

Maps 3.31.1 User Guide

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Document History

Rev A: November 2024

Maps 3.31.1 Release Notes

This document specifies changes made to the Thermo Scientific™ Maps 3.31.1 software application.

New Feature

SEM Analytics

Maps can now acquire EDS data through a software application interface on a SEM/SDB microscope. This functionality is available on systems with ChemiSEM support, including Apreo ChemiSEM, Axia ChemiSEM, and Quattro ESEM.

See [SEM Analytics](#) for more information.

TEM: support for TEM 3.22 and TEM 2.22

Maps now supports TEM server versions 3.17-3.22 for Titan and 2.17-2.22 for Talos.

Bug Fixes

The following bugs were fixed in this release of the Maps software.

Bug ID	Description
MAPS-11821	The Job Control button located in the status bar now supports a toggle pattern with a chevron icon. When you click the Job Control button repeatedly, the Job Control screen toggles between expanded and collapsed states. Previously, you could not collapse the screen by clicking the Job Control button.
MAPS-12455	A resolution of 512 x 512 pixels is now available on Phenom microscopes.
MAPS-12655	Maps now removes temporary acquisition files on Phenom microscopes when the files are no longer needed. This previously caused problems during long acquisitions of large tile sets, including errors and crashes when a system's temporary space filled up.

Overview

This document describes the Maps 3.31.1 application software used on SEM/SDB and TEM systems.

Topics in this section include:

[Introduction to Maps](#)

[Terminology](#)

[System Requirements](#)

[Data Storage Requirements](#)

[Project Directory](#)

[Package options](#)

Introduction to Maps

The Maps software application provides users with the ability to focus on areas of interest within a sample region by organizing the sample into tiles and then navigating, selecting, and overlapping tiles so they can be viewed and analyzed in a higher level of detail than previously available.

The application will:

- Create a grid of a sample to enable efficient navigation and previews of selected tiles.
- Acquire tiled images in an automated fashion from multiple sample locations, with correlation between multiple layers.
- Find stitching information between tiles in an automated or semi-automated fashion using cross-correlation.
- Stitch and blend tiles into larger images with the capability to export them into common industry formats for viewing.
- Provide the capability to interactively display and investigate images constructed from multiple locations and layers of the sample.
- Process powerful workflows to do alignments or array tomography.
- Use the mineralogy workflow to collect and analyze EDS and mineralogy data from geological samples.

Maps complements the Correlative Workflow features that enable you to move samples between light microscopes and electron microscopes with the help of automated alignment on supported sample holders and a suite of powerful correlation tools.

Maps provides a solution for correlative microscopy by facilitating workflows that involve optical microscopy, SEM, and TEM. Both automated and manual alignments are used for correlation of the data to truly understand the sample



Note: When upgrading from version 1 or 2 of Maps to version 3, a new license key is required.

Terminology

Common terms used in Maps and Array Tomography are defined below.

[Maps Terms](#)

[Tomography Terms](#)

Maps Terms

Common Maps terms are listed below.

Alignment

In Maps, adjusts project data to the current stage position.

Blending

The Maps software will create a smooth transition between images during stitching.

Correlation

In Maps context, correlation is used for two things: 1. finding back areas of interest that show up in different modalities, and 2. for visually overlaying data sets that correspond to the same area on the sample.

EM

Electron microscopy

FIB

Focused Ion Beam

Holder Calibration

This procedure is used to adjust the expected fiducial positions for automated holder alignment on individual systems. It must be performed the first time alignment is run on a supported holder. See the [Automated Holder Alignment](#) section on Calibration.

Image Registration

The computational process Maps uses to determine the position of a single tile within the greater tile set. The Image Registration process is run during tile set acquisition.

LM

Low Magnification mode on TEM.

Maps Offline Viewer

A version of Maps that has read-only capabilities for Maps projects.

MIP

Maximum intensity projection. Collapses a Z-Stack of images into a single image using the highest intensity pixels from the stack.

Nav-Cam

Navigation Camera

SDB

Small DualBeam; a family of microscopes that have both scanning electron and ion columns.

Segmentation

In the context of images, segmentation is the process of assigning a label to specified pixels in an image such that pixels with the same label share certain visual characteristics, such as color.

SEM

Scanning Electron Microscope

Stitching

The computational task of combining a set of individual images to form a single image.

STEM

Scanning Transmission Electron Microscopy. STEM mode exists on SEMs, SDBs and TEMs (depending on the exact configuration).

TEM

Transmission Electron Microscope

TIA

On TEM, the instrument user interface consists of two parts: TEM User Interface for instrument control and TEM Imaging and Analysis for acquisition and analysis.

Tile Acquisition

The automated task of acquiring, aligning, and registering tiled images, as defined by the user.

Overview

Tile Grid

The empty grid that defines where and how a set of tiles will be acquired.

Tile Set

The output of a tile grid once acquisition is run, or the set of actual tiled images.

xT Software

Platform software for the SEM/SDB microscopes.

xT UI

xT software user interface

Z-Stack

A sequence of images through the z-axis, used to build a 3D volume.

Z-Stack Browser

The Maps UI component that allows you to view and select image planes from a z-stack.

Tomography Terms

Common Array Tomography terms are listed below.

Classic Ribbons

(Array Tomography) Sample sections are attached to each other and the ribbon is always slightly bent. The angle between each section is constant, for the most part.

Serial Section Array

The layer group that contains tile set arrays and section outlines. The purpose of the group is to easily contain most of the array tomography data about a sample in one section of the Layer tree.

Tape Ribbons

Sample sections are regularly spaced and the angle between each slice varies slightly.

Tile Set Array

A collection of tile sets that all share the same acquisition parameters, but can differ in location and rotation.

Workflow

A series of steps that are necessary to complete a task.

System Requirements

- 3 GB of physical RAM
- 4.5 GB of memory paging allocated in Windows®
- Dual-core processor
- For Microscope Operation, microscope system software (xT, TEM Server, or LA) must be running before launching Maps

Data Storage Requirements

You can select a default location for project data. We suggest that you place the Project Data Directory on the D drive or a supplemental data storage device such as a network drive, external USB drive, or additional internal hard drive.

- You may need additional internal or external storage capacity to acquire large tile sets.
- Acquisition speed might be reduced when saving project data to USB or network locations.

The table below indicates the number of tile sets you can acquire at various image resolutions and dimensions, provided that the Project Data Directory is configured to save to a standard empty 350 GB drive partition.

i **Note:** For multiple channel acquisitions, the storage requirements increase incrementally with the number of channels.

Data Storage Requirements for Single Channel Image Acquisition				
Resolution	Tile Set Size			
	5x5	10x10	50x50	100x100
512	15 MB	100 MB	1.25 GB	5 GB
1 K	55 MB	200 MB	5 GB	20 GB
2 K	200 MB	700 MB	20 GB	75 GB
4 K	750 MB	2 GB	75 GB	250 GB
8 K	4 GB	10 GB	250 GB	1.00 TB
Color Key:				
Red	< 1 Tile Set			
Orange	1 to 2 Tile Sets			
Yellow	2 to 5 Tile Sets			
Green	> 4 Tile Sets			

Project Directory

At the root directory, you will see the following:



LayersData	4/12/2016 6:58 ...
MetaData	4/13/2016 7:08 ...
MapsProject.xml	4/13/2016 7:08 ...
MapsProject.xml.backup	4/13/2016 7:07 ...
Project.mapsxml	4/12/2016 6:58 ...
ProjectLog.log	4/13/2016 7:08 ...

The LayersData folder contains a directory structure that mimics the Layer tree in Maps, so you can manually locate the image files.

Launch Maps from a New File in the Project Directory

Double-click **Project.mapsxml** to launch Maps and automatically open the project from the directory in which this mapsxml file exists.

Package options

The table below lists all the package options available to you with the Maps software. To view your installed licenses and their expiration date(s), click the **Help** menu, and then click **About**. The expiration date(s) are determined by your product license key(s).

Contact your Thermo Fisher representative for licensing information.

Product	Version
Application	3.26.1.1
Imaging	7.6.0.2887
Sem Plugin	3.26.1.1
Array Tomography Plugin	3.26.1.1
TEM Plugin	3.26.1.1
Velox Plugin	3.26.1.1
XPS Plugin	3.26.1.1

Licensed Options	Expiration Date
✓ Annotations	12-31-2023
✓ Big Snapshot	12-31-2023
✓ Color Correlation	12-31-2023
✓ External Image Import	12-31-2023
✓ PhenomOnline	12-31-2023
✓ Project Editing	12-31-2023
✓ Stage Correlation	12-31-2023

OK

Maps Package Options	
Option	Description
Analytics for TEM	Licensed to run the Analytics plug-in and acquire EDS data through a first-party device interface (FDI). See TEM Analytics for more information.
Analytics for SEM	Licensed to run the Analytics plug-in and acquire EDS data through a software application interface on a SEM/SDB microscope. See SEM Analytics for more information.
Annotations	Licensed to create annotations in the project.
Array Tomography	Licensed to enable the Array Tomography workflow. See Array Tomography Workflow for more information.
Big Snapshot	Licensed to acquire high resolution square images (4k and 8k) on supported xT microscopes.
Color Correlation	Licensed to allow correlation features including segmentation and color maps.
External Image Import	Licensed to allow importing of images from any source such as other microscopes, cameras, CAD exports, etc.
Maps Offline Viewer	Installations of Maps Offline Viewer are licensed only for viewing datasets that have been generated by the full version of Maps.
Maps Min	Licensed to set up and acquire mineral EDS data with automated mineral classification post processing. See Maps Min for more information.
Phenom	Licensed to use the Maps application software on Phenom desktop SEM systems.
Project Editing	Licensed to edit projects. Without this projects are opened read-only.
Stage Correlation	Licensed to allow 1-3 point alignment.
Stitching	Licensed to allow stitching of acquired tile sets.
TEM Online	Licensed to run on TEM family of microscopes, such as Titan, Talos, etc.
xT Online	Licensed to run on the xT family of SEM and SDB microscopes, such as Helios NanoLab™, Quanta™, Versa, and so on.

Maps User Interface

This section describes the Maps software user interface.

Topics include:

[Default Shortcut Keys](#)

[Viewer Shortcut Keys](#)

[Main Screen](#)

[Menus](#)

[Toolbar](#)

[Layer/Holder Definition Control](#)

[Layer Tree Tabs](#)

[Layer Control](#)

[Job Control](#)

[Viewer](#)

[Rotation Control in the Viewer](#)

[Micron Bar](#)

Default Shortcut Keys

This topic lists default shortcut keys in Maps.

Shortcut Keys	
Keys	Description
F1	Opens the current Maps help system.
F2	Saves the screenshot with an automatically incremented file name. Same as selecting File > Save Screenshot .
Space	View all objects (zoom out).
Ctrl+Shift+C	Centers the view on the current layer, same as Center View on Selection and Center View .
Ctrl+G	Shows/hides grid lines for the current layer, same as Show Grid Lines (Tile Set right-click menu selection).
Ctrl+H	Hides all graphic elements in the viewer, leaving only the images. Same as selecting Options > Hide Annotations .
Ctrl+L	Opens the Log Viewer. Same as selecting Help > Open Logs .
Ctrl+O	Opens the project folder. Same as selecting File > Open Project Folder .
Arrows	Moves selected tile set in small increments.
Shift + arrow	Moves selected tile set in finer increments.
Ctrl + click or drag	Selects tiles.
Shift + click	Selects tiles by row.

Viewer Shortcut Keys

There are three profiles defined for Viewer’s shortcut keys (Application settings).

- [Default Profile](#)
- [Classic Maps Profile](#)
- [Avizo Profile](#)

Default Profile

Viewer Default Profile Shortcut Keys	
Keys	Description
Ctrl + mouse wheel +/-	Zooms in and out.
Mouse wheel	Zooms in and out slowly.
Shift + Ctrl + left-click and drag	Zooms the image to the selected region.
Left-click and drag	Pan (move)
Shift + left-click and drag	Rotates the viewer without moving the stage.
Alt + left-click and drag	Draw a feature of interest rectangle with a number of available options.
Left-click	Selects an object.
Ctrl + left-click	Selects multi objects.
Escape	Deselects all objects.
Shift + left-click	Selects tiles by row.
L + left-click and drag	Draw a line measurement tool.
A + left-click and drag	Draw an angle measurement tool.

Classic Maps Profile

Viewer Classic Maps Profile Shortcut Keys	
Keys	Description
Ctrl + mouse wheel	Zooms in and out.
Shift + mouse wheel	Zooms in and out slowly.
Shift + Ctrl + left-click and drag	Zooms the image to the selected region.
Shift + left-click and drag	Pan (move)
Shift + right-click and drag	Rotates the viewer without moving the stage.
Left-click and drag	Draw a feature of interest rectangle with a number of available options.
Left-click	Selects an object.
Ctrl + left-click	Selects multi objects.
L + left-click and drag	Draw a line measurement tool.
A + left-click and drag	Draw an angle measurement tool.

Avizo Profile

This profile defines the input as in Avizo® software.

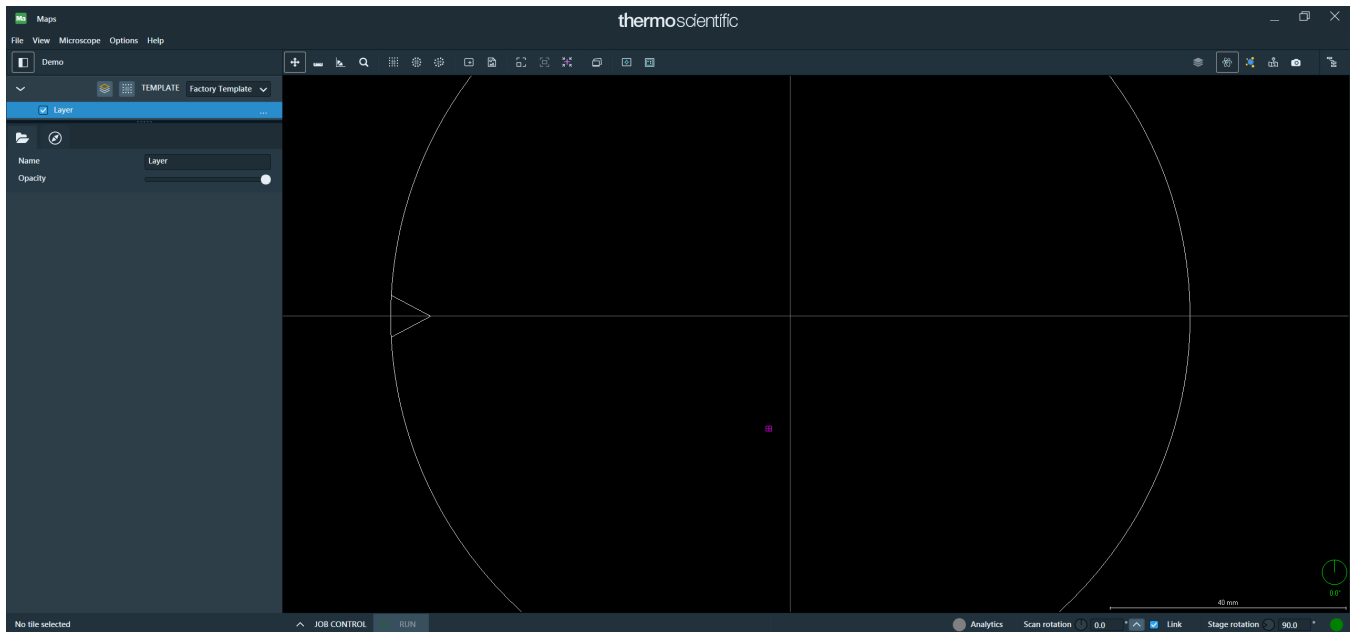
Viewer Classic Maps Profile Shortcut Keys	
Keys	Description
Ctrl + middle-click and drag	Zooms in and out.
Mouse wheel	Zooms in and out slowly.
Shift + Ctrl + left-click and drag	Zooms the image to the selected region.
Middle-click and drag	Pan (move)
Left-click and drag	Rotates the viewer without moving the stage.
Ctrl + Left-click and drag	Draw a feature of interest rectangle with a number of available options.

Viewer Classic Maps Profile Shortcut Keys(Continued)	
Keys	Description
P + Left-click	Selects an object.
Ctrl + left-click	Selects multiple objects.
L + left-click and drag	Draw a line measurement tool.
A + left-click and drag	Draw an angle measurement tool.

Main Screen

This topic shows and explains the Main screen of the user interface.

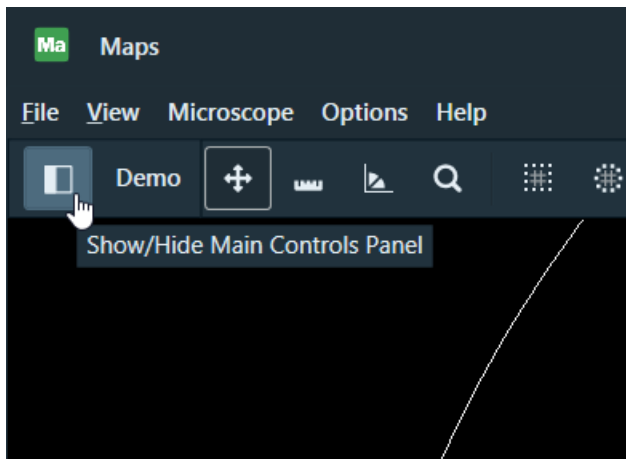
Maps User Interface, Control Panel



1. [Menus](#)
2. [Toolbar](#)
3. [Layer Control](#)
4. [Overview Viewer](#)
5. [Tile Set Tab](#)
6. [Visualization Tab](#)
7. [Viewer](#)
8. [Micron Bar](#)

Show or hide main controls

Click the last icon on the left side of the tool bar to hide the main controls. Click the icon again to show the main controls.



Microscope connection states

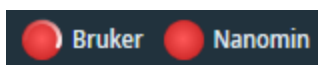
The bottom of the main screen contains two status icons that indicate the connection states between the Maps application and the microscope.

Green connection states include:



- **Solid Green:** If the status icon is solid green, then the connection is active and you can use the Maps application online.
- **Spinning Green:** If the status icon is green with a spinning wheel, then the connection is currently occupied with a task. To use the Maps application online, wait until the status icon becomes solid green.

Red connection states include:



- **Spinning Red:** If the status icon is red with a spinning wheel, then the connection is currently unavailable and the Maps application is attempting to secure the online connection.
- **Solid Red:** If the status icon is solid red, then the connection could not be established and the Maps application is no longer attempting to connect to the microscope. Click the status icon to initiate a new online connection.

Menus

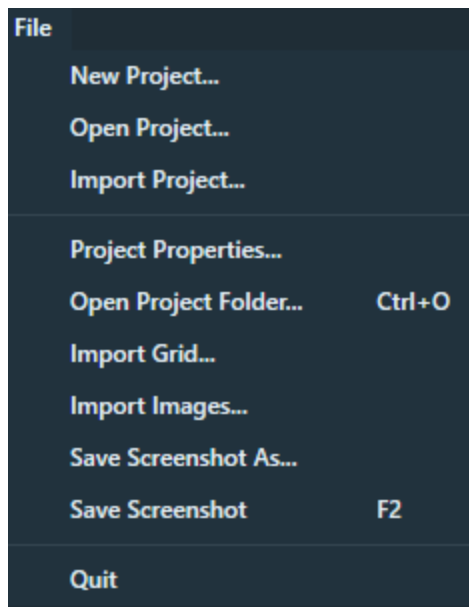
This section describes options listed in Maps software menus.

Topics include:

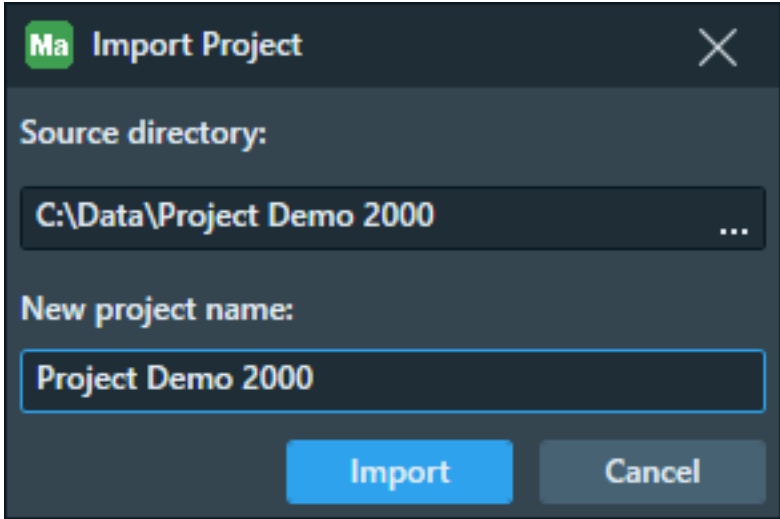
- [File menu](#)
- [View menu](#)
- [Phenom menu](#)
- [Options menu](#)
- [Help menu](#)
- [Tomography menu](#)

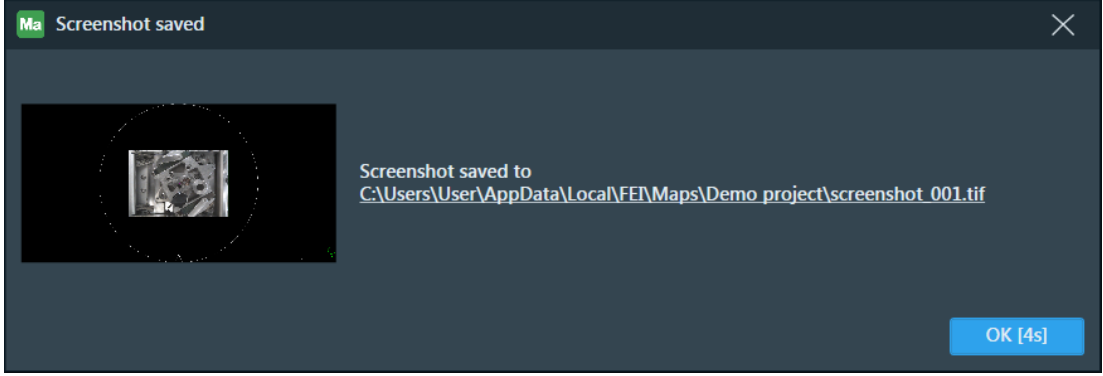
File menu

This section describes options listed in the **File** menu.



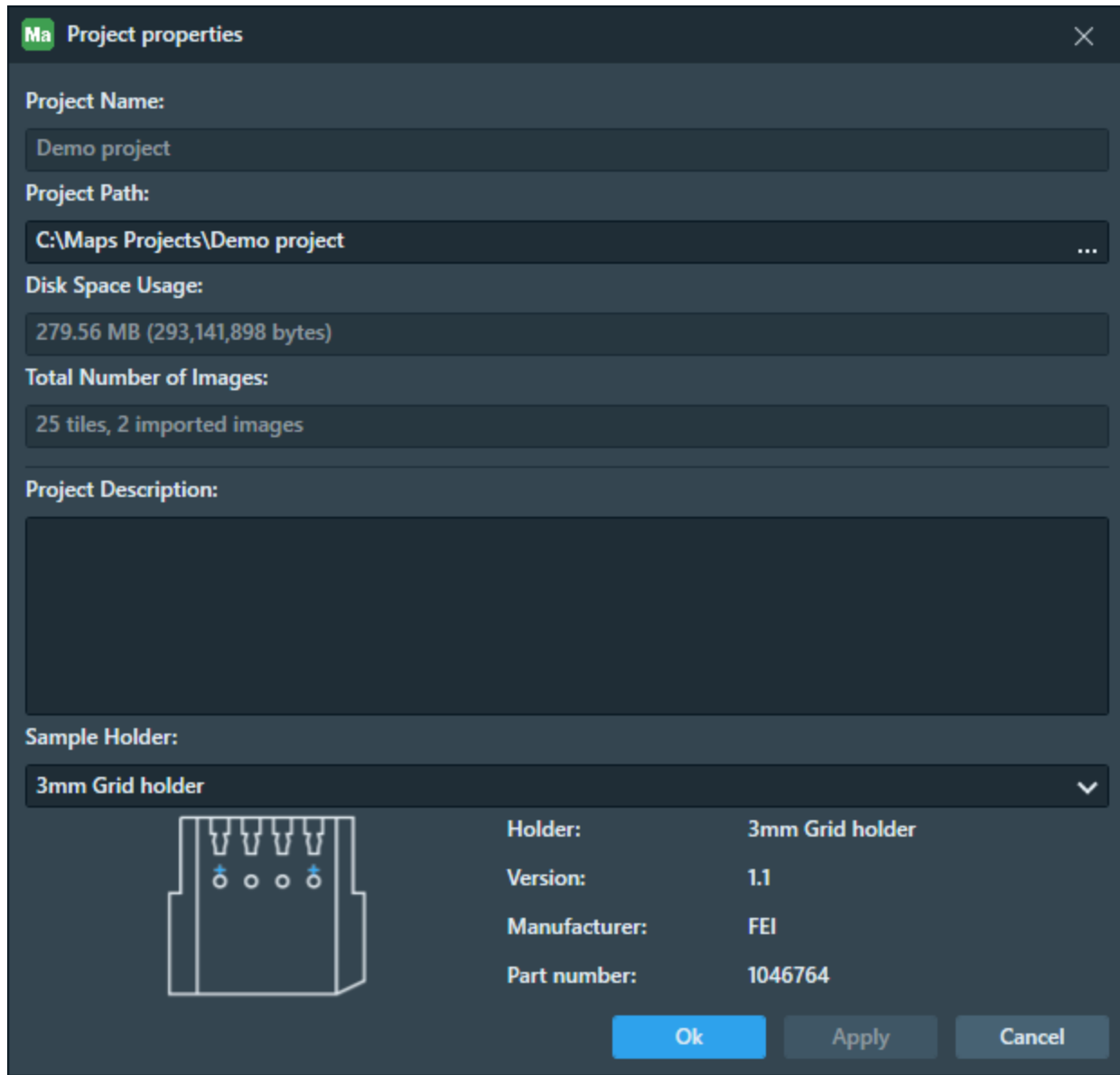
File Menu Overview	
Menu Selection	Description
New Project	Displays the New Project window. See New Project for full instructions.
Open Project	Displays the Project History window showing all previous projects. See Open a Project for more information.

File Menu Overview(Continued)	
Menu Selection	Description
Import Project	<p>Displays the Import Project window. Browse to a Source directory and select a project, rename it if appropriate, and then click Import. The imported project name will appear in the Project History list. This can be used for passing projects between computers.</p>  <p>See Import a Project for full instructions.</p>
Project Properties	<p>Displays the Project Properties window for selecting the Project Path, Sample Holder, and a project description. See Project properties for more information.</p>
Open Project Folder (Ctrl+O)	<p>Displays the project folder. This can also be accessed by selecting Open Folder in the Project Properties window.</p>
Import Grid	<p>Creates a blank tile set that matches the settings of a previously exported tile set. An exported tile set is saved as a .gridx file.</p>
Import Images	<p>Opens a standard open file dialog that enables the user to import a image file into the current Maps project.</p>
Save Screenshot As	<p>Displays a standard Windows Save As dialog box for saving a screen capture of the Maps viewer. Used for selecting a file name and a file type for saved viewer screenshots.</p>

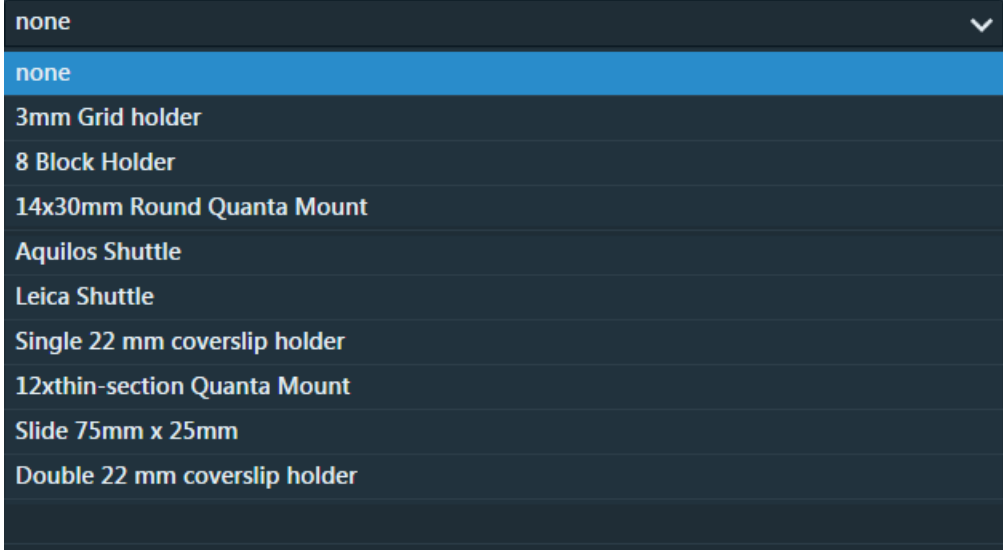
File Menu Overview(Continued)	
Menu Selection	Description
Save Screenshot (F2)	<p>Saves the screenshot with an automatically incremented file name. Briefly displays a dialog box with the saved (automatically incremented) file name.</p> 
Quit	Closes the Maps software.

Project properties

View the attributes of the current project and modify the selected sample holder and project description here.



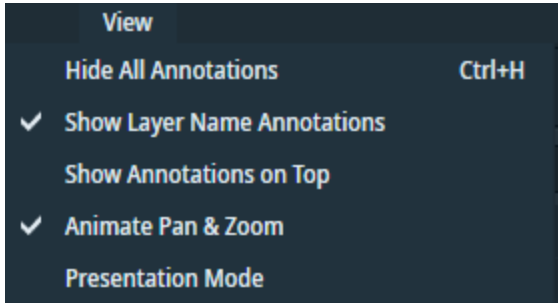
Project Properties Overview	
Interface Item	Description
Project Name	Displays the name given to the project.


Project Properties Overview(Continued)	
Interface Item	Description
Project Path	Displays the folder and location of the selected project.
Disk Space Usage	Displays the amount of disk space used by the project.
Total Number of Images	Displays the number of tiles and imported images for the project.
Project Description	Displays the description of the current project.
Sample Holder	<p>Displays a dropdown list of possible sample holders that support automated alignment on SEM/SDB microscopes.</p>  <p>Make a selection and then click Apply to see the holder outline displayed on the main screen. See Sample Holders for more information.</p>
OK	Applies the selections and closes the window.
Apply	Applies the selection only.
Cancel	Cancels any changes to the Project Properties and closes the window.

View menu

This section describes options listed in the **View** menu.

All selections

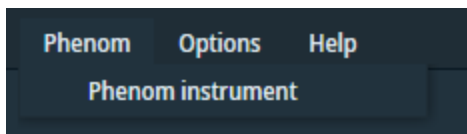


View Menu, All Selections Overview	
Menu Selection	Description
Hide All Annotations (Ctrl+H)	Hides all graphic elements in the viewer, leaving only the images.
Show Layer Name Annotations	Displays an additional annotation of the tile set names to help identify data during viewing. This option is activated by default and persists when you restart Maps. To deactivate this feature, click the Show Layer Name Annotations menu item to clear the check mark associated with it.
Show Annotations on Top	When activated, this menu option displays annotations on top of the image data. Annotations include areas of interest; sites of interest; and line and angle measurements. <div style="border: 1px solid #0070C0; padding: 5px;"> <p> Note: This option persists when you restart Maps.</p> </div>

View Menu, All Selections Overview(Continued)	
Menu Selection	Description
Animate Pan & Zoom	<p>Allows a smoother transition of panning and zooming. Note that this is a slower process and takes more memory. This option is activated by default and persists when you restart Maps. To deactivate this feature, click the Show Layer Name Annotations menu item to clear the check mark associated with it.</p> <ul style="list-style-type: none"> • Pan: To make a sweeping movement • Zoom: To simulate movement rapidly away from or toward a subject using a zoom lens <p>The “Center View on Sample,” “Center View on Selection,” and “Go to Microscope FOV” viewer functions animate pan and zoom by default.</p>
Presentation Mode	<p>This option is available when you have two monitors. When activated, a second full screen view of the project data displays on the other screen. This is useful for demos and presentations.</p>

Phenom menu

The **Phenom** menu is only available for Maps software on Phenom desktop SEM systems.



Phenom Menu Overview	
Menu Selection	Description
Phenom instrument	<p>Opens the Phenom instrument dialog. The dialog shows details of the connected Phenom microscope. You can also use the dialog to disconnect from the microscope. See Phenom Connectivity for more information.</p>

Options menu

This section describes options listed in the **Options** menu.

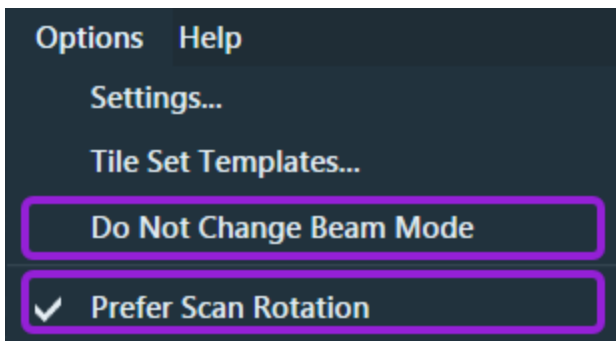
System views

The common selections are described in the table below. For system-specific menu selections outlined in purple, click the following links.

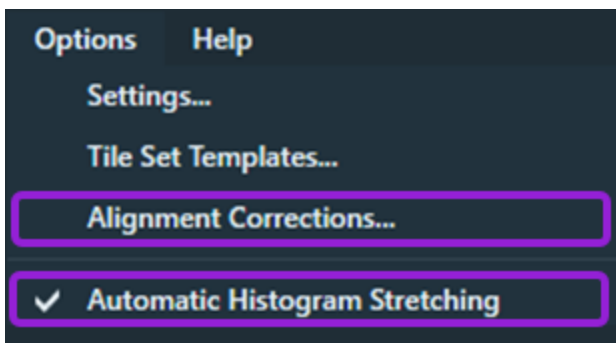
- [SEM/SDB Options Menu](#)
- [TEM Options Menu](#)

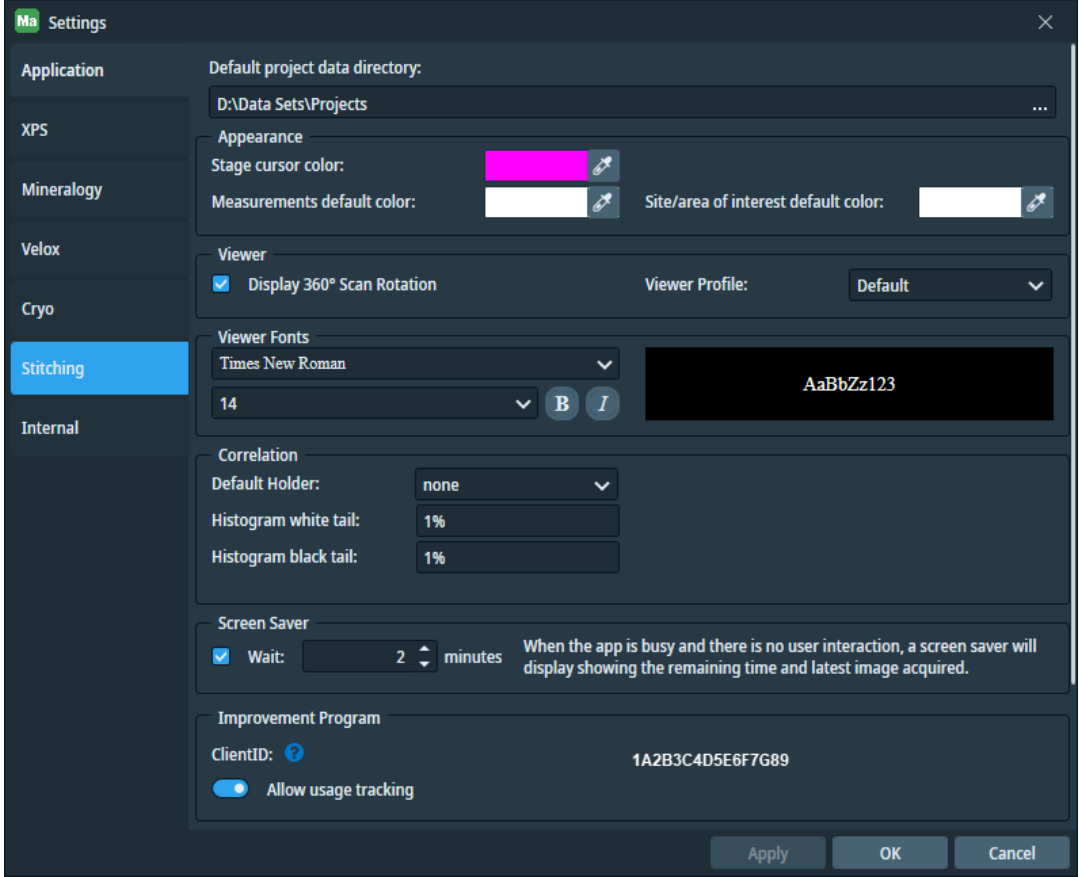
Options Menu, Specific Selections by System

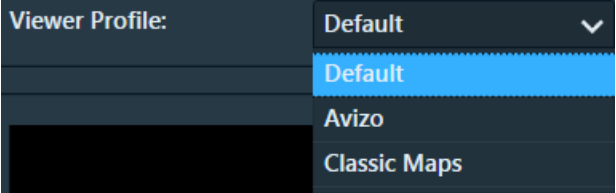
SEM/SDB View



TEM View

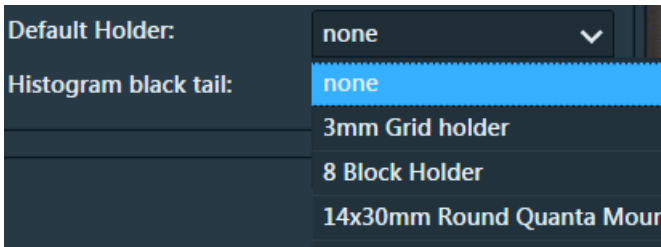


Options Menu, All Selections Overview	
Menu Selection	Description
Application Settings	<p>Displays the Application Settings window for changing defaults for all new projects.</p> 
	<p>Default Project Data Directory: Displays the default path with a browse button to allow you to choose a different path.</p>
	<p>Stage cursor color: Click the eyedropper to select a new stage cursor color.</p>
	<p>Measurements default color: Click the eyedropper to select a new color for line and angle measurements.</p>
	<p>Site/area of interest default color: Click the eyedropper to select a new default color for sites of interest and areas of interest.</p>

Options Menu, All Selections Overview(Continued)	
Menu Selection	Description
	<p>Display 360° Scan Rotation:</p> <ul style="list-style-type: none"> • When selected, displays 360° scan rotation. • When not selected, displays -180° to 180° scan rotation.
	<p>Viewer Profile: Displays a list of viewing choices.</p>  <p>Choices include:</p> <ul style="list-style-type: none"> • Default: See Default Profile for detailed inputs. • Avizo: The inputs defined for the viewer are based on Avizo/Amira® software. See Avizo Profile for detailed inputs. • Classic Maps: The inputs defined for the viewer are based on the previous Maps version (v2.5). See Classic Maps Profile for detailed inputs.

Options Menu, All Selections Overview(Continued)

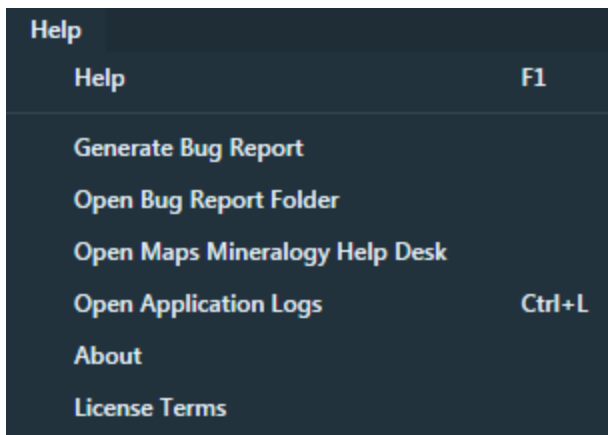
Menu Selection	Description
	<p>Viewer Fonts:</p> <div style="border: 1px solid #0070C0; padding: 5px; margin-bottom: 10px;"> <p>i Note: Changes to Viewer Font values affect the viewer scale bar and layer name annotations. These changes are applied to newly created annotations or measurements. Existing annotations and measurements displayed within the Maps project are not impacted by these font changes.</p> </div> <p>The first field displays a list of available fonts for the annotation and measurement tool description. Select a font from the dropdown menu to designate is as the default font.</p> <div style="border: 1px solid #0070C0; padding: 5px; margin-bottom: 10px;"> <p>Times New Roman ▼</p> <p>Sylfaen</p> <p>Συμβολ</p> <p>Tahoma</p> <p style="background-color: #0070C0; color: white;">Times New Roman</p> </div> <p>The second field displays a list of font sizes for the annotation and measurement tool description. Select a font size from the dropdown menu to designate it as the default font size.</p> <div style="border: 1px solid #0070C0; padding: 5px; margin-bottom: 10px;"> <p>14 ▼</p> <p style="background-color: #0070C0; color: white;">14</p> <p>15</p> <p>16</p> </div> <ul style="list-style-type: none"> • Bold: Click the B button to designate bold as the default font weight for the annotation and measurement tool description fonts. • Italic: Click the <i>/</i> button to designate italic as the default typeface for the annotation and measurement tool description fonts.

Options Menu, All Selections Overview(Continued)	
Menu Selection	Description
	<p>Default Holder: Displays a list of possible sample holders. Select a holder to be used as a default for all new Maps projects.</p> 
	<p>Histogram white tail: Trims a percentage of histogram pixels to eliminate noise.</p>
	<p>Histogram black tail: Trims a percentage of histogram pixels to eliminate noise.</p>
	<p>Screen Saver: Select the checkbox to display a screen saver when the application is busy for the specified number of minutes.</p>
	<p>Improvement Program: Shows the client ID for tracking your anonymous usage data that the Maps application sends back to the Maps team. The "Allow usage logging" setting is activated by default. To opt out of the improvement program, select the slider and move it to the left to deactivate the setting (a dark grey slider is deactivated).</p>
Tile Set Templates	<p>Displays the Tile Set Templates window. See Tile Set Templates for a full explanation of templates.</p> <p>Tasks related to tile set templates include:</p> <ul style="list-style-type: none"> • Default templates • Create custom templates • Edit custom templates • Import and export tile set templates
Microscope Settings	<p>These are system-specific.</p> <ul style="list-style-type: none"> • SEM/SDB Options Menu • TEM Options Menu

Options Menu, All Selections Overview(Continued)	
Menu Selection	Description
Snapshot Settings	These are system-specific. <ul style="list-style-type: none"> • SEM/SDB Options Menu • TEM Options Menu
XPS Settings	These are system-specific. See TEM Options Menu .
Cryo Settings	These are system-specific. See SEM/SDB Options Menu .
Amira-Avizo2D Settings	See Amira-Avizo2D Connectivity .

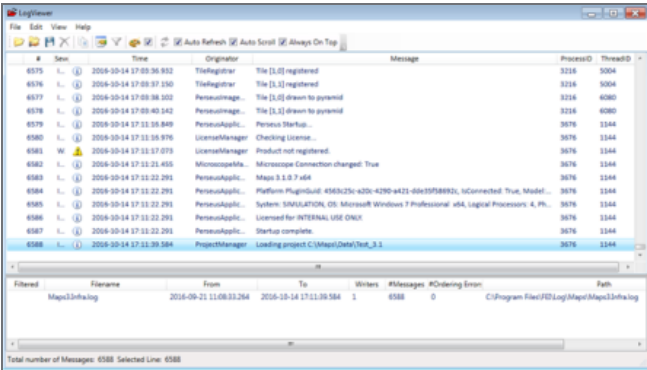
Help menu

This section describes options listed in the **Help** menu.



Help Menu Overview	
Menu Selection	Description
Help (press F1)	Displays an interactive help system that contains release notes, installation information, and user guide topics. PDF versions of the content are accessible from within the help system.
Generate Bug Report	Generates a bug report and opens the folder with the generated bug report.

Help Menu Overview(Continued)

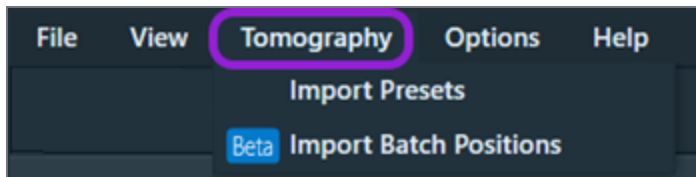
Menu Selection	Description
Open Bug Report Folder	Displays the folder where the generated bug reports are stored.
Open Maps Min Help Desk	Opens the Maps Min Help Desk for online support (see Maps Min). You can request/renew a license or report bugs through the help desk.
Open Application Logs (press Ctrl+L)	<p>Displays the Log Viewer dialog.</p> 
About	Opens the About screen, which displays information about the software versions and a list of your installed license options with expiration dates. For descriptions of the license options, see Package options .
License Terms	Displays the accepted end-user license agreement (EULA).

Tomography menu

When Maps is installed with the Thermo Scientific™ Tomography 5 Software application, the Tomography menu is available.

Tomography menu

Click **Tomography** to view the menu items, which include Import Presets and Import Batch Positions.

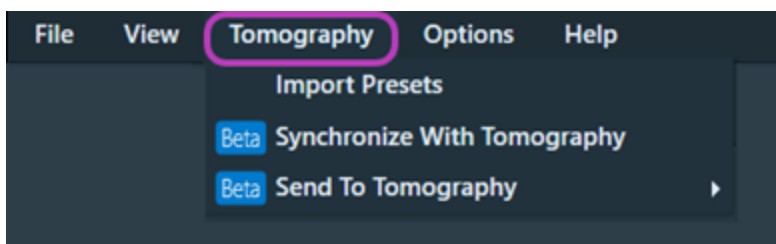


Tomography Menu Overview	
Menu Selection	Description
Import Presets	Imports Tomography microscope presets. The presets are stored as Maps templates to be used later for acquisitions and autofunctions.
(Beta) Import Batch Positions	Imports batch positions from Tomography with relevant Exposure, Tracking, Focus, and Condition areas.

Tomography menu with Maps Data Exchange Service

i Note: If you also have the Maps Data Exchange Service installed with the Tomography application, then the Tomography menu contains different options than if the service is not installed. For information on how to install the Maps Data Exchange Service, refer to the latest Maps Software Installation Guide.

Click **Tomography** to view the menu items, which include Import Presets, Synchronize With Tomography, and Send To Tomography.



Tomography Menu with Maps Data Exchange Service Overview	
Menu Selection	Description
Import Presets	Imports Tomography microscope presets. The presets are stored as Maps templates to be used later for acquisitions and autofunctions.
(Beta) Synchronize With Tomography	<p>Toggles the automatic synchronization of data with Tomography between ON and OFF.</p> <p>When synchronization is active, the following data are automatically exchanged between Maps and Tomography:</p> <ul style="list-style-type: none"> • Annotations are sent to Tomography, including areas of interest, sites of interest, and lamella sites. • Batch positions are imported from Tomography, including exposure, tracking, focus, and condition areas.
(Beta) Send To Tomography	<p>Sends all annotations of given type to Tomography when live synchronization is turned OFF.</p> <p>Select the annotation type from the submenu:</p> <ul style="list-style-type: none"> • Send All Lamellae • Send All Areas of Interest • Send All Sites of Interest

Toolbar

The common toolbar selections are described in the following table.

For system-specific selections, see:

- [SEM/SDB Toolbar, Right Side](#)
- [Phenom Toolbar, Right Side](#)

Topics in this section include:

[Left Side, All Systems](#)

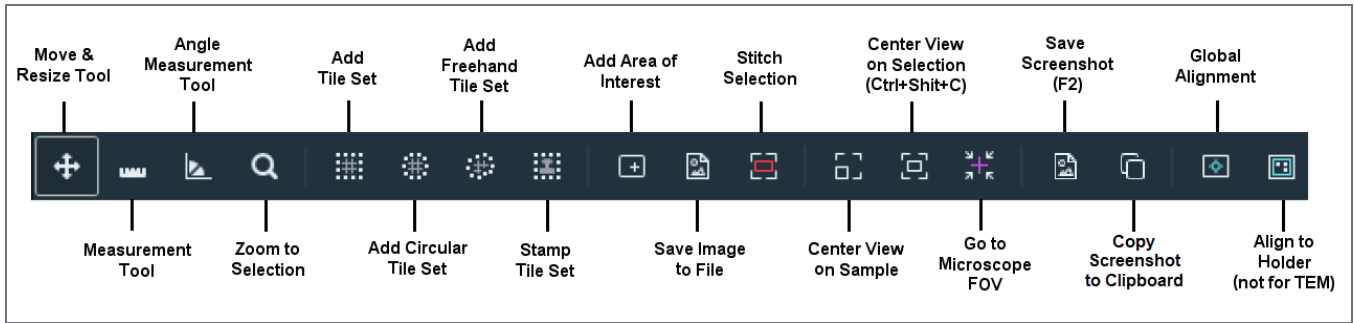
[Secondary Menu](#)

[Toolbar Descriptions](#)

Left Side, All Systems

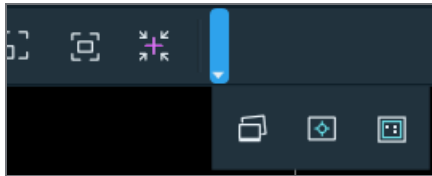
The left side toolbar appears as below on all systems.

Toolbar, Left Side, All Systems



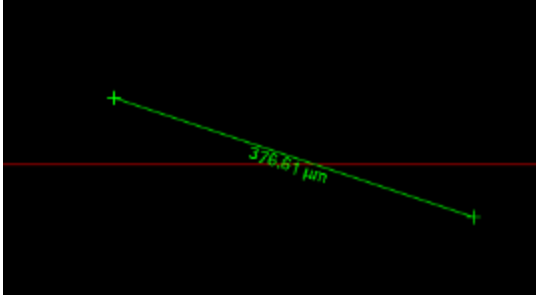
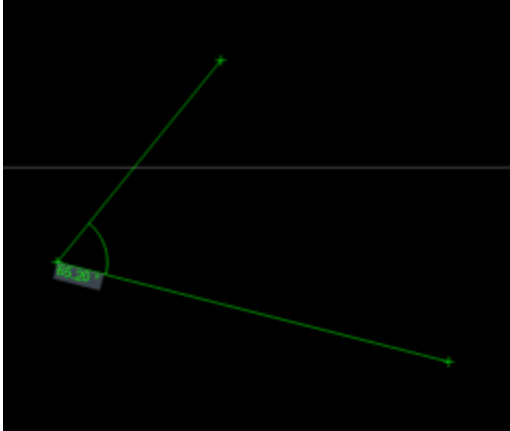
Secondary Menu

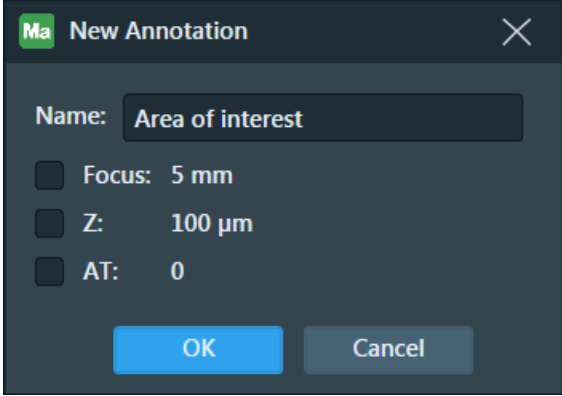
If the window is resized too small to display all tools, some of them are stored in a secondary menu. Click the down arrow to access them.

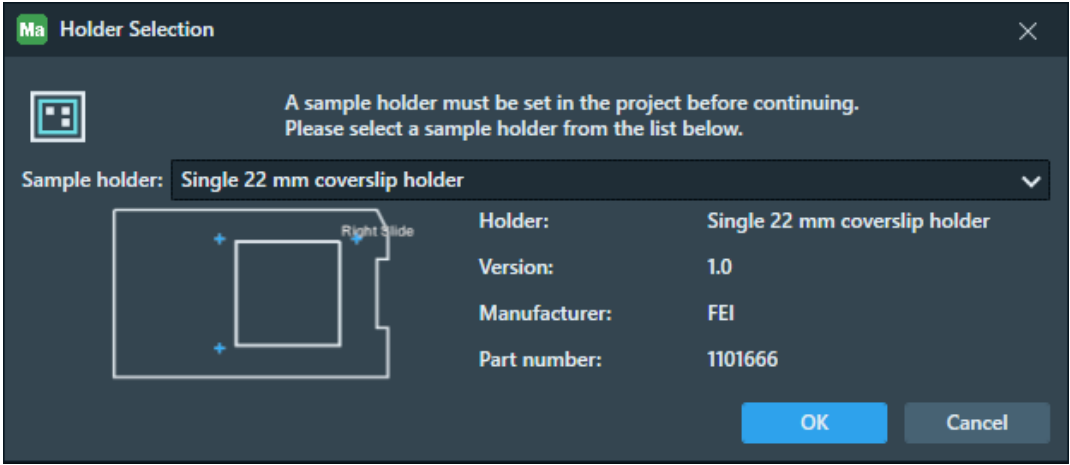


Toolbar Descriptions

Toolbar Descriptions	
Tool	Description
Move & Resize Tool	Moves or resizes the tile grid with click and drag.

Toolbar Descriptions(Continued)	
Tool	Description
Measurement Tool	<p>Draws a line and displays the length as a callout.</p> 
Angle Measurement Tool	<p>Draws a line and a third point; displays the angle as a callout.</p> 
Zoom to Selection	Zooms the field of view to the selected area.
Add Tile Set	Adds a tile set over a selected area in the viewer.
Add Circular Tile Set	Adds a circular tile set over a selected area in the viewer.
Add Freehand Tile Set	Adds a freehand drawn tile set over a selected area in the viewer.
Stamp Tile Set	Stamp a new tile set using the active template.

Toolbar Descriptions(Continued)	
Tool	Description
Add Area of Interest	<p>Displays the New Annotation dialog box for adding the drawn selected area of interest (AOI).</p>  <p>The new AOI becomes a new Annotation layer in the Layer control.</p>
Save Image to File	Saves an image to file. See “Save Image to File” on page 69.
Stitch Selection	Stitches a subset of tiles, as selected by the rectangle. See “Stitching” on page 99.
Center View on Sample	Zooms out to the full sample view. By default, this view animates the pan and zoom function to orient you within the sample space. To deactivate the animation functionality, see the “Animate Pan & Zoom” under View menu .
Center View on Selection (Ctrl+Shift+C)	<p><i>Unavailable until a project is open.</i></p> <p>Pans and zooms the viewer so that the currently selected layer item is centered. By default, this view animates the pan and zoom function to orient you within the sample space. To deactivate the animation functionality, see the “Animate Pan & Zoom” under View menu.</p>
Go to Microscope FOV	Pans and zooms the view to match the microscope (electron beam) field of view (FOV). By default, this view animates the pan and zoom function to orient you within the sample space. To deactivate the animation functionality, see the “Animate Pan & Zoom” under View menu .
Save Screenshot (F2)	Briefly displays a dialog box with the saved (automatically incremented) file name. Also available from File > Save Screenshot .
Copy Screenshot to Clipboard	Copies the current image display to the system clipboard. You can then paste the image into other applications using paste commands.

Toolbar Descriptions(Continued)	
Tool	Description
Global Alignment	Performs a 1-, 2-, or 3-point alignment to align all previously acquired data to the stage. It is useful if the sample was removed from the tool and you want to continue with it. See Coarse Alignment (1-, 2-, or 3-Point) .
Align to Holder (SEM/SDB only)	<p>Performs an Automated Holder Alignment; requires a specific holder hardware.</p> <p>If no sample holder has been selected for the project, a dialog box appears to prompt you to select a holder.</p> 

Layer/Holder Definition Control

This feature is only available on SEM/SDB systems (see [Holder Tab](#)).

Layer Tree Tabs

This section describes the tabs within the layer tree depending on the selected item such as a specific tile set, line, or angle. For example, the image below shows the Tile Set (20) and its associated tabs.

Topics include:

- [Image Tab](#)
- [Tile Set Tab](#)
- [Annotation Tab](#)
- [Measurement Tab](#)
- [Font Format Tab](#)
- [Visualization Tab](#)

[Overview Viewer](#)

Demo project

▼ TEMPLATE Factory Template ▼

▼ Imported images

- Z-stack_Fluorescence+Relection
- Helios PFIB NavCam (2)

▼ TEM tile sets

- Myoblast fusion
- Overview 84x (stitched)
- Overview 84x

▼ Layer

- Tile Set (3) ...
- Helios PFIB NavCam
- Zn_K_map

Name: Tile Set (3)

Acquisition Type: Electron ▼

Tiles X, Y:

Tile HFW:

Total HFW:

Resolution: 2048 x 1768 ▼

Pixel Size: 488.2813 nm

Dwell: 300 ns ▼

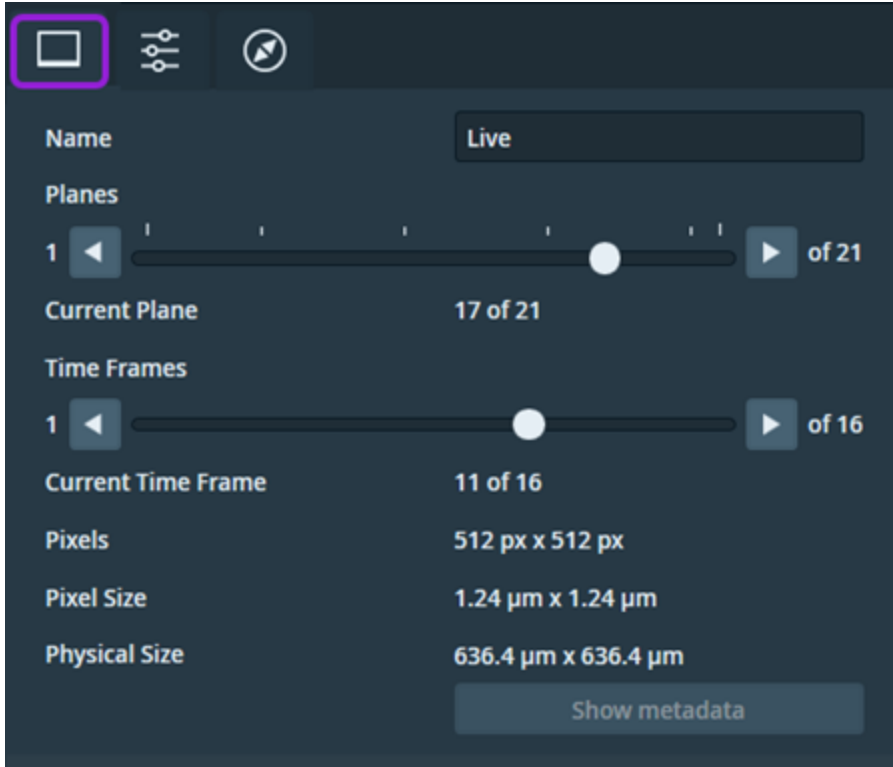
Frames: 1

Reduced Area:




Image acquisition time: 00:00:01

Image Tab

The Image tab appears in the left panel when you select an image layer in the layer tree view. This tab displays properties of images, including imported images and stitched layers.

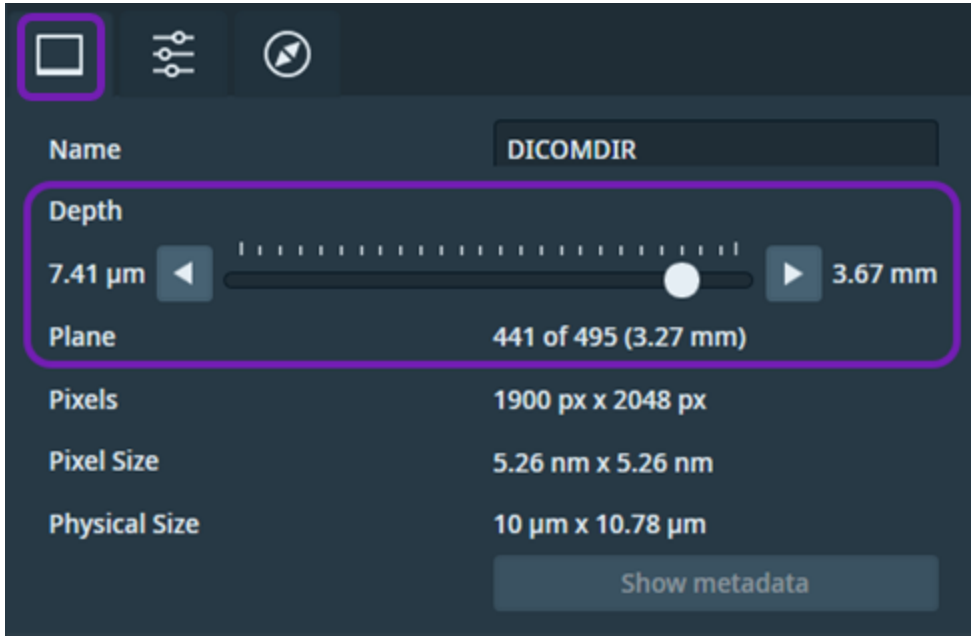


Control	Description
Name	Displays the name of the current image.

Control	Description
Planes	<p>Controls the image planes. Use the slider to change the current plane index and to show the plane in the main viewer.</p> <p>You can also click the left and right arrows to navigate one plane at a time.</p> <div style="border: 1px solid #0070C0; padding: 5px; margin-bottom: 10px;"> <p> Note: The control is activated only for images with multiple planes.</p> </div> <div style="border: 1px solid #0070C0; padding: 5px;"> <p> Note: If the image plane depth in the current image is available, then the Depth control is displayed instead of the Plane control (see Optional controls).</p> </div>
Current Plane	Displays the current plane index.
Time Frames	<p>Controls the image time frames. Use the slider to change the current frame index and to show the frame in the main viewer.</p> <p>You can also click the left and right arrows to navigate one time frame at a time.</p> <div style="border: 1px solid #0070C0; padding: 5px;"> <p> Note: The control is activated only for images with multiple frames.</p> </div>
Current Time Frame	Displays the current frame index.
Pixels	Displays the resolution of the current image.
Pixel Size	Displays the physical size of a single pixel within the current image.
Physical Size	Displays the physical size of the current image.
Show metadata	Opens a screen to display the metadata of a selected item in the layer tree (see Metadata Viewer). If there is not any metadata associated with the selected item, then this button is deactivated.

Optional controls

If the image plane depth in the current image is available, then the Depth control is displayed instead of the Plane control.



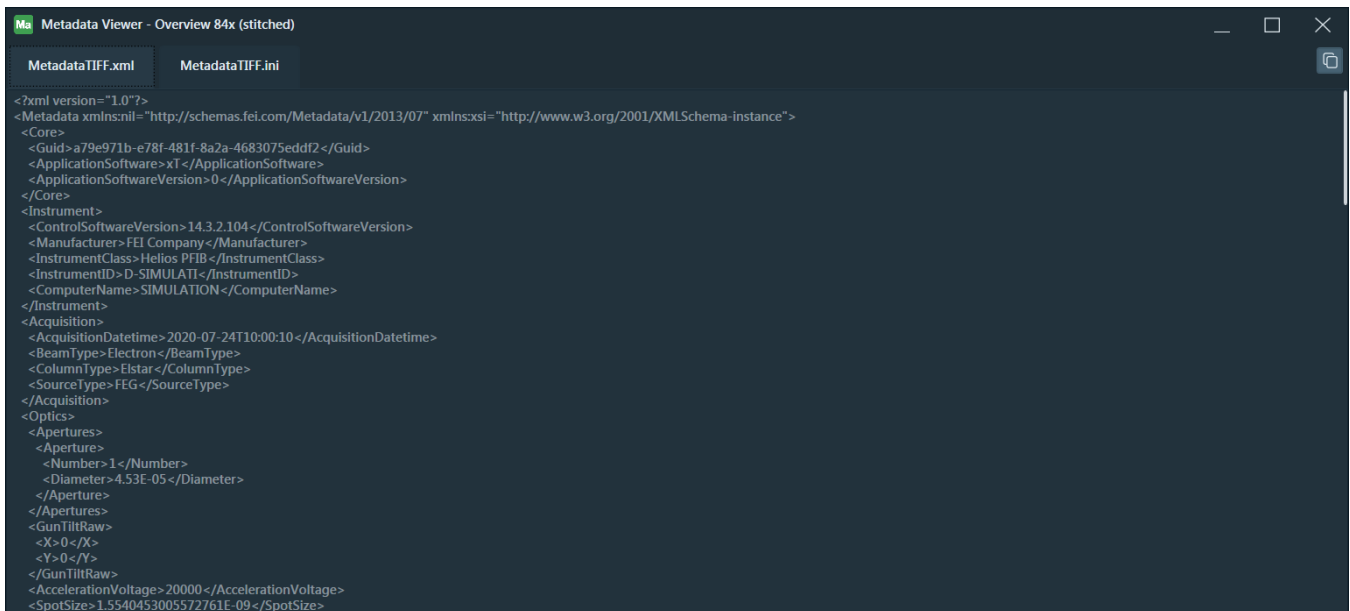
Control	Description
Depth	Controls the plane depth of the current image. Use the slider to change the depth, to change the plane, and to show the plane in the main viewer. You can also click the left and right arrows to navigate one depth plane at a time.
Plane	Displays the current plane index and its depth.

Metadata Viewer

This topic describes the Metadata Viewer, which displays the information associated with the selected item from the layer tree such as images, tiles, and tile sets. For example, the metadata for a stitched image contains the original microscope information.



Note: For Maps 3.31.1, the Metadata Viewer functionality only supports stitched images from SEM tile sets.

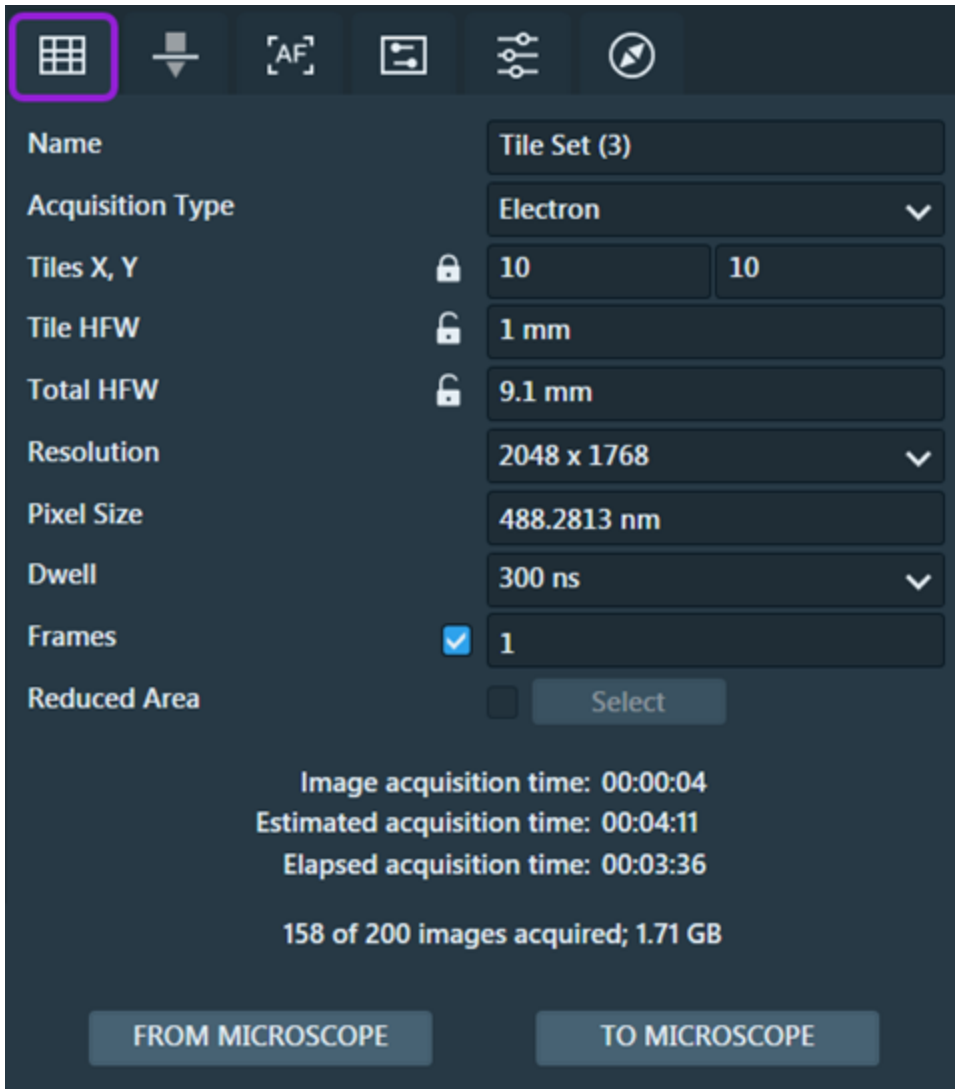


UI Item	Description
Title	Displays the name of the layer tree item associated with the metadata. The screen title is located in the upper-left corner of the viewer.
Metadata tabs	Displays the metadata of the element and is organized by the type of content. These tabs are located in the upper-left corner of the viewer.
Copy to clipboard	Copies the tab content to the clipboard, so that you can paste it to another text editor if needed. This button is located in the upper-right corner of the viewer.



Tile Set Tab

When you create a new tile set, the parameters for basic tile acquisition are populated with defaults.



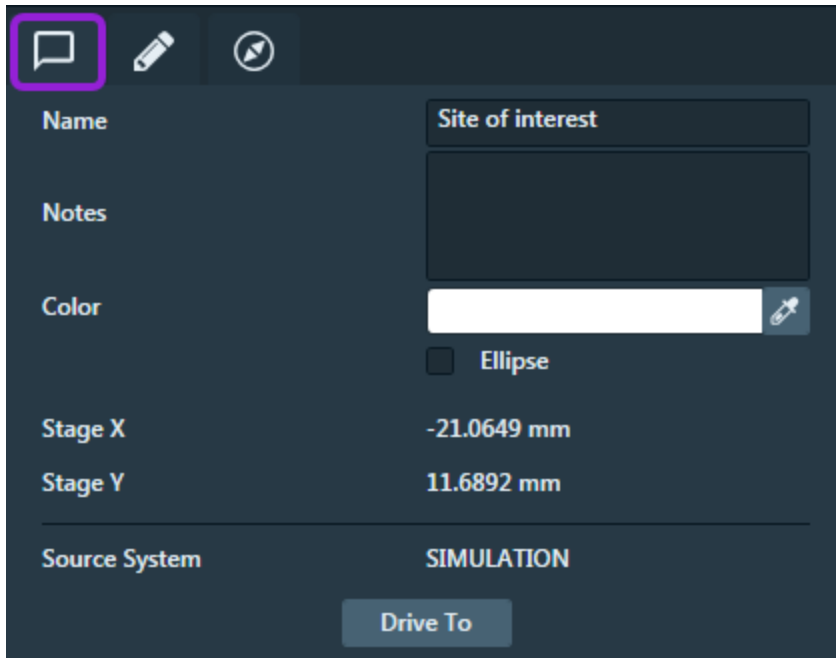
The selections are system specific:

- [SEM/SDB Tile Set Tab](#)
- TEM mode: [TEM Tile Set Tab](#)
- STEM mode: [STEM Tile Set Tab](#)

Annotation Tab

This Annotation tab contains the properties for the annotations within the main viewer. This tab appears in the left panel when you select either a *site of interest* or an *area of interest*.

Site of interest

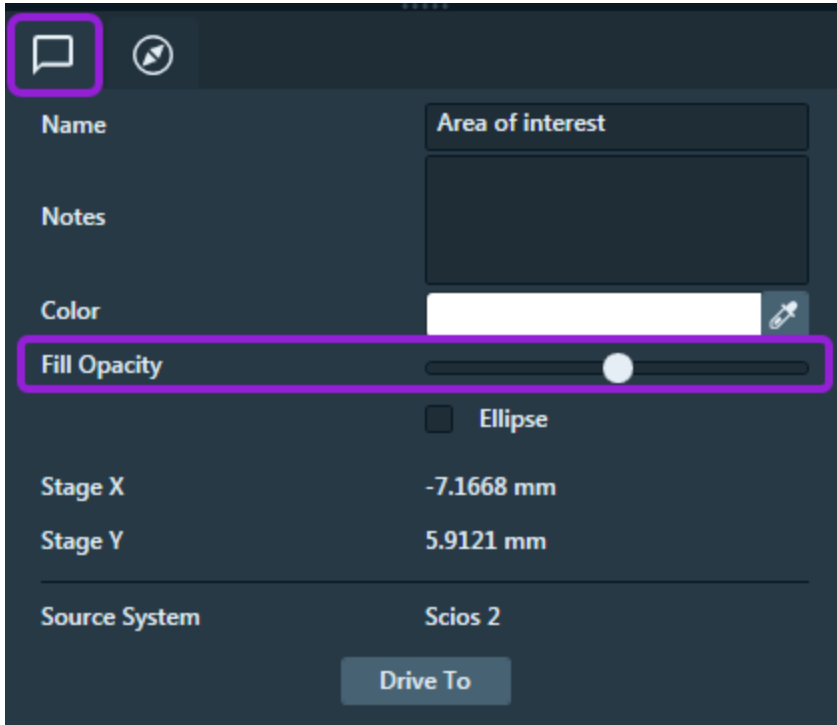


Property	Description
Name	Displays annotation name.
Notes	Displays annotation notes. Click in this field to add or edit these notes.
Color	Displays color of annotation. Click the color picker (that is, the eyedropper icon) to change the color.
Ellipse	Appears if the annotation is displayed with an ellipse form within the main viewer. Select this checkbox to change the value.
Stage X	Displays position of stage for X axis.
Stage Y	Displays position of stage for Y axis.
Source System	Displays name of source system.

Property	Description
Drive To	Click button to drive microscope field of view to annotation location.

Area of interest

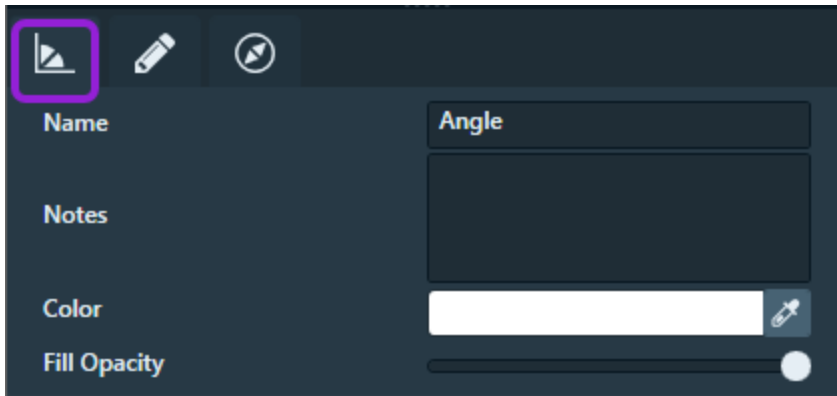
If the annotation is an *area of interest*, then the opacity property is shown in addition to the properties described in the previous table.



Property	Description
Fill Opacity	Sets the level of opaqueness for the entire annotation. Click and move the slider to the right to increase the level of opaqueness, or click and move the slider to the left to decrease the level of opaqueness. The less opaque, the more transparent the annotation becomes. Transparent annotations are useful when overlaying a layer over another layer.

Measurement Tab

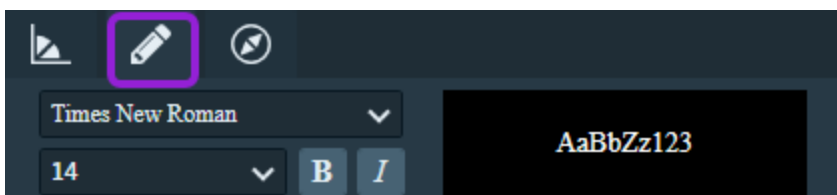
The Measurement tab appears in the left panel when you select a line or angle measurement layer. This tab displays properties of measurements.

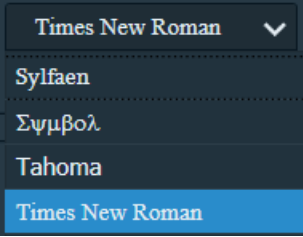
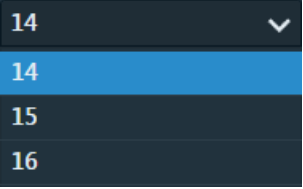


Property	Description
Name	Displays measurement name.
Notes	Displays measurement notes. Click in this field to add or edit these notes.
Color	Displays color of measurement. Click the color picker (that is, the eyedropper icon) to change the color.
Fill Opacity	Sets the level of opaqueness for the entire measurement. Click and move the slider to the right to increase the level of opaqueness, or click and move the slider to the left to decrease the level of opaqueness. The less opaque, the more transparent the measurement becomes. Transparent measurements are useful when overlaying a layer over another layer.

Font Format Tab

Use the controls under the Font Format tab to set layer font properties as rendered within main viewer. This tab appears only when you select a site of interest or when you select a line or angle measurement layer.

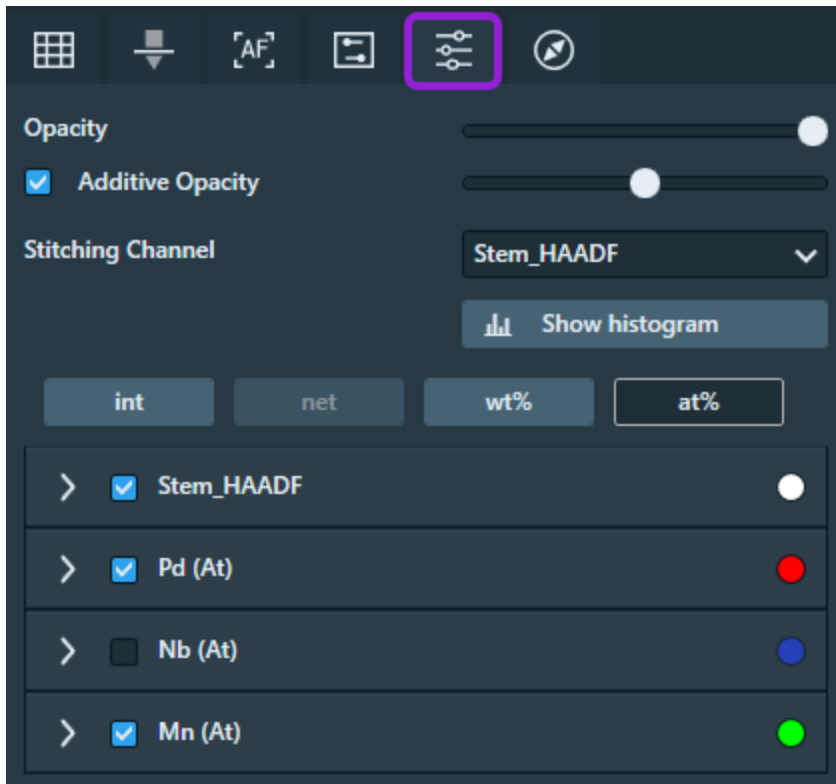


Property	Description
Font Family	<p>Displays a list of available fonts. Select a font from the dropdown menu to be displayed within the main viewer.</p> 
Font Size	<p>Displays a list of font sizes. Select a font size from the dropdown menu to be displayed within the main viewer.</p> 
Bold	Click the B button to display the font weight as bold within the main viewer.
Italic	Click the <i>I</i> button to display the font style as italics within the main viewer.
Font Viewer	Provides a rendering of the selected font format properties. This viewer is located to the right of the other four properties.

Visualization Tab

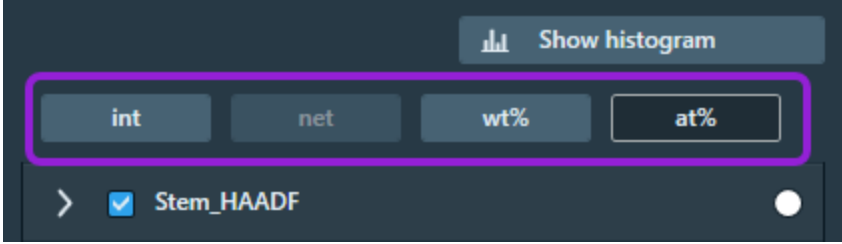
The Visualization tab (formerly called "Results" tab) contains the correlation controls, which you can use to apply simple coloring to the tile set images when acquired. Some correlation controls appear unavailable if they are not applicable to the system type.

Correlation controls

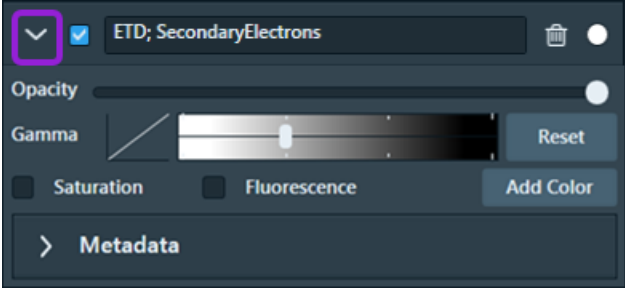
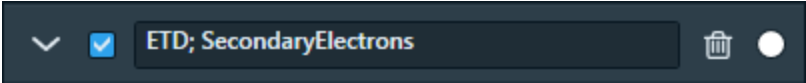


Correlation Controls Overview

Control	Description
Opacity	Sets the measure of opaqueness for the entire image. The less opaque, the more transparent it becomes. Transparent images are useful when overlaying on image over another.
Additive Opacity	Sets the control the opacity between fluorescence and regular channels. This is useful for the Analytics tile sets as they contain many non-overlapping channels. The Additive Opacity option is the default for EDS tile sets. Increasing the additive opacity makes fluorescence channels more visible.
Stitching Channel	Sets the channel used for stitching.
Show histogram	Shows/hides the histogram panel. See Histogram .

Correlation Controls Overview(Continued)	
Control	Description
Quantification Modes	<p>EDS channels acquired with Velox can have up to four different quantification modes. Click one of the activated buttons (shown in white) to select a quantification mode, which is used to visualize the elements. A deactivated button (shown in grey) indicates that the quantification mode was not calculated and is not available.</p>  <p>The elements display data in each quantification mode as follows:</p> <ul style="list-style-type: none"> • int: the counts according to the raw integrated spectrum • net: the counts according to the background corrected and fitted model • wt%: the weight fractions • at%: the atomic fractions

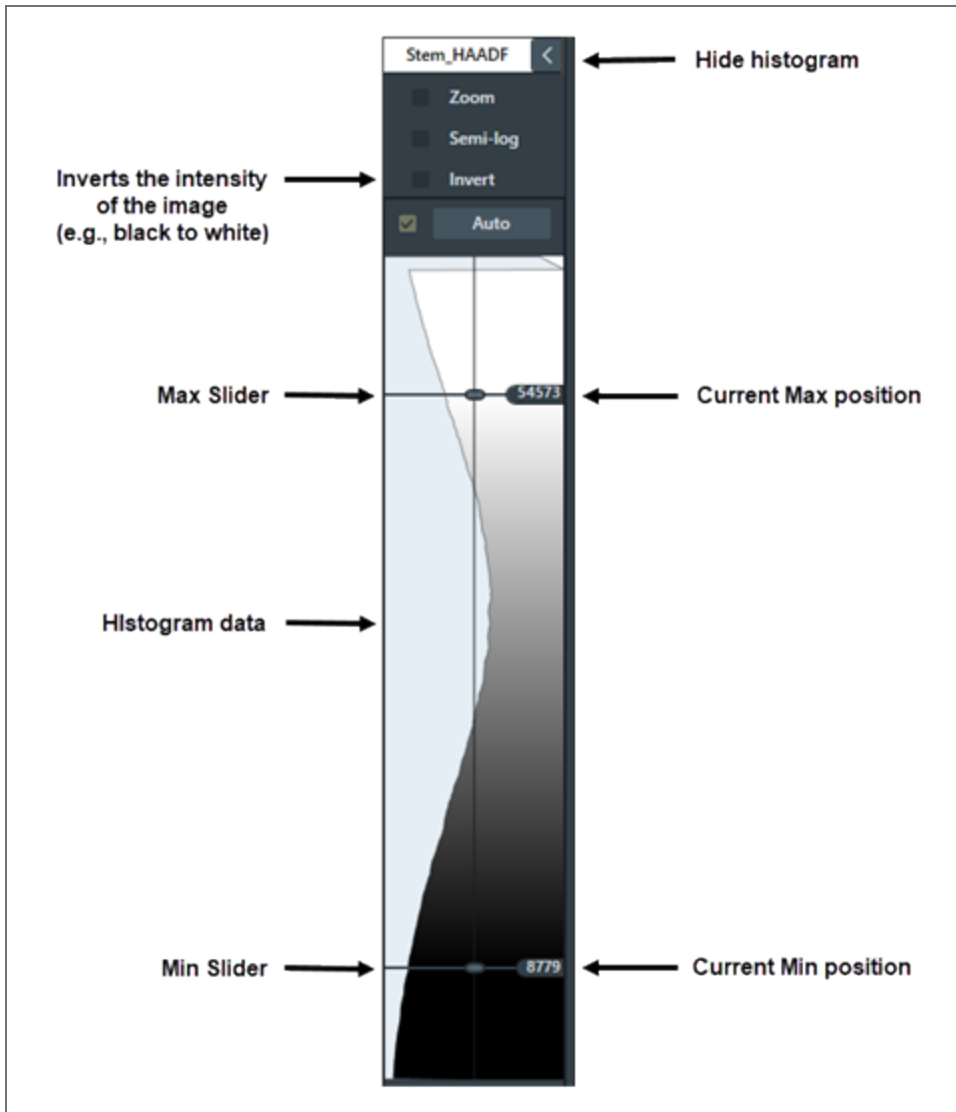
Correlation Controls Overview(Continued)

Control	Description
<p>Channels with Opacity slider and Gamma adjuster</p>	<p>Click the dropdown menu for each channel to view and select the options described below.</p>  <ul style="list-style-type: none"> • Channel name: Located at the top of the screen. This text field displays the channel name. • Delete Channel: For a multichannel image layer, the delete channel option is available and appears as a trash can icon. Click the trash can icon to delete the channel. This function is not available for a single channel image layer and when using the Offline Viewer.  <ul style="list-style-type: none"> • Color picker: Located next to the delete channel option. Click this button to select a unique color to display in the histogram. The color picker is set to white by default. • Opacity slider: Adjusts opacity for this channel only. • Gamma: Displays the gamma curve adjustment. • Reset: Resets the Gamma slider to the default. • Saturation: Select this check box to highlight saturated pixels. • Additive: Select this check box to designate this channel to use <i>additive</i> color mixing. Additive color mixing is used for channels such as fluorescence, cathodoluminescence, and EDS. Black is considered transparent and colors are added with other channels/images behind it. All channels marked additive are painted together (for example, red and green combine to display yellow). • Add Color: Launches Segmentation. Displays an additional histogram every time you click the button. • Metadata: Click the dropdown menu to view the channel metadata.

Histogram


Displays a histogram for the selected channel. Click a different channel name to select its histogram and associated color.

Selected Channel Histogram



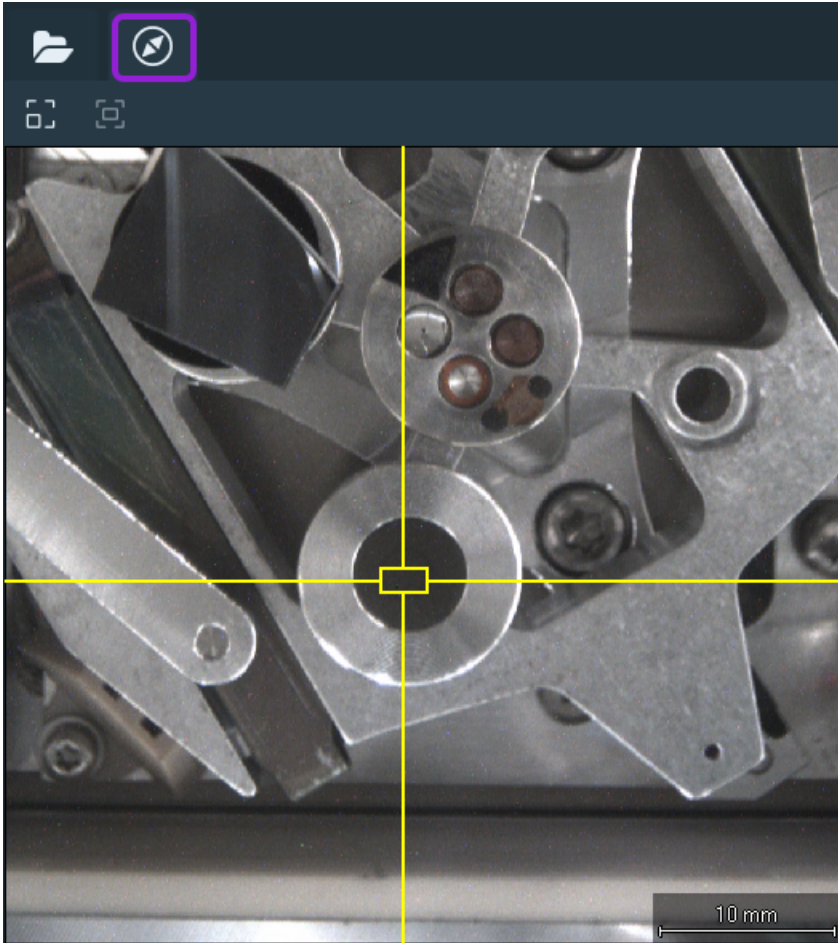
Selected Channel Histogram Overview

Interface Item	Description
Selected channel name	Displays the selected layer item (a tile set or image) from the Layer control.

Selected Channel Histogram Overview(Continued)	
Interface Item	Description
Hide	Hides the histogram. 
Zoom	Expands the histogram area of images with less than 255 colors.
Semi-log	When selected, changes the histogram intensity display to logarithmic.
Invert	Inverts the intensity of the image, e.g., black to white.
Auto	When selected, continuously adjusts the min and max for the histogram display.
Current max position	Displays the current max slider position.
Max slider	Any data above the max line is white. Gray levels display between the max and min sliders.
Histogram data	Displays the histogram data for the selected channel.
Min slider	Any data below the min line is black. Gray levels display between the max and min sliders.
Current min position	Displays the current min slider position.



Overview Viewer

The Overview viewer, located in the Overview tab, shows a lower-zoom view of your data, allowing you to see where the main Viewer field of view (FOV) is in relation to the whole project. See [Viewer](#) for more information about the main Viewer.

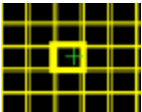


The yellow crosshair shows where the current FOV in the main Viewer is in relation to the entire data set. Double-click in the Overview viewer to move the FOV of the main Viewer.

There are two toolbar buttons:

Button	Description
	Center view on sample. Click to snap the Overview viewer FOV over all the sample data in the project. This action moves the FOV to the center of the sample and adjusts the zoom, so that it is visible.
	Center view on selection. Click to snap the Overview viewer FOV to the currently selected data in the Layer tree. This action moves the FOV to the Layer tree and adjusts that zoom, so that it is visible.

There is one unique context menu selection:

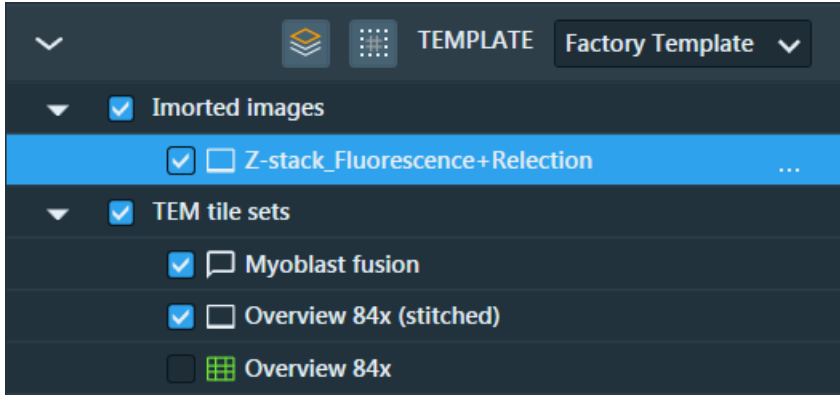
Menu Selection	Description
Drive Stage Here	Moves and centers the stage to the selected tile (see the green cross in the center of the grid). 

Layer Control



Use the controls to view existing layer items and create, delete, reorder, select, hide, and show layers.

Topics include:

- [Layer Icons](#)
- [Change Layer Order](#)
- [Progress of Running Layer Tasks](#)
- [Annotation Context Menu](#)
- [Layer Context Menu](#)
- [Tile Set Context Menu](#)
- [Image Context Menu](#)
- [Nav-Cam Context Menu](#)
- [Multiple Layer Context Menu](#)



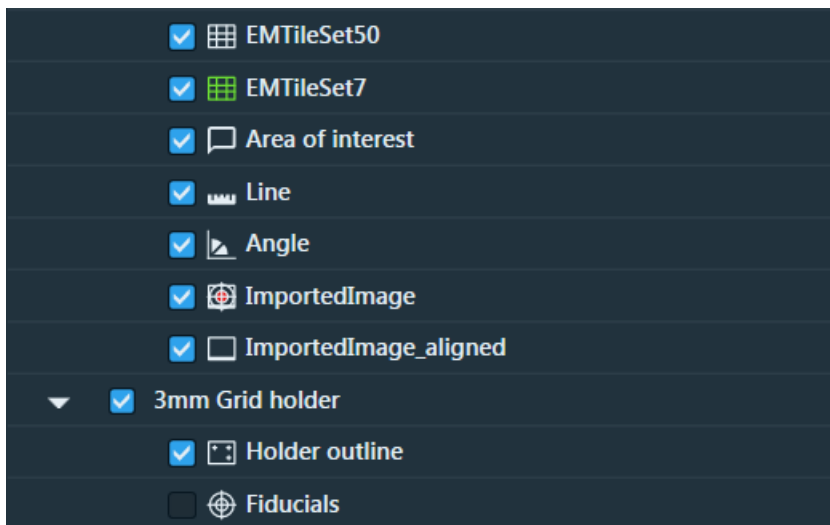
- When a check box is not selected, that layer item is not shown in the viewer.
- Double-click an item in the Layer control to center it in the viewer.









Layer Control Overview	
Control	Description
Add Layer 	Adds another Layer to the tree. When you have multiple layers, the selected layer will be green and the non-selected layers will be yellow.
Add Tiles 	You can only create a tile set if a microscope is connected. See Define a Tile Set for more information about adding tiles.
Template	Displays the name of the active template for the connected microscope. In the example above, it is Default Template . See Tile Set Templates for more information about templates.
Layer	Displays a list of existing tile sets, annotations (areas of interest), imported images (aligned and unaligned), sample holder, and fiducials for each layer. See Layer Icons for icon descriptions.

Layer Icons

Each created layer item has a unique icon.


Layer Control Icons

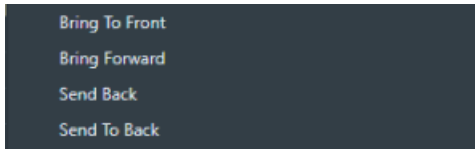


Layer Icons	
Icon	Indicates the layer contains
	Complete tile set registration and acquisition.
	Annotations (text callouts). Annotations are directly created in the layer selected at the time of creation.
	Line measurement.
	Angle measurements.
	An imported image that is not yet aligned.
	An imported image was aligned and stitched into this layer.
	A holder outline.
	Fiducial information.

Change Layer Order

Context Menu

Layers can be moved in the layer tree to change their position, depending on their [Permissions](#). Right-click on a layer in the layer tree (or click the ellipsis icon  next to a layer) to access the context menu for moving the layer forward or backward.





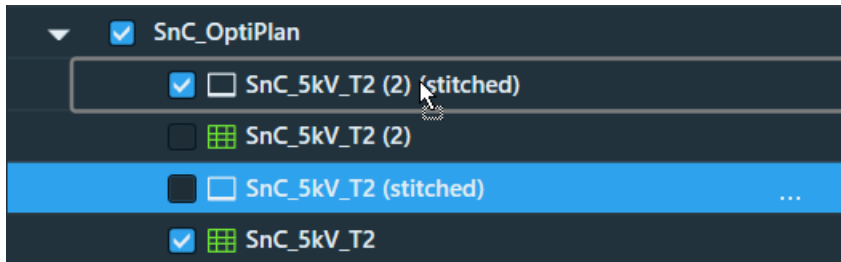
Layer Order Context Menu Options	
Menu Selection	Description
Bring to Front	Moves the layer to the front or top-most layer.
Bring Forward	Moves the layer forward one layer.
Send Back	Moves the layer backward one layer.
Send to Back	Moves the layer to the back or bottom-most layer.

Move layers

Layers can be moved in the layer tree to change their position, depending on their [Permissions](#). If allowed, you can click and move a layer up or down in the layer tree (or move multiple selected layers by pressing **Ctrl+left-click** before moving them). If a layer is locked, then it cannot be moved within the layer tree.

The mouse changes when dragging a layer to show what action is available:

-  When dragging a layer, the cursor changes to a cursor with a rectangle below.
-  When the dragged layer cannot be placed in a location, the mouse changes to a no-entry icon.
- When a layer is a valid drop location, the target group highlights with a rectangle :



- When dropping a layer between another layer, a divider appears:



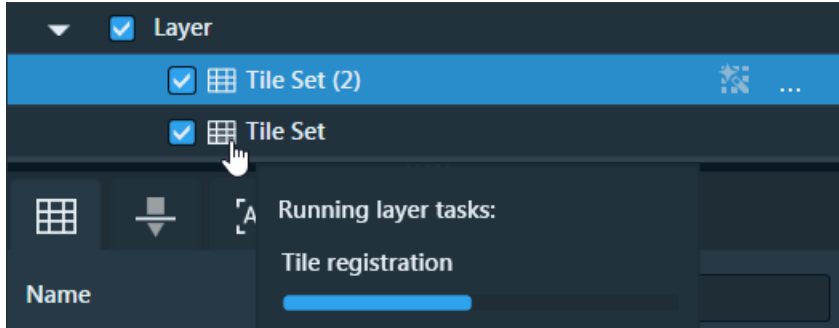
Permissions

The table below shows if a parent layer can accept a child layer. When working with multiple layer selections, these permissions are applied to each layer selection.

Layer Order Permissions					
		Parent Layer			
		Layer Group	Annotation	Tile Layer	Image Layer
Child Layer	Layer Group	Yes	No	No	No
	Annotation	Yes	Yes	Yes	Yes
	Tile Layer	Yes	No	No	No
	Image Layer	Yes	Yes	Yes	Yes

Progress of Running Layer Tasks

- **Acquisition progress** is reported in the [Job Control](#).
- **Registration progress** is reported by hovering the mouse over the tile set symbol.



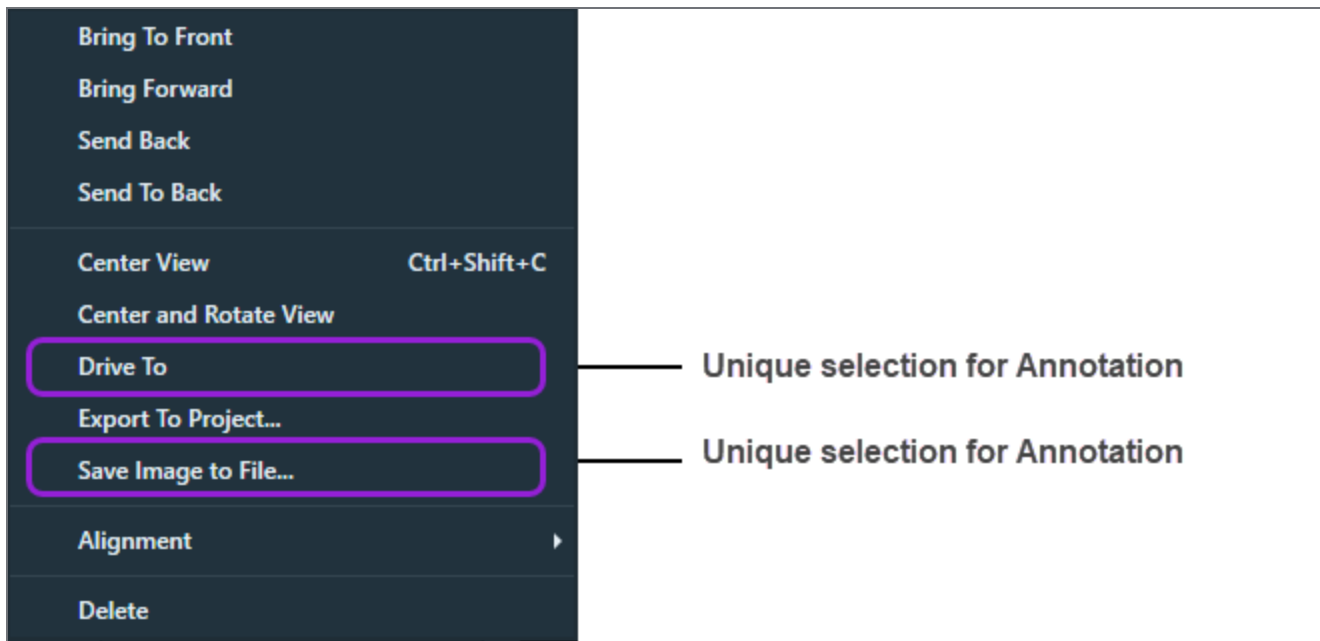
- When both Registration and Acquisition have completed, the green Tile Set icon appears.



Annotation Context Menu

Right-click on an annotation in the layer tree to access a context menu for centering and rotating the view, driving to, and deleting.

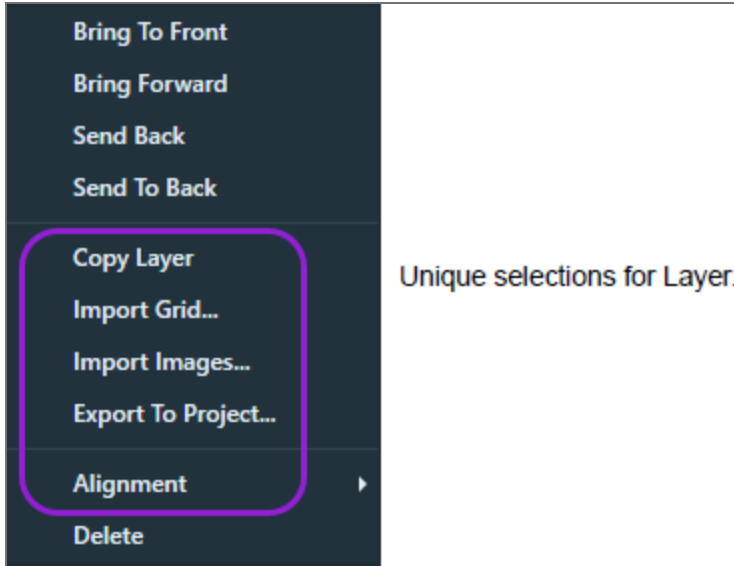
All of these menu commands, except **Drive To** and **Save Image to File...**, are common to most all other layer item context menus.



Annotation Context Menu Overview	
Menu Selection	Description
Center View	Centers the view on the annotation.
Center and Rotate View	Pans, zooms, and digitally rotates the viewer so that the selected annotation is centered and displayed at its natural point of rotation.
Drive To	Drives the stage to the annotation. This menu selection is available only while Maps is running from the Microscope PC and thus connected to the microscope.
Save Image to File...	Saves an image from the region outlined by the annotation (see Save image to file under Viewer). This menu selection is only available for an <i>area of interest</i> annotation (see Area of interest under Annotation Tab).
Delete	Deletes the annotation.

Layer Context Menu

Right-click on any Layer selection to access a context menu.



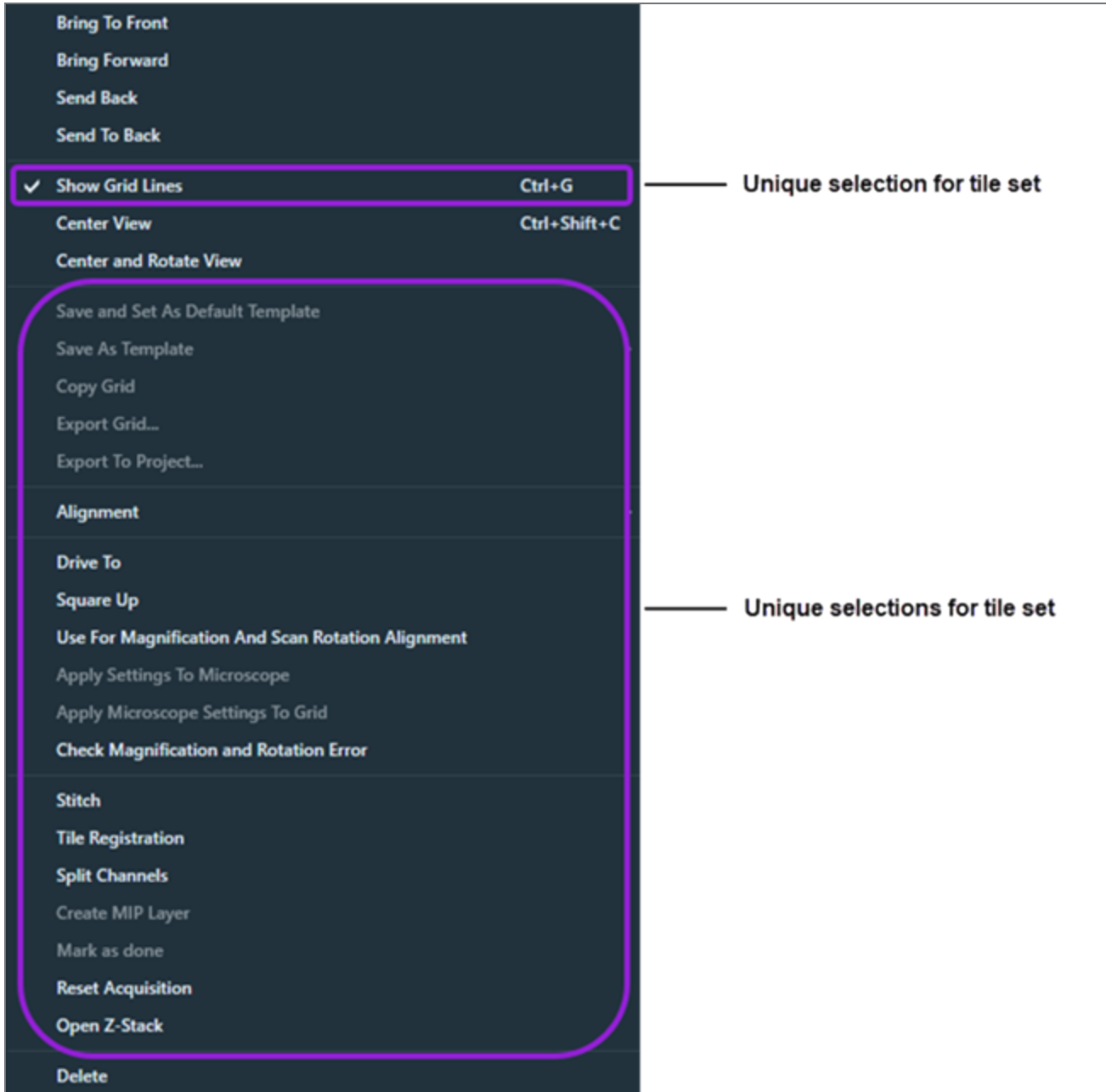
- For descriptions of common selections to all systems, see [Annotation Context Menu](#).
- For descriptions of Layer-specific selections, see the table below.

Layer Context Menu Overview	
Menu Selection	Description
Copy Layer	Copies all tile sets in the layer to a new layer.
Import Grid...	Displays a standard Open window for browsing to a saved tile grid file.
Import Images...	<p>Displays a standard Open window for browsing to a saved image file from another source, such as an optical microscope.</p> <p>These images, once aligned to the stage, can provide a navigation guide for you to find areas of interest, like the Nav-Cam does.</p> <p>See Import Images from Other Sources.</p>
Export To Project...	Exports to a new or existing project.

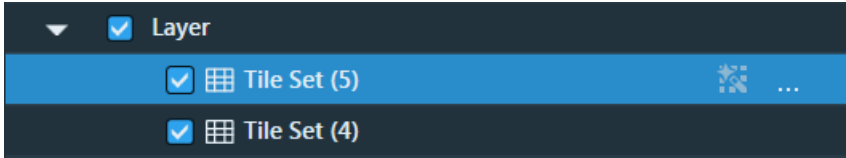
Layer Context Menu Overview(Continued)	
Menu Selection	Description
Alignment	<p>Displays alignment choices. See Magnification Alignment.</p> <p>Submenu selections include:</p> <ul style="list-style-type: none">• Align: Aligns a single tile set or image. Similar to Global Alignment, but for a single item. See Coarse Alignment (1-, 2-, or 3-Point).• Fine Alignment: Use Fine Alignment to fine-tune the alignment of layers and tile sets visually. The Fine Alignment controls only display after clicking Next after a 1-, 2-, or 3-point alignment. See Fine Alignment for descriptions of the controls.• Clear Alignment: Clears any tile set alignment that has been applied.

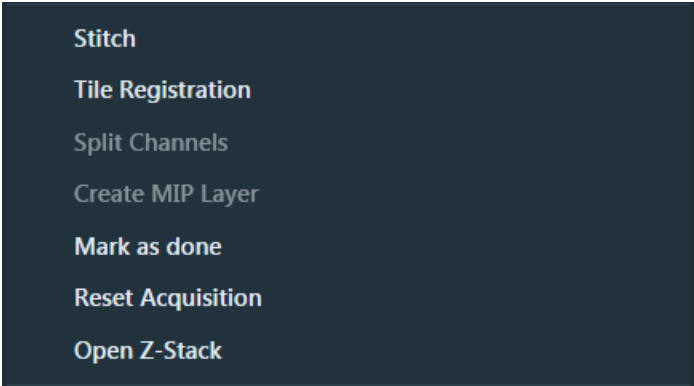

Tile Set Context Menu

Right-click on any tile set to access the context menu.



- For descriptions of common selections to all systems, see [Annotation Context Menu](#).
- For descriptions of tile set-specific selections, see the table below.

Tile Set Context Menu Overview	
Menu Selection	Description
Show Grid Lines (Ctrl+G)	Toggles to show/hide the tile grid lines onscreen.
Save and Set As Default Template	After editing the defaults, saves the edits as the new default template. See Default templates for further instructions.
Save As Template	Displays a submenu New Template , that allows saving the current tile layers template as a new template or overriding a previous template. See Create custom templates for further instructions.
Copy Grid	Creates a grid above the one that is copied, and incrementally numbers the name. In this example, EMTileSet 5 is a copy of EMTileSet 4. 
Export Grid...	Displays a standard Save As window for browsing to a folder in which to save the exported grid. Grids are saved in the *.gridx format.
Export to Project...	Copies the selected tile sets into a new or existing Maps project.
Alignment	Displays a submenu of alignment choices. See Layer Context Menu for descriptions.
Drive To	Drives to the selected tile set.
Square Up	Rotates the stage to match the orientation of the tile set.
Use For Magnification And Scan Rotation Alignment	When selected, uses the offsets calculated in the acquired tile set to correct for misalignment between the scan axes and the stage axes by applying a small magnification and scan rotation. This will allow better acquisition and alignment of future tile sets. To activate this menu selection, all tiles must be successfully registered (that is, no tiles outlined in red). You can use a tile set of any size, but it is recommended that you use a tile set of at least (9) tiles.

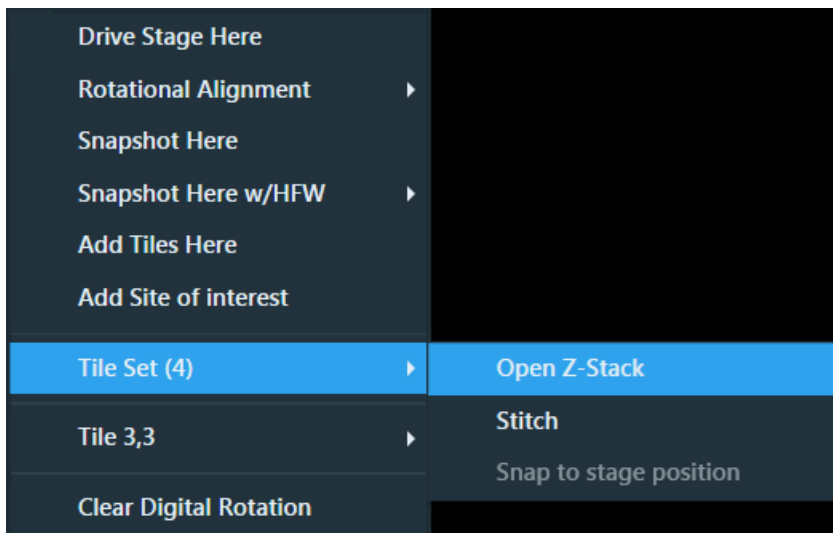
Tile Set Context Menu Overview(Continued)	
Menu Selection	Description
Apply Settings to Microscope	Applies all defined tile set settings to the microscope.
Apply Microscope Settings to Grid	Applies all microscope settings to the tile set.
Check Magnification and Rotation Error	Displays the calculated error of the microscope magnification and field-of-view rotation based on the tile registration results. To activate this menu selection, all tiles must be successfully registered (that is, no tiles outlined in red). You can use a tile set of any size, but it is recommended that you use a tile set of at least (9) tiles.
Post processing	<p>The following menu selections are related to post-processing functions.</p> 
Stitch	Stitches the entire tile set.
Tile Registration	Launch registration on tile set. See -.
Split Channels	<p>Divides the individual channels of a tile set into separate tile sets.</p> <div style="border: 1px solid #0070C0; padding: 5px; margin-top: 10px;"> <p> Note: This operation is permanent and cannot be undone.</p> </div>
Create MIP Layer	Collapses the Z-Stack into a single image using the highest intensity pixels from the stack. This menu selection is enabled for tile layers with more than one plane.

Tile Set Context Menu Overview(Continued)	
Menu Selection	Description
Mark as done	Sets the selected tile set that has started acquisition, but is not yet done. This option deactivates all the remaining non-acquired tiles and designates the acquisition job status as complete.
Reset Acquisition	Clears all acquired image data in the selected tile set and unlocks the parameter fields in the Basic tab for editing.
Open Z-Stack (SEM/SDB only)	Opens the Z-Stack Browser to view the focus stack of the tiles. See Z-Stack Browser Controls .

Z-Stack Browser Controls

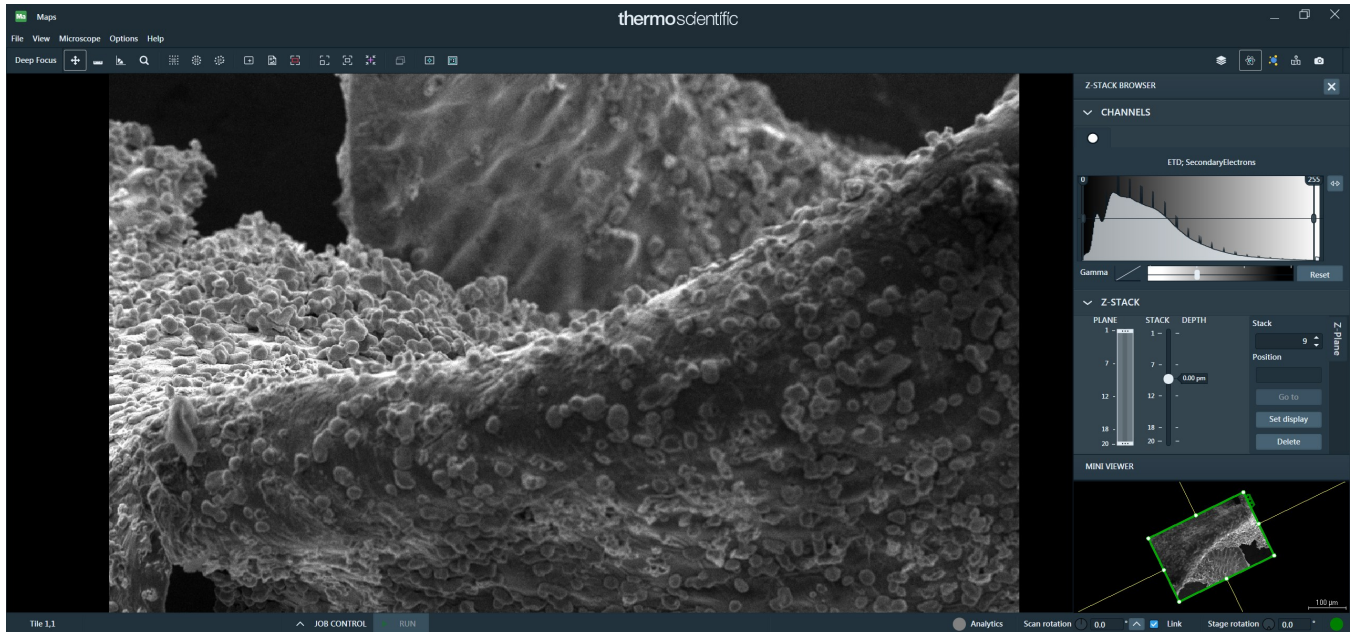
The Z-Stack Browser allows you to select and view individual image planes in the Z-Stack.

After acquiring a Z-Stack tile set, right-click on a single tile in the tile set and then click **Open Z-Stack** in the menu that appears.



The Z-Stack Browser appears on the right-side of the interface.

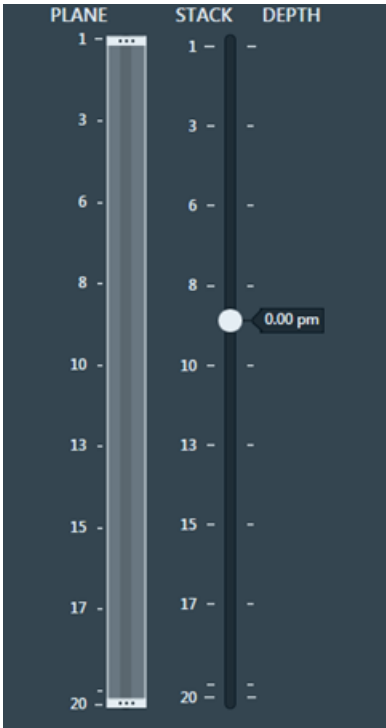
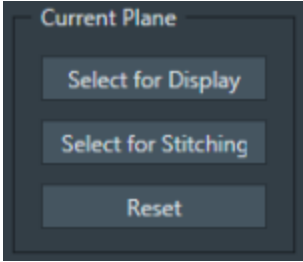

Z-Stack Browser Open with Controls on the Right

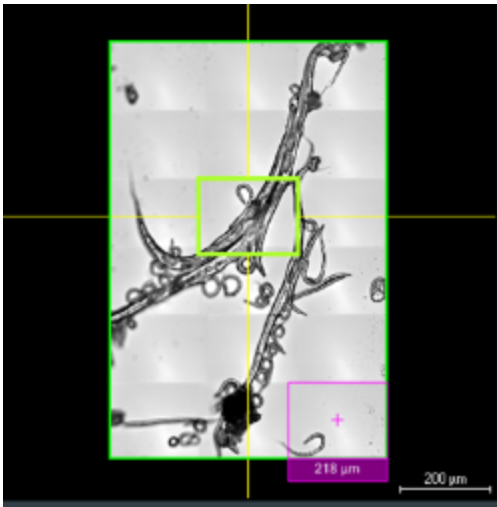


Z-Stack Browser Controls

Z-Stack Browser Controls Overview


Interface Item	Description
Channel Selector	Selects the channel to be displayed in the multi-channel Z-Stack. The pulldown list contains the same choices as in the Microscope controls.
Histogram	Displays the same histogram as in the Microscope controls. See Histogram .
Close	Closes the Z-Stack Browser.

Z-Stack Browser Controls Overview(Continued)	
Interface Item	Description
Plane Selector	<p>Selects the plane from the Z-Stack to be displayed with the channel selection. Move the slider or use the mouse scroll wheel to step through the planes.</p> 
Current Plane Control:	
Select for Display	<p>Selects the plane to be displayed in the main viewer after you close the Z-Stack Browser.</p> <div style="border: 1px solid #0070C0; padding: 5px; margin-top: 10px;"> <p> Note: Only one plane can be displayed in the main viewer.</p> </div>

Z-Stack Browser Controls Overview(Continued)	
Interface Item	Description
Select for Stitching	Selects the current plane to be used for the registration step for stitching. Choosing a plane with more image content is best.
Reset	Returns to the default gamma setting.
Go To	Sets the microscopes current focus to the value in the Z-Stack viewer control.
Gamma Control	Adjusts the gamma for the live image.
Tile Set View	<p>Displays the selected tile (with a thick green outline) from the main viewer and its neighboring tiles.</p> <p>You can use the mouse wheel to zoom in and out.</p> 

Tile Registration

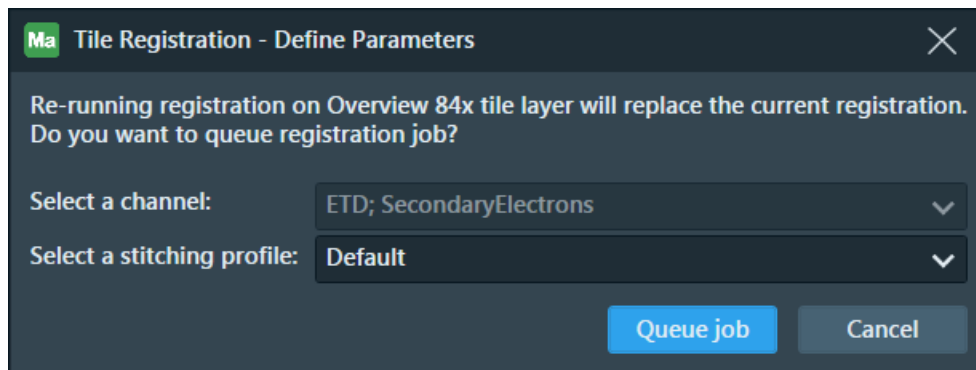
The tile registration feature allows you to re-run the registration on a previously acquired tile set.

 **Note:** The tile set must have at least two acquired tiles.



Note: Tile registration is only allowed for tile sets with positive Overlap X and Overlap Y properties.

1. Right-click the layer and then click **Tile Registration**.
2. If the tile set has more than one channel defined, then you must **Select a channel** for which perform registration.
3. **Select a stitching profile** with which the processing will use during registration.
4. Click **Queue Job**.



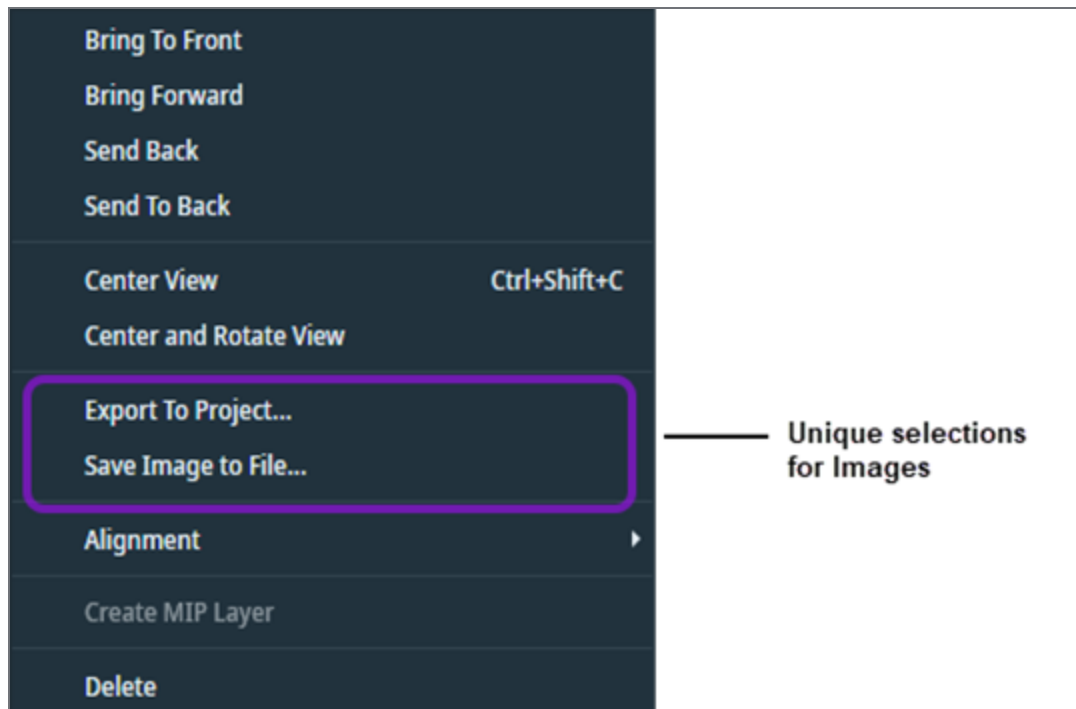
5. A registration job processes the tile set.

Image Context Menu

Images are directly stored in the selected layer. Right-click on an image to access its context menu.



Note: This menu is only available on SEM/SDB.



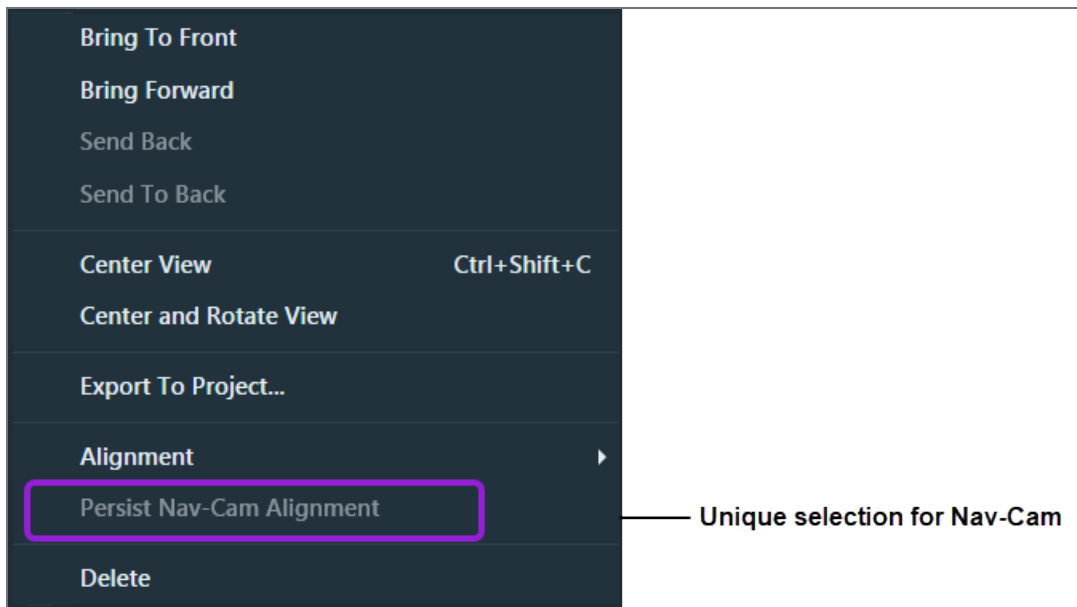
- For descriptions of common selections to all systems, see [Annotation Context Menu](#).
- For descriptions of image-specific selections, see the table below.

Image Context Menu Overview	
Menu Selection	Description
Export to Project...	Copies the data to a new or existing project.
Save Image to File...	Saves the image to disk as a TIFF image.

Nav-Cam Context Menu

The Nav-Cam image is stored in the selected layer. Right-click on a Nav-Cam entry to access a context menu.

Note: This menu is only available on SEM/SDB.

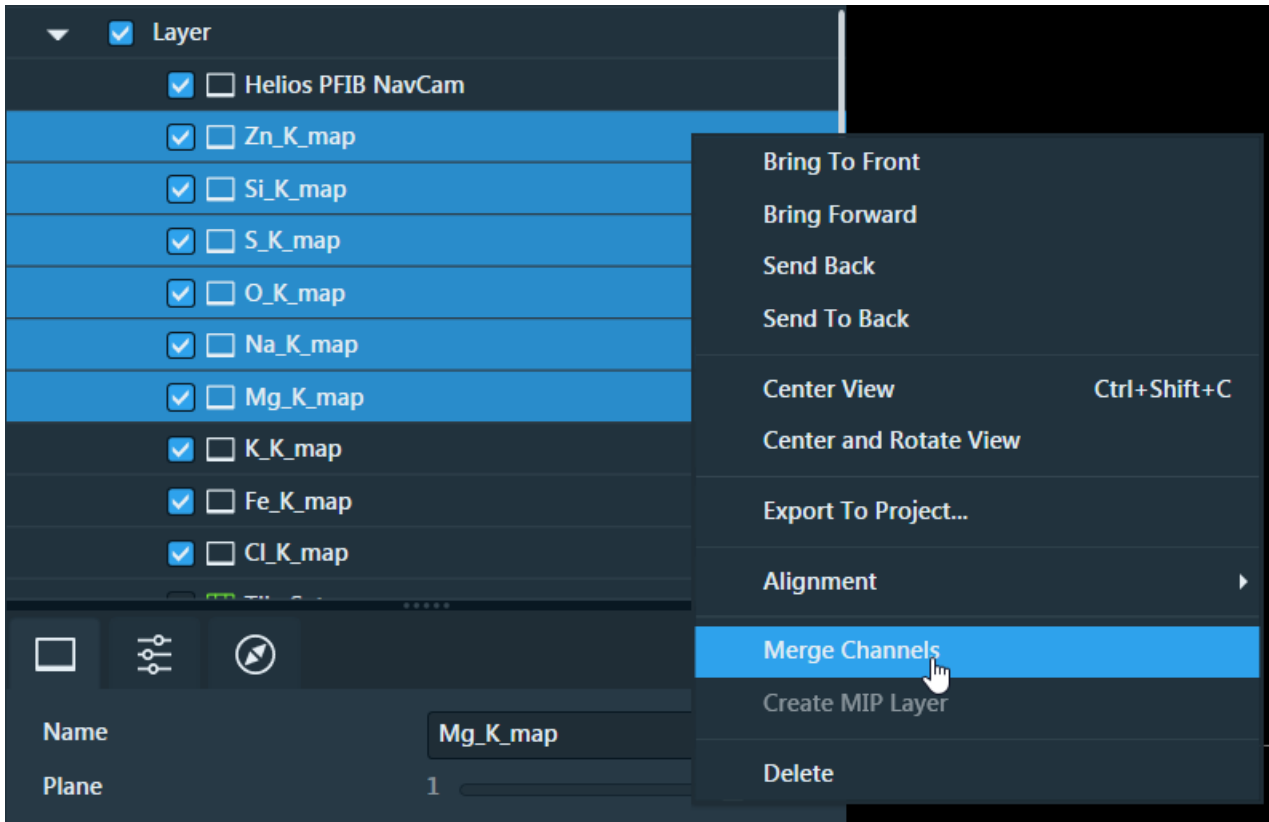


This only applies to SEM/SDB systems (see [SEM Nav-Cam Context Menu](#)).

Multiple Layer Context Menu

This menu is only available when multiple layers are selected.

Note: This menu is only available on SEM/SDB.



Menu Selection	Description
Merge Channels	Merges the selected image layers together by combining all their channels together and creates one resulting image layer. This requires all selected layers to be image layers and have the same resolution, the same number of z planes, and the same time frames.

This only applies to SEM/SDB systems (see [SEM Nav-Cam Context Menu](#)).

Job Control

This topic describes the Job Control.

Summary toolbar

The summary toolbar is always visible in the user interface by default. Once a job is queued, the Run button becomes available in the summary toolbar.



When a job is running, the summary toolbar displays the status of the current job.



- **Progress Bar:** This indicates the progress of an individual job (tile set acquisition, post processing, etc.).
- **Remaining Time:** This indicates the time required to complete all selected jobs.

Job Control panel

Use the Job Control panel to manage all of your queued jobs, including microscope acquisition jobs and data processing jobs. This panel contains an Acquisition tab for your microscope acquisition jobs and a Processing tab for your data processing jobs. Click the up arrow next to **Job Control** on the summary toolbar to open the Job Control panel.



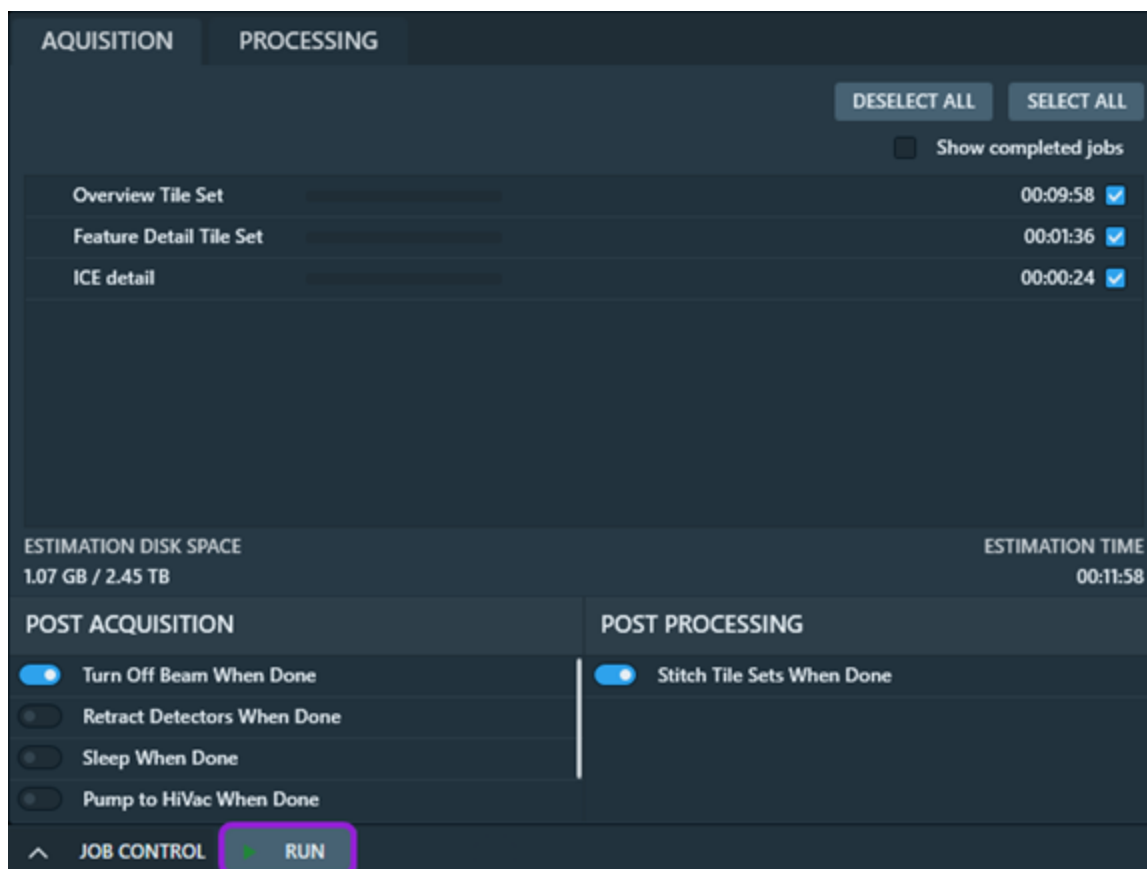
Note: To close the Job Control panel, click the user interface anywhere outside the control panel.

Microscope acquisition jobs

The Acquisition tab displays the current status and progress of the queued jobs related to microscope acquisition. Refer to the [Acquisition Tab Overview](#) table below for descriptions of each control within the Job Control panel.

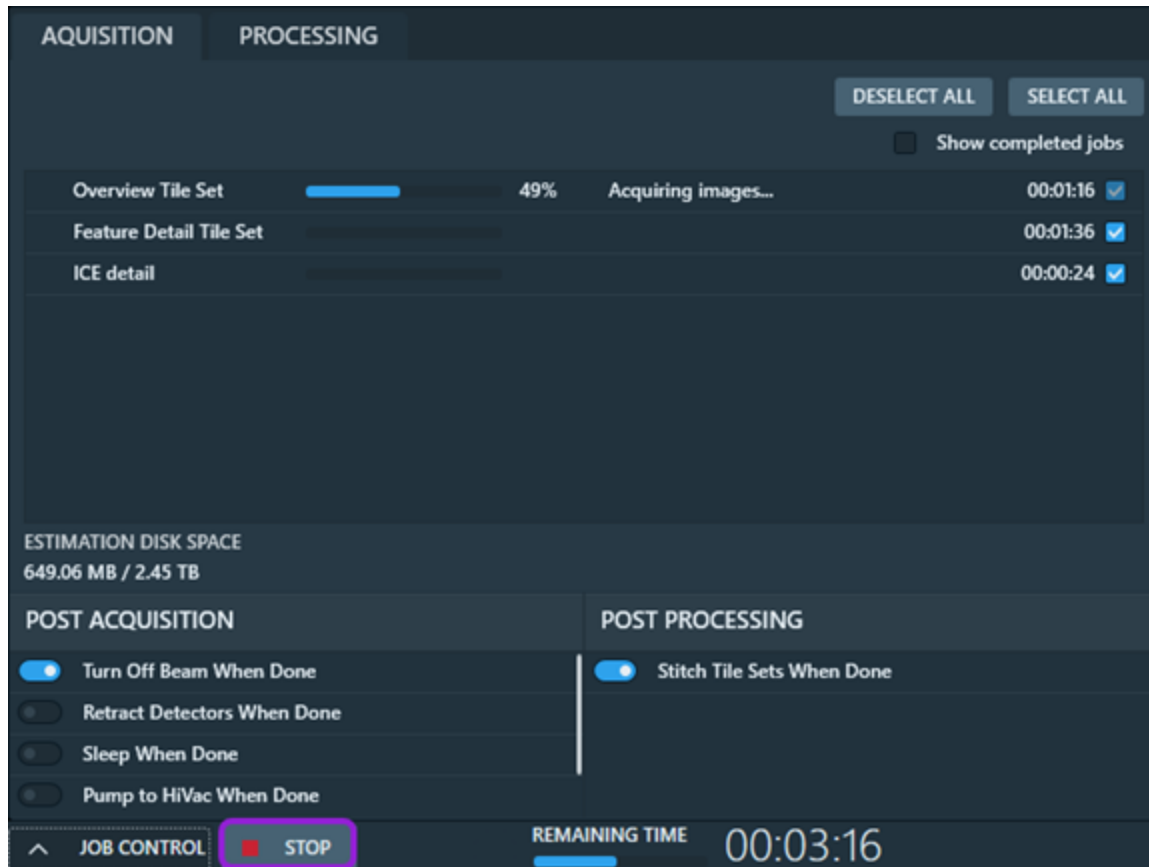
Run queued microscope acquisition jobs

Click **Run** in the summary toolbar to begin job execution for the microscope acquisition jobs.



Stop running microscope acquisition jobs

Click **Stop** in the summary toolbar at any time during job execution to stop running the microscope acquisition jobs.



Acquisition Tab Overview

Control	Description
Deselect All	Deselects all jobs for processing.
Select All	Selects all jobs for processing.
Show completed jobs	Displays completed jobs.

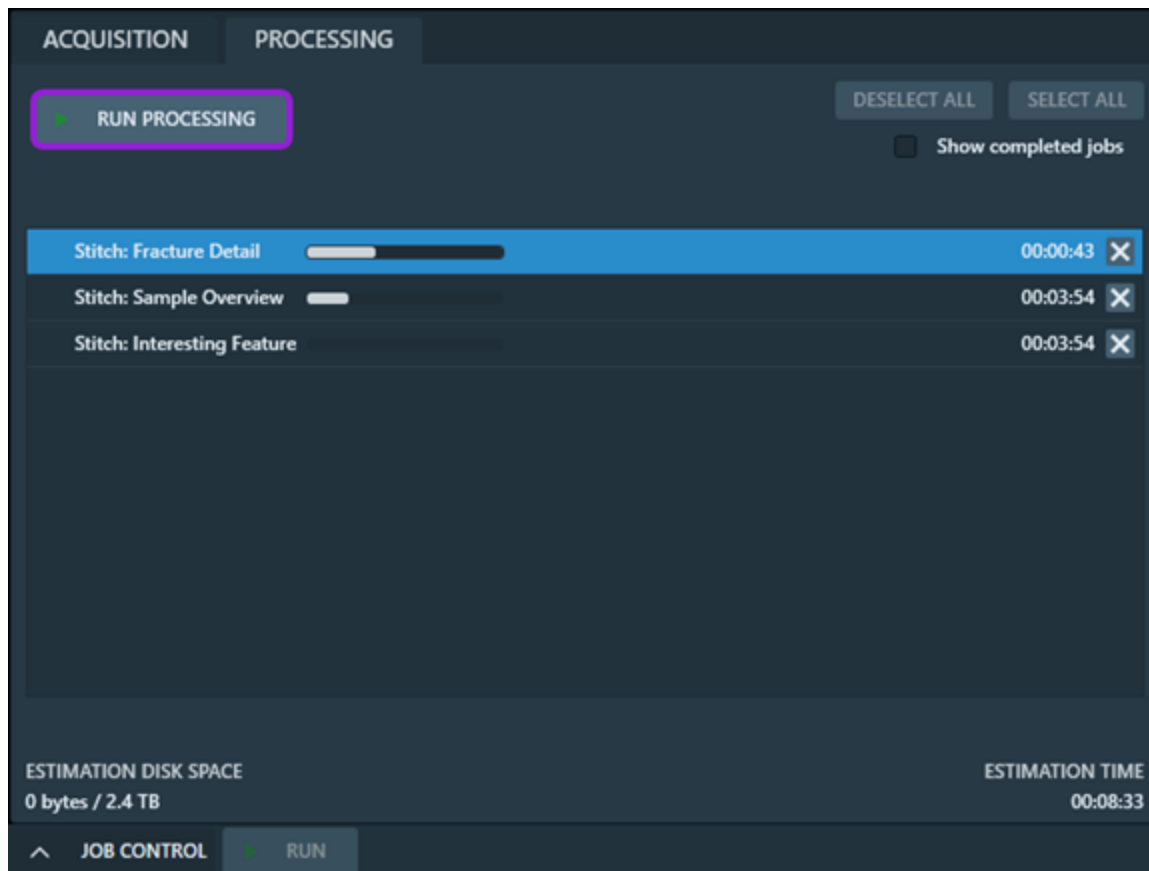
Acquisition Tab Overview(Continued)	
Control	Description
Job list items	<p>Each job row lists:</p> <ul style="list-style-type: none"> • Job name • Job progression • Time estimation if job has not started. If estimation is not provided by job, '---:--:--' is displayed instead. • Time remaining for job in progress. The value calculation is based on previous progress and appears after the job is started and the estimation is ready. <p>Jobs are listed in the order they will be processed. Select the check box to the right of a job to add it to the processing queue. For non-running jobs, you can click and drag the job rows to reorder them. You can also use the Context Menu to reorder them.</p>
Estimation disk space	Displays estimation disk space needed to complete all selected jobs and the available disk space. The field turns red if there is not enough space for the jobs.
Estimation time	Displays total estimation time needed to complete all selected jobs. The field displays '---:--:--' if there is no estimation provided by selected jobs.
Post acquisition	<p>Post-acquisition actions are listed in this section. If selected, actions are performed after acquisition.</p> <p>For system-specific action, see:</p> <p>TEM Post-Acquisition Actions SEM/SDB Post-Acquisition Actions</p>
Post processing	Post-processing actions are listed in this section. If selected, actions are performed after processing.
Stitch Tile Sets When Done	Automatically adds a stitching job to the end of the Processing queue for each completed acquisition job.

Data processing jobs

The Processing tab displays the current status and progress of the queued jobs related to data processing such as stitching, registration, or maximum intensity projection creation. Since these jobs do not require the use of the microscope, they can run in parallel to the microscope acquisition jobs. The Processing tab has the same functionality as the Acquisition tab described in the [Acquisition Tab Overview](#) table, however, the Processing tab contains its own run and stop buttons.

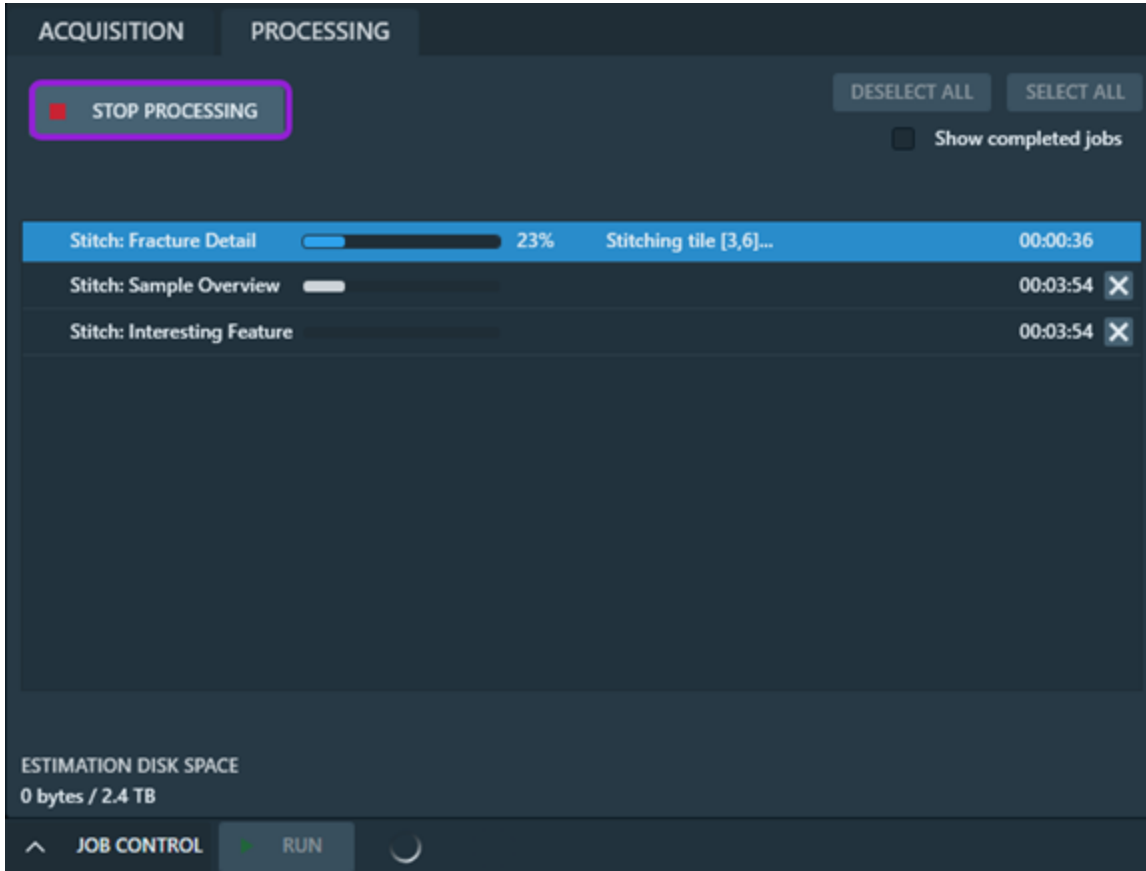
Run data processing jobs

Click **RUN PROCESSING** in the summary toolbar to begin job execution for the data processing jobs.



Stop running data processing jobs

Click **STOP PROCESSING** in the summary toolbar at any time during job execution to stop running the data processing jobs.

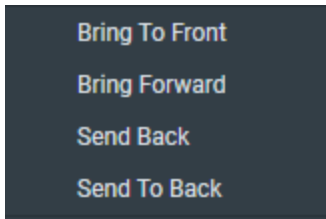


Processing Tab Overview

Control	Description
RUN PROCESSING	Starts execution of the data processing job. This button is available if any data processing jobs are queued, but the queue is not running.
STOP PROCESSING	Stops the execution of the data processing jobs. This button is available only if the queue is running.
Spinner icon	The spinner icon is located next to the Run button in the summary toolbar. This icon appears and animates while the data processing queue is running to indicate that background work is active. You can click the spinner icon to open the Processing tab whenever this tab is closed and the spinner icon is present within the summary toolbar.

Context Menu

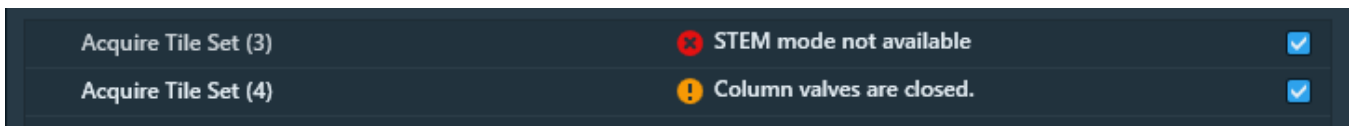
For non-running jobs, you can right-click on any job row to open the context menu and change the processing order.



- **Bring To Front:** Moves the selected job to the front of the queue. The job is processed as the first one.
- **Bring Forward:** Moves the selected job forward in the queue.
- **Send Back:** Moves the selected job backward in the queue.
- **Send To Back:** Moves the selected job to the back of the queue. The job is processed as the last one.

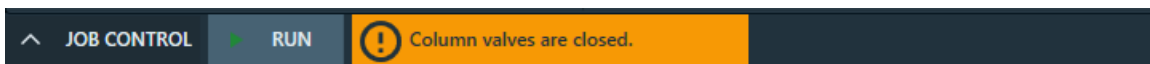
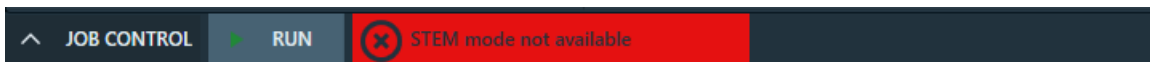
Job processing issues

When a job processes, you might encounter the following error and warning messages to indicate that there are processing issues.



- **Error:** This message indicates that the job execution is blocked, but it is not preventing other jobs from running.
- **Warning:** This message indicates that job execution needs attention, but it is not blocked.

You can also view the error and warning messages in the summary toolbar next to the job status.



Messages are displayed according to the following strategy:

- Errors have priority over warnings.
- If more than one error (or warning) occurs during the same job, then the most recent job processing issue is displayed first.
- A job processing issue related to an unscheduled job is not displayed.

Viewer

This topic describes the Viewer in the Maps user interface.

Topics in this section include:

[Tile Set Grid Color Key](#)

[Alt +Left-Click and Drag Selected Area](#)

[Save image to file](#)

[Viewer tile context menu](#)

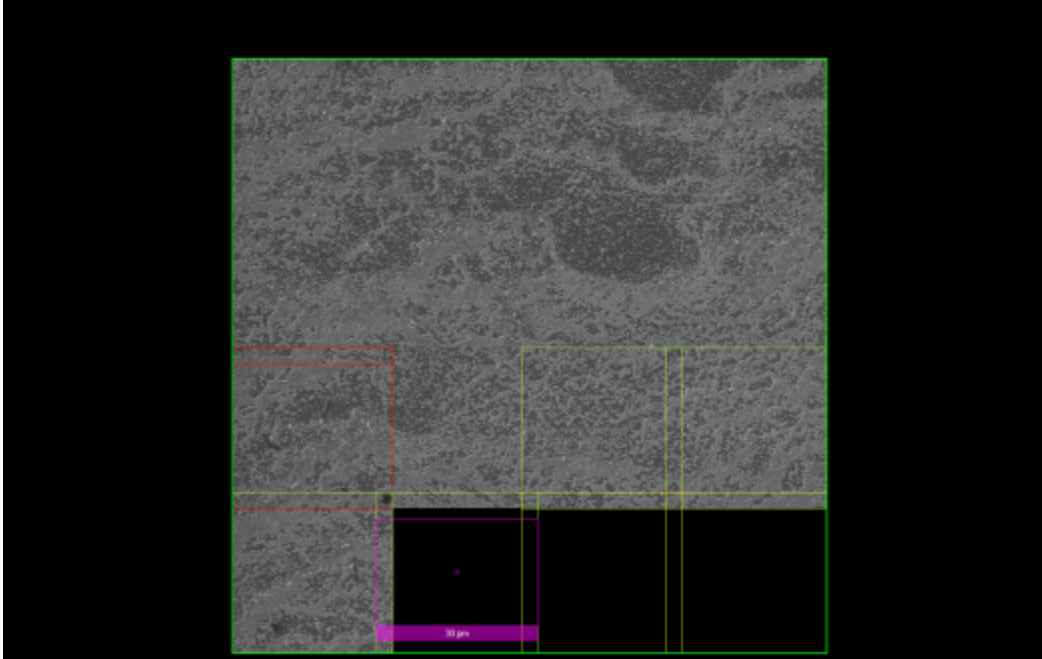
This example shows a 4 x 4 tile set grid.

- Double yellow lines indicate the overlap between tiles.
- The purple FOV (field of view) rectangle displays the HFW (horizontal field width).



Note: The coloring and labels of the FOV rectangle may change depending on the context.

- The *scale bar* (not shown) in the bottom right corner shows the distance (for example, in microns) in relation to the current magnification of the displayed image.
- The **Delete** key works in Maps for any selected item. You will receive a Confirmation request.

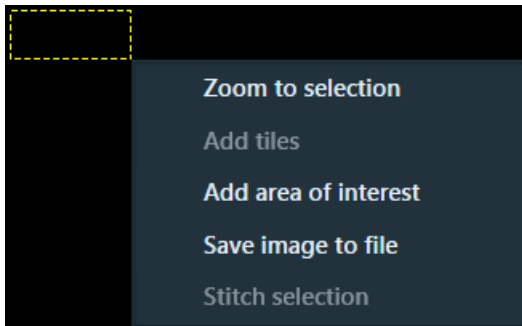


Tile Set Grid Color Key

- **Yellow** = Unacquired tiles. Visually indicates the tile overlap.
- **Grey** = Tiles that have been disabled; they will not be acquired
- **Lime Green** = Acquired tiles that are awaiting registration
- **No outline** = Acquired tiles that have been successfully registered
- **Red** = Acquired; but these tiles failed registration and will require manual alignment (see [Manual Alignment](#))
- **Bright Red** = Edges of groups of red tiles are highlighted with a brighter red, to show where the actual break in the connection is. Often, fixing a bright red connection (via [Manual Alignment](#)) will allow previously red tiles to become successful.

Alt +Left-Click and Drag Selected Area

Alt+left-click and drag a rectangle in the viewer to create a selected area. A menu appears with selections for that area.

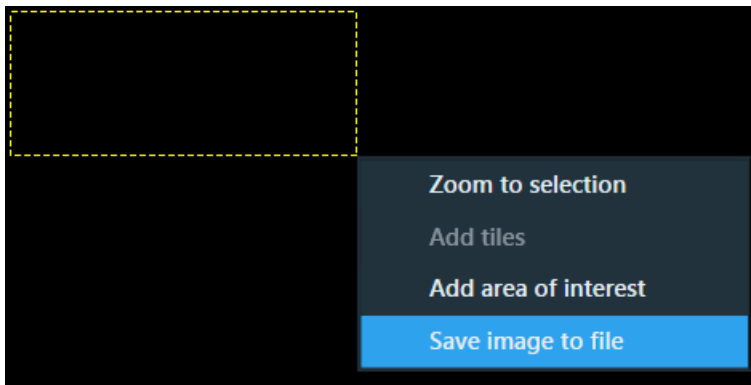


Viewer Selected Area Overview	
Menu Selection	Description
Zoom to selection	Zooms the field of view to the selected area.
Add tiles	Places a new tile set in the selected area, using the Active Template.
Add area of interest	Places a new Annotation layer in the Layer control. <div> <p>The dialog box for 'Add area of interest' is shown. It has a dark background and contains the following elements: a speech bubble icon and a location pin icon at the top left; a 'Name' field with the value 'Area of interest'; a 'Notes' text area; a 'Color' field with a white color swatch and a color picker icon; a 'Fill Opacity' slider; an 'Ellipse' checkbox; and 'Stage X' (-9.3604 mm) and 'Stage Y' (3.8232 mm) fields.</p> </div> <p>An area of interested is used to highlight regions of the sample. It can be named, notes captured, color selected, and it can also be an ellipse.</p>
Save image to file	Saves an image to file (see Save image to file below).

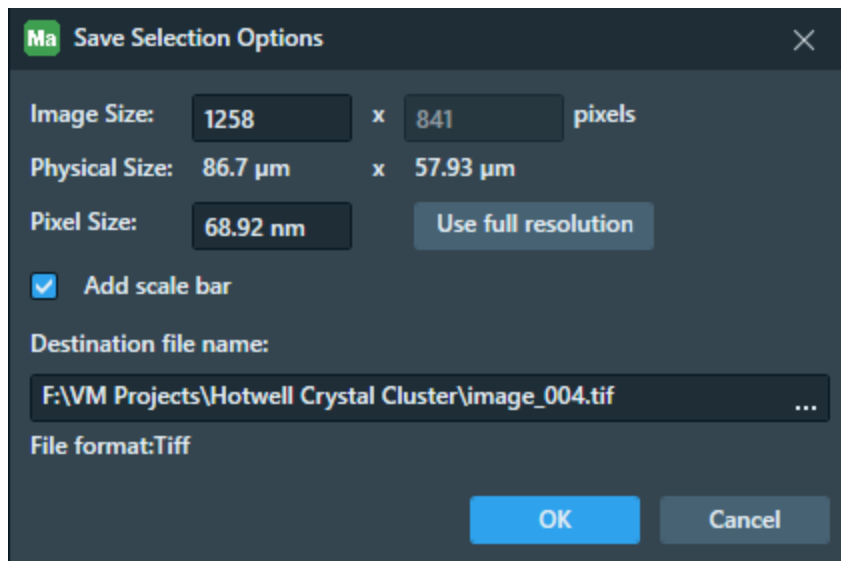
Viewer Selected Area Overview(Continued)	
Menu Selection	Description
Stitch selection	Stitches a subset of tiles, as defined by the rectangle area of interest (see Stitching below). This menu selection is deactivated and not available if a tile set is not selected.

Save image to file

When you use Alt+left-click and drag to create a new tile set, the menu selection **Save image to file** appears.



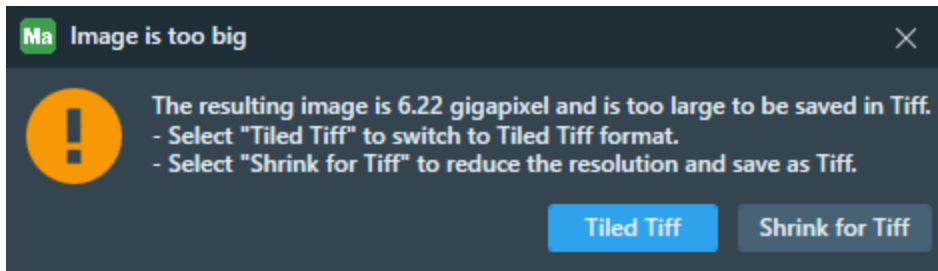
1. Click **Save image to file**. The Save Selection Options screen appears.



2. Either enter a desired resolution into the **Image Size** or **Pixel Size** field, or click the **Use full resolution** button to set the exported image width to the native pixel size.

i **Note:** Full resolution exports for large selections of high-resolution data are not available for all image types.

3. Select the **Add scale bar** check box to place the viewer scale bar on the exported image.
4. Click the browse button (...) to display the browser window.
5. File type options include TIFF Image and Tiled TIFF Image. Select a file type, file name, and location and then click **OK**.
6. There are limitations for the TIFF file type. If TIFF is desired, but the resolution of the selected area is too large for TIFF export, a warning appears. Click **Shrink for Tiff** and the exported image width in pixels is automatically reduced to the maximum resolution for TIFF export.



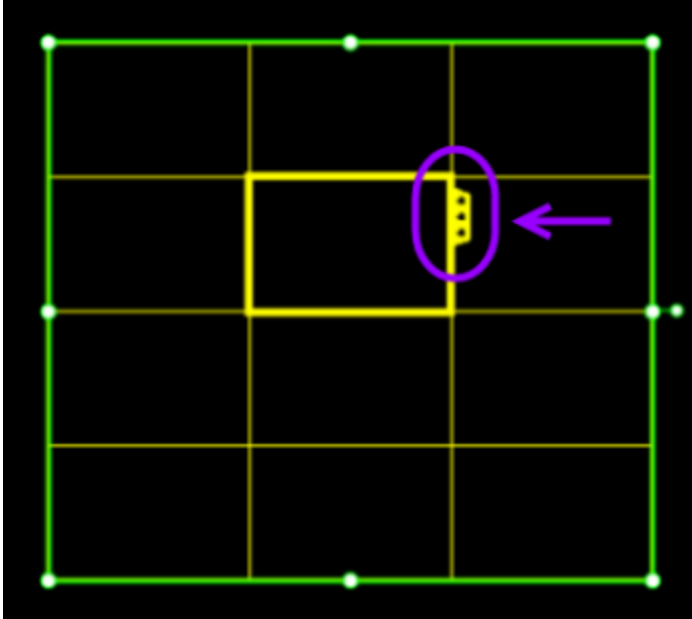
7. To save large resolution images, use the Tiled TIFF format.

i **Note:** Not all image processing software supports the Tiled TIFF format. We recommend that you use the TIFF format to ensure compatibility with external image processing packages.

8. The Save Selection Options window is still open. Click **OK** to close it.

Viewer tile context menu

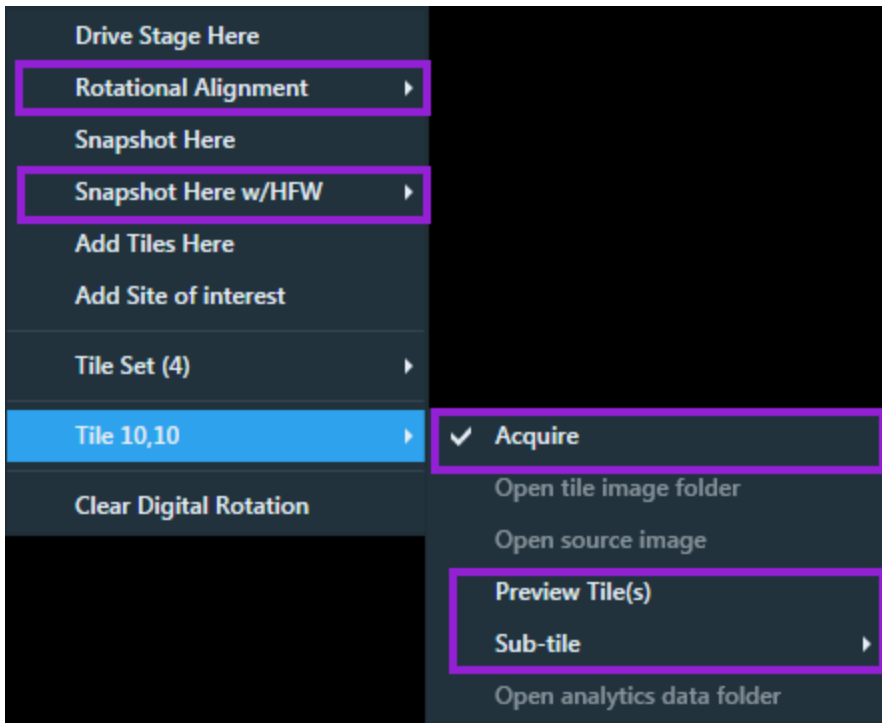
Right-click on a tile within the tile grid to access a context menu. Alternatively, you can select the small menu button on the side of the selected tile to have the tile-specific menu appear.



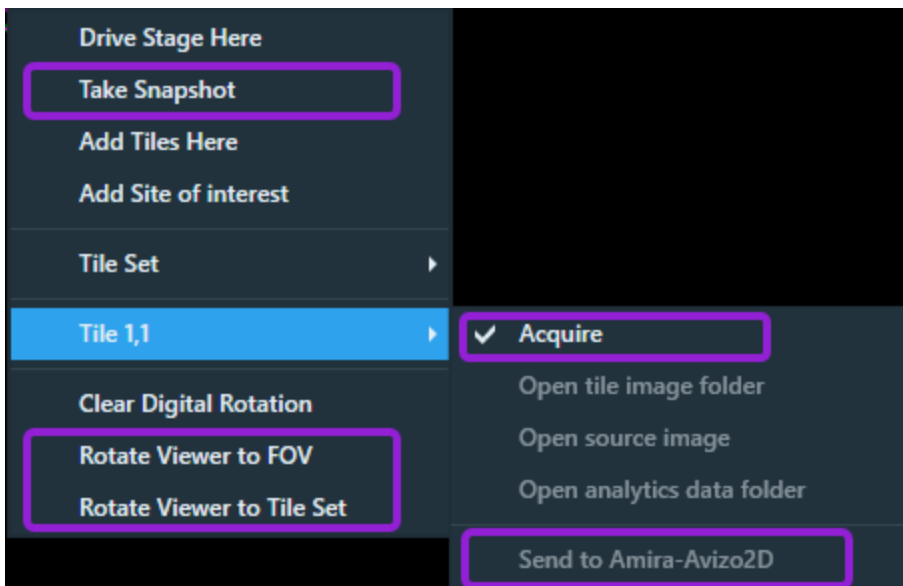
The menu items outlined in purple below are system-specific; whereas, all other menu items are common to SEM/SDB and TEM systems. See the [Common Viewer Tile Context Menu Overview](#) table for descriptions of the common menu items, which includes common items in the main menu and associated submenus. For system-specific menu selections outlined in purple, click the following links.

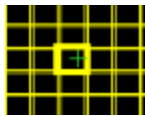
- [SEM/SDB Viewer Tile Context Menu](#)
- [TEM Viewer Tile Context Menu](#)

Viewer Tile Context Menu for SEM/SDB

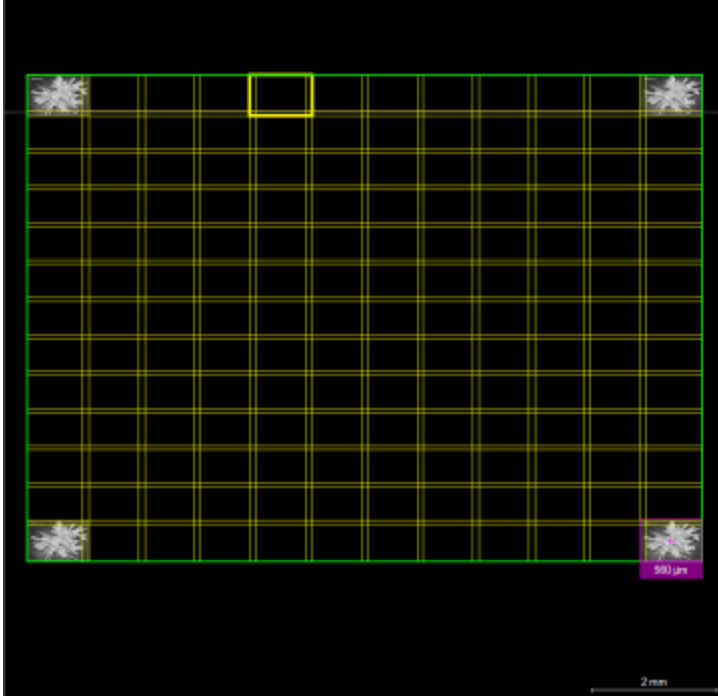


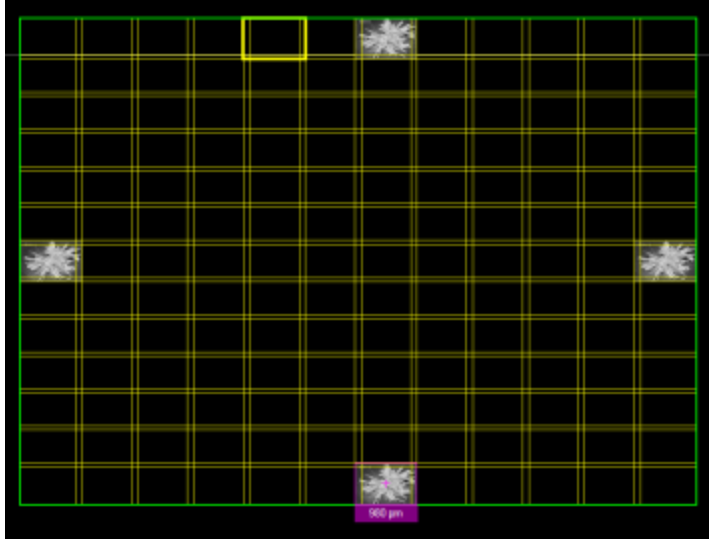
Viewer Tile Context Menu for TEM



Common Viewer Tile Context Menu Overview	
Menu Selection	Description
Drive Stage Here	Moves and centers the stage to the selected tile (see the green cross). 
Snapshot Here	Acquires a snapshot image centered on this stage location at the current horizontal field width.
Add Tiles Here	Adds a new Tile Grid centered on the clicked location.
Add Site of Interest	Displays a New Annotation dialog box for creating the Site of Interest (SOI). An SOI is a specific stage location used to mark sample features. Z: Stage Z and T: Alpha Tilt can optionally be stored to be recalled later. The new SOI is created is the currently selected layer group. <div style="border: 1px solid blue; padding: 5px;">i Note: This is different from the New Annotation dialog box for creating an Area of Interest, which marks an area of the stage.</div>
Clear Digital Rotation	Resets the digital rotation to 0 degrees if rotation had previously been applied. This only changes the displayed rotation of the images and does not rotate the microscope stage.
Tile Set submenu	
Tile Set	Displays the name of the selected tile set. Examples include: Tile Set, Tile Set (2), and Tile Set (3).
Open Z-stack	Opens the Z-Stack Browser to view the focus stack of the tiles. See Z-Stack Browser Controls .
Stitch	Initiates stitching for this tile set. See Stitching .
Snap to stage position	Moves the clicked position on the tile layer to the current stage position.

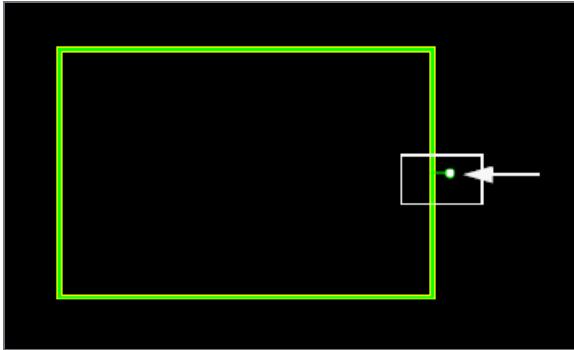
Common Viewer Tile Context Menu Overview(Continued)

Menu Selection	Description
<p>Preview Corners</p>	<p>This item is only available in the Tile Set submenu <i>before</i> acquisition. After running Preview Corners, preview images appear in the corners of the tile set.</p> 

Common Viewer Tile Context Menu Overview(Continued)	
Menu Selection	Description
Preview Edges	<p>This item is only available in the Tile Set submenu <i>before</i> acquisition. After running Preview Edges, preview images appear in center of each edge of the tile set.</p> 
Tile X, Y	Displays the row (X) and column (Y) number for the selected tile.
Tile submenu selections	
Tile	Displays the name of the selected tile. Examples include: Tile 1, 1 and Tile 1,3.
Open tile image folder	If activated, opens File Explorer to the directory that contains the tile image data.
Open source image	If activated, opens the tile's source image file with the default image viewer (Windows Picture Viewer).
Open analytics data folder	If activated, opens the tile's analytics data folder that contains the metadata files from Velox.

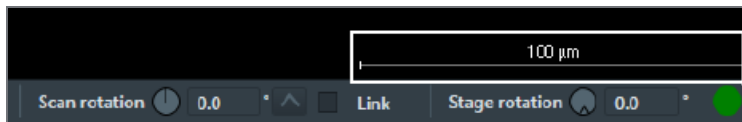
Rotation Control in the Viewer

Grab the lollipop-looking control with the mouse to easily rotate tile layers (not for TEM) and annotation layers.



Micron Bar

The micron (scale) bar scales to the magnification.



Basic Operations

This section describes the basic process flow for Maps.

Topics include:

[Launch the application](#)

[Application Window](#)

[Create a Project](#)

[Setting Options](#)

[Define a Tile Set](#)

[Tile Set Templates](#)

[Acquire a Tile Set](#)

[Import Images from Other Sources](#)

[Stage Navigation](#)

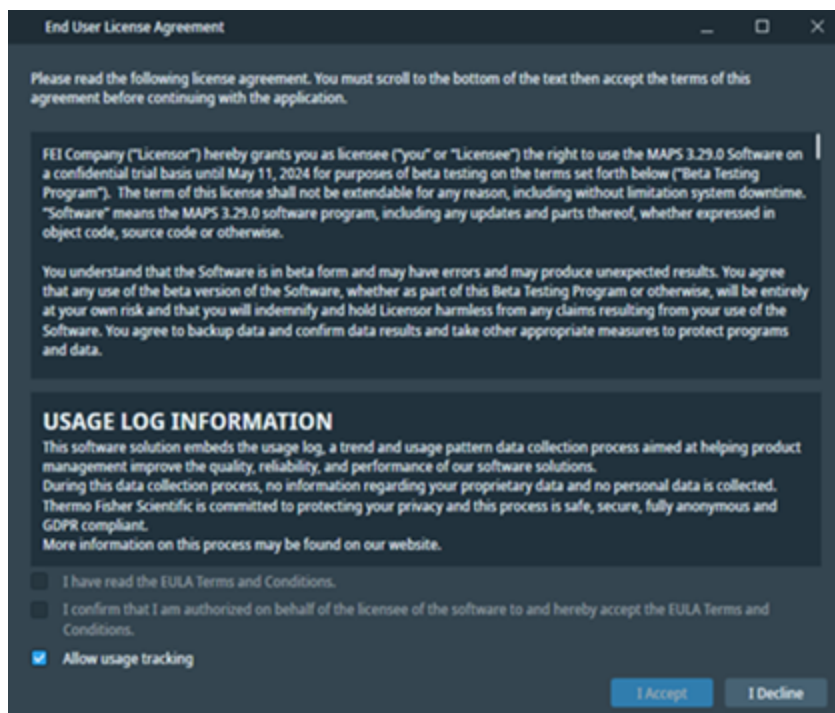
[Stitching](#)

Launch the application

Click the desktop icon , or use the Windows **Start** menu to launch the Maps application.

When the End User License Agreement dialog opens, do the following:

1. Read the entire end user license agreement by using the vertical scroll bar as you read.
2. When finished reading the end user license agreement, click **I have read the EULA Terms and Conditions**.
3. If you are authorized to accept the license agreement terms and conditions, then click **I confirm that I am authorized on behalf of the licensee of the software to and hereby accept the EULA Terms and Conditions**.
4. If you do not want the Maps application to anonymously track usage and send the data back to the Maps team, then deselect the **Allow usage tracking** checkbox.
5. If you agree with the end user license agreement terms and conditions, then click **I Accept** to proceed with the Maps application. If, however, you do not agree with the end user license agreement terms and conditions, then click **I Decline** to close the End User License Agreement dialog.

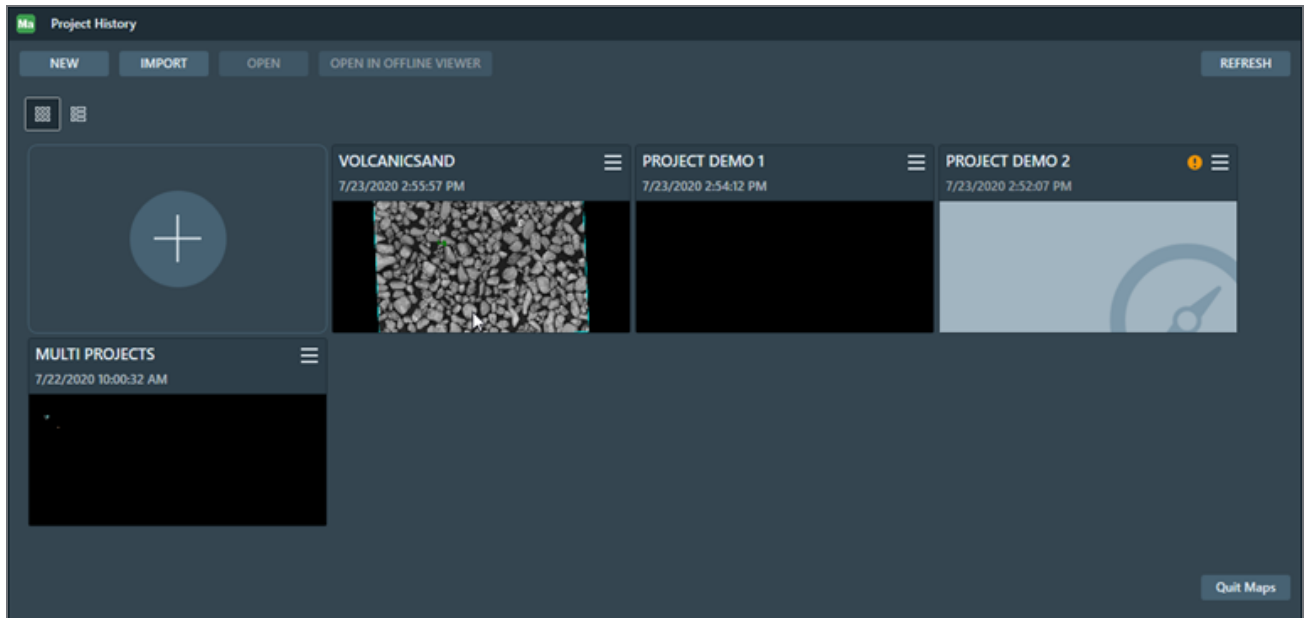


Application Window

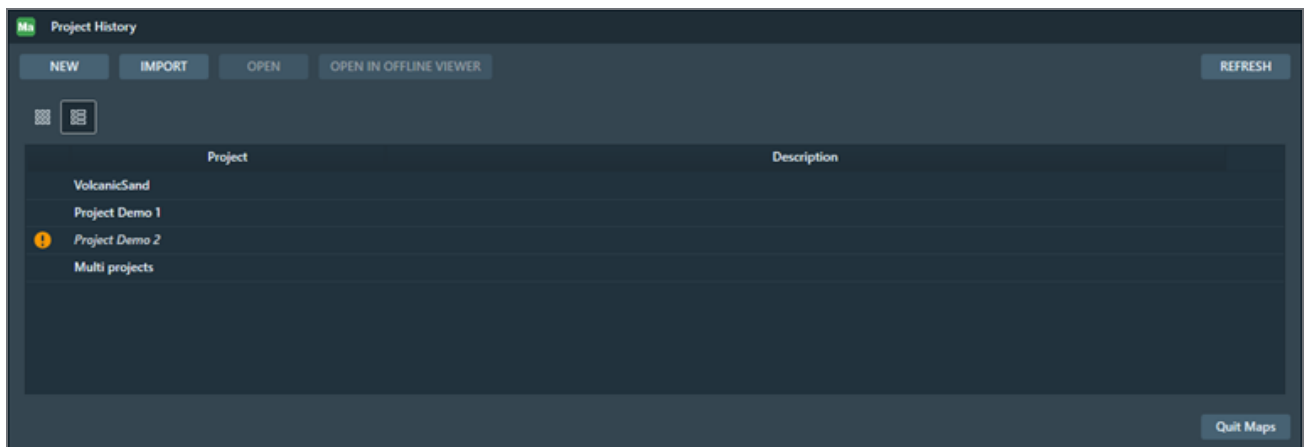
The application window appears with the **Project History** window open.

Select a display mode from the icons below the **New** button:

- **Thumb View:** Displays thumbnail images of project data.



- **List View:** Displays a list of project data.



New Project

If this is your first project, then the list/thumb view will be empty and the **Open Project** button will be unavailable. Click **New** and proceed to [Create a Project](#).

Import a Project

To import a project that was created on another system and does not appear in the project list, click **Import Project**. The project opens and its name is added to the project history list. See [Import a Project](#).

Open a Project

To open an existing project, highlight a project name in the list and click **Open Project** and then proceed to [Open a Project](#).

Yellow Exclamation Mark in Project List

This symbol appears if the project path is not found for that data, due to a disconnected network drive, USB drive, or other drive.

Refresh

Updates the status of any disconnected projects that have been reconnected properly.

Quit Maps/Cancel

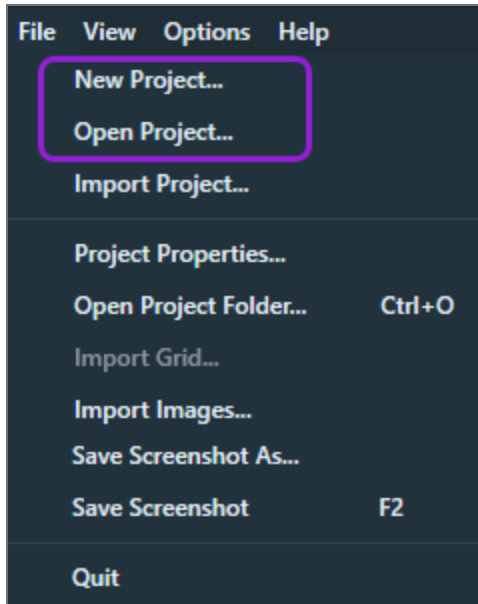
- If you have not opened a project yet, then you can directly quit Maps by clicking **Quit Maps**.
- If a project is already opened, then this button is replaced by a **Cancel** button that allows you to close the **Project History** window.

Create a Project

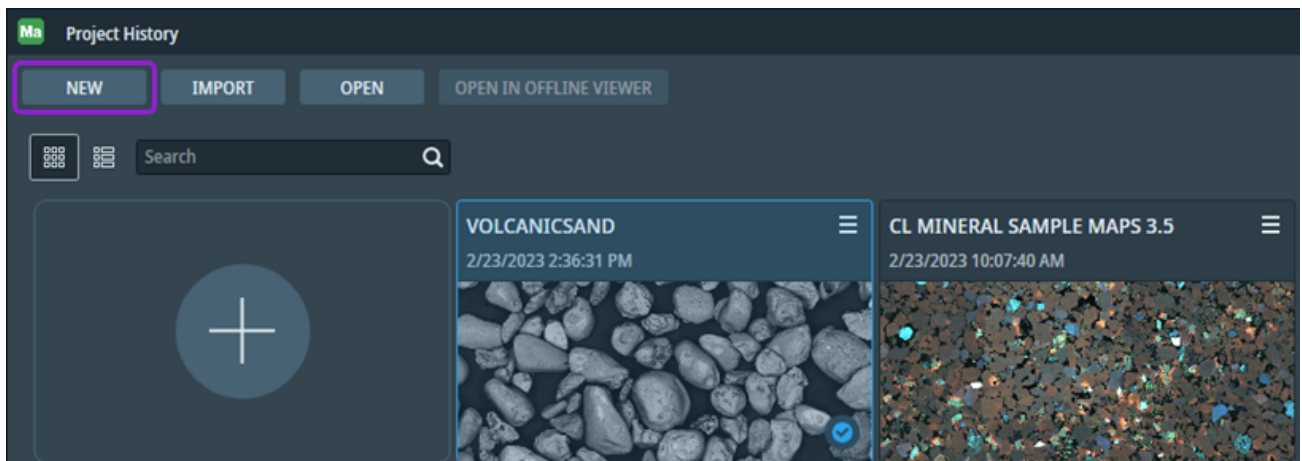
Create a new project, import a project, or open an existing project using File menu selections or Project History buttons.

New Project

1. To create a new project, click **File > New Project**.



Alternatively, click **File > Open Project** and then click **New** within the **Project History** window.



- When the **New Project** screen appears, enter the new into the **Project Name** field, enter a brief description into the **Project Description** field, select a holder from the Sample Holder dropdown menu, and then click **Create**.

Ma New Project

Project Name

Project Description

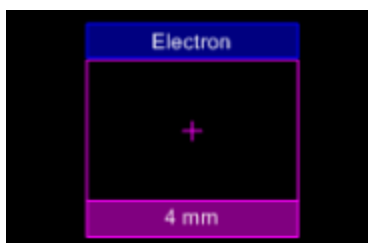
Project Path
C:\Maps Projects

Sample Holder:
3mm Grid holder

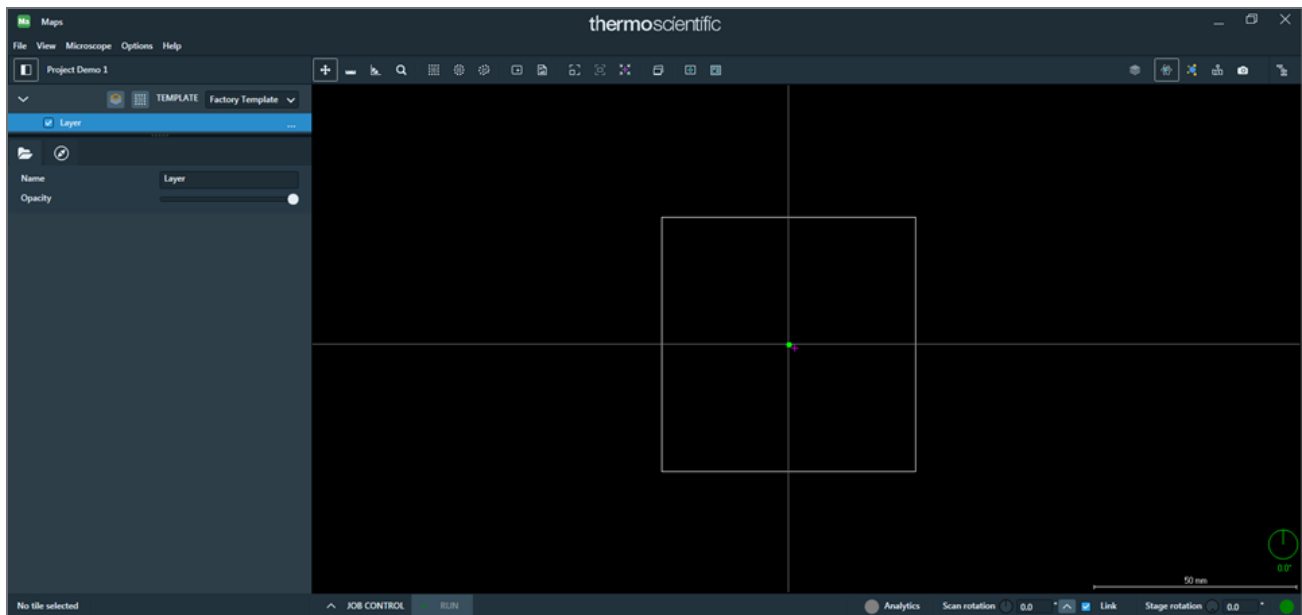
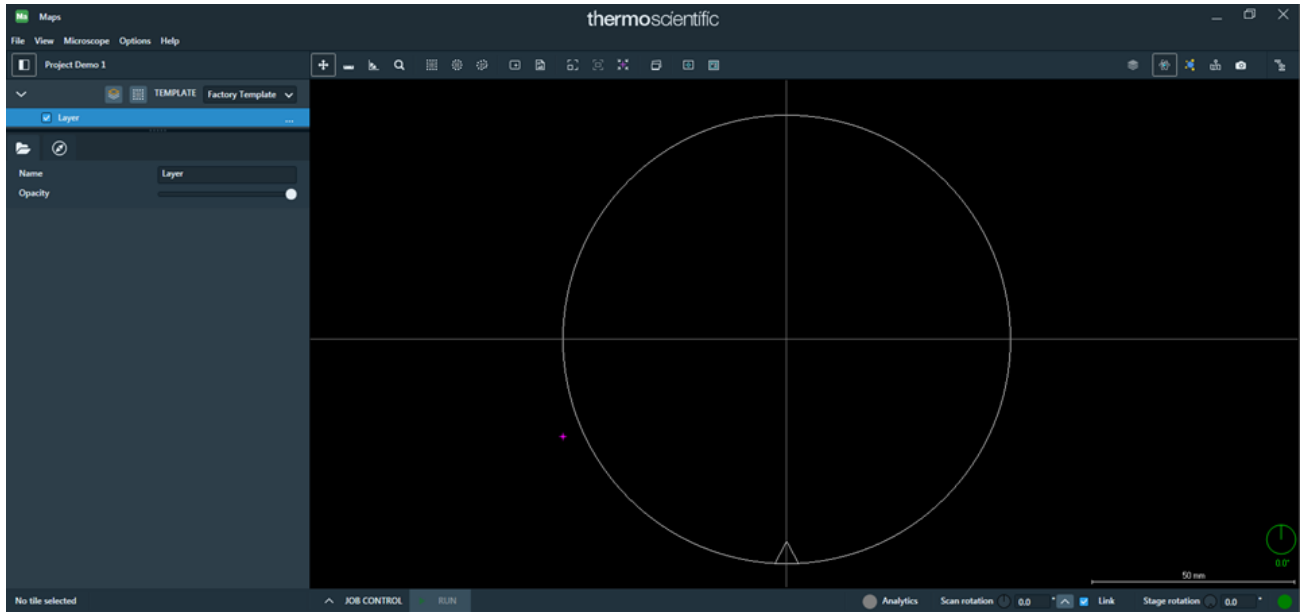
Holder:	3mm Grid holder
Version:	1.1
Manufacturer:	FEI
Part number:	1046764

Create Cancel

- The default data directory is used unless you browse to a new location.
- The new project name appears in the title of the Layer control panel and the Layer control shows a default Layer.
- The purple rectangle represents the current field of view on the sample and the purple + is the current stage position.

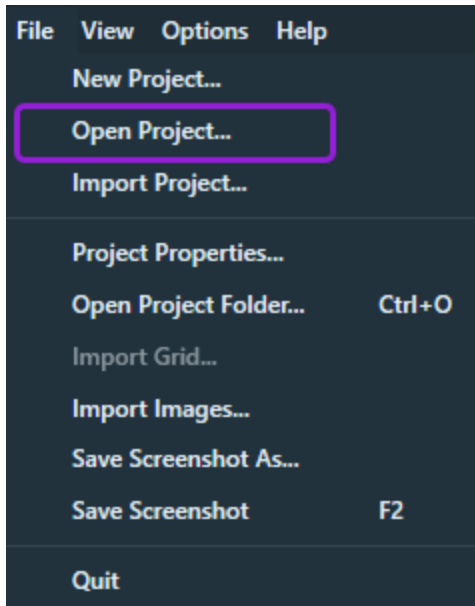


- 6. The white outline shows the stage boundaries, which can be circular or rectangular shaped depending on the instrument.

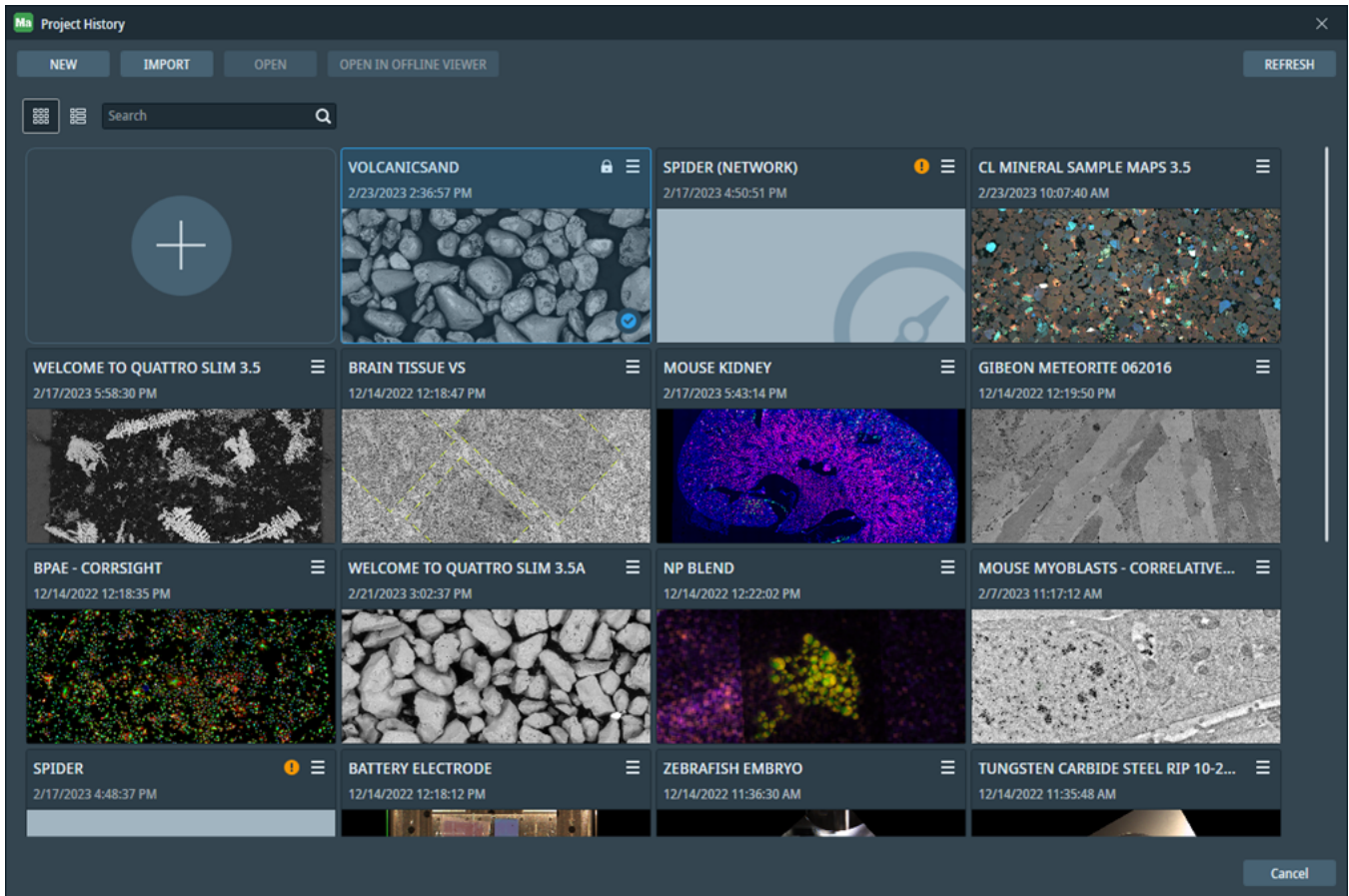


Open a Project

To select an existing project, select **File > Open Project** .



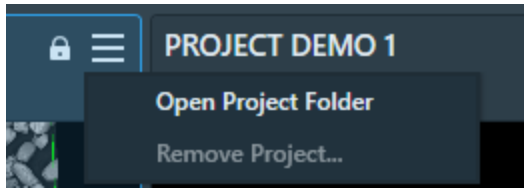
The **Project History** window appears, showing all existing projects. See the list of options below to locate, open, and search for a project.



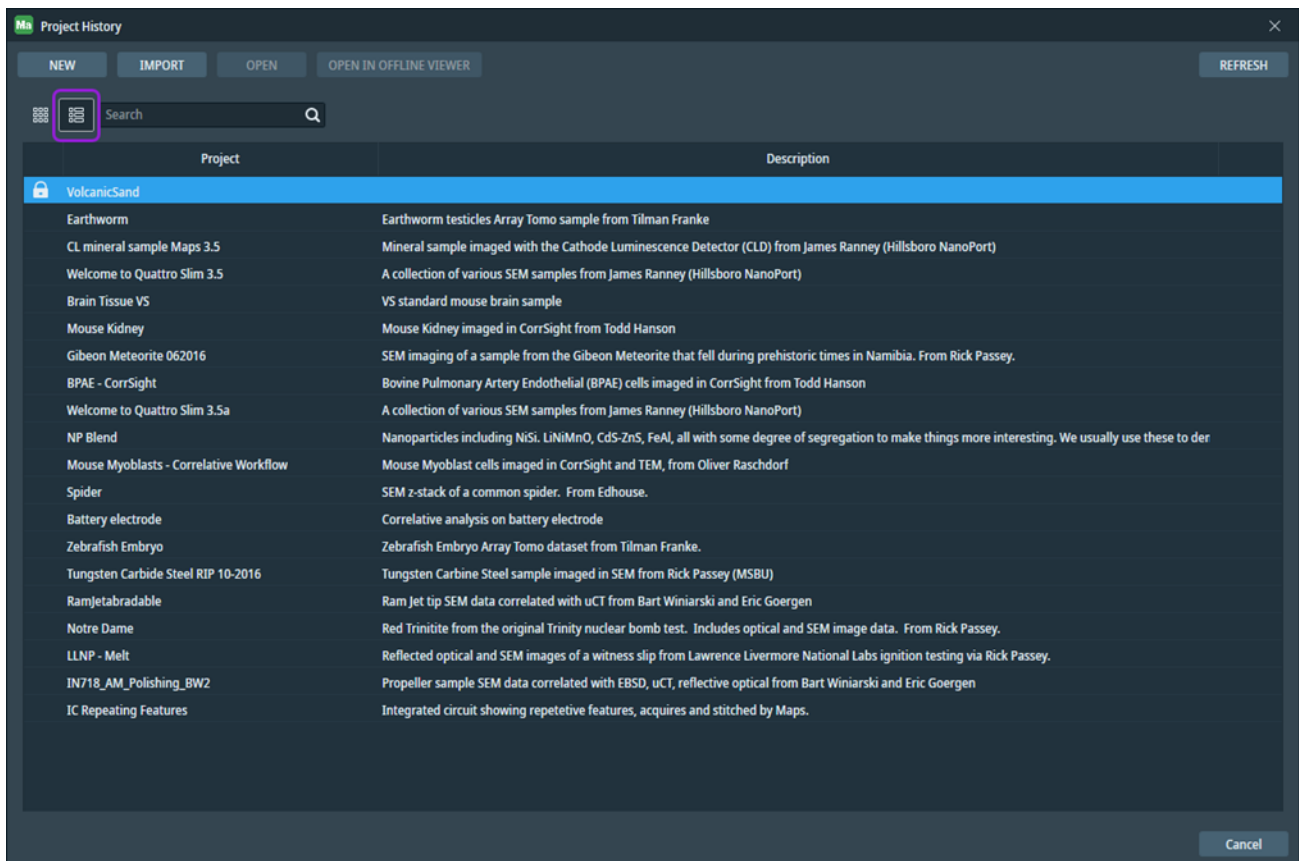
Note: The padlock located near the project title indicates that the current project cannot be opened because it is being used by the current instance or another Maps instance. The exclamation icon and a gray project title in italics indicates that the current project is not available (on a removable device).

- To open an existing project, double-click the thumbnail of the desired project and then click **OPEN**.
- To open the selected project in a new Maps Offline Viewer instance, double-click the thumbnail of the desired project and then click **OPEN IN OFFLINE VIEWER**.
- To search for an existing project, enter a project name or project description into the search bar and then click the **Search** icon.

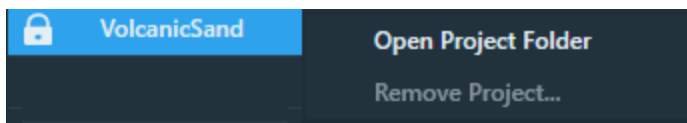
- Click the down arrow menu of the selected project to view two submenus: **Open Project Folder** and **Remove Project...**



- Click **REFRESH** to refresh the status of the project list (for example, Project not found).
- Click the **List View** icon to switch to a list view of projects.



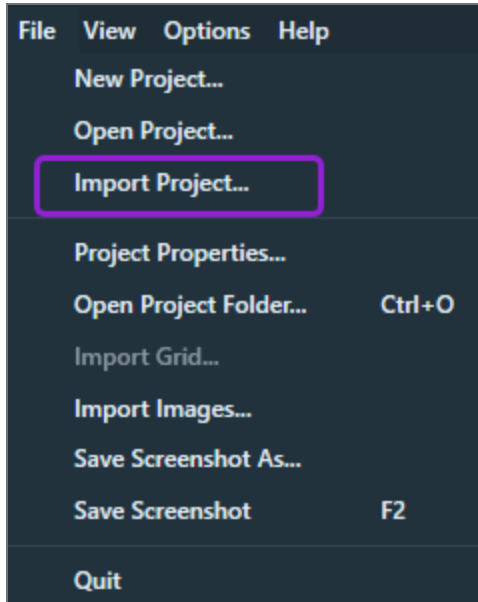
- Right-click a project name in the list view to access the submenu for opening a project folder and removing a project.



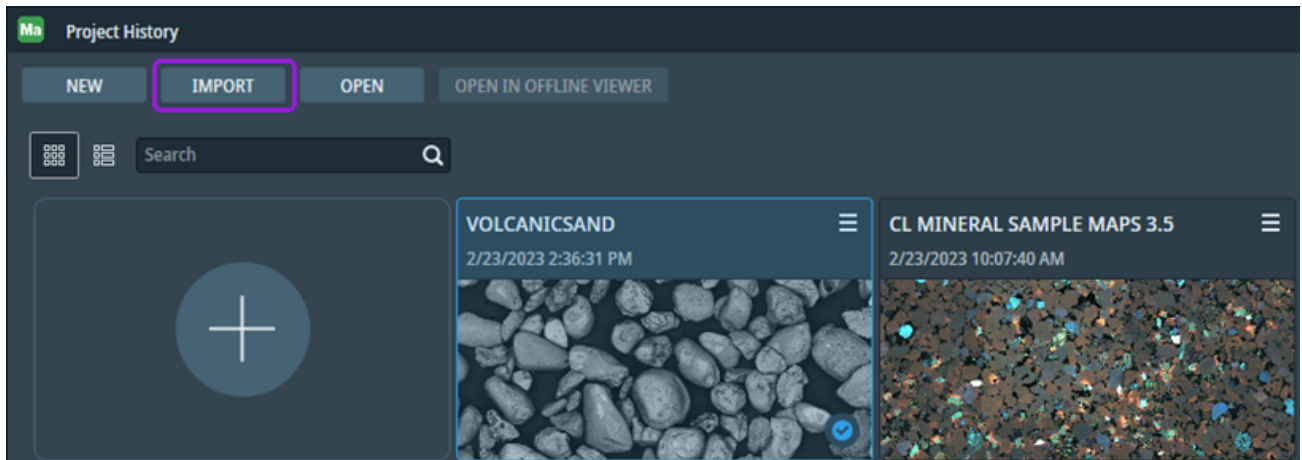
Import a Project

Importing a project is useful for passing projects between computers. Once imported, you can select it as an existing project.

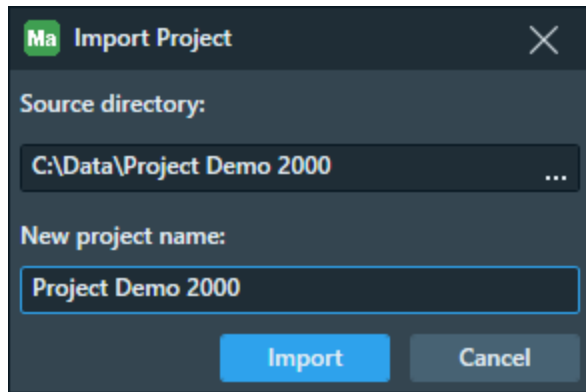
1. To import (save) an existing project, select **File > Import Project**.



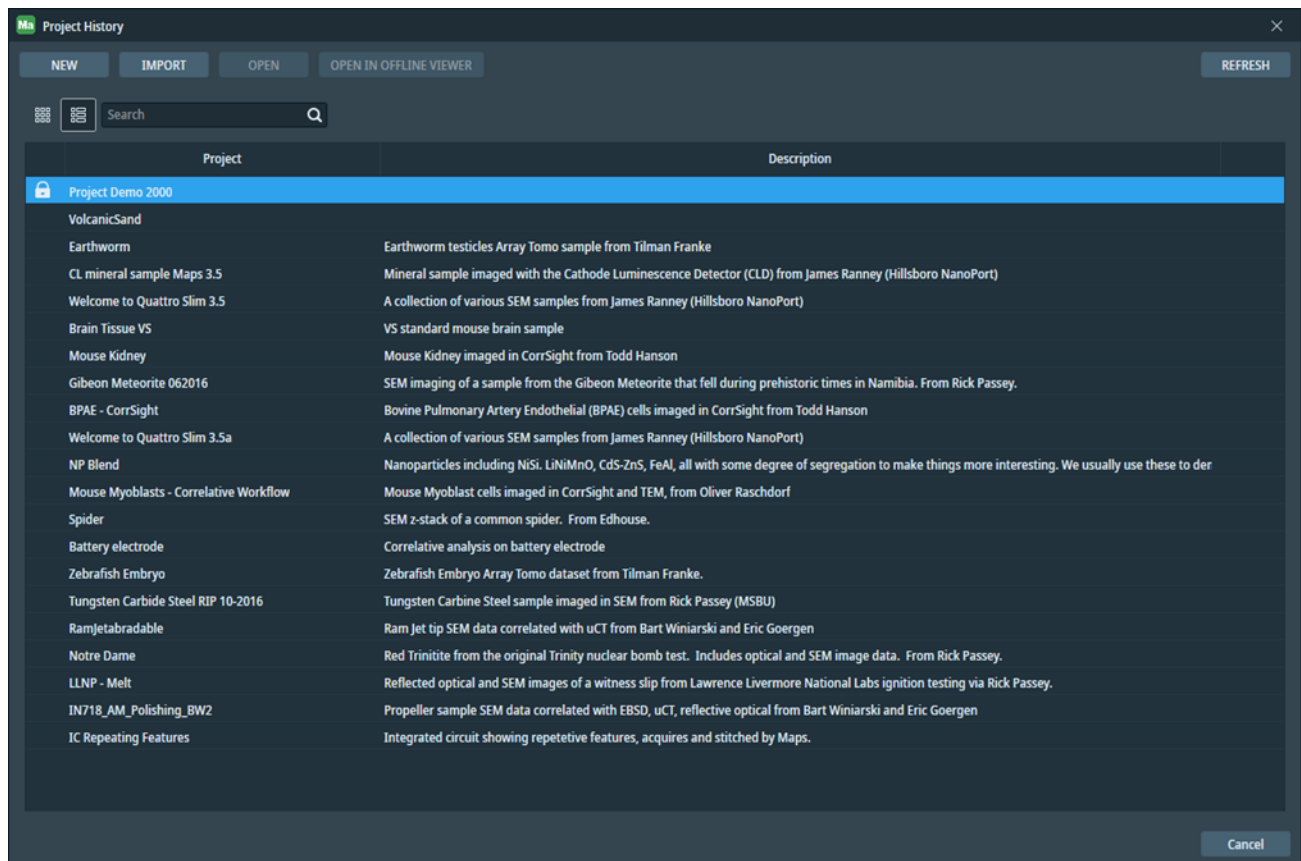
Alternatively, click **File > Import Project** and then click **Import** within the **Project History** window.



- Browse to a Source directory. Name the project to be exported and then click **Import**.



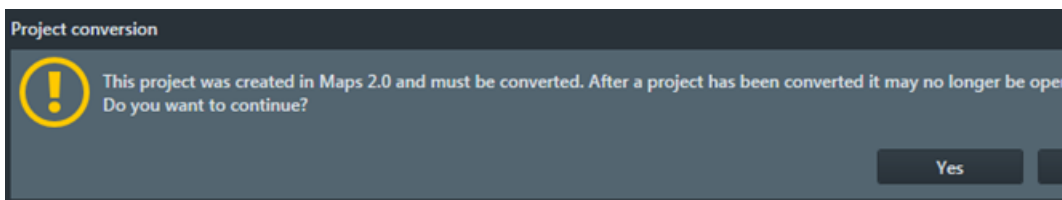
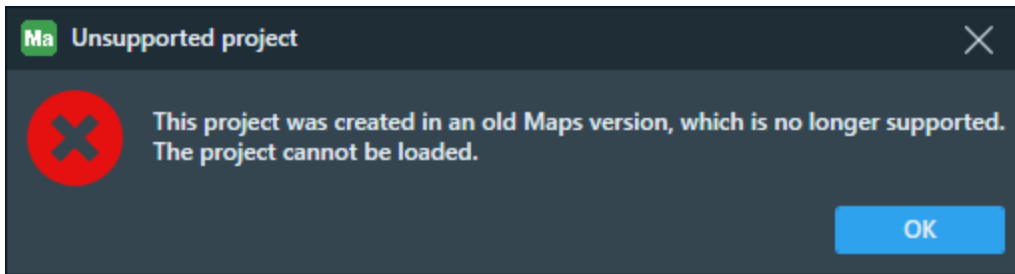
- The imported project opens and the file name is added to the project history list.



Unsupported Project version of Converting From Maps 1.1 or 2.0 Software

Only projects of Maps version 2.5 or higher can be imported. The import process is only one-way. Older software projects must be converted. When a project is imported from Maps v1.1 and 2.0, a warning is displayed telling the user that the import is one-way and the project will no longer be compatible with v1.1 and 2.0.

If you attempt to import older projects, following dialog will be displayed:



You are prompted to browse to a default location for storing project data.



We recommend that you do not use the C: drive, but you can use a supplemental data storage device such as a network drive, external USB drive, or additional internal hard drive.

Setting Options

Select new project defaults from the **Options** menu.

[Application Settings](#)

[TileSet Templates](#)

[Default Autofunctions Templates \(TEM Only\)](#)

[Microscope Settings](#)

[Snapshot Settings \(SEM/SDB Only\)](#)

[SnapShot Settings \(TEM Only\)](#)

[Animate Pan & Zoom](#)

[Nav-Cam Alignment \(SEM/SDB Only\)](#)

[Running the Automated Holder Alignment \(SEM/SDB Only\)](#)

Application Settings

Click **Options > Application Settings** to display a window for setting defaults. See [Options menu](#) for descriptions of the controls.

TileSet Templates

Click **Options > TileSet Templates** to display a dialog that shows a collection of templates and their respective settings. These settings are system specific:

- [SEM/SDB Tile Set Tab](#)
- [TEM Tile Set Tab](#)

Default Autofunctions Templates (TEM Only)

Click **Options > Default Autofunctions Templates** to display a dialog that shows a collection of templates and their respective settings. These settings are system and mode specific:

- [TEM Default Autofunction Templates](#)

Microscope Settings

Click **Options > Microscope Settings** to display the **Microscope Settings** window.

These are settings system-specific:

- [SEM/SDB Options Menu](#)
- [TEM Options Menu](#)

Snapshot Settings (SEM/SDB Only)

Click **Options > Snapshot Settings** to display the **Microscope Settings** window. See [SEM/SDB Options Menu](#).


Snapshot Settings (TEM Only)

Click **Options > Snapshot Settings** to display the **Snapshot Settings** Window. See [TEM Options Menu](#).

Animate Pan & Zoom

Click **Options > Animate Pan & Zoom** to allow a smoother transition of panning and zooming.

- **Pan:** To make a sweeping movement
- **Zoom:** To simulate movement rapidly away from or toward a subject using a zoom lens

 **Note:** This is a slower process and takes more memory.

Nav-Cam Alignment (SEM/SDB Only)

See [SEM Nav-Cam Alignment](#)

Running the Automated Holder Alignment (SEM/SDB Only)

See [Automated Holder Alignment](#).

Define a Tile Set

This section describes how to define tile sets. Refer to [Tile Set Templates](#) to learn how to change default template settings.

Topics include:

Methods

[Define a Circular Tile Set](#)

[Define a Freehand Tile Set](#)

[Stamp a Tile Set](#)

[Manually Adjust Tile Sets](#)

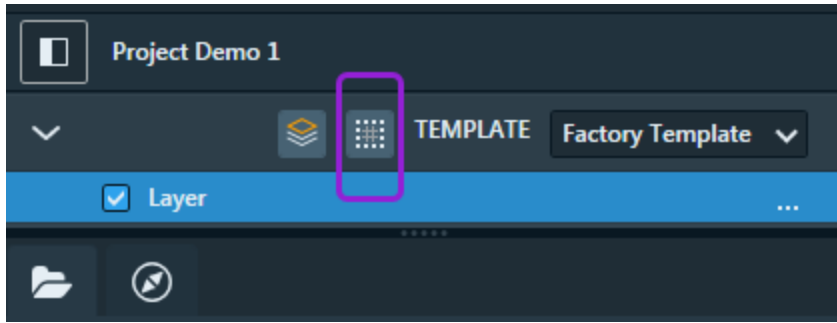
[Tile Set Display with Grid](#)

[Configure Tiling Parameters](#)

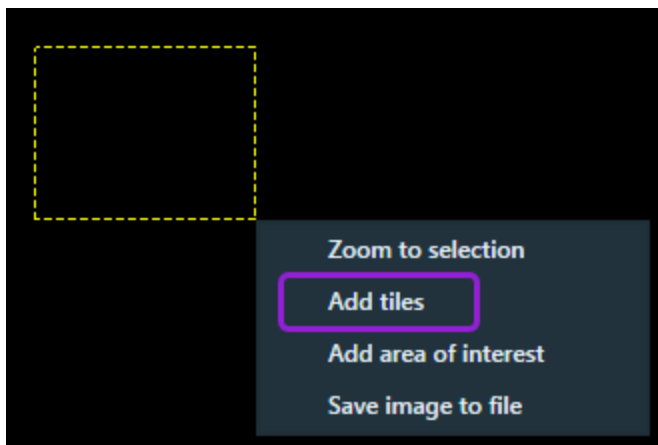
Methods

Define the tile set for your project using one of the three methods below:

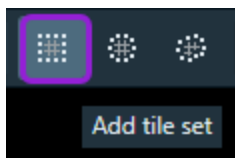
- Click the **Add Tiles** button on the Layer control.



- Press **Alt+click** and drag a rectangle in the Viewer, and then click **Add Tiles** in the menu.



- Click the **Add Tile Set** button in the tool bar, then click and drag an area in the viewer.

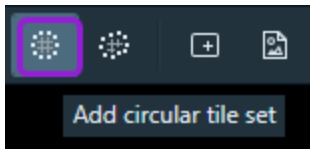


Maps creates a layer in the Layer control, depending on the type of microscope connected. You cannot create a tile set when not connected to a microscope.

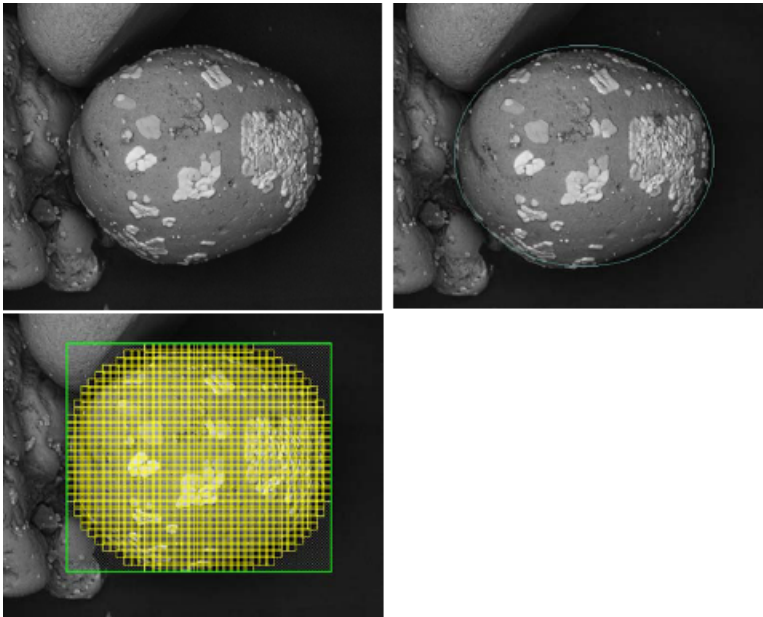
The new name is added to the list of tile sets beneath Layer in the Layer control. The Tile Set tab displays default parameters, and a grid (green square) is centered on the stage location.

Define a Circular Tile Set

Click the **Add Circular Tile Set** icon on the tool bar, then click and drag an area in the viewer to create the tile set.

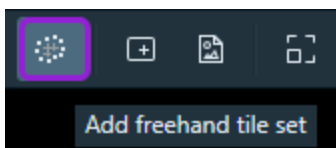


Example

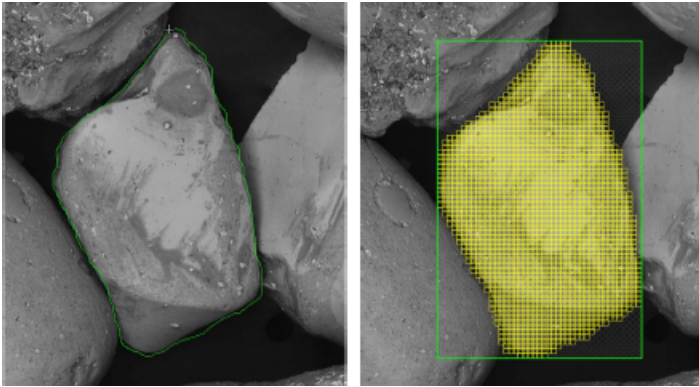


Define a Freehand Tile Set

Click the **Add Freehand Tile Set** icon on the tool bar, then click and drag an area in the viewer to create the tile set.

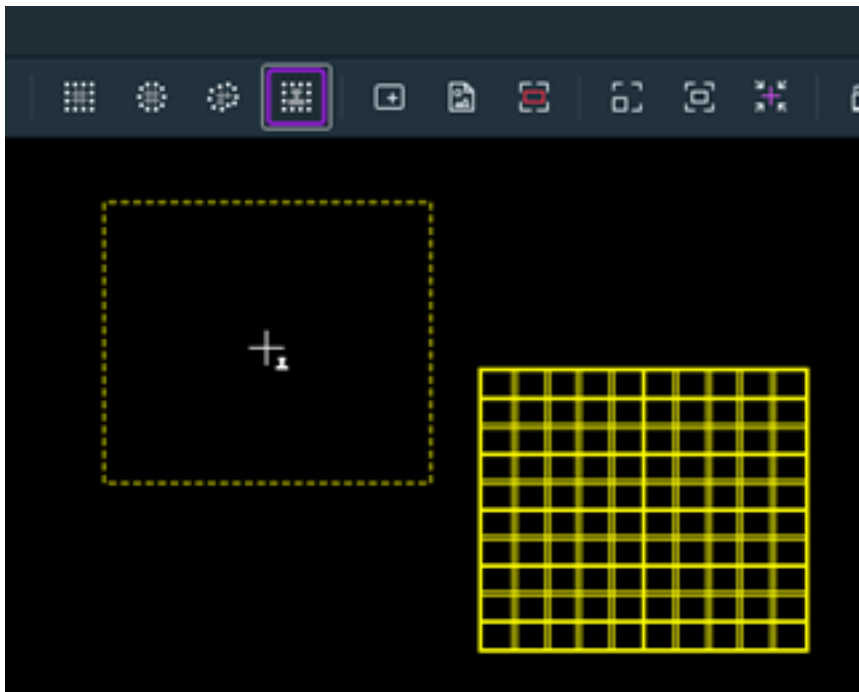


Example



Stamp a Tile Set

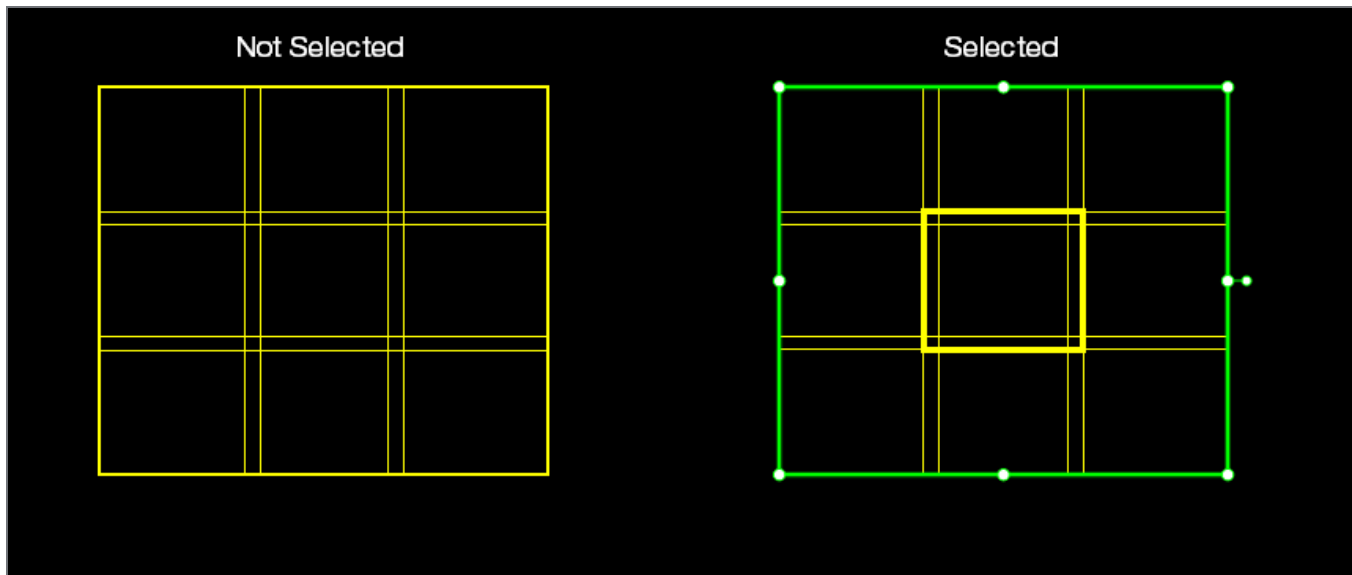
Go to the toolbar and click **Stamp Tile Set** to enter the stamp tile set mode. While in this mode, Maps creates a new tile set after each time you single-click in the Viewer. Maps creates tile sets using the active template, and it draws a tile set outline on the cursor location if it can determine the tile set size. To quit the stamp mode, either press **Esc**, right-click in the Viewer or select another tool from the toolbar.



Manually Adjust Tile Sets

Once a tile set is created, you can adjust the size of the tile set with the drag handles in the viewer.

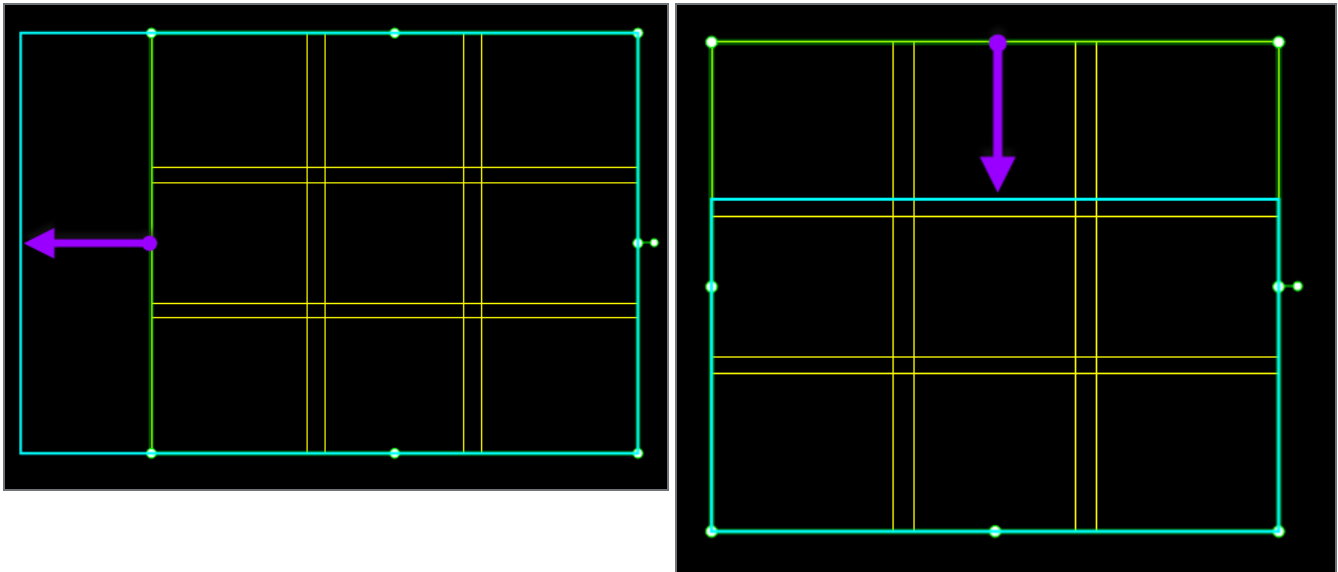
When a tile set is selected, its outline turns green and drag handles appear as small circles in the corners and on the sides of the tile set border.



Click and drag within the tile set region to reposition it. This can be performed on multiple tile sets at once by pressing **Ctrl+left-clicking** each tile set to multiselect them.

Click and drag the handles to perform resizing actions on the tile set. While dragging, you will see the adjustment result in a light blue border as shown below.

The screenshots below show resizing in process. The original border is green. The new border is light blue. The purple arrows show the direction that the border is dragged.

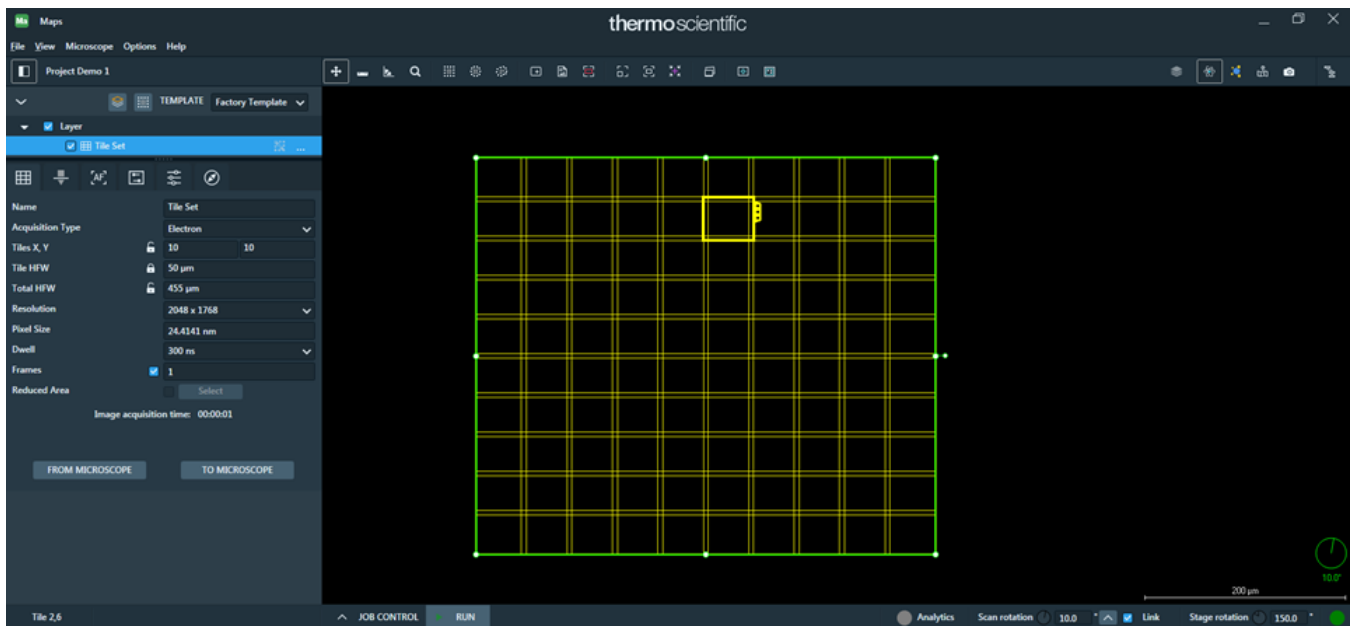


To rotate the tile set, click and drag on the small rotation control located on the side of the tile set. This can be performed on multiple tile sets at once by pressing **Ctrl+left-clicking** each tile set to multiselect them. This control is only visible for tile sets on systems that support rotation. See [Rotation Control in the Viewer](#).

Tile Set Display with Grid

Two views are shown below. They look different in STEM Mode.

SEM/SDB View



TEM View



Configure Tiling Parameters

- Change the default *tiling* parameters to customize the grid for the data you will be acquiring.
- Modify the *imaging* parameters and resize the grid for the level of detail and size you need.

Tile Set Templates

Tile Set Templates are a set of pre-defined microscope settings designed to make your workflow more efficient. You can use the factory template, or create custom templates to match your use cases.

Template terms

Here is some terminology to help you understand tile set templates.

Template

A set of tile set settings that are applied to a newly-created tile set to help create defined tile sets more efficiently.

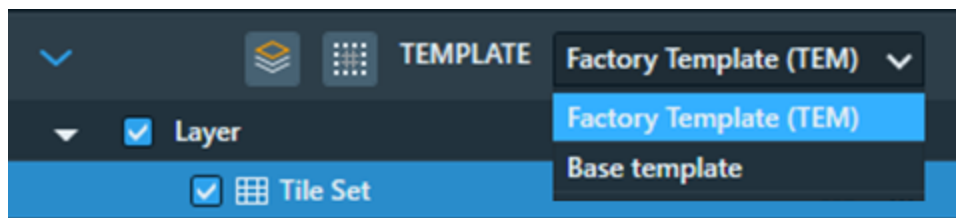
Custom template

A template created by a user.

Active template

The template that will be used when creating a tile set.

To change the active template, click the **Template** list and then click the template you want to use. The example below shows a TEM with the factory template and one custom template.



You can see your more details about your templates under **Settings > Tile Set Templates**.

Default template

A template that will be set as the active template when the Maps software is launched. The default template is initially set to the factory template until changed. Any template can be set as the default template in the ! window.

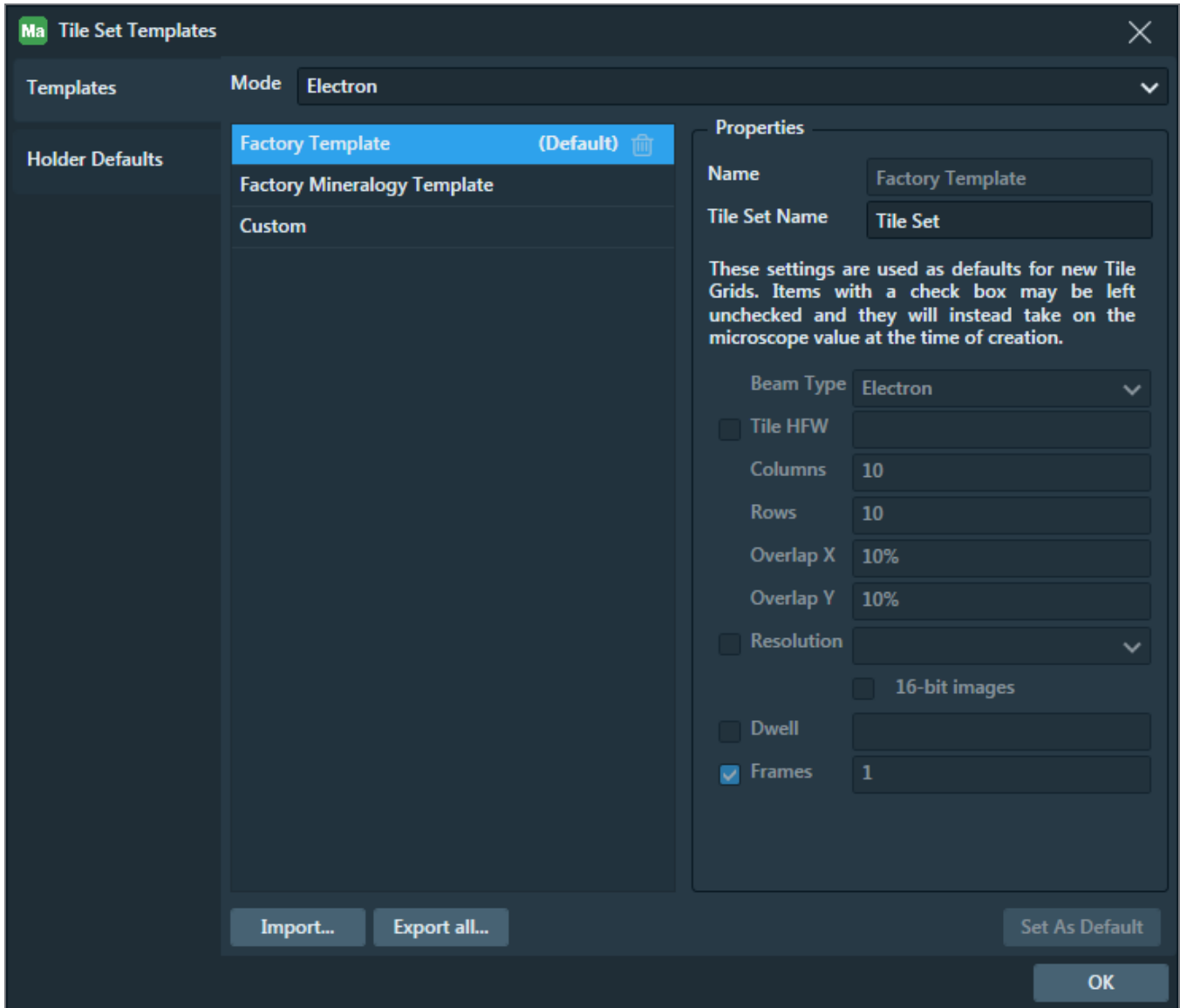
Factory template

A pre-defined, immutable template that comes with the Maps Software. There is one factory template per microscope mode.

Templates on SEM

On a SEM tool, a tile set template will have the properties shown below saved and applied when used. This screen capture shows three templates: two factory templates and one custom template. The factory template is set as the default template.

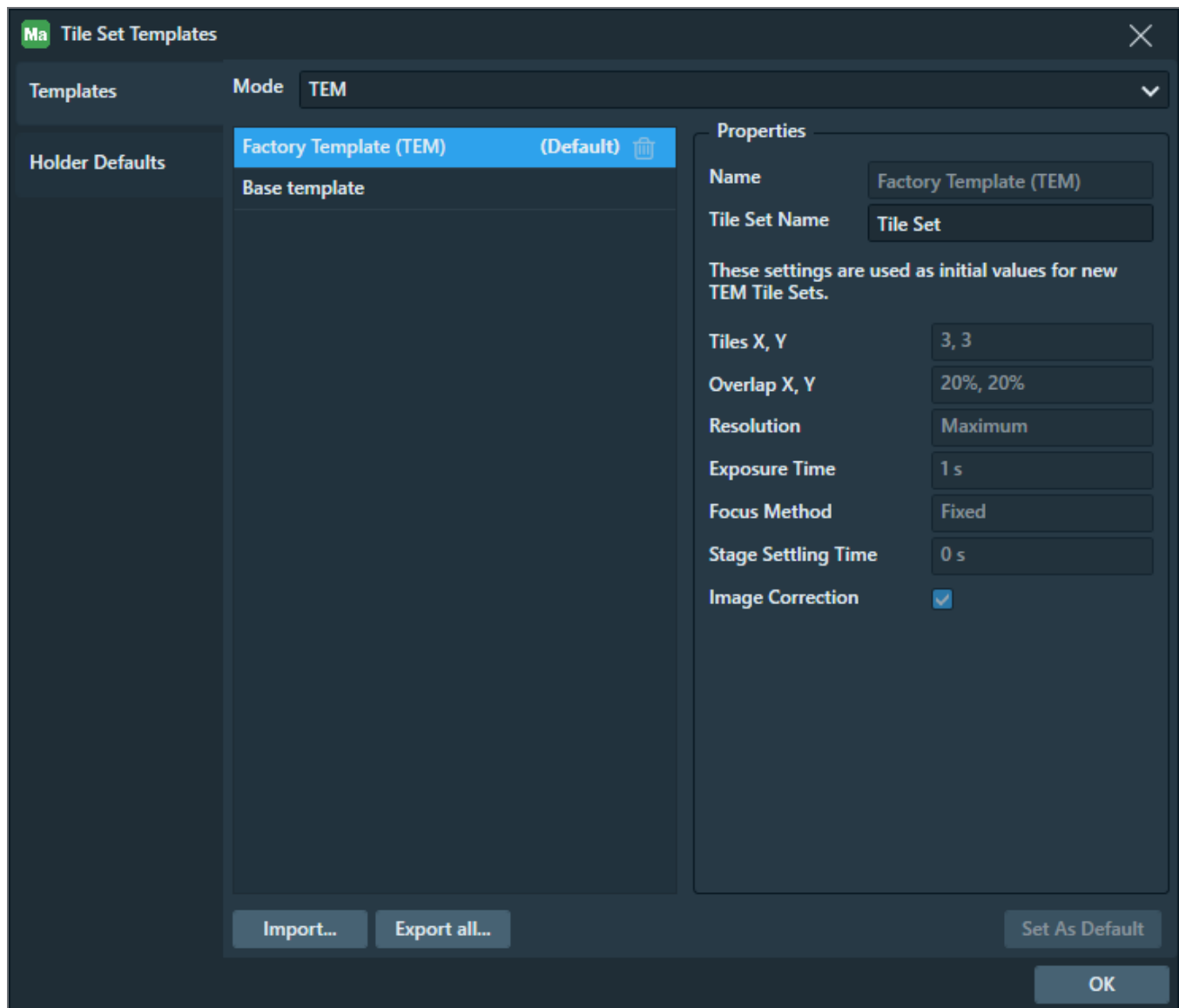
SEM Tile Set Templates window



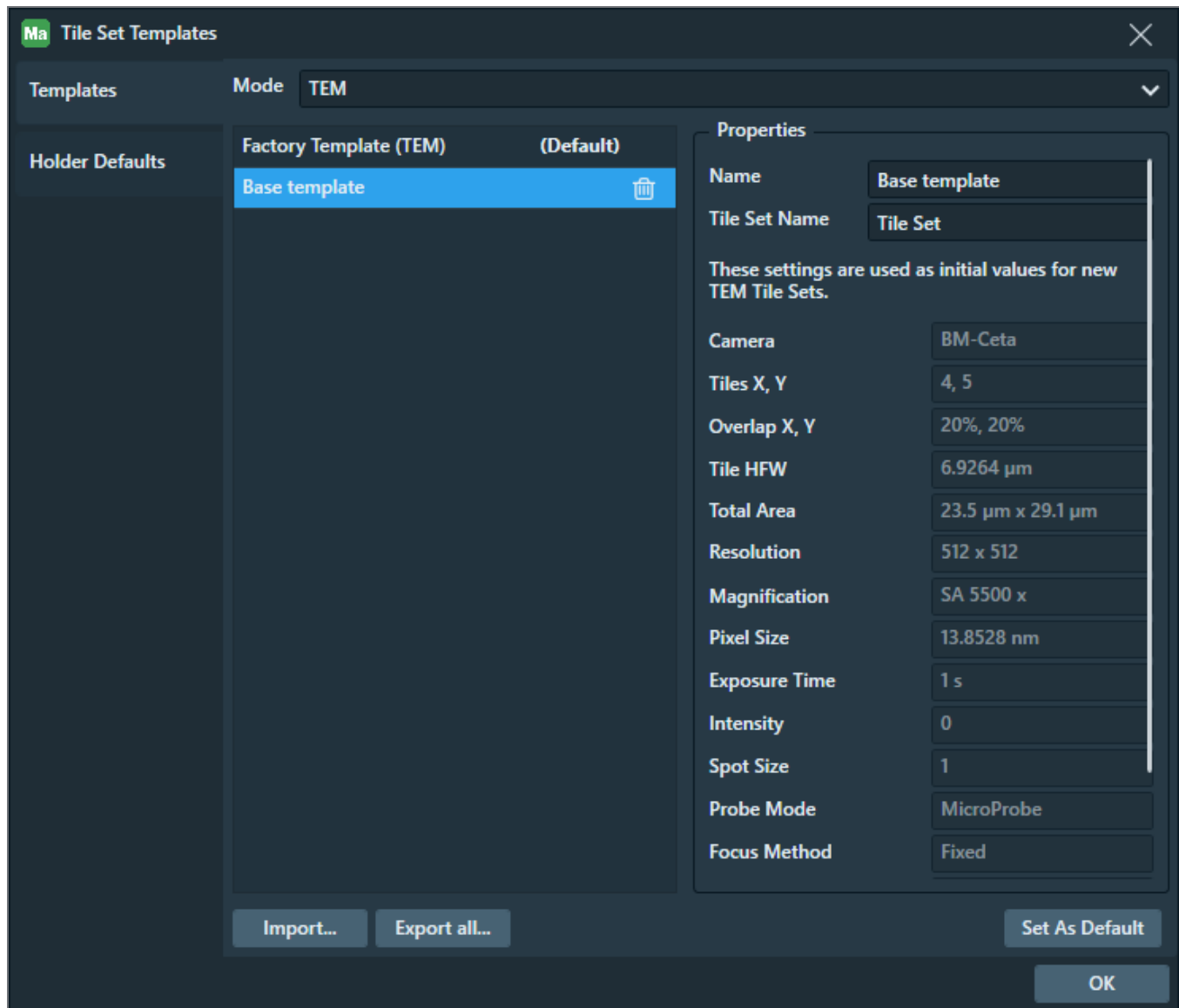
Templates on TEM

On a TEM, only the settings shown in the **Tile Set Templates** screen are saved in **Factory Template (TEM)**.

TEM Tile Set Templates screen



On a TEM, custom templates are also read-only after you set them up. You are prompted to define the settings you want when creating the template.



Tasks associated with tile set templates include:

Default templates

Depending on what type of system you are using, you can either update settings in the Default Template or choose a custom template to be the new default.

Save new Default Template settings

This procedure works on all tool types. It overrides the Default Template settings.

1. Create a tile set with the settings you want in the new default tile set template. See [Define a Tile Set](#).
2. Right-click on the tile set and then click **Save and Set As Default Template**.

Change Default Template

You can only directly edit the Default Template in SEM) but not in TEM. However, you can change the settings that Maps software uses to define default tile set templates.

Follow the steps from below.

Select a new default template

1. Create a tile set with the settings you want in the new default tile set template. See [Define a Tile Set](#).
2. Open the **Tile Set Templates** window. On the **Options** menu, click **Tile Set Templates**.
3. Click the template you want to be the new default and then click **Set As Default**.

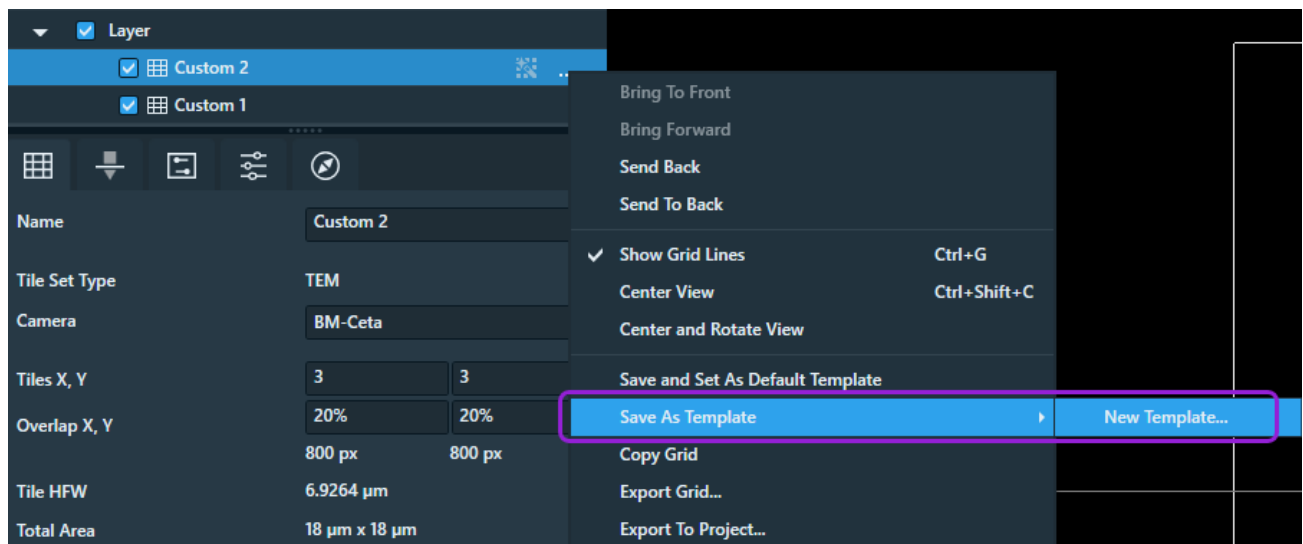
The (Default) label is displayed next to the new default template.

4. Click **OK**.

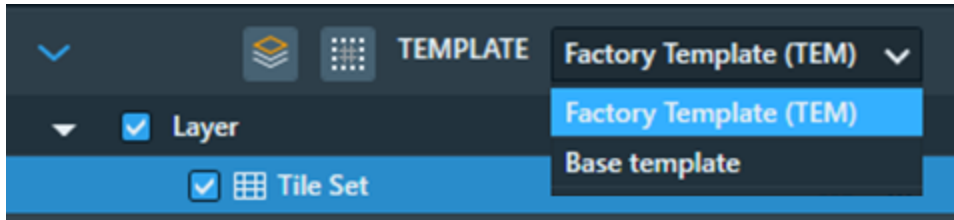
Create custom templates

Custom templates are collections of settings that you define and can reuse when you create tile sets.

1. Create a tile set with the settings you want in the custom tile set template. See [Define a Tile Set](#).
2. Right-click the tile set. In the context menu, hover the mouse over **Save as Template** and then click **New Template**.



3. On the **New Tile Set Template** window, type the **Name** of the new template.
4. Type the **Tile Set Name**. This becomes the default name of each new tile set created based on this template.
5. (SEM only) Update fields in the **Properties** section to the values you want in the custom template.
6. (SEM only) For the **Tile HFW**, **Resolution**, **Dwell**, and **Frames** fields, clear the check box if you always want Maps software to use the value from the microscope settings for that field.
7. Click **OK**. Maps software saves a new template based on the tile set settings.
8. To use the new template, click the **Template** list and then click the template you want to use.



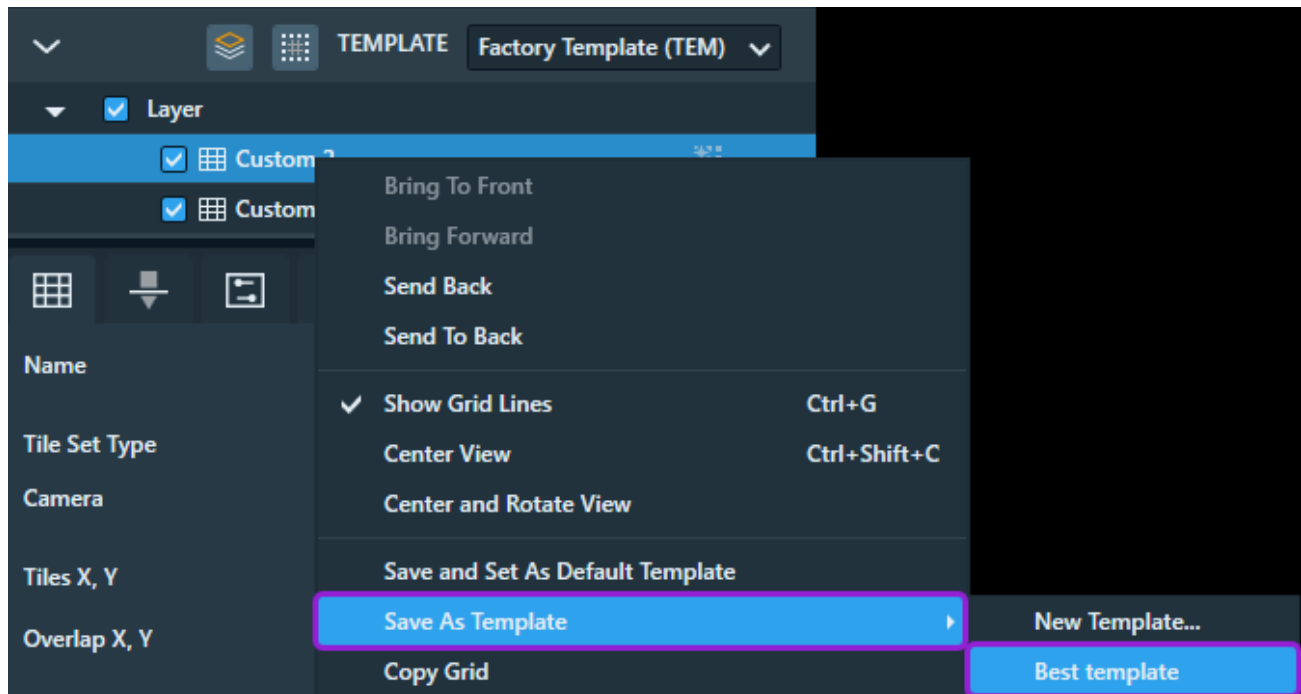
Edit custom templates

After you [Create custom templates](#), you can change or edit the settings to match your needs.

Edit a custom template (TEM)

You cannot directly edit custom templates on TEM microscopes, but you can override them.

1. Create a tile set with the settings you want in the custom tile set template. See [Define a Tile Set](#).
2. Right-click the tile set. In the context menu, hover your mouse over **Save as Template** and then click the name of the template you want to update.



Maps software updates the tile set template settings. All new templates created with that template use the new settings.

Edit a custom template (SEM)

1. Open the **Tile Set Templates** window. On the **Options** menu, click **Tile Set Templates**.
2. Click the template you want to edit.
3. Update fields in the **Properties** section to the values you want in the template.
 - If you clear the check box next to the **Tile HFW**, **Resolution**, **Dwell**, or **Frames** fields, then Maps software always uses the value from the microscope settings for that field.
 - Click **Reset** to reset the template to the default settings.
4. When you are done editing settings, click **OK**.

Delete custom templates

You cannot delete the template marked as (Default).

1. Open the **Tile Set Templates** window. On the **Options** menu, click **Tile Set Templates**.
2. Click the template that you want to delete.
3. Click the trash can icon.

Maps software deletes the template.

Import and export tile set templates

Maps software allows you to export tile set templates developed on one tool and import them onto another.

Import tile set templates

This procedure replaces all current templates with the imported set, including the default. You cannot recover the tile set templates replaced by the import process.

1. Obtain an XML file containing tile set templates and save it on your local machine. See [Export tile set templates](#) for instructions.
2. Open the **Tile Set Templates** window. On the **Options** menu, click **Tile Set Templates**.
3. Click **Import**.
4. Navigate to the XML file that contains your templates and then click **Open**.

Maps software replaces your current custom templates and the settings in the **Default Template** with the templates in the imported file.

Export tile set templates

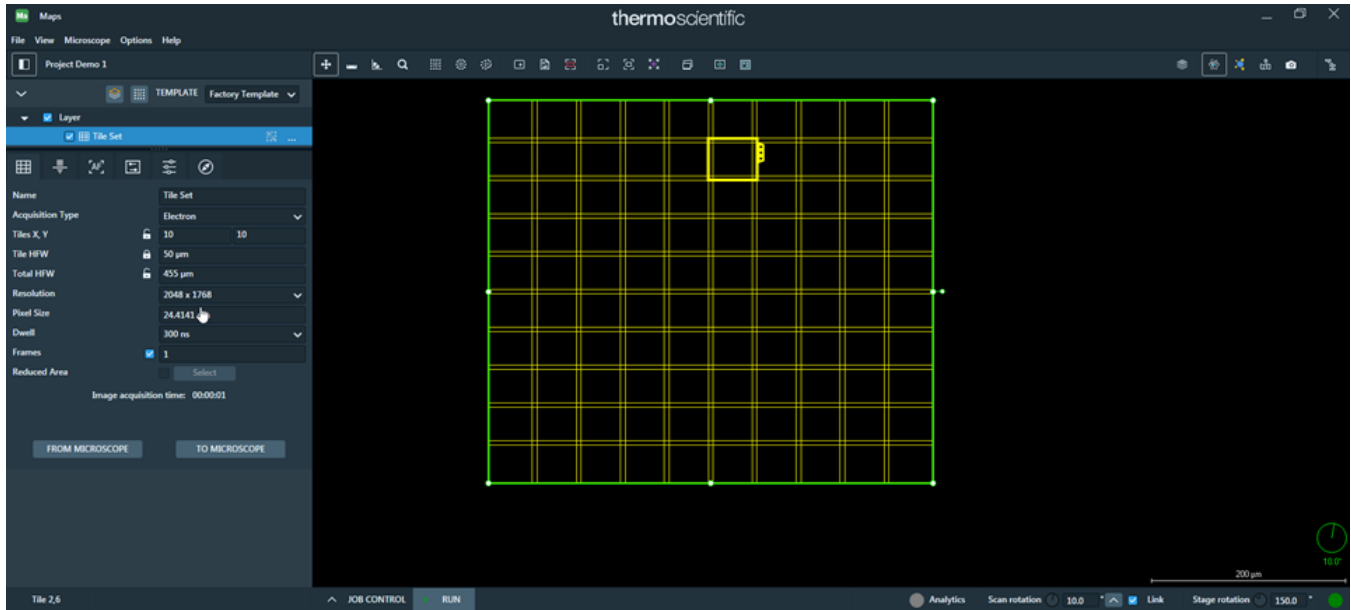
You can export tile set templates from a Maps software installation on one tool to another. Once exported, you can import the templates on another tool using [Import tile set templates](#).

1. Open the **Tile Set Templates** window. On the **Options** menu, click **Tile Set Templates**.
2. Click **Export all**.
3. Navigate to the place you want to save the XML file that contains your templates and then click **Save**.

Acquire a Tile Set

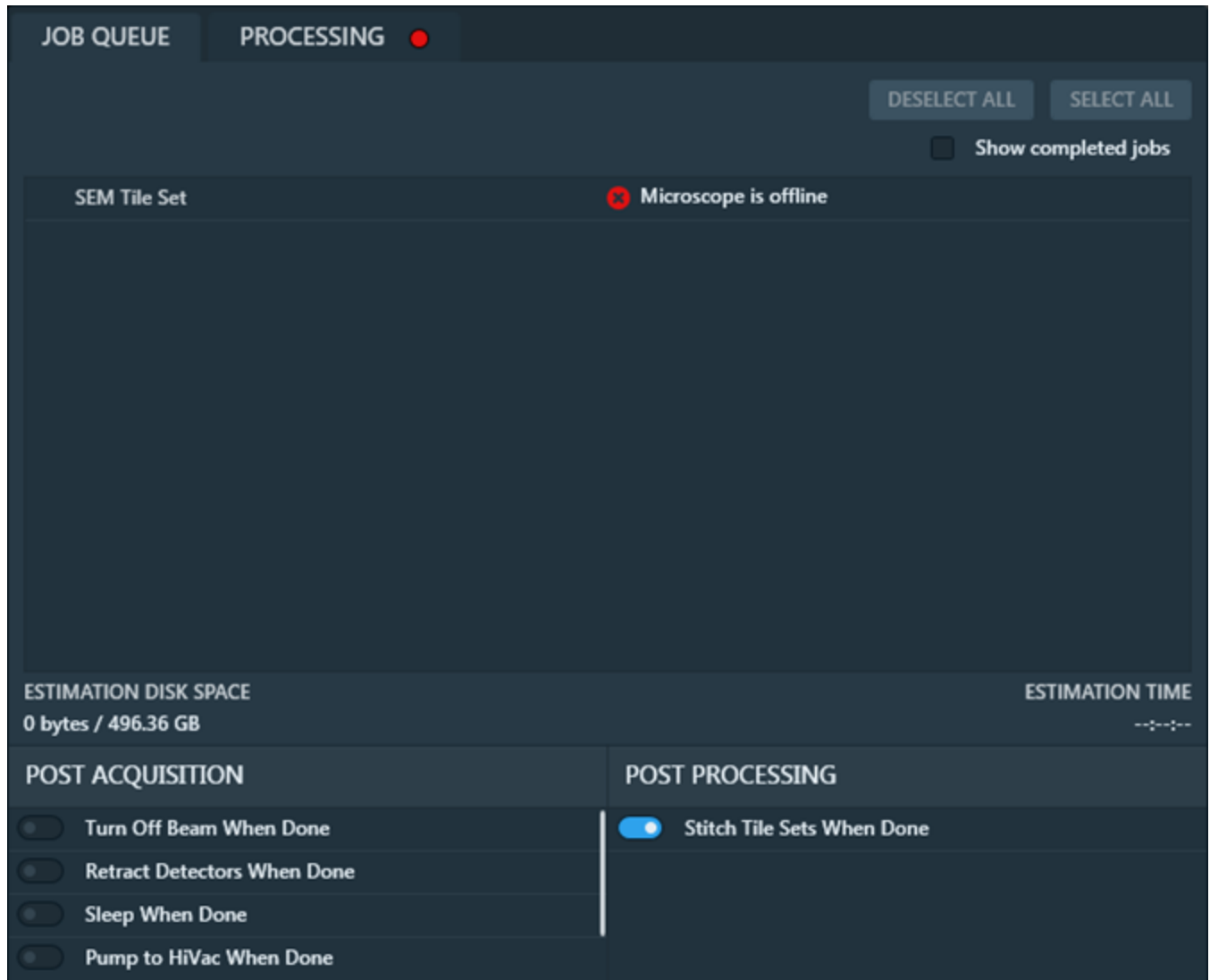
When ready to begin acquisition, click **Start Execution** located in the status bar next to **No Job**.

Tile images are registered for stitching as they are acquired and displayed in the grid. The tile sets are colored as they are registered to give immediate feedback on the stitching confidence. See [Tile Set Grid Color Key](#).



Preconditions

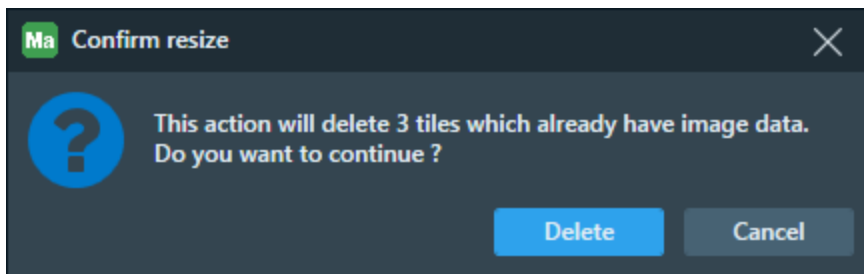
Microscope preconditions must be met to proceed with tile set acquisition. For example, if the microscope is not enabled or an acquisition parameter is invalid, then a validation error appears in relation to the tile layer and you cannot start acquisition.



Re-Adjust Acquired Tile Sets

When a tileset is acquired, you can adjust the size of the tile set with the drag handles in the viewer. See [Manually Adjust Tile Sets](#) for instructions.

When you resize an acquired tile set in such a way that some acquired tiles will be deleted (smaller in either dimension), you are asked to confirm the action:

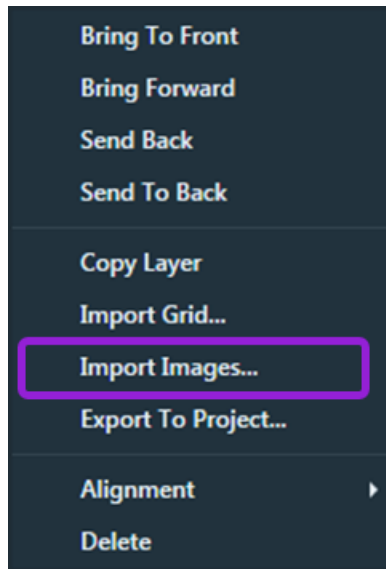


- Click **Delete** to delete acquired tiles.
- Click **Cancel** to cancel the resize operation.

Import Images from Other Sources

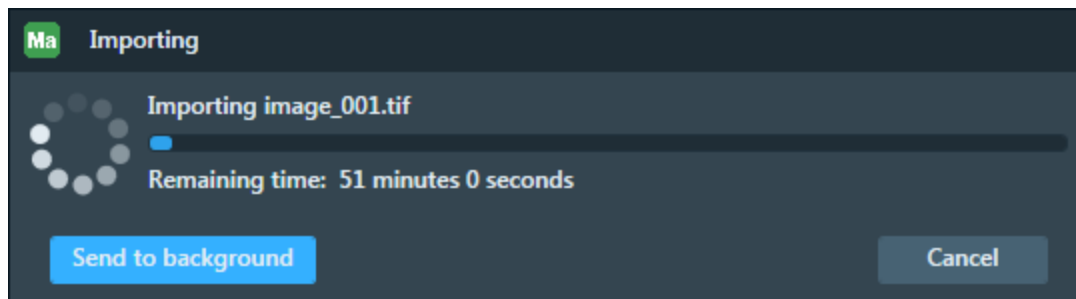
You can import an external image for navigation purposes to find the area of interest.

1. Right-click on a Layer in the Layer control and then click **Import Images...** on the context menu that appears.



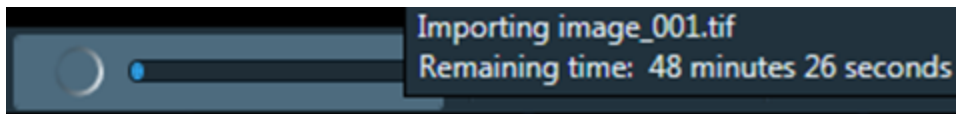
2. In the standard **Open** window that appears, browse to a saved image and then click **Open**. Most standard image formats are supported, including BMP, JPG, GIF, PNG, and TIFF. Various microscopy, scientific, and biological image data formats are also supported including LIF, MRC, RAW, and LEI as well as DICOM data with DICOMDIR, DIC, DCM, and other DICOM standard formats.

In the importing dialog that appears, you can cancel an image import or send the import to the background.

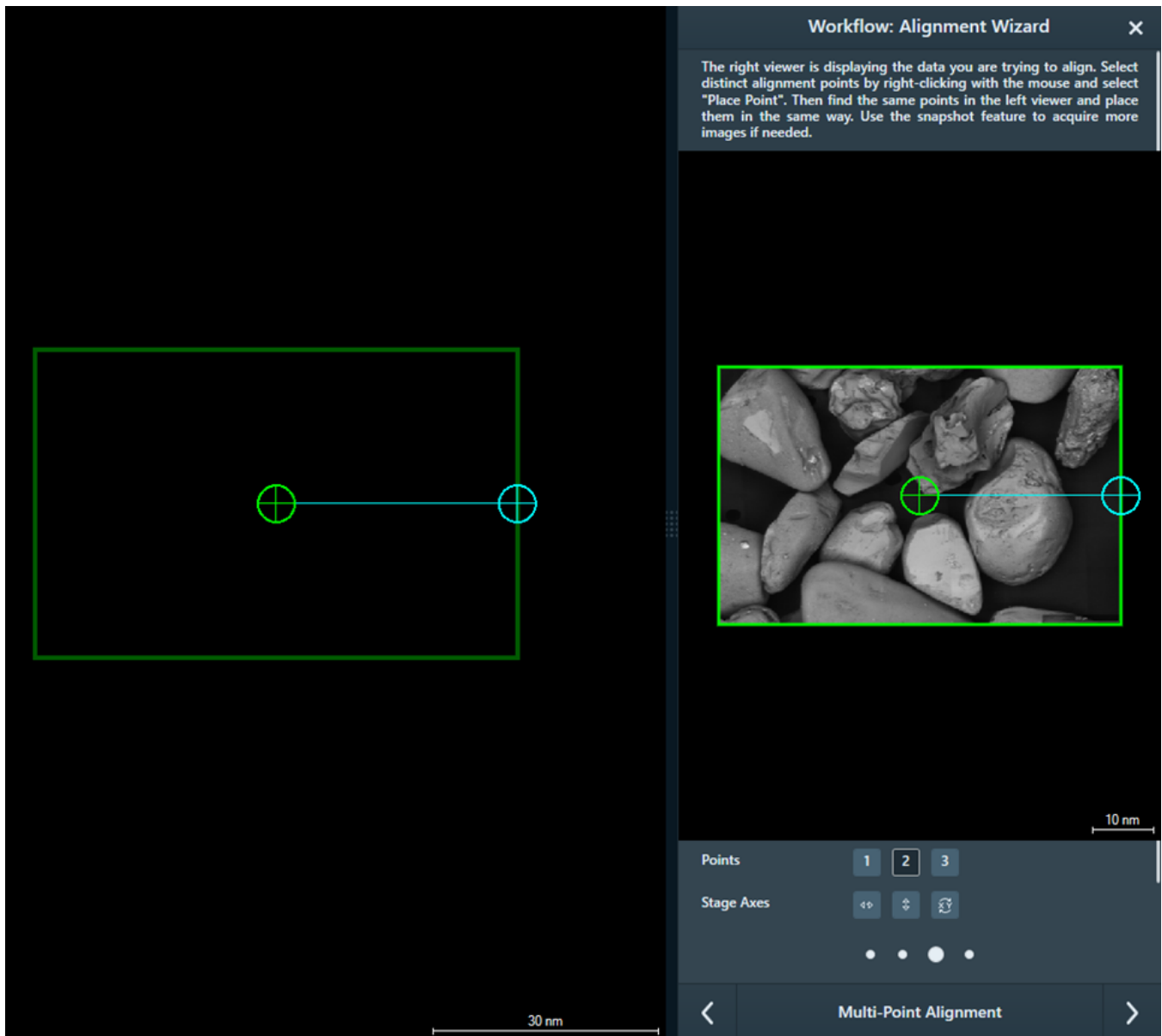


Sending the import to the background allows you to use Maps while the import is running. When the import is in the background, other image imports are unavailable.

You can track the background import with the status bar import control. Click the control to reopen the importing dialog.



The imported image is displayed to the right of the main viewer while the alignment workflow is in progress. See [Manual Alignment](#).



If you imported an image with known stage position (like Nav-Cam images, SEM/SDB images), then you are finished. Otherwise continue to the next step.

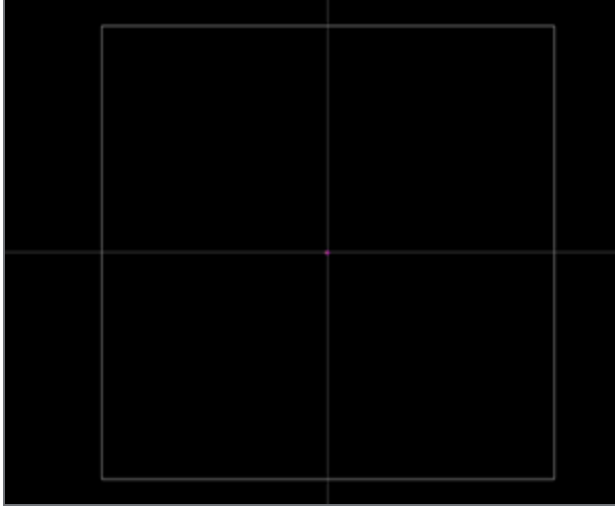
3. Align the two images with a simple one-, two-, or three-point alignment procedure: Move the alignment points on the imported image to match the feature on the tile set image and then click **Next**. See [Coarse Alignment \(1-, 2-, or 3-Point\)](#) for detailed information.

After clicking **Finish**, the viewer is restored to full size and the newly imported image is displayed aligned to the stage. The imported image name is added to the Layers panel.

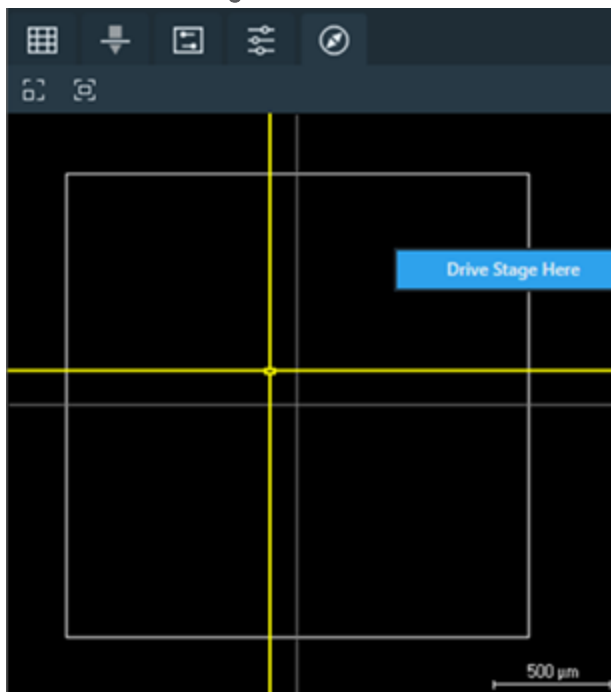
Stage Navigation

To move the stage to a location, do the following:

1. Double-click anywhere within the stage boundaries as shown by the white circle or square.



2. In the [Overview Viewer](#), right-click anywhere within the stage boundaries as shown by the white circle or square and click **Drive Stage Here**.



Stitching

After a tile set with at least one tile has been acquired, the **Stitch** action is made available.

[Initiate Stitching](#)

[Manual Alignment](#)

[Stitching Job Options](#)

[Stitching Profile Best Practices](#)

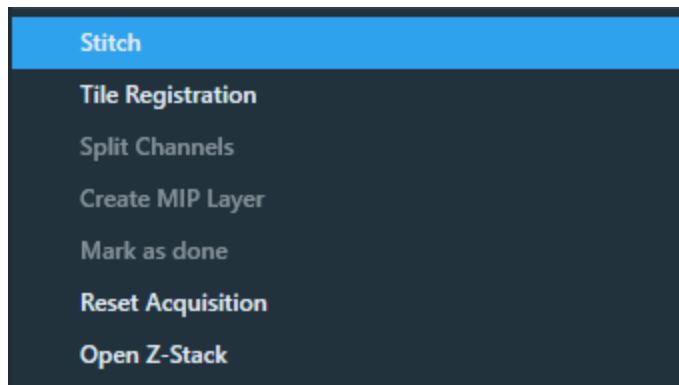
Initiate Stitching

Stitch single tile set

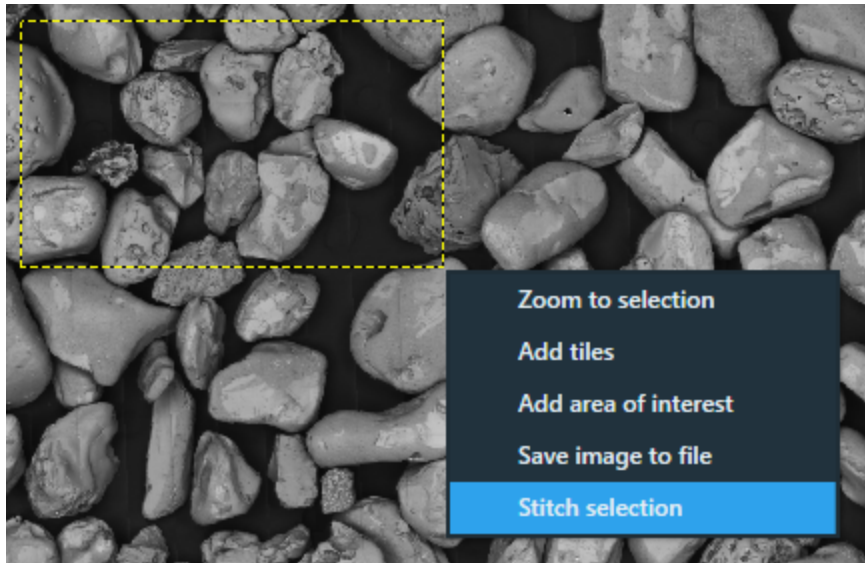
Select the acquired tile set in the Layer control, and then do one of the following:

- Click **Stitch** in the tile set context menu.

The manual UI appears so that you can confirm the tile alignments.



- Or, left-click and drag a rectangle around the tile sets to be stitched and then click **Stitch Selection** in the stitch context menu.



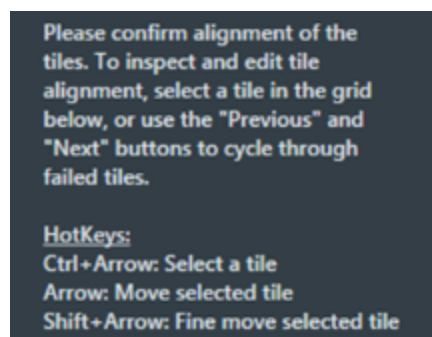
Stitch selection stitches all tiles inside the rectangle for the selected tile set. Tiles that are partially inside the rectangle are included as well. See [Alt +Left-Click and Drag Selected Area](#).

Stitch multiple tile sets

Select the acquired tile sets in the Layer control, and then click **Stitch** in tile set context menu. Note that the manual UI alignment of tiles is skipped, and the acquired tile sets will be stitched using the default stitching options (see [Stitching Job Options](#)).

Manual Alignment

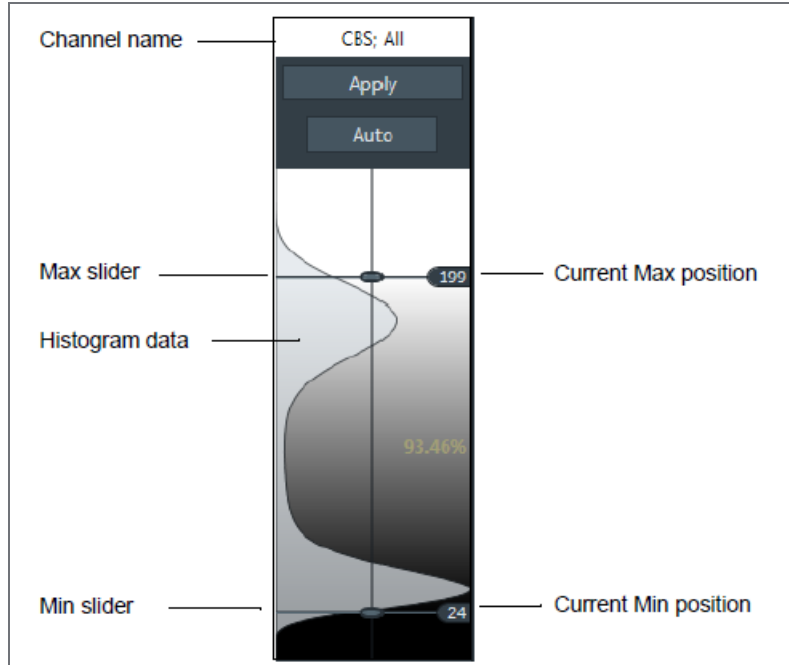
Follow the guided instructions to confirm or edit the alignment of the tiles.



Stitching Manual Alignment Histogram

Displays the histogram for the Stitching Channel.

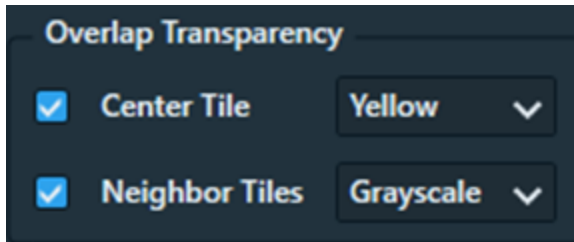
Stitching Manual Alignment Histogram



Stitching Manual Alignment Histogram Overview	
Interface Item	Description
Channel name	For SEM/SDB only: Displays the channel name, which is the detector name.
Apply	Applies changes to the histogram.
Auto	When selected, continuously adjusts the min and max for the histogram display.
Semi-log	When selected, changes the histogram intensity display to logarithmic.
Current Max position	Displays the current max slider position.
Histogram data	Displays the histogram data for the selected channel.
Current Min position	Displays the current min slider position.

Overlap Transparency

Overlap Transparency options are available for assigning a color for the **Center Tile** and its **Neighbor Tiles**.



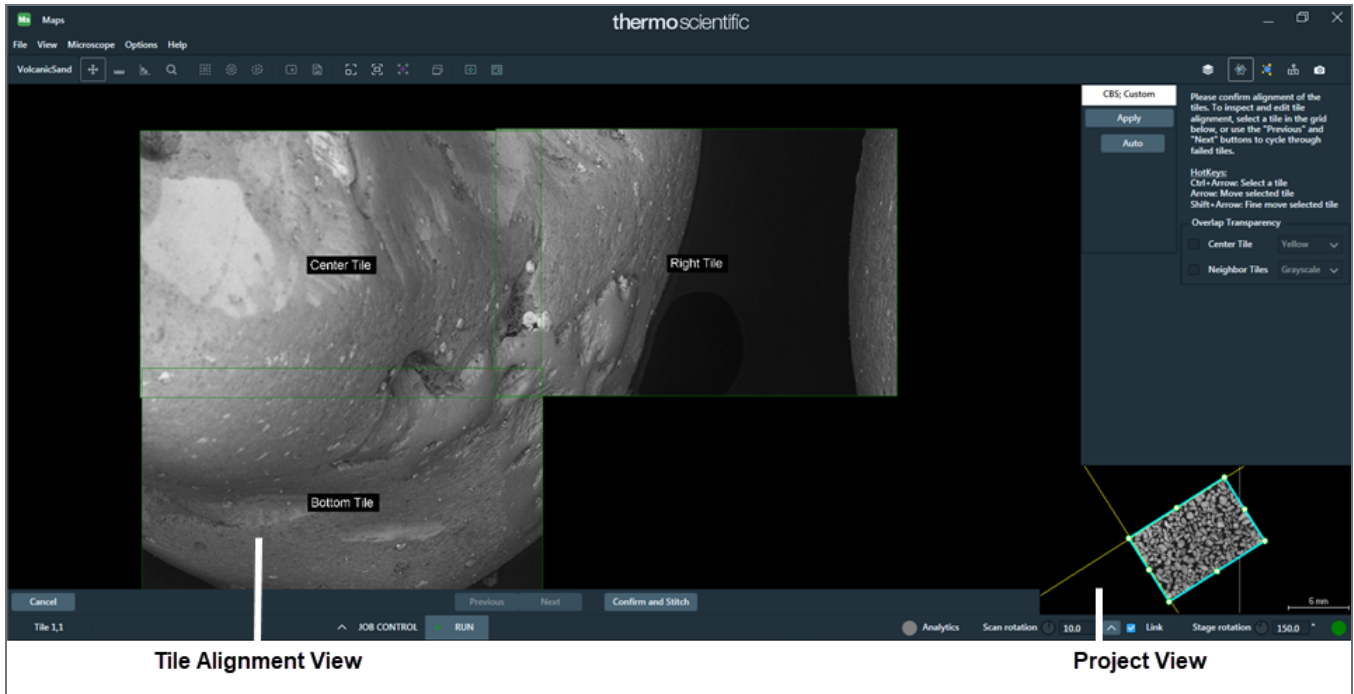
Transparency is useful for seeing through the layers to line up the tiles in manual tile alignment.

Two Views

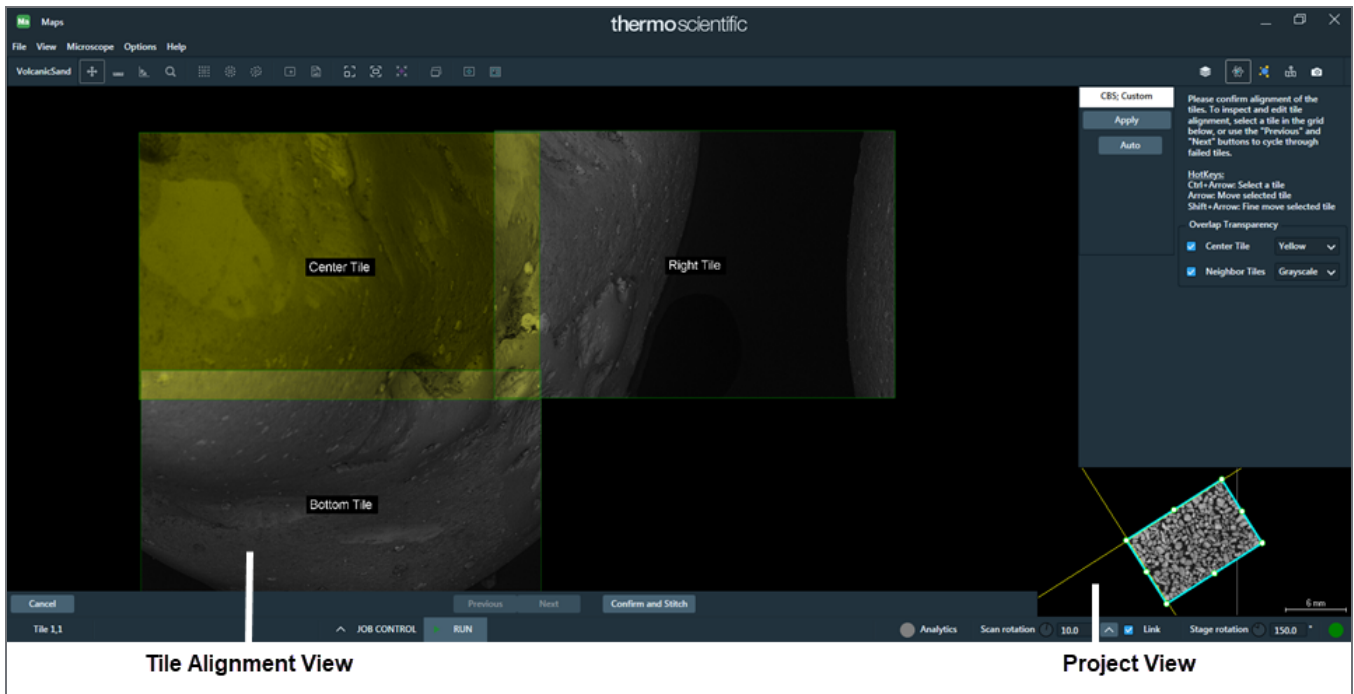
Manual stitching makes use of two views.

- The **Tile Alignment View** is the larger view:
 - This view displays the currently selected tile and its top, bottom, left and right neighbors. The positions of the neighboring tiles are based on their individual registrations to the center tile. This is not the same as the final position when stitched, which will be a result of the optimization of all tile-to-tile registrations of the tile set.
 - When manual alignment is first initiated, the first tile that failed alignment is selected and displayed here.
 - The view can be panned and zoomed in the same way as the other views. The center tile is fixed, but you can click left-mouse+drag to move its surrounding tiles.
- The **Project View** is the smaller version of the standard viewer in the bottom right.
 - This is a miniaturized version of the standard Maps project view.
 - It can be panned, zoomed, and each tile can be selected with the mouse. When a tile is selected, it appears as the center tile in the Tile Alignment View, and it can then be manually aligned to its neighbors.

Manual Alignment with Transparency Off



Manual Alignment with Transparency On



Stitching Alignment Status Color Key

Each tile outline is colored to indicate stitching alignment status.

- **Green:** The automatic tile alignment succeeded.
- **Orange:** One side of the tile alignment failed, but another succeeded. These tiles do not require manual alignment.
- **Red:** The tile failed to align with either neighbor, which means that there is not enough valid registration for a tile or one of its neighboring tiles to be properly positioned in the larger picture. Often multiple tiles can be red, but only one tile needs to be manually connected to the green tiles to achieve alignment for all. After realignment, the outline turns **blue**.

Realign Failed Tiles

Use the **Next** and **Previous** buttons to jump through the list of failed tiles.

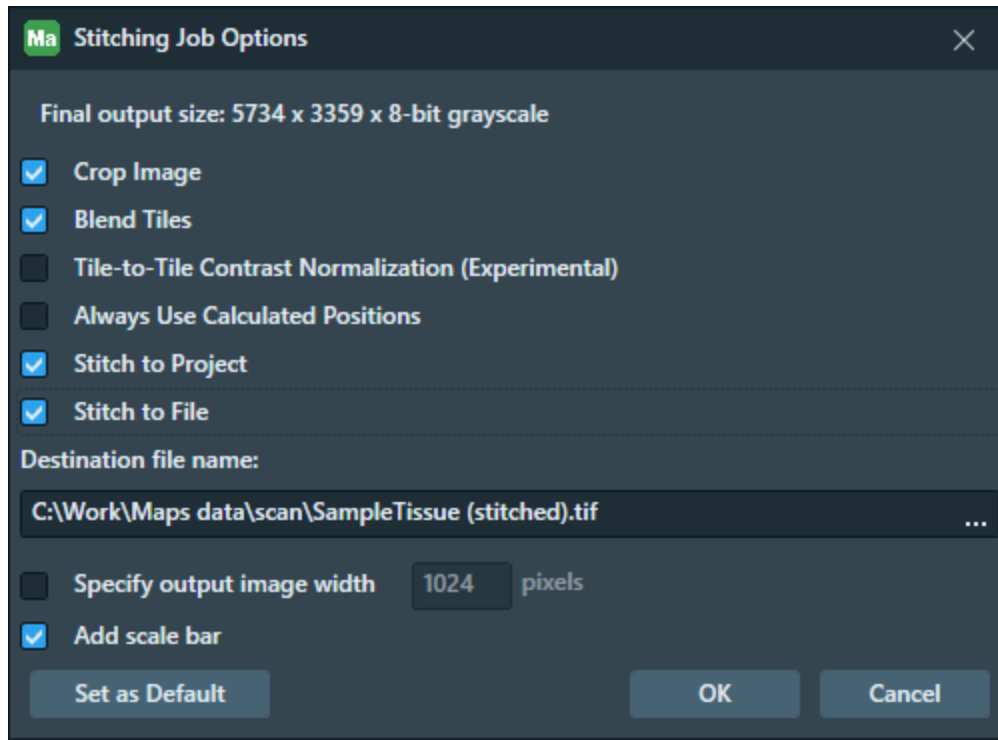
Confirm and Stitch

When manual alignment is finished, click **Confirm and Stitch** to begin stitching. You will be prompted to confirm and click **Yes**.

Stitching Job Options

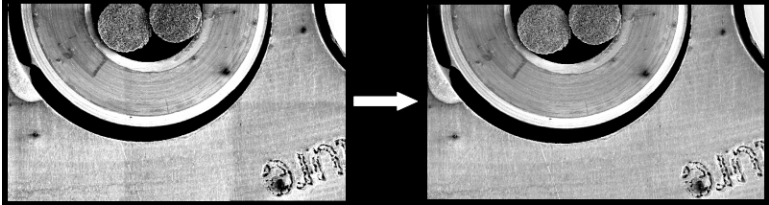

After you click **Yes** to the Confirmation prompt, the **Stitching Job Options** screen appears.

Some options are not available for all tile sets.



Stitching Job Options Overview

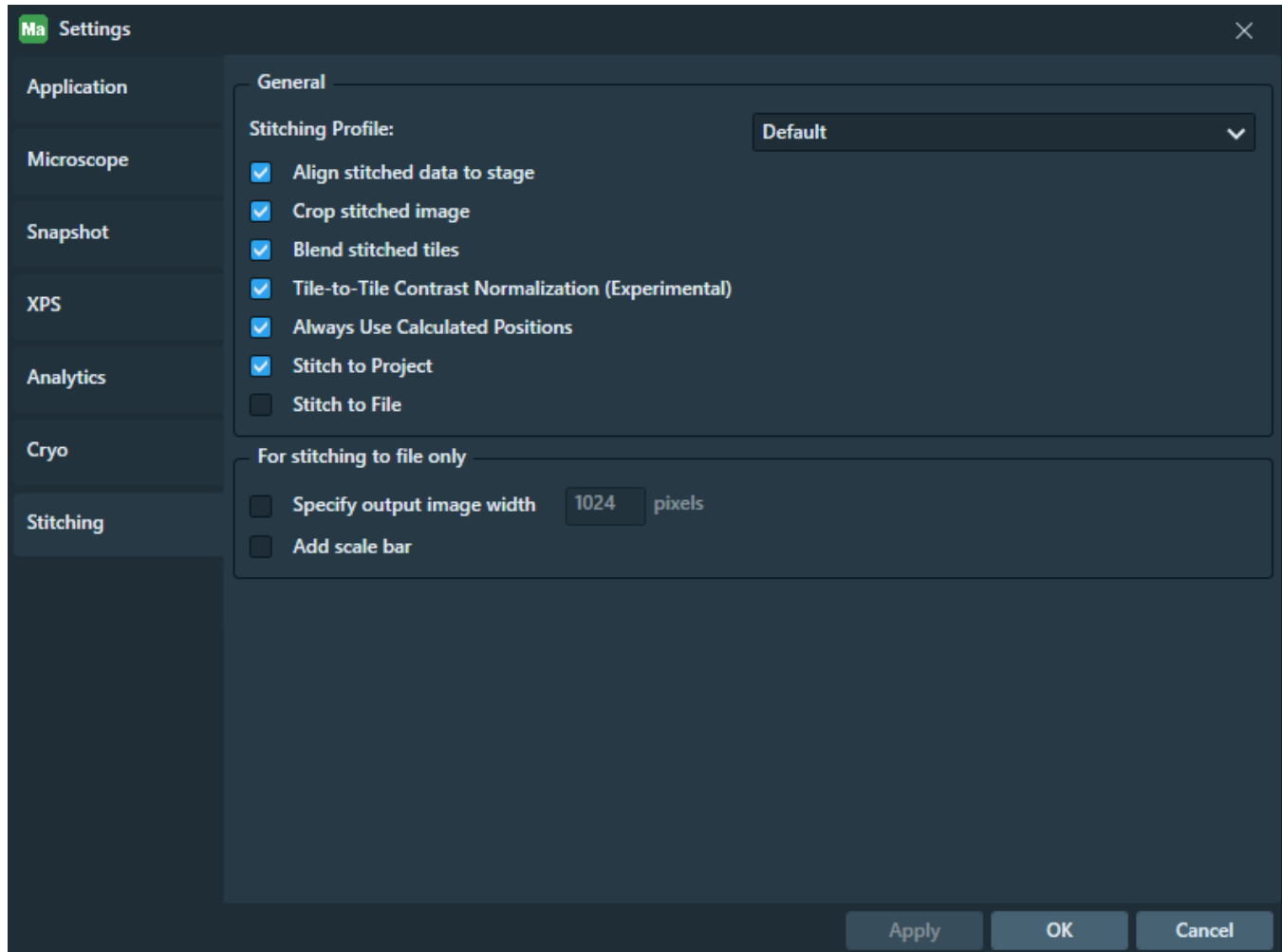
Interface Item	Description
Crop Image	Crops the outer edges of the image to make it rectangular. Otherwise, it will potentially have jagged edges where the tiles have been shifted.
Blend Tiles	Blends the overlapped regions of the tiles together to make it appear as one continuous image. In some rare cases, you may not want to blend the tiles.
Always Use Calculated Positions	Maps uses calculated relative positions between tiles even if they are outlined in red (that is, neighbor tiles in which Maps was not able to find a relative position with a high enough score).

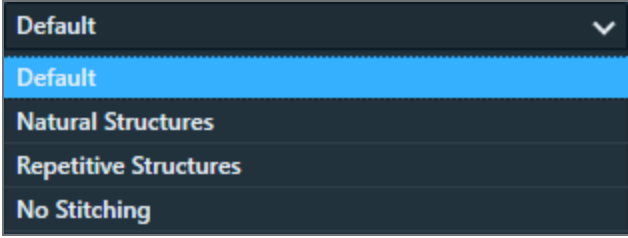
Stitching Job Options Overview(Continued)	
Interface Item	Description
Tile-to-Tile Contrast Normalization (Experimental)	<p>Removes differences in brightness and contrast between tiles in the stitched tile set. The example shows the <i>standard</i> output in the left image and the <i>normalized</i> stitched output in the right image.</p> 
Stitch to Project	<p>Stitches the tile set into the project for display in the Viewer. The stitched output appears as a new layer in the Layer control.</p>  <p>When you select this option, the field for Destination file name is not available.</p> <p>Selecting Stitch to Project will not export the stitched output. The stitched image will only appear in the Maps project. For data export, use the Stitch to File feature.</p>
Stitch to File	<p>Stitches the tile set into an image and exports the file to the specified folder location. The output file is formatted as either RAW or TIFF in the Destination File name field and then stored in the folder. The default folder location is the current project's data folder and the default file format is TIFF. When stitching to the TIFF image format, the image size limit is adjusted based on the following image bit depth:</p> <ul style="list-style-type: none"> • 8-bit grayscale: 2 gigapixel, or about 46,340 pixels square • 16-bit grayscale: 1 gigapixel, or about 32,767 pixels square
Destination File Name	Specifies the path and file name for the stitched project.
Specify output image width	Determines the resolution of the stitched image. Enter the desired stitched output width in the pixels field. When not selected, stitches to full resolution.

Stitching Job Options Overview(Continued)	
Interface Item	Description
Add scale bar	When selected, a scale bar is burned into the final image. This option is not available for RAW image format.
Set as Default	Current settings are stored and used as default values for all stitching jobs once you click Set as Default . You can edit the default stitching settings under Main menu > Options > Settings > Stitching .
OK	Click OK to accept the default stitching job options and begin the stitching process.
Cancel	Closes the window.

Stitching settings

To edit the default settings for stitching jobs, navigate to the Stitching tab located under **Main menu > Options > Settings > Stitching**.

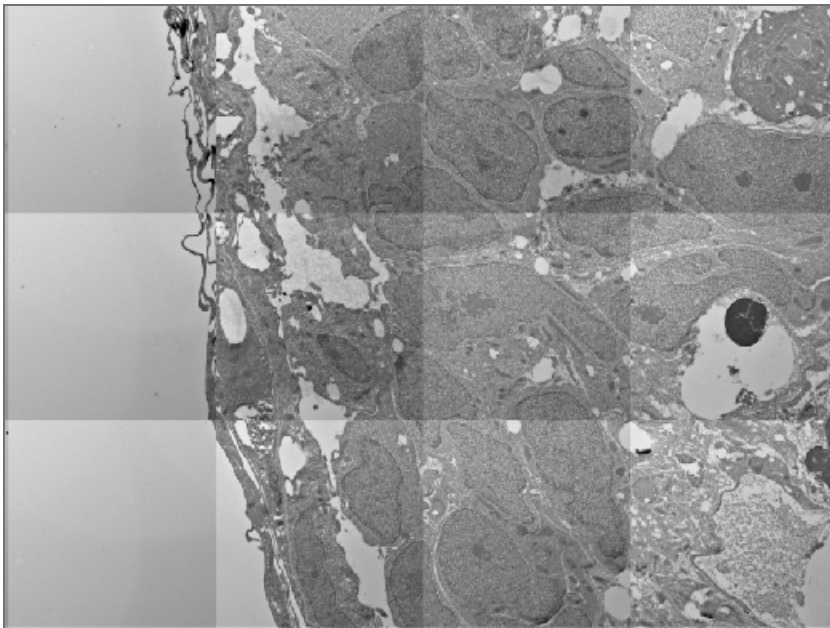


Stitching Settings Overview	
Settings Item	Description
Stitching Profile	<p>Displays a list of stitching profiles.</p>  <p>Choices include:</p> <ul style="list-style-type: none"> • Default: The settings in this profile are intended for stitching a broad range of samples. In general, it is recommended that you start with this profile. • Natural Structures: This profile is intended for life science or geology samples. The main difference between this profile and the default profile is that this profile has more tolerance in its assessment of alignment validity. Use this profile if the default settings mark too many tiles as invalid while the alignment is okay. • Repetitive Structures: This profile is intended for stitching of electronic devices, wafers, or repetitive structures. These settings force the algorithm to be more sensitive to edges and the algorithm uses a different method of assessing alignment validity (that is, since repetitive structures may mislead the image recognition algorithms). • No Stitching: The profile will not attempt to align the images. This option prevents any kind of stitching. Use this option to save CPU resources when stitching is not desired, or if stitching will be done by another application. <p>See Stitching Profile Best Practices.</p>
Align stitched data to stage	For data stitched to project, the final image is aligned to the stage for more accurate measurements and navigation.
Crop stitched image	See Crop Image in the above table.
Blend stitched tiles	See Blend Tiles in the above table.
Tile-to-Tile Contrast Normalization (Experimental)	See Tile-to-Tile Contrast Normalization (Experimental) in the above table.

Stitching Settings Overview(Continued)	
Settings Item	Description
Always Use Calculated Positions	See Always Use Calculated Positions in the above table.
Stitch to Project	See Stitch to Project in the above table.
Stitch to File	See Stitch to File in the above table.
Specify output image width	See Specify output image width in the above table.
Add scale bar	See Add scale bar in the above table.

Troubleshoot: Contrast gradients in stitched images

Sometimes uneven illumination results in contrast gradients in stitched images. Individual tiles might appear even, but the stitched image shows contrast gradients (shadow squares). The image below is an example of this issue.



Solutions

- To remove the illumination gradients, use the [Tile-to-Tile Contrast Normalization \(Experimental\)](#) option.

- To resolve this issue on the TEM system, contact your Thermo Fisher Scientific application engineer and request the procedure.

Stitching Profile Best Practices

- Start with the Default profile and only change it if the default settings are not working well enough.
- Before starting a large job, to do a few small runs (e.g., 4 x 4 tiles) and visually inspect the result to find out what the best profile and acquisition settings are. Then use the same acquisition setting on the small runs as on the large run.
- If neither profile gives satisfactory results, try to improve the image quality via the acquisition settings; high quality image data has better chance to be successfully stitched. On SEM, consider using larger dwell times as higher image quality may reveal small features that facilitate image recognition
- If the image data is highly repetitive or very sparse, use a tile size such that there are enough distinct features present in each tile.
- When the success rate of the alignment is not sufficient, try to look at it from an image recognition point-of-view: the algorithm looks at the pixel data in the overlapping border regions; if there are not enough distinct features in that area, the alignment is very difficult. Also think about ambiguity. For example, if the overlapping area only contains a horizontal line, the vertical alignment is trivial but horizontally any position is a valid solution. The tile size, overlap, or the image resolution may need to be increased in order to get data that aligns well.
- On SEM/SDB, recommended overlap for systems with a mechanical stage (for example, Quanta FEG):
 - HFW > 50 μm overlap: 10%
 - HFW 20-50 μm overlap: 15%
 - HFW < 20 μm overlap: 20%

If stitching is still unsuccessful, consider increasing the overlap even more.

- On TEM, recommended overlap:
 - Low Magnification: 20%
 - Magnification 3000x-50000x: 10%-15%
 - Magnification > 50000: 15%-20%



Note: The amount of required overlap is strongly related to how well the system is aligned.

SEM/SDB

This section describes user interface elements and procedures that are specific to the SEM/SDB (Small DualBeam) systems.

Topics include:

[SEM User Interface Elements](#)

[SEM Analytics](#)

[Cryo](#)

[Maps Min](#)

[Maps XPS](#)

[Rotational Alignment](#)

[SEM and SDB Scan Rotation](#)

[Stage Rotation](#)

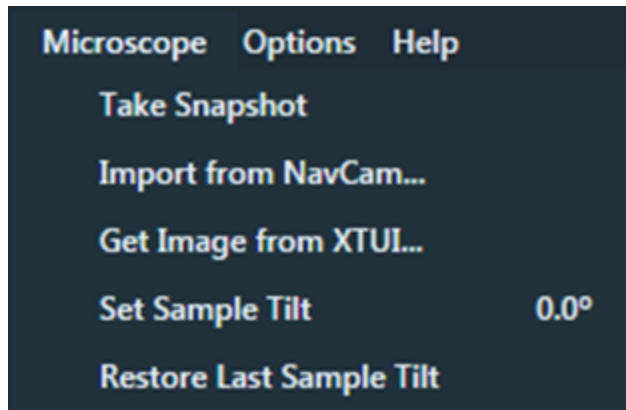
[Set sample tilt](#)

[SEM Nav-Cam Alignment](#)


SEM User Interface Elements

SEM Microscope Menu

The **Microscope** menu only appears for SEM/SDB systems.

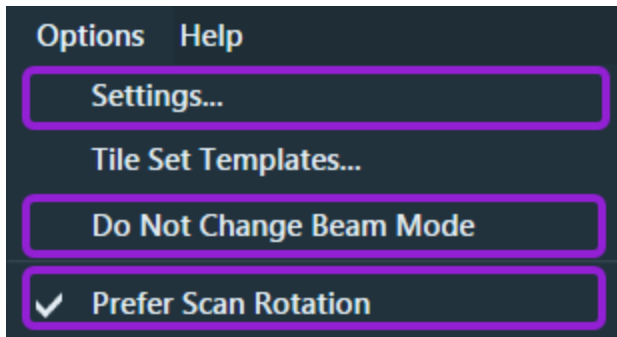


Maps Microscope Menu Overview

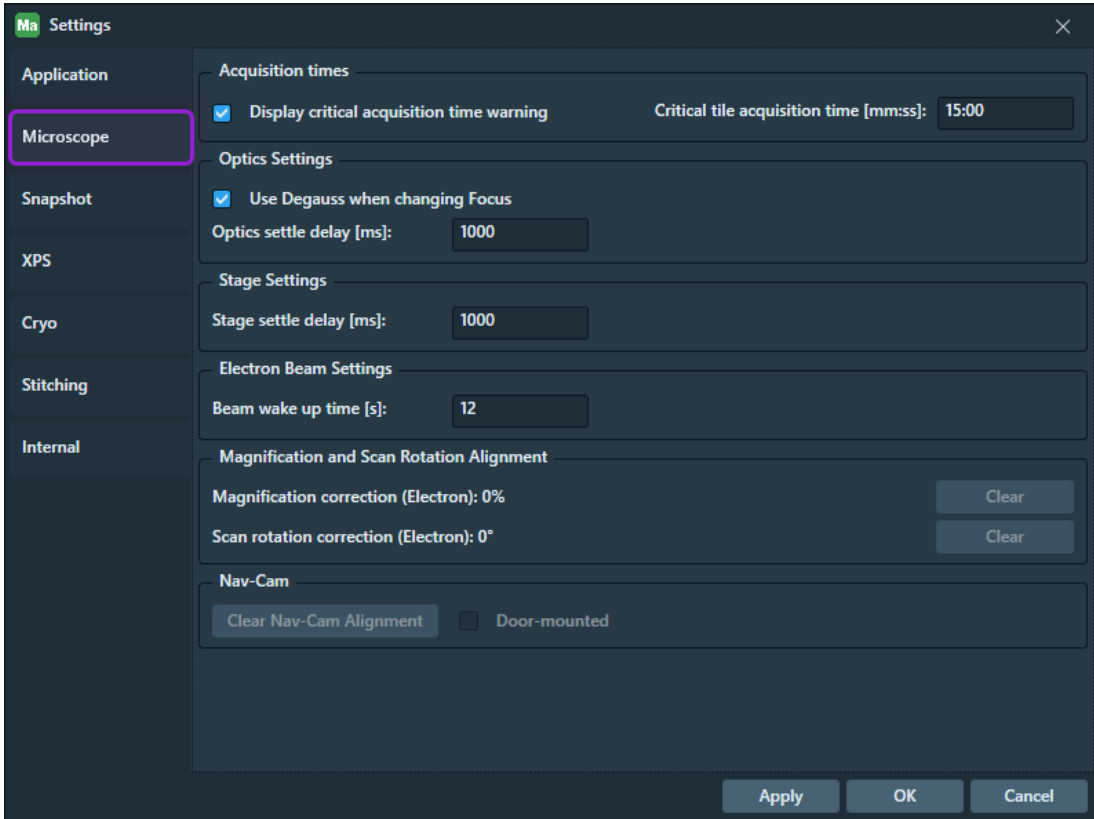
Menu Selection	Description
Take Snapshot	Acquires a SEM image at the current stage position and HFW and places it on the Maps viewer as a snapshot. The HFW can be changed from the SEM/SDB Tile Set Tab .
Import from NavCam...	<i>Not available while under vacuum if the door mounted Nav-Cam is installed.</i> Acquires and imports a Nav-Cam image, if the Nav-Cam is available. This top down image of the stage can be used for point and click navigation of the sample. See SEM Nav-Cam Alignment .
Get Image from XTUI...	Imports a SEM image or ColorSEM image (as a single color image), currently displayed in the xT UI without reacquiring the image and places it on the Maps Viewer as a snapshot.
Set Sample Tilt	Unlinks the stage and stores the current sample tilt to the current tilt of the microscope. When the sample tilt is set, there will be a check mark next to this option and the stage tilt that was set. See Set sample tilt for instructions. <div style="border: 1px solid #0070C0; padding: 5px; margin-top: 10px;"> <p> Note: Setting sample tilt makes the linked focus unavailable.</p> </div>
Restore Last Sample Tilt	After you make the Set Sample Tilt unavailable, this menu option appears. Click Restore Last Sample Tilt to restore the last sample tilt value.

SEM/SDB Options Menu

- For descriptions of common selections to all systems, see [Options menu](#).
- For descriptions of SEM/SDB-specific selections outlined in purple, see the table below. Note that microscope settings are system specific.

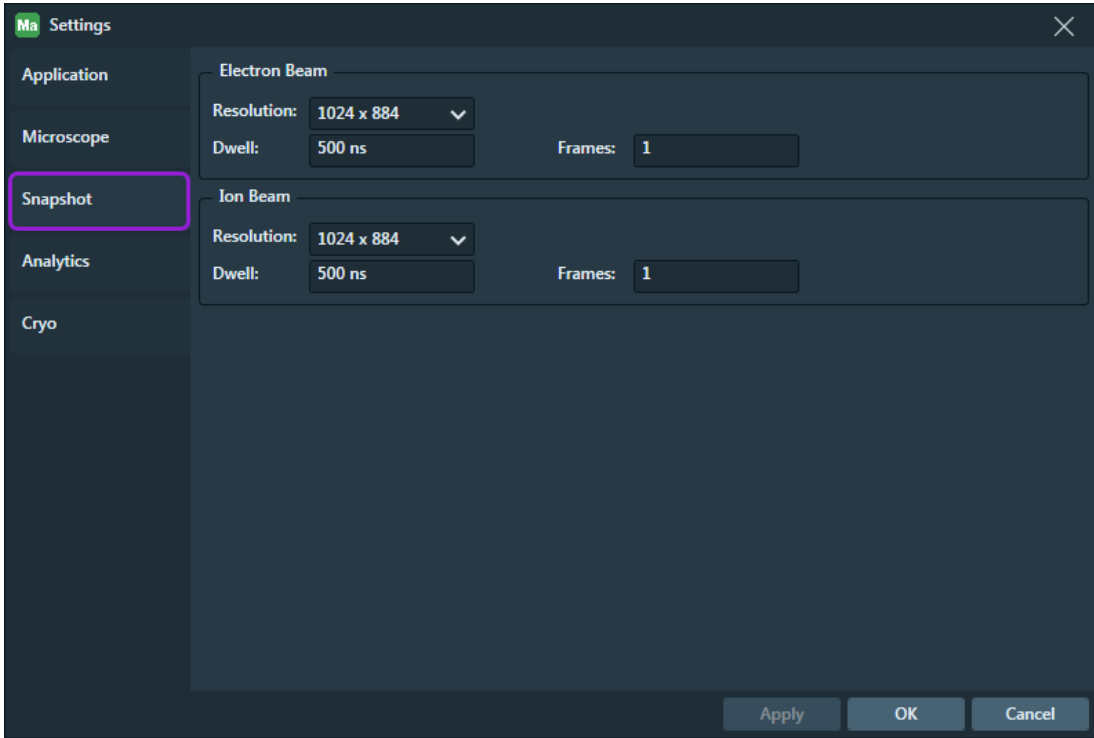



Options Menu, SEM/SDB Overview

Menu Selection	Description
Microscope Settings	 <p>Application times</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Display critical acquisition time warning Critical tile acquisition time [mm:ss]: 15:00 <p>Optics Settings</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Use Degauss when changing Focus Optics settle delay [ms]: 1000 <p>Stage Settings</p> <ul style="list-style-type: none"> Stage settle delay [ms]: 1000 <p>Electron Beam Settings</p> <ul style="list-style-type: none"> Beam wake up time [s]: 12 <p>Magnification and Scan Rotation Alignment</p> <ul style="list-style-type: none"> Magnification correction (Electron): 0% Clear Scan rotation correction (Electron): 0° Clear <p>Nav-Cam</p> <ul style="list-style-type: none"> Clear Nav-Cam Alignment <input type="checkbox"/> Door-mounted <p>Apply OK Cancel</p> <p>Application times:</p> <ul style="list-style-type: none"> • Display critical acquisition time warning: Select this check box to enable Maps to present the critical time warning as a dialog window that must be dismissed before proceeding. If this option is disabled, then the warning is displayed on the Layer Definition control, but it does not require acknowledgment. • Critical tile acquisition time [mm:ss]: Maps displays a warning whenever the acquisition parameters selected for a tile set, result in a per-tile acquisition duration larger than this threshold.

Options Menu, SEM/SDB Overview(Continued)	
Menu Selection	Description
Microscope Settings (continued)	<p>Optics Settings:</p> <ul style="list-style-type: none"> • Use Degauss when changing focus: Select the check box to automatically Degauss when changing focus during queued acquisitions. • Optics settle delay [ms]: Allows setting a delay (in milliseconds) before acquisition to allow the column optics to settle. Without a delay, some image distortion can occur. <p>Stage Settings:</p> <ul style="list-style-type: none"> • Stage settle delay [ms]: Allows setting a delay (in milliseconds) before acquisition to allow the stage movement to settle. Without a delay, some image distortion can occur. <p>Electron Beam Settings:</p> <ul style="list-style-type: none"> • Beam wake up time [s]: Required wait time between commanding the beam to turn on and starting image acquisition. This period of time ensures that the beam has enough time to provide an acceptable signal. If this wait time is too short, then the first tile might have a weak signal and appear black. <p>Magnification and Scan Rotation Alignment:</p> <ul style="list-style-type: none"> • Magnification correction (Electron): Corrects the magnification factor for the current beam. If the correction is in use and has a value other than zero (that is, a positive or negative value), then the Clear button becomes available to clear the alignment value. • Scan rotation correction (Electron): Corrects the scan rotation alignment for the current beam. If the alignment is in use and has a value other than zero (that is, a positive or negative value), then the Clear button becomes available to clear the alignment value. <p>Nav-Cam Settings:</p> <ul style="list-style-type: none"> • Clear Nav-Cam Alignment: Clears the saved default Nav-Cam alignment that is applied to all acquired Nav-Cam images. See SEM Nav-Cam Alignment. • Door-mounted: Select this check box if the system's Nav-Cam is mounted to the exterior of the chamber door. Do not select the check box if there is a Nav-Cam inside the microscope's vacuum chamber.

Options Menu, SEM/SDB Overview(Continued)

Menu Selection	Description
Snapshot Settings (Not available for SEM Offline)	<p>Displays the Snapshot Settings window and the scan settings that will be used to acquire preview images and snapshots.</p> 
Do Not Change Beam Mode	<p>When this option is selected, it prevents the Maps application from switching the SEM into or out of UHR (immersion) mode. Setting this option to Disabled, allows a queued tile set to automatically activate UHR mode for image acquisition without manual user interaction in the xT UI. In most cases, leave this option set to its default value of Enabled.</p> <div style="border: 1px solid orange; padding: 10px;"> <p> Warning: The Do Not Change Beam Mode feature exists to block the ability of Maps to perform an action with a risk of hardware damage. The SEM should never be put into UHR mode while a magnetic sample is loaded in the chamber, since this could damage equipment inside the microscope. Only make this feature unavailable if you are certain the sample is non-magnetic and you are operating in a use case that requires Maps to change lens modes without user intervention.</p> </div>

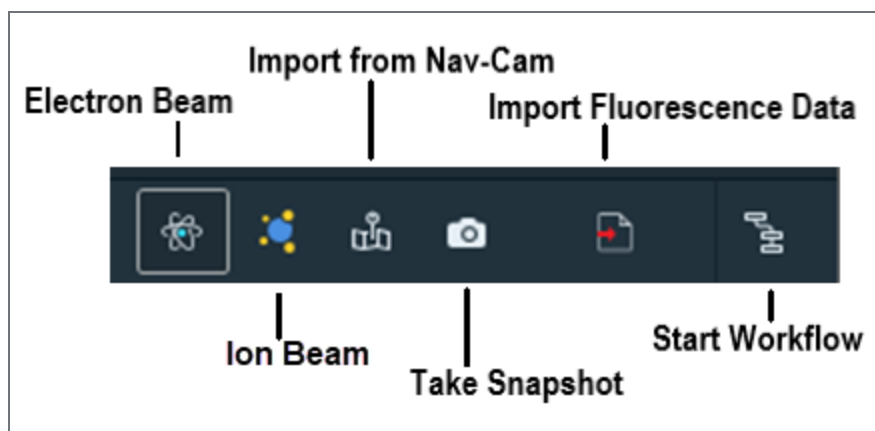
Options Menu, SEM/SDB Overview(Continued)

Menu Selection	Description
Prefer Scan Rotation	<p>If there is viewer rotation when creating a new tile set, the rotation will either be applied as stage rotation or scan rotation.</p> <ul style="list-style-type: none"> • When selected: Uses scan rotation. • When not selected: Uses stage rotation.

SEM/SDB Toolbar, Right Side

See [Left Side, All Systems](#) for common selections on all systems.

Tool Bar, Right Side, SEM/SDB



Toolbar Descriptions, SEM/SDB

Tool	Description
Electron Beam (SEM) (Online version only)	Selects the Electron beam for imaging.
Ion Beam (FIB) (Online version only)	Selects the Ion beam for imaging.

Toolbar Descriptions, SEM/SDB(Continued)	
Tool	Description
Import from Nav-Cam	<i>Not available while under vacuum if the door mounted Nav-Cam is installed.</i> Acquires and imports a Nav-Cam image, if the Nav-Cam is available. This top down image of the stage can be used for point and click navigation of the sample. See Nav-Cam Alignment (SEM/SDB Only) .
Take Snapshot	Acquires a SEM image at the current stage position and horizontal field width (HFW), and then places it in the Maps viewer as a snapshot image. The HFW can be changed from the Tile right-click menu selection: Snapshot Settings . See Options menu .
Import Fluorescence Data	Opens dialog where fluorescence data from optical microscope can be selected and imported to the current Maps project. <i>Note: Requires Cryo features to be activated within the Settings.</i>
Start Workflow	Opens workflow selection dialog, from where specific alignment workflow can be started.

SEM/SDB Tile Set Tab

This topic describes options in the Tile Set tab for SEM systems.

Basic Tab

The screenshot displays the 'Basic Tab' of the SEM/SDB Tile Set interface. It features a dark-themed control panel with several settings:

- Name:** Tile Set (3)
- Acquisition Type:** Electron (dropdown menu)
- Tiles X, Y:** 20 (X), 10 (Y)
- Tile HFW:** 10 μm
- Total HFW:** 181 μm
- Resolution:** 2048 x 1768 (dropdown menu)
- Pixel Size:** 4.8828 nm
- Dwell:** 1 μs (dropdown menu)
- Frames:** 1 (checkbox checked)
- Reduced Area:** Unchecked, with a 'Select' button

Acquisition statistics are displayed in the center:

- Image acquisition time: 00:00:04
- Estimated acquisition time: 00:00:58
- Elapsed acquisition time: 00:03:36

At the bottom, it indicates '158 of 200 images acquired; 1.71 GB' and provides 'FROM MICROSCOPE' and 'TO MICROSCOPE' buttons.

Tile Set Tab, Basic Tab Overview

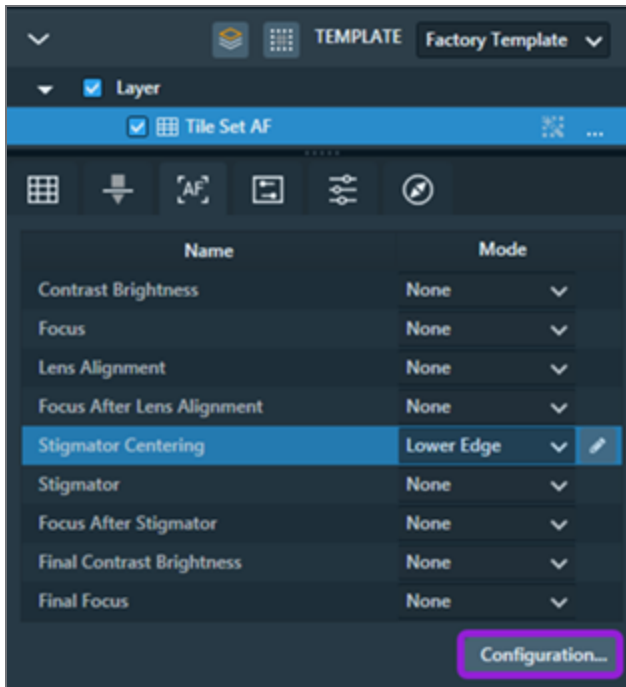
Control	Description
Name	Displays the name of the current tile set.
Acquisition Type	Specifies the beam to be used for imaging. Choices are: Electron or Ion.
Tiles X, Y	Sets the number of tiles in the X and Y directions.

Tile Set Tab, Basic Tab Overview(Continued)

Control	Description
Tile HFW	Specifies the horizontal field width (HFW) for each tile.
Total HFW	Shows the total HFW for all tiles.
Resolution	Specifies the image resolution. Choices are specific to each system type.
Pixel Size	Displays the physical size of a single pixel at the current acquisition settings. This is based on Tile HFW and Resolution.
Dwell	Specifies the amount of time the beam dwells on each pixel when images are acquired.
Frames	Sets the number of image frames.
Image acquisition time	Displays the estimated time required to acquire a single image in the tile set.
Estimated acquisition time	Displays the estimated remaining time required to acquire the whole tile set.
Elapsed acquisition time	Displays the actual elapsed acquisition time.
From Microscope	Applies the current microscope setting.
To Microscope	Applies these settings to the microscope.

Autofunction Tab

Note: The list of available autofunctions under the Autofunction tab may differ according to your Maps configuration and connected microscope.



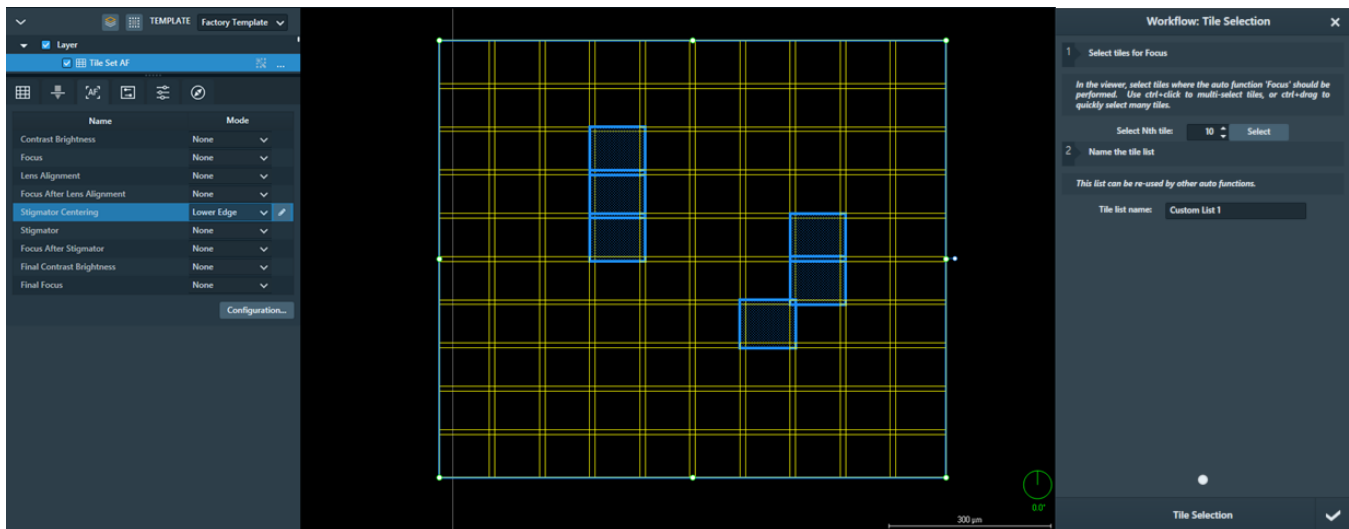
Autofunction	Description
Contrast Brightness	Optimizes the contrast and brightness of the image
Focus	Focuses the electron beam to produce a sharp image (see Focus Mode and Set interpolated focus)
Lens Alignment	Performs the lens alignment procedure
Focus After Lens Alignment	Performs another focus after lens alignment
Stigmator Centering	Performs the stigmator centering procedure
Stigmator	Compensates for any astigmatism
Focus After Stigmator	Performs another focus after stigmation
Final Contrast Brightness	Performs one last contrast and brightness optimization
Final Focus	Performs on last focus optimization

Set autofunctions

1. Select the autofunctions to use during acquisition.
2. If needed, click **Configuration** to set up a selected autofunction and then click the **play** button to perform a test run of the selected autofunction.
3. In the **Mode** combo box, select the mode in which the autofunction should be performed. Available modes include the following:
 - **None** - The autofunction is not used.
 - **Every tile** - The autofunction is run *locally* at every tile.
 - **First tile** - The autofunction is run *once* at the first tile before the acquisition.
 - **Custom tile list...** - The autofunction is run over specified list of tiles. Select this option to create a new list.

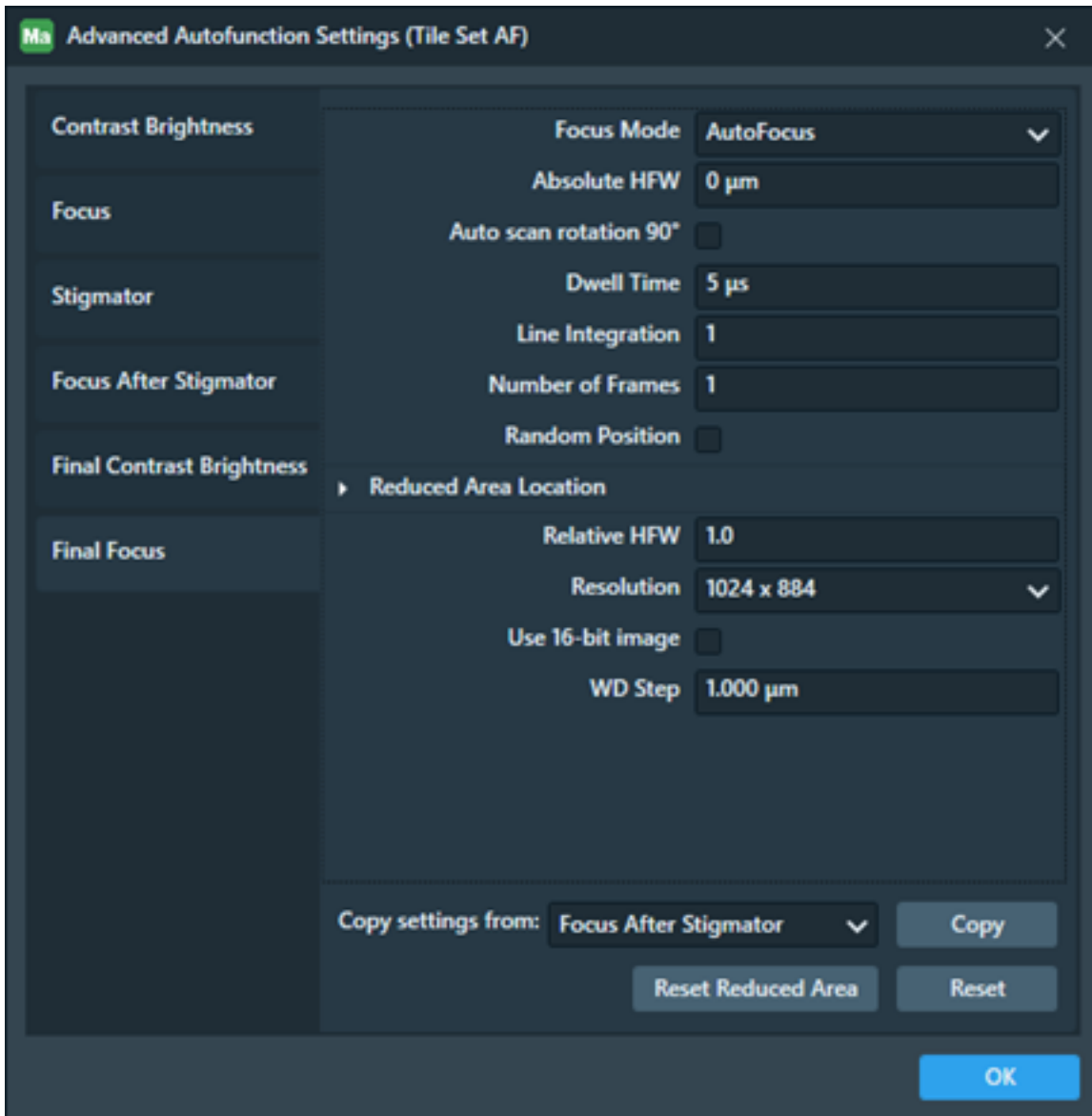
Create a custom tile list

Click **Custom tile list** option and the selection workflow panel opens and displays instructions to guide you. In the viewer, select tiles where the autofunction should be performed and name the new list. You can use the **Select Nth tile** option in the right panel to quickly select tiles at the selected Nth interval. You can finish the selection with closing the workflow panel or with leaving the autofunction tab. The new list is inserted to the mode combo box and can be re-used by other autofunctions in this tile set. Use the **edit** button if you need to further edit any tile selection.



Advanced Autofunction Settings

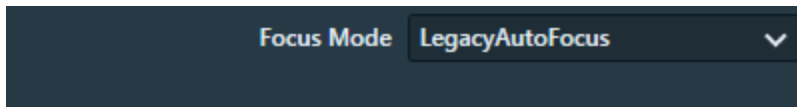
Hover your mouse cursor icon over any field name for more information.



Focus Mode

Select the Focus Mode to automatically focus before acquisition.

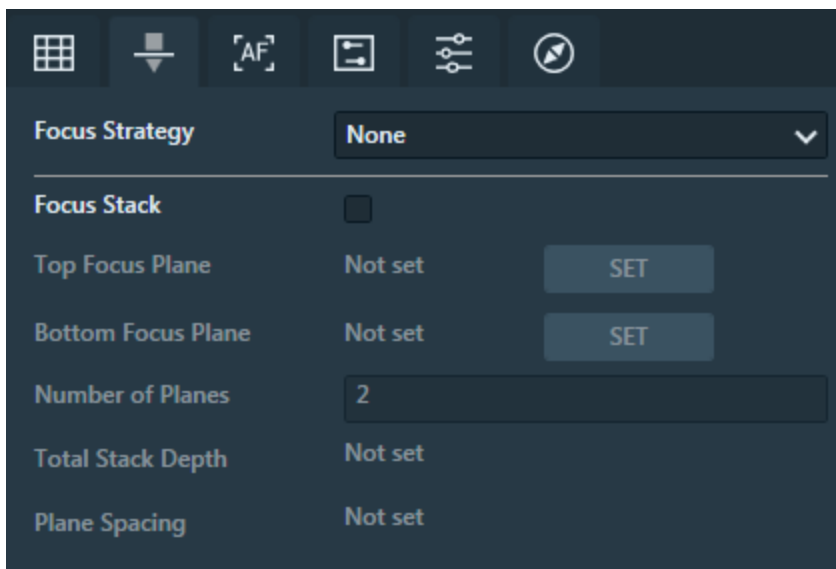
- **AutoFocus:** AutoFocus mode runs the auto focus routine at each tile before acquisition. This can result in better focus per tile, but adds considerably more time to the acquisition.
- **LegacyAutoFocus:** Runs the default autofocus algorithm provided by the microscope platform.



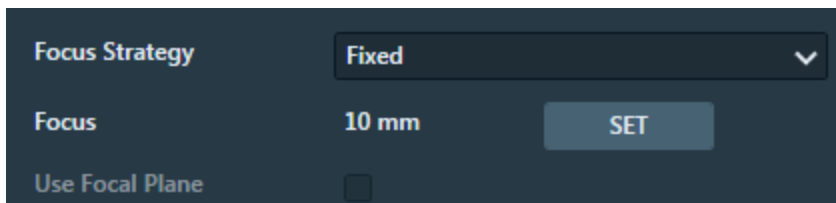
Focus Tab

Select the Focus Strategy to focus the electron beam to produce a sharp image.

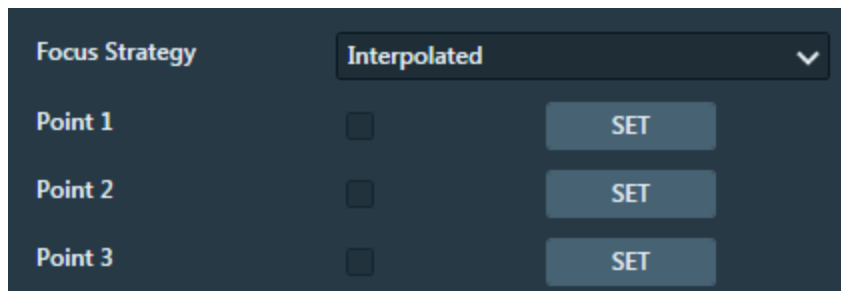
- **None:** The application does not touch the focus at all. You are free to change the focus using the xT UI during the run.



- **Fixed:** Uses the same focus for every tile.



- **Interpolated:** Select three focus points on the sample. The focus plane is then defined by these points. Each tile's focus is set based on where it is located in this plane.



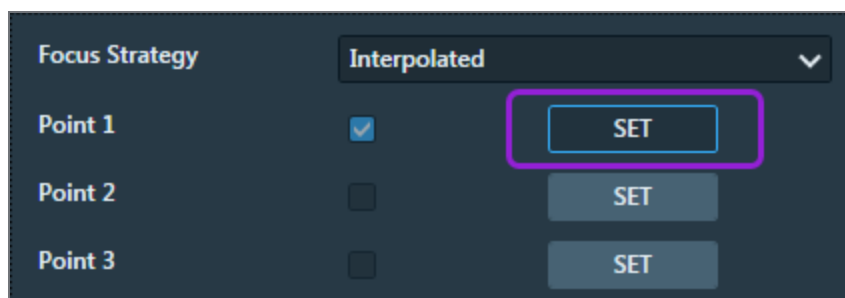
Set interpolated focus

1. Navigate to the first location.
2. Manually focus the image.
3. When image is in focus, click **Set**. The focus is retained for Point 1 and the **Set** checkbox is selected.
4. Repeat steps 1-3 for Point 2 (**Set**) and then for Point 3 (**Set**). Once all three **Set** checkboxes are selected, the tiles are ready to be acquired.

Note: These points are used to define a focus plane, so that all tiles use a focus as defined by this plane. Choosing points that are at opposite ends of the sample is important to get the best results.

Clear (unset) a focus point

To clear a focus point, simply toggle **Set**.



Focus Stack

Focus stacking is a technique that allows you to acquire a stack of images on differing focal planes. The focus stack control has two states.

State 1

The first state is used to set up an explicit top and bottom working distance for the focus stack.

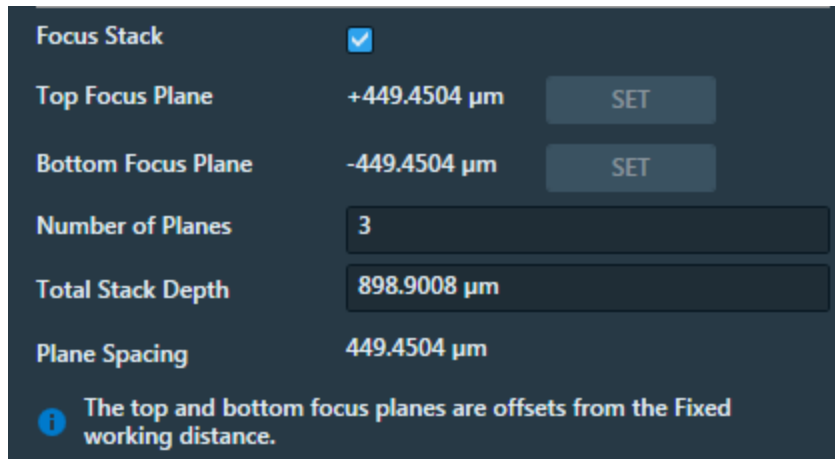
Next to the Top Focus Plane and the Bottom Focus Plane field, there is a Set button that grabs the current working distance from the XT platform position. You can change the number of planes to acquire in the Number of Planes text box. The Stack Depth is calculated from the setup values and the spacing between each image plane in the Plane Spacing field.

Focus Strategy	None	▼
Focus Stack	<input checked="" type="checkbox"/>	
Top Focus Plane	10 mm	SET
Bottom Focus Plane	9.1011 mm	SET
Number of Planes	3	
Total Stack Depth	898.9008 μm	
Plane Spacing	449.4504 μm	

State 2

The second state of the focus stack control is the relative focus setup. This is the automatic state of control if you are using a Fixed, Interpolated, or Auto Focus autofunction. In this state, the focal planes are relative to focus values set from the fixed, interpolated, or auto focus.

In the second state, you can set the Number of Planes and the Total Stack Depth. After setting the planes and stack depth, you can see the relative top and bottom planes change. A small notification appears at the bottom of the control pane that notifies what the focus stack is based upon.



Focus Tab Overview	
Control	Description
Focus Stack	Perform the focus stack acquisition.
Top Focus Plane	The working distance for the top plane of the focus stack.
Bottom Focus Plane	The working distance for the bottom plane of the focus stack.
Number of Planes	The number of focus planes acquired in the focus stack.
Total Stack Depth	The physical depth of the total focus stack.
Plane Spacing	The physical spacing between each focus plane in the focus stack.

Advanced Tab

Use the controls on this tab to set advanced tile acquisition properties for each tile set.

Line Integration: 1

Scan Interlacing: 1

Overlap X, Y: 10% / 10%
205 px / 177 px

Stage X: 440.5874 μm

Stage Y: -881.1749 μm

Scan Rotation: 0

High Voltage: [dropdown]

Beam Current: [dropdown]

Beam Mode: [dropdown]

Drift Corrected:

16-bit Images:

Stage R: 0

Stage T

Stage Z

Order: Raster [dropdown]

Maximum Run Time:

Display Acquisition Selection:

<input checked="" type="checkbox"/> Display 1 <input type="checkbox"/> Store Detector	<input type="checkbox"/> Display 2 <input type="checkbox"/> Store Detector
<input type="checkbox"/> Display 3 <input type="checkbox"/> Store Detector	<input type="checkbox"/> Display 4 <input type="checkbox"/> Store Detector

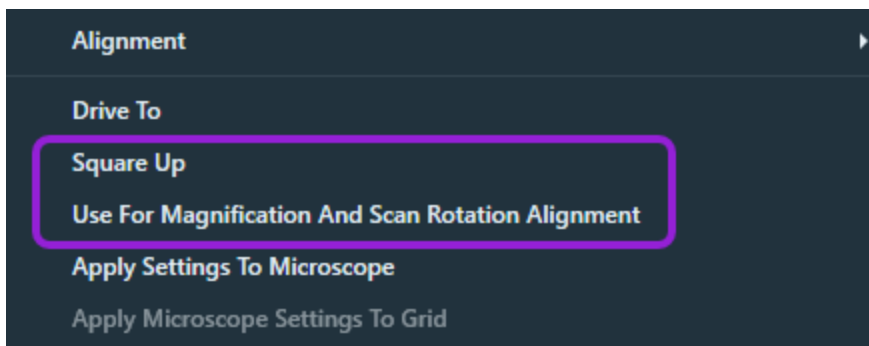
Stitching Display: Display 1 [dropdown]

Tile Set Tab, Advanced Tab Overview	
Control	Description
Line Integration	Specifies the number of times each raster line is scanned and integrated to combat certain types of drift.
Scan Interlacing	Specifies the number of times each frame is interlaced to combat certain types of drift.
Overlap X, Y	Displays the percentage of overlap between tiles in the tile set, as well as the pixels.
Stage X	Sets the X stage location of the center of the tile grid.
Stage Y	Sets the Y stage location of the center of the tile grid.
Scan Rotation	Allows manual adjustment of scan rotation for a tile set. Either enter a value in the edit box here or rotate the tile set in the viewer to update the scan rotation value.
High Voltage	Selects value of the high voltage setting.
Beam Current	Selects value of the total amount of electron or ion current striking the sample.
Beam Mode	Selects the electron beam lens mode.
Drift Corrected	If selected the correction of the image drift is used when the number of Frames is higher than 1.
16-bit image	When selected, saves image as 16-bit (65K grayscale levels), else image is saved as 8-bit (256 grayscale levels).
Stage R	Sets the stage rotation where the tiles are acquired. Existing tile sets rotate with the stage. New tile grids are created at the current rotation. Select the check box to enable the text field to change the default rotation.
Stage T	Sets the stage tilt where the tiles are acquired. Select the check box to enable the text field to change the default tilt.
Stage Z	Sets the stage height (Z) to be stored and used for acquisition. This allows multiple tile sets to be acquired at different heights, that is sometimes necessary for using different detectors. If left unselected, the stage height is not changed.

Tile Set Tab, Advanced Tab Overview(Continued)	
Control	Description
Order	<p>Determines the order in which the contained tiles are acquired. Options are:</p> <ul style="list-style-type: none"> • Raster: Left to right, then top to bottom. • Serpentine: Alternating left to right pattern per row, running top to bottom. • Spiral In: Iterating over tiles in a clockwise pattern starting with the outer most tiles moving inward. • Spiral Out: Iterating over tiles in a clockwise pattern starting with the inner most tiles moving outward.
Maximum Run Time	Sets the maximum time spent acquiring data for this tile set. The tile set will run until this time limit has been reached, or if all the tiles have been acquired. The time limit entered is only used by this tile set and the countdown starts when this tile set starts collecting images.
Display (1-4)	Select multiple displays to acquire images from multiple display channels.
Store Detector	Selects the method for acquiring detector settings. You can set up different tile sets with different detectors and line them up for acquisition. When selected, a label displays the current setting.
Stitching Display	Select the display used for stitching. Choose the display with the most detail of the sample for best results.

SEM Tile Set Context Menu

Right-click on any tile set to access the context menu.

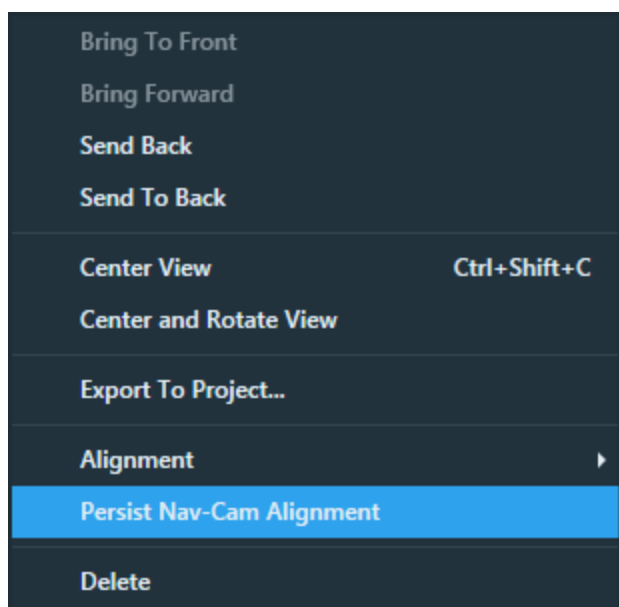


- For descriptions of common selections to all systems, see [Tile Set Context Menu](#).
- For descriptions of SEM/SDB-specific selections, see the two items outlined above as well as the table below.

Tile Set Right-Click Menu Overview	
Menu Selection	Description
Square Up	Rotates the stage to match the orientation of the tile set.
Use for Magnification And Scan Rotation Alignment	When selected, uses the offsets calculated in the acquired tile set to correct for misalignment between the scan axes and the stage axes by applying a small magnification and scan rotation. This will allow better acquisition and alignment of future tile sets.

SEM Nav-Cam Context Menu

The Nav-Cam image is stored in the selected layer. Right-click on a Nav-Cam entry to access a context menu.

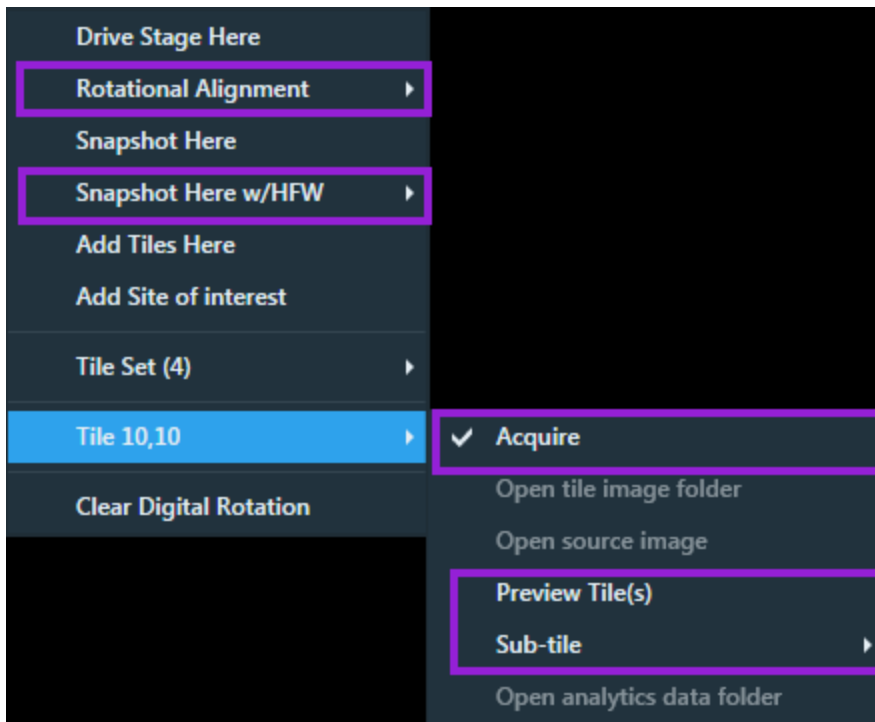


- For descriptions of common selections to all systems, see [Annotation Context Menu](#).
- For descriptions of SEM/SDB-specific selections, see the table below.

Nav-Cam Right-Click Menu Overview	
Menu Selection	Description
Persist Nav-Cam Alignment	Keeps the current Nav-Cam alignment.

SEM/SDB Viewer Tile Context Menu

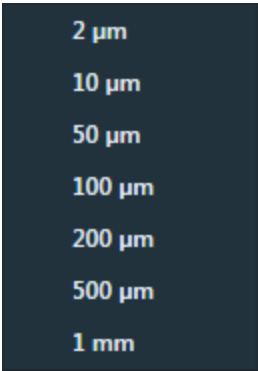
Right-click on a tile within the tile grid to access a context menu.



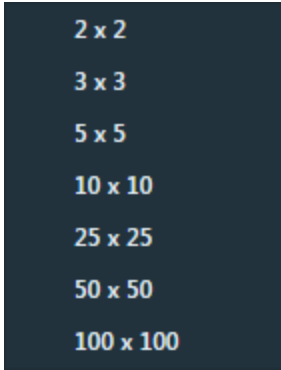
- For common selections, see [SEM/SDB Viewer Tile Context Menu](#).
- For SEM/SDB-specific selections, see the four items outlined above as well as the table below.

Viewer Tile Context Menu, SEM/SDB Overview

Menu Selection	Description
Rotational Alignment	Allows rotation of the stage to Place Point 1 , Place Point 2 , or Cancel . See Rotational Alignment .

Viewer Tile Context Menu, SEM/SDB Overview(Continued)	
Menu Selection	Description
Snapshot Here with HFW	<p>Acquires a preview SEM image at the selected stage coordinate and current HFW. Submenu choices:</p>  <p>This is the same functionality as using the Take Snapshot Image tool box button. See Tool Bar, Right Side, SEM/SDB.</p>
Acquire/Queue for re-acquisition	<p>Displays whether or not the tile has already been acquired as defined below. You can toggle between the two tile acquisition states as needed; however, only the <i>selected</i> acquisition state appears in the menu.</p> <ul style="list-style-type: none"> • Acquire: This acquisition state displays if the tile <i>has not been acquired</i>. If you select the check box for this menu item, then Maps queues the selected tile to be acquired. • Queue for re-acquisition: This acquisition state displays if the tile <i>has already been acquired</i>. If you select the check box for this menu item, then Maps queues the selected tile to be re-acquired and replaces the original image.
Preview Tile(s)	Acquires preview images for all selected tiles. Any tiles without pertinent image data can be disabled from image acquisition.

Viewer Tile Context Menu, SEM/SDB Overview(Continued)

Menu Selection	Description
Sub-tile	<p>Displays a submenu for selecting the number of sub-tiles to be in a mini grid within an individual tile, using the selected number of images.</p>  <p>The sub-tile names are automatically added to the Layers control (TileSet: (3,4)).</p>

SEM/SDB Post-Acquisition Actions

This section describes the post-acquisition actions for SEM/SBD microscopes.



Post-Acquisition Actions	
Control	Description
Turn Off Beam When Done (Not available for SEM Offline)	Turns off the beam after all jobs are completed.
Retract Detectors when Done (Not available for SEM Offline)	Retracts any insertable detectors after all jobs are completed

Post-Acquisition Actions(Continued)	
Control	Description
Sleep When Done (Not available for SEM Offline)	Puts the system into Sleep mode after all jobs are completed.
Pump to HiVac When Done	Returns the microscope to HiVac mode after completing a LowVac acquisition.

SEM Analytics

With the Analytics plug-in application, the Maps software can acquire EDS data through a software application interface on a SEM/SDB microscope. EDS is an analytical technique that enables you to collect information about chemical composition and elemental analysis. This section describes how you can use Maps to collect this information in large area mapping scenarios.



Note: This plug-in is not to be confused with the Maps Min that can also acquire EDS data on SEM microscopes.

Preparation for SEM Analytics

Preconditions

To run Analytics, your system must include the following components:

- EDS detector
- SEM platform with ChemiSEM support and license
- Valid Maps license with XT Online and Analytics options

To verify that your Maps license includes the necessary options, on the **Help** menu, click **About**.



Indication that Analytics is available

If all of the preconditions are satisfied, you can observe the following in the status bar:

- Analytics button is visible
- The color indicator on the button is green



Analytics Workflow for SEM

Proceed with the workflow in the following order:

1. **Define a Tile Set:** Use the normal procedure to define a tile set, and then navigate to the tile set section and click the **Analytics** tab.
2. **Configure Analytics for EDS Acquisition:** Once you have defined the tile set, you must configure the parameters on the Analytics tab before you acquire the EDS tile set.
3. **Acquire EDS Tile Set:** When you acquire the EDS tile set, you can observe the status of the EDS acquisition and EDS count data during acquisition.
4. **View Results of EDS Acquisition:** Once an Analytics tile set has finished EDS acquisition, you can view the results in the layer tree, Visualization tab, and main Viewer.
5. **Reprocess EDS Tile Set:** You can reprocess the spectrum data that is saved within the tile set for a different selection of chemical elements and EDS maps.
6. **Stitch EDS Tile Set:** You can stitch EDS tile set in the same way as any other tile set.

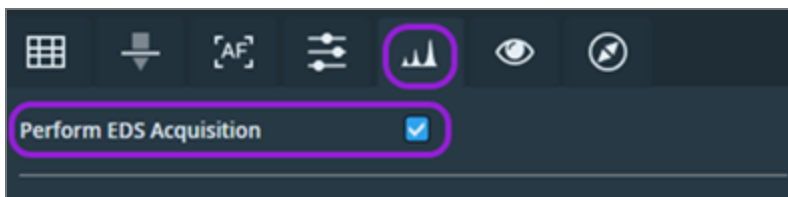
Configure Analytics for EDS Acquisition



Note: If the **Analytics** tab is not visible, one or more Analytics preconditions is not satisfied. Refer to [Preparation for SEM Analytics](#) for more information.

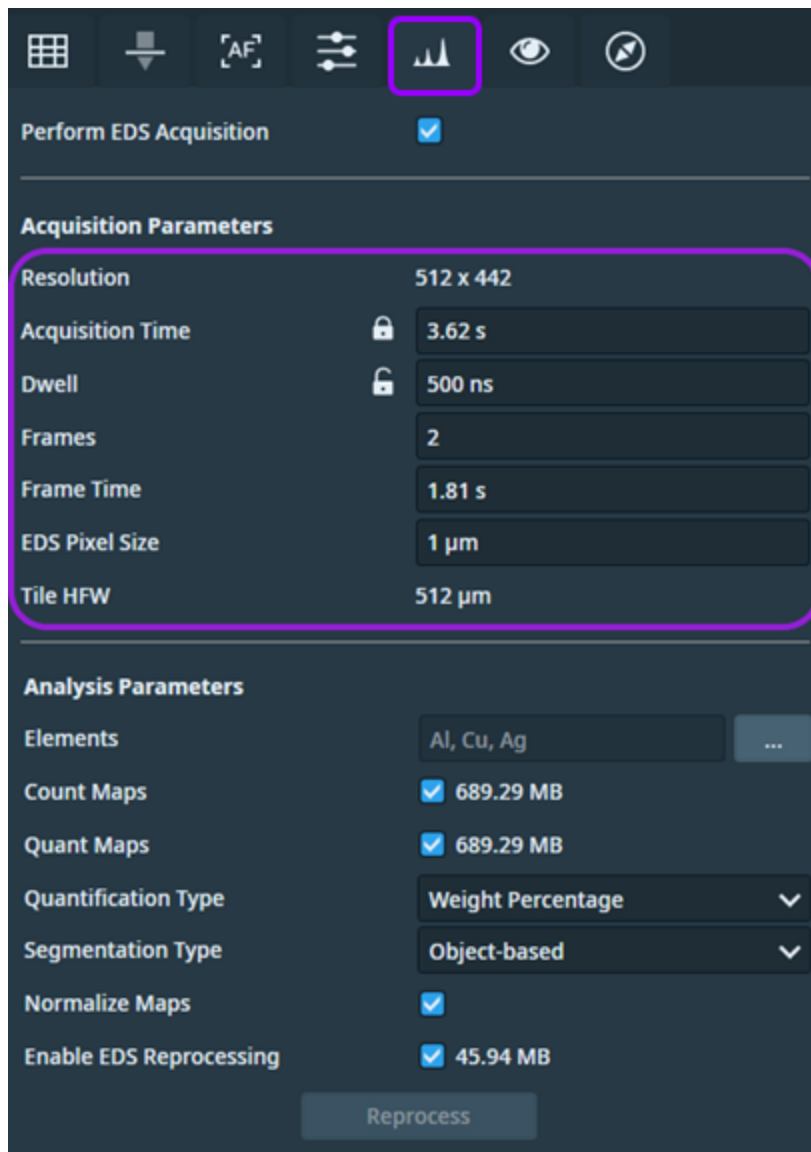
Follow the steps below to configure the parameters on the Analytics tab.

1. Click the **Analytics** tab, and then select the **Perform EDS Acquisition** checkbox to activate the tile set for EDS acquisition.

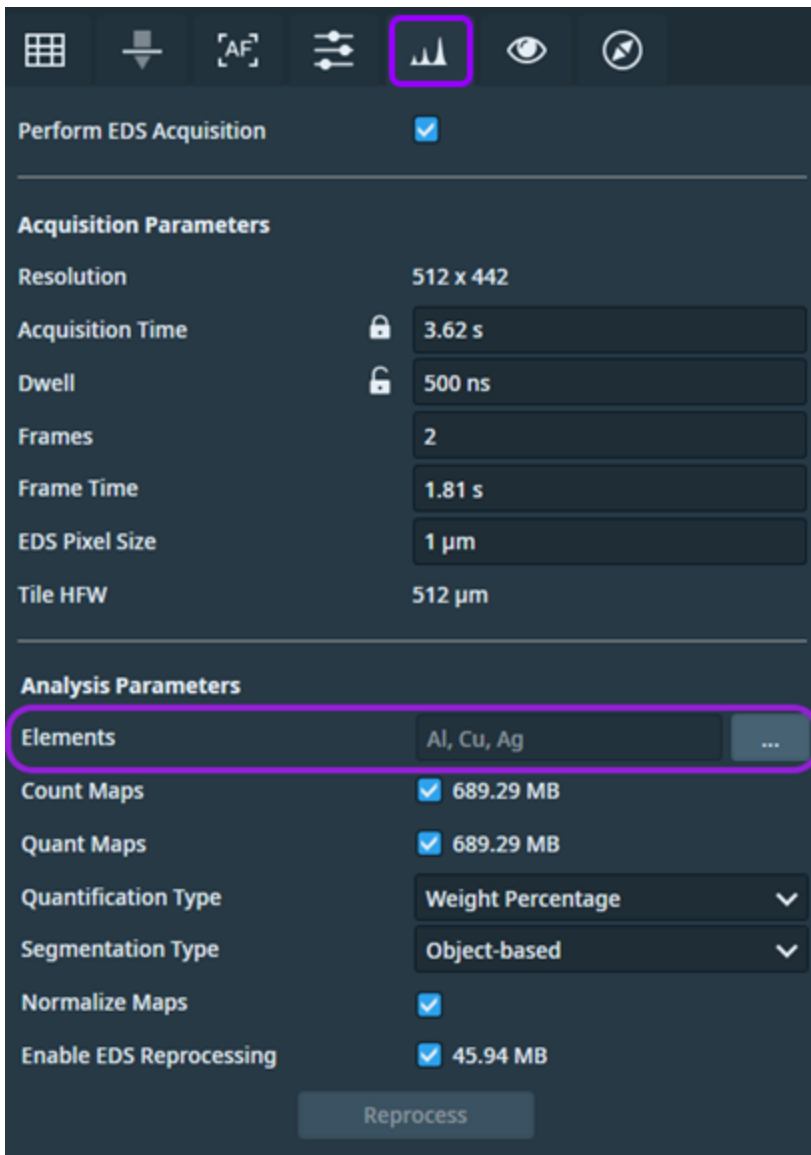


2. Configure the EDS acquisition parameters.

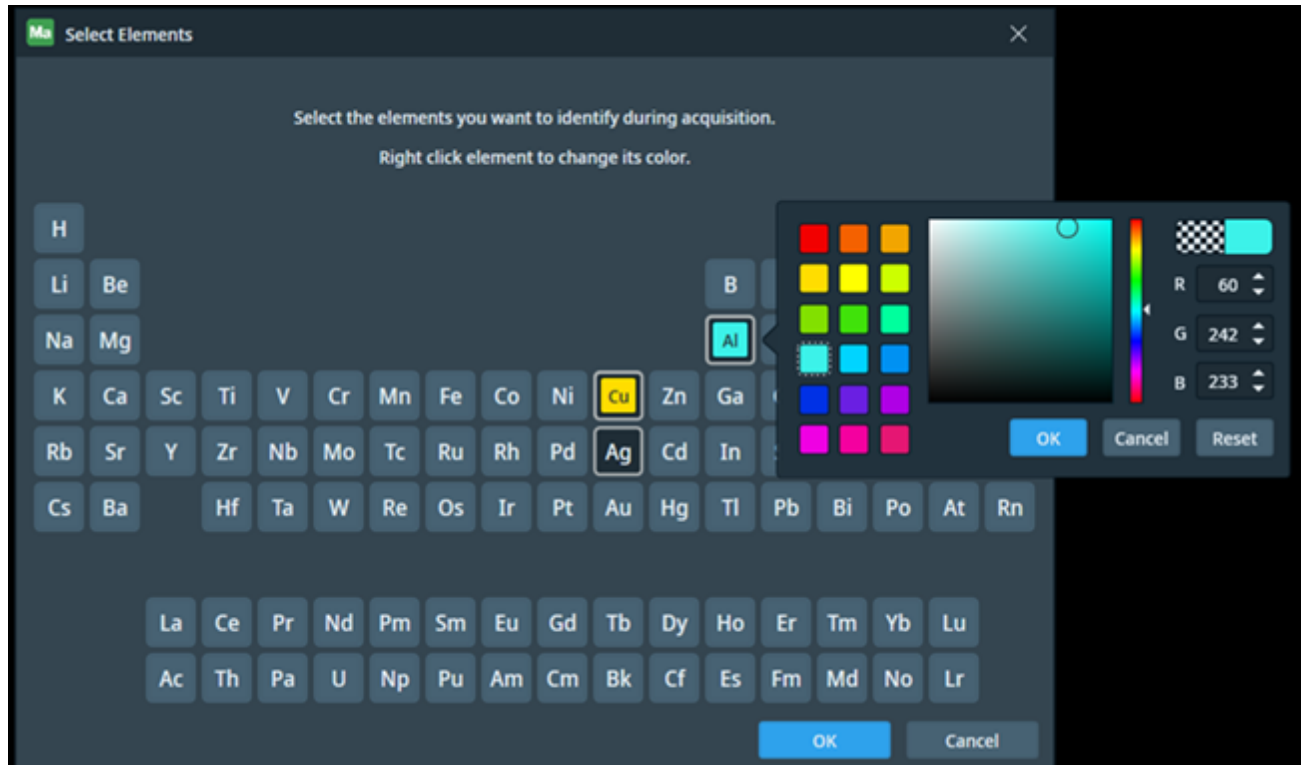
- Observe the **Resolution** of the EDS maps. Note that EDS resolution is the same as the selected tile set resolution up to the maximum supported EDS resolution, which is 512 x 442 or 768 x 512 based on the aspect ratio of the tile set resolution.
- Enter the **Dwell** time and number of **Frames** to achieve satisfactory EDS counts during acquisition. Note that **Acquisition Time** and **Frame Time** are automatically computed.
- Locate and adjust the **EDS Pixel Size** parameter if necessary. Note that any changes to EDS Pixel Size parameter affect the HFW of the tile set. Adjust the **Tile HFW** parameter to match the specified EDS pixel size.



3. Locate the **Elements** parameter under the Analysis Parameters section of the Analytics tab.



4. Click the ellipsis icon to open the Element Selector.
 - a. Select the individual elements that you want to identify during EDS acquisition by selecting them with a mouse click.
 - b. Optional: Associate a specific color with each selected element by right-clicking the element and selecting the desired color from color picker. The selected color is used for the EDS map generated for given element. If a color is not associated with the element, the color is automatically selected from the system palette to match the color that you typically see in the xT UI.



5. The acquired X-ray spectrum is processed and displayed as a color map for each selected element. There are two types of EDS maps that are currently supported: **Count Maps** and **Quant Maps**. To select the EDS maps associate with your specific type, do the following:

- a. For Count Maps, select one or more EDS maps to be generated after acquisition by selecting the corresponding checkbox. If you do not select any maps, then you must activate EDS reprocessing on the tile set so that processing can occur at a later point.
- b. For Quant Maps, specify the quantification parameters to be used for processing of the EDS spectrum:
 - **Quantification Type:** available values include **Atomic Percentage** and **Weight Percentage**.
 - **Segmentation Type:** available values include **Object-based** and **Regular**.
- c. For each selected type of map, observe the estimated disk size necessary for storing the maps after acquisition. If you anticipate that the estimated disk size will be exceeded, consider deselecting some elements if they are not critical for the experiment.

6. Observe that the **Normalize Maps** checkbox is selected by default. This option allows you to normalize the intensity of EDS maps across the entire tile set. See [Reprocess EDS Tile Set](#) for more details.

7. Select the **Enable EDS Reprocessing** checkbox to include EDS reprocessing data in the tile set after acquisition. This allows you to reprocess the spectrum data later for a different selection of chemical elements and EDS maps. If the data is not saved, reprocessing will not be available for this tile set.

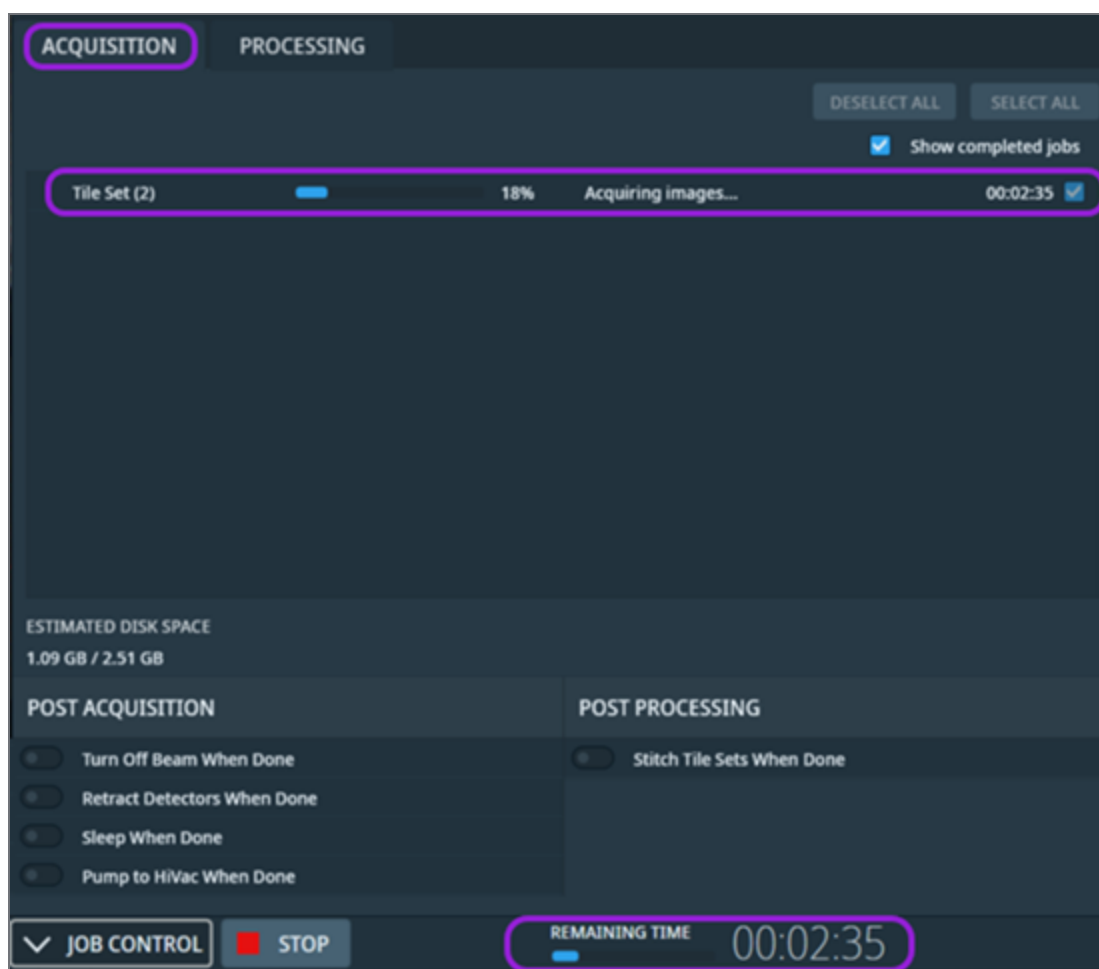


Note: If you select this option, the disk size estimate is displayed next to the checkbox. Note that the exact size is not available before acquisition, so the estimate is refreshed during EDS acquisition based on the measured data.

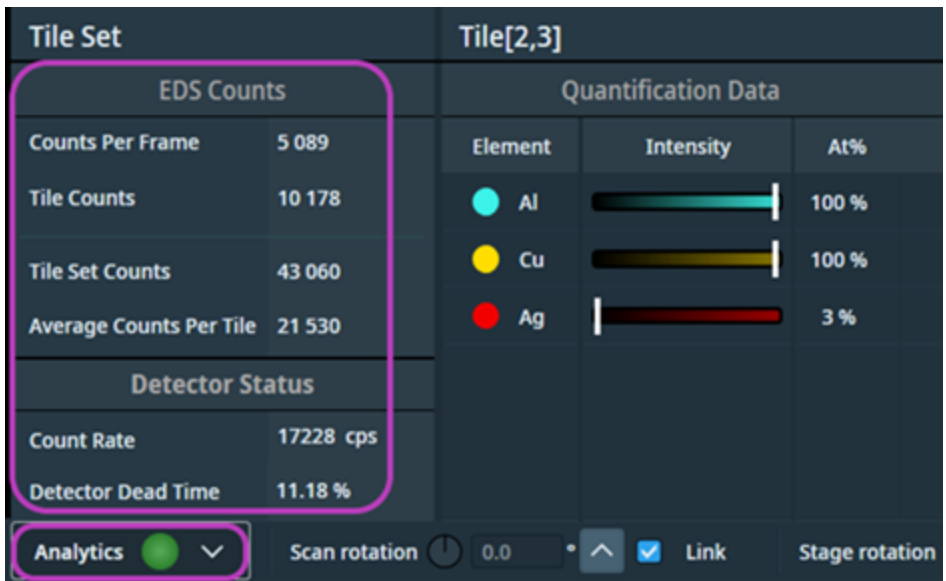
Acquire EDS Tile Set

Follow the steps below to acquire the EDS tile set.

1. Follow the standard tile set acquisition procedure described in [Acquire a Tile Set](#).
2. Observe status of the EDS acquisition in the following:
 - Progress bar and remaining time in the Acquisition job queue
 - Status notifications in the status bar
 - Remaining time in the status bar



3. Click the **Analytics** button on the status bar. A dialog will then open for you to view data about incoming counts, tile counts, and tile set counts during the EDS acquisition.

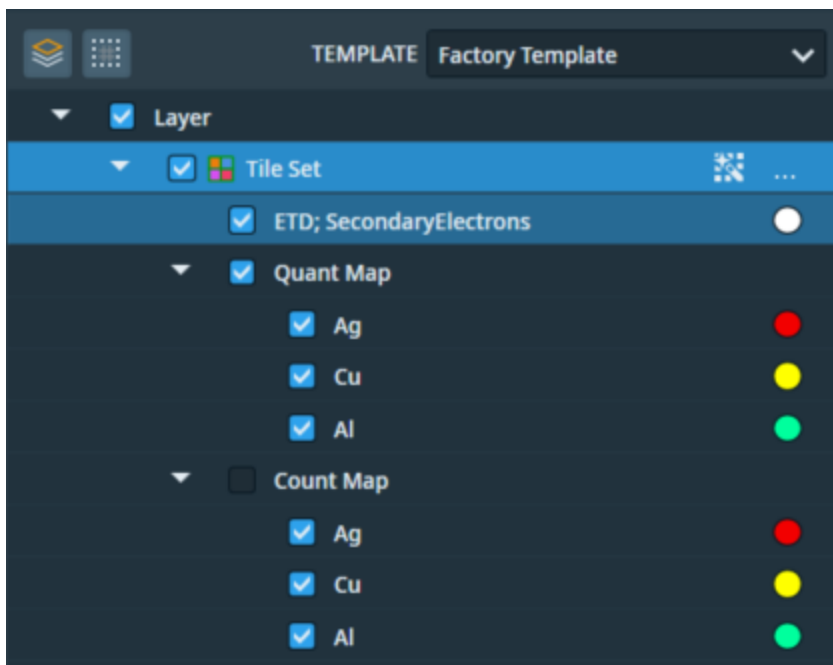


View Results of EDS Acquisition

Once EDS tile set has finished acquisition and processing, you can view the results in the layer tree, Visualization tab, Analytics dialog, and main Viewer (see [Layer Tree Tabs](#)).

View results in the layer tree

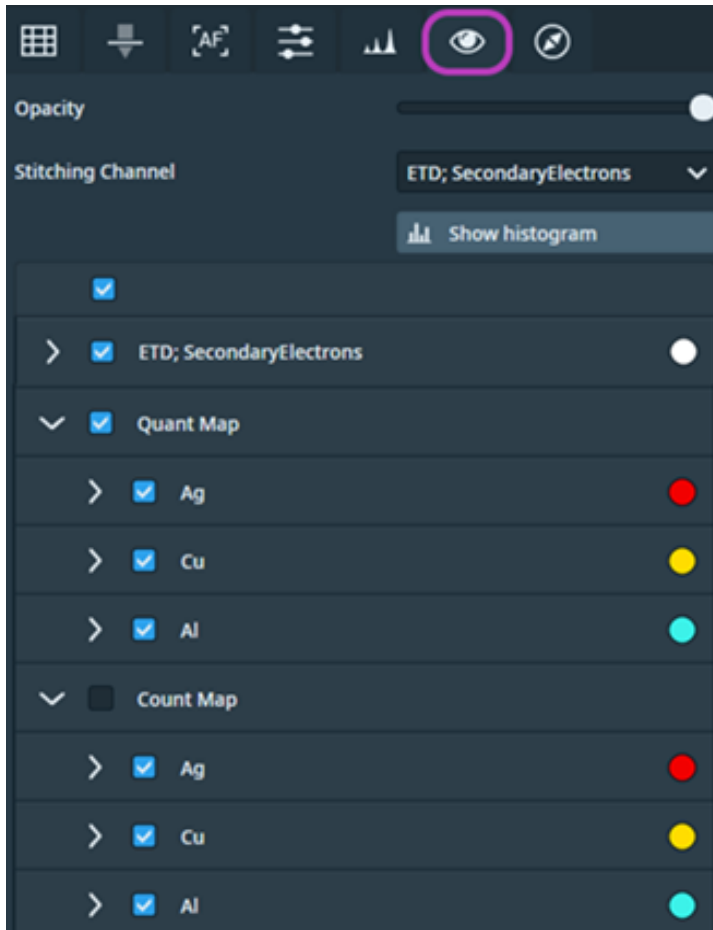
In the layer tree, the tile set has a collection of layers within it that corresponds to each processed element and SEM image. The inner layers are represented as color channels, and are organized within Quant Maps and Count Maps groups.



1. Expand the group by clicking on the small arrow next to the group name. The layer group is expanded to show the list of corresponding element channels.
2. Select the checkbox on the left side of the layer to toggle visibility of the element channel or group of channels.
3. Click the colored circle on the right to change the color of the element channel.

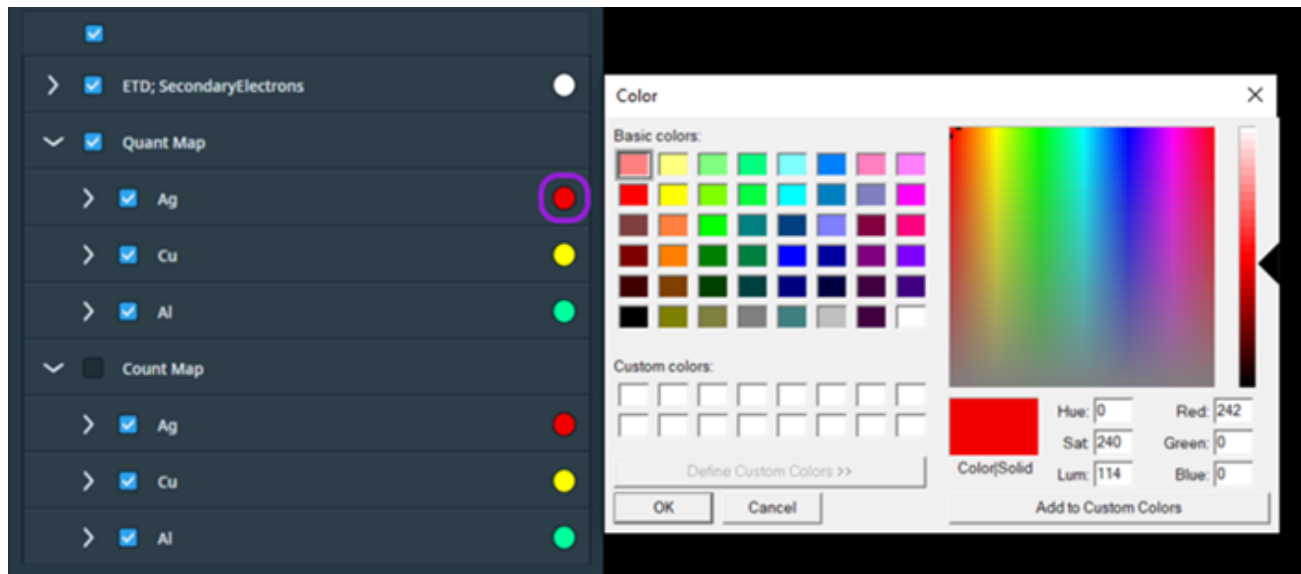
View results in the Visualization tab

The Visualization tab of the tile set shows the list of color channels that corresponds to each processed element and SEM image. The channels are organized within Quant Maps and Count Maps groups.



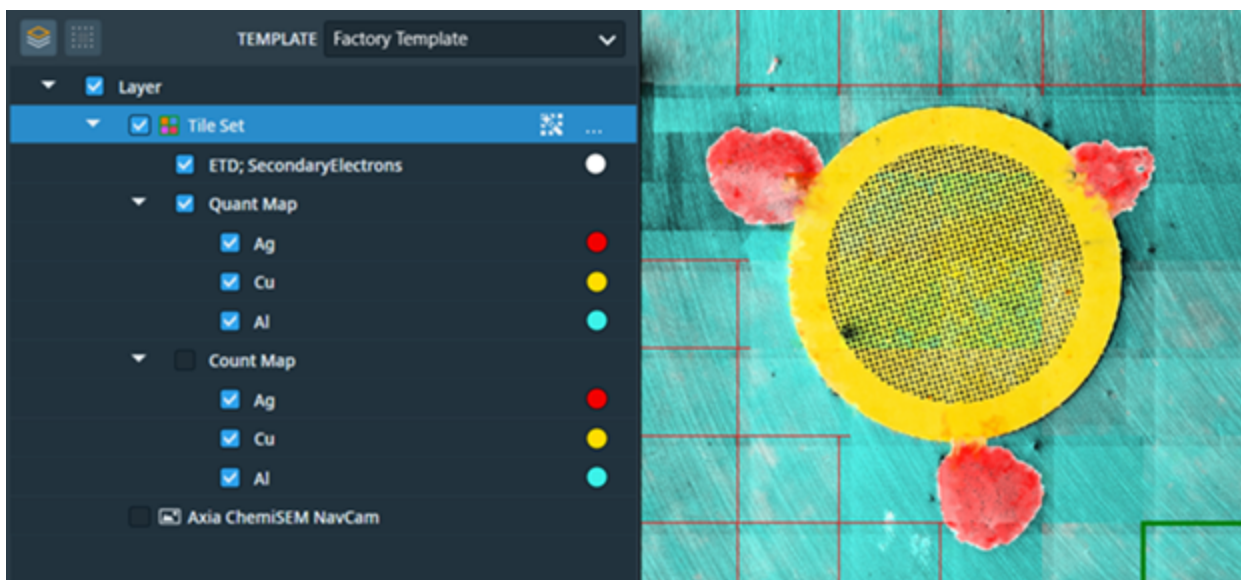
1. Expand the group by clicking in the group header. The group is expanded to show the list of corresponding element channels.
2. Expand the individual element channels by clicking in the channel header. In the expanded control, you can modify the visualization properties of the channel.

- Select the checkbox on the left side of the group or channel to toggle visibility of the element channel or group of channels.
- Click the colored circle on the right to change the color of the element channel or group of channels.



View results in main Viewer

The overall result of the EDS acquisition is displayed in the main viewer by blending the color maps that correspond to each processed element and SEM image. You can control what maps are included in the blended result by toggling visibility of the element channels in the layer tree or the Visualization tab.



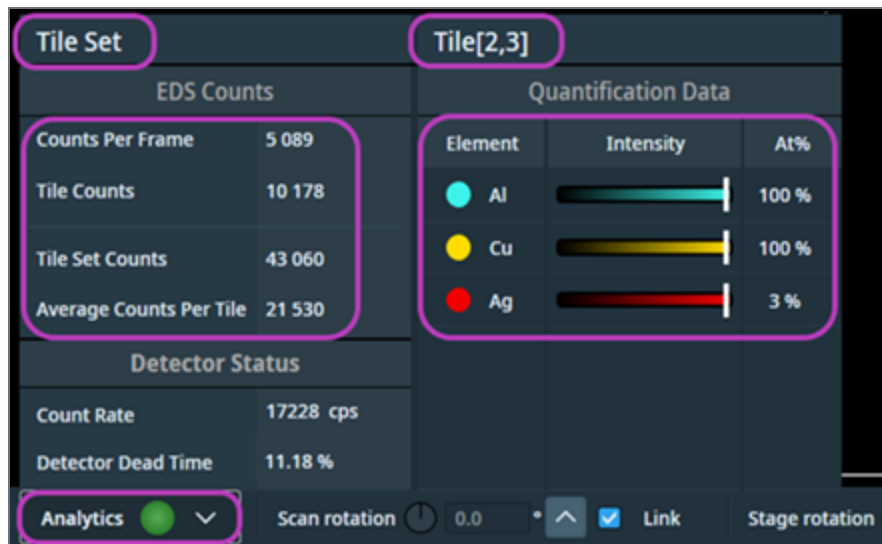
View quantification data and summary of counts in Analytics dialog

The following additional information is collected during EDS acquisition:

- Summary of incoming counts
- Quantification Data: This is included if you have selected the Quant Maps analysis on the Analytics tab.

You can observe this additional information by following the steps below:

1. Go to the status bar and click **Analytics** to open the Analytics dialog.
2. Select one of the tiles within the acquired EDS tile set in the main Viewer.
3. When the Analytics dialog opens, notice the name of the selected *tile set* and *tile* coordinates in the header of the Analytics dialog.



4. View the quantification data measured on the selected *tile* in the Quantification Data panel.

5. The elements are ordered by maximum concentration on the *tile set*, and for each element you can view the following:
 - Element: This displays the name and color of the element.
 - Intensity gradient: The range of intensities within the Quant Maps on the selected *tile set*.
 - White marker on the intensity gradient: This marks the highest intensity that is associated with maximum element concentration on the selected *tile*.
 - Maximum concentration in At% or Wt%: This percentage is the maximum concentration for a given element measured on the selected *tile*. This percentage also indicates that there is at least one pixel on some part of the selected *tile* with that concentration level. Note that the unit of measurement (At% or Wt%) depends upon the selected Quantification Type on the Analytics tab.
6. View the summary of detected counts in the **EDS Counts** panel of the dialog.

Reprocess EDS Tile Set

The reprocessing functionality allows you to reprocess the spectrum data that are saved within the tile set for a different selection of chemical elements and EDS maps.



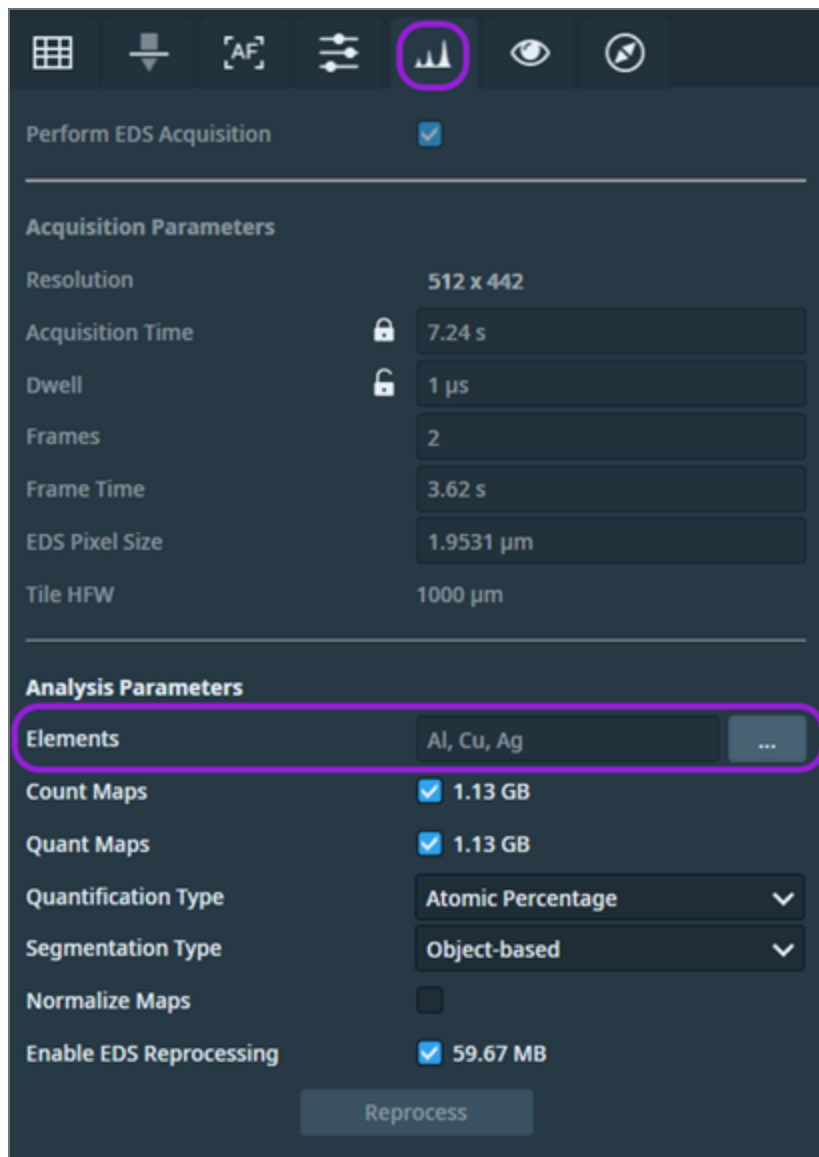
Note: EDS reprocessing must be activated for the tile set in order for this functionality to be available. Refer to [Configure Analytics for EDS Acquisition](#) for more information.

You can include multiple changes, as described in the sections below, within the same reprocessing operation:

- Change the selection of elements, EDS maps, or normalization option.
- Observe that warning is displayed on the Analytics tab and the Reprocess button after each individual change: "EDS parameters have been changed. Reprocess the tile set to reflect the changes."
- Continue adjusting EDS parameters until you complete all intended changes.
- Click the Reprocess button to reprocess the tile set and have all changes applied to the tile set within the same EDS reprocessing job.

Change selection of elements

1. Locate the **Elements** parameter and click the ellipsis icon to open the Element Selector.



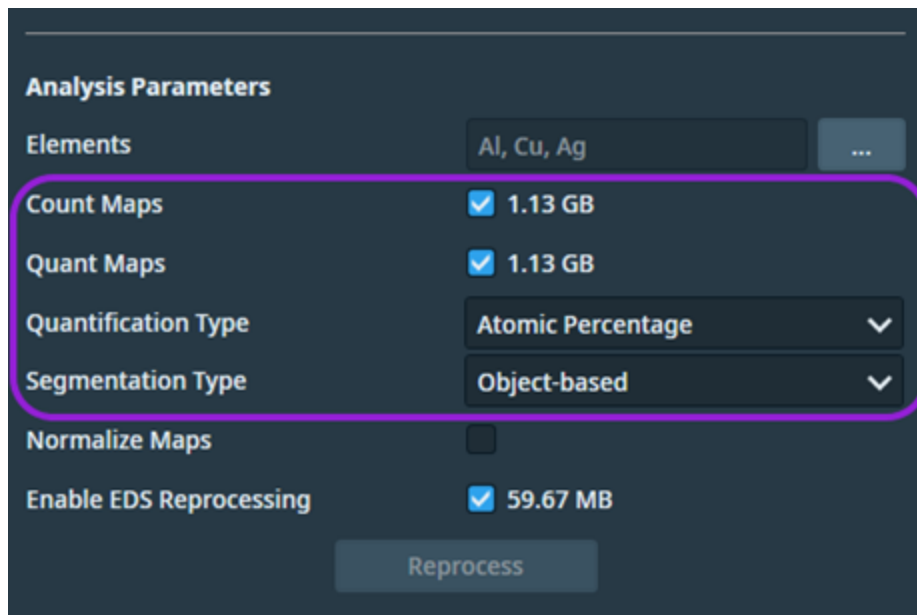
2. Observe the elements that are currently selected for EDS processing.

3. Choose new elements that you want to include in EDS reprocessing by selecting them with a left mouse click. Remove elements that you no longer want to include in EDS reprocessing by clicking the selected element with a left mouse click again.

4. Optional: Change the colors that are associated with each selected element by right-clicking on the element and choosing the desired color from color picker. You can also remove color that was previously associated with the element by clicking the Reset button in the color picker.

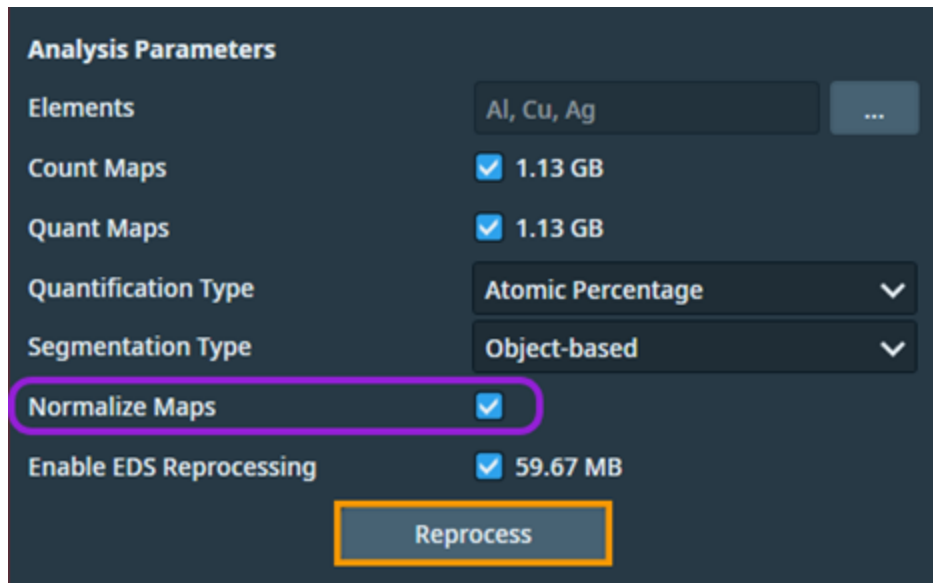
Change selection and parameters of EDS maps

1. Select or deselect **Count Maps** and **Quant Maps** checkboxes to include or exclude given type of EDS maps from EDS reprocessing.
2. For Quant Maps, you can also change **Quantification Type** and **Segmentation Type** that should be used for EDS reprocessing.



Normalize EDS maps

Select the **Normalize Maps** option to have the intensity of the EDS maps normalized across the whole tile set during EDS reprocessing.



Analysis Parameters

Elements	Al, Cu, Ag	...
Count Maps	<input checked="" type="checkbox"/> 1.13 GB	
Quant Maps	<input checked="" type="checkbox"/> 1.13 GB	
Quantification Type	Atomic Percentage	▼
Segmentation Type	Object-based	▼
Normalize Maps	<input checked="" type="checkbox"/>	
Enable EDS Reprocessing	<input checked="" type="checkbox"/> 59.67 MB	

Reprocess

The following occurs during the normalization process:

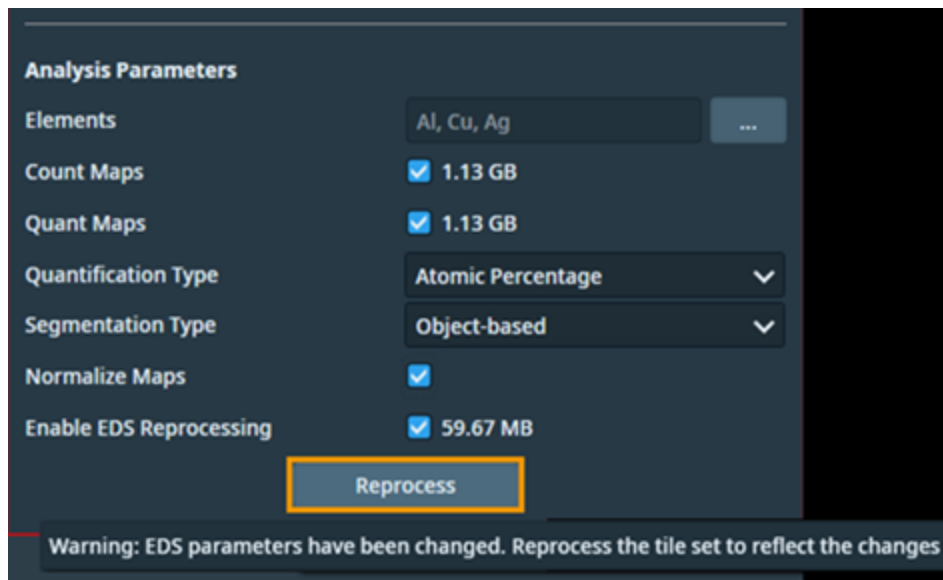
- The highest concentration of each element over the entire tile set is determined.
- The intensity maps are adjusted across all tiles to make the intensity ranges for given element relative to the global maximum concentration.
- Visually, this process ensures that the intensity values for a given element are consistent and comparable across different tiles.

Keep or remove EDS reprocessing data

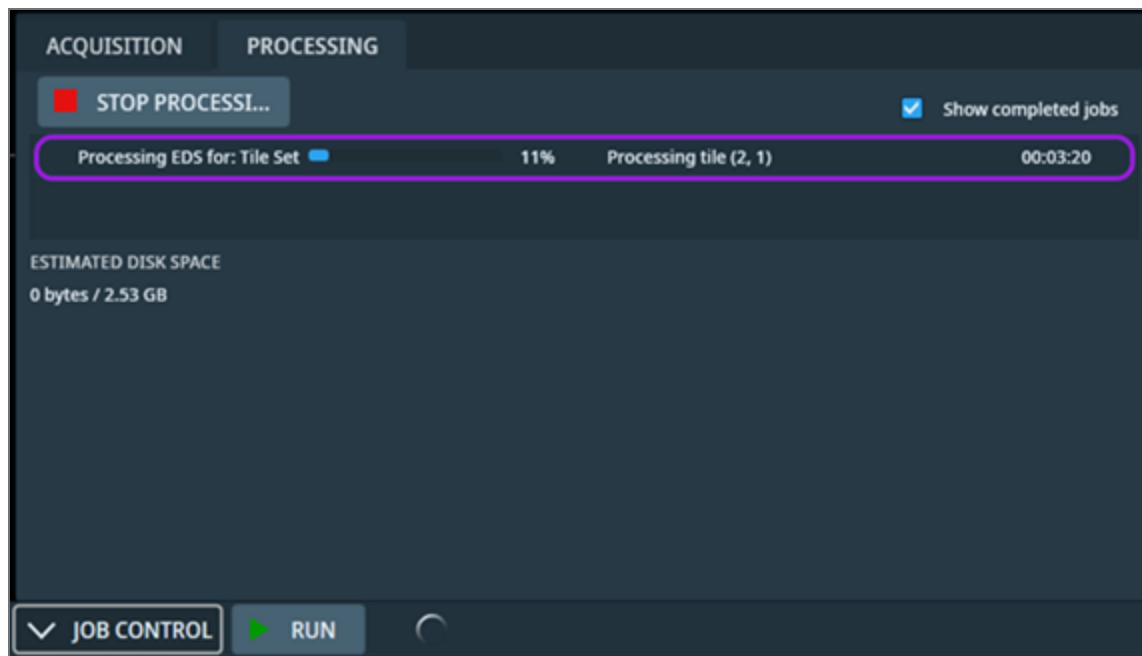
Deselect the **Enable EDS Reprocessing** checkbox if you no longer want to include EDS reprocessing data in the tile set. This will save storage space necessary for the project, but you will no longer be able to reprocess the tile set. If you deselect the option, final reprocessing will be performed after which the EDS reprocessing data will be removed.

Reprocess the tile set

1. Reprocess the tile set by clicking **Reprocess** at the bottom of the Analytics tab.



2. Observe the status of the reprocessing job in the Processing job queue.

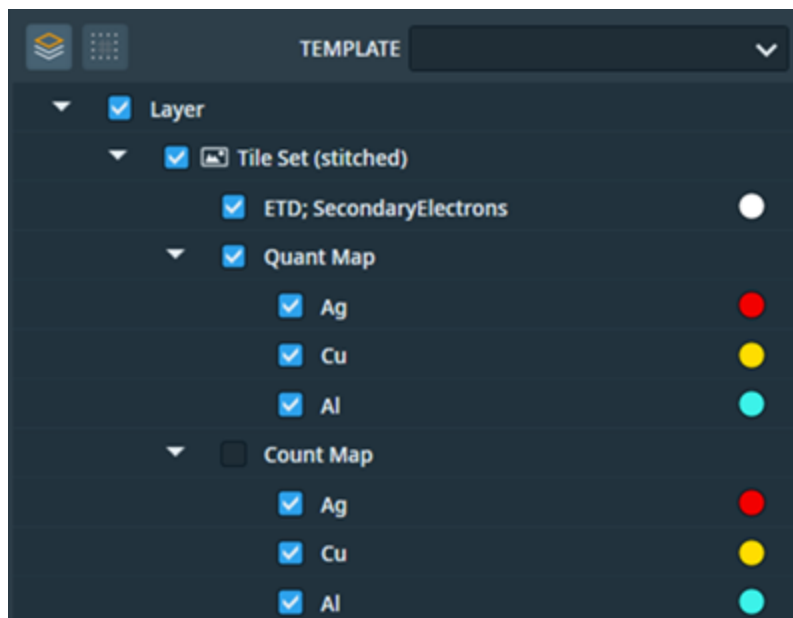


Stitch EDS Tile Set

You can stitch an EDS tile set in the same way as any other tile set. Intensity maps for the selected elements are stitched during the process as well and available in the stitched result. SEM electron image is used as the default stitching channel, and it is used to align tiles based on the overlaps.

View structure of the stitched EDS layer

In the layer tree, the stitched EDS layer has the same structure as the original EDS tile set. The stitched EDS layer contains a collection of layers that correspond to each processed element and SEM image. The inner layers are represented as color channels, and these inner layers are organized within Quant Maps and Count Maps groups.



1. Expand the group by clicking on the small arrow next to the group name. The layer group is expanded to show the list of corresponding element channels.
2. Select the checkbox on the left side of the layer to toggle visibility of the element channel or group of channels.
3. Click the colored circle on the right to change the color of the element channel.

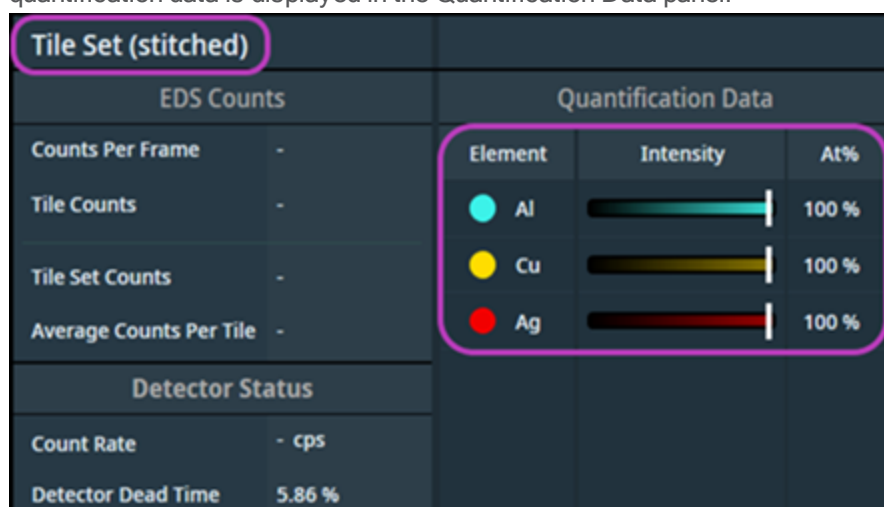
View quantification data in Analytics dialog

The stitched EDS layer also contains quantification data, if the following conditions are satisfied:

- The original tile set has Quant Maps analysis selected
- The original tile set is normalized

You can observe the quantification data by following the steps below.

1. Go to the status bar and click **Analytics** to open the Analytics dialog.
2. Select the stitched EDS layer in the layer tree, or select it in the main Viewer.
3. When the Analytics dialog opens, the name of your selected layer is displayed in the header and the normalized quantification data is displayed in the Quantification Data panel.



The elements are ordered by maximum concentration in the Quantification Data panel, and for each element you can view the following:

- Element: This displays the name and color of the element.
- Intensity gradient: The range of intensities within the Quant Maps.
- White marker on the intensity gradient: This marks the highest intensity that is associated with the maximum element concentration in the stitched layer.
- Maximum concentration in At% or Wt%: This percentage is the maximum concentration for a given element measured on the stitched layer. This percentage also indicates that there is at least one pixel on some part of the sample with that concentration level. Note that the unit of measurement (At% or Wt%) depends upon the selected Quantification Type on the Analytics tab.

Cryo

The Maps Cryo workflow is a collection of controls to help create a list of sites that support the cryo lamella TEM prep workflow.

In the Cryo workflow, you can target a collection of cells on a frozen sample grid by adding a cryo lamella site at each cell of interest.

The Maps Cryo workflow consists of the following tasks:

1. (optional) [Import and view fluorescence data](#).
2. [Set sample tilt](#) to make the cryo sample perpendicular to electron beam for imaging.

This procedure is required for the Cryo workflow because the cryo samples are on holders that are tilted. To image the sample correctly with the Maps software, the sample must be perpendicular to the electron beam at all times.

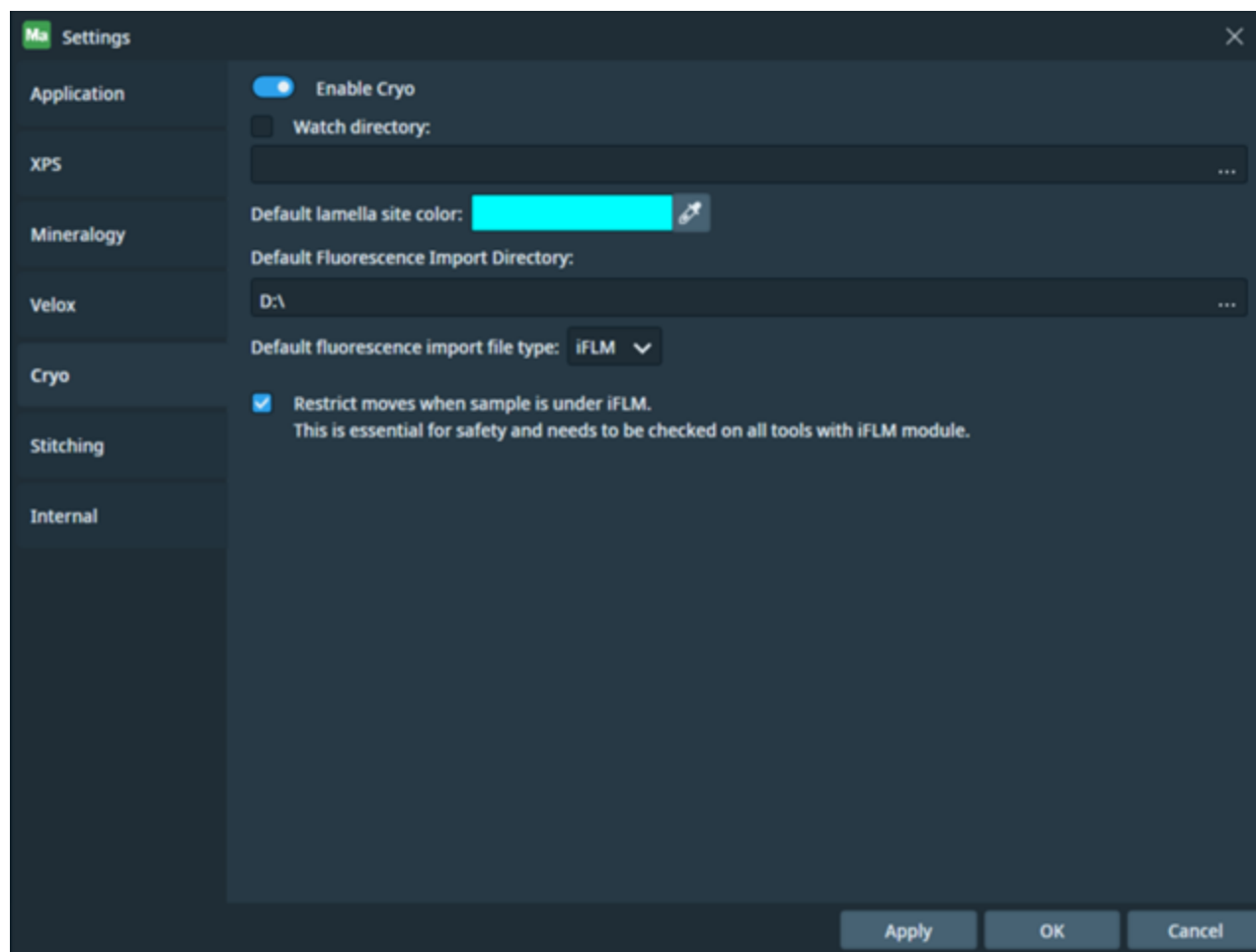
3. [Add lamella sites](#).
4. [Calculate the eucentric position](#) of lamella sites.
5. [Determine cryo milling position](#).
6. [Perform GIS deposition](#). When you have a collection of lamella sites fully setup and ready for milling, you must then perform a GIS deposition on the sample to prepare the sample for milling.

GIS deposition is performed after setting up the sites because it is hard to see cells of interest with a layer of a deposited substance covering them.

After you complete the workflow, you can analyze the milled-in-place lamellae in a TEM.

Configure Cryo settings

The Cryo settings allow you to activate the Cryo features and then select from the options described below.



Turn on Cryo features

1. Navigate to the Cryo Settings tab. On the **Options** menu, click **Settings** and then click the **Cryo** tab.
2. Click **Enable Cryo** to activate the Cryo features. The Maps application alerts you if a system restart is required to proceed. When the Maps software is in Cryo mode, then all the Cryo controls are available.

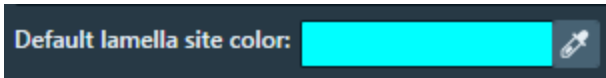
Choose a directory to watch

This option can speed up attaching files to selected lamella sites within Maps software. You can set this to the directory where xT saves images. When files are added to that directory and a lamella site is selected in the Maps software, you are prompted to attach the files to the selected lamella site timeline. See [Cryo lamella timeline](#) for more about the timeline.

1. Navigate to the Cryo Settings tab. On the **Options** menu, click **Settings** and then click the **Cryo** tab.
2. Select **Watch Directory** and then browse to a folder to choose a directory for Maps software to watch for new files.

Choose a lamella site color

1. Navigate to the Cryo Settings tab. On the **Options** menu, click **Settings** and then click the **Cryo** tab.
2. Click the eye dropper to choose the initial color used for a lamella site in the viewer when it is created.



Choose a default import directory for fluorescence data

The Leica Microsystems' Application Suite X (LAS X) software can export fluorescence data specifically for importation into the Maps software. The fluorescence data is a collection of images and a special XML file with "{CLEM_Positions_TFS}" in its name within the same directory. If you use this feature, then you can choose a default directory for Maps software to look for Leica fluorescence data import files.

1. Navigate to the Cryo Settings tab. On the **Options** menu, click **Settings** and then click the **Cryo** tab.
2. In the **Default Fluorescence Import Directory** field, browse to and select the directory where your fluorescence data is stored. This directory is used as the starting directory when you [Import and view fluorescence data](#).

Choose a default import file type for fluorescence data

The open file dialog defaults to a file filter for the selected fluorescence data type. Select the data type that will be imported most often.

Options include:

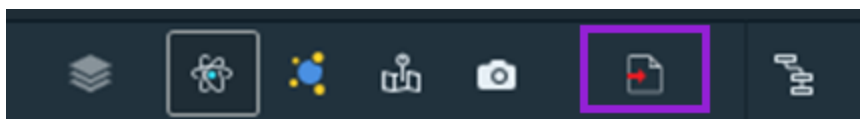
- **iFLM**: Integrated fluorescence light microscope, available on some Thermo Fisher Scientific systems.
- **Leica**: Fluorescence data from the Leica Microsystems' LAS X software.

Import and view fluorescence data

You can import fluorescence data and then view it within the Optical Data Browser.

Import procedure

When the Maps Cryo features are turned on, a command for importing fluorescence data is added to the Maps toolbar.



Prerequisites:

- Requires Cryo features to be activated within the Settings.
- Have fluorescence data available.

1. Click the **Import Fluorescence Data** icon within the Maps toolbar.

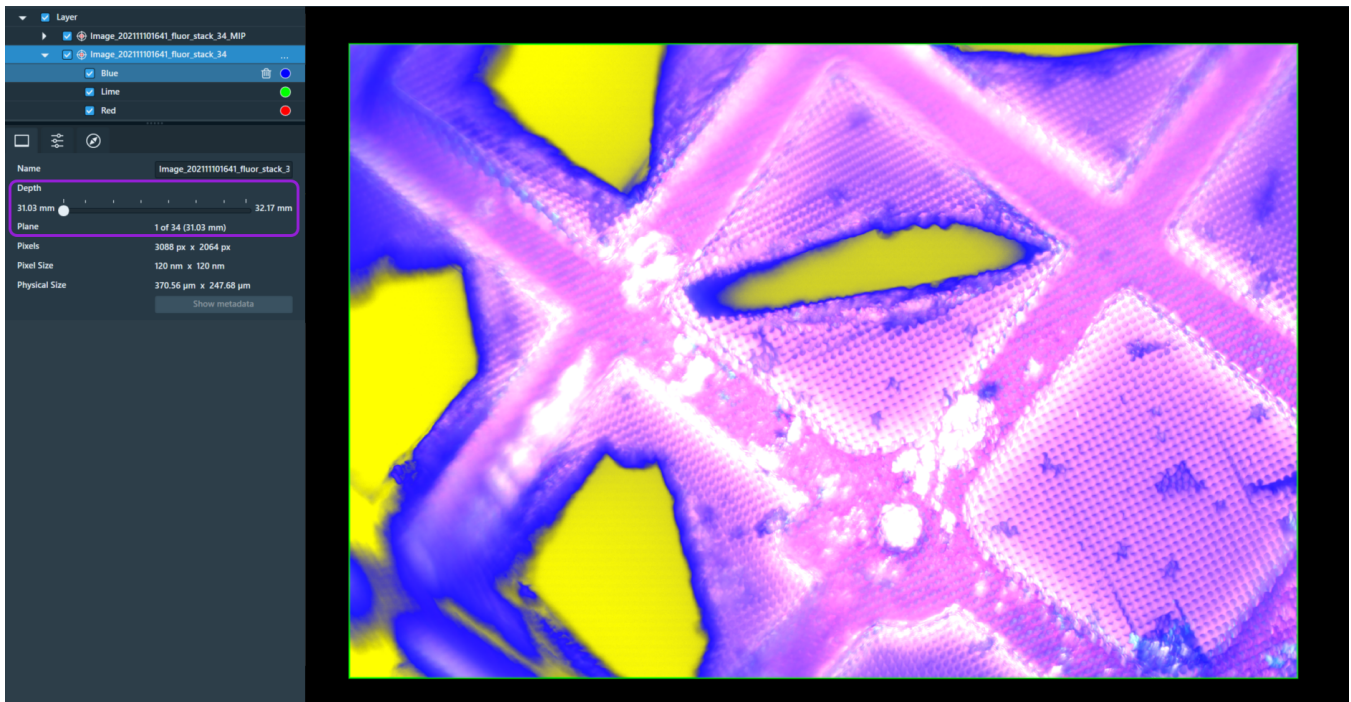


2. Select an image to import, and then Click **Open**.
3. The Maps software imports the fluorescence data.

View fluorescence data

When you select multilayer fluorescence data, hover your mouse cursor over the slider and move your mouse scroll wheel up/down to browse through the image layers displayed in the Optical Data Browser. Alternatively, you can use the Page Up and Page Down keys on your keyboard to browse through the image layers. When the slider has focus, use the Arrow keys on the keyboard to change the value by 1 and use the Page Up and Page Down keys to change the value by 10%.

Maps displays the actual position of the image planes in microns and adds tick marks in the browser's main viewer to display individual image planes for more accurate navigation. If Z coordinates are available within the imported file, then you can view the minimum and maximum depth values at each end of the Depth control slider. If Z coordinates are *not available* in the imported file, then a plane number value appears for the Plane control.



Import and view Arctis data

You can import and view Arctis data in the Maps software application on TEM systems. The Arctis data include fluorescence images and information about milled lamellae.

Note: This Cryo functionality is specific to TEM systems and is not available on SEM systems.

Import procedure

When the Maps Cryo features are turned on, a command for importing Arctis data is added to the Maps toolbar.



Prerequisites:

- Requires Cryo features to be activated within the Settings.
- Have Arctis data available.

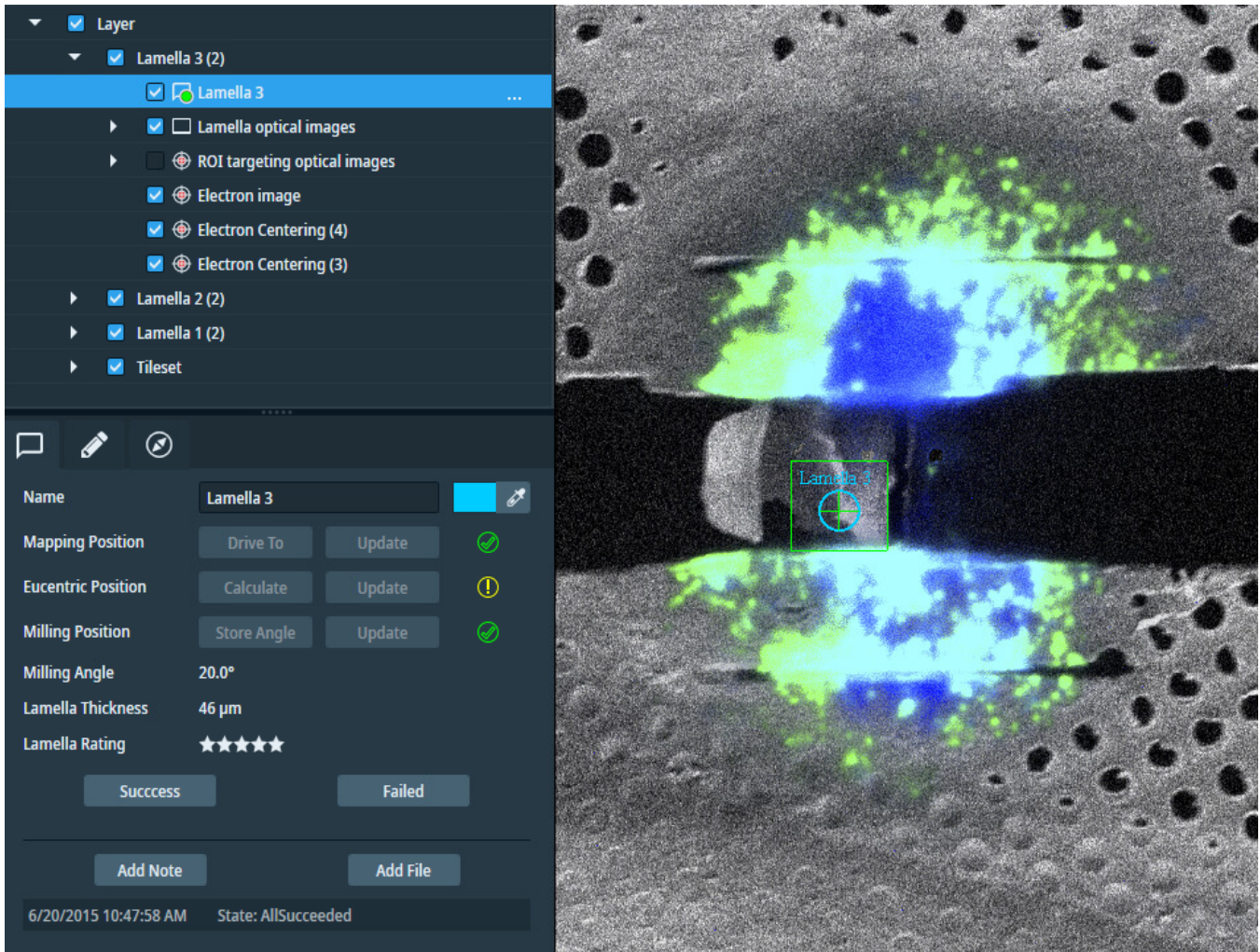
1. Click the **Import Arctis Data** icon within the Maps toolbar.



2. Select Arctis data to import, and then Click **Open**.
3. The Maps software imports the Arctis data.

View individual lamella sites

You can view individual lamella sites by expanding the corresponding lamella group in the layer tree. You will find electron images, optical images, and a lamella annotation within the group. When selecting the lamella annotation, you can see information about the milling angle, lamella thickness, and rating.



Add lamella sites

There are two ways to add lamella sites in Maps software. One way is to find a spot on images in the Maps software using the viewer. The other is to drive to the spot within xT and create the site based on the current microscope field of view position.

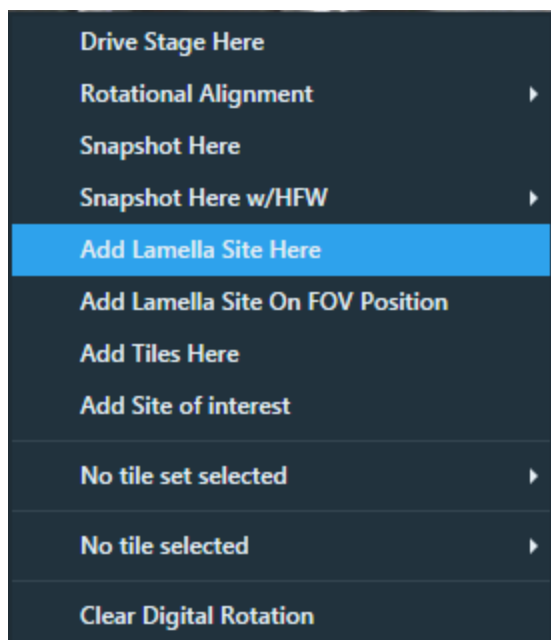
Prerequisites:

- Requires Cryo features to be activated within the Settings.

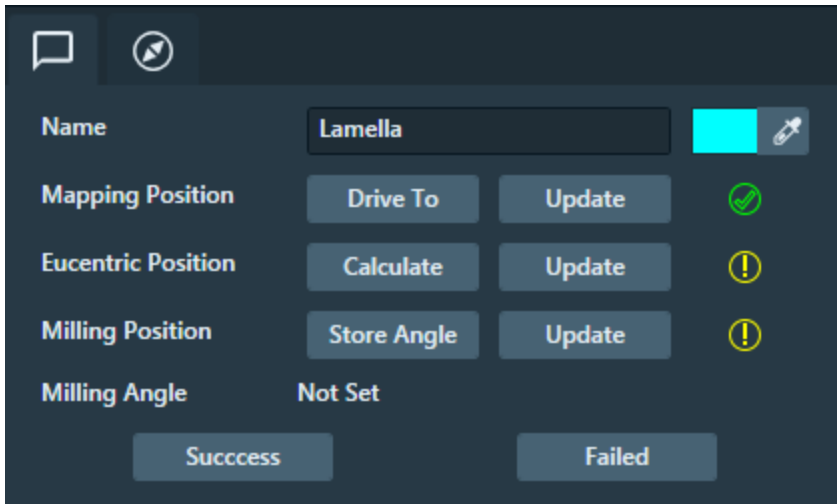
Add a lamella site in Maps software

This is the preferred/recommended method when you already have data in Maps and can find the desired site in the viewer.

1. In the Maps viewer, navigate to the location where you want to make a lamella site.
2. In the Maps viewer, right-click where you want to create a new lamella site and then click **Add Lamella Site Here**.



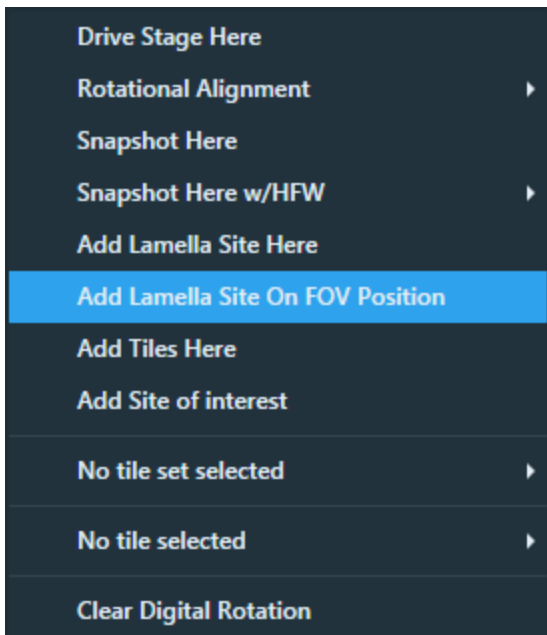
Maps software creates a new lamella site at that location and adds it to the active layer.



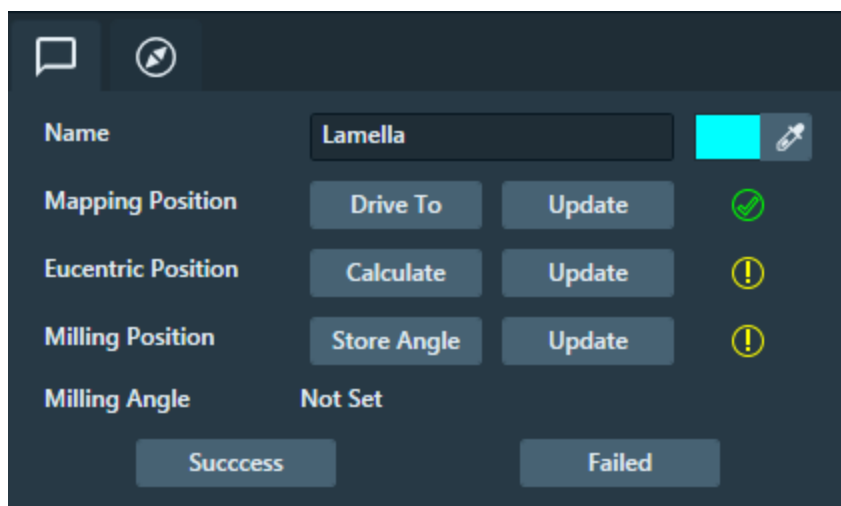
Add a lamella site using the current stage position.

Use this method when you do not have enough data in the Maps software to see the desired site from within the viewer. This method uses xT to find and navigate to the site of interest.

1. In xT, find and drive to the site of interest and center it in the field of view (FOV).
2. In the Maps viewer, right-click anywhere and then click **Add Lamella Site On FOV Position**.



Maps software creates a new lamella site in the center of the current microscope field of view and adds it to the active layer.



Calculate the eucentric position

Maps software can help you determine the eucentric position of a lamella site for the Cryo workflow. *Eucentric position* refers to a position where the sample can be tilted, and the area of interest does not move out of the field of view or go out of focus.

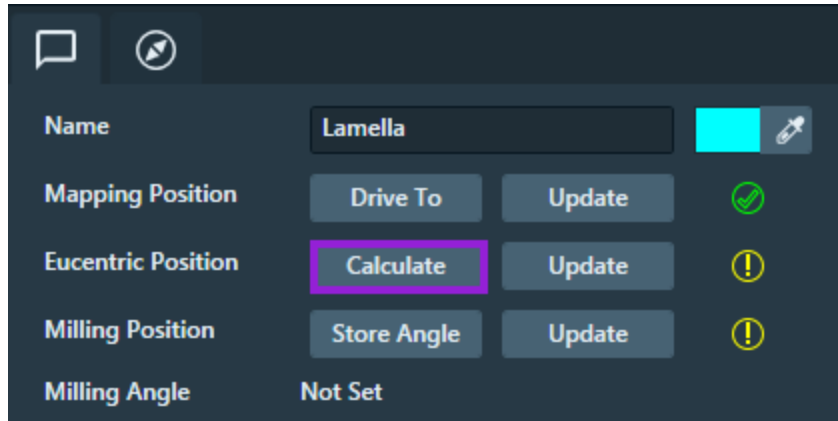
Prerequisites:

- Requires Cryo features to be activated within the Settings.
- At least one lamella site has been created.
- Stage tilt set for current sample. See [Set sample tilt](#) for instructions.

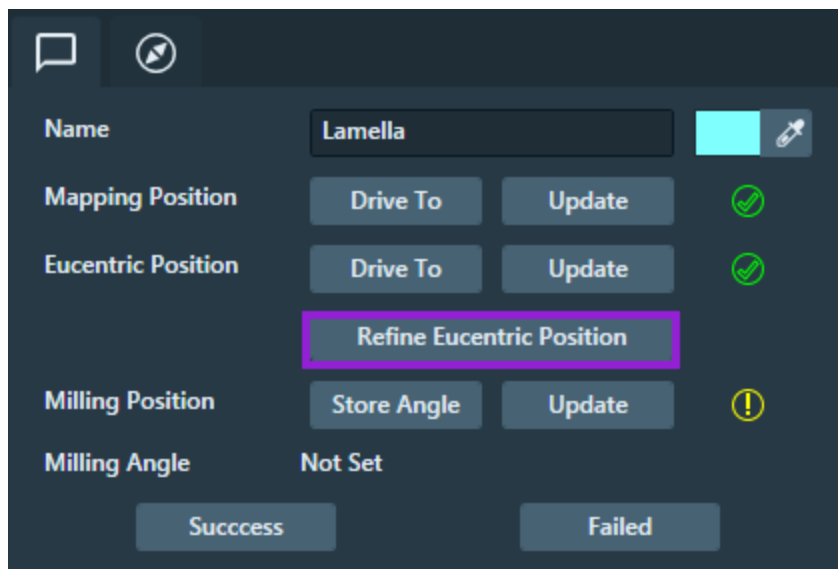
This procedure can be performed only for lamella sites in the Cryo workflow. If you have calculated the eucentric position and you want to change it, then you can refine it using the same procedure.

To calculate or refine the eucentric position

1. Click the lamella site in the Layer tree to select it.
2. In the Lamella Site pane, next to Eucentric Position, click **Calculate**.

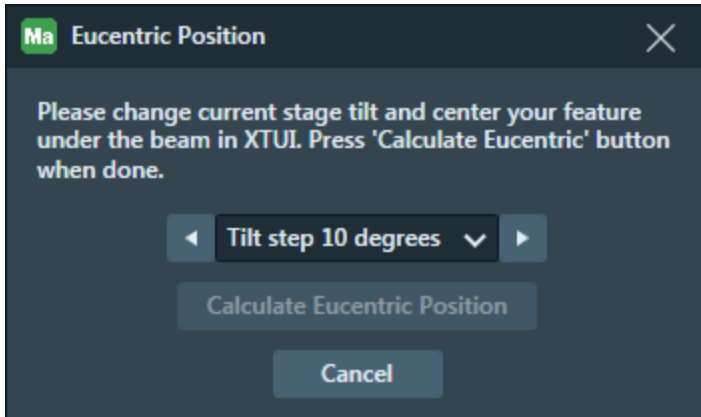


If the eucentric position has already been calculated for this site, then click **Refine Eucentric Position**.



3. Maps software prompts you to center the feature under the electron beam in xT. When finished, return to Maps software and click **OK**.

4. To calculate or refine the eucentric position of the site, perform a series of stage tilts, and re-center the feature at each tilt position.
 - a. On the dropdown list, click the tilt increment you want to use to tilt the stage. You can change the tilt step at any point while you are calculating. Starting with smaller tilt steps might make this task easier.

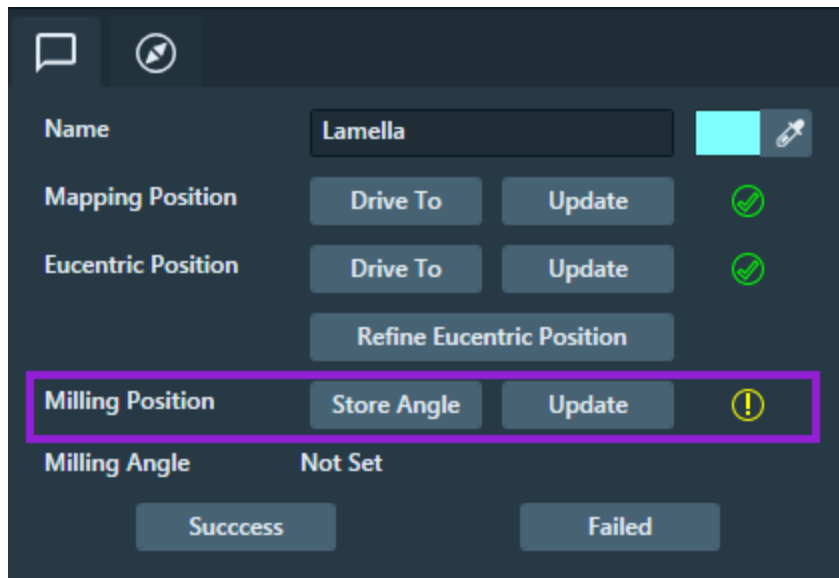


- b. Use the arrow buttons on either side of the dropdown list to tilt the stage up or down by the selected tilt step.
- c. Once the stage is done tilting, recenter your feature in xT.
- d. Click **Calculate Eucentric Position**.

Repeat the previous step as needed to increase the accuracy of the eucentric position. If the eucentric position is calculated correctly, then the feature stays centered in xT view window as you change the stage tilt.

- Once you see the feature stays in the center of the display in xT between tilts of at least +/-10 degrees, you can close the **Eucentric Position** dialog.

The eucentric position is now calculated and stored within the lamella site in Maps software.



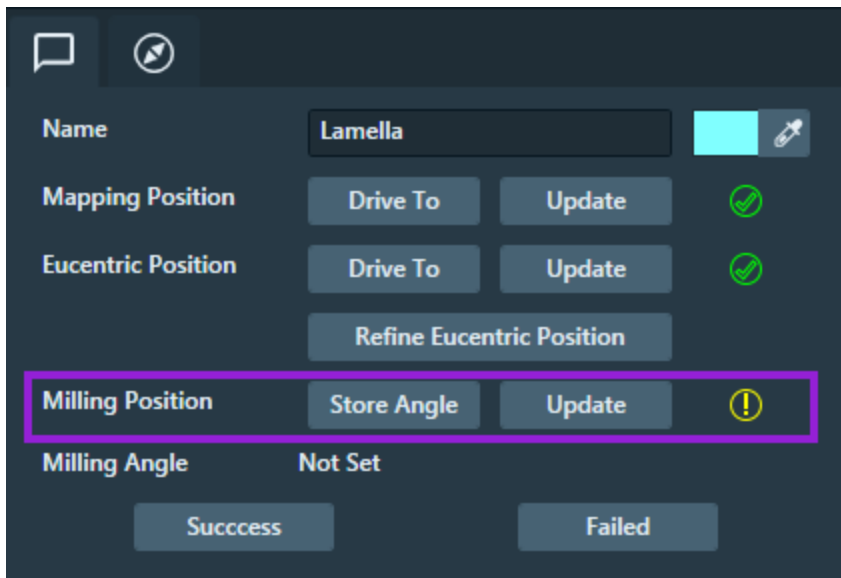
Determine cryo milling position

The *milling position* is the stage tilt and position to be used when milling the lamella. You must determine this position before you can [Perform GIS deposition](#).

Prerequisites:

- Requires Cryo features to be activated within the Settings.
- At least one lamella site has been created and the eucentric position has been calculated.

The yellow warning symbol indicates that the milling position needs attention.

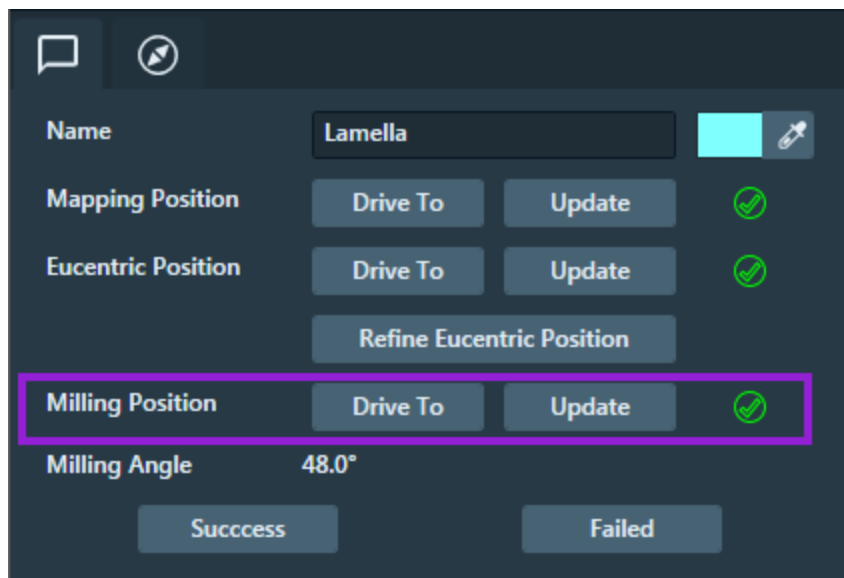


To determine the milling position:

1. Select the desired lamella site.
2. Click **Drive To** for Eucentric Position.
3. In xT, change the stage tilt to the angle at which you want to mill a lamella.
4. In Maps software, click **Store Angle** to finish setting up the milling position. Maps software stores the angle. The

lamella site is now fully setup.

5. The green check mark symbol confirms that you have successfully determined the milling position.



Perform GIS deposition

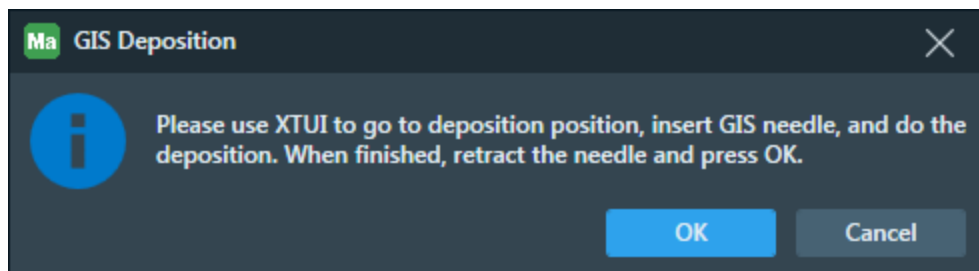
While creating sites, the sample tilt is set and the stage is unlinked. xT requires the stage to be linked when performing deposition. To make sure you do not accidentally perform any unlinked moves with the Maps software during deposition, you must lock the Maps user interface until you are done with deposition in xT.

Prerequisites:

- Requires Cryo features to be activated within the Settings.
- At least one lamella site must be fully setup and ready for milling.

1. On the Microscope menu click **GIS Deposition**.

i **Note:** This command only locks out the Maps user interface. It does not actually perform any deposition.

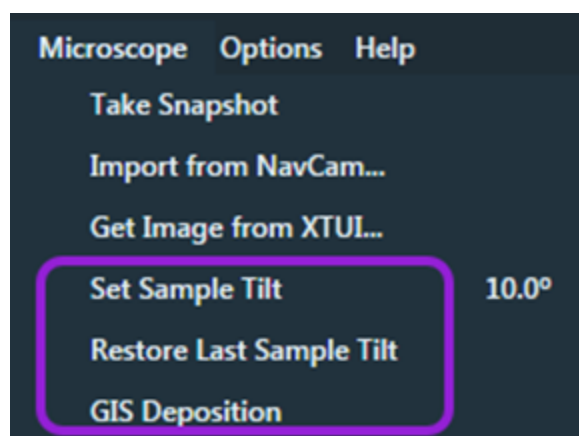


2. Using the xT software, perform a GIS deposition.
 3. When deposition is finished, return to the Maps software and click **OK** to resume using the Maps software.
- After deposition, the sample is ready to perform lamella milling in a TEM.

Cryo menu items

When Maps software is in Cryo mode, new commands are available on the **Microscope** menu.

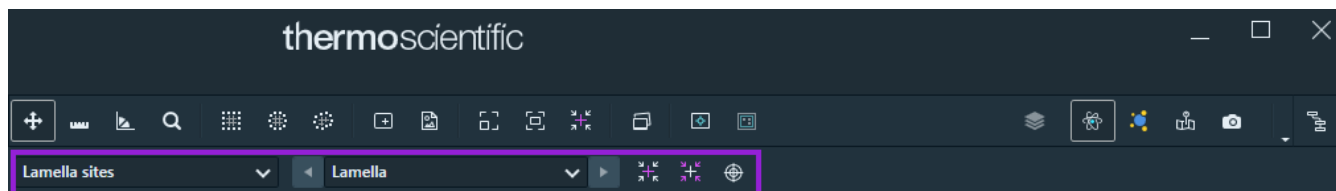
i **Note:** GIS Deposition is the only unique menu item for Cryo mode. The other commands are documented here because they are required for the Cryo workflow in Maps software.








Menu item	Description
Set Sample Tilt	Unlinks the stage and stores the current sample tilt to the current tilt of the microscope. When the sample tilt is set, there is a check mark next to this option and the stage tilt that was set. See Set sample tilt for instructions.
Restore Last Sample Tilt	Restores the previous sample tilt that was set. This command is only visible when the sample tilt is not set.
GIS Deposition	Sets up the Maps software for GIS deposition. See Perform GIS deposition for instructions.

Cryo lamella site toolbar

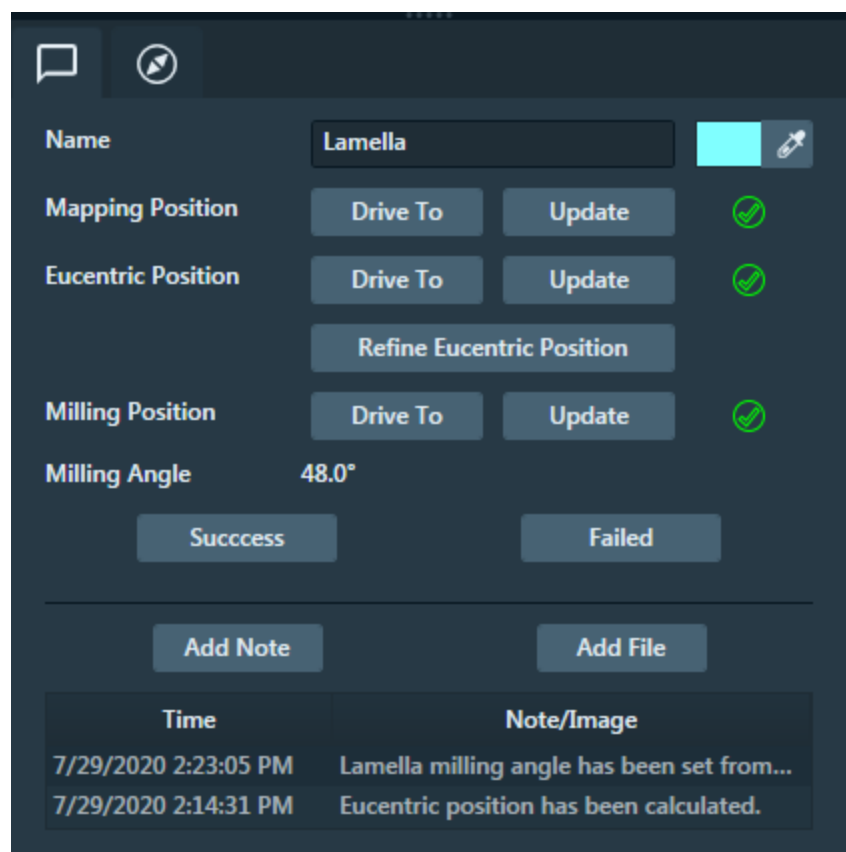
The cryo lamella site toolbar provides access to controls and actions relevant to the Cryo workflow. It is displayed only when the Cryo features are turned on as described in [Configure Cryo settings](#).



Toolbar item	Description
	Dropdown menu containing layer types that can be used in this toolbar.
	List of fully set up lamella sites. Changing the lamella selection changes the selected site in the layer tree. Use the arrow buttons on either side of the list to select the next or previous lamella site in the collection.
	Drives to the selected lamella site eucentric position. See Cryo lamella sites for more information about lamella sites.
	Drive to the selected lamella site mapping position. See Cryo lamella sites for more information about lamella sites.
	Starts the process to calculate the eucentric position. See Calculate the eucentric position for instructions.

Cryo lamella timeline

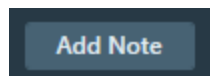
The timeline is a collection of notes, files, and actions that have happened or been attached to a selected lamella site. By default, the timeline automatically tracks property changes as text notes. This control can help you identify what has happened during the setup of the selected lamella site.



Add a note to the timeline

You can add simple text notes to lamella sites. The text appears on the timeline.

1. Click the site to which you want to add a simple text note.
2. Click **Add Note**.

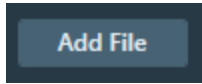


3. Type a text note in the dialog and then click **OK**.

Add a file to the timeline

You can attach files to lamella sites. The file is copied into the Maps project, so it is still available if you move the Maps project to another directory. In Cryo Settings, you can [Choose a directory to watch](#).

1. Click the site to which you want to add a file.
2. Click **Add File**.

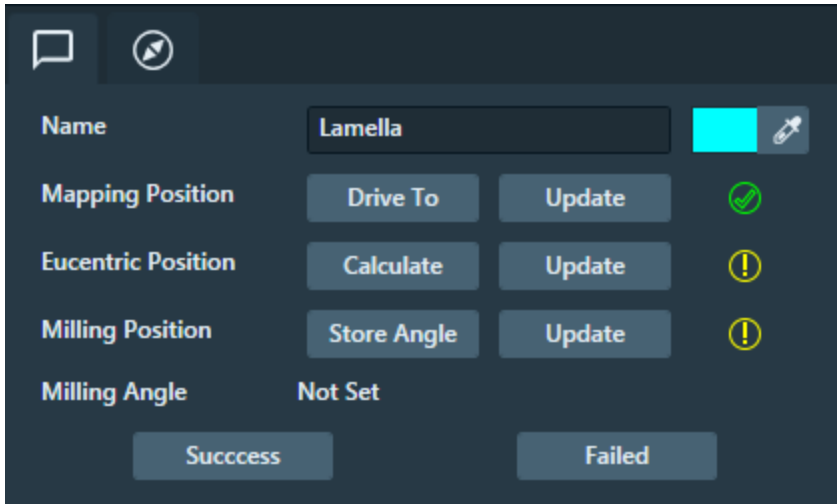


3. Browse to the file you want to attach, click it, and then click **Open**.

Cryo lamella sites



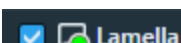
A *cryo lamella site* is a special annotation layer defined on a SEM tool to mark a specific location on a cryo sample where you want to mill a lamella. This layer contains special functionality and positioning. Each lamella site is used to mark cells of interest and to determine the angle at which to mill the lamella.

Lamella sites have the following properties in Maps software.



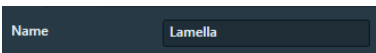

Lamella site status

The status symbol indicates the setup state of the lamella. This status symbol is displayed in the layer tree.



User interface item	Description
	The grey status symbol means the lamella site is in the initial state. It has been created, but nothing else has been done to it.
	The orange status symbol means the eucentric position has been calculated and stored for the lamella site.
	The green status symbol means the milling position and angle have been stored. The site is ready to be used for deposition and milling.


Lamella site properties

The following properties are displayed when you click on a lamella site.

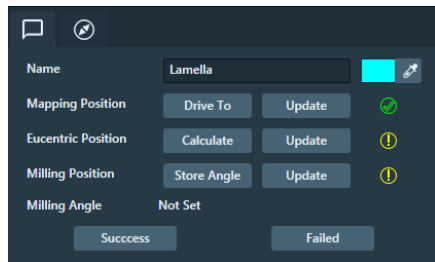
Property	Description
	Name of the lamella site.
	Color of the lamella site. Click this to change the color of the lamella site shown in the viewer.

Lamella site positions

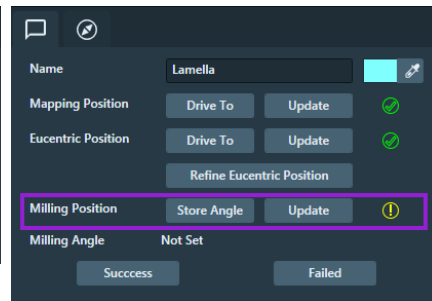
Positions listed in the Lamella Site property pane. A position has a yellow exclamation mark  when it is not set up and green check  once it is set up. You must set up a lamella site before you can [Perform GIS deposition](#).

Depending on the lamella site status, there are a different options per position. Notice the change in the buttons and the status indicators. A lamella site is considered fully setup when all three positions have a green check  next to them.

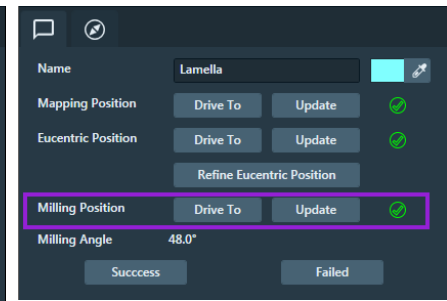
Initial



Eucentric position calculated



Setup complete

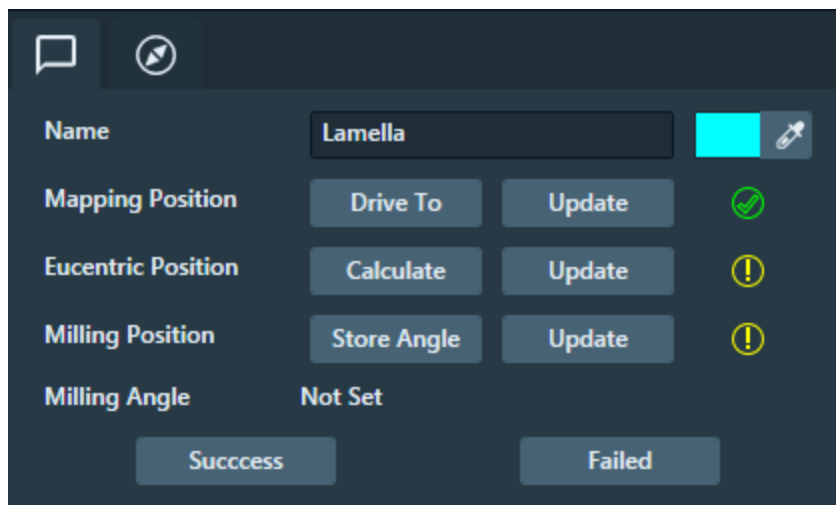


Mapping Position

The *mapping position* is the XYZ position where the lamella was initially added. See [Add lamella sites](#) for instructions.

- **Drive To** - Centers the Maps viewer on that position.
- **Update** - Changes the mapping position to the current microscope field of view location.

Initial setup



Eucentric Position

The *eucentric position* is the location where the stage can be tilted through a range of angles and the cell of interest the lamella site is marking does not move in X, Y, or Z in the field of view. It is not initially set up and must be calculated manually. See [Calculate the eucentric position](#) for instructions.

- **Calculate** - Click if the position has not been calculated.
- **Drive To** - Centers the Maps viewer on that position.
- **Update** - Changes the mapping position to the current microscope field of view location.
- **Refine Eucentric Position** - Click to re-calculate the position.

Eucentric position calculated

The screenshot displays a control panel for a lamella. At the top, there is a 'Name' field containing 'Lamella' and a color selection icon. Below this are three rows of controls: 'Mapping Position' with 'Drive To' and 'Update' buttons and a green checkmark; 'Eucentric Position' with 'Drive To' and 'Update' buttons and a green checkmark; and 'Milling Position' with 'Store Angle' and 'Update' buttons and a yellow warning icon. A red box highlights the 'Milling Position' row. Below the 'Milling Position' row is the 'Milling Angle' field, which is currently 'Not Set'. At the bottom of the panel are two buttons: 'Success' and 'Failed'.

Milling Position

The *milling position* is the stage tilt and position to use when milling the lamella. See [Determine cryo milling position](#) for instructions.

- **Drive To** - Centers the Maps viewer on that position.
- **Update** - Changes the milling position to the current microscope field of view location.

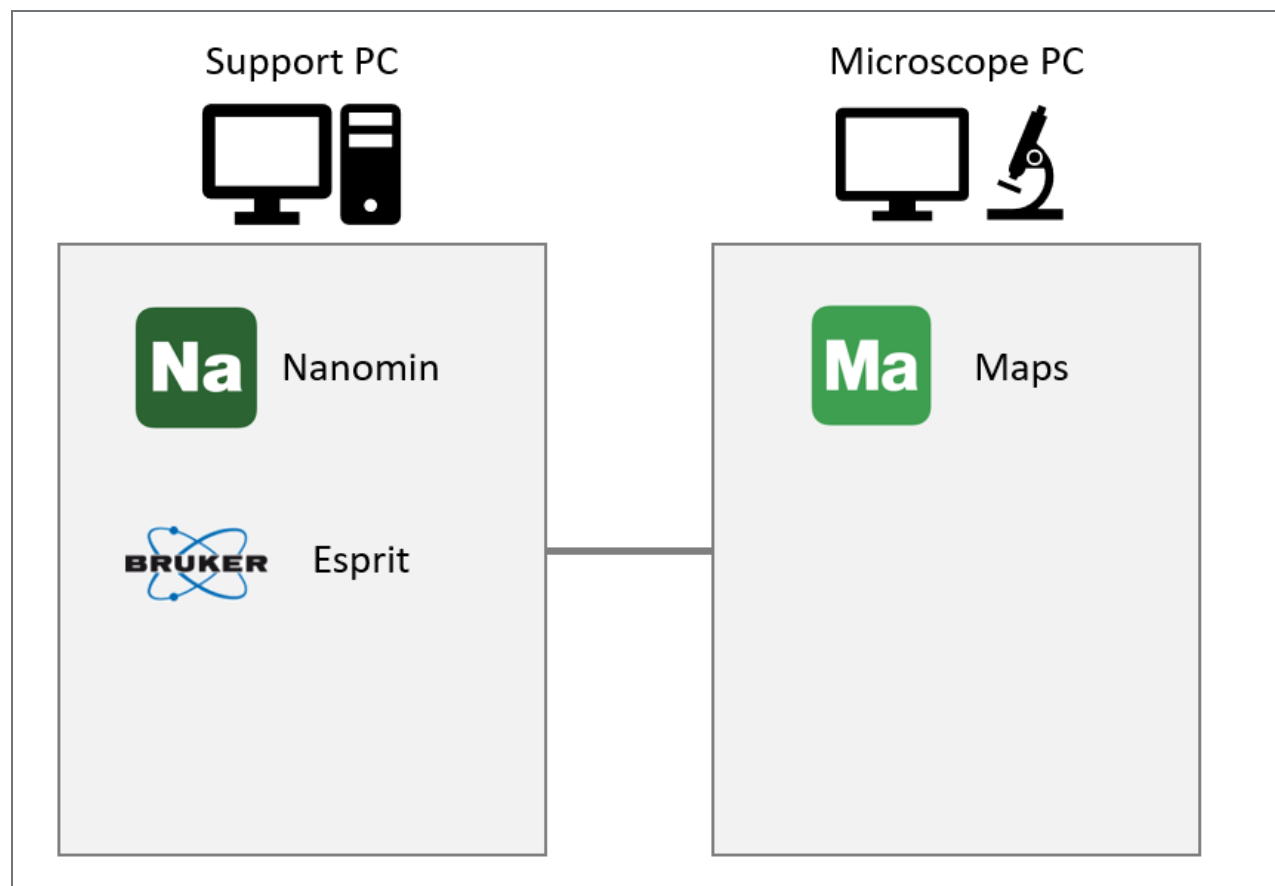
Setup complete

The screenshot shows a dark-themed software interface with the following elements:

- Top left: A speech bubble icon and a circular arrow icon.
- Name: A text field containing "Lamella" with a cyan highlight and a pencil icon to its right.
- Mapping Position: A row with "Drive To" and "Update" buttons, followed by a green checkmark icon.
- Eucentric Position: A row with "Drive To" and "Update" buttons, followed by a green checkmark icon.
- Below Eucentric Position: A "Refine Eucentric Position" button.
- Milling Position: A row with "Drive To" and "Update" buttons, followed by a green checkmark icon. This row is highlighted with a purple border.
- Milling Angle: A label "Milling Angle" followed by the value "48.0°".
- Bottom: Two buttons labeled "Success" and "Failed".

Maps Min

Maps Min includes a workflow spanning multiple software applications to collect and analyze EDS and mineralogy data from geological samples. Software includes Thermo Scientific Maps, Thermo Scientific™ Nanomin (called "Nanomin" within this user guide), and Bruker ESPRIT. Hardware includes the Support PC and the Microscope PC.



Get started

To get started in Maps Min, see [Configure Mineralogy Acquisition](#).

Online support

Go to the [Help menu](#) and click **Open Help Desk** to access online support from within the Maps application. Alternatively, click <https://thermofisher-asg.atlassian.net/servicedesk/customer/portal/16> to gain access outside of Maps. Click **Report Maps Min Bug** for mineralogy issues.

Configure Mineralogy Acquisition

Before you proceed with the Maps Min workflow, you must first configure the Maps software for mineralogy acquisition on the Microscope PC with the Nanomin software and Bruker ESPRIT software on the Support PC.

Prerequisites:

- Set up the Support PC according to the installation instructions.
- There must be a shared folder on the Support PC that the Microscope PC can access.



Note: This task needs to be performed only once.

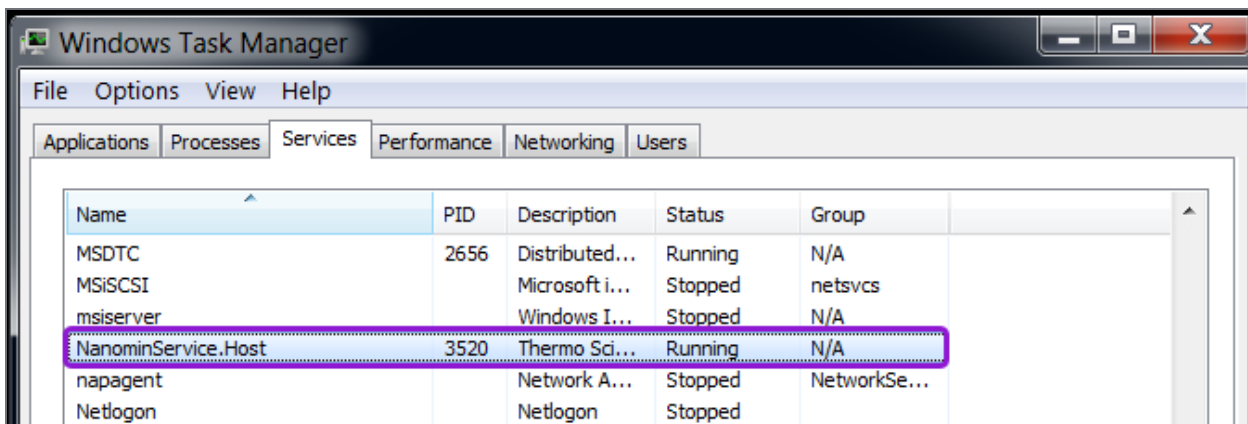
Procedure

On Support PC



Note: Only one user can be logged in at any given time on the Support PC. If you need to switch users, then first log off from your user account before another user logs into the Support PC.

1. Confirm that the required services are running.
 - a. Thermo Scientific Nanomin Service



- b. Thermo Scientific Bruker Service x64 and Thermo Scientific Bruker Service x86 (two blue icons appear in the task tray).



2. Perform the [Energy Calibration](#) procedure to ensure that the Bruker EDS detector is properly calibrated.

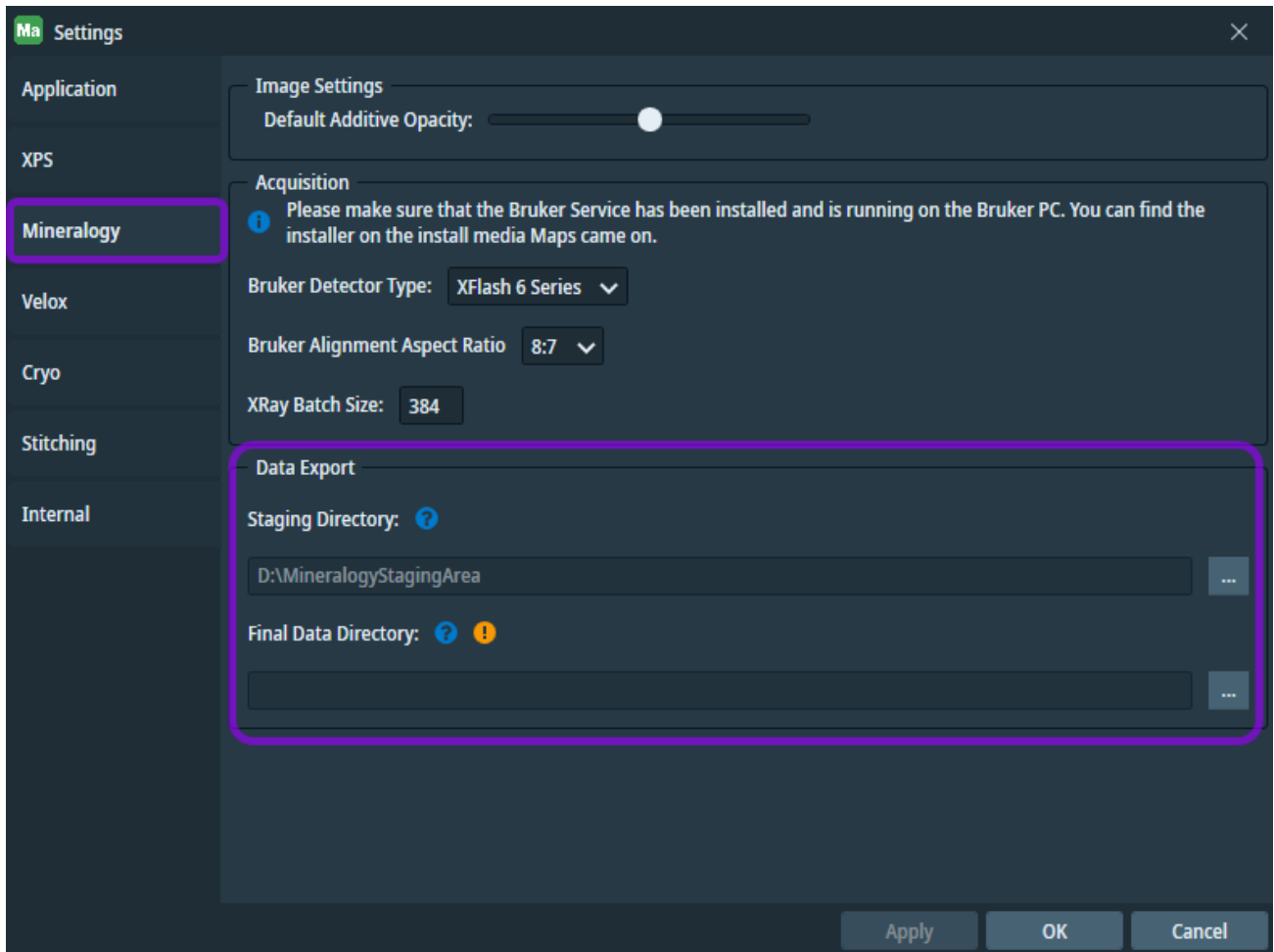
On Microscope PC

1. Launch the Maps application.
2. When prompted for a default Maps project directory, select a location that is local on the Microscope PC.
3. When the project history window appears, click **New** to create a new project.
4. Go to the Menu bar, and click **Options > Settings > Mineralogy**.
5. Go to the Bruker Detector Type dropdown menu, and then select the detector that is installed on your microscope system.

- Go to the **Mineralogy section >> Data Export >> Final Data Directory** field, and click the ellipsis [...] to search for the shared folder location on the Support PC. Select this folder location to designate it as the location where the final mineralogy data will be saved to and processed from during the mineralogy workflow.



Note: At this time, you may also specify a Staging directory location. Go to the **Mineralogy section >> Data Export >> Staging Directory** field and enter a non-network location on the Microscope PC. The staging directory location must NOT be a network location since Maps will store files in this location during acquisition to improve reliability of the transfer to the Final Data Directory.



- Click **OK** to save the settings.
- Wait for a solid, green status icon to appear in the status bar. This status icon indicates that Maps is connected and ready for Bruker acquisitions.



- Continue to [Mineralogy Workflow](#) now that the configuration is complete.

Energy Calibration

Correct calibration of the energy-channel (or gain) is a required for reliable qualitative and quantitative analysis results.

Prerequisites:

- The Bruker ESPRIT application must be installed.
- Dead time value is bellow 10%. If it is too high, decrease the spot size on the microscope.



Note: It is important to check the calibration on a weekly basis and adjust it if necessary to compensate for spectrometer drift.



Note: Calibration must always be performed after switching on the signal processing unit. This action is not required when using the standby mode, but it is highly recommended.

Procedure

Refer to the ESPRIT v2.2 user interface shown below for an overview of the procedure before you begin. The user interface slightly differs depending on the version of your ESPRIT software package.

- Click **EDS**, and then click the Spectrometer tab to select the spectrometer workspace.



Note: Since system factor calibration is accessible through the calibration buttons in every workspace that includes spectra acquisition, do not confuse *energy calibration* with *system factor calibration*.

- Move the calibration sample into the analysis position and set the beam current (spot size) to produce an intermediate count rate. Any element in the mid-energy range (that is, elements Mn-Zn) in a given sample can be used, provided that it is contained in a reasonable concentration. It is recommended that you use single element standards, such as pure copper, to avoid peak misidentification, increase speed, and improve accuracy.

3. Under the Settings to calibrate panel:
 - a. Pulse throughput: Select the check boxes of all the pulse throughput settings. The list of available speeds in this option is dependent on the license.
 - b. Energy range: Select **20kV** for the energy range to be calibrated for the spectrometer.
 - c. Detector segments: Select all detectors that are physically present on the system.
4. Under the periodic table, click the element of interest and then click **K- α** . It is recommended to use K- α lines whenever possible.
5. Under the Calibration panel, click **Precise** which is sufficient in most use cases, and then click **Start**.
6. When prompted to save the new calibration data, click **Yes**. Note that the storage of calibration data is not user specific, so changes in calibration affect all users of the spectrometer.

ESPRIT v2.2 software package

The screenshot displays the ESPRIT v2.2 software interface for the Spectrometer calibration process. The interface is divided into several sections:

- Top Panel:** Shows system parameters such as HV (15.0 kV), Size (2048 px), and Dead time (19%). A red arrow labeled '1' points to the Spectrometer icon in the top navigation bar.
- Settings to calibrate Panel:**
 - Pulse throughput:** Three checkboxes are checked, labeled '3'.
 - Energy range:** '20 kV' is selected.
 - Detector segments:** All three checkboxes are checked.
- Calibration Panel:**
 - 'Software calibration only' is checked.
 - 'Precise' is selected under the calibration level options, labeled '5'.
 - The 'Start' button is highlighted.
- Periodic Table:** A periodic table is shown with 'Copper' selected, labeled '4'. The 'K- α ' line is selected for calibration.
- Spectrum Plot:** A plot of counts per event (cps/eV) versus Energy [keV] is shown. A peak at approximately 8.0463 keV is highlighted in red, labeled '6'. A 'CONFIRM' dialog box is overlaid on the plot, asking 'Do you want to save new calibration data?' with 'Yes' and 'No' buttons.

Mineralogy Workflow

The Maps Min workflow explains how to use of Maps in tandem with Nanomin to acquire EDS data from a sample. It also explains how to generate a Microsoft[®] Office Excel[®] report with the acquired data and how to publish the data to the web-based Maps Min Reporting application. You can use the Maps Min Reporting application to filter, combine, and view the data online as desired. You can also export reports as Excel files similar to the Nanomin application.



Note: The Maps Min workflow is only available on SEM systems and requires an active Mineralogy license. See [Package options](#) for information about licenses.

Prerequisites:

- The Maps software is configured for mineralogy acquisition on the Microscope PC (see [Configure Mineralogy Acquisition](#)).
- The Nanomin software is configured on the Support PC (see [Configure Mineralogy Acquisition](#)).
- The Maps Min Reporting application is installed on the Support PC.
- You have loaded your sample and aligned your holder in Maps.



Note: You can repeat this workflow for each mineralogy sample if needed.

Set up mineralogy tile set

1. Complete the procedure in [Set Up Mineralogy Tile Set](#).
2. Repeat this task for as many tile sets as needed.
3. (Optional) Use the [Mineralogy Measurement Template](#) to quickly create multiple tile sets at once for repeated work.

Acquire mineralogy data

1. Start the Job Queue.
2. Wait for acquisition and processing to finish.

Open mineralogy data

1. Complete the procedure in [Open Mineralogy Data](#).
2. Diagnose the data.

Export mineralogy report

1. Complete the procedure in [Export Mineralogy Report](#).
2. Analyze data in report.

Publish mineralogy data

1. Complete the procedure in [Publish Mineralogy Data](#).
2. Analyze data in Maps Min Reporting.

Set Up Mineralogy Tile Set

This procedure explains how to set up a tile set in Maps, which performs a mineralogy EDS acquisition with the Bruker ESPRIT software and detector.

Prerequisites:

- Maps must be configured for mineralogy acquisition (see [Configure Mineralogy Acquisition](#)).
- xT software must be installed and running on the Microscope PC.



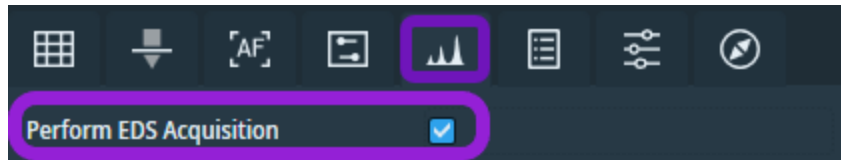
Note: If you have Mineralogy tile set templates that you created with an earlier version of Maps 3.28, then you will need to recreate them.



Note: Repeat this procedure for every data sample of interest to capture EDS information. Refer to [Mineralogy Acquisition Properties](#) for more information about each acquisition parameter.

Procedure

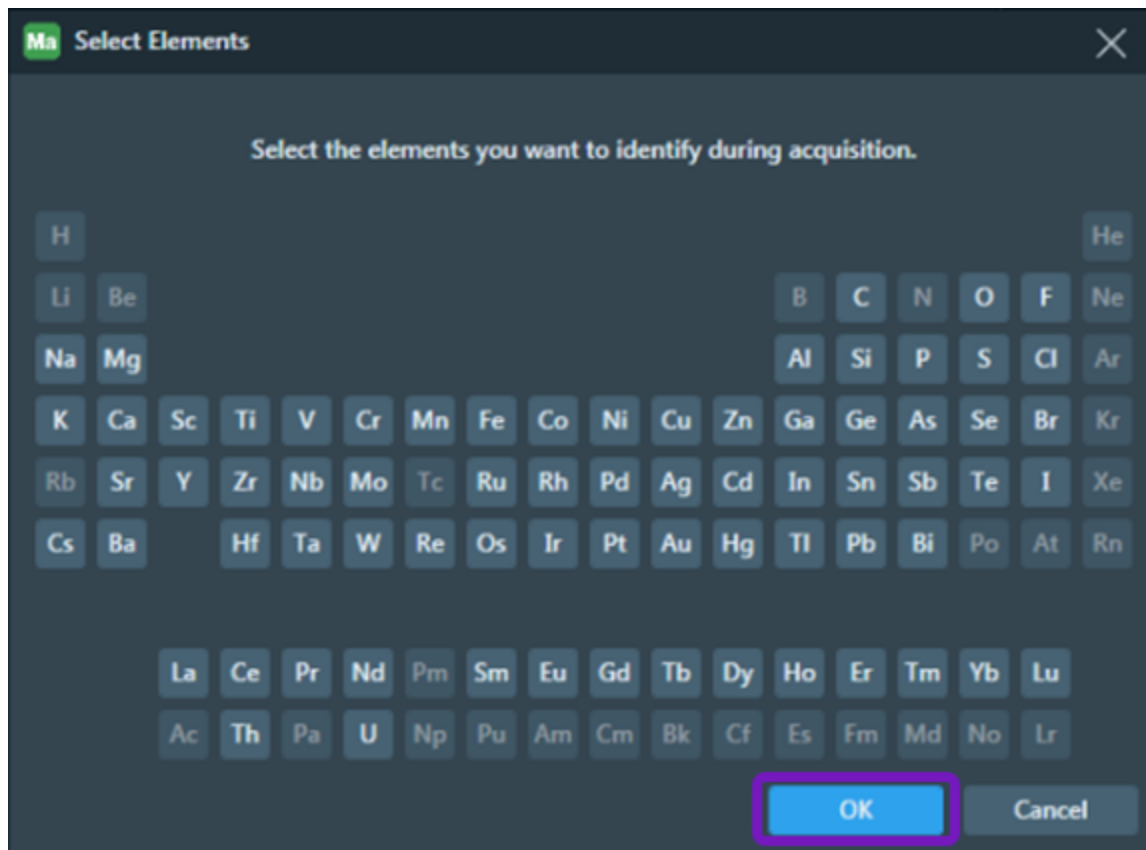
1. Create a tile set with one of the toolbar controls (see [Toolbar](#)).
2. Select the new tile set.
3. Click the Mineralogy Acquisition tab, and then select the **EDS Acquisition** check box to designate the tile set for mineralogy acquisition.



4. Click the ... to select the desired elements to acquire EDS data.



5. In the **Select Elements** window, click on the elements you want to select, and then click **OK**. If you do not want to view elements during acquisition, then only click **OK** and continue to the next step.



6. Complete the [Define Background BSE](#) procedure.
7. Click the **New** button next to the Segmentation Settings dropdown menu to open the [Segmentation Wizard](#). Use this wizard to set up the segmentation settings for acquisition and post processing. The wizard also helps you to define the background BSE.



8. Optional: In the Recipe dropdown menu, select which recipe you want to process the tile set with post acquisition in Nanomin.



9. Optional: To perform Bright Phase Search acquisition, select the **Use BSE Search Ranges** check box and follow the [Optional: Bright Phase Search Acquisition Workflow](#) procedure.



Note: When you activate **Use BSE Search Ranges**, the BSE image that Maps sends to Nanomin for processing is the uncalibrated image.

10. Select an Acquisition mode:

- **Grid:** This mode performs a simple serial scan to collect X-rays.

Acquisition Mode	Grid
EDS Dwell Time	8 ms
XRay Spacing	10 μm

After you select **Grid** mode from the dropdown menu, enter the **X-Ray Spacing** value to determine the distance between each location to collect X-rays. This is essentially the pixel size for the resulting EDS image.

- **Centroid (beta):** This mode performs some image processing on the BSE electron image to detect grains and attempts to perform a single X-ray scan on each grain to improve acquisition performance.

Acquisition Mode	Centroid (beta)
Process Edge Particles	<input type="checkbox"/>
Grain Size	3 μm

After you select **Centroid (beta)** mode from the dropdown menu, enter a **Grain Size** value to determine the grains of interest. Maps ignores any grains that are smaller than the Grain Size value; therefore, increasing the Grain Size value improves acquisition time, but may result in missing measurements on grains. The Process Edge Particles check box is deselected by default since there are known issues with edge particles while in Centroid mode. If you keep the default, then the particles that fall on acquisition tile edges are ignored during Nanomin processing.



Caution: The Centroid mode is still in beta and may have varying results. It is recommended that you only use a resolution of 512x442 for tile sets.

11. Enter the **EDS Dwell** time. This is the time spent collecting X-rays per EDS pixel. The default is 8 ms. Longer dwell times result in more acquired X-rays and higher quality results.



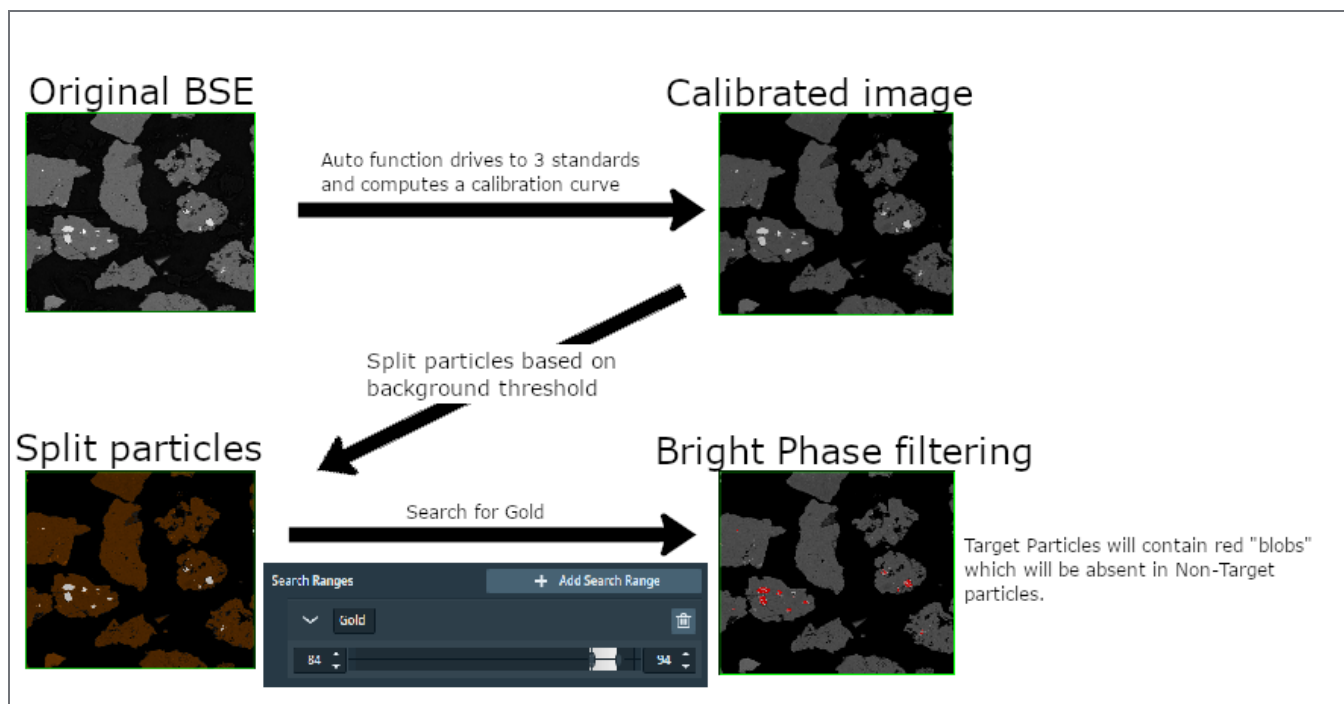
12. Optional: Fill out the Tags fields based on the sample associated with the tile set. These tags are used for sample tracking and generating reports. For more information on what the tags represent, see [Mineralogy Acquisition Properties](#).
13. Optional: Repeat this procedure to create additional tile sets if needed.
14. Return to the [Mineralogy Workflow](#) to continue.

Optional: Bright Phase Search Acquisition Workflow

The Bright Phase Search Acquisition workflow obtains mining data for particles containing bright phase, which results in faster acquisition and results within the web-based Maps Min Reporting application.

Workflow overview

The Bright Phase workflow utilizes user-defined standards to calibrate the incoming BSE images. The workflow then compares the BSE pixel values against another set of user-defined mineral search ranges to acquire EDS on particles of interest at a different resolution and dwell time. The goal of this workflow is to minimize data size and reduce acquisition time when only a subset of minerals is of interest.



Prerequisites:

- The Maps software is configured for mineralogy acquisition on the Microscope PC (see [Configure Mineralogy Acquisition](#)).
- The Nanomin software is configured on the Support PC (see [Configure Mineralogy Acquisition](#)).
- You have loaded your sample and aligned your holder in Maps.
- The xT software is installed and running on the Microscope PC.

Procedure

1. Set up standard sample locations with the [Mineralogy Standards Workflow](#). *You are required to have standard sample locations set up to continue with this procedure.*



Note: To ensure that the data are accurate, these standard sample locations must be from a sample holder that is currently loaded.

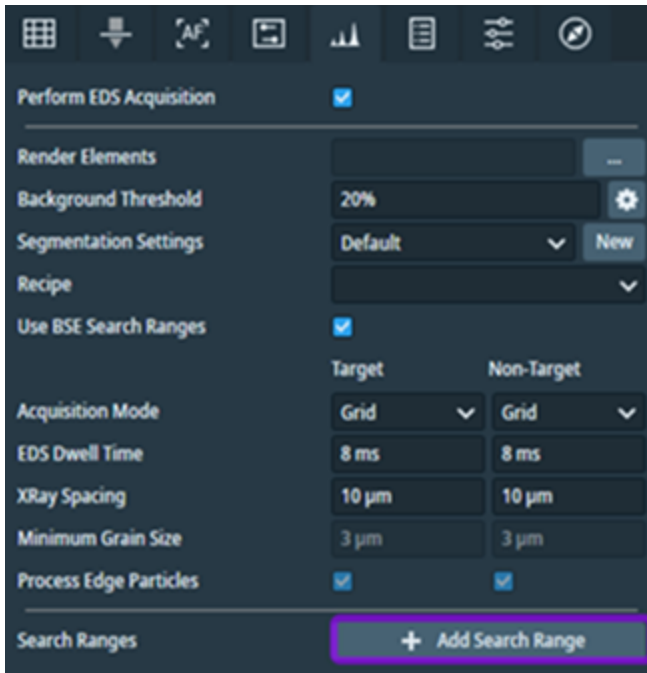
2. Begin the [Set Up Mineralogy Tile Set](#) procedure. Before you select an acquisition mode, select the **Use BSE Search Ranges** check box to opt for Bright Phase Search acquisition.

3. Click the Mineralogy Acquisition tab and set the acquisition settings for **Target** and **Non-Target**. The Target settings are acquisition scan settings for particles that contain pixels within defined BSE search ranges, and the Non-Target settings are acquisition scan settings for all remaining particles.

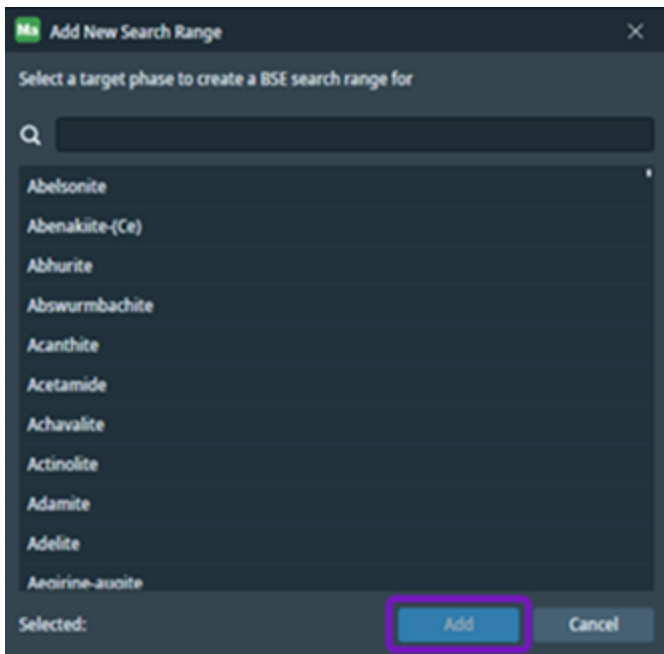


Note: Skipping Non-Target particles is not currently supported. As a workaround, you can lower the EDS Dwell Time to 1 ms to speed up acquisition of Non-Target particles.

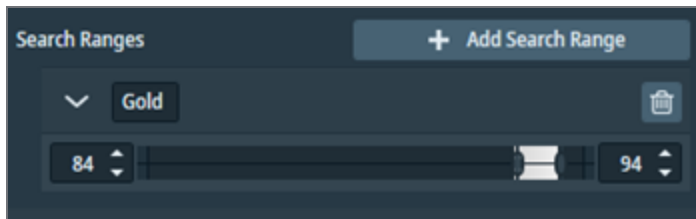
4. Click **Add Search Range** to add a new BSE search range.



5. When the **Add New Search Range** window appears. Click one of the target phases in the dropdown menu (or type a target phase in the Search box), and then click **Add**.



6. Your selected target phase will be added under **Search Ranges**. It will be populated with a search range based on the phase's average atomic weight. You can change the upper and lower threshold values of the search range by adjusting the left and right sliders bordering the histogram. Alternatively, you can click the up and down arrows of the two text boxes to change the upper and lower threshold values. The upper and lower threshold values range from zero to one hundred percent (that is, 0%-100%).



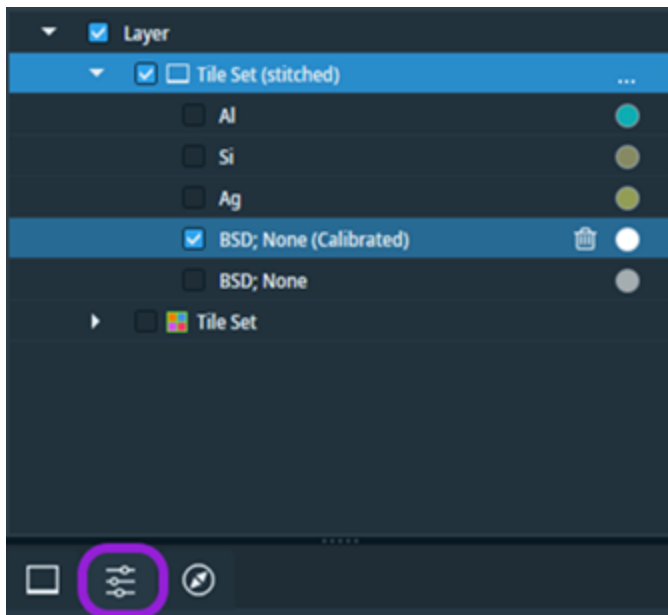
7. (Optional): Repeat this procedure to create an additional search range if needed.

8. Return to [Set Up Mineralogy Tile Set](#) to select an acquisition mode and continue setting up the mineralogy tile set.

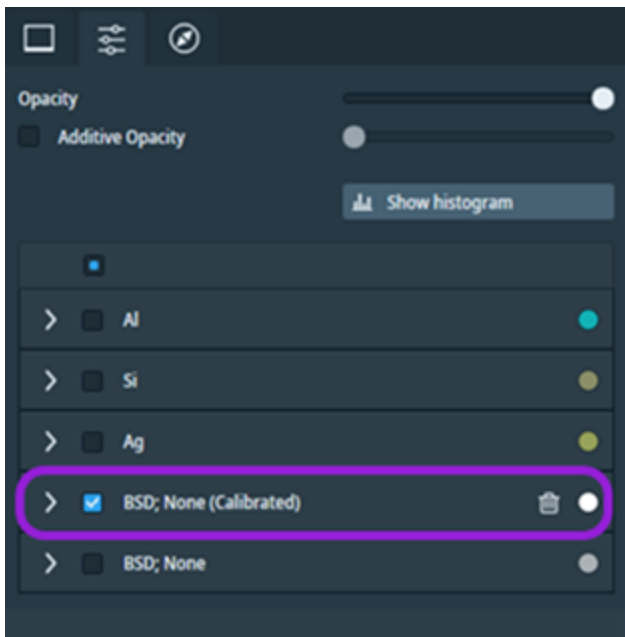
Optional: validate procedure

Once tile set acquisition is complete, validate that the particles were successfully acquired with the Target settings.

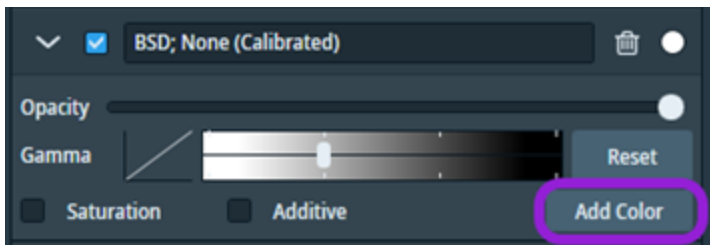
1. Select the stitched result layer, and click the **Visualization** tab.



2. Deselect all channels except the calibrated channel. As shown in the example below, the calibrated channel displays "(Calibrated)" at the end of the channel name.

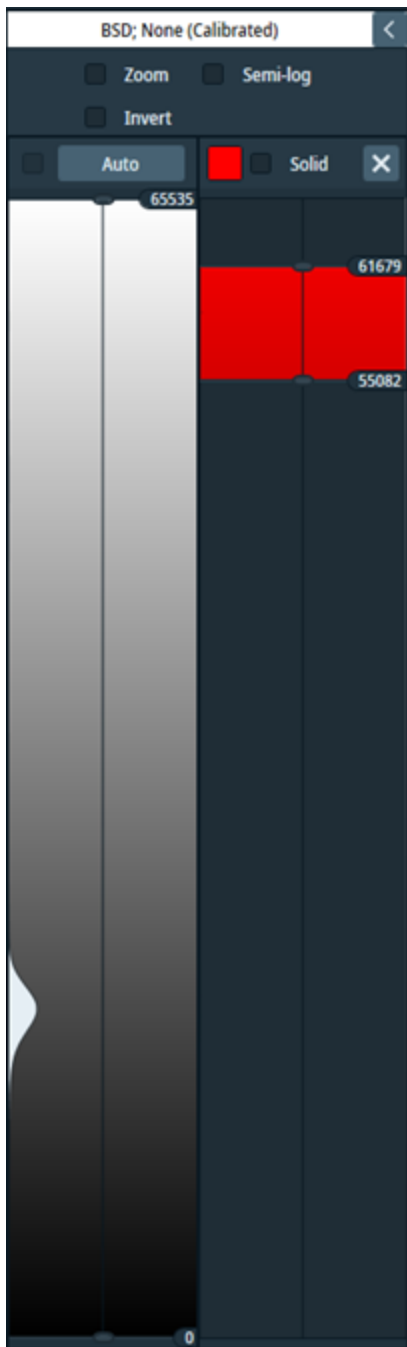


3. Expand the Calibrated channel, and then click **Add Color**.

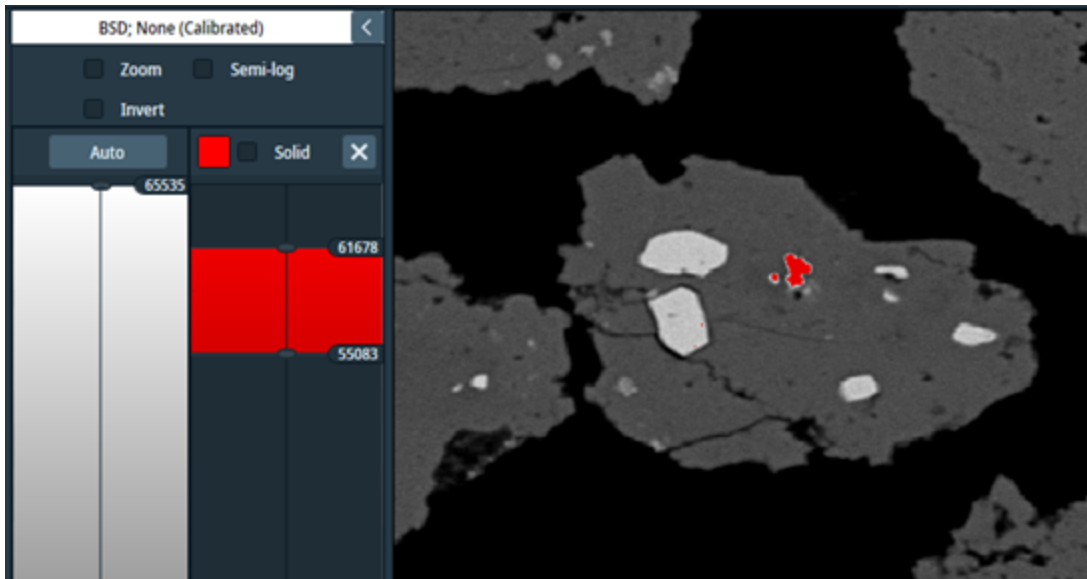


4. Review the BSE search range setup in the Bright Phase procedure above, and convert the upper and lower threshold values into 16-bit values (that is, pixels). For example, the 84%-94% range for gold would be converted to 55,049 and 61,603 pixels, respectively.

5. In the solid color pane, move the upper and lower threshold values to match the converted values that you calculated in the previous step. These updated threshold values define your BSE search range.



6. View the acquired image to locate the red pixels, which represent your BSE search range. This means that if a particle contains red pixels, then the particle was acquired with the Target scan settings.

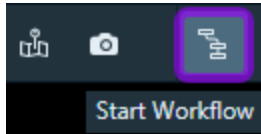


Note: If none of the particles in the acquired image contain red pixels, then it is recommended that you acquire another tile set with a different BSE search range values.

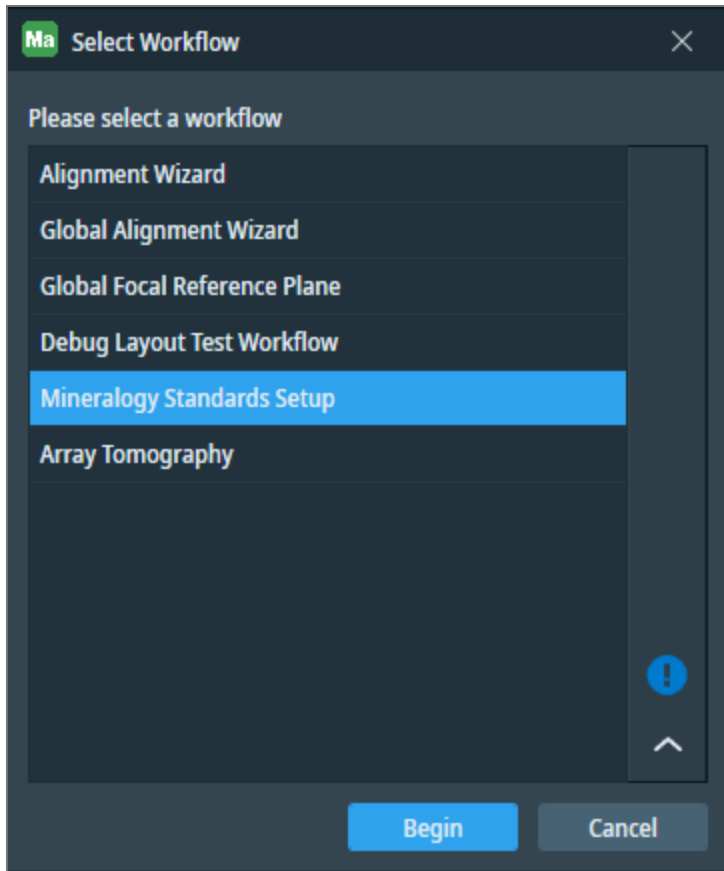
Mineralogy Standards Workflow

The Mineralogy Standards workflow explains how to set up standard sample positions used within the [Optional: Bright Phase Search Acquisition Workflow](#).

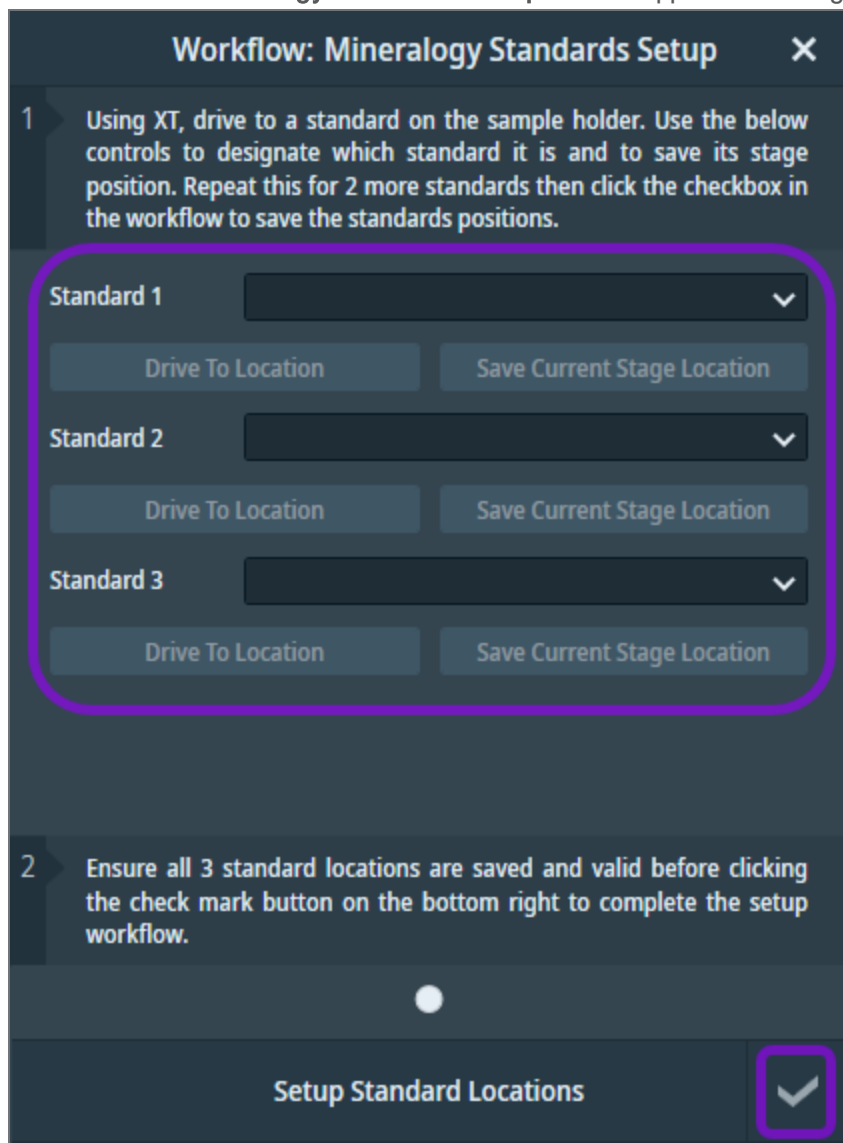
1. Click the **Start Workflow** icon located on the right side of the Toolbar.



2. In the **Select Workflow** window, click **Mineralogy Standards Setup**, and then click **Begin**.



3. The **Workflow: Mineralogy Standards Setup** window appears on the right side of the main screen.



4. Use the xT interface to drive the stage to a standard location on the sample holder.
5. Select the standard location from the **Standard 1** dropdown menu.
6. Click **Save Current Stage Position**.
7. Repeat steps 4-6 to set up Standard 2 and Standard 3.
8. Click the check mark icon located in the lower right corner of the workflow window to save the standard positions.

Segmentation Wizard

This procedure explains how to use the Segmentation Wizard, which you use to set the segmentation settings. Maps uses these settings during acquisition and classification to find particles and grains.

Prerequisites:

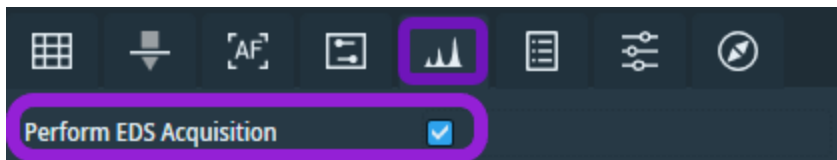
- Maps must be configured for mineralogy acquisition (see [Configure Mineralogy Acquisition](#)).
- xT software must be installed and running on the Microscope PC.



Note: Repeat this procedure for every data sample of interest to capture EDS information. Refer to [Mineralogy Acquisition Properties](#) for more information about each acquisition parameter.

Procedure

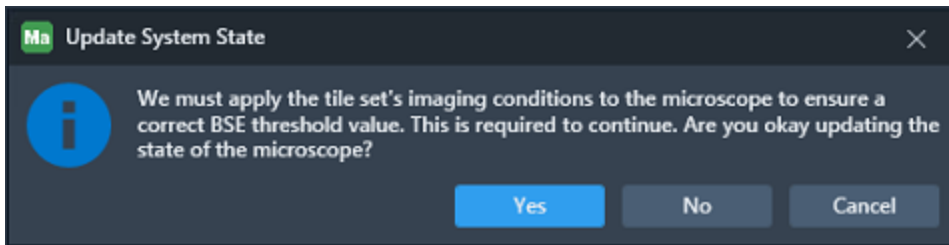
1. Create a tile set with one of the toolbar controls (see [Toolbar](#)).
2. Select the new tile set.
3. Click the Mineralogy Acquisition tab, and then select the **EDS Acquisition** check box to designate the tile set for mineralogy acquisition.



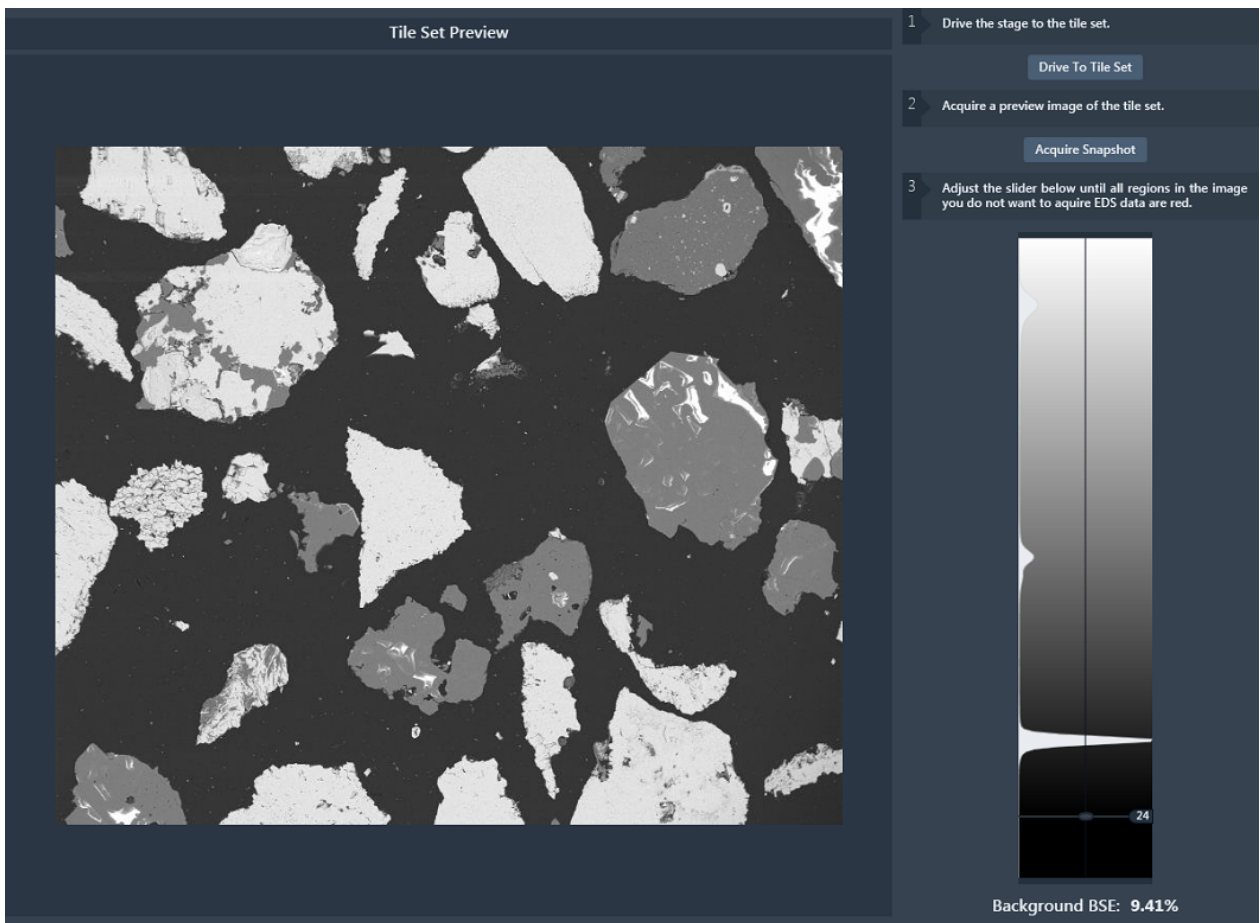
4. Click the **New** button next to the Segmentation Settings dropdown menu to start the Segmentation Wizard. The Segmentation Wizard automatically starts the workflow, which includes defining the BSE background threshold, setting up the particle segmentation, setting up the grain segmentation, and saving your new segmentation settings.



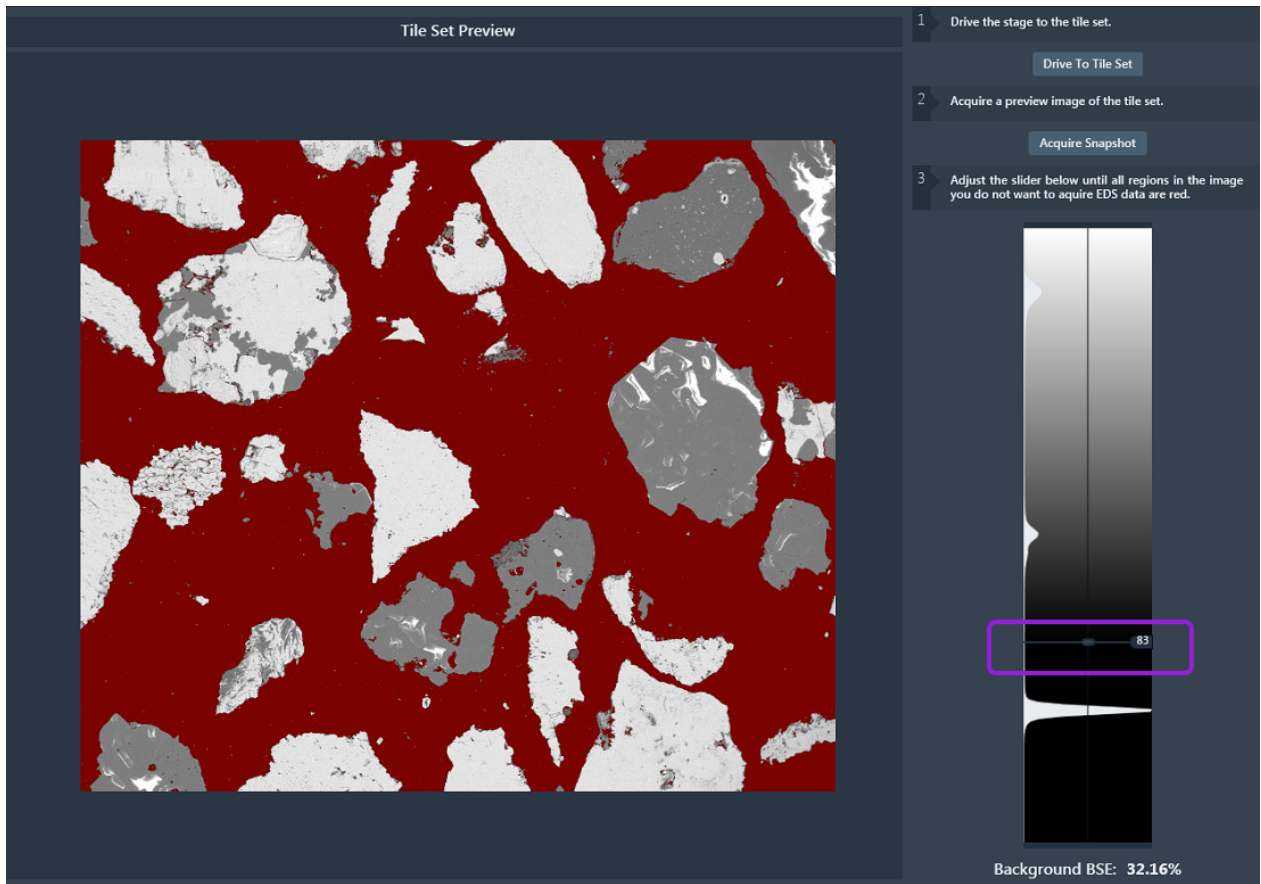
5. Define the BSE background threshold. This step determines the areas of the image that will *not* have any X-rays collected. Once a desired region is excluded from X-ray collection, move to the next step in the workflow.
 - a. Click **Drive To Tile Set** to move the stage to the center of the current tile set.
 - b. Click **Acquire Snapshot** to acquire an image. When prompted to apply tile set settings to the microscope, click **Yes**. This step is required to ensure that the image captured mimics the image that will be acquired by the tile set.



- c. Once Maps acquires the image, the image appears in the main panel of the workflow and a threshold histogram appears in the right panel.

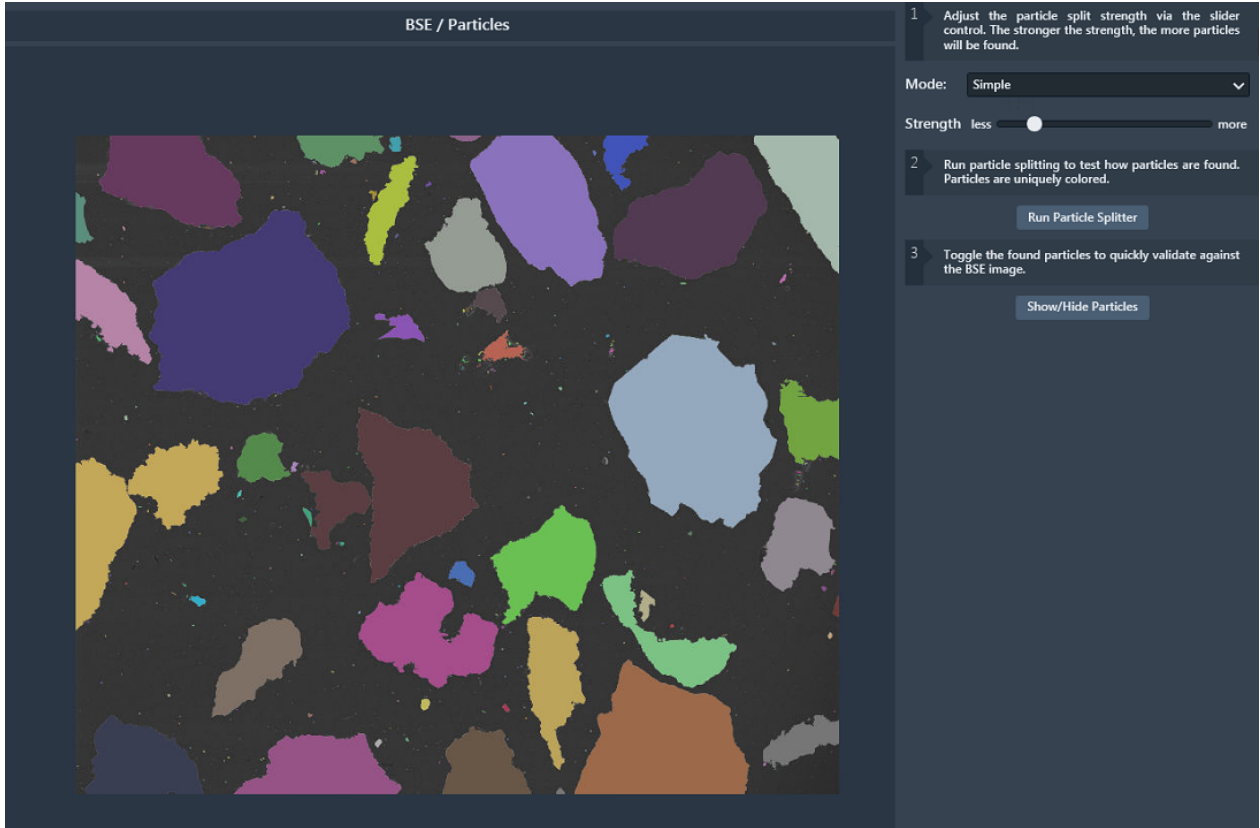


- d. Adjust the slider control for the threshold histogram to designate the areas of the image to be excluded from the collected X-rays. Continue adjusting the slider control until all the designated areas are highlighted in red.



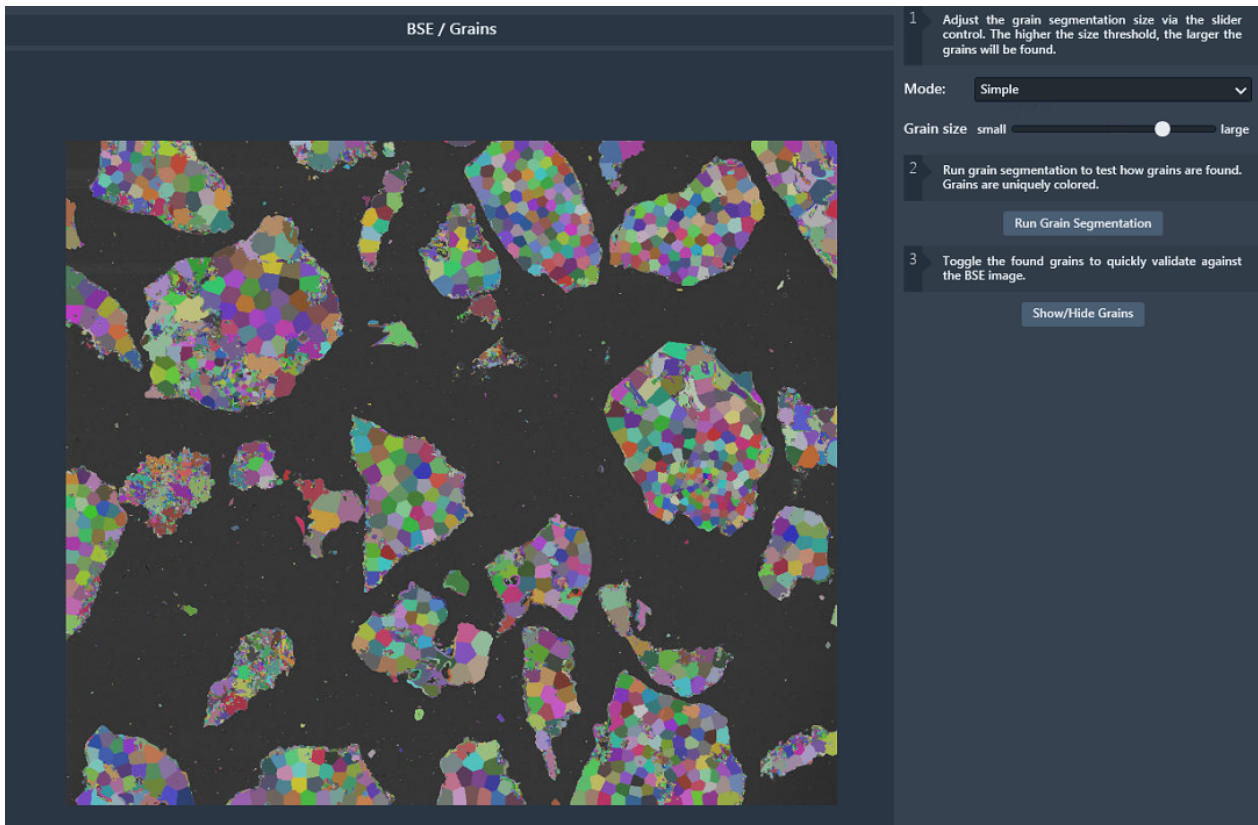
- e. Once a desired region is excluded from X-ray collection, move to the next step in the workflow.

- 6. Set up the particle segmentation. In this step, you to test the particle segmentation with the BSE image taken in the previous step to ensure that the segmentation settings perform as desired.
 - a. Click the Strength slider control to determine how aggressive you want the particle splitting. When you increase the strength, the number of found particles increases.
 - b. Click **Run Particle Splitter** to test the particle segmentation. Found particles appear in color, so you can identify them. Click **Show/Hide Particles** to toggle the visibility of the particles on and off so that you can compare them with the BSE image.



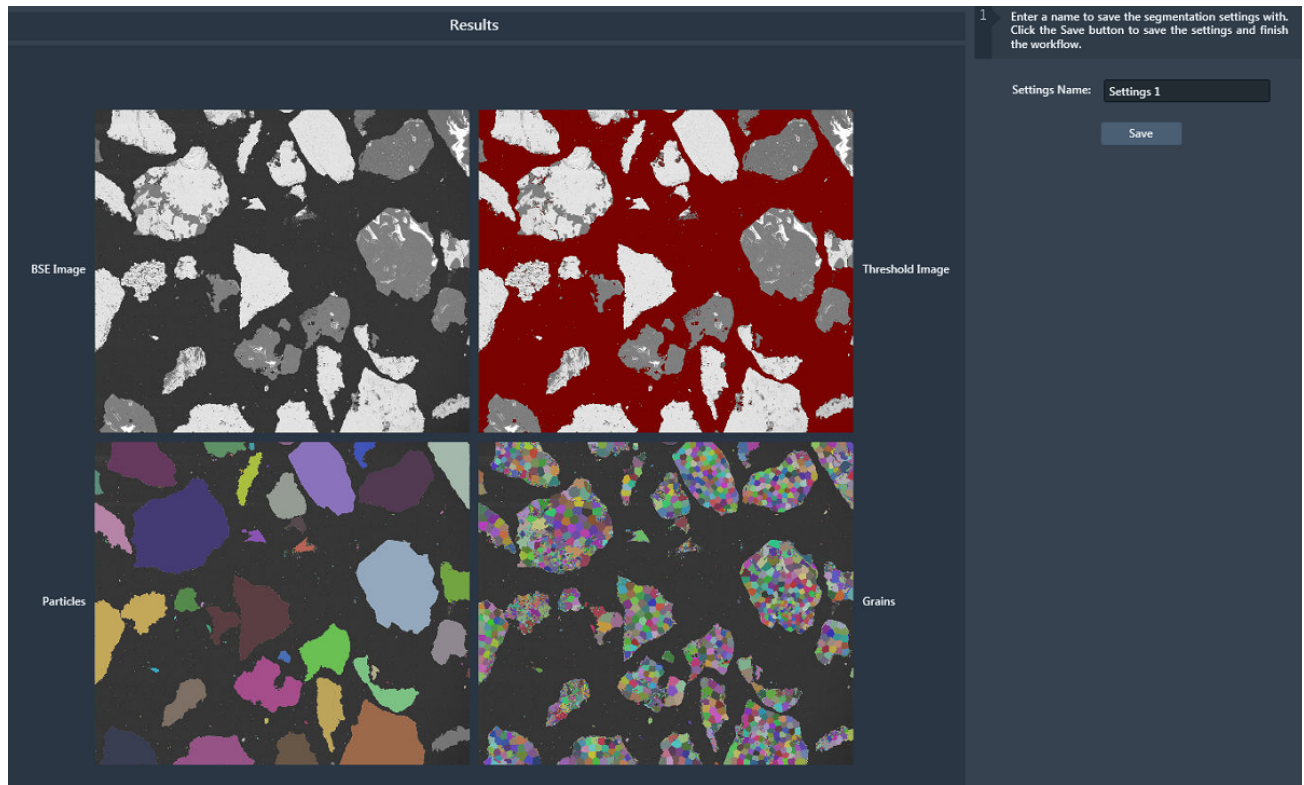
- c. When you are satisfied with your particle results, move to the next step in the workflow.

7. Set up the grain segmentation. In this step, you test the grain segmentation results from within the found particles of the particle segmentation. Note that this step is only available when the acquisition mode is set to **Centroid (beta)**.
 - a. Adjust the Grain size slider control to determine how granular you want the segmentation. Each grain appears in color, so you can identify them. Click **Show/Hide Particles** to toggle the visibility of the grains on and off so that you can compare them with the BSE image.



- b. When satisfied with the grain results, move to the next step in the workflow.

8. Click **Save** to save your new segmentation settings, so that you can reuse them with other tile sets. This step completes the segmentation workflow.



Mineralogy Measurement Template

The Maps Min software enables you to quickly set up multiple mineralogy tile sets at once with a customized CSV template file specific to your use case. Although a customized CSV template file is optional, it is recommended that you create one and import it into Maps.

A CSV file is a comma-separated values text file, which allows you to save data in a tabular format. Each line of data in the CSV file is a record, and each record consists of one or more fields separated by commas. In this instance, Microsoft Office Excel automatically opens the provided CSV file template and organizes the data. Each row in the Excel spreadsheet represents one mineralogy tile set record, and the columns contain the tile set properties associated with each mineralogy tile set record. Note that each mineralogy tile set record contains 2-10 tile set properties.

Create custom CSV template file

1. Navigate to the Support Files folder in the Mineralogy Installer.
2. Locate the file entitled *MineralogyMeasurementTemplate.csv* and copy/paste it to the desktop.
3. Double-click the desktop file copy to open the file as a standard Excel spreadsheet.
4. To create the first tile set record, refer to the table below and do the following in the first row of the spreadsheet.
 - a. Enter a value into the Hole Position column.
 - b. Enter a value into the Template column.
 - c. (Optional): Enter values into the other columns as desired.
5. To create more tile set records, repeat steps 4a-4c for each additional row.
6. Click **File**, select **Save As**, rename the file, and then click **Save**.
7. Continue to [Import custom CSV template file](#).

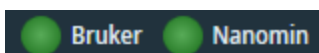
Column Header	Data Type	Required Field	Notes
Hole Position	Integer	Yes	This field represents which hole in the holder that you designate for the tile set creation (for example, 1 = hole 1, 2 = hole 2, 3 = hole 3, etc.).
Mineralogy Project Name	String	No	Use this field to designate a parent directory name for the acquisition results. This can help organize your sample data on disk.
Replicate	String		
Sample Code	String	No	Use this field to name the created tile set.
Sample Description	String	No	
Sample Name	String	No	
Sample Weight	Double	No	
Size Fraction	String	No	
Size Fraction Weight %	Double	No	
Survey Name	String	No	
Survey Description	String	No	
Template	String	Yes	This field represents the name of the <i>tile set template</i> within Maps. The tile set template must exist prior to importing your custom CVS template file into Maps.

Import custom CSV template file

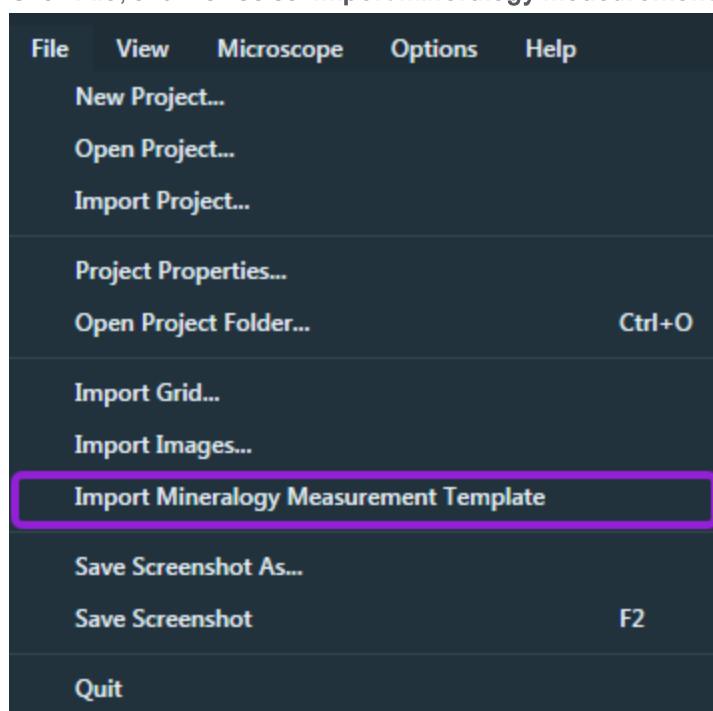
After you have created your custom CSV template file, you can then import it into the Maps.

Procedure

1. Confirm that a project is open and that Maps has a Bruker connection.
 - a. View the Maps status bar located at the bottom of the main screen. A green status icon next to the Bruker label indicates that Maps is connected to the Bruker label, and a green status icon next to the Nanomin label indicates that maps is connected to the Nanomin Service (refer to the [Main Screen](#) for more information on the microscope connection states).



- b. If the green status icon is not present, then go to [On Microscope PC](#) and configure the Maps software for mineralogy acquisition on the Microscope PC with Nanomin.
2. Click **File**, and then select **Import Mineralogy Measurement Template**.



3. When Maps prompts you, select your custom CSV template file from the desktop to import it into Maps. Maps uses this template to create a tile set for each mineralogy tile set record in the file.
4. Return to the [Mineralogy Workflow](#) to continue.

Open Mineralogy Data

This procedure explains how to open and view acquired mineralogy data in Nanomin.

Prerequisites:

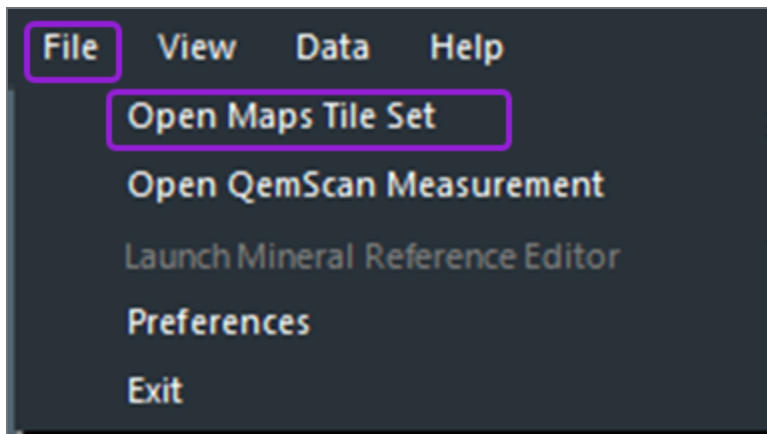
- Nanomin must be installed and licensed.
- You must have access to a Maps project that has acquired mineralogy data.



Note: This task can be performed anytime and repeated as needed.

Procedure

1. Launch the Nanomin application.
2. Click **File** from the toolbar, and then click **Open Maps Tile Set** from the dropdown menu to open the directory dialog.



3. Locate the Maps project file that contains the mineralogy tile set to open. If there is more than one mineralogy tile set within the selected Maps project, then Nanomin prompts you to select a mineralogy tile set to open.
4. Double-click the desired mineralogy tile set to open it.
 - If Nanomin has not yet classified the mineralogy tile set, then Nanomin prompts you to select a recipe to process the tile set. Select a recipe to continue.
 - If Nanomin has classified the mineralogy tile set, then classification automatically runs.

5. The mineralogy tile set opens and appears in the viewer. You can then view the mineral and elemental layers for the tile set.
6. Continue to [Export Mineralogy Report](#).

Export Mineralogy Report

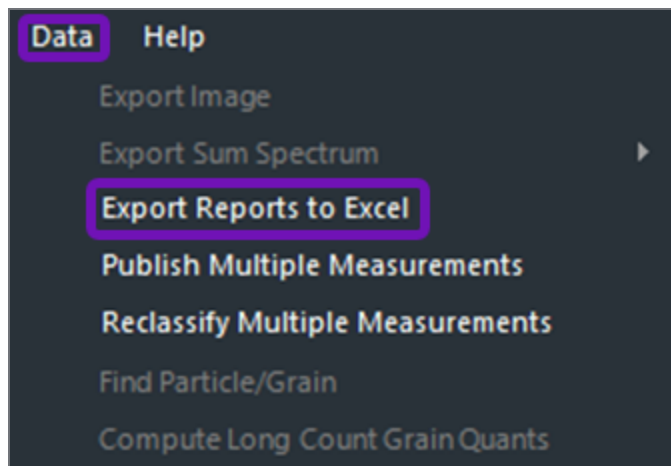
Nanomin can generate a mineralogy report containing a list of calculated results from one or more Maps Min tile sets. Follow the steps below to export a mineralogy report that can be read in Microsoft Office Excel.

Prerequisites:

- The Nanomin application must be installed.
- You must have a Maps Min tile set acquired and classified by Nanomin.

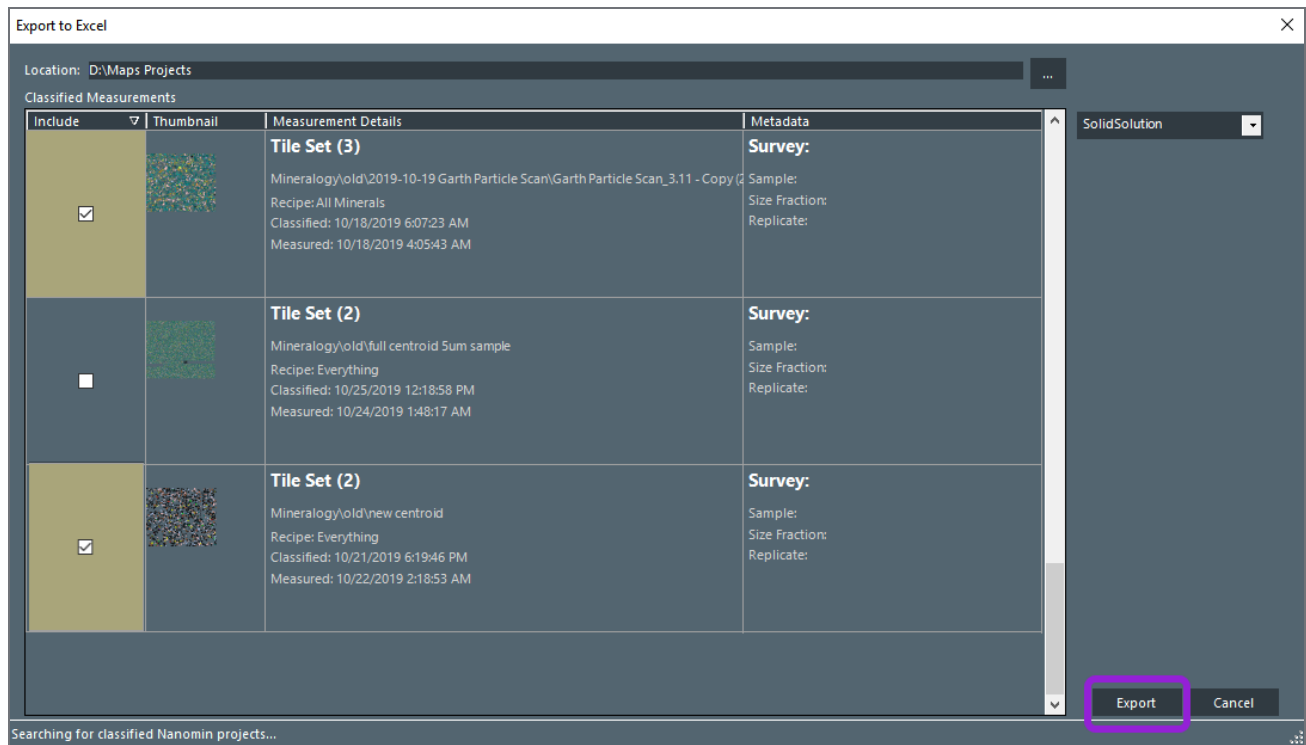
Procedure

1. Launch the Nanomin application.
2. Click **Data** from the toolbar, and then click **Export Reports to Excel** from the dropdown menu to open the directory dialog.



3. Locate the Maps project that contains the tile sets to be included in your report and then double-click it.

- Click the check boxes of the tile sets to designate their data for export.



- Click **Export**.
- When prompted, enter a file name, select a file location, and then click **Save**.
- The report automatically opens after the file is saved. See [Mineralogy Report Data](#) for more information.

Publish Mineralogy Data

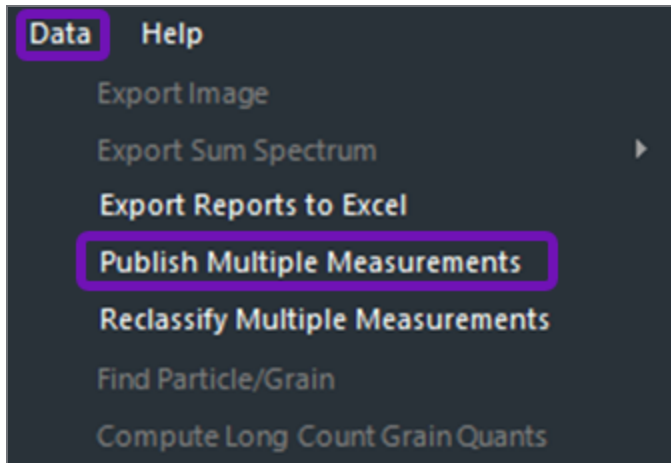
Nanomin can publish one or more Maps Min tile sets data to use with the web-based Maps Min Reporting application. Follow the steps below to publish data to the Maps Min Reporting server.

Prerequisites:

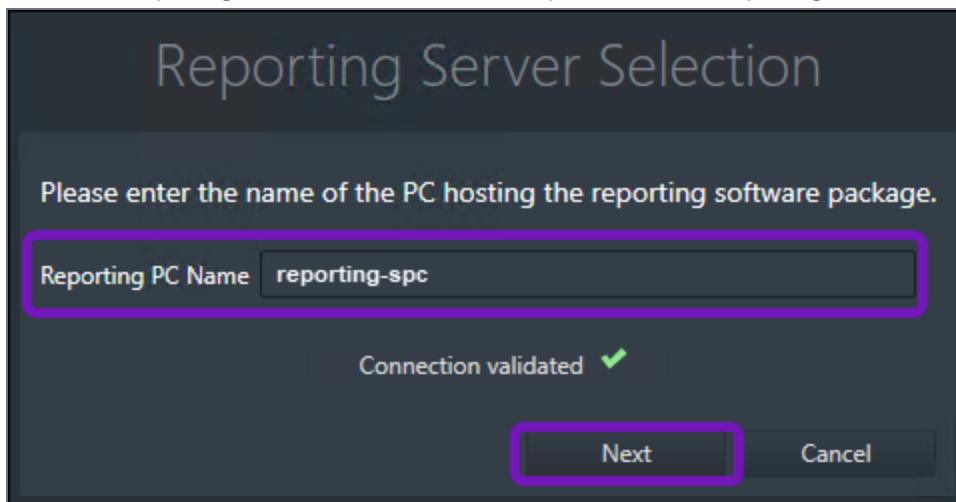
- The Nanomin application must be installed.
- You must have at least a Maps Min tile set acquired and classified by Nanomin.

Procedure

1. Launch the Nanomin application.
2. Click **Data** from the toolbar, and then click **Publish Multiple Measurements** from the dropdown menu to open the directory dialog.



3. When prompted, enter the URL address of the Maps Min Reporting server and then click **Next**.
4. When the Reporting Server Selection screens opens, enter the reporting PC name.

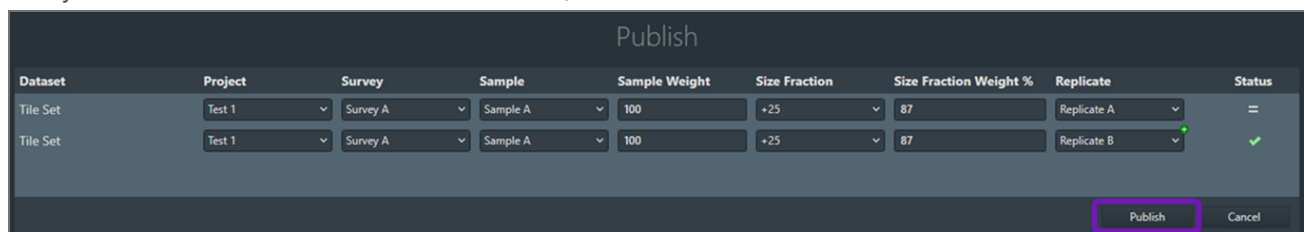


5. Locate the Maps project that contains the tile sets that you want to publish to the reporting server, and then double-click the project.

6. Select the checkboxes in the Publish column to designate the desired tile set data for publishing, and then click **Publish**.



7. Verify and edit the selected dataset's information, and then click **Publish**.



8. The data are automatically published to the Maps Min Reporting server.

References

The Maps Min workflow includes supporting information as listed below.

Topics include:

[Define Background BSE](#)

[Mineralogy Acquisition Properties](#)

[Mineralogy Report Data](#)

Define Background BSE

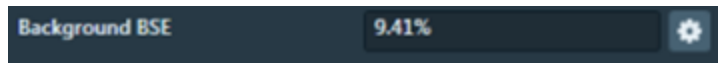
The Background BSE is a percentage that represents the darkest percent of pixels in the BSE image. Properly defining the Background BSE ensures that X-rays in any of these dark pixel locations are excluded from the acquisition, which optimizes EDS acquisition time.

Prerequisites:

- Maps Min must be configured (see [Configure Mineralogy Acquisition](#)).
- A Maps tile set must be created and selected (see [Set Up Mineralogy Tile Set](#)).
- The Mineralogy Acquisition tab must be selected in the tile set's property pane and the EDS Acquisition check box must be selected.

Procedure

1. Click the gear icon next to the Background BSE parameter.



2. Follow the beginning of the [Segmentation Wizard](#) procedure to define the background BSE.
3. Once you define the background BSE and move to the next step in the workflow, Maps closes the workflow and updates the Background BSE in the setup tab.

Mineralogy Acquisition Properties

There is a collection of acquisition properties for you to complete within Mineralogy Acquisition >> Mining Tag for each mineralogy tile set. Refer to the three tables below for property names and descriptions.

Table 1 - Acquisition Parameters


Property	Description
Acquisition Mode	<p>Determines the image processing mode used for collecting X-rays.</p> <p>Choices include:</p> <ul style="list-style-type: none"> • Grid: This mode performs a simple serial scan to collect X-rays. When this mode is selected, you must provide an X-Ray Spacing value. This value is the distance between X-ray scan locations. • Centroid (beta): This mode performs some image processing on the BSE electron image to detect grains and attempts to perform a single X-ray scan on each grain to improve acquisition performance. When selecting this mode, you must provide a Grain Size value to determine the minimum grain size when performing the image processing. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> Note: Centroid acquisition may have some known issues.</p> </div>
Background BSE	<p>Percentage that represents the darkest pixels in the BSE image. Maps software does not acquire X-rays in any of these dark pixel locations. The reason for this functionality is to optimize acquisition time by not measuring resin or dark materials that are not of interest.</p> <p>See Define Background BSE for details.</p>
EDS Acquisition	Determines if the tile set performs an EDS acquisition. Select the check box to activate.
EDS Dwell	Time spent collecting X-rays per EDS pixel. The default is 8 ms. Longer dwell times result in more X-rays being acquired and higher quality results.
Elements	The selection of elements displayed in Maps. Each selected element is its own channel in the tile set result.

Table 2 - Mining Tags

Property	Description
Mineralogy Project Name	This is a label that represents the name of the project containing a collection of mineralogy surveys. The mineralogy project name typically includes the customer name, date, and/or business case.
Survey Name	This is a collection of related sample measurements, which normally represents a set of samples taken from a plant or ore body at a particular time.
Sample Name	This represents a single instance of sample material being taken from a particular location. For example, the concentration stream of a flotation cell. This entity represents the raw and unsized material. This may optionally be further subdivided into multiple size fraction ranges if you have mechanically separated this material for analysis.
Sample Weight (kg)	This represents the weight of a single instance of sample material being taken from a particular location. The default value is 100 kg.
Size Fraction (µm)	This is a label that represents the size range of particles for this sample, assuming that the original sample has been sorted into size ranges. For samples that are not sorted, leave this field blank (null in the database) indicating that the sample is not sized.
Size Fraction Weight %	If the original sample is split into size fractions, this field indicates the proportion of total sample mass that exists within the current size range. This is a percentage, because the sum of all size fractions equals 100%. If they do not equal 100%, then you can conclude that there are samples missing or a data entry mistake has occurred.
Replicate	This represents the facility for making duplicate physical epoxy pucks, or thin sections for analysis, that share an identical size fraction, survey, and sample. This is typically done when searching for rare minerals to increase the reliability of statistics derived from them. For example, since platinum minerals are rare (parts per billion) you might only see 1-5 grains per physical block. Companies typically create 10,20,30 replicates from the original source material to increase the number of grains they find, so that they have decent aggregate data such as grain size histograms.

Table 3 - Post Processing

Property	Description
Recipe	Name of the Nanomin processing recipe classified with the tile set after acquisition. If Nanomin has not yet classified the mineralogy tile set, then Nanomin prompts you to select a recipe to process the tile set. If Nanomin has classified the mineralogy tile set, then classification automatically runs.

Mineralogy Report Data

The mineralogy report contains a collection of calculated results for the measured sample. The table below contains descriptions of the information that is stored in each tab of the Microsoft Office Excel report. Refer to this table when analyzing the data in your report.

Tab	Description
Department	This shows an inversion calculation of the elemental assay and modal mineralogy weight data. For a specified element (for example, Cu) in the Elemental Assay report, it shows what minerals are contributing to the weight of that selected mineral. It can be used in tailings analysis to determine whether a valuable element is worth recovering, or whether the mineral contributing to that signal is too difficult to process.
Department Pivot Table	This shows the elemental department in a pivot table where you can easily select an element of interest (and one or more samples) to see a report of that element alone.
Elemental Assay	Shows a bulk computed assay derived from the minerals identified in the Modal Mineralogy Weight report (including for region-of-interest). Minerals are converted into their equivalent chemistry from their theoretical textbook chemistry. However, if a specific mineral has a large number of pixels in the image, the chemistry is not taken from the textbook definition but instead from an EDS elemental quantification of the spectrum obtained for that mineral. Data here can be compared to other bulk analytical techniques, such as XRF, LIBS, wet chemistry, etc.
Grain Size Distribution	This records the grain size distribution for individual minerals found in the samples exported. They are recorded in a histogram.
Grain Size Distribution Data	This records the grain size distribution for all mineral grains across all measurements. You should use the filters at the top of the spreadsheet to select a mineral of interest.

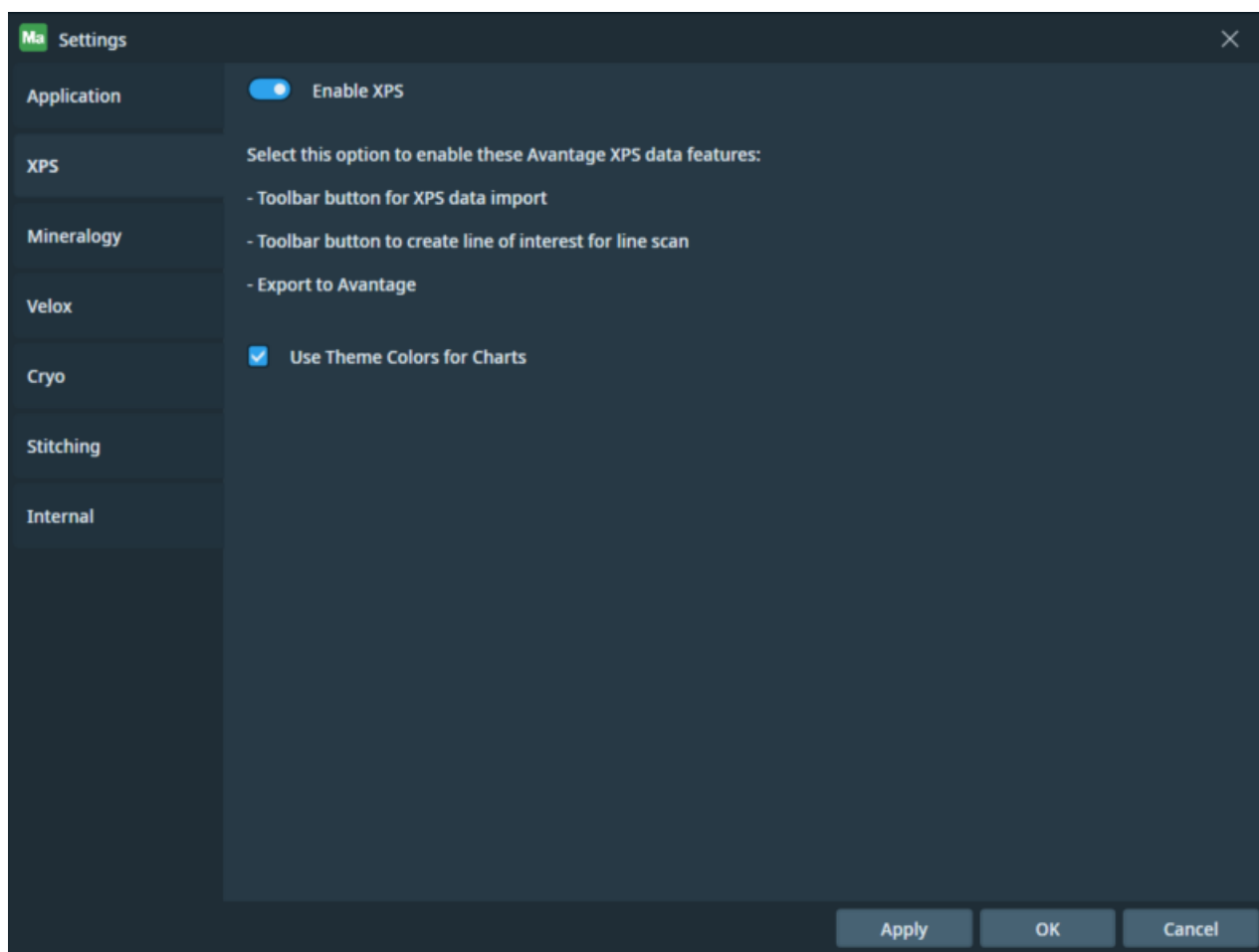
Tab	Description
Liberation Histogram	This shows a liberation report for all minerals and samples found. Liberation is computed as the total area of a mineral within each particle, and the report shows a summary view for all particles in the sample.
Locking Details	This is a detailed breakdown of the locking summary report. For each target mineral, it shows the percentage of the other minerals found in those particles as their weight percentage in binary or ternary classes.
Locking Summary	This is a refinement of the liberation report in which the percentage of minerals that are liberated or not liberated are shown. For particles that have two minerals, they are shown in the binary column. Particles with three minerals are shown in the ternary column. Particles with four or more minerals are shown in the complex column.
Modal Mineralogy Area	Shows the bulk mineralogy by area for the entire sample for one or more measurements. It also shows the mineralogy for all regions-of-interest defined in the exported measurements. Data here can be compared to other AM systems from other vendors.
Modal Mineralogy Weight	Based on the Modal Mineralogy Area, but shows the bulk results by weight instead of by area. Thus, heavy minerals (for example, pyrite or gold) have a higher effect than light minerals (for example, quartz or carbon). Data here can be compared to other bulk analytical techniques such as XRD, FTIR, RAMAN, or other AM systems.
Particle Size Distribution 1	This records a non-cumulative particle size distribution as a histogram across all measurements.
Particle Size Distribution Data	This records the cumulative particle size distribution for all particles across measurements.

Maps XPS

Maps XPS allows you to view XPS data and prepare sites, lines, and areas of interest for post processing within the Avantage software. To get started, follow the procedure below:

Get started

1. Go to the **Options** menu.
2. Click **Settings**, and then click the **XPS** tab.



3. Click **Enable XPS** to activate the XPS features. The Maps application alerts you if a system restart is required to proceed.
4. Click **OK**.
5. Proceed to the [XPS Workflow](#).

XPS Workflow

In the Maps XPS workflow, you can view imported XPS data and create annotations for post processing with the Avantage software. During post processing, the Avantage software uses the exported sites of interest for point measurements, converts the lines of interest to line scans, and converts the areas of interest to snap maps.

Prerequisites:

- You must enable XPS features within the Maps application settings (see [Maps XPS](#)).
- You must have a file containing XPS data that was prepared by the Avantage software (version 6.1 or newer).
- You must have an External Image Import license (see [Package options](#)).

Workflow procedure

1. [Import XPS Data](#) that are prepared in Avantage software.
2. [Initialize XPS Holder](#) (optional).
3. [View XPS Layer Types](#) within the Maps application.
4. Create and acquire tile sets (or snapshots).
5. [Create Annotations](#) based on acquired data from the microscope.
6. [Export XPS to Avantage](#) new annotations to an XML file.
7. Import the XML file to the Avantage software for post processing.

Import XPS Data

When the Maps XPS features are enabled, the Maps application adds an icon for importing XPS data to the SEM/SDB toolbar. If the XPS features are not enabled, then the icon does not display within the SEM/SDB toolbar.

1. Go to the right side of the SEM/SDB toolbar.
2. Click the Import XPS Data icon.

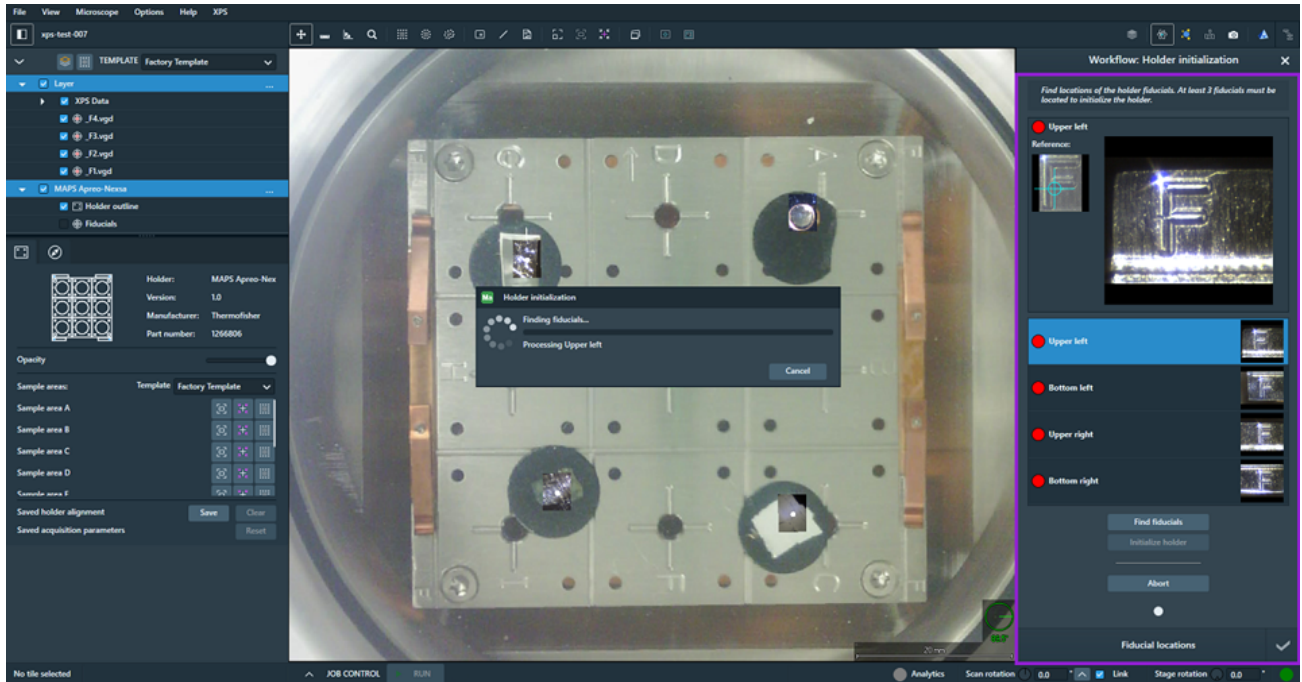


3. Select a file to import (file type *.tfs.xml).
4. Click **Open** to start the data import.
5. Proceed to [View XPS Layer Types](#).

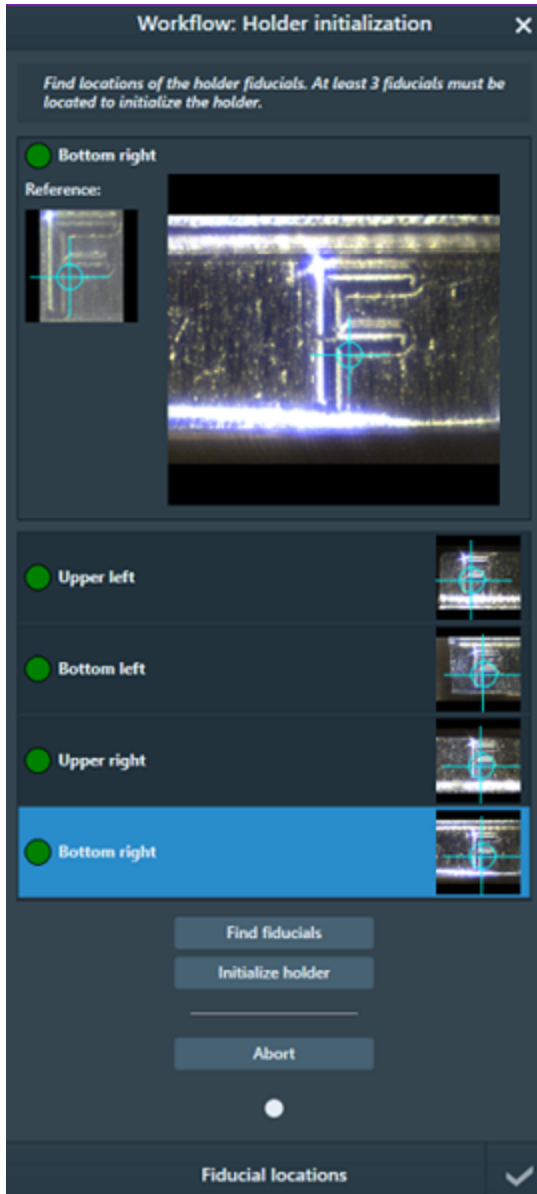
Initialize XPS Holder

If the imported XPS data contain information about the XPS holder, then the XPS holder initialization workflow starts automatically at the end of XPS data import. If desired, you can abort the initialization workflow anytime after it starts (see [Abort holder initialization](#)).

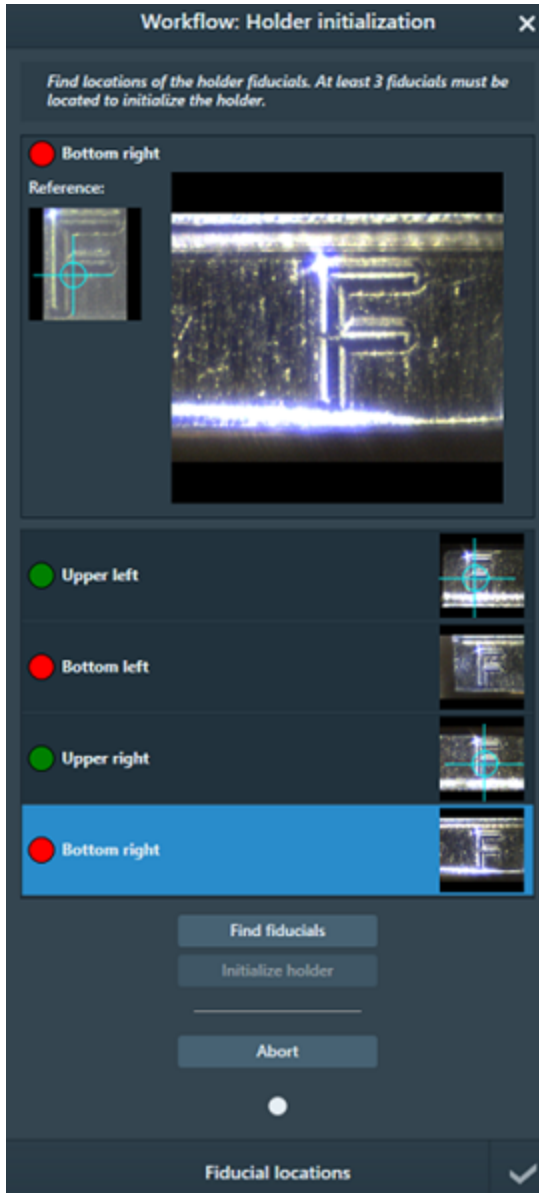
1. Maps locates the imported images that contain the fiducials and then populates them in the right panel.



2. Maps processes the fiducials and places reference points for each one. If Maps processes at least three fiducials, then it prompts you to check the fiducial positions.
 - If the status of each fiducial within the right panel indicates success (that is, indicated by a green status icon), then check for false positives by confirming that the blue crosshair locations in the fiducial and small reference screens match. If the crosshair locations match for each successful fiducial, then click **Yes** to initialize the holder and go to step 5 to initiate the automated holder alignment. If the crosshair locations do *not* match for each successful fiducial, then click **No** and continue the remaining steps to perform a manual placement for the false positives.



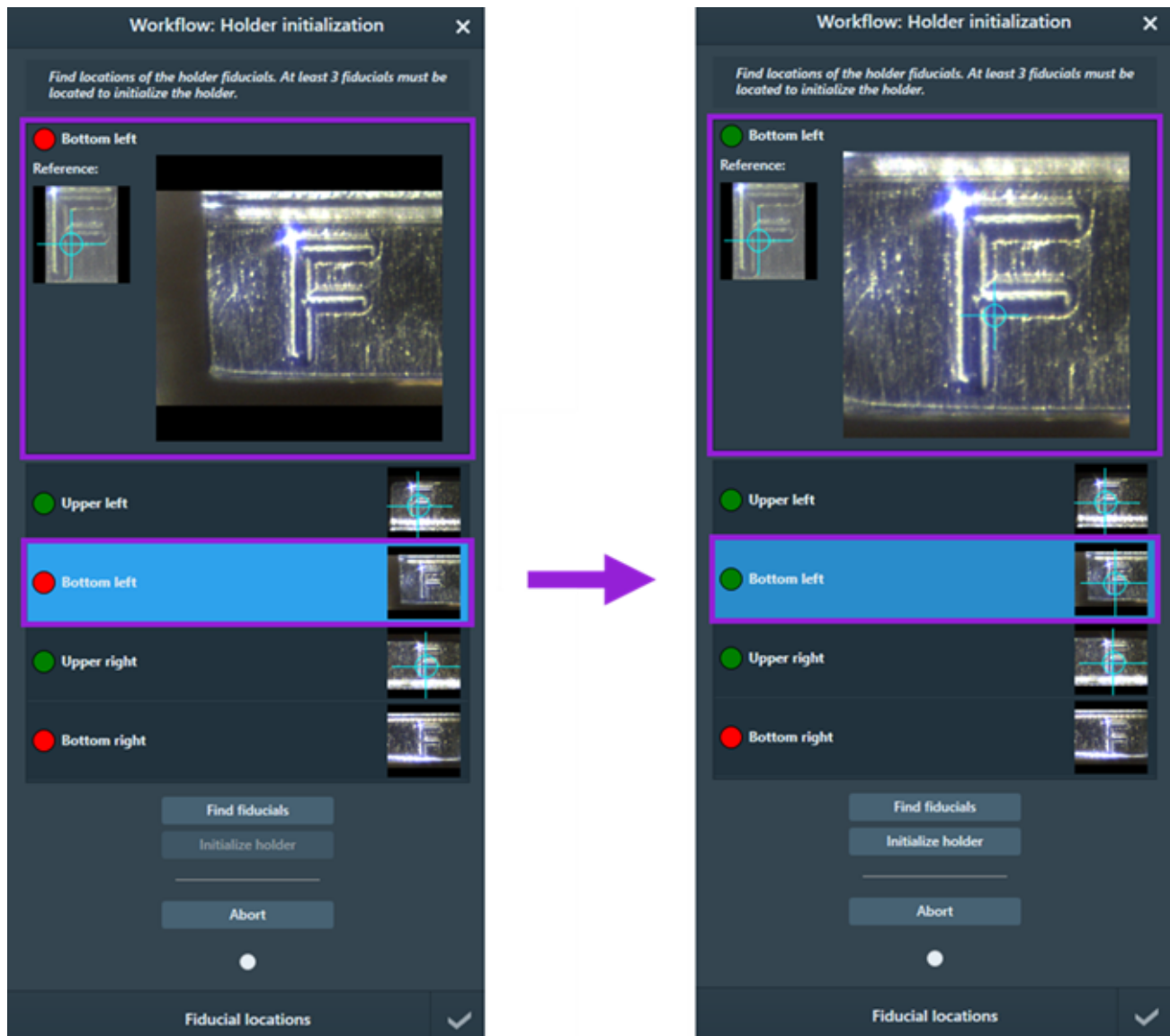
- If the status of each fiducial within the right panel indicates failure (that is, indicated by a red status icon), then click **No** and continue the remaining steps to perform a manual placement for the failed fiducials.



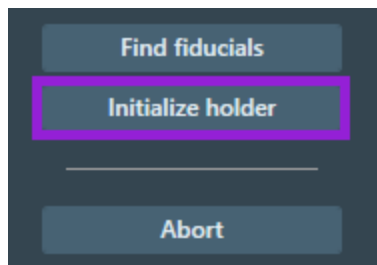
- Go through failed fiducials in the right panel and manually set the correct fiducial positions by double-clicking within the fiducial screen to move the blue crosshair so that it is in the same location as shown in the small reference screen. The small reference screen is located to the left of the fiducial screen. If needed, you can use the mouse wheel to drag and zoom to precisely set the fiducial position.



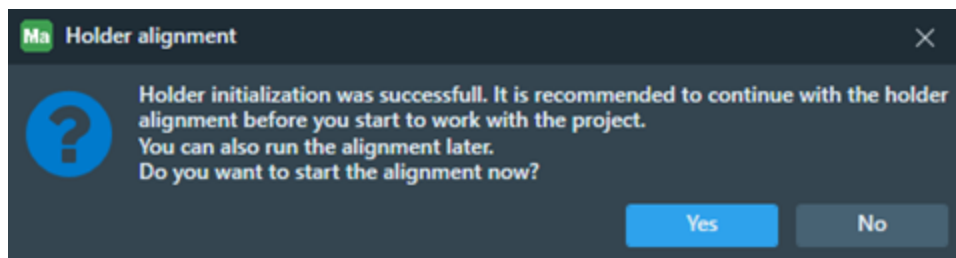
Note: Sometimes the Maps algorithm produces false-positives and places fiducial positions incorrectly (that is, the blue crosshair locations in the fiducial and reference screens do not match). If this occurs, you can manually change the fiducial positions defined by the automated workflow.



4. After you properly set at least three fiducial positions, click **Initialize holder** at the bottom of the panel.



5. After holder initialization completes, click **Yes** to start the automated holder alignment.

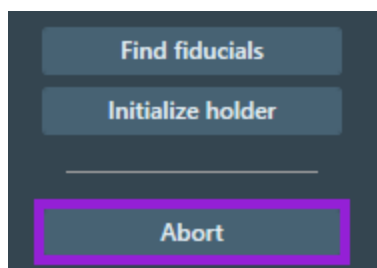


Alternatively, you can later start the holder alignment from the main toolbar by clicking the **Align to Holder** icon. Refer to the [Automated Holder Alignment](#) section for more information.

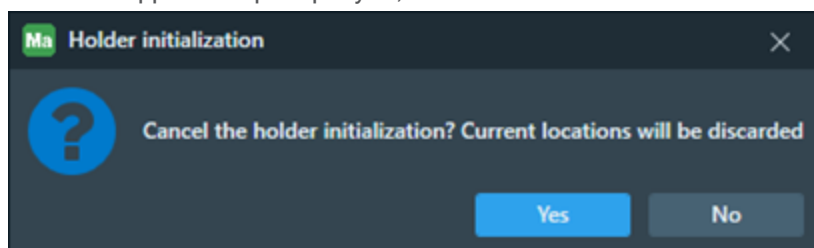


Abort holder initialization

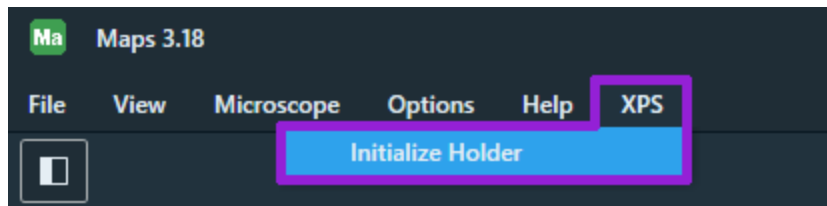
1. Click **Abort** at the bottom of the right panel.



2. When the application prompts you, click **Yes** to confirm.



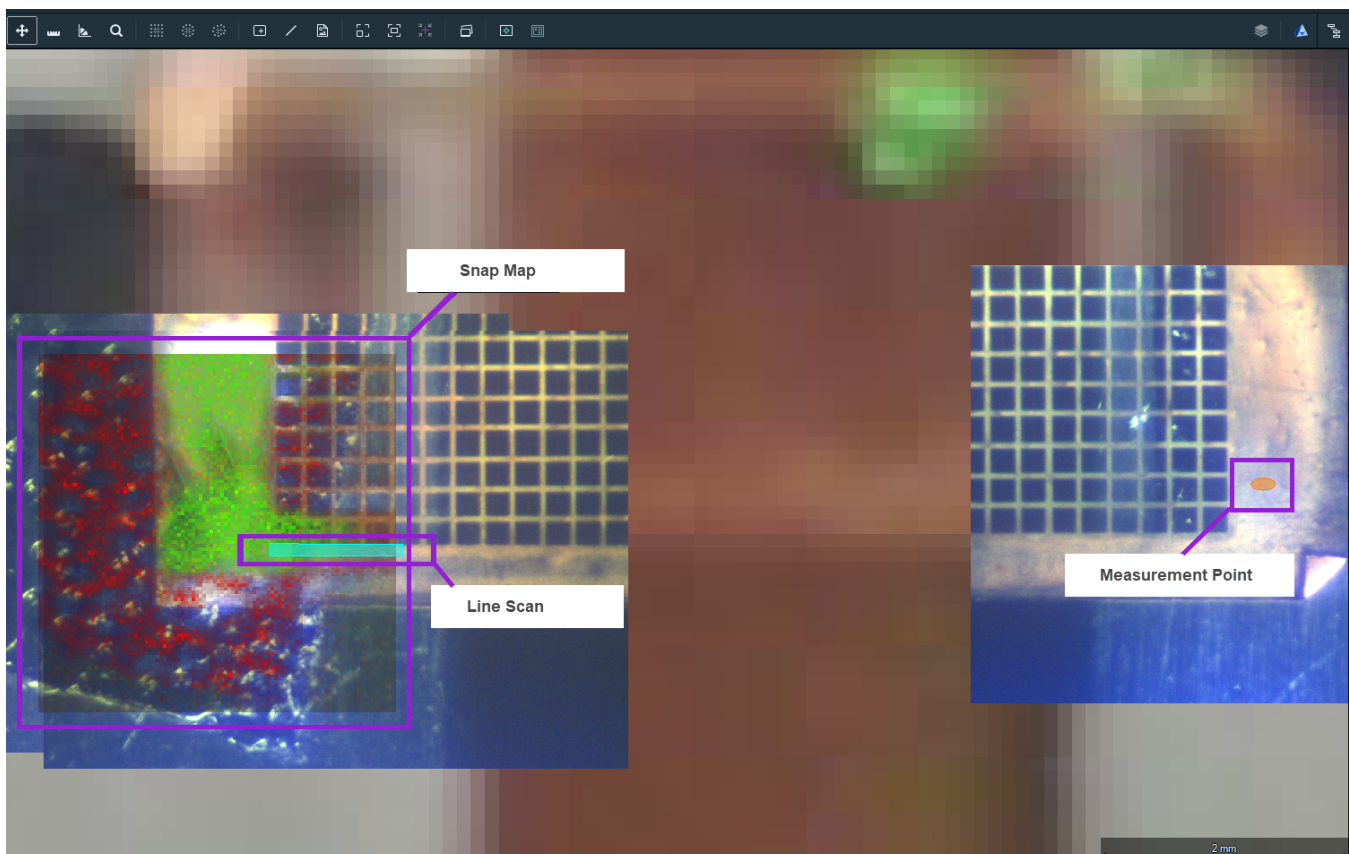
3. If you abort the holder initialization and would like to start the workflow again, navigate to the main menu and click **XPS >> Initialize Holder**. *The Initialize Holder submenu is only visible if you have XPS data with an XPS holder that has not yet been initialized. Once you initialize the holder, this submenu disappears.*



View XPS Layer Types

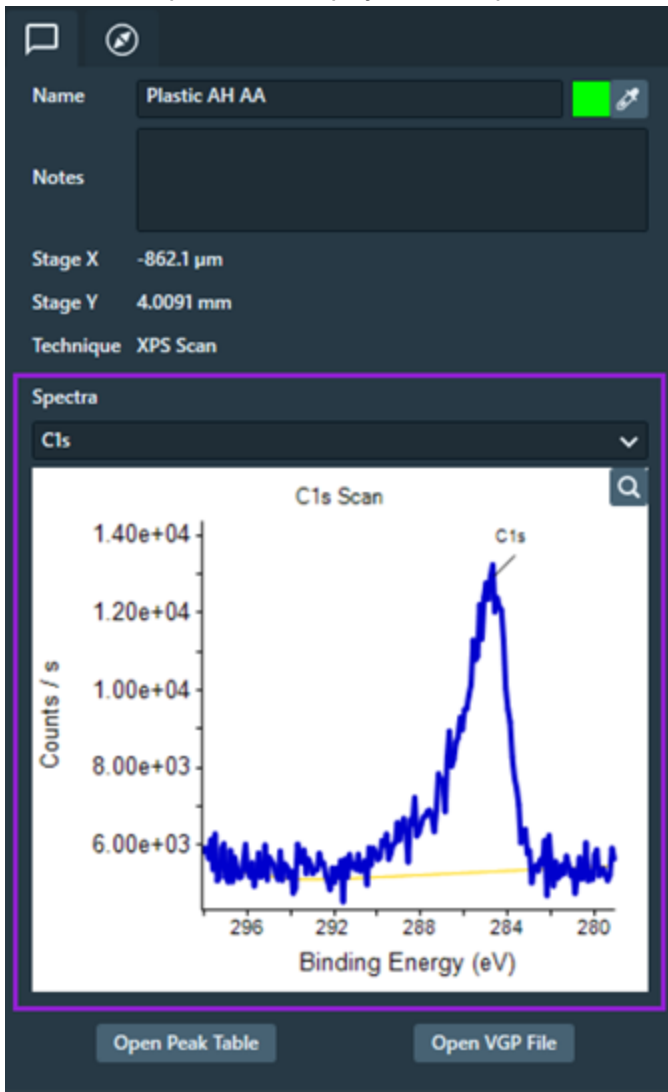
After importing the XPS data into the Maps application, the Maps project contains the following new layer types for you to view.

- Measurement point
- Line scan
- Snap map



Measurement point

Maps displays the measurement point as an elliptical area. This layer type contains multiple spectra, and you can select which spectrum to display in the left panel.



At the bottom of left panel, there are two options:

- Open Peak Table: Select this option to open the peak table (if present) in a separate window.

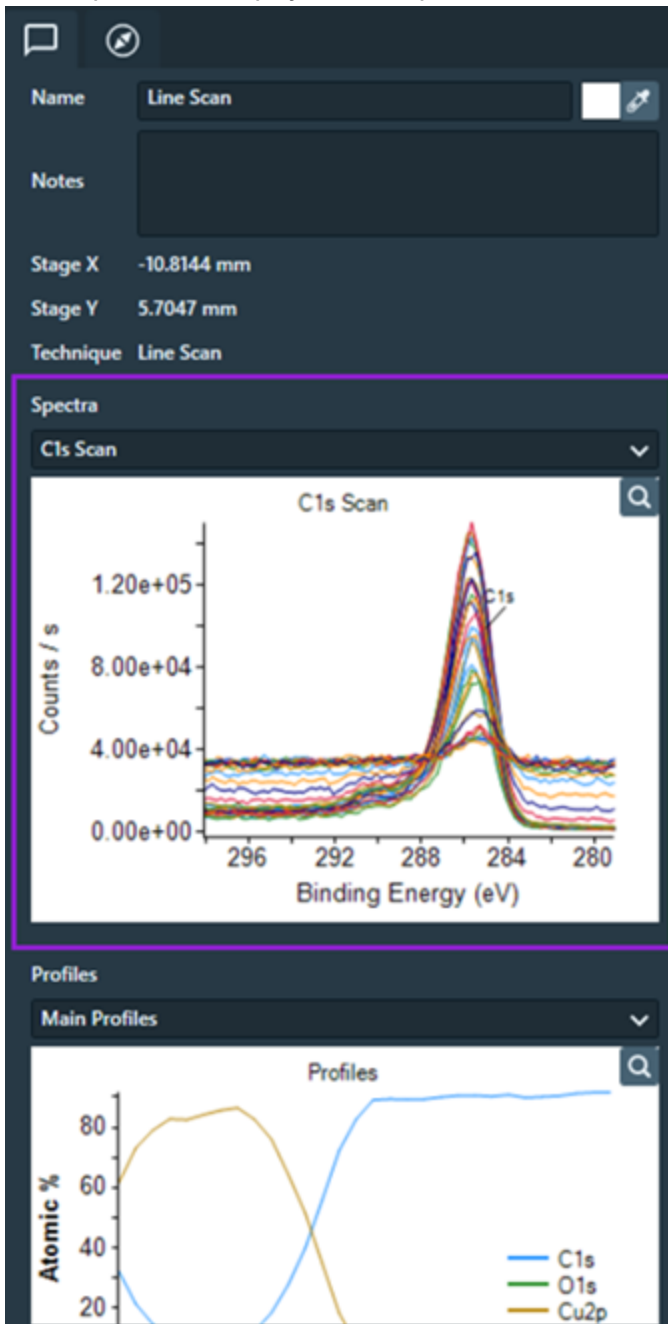


- Open VGP File: Select this option to open the VGP file associated with the measurement point in the Avantage software. You must have the Avantage software installed to use this feature.

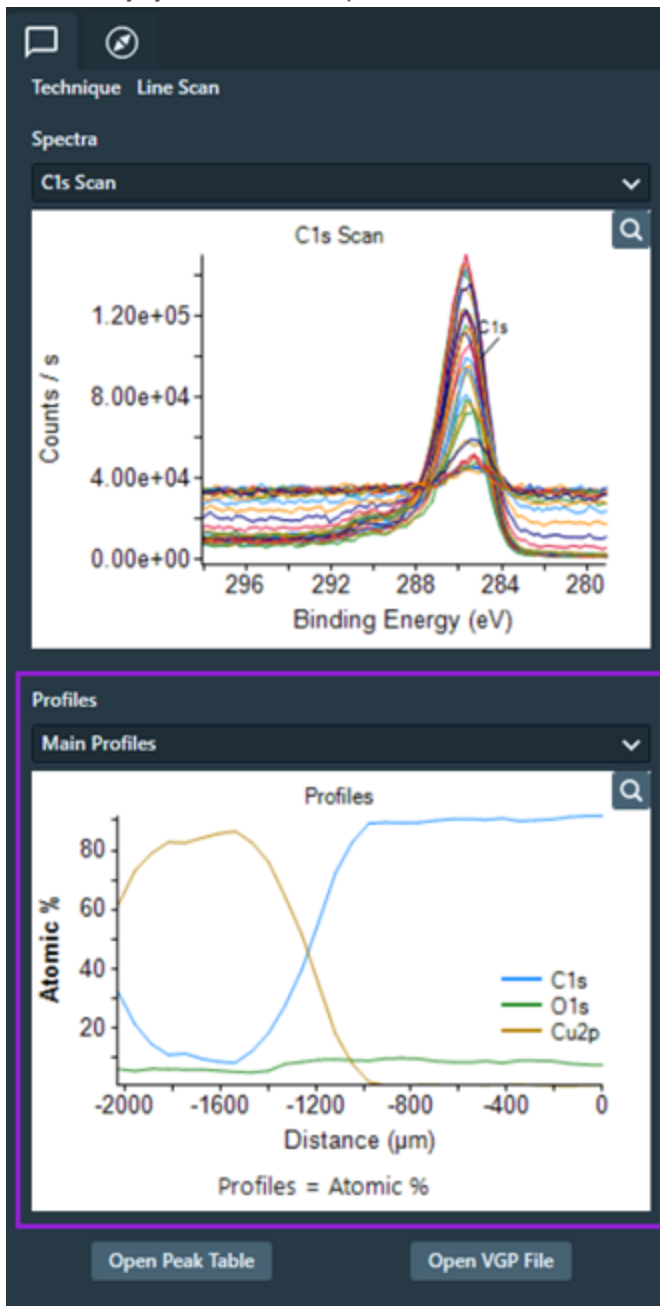


Line scan

Maps displays the line scan as thin rectangular area. This layer type contains multiple spectra, and you can select which spectrum to display in the left panel.

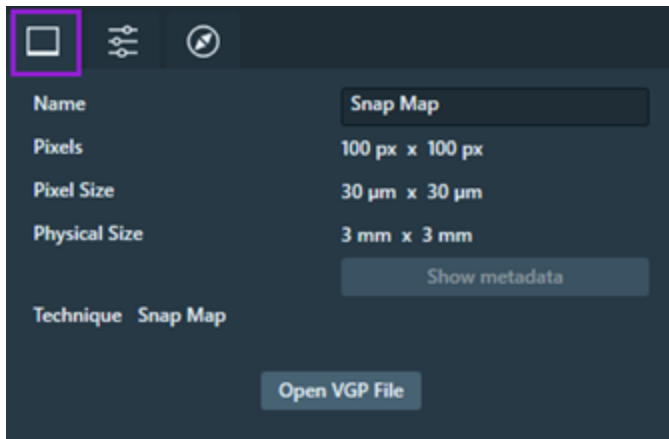


Additionally, you can select a profile as shown below to display.



Snap map tab

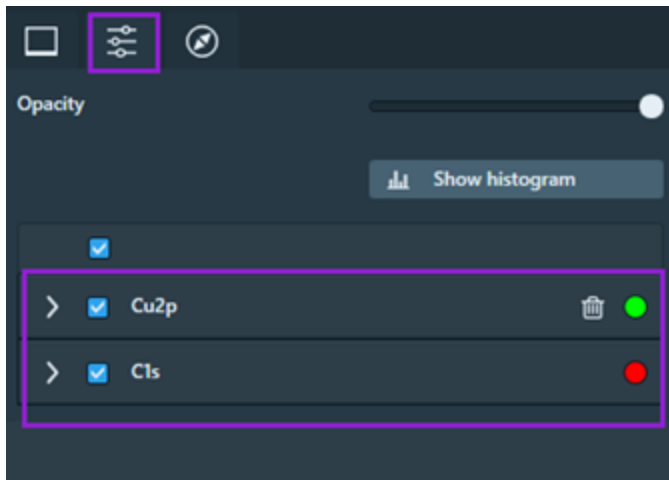
The Snap Map tab contains the default properties.



Property	Description
Name	Displays Snap Map name.
Pixels	Size of the image in pixels.
Pixel Size	Physical size of one pixel.
Physical Size	Physical size of the whole image.
Show metadata	This property is deactivated and not available since Snap Map does not include metadata.
Technique	Technique used to create the data in XPS. For example, Snap Map is the technique in this case.

Visualization tab

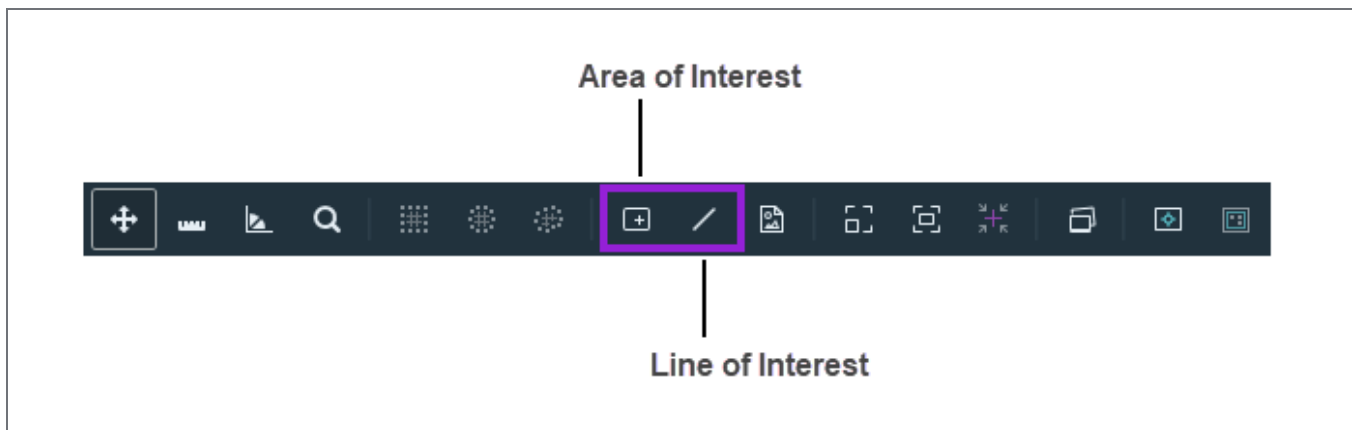
Maps imports the Snap Map as a multichannel image layer.



Create Annotations

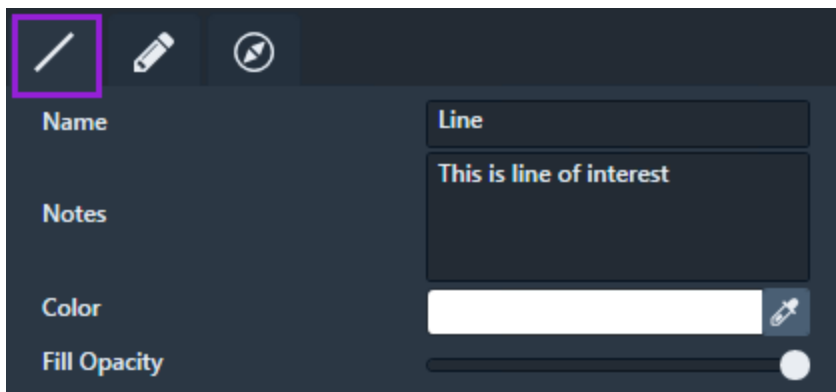
With the XPS data imported into the Maps application, you can create new annotations for your lines of interest, areas of interest, and sites of interest.

Toolbar



Create line of interest annotation

1. Go to the SEM/SDB toolbar. *The Line of Interest icon only appears in the toolbar when the Maps XPS features are enabled.*
2. The Line of Interest icon is located in the middle of the toolbar (see image above). Click the Line of Interest icon.
3. Click and drag your mouse cursor in the Maps Viewer to draw a line.
4. Enter a name for the annotation in the dialog that opens, and then click **OK**.
5. The Line of interest tab opens in left panel. Update the Line of Interest properties under this tab.
6. (Optional) Add notes if needed.
7. Click the color picker to designate the annotation color.
8. Set the fill opacity (see details in the table below).



Property	Description
Name	Displays annotation name.
Notes	Displays annotation notes. Click in this field to add or edit these notes.
Color	Displays color of annotation. Click the color picker (that is, the eyedropper icon) to change the color.
Fill Opacity	Sets the level of opaqueness for the entire annotation. Click and move the slider to the right to increase the level of opaqueness, or click and move the slider to the left to decrease the level of opaqueness. The less opaque, the more transparent the annotation becomes. Transparent annotations are useful when overlaying a layer over another layer.

Create area of interest annotation

1. Go to the SEM/SDB toolbar. *The Area of Interest icon is present in the toolbar even if the Maps XPS features are not enabled.*
2. The Area of Interest icon is located in the middle of the toolbar (see image above). Click the Area of Interest icon.
3. Click and drag your mouse cursor within the Maps Viewer to draw a rectangular area.
4. Update the properties as defined and described in the [Annotation Tab](#).

Create site of interest annotation

1. Right-click in the Viewer to access the Viewer Right-Click Menu.
2. Select **Add Site of interest**.
3. Update the properties as defined and described in the [Viewer](#).

Export XPS to Avantage

After you have created create new annotations for your sites of interest, areas of interest, and lines of interest, you can export them to an XML file and then later import the XML file into the Avantage software for post processing.

Export procedure

1. Go to the right side of the SEM/SDB toolbar.

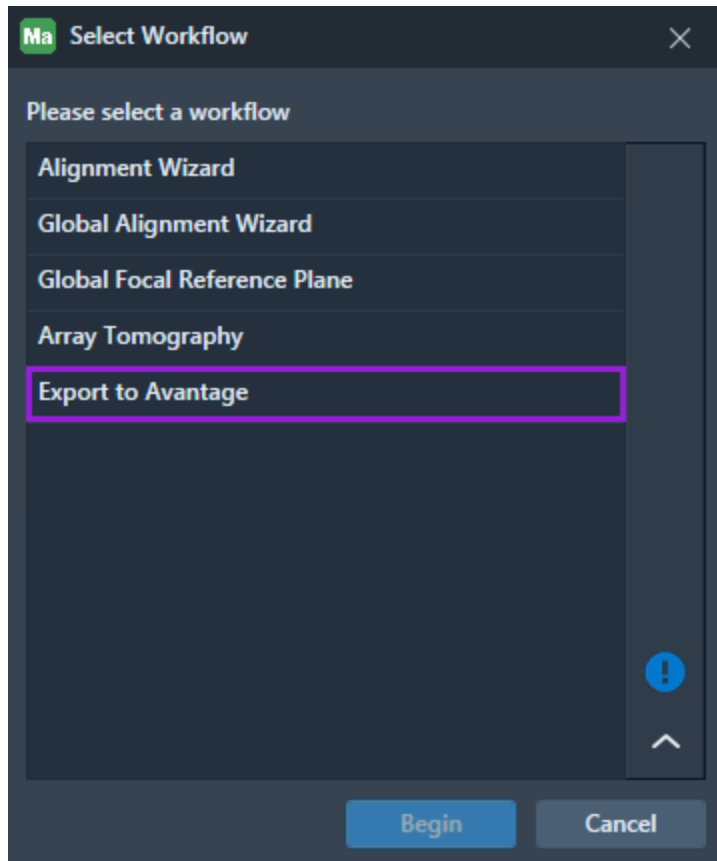


Note: Alternatively, you can start the export with the [Main screen method](#) and then skip to step 5.

2. Click the Workflow icon.

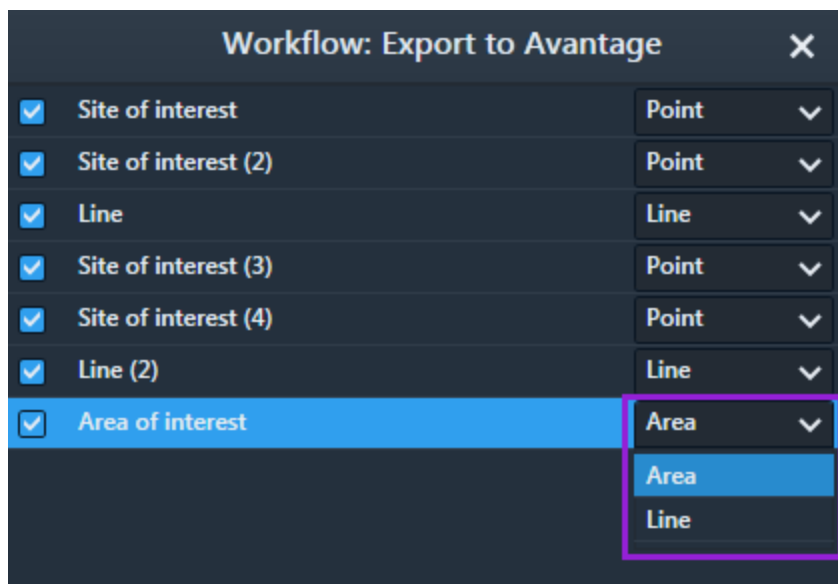


3. Select **Export to Avantage** from the menu.



4. Click **Begin**.

5. A single-step workflow panel opens on the right side of the export screen. This panel contains all annotations that you have created in the project.



Here you can do the following:

- All of your annotations are preselected, but you can deselect any of them if desired.
- You can double-click an annotation to center and zoom Maps on it.
- You can also select how these annotations will be exported.

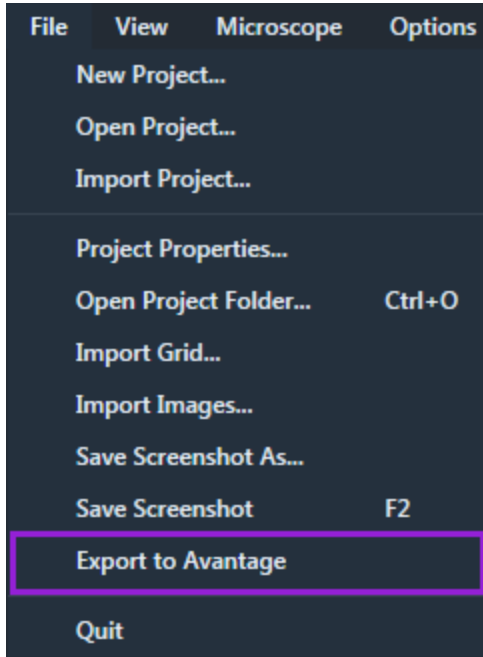


Note: Lines are exported *as lines*, sites are exported *as points*, and areas are exported *as either areas or lines*. If you export an area as a line, then the area is collapsed into a central line from within the area.

6. When the File Save dialog opens, select a file system location, enter the name of the exported file, and then click **Save**.

Main screen method

1. Go to the File menu.
2. Select **Export to Avantage** from the menu.

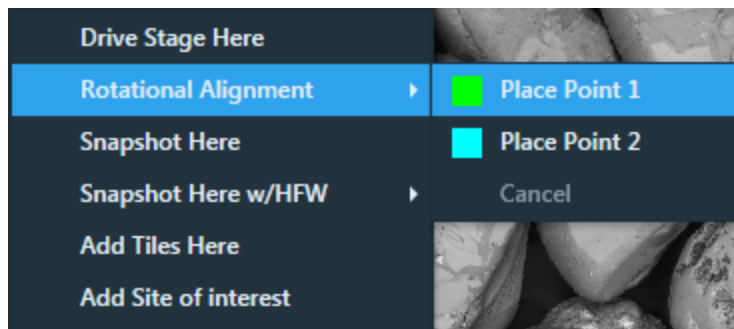


Rotational Alignment

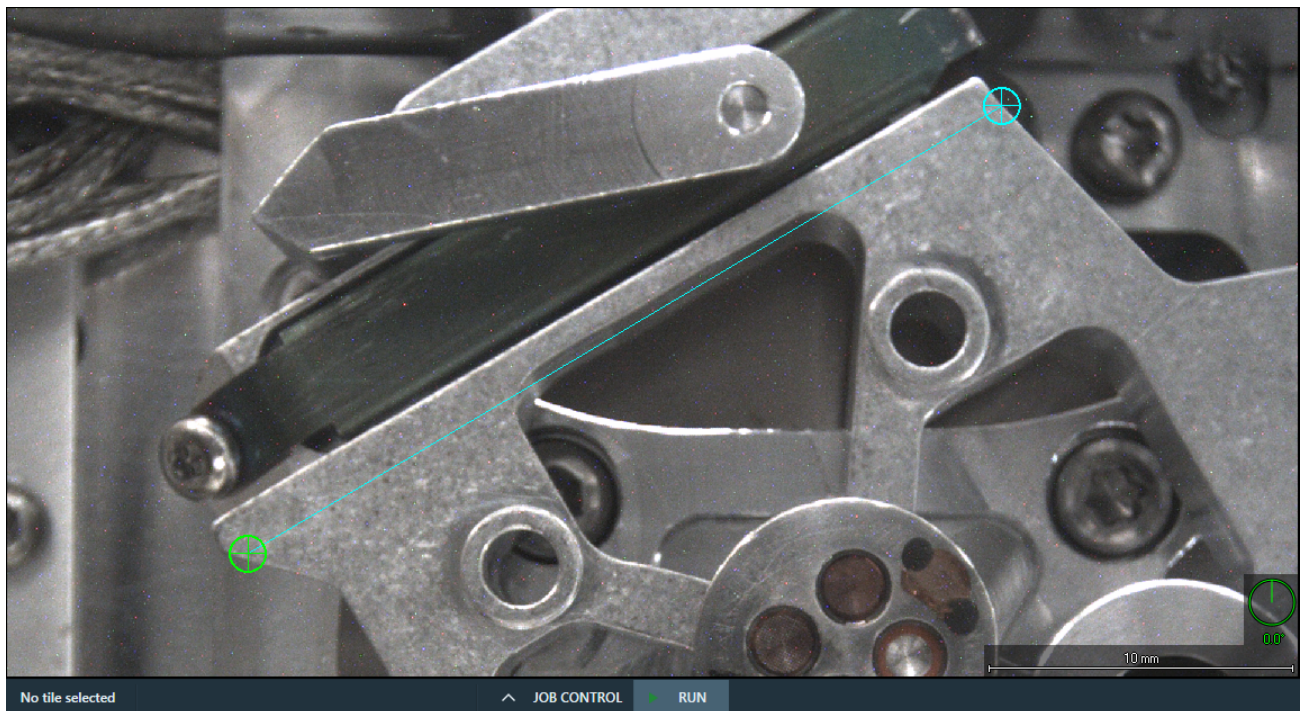
This topic gives instructions for using the Rotational Alignment feature.

Caution: Take care when using this feature with detectors inserted. Also, verify the clearance of installed stage hardware manually using the xT UI before performing the rotation in Maps.

1. Right-click where point 1 is to be placed.
2. On the context menu, click **Rotational Alignment** and then **Place Point 1**.



3. Right-click where point 2 is to be placed.
4. On the context menu, click **Rotational Alignment** and then **Place Point 2**.



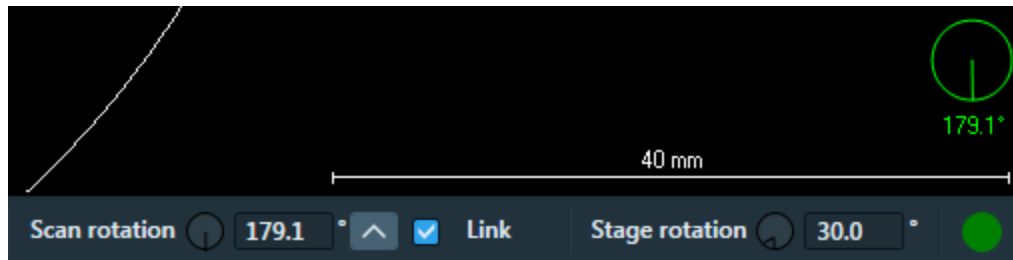
5. Select the rotation that you want to use.
 - **Stage Rotation:** Uses stage rotation to align the image.
 - **Scan Rotation:** Uses scan rotation to adjust the image.

The microscope rotates to make the line between Points 1 and 2 horizontal and zooms the viewer to the line.




SEM and SDB Scan Rotation

This function rotates the scan and aligns the image. It has no effect on the stage movements and is solely a scan coil function, but is used to orient the image relative to mechanical rotation and detector direction.



Scan Rotation Descriptions, SEM and SDB

Control	Description
Scan rotation	Displays and controls the current scan rotation in the microscope. Click the up arrow  to assign the viewer rotation value to the scan rotation text box.
Link	Select the Link checkbox to link the scan rotation with the viewer rotation. When linked, changes to the scan rotation angle automatically rotate the viewer and vice versa. This is indicated by the <i>green</i> rotational dial in the main viewer. When unlinked, the rotational dial is white.
Stage rotation	See Stage Rotation .

Stage Rotation

Type a value into the text box and press **Enter** to rotate the stage in the microscope.



Set sample tilt

Setting the sample tilt allows Maps software to perform stage moves with the stage unlinked. Having this tilt set lets Maps know how to drive the stage in x and y while maintaining the same height of the sample. This is vital when performing imaging within the Maps software.

Before you perform this procedure, confirm that the sample is perpendicular to the electron beam. This preliminary step adjusts the Maps stage to keep the sample at the same distance from the beam; thus, allowing navigation and tiling at stage tilt.



Note: Setting sample tilt makes the linked focus unavailable.

To set the sample tilt:

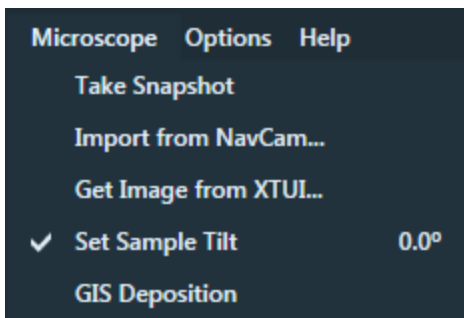
Before the sample tilt is set, Maps software displays the current stage tilt in degrees next to the menu command.

1. On the Microscope menu, click **Set Sample Tilt**.
2. Maps software asks if you want to set the current sample tilt to the current stage tilt and it will unlink Z from the working distance. Click **Yes**.

The Sample Tilt is now set. A check mark is displayed next to the menu command along with the stage tilt that was set.

Task Result


With the sample tilt set, you can now image the tilted sample with Maps software.

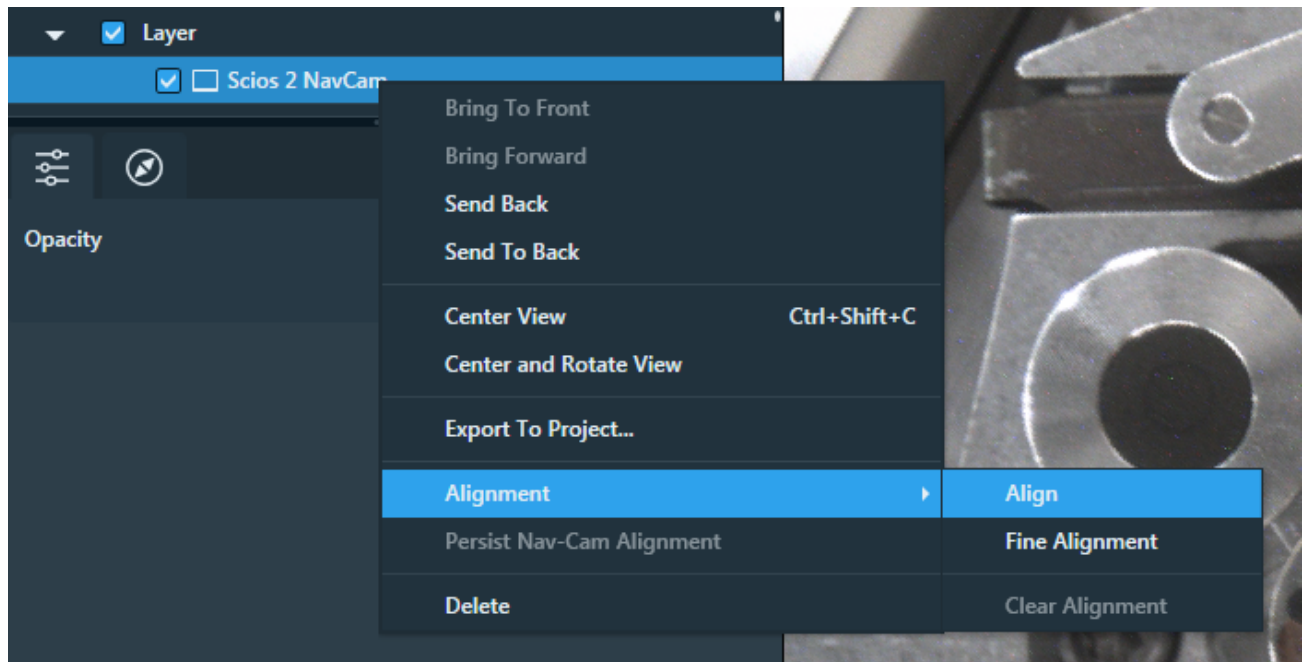


SEM Nav-Cam Alignment

For systems that have the Nav-Cam, Maps is able to acquire Nav-Cam images and align them. Maps is also able to save the Nav-Cam Alignment to be automatically applied to all future Nav-Cam images acquired with Maps.

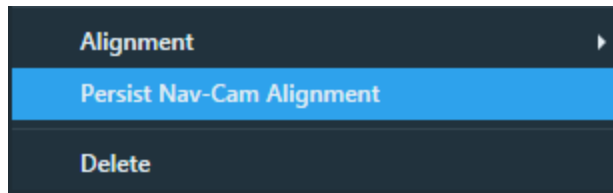
Align the SEM Nav-Cam

1. Click the **Import from Nav-Cam** tool bar icon .
2. When the Nav-Cam image appears in Maps, right-click on its name in the Layer control.
3. On the context menu, click **Align**.



4. Follow the alignment wizard to perform the coarse point alignment (1-, 2- or 3-Point) as described in [Coarse Alignment \(1-, 2-, or 3-Point\)](#).
5. Follow the alignment wizard to perform fine alignment adjustments as described in [Fine Alignment](#).
6. Test the Nav-Cam alignment by navigating to features on the sample and acquiring preview images.
If the Nav-Cam image is not sufficiently aligned, then perform the alignment procedure again.
7. When the Nav-Cam image is sufficiently aligned, right-click on its name in the Layer control.

- On the context menu, click **Persist Nav-Cam Alignment**.

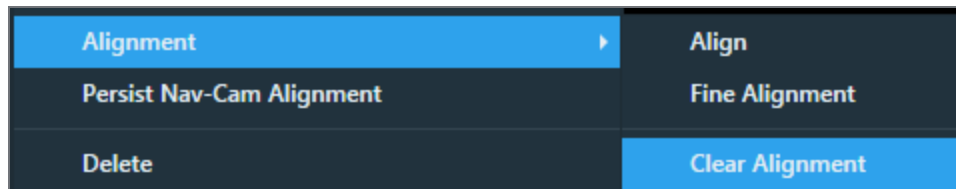


All subsequent Nav-Cam acquisitions using Maps will use this alignment.

Clear the Nav-Cam alignment

This clears the alignment for an individual image.

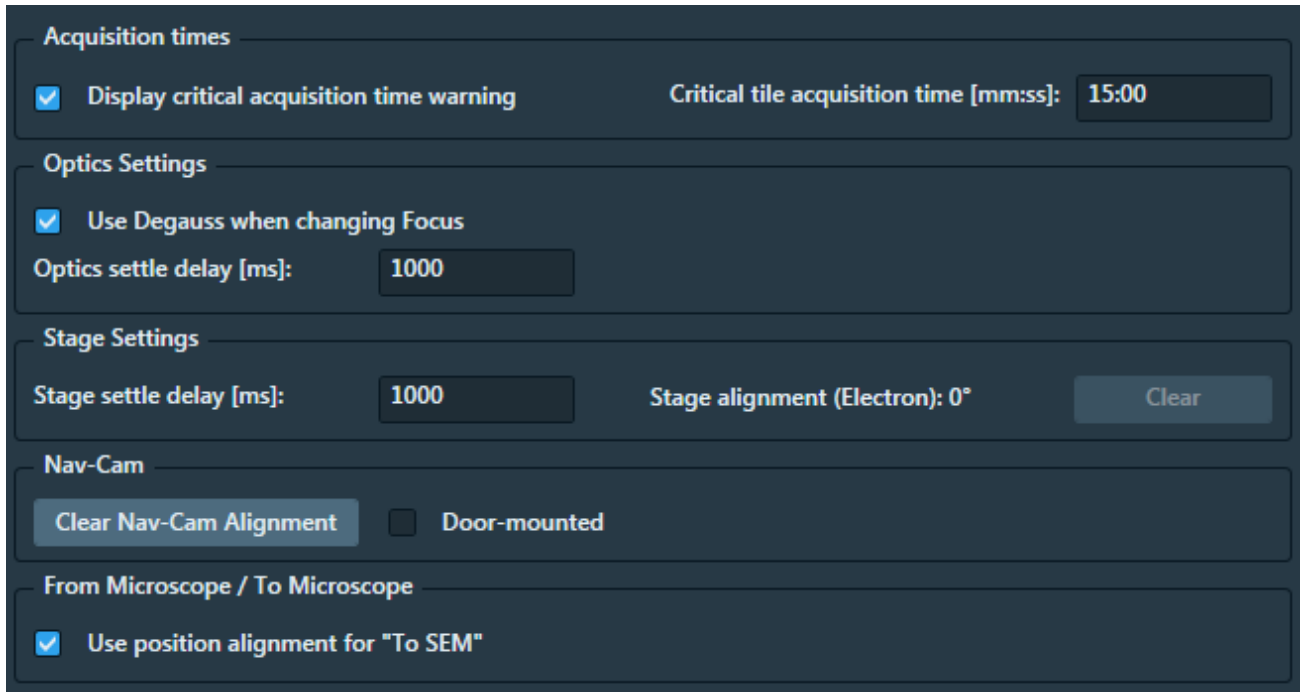
- Right-click the Nav-Cam image in the Layer control.
- On the context menu, click **Alignment** and then **Clear Alignment**.



Clear the saved default Nav-Cam alignment

This clears the alignment for all acquired Nav-Cam images.

1. On the **Options** menu, select **Settings -> Microscope**.
2. Click **Clear Nav-Cam Alignment**.



Phenom

This section describes user interface elements and procedures that are specific to the Phenom desktop SEM systems.

Topics include:

[Phenom Connectivity](#)

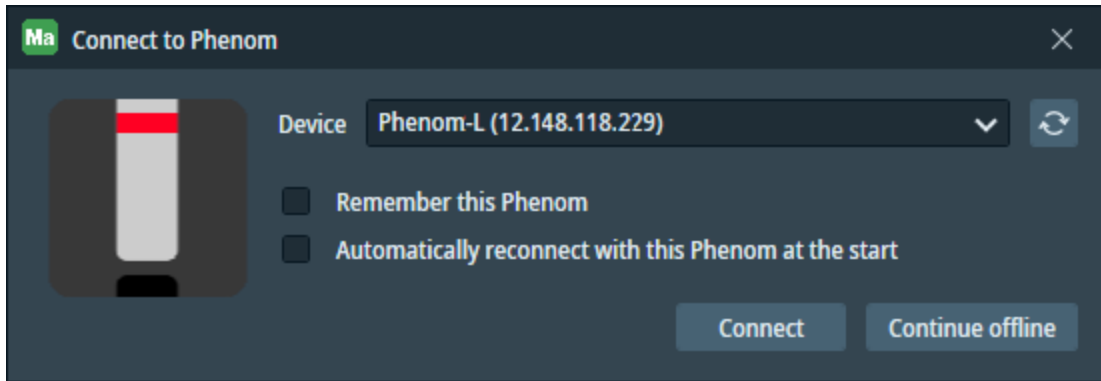
[Phenom Settings](#)

[Phenom Operational States](#)

[Phenom User Interface Elements](#)

Phenom Connectivity

When Maps starts for the first time, or when you have configured Maps to ask for a connection (see [Phenom Settings](#)), then the connection dialog opens as shown below.







Connect microscope

1. Click the **Device** dropdown menu and select a Phenom microscope from the list of microscopes. If you do not see the desired microscope in the list, then do the following:
 - a. Click **Refresh** and then select the desired microscope from the refreshed list.
 - b. If the refreshed list does not contain the desired microscope, then enter the IP address of the desired microscope in the **Device** field.
2. *Optional:* If you added a new Phenom microscope to the list of microscopes (see [Phenom Settings](#)), then select the **Remember this Phenom** checkbox. Maps will then add the new Phenom microscope to the list of known microscopes, so that it is a menu option in the future.
3. *Optional:* If you want Maps to automatically connect to your selected microscope upon startup, then select the **Automatically reconnect with this Phenom at the start** checkbox.
4. Select one of the following options to complete this procedure:
 - Click **Connect** to initiate the connection between Maps and the selected Phenom microscope.
 - Click **Continue offline** if you do not want to connect to a microscope. Maps will continue to perform in the offline mode.

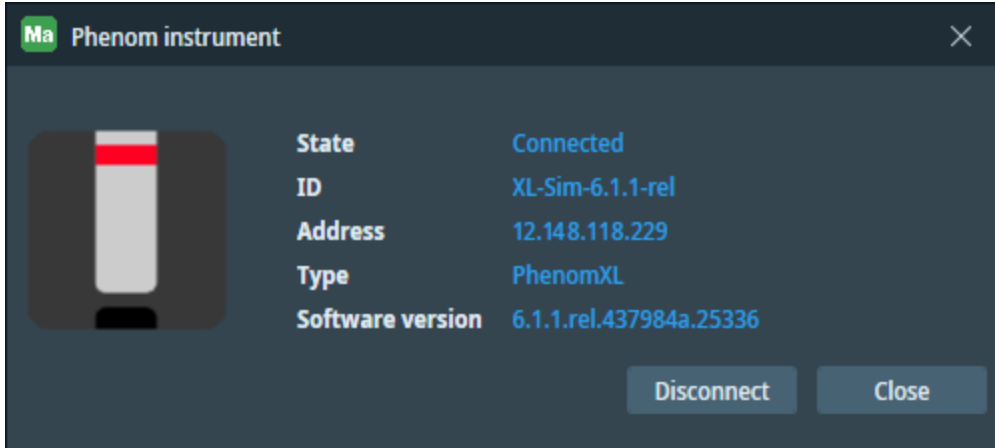
Connection states

The connection state icon is located in the lower-right corner of the Maps main screen. There are four color-coded connection states as described below.

States	Description
	A green icon indicates that Maps is connected to the microscope with full use and control.
	A blue icon indicates that Maps is connected to the microscope, but the connection is read-only since the microscope is locked by some other process(es). With this status, you can still use Maps, but you cannot use or control the microscope.
	A yellow icon indicates that Maps has lost the connection to the microscope. Note that the lost connection might be temporary since Maps automatically attempts to reestablish the connection while in this status. With this status, you can still use Maps, but you cannot use or control the microscope.
	A red icon indicates that Maps is not connected to the microscope. With this status, you can only use Maps in the offline mode.

View microscope details and disconnect

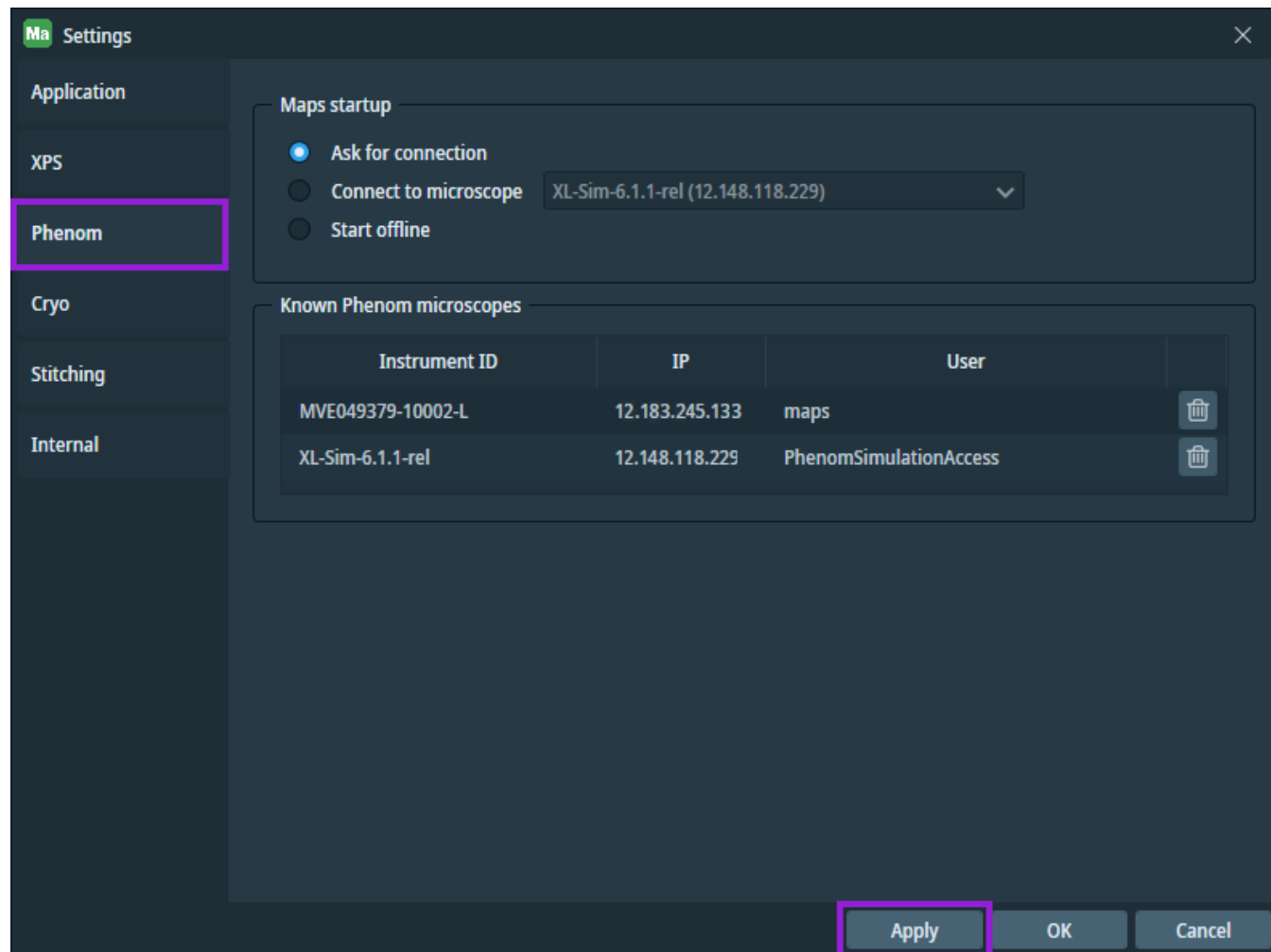
If you want to view the microscope details and/or disconnect the microscope from Maps, perform the procedure described below.



1. From the Main screen, click **Phenom->Phenom instrument** to open the Phenom instrument dialog. This dialog displays the connection state and microscope details.
2. Click **Disconnect** to disconnect the Phenom microscope. When disconnected, Maps switches to the offline mode. *Note that Maps cannot reconnect or connect to another microscope when it is in the offline mode.*

Phenom Settings

The Phenom settings allow you to define the Maps connection startup behavior and manage the known Phenom microscopes.



Configure settings

1. Navigate to the **Options** menu, click **Settings**, and then click the **Phenom** tab.
2. Click one of the following Maps startup options:
 - **Ask for connection**: The connection dialog appears when Maps starts (see [Phenom Connectivity](#)).
 - **Connect to microscope**: Maps automatically connects to the selected Phenom microscope when Maps starts.
 - **Start offline**: Maps starts in the offline mode without a Phenom microscope connection.
3. Under Known Phenom microscopes, review the list of stored Phenom microscopes. This list displays the instrument ID, IP address, and user name associated with the microscope.
 - To add a new microscope to the list, refer to the connection procedure under [Connect microscope](#).
 - To remove a microscope from the list, click the **trash can** icon next to the microscope's user name. When a warning dialog prompts you to confirm the removal, click **OK** to save the change and close the warning dialog.
4. Click **Apply** to save your settings, or click **OK** to save your settings and close the Settings screen.

Phenom Operational States

This topic describes the operational states of the connected Phenom microscope. Maps can use and control a Phenom microscope only when the following criteria is met:

- The microscope is operational.
- The microscope is in the operational mode, which is the SEM mode.

If this criteria is not met, then Maps will prompt you to take corrective action through the Phenom instrument dialog.

Corrective actions

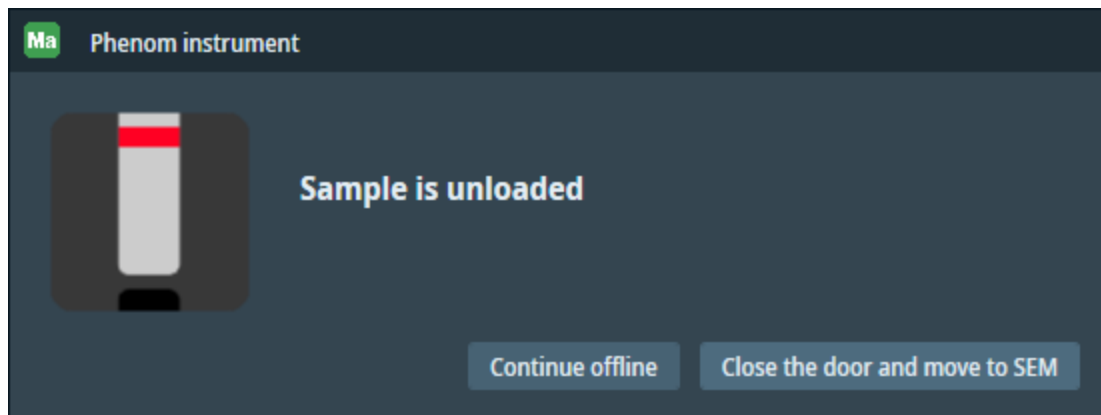
With each of these operational states you have the two options. You can either bring the microscope to the operational mode, or disconnect the microscope and continue with Maps offline.



Note: Note that Maps cannot reconnect to the microscope when it is in the offline mode.

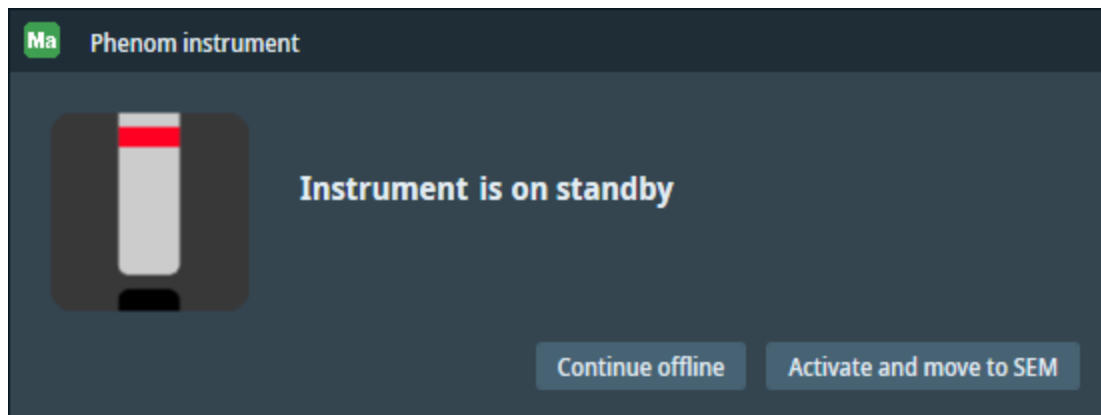
Operational state: The sample is unloaded and the microscope door is open

- Click **Close the door and move to SEM** to bring the microscope to the operational mode.
- Click **Continue offline** to disconnect and switch Maps to the offline mode.



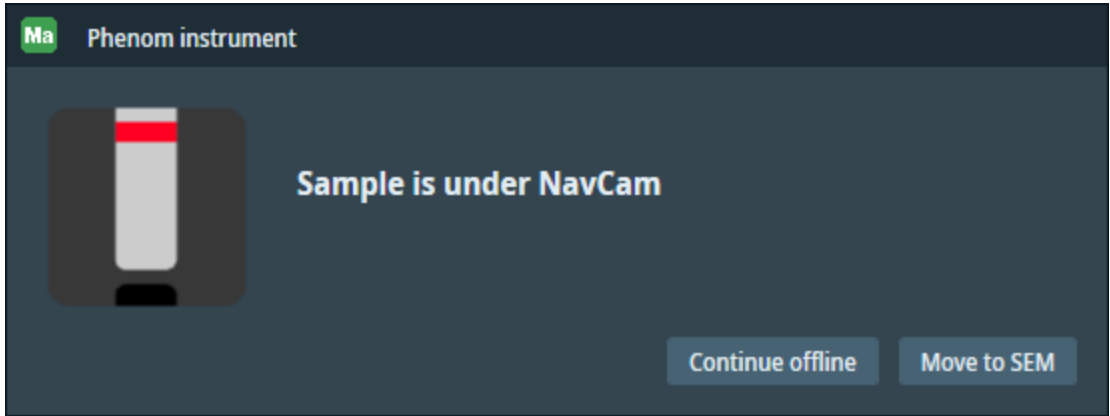
Operational state: The microscope is on standby

- Click **Activate and move to SEM** to bring the microscope to the operational mode.
- Click **Continue offline** to disconnect and switch Maps to the offline mode.



Operational state: The sample is under NavCam

- Click **Move to SEM** to bring the microscope to the operational mode.
- Click **Continue offline** to disconnect and switch Maps to the offline mode.

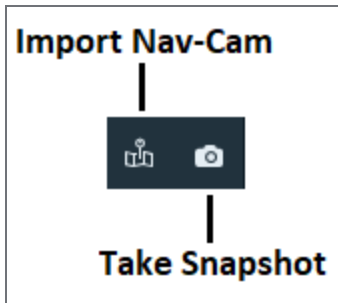


Phenom User Interface Elements

Phenom Toolbar, Right Side

See [Left Side, All Systems](#) for common selections on all systems.

Toolbar, right side, Phenom



Toolbar Descriptions, Phenom

Tool	Description
Import Nav-Cam	Imports a Nav-Cam image or acquires a new one if none is available, and imports the image to project. This top-down image of the stage can be used for point and click navigation of the sample. See Nav-Cam Alignment (SEM/SDB Only) .

Toolbar Descriptions, Phenom(Continued)

Tool	Description
Take Snapshot	Acquires an image at the current stage position and horizontal field width (HFW), and then places the image in the Maps viewer as a snapshot image. The image is acquired using the current parameters set in the microscope.

Phenom Tile Set Tab

This topic describes options in the Tile Set tab for the Phenom microscope.

Basic tab


The screenshot displays the 'Basic' tab of the Phenom Tile Set interface. At the top, a toolbar contains several icons, with the grid icon highlighted by a purple square. Below the toolbar, the following parameters are listed:

- Name:** Phenom Tile Set
- Tiles X, Y:** 2 (with a lock icon)
- Tile HFW:** 500 μm (with a lock icon)
- Total HFW:** 950.0001 μm (with a lock icon)
- Resolution:** 1920 x 1200 (with a dropdown arrow)
- Pixel Size:** 260.4167 nm
- Averaging:** High (with a dropdown arrow)
- Contrast:** 0.329
- Brightness:** 0.600

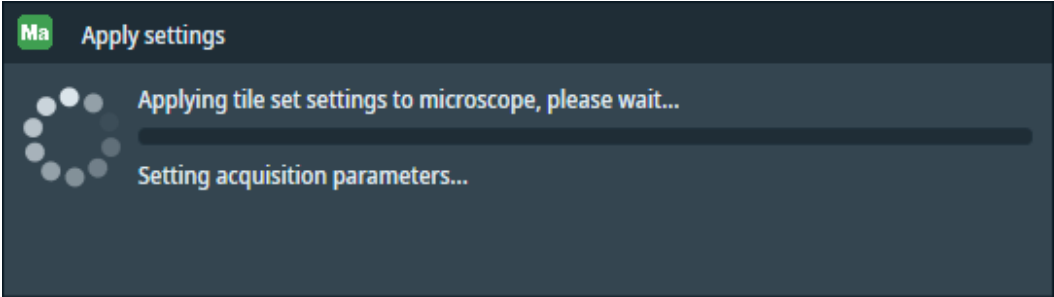
Below the parameters, the acquisition time statistics are shown:

- Image acquisition time: 00:00:07
- Estimated acquisition time: 00:00:40
- Elapsed acquisition time: 00:00:00

At the bottom, the status indicates: 0 of 4 images acquired; 31.57 MB. Two buttons are visible at the bottom: 'FROM MICROSCOPE' and 'TO MICROSCOPE'.

Tile Set Tab, Basic Tab Overview	
Control	Description
Name	Displays and sets the name of the current tile set.
Tiles X, Y	Sets the number of tiles in the X and Y directions.
Tile HFW	<p>Specifies the horizontal field width (HFW) for each tile.</p> <p>Values between 10 μm and 1 mm are always available. Other values can be used too, but their usage is limited to certain High Voltage and Working Distance settings. Confirm that your desired value is available for the acquisition. Limited values are indicated with the following warning icon:</p> 
Total HFW	Shows the total HFW of the whole tile set.
Resolution	Specifies the image resolution. Select the resolution from the list or enter a custom resolution.
Pixel Size	Displays the physical size of a single pixel at the current acquisition settings. This is based on Tile HFW and Resolution.
Averaging	<p>Sets averaging, or the number of image frames. Select a value from the list of preset options, or enter a custom value (number 1-255).</p> <p>The preset options are:</p> <ul style="list-style-type: none"> • Live (1) • Medium (4) • High (16) • Best (32)
Contrast	Sets contrast. The value is a number between zero and one hundred (that is, 0.0-100.0).
Brightness	Sets brightness. The value is a number between zero and one (that is, 0.0-1.0).
Image acquisition time	Displays the estimated time required to acquire a single image in the tile set.
Estimated acquisition time	Displays the estimated remaining time required to acquire the whole tile set.

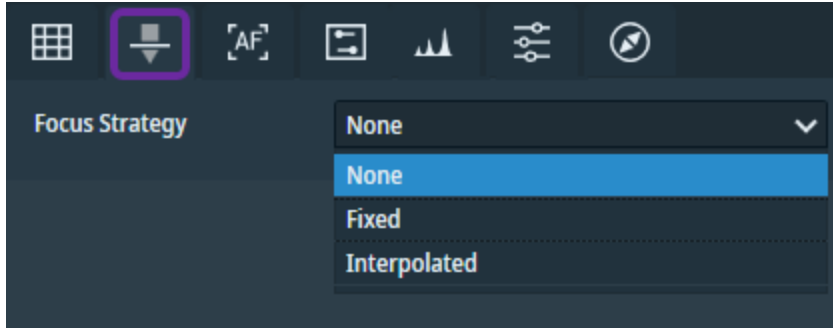
Tile Set Tab, Basic Tab Overview (Continued)

Control	Description
Elapsed acquisition time	Displays the actual elapsed acquisition time.
From Microscope	Applies the current microscope settings to the tile set.
To Microscope	<p>Applies the tile set settings to the microscope. In some instances, this operation might require additional time to process as shown in the dialog below:</p> 

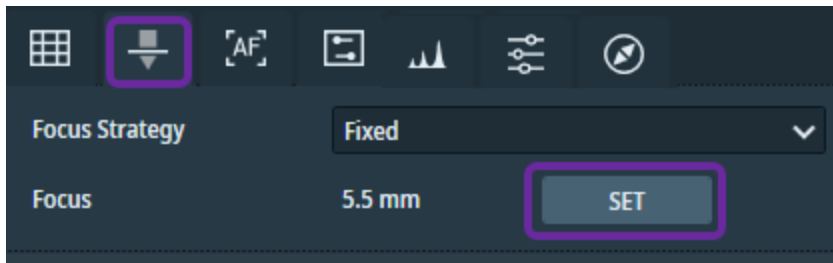
Focus tab

Select the Focus Strategy to focus the electron beam to produce a sharp image.

- **None:** The application does not touch the focus at all.



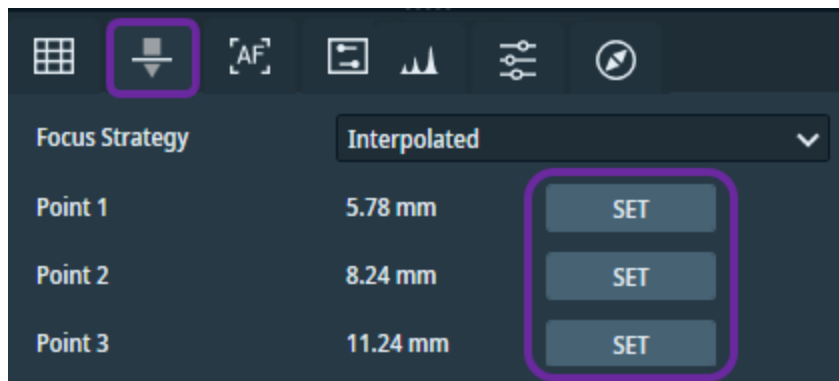
- **Fixed:** Uses the same focus for every tile.



To set the fixed focus:

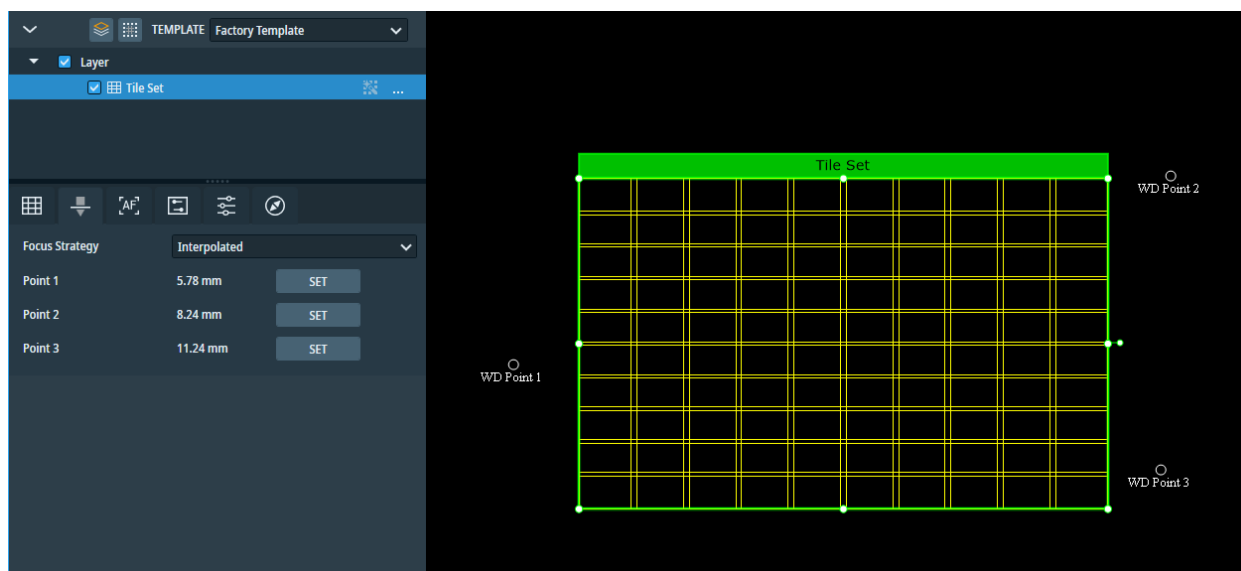
1. In the microscope, navigate to the sample location and manually focus the image.
2. Click **Set** to retain the working distance in the tile set.

- **Interpolated:** Select three focus points on the sample. The focus plane is then defined by these points. Each tile's focus is set based on where it is located in this plane.

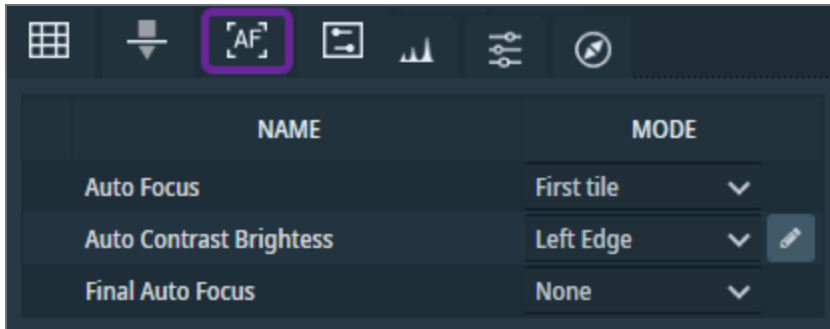


To set up the interpolated focus:

1. Navigate to the first location.
2. Manually focus the image.
3. When the image is in focus, click **Set**. The focus is retained for Point 1.
4. Repeat steps 1-3 for Point 2 and then for Point 3. Once all three points are set, the tiles are ready to be acquired.
5. Choosing points that are at opposite ends of the sample is important to get the best results.
6. Position of the points is visible in the viewer when the tile set is selected:



Autofunction tab



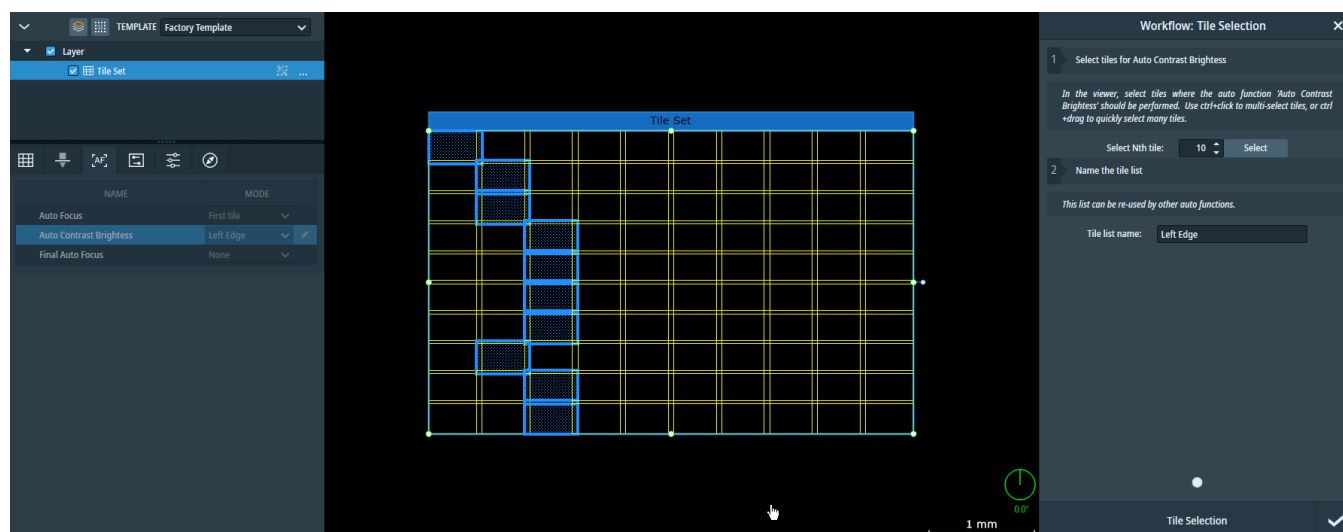
Autofunction	Description
Auto Focus	Focuses the electron beam to produce a sharp image
Auto Contrast Brightness	Optimizes the contrast and brightness of the image
Final Auto Focus	Performs on the last focus optimization

Set autofunctions

1. Select the autofunctions to use during acquisition.
2. In the **Mode** combo box, select the mode in which the autofunction should be performed. Available modes include the following:
 - **None**: The autofunction is not used.
 - **Every tile**: The autofunction is run *locally* at every tile.
 - **First tile**: The autofunction is run *once* at the first tile before the acquisition.
 - **Custom tile list...**: The autofunction is run over specified list of tiles. Select this option to create a new list.

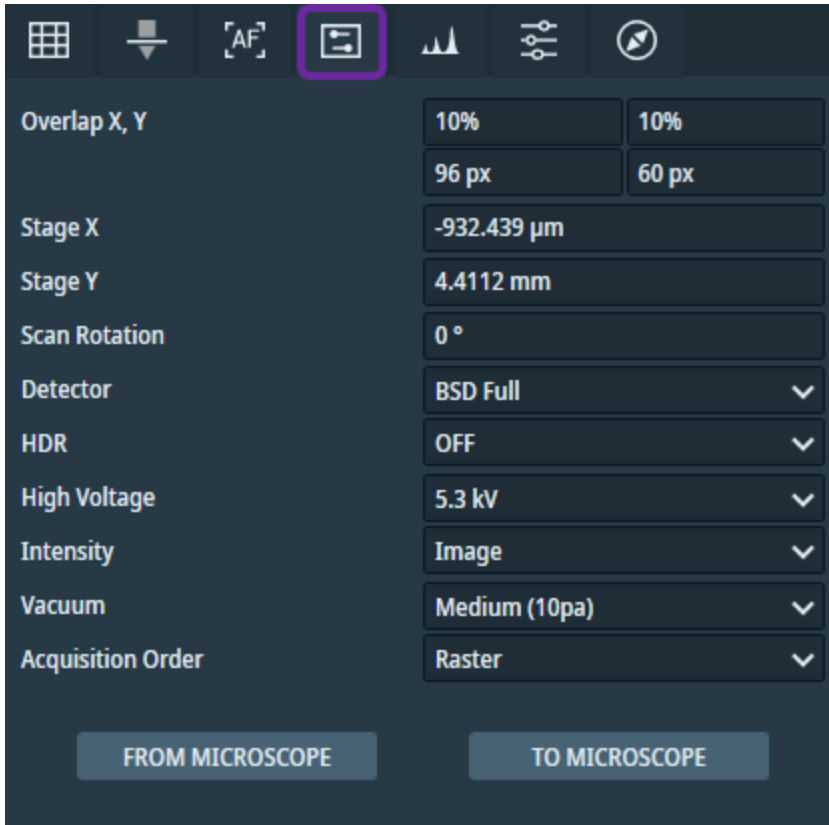
Create a custom tile list

Click **Custom tile list** option and the selection workflow panel opens and displays instructions to guide you. In the viewer, select tiles where the autofunction should be performed and name the new list. You can use the **Select Nth tile** option in the right panel to quickly select tiles at the selected Nth interval. You can finish the selection with closing the workflow panel or with leaving the autofunction tab. The new list is inserted to the mode combo box and can be re-used by other autofunctions in this tile set. Use the **edit** button if you need to further edit any tile selection.



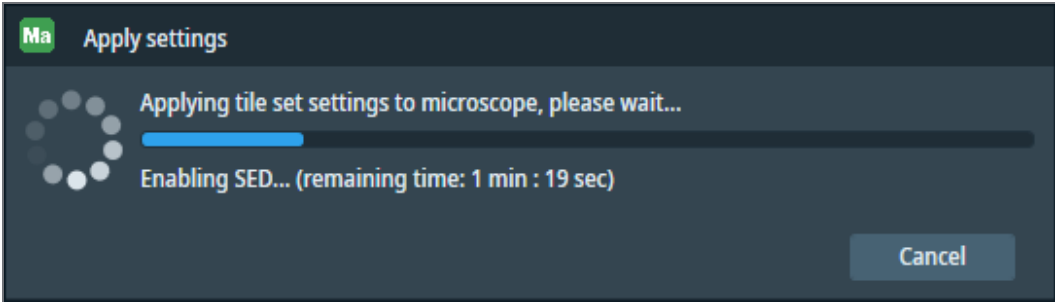
Advanced tab

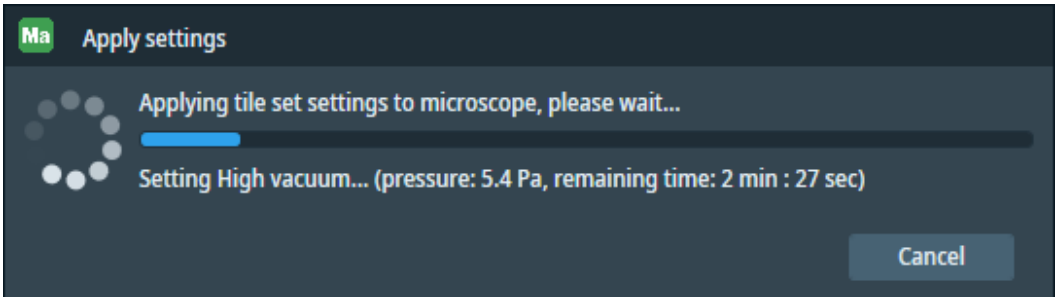
Use the controls on this tab to set advanced tile acquisition properties for each tile set.

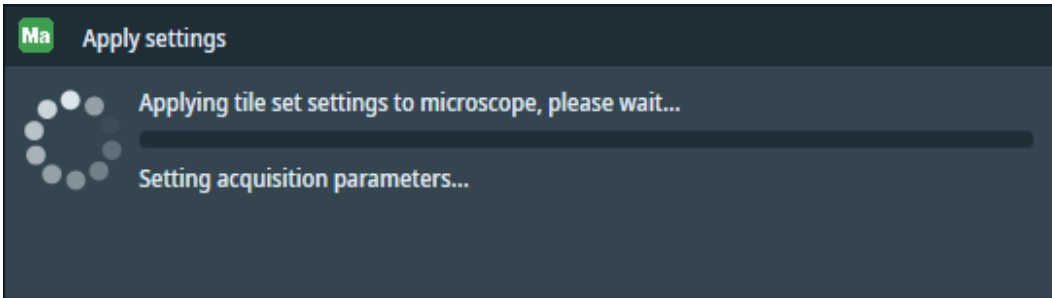


Tile Set Tab, Advanced Tab Overview

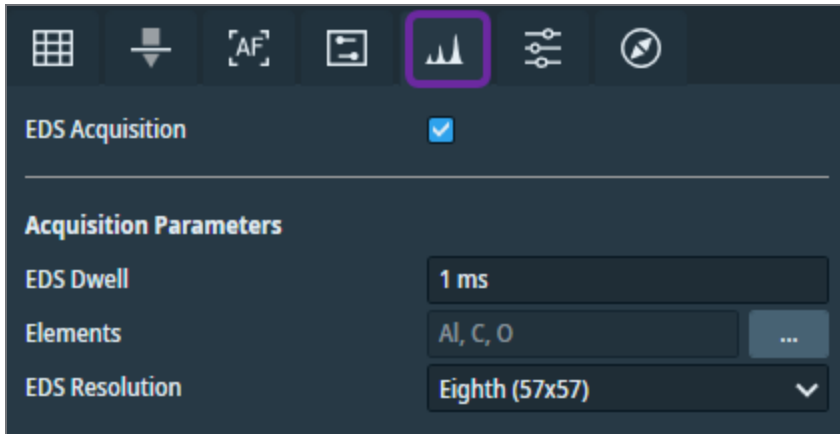
Control	Description
Overlap X, Y	Displays the percentage of overlap between tiles in the tile set, as well as the pixels.
Stage X	Sets the X stage location of the center of the tile grid.
Stage Y	Sets the Y stage location of the center of the tile grid.
Scan Rotation	Allows manual adjustment of scan rotation for a tile set. Either enter a value in the edit box here, or rotate the tile set in the viewer to update the scan rotation value.

Tile Set Tab, Advanced Tab Overview (Continued)	
Control	Description
Detector	<p>Selects the detector for the acquisition. Available detectors may be different for different microscopes.</p> <p><i>Note: The SED detector requires High vacuum. If the SED detector is selected, then the vacuum control is set to High and deactivated.</i></p> <p>Activation of the SED detector might need some time, and the Maps application must wait for the activation while the tile set settings are applied to the microscope. During this waiting period, an estimate of remaining time is displayed in the progress dialog.</p>  <p><i>Note: You can abort the SED activation by clicking Cancel. When aborted, the SED detector is not set in the microscope.</i></p>
HDR	<p>Specifies whether HDR (High Dynamic Range) should be applied to images.</p> <p><i>Note: If HDR is applied, it also sets the image format to 16-bit.</i></p>
High Voltage	<p>Sets the high voltage setting. Select a value from the list of presets, or enter a custom value.</p> <p>The preset options are:</p> <ul style="list-style-type: none"> • 5 kV • 10 kV • 15 kV • 20 kV

Tile Set Tab, Advanced Tab Overview (Continued)	
Control	Description
Intensity	<p>Sets beam intensity. Select a value from the list of preset values, or enter a custom value.</p> <p>The preset options are:</p> <ul style="list-style-type: none"> • Low (2.1) • Image (3.3) • Point (4.3) • Map (5.1)
Vacuum	<p>Specifies the required vacuum pressure during acquisition.</p> <p>Options are:</p> <ul style="list-style-type: none"> • High: 0.1 Pa or 1.0 Pa (according to the specification of the connected Phenom microscope) • Medium (10 Pa) • Low (60 Pa) <p>If the tile set settings are applied to a microscope, then the microscope might need some time to reach the required pressure. The Maps application waits until the pressure level stabilizes. During this waiting period, current pressure and an estimate of remaining time are displayed in the progress dialog.</p>  <p><i>Note: If you need to abort the waiting period for the pressure stabilization, click Cancel.</i></p>

Tile Set Tab, Advanced Tab Overview (Continued)	
Control	Description
Acquisition Order	<p>Determines the order in which the contained tiles are acquired.</p> <p>Options are:</p> <ul style="list-style-type: none"> • Raster: Left to right, then top to bottom. • Serpentine: Alternating left to right pattern per row, running top to bottom. • Spiral In: Iterating over tiles in a clockwise pattern starting with the outer most tiles moving inward. • Spiral Out: Iterating over tiles in a clockwise pattern starting with the inner most tiles moving outward.
From Microscope	Applies the current microscope setting to the tile set.
To Microscope	<p>Applies the tile set settings to the microscope. In some instances, this operation might require additional time to process as shown in the dialog below:</p> 

EDS tab



EDS Tab Overview	
Control	Description
EDS Acquisition (checkbox)	When selected, activates the acquisition of X-ray spectrums that are processed into separate element channels.
EDS Dwell	<p>Sets the minimum time to acquire X-rays per tile.</p> <p>Values between 1 millisecond and 10 seconds are allowed.</p>
Elements	<p>Defines the elements that will be processed from the acquired spectrum. A color channel will be added for each element that you select:</p> <div> </div> <p>You can use the color picker as needed to change the colors in the right column, but the defaults are shared between the Phenom user interface and the Maps software application.</p> <p>If additional elements are added after the acquisition is finished, the spectrum will be reprocessed and channels will be added for each of the additional elements. Note that any elements that you deselect will have their channels deactivated, but they will remain in the layer tree unless you manually delete them.</p> <p>See Element Selector for more information.</p>

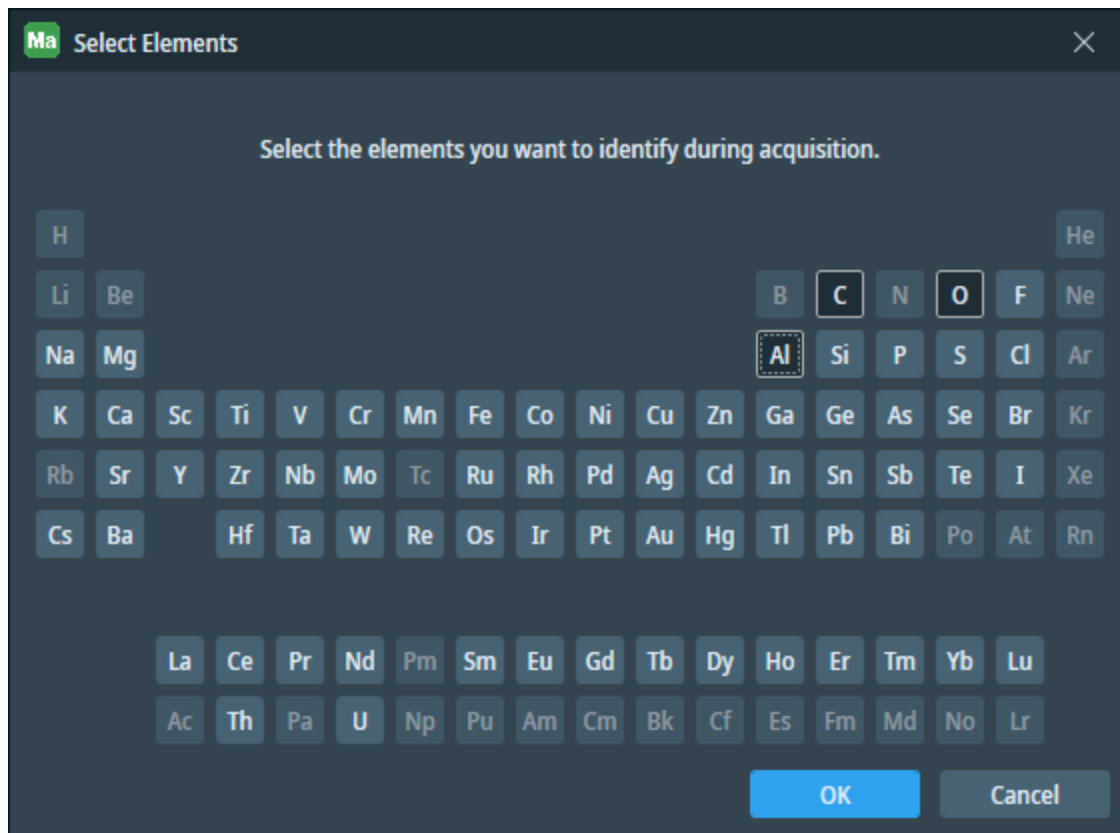
EDS Tab Overview (Continued)

Control	Description
EDS Resolution	Sets the resolution of the EDS map, this is directly proportional to the tile set resolution

Element Selector

To select the elements that you want to identify during acquisition, do the following:

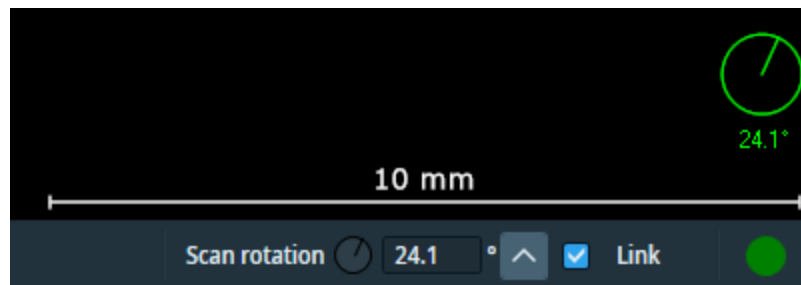
1. To open the Element Selector, go to the **Elements** field and click the ellipsis icon  next to it.




2. Once the Select Elements screen opens, click the individual element buttons to select your desired elements. Each of your selected elements will have a color channel associated with it.

Phenom Scan Rotation

This function rotates the scan and aligns the image. It has no effect on the stage movements and is solely a scan function, but is used to orient the image relative to the detector direction.

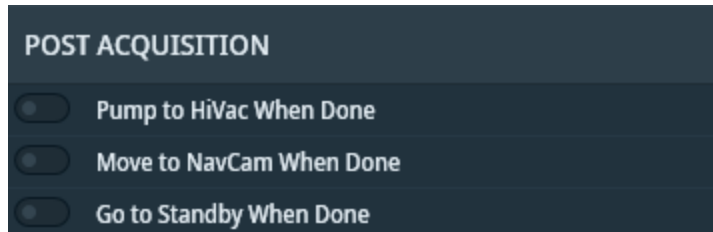


Scan Rotation Descriptions, Phenom

Control	Description
Scan rotation	Displays and controls the current scan rotation in the microscope. Click the up arrow  to assign the viewer rotation value to the scan rotation text box.
Link	Select the Link checkbox to link the scan rotation with the viewer rotation. When linked, changes to the scan rotation angle automatically rotate the viewer and vice versa. This is indicated by the <i>green</i> rotational dial in the main viewer. When unlinked, the rotational dial is white.

Phenom Post-Acquisition Actions

This section describes the post-acquisition actions for Phenom microscopes.



The table below contains the post-acquisition actions. You can activate any combination of these actions or all of them depending on your use case. If you activate all of them, then the Maps application performs them in the following order: Pump to HiVac When Done, Move to NacCam When Done, Go to Standby When Done.

Post-Acquisition Actions	
Control	Description
Pump to HiVac When Done	Returns the microscope to HiVac mode after all jobs are completed. Select this action This can be useful if you used LowVac or MedVac mode for the acquisition.
Move to NavCam When Done	Moves the sample to the NavCam after all jobs are completed.
Go to Standby When Done	Puts the microscope in the standby operational state after all jobs are completed.

TEM

This section describes user interface elements and procedures that are specific to the TEM, EFTEM, and STEM modes on TEM systems.

Topics include:

- [TEM User Interface Elements](#)

- [Define a Tile Set for TEM](#)

- [TEM Tiling Corrections](#)

- [Tiling Corrections Quality](#)

- [Magnification Alignment](#)

- [Use Interpolated Focus Method](#)

- [STEM Acquisition with Multiple Detectors](#)

- [STEM Intermediate Images](#)

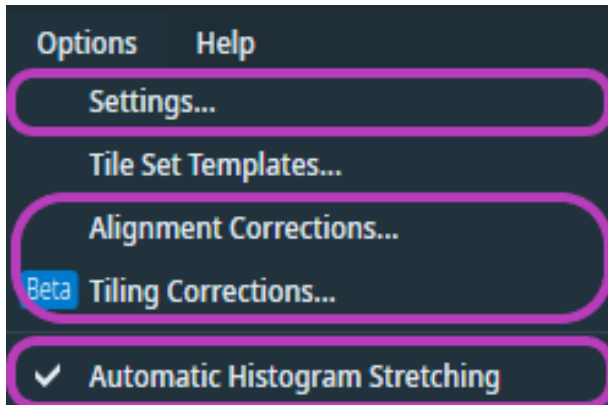
- [Automated Image Filtering](#)

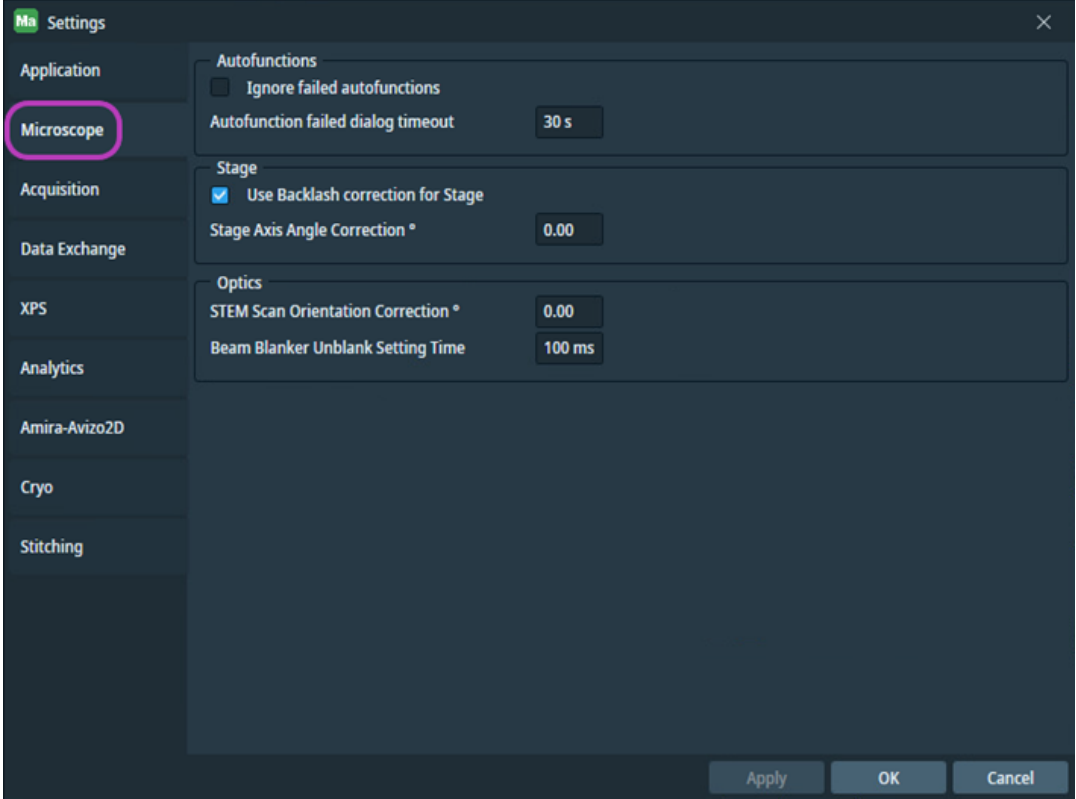
- [TEM Analytics](#)

TEM User Interface Elements

TEM Options Menu

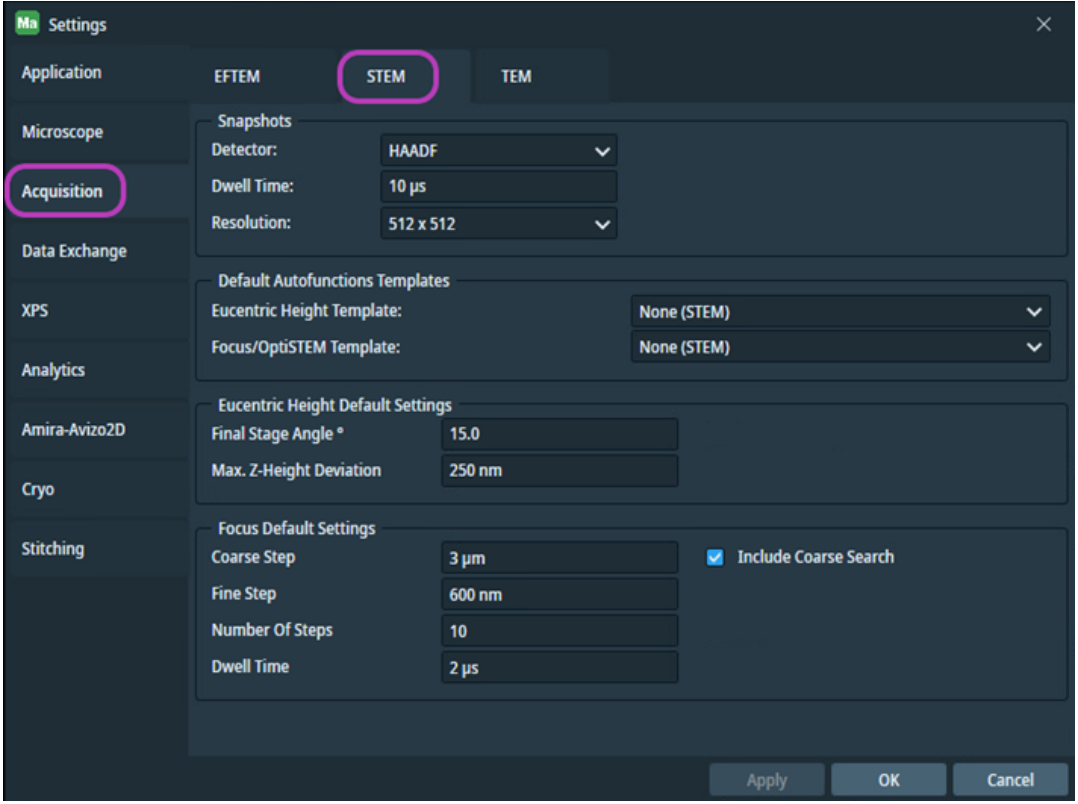
- For descriptions of common selections to all systems, see [Options menu](#).
- For descriptions of TEM-specific selections outlined in purple, see the table below. Note that microscope settings are system specific.

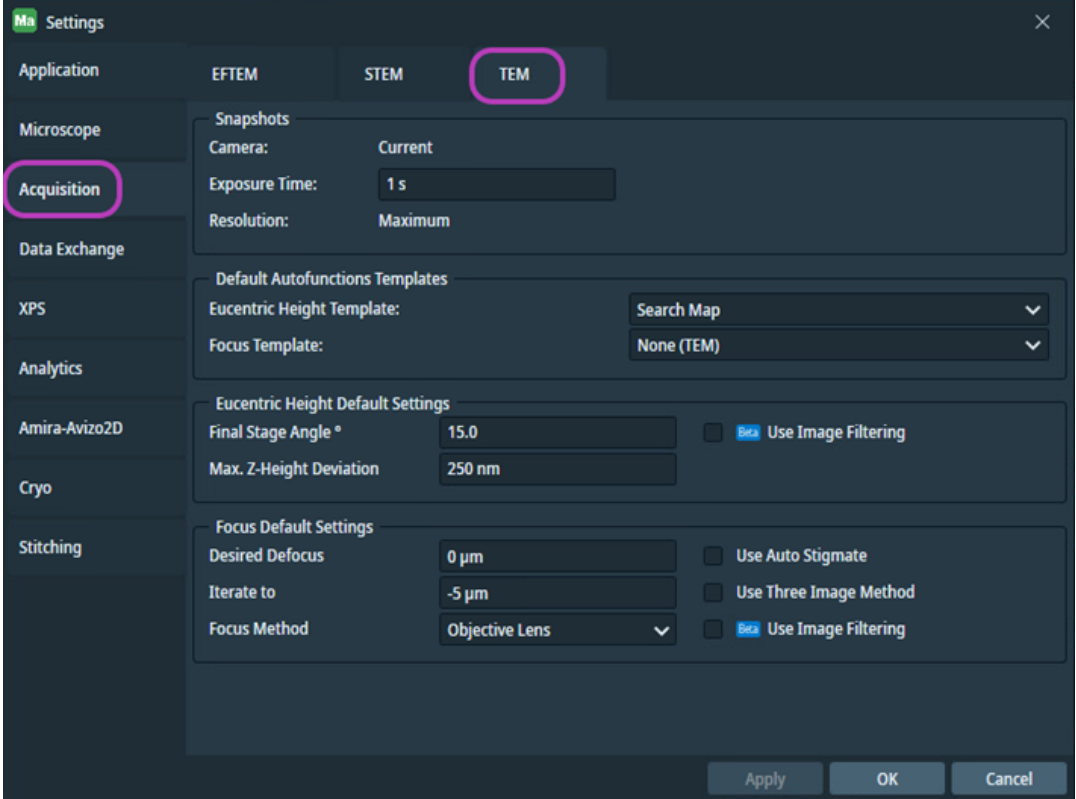


Options Menu Overview	
Menu Selection	Description
Microscope Settings	 <p>The screenshot shows a 'Settings' dialog box with a sidebar on the left containing menu items: Application, Microscope (highlighted with a pink circle), Acquisition, Data Exchange, XPS, Analytics, Amira-Avizo2D, Cryo, and Stitching. The main panel is divided into three sections: 'Autofunctions' with a checkbox for 'Ignore failed autofunctions' and a text field for 'Autofunction failed dialog timeout' set to '30 s'; 'Stage' with a checked checkbox for 'Use Backlash correction for Stage' and a text field for 'Stage Axis Angle Correction °' set to '0.00'; and 'Optics' with text fields for 'STEM Scan Orientation Correction °' set to '0.00' and 'Beam Blanker Unblank Setting Time' set to '100 ms'. At the bottom right are 'Apply', 'OK', and 'Cancel' buttons.</p> <p>Autofunction settings:</p> <ul style="list-style-type: none"> • Ignore failed autofunctions: When you select this check box, the autofunction errors during tile set acquisition are ignored and the tile set acquisition automatically continues without an error dialog. If desired, you can view failed autofunction errors within the TEM Notification Panel. They are listed as pipeline warning messages. • Autofunction failed dialog timeout: When you deselect the Ignore autofunction errors option under Settings >> Microscope, this option specifies the timeout period for automatically closing the autofunction error dialog. Tile set acquisition continues after the error dialog closes. You can modify the default value in the text field if desired.

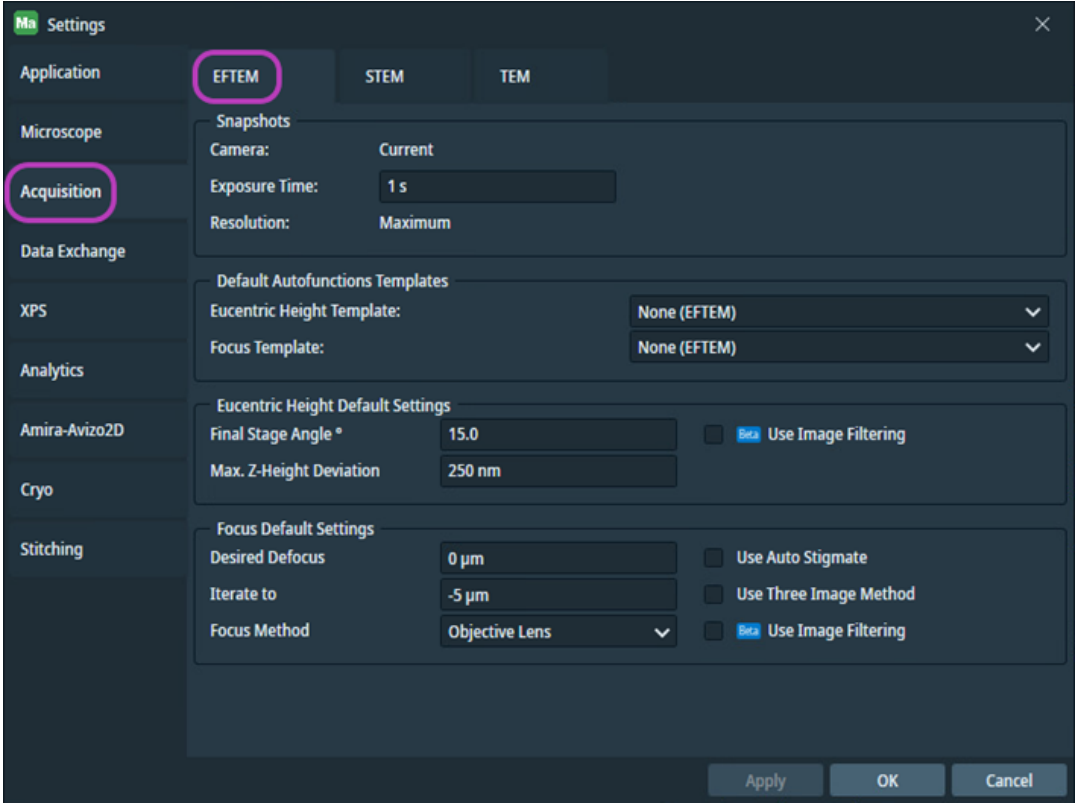
Options Menu Overview(Continued)	
Menu Selection	Description
	<p>Stage settings:</p> <ul style="list-style-type: none"> • Use Backlash correction for Stage: When this check box is selected (default), stage moves are more accurate because the moves are performed in a way to reduce backlash and wind-up effects. Usually there is no need to turn this correction off, and this switch is mostly used for diagnostics. One might consider temporarily turning off the correction to speed up low-magnification overviews (at the cost of accuracy) as the corrected move takes a bit longer. • Stage Axis Angle Correction: This is a small correction angle that allows for compensating for mechanical imperfections, if present, in the orthogonality between the X and Y axis of the stage. The default value is 0. Only adjust this value if there is a recurring, significant misalignment between tiles in TEM and STEM modes.
	<p>Optics settings:</p> <ul style="list-style-type: none"> • STEM Scan Orientation Correction: This is a small correction angle for compensating imperfections in the calibration of the STEM scan rotation. The default value is 0. Only adjust this value if there is a significant systematic misalignment between tiles in STEM mode. • Beam Blanker Unblank Setting Time: After blanking or unblanking the beam, it takes a short time for the optics to settle. The default values are sufficient for most systems, but on Tecnai systems without a fast beam blanker, a value of 1-3 seconds is recommended. An insufficient setting time manifests itself only in STEM mode, resulting in tile images where the top part starts out black and unstable.

Options Menu Overview(Continued)

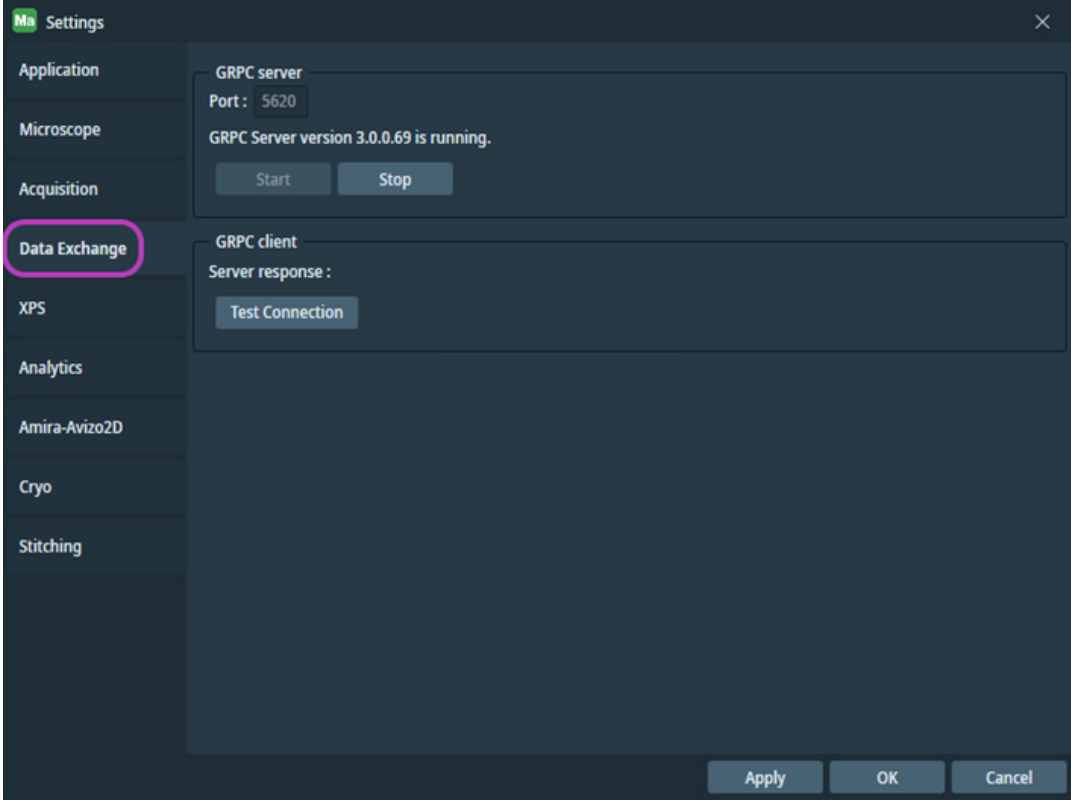
Menu Selection	Description
<p>Acquisition Settings (STEM Mode)</p>	<p>STEM Mode</p> <p>Displays the Detector, Dwell Time, and Resolution Settings to be used for acquisitions of snapshot images when in STEM mode. This screen also displays the Default Autofunctions Templates. These dropdown menus enable you to select a template for autofunctions with default imaging parameters that differ from the imaging parameters of tile images. See the TEM Default Autofunction Templates for details.</p> <p>The default settings for Eucentric Template and Focus Template contain default autofunction parameters for new tile sets.</p> 

Options Menu Overview(Continued)	
Menu Selection	Description
Acquisition Settings (TEM Mode)	<p>TEM Mode</p> <p>Selects the Exposure Time to use for the acquisition of snapshot images. Snapshots are always acquired with the maximum camera resolution, such as binning 1. This screen also displays the Default Autofunctions Templates. These dropdown menus enable you to select a template for autofunctions with default imaging parameters that differ from the imaging parameters of tile images. See the TEM Default Autofunction Templates for details.</p> <p>The default settings for Eucentric Template and Focus Template contain default autofunction parameters for new tile sets.</p> 

Options Menu Overview(Continued)

Menu Selection	Description
<p>Acquisition Settings (EFTEM Mode)</p>	<p>EFTEM Mode</p> <p>Selects the Exposure Time to use for the acquisition of snapshot images. Snapshots are always acquired with the maximum camera resolution, such as binning 1. This screen also displays the Default Autofunctions Templates. These dropdown menus enable you to select a template for autofunctions with default imaging parameters that differ from the imaging parameters of tile images. See the TEM Default Autofunction Templates for details.</p> <p>The default settings for Eucentric Template and Focus Template contain default autofunction parameters for new tile sets.</p> 

Options Menu Overview(Continued)

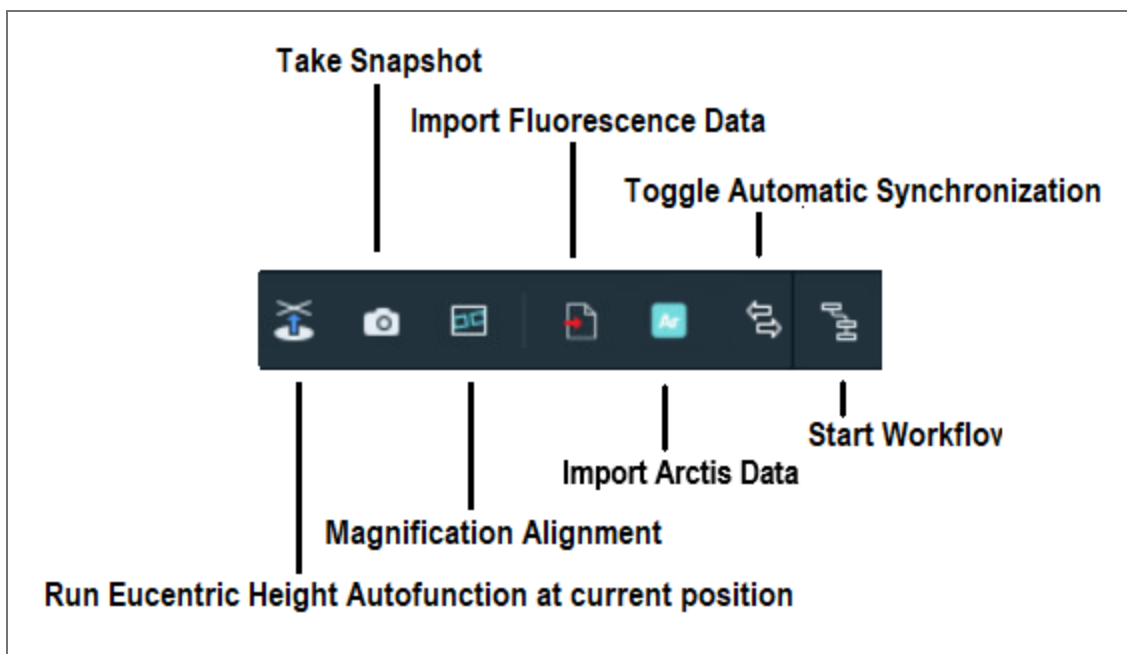
Menu Selection	Description
<p>Data Exchange Settings</p>	 <p>GRPC server:</p> <ul style="list-style-type: none"> • Port: Shows the port number that the clients use to communicate with the server. This is used for diagnostics purposes, in case there is a conflict with another GRPC-based server. • Server status: Shows the current version and status of the server. Possible states are Not installed, Running, Stopped. • Start: Starts the server if it is not running. The server must be installed. • Stop: Stops the server.

Options Menu Overview(Continued)	
Menu Selection	Description
	<p>GRPC client:</p> <ul style="list-style-type: none"> • Server response: Shows the response from the server when the connection test is in progress. Shows the result of the test when the test is complete. • Test Connection: Tests the connection to the server while the server is running. This connection test is used for diagnostics purposes. It performs actions that Maps client does when connecting to the server and shows the result of each of the actions.
Tile Set Templates...	On TEM, you cannot edit custom tile set templates. See Tile Set Templates for full template instructions.
Alignment Corrections...	Displays the corrections that currently apply for metrology analysis.
Tiling Corrections...	Shows dialog with the list of tiling corrections that are currently available. See TEM Tiling Corrections topic for more details.
Automatic Histogram Stretching	Automatically equalizes the minimum and maximum of associated tile set histograms during acquisition.

TEM Toolbar, Right Side

See [Left Side, All Systems](#) for common selections to SEM/SDB systems.

Toolbar, right side, TEM, EFTEM, STEM modes



Toolbar TEM, EFTEM, STEM mode Descriptions	
Tool	Description
Run Eucentric Height autofunction at current position	Runs Eucentric Height autofunction at current stage position. Default autofunction template for Eucentric Height autofunction will be used to set acquisition parameters on the microscope. Click Stop to cancel operation.
Take Snapshot	Acquires an image at the current stage position and magnification and places it on the Maps viewer as a snapshot image. See TEM Options Menu .
Magnification Alignment	Aligns tile sets from one magnification to another to correct small shifts. See Magnification Alignment .
Import Fluorescence Data	Opens dialog where fluorescence data from optical microscope can be selected and imported to the current Maps project. <i>Note: Requires Cryo features to be activated within the Settings.</i>

Toolbar TEM, EFTEM, STEM mode Descriptions(Continued)

Tool	Description
Import Arctis Data	Opens a dialog for you to select and import Arctis data into the current Maps project. See Import and view Arctis data . <i>Note: Requires Cryo features to be activated within the Settings.</i>
Toggle Automatic Synchronization	Toggles automatic synchronization of data with Tomography ON and OFF. <i>Note: Requires Thermo Scientific Maps Data Exchange Service to be installed and running.</i>
Start Workflow	Opens workflow selection dialog, from where specific alignment workflow can be started.

TEM Tile Set Tab

Basic group, TEM and EFTEM modes



The screenshot shows the TEM Tile Set Tab interface. The top toolbar contains several icons, with the grid icon highlighted by a purple box. The main panel displays the following configuration settings:

- Name:** Tile Set (2)
- Tile Set Type:** TEM
- Camera:** BM-Ceta
- Tiles X, Y:** 3 x 3
- Overlap X, Y:** 20% x 20%
- Tile HFW:** 10.0251 μm
- Total Area:** 26.1 μm x 26.1 μm
- Resolution:** 4096 x 4096
- Magnification:** SA 3800 x
- Pixel Size:** 2.5063 nm
- Exposure Time:** 1 s

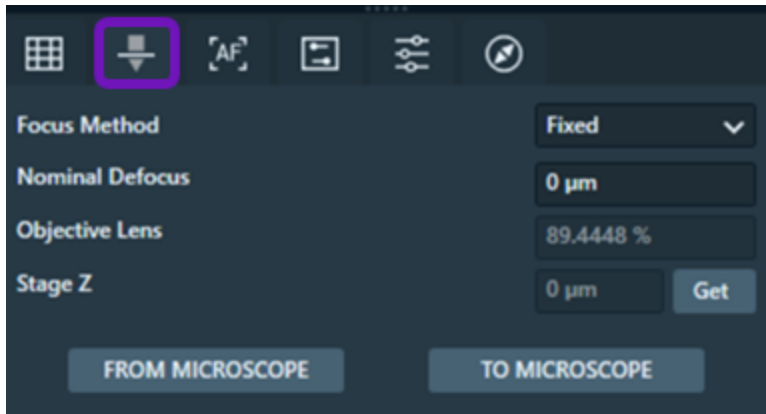
At the bottom, there are two buttons: "FROM MICROSCOPE" and "TO MICROSCOPE". The status bar at the bottom indicates "0 of 0 tiles acquired; 19.48 KB".

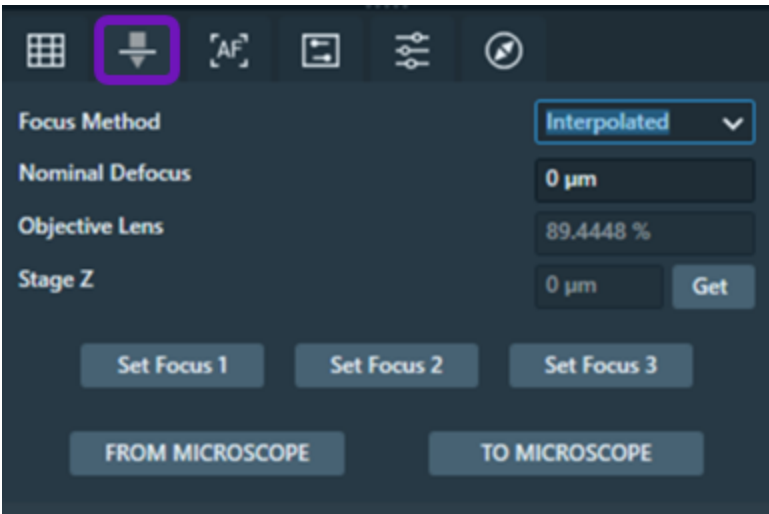
Tile Set Tab, TEM and EFTEM Modes, Basic Group Overview	
Control	Description
Name	Displays the name of the current tile set.
Tile Set Type	Indicates that the acquisition mode for this tile set is TEM, EFTEM, or STEM.
Camera	Selects the camera to use for the acquisition of tile images. Unsupported cameras are also listed and indicated in the camera dropdown list. These unsupported cameras may work with Maps, but compatibility is not guaranteed.
Tiles X, Y	Sets the number of tiles in the X and Y directions.
Overlap X, Y	Displays the percentage of overlap between tiles in the tile set as well as the pixels.
Tile HFW	For TEM, this is not editable. It is determined by the magnification, camera, and other optical settings.
Total Area	Displays the total HFW for all of the tiles.
Grid Squares Mask	Selects the detected grid layer to apply as a mask for the current layer.
Resolution	Specifies the image resolution. The choices are specific to each system type.
Magnification	Selects the magnification to use for the acquisition of the tile images
Pixel Size	Displays the physical size of a single pixel at the current acquisition settings. This is based on Tile HFW and Resolution.
Exposure Time	Specifies the exposure time on the camera for each tile acquisition.
Number of Tiles Acquired	Displays the number of tiles and the total disk space required to acquire the current tile set. A message appears if there is not enough space on disk for the acquisition.
From Microscope	Reads the current optical settings from the microscope and stores them in the acquisition settings of the selected tile set.
To Microscope	Sets the optical parameters of the acquisition settings of the selected tile set to the microscope.

i **Note:** From Microscope/To Microscope controls:

- Camera settings are not read from or written to the microscope; camera settings only apply during acquisition.
- Not all the optical acquisition settings can be edited directly. Some optical acquisition settings require clicking **From Microscope** to update the values.

Focus group, TEM and EFTEM modes

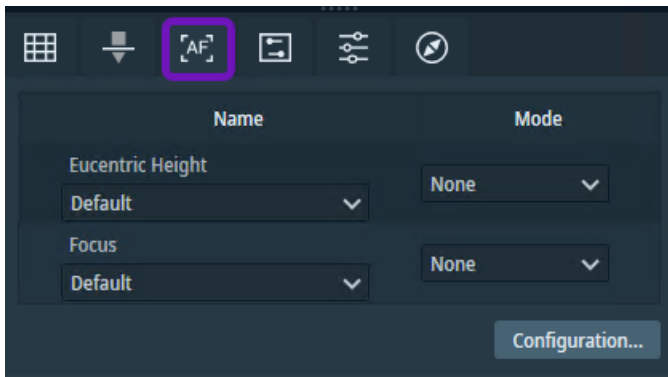


Tile Set Tab, TEM and EFTEM Modes, Focus Group Overview	
Control	Description
Focus Method	<p>Specifies whether the tile set is acquired with specific focus settings or none at all. The options are:</p> <ul style="list-style-type: none"> • None: The focus on the microscope is left as-is. • Fixed: The tile set is acquired at a fixed focus value to be stored in the tile set with the From Microscope button plus an optional relative Defocus for contrast formation. • Interpolated: You select three focus points on the sample and a focus plane is defined by these points. Each tile focus is set based on where it is located in this plane. See Use Interpolated Focus Method to perform the interpolated focus method procedure. 
Nominal Defocus	<p>When Focus Method is set to Fixed, specifies the amount of relative defocus to apply when acquiring the tiles.</p> <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <p>Note: Sets the focus to the microscope, not the defocus. The defocus is only applied during acquisition as a relative value on top of the Focus setting that was stored with the tile set.</p> </div>
Objective Lens	<p>When the Focus Method is set to Fixed, this is the objective lens strength setting to apply when acquiring the tile set. To update this value, click From Microscope.</p>
Stage Z	<p>When Focus Method is set to Fixed, specifies the Z coordinate at which the tile set is acquired.</p> <p>Click the check box to retrieve the current value from the instrument.</p>

Tile Set Tab, TEM and EFTEM Modes, Focus Group Overview (Continued)

Control	Description
From Microscope	Reads the current optical settings from the microscope and stores them in the acquisition settings of the selected tile set.
To Microscope	Sets the optical parameters of the acquisition settings of the selected tile set to the microscope.

Autofunction group, TEM and EFTEM modes



Use the controls in this group to define the Eucentric Height and Focus autofunction parameters for each TEM tile set. The Eucentric Height autofunction parameters are initially set at the creation of the tile set and filled with the values of the selected template, or with the current values on the instrument if the default template is used. After creation of the tile set, click **From Microscope** to update the values to the current state on the microscope. Some settings can be entered directly. For each autofunction, for example, you can specify which tiles of the tile set to run the autofunction. The list of values is specific for each autofunction.

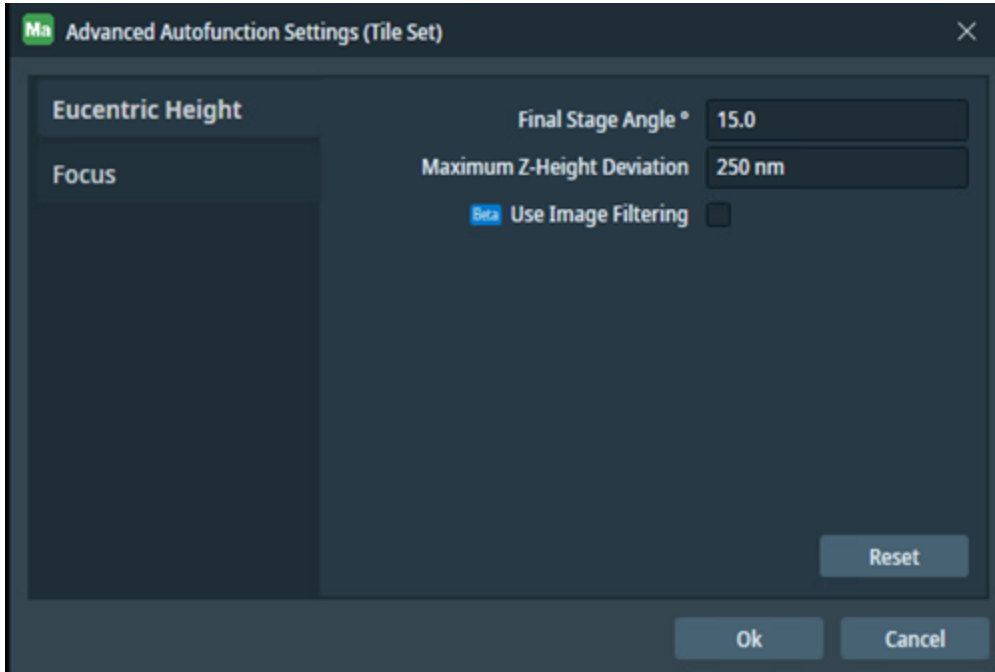
Tile Set Tab, TEM and EFTEM Modes, Autofunction Group Overview	
Control	Description
Name	<p>Available autofunctions are listed in this column.</p> <ul style="list-style-type: none"> • Eucentric Height: The Eucentric Height autofunction will adjust the sample height so that the sample can be tilted and the area of interest remains in the field of view. For the current tile set, you can select a custom autofunction template that is different from the default autofunction template. • Focus: The Focus autofunction will adjust the focus for a clear, sharp image. For the current tile set, you can select a custom autofunction template that is different from the default autofunction template. <p>For both autofunctions, the options are:</p> <ul style="list-style-type: none"> • The default autofunction template is the template that you defined under the Tile Set Templates settings. • The other options include a dynamic list of templates that you define as the user.

Tile Set Tab, TEM and EFTEM Modes, Autofunction Group Overview(Continued)

Control	Description
Mode	<p>Mode selection of the autofunction.</p> <div style="border: 1px solid #0070C0; padding: 10px; margin: 10px 0;"> <p>Note: For the Eucentric Height autofunction, only the <i>None</i> and <i>First Tile</i> modes are available.</p> </div> <p>Choices from the dropdown menu include the following:</p> <ul style="list-style-type: none"> • None: Autofunction does not run on the tile set. • First Tile: Autofunction runs only on the first tile within the tile set. • Every Tile: Autofunction runs on every tile within the tile set. • Custom Tile List: This allows you to select a custom collection of tiles where autofunction runs. Select your collection of tiles by pressing Ctrl+right-click, or by using the Select Nth tile option in the right panel. <div style="margin-top: 10px;"> </div>

Configure autofunctions

You can configure parameters for each autofunction by selecting **Autofunction**, and then clicking **Configuration** or the gear icon.



Tile Set Tab, TEM and EFTEM Modes, Autofunction Configuration

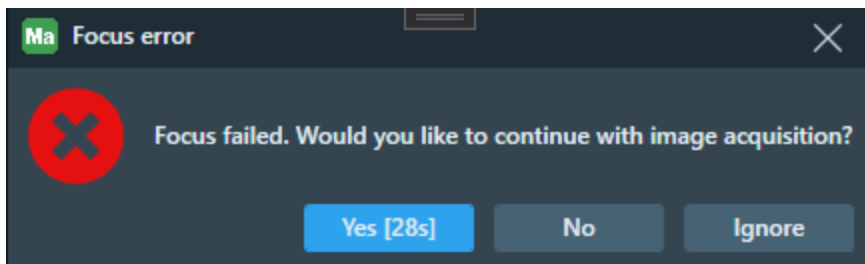
Autofunction	Control	Description
Eucentric Height	Final Stage Angle°	Specifies the final stage angle. The default value is set to 15.0 degrees and accepts values from 1.0 to 90.0 degrees.
	Maximum Z-Height Deviation	Specifies the maximum accepted Z-height difference measured between negative and positive final stage angles. The default value is set to 250 nm and it accepts values from 250 nm to 2 µm. Autofunction processes more quickly if you use a high value for this control, but the result will be less accurate.
	(Beta) Use Image Filtering	When activated, automatic image filtering is applied to cross-correlation algorithm.
Focus	Desired Defocus	Desired result of Focus Autofunction - expressed as a difference against optimal focus.
	Iterate to	Specific focus level to which Focus Autofunction iterates - expressed as a difference against optimal focus.

Tile Set Tab, TEM and EFTEM Modes, Autofunction Configuration (Continued)

Autofunction	Control	Description
	Focus Method	Method used to adjust current focus. Possible values are Objective Lens and Stage Z Height .
	Use Auto Stigmatate	When enabled, performs astigmatism correction.
	Use Three Image Method	When enabled, uses three image method to determine cross-correlation and peaks, as the function computes focus adjustment.
	(Beta) Use Image Filtering	When activated, automatic image filtering is applied to cross-correlation algorithm.

Autofunction error dialog

If you experience an autofunction error (and the **Ignore autofunction errors** option is not selected under Settings >> Microscope), then the following error dialog appears. This error dialog closes after the specified time (defined in the **Autofunction failed dialog timeout** option under Settings >> Microscope), and the tile set acquisition job continues.

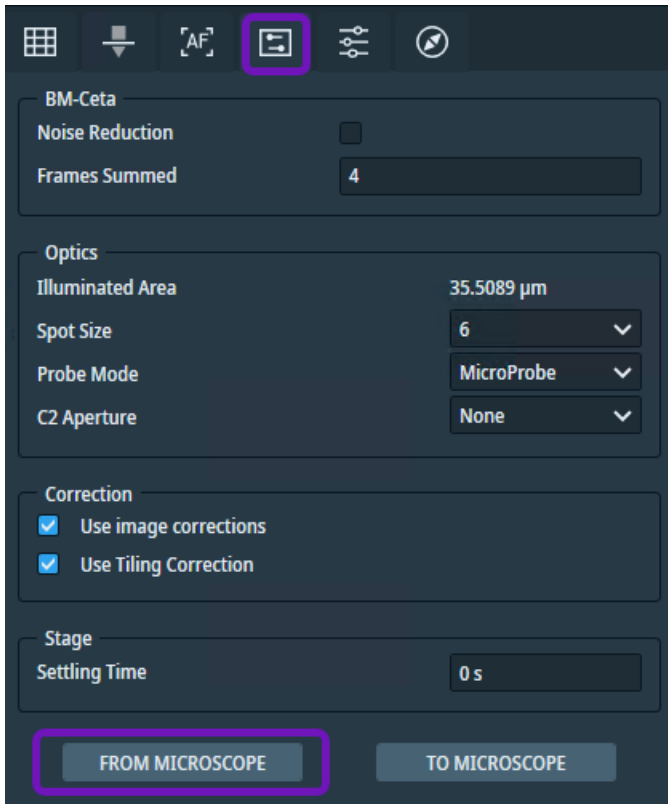


Choices include:

- **Yes {28s}**: Click to ignore the error dialog and continue with the image acquisition. The value in brackets indicates the total number of seconds required to perform the image acquisition.
- **Ignore**: Click to prevent these error dialogs from appearing in the future. If you opt to ignore future error dialogs, you can still view failed autofunction errors within the [TEM Notification Panel](#). They are listed as pipeline warning messages.
- **No**: Click to stop the acquisition job.


Advanced group, TEM mode

The advanced parameters are initially set at the creation of the tile set and filled with the settings of the selected template (or filled with the current settings on the system if the default template is used). After creation of the tile set, click **From Microscope** to update the settings to the current state on the instrument. For some settings, you can enter values directly into the user interface.



Tile Set Tab, TEM Mode, Advanced Group Overview

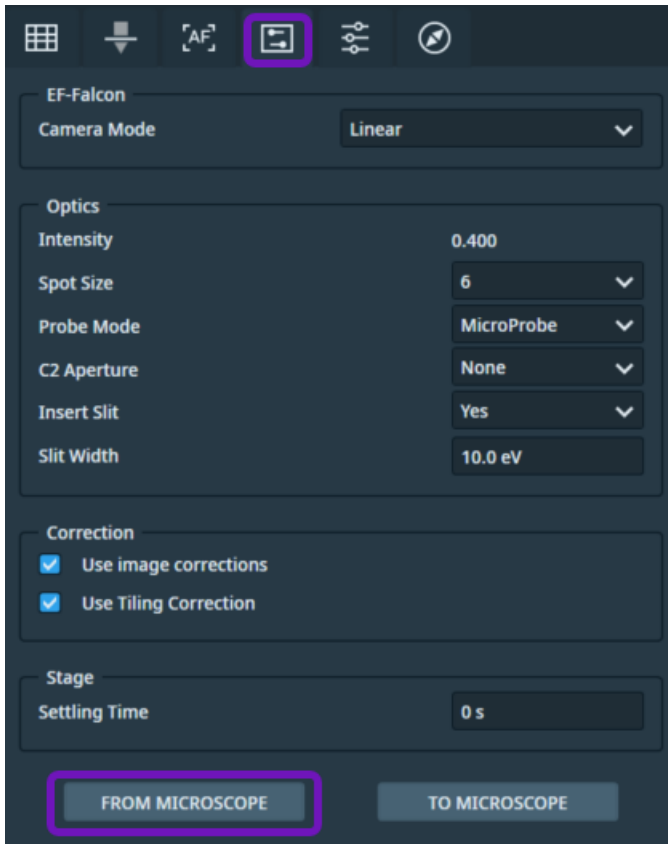
Control	Description
Noise Reduction	Specifies the Noise Reduction setting associated with the BM-Ceta camera. See the <i>Ceta 16M Application Instructions</i> for details.
Frames Summed	Specifies the Frames Summed setting associated with the BM-Ceta camera. See the <i>Ceta 16M Application Instructions</i> for details.
Illuminated Area	Specifies the beam intensity to use during the tile set acquisition.

Tile Set Tab, TEM Mode, Advanced Group Overview (Continued)	
Control	Description
Spot Size	Specifies the spot size to use during the tile set acquisition.
Probe Mode	Specifies the probe mode, such as the NanoProbe or MicroProbe, to use during the tile set acquisition.
C2 Aperture	Specifies the C2 aperture size to use during the tile set acquisition. Select a value to activate, or select None to deactivate.
Use image corrections	<p>When this setting is activated, a small image correction is applied to the acquired tile images resulting in improved tile set accuracy. Using this setting slightly affects the raw data recorded by Maps. If this result is undesired, turn off the image correction. This results is less accurate navigation.</p> <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <p> Note: When the correction is activated, the tiles are slightly smaller. Also, with the correction activated you can notice a small difference between the purple field-of-view rectangle and outline of the tiles.</p> </div>
Use Tiling Correction	When this setting is activated, tile alignment is corrected during acquisition according to a matching tiling correction. If matching correction is not available, then by default Maps performs an uncorrected acquisition. See TEM Tiling Corrections .
Settling Time	Specifies the duration of time in which acquisition is paused before each tile, which allows the stage to settle after moving to the target position.
From Microscope	Reads the current optical settings from the microscope and stores them in the acquisition settings of the selected tile set.

Tile Set Tab, TEM Mode, Advanced Group Overview (Continued)	
Control	Description
To Microscope	Sets the optical parameters of the acquisition settings of the selected tile set to the microscope.



Advanced group, EFTEM mode

The advanced parameters are initially set at the creation of the tile set and filled with the settings of the selected template (or filled with the current settings on the system if the default template is used). After creation of the tile set, click **From Microscope** to update the settings to the current state on the instrument. For some settings, you can enter values directly into the user interface.



Tile Set Tab, EFTEM Mode, Advanced Group Overview

Control	Description
Camera Mode	Specifies the Camera Mode setting associated with Falcon camera.
Intensity	Specifies the beam intensity to use during the tile set acquisition.
Spot Size	Specifies the spot size to use during the tile set acquisition.
Probe Mode	Specifies the probe mode, such as the NanoProbe or MicroProbe, to use during the tile set acquisition.

Tile Set Tab, EFTEM Mode, Advanced Group Overview (Continued)	
Control	Description
C2 Aperture	Specifies the C2 aperture size to use during the tile set acquisition. Select a value to activate, or select None to deactivate.
Insert Slit	When this setting is set to Yes , energy-selecting slit is inserted before tile set acquisition. When the value is set to No , energy-selecting slit is retracted before tile set acquisition.
Slit Width	Specifies the width of the energy-filtering slit. <div style="border: 1px solid blue; padding: 5px;"> <p> Note: This setting is applied only when the energy-filtering slit is set to be used for the acquisition (Insert Slit settings is set to Yes).</p> </div>
Use image corrections	When this setting is activated, a small image correction is applied to the acquired tile images resulting in improved tile set accuracy. Using this setting slightly affects the raw data recorded by Maps. If this result is undesired, turn off the image correction. This results is less accurate navigation. <div style="border: 1px solid blue; padding: 5px;"> <p> Note: When the correction is activated, the tiles are slightly smaller. Also, with the correction activated you can notice a small difference between the purple field-of-view rectangle and outline of the tiles.</p> </div>
Use Tiling Correction	When this setting is activated, tile alignment is corrected during acquisition according to a matching tiling correction. If matching correction is not available, then by default Maps performs an uncorrected acquisition. See TEM Tiling Corrections .
Settling Time	Duration for which acquisition is paused before each tile, to let the stage settle after moving to the target position.
From Microscope	Reads the current optical settings from the microscope and stores them in the acquisition settings of the selected tile set.
To Microscope	Sets the optical parameters of the acquisition settings of the selected tile set to the microscope.

STEM Tile Set Tab

Basic group, STEM mode

Name: Tile Set
 Tile Set Type: STEM
 Tiles X, Y: 3, 3
 Overlap X, Y: 20%, 20%
 Tile HFW: 9.7656 μm
 Total Area: 25.4 μm x 25.4 μm
 Mode: Nanoprobe
 Scan Field Of View: 10 μm
 Magnification: 10000x
 Resolution: 512 x 512
 Pixel Size: 19.5312 nm
 Dwell Time: 10 μs
 Scan Rotation $^{\circ}$: 0.00
 Selected Detectors: BF, DF2, DF4, HAADF
 Default Detector: HAADF
 Frame Time: 0:03
 0 of 9 tiles acquired; 18.24 MB
 FROM MICROSCOPE TO MICROSCOPE

Tile Set Tab, STEM Mode, Basic Group Overview	
Control	Description
Name	Displays the name of the current tile set.
Tile Set Type	Displays the microscope mode for the tile set, which is either STEM, TEM, or EFTEM (see TEM Tile Set Tab for TEM or EFTEM modes).
Tiles X, Y	Sets the number of tiles in the X and Y directions.
Overlap X, Y	Displays the percentage of overlap between tiles in the tile set as well as the pixels.
Tile HFW	For STEM, this is not editable. It is determined by the magnification, camera, and other optical settings.
Total Area	Displays the total HFW for all of the tiles.
Grid Squares Mask	Selects the detected grid layer to apply as a mask for the current layer.
Mode	Selects the probe mode of the beam: Microprobe, Nanoprobe, or LM. Note that to use LM STEM, it is strongly recommended to first enable LM STEM via the TEM User Interface.
Scan Field Of View	Defines the size of the scan area and magnification for the acquisition of each tile.
Resolution	Specifies the image resolution. The choices are specific to each system type.
Pixel Size	Displays the physical size of a single pixel at the current acquisition settings. This is based on Tile HFW and Resolution.
Dwell Time	Specifies the amount of time the beam dwells on each pixel when images are acquired.
Scan Rotation	Defines the orientation of the scanning, which determines the orientation of the image. The tile set orientation is adjusted accordingly. Typical use of this property is to line up the acquired images to a feature on the sample.
Selected Detectors	Specifies the detectors to use for the acquisition of tile images. You are required to select at least one detector. Choices depend on which detectors are available on the system.
Default Detector	Specifies the default detector for the acquisition. This detector is used for situations in which only one detector is required for acquisition such as within stitching and autofunctions. Choices only include the detector(s) that you selected for acquisition under Selected Detectors.
Frame Time	The estimated time for each tile acquisition.

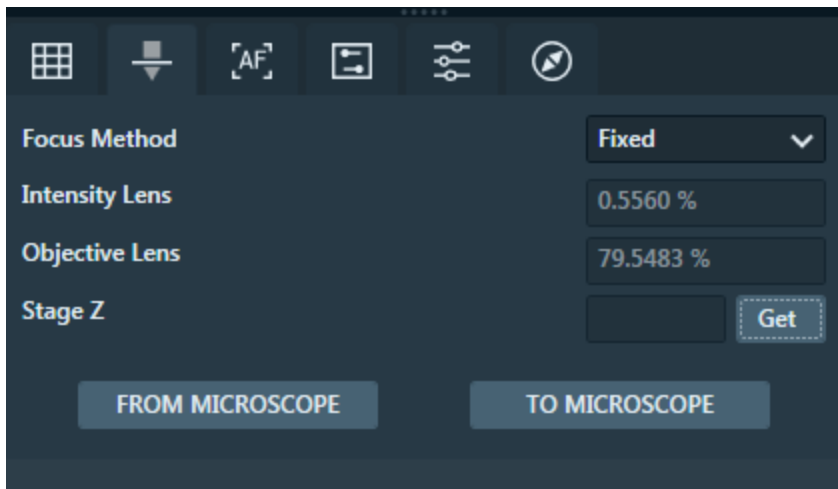
Tile Set Tab, STEM Mode, Basic Group Overview (Continued)

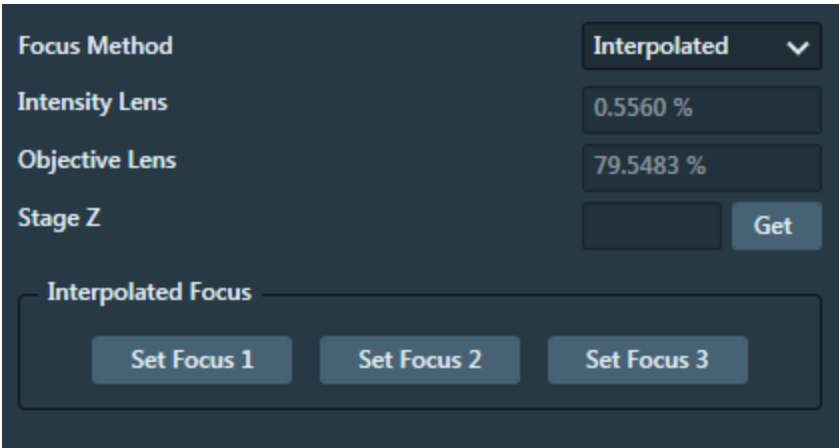
Control	Description
Number of Tiles Acquired	Displays the number of tiles and the total disk space required to acquire the current tile set. A message appears if there is not enough space on disk for the acquisition.
From Microscope	Reads the current optical settings from the microscope and stores them in the acquisition settings of the selected tile set.
To Microscope	Sets the optical parameters of the acquisition settings of the selected tile set to the microscope.

i **Note:** From Microscope/To Microscope controls:

- Camera settings are not read from or written to the microscope; camera settings only apply during acquisition.
- Not all the optical acquisition settings can be edited directly. Some optical acquisition settings require clicking **From Microscope** to update the values.

Focus group, STEM mode



Tile Set Tab, STEM Mode, Focus Group Overview	
Control	Description
Focus Method	<p>Specifies whether to acquire the tile set with specific focus settings or none at all. There the following options:</p> <ul style="list-style-type: none"> • None: The focus on the microscope is left as-is. • Fixed: The tile set is acquired at a fixed focus value to be stored in the tile set with the From Microscope button. • Interpolated: You select three focus points on the sample to define a focus plane. Each tile focus is set based on where it is located in this plane. See Use Interpolated Focus Method to perform the interpolated focus method procedure. 
Intensity Lens	When the Focus Method is set to Fixed , specifies the beam intensity percentage value at which the tile set is acquired. This lens focus setting is set during tile set acquisition. To update this value, click From Microscope .
Objective Lens	When the Focus Method is set to Fixed , specifies the objective lens percentage value at which the tile set is acquired. This objective lens setting is set during tile set acquisition. To update this value, click From Microscope .
Stage Z	When Focused Method is set to Fixed , specifies the Z coordinate at which the tile set is acquired.
From Microscope	Reads the current optical settings from the microscope and stores them in the acquisition settings of the selected tile set.
To Microscope	Sets the optical parameters of the acquisition settings of the selected tile set to the microscope.

Advanced group, STEM mode

Use the controls in this group to set advanced tile acquisition properties for each STEM tile set. The advanced parameters are initially set at the creation of the tile set and filled with the settings of the selected template or with the current settings on the instrument if the default template is used. After creation of the tile set, click **From Microscope** to update the settings to the current state on the microscope. Some settings can be entered directly.

The screenshot shows the following settings:

- Optics:** Spot Size is set to 8 (dropdown), Camera Length is 14 mm.
- Detectors:** A table with Gain and Offset values for different detectors.


	Gain	Offset
BF	50%	100%
DF2	34.3%	56%
DF4	53%	91%
HAADF	25%	50%
- Correction:** Use image corrections.
- Stage:** Settling Time is 0 s.

Buttons at the bottom: **FROM MICROSCOPE** (highlighted with a red box) and **TO MICROSCOPE**.

Tile Set Tab, STEM Mode, Advanced Group Overview

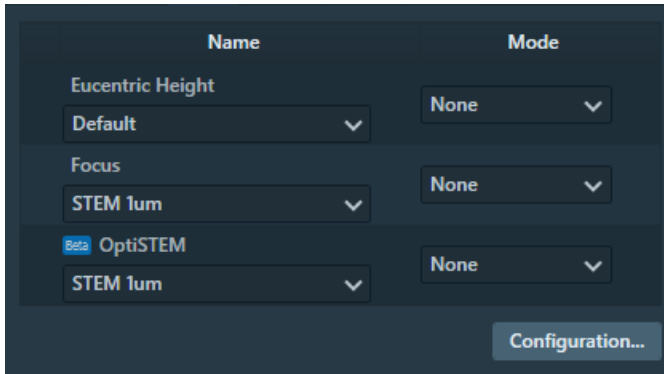
Control	Description
Spot Size	Specifies the spot size to use during the tile set acquisition.
Camera Length	Specifies the STEM camera length, which is typically used to tune the contrast of the images.

Tile Set Tab, STEM Mode, Advanced Group Overview (Continued)

Control	Description
Detectors	<p>Specifies the individual detector settings for the detectors available on the system. You can only change settings of the detectors selected for STEM acquisition.</p> <p>Choices for each detector include:</p> <ul style="list-style-type: none"> • Gain: Specifies the contrast setting of the detector, which represents the dynamic range of the detected signal (that is, it defines the amplification of the detector signal). • Offset: Specifies the brightness setting of the detector, which represents the null level of the detected signal (that is, it defines the offset of the detector signal).
Use image corrections	<p>When this setting is enabled, a small image correction is applied to the acquired tile images resulting in improved tile set accuracy. Using this setting slightly affects the raw data recorded by Maps. If this result is undesired, turn off the image correction (that is, at cost of slightly less accurate navigation).</p> <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <p> Note: When the correction is enabled, the tiles are slightly smaller. Also, with the correction enabled you can notice a small difference between the purple field-of-view rectangle and outline of the tiles.</p> </div>
Settling Time	Specifies the amount of time it takes for the stage to settle.
From Microscope	Reads the current optical settings from the microscope and stores them in the acquisition settings of the selected tile set.
To Microscope	Sets the optical parameters of the acquisition settings of the selected tile set to the microscope.

Autofunction group, STEM mode

Use the controls in this group to define the Eucentric Height and Focus autofunction parameters for each STEM tile set. The Eucentric Height autofunction parameters are initially set at the creation of the tile set and filled with the values of the selected template, or with the current values on the instrument if the default template is used. After creation of the tile set, click **From Microscope** to update the values to the current state on the microscope. Some settings can be entered directly. For each autofunction, for example, you can specify which tiles of the tile set to run the autofunction. The list of values is specific for each autofunction.



Tile Set Tab, STEM Mode, Autofunction

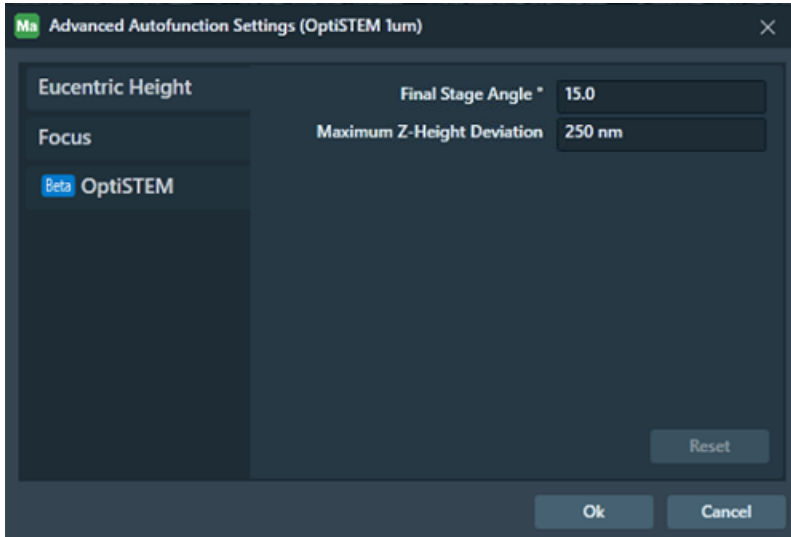
Control	Description
Name	<p>Available autofunctions are listed in this column.</p> <ul style="list-style-type: none"> • Eucentric Height: The Eucentric Height autofunction will adjust the sample height so that the sample can be tilted and the area of interest remains in the field of view. For the current tile set, you can select a custom autofunction template that is different from the default autofunction template. • Focus: The Focus autofunction will adjust the focus for a clear, sharp image. For the current tile set, you can select a custom autofunction template that is different from the default autofunction template. • (Beta) OptiSTEM: The OptiSTEM autofunction adjusts both the focus and condenser astigmatism (A1/C1). For the current tile set, you have the option to select a custom autofunction template that is different from the default autofunction template. This feature is only available on 2.15 and 3.15 TEM Server versions. <p>For all autofunctions, the options are:</p> <ul style="list-style-type: none"> • The default autofunction template is the template that you defined under the Tile Set Templates settings. • The other options include a dynamic list of templates that you define as the user.

Tile Set Tab, STEM Mode, Autofunction (Continued)

Control	Description
Mode	<p>Mode selection of the autofunction.</p> <div style="border: 1px solid #0070C0; padding: 10px; margin: 10px 0;"> <p>Note: For the Eucentric Height autofunction, only the <i>None</i> and <i>First Tile</i> modes are available.</p> </div> <p>Choices from the dropdown menu include the following:</p> <ul style="list-style-type: none"> • None: Autofunction does not run on the tile set. • First Tile: Autofunction runs only on the first tile within the tile set. • Every Tile: Autofunction runs on every tile within the tile set. • Custom Tile List: This allows you to select a custom collection of tiles where autofunction runs. Select your collection of tiles by pressing Ctrl+right-click. <div style="border: 1px solid #0070C0; padding: 10px; margin: 10px 0;"> </div>

Configure autofunctions

You can configure parameters for each autofunction by selecting **Autofunction**, and then clicking **Configuration** or the gear icon.



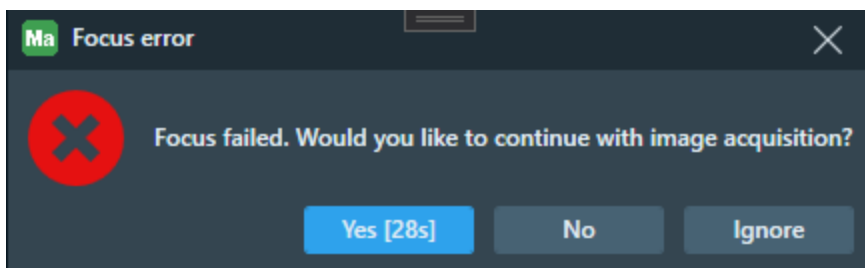
Tile Set Tab, STEM Mode, Autofunction Configuration

Autofunction	Control	Description
Eucentric Height	Final Stage Angle°	Specifies the final stage angle. The default value is set to 15.0 degrees and accepts values from 1.0 to 90.0 degrees.
	Maximum Z-Height Deviation	Specifies the maximum accepted Z-height difference measured between negative and positive final stage angles. The default value is set to 250 nm and it accepts values from 250 nm to 2 µm. Autofunction processes more quickly if you use a high value for this control, but the result will be less accurate.
Focus	Include Coarse Search	Allows using the coarse search method.
	Coarse Step	Specifies the coarse step value.
	Fine Step	Specifies the fine step value.
	Number of Steps	Specifies the number of steps for focus autofunction.

Tile Set Tab, STEM Mode, Autofunction Configuration (Continued)		
Autofunction	Control	Description
	Use Tree Image Method	Specifies if the tree image method is used.
(Beta) OptiSTEM	Algorithm	This read-only field specifies the OptiSTEM algorithm. Currently, only the A1/C1 algorithm is supported. This feature is only available on 2.15 and 3.15 TEM Server versions.

Autofunction error dialog

If you experience an autofunction error and the **Ignore autofunction errors** option is not selected under Settings >> Application, then you can view the following error dialog. The error dialog automatically closes after the time specified in the **Autofunction failed dialog timeout** option under Settings >> Microscope, and the tile set acquisition job continues.



Choices include:

- **Yes {28s}**: Click to ignore the error dialog and continue with the image acquisition. The value in brackets indicates the total number of seconds required to perform the image acquisition. This option is the default.
- **Ignore**: Click to prevent these error dialogs from appearing in the future. If you opt to ignore future error dialogs, you can still view failed autofunction errors within the [TEM Notification Panel](#). They are listed as pipeline warning messages.
- **No**: Click to stop the acquisition job.

TEM Notification Panel

You can view additional information about the progress of the tile set acquisition jobs (and potentially any other job) in the Notification Panel, which is located under Job Control >> Notifications.

The Notification Panel contains these three sections.

- **Filters:** This section is located at the top of the screen and contains three filter buttons: **Notifications**, **Warnings**, and **Errors**. Toggle each button to show/hide the notification, warning, and error messages associated with each selected pipeline. If needed, click **Clear All** to delete the list of all pipelines and their associated messages.
- **Pipelines:** This section is located in the middle of the screen and contains a list of pipelines. A pipeline typically corresponds to a single job, and each pipeline indicates when it was started. If the pipeline is closed/ended, then it also indicates the time it finished and job duration.
- **Pipeline messages:** Click a single row to select a pipeline. Once selected, you can view the list of associated messages for the pipeline at the bottom of the screen.

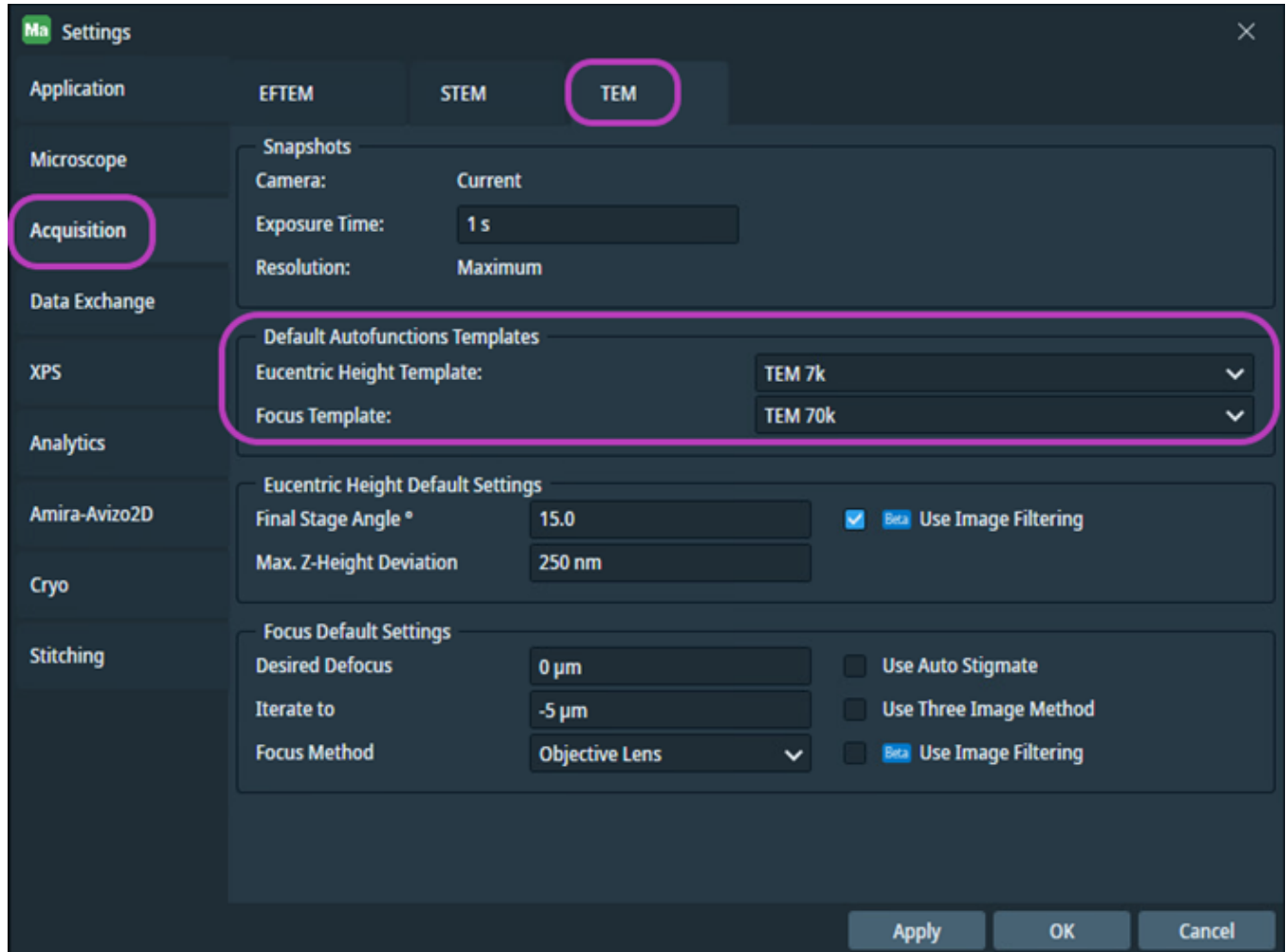
The screenshot shows the TEM Notification Panel interface. At the top, there are three tabs: 'JOB QUEUE', 'PROCESSING' (with a red dot), and 'NOTIFICATIONS'. Below the tabs are three filter buttons: '59 NOTIFICATIONS' (selected), '0 WARNINGS', and '3 ERRORS', along with a 'CLEAR ALL' button. The main area displays a table of pipeline jobs with columns for Name, Started, Finished, and Duration. The third row is highlighted in blue. Below the table is a list of messages for the selected pipeline, with columns for Name, Details, and Date. The bottom bar shows 'JOB CONTROL' and a 'RUN' button.

Name	Started	Finished	Duration
Tile Set	2021/01/04 08:30:44	2021/01/04 08:31:33	00:48
Tile Set	2021/01/04 08:31:45	2021/01/04 08:32:58	01:12
Tile Set	2021/01/04 08:34:53	2021/01/04 08:36:35	01:41

Name	Details	Date
Tile Set	Preparing microscope...	2021/01/04 08:34:53
Tile Set	Normalizing lenses...	2021/01/04 08:34:53
Tile Set	Performing initial auto functions...	2021/01/04 08:35:07
Tile Set	Performing Focus autofunction...	2021/01/04 08:35:07
Tile Set	Focus failed. Preconditions not met.	2021/01/04 08:35:07
Tile Set	Microscope set up...	2021/01/04 08:35:36
Tile Set	Preparing for tile [1,1]...	2021/01/04 08:35:36
Tile Set	Acquiring tile [1,1]...	2021/01/04 08:35:36
Tile Set	Saving image(s) of tile [1,1]...	2021/01/04 08:35:42
Tile Set	Preparing for tile [2,1]	2021/01/04 08:35:43

TEM Default Autofunction Templates

See the [TEM Options Menu](#) to open Settings >> Acquisition. This screen enables you to assign a template to each autofunction and mode (TEM, EFTEM, or STEM), which then applies to all projects. You can select any autofunction template from this screen except for the default factory template. If a template is not selected for an autofunction and mode (displayed as **None** in the dropdown menus), then it is not possible to run an autofunction.



Template parameters

There are two parts to the autofunction parameters.

- Common imaging parameters (such as magnification, resolution, and pixel size): These parameters are defined by the autofunction template and used during the tile set autofunction run.
- Autofunction-specific parameters (such as final stage angle, use auto stigmat, and iterate to): These parameters are initially determined by the tile set template, but can be changed for each tile set instance. These settings are available under the configuration button under the Autofunction tab.

Follow these guidelines to achieve the best results from the autofunctions during your workflows:

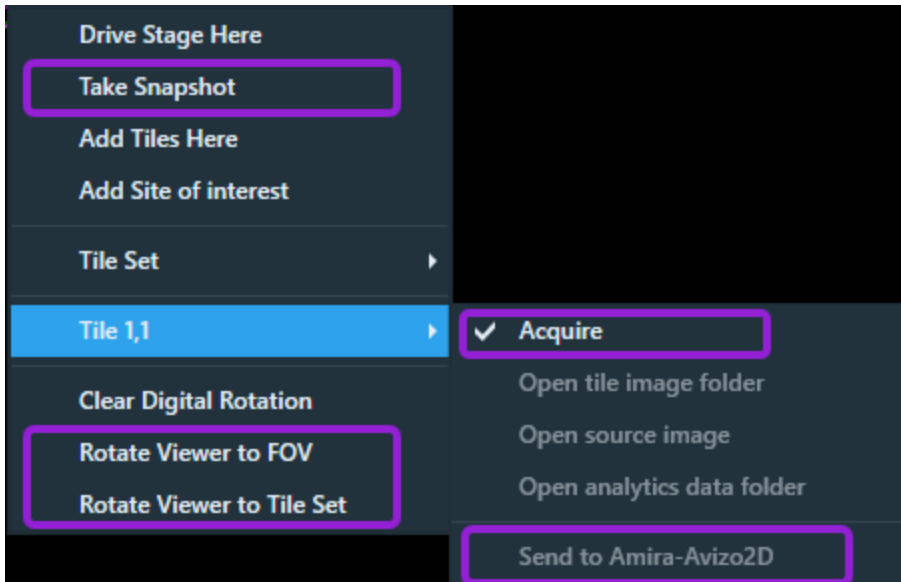
- Either manually create tile set templates, or import templates from the Tomography application to be used as default autofunction templates.
- For manual template creation, create a new tile set and set parameters to be used for a specific autofunction run.
- Parameters suitable for autofunction templates can vary based on the specimen or tool type. For the Eucentric Height autofunction, it is recommended that you use a low SA magnification range; whereas, for the Focus autofunction, it is recommended that you use a higher SA magnification range.
- Consider selecting **(Beta) Use Image Filtering** if you want to improve the reliability of the default cross-correlation algorithm (depends on your sample type). See [Automated Image Filtering](#) for more information.
- If you right-click your mouse cursor directly on the tile set in a layer tree, then it is possible to save the tile set as a template. This template can then be aligned to a specific autofunction by selecting it from the Focus Template dropdown menus listed under Settings >> Acquisition.

Focus autofunction example

1. Create a new tile set (manually or import it).
2. Set the magnification to 120 kx and other parameters suitable for the Focus autofunction.
3. Right-click your mouse cursor directly on the tile set in layer tree and select **Save as Template**, select, **New Template**, and then enter **Focus Template** as the name.
4. Go to the main screen, click the **Options** menu, and then select **Default Autofunctions Templates**.
5. From the Focus Template dropdown menus, select your new focus template and close the dialog.
6. Create a new tile set and activate **Focus Autofunction** under that Autofunction tab.
7. Set additional parameters (such as desire defocus for, focus method, etc.) for the Focus autofunction through the **Configuration** button under the Autofunction tab.

TEM Viewer Tile Context Menu

Right-click on a tile within the tile grid to access a context menu.



- For common selections, see the [Common Viewer Tile Context Menu Overview](#).
- For TEM-specific selections, see the table below. and [Define a Tile Set for TEM](#).

Viewer Tile Context Menu, TEM Overview	
Menu Selection	Description
Take Snapshot	Takes a single snapshot at the current microscope location.
Acquire/Queue for re-acquisition	<p>Displays whether or not the tile has already been acquired as defined below. You can toggle between the two tile acquisition states as needed; however, only the <i>selected</i> acquisition state appears in the menu.</p> <ul style="list-style-type: none"> • Acquire: This acquisition state displays if the tile <i>has not been acquired</i>. If you select the check box for this menu item, then Maps queues the selected tile to be acquired. • Queue for re-acquisition: This acquisition state displays if the tile <i>has already been acquired</i>. If you select the check box for this menu item, then Maps queues the selected tile to be re-acquired and replaces the original image. <p>For TEM, turning off a tile acquisition state will only be remembered while the tile is inside the stage boundary.</p> <p>See Define a Tile Set for TEM for more information.</p>

Viewer Tile Context Menu, TEM Overview (Continued)

Menu Selection	Description
Send to Amira-Avizo2D	If activated, sends the tile image to Amira-Avizo2D.
Rotate Viewer to FOV	Digitally rotates the viewer to line up the display to the orientation of the current field-of-view (as indicated by the purple rectangle).
Rotate Viewer to Tile Set	Digitally rotates the viewer so the current tile set is aligned with the screen. See Viewer Tile Context Menu for TEM .

TEM Post-Acquisition Actions

This section describes the post-acquisition actions for TEM microscopes.



Post-Acquisition Actions

Control	Description
Close Column Valves When Done	Closes the column valves after all jobs are completed. Select the check box to close the column valves after all jobs are completed.
Switch off Emission when Done	Applies only to systems with thermionic guns, such as a Talos LaB6. Select the check box to turn off the gun emission for any queued acquisition to preserve the filament. In order to turn the gun emission on again after it is switched off, you must use the TEM UI, which is outside of Maps.

Define a Tile Set for TEM

This section is a supplement to the general operations on tiles and tile sets. Tiles for TEM cannot be acquired when they are situated outside the stage boundary. That is why defining, resizing and moving a tile set on TEM is different from those actions on other systems. It also affects enabling and disabling **Acquire** property for a tile.

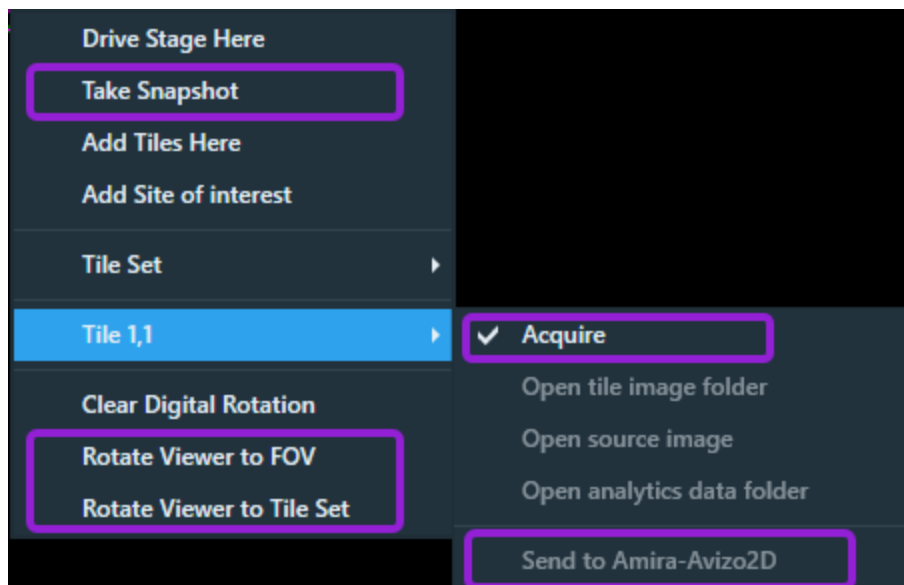
Methods for defining a tile set

A tile set can be defined the same way as described in [Define a Tile Set](#). When creating a tile set, Maps software creates a layer in the Layer control. Tiles in that layer that are created inside the stage boundary have **Acquire** available by default. Tiles in that layer that are created outside the stage boundary cannot be acquired (**Acquire** command is unavailable).

Manually adjust tile sets

Once a tile set is created, you can adjust the size of the tile set with the drag handles in the viewer as described in [Define a Tile Set](#).

Acquire menu command



The **Acquire** menu command is described in [TEM Viewer Tile Context Menu](#). When a tile Acquire property is turned off, and the tile is moved inside the stage boundary, then the **Acquire** command remains unavailable. When the tile Acquire property is turned off, and the tile is moved outside the stage boundary, and then back inside the stage boundary, then the **Acquire** command is made available.

Automatically deactivate a tile after acquisition

When a tile set has been acquired, the tile set cannot be moved again. Also, the **Acquire** menu option is not available when the tile has been acquired.

TEM Tiling Corrections

On TEM systems, you will observe imperfections in tile alignment during tile set acquisition. The imperfections vary across different magnifications and result in visible artifacts along the edges of individual tiles. The sources of these errors include magnification error, rotation error, and imprecision of stage movement. You can use the Tiling Correction beta feature to compensate for these errors and achieve better tile alignment during acquisition.



Note: This functionality is intended to compensate only for relatively small errors that remain on an aligned and calibrated system. It is recommended that you always ensure that your system is properly calibrated and aligned before using Tiling Corrections.

Stitching verses tiling correction

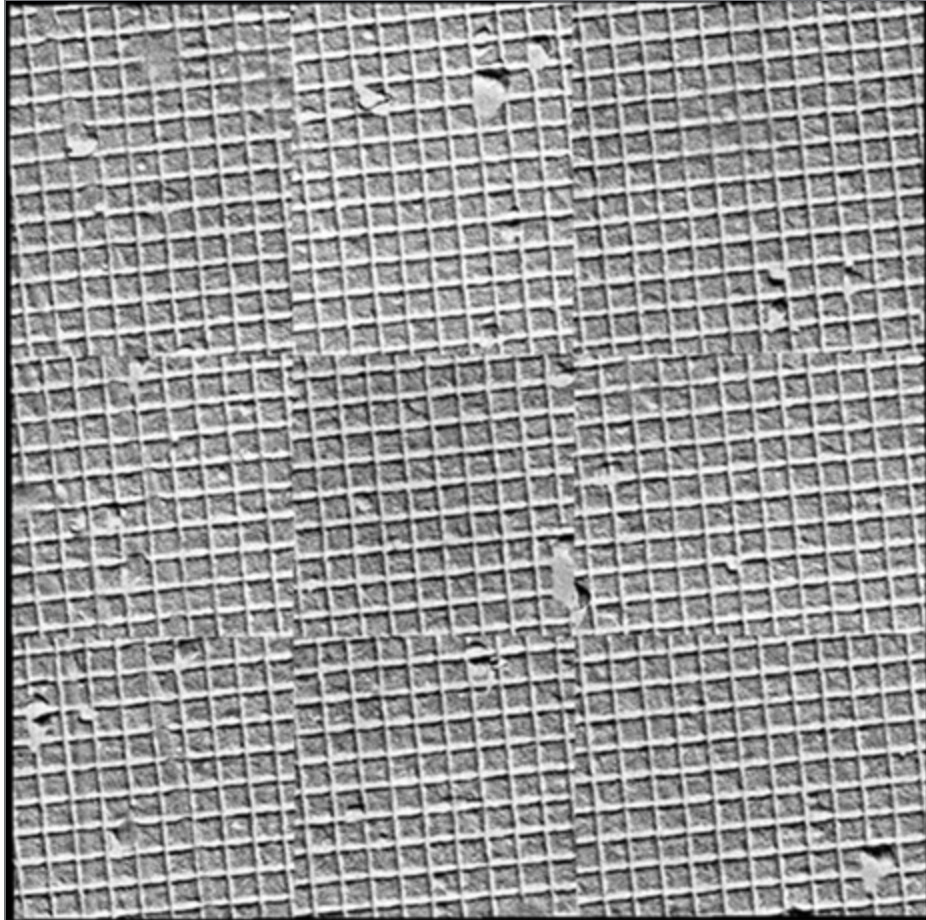
There are two tiling correction mechanisms available in Maps for TEM systems: stitching and tiling correction.

Stitching creates a new image layer from a given tile set, in which individual tiles are moved so that the overlapping portions of neighboring tiles match each other. While the relative shift between neighboring tiles is computed and stored in tile registration data already during acquisition, stitching is a post-processing action and can be performed only after the acquisition is finished.

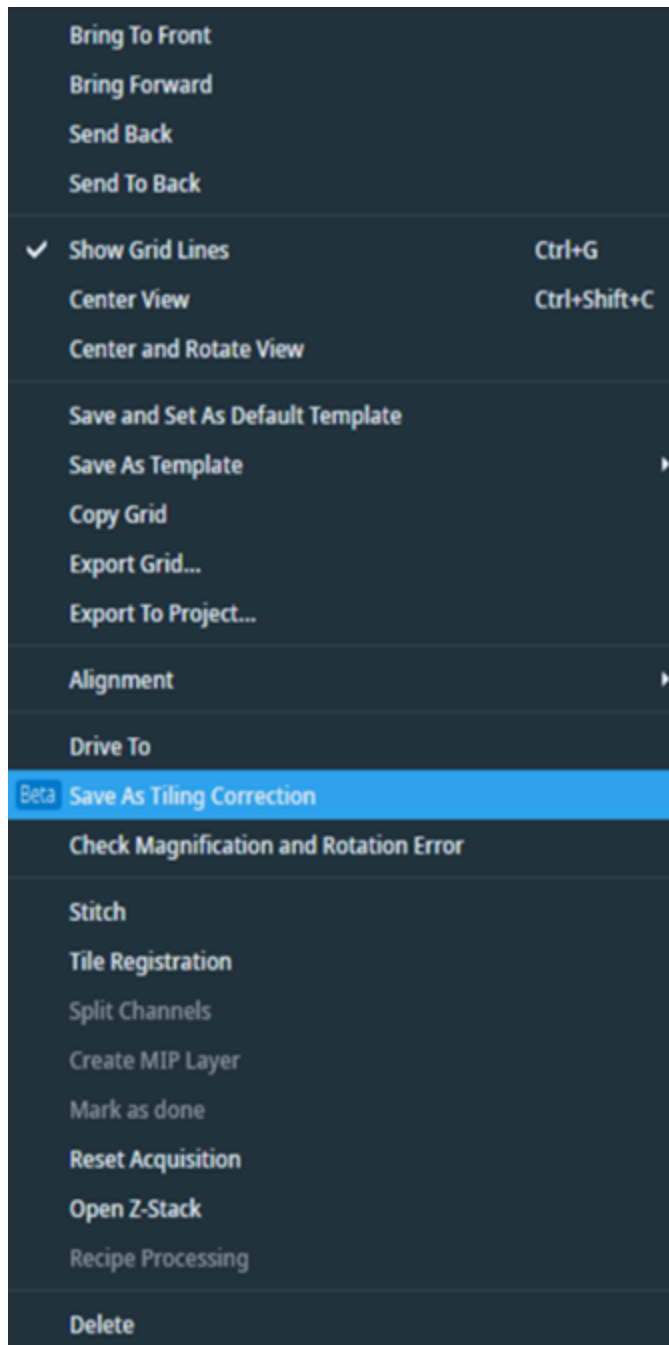
Tiling correction, on the other hand, takes advantage of the fact that the tile alignment error is static for a given set of optical settings. This means that the alignment error can be compensated by correcting tile rotation and magnification *during* tile set acquisition. The correction is computed from the same tile registration data as stitching, but instead of using the correction only on a single layer it is saved for subsequent acquisitions of all tile sets that match a given set of optical settings.

Create tiling correction based on existing tile set

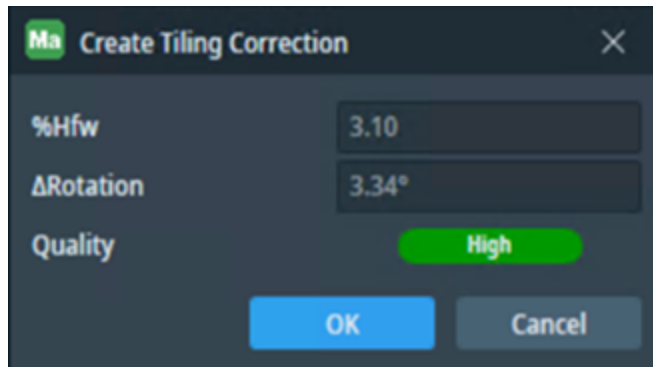
1. Click the acquired tile set that has misaligned tiles. For example, the tiles in the following 3x3 tile set are misaligned since the cross-grating pattern is broken along the edges of neighboring tiles.



2. Right-click on the selected tile set.
3. In the context menu, click **Beta - Save As Tiling Correction**.



- When the Create Tiling Correction screen appears, review the correction parameters and quality score generated by Maps.



- Click **OK** to create the tiling correction.



Note: If the quality score is Medium or Low, move your mouse over the quality indicator to view the tool tip. The tool tip contains a short description of why the quality is lower than High and it provides suggestions for quality improvement. See [Tiling correction quality](#) for more information.

View available tiling corrections

When a tiling correction is created, Maps stores a record of the correction and associates it with optical settings that match the original tile set. Click **Options > Tiling Corrections** to view the records in the Tiling Corrections screen.

The tiling corrections are stored in a table per instrument mode within the Tiling Corrections screen, so that subsequent acquisitions benefit from the tiling corrections. Be aware that the tiling corrections are not part of the project; instead, they are part of the Maps global settings.

Mode	Magnification	Probe Mode	Camera	%Hfw	ΔRotation	Quality	
LM	210x	MicroProbe	BM-Ceta	1.81	0.22°	High	×
LM	700x	MicroProbe	BM-Ceta	1.92	-0.18°	High	×
HM	11000x	MicroProbe	BM-Ceta	3.10	3.34°	High	×
HM	150000x	NanoProbe	BM-Ceta	2.75	4.56°	Medium	×

Correction Record Overview

Interface Item	Description
Mode	Indicates the magnification mode (values include: LM, HM).
Magnification	Specifies the magnification value.
Probe Mode	Indicates the probe mode (values include: MicroProbe and NanoProbe).
Camera	Displays the Camera name.

Correction Record Overview(Continued)	
Interface Item	Description
%Hfw	Specifies the horizontal field width correction that Maps applies during acquisition.
Δ Rotation	Specifies the rotation correction that Maps applies during acquisition.
Quality	Indicates the quality score (values include: High, Medium, and Low). Maps uses a cross-correlation algorithm to determine the quality score. See Tiling correction quality .

There are additional controls in the Tiling Corrections screen that you can use to import, export, or delete corrections.

Tiling Corrections Table Overview	
Control	Description
Export	Exports the corrections for TEM and EFTEM instrument modes to a file. Select the instrument tab (EFTEM or TEM), and then click Export .
Import	Imports the corrections for TEM and EFTEM instrument modes from a file. Select the instrument tab (EFTEM or TEM), and then click Import .
Delete All	Removes all corrections for the selected instrument mode (EFTEM or TEM).
OK	Saves the changes made to the EFTEM and TEM tables, and then closes the window.
Cancel	Cancel the changes made to the EFTEM and TEM tables, and then closes the window.

Use tiling correction during acquisition

To use tiling correction, you will need to create a new tile set with parameters that match one of the saved tiling corrections and then acquire the tile set. For example, consider the correction that is highlighted below (parameters: HM, 11000x, MicroProbe, BM-Ceta, 3.10%, 3.34°, High).

Mode	Magnification	Probe Mode	Camera	%Hfw	Δ Rotation	Quality	
LM	210x	MicroProbe	BM-Ceta	1.81	0.22°	High	×
LM	700x	MicroProbe	BM-Ceta	1.92	-0.18°	High	×
HM	11000x	MicroProbe	BM-Ceta	3.10	3.34°	High	×
HM	150000x	NanoProbe	BM-Ceta	2.75	4.56°	Medium	×

Create a TEM tile set

1. Click the TEM Tile Set tab, and then do the following:
 - a. Select **BM-Ceta** from the Camera dropdown menu.
 - b. Select **SA 11000x** from the Magnification dropdown menu.

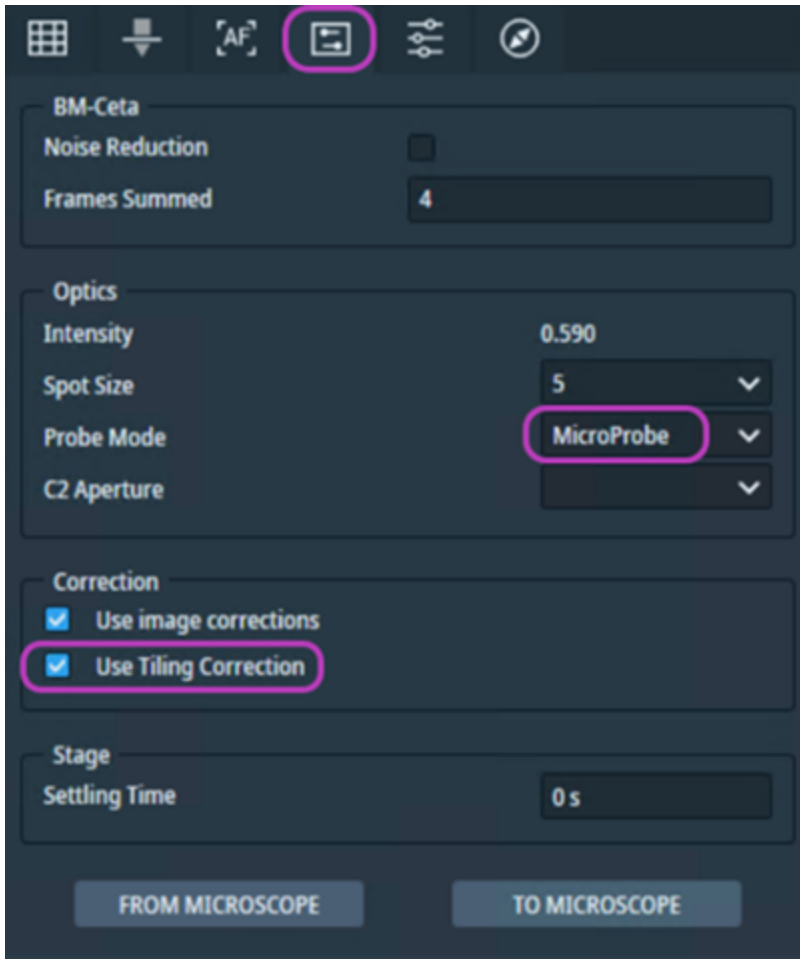
The screenshot shows a software interface for configuring a TEM tile set. The 'Camera' dropdown menu is set to 'BM-Ceta' and the 'Magnification' dropdown menu is set to 'SA 11000 x'. The 'Name' field is 'Corrected Tile Set'. The 'Tile Set Type' is 'TEM'. The 'Tiles X, Y' are both '3'. The 'Overlap X, Y' are both '20%'. The 'Tile HFW' is '5.4871 μm'. The 'Total Area' is '14.3 μm x 14.3 μm'. The 'Resolution' is '512 x 512'. The 'Pixel Size' is '10.9743 nm'. The 'Exposure Time' is '1 s'. The status bar shows '0 of 9 images acquired; 18.24 MB'. There are buttons for 'FROM MICROSCOPE' and 'TO MICROSCOPE'.

Name	Corrected Tile Set
Tile Set Type	TEM
Camera	BM-Ceta
Tiles X, Y	3 3
Overlap X, Y	20% 20%
	100 px 100 px
Tile HFW	5.4871 μm
Total Area	14.3 μm x 14.3 μm
Resolution	512 x 512
Magnification	SA 11000 x
Pixel Size	10.9743 nm
Exposure Time	1 s

0 of 9 images acquired; 18.24 MB

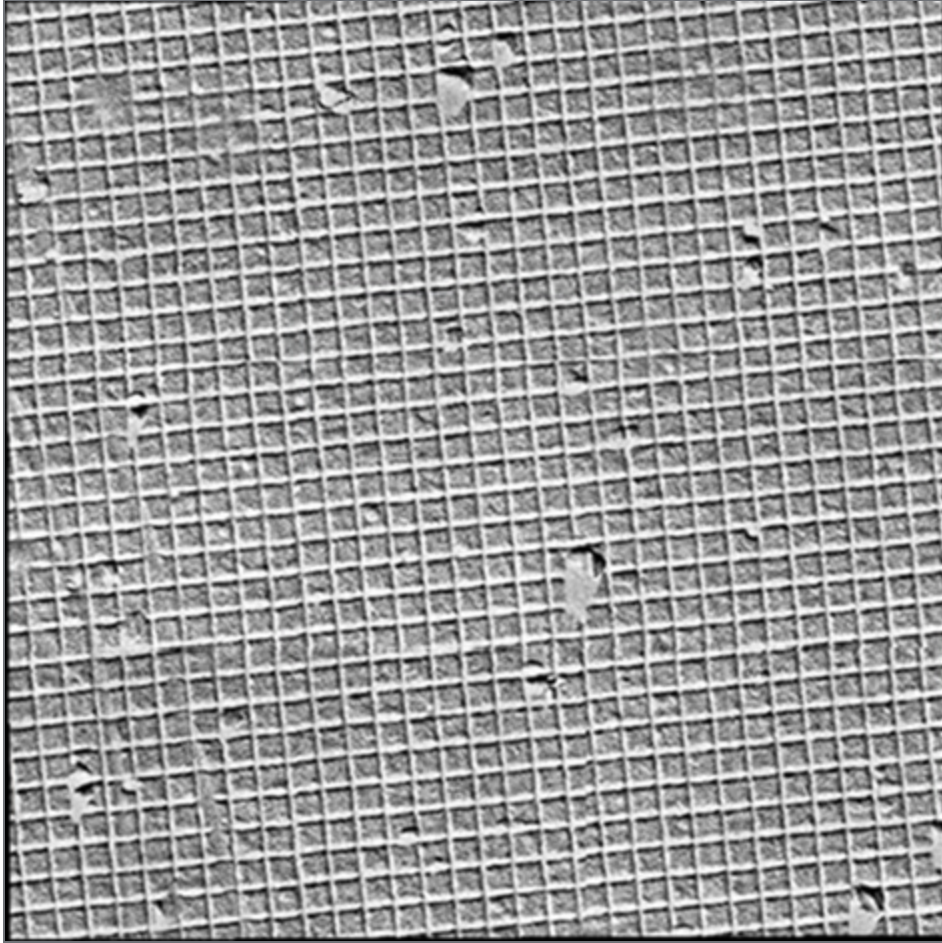
FROM MICROSCOPE TO MICROSCOPE

2. Click the Advanced tab.
 - a. Select **MicroProbe** from the Probe Mode dropdown menu.
 - b. Notice that the **Use Tiling Correction** checkbox is automatically selected.



3. Acquire the tile set. If needed, refer to [Acquire a Tile Set](#).

4. View the results in the main Viewer. Notice that the tiles are better aligned as a result of the tiling correction applied during acquisition.



Tiling correction quality

Tiling correction is computed from cross-correlation of overlapping portions of neighboring tiles. The quality and precision of the computation depends on several factors, including:

- Image intensity and focus
- Size of tile overlap
- Distinct features in the overlap portion of the tiles
- Stitching profile that matches sample type



Note: As a general rule, it is recommended to use tile sets with the following parameters as a basis for tiling corrections:

- Dimensions at least 3x3, with at least 20% tile overlap
- All tile overlaps are successfully registered (no red outlines in the tile set)
- Image has sufficient intensity and is in focus

You can observe the quality score of the tiling correction in the following screens:

- The Create Tiling Correction screen (when you are creating a new tiling correction)
- The Tiling Corrections screen (when you review available corrections)

See [Tiling Corrections Quality](#) for additional instructions on how to resolve issues related to quality.

Tiling Corrections Quality

This topic describes how you can resolve issues that negatively impact the quality and precision of tiling corrections.



Note: For a general description of tiling corrections and the quality of tiling corrections, see [TEM Tiling Corrections](#).

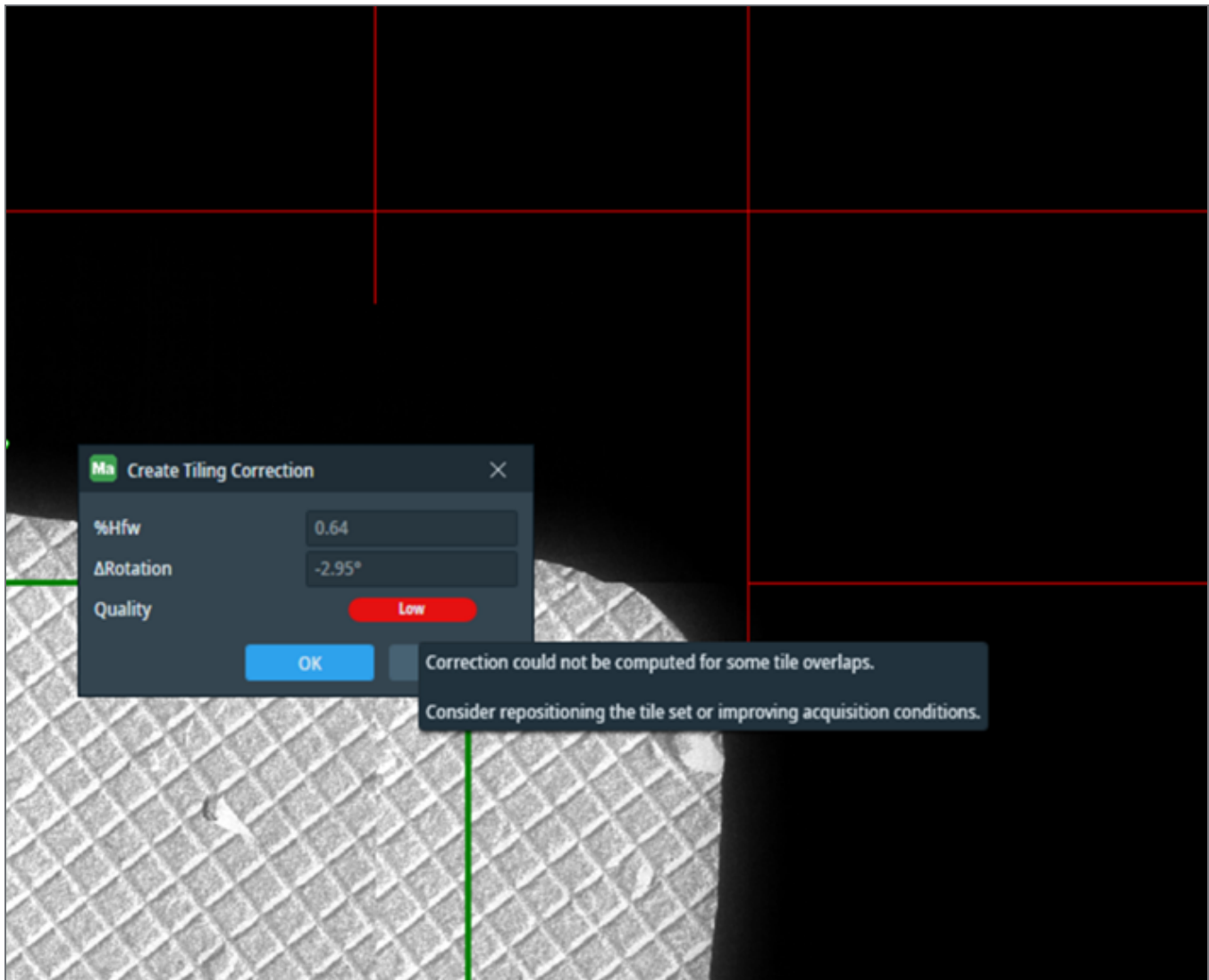
The following issues cause the quality score of a tiling correction to be lower than desired:

- Failed tile registrations
- Insufficient size of tile overlap
- Insufficient size of the tile set
- Large error margin in a portion of the tile set
- Large overall size of the correction

Failed tile registrations

You can recognize failed tile registrations by one or more red outlines visible in the acquired tile set. The failed registrations are caused by inability to compute cross-correlation on overlapping portions of neighboring tiles. This is usually due to poor imaging conditions, or when the tile set is being partially placed on a portion of the sample with no visible details.

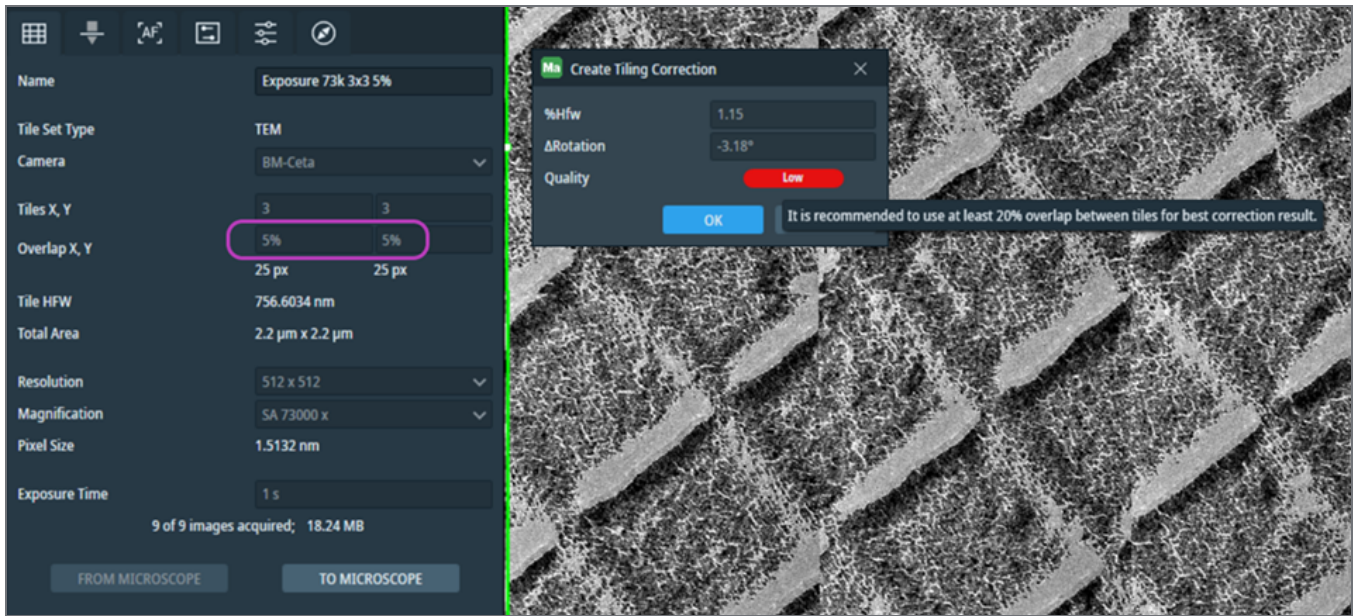
For example, the tile set below has several failed tile registrations because the affected tiles are placed on a grid bar. To resolve this issue, reposition the tile set so that all tiles contain a sufficient level of detail and then acquire the tile set again.



Insufficient tile overlap size

It is recommended to use a tile overlap of at least 20% for tile sets that are used as a basis for tiling correction. The overlapping regions of neighboring tiles should ideally contain distinct features that the cross-correlation algorithm can use to compute necessary correction. A larger size of tile overlap gives the algorithm larger areas to work with, which is desirable.

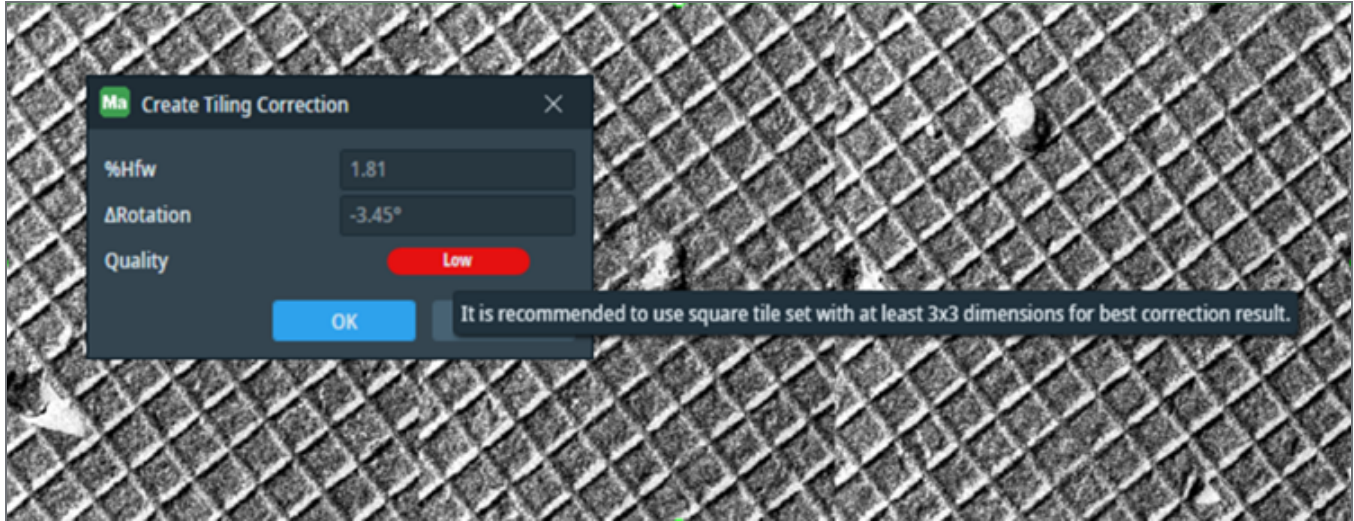
For example, the following tile set has only 5% tile overlap, causing the quality indicator to report a low quality score. To resolve the issue, reset the tile set, increase the size of tile overlap to at least 20%, and then acquire the tile set again.



Insufficient tile set size

It is recommended to use a tile set of at least 3x3 size as a basis for tiling correction. This size gives the cross-correlation algorithm a sufficient number of overlapping regions to compute overall correction from since they are equally distributed across both columns and rows.

For example, the following tile set has only 3 tiles in a single row, thus causing the quality indicator to report a low level of quality. To resolve the issue, reset the tile set, increase its size to at least 3x3, and then acquire the tile set again.



Large error margin

Error margin is the difference between the average correction computed from the whole tile set and a local correction that is computed from a specific tile overlap. When the corrections computed for different tile overlaps differ by a large extent from each other, the quality indicator reports a large error margin.

Increased error margin can be caused by one of the following issues:

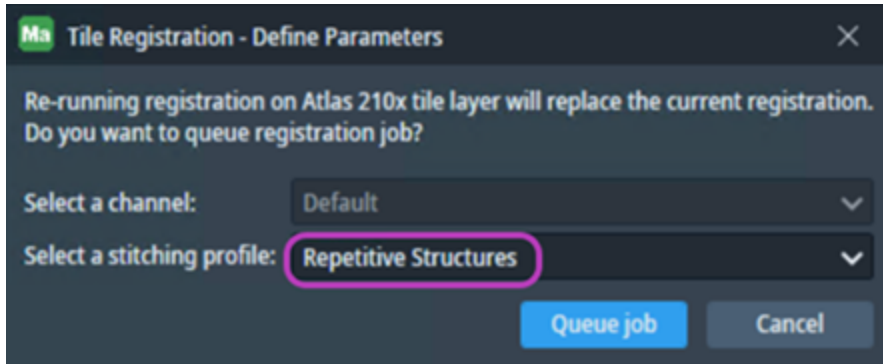
- Different imaging conditions in one portion of the tile set compared to the rest of the tile set.
- Recurring pattern in the specimen that causes false peak in the cross-correlation, so the correction targets the pattern rather than a distinct feature in the specimen.
- Lower signal-to-noise ratio such as low-dose conditions in which the signal counts are so low that recurring patterns and noise in the dark, and gain reference images, are interpreted as features of the specimen.
- Imprecision of mechanical stage movement at high magnifications.

For example, the following tile set contains a recurring grid pattern. The default stitching profile is not able to detect false peaks in cross-correlation, thus causing a large error margin in a portion of the tile set.

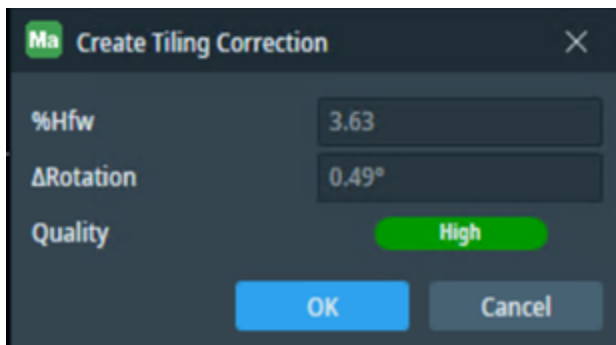


To resolve the issue in this specific use case, do the following:

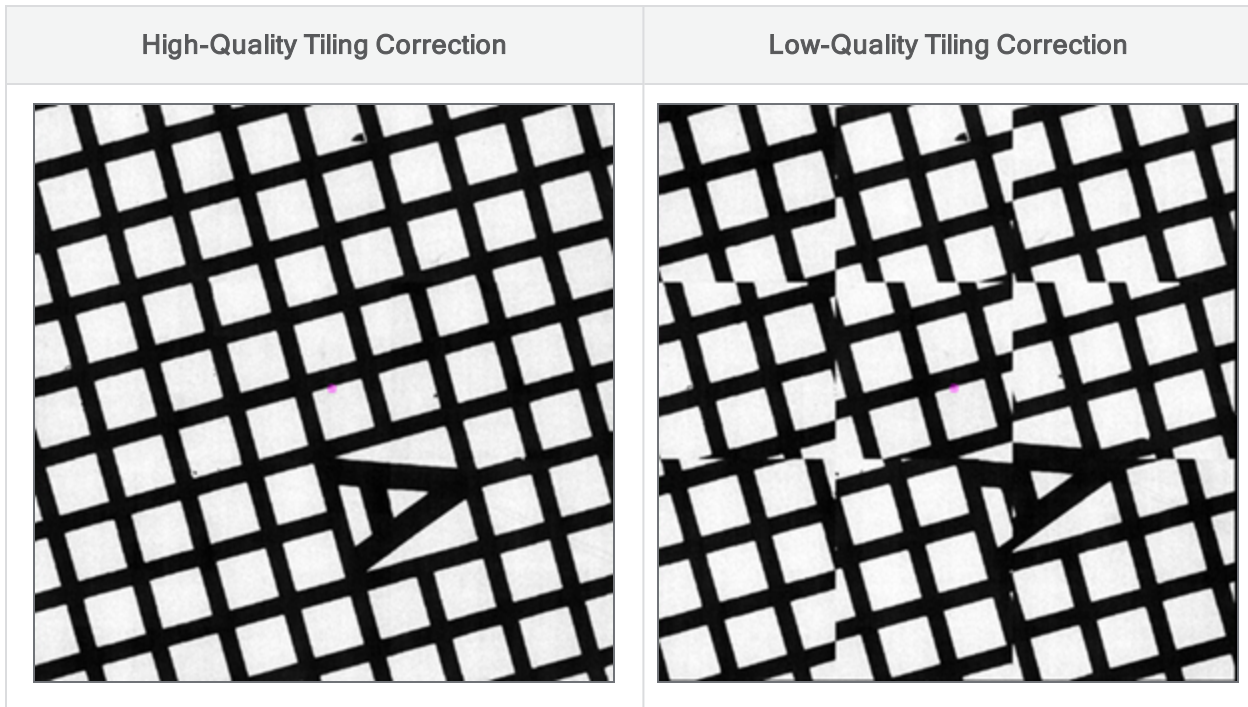
1. Right-click the tile set to open the context menu and then select **Tile Registration** to open the Tile Registration - Define Parameters screen. See [- topic](#) for details.
2. Select **Repetitive Structures** from the stitching profile dropdown menu.



3. Click **Queue job** to rerun the tile registration with the selected stitching profile.
4. Create a tiling correction for the tile set based on the updated stitching profile (see [Create tiling correction based on existing tile set](#)).



5. View the improved quality for the tile set with the recurring grid pattern. As shown below, the tile alignment is properly aligned with the high-quality tiling correction compared to the original low-quality tiling correction.



Large correction size

Tiling corrections are intended to compensate only for relatively small errors that remain on a well aligned and calibrated system. If the computed size of the correction is too large, then the quality indicator will display a lower quality score. To resolve the issue, ask the system owner to verify and rerun the magnification calibrations on the microscope.

Magnification Alignment

On TEM systems, you will observe imperfections in the tile set alignment from one magnification to another. These imperfections result in small shifts when changing the magnifications. You must always properly calibrate and align the system, but small shifts may still remain since changes in the optics can lead to additional shift. To compensate for the small shifts that may remain, you can use the drag-and-drop functionality of Maps to align tile sets.



Note: This functionality is available for both TEM and STEM mode, but the remainder of this section explains how it works for TEM tile sets. For STEM mode the functionality is similar, with the small difference that the magnification is a derived value (inferred from the Field of View).

Magnification Alignment versus Manual Alignment

There are two alignment mechanisms available in Maps: Magnification Alignment and Manual Alignment.

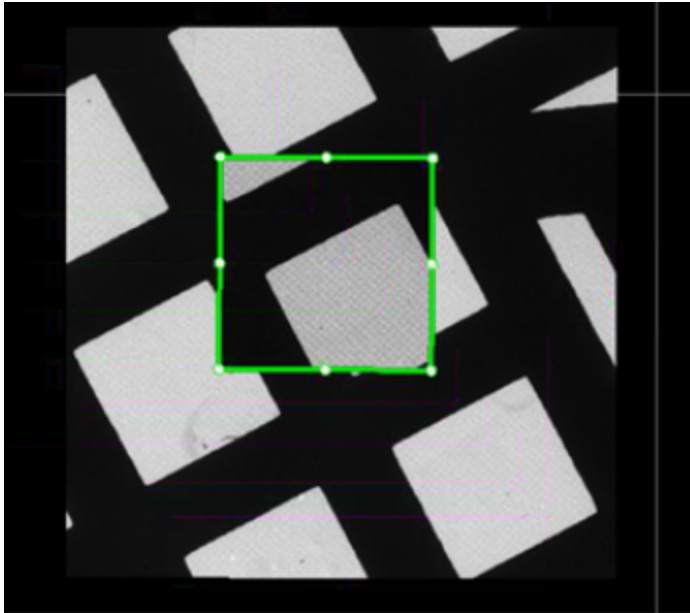
Magnification Alignment moves the data in the Maps canvas and *stores this alignment for subsequent acquisitions* at the same magnification.

Manual Alignment only aligns the data within the Maps canvas. Any subsequent acquisition will not have access to information about the alignment.

Align a Tile Set and Its Magnification

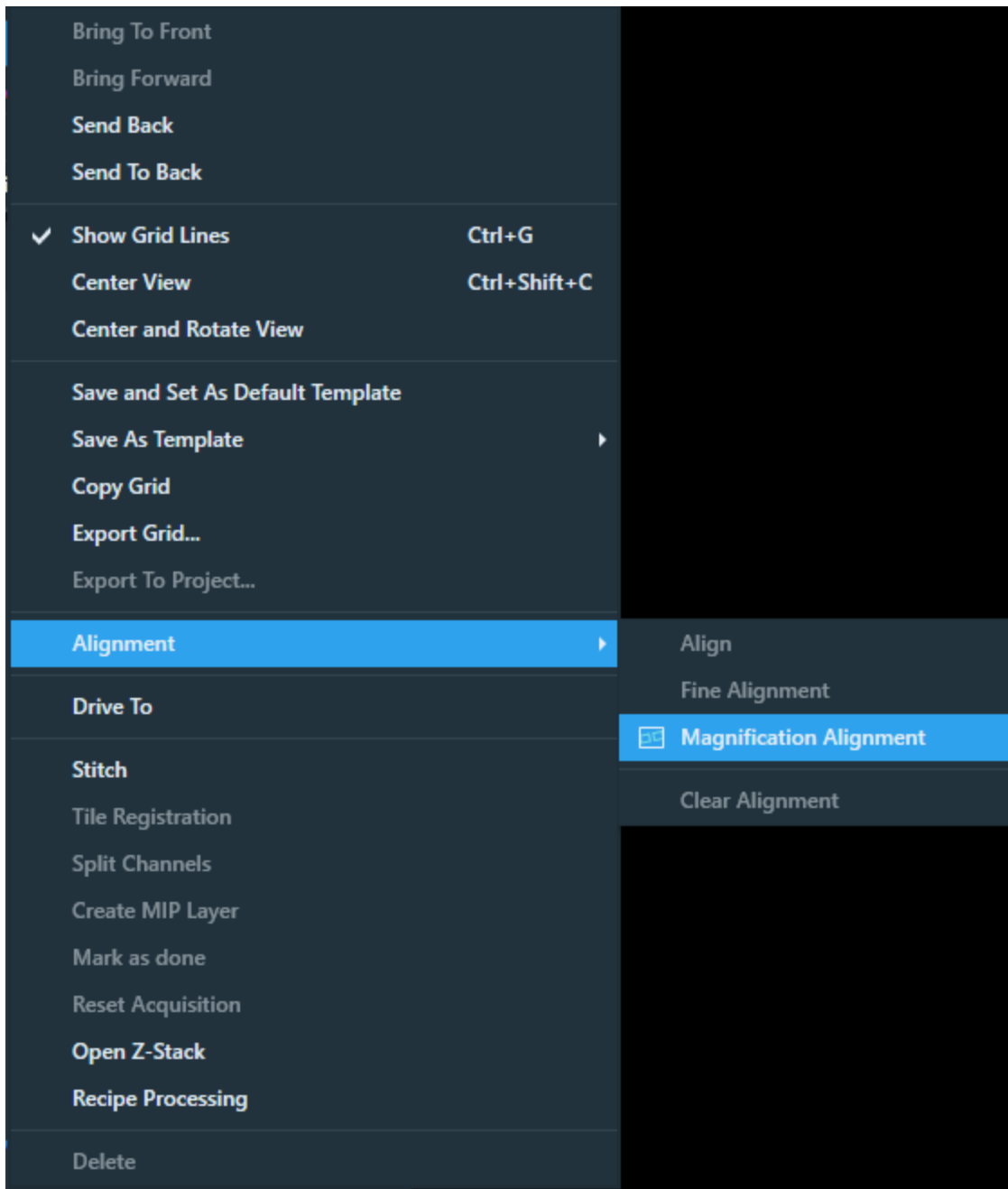
1. Click the acquired tile set that is slightly misaligned.


For example, the higher magnification tile set within the green border is misaligned with respect to the lower magnification.




2. Right-click on the selected tile set.

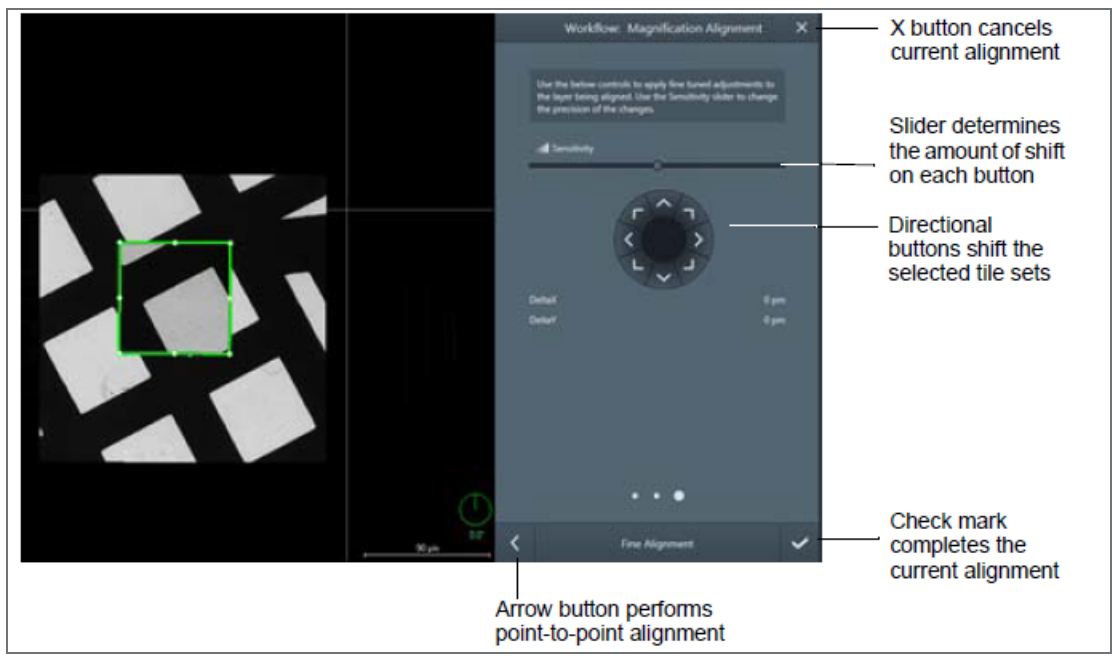
3. Do one of the following:
 - In the context menu, click **Alignment** and then click **Magnification Alignment**.



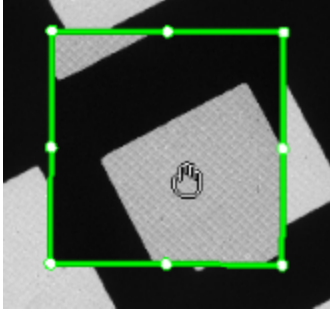
- On the right side of the tool bar, click **Magnification Alignment** 

- On the right side of the tool bar, click **Workflow**. See [Workflow](#). 

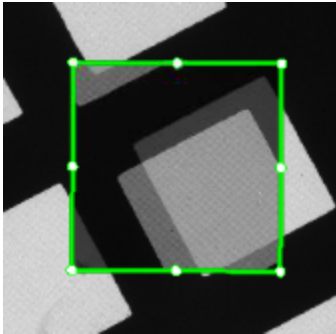
The Workflow Magnification Alignment panel appears.



4. Reposition the tile set using the directional buttons in the Workflow Magnification Alignment panel.



You can reposition the tile set by clicking and holding the left-mouse button while hovering over the tile set.



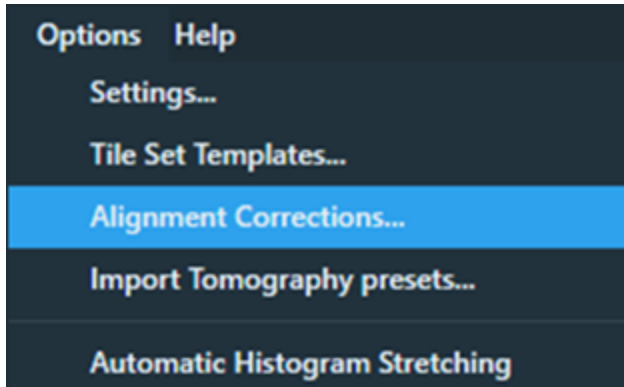
5. Click the check mark within the alignment workflow panel to complete the current alignment, or click the X to cancel it.

The results of the alignment are twofold:

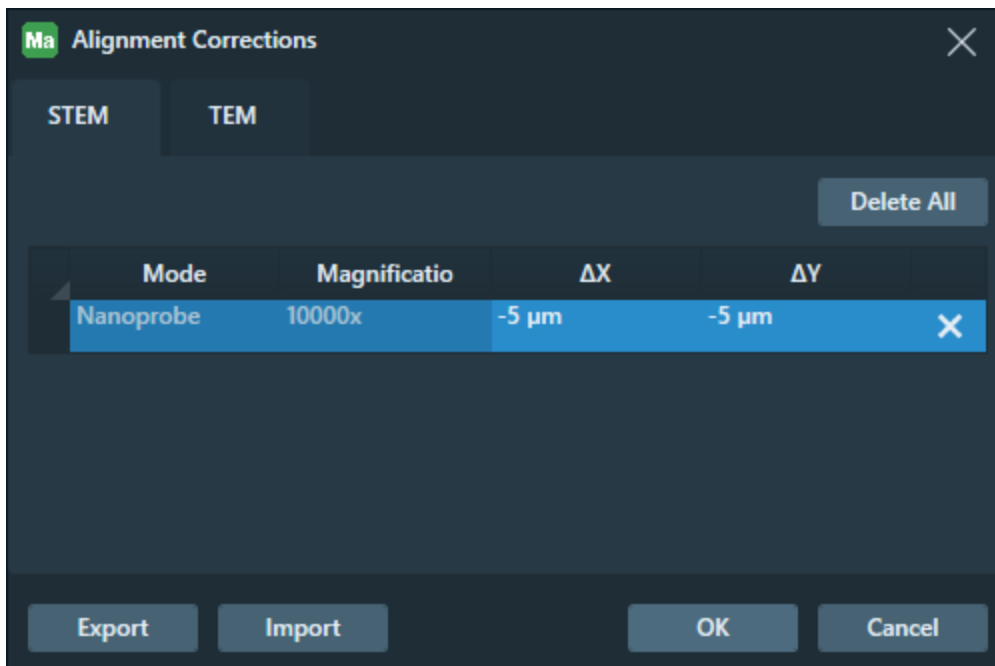
- The tile set with the existing data is realigned within the Maps canvas.
- An *alignment correction* record is stored for the magnification associated with the tile set. All subsequent acquisitions are automatically aligned based on this record. See [Alignment Corrections Table](#).

Alignment Corrections Table

When a tile set is aligned, Maps stores a record of the magnification associated with the tile set. Click **Options > Alignment Corrections** to view the record in the **Alignment Corrections** table.



The **Alignment Corrections** are stored in a table per instrument mode, so that subsequent sessions benefit from the alignments. Note that the corrections are not part of the project; they are part of the Maps global settings.



Alignment Corrections Table Overview	
Interface Item	Description
Import	Imports all the alignment corrections for TEM and STEM.
Export	Exports the alignment corrections for TEM and STEM.
Delete All	Removes all alignment corrections for the currently selected mode (STEM or TEM).
Cancel	Cancel the changes made to the tables and then closes the window.
OK	Saves the changes made to the tables and then closes the window.

Propagation of Alignment Corrections

The magnification alignments automatically propagate to higher magnifications that do not have an entry in the Alignment Correction table. However, individual magnifications can be aligned at any time, overruling the propagated alignment. With this approach, only a minimum number of alignments is required and it allows for refinement when needed. An additional benefit of this approach is that it naturally follows the typical Maps workflow from low-to-high magnification, allowing you to realign during the workflow when needed.

- In TEM, alignment corrections for low-magnification mode (LM) do not automatically propagate to the high-magnification modes (Mi/Sa/Mh), because on TEM systems these modes are mostly uncorrelated.
- In STEM, alignment corrections only propagate within the same mode (LM/NanoProbe/Microprobe).

The concept of the propagation is demonstrated in the example described below.

Example: Assuming you have an Alignment Corrections table as shown below and the system supports the magnifications as listed in [Example of Propagation](#).

Example of Propagation

	Mode	Magnification	Correction	
Low Magnifications	LM	50x	<i>none</i>	1
	LM	100x	<i>none</i>	
	LM	500x	(-3 um, 4 um)	2
	LM	1000x	(-3 um, 4 um)	
	LM	1800x	(-3 um, 4 um)	
High Magnifications	Mi	2000x	<i>none</i>	3
	Mi	2500x	<i>none</i>	4
	SA	3000x	<i>none</i>	
	SA	5000x	(1 um, -2 um)	
	SA	12000x	(1 um, -2 um)	5
	SA	20000x	(0.7 um, 0.2 um)	
	SA	50000x	(0.7 um, 0.2 um)	
	Mh	100000x	(0.7 um, 0.2 um)	5
	Mh	200000x	(0.7 um, 0.2 um)	

In the example, the propagation works as follows. Numbers used below correspond to the annotation in the table above.

1. The first magnifications have no alignment correction.
2. The LM 500x magnification has an alignment correction, which propagates to the next magnifications LM 1000x and LM 1800x, but not to the high magnification modes (3, 4 and 5).
3. The first high magnifications do not have an entry in the alignment corrections table, hence they have no correction.
4. The SA 5000x is the first high magnification with a correction, which propagates only to the next magnification SA 12000, because SA 20000x has its own entry in the alignment correction tables (5), which overrules the propagated correction of SA 5000x.
5. The correction of SA 20000x propagates to all the next magnifications.

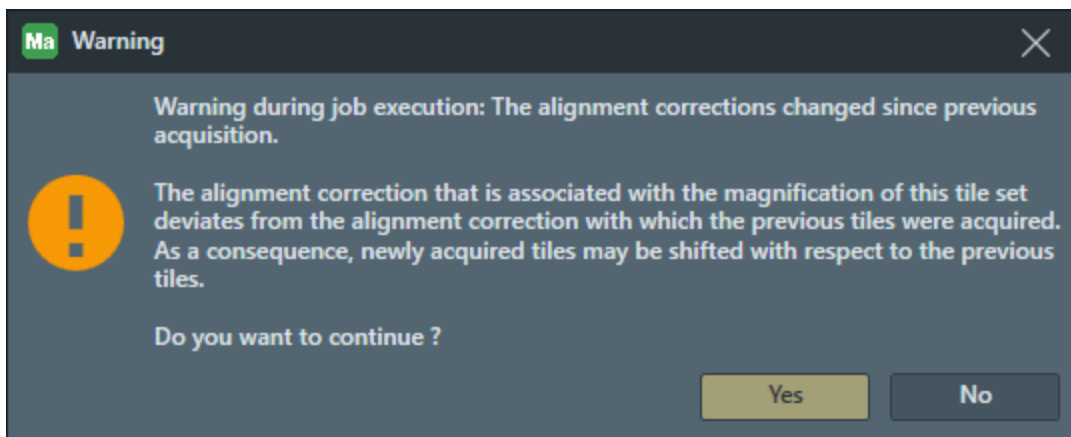
Working with Magnification Alignments

- You can refine the alignment at any point in time, even when job execution is paused during tile set acquisition.
- A magnification alignment automatically applies to higher magnifications, so not all magnifications need realignment. See [Propagation of Alignment Corrections](#).
- You can align multiple tile sets simultaneously by selecting a number of tile sets before starting the alignment.
- The alignment corrections are stored on disk and remain active for subsequent sessions.

- View which alignment corrections are present in the [Alignment Corrections Table](#).
- If alignment corrections apply, you should see the field-of-view rectangle shift when changing the magnification on the system as Maps tracks the current field-of-view. Tracking includes the alignment corrections.
- Magnification Alignment can be used to compensate for shifts between STEM and TEM mode. This allows you to use a LM TEM tile set as reference for navigation while in NanoProbe STEM.

Alignment Tips

- The magnification alignments are for Maps only. They determine how Maps controls the stage and how acquired images are positioned in the Maps canvas without affecting the optics of the microscope. This mechanism can safely coexist with other applications that use different means for realignment.
- The FOV visualization automatically incorporates the image beam shift set by other applications, such as with Thermo Scientific Tomography. This allows Maps to be used side-by-side with other applications, since it ensures that the FOV is the same in both applications. See [Alignment with Other Applications](#).
- Magnification Alignment is related to Align Layer (see [Layer Context Menu](#)) and Global Alignment functions (see [Toolbar](#)), but serves a different purpose.
 - Global Alignment realigns existing data to the coordinate system of Maps. This functionality is typically used for imported data.
 - Magnification Alignment targets misalignments on the instrument itself.
- Magnification Alignment is a mechanism to compensate for imperfections in the optical alignment of the microscope. It is global in nature and applies to all positions. Small position-dependent shifts might remain due to other factors.
- Performing a Magnification Alignment for a magnification changes the current alignment state. That means that tile sets that have already been acquired before the adjustment were using a different Magnification Alignment. If you would re-acquire such tile sets, the images may be shifted due to the new alignment. This situation is detected and the system displays the following warning:



Alignment with Other Applications

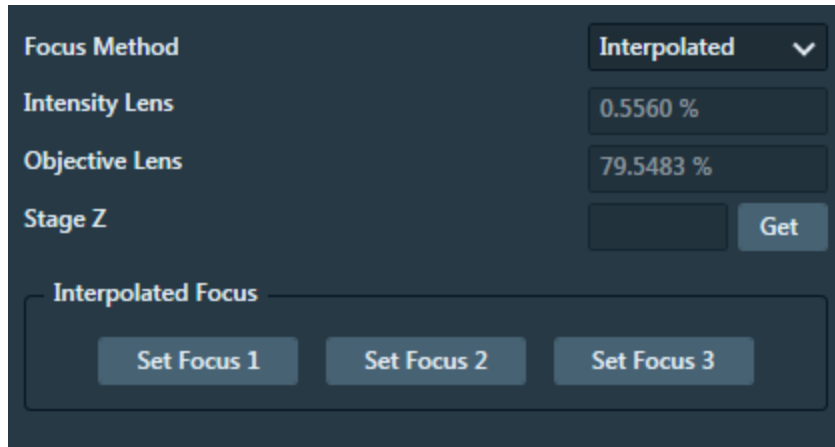
- The FOV visualization automatically incorporates image beam shift set by other applications, such as Thermo Scientific Tomography. This allows Maps to be used side-by-side with other applications, since it ensures that the FOV is the same in both applications.
- Image beam shift is a mechanism that compensates for imperfections in the optical alignment of the microscope. The image beam shift changes the current alignment state. This means that tile sets that were already acquired before changing the image beam shift used a different magnification alignment. If you reacquire these tile sets, the images might shift due to the new alignment. The new alignment is not detected automatically, and no warning is displayed.



Note: With some applications, such as Thermo Scientific Tomography, the image beam can shift regularly.

Use Interpolated Focus Method

This topic explains the procedure for the interpolated focus method.



The screenshot shows a control panel for the Interpolated Focus method. It includes a dropdown menu for 'Focus Method' set to 'Interpolated', two input fields for 'Intensity Lens' (0.5560 %) and 'Objective Lens' (79.5483 %), and a 'Stage Z' input field with a 'Get' button. Below these is a section titled 'Interpolated Focus' containing three buttons: 'Set Focus 1', 'Set Focus 2', and 'Set Focus 3'.

1. Navigate to the first location.
2. Manually focus the image.
3. When the image is in focus, click **Set Focus 1**.

The current focus will be remembered for that point and the button is now selected.

4. Repeat for the other two **Set Focus** buttons.

Once all three are checked, tiles are ready to be acquired.

i **Note:** These points will be used to define a focus plane. All tiles will use a focus as defined by this plane. For best results, choose points at opposite ends of the sample.

To unset a focus point, click **Delete Focus** for that point.

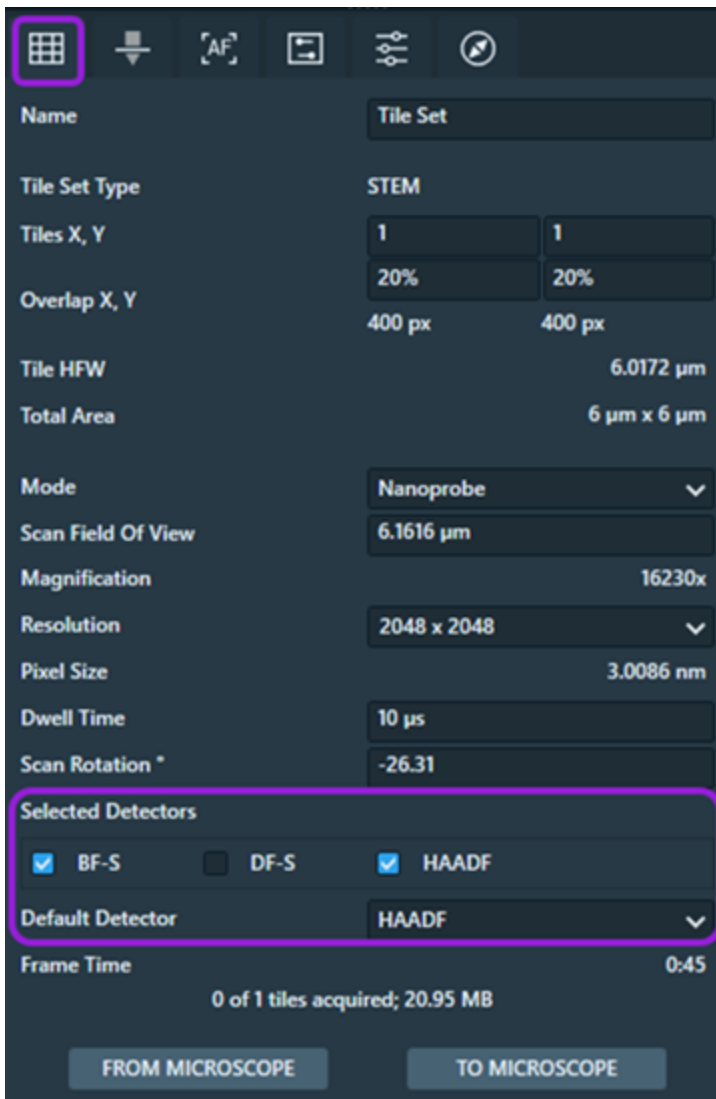
STEM Acquisition with Multiple Detectors

This topic describes how to set up tile set STEM acquisition with multiple STEM detectors.

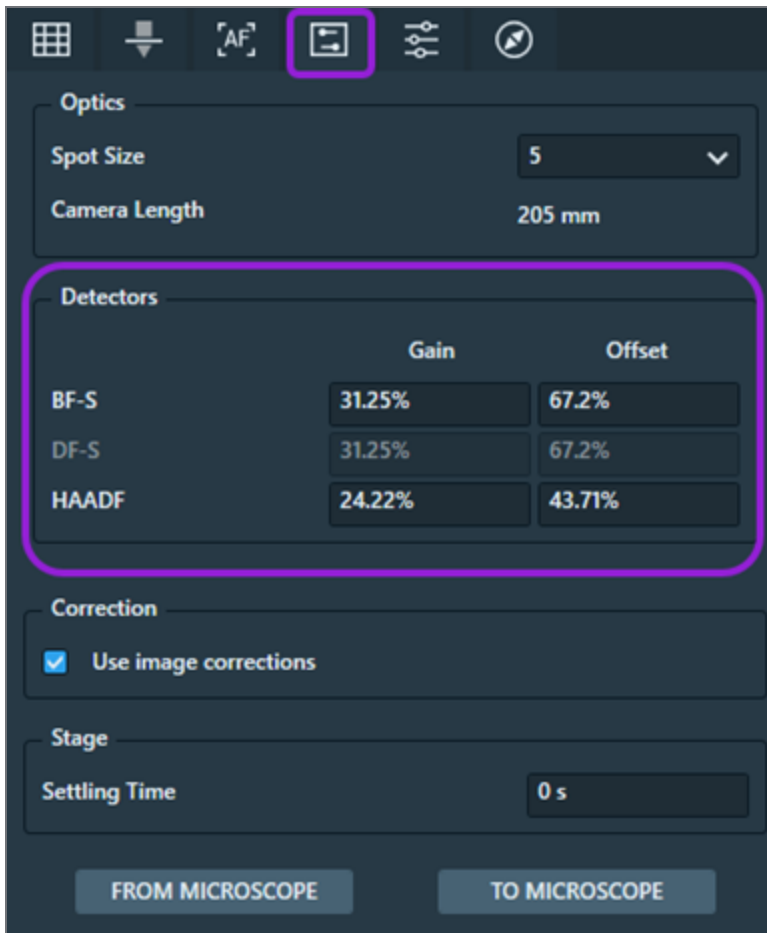
Create STEM acquisition with multiple detectors

Do the following to set up STEM acquisition with multiple detectors, do the following.

1. Define a new STEM tile set (see [Define a Tile Set for TEM](#)).
2. Click the Tile Set tab, and then select the checkbox of more than one detector within the **Selected Detectors** section. Detector choices depend on which detectors are available on the system.

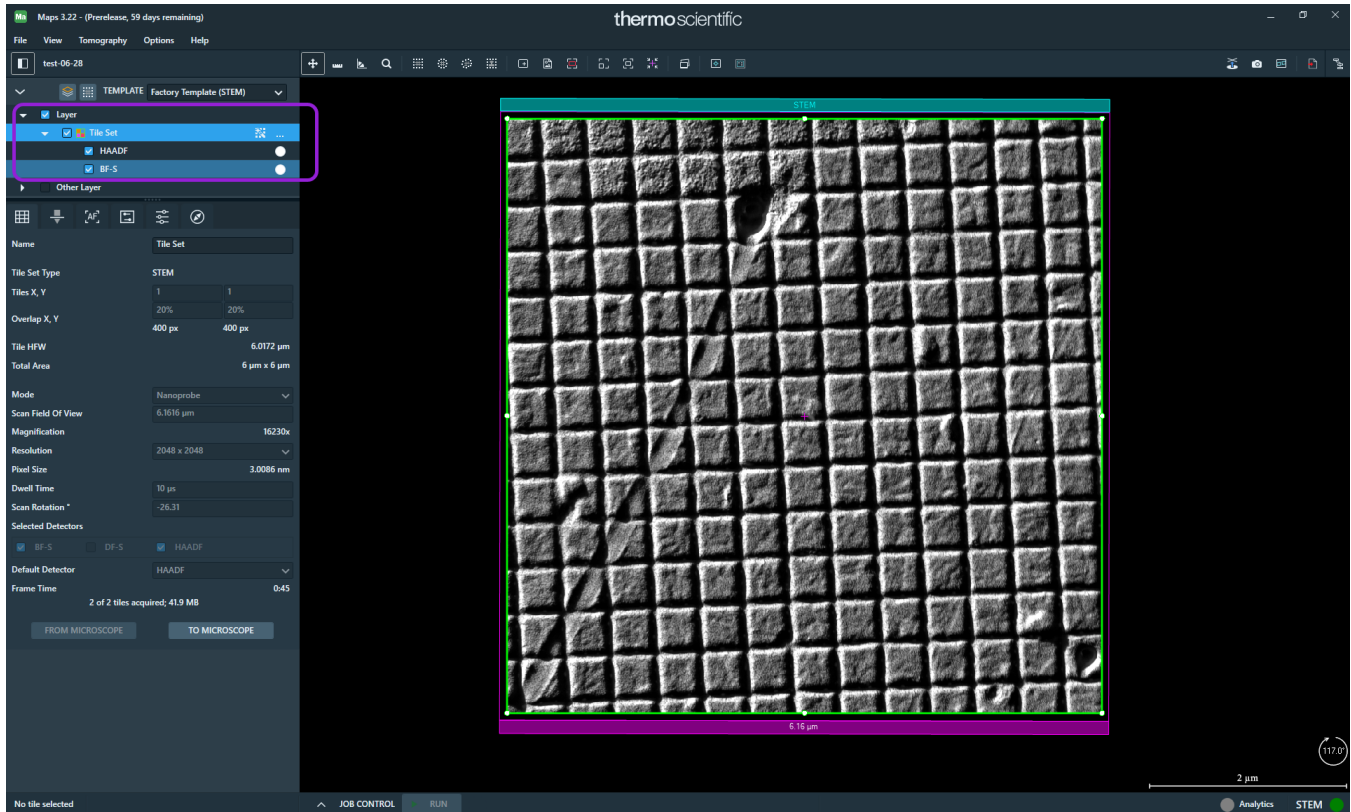


3. Select a default detector from the **Default Detector** dropdown menu. The default detector is used for operations that require only one detector (for example, autofunctions and stitching). The acquired images from the default detector automatically display in the main Viewer.
4. Click the Advanced tab and locate the Detectors section. Edit the values of the **Gain** and **Offset** fields as desired (see [Advanced group, STEM mode](#)). You can only edit the parameters of the detectors that you previously selected for acquisition. Unselected detectors are deactivated.

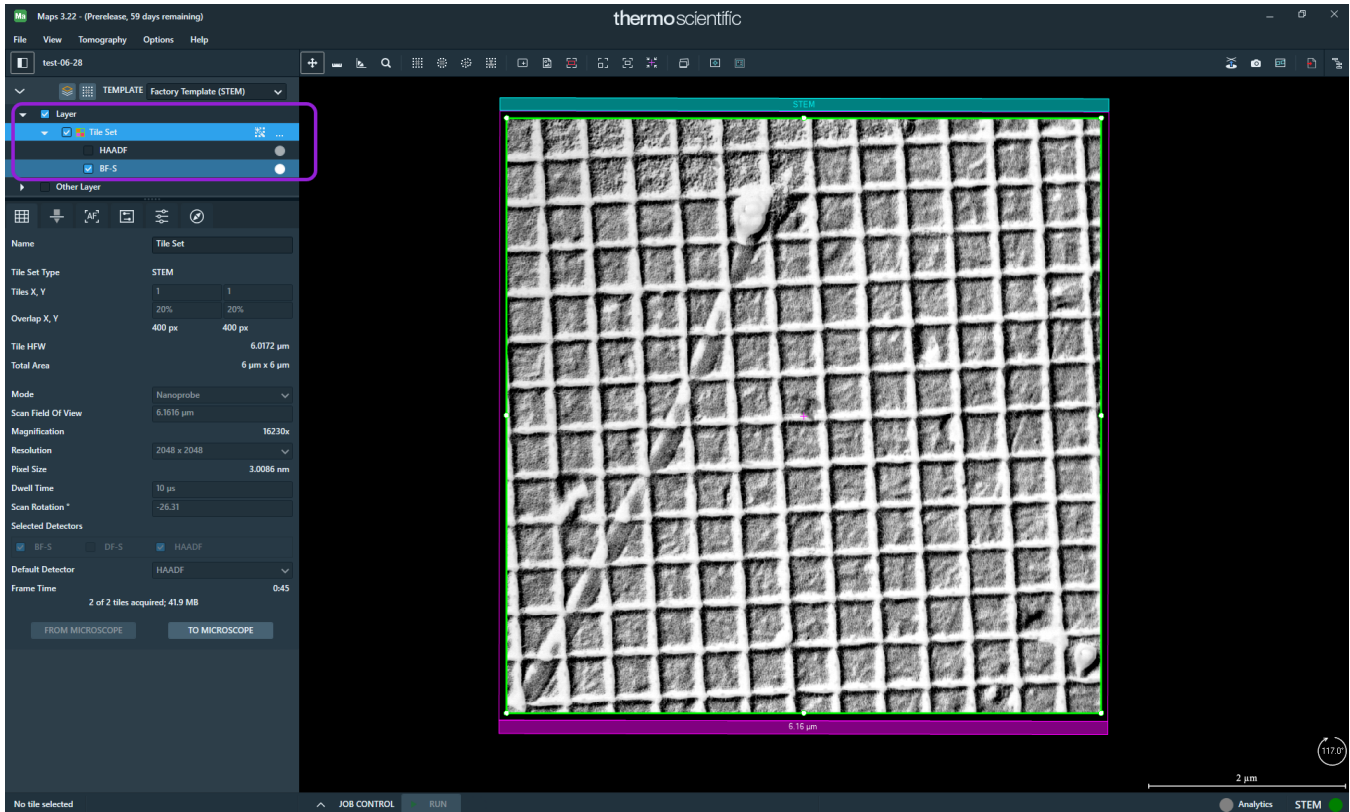


Result of multiple detector acquisition

The result of STEM acquisition with multiple detectors is a multichannel tile set in which each channel corresponds to each of the selected detectors. The channel with the default detector is always displays as the first channel and its acquired image is automatically displayed in the main Viewer.



To view images from other detectors, deselect the tile set channels above the selected tile set channel in the layer tree. In the example below, you can view the BF-S image because this tile set channel is selected and the HAADF tile set channel above it is deselected.



STEM Intermediate Images

This topic describes the intermediate images during STEM AutoFocus and the STEM Eucentric autofunction. Intermediate images are visual observations that display in the right-side panel of the Main Screen, which appears when autofunction starts and then disappears when autofunction stops.

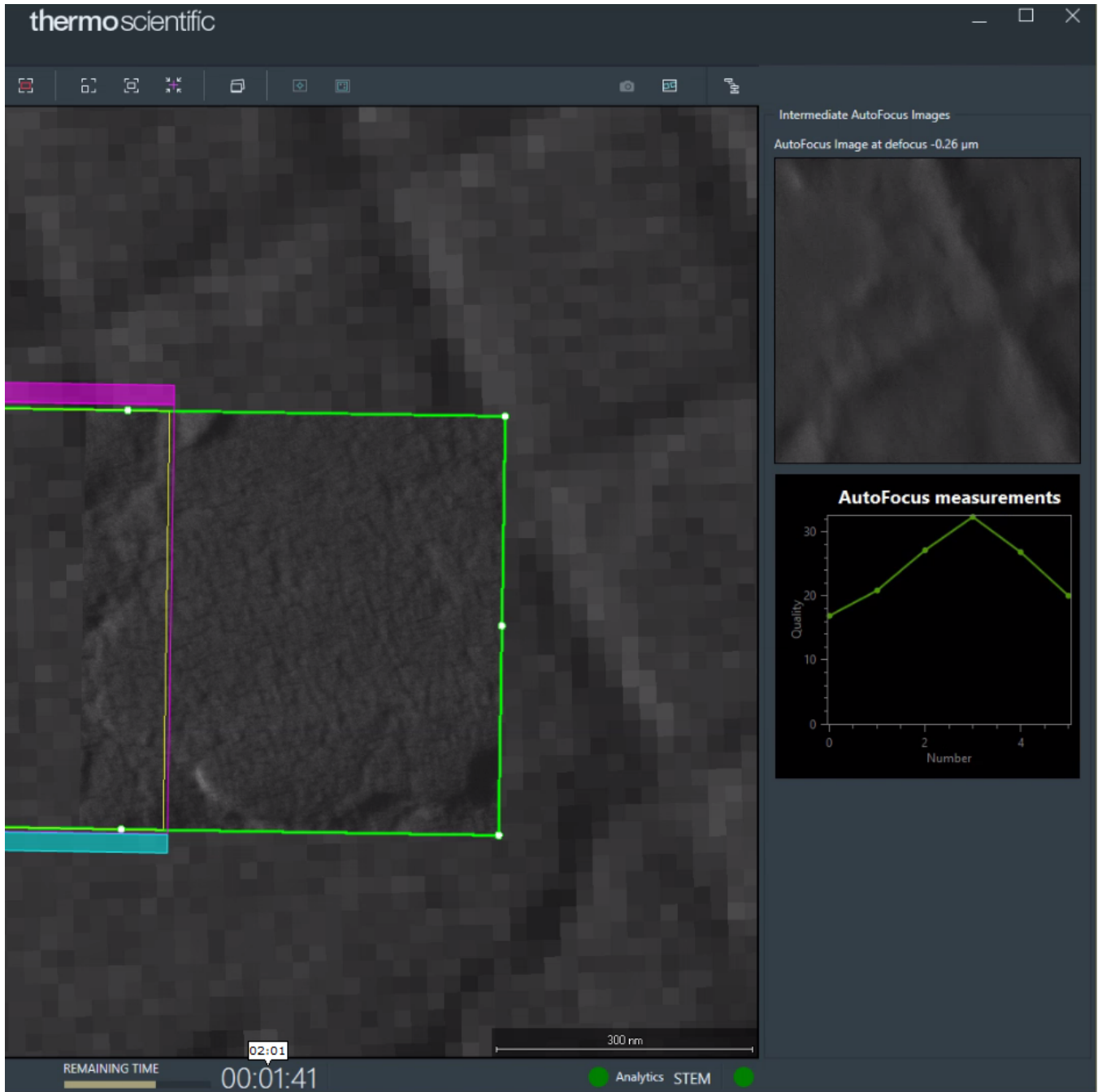
STEM Autofocus

You can observe the intermediate images acquired during the AutoFocus process to determine if the parameters used for AutoFocus are acceptable. The same feature can be found also in STEM Tomography software.

The AutoFocus image contains the defocus value for the image. A graph of the contrast quality appears directly below the intermediate image screen, and the contrast quality increases and then decreases within the range of different defocus values. When the graph reaches the maximum value for quality along the Y axis, then the image is focused.

**Note:**

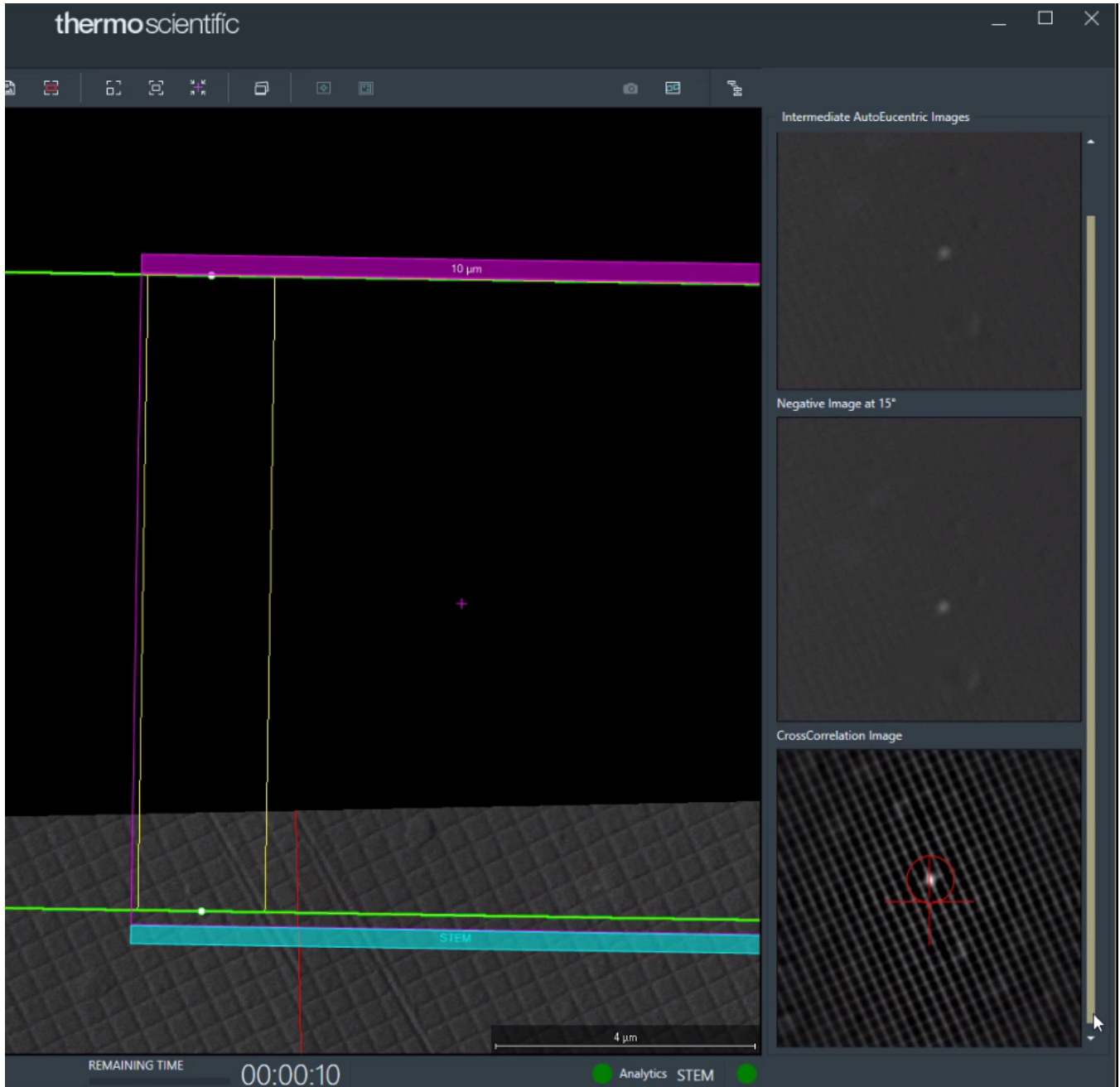
Quality is defined as a unitless number that is based on the measured contrast of the image.



STEM Eucentric Autofunction

You can observe intermediate images captured at different angles, typically between -15° and 15° , during the Eucentric autofunction measurement. You can also change the angle value by configuring the Final Stage Angle of the Eucentric autofunction (see [Configure autofunctions](#)).

A cross correlation image displays under the positive and negative images. The cross correlation image contains a crosshair cursor at the center of the image, as well as a circle marker at the position of the highest cross correlation peak.



Automated Image Filtering

This topic describes automated image filtering, which you can use to improve image shift calculation associated with TEM and EFTEM autofunctions.

Image shift calculation

TEM and EFTEM autofunctions are often implemented by calculating the shift between two images. For example, the Eucentric Height autofunction determines the eucentric height by minimizing shift between positive and negative tilt images. The image shift calculation typically uses the cross-correlation of the Fourier transform for the images. Depending on the specimen and the required imaging conditions, there are multiple factors that can decrease the reliability and accuracy of the image shift calculation.

- Recurring patterns in the specimen can cause false peaks in the cross-correlation at various shifts. The peaks are related to the pattern rather than a distinct feature in the specimen.
- The signal-to-noise ratio of the images influences the quality of the cross-correlation. Especially in low-dose conditions, the signal counts can be so low, that recurring patterns and noise in the dark and gain reference images can be interpreted as features of the specimen. Because the reference images are identical in all acquired images, the cross-correlation image may show a peak at zero shift.
- A Fourier transform is based on the assumption that the image can be extended periodically in all directions. In practice, however, the image is finite and has edges. This results in artifacts in the Fourier transform, such as horizontal and vertical lines (for example, when the image is dark on one edge and bright on the opposite edge). These artifacts can have a negative impact on the accuracy of the image shift calculation.

To overcome these factors, you can use automated image filtering to do the following:

- Improve the sharpness and relative height of the peak in the cross-correlation by enhancing features of a specific size range.
- Reduce artifacts introduced by the edges of the image.
- Decrease or eliminate the peak at zero shift.

Automated image filtering

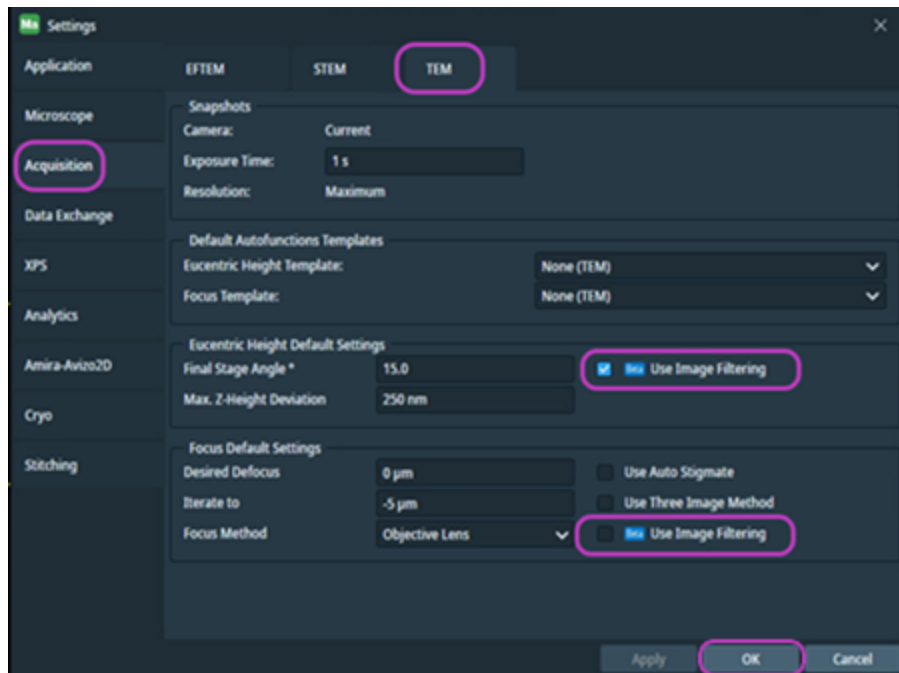
With automated image filtering, the Maps software application selects the following set of filters and tunes them automatically by using recommended default values.

- **Band Pass filter:** Enhances features of size range between 1/200 of FOV width and 1/20 of FOV width.
For example, when running automated eucentric height at 7500X magnification with FOV width of 4 μm , enhances features between 20 nm and 200 nm in size.
- **Hanning Window filter:** Reduces artifacts introduced by the edges of the image.
- **Suppress Zero Peak filter:** Decreases or eliminates the peak at zero shift.

Configure automated image filtering

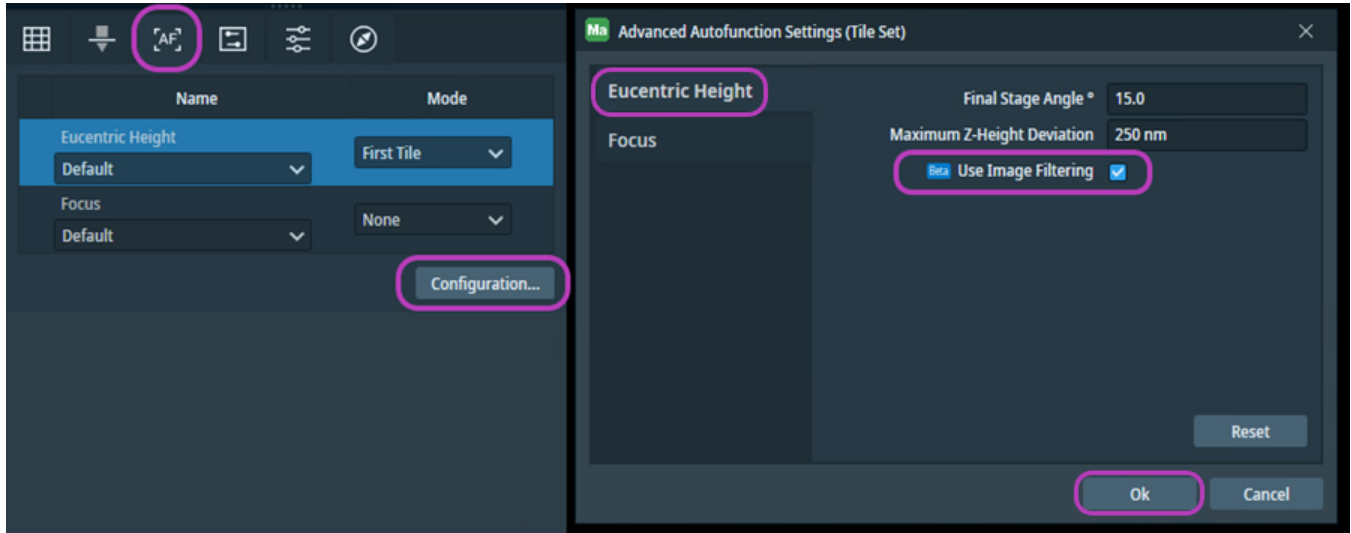
You can configure automated image filtering as the default setting *for all new tile sets* through the application settings. If desired, you can also override the default setting for all new tiles sets and configure the automated image filtering *for a specific tile set* through the tile set tab.

To configure the default setting in TEM mode (or EFTEM mode) *for all new tile sets*.



1. Click the TEM **Options** menu >> **Settings...** menu >> **TEM** tab (or **EFTEM** tab) >> **Acquisition** tab.
2. Under the Eucentric Height Default Settings section, click the **Use Image Filtering** check box.
3. Under the Focus Default Settings section, click the **(Beta) Use Image Filtering** check box.
4. Click **OK**.

To override the default setting and configure the automated image filtering *for a specific tile set* through the tile set tab (TEM and EFTEM modes).



1. Under the tile set tab, click the **Autofunction** tab.
2. Click **Configuration...** to open the Advanced Autofunction Settings (Tile Set) screen.
3. Click the **Eucentric Height** tab within the Advanced Settings (Tile Set) screen.
4. Click the **(Beta) Use Image Filtering** check box.
5. Click the **Focus** tab within the Advanced Autofunction Settings (Tile Set) screen.
6. Click the **(Beta) Use Image Filtering** check box.
7. Click **OK**.

TEM Analytics

With the Analytics plug-in, the Maps software can acquire EDS data through a software application interface with Thermo Scientific Velox™.



Note: This plug-in is not be confused with Maps Min or Generic Detector Interface (GDI).

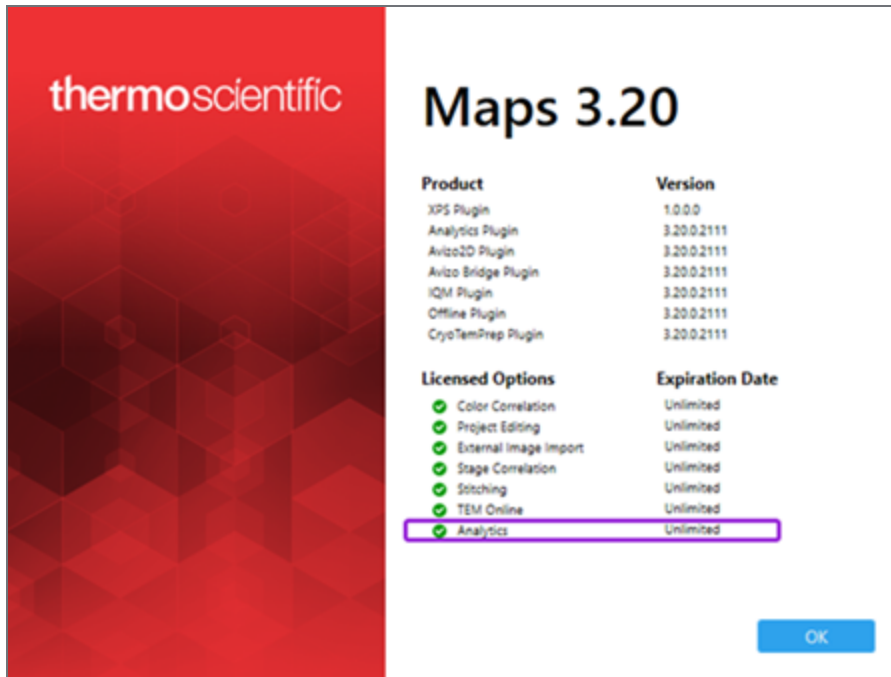
Preparation for TEM Analytics

Preconditions

To run Analytics, your Maps installation must include the following components:

- At least one software package from a provider for EDS acquisition
- An Analytics plug-in with the correct license

To verify that your license includes the Analytics plug-in option, on the **Help** menu, click **About**.



Analytics Workflow for TEM

The Analytics workflow explains how to set up and activate the Velox software on your TEM system before you define a tile set. It also explains how to configure Analytics, acquire a tile set, and view the results of the acquisition.

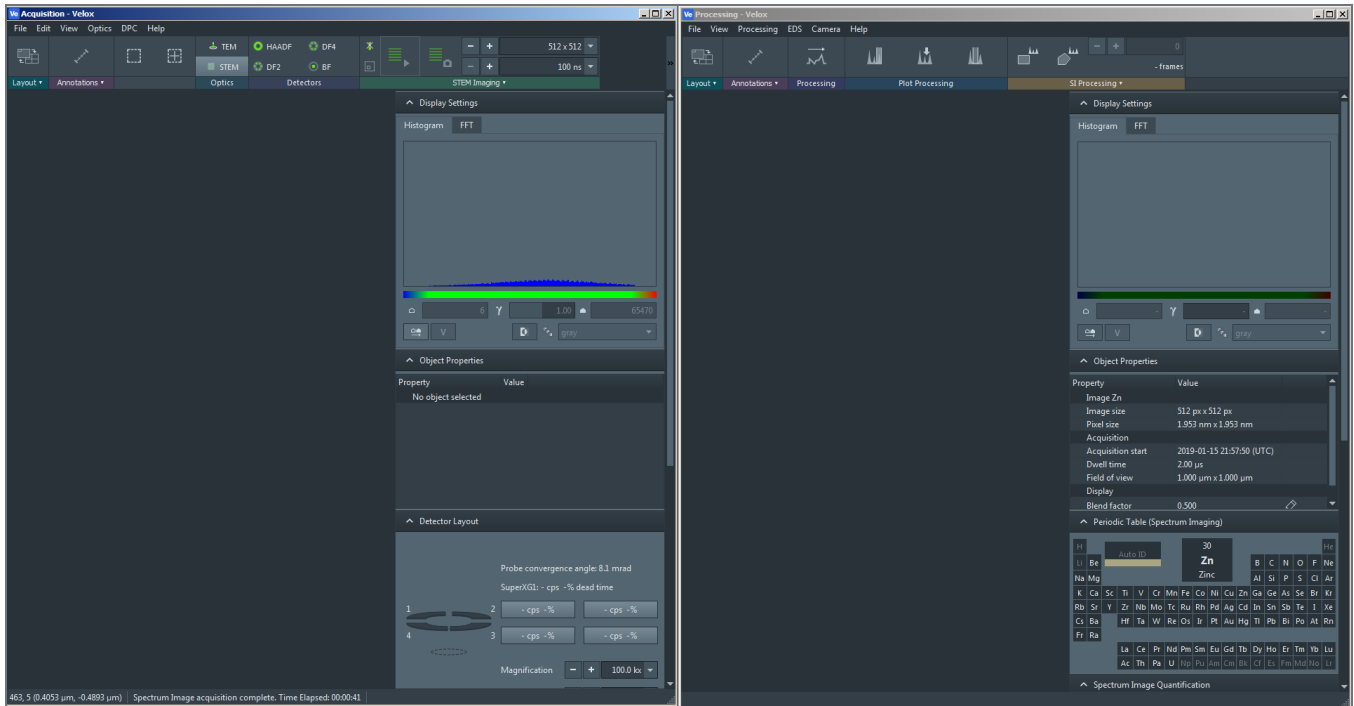
Proceed with the workflow in the following order:

1. **Set Up Velox Software:** Before you acquire EDS images in Maps with Velox, you must set up the Velox software.
2. **Activate Velox Software:** To perform the initial configuration for Analytics, you must activate Velox in Maps.
3. **Define a Tile Set:** Use the normal procedure to define a tile set, and then navigate to the tile set section and click the **Analytics** tab.
4. **Configure Analytics for Acquisition:** Configuration depends upon which EDS acquisition software you have, either Velox or Bruker. Follow the instructions for your specific EDS acquisition software.
5. **Acquire a Tile Set:** Use the normal procedure to acquire an Analytics tile set.
6. **View Results of Acquisition:** Once an Analytics tile set has finished acquisition, you can view the results in the layer tree and the Results pane.

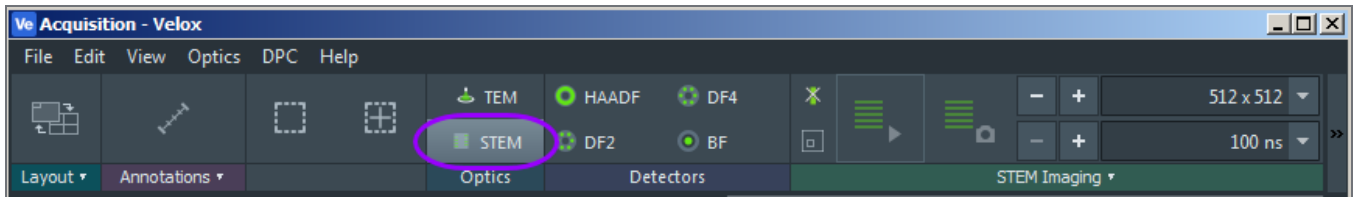
Set Up Velox Software

Before you acquire EDS images in Maps with Velox, you must set up the Velox software.

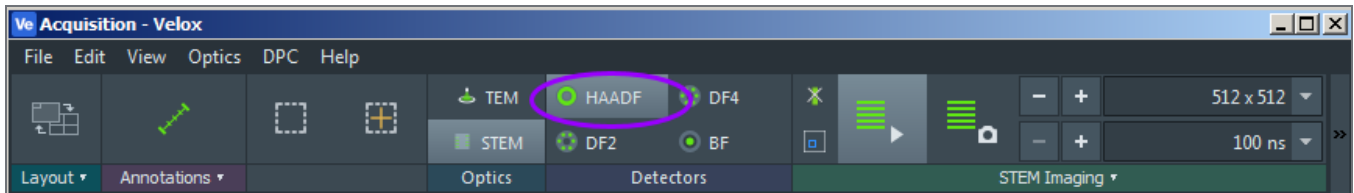
1. Launch the Velox software application to the Acquisition and Processing screens.



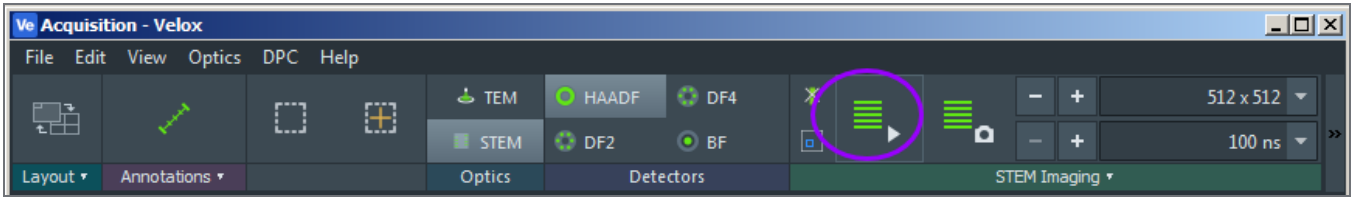
2. In the Acquisition screen, under the Optics pane, click **STEM**.



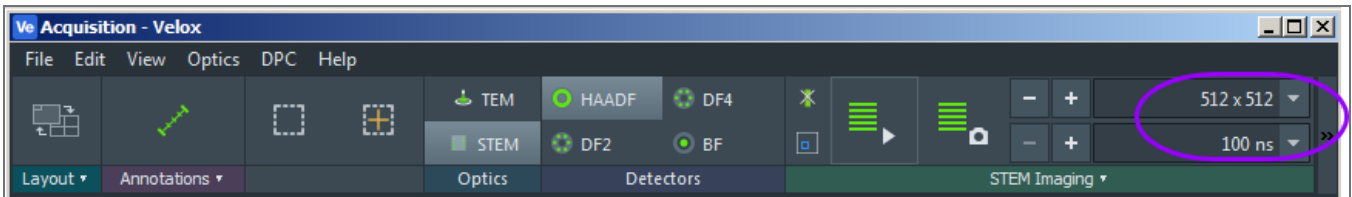
3. Within the Detectors pane, click **HAADF**.



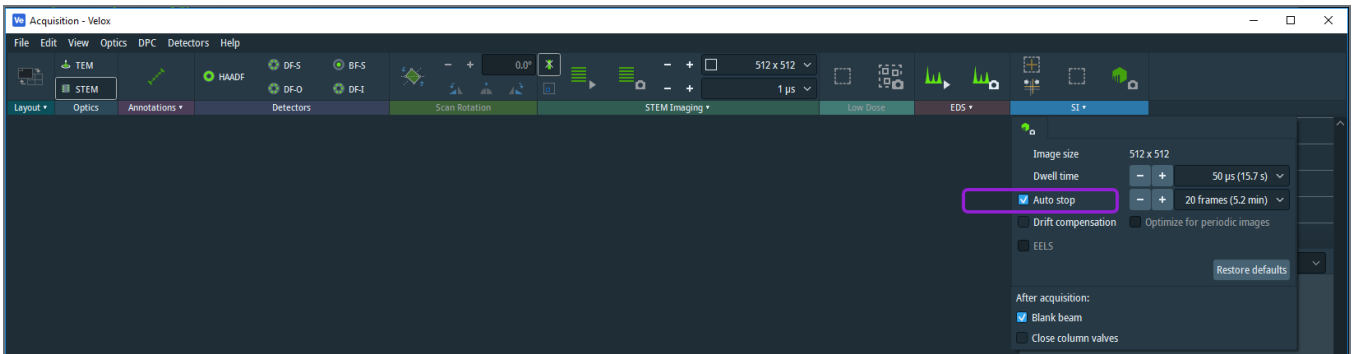
4. Within the STEM Imaging pane, click the Scanning button to pause.



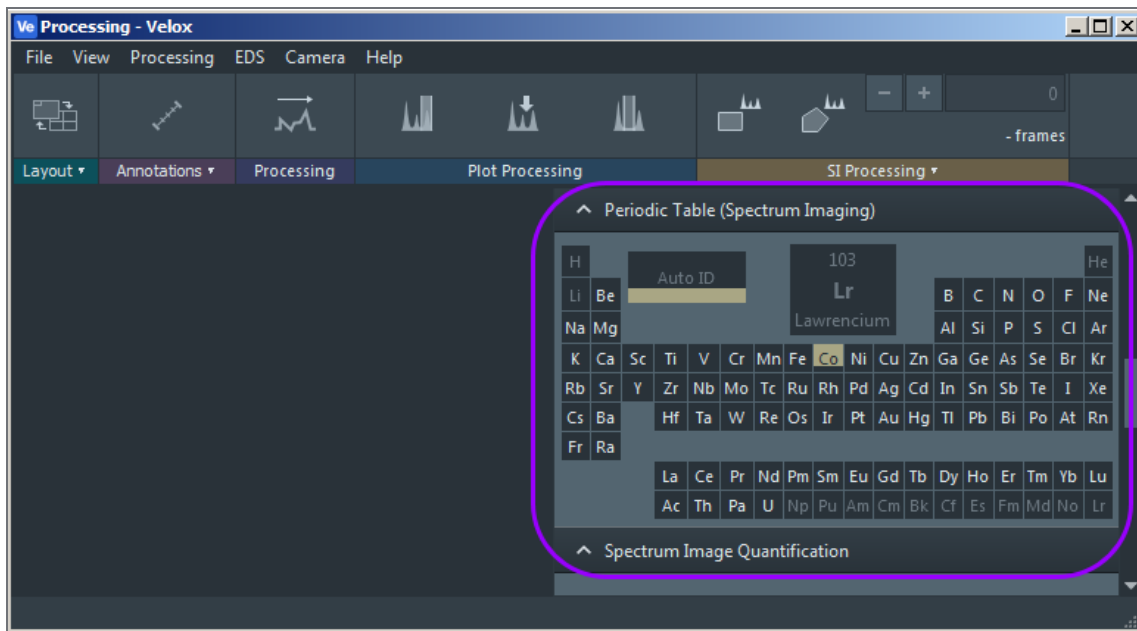
5. Within the STEM Imaging pane, change the resolution to match the tile set resolution in the Maps application.



6. Within the SI pane expander, select **Auto stop**.



7. In the Processing screen, click to the elements of interest under the Periodic Table (Spectrum Imaging) pane.

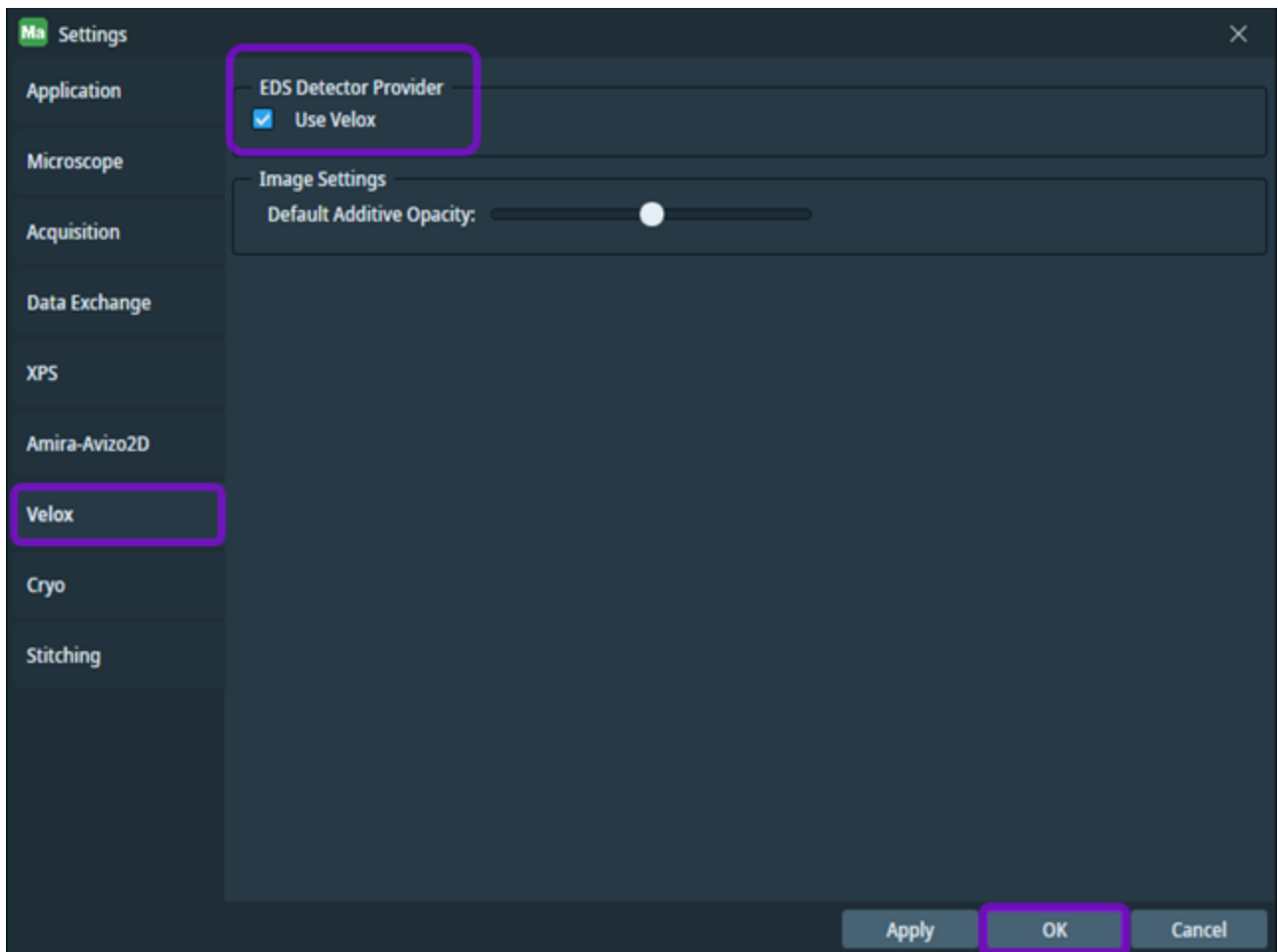


8. Go to [Activate Velox Software](#).

Activate Velox Software

To perform the initial configuration for Analytics, you must activate Velox in Maps.

1. Under the **Options** menu, click **Settings**.
2. Click the **Velox** tab, and then select the **Use Velox** check box.
3. Click **OK**.



4. Restart the Maps software application.
5. After restarting Maps, a green status icon appears next to the Velox label on the status bar to confirm success.

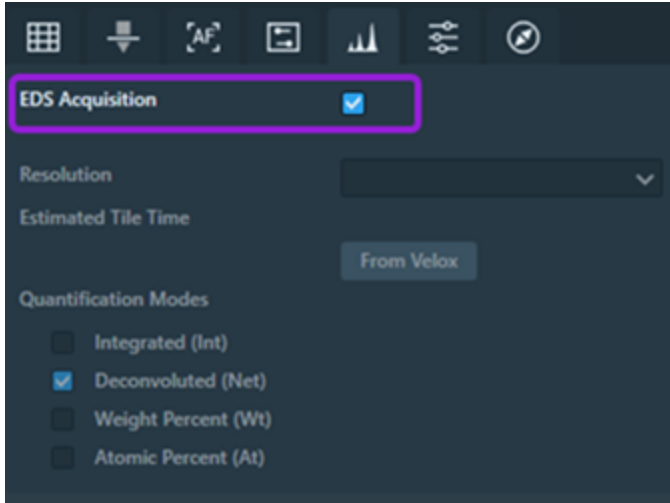


Configure Analytics for Acquisition

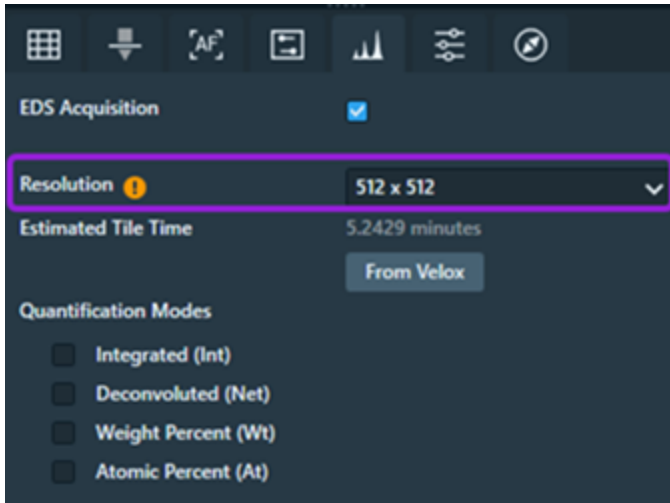
Most Analytics details are set up in the software packages from the EDS acquisition providers. If you are using Velox software for EDS acquisition, then follow the setup instructions below. If you are using Bruker software for EDS acquisition, then follow the instructions under [Set up Bruker Analytics](#).

Set up Velox Analytics

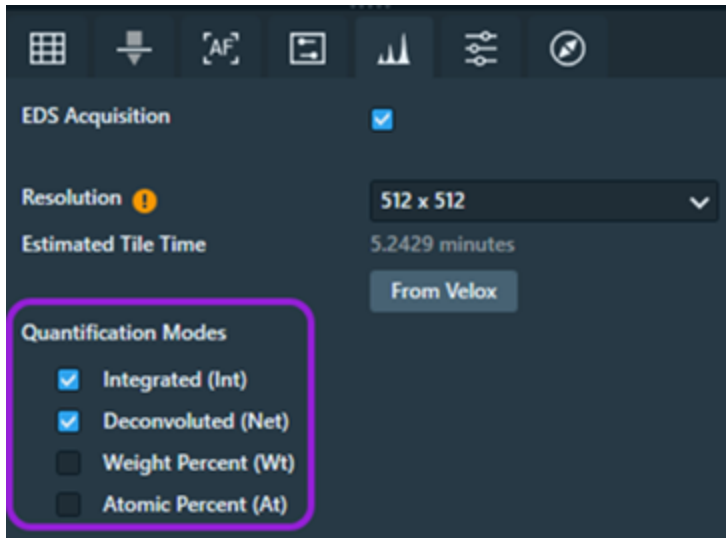
1. Select the **EDS Acquisition** check box.



2. If the Velox software did not provide the required fields, then Maps shows a warning icon and activates the Resolution dropdown menu. Select the same value here that you selected when you set up the Velox software.



3. Select 1-4 quantification modes as desired.



Note: The tile set resolution must match the resolution of the image returned from the Velox application, so verify they are the same *before* acquisition begins. For example, resolution width: 512, and resolution height: 512.

The tile set is now set up and ready for acquisition. If you change parameters on the tile set (specifically anything related to resolution), then you might need to run the setup again. See [Configure Analytics for Acquisition](#).

Set up Bruker Analytics

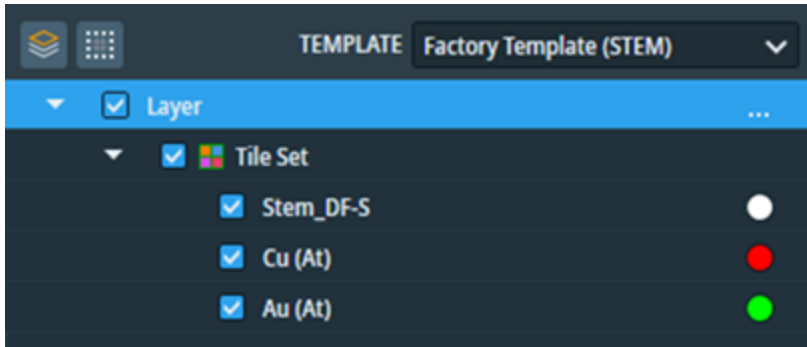
Follow the procedure in the [Configure Mineralogy Acquisition](#) section.

View Results of Acquisition

Once an Analytics tile set has finished acquisition, you can view the results in the layer tree and the Results pane.

Layer tree

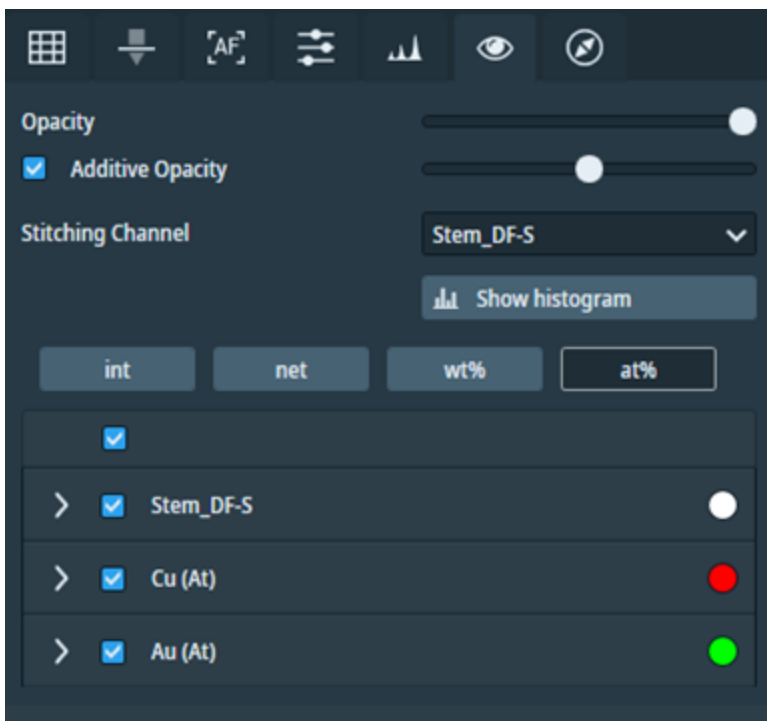
In the layer tree, the tile set has a collection of layers within it that corresponds to each element and STEM image.



- Click the colored circle on the right to change the color of the element layer.
- Select the check box on the left side of the layer to toggle visibility.

Results tab

The Results tab of the tile set shows the list of channels for the tile set, which corresponds to each of element and STEM image. You can expand each any of these channel controls by clicking in the channel header.



In expanded control, you can modify the channel and view the metadata collection of the given element and STEM image. An example of an expanded channel follows.

The screenshot shows a control panel for a STEM image channel. At the top, there is an 'Opacity' slider and a checked 'Additive Opacity' checkbox. Below this is a 'Stitching Channel' dropdown menu set to 'Stem_DF-S' and a 'Show histogram' button. A row of buttons includes 'int', 'net', 'wt%', and 'at%', with 'at%' selected. A checked checkbox is visible below the buttons. The main channel control area includes a 'Stem_DF-S' dropdown, an 'Opacity' slider, a 'Gamma' slider with a 'Reset' button, and 'Saturation' and 'Additive' checkboxes. An 'Add Color' button is also present. At the bottom, a metadata table is displayed with the following data:

ImageWidth	512 px
ImageHeight	512 px
ImageName	Image 1
Detector	DF-S
Optics	Stem
PixelSizeX	0.0232930828861061 μm
PixelSizeY	0.0232930828861061 μm
Dwell	2000 ns
Frames	0
StemMagnification	8600

Sample Holders

This section describes the sample holders that are available for Maps.

When a holder is selected and applied to the project:

- The outline displays in green on the viewer. The holder outline is red until it is aligned.
- The name, drawing, version, and so on are displayed on the Holder tab.
- A new Layer is added to the Layer Control. This is where you choose to show or hide the Holder outline and Fiducials. The Fiducials only show after image acquisition. The default is to not show them. Select the check box to view your fiducial images.

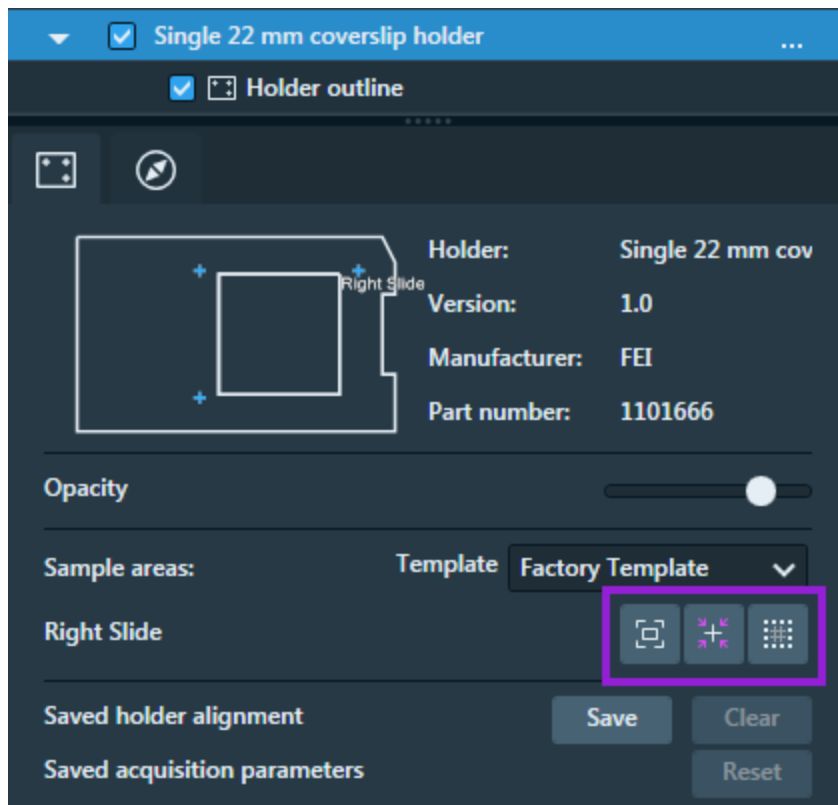
Refer to your application specialist for procedural information for each sample holder type.

Holder Tab

When a holder is selected and applied to the project:

- The outline displays in red on the viewer if automated holder alignment is supported. If automated alignment is not supported, then the outline displays in green.
- The name, drawing, version, and so on are displayed on the Holder tab.
- A new Layer is added to the Layer Control. This is where you choose to show or hide the Holder outline and Fiducials. The Fiducials only show after image acquisition. The default is to not show them. Enable the check box to view your fiducial images.

- The Left, Middle, and Right quick access buttons for the sample area appear adjacent to **Right Slide**.



- Left:** Centers the view on the sample area
- Middle:** Drives the stage to the center of the sample area
- Right:** Creates a new tile set that covers the sample area

Holders Supported for Automated Holder Alignment

When selected, the holder outline displays in red on the viewer, if automated holder alignment is supported. See [Automated Holder Alignment](#).

Topics include:

[3 mm Grid Holder](#)

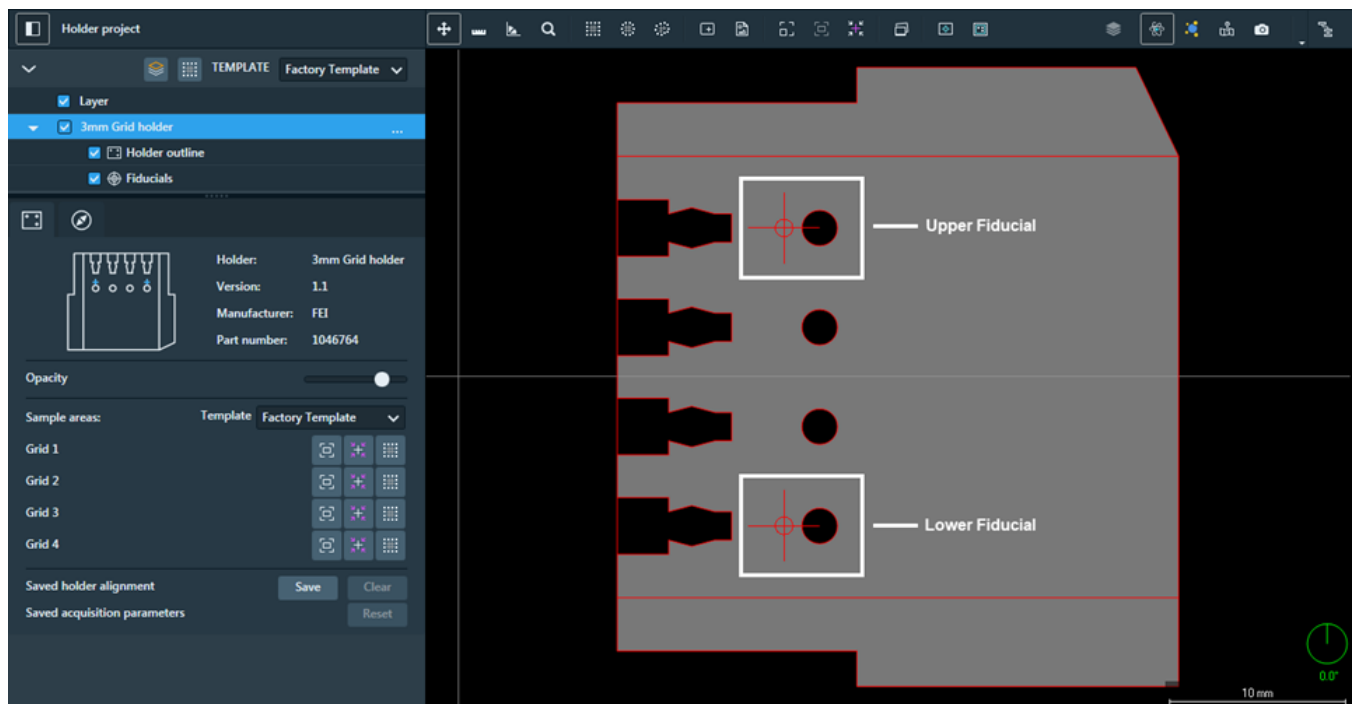
[Single 22 mm Coverslip Holder](#)

[Double 22 mm Coverslip Holder](#)

3 mm Grid Holder

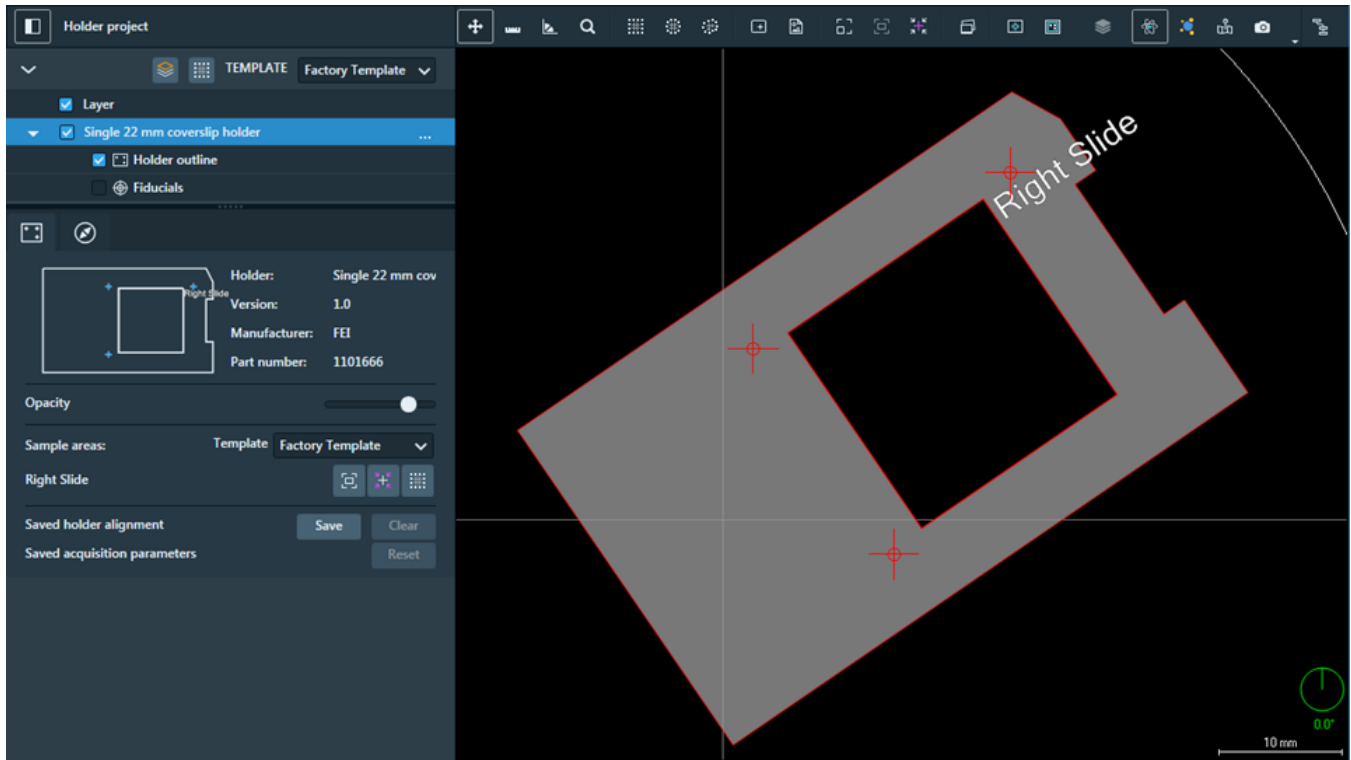
This is a holder for 3 mm diameter grids that can be loaded inside a transmission electron microscope (TEM).

3 mm Grid Holder with Upper and Lower Fiducials Marked



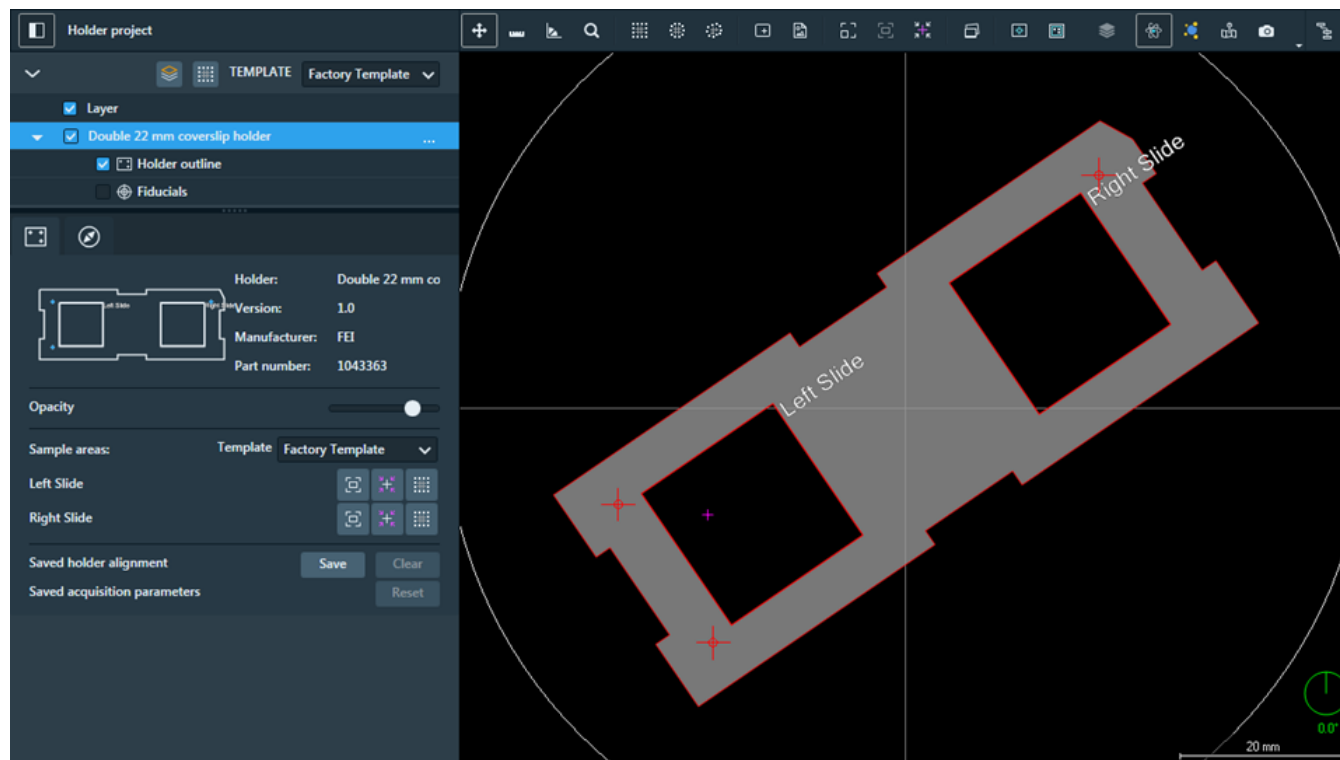
Single 22 mm Coverslip Holder

This is a single 22 mm coverslip holder.



Double 22 mm Coverslip Holder

This carrier holds up to two samples.



HOLDERS Supported for Graphical Overlay

Maps can draw a graphical overlay to assist with navigation. The graphical overlay can be aligned manually to other image layers, but the automated holder alignment is not supported on these layers.



Note: When selected, the holder outline displays in green on the viewer, indicating that automated holder alignment is not supported.

Topics include:

[Cryo Corsight Shuttle Holder](#)

[Cryo AquilosSEM Shuttle Holder](#)

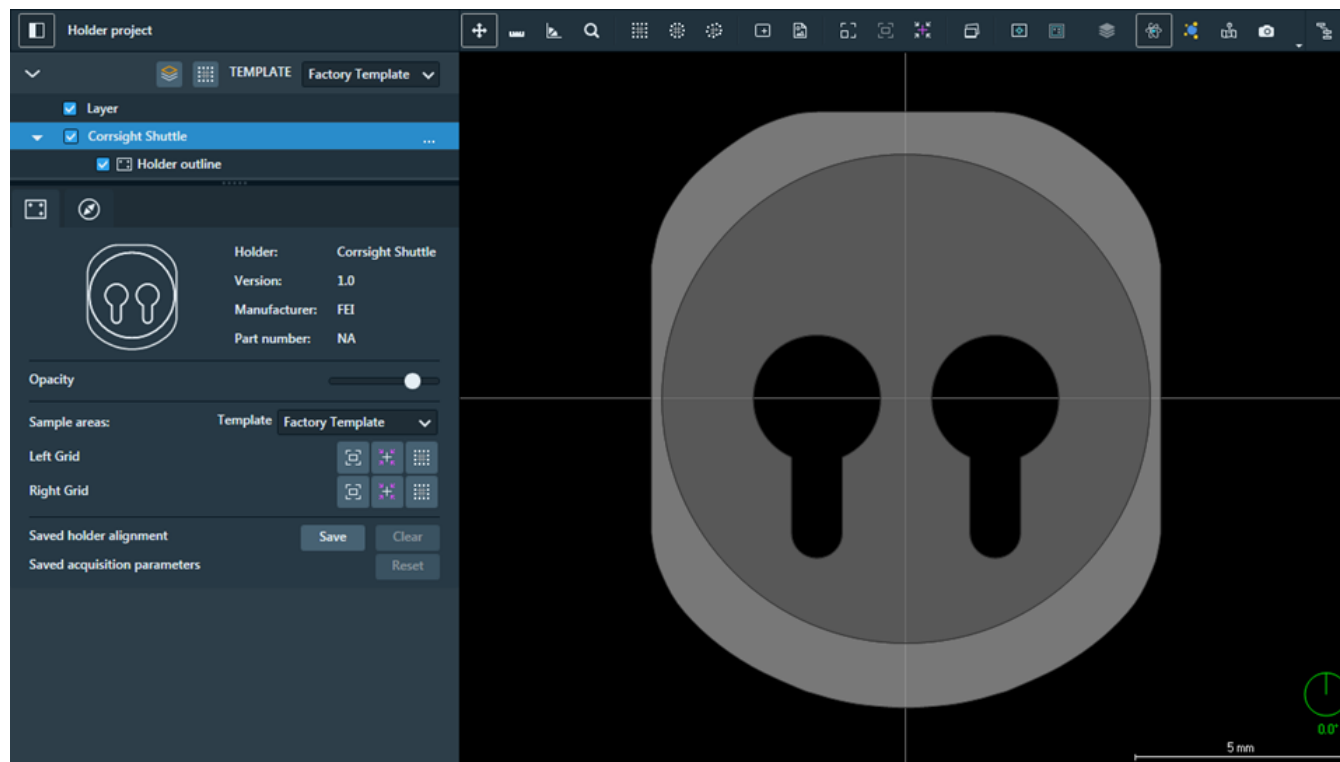
[Slide 75 mm x 25 mm Holder](#)

[12xthin-section Quanta Mount Holder](#)

[14 x 30 mm Round Quanta Mount Holder](#)

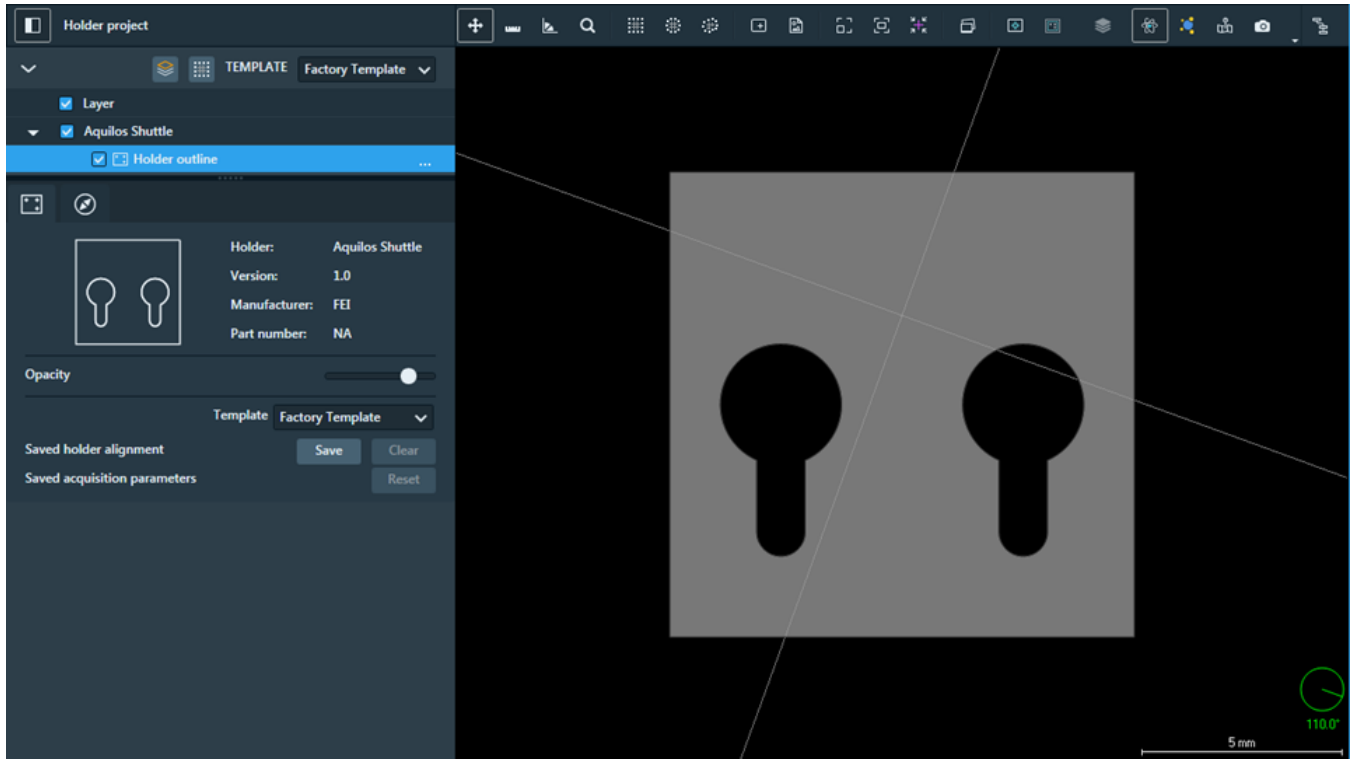
Cryo Corrsight Shuttle Holder

This holder can be connected to a cooling system for imaging samples at cryogenic temperatures.



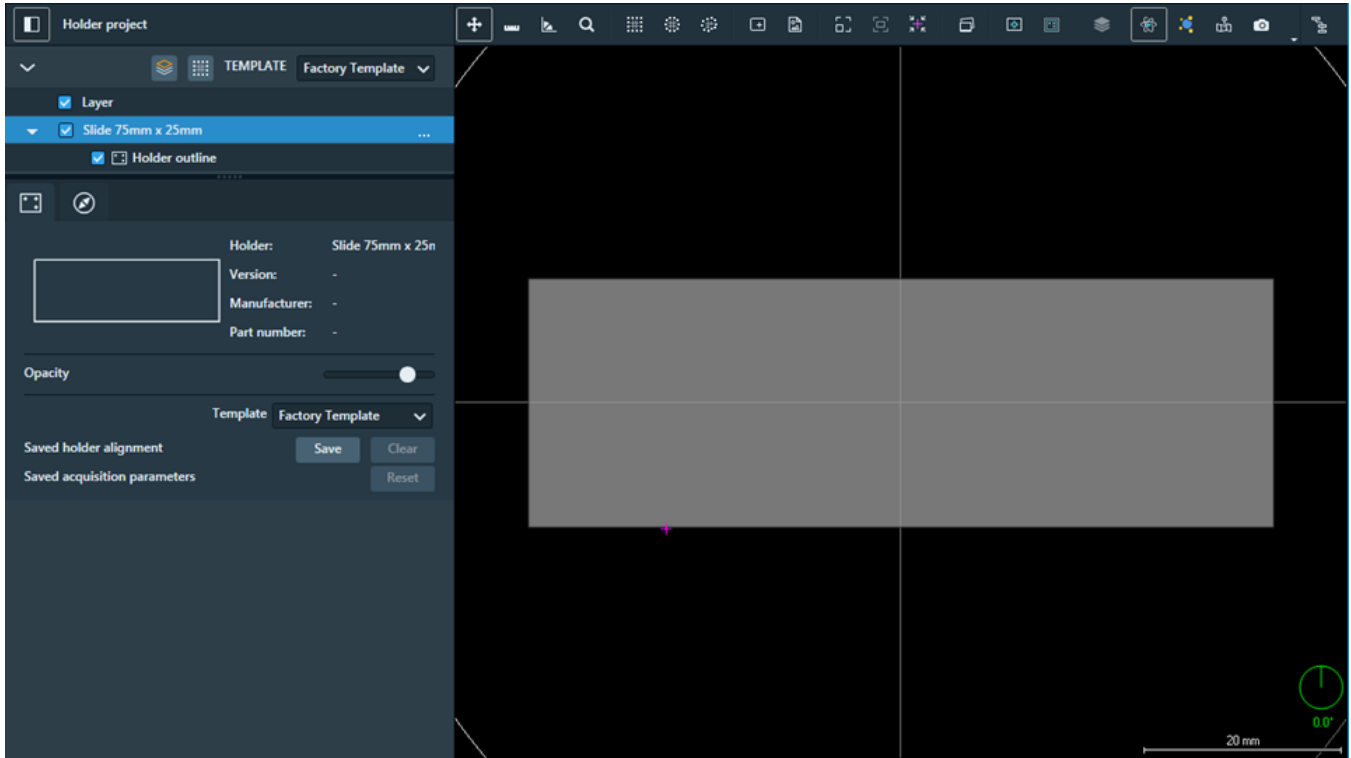
Cryo AquilosSEM Shuttle Holder

This holder is used for Cryo applications. It can be connected to a cooling system for imaging and sample preparation at cryogenic temperatures.



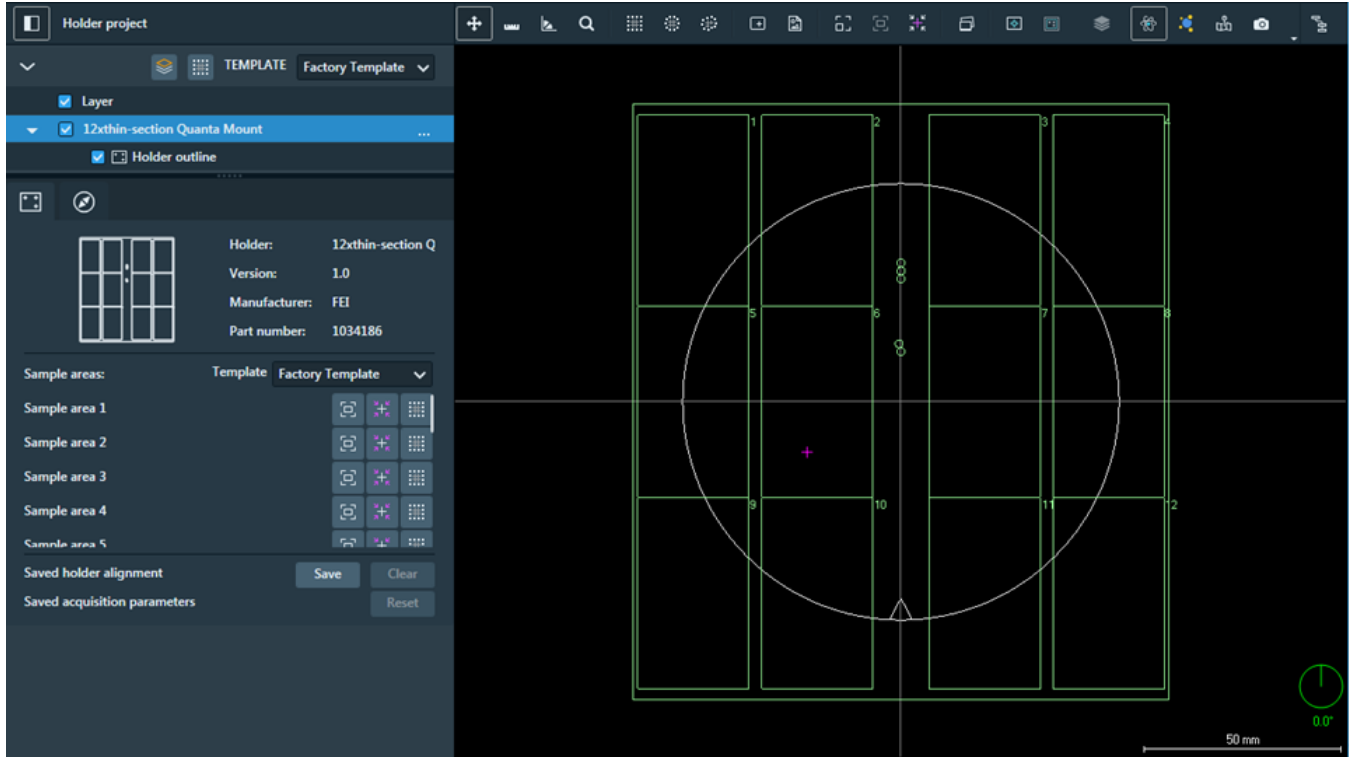
Slide 75 mm x 25 mm Holder

This holder represents a slide with dimensions 75 mm x 25 mm.



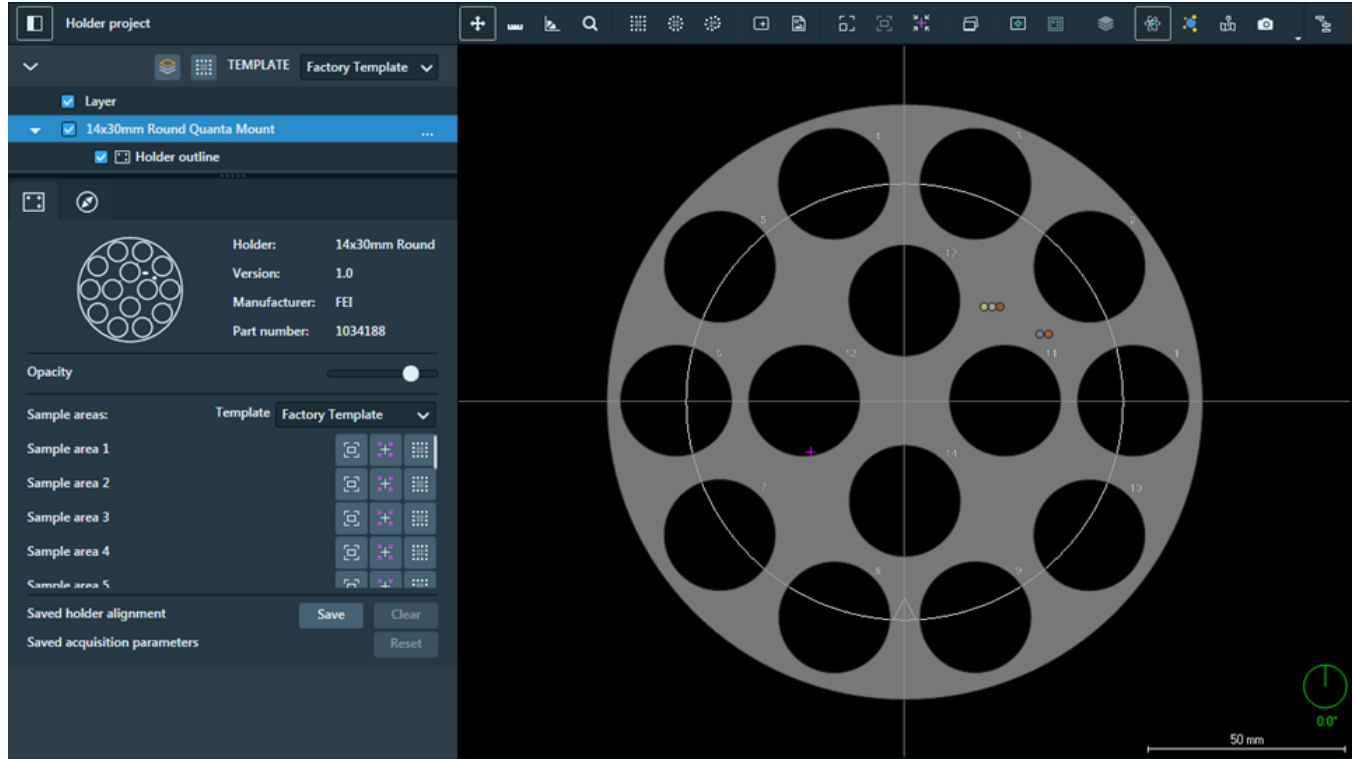
12xthin-section Quanta Mount Holder

This mount holder is designed to handle up to 12 thin mineralogy samples. The mount holder includes a Faraday cup; meets gold, quartz, and copper standards; and has a magnesium calcium position.



14 x 30 mm Round Quanta Mount Holder

This mount holder is designed to handle up to 14 samples of 30-mm resin embedded mineralogy samples. The mount holder includes a Faraday cup; meets gold, quartz, and copper standards; and has a magnesium calcium position.



Automated Holder Alignment

This section describes the procedure for automated holder alignment (AHA) setup, calibration, and operation for a particular supported holder on SEM/SDB systems. It is a guideline for using Maps and the automated holder alignment, and can also be used for SEM/SDB-only as well as multi-system correlative Maps projects.



Note: Automated Holder Alignment is not supported for Maps on TEM systems.

Topics include:

[Holders Supported for Automated Holder Alignment](#)

[Automated Holder Alignment User Interface](#)

[Execute Holder Alignment](#)

[SEM/SDB Holder Calibration](#)

[Correlating Projects](#)

[Problems with Alignment](#)

Holders Supported for Automated Holder Alignment

When selected, the holder outline displays in red on the viewer. They appear in green if automated holder alignment is *not* supported. See [Sample Holders](#).

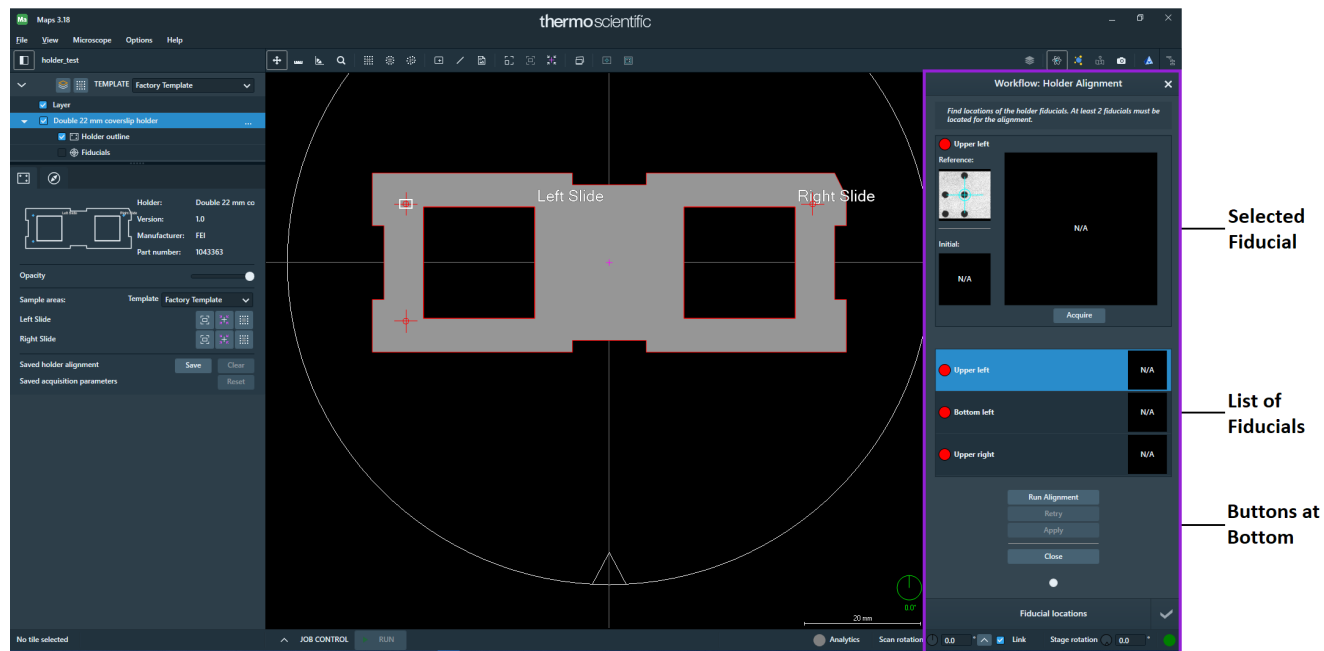
- [3 mm Grid Holder](#)
- [Double 22 mm Coverslip Holder](#)

All supported holders must be manually calibrated on a given system before Automated Holder Alignment is possible. This is a one-time procedure. After manual calibration is complete, little to no manual action will be required.


Automated Holder Alignment User Interface

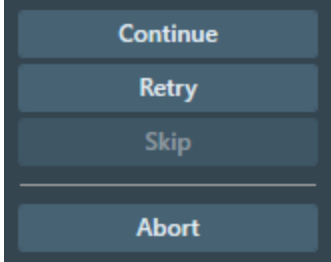
Click the **Align to Holder** icon in the tool box and select the appropriate holder from the **Sample Holder** dropdown menu to cause the Automated Holder Alignment user interface to appear next to the viewer.

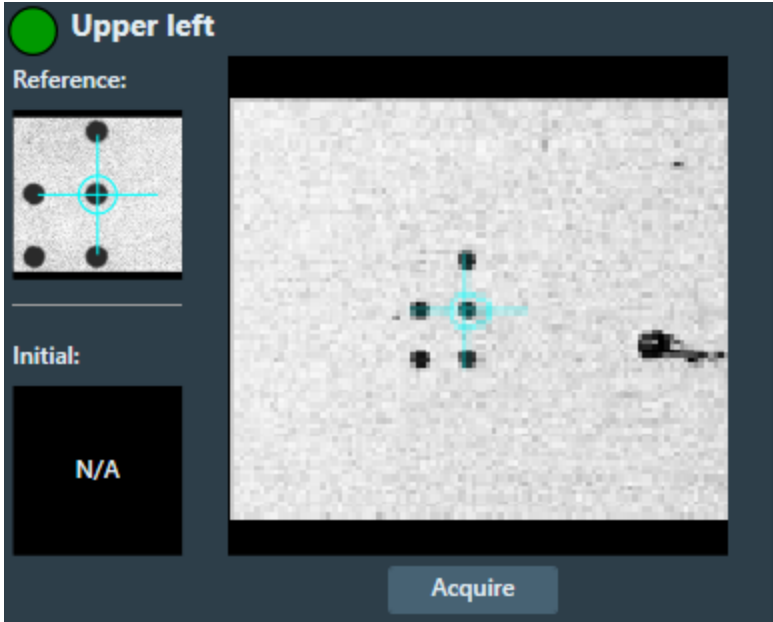
Automated Holder Alignment UI



Automated Holder Alignment UI Overview

Interface Item	Description
Buttons at Bottom (Before Starting Alignment):	
Run Alignment	Moves the stage to the position where it expects to find the fiducial, auto-focuses, and attempts to match the fiducial.

Automated Holder Alignment UI Overview(Continued)	
Interface Item	Description
Apply	Applies the alignment to the project if the alignment is not immediately applied when the automated procedure completes. This can be used if the automated alignment completes but manual adjustment is needed.
Close	Closes the alignment UI and returns to the main viewer before the automated procedure has begun.
Buttons at Bottom (During Alignment):	
Continue	On SEM systems, the automated holder alignment requires manual optimization of the image (contrast, brightness, focus, and so on). After the stage is automatically moved to the location of the first fiducial and the prompt for image optimization has appeared, use Continue to proceed with fiducial matching.
Retry	Autofocuses and attempts to match the fiducial. If the match is successful, the automated alignment procedure will continue to the next fiducial.
Skip	Skips the current fiducial matching procedure and proceeds to the next fiducial. This can be useful if Maps encounters difficulty matching, however, the best practice is to optimize the image for successful automatic matching or to manually select the fiducial position.
Abort	Cancels the alignment procedure currently in progress and returns to the main viewer.

Automated Holder Alignment UI Overview(Continued)	
Interface Item	Description
Fiducial Window	
Green/Red Ball	Indicates if the fiducial was found: Green = Found; Red = Not Found.
Fiducial Name	Displays the name of the fiducial. In this example, Upper Left.
Reference	Displays the reference image.
Initial	Displays the result of the previous alignment procedure for a project that has already been automatically aligned.
Current Fiducial Window	Displays the fiducial image acquired during the current automated holder alignment procedure.
Acquire	Acquires an image of the specified fiducial. Maps will move to the expected location for the specified fiducial and attempt to match.

Automated Holder Alignment UI Overview(Continued)

Interface Item	Description
Fiducial Markers for Matching	<p>The fiducial marker is placed on the fiducial image as a point of reference. Maps will align these reference points during alignment.</p> <ul style="list-style-type: none">• Light Blue markers are used in the reference images to display the reference point that the automated procedure expects to find. Light blue markers are also automatically placed on the fiducial image when a match is successful.• Light green markers denote the reference points from the previous alignment procedure and appear in the initial fiducial images.

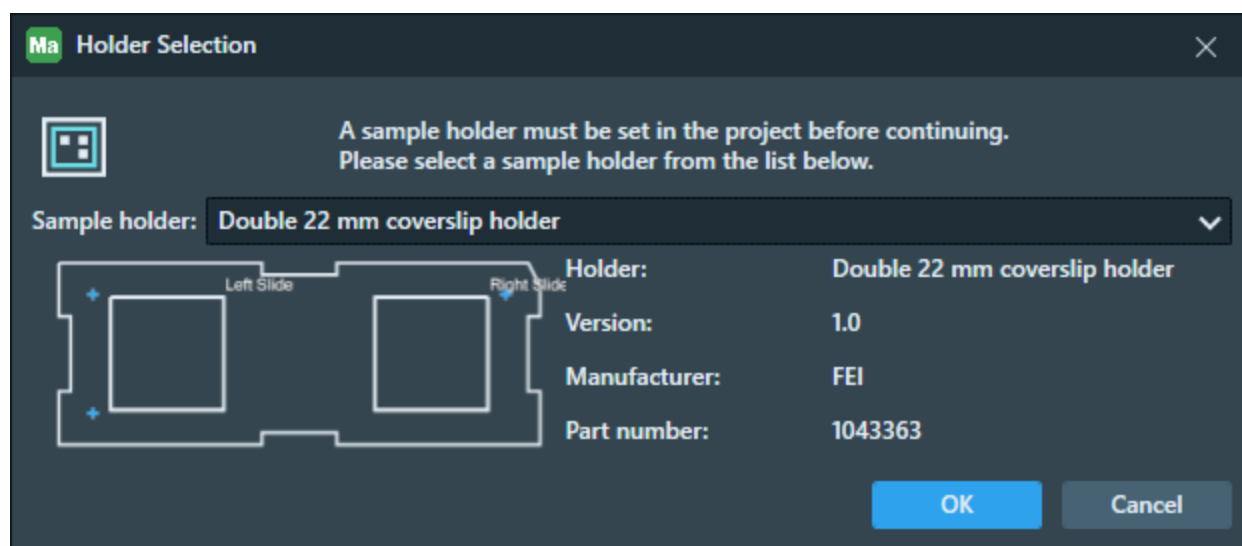
Execute Holder Alignment

When using a sample holder that has already been calibrated on your microscope, the following procedure describes how to execute the alignment sequence.

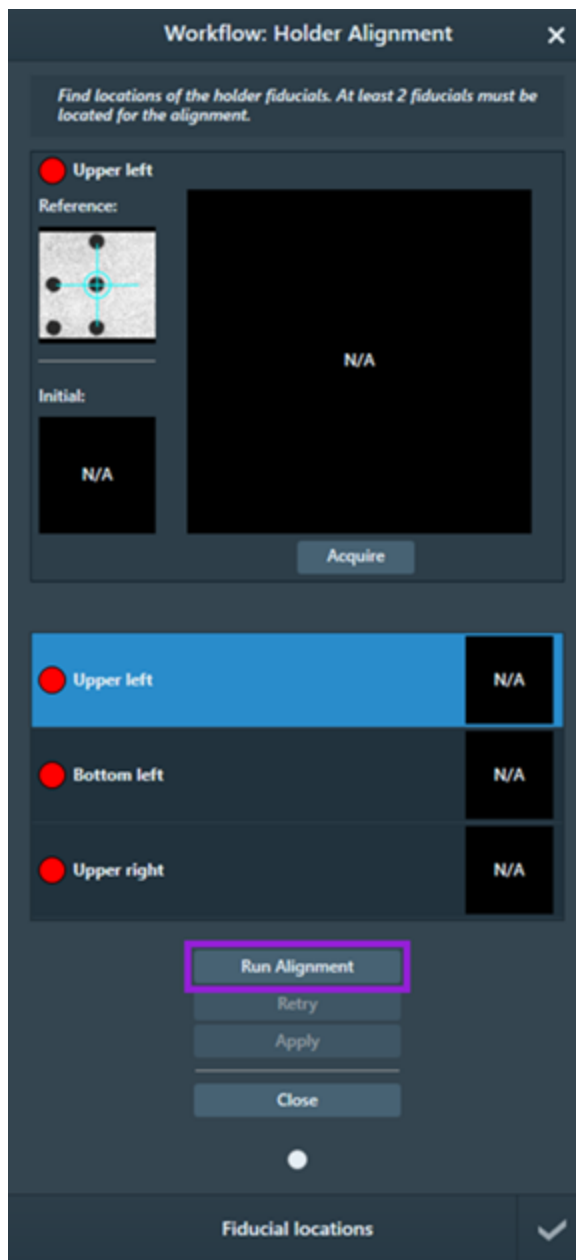
1. Click **Align to Holder** icon.



2. Select the same holder that was just calibrated, in this case **Double 22 mm coverslip holder**, and then click **OK**.



3. Click **Run Alignment**. The Alignment proceeds automatically.



- If the automated alignment is able to match all fiducials successfully, the holder calibration is complete.
- If the alignment failed to recognize any of the fiducials, then perform the calibration procedure (see [SEM/SDB Holder Calibration](#))

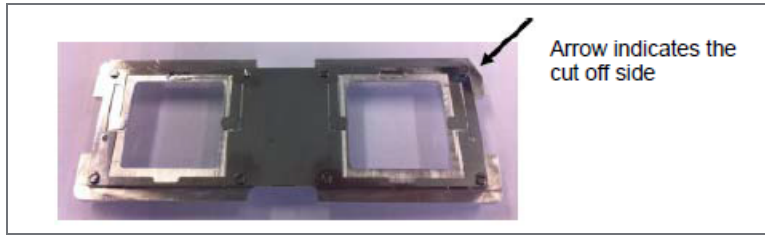
SEM/SDB Holder Calibration

This topic explains the procedure for calibrating a SEM/SDB holder.

Mount the Coverslip Holder and Adaptor to the Stage

Follow this procedure to mount the Double 22 mm coverslip holder and adaptor to the stage.

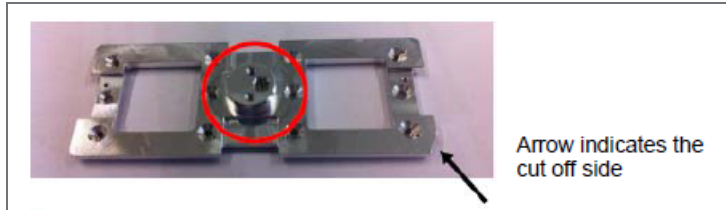
Top View of the Holder



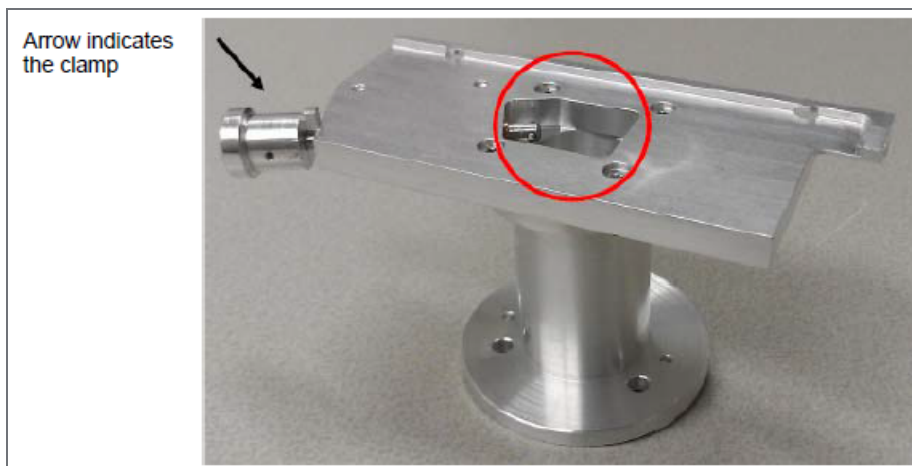
The holder only fits in the adaptor in one position.

1. Withdraw the clamp and place the holder with the cut off side facing the clamp in the holder. The holding device (encircled in red) fits the hole (encircled in red) in the adaptor.

Bottom View of the Holder

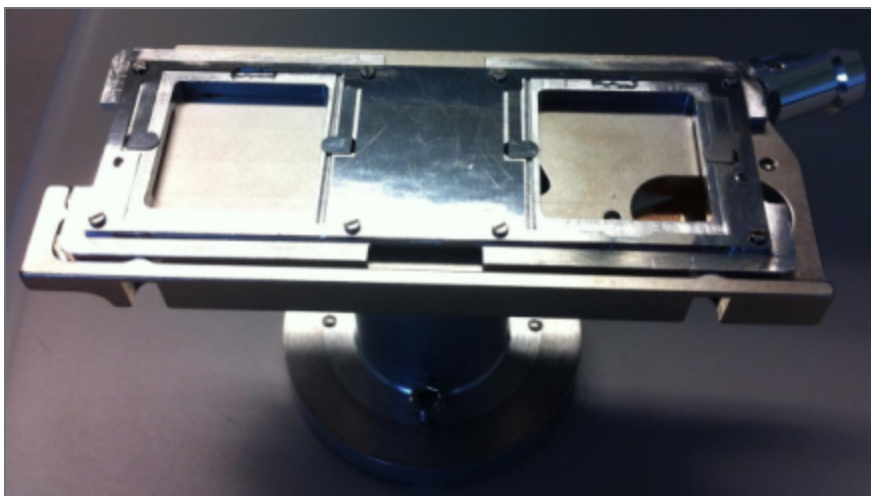


6 inch Stage Adaptor for Double 22 mm Coverslip Holder



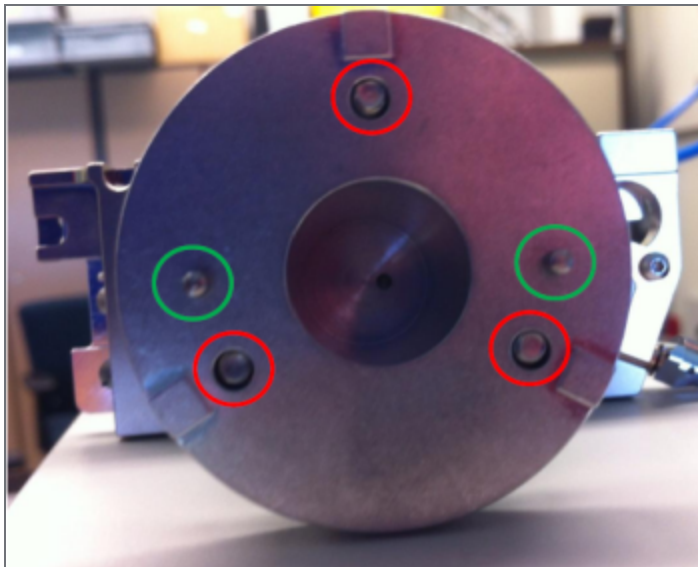
2. If the holder is positioned, then release the clamp.

Holder Positioned on Adaptor

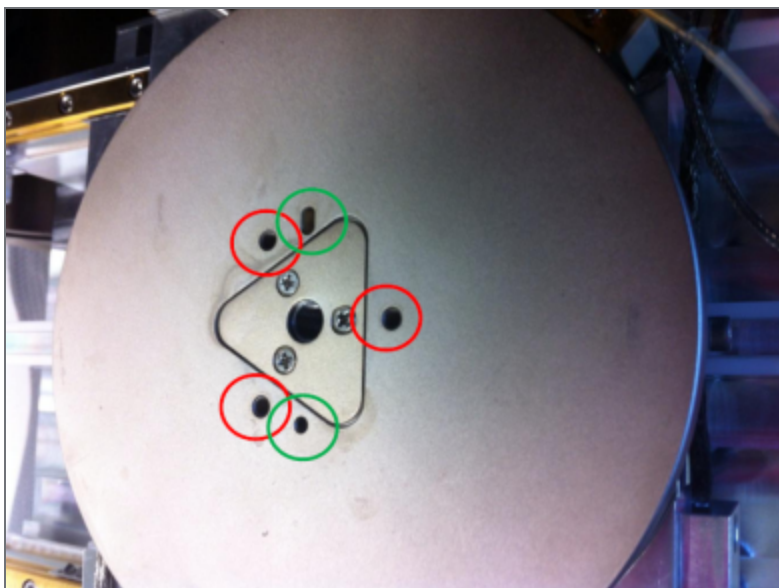


3. Place the holder and adaptor on the stage. This can only be done in one orientation. The adaptor has three screws (encircled in red) and two pins (encircled in green) that fit nicely into the stage.

Adaptor Base with Screw and Pin Positions



Stage Screw and Pin Placement Indicators



4. Tighten the screws so the stage cannot move.
5. Set the Z coordinate to 0 using the xT UI to make sure the holder will not touch the pole piece when inserting.
6. Close the chamber.
7. Press **Pump**.



Note: Refer to your application specialist for procedural information for each sample holder type. See [Sample Holders](#) for descriptions of the other types of holders.

SEM/SDB Preconditions

Before performing calibration on a Maps supported holder using an SEM/SDB system, verify that the following preconditions are satisfied:

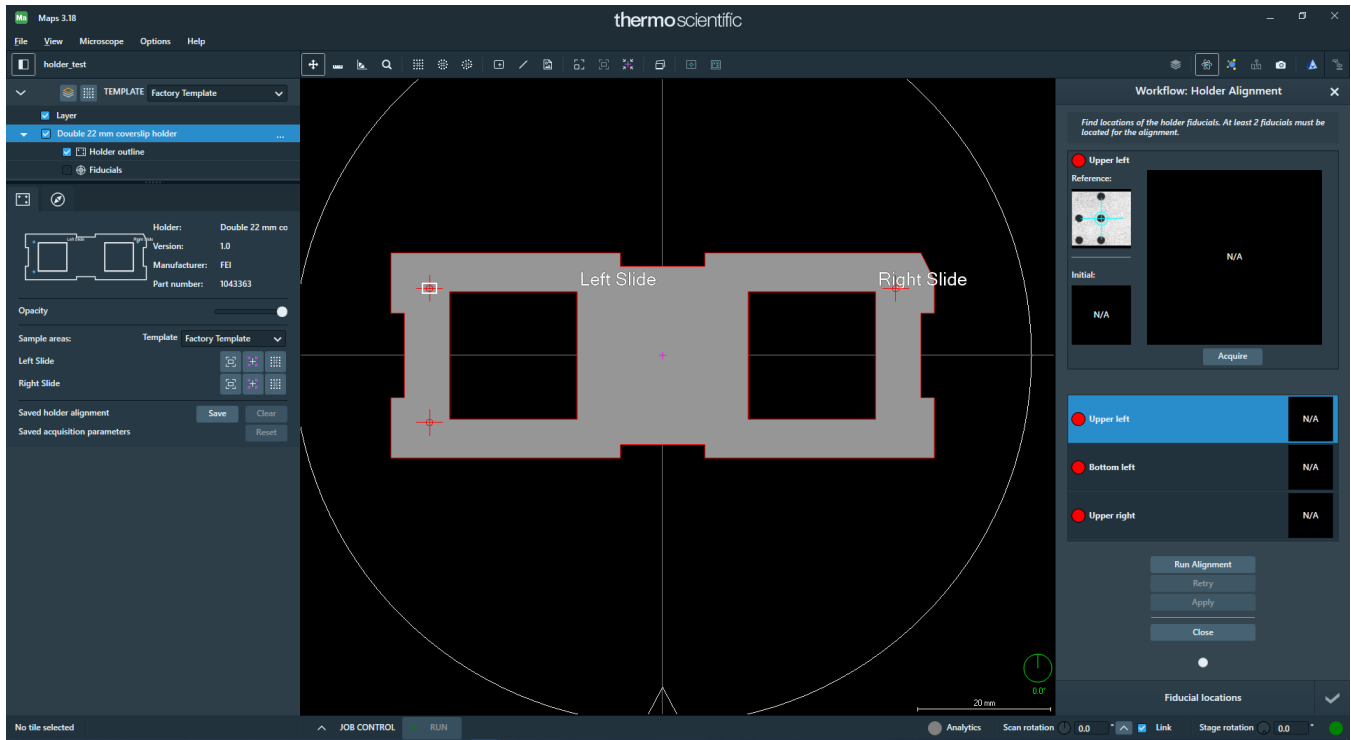
- Home stage
- SEM mode: lowest magnification
- ETD
- BSE
- 10 kV
- 100 pA (Use higher beam current of about 1 nA if you have difficulty matching automatically)
- Eucentric
- Link stage to WD
- Optimize contrast such that the fiducial holes are black and the background is white

Find the Fiducials and Store their Coordinates

This procedure is only necessary when starting Maps for the first time on a particular SEM/SDB, using a particular holder.

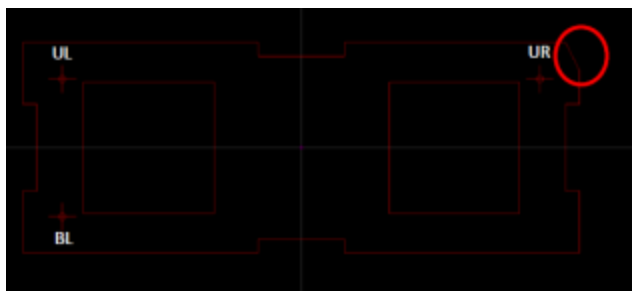
Using the xT UI, find the upper right (UR), upper left (UL), and bottom left (BL) fiducials and store the coordinates on the Stage tab.

The fiducial orientation must match the reference image.



The fiducial next to the chamfer/cut off (encircled in red) is called upper right.

Upper Right Fiducial



The upper right fiducial should be present at coordinates:

- X: 9.5 mm
- Y: -35.0 mm

The upper left (UL) fiducial should be present at coordinates:

- X: 9.5 mm
- Y: 35.0 mm

The bottom left (BL) fiducial should be present at coordinates:

- X: -9.5 mm
- Y: 35.0 mm



Note: Depending on the system type, X and Y coordinates might be reversed.

- If you are entirely unable to find the fiducials on the holder, perform a large overview tile for help in navigation.
- If the system is equipped with a NavCam, use the NavCam navigation image to assist with finding the fiducials.

Calibrate the Holder

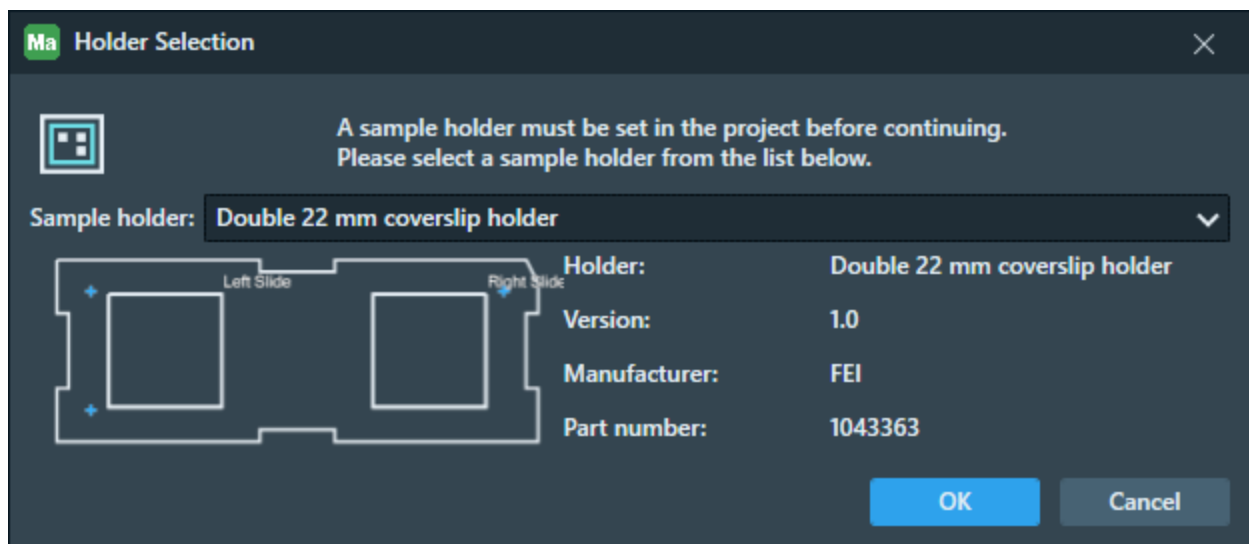
1. Load the appropriate sample holder. In this example, it is Double 22 mm coverslip holder.

Note: Refer to your application specialist for procedural information for each sample holder type. See [Sample Holders](#) or descriptions of the other types of holders.

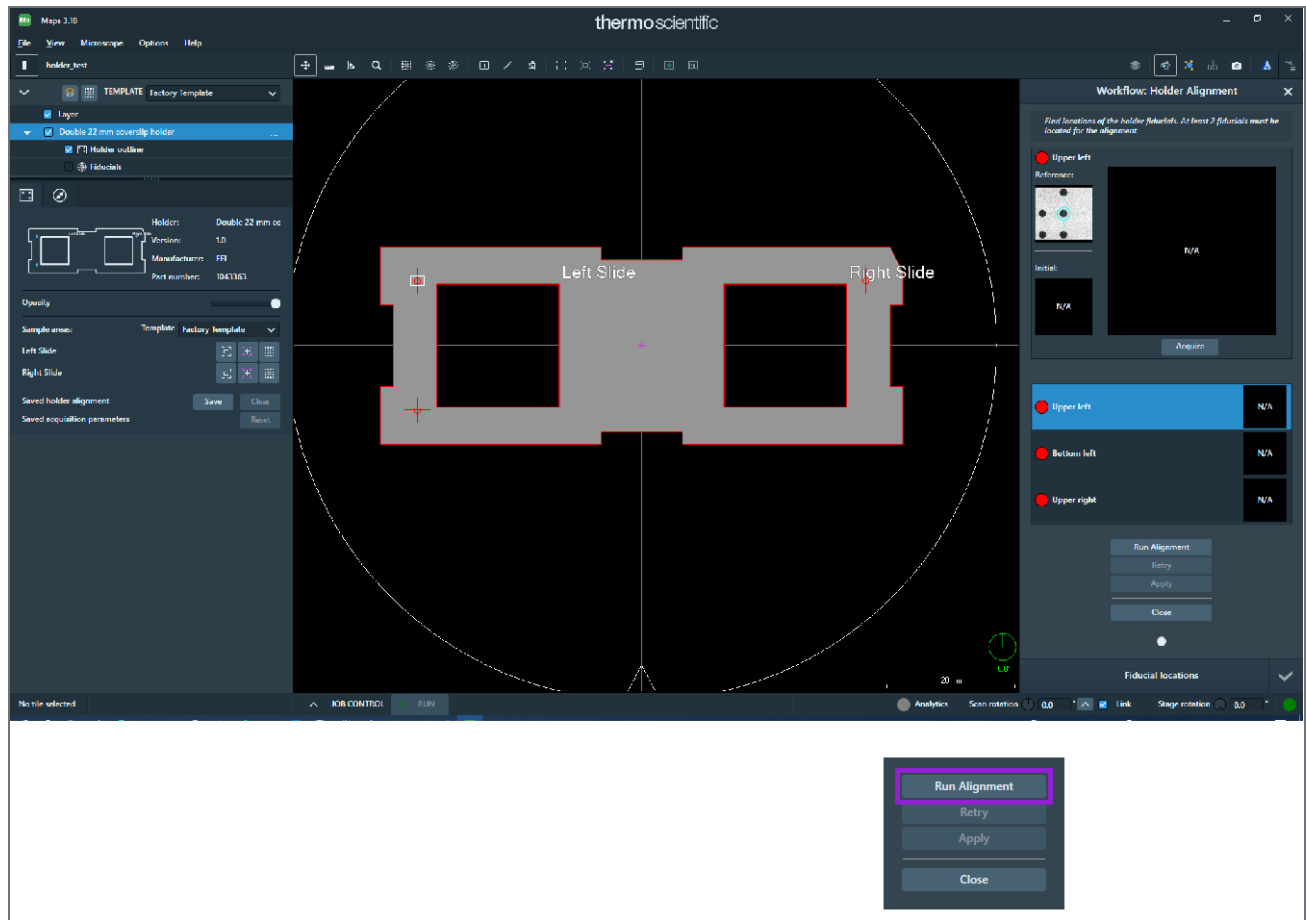
2. Create a new project or open a project that uses the loaded holder type. See [Create a Project](#) for more information about creating projects.
3. Click the **Align to Holder** tool box button.



4. Select the appropriate holder from the dropdown and then click **OK**.

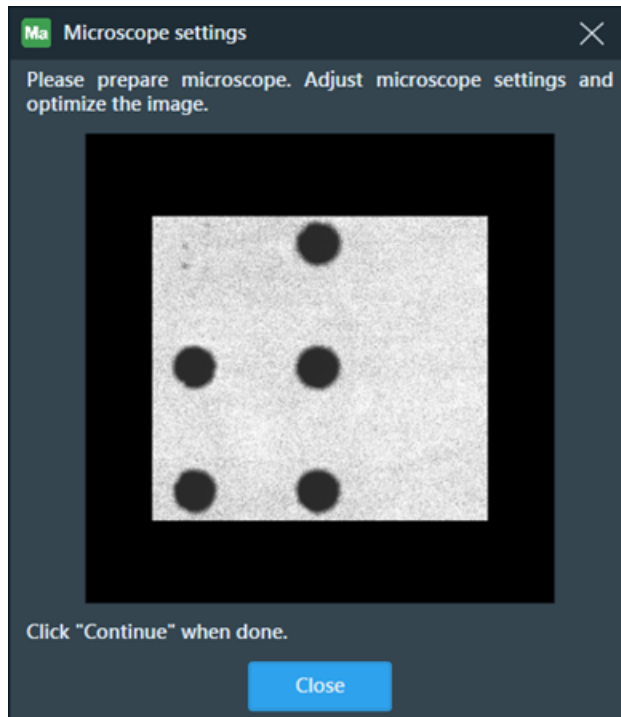


- In the fiducial alignment controls that appear, click **Run Alignment**.



The stage drives to the position where it expects to find the upper left fiducial. Maps displays a prompt to adjust microscope settings for optimal fiducial image.

6. Click **Close**.



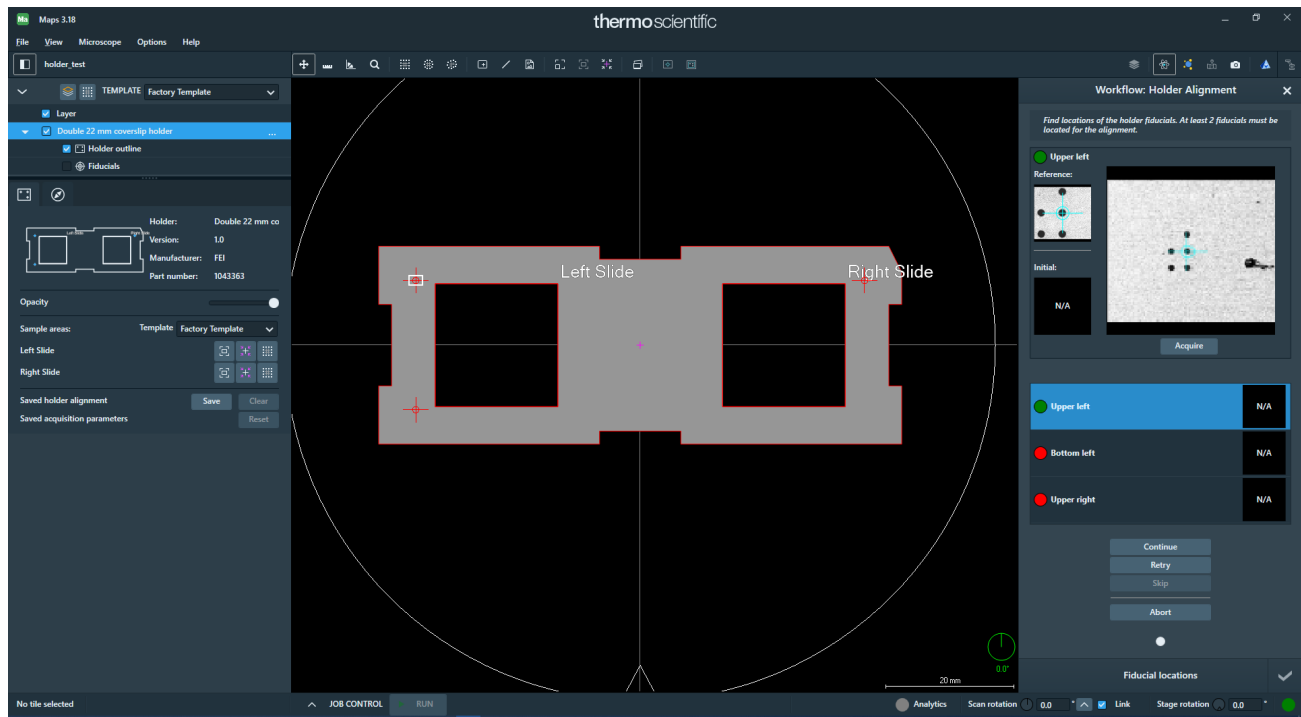
7. Go to the xT UI and find the stored position for upper left fiducial. Select the upper left coordinates and then click **GoTo**. The stage navigates to the stored coordinates of the upper left fiducial.
8. Optimize the image (set correct focus and contrast/ brightness) of the upper left fiducial using the xT UI. The optimal image will have completely black fiducial holes against a completely white background.

9. When the image has been optimized, return to the Maps UI and click **Continue**.

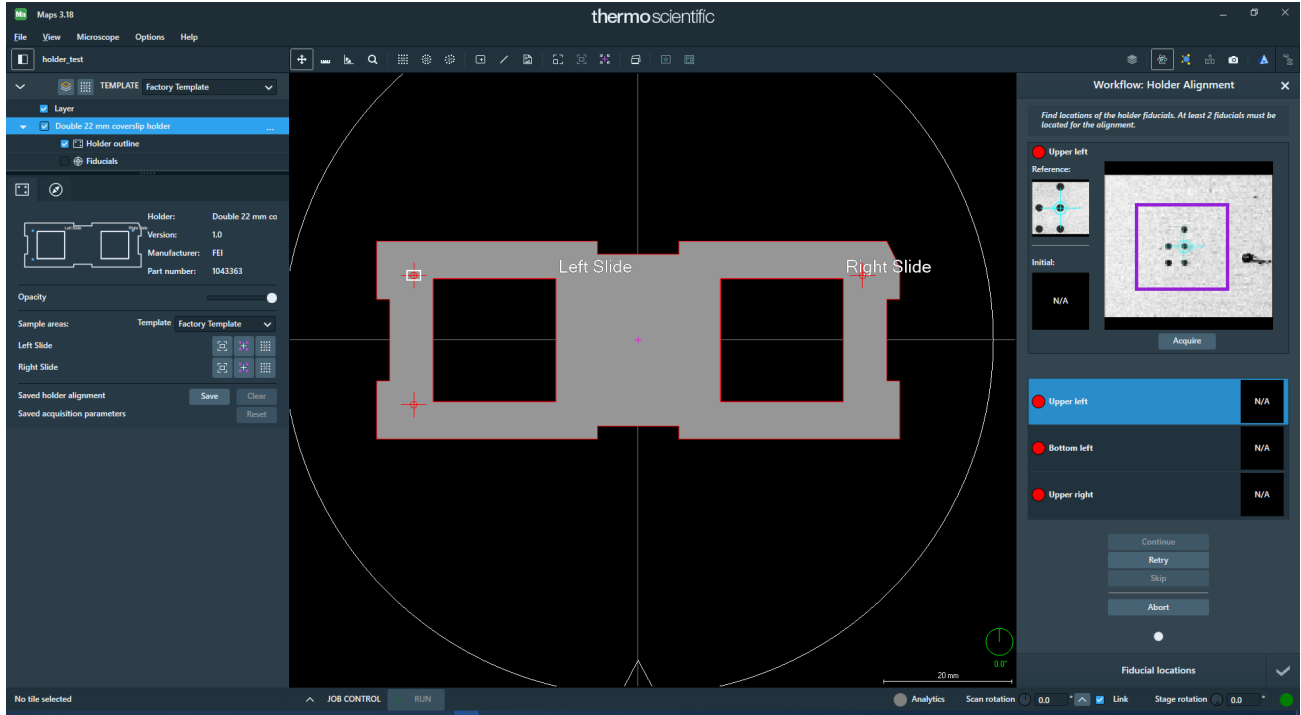


Note: If you are having trouble matching, make sure the:

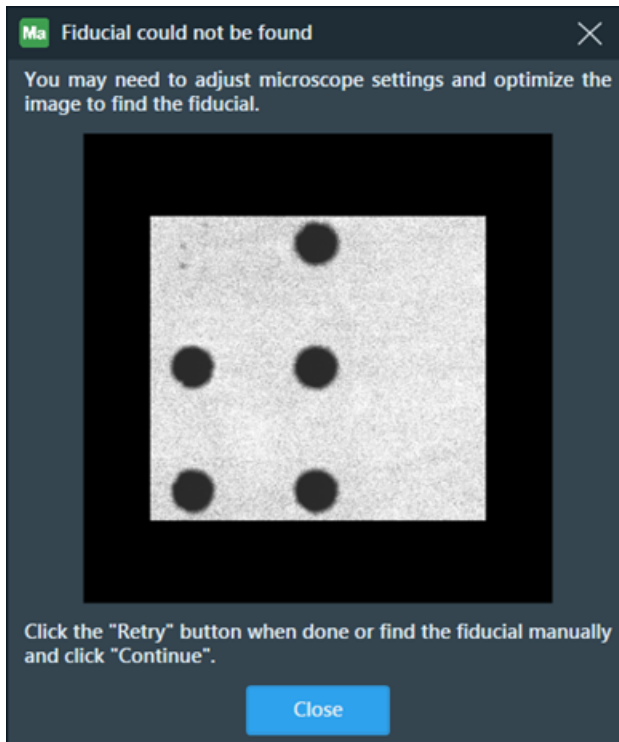
- Contrast / brightness matches reference
- Fiducial orientation matches reference
- HFW is 1.5 mm
- Sample is clean with clearly distinguishable features and no dust / contamination



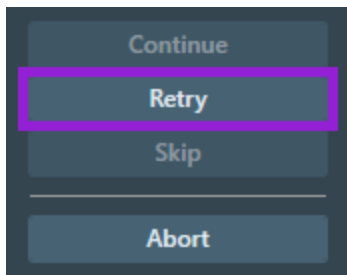
During calibration, Maps does not know the orientation of the holder. This can cause false positive matches, as shown in the diagram below. This is normal and these false positives will not occur after the holder has been successfully calibrated.



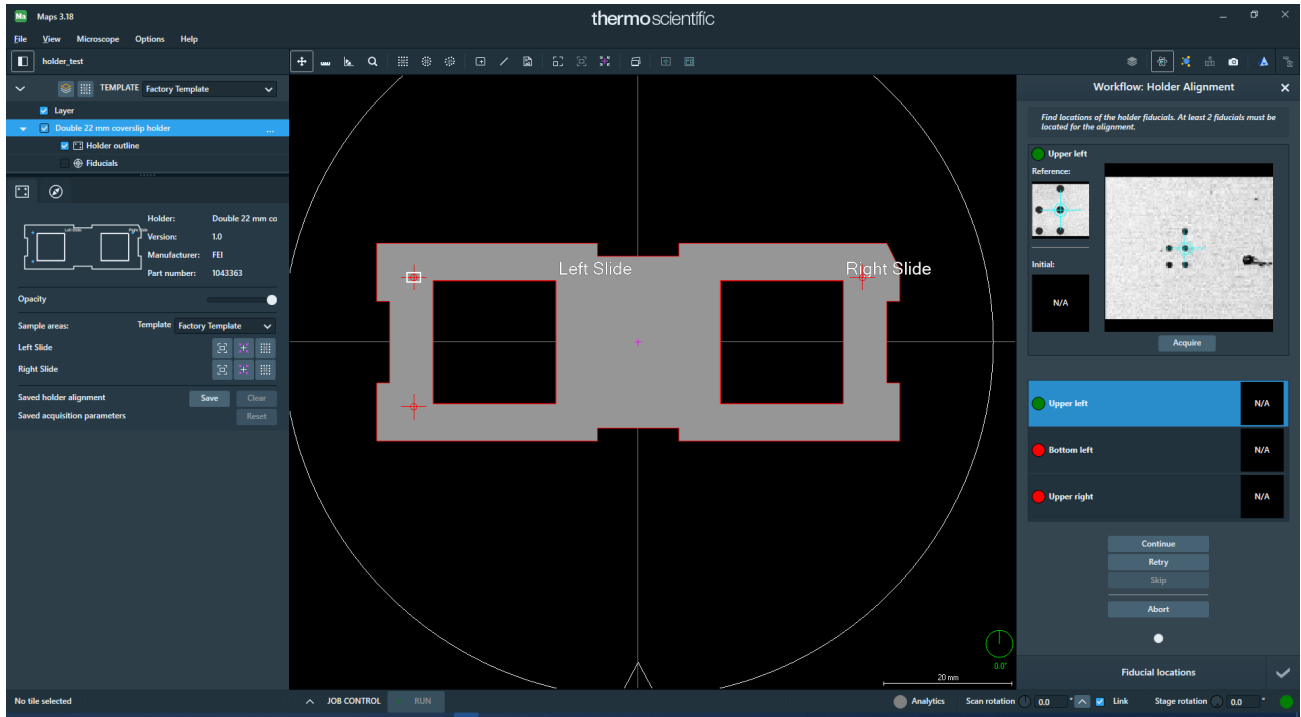
10. The Microscope Settings box appears again if Maps still does not recognize the acquired fiducial. Click **Close**.



11. Optimize the fiducial image again to match the reference image and then click **Retry**.



- 12. If Maps is not able to automatically match the fiducial, double-click to place the blue cross hair on the same fiducial hole that contains the red crosshair in the Reference image.

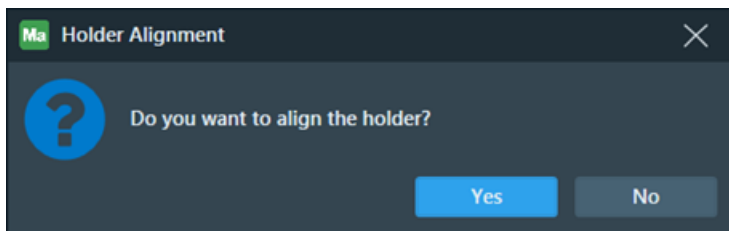


The red button turns green if Maps recognizes the fiducial.



If Maps does not automatically navigate to the second fiducial, then click **Continue**.

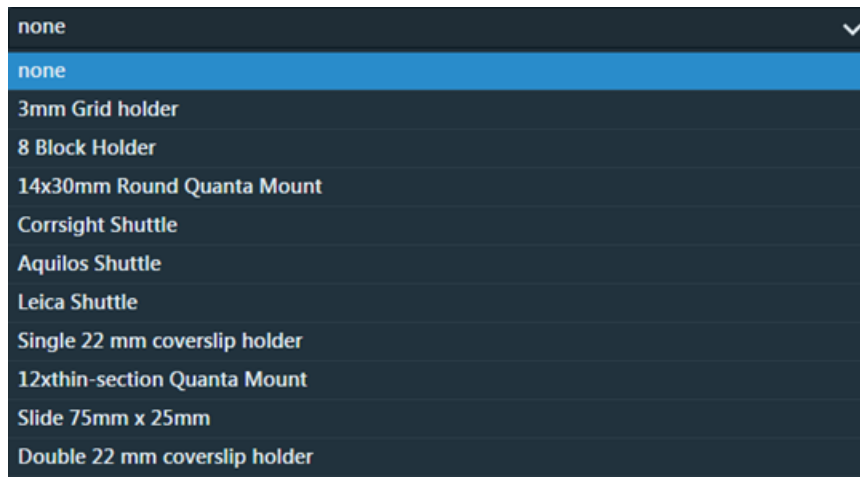
- 13. Maps automatically attempts to match the second fiducial. If the match is not successful, then repeat the calibration for the second fiducial. Once the second fiducial is recognized, Maps will automatically navigate to the final fiducial (for holders with more than two fiducials).
- 14. Since the automated alignment required manual adjustment, the Calibration prompt appears. Click **Yes** to save the holder calibration.



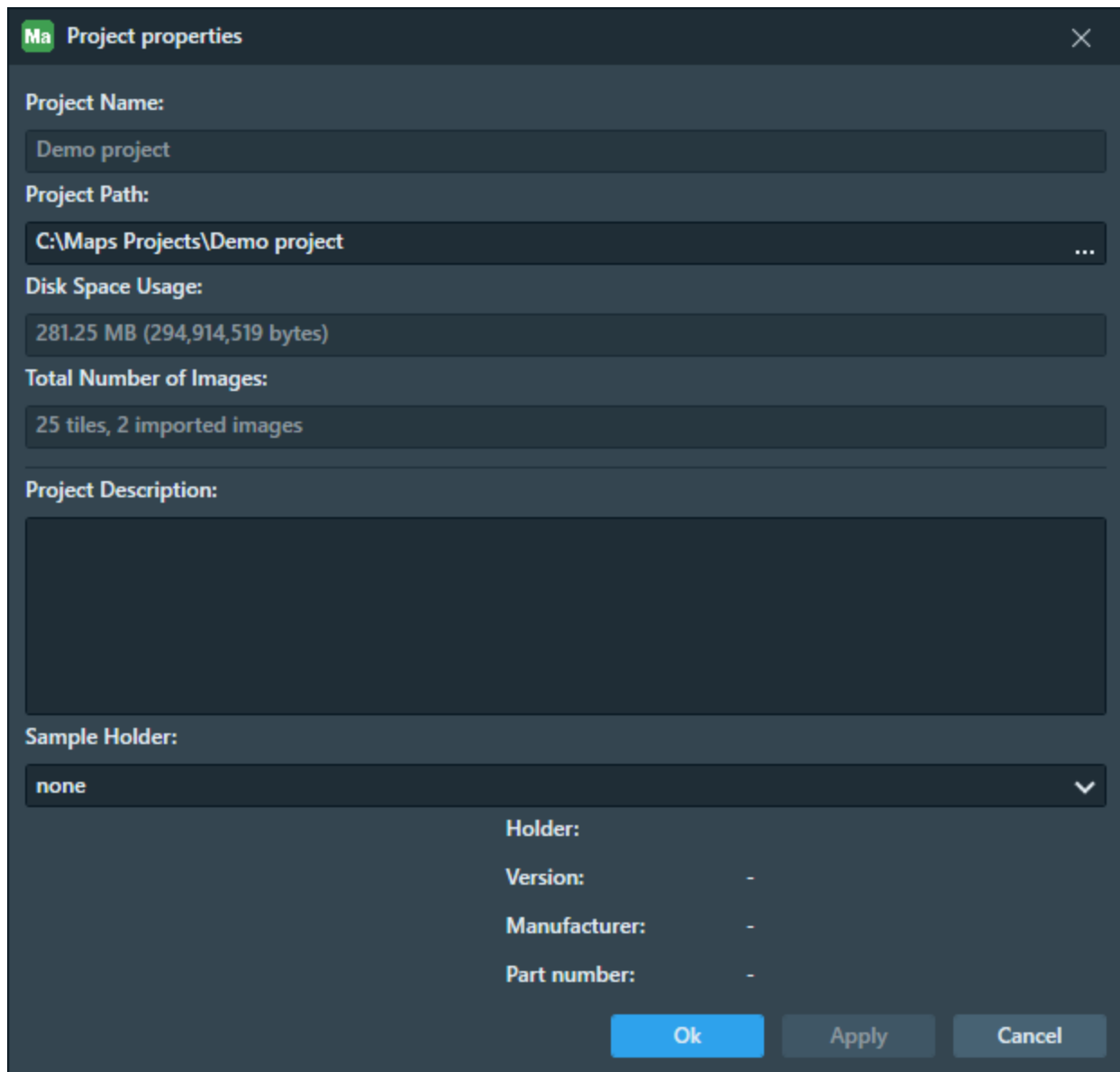
i **Note:** If the calibration prompt does not appear, Maps has low confidence in the calibrated fiducial positions and will not allow you to save the potentially bad calibration values. This can occur if there is a large unexpected rotation between fiducials. Perform the calibration a second time, and make sure fiducials are well centered and are oriented properly to match the reference.

Verify Alignment

1. On the **File** menu, click **Project Properties**.
2. In the **Sample holder** list, click **none**.



3. Click **OK** to clear the holder from the project. Click **OK** again at the prompt.



4. Proceed to [Execute Holder Alignment](#).

Correlating Projects

Prerequisites for running a multi-tool correlative experiment with Maps using Automated Holder Alignment:

- Sample is mounted on a supported sample holder
- Holder to be used has been calibrated on all systems



Note: Manual correlation can be performed on non-supported sample holders using the Maps Global Alignment procedure.

To perform a correlative project:

1. Create a new project in Maps on the first system.
2. Run the AHA ([Automated Holder Alignment](#)).
3. Acquire the desired sample data.
4. Close Maps.
5. Make a copy of the entire project directory and move it to the second system's PC.
6. Install the supported holder into the second system.
7. Open Maps on the second system and Import the project.
8. Run the AHA.
9. Acquire the desired sample data.
10. Use alignment to adjust the position of sample data, as desired.
11. Export the results by stitching or saving images to file.

Problems with Alignment

Misalignment between data in a Maps project can be due to one or more of the following contributing factors:

- Stage positioning error
- Stage drift
- Modified scanning parameters
- Modified column parameters
- Microscope modality change
- Sample moved relative to holder
- Sample changed physically during sample prep
- Misalignment between imaging modes/microscope objectives
- Improper holder calibration or false positives during Automated Holder Alignment

Manual Alignment

This section describes manual alignment workflows.

Alignment is used in Maps to adjust project data to the current stage position. For example, this is useful after a sample has been removed and re-installed into a system in a different orientation.

Alignment can be performed on imported images, tile sets, stitched tile set data, layers, and entire projects (Global Alignment). The procedure is identical when aligning each of these different objects.

It is worth noting that objects are never aligned to each other in Maps, but instead are aligned to the current stage position. If two objects do not match up, align the first to the stage, then align the second to the stage. To maintain alignment between objects, place all the aligned objects into a separate layer. Then, you can perform alignment on the Layer and all objects in the layer will be moved in unison.

For Offline alignment where there is no stage present, simply choose one image or tile set as a standard and align all other data to this standard. When the project is reopened on a system, a single Global Alignment will correctly adjust all the project data.

There are four levels of alignment:

- **Align:** Aligns a single tile set or image. Selected from the [Tile Set Context Menu](#).
- **Align Layer:** Aligns an entire layer, including all tile sets and images at once. Selected from the [Layer Context Menu](#).
- **Global Alignment:** Performs an alignment to align all previously acquired data to the stage. Selected from the [Toolbar](#).
- **Magnification Alignment:** Performs an alignment to align TEM-acquired layers based on magnification. Selected from the [Layer Context Menu](#).

Topics include:

[Coarse Alignment \(1-, 2-, or 3-Point\)](#)

[Fine Alignment](#)

Coarse Alignment (1-, 2-, or 3-Point)

Use 1-, 2-, or 3-point alignment to match up a previously acquired image with the current stage position.

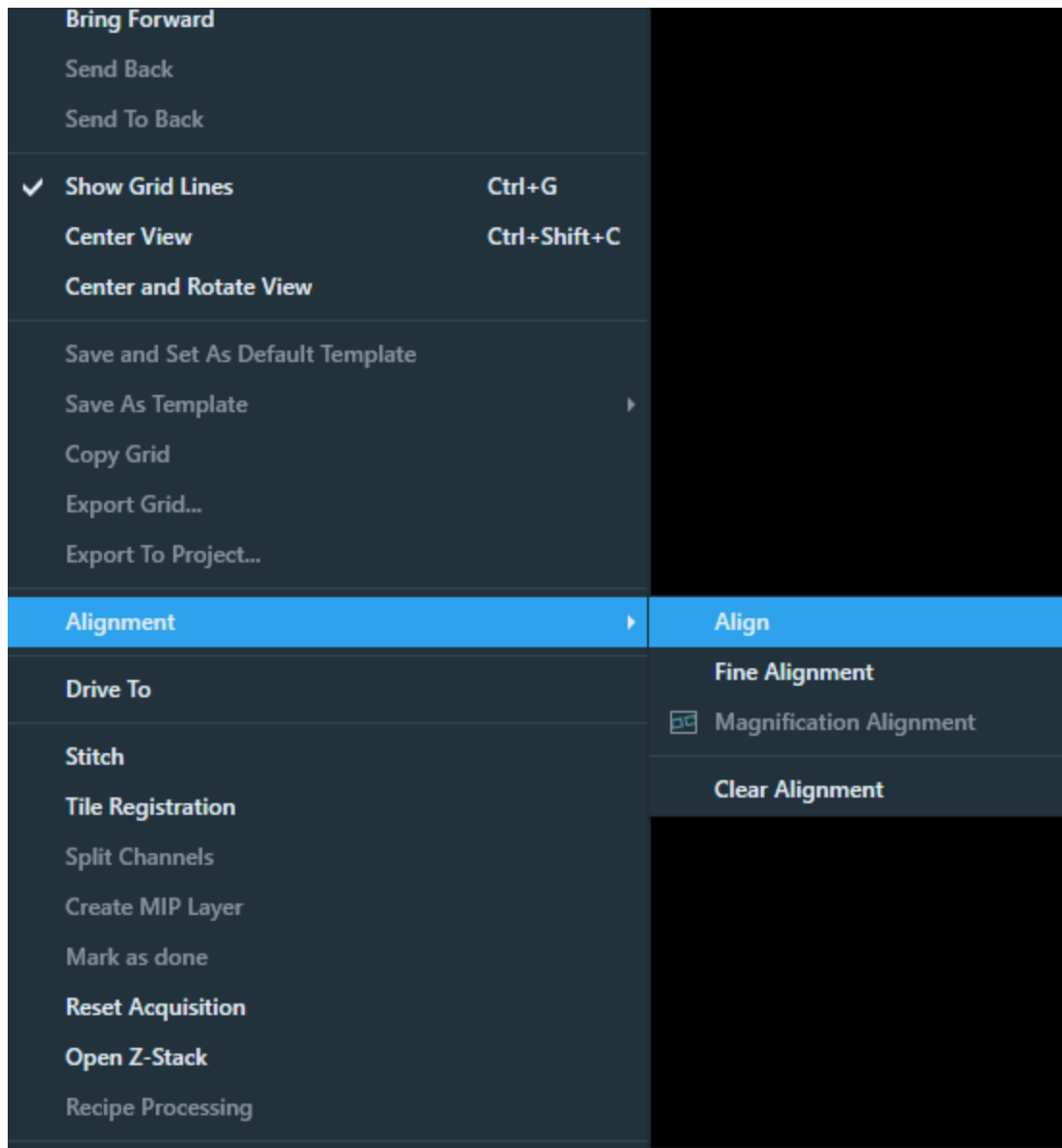
- **1 point:** Adjusts the data using translation only.
- **2 point:** Adjusts the data using translation, rotation, and scale.
- **3 point:** Adjusts the data using translation, rotation, scale, and orthogonality.

Workflow

The workflow described below relates to aligning a single tile set. The same procedure is used for all alignments in Maps.

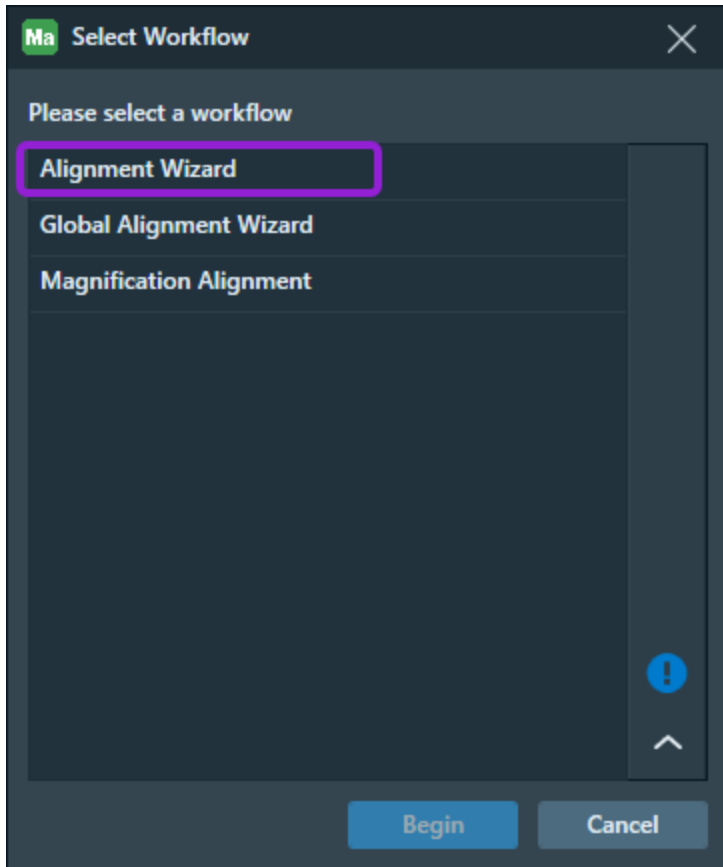
Coarse Alignment from Tile Set

1. Acquire a tile set as described in [Acquire a Tile Set](#).
2. Right-click on the tile set in the Layer control and click **Alignment > Align**.

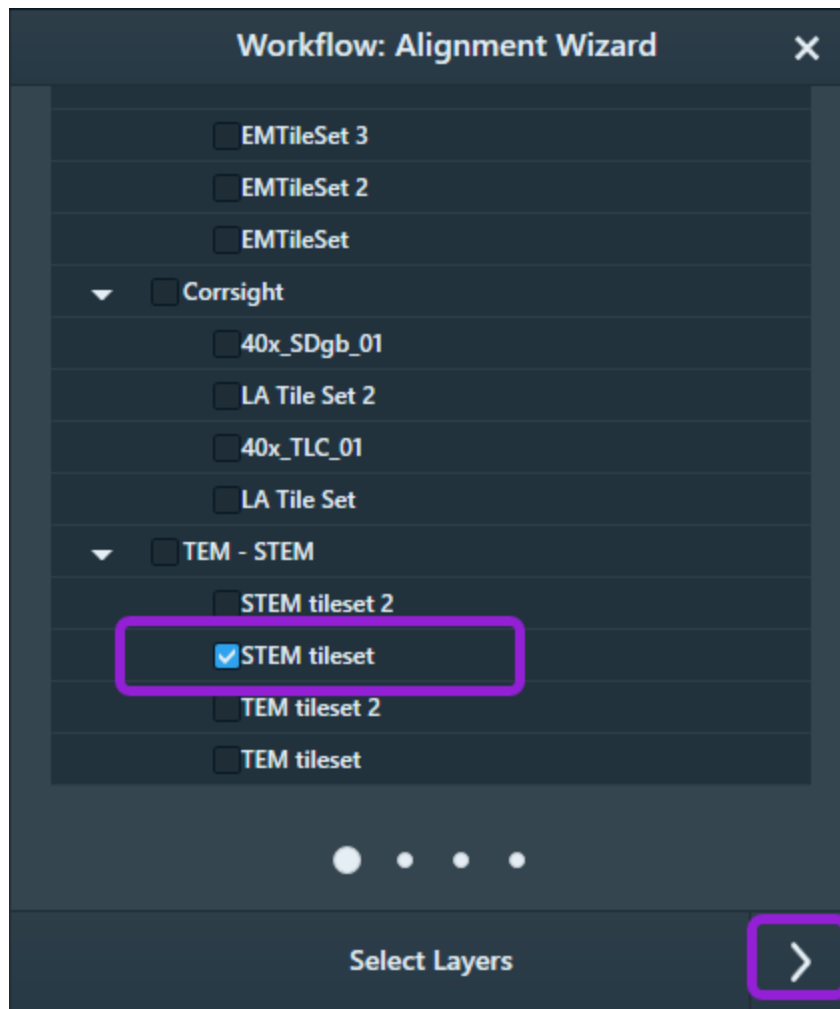


Coarse Alignment from Workflow

1. Click the workflow button, and then click **Alignment Wizard** and **Begin**. The workflow panel opens and lists layers for alignment.

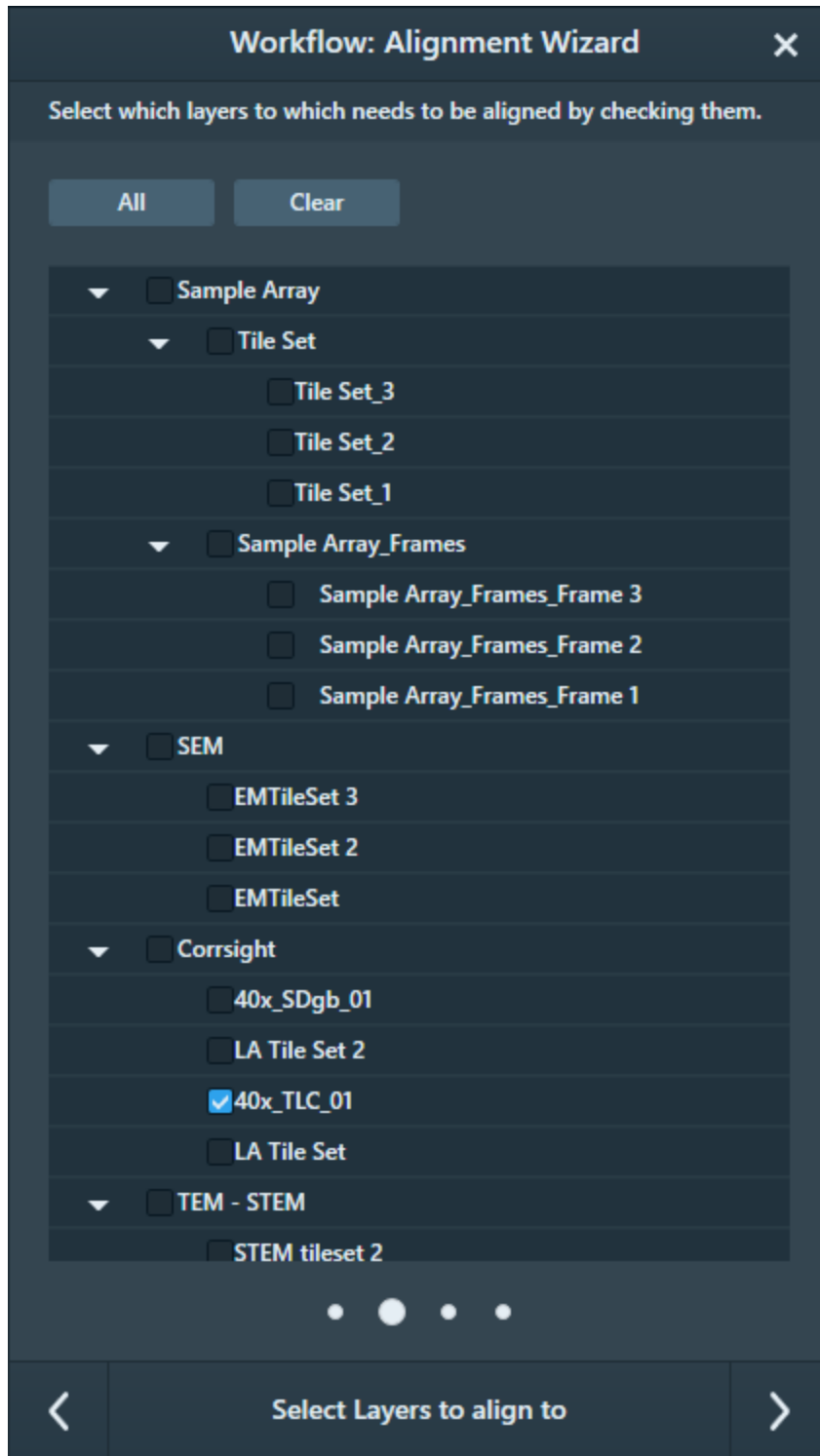


2. Select an acquired tile set to align.



3. Click the right arrow button at the bottom of the workflow panel to go to the next step.

4. Select a Tile Set to which you want to align to (such as the Tile Set as acquired in step 1).

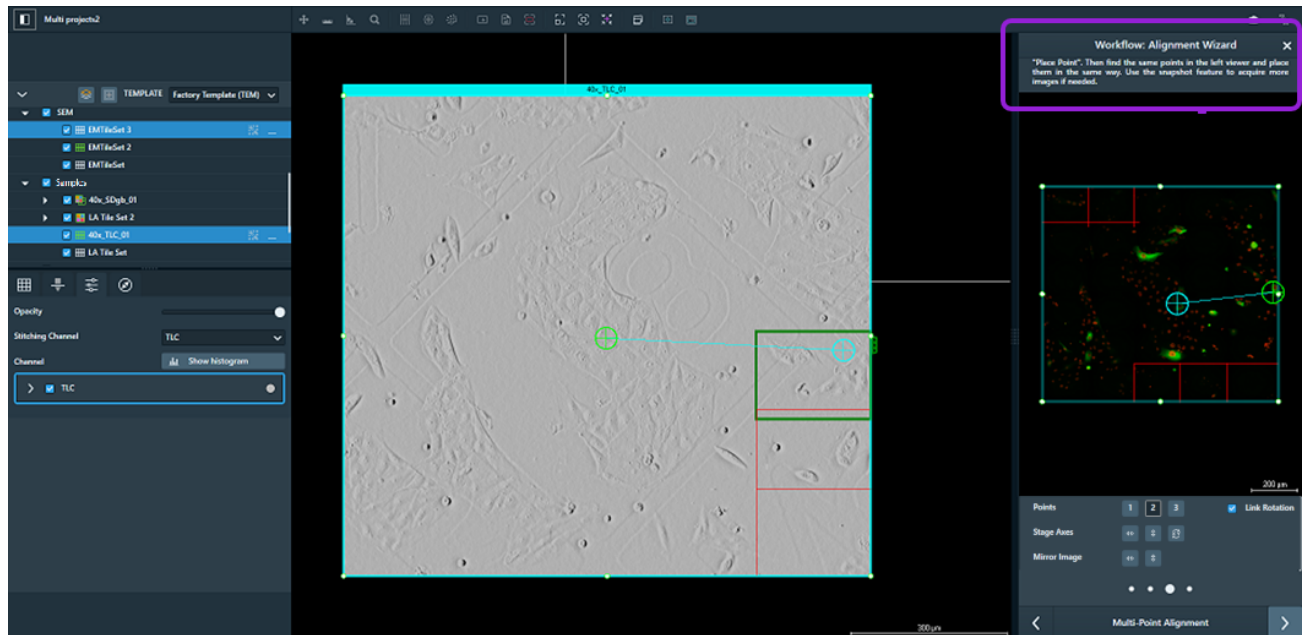


- Click the right arrow button at the bottom of the workflow panel to go to the next step.

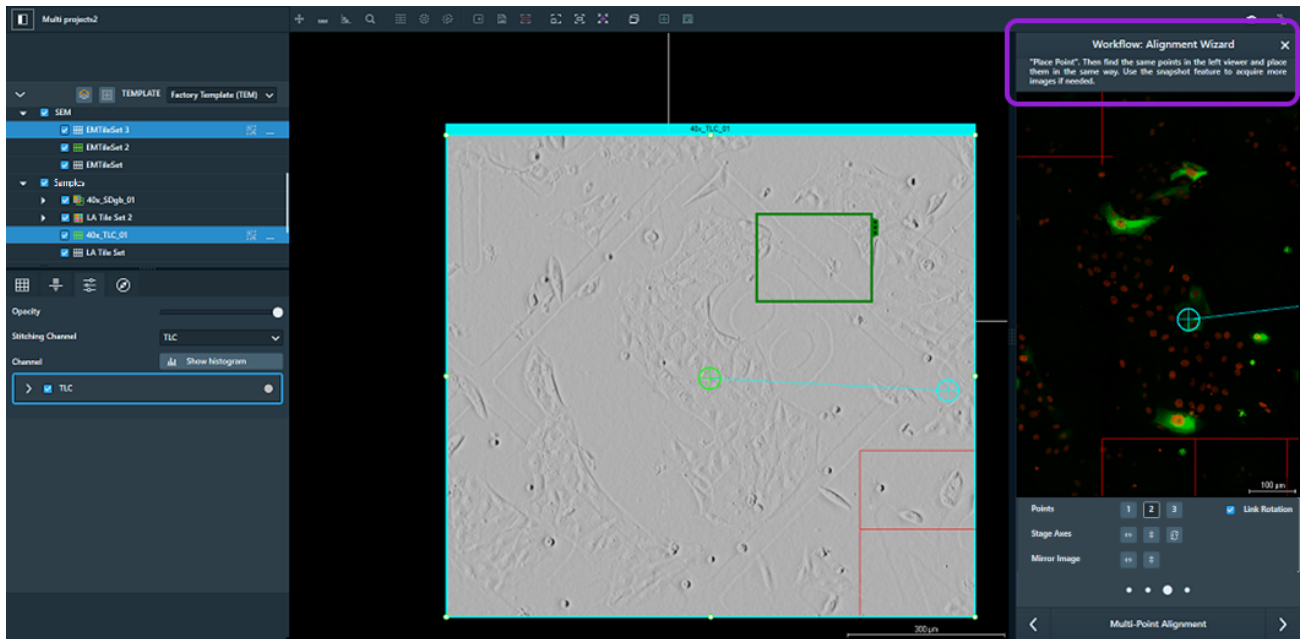
The Tile Set that was selected in step 1 appears in the workflow panel.

The Tile Set that was selected in step 2 appears in the Viewer.

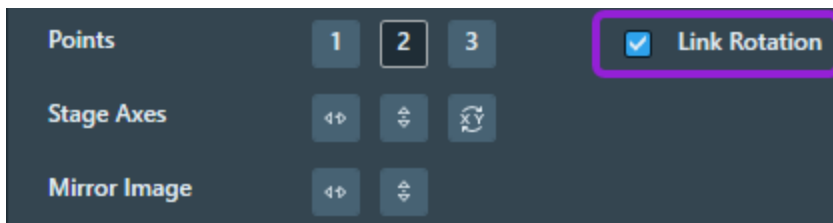
- Follow the instructions in the workflow panel.



7. Follow the guided instructions in the workflow panel to find the same distinct feature in both windows and place Point 1, 2, or 3 in each window. You might have to zoom in close on a feature and grab a new preview image with more resolution to make the best match.



8. (Optional) Using the **Mirror Stage Axis** or **Mirror Image** controls below the viewer in the workflow panel, you can mirror the image horizontally or vertically. Use **Swap Stage Axes** to swap the X and Y stage positions. It is common to use combinations of these buttons when aligning optical images. If you select the checkbox for the **Link Rotation** option, the left and right image viewers will rotate together. Deselect the checkbox for the **Link Rotation** option to rotate them independently.



9. Select 1, 2, or 3 point alignment.
10. Click the right arrow button at the bottom of the workflow panel to enter [Fine Alignment](#).

Fine Alignment

Use Fine Alignment to fine-tune the alignment of layers and tile sets visually.

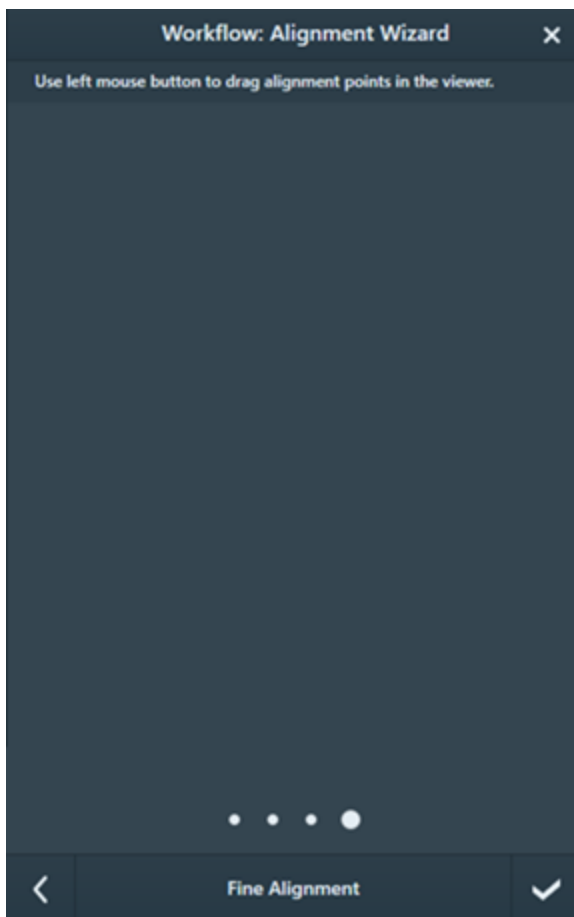


Note: When you start a second alignment on a layer, the Maps application remembers and reuses the alignment points from the previous alignment.

Fine alignment user interface

The Alignment Wizard appears when you do either of the following:

- Click the right arrow button at the bottom of the workflow panel after a 1-, 2-, or 3-point alignment.
- Right-click the Tile Set in the Layer control and then click **Alignment > Fine Alignment**.



Fine Alignment Overview	
Interface Item	Description
Viewer Window	The work area within the Alignment Wizard. You can drag alignment points into the viewer during the fine alignment (see Fine alignment mouse controls) process. This window is empty when it opens.
Back Arrow	Returns to the selection of alignment points in the coarse alignment workflow. From there, click Cancel if you want to undo the coarse alignment.
Finish Check Mark	Closes the Fine Alignment workflow panel.

Fine alignment mouse controls

During fine alignment, you can:

- Drag an alignment point into the viewer by left-clicking the alignment point with your mouse and holding the mouse button down as you drag the alignment point into the viewer.
- To pan within the viewer, left-click your mouse and then hold down the mouse button as move your mouse up, down, left, or right.
- Rotate the viewer by clicking the viewer and holding down the **Shift** button.
- Add a new alignment point, or reposition an existing alignment point, by positioning your mouse within the viewer and right-clicking your mouse to open the viewer's context menu. Click the menu option associated with your desired task.

Correlation

This section describes the correlation controls you can use to apply simple coloring to the tile set images when they are acquired. This can be used to highlight some features for demonstration or evaluation purposes.

Topics include:

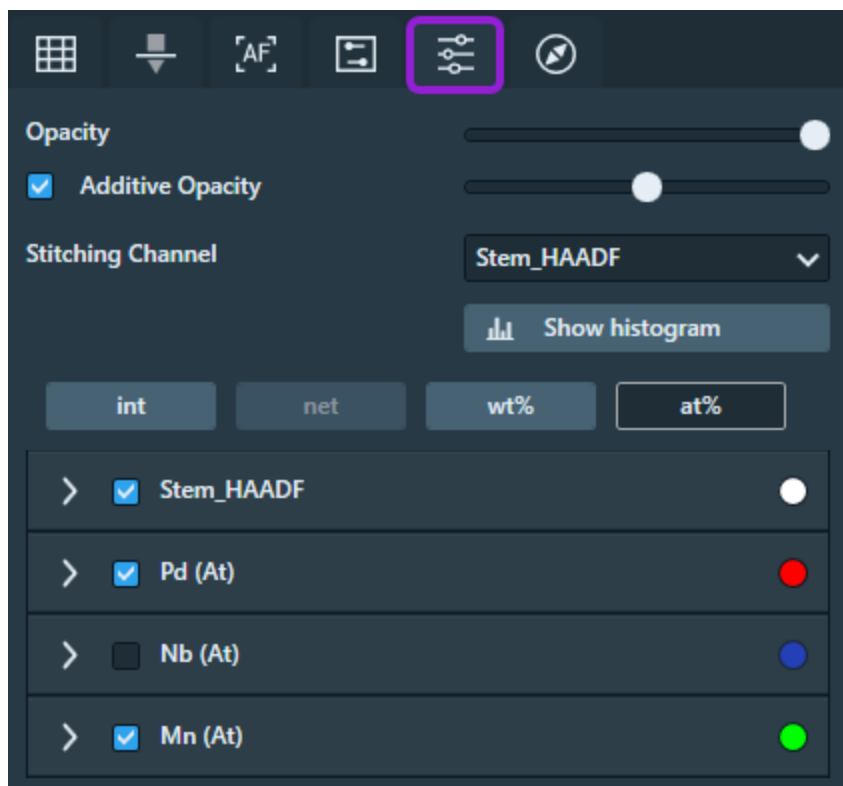
[Visualization Tab](#)

[Segmentation](#)

Visualization Tab

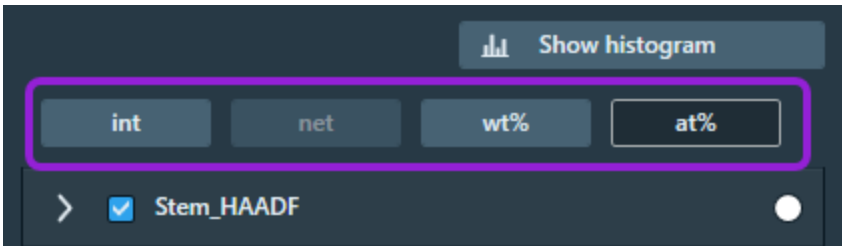
The Visualization tab (formerly called "Results" tab) contains the correlation controls, which you can use to apply simple coloring to the tile set images when acquired. Some correlation controls appear unavailable if they are not applicable to the system type.

Correlation controls

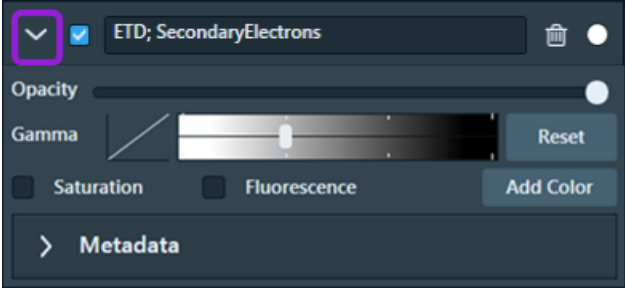
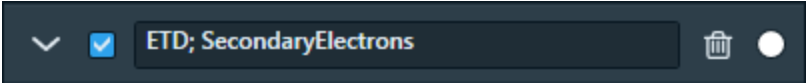


Correlation Controls Overview

Control	Description
Opacity	Sets the measure of opaqueness for the entire image. The less opaque, the more transparent it becomes. Transparent images are useful when overlaying on image over another.
Additive Opacity	Sets the control the opacity between fluorescence and regular channels. This is useful for the Analytics tile sets as they contain many non-overlapping channels. The Additive Opacity option is the default for EDS tile sets. Increasing the additive opacity makes fluorescence channels more visible.

Correlation Controls Overview(Continued)	
Control	Description
Stitching Channel	Sets the channel used for stitching.
Show histogram	Shows/hides the histogram panel. See Histogram .
Quantification Modes	<p>EDS channels acquired with Velox can have up to four different quantification modes. Click one of the activated buttons (shown in white) to select a quantification mode, which is used to visualize the elements. A deactivated button (shown in grey) indicates that the quantification mode was not calculated and is not available.</p>  <p>The elements display data in each quantification mode as follows:</p> <ul style="list-style-type: none"> • int: the counts according to the raw integrated spectrum • net: the counts according to the background corrected and fitted model • wt%: the weight fractions • at%: the atomic fractions

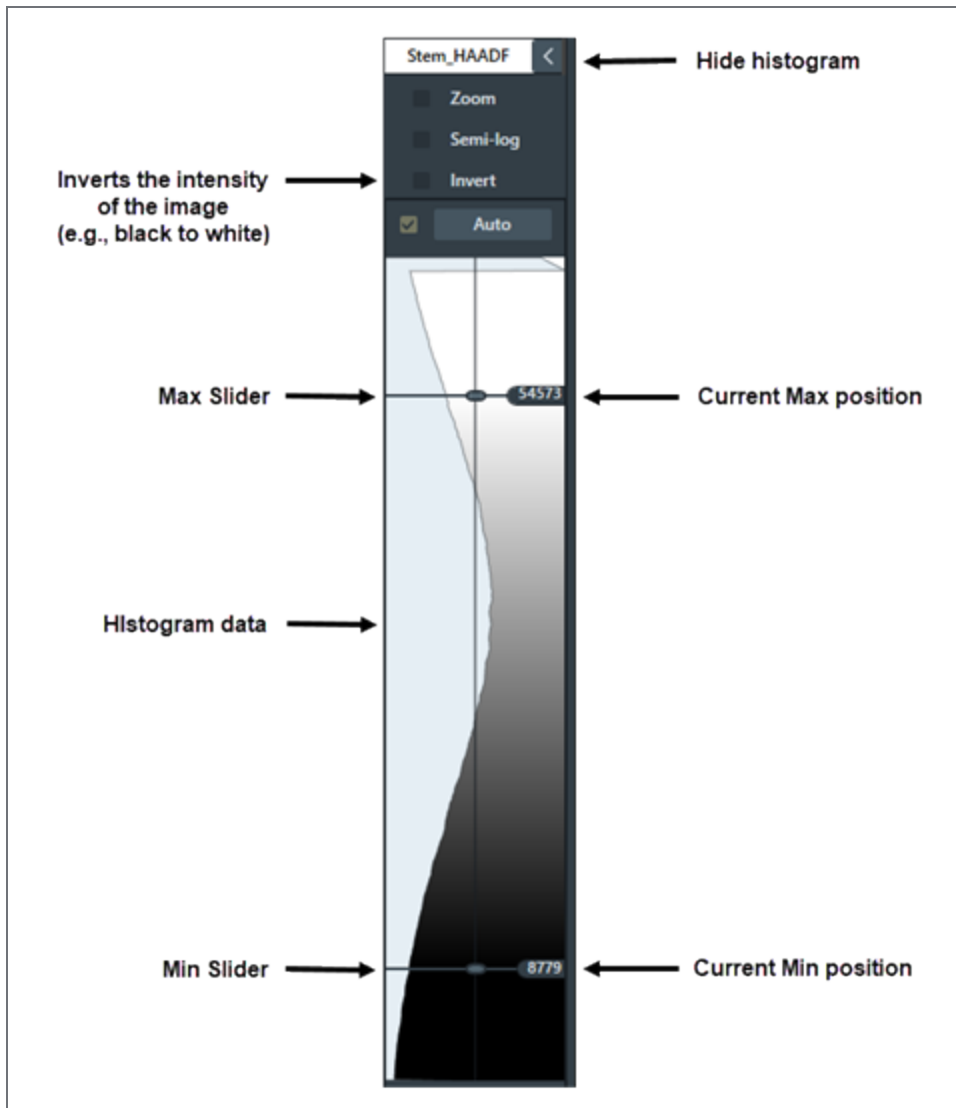
Correlation Controls Overview(Continued)


Control	Description
Channels with Opacity slider and Gamma adjuster	<p>Click the dropdown menu for each channel to view and select the options described below.</p>  <ul style="list-style-type: none"> • Channel name: Located at the top of the screen. This text field displays the channel name. • Delete Channel: For a multichannel image layer, the delete channel option is available and appears as a trash can icon. Click the trash can icon to delete the channel. This function is not available for a single channel image layer and when using the Offline Viewer.  <ul style="list-style-type: none"> • Color picker: Located next to the delete channel option. Click this button to select a unique color to display in the histogram. The color picker is set to white by default. • Opacity slider: Adjusts opacity for this channel only. • Gamma: Displays the gamma curve adjustment. • Reset: Resets the Gamma slider to the default. • Saturation: Select this check box to highlight saturated pixels. • Additive: Select this check box to designate this channel to use <i>additive</i> color mixing. Additive color mixing is used for channels such as fluorescence, cathodoluminescence, and EDS. Black is considered transparent and colors are added with other channels/images behind it. All channels marked additive are painted together (for example, red and green combine to display yellow). • Add Color: Launches Segmentation. Displays an additional histogram every time you click the button. • Metadata: Click the dropdown menu to view the channel metadata.

Histogram

Displays a histogram for the selected channel. Click a different channel name to select its histogram and associated color.

Selected Channel Histogram



Selected Channel Histogram Overview	
Interface Item	Description
Selected channel name	Displays the selected layer item (a tile set or image) from the Layer control.
Hide	Hides the histogram. 
Zoom	Expands the histogram area of images with less than 255 colors.
Semi-log	When selected, changes the histogram intensity display to logarithmic.
Invert	Inverts the intensity of the image, e.g., black to white.
Auto	When selected, continuously adjusts the min and max for the histogram display.
Current max position	Displays the current max slider position.
Max slider	Any data above the max line is white. Gray levels display between the max and min sliders.
Histogram data	Displays the histogram data for the selected channel.
Min slider	Any data below the min line is black. Gray levels display between the max and min sliders.
Current min position	Displays the current min slider position.

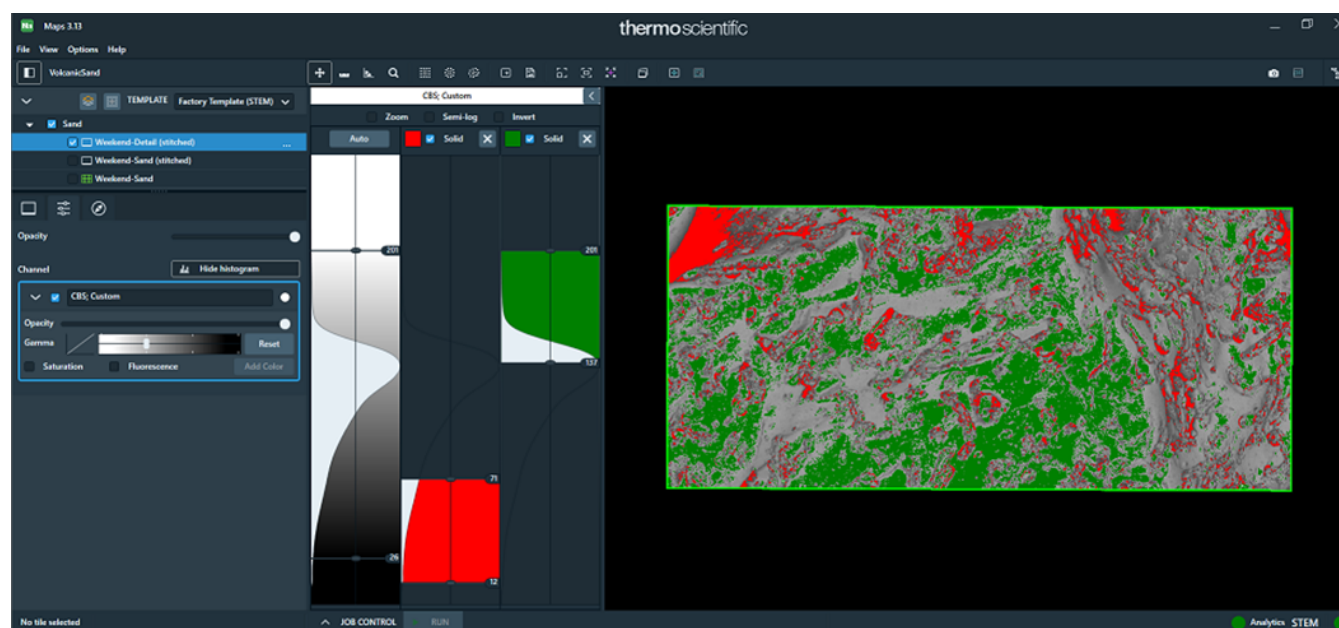
Segmentation

Image segmentation is the process of partitioning a digital image into sets of pixels, called segments. The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.

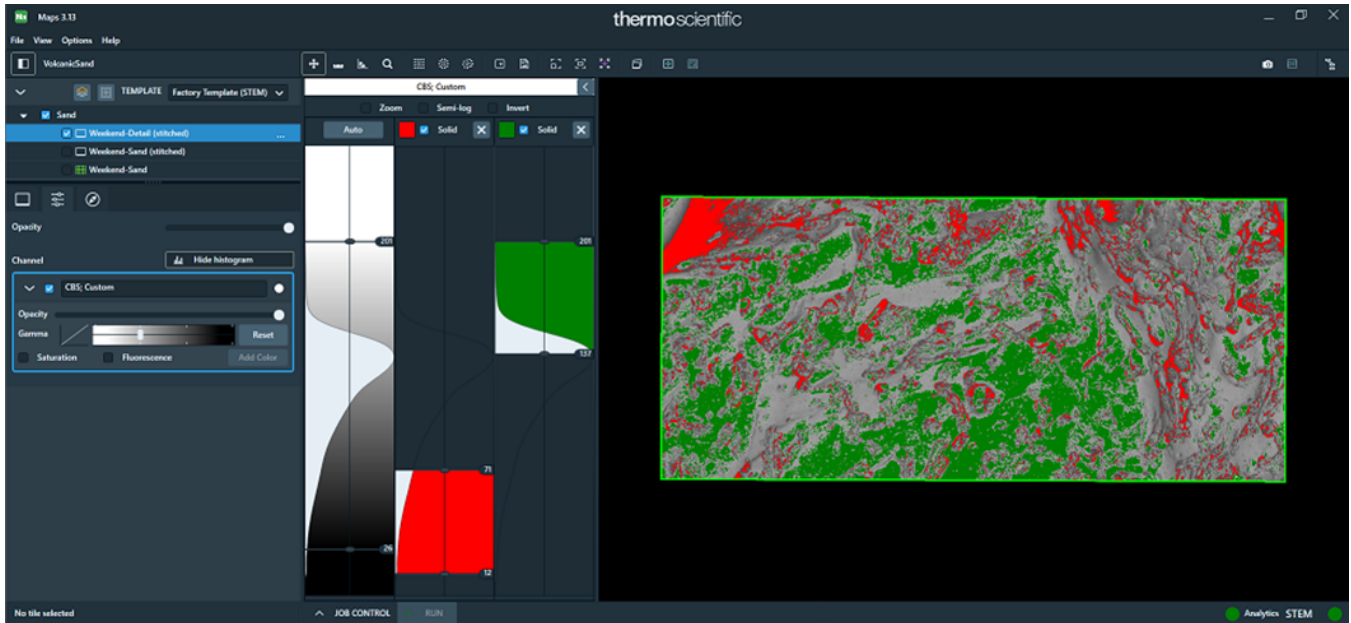
Add Color

In Maps, images and tile sets can be segmented such that each segment is assigned a color. Segments are defined using the image histogram and a min/max slider that determines the regions of the image to be included in the segment. Additionally, Maps automatically calculates the number of pixels within the segment as a percentage of the total number of pixels and displays the result.

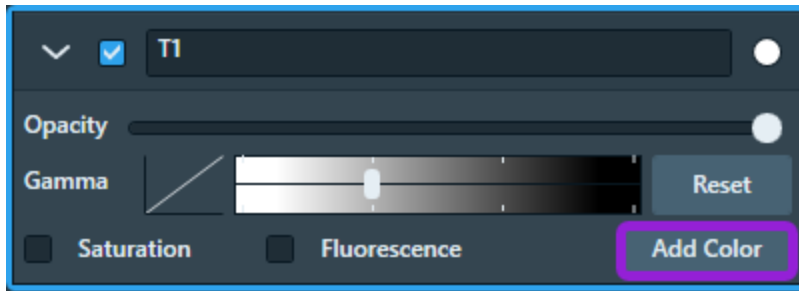
Segmentation, One Color



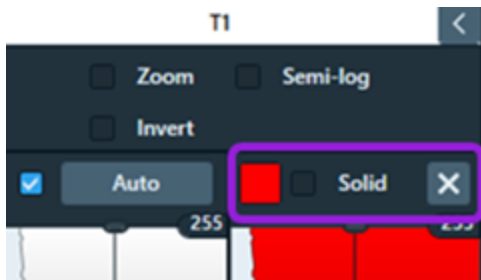
Segmentation, Two Colors



1. Click **Add Color** to add an additional image segment.



2. Choose a color from the **Color Selector** and select the **Solid** check box. When not selected, the color will be a gradient. See [Segmentation, One Color with Gradient](#).



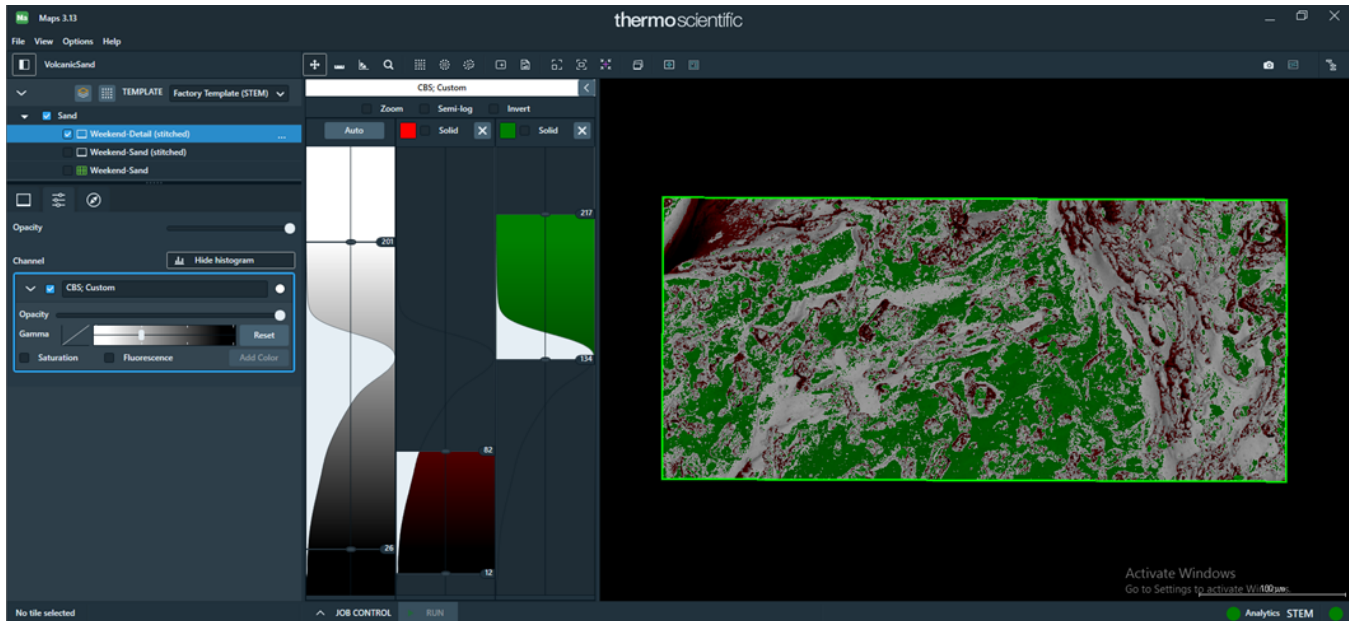
3. Adjust the **Max** and **Min** sliders to change the range of the histogram data to be assigned to the segment.

4. Click **Add Color** again to add another image segment and get segmentation with two colors.
5. Adjust the **Max** and **Min** sliders to select a different range of the histogram data to be assigned to the second image segment.

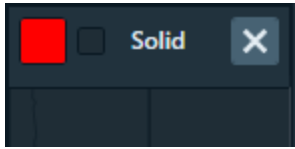
Segmentation, One Color with Gradient


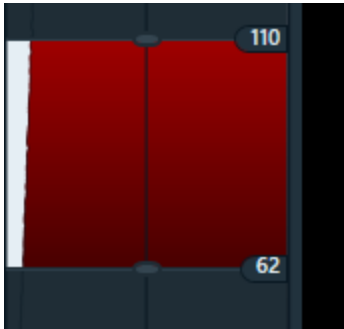
When the **Solid** check box is *not* selected, the histogram fill color is a gradient from light to dark.

Segmentation, One Color with Gradient



Segmentation Controls Overview



Segmentation Controls Overview	
Interface Item	Description
Remove	Removes the segment from the image and returns to normal display. 
Color Picker	Displays the color picker for selecting a color, then colors the area between the Min and Max sliders with the selected color.
Solid	When selected, the data between min and max on the Segmentation histogram will be one color instead of a gradient.
%	Calculates the number of pixels between min and max as a percentage of the entire image. 

Amira-Avizo2D Connectivity

This section describes how to set up the connectivity between Maps and Amira-Avizo2D, so that you can do the following:

- Create a recipe in Amira-Avizo2D from an image sent by Maps
- Define post-processing options in Amira-Avizo2D

Prerequisites

Maps with Amira-Avizo2D is designed to run on a system with resources equal to or greater than the following:

- 8 GB of physical RAM
- Maps must run in offline mode, or with a SEM or TEM microscope
- Analyzer is installed by Amira-Avizo2D product installer (minimum version 2021.1).

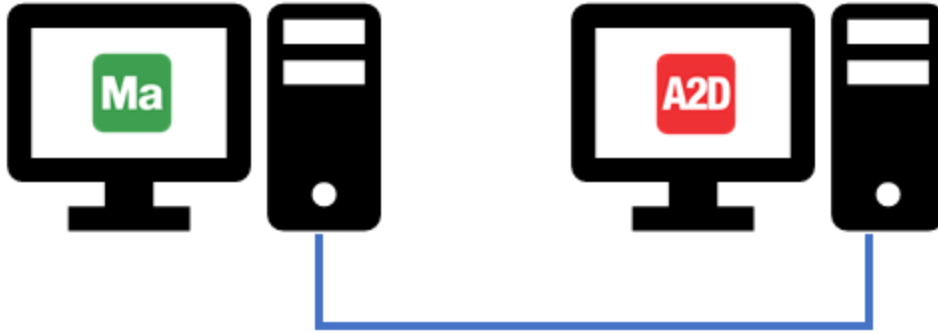
Configuration options

There are four configuration options for connecting Amira-Avizo2D to Maps: None, Local, Direct, or NAT. Select the option based on your network setup, and then refer to the corresponding section below for detailed instructions.

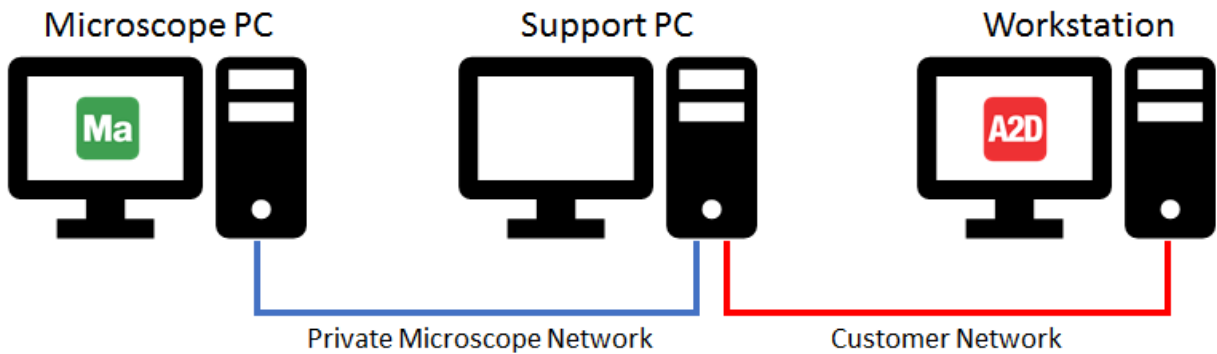
1. **None:** Use the None option if connectivity with Amira-Avizo2D is not required.
2. **Local:** Use the Local option if Amira-Avizo2D is installed on the same PC as Maps. This will typically be for Maps Offline installations on a workstation.



- 3. **Direct:** Use the Direct option if Amira-Avizo2D is installed on a different PC on the same network. This may be applicable if Maps is on the Microscope PC and Amira-Avizo2D is installed on the Support PC, or if Maps Offline is installed on a different PC other than Amira-Avizo2D.



- 4. **NAT:** Use the NAT option if Amira-Avizo2D is installed on a different PC on the customer network and the Microscope PC is only connected to the Support PC on the private microscope network.



Local setup

1. From the Maps PC, navigate to **Maps Options>>Settings... menu item** to open the Amira-Avizo2D settings.
2. Click the Amira-Avizo2D tab.
3. Select **Local** from the Connection Type field.
4. Configure the shared folder path as indicated in the table below.


Amira-Avizo2D Local Settings	
Interface Element	Description
Maps - Amira-Avizo2D folder	Enter the path to the shared folder for the image and recipe data. See Configure shared folder for details.
Connection time out	Determines the duration time required for Maps to connect with Amira-Avizo2D before Maps cancels the connection. The duration time is measured in seconds.

5. From the same PC, launch the Analyzer application (see [Start Analyzer application](#)).

Direct setup

1. From the Microscope PC, navigate to **Maps Options>>Settings... menu item** to open the Amira-Avizo2D settings.
2. Click the Amira-Avizo2D tab.

3. Select **Direct** from the Connection Type field.
4. Configure the shared folder path as indicated in the table below.

Amira-Avizo2D Direct Settings	
Interface Element	Description
Shared folder path from Maps PC	<p>Enter the path to the shared folder for the Maps software PC. See Configure shared folder for details.</p> <div style="border: 1px solid #0070C0; padding: 5px; margin-top: 10px;"> <p> Note: If the shared folder is on the Maps PC and the application encounters an I/O error while processing a recipe, consider moving the shared folder to the Amira-Avizo2D PC. See Define Shared Folder for instructions.</p> </div>
Shared folder path from Amira-Avizo2D PC	Enter the path to the shared folder for the Amira-Avizo2D PC. See Configure shared folder for details.
Hostname of Amira-Avizo2D PC	Enter the hostname of the Amira-Avizo2D PC. See Locate hostname for details.
Connection time out	Determines the duration time required for Maps to connect with Amira-Avizo2D before Maps cancels the connection. The duration time is measured in seconds.

5. From the Amira-Avizo2D PC, launch the Analyzer application (see [Start Analyzer application](#)).

NAT setup

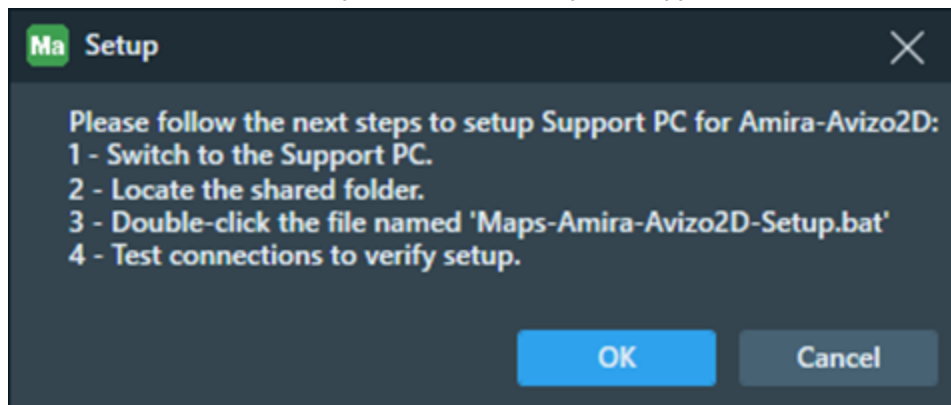
It is required that you first set up the Support PC by following steps indicated in Maps settings to connect Maps with Amira-Avizo2D.

1. From the Microscope PC, navigate to **Maps Options>>Settings... menu item** to open the Amira-Avizo2D settings.
2. Click the Amira-Avizo2D tab.
3. Select **NAT** from the Connection Type field.

4. Configure the shared folder path as indicated in the table below.

Amira-Avizo2D NAT Settings	
Interface Element	Description
Shared folder path from Maps PC	Enter the path to the Support PC shared folder for the Maps software PC. See Configure shared folder for details.
Shared folder path from Amira-Avizo2D PC	Enter the path to the Support PC shared folder for the Amira-Avizo2D PC. See Configure shared folder for details.
Hostname of Support PC	Enter the hostname of the Support PC. See Locate hostname for details.
Hostname of Amira-Avizo2D PC	Enter the hostname of Amira-Avizo2D PC. See Locate hostname for details.
Connection time out	Determines the time duration required for Maps to connect with Amira-Avizo2D before Maps cancels the connection. The time duration is measured in seconds.

5. Click **Setup Support PC**.
6. Click **OK**, and then follow steps indicated to set up the Support PC.



7. From the Amira-Avizo2D PC, launch the Analyzer application (see [Start Analyzer application](#)).

Configure shared folder

The shared folder is used as an image and recipe exchange location between Maps and Amira-Avizo2D (see [Define Shared Folder](#) for details). Configure the shared folder the way it can be accessed by both Amira-Avizo2D and Maps applications. The shared folder must be mapped as drive according to the following connection options:

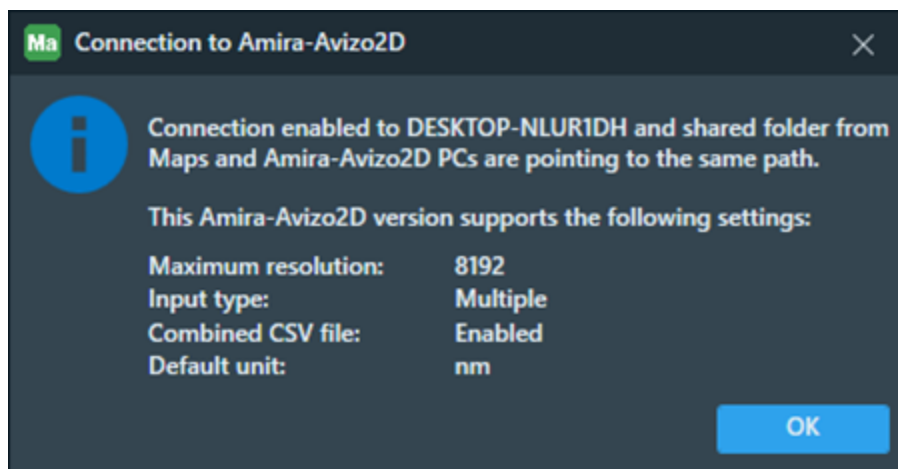
- **Local:** On the same computer as Maps if both Amira-Avizo2D are hosted on the same computer.
- **Direct:** Either on the Amira-Avizo2D computer and drive mapped to the Maps computer, or on the Maps computer and drive mapped to the Amira-Avizo2D computer.
- **NAT:** On the Support PC, drive mapped on both the Microscope PC and the Amira-Avizo2D computer.

Test connections

Test the Maps and Amira-Avizo2D connectivity after configuration of the hardware and shared folder to verify the connection. Go to the Connection with the Amira-Avizo2D field, and then click **Test Connection** to test the connection between Maps and Amira-Avizo2D.

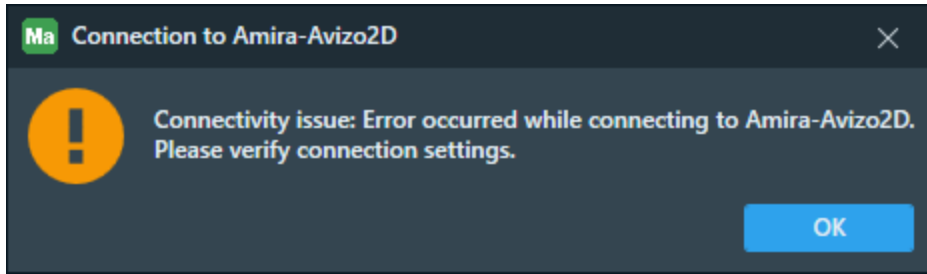
When testing the connection to determine whether or not the images can be analyzed with Amira-Avizo2D, there are five possible results.

- **Connection:** If the Maps and Amira-Avizo2D connection and shared folder are correct, then the following message appears. Click **OK**.



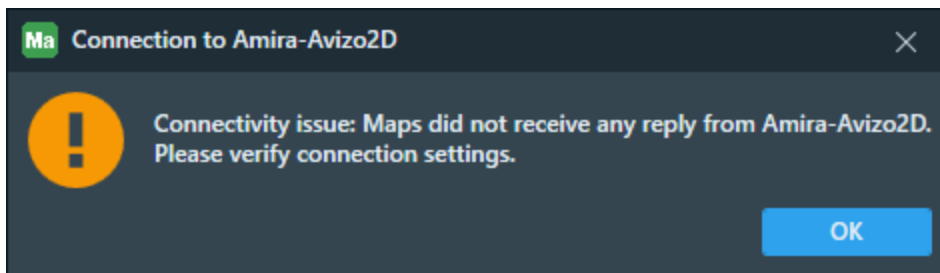
The message indicates settings supported by an Amira-Avizo2D instance connected to Maps (see [Recipe processing specification](#)).

- **No Connection:** If the Amira-Avizo2D host is incorrect while in Direct or NAT mode, or the Analyzer application is not launched in Local or Direct mode, then the following message appears.



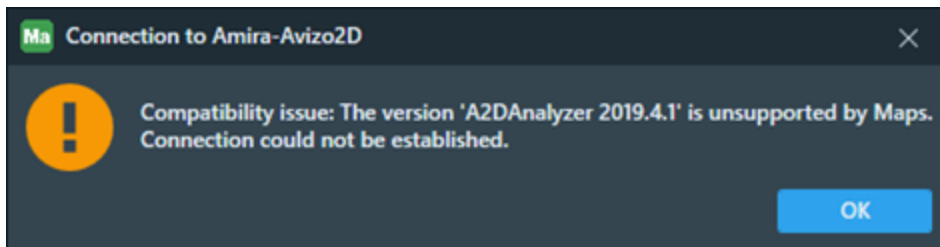
Solution: Click **OK**, and then check that the hostname is entered correctly and that Analyzer is running. If not, see [Configuration options](#) and [Start Analyzer application](#).

- **No Connection:** If the Analyzer application is not launched in NAT mode, then the following message appears.



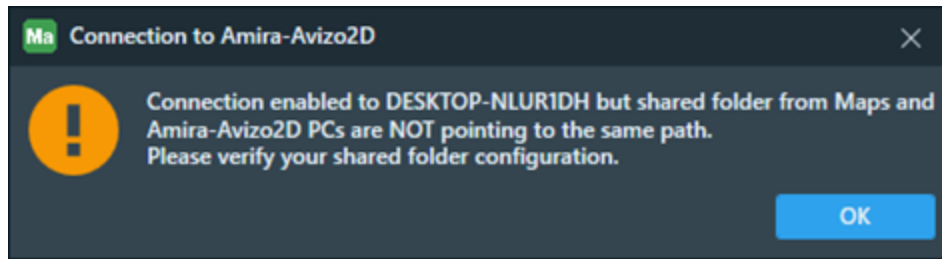
Solution: Click **OK**, and then check that Analyzer is running. If not, then see [Start Analyzer application](#).

- **No Connection:** If the selected Amira-Avizo2D version does not correspond to the running application, then the following message appears.



Solution: Click **OK**, and then check that the Amira-Avizo2D version matches with the running application. If not, then select the matching version.

- **Connection without shared folder:** If Amira-Avizo2D connects and the shared folder is not set up correctly, then the following message appears.



Solution: Click **OK**, and then check that the entries for the shared folder point to the same location from both PCs. If not, see [Configure shared folder](#).

Start Analyzer application

It is required that you run the Analyzer application on the Amira-Avizo2D PC to use Amira-Avizo2D capabilities with Maps. The Analyzer application is included with the Amira-Avizo2D software package.

Click the **Analyzer for MAPS** desktop shortcut, which launches the Analyzer application with the graphical user interface (GUI) used for recipe processing.

Process images with recipe

Once the connection to Amira-Avizo2D is successful and you have launched the Analyzer application, then the system is ready to process images with Amira-Avizo2D. To begin this process, you must open, create, or import a Maps project from the shared folder. You can use either a SEM/SDB or TEM tile set; SEM/SDB or TEM acquired tile set; or stitched image. Note that the recipe processing specification differs depending on the software version that is defined in the Amira-Avizo2D settings (see [Recipe processing specification](#)).

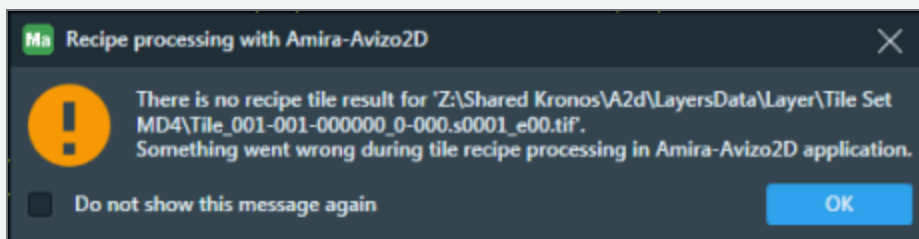
SEM/SDB or TEM Tile Set

1. On a newly created tile set, open the Amira-Avizo2D section.
2. Configure recipe processing options according to your use case:

SEM or TEM Tile Set Recipe Processing Overview	
Interface Element	Description
Recipe file path	Select the .hxisp file used for recipe processing. This file must be located in the shared folder.
Measure group	<p>Select the measure group that will be processed on Amira-Avizo2D from all measure groups available in the A2DAnalyzer application. See the Amira-Avizo2D documentation for more information on Measures.</p> <ul style="list-style-type: none"> • Select the Refresh button to reload measure groups available in Amira-Avizo2D. Refresh is useful if measure groups were added or removed on A2DAnalyzer in the meantime. • By default, a None entry is selected and it will not produce any .csv measure output in the layer directory. <div style="border: 1px solid #0070C0; padding: 5px; margin-top: 10px;"> <p>Note: When measure groups cannot be retrieved, the default measure group list contains a Custom measure group. Select the Custom measure group only when it is available in the A2DAnalyzer application, otherwise recipe processing fails.</p> </div>


3. Finalize your tile set configuration and run the Job Queue. While the tile set is acquired, the resulting layer tiles are updated once they are processed by Amira-Avizo2D.

Note: For each Amira-Avizo2D recipe processing job that fails, acquisition continues normally and Maps displays a warning message. Select the **Do not show this message again** box if you do not want this warning to appear again while the recipe processing job is running.



SEM/SDB or TEM Acquired Tile Set


1. Right-click on the tile set acquired on the layer tree, and then select **Recipe Processing**.
2. Configure recipe processing options according to your use case:

SEM or TEM Acquired Tile Set Recipe Processing Overview	
Interface Element	Description
Recipe file path	Select the .hisp file used for recipe processing. This file must be located in the shared folder.
Measure group	<p>Select the measure group that will be processed on Amira-Avizo2D from all measure groups available in the A2DAnalyzer application. See the Amira-Avizo2D documentation for more information on Measures.</p> <ul style="list-style-type: none"> • Select the Refresh button to reload measure groups available in Amira-Avizo2D. Refresh is useful if measure groups were added or removed on A2DAnalyzer in the meantime. • By default, a None entry is selected and it will not produce any .csv measure output in the layer directory. <div style="border: 1px solid blue; padding: 5px; margin-top: 10px;"> <p> Note: When measure groups cannot be retrieved, the default measure group list contains a Custom measure group. Select the Custom measure group only when it is available in the A2DAnalyzer application, otherwise recipe processing fails.</p> </div>

3. Click **Queue Job** to create a new job in the job control.
4. Run the Job Queue to start processing.
5. When the job is finished, a tile set is created containing the processing results from Analyzer.

Stitched image

1. Right-click the stitched image on the layer tree, and then select **Recipe Processing**.
2. Configure recipe processing options according to your use case:

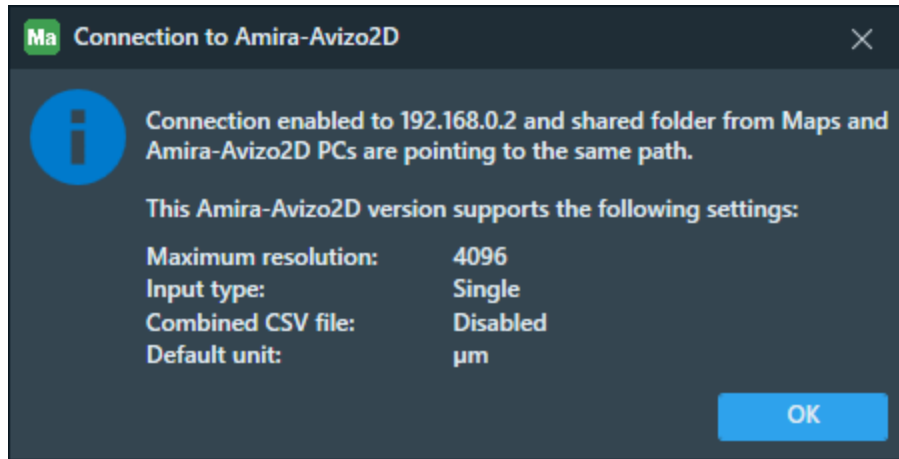
Stitched Image Recipe Processing Overview	
Interface Element	Description
Recipe file path	Select the .hisp file used for recipe processing. This file must be located in the shared folder.
Measure group	<p>Select the measure group that will be processed on Amira-Avizo2D from all measure groups available in the A2DAnalyzer application. See the Amira-Avizo2D documentation for more information on Measures.</p> <ul style="list-style-type: none"> • Select the Refresh button to reload measure groups available in Amira-Avizo2D. Refresh is useful if measure groups were added or removed on A2DAnalyzer in the meantime. • By default, a None entry is selected and it will not produce any .csv measure output in the layer directory. <div style="border: 1px solid #0070C0; padding: 5px; margin-top: 10px;"> <p> Note: When measure groups cannot be retrieved, the default measure group list contains a Custom measure group. Select the Custom measure group only when it is available in the A2DAnalyzer application, otherwise recipe processing fails.</p> </div>

3. Click **Queue Job** to create a new job in the job control.
4. Run the Job Queue to start processing.
5. When the job is finished, an image layer is created containing the processing results from Analyzer.

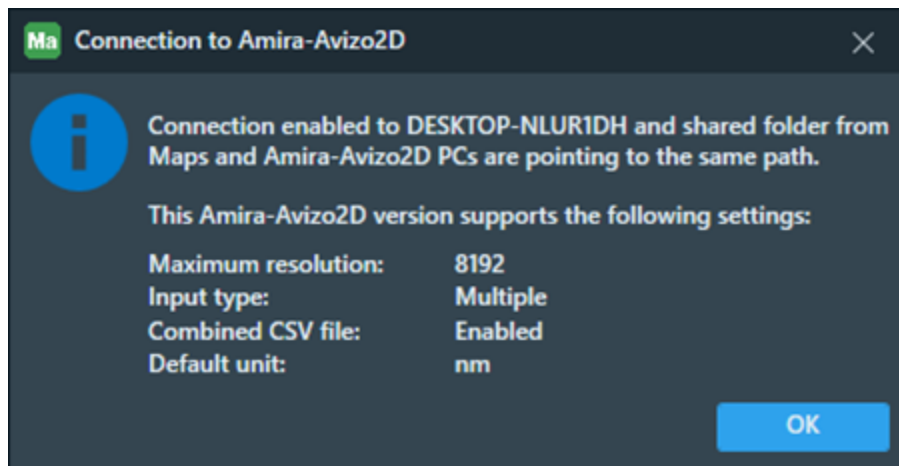
Recipe processing specification

The recipe processing specification differs depending on the connected A2DAnalyzer instance (that is, the version and licensing). To confirm A2DAnalyzer supported settings, test the connection between Maps and Amira-Avizo2D.

- Test connection to A2DAnalyzer 2021.1 licensed without PRO extension



- Test connection to A2DAnalyzer 2021.1 licensed with PRO extension

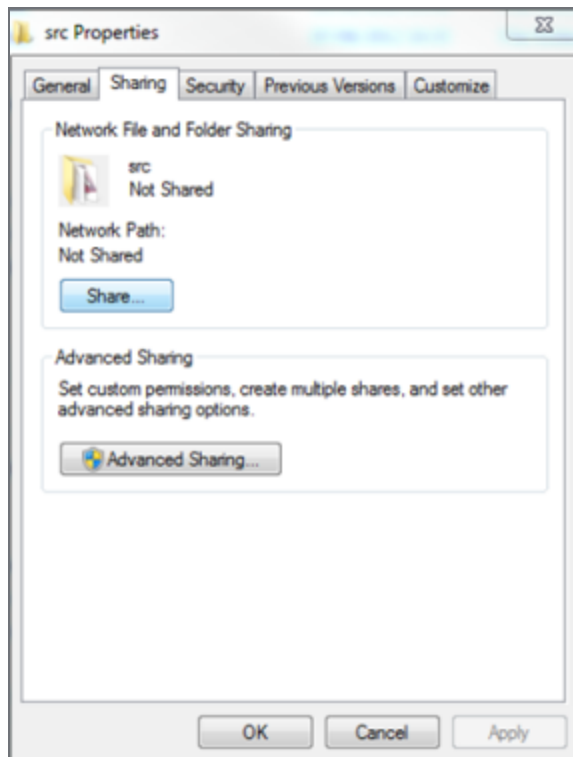


Recipe processing settings overview	
Settings	Description
Maximum resolution	Indicates the maximum resolution in pixels supported by the connected A2DAnalyzer instance.
Input type	<p>Indicates the recipe input types supported by the connected A2DAnalyzer instance.</p> <p>Choices include:</p> <ul style="list-style-type: none"> • <i>Single</i>: Recipe supports only a single input image and generates a single output image. As a result, applying a recipe on a multichannel layer produces a multichannel layer with the same number of channels. • <i>Multiple</i>: Recipe supports multiple input images and generates a single output image. As a result, applying a recipe on a multichannel layer produces a single channel layer.
Combined CSV file	Determines if a measure as a recipe parameter produces a single .csv file for all processed images named 'CombinedMeasure.csv' in the result layer folder. If not activated, Maps produces a .csv file for each processed image in the result layer folder.
Default unit	Default unit supported by the connected A2DAnalyzer instance, which is used to exchange images.

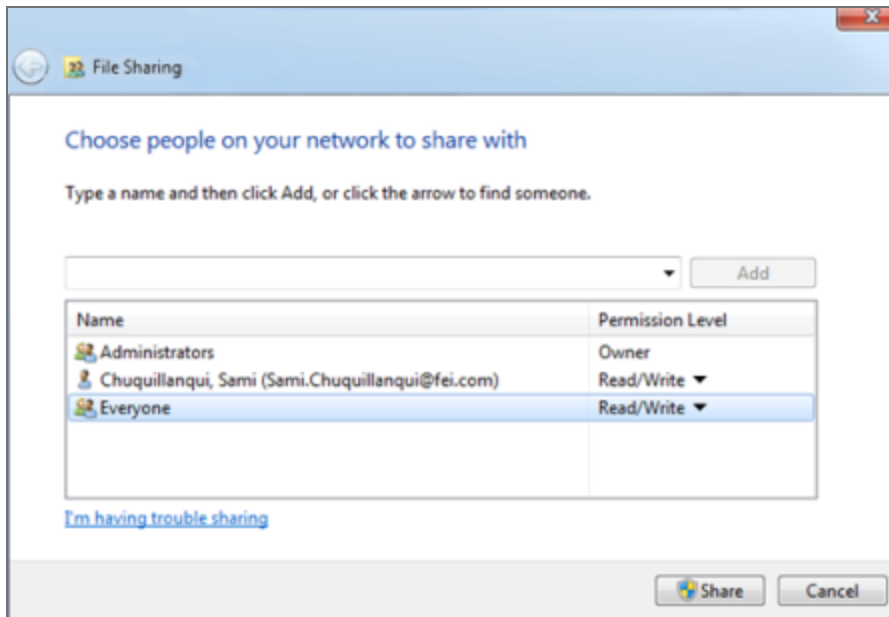
Define Shared Folder

A shared folder is necessary to allow data exchanges. This folder can be located in any place, as long as it is accessible to both software applications. It can be located on one of the two computers.

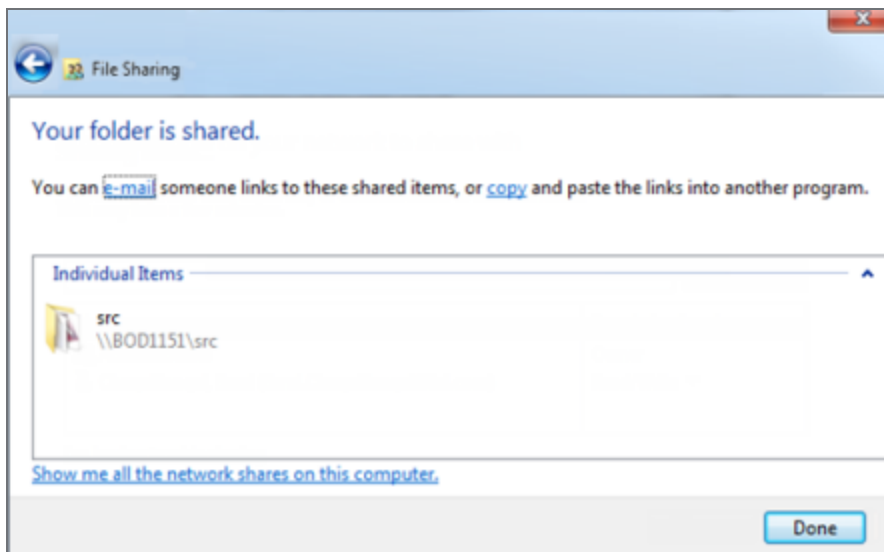
1. To share a folder, determine the folder you want to share.
2. Right-click on the folder and click **Show Properties**.
3. Click **Share** in the **Properties** dialog box.



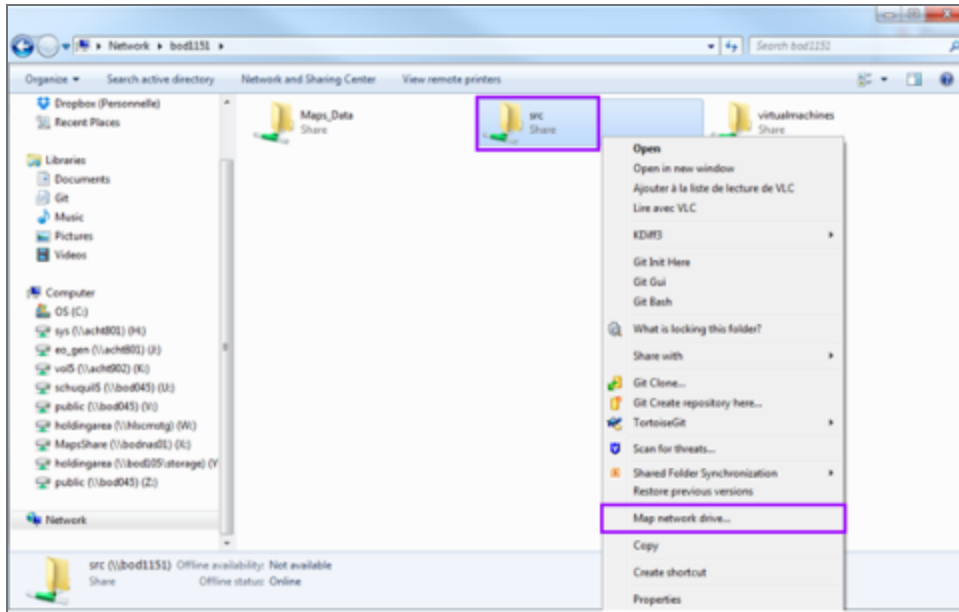
4. Select **Everyone** for Name, click **Read/Write** for Permission Level, and then click **Share**.



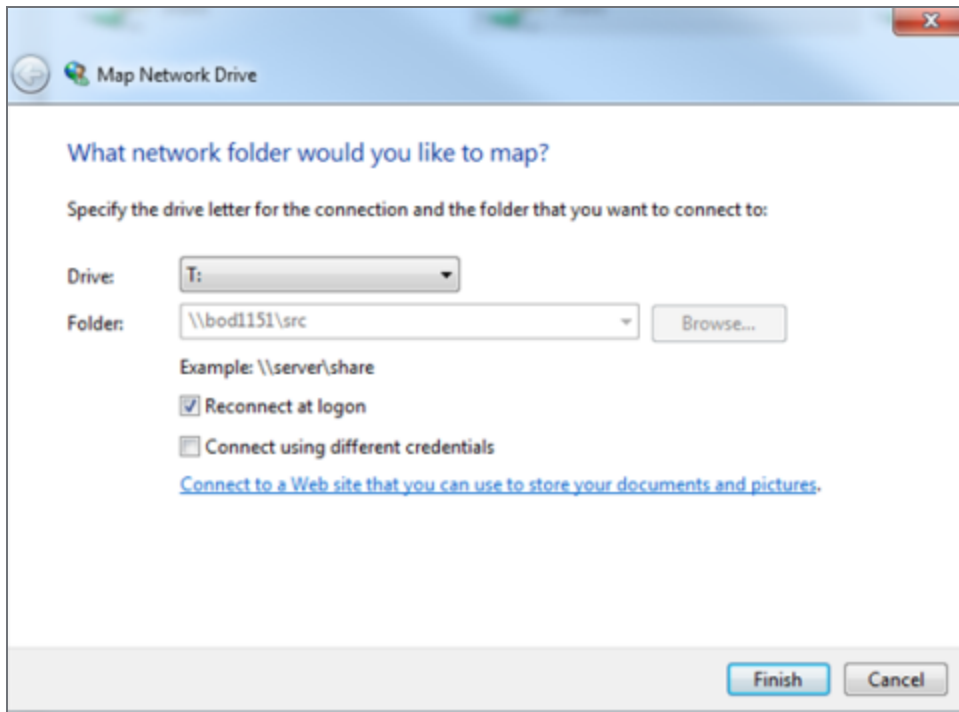
5. Click **Done**.



6. Right-click on the shared folder and then click **Map Network Drive** to define the shared folder as a network drive to simplify access to this folder.





7. Select the network drive and click **Finish**.

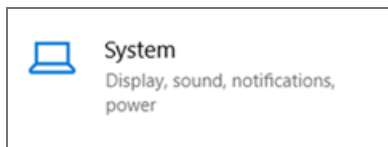


Locate hostname

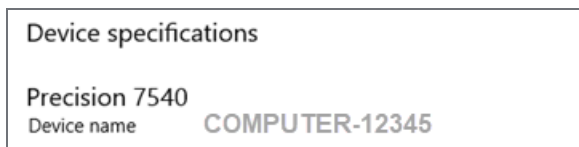
A hostname is a label assigned to a device (that is, a "host") on a network. It distinguishes one device from another on a specific network, or over the Internet.

Do the following to locate the hostname for your computer.

1. Click the Windows Start icon  on the left end of the taskbar to open the Start menu.
2. Click the Settings cogwheel icon  to open the Settings menu.
3. Click the System icon to open the system settings screen.



4. Navigate to the left-side panel and click **About**.
5. Scroll down to the Device specifications section and locate the computer model (for example, Precision 7540).
6. View the Device name, which is also the hostname for your computer.



Tomography

This section describes how to use Tomography with the Maps software.

Topics include:

[Import Tomography Presets](#)

[Import Tomography Batch Positions](#)

[View and Visit Tomography Batch Positions](#)

[Send Annotations to Tomography \(Beta\)](#)

Import Tomography Presets

This topic describes the **Import Presets** option under the [Tomography menu](#).

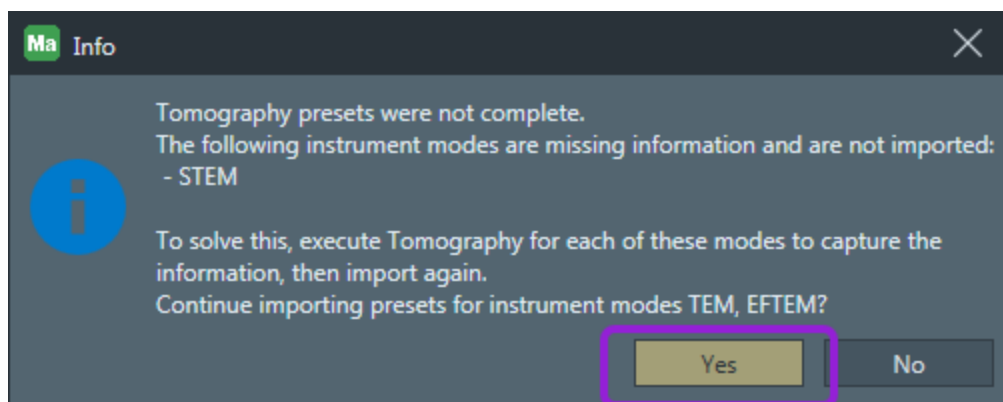
Note: For this menu option to work, you must have both Maps and the Tomography 5 Software installed. Also, you must have used Tomography at least once, and be aware that the import will only work for the instrument modes that have been used for Tomography (EFTEM, STEM, and TEM).

The following settings, which are available in both Tomography and in Maps, are stored as templates when you use the import option.

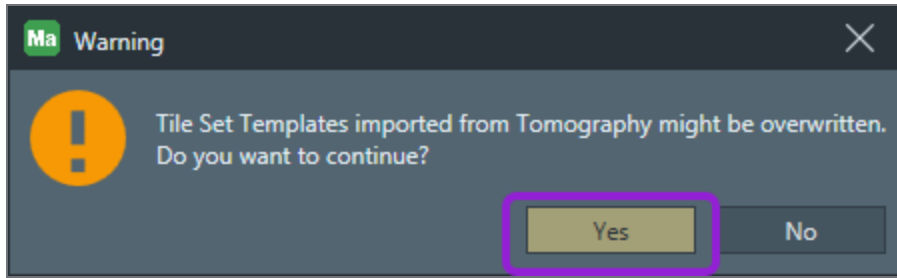
- Atlas
- Exposure
- Template
- Overview
- Search
- Template

Import presets

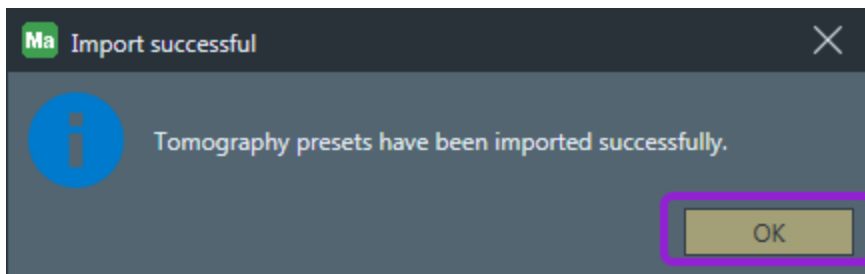
1. Navigate to the TEM Options menu and click **Import Tomography presets....**
2. If not all the instrument modes are available, then a message appears to indicate which instrument modes are missing. Click **Yes** to continue.



3. If a template already exists for Tomography presets, then the following warning appears to indicate that it will be overwritten by the import. Click **Yes** to continue.

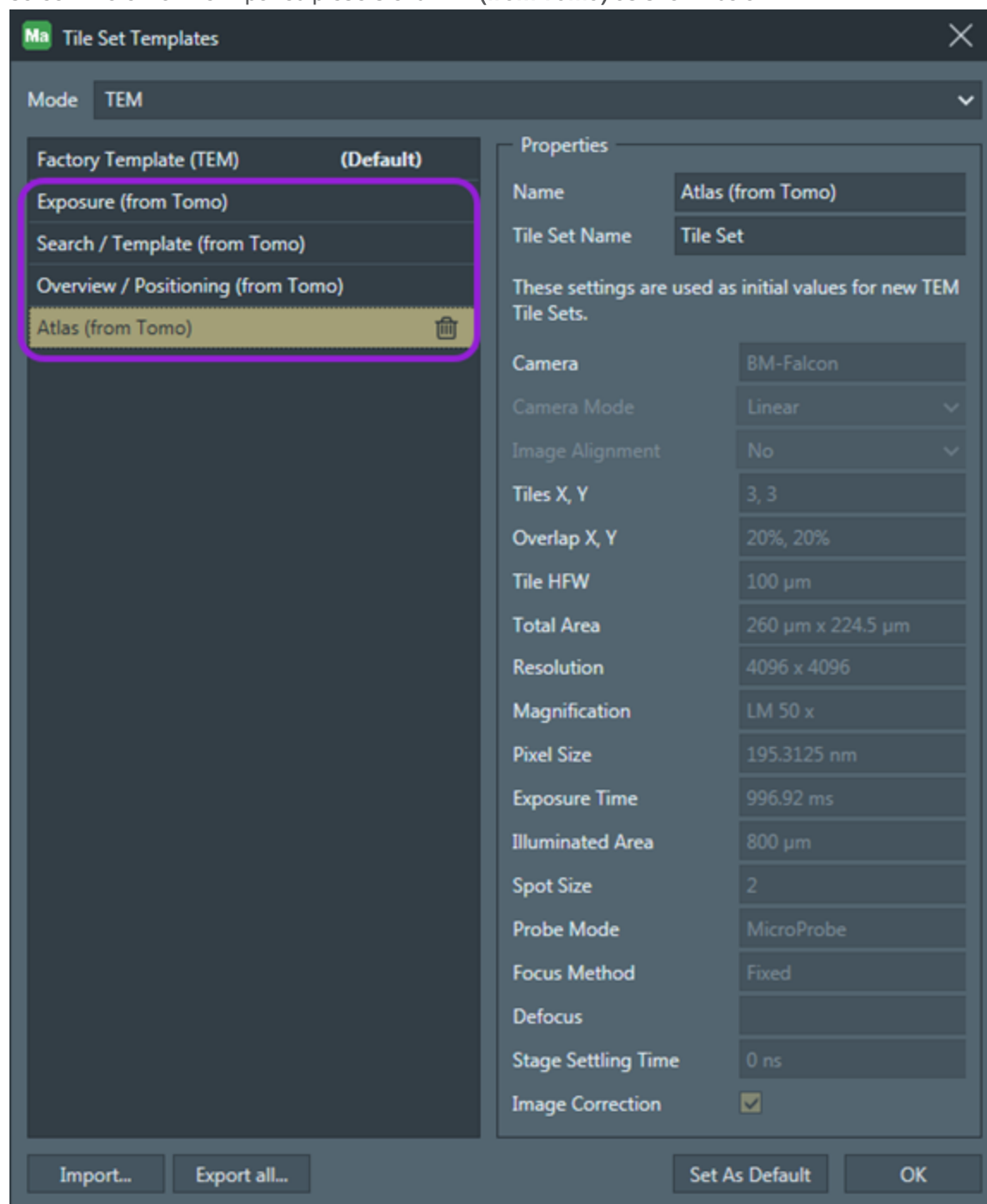


4. The following message appears in the import is successful. Click **Yes** to continue.



View stored templates

Each successful import is stored as a template, and you can inspect or alter them from within the Tile Set Templates screen. Note that the imported presets end with **(from Tomo)** as shown below.



Import Tomography Batch Positions

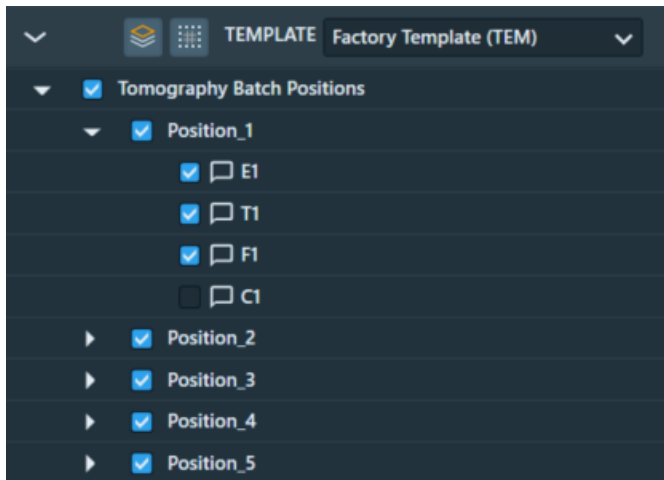
This topic describes how batch positions are imported from Tomography to Maps. How you import batch positions depends on whether or not the Maps Data Exchange Service is installed on the system.



Note: For the import operation to work, you must have both Maps and the Tomography 5 Software installed. Also, you must have imported the Exposure preset from the Tomography 5 Software. If you want to use automatic synchronization instead of the file-based exchange to import the positions, then the Maps Data Exchange Service must also be installed.

Import and update batch positions

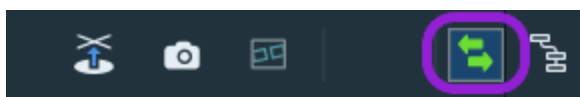
1. Navigate to the [Tomography menu](#), and then click **Import Batch Positions...** to open the system file dialog.
2. Click the file you want to import, and then click **Open**.
3. Maps imports the Tomography batch positions after successfully importing a new top layer. You can view the imported positions in the Viewer as shown below.



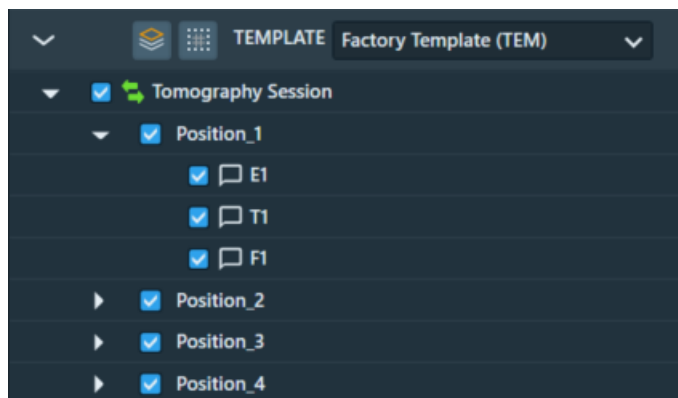
4. Hover your mouse cursor over an imported position and right-click to open the context menu.
5. Select **Update Tomography batch positions** to update the current list of batch positions. Positions are reloaded from the batch positions file last used. If the file is no longer available, the system file dialog opens so that you can select a different file to import. All existing positions that are not included in the new file will be deleted.

Synchronize batch positions with Maps Data Exchange Service (beta)

1. Confirm the following preconditions are met.
 - a. Maps is running
 - b. Tomography is running and a session has been created
 - c. Tomography is connected to the Maps Data Exchange Service
 - d. One or more batch positions have been created
2. To activate the automatic synchronization of data with Tomography, either click **Synchronize With Tomography** under the [Tomography menu](#), or click the **Toggle Automatic Synchronization** icon in the [TEM Toolbar, Right Side](#). Once activated, the arrows in the toolbar icon turn green.



3. Maps creates a new layer that represents the active Tomography session. It also imports batch positions from the active session. You can view the imported positions by expanding the layer, as shown below.



4. While the automatic synchronization is turned ON, any batch position changes in the active Tomography session are automatically propagated to Maps (end-user interaction is not required).

View and Visit Tomography Batch Positions

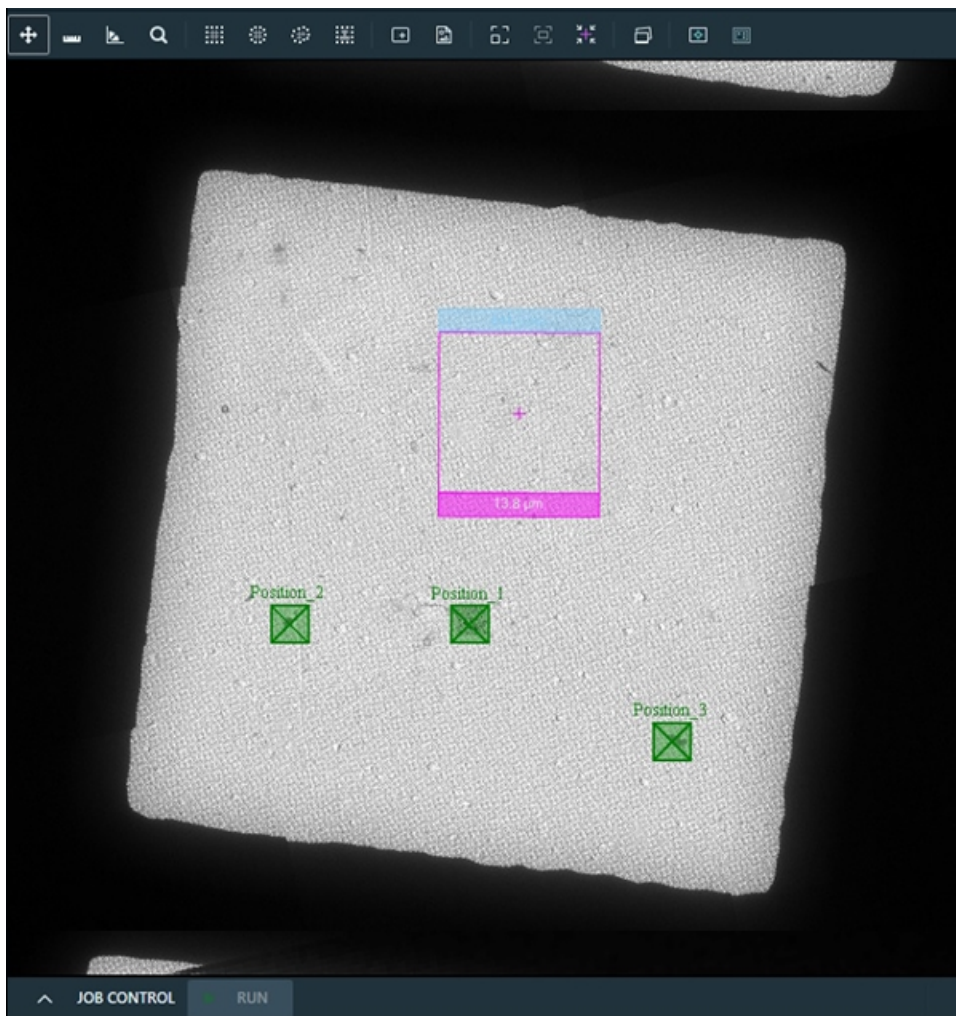
This topic describes how you can view and visit Tomography batch positions after they are imported from the Tomography 5 Software application.

View batch positions

You can view the batch positions in the Viewer from two different modes, zoomed-out or zoomed-in.

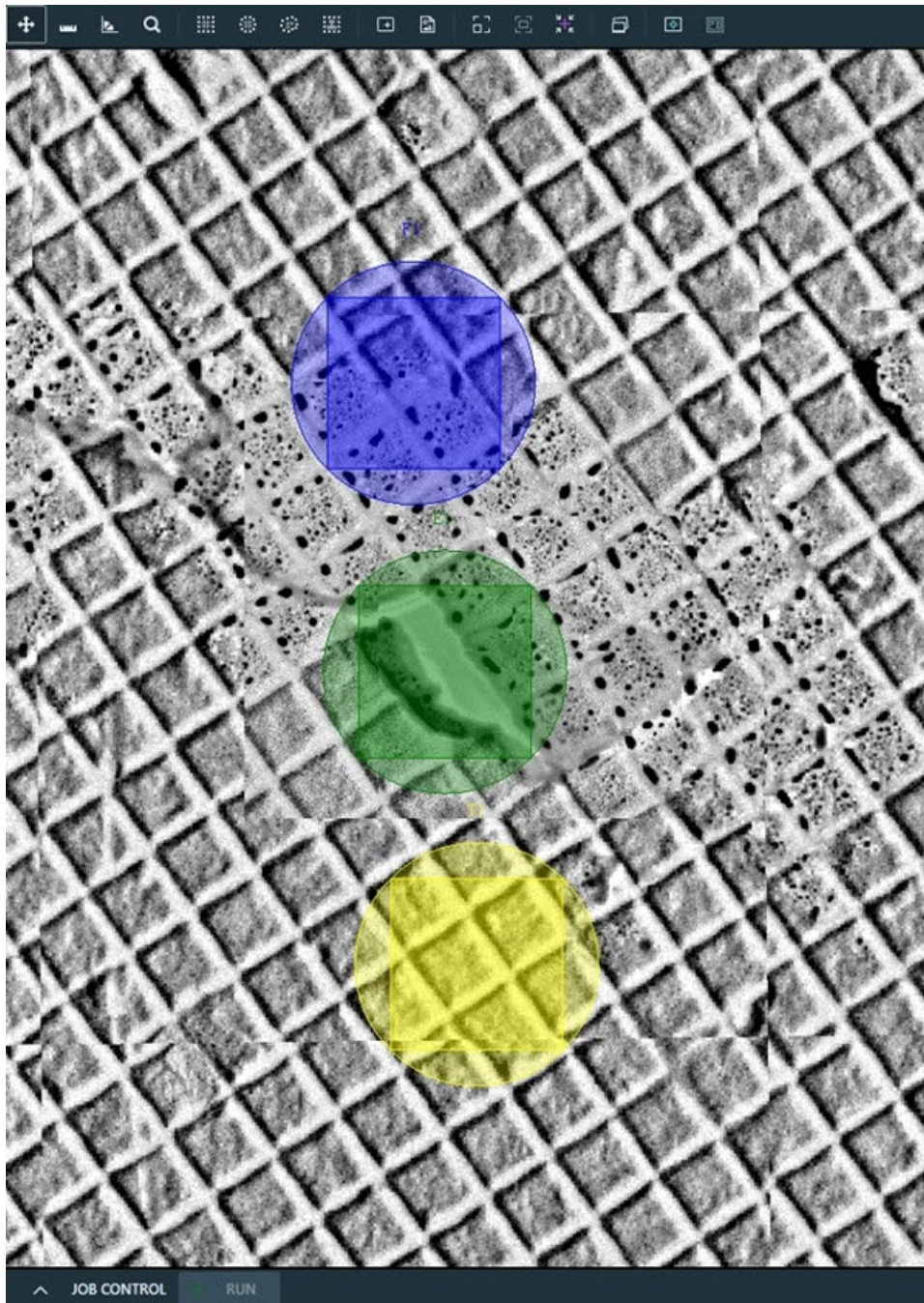
Zoomed-out mode

When you view the batch positions from the Zoomed-Out mode, you can see an overview of all the lamellae locations (indicated in green).



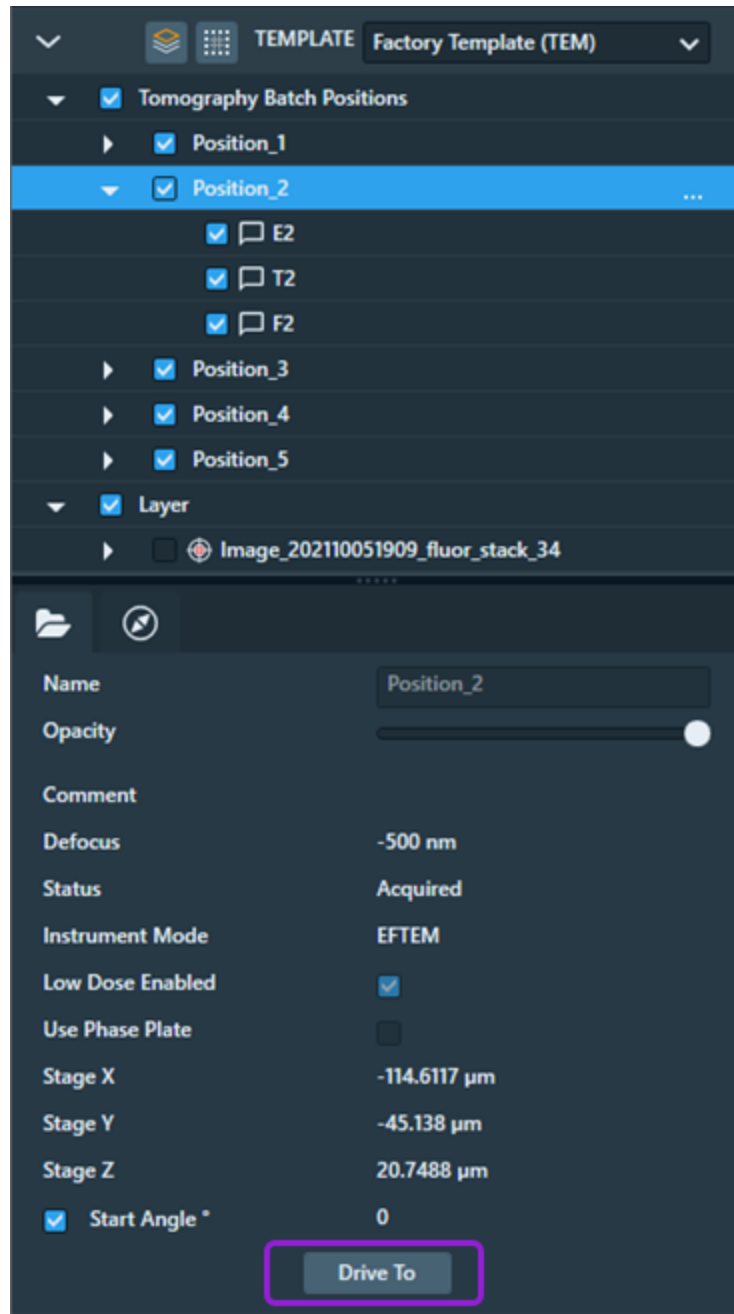
Zoomed-in mode

When you view the batch positions from the Zoomed-In mode, you can see the locations of the tracking area (indicated in green), exposure area (indicated in yellow), and focus area (indicated in purple) for each individual lamella.



Visit batch positions

You can move the stage to the batch position or zoomed-in location of a lamella's areas for tracking, focus, and exposure. To move the stage, click **Drive To** under Position properties as shown below.



Send Annotations to Tomography (Beta)

This topic describes how annotations are sent from Maps to Tomography.



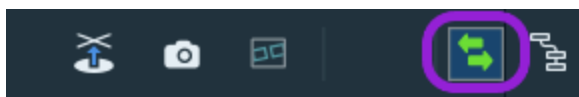
Note: For the operation to work, you must have both Maps and the Tomography 5 Software installed. Also, Maps Data Exchange Service must be installed.

Preconditions

1. Before sending the annotations, confirm the following preconditions are met.
 - a. Tomography is running, a session has been created, and the session is connected to the Data Exchange Service
 - b. Maps is running, a project has been created, and the project is connected to the Data Exchange Service
2. Create one or more annotations in Maps. The annotations may include any of the following:
 - a. Sites of interest
 - b. Areas of interest
 - c. Lamella sites

Synchronize all annotations automatically

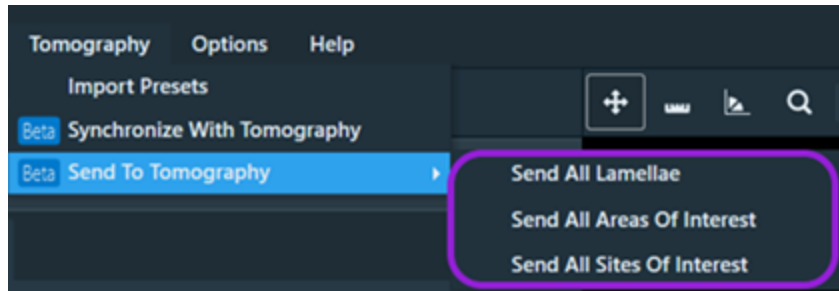
1. To activate the automatic synchronization of data with Tomography, either click **Synchronize With Tomography** under the [Tomography menu](#), or click the **Toggle Automatic Synchronization** icon in the [TEM Toolbar, Right Side](#).
2. The arrows in the toolbar icon turn green once the automatic synchronization is activated. Maps sends all annotations to Tomography and then displays them in the Tomography viewer.



3. While the automatic synchronization is turned ON, any batch position changes in the active Tomography session are automatically propagated to Maps (end-user interaction is not required).

Send all annotations of given type manually

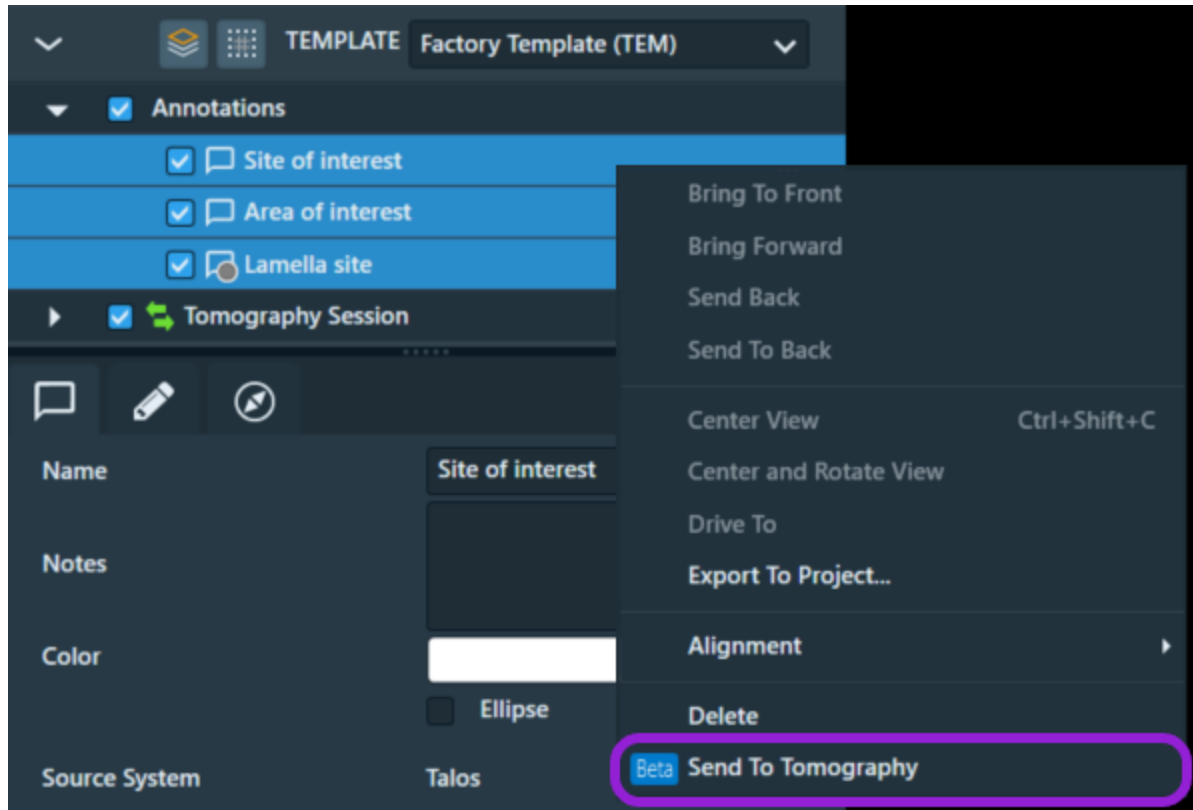
1. Click **Send To Tomography** under the [Tomography menu](#).
2. Click an annotation type from the submenu to send all annotations of the selected type from the current Maps project to Tomography.



3. To update the annotations of your selected type at a later time, repeat the previous steps.

Send selected annotations manually

1. Select annotations in the layer tree of the current project.
2. Hover your mouse cursor over an imported position and right-click to open the context menu.



3. Click **Send to Tomography** to send selected annotations from the current Maps project to Tomography. Any annotations that have been previously sent, are replaced by the current annotations.
4. To update the annotations at a later time, repeat the previous steps.

Array Tomography

This section describes how to create an Array Tomography (AT) job using Maps software. Maps AT functionality requires an active AT license.

Topics include:

[About Array Tomography](#)

[Array Tomography Workflow](#)

[Extended Controls](#)

About Array Tomography

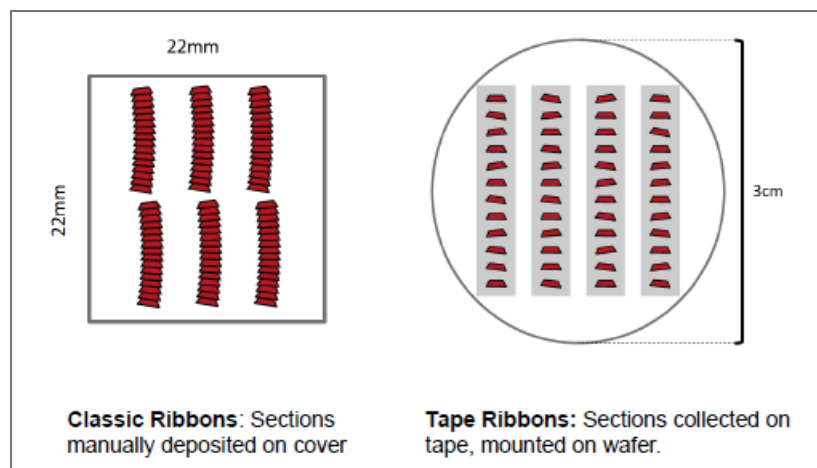
AT is an imaging technique in which 3D image data is reconstructed from serial recordings on serial sections that are spread out on a large sample carrier.

Samples

Samples for AT are produced by serial sectioning of a plastic-embedded sample in a microtome. Sections are deposited on ITO-coated glass substrates (that is, 22 x 22mm cover glasses) or on wafers.

Depositing samples is done manually or by a tape collection device (that is, ATUMtome). The resulting AT samples differ fundamentally.

Classic and Tape Ribbons



Sample Sections and Tile Set Arrays

The main purpose of the AT feature is to easily align high-resolution imaging on areas of interest on all sample sections. The AT feature set consists of a concept called a *Tile Set Array*. The Tile Set Array sets up local coordinate systems around the individual sample sections to create a collection of tile sets across *all* sample sections.

Terminology

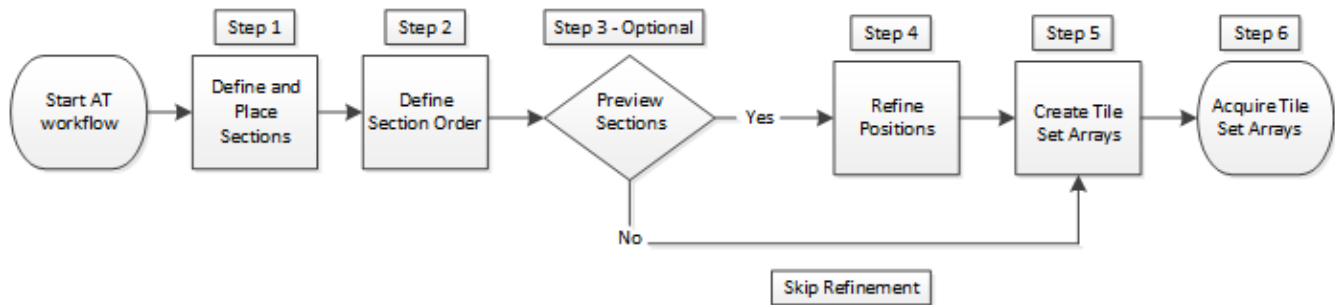
- **Section:** Defined as a single slice of the overall sample placed on the stage. Alternatively used to refer to the outline of a given sample slice that is used in Maps.
- **Tile Set Array:** A collection of tile sets that span all or some of the sample sections. There will be one tile set per section initially and they are all placed in the same relative location within their section. Tile set arrays are used as the source images for creating a 3D data set. Most tile set settings are shared across the whole array. All the tile sets created within this array are linked. If the position, rotation, or imaging parameters of one tile set changes, then the rest of the tile sets will be updated.

Array Tomography Workflow

The AT workflow contains two branches to set up and capture images for an AT reconstruction:

- A branch for mapping out all sections on your sample manually.
- A branch for running an algorithm to auto detect the sections.

The following diagram shows the steps in the workflow for both branches.



[Start the Array Tomography Workflow](#)

[Step 1: Define and Place Sections](#)

[Step 2: Define Section Order](#)

[Step 3: Preview Sections \(Optional\)](#)

[Step 4: Refine Positions](#)

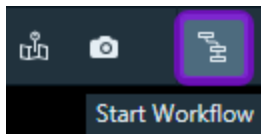
[Step 5: Create Tile Set Arrays](#)

[Step 6: Acquire Tile Set Arrays](#)

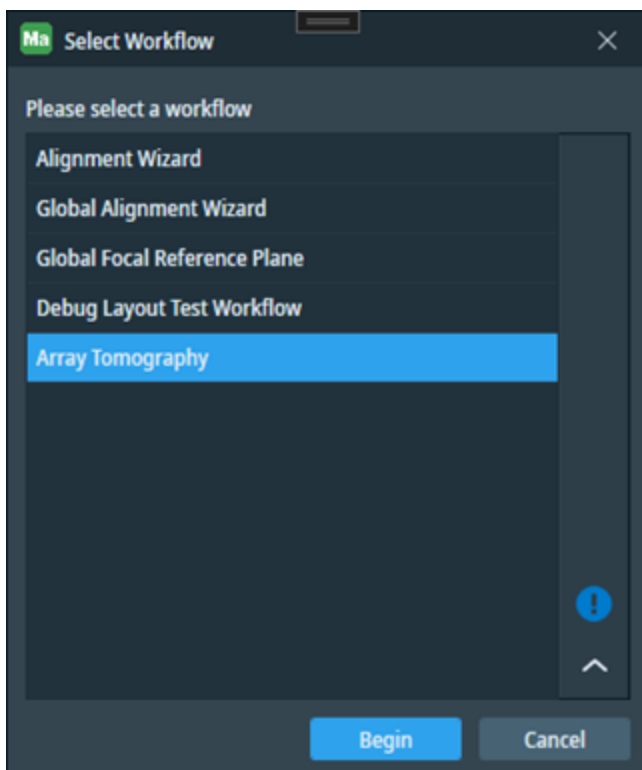
Start the Array Tomography Workflow

An Array Tomography (AT) job is a workflow used within the Maps workflow panel. The workflow panel is a control that contains step-by-step processes that help make complicated jobs easier. The workflows available depend on your product license.

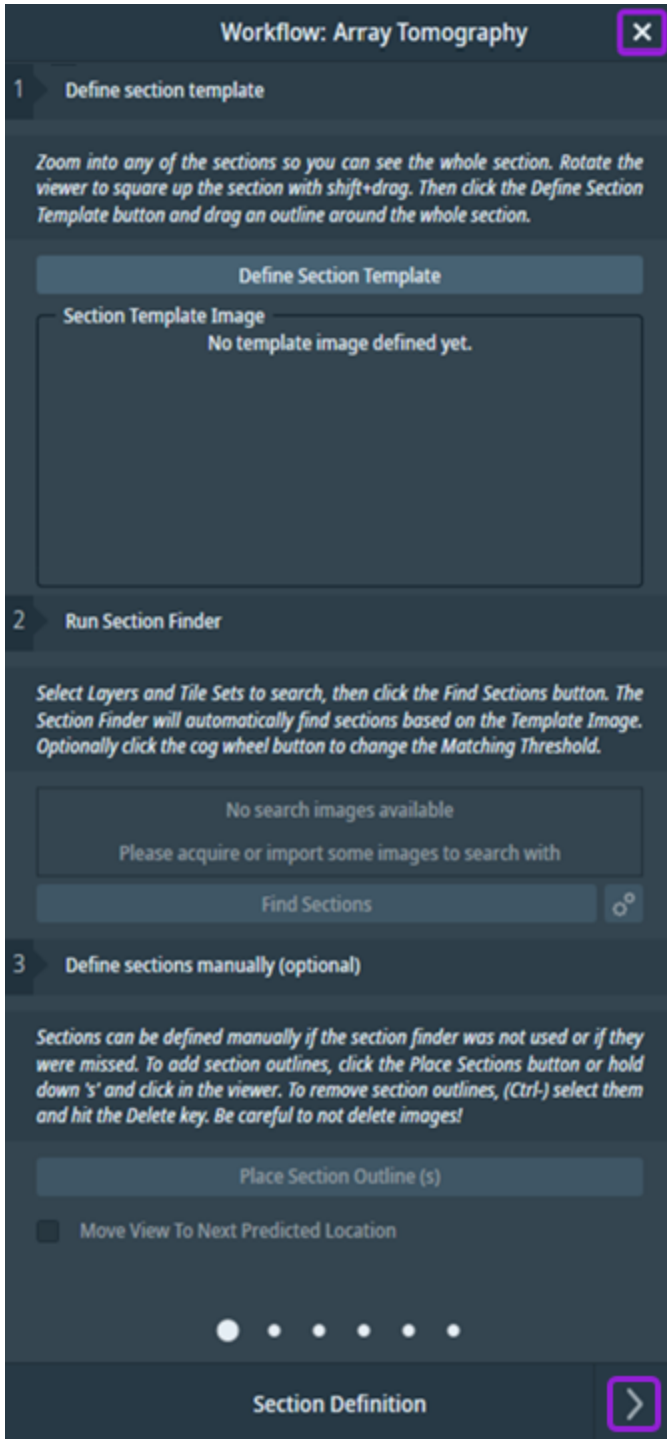
1. Click the **Start Workflow** icon located on the right side of the Toolbar.



2. In the **Select Workflow** window, click **Array Tomography**, and then click **Begin**.



3. The **Workflow: Array Tomography** window appears on the right side of the main screen. To navigate through the steps within the workflow, use the forward and back arrows located at the bottom of the window. To exit the workflow, click **X** at the top-right corner of the panel.

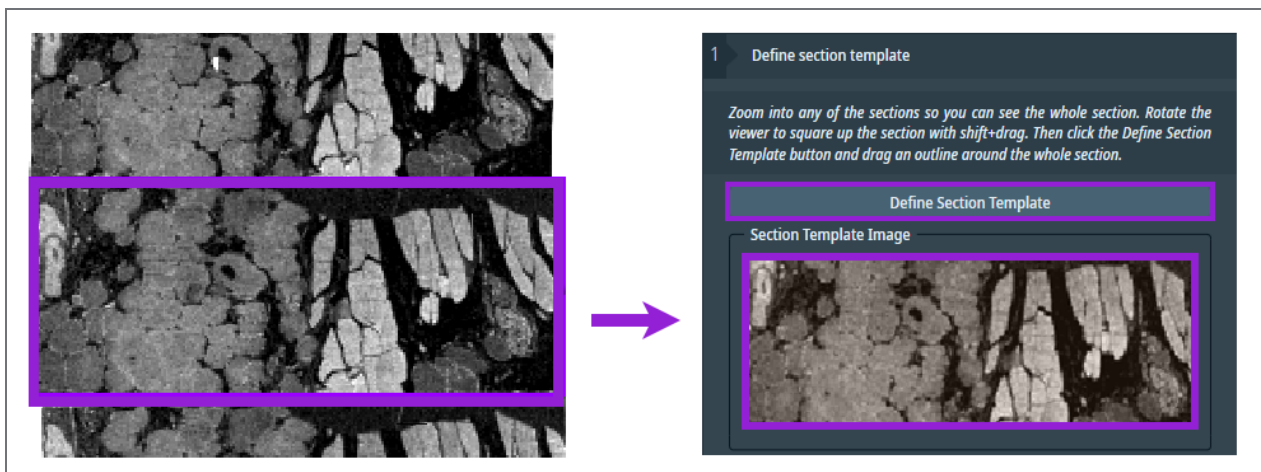


Step 1: Define and Place Sections

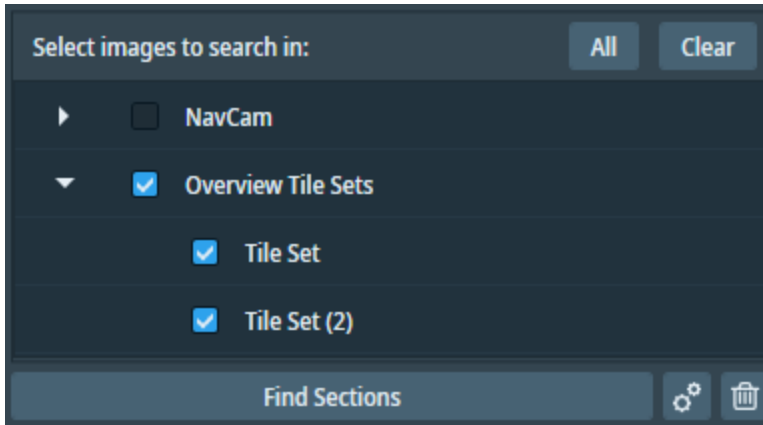
The first step of the workflow is to define a section template to pattern match across the entire sample for section placement.

Workflow procedure

1. Define the section template.
 - a. Use the mouse scroll wheel to zoom into one section of the sample.
 - b. Press **Shift+left mouse button** to rotate the viewer until the section aligns horizontally and vertically within the viewer.
 - c. Click **Define Section Template**, and then draw a rectangle around the sample slice in the viewer. Maps displays this image selection in the **Section Template Image** box within the workflow panel. Array Tomography then uses this image as the search template within the section finder.

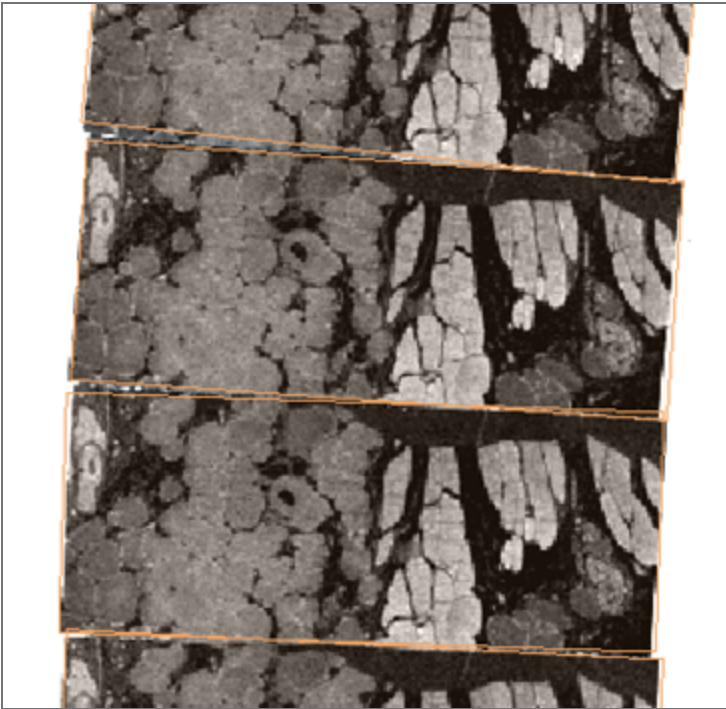


2. Use the section finder to automatically search for regions of overview images that match the **Section Template Image** for fast section placement. *Note that if you have 10 sections or less in your workflow, then it is faster to perform this step manually.*
 - a. In the Searchable Layers pane, select the desired overview image layers for the Array Tomography search.



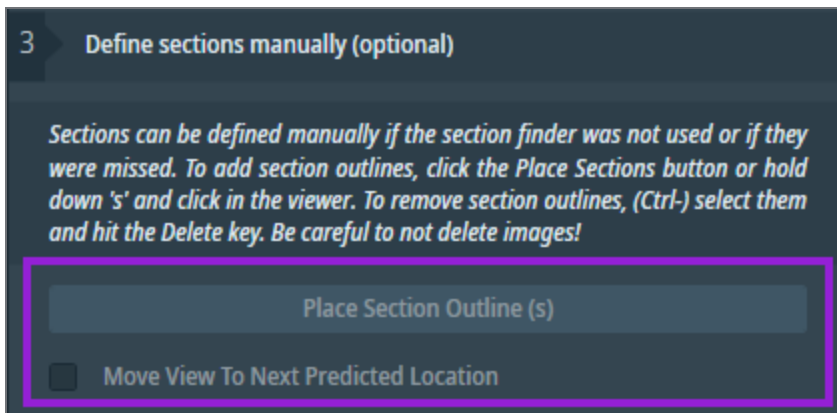
- b. *Optional:* You can click the double gear icon to open a dialog to set a matching threshold for the section finder. This icon is located below the layers pane.
 - c. *Optional:* You can click the trash can icon to either clear all sections if (a) you would like to start over, or (b) the section finder did not function as expected with your defined parameters. This icon is located below the layers pane.

- d. Click **Find Sections** to start the automated section finder. When the automated section finder finishes searching, the viewer displays the outlined sections.



- e. The section finder might place an extra section outline where a sample section does not exist (this is called a "false positive"). If this occurs, then delete the false positive as follows:
 - a. Click the section outline in the viewer.
 - b. Press the **Delete** key to remove the extra section outline.

3. Add any remaining sections manually.
 - a. Confirm that the section requiring an outline is correctly aligned within the viewer. The software application typically aligns the section within the viewer.
 - b. Click **Place Section Outline (s)** to generate a preview outline of the missing section or press the letter **s** on your keyboard as a shortcut. Next, select the **Move View To Next Predicted Location** check box to auto-orient the view based on the two previously placed section locations and rotation.



- c. Click in the viewer to place the outline.
4. Once you place all the sections, click the forward arrow at the bottom of the workflow panel to continue to [Step 2: Define Section Order](#).

Step 2: Define Section Order

The second step of the workflow defines the order of the sections.

Ordering tool

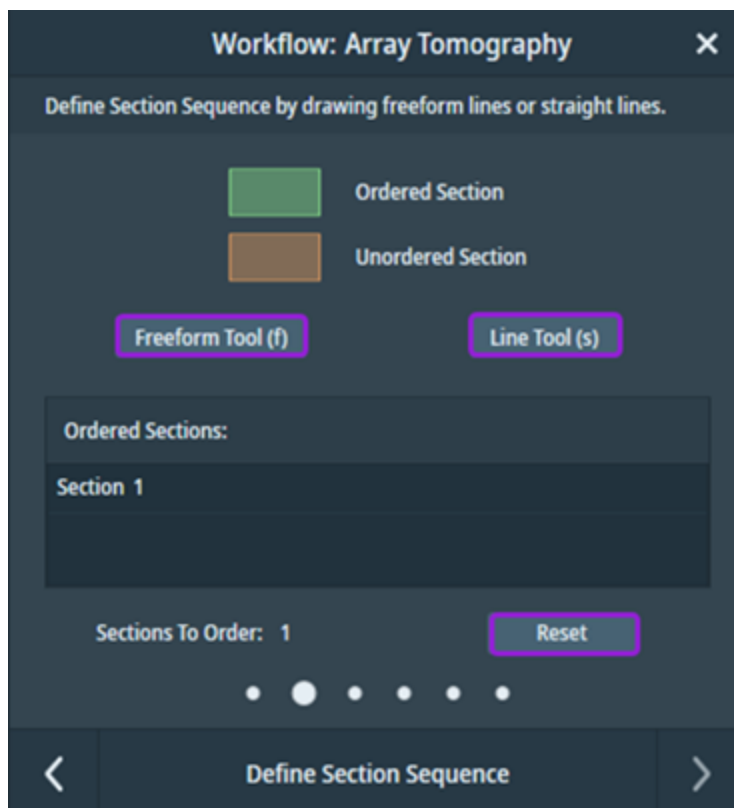
An ordering tool allows you to draw a line through a collection of sections within the viewer to determine the order. Sections closest to the start of the line are first in the order; whereas, sections near the end of the line are at the end of the sequence.

There are two available ordering tools for you to use:

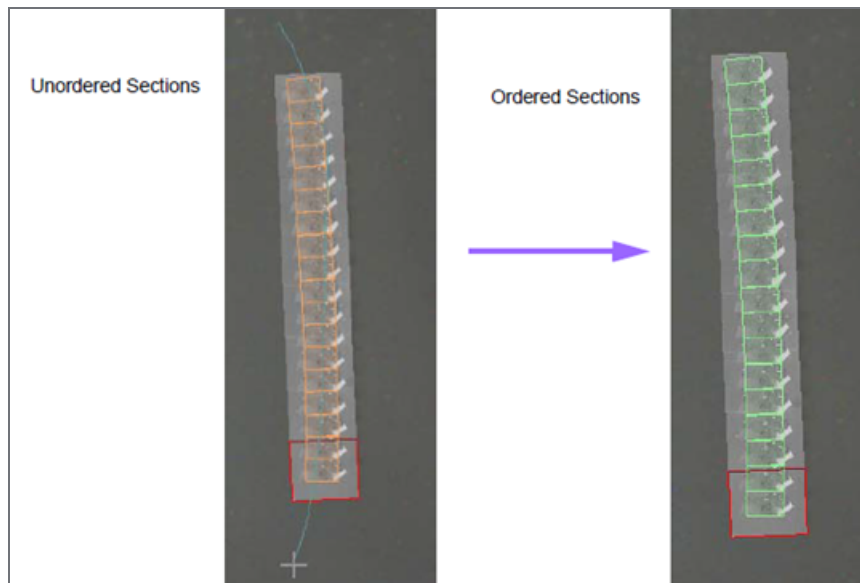
- Freeform Tool: Use this ordering tool to draw a custom line in the viewer like a pencil tool used in graphical editors.
- Line Tool: Use this ordering tool to draw a line between two points by dragging a line in the viewer.

Workflow procedure

The viewer displays the newly ordered sections once you define their order. To define the order of the sections, do the following workflow procedure:



1. Click the user interface button of your chosen ordering tool to activate it.
 - Freeform Tool: Click the **Freeform Tool (f)** button.
 - Line Tool: Click the **Line Tool (s)** button.
2. Starting with the first section in the sequence, use the ordering tool to draw a line in the viewer tool to indicate section order. Note that the *unordered sections* are highlighted in brown and the *ordered sections* are highlighted in green.



Note: Use the keyboard shortcut to quickly switch ordering tools anytime during this step of the workflow. Press the letter **f** on your keyboard to activate the Freeform Tool; press the letter **s** on your keyboard to activate the Line Tool.

3. Repeat the previous step until all sections appear in the ordered list. If you want to delete the current order and start over, then click **Reset**. The number of unordered sections is displayed at the bottom of the panel for your quick reference.
4. After you have ordered all sections, click the forward arrow at the bottom of the workflow panel to continue to [Step 3: Preview Sections \(Optional\)](#).

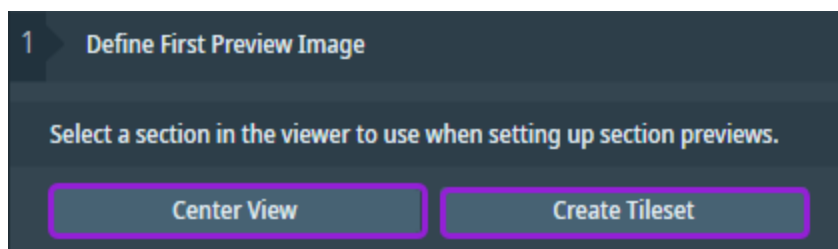
Step 3: Preview Sections (Optional)

The third step of the workflow is optional, but this step is highly recommended since it will increase the accuracy of the section placement on your sample for more aligned final data capture. Proceed with this workflow step to acquire high-resolution images for each section, so that you can then perform section position refinement.

Note: To skip this step and [Step 4: Refine Positions](#) in the workflow, DO NOT acquire any additional section previews. Be sure to delete all acquired section previews and existing section preview tile sets. Once you have deleted these items, click the forward arrow at the bottom of the workflow panel to continue to [Step 5: Create Tile Set Arrays](#).

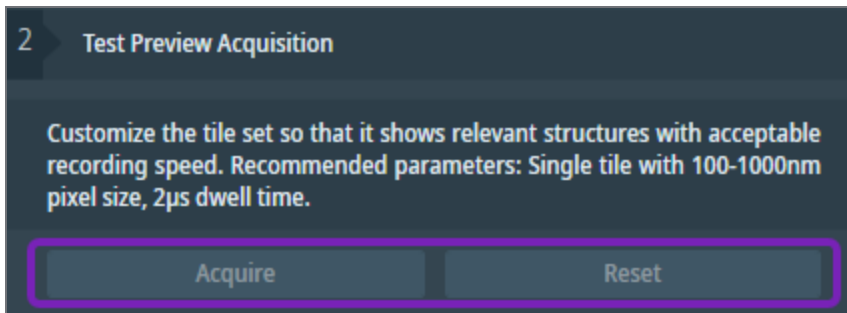
Workflow procedure

1. Determine a section in the viewer to acquire and use for your section preview tile sets.
2. *Optional:* Select the desired tile set to use for previews in the viewer, and then click **Center View** to zoom in on and match the rotation of the tile set.

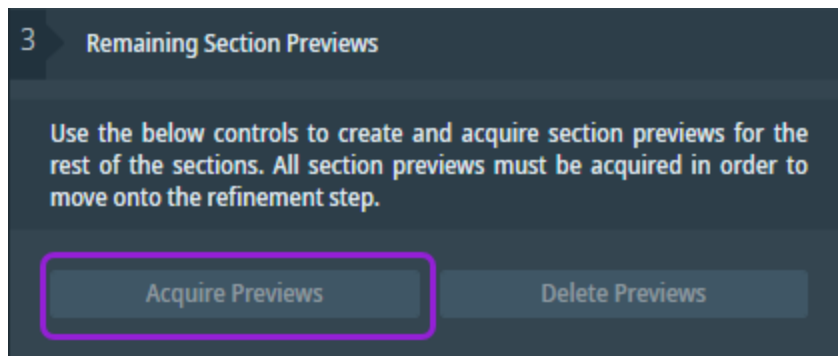


3. Click **Create Tileset** to define the section preview template, which is a tile set that will be used for all other section preview tile sets (including their properties).

4. Edit the section preview template to capture a quality image of the section. Note that you can edit the section preview template like other tile sets.
 - a. Set up the recommended parameters, so that the section preview template has good image contrast and recording speed:
 - Use a single tile with a 100-1000 nm pixel size
 - Set the dwell time to 2 μ s
 - Use a minimum total resolution of 2K for the tile set
 - b. Click **Acquire** to acquire, or click **Reset** to reset the acquisition results of the section preview template.



5. Click **Acquire Previews** to create and acquire all remaining section previews based on the section preview template.



6. *Optional:* Click **Delete Previews** to delete all section previews except the template section preview.



Note: If you encounter workflow issues while acquiring section previews, repeat Steps 1-5 to recreate the template section preview and delete all section previews.

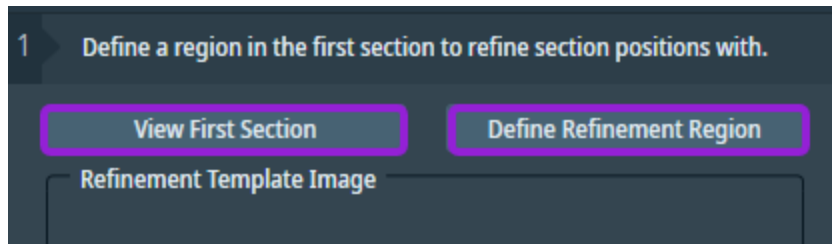
7. Once you have acquired all section previews, click the forward arrow at the bottom of the workflow panel to continue to [Step 4: Refine Positions](#).

Step 4: Refine Positions

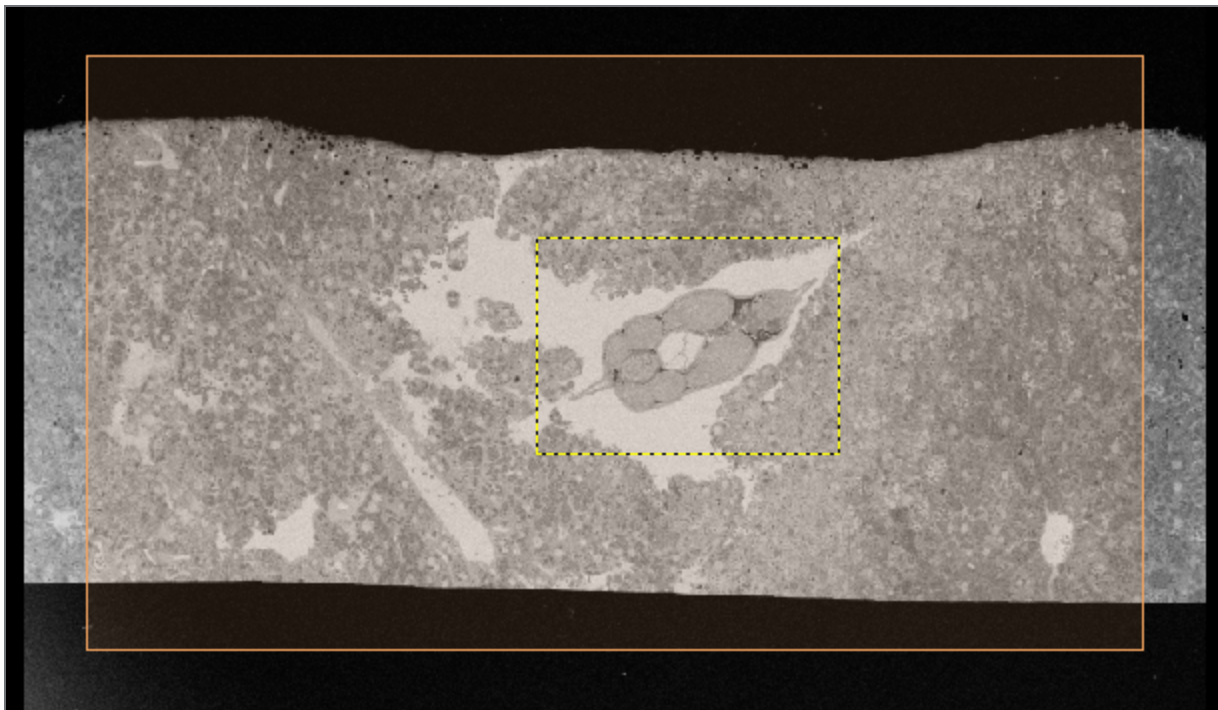
The fourth step in the workflow will help increase the accuracy of the positions of the section outlines based on the preview images acquired during [Step 3: Preview Sections \(Optional\)](#) of the workflow.

Workflow procedure

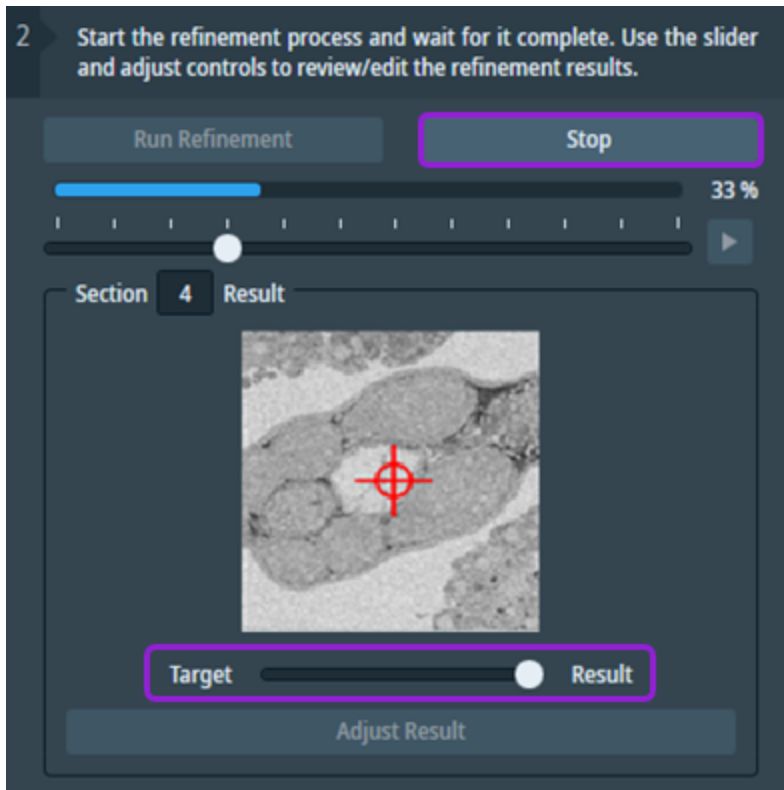
1. Click **View First Section**, and then click **Define Refinement Region**.



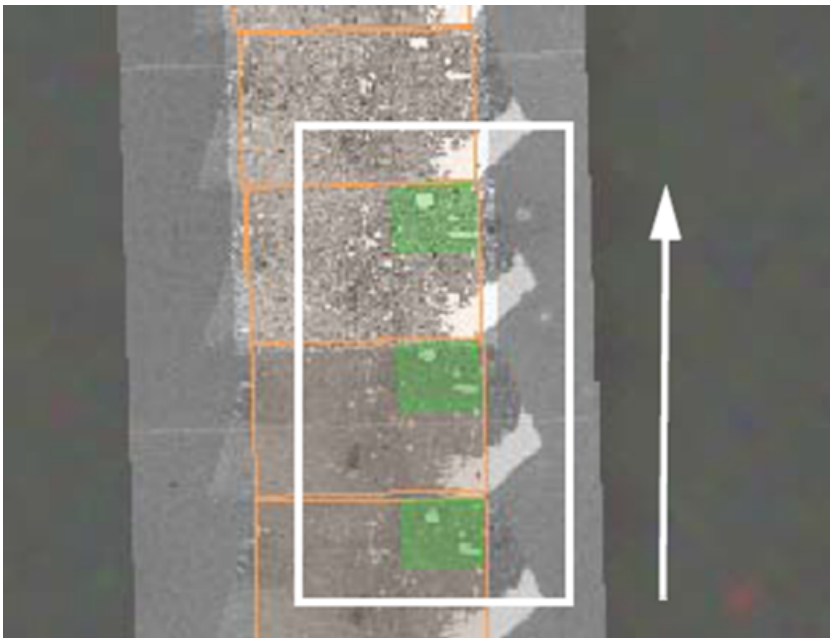
2. In the viewer, drag the mouse to create a yellow border box to define the refinement region. The Maps software application will then use this region to begin refining the section positions. The refinement region image cutout is displayed in the **Section {section #} Result** box.



3. Click **Run Refinement** to begin the refinement process.
 - Refinement progress is displayed in the workflow panel. The example below shows the refined result for a selected section. To stop the refinement process, click **Stop**.

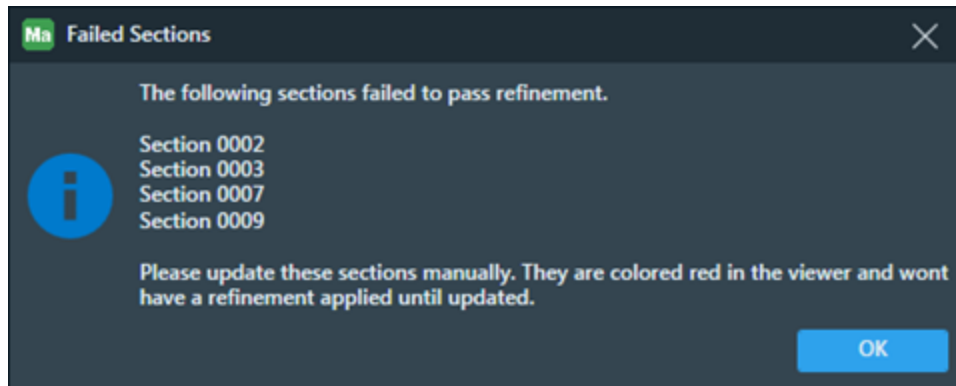


- During the fine refinement sequence, Array Tomography places green rectangles in the viewer where the refinement process found an appropriate match. The refinement region image displayed and the offset results both update based on the incoming results. Refinement results appear based on the order of the sections.



- After the refinement process completes, you can browse sections using the slider, input a number in the input box, or press the play button to navigate through all sections.
- Adjusting the **Target-Result** slider will adjust the relative transparencies of the current result and the previous result.

4. If there are no failures during the refinement run, then the workflow skips this step. If there are failures, then a dialog box appears after the refinement completes. The dialog box displays the names of the sections that require your attention.

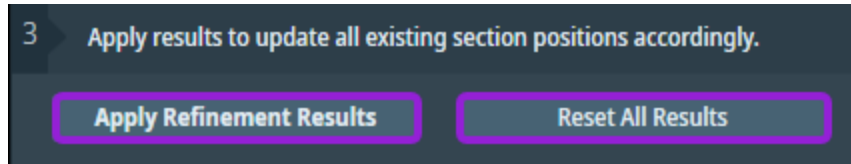


Failed sections are highlighted red in the viewer.

- a. To update or fix failed sections, navigate within the viewer to the failed section cutout and select it.
- b. Click **Adjust Result**. The cutout color should change to blue, indicating that a manual adjustment is in progress.
- c. Move and rotate the cutout in the viewer to correct its placement.
 - Move the slider control below the Section Result image to the Target side. This will overlay the current result on top of the previous result with varying transparency.
 - To help target a center spot, match the location of the green crosshair displayed within the blue box of the viewer to the red crosshair displayed in the Section Result image.

- d. There are several choices once the manual adjustment has been made.
 - Save
 - Use the Save option to save the current manual adjustment for the section.
 - The section cutout will update to green in the viewer, thus indicating that it has been refined.
 - All other sections have their refinement status retained.
 - Save and Continue
 - Use the Save and Continue option to save the current placement of the section cutout. Array Tomography starts running the refinement again from this section onwards, thus redoing any previous refinement for sections following the saved section cutout.
 - The section cutout will update to green in the viewer, thus indicating that it has been refined.
 - Cancel
 - Use the Cancel option to cancel any current adjustments to the section.
 - The section cutout will update to its color in the viewer to the color it had prior to starting the adjustment.
 - Trash can
 - Use the Trash Can option for sections that were damaged during sample prep and will result in inadequate final data.
 - The Trash Can option marks the section to be deleted.
 - The section cutout will be updated to a light grey color in the viewer.
 - If the refinement is re-run, this section will be ignored from the run.
 - When applying the refinement results, this section will be deleted from the project along with its associated preview tile set.
 - e. Repeat the previous steps for any remaining failed sections.
5. After all sections have passed refinement, check how well the refinement placed itself by using the slider bar above the Section Result image box. Do the following to check all refined sections:
 - a. Move the slider from left to right to show the final results in the Section Result image region.
 - b. Use the Play button to the right of the slider bar to automatically animate the sequence.

6. Click **Apply Refinement Results** to apply the refinement offsets to the section outline placement. Or, click **Reset All Results** to start from the beginning of this step.



i **Note:** Applying the refinement results is a one-time action is not reversible and it will automatically progress you to the next step in the workflow.

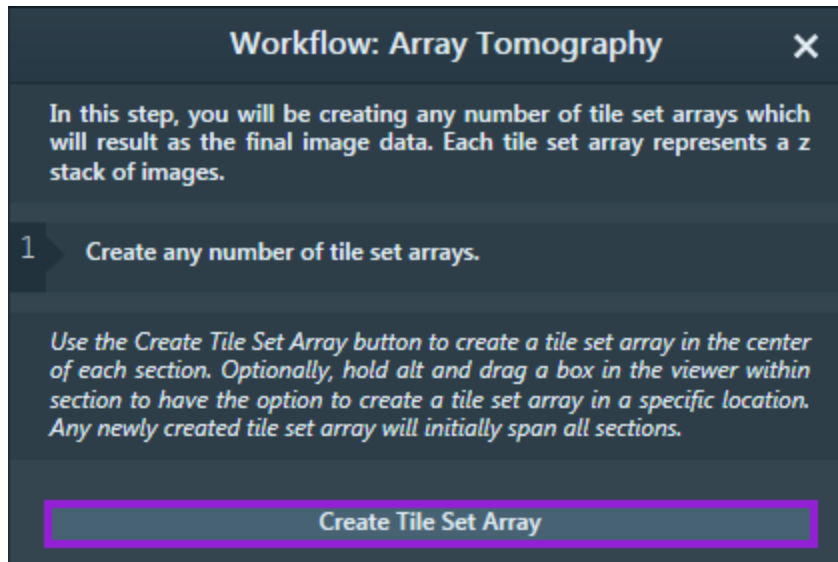
7. When you are satisfied with the section outlines placement, click the forward arrow at the bottom of the workflow panel to continue to [Step 5: Create Tile Set Arrays](#).

Step 5: Create Tile Set Arrays

In the fifth step of the workflow, you create and edit the tile set arrays.

Workflow procedure

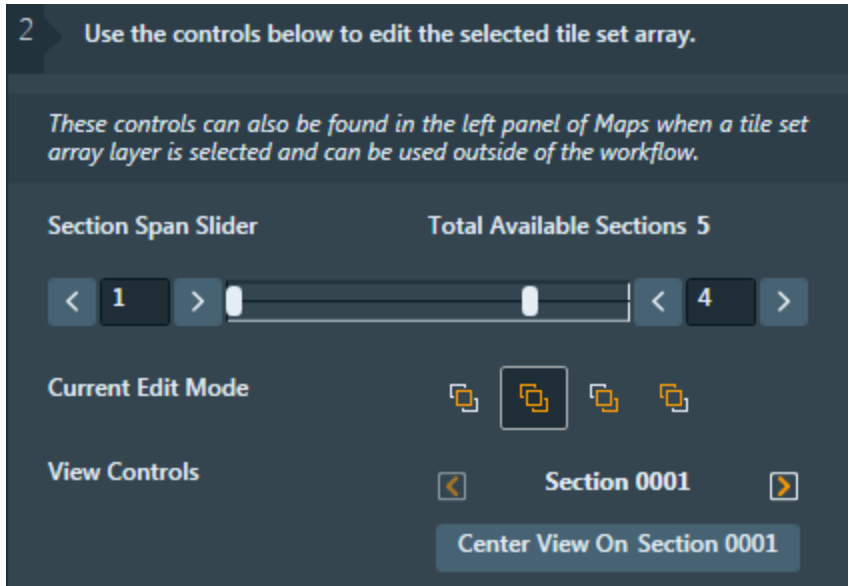
1. Click **Create Tile Set Array**.



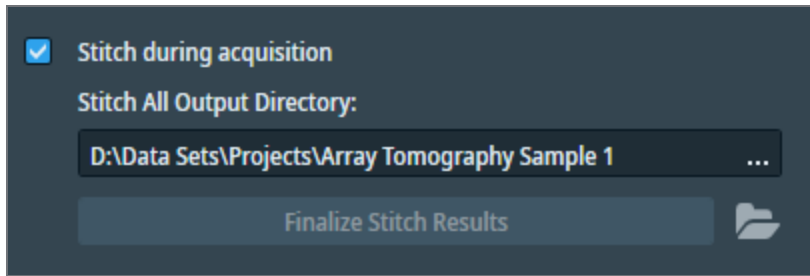
This step creates a new tile set array. Each tile set is placed in the center of a section.

i Note: There is an exception to the tile set linking functionality in the array for one of the imaging parameters. The Focus Strategy for all tile sets within the array are shared. However, if the Focus Strategy is set to Fixed, then the actual Fixed Value is not shared between each tile set. This allows you to manually focus and store the found focus position for each tile set for samples on which autofocus does not work.

- Once the tile set array is created, you can adjust the properties of the tile set array with the edit controls provided. To learn more about these edit controls, see [Extended Controls](#).



- Optional:* After final acquisition, select the **Stitch during acquisition** checkbox and a folder to output each stitched tile set to a designated folder. When activated, this functionality outputs a series of images to your specified folder after acquisition. These images are all fitted to be the exact same size and are aligned, so they can be reconstructed into a 3D volume within another software application. If data has already been acquired, then the **Finalize Stitch Results** button becomes activated and you can click it to manually export the images.



- When you have created and edited all tile set arrays as desired, click the forward arrow at the bottom of the workflow panel to continue to [Step 6: Acquire Tile Set Arrays](#).

Step 6: Acquire Tile Set Arrays

In the sixth step of the workflow, you acquire the tile set arrays.

Workflow procedure



1. Double-check that all desired tile sets have been created.
2. Order the tile sets.
 - a. Click a tile set to select it.
 - b. Click the arrow buttons to move it either up or down.
3. Click **Update Queue** to add all tile sets to the acquisition queue, grouped by their section.
4. Click the **RUN** Button on the bottom status bar to begin final acquisition.



Extended Controls

Create and manipulate AT data sets with tools described in this topic.

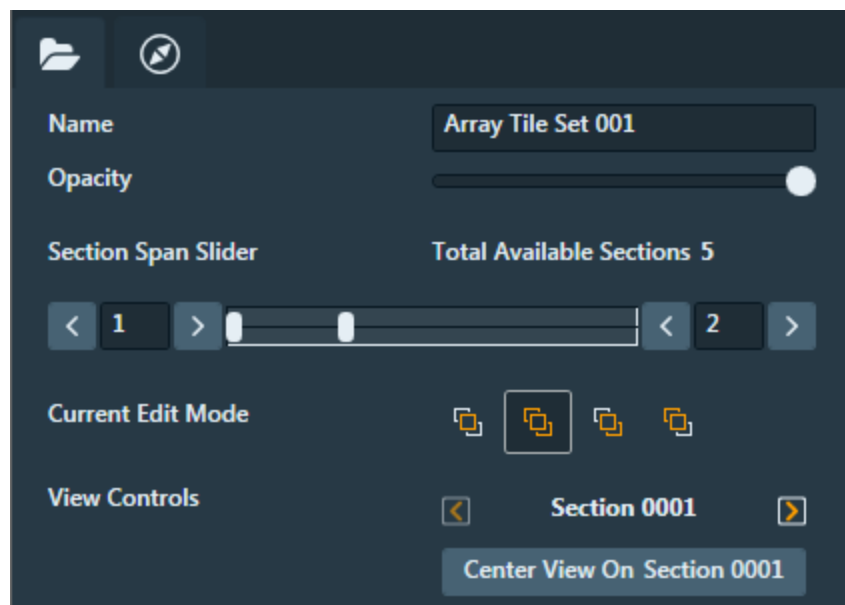
Most of the work for AT occurs within the [Start the Array Tomography Workflow](#). These extended controls allow you to create and manipulate AT data sets outside of the workflow.

Layer property pane

Some layers types that are associated with an AT job have extended controls in the layer property pane in the Array Tomography section. The options change depending on what you select in the layer tree.

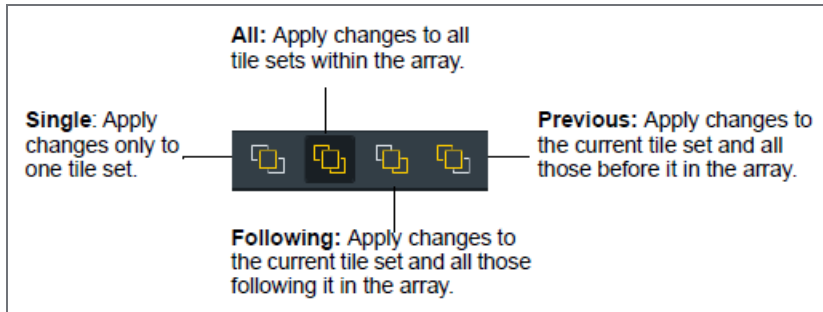
Tile set array

Click the tile set array group layer. Controls appear in the **Array Tomography** pane that allow you to edit the tile set array.



- **Name** - The name of the selected tile set array.
- **Opacity** - Controls the level of transparency for the tile set array. Click the slider knob and move it to the right for low transparency, or move it to the left for high transparency. By default, the slider knob is on the extreme right so that the tile set array is completely visible.
- **Section Span Slider** - Controls which sections the tile set array spans across. The left value is the section index that the tile set array starts on, the right value is the section index where the tile set array ends.

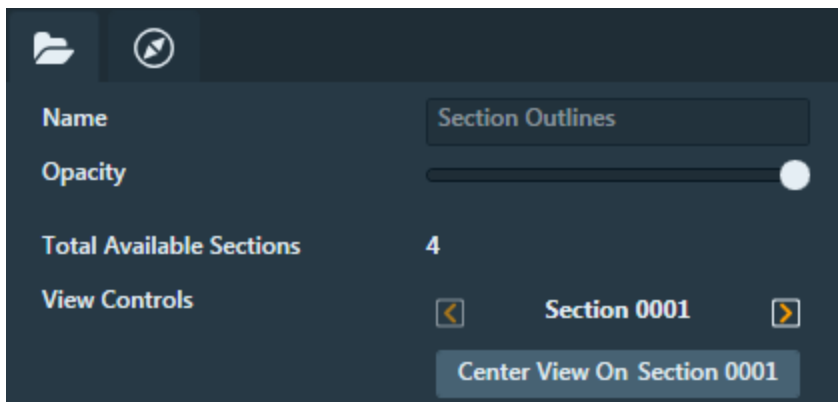
- **Current Edit Mode** - Changes which tile sets within the selected array change when one tile set from the array is dragged or rotated in the viewer.



- **View Controls** - Center the viewer on the displayed section or move the view from one section to another while keeping the same relative field of view. This can help you inspect the results of a tile set array.

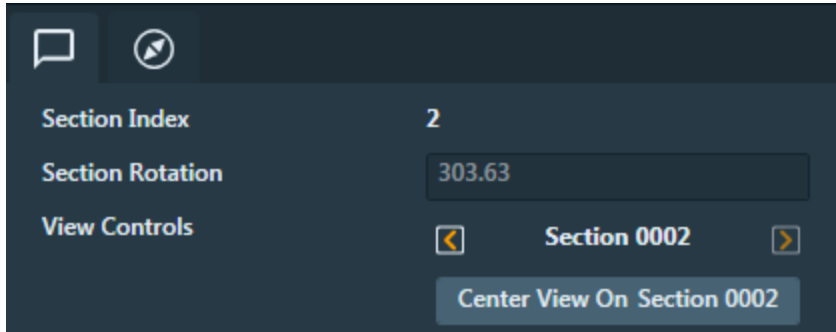
Section outlines

The layer group that contains all the section outlines. It includes **View Controls** described above and displays the number of **Total Available Sections**.



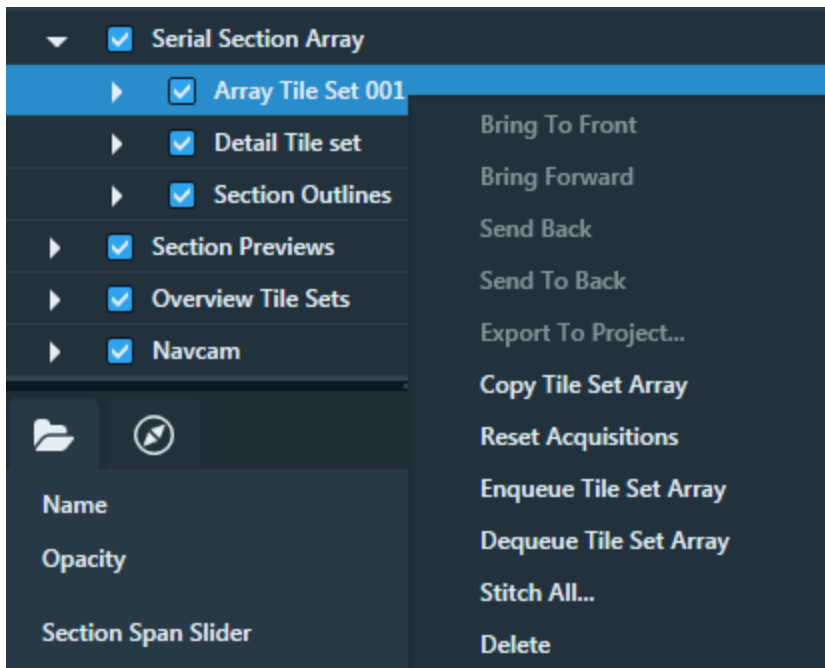
Section

The Section layer includes **View Controls** described above and shows the **Section Index** and **Section Rotation** of the selected section.



Layer tree context menu

Tile set array

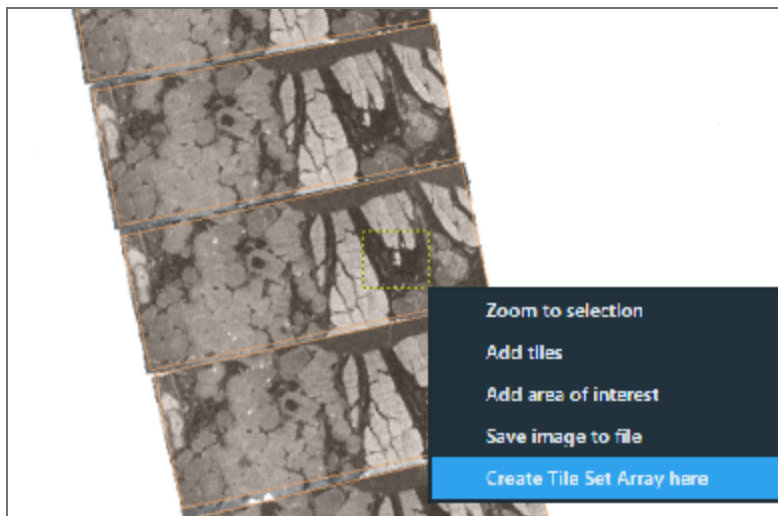


The tile set array layer group in the layer tree has some extended options in its right-click context menu.

- **Copy Tile Set Array** - Creates a complete copy of the whole tile set array.
- **Reset Acquisitions** - Resets the acquisitions of any tile sets within the tile set array.
- **Enqueue Tile Set Array** - Queues up the whole tile set array for acquisition.
- **Dequeue Tile Set Array** - Removes the whole tile set array from acquisition.
- **Stitch All...** - Prompts you to start a **Stitch All** operation. This has the following outcomes:
 - All stitched images are saved to one output directory.
 - All images are saved with the same dimensions. This makes it easier to create image stacks.
- **Delete** - Deletes the whole tile set array. When you select this option, a message dialog appears to summarize all the items designated for deletion. Verify the summary, and then click **Delete** to confirm.

Create a new tile set array

1. To create a new tile set array outside of the workflow:
2. Press Alt and drag to select an area that is completely contained within a section in the viewer.
3. Right-click and then click **Create Tile Set Array here**.



This creates a new tile set that spans all selected sections.

Known issues

The following known issues have been identified in the Maps software application.

[Maps 3.30.2 known issues](#)

[Maps 3.29.1 known issues](#)

[Maps 3.28.1 known issues](#)

[Maps 3.27.1 known issues](#)

[Maps 3.24 known issues](#)

[Maps 3.22 known issues](#)

[Maps 3.20 known issues](#)

[Maps 3.18 known issues](#)

[Maps 3.14 known issues](#)

[Maps 3.13 known issues](#)

[General known issues](#)

[Amira-Avizo2D known issues](#)

[SEM known issues](#)

[TEM known issues](#)

[Mineralogy known issues](#)

Maps 3.30.2 known issues

Mineralogy: Maps freezes when simultaneously updating Mineral Reference Editor and running a mineralogy acquisition with a recipe (also affects all previous Maps versions)

If you update Mineral Reference Editor (MRE) while running an acquisition with a configured MRE recipe, then the Maps user interface freezes during the X-ray acquisition steps. To prevent this issue, perform all necessary Mineral Reference Editor updates prior to initiating a Maps acquisition. If you encounter the user interface freeze, click **Stop** to pause the acquisition and then click **Run** to resume the acquisition.

Maps 3.29.1 known issues

TEM: Data exchange between Maps and Tomography does not work

The data exchange does not work with the version 3.0.0.72 of the Maps Data Exchange Service, which is included in the Maps 3.29.1 installation package (*ThermoScientificMapsDataExchangeService3.0.0.72.exe*).

Workaround: Use the *ThermoScientificMapsDataExchangeService3.0.0.70.exe* file, which is included in the Maps 3.27.1 installation package.

Mineralogy: Loading time for Mineral Association report

The Mineral Association report in Reporting may take some time to load due to the complexity of the analysis involved. However, to provide a better user experience, a loading icon is displayed to indicate that the report is loading. Additionally, a warning icon is displayed next to the report selection to alert you about the loading time.

Mineralogy: Reports data cannot be displayed after installation

When upgrading from Maps Min Reporting 3.28 to 3.29, you might encounter a problem in which the data are not displayed on the Reporting web page for a few minutes after the installation process successfully completes. To address this issue, it is recommended that you uninstall the Maps Min Reporting application and then reinstall it as a temporary workaround.

Mineralogy: Nanomin cannot open exported report in Excel (affects Maps 3.29.1 and any other Maps version on a Windows 11 system)

Nanomin might crash when attempting to open Excel with newly exported reports in Excel format on Windows 11. This issue occurs specifically when Excel displays the "Your privacy matters" dialog with Microsoft 365 (Office), or when the Excel license is not activated. To resolve this issue on Windows 11 systems, follow the steps listed below on the next page.

1. Ensure that your Excel license is activated and up to date.
2. Follow these steps to deactivate any Microsoft 365 (Office) privacy matters dialog that is triggered by Excel:
 - a. Open any Office 365 application, such as Word or Excel.
 - b. Click the "File" tab in the upper left corner.
 - c. Select **Options** from the drop-down menu.
 - d. In the Options window, navigate to the "Trust Center" tab.
 - e. Click **Trust Center Settings...**
 - f. In the Trust Center window, select **Privacy Options**.
 - g. Click **Privacy Settings...**
 - h. Uncheck the box that says, "Turn on optional connected experiences".
 - i. Sign out of the Microsoft application that you have open.
 - j. Open the Microsoft 365 (Office) application on your computer and sign out.
 - k. Restart all Office applications.
 - l. Sign back into your Microsoft 365 (Office) account.
 - m. Open a Microsoft application and log in. The privacy matters dialog should no longer appear.

Maps 3.28.1 known issues

TEM: Maps Data Exchange Service installer is missing in 3.28.1 installation package

The *ThermoScientificMapsDataExchangeService3.0.0.70.exe* file is not present in the Maps 3.28.1 installation package.

Workaround: Use the *ThermoScientificMapsDataExchangeService3.0.0.70.exe* file, which is included in the Maps 3.27.1 installation package.

Mineralogy: Centroid mode slows down Maps

When running the Centroid mode only or when using the BSE search ranges option within the Maps Min workflow, the Maps application could hang if you use high-resolution tiles, or if you use very fine particles or grains. The particles split into very fine particles if you use a high-strength setting during particle segmentation, and the grains split into very fine grains if you use a small grain size setting during grain segmentation.

The following can help you to prevent this issue:

- Use 512x442 for BSE resolution
- Use a lower strength setting for particle segmentation
- Use a larger grain size setting for grain segmentation

Maps 3.27.1 known issues

Inability to recover data if rare error occurs during splitting of tile set channels

If a rare error occurs during the splitting of tile set channels, data loss can occur in Maps and the data would not be recoverable. Also, if a Phenom EDS or Mineralogy tile set is split through the Split Channels feature, then the backing Mineralogy or Phenom data will be lost. This specific data loss would result in not being able to reprocess a Phenom EDS tile set and the data loss could also break Mineralogy tile sets.

Mineralogy: Distinct Particle Size Distribution report results between Nanomin and Reporting

Nanomin and Reporting use two different methods to calculate the Particle Size Distribution report results. Nanomin uses a calculated pixel area that encompasses all pixels within the particle, including those within porous regions; whereas, Reporting, uses a calculated pixel area equivalent to the sum of all grain pixel areas of the particle.

Phenom: Compatibility limitation (affects Maps 3.26.1 and Maps 3.27.1)

Maps requires the Phenom server version 6.6 or later.

Phenom: Remote connections not supported for EDS acquisition

Maps must be running on a computer directly connected to the Phenom instrument when performing EDS acquisition. Remote connections are not supported due to slow performance.

Maps 3.24 known issues

TEM: Lamella site imported from SDB might show incorrect milling angle

The milling angle of a lamella on SDB systems is computed based on several parameters, including the sample pre-tilt angle (which depends on the sample shuttle type), the stage tilt angle, and the angle of the ion beam. The sample pre-tilt angle is currently assumed to always be 35 degrees on TEM systems. If the shuttle type with a different pre-tilt angle was used on the SDB system, then the milling angle that is shown on the TEM system will not be correct.

This known issue will be resolved in an upcoming release of Maps. A workaround is not available.

Maps 3.22 known issues

TEM: Failure to acquire EDS tile set (affects Maps 3.19-3.22)

Maps encounters an error during acquisition of EDS tile set. The error description is the following: "Error encountered during job execution: Error trying to acquire an image: Index (zero based) must be greater than or equal to zero and less than the size of the argument list." The error is caused by a timing issue and thus appears to show up randomly.

Workaround: Restart Maps and Velox, and then perform the acquisition again to resolve the error. If the error persists, decrease the amount of data that is exchanged between Velox and Maps during acquisition (for example, by lowering the resolution of the acquired images and EDS maps).

Maps 3.20 known issues

Mineralogy: Segmentation Wizard hang

When running the Segmentation Wizard, the Maps application will hang if you use very fine particles or grains. The particles split into very fine particles if you use a high strength setting during particle segmentation, and the grains split into very fine grains if you use a small grain size setting during grain segmentation.

The following can help you to prevent this issue from happening:

- Use a lower BSE resolution
- Use a lower strength setting for particle segmentation
- Use a larger grain size setting for grain segmentation

Maps 3.18 known issues

SEM: Quattro acquisition failures

Maps may encounter an error during the first acquisition of a tile set or snapshot. The error description is "Error encountered during job execution: Job execution failed: Image grab action failed. The following error occurred: No description available. The error occurred was: No description available." To resolve this error, close Maps and restart the xT Microscope Server.

Mineralogy: Data migration performance

Performing data migrations from Maps Min 3.14 or 3.1 can be slow. Terminating the process can corrupt the underlying database. Allow the migration process to complete to preserve data integrity.

Mineralogy: Mineral classification requires free space on C: drive

If the system C: drive is low on space, then Nanomin will report that the C: drive is out of space during classification even if the data is stored on a different drive. Ensure the C: drive has at least 10 GB of free space.

Maps 3.14 known issues

TEM: 4D-STEM acquisitions fail

If the camera is selected for STEM mode when acquiring EDS data in the Maps application with Velox, the acquisition fails and displays the following error message: "Error trying to acquire an image: Camera cannot be enabled in STEM mode during remote acquisition." When you receive this error message, deselect the camera and then restart Maps to continue acquisition.

TEM: Templates and camera replacement

If the camera is replaced with a different camera, then the tile set templates may no longer be valid and thus require manual updating.

Maps 3.13 known issues

SEM: Failure to acquire square resolutions

When acquiring square resolutions on Windows 7 microscopes (for example, 8096 x 8096), the acquisition may fail with an unhandled exception. If this error is encountered, either use a non-square resolution, or install the platform update for Microsoft Windows 7 SP1 KB2670838.

General known issues

Error message: "A generic error occurred in GDI+."

After installing the application and starting it for the first time, this message might appear.

Workaround: Restart the PC to resolve the issue.

Cannot select a tile set in the viewer

Workaround: Hide other items in the layer tree that are in front of the desired tile set. Alternatively, select the tile set in the layer control.

Error message: "There was a problem preparing the tiles for stitching. Please restart the application as soon as possible."

Workaround: Restart the application. If this does not resolve the problem, then restart the PC.

Stitching errors occur when stitching a tile set

See the "Stitching Best Practices" section of the Maps user guide.

Workaround: Optimize your tile set parameters and image quality, or try a different stitching profile.

Maps appears to hang while recalculating tile positions

For very large (> 100 GB) high-resolution tile sets, recalculation of tile positions can be time consuming.

Workaround: Allow a few minutes for this procedure to complete.

Maps does not open on the correct monitor

Workaround: Move the Maps window to the desired screen and click the X button located in the top right corner to close Maps. The next time Maps is opened, it opens to the correct monitor.

Newly-created tile set does not appear in the viewer

Workaround: Ensure the tile set and associated layer are enabled in the layer control. Also, the **Hide Annotations** feature (press Ctrl+H) can be used to make all Maps viewer graphics enabled or not enabled.

Projects from Maps v1.0 cannot be imported

Maps v1.0 projects are not supported.

Workaround: You can import Maps v2 and v1.1 projects.

Quit is not enabled in the Maps File menu

Workaround: If the automated holder alignment is running, Abort and Close the holder alignment UI. It should then be possible to quit Maps.

Amira-Avizo2D known issues

Sending two images in a row without performing the image calibration results in unexpected behavior from Analyzer. It is recommended that you always perform the image calibration after you send an image to Amira-Avizo2D.

SEM known issues

AutoFocus only runs in Quad 1

Even when acquiring multiple Quads or when Quad 1 acquisition is disabled, AutoFocus only runs in Quad 1. You cannot define a tile set that will AutoFocus on a different quad. Workaround: If you select AutoFocus or InitialAutoFocus in the Focus Setting property of a tile set, then the detector that you use for Quad 1 imaging must be the one that you intend to use for the AutoFocus operation.

Cannot use Line Integration with 8192 x 8192 or 4096 x 4096 image resolution

An error occurs when you use try to use Line Integration to capture a tile set with 8192x8192 or 4096x4096 resolution on the Helios PFIB microscope.

Workaround: If you need to use line integration, then select a different image resolution.



Note: This issue only occurs on the Helios PFIB product.

SEM: Focus stack can result in blurry images

On Quanta and Prisma E systems, acquiring a focus stack can result in a blurry stripe along the top of the images.

There is no workaround. Avoid focus stack acquisition on these systems.

Line Integration and Scan Interlacing are ignored when acquiring multiple detector channels

When you use multiple quads on the **Advanced** tab of a SEM tile set, Maps ignores any values in the **Line Integration** or **Scan Interlacing** settings.

Workaround: If you need to use Line Integration or Scan Interlacing, then you can only specify a single detector channel in your tile set.

Unable to queue jobs that involve detector insertion/retraction

Maps does not insert or retract detectors.

Workaround: Manually insert retractable detectors.

Some tiles are not in focus when running tile sets with AutoFocus enabled

Workaround: Try modifying the AF parameters using the microscope control software. Alternatively, you can reacquire the tiles with bad focus using a different focus strategy.

Rotation is not supported when using Set Sample Plane

Workaround: Do not change stage R while using this feature.

Fast multi-detector tile acquisitions error message: “This detector combination is not supported for multiple detector acquisitions”

Fast acquisitions could be, for example, 1024 resolution with 50 ns dwell.

Workarounds:

- Use single-detector acquisition.
- Use a longer dwell time.
- Use a larger resolution.

SEM tile sets from earlier versions

Due to architectural changes, SEM tile sets from versions prior to Maps 3.6 can no longer be manipulated or acquired. This data can still be imported, visualized, and stitched. To acquire new SEM data into these projects, create new tile sets.

When acquiring a STEM tile set that is using auto focus and the auto focus routine fails on a tile, no image for that tile is acquired. This can result in some tile sets having blank tiles.

SEM: Lens Alignment auto-function is not available on Quanta FEG

This auto-function does not support the Quanta FEG.

SEM: PrismaE xT version 16.1 intermittently fails when using square resolutions

Square resolutions (such as 2048 x 2048 and 40960 x 40960) fail intermittently with an error: "Cannot move stage in X axis. It is either unavailable or locked." Do not use square resolutions on PrismaE with xT version 16.1. This issue is resolved in xT 16.2.

TEM known issues

After you select Ceta or Falcon I/II camera in PEOUI, it is not selected in Maps

When both Ceta and Falcon I/II cameras are not inserted, the Microscope Field of View (FOV) might show an unsupported camera.

Workaround: In PEOUI, insert the Ceta or Falcon I/II camera.

For large magnifications, the Microscope FOV might not be located at the exact position of the last acquired tile

At high magnifications, there can be a small differences between the tile positions and position of the Microscope FOV rectangle when the tile is being acquired. This small offset originates from small mechanical errors in the stage positioning.

Workaround: The FOV rectangle is the most accurate representation since it tracks the stage measuring system.

Snapshot image differs from a tile image.

When a snapshot image is taken at the same location and with equal settings that a tile was acquired with, the snapshot image differs from the tile image because the histogram of a snapshot is based on a single image; whereas, for a tile, the histogram is based on the entire tile set.

Unclear with which spot size a tile set is acquired when spot size is clipped

For example, when you select a spot size of 1 in Maps and acquire the tile set, the microscope clips the spot size to 5 for X-ray safety. In this case, the tile set is acquired with spot size 5. However, if you look at the tile set parameters it seems that it was acquired with a spot size of 1.

Workaround: Set the tile set to be acquired with a spot size that is not going to be clipped.

Tiles are misaligned

This can happen for a number of reasons. Maps uses the instrument alignments and calibrations to determine tile size and orientation. If these are off, then the tile set will not be properly aligned. Regular system alignments and calibrations are recommended as described in the system documentation.

Workarounds (contact your application support engineer for details):

- If the instrument is not at eucentric height and/or far out of focus, then adjust Z to set the stage at eucentric height and/or focus.
- If there are inaccurate lens alignments and magnification calibrations, redo the alignments and calibrations for the applicable magnification.
- If the stage is non-orthogonal: Some TEM stages have a slight angle between the X and Y stage axis. This can be checked by performing pure X and Y moves using PEOUI and TIA. Then measure the angle. Maps has a provision to take this into account, but this requires adjustment of one of the configuration files.

When a tile set with invalid values is acquired, it is unclear with which settings it is acquired

When one or more parameters of a tile set are out of range, this is indicated by a red box. It is still possible to acquire such a tile set. The values used during acquisition are the last valid values that you entered.

Workaround: Enter valid values, so that a red box is not shown before acquisition.

When C2 or C3 lens is switched off, a tile set can be acquired with an unrelated intensity value

On a system with three condenser lenses, you can switch off either C2 or C3. Maps does not detect which lens is switched off. You can create a tile set when C2 (or C3) is switched off and then acquire it when C3 (or C2) is switched off, which results in an unrelated intensity value.

Workaround: Complete tile set creation and acquisition before switching to another lens.

Maps might prevent or fail acquisition in other applications

Maps does not check if other applications use a detector or camera. The detectors and cameras are retracted, except the one that the tile set is going to be acquired with. As soon as Maps starts acquisition, it detects that another application is using the detector or camera (and does not start acquisition). This behavior might prevent acquisition from being done in the other applications.

Workaround: Do not start acquisition of a tile set when another application is using a detector or camera.

Intensity or illuminated area is not set to the microscope

When you switch off C2 or C3 on a system with three condenser lenses, the intensity is not set to the Microscope for a tile set that was created when you switched on both C2 and C3.

Workaround: Switch on both C2 and C3 and then click **To Microscope**. When you switch on C2 and C3 on a system with three condenser lenses, the illuminated area is not set to the Microscope for a tile set that was created when you switched off C2 or C3.

Workaround: Switch off C2 or C3 and then click **To Microscope**.

Errors occur when TEM server, TIA and Digital Micrograph are not running

Before Maps can be started, the TEM server, TIA, and Digital Micrograph (when applicable) must be running. When Digital Micrograph, TIA, or the TEM server crashes or is stopped, Maps might crash, show error messages, or behave incorrectly. Examples include the following:

- TEM plug-in generated an exception during initialization.
- Object reference not set to an instance of an object.
- FOV size incorrect.
- Maps crash during acquisition as soon as TIA crashes or is stopped.

Workarounds:

- When using the Camera ocx in PEOUI, the camera combo box is empty, TIA has crashed, or is not running. Restart TIA and ensure that the camera combo box lists your cameras, and then restart Maps.
- When the TEM server has crashed or is not running, restart the TEM server, start TIA, and then restart Maps.
- For camera usage that depends on Digital Micrograph, the startup order is:
 1. TEM server
 2. TIA
 3. Digital Micrograph

When TEM server is restarted, restart TIA and then Digital Micrograph. When TIA is restarted, restart Digital Micrograph.

- After changing the high-tension value or executing camera calibrations, restart Maps.

Maps becomes unresponsive

This can happen when the stage is not working properly.

Workaround: In PEOUI, verify that the stage is working properly and restart Maps.

Maps becomes unresponsive when deleting a large amount of large tile sets

When you delete a large amount of large tile sets, Maps becomes unresponsive during this operation. It can take extra time to delete large tile sets. Do not end the program, or you will interrupt the operation and need to start over.

When Maps is running offline, sometimes Intensity is displayed instead of Illuminated Area

When Maps is running offline, Maps does not know whether the TEM tile set was acquired on a system with two or three condenser lenses. Maps incorrectly shows Intensity for a TEM tile set that is acquired on a system with three condenser lenses.

The disk space usage estimate may be incorrect

The total disk space required is only an estimate and might vary. Please allow extra space for large data sets.

Images that include part of a grid bar are slightly darker

In a tile set, the images that contain a part of a grid bar are slightly darker due to a difference in image contrast.

Workaround: Avoid images with grid bars.

New tile sets are deselected in the Job Queue after a Magnification Alignment

When Magnification Alignment is performed on a tile, empty tile set jobs in the **Job Queue** might become deselected causing them to not get acquired.

Workaround: Go to the **Job Queue** and select the check boxes of the applicable tile sets.

Microscope FOV is not updated when the Stage Axis Angle Correction is updated

When the Stage Axis Angle Correction is updated in the **Settings** menu, the microscope Field of View (FOV) is not updated.

Workaround: Change the magnification to update the microscope FOV for magnification, or move the stage to update the microscope FOV for location.

Microscope FOV is not updated when the STEM Scan Orientation Correction is updated

When the STEM Scan Orientation Correction is updated in the **Settings** menu, the microscope FOV is not updated.

Workaround: Change the STEM FOV or magnification.

Maps software hangs when acquiring on a microscope with a Gatan camera or DigitalMicrograph

On a microscope with a Gatan camera or Gatan DigitalMicrograph running, Maps software can sometimes freeze during acquisition.

Workaround: Close Maps software and restart Maps.

In EFTEM mode, images can be acquired only with maximum camera resolution

In EFTEM mode, images can be acquired only with maximum camera resolution , such as binning 1.

In EFTEM mode, stitched images are incorrect

When tile sets acquired in EFTEM mode are stitched, the size of the stitched output is incorrect and tiles are incorrectly joined.

Mineralogy known issues

Mineralogy: The reporting page is not reachable due to WSL

The reporting page may fail to work properly if the Windows Subsystem for Linux (WSL) is not started. This issue can occur in situations where the WSL service is not running or encounters an error during the startup process.

To resolve this issue, please follow the steps outlined below:

1. Open a command window as an administrator.
2. Type the command: `tasklist /svc /fi "imagename eq svchost.exe" | findstr LxssManager` and note the returned PID.
3. Run the Task Manager as an administrator.
4. Go to the "Details" tab in Task Manager.
5. Search for the svchost.exe process containing the previously noted PID.
6. Right-click **svchost.exe** and select "End Process Tree."
7. Return to the command window opened as an administrator and type '`wsl -shutdown`', followed by '`wsl`'.
8. Ensure that a command line is returned without any errors.

By following these steps, you can resolve the issue related to the reporting page not working due to WSL not being started. This workaround will help restart the necessary services and ensure the proper functioning of the reporting page.

Mineralogy: Bruker Esprit error on long running acquisition

During the process of running a long acquisition with the Bruker Esprit tool, there is a known issue where an error message may appear stating 'An expected error occurred on server. Consider to save your current and restart Esprit'. In some cases, this error message can cause the acquisition process to stop unexpectedly on the Support PC. A workaround is currently not available.

Release Notes

Be sure to read the release notes for the latest software version of the Maps software to learn about new features and changes in functionality.

[Maps 3.30.2 Release Notes](#)

[Maps 3.30.1 Release Notes](#)

[Maps 3.29.1 Release Notes](#)

[Maps 3.28.1 Release Notes](#)

[Maps 3.26.1 Release Notes](#)

[Maps 3.25.1 Release Notes](#)

[Maps 3.24 Release Notes](#)

[Maps 3.23 Release Notes](#)

Maps 3.30.2 Release Notes

This document specifies changes made to the Thermo Scientific™ Maps 3.30.2 software application

Known Issues

See [Known issues](#) for known issues introduced with this version of Maps software.

Maps 3.30.1 Release Notes

This document specifies changes made to the Thermo Scientific™ Maps 3.30.1 software application.

New Features

Phenom: Default license includes basic features

Maps on your Phenom microscope now includes basic features without a need for product registration and activation. The basic features allow you to control the Phenom microscopes; create and edit projects; create and acquire tile sets; and perform stitching of acquired data.

TEM: support for TEM 3.21 and TEM 2.21

Maps now supports TEM server versions 3.16-3.21 for Titan and 2.16-2.21 for Talos.

Known Issues

See [Known issues](#) for known issues introduced with this version of Maps software.

Bug Fixes

The following bugs were fixed in this release of the Maps software.

Bug ID	Description
MAPS-11391	TEM: Autofunctions now run correctly in EFTEM mode on all supported cameras. Previously, the autofunctions failed to run on some cameras.
MAPS-11407	Maps no longer freezes when exporting a group layer to a new or existing project.
MAPS-11418	TEM: The first tile is now acquired in a more precise position after eucentric height autofunction runs on the first tile. Previously, it could be visibly shifted relatively to the rest of the tile set in some use cases.
MAPS-11478	Leica XLEF import: Confocal stacks are now oriented consistently with overview images.
MAPS-11479	The color indicator for fluorescence channels now shows a color gradient based on a lookup table. Previously, the color indicator showed as white if the lookup table was used.
MAPS-11793	TEM: The Data Exchange Service runs correctly again, thus allowing data exchange between the latest versions of Maps and Tomography. This service was previously broken by a library update conflict, which caused the data exchange to fail.

Maps 3.29.1 Release Notes

This document specifies changes made to the Thermo Scientific™ Maps 3.29.1 software application.

Product News

Mineralogy: Revised product name

The product name of the Maps Mineralogy plugin application has been revised to "Maps Min". The new product name is effective as of this release.

New Features

Mineralogy: Bruker XFlash® 7 EDS Detector support

Maps Min now supports the Bruker XFlash 7 EDS detector. This new option enables you to configure and utilize the advanced capabilities of the Bruker 7 Series detector for your elemental mapping analysis. You can select this detector when you configure the Maps software for mineralogy acquisition.

See [Configure Mineralogy Acquisition](#) for more information.

Mineralogy: Maps Min Reporting plugin application

- You now have the ability to import a reporting list from another project and integrate it into your current project.
- You can now easily delete project and associated data. Select a project, click the delete button, confirm the deletion, and then project will be permanently removed.
- A new report named 'Mineral Association' is available and is visible in tabular form. This report provides an analysis of the minerals grains relationships and interactions through the perimeter proportion between grains. This report also includes particle filter; data set selection; reporting list selection and combination by replicates; and can it can be exported in .csv format.
- Previously, you were limited to publishing particles with BSE (Backscattered Electron) data less than 20 MB. Now, you can publish and view large particles without any size limitations. This enhancement ensures compatibility with image sizes up to 50-82K pixels, allowing you to work with high-resolution particles.
- In the Reporting user interface, you can open the dataset and select the Particle View report. All particles (including those exceeding 20 MB), will be displayed, thus, providing a comprehensive view of the dataset.

Phenom: advanced tab control enhancements

The following enhancements have been added to the advanced tile acquisition controls.

- High Voltage: The preset options now include 20 kV.
- Detector: The options now include the SED detector.

See [Phenom Tile Set Tab](#) for more information.

Phenom: new advanced tab controls

There are new advanced tile acquisition controls in the user interface.

- Vacuum: Use this control to specify the required vacuum pressure during acquisition.
- Acquisition Order: Use this control to determine the order in which the contained tiles are acquired.

See [Phenom Tile Set Tab](#) for more information.

Phenom: post-acquisition actions

Post-acquisition actions are now available for Phenom. After all jobs are completed, you can return the microscope to HiVac mode, move the sample to the NavCam, and put the microscope in the standby operational state.

See [Phenom Post-Acquisition Actions](#) for more information.

SEM: support for Quattro 35.0

Maps now fully supports Quattro 35.0. The corresponding xT server version is automatically recognized during Maps installation.

TEM: support for TEM 3.20 and TEM 2.20

Maps now supports TEM server versions 3.15-3.20 for Titan and 2.15-2.20 for Talos.

Updated system requirements for installation

- Windows compatibility: The Maps application can now run on Windows 11.
- .Net Framework: The required version of .Net Framework has been updated to 4.8, which will be now installed during the Maps installation process if it is not already installed on the system.

Known Issues

See [Known issues](#) for known issues introduced with this version of Maps software.

Bug Fixes

The following bugs were fixed in this release of the Maps software.

Bug ID	Description
MAPS-10804	Stitching of tile sets with some tiles deactivated no longer causes an exception to occur.
MAPS-11136	Importing TIF files with invalid metadata no longer causes Maps to crash.
MAPS-7863	Mineralogy: Detector names in the xT quadrants are now being retained correctly.
MAPS-10158	Mineralogy: Exporting size distribution to CSV now produces correct ranges for the X-axis depending on the dynamic or fixed bins.
MAPS-10680	Mineralogy: The Mineralogy Reporting server graphs are now accurate.
MAPS-10901	Mineralogy: You can now export images with Porosity overlay on BSE in Nanomin.
MAPS-11034	Mineralogy: The Sort by Mineral or Element proportion are now functional within the Particle View report.
MAPS-10967	STEM: The beam convergence angle now displays in a more user friendly manner, rounded to two decimal places and with units displayed after the angle value.

Maps 3.28.1 Release Notes

This document specifies changes made to the Thermo Scientific™ Maps 3.28.1 software application.

New Features

Bright Phase Search acquisition

The Maps application now supports Bright Phase Search acquisition, which produces faster acquisition and results within the web-based Maps Mineralogy Reporting application. Bright Phase Search acquisition is available in either Grid mode or Centroid mode (beta).

See [Optional: Bright Phase Search Acquisition Workflow](#) for more information.

Maps improvement program

Maps has introduced an improvement program that will send your anonymous usage data back to the Maps team for product improvement purposes. If desired, you can opt out of this program after you first launch the Maps application and accept the End User License Agreement (EULA). Go to the application settings and deselect the "Allow usage logging" setting under the Improvement Program section.

See [Options menu](#) for more information.

Mineralogy: Bruker and Nanomin connection states

The Analytics connection indicator has been expanded to separate the Bruker and Nanomin status icons, which indicate the online connection states between the Maps application and the microscope. This change provides more status support by communicating if a connection is in use, if a connection is attempting to connect, or if a connection has timed out.

See [Microscope connection states](#) for more information.

Mineralogy: Improved Nanomin performance for large datasets

Pyramid rendering has been updated in the Nanomin application to improve panning, zooming, and overlay rendering speeds while you navigate large datasets.

Mineralogy: Maps Mineralogy Reporting application

- A desktop shortcut is now available on your desktop soon after you successfully install the Maps Mineralogy Reporting application. Double-click the desktop shortcut and the application will launch the user interface within your browser.
- You can now generate Locking and Liberation reports by Area % within the Maps Mineralogy Reporting application. This means that you can choose between Weight % or Area % as the output type for increased flexibility and precision.
- When you select either a locking or liberation report while using the Maps Mineralogy Reporting application, the initial option within the Liberation Type field has been changed from "Area %" to "Composition" to clearly identify particle composition.
- You can now view product information within the Maps Mineralogy Reporting application. This information includes the version number of the application, server, and client for you to share with Thermo Fisher Scientific while troubleshooting a software issue.

Mineralogy: plugin enhancements

- New and improved data tracking of Mineralogy tile set metadata.
- You can now view Mineralogy tile set parameters offline.
- Mining tags have moved to a new tab.
- Analytics tab for mineralogy has been renamed to "Mineralogy Acquisition" tab.

Phenom: simplified connectivity

The microscope connection process for the Phenom has been simplified, so that the connection dialog no longer requires you to enter your user name and password. The Maps application contains a security tool that allows it to connect to any available Phenom within your network.

See [Phenom Connectivity](#) for more information.

TEM: Added support for TEM 3.19 and TEM 2.19

Maps 3.28.1 supports TEM server versions 3.14-3.19 for Titan and 2.14-2.19 for Talos.

TEM: Standalone Velox plugin

Acquisition of EDS tile sets through Velox is now available as a standalone plugin, so connectivity to Velox and the acquisition process is more robust.

See [Activate Velox Software](#) for more information.

TEM: Tiling correction

You can use the Tiling Correction beta feature to achieve better tile alignment during acquisition.

See [TEM Tiling Corrections](#) and [Tiling Corrections Quality](#) for more information.

Known Issues

See [Known issues](#) for known issues introduced with this version of Maps software.

Bug Fixes

The following bugs were fixed in this release of the Maps software.

Bug ID	Description
MAPS-7863	Mineralogy: Detector names in the xT quadrants are now being retained correctly.
MAPS-10158	Mineralogy: Exporting size distribution to CSV now produces correct ranges for the X-axis depending on the dynamic or fixed bins.
MAPS-10774	The beam convergence angle on STEM is now displayed in mrad units instead of degrees.
MAPS-10781	Taking a STEM snapshot on a system without the HAADF detector no longer causes an error. Previously, the HAADF detector was used as a default detector for snapshots on all systems, regardless of the actual configuration.

Maps 3.26.1 Release Notes

This document specifies changes made to the Thermo Scientific™ Maps 3.26.1 software application.

New Features

Array Tomography workflow controls

The Array Tomography workflow has been streamlined with new and improved controls including:

- New Line Tool to order sections
- New keyboard shortcuts for specific steps to expedite workflow
- Increased flexibility for section previews creation
- Revised refinement step to improve viewing and editing of results
- New "stitch all" option during tile set array acquisitions

See the [Array Tomography Workflow](#) for more details.

CRYO: Arctis data features

This bundle of new features allow you to import and view Arctis Cryo-Plasma-FIB data in the Maps software application on TEM systems.

See [Import and view Arctis data](#) for more information.

TEM: OptiSTEM autofunction automatically restores last known good state

When the OptiSTEM autofunction fails to converge or the quality of the result is poor, the Maps software application automatically restores the focus and stigmator values to the last known good state.

TEM: Added support for TEM 3.17 and TEM 2.17

Maps now supports the latest TEM server versions for Titan (TEM 3.17) and Talos (TEM 2.17).

Documentation Update

A comprehensive Phenom section has been added to the Maps software application user guide. This new section describes the Phenom connectivity, settings, operational states, and user interface elements.

See [Phenom](#) for more information.

Bug Fixes

The following bugs were fixed in this release of the Maps software.

Bug ID	Description
MAPS-9687	TEM: The position of the crosshair and cross-correlation peak annotations is now correct. Previously, the annotations in the intermediate cross-correlation images during the execution of autofunctions were not positioned correctly when a camera with a rectangular image resolution was used (for example, a Gatan K3 camera).
MAPS-10276	TEM: Camera settings are now properly applied when used in the autofunction templates on TEM and EFTEM. Previously, autofunctions used the default camera settings and ignored settings like Frames Summed for Ceta-F camera or Electron Counting Mode for Falcon camera.

Maps 3.25.1 Release Notes

This document specifies changes made to the Thermo Scientific™ Maps 3.25.1 software application.

New Features

Animation for viewer functions

The “Center View on Sample,” “Center View on Selection,” and “Go to Microscope FOV” viewer functions in the toolbar now animate pan and zoom to help keep you oriented in the sample space. If desired, you can deactivate this feature under the “Animate Pan & Zoom” View menu item.

See [Toolbar](#) and [View menu](#) for more information.

EFTEM slit control

Slit insertion state and energy-selecting slit width can now be set directly on a tile set. Slit parameters are also now part of EFTEM tile set templates, and are propagated from Tomography presets when importing the presets to Maps.

See [Advanced group](#), [EFTEM mode](#) for more information.

Phenom SEM support

This version of Maps now supports the Thermo Scientific™ Phenom™ desktop SEM series. As a Phenom user, you will be able to access all the Maps features that are currently available on your other Thermo Fisher SEM, SDB, and TEM systems. This integrated support also allows you to expand the correlative workflows within Maps from desktop SEMs to high-end TEM systems for a variety of scientific experiments. A Maps Phenom license is required, so please contact your Thermo Fisher account manager for additional information.

Note: The Maps software application user guide will be updated in a future release to include the Phenom functionality.

Project History search bar

The Project History window now has a search bar available. When you use this search bar, it immediately filters the project history and provides results that match either the Project Name or Project Description fields.

See [Open a Project](#) for more information.

TEM/EFTEM: Automated image filtering for autofunctions

TEM and EFTEM autofunctions support a new setting called "Use Image Filtering". You can use this new setting to improve the reliability and accuracy of these autofunctions.

See [Automated Image Filtering](#) for more information.

TEM: Added support for TEM 3.16 and TEM 2.16

Maps now supports the latest TEM server versions for Titan (TEM 3.16) and Talos (TEM 2.16).

Bug Fixes

The following bugs were fixed in this release of the Maps software.

Bug ID	Description
MAPS-9271	TEM: Correct milling angle of a lamella is now displayed in projects imported from SDB to TEM. Previously, the sample pre-tilt angle used on SDB was either ignored, or assumed to be 35 degrees (Maps 3.24), causing the incorrect milling angle to be computed on TEM. Maps on TEM systems now reads the sample pre-tilt angle that was used on the SDB system and adjusts the computed milling angle accordingly.
MAPS-9274	TEM: Falcon 4 camera settings now work properly in EFTEM mode. Previously, the camera mode was not properly initialized based on microscope state, and Linear mode was used for acquisition even if Counted mode was specified on the tile set.
MAPS-9442	TEM: Templates created from a new tile set can now be used immediately as an autofunction template within the new tile set. Previously, there was a synchronization issue that caused the new template to appear only after switching to another layer in the layer tree and then back to the tile set.

Maps 3.24 Release Notes

This document specifies changes made to the Thermo Scientific™ Maps 3.24 software application.

New Features

TEM: Added support for TEM 3.15 and TEM 2.15

Maps now supports the latest TEM server versions for Titan (TEM 3.15) and Talos (TEM 2.15).

TEM: Data Exchange with Tomography

The integration between Maps and Tomography has been enhanced to support cryo-ET scenarios. The following data can now be automatically synchronized between both applications:

- Annotations created in Maps, including sites of interest, areas of interest, and lamella information
- Batch positions created in Tomography, including exposure, tracking, focus, and condition areas

See [Tomography](#) for more information.

TEM: OptiSTEM autofunction (beta)

The OptiSTEM autofunction has been added to the list of supported autofunctions on STEM as a beta feature. This autofunction corrects defocus and condenser astigmatism (A1/C1). It requires the Thermo Scientific™ Sherpa software with the OptiSTEM license to be installed on the system. This feature is only available on 2.15 and 3.15 TEM Server versions.

TEM: Temporary data default location

Previously, temporary data created by Maps on TEM was stored on the system drive (C:). The default location has been changed to the data drive (D:) to provide more effective management of free space and backups on the system drive. The data written to D: drive includes EDS maps from Velox and intermediate images produced during acquisition (that is, when image logging is activated).

Known Issues

See [Known issues](#) for known issues introduced with this version of Maps software.

Bug Fix

The following bug was fixed in this release of the Maps software.

Bug ID	Description
MAPS-9066	TEM: Tile sets based on imported Tomography presets now correctly preserve the focus across magnification ranges. Previously, if the current magnification range on the microscope (for example, SA) did not match the magnification range of the tile set (for example, LM), then the incorrect focus was used during tile set acquisition.

Maps 3.23 Release Notes

This document specifies changes made to the Thermo Scientific™ Maps 3.23 software application.

New Features

End user license agreement moved to application launch

Maps no longer presents the end user license agreement to you during the application installation process. Instead, Maps now prompts you to read the end user license agreement immediately after you launch the application.

See [Launch the application](#) for details.

Move or rotate multiple tile sets

Tile sets and other movable objects can now be moved or rotated together when using mouse drag and multiselect.

See [Manually Adjust Tile Sets](#) for details.

Stitch option is now compatible with multi-select

You can now use multi-select to queue multiple tile sets when you initiate stitching.

See [Initiate Stitching](#) for details.

SDB/SEM microscope settings

The following changes have been made to the SDB/SEM microscope settings.

- A new setting for the electron beam, called "Beam wake up time," has been added.
- A new alignment, called "Magnification correction (Electron)," has been added.
- The "Stage alignment (Electron)" setting has been renamed to "Scan rotation correction (Electron)".

See [SEM/SDB Options Menu](#) for details.

TEM: Acquisition of multiple EDS tile sets at different magnifications

Multiple EDS tile sets with different magnifications can now be added to the job queue. Previously, all EDS tile sets within the job queue required the same magnification.

TEM: Added support for TEM 3.14 and TEM 2.14

Maps now supports the latest TEM server versions for Titan (TEM 3.14) and Talos (TEM 2.14).

User Interface Changes

A "Copy Screenshot to Clipboard" button has been added to the left side of the toolbar. You can use this new button to copy the image display to the system clipboard.

See [Toolbar](#) for details.

Bug Fixes

The following bugs were fixed in this release of Maps software.

Bug ID	Description
MAPS-8287	TEM: Resolved cases in which tile set rotation occasionally did not match FOV rotation during acquisition.
MAPS-8418	MINERALOGY: Resolved an error in the Mineral Reference Editor that occurred when using a mineral variety name that was already in use by a solid solution.
MAPS-8589	TEM: EDS acquisition no longer fails when multiple STEM detectors are activated in Velox.
MAPS-8801	TEM: Import of presets from Tomography is now more robust in cases where occasional errors occurred.
MAPS-8908	MINERALOGY: Resolved an error in Maps caused by Bruker SCU disconnection during long acquisition jobs.
MAPS-8977	MINERALOGY: Reduced X-ray collection batch size to increase Bruker detector reliability.
MAPS-9038	TEM: Maps now maintains the slit in the current position by default when performing EFTEM acquisitions. If desired, you can override this default setting in the Maps acquisition settings (EFTEM mode).

License Information

The following licensed content is included in Maps 3.31.1.

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Munkres algorithm - The Hungarian method for solving the assignment problem

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Statistical Quantiles: implementation and unit tests

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ZedGraph Library

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