

Amira-Avizo Software version 2024.1

Release notes

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Introduction

This document covers the most important new features, improvements, and changes in this version of Thermo Scientific™ Amira™ Software and Avizo™ Software. In addition, you will find a list of new Xtras including video tutorials, recipes, and workflows which have been published in the [Xtras Library](#) since the previous release.

Visit our [Customer Support and Service Center](#) to access services and resources that help you make the best use of your product.

We value your feedback. If you encounter any problems or have any suggestions for improvement, do not hesitate to [contact us](#).

Definitions and glossary

OS requirements:

While we have a list of supported operating systems (OS) for our software, some functionalities may only work on certain dedicated operating systems. For each functionality, we will indicate whether it works with all supported operating systems, or only dedicated systems.

Licensing

Amira and Avizo Software are available as packages that can be enhanced with extensions geared to specific tasks or industries. These packages include:

- Standard packages
 - Amira 3D Software
 - Avizo 3D Software

- Advanced packages
 - Amira 3D Pro Software
 - 3D Cell Biology Package for Amira Software
 - EM Systems Package for Amira Software
 - Avizo 3D Pro Software
 - 3D Industrial Inspection Package for Avizo Software
 - EM Systems Package for Avizo Software

Documentation

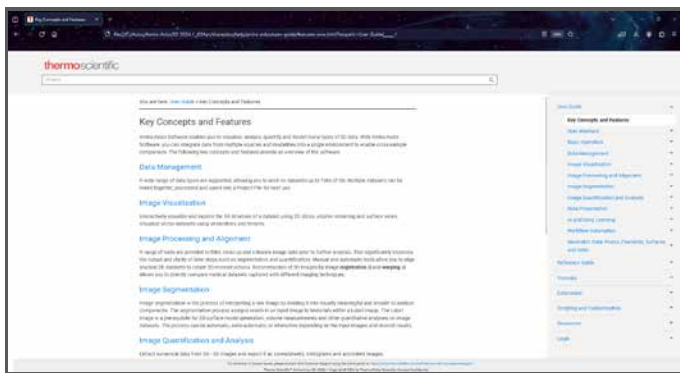
Based on your feedback, we have transformed the documentation to provide a more intuitive and user-friendly experience. This is part of a major effort to completely revamp our documentation from scratch.

The documentation is now displayed in your preferred web browser, enabling multiple tabs to be open simultaneously. Browser access keeps you from losing interactivity with the software, offers better support for scientific equations, images, and video content, and

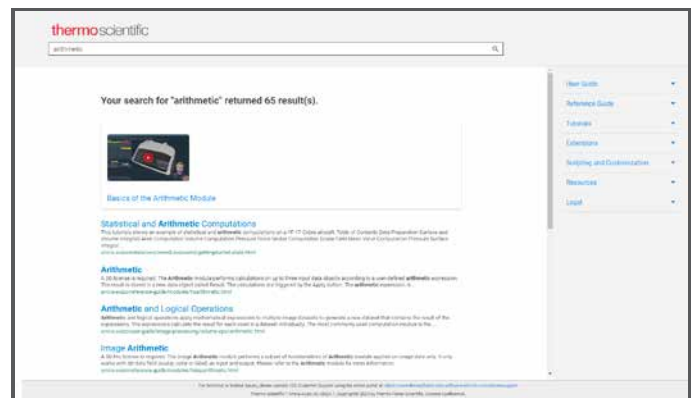
even allows you to use browser plugins for language translations. No internet connection is required, except for some videos.

The content has been re-organized in a logical and easy-to-navigate manner, allowing you to quickly find information through the table of contents and improved search function.

We welcome your feedback on these updates and any future improvements made to Amira-Avizo documentation.



The reorganized User's Guide can now be displayed in your preferred web browser.



Improved search function and results.

OS requirements: All supported platforms

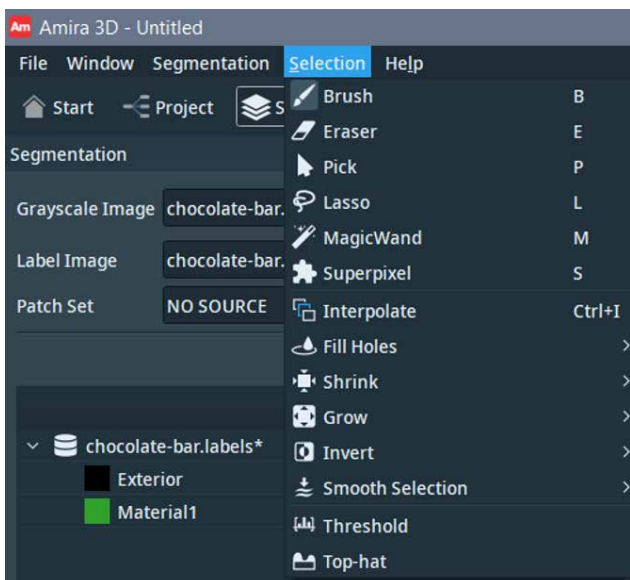
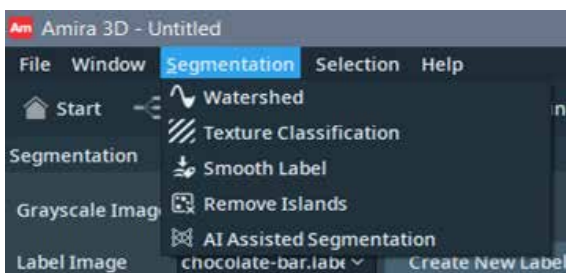
Licensing: Standard packages

Segmentation+ Workroom

The capabilities and ergonomics of the Segmentation+ workroom have been further expanded. We greatly appreciate your feedback and encourage you to continue sharing your thoughts and suggestions to help us enhance your experience further.

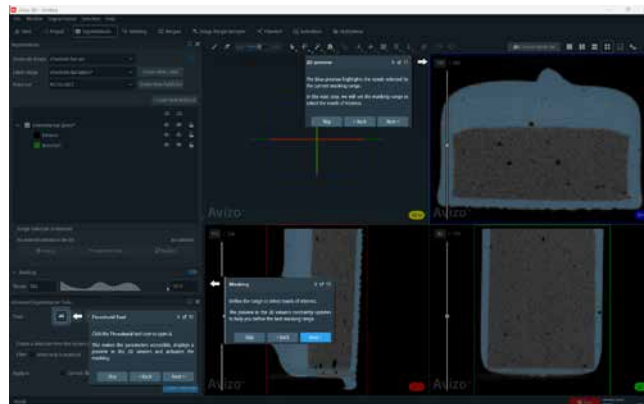
Ergonomics

- New menus:**
Segmentation and Selection tools are now accessible through the corresponding menus in the application.



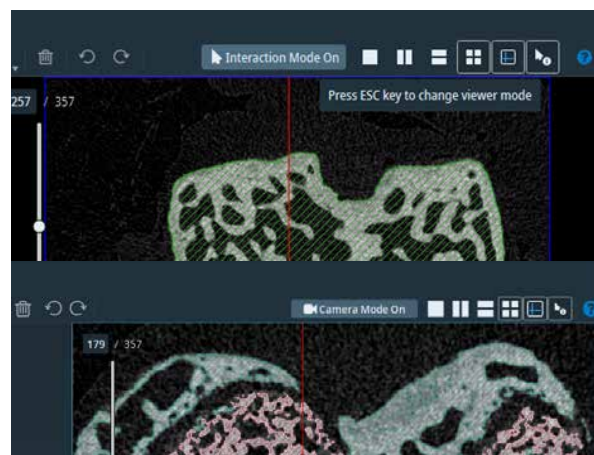
Segmentation and Selection menus, showing all available tools. Example dataset (below) courtesy of Dr. Eva Herbst, reproduced under CC BY 4.0 from Herbst, E.C., et al. R. Soc. Open Sci. 8210408 (2021). doi: 10.1098/rsos.210408

- Quick Probe:**
The Quick Probe tool can be used in the 2D viewers to display coordinates, grayscale, and label values under the mouse pointer as it is moved around the image.
- Threshold tool tutorial:**
An interactive tutorial on the threshold tool is now available in the help/guided tour menu.

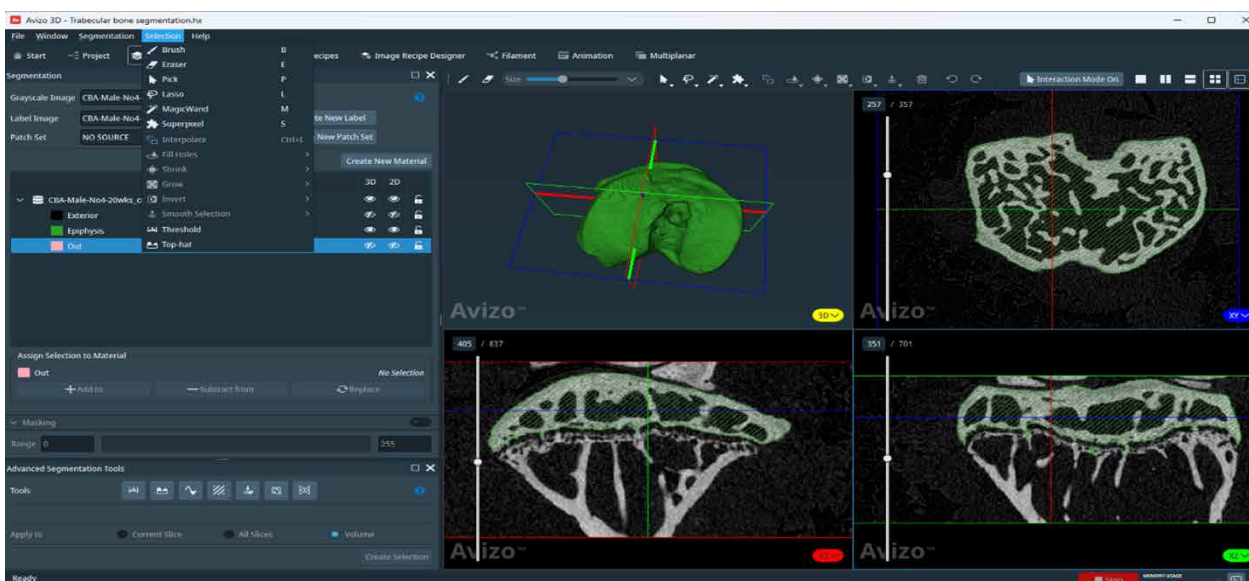


Snapshots of the new guided tutorial for the threshold tool.

- Camera/interaction mode:**
You can now click on the mode indicator to switch between Camera and Interactive modes.

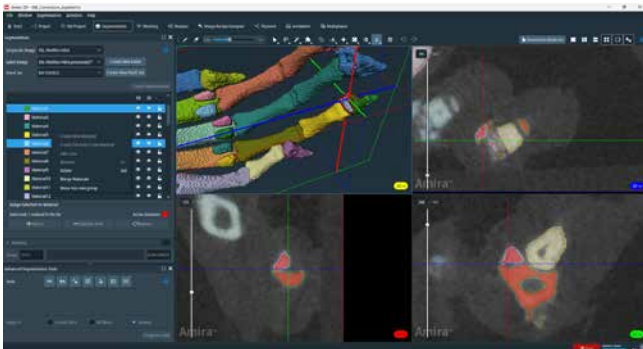


Toggle between Interaction and Camera modes by using the escape key or by clicking the corresponding button in the toolbar.



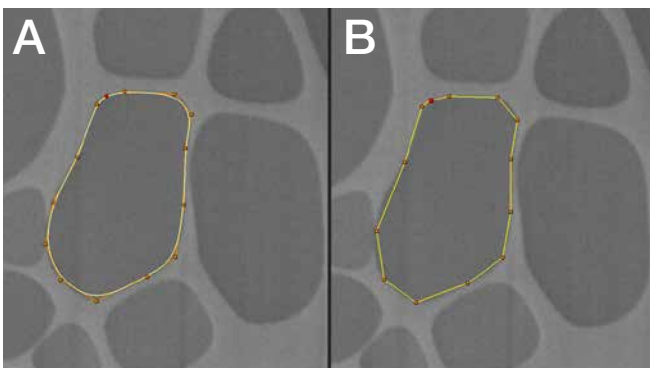
New tools in the Segmentation+ workroom

- **Smooth label image:**
Applies a modified Gaussian filter that smooths the material boundaries in a label image. It can either directly modify the current segmentation, or generate a new label image.
- **Pick tool:**
It is now possible to select a material directly from the 3D viewer. The Pick tool allows you to select either an entire material or a single connected component independently, on the current slice or in 3D.
 - *Change from previous version:* It was possible to select materials directly by clicking in the 2D viewers and using the options in the contextual menu. This feature is now available through the Pick tool.
- **Merge materials:**
It is now possible to merge several materials into one from the *Material List*. If one of the materials is locked, a pop-up window asks whether to merge only unlocked materials, all selected materials, or to cancel the merge operation.



Structures selected in the 3D viewer using the Pick tool, with quick probe used to identify material names. When automatic segmentation over-separates materials, they can be combined with the merge materials option. Data courtesy of Mark Kenney, University of Rochester Medical Center. For more information on this project, read Kenney, HM, *et al.* Bone Reports 16:101167 (2022). doi: [10.1016/j.bonr.2022.101167](https://doi.org/10.1016/j.bonr.2022.101167)

- **Lasso:**
 - **BSpline on 2D lasso:** Converts the polygonal lasso into a spline lasso. Produces smoother lines for better trimming of shapes at low zoom and of round shapes using fewer control points.
 - **Lasso with masking:** Masking restricts the range of voxels which can be selected based on their grayscale values. It is enabled in the Segmentation panel; a histogram is used to control the grayscale range of voxels available for selection.



A) Lasso selection with spline constraints. B) Polygonal lasso selection.

- **Magic wand:**
This tool allows you to select all connected voxels within a defined grayscale range in either 2D or 3D.
 - *Change from previous version:* Once a seed voxel has been selected in the 2D viewer, a new selection is created each time you change the range of the masking histogram.

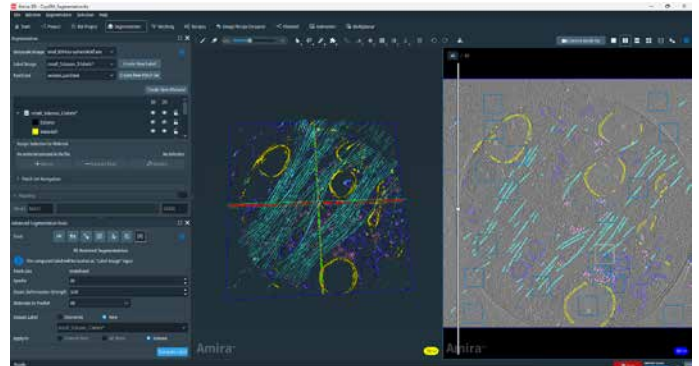
OS requirements: All features presented in this section are available on all supported platforms.

Licensing: All features presented in this section are available with the Standard packages.

AI improvements in the Segmentation+ workroom

The AI-assisted tool can now generate a multi-class segmentation using a label image, a set of patches, and/or an annotation of all image structures. This new version allows for uninterrupted processing of all materials while maintaining the same level of computation time and segmentation quality, resulting in a more user-friendly experience.

Limitations: An NVIDIA GPU supporting CUDA Compute Capability 5.2 or higher is required, with up-to-date drivers. CPU must support the AVX2 extensions. The Python environment for deep learning has been upgraded; please remember to install it prior to using this tool.



The AI-assisted segmentation tool can now process all materials and generate a label field as output.

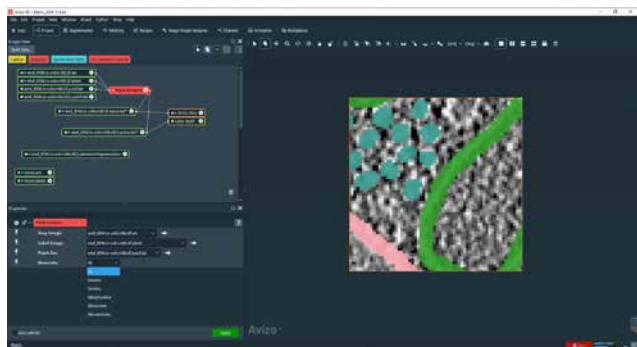
OS requirements: Windows only.

Licensing: 3D Pro Packages, Edition Packages.

AI Improvements

- **Extract multi-class patches:**

The Patch Extractor module can be used to obtain patches from both grayscale and label images that have been defined using the *Add Patch* tool in the Segmentation+ editor. The module now has the capability to also extract multi-class patches from the label image, simplifying the training of deep 2D UNet models using the DL Training - Segmentation 2D module with sparsely annotated data.



The AI Patch Extractor module can now be used to extract all materials in a single label field.

- **Create probability maps with the Deep Learning Prediction module:**

For AI image segmentation, probability maps offer detailed information about the likelihood of each class at every pixel, enabling nuanced analysis, uncertainty estimation, and post-processing flexibility to improve the accuracy of the final segmentation. When utilizing AI segmentation models, you can now select the desired prediction format, either as a label image or per-class probability maps. By starting with probability maps, you can refine and seamlessly integrate the segmentation model results into your workflow.

Limitations: An NVIDIA GPU supporting CUDA Compute Capability 5.2 or higher is required, with up-to-date drivers. CPU must support the AVX2 extensions. The Python environment for deep learning has been upgraded; please remember to install it prior to using this tool.

OS requirements: Windows only.

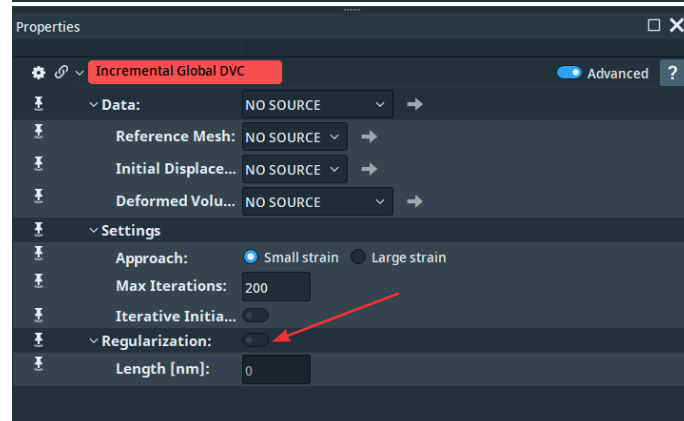
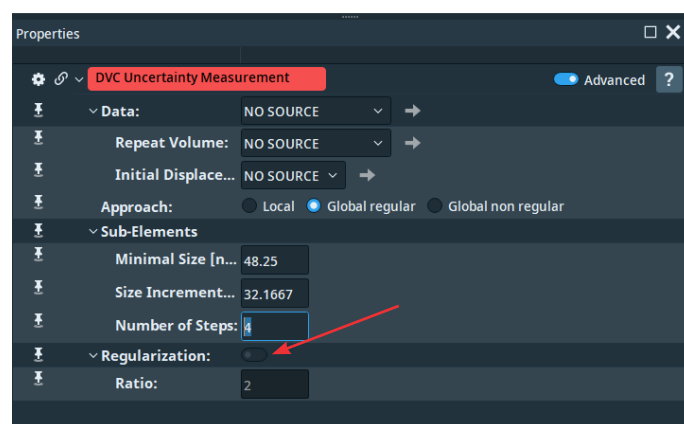
Licensing: 3D Pro Packages, Edition Packages.

Digital volume correlation

In the previous release, mechanical regularization was introduced for the Global DVC module. This capability has now been expanded to more modules. You can now use mechanical regularization:

- In the DVC Uncertainty Measurement module to optimize the trade-off between the spatial resolution of the estimated deformation field and the measurement uncertainty
- For time-series data within the Incremental Global DVC module

Mechanical regularization enables more accurate DVC results, especially on lower contrast or less textured samples. For more information, please refer to the 2023.2 release notes or watch the on-demand webinar on our website.



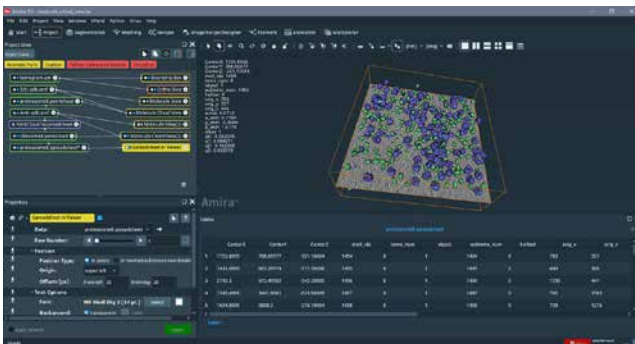
A mechanical regularization option has been added to the DVC Uncertainty Measurement and Incremental Global DVC modules.

OS requirements: All supported platforms.

Licensing: XDigitalVolumeCorrelation Extension.

Other improvements

- **Enhanced large mesh visualization:**
The performances of the **Surface View** and **Tetra Grid View** modules have been improved, enabling faster and smoother interaction when visualizing large meshes. Gains of 30–500% frames per seconds can be expected, depending on the number of mesh elements that are displayed.
- **Quick Probe in Project View:**
The **click-to-update** option has been removed and the tool can now only be activated in auto mode. If a performance problem is detected, the tool is automatically deactivated and describes how you can instead pick the image information manually. The **Quick Probe** now also works on an **OrthoSlice** and **Colorwash** to display the pixel information of the two datasets being overlaid, including the index and material name for label fields.
- **New Point Cloud to Spreadsheet module:**
This module can convert a point cloud object into a spreadsheet for read out or export of point coordinates and associated data. The **Spreadsheet to Point Cloud** module already offers conversion back from a spreadsheet to a point cloud.



The Point Cloud to Spreadsheet module can be used to list the coordinates and attributes of a point cloud object.

OS requirements: All features presented in this section are available on all supported platforms.

Licensing: All features presented in this section are available with the Standard packages.

Compatibility notes

- **Custom modules:**
The procedure to document XPAND custom modules, as well as TCL and python modules, has been updated and now only requires a single call to the TCL command *createDocFile* to generate the documentation template. Please refer to the scripting documentation for more information.
- **Custom documentation:**
Custom documentation pages that were generated with previous versions of the software are still accessible and readable. However, for better integration of your custom documentation within the software, we recommend you recreate them using the new documentation format. The experimental TCL command *convertDocFormat* can be useful for simple cases.
- **Python environments for deep learning:**
It is necessary to update the Python AI environment to benefit from new deep learning functionalities. The previous environments are no longer compatible, so a new installation is required. You can do this by accessing the *Python* menu, selecting **Environment**, and then choosing to create a new environment.

XPand extension requirements

To add custom C++ extensions to Amira and Avizo Software (Advanced Packages), you will need:

- Microsoft Visual Studio 2019 version 16.2 (v142) on Windows
- gcc 9.x on Linux Ubuntu 20.04

End of Support

The following modules, which were previously announced as deprecated several versions ago, have been definitively removed. Old projects referencing such modules will generate error messages when opened in Amira or Avizo Software 2024.1. Please update your projects using the proposed replacement modules below.

Deprecated module (command)	Deprecated since	Replacement module (command)
Access Large Disk Data	Avizo 5.0	Extract Subvolume
Vorticity Identification	Avizo 6.1	Secondary Variables
CastLattice	Avizo 7.0	Convert Image Type
Plot Spreadsheet (HxPlotSpreadSheet)	Avizo 7.0	Plot Spreadsheet (HxPlotSpreadSheet2)
Deep Learning Training	Amira-Avizo 2022.1	DL Training - Segmentation 2Dmodule
Radial Autocorrelation (HxRadialAutoCorrelation)	Amira-Avizo 2022.1	Radial Autocorrelation (radial_autocorrelation)
Hierarchical Watershed	Amira-Avizo 2023.1	Hierarchical Watershed Segmentation

Operating systems

Amira and Avizo Software version 2023.2 runs on:

- Microsoft Windows 10 (64-bit).
- Microsoft Windows 11 (64-bit)
- Linux x86 64 (64-bit) running on Intel64/AMD64 architecture and Ubuntu 20.04 (desktop)

Our products are tested on the following configurations:

Platform	GPU	Driver number
Windows 10	NVidia Tesla T4	537.13
Windows 11	NVidia RTX A4500	537.34
Ubuntu-20.04	NVidia T1000	535.113.01

Resolved Issues

Name	ID	Description
Xtra Installer	AA-29752	The <i>Install Xtra</i> button was not available in China. This is no longer the case.
Incremental Global DVC	AA-29725	The regression introduced in release 2023.2, on the display of the iteration number in the results table, is now solved.
AMIRA_ROOT	AA-29683	When AMIRA_ROOT is set, Avizo and Amira Software now start without failures.
4k Display	AA-29604	The zoom under cursor feature in the new segmentation workroom is now properly working on 4K screens.
Crop Editor	AA-29470	The dragger box of the Crop Editor is now consistent with the data bounding box when the unit is ON.
JPEG Reader	AA-29307	UTF-8 characters are now supported by the JPG reader.
Tetra Grid View	AA-29237	Performance is improved when using <i>Const alpha</i> transparency on the <i>outlined</i> draw style.
Tetra Grid View	AA-29231	<i>Const/Fancy alpha</i> is now supported with color field and texture mode.
Tetra Grid View	AA-29229	<i>Fancy alpha</i> is now supported with color field and Gouraud mode.
Tetra Grid View	AA-29228	Culling is now working correctly for the <i>Both Faces</i> , <i>Front Faces</i> , or <i>Back Faces</i> options when the Draw Style is <i>Lines</i> or <i>Points</i> .
Tetra Grid View	AA-29150	Texture mode is now supported when selecting the <i>transparent</i> draw style.
Surface View	AA-29149	Performance is improved when the Draw Style is <i>Transparent</i> and the Transparency is <i>Sorted Pixels</i> .
Measurement	AA-28932	Point updates have been adjusted to avoid the invalid display of angle points.
Point Probe – Unit	AA-28578	At each point change, the callout and port coordinates are now properly synchronized, even if the Unit and Display Unit have different values.
Transparency, Spatial Graph View	AA-30111	Correct transparency management is now consistent when using a Surface View and Spatial Graph.

Learn more at thermofisher.com/amira-avizo