CASE STUDY

Thermo Scientific Niton XRF Analyzer

Indonesia's Power Producer Achieves Safety, Reliability and Operational Excellence with X-ray Fluorescence Spectrometry

Electricity in Indonesia is provided by either independent or state-owned power producers, and subsequently distributed to households and businesses throughout the Indonesian archipelago by a state-owned enterprise.

Historically, power outages occurred when the power generator in the power plant had been damaged or temporarily halted due to a safety consideration. Inside a power generator, the counterweight, a critical component, relies on long bolts to connect it to its rotating parts which move at the speed of 600 rpm. If just one of the long bolts breaks, the power generator will be disrupted or may even be damaged which could either take a long time to be repaired, or worse, require a replacement.

The Thermo Scientific™ Niton™ XL5 handheld XRF analyzer in use validating incoming materials to ensure material specifications are met.

The best way to mitigate risks of power outage is for the power plant personnel to verify that the composition of materials used in the power generator matches the specification given by the power generator's manufacturer.

Challenge: Non-Genuine OEM Components in the Power Industry

Available throughout the industry are cloned bolts or non-genuine OEM components that are inferior to those of the genuine components. These cloned bolts look just like the original components but have different material composition. As such, these cloned bolts may have much shorter and unpredictable lifespan than the bolts specified in the documentation provided by the power generator manufacturer. The use of the cloned bolt past its lifespan could potentially damage the power generator device or cause accidents and endanger the lives of plant operators.

Previously, plant operators relied solely on mill test reports (MTRs) submitted by the parts suppliers. However, for peace of mind, the plant operators had to take control of their quality control program to prevent incorrect material from being installed. The plant operators had to deploy a "trust but verify" program using positive material identification (PMI) to validate the incoming spare bolts or components and to ensure that these are not cloned bolts or bolts of lower quality.

For this power operator, the team had previously arranged for elemental analysis by sending out samples of spare parts to external accredited laboratories or the company's research and development (R&D) department. However, such lab analysis took weeks and was costly as it involved destruction of materials.

As such, there was an urgent need for a practical, rapid, non-destructive elemental analysis for PMI on incoming materials and spare parts used in the power generator.

Solution: Handheld X-ray Fluorescence (XRF) Analyzer

A team at the power producer plant worked together to evaluate the available PMI solutions on the market, taking into consideration the latest technologies, the vendor's distribution network, quality of sales and support, and training for operators.

After a thorough tender exercise, the team selected the Thermo Scientific™ Niton™ handheld XRF analyzer, a spectrometer which enables power plant operators to conduct on-site elemental analysis of the spare parts in seconds. Quality training was provided to a team of inspection professionals to help them conduct detailed and precise elemental analysis necessary for investigative as well as maintenance purposes.

With Niton handheld XRF analyzers, the inspection team was able to undertake PMI on spare parts and incoming materials, assess material remaining lifespan, as well as verify material coating thickness. The team could analyze up to 10 samples and conduct two hours of maintenance activity every day. Working on the power generation engine, the inspectors do not need to wait hours for the engine to cool. They could easily conduct elemental analysis of specific parts at any time.

Uninterrupted Power Supply for Businesses and Consumers

Through on-site PMI, the power producer was able to analyze and identify material grade, determine alloy composition and to ensure quality and safety. Since embarking on PMI, the company has been using the Thermo Scientific™ Niton™ XL2, Niton XL2 Plus and Niton XL3t GOLDD handheld XRF analyzers across several power plants.

Using Niton handheld XRF analyzers, the inspection team was able to rapidly verify the authenticity of incoming materials against the company's purchase order and the certificate of conformity. Following the inspection, the company would reject materials assessed not to have fulfilled the standard requirements.

The Niton handheld XRF analyzer helped the team at the power plant to provide fast, accurate and reliable PMI of parts for the power generator, reducing the potential risk of unexpected downtime from low-quality OEM components. This enables the power producer to maintain their promise of uninterrupted power supply to customers, both consumers and businesses.

"Thanks to the Thermo Scientific™ Niton™ handheld XRF analyzer, our company is able to reject non-genuine OEM components and use only high-quality components that meet tight specifications. Moving forward, we are also able to improve operational excellence and reduce costs while boosting reliability of power supply." – Manager, Power Plant.

X-ray fluorescence (XRF) spectroscopy is a non-destructive analytical technique used to determine the elemental composition of materials.

XRF analyzers can detect elements and determine their concentrations in samples by measuring the fluorescent (or secondary) X-rays emitted from a sample when the surface of the latter is struck by a primary beam of an X-ray source.

Each of the elements present in a sample produces a set of characteristic fluorescent X-rays ("a fingerprint") that is unique for that specific element, which is why XRF spectrometry is an excellent technology for qualitative and quantitative analysis of material composition.

Applications of XRF Analyzers:

- **Detection of Metals / Alloys**
  - Scrap metal recycling
  - Positive material identification (PMI)
  - Manufacturing QA/QC
- **Environmental Hazards**
  - Soils
  - Industrial lead paint
  - Residential lead paint
  - Dust and air filters
- **Mining**
  - Greenfield exploration
  - Brownfield exploration
  - Oil & gas exploration
  - Grade control
  - Rare earth elements
- **Coatings**
  - Metal coatings
- **Precious Metals**
  - Jewelry & precious metals analysis
  - Automotive catalysts
- **Art & Archaeometry**
  - Metal Artifacts, pigments & ceramics, etc.
- **Consumer Goods**
  - Children's toys, apparel, jewelry & furniture, etc
  - RoHS/halogen-free/WEEE

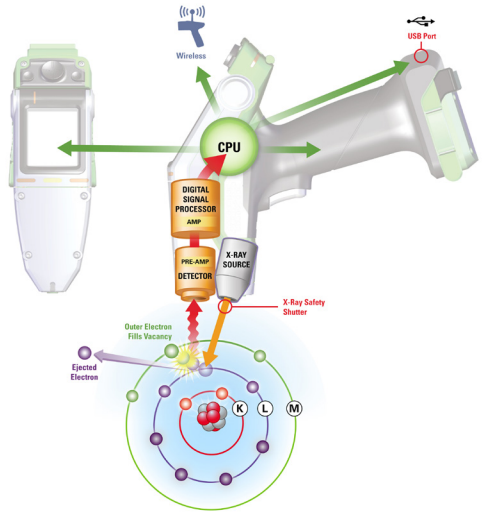
How XRF Works:

1. A solid or a liquid sample is irradiated with high energy X-rays from a controlled X-ray tube.

2. When an atom in the sample is struck with an X-ray of sufficient energy (greater than the atom's K or L shell electron's binding energy), an electron from one of the atom's inner orbital shells is dislodged.

3. The atom regains stability, filling the vacancy left in the inner orbital shell with an electron from one of the atom's higher energy orbital shells.

4. The electron drops to the orbital shell by releasing a fluorescent X-ray. The energy of this X-ray is equal to the specific difference in energy between two quantum states of the atom, i.e. of the element. The measurement of this energy is the basis of XRF analysis.



Lab-Quality Results in the Field

Thermo Scientific™ Niton™ handheld XRF analyzers have become the standard for non-destructive elemental analysis in a wide range of applications.

Our systems are routinely used for rapid quality control, inspection and analysis to ensure that chemical composition of the product meets the specifications. Lightweight and easy to use, these instruments provide instant analysis in any field environment.

Learn more at **thermofisher.com/Niton**

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