



Case Study

Tetra Engineering

Handheld Niton XRF Analyser provides Tetra engineers with immediate, lab quality results



The adoption of an advanced portable Niton XRF (x-ray fluorescence) alloy analyser has enabled the specialist engineering consultants at Tetra Engineering to investigate and quickly pinpoint failures within a power plant's complex pipeline network.

Tetra has provided boiler engineering and inspection services to power plant operators worldwide since 1989, with a focus on improving the operating life, reliability and thermal performance of the Heat Recovery Steam Generator. Flow-assisted corrosion (FAC), in which steel piping and its components degrade due to flowing water or steam-water mixes, has long been a problem for nuclear and fossil fuel power plants.

Research has shown that FAC is a function of temperature, velocity, pH, dissolved oxygen levels, the geometry of the component, and the material properties of the pipe. While most of these variables can be measured or inferred it is the material properties that are most elusive. Research shows that the presence of the alloying elements of chromium (Cr) and molybdenum (Mo) has a big impact on a pipe's resistance to FAC, and that even small amounts can make a difference.





Specifications for carbon steel piping often exclude these elements or simply set an upper limit.

When trying to predict wear on pipes engineers have often had to guess at suitable Cr and Mo levels or make use of spark-based OES (optical emission spectroscopy) instrumentation that requires complex and time-consuming sample preparation.

The advent of handheld Niton XRF alloy analysers has changed this. Tetra Engineering hired the handheld Niton XL3t XRF analyser from Niton's rental partner, Ashtead Technologies, as part of a project focusing on the degrading pipework at a combined cycle power plant in the UK.

Mark Taylor, a Senior Engineer at Tetra, explains:

"The Niton XL3t analyser has enabled us to easily identify the Cr and Mo content of components in the piping system. As a result of this we have been able to refine our engineering calculations and to re-rank the risk of failure in susceptible components.

"The XL3t provides quick results, giving us a more efficient engineering process. In addition to FAC work we have also used the Niton instrument on general plant inspections, and for practical purposes it is far superior to using the services of an analytical laboratory.

"We also found Ashtead very helpful to deal with throughout the rental period and we will definitely use them again."

The Niton XL3t enables users to carry out on-site Positive Material Identification (PMI) and elemental analysis of alloys quickly and easily. It has increased precision and lower detection limits than those previously achievable with XRF technology. Several hundred alloys are stored on the instrument's library and customised settings are available for unique alloys, including a 'pass / fail' mode.

The Niton XL3t Analyser

The Niton XL3t Analyser provides a number of distinct benefits:

- Very easy to use - even by non-technical personnel
- Lab-quality performance in a handheld instrument
- Improved cycle time for high sample throughput
- Truly non-destructive testing with near instantaneous results
- From turn-on to trigger-pull to results in seconds
- Confident analysis with technology from the industry leader

Technical Specifications:

Weight: < 3.0 lbs (< 1.3 kg)

Dimensions: 9.60 x 9.05 x 3.75 in. (244 x 230 x 95.5 mm)

Tube: Au anode 50 kV maximum, 40 uA maximum,

Ag anode with optional light element analysis package

Detector: High-performance semiconductor

System Electronics: 533 MHz ARM 11 CPU

300 MHz dedicated DSP

80 MHz ASICS DSP for signal processing

4096 channel MCA

32 MB internal system memory/ 128 MB internal user storage

Batteries: Two 4 (or optional 6) cell lithium-ion battery packs

Display: Adjustable angle, color, touch-screen display

Standard Analytical Range: >25 elements from S to U

Optional Light Elements: Additional elements Mg, Al, Si, and P via helium purge

Data Transfer: USB, Bluetooth and RS-232 serial communication

Alloy Modes: Metal Alloy, Electronics Alloy, Precious Metals

Bulk Modes: Mining, Soil

Plastic Modes: RoHS Plastics, Toy & Consumer Goods Plastics, TestAll™, Painted Products

Other Modes: Lead Paint, Thin Sample

Data Entry: Touch-screen keyboard, User-programmable pick lists, Optional wireless remote barcode reader



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