

## University of Sheffield, Department of Archaeology

**Niton alloy analyser helps  
unlock Stonehenge secrets**



Stonehenge's ancient stones and their wider landscape are being investigated with the help of a Niton XL3t material analyser from Niton UK. By producing instant read-outs of the composition of stones and soil, the handheld x-ray fluorescence instrument has allowed the archaeological team from Sheffield University to change the way they work.

The Niton XL3t enabled the team, co-ordinated by archaeologist Roger Doonan, to make a rapid preliminary characterisation of variability amongst stone working debris associated with the erection of Stonehenge. This took place in situ as the excavation progressed, meaning that results could be evaluated as decisions were made. Chemical data does not normally inform excavation strategy since waiting times for results from conventional laboratory-based analyses can take months.

“Without the Niton XL3t we simply could not operate in this way,” said Dr Doonan, who is a lecturer in archaeology at the University of Sheffield. “It has offered us new ways to work.”





The multidisciplinary project, directed by Prof Mike Parker-Pearson is looking at how Stonehenge relates to the wider landscape.

A critical consideration is investigating the area associated with working (dressing) the stones prior to their erection. It appears that a variety of stones were used and this needs to be understood, in terms of where they came from and what they were.

“The Niton XL3t has proven to be very reliable and most importantly it is pretty much weatherproof. It is also very flexible, which is ideal for a research environment,” continued Dr Doonan.

“The ability to rely on fundamental parameter calibrations but to undertake our own empirical calibrations as well is a great combination.”

The Niton XL3t has the advantage of offering light element analysis, since in some applications it is important to measure elements such as phosphorus or silicon. The in situ analysis of Phosphorus is particularly powerful as this is an element which is often a direct indicator of human activity; such capabilities mean that the instrument will be increasingly used in mainstream archaeology.

The Niton instrument is being used for a wide range of tasks, from basic artefact analysis through to chemical characterisation of soil to look at how people inhabit different spaces. Dr Doonan has recently undertaken a survey of a Bronze Age landscape and surveyed heavy metals over one hectare at 2m resolution in three days using only three people. Previously such work had taken three people over a week just to collect samples and then months in the laboratory processing them.

“I chose the Niton XL3t because of Niton UK’s customer service, since their support, advice and assistance are excellent. Their technical support staff acted like tutors, meaning that we have had intelligent discussions characterised by a very honest atmosphere” said Dr Doonan.

Roger Doonan’s main research focus is on ancient technology, and he has undertaken archaeological projects in Peru, Greece, Italy, Siberia, Romania, Isle of Man and the UK.

## 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

