AZtec Energy

EDS Acquisition and Analysis

...the ultimate EDS System
AZtec Energy

The most powerful, the most flexible EDS system you’ll ever see

AZtec integrates AZtec Energy acquisition and analysis software with Oxford Instruments’ X-Max® and x-act ranges of SDD detectors to create the ultimate materials characterisation system.

AZtec combines unrivalled speed and accuracy of results for routine analysis, with the flexibility and power required for applications that push the frontiers of the EDS technique.

Developed by the market leader with global customer support and over 40 years experience in nanoanalysis, AZtec meets the ever more challenging requirements of analysis at the nanoscale.
AZtecEnergy

At a glance...

**Powerful**
- AZtec has a host of new tools and technologies that will transform the way you get results and enable everyone to see ‘The Real Picture’

**Flexible**
- Whatever your level of expertise, AZtec will be there to guide you from start to finish or give you the tools to explore in your own way

**Fast**
- Every feature of AZtec has been optimised with speed and productivity in mind, for consistently accurate real-time results

**Accurate**
- New Tru-Q technology takes standardless analysis to the next level and ensures that AZtec gives you the best ‘out of the box’ results

**Innovative**
- A host of brand new features and novel visualisations deliver useful information to help you make decisions

**Structured**
- Whatever your level of expertise, AZtec will assist you from start to finish with Step Notes and editable Standard Operating Procedures (SOP)
Point&ID has been designed to take advantage of the high count rates generated by the latest SDD detectors to deliver accurate specimen information in real-time.

See the elements in a specimen and its composition instantly

- Simply select the area to analyse, then, in the few seconds required to acquire a spectrum:
  - Elements are identified using an improved version of our field-proven automatic PeakID routine
  - Composition is displayed in the unique MiniQuant using the accuracy of new Tru-Q technology
  - Annotate and e-mail results directly from the software

Acquisition starts, elements are automatically identified in real-time...
Review with MiniQuant...

MiniQuant shows comparison data in numerical and pictorial formats.

Everything in real-time

Annotate on screen...

...one click reporting to print or email direct from the interface.
Tru-Q provides high accuracy AutoID and quantitative analysis using a unique combination of technologies. Only AZtec offers high quality results without the need to standardise using:

**QCAL**
- Complete detector and hardware characterisation for true standardless analysis

**FLS**
- Robust spectrum processing that works in all situations with no need for any background fitting adjustment

**XPP**
- Matrix correction with proven accuracy beyond that possible with ZAF or Phi-Rho-Z

**Pulse Pile-up Correction (PPC)**
- Automatic correction for pulse pile-up at high count making accurate quant at 200,000cps a reality

Tests on published data show that XPP results are more accurate than older methods, particularly for light elements.

Tests of un-normalised quant shows that, with QCAL, errors are reduced to less than 5% relative...a level of accuracy only previously possible using standards-based analysis.
AZtec provides new tools to make the task of checking PeakID faster and more reliable.

Be confident, even where peaks overlap
- Element profiles give a much clearer picture than traditional markers
- Interactive overlays show when the element list is correct

Element profiles and interactive overlays make investigating peak overlaps simple, e.g. Ba/Ti/V. When all the elements are correctly assigned the fitted spectrum overlay should match the spectrum. Assigning Ba alone produces a poor match, adding Ti improves this, but a perfect match is not seen until V is included.

Calculate quantitative results the way you want to
- Flexible processing options
- Batch output from multiple specimens
- Standardisation manager for easy optimisation for special samples or conditions

The best results... guaranteed.

Powerful visualisation specimens includes combining results from different samples and projects.
SmartMap spectral mapping brings the benefits of automatic qualitative analysis into two dimensions to identify elements and show their distributions.

**Now see how all elements are distributed in a specimen**
- No specimen pre-knowledge required
- Maps for all elements identified and generated automatically
- Single Layered Image highlights chemistry and phase distribution in seconds
- Up to 4K SmartMap resolution to combine wide area and high resolution studies

**Layered Image of a slag sample, a 4K electron image is overlaid by 4K X-ray maps**

Layered Image gives complete picture of composition and phase distribution. Or view individual X-ray maps for more detailed information.
Analyse the information in greater depth at any time

- Reconstruct any data from the SmartMap to the same accuracy provided by live spectrum acquisition

Reconstruct spectra from any area during or after acquisition.

Accurate ElementID and MiniQuant give instant result.

Data is of same high quality as live spectra acquisition for accurate quant analysis.

AutoLayer: a complex story made simple.

At the click of a button, AutoLayer takes the often complex information contained in a set of X-ray maps, and turns it into a single image that helps you visualise both phase and element distribution in your specimen.

- Instantly and automatically interprets your specimen
- Highlights what’s important in a single image
- Unravels the complexity of real specimens
- Colours on the Layered Image correlate to the X-ray map colours

Paint cross-section taken from a demolition site highlights Pb-rich layers and particles in red. Due to the 4k resolution of the data, features less than 10 µm can easily be seen at the same time as viewing the chemical variation over the 1 mm² field of view.
TruMap: Unique Real-time Mapping solution takes advantage of the increased counts acquired by the latest SDD detectors.

TruMap has been designed to really take advantage of high counts generated by latest SDD detectors offering a new level of data integrity.

Now see the real element variation:
- Eliminates artifacts
- Corrects element overlaps
- Removes false variations due to X-ray background
- Everything is in real-time

Why map any other way?

TruMap reveals real element variations in this ore specimen. Overlaps such as AsLMgK are resolved, and variations in X-ray background seen in the Zn map are removed.

Choose the Right Picture NOT the Bright Picture

Overlaps resolved
Elimination of false information
Enhances compositional variations
No loss of real data
Resolves a Complex Story... Quickly

TruMapping starts...

After 5 seconds...

A full map comprising 200,000 data points processed and corrected in just 17 seconds

After 10 seconds...

TruMap works in real-time or can re-process stored data.

After 15 seconds...

TruMap now shows the correct distribution.

Finished after 17 seconds, overlaps resolved.

Standard mapping apparently shows identical distribution of magnesium (bottom left) and arsenic (top right).
AutoPhaseMap is a new way to automatically create a phase distribution map of a specimen.

During or after acquisition, AutoPhaseMap automatically:

- Turns X-ray map data into Phase Map data in seconds
- Calculates and displays:
  - distribution of each phase
  - spectrum and composition for each phase
  - area fraction for each phase
- Finds phases for all size ranges, including nanomaterials
- Finds hidden phases, highlighting missing elements which are present in trace amounts

AutoPhaseMap separates phases at the nano-scale - for example, in this complex nano-structure of inter-metallics in a nickel based super-alloy.
AZtec finds phases present in trace amounts even when their constituent elements have not been identified during X-ray mapping. In this example, tiny inclusions of the ZrO₂ mineral Baddelyte, making up less than 0.005% of the map, have been found by AutoPhaseMap even without the Zr map being present.
LineScan, QuantLine and TruLine™

See the right line every time

LineScan:
Visualise composition along a line.

LineScan brings the concepts of AZtec real-time acquisition and reporting to the study of linear variations

- Visualise LineScans clearly, quickly and easily
- Flexible views make interpretation easy
- View LineScans in stacked or titled format
- Normalise display to compare major and trace element variations easily

QuantLine:
Utilise the accuracy and repeatability of Tru-Q to see quantitative element variations

- No need to wait for lengthy data processing...see quantitative linescans live!
- View data in graphic form or as a table, with quantitative results shown in Wt% or At%
- Table of results can be exported to Excel
- Point spectra can be extracted for further, more detailed, analysis

Rotatable monitors show LineScan information at its best – in profile rather than landscape format.
TruLine:

Incorporates TruMap technology ensuring that you will see real element distribution

- Corrects for peak overlaps automatically
- Enhances real elemental differences by removing X-ray background variation
- Aligns image and LineScan for clear visual comparison
- Normalised intensity scales make comparison of major and minor elements simple

Standard Silicon and Tungsten Maps and LineScans

Silicon and Tungsten TruMaps and TruLineScans

Standard X-ray Maps and LineScans indicate that Tungsten and Silicon are concentrated in similar regions of the structure, however, with TruMap technology the real positions of these elements are revealed.
AutoLock provides a seamlessly integrated and powerful solution for collecting useful data when specimens drift.

- Works in extreme situations, even on the nanoscale
- Keeps you informed about specimen drift
- Provides live updates of corrective action taken

Innovative

- Unique blend of predictive and reactive drift correction routines cope with different types of specimen drift

At first glance, both Layered Images look stunning, but on closer inspection the one with AutoLock shows rich detail of small particles, which are otherwise lost.
Layer thickness and composition analysis

Seamlessly integrated into AZtecEnergy, LayerProbe complements the element and phase information gained from conventional EDS analysis by calculating the composition and thicknesses of the individual layers beneath the surface.

Non-destructive
- Multi-layered structures are characterised from an X-ray measurement, without the need to cross-section the specimen

High spatial resolution
- Accurately characterises features down to 200nm wide
- Layer thickness down to the nanometre scale can be measured quickly and accurately

Cost effective
- Cost-effective: Use your SEM as a high-performance thin film and coating analyser

Suitable for metallic layers:
- Metallic films can be measured at thicknesses far beyond their optical transparency

Visit www.oxinst.com/layerprobe to download the brochure
Guidance and Structure

Choose the way you want to work

AZtec is designed for all types of users and offers many different ways of working.

Guided Mode

- Ideal for those who prefer a ‘step by step’ approach to analysis
- Each step of the Navigator has a clear purpose
- You can always see what is happening and what to do next

Describe Specimen – Record important experimental information.

Scan Image – Acquire electron images.
In Custom Mode, you can expand your work over more than one display, still with widescreen resolution.

Custom Mode

- Ideal for those who prefer the freedom and flexibility to do what they want, when they want
- You decide what functionality you want to see and where you want to see it
- Choose the visualisations that suit your task and expand them over as many monitors as you need
Guidance and Structure

Ensuring that everyone gets the job done correctly

Step Notes and Standard Operating Procedures.

Step Notes are available on every Navigator step to help you get the most from AZtec in the quickest time possible

- Help precisely where you need it
- Easy to follow text and images ensure that you know exactly what to do next

Step Notes can be easily turned into Standard Operating Procedures (SOPs)

- Define on-screen SOPs using text and images
- By following an SOP, novice staff can be productive from the start, and achieve repeatable and reliable results every time

Copy from Word and paste into AZtec

Turn your system into an integrated SOP
Multi-tasking: Change the way you work forever.

AZtec has true multi-tasking capability, meaning that every second of data acquisition can also be used for processing and reporting.

- Interrogate and report on data from one project while acquiring data for a new project
- Interrogate data even during acquisition
- Unleashes the potential of the latest high-speed detectors
- Many tasks that used to take minutes now take seconds
- Revolutionise productivity

Acquire, process and report all at the same time.

User Profiles: Managing a multi-user environment is now straightforward.

User Profiles take the hassle out of setting up the system for different users.

- Set-up your system once for a user, then save all the relevant settings into a user profile
- Next time simply load the profile and you are ready to go
Integrated Reporting

Flexible or structured, always fast

**Integrated Reporting:** You talked... We listened.

- **Three** ways to report your data...
- **Three** ways to save time...
- **Three** ways to take the hassle out of reporting

**Structured**

- Print a professional report with a single button press
- Comprehensive list of report templates tailored to each application
- A dedicated ‘Site Report’ will print out all data acquired during a specimen investigation
- Customise reports to incorporate your company logo

Want to create your own templates? **AZtec’s** integrated report template generator allows you to do just that!

- Simple easy to use interface
- Create templates for use across multiple techniques
- Create multiple page templates
- Create templates for single or multiple users

**Fast**

- Reporting direct from the interface
- A simple right click and data can be e-mailed direct to your customer

**Flexible**

- Dedicated export application
- Export your data in the format and resolution you want
Report your data quickly and in the way you want.
Oxford Instruments recognises that your success requires not just only world-class products, but also world-class service and support. Our global service team is renowned for delivering outstanding service to customers and microscope vendors:

- Hands-on and theory classroom training
- On-site training tailored to your specific needs
- Web-based courses and training videos
- Consultancy and application support
- Multi-layered maintenance and service contracts

visit [www.oxford-instruments.com/AZtec](http://www.oxford-instruments.com/AZtec)