Led by experience. Driven by curiosity.

FXE Series

See the bigger picture

comet
x-ray

FXE Series

Revealing details under stable conditions

Ideal for performing NDT quality control, offline inspection, and measurements of parts with defects in the low µm range

See beyond the image to understand the bigger picture

When specifying the tube for your next microfocus project, it's tempting to focus solely on resolution, speed and initial cost: Three fixed parameters you can compare across spec sheets and price lists. But when choosing the perfect tube for your application, there's more that meets the eye than just the image.

Find the perfect balance

The complex interplay between power and resolution, between deterioration and efficiency, between flexibility and dedication - these factors will all impact ultimate performance and total cost. There is always a compromise to be made – and the FXE is designed to maximise the possibilities of these delicate combinations while maintaining valuable uptime and the longevity of your system.

Take the long view

Add to this platform independence for seamless integration, global support of an established industry leader in terms of consultation, service and local spare part availability and you have the ideal solution that takes into account all the details you need to consider when seeing the big picture for your next project.

They feature high power targets, active focus optics with optional cooling, a high vacuum system, and a serviceable beam chamber.

High power density - fast scans

Increase throughput of your X-ray inspection application with faster scan times, thanks to higher dose rates. At high resolutions with a small focal spot, the thermal load is highly concentrated and needs to be efficiently dissipated to allow maximum power and reasonable flux, and thanks to the FXE's high power targets, image acquisition can be much faster than with a standard target.

Single tube - multiple focus

The multi-focus FXE modules are suited for a wide range of inspection tasks and a variety of feature sizes, thanks to its ability to change focal spot size. This versatility is achieved by always creating the best compromise between resolution and power, using another electron beam crossover and stronger demagnification of the electron beam for spot sizes in the nanometer range; or the low loss of electrons resulting in the highest possible power.

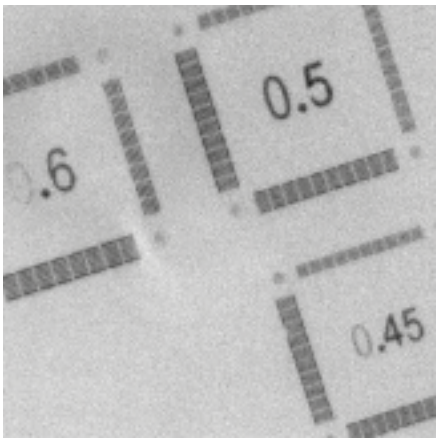
Usually, the resolution of single focus tubes can only be altered by changing its power. A multi-focus tube optimizes settings for when either the highest resolution or the highest power at a suitable focal spot is required, thus giving you the benefit of three tubes for the price of one.

Nanofocus - flexible feature size range

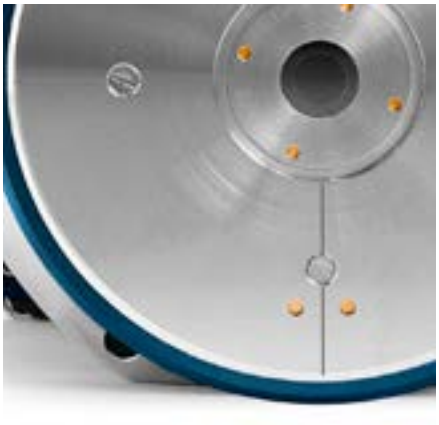
With feature recognition from 500 nm to a few millimeters, you can analyze a broad range of products with small defects. The FXE's active focusing optics adjust for optimum focal spot size at any kV and power setting, allowing you to imagine all types of material with different densities and feature sizes.

Typical transmission tube applications

- Electronics inspection
  - Soldering joints on circuit boards - PCBA
  - Ball grid arrays - BGA
  - Integrated circuits - IC
  - Bonding wires
- Semiconductor packaging and interconnects
- Wafer-level chip-scale packages - WLCSP
- Microelectromechanical systems - MEMS
- Optical components
- Battery cell inspection
- Cables, conduits, and plastics
- Small animal imaging
- Soft tissue imaging and scaffolding
- Medical implants and devices



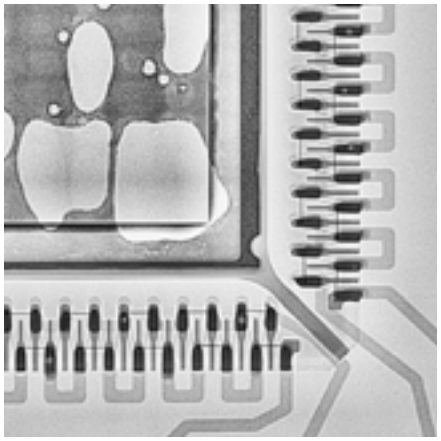
Nanofocus Resolution
Miniscule focal spots in the sub-micrometer range allow to resolve even finest details and obtain clear images.



Fine details
The FXE transmission X-ray modules make the finest details visible through high optical magnification achieved by the short distance between X-ray generation and the inspected object.

Versatile optics
The multi-focus tube head optimizes operation at either the highest possible resolution or power.

Unlimited lifetime
Wear parts, like electron emitters, are designed for quick replacement. You don't need to worry about running the tube at its limit, as you can always restore the module to its original state.



Optimal contrast
True X-ray Intensity - TXI helps to deliver constant picture contrast by controlling the electron current on the target.

High power
Reflection tubes enable penetration of high density objects at fast scan rates.

Consistent image quality

The FXE's high penetration power at up to 225 kV and instant stability make it ideal for micro-CT applications in electronics, NDT, and pre-clinical applications. The FXE module enables long scans that deliver consistent image quality with True X-ray Intensity - TXI. By keeping the target current constant, unwanted influences from fluctuations in the extraction, deflection, and focusing of the electrons are ruled out. By delivering stable X-ray intensity, feature recognition and analytics are enhanced.

Low total cost of ownership

The quest for increased speed and higher resolution has a downside: To maximize throughput, you want to operate above the specified service temperature, but in turn, using high power densities accelerates damage to both filaments and targets. With the FXE module, it is possible to balance the advantage of speed with the low-cost replacement of inexpensive components.

"You'll never have to worry about running the tube at its limit because the FXE's modular design facilitates quick replacement of wear parts - making the FXE's total ownership cost among the lowest in its class."
Dirk Schneider, Product Manager Microfocus.

Typical reflection tube applications

- Aerospace and automotive
  - Rotor- and turbine blades
  - Titanium and aluminum cast parts
  - Battery inspection
  - Lightweight metal
  - Sensors, relays, fuses, and coils
- Materials testing: plastic, ceramics, steel
- Weld joints in conduits
- Additive manufacturing
- Computed tomography
- Microsystems and encapsulated components
- Medical implants and devices
- Pharmaceutical, medical, and biomedical

Modular thinking

With more than 70 years under our belt, we've come to understand how vital it is that all the elements in an X-ray module work seamlessly together. It also requires deep know-how of the wide range of applications our customers demand – and how important it is for you to get a module, which is not only tailored to your needs, but is easy to configure, simple to install and trusted to deliver quick readiness. That's how we can offer you a module that's built with your company's success in mind.

Flexibility increases performance

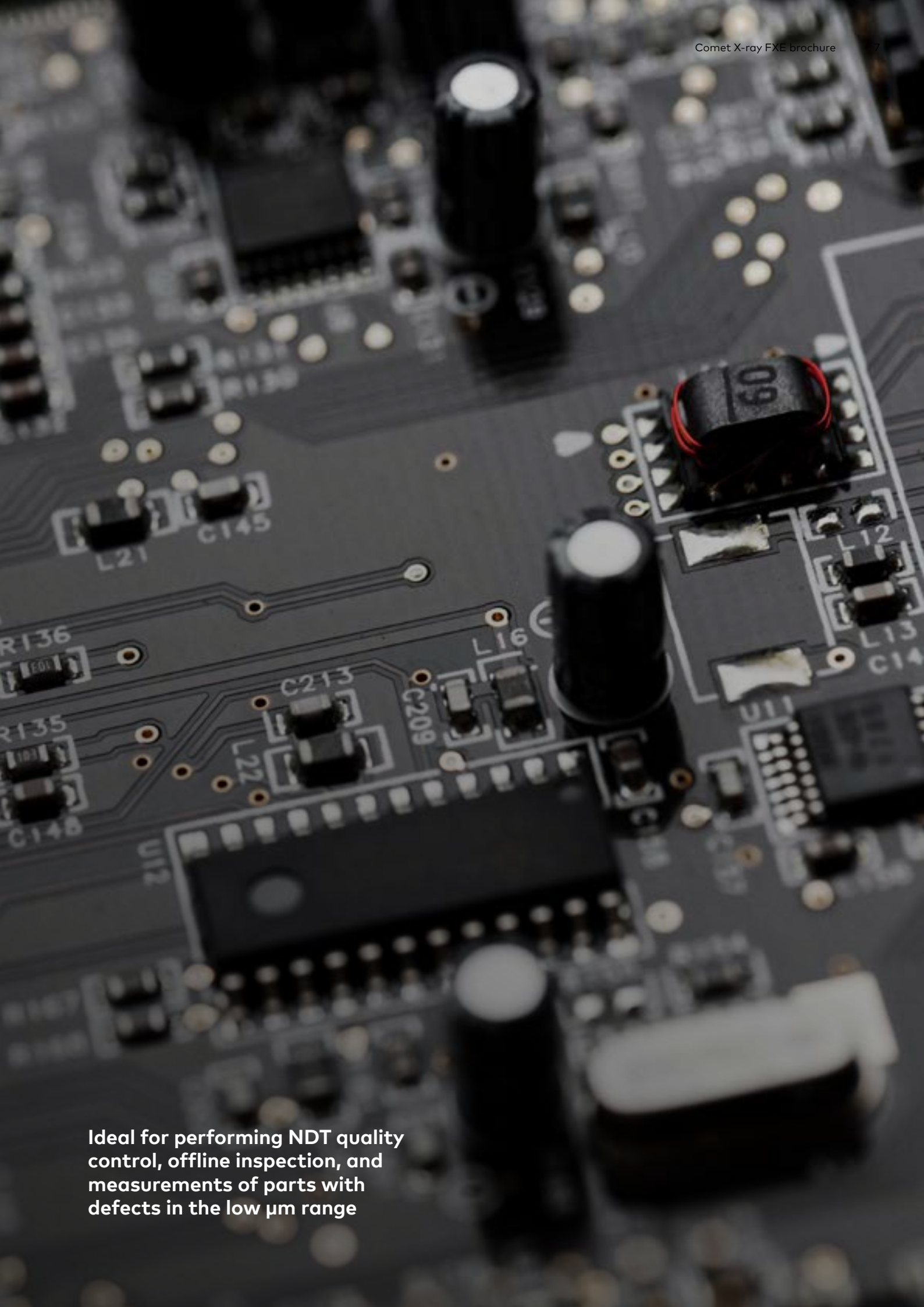
Our unique modular design approach means you can quickly swap out components for service, repair or trouble shooting. Save the cost and time of sending for a technician, as parts can be exchanged by the operator. None of us know precisely what the future will bring, but we do know that being flexible makes us faster to respond to change. Our modular system can be configured for your specific challenges.

Inpection of electronics

Electronic components are becoming increasingly miniaturized. High-resolution and high-magnification X-ray and computed tomography (CT) inspection modules provide the necessary tools for examining such components.

Typical applications

- Multilayer and assembled PCB Inspection
- Visualization of layers, defect solders, solder voids
- SMD Inspection
- Testing of bond wires, solder joints
- Wafer Inspection
- Testing of 3D integrated circuits (IC)



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