



# X-ray inspection of electronics for textile weaving and other machinery



Nikon Metrology providing XT V 160 radiography and laminography training to ROJ technicians.

Italian electronics firm ROJ ([www.roj.com](http://www.roj.com)) manufactures control systems for its Belgian parent group VANDEWIELE'S carpet and velvet weaving machines, as well as mechatronics and embedded electronics for automation in a wide range of other industries worldwide, from banking to agriculture. For radiographically inspecting the printed circuit boards it manufactures, the company has bought from Nikon Metrology ([www.nikonmetrology.com](http://www.nikonmetrology.com)) an XT V 160 X-ray system with a 160 kV / 20W source and a silicon-based, flat panel detector having a 1,024 square, 127-micron pixel array.

Included in the turnkey package was Nikon's in-house Inspect-X software for control, imaging, analysis and reporting, together with the X-Tract laminography option. The latter's automated acquisition capability uses the manufacturer's advanced CT (computed tomography) reconstruction algorithm to generate virtual 3D micro-sections of a sample in any orientation in a matter of minutes.

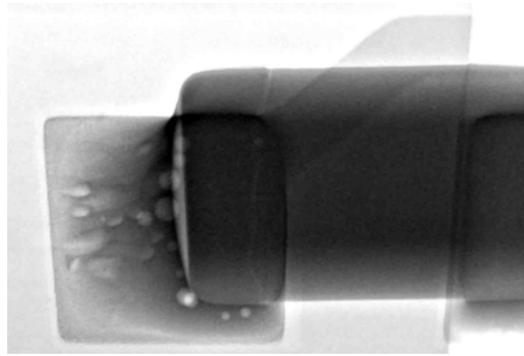
The hardware and software combination provides high image quality coupled with seamless transition between radiography and 3D laminography in one system. It allows the user to gain better insight into the presence of faults such as voids, cracks and misalignments in complex and multi-layer electronics, leading to higher productivity and reduced recall rates. Moreover it is a non-destructive process, so the products under test are not wasted.

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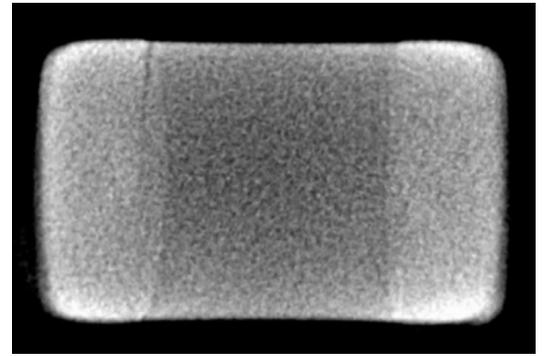
Luca Deluca, ROJ process engineer

XT V 160

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X-ray inspection of a defective capacitor at ROJ at a tilt angle of 45 degrees reveals a crack originating on the ceramic at the solder pad level.



With X.Tract laminography, the crack is clearly visible from the top slice.

ROJ process engineer Mister Luca Deluca, in charge of inspection at the Biella factory commented, "Our quality control is targeted at BTC (bottom terminated component), pin-in-paste and THT (through hole technology) components.

"The previous X-ray inspection system here was relatively basic, without laminography or the ability to tilt the specimen being tested to obtain a better view. Images were quite blurred, restricting our ability to see faults and it was not possible to automate the process, so it was more time consuming.

"The laminography function in the Nikon equipment gives us much clearer results, enabling reliable identification of specific defects and making it easier to validate rework. It is faster to use than the previous system, allows closer control over our manufacturing processes and gives us a valuable sales argument when approaching potential customers in new market sectors."

He added that the Nikon X-ray solution was chosen after a benchmark with other suppliers taking into consideration performance and flexibility.

Additionally, automated inspection was desired as well as an ability to easily create increasingly detailed analyses and reports being demanded by ROJ's customers. The XT V 160 is also supporting the R&D department in Biella to ensure that any design deficiencies in new products are spotted at an early stage of their development.

An aspect of the construction of the Nikon Metrology X-ray system that ROJ appreciates is the open tube. It allows quick, easy and inexpensive replacement of the filament, unlike on the former X-ray machine which had a closed tube. The speed of changeover also minimises downtime of the inspection equipment, increasing its availability.

Mr Barillà, process engineer, concluded, "Flexible, lean manufacturing is key to our success and the new X-ray inspection system supports that goal. The Nikon XT V 160 is performing well and the supplier has provided a high standard of training for our technicians."

#### ABOUT THE NIKON METROLOGY XT V 160

High-precision, proprietary X-ray technology built into the XT V 160 X-ray inspection system facilitates efficient defect analysis in a smooth, non-destructive process. The machine has over 2000x geometric magnification and sub-micron defect recognition, making it ideal for inspecting high density PCBs with BGAs (ball grid arrays), quad-flat no-lead (QFN) interconnections, microchip carriers, fine pitch connectors and multiple layers. Besides electronics inspection, the machine is also suitable for inspection of a variety of small components.

The operator controls a 5-axis sample manipulator using precision joystick navigation that drives real-time X-ray imaging, allowing defects to be traced intuitively and quickly on complex printed circuit boards and electronic components. 360-degree fly-around viewing is possible while keeping the region of interest locked into the centre of the field of view.

Other key attributes are proprietary micro-focus source technology, rapid automatic inspection using customisable macros, a display for combined measurement and real-time analysis, and the capability for the system to be retrofitted with computed tomography (CT) scanning. All of Nikon Metrology's X-ray machines are built at a production facility in Tring, Hertfordshire, UK.

