



DensXspect®

In-line X-ray density measurement system



DensXspect® is an in-line system for measuring the absolute density and chemical composition of materials and manufactured products. It is an extremely innovative integrated NDT (Non-Destructive Testing) system for real-time control and monitoring of in-line production processes.

The instrument consists of an X-ray source and a solid-state radiation sensor. The collimated X-ray beam penetrates the material under analysis, and the spectroscopic radiation sensor analyzes the attenuated beam after it has passed through the volume of the object being examined. The analysis of the material characteristics is performed at a specific point, with a collimated beam size of less than 1 mm.

The analysis of the acquired attenuation data makes it possible to identify the unique fingerprint left by each material on the transmitted X-ray beam. This fingerprint is determined by the specific density and elemental composition of the manufactured product being analyzed, enabling the absolute density of materials with known composition to be measured.

DensXspect® sensing technology, based on Cadmium-Zinc-Telluride (CdZnTe, CZT) and used in single-photon counting readout mode, differs from traditional scintillation-based radiation detection systems thanks to its excellent energy resolution and ultra-low-noise acquisition. This innovative technology ensures maximum measurement precision and reproducibility.

Data are transmitted via Ethernet, with several communication protocols available. Limiting the power of the radiation source

below a defined threshold, together with the high collimation of the X-ray beam, ensures compliance with legal requirements concerning ionizing radiation.

The C-shaped design of DensXspect® is intended to facilitate installation of the system along industrial production lines, including existing ones, and to allow it to operate alongside and integrate with other production monitoring systems, whether optical or of another type.

Key Features and Benefits

- High-energy-resolution spectroscopic X-ray acquisition
- Compact and long-lasting sensor compared with scintillators
- Easy integration into continuous production lines
- Data transmission via Ethernet with several communication protocols
- Customizable system output

Fields of application

- Measurement of the absolute density of materials/alloys with known composition
- Classification of optically identical elastomeric products with different compounds
- Identification and/or quantification of CRMs (Critical Raw Materials) or contaminants in powders or liquids

MADE IN ITALY

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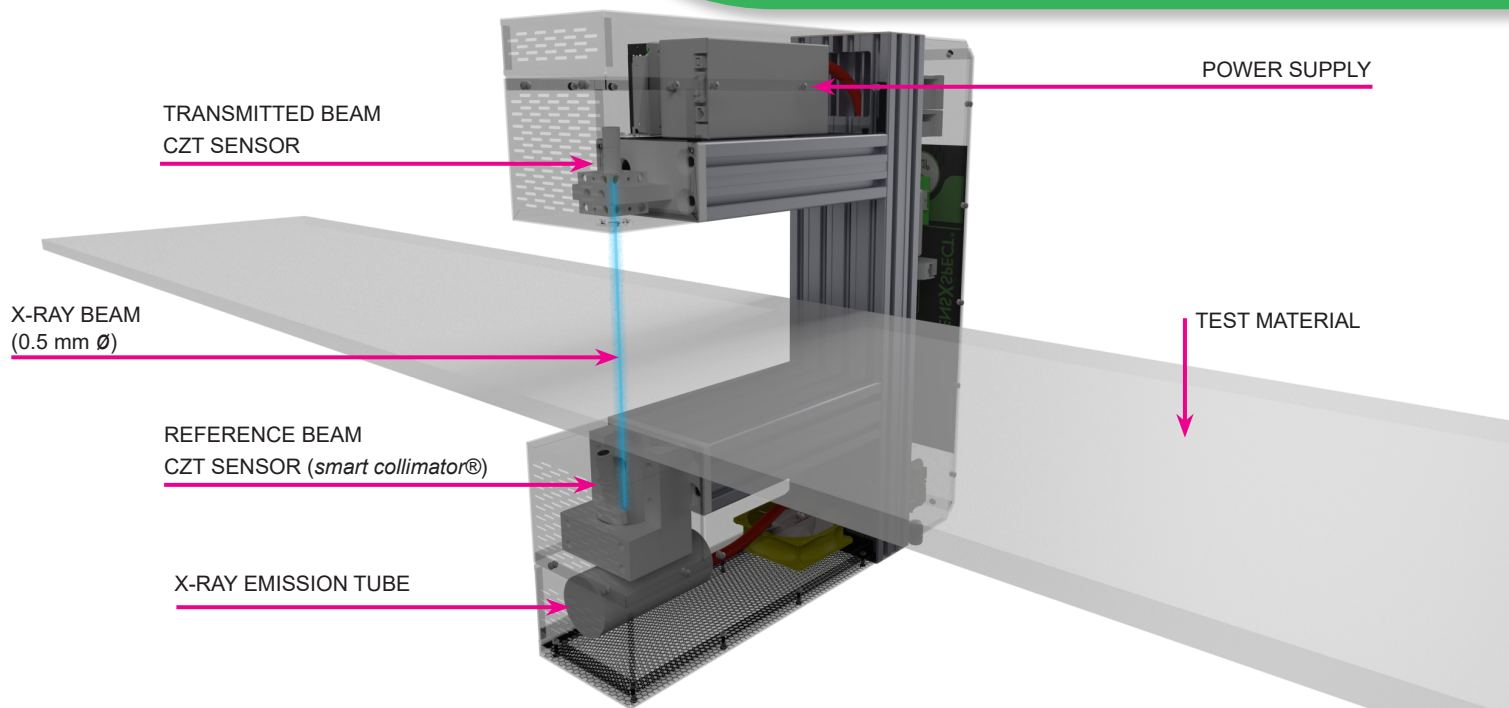
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X-rays as you've never seen before

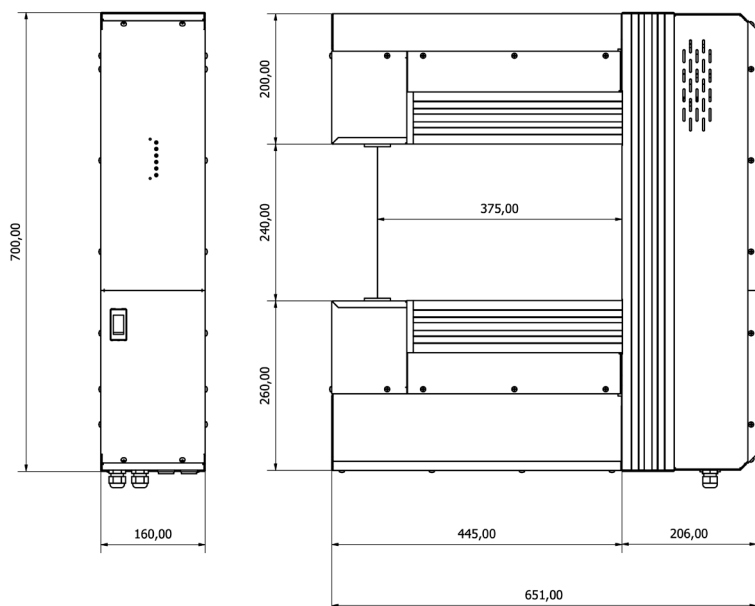
Radiation detection technology based on CZT sensors (CdZnTe, cadmium zinc telluride) and single-photon counting represents a new paradigm in the field of in-line non-destructive testing. DUE2LAB is the only company in Italy that designs and manufactures industrial sensors and systems based on CZT single-photon counting detectors. DUE2LAB combines

pioneering expertise developed through R&D projects in aerospace, the circular economy, and X-ray/gamma-ray sensing for synchrotrons and particle accelerators with more than ten years of experience in designing tailor-made industrial solutions for the wood, rubber, paper, and packaging industries.

DUE2LAB solutions represent a true evolution of current X-ray systems in terms of performance, reliability, and service life, while also making it possible to measure in real time material properties that have so far been inaccessible.



System dimensions



Technical Specifications

Maximum X-ray energy:	30 kV
Maximum X-ray power:	50 W
Sensor:	CdZnTe, single pixel (0.032 cc)
Operating mode:	Single-photon counting
Minimum integration time:	1 ms
Sensor lifetime:	does not degrade (>> scintillator)
Material passage clearance:	230 mm
X-ray beam diameter:	0.5 mm
Communication interface:	socket TCP/IP via Ethernet RJ45
Power supply:	230 V; 50/60Hz; 0.5 kVA
Power consumption:	500 W
Housing structure:	anodized aluminum
Dimensions (AxPxL):	590x786x160 mm
Weight:	30 kg
Cooling system:	Forced-air cooling
Operating temperature:	max 40°C (environment)
Protection rating:	IP5X

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