Industrial computed tomography (iCT)

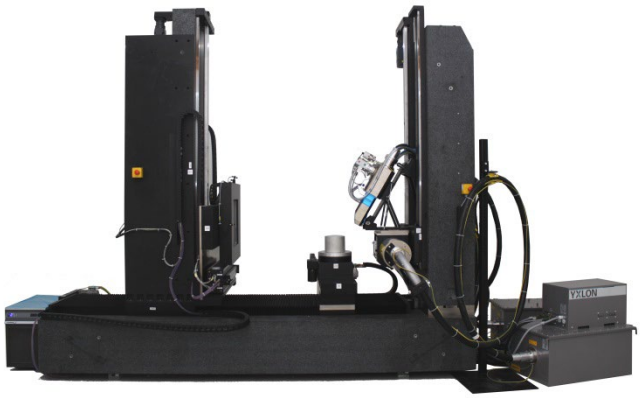
Testing of polymers and fiber composites

Eurofins Qualitech AG is a leading service provider for non-destructive material testing with highly trained and qualified specialists. Our decades of experience in all common non-destructive testing methods offer you a wide range of testing options to check your materials and workpieces for defects. This guarantees you satisfied customers, because nothing is more damaging to business than unexpected damage.

In spring 2016, the range of services offered by of Eurofins Qualitech AG was expanded to include industrial computed tomography (CT).

CT makes it possible to generate a non-destructive digital image of the actual condition of an object within a short period of time. The data set obtained can be specifically analysed afterwards, allowing a direct comparison with the target condition. CT offers several advantages over conventional material testing or tactile measurement methods. For example, CT can be used to detect cracks very well, which are often difficult to recognise with conventional 2D radiographic testing. In the field of metrology (measurement), it is possible to measure internal structures that are not accessible by tactile methods.

Eurofins Qualitech AG operates one of the **most modern and largest CT systems in Switzerland**. The high radiation output of up to 600 kV makes it possible to analyse large and thick-walled components, while the 225 kV microfocus X-ray tube enables high-resolution images in the micrometre range.



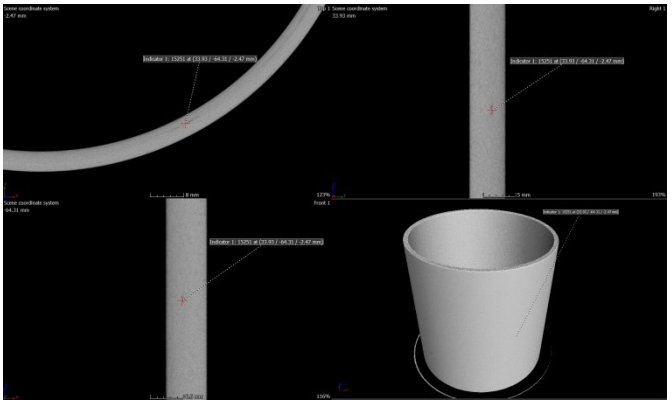
Modular CT from YXLON at Eurofins Qualitech AG

Polymers and fibre-reinforced plastics

For the quality control of polymers and fibre-reinforced plastics, an accurate, non-destructive 3D volume inspection method is essential. The orientation of individual fibres or fibre bundles, delaminated areas or porosities often have to be resolved with pinpoint accuracy. Components made of fibre composites are becoming increasingly complex and larger. The special CT scanner from Qualitech has a scan height of 2 metres, meaning that materials up to 3 metres in length (separate measurement from both sides) could theoretically be examined.

Porosity and delamination

With the volume data from a CT scan, a 3D visualisation of the existing porosity in the component is obtained within a short time. This can then be evaluated with regard to various aspects, such as total porosity, pore volume (in the entire part or in partial areas), pore size or number of pores, and marked in colour in the generated 3D volume. Delaminations or cracks can also be analysed and displayed graphically.



Cylindrical fibre winding with delaminated areas and porosity; bottom right: Volumetric representation; left and top right: perpendicular sectional views.

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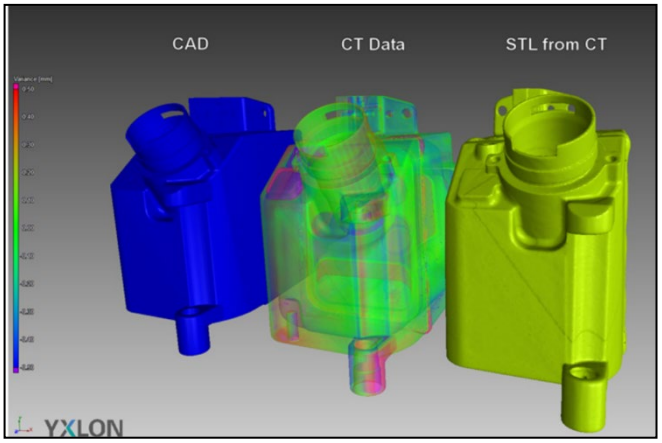
Target/actual comparison of moulded parts

CT offers the advantage of measuring the entire component, including internal structures, without contact and displaying it in colour-coded form, which is not possible with tactile methods. This means that target and actual values can be compared quickly and easily using CAD files and deviations can be highlighted in colour directly on the CAD model.



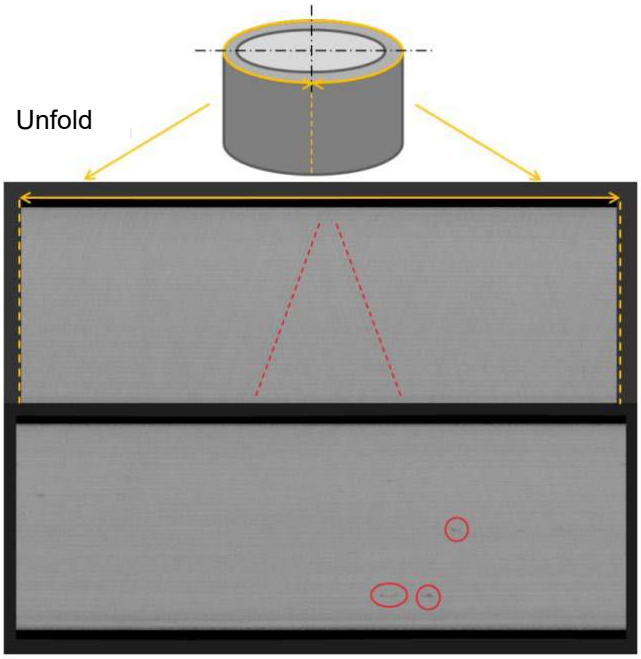
Target/actual comparison of enclosures. Left: CAD file; right: STL file from CT scan; centre: comparison of the two surfaces with colour-coded representation of the deviation.

Wall thickness analysis

Wall thickness analyses can be carried out with little effort using the volume data from a CT scan. In this way, the wall thicknesses can be colour-coded in the 3D volume and in the individual sectional images. This allows critical areas to be highlighted in colour, making them quick and easy to locate.

Fibre orientation

The fibre orientation can also be displayed quickly and easily using the contrast difference. This allows the orientation of fibre windings or fabrics to be checked non-destructively.



Cylindrical winding was virtually "unfolded" to show fibre orientation and defects in layer images through the cross-section.

Technical data sheet of the computer tomograph

As a service provider, we want to cover the widest possible range of applications for different materials, complex geometries and a wide variety of component sizes and wall thicknesses. With our modular system, we can test very large components, such as coiled tubes or laminated geometries up to a theoretical height of 3 metres and a diameter of approx. 610 mm. However, very small components can also be visualised in high resolution. Two different X-ray tubes and two detectors have been installed for this purpose.

Delivery times

Depending on the type and scope of the examinations carried out or the required test duration. Usually within a few working days or even hours.

	Cone beam CT		Fan beam CT
	225 kV Mikrofocus	600 kV Mikrofocus	600 kV Mikrofocus
Scan field height:	ca. 2100 mm	ca. 1950 mm	ca. 1550 mm
Scan field diameter:	ca. 610 mm	ca. 650 mm	ca. 880 mm
Opt. spatial resolution:	ca. 15 µm	ca. 175 µm	ca. 190 µm
Component weight:	ca. 350 kg	ca. 350 kg	ca. 350 kg

Technical data of the different measuring modes of the computer tomograph with an approximate indication of the radiopaque wall thickness of different materials

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