

Industrial computer tomography (iCT)

Testing of polymers and fibre composites

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

In spring 2016, Qualitech AG expanded its range of services to include **industrial computer tomography (CT)**.

CT makes it possible to generate a non-destructive digital image of the current state of an object within a short time. Subsequently, the data set obtained can be specifically analysed, allowing a direct comparison with the target condition. Compared to conventional material testing or tactile measuring methods, CT offers several advantages. By means of CT, for example, cracks can be detected very well, which are often difficult to detect with conventional 2D radiographic inspection. In the field of metrology (measurement) it is possible to measure internal structures which are not accessible by tactile means.

Qualitech AG operates one of the **most modern** and **largest CT systems in Switzerland**. The high radiation power of up to 600 kV allows the analysis of large and thick-walled components, while the 225 kV microfocus X-ray tube allows high-resolution images in the micrometer range..

Polymers and fibre-reinforced plastics

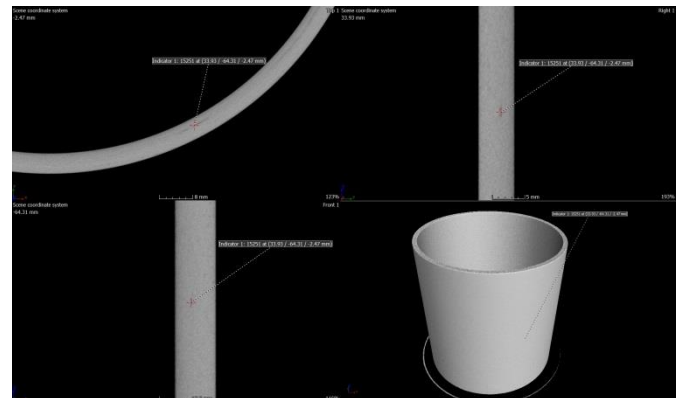
For the quality control of polymers and fibre-reinforced plastics, an accurate, non-destructive 3D volume inspection method is essential. Often, orientations of individual fibers or fiber bundles, delaminated areas or porosities have to be resolved with pinpoint accuracy. Components made of fibre composites are becoming more and more complex and also larger and larger. The special CT from Qualitech has a scanning height of 2 m, theoretically materials up to a length of 3 m (separate measurement from both sides) could be examined.

Porosity and delamination

Using the volume data of a CT scan, a 3D representation 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 evaluated and graphically displayed.



Modular CT of the company YXLON at Qualitech AG

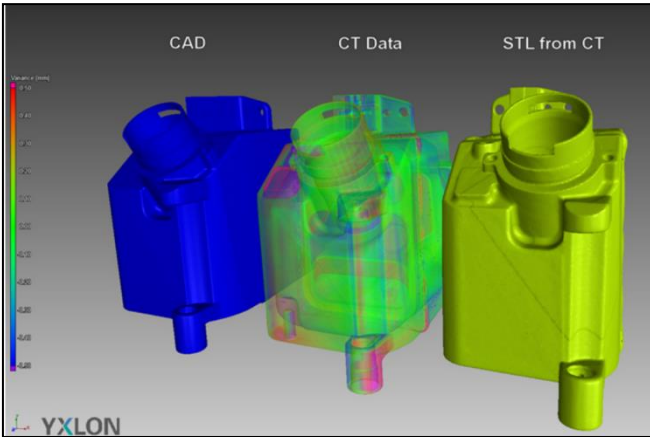


Cylindrical fiber winding with delaminated areas and porosity; lower right: Volume display; left and top right: sectional views perpendicular to each other.



Target-performance comparison of moulded parts

CT offers the advantage of measuring the complete component including internal structures without contact and displaying them in color-coded form, which is not possible with tactile methods. This allows a quick and easy comparison of target and actual values based on CAD files, and deviations can be highlighted in color directly on the CAD model.



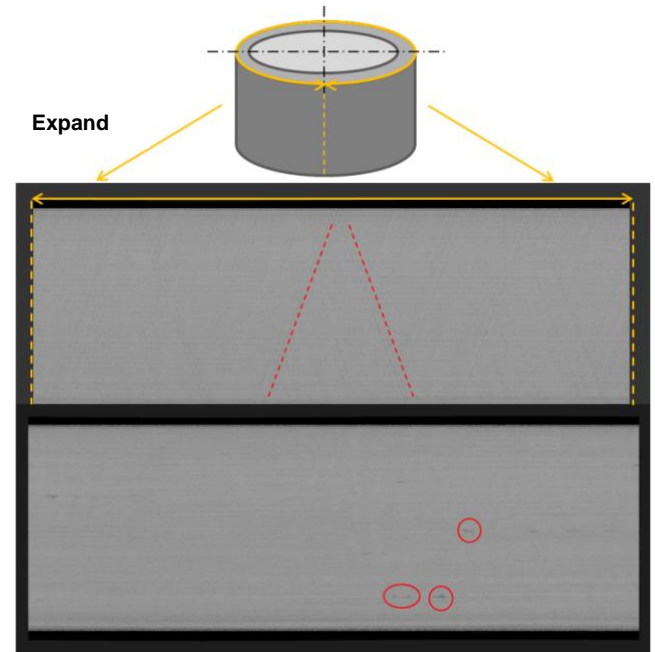
Target-performance comparison of housings. Left: CAD file; Right: STL file from CT scan; Middle: Comparison of the two surfaces with colour-coded representation of the deviation.

Wandstärkenanalyse

With the volume data of a CT examination, wall thickness analyses can be carried out with little effort. In this way, the wall thicknesses in the 3D volume and in the individual sectional images can be displayed in color-coded form. Critical areas can thus be highlighted in colour and are thus quick and easy to find

Fibre orientation

The fiber orientation can also be displayed quickly and easily on the contrast difference. Thus the orientation of fibre windings or fabrics can be checked non-destructively.



Cylindrical winding was virtually "unfolded" to show fiber orientation and defects in layered 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 the modular system we can test very large components, such as wound tubes or laminated geometries up to a theoretical height of 3 m and a diameter of approx. 610 mm. But also very small components can be displayed in high resolution. For this purpose, two different X-ray tubes and two detectors were installed.

Delivery times

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

	Cone Beam -CT		Fan beam -CT
	225 kV Microfocus	600 kV Minifocus	600 kV Minifocus
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 radiolucent wall thickness of different materials