Industrial Computed Tomography (iCT)

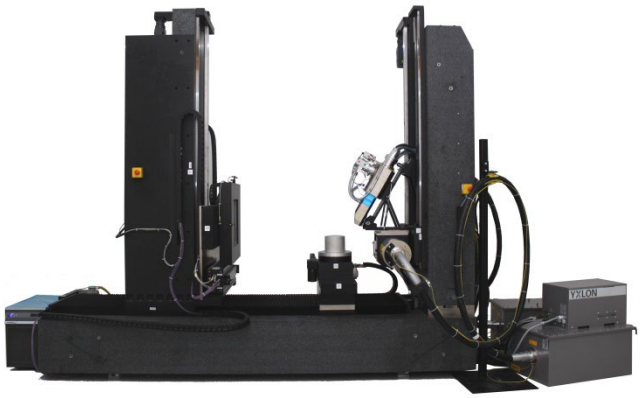
In the field of casting inspection

Eurofins 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, Eurofins 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.

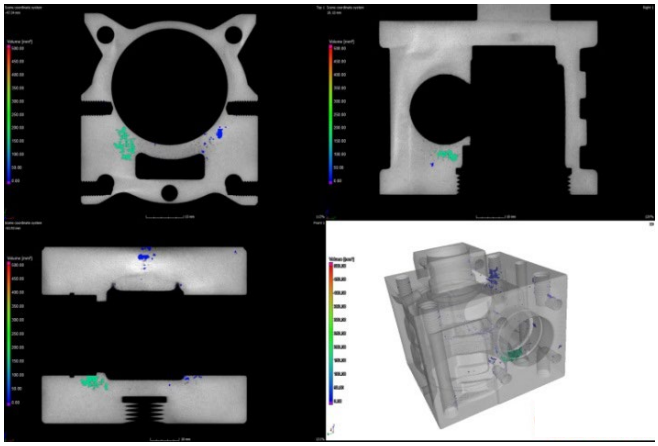
Eurofins Qualitech AG operates one of the **most modern** and **largest CT systems in Switzerland**. The high radiation power of up to 600 kV allows the analysis of large and thick-walled components, while the 225 kV microfocus X-ray tube allows high-resolution images in the micrometer range.



Modular CT of the company YXLON at Eurofins Qualitech AG

CT in the foundry sector
Computer tomography has become indispensable for both initial sample inspection and series testing of castings. CT provides information about the cast part that is not possible with any other inspection method. In the following, some common inspection possibilities will be discussed.

Inhomogeneities, such as porosity or cracks
Within a short time, a 3D representation of the existing porosity in the component is obtained. This can 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 can be marked in colour in the generated 3D volume. Inclusions or cracks can also be evaluated and graphically displayed. Thus the casting process can be evaluated in detail quickly and easily and optimized if necessary



Result of a CT scan - bottom right is the 3D volume, the dark background images show sectional views through the component - all images show a color-coded representation of the blowhole volumes and their exact position in the component.

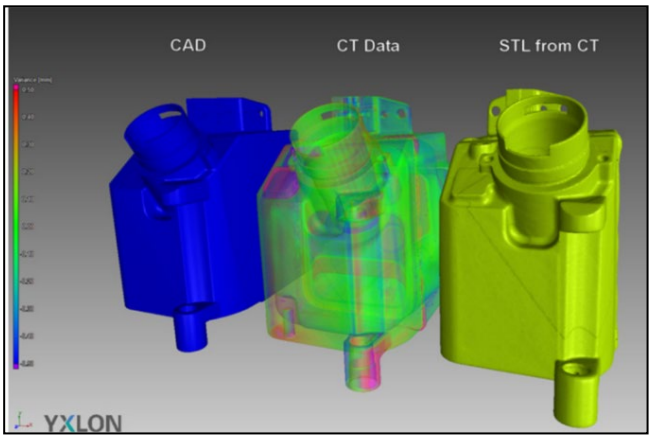
Eurofins Qualitech AG
Accredited test centre

Tel. +41 62 889 69 69
qualitech@qualitech.ch | www.eurofins-qualitech.ch

Headquarters:
Almuesenacherstrasse 3, 5506 Mägenwil

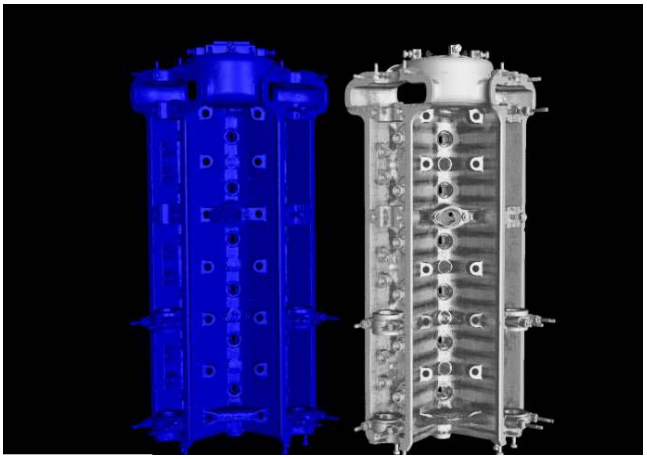
Subsidiaries:
8404 Winterthur | 9423 Altenrhein | 2555 Brügg

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.



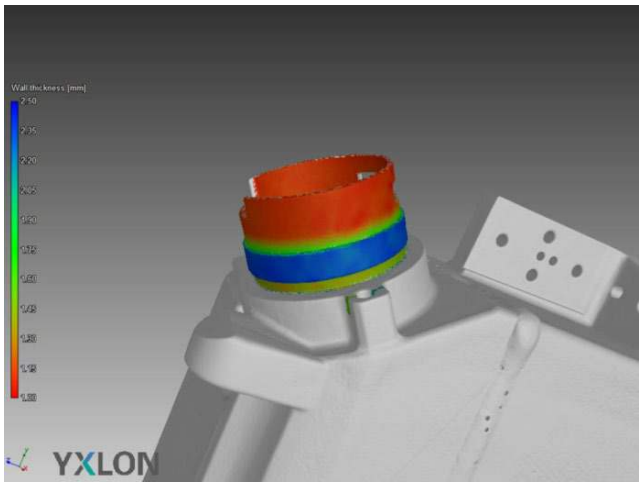
Target-performance comparison of housings. left: CAD file; right: STL file from CT scan; centre: comparison of the two surfaces with colour-coded representation of the deviation.

Reverse engineering
Do you have to reproduce a component and do not have any technical drawings or CAD files? CT enables you to graphically represent your component, including internal structures, in a variety of ways. The powerful X-ray tube allows for example the radiography of aluminium up to a cumulated wall thickness of 300 mm.


Scan of a cylinder head for an after-casting. Right: Scanned cylinder head; left: STL file for the production of the casting mould.

Wall Thickness Analysis
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. Thus, critical areas can be highlighted in colour and can be found quickly and easily.

Wall thickness analysis. Color-coded representation of the wall thickness of a



component.

Technical data sheet of the computer tomograph
As a service provider, we want to cover the widest possible range of applications for different materials, component sizes and wall thicknesses. With the modular system we can test very large components, such as cast cylinder heads or housings up to a theoretical height of 2 m and a diameter of approx. 880 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.

	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
Radiolucent wall thickness:			
Steel:	ca. 7 mm	ca. 90 mm	ca. 90 mm
Aluminium:	ca. 100 mm	ca. 300 mm	ca. 300 mm
Ni-Basis:	ca. 4 mm	ca. 50 mm	ca. 50 mm

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

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

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