

Evolution and potential of X-ray Computed Tomography for applications in industry and science

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Abstract

The demand for industrial computed tomography has increased strongly in recent years. Before, CT was applied rarely as a method for non-destructive testing. In most cases section images were analyzed to define the exact location of a defect in material. With today's advanced computers and the possibilities of 3D imaging of CT data, a wide field of interesting opportunities has opened. Nowadays, industrial computed tomography is not only used for non-destructive testing but also and even more important for metrology. Different kind of industrial computer tomographs are available on the market. To be able to penetrate large parts or samples of high X-ray absorbing materials, in general 450 kV X-ray tubes or in some cases linear accelerators are used. State-of-the-art CT scanners using high X-ray energy are equipped with line detectors and collimators to avoid scattering as much as possible. These so-called 2D-CT systems can obtain only one single slice at a time. For a fully 3D data acquisition multiple contiguous slices have to be scanned. This process is time consuming and expensive. During a recently finished European research project, in collaboration with the University of Bologna, a prototype of a new generation of CT scanners has been installed at Empa. The new tomograph uses a large area detector. A volume can be scanned with only one rotation of the sample. The contribution gives an overview of the evolution of industrial X-ray CT and its potential for applications in industry and science. It describes problems of data acquisition, especially when using high X-ray energies and presents also first results with the new research prototype.