Dear Sir or Madam,

Different material processing techniques induce various kinds of internal defects in the form of shrinkages, porosity and inclusions. There is a strong influence of such processing characteristics on quasistatic and cyclic properties of materials. Characterization of internal defects is largely being carried out using 2D destructive technique through material surface investigations which may not be the true representation of defect distribution throughout the volume. In the recent era of material performance optimization, 3D investigation of such defects is inevitable.

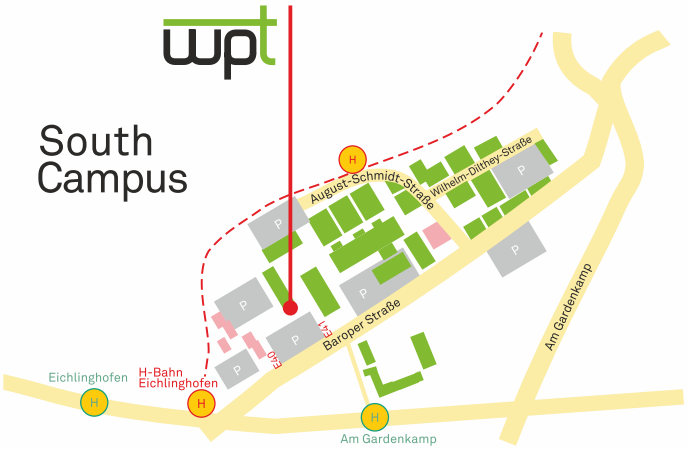
X-ray micro-computed tomography characterizes the internal defects in 3D manner in terms of morphological characteristics, i.e. size, shape, location, distribution function and volume density of material. As a non-destructive technique, quality control of the mechanical components can be performed to meet qualification criteria. Moreover, under the application of static loads, the growth rate of internal defects and damage behaviour of material can be standardized.

Materials Test Engineering at TU Dortmund University has the expertise for 3D characterization of internal material defects; and the successive development of damage during tension and compression loading is investigated using a process- and product-optimized in-situ testing system.

With best regards,

Yours

Prof. Dr. Frank Walther



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technische universität dortmund

Quality Control by X-Ray Computed Tomography

wpt

www.wpt-info.de

Faculty of Mechanical Engineering

Event detection

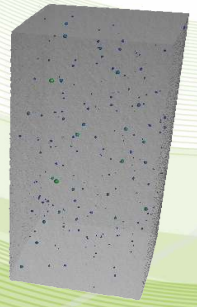
Test equipment and parameters

- MicroFocus X-ray source
- UltraFocus reflection target
- Voltage: 160 kV, Power: 60 W
- Real-time detector: 1024 x 1024 pixels
- 5-axis specimen manipulator
- Axis travel: 200 mm (X), 300 mm (Y), 610 mm (Z)
- System shield: 1 µSv/h

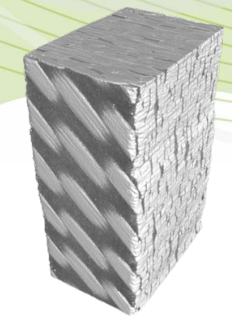
Project examples

Aluminium

Titanium aluminide



Glass fiber reinforced polyurethane (PU-GF)

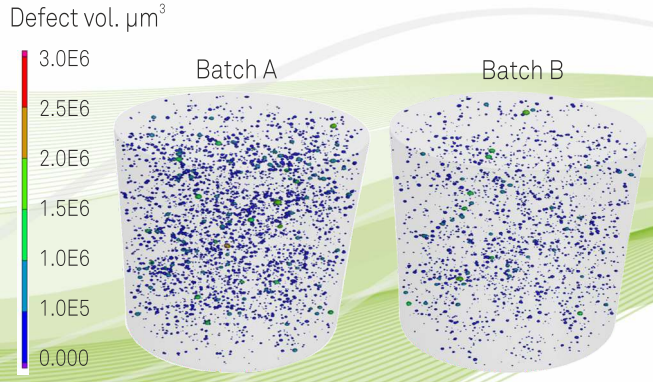


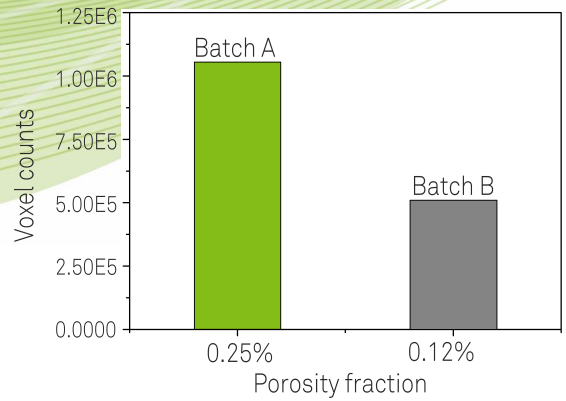
Concrete

Analysis

Goals

- Non-destructive quality control
- Defect analysis
- Porosity analysis, i.e. size, shape, location
- Statistical porosity distribution
- Reverse engineering calculation
- Surface roughness measurements of internal structures
- Crack identification and In-situ measurements





In-situ testing

Test equipment

- Load cell: 5 kN
- Testing under imposed temperature
- Temperature range: -20 to +160 °C

Goals

- Porosity deformation analysis
- Damage development under loading
- Finite element-based stress concentration calculation