Method for the evaluation of automatic porosity detection for CT-data

J. Rosc, D. Habe, G. Geier, T. Pabel
Austrian Foundry Research Institute, Leoben, Austria
P. Schumacher
Chair of Casting Research, University of Leoben, Leoben, Austria

TASK

The evaluation of porosities within given component parts is a fundamental task in many industrial sectors. Very often such investigations need to be accomplished in a non-destructive way. Computed tomography provides the great advantage of accessing the full three-dimensional properties of the object under examination with non-destructive means.

The objective of this work is to present an innovative method to investigate the exactness of automatic porosity detection using well-defined reference bodies. This can be a great benefit for the experienced investigator to design a CT-scan appropriate to the particular task (expected pore sizes, required resolution, grey value contrast,…) or to estimate the accuracy of the data obtained from the semi-automatic porosity detections.

REALIZATION

Reference body: seven spheres located within a ring manufactured in high-precision. This enables the calculation of the exact porosity and with this an accurate reference for the porosity detection.

CT-Scans: varying voxel-sizes, varying grey-value contrast

Metallography: traditional method, reference for CT, 4 microsections

General: CT-scans realized with varying voxel-sizes, varying grey value contrast

Figure 1: Volume porosity detected from CT-datasets with varying scan parameters.

Figure 2: a) microsection of plane 3, b) porosity detection on plane 3, c) plane 3 from CT-dataset with 50 µm voxel-size, d) plane 3 from CT-dataset with 200 µm voxel-size.

Figure 3: Comparison of metallographic evaluation, theoretical values and porosity detections from CT-data of four planes of the reference body.