Priv.-Doz. Dr. Beate OSWALD-TRANTA
Mining University of Leoben
Chair for Automation
Peter-Tunner-Straße 27
A-8700 Leoben
Austria
e-mail: beate.oswald@unileoben.ac.at

Keynote-1

ABSTRACT

PRESENTATION

PAPER

Beate Oswald-Tranta received her MS in electrical engineering. She made her PhD at the area of solid state physics, modelling and measuring of semiconductor structures for infrared detection. Since 2003 she works at the Chair for Automation of the Mining University of Leoben in Leoben, Austria. Her research fields are automated non-destructive testing, thermography with inductive and with flash excitation and image processing.

INDUCTIVE THERMOGRAPHY - A NON-DESTRUCTIVE INSPECTION TECHNIQUE

Inductive thermography is an excellent inspection technique for detecting defects in metallic materials. An inductor is used to induce eddy currents in a workpiece and an infrared (IR) camera records the surface temperature. Due to the ohmic resistance of the material, Joule heat is generated in the workpiece. Defects, such as cracks, affect both the eddy current distribution and the heat flow, making the defects visible in the IR images.

The technique has been greatly improved over the last few decades. Through the development of different inductors, from water-cooled copper coils with different geometries to air-cooled inductors with ferrite cores. Finite element simulations assist in the design of the inductors to achieve the most optimal eddy current induction to make defects visible.

Comparison with finite element simulations and with results from other techniques such as computer tomography shows that the variation in surface temperature over time also depends on the depth and orientation of the crack below the surface. This gives a great opportunity to use this technique not only for crack detection but also for crack characterisation.

Several processing techniques have been developed to reduce the measurement noise and the influence of negative effects such as inhomogeneous heating or inhomogeneous surface properties. The most commonly used method is the pixel-wise Fourier transform, which generates a phase image from the IR sequence.

The method is non-contact, fast and, as well as the inspection procedure and the evaluation can be carried out fully automatically. The presentation will give an overview of this method and its path from laboratory setup to industrial applications.