PROFILE

ITW e.V. Chemnitz
Institute for Innovative Technologies

Automation technology

- Control technology, robotics, handling

Measuring and test technology

- Industrial image processing
- Micro-measurement technology
- Optical solutions for detecting defects in solar cells
- Inline measuring and test technology for modern photovoltaic wafer, cell and module technology

Production technology

- Laser technology
- Water jet-guided laser technologies

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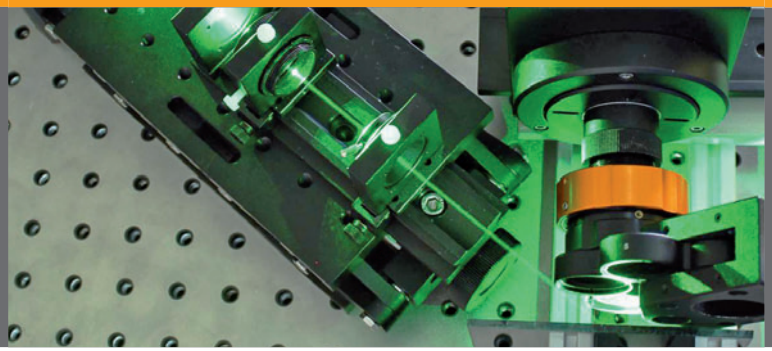
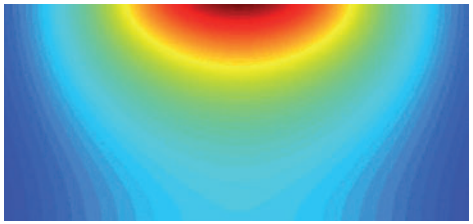
PRODUCTS

Inline measuring and test solutions and laser-based technologies for the production of cutting edge and future PV products with cost-optimised factory modules



Increasing wafer strength and fault detection

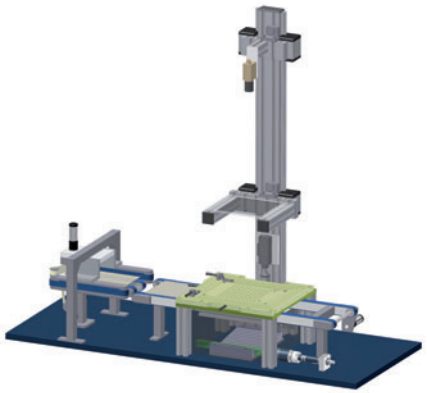
Developing non-destructive short-course thermal treatment for increased strength. We simulate energy input to classify and test compatible radiation sources for fixing defects under real world conditions. We also test spatially resolved test procedures. After categorising wafer defects which lead to breakage, we analyse possible sensor principles and incorporate them into a camera-based solution.



Simulation of the energy input into a silicon wafer

Measuring and test technology for MWT cell production

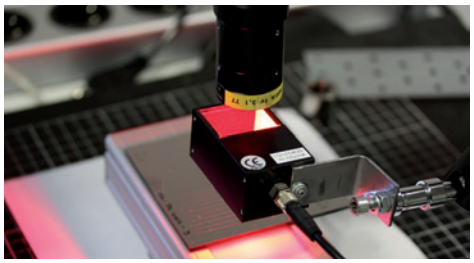
Development of inline measurement solutions in industrial MWT cell production in order to manage production processes along the entire process chain and guarantee a consistently high level of product quality. A focal point of our research is the contactless detection of geometrical features (ridges, contact metallization, holes, isolation grooves) of partially processed silicon wafers using optical measurement processes.



Wafer holes test concept

Test technology for thin-film solar module production

We work with tests involving measurement technology and automated test concepts for quick inline quality control of isolation grooves in the laser scribing of thin film solar substrates. We also focus on selecting and qualifying sensor principles and measurement equipment for testing whether laminated solar modules are resistant to moisture.



Camera-based groove testing

INNOVATIONS

- **Lower breakage rates and higher throughput**
- **New technologies and economical equipment for current and future high-efficiency cell and module concepts**
- **Inline quality monitoring for optimum process reliability**

Our primary objective is developing inline repair technology to improve resistance at every stage of the production chain for crystalline wafers and cells. Our secondary objective is developing a combined BV solution for spatially resolved detection of material defects that reduce the strength of thin wafers. This is the basis for visualising and evaluating components at various stages of production in an efficient manner. We use detectors with enhanced spectral sensitivity, high performance excitation sources and optical filter systems.

Industrial and inline-capable measurement system for simultaneous measurement of up to 100 holes on a silicon wafer with image processing technology. The diameter and geometry of each borehole is tested, along with its position on the wafer. The minimum detectable hole diameter is approx. 50 µm. The measurement cycle is less than one second.

The innovations we are trying to develop will culminate in an economically viable inline test solution for monitoring the quality of grooves on scribed solar substrates in the immediate vicinity of the laser in specific cycles. A prototype will be developed to demonstrate the functionality and practical suitability of the innovative solution. We are also developing an industrial concept for the non-destructive testing of laminates for resistance to moisture.