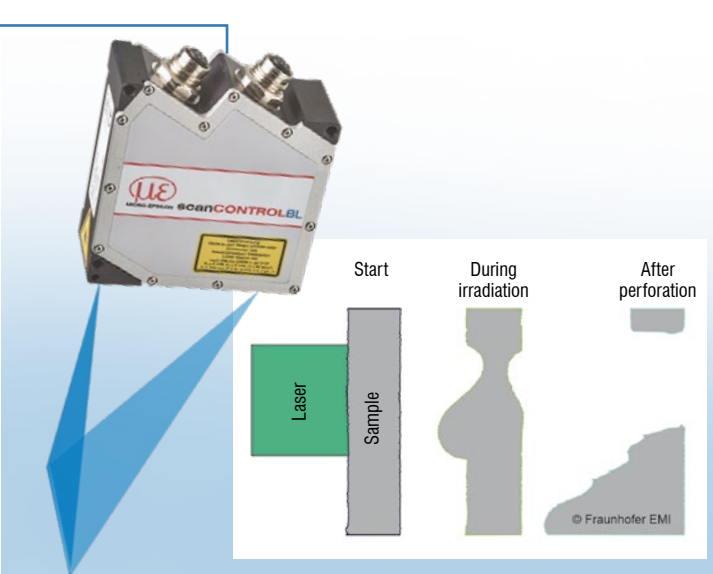
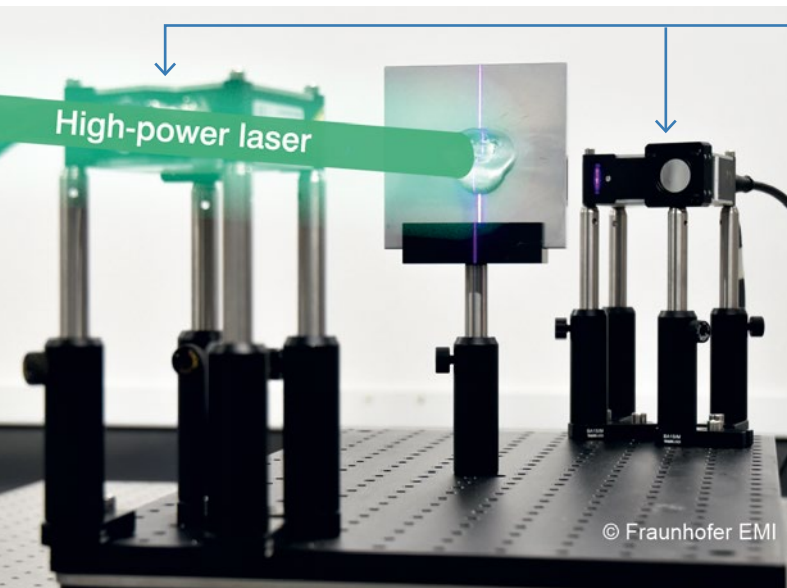




Measurement of surface changes by laser irradiation (700°C)

Fraunhofer EMI researches the effect of laser beams on different surfaces. For this purpose, various samples are irradiated with a high-power laser that packs a punch of several kilowatts. Meanwhile, two scanCONTROL laser profile scanners from Micro-Epsilon measure the exact change in surface geometry.

Based on the measurement results, new insights can be gained into how different process parameters, e.g., laser power, laser spot size, and air flows, influence the laser-matter interaction process.

The scanCONTROL 2900-100/BL laser profile scanners used operate with a blue laser. This allows for precise measurement of hot and molten aluminum. In order to provide a sufficient picture of all relevant information, scanners with a large measuring range of 100 mm are used at high profile and distance resolution. Another important parameter is a high profile rate, so that the dynamic process can also be accounted for. In addition, a large working range of up to 300 mm is also required to protect the sensor from process gas flames.

Thanks to individual SDK integration, the laser profile scanners are integrated into the laboratory's existing control system. As a result, individual measurement procedures for different applications can be implemented in a simple manner. The scanners mostly operate in pulsed mode with asynchronous detection to prevent interactions between the laser beams.

Requirements for the measurement system

- Reliable measurements on different materials
- Reliable measurements during simultaneous high-power laser irradiation
- Raw data output
- Large measurement distance to protect against process gas flames
- Large measuring range in X and Z direction

Ambient conditions

- Test laboratory with increasing sample temperature up to melting point (approx. 700°C)

System design

- Sensor: 2x LLT2900-100/BL
- Evaluation by customer via PC with Python for control and data recording and post-processing of data

Advantages

- Non-contact in-situ measurement of the sample surface during laser processing
- Highly accurate monitoring of the melting process without influencing the process
- Compact design and low weight make integration easier
- Large measuring range of 100 mm with excellent resolution in X and Z for precise surface detection

You can also find more information
in the Fraunhofer MDPI article:
www.doi.org/10.3390/ma15113743