



## IN-LINE MEASUREMENT TECHNOLOGY FOR LASER MICROSTRUCTURING

### Task

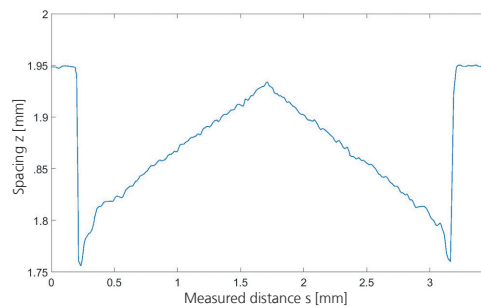
For the laser microstructuring of metallic surfaces, the processing and the evaluation of the production results are typically carried out on two different machines. After processing on a laser microstructuring system, the workpieces are examined for quality assurance, for example, using a white light interferometer or a laser scanning microscope. However, investigations with such laboratory measurement methods are time-consuming and not suitable for a 100 percent level of control.

### Method

For such a 100 percent level of control, there are measurement methods that can be integrated into laser microstructuring systems. Absolute-measuring interferometers are particularly suitable for this task since their measuring radiation can be guided coaxially through the existing processing optics. The »bd-2« sensor developed at Fraunhofer ILT has a very high measuring accuracy at a measuring frequency in the range of several 10 kHz so that microstructures of the order of 10  $\mu\text{m}$  up to several 100  $\mu\text{m}$  can be measured reliably and quickly.

### Results

In test series, the compact, robust measuring heads of »bd-2« sensors have successfully measured various surfaces structured with laser radiation. The measuring distances were between 100 mm and 300 mm. Due to the large spectral width of the



radiation source used, the method is insensitive to disturbance from the speckle effect. Ambient light and even process lights do not impair the measurements so that quality control can even take place in-line, i.e. during the laser microstructuring process.

### Applications

The in-line measurements will be used not only for 100 percent quality control, but also for increasing product quality. Thus, machining operations can be stopped in a targeted manner when the predetermined ablation depth has been reached, or corrective actions can be carried out before the workpiece is removed from the laser microstructuring plant.

### Contact

Dr. Stefan Hölter MBA  
Telephone +49 241 8906-436  
stefan.hoelters@ilt.fraunhofer.de

Prof. Reinhard Noll  
Telephone +49 241 8906-138  
reinhard.noll@ilt.fraunhofer.de

2 »bd-2« -sensor with connected measuring head; measuring head size:  $L \times \varnothing = 55 \text{ mm} \times 18 \text{ mm}$ ,  $m = 40 \text{ g}$ .