

# MEASUREMENT OF ONLINE THICKNESS USING AN INTE-GRATED INTERFEROMETER

#### Task

Inner coatings are commonly used for reconditioning highquality components such as bearings, housings or cylinders, which, for example, are commonly used in the oil and gas industry. In order to ensure the coating quality, and in particular to monitor the applied layer height during the process, Fraunhofer ILT has developed an online measuring method while also taking the restricted accessibility for the coating thickness measurement into consideration.

## Method

As a solution, an absolute measuring interferometer has been integrated in the optical beam path of the internal coating optics. The interferometer emits a beam which is divided by a beam splitter into a reference beam and a measurement beam. Before the coating process, both partial beams are calibrated to one another so that their path lengths are equal. Measuring beam and processing beam are superimposed; they run coaxially to each another and meet at a point on the workpiece. During the coating process, the measuring beam reflected back from the workpiece is superimposed with the reference beam in the interferometer. The resulting difference between the optical paths of measurement beam and the reference beam is then used for determining layer thickness.

#### Result

The successful integration of an absolute measuring interferometer makes it possible to directly measure coating thickness during the coating process without destroying the sample. To verify the accuracy of measurement, Fraunhofer ILT evaluated six coated layers with different heights under a light microscope. The maximum deviation of the film thickness between the interferometry measurement and light microscopic evaluation is approximately 2.5 percent.

### Applications

With this online measurement technology, the layer thickness of the coating process can be monitored, thus improving the coating quality substantially. In principle, the inner coating optics can be used for all applications in which internal surfaces need to be coated.

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3 Experimental setup.4 Measurement results.