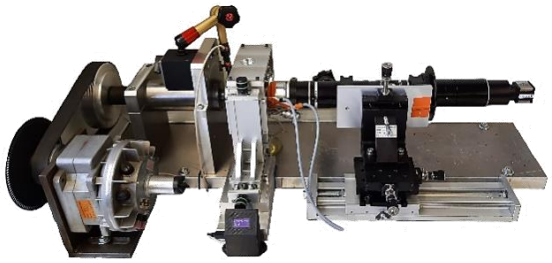
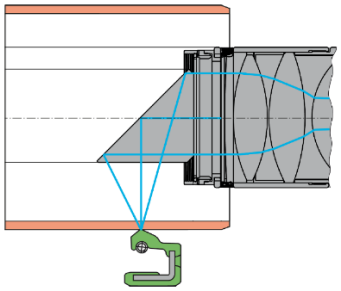
Test Rig for Visual Flow Investigations

University of Stuttgart
Institute of Machine Components

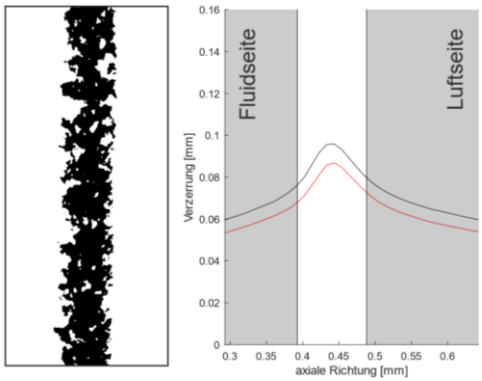
IMA-TechSheet #101070 V3



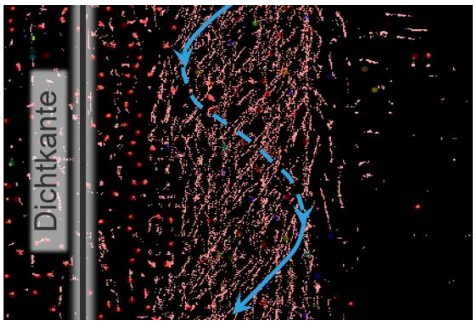
(1) Overview of the test rig



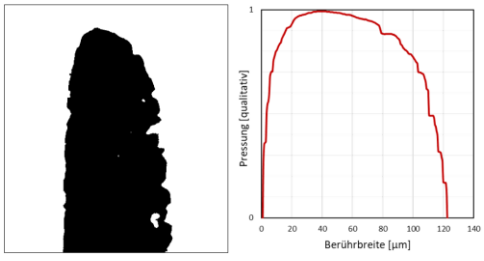
(2) Section through glass shaft and lens



(3) Contact and distortion of the sealing edge



(4) Fluid flow visualized with the PTV



(5) Measured qualitative pressure distribution

Description:

- Test rig for visual examination of the flow under the sealing edge of rotary shaft seals and PTFE lip seals
- The sealing edge is observed through a hollow glass shaft. Due to the radial view from the inside of the shaft, the sealing contact can be examined
- A zoom lens allows a wide range of magnifications
- It is possible to view structures with a size less than 1µm with the given resolutions
- The fluid flow in the area of the sealing edge can be visualized by adding particles (copper or fluorescent particles) to the fluid
- A cold light source with focused waveguides or alternatively a coaxial illumination is used to illuminate the region of interest

Technical Data:

Rotational Speed:		0,1 - 200	1/min
Shaft diameter		80	mm
Image Section	min.	0,78 x 0,44	mm
	max.	5,33 x 3,08	mm
Frame Rate		70	fps
Frame Rate CCD:		1000	fps

Available Test Methods:

- Measurement of the distortion on the sealing edge of rotary shaft seals
- Analyzation of the fluid flow in the area of the sealing edge with the Particle Image Velocimetry (PIV) or the Particle Tracking Velocimetry (PTV)
- Measurement of the qualitative pressure distribution with FTIR (Frustrated Total Internal Reflection)
- Observation of the wetting process
- Analyzation of the contact area with FTIR and determination of the contact area ratio
- Observation of an oscillating sealing edge