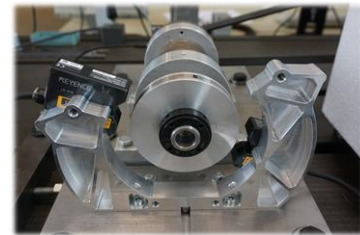
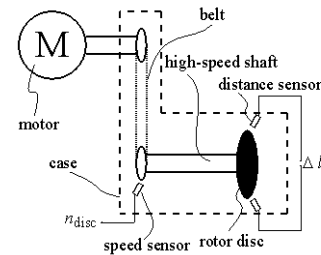


# Test Bench for High-Speed Rotor Deformation Measurements

## Technical data

- A servo drive (induction machine) is connected to high-speed shaft by belt
- Measurement system with high-resolution laser sensors allows in-situ determination of rotor deformation for high speeds
- Machine control and measurement signal recording implemented in LabView

Rated power	22 kW
Rated speed	6081 rpm
Rated speed	6,000 rpm
Rated power factor	0.89
Transmission ratio of belt	3.5
Slip of belt	1 .. 2 %
Rated speed of high-speed shaft	20,790 rpm



## Equipment

- 2 laser sensors for distance measurement: Keyence LK-G15 laser triangulations sensors
- National Instruments USB-6001 data acquisition device
- Infrared forked light barrier Vester PKI-30 for speed measurement

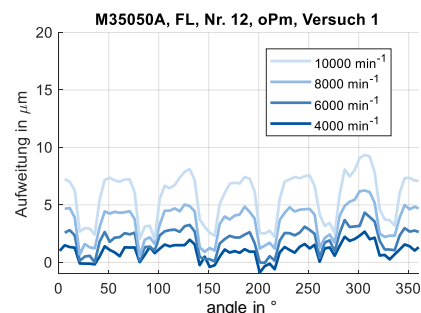


### Measurement capabilities of laser distance sensors

Measurement range	10 mm ± 1 mm
Repeat accuracy	0.01 μm
linearity	0.3 μm
Max. sampling frequency	50 kHz
Signal shape	Laser line 20 x 500 μm

## Current application/ Opportunities

- Measurement of distance with two laser sensors placed opposite to each other allows an in-situ determination of rotor deformation for high speeds
- Mechanical stress distribution inside rotor lamination can be determined using rotor deformation
- Study of influences on deformation:
  - Soft magnetic material grade
  - Magnet arrangement
  - Geometry
- In addition, specimens can be subjected to cyclic load
- Validation with static and dynamic mechanical simulations



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