

# Eddy current sensors

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# Overview

- Background
- Eddy current sensors
- Measurement errors in the sensors
- Ongoing research

# Background – Met4Wind

- Research project – Metrology for enhanced reliability and efficiency of wind energy systems
- The overall objective is to develop the measurements processes of mechanical parts used in wind energy systems

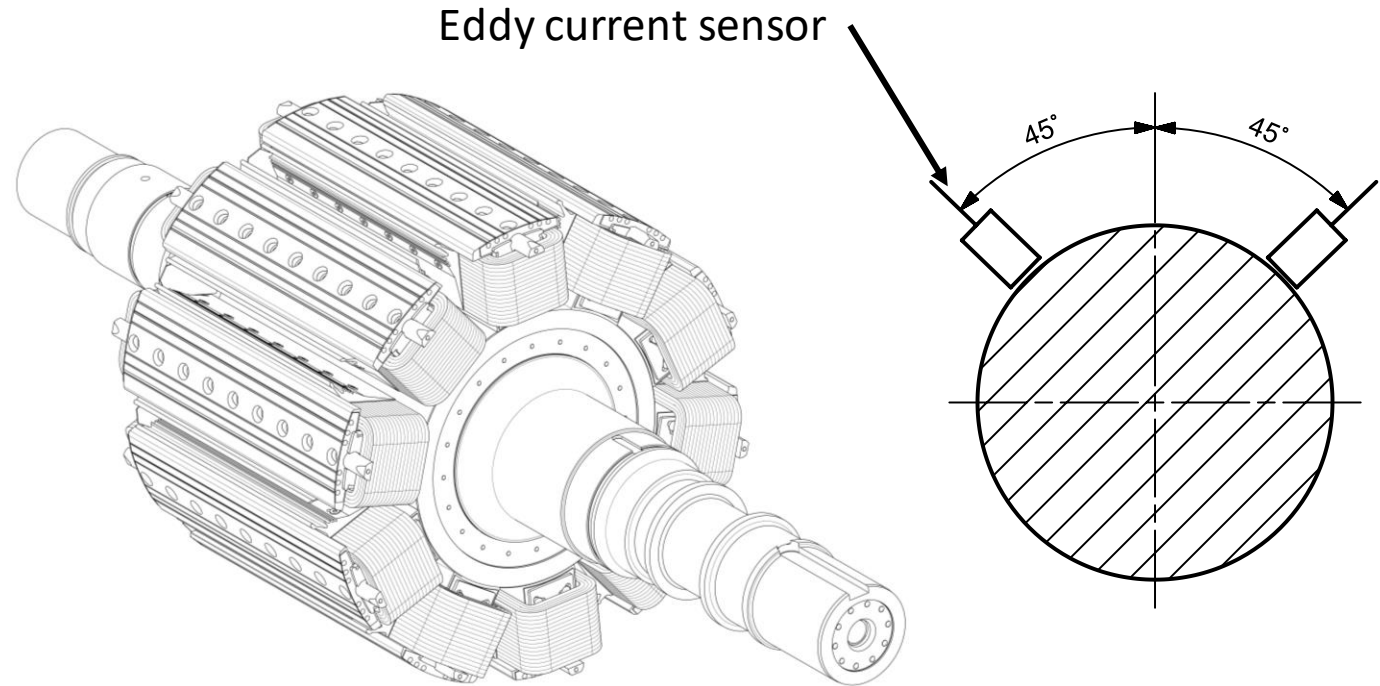


The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

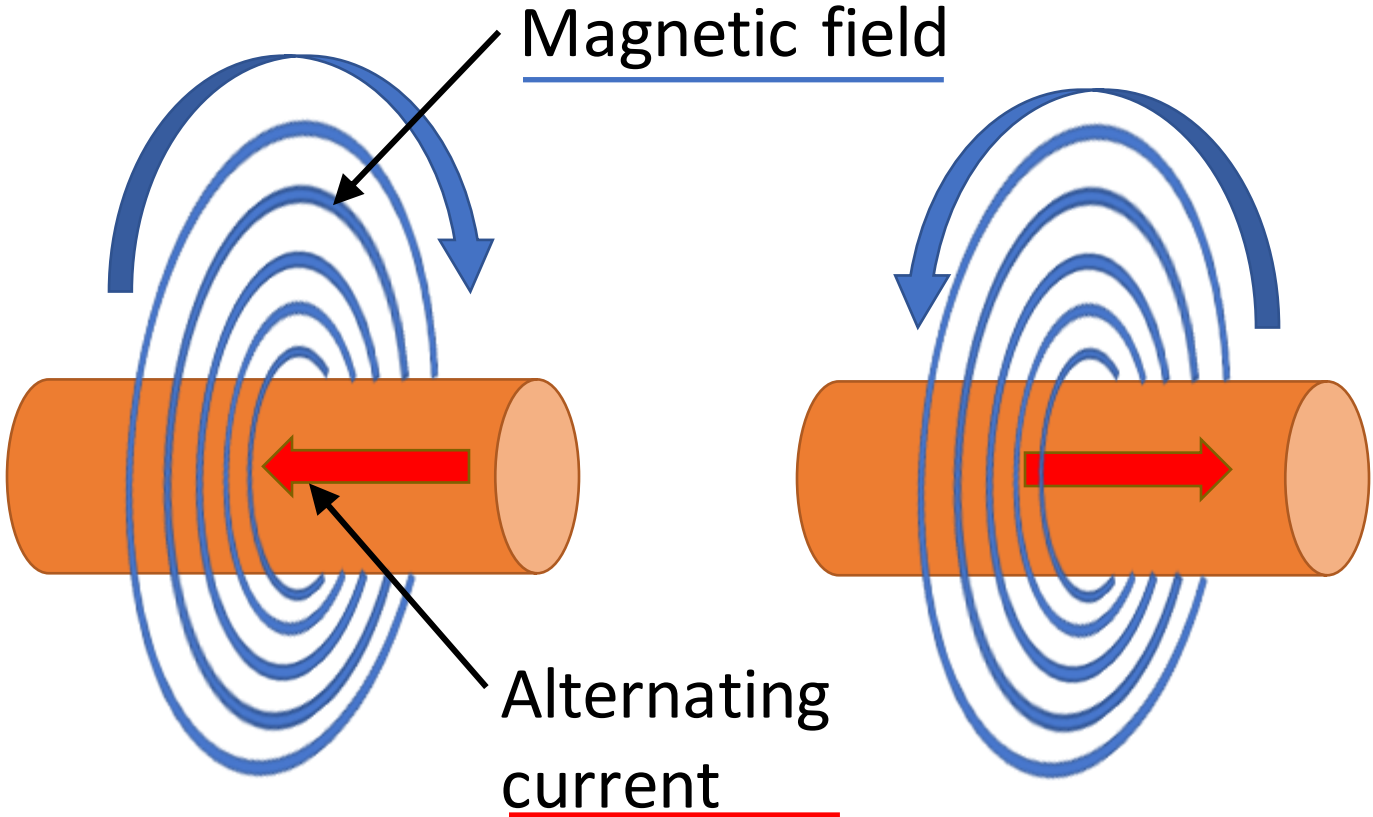
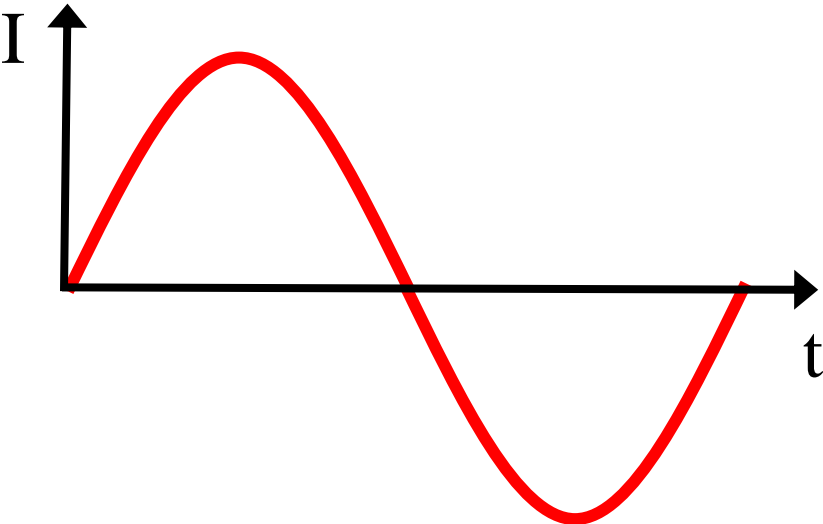


# Background – Eddy current sensors

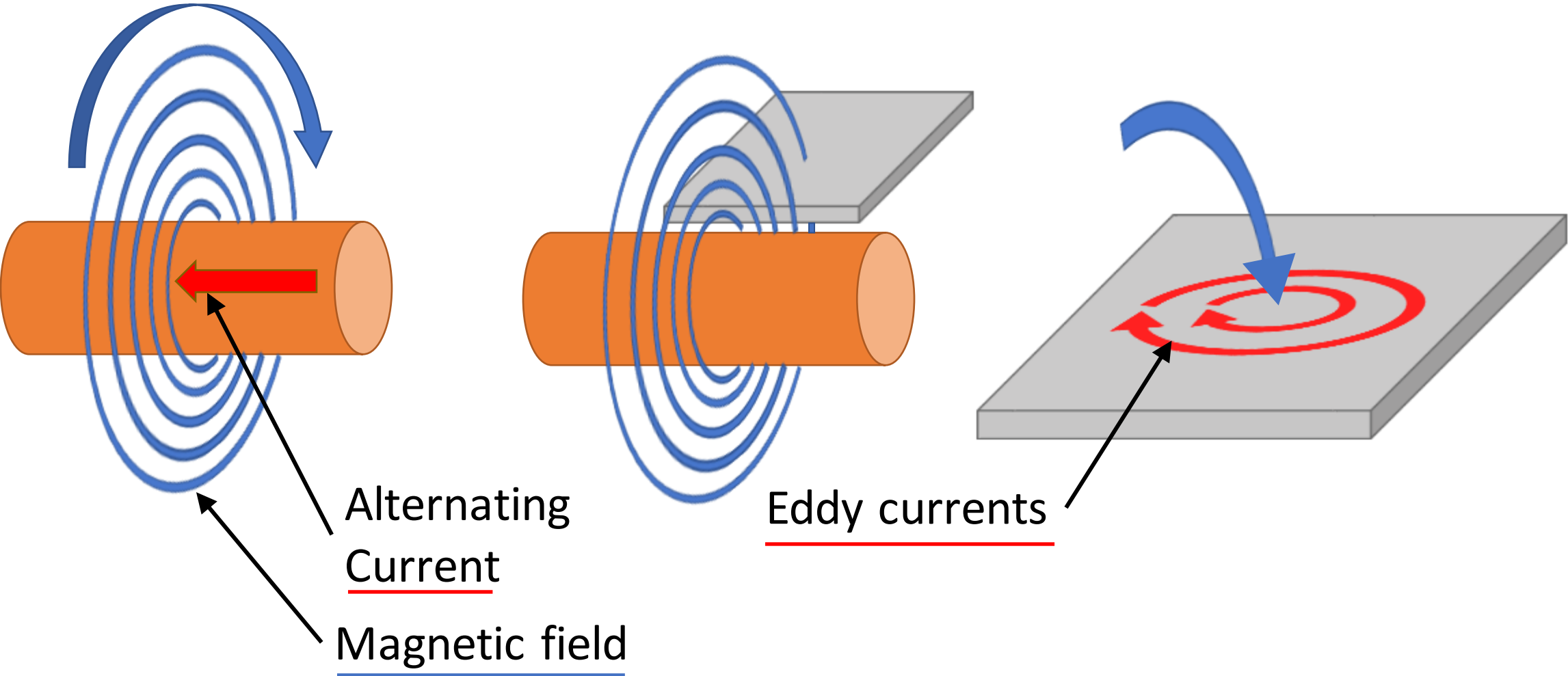
- Eddy current sensors are commonly used to measure vibrations in various rotating machines
- However, the measurement result is affected by the electrical properties of the target surface



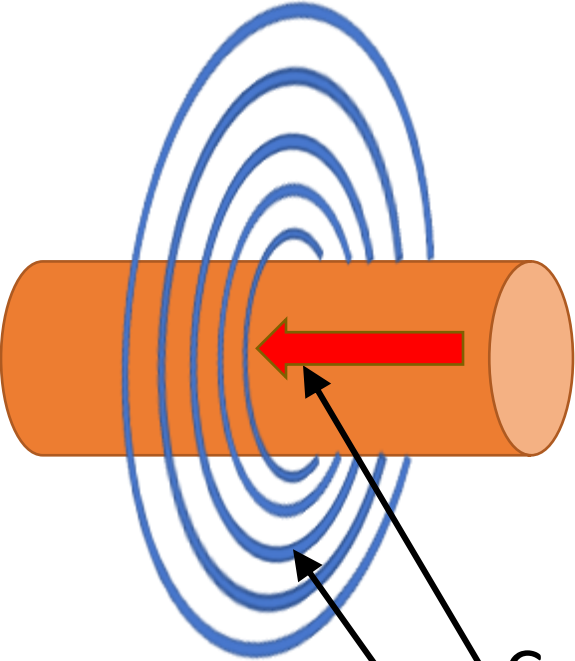
# Current and magnetic field



# Eddy currents

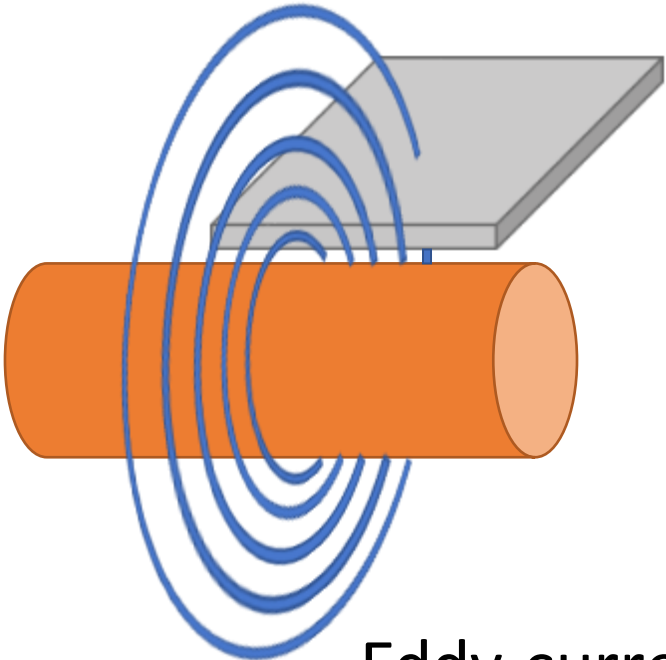


# Eddy currents

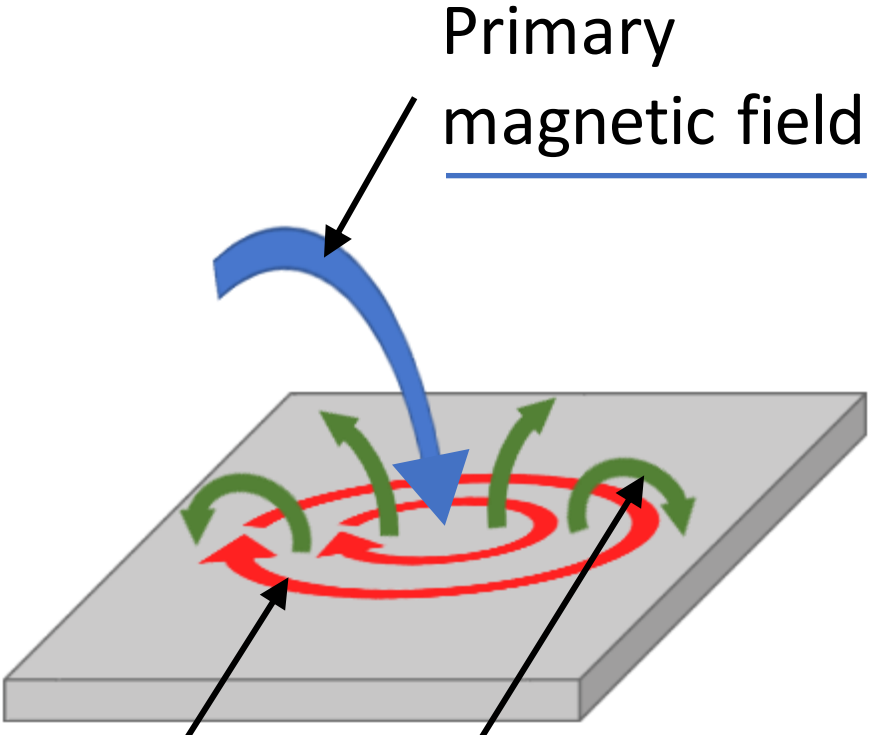


Current

Magnetic field



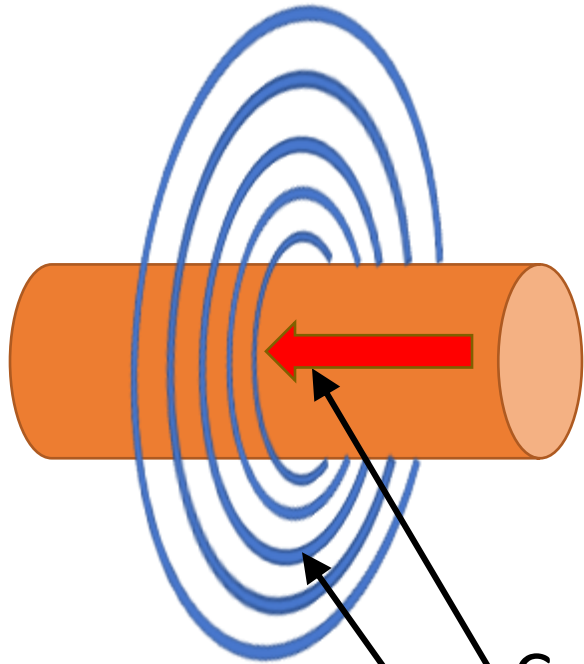
Eddy currents



Primary magnetic field

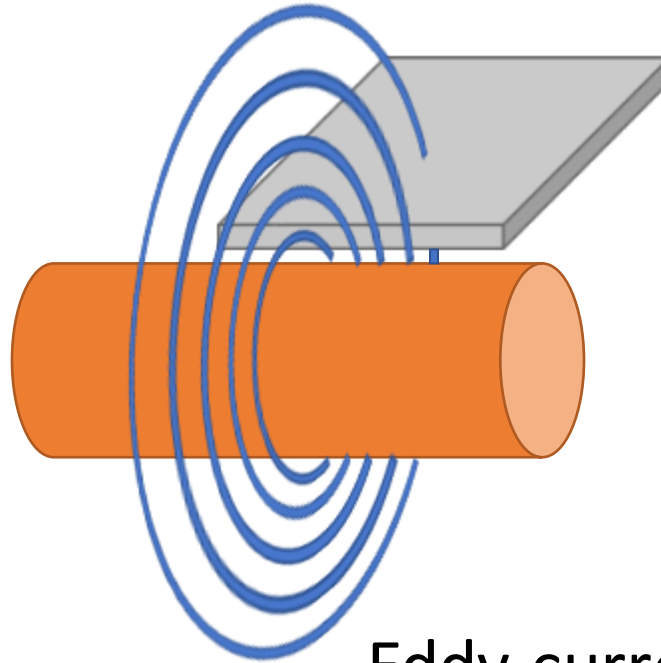
Secondary magnetic field

# Eddy currents

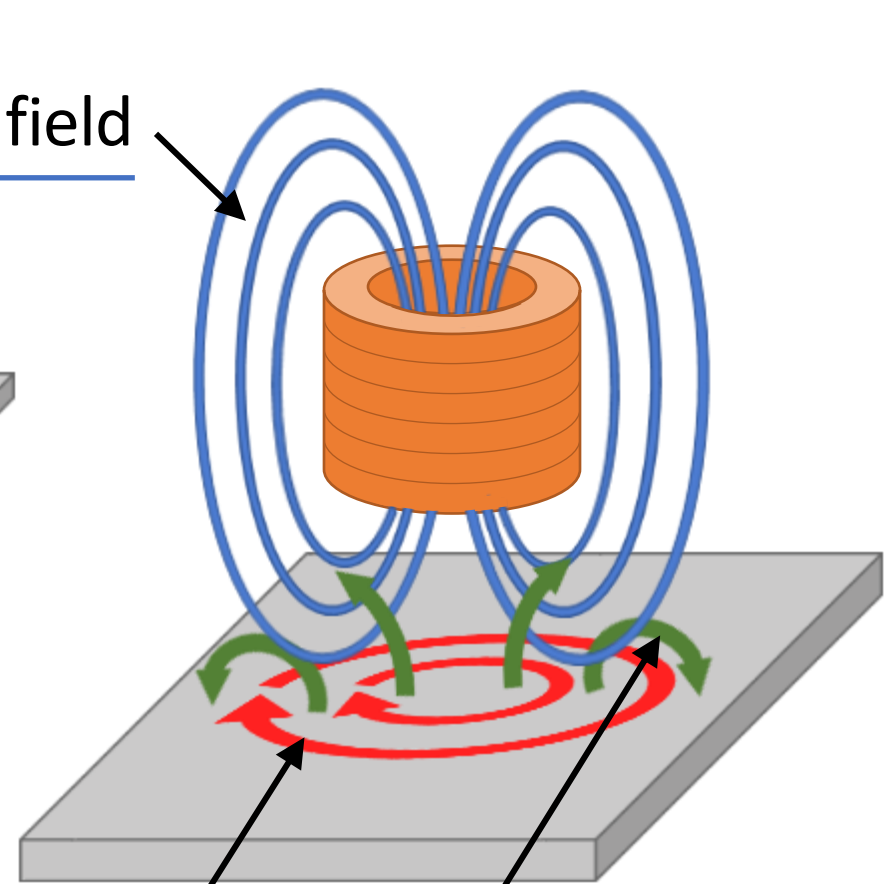


Current

Magnetic field



Eddy currents

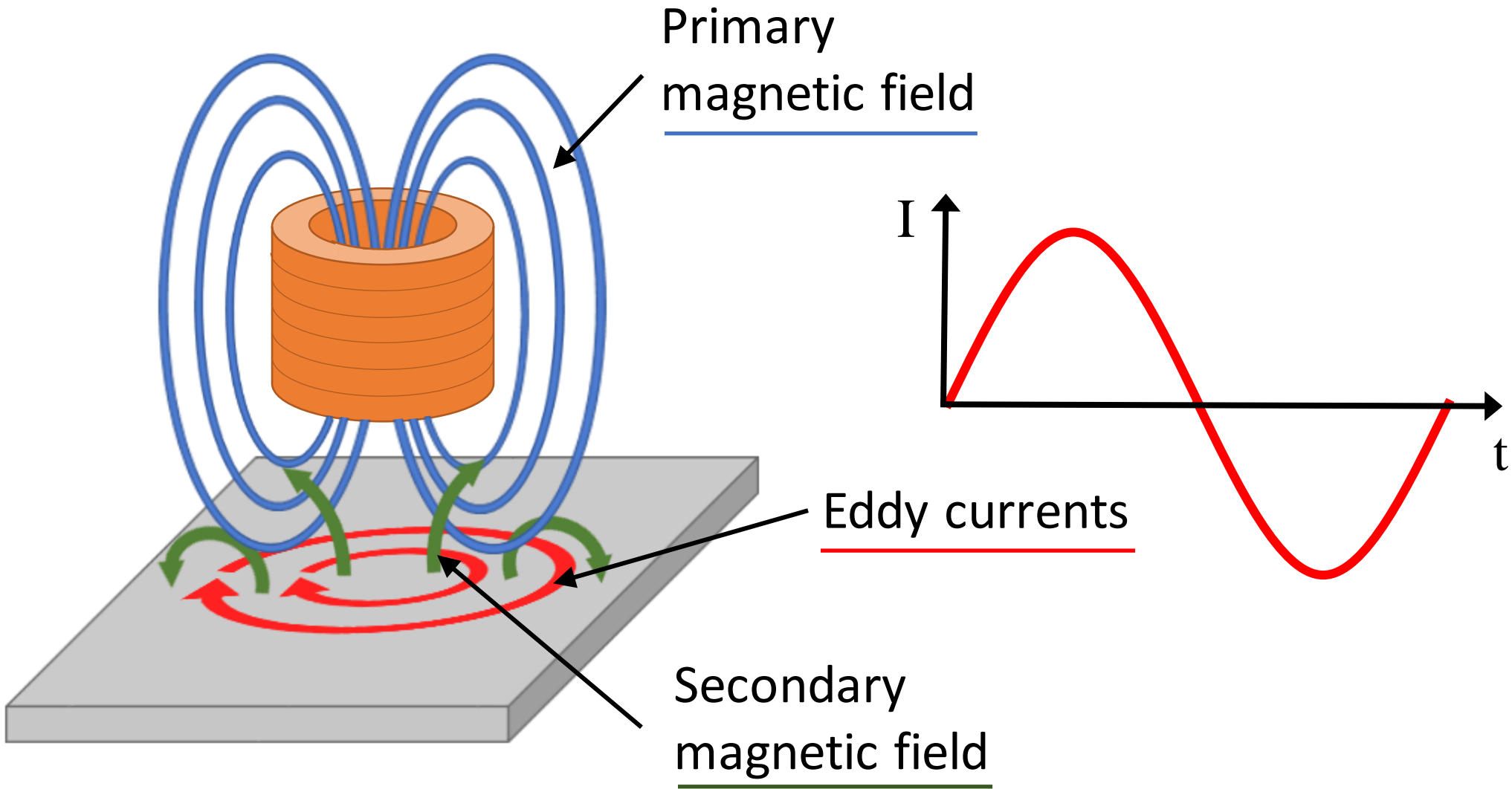


Primary magnetic field

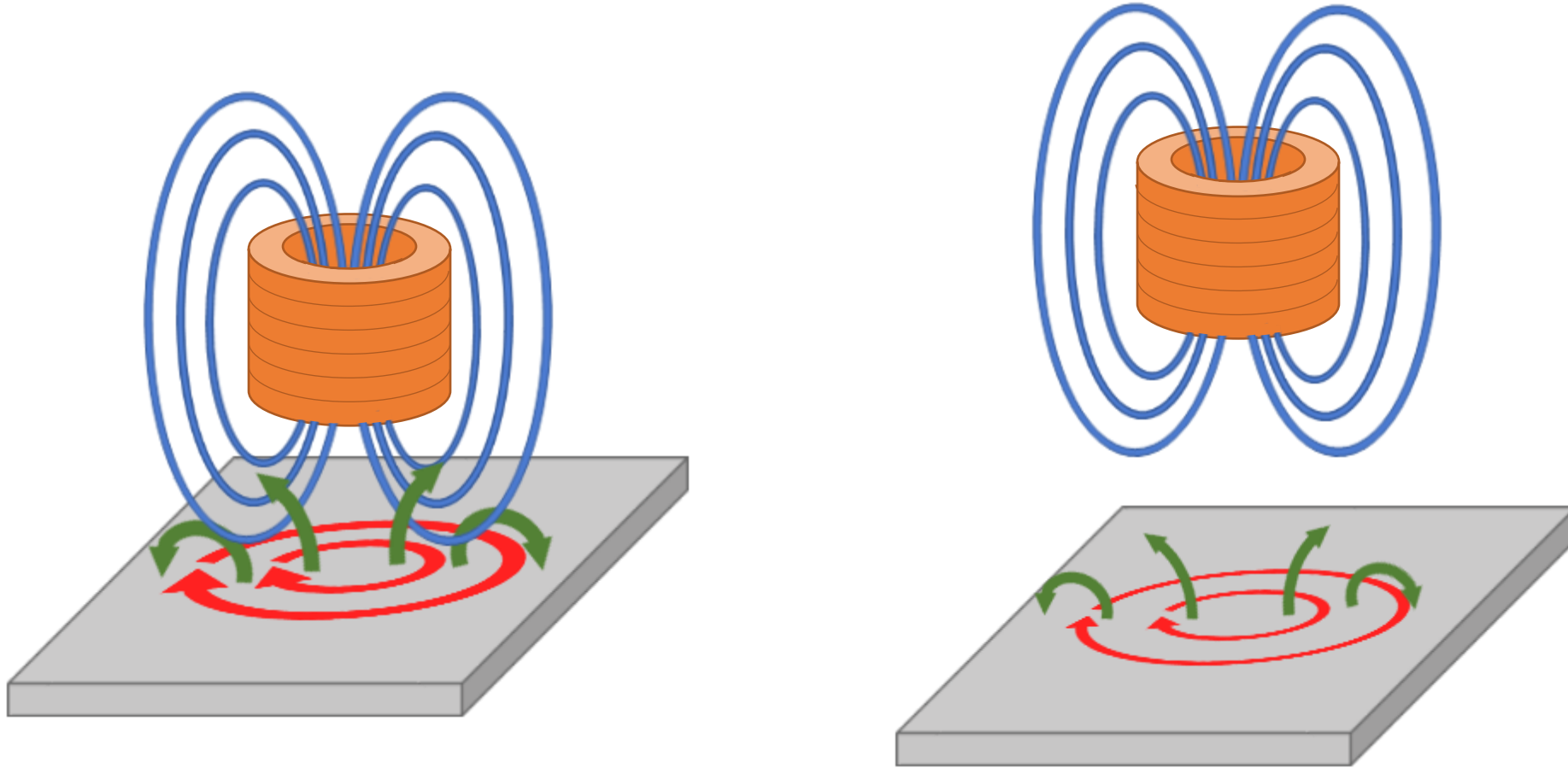
Secondary magnetic field



# Eddy current sensor



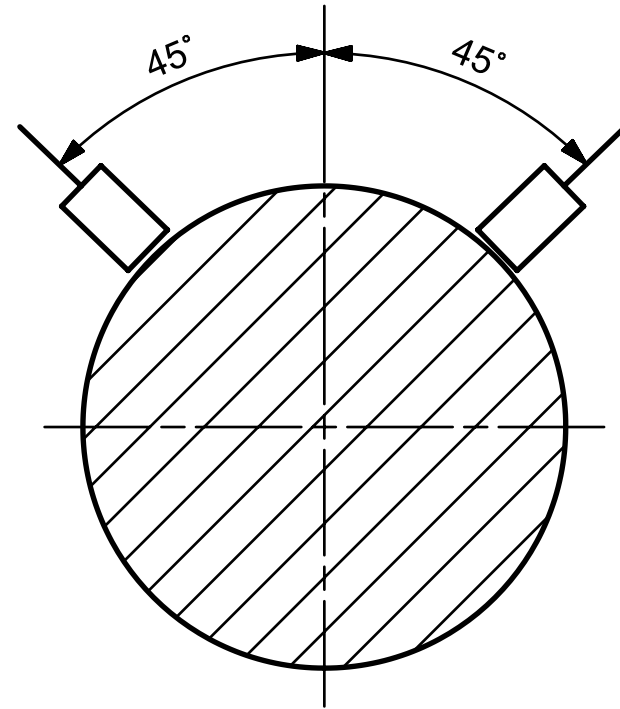
# Eddy current sensor - Displacement



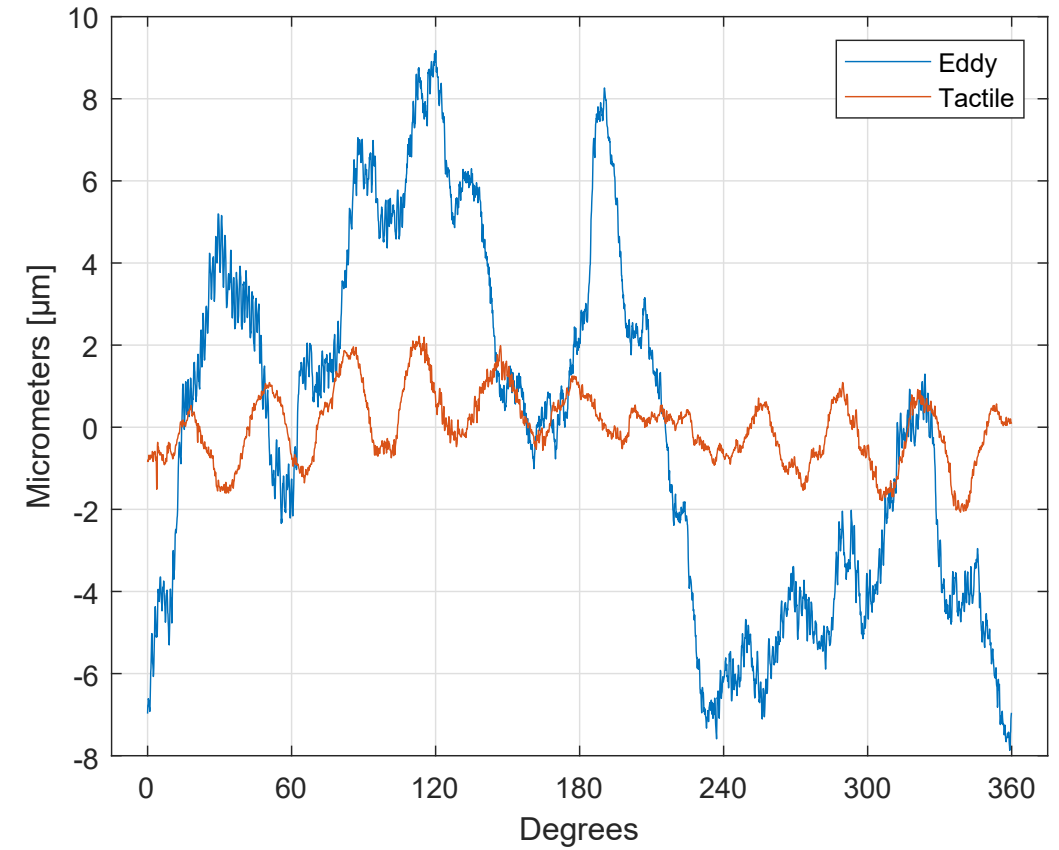
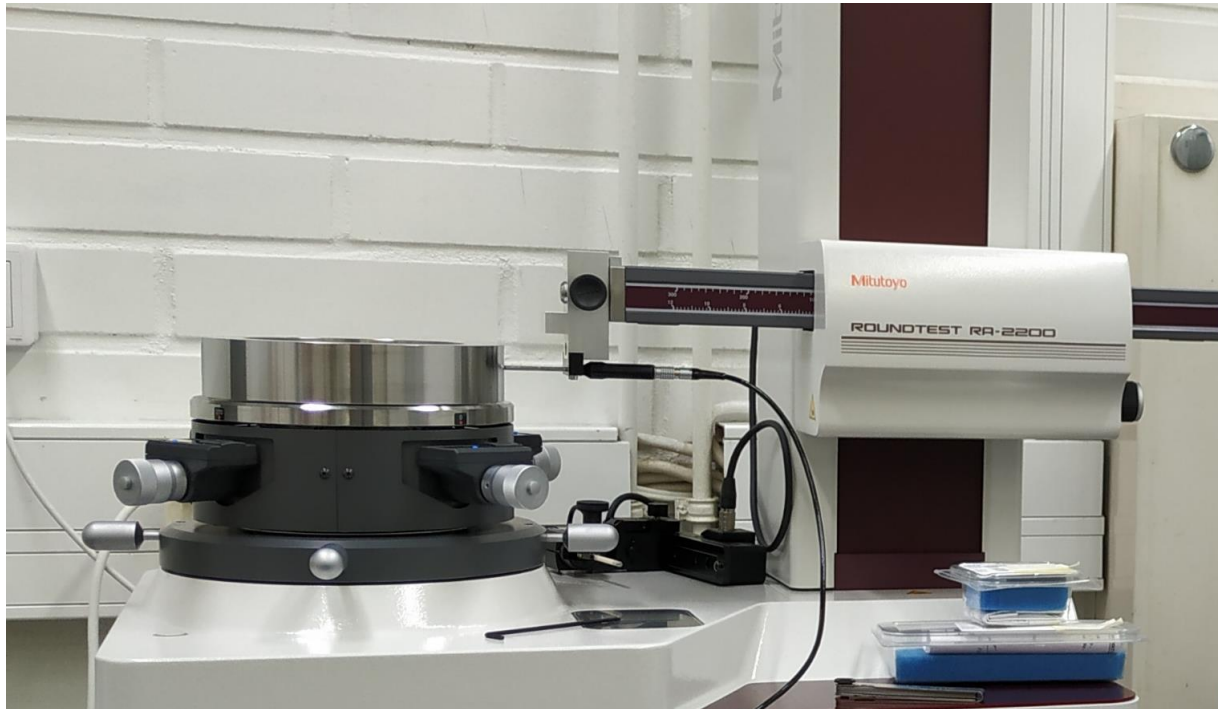
# Causes for measurement errors

The eddy current sensors are also sensitive to variations of electrical caused by

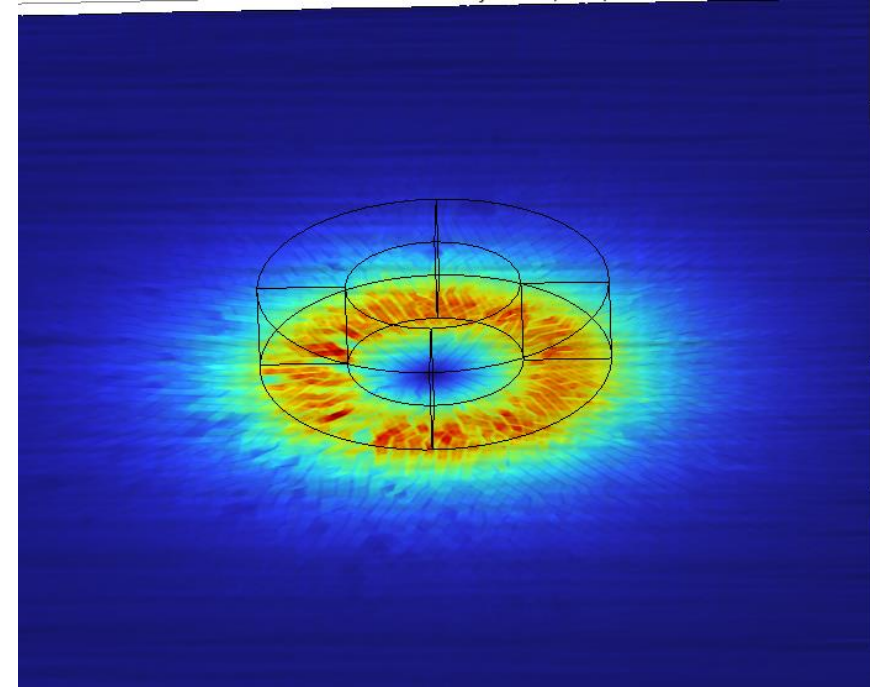
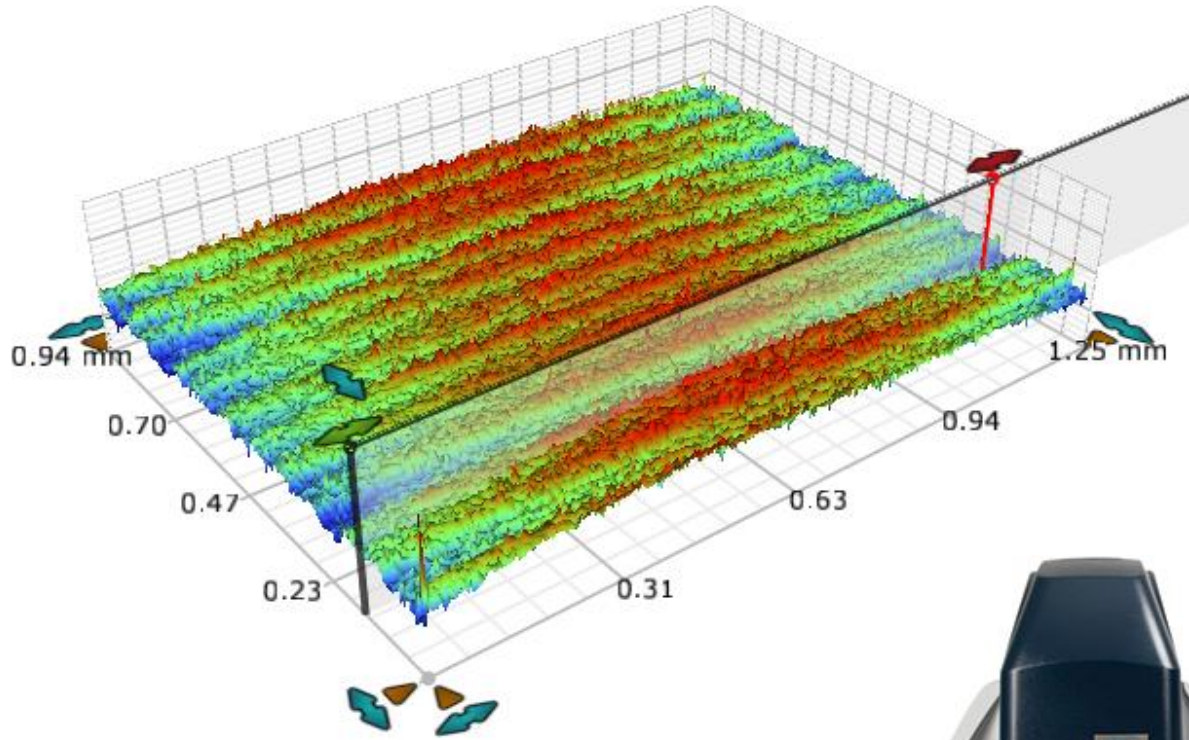
- Microstructural variations
- Surface texture changes e.g. cracks, surface roughness
- Residual stresses concentrations
- Residual magnetism



# Measurement errors

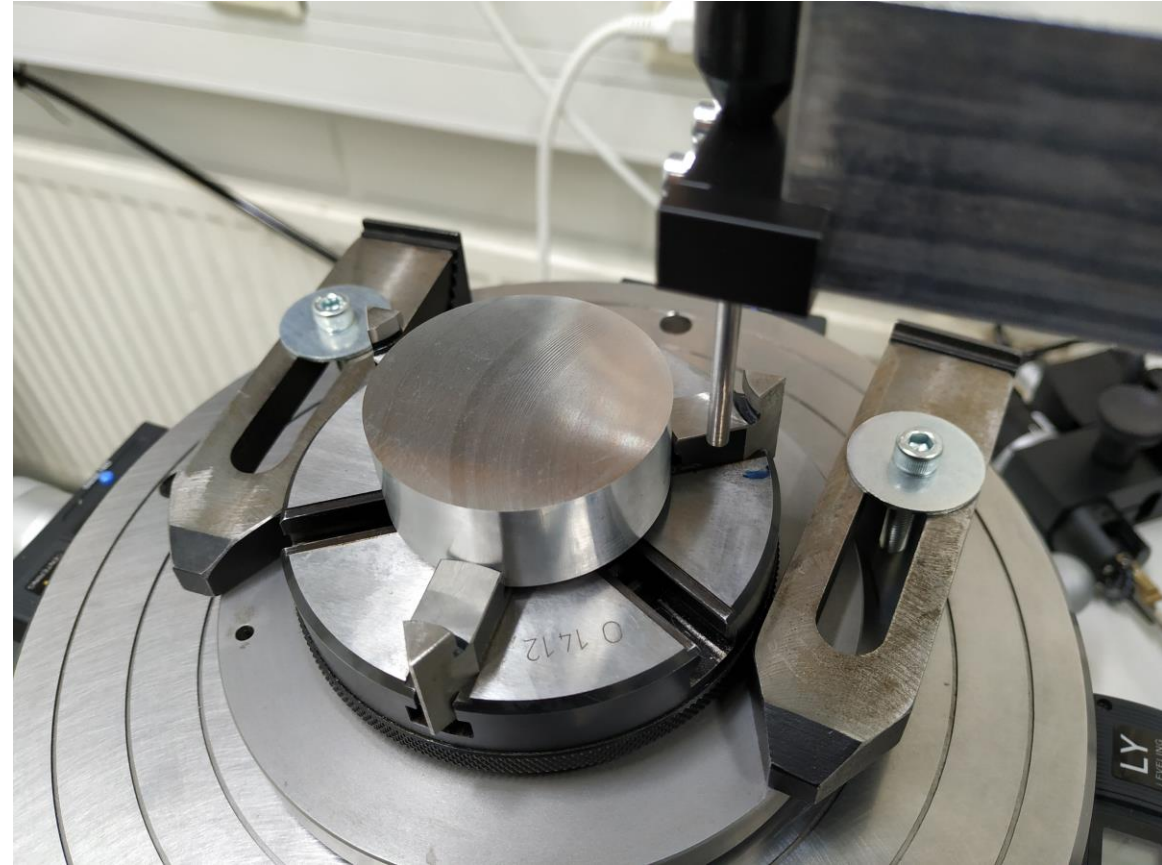


# Ongoing research – Surface roughness





# Ongoing research – Surface roughness



# Demo day



# Eddy current sensors

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