



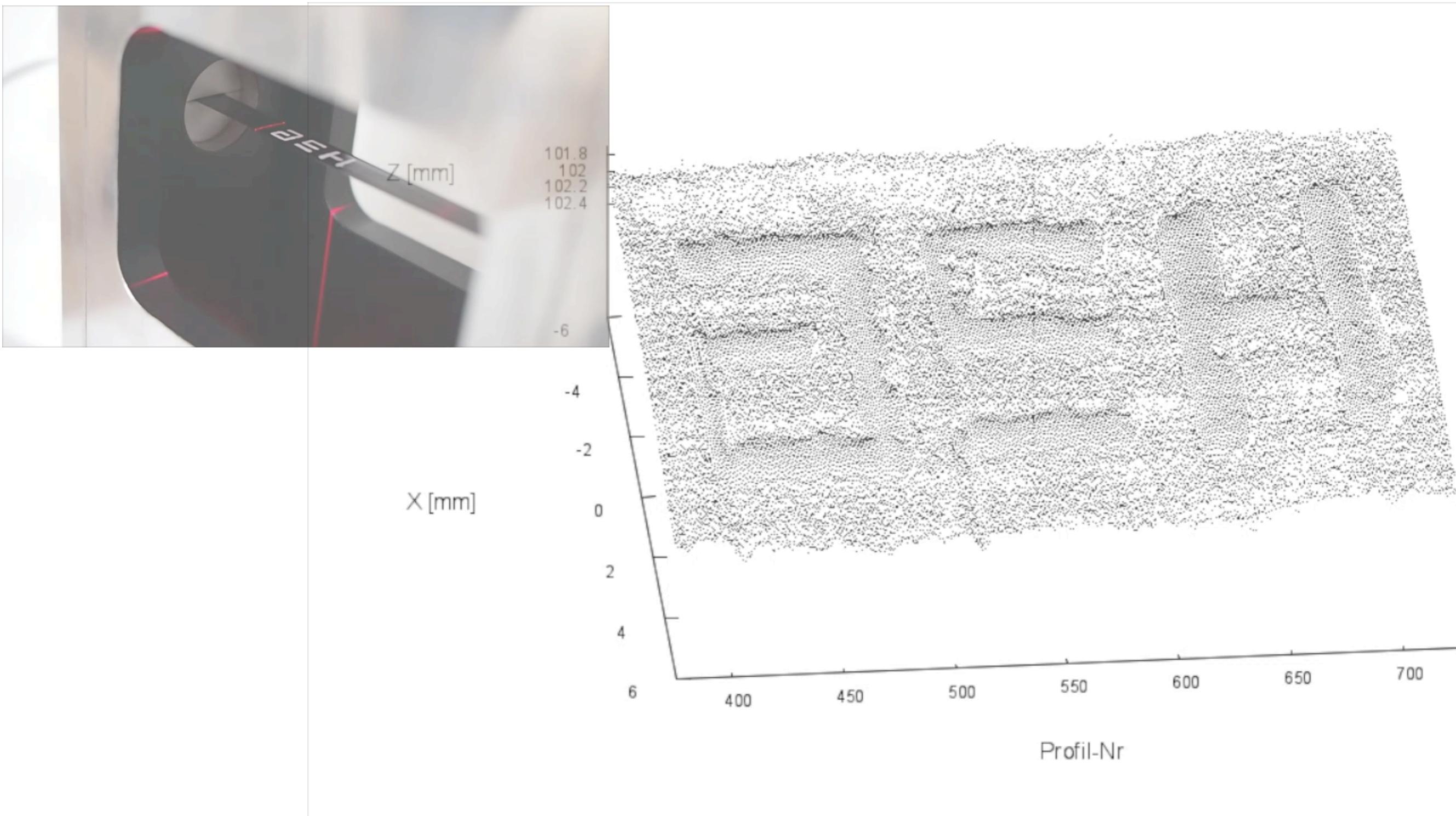
# AUTOMATION STEEG & HOFFMEYER

Automation Steeg und Hoffmeyer GmbH  
Mainzer Landstrasse 155  
55257 Budenheim  
Germany

## Scanning Technology to Detect Surfaces and Bodies

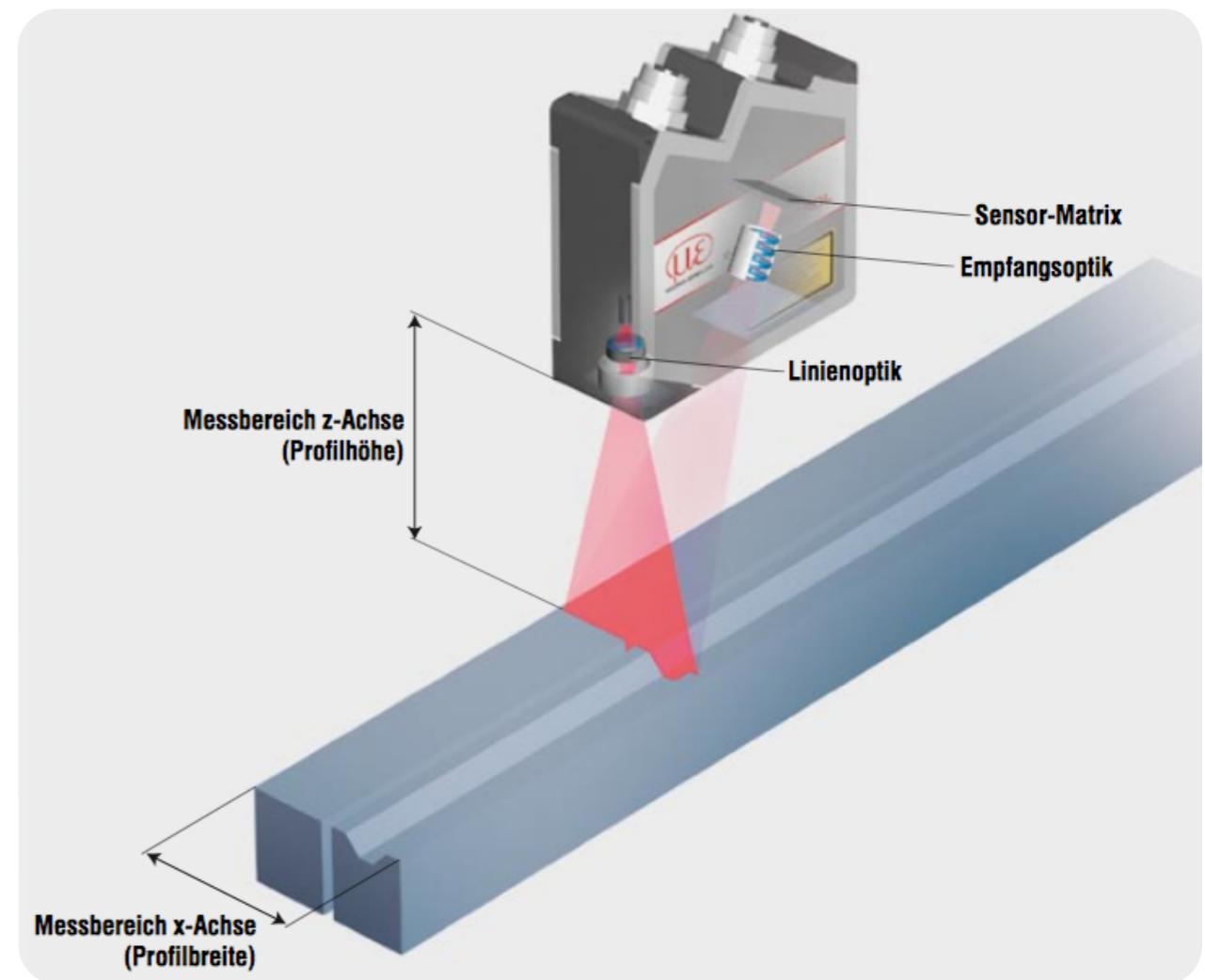
Dr.-Ing. Markus Steeg  
Dipl.-Ing. Carsten Degel  
Dipl.-Ing. (FH) Jens Lichtner

# Online Scanning and Direct Evaluation!



# Detection of Surfaces and Bodies

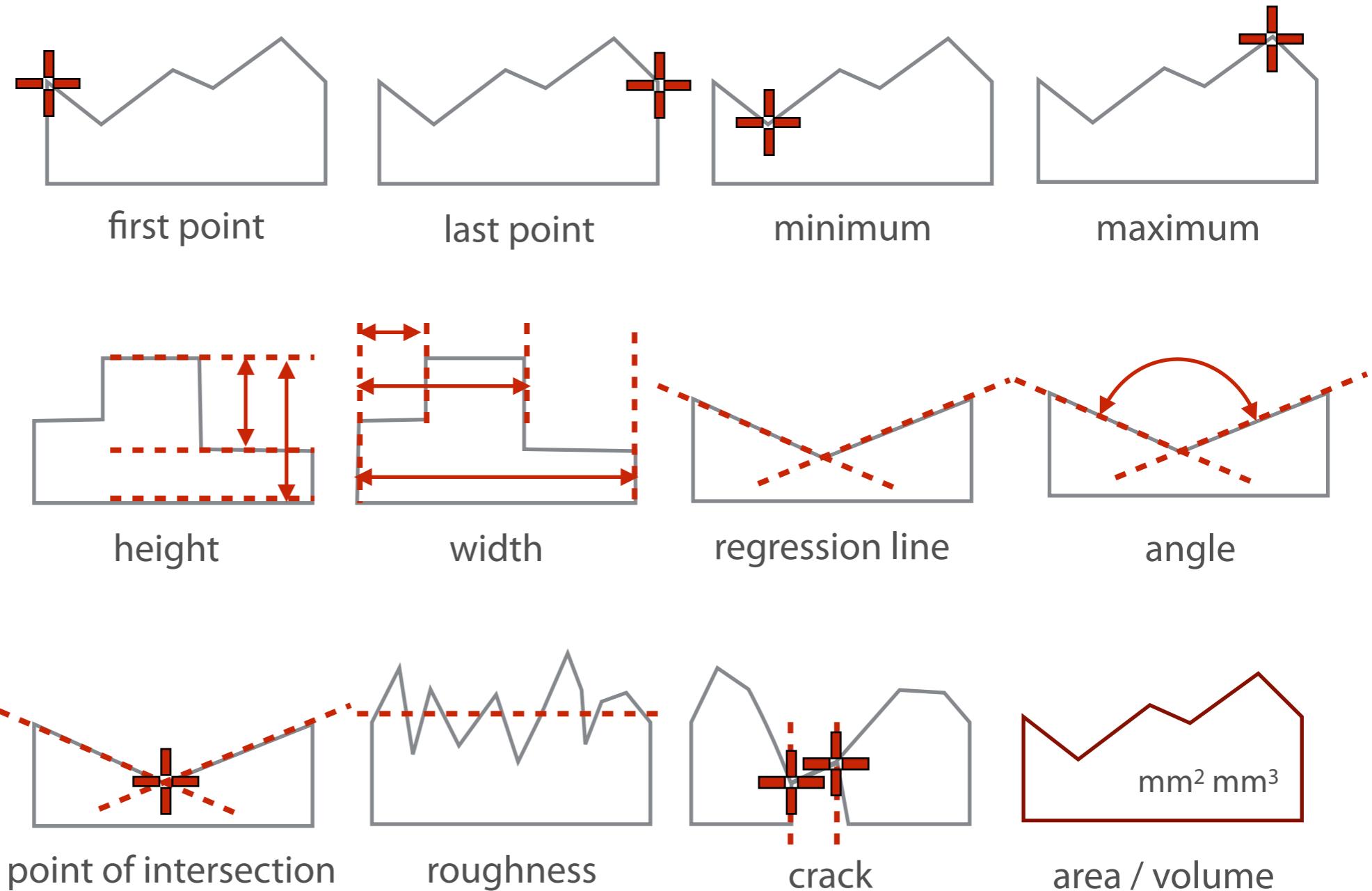
- Surfaces are measured without contact at high precision
- All acquired data can be evaluated online/offline
- High scanning frequencies allow scanners or objects to be traversed while scanning
- Class 2M lasers do not require special safety solutions
- Software is adapted to customer's specification



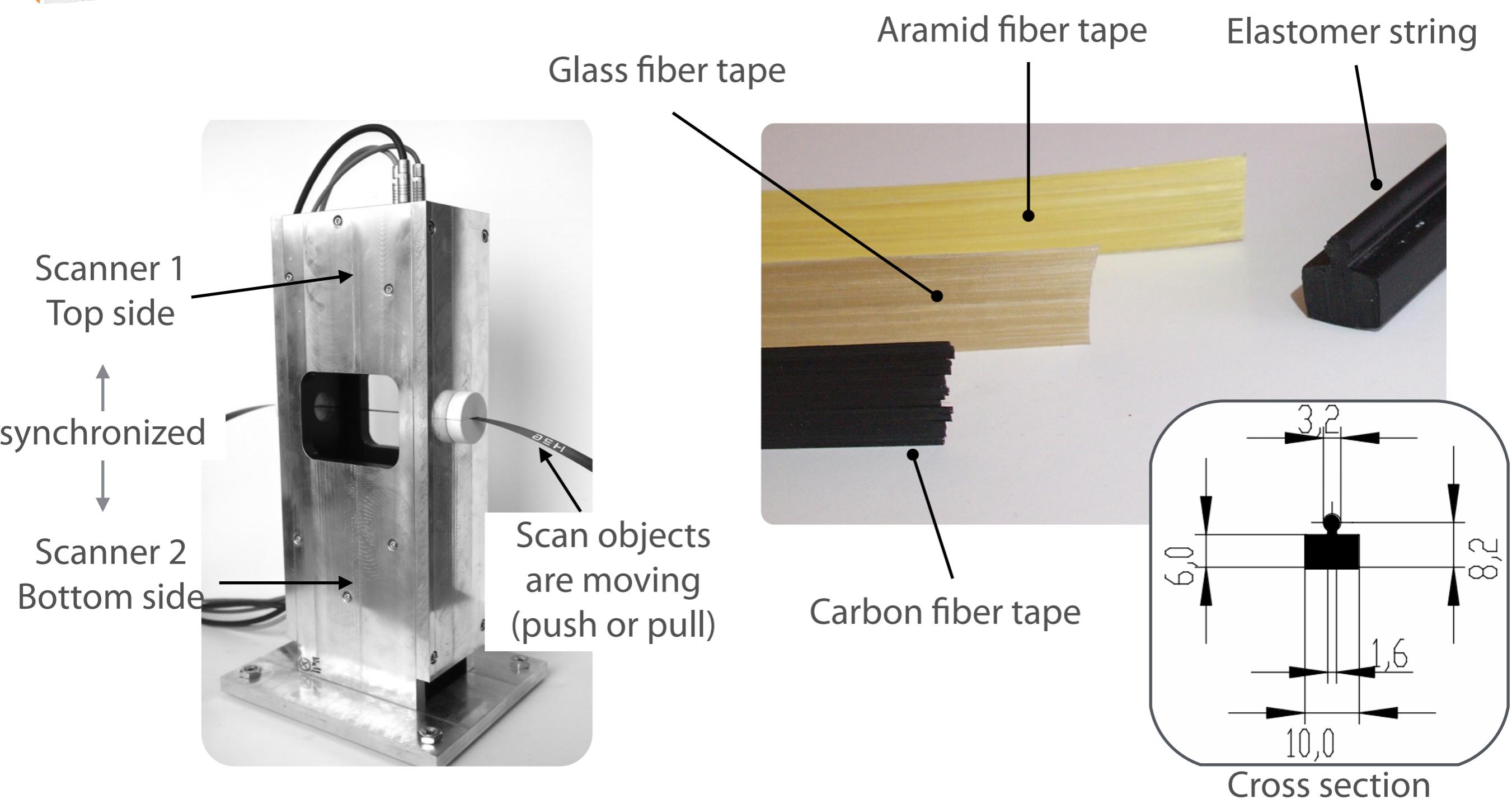
# Measurement Criteria - Extract

- Detection of:

- profile
- width
- thickness
- depth
- ledge
- notch
- channel
- welding bead
- angle
- roundness
- flatness
- roughness
- deformation
- area
- volume
- ...

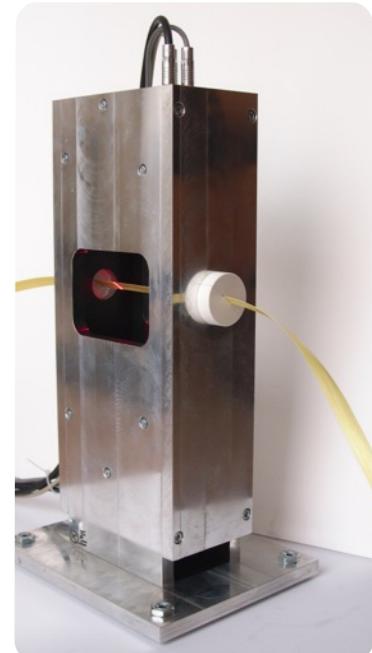
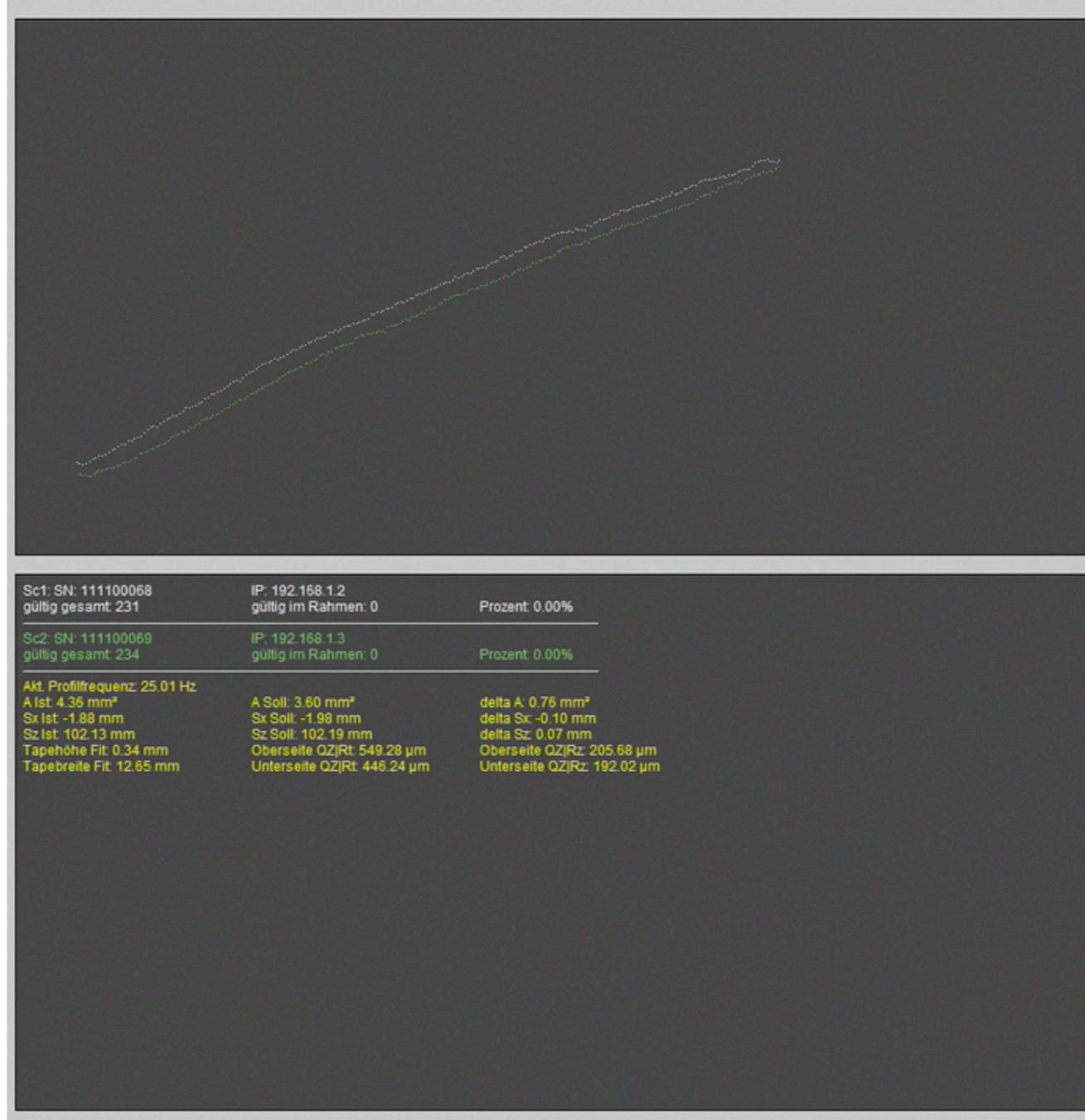


# Test Setup for Tapes or other Cross Sections

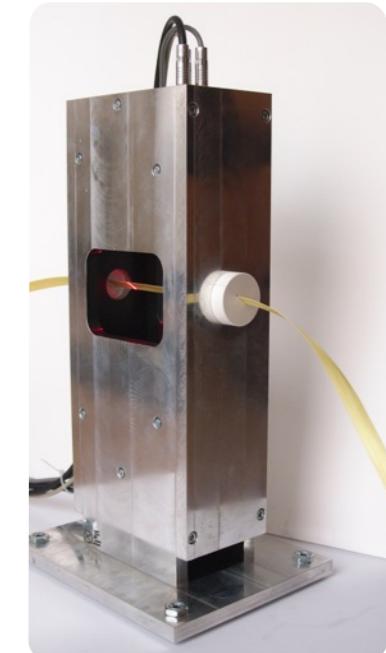
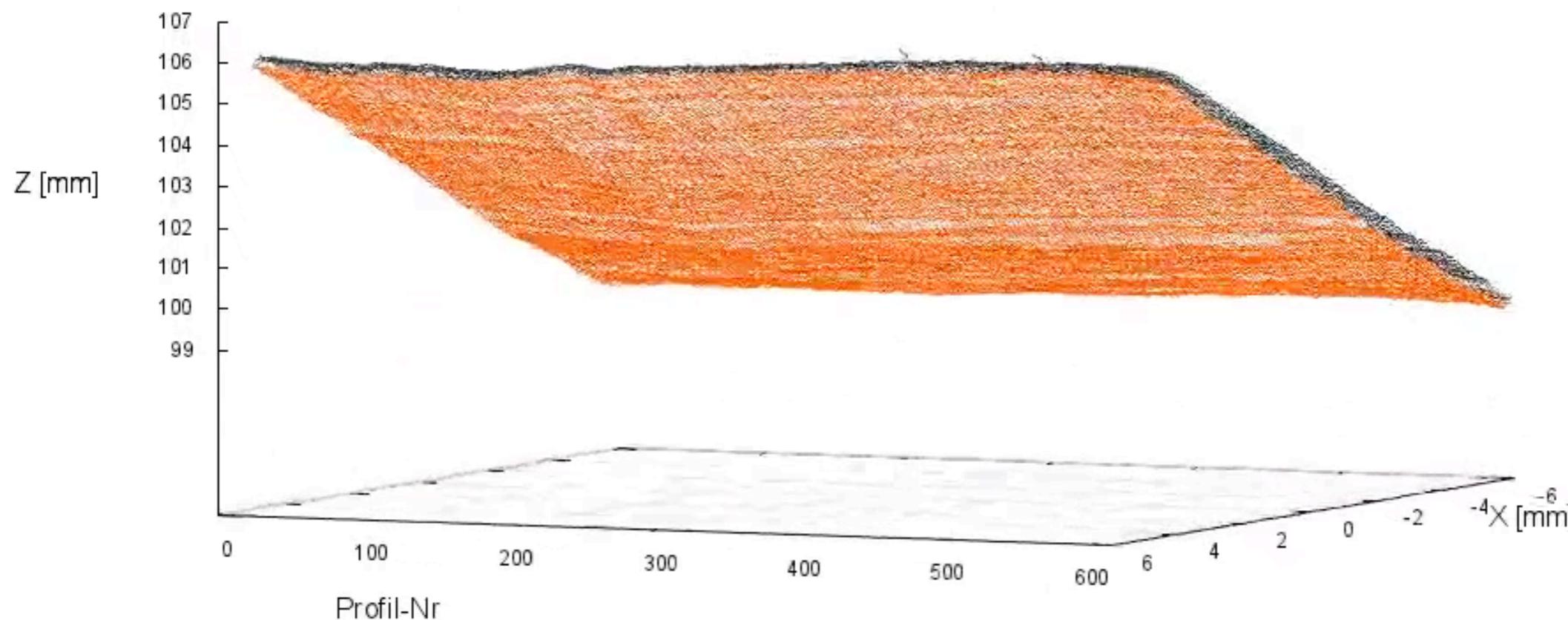


# Aramid Tape Online Detection

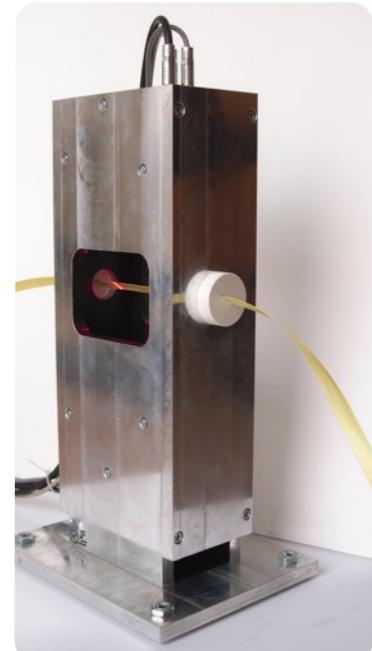
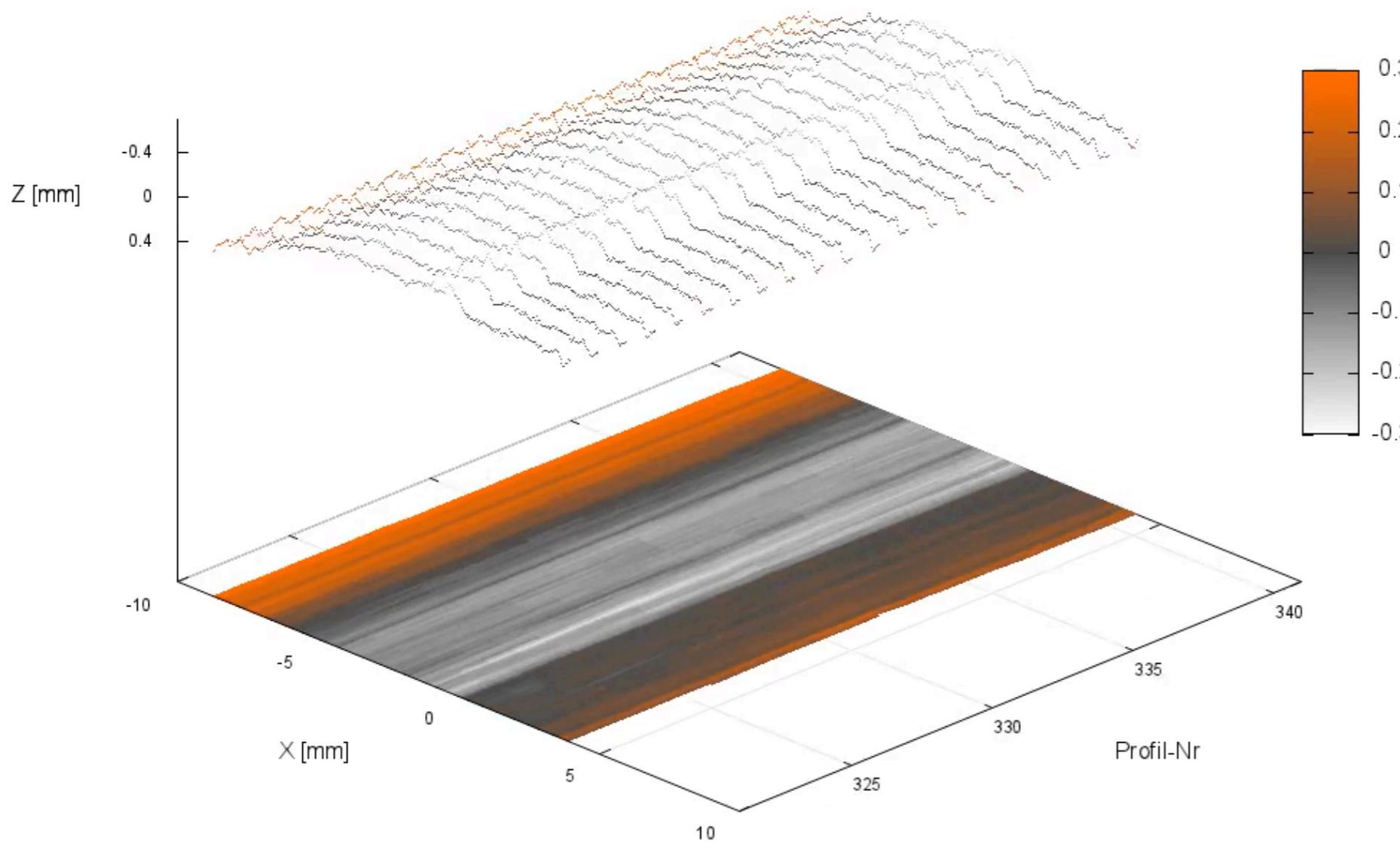
- Moving Tape
- Detection of:
  - top side and bottom side synchronized
  - ledge
  - width
  - thickness
  - area
  - „Ra“, „Rt“, „Rz“



# Aramid Tape 3D-Surface Offline Evaluation

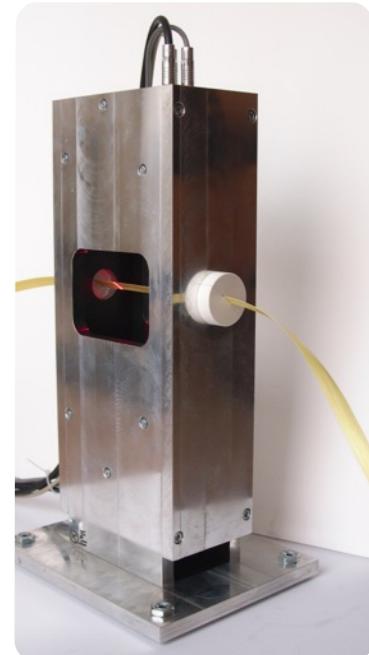
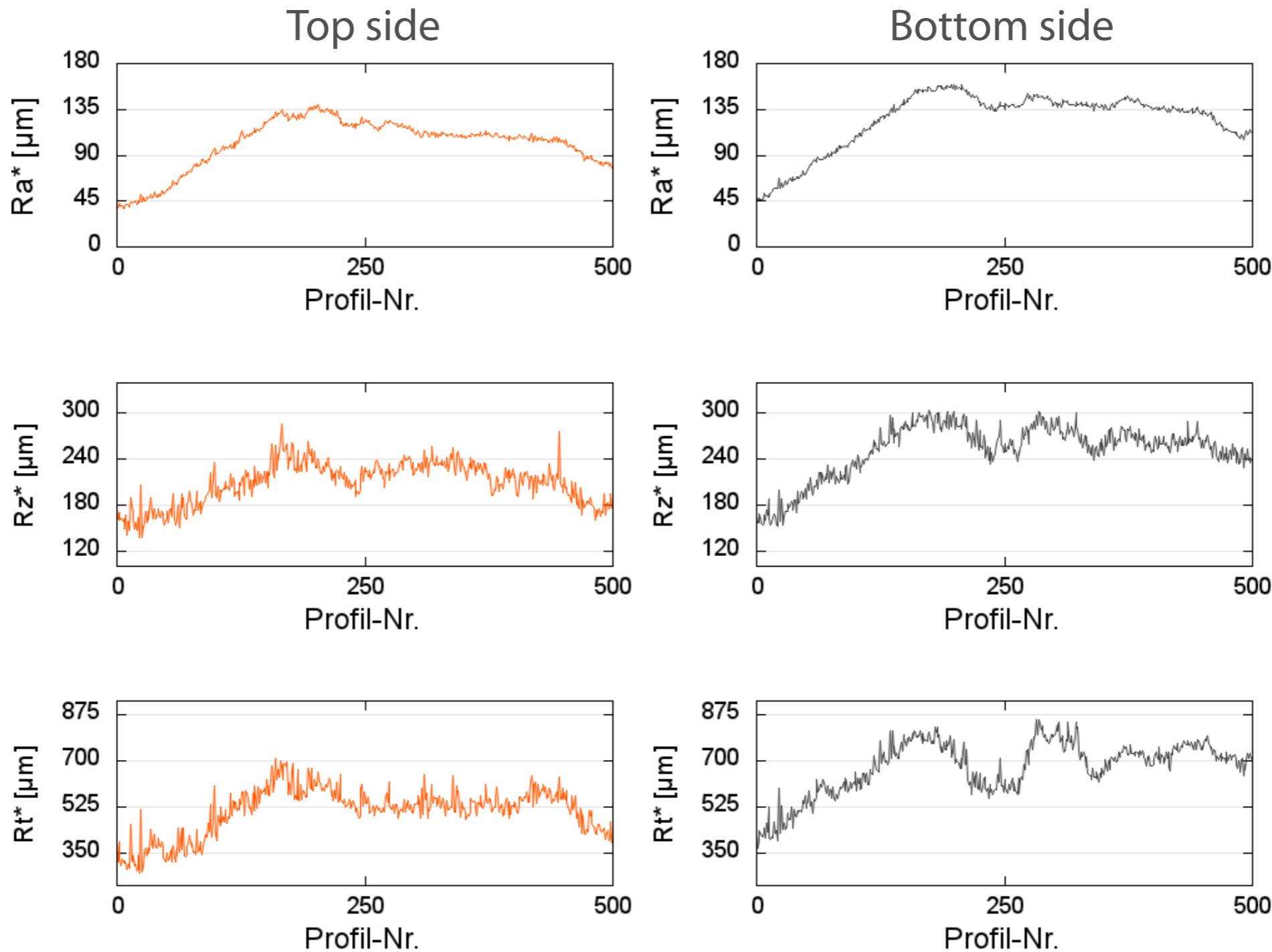


# Aramid Tape 2D Surface Offline Evaluation Top Side



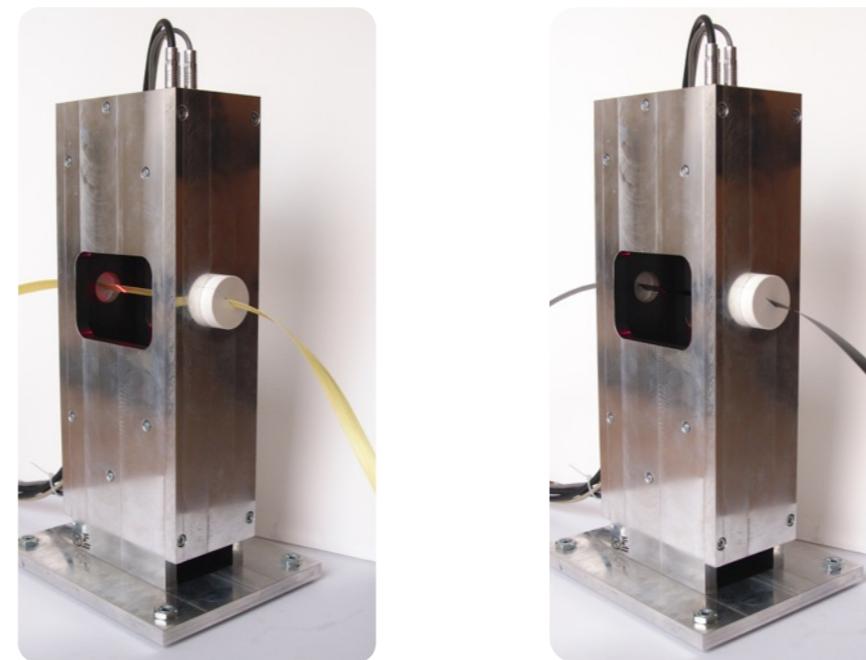
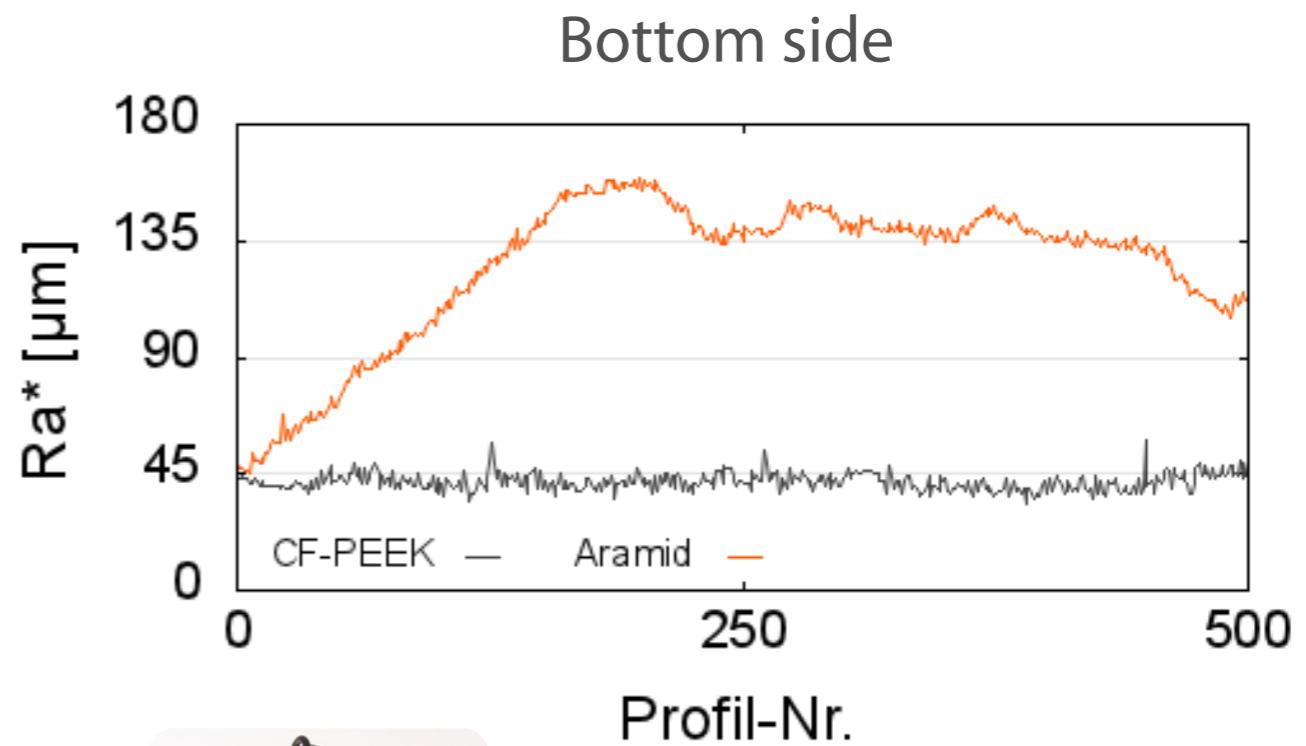
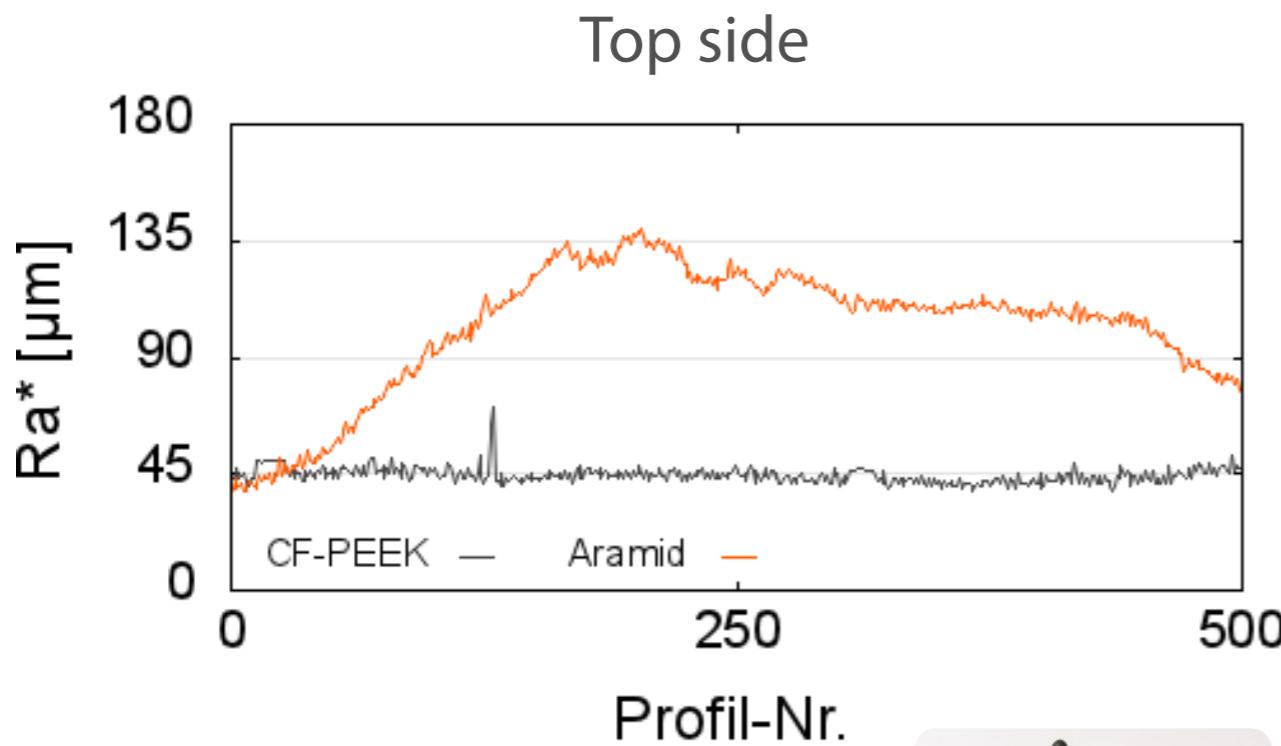
# Evaluation Aramid Tape

## R<sub>a</sub>\*, R<sub>t</sub>\*, R<sub>z</sub>\*



\* Linked to a straight regression line, but tapes are not even

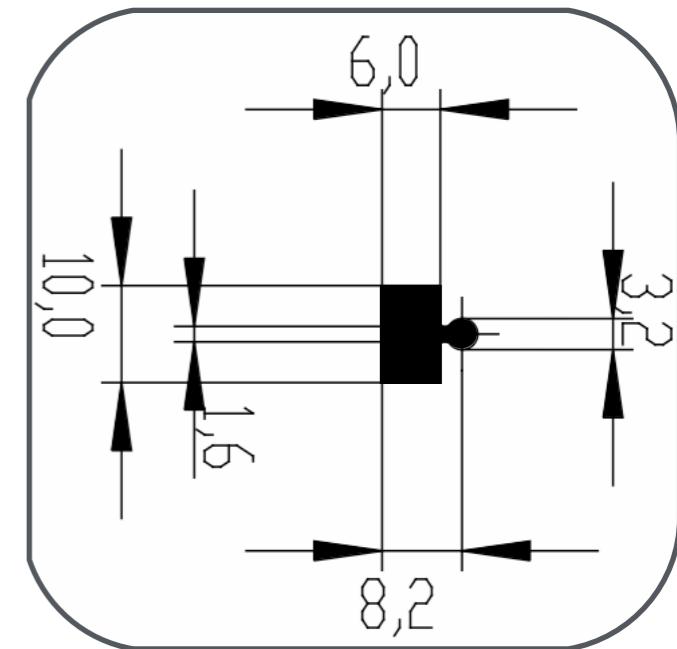
# Aramid Tape vs. Carbon Fiber Tape



\* Linked to a straight regression line, but tapes are not even

# Elastomer String Online Detection

- Moving String
- Detection of:
  - geometry
  - ledge
  - width
  - thickness
  - area
  - „Ra“, „Rt“, „Rz“

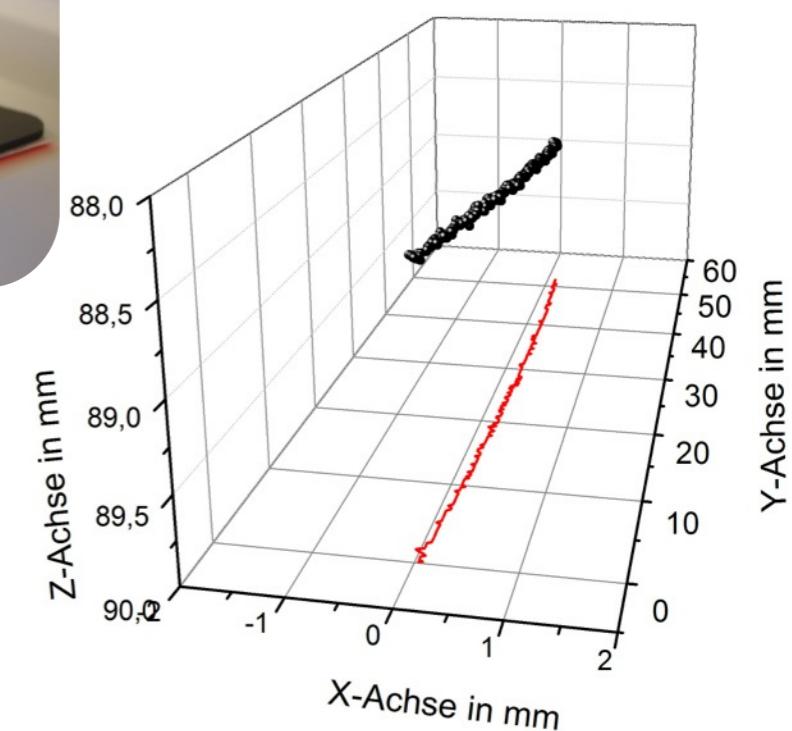
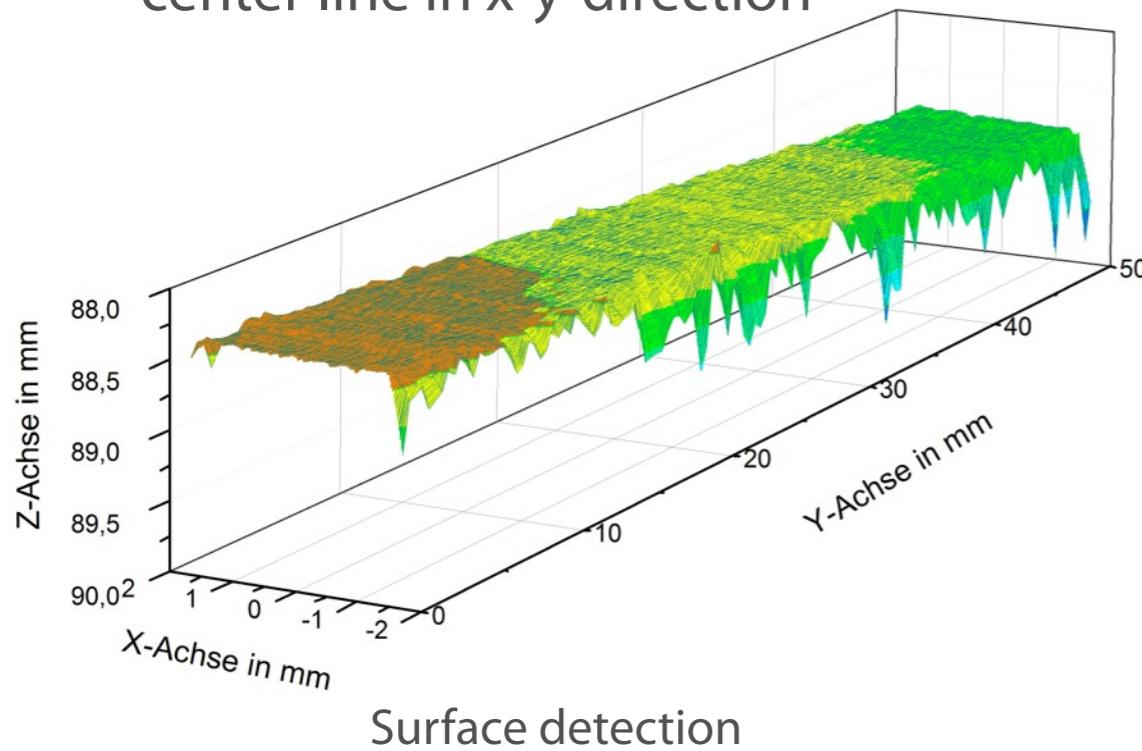


Cross section

# Ledge Detection

## Carbon-Fiber-Reinforced-Plastic (Thermoplast)

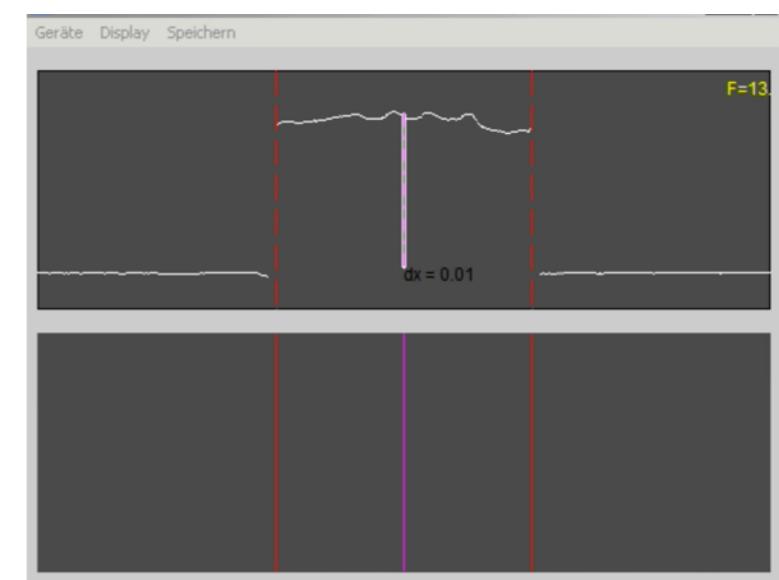
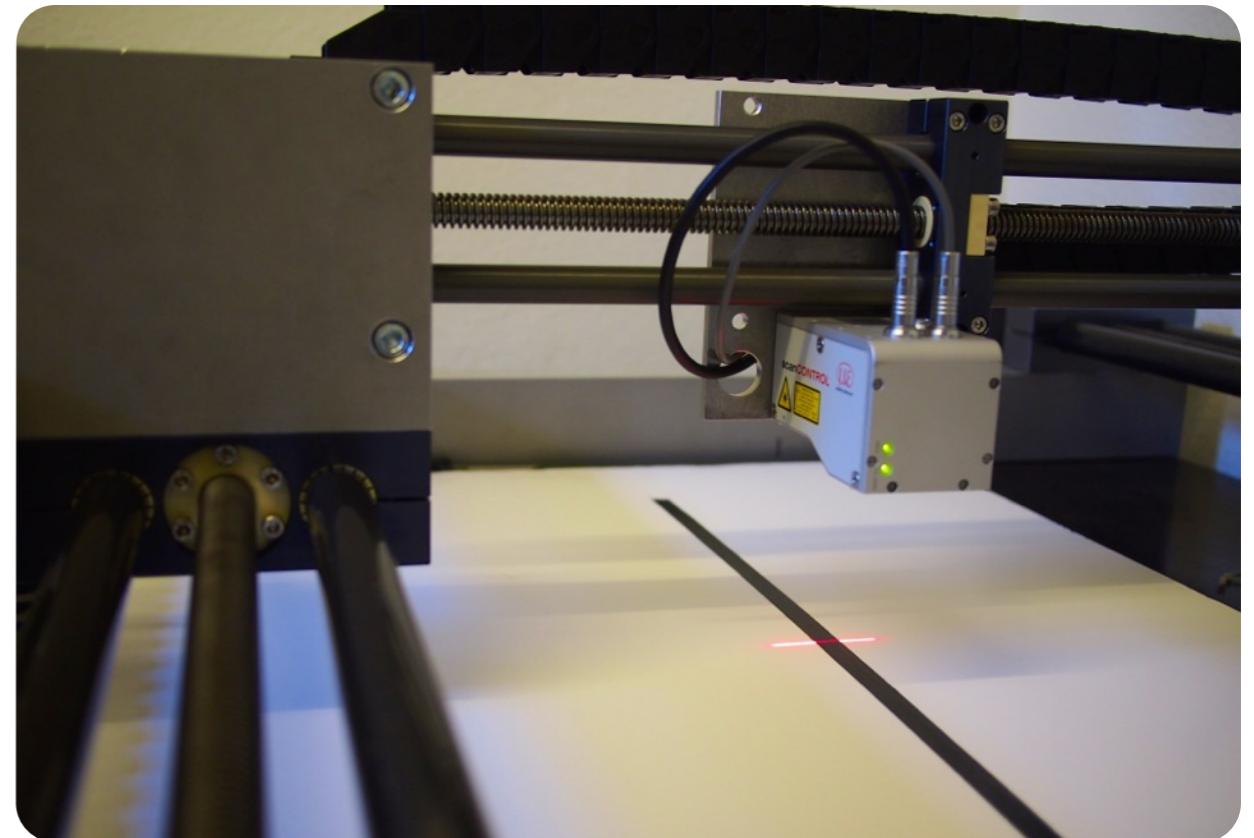
- Moving scanner
- Online detection of:
  - ledge
  - surface (scatter)
  - center points (x,y,z)
  - „Ra“, „Rt“, „Rz“
- Online follow mode
  - axis (drive technology) are following the center line in x-y-direction



Center points out of ledge detection

# Online Ledge Detection of Tape

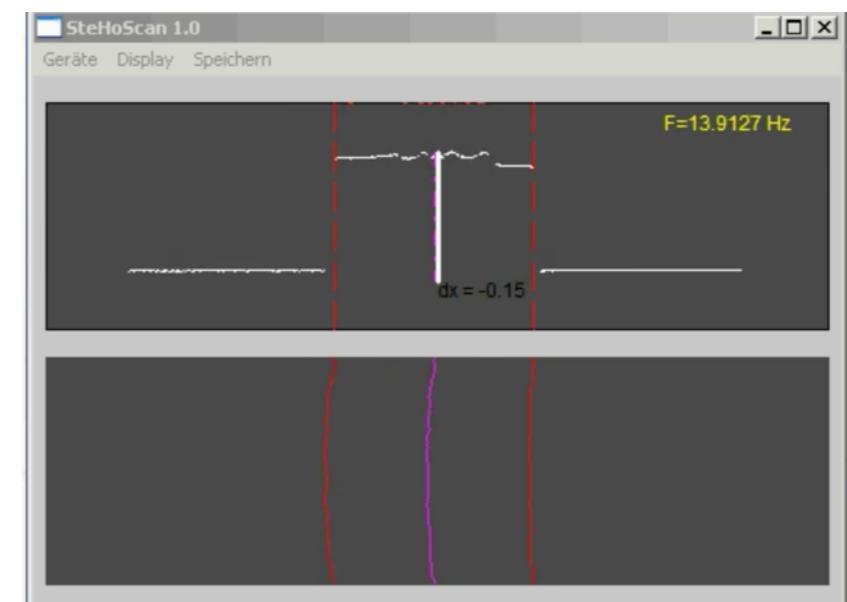
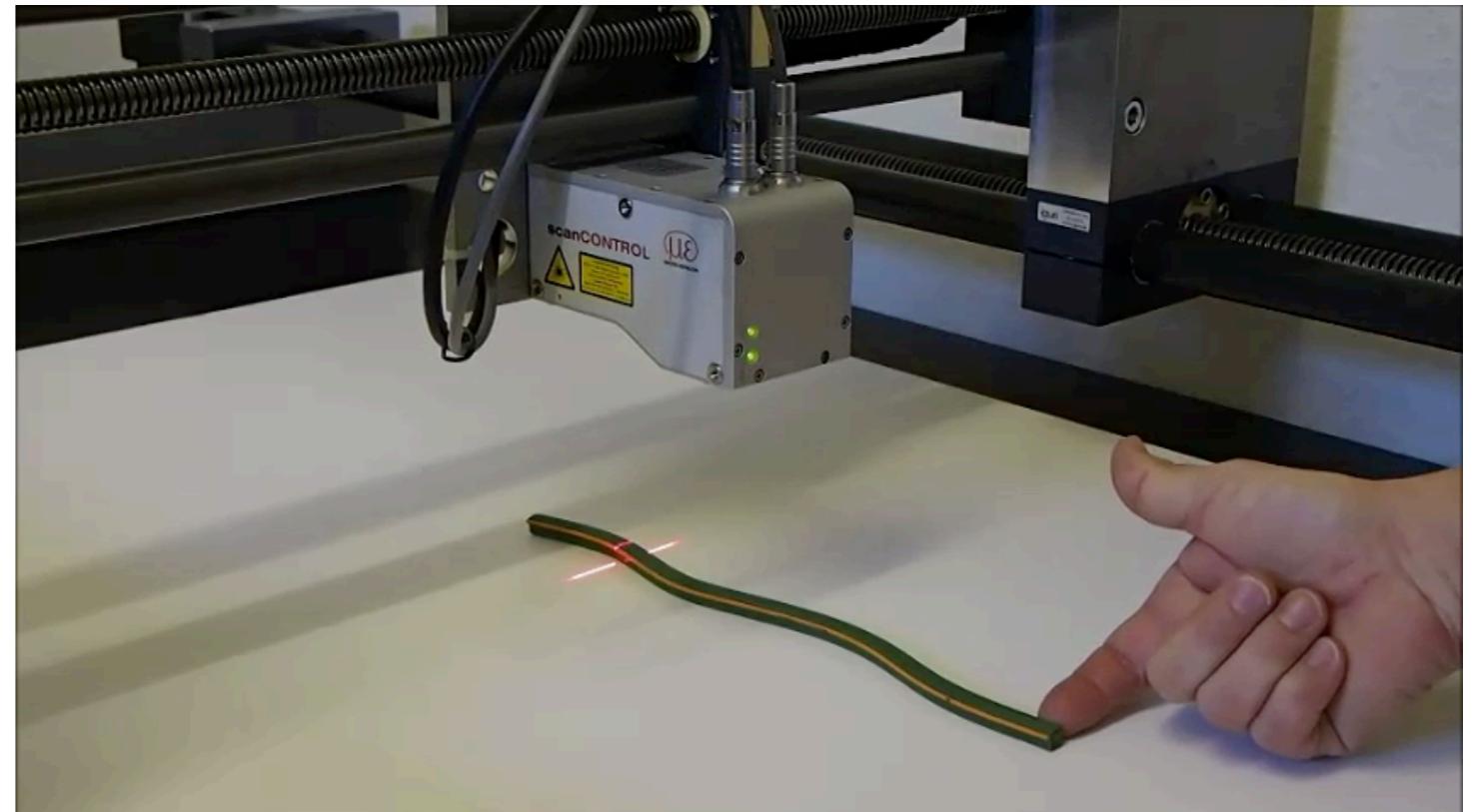
- Moving scanner
- Detection of:
  - ledge
  - „Ra“, „Rt“, „Rz“
- Online calculation of center line in x-y-direction
- Follow mode:
  - axis (drive technology) are following the center line in x-y-direction



Ledge detection

# Ledge Detection and Online Path Adjustment

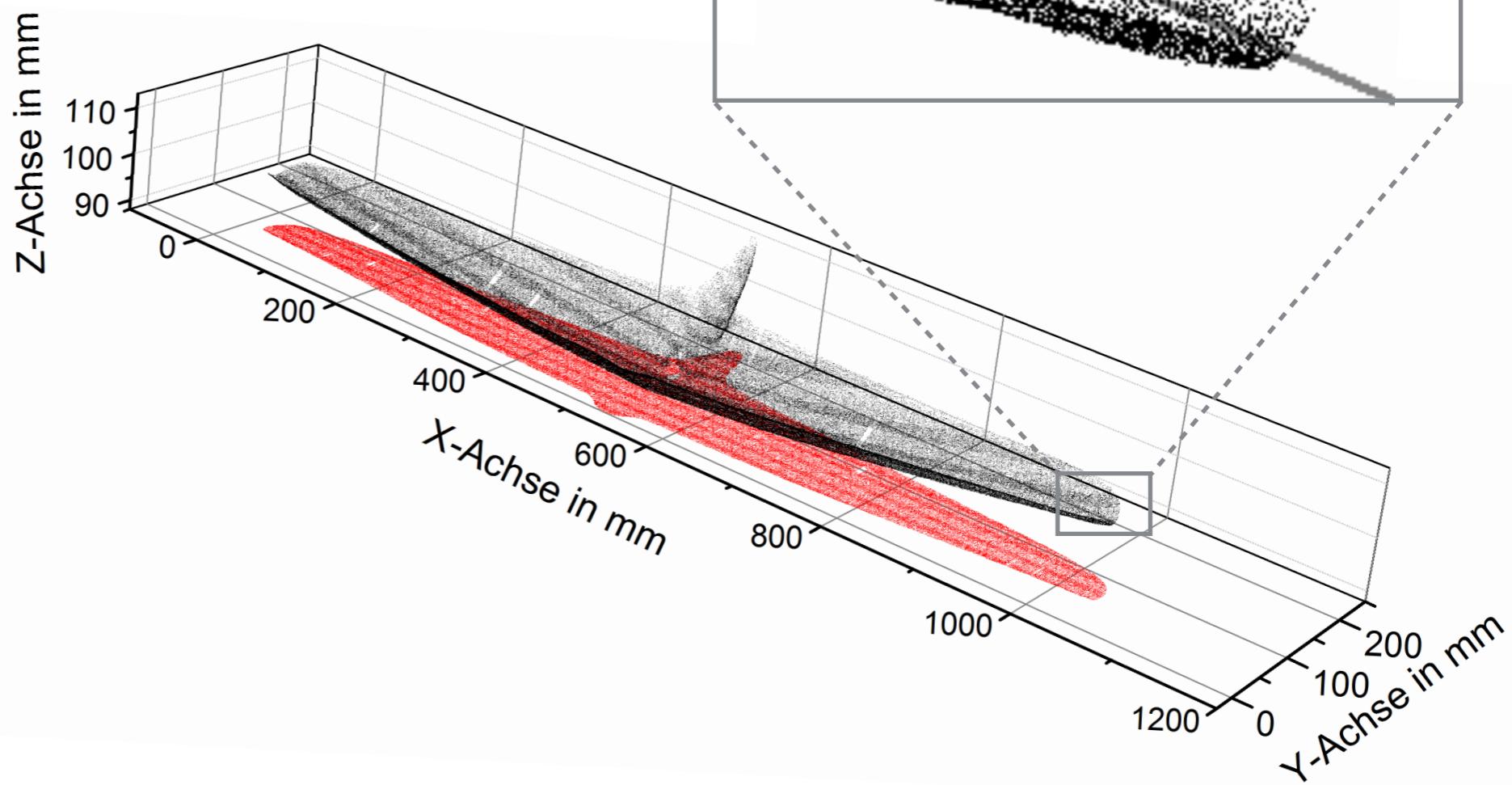
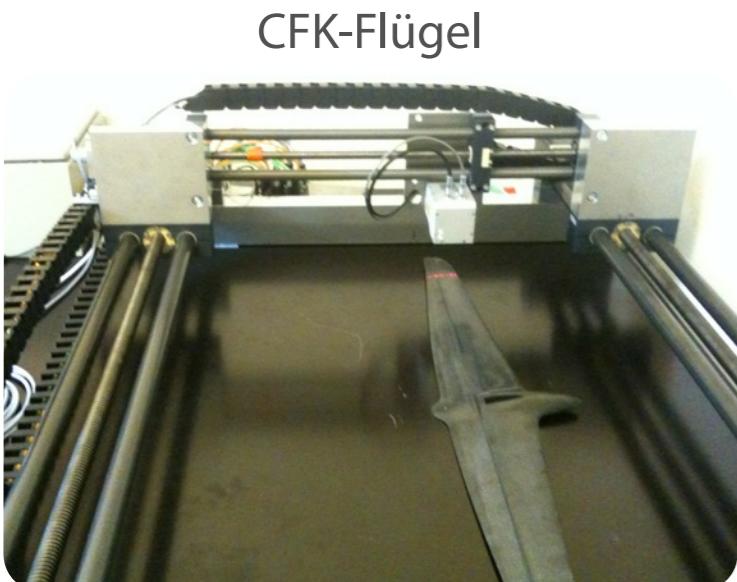
- Moving scanner, manual manipulation of object
- Detection of:
  - ledge
  - online calculation of center line in x-y-direction
- Center position of scanner is slightly ahead of the tool center point
- Axis (drive technology) are following the center line in x-y-direction and keeping the tool center point velocity constant



Ledge detection

# 3-D Measurement Hydrofoil

- Moving scanner
- Detection of:
  - surface (scatter)
- Speed of scanner 10 mm/s
- Graph is showing approximately 0,5 % of all values



# Thank you for your Attention



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*„You'll find the corresponding video  
at our homepage“*

[www.automation-gmbh.com](http://www.automation-gmbh.com)