

# Cavities

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E.Elsen



# Towards high-gradient cavities

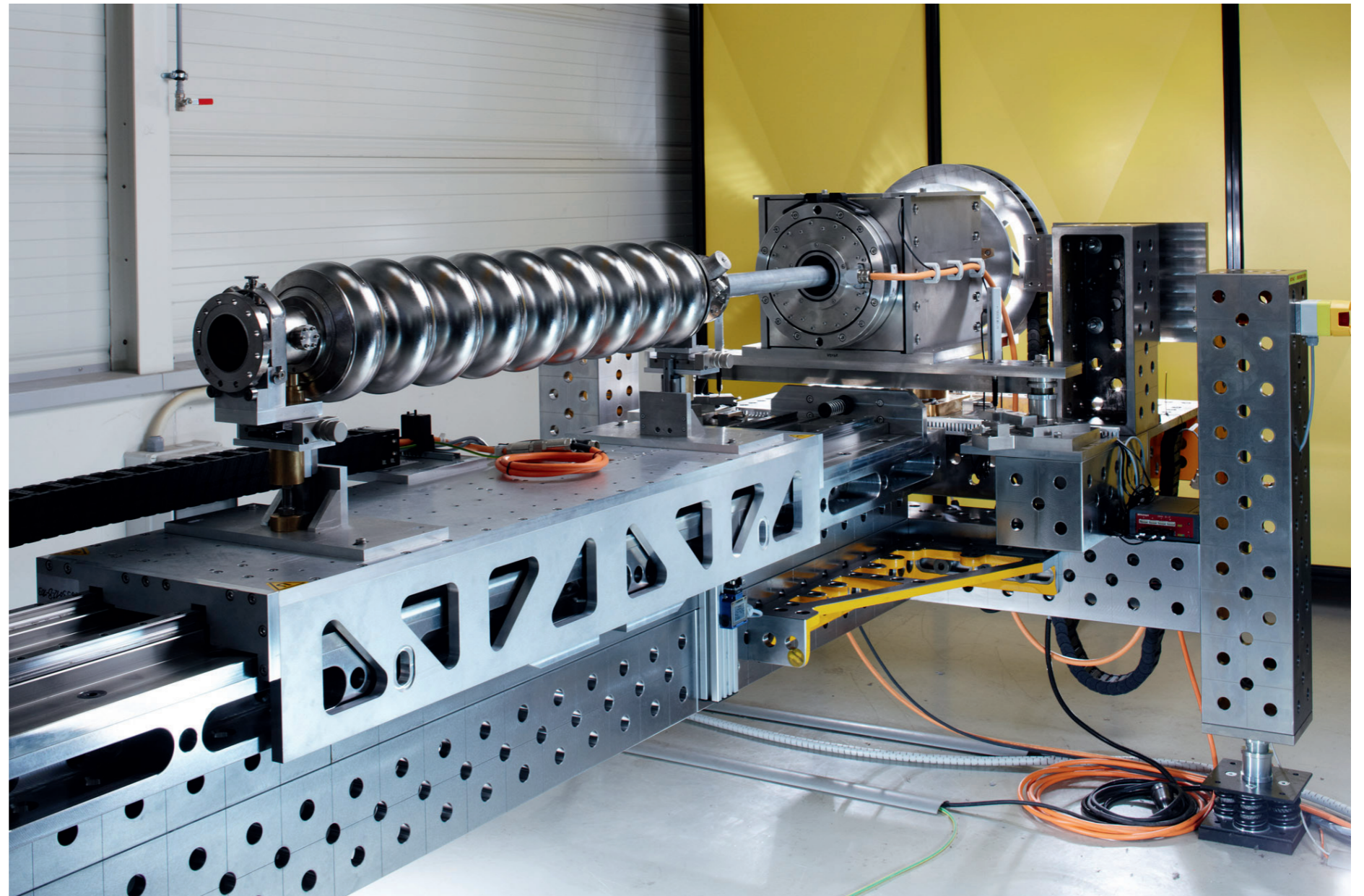
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- World-wide activities led to impressive improvements in accelerating field
  - recent batch of industrially produced cavities exceed 80% yield
- Cavity delivery is delayed till after the end of the project (spring 2012)
  - invest in tools and methods to ascertain quality and performance
  - cavity testing continues after the project
  - final report will describe the results of cavity performance based on the tools developed

# Optical Scanner

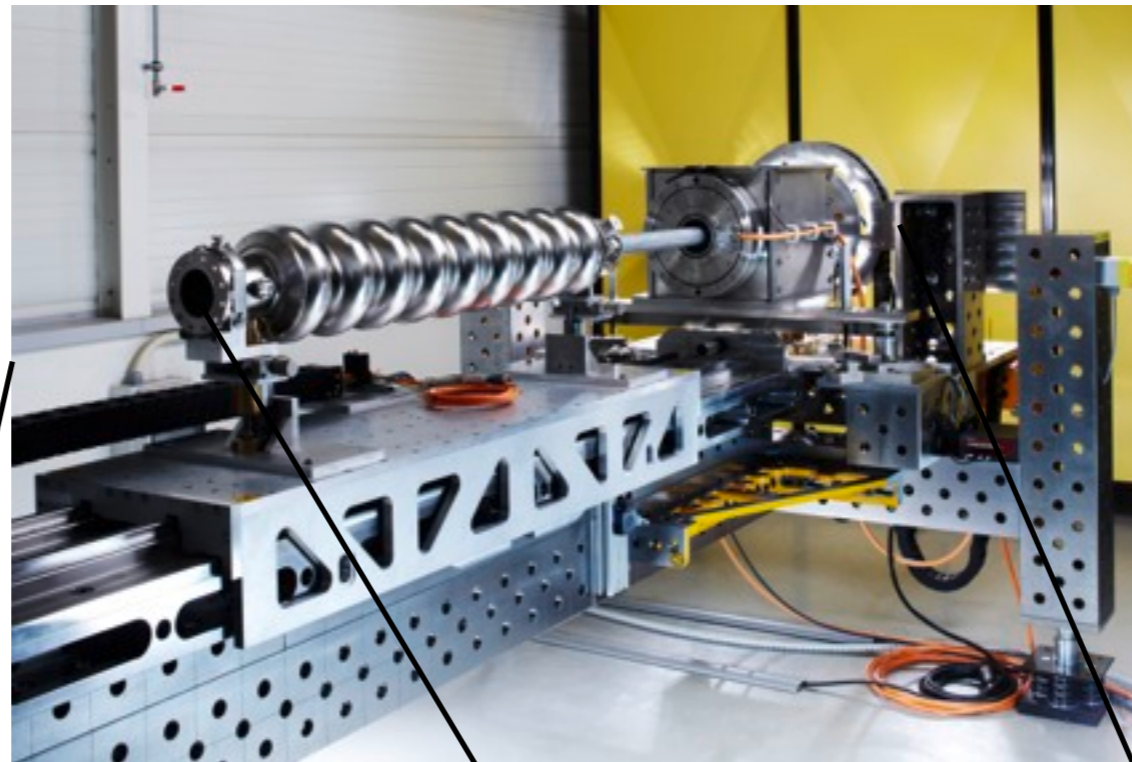
- Elements

- linear drive for cavity
- rotational drive for camera rod
- laser guidance system



Scanner in test laboratory

# Laser guiding system – Collision free movements



light receiver



light emitter

# Motor Control



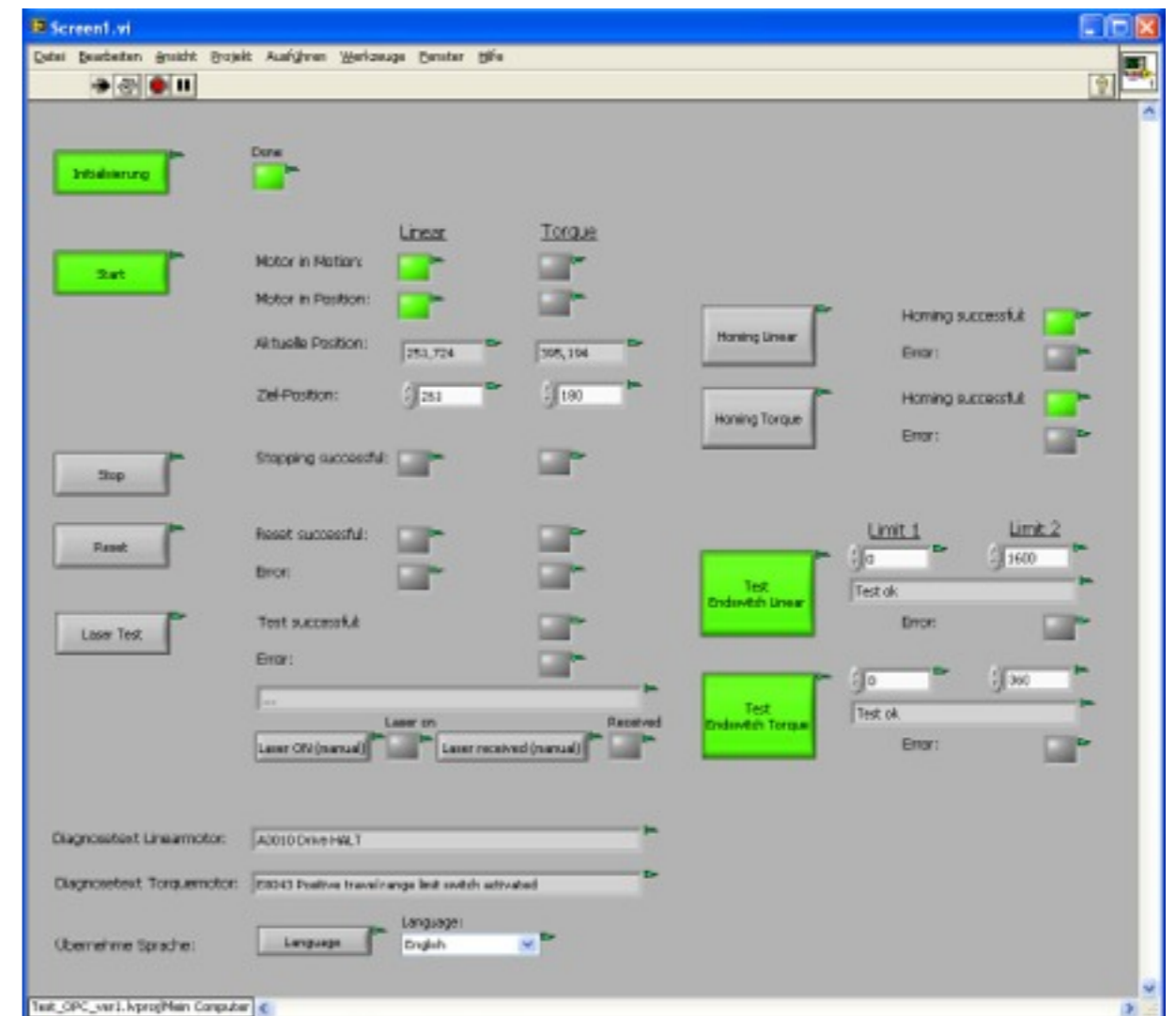
Front door operator panel



Motor driver status displays for maintenance

# Labview Expert Gui

- Features:
- Homing function: find reference point automatically
- Verification of end switches: check functionality of hard- and software end switches automatically. Check redundancy.
- Start: move both axes independently
- Accuracy:  
torque: 0.01 deg  
Linear: 0.01 mm
- Languages:  
message output in English, German, French, Spanish and Italian



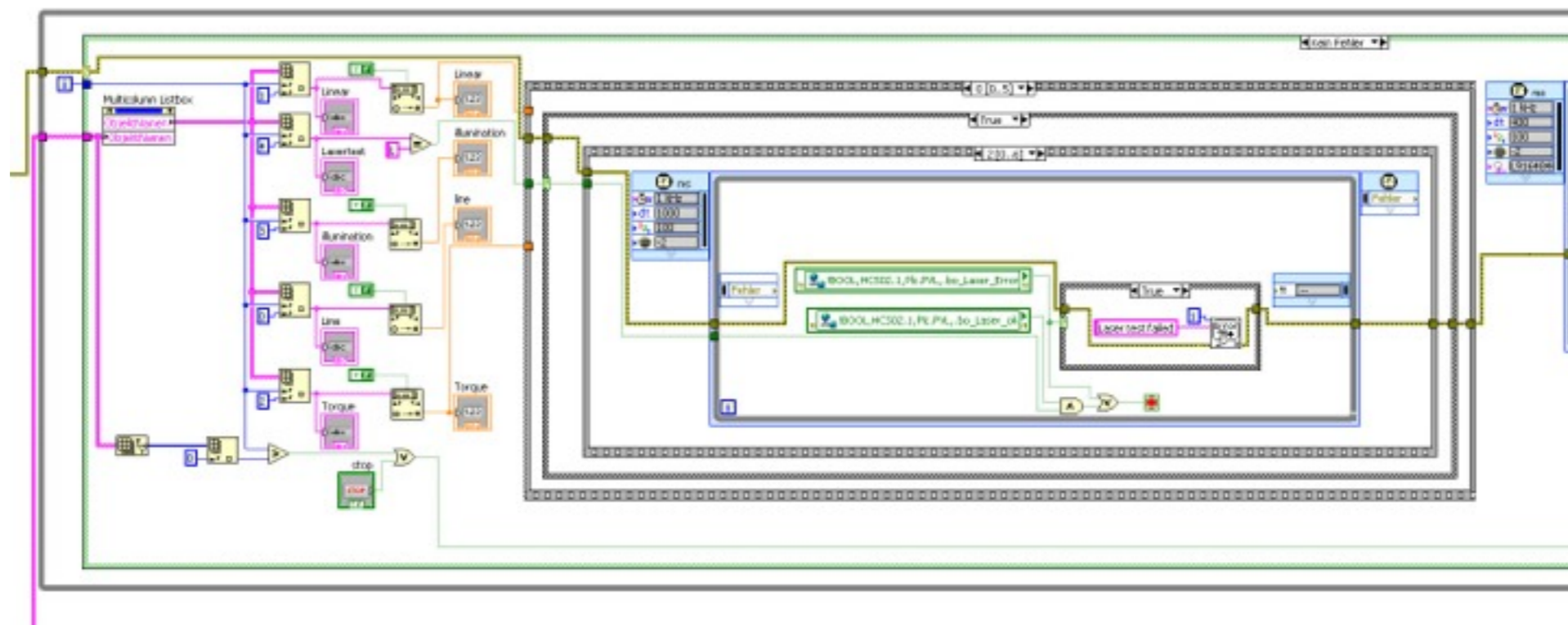
# Additional Features

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- Lookup table for automatic movement to predefined positions
- Arbitrary laser tests for safety reasons (clearance of path)
- Manual control option
- System self check
- Remote access
  - control foreseen
  - maintenance possible
- Safety aspects
  - all realised in hardware
  - light fence for access restriction
  - light signal tower



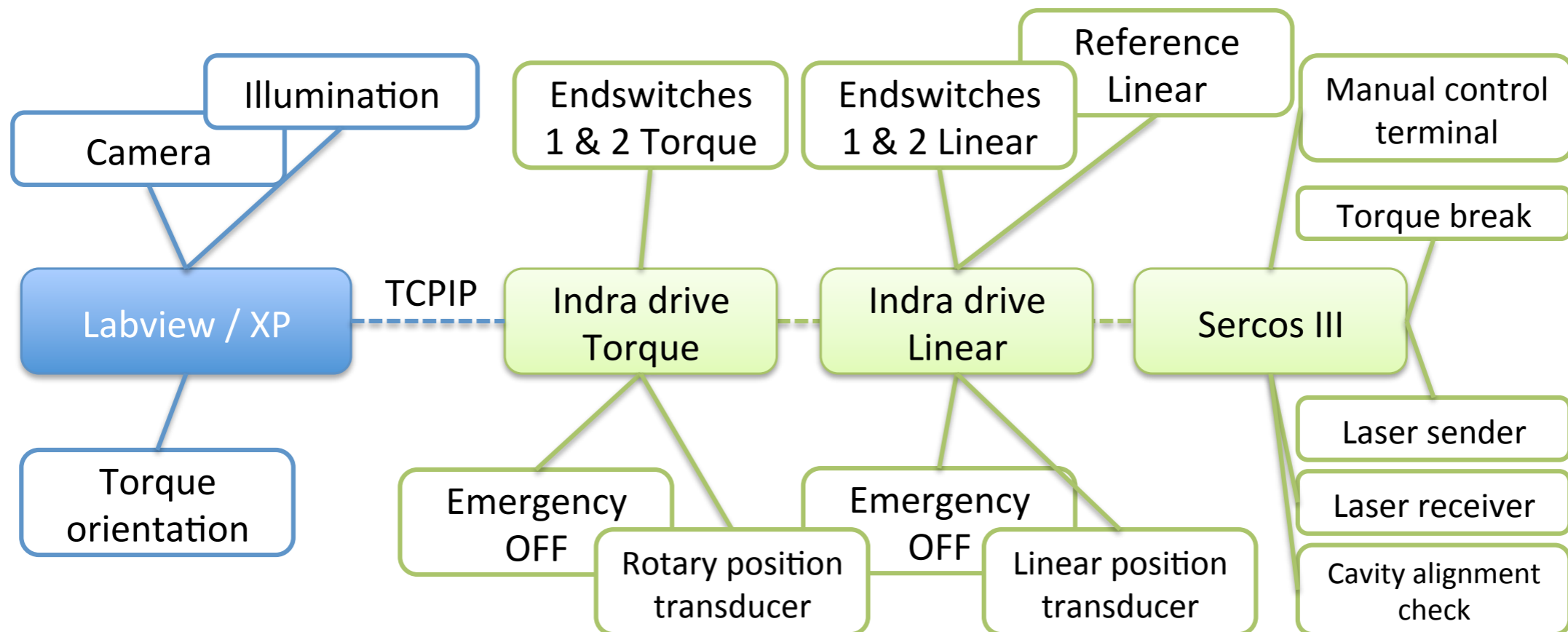
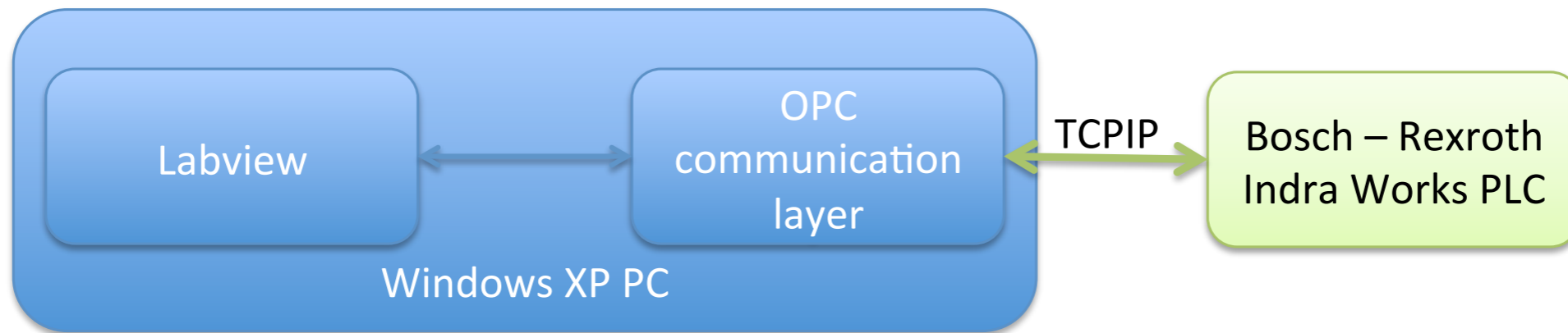
# Labview Program



Labview overview  
Motor and Camera



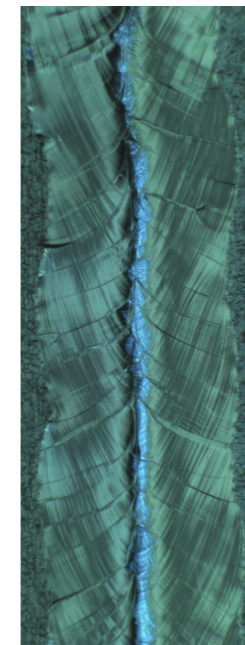
# Communication Structure



# Automatic image processing

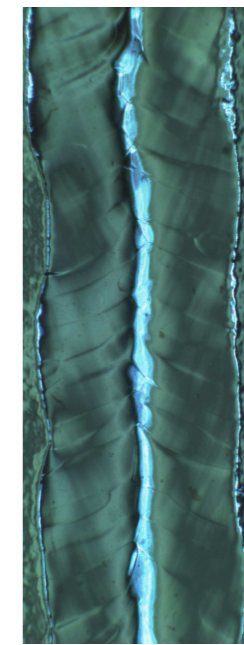
- Current approach
  - Conversion to greyscale image
  - Measure variations of grey scales over entire picture
    - size of objects
    - surface roughness, etc.
- Classify images
  - relate to processing
- Search for exceptional features (those that are sufficiently well separated from "average" using a "distance" in measurement space)

Before EP



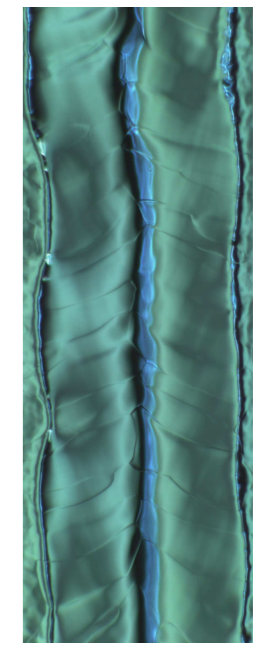
$$R_{dq} = 0.312$$

After 1st EP

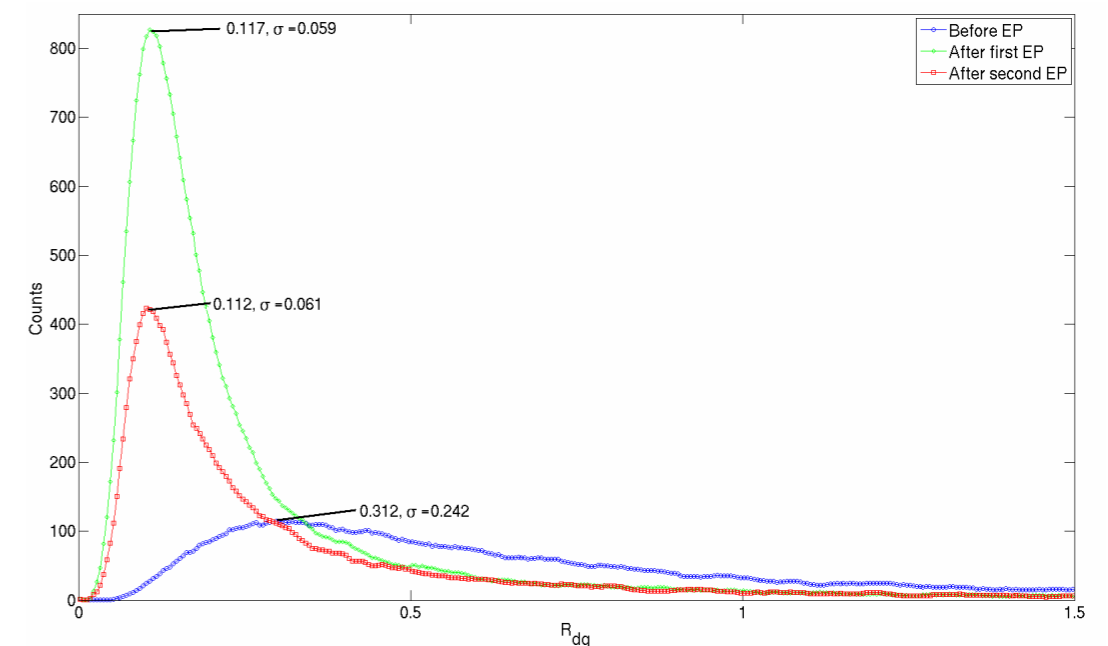


$$R_{dq} = 0.112$$

After 2nd EP

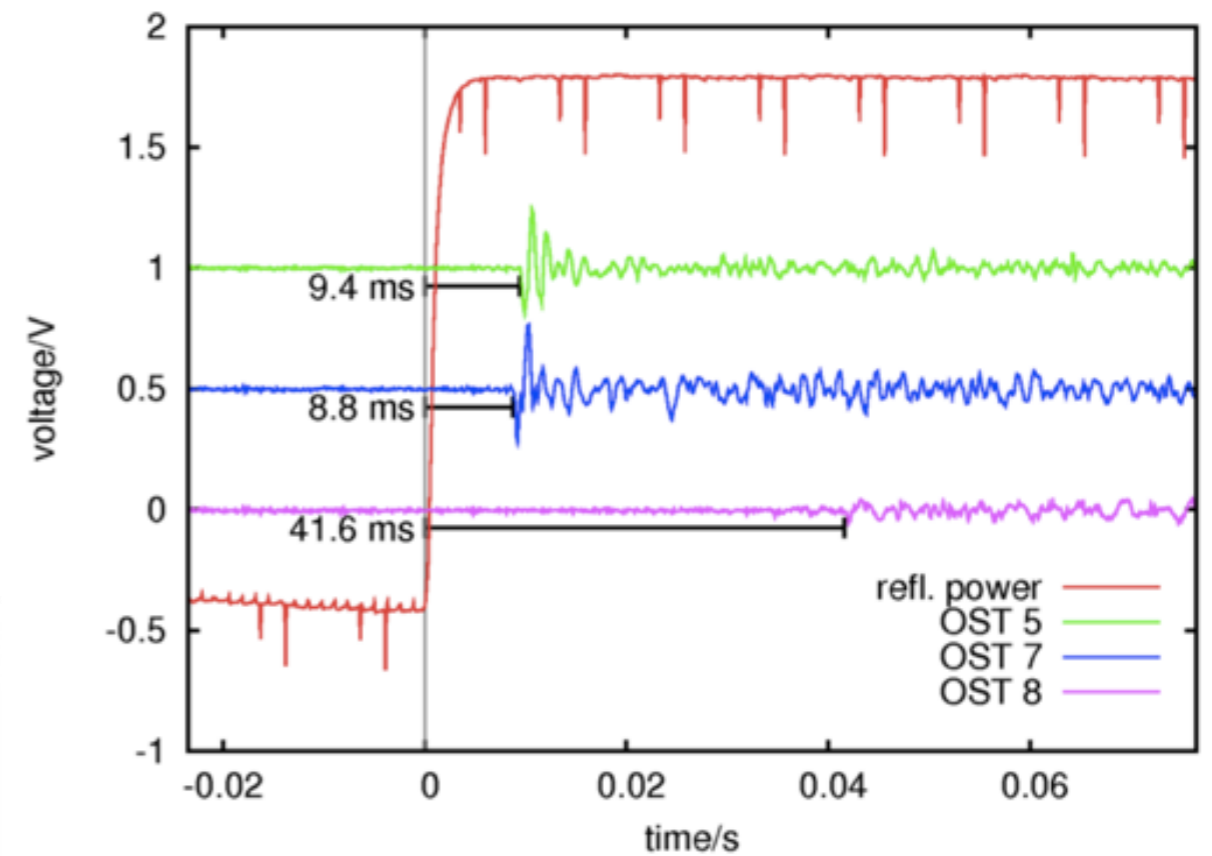
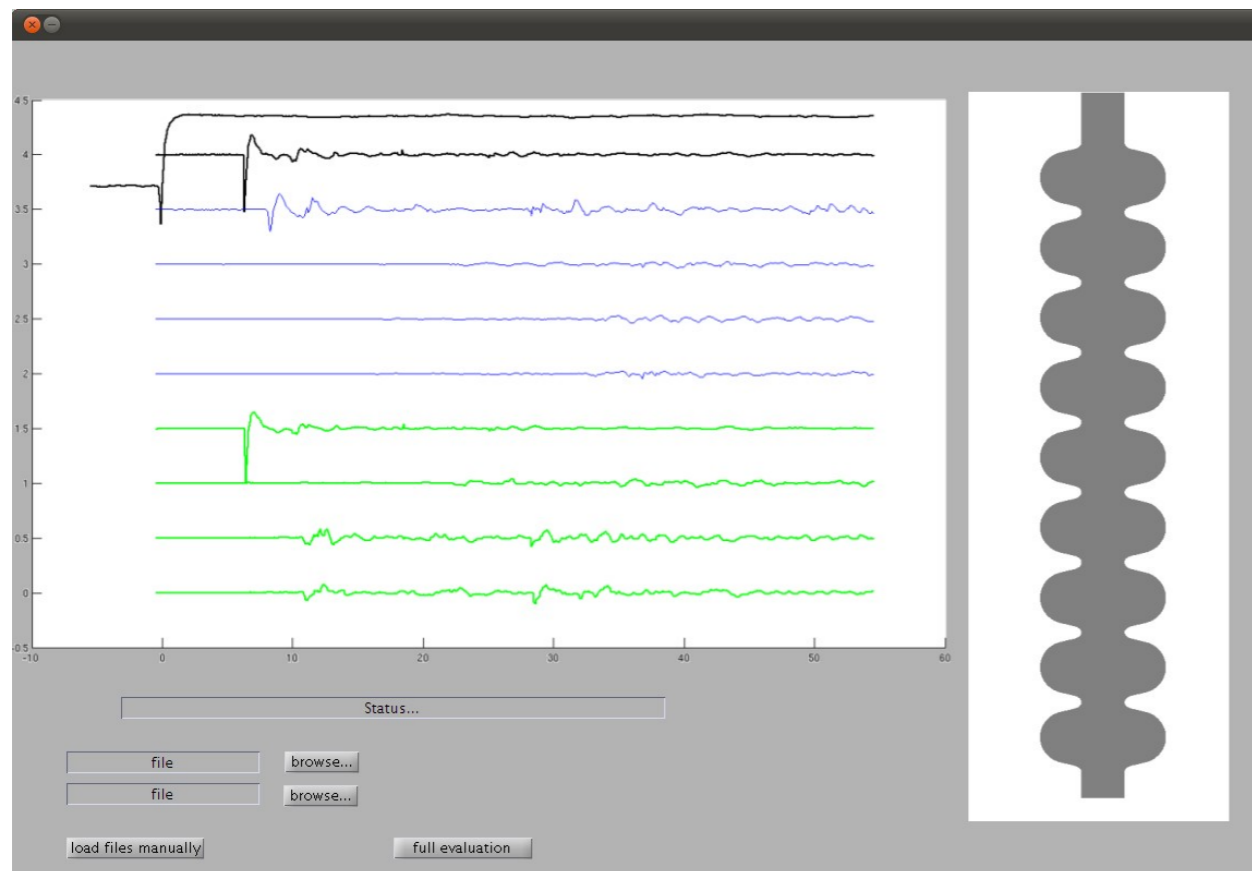


$$R_{dq} = 0.117$$



# Second sound quench detection

- Technique now routinely used in vertical test stand
- Calculation of quench location by triangulation; implemented in user interface



# Summary

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- Tools for cavity QA developed
  - Optical scanner will be in place by start of delivery of cavities
  - Catalogue properties of all cavities
  - analyse for exceptional features
  - description will form the basis of the 4th annual report
- Awaiting delivery of cavities
- Final report to describe the results