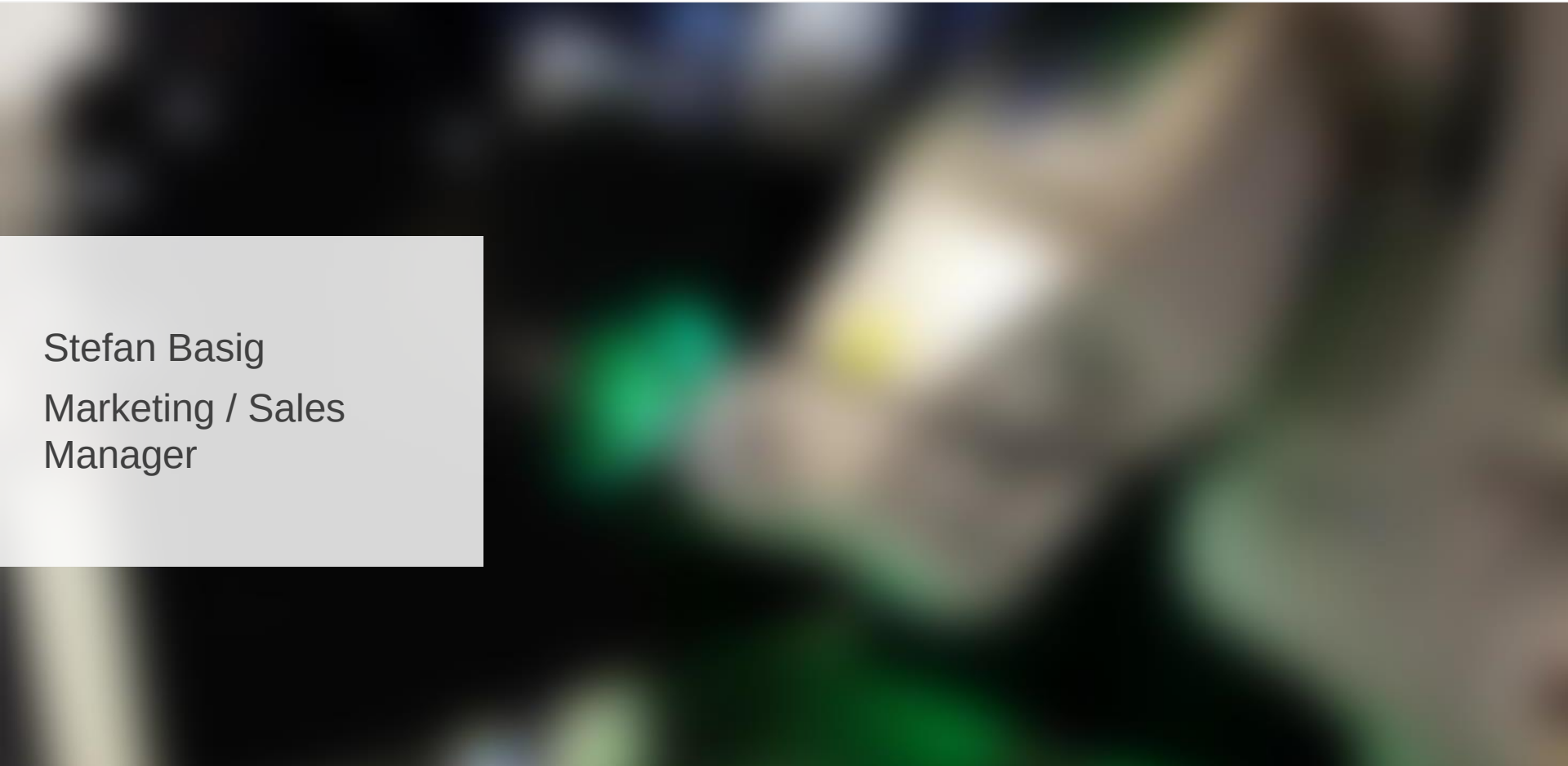
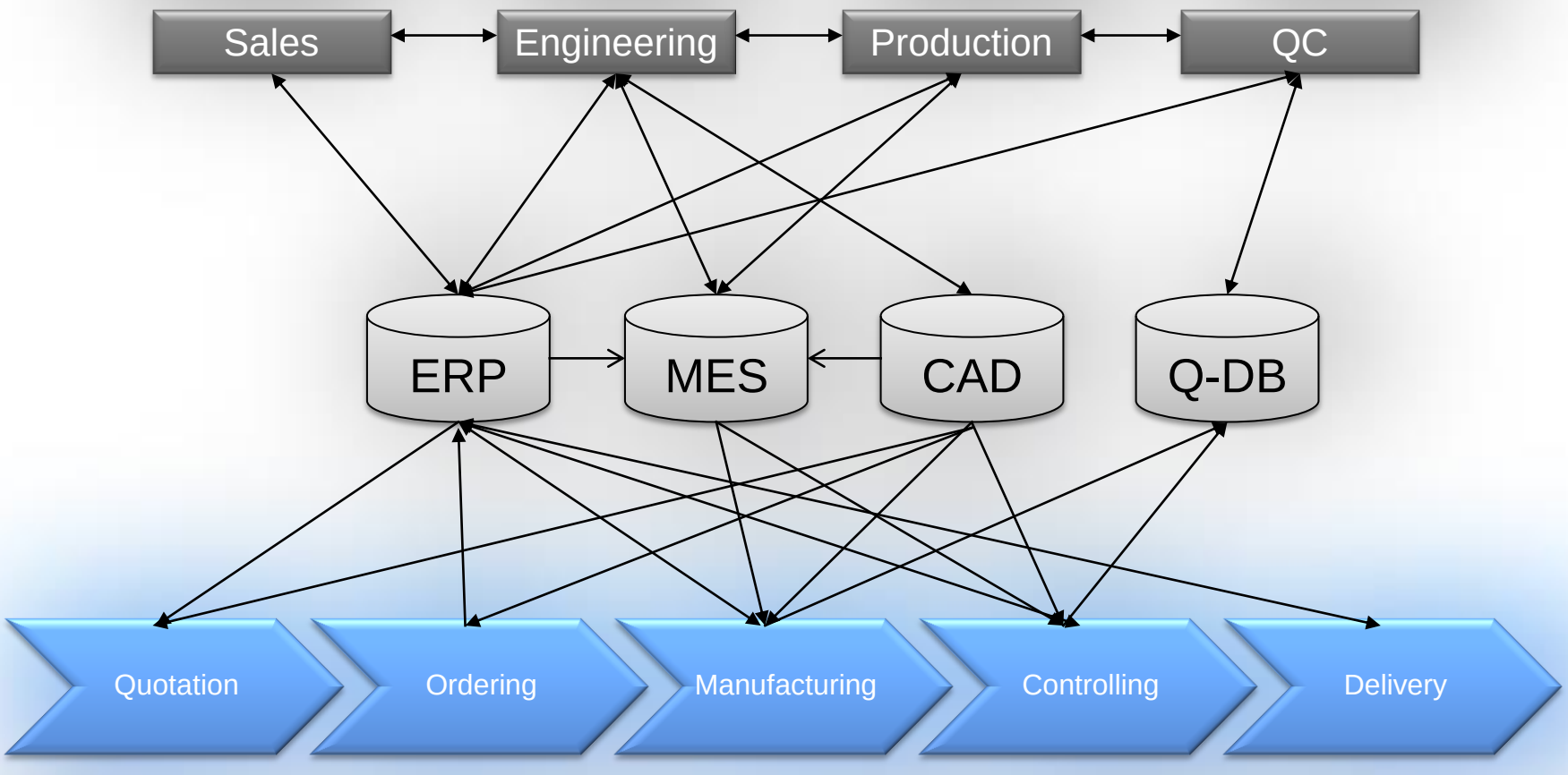
Autonomous test cell lives batch size 1



Stefan Basig

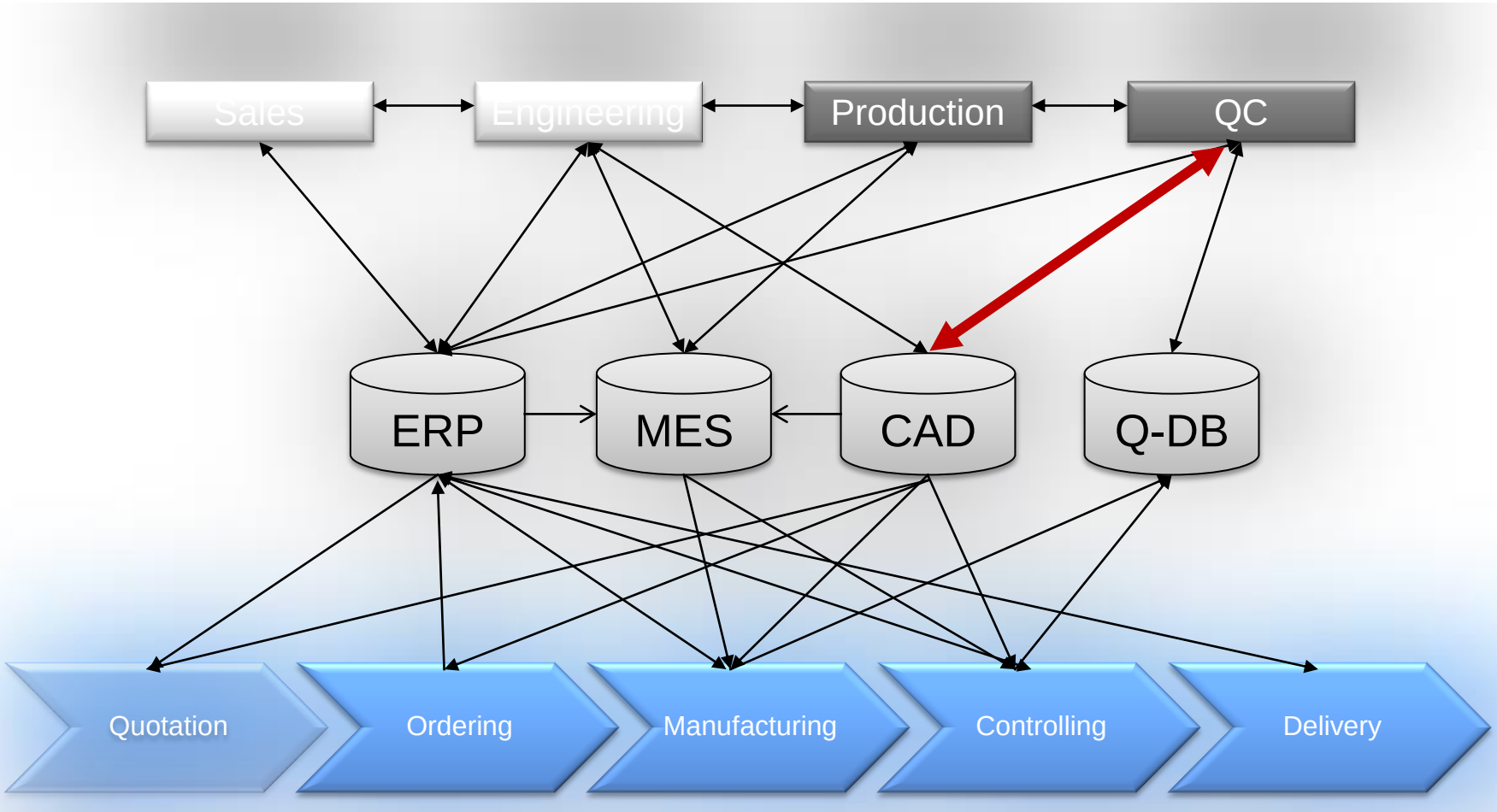
Marketing / Sales Manager

Smart Factory in practice



- ERP — Enterprise Resource Planning
- MES — Manufacturing Execution System
- CAD — Computer Aided Design
- Q-DB — Quality Data Base

Smart Factory in practice



- ERP — Enterprise Resource Planning
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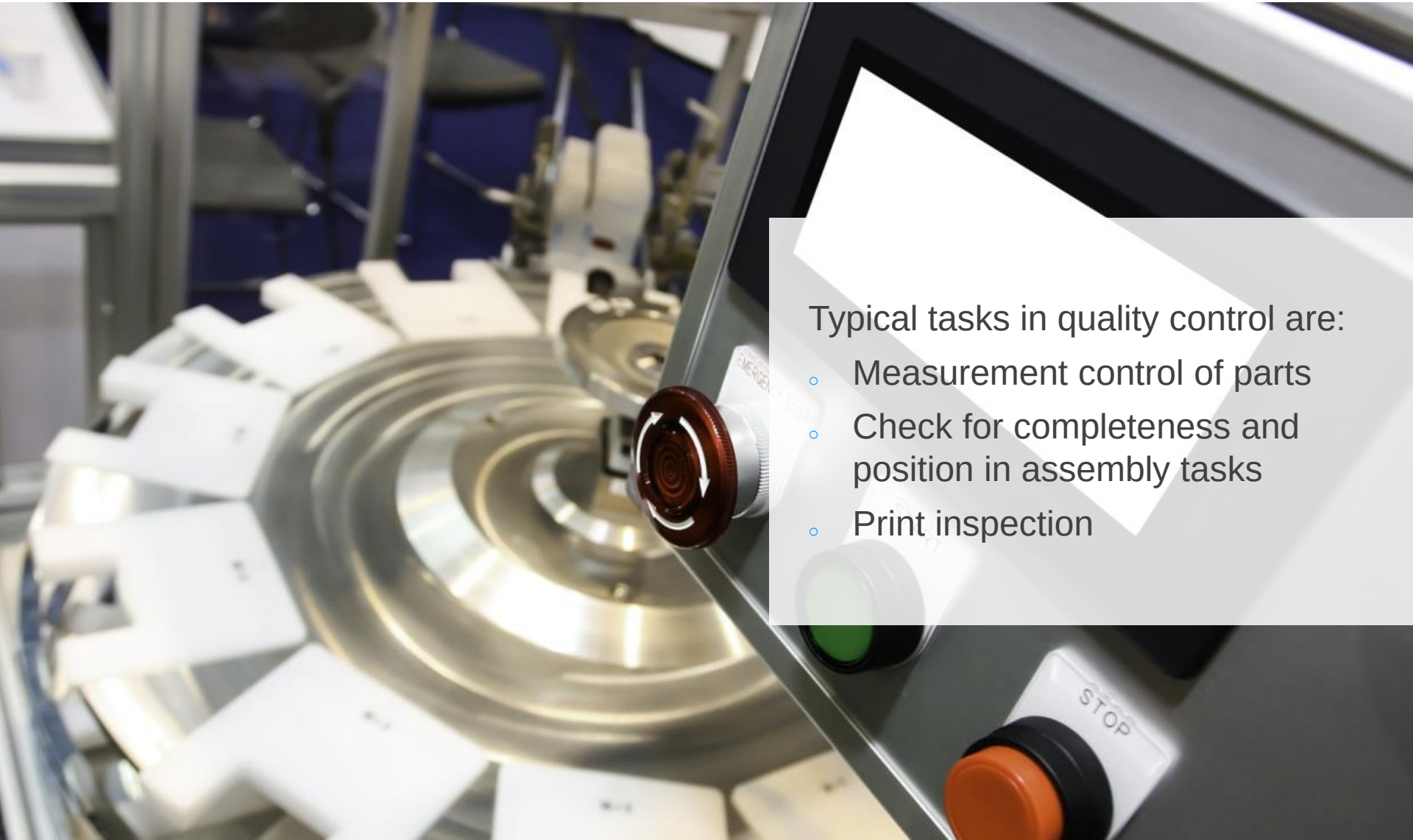
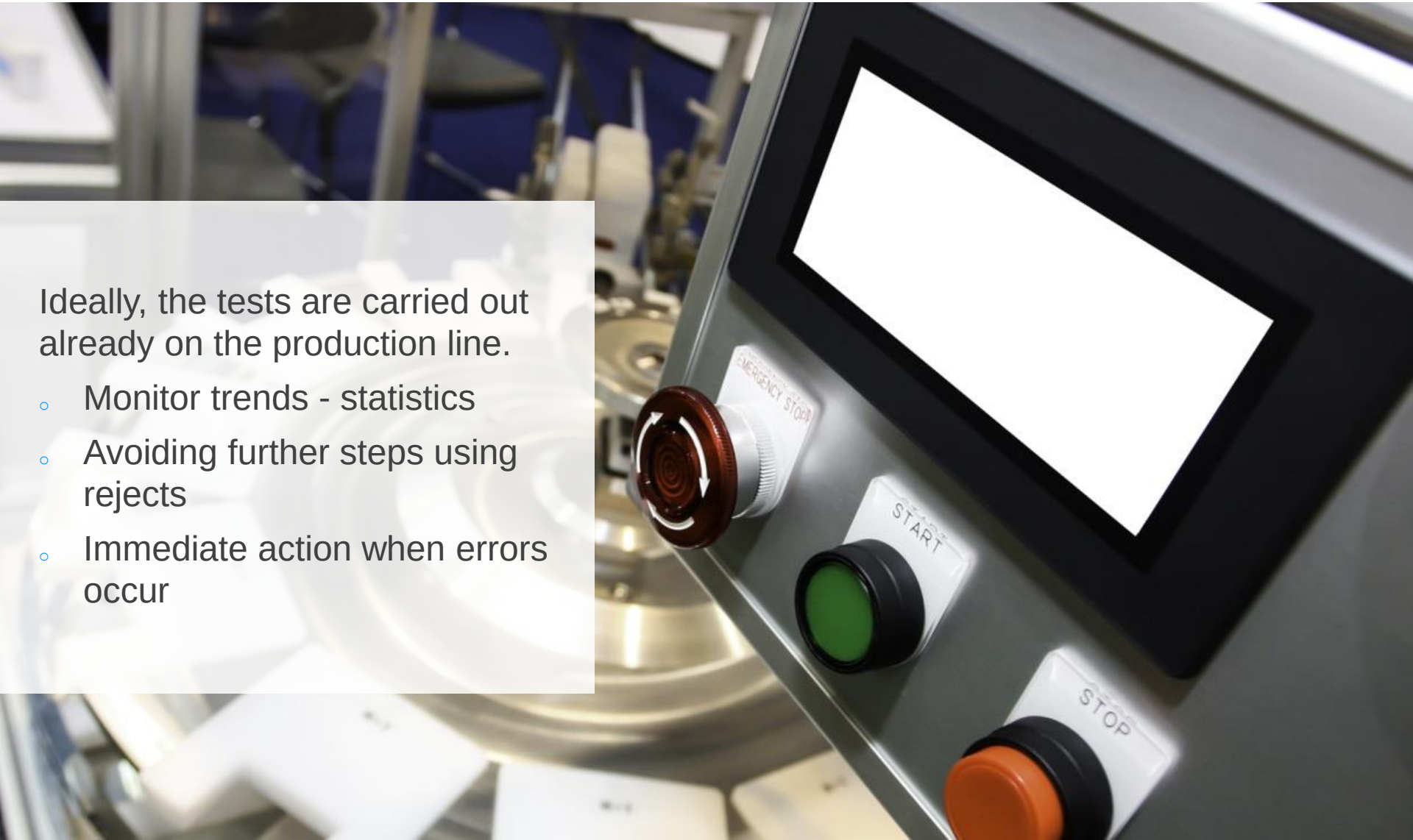
Quality Control



Typical tasks in quality control are:

- Measurement control of parts
- Check for completeness and position in assembly tasks
- Print inspection

Quality Control



Ideally, the tests are carried out already on the production line.

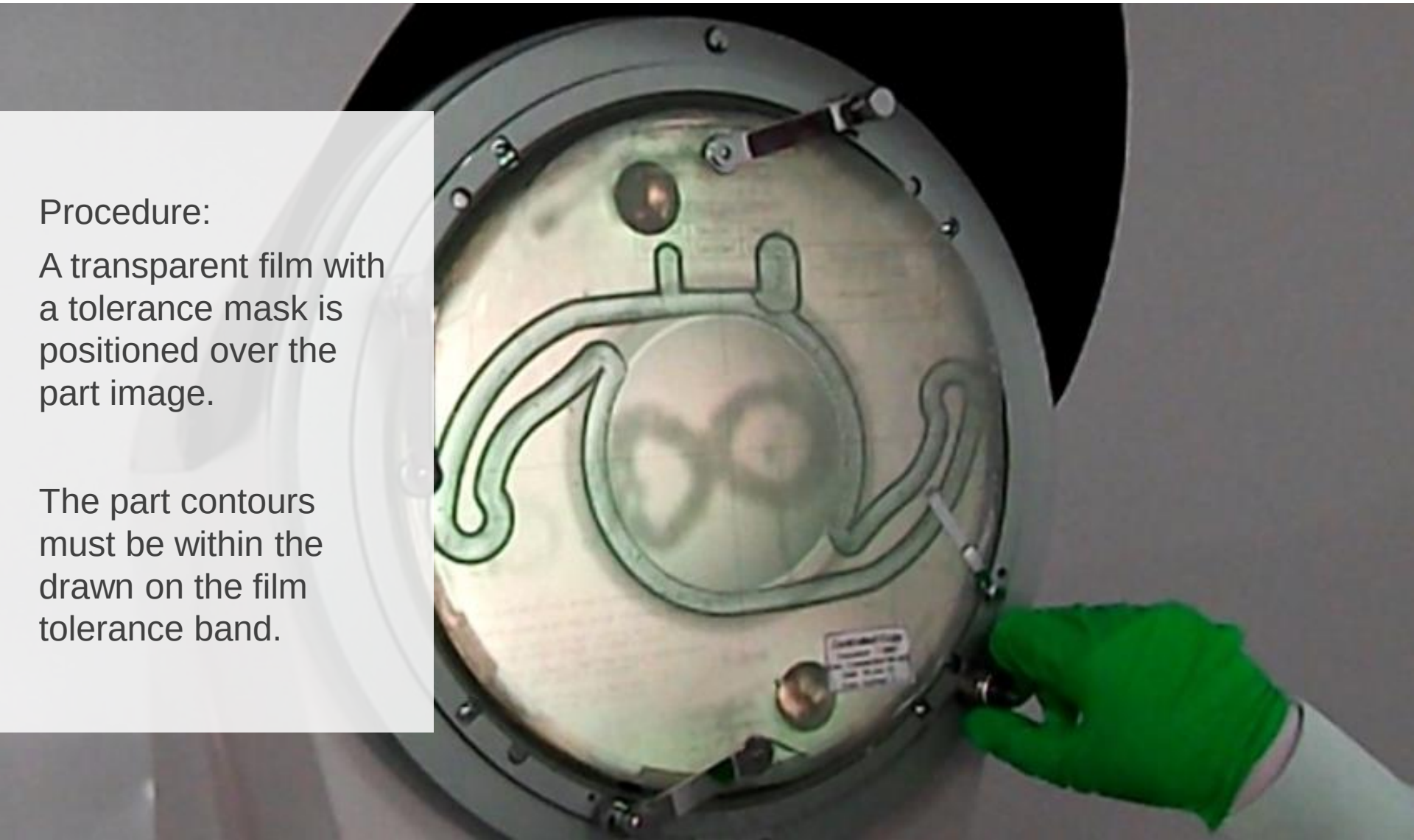
- Monitor trends - statistics
- Avoiding further steps using rejects
- Immediate action when errors occur

Quality Control

Flexible solutions are

- Vision systems for in-line inspection
- Vision systems and automatic handling for off-line test

Manually test with profile projector



Procedure:

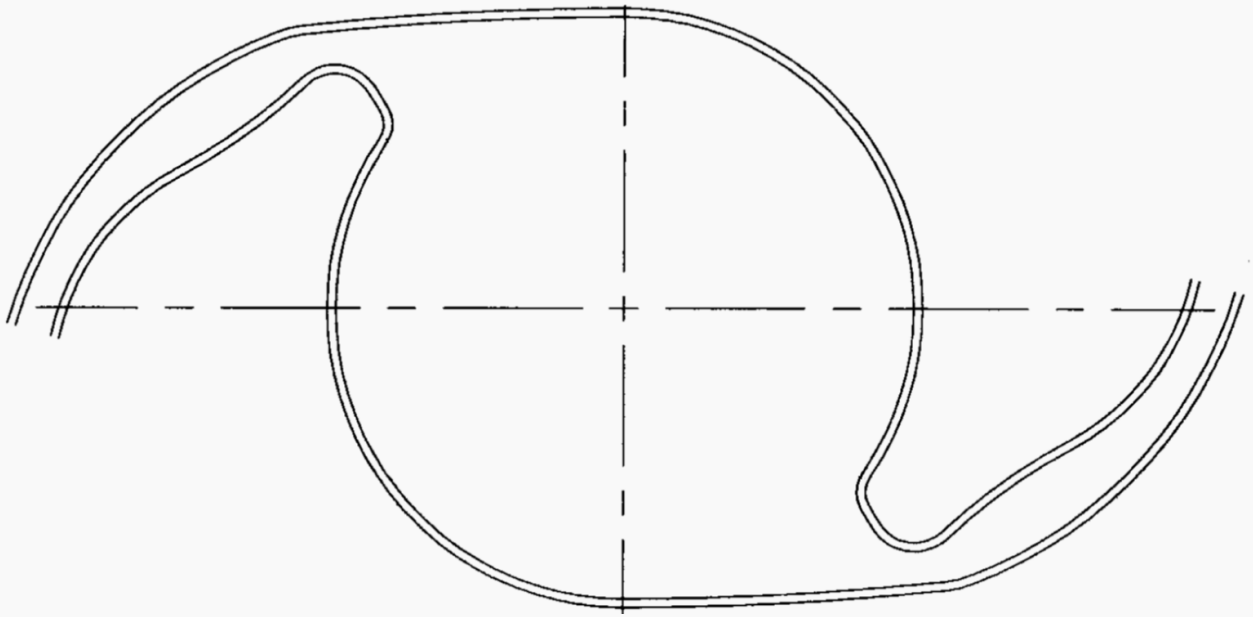
A transparent film with a tolerance mask is positioned over the part image.

The part contours must be within the drawn on the film tolerance band.

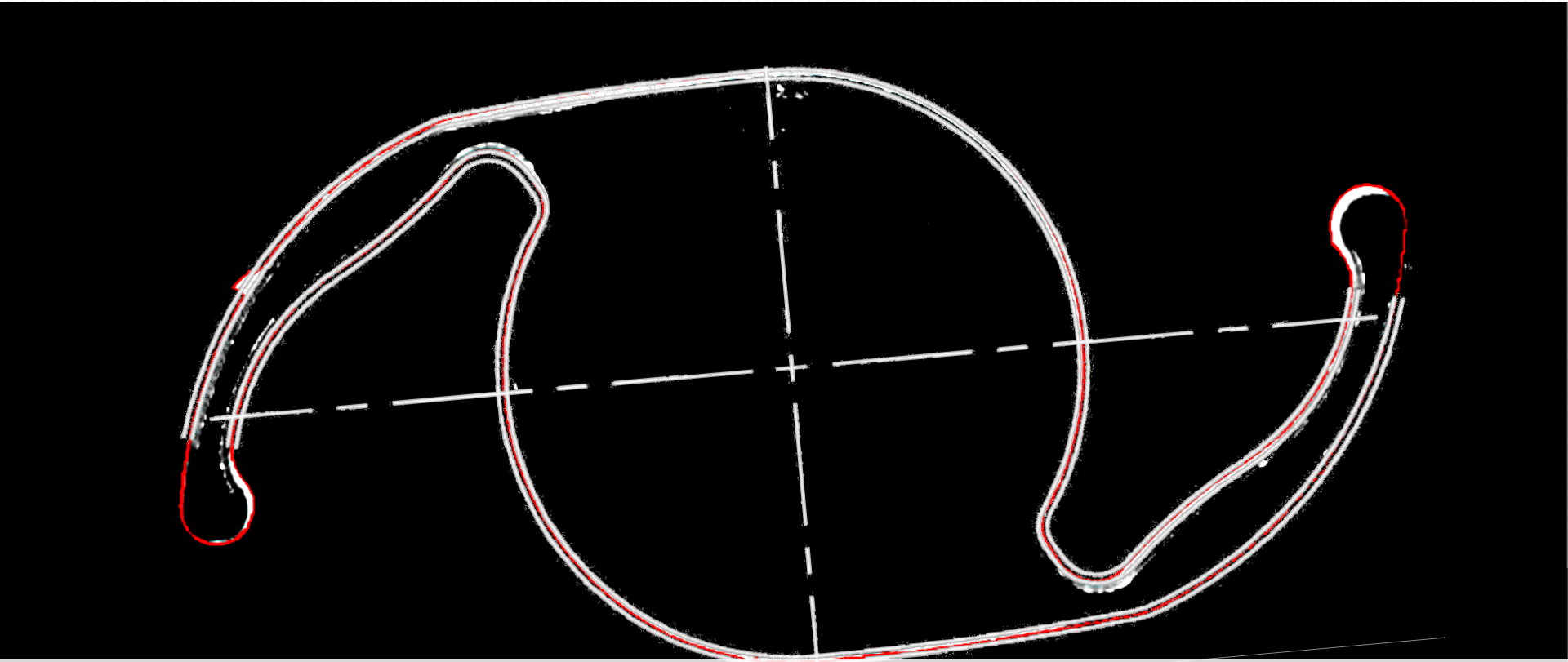
Vision system uses CAD - data

Films for the profile projector are printed from CAD files esp. (. Dxf files)

The vision system uses the same CAD files to generate tolerance ranges for automatic inspection



Vision system uses CAD - data

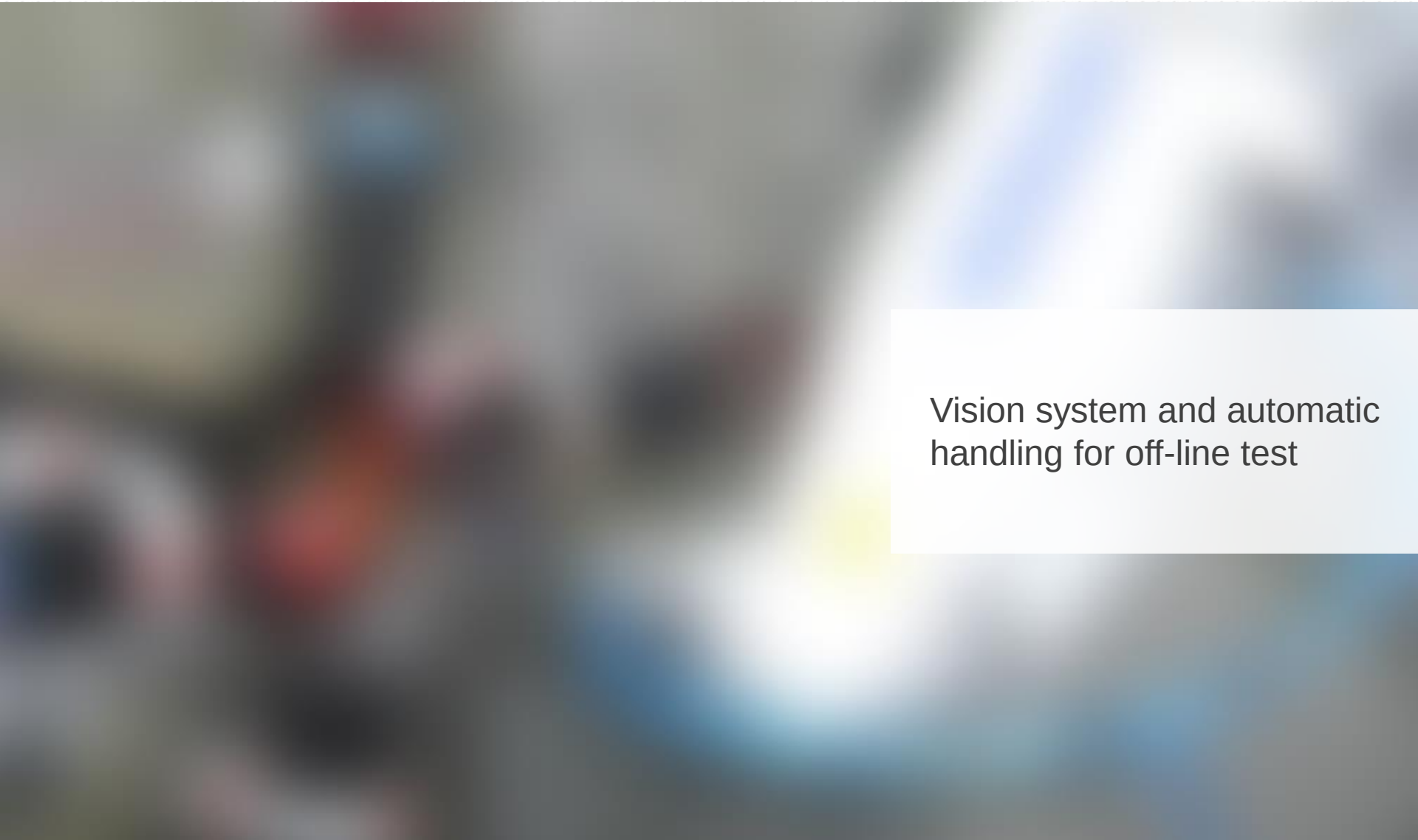


For the inspection, the part outlines are extracted from camera image and are fitted into the tolerance band by Visionexpert software.

Advantages of Vision system uses CAD - data

- No teaching of sample parts
- Ideal template for comparison (sample parts are never perfect)
- Objectification of inspection
- traceability
- Higher productivity and flexibility

Advantages of Vision system uses CAD - data

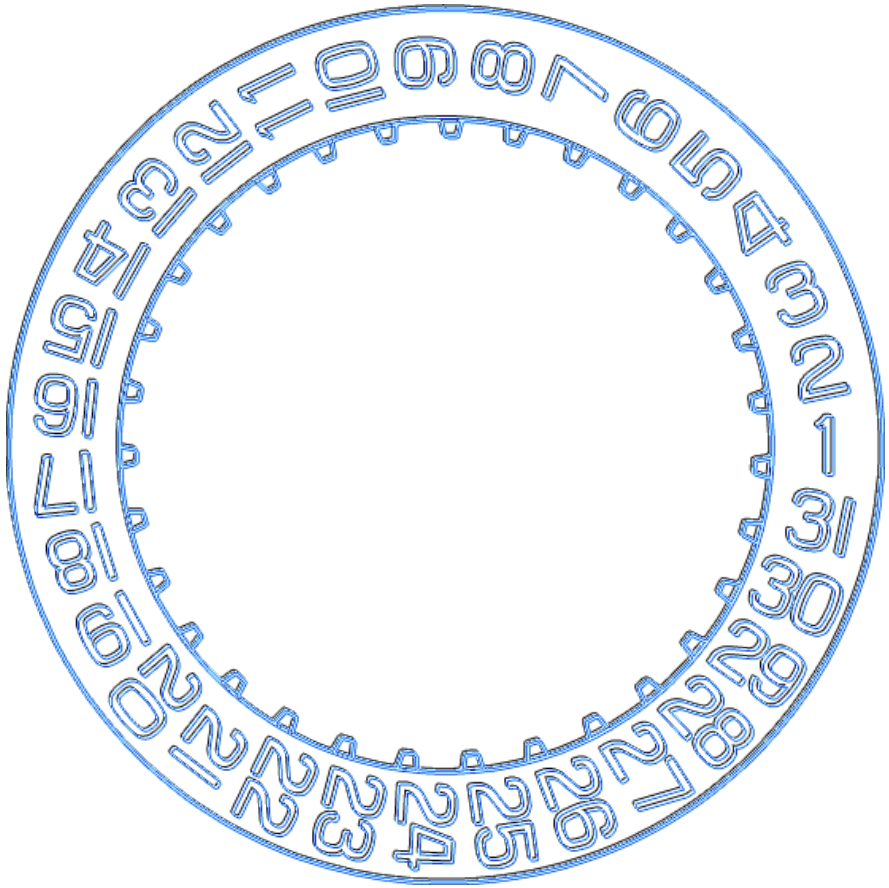


Vision system and automatic handling for off-line test

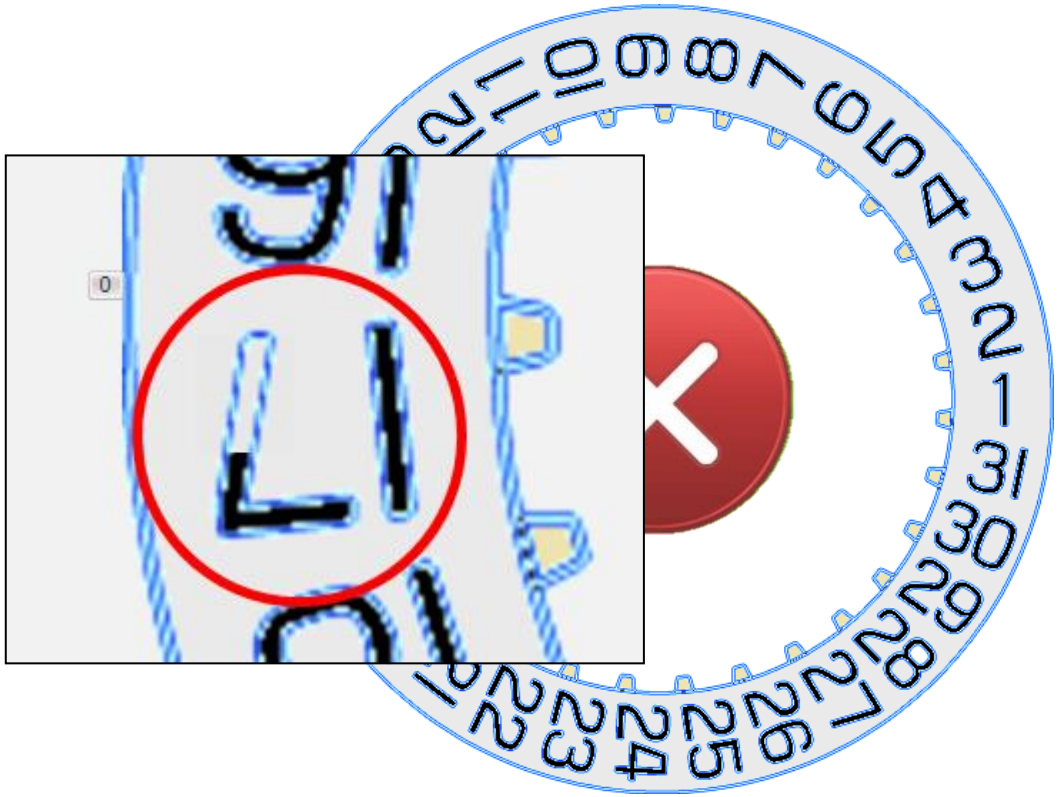
Print control directly from CAD data

Cliche is available as a CAD file

Outlining and scaling



Print control using ideal CAD template



Benefits of digitization

- No teaching of new Clichés
- Ideal template for comparison
- Objectification of inspection
- traceability

Vision system uses CAD - data

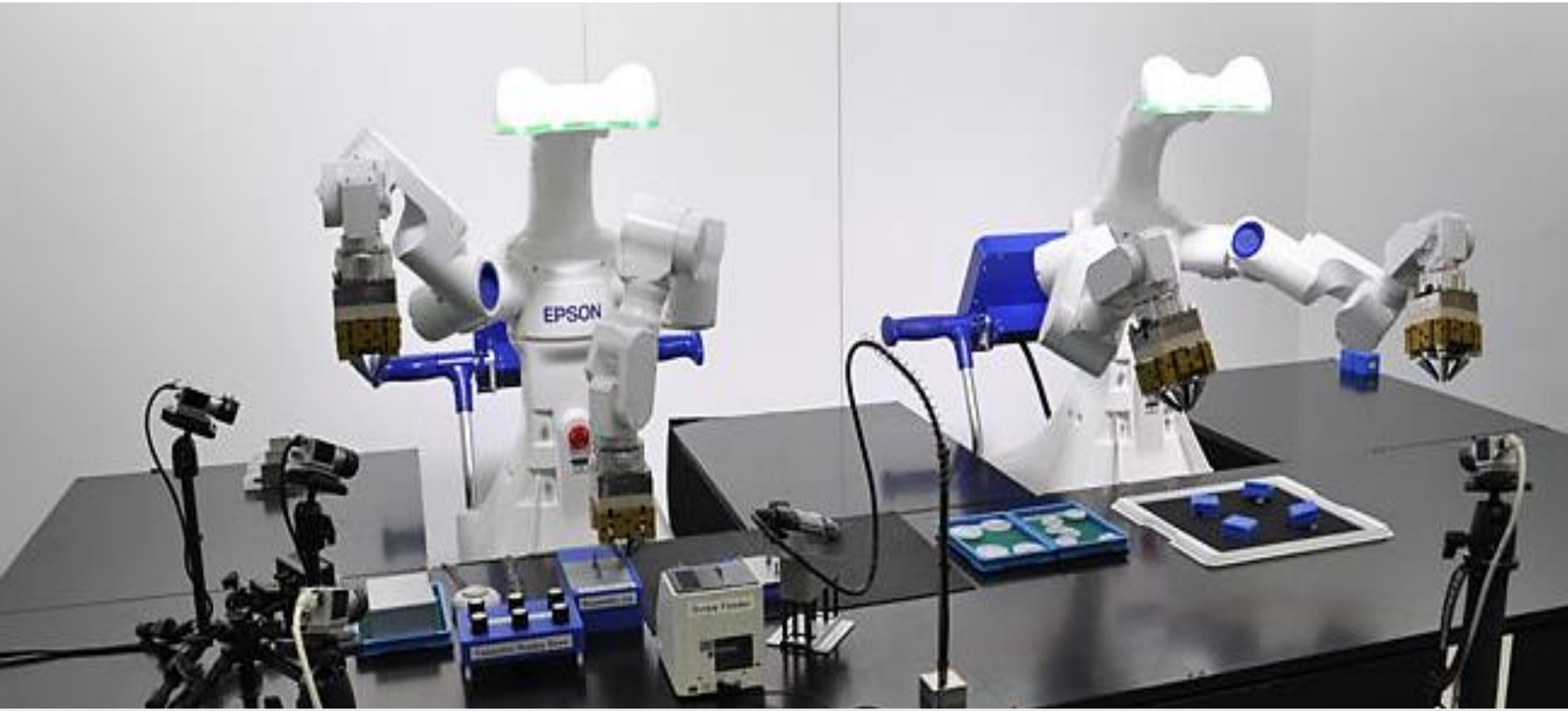
Vision system for in-line inspection of print images

Smart Factory

- Integration into IT environment
- Optical inspection from CAD data (dxf)
- batch size 1
- Off-line programming of robots and simulation of robot handling and test procedure, characterized
  - no or short downtimes of the production plant
  - risk reduction by detecting collisions
  - faster execution of tests (100% speed, restart by pressing a button)

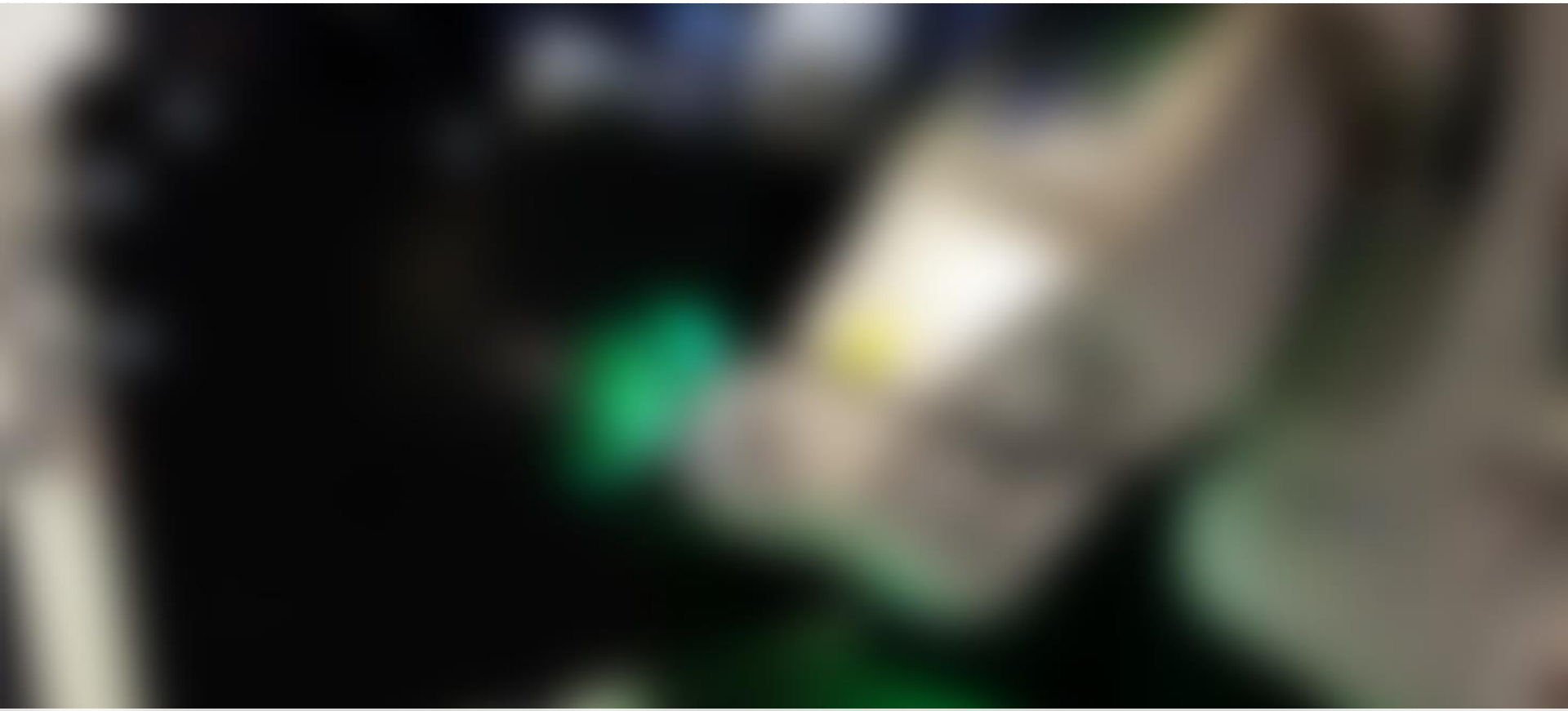
What does the future hold ?

Roboter in der Smart Factory



See, sense, think, and react: "Autonomous Dual-arm Robot"

Thank you for your attention



Realized application with quality control uses CAD data