SpraySpy®

Spray Analysis • Spray Monitoring • Spray Digitization

Evaluation of a continuous inline spray monitoring to reduce end-of-line quality inspection at Volkswagen

SURCAR Europe 2025

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Intro SpraySpy® technology – inline process monitoring for the spray application

SpraySpy® monitoring for coating processes

SpraySpy® Monitors:

- Atomization
- Volume flow
- Spray cone / spray angle
- Paint viscosity
- Equipment contamination
- Equipment functionality

SpraySpy® Advantages:

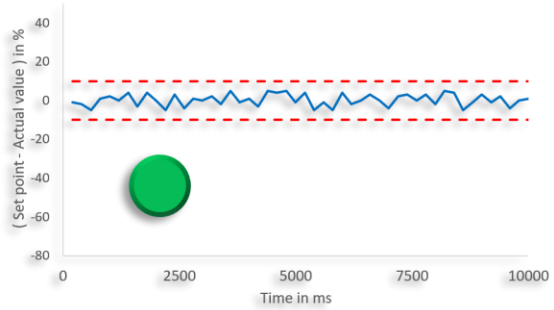
- OK/Not-OK per piece & in real time
- Better first-run-no-touch rate
- Lower maintenance costs
- Digitization of the process

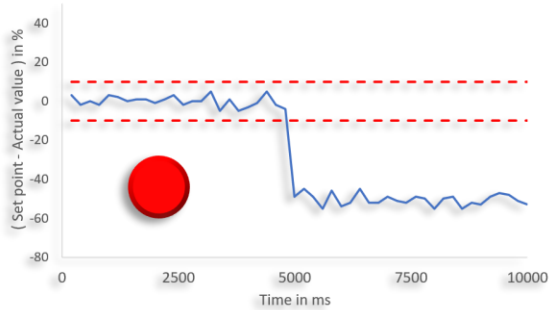
The SpraySpy® ProcessLine – Inline Monitoring

SpraySpy® inline monitoring the spray

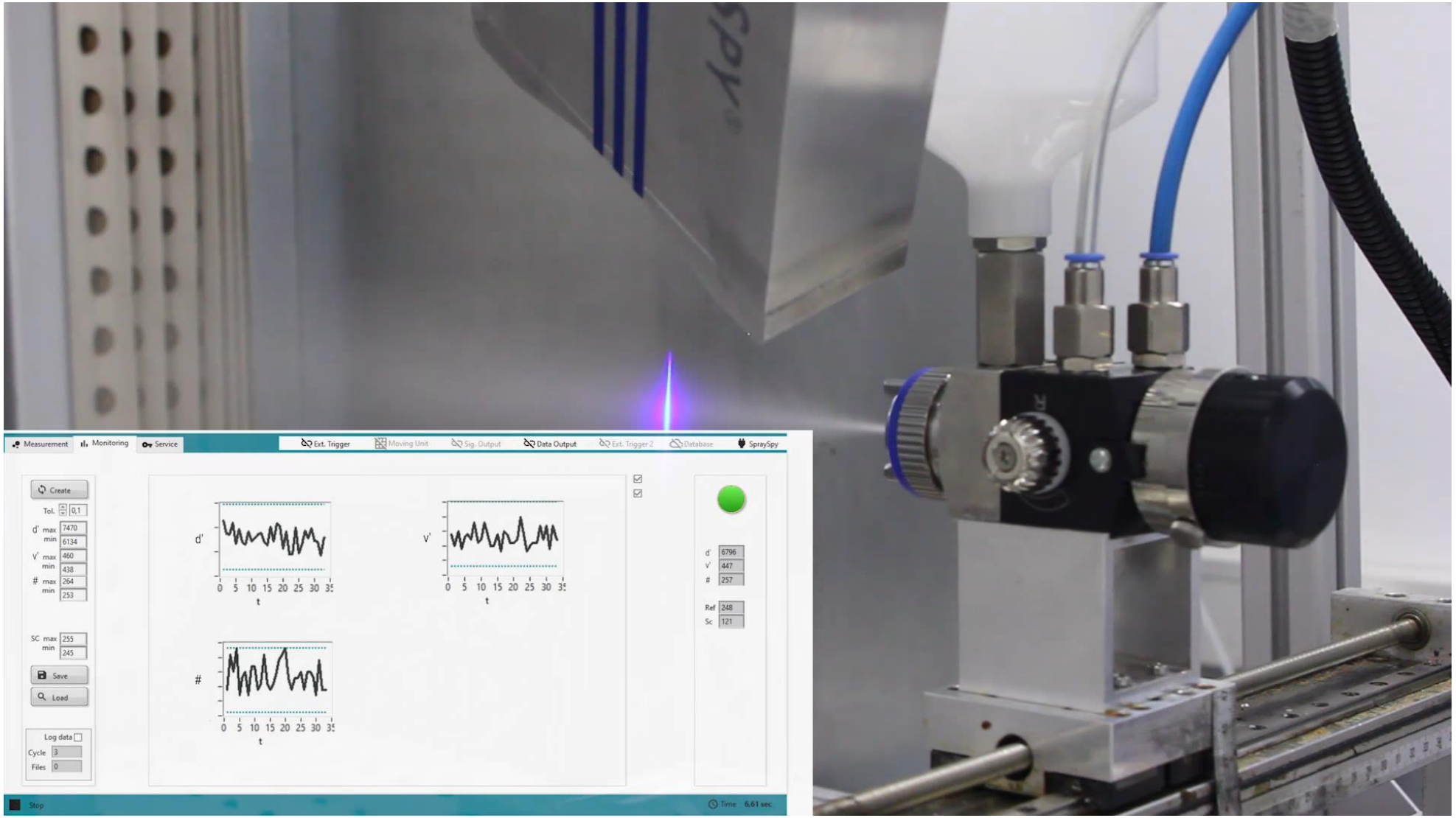
- Inline monitoring on the atomizer

- Failure detection in real-time





The SpraySpy® ProcessLine – Demo Video



Video link: https://youtu.be/L06byTkfg1Y

Evaluation of a continuous inline spray monitoring to reduce end-of-line quality inspection at Volkswagen

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Smart Sprays in Production
AGENDA

1 Initial situation - state of the art

2 Potentials of SpraySpy® inline monitoring

3 Project description

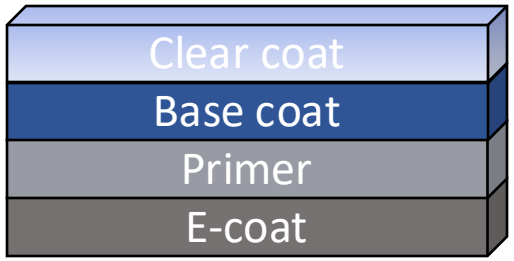
4 Scope of experiments

5 Results

6 Summary and outlook

Smart Sprays in Production
Initial situation - state of the art

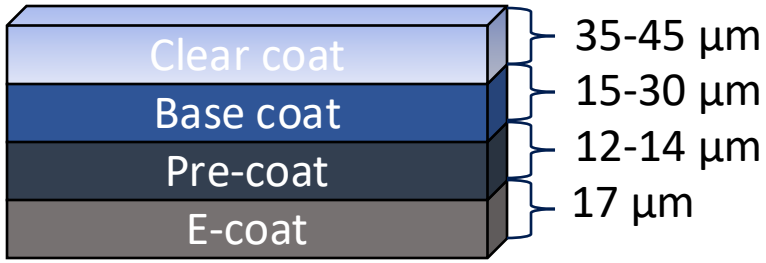
Primer painting process 5a



Coating structure in the painting process 5a.

- Primer contributes significantly to transmission protection.

Primerless painting process 2010V



Coating structure and layer thicknesses in the painting process 2010V.

- Requirement: strict adherence to **minimum layer thicknesses** to ensure transmission protection → otherwise: delamination.
- Installation of paint checker and nowadays **offline measuring cell.**

Example of delamination.

Smart Sprays in Production
Initial situation - state of the art

- Layer thicknesses determined on car body after top coat has dried → **only for 10%**.

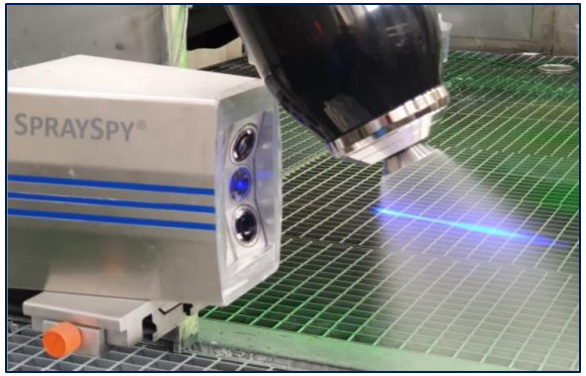
- Application errors detected ~30 vehicles after painting → risk of **high reworking costs**.

- **No error prevention measures** to ensure high quality paint jobs.

Offline measuring cell at Volkswagen paint shop.

Smart Sprays in Production
Potentials of SpraySpy® inline monitoring

- Reduction of rework.
- Reduction of film thickness and solvent emissions.
- Elimination of the current layer thickness control by measuring cell.
- Improved quality.
- Digitalization of painting process and possibility of AI and BIG DATA evaluations.
- Further step towards autonomous paint shop operation.



SpraySpy® measuring system.

Smart Sprays in Production
Project description

- **Inline monitoring** using SpraySpy® on 7 axis robot with bell atomizer at VW technical center.

- Proof of **concept suitability** according to TEP.

  → Validation of transferability from laboratory to industrial scale.

- **Patented innovation** by VWN, VW, Audi and AOM-Systems.

VW technical center with 7 axis robots.

SpraySpy® attached to bell atomizer.

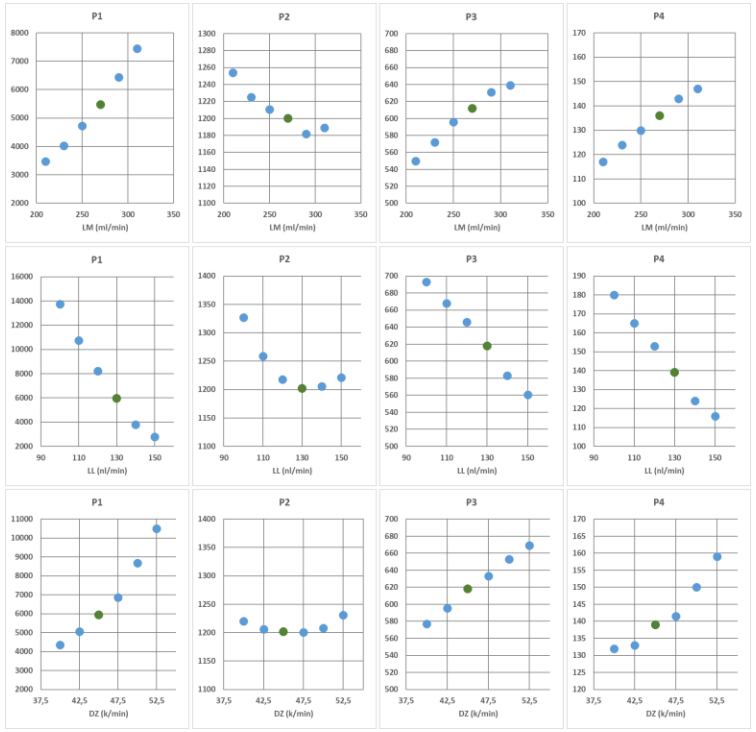
Smart Sprays in Production
Scope of experiments

- Various colors with series painting parameters
- Systematic test series around target value:
  - Paint flow: +/- 20, 40, 60 ml/min
  - Shaping air: +/- 10, 20, 30 NL/min
  - Rotational speed: +/- 2500, 5000, 7500 RPM
- Other manipulations:
  - Without / changed high voltage
  - Taped shaping air holes
  - Paint viscosity change: 15% deionized water
  - Changed bell: Smooth instead of knurled

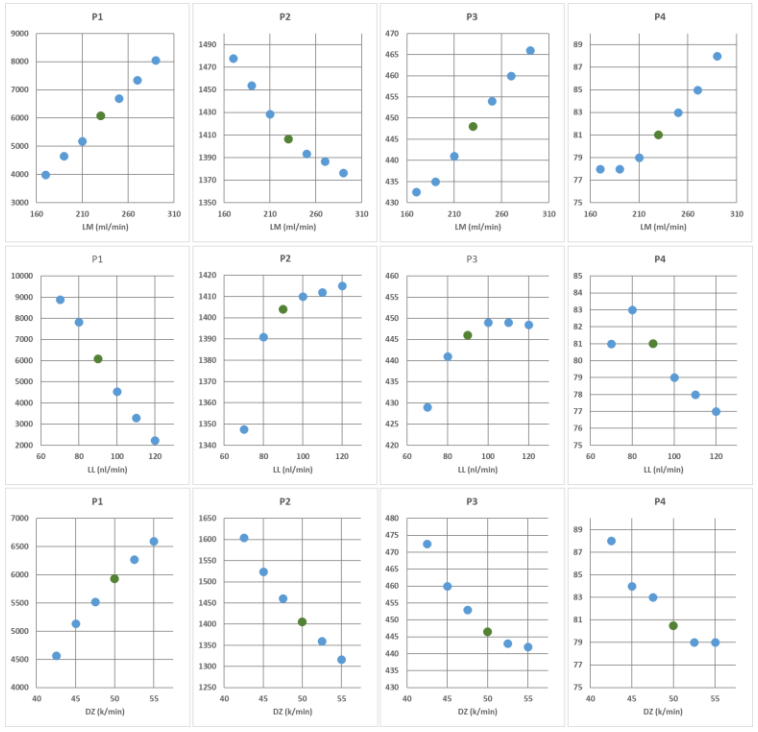
Implementation of SpraySpy® attached to bell atomizer on a 7-axis robot.

Smart Sprays in Production
Results – Systematic parameter changes

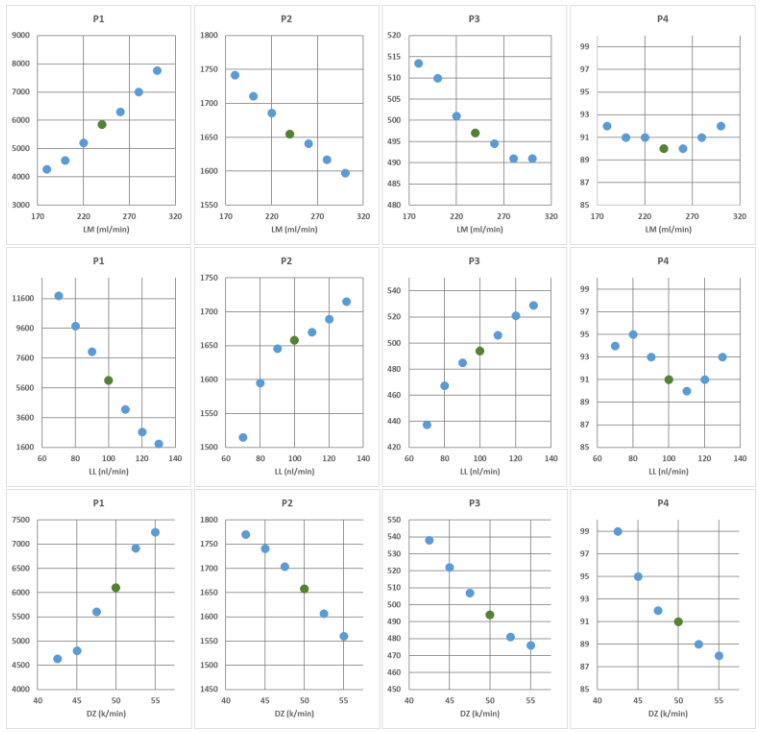
White



Silver



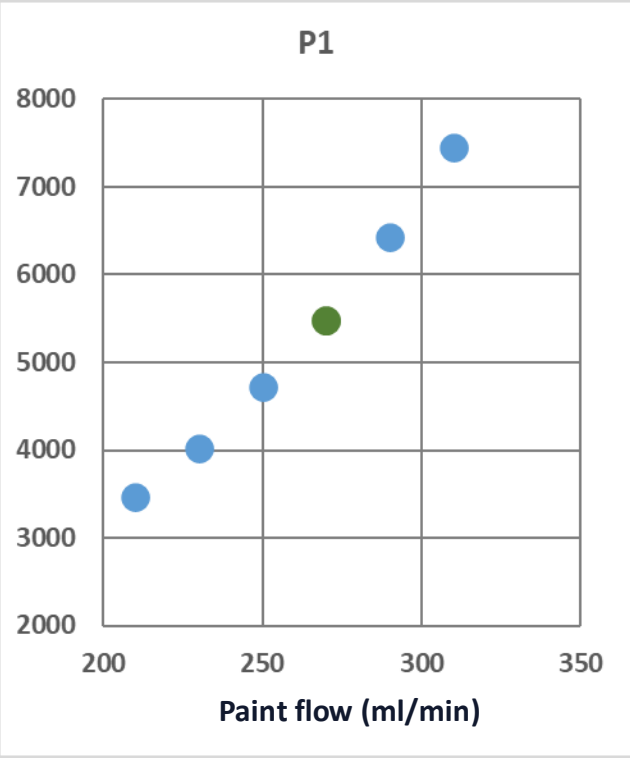
Blue



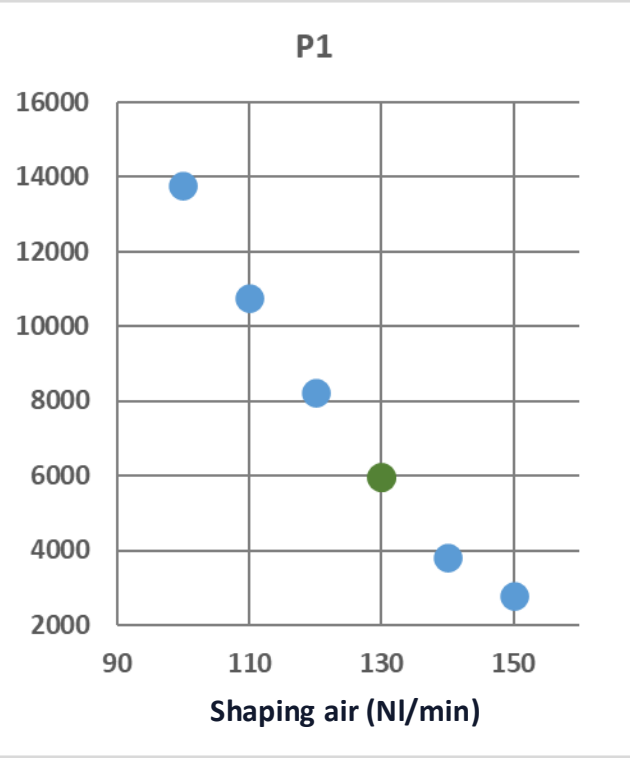
Systematic changes in measured values visible

Smart Sprays in Production
Results – Systematic parameter changes (example: white)

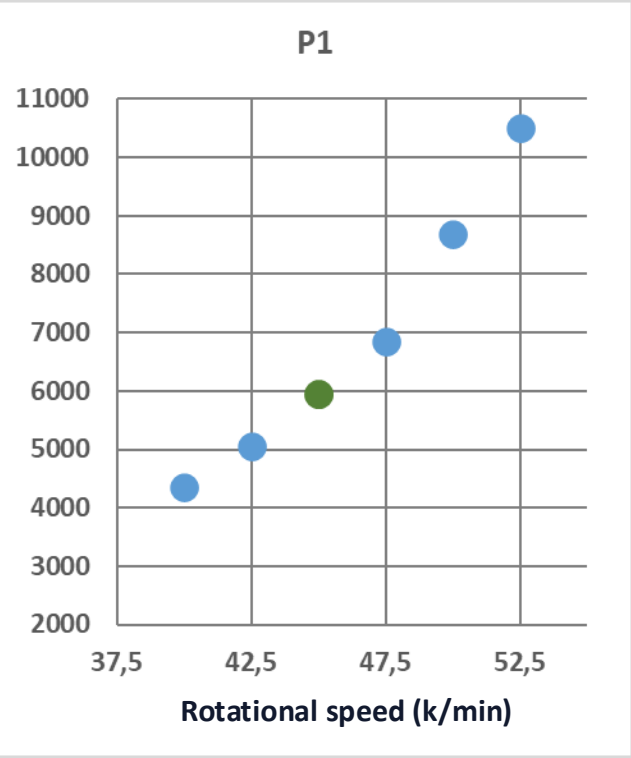
Paint flow



Shaping air

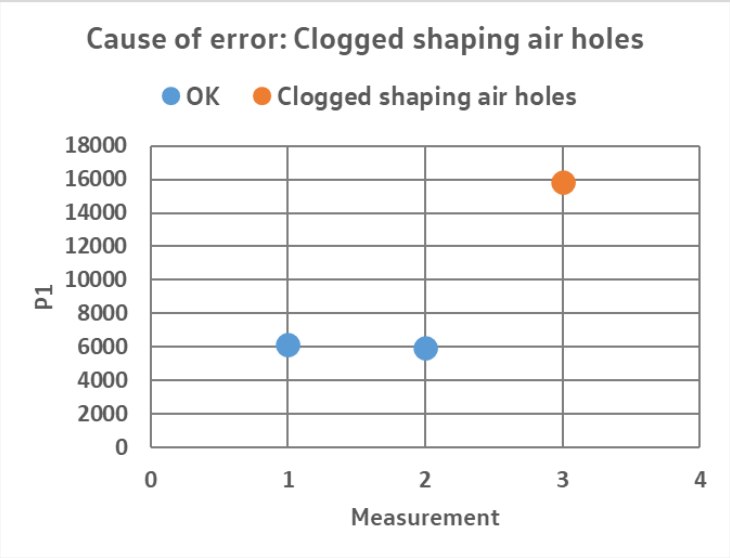


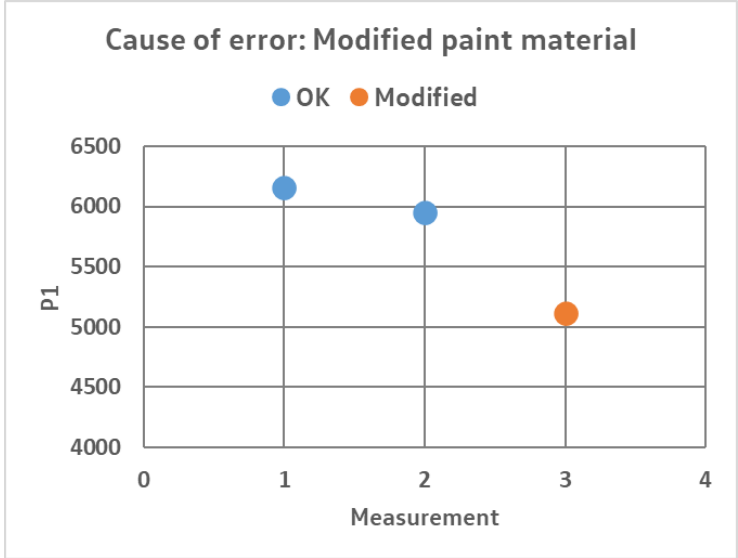
Rotational speed

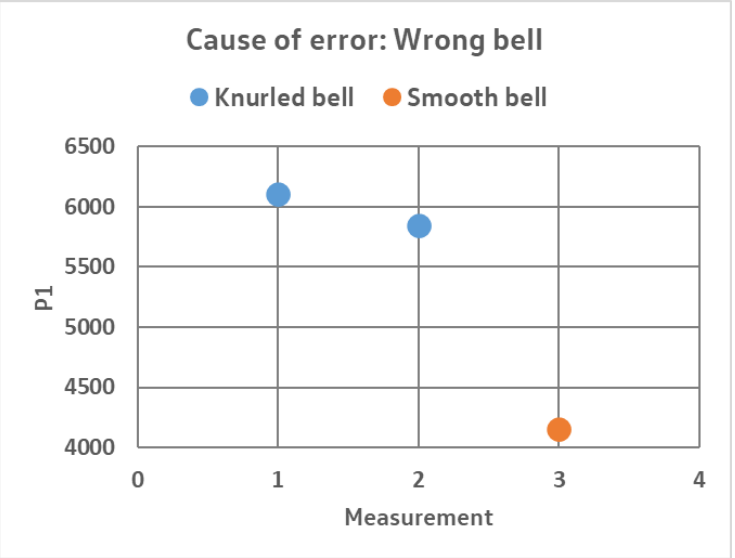


Systematic changes in measured values visible

Smart Sprays in Production
Results – Individual manipulations







Manipulations detected

Smart Sprays in Production
Summary and outlook

- Tests for concept suitability:
  - ✓ SpraySpy measurement on moving robot while painting a car body
  - ✓ Detection of painting parameter deviations and various error influences
  - ✓ Detection for various paint materials

- Outlook: SpraySpy® tests under series conditions in production

  → Goal: series release as final step of TEP.

Thank you very much for your attention!