Challenges for automated Measurement Systems

BYK-Gardner European User Meeting
Innsbruck 2013

Tobias Eid – CMO
ASIS GmbH
Automation Systems & Intelligent Solutions
Kiem-Pauli-Straße 3
D-84036 Landshut
Locations

Oldenburg (Subsidiary North)

Landshut (Headquarter ASIS)
Key Data

- **CEO**: Dipl. Ing. Hans-Jürgen Multhammer
- **CMO**: Dipl. Ing. Tobias Eid
- **COO**: Dipl. Ing. Mathias Harlander
- **Turnover**: approx. 13 Mio. €
- **Employees**: 89
- **Representatives**: Germany, China, Poland, Russia, South Africa
- **Languages**: German, English, Russian, Chinese, Turkish, Polish
Employees

- Totally: 89
- Software (PLC, Scada) 27 Engineers
- Mechanical Construction 7 Technicians
- Electrical Construction 7 Technicians
- Robot System Programming 2 Technicians/Engineers
- Robot Painting Programming 4 Technicians
- Service Mechanical/Electrical 28 Technicians
Service Portfolio

• Painting technology (Wet- and Powder coating)
• Automatic Measurement Systems
• Paint supply systems
• Robot integration
• Control- and Safety- Technology
• Scada Systems
• Robotic Flaming Equipment
Robot Integration

Integration of Paint robots in new or existing Paint Shops

(New Paint Shop A-Plas Bursa, Türkei)
Robot Integration

Integration of 4x new Primer robots with Sames Accubell Application at VW Hannover
Flaming Equipment

Pretreatment of PP parts with ASIS flaming equipment

Electrical and mechanical Design of the ASIS flaming equipment
Control- and Scada Systems

Programming and Commissioning of all Standard Systems

PLC Systems
- Siemens S7
- Siemens S5
- Rockwell Allan Bradley
- Mitsubishi

Scada Systems
- Wonderware InTouch
- CopaData Zenon
- Siemens WinCC / ProTool
Reasons for the automated Measurement

- Mounting parts have many and big intersections with the car bodies
- Consistent Appearance in color and structure
- Offline Painting of mounting parts demands a tight interface between supplier and OEM
- Manual Measurement causes much human resources with big inaccuracy
- Reproducibility of the measurement
- Higher Quality of the products
- High process safety for the supplies and the OEMs
Automated Measurement on car bodies
Automated Measurement on car bodies

Robotic Measurement of:
- Color
- Appearance
- Film Thickness

Scope of delivery from ASIS:
- Integration of all Measurement Systems
- Complete Control system
- Robots (ABB, Fanuc & KUKA)
- System Commissioning as general contractor
How does the automatic measurement works?

Triple Sensor Head

- BYK-mac ROBOTIC (Color)
- BYK WaveScan ROBOTIC (Appearance)
- JSR robotic PELT (Film Thickness)
Additional functions of the BYKmac robotic system

- Sparkling
- Graininess
Advantage of the automatic BYK systems
Comparability of the manual and the automatic tool

WaveScan

BYK-mac

Excellent correlation between the measurement results of the manual and the automatic systems
Automated Measurement on plastic parts

Robotic Measurement of:
- Color
- Appearance

Scope of delivery from ASIS:
- Integration of all Measurement Systems
- Ultrasonic Pre-Positioning System
- Construction of a rotatable Adapter
- Complete Control System
- Robot integration and programming
- System Commissioning as general contractor
How does the automatic measurement works?

BYK-mac ROBOTIC (Color)

Rotatable Adapter (0°, 90°, 180°)

Ultrasonic-Pre-Positioning

Wave-Scan ROBOTIC (Structur)
How does the automatic measurement works?

Color Measurement with BYK-mac ROBOTIC

1. The robot moves in Pre-Position
2. The distance between sensor head and car body is measured, hereby, the ultrasonic system is used
3. The sensor head is calibrated in 90° to the surface in maximum 3 steps
4. The TCP of the robot is changed to the TCP of the BYK-mac ROBOTIC
5. The robot moves the sensor on the surface, that the 4 “pins” of the BYK-mac ROBOTIC touch the body
6. The fine calibration is done with the distance and angle values of the BYK-mac ROBOTIC
7. If all values are in range, the measurement starts
8. The values are transmitted via .xml file to the quality management tool
What process time is necessary for the automatic measurement?

<table>
<thead>
<tr>
<th></th>
<th>BYK-mac ROBOTIC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultrasonic Measurement and correction</td>
<td>4,5 s</td>
<td></td>
</tr>
<tr>
<td>Rotate the tool to measurement position</td>
<td>8,9 s</td>
<td></td>
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<tr>
<td>Position correction on the part per cycle</td>
<td>2,0 s</td>
<td></td>
</tr>
<tr>
<td>Measurement BYKmac, incl. Effects</td>
<td>8,8 s</td>
<td></td>
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<tr>
<td><strong>Total time</strong></td>
<td><strong>26 s</strong></td>
<td></td>
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<table>
<thead>
<tr>
<th></th>
<th>WaveScan ROBOTIC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2x Ultrasonic Measurements + correction</td>
<td>9,8 s</td>
<td></td>
</tr>
<tr>
<td>Rotate the tool to measurement position</td>
<td>0,5 s</td>
<td></td>
</tr>
<tr>
<td>Measurement WaveScan</td>
<td>3,5 s</td>
<td></td>
</tr>
<tr>
<td><strong>Total time</strong></td>
<td><strong>14 s</strong></td>
<td></td>
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</tbody>
</table>
Automatic film thickness measurement

Technical opportunities

- Measurement of up to 5 different layers (KTL, Primer, Basecoat, Clearcoat)
- Accuracy +/- 1µm
- Nondestructive Measurement
- Measurement on different substrates
- Contact media deionized water
- Every media has to be calibrated separately
- Process time per measurement: 11s
ASIS CQA – Coating Quality Analyzer

BYK-Link Software generates .xml File

Scada PC

Send data from .xml File to Database with „Importer“ Software

Validation of the data with CQA Software

Statistical & Historical functions for QM in the CQA Software

DataBase

Robot Station

Quality Office PC

6. Mai 2013

IDEEN – DENKEN – HANDELN
CQA – Coating Quality Analyzer

- Administration of all parts
- Possibility to manage different measurement systems (BYK-mac, Wave-Scan, JSR)
- Possibility to import values form manual systems
- Analysis of the measured values, depending on the different customers requirements
- Instant analysis of the values to give immediate feedback
- Definition of warn- and error limits of the measures values (LAB, Thickness,…)
- Large scaled statistical functions in analysis
- Graphical analysis
- Compatible with all standard Database systems
- Interface with BASF ColorCare and BMW AQM
Automatic laboratory system

Technical Data

- Automatic Measurement of trial panel in different sizes and substrates

- Each panel can be measured with an individual program

- Different tools are used

- Color-, Structure-, Mottling-, Gloss- und Film thickness Measurement
Projects and Customers World Wide

• BMW Dingolfing (2004) 2x Fanuc Robots with CarFlash, WaveScan and JSR for Car Bodies
• BMW Regensburg (2005) 2x KUKA Robots with CarFlash, WaveScan and JSR for Car Bodies
• BMW Leipzig (2006) 2x KUKA Robots with CarFlash, WaveScan and JSR for Car Bodies
• BMW Oxford (2006) 2x KUKA Robots with JSR for Car Bodies
• Peguform Neustadt (2008) 2x Fanuc Robots with CarFlash, WaveScan for Plastic Parts
• Daimler Rastatt (2011) 1x KUKA Robot Integration of BYKmac for Car Bodies
• BMW Dingolfing, Oxford and Leipzig (2011/2012): Integration of BYK-mac instead of CarFlash
• BMW Landshut (2011) 1x ABB Robot with BYK-mac for Plastic Parts
• Minghua Moulding Beijing (2012) 1x ABB Robot with BYK-mac and WaveScan for Plastic Parts
• BMW Shenyang (2012/2013) 2x KUKA Robots with BYK-mac, WaveScan and JSR for Car Bodies
• Safeway Hefei (2013) 1x ABB Robot with BYK-mac and WaveScan for Plastic Parts
• BMW Spartanburg (2013): Integration of BYK-mac instead of CarFlash
• BMW Leipzig (2013) 1x ABB Robot with BYK-mac and WaveScan for Plastic Parts
ASIS Substitutes and Services

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Shanghai TZ ME Engineering CO., Ltd.
8 Floor, No. 393 building, Lane 1555
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WEST BDC, Shanghai

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Thank you for your attention

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