LEADING IN PRODUCTION EFFICIENCY
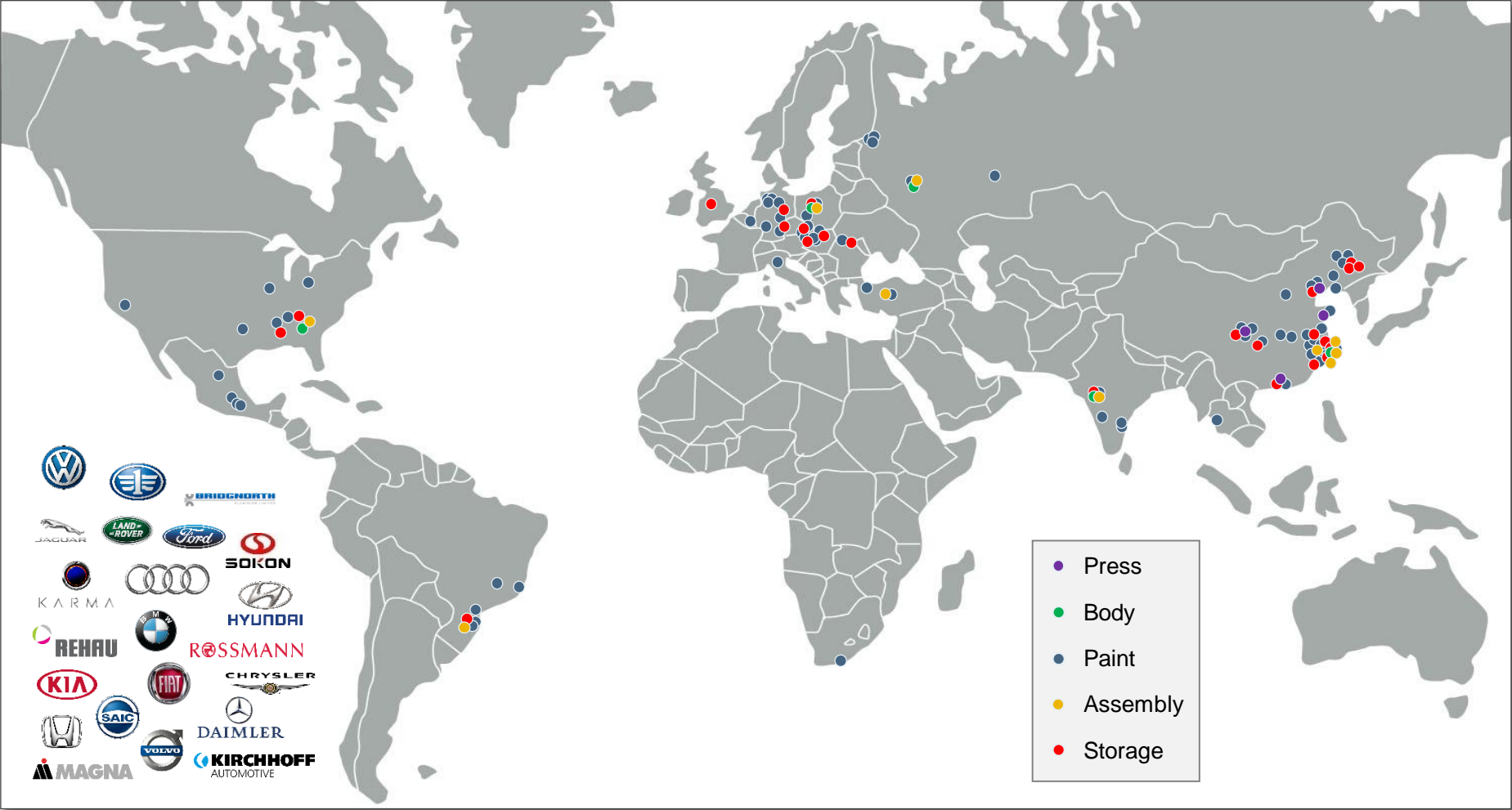
DÜRR

DXQ – State of the art software products for plant operation

October 23, 2019
Bietigheim-Bissingen

**Bernd Kremer, Senior Manager Sales Digital Solutions, Dürr Systems AG**

Dürr – 21 years of digital transparency with Dürr

Global success

- 178 shops
- 105 locations
- 20 countries
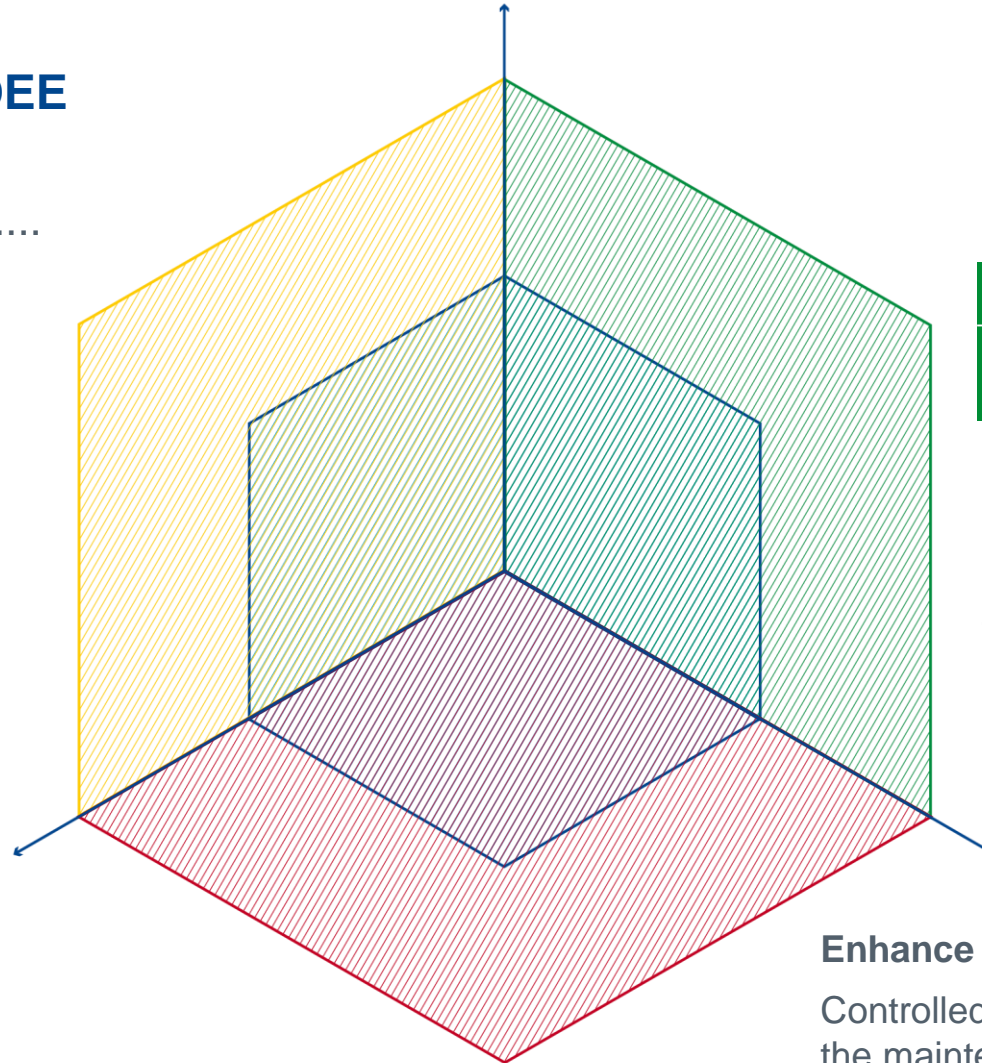- 6 completely integrated factory systems
- 4 press shops

Legend:
- Press
- Body
- Paint
- Assembly
- Storage

Agenda

DÜRR

1 DXQ digitalization by Dürr

2 Wheel tracking solution by Olpidürr

3 Questions and answers
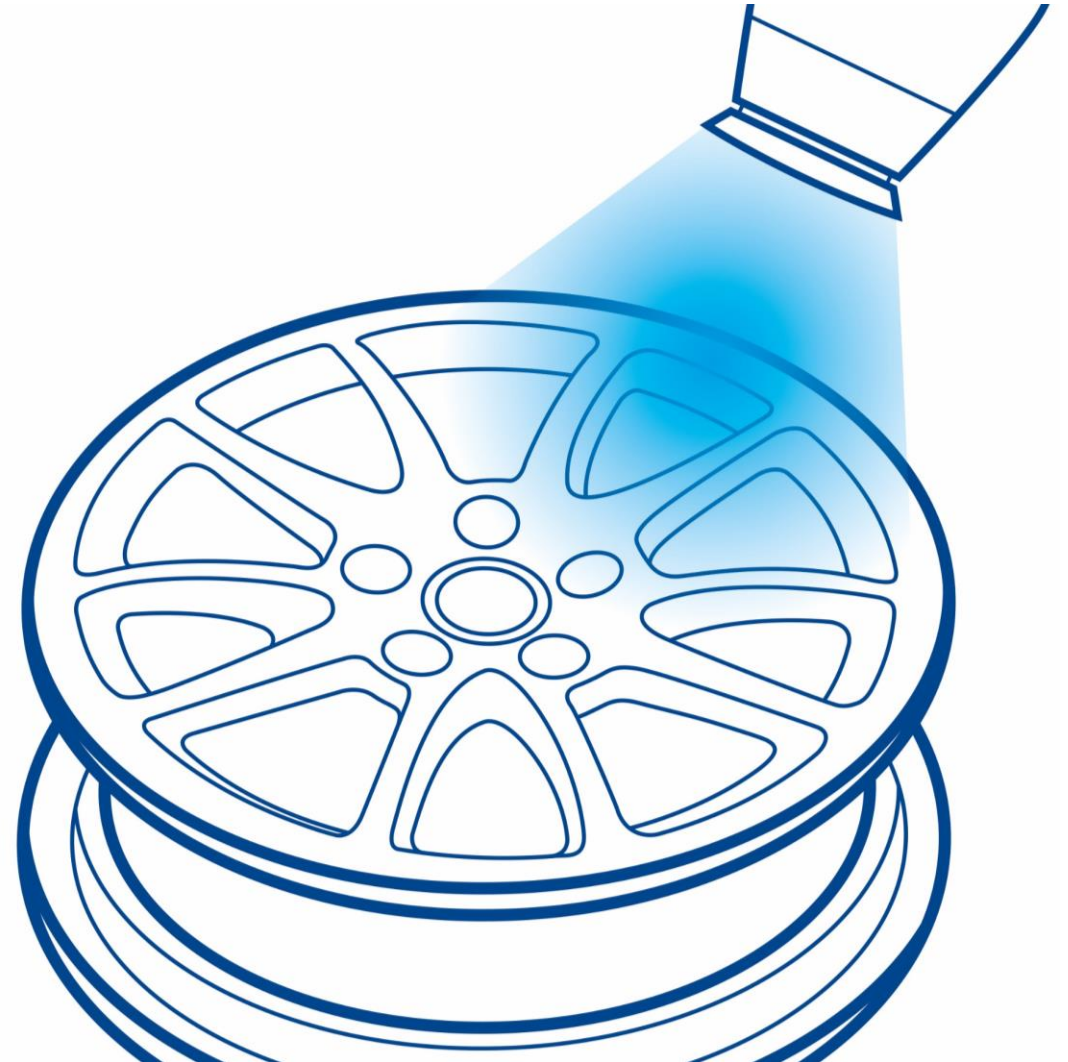
Plant operation
Approaches to improve the OEE

DÜRR

OEE is made up of three aspects ....

100% production quality

The main focus of quality management departments

Increase OK units / Quality

Recording production and quality data with reference to the single product. Analysis and correlation of the recorded date

- **DXQ**equipment.analytics
- **DXQ**plant.analytics

100% system performance
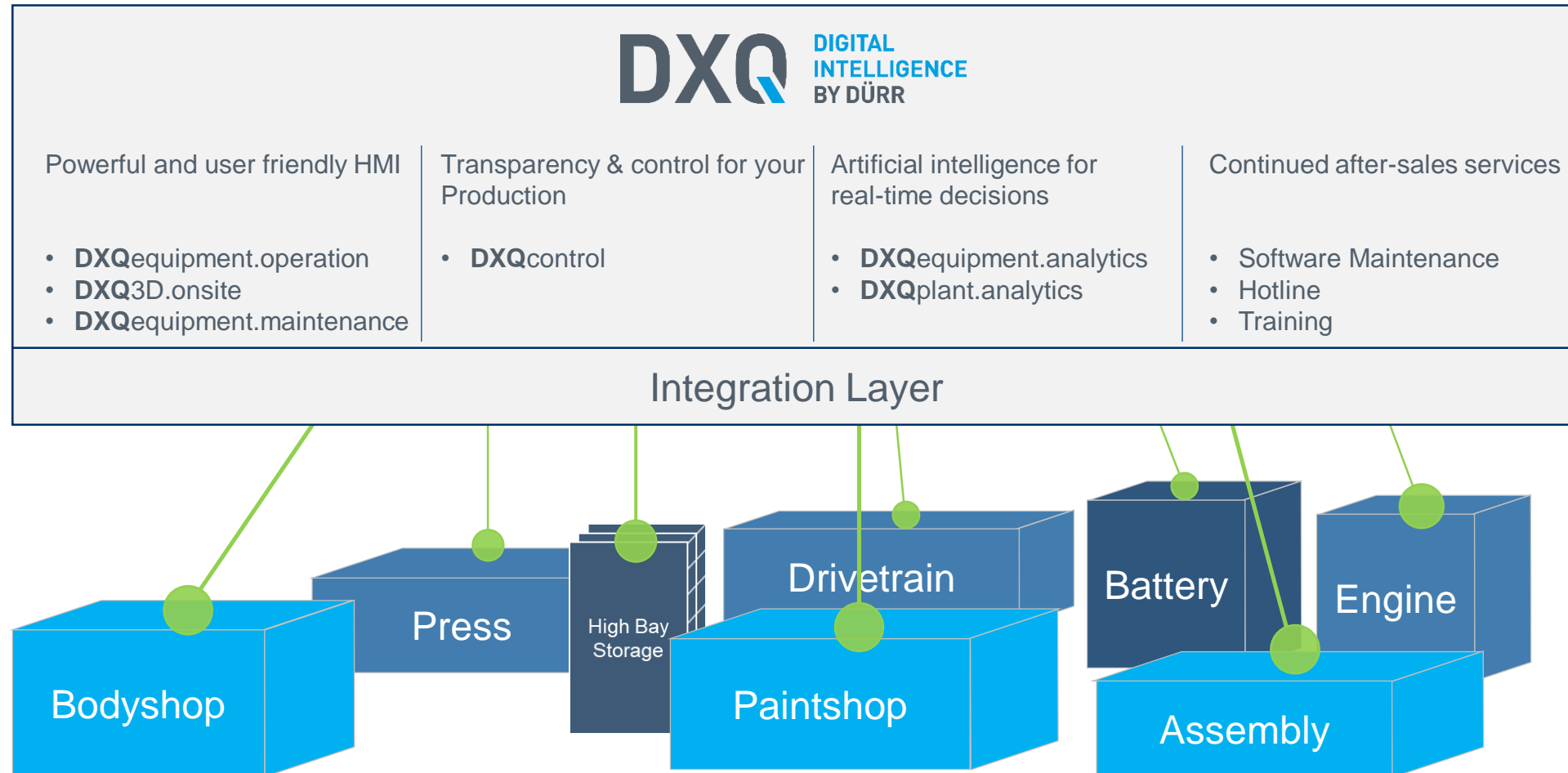
The main focus of operations and production planning departments

Factory transparency and control

Production control driven by the MES with optional modules (e.g. Advanced Planning, Material logistics, …)

- **DXQ**operate
- **DXQ**control

Enhance Availability

Controlled maintenance in accordance with the maintenance plan including recording of the tasks and findings.

- **DXQ**maintenance.assistant
- **DXQ**equipment.analytics

100% system availability

The main focus of maintenance management departments

The DXQ portfolio

DXQ DIGITAL INTELLIGENCE BY DÜRR

Powerful and user friendly HMI	Transparency & control for your Production	Artificial intelligence for real-time decisions	Continued after-sales services
• **DXQ**equipment.operation • **DXQ**3D.onsite • **DXQ**equipment.maintenance	• **DXQ**control	• **DXQ**equipment.analytics • **DXQ**plant.analytics	• Software Maintenance • Hotline • Training

Integration Layer

Bodyshop

Press

High Bay Storage

Drivetrain

Paintshop

Battery

Assembly

Engine

DXQequipment. operation

Features:

- Touch based user interface for process, conveyors and application usage
- Scalable from machine to plant to factory
- User interface for the visual analysis of time series and event data
- HTML5 based, supporting all standard devices
- Adresses color blind people

Benefits:

- Any HTML5 based device can be used
- Ease of use due to concentration on user
- Optimized operation philosophy
- Fully integrated into the DXQ product family

Added Value:

- Increased plant availability through faster troubleshooting.
- Full integration of data into IIOT world of ADAMOS

HTML5

DXQequipment.maintenance

Features:
- Automatic observation of maintenance tasks for the entire plant
- Maintenance planning according to usage, run-times and equipment condition.
- Plant visualization indicates due maintenance tasks.
- Customizable database to adjust tasks and integrate other systems.

Benefits:
- Operation of the equipment at the defined optimum operating point according to specifications.
- Maintenance according defined activities with appropriate documentation.
- Complete history of executed maintenance tasks.

Added Value:
- Increased availability and reliability of the equipment / plant.
- Holistic increase of overall plant effectiveness.
- Reduction of maintenance management effort.

VIDEO:
https://www.durr.com/fileadmin/durr.com/01_Products/12_Software_Controls/DXQ/01_DXQoperate/duerr-dxqequipment-maintenance-video-de.mp4

# DXQcontrol – MES/SCADA from Dürr

Features:

- Complete MES / SCADA functionality for Production, Maintenance, Logistics and Quality in automotive factories
  - **DXQ**plant.monitoring
  - **DXQ**production.control
  - **DXQ**logistics.control
  - **DXQ**quality.management
  - **DXQ**business.intelligence

Benefits:

- Standards-based portfolio - Modular and Scalable
- Digital solutions for planning, operation, and control in sync with production
- Open interfaces for rapid integration

Added Value:

- Transparency and control for your production
- Turnkey solutions for automotive production

# DXQequipment.analytics
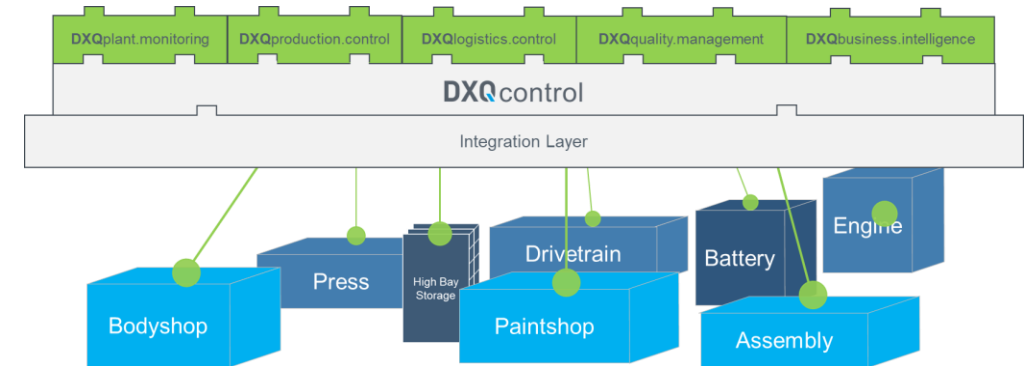
Features:
- Acquisition and analysis of sensor, actor and production data with one tool
- Synchronous 3D visualization with the cursor position (time) in the signal representation.
- Identify quality problems. Optimizing process parameters and path programs. Carry out cause analyses.
- Graphical creation of analysis models instead of programming.

Benefits:
- Near real-time analysis of sensor data for the detection of patterns, errors.
- Digital fingerprint of the workpieces for the customers.

Added Value:
- Increased plant availability by faster troubleshooting and predictive maintenance
- Increased quality of the produced workpieces (increased First-Run-Rate).
- Lower cost of workpiece quality due to elimination of inspection stations.
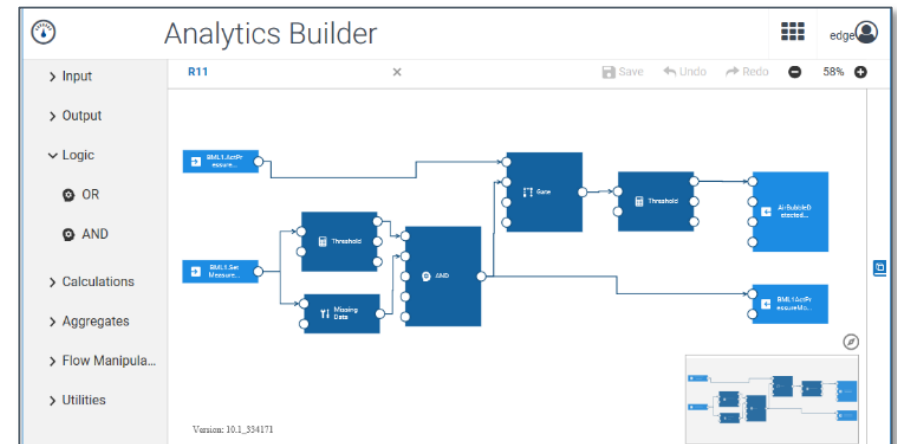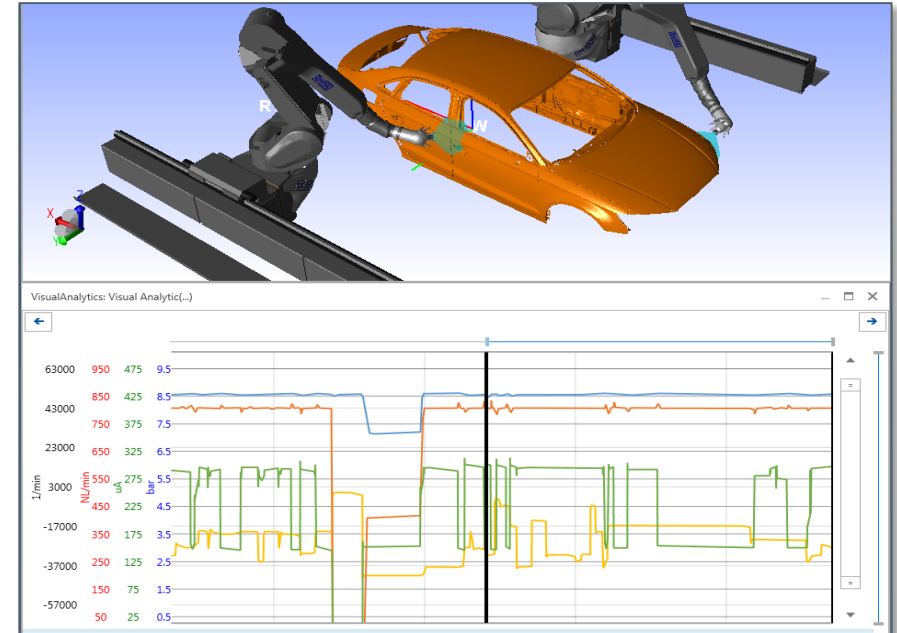
Design and functional principle

Streaming Analytics – Model management and editor

- Analyze Data Streams to recognize Patterns, Relationships and Errors
- Near real-time Processing of Sensor Data and Events
- Extensive Block Library
- Graphical Editor to build Models by connecting Blocks
- No Programming Skills required
- Configurable Reaction Types to Model Output (i.e. stop station)
- Store Model Output in Database
- Simple Model Management
- Simulate Models on historical Data before Deployment

Model Management

Design and functional principle
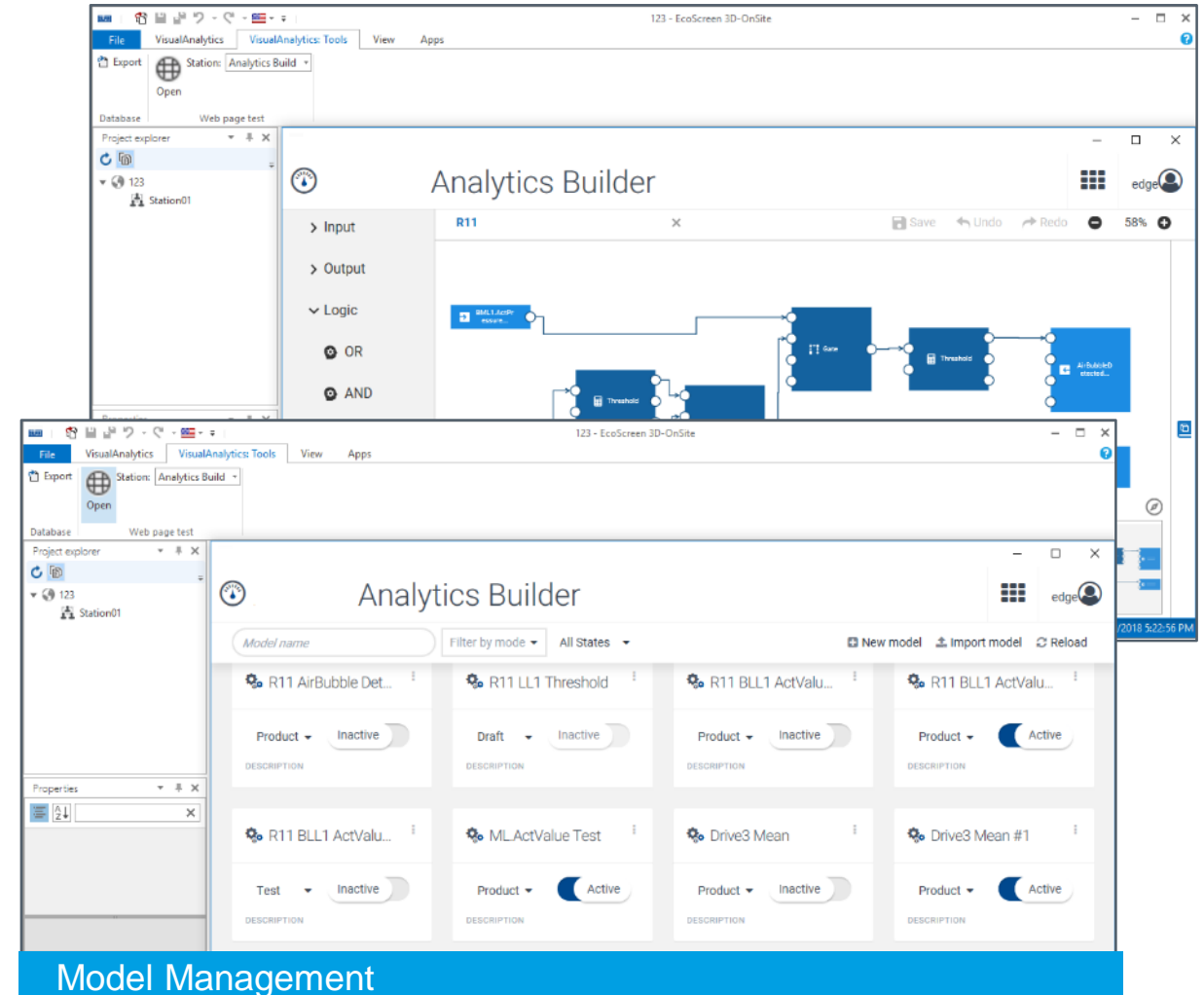
Streaming Analytics – Example of application

- Torque peak counter Axis 1
  - Stop conveyor if threshold is breached the second time
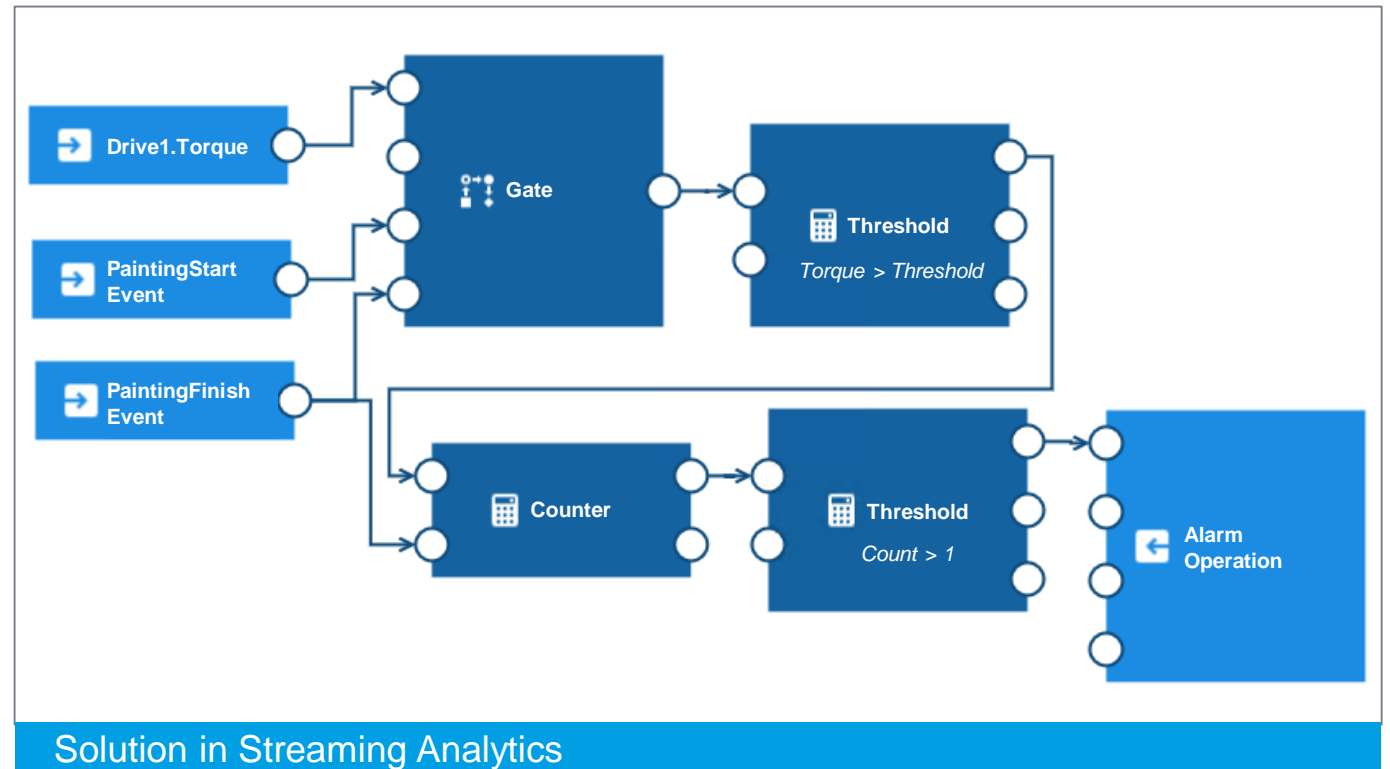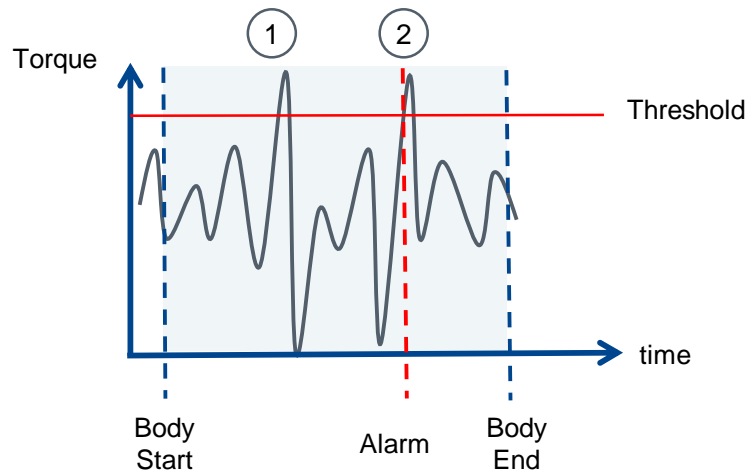
Task

Solution in Streaming Analytics

DXQequipment.analytics for ovens

Features:
- Near real-time monitoring of the quality of the heat-up and baking process
- Near real-time simulation of car body specific heat-up curves
- Permanent and car body specific recording of process data and simulated heat-up curves
- Simplified recording and evaluation of test- and calibration runs
- Car body specific display of heat-up curves and process values
- Transparency of baking process due to near real-time display of key figures
- Integrated in **DXQ**equipment.operation

Benefits:
- Simplified evaluation of heat-up curves
- Digital fingerprint of the workpieces for the customer
- Central and permanent storage of sensor values of measurement runs

Added Value:
- Support with tests and calibration as well as with process and quality surveillance

- VIDEO:
  https://www.durr.com/fileadmin/durr.com/01_Products/12_Software_Controls/DXQ/02_DXQanalyze/duerr-dxqequipment-analytics-video-de.mp4

DXQequipment.analytics
Advanced analytics – Use cases for application technology

DÜRR

AI-based analytics models

Anomaly detection – Quality indicator	Predictive maintenance

Anomaly detection – Quality indicator

- Self-learning system
- Detection of parameters responsible for quality deviations in the Turbine, Shaping Air, High Voltage, Dosage Pump due to e.g.
  - Disruption of paint supply (Air bubbles)
  - Dirt (Shaping Air, External Charging)
  - Loss of bell-cup
  - Viscosity deviations
- Prediction about car body quality →
  Visualization of quality indicator per vehilce (ok, nok)

Predictive maintenance

- Self-learning, predcitive detection of:
  - Dirt, residual humidity on the atomizer
  - Residual Life Time of
    - Mixer (2K)
    - Pumps
    - Main needle valve
  - Problems with valve action (according to long rinsing)
  - Change of motor behaviour (temp, torque)
  - Leakage on paint pressure regulator
  - Wear of Turbine, shaping air and LCC-drive

Logbook quality problems	Feedback Customer	Logbook equipment problems

DXQequipment.analytics

Advanced analytics – Use cases for **process technology**

AI-based analytics models

Process monitoring and fault analysis	Detection of quality problems and anomalies
▪ Deteciton of signal patterns in historic data for fault analysis	▪ Detection of systematic patterns in quality defects in terms of body color, type, fault type and position throughout the complete plant
▪ Fault prediction for monitoring the bath temperature of the e-coat and pre-treatment	▪ Detection of process anomalies for air (re-)circulation as well as e-coat and pre-treatment
▪ Simulation for monitoring the heat-up curves of the EcoIncure	
▪ Root-Cause-Analysis for Air (re-)circulation as well as e-coat and pre-treatment	

Maintenance plans   **Feedback Customer**   **Quality defects from inspection**

DXQplant.analytics

DXQanalyze **DÜRR**

Features:
- Correlation of process data and work piece quality data alongside the whole value chain
- Dashboarding for quality relevant plant KPIs
- Smart pattern recognition for systematic quality defects
- Structured visualization of workpiece-related life cycle data

Benefits:
- Early detection of defects to reduce production costs
- Prevention of production stops due to quality defects
- Indication of root-causes based on Big-Data-Analytics and expert rules

Added Value:
- Increase of First-Run-Rate and reduction of rework
- Reduced maintenance and repair effort
- Holistic increase of paint shop efficiency
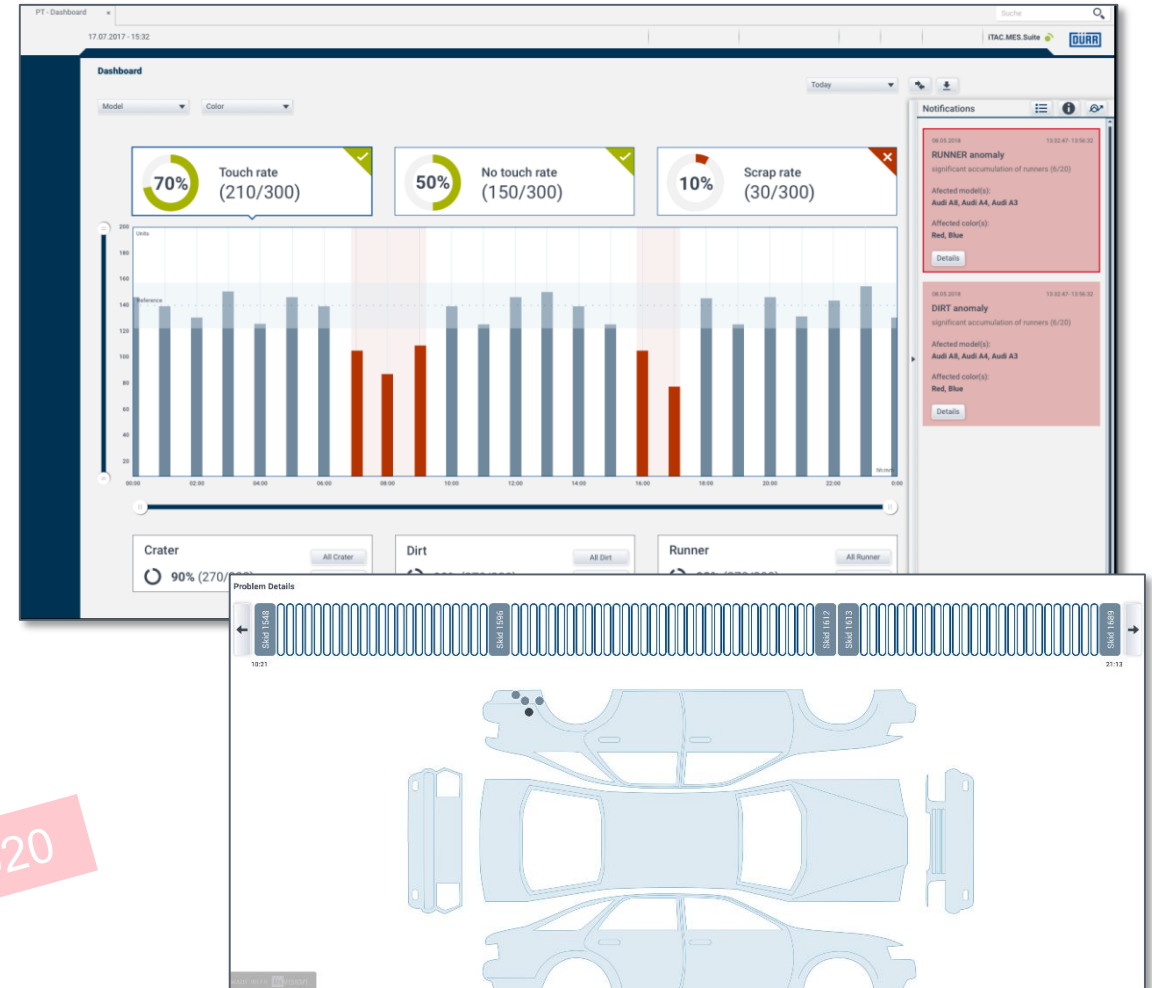
Available in 2020

Plant operation / OEE Improvement
Correlation of data, signals, events as sources of action
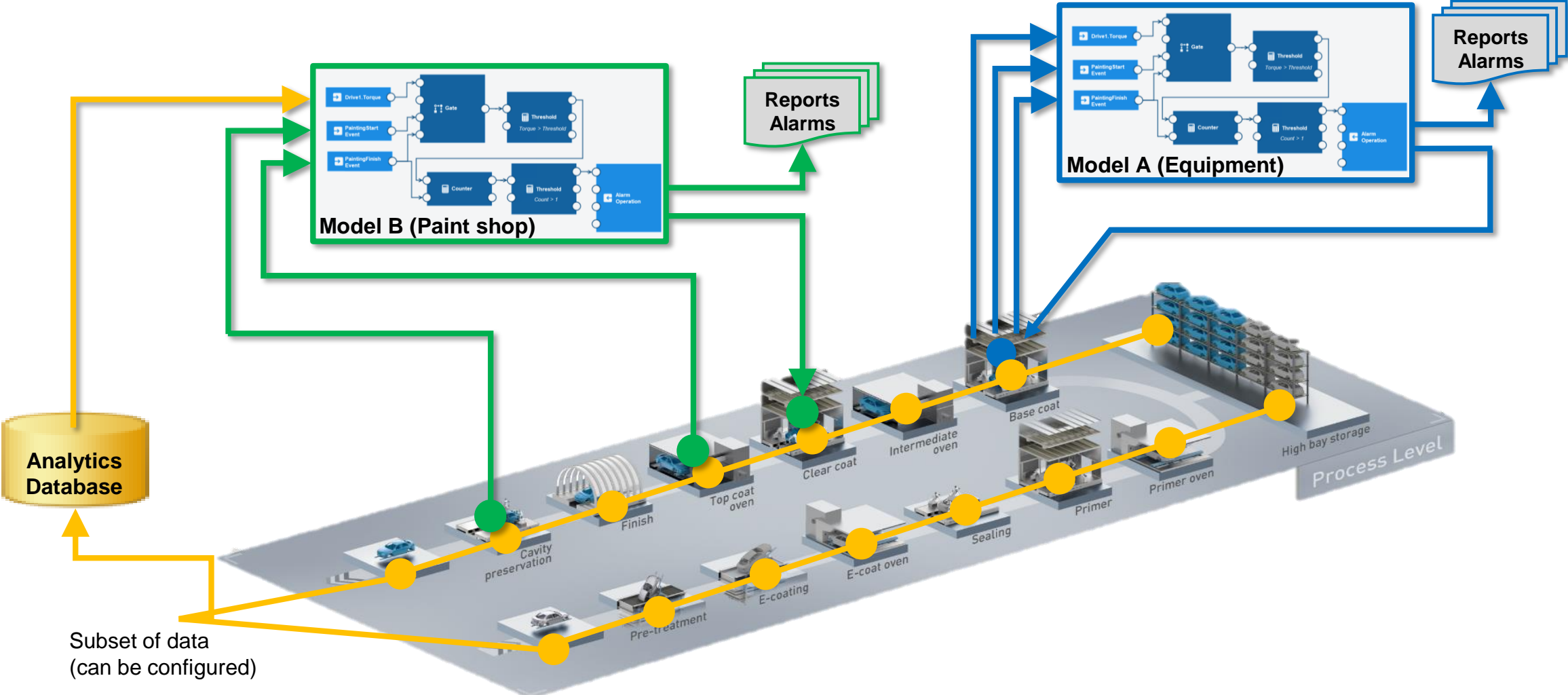
DXQsupport

Excellence through cooperation and service

Features:
- Central hotline for DXQ products
- Extended Services (System Audits, Database Administration, Ramp-Up Assistance)
- Tailored and modular training catalogue
- Continuous updates through software maintenance

Benefits:
- Increased Performance, Quality, Availability and Security
- Direct and quick access to system experts
- Regular updates ensure security and stability
- Increased know-how through tailored trainings

References:
- Hotline, Training, Maintenance
  - All Dürr software installations
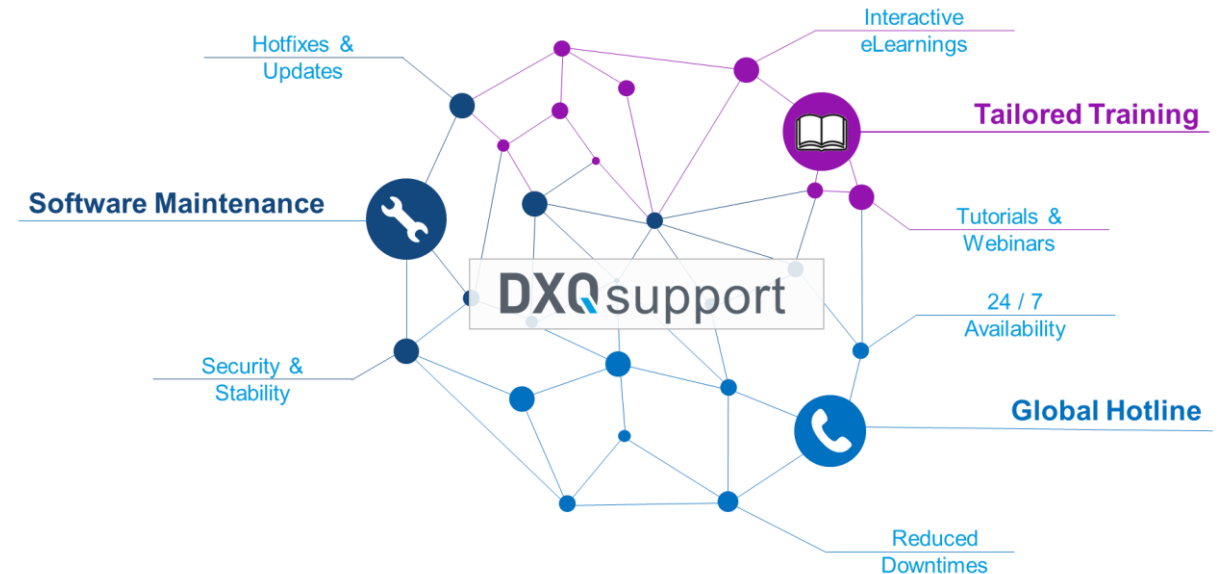
Digitalization
The DXQ portfolio

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Integration layer

Bodyshop

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2 Wheel tracking solution by Olpidürr

3 Questions and answers

System architecture and interfaces

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ERP system

- Customer orders, purchasing, invoicing
- ...

Standardized ERP integration layer

MES System

- Production management, machine data collection, traceability, process control
- ...

Standardized shop floor integration layer

Shop floor

- Execution of production orders incl. confirmation to MES
- ...

Wheels traceability
Tracking points

Unloading station
Water dryer cooler
Water dryer oven
Oxilan PT
Pickling PT
Degreasing PT
Loading station
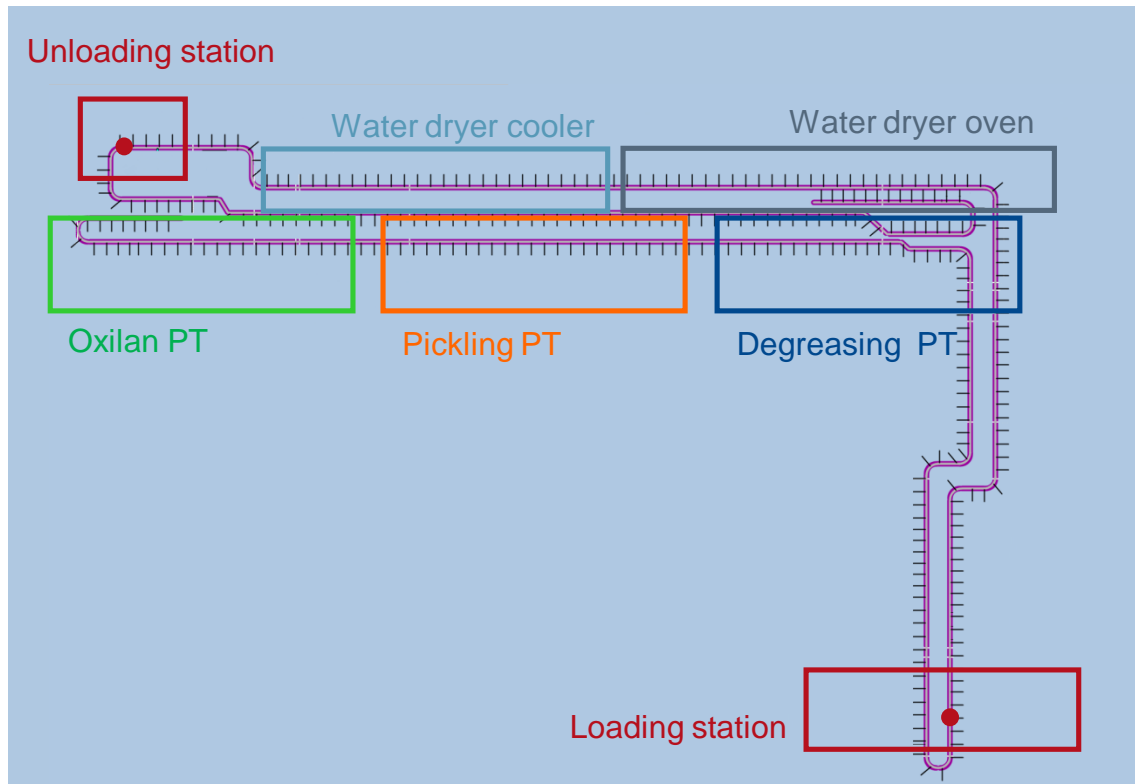
How many tracking points?

- Loading station
- Degreasing section
- Pickling section
- Oxilan section
- Waterdryer oven
- Waterdryer cooler
- Transfer station (from the Pretreatment loop to the following ones)
- …

For each tracking point the system records and archive all the information

Masterdata (Wheel editor)
- Management of all production parameters -

Online visualization

Conveyor overview
- Shows the complete production plant and presents animated with its process lines

Conveyor monitoring
- Shows all conveyor sections and the status of every motor and all other devices

Online visualization
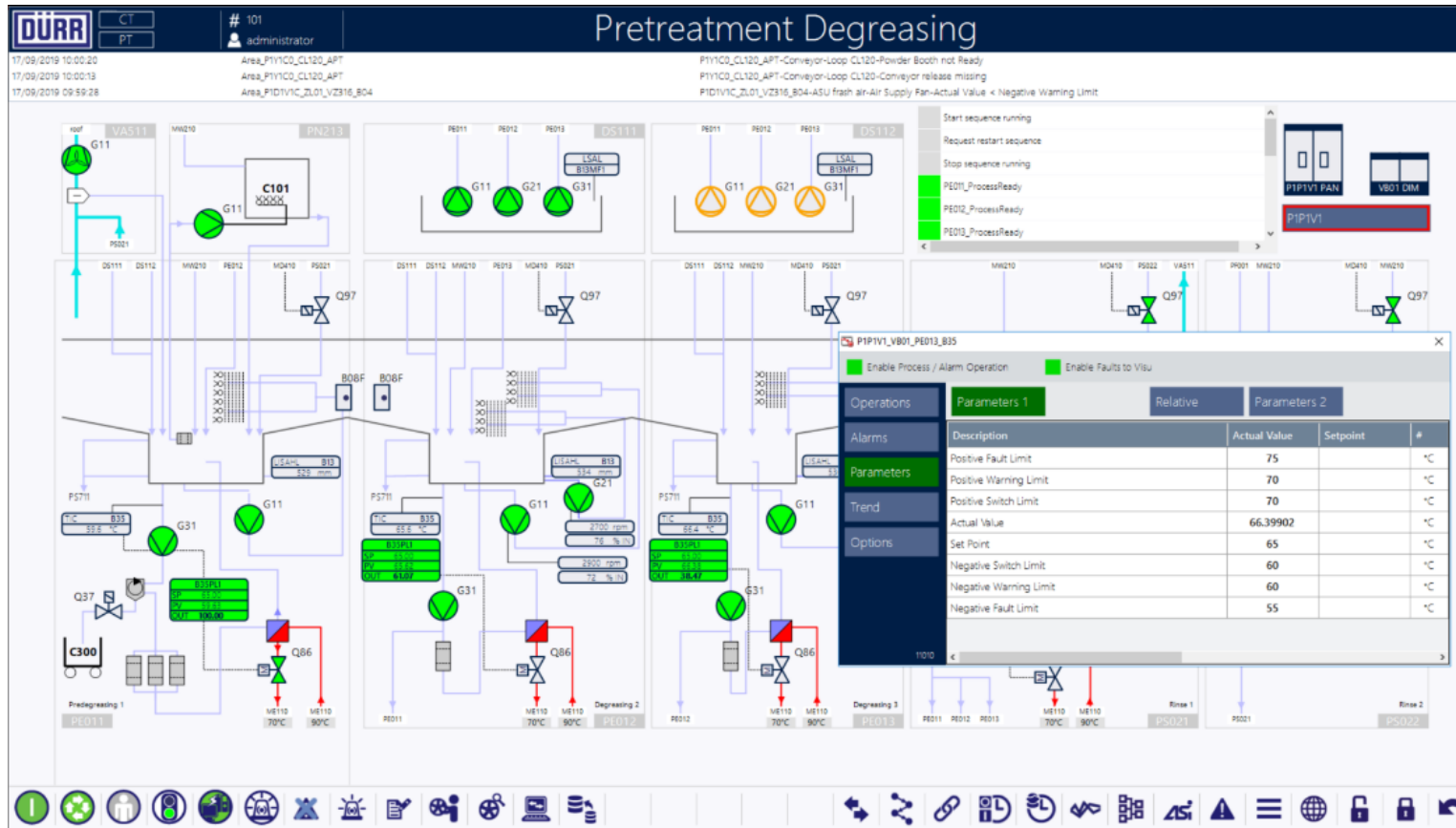
Process overview
- Shows all the plant areas as blocks and their status with Drill down capability

Process monitoring
- A series of overview pages (one for each area).
- Shows all the devices to monitor the analogical/digital values

1. Batch TRACKING

Data record

Each record is composed by following fields:

- Tracking point ID
- Batch ID
- Recipe information (TBD)
- Wheel type
- Time of the first batch position that gets inside
- Time of the first batch position that gets outside
- Empty hanger / spindles ahead of the batch
- Number of hangers/spindles assigned to the batch
- Number of wheels assigned to the batch

The batch record is available when the last batch wheel gets out from the plant (Olpidürr scope of supply)

2. Single wheel TRACKING
Data record

Each record is composed by following fields:

- Tracking point ID
- Batch ID
- Wheel ID (QR code?)
- Recipe information (TBD)
- Wheel type
- Time the will remains inside a process area
- Main process data (minimum, maximum value and average)
- Applications sets / process values → have to be discussed with APT suppliers

The wheel record is available when the last batch wheel gets out from the plant (Olpidürr scope of supply)

Historical data
Results per batch / serial number

Agenda

1. DXQ digitalization by Dürr

2. Wheel tracking solution by Olpidürr

3. Questions and answers

www.sli.do Your questions are welcome!

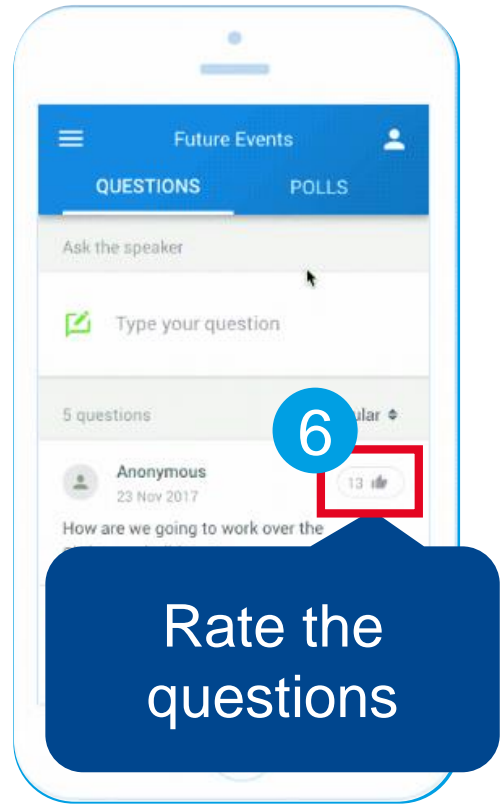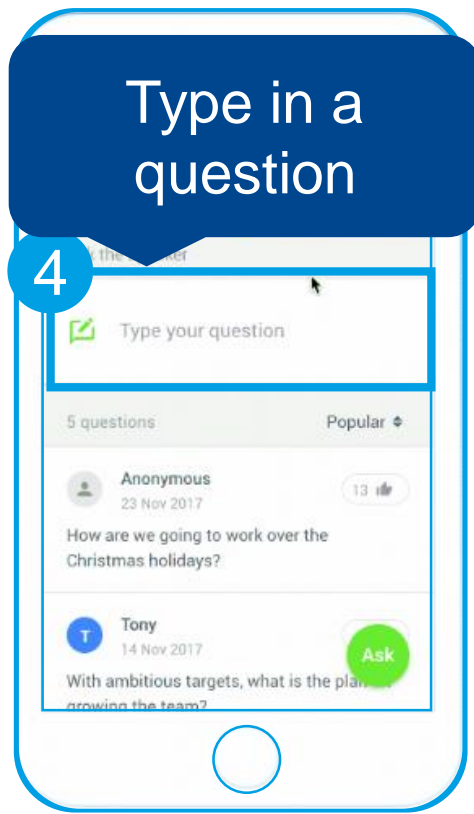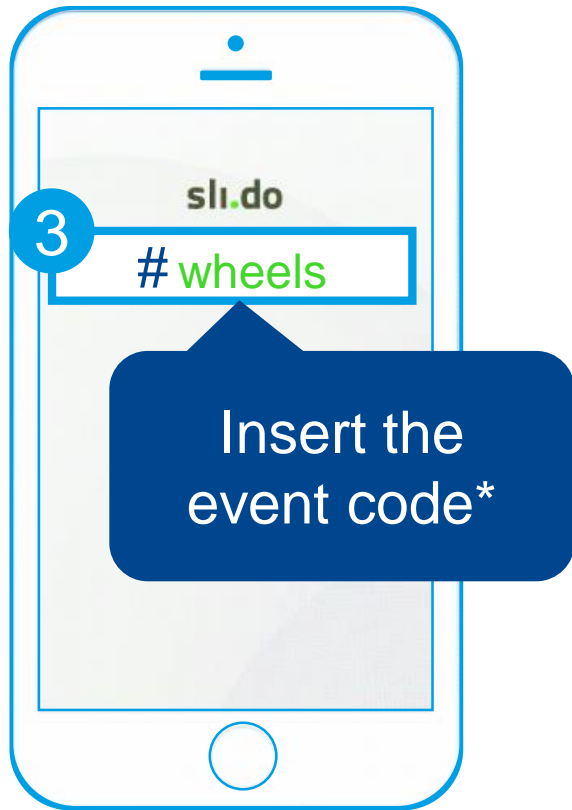*Event code: wheels

Ask your questions after the presentations
Ask your guides
Use slido for the final panel discussion
WIFI: DUERR_EVENT

1 Open your Browser

2 Open www.slido.com

3 sli.do #wheels

Insert the event code*

Type in a question

4

Type your question

5 questions   Popular ↕

Anonymous
23 Nov 2017
How are we going to work over the Christmas holidays?

Tony
14 Nov 2017
With ambitious targets, what is the plan for growing the team?

5 Ask the speaker

Type your question
160

Your name (optional)   SEND

Submit the question anonymously or with your name

6 Future Events

QUESTIONS   POLLS

Ask the speaker

Type your question

5 questions

Anonymous
23 Nov 2017
How are we going to work over the

13 👍

Rate the questions

Bernd Kremer, Senior Manager Sales Digital Solutions, Dürr Systems AG

DXQ – State of the art software products for plant operation