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The importance of manufacturing execution systems in the growing PV industry

30 May 2023

3:00 pm – 4:00 pm | BST, London
4:00 pm – 5:00 pm | CEST, Berlin, Paris
10:00 am – 11:00 am | EDT, New York City

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Senior Sales Manager
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Welcome!

Do you have any questions? ❓

Send them in via the Q&A tab. 👉 We aim to answer as many as we can today!

You can also let us know of any tech problems there.

We are recording this webinar today. 📹

We‘ll let you know by email where to find it and the slide deck, so you can re-watch it at your convenience. 👀 💡

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Kontron AIS GmbH

The importance of manufacturing execution systems in the growing PV industry

Secure quality.
Improve processes.
Save costs.

Robin Schubert
Product Manager
Factory Automation
Kontron AIS GmbH

Frank Tannhäuser
Senior Sales Manager
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Kontron AIS GmbH

Agenda

01 PV customers of Kontron AIS

02 Value of data and software today

03 PV Trends and their significance for software

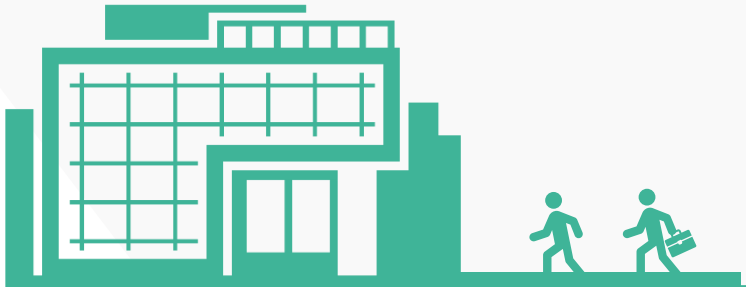
04 MES functions that are needed today

05 A look at MES practice

Portrait

Provider
for industrial
software

Kontron AIS GmbH



> 30
years of experience

> 200
employees

18,1 mio.
€ turnover

7
Products

- ToolCommander®
- EquipmentCloud®
- FabLink®
- FabEagle®Connect
- FabEagle®Monitoring
- FabEagle®MES
- FabEagle®LC

> 200
customers
in 2022

45
countries

Kontron AIS – PV and Solar Customers

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Kontron AIS GmbH

FabEagle®MES

Crystallization Growing Wafering	Thin film production	Silicon based cell manufacturing	PV module manufacturing	Solar receiver production
10 x	14 x	50 x	20 x	2 x

Value of data and software today

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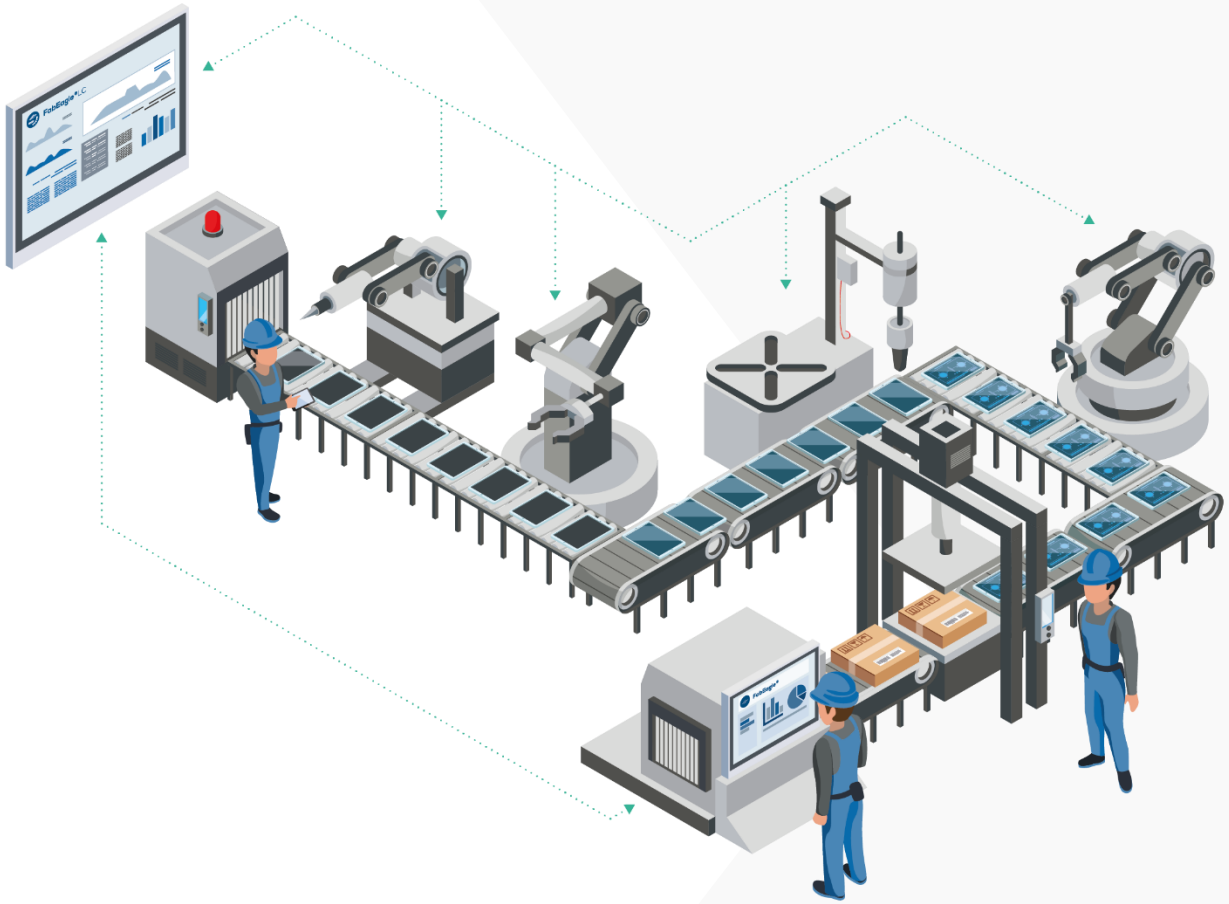

- Big data sets enable detecting small process dependencies
- Data analysis improve quality and throughput
- Identify maintenance needs early to avoid downtime
- Personalised visualization of equipment data for improved workflow

PV trends and their significance for software

1. Factor production complexity

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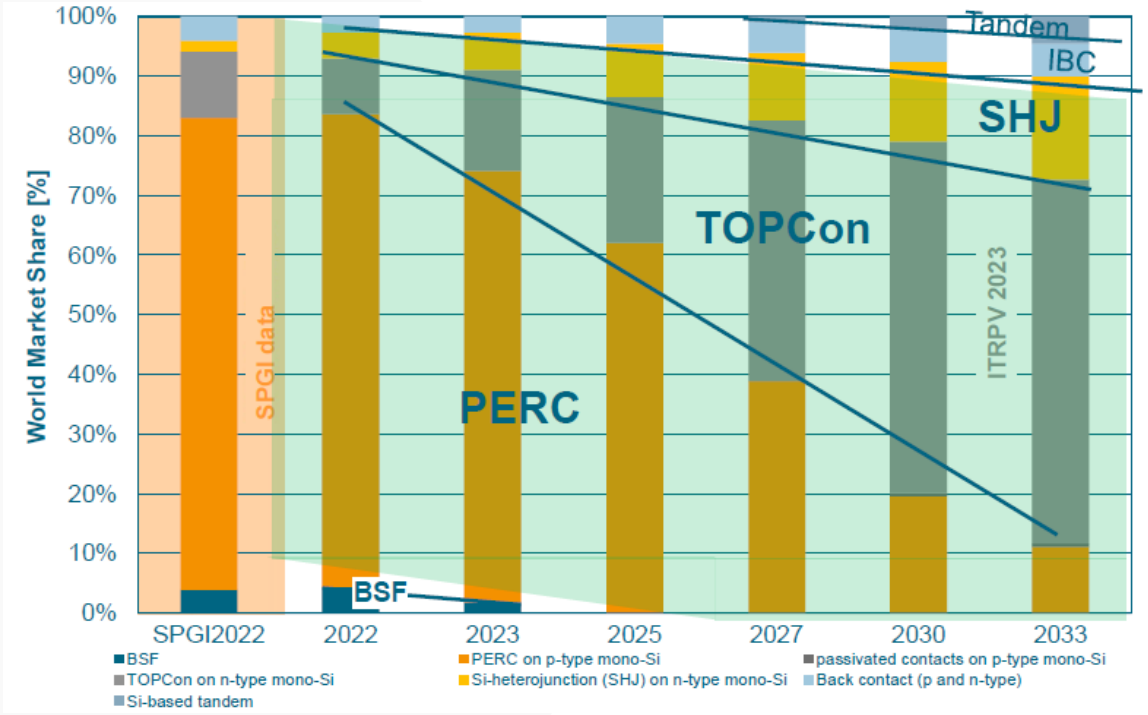
- Increasing complexity causes extensive data sets which need to be analyzed
- More inline equipment is used to test quality
- New advanced equipment provides high data output with high resolution

Cell products: cell technologies

(Source: VDMA, ITRPV 2023)



PV trends and their significance for software

2. Factor production capacity

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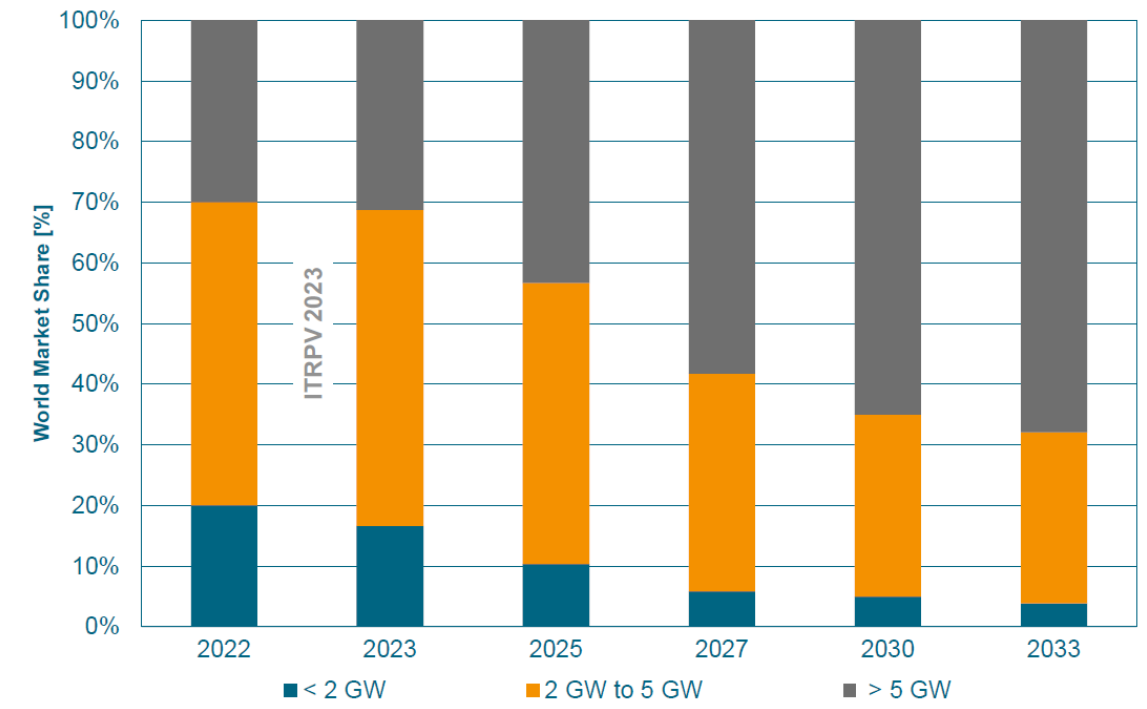
- Data volumes increase proportionally to production volumes
- With higher throughput per factory, the risks increase (e.g., cost of downtime)
- Requirement for comparability between several company locations

Trend for production sites capacity

(Source: VDMA, ITRPV 2023)



PV trends and their significance for software

3. Factor maintenance and uptime

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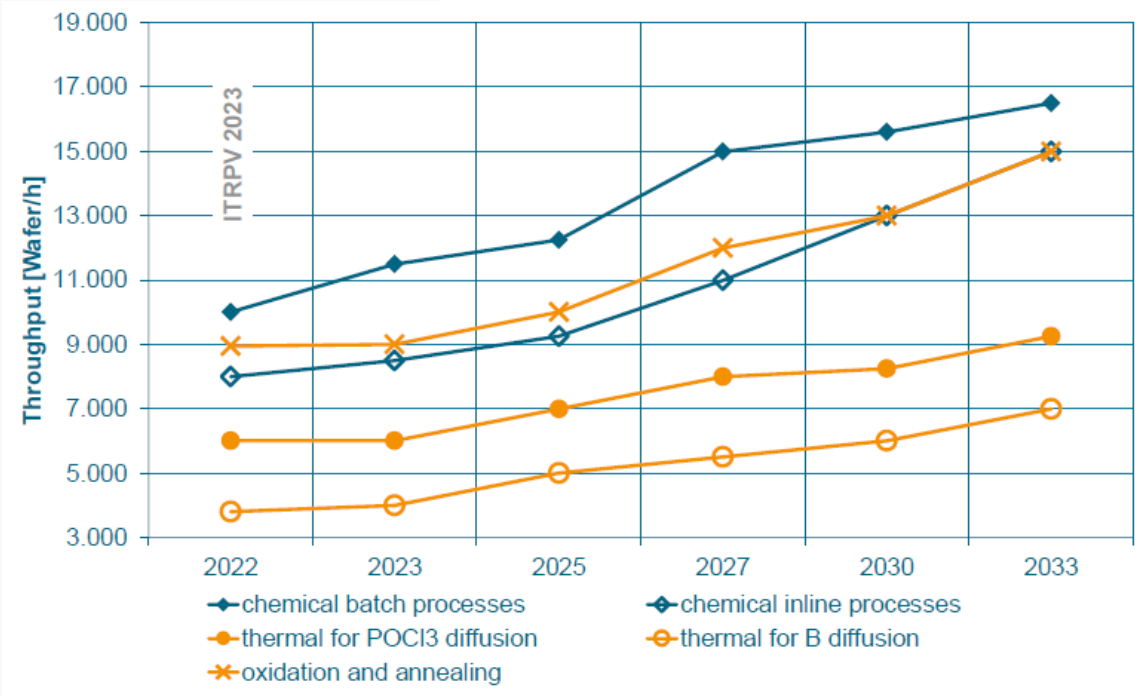
- High-cost pressure requires preparation of planned and unplanned downtime
- Information on handling complex equipment must be available immediately
- Support through digital documentation of equipment data and maintenance to optimize service calls

Cell products: cell production tool throughputs
(Source: VDMA, ITRPV 2023)



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FabEagle®MES

Components and features

MES functions that are needed today

Solution

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Increased transparency

- Online Process Visualization
- Manufacturing Visualization
- Trends / Reporting
- Logbook / Machine Log

Traceability

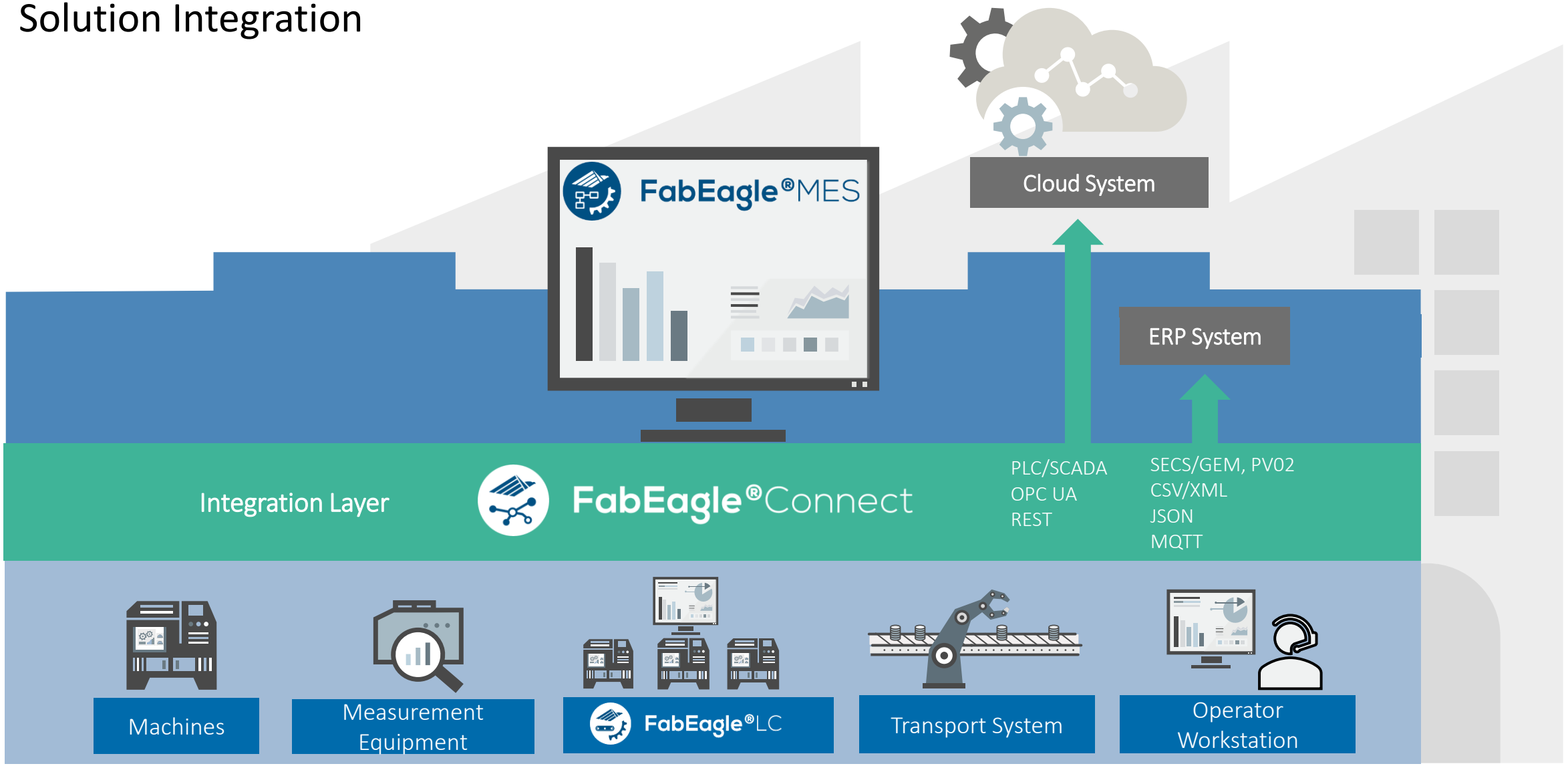
- Material and Carrier Tracking & Interlock
- Inspection and Rework
- Quality Data Acquisition
- Long-term Archiving

Production control

- Order Management
- Workflow Management
- Maintenance Management
- Online-SPC
- Event Manager

MES functions that are needed today

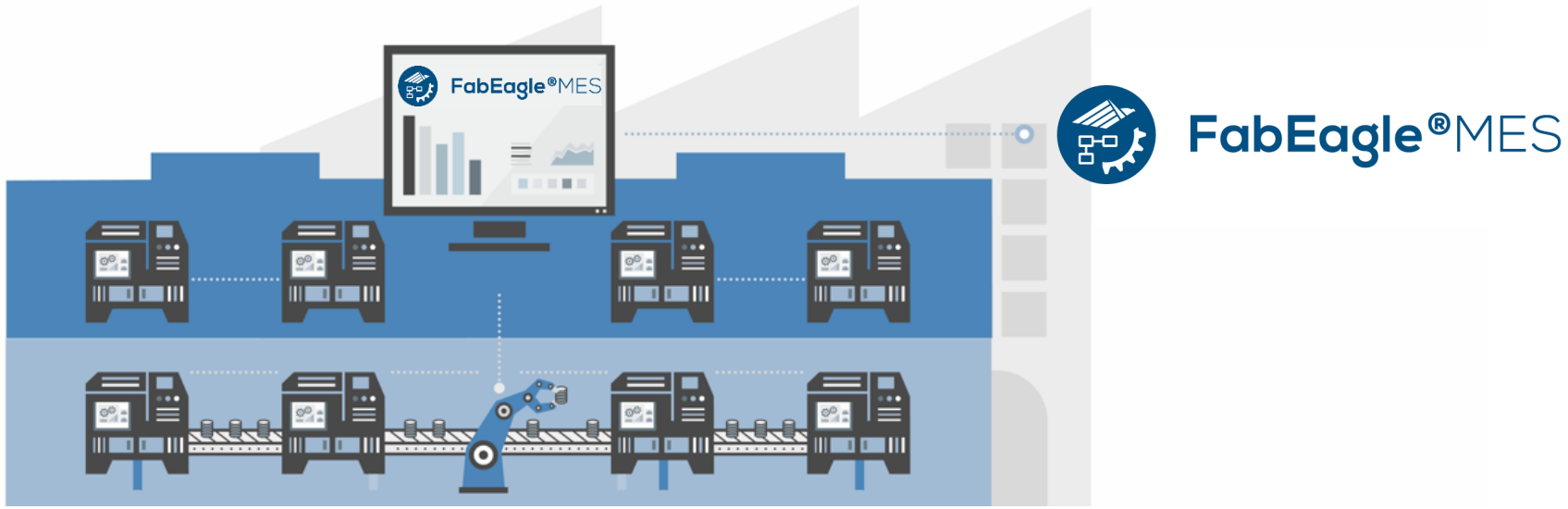
Solution Integration



MES functions that are needed today

Modules

- Production Visualization
- Order Management
- Work Plans
- Recipe Management
- Production Control
- Material Tracking
- Machine and Production Data Acquisition
- Product Data Acquisition
- Reporting & Online SPC
- Archiving
- Operator Workstation
- User Management



FabEagle®MES

MES functions that are needed today

Blueprint for modern data architecture

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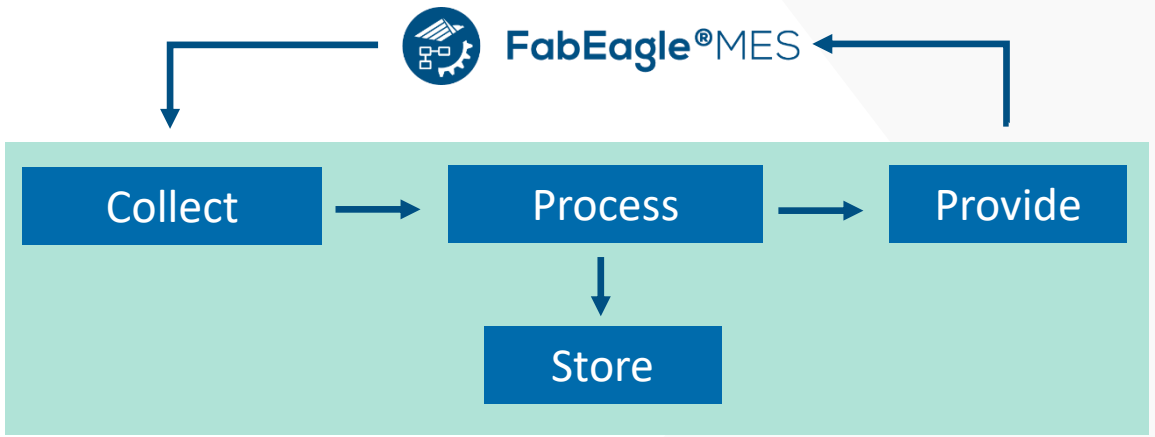
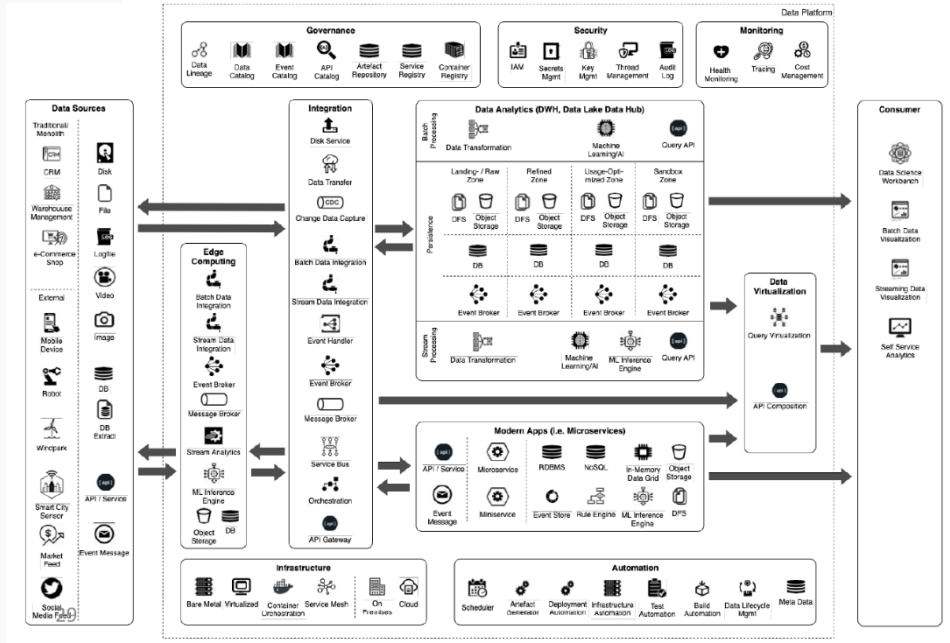
- Event based
- Separation of storage and compute
- Automation over manual coding and processes
- Keep raw data in central place with potential storage tiering

Hybrid solution of MES and Cloud





EquipmentCloud®

MES functions that are needed today

Cloud-enabled MES extensions

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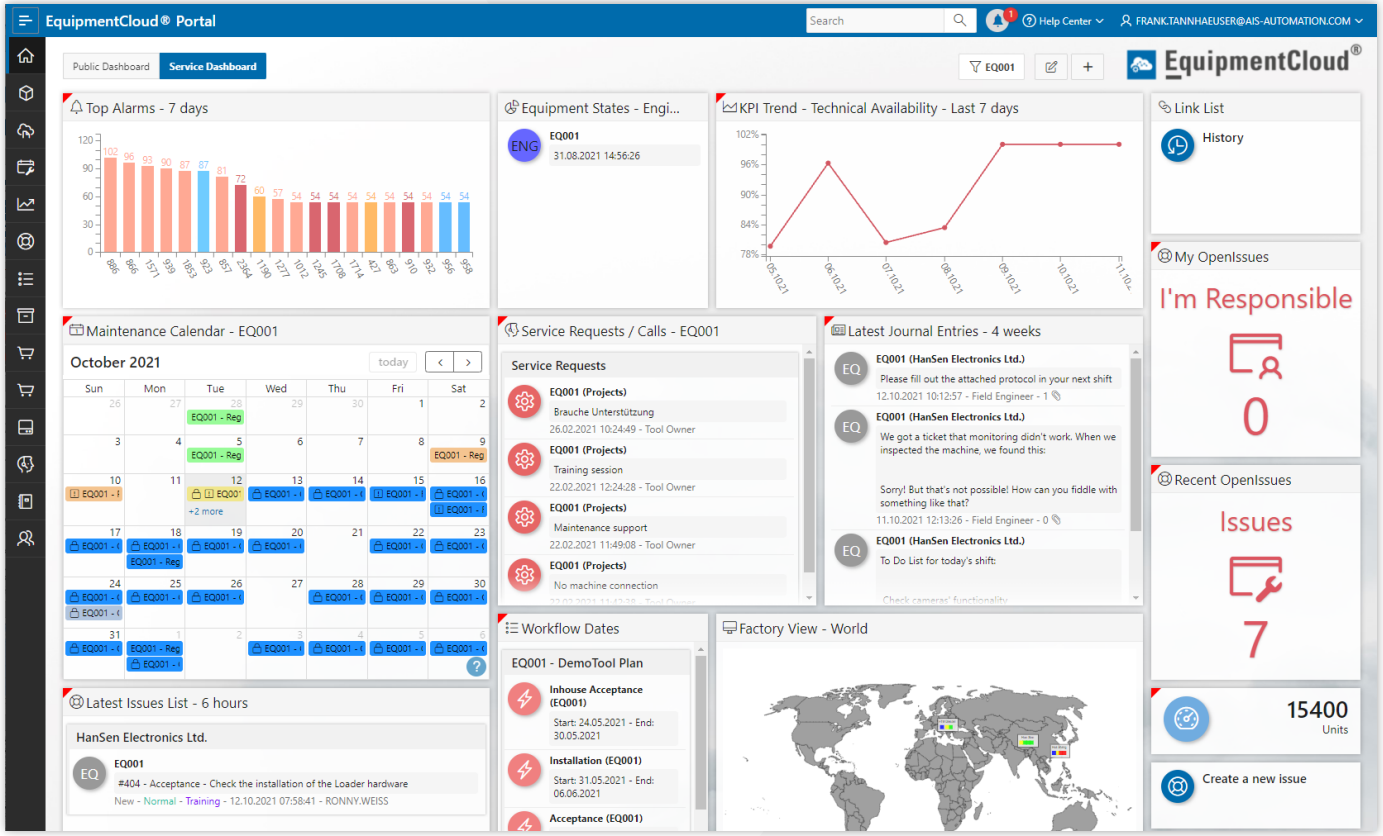

Moduls to support production:

- Monitoring
- Maintenance
- Documents
- Open Issues
- Knowledge Base
- Spare Parts
- Remote Assistance

MES functions that are needed today

Cloud-based maintenance management

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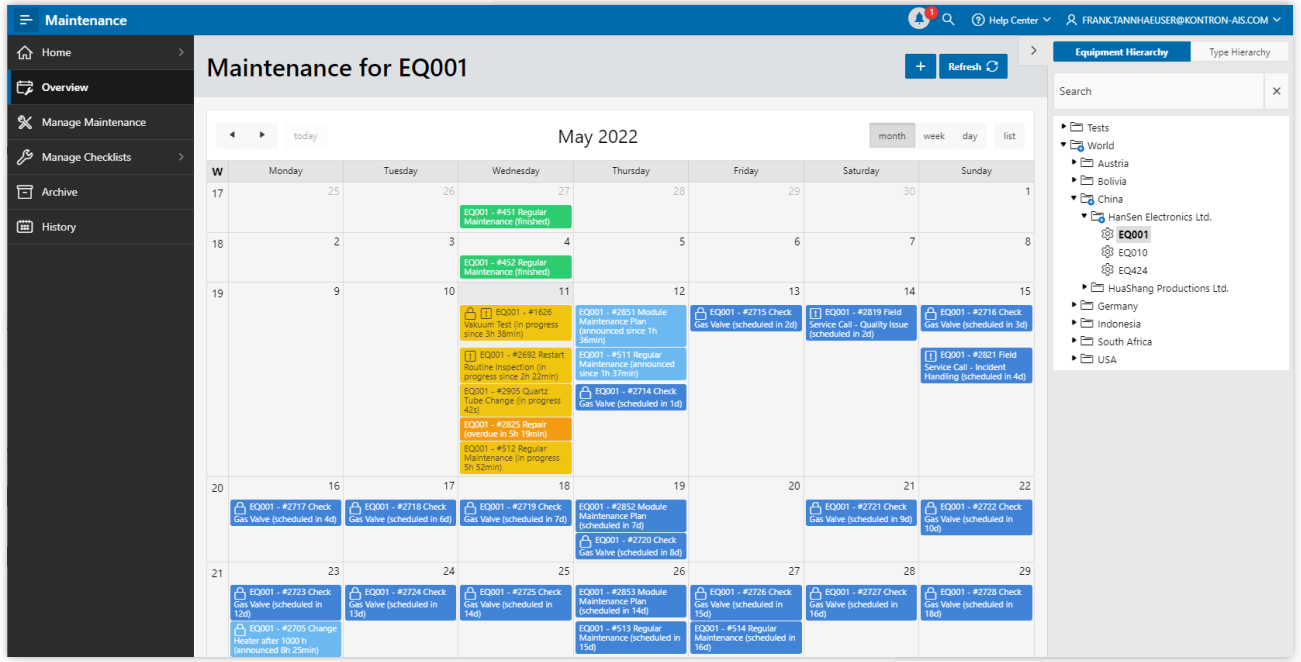

Functions:

- Maintenance calendar
- Cyclic, alarm or condition-based, Process value-based
- Incremental counter maintenance
- Integrated workflows with variable parameters

Your benefit:

- Planning, documentation (link to workflows) and reminder in one tool

MES functions that are needed today

Integration of Vision AI Hub

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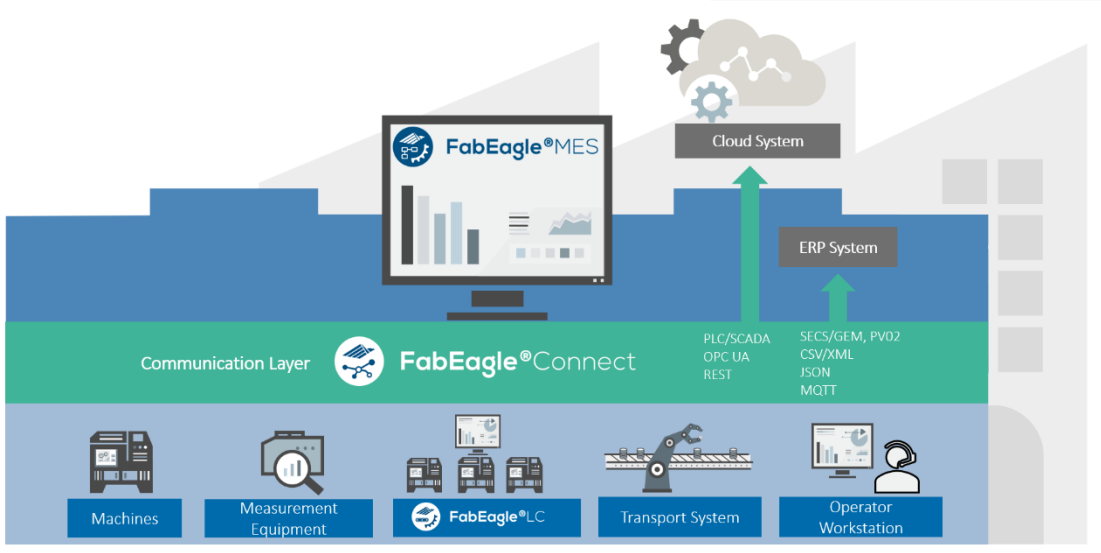
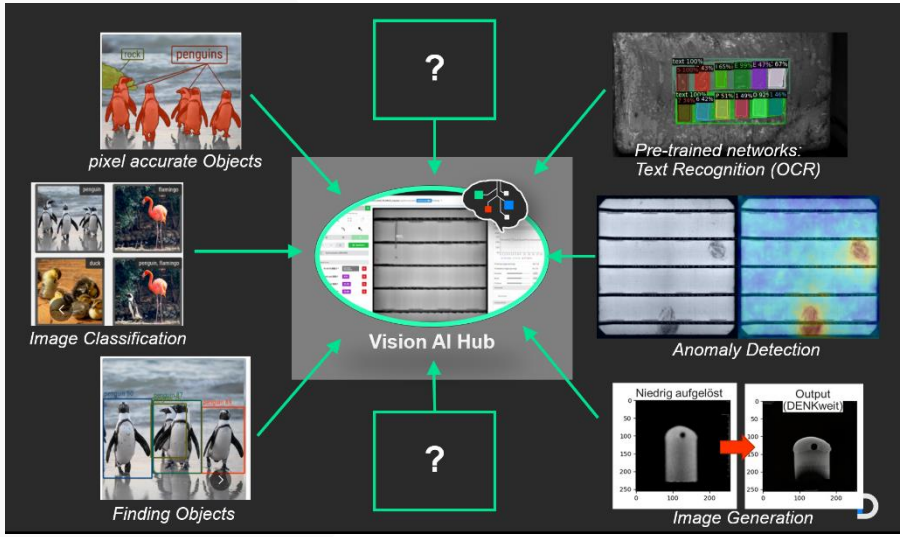
- Image processing can be used as virtual (software) measurement device
- Common data handling for process control and reporting within MES



Vision AI Hub



MES functions that are needed today

Connectivity overview

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HMI & SCADA

Big Data Analytics

MES & ERP

FabEagle®MES

Database

Historian Archiving

OPC UA | REST | TCP/IP | Custom Client | MQTT

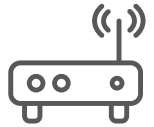
FabEagle®Connect

OPC UA | PLC-S7 | TCP/IP | PV02 | SECS/GEM | XML/JSON

OPC Server

PLC

Application Database



Sensors & Devices

Files

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A look at MES practice

A look at MES practice

Webclient – Factory visualization

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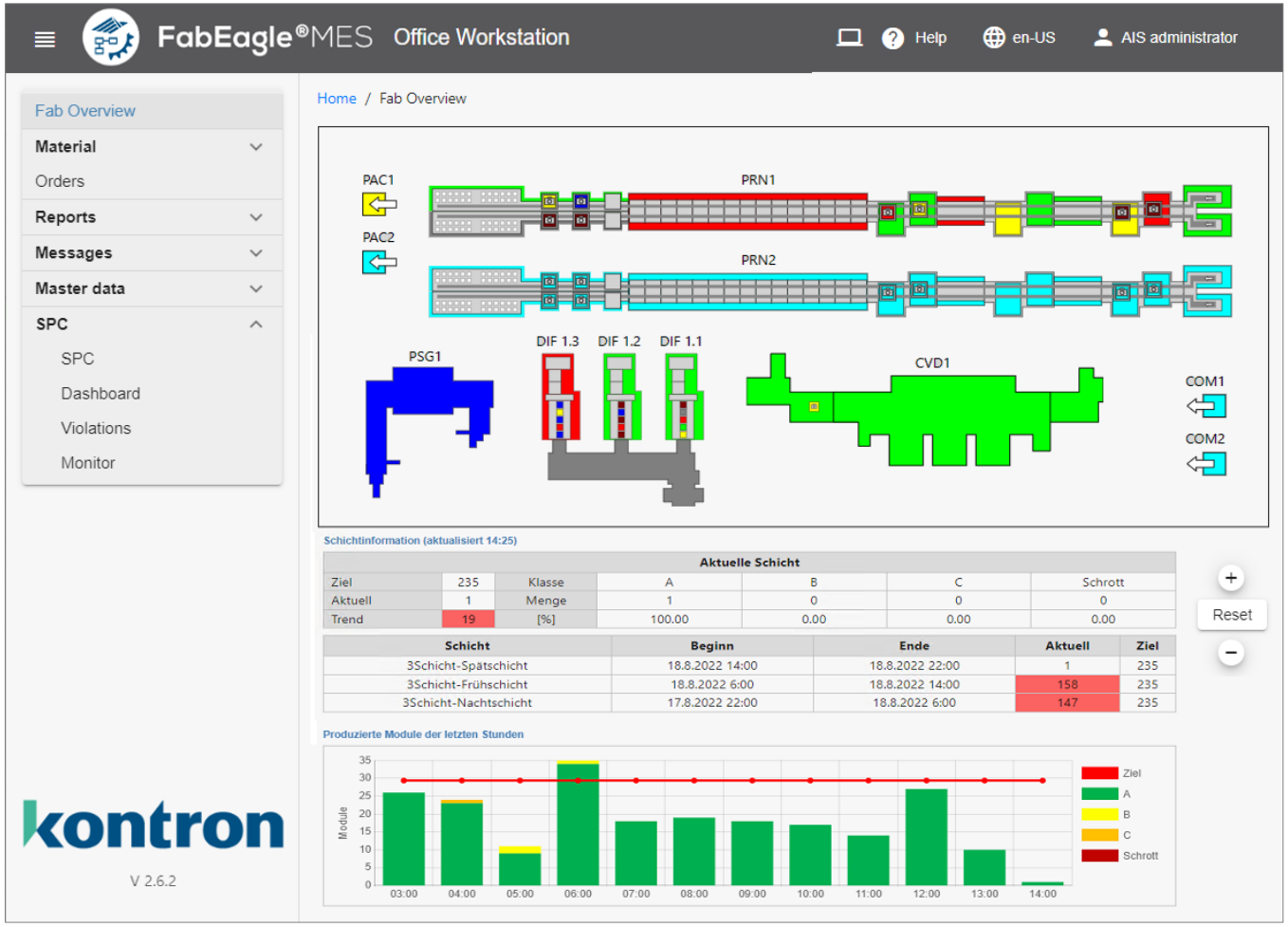

- Transparency with Equipment states (SEMI E10)
- Monitoring with trend views and KPIs for solar cell or module production

A look at MES practice

Webclient – Workplan view

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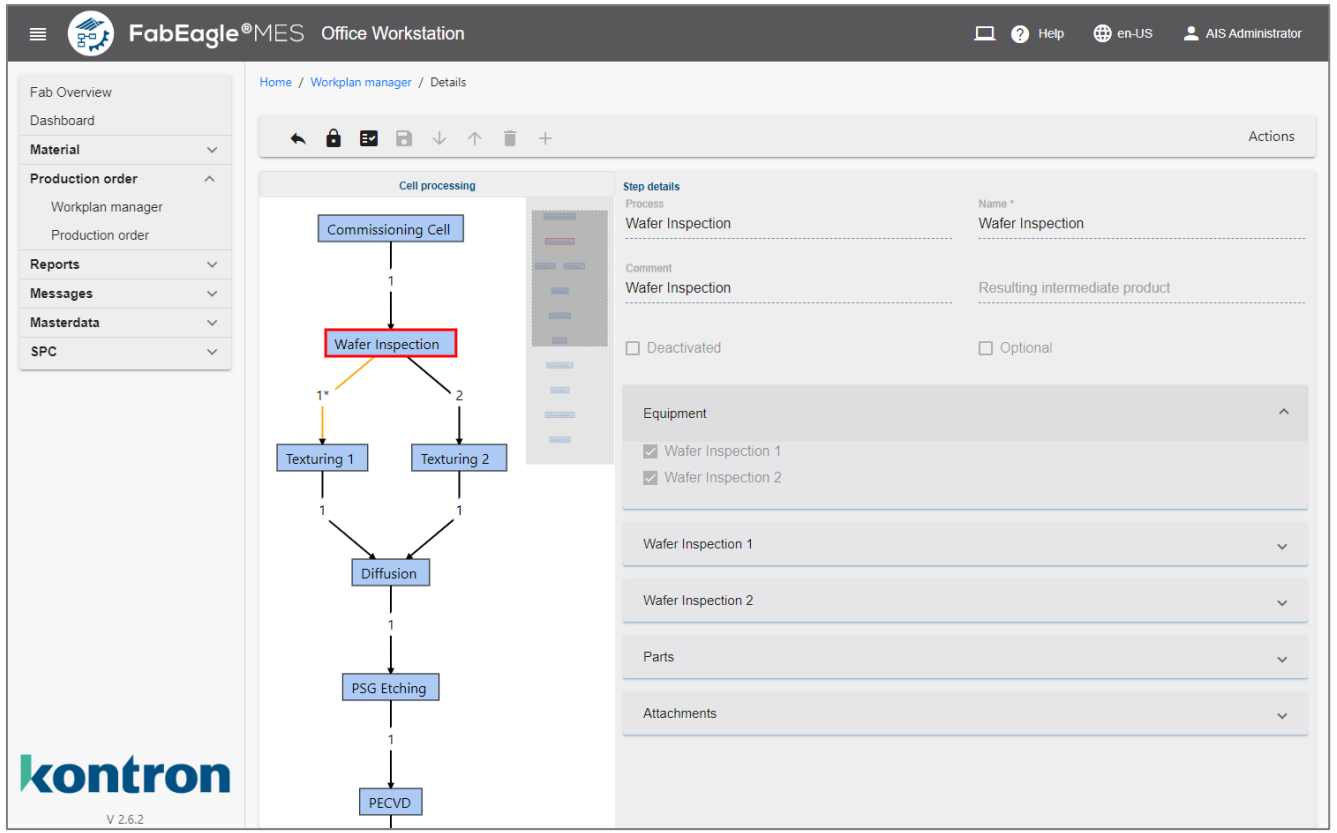

- Configure your workflow graphically
- Use it as a template for product variants
- Setup bill of material (BOM) for ERP posting
- Select recipes and equipment parameters
- Add documents for reference or work instructions
- Setup alternative material routes based on state or process data of material
- Configure rework loops to route material back to previous work steps

A look at MES practice

Webclient – Carriers and materials

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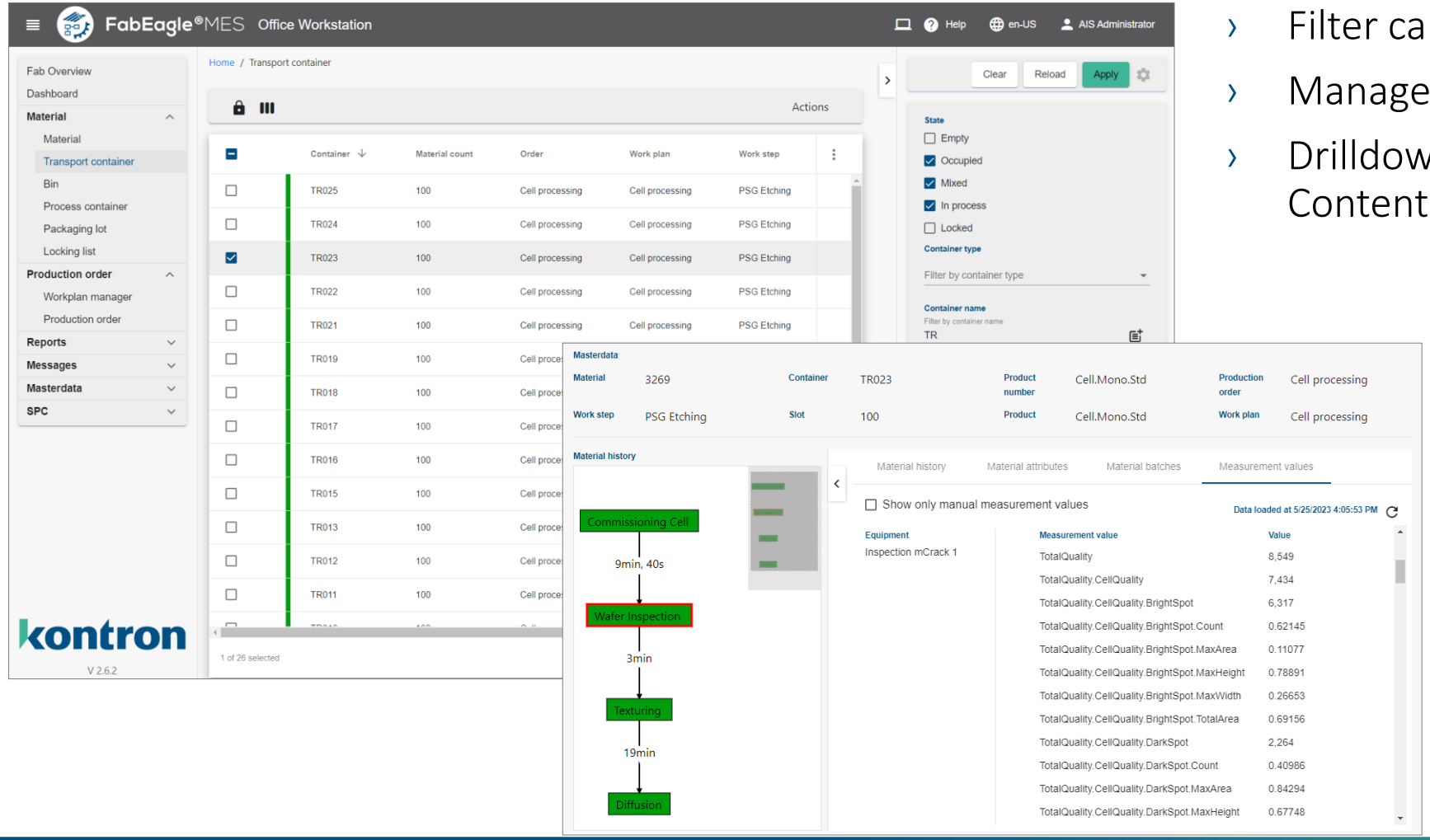

- Filter carriers (containers)
- Manage materials and products
- Drilldown from Carriers to Content and Data

A look at MES practice

Communication MES – Equipment

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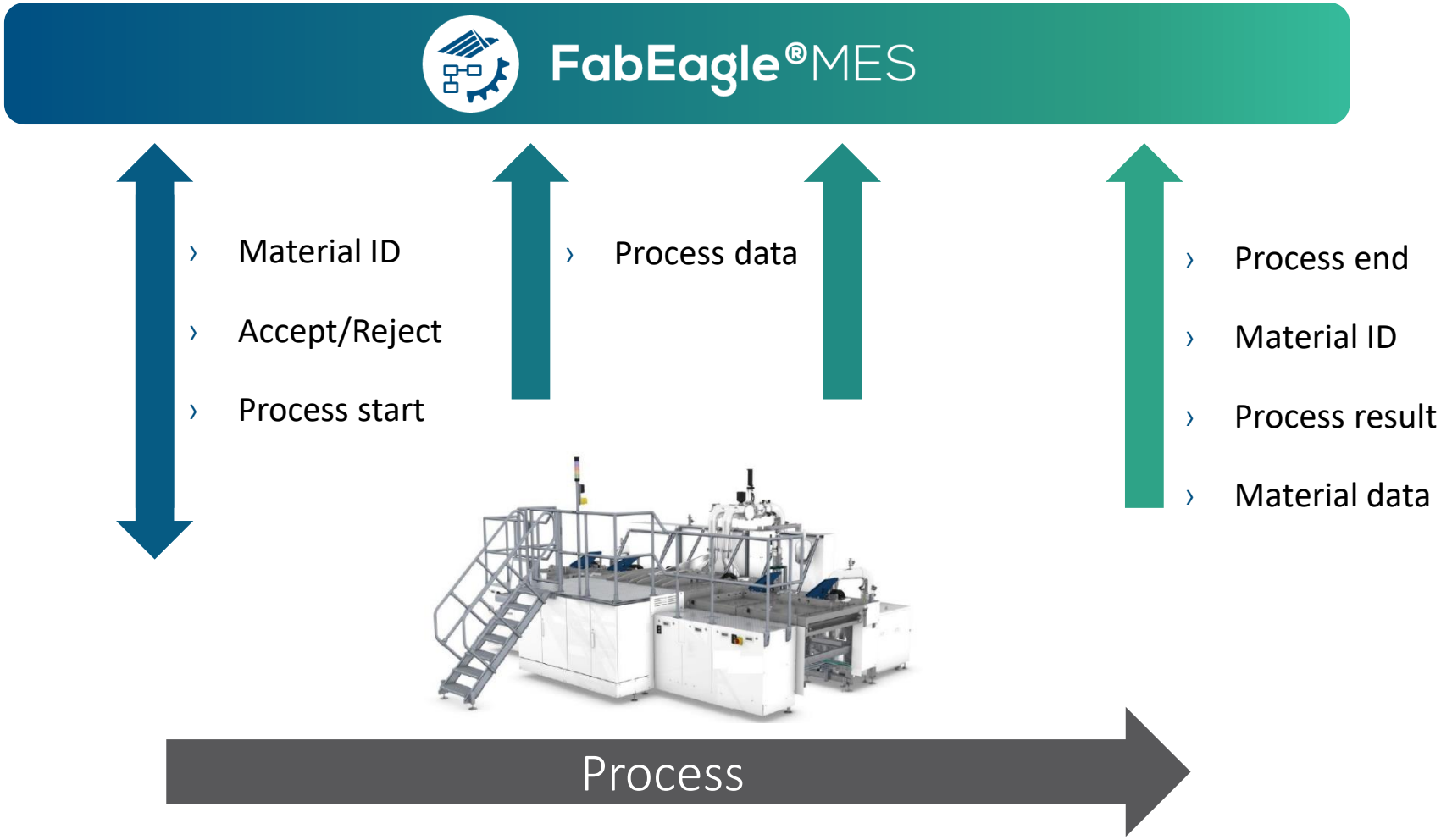

A look at MES practice

Benefits of virtual tracking in solar cell production

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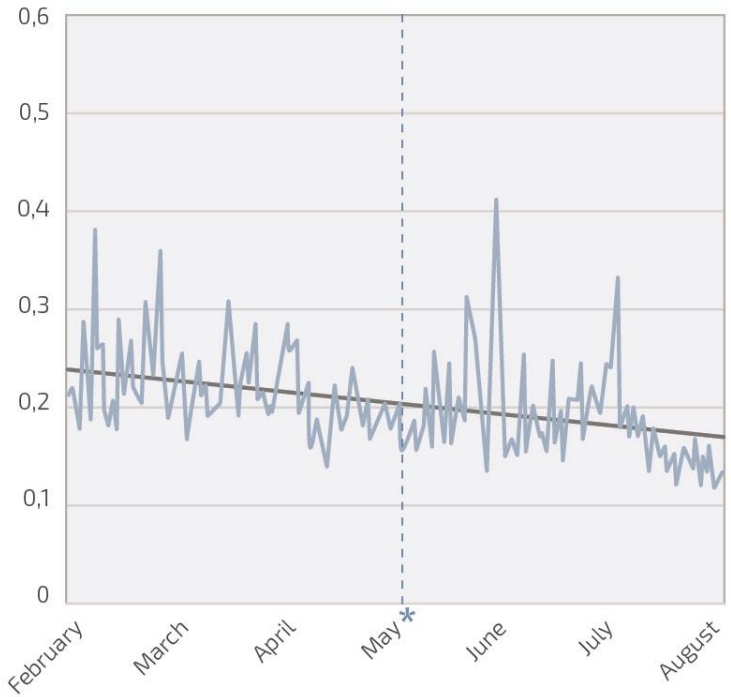
Material tracking and solar cell efficiency

Material tracking and standard deviation of solar cell efficiency



* Improvement of the tracking rate

Average cell efficiency | Cell tracking rate | Trend | Efficiency deviation

A look at MES practice

Solar cell and module production (sample project)

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- Over 1,000 equipment connected to FabEagle®MES to produce several 100,000 solar cells per day
- Real-time connection to ERP to track finished and semi-finished products
- Process and Equipment data acquisition with Online-SPC
- Material and carrier interlock
- Product Track & Trace
- Monitoring of equipment performance

Crystal Growing → Cropping → Wafering → Solar Cell → Solar Module

Benefits of MES modules

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Increased transparency

- Reduce downtimes and troubleshooting to optimize production
- Motivate employees with feedback on the production state

Traceability

- Improving product quality by collecting material batches and process data
- Rapid response time to deviations by automated data acquisition

Production control

- Improving product quality by collecting material batches and process data
- Rapid response time to deviations by automated data acquisition

Kontron AIS GmbH

Our team, your questions.

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4:00 pm – 5:00 pm CEST, Berlin, Paris, Madrid

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Ryan Kennedy
Editor
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