SYNTAX

Digital Manufacturing Cloud

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SAP Platinum Partner

Agenda

SAP Digital Manufacturing Cloud Overview

SAP Digital Manufacturing Cloud for execution

- Solution details
- Execution tasks
- Process industries
- Resource Orchestration
- Artificial Intelligence/Machine Learning
- Extensibility

SAP Digital Manufacturing Cloud for insights

- DKPI Analytics & OEE
- Alert Management

SAP Digital Manufacturing Integration

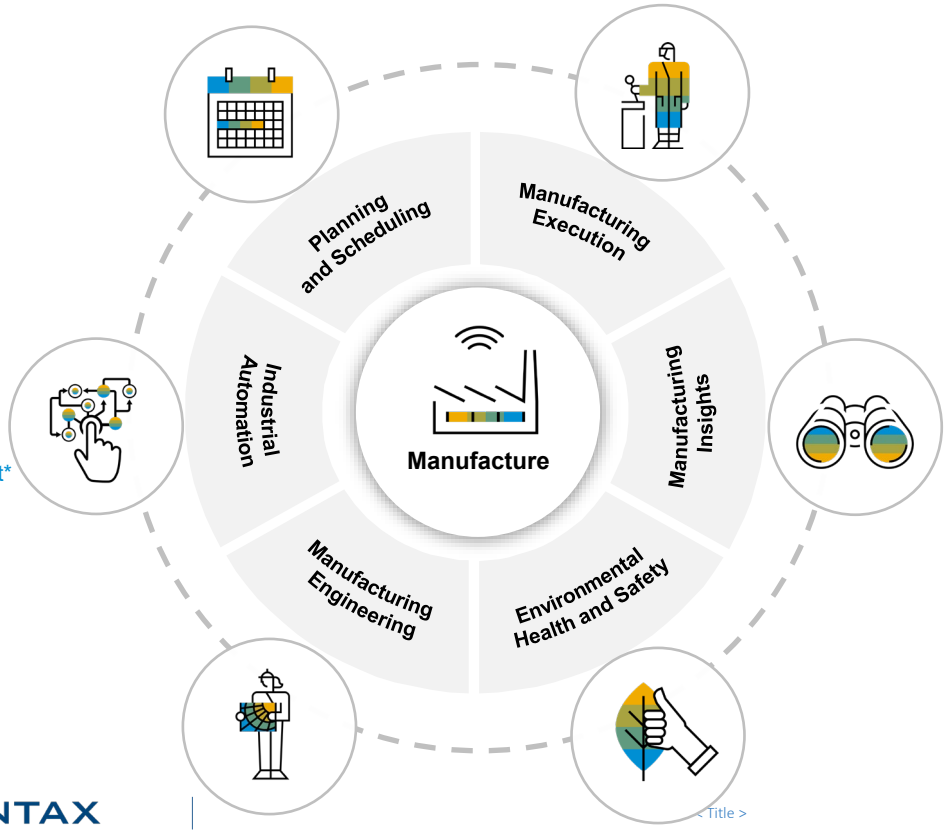
SAP Digital Manufacturing Cloud

Solution Overview

SAP Digital Manufacturing Solutions

A complete portfolio of manufacturing solutions to support digitalization and Industry 4.0

- Connectivity
- AI/ML
- Scenarios Management*



SAP Digital Manufacturing Cloud

- Manufacturing Execution
- Manufacturing Insights
- SAP Plant Connectivity

SAP S/4HANA Manufacturing

- for Production Engineering and Operations
- for Planning and Scheduling
- Environmental, Health & Safety

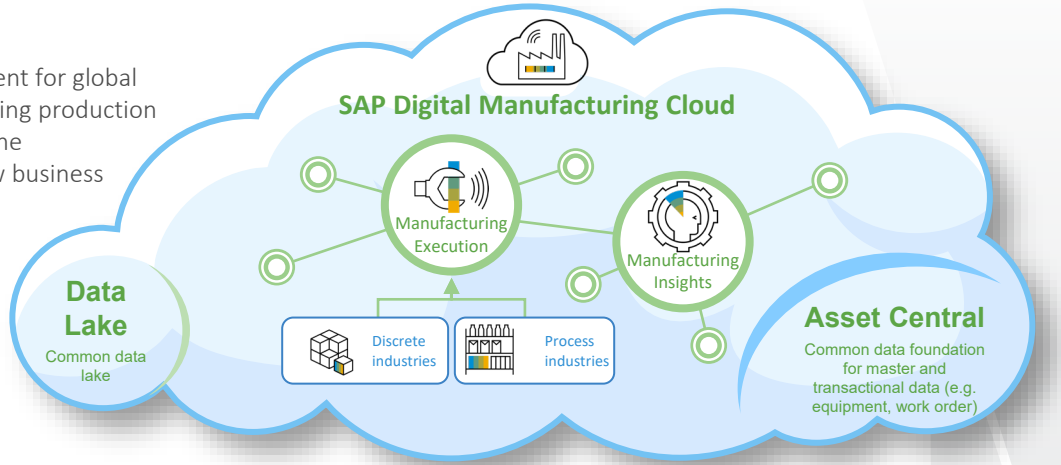
SAP Manufacturing Suite

- SAP Manufacturing Integration and Intelligence
- SAP Manufacturing Execution

SAP Digital Manufacturing Cloud

Product overview

Connect your top floor business systems to your shop floor equipment for global visibility across all plants while orchestrating execution and monitoring production operations down to the individual work center. Take advantage of the manufacturing network to achieve greater flexibility and realize new business models.



Manufacturing Execution*

- Manage your production using the latest technology built on the SAP Cloud Platform
- Orchestrate and control the shop floor with out-of-the box integration to SAP ERP and S/4HANA

Manufacturing Insights

- Take informed decisions to increase productivity and performance of your production systems with real-time insights and root cause analysis
- Detect product quality defects early in production with prediction models using machine learning
- Collaborate with partners in the network to build digital inventories to optimize your offerings
- Act as the digital twin of the physical world, including any equipment as well as any kind of automation devices
- Enables processes and an easy exchange of data between Information Technology and Operational Technology in a manufacturing environment

* The Digital Manufacturing Cloud for execution license includes all functionalities of Digital Manufacturing Cloud for insights.

SAP Digital Manufacturing Cloud

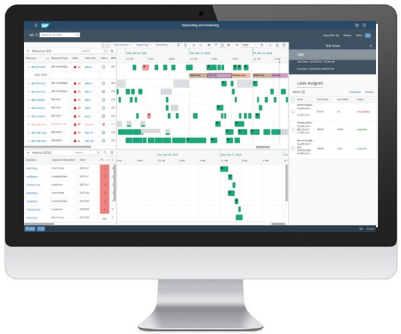
Automate processes and resources to improve manufacturing efficiency, quality and productivity

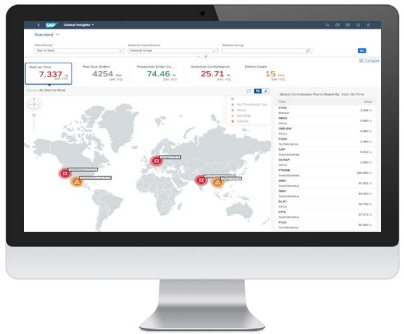
Paperless production with intuitive user interfaces for production operators, automatic data collections and set machine parameters, thereby lowering cost, increasing productivity and quality.

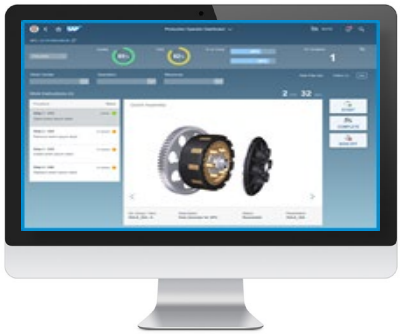
Design, distribute and dynamically control manufacturing shop floor activities enabling a smart factory.

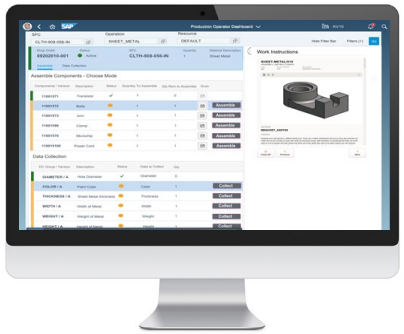
Shift and Labor planning to ensure business operations with right qualifications. Production Order scheduling and dispatching considering labor, resource and maintenance constraints to plan operations and adopt to short term changes.

Cross plant real-time analytics for manufacturing performance e.g. perfect order fulfillment, Overall Equipment Effectiveness, loss analysis along with machine data to identify improvement opportunities.









Manufacturing Insights

Intelligent insights and analysis across global plant operations

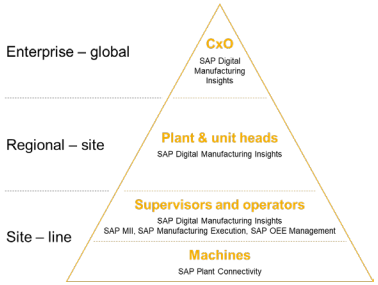
Adaption to any manufacturing process and global visibility and analytics for key performance indicators across a single plant or global operations

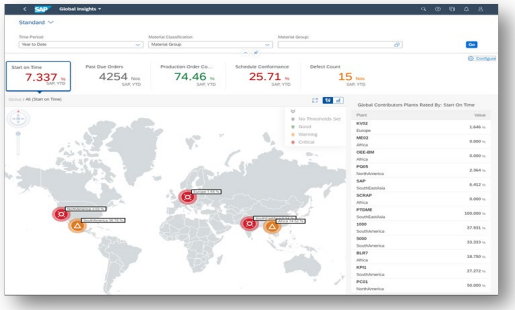
Full integration to combined business and operational data from ECC, S/4HANA and the Manufacturing Suite for improved decisions

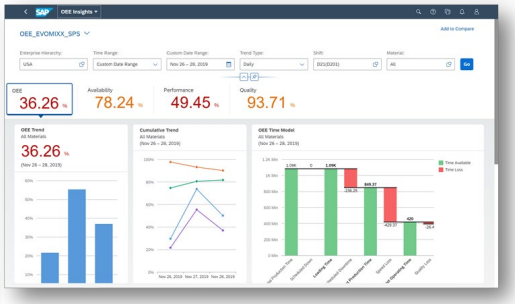
Manage and view harmonized data acquired from disparate sources for better visibility into your plant operations

Business logic orchestration to enable customer-specific processes for planning, execution, maintenance and quality

Manufacturing Performance Management with OEE Energy Management to lower operational costs through an intuitive tailored Worker UI







Benefits of a Public Cloud Solution like Digital Manufacturing Cloud

Lower Total Cost of Ownership (TCO)

Speed of Implementation

Speed of Subsequent Rollouts

Return On Investment(ROI)

Resource Driven, not by Plant

Modern User Experience - Latest technology

Expanded Portfolio

Always on the Latest release

Quicker Rollout of New Functionality

Labor Flexibility

SAP Digital Manufacturing Cloud for Execution

Solution Details

Manufacturing Execution

Orchestrate and control the shop floor

Key capabilities

- Implement top-floor to shop-floor scenarios to achieve rapid return-on-investment through out-of-the-box integration to SAP solutions
- Utilize intuitive user interfaces (UI) for production operators and transform to paperless production
- Dispatch and sequence operations to reflect the real world in the short term
- Monitor the entire manufacturing process to optimize resources and execution
- React quickly to unexpected events

Manufacturing Execution (ME)

Automate processes and resources to improve manufacturing efficiency, quality and productivity

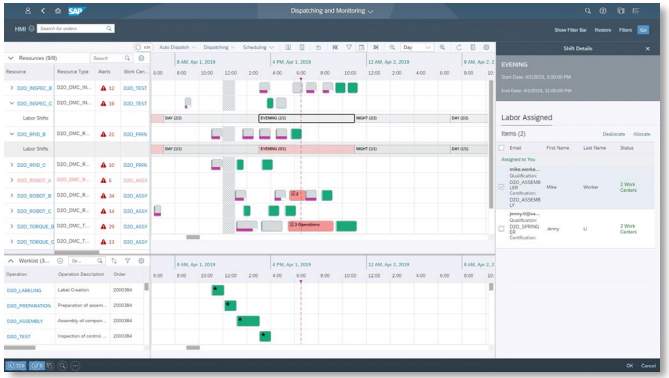
Enable resource orchestration by dispatching and sequencing operations to compress the manufacturing lifecycle and provide real-time production performance tracking

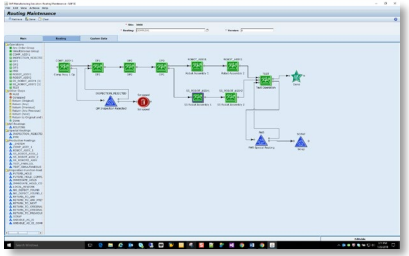
Implement top-floor to shop-floor scenarios to achieve rapid return-on-investment through out-of-the-box integration to SAP solutions

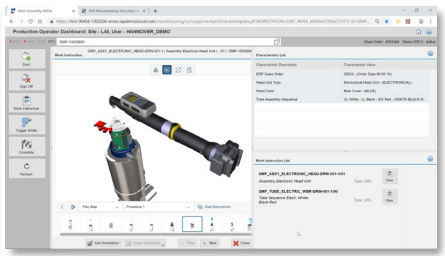
Utilize intuitive user interfaces (UI) for production operators and transform to paperless production, lowering cost and increasing productivity.

React quickly to unexpected events by monitoring the entire manufacturing process to optimize resources and speed execution utilizing built-in intelligence

Collaborative integration to allow you to respond quickly to unexpected events







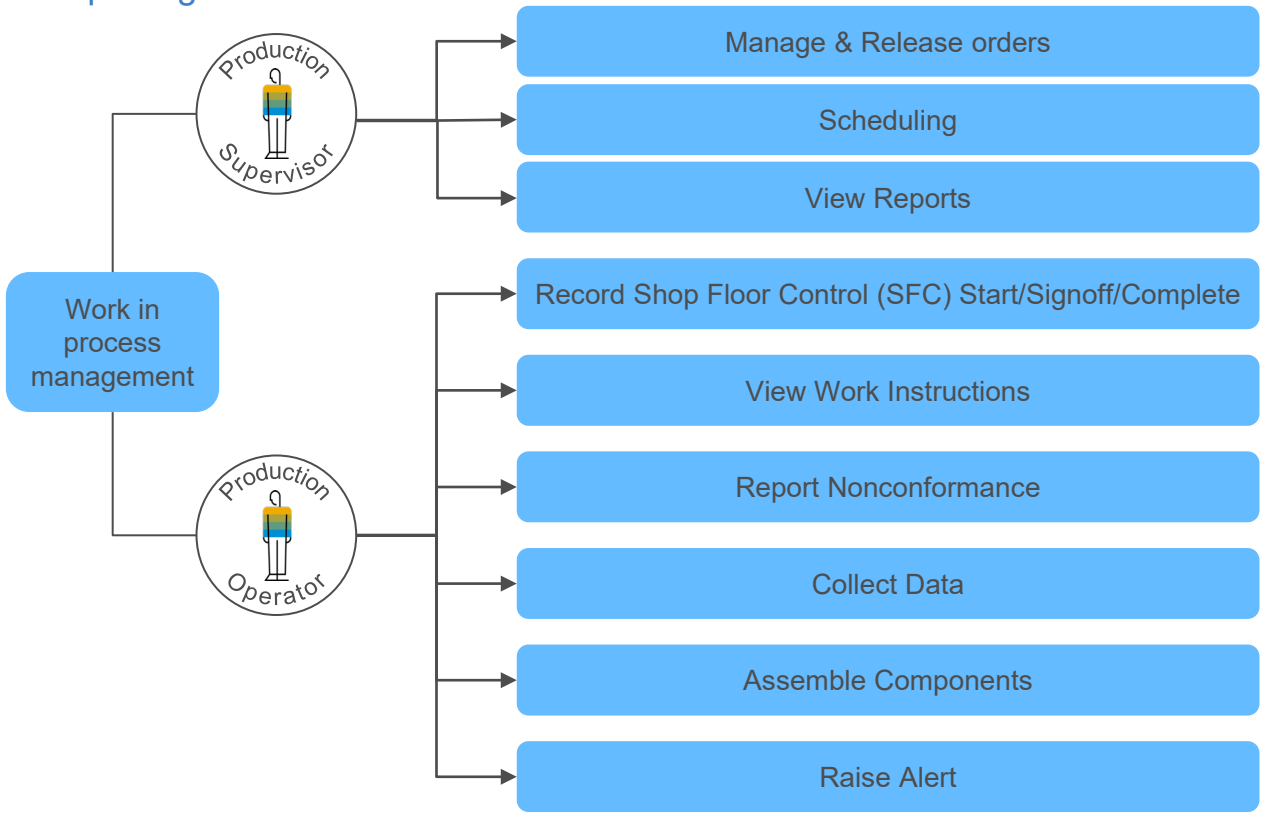
SAP Digital Manufacturing Cloud for Execution

Execution Tasks

SAP Digital Manufacturing Cloud for Execution

Work in process management and reporting

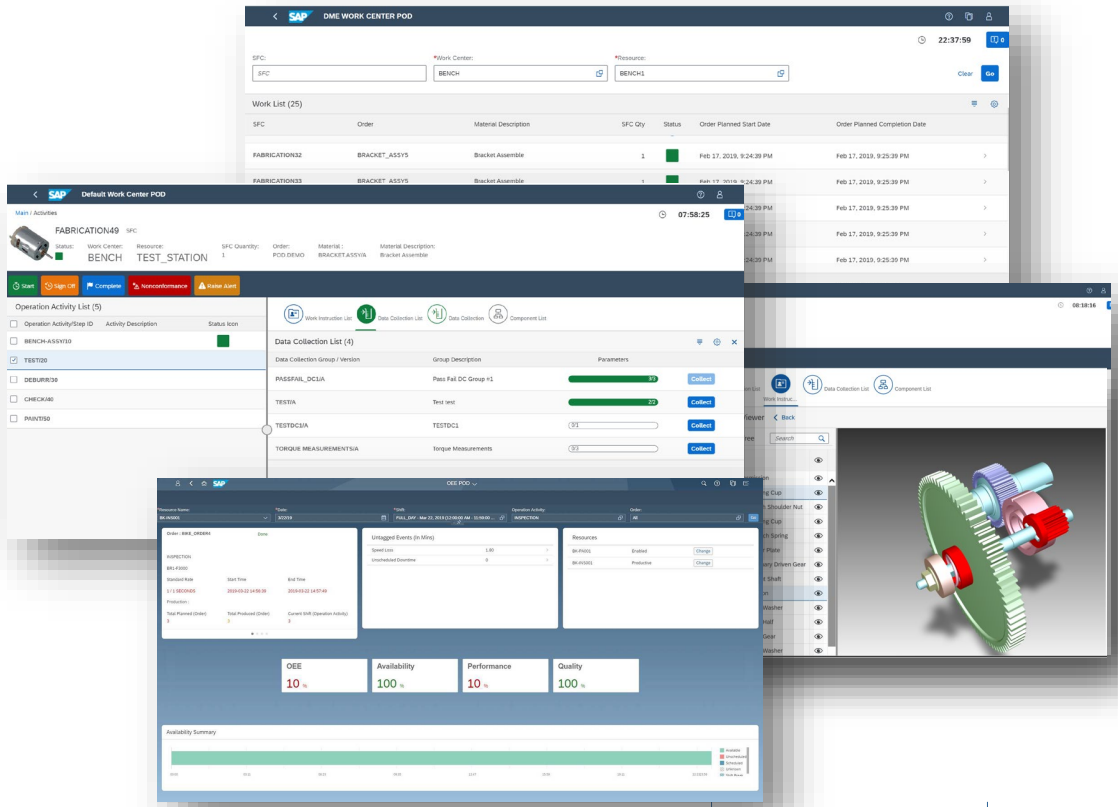
- Manage and release orders for execution on the shop floor
- Production operators use the configurable PODs (Production Operator Dashboards) that were created in the POD Designer to capture and report execution data
- An SFC is a unique WIP identifier representing a specific instance of the material being built during the manufacturing process and allows for full traceability of the product.
- The SFC represents a quantity of the product to be produced, depending on the lot size of its material. An SFC can be a serialized or non-serialized (lot).



SAP Digital Manufacturing Cloud for Execution

Discrete Industry - Production Operator Dashboard (POD)

- Support operators with a highly flexible and **intuitive user interface** (POD)
- Configure and **design the POD** based on user requirements
- Display execution-relevant information of production orders
- **Guide operators** through **work instructions** in the POD
- Support of **data collections**
- Logging of defects and subsequent rework and repair actions using the **nonconformance** functionality
- Provides product serialization and re-identification
- Recording of assembled components for traceability and to trigger **goods movements**
- Monitor **OEE** using established **KPIs** in the POD
- Post operation activity-level **yield confirmations** happen automatically as well as **goods receipts** as units are completed



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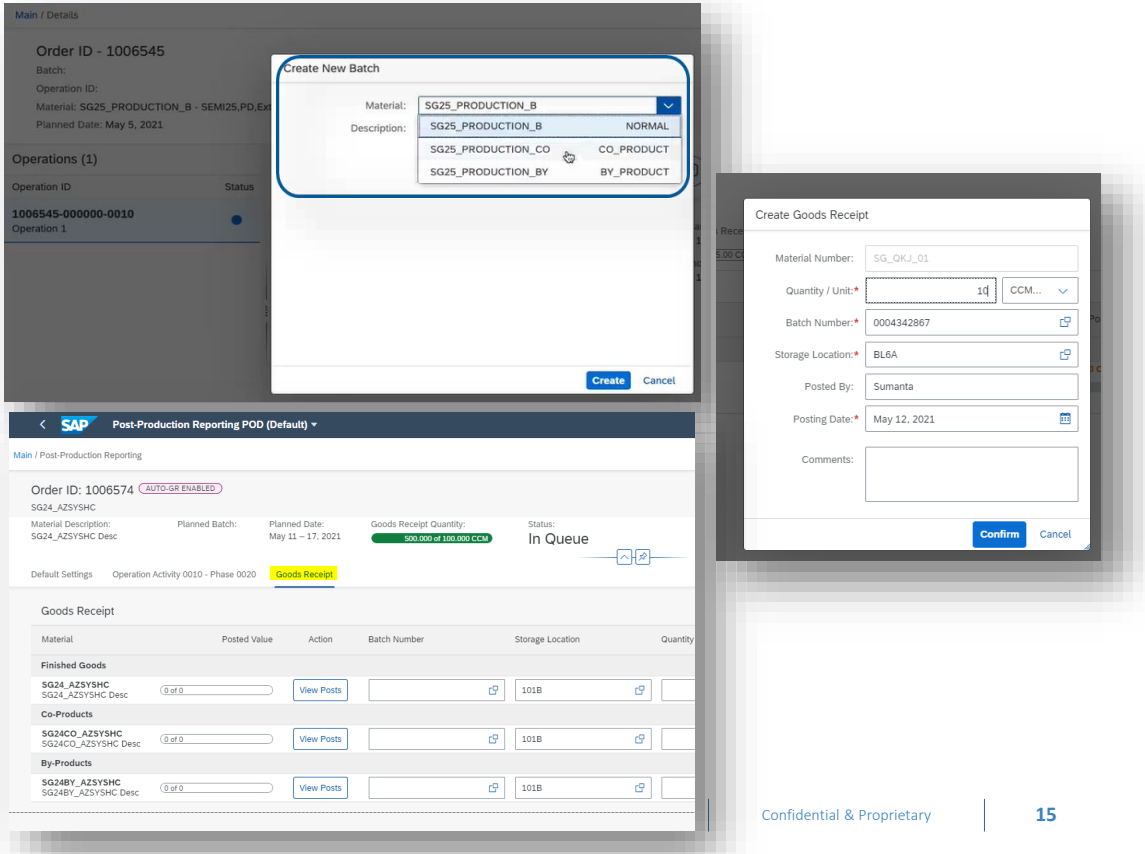
Execute Production Order in Order POD

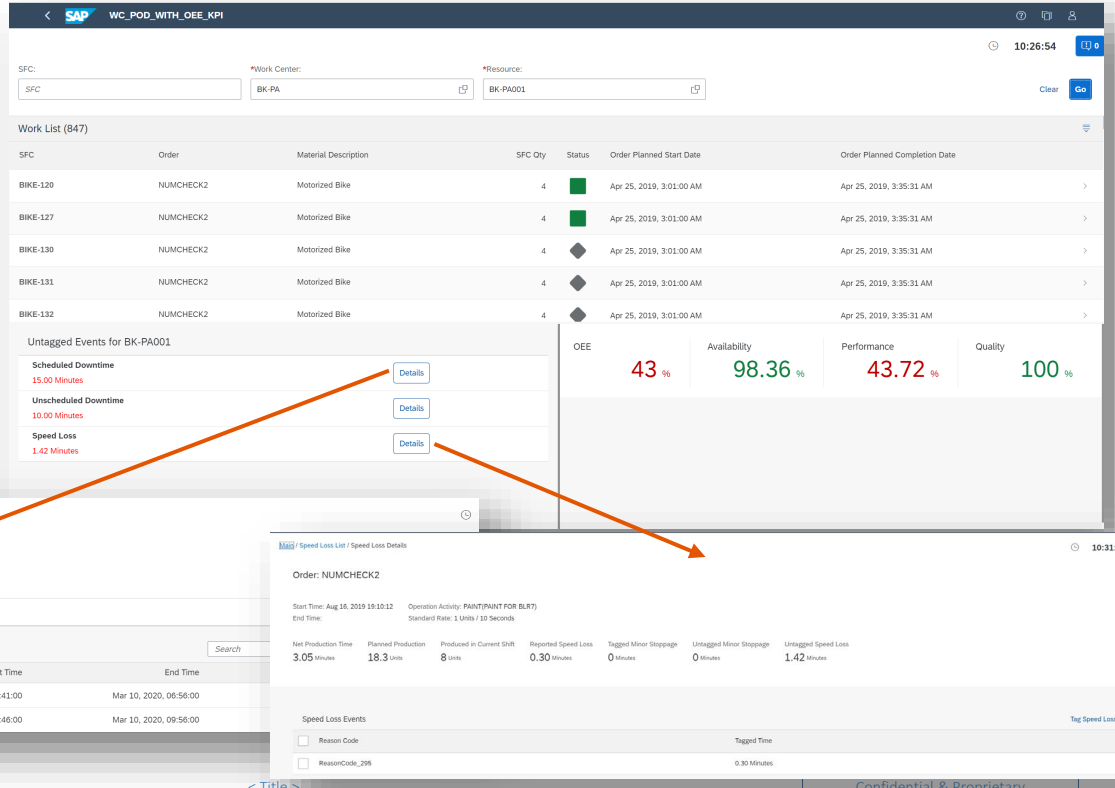
- Operator can see the details of the order (including batch) and execute the following activities:
  - Start Operation
  - Report Activities
  - Report Yield and Scrap
  - Report Material Consumption
  - Data Collection
  - Complete Operation
  - Report Goods receipt header material
  - Report Goods Receipt for Co-products and Batch-products
  - Valuate batch during Goods receipt (update batch characteristics)
- Operator can execute the following activities in Post-Production POD:
  - Report Goods receipt for Production Order
  - Report Data Collection for Production Order



SAP Digital Manufacturing Cloud for Execution

Overall Equipment Effectiveness

- Optimizing the machine efficiency by utilizing the Overall Equipment Effectiveness (OEE) functionality
- Real-time visibility via related KPIs
- Production Operator Dashboard (POD) is configured showing OEE KPIs.
- Straightforward user interface allows production operators to easily report machine status change
- Detailed OEE insights and root cause analysis

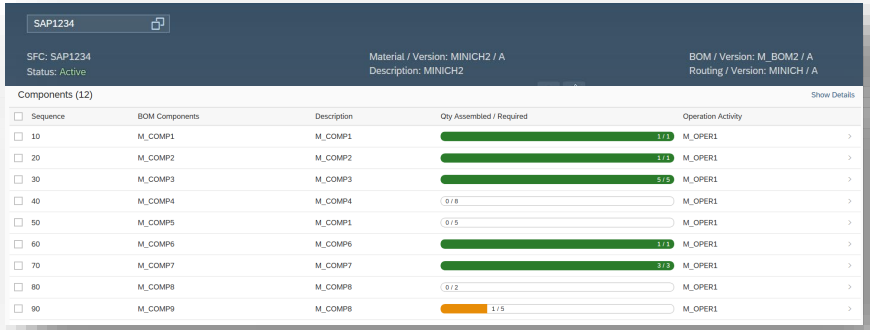


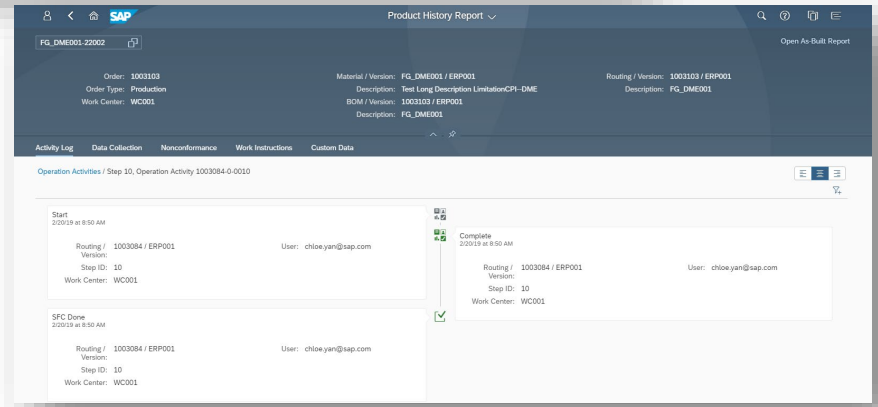
SAP Digital Manufacturing Cloud for Execution

Work in process management and reporting

- Capture the digital twin of the production process presented by the following reports:
  - The *Product Genealogy Report* displays the details of the component data collected for an SFC
  - The *Product History Report** displays the activity of
    - an SFC over a period of time for Discrete Industries
    - a Batch over a period of time for Process Industries (see more details)

** The two styles of report (Discrete/Process) with different input parameters and report terminology will be set automatically based on the industry type of Plant configured in User profile.*





SAP Digital Manufacturing Cloud for Execution

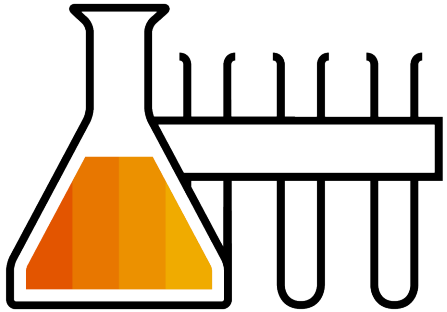
Process Industries

*) Shop Floor Designer (SFD) gets renamed to Production Process Designer (PPD) in 2111.

SAP Digital Manufacturing Cloud for Execution

Capabilities for Consumer and Process Industries

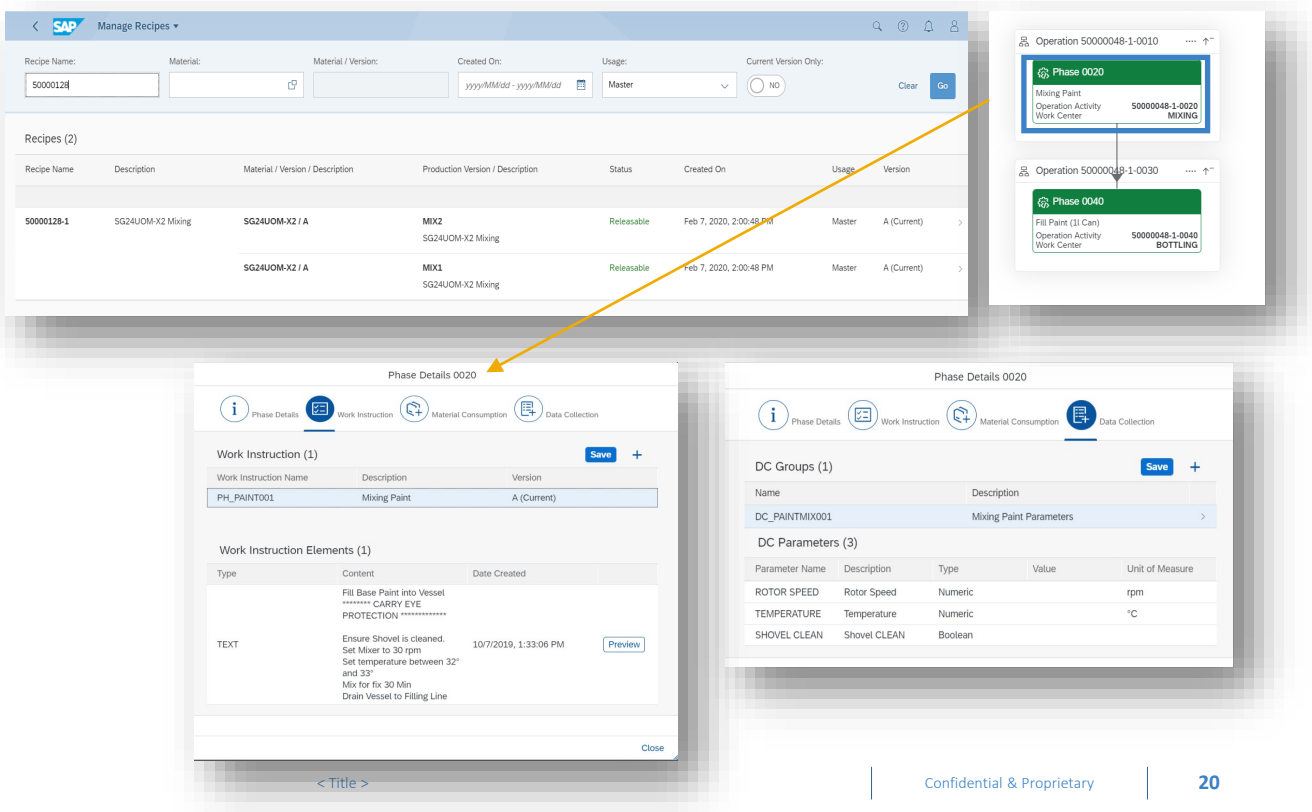
- **Extend Master Recipes** integrated from S/4HANA with Work Instructions, Data Collections and Process Parameters
- **Execute and Split Batch related Process Orders** in the Production Order Dashboard (POD)
- **Create and Valuate Batches** for Main-Products as well as for **Co-Products and By-Products** during Production and search and **Consume batches** based on characteristics
- **Confirm process order phases** with Yield, Scrap and Activities integrated with S/4HANA
- Post and Cancel **goods movements** for goods issues and receipts seamlessly integrated with S/4HANA
- **Record inspection results with Inspection Points** integrated with S/4HANA QM
- **Integrate with the Shop Floor** in a **bi-directional** way using Equipment Connectivity (Production Process Designer*)) and Plant Connectivity (PCo)
- Enable **Post-Production Reporting**
- **Customize** your application with the POD Designer
- Print customized **Labels**
- **View product history report** for produced batches



SAP Digital Manufacturing Cloud for Execution

Process Industry – “Manage Recipe” App

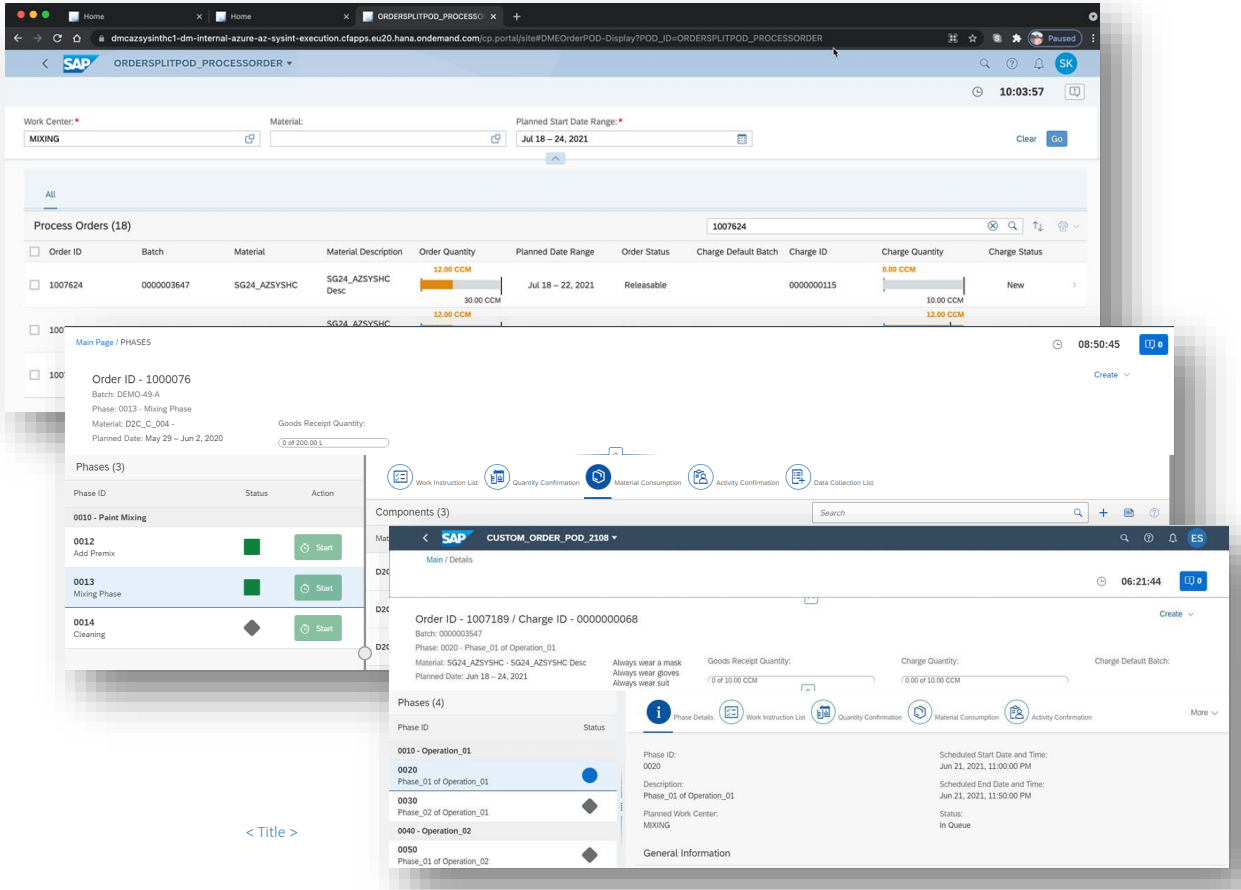
- Integrate **Master Recipes** with S/4HANA
- Maintain execution relevant data such as **Work Instructions or Data Collection** parameters in DMC
- Graphical interface for recipe display
- Integrate **Production Versions** with S/4HANA Cloud



SAP Digital Manufacturing Cloud for Execution

Process Industry - Production Operator Dashboard (POD)

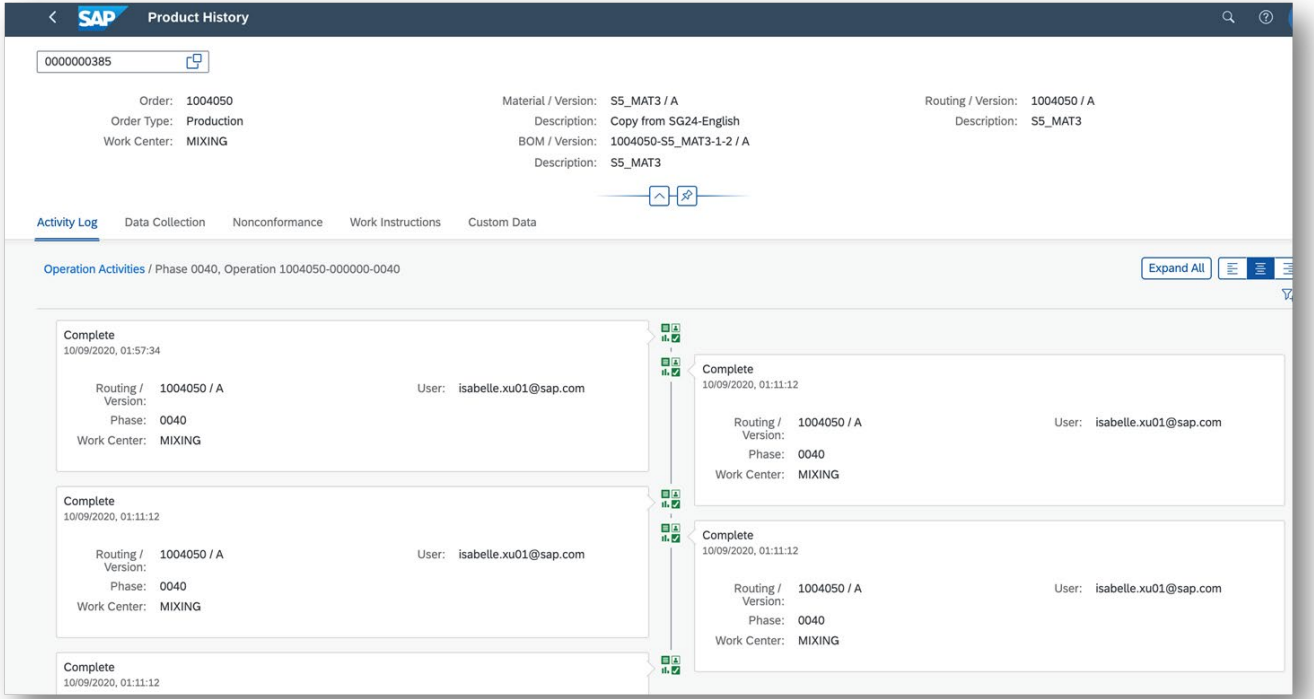
- **Integrate process orders** with S/4HANA
- Provision of the **new Order POD** to support order and batch-based execution of process orders with batches
- Guide Operators with a highly flexible and **intuitive user interface** (POD)
- Configure and **design the POD** based on user requirements
- Support of **Data Collections** to collect execution related data
- **Record inspection results** for process order operation/phase (inspection lot type 03) and integrate with S/4HANA
- **Log Defects** for an Order which can be viewed in the Product History Report
- Report downtimes from POD to calculate OEE availability



SAP Digital Manufacturing Cloud for Execution

Product History Report for Process Industry

- Existing PHR report has been enhanced to enable using by Process Industry Customers.
- Input parameters and report terminology will be set automatically either to Process or Discrete based on industry type for Plant specified in User profile.
- User can search by Batch, Material or Order after pressing a value help button.



SAP Digital Manufacturing Cloud for Execution

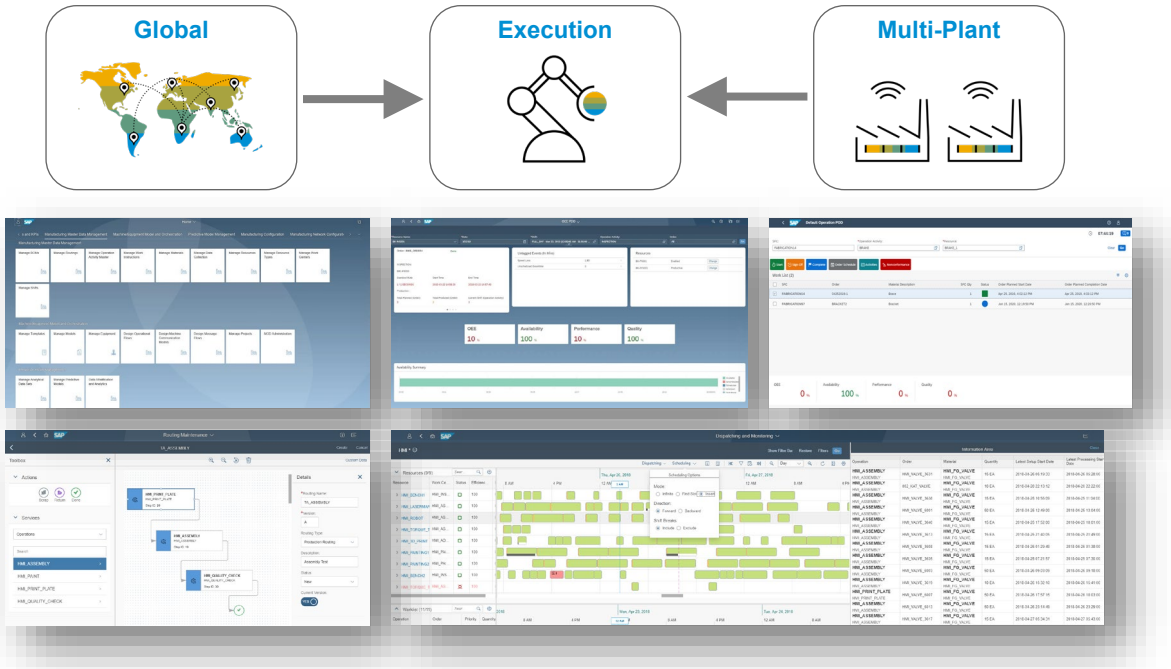
Resource Orchestration

SAP Digital Manufacturing Cloud for Execution

Orchestrate and control the shop floor

Key capabilities

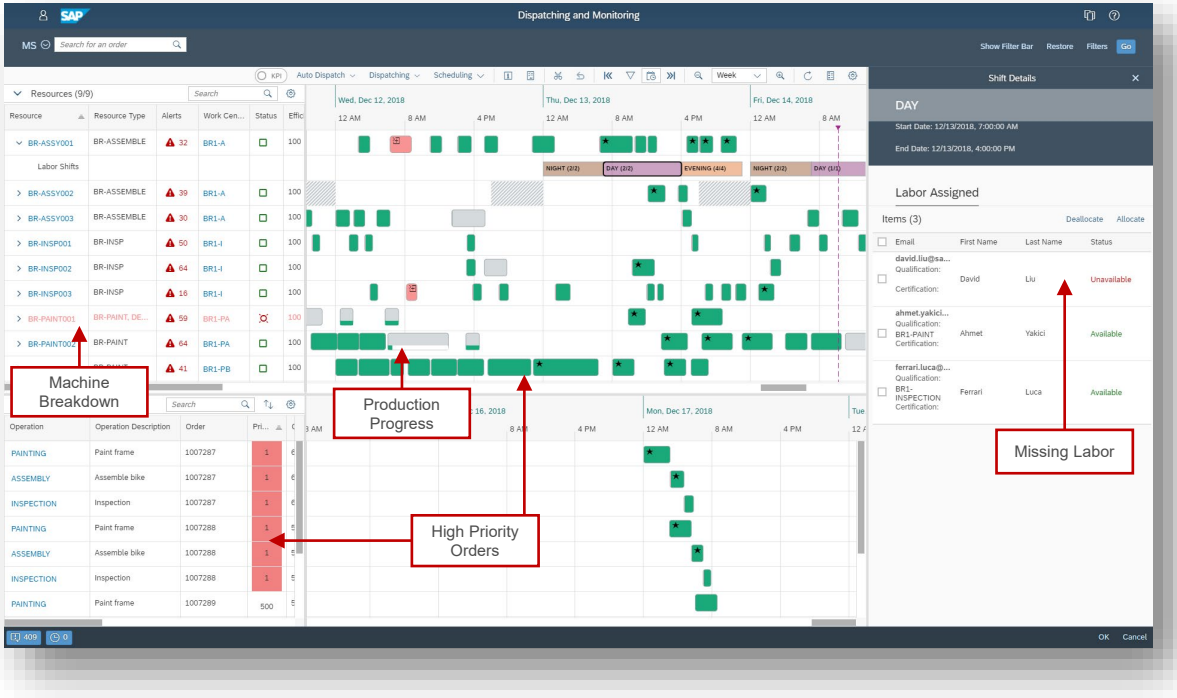
- Monitor the entire manufacturing process to optimize resources and execution
- Role-specific Fiori and operator dashboards
- Fully configurable Production Operator Dashboard (POD) that supports drag & drop and preview
- Monitor OEE and manage downtime events
- Resource Orchestration to manage shop floor workflow and labor assignments
- Automation interfaces to provide for shop-floor-driven manufacturing events and data collection



SAP Digital Manufacturing Cloud for Execution

Resource Orchestration & Dispatching

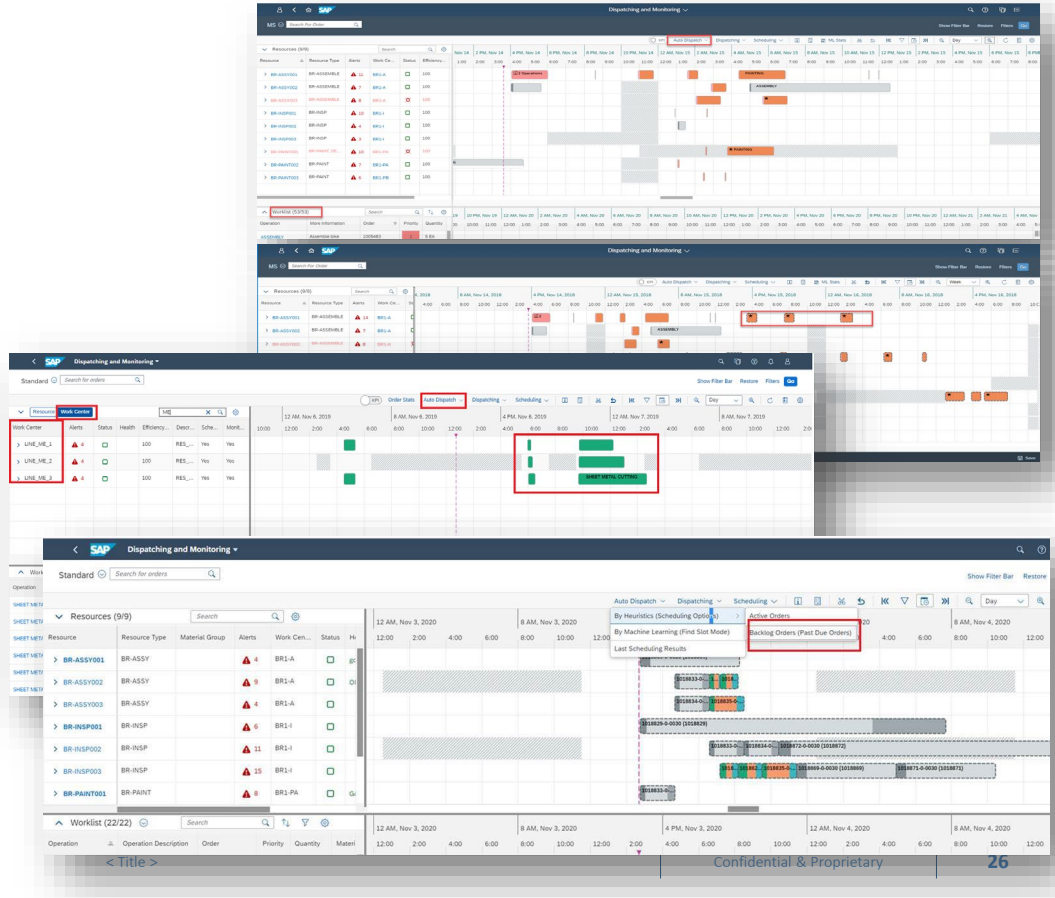
- Orchestrate labor and resources on the shop floor to achieve maximum availability
- React quickly to unexpected events utilizing built-in intelligence
- Dispatch and sequence operations to reflect the “real world” on the shop floor
- Provides multiple options for dispatching
  - Operations can be dispatched on Resource level (e.g. for Job Shop scenarios)
  - Operations can be dispatched on Work Center level (e.g. for Production lines or Production cells)
- Monitor the entire manufacturing process to optimize resources and execution
- Reflect the reality on the shop floor by visualizing high priority orders, machine breakdowns, missing labor and production progress



SAP Digital Manufacturing Cloud for Execution

Resource Orchestration & Dispatching

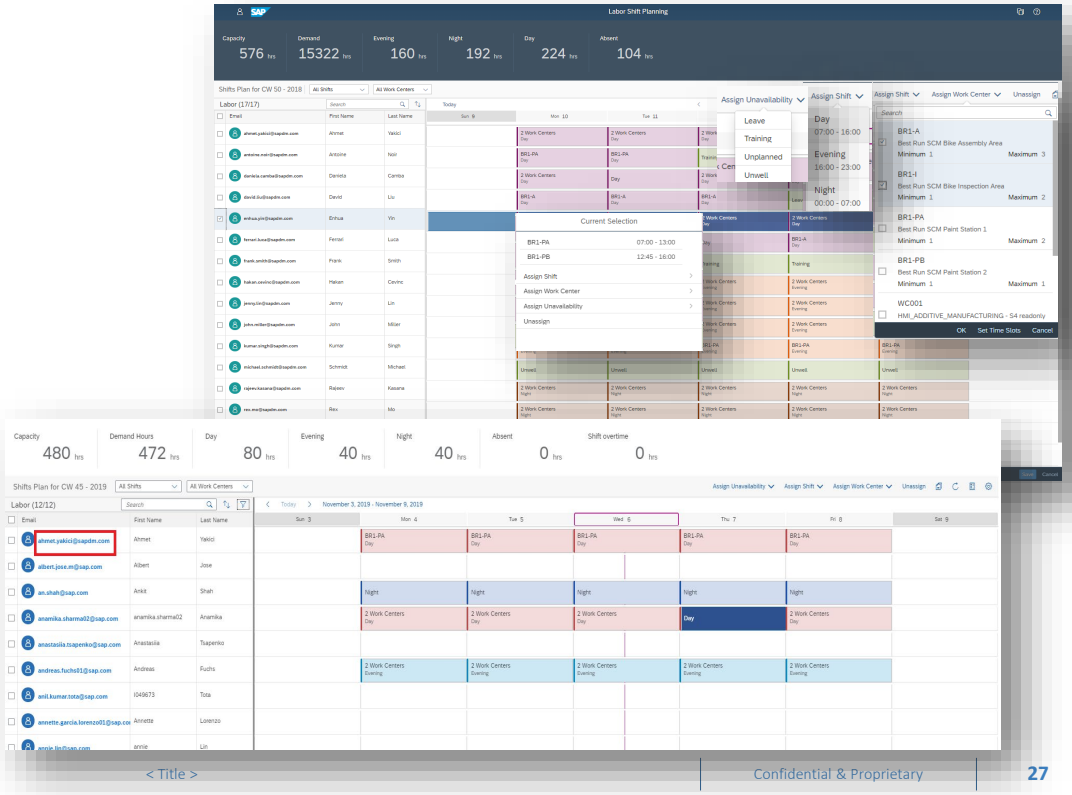
- Automatically dispatch operations from the Work List
- Trigger order release from order view and Gantt Chart and show created SFCs
- Operations can be split, merge and distributed to alternative resources
- Split quantities are shown in the order schedule information of the POD
- Tight POD integration to reflect planning situation on the shop floor and to visualize changes from execution in planning and vice versa
- Automatically or manually dispatch operations using Work Center view
- Check and reserve tools from the planning board
- Automatically schedule the backlog orders with advanced heuristics



SAP Digital Manufacturing Cloud for Execution

Resource Orchestration- Labor Scheduling

- Manage shifts and labor considering labor qualification and certification
- Assign labor to work centers and if required to time intervals
- In the situation where workers are not available, the unavailability of the worker(s) can be entered for the corresponding day or week
- Unavailability can also be entered in time slices if the unavailability is only for few hours
- Assignments are considered during dispatching in the Gantt Chart of the scheduling and dispatching app
- KPIs visualize the status for selected week:
  - Capacity reflects available labor capacity
  - Demand reflects demand coming from the orders
- Send emails to operators using the Schedule Labor app



SAP Digital Manufacturing Cloud for Execution

AI/ML Scenario Management

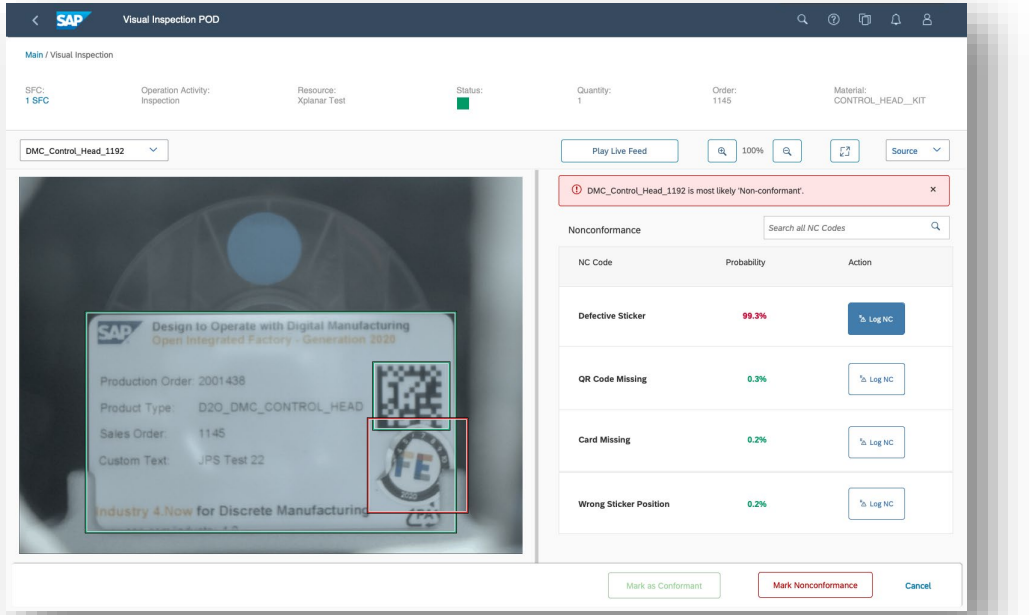
SAP Digital Manufacturing Cloud for Execution

AI/ML Scenario: Visual Inspection - Assist Nonconformance Logging

Machine learning models **assist operator** on the shop floor **to execute visual inspection tasks** of manufactured products. Using a **Production Operator Dashboard**, it **simplifies** the **identification of defects** and **logging** the right **Nonconformance** to ensure defective parts are handled as business requires.

Key Capabilities

- Upload pre-trained machine learning model and deploy it to shop floor supporting the operator on visual inspection tasks.
- Operator can capture images with connected cameras or can inspect images from industrial cameras provided by the data collection API
- Assist operator to identify defects and log the right Nonconformance code using the machine learning model
- Allow the machine learning model to log the Nonconformance automatically based on the prediction and under operator's control
- Automated collection of images and inspection results which can be reviewed, analyzed and downloaded as analytical data sets to train new machine learning models.



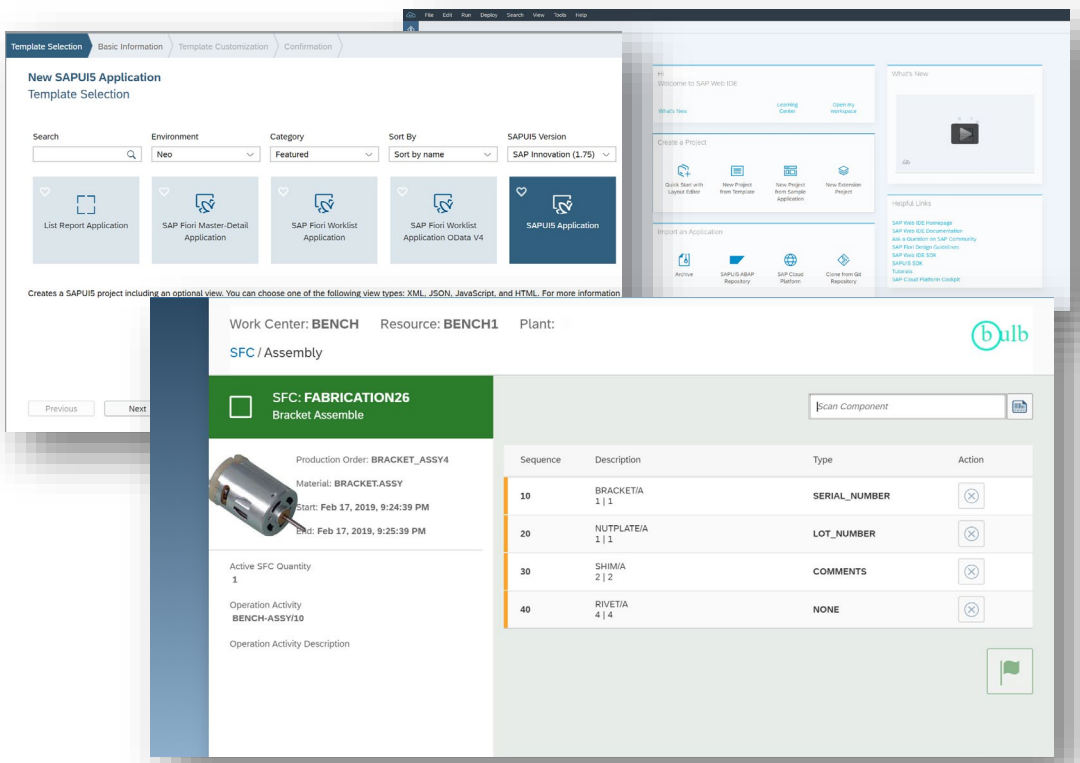
SAP Digital Manufacturing Cloud

Extensibility

SAP Digital Manufacturing Cloud

UI Extensions (Custom POD Plugin, Custom Application)

- Provides mechanism to allow customers/partners to develop custom SAP UI5 based POD plugins using SAP Web-IDE
- Step by step guide is available in sap help portal
- Custom POD plugin becomes available inside POD Designer thereby allowing them to be consumed inside POD
- Alternatively, the customer/partner might make use of the public API's available in the SAP Business API Hub to create a full SAPUI5 Custom Application in customer/partner PaaS tenant.
- Template Assembly POD is provided by SAP including step by step guide on sap help portal

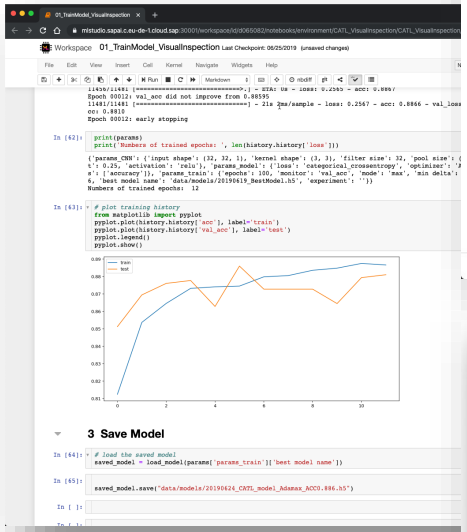


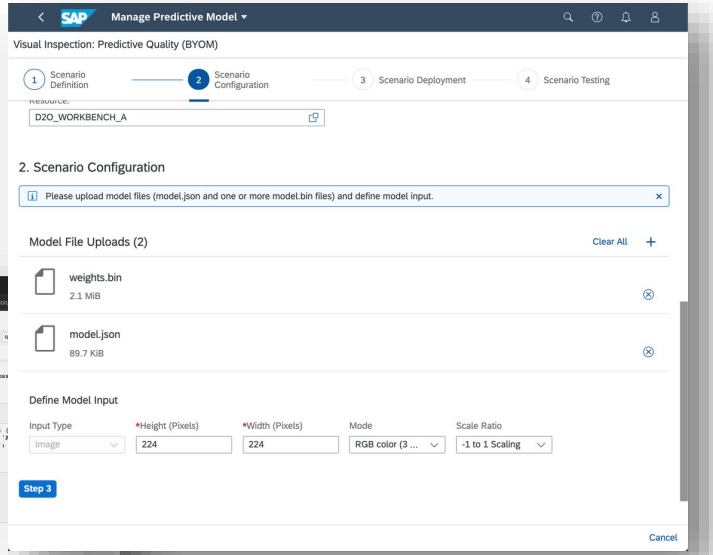
SAP Digital Manufacturing Cloud

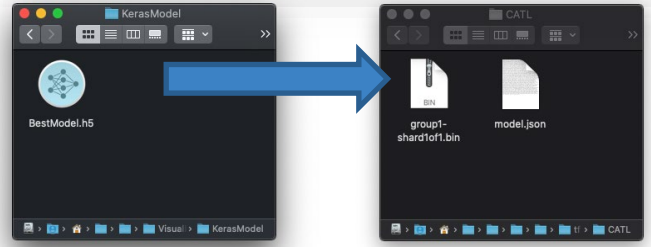
Machine Learning Extensions

Bring your own model for Visual Inspection Scenarios

- Download image and inspection results collected through usage of POD Plugin Visual Inspector
- Train your own classification or defect detection model using preferred machine learning tools and convert it to Tensorflow Javascript model files
- Upload you own model files using wizard for creation of new visual inspection scenarios
- Activate visual inspection scenarios with the own model to be used by POD Plugin Visual Inspector







SAP Digital Manufacturing Cloud for Insights

Solution Details

Manufacturing Insights

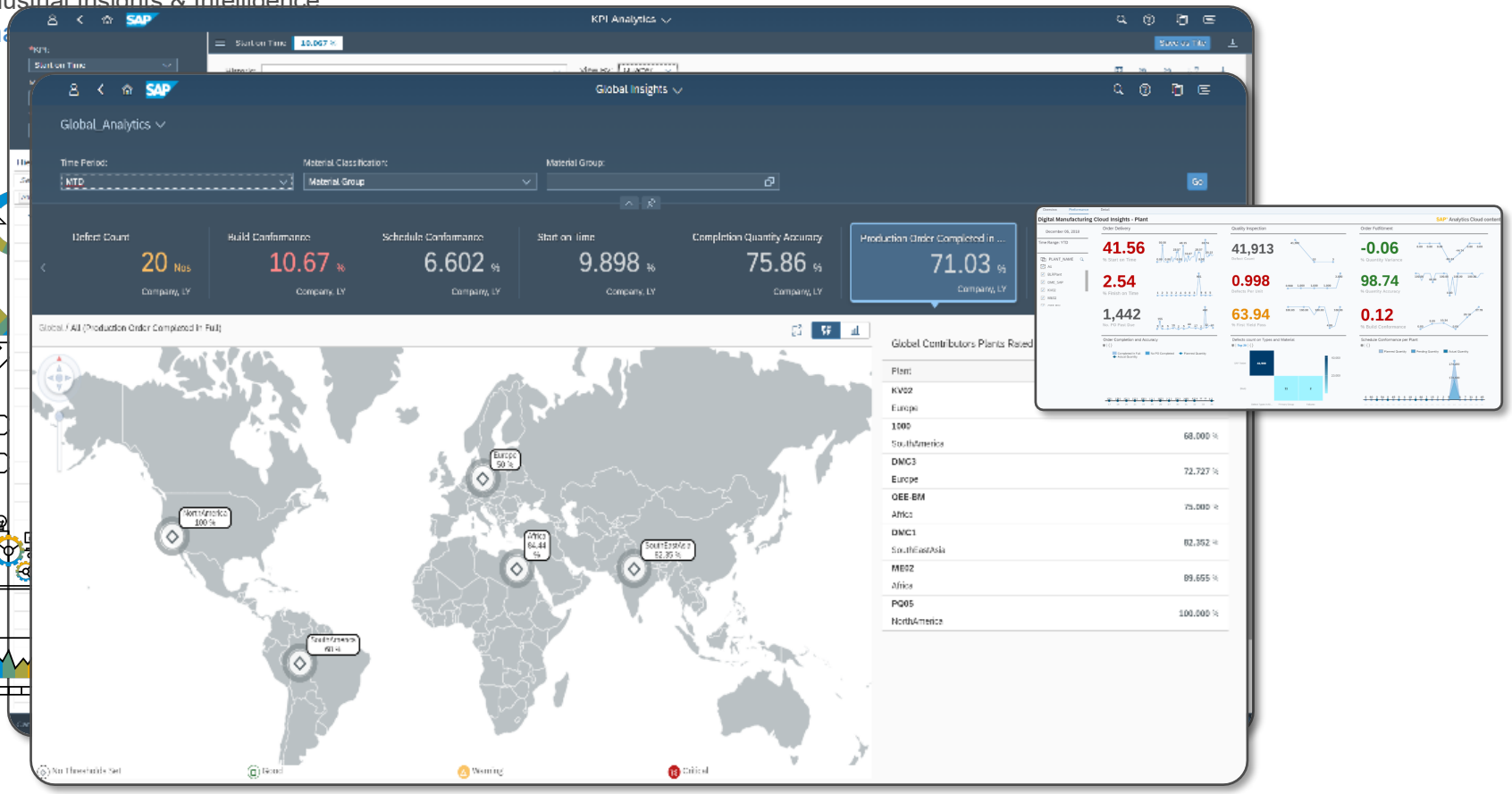
Digital system to gain real-time visibility of production performance with business context across the enterprise

Key capabilities

- Gain insights on performance and productivity across different levels of the enterprise hierarchy (i.e. across regions, plants, work centers , resources, etc.)
- Take informed decisions by combining and utilizing data from shop floor systems, execution systems, along with contextual information from business sources (i.e. ERP)
- Use pre-delivered interactive dashboards filled with standardized key performance indicators (KPI) based on harmonized data
- Incorporate data from non-SAP sources, build customized KPI's and personalize your dashboards & reports
- Perform root cause analysis, drill -down and -up across different levels of the enterprise hierarchy

Industrial Insights & Intelligence

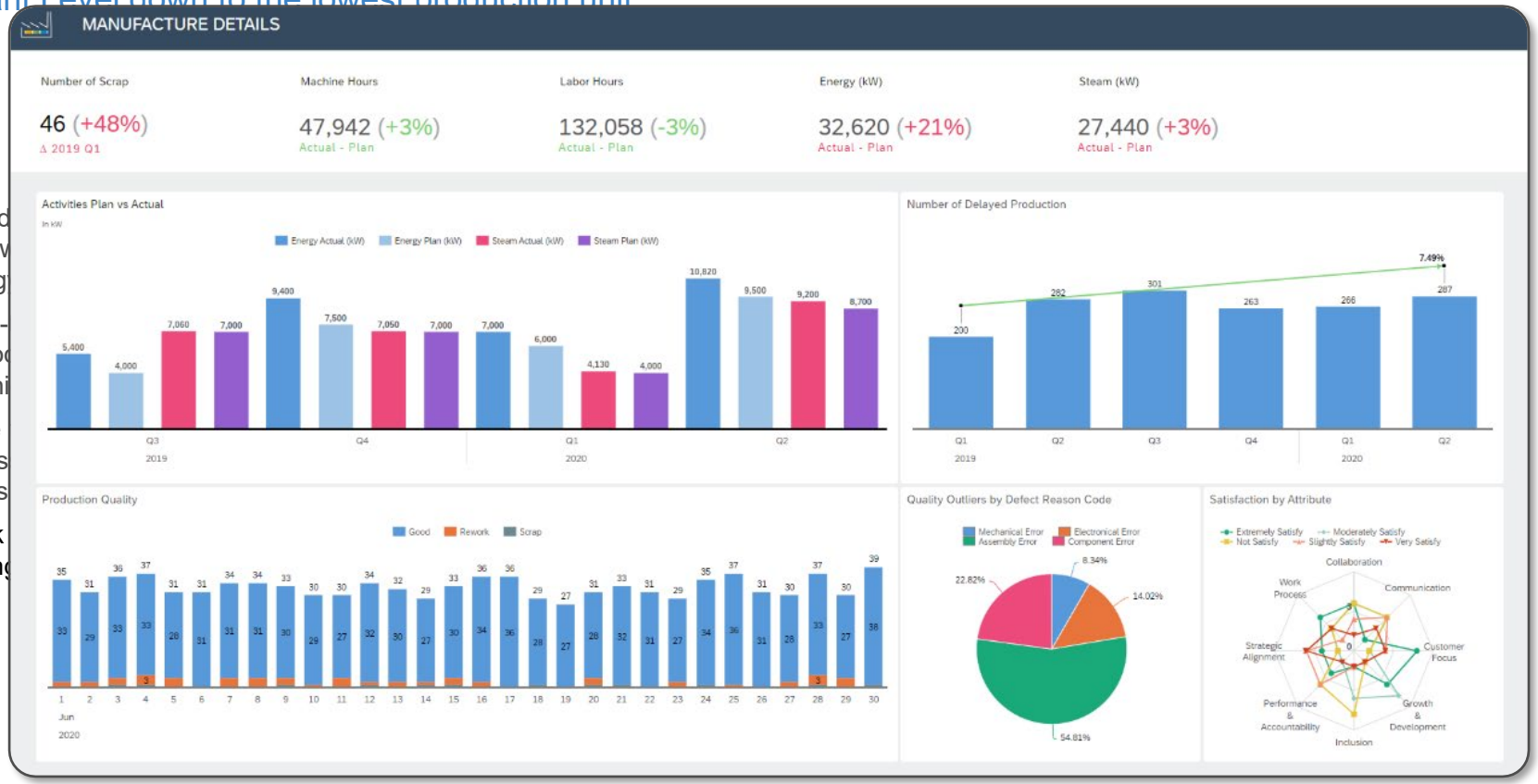
Ana



Insights

From Plant Level down to the lowest production unit

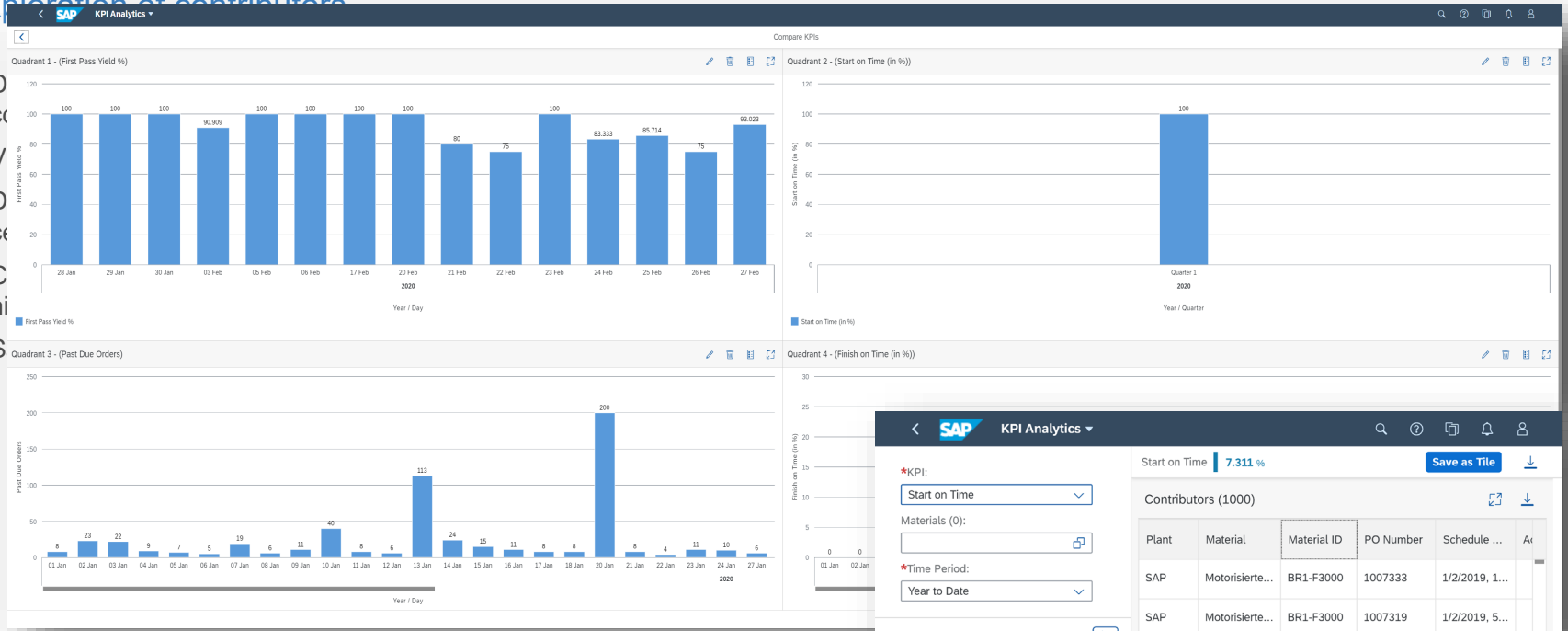
- Use stand
  KPIs fed v
  technolog
- Gain real-
  of the proc
  geographi
- Compare
  and acros
  resources
- Get quick
  performing



Deep Dive - KPI Analytics

Exploration of contributors

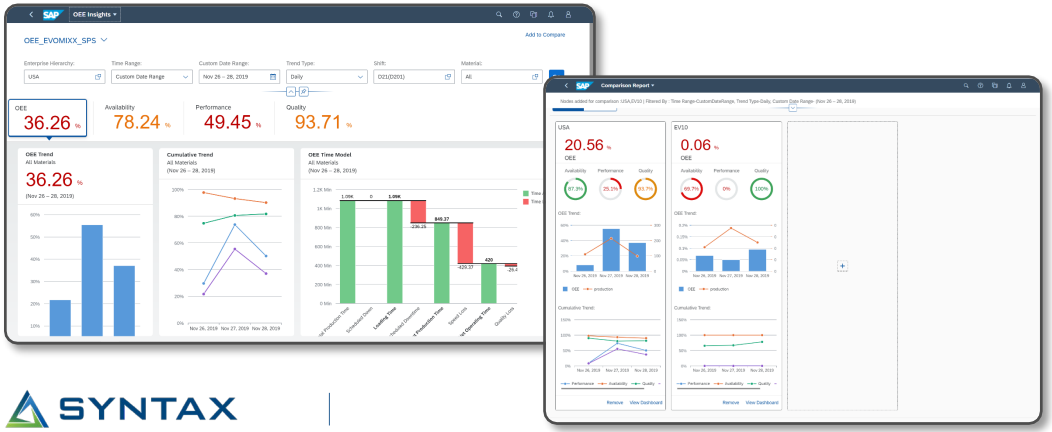
- D
- V
- D
- C
- S

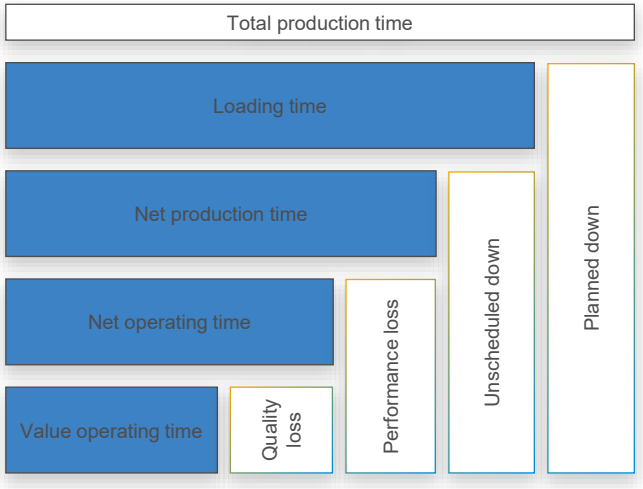


Insights on Overall Equipment Effectiveness

Standard metric for measuring manufacturing productivity

- Measure productivity with standard pre-delivered OEE calculations
- Analytics on identified losses captured during execution
- Normalization of various losses into time lost
- Analyze OEE across a custom time range, across materials, and across shifts
- Root cause analysis for all OEE losses (availability, performance, and quality losses)
- Perform OEE comparison and loss analysis between work centers, resources, and plants across different time zones of the world

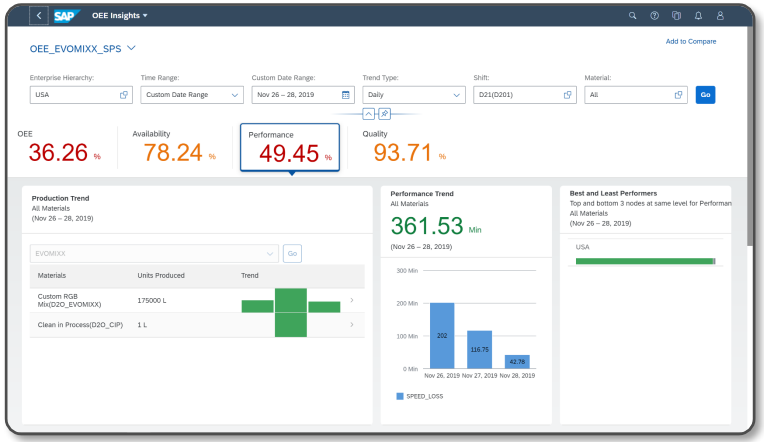


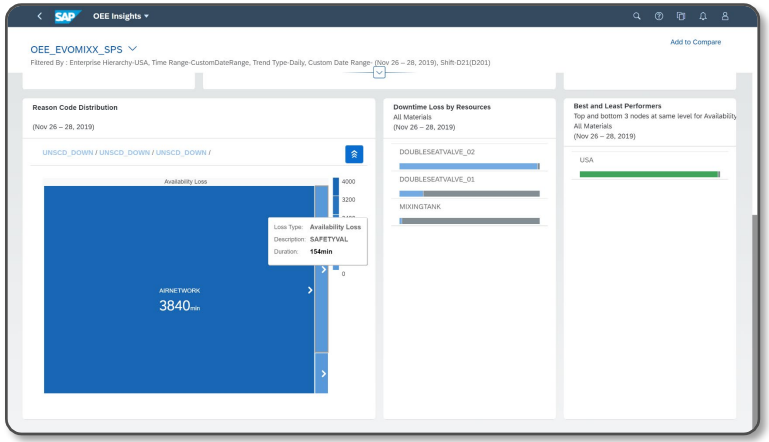


Root Cause Identifier for OEE Losses

Helps to focus on the reasons for sub-optimal performance

- Root cause analysis for all OEE loss types, e.g. unscheduled down, schedule down, performance loss and quality loss
- Identify major contributors for losses
- Multi-level reason code drill-down to identify root cause of the issue

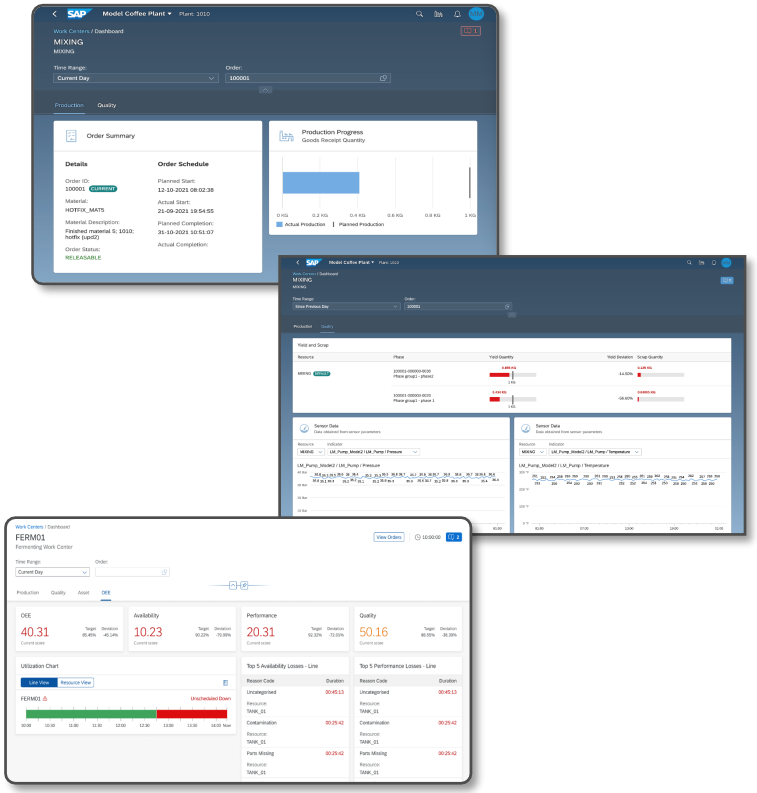




SAP Digital Manufacturing Cloud for Insights

Live Production Visualization & Monitoring

- Seamlessly design to your wish the details to monitor and track the production line from the Line Monitor plugins provided out of the box from POD designer.
- Track the actual production progress against planned production with order-specific details from the perspective of “Production”.
- Monitor the yield, scrap at every phase level of the order from the perspective of “Quality”. Embed IoT sensor data to help operators to visually identify anomalies and correlate with specific orders.
- Visualize the resource availability summary and associated availability losses from the perspective of “Assets”.
- Monitor and track the effectiveness and performance from the perspective of “OEE”.
- Visualize shop floor 2D layout and overlay information on top

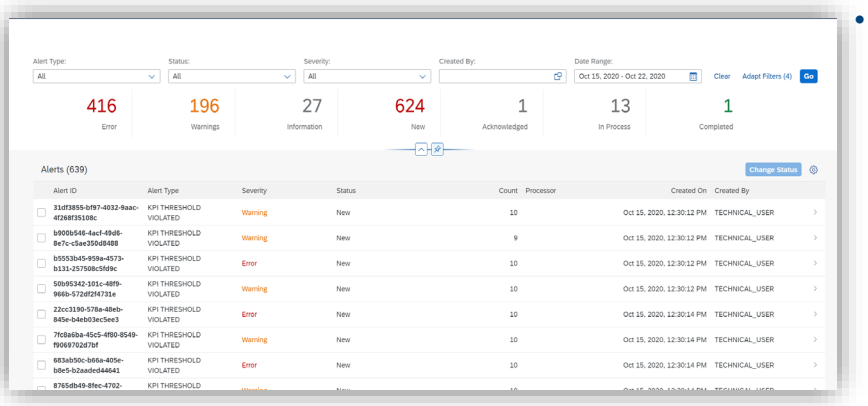


SAP Digital Manufacturing Cloud for Insights

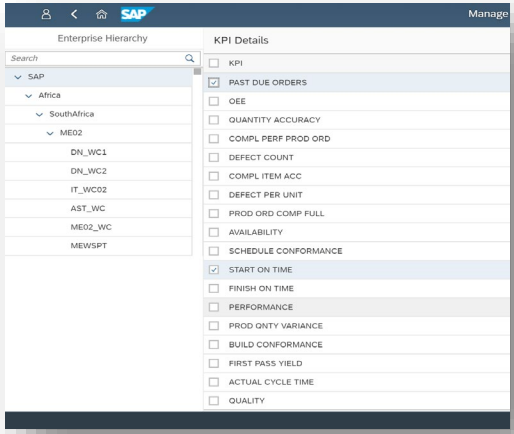
Alert Management

SAP Digital Manufacturing Cloud for Insights

Alert Management – KPI Threshold Violation

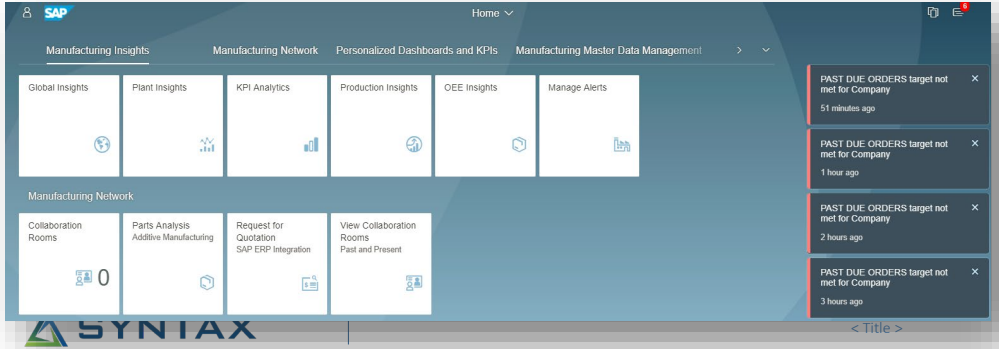


- **Alert Overview**
  - Visualize the alerts with appropriate filters
  - Complete alert lifecycle to make it to in process, acknowledge and complete



KPI violation

- Personalized subscription for alerts on KPI threshold breach at any hierarchy node as per personal responsibility



Push Notification

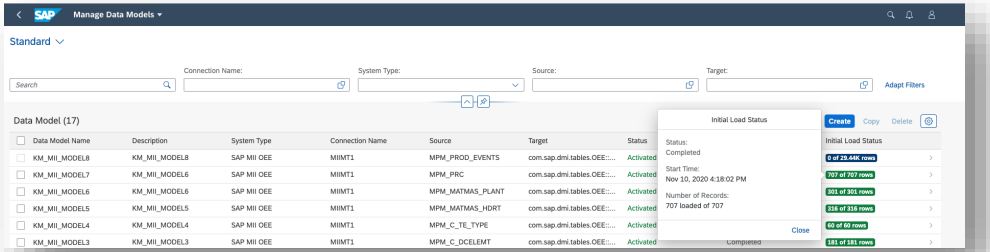
- Contextualize view of alerts; categorized by date, type and priority
- Push notification without refreshing the page

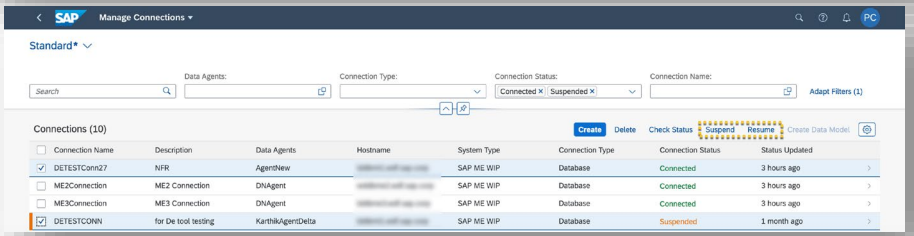
SAP Digital Manufacturing Cloud for Insights

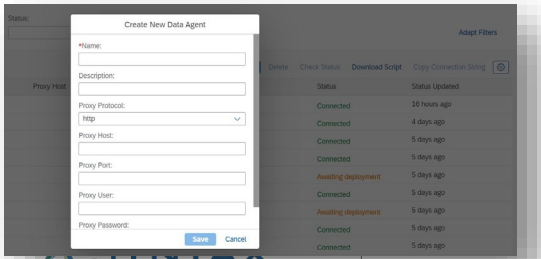
Data Engineering

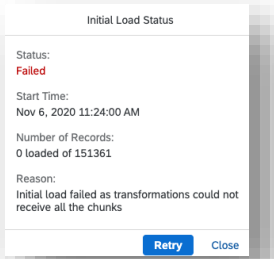
Data Agents, Connections and Data Model for Analytical Insights

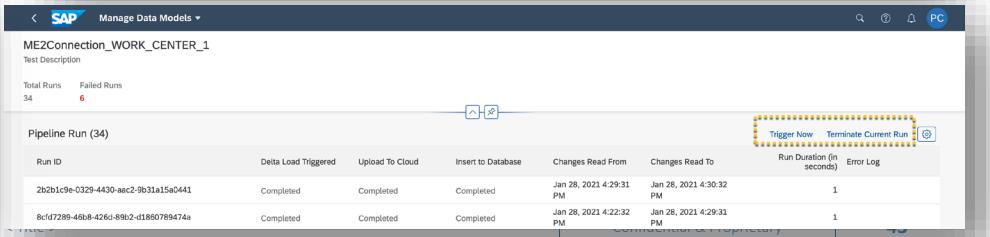
- Acquire data from on-premise systems (ME, ECC and S/4HANA) to the cloud (DMC)
- Enable data replication by defining data agents and connections for corresponding host systems
- Prepare and contextualize the replicated data for consumption by defining data models
- Ensure data integrity, continuity and completeness of replication
  - Qualitatively monitor connectivity status and quantitatively monitor replication status
  - Suspend and resume connectivity to the host system (e.g. in case of database maintenance)
  - Suspend data replication and resume it from the delta load







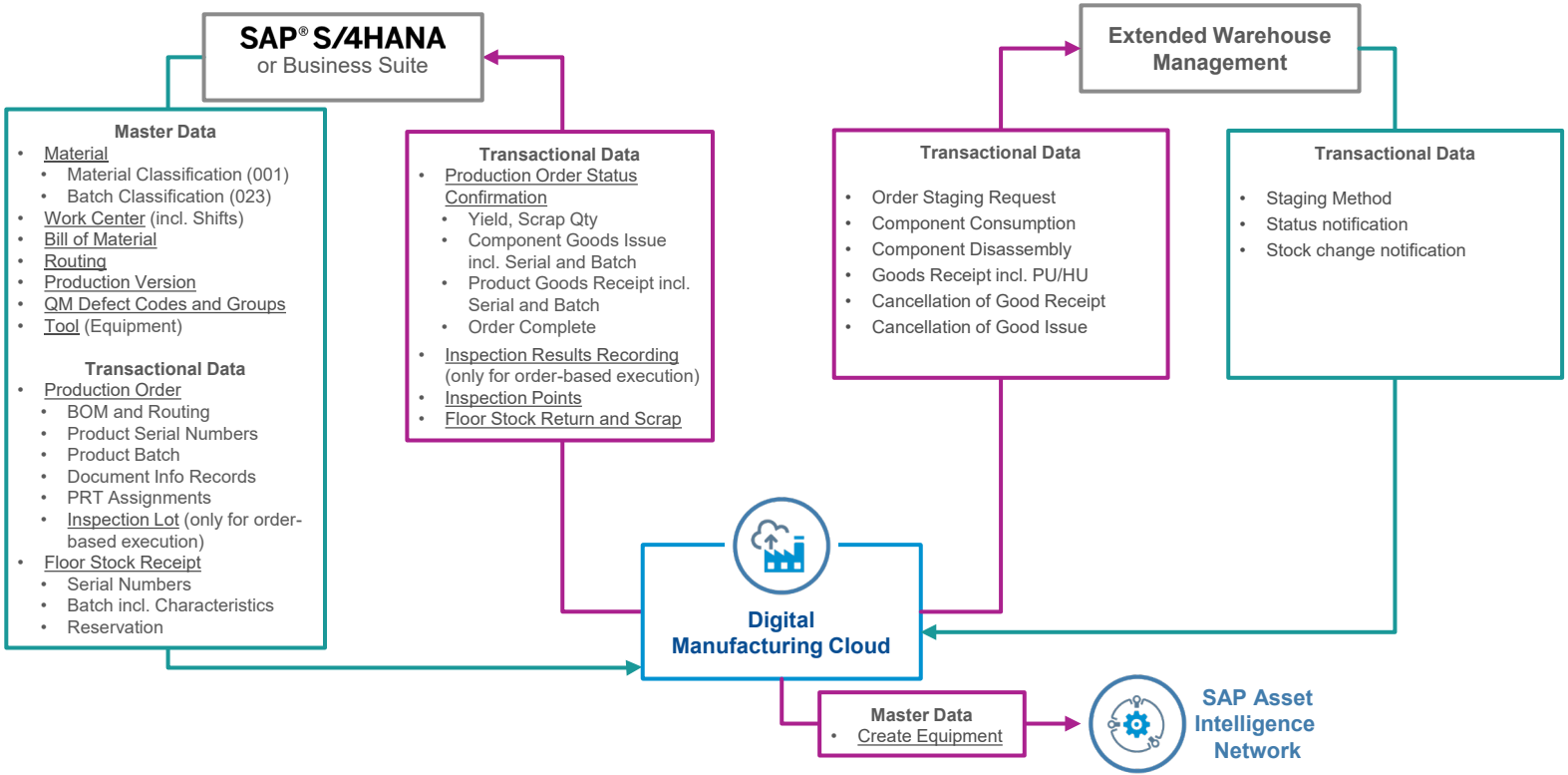




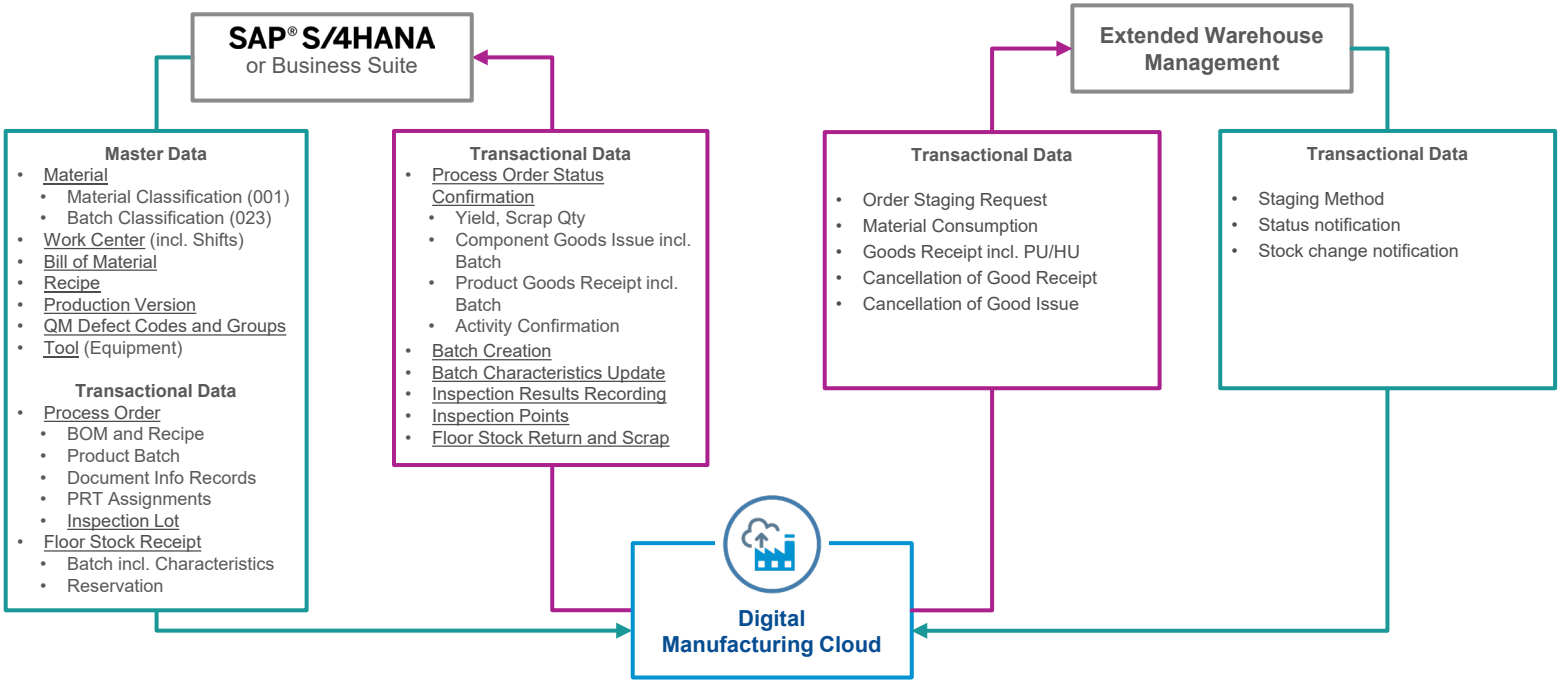
SAP Digital Manufacturing Cloud

Integration

Discrete Industries Integration Scenarios for DMC – S/4HANA or Business Suite



Process Industries Integration Scenarios for DMC – S/4HANA or Business Suite

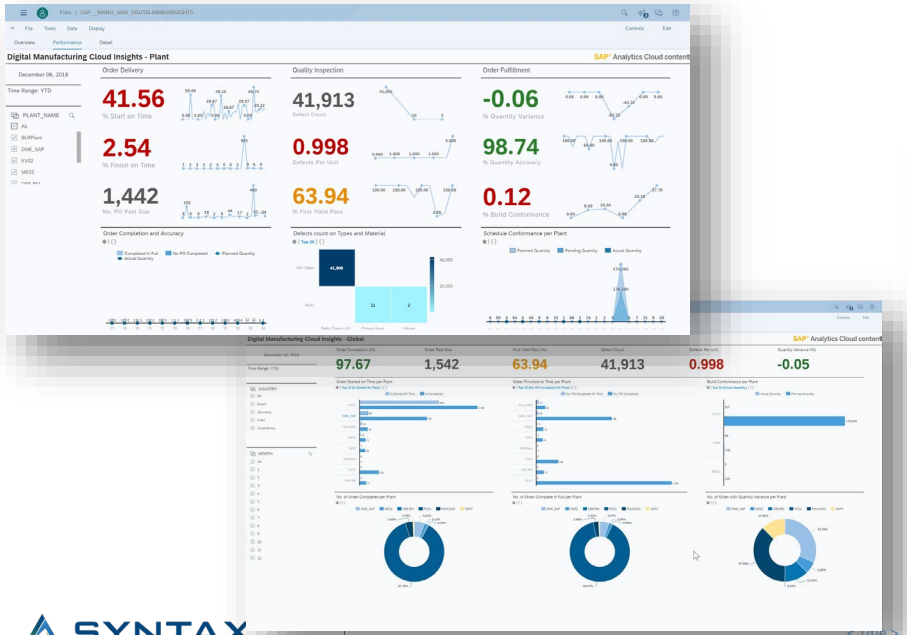


SAP Digital Manufacturing Cloud for Insights

SAP Analytics Cloud Integration

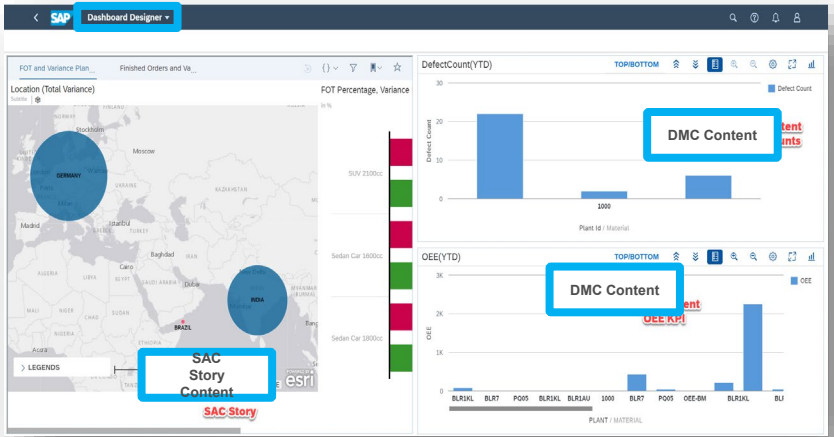
Manufacturing data in SAP Analytical Cloud (SAC)

- Set up live connection from SAC to Digital Manufacturing Cloud for Insights
- Use DMC Insights KPIs in SAC stories and combine with other data in Digital Boardroom



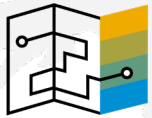
SAC Stories in Dashboard Designer for Enhanced Insights

- Drag-and-drop SAC stories with ease into dashboard designer
- Contextualize SAC story content with production performance management KPI's and content available from DMCi
- Leverage the complementary strengths of SAC and DMCi



Further Information

Key Links:



SAP Road Maps

SAP Manufacturing Community

SAP Support

SAP Partner Portal

SAP Innovation Discovery

SAP Help Portal

Where to go to Provide Product Feedback and Ideas:

SAP Idea Place

Influence Programs

SAP User Groups


SYNTAX
Thank You