Feature Scope Description | PUBLIC
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SAP Digital Manufacturing 2402
Feature Scope Description

THE BEST RUN **SAP**

Content

1 About This Document

This feature scope description describes the features that are provided with SAP Digital Manufacturing.

In addition, this feature scope description also defines the product documentation for SAP Digital Manufacturing.

Product Documentation

The following product documentation is available for SAP Digital Manufacturing:

- This feature scope description
- Information on installation
  You can find the relevant information on how to install SAP Digital Manufacturing at https://help.sap.com/viewer/product/SAP_DIGITAL_MANUFACTURING_CLOUD/latest/en-US?task=discover_task.
- Information on security
  You can find the relevant security information for SAP Digital Manufacturing at https://help.sap.com/viewer/product/SAP_DIGITAL_MANUFACTURING_CLOUD/latest/en-US?task=discover_task
- Information on operation
  You can find the relevant information on how to operate SAP Digital Manufacturing at https://help.sap.com/viewer/product/SAP_DIGITAL_MANUFACTURING_CLOUD/latest/en-US?task=discover_task

Licenses

Certain features described in this document, can require a separate subscription license. For further information, contact your SAP Account Executive.

Integration

SAP Digital Manufacturing supports integration with other SAP and non-SAP products. Note the following:

- Other products mentioned in this feature scope description can have their own product lifecycle, their own localization versions, or their own language scope, and are therefore named only as an example or as currently integrated.
- Integration with other products can be subject to a change with the next release of SAP Digital Manufacturing.
- It's possible that you need additional licenses for other products.

For further information, contact your SAP Account Executive.

2   SAP Digital Manufacturing for execution

Business Background

Using SAP Digital Manufacturing for execution, you can monitor the entire manufacturing process to optimize resources and execution. Use role-specific SAP Fiori and operator dashboards and a configurable Production Operator Dashboard (POD) to orchestrate and control the shop floor, monitor overall equipment effectiveness (OEE), and manage downtime events. Automation interfaces provide for shop-floor-driven manufacturing events and data collection. Out-of-the box integration to SAP ERP, SAP S/4HANA, SAP Extended Warehouse Management (EWM), and SAP Business Network Asset Collaboration) enables seamless integration scenarios.

Feature	Description
Work-In-Process Management	- You can release orders and manage their status. - You can automatically create SFCs in the Operation Activity POD. - You can start and complete orders through the routing operation activities. - Industry 4.0 support of one-piece flow - Enforcement of routing flow including dynamic routing decisions - You can enrich routings with work instructions and data collection groups downloaded from SAP S/4HANA Cloud. - You can view information about BOM components assigned to individual operation activities of routings. - You can view information about the installation points of BOM components downloaded from SAP S/4HANA. - You can record production activities for orders. - You can place or release holds on SFCs. - You can pass or fail data collection groups through the collection of numeric data parameters. - You can serialize SFCs. - You can relabel an SFC. - You can split any quantity of one SFC into a new SFC and merge several SFCs into one SFC. - You can create and execute logistics orders to track work-in-process transportation on the shop floor. - You can assign destinations to packing units or SFCs to automatically create the respective logistics orders. - You can assign transport systems to logistics orders. - You can add SFCs to process lots to start, complete, and sign off the SFCs as a group. - You can log nonconformances against process lots.

Feature	Description
Work Instruction	- Supports multiple types of work instruction elements (URL, text, file, and **streaming**) for each work instruction. - Supports 3D models for work instructions. - You can add multiple types of work instruction elements to a single work instruction. - You can add descriptions to work instruction elements and rearrange the order they display in when viewed in the POD. - You can preview, edit, and delete work instruction elements. - You can stream work instruction elements from SAP Enterprise Product Development. - You can record the viewing of work instructions during production. - You can assign work instructions to a material, operation activity, routing, recipe, phase, resource, order, or any combination of these objects. - You can delete previously associated materials, operation activities, routings, recipes, phases, resources, and orders from work instructions. - You can view the date and time when the work instruction was created and changed the last time.

Feature	Description
Nonconformance	• You can define a nonconformance code hierarchy.
	• You can use a graphical routing engine to define the production flow, including theYou can record nonconformances during the manufacturing process to indicate production deviations.
	• You can record of the status of nonconformances.
	• You can dispose of the recorded nonconformances for rework and scrap purposes.
	• You can log secondary NC codes against a previously logged NC code to form a parent-child NC record structure
	• You can check for open nonconformances to prevent an SFC from further processing
	• You can close both primary and secondary NC codes automatically when logging a secondary NC code.
	• You can generate an incident number automatically based on the numbering pattern when logging an NC code.
	• You can make a nonconformance group valid for all operation activities or only for the assigned operation activities.
	• You can attach a file when logging an NC code.
	• You can preview a file attached to an NC code.
	• You can perform visual inspection based on live images of manufactured materials, enabled by machine learning.
	• You can automatically split off a partial quantity of an SFC for nonconformance dispositioning.
	• You can log nonconformances for defective BOM components with the help of a 3D model attached to work instructions.

Feature	Description
Data Collection	• You can define required and optional data collection parameters and groups attached at the appropriate point in the production process. • You can define parameter types to be recorded (such as numeric, text, and Boolean) and their limits. • Collection of actual data from the production UI (POD) • You can collect parameters from the machine integration layer. • You can use pass/fail data collection groups. • You can assign data collection groups to recipes at phase level. • You can attach a file during data collection. • You can preview a file attached to a data collection. • You can collect data multiple times per an SFC for a DC group. • You can collect data for parameters with defined minimum and maximum limits. • You can automatically log an NC code when the entered parameter value is outside the minimum and maximum limits. • You can collect data in the POD independently of the Data Collection List. • You can attach data collections to the routing level and the routing step level.

Feature	Description
POD Designer	- You can use a graphical production UI builder to create role-specific, personalized, and extensible production operator dashboards - You can create various POD types: Work Center, Operation Activity, Order, Custom, Standalone Nonconformance, and Monitor. Each POD type queues the operator's work per your business process. - You can drag and drop plugins onto the pallet designer. - You can preview POD designs using business data. - You can use configurable definitions for commonly used lists, such as worklists, including sorting capabilities - You can use multiple page layouts and dynamic side-by-side content - You can create a tile for your POD on the launchpad. - You can display page header information, such as breadcrumbs and a clock on multiple pages of the POD. - You can launch plugins on separate tabs in an area in the POD. - You can configure the header information, such as field labels and display options - You can define the content density mode to support display on various devices, such as tablets and laptops. - You can configure POD notifications. - You can create configurable buttons with defined button sizes, font sizes, colors, and other attributes. - You can visually split and configure different areas in the POD. - You can assign hotkeys to action buttons to trigger actions. - You can assign a thumbnail to the material being manufactured. - You can copy the POD URL to launch the POD in a new window or create a shortcut on your desktop. - You can delete a POD configuration. - You can view and copy out-of-the-box POD configurations. - You can set up a production process call and an SAP S/4HANA Cloud transaction to be executed in the POD. You can specify parameters to be passed with each. - You can set up a custom plugin to receive a custom notification.

Feature	Description
	• You can set a custom session time out for each POD that is different from the session timeout defined for SAP Digital Manufacturing.
	• You can configure a tab page which displays multiple plugins in one of the tabs in an icon tab bar.
	• You can define plugins to display as popovers.
	• You can enable multiple reporting in the Post-Production Reporting POD.
	• You can post final confirmations to integrated SAP ERP systems when creating activity confirmations in the Order POD and Post-Production Reporting POD.
	• You can configure and assign footer buttons to a popup.
	• You can assign multiple plugins to open in a modal dialog popup.
	• You can append a parameter list with preset values when you open a Line Monitor POD.
	• You can use a transaction to launch a URL that uses https:// protocol. You can define the URL using command syntax. You can define your transaction to open in a tab or a modeless popup.
	• You can view information related to process and production orders in the Production and Quality perspectives of the Line Monitor POD.
	• You can perform certain transactions at the process level in discrete PODs.
	• You can view information about quality losses in a work center.

Feature	Description
Production Operator Dashboard	- You can view SFCs based on the selected operation activity in the manufacturing process. - You can customize the Order POD and Post-Production Reporting POD to view SFC details. - You can split an SFC in a custom Order POD. - You can view localized material descriptions. - You can change the default resource for operation activities in the Order POD. - You can check the user certifications required for materials, operation activities, and resources. - You can execute process orders and record manufacturing data. - You can receive POD notifications that trigger a POD refresh to indicate that an event has occurred. - You can view and acknowledge alerts resulting from backflush errors in the Order POD. - You can calculate consumption quantities using formulas. - You can automatically select the first SFC in the work list. - You can automatically update SFCs and log nonconformances. - You can automatically select the first workable operation activity in the list. - You can navigate between work instructions in a popup in the POD. - You can call SAP S/4HANA Cloud applications. - You can run a production process in the POD. - You can start and complete a simultaneous or any-order group in the POD. - You can use a routing with a relaxed flow or a routing with operation groups containing multiple operation activities. - You can view the POD action step that is being run by a production process. - You can configure a custom field for Activity Confirmation, Material Consumption, Goods Receipt, and Quantity Confirmation. - You can configure to enable or disable posting dates while reporting activity confirmations.

Feature	Description
	• You can filter orders by resource and multiple work centers.
	• You can configure a custom POD to report downtime, view availability, and OEE KPIs.
	• You can configure weighing scales to send weight details of materials to the Order POD. You can use the weight information while consuming materials.
	• You can configure a custom POD to display the long text defined for production orders.
	• You can view BOM components alternates and work instructions at component level in a custom POD.
	• You can view the plugins required to execute an operation activity in a pre-defined sequence in the POD.
	• You can use an electronic signature to verify or approve steps in your manufacturing process.
	• Active orders are automatically displayed in the Line Monitor POD.
	• You can configure scrap categories based on reason codes to be displayed in the Line Monitor POD.
	• You can view the duration of untagged performance losses, untagged availability losses, and untagged quality losses for resources in a work center in the Line Monitor POD.
	• You can view the latest indicator values in the Line Monitor POD.
	• You can view the availability of resources in the Line Monitor POD.
	• You can scan supported two-dimensional barcodes.
	• You can configure your Line Monitor POD to display work center and order information according to the shift or time range that you select.
	• Certain POD types can display a customizable button when operation activities or phases reach certain statuses. This button can be used to trigger an action that you've defined.

Feature	Description
Process Order Execution	• You can execute process orders with single and multiple batches.
	• You can replicate process orders, materials, material classifications, work centers, BOMs, batches, and recipes from SAP ERP, SAP S/4HANA, and SAP S/4HANA Cloud.
	• You can replicate production versions from SAP ERP and SAP S/4HANA.
	• You can enrich recipes with work instructions and collect data for process order execution.
	• You can start and complete phases, report material consumption, carry out yield and scrap confirmations as well as activity confirmations, and post goods receipts from the shop floor to SAP S/4HANA Cloud. When reporting material consumption on the Order POD, you can include the handling unit number for EWM-integrated systems.
	• You can create goods receipts and batch numbers for co-products and by-products and transfer this data to SAP S/4HANA Cloud.
	• You can perform goods issues and goods receipts with batch characteristics.
	• You can record quality inspection results for inspection-relevant phases including the use of inspection points.
	• You can perform quantity confirmations and trigger automatic confirmations of backflush components, including co-products and by-products.
	• Supports post-production reporting of order execution data
	• You can pack full or partial quantities of SFCs into packing units.

Feature	Description
Production Order Execution	You can execute production orders using the Order POD or Post-Production Reporting POD: • You can replicate production orders, materials, work centers, BOMs, batch numbers, and routings from SAP ERP, SAP S/4HANA, and SAP S/4HANA Cloud. • You can replicate production versions from SAP ERP and SAP S/4HANA. • You can choose different scenarios for production order execution at the material level. These scenarios can include the merging of master data and order-specific routings, as well as various modes of overriding ERP order-specific objects by SAP Digital Manufacturing master data objects. • You can enrich routings with work instructions and collect data for production order execution. • You can start and complete operations, report material consumption, carry out yield and scrap confirmations as well as activity confirmations from the shop floor to SAP S/4HANA. When reporting material consumption on the Order POD, you can include the handling unit number for EWM-integrated systems. • You can create goods receipts for finished goods, co-products, and by-products. • You can perform quantity confirmations and trigger automatic confirmations of backflush components, including co-products and by-products. • You can pack full or partial quantities of SFCs into packing units.
Planned Order Execution	You can execute planned orders using the Work Center POD or the Operation Activity POD: • You can replicate production orders, materials, work centers, BOMs, routings, and production versions from SAP ERP or SAP S/4HANA. • You can start and complete operations, carry out yield and scrap backflushing to SAP ERP or SAP S/4HANA. • You can trigger automatic confirmations of backflush components from the final backflush after completion of the last operation activity.

Feature	Description
Master **Routings** / Recipes	• You can download routings / recipes and enrich them with work instructions and data collections. • You can update master routings / recipes transferred from SAP ERP, SAP S/4HANA, and SAP S/4HANA Cloud. • You can view information about BOM components assigned to individual operation activities of routings / phases of recipes. • You can delete previously attached work instructions and data collection groups from routings and operation activities / recipes and phases.
Buyoff	• You can create and edit buyoffs. • You can log buyoffs.
OEE	• You can configure OEE time models and reason codes. • You can upload files with the hierarchy of the OEE reason codes. • You can view information related to OEE in relevant PODs. • You can configure triggers for machine status changes. • You can mark an entire line as down if a resource downtime impacts the entire line.
Plant, Resource, and Work Center Management	• You can define production plants. • You can view and change business settings that belong to various categories. • You can define resources, including resource types and efficiency metrics. • You can assign shifts to resources. • You can define work centers, including the hierarchy of work centers down to the resource level. • You can define SFC numbering patterns. You can define next number configurations based on material groups. • You can assign resources to work centers.
Shift Management	• You can define shifts, including user types, resource types, and break times. • You can define shift intervals and effective date ranges.

Feature	Description
User Management	- You can assign users to calendars. - You can assign certifications to users. - You can define available working hours in user calendars. - You can assign users to supervisors and work centers.
Tool Management	- You can create tools. - You can view tools created automatically with equipment PRTs transfer. - You can set up tool logging methods. - You can log tool usage in the POD. - You can assign tools to resources for orders. - You can track tool usage and view tool schedules planned in Resource Orchestration (REO). - You can see tool usage data for a specific SFC in a report. - You can load and unload tools for resources to record the actual tools used in the production. - You can validate loaded tools against planned production resources/tools (PRTs) or tools scheduled for a specific resource.

Feature	Description
Floor Stock Management	You can use floor stock management capabilities to address materials that are stored on the factory floor prior to being used during manufacturing. • You can use standalone inventory functionality to create and manage floor stock records in SAP Digital Manufacturing locally, including inventory creation, floor stock reservation, and storage location assignment. • You can receive floor stocks locally, or receive inventory transferred from SAP S/4HANA, SAP ERP, SAP S/4HANA Cloud, and SAP EWM. • You can return and scrap components using reason codes to SAP S/4HANA and SAP ERP. • You can return components using reason codes to SAP S/4HANA Cloud. • You can remove components in PODs to SAP S/4HANA, SAP ERP, SAP S/4HANA Cloud, and SAP EWM. • You can disable the local inventory management of floor stocks that are transferred from SAP S/4HANA Cloud. • You can enable either Individual or Consolidated inventory management mode in SAP S/4HANA, SAP ERP and SAP S/4HANA Cloud integration. • You can import, view, and edit third-party inventories if you're using a third-party system as the single source of inventories to transfer to SAP Digital Manufacturing. • You can change the status of a stock using the reason code.
Batch Management	• You can create batch numbers locally, or download batch numbers transferred from SAP S/4HANA, SAP ERP, and SAP S/4HANA Cloud. • You can view and update a single value, multiple values or additional values for a batch characteristic. • You can retrieve batch numbers and batch characteristics in real time from SAP S/4HANA, SAP ERP, and SAP S/4HANA Cloud.

Feature	Description
Quality Inspections	You can record quality inspection results for production and process orders in the PODs where quality inspection-related plugins are configured. • You can record inspection results for inspection-relevant operations of a selected SFC (100% inspection). • You can upload documents for inspection characteristics. • You can configure and use inspection points for orders transferred from SAP S/4HANA and SAP ERP. You can check against value limits defined in integrated ERP systems.

Feature	Description

Out-of-the-box ERP Integration	Integration with SAP S/4HANA and SAP ERP:
	
	 • Integration with multiple SAP S/4HANA systems using one instance of SAP Cloud Integration
	
	 • Inbound integration including materials, BOMs, routings, recipes, production orders, planned orders, process orders, work centers, resources, shifts, batch characteristics, in-process inspection lots, and EWM stock change
	
	 • Outbound integration including goods issues and receipts, quantity confirmations, activity confirmations, batches, batch characteristic recordings, inspection results recordings, and inspection point creation.
	
	 • Order integration:
	    • Inbound integration including BOMs and routing information
	    • Outbound integration including order yields and scrap confirmations
	    • Update orders from integrated SAP ERP systems before release in SAP Digital Manufacturing
	    • Enhance orders from SAP S/4HANA and SAP ERP with a routing or routing elements created in SAP Digital Manufacturing
	
	 • Floor stock integration:
	    • Inbound integration including floor stock replenishment
	    • Outbound integration including material consumption and floor stock returns, scrap, and removals
	
	 • Nonconformance integration:
	    • You can transfer Quality Management (QM) defect code groups and codes from SAP S/4HANA.
	    • When you log a nonconformance code in SAP Digital Manufacturing against an SFC, a production defect is created in SAP S/4HANA Quality Management.
	
	 • You can monitor integration messages.
	    • Inbound from SAP ERP and SAP S/4HANA
	    • Outbound to SAP ERP, SAP S/4HANA, and SAP Business Network Asset Collaboration

Feature	Description

	Integration with SAP S/4HANA Cloud:
	
	• Inbound integration including materials and batch characteristics, recipes, production / process orders, routings, work centers, and in-process inspection lots
	• Outbound integration including goods receipts, quantity confirmations, activity confirmations, and inspection results recordings
	• Order integration:
	    • Inbound integration including BOMs and routing information
	    • Outbound integration including order yields, scrap confirmations, order discards, and order status synchronization (RMES).
	    • Update orders transferred from SAP S/4HANA Cloud before release in SAP Digital Manufacturing
	    • Enhance orders from SAP S/4HANA Cloud with a routing or routing elements created in SAP Digital Manufacturing
	• Floor stock integration:
	    • Inbound integration including floor stock replenishment
	    • Outbound integration including material consumption, floor stock returns, and removals
	• Nonconformance integration:
	    • You can transfer Quality Management (QM) defect code groups and codes from SAP S/4HANA Cloud.
	    • When an operator logs a nonconformance code originated from SAP S/4HANA Cloud in the POD, it is automatically transferred to SAP S/4HANA Cloud and a generic defect record is created.
	• You can monitor integration messages from SAP S/4HANA Cloud.
	• Supports calling SAP S/4HANA Cloud applications from Production Operator Dashboard

Feature	Description
Out-of-the-box EWM Integration	You can integrate with SAP Extended Warehouse Management (EWM) to support the following staging scenarios: • Single-order staging requests • Cross-order staging requests • Single-order staging confirmations • Cross-order staging confirmations • Report of component consumption • Report of component removal • Transfer of goods receipt upon packing unit completion • Transfer of goods receipt without packing unit • Automatic staging at SFC level • Packing unit set as handling unit for goods receipt • EWM goods issue cancellations • EWM goods receipt cancellations • Dynamic staging
Out-of-the-box SAP Business Network Asset Collaboration Integration	• An SAP Business Network Asset Collaboration item of equipment is automatically created when the status of an SFC is set to done. • An item of equipment is created only if the material in SAP Digital Manufacturing for execution has an assigned external ID from the SAP Business Network Asset Collaboration model.
Genealogy	• You can assemble components on the shop floor. • You can enter assembly data values for materials at assembly points. • You can remove assembled components. • You can automatically assemble preloaded components.
Printing	• You can define production-related documents, such as labels and travelers that can be printed for SFCs. • You can set up printers to print various types of production-related documents. • Supports data fields associated with the following objects: SFCs, orders, materials, BOMs, and routings • You can print documents and manage print queues.

Feature	Description
Order Scheduling	• You can view order schedule information, including information about the order quantity that has been split for a specific operation activity in Resource Orchestration.
Set Points	• You can define values of set point indicators.
	• You can assign set point groups to objects, such as materials, routings, steps, recipes, phases, operation activities, resources, and orders.
	• You can define values that can be written to asset (equipment) indicators / tag values.
	• You can use an API to get set point indicators for machine integration purposes.
	• You can define set point indicators of the data type *Numeric*, *String*, and *Boolean*.
Reports	• You can obtain information about the component genealogy of SFCs and batches.
	• You can obtain historical activity data for SFCs and batches.
	• You can navigate between parent and child SFCs.
	• You can obtain information about unplanned components that were consumed for an SFC.

Feature	Description
Packing	- You can pack and unpack SFCs to and from packing units. - You can pack and unpack packing units to and from packing units. - You can generate packing unit numbers. - You can define the characteristics of packaging materials. - You can pack and unpack content to and from packing units with a simple packaging material. - You can pack and unpack content to and from packing units with a returnable packaging material and its instance (carrier ID). - You can choose a package type (conformant or nonconformant) for a packing unit if you use a returnable packaging material for packing. - You can choose a current location and destination (resource) for a packing unit if you use a returnable packaging material for packing. - You can unload the content of a packing unit from a carrier. - You can pack a partial quantity of an SFC into packing units (depending on the material settings). - You can filter packing units based on their packaging materials.
Process Lots	- You can create, find, and delete process lots, as well as add and remove content to and from process lots. - You can place both SFCs and process lots into another process lot. - You can create a nested structure by placing a process lot into another process lot. - You can start, complete, and sign off process lots. - You can view the process lots of SFCs in work lists and operation lists.
Extensibility	You can create business process extensions using SAP BTP, serverless runtime.
Process Industry Terminology	Certain apps and PODs support process industry and discrete industry terminology.

Feature	Description
Overlay	• You can create a project containing a 2D image.
	• You can design overlays that appear over the 2D image in the project.
	• Line Monitor can use the projects as a visual representation of a plant's floorplan that highlights the locations of work centers in various perspectives.
	• You can copy a project.
	• You can delete a project.
	• You can select the color of an overlay or you can configure the overlay to change color based on the status of the KPIs in the perspectives of a Line Monitor POD.
	• You can adjust the location of a label on an overlay.
	• You can view in which Line Monitor PODs a project is being used in.
Time Tracking	• You can record attendance on the shop floor.
	• You can track direct labor for SFCs and process lots.
	• You can use standard value keys to select or default standard values for time records for direct labor.
	• You can track indirect labor.
	• You can edit the start and stop date and time of time records.
	• You create, delete, and approve time records.
	• The system determines the effective labor time used for an SFC.
	• You can adjust the effective labor time determined for direct labor and the duration recorded for indirect labor.
	• The system logs changes to time records.
	• You can display information related to time tracking in the POD.

Feature	Description
Alert Type and Alert Management	You can view and update the alert types to assign actions to the alert types. • View the top 100 alert types. • Search alert types by alert type, category, and default severity. • Customize the filters and the fields for alert types. • Switch between different views using the variant management feature. • View details and edit header information, actions, and language and description. • Configure action buttons and assign production processes or emails to them. All the alerts associated with the alert type display the configured action buttons and emails in the alerts details page. Choosing the action button or email executes the assigned production process. • Assign processors to alerts.

AI/ML Scenarios Management

Feature	Description
Create Analytical Data Set	• Manage analytical data sets for AI/ML scenarios which can be used to train new machine learning models. • Select and deselect manufacturing data (IT/OT) collected as analytical data set. • Automated creation of analytical data sets for the *AI/ML scenario for Visual Inspection* which allows to download images of inspected materials and inspection results that were collected with the POD Plugin *Visual Inspector* on the shop floor.

Feature	Description
AI/ML Scenarios - Visual Inspection	• Create visual inspection scenarios using a wizard. These scenarios are used to simplify the detection of visual defects during an inspection using machine learning. • Upload a trained model to classify images of inspected materials into conformance and nonconformance categories, and map model results to Nonconformance codes. • After a scenario for visual inspection has been created and machine learning model has been provided, this model assists the operator in logging correct nonconformance codes using the POD plugin *Visual Inspector*. • Add multiple scenario combinations (plant, material, and operation) during the creation of a visual inspection scenario. Visual inspection scenarios can be configured to support manual (without machine learning model) or assisted modes (with machine learning model). • Visual inspection scenarios support machine learning model types for binary classification, multi-class classification, multi-label classification, and object detection.

Resource Orchestration

Business Background

Resource Orchestration allows you to manage shop floor workflows, labor assignments, and schedule or reserve available production tools to work centers and resources.

Feature	Description
Scheduling and Dispatching	• Enables production supervisors to create workloads for the resources and work centers they're responsible for. The scheduling mode and scheduling direction are considered along with working and nonworking times. • Displays capacity overload situations and resource status. Helps production supervisors identify and react to bottleneck situations. • Displays dispatched operations for a selected work center; supervisors can change the sequence of the operations and resolve overload situations. • Based on the assignments scheduled for labors, production supervisors can react to missing labor alerts. • You can view any overlap in tools assignment and unassign overlapping assignments. • Production supervisors can define the resources they want to see in the Gantt chart by specifying them as relevant to scheduling or monitoring. • Production supervisors can release complete orders with complete quantity. • Production supervisors can release orders from the Gantt chart directly. Orders that are successfully released are displayed with their SFC details. • The last scheduling results of operations that are automatically dispatched and the shift plan assignment of a labor for the current date can be downloaded to an Excel spreadsheet.
Monitoring	• Displays production progress. If the production is behind schedule, it's displayed in the Gantt chart. • Displays the resource breakdown situations where the operator or supervisor can decide to reschedule the operations to an alternative resource or the same resource at a different point in time. • Icons and notifications indicate high-priority orders or violations of operation relationships. • You can display an overview of all operations belonging to an order.

Feature	Description
Labor Scheduling	• Production supervisors can assign shifts to production operators. • Production supervisors or operators can assign work centers to production operators and shifts. • If a production operator isn't available, you can assign the unavailability of the production operator to the corresponding day or week. • Labor assignments are considered during dispatching in the Gantt chart. • You can displays the shift assignment of production operators for a week or month. • You can view a labor report for a calendar that includes details such as work centers assigned, start and end dates, shifts assigned, duration of work done by the production operator and shift overtime information for production operators who have performed overtime during the week. As a production supervisor, the shift assignments of the production operators they are responsible for are displayed. As a production operator, the shifts assigned to them are displayed.
Tools Scheduling	• Schedule or reserve the available production tools to work centers and resources for a calendar week/day. The reserved production tools are displayed for the respective work center and resource. Tools that are assigned to a particular operation of a production order are displayed. • View and download a report on the tools assignment to operations in an order for a selected date range.
Skills	You can edit and view the skills, skill levels, and qualifications of employees.
Onboarding Workforce	You can onboard employees to relevant cost centers and make the workforce available for labor planning.
Schedule Data Replication	You can schedule the replication of data from certain integrated systems. You can define an appropriate source system.
Integration with SAP SuccessFactors	You can replicate workforce and availability data and use this data for labor planning.

3 SAP Digital Manufacturing for insights

Business Background (for Manufacturing Insights)

With SAP Digital Manufacturing for insights, you can analyze and optimize your digital operations based on data provided by SAP Digital Manufacturing for execution. Your production data is structured and stored in Manufacturing Data Objects (MDOs) that are ready to use for your analytics. Moreover, you can access these MDOs using external APIs. You can live monitor your production processes. You can also analyze data sets that cover longer periods using operational analytics. To obtain deeper insights into your production processes, you can use advanced analytics features.

Business Background (for Data Engineering)

Using Data Engineering (DE) you replicate data from on-premise systems to the cloud using applications that are specific to Data Engineering. This data is then available for analysis using the SAP Digital Manufacturing for insights component, covering various manufacturing use cases, such as consumption of analytical reports at a global scale.

Feature	Details
Data Management	• Suspend and resume connections to host systems • Create multiple data models simultaneously • Monitor the connectivity status of the data agent and the replication status of the data • Trigger on-demand delta loads and terminate current runs, while managing data models • Access plant data from SAP Digital Manufacturing for execution for KPI calculations and analytics

Feature	Details
Manufacturing Data Layer	• With the Manufacturing Data Layer, data from SAP Digital Manufacturing for execution is available in a single store in order to allow cross-plant data analysis and comparison. The Manufacturing Data Layer transforms and contextualizes master and transactional data for analytical purposes. It allows customers to create analytical reports. • The harmonized data is stored in well-defined schema definitions, called Manufacturing Data Objects (MDOs). Using the MDOs, business users can design and perform queries and create reports based on data from SAP Digital Manufacturing for execution using embedded SAP Analytics Cloud. • The MDOs and their complex relationships are created automatically in the background. • The Manufacturing Data Layer serves as an open platform that allows read access to Manufacturing Data Objects using APIs.

Feature	Details

Analytics and Insights	• Live monitoring: This capability provides near real-time analytics (current day/current shift) and enables the following functionality:
	  • Tracking actual production progress against planned production with order-specific details
	  • Monitoring yield and scrap at every phase level of the order
	  • Visualizing an overview of resource availability and associated availability losses
	  • Monitoring and tracking effectiveness and performance
	• Operational analytics: This capability offers prebuilt reporting apps as well as a self-service environment to build manufacturing KPIs and dashboards using embedded SAP Analytics Cloud. Operational analytics provides the following features:
	  • Dashboard content management including publishing of dashboards
	  • Data visualization leveraging a set of widgets
	  • KPI modeling using calculations and aggregations based on custom queries
	  • Dynamic filtering across multiple dimensions and KPIs
	  • Intuitive layouting and styling (including corporate identity styling)
	  • Apps to view and filter information related to orders and SFCs
	• Advanced analytics: This capability provides KPIs and analytics features that are based on complex logic such as Overall Equipment Effectiveness. The following features are provided by SAP Digital Manufacturing for insights and can be consumed for live monitoring and operational analytics using APIs:
	  • Leverage prebuilt calculation logic for Overall Equipment Effectiveness (OEE)
	  • Normalization and in-depth analysis of losses for availability, performance, and quality
	  • Extensibility and tailoring of calculation logic using APIs

Automation

Business Background

Manufacturing Automation enables machine integration from cloud to shop floor through Production Connector / SAP Plant Connectivity. This allows you to capture the communication interfaces provided by the machine and exchange data from and to the shop floor. Additionally, services can be called on shop floor systems. This enables you to design production processes using the Production Process Designer in the cloud.

Production processes can be called by observing conditions on the shop floor or by configuring alerts or the Production Operator Dashboards.

Feature	Description
Web Server Management	Enable management of REST-based web servers: • Define and model a web server that can be connected to other web servers to design and run cloud-based or Production Connector / SAP Plant Connectivity-based production processes using services exposed across the network of connected web servers. • Enable connection and communication with the server instance by configuring the web server with details such as the server endpoint and security information. Service metadata information is available in the service registry when software product, software version or web server is assigned to services. • Services can be assigned to web servers and used from relevant servers to design cloud-based or Production Connector / SAP Plant Connectivity-based production processes.
MQTT Broker Management	• Deploy an MQTT Broker on an edge instance. • Configure an MQTT Broker from SAP Digital Manufacturing. • Connect an MQTT broker with one or more Production Connectors.
Asset Model	You can define instances and metadata (such as nested structures of attributes and indicators) of assets. You can manage tag-indicator mappings to shop floor systems.

Feature	Description
Configure Production Connectivity	Monitor Production Connector / SAP Plant Connectivity systems remotely.
	Restore a backup from cloud.
	Choose a certificate based on the subject.
	Enable configuration of Production Connectivity Model and shop floor integration:

Enable configuration of Production Connectivity Model and shop floor integration:

- Define the digital twin of the machine and manage information required to call up machine data or plan a machine orchestration in the Production Connectivity Model.

- The Production Connectivity Model connected to Production Connector / SAP Plant Connectivity enables information exchange with the shop floor system by reading and writing tags of machines and performing services or methods of machines.

- Onboard assets/equipment by importing tag configuration from a data source in shop floor and manage connectivity configuration for onboarded assets/equipment. You can create, display, change, and delete the elements needed to onboard assets/equipment and to set up the connectivity to the related device.

  - Production Connector / SAP Plant Connectivity objects, including the service provider capabilities that Production Connector / SAP Plant Connectivity offers.

  - Shop floor systems that are used as data sources such as OPC UA, OPC DA, OPC HDA, IP21, Proficy Historian, and Asset Framework to which the Production Connector / SAP Plant Connectivity objects are connected.

  - Web server objects (like SAP Digital Manufacturing) to which the Production Connector / SAP Plant Connectivity objects are connected.

  Use deployment groups to deploy shop floor systems, service providers, services, and client proxies to Production Connector / SAP Plant Connectivity.

- Subscribe to Production Connector / SAP Plant Connectivity tags and notify relevant services on specific trigger conditions and write back a sensor data based on service output. Sensor data from Production Connector / SAP Plant Connectivity can be brought into Insights using HTTP protocol based on query scenario.

Feature	Description
Runtime Environments	The following runtime environments for production processes are supported: • Process Engine runtime environment, orchestrating mainly business-related processes • Production Connector / SAP Plant Connectivity systems, orchestrating mainly shop-floor-related processes (also called "automation sequences")

Feature	Description
Visualized Production Configuration	You can model production processes that orchestrate and automate machine communication and process execution using a visual editor.

You can define production processes for the Process Engine or Production Connector / SAP Plant Connectivity systems.

- For all runtime types, you can:
  - Bundle different processes in one "design".
  - Reuse, that is embedding one production process into another. This can happen also between different runtimes.
  - Start and complete process with control elements: This includes the definition of parameters that are to be supplied to the process at start time (process input parameters) and those that the process hands back to the caller after process execution (process output parameters).
  - Reuse snippet - a small region of process components of control elements and services (excluding embedded production process) across production process designs.
  - Use complex data types as values of parameters and variables.
  - Save results of one activity for input in a later activity with internal variable.
  - Transfer result values of one activity directly as input values for a later activity.
- In designing production processes based on the Process Engine, unless specifically noted, you can:
  - Branch the process flow for multiple conditions using the condition control element.
  - Execute steps in parallel using the parallel control element: The process execution is unconditionally branched into multiple execution threads, which are processed in parallel.
  - Call sub-processes synchronously, that is, the caller waits for the called process returning a result, or asynchronously, that is, the called process is executed independently of its caller.
  - Handle errors with the error control element: The execution of an individual process step terminates with an error. The execution of the process step can be retried a configured amount of time. If the retry fails, the error can be fetched and processed; the entire production process may terminate with an error accordingly.
  - Delay subsequent process steps from execution for a specific duration using wait control elements.

Feature	Description
	- Design scripts with the script task control element: The user can define JavaScript routines which execute computations on production process variables. - Call the Production Operator Dashboard to take action or display messages using a plugin extension or notification element. - Read and write indicators with production connectivity model services. This includes the writing of defined set points. - Read and write indicator locally. - Read or write values from selected indicators through variables of asset name, reference path, and reference name. - Call SAP Digital Manufacturing services that are executing various manufacturing execution functionalities and user-defined applications on SAP Business Technology Platform or other platforms exposed as a service. - Analyze the information log and adjust input/output parameter values step by step to resolve problems using the debugging function. You can control which step the debugging process is going to stop at by setting stop point in the process workflow. - In designing production processes based on Production Connector / SAP Plant Connectivity, you can: - Branch the process flow for a condition using the condition control element. - Call automation routines supplied by Production Connector / SAP Plant Connectivity itself or by a shop floor service provider (such as an OPC UA server). - Call subprocesses based on Production Connector / SAP Plant Connectivity as well as production processes based on the Process Engine. - Call SAP Digital Manufacturing for execution services.

Feature	Description
Production Process Execution Monitoring **and Administration**	You can observe and conduct relevant operations on the Process Engine, Production Connector / SAP Plant Connectivity process executions. • You can see all production processes that are deployed on a dedicated runtime. • You can automatically or manually delete instance log information of dedicated processes. • You can configure log level, booster mode, and debug mode of processes. • You can debug process instance executions. • You can see all running process instances in one table. • You can see process start- and end-time as well as the duration in a table. • You can see the status of the process instance in a table. • You can see subprocesses, that is, processes called synchronously by another process. • You can see the trigger type and trigger name of process instances in a table. • You can filter the process instances. • You can download process instance logs automatically archived by the system. • You can analyze the performance of process instances using various dimensions. • You can see log information for any process instance at a designated level. You can relaunch asynchronously-run Process Engine based processes that terminated with an error.
Indicator and Message Subscription Management	You can observe indicator values (tag values), MQTT messages, and trigger an action if a condition becomes true. Trigger events are: • Change of an indicator value • MQTT message • A logical condition on the indicator value • A logical condition on the MQTT message Possible actions can be: • Call a single SAP Digital Manufacturing service or a service of an external service provider • Call a production process

Feature	Description
Timer Management	You can create a timer to trigger actions in SAP Digital Manufacturing. Possible actions are services from the service registry.
Business Rule Management	You can create a business rule to trigger an action before or after a specific business service is executed, when there is an error during the business service execution, or after an event. Possible actions are services and processes from the service registry for business service type rules and registered cloud processes for event type rules.
Production Configuration Management	You can deploy production configurations using deployment groups: • All production connectivity model artifacts such as the configuration of Production Connector / SAP Plant Connectivity systems and shop floor systems (for example, OPC UA servers) • Message brokers • Production process designs, that is, any kind of production processes • Subscriptions • Timers • Business rules
Service Registry Management	• You can register services and plugin extensions. • You can define complex data types for use in the Production Process Designer.

4   SAP Digital Manufacturing for edge computing

Using SAP Digital Manufacturing for edge computing, you can process machine data, and thereby support production processes, closer to the source of data and on the shop floor, to enable faster decision-making and to operate with latent connectivity to the cloud.

SAP Digital Manufacturing for edge computing enables you to deploy a defined set of functions provided by SAP Digital Manufacturing on the edge.

SAP Digital Manufacturing for edge computing enables the synchronization of configuration and business data between edge and cloud. The solution also provides a graphical user interface that allows you to access functions on the edge.

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