PSImetals
Release 5.26

SUPPORTING YOUR

DECARBONIZATION JOURNEY

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Dear Customer,

There have been several trends in the metals industry, but none has had as much at stake as green steel production and digitalization. This is because the goal to produce green steel and reduce CO2 emission from our atmosphere does not only impact our businesses but also our environment. Digitalization is also an enabler of decarbonization. When there is so much at stake, you never stop asking how you can improve.

Following intensive phases of testing and delivery preparations, we are delighted to announce the availability of our Release 5.26!

PSImetals Release 5.26 offers new features for ongoing decarbonization and energy management. It supports the management of hybrid steel plant during the transition from blast furnaces to direct reduced iron-based routes. It enhances precise prediction of energy and raw material demand across all time horizons. In addition, there is an interface of Qualicision Smart Day Trader which allows you to buy and sell energy in the intra-day market at best prices.

Our new release is termed "Supporting Your Decarbonization Journey".

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This Release signals an important milestone in our migration to the Service Platform (SP), a technology that supports efficient metals production. The Release includes the SP-based support for the Demand & Sales Planning process while providing improved forecast scenario management, workflow modelling by PSIbpm, data analytics based on our Embedded Business Intelligence framework and full support of all common database products, including MS SQL-Server and PostgreSQL.

With PSImetals 5.26, you not only have strong capability to meet the challenges of today, you also become well prepared for a more sustainable and prosperous tomorrow

In PSImetals Quality, we accomplished a significant step by implementing our Quality Decision Process fully on the Service Platform. Just like all new SP-based feature nowadays, all related functions are fully web-based.

Key milestone achieved and no more Oracle dependencies.

We further replaced all Oracle dependencies, just as we did with the Demand and Sales Planning modules. As promised, the new SP features are running smoothly and integrated with the remaining Oracle-based components, allowing smooth migration during maintenance.

As we look towards the future, the significance of adopting innovative solutions cannot be overstated. With PSImetals 5.26, you not only have a strong capability to meet the challenges of today, you also become well prepared for a more sustainable and prosperous tomorrow.

Best regards,
Jörg Hackmann
Managing Director PSI Metals

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- **Product Carbon Footprint Tracking**

- **Energy Demand Forecast**

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Product Carbon Footprint Tracking

In the transition of steel industry towards decarbonization, there is a need for transparent calculation and tracking of CO2 equivalent emissions on piece and product level, along the entire production chain.

PSImetals Quality Process Snapshot provides an approach to collect all process and material data relevant for the carbon footprint of a material piece at a certain production step (like material, electrical energy and process gas consumptions). It also collects the derived product carbon footprint (PCF) from this step and aggregated over all steps so far.

Therefore, the PCF can be tracked and visualized along the PSImetals Material Genealogy, providing the basis for:

- Green KPIs to be used for optimized production planning, scheduling and execution considering CO2 emissions.
- Green Lead Markets fostering the decarbonization journey of the industry.

PSImetals is the single source of truth for material tracking accross the entire production chain to provide the data for Green steel certificates generation.

PSIMETALS QUALITY PROCESS SNAPSHOT (QPS)

Process Data
- Tundish filling level
- Mould oscillation (position)
- ...
- + Material & energy consumptions
- + Direct CO_2 emissions

Material Data
- Thickness
- Flatness
- Surface texture
- Weight
- ...

Derived Quality Indicators
- Cleanliness
- Microstructure
- Shrink hole density
- ...
- + Product Carbon Footprint (kg CO_2e)

Set of quality and GHG emissions related data for a single production step and material

Definition of PCF Input and Output Data with related Calculation Rules in PSImetals Process Snapshot Specification.

For determination of the PCFs (as Quality Indicators) along the production route, master data with GHG emission factors for different material, electrical energy and process gas consumptions have to be configured within dedicated Process Specification Dialogues. The data configured also includes related process input data (Process Characteristics) and calculation rules.

Process Characteristics:

- PCF input data like material, electrical energy and process gas consumptions of production step.

Quality Indicators:

- PCF output data from defined calculation rules for CO2 equivalent emissions of specific production step, and aggregated over all steps so far;
- Using related PCF input variables;
- As well as master data with GHG emission factors for different consumption types.

Visualization of PCF Tracking in PSImetals Material Genealogy

The calculated and tracked Product Carbon Footprints are visualized in the Material Genealogy screen along the whole production chain. Included is a detailed tab displaying the CO2 emissions from the individual process steps and their aggregated values for the respective product piece.

Visualization of PCF
Tracking in PSImetals
Material Genealogy

Energy Demand Forecast

PSImetals Online Heat Scheduler creates a detailed work schedule for all planned heats, including forecasts for required energy. Steel producers can better react to volatility and availability of renewable energy, which will play a bigger role in the future.

Steel production is an energy intensive process and one of the largest emitters of industrial CO2. With current environmental concerns and the demand for green steel, producers have to devise new process technologies to accelerate decarbonization.

Software like PSImetals Online Heat Scheduler, on the PSImetals Service Platform (OHS SP), can help steel producers save energy and material costs, optimize production processes, manage heat schedules, comply with CO2 regulations and stay competitive with changing market demands.

The Online Heat Scheduler generates the detailed routes and calculates exact time schedules for all heats in a given time horizon based on steel grades, line availability and production times.

The scheduler also generates forecasts for so called Secondary Resource Demand like Hot Metal Demand, DRI or Energy.
Based on availability of these resources we are now able to schedule and optimize different scenarios.

OHS SP optimizes Heat Schedules;

- According to Steel Grade and availability or price of Energy prioritises either BOF or EAF route;
- Utilization of Green Energy is optimized.

OHS SP forecasts Energy Demand profiles;

- Energy Demand is forecasted rule based e.g. for the EAF based on Scrap Menus for the schdeuled Steel Grades;
- Renewable Energy Availability is provided by the Energy Supplier via a Standard Interface or forecasted on rule based contract profiles;
- Market Requirement is calculated by OHS SP and provided to the Energy Supplier via Interface.

Forecasts are based configurable "secondary resources";

- Rules can be edited by the user;
- Other forecasts, e.g. for DRI Demand can be added by the user.

Energy Demand
Energy Availablity/Price
Market Requirement

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Manage, visualize and evaluate KPIs

The Online Heat Scheduler is able to calculate and optimize different scenarios with different KPI settings. The dashboard assists the user to easily manage and evaluate the KPI settings for different scenarios.

KPIs can easily be managed, visualized and evaluated for different scenarios through an integrated KPI dashboard.

- The **Radar Graph** shows the KPI fulfilment for different calculated scenarios based on different KPI Goals.
- The **Goal Function** sets the quantifiable ranges of a KPI. For example, the number of ladles to be used to achieve good and feasible schedules or the utilization of Renewable Energy.
- The **Relation Matrix** visualizes how these additional KPIs are supporting or contradicting the other ones.

Scenario calculations or simulations can be done in parallel to the normal operation, which means, while the OHS SP is tracking and scheduling the actual heats and the treatment, the user can simulate other scenarios in the background.
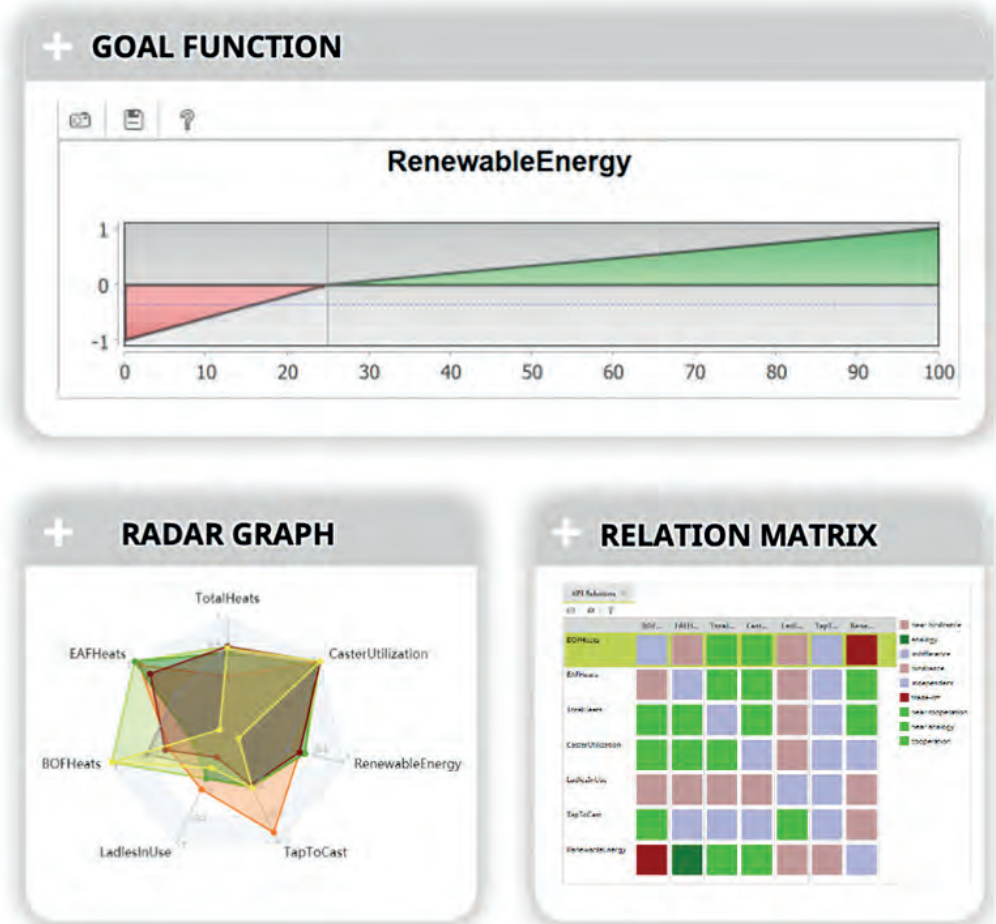
Manage, visualize and evaluate KPIs

Adding Green KPIs for Qualified Decision

To find find the right trade-off between Economical and Ecological Production Management, OHS SP also balances and optimizes classical scheduling KPIs vs. Green KPIs:

- Throughput or number of heats for a certain production period;
- Number of Ladles in use;
- Tap-to-cast Time;
- Caster Utilization;
- Number of heats which should use the EAF route.

To rank and evaluate schedules based on Green KPIs for a Qualified Decision, OHS SP now offers additional "Green KPIs", e.g.:

- Renewable Electricity Utilization
- Electricity Price
- DRI usage
- Tap Temperature
- LF Heating Temperature
- Ladle Re-Heating Energy
- CO2 Emission

KPIs can easily be managed, visualized and evaluated for different scenarios by an integrated KPI dashboard

- **Production Order Monitor (OD)**

- **Permissions for Derivation Tables (OD)**

- **Chart Enhancements**

- **Migration to Service Platform: Process Quality Decision**

- **Pre-Certification of Test Results**

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Order Dressing - Production Order Monitor

The Business Intelligence application embedded in PSImetals is being used in order to monitor the results of the Technical Elaboration (TE) of Production Orders (PO) in PSImetals Order Dressing.

In the new dashboard Production Order Monitor, visually rich charts are created to show available measures aggregated by selectable dimensions, with specific KPIs calculated.

The dashboard aims at increasing transparency of the business process of Order Dressing, by aggregating and filtering Production Order data, as well as the calculation of KPIs. PSImetals offers a selection of predefined charts and KPIs, but the expert user, with granted corresponding permissions, can customize the dashboard.

The following measures are evaluated:

- PO (as count or mass in tons)
- NEW: Technical Elaboration time

In more detail, the Production Orders are aggregated in terms of PO count or sum of their mass in tons and displayed in absolute values or percentages. Newly available with the current release are the measures of the PO's technical elaborations preparation and processing times in seconds.

The corresponding KPIs can be calculated for different dimensions: not only PO attribute like Product, Grade or Customer, but also Order Dressing specific data like TE status and TE duration bucket. Heat map charts are enabled to combine more than one dimension to a matrix.

The EBI dashboard not only provides a clear overview of the Order Dressing's performance, but additionally enables, with its native BI functions, to drill down the data to specific aspects of interest.

Filters applied in the EBI dashboard are automatically replicated in the PSImetals classical list view of Production Orders for seamless, more detailed insights.

The main benefit of Production Order Monitor is the possibility of discovering, in a few clicks, systematic issues of the Technical Elaboration based on metrics (and not "feelings"). This is a first step of the continual improvement process or root cause analysis, thereby, shifting from a repeated punctual correction mode to a thorough solution.
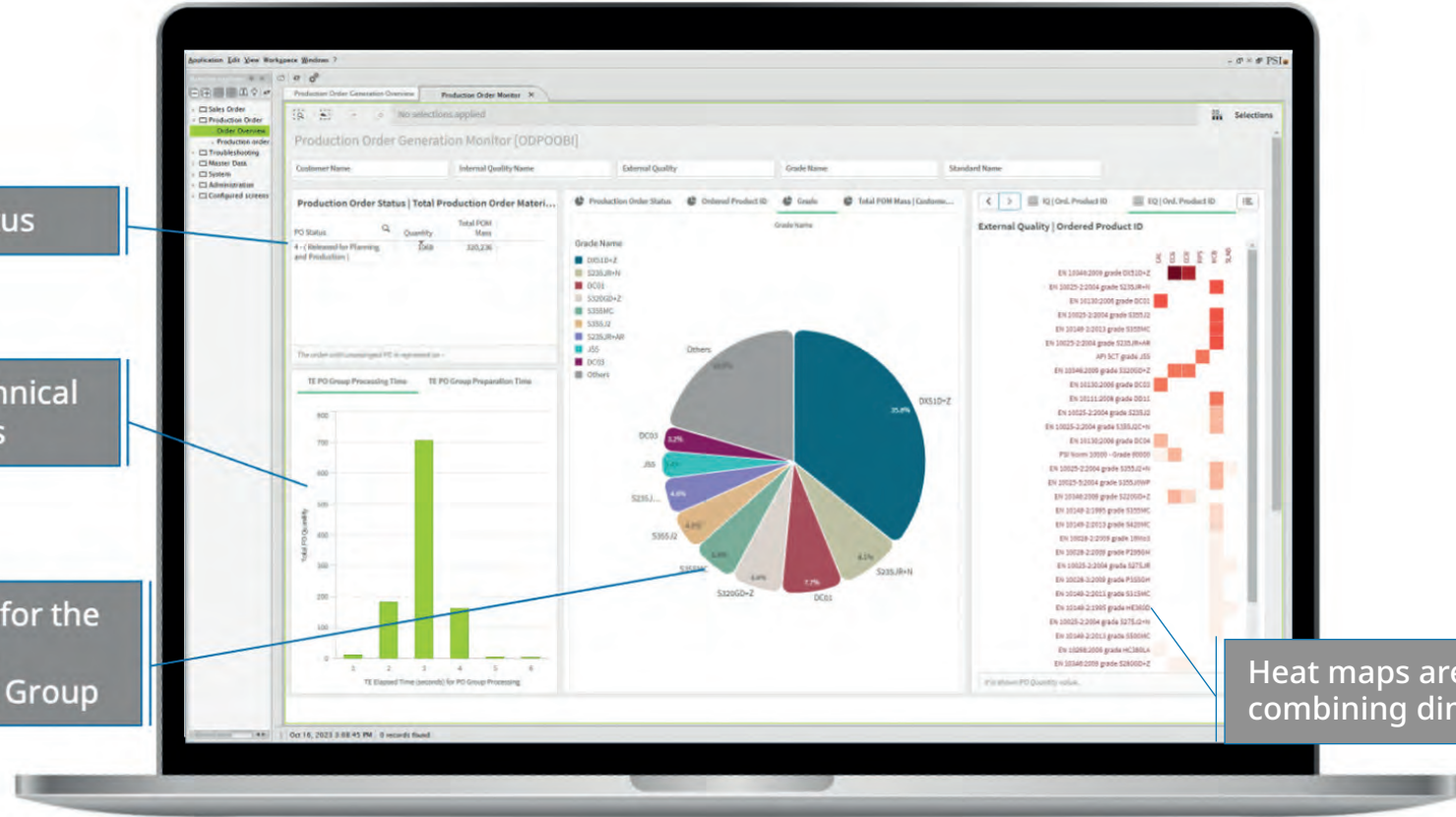
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QUALITY

KPI about PO Status

Bar Chart for Technical Elaboration Times

Pie Chart available for the dimensions Grade, Customer, Product Group

Heat maps are used in combining dimensions

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Order Dressing - Permissions for Derivation Tables

Reading and editing Derivation Tables can now be individually restricted by permissions

In order to control the possibility of editing Derivation Tables (DerTab) in Order Dressing, a new system of permissions for DerTab has been implemented.

The permissions are based on roles, which are assigned to named user in PSIauth, in order to grant them reading or editing permission.

To define permissions for different roles, a combination of the below is used:

- PSIauth scopes assigned to roles;
- Order Dressing's scope categories assigned to each Derivation Table.

After named user logs in, PSIauth checks their role and grants appropriate permission for each Derivation Table:

- Read (e.g. loading and display of data in the detail window)
- Edit (e.g. activation of the corresponding GUI buttons)

The assignment of a user to multiple roles and the accumulation of corresponding permissions are supported.
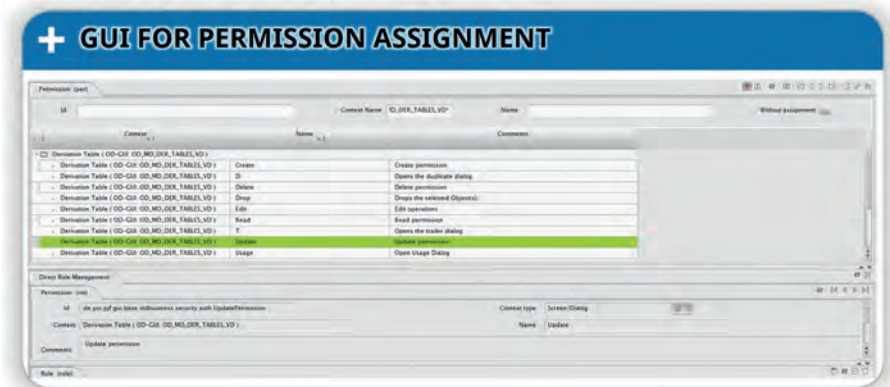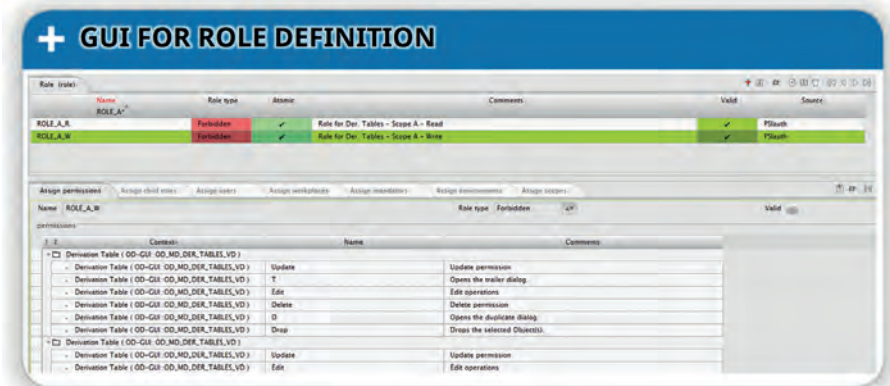
Reading and editing Derivation Tables can Now be individually restricted by permissions

Quality Data Management - Chart Enhancements

Continuous improvement of the graphic charts for visualization of process data is the result of our customers' feedback

With 5.26, the requirement of displaying multiple convertible measurement units on curve charts including the coil coordinate system was in focus.

Now it is possible to scale axes according to two different measurement units, for example, length, width and temperatures in both the metric and the US customary system. Additionally, for the curve chart, it is now possible to select which curve has to be shown in a separate chart and which in a multiple-curve chart.

The curve charts are enriched with a configurable title which can contain free editable text but also content depending on the material for which the chart is plotted.
- For instance, Material ID but also statistics of the depicted curve, like min, max, and average value, standard deviation, and number of measurements.
- Additional attributes can be defined in PAM and added to the list available for title composition.

The autoscale function for the y-axis has been introduced. Autoscale takes into account the curve values. In the case of available curve limits, the activation of a dedicated setting guarantees that autoscale takes them into account to make them always visible.
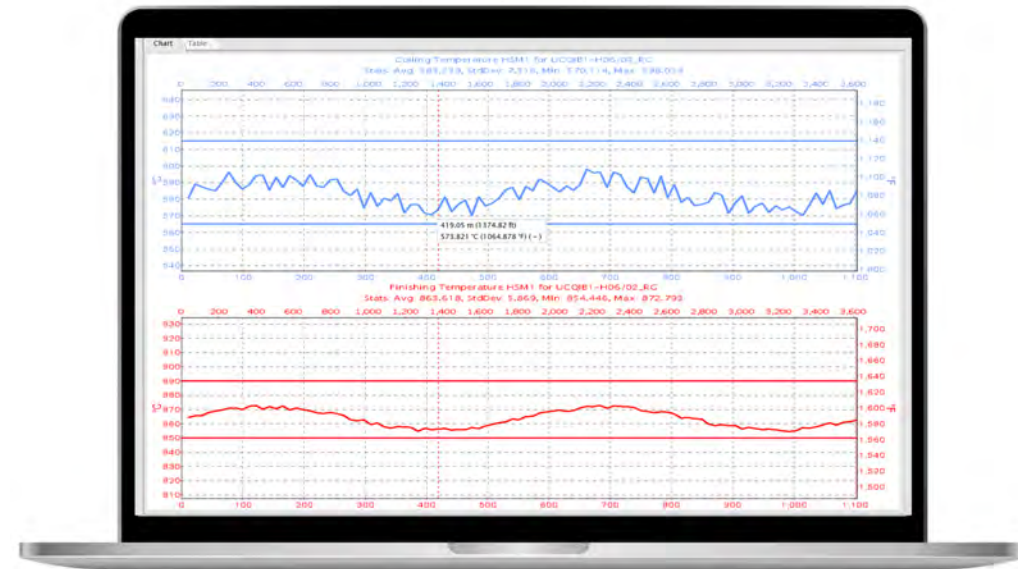
Display of different curves in separate charts

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New chart for Surface Inspection System (SIS) data now available within the standard Chart Configuration with dedicated settings

The graphic showing the collected results from the Surface Inspection System (SIS) has been reworked. It is now a standard graphic available in the standard charts configuration menu with dedicated settings:

- Selection of data source;
- Chart assignment to Production Step;
- Configurable colorization;
- Display of defect images (where available);
- Display of two convertible measurement units (e.g. metric / US customary) for both width and length.

Additionally, new statistics regarding surface defects are provided. Configurable attributes (like severity or counts) can be aggregated along the width or the length of the materials unit. This way, areas extraordinarily affected by defects can be identified. Defect pictures, fetched from the SIS, can be also displayed.
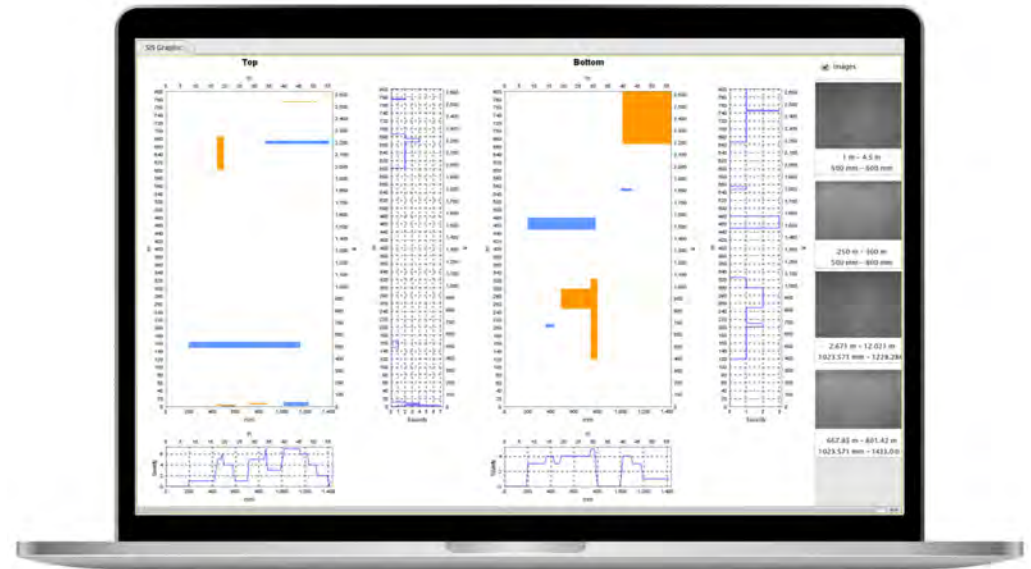
New chart for Surface Inspection System (SIS)

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Migration to Service Platform: Process Quality Decision

Execution of Process Quality Decision is now also available within the Service Platform framework

PSImetals Quality is progressively migrating from PL/SQL to PSI's own Service Platform framework. As an additional step of the migration, with Release 5.26 the execution of the Process Quality Decision (PQD) with Quality Indicators can be performed in the new framework.

SP-based PQD is seamlessly integrated and synchronized via PSIbus with non-SP-based PSImetals Production & Quality.

This is also reflected in the User Interface (UI): the PSIweb UI that comes with the Service Platform is embedded in the "classical" PSIgui so that the user still works with One GUI despite the fact that some Quality services run in the PL/SQL framework and some in the new Service Platform.

A new screen "PQD Browser" has been released. It follows a master-detail approach:

- In the first tab, an Embedded Business Intelligence dashboard "PQD Monitor" aggregates all results of executed Process Quality Decisions, enabling monitoring them also with the support of KPIs. It also enables a drill down analysis by application of dedicated filters.

- In the second tab, the PSIweb List View "PQD Overview" reports each single PQD with an evaluation of tests and characteristics; filters applied in the "PQD Monitor" are carried over to this list view.

- In a third tab "PQD Detail", details of the Quality Process Snapshot related to each PQD are shown, including QI values, process data charts, and Material Genealogy.

Process Quality Decisions (PQD) are now available in SP

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# Pre-Certification of Test Results

Deviating test results can be certified or corrected at Process Quality Decision (PQD) level and automatically inherited for Final Quality Decision (FQD), increasing the efficiency of the material release workflow.

So far, in PSImetals Quality, the decision of which test results are used for certification (and therefore handed over to ERP in an unequivocal way) happens at a later stage corresponding with the operation called Final Quality Decision.

However, it is not unusual that some of these results are already available at an earlier stage. To check them, an previously available Process Quality Decision can be configured to also include these tests (additionally to FQD).

The current extension of PQD enables Quality Operators to manage test results that already miss the target at the PQD level, e.g. making decisions of which values will enter the certification before FQD.

FQD will then inherit these decisions and hand over the corresponding values to ERP for certification without asking for any additional intervention at the FQD level.
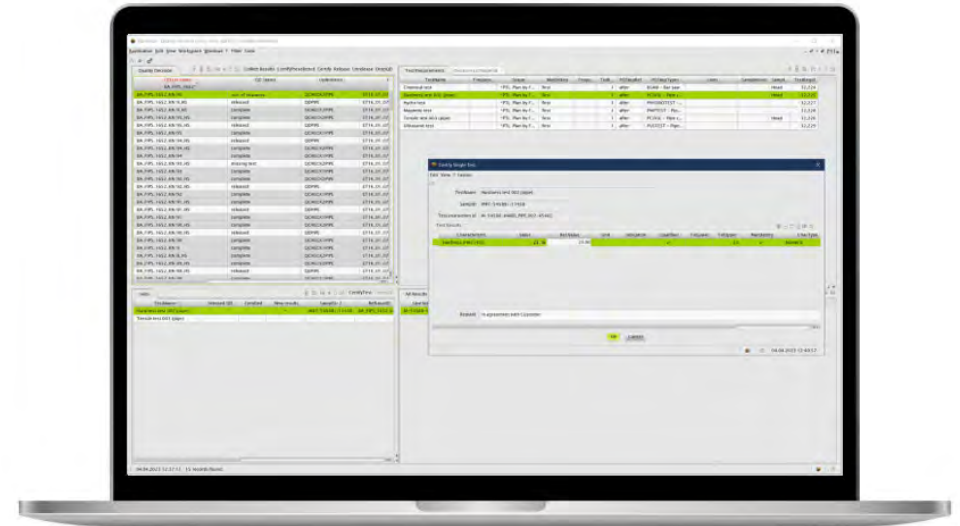
- "Certify" button works also for PQD
- Dedicated "Certify Test" button
- Remarks in "Certify Single Test" dialog

More in detail, the following actions are possible at the PQD level:

- If more than one test has been executed but only one result set is requested for certification, the Operator can select which test result is handed over to the Final Quality Decision.

- In case a test result misses the target, the value can be declared suitable for certification of the entire Quality Decision lot (and therefore neither PQD nor the PQD and FQD at a later stage will withold the materials due to these violations). For this purpose, a dedicated "Certify" button is available in the GUI. An explanatory comment can be entered to justify this decision and will be made available to the ERP for certification.

- Alternatively, in case a test result misses the target, a value can be entered manually ("release value") and set as suitable for certification of the entire Quality Decision lot, even if it may not meet the target. For this purpose, a dedicated "CertifyTest" button is available in the GUI at the test level (i.e. first select the test, then press button).

As a consequence, both PQD and later PQD/FQD will not withold the materials due to this characteristic. The manually entered value is separately saved in the database. An explanatory comment can be entered to justify this procedure and will be made available to the ERP for certification.

The described PQD actions can be performed again (e.g. to change the "release values"), as long as the Final Quality Decision is not released for certification, e.g. FQD has not happened yet (materials have not reached that point yet) or FQD has been manually unreleased (function already available for FQD).

Benefits

- Experts of specific production steps can immediately solve "release issues" at the intermediate production step level;
- No need to repeat decisions/operations performed at the PQD level when the material reaches FQD;
- Increased efficiency in release operation, saving time and communication efforts.

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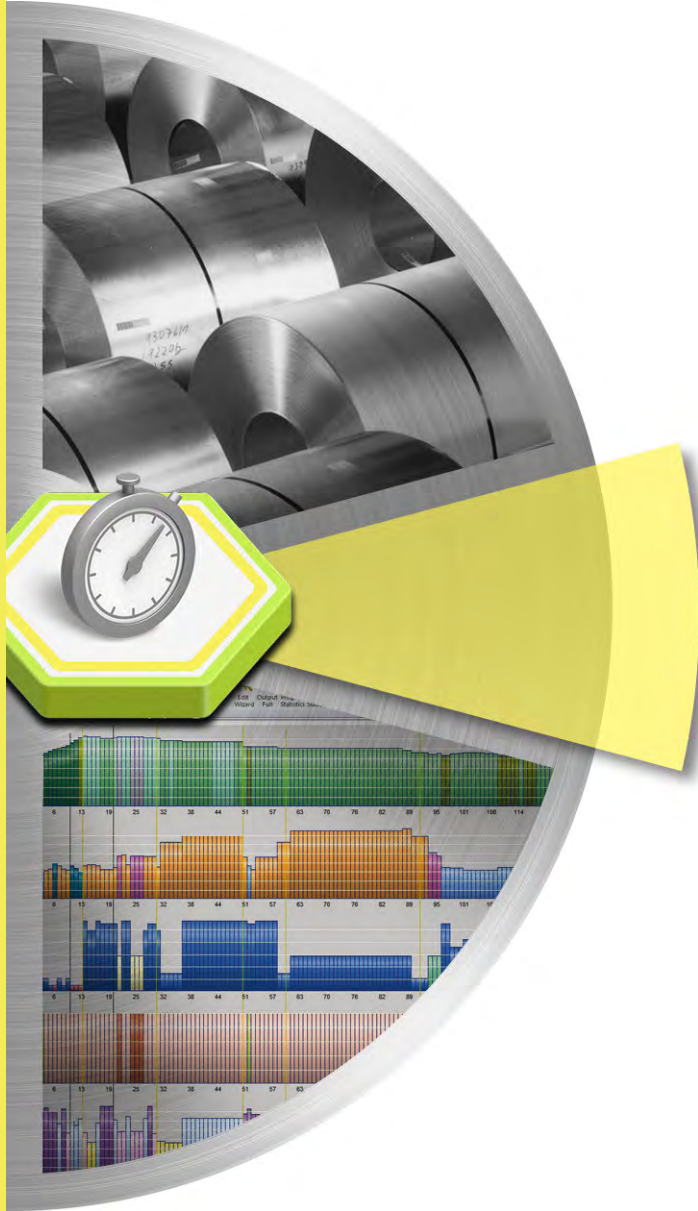
- **Demand & Sales Planning:**

  - Scenario Management
  - Sales & Operations Planning and Due Date Quoting: Functional Improvements

- **Embedded Business Intelligence (EBI) improvements:**

  - Demand Manager: DDQ Calculation logs in EBI view
  - Forecast Scenario Analysis
  - S&OP Plans Analysis and Comparison
  - Extended Order Scheduler Data Support in EBI views
  - EBI Data Processing Improvements in Line Scheduler and Master Planner

- **Master Planner:**

  - UI improvements
  - Order Planning Functional Improvements

- **Caster Scheduler**

  - Smart Tundish Approach

Demand & Sales Planning - Scenario Management

PSImetals 5.26 Demand and Sales Planning takes the lead in simplifying and accelerating scenario management

Scenario management in Sales and Operations Planning (S&OP) is a strategic approach that involves creating multiple business scenarios to help organizations to ensure they are resilient and agile in a dynamic business landscape. It is an indispensable tool for proactive decision-making.

PSImetals 5.26 Demand and Sales Planning takes the lead in simplifying and accelerating scenario management. By facilitating the effortless creation of alternative input data versions, such as Forecast scenarios or Calendar plans, and enabling the calculation of alternative S&OP plan simulation results for each, it streamlines the decision-making process.

All versions are conveniently stored and readily accessible for side-by-side comparisons via an intuitive graphical user interface. Users retain the flexibility to choose which scenario(s) to implement and can effortlessly revert to alternative options if necessary.

As a result, this robust solution ensures:
- Informed decisions through comprehensive scenario analysis;
- Enhanced collaboration and alignment across the entire organization;

- A comprehensive coverage of the demand and supply planning lifecycle, equipping your business for success in today's rapidly changing landscape.
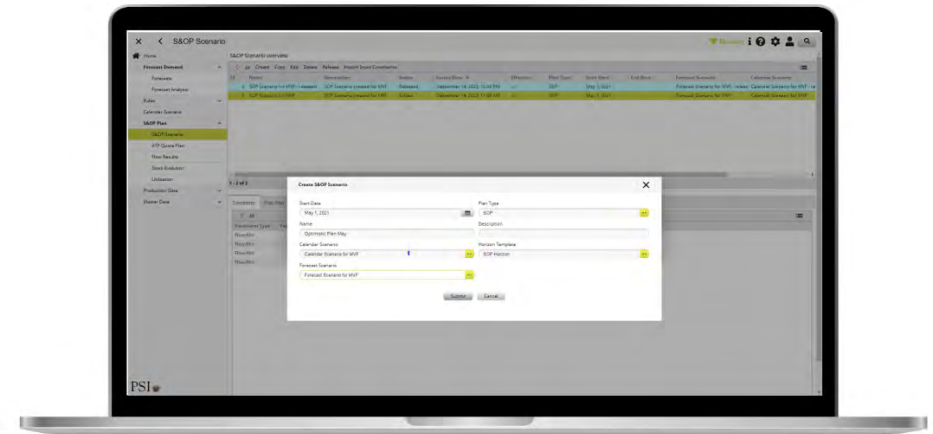
A S&OP scenario takes as input
- A selected time horizon and bucket granularity (horizon template)
- A selected demand plan (forecast scenario)
- A set of downtimes, campaigns and constraints (calendar scenario)

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The supporting architecture includes a common data frame that serves as the foundation shared among all S&OP scenarios. This core dataset encompasses plant production lines and product families' master data, including alternative routing networks.

Additionally, it also includes the already contracted order book (real demand), as well as the released production shifts and downtimes at the beginning of the horizon (production calendar).

Scenario-specific data includes the generated alternative demand plans and supply plans. More specifically, alternative demand forecast scenarios and plant calendar scenarios, including planned downtimes and constraints can be created based on which one or more alternative S&OP plan results can be generated and compared.

A S&OP scenario is also based on a defined time horizon (e.g. 6 months) and time bucket granularity pattern (e.g. weekly buckets for 3 months, followed by monthly buckets).

A S&OP scenario takes as input:
- A selected time horizon and bucket granularity (horizon template);
- A selected demand plan (forecast scenario);
- A set of downtimes, campaigns and constraints (calendar scenario).

PSImetals Demand & Sales Planning offers the flexibility to generate as many S&OP scenarios as needed. Some may share the same forecast scenario while employing different calendars, while others may utilize the same calendar with varying forecast scenarios.

Each scenario is then passed to the Master Planner solver, where the user configures and runs the solver to compute the S&OP Plan.

At this stage the user can conduct a standard what-if analysis to generate various supply plan (or flow plan) results based on each specific set of scenario inputs. Ultimately arriving at the most suitable S&OP plan, which can then be released for review and benchmarking during the executive S&OP meeting.

Results can be evaluated through dedicated Embedded Business Intelligence (EBI) dashboards, to decide whether to approve the plan or initiate another iteration.
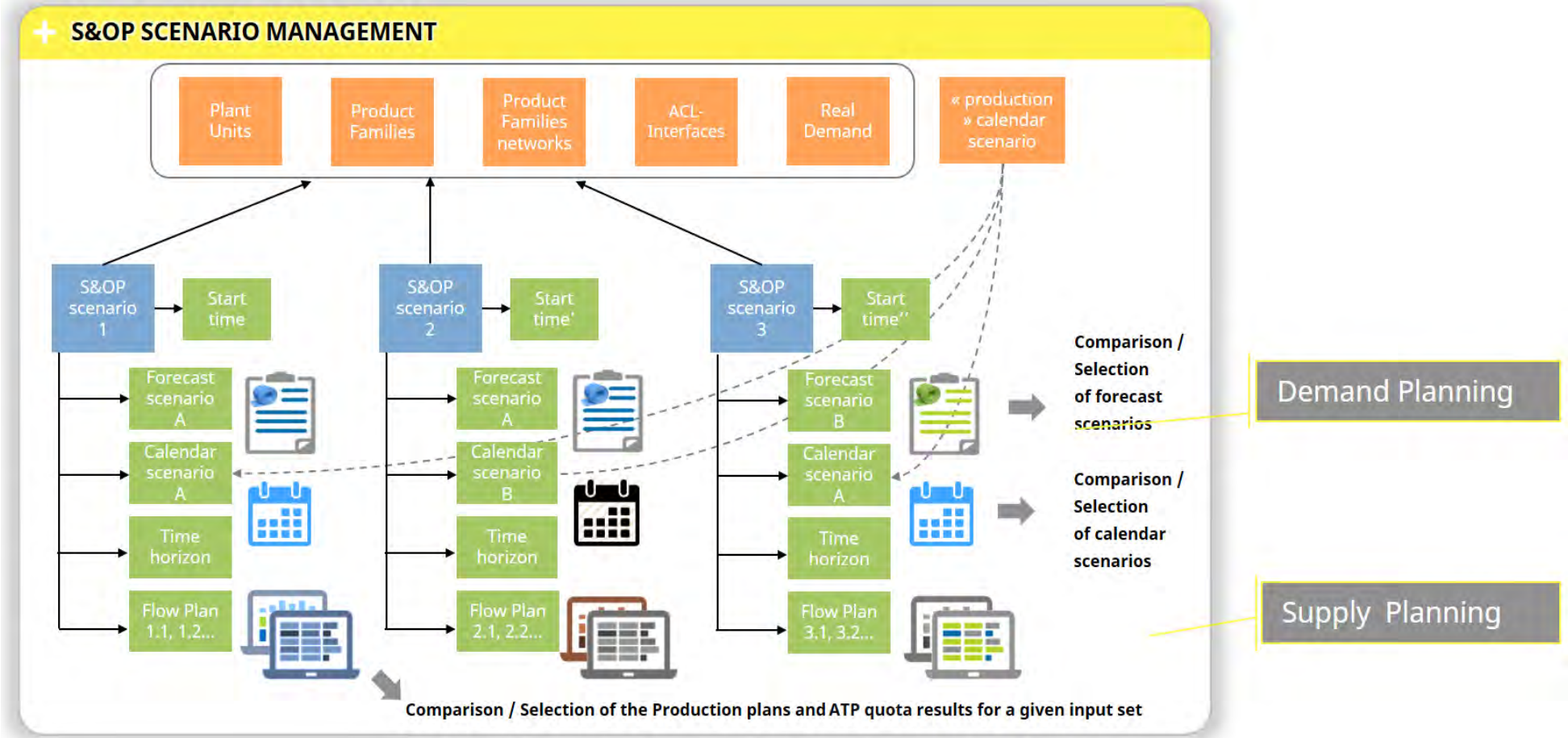
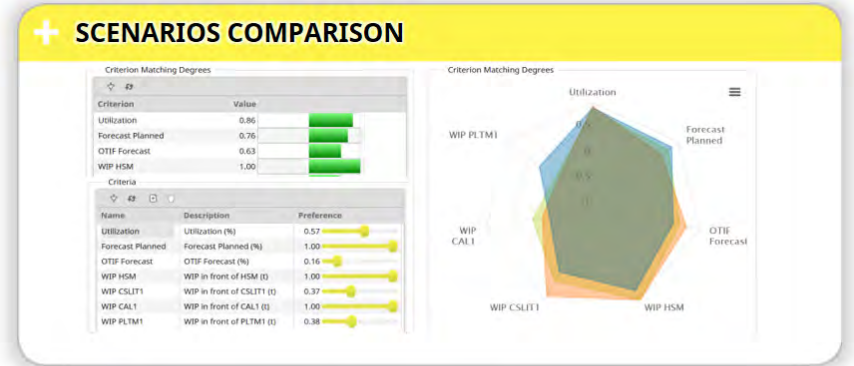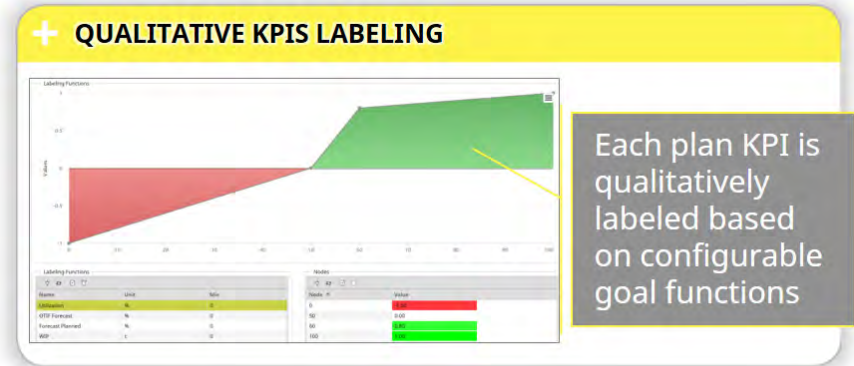# Sales & Operations Planning Functional Improvements - KPI-based Scenario Comparison in Web UI

In addition to enhancing scenario management, PSImetals S&OP release 5.26 introduces an advanced KPI management functionality that further facilitates the comparison and selection of plans.

This update not only involves evaluating business objectives based on key performance indicators (KPIs) but also incorporates qualitative labeling of those KPIs according to specific goal functions. These goal functions are fully configurable by the user in the GUI and allow normalizing the impact of each KPI on a [-1,1] scale along its value range, for each calculated solution.

Beyond visualizing the KPI impact of each S&OP scenario on a radar chart, this new analysis framework facilitates the identification of both positive and conflicting KPI correlations and further enables the users through dedicated sliders to set specific preferences in terms of relative KPI impact weight, based on which a best-fitting scenario can be automatically selected.

Benefits:
- Easy impact analysis and comparison of different scenarios (supporting fast decision-making);
- Understanding positive and conflictual KPI correlations;
- Comprehensive and uniform KPI visualization in web UI across PSImetals SP components.

QUALITATIVE KPIS LABELING

Each plan KPI is qualitatively labeled based on configurable goal functions

SCENARIOS COMPARISON

Comparison of scenarios and selection of best plan based on KPIs prioritization

Sales & Operations Planning Functional Improvements - Planning Horizon Templates management

A dedicated and user-friendly web interface makes it simple for the user to create and manage Planning Horizon templates and select which Horizon template to apply for each S&OP Scenario.

The user is now able to define the planning horizon's time buckets with just a few clicks and set up more complex rules for bucket calculation, especially for rolling time horizons.

the first month of planning, transitioned to monthly buckets for the rest of the quarter, and finally downscaled to quarterly buckets.

Now the user can:

- Create and manage Planning Horizon templates in web UI;
- Define the time buckets, in just a few clicks, and configure more complex rules for bucket calculation, especially for rolling time horizons;
- Set up and adjust a Planning Horizon with time buckets of different sizes throughout the planning period;
- Select which Horizon template to apply for each S&OP Scenario;
- Define one or more planning horizon template(s), composed of multiple bucket granularities in a dedicated UI screen.

In the provided example, we created a telescopic planning horizon, where we started with detailed weekly buckets for
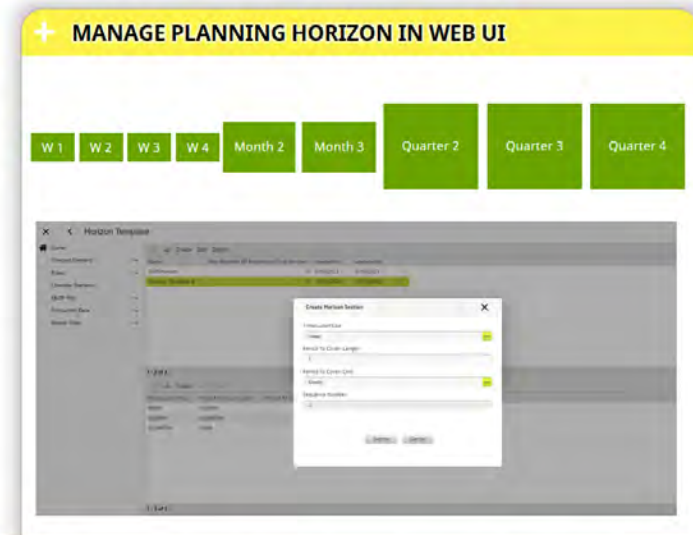
In this example, we want to cover the first month of planning with detailed weekly buckets, then switch to monthly buckets to cover the rest of the quarter, and finally downscale to quarterly buckets

Due Date Quoting Improvements

PSImetals Due Date Quoting release 5.26 has also been enhanced with new functionalities.

Support of Material Reservation

Firstly, the algorithm has been supplemented to support Material Reservation. Material Reservation is an allocation method that allows the assigning of a bulk amount of compatible materials to an order, instead of individual pieces.

During the Due Date Quoting process, Material Reservation (MR) units are checked for available weight to be used. If a MR unit is compatible and available, then the upstream capacity is netted against it on a volume basis rather than allocating individual pieces.

User-defined Due Date for an Inquiry

Secondly, a new feature of user-defined due date has been added. A user can now gain full control over the DDQ process, by enforcing a due date and bypassing the automated quoting process.

Visibility of the Calculation logs in an EBI view

Finally, more visibility has been added to the process by displaying the DDQ calculation logs in a dedicated EBI dashboard. This enables the user to explore the algorithm's decisions and compare how the order was quoted in different DDQ calculations.
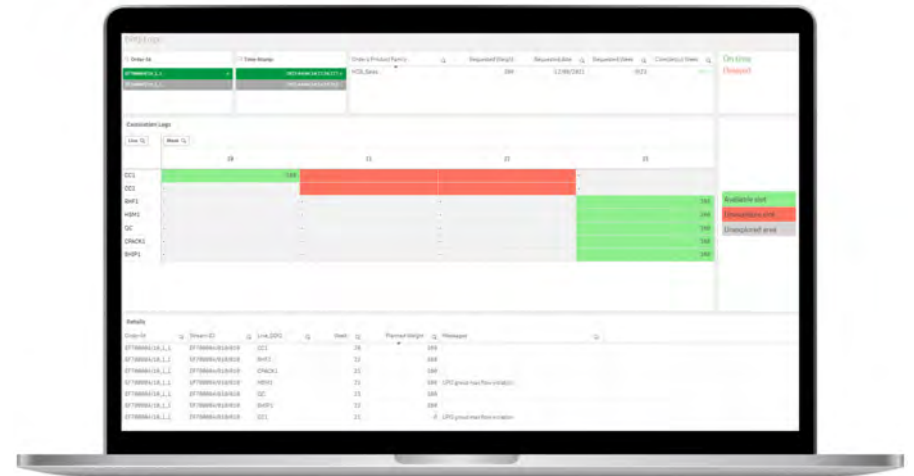
Bringing more transparency to the due date quoting process

Demand & Sales Planning:
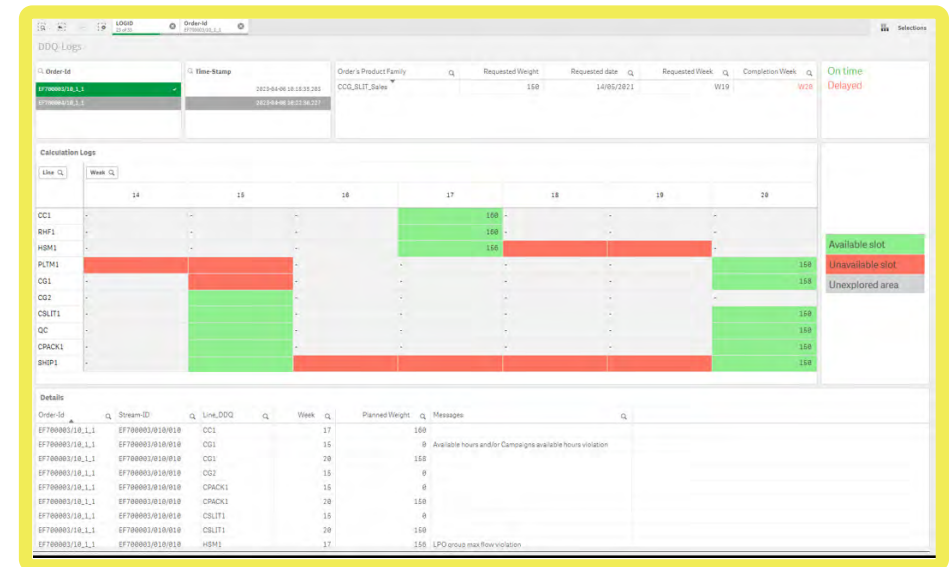# DDQ Calculation Logs In EBI View

In this example, the colored cells highlight the search path that the DDQ algorithm has explored to find a quote proposal.

- The red color indicates a failed attempt to plan the required weight in a given bucket and line.
- Explored cells with available capacity are displayed in green, and the ones eventually selected also contain the quoted amount.

The reasons for each restricted placement are listed in the log message list pane which appears in the figure below.

For example, it could be that a maximum flow constraint or the remaining available capacity would be violated.

Thanks to such a log dashboard, it is easier for the planner to understand the reasons for deviations between the initially requested dates and the quoted dates.

DDQ Calculation Logs In EBI View

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Demand & Sales Planning - Forecast Scenario Analysis

The new EBI dashboard in PSImetals S&OP enables a user to analyze, compare, and edit forecast scenarios in one cohesive view.

Several EBI template dashboards have been designed to support more efficient decision-making along the various steps of the Demand & Sales Planning business processes.

One of these is the Forecast Scenario Analysis EBI view, as shown in the screenshot. This dashboard empowers users to analyze, compare, and edit forecast scenarios seamlessly.

With the new EBI dashboard users can:

- Compare multiple forecast scenarios side by side;
- Customize the dashboard to analyze forecasts from different perspectives using an adjustable pivot table and interactive charts;
- Effortlessly navigate through forecast items to filter and select the desired demand;
- Edit selected forecast items in a synchronized list view in the bottom pane.

This dashboard further provides a comprehensive breakdown of forecast scenarios, including periods, product aggregation groups, and customizable demand attributes like market, customer, and country.

Like all other EBI dashboards, it is highly customizable and can be tailored to meet specific business needs.
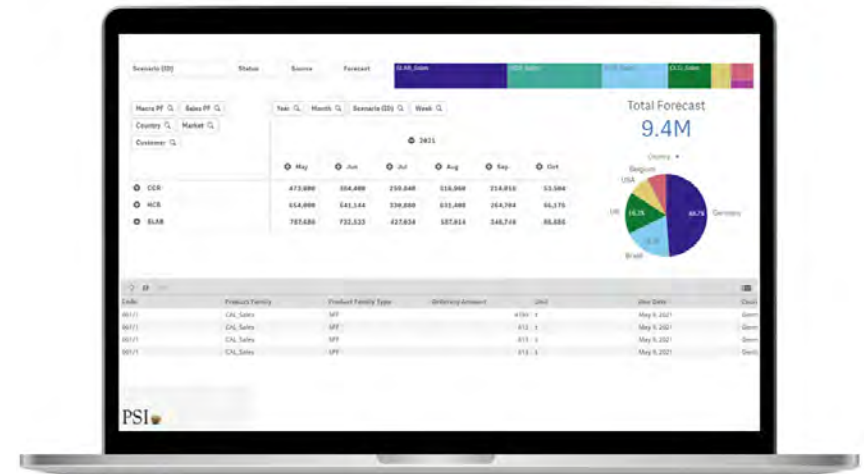
The dashboard provides a detailed forecast scenario, broken down in time periods, product aggregation groups and customizable demand attributes

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Demand & Sales Planning -
# S&OP Plan Analysis and Comparison

New EBI dashboards allow visualization of the results of S&OP plan calculation per Line, Product Family, and Expandable Time Bucket (year, month, week)

When the S&OP plan is calculated for a specific scenario, multiple EBI dashboards are now available that enable a swift review of the results, including Production Flows, Total Shipment, Line Utilization, and Stock Evolution.

The dashboards facilitate the visualization of S&OP plan calculations across various dimensions, such as Production Line, Product Family, and Expandable Time Bucket (year, quarter, month, week).

Additionally, the user can compare several plans in a side-by-side view.

For efficient navigation through the results and milestones, an "All-in-One" Scenario Overview dashboard is also available, making it quick and easy to access the information needed.
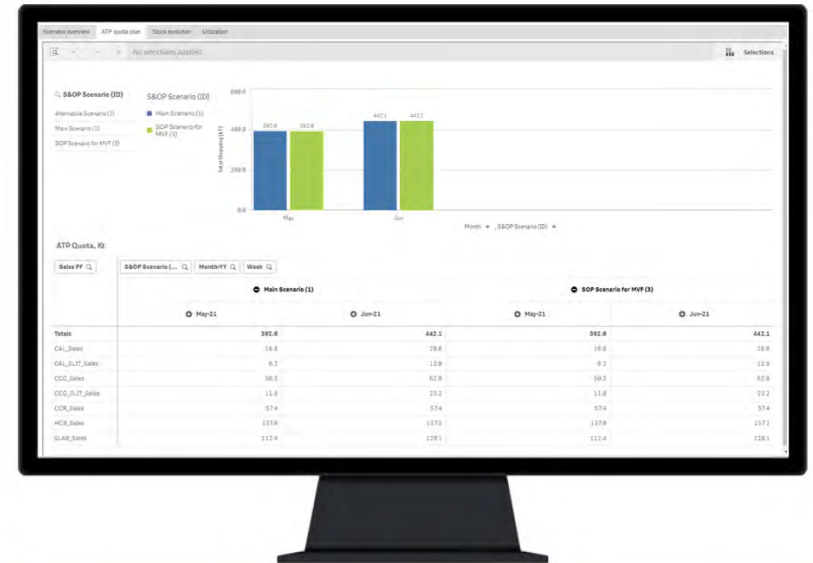
This dashboard displays the ATP Quota (Total planned shipment) side-to-side comparison for two S&OP Scenarios

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The All-in-One
Scenario Overview
dashboard allows the
user to review the
aggregated KPIs for all
scenarios
and to easily revise the
calculation results by
switching between the
indicators of interest.

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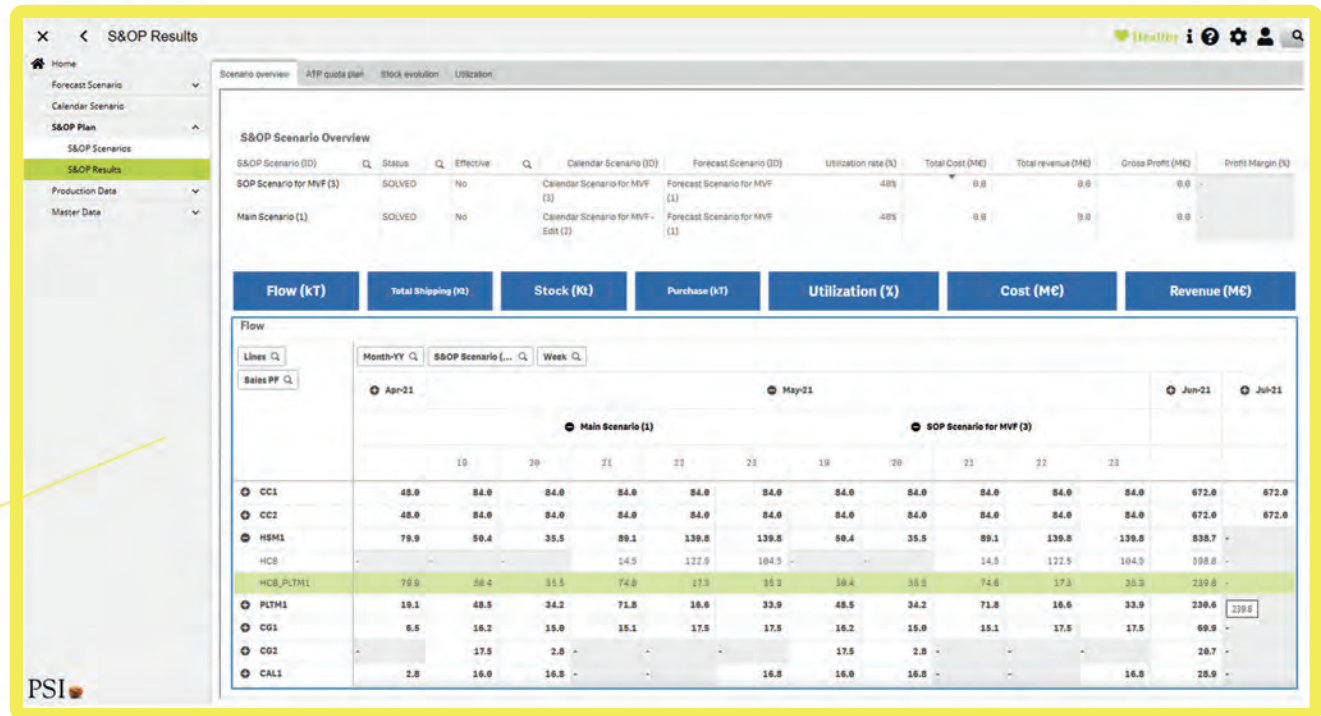
Extended Order Scheduler Data Support in EBI Views

Extended Order Scheduler data, including planned order quantities, can now be used in Embedded BI dashboards.

The BI dashboards embedded within PSImetals Planning components can use data from different sources: the database, the in-memory data (which is the data generated during the user's current session), or even a third-party source if needed.

Extended Order Scheduler data, including planned order quantities, can now be used in EBI dashboards, which provides the possibility to visualize the most up-to-date scheduling information in the dashboards.

As an example, the "Target Date Performance" EBI dashboard displayed within the screenshot uses the running session's scheduling data to compare the Scheduled date with the Target date of a production order step:

- The advance/delay analysis chart highlights in red the amount of weight that is planned later than its' target date;
- In green – planned on time;
- In blue –planned in advance.

The interactive EBI screen allows the filtering of the data according to the user's needs. For example, by selecting a particular line, a planned date range, or a delay time, to focus only on what is currently important.
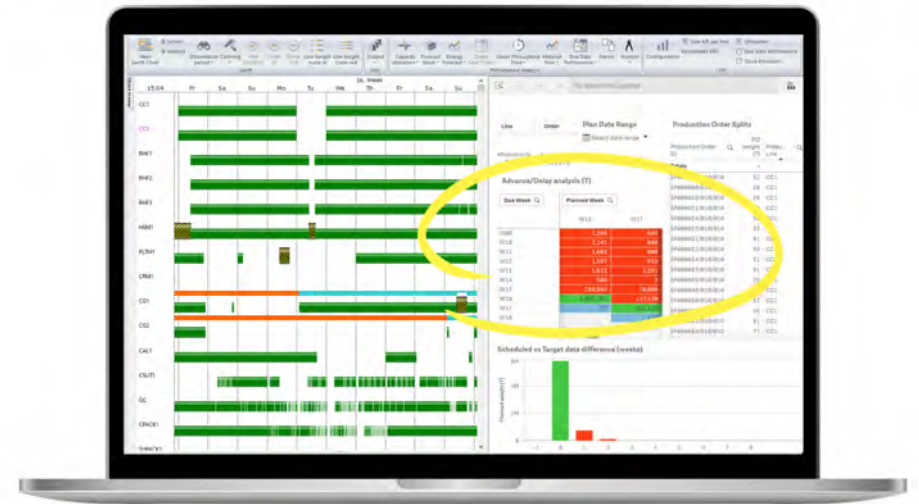

The advance/delay analysis chart compares Target Date and Scheduled Date for the Planned production order quantities

Once the user applies a selection on the EBI view, the data in Order Scheduler Gantt chart is highlighted accordingly (here, in yellow), following the principle of the Embedded BI.
From there, the user can act on the selected objects in the Order Scheduler (e.g. increase their priority as input to another planning run).
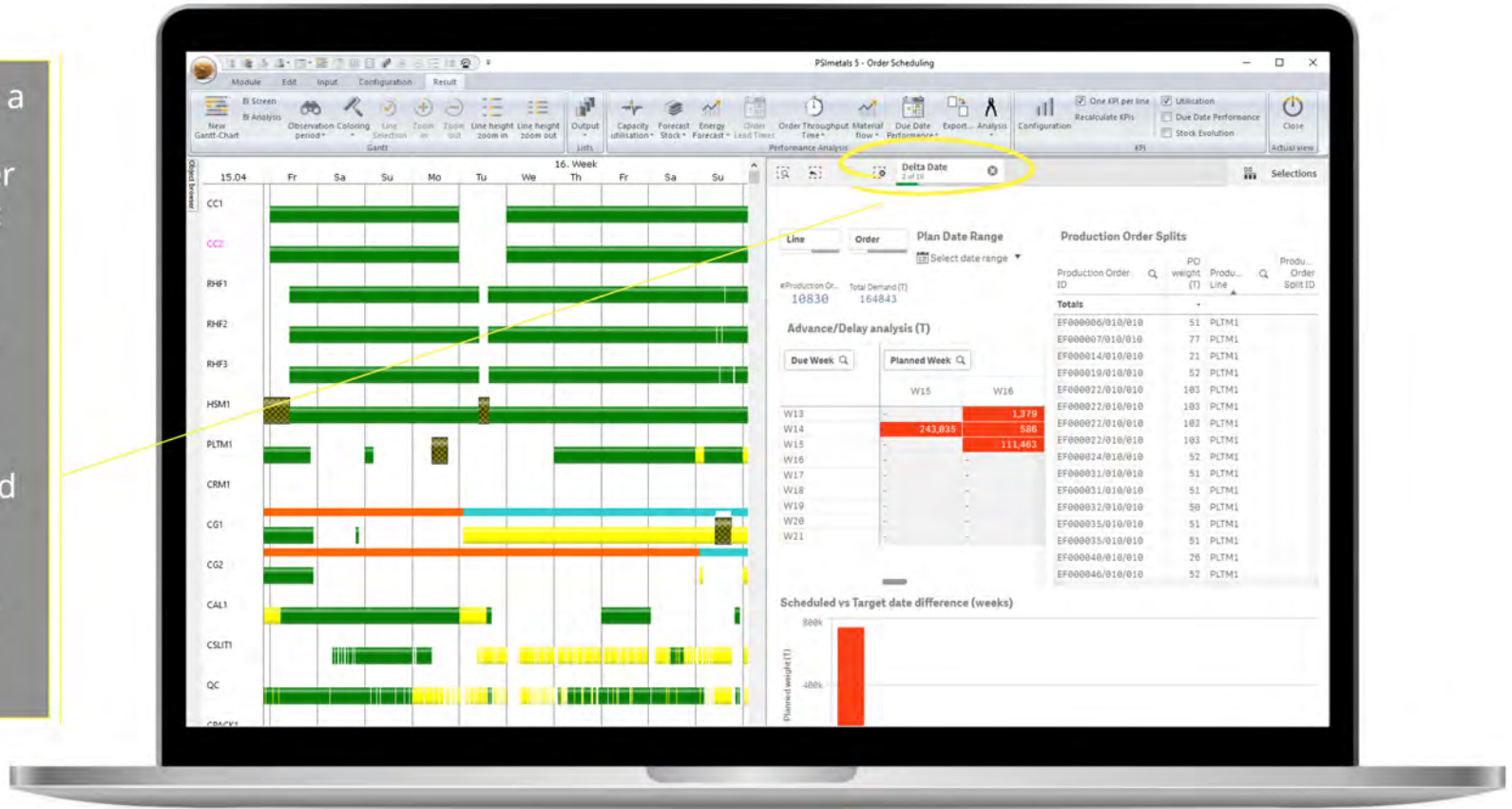
Embedded BI - EBI Data Processing Improvements

Data processing improvements, including asynchronous data update and data compression, are now supported within the EBI mechanism.

Data processing improvements, including asynchronous data updates and data compression, are now supported within the EBI mechanism. Whenever the user prefers to refresh EBI Dashboard data in real-time, to schedule the update according to some rules or to do the data refresh manually, all the options will be now supported in PSImetals Line Scheduler and Master Planner.

The asynchronous data loading will perform the EBI data update in the background, without disturbing the user from their current tasks – i.e. the user no longer needs to wait for the data upload/refresh to be completed.

The data updates can be triggered differently, according to the user's needs. They can:

- be set up as a step of a solver algorithm;
- be set up as an automated post-process step after every manual plan/schedule edition;
- be triggered manually.

Furthermore, independently of the chosen data update option, a new data compression algorithm has been added which is applied to make communication with EBI even faster.

EBI Data processing improvement

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Master Planner UI Improvements - Customizable units of measurement

Default weight and time measure units for Master Planner spreadsheet view (CapTreeView) - tons and hours - can now be customized through a dedicated menu within Master Planner UI

- No data change is required: the user simply needs to set the conversion rules from one measurement unit to another, for example from tons to kilograms or from hours to days.

- Specific units of measurement can thereby be applied to a particular line/product type or family.

- All the changes can be easily configured by the user in the Master Planner GUI, as shown in the screenshot.

CUSTOMIZABLE MEASURE UNITS

Variable	FLOW
Unit	Tons
Colorization-Name	Routes
Weight-Display-Name	Tons
Weight-Display-Scale	1
Time-Display-Name	Hours
Time-Display-Scale	1

Variable	FLOW
Unit	Kg
Colorization-Name	Routes
Weight-Display-Name	Kg
Weight-Display-Scale	0.001
Time-Display-Name	Days
Time-Display-Scale	24

The default units of measure (tons and hours) were changed to the custom ones (kilograms and days)

The dedicated scales set conversion rules

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Master Planner UI Improvements - Colorization of planned quantities based on custom attributes

Production plan quantities in Master Planner, represented by planned jobs (GS-jobs), can now be colorized based on custom attributes

The user can display in different colors the planned order flows that are supplied from different upstream lines or locations or indicate by different colors the accessibility of a required material. Planned quantities on each production line and in each time bucket will be proportionally colorized according to the defined GS-jobs criteria.

In this example, the colorization of planned quantities on each production line and in each time bucket is based on the material accessibility:

- The green color indicates that the material is stored in front of the line, yellow – in the plant;
- Orange and red indicate that the material is outside the plant (with or without a transportation request respectively).
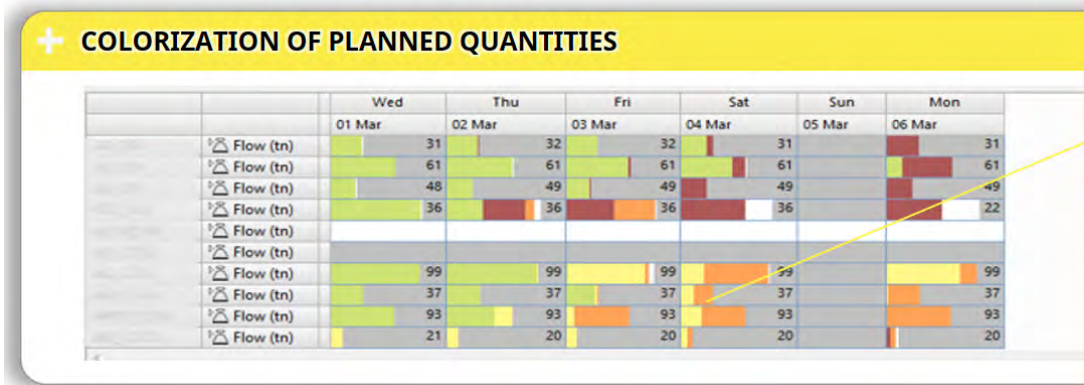
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Order Planning functional improvements

Production order step group (LPO-group) constraints can now be applied for a group of production lines

When it comes to order planning, defining production constraints plays a crucial role in ensuring a successful plan. Within PSI-metals Flow & Order Planning, constraints on different plan variables (Stock, Flow, Cumulated Flow) can be applied to different demand aggregation levels (Product type, Product Family, Production order step group -or LPO-group) and production steps (for individual lines or line groups).

With release 5.26, the users are now able to create a Production order step group (or an LPO-group) for a group of lines and to apply a constraint for such LPO-groups at the line group level. For example, let's consider a use case where we have a group of 'Export narrow orders' with a downstream transport constraint of 150 tons per day.

While each of our two Hot Rolling lines (HR1, HR2) is allowed to process 100 tons of the "Export narrow" orders daily, we want to put a cap on the total production for the line group "Hot Rolling" (HR) corresponding to our downstream limitation – 150 tons per day.

LPO-group constraints set at the line group level will apply on top of individual line constraints.

PRODUCTION PLAN CONSTRAINTS STRUCTURE

Production plan constraint

- Applies to a demand aggregation level
  - All demand
  - Product Type
  - Product Family
  - **PO-step group (LPO group)**
- Applies to a production step
  - Per line
  - **Per line group**
- Applies to a plan variable
  - Flow
  - Cumulated Flow

EXAMPLE

LPO group: «Export narrow orders»	Max Flow for individual lines
HR1 line	100 t
HR2 line	100 t
Max Flow for line group	
HR line group	150 t

LPO-group constraints set at the line group level will apply on top of individual line constraints
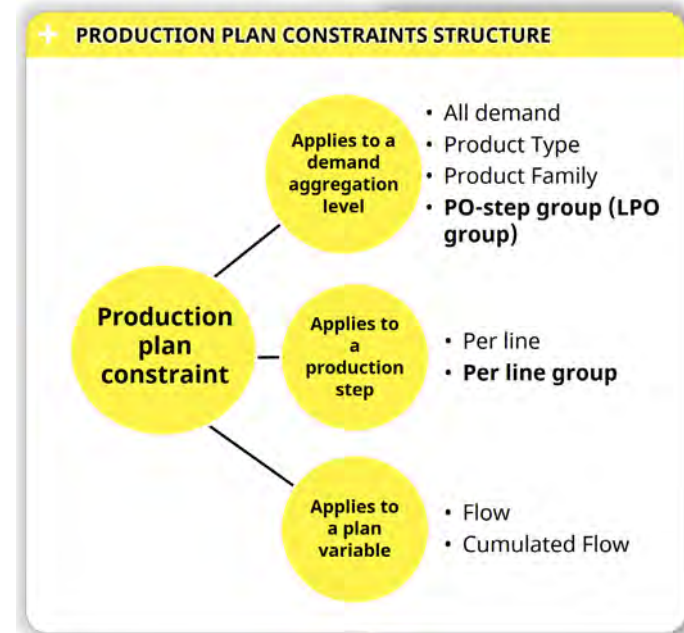
Caster Scheduling - Smart Tundish Approach

Caster Scheduler users can now use an algorithm that generates a tundish proposal based on a selection of grades, width and orders.

Managing the schedule for casting is a complex and challenging task. The scheduler needs to ensure an optimal sequence of slabs with varying qualities and dimensions, while minimizing production costs.

Besides the fully automated sequencing and the pure manual mode, PSImetals Caster Scheduler now provides a Smart Tundish functionality that enables a semi-automatic creation of optimal tundishes as part of a casting sequence.

Having performed an initial selection of production orders for a given tundish type, the scheduler can then select a starting and ending grade as well as a starting and ending width on each strand.

He or she can then specify how many tundishes are to be created, whether or not a slab cutting plan should also be calculated, and if additional orders could be added as well.

Upon confirmation, the system will automatically generate the corresponding optimal tundishes. These can then be imposed as input to a subsequent overall caster schedule calculation.

With this functionality, the user can save a considerable amount of time, ensuring certain orders and grade-dimension combinations will be included in the sequence and retaining full control over the schedule without having to build the sequence fully manually.
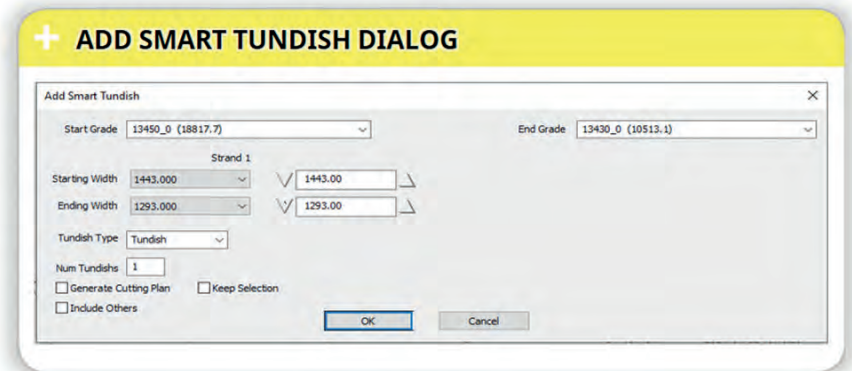
Smart Tundish bridges the gap between fully manual and fully automatic scheduling
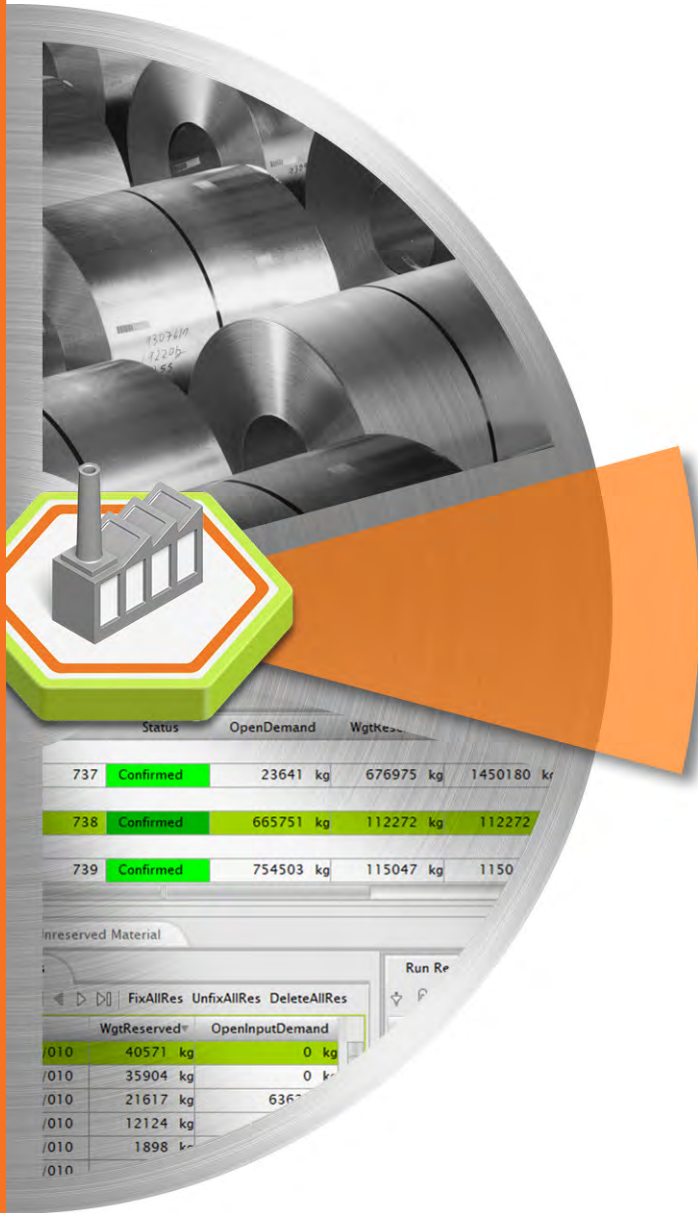
- **PDA - PSIweb User Interface**

- **POL - PO Variant Management**

- **Shopfloor App - Inspection & Defect Handling**

- **Synchronization of Quality and Chemical Analysis**

- **Material Management - Stock Overview**

- **Material Management - Stock taking extension**

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Production Data Acquisition - PSIweb User Interface

The Production Data Acquisition screens are now available as PSIweb App.

The web user interface provides the following advantages:

- It works in every web browser without installation. Therefore there are no compatibility issues caused by hardware or OS.
- It is possible to log into multiple sessions at a time. The usage on different devices is supported by its responsive design.
- On top of this, the PSIweb framework comes with a high configurability, which makes it easy to customize default lines and personalized screens.

The PSIweb PDA App is part of the Service Platform and its data will be accessed via PSIbus.
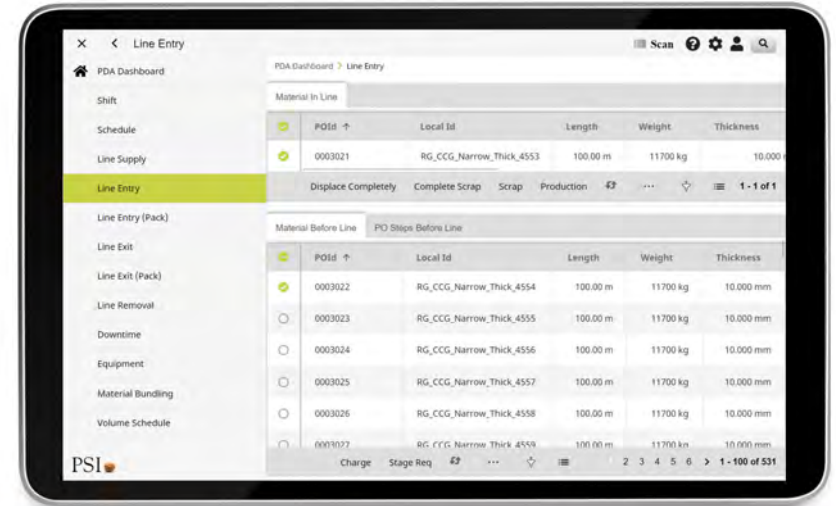
With PSIweb PDA App you can:
- supply the lines and book production
- execute quality operations
- handle shifts, schedules, downtimes & equipment

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POL - PO Variant Management

The management of PO variants in the Office GUI provides a fast and easy way to react to unplanned changes in the production capacity.

In case of a downtime of a plant or line or its reduced capacity, the production order can be redirected completely or partly to alternative routes (PO variants) directly in the Office GUI.

The concept of PO variants contains a Main route PO and one or multiple connected PO variants, describing alternative routes to produce the order. The overall information related to the PO variants is aggregated in the Main route PO and the route of the PO variants is linked back to the MainRoute PO in the end.

In the Production Order Screen a new tab „Variant Details" lists all PO variants and the Main route for a selected Production Order, which is part of the PO variant family. The fulfillment of each variant and the Main Route POs are listed.

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In a detailed view on the right side, the overall fulfillment for the PO variant family is displayed. In case the current PO cannot produce the planned amount, its weight can be partly distributed to one or multiple PO variants or it can be transferred completely to one PO variant.
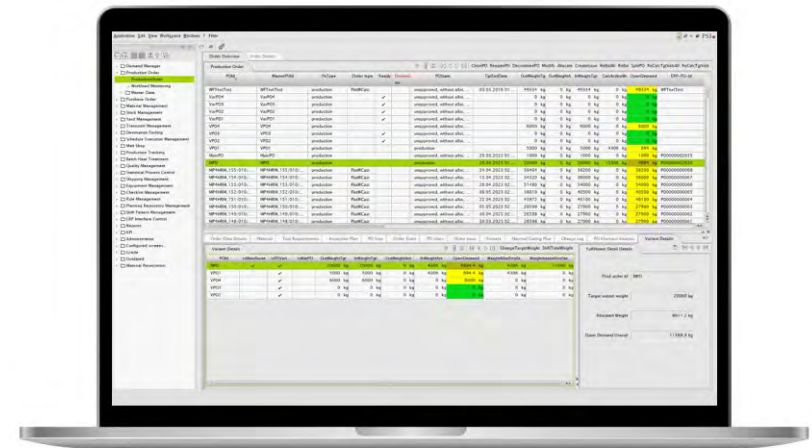
Tab „Variant Details" in Production Order screen
List of connected Main route and Variant POs
Fulfillment (PO variants, Main route, Overall)
Actions to change, transfer weight

Shopfloor App - Inspection & Defect Handling

Manage defects and inspections directly on the shop floor with a mobile device, using the PSIweb ShopFloor App.

With the new features of the PSIweb shop floor App, defects and inspections can be managed directly where they occur – on the shop floor.

Defects for a selected material can be created and settled in the material details and list screen. Additionally, pictures and files can be attached to defects in the Shopfloor App and the defect screens of the OfficeGUI.

The new screen inspection overview provides information and operations for inspection/test handling:

- Enter test results
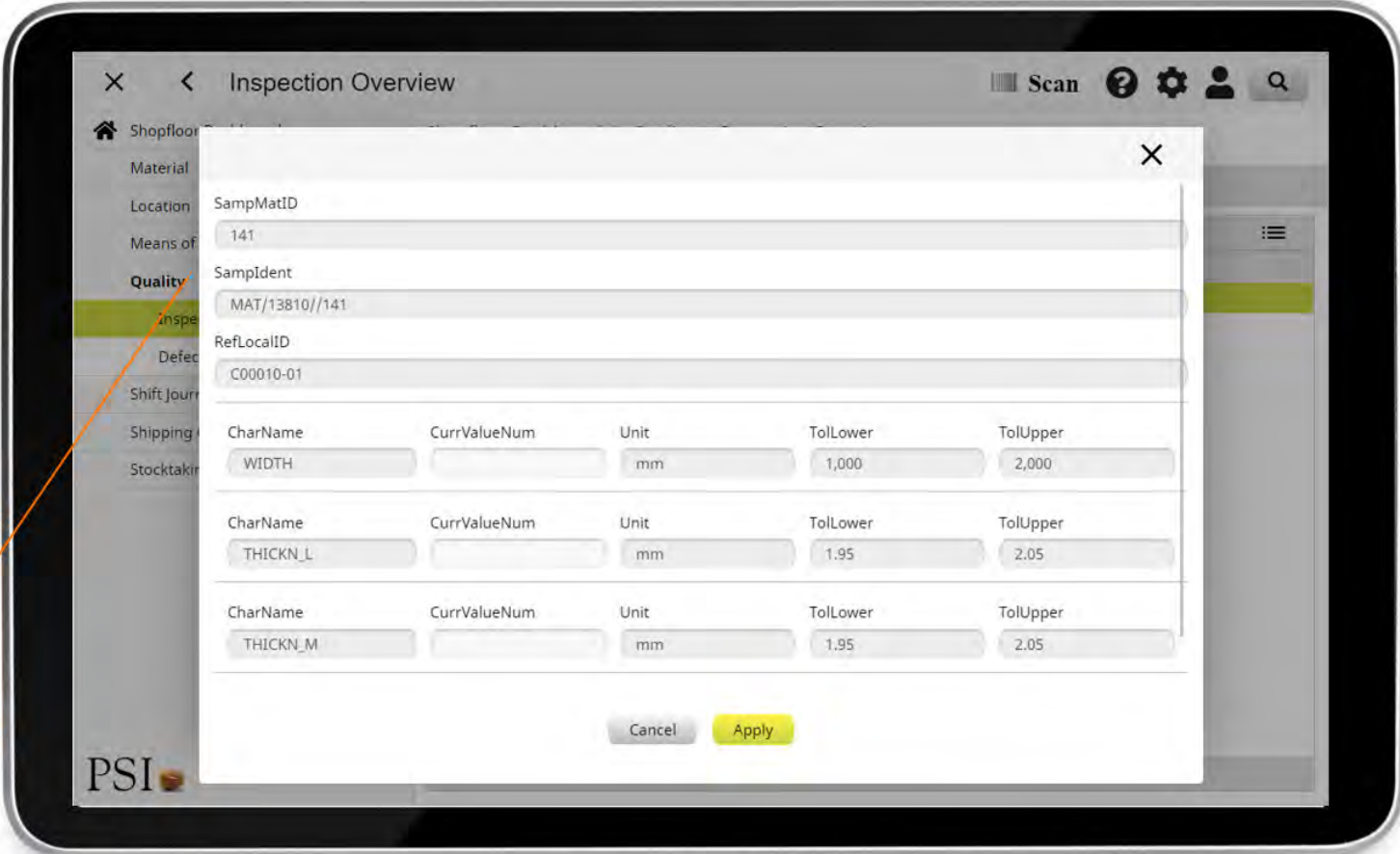- Approve test
- Reject/disapprove test

For a selected sample the test requirements and their characteristics are displayed. Results can be entered and approved / disapproved.
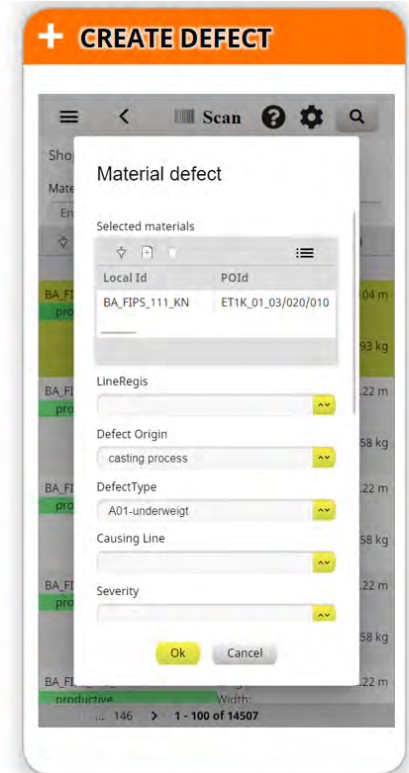
Defects for a selected material can be created and settled in the material details and list screen
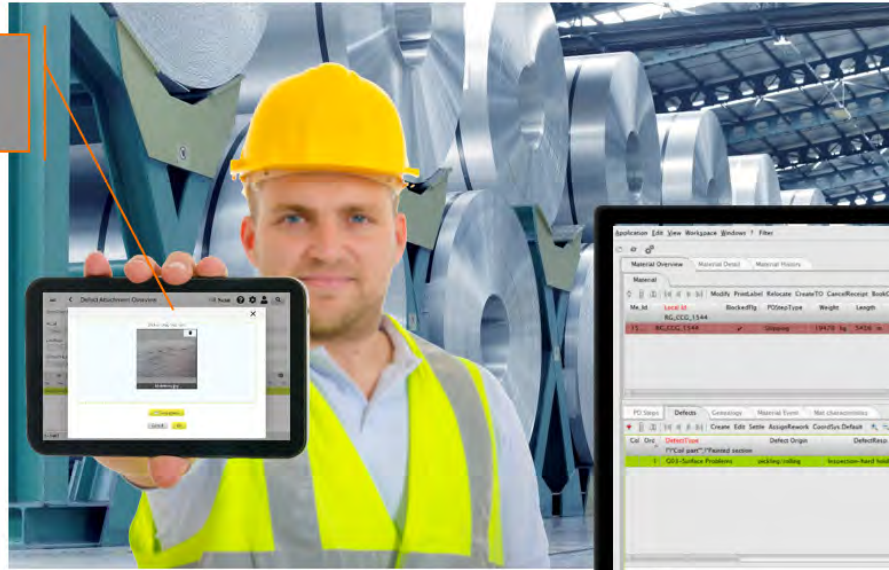
Inspection Overview
Enter test results,
 Change approval of
tests and inspections

Inspection Overview

× | Scan | ? ⚙ 👤 🔍

Shopfloor
Material
Location
Means of
Quality
  Inspe
  Defec
Shift Journ
Shipping
Stocktaki

×

SampMatID
141

SampIdent
MAT/13810//141

RefLocalID
C00010-01

CharName	CurrValueNum	Unit	TolLower	TolUpper
WIDTH		mm	1,000	2,000

CharName	CurrValueNum	Unit	TolLower	TolUpper
THICKN_L		mm	1.95	2.05

CharName	CurrValueNum	Unit	TolLower	TolUpper
THICKN_M		mm	1.95	2.05

Cancel   Apply

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DEFECT ATTACHMENTS IN SHOPFLOOR APP AND OFFICE GUI

Defect Attachements in the Shopfloor App

Defect attachment from the shopfloor to the OfficeGUI

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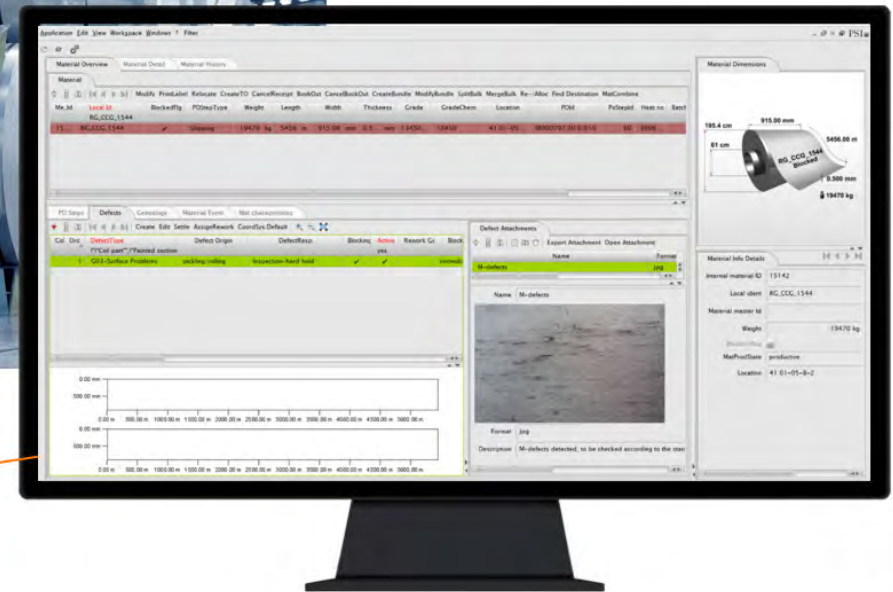
ERP SIBB - Synchronization of Quality and Chemical Analysis

Automatic synchronization from Order Dressing to ERP with release 5.26.

Quality engineers no longer have to maintain the master data of internal qualities and chemical analysis both in Order Dressing and the ERP system.

Order Dressing can become the single source of truth for:

- Internal qualities;
- Chemical analysis master data with internal quality assignment.

With two new ERP SIBB messages the data is automatically synchronized from Order Dressing to the ERP system.

A dedicated new queue avoids any conflicts or slowdowns of other sending processes.

Having Order Dressing as the single source of truth for internal qualities and chemical analysis reduces on one hand the efforts to maintain the master data and on the other hand, reduces the risk of errors and mismatches.

+ BUSINESS FLOW

Automatic synchronization from Order Dressing to ERP system with new messages: InternalQualitySnd and ChemicalAnalysisSnd
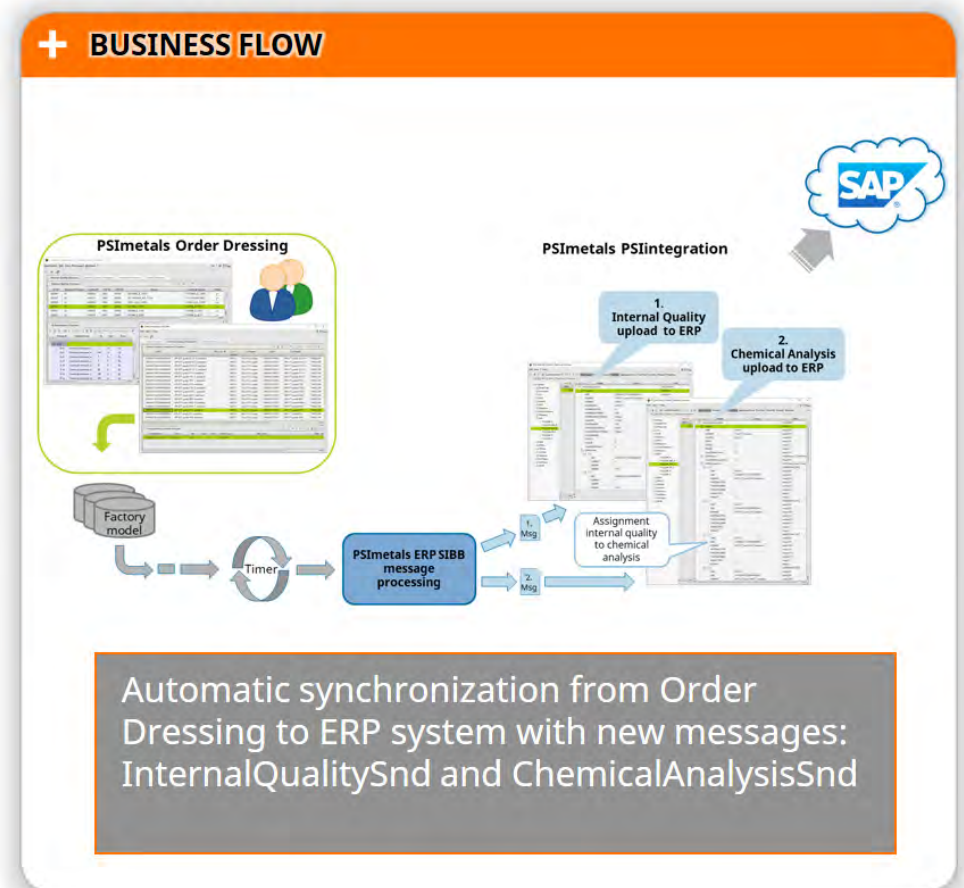
Material Management - Stock Overview

New dashboard "Stock Overview" made available in PSImetals via Embedded Business Intelligence.

- It provides an overview of the current stock by visualizing the amount in tons per grade, material type, dimensions, hall, and allocation (unallocated, at a Production Order Step Type, to a Customer).

- The user can select a subset directly inside the dashboard (e.g. grades, halls) or enter filters to quickly see the relevant data.

- The filters are passed over to the connected tabs "Material Overview", "Material Details" and "Material History" so that actions may be performed directly on the selected material.

- Therefore the "Stock Overview" dashboard can be the entry point for use-cases such as analyzing the stock for reorganization, planning the restock of pre-materials, planning shipping, and many more.
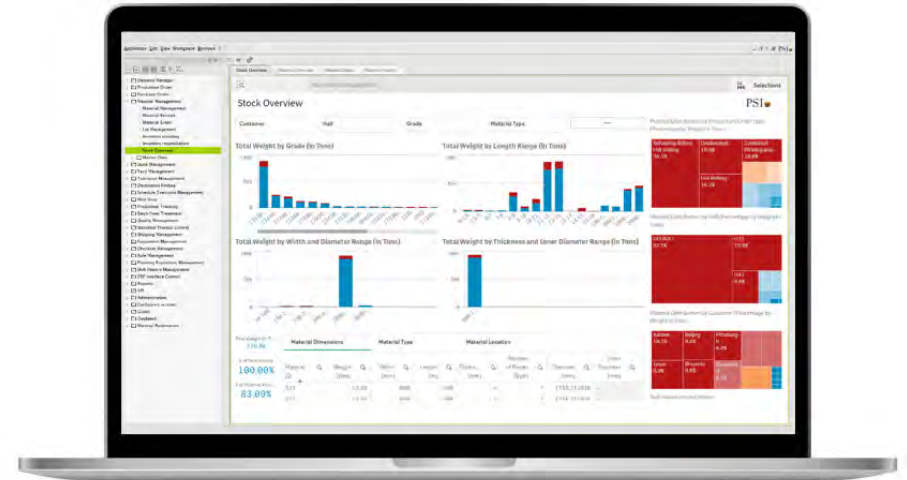
BI dashboard „Stock Overview" embedded in the Office GUI and linked to „Material Overview", „Material Details", and „Material History"

Material Management - Stock Taking Extension

The new extensions for stock taking are providing an intuitive and efficient workflow for inventory counting and reconciliation of materials without readable labels.

A typical example would be billets of the same type, managed as bulks stored in a rack. After creating a stocktaking session in the Office GUI, the inventory counting is performed within the PSIweb Shopfloor App on a mobile device in the yard. The operator selects a session and starts the new "Checklist Mode". After selecting a location (e.g. via scan), the app lists the material which is booked on the location in the system. The operator confirms the entries matching the physical situation and notes the deviations e.g. adding new entries for missing material, changing the properties, etc.

The new operation "Fix pile" can be used to correct the position of materials inside the slot. This process is done location by location. After finishing the inventory counting on the shop floor, the inventory reconciliation is done in the Office GUI.

The new detail tab 'Matching snapshot material' in the tab 'Missing Data,' supports the finding of the right database entries for newly created entries of unidentified material, which were "found" in the yard. When selecting a new entry, the 'matching snapshot material' displays material with common properties (e.g. same heatNo).

The new operation 'Match data' helps to bring the information from the database entry (e.g. LocalId, Geneology, etc.) together with the physical information from the new entry (e.g. real location, number of pieces, etc.). To reconcile bulk material, the operations 'spilt' and 'merge' were added to the inventory reconciliation screens in the Office GUI.
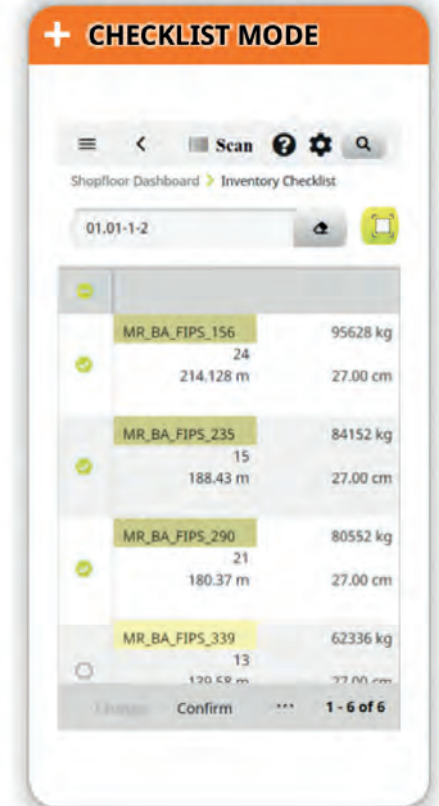
New 'Checklist Mode' in Shop Floor App

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- **Metadata and dynamic access**

- **Generic Actions**

- **Data Synchronization**

- **PSIbpm Framework Introduced**

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Metadata and dynamic access

Rule Engine can access metadata in order to Provide auto completion capabilities to the user during Rule Definition.

Metadata describes the model of an application, and we need it for generic UI. For example: display data in screens. We also need Metadata to create "mapping rules" to map incoming/outgoing telegrams into/from entities, and retrieving/setting data of entities in a generic way (also referred as "dynamic access").

- generic UI to e.g. display data in screens
- creation of "mapping rules" to map incoming/outgoing telegrams into/from entities
- retrieving/setting data of entities via a generic way (also referred as "dynamic access")

Since Release 5.25, Rule Engine can access metadata in order to :

- Provide auto completion capabilities to the user during Rule Definition. The user will be able to see a list of possible attributes (standard & project specific) when entering an entity.

- The user will also be able to access the relevant data for an object via dot notation during Rule Execution.
E.g. getAttributeValue("Mat.Weight") should return the value which is stored in the corresponding database field.
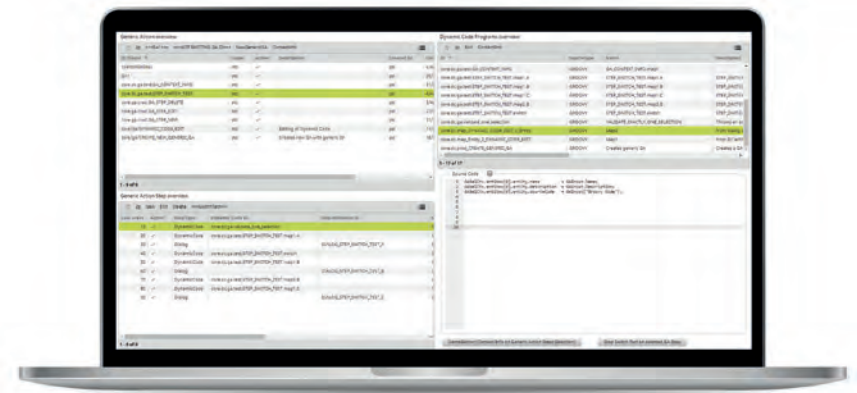
Generic Actions with SP

Since Release 5.25, the user can configure (add, remove, or change parameters) actions for the existing Views or Lists without changing underlying code

Since Release 5.25, Generic actions were made available in SP. Generic Action means the possibility to configure (add, remove, or change parameters of) actions for a view/list without having to change the underlying source code.

A Generic Action consists of a variable list of steps, each either is a step performed on the backend 'Dynamic Code' or on the front end 'Dialog').

Now end customers (projects) with knowledge of Service Platform and the internal competence centers can attach actions to Generic Actions on the fly and don't need to re-compile or restart the application.

Users are now able to introduce new parameters in a standard screen and push data changes to the database via dialogue boxes. They can also configure "Generic Actions" provided they have the know-how of working with Service Platform.

The Generic Action configuration and test Screen

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Data Synchronization

To ensure consistency in a distributed environment, the data between applications has to be consistent and this can be achieved using the Data Synchronization mechanism available with since Release 5.25.

PSImetals 5 (base4ora and SP) is designed as a distributed system, whereby each application has its data storage (usually a dedicated DB schema). Despite the fact that the data storage is separated for each application, the different models of the application have a large portion of elements in common due to the shared model definition on various levels of business contexts. E.g., nearly all applications will have the sp-met-global business context; all planning applications will have met-pla-core in common, etc.

To ensure consistency in a distributed environment, the data between applications has to be consistent. In a distributed system like SP, data synchronization is needed frequently between the applications.. If application "A" changes data for an object, which is also known in other applications, a data synchronization has to be triggered.

Data sync is a generic implementation to support those use cases. It uses the standard PSImetals SP API to ensure data consistency between SP applications. In the case that multiple applications have to agree on a change this agreement has to be done before the data synchronization message is triggered.

SYNCHRONIZATION BETWEEN TWO APPLICATIONS

Two applications in a SP environment will trigger Data synchronization mechanism when needed
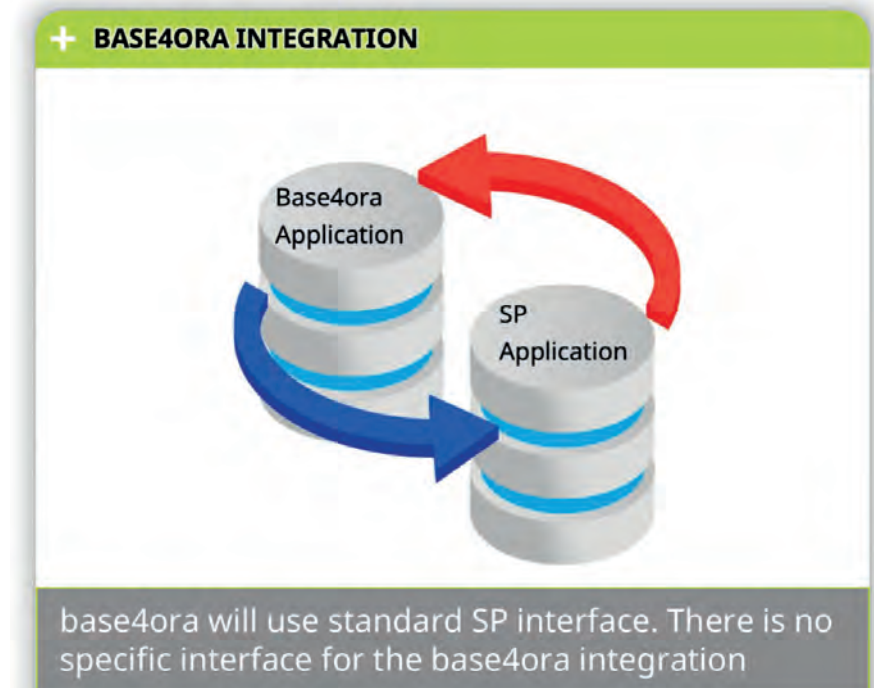
Based on data synchronization functionality released with 5.26, a toolset has been developed to allow easy data synchronization between the base4ora stack and SP:

This toolset includes:

- A mechanism to generate PSIintegration message descriptions out of SP standard interfaces (DTOs)
- A pattern for PSIintegration adapters for both directions
- Oracle processes to receive/send corresponding messages for standard entities
- Audit trail configuration to trigger data synchronization from base4ora to SP for standard entities

The following should be achieved by the data synchronization design:

Have a common, pre-defined way for data synchronization;
- Data synchronization should be applicable regardless of the source/target application, so the same concept should be applied for;
- Base4ora to SP application;
- SP application to base4ora;
- SP application to SP application;
- Synchronization with 3rd party systems following. datasync protocol

+ BASE4ORA INTEGRATION

Base4ora Application

SP Application

base4ora will use standard SP interface. There is no specific interface for the base4ora integration

PSIbpm Framework Introduced

Now with PSImetals 5.26, PJF introduced a standard integration with Camunda. We have migrated our BPM solution towards the PJF standard way.

Camunda is a powerful open-source workflow automation and business pro-cess management (BPM) platform designed to streamline and optimize com-plex business processes. It provides a comprehensive suite of tools and ca-pabilities to help organizations model, automate, monitor, and improve their workflows efficiently.

Now with release 5.26 PJF introduced a standard integration with Camunda. We have migrated our BPM solution towards the PJF standard way. PSIbpm is a PSI software component that integrates workflow management into PJF environment.

This release offers a new level of configuration for projects. PSI business workflows are now adapted to PSIbpm and well integrated with Camunda. All this made it even easier to create user tasks because hardcoded workflows and knowledge of programming knowledge are no more a bottleneck
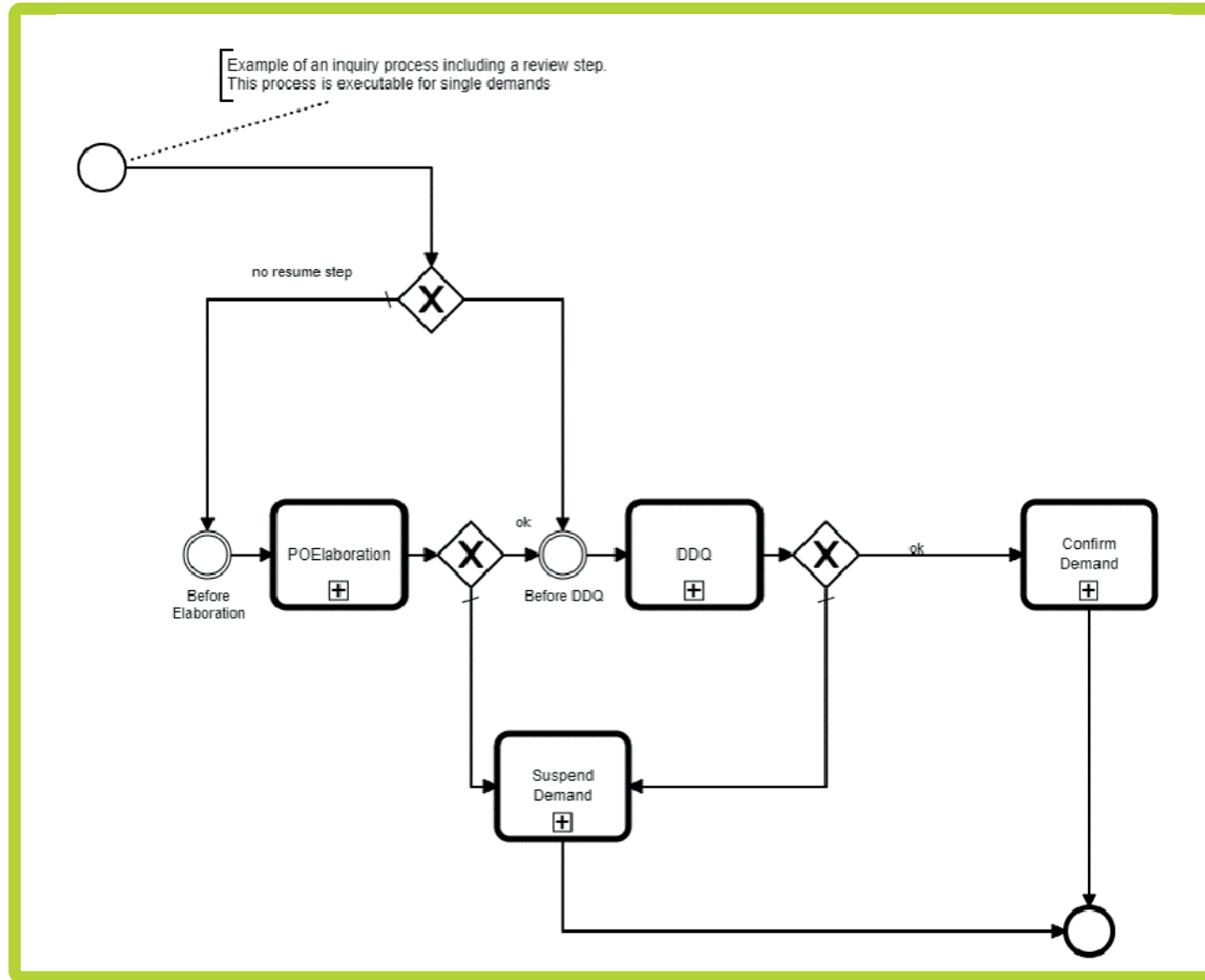
A few out-of-the-box benefits are:

• Support of user tasks and user dashboard

• Projects can achieve configurable business processes

MONITOR DEMAND WORKFLOW
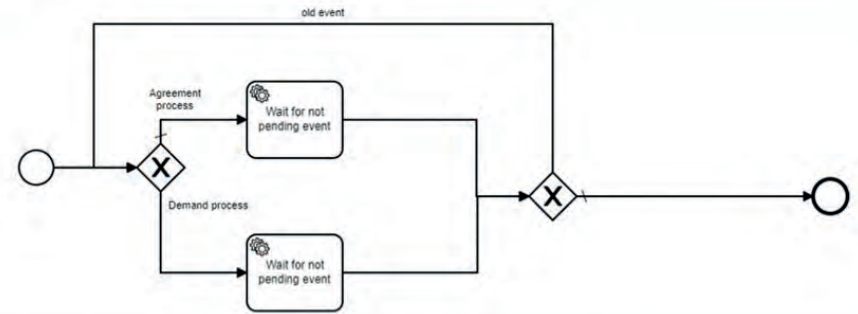
The circles mark the start and end of the workflow, the rhombus indicates the decision step and the rectangle indicates the regular task for the process

Inquiry Workflow for incoming demand

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Suddenly everything's that simple.