

OpenValue
Consulting

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The OpenValue Solution

The OpenValue Solution

The Manufacturing Planning Solution

- Planning Engine
- MTO Solution
- MTS Solution

The Manufacturing Execution Solution

- Shop Floor Control
- Master Production Plan
- Scheduling Engine
- Subcontracting
- BoM Management
- External Operation
- Product Costing

The Plant Maintenance Solution

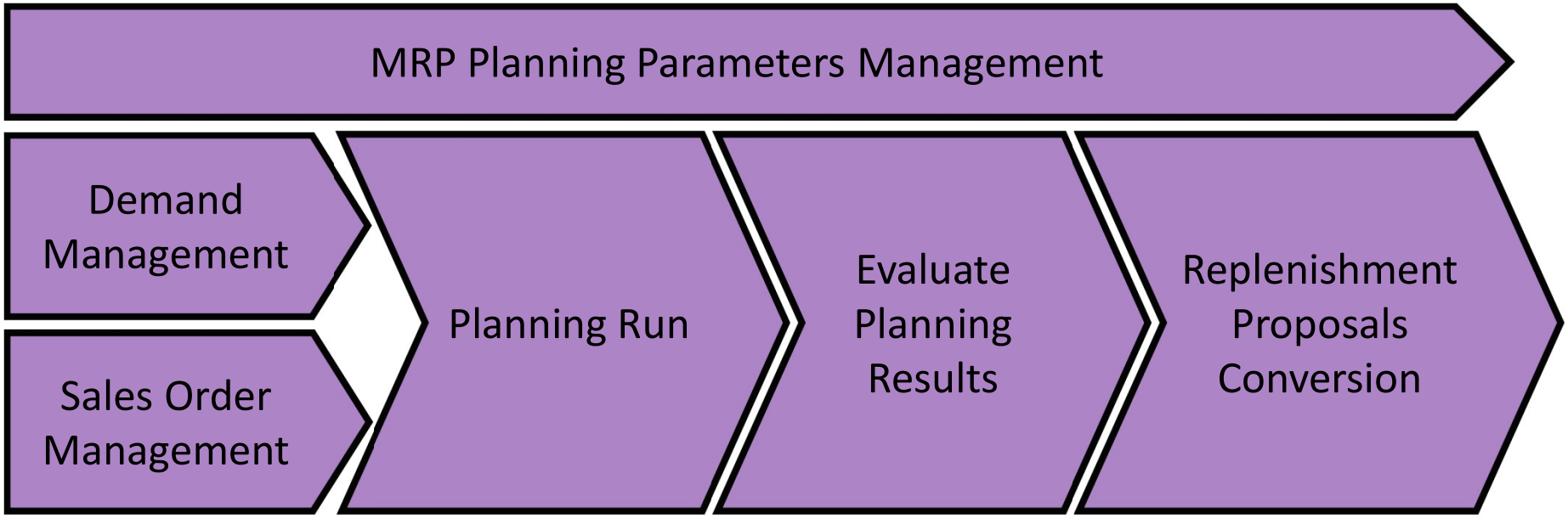
- MRO Maintenance
- SFC MRO Maintenance Integration

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The Manufacturing Planning Solution

The planning process overview



The OpenValue Solution enables end-to-end planning across the entire Supply Chain.

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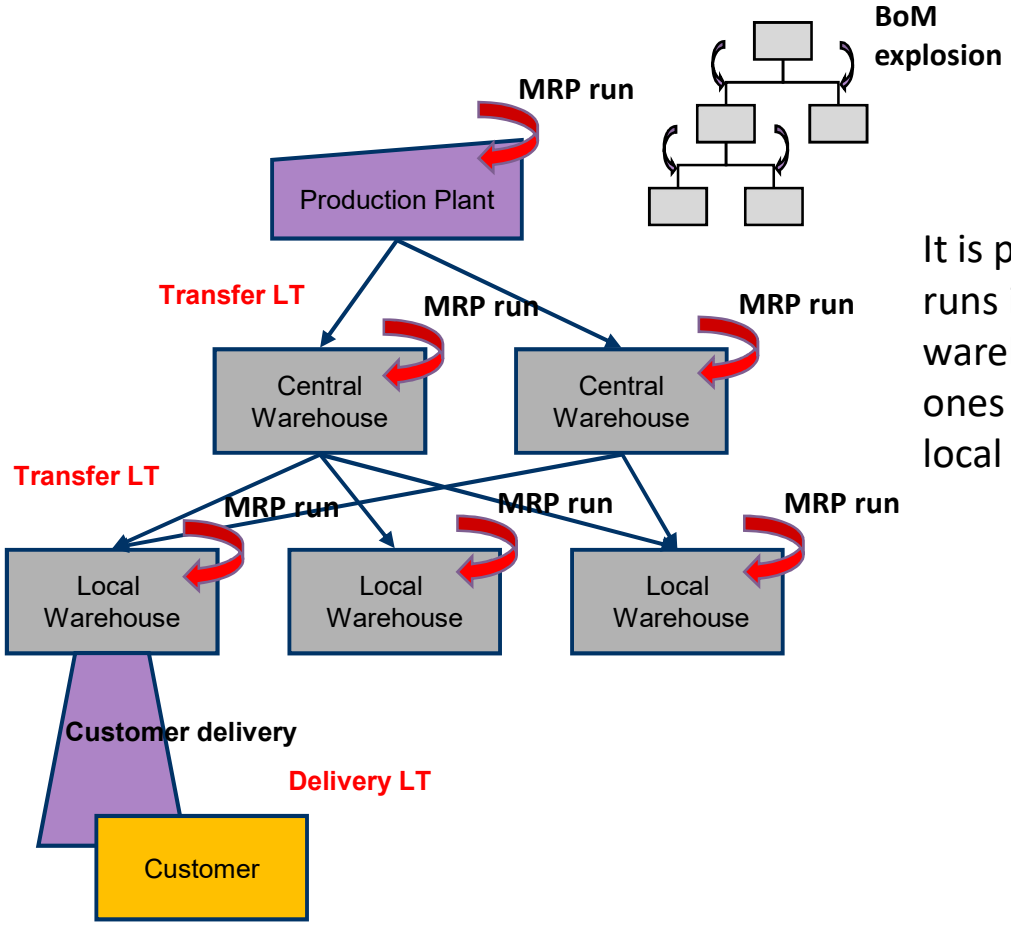
Planning Engine

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The planning area

The planning process is performed at warehouse level, i.e. **the planning area is defined at warehouse level**.

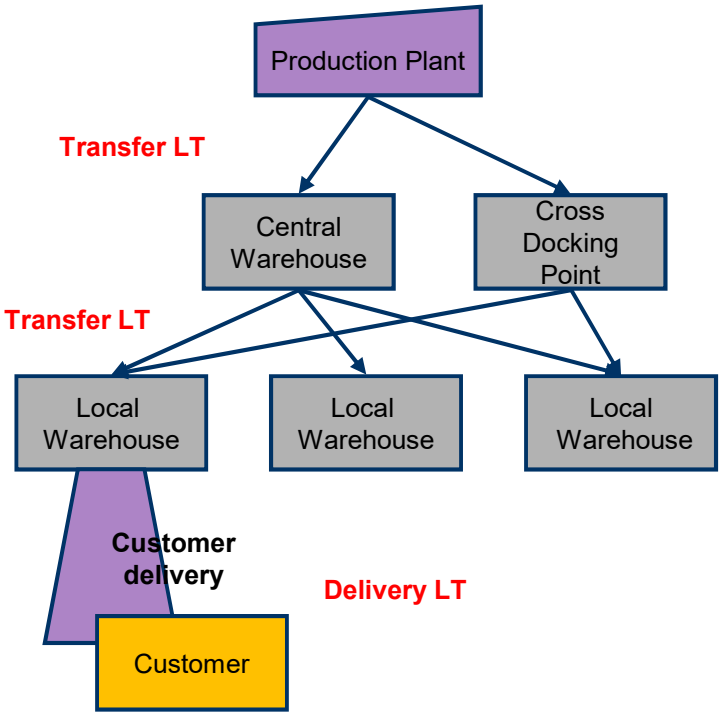


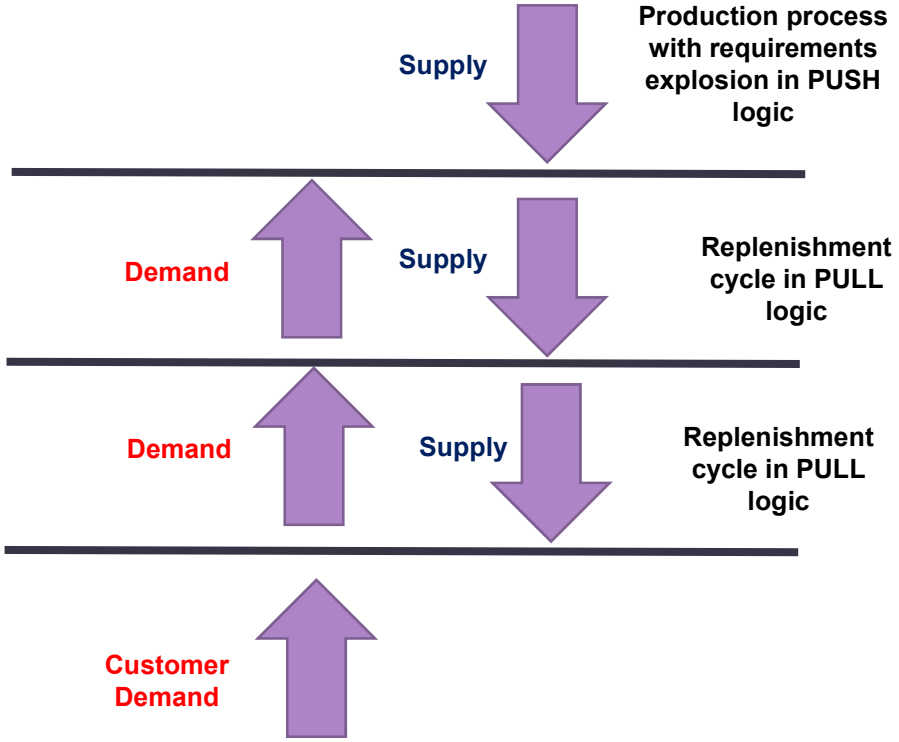
It is possible to sequence properly several planning runs in planning supply chains. For example, local warehouses have to be planned before the central ones because these are the internal sources for the local warehouses.

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The OpenValue solution in Supply Chain management

Distribution Network



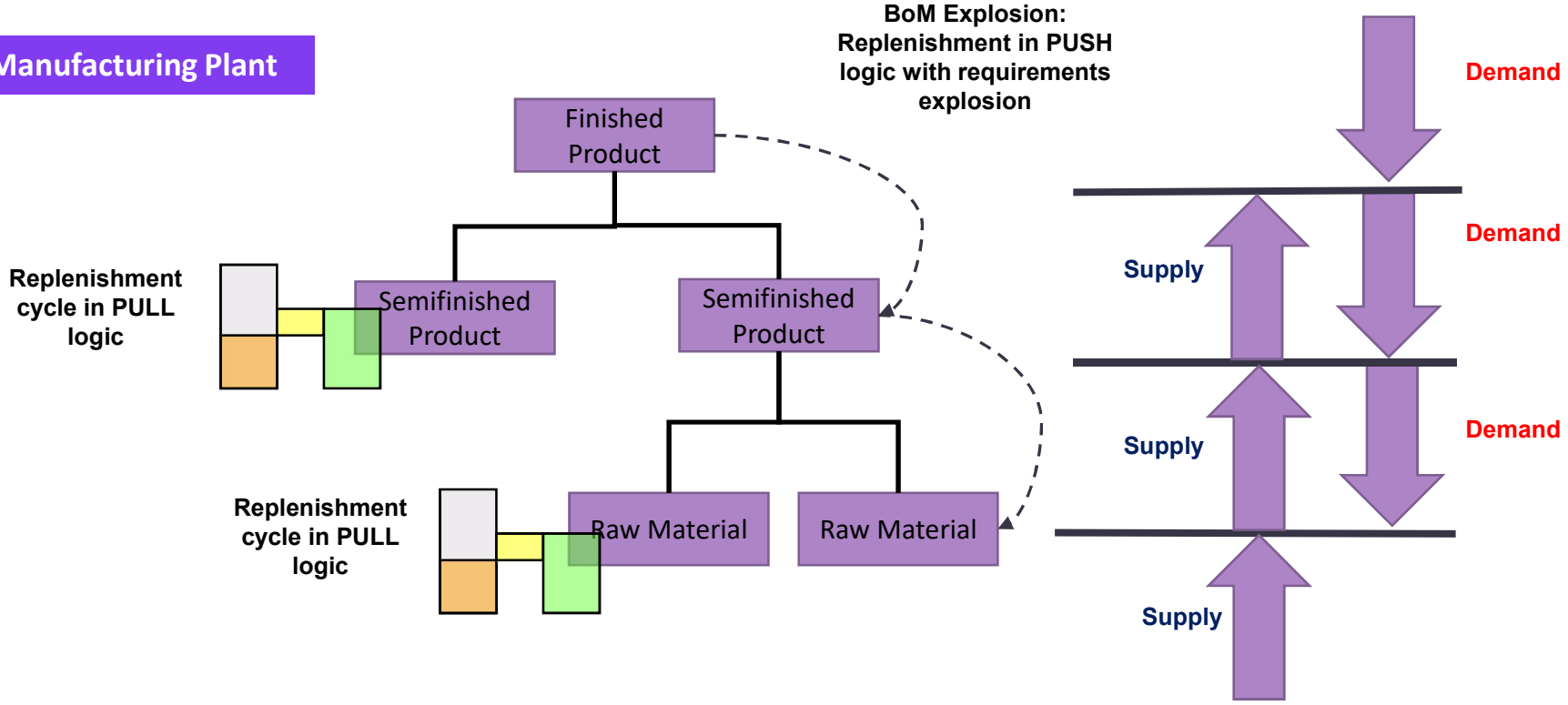


The OpenValue Solution manages planning and execution processes in challenging distribution systems

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The OpenValue Solution material planning for manufacturing plants

Manufacturing Plant



The Material Requirements Planning process inside the production plant is supported by the Planning Engine

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The planning methodologies: PULL vs PUSH

The two basic materials planning methods are:

- **Push logic** with backwards scheduling and requirements explosion (where BoM is defined); that's the classical **MRP** tool provided in the most of ERP packages
- **Pull logic**, that's **Reorder Point** with forward scheduling for automatic stock replenishment

Both of them have been implemented in the same tool and, therefore, are performed at the same time at warehouse level.

The "MRP Planning Engine" implements the two planning methodologies in only one tool

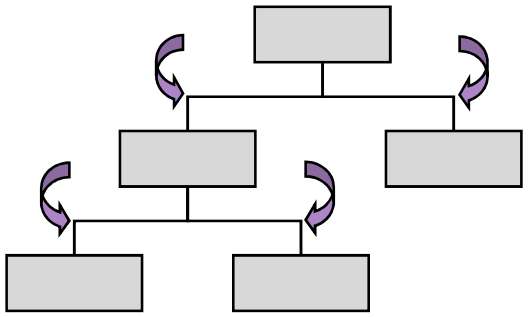


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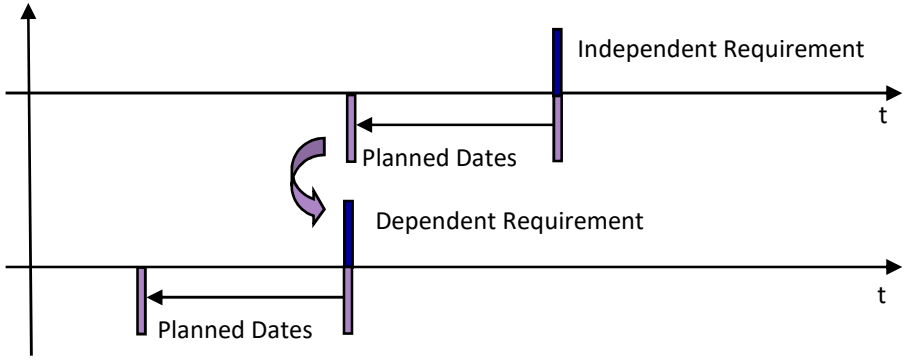
The Material Requirements Planning

MRP takes current and future demand as it's reference point. Depending on the Demand Management strategy, actual and planning sales requirements trigger the MRP calculation. In MRP, the requirements elements include sales orders, planned demand items, material reservations and the dependent requirements created by exploding the BOM.

BoM explosion for requirements determination



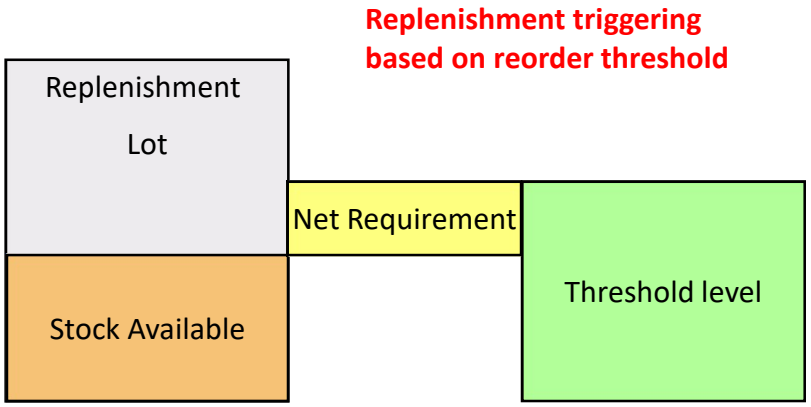
Backwards Scheduling

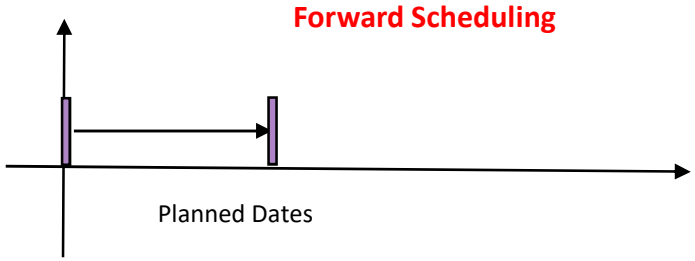


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The Reorder Point planning

It’s based on a manually entered reorder point parameters. During the planning run, the system checks only whether stock has fallen below this reorder point or not. It that is the case, the system triggers procurement of the quantity defined by the lot size method.





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The replenishment processes

In case the planning run determines shortage quantities, the system creates procurement proposal (planned orders) which can be changed, rescheduled or deleted when and where necessary.

The planned orders are to be converted in their final document:

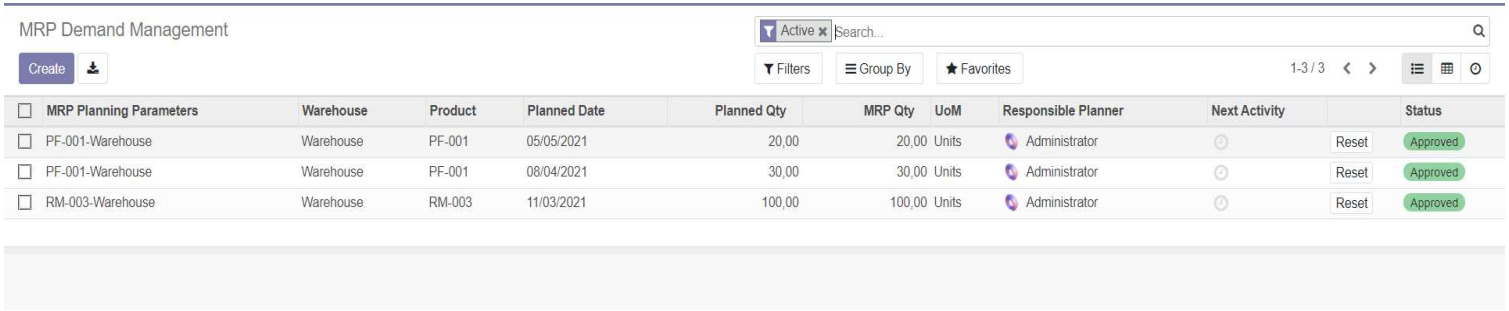
- For **in-house production**, planned order is converted in a **manufacturing order**
- For **external procurement**, planned order is converted in a **purchase order**
- For **subcontracting**, planned order is converted in a **purchase order for subcontracting**
- For **internal procurement**, a **goods transfer** chain from the source warehouse is achieved by converting planned orders

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The forecast demand

- Forecast demand items are to be entered at warehouse level (MRP Area)
- Forecast demand workflow is managed by status (draft, approved and cancel)
- Only approved items are relevant as independent demand, so taken into account by the planning run
- As per the **requirements method** indicator, the demand and the sales order can force the reorder point calculation.
- Massive forecast demand items creation is supported by a specific tool.
- Past forecast items can be deleted by an adjustment tool.



MRP Planning Parameters	Warehouse	Product	Planned Date	Planned Qty	MRP Qty	UoM	Responsible Planner	Next Activity		Status
PF-001-Warehouse	Warehouse	PF-001	05/05/2021	20,00	20,00	Units	Administrator		Reset	Approved
PF-001-Warehouse	Warehouse	PF-001	08/04/2021	30,00	30,00	Units	Administrator		Reset	Approved
RM-003-Warehouse	Warehouse	RM-003	11/03/2021	100,00	100,00	Units	Administrator		Reset	Approved

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The Demand Planning Strategies

The following **Demand Planning Strategies** are supported:

- *Make To Stock Anonymous*
- *Make To Order*
- *Planning production by lots*
- *Planning with final assembly*
- *Planning without final assembly*

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Planning Strategies Overview

Planning Strategy	PIRs – Planned Independent Requirements	Sales Orders
MTS Anonymous	NOT Relevant for planning	Not relevant for planning PIRs consumption at delivery (goods issue)
Make To Order	Not relevant for planning	Relevant for planning
Planning production by lots	Relevant for planning	Relevant for planning PIRs consumption at delivery (goods issue)
Planning with final assembly	Relevant for planning	Relevant for planning: overplanning for quantities not covered by PIRs. PIRs reduction at sales order confirmation
Planning without final assembly	Relevant for planning Not relevant for execution (finished products planned order cannot be converted)	Relevant for planning: semifinished products overplanning for quantities not covered by PIRs. PIRs reduction at sales order confirmation

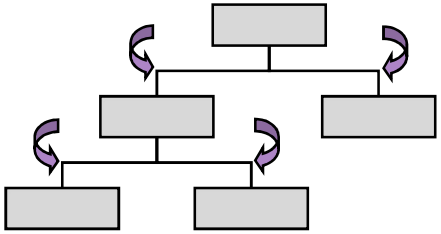
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The Planning Engine run

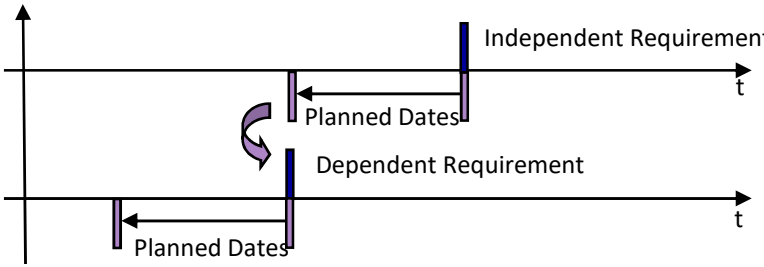
- The planning run is performed at warehouse level (planning area)
- Planned Orders are the result of a planning run session: they are created by the planning run as replenishment proposals to fulfill requirements.
- In case of errors, an exception message is posted on the MRP planning parameters master data and assigned to the responsible planner.
- In the same planning run, both MRP (PUSH logic) and Reorder Point (PULL logic) procedures are performed

PUSH

BoM explosion for requirements determination

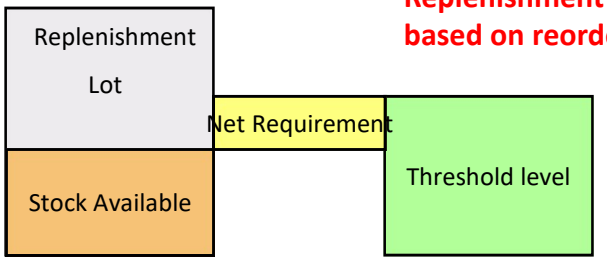


Backwards Scheduling

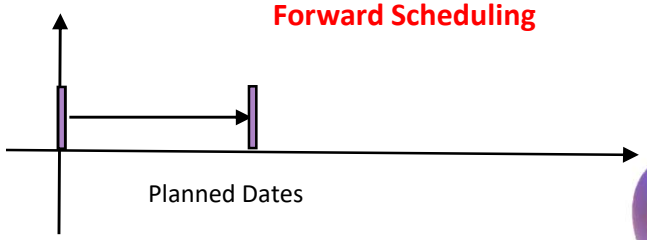


PULL

Replenishment triggering based on reorder threshold



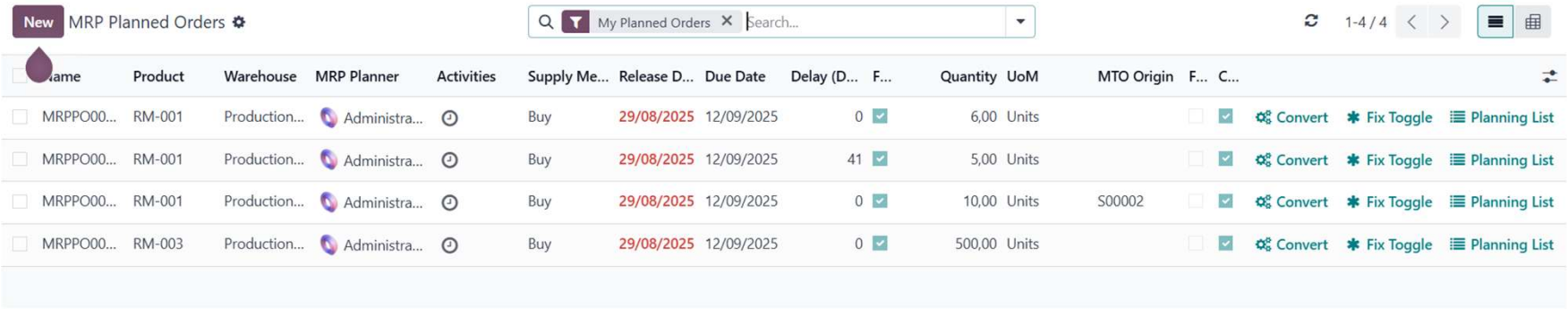
Forward Scheduling



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Planned Orders

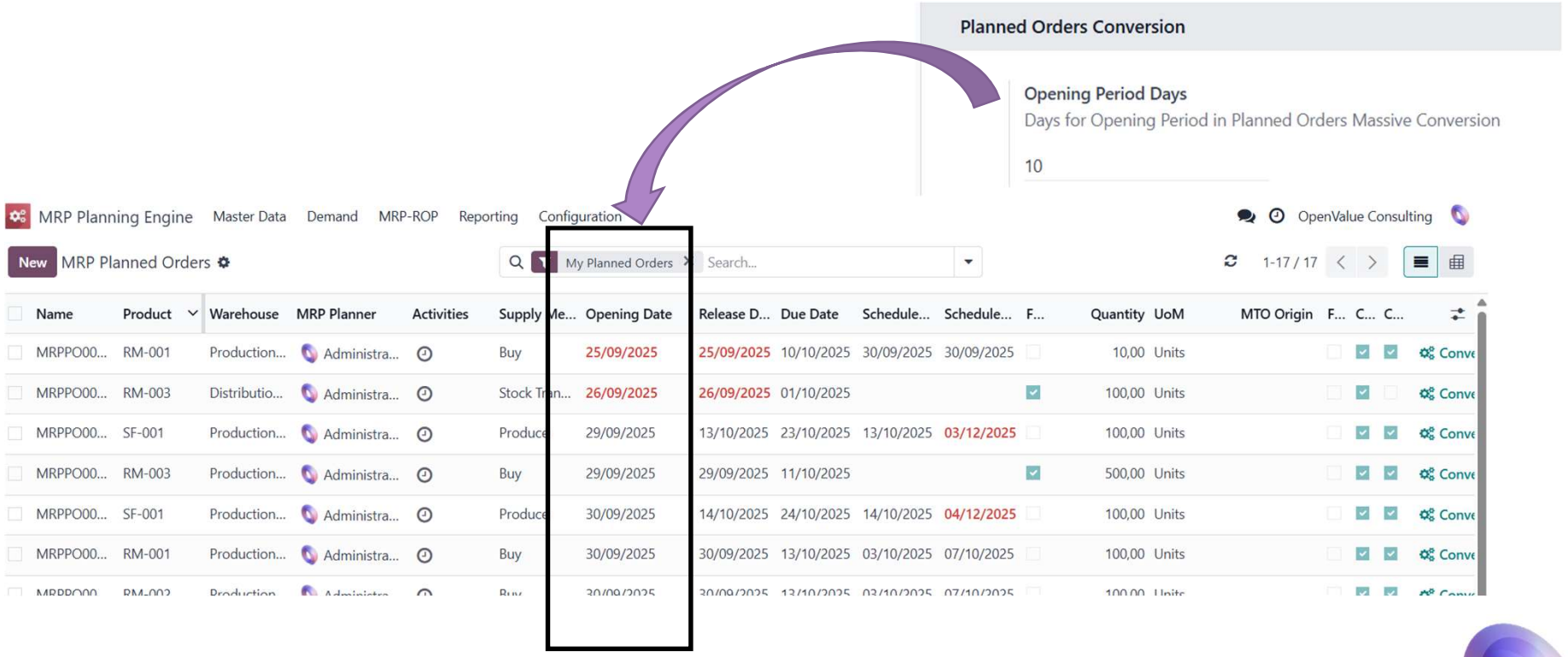
- Planned Orders are the result of a planning run session: they are created by the planning run as replenishment proposals to fulfill requirements.
- The Planned orders list by Release Date represents the workload of the responsible planner.
- Planned Orders can be fixed by the planner responsible, so not removed by the next planning run.
- A Planned Orders can be created manually also and it is automatically fixed.
- The forward mode indicator is useful to distinguish which products have been planned in backward mode and which ones in forward mode
- Massive conversion is possible



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Planned orders conversion process

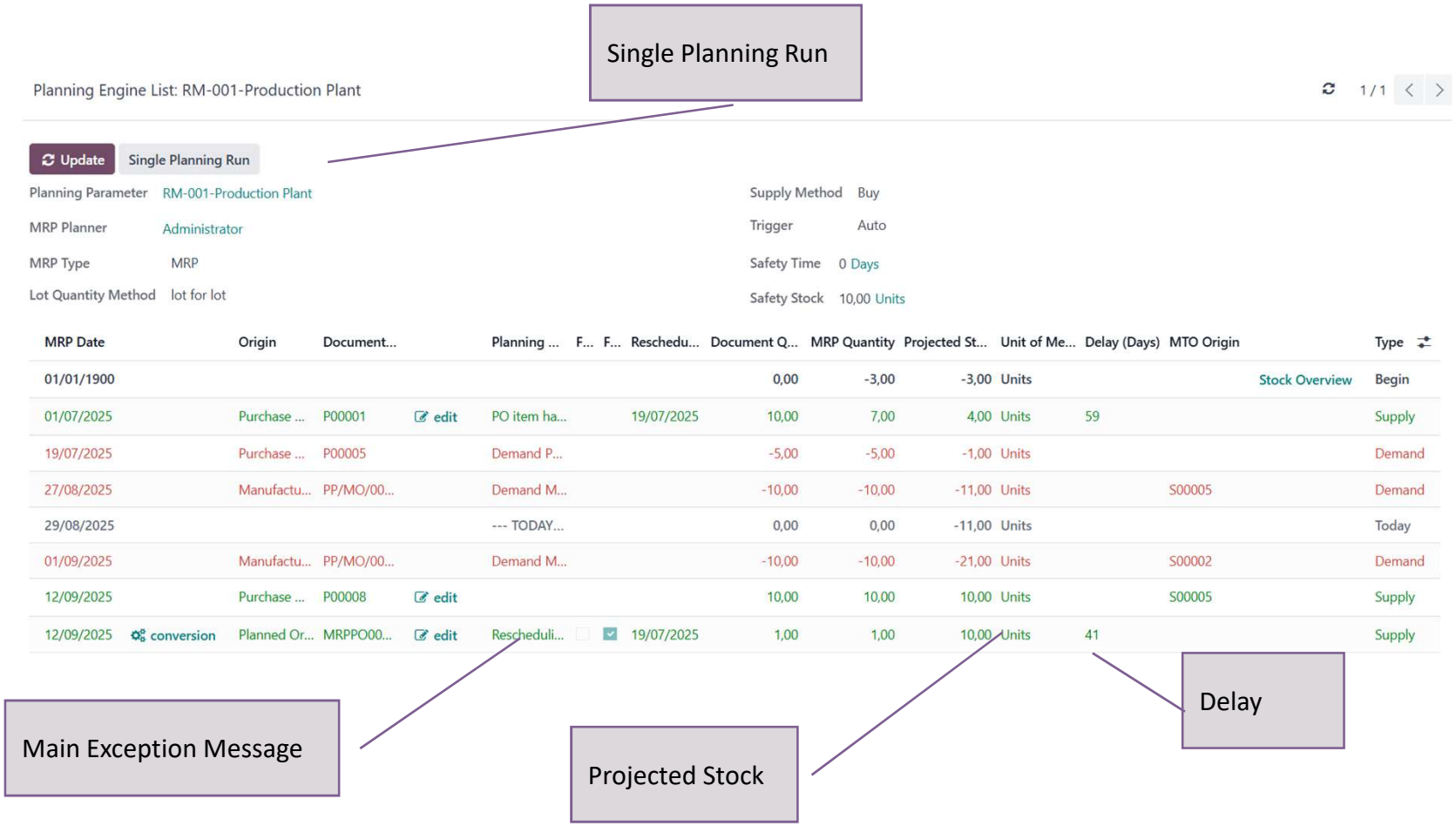
An **Opening Period** in working days is defined for the management of planned order conversion. The **Opening Date** determines when a planned order must be converted into a production order, following an ‘as late as possible’ approach. A filter allows the selection of the planned orders to be converted.



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Evaluate planning run results

The main tool for evaluating the planning results is the “**MRP Planning Engine List**”: all procurement requirements elements are listed over the time.



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Delay Analysis

The **Delay Analysis** is crucial for planning results consolidation.

Two possible methods are possible for delay determination:

- Optimistic: it is due for delivery today
- Pessimistic: it start for delivering today

Update | Single Planning Run

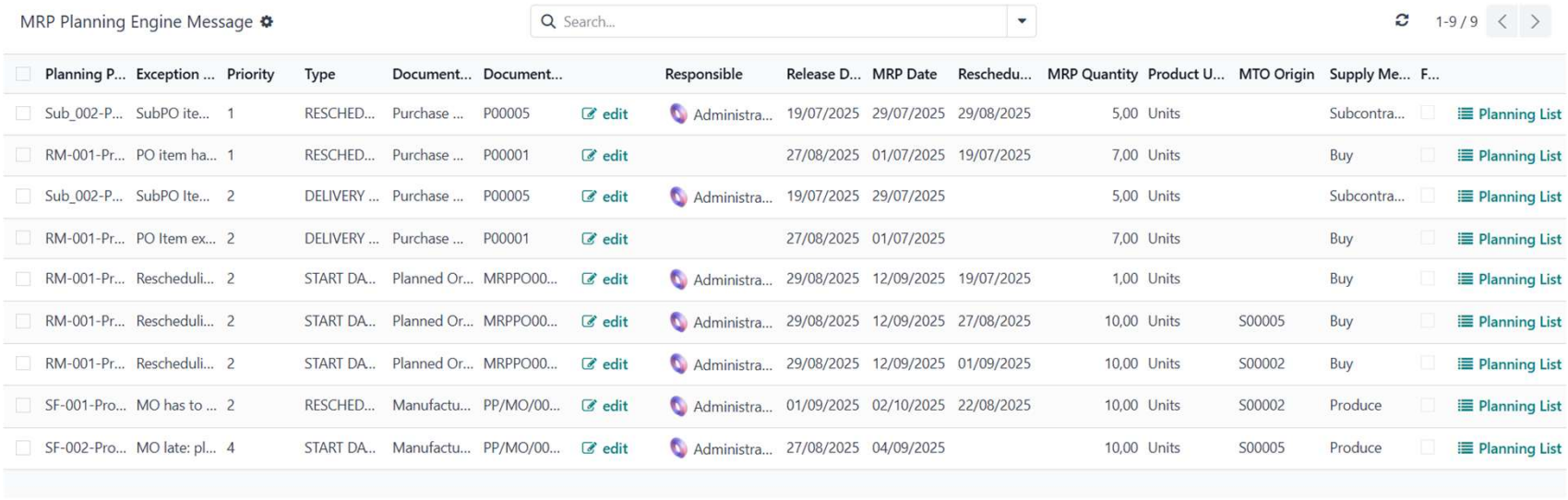
Planning Parameter	RM-001-Production Plant	Supply Method	Buy
MRP Planner	Administrator	Trigger	Auto
MRP Type	MRP	Safety Time	0 Days
Lot Quantity Method	lot for lot	Safety Stock	10,00 Units

MRP Date	Origin	Document...		Planning ...	F...	F...	Reschedu...	Document Q...	MRP Quantity	Projected St...	Unit of Me...	Delay (Days)
01/01/1900								0,00	11,00	11,00	Units	
01/07/2025	Purchase ...	P00001	edit	PO item ha...			19/07/2025	10,00	7,00	18,00	Units	59
19/07/2025	Purchase ...	P00005		Demand P...				-5,00	-5,00	13,00	Units	
07/08/2025	Purchase ...	P00008	edit	PO item ha...			19/07/2025	10,00	10,00	23,00	Units	22

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Planning Engine exception messages

- All planning exception messages are collected in the “**Planning Engine Messages List**”.
- The list is sorted by release date and the responsible user is available to address the issue



MRP Planning Engine Message

Search...

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Planning P...	Exception ...	Priority	Type	Document...	Document...		Responsible	Release D...	MRP Date	Reschedu...	MRP Quantity	Product U...	MTO Origin	Supply Me...	F...	
Sub_002-P...	SubPO ite...	1	RESCHED...	Purchase ...	P00005	edit	Administra...	19/07/2025	29/07/2025	29/08/2025	5,00	Units		Subcontra...		Planning List
RM-001-Pr...	PO item ha...	1	RESCHED...	Purchase ...	P00001	edit		27/08/2025	01/07/2025	19/07/2025	7,00	Units		Buy		Planning List
Sub_002-P...	SubPO Ite...	2	DELIVERY ...	Purchase ...	P00005	edit	Administra...	19/07/2025	29/07/2025		5,00	Units		Subcontra...		Planning List
RM-001-Pr...	PO Item ex...	2	DELIVERY ...	Purchase ...	P00001	edit		27/08/2025	01/07/2025		7,00	Units		Buy		Planning List
RM-001-Pr...	Rescheduli...	2	START DA...	Planned Or...	MRPPO00...	edit	Administra...	29/08/2025	12/09/2025	19/07/2025	1,00	Units		Buy		Planning List
RM-001-Pr...	Rescheduli...	2	START DA...	Planned Or...	MRPPO00...	edit	Administra...	29/08/2025	12/09/2025	27/08/2025	10,00	Units	S00005	Buy		Planning List
RM-001-Pr...	Rescheduli...	2	START DA...	Planned Or...	MRPPO00...	edit	Administra...	29/08/2025	12/09/2025	01/09/2025	10,00	Units	S00002	Buy		Planning List
SF-001-Pro...	MO has to ...	2	RESCHED...	Manufactu...	PP/MO/00...	edit	Administra...	01/09/2025	02/10/2025	22/08/2025	10,00	Units	S00002	Produce		Planning List
SF-002-Pro...	MO late: pl...	4	START DA...	Manufactu...	PP/MO/00...	edit	Administra...	27/08/2025	04/09/2025		10,00	Units	S00005	Produce		Planning List

- The following exceptions are managed:
  - Planned Orders with release date in the past (expired planned order or possible stockout in the projected stock)
  - RfQs with document date in the past (delay in converting RfQ in PO)
  - PO items not yet delivered with delivery date in the past (vendor expediting)
  - Draft or converted MOs with planned start pivot date in the past (shop floor expediting)
  - Open MOs with the scheduled finished date after the planned finished pivot date (scheduling issue)
  - Firmed Planned Orders, POs and MOs to be rescheduled (see Rescheduling Prosess)

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Rescheduling process definition

The rescheduling check process is to suggest a **rescheduled date** of already existing firmed receipts not planned on the same day as the corresponding requirement to suit its requirement date. For this purpose, the system displays the appropriate **exception message** with rescheduling proposal date for these firmed receipts to be processed by the Planner.

The firmed receipt elements are:

- Requests for Quotation,
- Purchase Orders,
- Subcontracting Requests for Quotation,
- Subcontracting Purchase Orders,
- Manufacturing Orders
- Firmed Planned Orders

Rescheduling exception messages types are:

- Reschedule in
- Reschedule out
- Cancel process

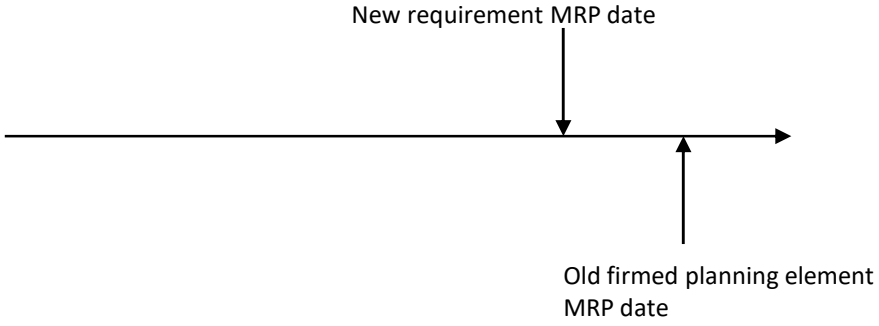
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Rescheduling In process

In the rescheduling horizon the system checks whether existing firmed receipt elements could cover the requirements by rescheduling in the already existing firmed receipts. Therefore, within this rescheduling horizon, it is checked whether, after a requirement, a firmed receipt exists, which can be used to cover this requirement. Then the system displays a rescheduling date as well as the exception message "**Bring forward**" for this receipt. The net requirements calculation then uses this receipt and the system will only create another procurement proposal if the receipt quantity is **not** sufficient to cover the complete requirement. Several firmed receipts can be used to cover one requirement.

In case the rescheduling is within a tolerance, no rescheduling message is issued.

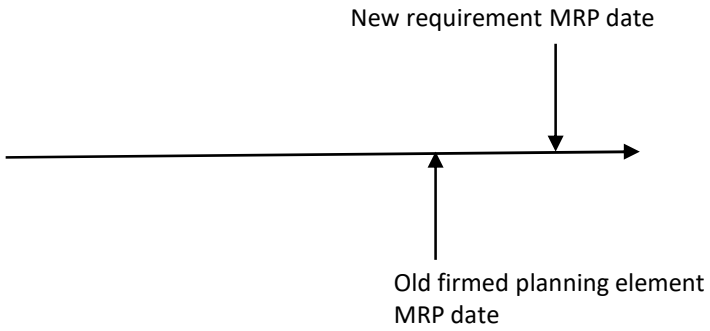


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Rescheduling Out and Cancel processes

It is checked over the complete time axis whether the receipt planned here could be used to cover a future requirement. If the system can find such a requirement, it then displays a rescheduling date as well as the exception message “**Postpone**” for this receipt.

In case the rescheduling is within a tolerance, no rescheduling message is issued.



If the system finds no future requirement, for which the receipt is required, the system displays the exception message “**Cancel**”.

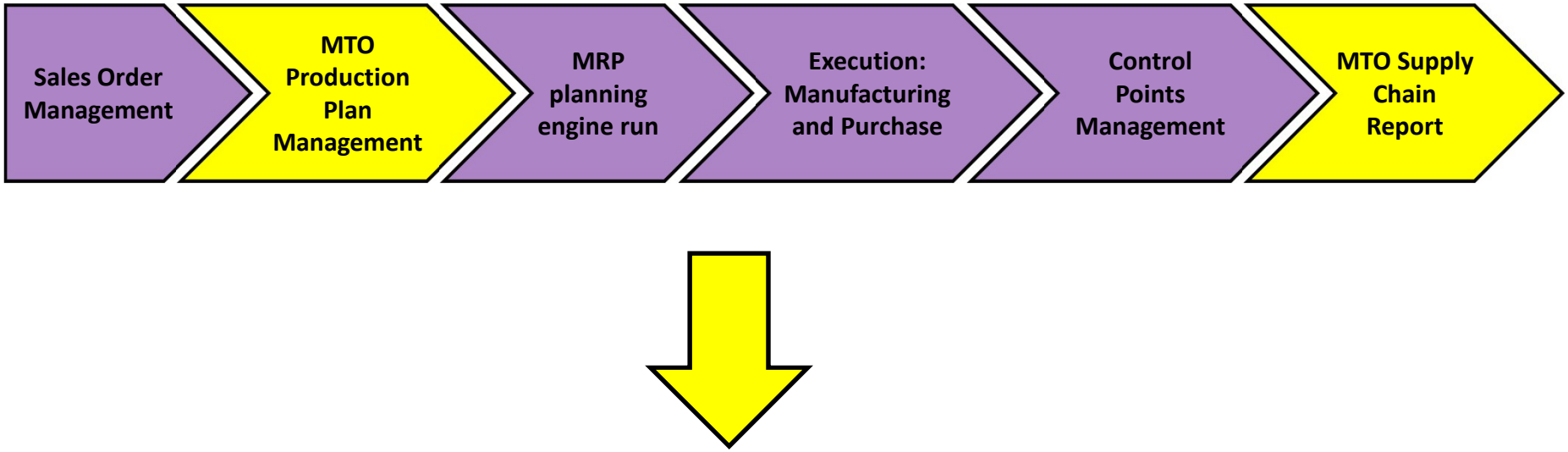
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MTO Solution

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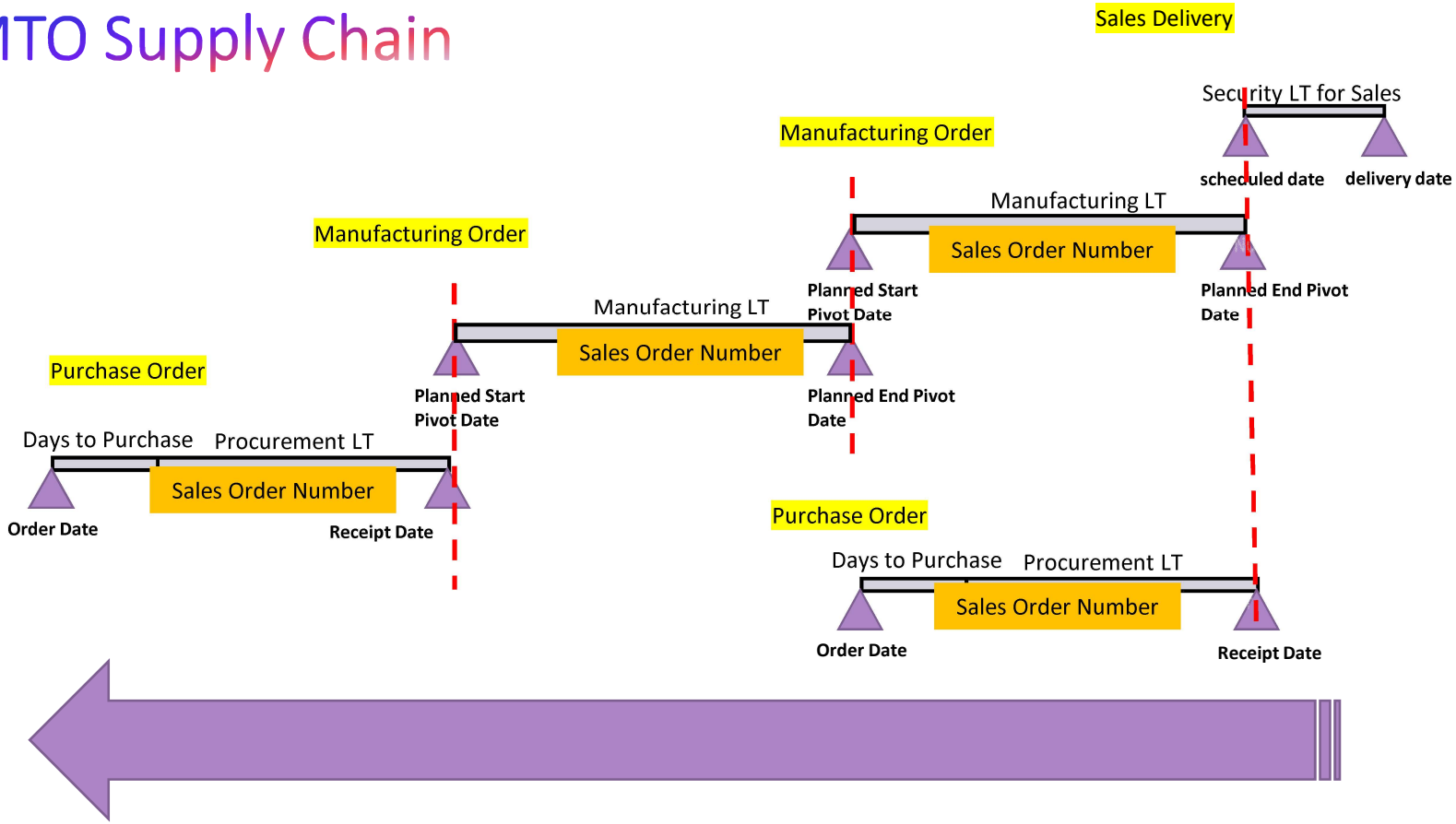
Overview of the planning and execution process in Make-to-Order scenario



The **MTO Production Plan** and the **MTO Supply Chain Report** support the end-to-end planning and execution of Make-to-Order processes within the OpenValue manufacturing solution.

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MTO Supply Chain



BACKWARDS PLANNING

performed by
the OpenValue Planning Engine

Sales Order Number

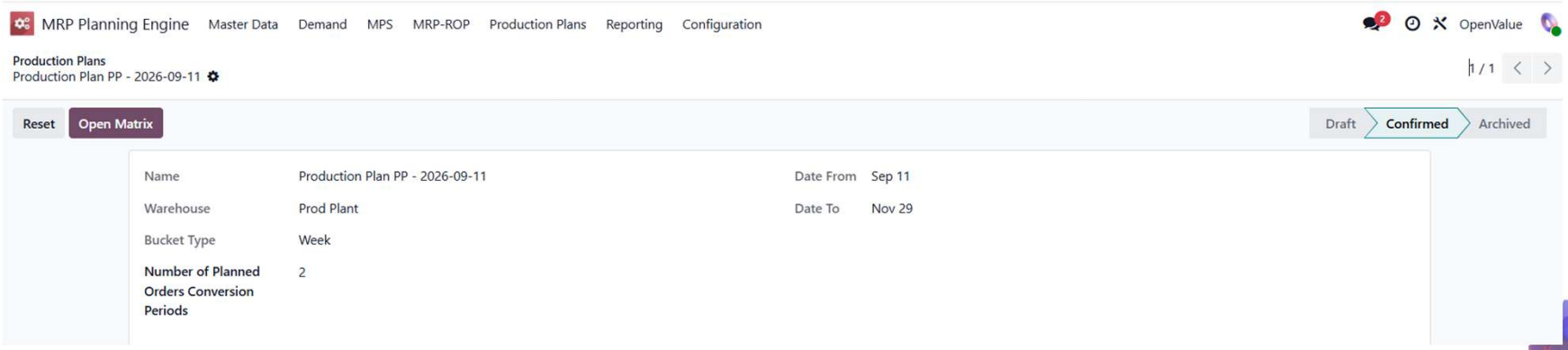
MTO reference is propagated throughout the overall supply chain to identify the specific replenishments generated by each sales order item.

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MTO Production Plan Overview

The **MTO Production Plan** module provides the following capabilities:

- Ensures the feasibility of the manufacturing plan through real-time monitoring of critical resource capacity loads
- Manages a frozen planning horizon to protect shop floor execution from excessive re-planning and to ensure compliance with production lead times and process constraints
- Supports the definition of the Number of Planned Orders Conversion Periods, determining the planning horizon to be converted into Planned Orders and integrated with the Planning Engine
- Provides status management to support a controlled workflow for plan preparation, review, confirmation and execution
- Supports production leveling and mixing to achieve a smoother and more stable flow and therefore minimizes bullwhip effects across both manufacturing and procurement processes
- Provides MTO Control Point report to manage priorities in execution phase based on Buffer Management as per Simplified Drum-Buffer-Rope (S-DBR) principles.



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Production Plan Matrix

The Production Plan consolidates:

- Open Sales Orders
- Open Production Orders and Firmed Planned Orders
- Planned quantities
- Available Capacity for the capacity constraint resources

into a single planning workspace (**Production Plan Matrix**).



Back | Recompute | Create Planned Orders | Optimize Production Plan

Product / Sales Order Line	W23 2026	W24 2026	W25 2026	W26 2026	W27 2026	W28 2026	W29 2026	W30 2026	W31 2026	W32 2026	W33 2026
PF-002 - S00001 - Customer 001											
Sales Qty	0	0	0	0	0	-10.00	0	0	0	0	0
Open Receipts Qty	0	0	10.00	10.00	0	0	0	5.00	0	0	0
Planned Qty	0	0	0	0	0	0	0	0	0	0	0
Projected Balance	0	0	10.00	20.00	20.00	10.00	10.00	15.00	15.00	15.00	15.00
WC 001 - Capacity Load	0%	0%	25.00%	25.00%	0%	0%	0%	12.50%	0%	0%	0%
PF-003 - S00001 - Customer 001											
Sales Qty	0	0	0	0	-10.00	0	0	0	0	0	0
Open Receipts Qty	0	0	5.00	5.00	0	0	5.00	0	0	0	0
Planned Qty	0	0	0	0	0	0	0	0	0	0	0
Projected Balance	0	0	5.00	10.00	0	0	5.00	5.00	5.00	5.00	5.00
WC 001 - Capacity Load	0%	0%	12.50%	12.50%	0%	0%	12.50%	0%	0%	0%	0%

The planner can evaluate demand, supply, projected inventory and capacity load over a rolling planning horizon.
Therefore, this allows to immediately identify shortages and overload situations.

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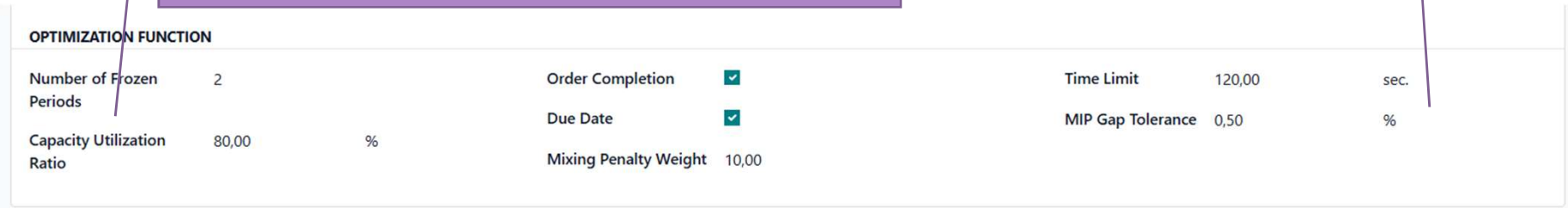
Optimized Production Plan

The **MTO Production Plan** can be managed manually or supported by a **MILP (Mixed Integer Linear Programming)** optimization engine based on the following constraints:

- Available capacity of critical resources (**hard constraint**)
- Quantity fulfillment requirements (**soft constraint** that can be relaxed when necessary)
- On-time delivery performance requirements (**soft constraint** that can be relaxed when necessary)
- **Single-start constraint** for each lot covering a sales order line (**hard constraint**), ensuring that production is scheduled in consecutive time buckets without gaps
- Specific constraint for achieving **mixing and leveling** of the production plan, supported by a dedicated component of the objective function, to ensure a smoother and more stable execution flow.

Configurable Capacity Utilization Ratio to limit the maximum saturation of CCRs, preserving protective capacity and avoiding the nonlinear increase in queueing times described by Kingman's formula.

Configurable time limit and MIP gap tolerance parameters for the optimization solver



Custom constraints and objective function can be implemented on requests

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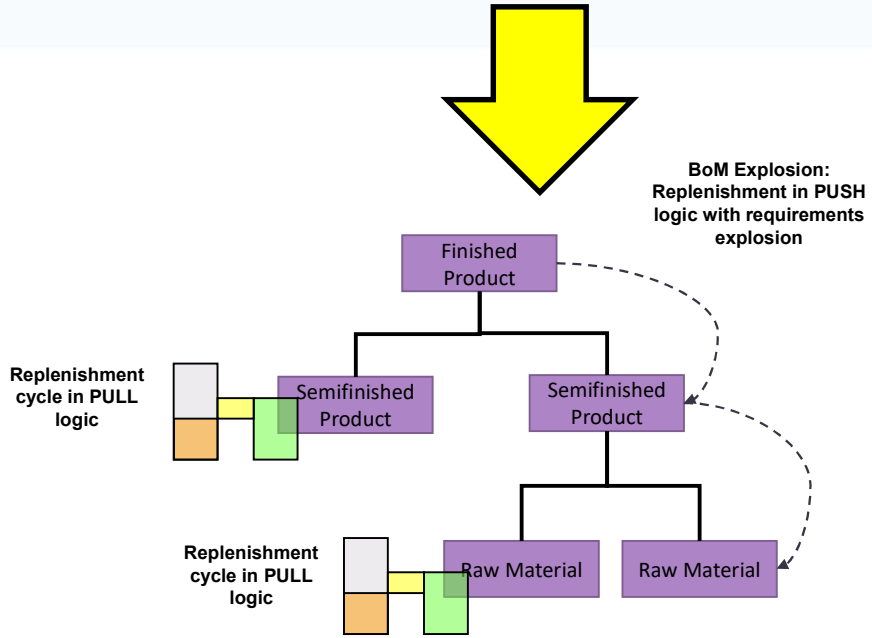
Planned Order Generation

Once approved the MTO Production Plan, the planned quantities can be converted into firmed planned orders scheduled backwards with capacity load; the lot-sizing policies are applied.

The Planned Orders from MTO Production Plan are the input for **the planning engine run**.

New | MRP Planned Orders | My Planned Orders | Search... | 1-2 / 2

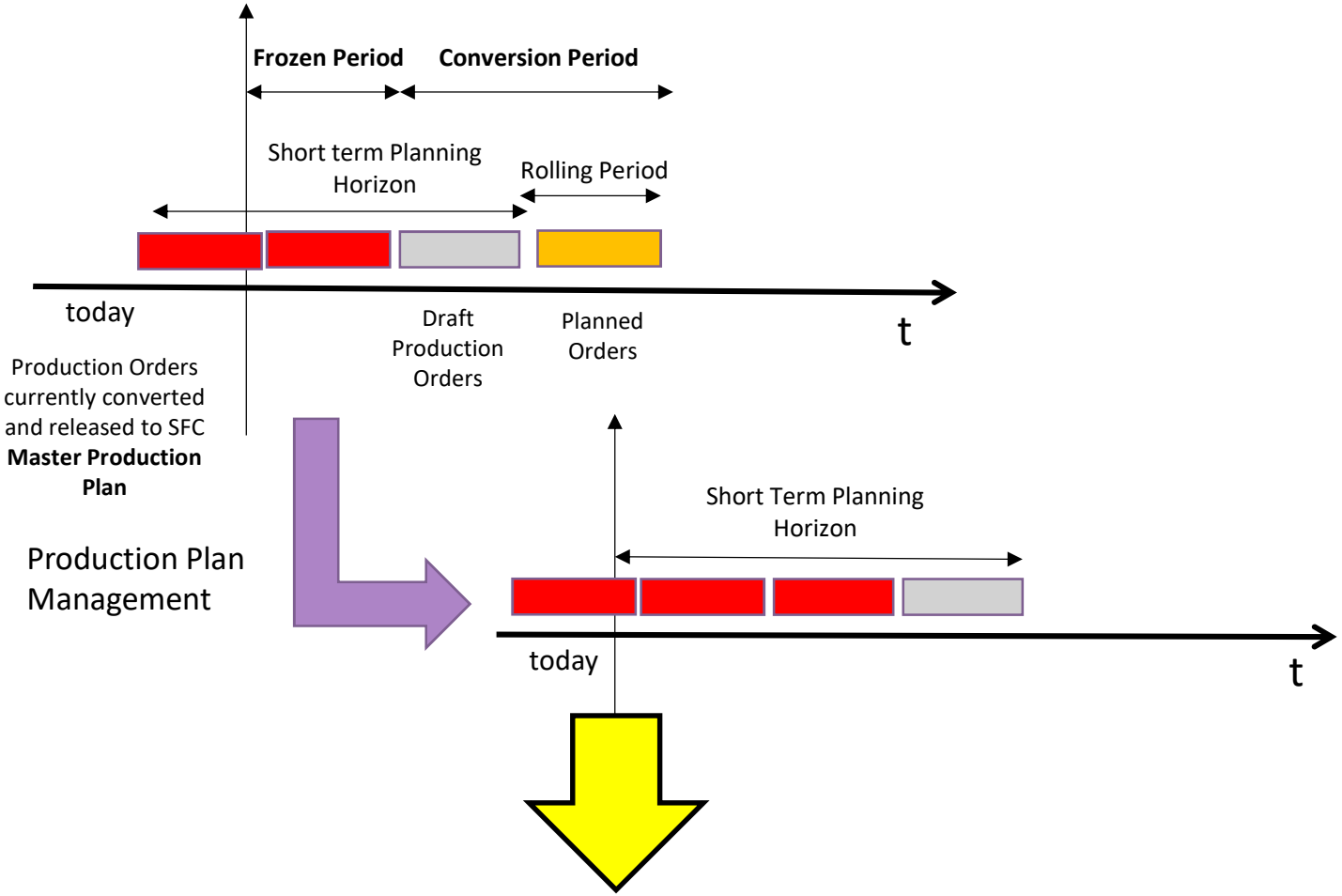
Name	Product	Warehouse	MRP Planner	Activities	Supply Method	Release Date	Due Date	Scheduled ...	Scheduled ...	F...	Quantity	UoM	MTO Origin	F...	C...	C...
MRPPO00000436	PF-002	Prod Plant	Administrator		Produce	Jun 15	Jun 22	Jun 18	Jun 22		10,00	Units	Customer 001 - ...			
MRPPO00000437	PF-003	Prod Plant	Administrator		Produce	Jun 15	Jun 22	Jun 18	Jun 22		10,00	Units	Customer 001 - ...			



planning engine

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Planned Orders Conversion Period



- The Number of Planned Orders Conversion Periods determines the portion of the planning horizon to be converted into Planned Orders and integrated with the Planning Engine.
- The correct execution of the Master Production Plan management process is essential to ensure its feasibility in terms of the availability of both components and production resources.

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MTO Control Point Production Orders report

MTO Control Point PO report, based on Buffer Management in Simplified Drum-Buffer-Rope (S-DBR) principles, provides the following capabilities:

- Manages execution priorities, ensuring alignment with the priorities established during the planning phase.
- Provides monitoring of slack
- Measure in real-time the buffer penetration for each Manufacturing Order.
- Monitors the real-time Manufacturing Order buffer status against the customer due date

MTO Control Point Production Orders

Search...

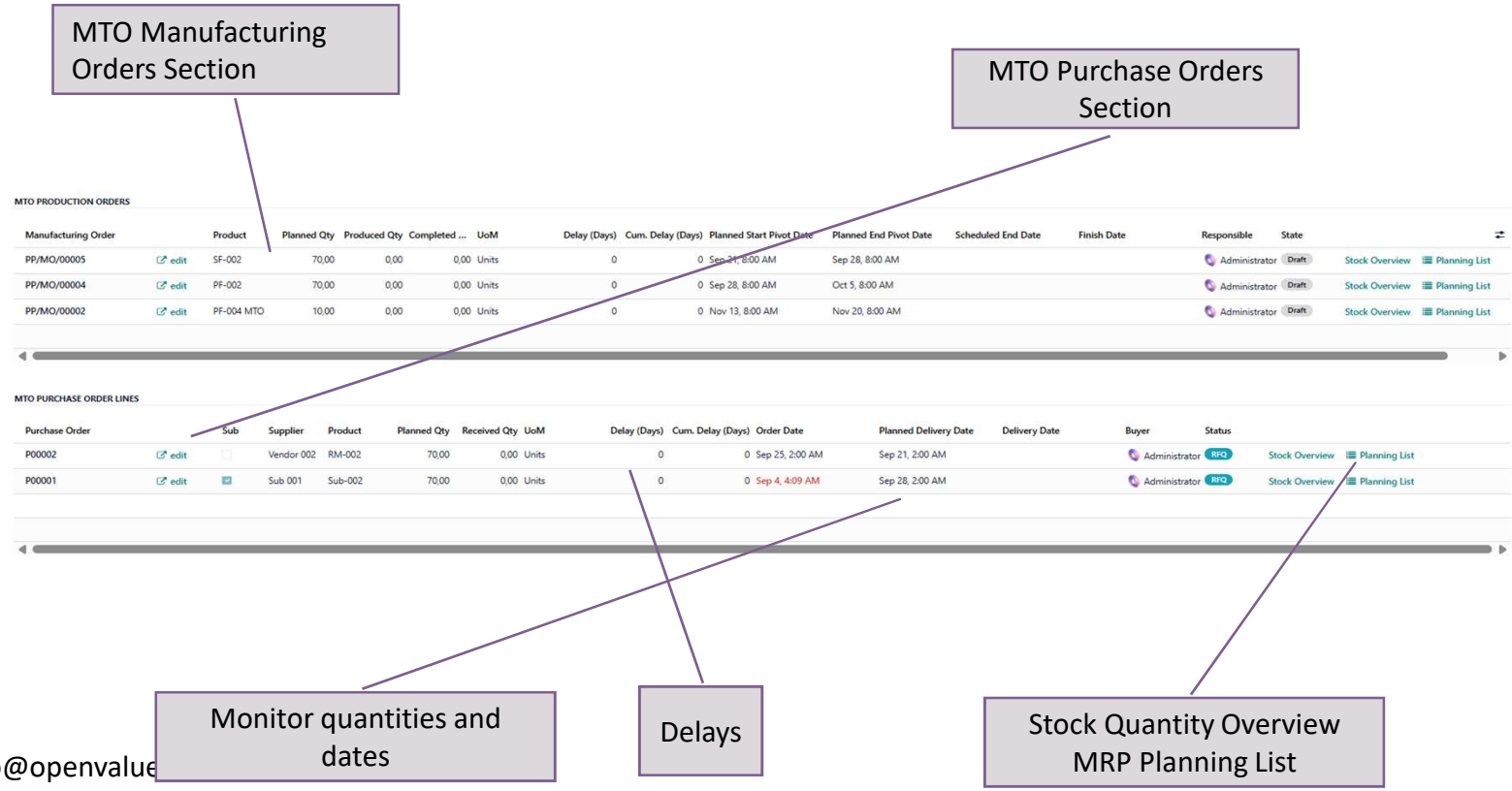
1-7 / 7

Reference		MO Monitor	MTO Origin	Customer Delivery Date	Slack Days	SO Monitor	Activities	Product	Warehouse	Quantity To ...	Total Quantity	C
PP/MO/00033	Update edit	60.0	Customer 001 - S00001	Jun 24, 3:00 PM	13	86.44		PF-002	Prod Plant	10,00	10,00	
PP/MO/00031	Update edit	100.0	Customer 001 - S00001	Jun 24, 3:00 PM	9	100.0		PF-002	Prod Plant	10,00	10,00	
PP/MO/00035	Update edit	200.0	Customer 001 - S00001	Jun 24, 3:00 PM	2	164.52		PF-002	Prod Plant	5,00	5,00	
PP/MO/00030	Update edit	-20.0	Customer 001 - S00001	Jun 17, 3:00 PM	12	56.36		PF-003	Prod Plant	10,00	10,00	
PP/MO/00034	Update edit	0.0	Customer 001 - S00001	Jun 17, 3:00 PM	9	60.78		PF-003	Prod Plant	10,00	10,00	
PP/MO/00032	Update edit	100.0	Customer 001 - S00001	Jun 17, 3:00 PM	2	100.0		PF-003	Prod Plant	10,00	10,00	
PP/MO/00036	Update edit	400.0	Customer 001 - S00001	Jun 17, 3:00 PM	-19	Delayed MO		PF-003	Prod Plant	5,00	5,00	

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MTO Supply Chain Report

- The **MTO Supply Chain Report** purpose is to monitor the MTO supply chain status to track the promised customer delivery date with alerts for quantity shortages and time delays
- It provides for a MTO sales order an overview of the overall MTO supply chain status by listing of all the MTO replenishment elements, i.e. MTO manufacturing orders and MTO purchase order items for subcontracting also, with their status, dates and quantities
- a recap of all necessary figures support in only one report the monitoring of the overall MTO supply chain status



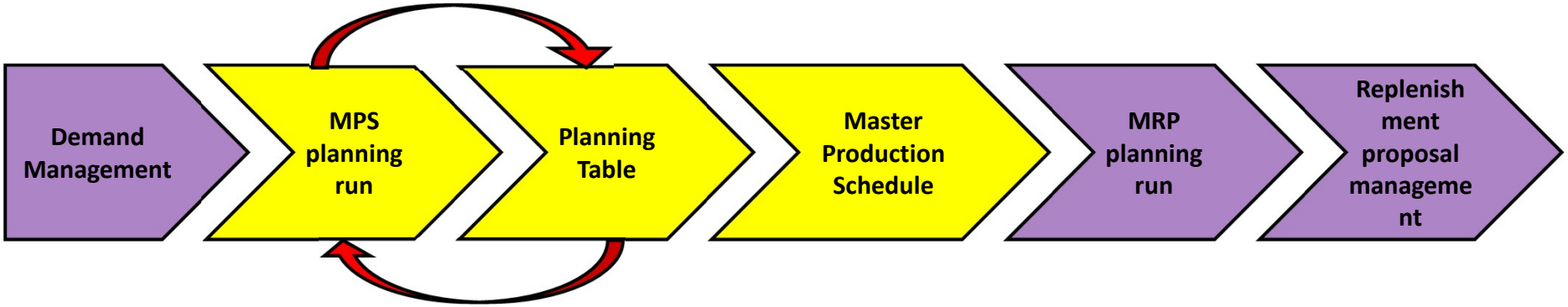
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MTS Solution

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Overview of the planning and execution process in Make-to-Stock scenario



Menage the forecast demand by entering Planned Independent Requirements

Perform the planning run for MPS items

Evaluate the feasibility of MPS planning run results by leveling the MPS capacity requirements through Planning Table

Freeze the MPS planning run result to determine the Master Production Schedule

Perform the planning run for all remaining items

Evaluate planning run results and converting planning proposal

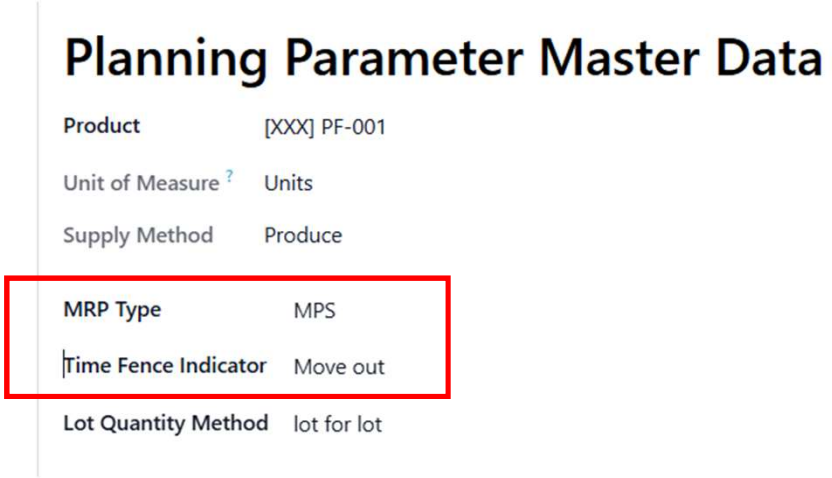
As part of the overall planning process in Make-To-Stock scenario, the "**Master Production Schedule**" is fully integrated in the overall Openvalue manufacturing planning and execution solution

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The Master Production Scheduling process overview

The **Master Production Scheduling process** aims to ensure **material availability** and increase **planning stability**.

This is achieved by designating products that have a significant impact on company profits or consume critical resources as MPS-relevant. Doing so allows these products to be monitored and planned separately within the MPS process.



Planning MPS products has a strong influence on the overall production planning process, even if they represent only a small portion of the total product range.

The MPS planning run focuses exclusively on products marked as MPS-relevant. Dependent requirements are generated for the BOM level directly below the MPS planning level; however, this level and all lower levels are not planned.

Frequent changes to these items can make the full MRP run unstable. Therefore, MPS parts should be planned separately before planning all the other products with MRP planning run.

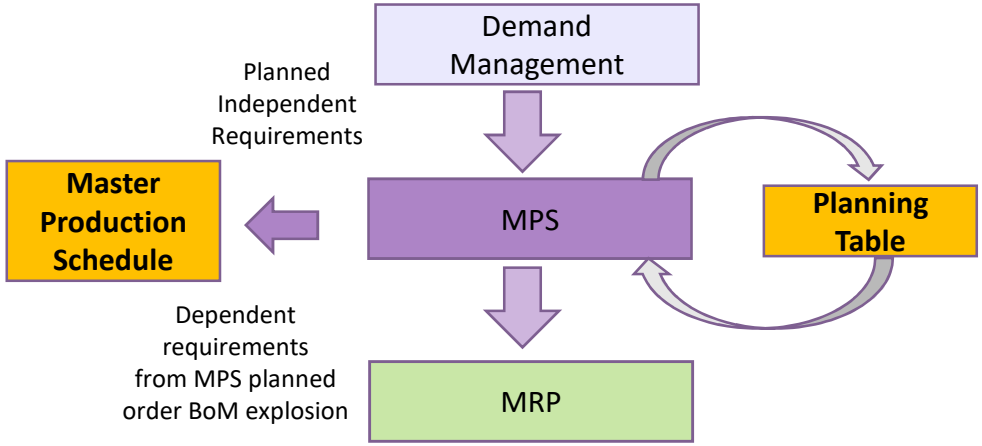
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The MPS planning run in the overall planning process

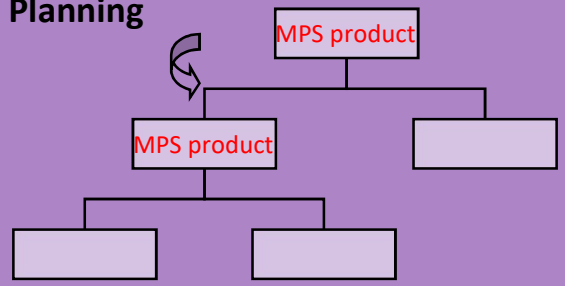
It is crucial to consolidate demand into a feasible plan: **a capacity-constrained plan** can be achieved through **Planning Table** cycles by loading work-center capacity.

The required production capacity is evaluated over the medium-term horizon.

Strategic component sourcing is assessed to determine procurement strategies and define purchasing agreements.

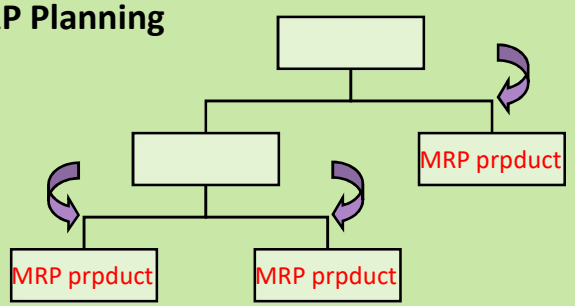


MPS Planning



Performing the MPS planning engine run and tuning the Master Production Schedule by checking its feasibility (Rough-Cut capacity through the Planning Table)

MRP Planning



Performing the MRP planning engine run for all remaining dependent parts

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The Planning Table

For critical products (make, purchased and subcontracted) capacity load is evaluated by the **Planning Table**.

The Planning Table is an operational multi-level planning tool that enables the consolidation of Master Production Scheduling process results into a feasible Production Plan, by verifying material availability and ensuring alignment with production resource capacity (Rough-Cut Capacity Planning).

Back | Recompute | Update Planning Table | Fix Planned Orders

Product / Planning Data	W41 2026	W42 2026	W43 2026	W44 2026	W45 2026	W46 2026
0 - [XXX] PF-001						
Stock	10.00	10.00	10.00	0	0	0
Forecast Qty	0	0	0	0	0	0
Sales Qty	0	0	-200.00	0	0	0
Dependent Demand Qty	0	0	0	0	0	0
Open Receipts Qty	0	0	0	0	0	0
Planned Qty	0	0	190	0	0	0
ATP	10.00	10.00	0	0	0	0
Projected Balance	10.00	10.00	0	0	0	0
WC 002 - Capacity Load	0	70.83	120.83	0	0	0
1 - SF-001						
Stock	20.00	20.00	0	0	0	0
Forecast Qty	0	0	0	0	0	0
Sales Qty	0	0	-100.00	0	0	0
Dependent Demand Qty	0	-190.00	0	0	0	0
Open Receipts Qty	0	170.00	0	0	0	0
Planned Qty	0	0	100	0	0	0
ATP	20.00		0	0	0	0
Projected Balance	20.00		0	0	0	0
WC 002 - Capacity Load	0		120.83	0	0	0

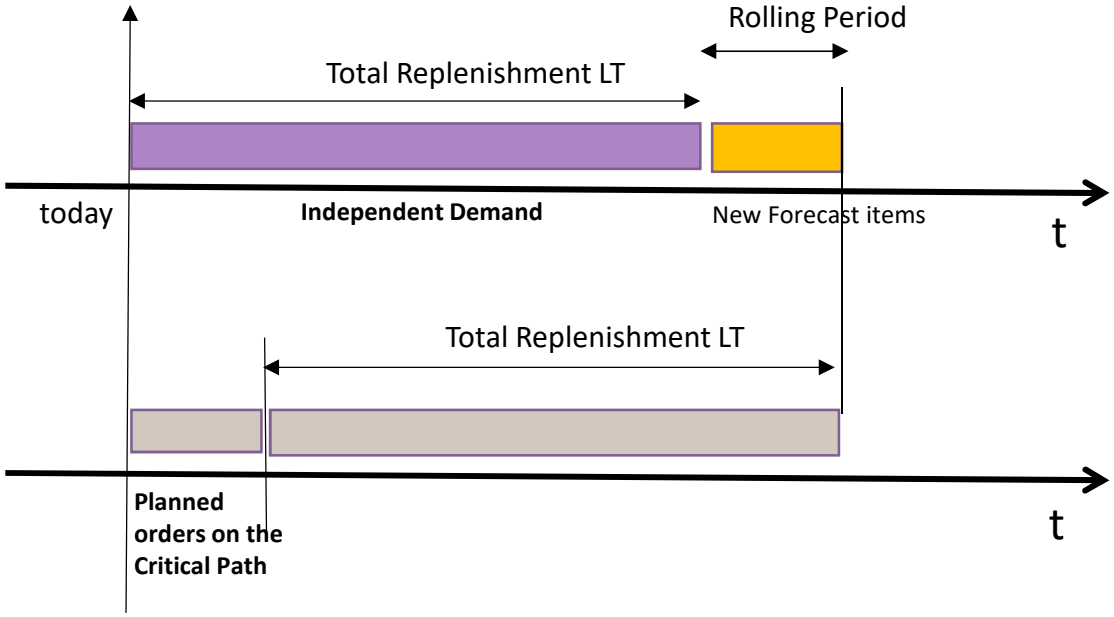
Master Production Schedule

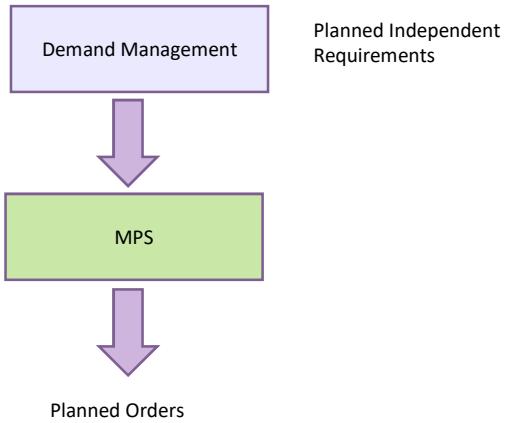
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The Total Replenishment Lead Time

In the Demand Management, it is essential to enter new forecast items with a rolling approach while protecting the current plan before the planning time fence.

The Total Replenishment Lead Time can be estimated using **the Planning Engine BoM TRLT report**.



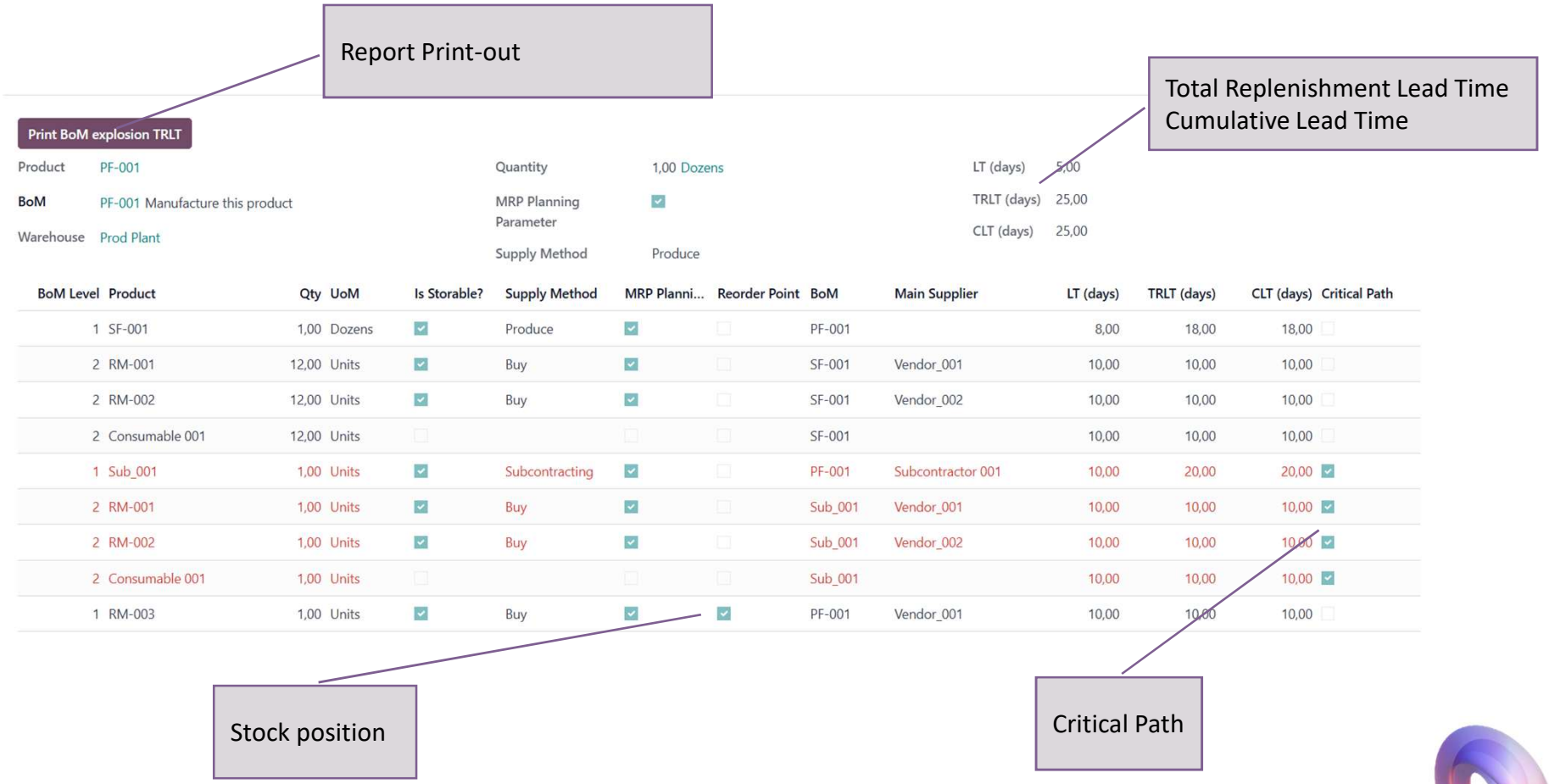


The **Total Replenishment Lead Time** (Planning Time Fence) is managed at the MRP Parameter level. Creating a Demand Item inside the pre-planning fence window triggers a warning about potential plan infeasibility. This is the basis for implementing a proper **Demand Management** process.

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The Total Replenishment Lead Time Report

The report supports the calculation of both the **Total Replenishment Lead Time** and the **Cumulative Lead Time** across the entire product structure, enabling the identification of the **Critical Path**.



Print BoM explosion TRLT

Product	PF-001	Quantity	1,00 Dozens	LT (days)	5,00
BoM	PF-001 Manufacture this product	MRP Planning Parameter	☑	TRLT (days)	25,00
Warehouse	Prod Plant	Supply Method	Produce	CLT (days)	25,00

BoM Level	Product	Qty	UoM	Is Storable?	Supply Method	MRP Planni...	Reorder Point	BoM	Main Supplier	LT (days)	TRLT (days)	CLT (days)	Critical Path
1	SF-001	1,00	Dozens	☑	Produce	☑	☐	PF-001		8,00	18,00	18,00	☐
2	RM-001	12,00	Units	☑	Buy	☑	☐	SF-001	Vendor_001	10,00	10,00	10,00	☐
2	RM-002	12,00	Units	☑	Buy	☑	☐	SF-001	Vendor_002	10,00	10,00	10,00	☐
2	Consumable 001	12,00	Units	☐		☐	☐	SF-001		10,00	10,00	10,00	☐
1	Sub_001	1,00	Units	☑	Subcontracting	☑	☐	PF-001	Subcontractor 001	10,00	20,00	20,00	☑
2	RM-001	1,00	Units	☑	Buy	☑	☐	Sub_001	Vendor_001	10,00	10,00	10,00	☑
2	RM-002	1,00	Units	☑	Buy	☑	☐	Sub_001	Vendor_002	10,00	10,00	10,00	☑
2	Consumable 001	1,00	Units	☐		☐	☐	Sub_001		10,00	10,00	10,00	☑
1	RM-003	1,00	Units	☑	Buy	☑	☑	PF-001	Vendor_001	10,00	10,00	10,00	☐

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Time Fence

The **Time Fence Indicator** can be used to protect and freeze the **Master Production Schedule (MPS)** within the **Total Replenishment Lead Time**.

Planning Parameter Master Data

Product	[XXX] PF-001
Unit of Measure	Units
Supply Method	Produce
MRP Type	MPS
Time Fence Indicator	Move out
Lot Quantity Method	lot for lot

If a **Planned Order** falls within the **Total Replenishment Horizon**, it is automatically rescheduled beyond this horizon, allowing the planner to assess the potential impacts and manually reschedule the order if necessary.

MRP Planning Engine | Master Data | Demand | MPS | MRP-ROP | Production Plans | Reporting | Configuration

New | MPS Planned Orders | My Planned Orders | Search...

Name	Product	Warehouse	MRP Planner	Activities	Supply Method	Opening D...	Release Date	Due Date	Forward ...	Quantity	UoM	F...	Conver...	Time Fence Move Out Indicator
MPSPO00000234	SF-001	Prod Plant	Administrator		Produce	Sep 23	Oct 9	Oct 16		170,00	Units	☑	☑	☐
MPSPO00000231	Sub-001	Prod Plant	Administrator		Subcontracting	Oct 1	Oct 1	Oct 16		190,00	Units	☑	☑	☐
MPSPO00000286	SF-001	Prod Plant	Administrator		Produce	Oct 7	Oct 22	Oct 29		100,00	Units	☐	☑	☐
MPSPO00000291	RM-001	Prod Plant	Administrator		Buy	Oct 7	Oct 7	Oct 22		615,00	Units	☐	☑	☐
MPSPO00000283	[XXX] PF-0...	Prod Plant	Administrator		Produce	Oct 14	Oct 29	Nov 4		190,00	Units	☐	☑	☑
MPSPO00000287	SF-001	Prod Plant	Administrator		Produce	Oct 30	Nov 16	Nov 23		172,00	Units	☐	☑	☐
MPSPO00000284	[XXX] PF-0...	Prod Plant	Administrator		Produce	Nov 6	Nov 23	Nov 30		172,00	Units	☐	☑	☐

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The Stock Target Policy

The **Stock Target Policy** is to calculate **the range of coverage** (i.e. **dynamic safety stock**), i.e. the number of days in which a material must still be available to cover requirements.

The MRP Planner defines the range of coverage as a planned number of working days, so that fluctuations in requirements can be smoothed (**target range of coverage**).

This is a statistical calculation on the basis of average daily requirements.

The dynamic safety stock is calculated depending on the requirements within a specified period (**average daily requirements**) and the target range of coverage.

Therefore, it is possible to determine a safety stock based on requirements and range of coverage. The dynamic safety stock adapts automatically to the changed requirements.

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The Stock Target Policy

Planning run results

In Planning Run the dynamic safety stock is added to the order proposal quantity.

Update | Single Planning Run

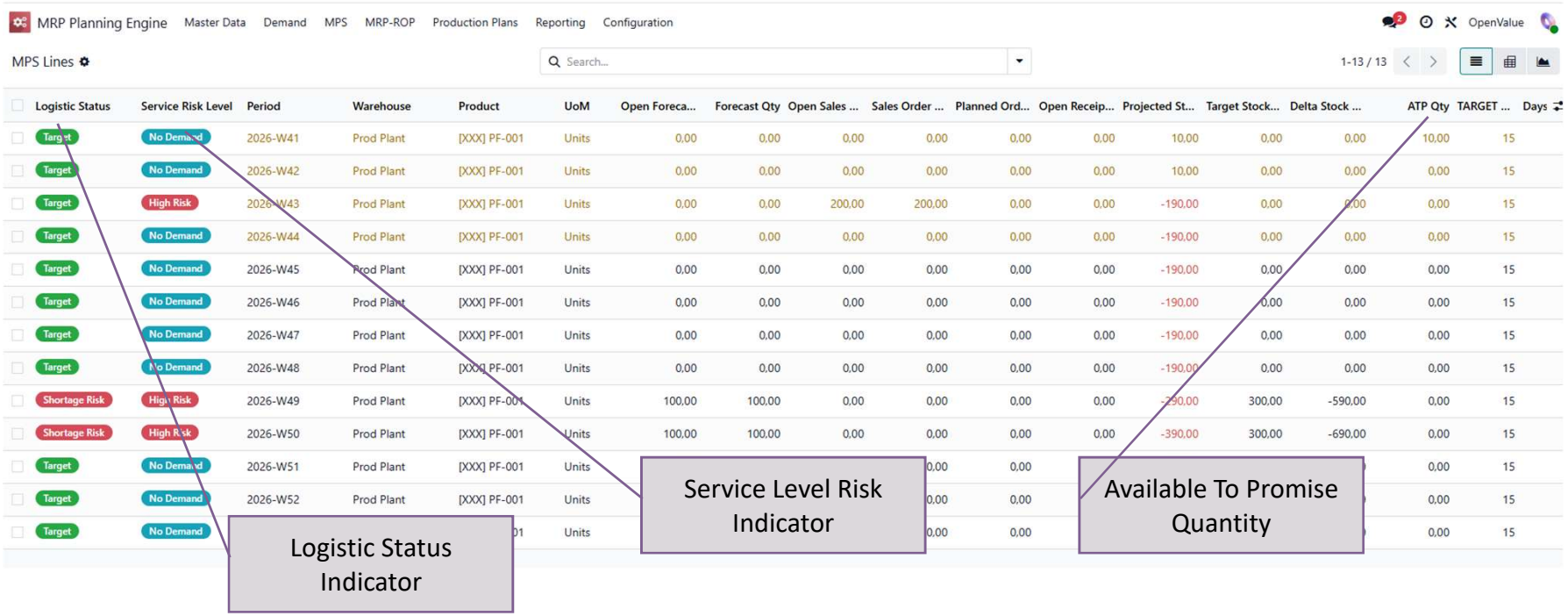
Planning Parameter PF-001-Prod Plant
Supply Method Produce
MRP Planner Administrator
MRP Type MPS
Safety Time 0 Days
Lot Quantity Method lot for lot

MRP Date		Origin	Document Number		Planning Note	MRP Quantity	Projected St...	Unit	
						10,00	10,00	Units	
Oct 8					--- TODAY ---	0,00	10,00	Units	
Oct 14					--- Replenishment LT ---	0,00	10,00	Units	
Oct 23	conversion	Planned Order	MPSPO00000264	edit		190,00	200,00	Units	Pegging Up
Oct 23		Sales Order	S00002		Delivery document: PP/PIC...	-200,00	0,00	Units	Pegging Down
Nov 30	conversion	Planned Order	MPSPO00000265	edit		172,00	172,00	Units	Pegging Up
Nov 30		Demand Item	Demand Item		Demand Item	-100,00	72,00	Units	Pegging Down
Dec 7	conversion	Planned Order	MPSPO00000266	edit		171,00	243,00	Units	Pegging Up
Dec 7		Demand Item	Demand Item		Demand Item	-100,00	143,00	Units	Pegging Down
						0,00	143,00	Units	

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The MPS Item

The **MPS Item** provides a **monitoring report** at finished product level that integrates inventory performance and customer service risk indicators to support planning decisions.



The system calculates the range of coverage in MPS line to enable the MRP Planner to see how many days requirements are covered by the stock available (**actual range of coverage**).

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The promise delivery date determination



In bidding process, the availability check for determining the promise delivery date in customer quotation phase is one of the biggest issues.

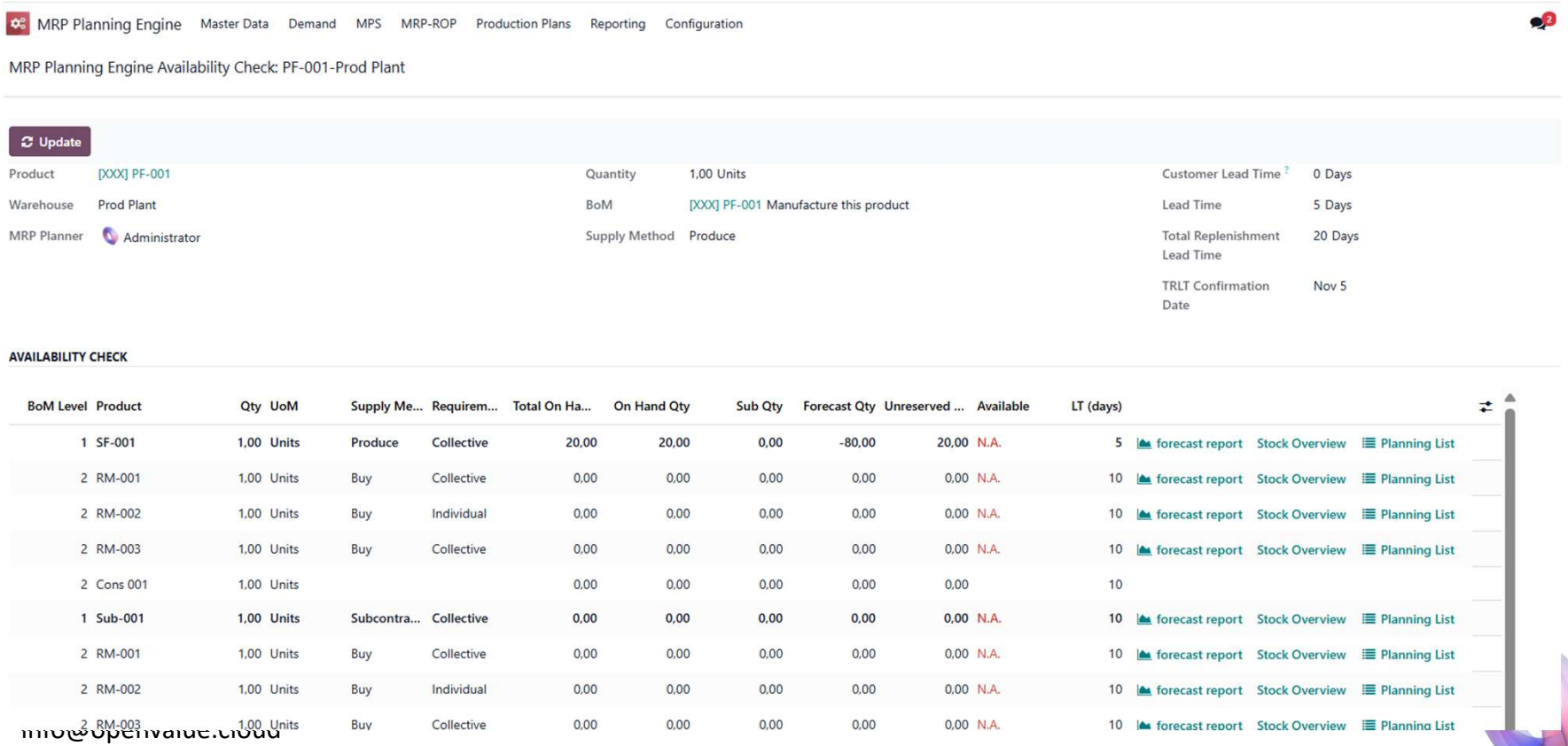
The “MRP Planning Engine Availability Check” tool supports production feasibility check of customer requested quantity based the projected stock availability at all BoM’s levels.



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Planning Engine Availability Check report

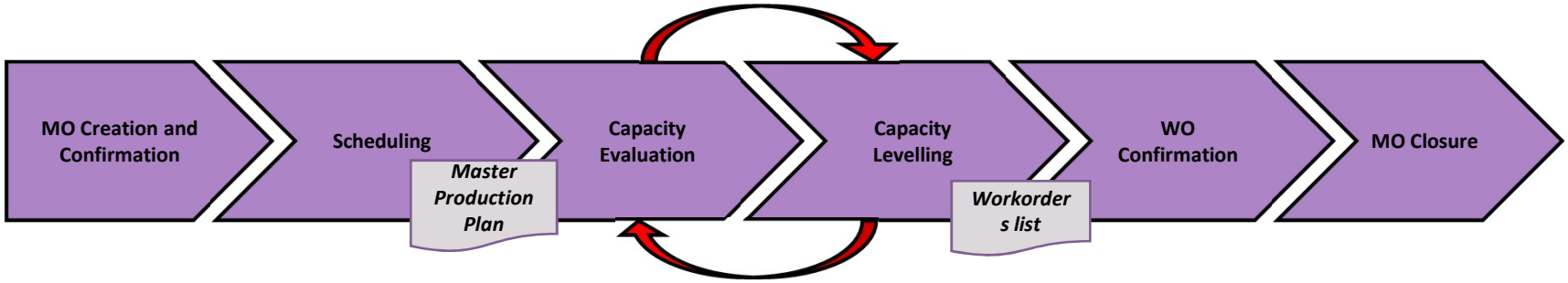
In case of material unavailability on the customer's requested date, or for managing delivery delays, it is essential to manage the delivery date confirmation process. The **Planning Engine Availability Check report** supports the customer delivery confirmation process providing full visibility across the entire BoM explosion with stock and planning data



BoM Level	Product	Qty	UoM	Supply Me...	Requirem...	Total On Ha...	On Hand Qty	Sub Qty	Forecast Qty	Unreserved ...	Available	LT (days)			
1	SF-001	1,00	Units	Produce	Collective	20,00	20,00	0,00	-80,00	20,00	N.A.	5	forecast report	Stock Overview	Planning List
2	RM-001	1,00	Units	Buy	Collective	0,00	0,00	0,00	0,00	0,00	N.A.	10	forecast report	Stock Overview	Planning List
2	RM-002	1,00	Units	Buy	Individual	0,00	0,00	0,00	0,00	0,00	N.A.	10	forecast report	Stock Overview	Planning List
2	RM-003	1,00	Units	Buy	Collective	0,00	0,00	0,00	0,00	0,00	N.A.	10	forecast report	Stock Overview	Planning List
2	Cons 001	1,00	Units			0,00	0,00	0,00	0,00	0,00		10			
1	Sub-001	1,00	Units	Subcontra...	Collective	0,00	0,00	0,00	0,00	0,00	N.A.	10	forecast report	Stock Overview	Planning List
2	RM-001	1,00	Units	Buy	Collective	0,00	0,00	0,00	0,00	0,00	N.A.	10	forecast report	Stock Overview	Planning List
2	RM-002	1,00	Units	Buy	Individual	0,00	0,00	0,00	0,00	0,00	N.A.	10	forecast report	Stock Overview	Planning List
2	RM-003	1,00	Units	Buy	Collective	0,00	0,00	0,00	0,00	0,00	N.A.	10	forecast report	Stock Overview	Planning List

The Manufacturing Execution Solution

The Manufacturing Execution process



Manufacturing order creation manually or by converting planned orders (MRP Planning Engine)

Planned Start Pivot Date and Planned End Pivot Date determination at Manufacturing Order level

Material Availability Check

Scheduled Start Date and Scheduled End Date determination at single WorkOrder Level and the overall Manufacturing Order Level and

Capacity Loading at WorkCenter Level

Capacity Availability Check

Detailed Capacity Evaluation for determining capacity shortage issue

Capacity levelling by the Mid-Point Scheduling tool for WorkOrders Sequencing

Recording actual produced Quantity at single WorkOrder level

Recording actual duration times for single WorkOrder

Actual Scheduled Start Date and Actual Scheduled End Date determination at WorkOrder Level

Actual Start Date and Actual End Date determination at Manufacturing Order Level

The OpenValue Solution supports the E2E Manufacturing Execution process from the manufacturing order creation to its closure

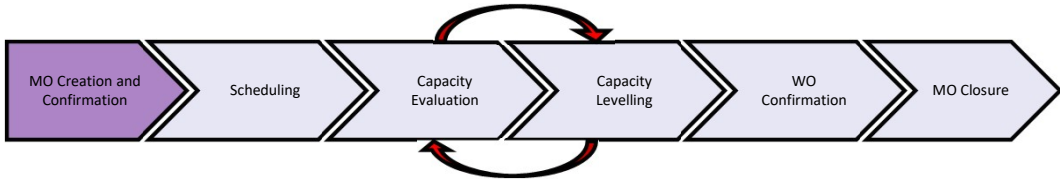
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Shop Floor Control

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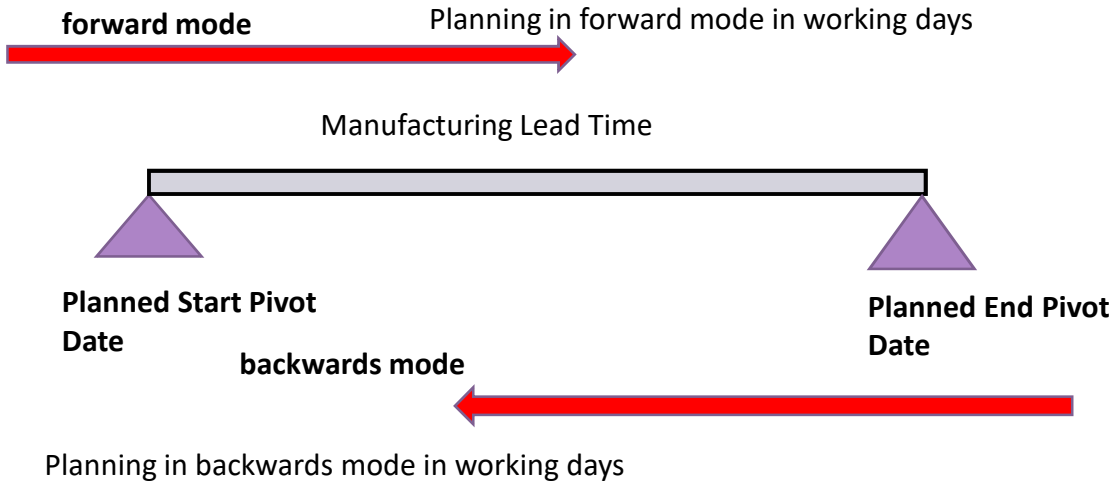


Manufacturing Order Creation and Confirmation



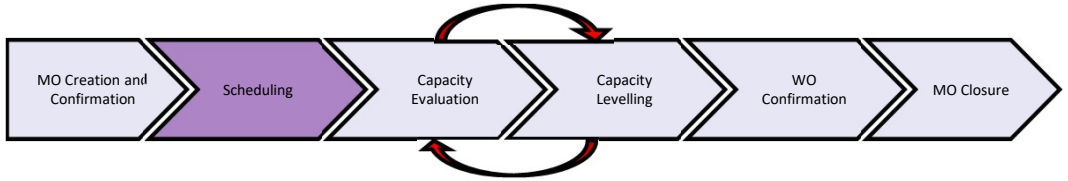
Planned Pivot Dates determination

- The planned pivot dates are determined by taking into account the **Manufacturing Lead Time** in product master data
- According to the "**planning mode**" indicator, the planning is performed in **forward mode** starting from the Planned Start Pivot date or in **backwards mode** starting from the Planned End Pivot date
- The planning is performed in working days based to the working calendar set at warehouse level



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Workorders Scheduling and Work Center Capacity Loading

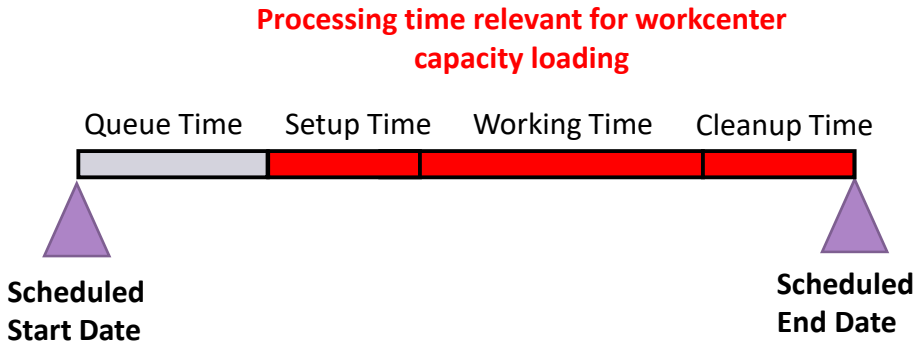


Scheduled Dates determination

The Workorder Scheduled Dates determination is performed in forward mode and based on the following times:

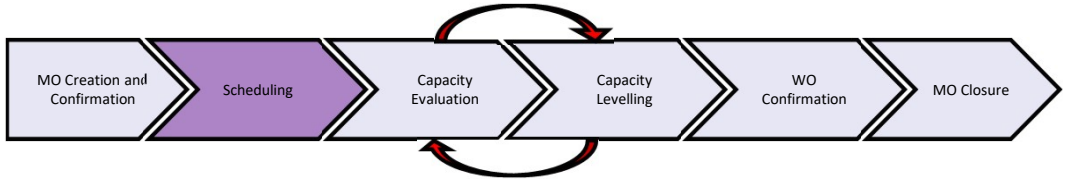
Queue time
Cycle time
Setup time
Cleanup time

The scheduling is performed according the working calendar entered in the Work Center for each operation in BoM. Rescheduling is possible until the next phase, the workorder confirmation, has not been started.



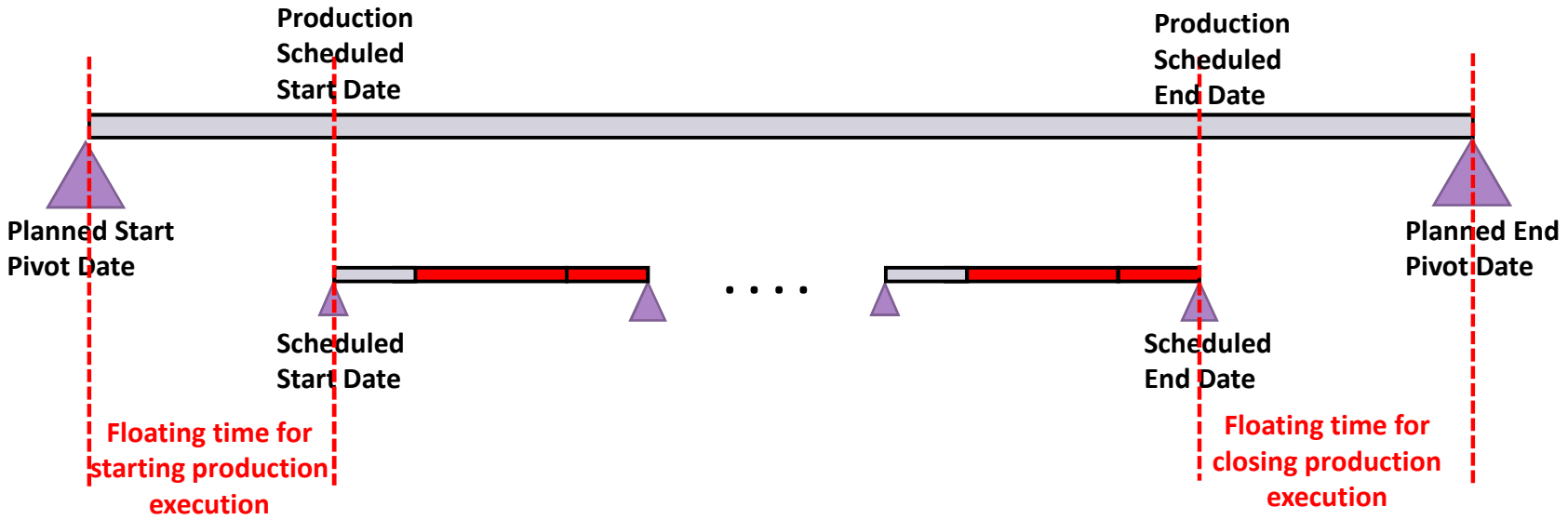
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Workorders Scheduling and Work Center Capacity Loading



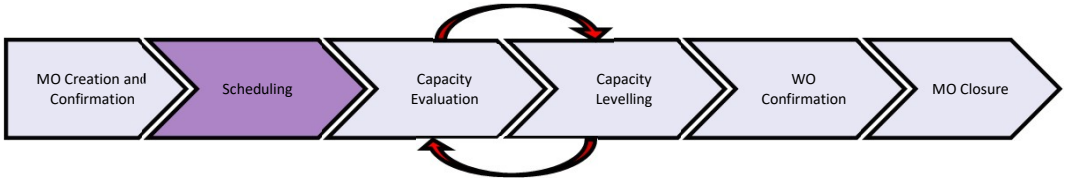
Planned dates and Scheduled dates

The comparison between the Planned Pivot Period and Scheduled Period is useful for checking the correctness of manufacturing master data (i.e. planned LT vs time cycles) and the delay in the overall supply chain planning



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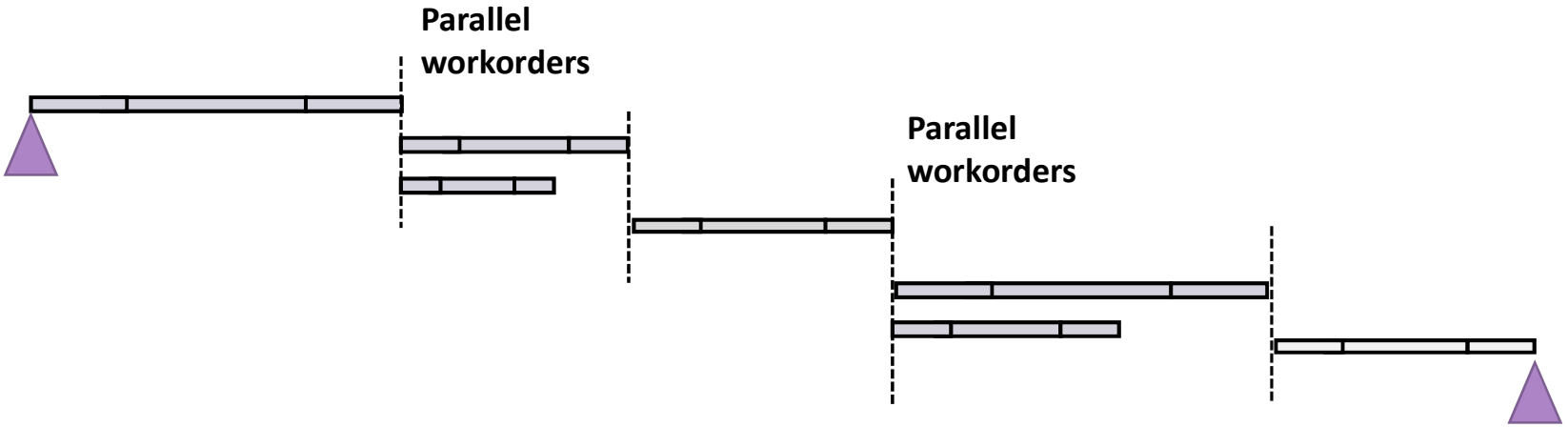
Workorders Scheduling and Work Center Capacity Loading



Workorders Sequencing

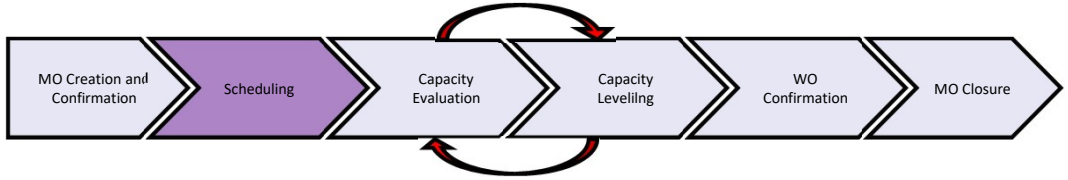
The workorders sequencing is based on the sequence assigned to each BoM's operation. The sequence can be changed in the manufacturing order.

Parallel workorders (operations with the same sequence in BoM's operations) are scheduled in overlapping with the same start scheduled date.



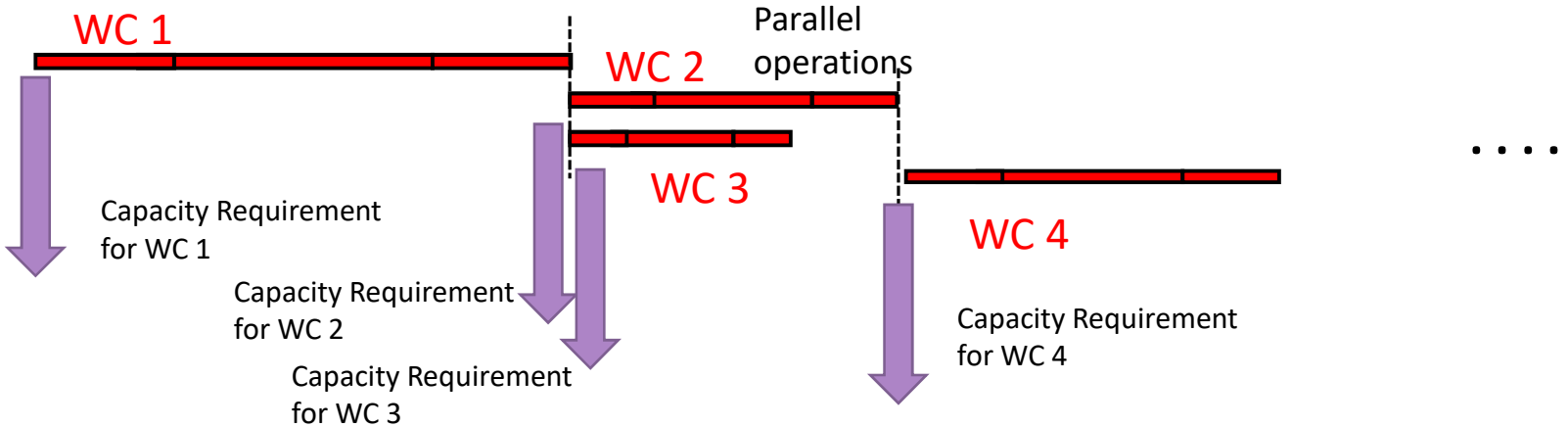
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Workorders Scheduling and Work Center Capacity Loading



Work Center Capacity Loading

The Workorder Capacity Requirements are calculated in scheduling phase based on the scheduled working hours, hence capacity loading occurs for the corresponding Work Center.
The capacity requirements are to be compared with the available capacity in the subsequent capacity evaluation phase

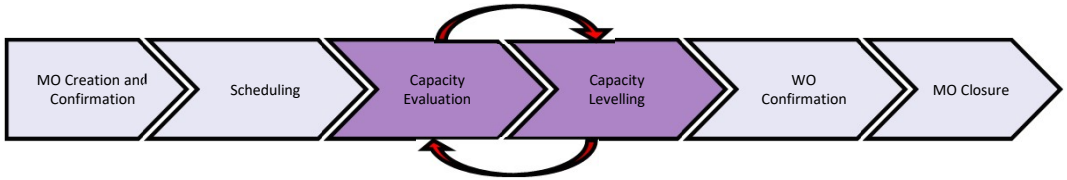


Work Center

Capacity available
Capacity Requirements

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Capacity Evaluation and Levelling

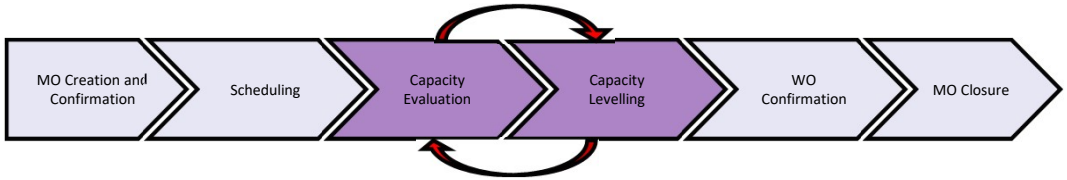


Work Center Capacity Planning

A capacity planning process has to be carried out to check the capacity load.
Real-time simulations are possible to assess the impacts of changes in available capacity (calendar and installed capacity).
Overloaded work centers can be identified and selected.

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Capacity Evaluation and Levelling



Work Center Capacity Evaluation

To Evaluate the Manufacturing Plan feasibility for capacity point of view a Capacity Evaluation has to be performed for the bottlenecked Work Centers at least.

The following figures are provided:

- the weekly available capacity to be compared with the capacity requirements over the time, week by week, at Work Center level
- The work center capacity load in percentage and the remaining capacity are calculated for supporting the subsequent capacity levelling phase

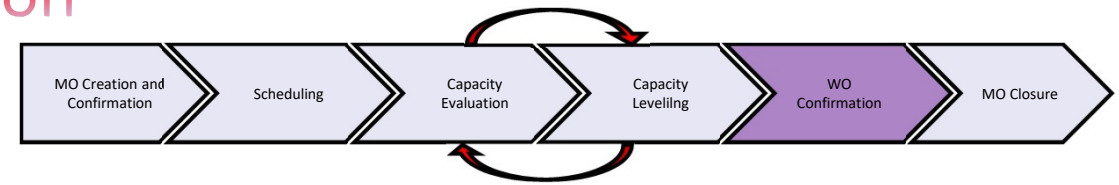
The capacity load can be displayed in the manufacturing order to check immediately its feasibility

Capacity Levelling

Capacity levelling is achieved by moving workorders over the time so the corresponding capacity requirement is moved also. The **mid-point scheduling** logic has been implemented for determining new scheduled dates for all the remaining active workorders.

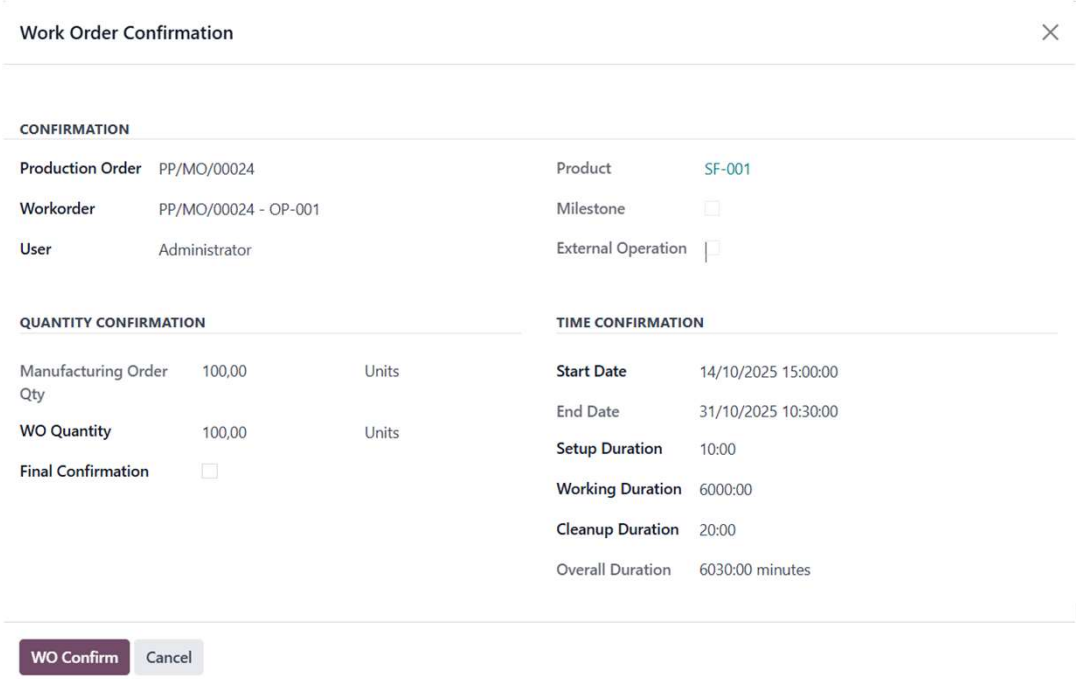
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Workorder Confirmation



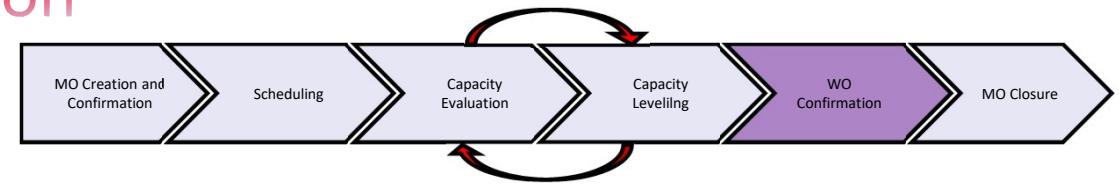
Workorder Confirmation

- Workorder confirmation phase is to record actual produced quantity for a single workorder and declaring actual times, i.e. actual working duration, actual setup duration and actual cleanup duration; therefore, the effective actual overall duration is calculated.
- All actual durations are reported in time tracking section at workorder level
- the overall duration is determined
- The actual duration are relevant for actual direct cost posting



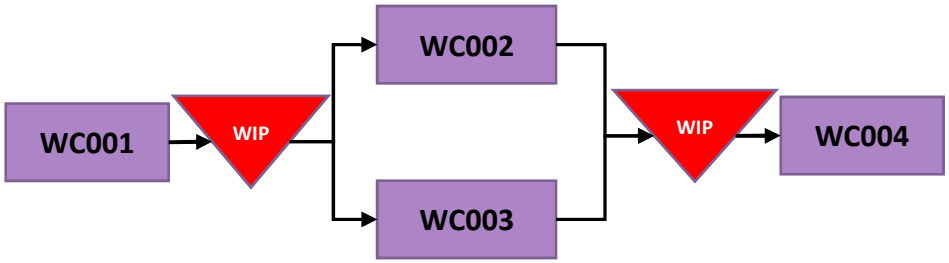
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Workorder Confirmation



Workorder Confirmation: partial confirmation

By performing the workorder confirmation several times for partial quantities, the confirmed quantities are moved down in the production process as WIP quantity available for starting the next workorders. In this way, “one piece flow” procedure can be managed.



The WIP quantity is calculated on real time for each workorder based on its partial confirmations.

Capacity load overview

- Expected duration in working time
- Elapsed in calendar time
- Effective duration in working time

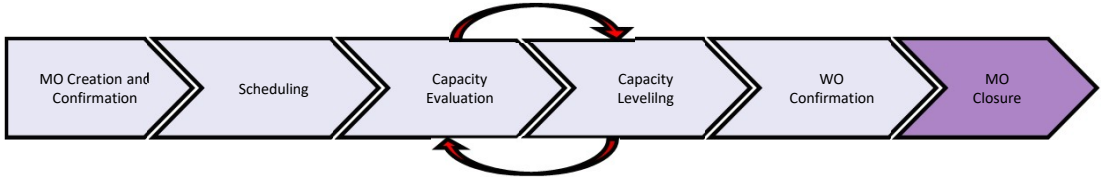
- WO queus quantity
- Wo processed quantity

Dates | Components | Work Orders | By-Products | Miscellaneous | Times | Tools | Production Unit Costs | Production Costs

Capacity Load

Work Cent...	Scheduled Start D...	Scheduled End Date	M..	F..	Expected ...	Elapsed	Effective Du...	WO Qty	Queue Qty	Previous ...	Purchase ...	Status	WC Status
WC 001	14/10/2025 15:00:00	31/10/2025 10:30:00			6030:00	5350:00	610,00	10,00	90,00			In Progre...	READY
WC 002	31/10/2025 10:30:00	18/11/2025 16:00:00			6030:00	00:00	0,00	0,00	10,00	PP/MO/00...		Waiting f...	READY
WC 003	31/10/2025 10:30:00	18/11/2025 16:00:00			6030:00	00:00	0,00	0,00	10,00	PP/MO/00...		Waiting f...	READY
WC 004	18/11/2025 16:00:00	05/12/2025 11:30:00	☑		6030:00	00:00	0,00	0,00	0,00	PP/MO/00...		Waiting f...	READY

Manufacturing Order Closure



Manufacturing Order Closure

Manufacturing actual dates are determined based on times declaration in Work Order Confirmation phase; actual Dates are determined for production orders without workorders also.

The manufacturing order closure cannot be performed if any workorder has not been performed yet**.**

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Manufacturing Times classification

Standard Times calculated based on the manufacturing data structure, i.e. BoM and workcerters; these are useful for engineering manufacturing dpt as reference for checking the correctness of scheduling data

Planned Times calculated from operations in production order before their executing (freezing at production order confirmation phase) to provide a reference starting point to measure production department efficiency

Unplanned Times calculated at confirmation phase from workorders created manually so without reference to operations

Actual Times determined in real time during the manufacturing execution phase related to real workorders execution times

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Manufacturing Times figures

All times figures related to workorders scheduling and execution are reported at manufacturing order level

- ***Total setup time***
- ***Total working time***
- ***Total cleanup time***
- **Overall time = *Total setup time* + *Total working time* + *Total cleanup time***

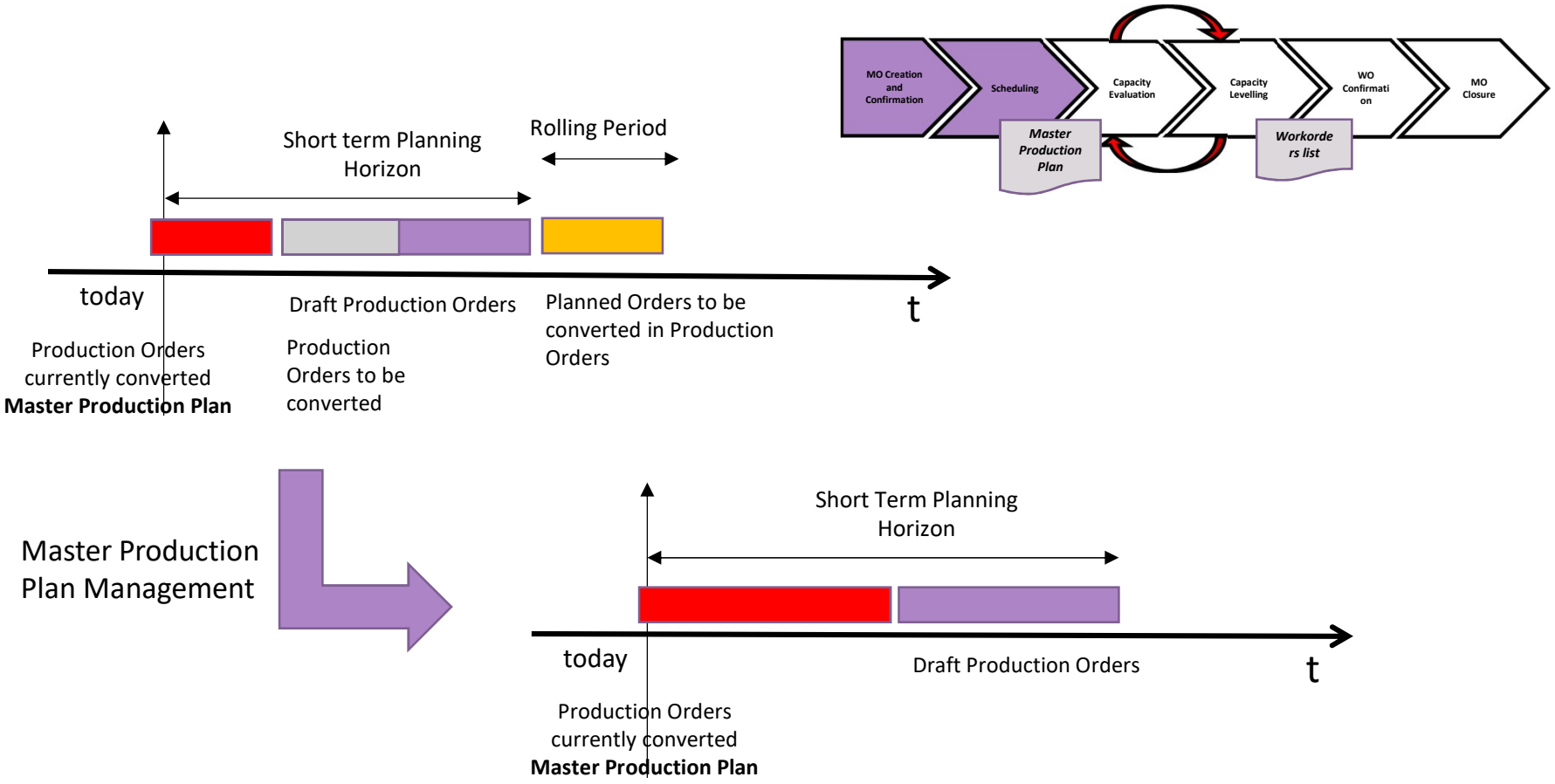
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Master Production Plan

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The Master Production Plan process overview



The correct execution of the Master Production Plan management process is essential to ensure its feasibility in terms of the availability of both components and production resources.

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The Master Production Plan

Material Availability Check

- A **material availability check** for production orders in **draft** status ensures that all components required for their execution are available.
- A system-supported organizational procedure is crucial for promptly resolving component shortages and allocating components to production orders according to priorities.
- In case components are not available for a production order, a message is issued upon conversion (configurable via a setting to be not relevant, warning or error).

Capacity Availability Check

- During the conversion of **draft** production orders, a **capacity availability check** is performed to identify work center overloads on a weekly basis.
- In case resources are not available for a production order, a message is issued upon conversion (configurable via a setting to be not relevant or warning).
- The subsequent production capacity management process addresses potential capacity spikes by leveling the capacity load and sequencing work orders.

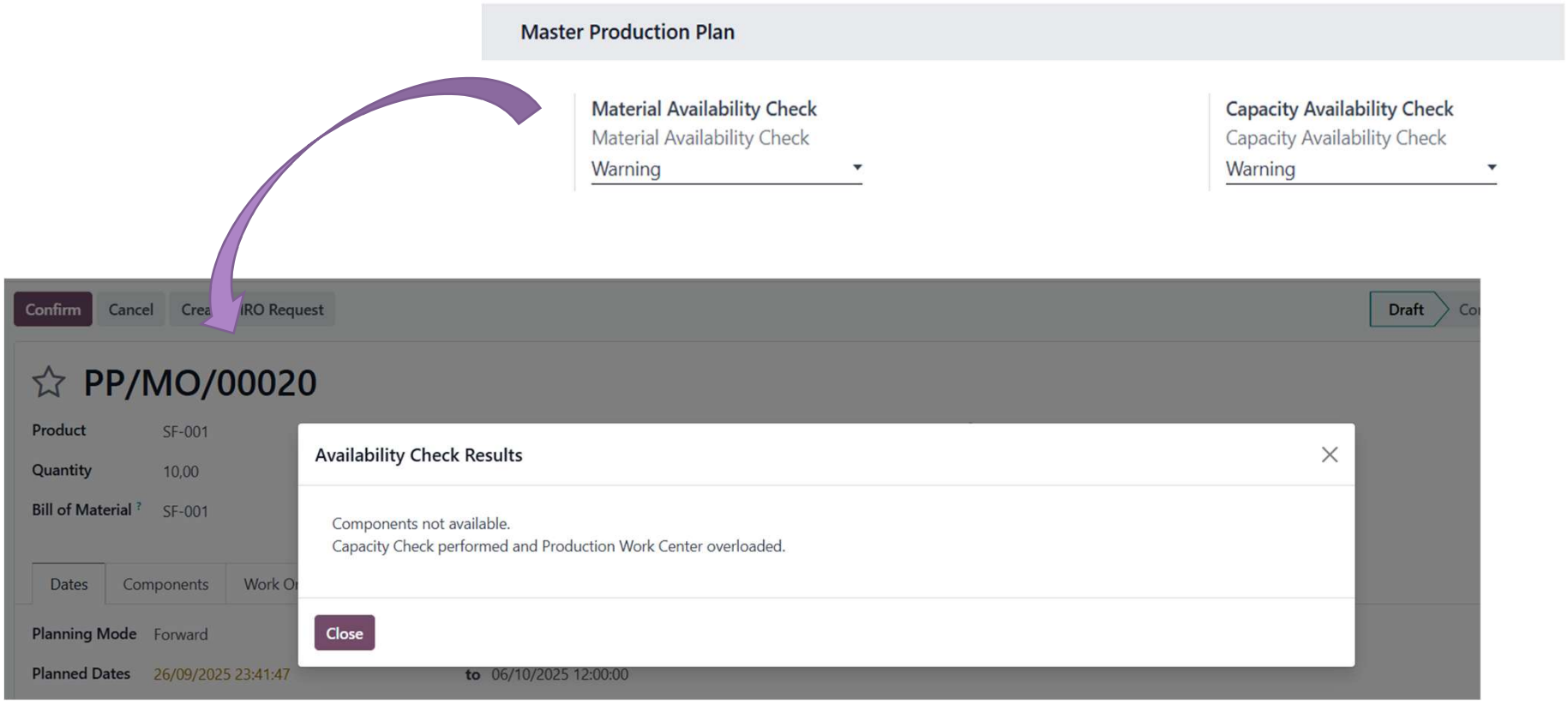
Master Production Plan

- A report allows the selection of production orders—either in draft status or already converted—by date, thereby enabling management of the Master Production Plan.

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Material and Capacity Availability Checks on production orders conversion



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Production orders release process

An **Release Period i**n working days is defined for the management of production orders release. The **Release Date** determines when a production order must be release to shop floor control, the scheduling is performed following an ‘as soon as possible’ approach. A filter allows the selection of the production orders to be confirmed.

Reference	Release D...	Planned Start Pivot ...	Planned End Pivot ...	Product	Source	Componen...	Componen...	Quantity	UoM	Company	State
PP/MO/00...	19/09/2025	26/09/2025 23:39:07	06/10/2025 12:00:00	SF-001			Available	100,00	Units	OpenValue ...	Confirmed
PP/MO/00...	19/09/2025	26/09/2025 23:39:41	06/10/2025 12:00:00	SF-001			Not Availab...	1.000,00	Units	OpenValue ...	Confirmed
PP/MO/00...	19/09/2025	26/09/2025 23:41:07	06/10/2025 12:00:00	SF-001			Not Availab...	10,00	Units	OpenValue ...	Confirmed
PP/MO/00...	19/09/2025	26/09/2025 23:41:47	06/10/2025 12:00:00	SF-001			Not Availab...	10,00	Units	OpenValue ...	Confirmed
PP/MO/00...	19/09/2025	26/09/2025 23:43:21	06/10/2025 12:00:00	SF-001			Not Availab...	10,00	Units	OpenValue ...	Confirmed
PP/MO/00...	19/09/2025	26/09/2025 23:53:43	06/10/2025 12:00:00	SF-001		Not Availab...		10,00	Units	OpenValue ...	Draft
PP/MO/00...	08/10/2025	15/10/2025 13:00:00	23/10/2025 02:00:00	SF-001	Engine: 202...		Not Availab...	100,00	Units	OpenValue ...	Confirmed

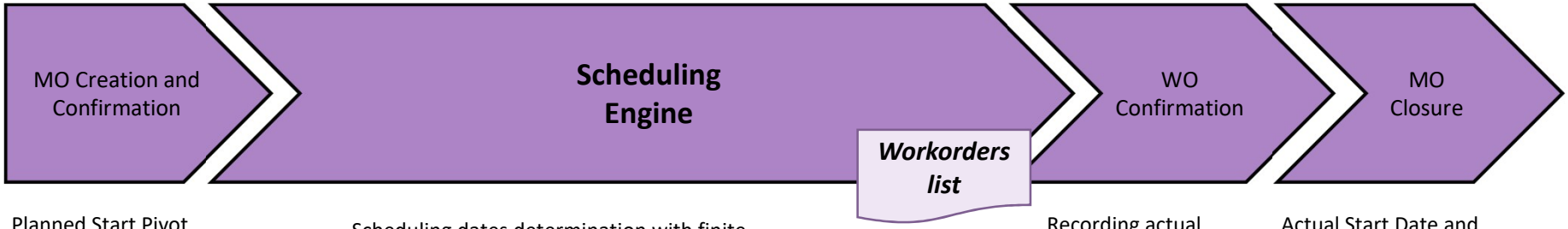
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Scheduling Engine

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The Manufacturing Execution process supported by Scheduling Engine



Planned Start Pivot Date and Planned End Pivot Date determination at Manufacturing Order level

Scheduling dates determination with finite capacity constraints (the available capacity defined at workcenter level)

Scheduling sequence is assigned to each workorder for sequencing their processing per workcenter

Recording actual produced Quantity at single WorkOrder level

Recording actual duration times for single WorkOrder

Actual Scheduled Start Date and Actual Scheduled End Date determination at WorkOrder Level

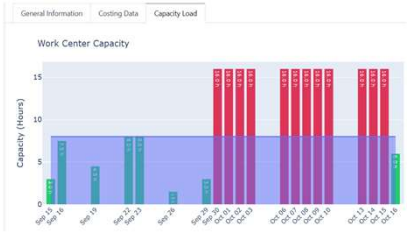
Actual Start Date and Actual End Date determination at Manufacturing Order Level

The "*MRP Schedule Engine*" provides a full comprehensive tool for managing workorders scheduling process in finite capacity way.

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The Scheduling Engine run

An **Optimizer** performs **finite capacity scheduling** of the all open Workorders



Objective Functions (KPI):

- **LENGTH MOs – WIP**
- **MAKESPAN**
- **SUM COMPLETITION**:
- **TARDINESS**

Scheduling Engine



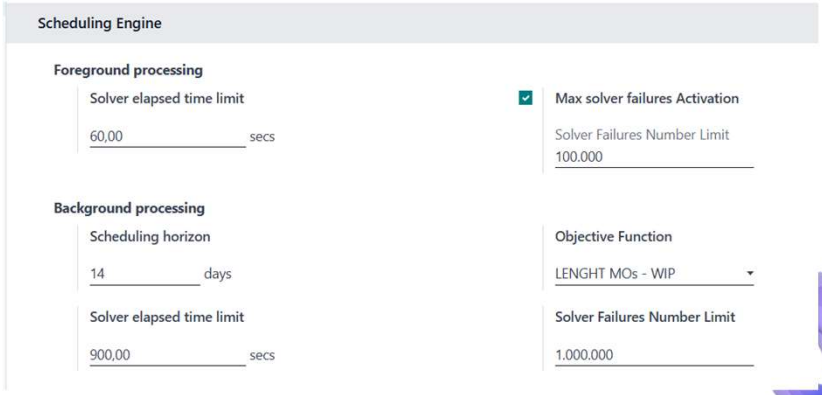
Capacity Leveling
Workorder Sequencing

The outcome is **daily resources capacity leveling** (the master production plan is feasible) and the assignment of the **processing sequence** to workorders. In this way, operations are assigned to production resources without conflicts.

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The Scheduling Engine processing details

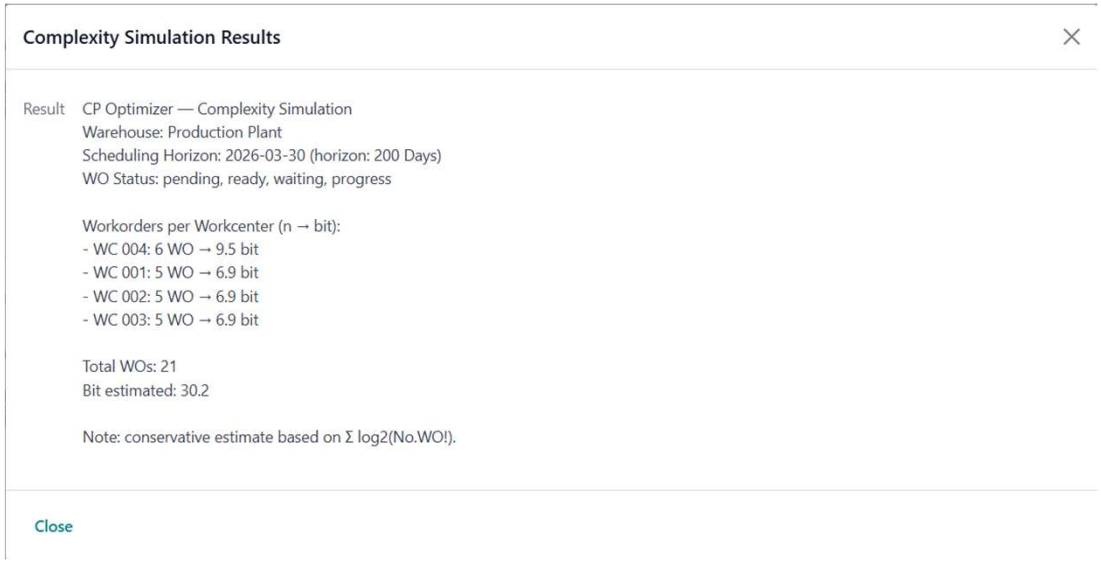
- Workorders are selected by Warehouse (Scheduling Area) and Scheduling Horizon
- In progress workorders are taken into account also as model constraint
- The following **objective functions** (main **KPI**) are available:
  - **LENGTH MOs – WIP**: *Minimize the sum Manufacturing Order throughput time (span) — and therefore the WIP.*
  - **MAKESPAN**: *Minimize the completion of overall Master Production Plan (the total time required to complete all production orders)*
  - **SUM COMPLETITION**: *Minimize the sum of Manufacturing Order Completion Time*
  - **TARDINESS**: *Minimize the sum of positive lateness (delay) relative to the due date*
- The scheduling Engine can be performed in foreground or background (nightly job) with specific settings



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The Scheduling Engine run: simulation mode

The Optimizer can be performed in **simulation mode** for evaluating the **processing complexity**



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The Scheduling Engine Lists

The **Scheduling Engine List** report allows to evaluate the scheduling results, highlighting delays respect to the planned end date

Scheduling Engine List

Print

Warehouse Production Plant

Workorder	Workcenter	WO State	Product	Quantity	Scheduli...	Expected Du...	Scheduled Start Da...	Scheduled End Date	Planned Start Pivot...	Planned End Pivot ...	Expected De...
OP-001	WC 001	Waiting for components	SF-001	10,00	1	630,00	11/09/2025 08:00:00	12/09/2025 10:30:00	10/09/2025 09:28:54	17/09/2025 12:00:00	0,00
OP-001	WC 001	Waiting for components	SF-001	20,00	2	1.230,00	12/09/2025 10:30:00	16/09/2025 16:00:00	10/09/2025 09:28:54	17/09/2025 12:00:00	0,00
OP-001	WC 001	Waiting for components	SF-001	1,00	3	90,00	23/09/2025 14:00:00	23/09/2025 15:30:00	10/09/2025 13:39:17	17/09/2025 12:00:00	147,50

The **Scheduling Work Center List** report enables communication to the shop floor -by production departments, i.e. work centers - of the respective workload (open work orders), the scheduled dates and the scheduling sequence

Scheduling Work Center List

Print

Warehouse Production Plant

Workcenter WC 001

Scheduli...	Workorder	WO State	Production Order	Scheduled Start Da...	Scheduled End Date	Expected Du...
1	OP-001	Waiting for components	PP/MO/00026	11/09/2025 08:00:00	12/09/2025 10:30:00	630,00
2	OP-001	Waiting for components	PP/MO/00027	12/09/2025 10:30:00	16/09/2025 16:00:00	1.230,00
3	OP-001	Waiting for components	PP/MO/00028	23/09/2025 14:00:00	23/09/2025 15:30:00	90,00

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The daily capacity work center load

A chart is available in the work center master to visualize its daily capacity load compared to its available capacity



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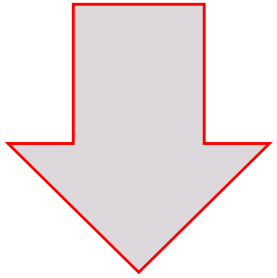
Subcontracting

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The Subcontracting replenishment process

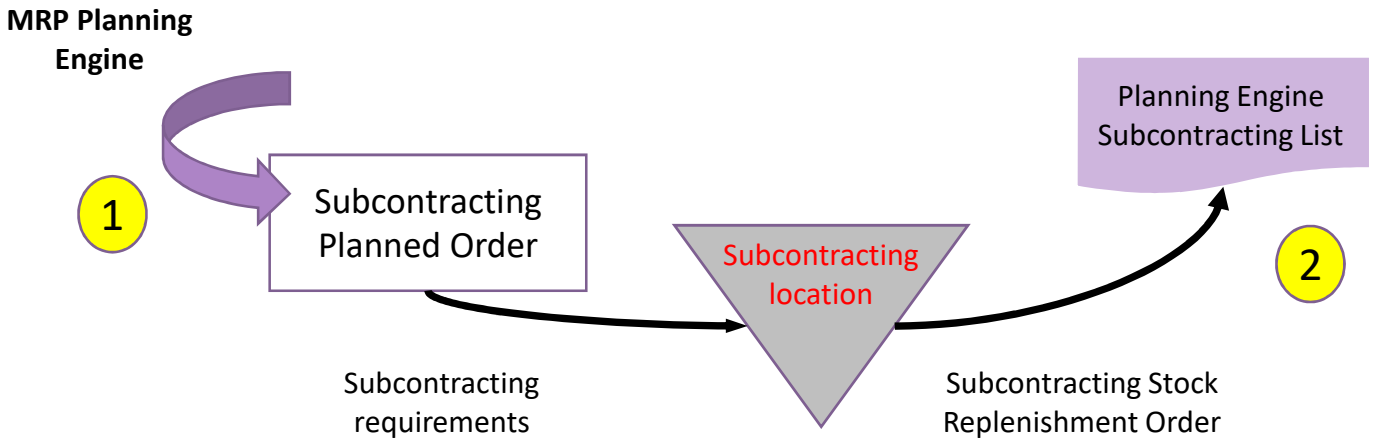
- The subcontracting replenishment process is supported by a new tool, i.e. "**Subcontracting List**": in case of projected stock quantity shortage in subcontracting location, a replenishment element, the "**Subcontracting Stock Replenishment Order**", is created
- By releasing a Stock Subcontracting Replenishment Order, a delivery stock transfer is created from warehouse stock to subcontracting location



The "SFC Subcontracting" module enhances the OpenValue Execution Solution by implementing a subcontracting replenishment process based on the projected stock quantity shortage at subcontraction storage location level

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The Subcontracting Replenishment planning phase

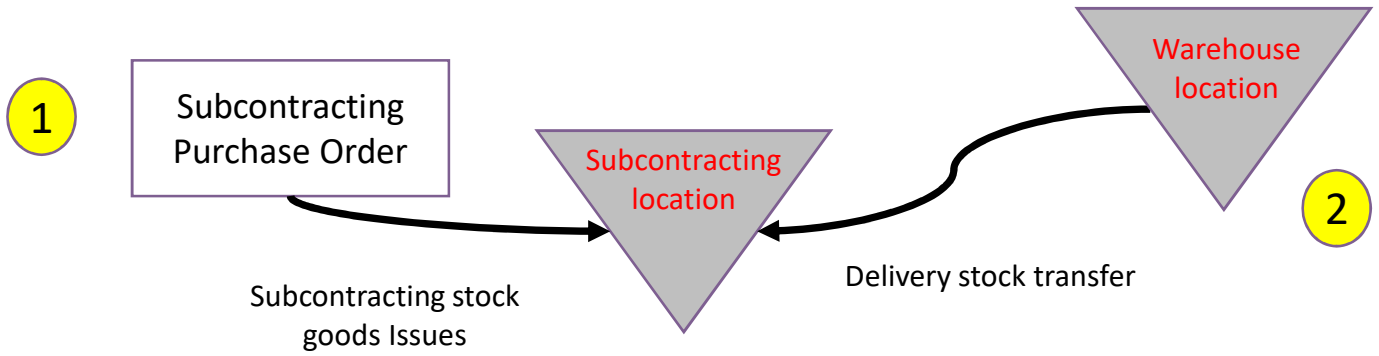


1. In case of quantity shortage the MRP Planning Engine run creates a subcontracting planned order; the subcontracting BoM explosion creates subcontracting requirements on subcontracting location

2. the Planning Engine Subcontracting list points out the projected stock shortage and creates a Subcontracting Stock Replenishment Order to fulfill requirements on subcontracting locazion

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The Subcontracting Replenishment execution phase



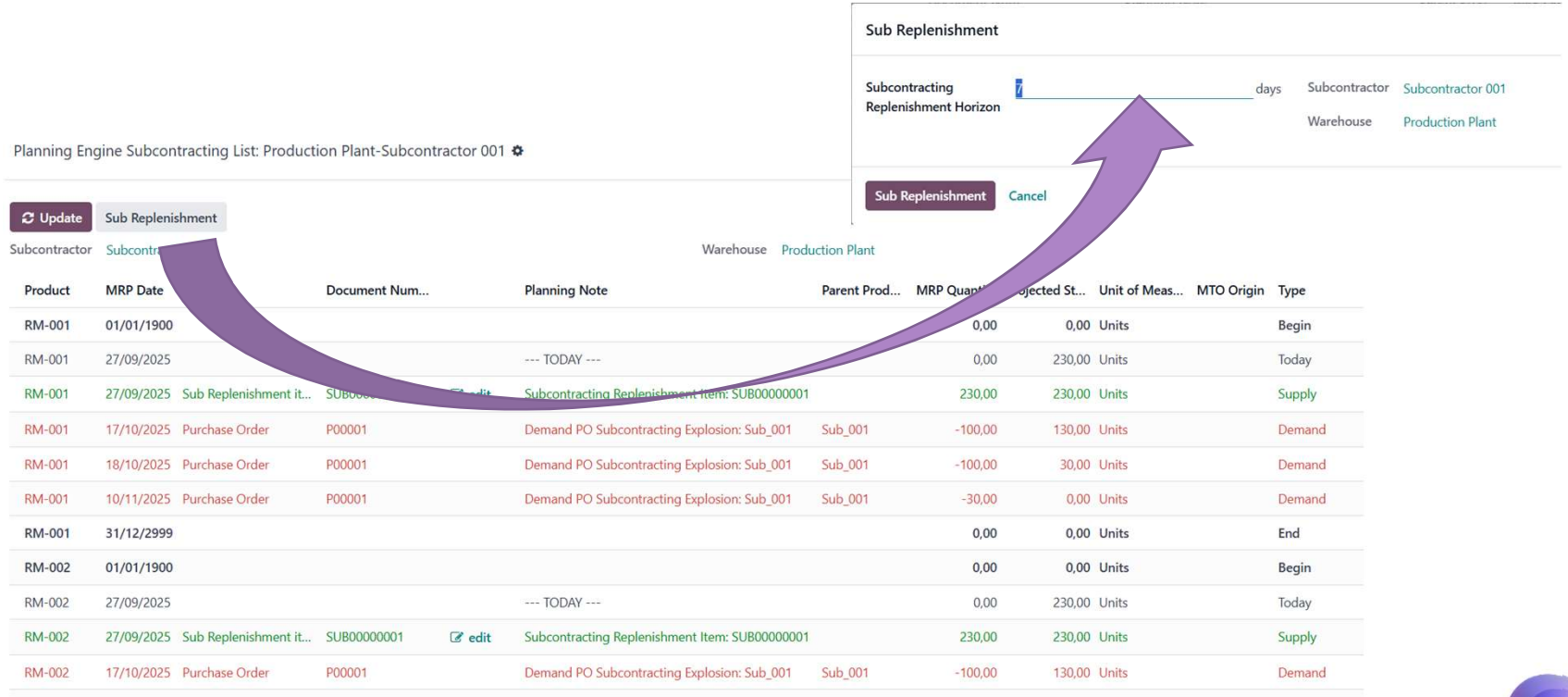
1. The planned order is converted in a RfQ and this in a subcontracting PO. Subcontracting goods movements are automatically created.

2. When confirming the Subcontracting Stock Replenishment Order, a delivery stock transfer is created to fulfill subcontracting requirements

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SFC Subcontracting List

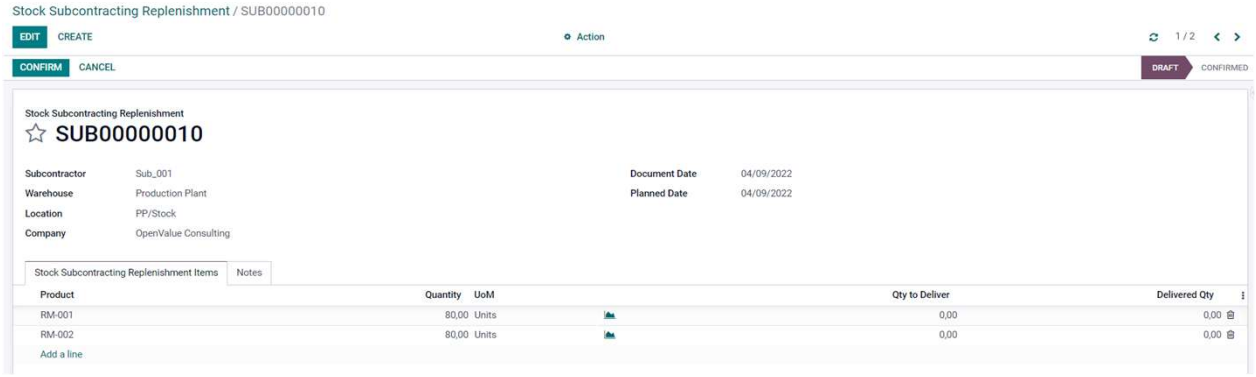
The “SFC subcontracting list” display the projected stock on subcontracting location over the time for all relevant subcontracting components. Subcontracting component requirements from confirmed purchase orders are taken into account only.
By specifying the replenishment horizon, subcontracting replenishment orders are generated to cover subcontracting requirements. Their component quantity can be changed.



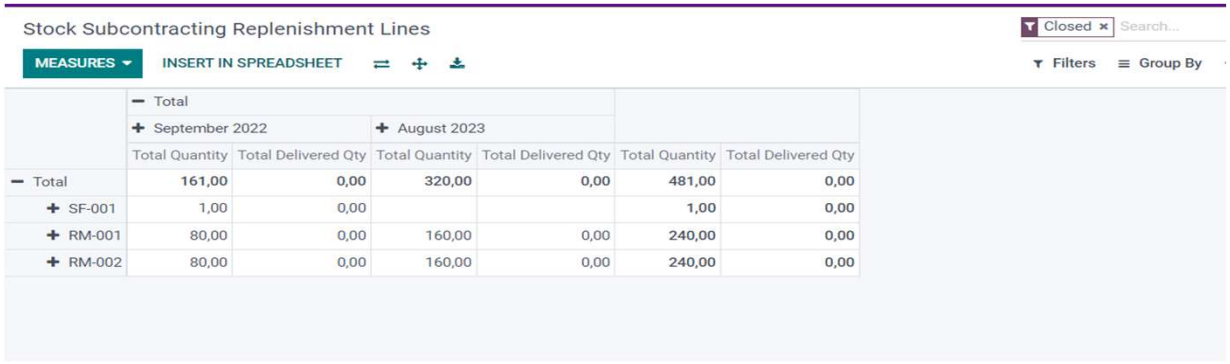
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Stock Subcontracting Replenishment order

A new business transaction is available to replenish Subcontracting location



By confirming it, a delivery transfer is created to fulfill the subcontracting location.
Reporting is available for comparing planned qty with actual delivery qty over the time.



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BoM Management

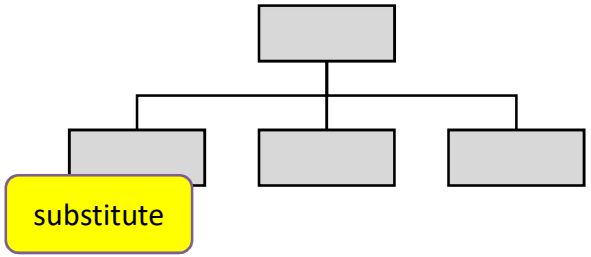
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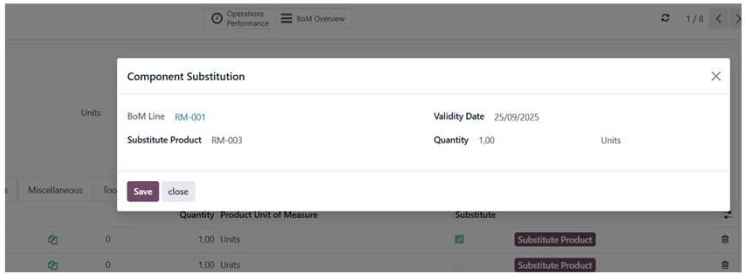


BoM Components Substitute or Alternative Components management

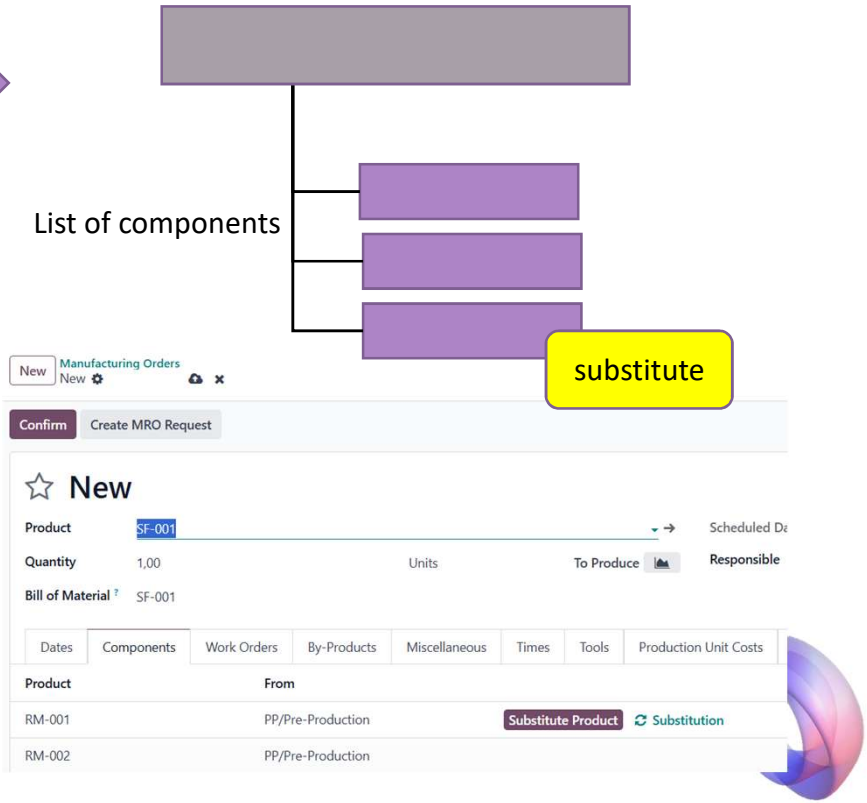
- It is possible to enter a substitute for each BoM item, detailing its code, quantity, unit of measure and Validity Date
- When processing manufacturing orders, single component can be substitute: this is useful for managing equivalent components with the main one, entered in the BoM line, in stockout or **Discontinued Parts process**

Bill of Materials





Production Order

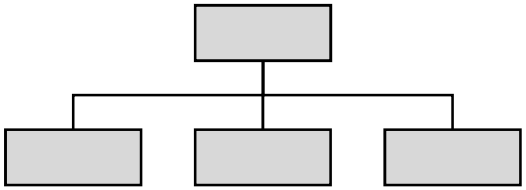


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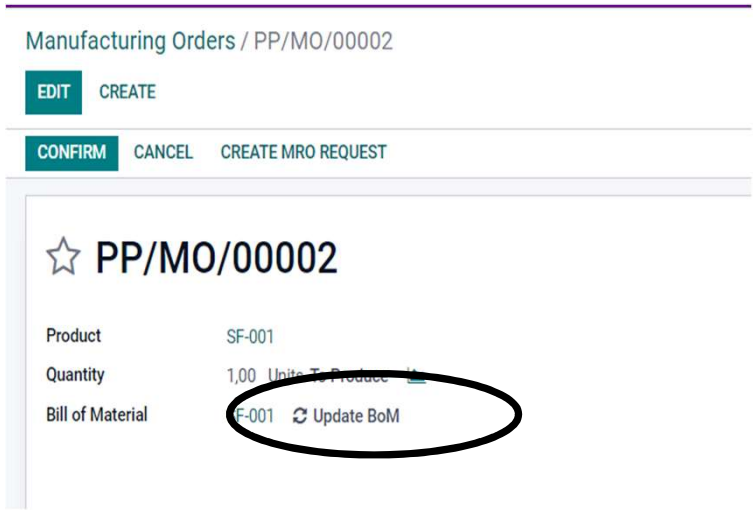
Components and Operations updating in Manufacturing Order from Bill of Materials

It is possible to update components and operations in manufacturing order in draft status only.

Bill of Materials



BoM Alignment

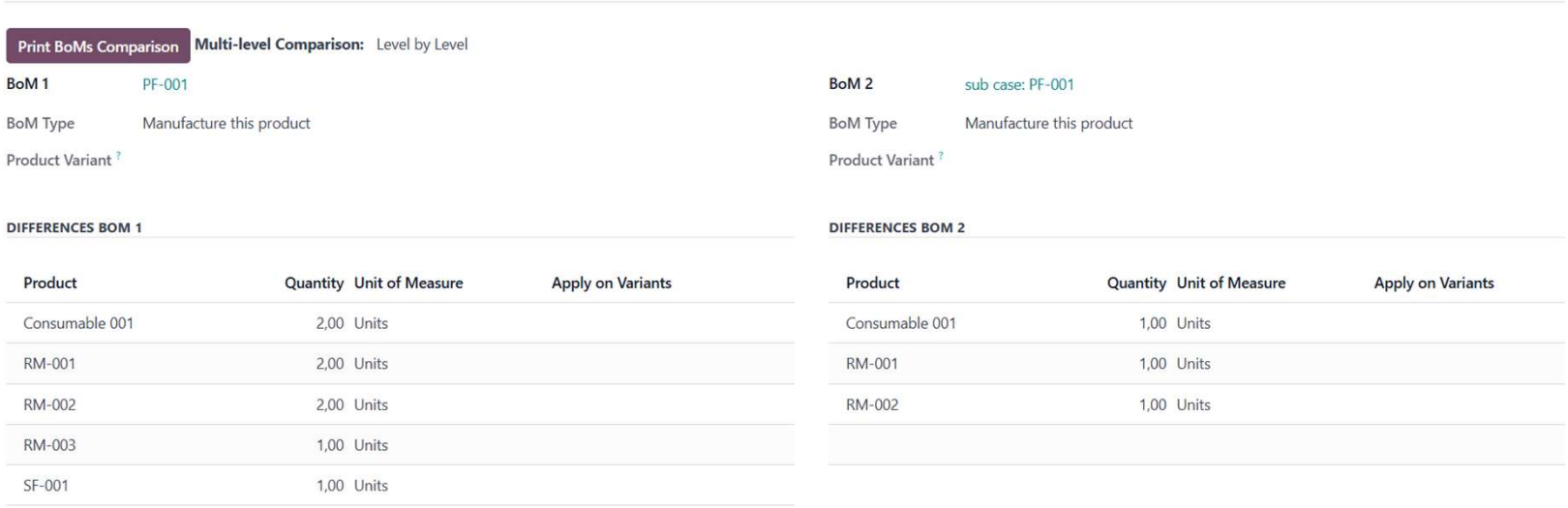


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BoM Comparison

SFC BoM Comparison compares two Bills of Materials as:

- **Single-level** comparison
- **Multi-level level-by-level** comparison (subassemblies/semifinished items included)
- **Multi-level summarized** comparison (components only)



Print BoMs Comparison **Multi-level Comparison:** Level by Level

BoM 1	PF-001	**BoM 2**	sub case: PF-001
BoM Type	Manufacture this product	BoM Type	Manufacture this product
Product Variant		Product Variant	

DIFFERENCES BOM 1

Product	Quantity	Unit of Measure	Apply on Variants
Consumable 001	2,00	Units	
RM-001	2,00	Units	
RM-002	2,00	Units	
RM-003	1,00	Units	
SF-001	1,00	Units	

DIFFERENCES BOM 2

Product	Quantity	Unit of Measure	Apply on Variants
Consumable 001	1,00	Units	
RM-001	1,00	Units	
RM-002	1,00	Units	

It supports the transition from **Engineering BoM (EBoM)** to **Manufacturing BoM (MBoM)**, helping engineering and operations align faster and reduce shop-floor issues.

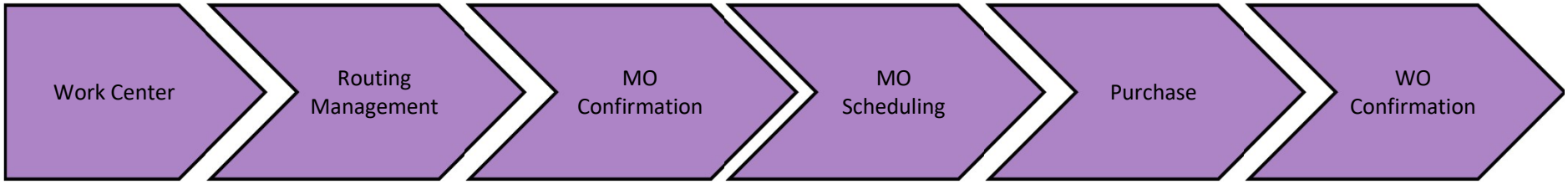
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External Operation

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Shop Floor Control External Operation Process



Set a work center as external operation for managing production outsourcing activities

Checks are performed for operation times

A routing activity is set as external by assigning an external workcenter and an outsourced service product

Checks are performed for operation times

When confirming a Manufactiring Order, checks are performed to ensure full integration with purchase

Check is performed to avoid to cancel or reset the scheduling for MOs with confirmed purchase orders for external activities

In manufacturing order scheduling, a RfQ is automatically created for outsourced activities.

Manufacturing order scheduling is performed by taking into account purchase lead times

Purchase order automatically created reporting the reference to the MO.

The order and delivery dates are derived from order scheduling

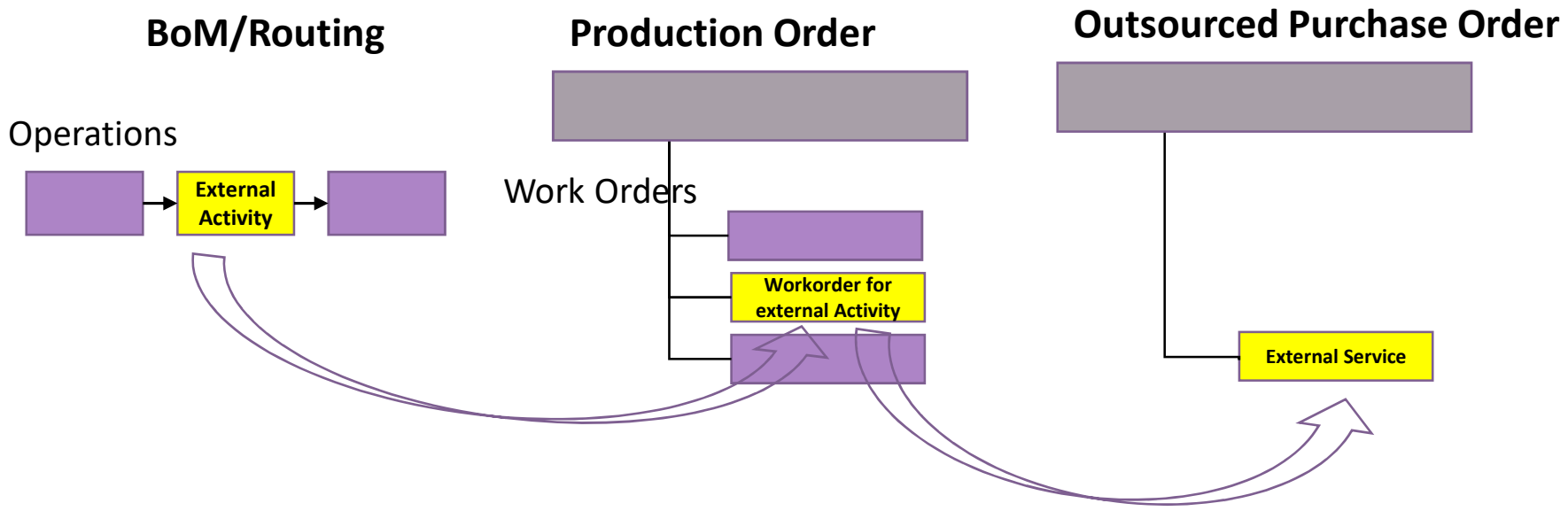
Work Order Confirmation is designed specifically for external activity management.

An E2E process is supported from purchasing and production master data to purchase order invoice and work order confirmation

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Shop Floor Control External Operation Process

Due to capacity constraints or technological specialization, some production activities (workorders) are to be outsourced to suppliers



For an effective solution in managing the outsourced production activities process, shop floor management is fully integrated with purchasing

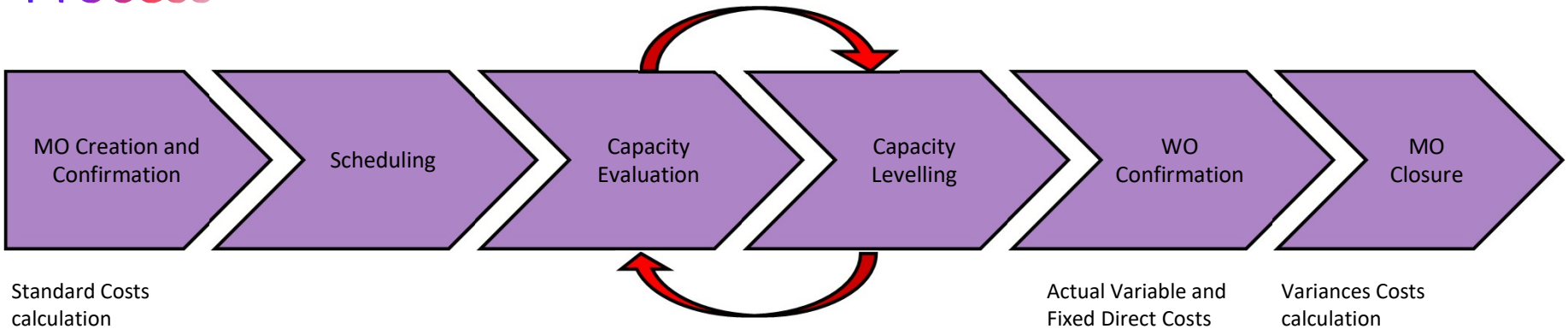
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Product Costing

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The Product Costing in the Manufacturing Execution Process



Standard Costs calculation

Planned Costs calculation and their freezing at manufacturing order confirmation phase

Actual Variable and Fixed Direct Costs determination

Financial and Analytic Postings for Actual Direct Costs

WIP calculated at Manufacturing Order Level

Variances Costs calculation

Financial and Analytic postings for Variances Costs

Overhead Costs and Full Industrial Cost determination

Analytic postings for Overhead Costs

The **OpenValue Product Costing** module supports the decision-making process in manufacturing execution providing with all necessary manufacturing costing figures

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Manufacturing Costs classification

Standard Costs calculated based on the manufacturing data structure, i.e. BoM and standard costs in product master data; these are useful for engineering manufacturing dpt as reference to design costs

Planned Costs calculated from components and operation in production order before its executing (freezing at production order confirmation phase) to provide a reference starting point to measure production department efficiency

Actual Costs determined in real time during the manufacturing execution phase related to real components consumption and real workorders execution times; variances costs are determined and posted at production order closure

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Manufacturing Cost figures

All costing figures are provided both as unit and overall amount at manufacturing order level

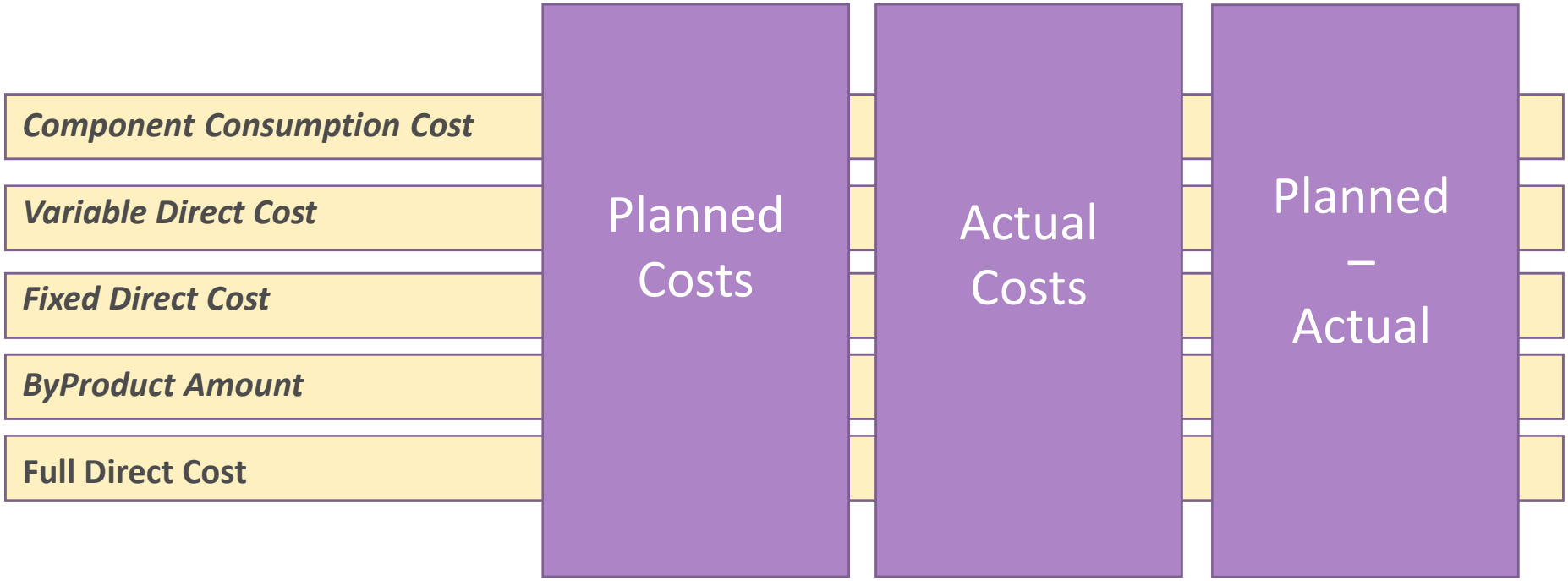
- ***Component Consumption Cost***
- ***Variable Direct Cost***
- ***Fixed Direct Cost***
- ***ByProduct Amount***
- **Full Direct Cost =** Component Consumption Cost + Variable Direct Cost + Fixed Direct Cost - ByProduct Amount
- ***Full industrial Cost*** = Full Direct Cost + Overhed Costs

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Production Cost delta analysis

delta analysis between planned costs and actual ones related to all direct costing figures at manufacturing order level



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Overhead Costs

variable direct overhead costs calculated from actual workorder variable direct costs

fixed direct overhead costs calculated from actual workorder fixed direct costs

components consumption overhead costs calculated from actual components consumption costs

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Cost Variances

Specific financial and analytic accounts are assigned to each cost variance
Financial postings are to balance WIP account at manufacturing order closure
Analytic postings for assign cost variances to their responsability

- ***Planned Costs Variance:*** standard cost compared to full planned direct cost
- ***Material and By-Products Variance:*** actual components consumption costs to the planned ones
- **Direct Costs Variance:** actual workorder times costs to the planned ones

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WIP Calculation

WIP evaluation in real time by taking into account the following cost components:

- raw material consumption allocation at planned values (cancelled at order closure)
- components consumption overhead costs at planned values (cancelled at order closure)
- direct costs
- variable direct overhead costs
- fixed direct overhead costs
- raw material consumption cost

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Reporting

List of closed manufacturing orders with actual costing figures; check whether the financial closure has been performed

Pivot for costing figures over the time (mothly based)

Graph for costing figures over the time (mothly based)

Review of “cost analysis” report at production order level to be consistent with the openvalue product costing logic

Production Cost Analysis report consistent with the OpenValue product costing business logic

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Production Cost Analysis report

The PRODUCTION COST ANALYSIS report is available at manufacturing order level for detailing all cost elements in the OpenValue product costing business logic.

Manufacturing Orders / PP/MO/00005 / Cost Analysis

PRINT

SF-001 - 1.0 Units

Cost of Components

Components	Quantity	Unit Cost	Total Cost
RM-001	-1,00 Units	10,00 €	-10,00 €
RM-002	-1,00 Units	10,00 €	-10,00 €
Total Cost of Components			**-20,00 €**

Operation costs splitted in fixed and Variable ones

Cost of Operations

Operation	Fixed Cost	Variable Cost	Total Time	Total Cost
ACT-001	-60,00 €	-100,00 €	01:30 hours	-160,00 €
ACT_002	-60,00 €	-100,00 €	01:30 hours	-160,00 €
Total Cost of Operations				**-320,00 €**

By Products

By Product	Quantity	Unit Cost	Total Cost
BYPROD_001	1,00 Units	10,00 €	10,00 €
Total Amount of By Products			**10,00 €**

By Product cost as component of the overall product costing

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The Plant Maintenance Solution

MRO Maintenance

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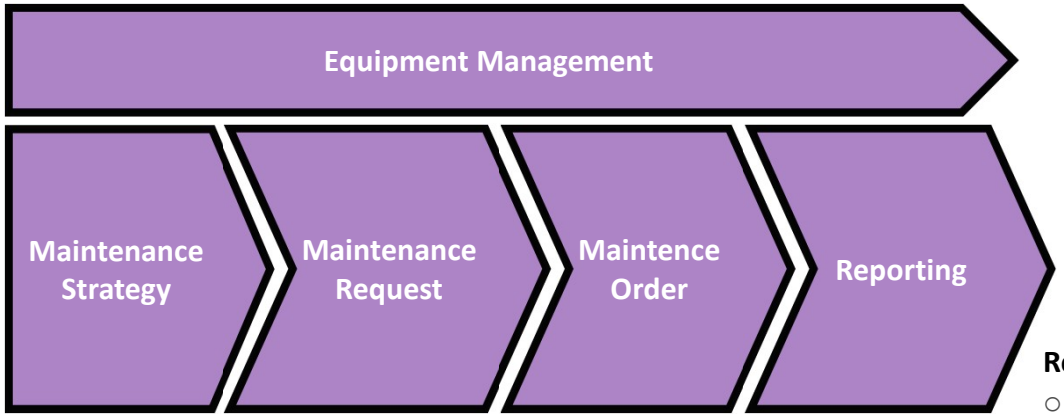


The Maintenance management overview

Maintenance master data
- Functional location
- Meter management
- Gauge management
- Spare parts
- Tool management
- Check list
- Maintenance task

Maintenance Team
- Dashboard
- Team members assignment
- Cost management

Equipment master data
- Location assignment
- Equipment status management
- equipment hierarchy
- Document management



Maintenance strategies
- Corrective
- Preventive
- On condition
- Periodic
- Maintenance Plan
- Inspection
- Retrofit

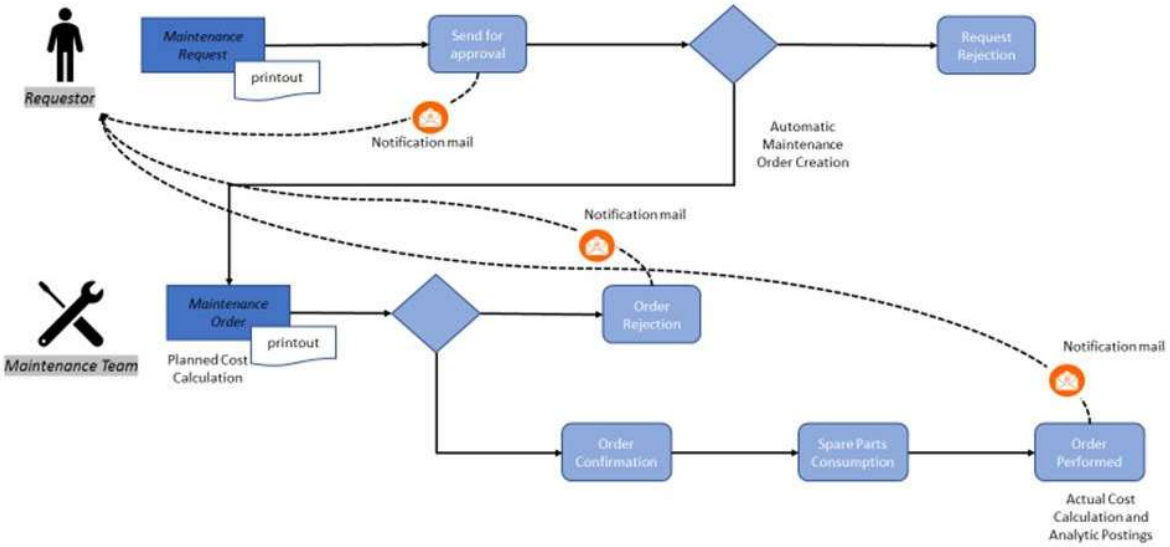
Integration features
- Priority management
- Accounting integration
- Email communication
- Activity management
- Document management

Reports
- equipment cost analysis
  equipment hierarchy cost analysis
- maintenance cost analysis
- tool utilization analysis

The “MRO Maintenance” supports maintenance processes management with different maintenance strategies.

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The main maintenance process



Remarks

- The maintenance request is for requesting maintenance job for the corrective, inspection and retrofit maintenance strategies.
- Maintenance orders can be created manually without any maintenance request as reference or automatically as result of maintenance procedures run (on condition, periodic and maintenance plan)

The maintenance process steps

- maintenance request creation and its printout
- approval request (communication via email)
- maintenance order automatic creation after approving maintenance request
- spare parts, tools and check list assignment to maintenance order
- scheduling execution dates with planned duration
- maintenance order printout
- maintenance order confirmation and maintenance planned cost automatic calculation
- execution of maintenance job checking material availability and reserving tools
- maintenance order closing and actual cost calculation and analytic account postings

Equipment management

- An Equipment is assigned to a Functional Location as:
  - Scrap location
  - Operative location with hierarchical structure
  - Warehouse location

- The Equipment Status management with the possible following values:
  - Warehouse,
  - Breakdown,
  - in Maintenance (maintenance order running),
  - Operative (installed) and
  - Scrapped (no maintenance order creation)

- The equipment status is automatically determined based on its functional location and its maintenance orders in progress

- Hierarchical representation of complex equipments' structure

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Key performance indicators

At equipment level, the following KPIs are available:

- **Mean Time To Repair (MTTR)** is an average time for performing corrective maintenance
- **Mean Time Between Failure (MTBF)** is an average time between corrective maintenance order actual closure dates and next corrective maintenance order planned request dates
- **Next maintenance date** from the next open maintenance order
- **Last failure data** from the last corrective maintenance order
- **Estimated time before next failure** calculated as Last failure data + MTBF



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Maintenance Request

Process steps:

- The maintenance request is created detailing equipment, request date, maintenance type, requester, priority and cause (detailed description of maintenance request, reported in the related maintenance order)
- After saving, a mail is sent out to the requester for maintenance request approval
- the requestor can approve it and a maintenance order with reference to this request is automatically created
- or reject it detailing the rejection reason, reported into the related maintenance request
- the maintenance order confirmation moves the maintenance request state in execution
- after performing the maintenance job, so closing the maintenance order, the maintenance request will be automatically closed (state done)

State management with the possible following values:

- Draft → initial creation state
- Confirmed → requester approval performed
- Execution → maintenance order running
- Done → maintenance order closed
- Rejected → maintenance request rejected
- Cancelled → maintenance request cancelled

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Maintenance Order 1/2

Process steps:

- A maintenance order is created manually or automatically by approving a request
- maintenance request is reported into the related maintenance order
- scheduling by entering the end schedule date and the planned duration (backward scheduling)
- maintenance manager can approve or reject maintenance order
- in case order rejection, a mail is sent out to the maintenance requester
- spare parts, tools, planned duration and check lists are suggested by default by selecting the proper task
- maintenance order printout (with all needed information for performing it)
- at order confirmation, the planned costs are automatically calculated and actual start execution date is set
- the order closing sets the end execution date, calculate the actual costing figures and performing analytic posting; a mail is sent out to the requestor to inform him/her the maintenance job has been performed
- analytic postings on analytic account set in maintenance team master data for spare parts costs, labor costs and tools utilization costs

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Maintenance Order 2/2

State management with the possible following values:

- Draft → initial creation state
- Released → order approved with waiting parts
- Ready → order approved with available parts
- Done → maintenance order closed
- Cancelled → maintenance order cancelled/rejected

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The maintenance procedures

- **On Condition Maintenance**
- **Periodic Maintenance**
- **Maintenance Plan**

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On condition maintenance procedure

- On condition maintenance is based on actual measures provided by a gauge installed to an equipment.
- A maintenance order is automatically created whether a measure is out of the allowed interval.
- Therefore, the process is triggered for “not processed” measures outside the allowed interval/thresholds for gauge assigned and installed to an equipment and an active maintenance order is not already running
- A new on condition maintenance order is created and all not processed measured are set as processed
- The reference to the new maintenance order is recorder on the related measure for tracking purposes

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Periodic maintenance procedure

- Periodic maintenance is based on actual equipment utilization provided by a meter installed to an equipment.
- A maintenance order is automatically created whether cumulated utilization or working time spent from the last maintenance order exceeded defined threshold.
- the process is triggered based on the following conditions:
  - the actual time calculated from the last periodic maintenance order (if none, meter installment date) is upper than a threshold
  - the actual utilization calculated as actual measure – “utilization from the last periodic maintenance order” is upper than a threshold
  - an active maintenance order maintenance order is not already running
- a new periodic maintenance order is created#
- the reference to the new maintenance order is recorder on the related measure for tracking purposes

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Maintenance plan procedure

- The Maintenance Plan defines a list of planned maintenance jobs for a specific equipment as a list of planned date, planned utilization and maintenance task.
- A meter has to be assigned to an equipment subjected to maintenance plan.
- Based on actual utilization and the current date compared with planned utilization and maintenance planned date a maintenance order is created.
- The process is triggered when one of the following two conditions occurs for a maintenance plan item and an maintenance order is not already running:
    - the planned date is in the past
    - the actual utilization calculated as actual is upper than the planned utilization
- a maintenance plan order is created and its reference is recorded on the related maintenance plan item for tracking purposes
- after processing the maintenance plan order the maintenance plan item is closed
- Maintenance plan procedure can be performed manually and reporting the maintenance order on the corresponding maintenance plan item.

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SFC MRO Maintenance Integration

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Maintenance integration in Work Center master data

- Workcenter can be assigned to an Equipment; therefore, all maintenance activities can be performed with reference to a workcenter
- A periodic maintenance as maintenance policy can be activated and collect automatically workorder confirmations as meter measures
- Maintenance Requests can be raised from the Workcenter master data; the user should have maintenance permission
- Maintenance Requests and Maintenance Orders with reference to the equipment linked to a workcenter are collected in the related Workcenter master data
- In case a Maintenance Order is running, the Workcenter status is automatically set from “Ready” to “On Maintenance”



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Maintenance integration in Manufacturing Order process

- Maintenance Request can be raised when Manufacturing Order is running
- All Maintenance Requests created for maintenance activities related to a manufacturing order processing are collected in the manufacturing order
- It is not possible to confirm a workorder when the related workcenter is “on maintenance” status
- It is not possible to confirm a milestone workorder whether a previous workorder to be closed is linked to a workcenter in “on maintenance” status
- In case periodic maintenance indicator has been activated at workcenter level, workorder confirmation creates automatically a meter measure
- Workcenter status is reported in the workorders list.

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