SO99+ Replenishment

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SO99+ Supply planning development areas

1

Dynamic Planning

Take your inventory and replenishment planning from static to dynamic, optimized across your entire network

2

Advanced Replenishment and Aggregate Constraints

New and enhanced aggregate constraints on transfers / purchases and advanced replenishment functionalities

3

Explainability

Overall improvements to transparency and ease-of-understanding for results

4

Modularization

Our Replenishment engine has been modularized to improve flexibility and reaction speed

Agenda

- Probabilistic BOM
- Automatic lead-time adjustment based on order expected delivery dates
- Backup Suppliers
- Throughput capacity
- Maximum consolidation horizon
- Net lead-time extension in delivery constraints
- Replenishment incoherency detection and price breaks
- New Proposal status

Dynamic Planning

Dynamic Planning in SO99+

Key objectives:

- Quick adaptation to changes
- Automatically adjust inventory and replenishment
- Mitigate the risks of uncertainty
- Optimize flow of goods
- Optimize for service level

You might have missed in SO99+:

- **Dynamic sourcing** and **Multi-sourcing**: reducing supply risks

- **Dynamic stock levels**: automatically adapt stock levels to demand and supply changes

Probabilistic BOM

Challenge

A finished product has some **variants** and can be configured by the final customer. It is very **difficult to correctly plan** the replenishment of its components, given that the finished product's stock, demand and forecast is not differentiated for each possible variant.

Solution

SO99+ can calculate the **probability of usage of each component in the bill of materials**, and it can then plan the optimal inventory and replenishment levels of each component by using these probabilities.

Benefits

- Optimal replenishment of **«optional» and «alternative»** components in bill of materials
- Alternative or optional components can be used in multiple bill of materials or locations, with **different probabilities** of usage for each one of them, and sold directly
- **Automatic calculation** of probabilities of usage

Probabilistic BOM

Key Functional Highlights

The Bill of Materials can have a mix of **standard** components, **optional** components and **alternative** components

Automatic calculation of probability of use of components based on **historical consumption** (optional)

The **probability of use** is considered in stock levels, variability, kit requirements propagation and proposal calculation

Outflow Type: Kit consumption

Kit consumption

Kit	Description	Units used	Probability of use	Alternative Component Group	[Units] / Month	Lines / Month	Demand variability	Order line variability
FF706	kit F706	2	0.26	CGR2	436.2788	11.7894278	0.267050683	0.258931041
Total					**436.278809**	**11.789428**		

Probabilistic BOM

Use cases

- Highly common requirement for **manufacturing** customers
- Effectively manage the replenishment of components based on **frequency of inclusion** in semifinished and finished products
- Manage **variants** of a product using a common forecast, safety stock and stock value

- Replenishment planning of components used for **product customization** at time of sale

- **Optimal inventory management** with lower risk of over and under-stocking optional or alternative components

Automatic Lead-Time Adjustment based on Incoming Order Expected Delivery Date (SKU-L level)

Challenge

When supply is uncertain, **delivery dates can be subject to delays** that can have significant cascading effects in a multi-level network. If planning uses the “standard” replenishment lead-time, the results and **the effect downstream can be misleading**.

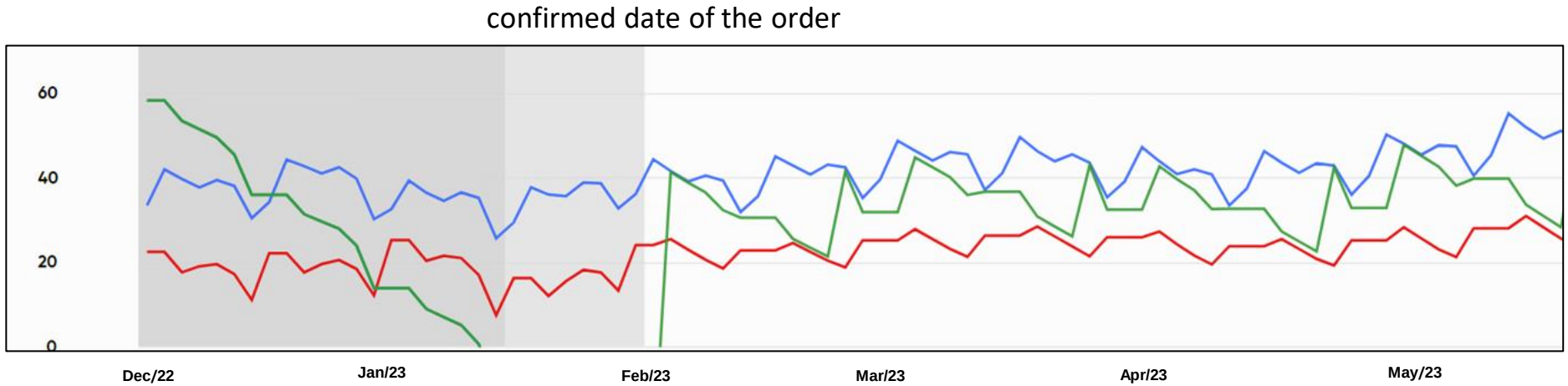
Solution

When there is a supply disruption, the system can **deduce the current effective replenishment lead-time** and **replan** the entire network replenishment **based on the latest confirmed delivery dates** from the on-orders (if longer than the standard lead-time) without changing target stock levels.

Benefits

- **React quickly** to supplier and network transfers delays and plan accordingly
- **Flexibility** to choose which SKU-L it applies to and the time horizon of on-orders that may affect the effective lead-time
- **Fairly allocate** the available stock based on expected delivery dates and evaluate the **projected lost sales** in each node of the network

Automatic Lead-Time Adjustment based on Incoming Order Expected Delivery Date (SKU-L level)



Backup Suppliers

Challenge

Due to their lower costs, primary suppliers are often located far away with long lead times.

As a consequence:

- The probability that shipments get delayed is quite high
- There can be exceptional customer orders that cannot be served on time

Solution

A behind-the-corner supplier, which typically offers higher costs but a much shorter lead time, can be explicitly configured as a backup supplier. **The system can automatically generate orders to the backup supplier(s)**, to keep the projected stock at the right level. This is done **as soon as it realizes the confirmed orders from the standard suppliers are coming too late** to meet the expected demand, putting those orders at risk.

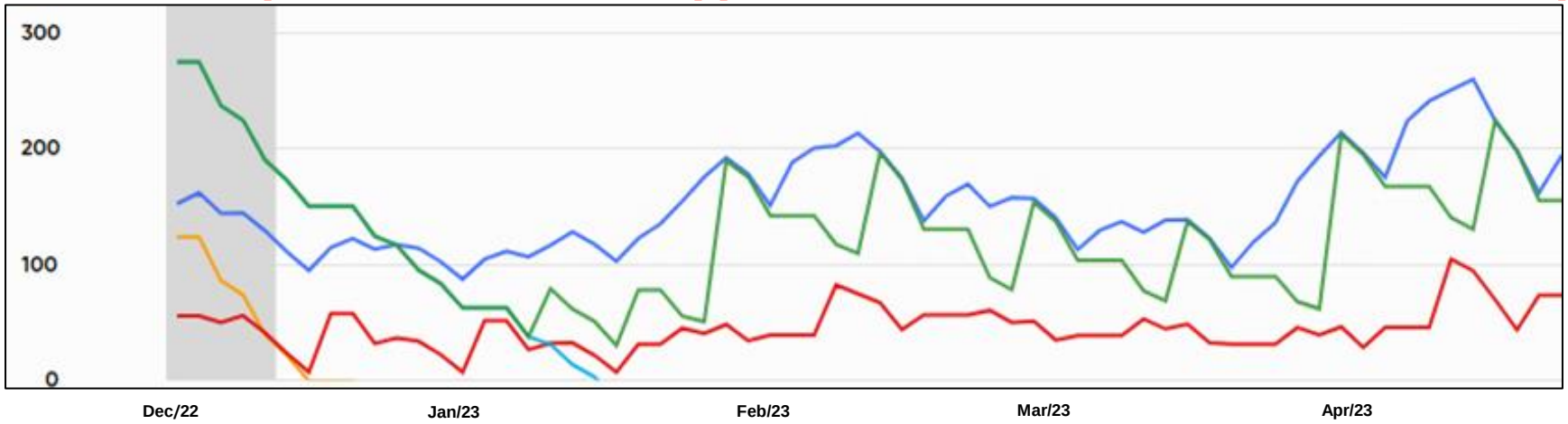
Benefits

- **Keep the stock at the right level** to meet planned service levels, even when facing situations where suppliers are not able to deliver on-time
- The system **picks the lower cost supplier** among those available to deliver in time to avoid an impact on the projected stock level

Backup Suppliers

Replenishment from backup supplier(s) with shorter lead-time

Replenishment from primary supplier(s)



Proposal Index	Source / Supplier	Proposal Release Date	Proposal Shipping Date	Proposal Due Date ↑	Unconstrained Quantity [Units]	Constrained Quantity [Units]
7	Supplier: PP01	2023-01-02	2023-01-16	2023-01-17	48	48
11	Supplier: PP01	2023-01-06	2023-01-20	2023-01-21	48	48
1	Supplier: PFC0	2022-12-26	2023-01-25	2023-01-25	160	160
5	Supplier: PFC0	2023-01-02	2023-02-01	2023-02-01	132	132
9	Supplier: PFC0	2023-01-09	2023-02-08	2023-02-08	104	104

Advanced Replenishment functionalities and aggregate constraints

Throughput Capacity

Challenge

In some cases, the “ideal” transfer proposals to downstream warehouses may be too concentrated on specific dates (particularly ahead of demand peaks), overloading the source warehouse on some dates and underutilizing the shipment capacity on others. **Planners are forced to manually spread the shipments to balance the warehouse workload.**

Solution

SO99+ can now be configured to have an **outbound maximum throughput capacity for each warehouse on aggregates of products**, directly constraining the final transfer proposals. The system optimally adjusts the proposals by pulling forward or delaying quantities in accordance with downstream requirements and aggregated workload on the source warehouse.

Benefits

- **Balanced shipments** in the distribution network
- **Automatic proposal adjustments** by considering the target stock levels downstream
- Coherent with Fair Allocation of Source Availability

Throughput Capacity

- Throughput Capacity allows to consider the **maximum daily throughput capacity** for each warehouse
- It adjusts the **final transfer proposals** based on the outbound throughput capacity of user-defined picking zones in the source warehouse.

Multiple **“picking zones”** can be defined in each location, characterized by different throughput capacities (with different unit of measurement).

The throughput capacity can be defined in terms of either:

1. Number of picks per day
2. Number of Handling units/Volume/Cube/Weight/Pallets/Units per day

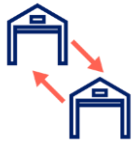
Throughput Capacity

Use cases

- **Limited picking capacity:** The quantity of goods that can be transferred to downstream warehouses could be subject to a limited number of picks allowed per day (due to warehouse layout, labor availability, etc...).

- **Limited shipment capacity:** The quantity of goods that can be transferred each day to downstream warehouses can be subject to a limited capacity of the shipments.

- **Limited processing time**: The items to be delivered may need a time to be processed before the shipment (packing, preparing box, etc…) which may limit the quantity of goods that can be shipped per day.



- **Need to balance the shipments**: there may be the need to reduce outbound transfer peaks and to level the shipments.

Improvements in Supplier constraints and Price Breaks

Challenge

The “Supplier Price Breaks” or “Item Price Breaks” functionalities automatically pull forward and aggregate future purchasing proposals to reach the most convenient price break. However, in cases of perishable goods or storage capacity constraints, it **may pull forward too much inventory,** requiring a manual adjustment.

Solution

A new **“Maximum consolidation horizon”** parameter adds a constraint when the system pulls forward proposal quantities to reach an ideal purchasing quantity.

The constraints, when pulling forward purchasing quantities, may **prioritize** some items over others that may create a bigger overstock in number of days.

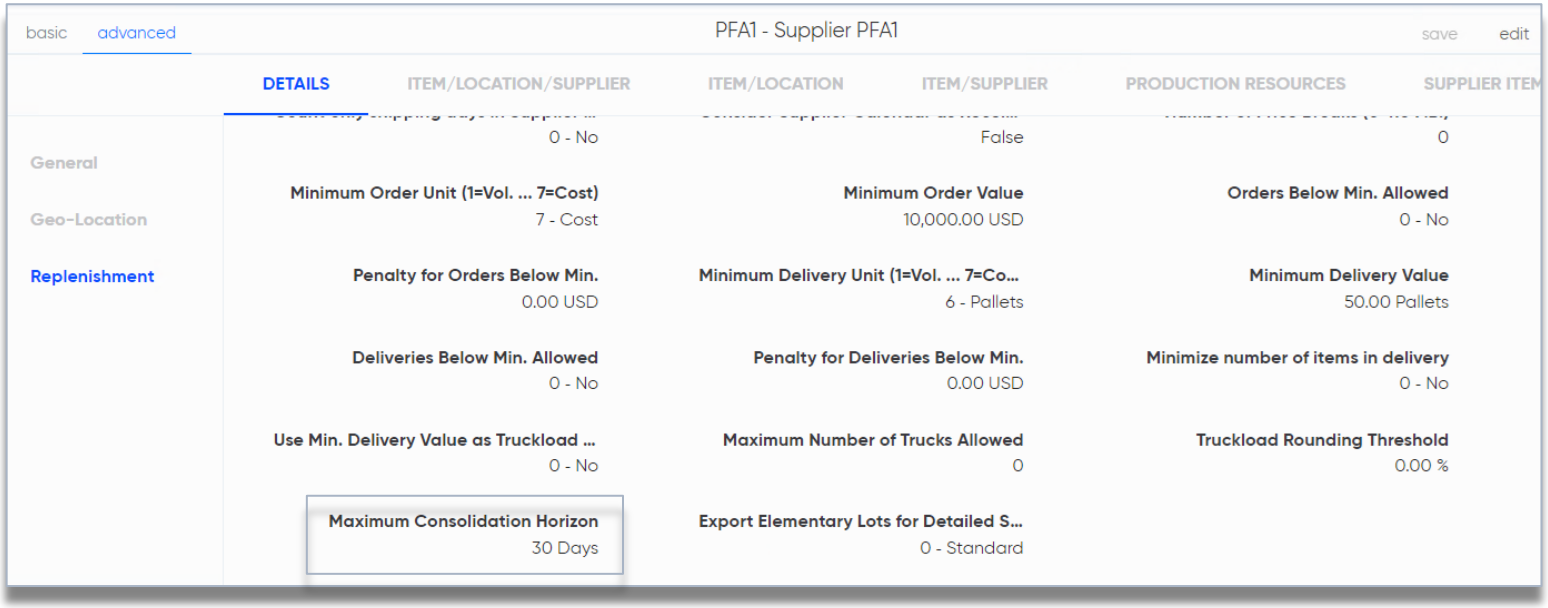
Benefits

- Keep control over **how many overstock days** can be created by supplier constraints and convenient price breaks
- **Avoid ordering too much on specific suppliers**, even if there is a very convenient price break

Improvements in Supplier constraints and Price Breaks

Maximum consolidation horizon

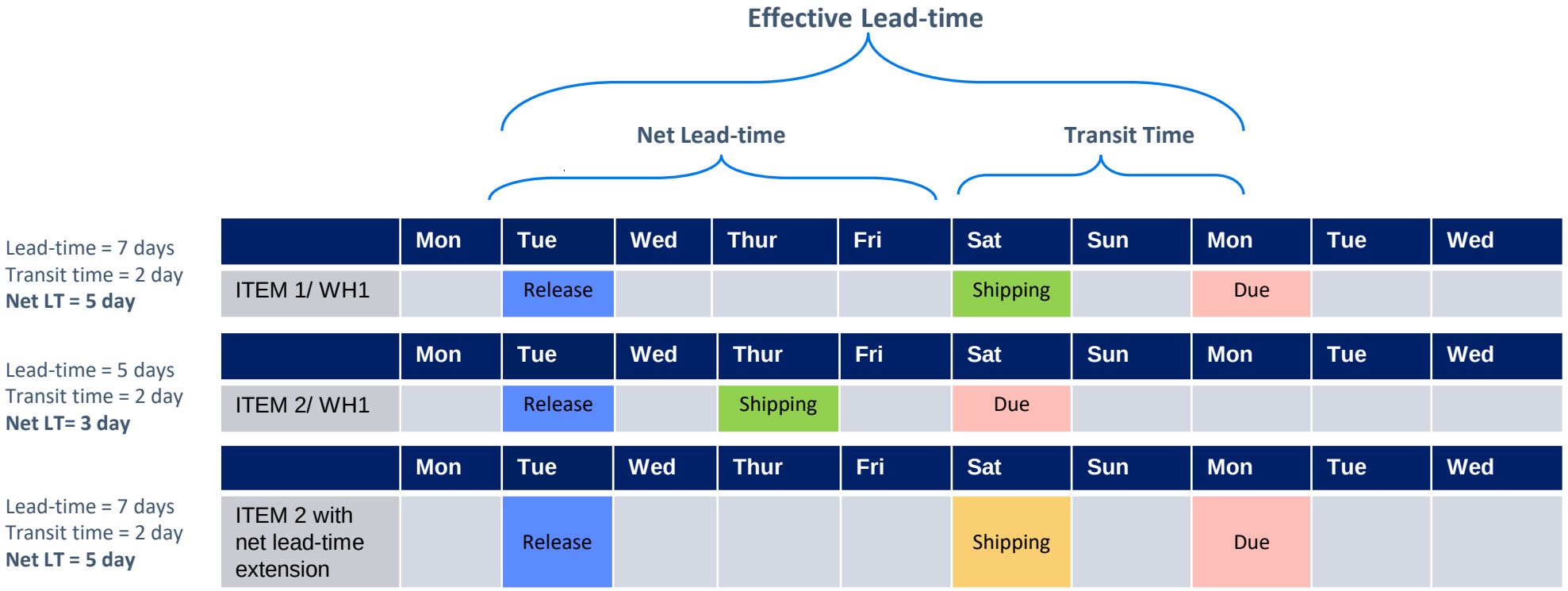
- Represents the **maximum number of days for which a proposal can be brought forward** in order to satisfy a price break or a supplier constraint.
- Applied to: Item price breaks, Minimum delivery value, Minimum order value, Supplier item groups, Supplier price breaks.



Improvements in Supplier constraints

Net lead-time extension

SO99+ can automatically **synchronize the "net lead-time"** of items subject to the same **delivery constraint**, in order to generate coherent shipping dates of planned proposals and realistic projected inventory.



Explainability

Improved “Explainability”

Challenge

In some cases, the tunnel and/or proposals may show **unexpected results** and it is not clear what went wrong. Some examples may be missing proposals, proposals that may bring the projected inventory outside the tunnel, or parameters changed by the system. The user must do an analysis or ask for support to **understand the cause**.

Solution

- **SO99+ Replenishment has an automatic detection of data incoherences** that can show a warning and the action performed, in case it finds data or setting or constraint incoherences during the calculation.
- If a proposal must be changed due to a constraint or a specific calculation setting, an expanded list of **proposal statuses** show the user the specific constraint or setting that affected the proposal.

Benefits

- **Clear explanation** of the cause of unusual proposals
- **Easily identify incorrect data** that may cause nonoptimal replenishment results and prevent future issues
- **Visibility of the parameters automatically adjusted** by the system in case of incoherences

Replenishment Incoherency Detection

The Replenishment **automatic detection of data incoherences** collects all problems it finds during calculations that can lead to incorrect results or parameters changed automatically by the system.

The warnings are shown in a new Tunnel Display tab (selected item/warehouse) and in a report that can be converted as an alert

Examples

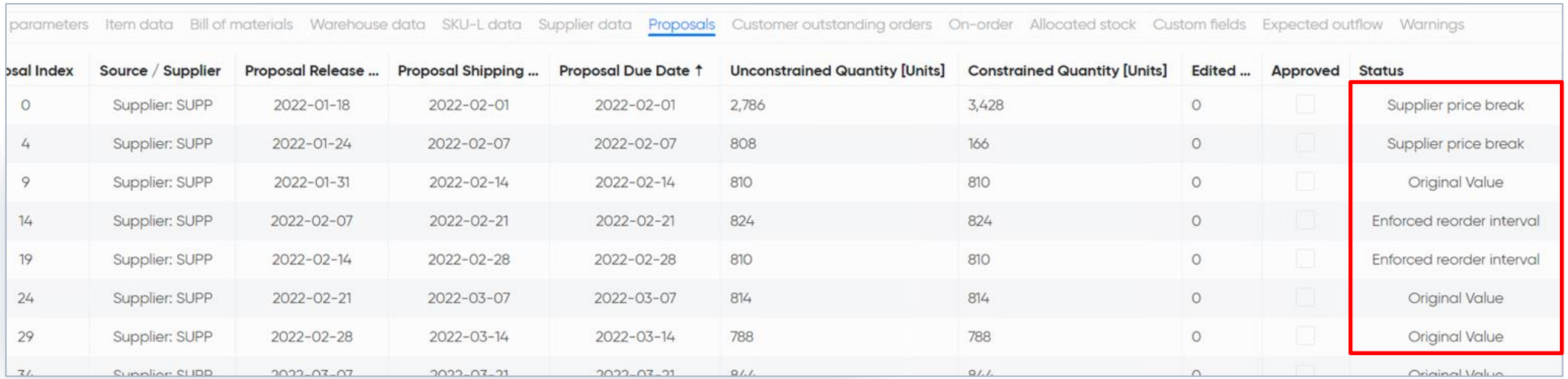
- Transit time longer than minimum lead-time
- UoM not correctly defined at item level, when involved in a constraint based on that UoM
- Production time longer than the net lead-time in Rough Cut Capacity Planner
- Impossible to satisfy a constraint due to another incoherent constraint: i.e. a ‘Maximum consolidation horizon’ parameter that prevents from reaching a Minimum Order Value constraint

Item Code	Warehouse Code	Number of Warning Messages	Last Warning Message	Description
K0031	DC25_1	1	0	Kit item replenished by 'Make' supplier: no proposals calculated
K0032	DC24_1	1	0	Kit item replenished by 'Make' supplier: no proposals calculated
K0032	DC25_1	1	0	Kit item replenished by 'Make' supplier: no proposals calculated
FA535	CW	1	1	Transit time > minimum lead-time: minimum lead-time extended
FA618	CW	1	1,200	Resource production time > net production lead-time: resource production time reduced
FP535	CW	1	1,200	Resource production time > net production lead-time: resource production time reduced
FP394	CW	1	1,200	Resource production time > net production lead-time: resource production time reduced

New Proposal Status

Proposal status has changed to an **expanded list of numeric codes, with related descriptions**, that are visualized in the Tunnel Display.

For users, it is now much clearer which constraint or setting affected the proposal quantity.



parameters | Item data | Bill of materials | Warehouse data | SKU-L data | Supplier data | Proposals | Customer outstanding orders | On-order | Allocated stock | Custom fields | Expected outflow | Warnings

osal Index	Source / Supplier	Proposal Release ...	Proposal Shipping ...	Proposal Due Date ↑	Unconstrained Quantity [Units]	Constrained Quantity [Units]	Edited ...	Approved	Status
0	Supplier: SUPP	2022-01-18	2022-02-01	2022-02-01	2,786	3,428	0		Supplier price break
4	Supplier: SUPP	2022-01-24	2022-02-07	2022-02-07	808	166	0		Supplier price break
9	Supplier: SUPP	2022-01-31	2022-02-14	2022-02-14	810	810	0		Original Value
14	Supplier: SUPP	2022-02-07	2022-02-21	2022-02-21	824	824	0		Enforced reorder interval
19	Supplier: SUPP	2022-02-14	2022-02-28	2022-02-28	810	810	0		Enforced reorder interval
24	Supplier: SUPP	2022-02-21	2022-03-07	2022-03-07	814	814	0		Original Value
29	Supplier: SUPP	2022-02-28	2022-03-14	2022-03-14	788	788	0		Original Value

What’s Next

What's Next

Dynamic Planning

- Inventory and Replenishment with a **Dynamic Network:** Automatic stock levels transitions and distribution to mitigate effects of source changes on the provided service level to the final demand
- Recommendation of **Alternative Transportation Modes**: Quickly react in case of emergencies with the most cost-effective solution
- **Dynamic Capacity Planning:** Automatically switch to another production site or external supplier in case of insufficient production capacity

Modularization

- **On-demand Recalculation of Constrained Proposals** in the network and projected lost sales based on events (like updated delivery dates from the supplier)
- **Tunnel Updates by Item** during the day
- Constraints **APIs**

Recap

Probabilistic BOM

Automatic lead-time adjustment based on order expected delivery dates

Backup Suppliers

Throughput capacity

Maximum consolidation horizon

Net lead-time extension in delivery constraints

Replenishment incoherency detection and price breaks

New Proposal status

toolsgroup/Engage.

Thank You

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