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Supply Chain Management 4.0

WHEN SUPPLY CHAINS BECOME SUPPLY NETWORKS!

Globally acting companies with production sites spread throughout the world may be strongly affected be complexity issues when it comes to supplies within their own and/or through supplier networks, but also in the case of vendor-managed inventory (VMI)

The world becomes more and more globalized and companies with a global footprint do not just cover global distribution networks, but also global supply networks. Thus, it becomes standard that a Chinese plant produces an intermediate that is refined in the US or in Europe. This may happen within own company structures but also with highly integrated suppliers. The result: Planning complexity raises and processes need to be managed transparently and efficiently.

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Network Distribution Planning – The Challenges

Nowadays, the typical production process of globally acting companies covers all five continents: E.g. a Chinese plant may produce an intermediate that can be used for a refining process in the US or in Europe. Hence, the supply chain becomes a supply network and companies are confronted with complex decision-making processes in terms of different transportation routes and their costs. In addition to this, subcontractors are often integrated into this production network as well. In this case, limited capacity has to be considered similarly to the own managed production plants.

By the way, global players sometimes have a very tight bond with special customers. This is reflected by frequently published information about the planned consumption of components provide by the vendor. This process may be beneficial for both parties: The vendor's medium-term forecast data is heavily increased, while the customer can expect that these requirements will always be replenished in time. This agreement is called vendor-managed inventory (VMI).

Overall, the whole distribution network can be described as n:m-network. For each relation exists different means of transport and transport routes with varying delivery times and costs.

Managing such a network turns out to be a real challenge for global-acting companies: Beside the primary goal to reach an excellent service level for all customers, the networking capital and the amount of freight costs are important factors as well. SAP ERP, as one of the world's leading ERP, provides a bundle of basic transactions, e.g. for creating stock transfer orders or subcontract orders, managing the freight forwarders, invoicing of activities, posting goods movements etc. But this system may not be described as a planning/simulation tool for the purpose of managing such complex networks.

ORSOFT Manufacturing Workbench | Network Distribution Planning: A journey through its application

The **ORSOFT Manufacturing Workbench** is an Advanced Planning and Scheduling (APS) system that is designed as an add-on to SAP ERP or SAP S/4HANA. This tool exclusively uses master data and transactional data extracted from the ERP. Within its basic version, ORSOFT Manufacturing Workbench provides a wide range of functions for simultaneous production and material planning. During the planning cycles, the software creates inventory and capacity projections for production plants.

The module **ORSOFT Network Distribution Planning** extends the ORSOFT Manufacturing Workbench by planning functionalities for supply chain managers:

- → Transparent overview of the current situation of multisite factories
- → Monetary evaluation of the networking capital
- → Consideration of transport routes and costs
- → Subcontracting: Planning of limited capacities
- → VMI: Consideration of stock- and requirement information of customers

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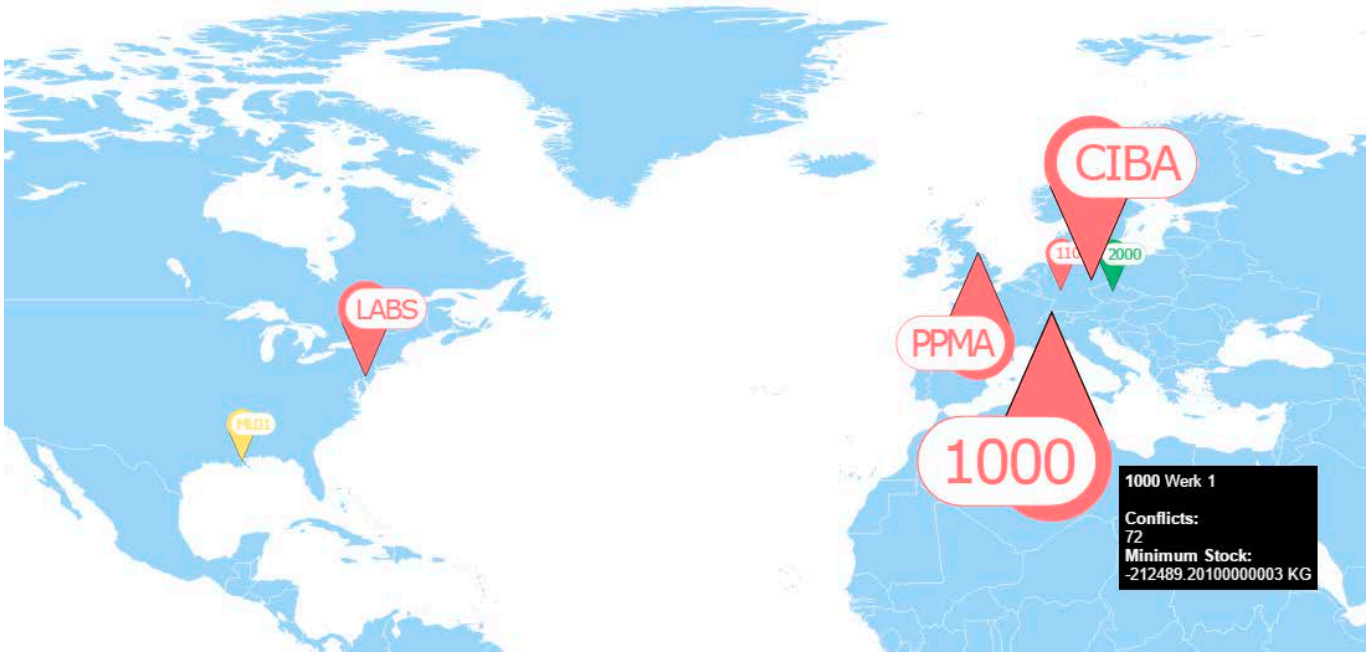
Transparent overview of the current situation of multisite factories

One of the main features of the module is to provide an overview on the current planning situation. The figure below shows the global map of such a network. Red needles illustrate exceptions and alerts for the selected materials and locations. Green/yellow needles, in turn, reflect alert-free/ pre-warning situations. The size of the needles represents the number of conflicts.

Use-Case-Scenario

The document refers to a specific use case applying the ORSOFT Manufacturing Workbench | Network Distribution Planning:

→ Intragroup Plant Network of seven plants named “1000”, “1100”, “2000”, “CIBA”, ”LABS”, “ML01”, and “PPMA”



ORSOFT Manufacturing Workbench | Network Distribution Planning: Global map of a supply network with conflict window

Tooltips show aggregated data regarding the plants and the number of conflicts. If the supply chain planner wants to analyze the situation within one plant, a click on the plant ID opens a table with detailed information about the plant materials and their shortages. There, the first and the most critical shortage during the planning interval is displayed.

Additionally, a variety of important information such as average inventory level or capital tie-up costs are calculated.

For solving shortages in distribution plants, **ORSOFT Manufacturing Workbench | Network Distribution Planning** offers a powerful tool, called Multi-Level Planning Board.

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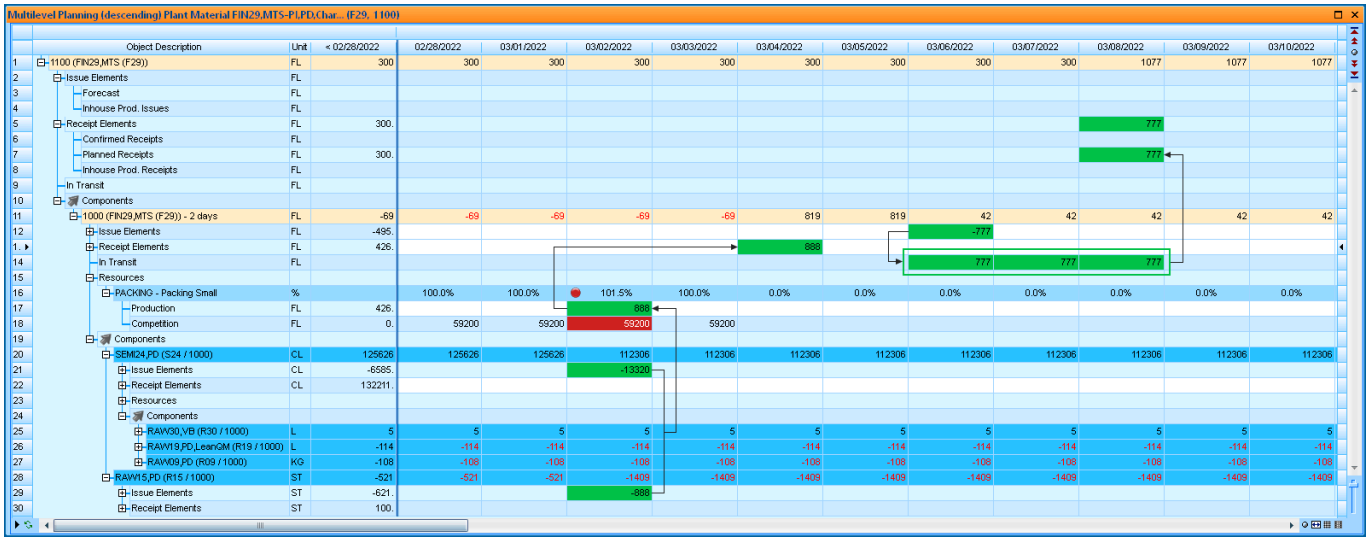


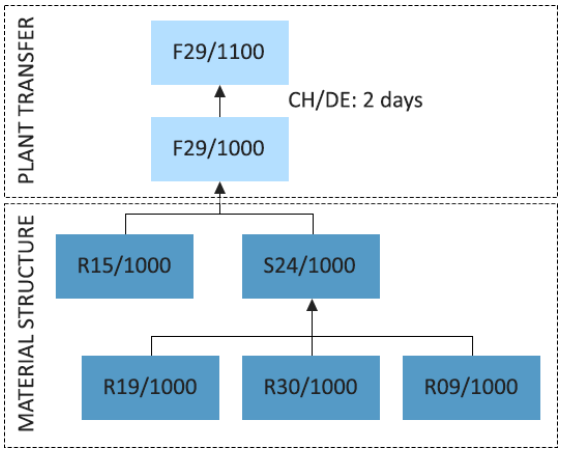
ORSOFT Manufacturing Workbench | Network Distribution Planning: Multi-Level Planning Board

This planning board illustrates, on a timely basis, the simulated stock projection for a distribution plant. The arrows tag a scenario of production, storage and stock transfer from one plant to another. The framed segment represents the transfer period. The green marked fields represent a scheduled production on a fully utilized production line including a conflict situation. For the time of the stock transfer, the material appears as "In Transit". ORSOFT Manufacturing Workbench | Network Distribution Planning is able to use routing tables, planned delivery time of materials, or special Z-tables to derive the transportation time between plants.

Use-Case-Scenario

Network Distribution Planning from production plant 1100 (Switzerland) to distribution plant 1000 (Germany)

- → Production of 888 units (filled 0.15ml bottles) of product "F29"
- → Product "F29" is composed of "R15" and "S24", and stored after one day for Quality Control (QC)
- → Conflict alert (red marking/red dot) due to production capacity issues (101.5%)
- → 777 units of product "F29" is transferred from plant 1100 to 1000 (green frame) within two days



ORSOFT Manufacturing Workbench | Network Distribution Planning: Material Structure & Plant Transfer

The supply chain stretches over one distribution plant, whereas one plant is the production site, and the other plant the distribution site. If it is maintained in the ERP system, the utilization rate of the material's main production resource can be displayed. This number enables the supply chain planner to transfer production to other plants or to pull additional production to this plant.

If necessary, a changed number in the line "Receipt Elements" creates production orders, stock transfers or inter-company purchase orders from the production plant to the distribution plant that delivers the production to the customer.

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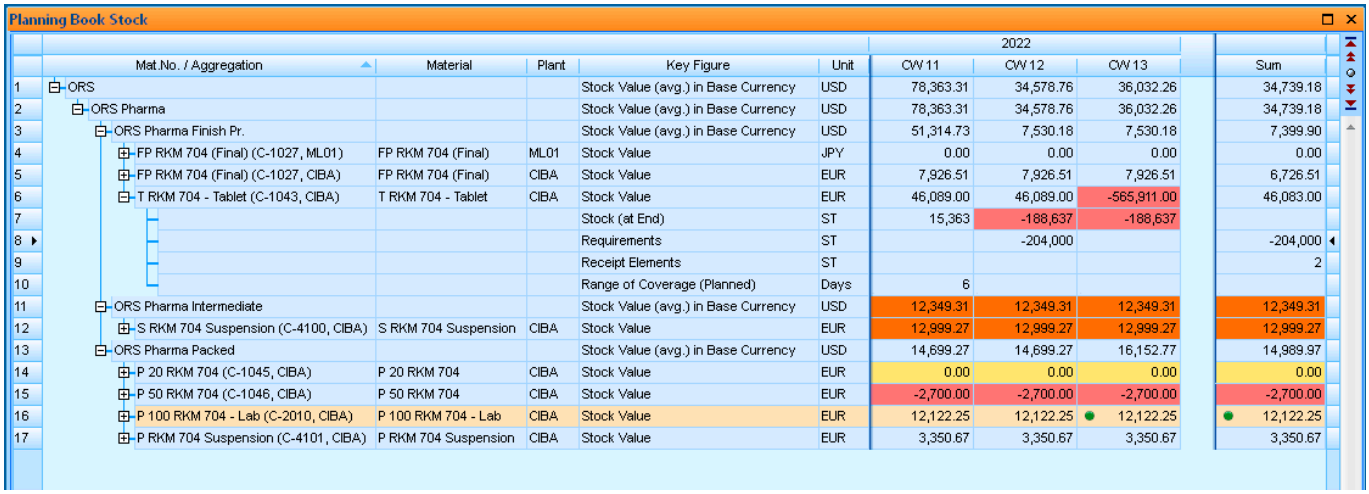
Monetary Evaluation of Net Working Capital

The ORSOFT Manufacturing Workbench | Network Distribution Planning also provides functionalities to calculate and to visualize the stock projection for each location and material and its monetary expression.



Planning Book Stock

	Mat.No. / Aggregation	Material	Plant	Key Figure	Unit	2022 CW 11	2022 CW 12	2022 CW 13	Sum
1	ORS			Stock Value (avg.) in Base Currency	USD	78,363.31	34,578.76	36,032.26	34,739.18
2	ORS Pharma			Stock Value (avg.) in Base Currency	USD	78,363.31	34,578.76	36,032.26	34,739.18
3	ORS Pharma Finish Pr.			Stock Value (avg.) in Base Currency	USD	51,314.73	7,530.18	7,530.18	7,399.90
4	FP RKM 704 (Final) (C-1027, ML01)	FP RKM 704 (Final)	ML01	Stock Value	JPY	0.00	0.00	0.00	0.00
5	FP RKM 704 (Final) (C-1027, CIBA)	FP RKM 704 (Final)	CIBA	Stock Value	EUR	7,926.51	7,926.51	7,926.51	6,726.51
6	T RKM 704 - Tablet (C-1043, CIBA)	T RKM 704 - Tablet	CIBA	Stock Value	EUR	46,089.00	46,089.00	-565,911.00	46,083.00
7				Stock (at End)	ST	15,363	-188,637	-188,637	
8				Requirements	ST		-204,000		-204,000
9				Receipt Elements	ST				2
10				Range of Coverage (Planned)	Days	6			
11	ORS Pharma Intermediate			Stock Value (avg.) in Base Currency	USD	12,349.31	12,349.31	12,349.31	12,349.31
12	S RKM 704 Suspension (C-4100, CIBA)	S RKM 704 Suspension	CIBA	Stock Value	EUR	12,999.27	12,999.27	12,999.27	12,999.27
13	ORS Pharma Packed			Stock Value (avg.) in Base Currency	USD	14,699.27	14,699.27	16,152.77	14,989.97
14	P 20 RKM 704 (C-1045, CIBA)	P 20 RKM 704	CIBA	Stock Value	EUR	0.00	0.00	0.00	0.00
15	P 50 RKM 704 (C-1046, CIBA)	P 50 RKM 704	CIBA	Stock Value	EUR	-2,700.00	-2,700.00	-2,700.00	-2,700.00
16	P 100 RKM 704 - Lab (C-2010, CIBA)	P 100 RKM 704 - Lab	CIBA	Stock Value	EUR	12,122.25	12,122.25	12,122.25	12,122.25
17	P RKM 704 Suspension (C-4101, CIBA)	P RKM 704 Suspension	CIBA	Stock Value	EUR	3,350.67	3,350.67	3,350.67	3,350.67

ORSOFT Manufacturing Workbench | Network Distribution Planning: Planning Board with illustrated stock levels and its monetary evaluation

A simple planning book is structured hierarchically, e.g. by product hierarchies, by location, or by customer. A flexible selection of time buckets (e.g. hourly, daily, weekly, monthly) add further functionalities to the dashboard. This creates a holistic planning board that allows a look on the planned inventory from multiple perspectives: Planners can thus look at the work centers and get insights about valuated warehouse stocks as well as estimated utilization rates or raw material needs on a timely basis. Due to its multi-site planning approach, the software allows to issue a base currency to monitor stock levels on a global scale.
Any key figure can also be visualized as diagram or projection.

ORSOFT Manufacturing Workbench | Network Distribution Planning: Diagram option with visualized stock levels

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Consideration of transport routes and costs

Based on additional master data in the SAP ERP, the ORSOFT Manufacturing Workbench | Network Distribution Planning allows to select alternative means of transports. For resolving ATP conflicts, the network planner is able to select alternative routes and conveyances. The tool demonstrates all available routes between material-plant-combinations and the necessary time to transport the material between plants.

The supply chain planner can manually select the planned route for each stock transfer. This allows to obtain a better picture of the estimated arrival date at the receiving plant. If transportation costs are maintained and the supply network becomes increasingly complicated, ORSOFT Manufacturing Workbench | Network Distribution Planning can also be used to find a cost-optimal way to cover requirements in a distribution plant.

Planning of limited capacities & subcontracting

Similarly, companies are sometimes faced to decide whether a material should be produced within its own production plant or not. If there is not enough production capacity on the production line, companies may switch to subcontractors. Best possibly, the production partner utilizes same operations and can operate with a clear process instruction, provided formulations and provision of raw materials and packaging units. Hence, subcontracted materials require a continuous checking of the used raw materials and their projected inventory. ORSOFT Manufacturing Workbench | Network Distribution Planning allows for continuous monitoring of subcontracted products.

VMI – Consideration of stock- and requirement information of customers

In the case of a simultaneous planning of own inventories and those of the customers, it is a crucial need to get the most current consumption forecast data from the customer. This data allows to calculate accurate inventory projections which, in turn, are treated in the same way like a warehouse. Hence, the planner is able to see (by alerts) if and when the inventory is projected to be below an agreed (safety stock) limit, and can create replenishment elements. Typically, these replenishments will be saved as customer orders or as scheduling agreement items.

ORSOFT GmbH

ORSOFT GmbH
Martin-Luther-Ring 13
04109 Leipzig, Germany

Phone: +49 (0)341/ 230 89-00
E-Mail: marketing@orsoft.de

HRB 28318, County Court Leipzig

Get in touch →

About ORSOFT: As an internationally acting software and consulting company, ORSOFT develops and implements innovative and reliable solutions in the field of Advanced Planning & Scheduling (APS) and Supply Chain Management (SCM) as certified add-ons to SAP ERP and SAP S/4HANA and other ERP systems. With its affiliate companies, ORSOFT is part of the Germanedge Group which incorporates a focus on digital production 4.0.