COSMO Discrete Manufacturing

Industry Solution based on Microsoft Dynamics 365 Business Central

Built on Microsoft Dynamics 365 Business Central On-Premises, **COSMO Discrete Manufacturing**, developed by COSMO CONSULT, is the industry solution that integrates all operational processes from order acquisition, construction, production planning and control to delivery and invoicing into the company processes of companies in countless industrial sectors, such as mechanical and plant engineering, special vehicle construction, lift manufacturing, as well as, equipment and apparatus engineering.

COSMO Discrete Manufacturing relies on a unique, integrated information system guaranteeing consistent and transparent management of all business processes at all times through industry-specific functionalities, such as immediate and simultaneous calculations, and integration of the technical department or the product configuration using checklists and dynamic bills of material (BOMs). This allows a quick realization of important company objectives in terms of transparency and stability of processes, integration of all departments involved, as well as the reduction of lead times.

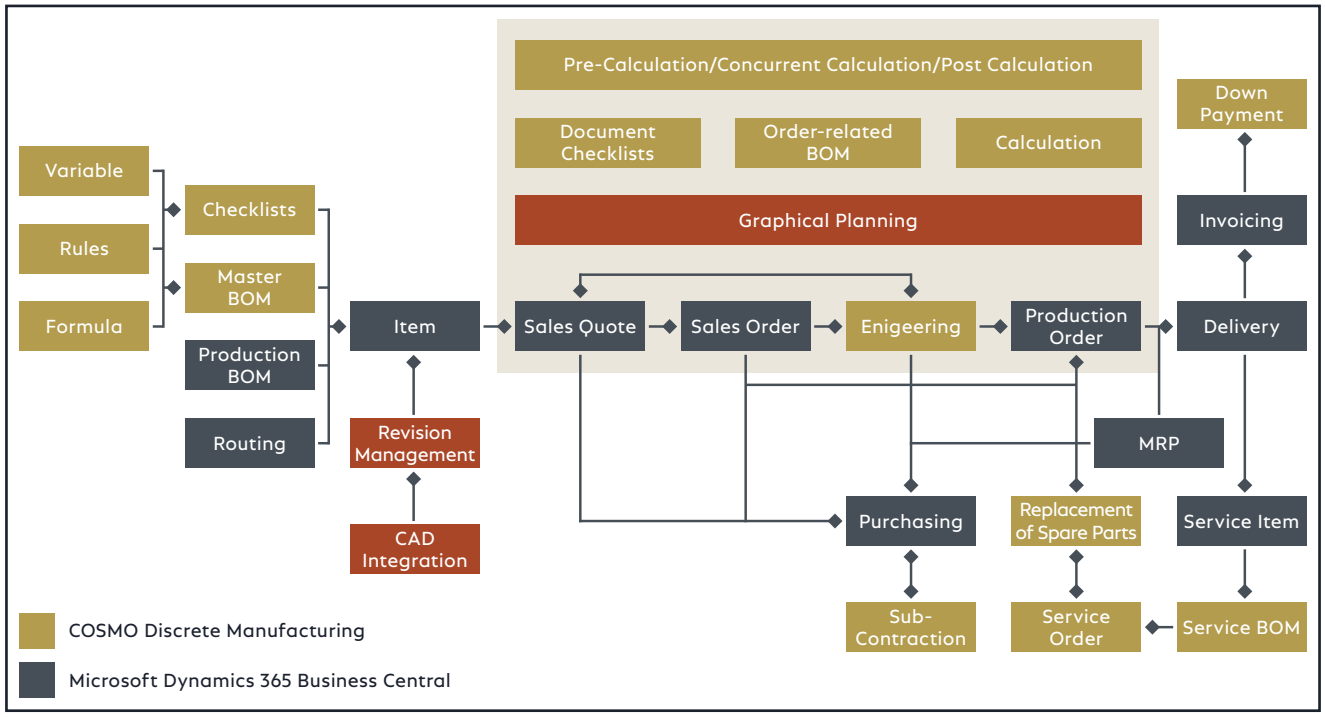
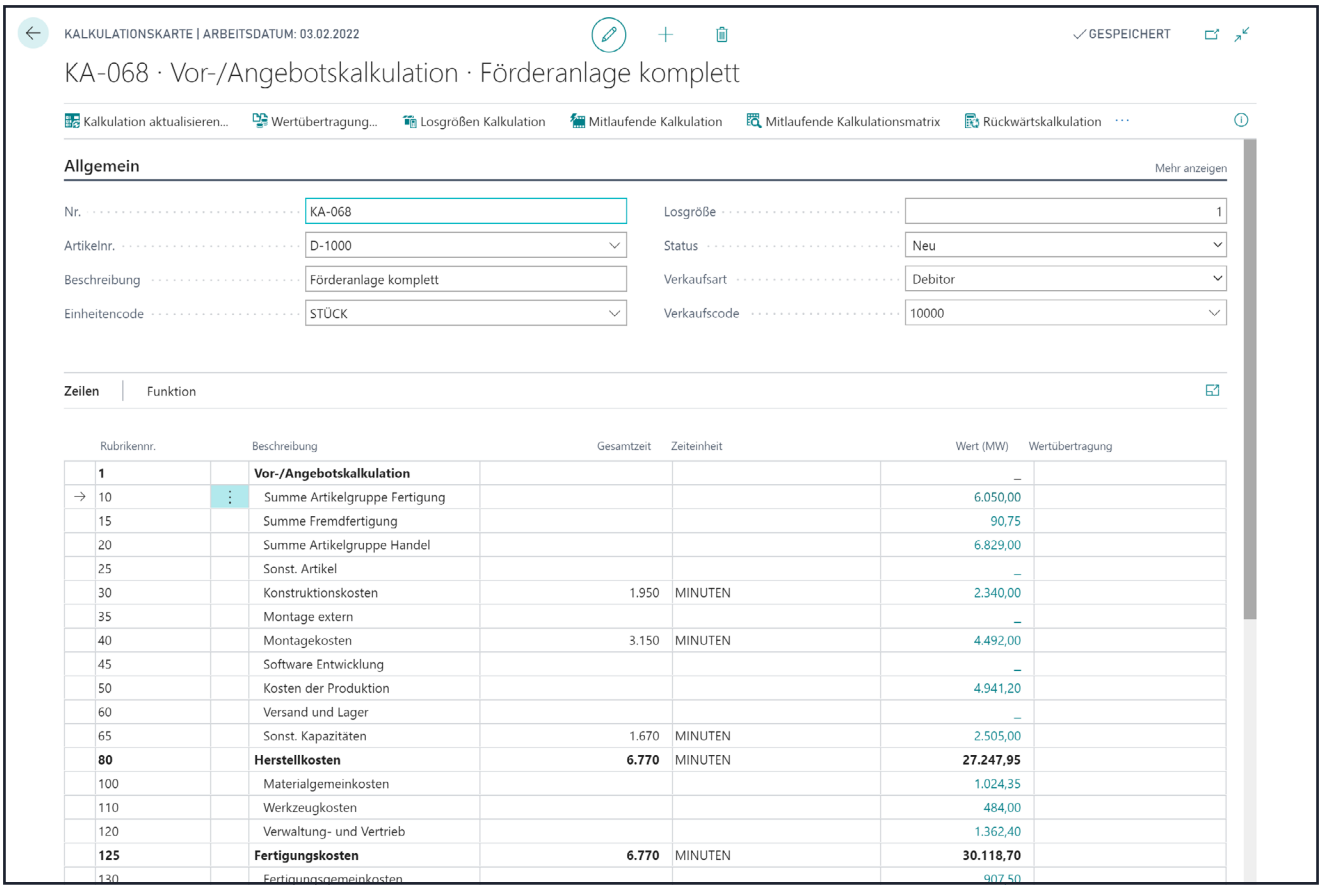


Fig. 1: Overview **COSMO Discrete Manufacturing**

A High-Quality Product Provides the Basis for Success

Unlike other industrial sectors, the creation of quotations is a special challenge in discrete manufacturing. Here sales, technical and calculative components have to interlock in order to describe all specifications included in the delivery, and accurately and simultaneously guarantee the successful completion of an order. The reliability of cost and budget control plays a crucial role in this respect (see fig. 2).



Rubrikennr.	Beschreibung	Gesamtzeit	Zeiteinheit	Wert (MW)	Wertübertragung
1	**Vor-/Angebotskalkulation**			_	
10	Summe Artikelgruppe Fertigung			6.050,00	
15	Summe Fremdfertigung			90,75	
20	Summe Artikelgruppe Handel			6.829,00	
25	Sonst. Artikel			_	
30	Konstruktionskosten	1.950	MINUTEN	2.340,00	
35	Montage extern			_	
40	Montagekosten	3.150	MINUTEN	4.492,00	
45	Software Entwicklung			_	
50	Kosten der Produktion			4.941,20	
60	Versand und Lager			_	
65	Sonst. Kapazitäten	1.670	MINUTEN	2.505,00	
80	**Herstellkosten**	**6.770**	MINUTEN	**27.247,95**	
100	Materialgemeinkosten			1.024,35	
110	Werkzeugkosten			484,00	
120	Verwaltung- und Vertrieb			1.362,40	
125	**Fertigungskosten**	**6.770**	MINUTEN	**30.118,70**	
130	Fertigungsgemeinkosten			907,50	

Fig. 2: Calculation

Benefit

Industry functionality

- Coverage of all core requirements
- Best practice approach
- Easy to configure

All key processes can be mapped in the standard.

Modern infrastructure

- Available in the cloud (Azure) as well as on-premises
- Report generation and analysis in Microsoft PowerBI
- Dashboard display with real-time data on all end devices
- Flexible and scalable

With **COSMO Discrete Manufacturing**, you are always up-to-date.

Integration

- Process mapping of the entire company in one solution
- No interfaces and no isolated applications
- Integration of the Microsoft Office world into the ERP system
- Reduction of the administration effort due to the seamless interlocking of the systems.

Quick and Accurate Statements with the Checklist

Checklists, also known as Q&A spreadsheets, provide the sales staff a high benefit beginning in the quotation phase - even without the need for in-depth technical knowledge of the diverse product characteristics. (see fig. 3)

The checklist system uses rule-based logic to check the technical feasibility of a product specification as early as the time it is entered and indicates any additional services that may be required. In addition, the configurator can be used to generate a customer-specific BOM from the checklist, which forms the basis for technical order processing and costing.

In addition, the checklist offers the option of mapping pricing based on options and additional equipment. Excess/shortfall prices, discounts and weight calculation are an integral part of this.

Special customer requirements can be entered as text by the sales employee and made available to the design department or other downstream departments.

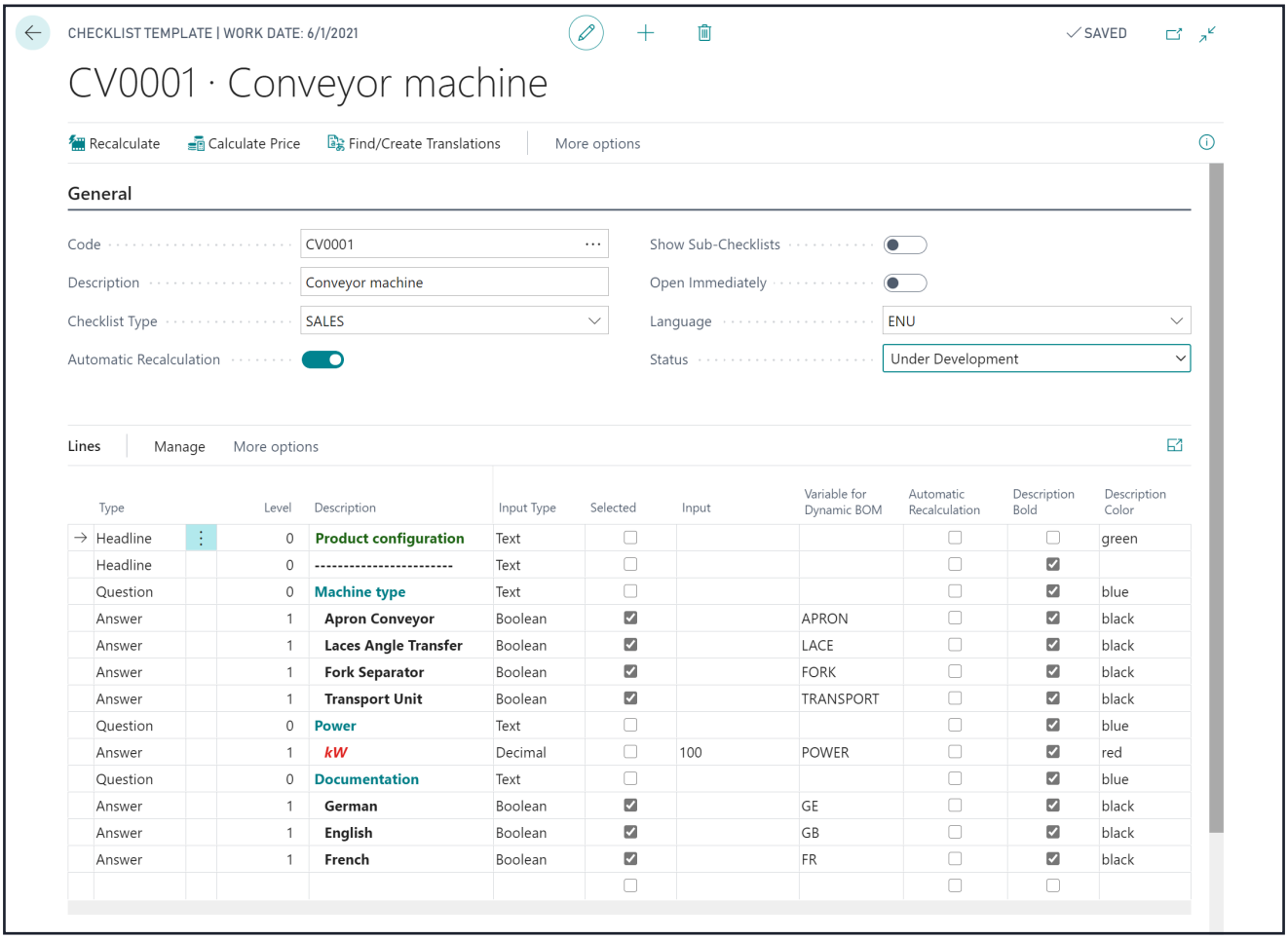


Fig. 3: Integrated Checklist

Construction and Technical Assessment

The departments “Design” or “Technical Office” are not represented in many ERP systems, but they often represent the link between sales and production. The requirements of a design department, such as the testing and approval of technical concepts, the creation of order-related parts lists, prototype construction or change management are necessary and can be easily done with **COSMO Discrete Manufacturing**. If necessary, the design is integrated into the quotation phase. This integration significantly minimizes lead times in the production process.

Visual Optimization of Bills of Materials

A construction order is based on the information in a sales order. The structure of the data allows for the separation of different assembly groups that can subsequently be viewed separately or in combination with other stages of the construction process.

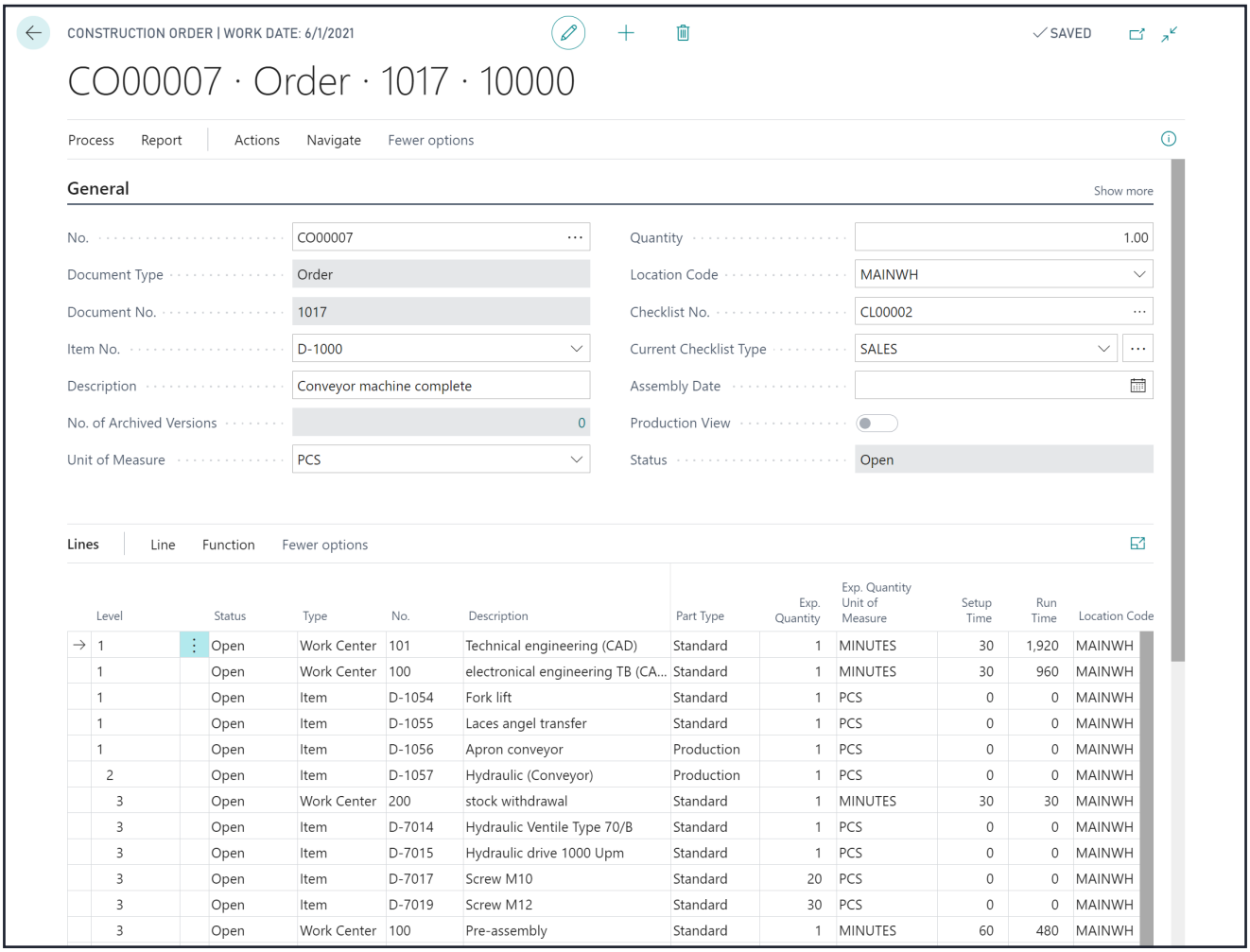
Planning Ahead – Avoid Delays

Components with long lead times can jeopardize promised delivery dates. In this case, **COSMO Discrete Manufacturing** offers the ability to plan such „long lead time items" in advance. It is irrelevant whether the parts are purchased or produced. The actual procurement costs are, of course, allocated to the originating order.

Manufacturing During Construction

Constructive adaptation of individual assemblies or complex new designs often cause long lead times and unnecessary waiting times in production. This often results in increased planning effort in production and higher capital commitment because goods are procured too early. With **COSMO Discrete Manufacturing**, it is possible to continue focusing on design and production because part orders can be released for production while other assemblies are still in construction. (see fig. 4)

In this way, individual components can be manufactured in advance, which flow into the final product after completion of the technical order processing.



Level	Status	Type	No.	Description	Part Type	Exp. Quantity	Exp. Quantity Unit of Measure	Setup Time	Run Time	Location Code
1	Open	Work Center	101	Technical engineering (CAD)	Standard	1	MINUTES	30	1,920	MAINWH
1	Open	Work Center	100	electronical engineering TB (CA...	Standard	1	MINUTES	30	960	MAINWH
1	Open	Item	D-1054	Fork lift	Standard	1	PCS	0	0	MAINWH
1	Open	Item	D-1055	Laces angel transfer	Standard	1	PCS	0	0	MAINWH
1	Open	Item	D-1056	Apron conveyor	Production	1	PCS	0	0	MAINWH
2	Open	Item	D-1057	Hydraulic (Conveyor)	Production	1	PCS	0	0	MAINWH
3	Open	Work Center	200	stock withdrawal	Standard	1	MINUTES	30	30	MAINWH
3	Open	Item	D-7014	Hydraulic Ventile Type 70/B	Standard	1	PCS	0	0	MAINWH
3	Open	Item	D-7015	Hydraulic drive 1000 Upm	Standard	1	PCS	0	0	MAINWH
3	Open	Item	D-7017	Screw M10	Standard	20	PCS	0	0	MAINWH
3	Open	Item	D-7019	Screw M12	Standard	30	PCS	0	0	MAINWH
3	Open	Work Center	100	Pre-assembly	Standard	1	MINUTES	60	480	MAINWH

Fig. 4: Construction Order

Manufacturing and Purchase with Numerous Auxiliary Functions

The manufacturing and purchase departments operate closely together. To ensure punctual delivery, it is important to know which materials are needed when. Beyond the scope of Dynamics 365 Business Central, **COSMO Discrete Manufacturing** offers additional functions that facilitate work in both departments and improve the content of information.

Subcontracting with Supply of Material

Order-related manufacturing may warrant multi-staged assignments that need to be realized simultaneously at multiple locations. Individual operations are often outsourced in such situations, subcontractors and specialists assigned to such tasks must be considered in production plans. The **COSMO Discrete Manufacturing** module offers the necessary functions that display the supply of materials, monitor the external production, and check incoming invoices.

Multiple Production Processes, Equal Procedures

In some cases, the same procedure can appear at several stages of one related or multiple unrelated production processes. To increase effectiveness, these procedures can be combined into work packages before execution. Time and materials that will be consumed can be considered proportionally, which guarantees the accurate allocation of costs.

Different Base Materials, Same Finished Item

Another important consideration for design and production is the material to be processed. Technical specifications determine which base material is used in the finished item; weight calculation based on the specific weight or the prices of the material are deciding factors.

Our Industry Solution Allows You to Keep Track

It is a familiar problem: A system provides decent functions facilitating day-to-day operations, increases quality and yields the desired analyses, but over the course of time the collected data becomes complex and confusing; perhaps superfluous. **COSMO Discrete Manufacturing** provides many useful features for solving this problem.

Item Description Catalogue

Often, a new item is created unnecessarily because the existing one was not immediately found. Sometimes a different spelling or case sensitivity of an item prevented the user from successfully finding it, even though it already exists. This results in unnecessarily high process costs as well as incorrect reports and statistics.

The clear structure of the item description catalogue, however, will ensure that item descriptions are standardized, duplicate data will not be created and that existing items can be found quickly.

Configuration

Small-batch and variant manufacturing companies are usually characterized by the fact that almost every final product is unique, but in principle it is produced from the same or similar parts and assemblies. This results in a considerable amount of time and money for generating and maintaining the necessary master data. **COSMO Discrete Manufacturing** takes this aspect into account by creating the relevant master data for all product groups and variants only once. A „maximum BOM" is used as an instrument, with stored rules, characteristics and formulas from which an order-related BOM is derived automatically and dynamically based on the master data once it has been entered.

Prototypes: Learning from Experience

The prototype function assists in searching for products with the same or similar specifications and thus avoids unnecessary repetitive tasks.

Prototypes can be used at an early stage in the sales process. The logic of the checklists verifies the complete inputs of all necessary characteristics and specifications. By using prototypes, the system checks whether a product with the same characteristic values (such as width, length, material type) already exists and automatically enters the new data if the search was not successful.

However, if the system finds a matching product in the historical data, the BOM that was manufactured and the routings across all of the manufacturing stages will be consulted again for the construction process.

As a result, all the necessary information and benefits from legacy data are available at the same time.

Discontinued Items

The discontinuation control of items is often a challenge: Should inventories of the old part be used up before the new part is installed? Or does the service still require stock, so that a complete usage is not meaningful? Does a part exchange also have to take place in current orders or only in the master data? The "discontinued items" function provides all relevant information and supports design and production in this task.

Because nothing is more consistent than change, flexible data and processes are critical to business solutions today.

Maximum flexibility

Because nothing is more constant than change, flexible data and processes are crucial today for business solutions.

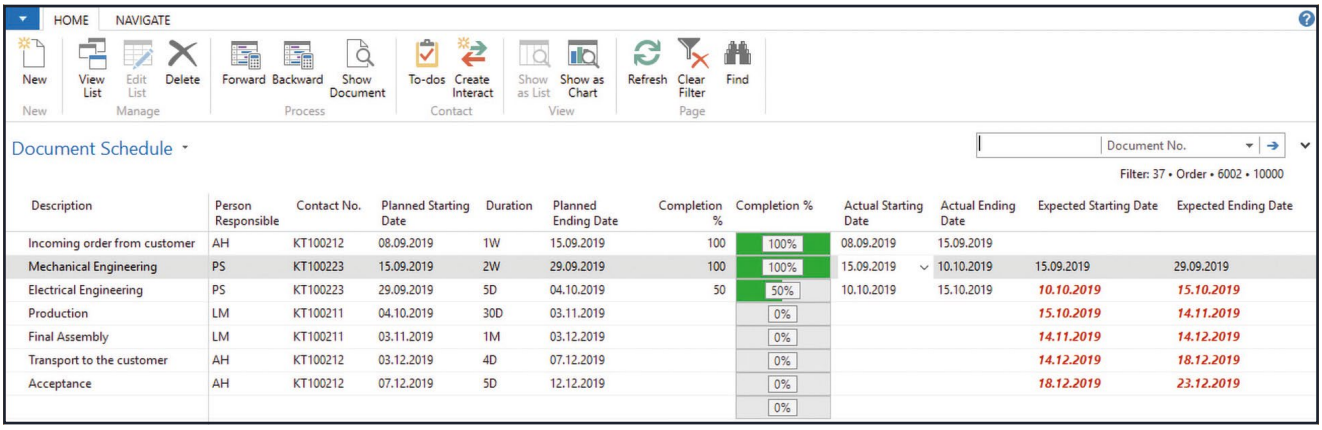
Subsequent Changes

When necessary, subsequent changes requested by the customer can be transferred from sales and distribution to production via the design department. The design checks the feasibility and the system ensures a smooth transfer of the change even into existing orders.

Milestone Plan

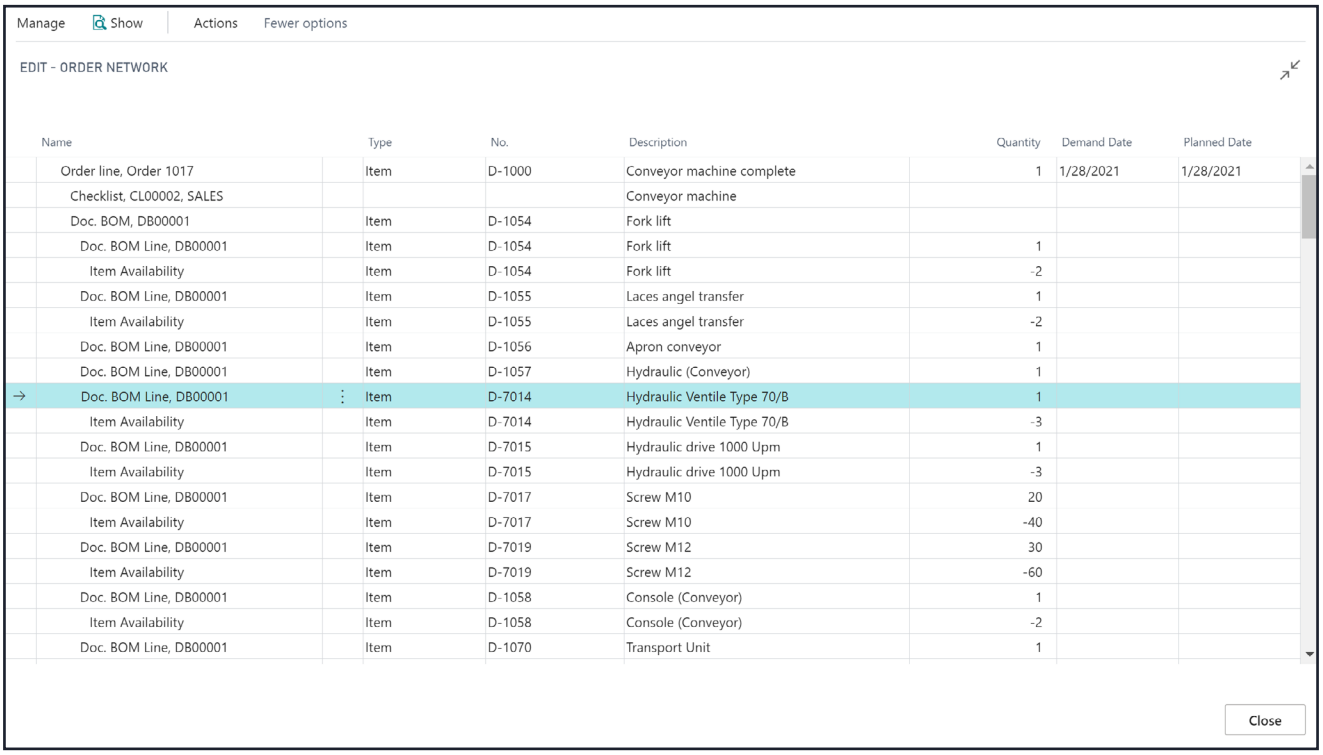
Given the large amount of information and the complexity of a job, the overview can sometimes be lost. There is usually no milestone plan that includes the most important tasks, deadlines and responsibilities across departments. (see fig.5)

COSMO Discrete Manufacturing offers the ability to create a schedule without the knowledge of all detailed information and to use it as a basis for internal meetings —or also for coordination with customers and suppliers.



Description	Person Responsible	Contact No.	Planned Starting Date	Duration	Planned Ending Date	Completion %	Completion %	Actual Starting Date	Actual Ending Date	Expected Starting Date	Expected Ending Date
Incoming order from customer	AH	KT100212	08.09.2019	1W	15.09.2019	100	100%	08.09.2019	15.09.2019		
Mechanical Engineering	PS	KT100223	15.09.2019	2W	29.09.2019	100	100%	15.09.2019	10.10.2019	15.09.2019	29.09.2019
Electrical Engineering	PS	KT100223	29.09.2019	5D	04.10.2019	50	50%	10.10.2019	15.10.2019	*10.10.2019*	*15.10.2019*
Production	LM	KT100211	04.10.2019	30D	03.11.2019		0%			*15.10.2019*	*14.11.2019*
Final Assembly	LM	KT100211	03.11.2019	1M	03.12.2019		0%			*14.11.2019*	*14.12.2019*
Transport to the customer	AH	KT100212	03.12.2019	4D	07.12.2019		0%			*14.12.2019*	*18.12.2019*
Acceptance	AH	KT100212	07.12.2019	5D	12.12.2019		0%			*18.12.2019*	*23.12.2019*
							0%				

Fig. 4: Order Shedule



Name	Type	No.	Description	Quantity	Demand Date	Planned Date
Order line, Order 1017	Item	D-1000	Conveyor machine complete	1	1/28/2021	1/28/2021
Checklist, CL00002, SALES			Conveyor machine			
Doc. BOM, DB00001	Item	D-1054	Fork lift			
Doc. BOM Line, DB00001	Item	D-1054	Fork lift	1		
Item Availability	Item	D-1054	Fork lift	-2		
Doc. BOM Line, DB00001	Item	D-1055	Laces angel transfer	1		
Item Availability	Item	D-1055	Laces angel transfer	-2		
Doc. BOM Line, DB00001	Item	D-1056	Apron conveyor	1		
Doc. BOM Line, DB00001	Item	D-1057	Hydraulic (Conveyor)	1		
Doc. BOM Line, DB00001	Item	D-7014	Hydraulic Ventile Type 70/B	1		
Item Availability	Item	D-7014	Hydraulic Ventile Type 70/B	-3		
Doc. BOM Line, DB00001	Item	D-7015	Hydraulic drive 1000 Upm	1		
Item Availability	Item	D-7015	Hydraulic drive 1000 Upm	-3		
Doc. BOM Line, DB00001	Item	D-7017	Screw M10	20		
Item Availability	Item	D-7017	Screw M10	-40		
Doc. BOM Line, DB00001	Item	D-7019	Screw M12	30		
Item Availability	Item	D-7019	Screw M12	-60		
Doc. BOM Line, DB00001	Item	D-1058	Console (Conveyor)	1		
Item Availability	Item	D-1058	Console (Conveyor)	-2		
Doc. BOM Line, DB00001	Item	D-1070	Transport Unit	1		

Fig. 6: Order Network

Order Network

In the order network, it is possible to track all information about an order, starting with the order, through design to production and all procurement processes. (see fig.6)

For example, problems with production scheduling or material procurement can be quickly and comprehensively recognized in the order network.

A new supplier or a new material?

Products with a high vertical range of manufacture require the right information from different perspectives. Especially when replacing one material with another, the question of where the material is used can be challenging.

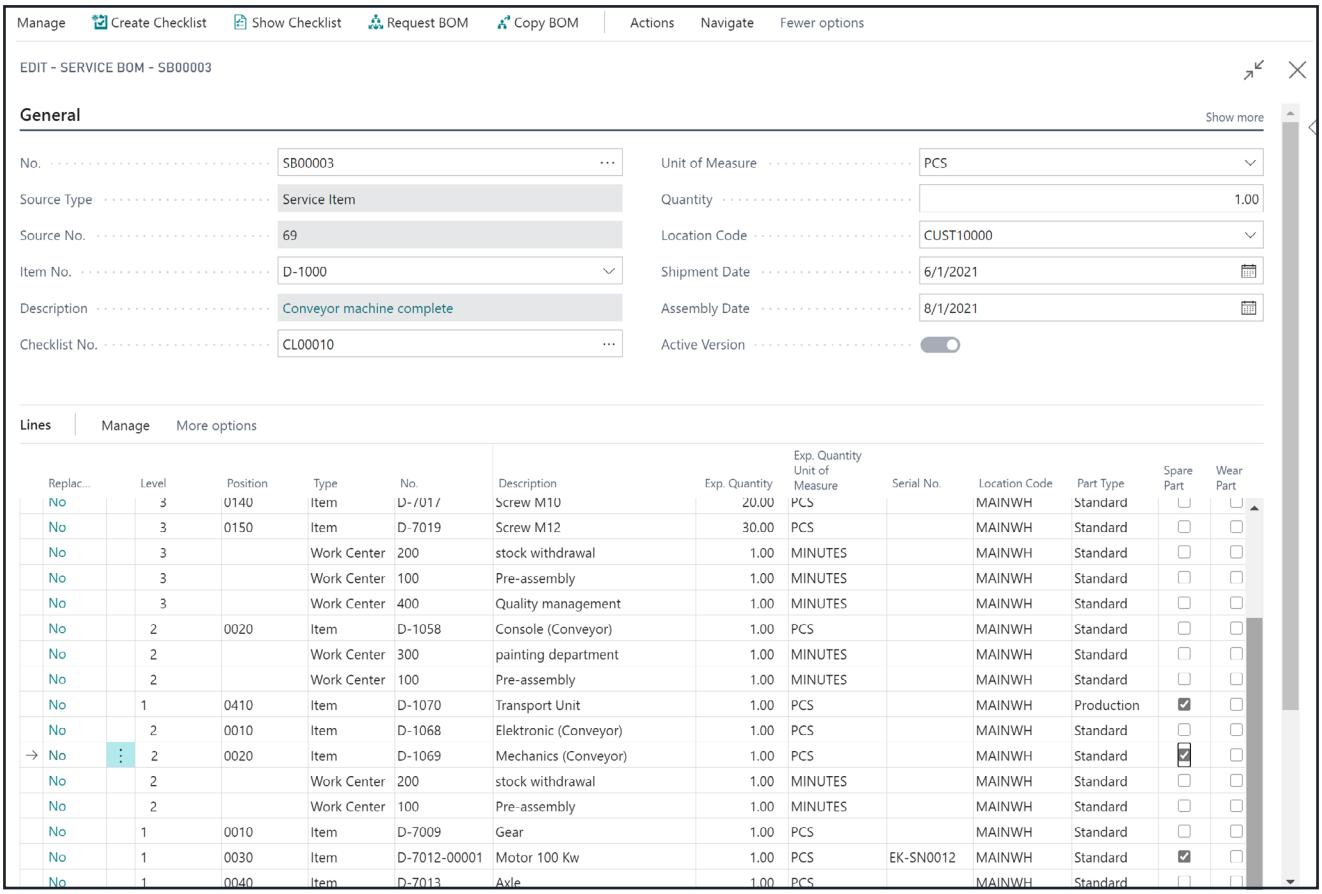
COSMO Discrete Manufacturing supports this process: You decide which material you want to replace, the system performs all necessary change tasks for you.

Construction and production BOM

Design and production often have a different view on a product. For example, from a design point of view, an assembly consists of materials that are used at different points in the production process. **COSMO Discrete Manufacturing** allows you to derive different views of a BOM.

The machine as a service article

The information on a plant documented in production is completely transferred to the service area as information and made available for the product life cycle. Here you can find every screw and every component that was once assembled in original production. Variances between design and production are also documented (see fig.7).



Replac...	Level	Position	Type	No.	Description	Exp. Quantity	Exp. Quantity Unit of Measure	Serial No.	Location Code	Part Type	Spare Part	Wear Part
No	3	0140	Item	D-7017	Screw M10	20.00	PCS		MAINWH	Standard		
No	3	0150	Item	D-7019	Screw M12	30.00	PCS		MAINWH	Standard		
No	3		Work Center	200	stock withdrawal	1.00	MINUTES		MAINWH	Standard		
No	3		Work Center	100	Pre-assembly	1.00	MINUTES		MAINWH	Standard		
No	3		Work Center	400	Quality management	1.00	MINUTES		MAINWH	Standard		
No	2	0020	Item	D-1058	Console (Conveyor)	1.00	PCS		MAINWH	Standard		
No	2		Work Center	300	painting department	1.00	MINUTES		MAINWH	Standard		
No	2		Work Center	100	Pre-assembly	1.00	MINUTES		MAINWH	Standard		
No	1	0410	Item	D-1070	Transport Unit	1.00	PCS		MAINWH	Production	☑	
No	2	0010	Item	D-1068	Elektronic (Conveyor)	1.00	PCS		MAINWH	Standard		
→ No	2	0020	Item	D-1069	Mechanics (Conveyor)	1.00	PCS		MAINWH	Standard	☑	
No	2		Work Center	200	stock withdrawal	1.00	MINUTES		MAINWH	Standard		
No	2		Work Center	100	Pre-assembly	1.00	MINUTES		MAINWH	Standard		
No	1	0010	Item	D-7009	Gear	1.00	PCS		MAINWH	Standard		
No	1	0030	Item	D-7012-00001	Motor 100 Kw	1.00	PCS	EK-SN0012	MAINWH	Standard	☑	
No	1	0040	Item	D-7013	Axle	1.00	PCS		MAINWH	Standard		

Fig. 7: Service BOM

Repair and replacement articles

If certain components have to be replaced during routine maintenance or repair, the system creates service orders. The required times and materials are recorded on the resulting work sheets. An exchange of parts, the service activities and any comments made by the service technician are added to the life cycle card of the plant. The service article contains all information on how the system was originally installed and which components were replaced and when.

Replace old assemblies

If a certain item or assembly is to be replaced by a new one, it is possible to access all information about the existing system. This information can, for example, be used as the basis for letters to customers.

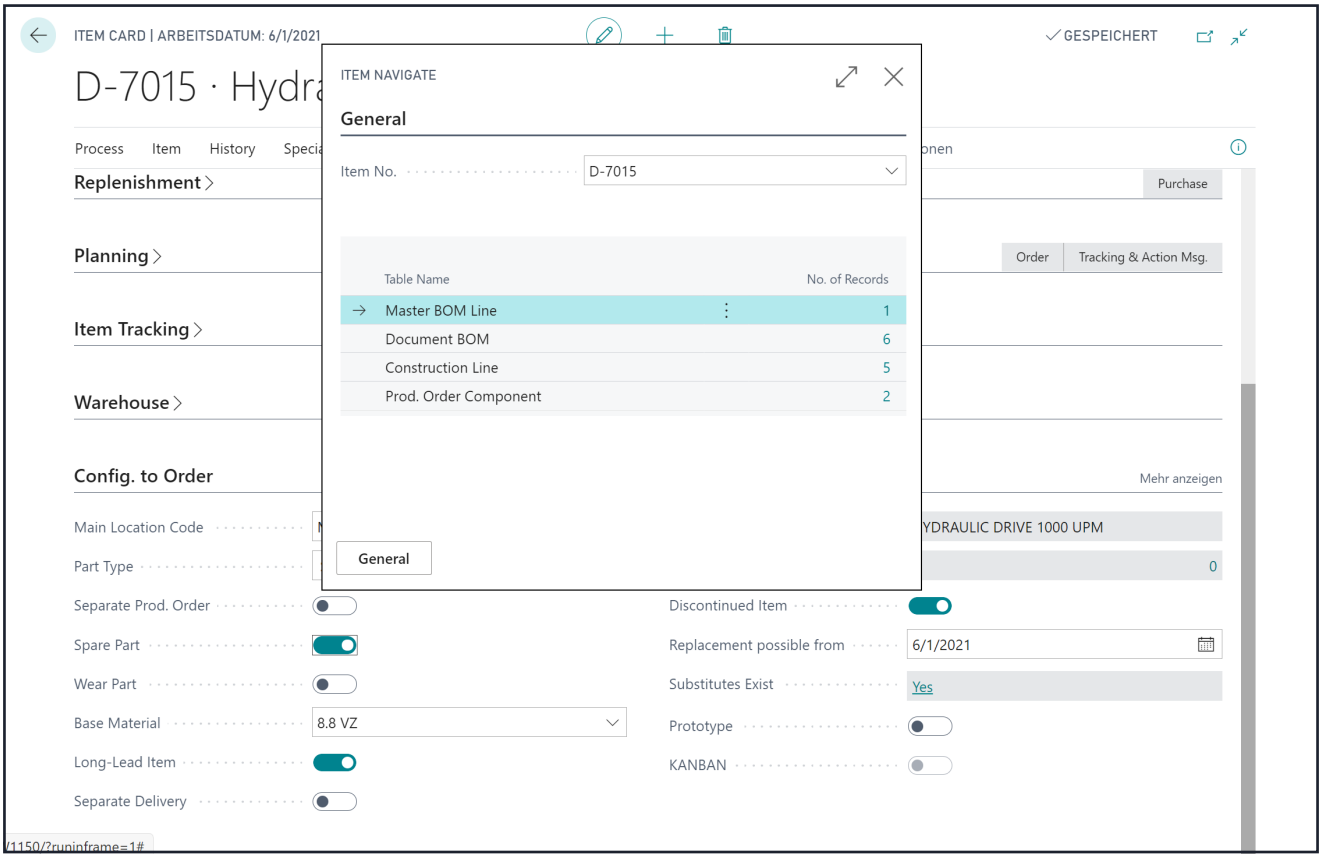


Fig. 8: Discontinued Item

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