

COSMO Process Manufacturing

Industry Solution based on Microsoft Dynamics 365 Business Central

naviona

Benefits

- Enable organizational standardization by using single data source for all areas of an enterprise
- Access to real-time data across all areas of the company, giving managers the power to make decisions
- Streamline business processes and reduce internal errors by automating processes
- Manage complicated recipes and formulas for batch production
- Enable organizations to generate accurate schedules that consider constraints around people, machines, tooling and materials
- Provide enhanced allocation of resources to lower costs of the workload
- Provide accurate costing with real-time tracking
- Monitor production processes and track exceptions
- Increase visibility of co-products and by-products

In competitive markets, manufacturing companies face high pressure for cost reductions and tight schedules. Business processes must therefore be continuously optimized. Although many manufacturers start out small and can manage these processes manually, things quickly become much more complex and error prone as the company grows. With over 150,000 installations worldwide, Microsoft Dynamics 365 Business Central is one of the most popular enterprise solutions and provides users with a decisive contribution to meeting these challenges. The system seamlessly links, and makes visible in real-time, critical business functions and information.

Dynamics 365 Business Central, enhanced by COSMO CONSULT products, tracks information in all areas of an organization and specifically in critical areas such as manufacturing processes, planning and execution, inventory management, quality management, sales, and more. It integrates all this data and provides the ability to store, share, track, and report information using one common database. Real-time and instant access to information gives manufacturers the business intelligence they need to stay ahead.

COSMO CONSULT's industry solution for process manufacturers is designed for batch processing

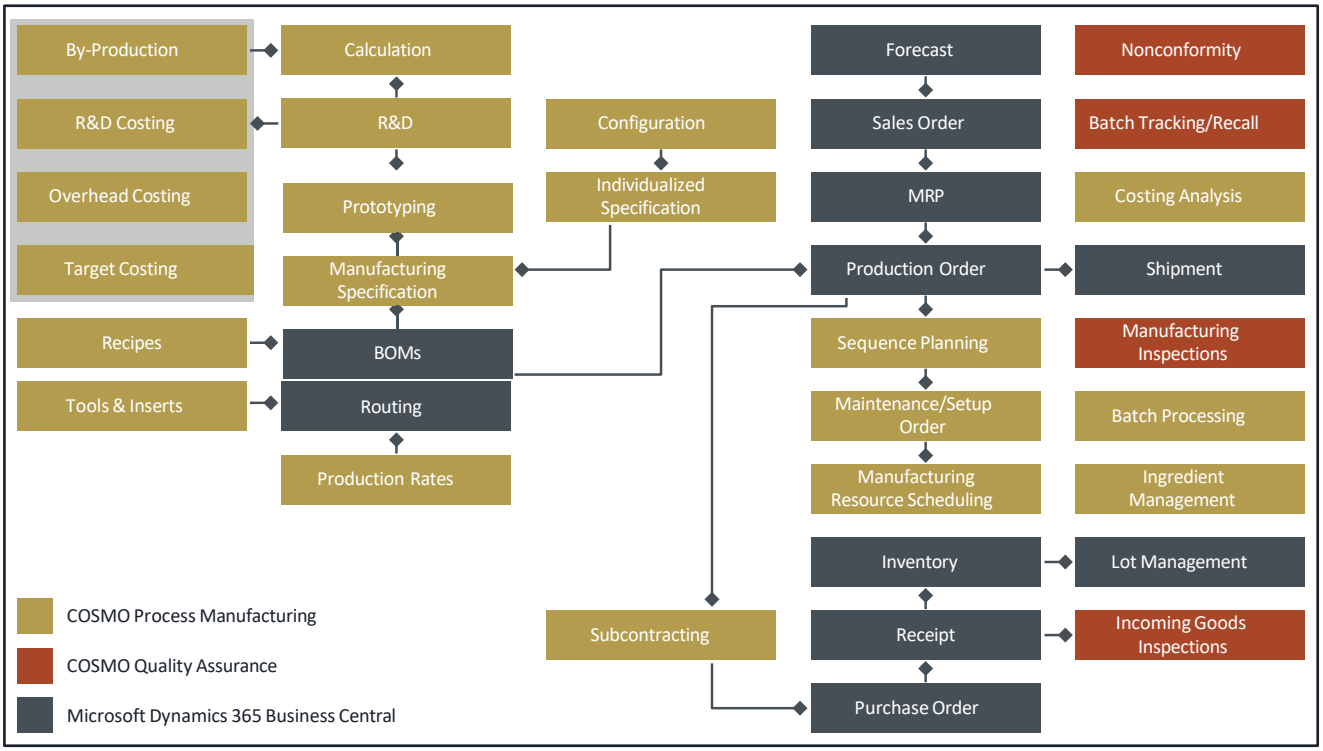

Fig. 1: Overview COSMO Process Manufacturing

manufacturing and helps them track, trace, and monitor their inventory and ensure quality so that their data can propel them ahead, not slow them down.
Developed in close collaboration with the industry, all functions provide proven best practices.

Recipe Management

Recipe management is a major concern of batch manufacturing companies. COSMO Process Manufacturing allows the formulation and management of recipes
in combination with BOMs and routings. Recipes are distinguished from BOMs by the fact that instead of specifying component quantities, recipes are specified in relative shares from input to expected output. Inaccuracies caused by rounding are thus avoided and even relatively small application quantities, such as active ingredients, are reliably calculated. Whether manufacturing is requesting a 2kg batch for sample use or 5000kg batch for a customer order, the resulting production order will present the appropriate level of precision in the stated material quantities.

Recipes allow batch manufacturers to model their processes in a series of controllable and repeatable process stages. For instance, the usage of embedded recipes (main recipe) allows stages within a formula to be linked together, so that the output of one stage becomes the input for the next stage, without having to perform an intermediate inventory transaction or define an unnecessary intermediate product.

BOMs and Routings

Dynamics 365 Business Central has a robust manufacturing capability to produce discrete products based on routings and bills of material (BOMs). For process manufacturers, the ERP system is extended by COSMO Process Manufacturing to formulate products and to summarize master data of manufacturing in a single view (production structures).

To specify manufacturing, these production structures manage

- **when** ingredients need to be added in process operations,
- **how much** of each ingredient is needed
- **where** to pick from inventory and
- **in which quantity**.

For instance, when purified water is used in multiple operations, manufacturers must know every place where the water was used, how to process it, and where it is located for consumption.

Production structures manage the specifications of products, including intermediate, co-products and by-products. In addition to defining product ingredients, product developers can embed quality inspections, work instructions and costs within the specifications. Ingredient characteristics, including costs, are rolled up into development structures, which manage BOMs, recipes and routings in a single view.

COSMO Process Manufacturing can employ recipes, BOMs and routings to manage processing and packaging. By linking production and packaging specifications, but maintaining them separately, batch manufacturers can produce products for future private labeling or to produce intermediates (such as master batch slurries produced in a tank that will be dispensed into smaller containers after pigment and additives are added). This integration of discrete and process-oriented components within the same production structure allows an organization to satisfy the needs of product designers within the context of one system.
The result is a comprehensive system that leverages a central repository of company data. The benefits are improved communication and a reduction of data-based errors.

Process Actions and Operating Instructions

In addition to structured data like times and quantities, unstructured data can be specified as process actions or other operating instructions. Depending on language and valid period, an unlimited number of processing activities can be assigned to BOMs, recipes or routings. These textual instructions can be predefined by users and selected from a library.

Research and Development

COSMO Process Manufacturing supports and manages production structures (BOMs, recipes, routing) over an entire product life cycle — from early development through commercial manufacturing — with the goal of consistently delivering the intended performance.
The application can transfer product and process knowledge between development and manufacturing groups within the organization.

The cost of newly formulated intermediate or finished good is calculated by rolling up the costs of its ingredients. Theoretical costs can be assigned to conceptual ingredients. For an initial price calculation, multiple costs such as setup costs, operational costs and overheads can be added. Or, in reverse, target calculations can be used to analyze cost drivers based on a given market price.

The process of moving a new product concept through a pilot plant trial that simulates real-life production reduces risk for commercial manufacturing. In this phase, procurement of raw materials needs to be clarified, item master data is updated, and process design and manufacturing operations are determined. COSMO Process Manufacturing supports process development
(e.g., nutritional targets, formulation or processing options, ingredient costs and shelf life) and the transfer of formulations to master data for pre-commercial runs (e.g., pilot plant) before they are finalized for commercial production.

Fix-Step Rates for Scaled Production

A batch run may be expected to produce a quantity of output within a given range in a certain period of time. For example, blending 50 liters of a solvent takes the same time as 100 liters of the same solvent in the same vessel. When batch runs are scaled up or down, the batch quantity ranges and the production times follow a fix-step algorithm rather than a linear function. COSMO Process Manufacturing is capable of supporting fix-step scales even if these are dependent on tools and/or tool inserts.

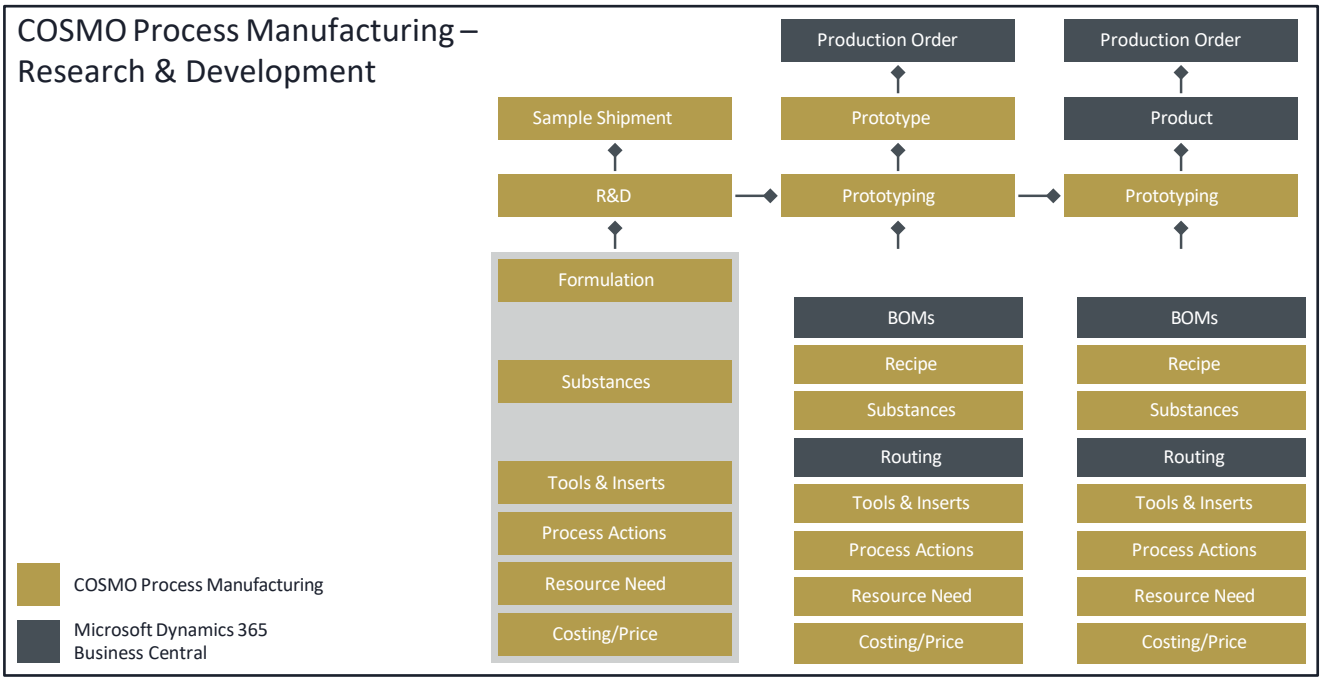

Fig. 2: Overview Research & Development

Tools, Inserts and Production Rates

The assignment of work center groups, tools and tool inserts has interdependencies that lead to different lead times and output quantities depending on the selected usage scenario. These dependencies are included in the calculation and planning of manufacturing orders. In this way, the available capacity of tools and their inserts is managed, as well as the allocation of production orders.

For example, if it is a punching or injection molding tool, COSMO Process Manufacturing calculates cycle times and the number of cavities to calculate production rates. In addition, different sprue weights or different travel times are considered if necessary.

If a tool needs to be reworked after a certain period, the system proposes a maintenance order and can schedule it as required. After or during production, information about the tools can be recorded and thus the tool card remains always up to date. The tools life cycle can be tracked within the system; purchase dates, services and usage can all be logged.

Calculation

Dynamics 365 Business Central allows the manufacturer to define the production processes with integrated manufacturing costing to account for production costs within the system. Enhanced by the industry solution

of COSMO CONSULT, controllers can calculate the cost of a product with different scenarios for comparison. For instance, to calculate cost of goods sold (COGS), controllers can design individualized schemes. Cost degression can be analyzed in a matrix of different lot sizes. Product costing becomes easy and accurate at all phases of product life cycle, sales processing and manufacturing (e.g., for product costing analysis). The module COSMO Calculation is designed to put costing information at the fingertips of the cost controller. Information flows readily from other modules to the cost calculation module for analysis and decision making.

Production Dimensions

The capability to scale manufacturing in an ERP system depends on how well the application can manage material and process variability. To identity and control material in manufacturing, it is key to extend manufacturing master data by individualized information.
Enhanced by COSMO Process Manufacturing, Dynamics 365 Business Central can manage variability in manufacturing due to an unlimited number of item characteristics (production dimensions) specified for raw material, for bulk and finished products, for work centers, for inserts or tools. Production dimensions support user-definable characteristics as well as industry standard characteristics, such as pH, potency, or moisture content

Ingredient Management

To handle an active ingredient or allergen, COSMO Process Manufacturing tracks this lot-specific data for handling and use. Formulation and process control are the primary concerns in chemical manufacturing operations, where variability creates significant challenges for process specifications. Variable product characteristics, such as substance grade, determine the ingredient

proportions in certain process stages. Raw materials are purchased and finished goods are produced in a variety of quantities, substances, and qualities. COSMO Process Manufacturing can identify and monitor these variabilities to balance consumption of ingredients.

Delivery, Production and Sales Tolerances

To deal with under and over fulfillment in supply chain processes of production, procurement and distribution, Dynamics 365 Business Central is enhanced by tolerances. The production, delivery and sales tolerances are specified to accept certain under or over fulfillment on expected quantities. For later evaluation of this deviation, each of these detected events is recorded.

Sales and Distribution

Returnable Container

Companies that ship their products in returnable, reusable containers are assisted by COSMO Process Manufacturing, which manages distribution, inventory on customer accounts and return of these containers. Knowing where all the packaging is within their supply chains at any given time is crucial for ongoing tuning of operations. With compliance standards such as Sar- banes Oxley, it is becoming more critical to implement reliable tracking of returnable containers.

Simulated Production View on Sales Order

At sales order entry, user can perform a first feasibility check and simulate production for an ordered quantity. Thus, an overview of times, component quantities and their availability in the inventory is accessible to users without any influence on the current production planning.

Order Network

To investigate order performance, COSMO Process Manufacturing provides a view (order network) to the recorded order history of a customer (see fig. 3). Order Network provides essential information about company supply chain and is used for planning. All orders of a customer are exploded to downstream processes. Starting from an overview, the user is able to drill down to related documents in the supply chain and adjust them. In addition, the system informs the user about the cur- rent and planned availability of material.

Hybrid Manufacturing

If companies are investing in an ERP solution, they will want to choose an application with best practices for their industry built into the solution, without adding extra cost. For instance, plastics manufactures are by default a mixed-mode manufacturer with processes of batch and discrete manufacturing. COSMO Process Manufacturing is part of a manufacturing package, which together with further industry solutions, offers capabilities for make-to-order and project-based manufacturing.

Manufacturing

In a rapidly changing production scenario, real-time data is critical to production process and is beneficial for many other business processes. Dynamics 365 Busi- ness Central enhanced by COSMO Process Manufacturing supports all the mix, blend, fill, assemble, and other manufacturing processes required to produce one's intermediates and finished goods, including co-products and by-products, in a make-to-order, make-to- stock and mixed-mode manufacturing environment.

By-Production, also called combined production, is considered as output of one or more additional products. After a one-time setup of the proportions between main and by-products that result from the production, they will be automatically considered when registering a new production order.

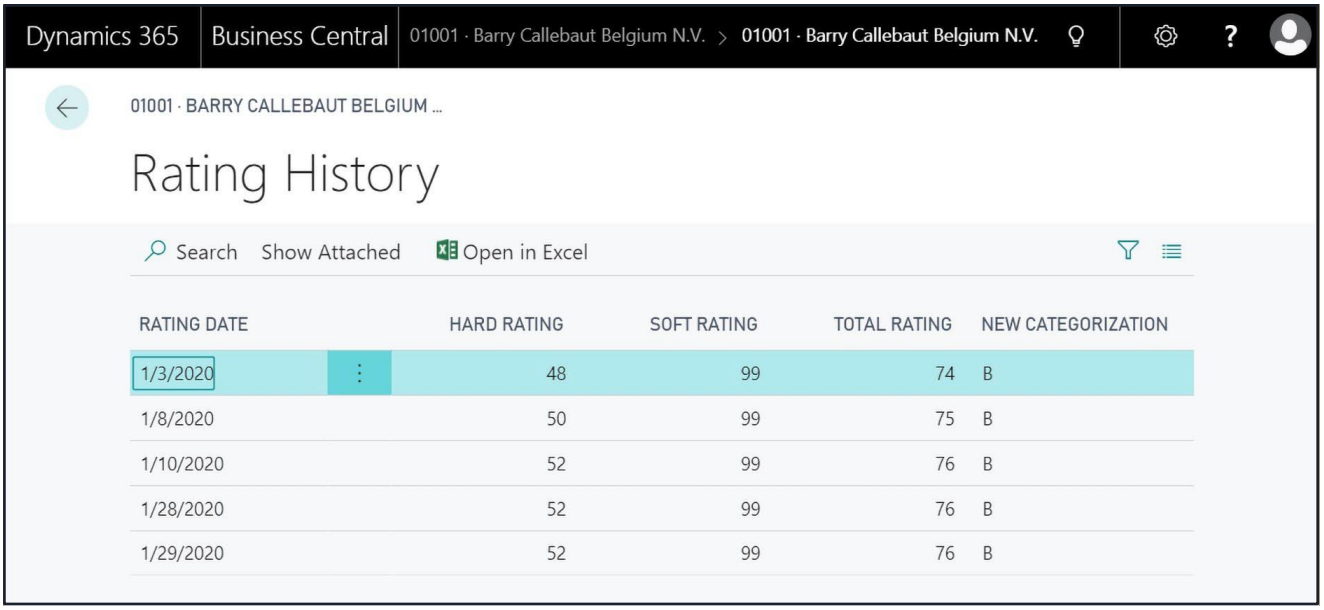

Fig. 3: Vendor Rating

Further advantages at a glance

- Lot expiration based on shortest ingredient life
- Individual formulation for economic e
- Together with COSMO Quality Assurance, quality inspections at process operations
- Specification of reclaimed scrap and of allowed incorporation (e.g., of polymers)

Integration to Shop Floor System

Automated communication between shop floor and ERP system is not only efficient, it provides real-time job tracking on the shop floor for improved visibility and scheduling. Dynamics 365 Business Central offers web technology for automated data exchange to electronic devices via web services. Other modules, such as COSMO Data Integration Framework, COSMO Factory Data Capture or COSMO Mobile Solution, provide a wide variety of electronic and field devices.

Production Planning

Sequence Planning

Time and again, everyday operations in production control are characterized by short-term changes due to unplanned machine failure and unexpected customer orders, which necessitate high planning flexibility and transparency (see fig. 4).

It is crucial for batch manufacturers to orchestrate their production plan in the right sequence, factoring in planned capacity and availability of raw materials.
COSMO Process Manufacturing functionality helps pro- duction planners drive the sequence of operations and jobs, making sure they have a priority-driven schedule that includes planned change-over, machine cleaning and setup changes.

Orders can be easily postponed or moved from one machine to another as a whole or split into multiple parts.

Maintenance and Setup Jobs

Based on a setup matrix, orders for setup are calculated in dependency to previous run on the work center. The setup matrix defines different setup times for different change scenarios—for example, due to color or tool changes. COSMO Process Manufacturing incorporates these setup orders between runs on the work center and recalculate dates of the subsequent production orders.

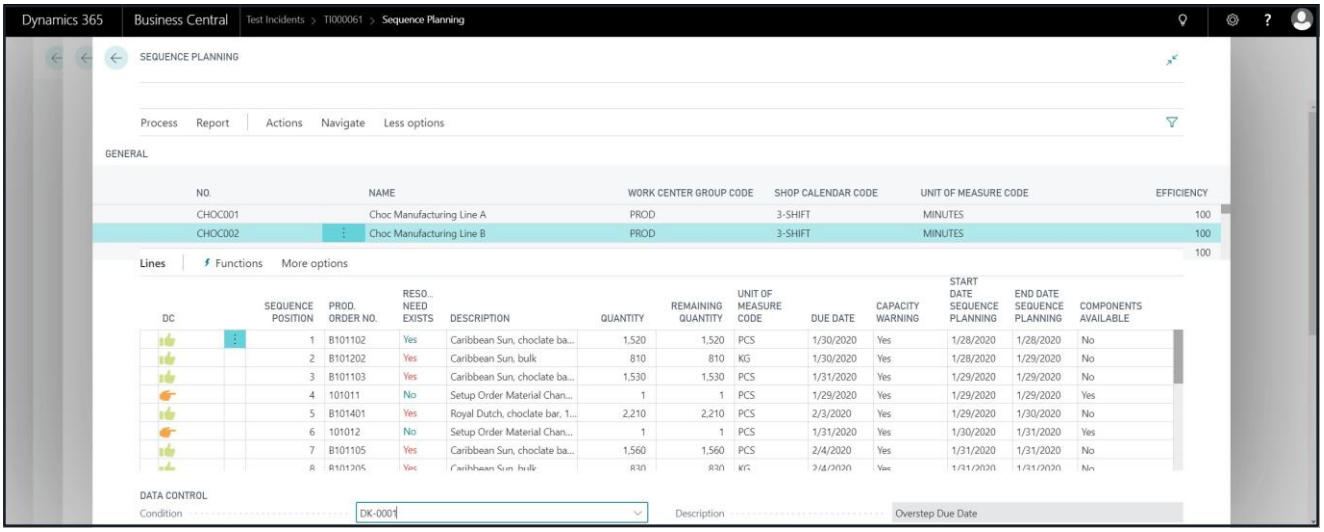

Fig. 4: Sequence planning

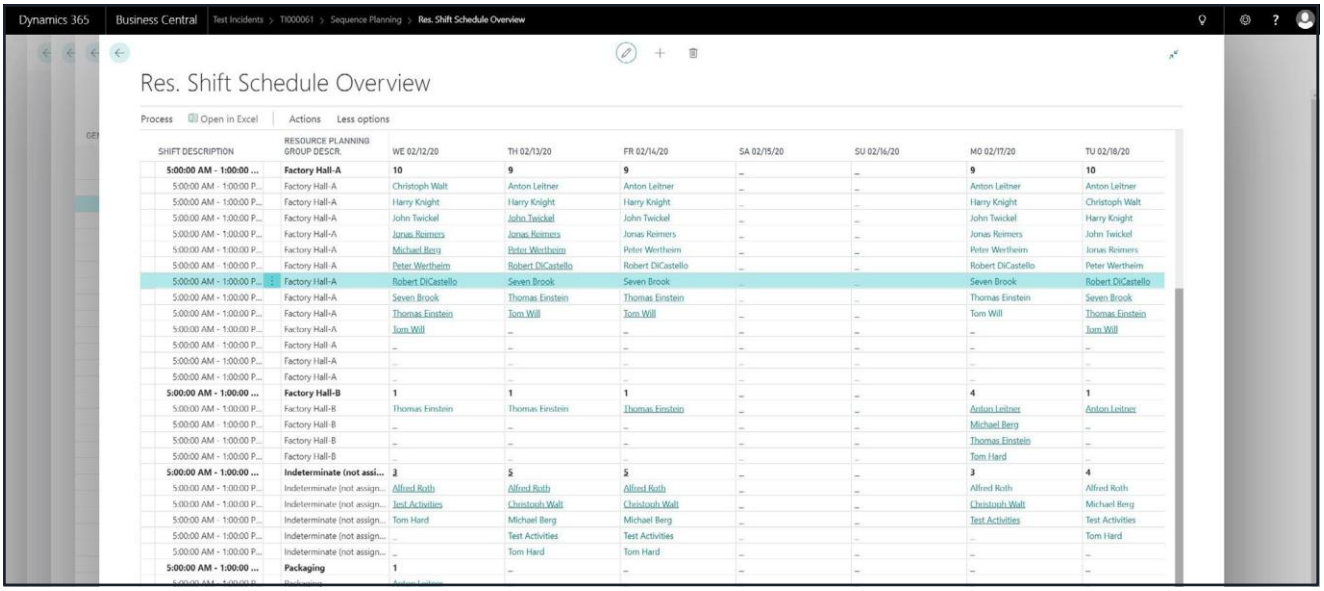

Fig. 5: Resources shift schedule

Resource Planning: Put the right people with the right skills in the right place—at the right time

A manufacture organization's demand is highly variable and tends to vary by time, day, week, and month, and for many other reasons. This means that shift patterns and schedules will vary, possibly even daily, because of the need to efficiently match shift planning, availability of resources, and capacity of resources to the demand. Shift planners in manufacturing companies are faced with the challenge of responding adequately to these rapidly changing impacts. The real-time visibility of COSMO Process Manufacturing into the workforce allows planners to handle staffing changes (see fig. 5).

The integrated scheduler of COSMO Process Manufacturing automatically generates best-fit schedules to help minimize compliance risk and improve productivity. It automatically sorts employees based on predefined criteria — availability, team preferences, skills, and certifications — so shift planners are able to quickly assign the right person to each setup and process operation.

Planning Pools

COSMO Process Manufacturing gives departments the real-time visibility they need to make decisions to ensure materials are available without overstocking.
Users can easily filter on planning-relevant information to locate what is needed and to navigate directly to the point in the procurement, planning or production process for decision making (see fig. 6).

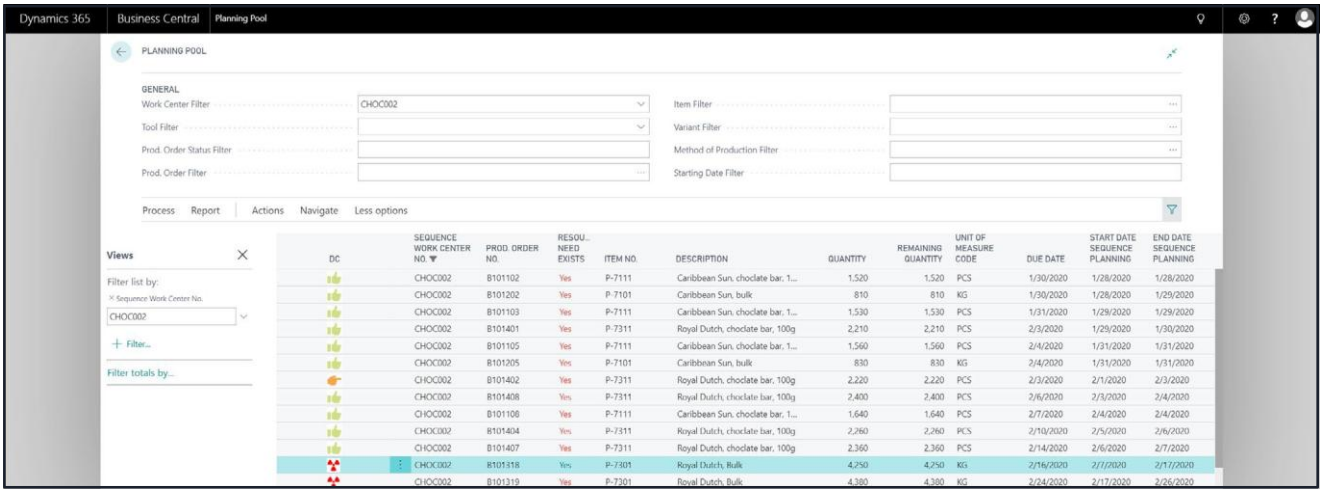

Fig. 6: Planing pool

Graphical Scheduling

A real-time graphical scheduler illustrates the manufacturing schedule in bar charts and remaining capacity for any work center in a calendar view. The scheduler provides quick access to additional operations and work order details. By means of visual sequencing, production planners can set up batches for production on certain equipment, schedule packaging lines, and adjust orders to build a complete, reliable schedule.

An ERP System with Quality Assurance

An ERP system for manufacturers must ensure that the end product meets the quality requirements of the company. COSMO Quality Assurance allows inspections at SCM processes to ensure the quality of raw materials is carried through to the finished good, and everything in between happens according to plan.

The system accounts for and supports users in conducting inspections throughout packaging and production.

When it comes to making quality decisions in manufacturing, a higher degree of variability often results in a range of acceptability. COSMO Quality Assurance helps manufacturers track the quality conditions of raw materials and finished goods and make better decisions about product quality (see fig. 7).

Hazardous Substance Management (HSM)

Enhanced by COSMO Hazardous Substance Management (HSM), the system provides increased compliance with end application analysis, easy calculation and distribution of compliance documentation, automated generation of safety data sheets and transport documents (ADR, IMO, IATA). Designed specifically for chemical manufacturing and distribution. HSM is compliant with industry regulations (e.g., GHS, WGK) and offers rich options based on ready-to-use and multilingual content packages.

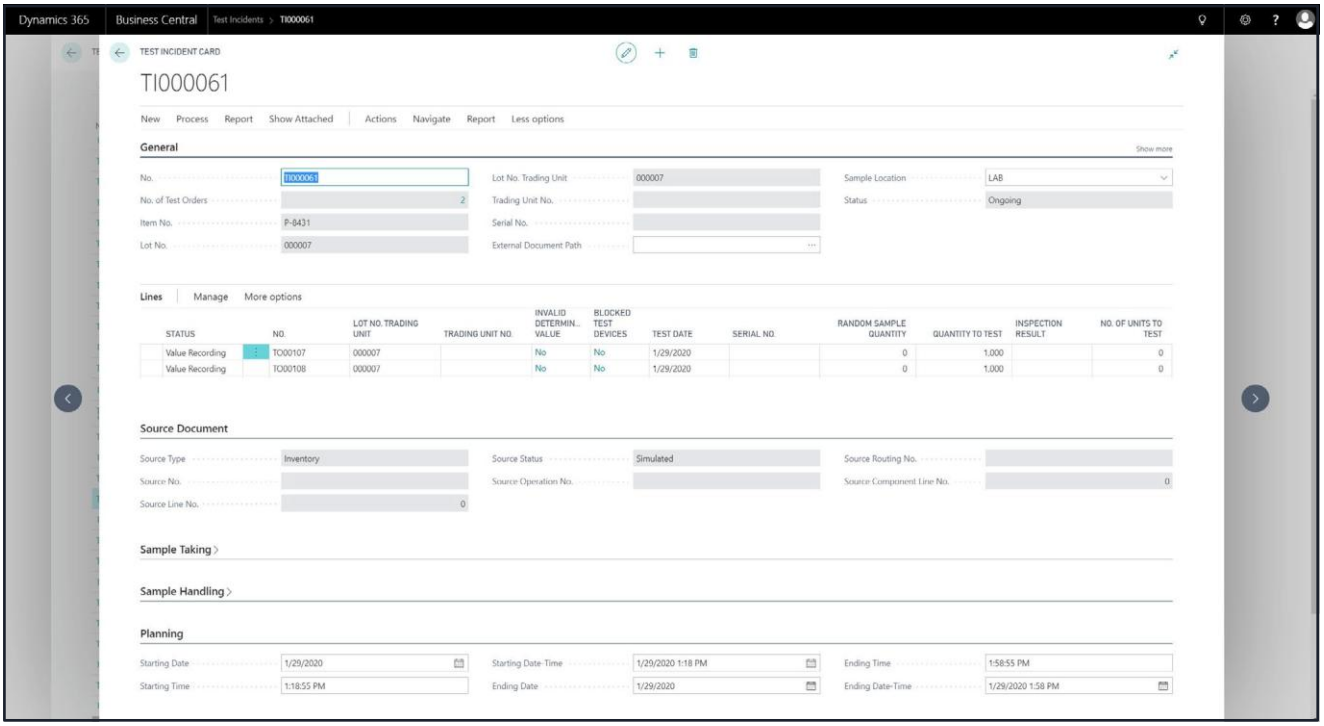

Fig. 7: Quality Assurance

Data Integration Framework

For multinational companies, it is vital to have multi- site cooperation to avoid the problems caused by many disparate systems. To work together to grow and expand their operations, more insight and control over processes and real-time reporting has become essential. Enhanced by COSMO Data Integration Framework, intercompany processes are supported and data silos become connected.

Conclusion

Reliable, repeatable processes not only improve customer service levels with your customers but also drives up staff productivity and means less time spent fire-fighting—so all stakeholders can focus on the things that matter most to their business.

Discover how COSMO Process Manufacturing is just one of many benefits for your business. You will see how it helps you better manage the complexity of your business.

Naviona is a Microsoft Solutions Partner that specializes in helping manufacturing companies gain better control of their operations, finances, inventory, and production processes through Microsoft Dynamics 365 Business Central.

Our primary focus is serving plastics manufacturers, specialty metals producers, and chemical companies. While each industry operates differently, they share many of the same challenges: complex inventory management, demanding costing requirements, strict traceability demands, growing compliance expectations, and increasing pressure to make faster business decisions with accurate data.

We help organizations overcome these challenges by aligning people, processes, and technology around a single goal: operational excellence.

Clients engage Naviona to:

- Transition from an outdated ERP system to Business Central
- Improve inventory accuracy and traceability
- Strengthen costing and profitability reporting
- Streamline financial close and reporting processes
- Automate manual business processes
- Develop solutions tailored to their manufacturing environment

Unlike firms that focus primarily on software deployment, we focus on business outcomes. We take the time to understand how your products are made, how inventory moves through your facilities, and where operational bottlenecks impact performance.

By combining deep Business Central expertise with real-world manufacturing knowledge, we help companies build systems that support better decisions, stronger performance, and sustainable growth.

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