Planning

Version 5.11

Product Description

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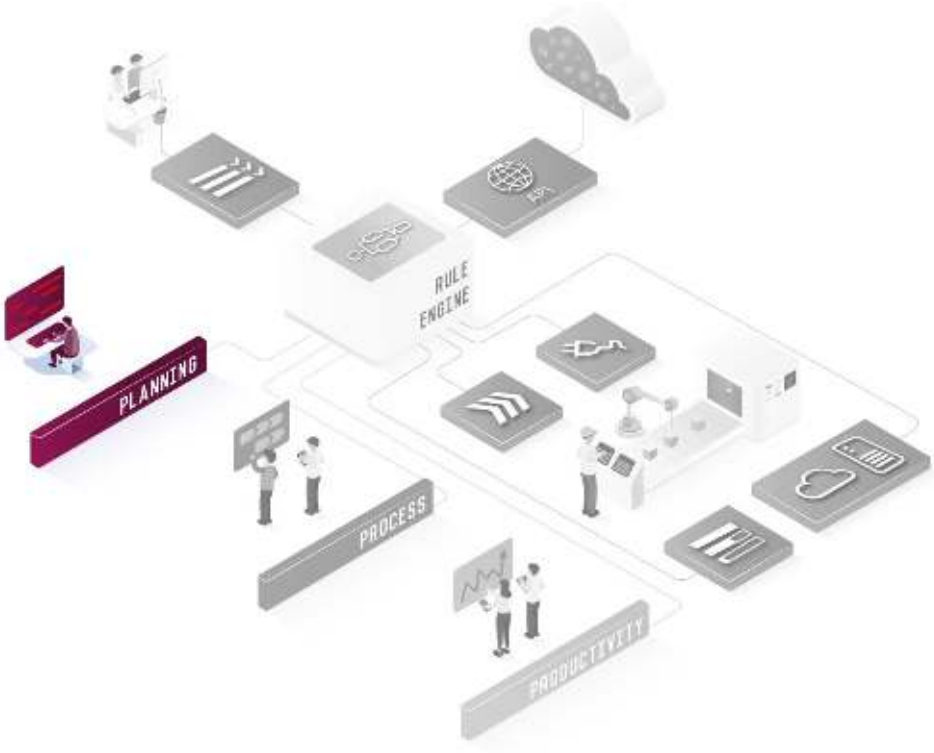
Overview

The FORCAM planning apps provide functionalities for production planning. These include the **Detailed Order Scheduling** and the **Digital Planning Board**. This document presents both apps and gives a scope of performance with their most important functions.

Both the Detailed Order Scheduling and the Digital Planning Board provide a variety of functions and are aimed at different planning scenarios.

In addition to detailed planning, the Detailed Order Scheduling can also carry out longer-term planning. In this process, the capacity requirements that are predefined by the ERP are dispatched to the limited available capacities of the production system to automatically determine a planning scenario that is as robust as possible. After a possible manual adjustment and final check by the planner, the planning scenario is released, updating the order data both within FORCAM FORCE IIOT and, if desired, in the ERP system.

The Digital Planning Board can also be used for detailed scheduling but is particularly suitable for planning adjustments or ad hoc rescheduling on the shopfloor. By using current data from the machine and manual workplaces, the Digital Planning Board also serves as a tool for monitoring production progress, thus increasing transparency in production.

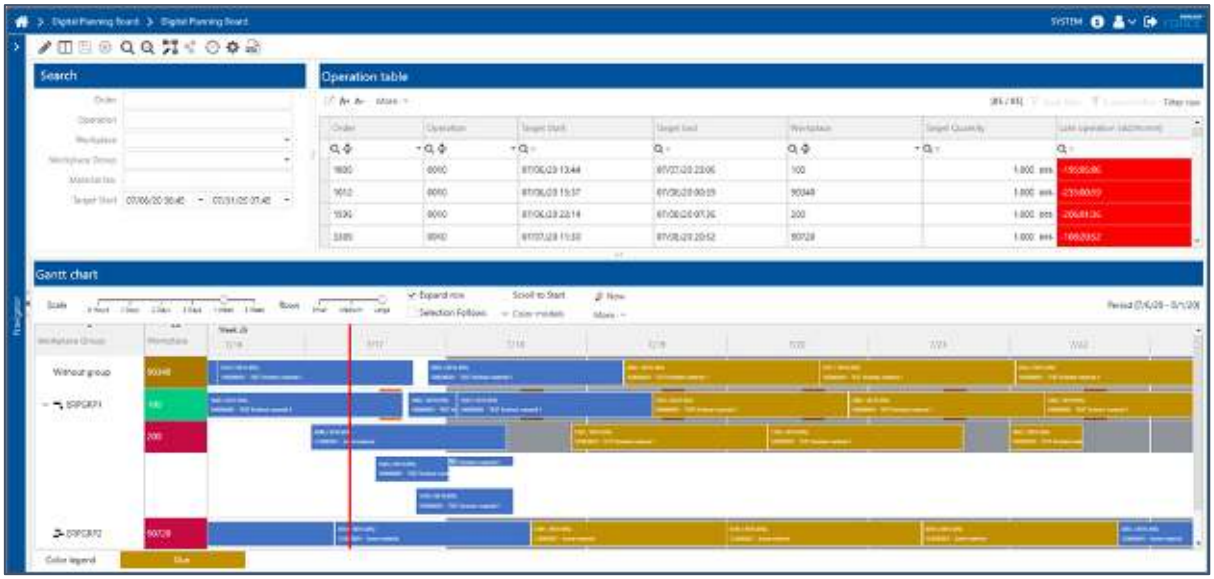


The following overview compares the functionalities of the two apps:

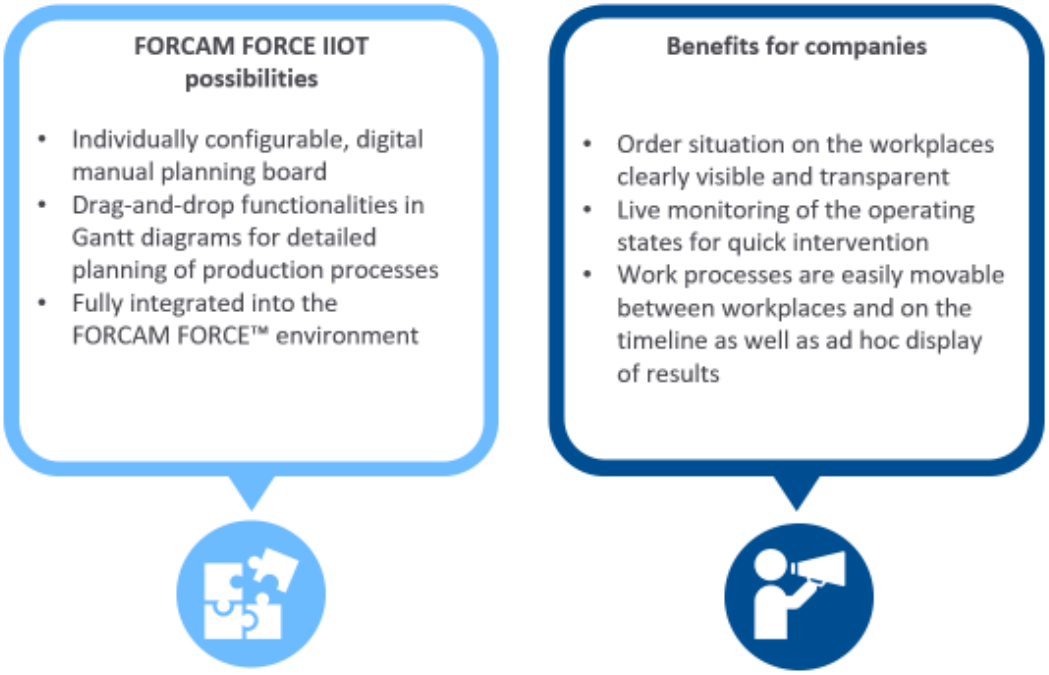
	Digital Planning Board	Detailed Order Scheduling
Display workplace in Gantt diagram	✓	✓
Reschedule with drag-and-drop	✓	✓
Close gap automatically at schedule gaps	✓	✓
Consideration of shifts in planning	✓	✓
Selection of defined color models	✓	✓
Manual workplace split possible	✓	✓
Definition of restricted areas for planning	✓	✓
Feedback to ERP	✓	✓
Observance of sequence of operations	✓	✓
Observance of capacities	✓	✓
Current data and quantities from production	✓	✓
Planning of joint production & block production	✓	✓
Integrated in FORCAM FORCE modules	✓	–
Graphics are highly customizable	✓	–
Monitoring mode with ad hoc rescheduling	✓	–
Search, filter, export	✓	–
Reset to ERP defaults	✓	–
Save configuration in user profile	✓	–
Simulation of production scenarios	–	✓
Supported through algorithm	–	✓
Selection of priority rules	–	✓
Consideration of personnel pools	–	✓
Tool availability	–	✓
Alternative workplaces	–	✓
Order network planning	–	✓

Digital Planning Board

The Digital Planning Board is a tool for planning and managing operations. The combination of a detailed tabular display with a built-in responsive Gantt chart provides a clear overview of the operations and also displays data relevant to production.

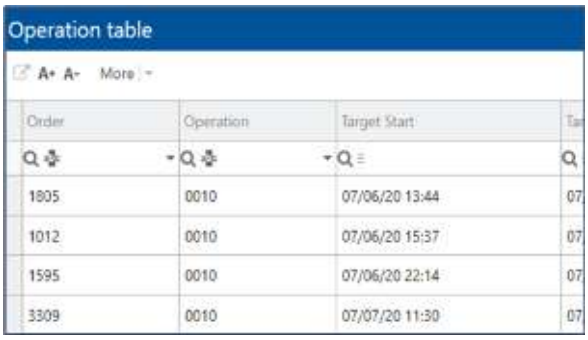


Benefit

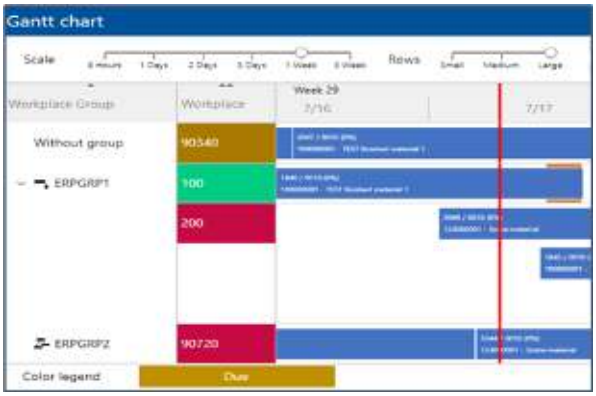


User interface

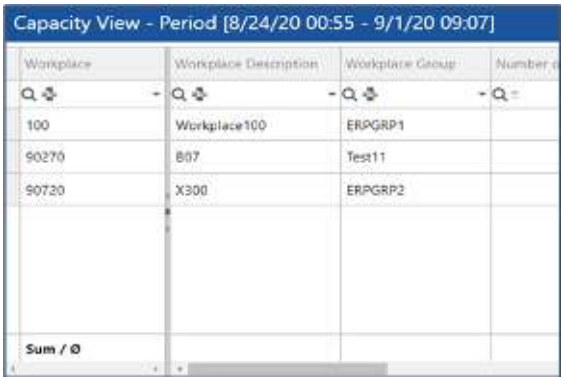
The Digital Planning Board is displayed in a customizable dashboard. There are four dashboard components that can be shown or hidden, and they can be re-sized individually.



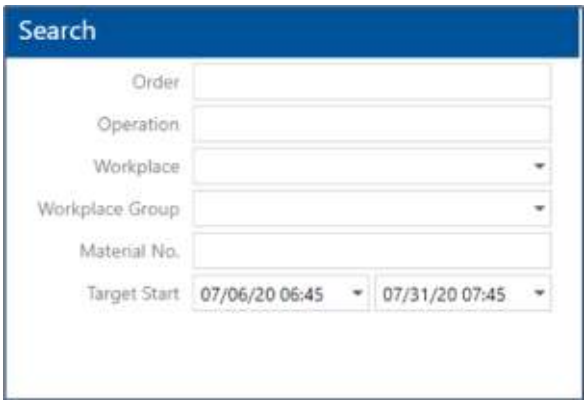
As a default, the operation table lists the corresponding workplace and order for each operation in tabular form and specifies further data such as dates or quantities. Columns can be removed, or additional ones added any time for customer specific interests. For this purpose, many additional columns are available in the configuration.



The Gantt chart provides a clear depiction of operations per workplace on a time axis. Here, the operations can be moved manually at any time for flexibly and promptly adjusting production planning. Each operation is displayed as a bar whose color changes dynamically according to a configured rule. For example, the color changes when a deadline is missed, or the color saturation increases or decreases depending on the progress.
The Gantt chart offers a variety of options for personalizing that can meet any display requirement.



The capacity view is another table that displays information specific to the capacity of a workplace. Production-relevant data such as the number of all operations, capacity workload, production and waiting periods, or availability is displayed for each workplace. Hence, the capacity view contains data from production that is relevant to production planning and significantly supports operation planning. There are various additional columns available here also.



If necessary, the search area can be used for filtering the displayed operations or workplaces according to certain search parameters so that less relevant data is not displayed. The search area can be configured to show further search parameters or to hide existing parameters.

Use cases

The functions of the Digital Planning Board can be grouped to three basic use cases:

- Live monitoring of all current processes in an overview
- Production planning for the next hours or days
- Ad hoc rescheduling, e.g. to react to unplanned events

Monitoring

In monitoring mode, the Digital Planning Board can only be viewed, no planning can be made. Processes and their statuses are visible at a glance and important information can be read off directly.

In the operation table, information on operations can be searched for and displayed.
The actual status of the current planning is displayed in the Gantt chart.
The automatic cycle of the monitoring mode specifies the status or phase of the operation at a certain time and shows when they change. Interaction with the operations – such as rescheduling – is not done in this mode.
However, visual adjustments such as changing the color model or resizing the chart are possible at any time.

Detailed scheduling

The scheduling person can use the Digital Planning Board to carry out detailed scheduling and adjust the entire planning area as well. They have an overview of a manageable area of time and a certain number of workplaces and can see at a glance the number and relationship of operations. This enables efficient and uncomplicated planning.

Feedback loops that influence the planning, e.g. through production meetings, can be easily incorporated and planning can be manually adjusted by the scheduling person. The Digital Planning Board allows for any spontaneous necessary rescheduling at any time.

Dispatching and scheduling

Production personnel - such as crew leader or shift supervisors - can easily adapt the detailed planning to the technical details of the workplace.
For example, when ad hoc rescheduling is required due to a machine or material failure, it is not necessary to call in a planner first. The Digital Planning Board thus offers the possibility of specifically intercepting failure scenarios.

Scope of functions

Planning functions

- Tabular and graphic representation of operations on a time axis (Gantt chart)
- Interactive sequencing and rescheduling with the Gantt chart and in the table
- Cyclic update of order and status data in monitoring mode
- Visualize current times of operations in Gantt chart
- Calculating the remaining time of operations based on total quantities
- Dashboard with components for planning and visualization of processes:
  - Operation table
  - Gantt chart
  - Capacity view
  - Search area
- Integration or visualization of the Gantt chart in the Shopfloor Terminal for the worker
- Configurability of opening successive operations without gaps
- Parallel processing of operations configurable per workplace
- Checking the operation sequence of each order
- Possibility of manual operation splits
- Manual fixation of any operations in planning mode
- Processing lock for all active operations
- Establishment of areas where planning is blocked, i.e. where operations may not begin
- Option to extend operation duration during non-shift periods and/or maintenance
- Support of joint production, block production, cutting processes, etc. by simply scheduling groups of operations together (one- or two-stage):
  - Operation blocks: consisting of several operations starting sequentially or in parallel
  - Operation block groups: consisting of sequentially starting blocks
  - In addition, it is possible to create and change blocks and block groups directly in the planning element editor
- Feedback to ERP (scheduling changes)

Planning support functions

- Predefined color models and configurator for custom color models (for Gantt and table)
- Color display of shift times, non-shift times, breaks, and maintenance
- Hierarchical display of workplaces and workplace groups
- Highlighting the operations belonging to an order
- Selection of the period to be displayed via calendar
- Extensive search, sorting, and filter functions
- Configurable search and table fields
- Configurability of operation and workplace information in the bar diagram and tooltip
- Highly customizable
- Excel and PDF exports
- Backup of the configuration in user profiles

Detailed Order Scheduling

FORCAM FORCE IIOT Detailed Order Scheduling supports the planning, scheduling and control components for production-related processes. The user is provided with planning functionalities to match capacity requirements (planned orders and production orders) with available capacity (machines and personnel).

The heart of the ERP system's materials management is the so-called MRP run (Material Requirements Planning).
The MRP run considers the following points in the calculation:

- Requirements
- Stock levels
- Specifications for minimum stock levels
- Replenishment times
- Already existing orders
- Planned scrap

The results of the MRP run are production and order proposal quantities.
The production target quantity is generated by way of planned orders and production orders. This results in capacity requirements for production factors such as machines, personnel, tools and materials.

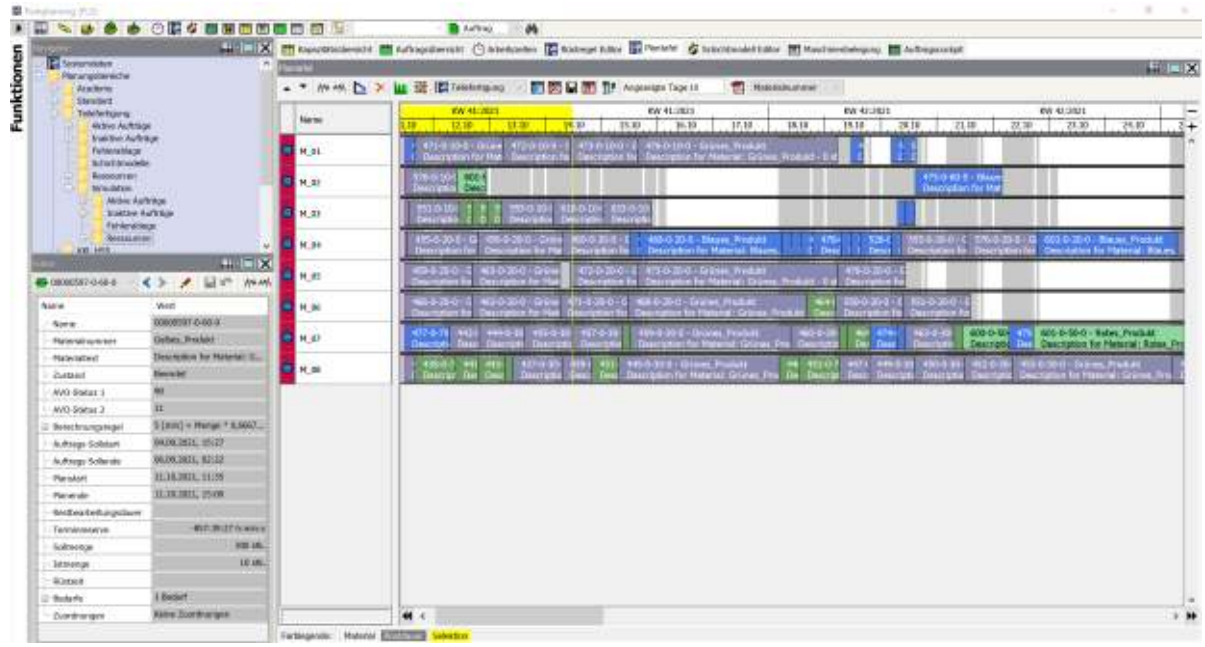
The FORCAM Detailed Order Scheduling automatically schedules the production and planned orders, which display the capacity requirements, against the available capacity. The available capacity is mainly represented by machines and personnel pools. Tools can also be processed analog to personnel pools as a further planning restriction.

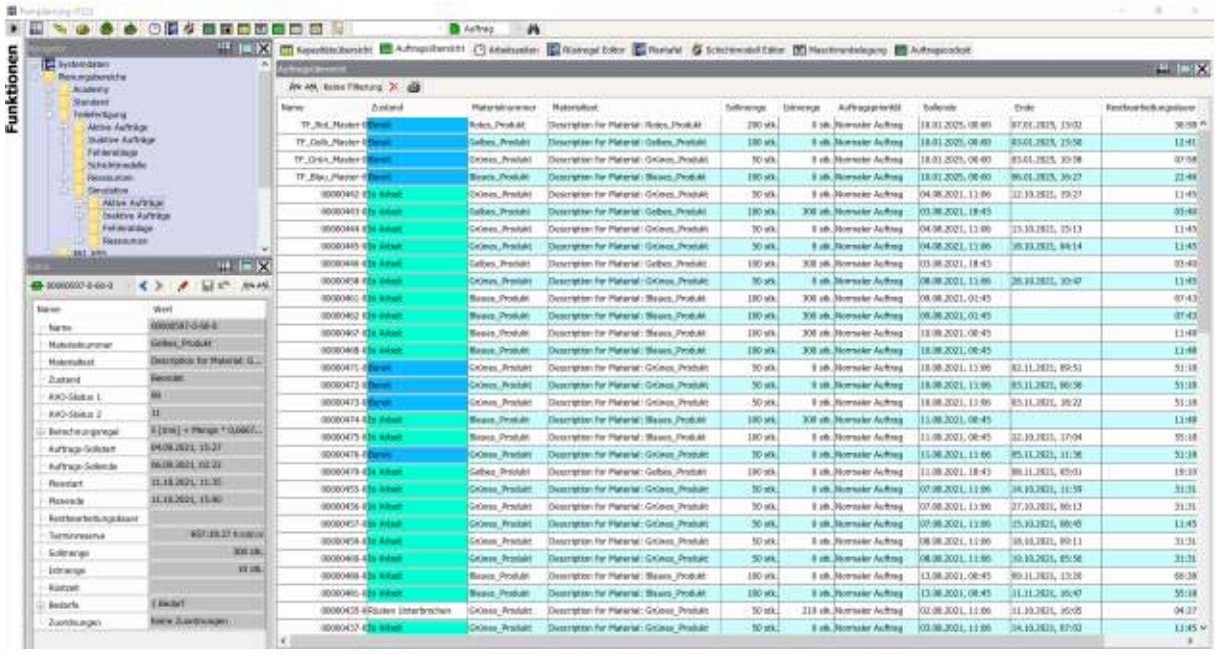
From a data perspective, the relevant ERP order data is transmitted from the ERP to the FORCAM FORCE IIOT database. For more information, see the manuals ERP Interface - Data and Events via SAP IDoc and ERP Interface - Data and Events via XML.

Based on this data, simulations are generated where the individual operations of the production and planned orders are dispatched to possible machine resources for each order within the planning period predefined by the ERP system. This results in a viable plan with the shortest possible lead time. In the Detailed Order Scheduling settings, optimization criteria such as deadline compliance, order priority or setup time optimization can be predefined for the scheduling algorithm.

The resulting schedules and workload profiles can be interpreted and compared.

The following images show the Detailed Order Scheduling of FORCAM FORCE IIOT:





Scope of functions

- Simulation of resource requirements with any amount of workplace models simultaneously and concurrently in the same system using a queue-based procedure for sequence planning. To ultimately achieve global optimization with respect to the order deadline via the priority rules of the queues, the respective deadline limits are determined at the beginning of each simulation per operation via network procedures.
- Throughput and capacity scheduling with limited capacities
- Scheduling and capacity planning
- Optimization of order sequence
- Order monitoring
- Capacity management
  Multi-level (hierarchical) shift management (factory calendar on each hierarchy level, close range with individual shifts and long range with weekly shift models)
- Configuration of the planning board
  - Free choice of colors
  - Multi-part bar labeling
  - Free time axis definition
- Simulation and planning parameters
  - Queue-oriented, multi-level planning procedure
  - Rush orders
  - Setup optimization
  - Order deadline orientation
  - Parts list-based order networking over several production stages
  - Simultaneous additional demand planning (machine and personnel)
  - Qualification groups: Setup, production, checking etc. per machine
  - Alternative machines
  - Consideration of the MES feedback
  - Overlapping order planning due to send ahead quantities
- Capacity calculation rules
  - Consideration of the OEE per workplace
- Test parameters for manual rescheduling
  - Specification of plausibility
- Graphically interactive layout design
  - Free configuration of tables
  - Free arrangement of graphics and tables
- Key figure-oriented simulation evaluation
  - Capacity profile
  - Backlog profile
  - Bottleneck analysis