Quick Start Tutorial

1. Overview

1.1. Produmex Manufacturing

Produmex Manufacturing is an add-on for SAP Business One that extends the Production module of SAP Business One with new factor: manufacturing resources. The incorporation of this new concept required a myriad of modifications to the system forms and databases and new forms, reports and database tables.

A major strategic decision was that wherever SAP Business One has a solution for manufacturing concept, Produmex Manufacturing will re-use or extend that solution. For example, the original forms and database tables for Item Master Data, Bill of Material, Production Orders, MRP Scenarios and Recommendations have been reused and extended. The Material Resource Planning logic had to be completely rewritten, and when the user presses the Run button in the MRP Wizard screen, the Produmex Manufacturing Advanced MRP logic executed, and not the original simple MRP. The architecture of the add-on is backward compatible with the SAP Business One original simple Production Module; this make migration very simple and straightforward.

1.2. Business Benefits

From business perspective the major benefits the user of the add-on may get are as follows:

- The technology of manufacturing process can be defined with the operations and material requirements. The entire production process can be scheduled at the minute level. This way the company will have an exact schedule of the manufacturing resource consumption. Eventually it may come to light that the old processes were not efficient and fewer resources may produce the same results, or the same amount of resources could produce more products.
- Since the manufacturing process is scheduled the material requirements can be ordered just-in-time. That is it is not needed to purchase all materials long before the materials are actually needed. This way warehousing costs can be significantly reduced and the money needed to finance the manufacturing process could be reduced.
- Since the manufacturing resources of limited capacity are taken into consideration when planning or scheduling the process, the result will be much more realistic.
- Since the add-on is fully and completely integrated with SAP Business One, there is no gap between the manufacturing system and the enterprise information (inventory, sales, purchasing, accounting, etc) system.

2. Setup and Installation of the Company

2.1. Installing the Produmex Manufacturing Add-On

Produmex Manufacturing is packaged and distributed as a regular SAP Business One add-on with an

.ard and a self-installing .exe file. For more information about the installation process please see: Installation Guide

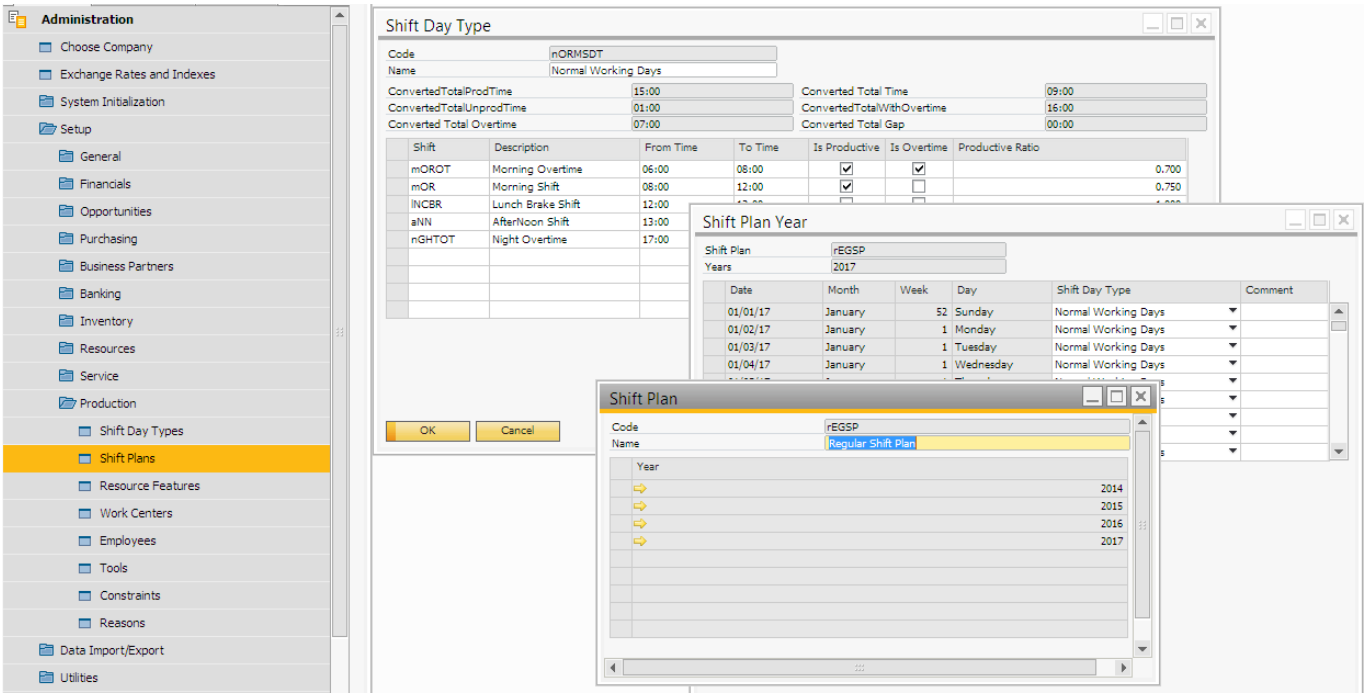
2.2. Setup initial data

Produmex Manufacturing extended the standard SAP production module with manufacturing resources. Work centers are the primary resources. When using the multi-dimensional allocation strategy, supplementary resources such as employees, tools and constraints can be defined as well.

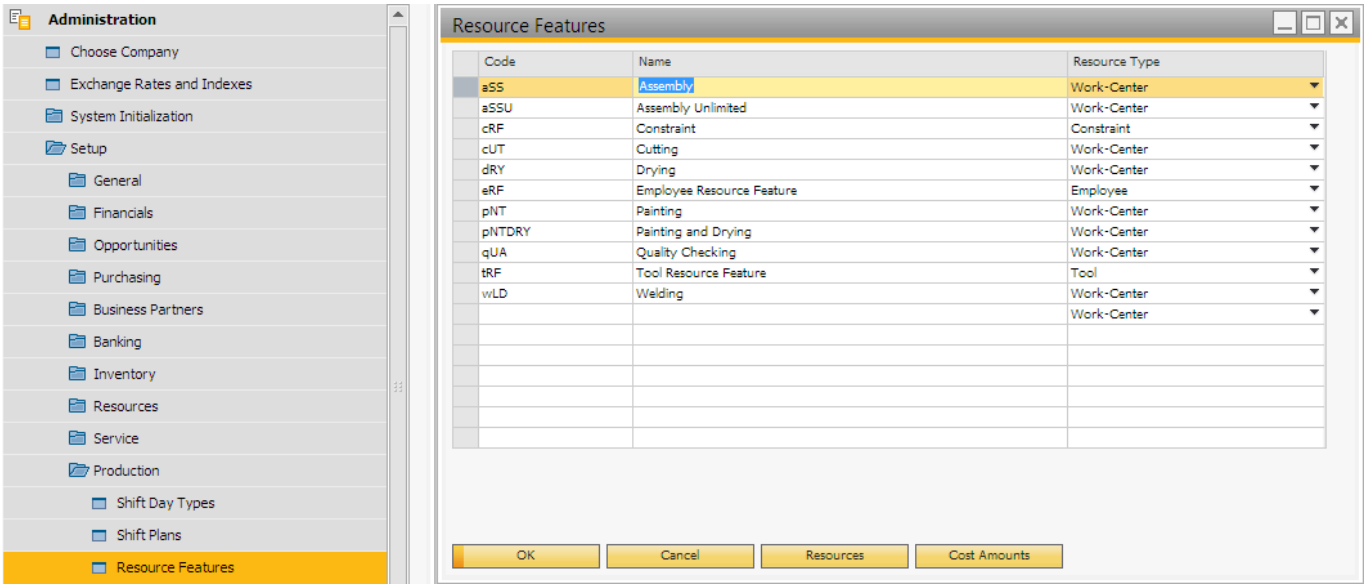
Before setting up the resources, create Shift Day Types and Shift Plans.

The shift day types are used when shift plans are defined for resources. A shift day type can contain multiple shifts. It is possible to add overtime and nonproductive shifts for administrative reasons, but such shifts are never used by the resource scheduling logic. The productive ratio determines how much of a shift is used by the resource allocation logic.

On shift plans a shift day type can be assigned for each calendar day.



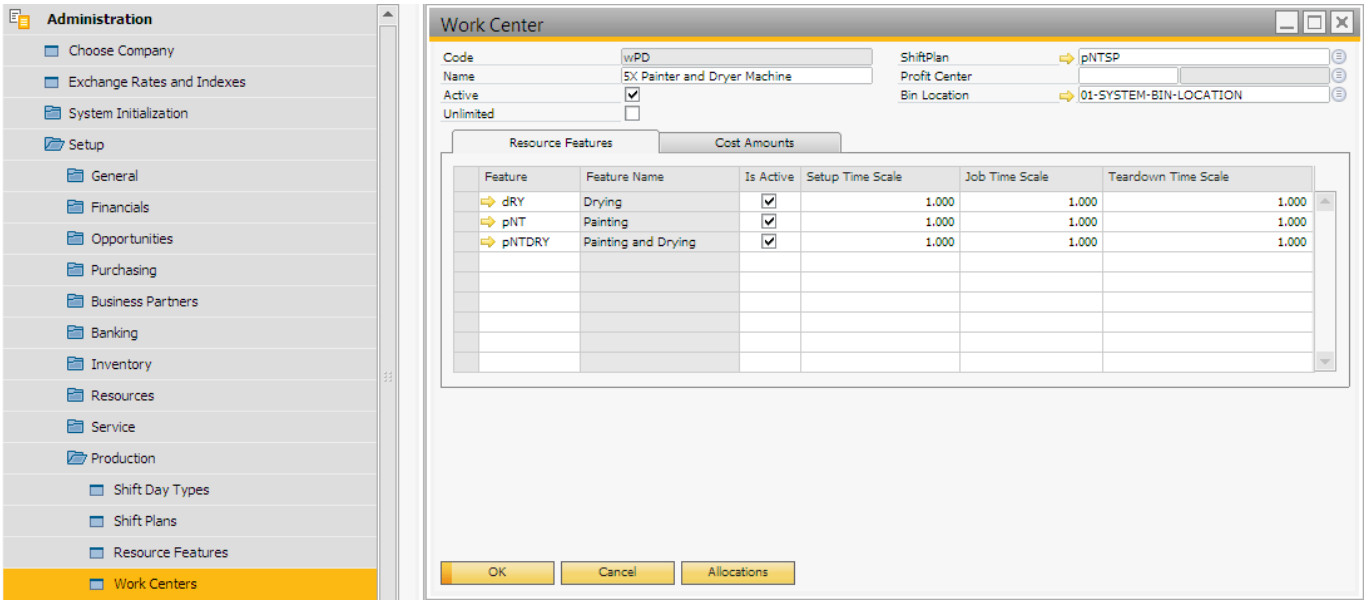
Then define the Resource Features. A feature in the resource context is a kind of capability a specific resource has. A resource may support multiple features. A feature is used by the resource scheduling logic to find the appropriate resource for a manufacturing operation.



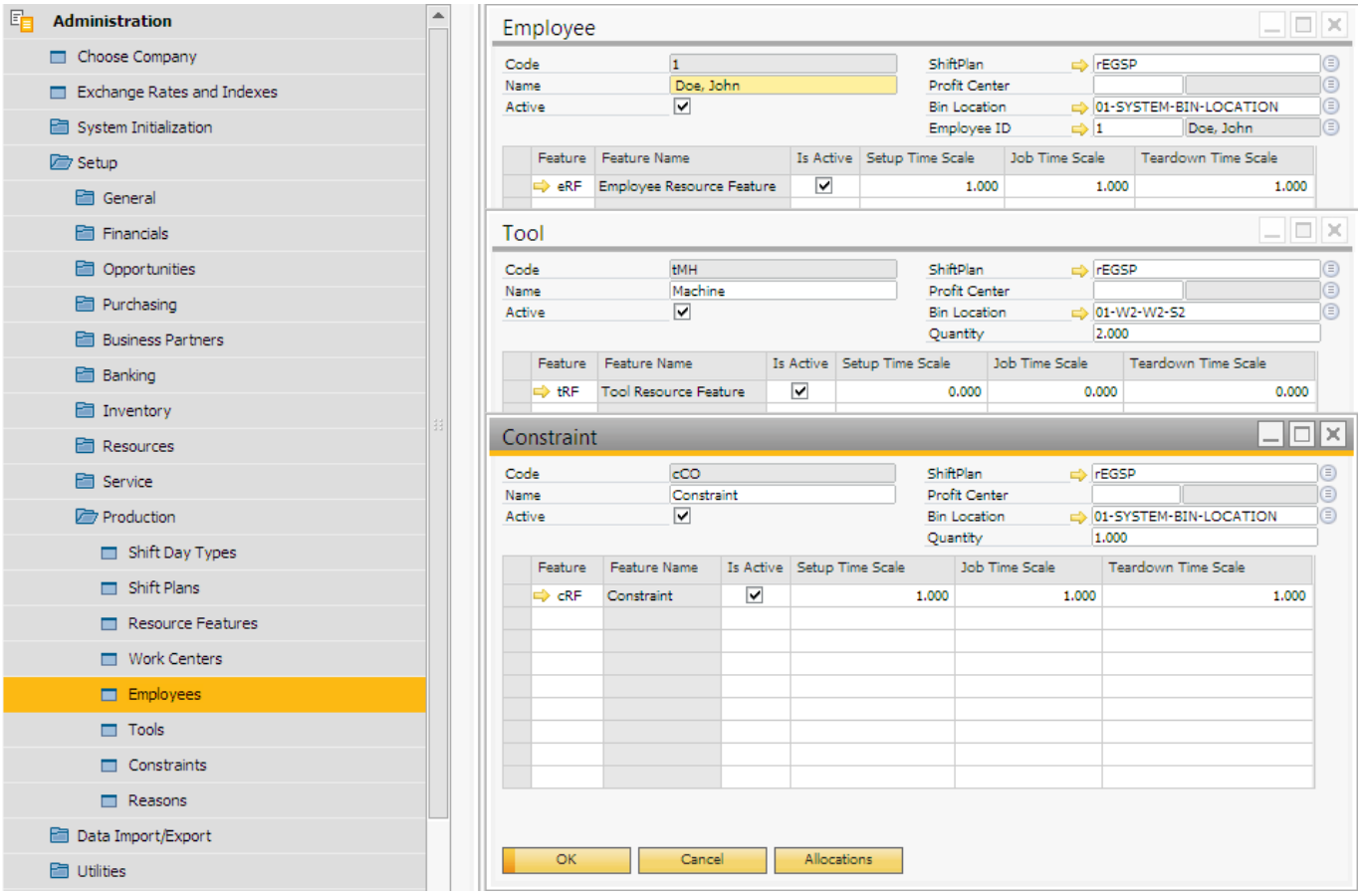
Then define Work Centers. A work center is an individual production area or sub-process of an overall manufacturing process. It is a section of a production facility where all tasks associated with a particular process (such as assembling, painting, welding) are performed. A work center may represent a single machine, a group of machines, a single person, a group of persons.

The job scheduler will only take into account *'Active'* work centers. The assigned shift plan defines the working schedule of the work center.

Work centers must support at least one feature. Features can be switched off individually with the *'Is Active'* checkbox. With the '*Job Time Scale*' setting the efficiency of the work center regarding the feature can be set.



When using the multi-dimensional allocation strategy, you can define Employees, Tools and Constraints too.



Resources can be linked to the BoM/production order with operations. Operations are special items that represent manufacturing processes.

First create a Manufacturing Operation. When a manufacturing operation is created, an *'Operation'* item is automatically added. The parameters of the operation can be set on the Item Master Data and the Manufacturing Operations form. The operation will be more meaningful in the context of a Bill of Material (BoM) or Production Order. All the parameters (except Is Outsourceable) for an operation can be redefined in a BoM or Production Order.

An operation has a number of parameters, the most important of which is the '*Job Time*'. The '*Job Time*' defines the resource capacity the operation requires. The setup, job and teardown times consume resource capacity while the before, safety and after times do not consume capacity but are taken into account when calculating the beginning of the jobs in the sequence of operations. The job time for some operation cannot be defined for a single unit; the '*Time Base*' is the number of the units of the operation the job time refers to.

The second most important parameter of an operation is the Work Center Feature. For each operation a Work Center Feature must be selected. This parameter is used extensively by the job scheduler; when the scheduler tries to find work center capacities for an operation, it will search for work centers that have the selected feature for the operation. It is possible to define a preferred work center. When the *'Is Mandatory Work Center'* checkbox is checked, the job scheduling logic will always allocate the operation on the preferred work center. When using the multi-dimensional allocation, supplementary resources can be defined for the operation on the grid.

If an operation is a parallel operation, it means that it can be performed by multiple work centers at the same time if there are enough resource capacities available. Operation break types define

whether more than one allocation for an operation is allowed or not.

As mentioned earlier operations are items from the perspective of SAP Business One, and some of their parameters can be defined in the item Master Data form. An operation item is never an inventory item. If the operation is outsourceable the item is set as 'Purchased' item.

Operations are used extensively in production Bill-of-Materials. The standard SAP Business One BoMs are extended by Produmex Manufacturing add-on with operation items.

The role of an item can be indicated with row types. A row in a BoM may be of type:

- Material (Purchased and own-manufactured items are differentiated with row icons)
- Operation
- By-Product (A material with negative quantity)
- Unfinished Product (For Outsourcing.)
- Unfinished Material (For Outsourcing.)
- Phantom (Virtual item in SAP Business One.)
- Cost (Any non-inventory item can be defined as ‘Cost’)

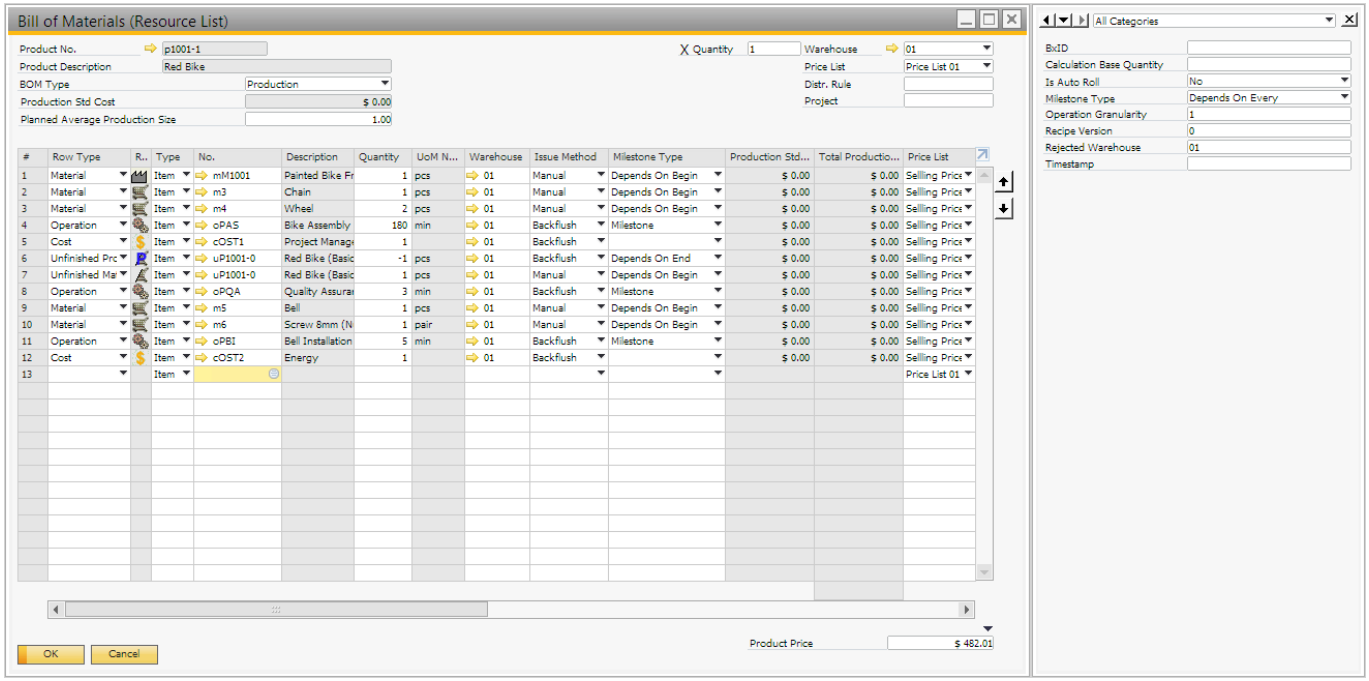
The sequence of materials and operations are important: materials required for an operation should come above (from top down) the operation.

Milestones connect the operations with the belonging materials. The issue method of an operation should always be ‘Backflush’. Items with ‘Manual’ issue type can be set with the following Milestones:

- *Depends on Begin*: The item will be issued when a Start Job is reported for the subsequent operation.
- *Depends on Every*: The item will be issued/received at every PDC booking for the subsequent operation where a quantity is booked.
- *Depends on End*: The item will be issued/received at every complete job booking for the subsequent operation.

> We recommend to only use the ’Depends on End’ milestone type if the base quantity of the material is 1 and only ’Completed’ job bookings are used.

The quantity of an operation is the same as the job time. The initial parameters of an operation are copied from the manufacturing operation, and these parameters may be customized for the BoM. The operation details form can be opened by clicking the row image icon.



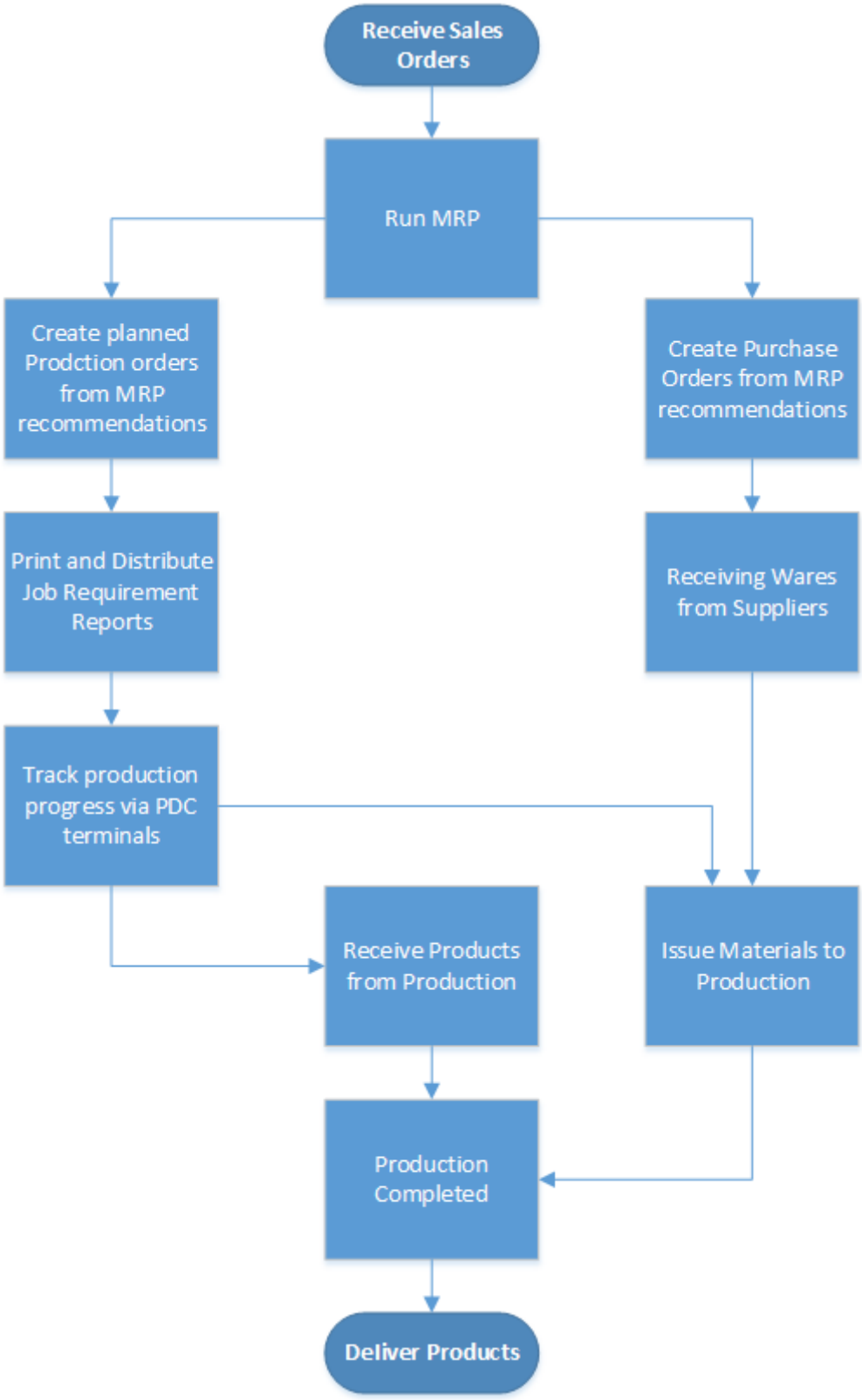
To calculate the estimated price of a product based on the Bill of Materials, configure the Cost Calculation settings.

2.3. Install initial data

In most cases when SAP Business One is installed for a company, the company has already had some computerized information system. Therefore, typically the first job for a SAP Business One installation project is to migrate or import the startup data for the company database of SAP Business One. The tools that may help in this job are Test Script Executor and Test Script Creator. Download the Test Script Executor and the Test Script Creator from: TxTestScriptCreator.zip

For more information about how to use the Test Script executor for installing initial data please see: Test Script Executor

3. Everyday Work – Business Process



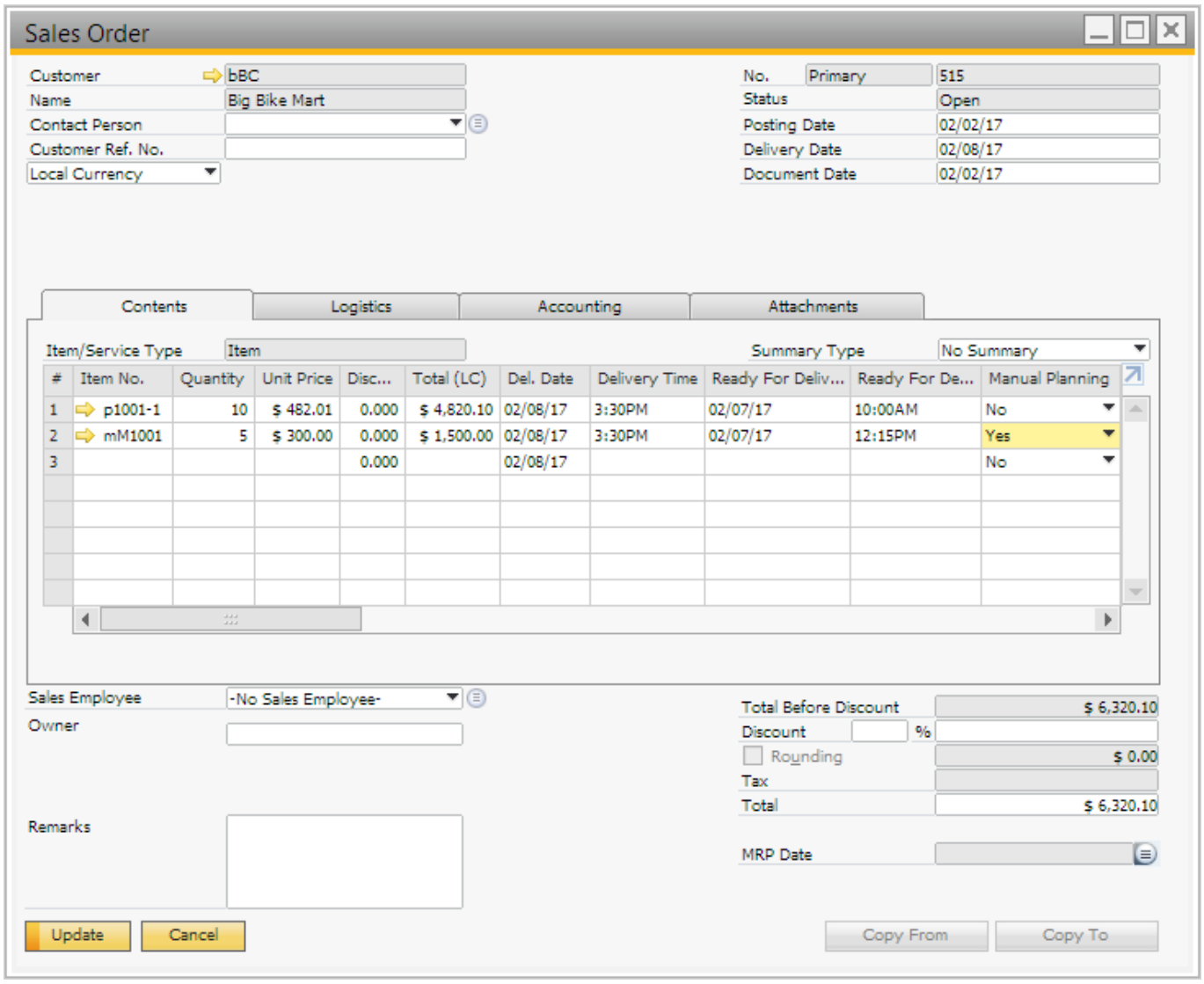
3.1. Receiving Sales Orders and Sales Quotations

3.1.1. Receiving Sales Orders

The requirements for the manufacturing process in most businesses are driven by sales orders. The Sales Order form is extended by Produmex Manufacturing with a new field ‘MRP Date’. The MRP Date calculated by the planning logic of Produmex Manufacturing is the earliest possible date to

accomplish/fulfill the sales order.

Please note: Only the Bill of Materials of the product is considered during the MRP Date calculation. The Bill of Materials of lower level assembly materials are not considered during the calculation.



Produmex Manufacturing supports just-in-time manufacturing; a new 'Delivery Time' column is added to the items matrix, which is the time of date of the 'Delivery Date' (a standard SAP Business One field). Since Production Orders extended by Produmex Manufacturing support 'Due Time', the recommendations created by MRP support 'Due Time' as well.

In a number of cases the 'Delivery Date' and 'Delivery Time' is the time when the customer wants the products on her premises. In such a case if the shipping time is significant, the manufacturing should accomplish the production before shipping. This is where the 'Ready for Delivery' and 'Ready for Delivery Time' fields are important: if they are defined, the MRP logic uses them as the expected due date and time for the Production (or Purchase) Order Recommendations.

In some situations some of the Sales Order lines should be ignored by the MRP. If the '*Manual Planning*' flag is set to 'Yes', the MRP ignores this and the fulfillment of the sales order line should be managed manually. This setting allows the combined running of the MRP and the MTO.

3.1.2. Receiving Sales Quotations

The earliest fulfillment date can also be calculated for Sales Quotations. The form is extended by Produmex Manufacturing with a new *'MRP Date'* field. Click on the button next to the MRP Date field. Starting from the current date, the planning logic of Produmex Mnaufactuirng will calculate the earliest possible date to fulfill the sales quotation.

Please note: Only the Bill of Materials of the product is considered during the MRP Date calculation. The Bill of Materials of lower level assembly materials are not considered during the calculation.

If the '*Advanced MTO Recommendation*' option is enabled on the MTO tab of Produmex Manufacturing settings, a *'Sales Quotation Simulation Parameters'* form will open.

On this form a separate MTO scenario can be created for the sales quotation. It is possible to adjust the scenario name and select additional MRP scenarios to include in the allocation simulation. The type of the scenarios that can be included is defined by the '*Sales Quotation Simulation Type filter*' setting on the MTO tab of Produmex Manufacturing settings.

Click on the *'Calculate'* button to calculate the earliest MRP Begin Date/Time and MRP End Date/Time for the sales quotation lines. The 'MRP Mark' column determines which lines are taken into account in the simulation:

- If the 'MRP Mark' is set to 'No' for each line, every sales quotation line will be taken into account.
- If there is at least one line with enabled 'MRP Mark', only lines where the 'MRP Mark' is set to 'Yes' will be taken into account.

These fields will be populated with the begin/due date/time of the order recommendation of the item created by the MTO.

To also see the simulation results on the Job Scheduling Control Panel, click on the *'Show'* button.

3.2. Detect Requirements

3.2.1. Advanced MRP

Material Resource Planning (MRP) is the tool in SAP Business One to find the purchasing and production requirements driven by sales orders, advance/reserve invoices, forecasts and inventory level requirements.

In SAP Business One MRP can be run with a number of parameters; the parameters and the purchasing and production recommendations are saved in scenarios. Produmex Manufacturing simply extends the scenario concept of SAP Business One.

When the Run button is pressed on the MRP Wizard screen, the advanced MRP logic of Produmex

Manufacturing is executed suppressing the built-in simple MRP logic of SAP Business One. The advanced MRP logic of Produmex Manufacturing uses exactly the same parameters of a scenario as SAP Business One, but the algorithm is much more complex because it takes the available resource capacities into account.

The results of the advanced MRP are displayed in an overview matrix. When the buttons are clicked a form is shown that explains the driving factors behind that recommendation.

If there are requirements that cannot be fulfilled on time, a list of error is displayed after MRP has completed running. In many cases the reason of the error is that the MRP cannot find available capacity for the operation of a production order recommendation. Click on the red x to see the detailed explanation.

The problematic figures are displayed in red on the overview matrix. The pegging information window shows the production or purchase order recommendation.

3.2.2. Manage MRP scheduling on a graphic board

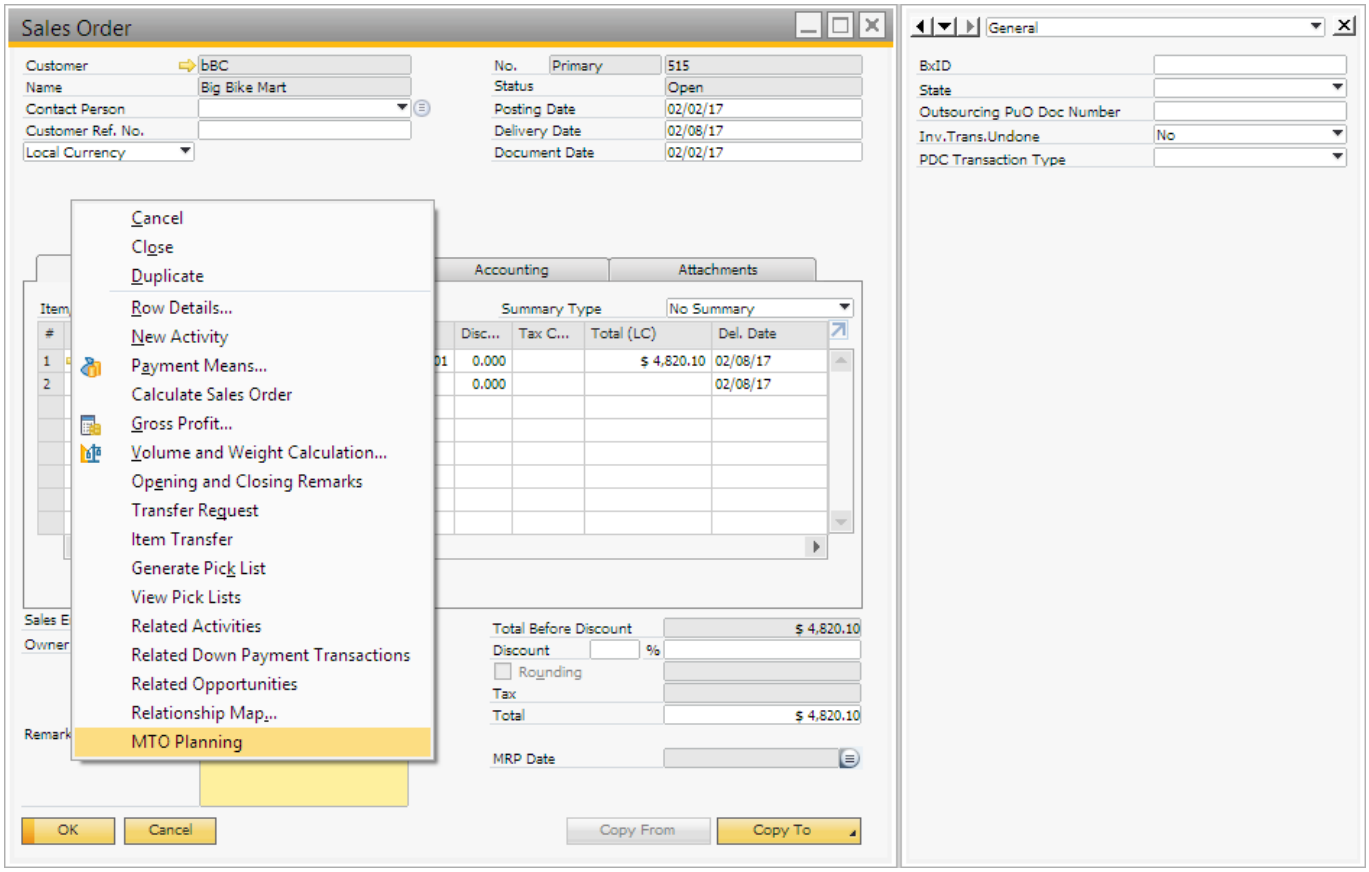
To see the simulated resource allocations for the production orders recommended by the MRP, open the Job Scheduling Control Panel. Click on the ‘Query’ button. Check ‘MRP recommendations’ as a Data Source and select the MRP scenario from the dropdown list.

3.2.3. Make To Order

Produmex Manufacturing also supports procurement planning strictly based on production orders and incoming sales orders. With Make To Order planning a separate MRP scenario can be created for the triggering production/sales order. Production and purchase orders created from MTO recommendations will be linked to the top order.

In order to take into account an item during the MTO planning, set the *‘MTO Planning’* UDF to ‘Yes’ on the Item Master Data.

Initiate the MTO from the right click menu of the top order.



On the opening ‘Top Order Picker’ form select the top order line. It is possible to combine more than one orders in one MTO scenario. Click on the ‘Load Top Orders’ button to load every order that can be included in the MTO scenario. Select the orders with the *‘Selected’* checkbox then click on the ‘Add’ button to add the new MTO scenario.

3.2.4. Combine MRP and MTO

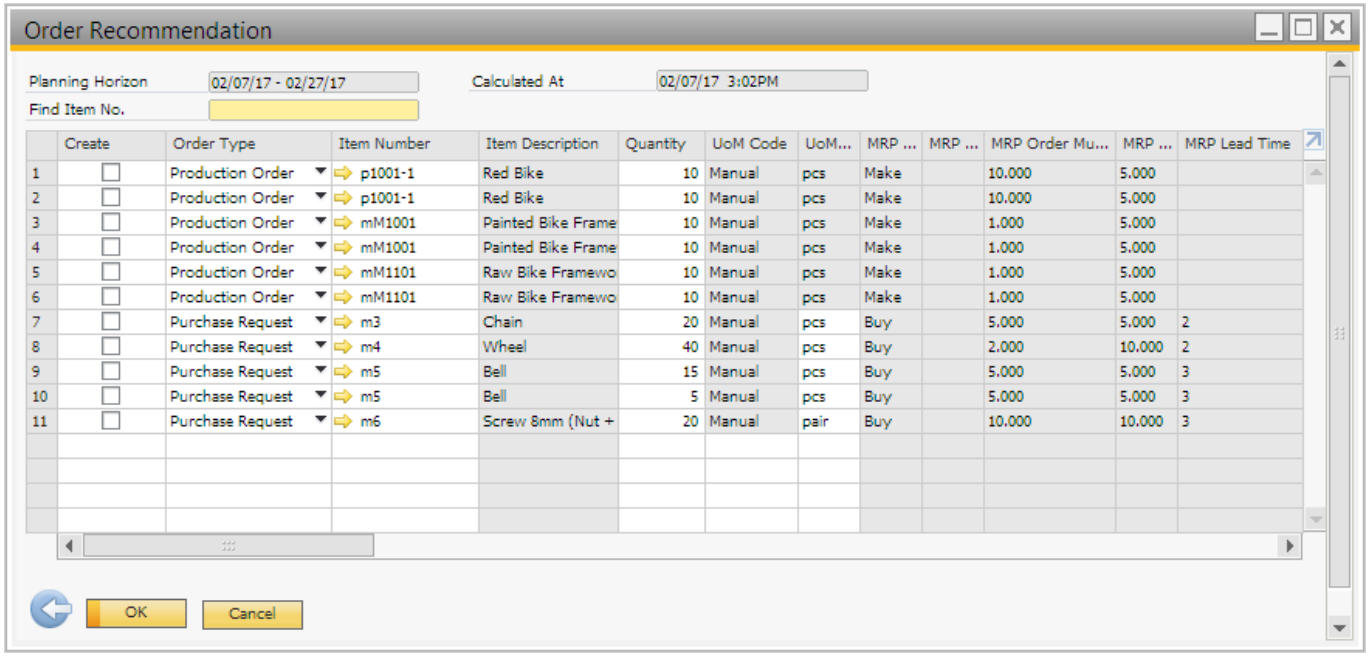
Manufacturing companies that produce complex and customizable products might want to run MRP and MTO simultaneously. Produmex Manufacturing supports the combined use of MRP and MTO.

To plan the procurement of an element with MTO only, enable the *’Skip MTO from Normal MRP’* option on the MTO tab of Produmex Manufacturing settings. Every item with the ‘MTO planning’ option set to ‘Yes’ will be excluded from the MRP run.

To exclude certain sales order lines from the MRP run, set the ‘Manual Planning’ field of the line to ‘Yes’ on the sales order.

3.3. Creating Production and Purchase Orders from Recommendations

Order recommendations created by the Produmex Advanced MRP and MTO are saved into the same database as used by the SAP Business One’s original simple MRP logic. This way the standard Order Recommendation form extended by the Produmex Manufacturing add-on is used to review the recommendations for a scenario. From this form the user may create both production orders and purchase orders.



	Create	Order Type	Item Number	Item Description	Quantity	UoM Code	UoM...	MRP ...	MRP ...	MRP Order Mu...	MRP ...	MRP Lead Time
1	☐	Production Order	p1001-1	Red Bike	10	Manual	pcs	Make		10.000	5.000	
2	☐	Production Order	p1001-1	Red Bike	10	Manual	pcs	Make		10.000	5.000	
3	☐	Production Order	mM1001	Painted Bike Frame	10	Manual	pcs	Make		1.000	5.000	
4	☐	Production Order	mM1001	Painted Bike Frame	10	Manual	pcs	Make		1.000	5.000	
5	☐	Production Order	mM1101	Raw Bike Framewo	10	Manual	pcs	Make		1.000	5.000	
6	☐	Production Order	mM1101	Raw Bike Framewo	10	Manual	pcs	Make		1.000	5.000	
7	☐	Purchase Request	m3	Chain	20	Manual	pcs	Buy		5.000	5.000	2
8	☐	Purchase Request	m4	Wheel	40	Manual	pcs	Buy		2.000	10.000	2
9	☐	Purchase Request	m5	Bell	15	Manual	pcs	Buy		5.000	5.000	3
10	☐	Purchase Request	m5	Bell	5	Manual	pcs	Buy		5.000	5.000	3
11	☐	Purchase Request	m6	Screw 8mm (Nut +	20	Manual	pair	Buy		10.000	10.000	3

After the production orders have been created from the recommendations, they are created in ‘Planned’ status initially. The production order can be modified in any manner.

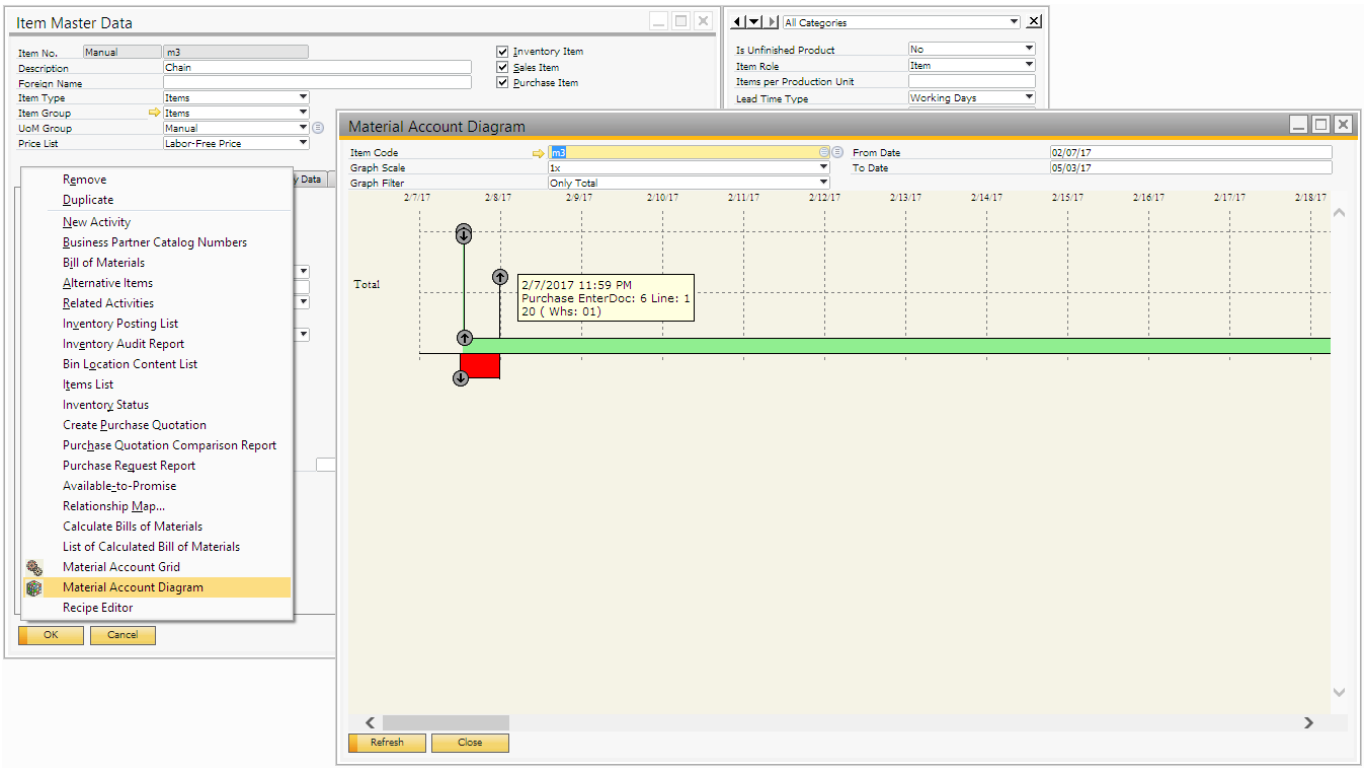
For planned production orders only temporary allocations are made. Permanent allocations will only be created after the production order has been released.

As mentioned earlier, Produmex Manufacturing extended the production order 'Due Date' with a time component. With the '*Due Time*' UDF the production planning is detailed at the time-of-day level.

3.4. Detect missing components

At this point the components needed for the production may be missing. The Missing Parts Report shows the components that are not on stock for the planned or released manufacturing, and this way they need special attention.

To see the material flow of a given item, open the Material Account Grid/Diagram from the right-click menu of the Item Master Data.



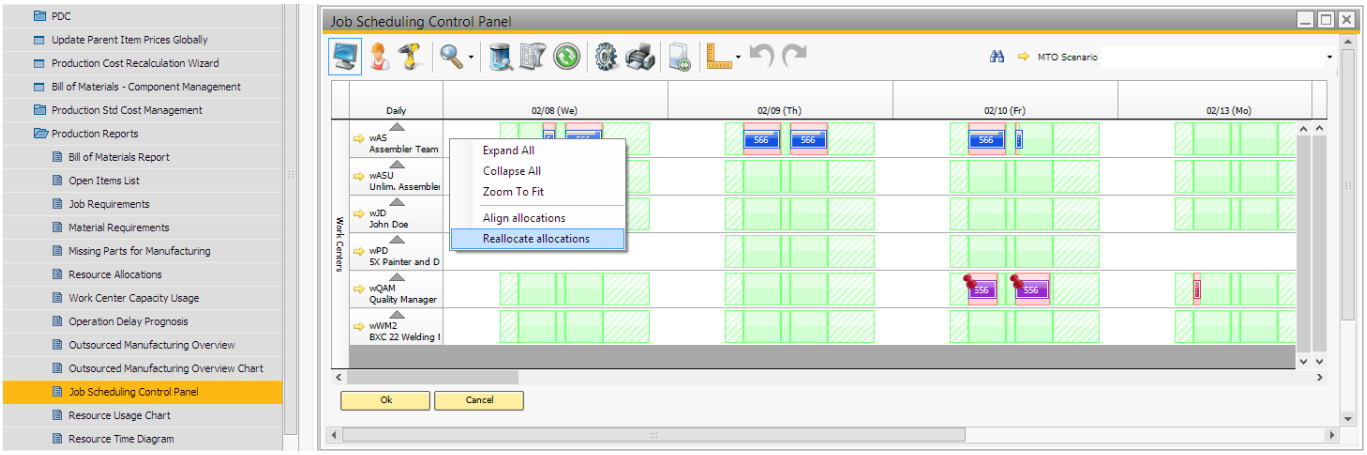
When the mouse cursor is moved over the circled arrow icons, a bubble shows details about that transaction; if the icon is clicked the appropriate production, purchase, etc. order form is opened. The up arrow shows incoming, the down arrow outgoing inventory transactions.

When all the purchased components are on stock the production can be started.

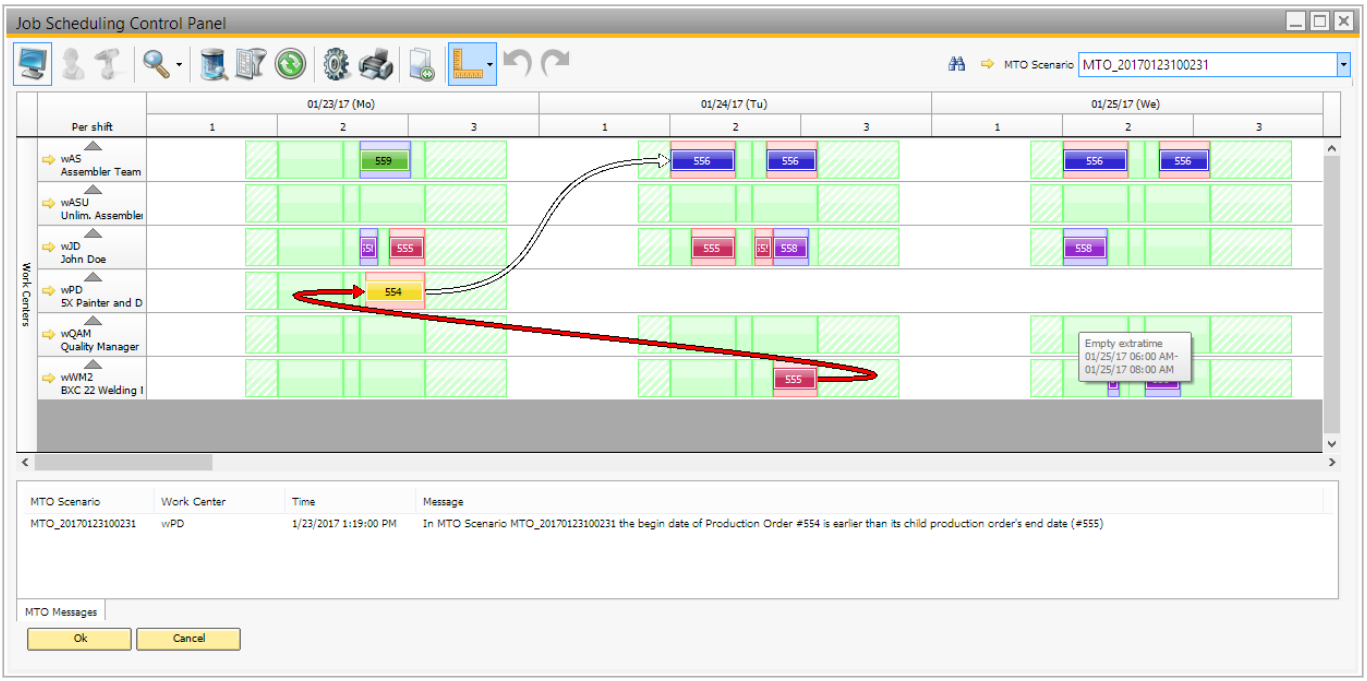
3.5. Manage scheduling

For the operations of production order recommendations and planned production orders, no actual resource capacities have been allocated. In the case of such orders, the resource allocations are only temporarily made as a simulation. Permanent allocations are only created when a production order is released.

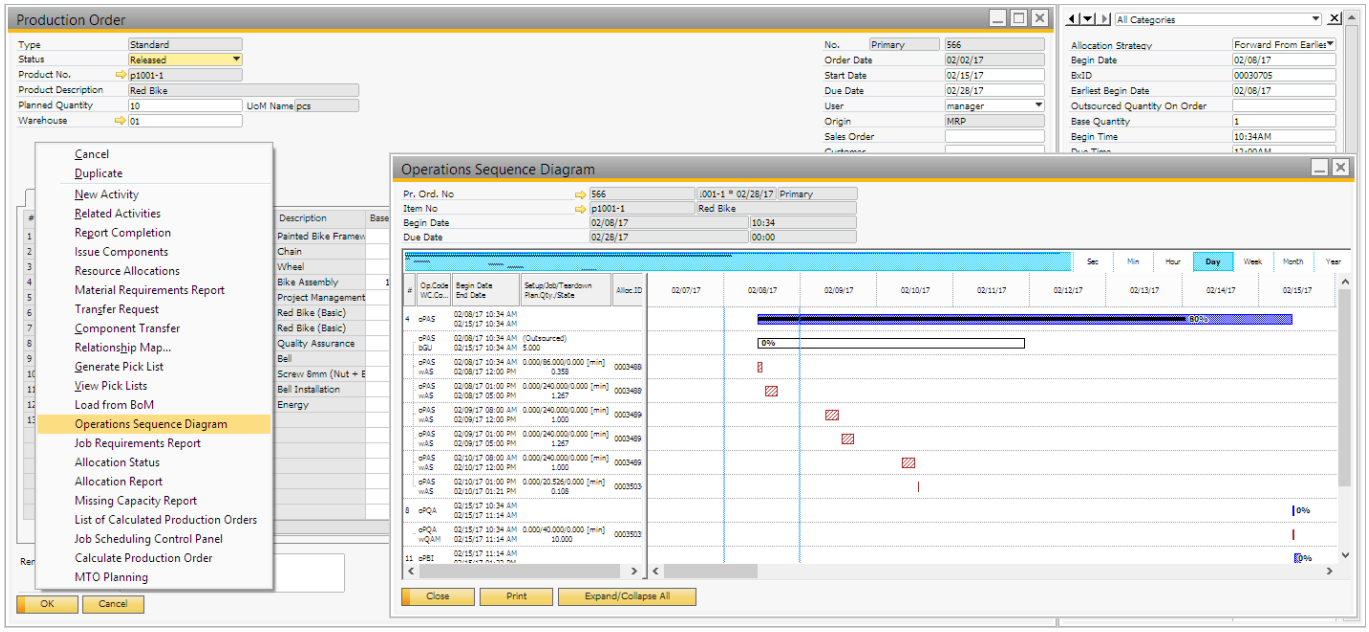
On the Job Scheduling Control Panel not just the allocations for recommendations but the simulated allocations for planned production orders and the temporarily allocations for released orders can be monitored. To reschedule an operation, simply drag it and replace it on a free slot. To reschedule every allocation for a resource, use the semi-automatic rescheduling functions.



The Job Scheduling Control Panel has special functions for MTO scenarios. If a scenario is highlighted, the sequence of the operations is indicated with arrows. When the system detects discrepancy, an MTO message is shown and the discrepancy is marked with a red arrow.



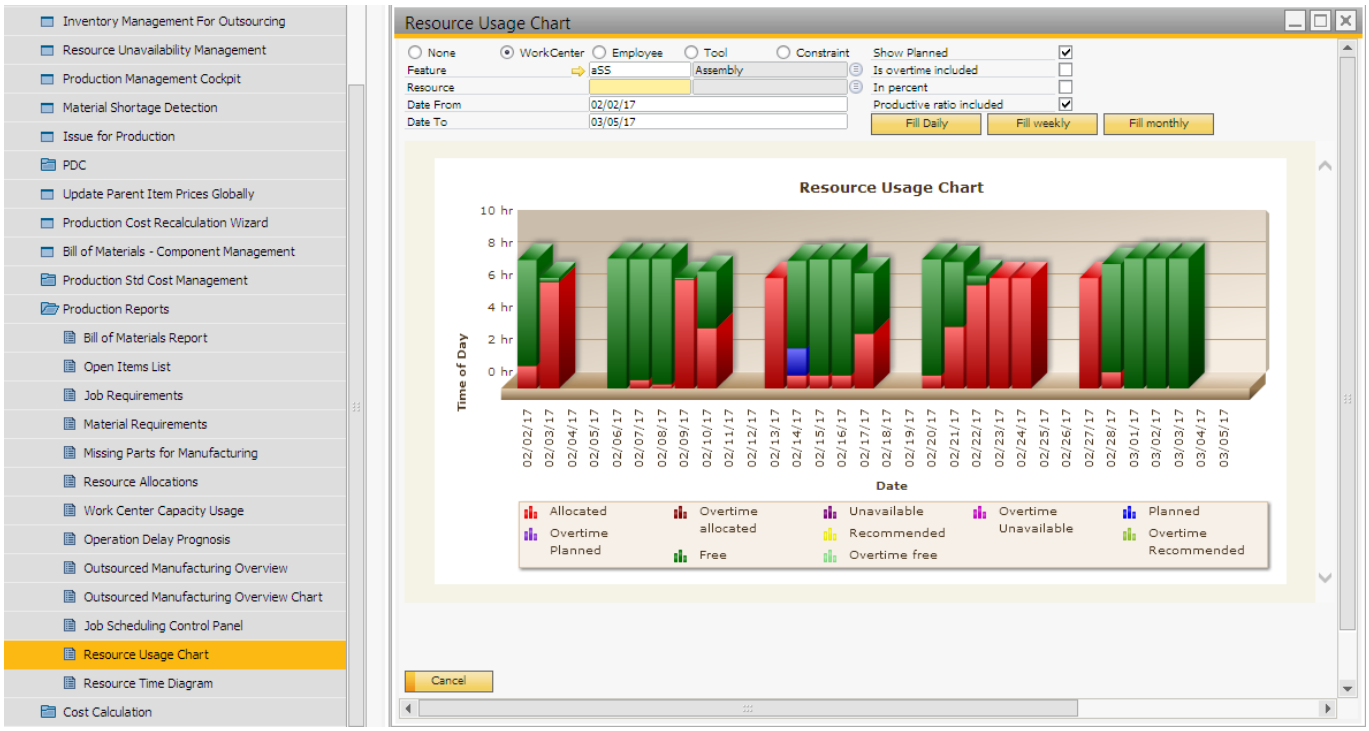
To review the operation sequence of only one production order, open the Operation sequence diagram from the right-click menu of the order. On the diagram resource allocation are displayed in separate lines with the completion percentage.



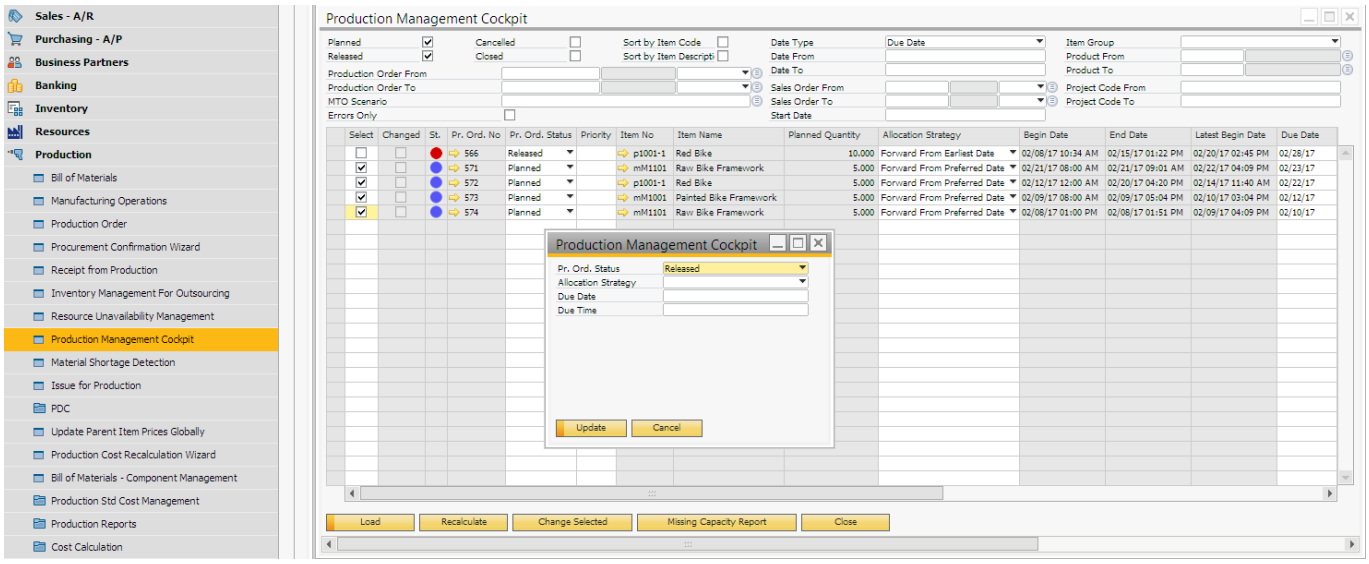
One of the goals of a manufacturing company is to optimize the usage of resources.

The Resource Usage Chart may be used even with planned or recommended production orders. Keep in mind that resource capacities are allocated for the operations in production orders based on the resource feature settings.

When no work center is selected, the combined usage of all work centers of the company is shown. The available capacities of the resources are determined by the associated shift model.

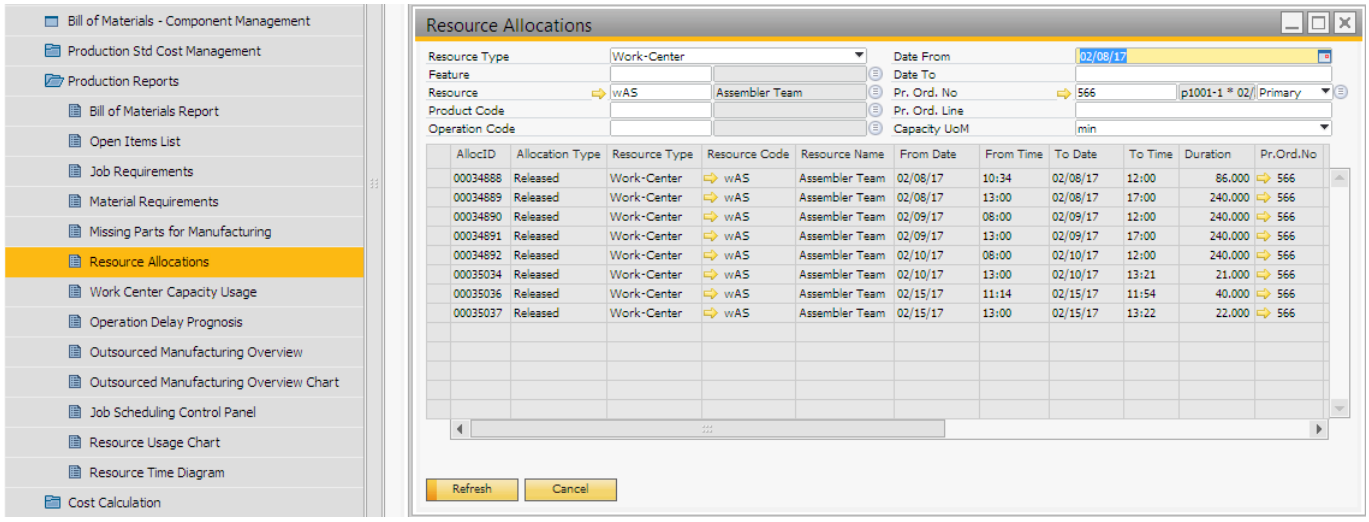


Produmex Manufacturing also offers a Production Management Cockpit. On this cockpit production orders can be released, closed or rescheduled in groups. To release multiple production orders, select the lines of the production orders then click on the ‘Change Selected’ button. Select the new status from the dropdown menu. After pressing ‘Update’ recalculate the production orders.

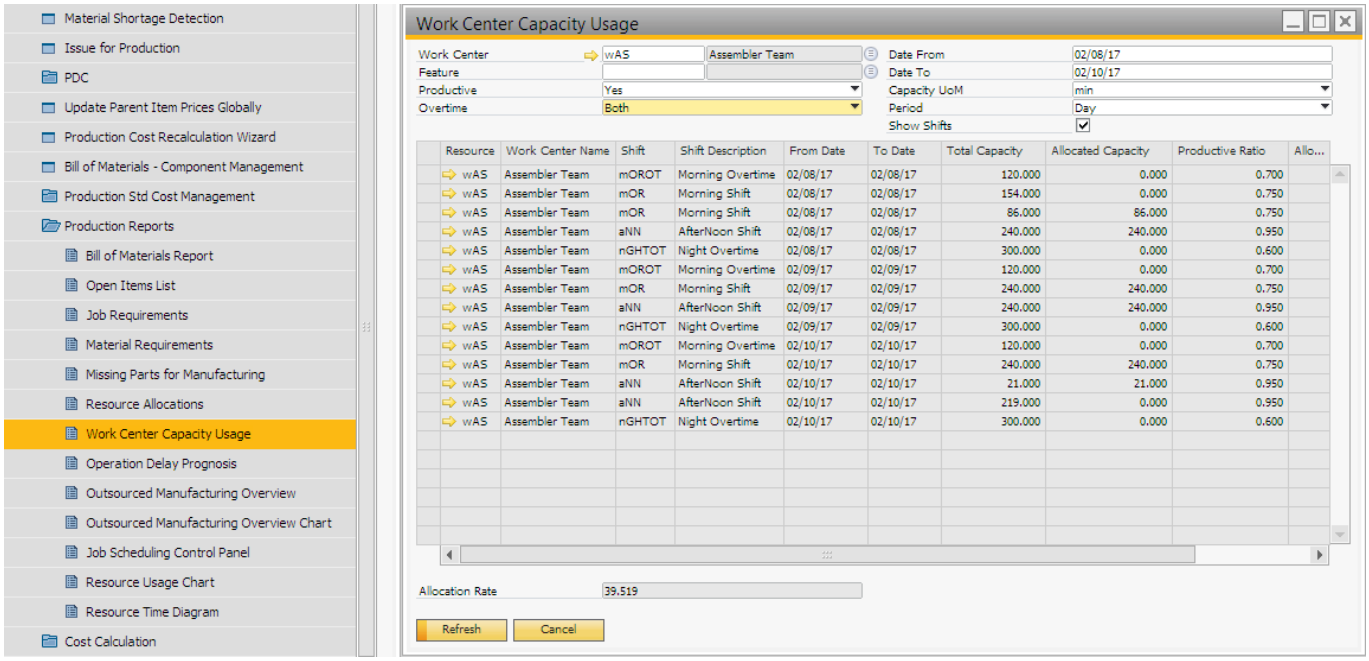


When a production order has been released, the scheduling logic of the Produmex Manufacturing add-on finds resource capacities for the operations and a number of reports are available including the Resource Allocations report.

The allocations for a selected resource, resource feature, product, production order or time period can also be viewed on a grid. Open the Resource Allocations form.



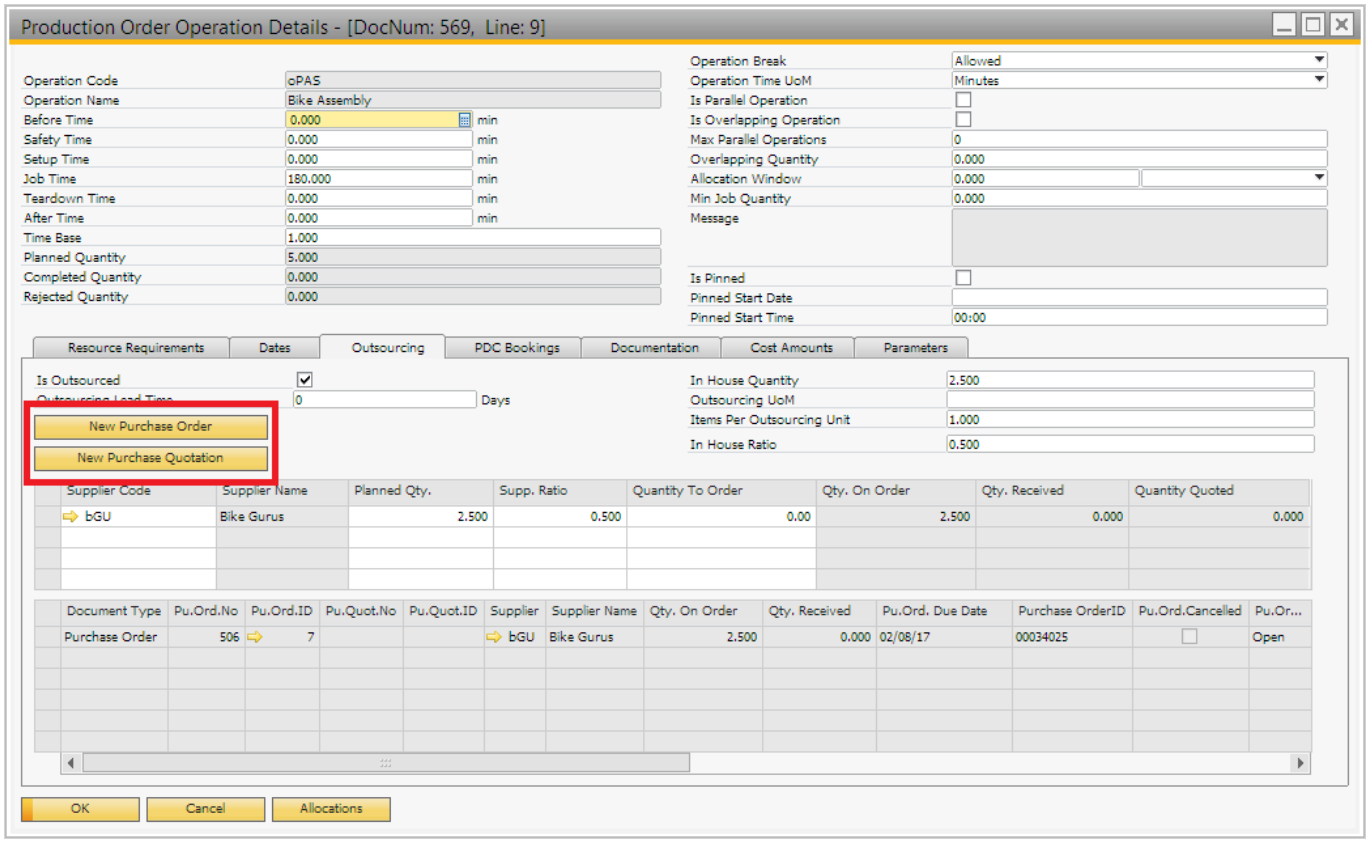
To see the capacity usage of a given work center, open the Work Center Capacity Usage form. On the *'Allocation Rate'* field the work center usage percentage for the given work center with the selected parameters is shown.



3.6. Create outsourcing orders

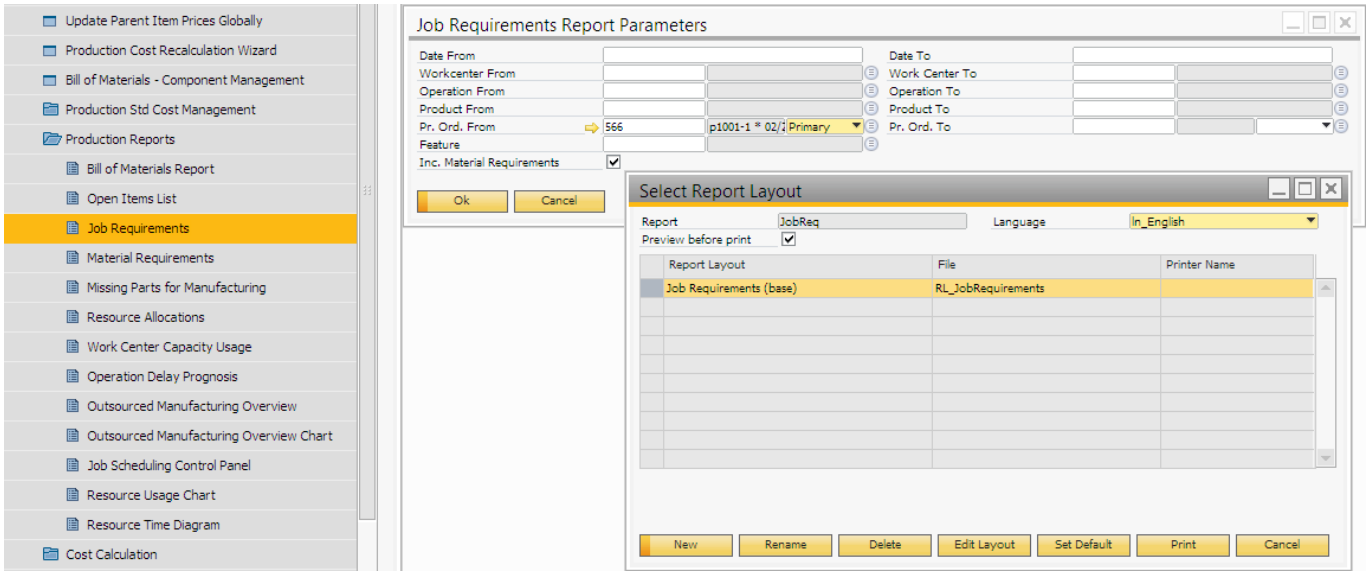
After the production order has been released, purchase quotations and purchase orders can be created for the outsourced operations on the Production Order Operations Details form.

For more information about the Outsourcing please see: Outsourced Manufacturing

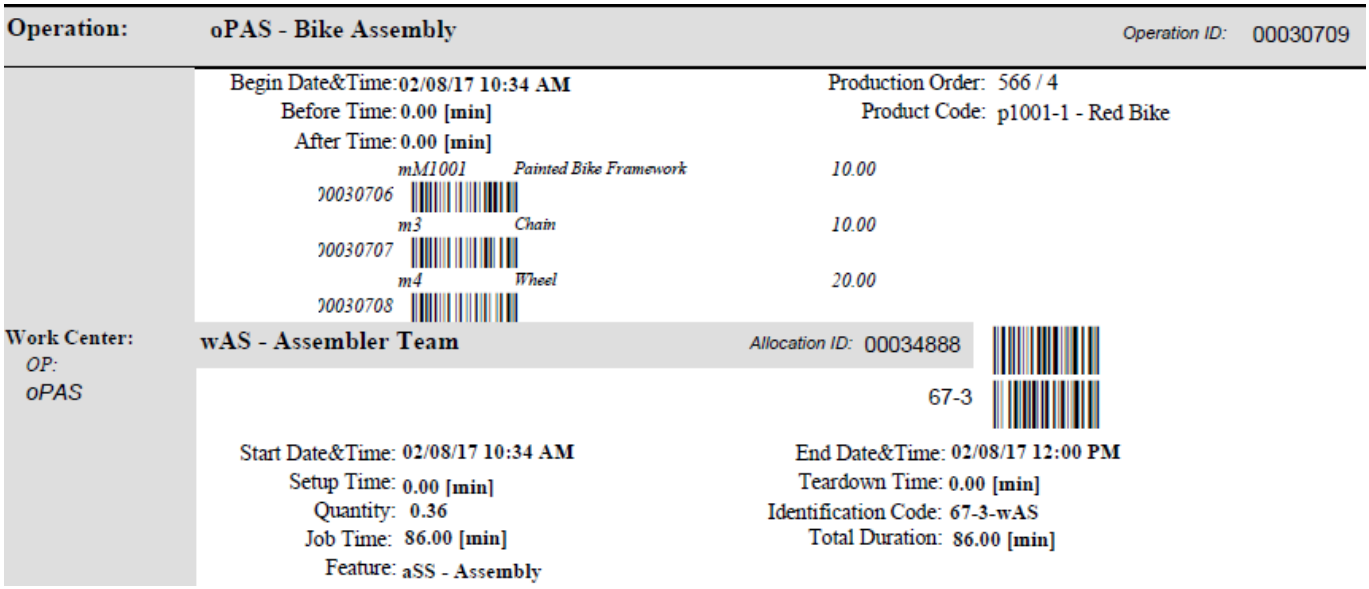


3.7. Print production reports

Before starting the production on the shopfloor, print the Requirements Reports for the operations and materials. The Job/Material Requirements Report is meant to be distributed to the workers who do the jobs. These reports are a kind of daily work orders for the workers. The production data collection is done with the help of these reports.



Define the parameters of the report. To print the material requirements among the job requirements, check the *'Inc. Material Requirements'* checkbox. After pressing the 'Print' button, the printing is directed to the default printer. To print the report in PDF file, check the *'Preview before Print'* checkbox. The report is built with Crystal Reports and can be customized.

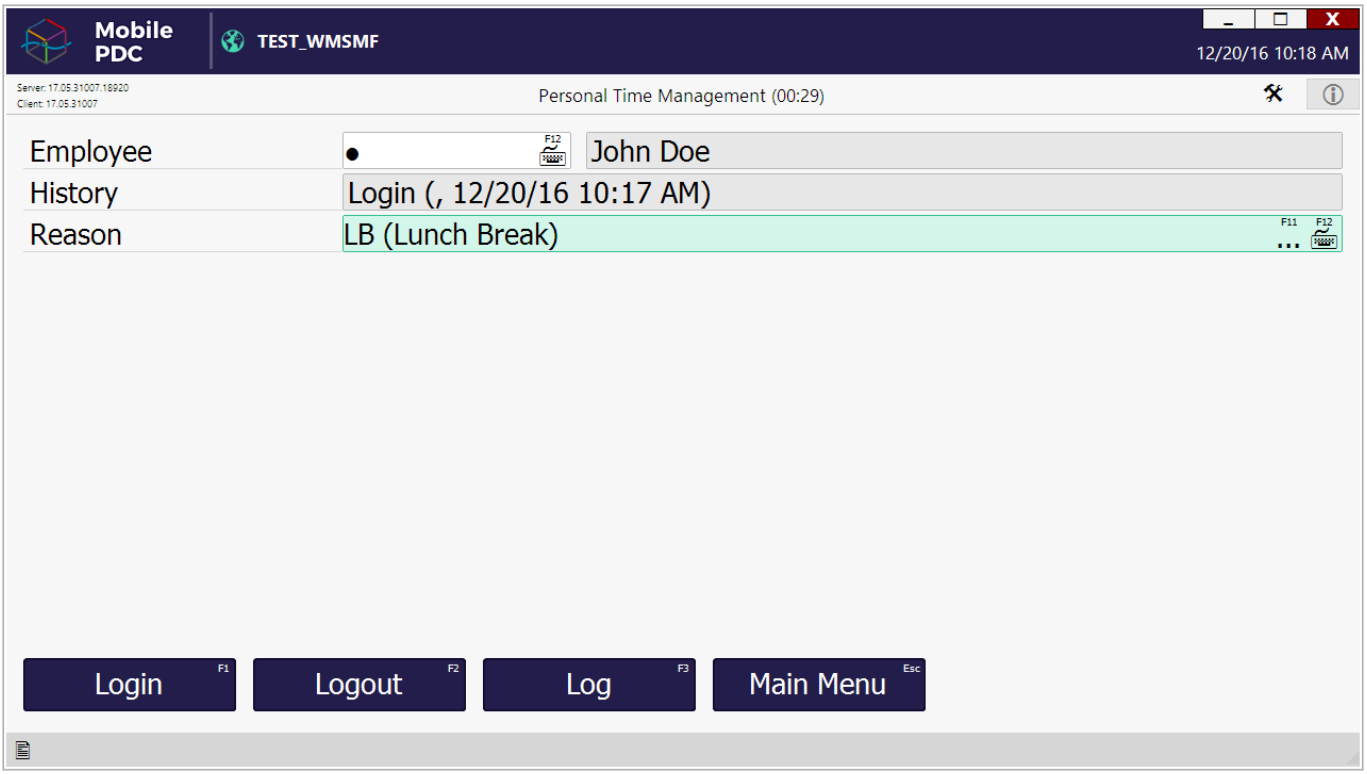


3.8. Production on the shopfloor

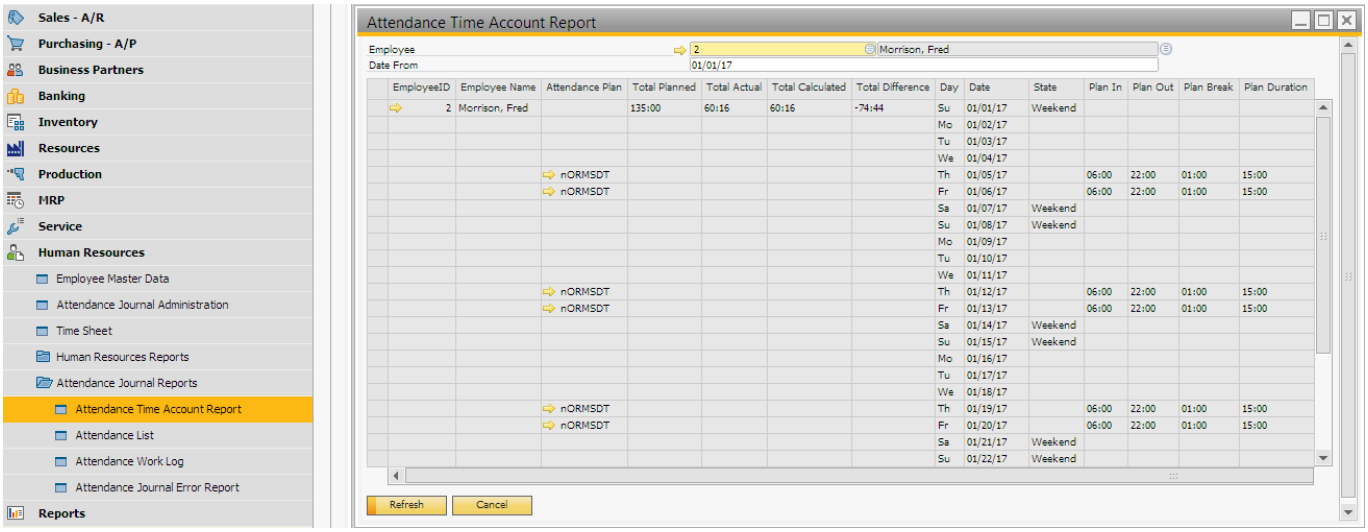
3.8.1. Personal Time Management

Produmex Manufacturing can be extended with an employee attendance data collecting solution. At the beginning and end of their shift, employees can login/logout on a terminal. This transaction is

recorded in SAP Business One in real time which allows to monitor arrivals and leaves directly from the office.



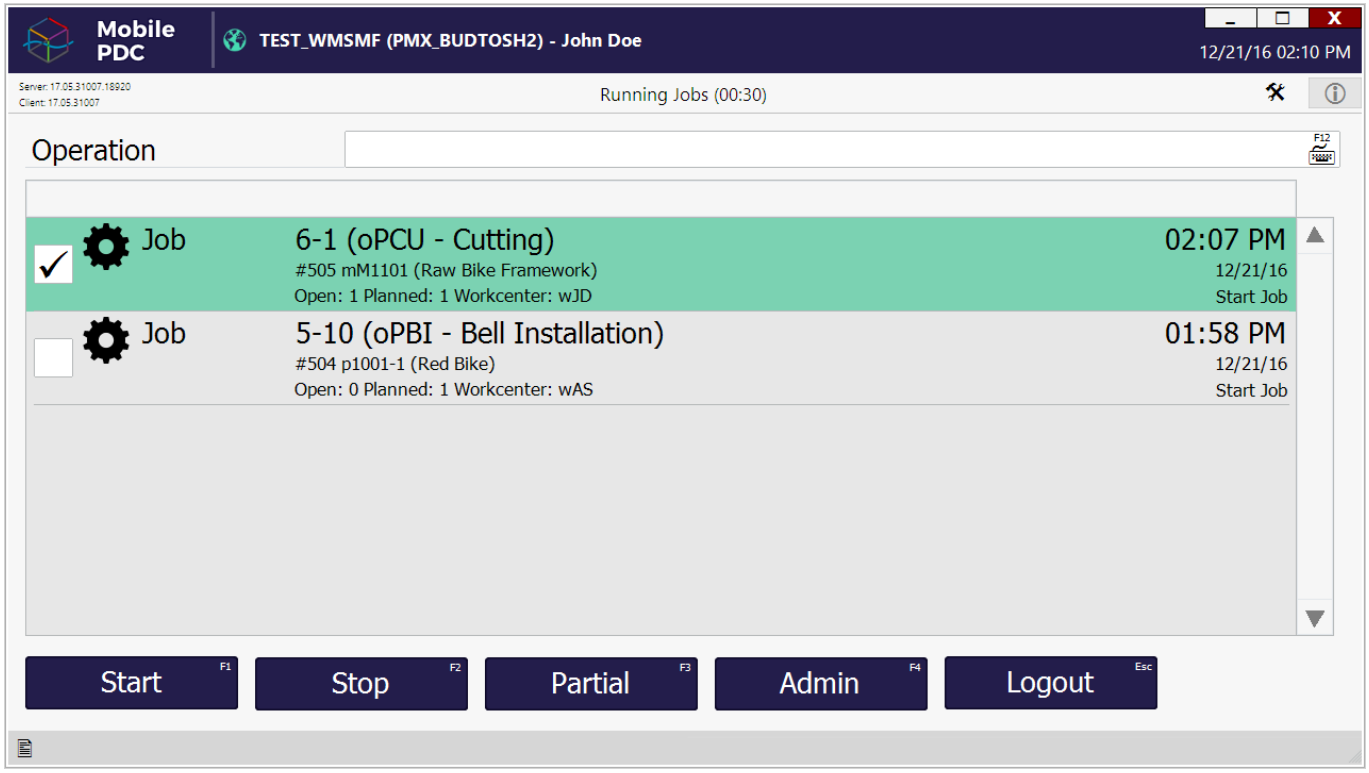
On the office module of PTM monthly and ad-hoc attendance reports can be generated.



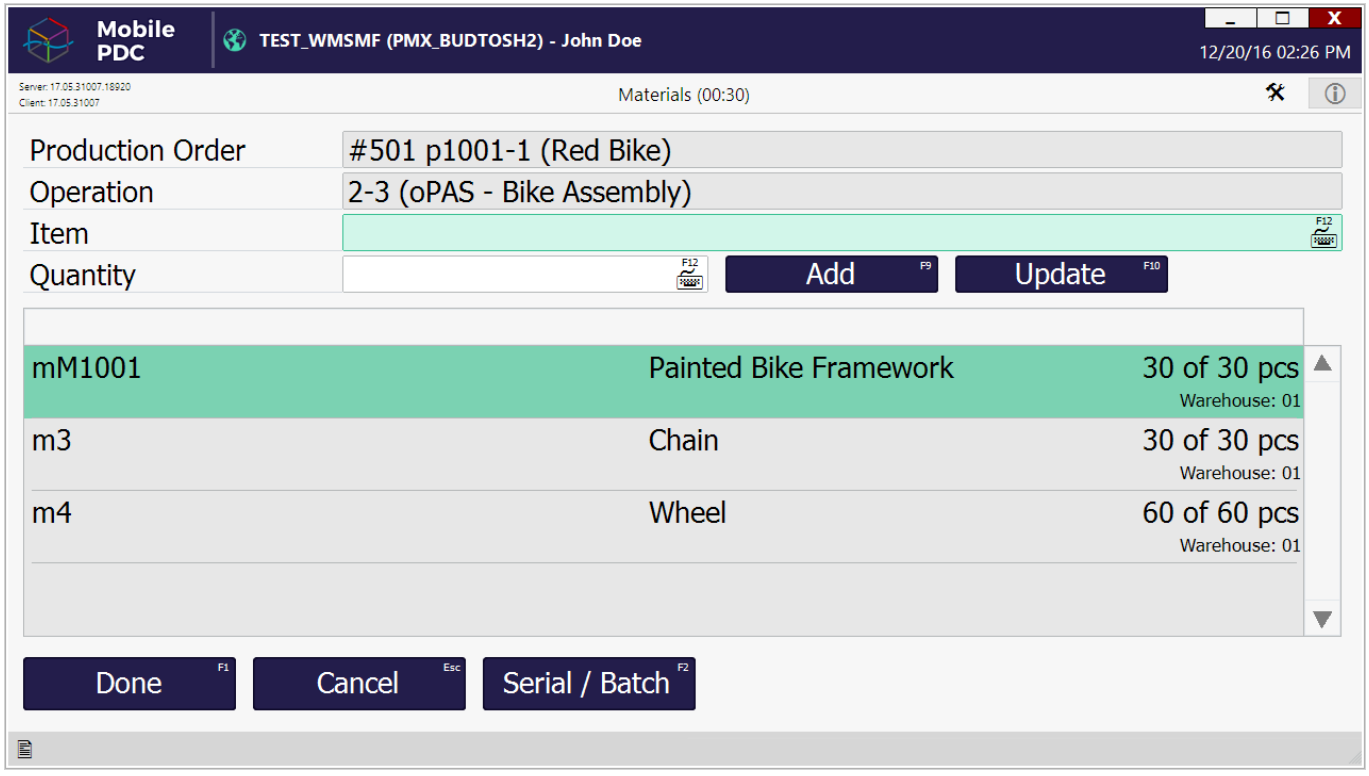
3.8.2. Production Data Collection

Production Data Collection is when the workers report back to the system how their work is progressing.

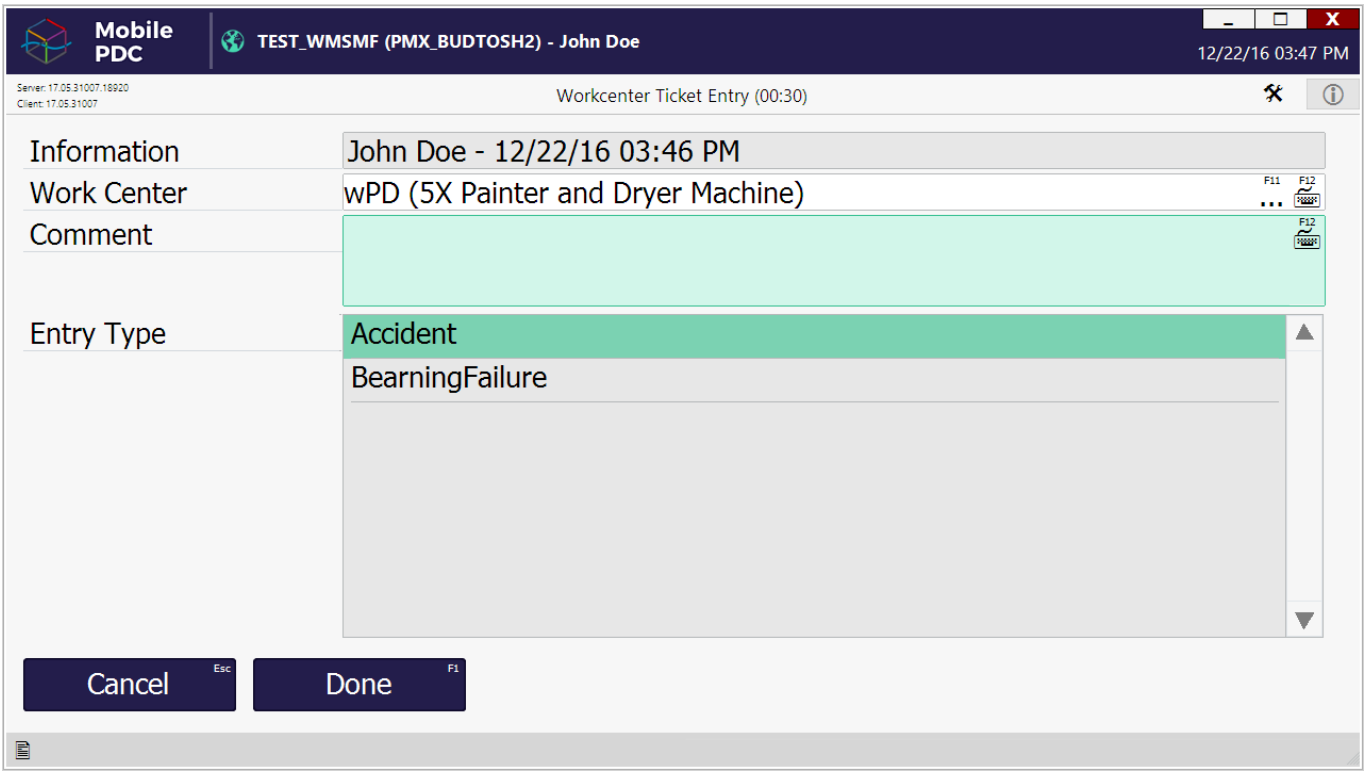
With the standard PDC application employees first have to start the setup/job then they can report partial/full completion. The duration of the operation is measured in real time and cannot be modified. With the simple job function employees can report the operation duration, setup and job completion in one step.



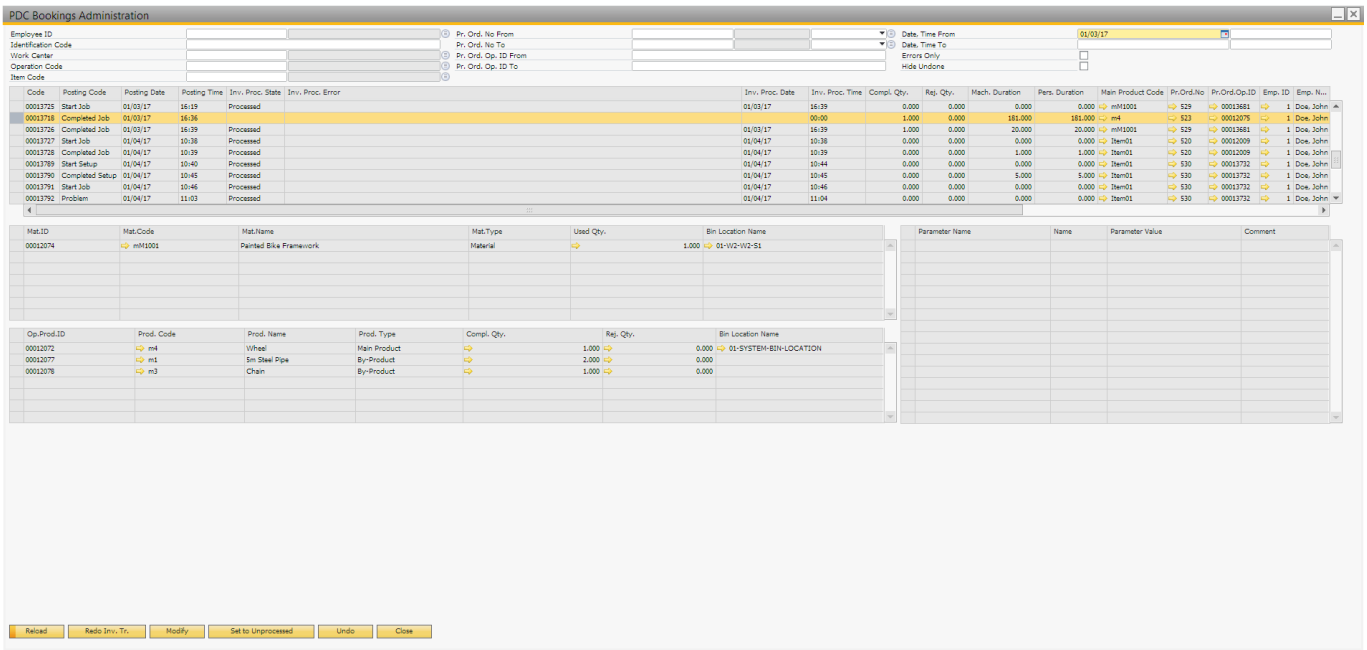
According to the milestone settings of the production order lines and the production order, material consumption and product and by-product completion can be reported during the PDC booking. The appropriate material issue or product receipt inventory transactions will be committed as well.



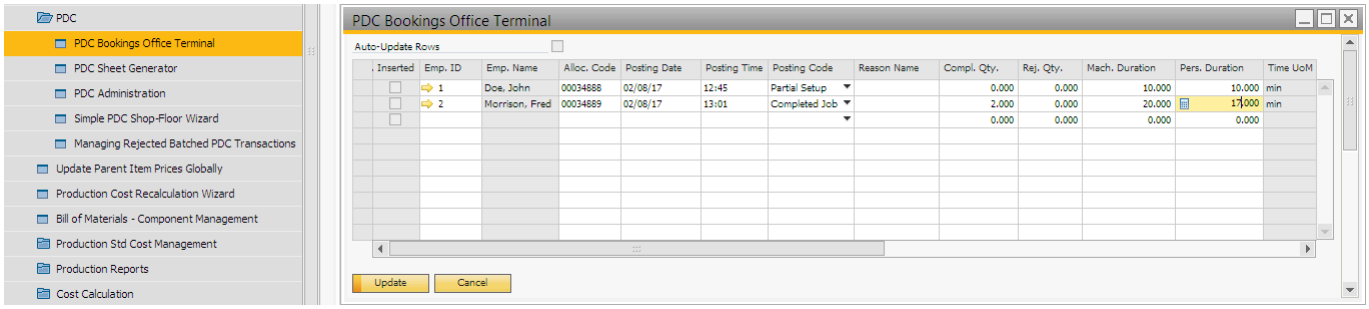
Unplanned work center unavailability or machine failure can be reported with the Workcenter Journal and Workcenter Ticket functions.



On the PDC office terminal, PDC bookings can be monitored, canceled or created.

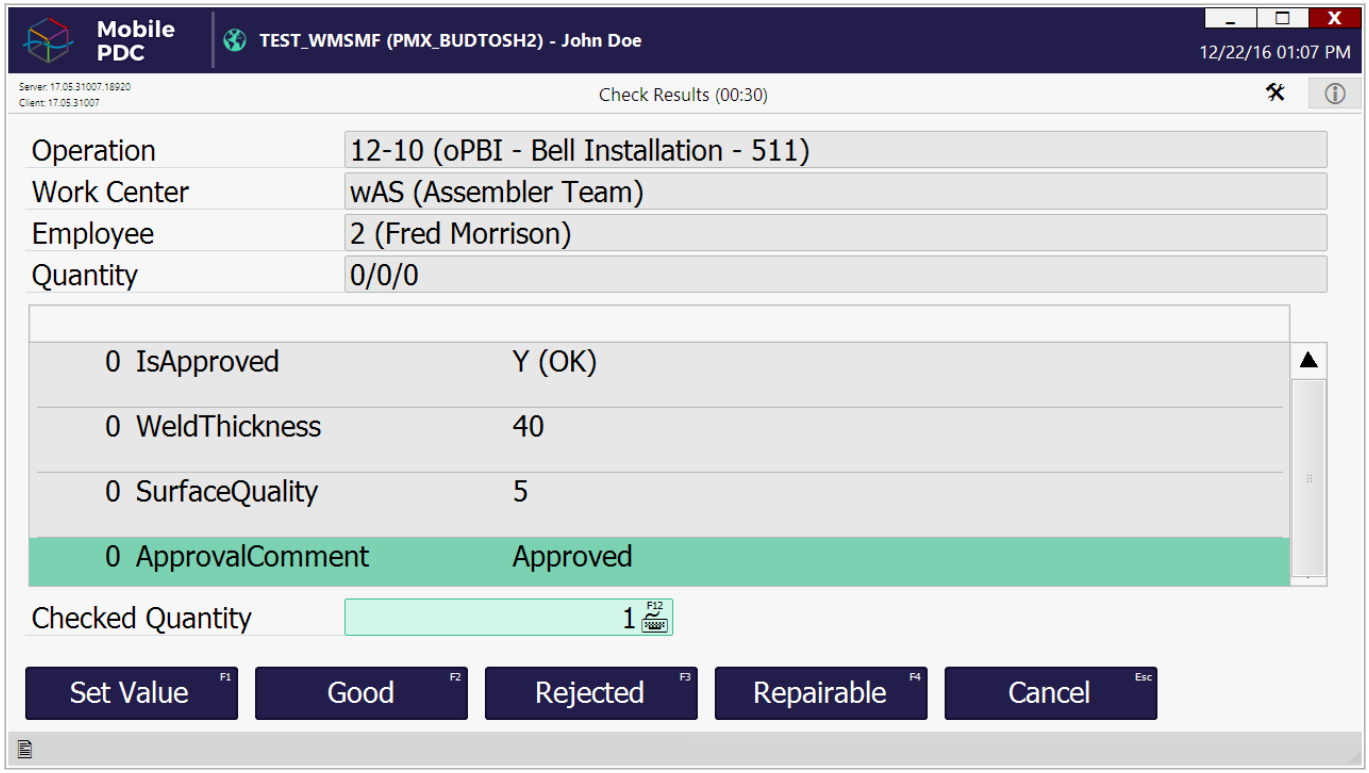


Many manufacturing companies do not need the full-fledged data collection terminal. Instead, they could do very well with the much simpler PDC Bookings Office Terminal. In this scenario, the production data is collected (mostly) on paper, and the data is entered at the end of the day by an office assistant.



3.8.3. Quality Control

The early detection of defects reduces product risk and helps to identify delay in an early stage. With the Quality Control function the appointed inspector can report quality assurance data for own-manufactured and outsourced products.



To appoint an inspector, add the Employee Quality Control Role defined on Produmex Manufacturing settings as the Role for employee.

To setup quality control parameters, enable the *'Use Operation Parameters'* option on Produmex Manufacturing settings. Define the parameter types on the Operation Parameter Types UDW. Link the quality control parameters to an operation on the Operation Details form.