

FESTO

MES 4 / 1.0.1.3 ®

Manual



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Note

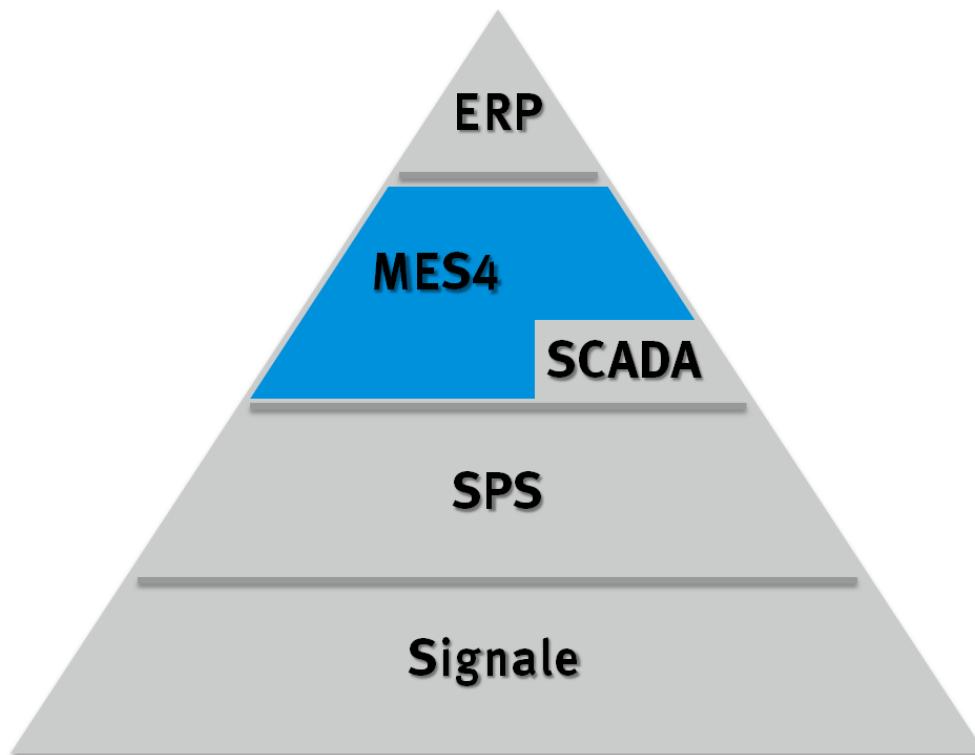
Where only pronouns such as he and him are used in this manual, these pronouns are of course intended to refer to both male and female persons. The use of a single gender should not be construed as gender discrimination; it's intended solely to make the manual easier to read and the formulations easier to understand.

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1 MES 4 / Software

1.1 General informations



Production Control System, MES 4

Based on Microsoft Access Database

User surface: Microsoft Access

General information:

Orders can be started or finished on each station

The Database is open and can be written and read by external programs via SQL-instruction (e.g. Order entry via ERP system)

Operating instructions for manual workplaces can be entered or adjusted in the Production Control System at any time.

The Production Control System offers as well order monitoring.

1.2 Main window

On the top of the main window (Pos1 in graphic below) you can find the menu bar. You can use this menu bar to change the user, open special tools and organize sub windows.

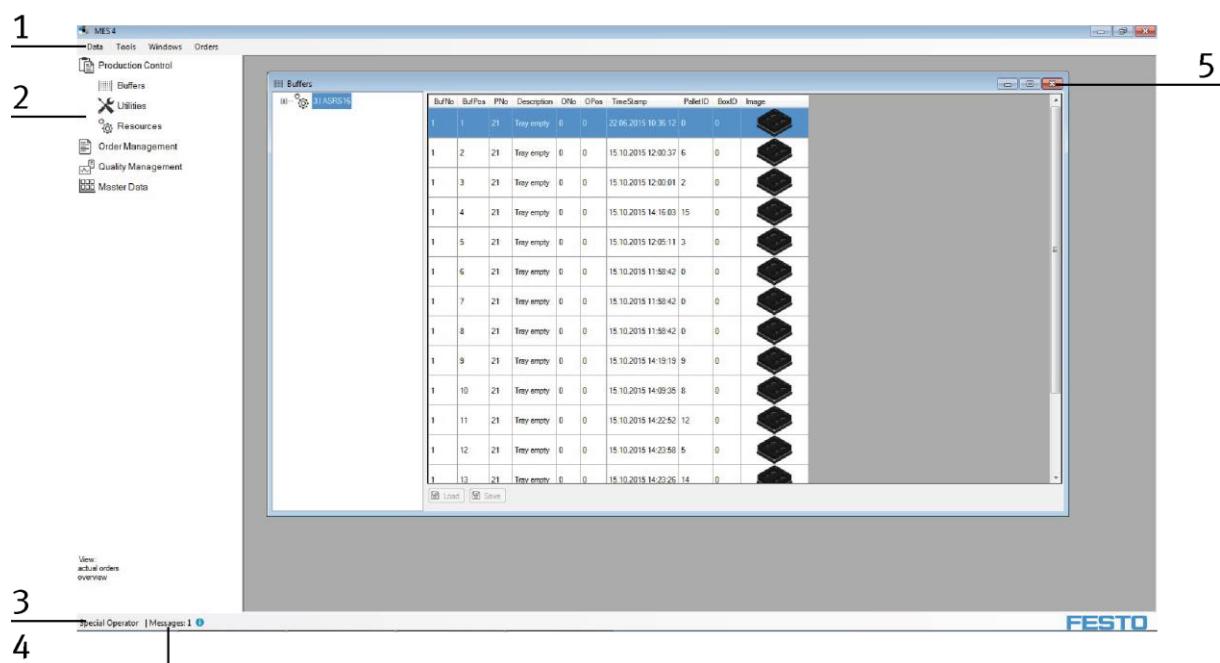
On the left side of the main window (Pos2 in graphic below), you can find the main menu with buttons to open different sub windows. These buttons are organized into 4 groups.

1. Production Control: Windows to see the state of the production.
2. Order Management: Windows to manage the orders. Create order; see the planed and actual orders.
3. Quality Management: Windows to see the efficiency report of different stations and finished orders.
4. Messages: If there is a message, it could be announced here. Just click on the message and it will open in a new window.
5. Master Data: Windows to add, configure and delete parts, work plans, stations,...

These groups act as a folder. You can open and close these folders by left-click on them. You will find more detailed description of different groups in the following chapters.

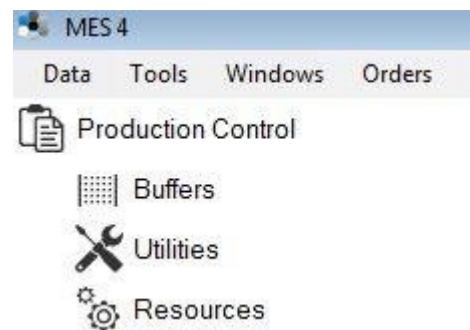
The opened sub windows are on the right side of the main window (Pos3 in graphic below). You can find different functions in different sub windows. You will find more detailed description of different sub windows in the following chapters.

There is a status bar at the bottom of the main window (Pos4 in graphic below). On the status bar you can see, which the actual user is.



1.3 Production Control windows

The Production Control group is for checking the actual state of production. There are 3 different sub windows available in this group.



Production control

- Buffers
- Utilities
- Resources

1.3.1 Buffers window

You can open the Buffer window from Production Control/Buffers. Some resources have one or more buffers. The buffers store parts with or without order number. In the Buffer window you can see the state of these buffers, and you can change the contents of them. If you chose the station in the left side from the window, all buffers are shown in the right table. If you chose the buffer position under the station, all single positions from the buffer are announced.

BufNo	BufPos	PNo	Description	ONo	OPos	TimeStamp	PalletID	BoxID	Image
1	1	21	Tray empty	0	0	22.06.2015 10:36:12	0	0	
1	2	21	Tray empty	0	0	15.10.2015 12:00:37	6	0	
1	3	21	Tray empty	0	0	15.10.2015 12:00:01	2	0	
1	4	21	Tray empty	0	0	15.10.2015 14:16:03	15	0	
1	5	21	Tray empty	0	0	15.10.2015 12:05:11	3	0	
1	6	21	Tray empty	0	0	15.10.2015 11:58:42	0	0	

Check the states

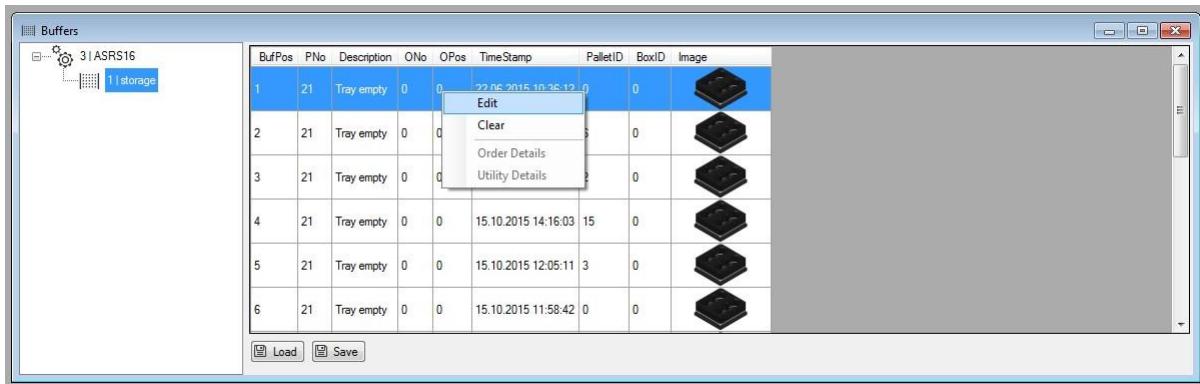
In the table you can see different information about the parts in the buffer.

- BufPos: Buffer position number
- PNo: Part number
- Description: Short description of the part
- ONo: Order number (If it is 0 it means, there is no order for the part.)
- OPos: Order position
- TimeStamp: Timestamp of the last change by the resource
- PalletID: Pallet ID of the part
- BoxID: Box ID of the part
- Image: Image of the part

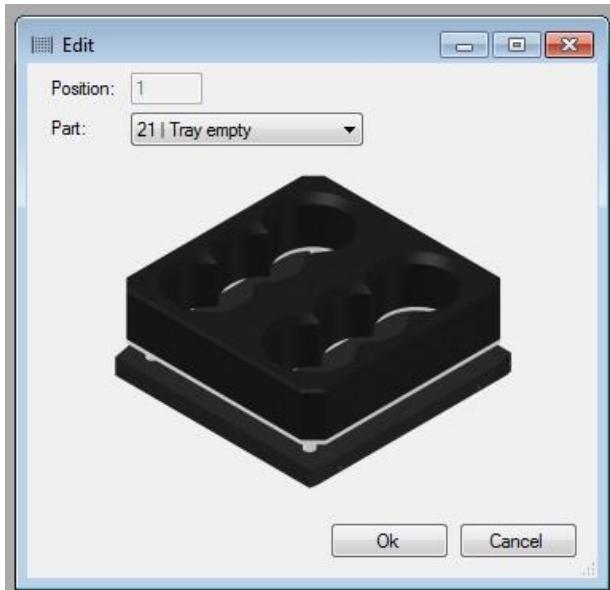
BufPos	PNo	Description	ONo	OPos	TimeStamp	PalletID	BoxID	Image
1	21	Tray empty	0	0	22.06.2015 10:36:12	0	0	
2	21	Tray empty	0	0	15.10.2015 12:00:37	6	0	
3	21	Tray empty	0	0	15.10.2015 12:00:01	2	0	
4	21	Tray empty	0	0	15.10.2015 14:16:03	15	0	
5	21	Tray empty	0	0	15.10.2015 12:05:11	3	0	
6	21	Tray empty	0	0	15.10.2015 11:58:42	0	0	

Manipulate buffers

If you right-click on a row in the table of a buffer, you have four options to change it.



- **Edit:** With this option you can open the EditBufferPos window, where you can change the selected buffer position.



- **Clear:** It means, you remove the part from the selected buffer position.
- **Order Details:** It is active, when there is an order at the selected buffer position. With this you can open the detailed view of the order.
- **Utility Details:** It is active, when a pallet ID is available – then you can choose the utility details to edit them directly.

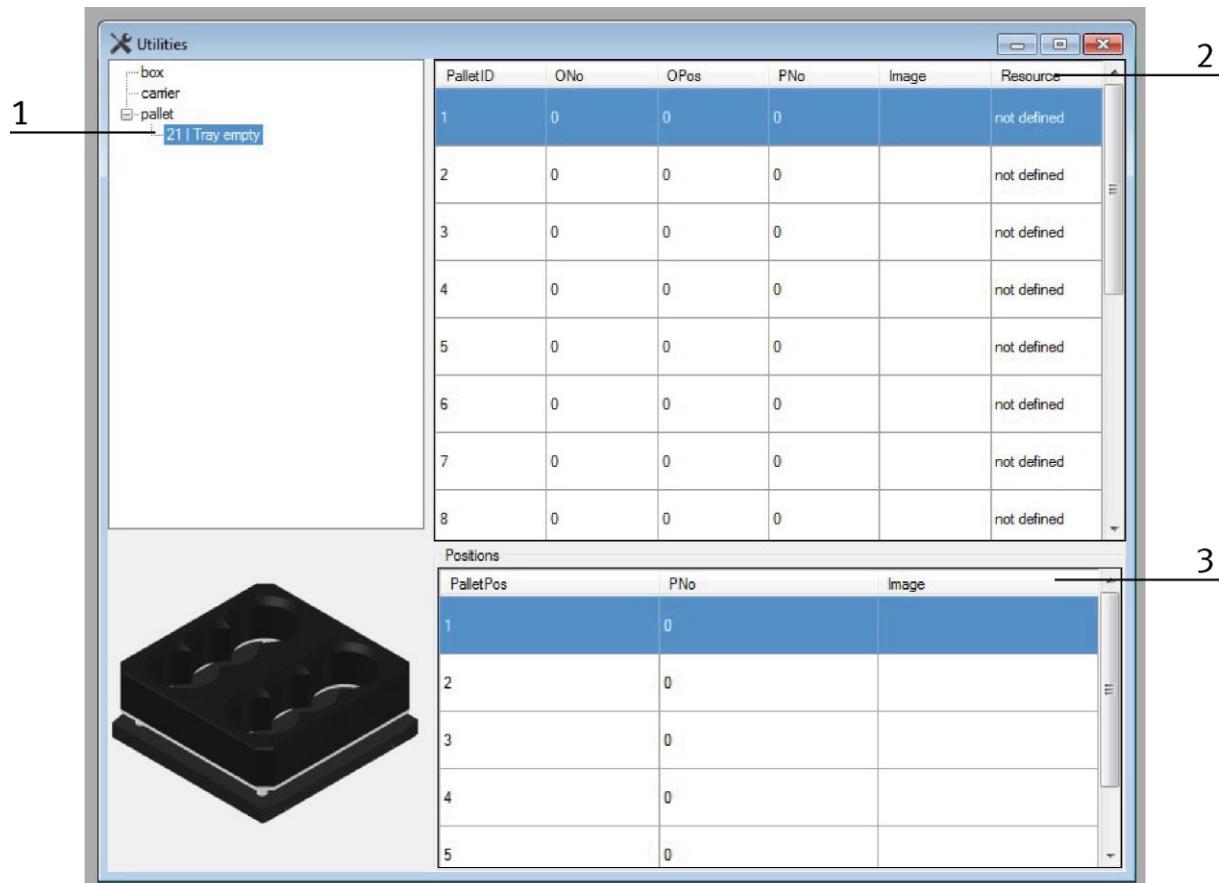
Save and load buffer states

At the bottom of the Show Buffer window, you can find two buttons to save and load buffer states. With these buttons you load or save the complete buffer. The buffer states are stored in XML format.



1.3.2 Utilities window

You can open the Show Utilities window from Production Control/Utilities. In this window you can check the state of the different utilities.

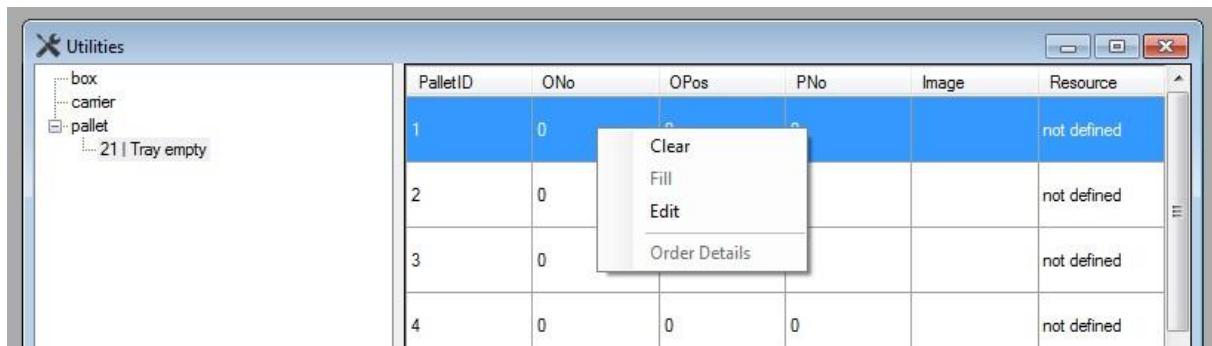


Check the states

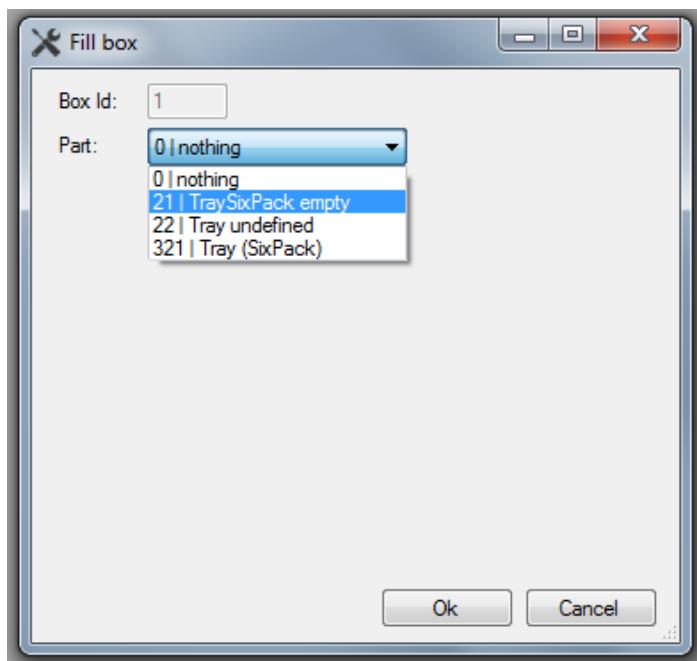
On the left side (Pos1 in picture above) of the Show Utilities window you can select a utility type. After that you will see a list (Pos2 in picture above) about the utilities with the selected type. If the utility type has more positions, then you can see a table (Pos3 in picture above) about the utility positions. The columns in the utility table and position table depend on the utility type.

Manipulate utilities

If you right-click on a utility, you can clear that utility. If it has more positions, then you clear all positions. If the utility has an order, you can open the detailed view of the order clicking on the order details button.



With the fill function it is possible to fill the box and the pallet with different parts.



1.3.3 Resources window

You can open the Resources window from Production Control/Resources. In this window you can check the state of all resources.

Picture	ID	Name	MESMode	AutomaticMode	ManualMode	Busy	Reset	ErrorL0	ErrorL1	ErrorL2	IP	Connected
	1	Filling									192.168.10....	
	2	Packaging									192.168.10....	
	3	ASRS16									192.168.10....	
	4	InOut									192.168.10....	
	5	Unpacking									192.168.10....	
	6	Recycling									192.168.10....	
	9	Transport									192.168.10....	

Check the states

In this window you can see more information about resources.

- Picture: Small image about the resource
- ID: Resource ID of the resource
- Name: Name of the resource
- MESMode: Green if the MES mode is active, otherwise red
- AutomaticMode: Green if the resource is in automatic mode, otherwise grey
- ManualMode: Green if the resource is in manual mode, otherwise grey
- Busy: Yellow if the resource is busy, otherwise grey
- Reset: Yellow if the resource is in resetting mode, otherwise grey
- ErrorL0: Red if there is a level 0 error at the resource, otherwise grey
- ErrorL1: Red if there is a level 1 error at the resource, otherwise grey
- ErrorL2: Yellow if there is a level 2 error at the resource, otherwise grey
- IP: IP address of the resource
- Connected: Green if the resource is connected to the MES server, otherwise red

Picture	ID	Name	MESMode	AutomaticMode	ManualMode	Busy	Res
	1	Filling					
	2	Packaging					
	3	ASRS16					
	4	InOut					

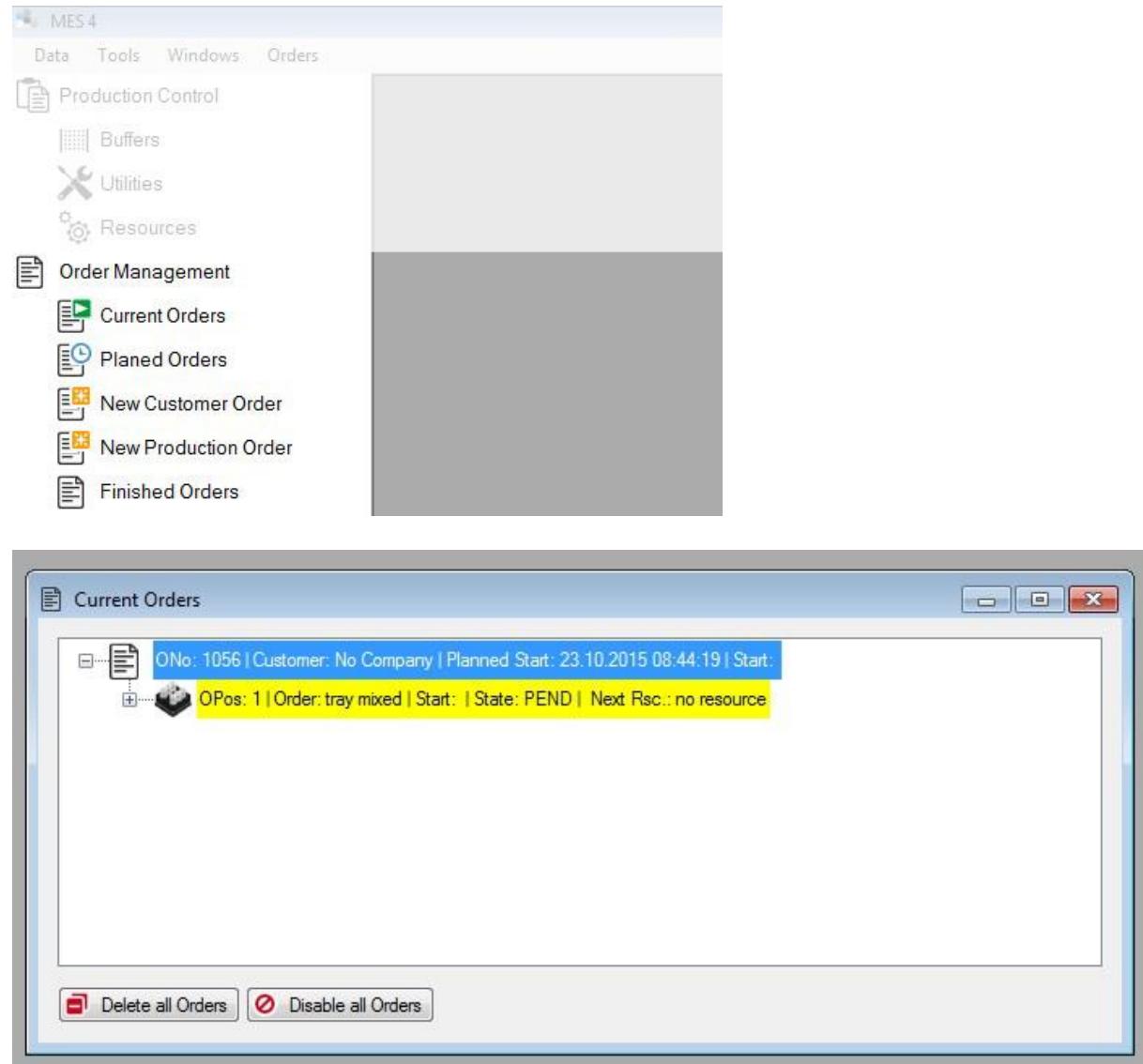
If you right-click on a resource, it is possible to get more information's about the resource from a web page.

Not all resources have a link to a web page.

1.4 Order Management windows

1.4.1 Current Orders window

You can open the Current Orders window from Order Management/Current Orders. In this window you can see the state of the current orders.



Check the states

The orders are sorted by order numbers, and all orders have one or more order positions. Some orders have sub orders too. With the mouse click you can open and close the orders to show/hide order positions or sub orders.

A row in the order list contains the most important information of the order.

- ONo: Order number
- Customer: The customer of the order
- Planned Start: When should the production of the order start?
- Start: When was the production of the order started?

The most important information of the order positions and sub orders are also displayed in the list.

- OPos: Order position number
- Order: The description of the order
- Start: When was the production of the order position started?
- State: What is the state of the position order (PEND=pending, IDLE, BUSY, ERROR)
- Next Rsc: The next resource for the order position

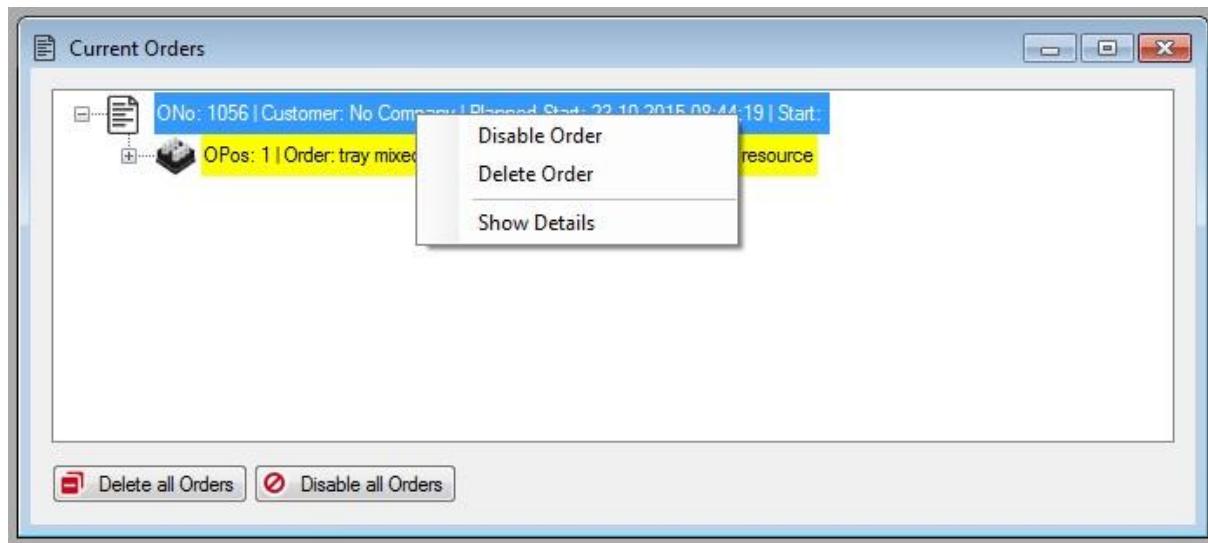
The color codes help the quick overview. All colors have different meaning.

- White: This is the normal state. The processing of the order is not started.
- Blue: You selected this order by the mouse click, or it is finished.
- Yellow: The order started and it is in progress.
- Lime: The order is in BUSY state.



Manipulate orders

With the orders you can do three different things after you right-click on them.



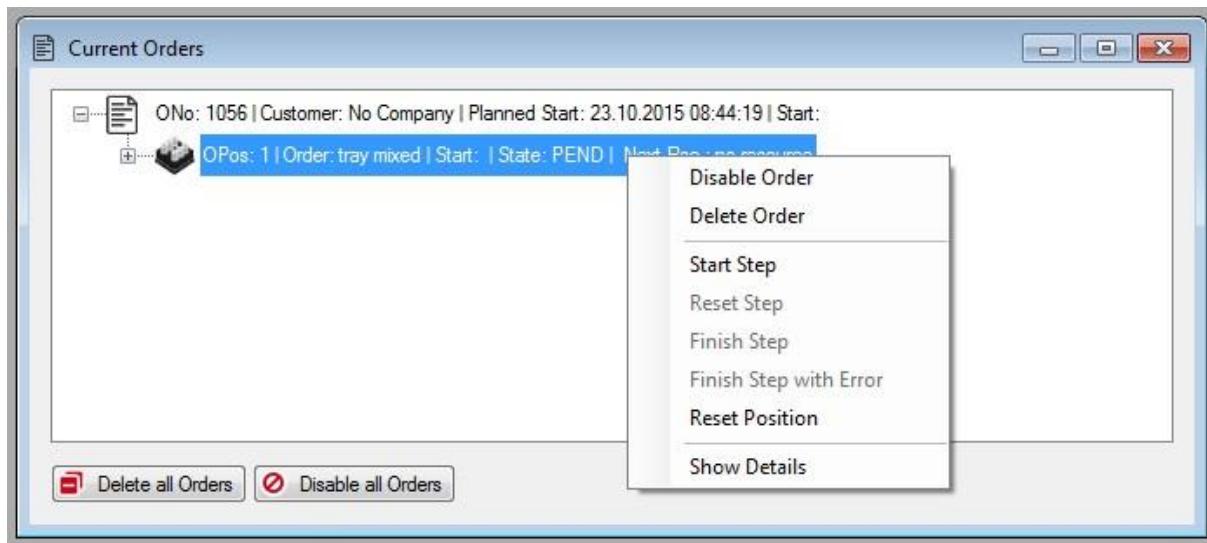
- Disable Order: It is possible when none of the order positions was started before. It means you move back the order from the actual orders to the planned orders. Later you can change the planning of the order and move it back.
- Delete Order: It is also possible if one of the order positions was started. In this case you delete the orders, so you do not have possibility to restore it later. If you delete an order erase all parts from the carriers which are connected to this order.
- Show Details: With this option you open a new window with the details of the selected order. You will find a detailed description in one of the following chapters.

You can delete and disable all orders at the same time using the two buttons on the bottom of the sub window.



Manipulate order positions and sub orders

With order position and sub orders you can do more things after right-click.

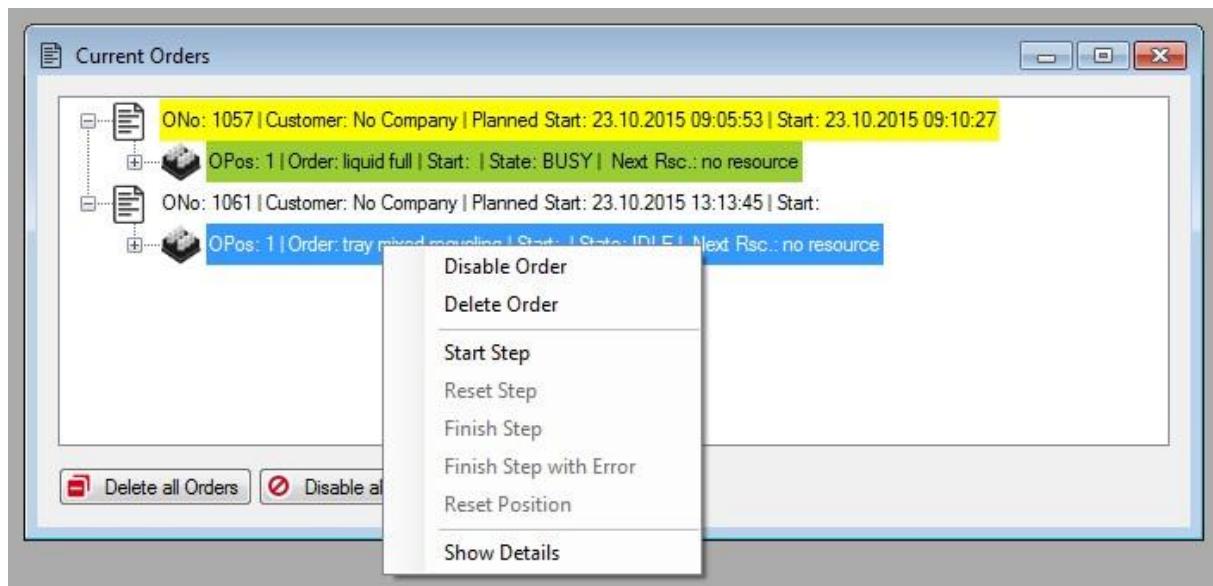


- Disable Order: It is possible when none of the order positions was started before. It means you move back the complete order (not just the order position or sub order) from the actual orders to the planned orders. Later you can change the planning of the order and move it back.
- Delete Order: It is also possible if one of the order positions was started. In this case you delete the complete order (not just the order position or sub order, so you do not have possibility to restore it later).
- Start Step: the chosen position is started, a manual mode can execute. A new window is opened to start the order.
- Reset Step: This option is active, if the production of the order position was started. This option will reset the state of the order position (restart the production).
- Finish Step: This option is active, if the production of the order position was started. This option will finish the actual step – the step is finished without an error.
- Finish Step with Error: This option is active, if the production of the order position was started. This option will finish the actual step – the step is finished with an error.
- Reset Position: The chosen position is reset to the original conditions. A new window is opened to start the order.
- Show Details: With this option you open a new window with the details of the selected order position or sub order. You will find a detailed description of this window in a following chapter.

Example of the Actual orders window

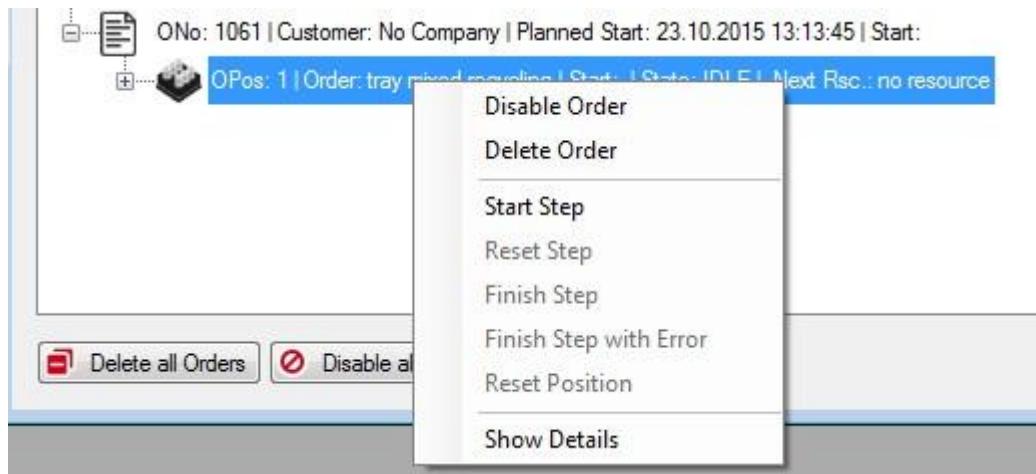
You can see an example on the picture bellow. The order 1057 was started, and now it is in PEND (pending) state. The order is waiting for no resource. The order 1061 has 1 order position and is not started at the moment.

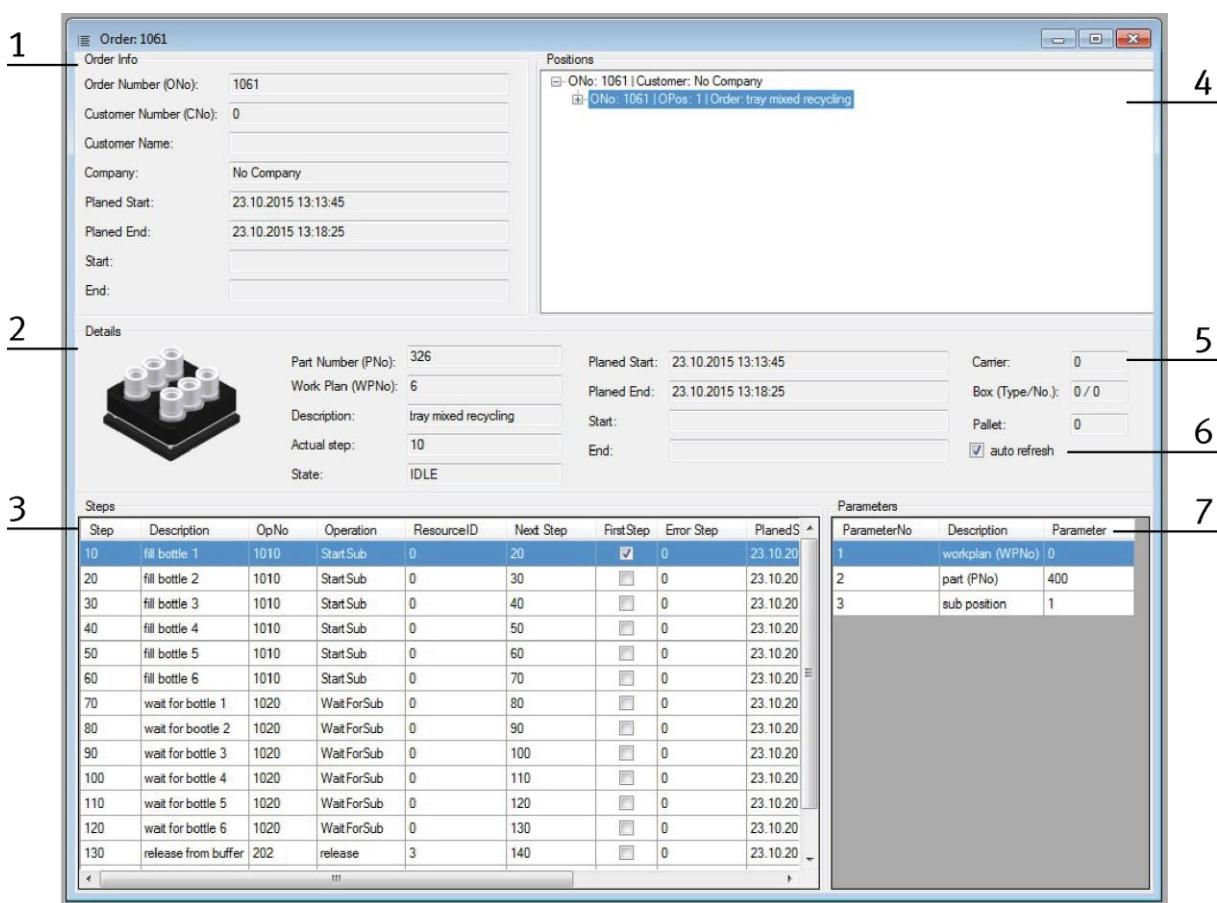
You can also see, that a previously right-click on the order position 1 of order 1061 is done to show the operating possibility's for this order.



1.4.2 Order Details window

You can open the Order Details window from an order list if you right-click on an order and select the “Show Details” option (see picture below). In this window you can see the details of the order.





Order Info

On the top-left corner (Pos1 in picture above) of the Order window you can find the information about the order.

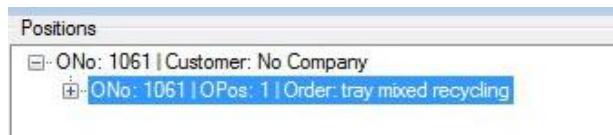
This is a zoomed-in view of the 'Order Info' section from the screenshot above. It includes the following fields:

- Order Number (ONo): 1061
- Customer Number (CNo): 0
- Customer Name: (empty)
- Company: No Company
- Planed Start: 23.10.2015 13:13:45
- Planed End: 23.10.2015 13:18:25
- Start: (empty)
- End: (empty)

- Order Number (ONo)
- Customer Number (CNo)
- Customer Name
- Company: company of the customer
- Planed Start
- Planed End

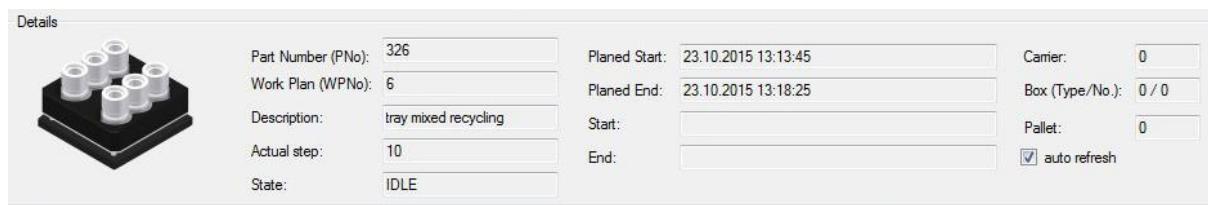
Order position list

On the top-right corner (Pos4 in picture side before) of the Order window you can find a list of the order positions.



Order position info

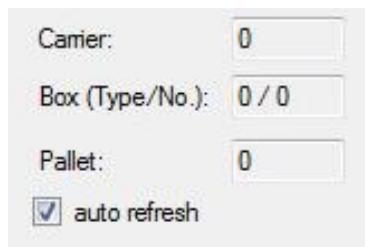
If you select one of the positions you can see information about that order position in the middle section (Pos2 in picture side before) of the window.



- Part Number (PNo): Identification number of the part at the order position
- Work Plan: the number of the work plan is announced here
- Description: Description of the part
- Actual step: The actual step number of the work plan
- State: state of the production (PEND=pending, IDLE, BUSY)
- Planned Start
- Planned End
- Start: When the production of the part was started
- End: When the production of the part was finished

Carrier function

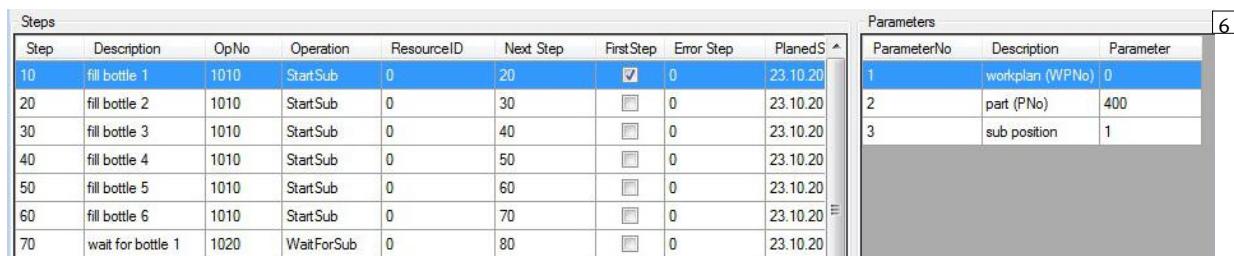
On the middle section on the right (Pos5 in picture side before) of the Order window you can find information's about the carrier, the type of the box and the pallet.



If you select the auto refresh option (Pos6 in picture side before) (it is checked by default), the state display of the order will be refreshed automatically. It is good, if you want to follow the production of an order.

Order position work plan

At the bottom of the window you can find the work plan of the order position. If you select a step on the left side (Pos3 in picture 2 sides before), you will see the parameters of the operation on the right side (Pos7 in picture two sides before).



Steps

Step	Description	OpNo	Operation	ResourceID	Next Step	First Step	Error Step	PlannedS
10	fill bottle 1	1010	StartSub	0	20	<input checked="" type="checkbox"/>	0	23.10.20
20	fill bottle 2	1010	StartSub	0	30	<input type="checkbox"/>	0	23.10.20
30	fill bottle 3	1010	StartSub	0	40	<input type="checkbox"/>	0	23.10.20
40	fill bottle 4	1010	StartSub	0	50	<input type="checkbox"/>	0	23.10.20
50	fill bottle 5	1010	StartSub	0	60	<input type="checkbox"/>	0	23.10.20
60	fill bottle 6	1010	StartSub	0	70	<input type="checkbox"/>	0	23.10.20
70	wait for bottle 1	1020	WaitForSub	0	80	<input type="checkbox"/>	0	23.10.20

Parameters

ParameterNo	Description	Parameter
1	workplan (WPNo)	0
2	part (PNo)	400
3	sub position	1

The information of work plan:

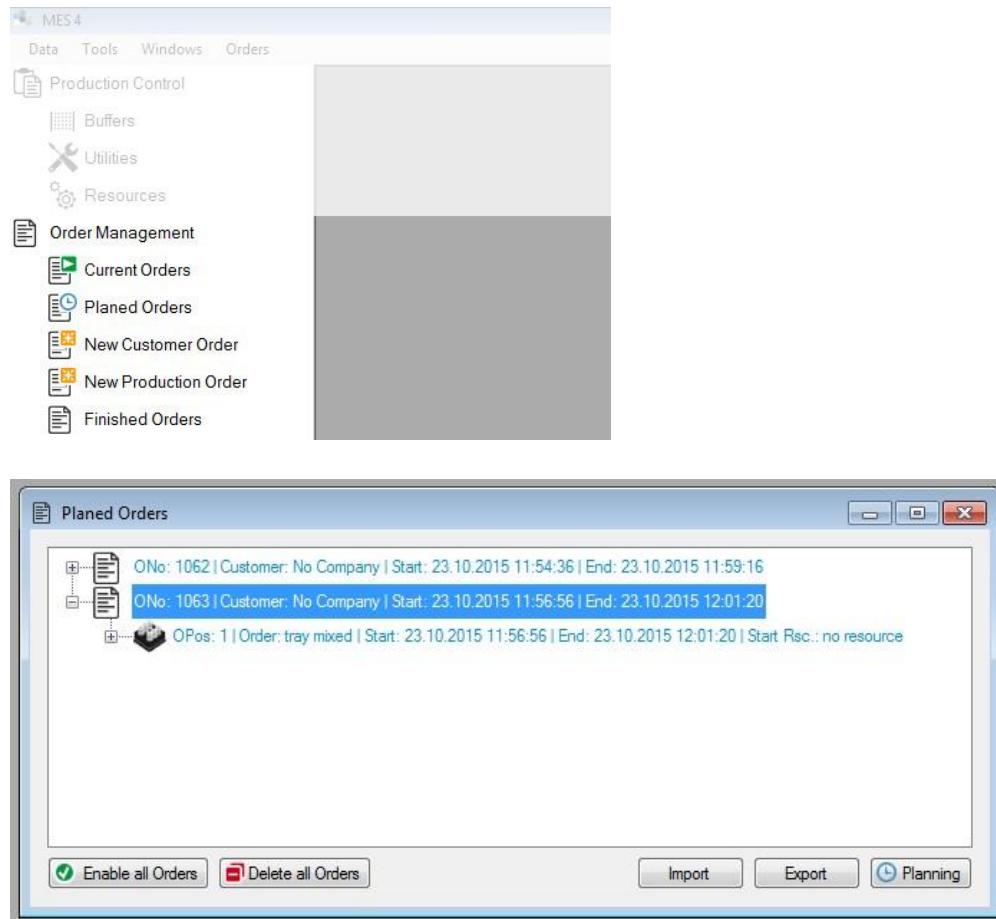
- Step: Step number
- Description: Description of the operation
- OpNo: Operation number
- Operation: Name of operation
- ResourceID: ID of the resource which will do the operation
- Next Step: Step number which will be active after this step
- First Step: It is checked, if it is the first step
- Error Step: Step number which will be active after this step, if there was an error
- PlanedStart
- PlanedEnd
- Start: When the step was started
- End: When the step was finished

Parameters of operation:

- ParameterNo: Parameter number
- Description: Description of the parameter
- Parameter: Value of the parameter

1.4.3 Planed Orders window

You can open the Planed Orders window from Production Control/Planed Orders. In this window you can see the state of the planed orders, and you can activate them, or change the planning.



Check the states

The orders are sorted by order numbers, and all orders have one or more order positions. Some orders have sub orders too. With the mouse click you can open and close the orders to show/hide order positions or sub orders.

A row in the order list contains the most important information of the order.

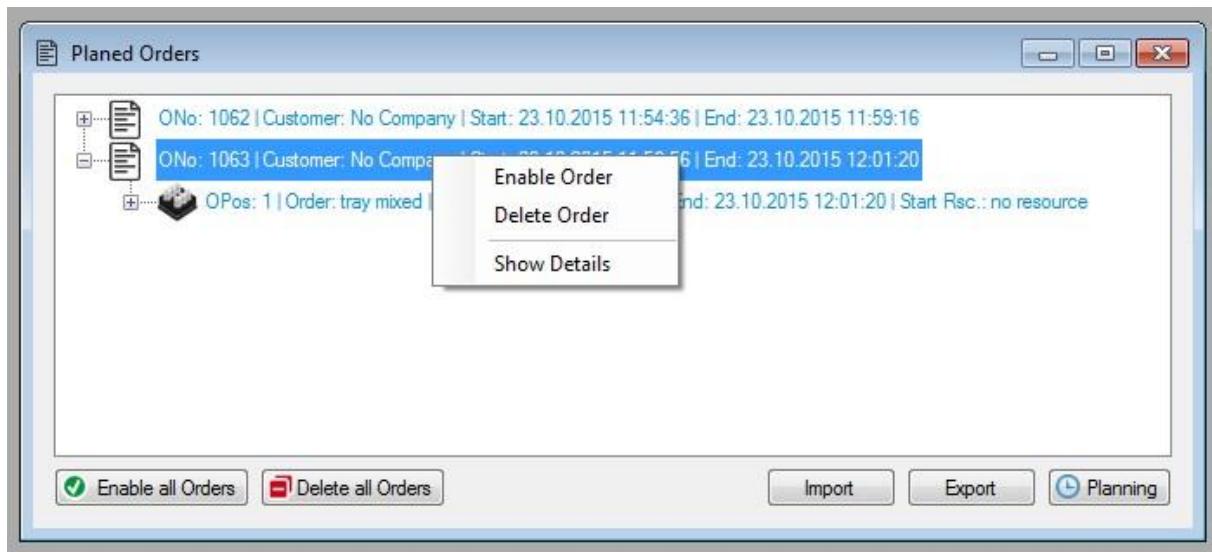
- ONo: Order number
- Customer: The customer of the order
- Start: When should the production of the order start?
- End: When the production of the order is ready?

The most important information of the order positions and sub orders are also displayed in the list.

- OPos: Order position number
- Order: The description of the order
- Start: When was the production of the order position started?
- End: When was the production of the order position finished?
- StartRsc: The responsible resource for the order position is announced

Manipulate orders

With the orders you can do three different things after you right-click on them.



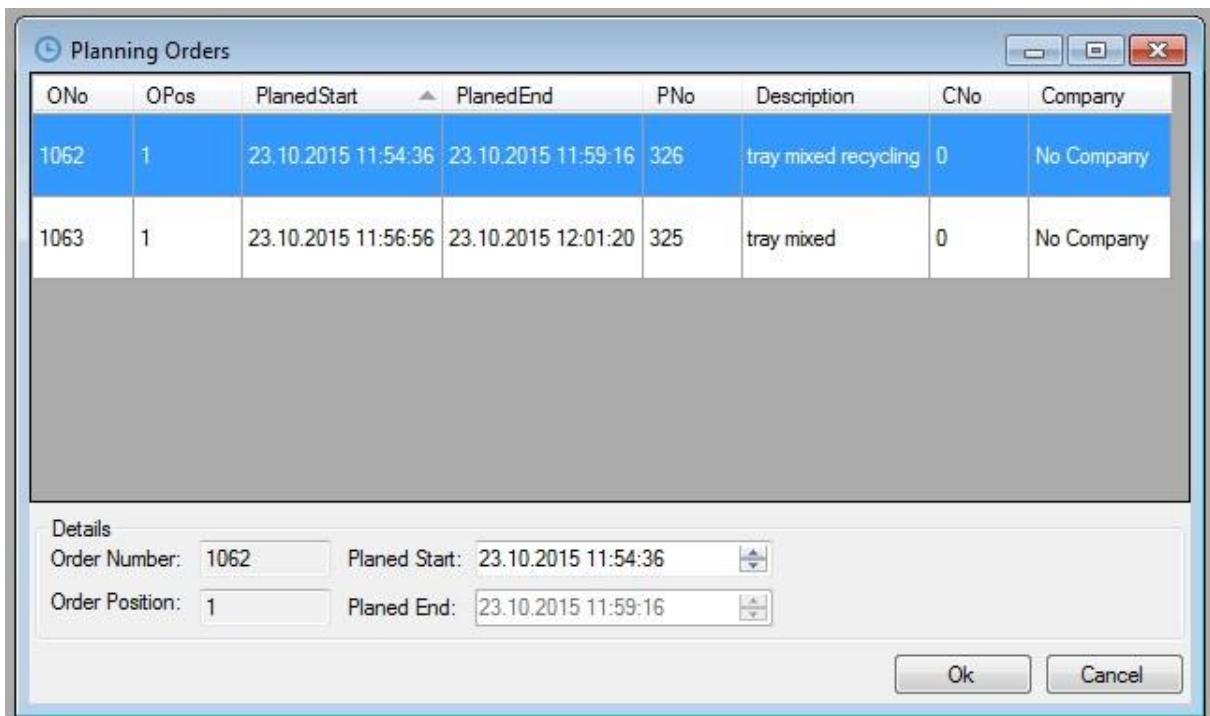
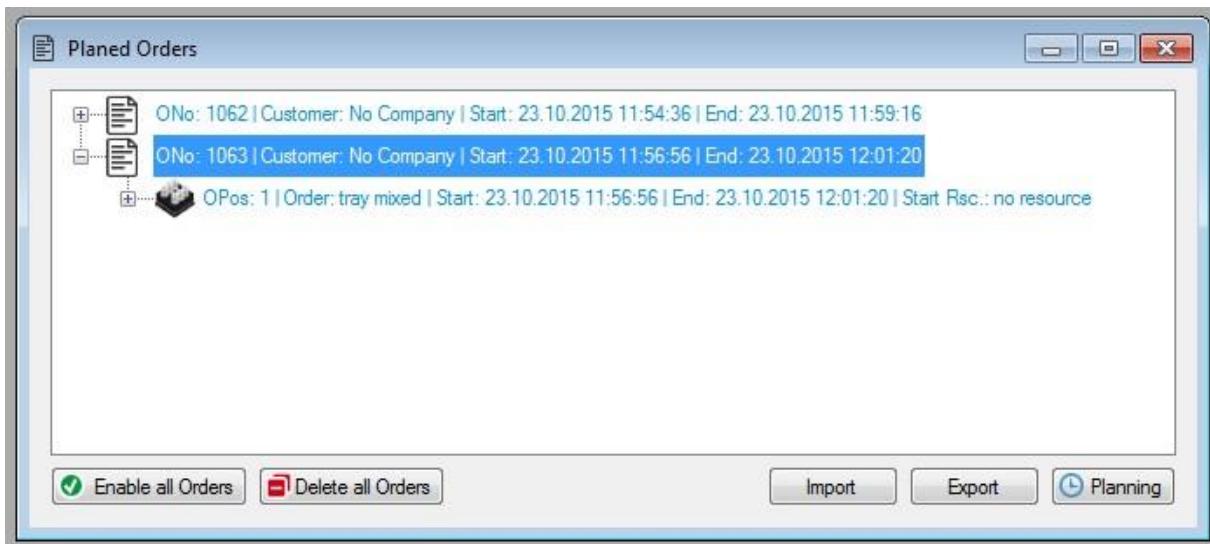
- Enable Order: chosen order position is free for production
- Delete Order: It is also possible if one of the order positions was started. In this case you delete the complete order (not just the order position or sub order, so you do not have possibility to restore it later.) Even the workpieces are deleted.
- Show Details: With this option you open a new window with the details of the selected order position or sub order. You will find a detailed description of this window in a following chapter.

You can enable and delete all orders at the same time using the two buttons on the bottom of the sub window.



1.4.4 Planning Orders window

You can open the Planning Orders window from the Planed Orders window, if you click on the planning button on the right bottom side.

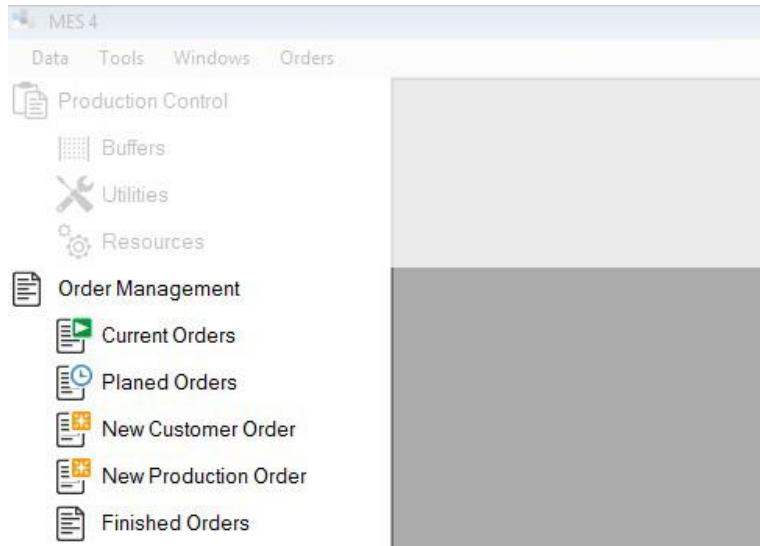


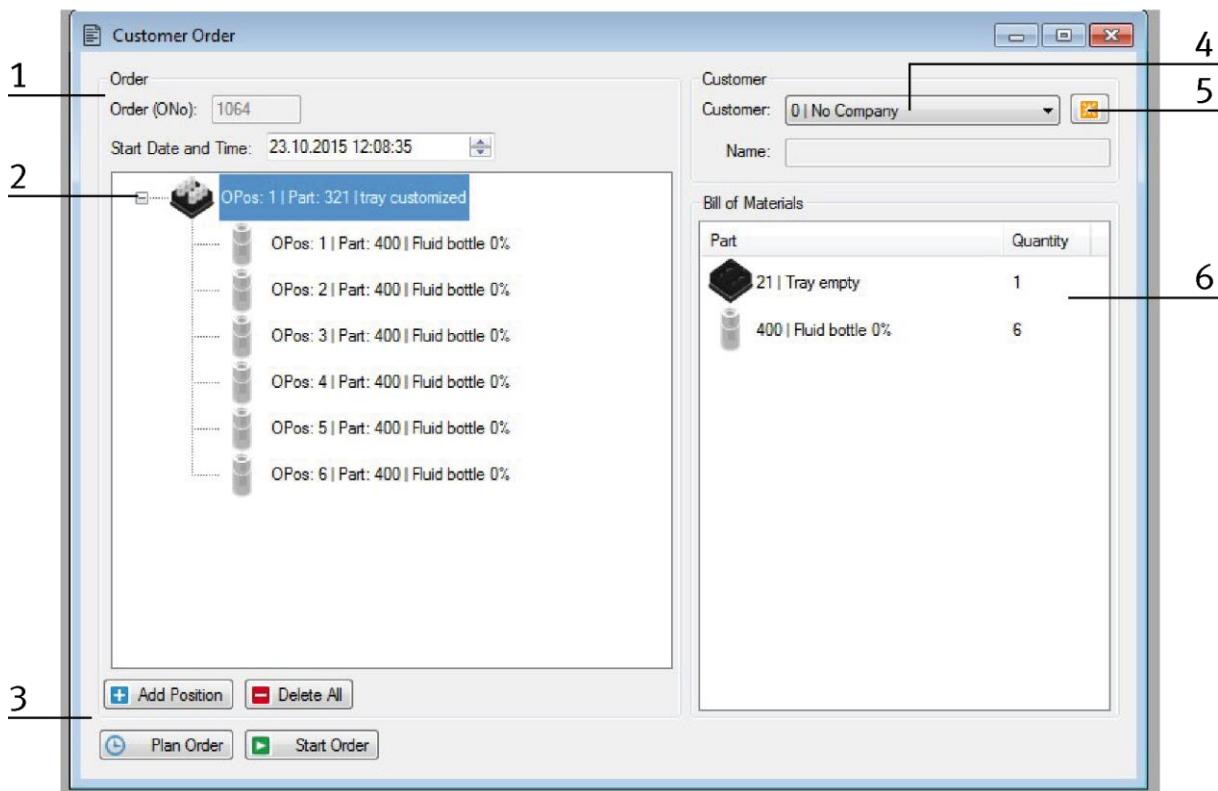
Change planed start

If you left-click on an order position in the plan list, you can change the planed start at the bottom of the sub window. The planed end is automatically calculated.

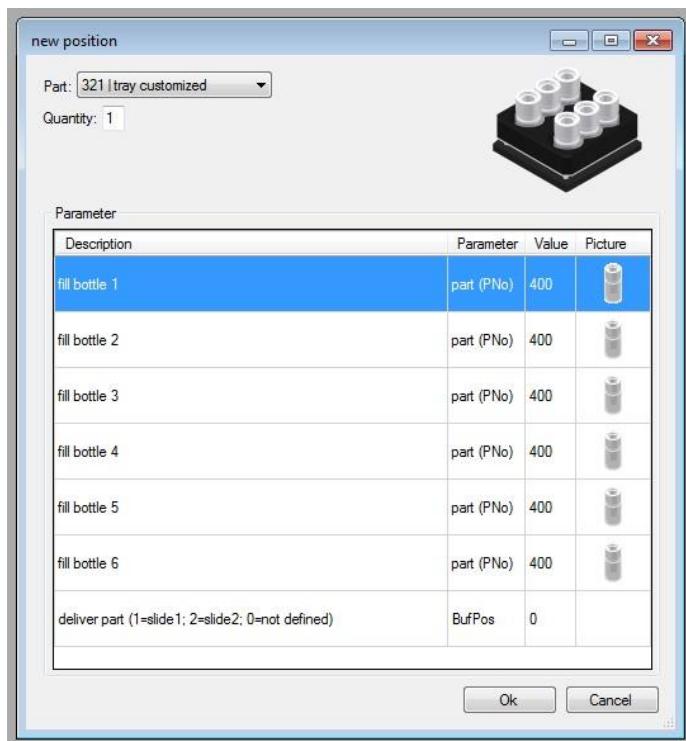
1.4.5 New Customer Order window

You can open the New Customer Order window from Order Management/New customer Order. In this window you can create new customer orders with one or more order positions.

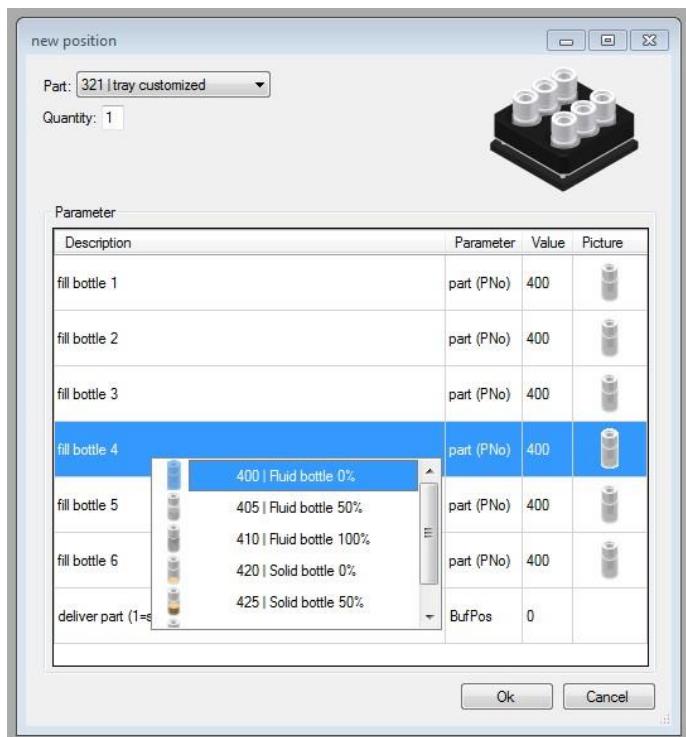




Position	Description
1	Edit start time and announcement of order number
2	Started orders are announced here. With a right click into the field, it is possible to insert new positions (see next screen) With a right click onto a order, it is possible to delete the chosen position
3	With click on "Add Position" it is possible to insert a new position (see next screen) With click on "Delete All" it is possible to delete all active orders With click on "Plan Order" it is possible to see and change the planed start and finish times of the orders. With click on "Start Order" it is possible to start already existing orders
4	Chose Customer from existing customers
5	Create a new customer
6	List of items with all necessary parts



Create new position

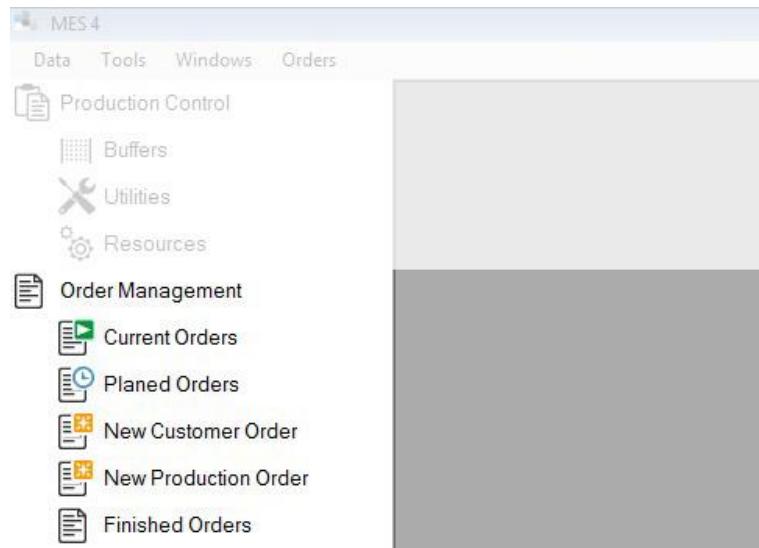


Change workpiece at position4

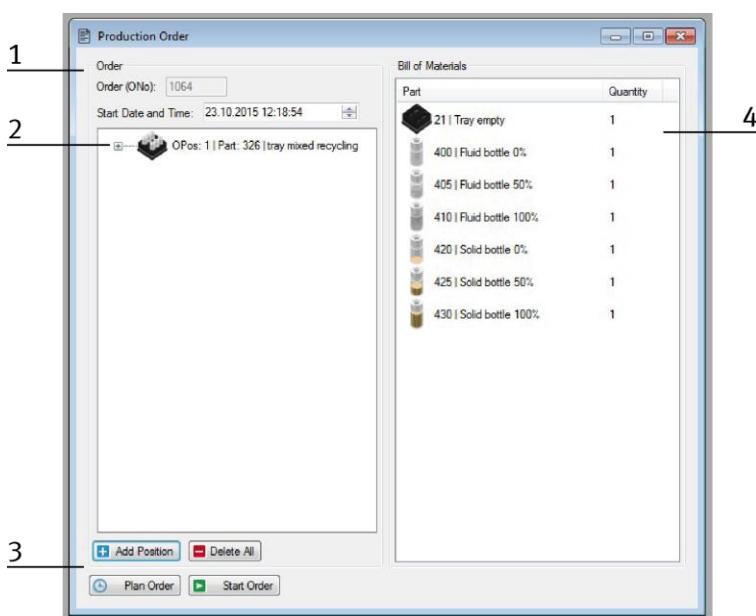
Here the workpiece can be equipped with further information, for example how the workpiece should stored into the storage.

1.4.6 New Production Order window

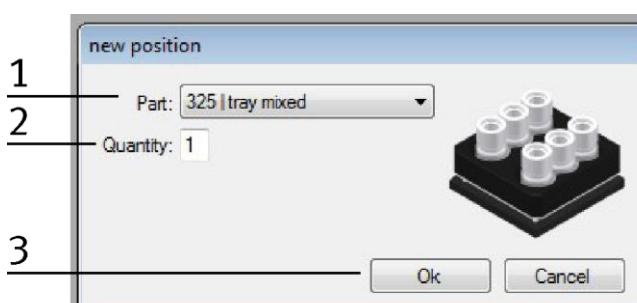
You can open the New Production Order window from Order Management/New Production Order. In this window you can create new production orders with one or more order positions.



Here it is possible to choose parts which are already applied as production parts. The parts are produced according the defined work plans.



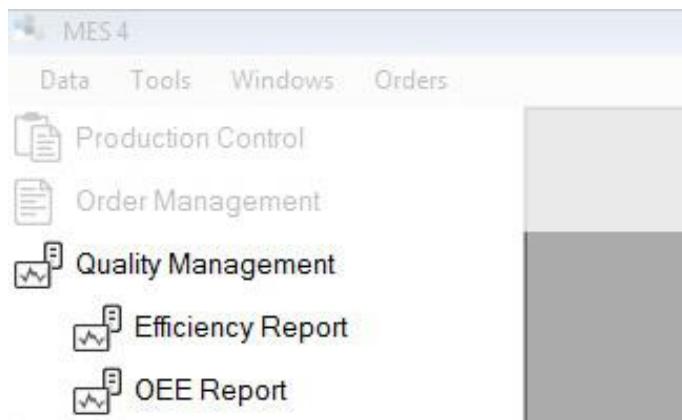
Position	Description
1	Edit start time and announcement of order number
2	Announcement of necessary parts With a right click into the field, it is possible to insert new part With a right click onto a part, it is possible to delete the chosen part
3	With click on "Add Position" it is possible to insert a new part (see next page) With click on "Delete All" it is possible to delete all active parts With click on "Plan Order" it is possible to see and change the planned start and finish times of the orders. With click on "Start Order" it is possible to start already existing orders
4	Announcement Bill of Materials, all parts which are necessary for production are announced here. The Bill of Materials is arising from the work plan.



Position	Description
1	Choose part
2	Choose quantity
3	Confirm or delete new settings

1.5 Quality Management windows

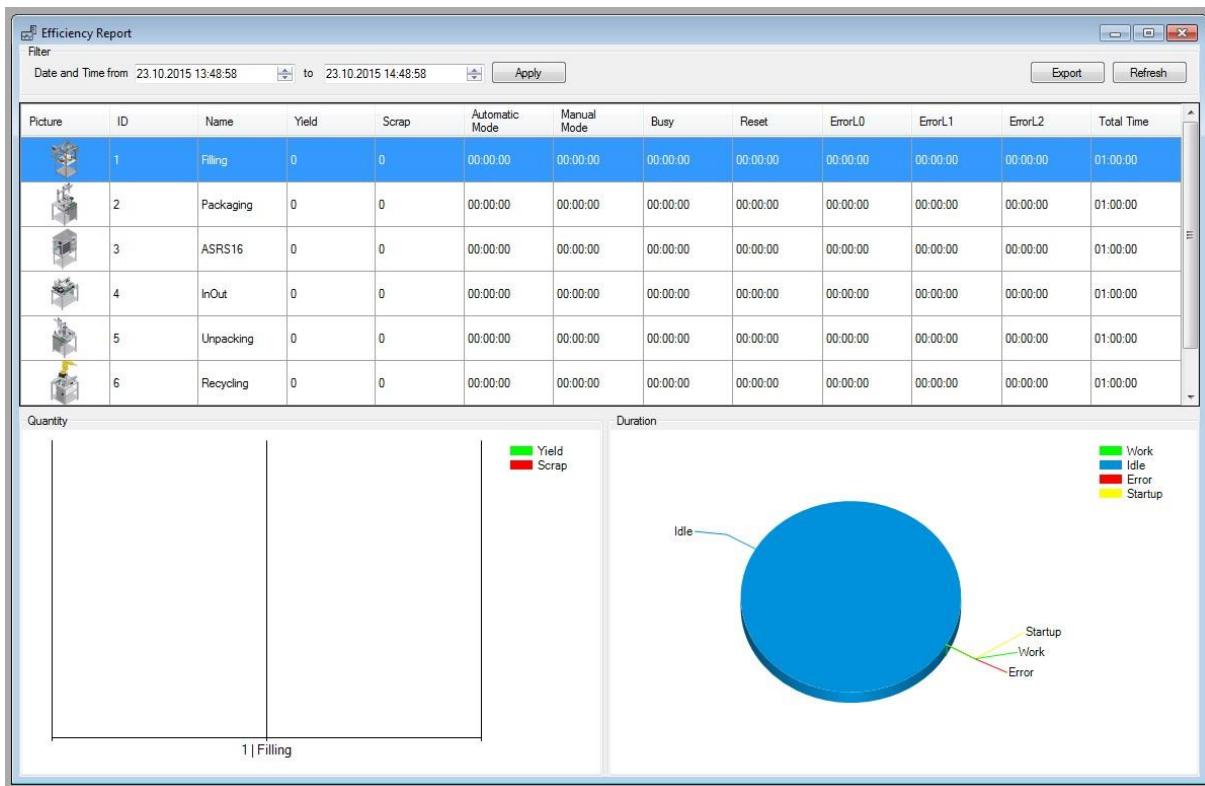
The Quality Management group is for checking the different efficiency report. It could help in the optimization of the system. There are 2 different sub windows available in this group.



- Efficiency Report
- OEE Report

1.5.1 Efficiency Report window

You can open the Efficiency Report window from Quality Management/Efficiency Report. In this window you can check the efficiency of the resources. It is important for optimization.



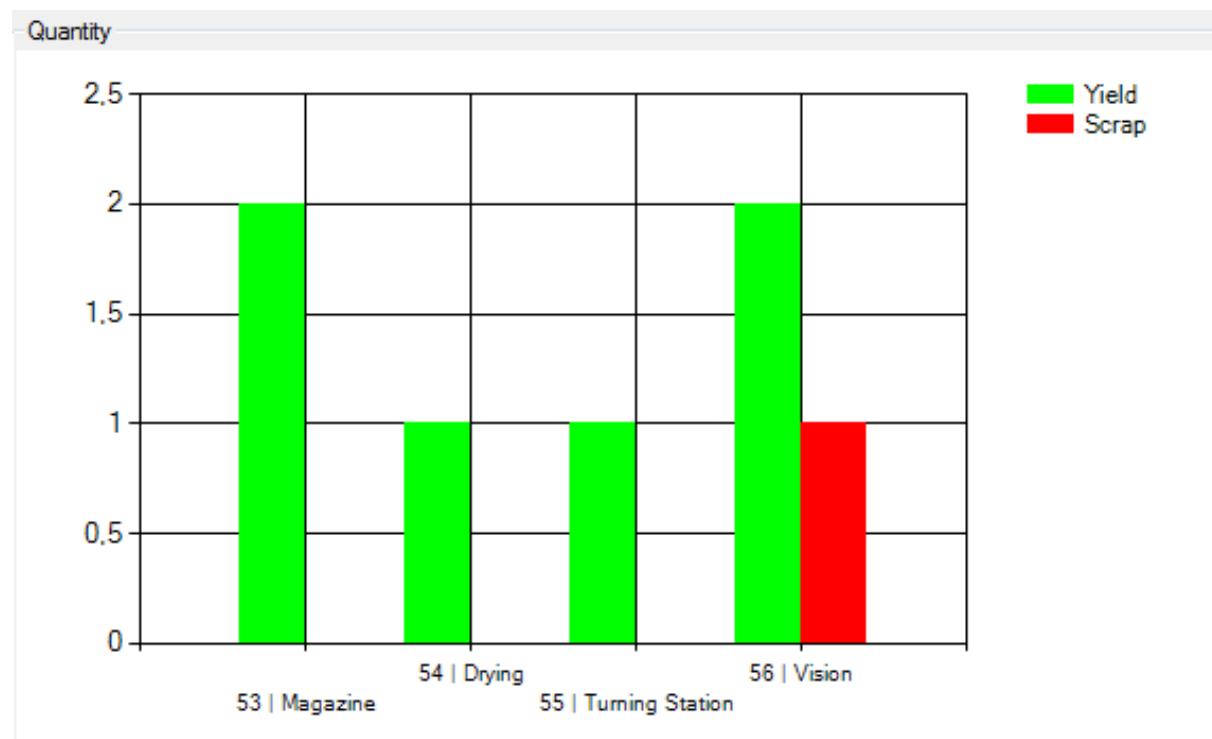
On the top of the sub window you can find a filter. With the load button you can load the data according to the filter. You can filter for a time range with changing the “Date and time from” and “to” time fields.

Bellow the filter you can find the list of the resources with some important information.

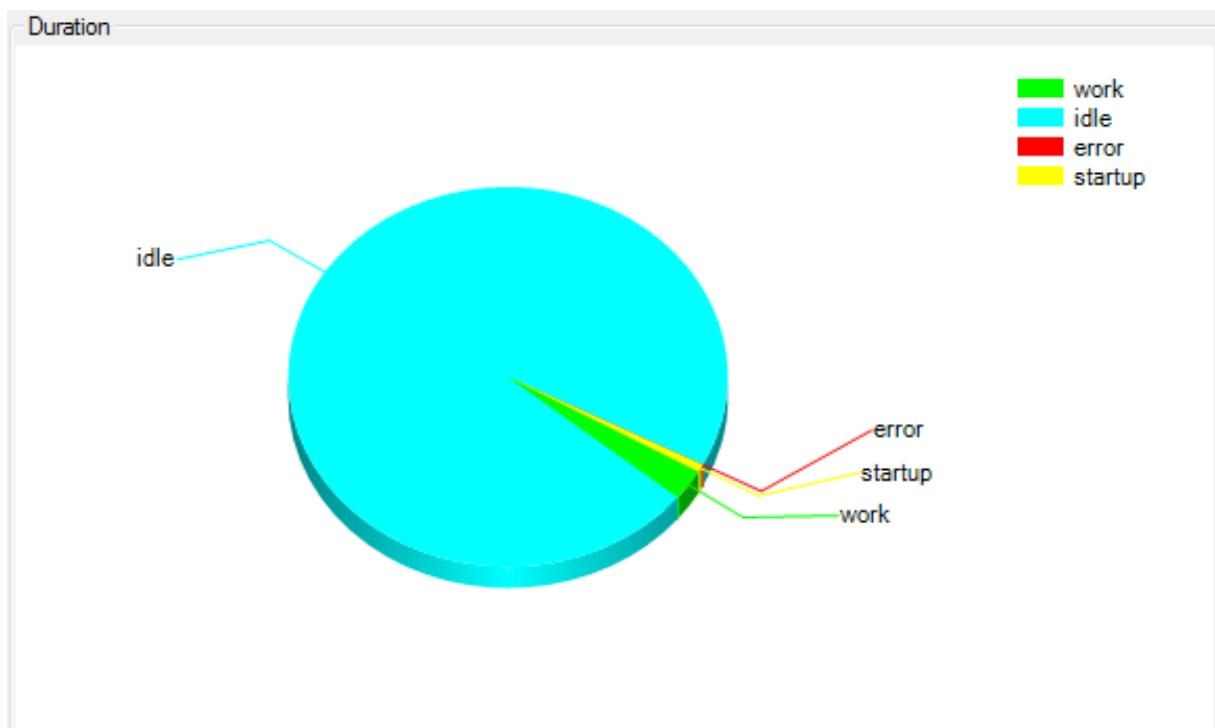
- Picture: Small image about the resource
- ID: Resource ID of the resource
- Name: Name of the resource
- yield: number of the produced parts
- scrap: number of wrong parts
- Automatic mode: duration in automatic mode
- Manual mode: duration in manual mode
- Busy: duration of busy states
- Reset: duration of reset modes
- ErrorL0: duration of level 0 errors
- ErrorL1: duration of level 1 errors
- ErrorL2: duration of level 2 errors
- Total time: total working time

If you click on a resource, you load two diagrams of the selected resource.

- Quantity: It shows the amount of production and the wrong part ratio. (Pos.2 in picture side before)

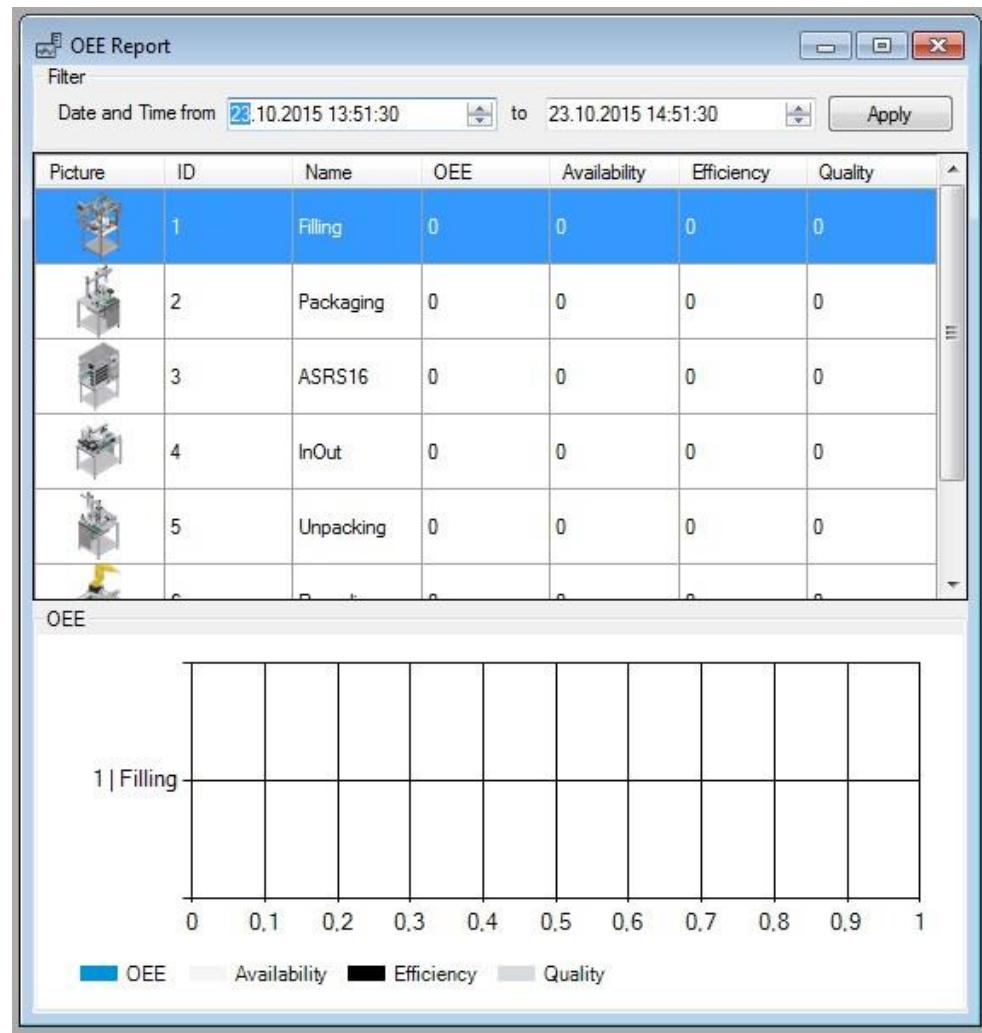


- Duration: It shows the ratio of duration in different states. (Pos. in picture side before)



1.5.2 OEE Report

You can open the OEE Report window from Quality Management/Finished Orders. In this window you can find a list of all finished orders. The finished orders are shown with blue color.



At the upper part of the window is a filter, with the Load button it is possible to load the data in dependence of the filter. It is possible to filter for a time period, insert the chosen time period in date and time "from" -"to".

Below the time filter is a table with important information's

- Picture: small picture of the resource
- ID: Resource ID of the resource
- Name: Name of the resource
- OEE: effective of the main facility of the chosen resource
- Availability:
- Efficiency:
- Quality:

With a click on the resource, a diagram is opened below.

Totale Operationszeit					
Geplante Operationszeit					Geplante Nichtproduktion
Nutzung	A Geplante Produktionszeit				Geplante Stillstände
	B Betriebsdauer				Stillstände
Effizienz	C Vorgegebene Menge*				Störungen
	D Produzierte Menge				Leistungsverluste
Qualität	E Gutmenge		Ausschuss		Stillstandsverluste
	$\text{OEE} = \frac{\text{B/A}}{\text{Nutzungsgradfaktor}} \times \frac{\text{D/C}}{\text{Effizienzfaktor}} \times \frac{\text{E/D}}{\text{Qualitätsfaktor}}$				

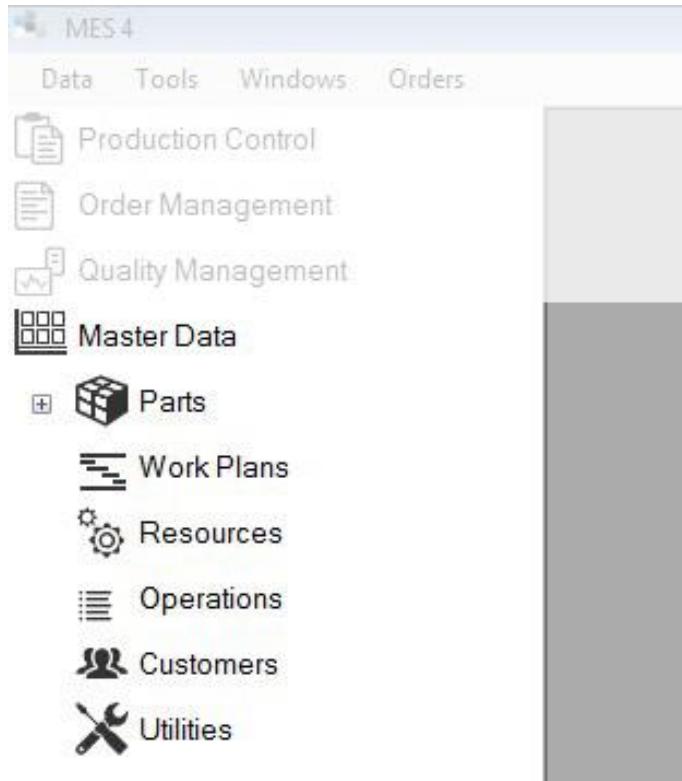
* (Betriebsdauer x theoretische Laufrate)

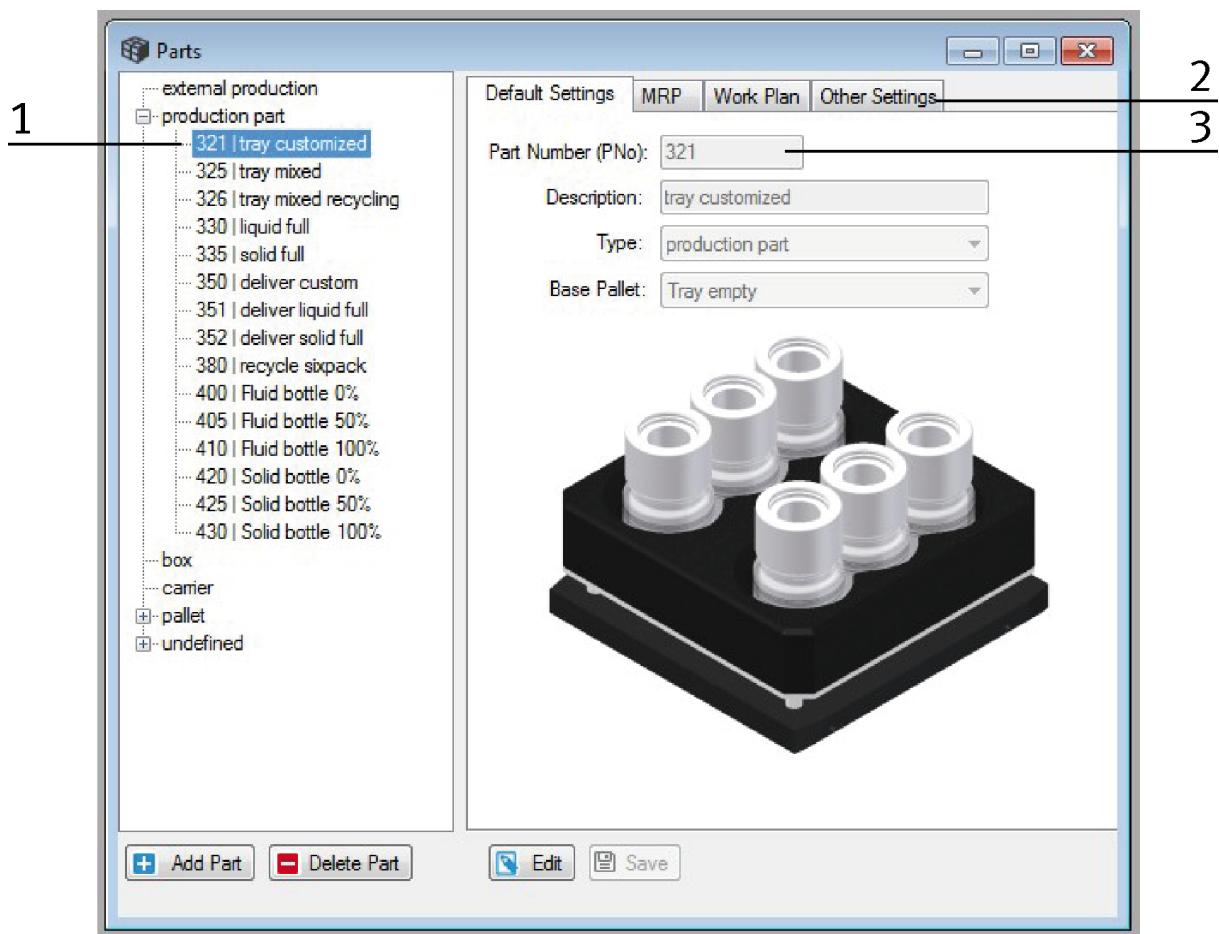
Tabelle zur Errechnung der OEE Kennzahl

1.6 Master Data windows

1.6.1 Parts window

You can open the Parts window from Master Data/Parts. In this window you can see and change, or create new parts.





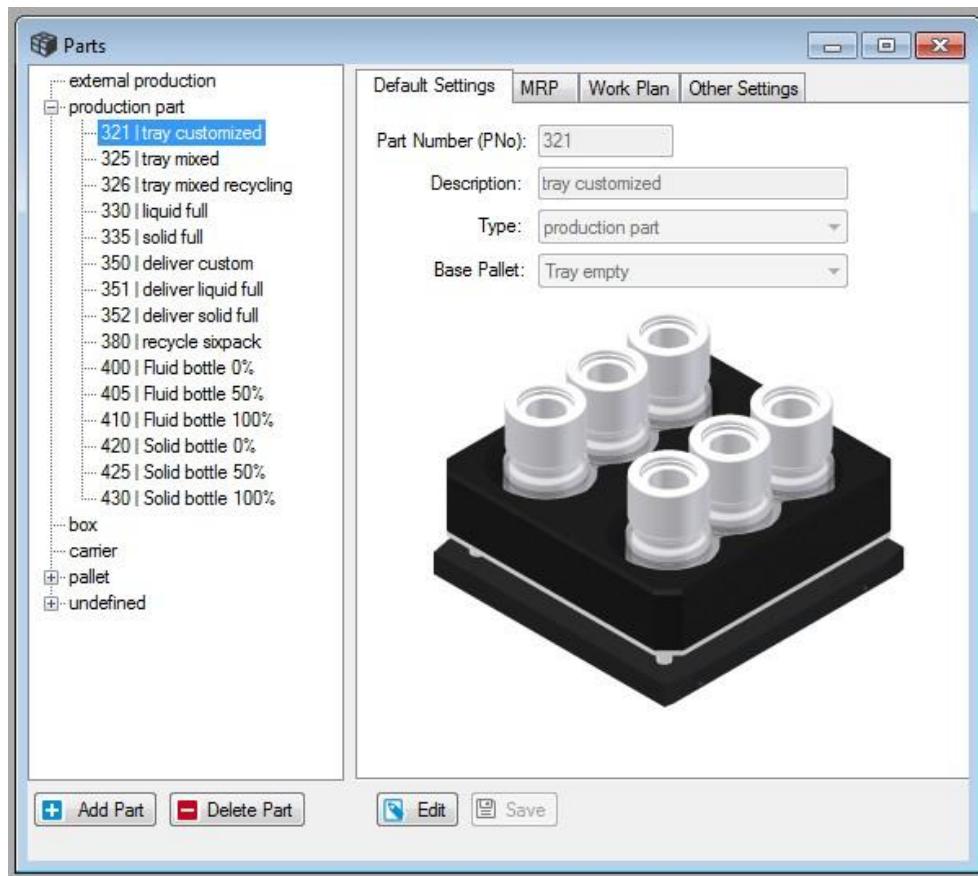
Select part

If you click on one of the parts on the left side (Pos1 in picture above), you will see information about the part on the right side (Pos3 in picture above). The parts are organized into different types.

- External production: bying parts / raw parts
- Production Part: You can select this type of parts as an order.
- Box
- Carrier
- Pallet
- Undefined

Information about the part

The information's about the parts are divided into 4 groups, the default settings, MRP, the working plans and other settings.

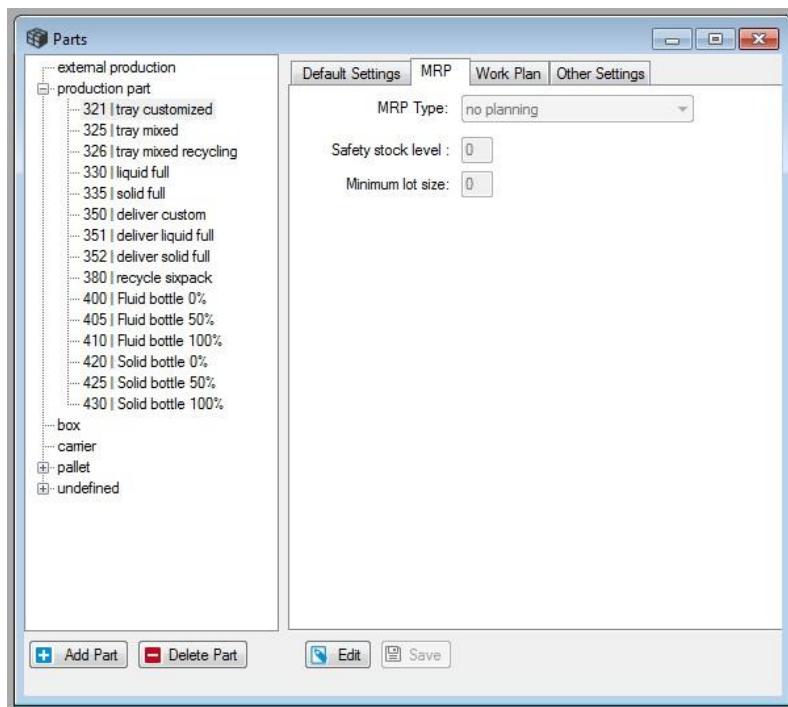


Default settings

- Part Number (PNo)
- Description
- Type
- Base Pallet – the empty pallet can be defined here (not possible at utilities)
- Work Plan: it is available, if the part is a production part. In this case it should have a work plan for production.
- Other settings: with the edit function it is possible to add workpieces to groups.

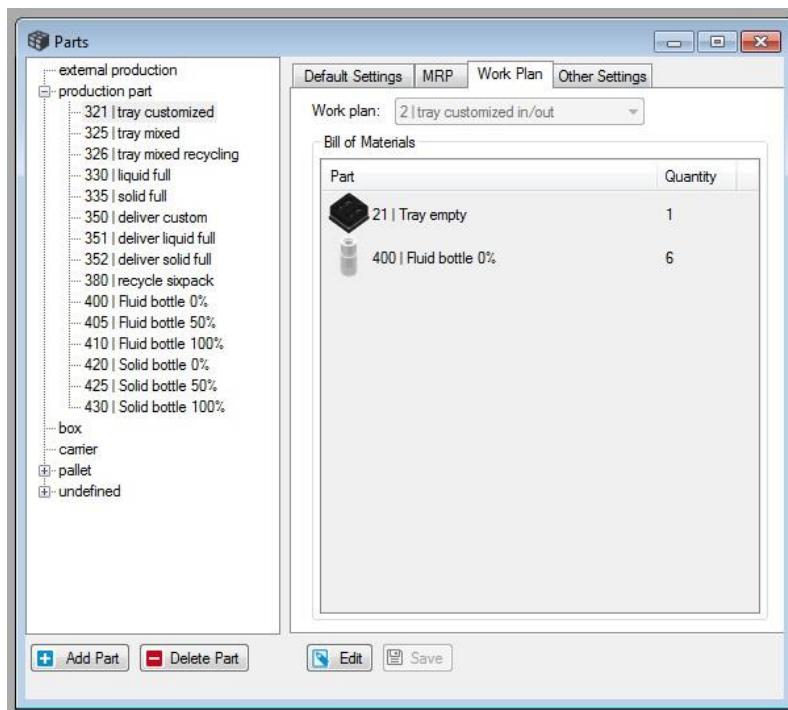
With the Edit button it is possible to edit the workpieces.

The following screens are only announcement.



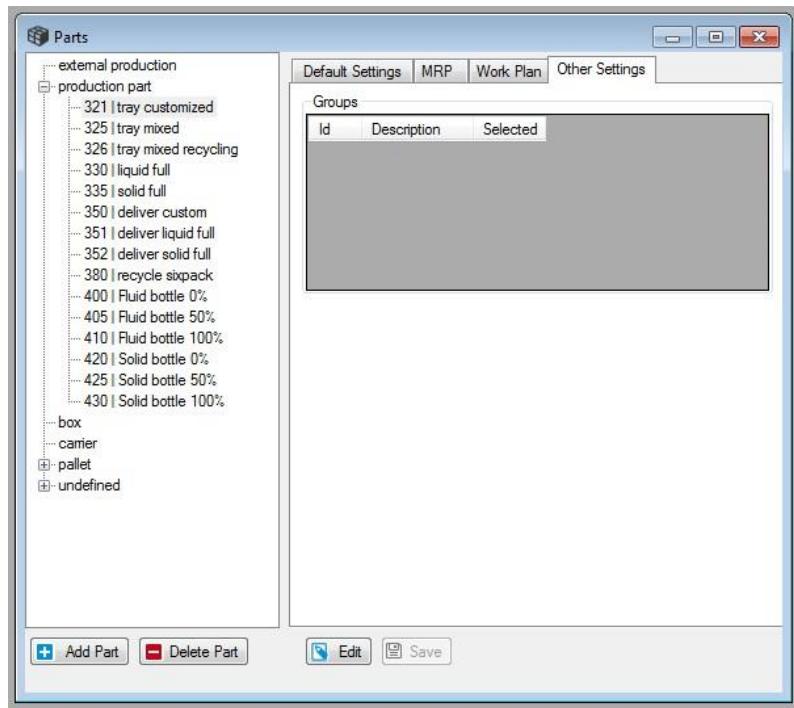
MRP – material requirements planning

- MRP type
- Safety stock level
- Minimum lot size



Work plan

- Work plan

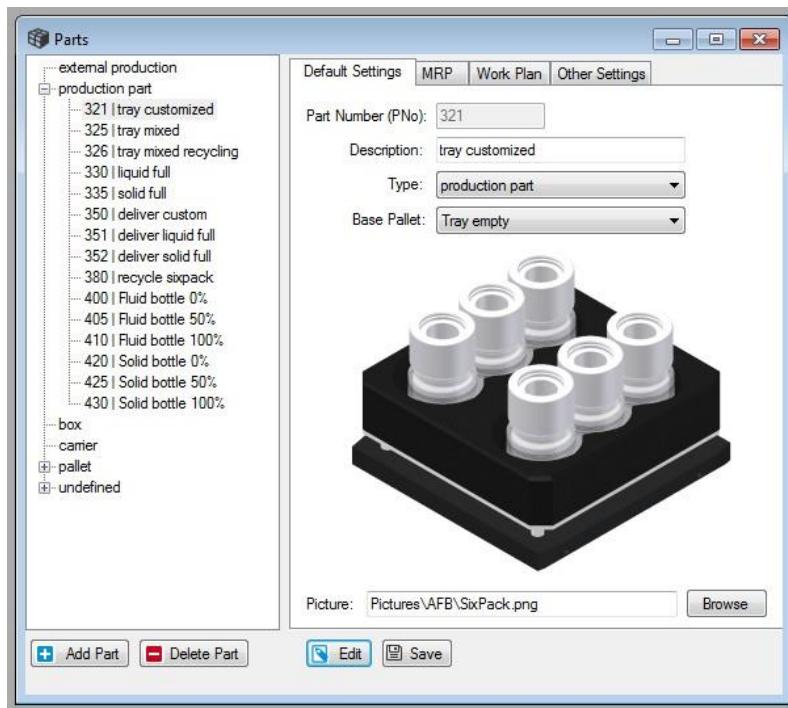


Other settings

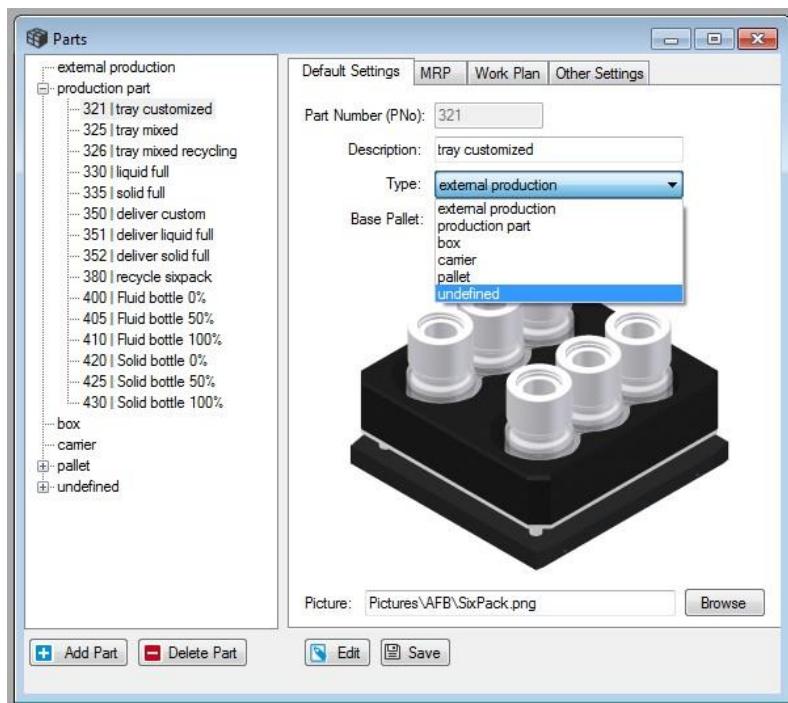
- Choose groups if available

Edit the part

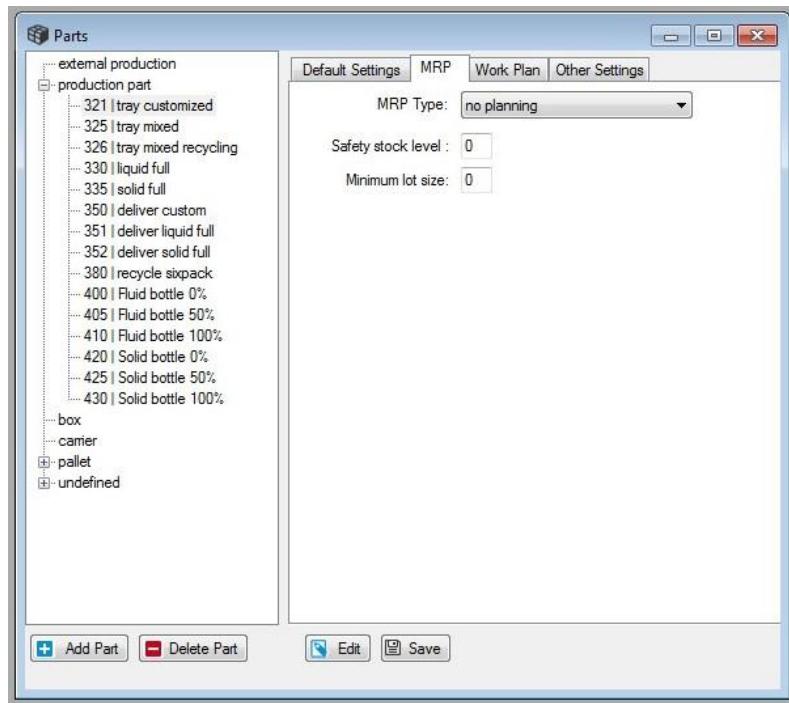
If you select a part and click on the edit button, you can edit the part. In this case a new input field (Picture) will be available to select a part. After you finished the change, you can click on the save button.



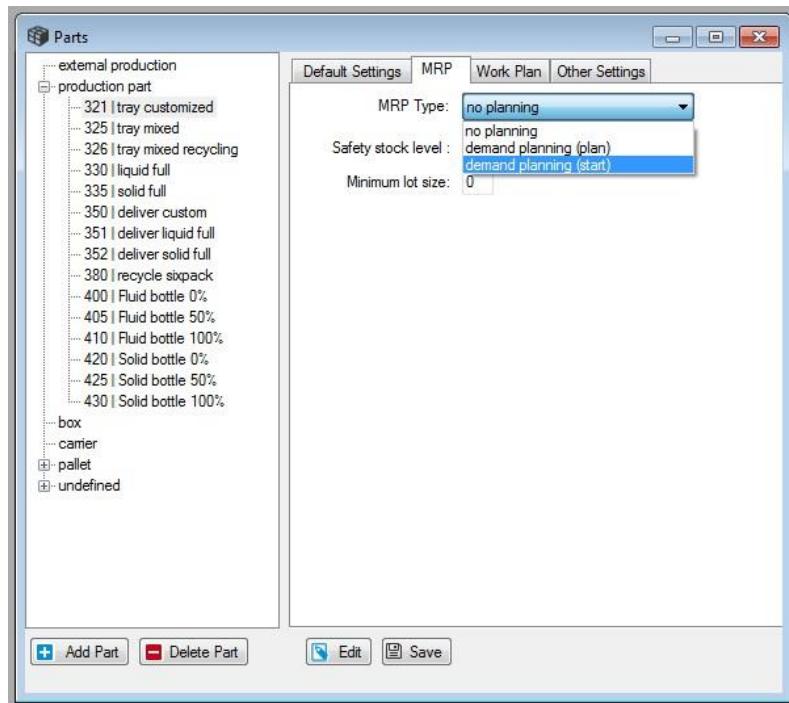
Main window to edit a part in default settings



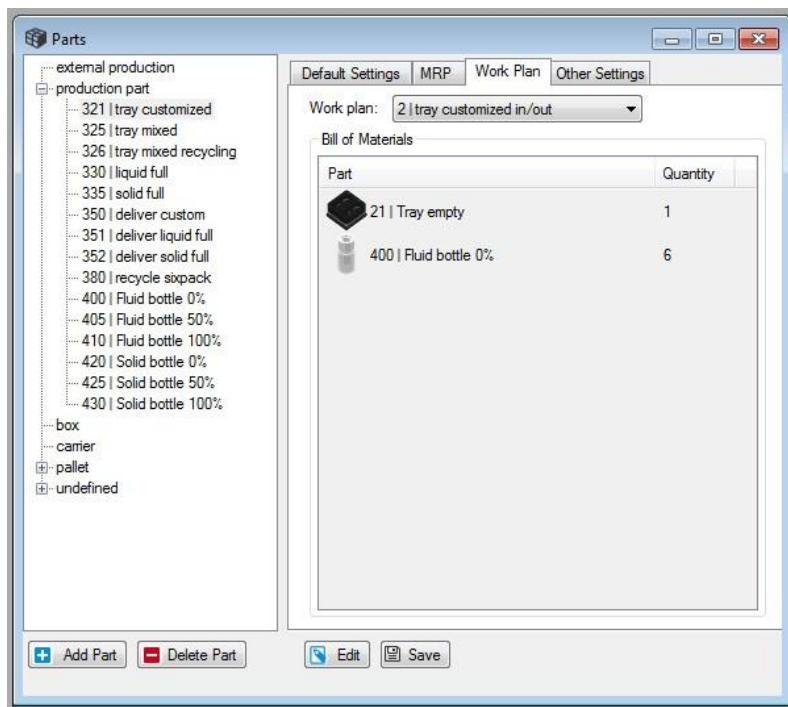
Example to change the type



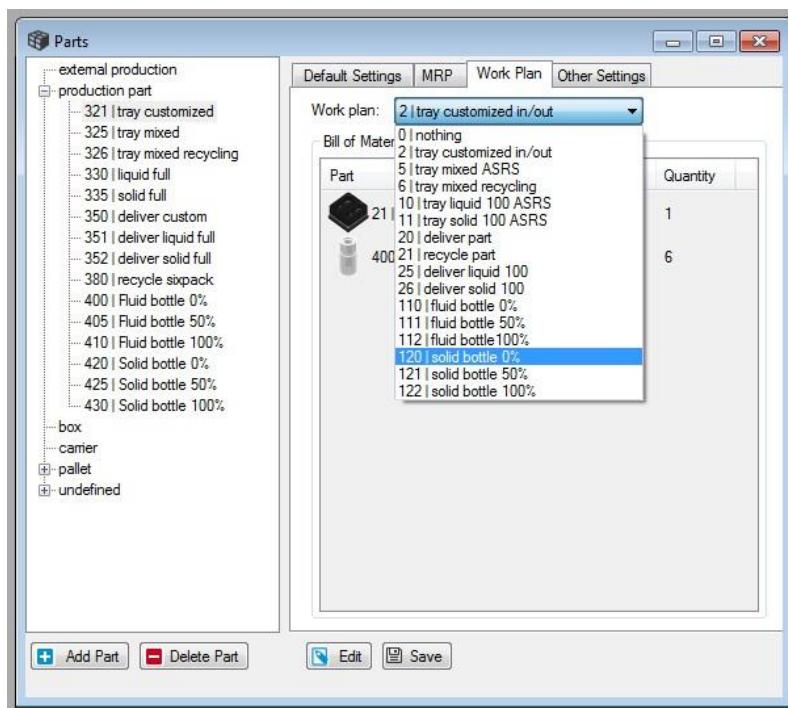
Main window to edit a part in MRP



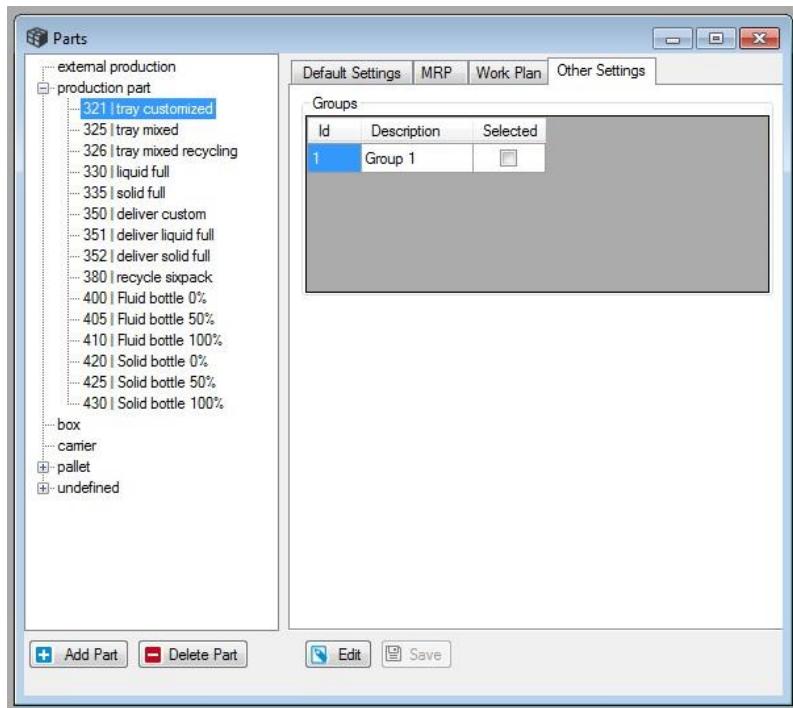
Example to change the type



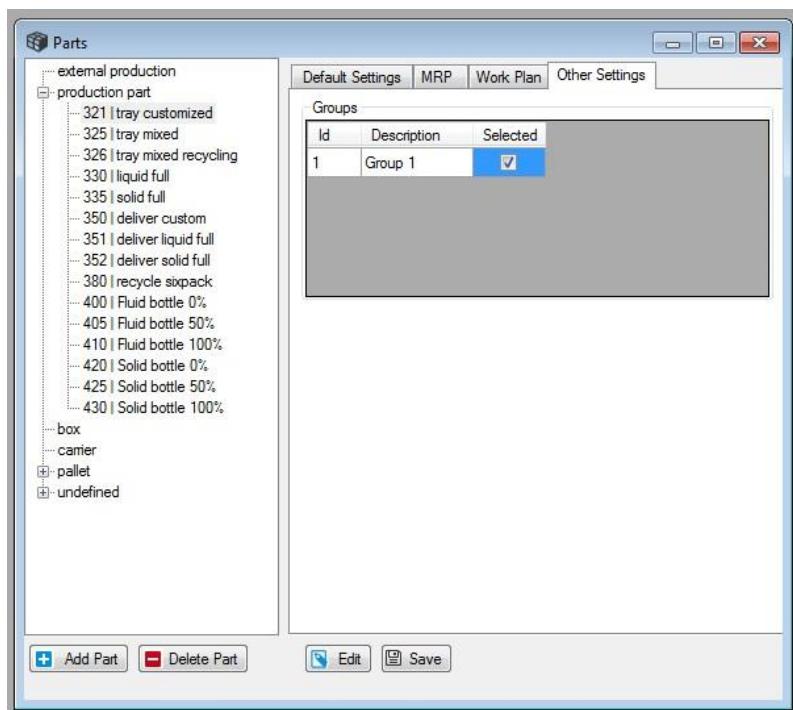
Main window to edit a part in work plans



Example to edit a work plan



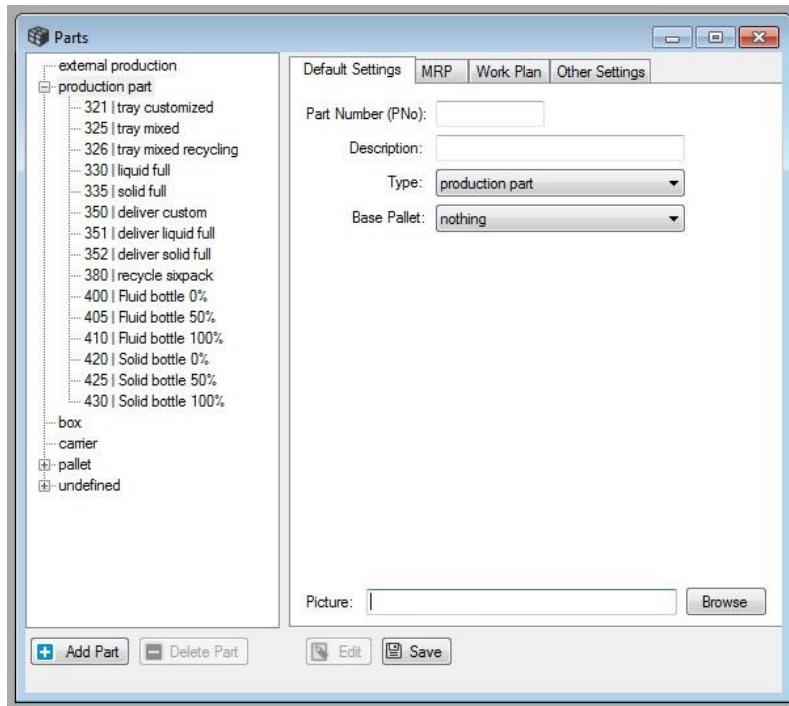
Main window to edit a part in other settings



Example to add a part to a group

Add part

At the bottom-left corner you can find an “add part” button. If you click on it, you can create a new part. If you select the “production part” type, you will see the Work Plan field too.

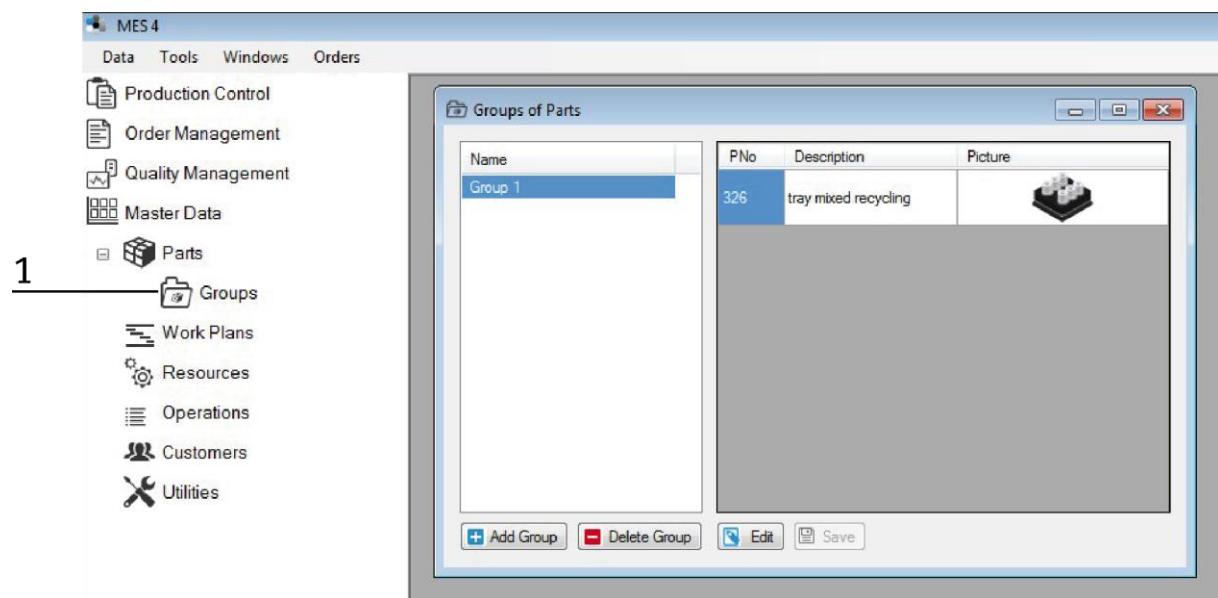


Delete part

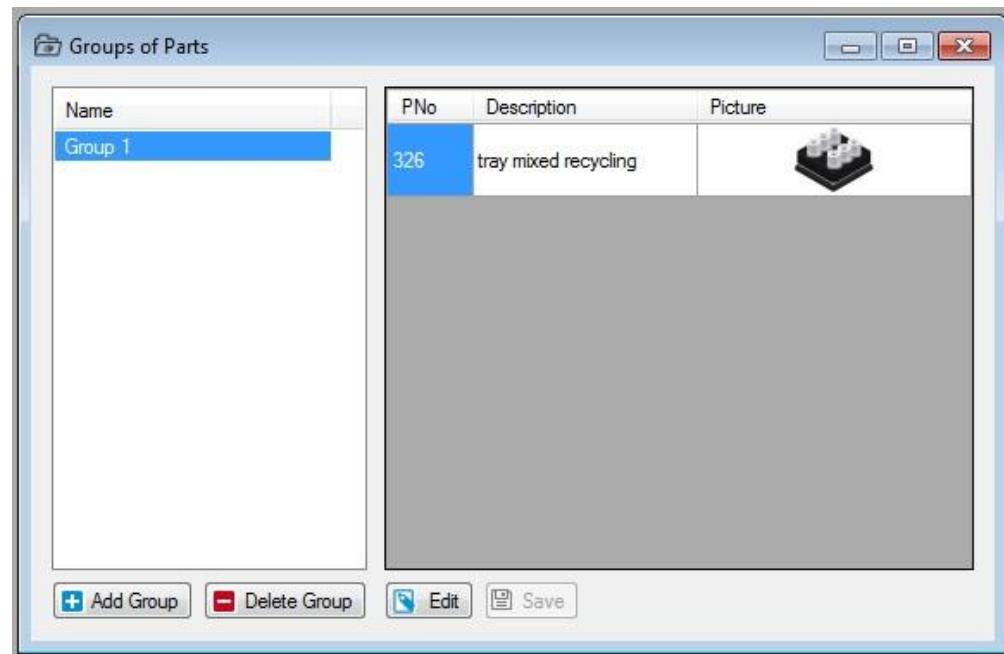
If you click on the “delete part” button at the bottom-left corner of the window, you can delete the selected part.

Edit groups

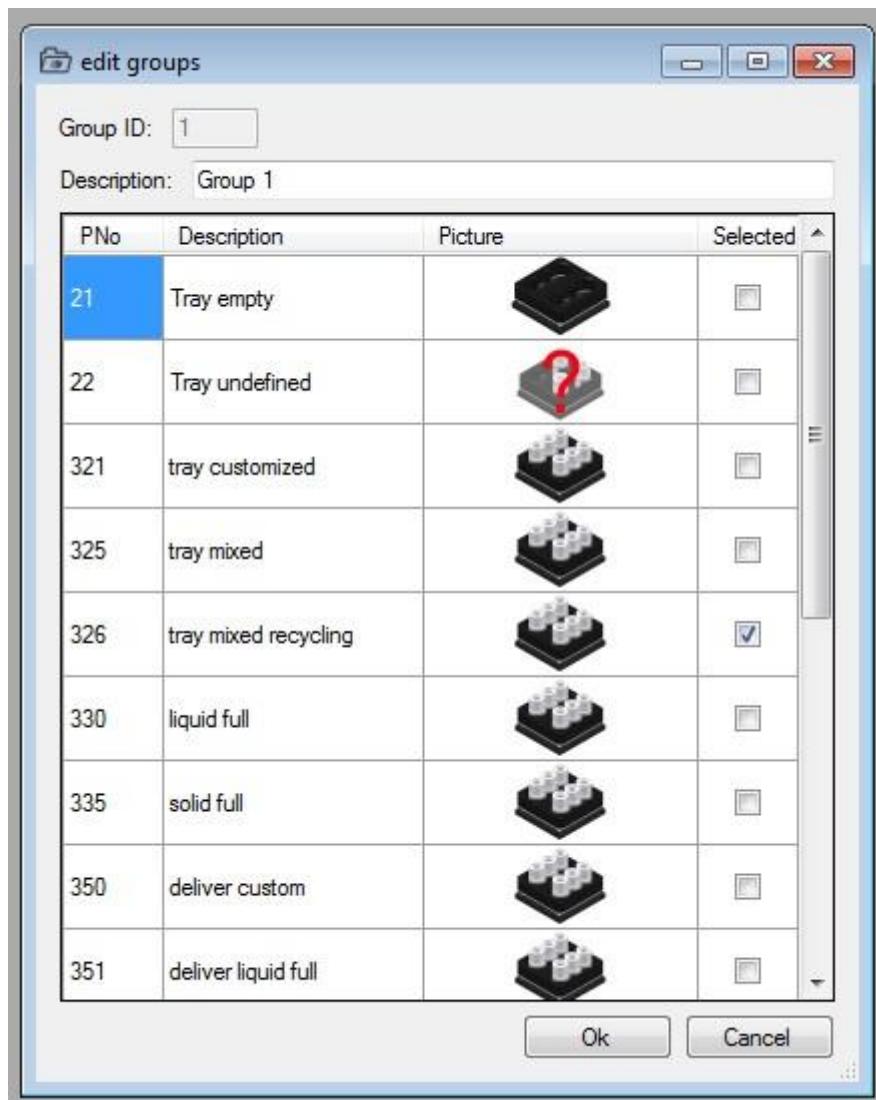
If you select a group and click on the edit button (left mouse button), you can edit an group.



In this case a new input field (Picture) will be available. Here it is possible to edit or delete groups and to create new groups.

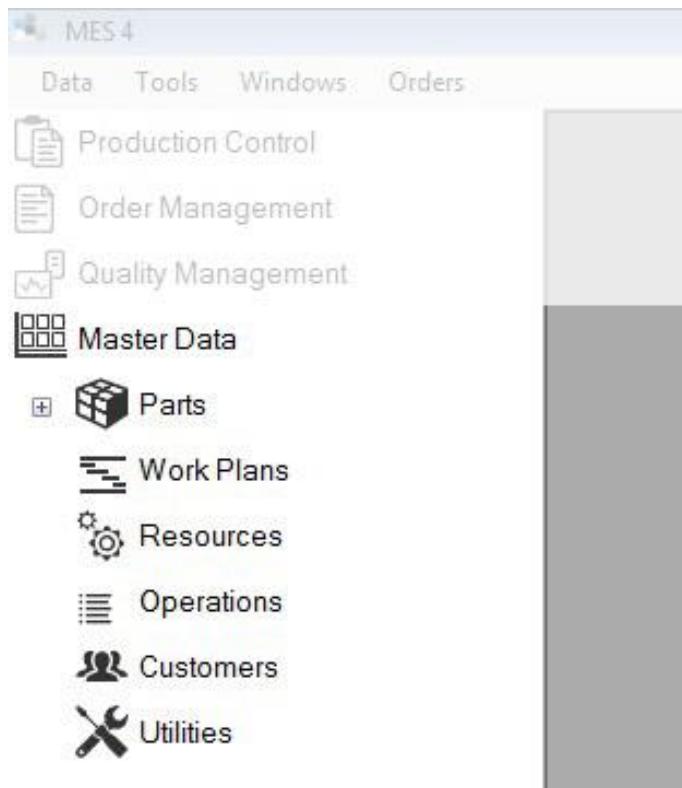


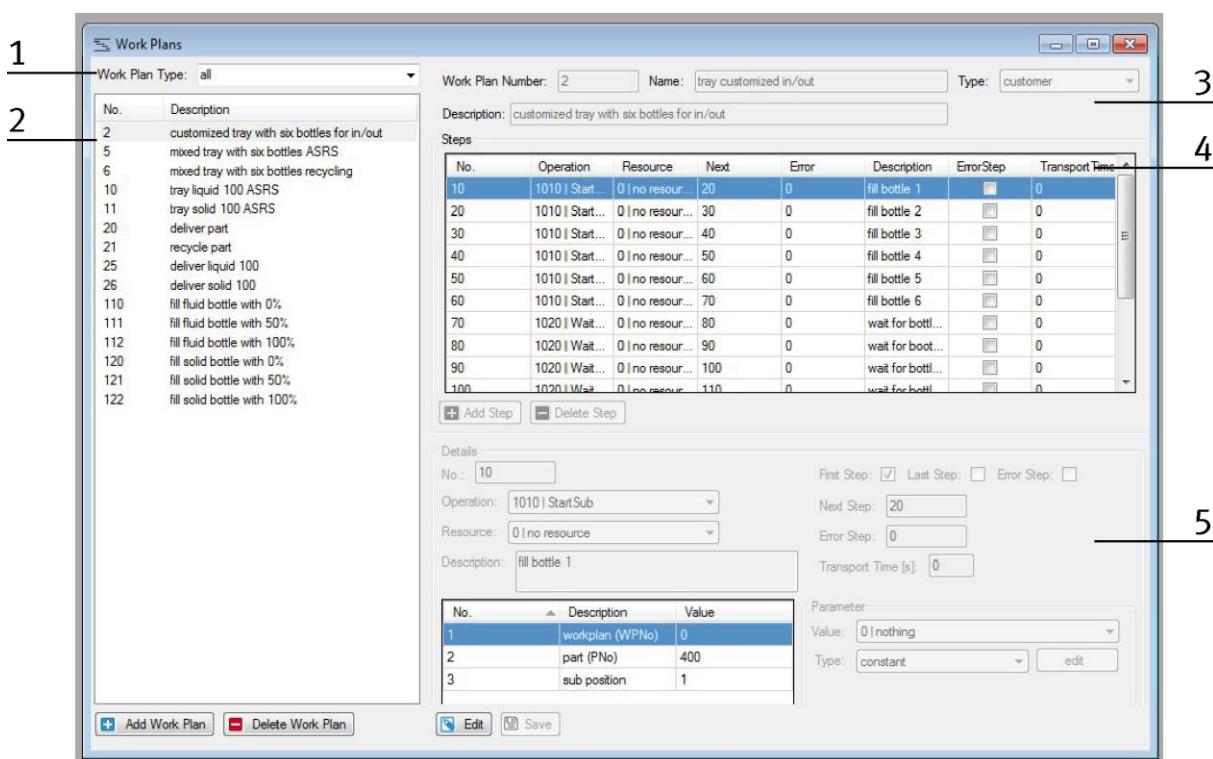
If you select a group and click on the edit button, you can edit an available group. In this case a new input field (Picture) will be available to select parts to a group. Insert a name for the group and click on Ok, to save the changes.



1.6.2 Work Plans window

You can open the Work Plans window from Master Data/Work Plans. In this window you can see and change, or create new work plans.





Select work plan

At the top-left corner (Pos1 in picture above) you can change the filter to display different types of work plans.

- all: Display all types of work plans
- Production: Display the production work plans
- Commissioning: Display the commissioning work plans
- Templates: Display the template work plans

After you changed the filter you can see the list of work plans bellow the filter (Pos2 in picture above). If you click on one of the work plan, the information of that work plan will be displayed on the right side.

Information of work plan

At the top-right corner (Pos3 in picture above) of the window you can find the main data of the work plan.

Work Plan Number:	2
Name:	tray customized in/out
Type:	customer
Description:	customized tray with six bottles for in/out

- Work Plan Number
- Short Description
- Type: (Production, Commissioning, Template)
- Description

Bellow the main data you can find the steps of work plan (Pos4 in picture side before). In the table you see the following information.

No.	Operation	Resource	Next	Error	Description	ErrorStep	TransportTime
10	1010 Start...	0 no resour...	20	0	fill bottle 1	<input type="checkbox"/>	0
20	1010 Start...	0 no resour...	30	0	fill bottle 2	<input type="checkbox"/>	0
30	1010 Start...	0 no resour...	40	0	fill bottle 3	<input type="checkbox"/>	0
40	1010 Start...	0 no resour...	50	0	fill bottle 4	<input type="checkbox"/>	0
50	1010 Start...	0 no resour...	60	0	fill bottle 5	<input type="checkbox"/>	0
60	1010 Start...	0 no resour...	70	0	fill bottle 6	<input type="checkbox"/>	0

- No.: Step number
- Operation
- Resource: Resource of the operation
- Next: Next step after finishing this one
- Error: Next step after finishing this one with error
- Description
- Transport time: The necessary time to transport the part to the resource of this step

If you click on a step of work plan, you will see the details at the bottom of the window. (Pos5 in picture side before)

Details

No.:	10
Operation:	1010 StartSub
Resource:	0 no resource
Description:	fill bottle 1

First Step:	<input checked="" type="checkbox"/>
Last Step:	<input type="checkbox"/>
Error Step:	<input type="checkbox"/>
Next Step:	20
Error Step:	0
Transport Time [s]:	0

No.	Description	Value
1	workplan (WPNo)	0
2	part (PNo)	400
3	sub position	1

Parameter

Value:	0 nothing
Type:	constant
<button style="margin-left: 10px;">edit</button>	

Edit
 Save

The following information's are available about the step.

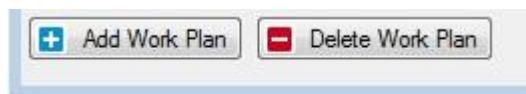
- No.: Step number
- Operation
- Resource: Resource of the operation
- Description
- First Step: It is checked, if this is the first step of production
- Last Step: It is checked, if this is the last step of production
- Error Step: It is checked, if this step is an error step
- Next Step: Next step after finishing this one
- Error Step: Next step after finishing this one with error
- Transport time [s]: The necessary time to transport the part to the resource of this step
- Parameters
 - No.: Number of parameter
 - Description
 - Value

Editing work plan

If you click on the edit button, you can edit the work plan. For editing the parameters you should select the parameter from the table and then you can change it on the right side. After you finished the change, click on save button.

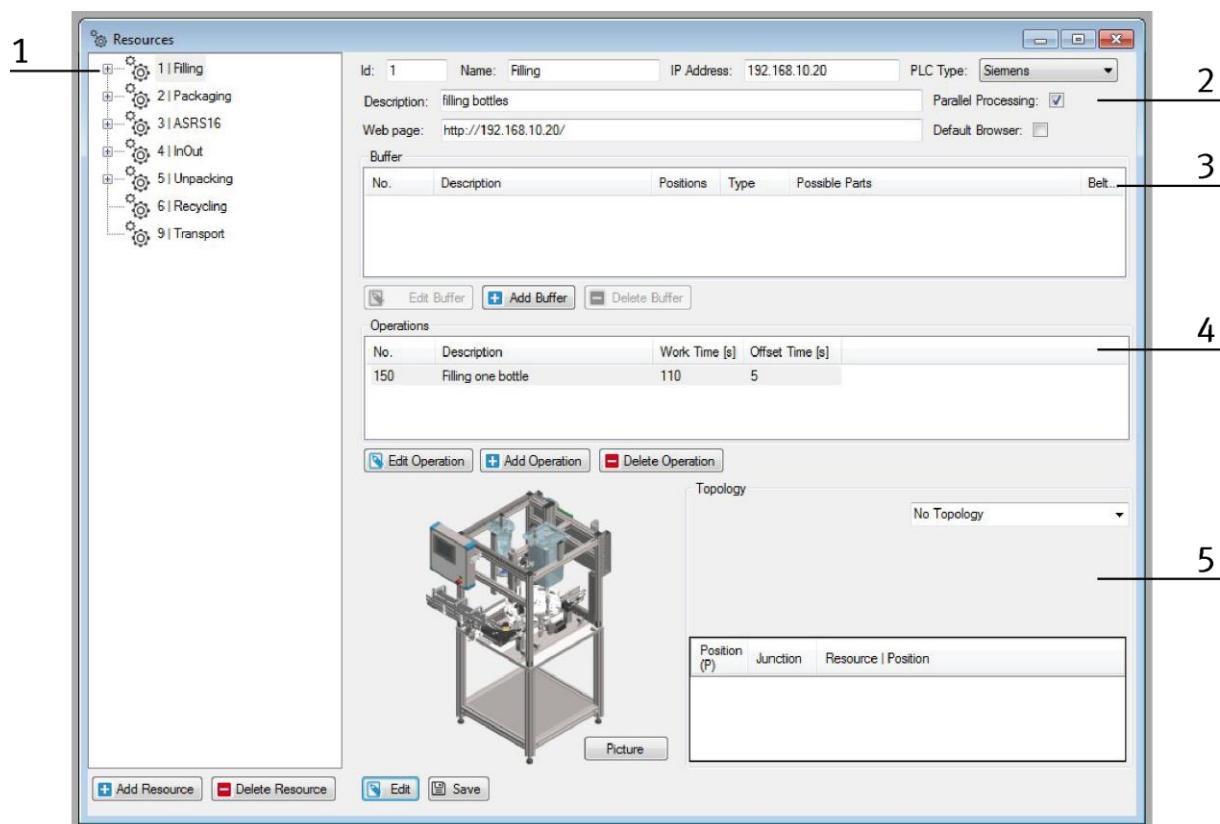
Add/delete work plan

At the bottom-left corner of the window, you can find two buttons for add new work plan, or delete the selected work plan.



1.6.3 Resources window

You can open the Resources window from Master Data/Resources. In this window you can see and change, or create new resources.



Select resource

At the left side of the window, you can find the resource list (Pos1 in picture above) If you open a resource, you can see the parts of the resource. A resource can have operations and buffers. If you click on a resource or a buffer/operation of a resource, the resource information will be shown on the right side of the window.

Information of Resource

At the top of the window (Pos2 in picture side before) you can find the main data of the resource.

Id:	1	Name:	Filling	IP Address:	192.168.10.20	PLC Type:	Siemens
Description:	filling bottles			Parallel Processing:	<input checked="" type="checkbox"/>		
Web page:	http://192.168.10.20/			Default Browser:	<input type="checkbox"/>		

- Id
- Name
- IP Address
- Description
- PLC Type
- Parallel processing: It means, the resource can do all operation in the same time.
- Web page: Here it is possible to add a webpage with further informations, check Default browser to activate this function.

Bellow the main data you can find the buffers (Pos3 in picture side before) of the resource (if it has).

Buffer						
No.	Description	Positions	Type	Possible Parts	BeltNo	
1		0	stack	all	0	

- No.: Buffer number
- Description
- Positions: How many positions available in the buffer
- Type
 - storage: memory with random access
 - fifo: First in first out memory
 - to AGV: Buffer to AGV (Automated Guided Vehicle)
 - from AGV: Buffer from AGV (Automated Guided Vehicle)
- Possible part: Which type of parts can be stored inside the buffer.
- BeltNo: Choose conveyor

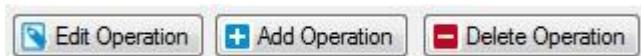
Bellow the buffers you can find the operations (Pos4 in picture side before). One resource can have more operations.

Operations			
No.	Description	Work Time [s]	Offset Time [s]
150	Filling one bottle	110	5

- No.: Operation number
- Description
- Work Time [s]: necessary working seconds for the operation (it is used for time calculation)
- Offset Time [s]: indication of Offset time.

Editing the resource of the operation

If you click on the edit button, you can edit the operation. You can simply overwrite the main data. To change the buffer or operation you have to select it and after that you can delete or edit with the appropriate button. To add a new buffer or operation is also possible.

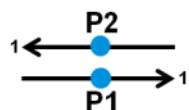


Bellow the Editing operation data you can find the Topology. Here it is possible to give a direction to the carrier inside the resource. Additional it is necessary to choose the following station, this is done in the table below.

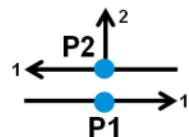
Position (P)	Junction	Resource Position
1	1	
1	2	
1	3	



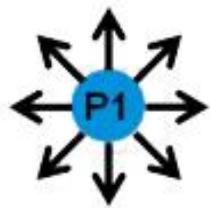
Example 1: The carrier is going straight on conveyor 1 / P1; 1 out



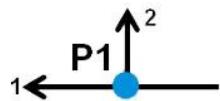
Example 2: The carrier is going straight on conveyor 1 / P1; 1 out
The carrier is going straight on conveyor 2 / P2; 1 out



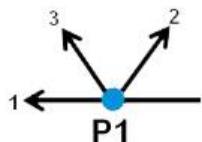
Example 2: The carrier on conveyor 1 is going straight / P1; 1 out
The carrier on conveyor 2 is going straight / P2; 1 out
The carrier on conveyor 2 is going to the right / P2; 2 out



Example 3: The carrier is going straight on conveyor 1 / P1; 1 out



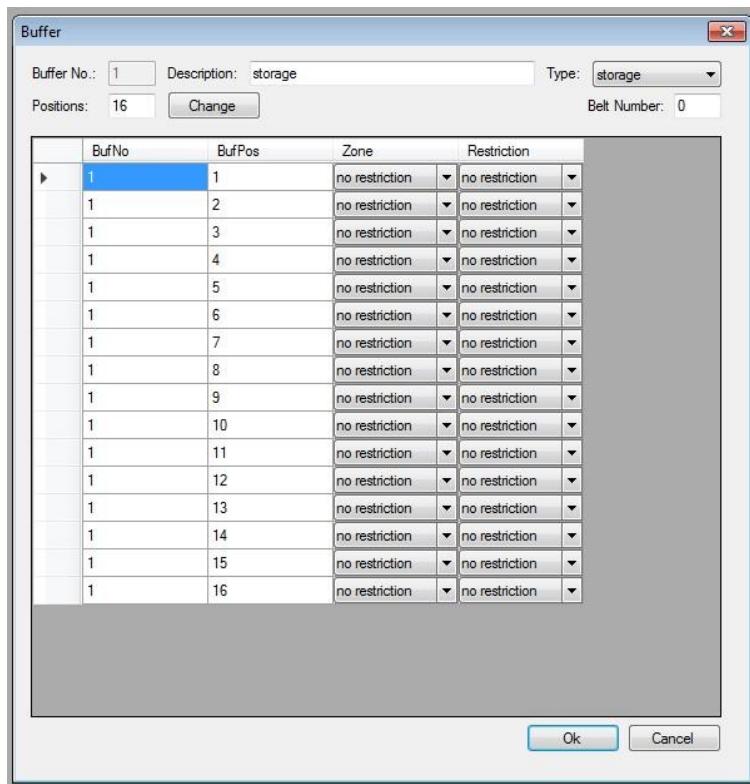
Example 4: The carrier is going straight on conveyor 1 / P1; 1 out
The carrier is going straight on conveyor 2 / P2; 1 out



Example 5: The carrier on conveyor 1 is going straight / P1; 1 out
The carrier on conveyor 2 is going straight / P2; 1 out
The carrier on conveyor 2 is going to the right / P2; 2 out

Editing buffer

If we select a buffer from the table, we can edit it by clicking on the “edit buffer” button.

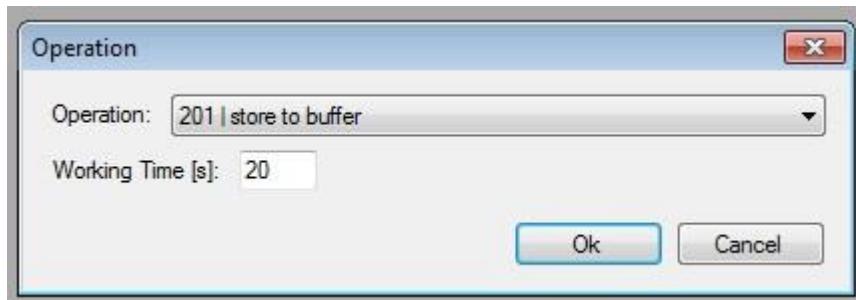


In the buffer editing window we can change the description the type, the belt number (it is available only for AGV buffers), and the positions. If we change the number of positions, we should click on the Change button to update the position table. In the position table we can find the following columns.

- BufNo: Buffer number
- BufPos: Buffer position number
- Zone: Which type of parts can be stored at that buffer position
- Restriction: here it is possible to choose parts to store them manually into the buffer

Editing operation

If we select an operation from the table, we can edit it by clicking on the “edit operation” button. In the operation editing window we can change operation and the working time. The Operation is selectable from the drop-down list. The operations are defined in the Operation window.



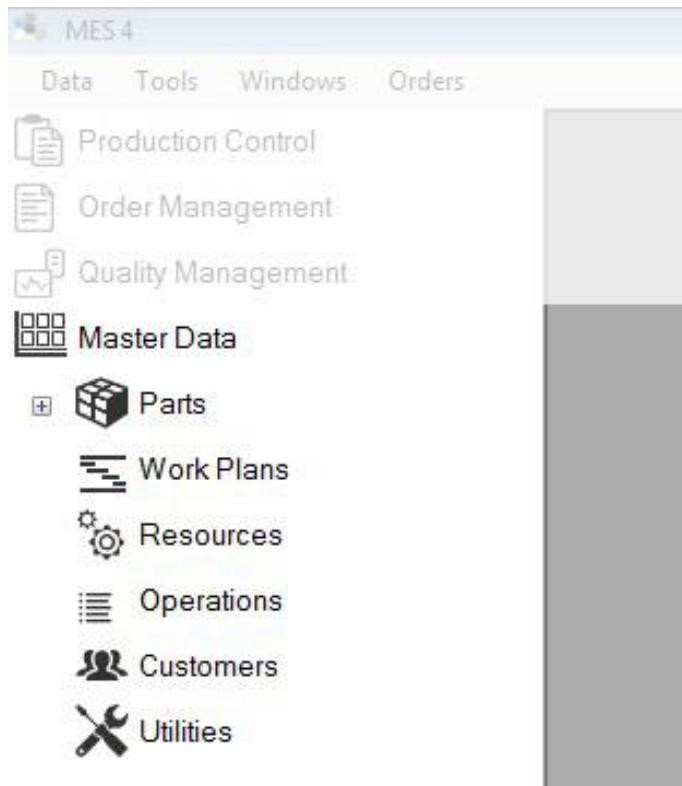
Add/Delete resources

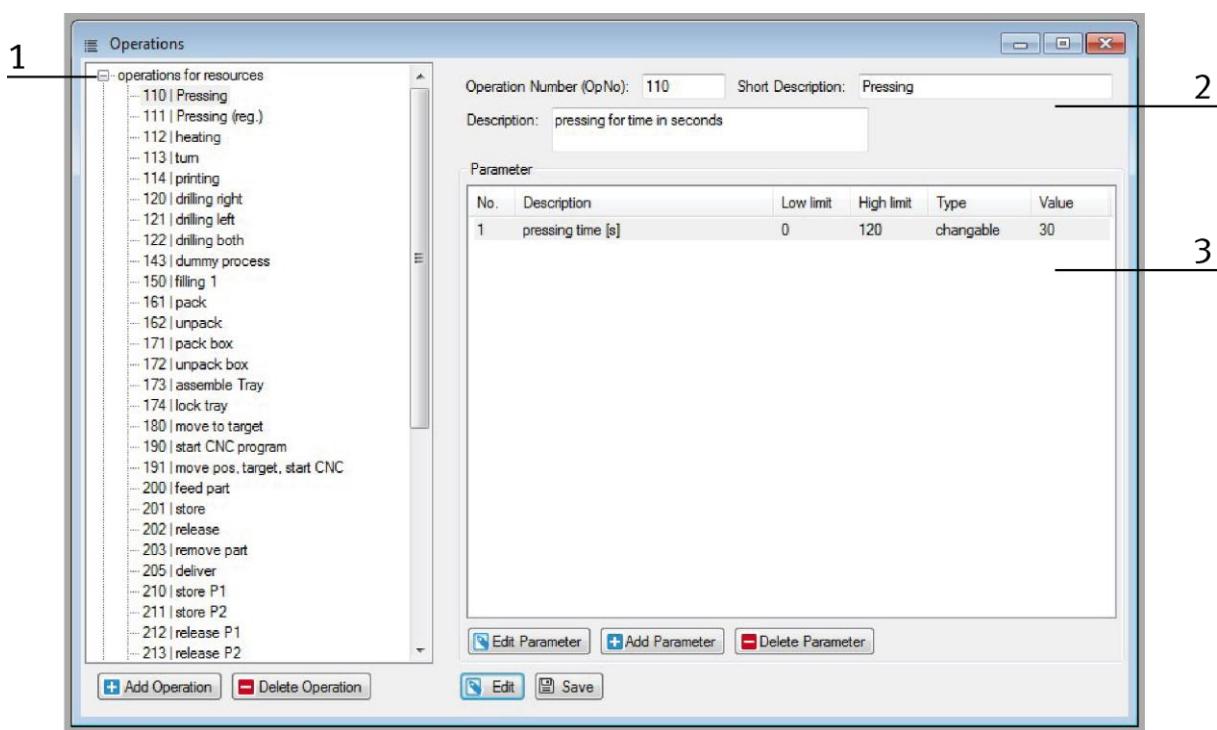
At the bottom-left corner we can find buttons to create a new, or delete the selected resource.



1.6.4 Operations window

You can open the Operations window from Master Data/Operations. In this window you can see and change, or create new operations.





Select operation

At the left side of the window, you can find the operation list (Pos1 in picture above). The operations are organized into two different groups.

- Operations for resources: You can assign these types of operations to a resource
- Internal operations: These operations are special operations and you cannot assign them to resources. These are the operations of the MES server.

Information of resource

If you open an operation, you can see the details of that operation on the right side. At the top you can see the main data of the operation (Pos2 in picture above)..

Operation Number (OpNo):	110	Short Description:	Pressing
Description: pressing for time in seconds			

- Operation Number (OpNo)
- Short Description
- Description

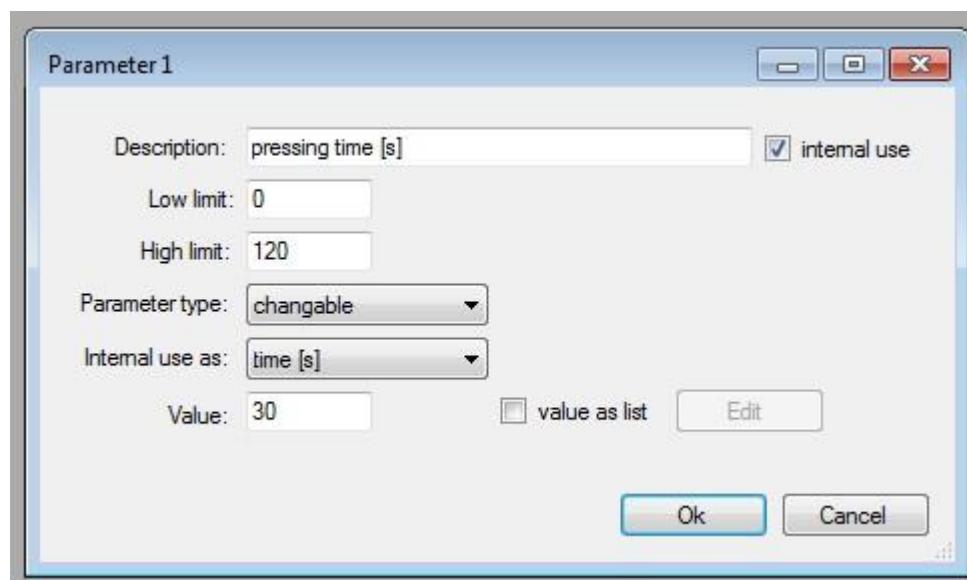
Bellow the main data, you can find the parameter list (Pos1 in picture side before). An operation can have more parameters.

Parameter					
No.	Description	Low limit	High limit	Type	Value
1	pressing time [s]	0	120	changable	30

- No.: Parameter number
- Description
- Low Limit: Minimum value of the parameter
- High Limit: Maximum value of the parameter
- Type: Constant, Changeable, on dispatch, on runtime (the resource will change it)

Editing parameter

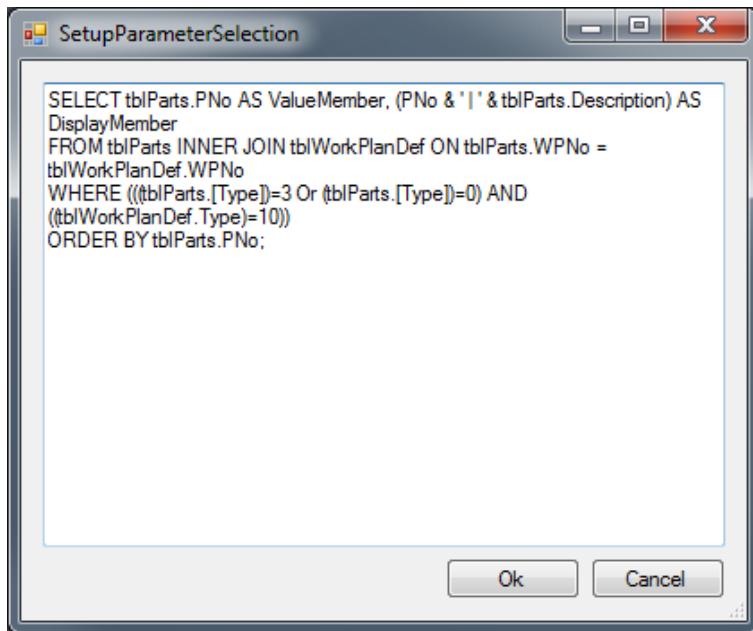
If you click on the edit button, you can edit the parameter. You can simply overwrite the main data. To change the parameters you should select the parameter and click on the edit parameter button.



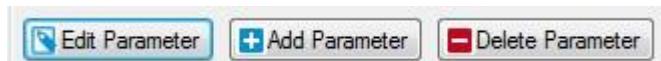
You can change the following data.

- Description
- Internal use – if this is checked, it is possible to edit the “internal use as” function
- Low limit: Minimum value of the parameter
- High limit: Maximum value of the parameter
- Parameter type: Constant, Changeable, on dispatch, on runtime (The resource will change it)
- Internal use as: nothing, Time (s), Part number
- Value: default value

If you click on the edit button a new window will be opened, where you can define a special SQL query to generate the drop-down list.



You can also delete the selected parameter or add a new parameter to the operation.



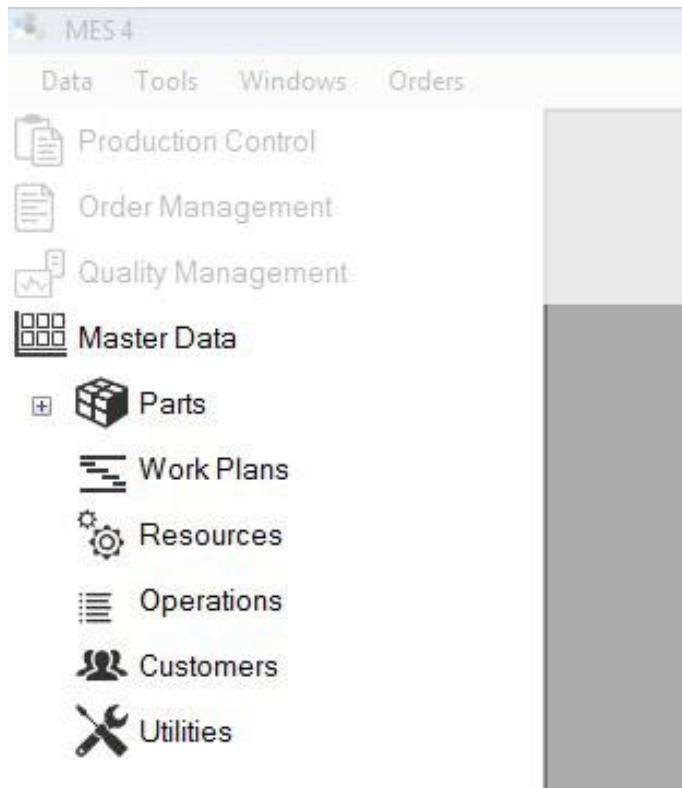
Add/Delete operations

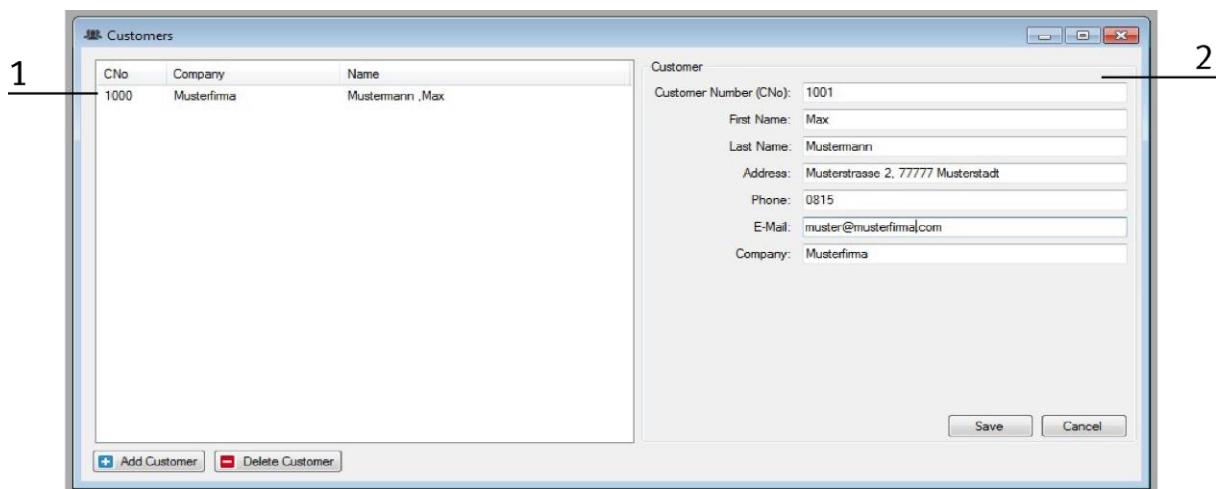
At the bottom-left corner we can find buttons to create a new, or delete the selected operation.



1.6.5 Customers window

You can open the Customers window from Master Data/Customers. In this window you can see and change, or create new customers.





Information of customers

On the left side of the window, you can find the list of the known customers (Pos1 in picture above). If you select one of the customers, you will see the details on the right side (Pos2 in picture above). The following information of the customers are stored.

- Customer Number (CNo)
- First Name
- Last Name
- Address
- Phone
- E-Mail
- Company

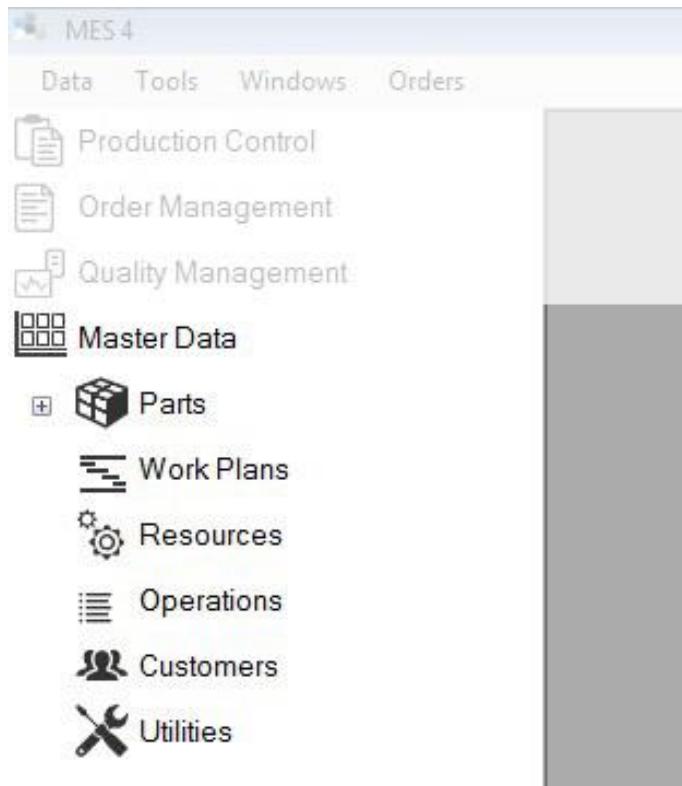
Editing customers

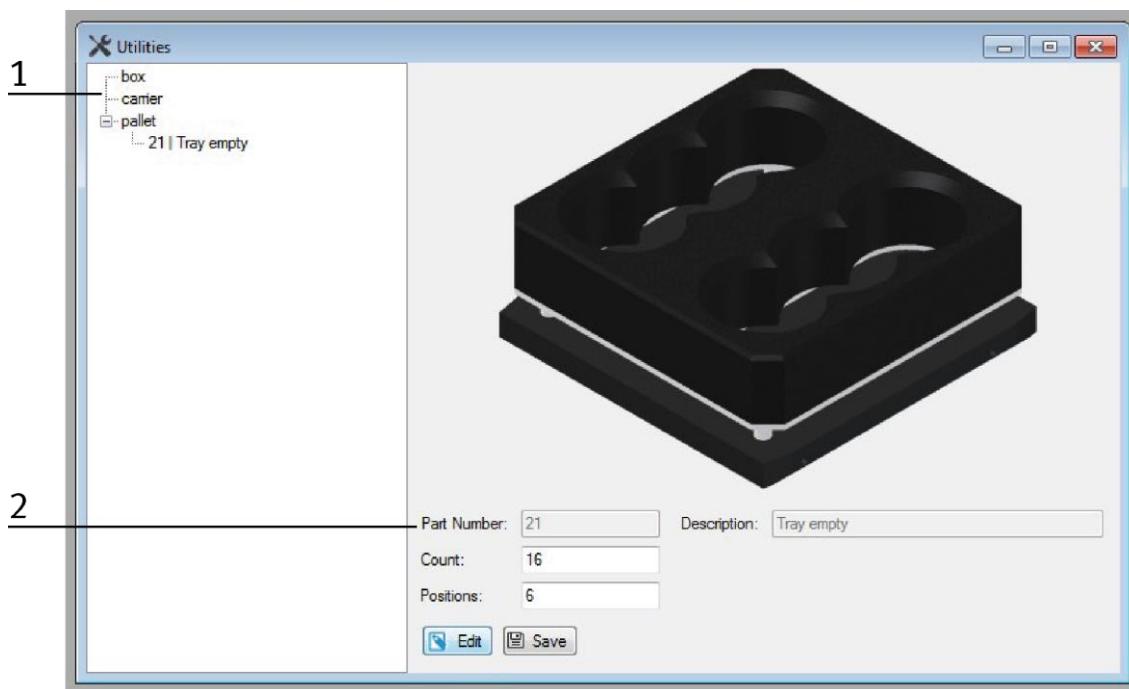
After you select a customer, you simply change the data on the right side. You do not have to save, because the changes are automatically stored. At the bottom-left corner you can find buttons to create a new, or delete the selected customer.



1.6.6 Utilities window

You can open the Utilities window from Master Data/Utilities. In this window you can see and change the existing utilities.





Selecting utilities

On the left side of the window (Pos1 in picture above) you can find the utilities list. The utilities are organized into three types.

- Box
- Pallet
- Carrier

If you click on a utility, you will see the details on the right side.

Information of utilities

The utilities have the following data (Pos2 in picture above).

- Part Number
- Count: Quantity of this type of utility
- Positions: The available positions of the utility
- Description

Editing the utility

If you want to edit the utility, select it on the left side, and then click on the edit button. After you finished the change, click on the save button.



Add remove utilities

The utilities are special parts (box, pallet, carrier). It means, when you want to create a new utility or remove an existing one, you should do it in the parts editing window.

1.7 Data menu

In the data menu you can change the user or close the MES software.



1.7.1 Change user

There are 4 different types of users. The different users have different privileges. To change the user, select the Change user form the Data menu. After that the login window will be opened, where you can select the user from a drop-down list and enter the password. On the left side of the window you can find a description about the privileges of the selected user.

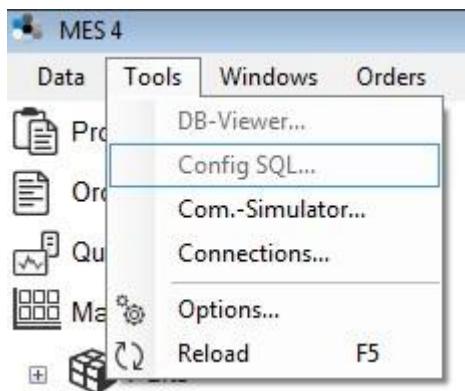


Users and privileges

User	Privileges	Default password
Guest	Can inspect the whole data, but cannot change anything. (no password)	
Operator	Can inspect the whole data and add orders.	Festo1
Special Operator	Additionally to the operator can change the master data.	Festo2
Administrator	Can change everything (It is a special user for FESTO, the password is not public)	

1.8 Tools menu

In the tools menu you can open some special tools for Administrator and change the settings of the MES software.



Declared as Administrator

- DB-Viewer – this option is only for new systems recommended. The actual data bank is chosen, this databank is announced and it is possible to edit the data bank.
- Config SQL – the request of data from the PLC are handled here, this data's are declared from MES to a SQL basis. The requested data is announced and it is possible to edit them.

Editing in this area is recommended in agreement with Festo.

Declared as special operator

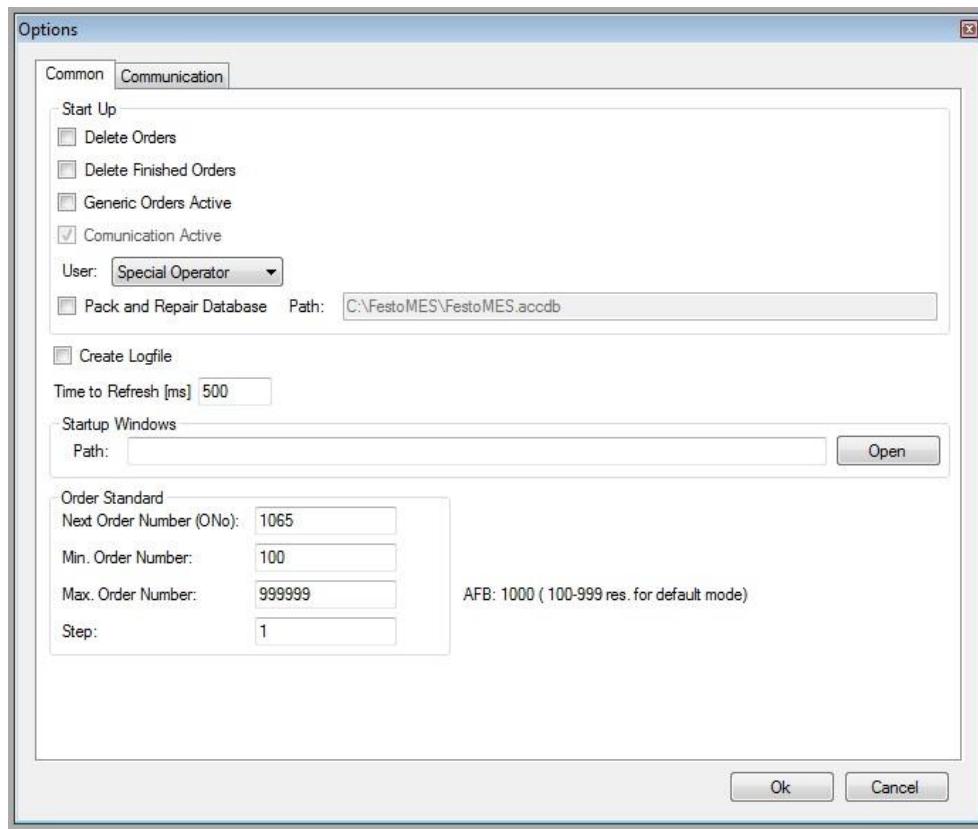
- Com.-Simulator – The communication between MES and PLC can simulated, here the SQL Data bank is requested. The request must be chosen, the green marked fields have to be filled and with the send button the requests are started. Now the values of the PLC are announced.
- Connections – is a tool to see the Ethernet connections in real time, it is for startup. On the left side the connected stations are announced and on the right side, the status of the station is announced.

1.8.1 Options

In the Option menu you can change the settings of the MES server. Change the communication ports and the start-up state.

Common tab

On the Common tab of Option window you can change the common settings of MES software.

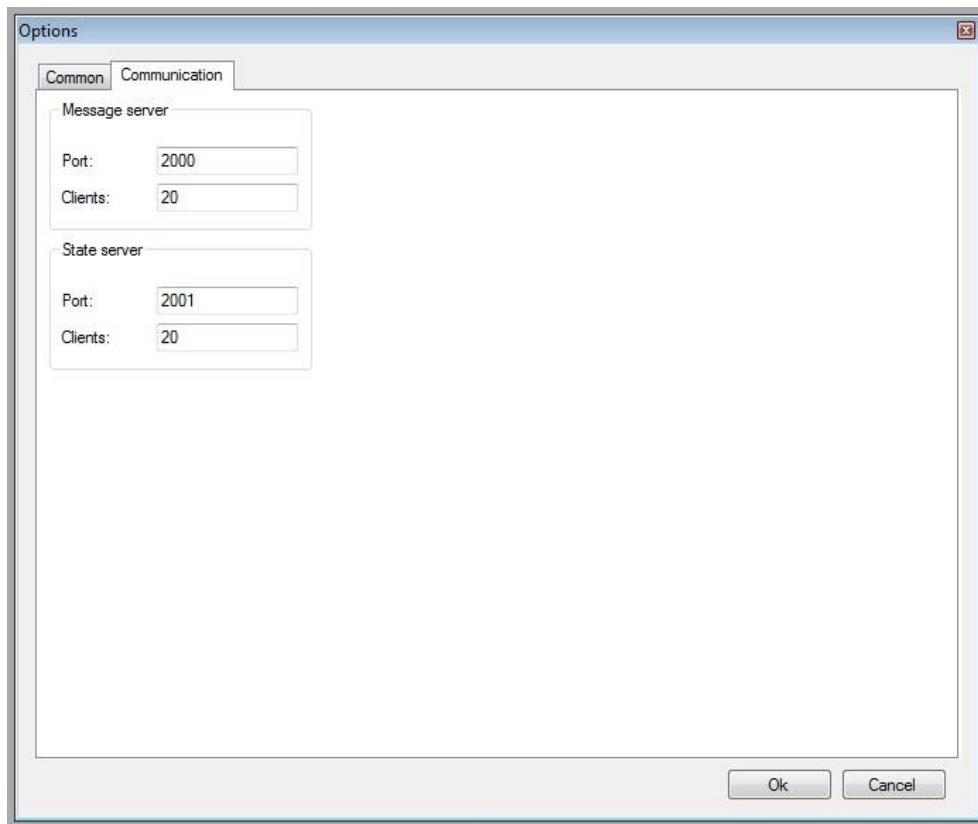


Description of different options:

- Delete Orders: Delete the planned and actual orders at start-up
- Delete finished Orders: Delete finished orders at start-up
- Generic orders active: switch on/off automatic orders during start up
- Communication active: Communication to PLC – not changeable at the moment
- User: Choose user for start up
- Create Logfile: Create log file
- Time to refresh [ms]: Refresh rate in ms
- Startup windows: if this option is checked, the database is optimized and compromised at each start up to get the system faster.
- Start windows: Default window configuration at start-up
- Next Order Number (ONo): Next order number when we create a new order
- Min. Order Number: Minimum value of order numbers (at AFB system it is 1000).
- Max. Order Number: Maximum value of order numbers
- Step: Increment of order numbers

Communication tab

On the communication tab you can change the communication parameters.



Description of different options:

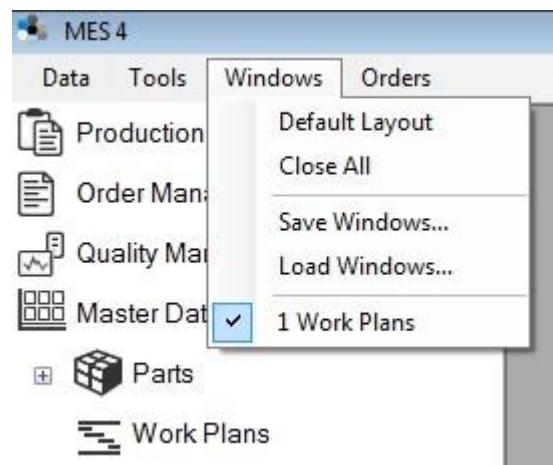
- Message server / Port: Port number for message server (default: 2000)
- Message server / Clients: The maximum client number for message server
- State server / Port: Port number for state server (default: 2001)
- State server / Clients: The maximum client number for state server

1.8.2 Reload

Refresh the state of all windows. Also possible with F5 button at keyboard.

1.9 Windows menu

In the windows menu you can change the window configuration.

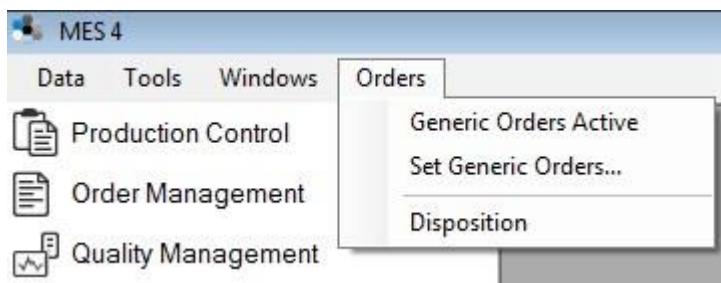


Description of different options:

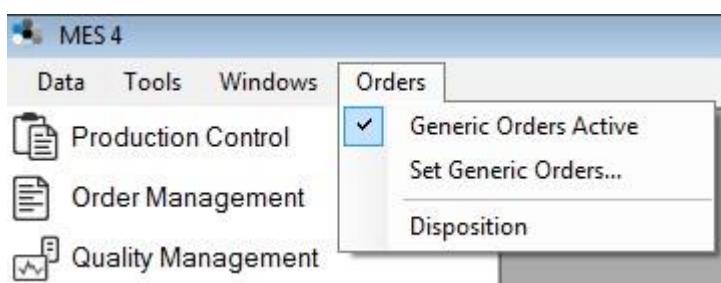
- Default Layout: clears the size and the positions of the windows to the main settings back. (The windows can be changed in height, width and the position. It's the same function then in windows, grab the window at an edge or the frame and pull it to the position you want.)
- Close All: Close all windows
- Save Windows: Save the actual window configuration into XML file.
- Load Windows: Load a window configuration from XML file.
- 1, 2, 3, ...: Change the active window

1.10 Orders Menu

In the order menu it is possible to insert generic orders.

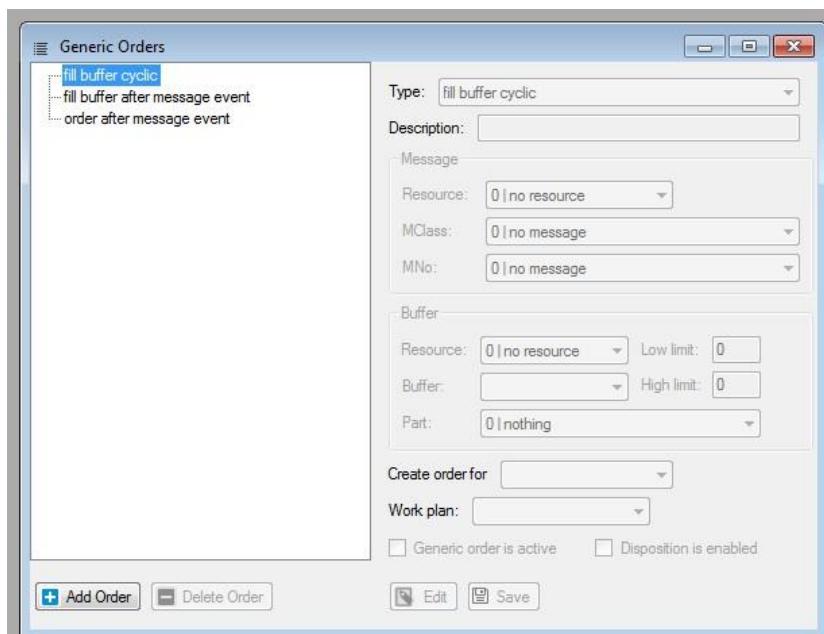


Generic orders active

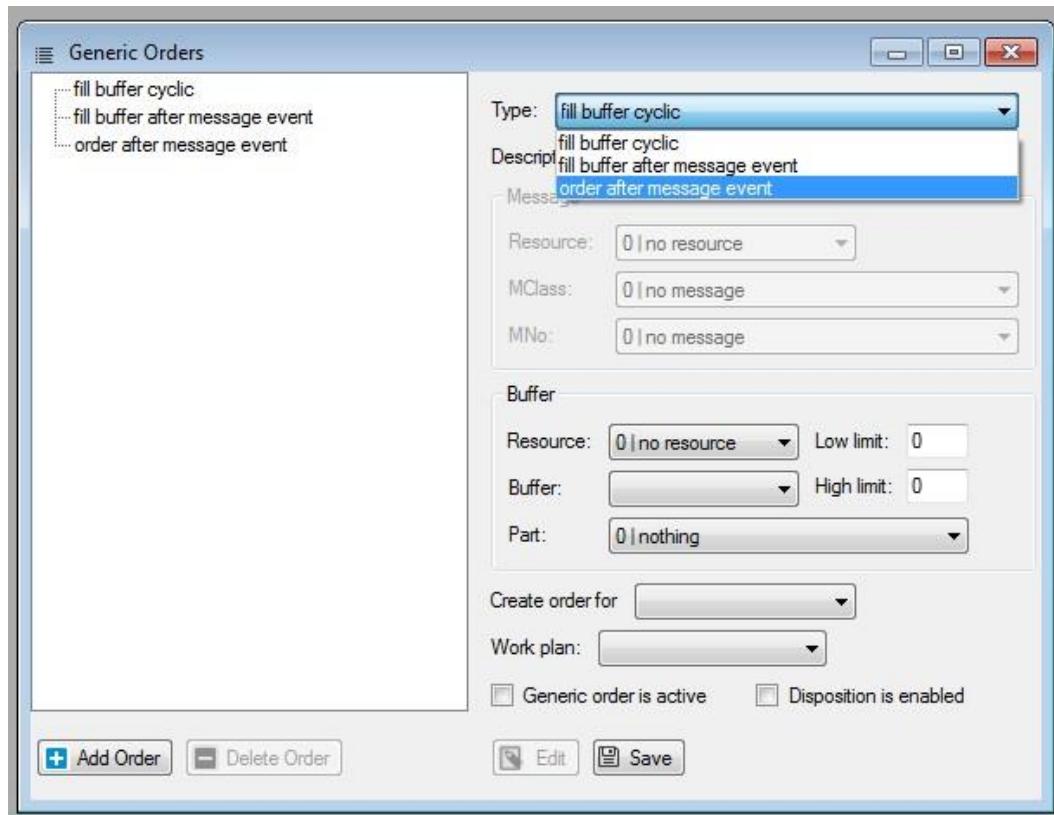


Here the generic orders can be activated, if the function is active, the hook is announced. In this function the Orders are requested every second and if there is a new generic order, this will be executed automatically.

Set generic orders



Here it is possible to edit, configure or generate orders. A multiple execution is also possible.



With the add order Button new orders can be generated, if an available order is chosen, it is possible to edit the order with the Edit Button.

Dispositions

Here the orders are checked for not available workpieces. If a workpiece for an order is missing, an order is generated to produce the missing workpiece.

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