User Manual

DELMIA Process Engineer®

RAPID - STM Configuration

DELMIA

Foreword

This manual provides an introduction to the Process Engineer Rapid operations and functions.

While developing these functions we have made every effort to create a clearly organized, easy-to-understand program structure.

A user-friendly interface as well as a clear menu guide will enable you to quickly learn how to operate the program and to get familiar with its functions so that you can carry out your planning tasks in a quick and reliable way.

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Table of Contents

1. Introduction

This manual explains how to use the Process Engineer Rapid functions and menu guidance’s for your planning purposes.

1.1 How to Use this Manual

This manual enables you to get familiar with the operation and functions of Rapid. This manual briefly describes:

- The menus provided by the Rapid STM
- How to execute the menu functions and how to navigate in views

Note

When handling the basic Rapid functions, please remember that there is a general introduction to the Process Engineer in the Basic Manual.

Click General Introduction to access the manual.

1.2 Documentation Conventions and Symbols

The symbols used in this manual are intended to provide you with keys to the contents in an immediately understandable manner.

This symbol is used to introduce key concepts that are covered in the sections immediately following this symbol. As a result, this symbol most frequently appears at the beginning of chapters or sections.

Note

This symbol is used to mark notes, which provide you with additional information you need to have for further work. You will either find the Note sign at the beginning of a chapter or in a particular text passage in the chapter. Texts bearing this sign are additionally marked with ***Note****. The text is always in italics.*

Caution

This symbol indicates that the text that follows describes particular circumstances that you must avoid to avoid potential errors with the operation of the program or harm to data. You will either find the Caution sign at the beginning of a chapter or near a particular text passage in the chapter. Texts that are introduced by this sign are additionally marked with ***Caution****. The text is always in italics.*

Example

This symbol marks examples which serve to illustrate a certain situation.

This symbol marks the individual operational steps involved in a particular operating instruction. Operating instructions describe operational steps, for example, how to open a menu or execute a function.

▪ This symbol marks listed subjects. The symbol for listed subjects can be either used to structure a continuous text or to list main subject keywords.

➢ This symbol marks list inside a bulleted or numbered list.

This symbol marks cross reference information that is available in another manual.

1.3 New Functions in Rapid

No new functionality has been added for this release.

2. Overview

2.1 General Information

The standard configuration for the process engineer is based on a structured revision and analysis of the current database concept. Projects are planned in the standard configuration on the basis of a plantype set; they are available in English and German. The user interface has been harmonized and ergonomically adapted, and the dialogs and context menus have been simplified.

The individual objects of the three project structures (products, processes, and resources) are marked in color with different icons:

- Products = blue

- Processes = red

- Resources = green

The language of all executed scripts is checked in the registration editor so that the selected language corresponds to the language displayed in the script dialog.

2.1.1 Creating Procedure or Process Analyses

The biggest change visible on the interface is the integration of the *DB-Ergotime* database into the *DB Database*. Some adjustments must be made when upgrading from DPE version 5.14 to DPE version 5.14. This applies only to an upgrade, however. You do not need to make any adjustments when installing RAPID in version 5.15 for the first time. The following scenarios are possible:

- Upgrade from DPE 5.14 or earlier to DPE 5.15. The adjustments that need to be made can be read about in the chapter Upgrade of Version 5.14 on Higher Versions
- New installation of version DPE 5.15.
  No adjustments.
- New installation of version DPE 5.15, but a *DB-Ergotime* database already exists. How to import the data from the *DB-Ergotime* database is described in the chapter Upgrade of Version 5.14 on Higher Versions and in the Administration Manual.

2.1.1.1 Importing and Exporting Allowance Sets

The import and export of allowance sets are immediately related to the time analyses. You can read about them in the chapter Importing and Exporting Allowance Sets.

2.1.2 Printing a Station Report

By using this script you can generate an overview of a workplace group or a workplace. You can read about them in the chapter Create Stations Report.

2.1.3 Objectives of the Standardization

One of the fundamental objectives of the standardization is to make planning methods in the Process Engineer easy to comprehend for every user.

Some objectives in brief and incisive terms include:

- Quick and flexible detail planning of products, processes, and resources in the manufacturing process based on a standard configuration.
- Optimized standard evaluations and reports for showing the results of the planning process.
- Standardization of the planning methods.
- Reduction of the planning costs and time.
- A clear and easily replicated procedure for planning methods.

2.1.4 Data Structures in the Plantype Set

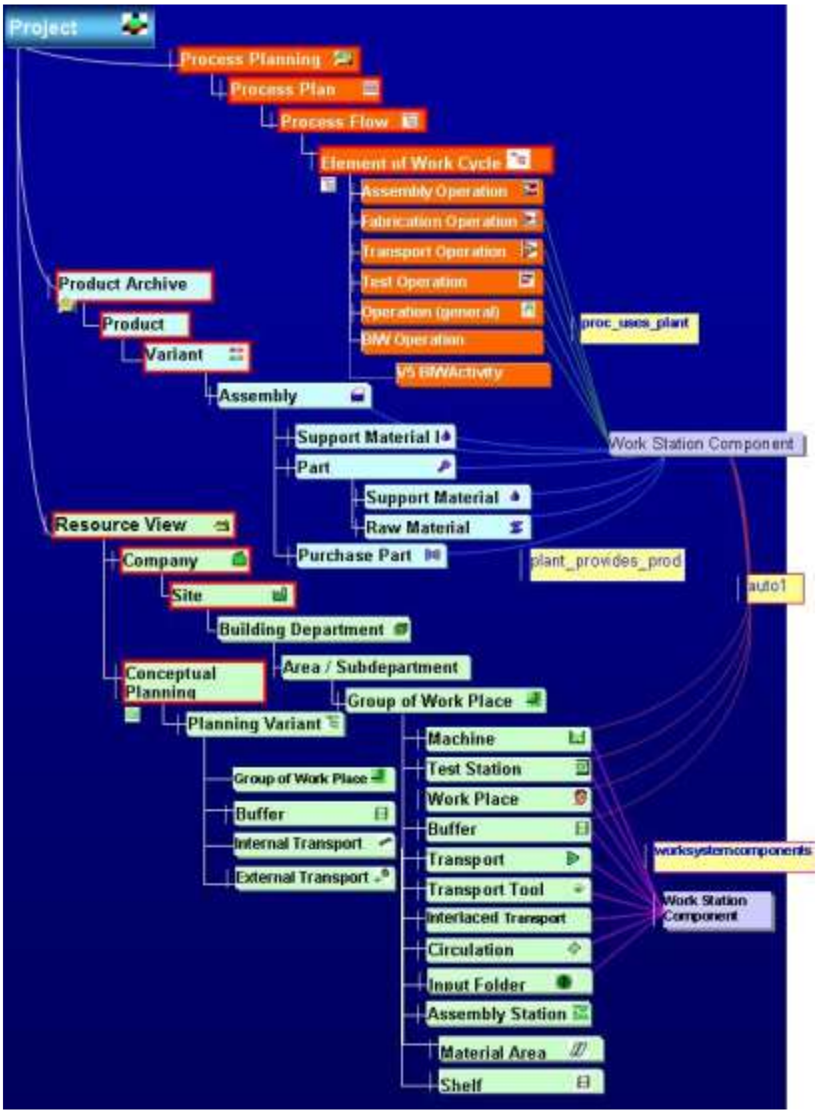


Figure 1: Structured Data Model – Standard Plantype Set

2.2 Structured Planning Methods

Figure 2: Planning Methods

Project Administration		
Create project	Edit user management	*Please refer to the* Administration Manual
Define premises	Project premises	*Please refer to the* Project Library Manual
	Variants and filters	*Please refer to the* Project Library Manual
Product Archive		
Create products and variants	Import and update product structures	*Please refer to the* page 21
	Assign parts bins to products and calculate refill cycle	*Please refer to the* page 33
	Calculation of material costs	*Please refer to the* page 47
	Print product structure	*Please refer to the* page 42
	Adaptation of the product structure	
	Print logistics data	*Please refer to the* page 41
Process Planning		
Create new process structures	Create process graph	*Please refer to the page* 50
	Import processes	*Please refer to the page* 57
	Edit processes	
	Edit time analyses	
	Assign fixtures	
	Process list evaluation	*Please refer to the page* 59
Edit current process structures	Edit process graph	
	Edit time analyses	
	Edit processes	
	Assign fixtures	
	Process list evaluation	*Please refer to the page* 59
Resource View		
Concept planning	Create plan variants	
	Create manufacturing concept	
	Use existing manufacturing concept	
	Block layout	*Please refer to the* page 74
	Create work load balancing	
	Automatic line balancing	

	Area cost factor and depreciations	*Please refer to the page 94*
Location planning / layout	New layout	
	Use current layout	
	Ergonomics	

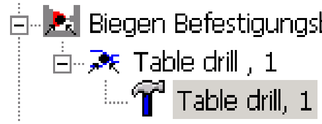
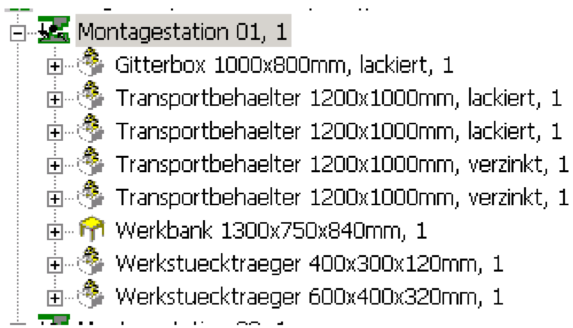
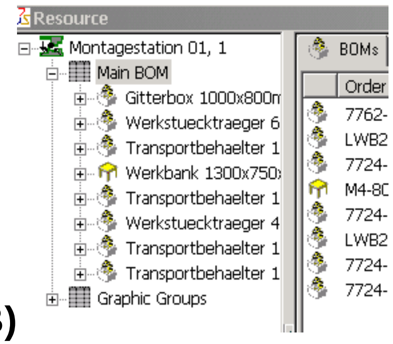
2.2.1 Using Relations

The most frequently used relations and their standard configurations are listed in the following table.

Figure 3: Overview of Relations

Please refer to the page 5.

	Description	Parent type / child type	Child list	Prompt
	from WSC (parts bin) (Resource)			
To Product	Link a WSC (here parts bin) to a product (part). Used for logistics analyses. When linking from the finder, resources which are linked to the corresponding system element are created. These resources are placed in the project library and then referenced to the product. The bin and product are displayed in the layout with autorelations. The relations used for this, "wsc_provides_prod_reverse" and "wsc_provides_prod", are used internally in order to create the relations between WSC resource and product.	**ergocompproductdefault**	**plant_provides_prod_reverse**	Product is provided by resource Product is provided by resource
		ergocompplantdefault	**plant_provides_prod**	Resource provides product Resource provides product.
		ergocompplantdefault	**worksystemcomponenents**	Bill of materials entries Bill of materials entries
		worksystemcomponenent		
	Example of the data model whenever a system element is linked to a product.	Heissleiter, 1 Einsatzkasten 130x180x80mm, leitfaehig LWB2261LF, 1 Einsatzkasten 130x180x80mm, leitfaehig, 1		
	from WSC (fixtures) (resource)			
To process	Link a WSC (here fixtures) to a process. Can be used for fixtures planning. When linking from the finder, resources which are linked to the corresponding system element are created. These resources are placed in the project library and then referenced to the process. Linked fixtures are displayed via autorelations in the layout graphic. The relations used for this, "proc_uses_wsc_reverse" and "proc_uses_wsc",	**ergocompprocessdefault**	**proc_uses_plant**	
		ergocompplantdefault	**proc_uses_plant_reverse**	
		ergocompplantdefault	**worksystemcomponenents**	Bill of materials entries

	Description	Parent type / child type	Child list	Prompt
	are used internally in order to create the relations between WC resource and product.	**worksystemcomponenent**		
	The adjacent graphic example should clarify what the data model looks like after the WSC function is used on the process.			
	From WSC			
To resource	Link a WSC to a resource such as stations, plants, buildings, etc. The basis is the type ergocomplantdefault and all of its heirs. The linked object can be ... in the layout editing or, as long as configured, in the PPR-Navigator	**ergocomplantdefault**	**worksystemcomponents**	Bill of materials entries Bill of materials entry
		worksystemcomponent		
	The adjacent example clarifies what the data model looks like after the WSC function is used on the resource. A) View in PPR Navigator and B) View in the resource client as a bill of materials entry	A)  B) 		

The relations (parent-child relations) can in principle be created in both directions. However in this case the sequence was adapted to the workflow that essentially corresponds to the planner's manner of planning.

	Description	Parent type / child type	Child list	Prompt
	From the product			
To process	The part is processed (contact) and processed for the first time in the process chain. This means that the bin must be provided here if the process is placed on a resource. This relation is necessary if the bin is to be displayed in the layout via the autorelations.	**ergocompproductdefault**	**proc_firstprocesses_prod_reverse**	Product is first processed by process Product is first processed by process
		ergocompprocessdefault	**proc_usescontainerfrom_prod**	Process first processes product First processes product
To process	OUTPUT which comes from process. Example: Several parts are combined in a sub-assembly (could also be an intermediate subassembly which would have to be created in the product view (as a so-called pseudo-subassembly). This subassembly "leaves" the process (actually the workplace). This can happen in a new bin which does not appear as an autorelation on the resource via this relation.	**ergocompproductdefault**	**proc_creates_prod_reverse**	Product is created by process Product is created by process
		ergocompprocessdefault	**proc_usescontainerfrom_prod**	Process creates product Process creates product
To process	Part is processed (without bin) - combined in subassembly	**ergocompproductdefault**	**proc_processes_prod_reverse**	Product is processed by process Product is processed by process
		ergocompprocessdefault		Process processes product Process processes product
To process	Disassembly of subassemblies / removal of parts. (informative only)	**ergocompproductdefault**	**proc_removes_prod_reverse**	Product is removed by process Product is removed by process
		ergocompprocessdefault	**proc_usescontainerfrom_prod**	Process removed product

	Description	Parent type / child type	Child list	Prompt
				Process removed product
To process	Automatic line balancing	ergocompproductdefault	proc_usescontainerfrom_prod_reverse	Process uses container from product reverse
		ergocompprocessdefault	proc_usescontainerfrom_prod	Process uses container from product
	From the process			
To process	Is only in the process graph (graph-wide)	ergocompprocessdefault	process_runsbefore_process	Runs before
				Runs before
		ergocompprocessdefault	process_runsbefore_process_reverse	Runs after
				Runs after
To process	Is in PPR Navigator and in the process graph (project-wide)	ergocompprocessdefault	process_mustprecede_process	Must precede
				Must precede
		ergocompprocessdefault	process_mustprecede_process_reverse	Must succeed
				Must succeed
To process		ergocompprocessdefault	process_isalternative_process	Is alternative
				Is alternative
		ergocompprocessdefault	process_isalternative_process_reverse	Is alternative (reverse)
				Is alternative (reverse)
To process		ergocompprocessdefault	proc_alike_proc	Process fed by another process
				Process fed by another process

	Description	Parent type / child type	Child list	Prompt
		ergocompprocessdefault	**proc_feedby_proc_reverse**	Process feeds another process Process feeds another process
To process		ergocompprocessdefault	**proc_alike**_proc	Process alike process Process alike process
		ergocompprocessdefault	**proc_alike_proc_reverse**	Process alike process (reverse) Process alike process (reverse)
	From the process			
To resource		ergocompprocessdefault	**proc_uses_plant**	Process uses resource Process uses resource
		ergocompplantdefault	**proc_uses_plant_reverse**	Resource is used by process Resource is used by process
To resource		ergocompprocessdefault	**proc_runningon_plant**	Process running on resource Process running on resource
		ergocompplantdefault	**proc_runningon_plant_reverse**	Resource runs process Resource runs process
To resource		ergocompprocessdefault	**process_attaches_resource**	Process attaches resource
		ergocompplantdefault	**process_attaches_resource_rev**	Process is attached by resource

	Description	Parent type / child type	Child list	Prompt
			erse	
To resource		ergocompprocessdefault	process_detaches_resource	Process detaches resource
		ergocompplantdefault	process_detaches_resource_reverse	Process is detached by resource
To resource	Is used in the manufacturing concept for linking the individual resources (machines).	ergocompplantdefault	plant_connectedwith_plant	Plant connected with plant
		ergocompplantdefault	plant_connectedwith_plant_reverse	Plant connected with plant reverse
To resource	Is used in the manufacturing concept for linking the individual resources (machines).	ergocompplantdefault	plant_connectedwith_plant_pw	Plant connected projectwide with plant
		ergocompplantdefault	plant_connectedwith_plant_pw_reverse	Plant connected projectwide with plant reverse

2.3 Product Structure

A product structure is split into several hierarchical levels. Before setting up a product structure, read the brief information on the menu items:

Product Archive

In the *Product Archive* you can set all the information that completely describes one or more products or makes.

- ➢ The Product Archive is an organizational node which you will always use for the structuring of the product structure in the project.

Make / Product

Make / Product is the general node for an individual product. Under this node you can create the variants, groups, and parts from which the product is to be manufactured.

- ➢ The make is an organizational node you can use for displaying several variants, for example for a series of a certain type for which the various variants are to be planned.

Variants

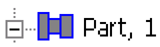
With the help of the variants you can define the technical data for a product, such as name, item number, and location premises. You can map the product structure for a variant under aspects, construction, and manufacturing bills of materials. You can display an unlimited number of variants for a make. Under the menu item **Connector List** you can also set the materials required for weld joints.

- ➢ The variant is a technical node under which all subassemblies, parts, and raw materials are defined and from which the product (variant) is manufactured. All technical data for a product are defined under this node. Variants can also be viewed with a filter, depending on their effectivities; see the Project Library Manual.

Group

You can define the technical data for a product subassembly with the help of a group. You can display an unlimited number of groups for a variant.

- ➢ The group is a technical node under which an unlimited number of groups can be defined. A group consists of any number of parts, purchased items, and support materials.



Part

You can define the technical data for a self-created part with the help of a part. You can display an unlimited number of parts for a group. A part is an object, which, from the perspective of the user, does not require any further division.

- ➢ The part is a technical node under which you can set raw materials and support materials for the part to be manufactured.

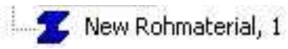
Purchased Item

Use a purchased item to define the technical data of a part manufactured by another vendor, for example set the name, manufacturer, and item numbers. You can display an unlimited number of purchased items for a group.

- ➢ A purchased item can correspond to a subassembly or a part.

Support Material

Use support materials to define the support materials used for the manufacture of the products. They are either excluded or only partially included in the product (e.g. solder, welding wire...). You can have an unlimited number of support materials displayed for a group or a part.



Raw Material

You can define the raw material used for the manufacture of a part with the help of raw materials. Raw material is a conditioned base material, formed or not formed, which is used for further processing. You can display an unlimited number of raw materials for a part.

2.4 Process Structure

A process structure is split into several hierarchical levels. Before setting up a process structure, read the brief information on the menu items:

Process Planning

With the help of the *Process Planning* you can fully describe the process structure for all products that are planned in the project. Under *Process Planning* you can set all processes and nodes used for the manufacture of one product or several products.

➢ Process Planning is an organizational node which you will always use for the structuring of the process structure in the project.

Process Flow Planning

Process flow planning is the general node for displaying the process structure, structured hierarchically for **one** product.

➢ *Process flow planning* is an organizational node. Use this node to structure the process structure of a product. You can create an unlimited number of nodes of the type *Process flow planning* under the node *Process planning*.

➢ In this node (process planning) you can create technical nodes (process flows), in which the process flows (e.g. process graph) are depicted for the manufacture of the product as assembly processes or mechanical working processes.

Process Flow

You can use *Process flow* to arrange the individual technical planning stages (e.g. assembly, mechanical processing) of the process structure of a product. The node Process flow is the father node of all technical processes which are actually executed. The process flow can in principle be thought of as a working plan with operations (processes). You can define an unlimited number of processes under the node Process flow.

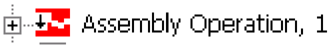
➢ The process flow is a technical node. All technical processes of a product are defined under this node.

Operation

You can use an operation to define the technical data of a general process operation. You can define an unlimited number of operations under the node Process flow.

➢ An operation is a stage of a work flow in which a unit of a work order is executed. The operation of an order is repeated *m* times. This also applies to subsequent types of operations.

- Use this type of process if you want to plan an unlimited number of general process operations in the process structure; for example, if you want to plan processes for various operations in the process graph.
- The operation process type can be used for assembly, manufacturing, or non-value adding operations.
- The operation is a technical object.



Assembly Operation

You can use an assembly operation to define the technical data of an assembly operation. You can define an unlimited number of assembly operations under the node Process flow.

- This type of process is used if you want to plan an unlimited number of assembly operations in the process structure, such as for pre-assembly or final assembly processes.
- As a rule you would link these processes to assembly processes or resources for assembly operations; for example in the process graph, if you wanted to link a previous and subsequent process to a relation.

⇨ The assembly operation is a technical object.

Manufacturing Operation

You can use a manufacturing operation to define the technical data of a working process. You can define an unlimited number of manufacturing operations under the node Process flow.

- Use this type of process if you want to plan an unlimited number of working processes in the process structure, such as milling, turning, or galvanizing.
- As a rule you would link these processes to manufacturing processes or resources for working operations; for example in the process graph, if you link a previous and subsequent process to a relation or to raw materials in the product structure.
- The manufacturing operation is a technical object.

Test and Measuring Operation

You can use a test and measuring operation to define the technical data of a test and measuring process. You can define an unlimited number of test and measuring operations under the node Process flow

- Use this type of process if you want to plan an unlimited number of test and measuring operations in the process structure. This type of process belongs to the category of non-value adding processes, and it can, for example, be linked to all products in the product structure.
- The test & measuring operation is a technical object

Transport Operation

You can use a transport operation to define the technical data of a transport process. You can define an unlimited number of transport operations under the node Process flow.

- Use this type of process if you want to plan an unlimited number of transport operations in the process structure; for example, if you plan transports in the process graph in a process line or if transports occur between parallel process lines.

- The transport time is considered in the throughput time calculation and in the simulation of material flows.
- The transport operation is a technical object.

Shell Operation

You can use a shell operation to define the technical data of a shell process. You can define an unlimited number of shell operations under the node Process flow.

- Use this type of process if you want to plan an unlimited number of shell operations in the process structure; for example, if you want to plan processes types for positioning methods in the process graph.
- The shell operation is a technical node. You can plan further operations using this process type, such as BIW operations that you use for the V5 integration.

2.5 Resource Structure

A resource structure is split into several hierarchical levels. Before setting up a resource structure, read the brief information on the menu items:

Resource View

With the help of the *Resource view* you can fully describe the resource structure of all products that are planned in the project. All processes and nodes used for the manufacture of a product or several products are set under *Resource View*.

- *Resource View* is an organizational node that is always used for structuring the resource structure in a project.

Concept Planning

Concept Planning is the general node for presenting the resource structure of **one** product in a hierarchical structure regardless of the location.

In principle, Concept Planning serves to generate plan variants independent of location planning for purposes of making decisions.

- *Concept Planning* is an organizational node. With the help of this node you can structure the concept of the resource structure for a product, regardless the respective area, e.g. plant, building, or department. You can create an unlimited number of nodes of the type *Concept planning* under the node *Resource view.*
- You can also create the technical nodes for variants possible for the product under this node (Concept Planning).

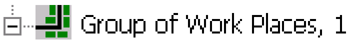
Plan Variants

Plan variants are used to define individual variants of a product or a specific series. You can create an unlimited number of *variants* under the node *Concept Planning.*

- Plan variants are technical node under which resources such as workplace groups, buffers, or transports can be created.

- These resources are initially not assigned to any certain organizational unit in this structure. You can make this assignment under the node *Company*, which mirrors the organizational company structure with assigned technical resources.

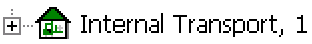
Workplace Group



Workplace group is used for one connected workplace, for example for an assembly line or workplace group. You can create an unlimited number of workplace groups under the node *Plan variants*.

- The *workplace group* is a technical node that you can use not only for planning a manufacturing concept but also for the balancing process of assembly processes.
- The *workplace group* is the area in which the planners execute their plans for the individual stations and workplaces.

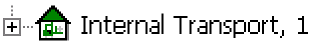
Intra-Plant Transport



The intra-plant transport is used to define the transports between, for example, workplace groups or assembly lines located within an organizational unit. You can create an unlimited number of intra-plant transports under the node *Plan variants*.

- Intra-plant transport is a technical object.

Transport between Companies



Transport between plants is used to define transports between, for example, workplace groups or assembly lines located in different organizational units (**plant 1 to plant 2**). You can create an unlimited number of transports between plants under the node *Plan variants*.

- Transport between plants is a technical object.

Company

The node *Company* is used to define the organizational units of a company structure for a project to which you assign technical resources. You can create an unlimited number of nodes of the type *Company* under the node *Resource view*.

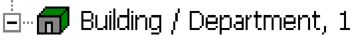
- The node *Company* is an organizational node. Use this node to structure the organizational structure of a company, such as plant, building, or production area. The technical resources on which processes for manufacturing products are run are planned for a production area.

Plant

The node *Plant* is used to define the organizational area in a company that manufactures the planned product. An organizational area is, for example, a plant or another business area in the company. You can create an unlimited number of *Plant*-type nodes under the node *Company*.

- The node *Plant* is an organizational node. This node is used to define the local organizational area for manufacturing the product. The plant can also be viewed as a location.

Building/Department



The node *Building/department* is used to define the local areas for operations, such as building units for technical and commercial areas (departments). You can create an unlimited number of nodes of type Building / Department under the node *Plant*.

➢ The node Building/department is a technical node. This node is used, for example, to show layouts of the production areas of one building.

Building/Department Area

The node *Building/department area* is used to define the local areas for a department, such as room units for technical and commercial areas departments. You can create an unlimited number of nodes of type *Building/department area* under the node *Building/department*.

➢ The node Building/department area is a technical node. This node is used, for example, to show layouts of the production areas for departments.

Assembly Station

The *Assembly station* is used for defining the technical resources for assembly processes. You can create an unlimited number of assembly stations under the node *workplace groups*.

➢ The assembly process is a technical object under which an unlimited number of assembly stations can be created, for example for when you want to combine several assembly stations in a group or in an assembly line.

➢ The *Assembly station* is used for manual workplaces.

Processing Station (BAZ)

The *processing station* is used to define the technical resources for machines, for example for automatic processing centers, CNC machines, or assembly robots. You can create an unlimited number of processing stations under the node *workplace groups*.

➢ The *processing station* is a technical object for which you can set technical data, for example for investment costs, order and delivery date, and shift models.

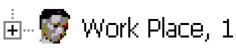
Test and Measuring Station

You can use a test *and* measuring station to define the technical data of a test and measuring process. You can define an unlimited number of test and measuring stations under the node *Workplace group.*

➢ Use this type of resource if you want to plan an unlimited number of test and measuring stations in the resource structure. This type of resource belongs in the category of non-value-adding resources.

➢ The test and measuring operation is a technical object.

Work Position



Work position is used to define employees for work positions to be carried out either manually or mechanically. You can create an unlimited number of work positions under the node *workplace groups*.

➢ The work position is a technical object. A work position generally requires several employees defined, for example, via shift models or the balancing process of an assembly line.

Buffer

A buffer is used to define the buffers for the workplace groups that are necessary for the optimal throughput of a product. You can create an unlimited number of buffers under the node *workplace groups*.

- A buffer is a technical object. Shelves, box pallets, and pallets can be used as buffers.
- Buffers are used for the planning of the product throughput, for example in the balancing process of an assembly line for the material provision.

Transport

The transport is used to define the transport within a workplace group or to another workplace group. You can create an unlimited number of transports under the node *workplace groups*.

- The transport is a technical object. A transport is a process that describes the transport between resources. In order for a transport to be able to be carried out physically, a means of transport is always assigned to this defined transport.

Means of Transport

The means of transport is used to define the manner in which a transport is carried out. You can create an unlimited number of means of transport under the node *workplace groups*.

- The means of transport is a technical object. A means of transport is always connected to a defined transport.
- Means of transport include stacker trucks and forklift trucks.

Interlaced Transport

The interlaced transport is used to define transports which take place in closed systems, for example a band-conveyor that connects several constantly connected assembly units. You can create an unlimited number of interlaced transports under the node *workplace groups.*

- The interlaced transport is a technical object that you can use for manual and automatic means of transport. In automatic transport systems the interlaced transport should be linked to the technical object circulation in order to provide these data for the simulation in *QUEST*.

Circulation

Circulation is used to mark the logistical sequences of an assembly line of which the individual stations are constantly connected with each other. You can create an unlimited number of technical objects of type circulation under the node *workplace groups*

- Circulation is a technical object. All interlaced transports linked to a circulation inherit the parameters set in the properties dialog of a circulation.
- The parameters for the simulation in *QUEST* are provided via the resource circulation.

Input Folder

In the extended Work Load Balancing this resource can be seen as a type of clipboard in which non-balanced processes are filed without being components of the work load balancing. This object is not used as an object for the resource planning, layout, or other applications.

In order to be able to use this function, the work load balancing must be configured accordingly. (*Please refer to the* Administration Manual)

Material Area

The plantype *Material Area* is used only in the ALB. The plantype displays the provisioning surface in the graphic; the surface is used as a symbol in the ALB. When being used in the ALB, corresponding workload balancing configurations are necessary, e.g. a graphic macro. (*Please refer to the* Administration Manual)

Shelf

The resource type shelf is used in the ALB, see Configuration of the work load balancing. (*Please refer to the* Administration Manual)

3. Using Scripts

Planning functions in the Process Engineer are explained in the following descriptions of scripts.

One way of displaying the structures product, resources, and process in the Process Engineer is to create them manually. Product and process structures can be imported with the introduction of standardization.

3.1 Importing and Updating Product Structures

3.1.1 Importing Product Structures

The first step in planning is to read in the product data.

You can import new product data and align current data (product update) using this script. Prepare product data that you import in an Excel table separated with separators, and save it as the file type ...csv.

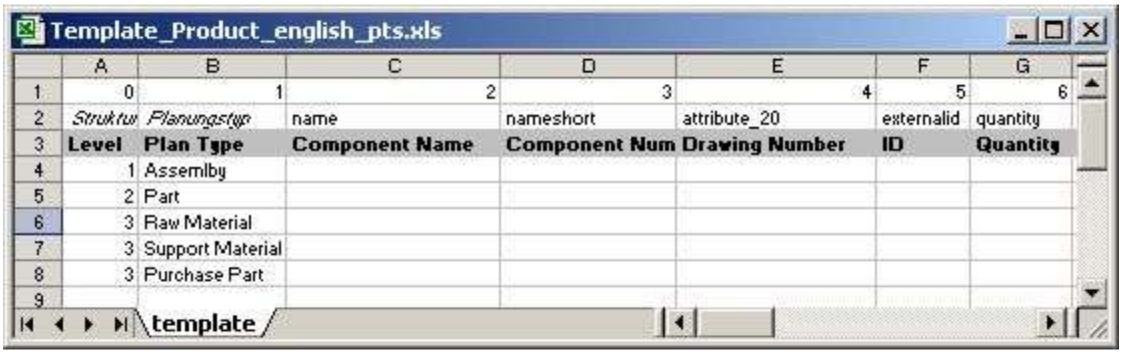
The product import should be prepared and executed by an administrator. The administrator has access to two Excel templates (German, English). The product import is executed only if the product data to be imported were created on the basis of these templates.

3.1.1.1 Templates

The templates can be found in the directory:

Note

Always save the template as ...csv if you create an import file.



Template_Product_english_pts.xls

	A	B	C	D	E	F	G
1	0	1	2	3	4	5	6
2	*Struktur*	*Planungstyp*	name	nameshort	attribute_20	externalid	quantity
3	**Level**	**Plan Type**	**Component Name**	**Component Num**	**Drawing Number**	**ID**	**Quantity**
4	1	Assemlby					
5	2	Part					
6	3	Raw Material					
7	3	Support Material					
8	3	Purchase Part					
9							

template

Figure 4: Excel Template for ...csv Tables

3.1.2 Objects of the Product Structure Marked with Status

The color-coded marking of the product icons indicates the respective status of the individual objects in the product structure after an import or update.

The two plantypes **Support material** and **raw material** are not marked in color on updating or an initial import, even if, for example, changes were made to one of the two plantypes before the import was carried out.

The possible states of the objects of the product structure are listed with the respective color-coded mark in the table:

Figure 5: Status for Product Icons after Import

Icons	Status	Meaning
	No change	The respective object is marked by the respective standard icon.
	Product update – objects changed, no structure change	The respective object is marked in yel-low.
	New object imported	The respective object is marked in red.
	Object moved after the import	The respective object is marked in green.
	Object moved and changed after the import	The respective object is marked in grey.
	Object deleted after the import	The respective object is marked in black.

3.1.3 Importing Products

Note

You can execute the script only on the plantype Group.

A product structure which is to be imported is prepared in an Excel table. A product structure is organized hierarchically. For structuring the import file you can use only the plantypes specified in the plantype set.

- You can use the plantypes group, part, purchased item, support material, and raw materials for the import.
- With the help of the plantypes, for example groups or parts, you can set the hierarchical product structure in the import file.

3.1.3.1 Display of the Product Structure via Plantypes

The hierarchical structuring, and thus the use of the plantypes for the import file, is specified in the plantype set.

- **Plantype group:** With the help of a group you can display product subassemblies to which groups, parts, purchased items, and support materials can be hierarchically assigned.
- **Plantype part:** With the help of part you can display individual parts (internal or external manufacture) to which raw materials or consumables can be assigned.

Plantypes for structuring of the product structure.

When importing products, a first import (create new product structure) is differentiated from an update (update current product structure).

For the product update, *Please refer to the* Execute Product Update.

In this chapter you will learn the procedure for importing and aligning product structures with several examples:

- First import of a product structure
- Aligning product structures

3.1.3.2 Structuring Import Files (Creating Import Files)

There are 35 columns available in the template. Whenever you create an import file, at least three columns must be filled out for the structuring of the product data:

Level
A level is used to set the hierarchical level of the plantype. When setting the hierarchical level pay special attention to ensure that this and the plantype correspond with the hierarchy in the plantype set: for example, you cannot create any further group hierarchical levels for a part, only raw materials and support materials. *Please refer to the* Display of the Product Structure via Plantypes.

Plantype
The plantype is used to set the type of the product – e.g. group, part, purchased item. The selected plantype must correspond to the type in the plantype set, and it must be created with the same name in the import file.

Type and hierarchical level are set in the plantype set: If, for example, you import parts or subassemblies, enter plantype group and part in the import file / column.

An incorrect name leads to errors when importing – in this case these products are not imported.

ID
The identification number (ID) is used to identify the product. This number must always be unambiguous and may be assigned only once. The ID must be imported before the first product import.

- If these three columns are filled out correctly, the product import can theoretically take place.
- The number of columns must not be changed. However they do not all have to be filled out.
- The remaining columns serve to describe the object. (Therefore it makes sense to assign a name, etc.). The graphic position is entered in the last 12 columns.
- Whenever importing SA code rules, a token list and the corresponding SA codes must already be available in the system.

3.1.3.3 Example - Scheme for the Product Structure for an Import File

Example

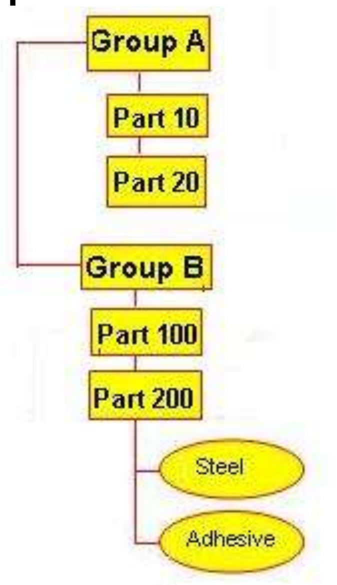
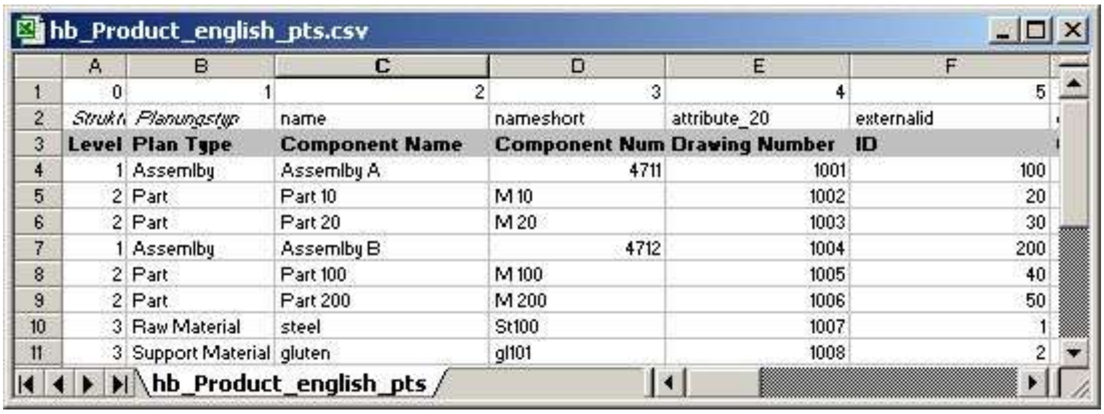


Figure 6: Example Scheme for an Import File

Example

The product structure shown in the scheme is depicted in the table as follows:

- Group with level (hierarchical level) **1**
- Part with level (hierarchical level) **2**
- Raw materials and support material with level (hierarchical level) **3**


hb_Product_english_pts.csv

	A	B	C	D	E	F
1	0	1	2	3	4	5
2	*Strukt*	*Planungstyp*	name	nameshort	attribute_20	externalid
3	**Level**	**Plan Type**	**Component Name**	**Component Num**	**Drawing Number**	**ID**
4	1	Assemlby	Assemlby A	4711	1001	100
5	2	Part	Part 10	M 10	1002	20
6	2	Part	Part 20	M 20	1003	30
7	1	Assemlby	Assemlby B	4712	1004	200
8	2	Part	Part 100	M 100	1005	40
9	2	Part	Part 200	M 200	1006	50
10	3	Raw Material	steel	St100	1007	1
11	3	Support Material	gluten	gl101	1008	2

hb_Product_english_pts

Figure 7: Table for Import File

Note

An import file can contain an unlimited number of products. You should always keep one thing in mind -- the hierarchical structuring and use of the plantypes must correspond to the plantype set.s

This structuring would be conceivable as well!

An import file could, for example, also have the following hierarchical structure:

Groups **A and B,** part **10, 20, 100, 200** and the support material **adhesive** in the example could all be marked with **Level 1** (hierarchical level one) since it is assigned to the plantype group and is thus on the same hierarchical level.

You could, for example, create a group for another group since the plantype group is set recursively in the plantype set, i.e. it can be created on itself an unlimited number of times.

Caution

The separators in a csv file may vary depending on the language settings used. For example, in a German csv file, the separator is a semicolon ";", whereas in English it is a comma ",".

3.1.3.4 Starting Product Import – First Import

Example

Example one: first import.

You must create the product structure up to the plantype group in the PPR-Navigator. The example shows it as **New Assembly**, to which the product structure shown in the import file is to be assigned.

1) Open the context menu in the plantype group (example assembly group) and select the entry **Applications**.

2) Select **Import Update from File**.

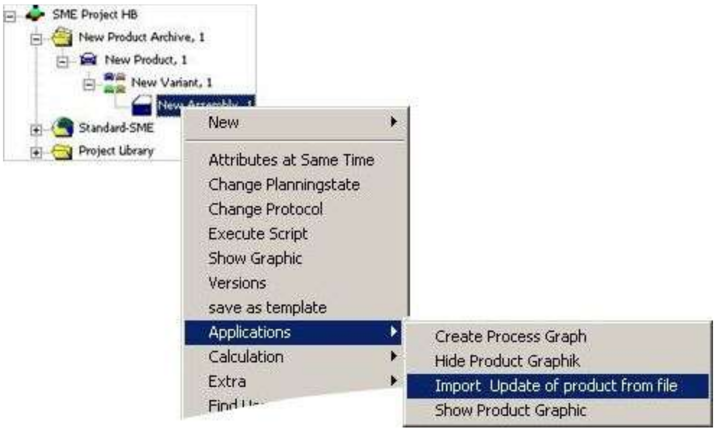


Figure 8: Starting a Script from the Context Menu

➢ A dialog for selecting the import file appears. The import file is searched for the directory *\DELMIA\PPRClient\data\Import\Product* in the standard configuration.

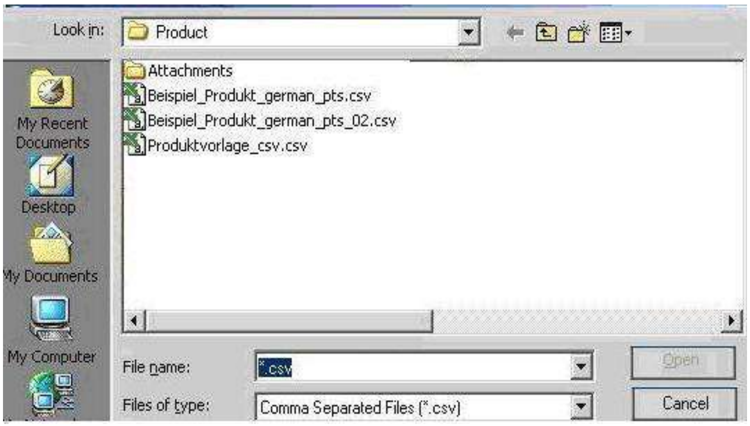


Figure 9: Selection Dialog

3) Select the import file and click **Open**.

➢ A dialog for setting the separators of your import file opens. This option is important since the separators in a csv file could vary, depending on the language settings used. Before importing a file and especially before starting an update, you should double-check the separator of the import file.

Figure 10: Select Separator

What is important to note with regard to the separator?

The import mechanism recognizes the individual columns of the import file via the separator. If the separator also appears in the values of the individual columns, this could lead to an incorrect interpretation of the number of columns. In order to prevent this, avoid using the same separators for the values for the import file.

If the imported data differ from the data of the import file, check your import file for any possible separators.

4) Set the separator and click **OK**.

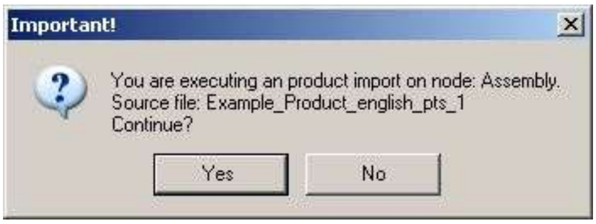


Figure 11: Message for First Import

5) If you choose **No** for the following messages, the product import is not carried out -- it is terminated.

6) Confirm the message with **Yes** if you want to continue with the import.

Figure 12: Message Read Log File

Caution

Always update the view in the PPR-Navigator after terminating a product import or update – press the F5 key or select the context menu item Reload – on the node where the product import was executed.

Figure 13: VB Script

If you do not update the view, the product structure will be visible even though in actuality no import was executed. This misleading situation is due to the synchronization of script and Process Engineer.

This product structure is no longer shown once the Process Engineer has been updated or closed.

➢ The products that are to be imported are shown with update information in the log file. You can set the location for saving before the log file is saved.

Figure 14: Set the Location for Saving the Log File

In the standard configuration the log files are saved under the path **\\DELMIA \ PPRClient \ data \ Import \ Product \ Attachments** with the names of the import file and the import date.

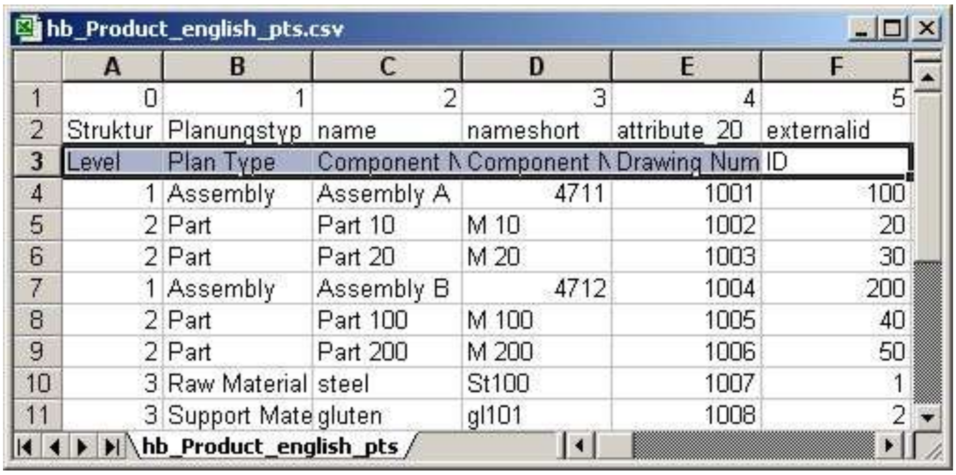
7) Click **No** if you want to select another location for saving.

➢ Set the location for saving in the dialog that opens.

Figure 15: Select the Directory for the Saving Location of the Log File

The products that are to be imported are shown with update information in the log file (table).

- Since the example shows a first import, the update information is identical for all products: Column B New. *Please refer to the* also Figure 5.



	A	B	C	D	E	F
1	0	1	2	3	4	5
2	Struktur	Planungstyp	name	nameshort	attribute_20	externalid
3	Level	Plan Type	Component N	Component N	Drawing Num	ID
4	1	Assembly	Assembly A	4711	1001	100
5	2	Part	Part 10	M 10	1002	20
6	2	Part	Part 20	M 20	1003	30
7	1	Assembly	Assembly B	4712	1004	200
8	2	Part	Part 100	M 100	1005	40
9	2	Part	Part 200	M 200	1006	50
10	3	Raw Material	steel	St100	1007	1
11	3	Support Mate	gluten	gl101	1008	2

Figure 16: Log File - Table First Import

Figure 17: Message Update Executed

8) Confirm both messages with **Yes** in order to complete the update.

First import results.

First Import Results

The imported structure is assigned to the **New Assembly** in the PPR-Navigator**.** The new objects are marked in red. Support materials and raw materials are not marked in color. The hierarchical structure corresponds to the structure specified in the import file. *Please refer to the* Figure 16.

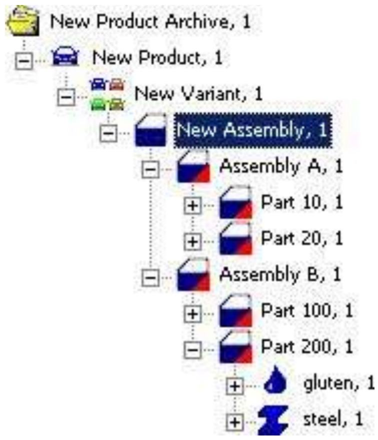


Figure 18: First Import Product Structure – Red Icon

9) In order to open the log file at a later point in time, open the properties dialog on the group on which you started the import. You will find the file under the Attachments tab.

3.1.4 Execute Product Update

Execute a product update for available product structures in order to update them.

Note

You should always execute a product update specifically for the respective product structure.

Erroneously executing a product update on another structure apart from the target hierarchical level leads to severe errors: groups, parts, purchased items, etc. will either be deleted, duplicated, or assigned to another product structure.

3.1.4.1 Update Information

A log file that contains all the information on a specific product import is created for every update.

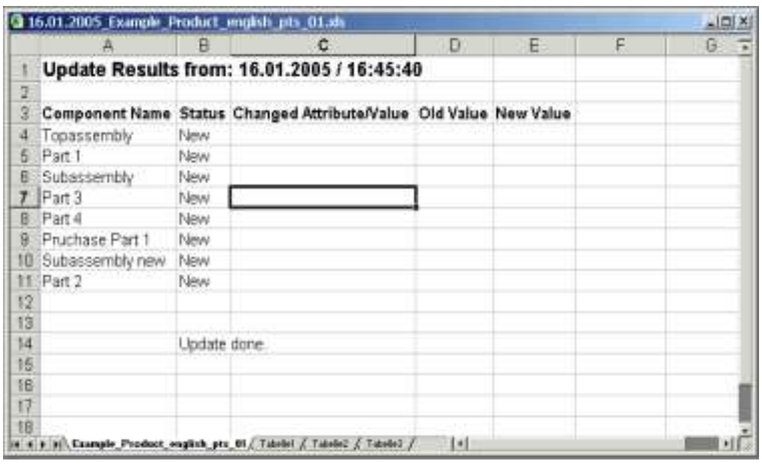


Figure 19: Example of a Log File

The log files are saved in the directory:
\Programs\DELMIA\PPRClient\data\Import\Product\Attachments
in the standard configuration.

1) In order to open the log file, double-click the selected file or click **Open**.

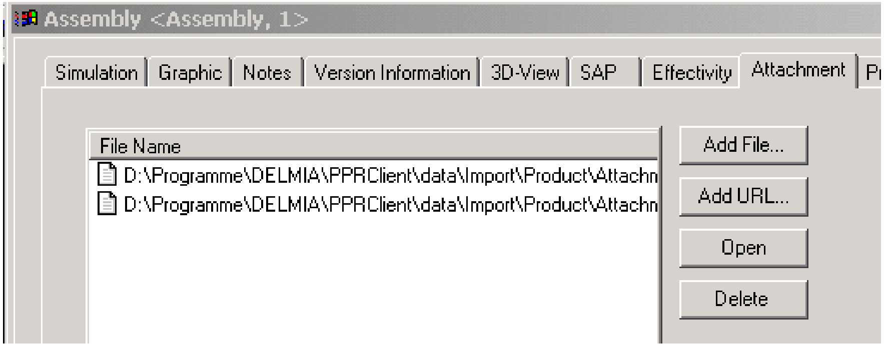


Figure 20: Log Files for Product Import

- **Changing Individual Attributes**

If the value of an attribute has changed, the changed attribute is listed in the log file with its old and new value.

- **New Objects**

New objects are marked red and are inserted into the hierarchy at their correct position when they are imported for the first time.

- **Objects that were moved within the structure**

If objects are moved within the structure during an update, the old and new "parent nodes" are indicated together with their IDs in the log file. The parent node is the object located in the hierarchical level directly above the moved components; the moved object is assigned to it.

- **Moving and Changed Object**

If an object's properties are changed after it is moved, this is logged as well.

- **Deleted Objects**

Objects that are not included in the update file but have been created during the first import or have been added manually are marked as deleted. These objects that are marked as deleted continue to be exist in the database and are filed in the system library under the new directory. These objects can continue to be used for planning purposes later.

Code rules and corresponding SA codes must already be available in the project library before you can import them.

Update information in the project library

Always execute a product import from a product group.

Nothing is lost when doing this. All objects are created under the respective plantype in the project library whenever a product import or update is executed. The status of an object after the update is displayed.

In addition, the plantype group contains all current information for surplus, i.e. deleted elements.

- Deleted elements are created for the respective update in the group **Surplus Elements**.

2) In order to view the update information, open the project library/components/product components and then the respective plantypes: e.g. plantype group.

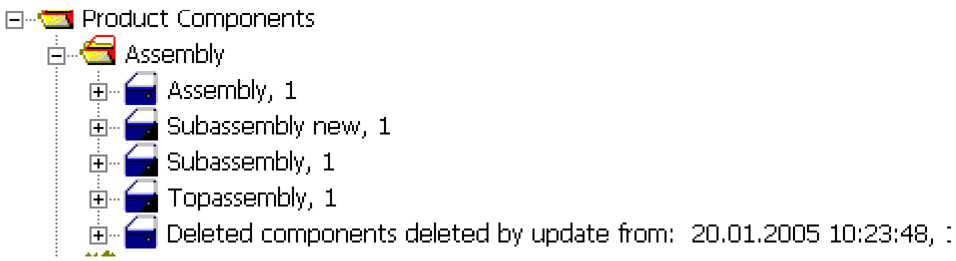


Figure 21: Project Library with Update Information

Display Status

You can view the status of a product import for every object of a product structure via **properties dialog/tab General**. You can also change this status manually there. *Please refer to the* also Figure 5.

Figure 22: Show Update Information in the Properties Dialog

3.1.4.2 Start Product Update – Example One

The following examples refer to the structure created after the first import.

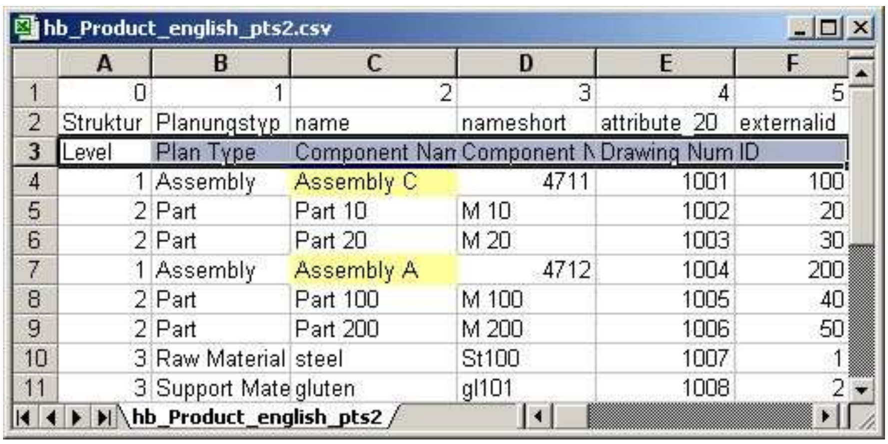
Example

In this example, the names of both groups are to be changed:

- Name of group **A** is changed to group **C**
- Name of group **B** is changed to group **A**

1) The changes are made in the import file: Change the names of both groups in the column component name.

2) It is convenient to use the old import file and then to save it under another name: In the example, **hb_Product_english_pts2**.


hb_Product_english_pts2.csv

	A	B	C	D	E	F
1	0	1	2	3	4	5
2	Struktur	Planungstyp	name	nameshort	attribute_20	externalid
3	Level	Plan Type	Component Nan	Component N	Drawing Num	ID
4	1	Assembly	Assembly C	4711	1001	100
5	2	Part	Part 10	M 10	1002	20
6	2	Part	Part 20	M 20	1003	30
7	1	Assembly	Assembly A	4712	1004	200
8	2	Part	Part 100	M 100	1005	40
9	2	Part	Part 200	M 200	1006	50
10	3	Raw Material	steel	St100	1007	1
11	3	Support Mate	gluten	gl101	1008	2

hb_Product_english_pts2

Figure 23: Import File for Update Example One

3) Start the product update. In the example it is the assembly group.

➢ How to start a product import is described in the section 3.1.3.4 Starting Product Import – First Import.

Example

Result – Product Update – Example one

The structure changes after this import: Both changes to the group names are, in addition, marked in yellow.

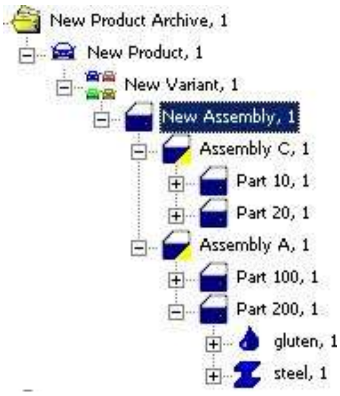


Figure 24: Update Product Structure – Yellow Icon

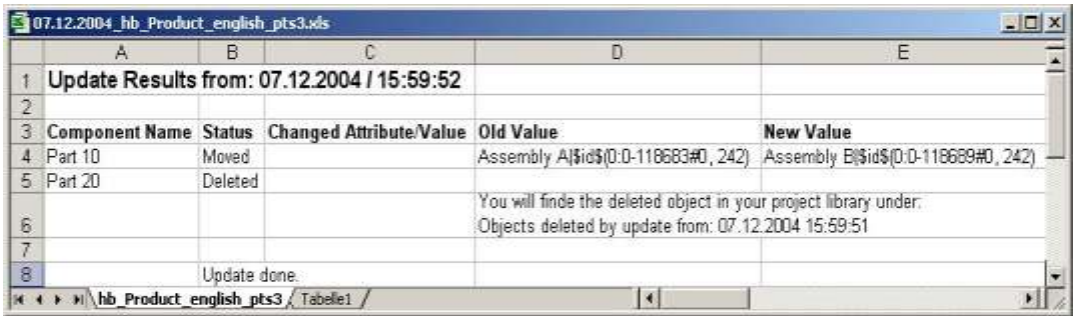
3.1.4.3 Starting Product Structure – Example Two

This example also refers to the product structure that was created after the first import.

- In this example, part 10 from group A is moved to group B
- Part 20 is deleted

1) Start the product update. Example two deals with the assembly group.

➢ How to start a product import is described in the section Starting Product Import – First Import.



07.12.2004_hb_Product_english_pts3.xls

	A	B	C	D	E
1	Update Results from: 07.12.2004 / 15:59:52				
2					
3	Component Name	Status	Changed Attribute/Value	Old Value	New Value
4	Part 10	Moved		Assembly A|id(0:0-118683#0, 242)	Assembly B|id(0:0-118689#0, 242)
5	Part 20	Deleted			
6				You will finde the deleted object in your project library under: Objects deleted by update from: 07.12.2004 15:59:51	
7					
8		Update done.			

hb_Product_english_pts3 / Tabelle1

Figure 25: Product Update

Result Product Update – Example Two

The structure changes after this import; Part 10 is moved to group B; the icon of part 10 is marked in green.

Figure 26: Update Product Structure – Icon Green

Part 20 is deleted. Part 20 is still available in the project library.

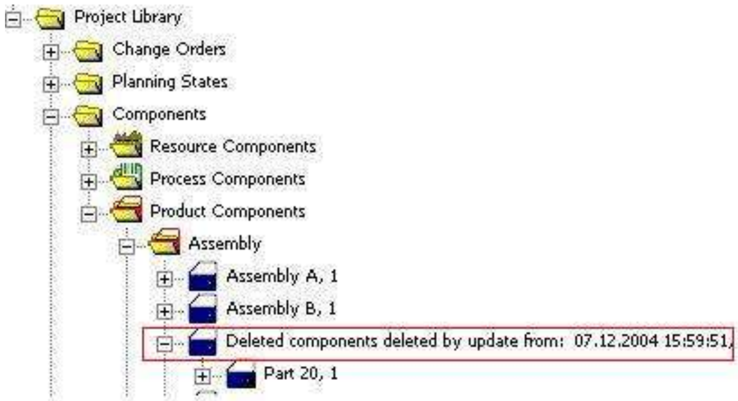


Figure 27: Deleted Components

3.1.4.4 Starting Product Structure – Example Three

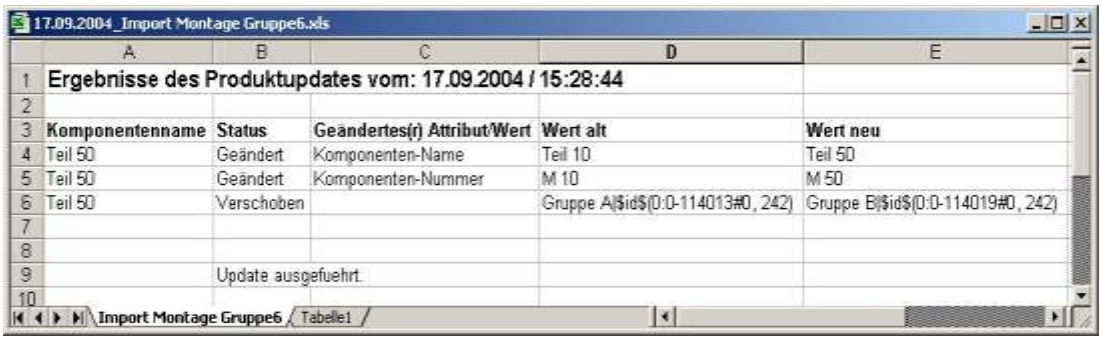
Example

This example also refers to the product structure that was created after the first import.

- In this example, part 10 from group A is moved to group B.
- The component name of part 10 is furthermore changed to part 50 and the component number of M10 is changed to M50.

1) Start the product update. Example two deals with the assembly group.

➢ How to start a product import is described in the section Starting Product Import – First Import.


17.09.2004_Import Montage Gruppe6.xls

	A	B	C	D	E
1	Ergebnisse des Produktupdates vom: 17.09.2004 / 15:28:44				
2					
3	Komponentenname	Status	Geändertes(r) Attribut/Wert	Wert alt	Wert neu
4	Teil 50	Geändert	Komponenten-Name	Teil 10	Teil 50
5	Teil 50	Geändert	Komponenten-Nummer	M 10	M 50
6	Teil 50	Verschoben		Gruppe A|id(0:0-114013#0, 242)	Gruppe B|id(0:0-114019#0, 242)
7					
8					
9		Update ausgefuehrt.			
10					

Import Montage Gruppe6 / Tabelle1

Figure 28: Product Import

Result Product Update – Example Three

The structure changes after this import: part 10 is moved to group B and its component name is changed to part 50: the icon of part 50 is marked in gray.

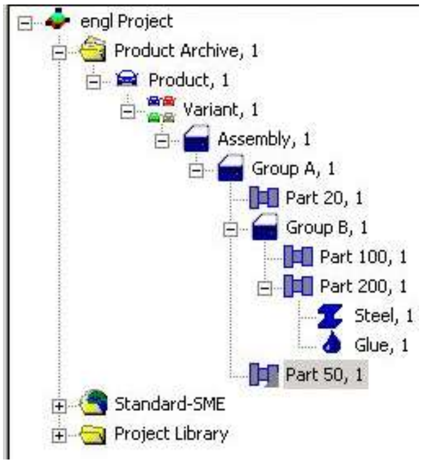


Figure 29: Update Product Structure – Gray Icon

3.1.4.5 Starting Product Structure – Example Four

This example shows that graphic files can also be imported if the path is specified in the import file, as is shown for part 10.

1) The graphic can be displayed either by using the context menu -- **Show Graphic -- or via the 3D View tab** in the properties dialog of part 10.

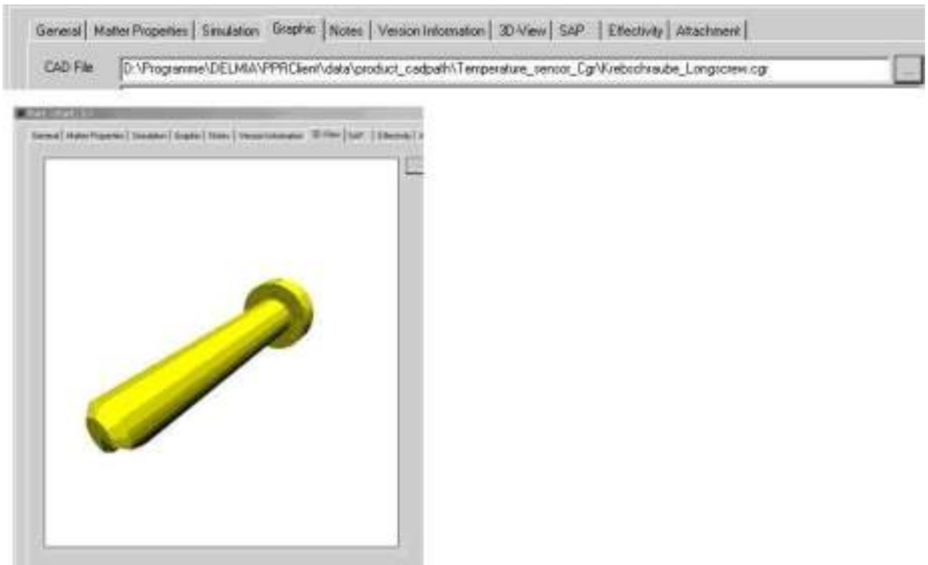


Figure 30: Import and Display Graphic File

3.2 Assign Parts Bins to Products

Products are transported via parts bins and, for example, supplied in these bins on assembly lines. You can use drag and drop to link parts bins to products; this applies to product groups, individual parts, or purchased items.

Specific data of the parts bin (e.g. dimensions) are written in the newly created resource parts bin by the subsequently executed script. This is a prerequisite for calculating the refilling cycle -– the refilling cycle corresponds to the number of manufactured products until the next time the partbins provided for these products is refilled.

Part bins can be found in the system library in the **Partsbins** directory. You can link individual parts bins to products directly by selecting the corresponding parts bin in the directory **Partsbins** or by using the **General Finder** and searching for the specific parts bins – you will learn more about this process based on an example later. (*Please refer to the* Setting the Parameters for the Refilling Cycle.

The products are linked to the parts bins with the **relation product is provided by resource**.

Please refer to the Definitions of Terms for the Refilling Cycle and Planning the Refilling Cycle.

3.2.1 Definitions of Terms for the Refilling Cycle

The refilling cycle is used to set the number of products after which new parts bins are either to be provided for the expendable items or filled.

Also see for setting the individual parameters of the refilling cycle.

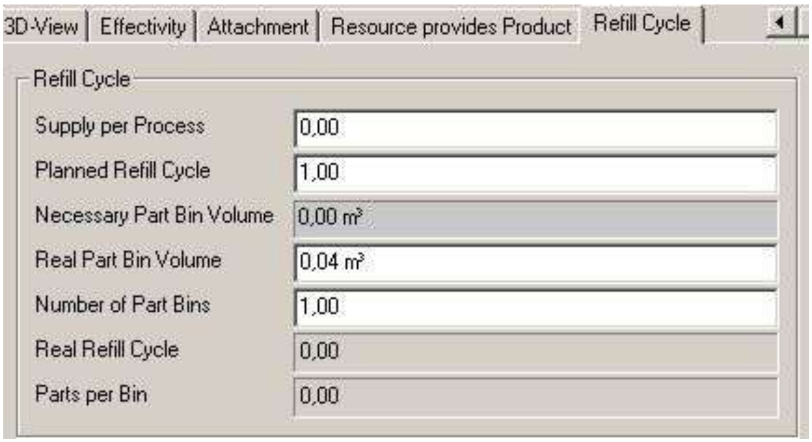


Figure 31: Example of Data in the Properties Dialog of the Parts Bin

Figure 32: Definitions of Terms for the Refilling Cycle

Term	Definition
Supply per Process	Consumption rate of **parts / product**. In this field type in the number of parts required for a product when a process is executed. The consumption rate is entered manually.
Planned Refill Cycle	Planned required amount of the product. The planned amount is used to set the number of products for which the processed part (consumption rate) is to be provided in the parts bin. The amount entered sets the refilling cycle, which in turn determines the item number and height of the parts provision for the product. The planned required amount is entered manually; the script's default for this field is an amount of one.
Necessary Part Bin Volume	The necessary parts bin volumes are calculated based on the consumption rate, required amount, and the dimensions of the part to be provided in the parts bin. The total volume of parts bins required is calculated in this field. This field is calculated; manual input is not possible in this case.
Real Part Bin Volume	The actual parts bin volume is calculated based on the dimensions of the linked parts bins. The actual parts bins volume can be changed manually and used in the calculation of the actual filling cycle, for example in order to provide the parts in a larger or smaller parts bin.

Term	Definition
Number of Part Bins	The default parts bin number after execution of the script is one. The parts bin number affects the calculation of the actual filling cycle. The parts bin number can be manually increased or decreased in order to adjust the calculated result of the actual filling cycle to the planned filling cycle.
Real Refill Cycle	The actual calculated required amount of the product. The actual filling cycle is calculated on the basis of the data entered for the refilling cycle. On the basis of these data the result shows for which number of products the parts bin should actually be refilled. The basis for the calculation of the actual filling cycle are the data in the fields Delivery per process, Actual parts bin volume, Number of parts bins, and the dimensions of the parts to be delivered. You can make corrections using the three fields in the refilling cycle, and the result is to be adjusted to the planned filling cycle.
Parts per Bin	The parts per bin is determined on the basis of the dimensions of the supplied part and the actual parts bin volume. You can increase or decrease the number of parts per bin using the actual parts bin volume. This field is calculated; manual input is not possible in this case.

3.3 Setting the Parameters for the Refilling Cycle

You can use the parameters of the refilling cycle to set the interval of the number of parts after which parts bins are supplied or refilled.

The following prerequisites must be fulfilled:

- Product structure must be generated.
- The shape type and dimensions of the part to be supplied must be created.
- Parts bins must be linked to this part.

From the following examples you will learn the procedure for linking parts bins and setting the parameters for the calculation of the refilling cycle.

The procedure is shown in the following examples.

3.3.1 Create Product Structure

The optimal refilling cycle is to be determined for the roller bearing processed in product subassembly C.

The first step is to create a product structure. In the following examples the refilling cycle for the roller bearing to be installed in product subassembly C is determined.

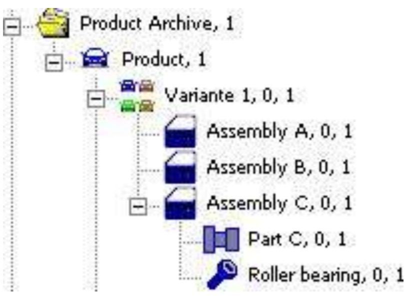


Figure 33: Example of a Product Structure

3.3.1.1 Setting the Properties for the Roller Bearing

You must always do the following at the minimum in the properties of the part (roller bearing, in the example):

- Select the shape type and set the dimensions.

Setting shape type and dimensions.

Note

In order to be able to calculate the number of parts for a parts bin, you must always specify the shape type and dimensions in the properties of the part to be provided in the parts bin. The script can not determine the refilling cycle without this information.

1) In the example, the shape type cylinder is selected for the roller bearing and a length of 42 mm and a diameter of 25 mm have been set for the dimensions.

2) The shape type and the dimensions are used for the calculation of the parts per container.

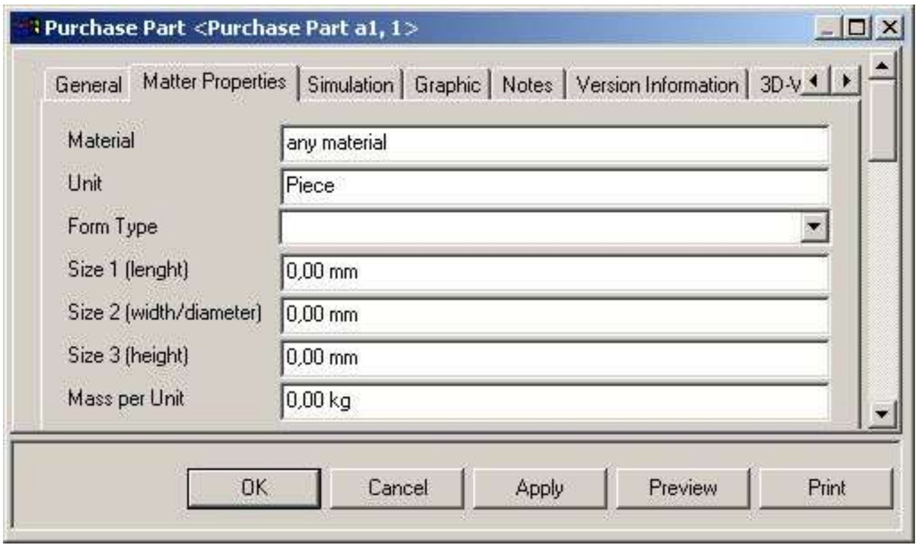


Figure 34: Properties of Roller Bearing

3.3.1.2 Linking Parts Bins to Products

All standardized parts bins can be found in the directory **Work System Components** / **Partsbins** of the system library. Select the corresponding parts bin:

In the example, the roller bearings are to be provided in the parts bin **Grab container** with the dimensions 240X160x80 mm. The general finder is used in the example for searching for the parts bin.

- You can search specifically for parts bins using the general finder. To do this, you must enter certain information on the type of parts bin, e.g. the system name or order number - you can, for example, conduct a search using only the system name if you do not know the order number.

How the finder is used is described in the Finder Manual.

Find and link parts bins using the general finder.

2) Open the general finder, select **Partbins** (**WSC**) and enter the data for the parts bin, e.g. system name and order number.

3) Select the parts bin in the display field of the finder, **Grab container** in the example.

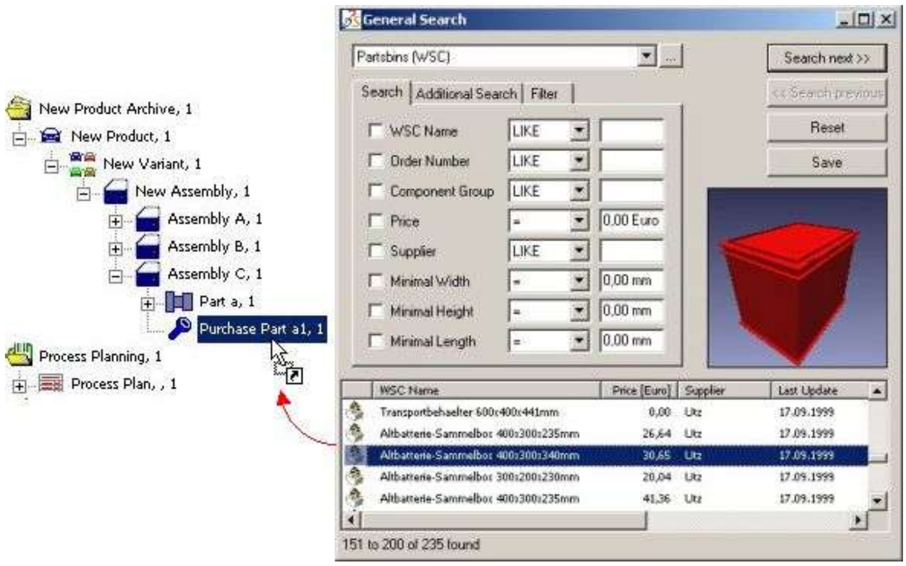


Figure 35: Link Parts Bins using the General Finder

3) Drag the parts bin to the product in the PPR-Navigator -- roller bearings in the example. Confirm the message Create reference with **Yes**.

➢ The link is created. The next step involves the prompt as to whether price and dimensions should be applied; this prompt is a component of the stored script.

4) Confirm this message with **Yes**. If you answer the message with **No**, the dimensions and the price are not applied, and the link is made anyway.

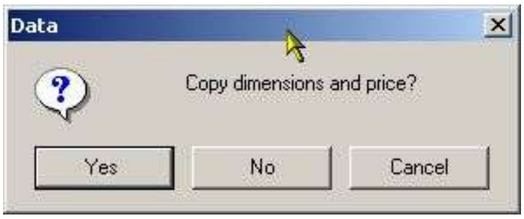


Figure 36: Start Script Message

3.3.1.3 Properties of the Parts Bin

1) Open the properties dialog of the parts bin in the list view of the part (roller bearings in the example) under the tab of the relation (**Product is provided by resource**), either using the context menu or by double clicking on the relation.

Open the properties of the linked parts bins.

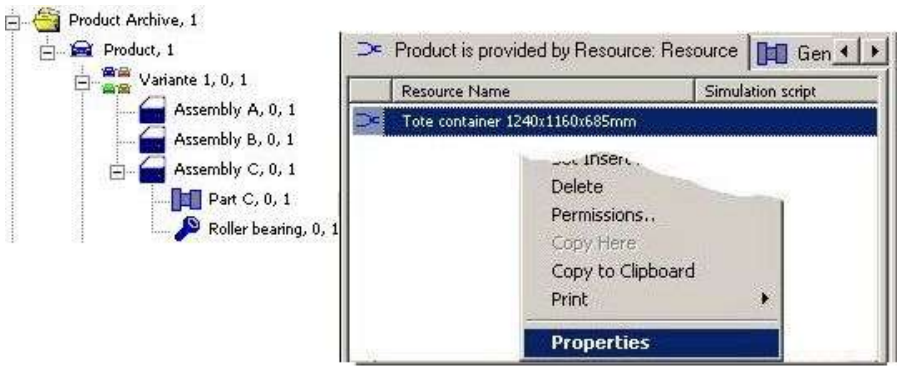


Figure 37: Open the Properties of the Resource Parts Bin

The data transferred by the script are entered on the three page of the tabs **General**, **Investment** and **refilling cycle in the** properties dialog of the parts bin.

Information on the properties of the parts bin after the script has been executed for the linked object.

General Tab

On this page you can always find the resource name of the parts bin and the dimensions.

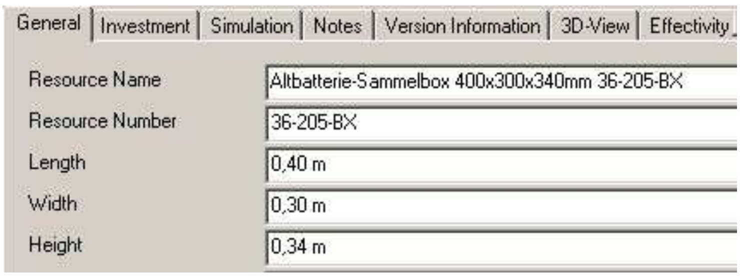


Figure 38: Property Parts Bin – General Page

Investment Tab

You can always find the price of the parts bin on this page.

Figure 39: Property Parts Bin – Investment Page

Refilling Cycle Tab

On this page you can find the initial data for the refilling cycle:

- The number of parts bins and the planned filling cycle are always assigned one by the script.
- The actual parts bin volume is calculated based on the dimensions of the linked parts bins.

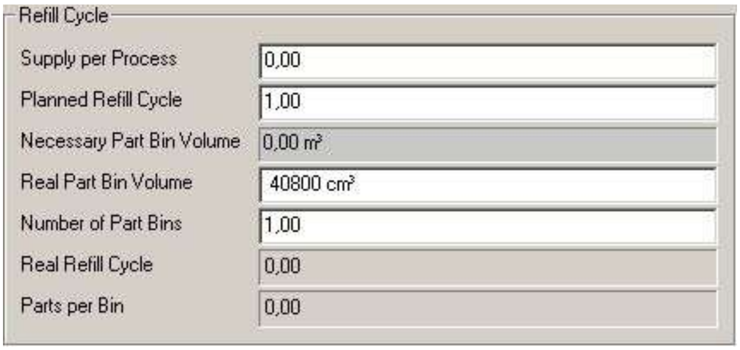


Figure 40: Property Parts Bin – Refilling Cycle Page

In order to determine the actual filling cycle *Please refer to the* Planning the Refilling Cycle.

3.3.2 Planning the Refilling Cycle

A prerequisite for the calculation of the actual filling cycle is the information for the refilling cycle: the same number of the manufactured products until the next refilling of the parts bin.

The calculation of the actual filling cycle is made on the basis of the fields:

- Delivery per process
- Actual parts bin volume
- Number of parts bins and the dimensions of the parts to be delivered

The information entered for *Planned filling cycle* and *Delivery per process* are not changed for the first three examples:

- Planned filling cycle: 100 products
- Delivery per process: 2 parts (roller bearings)

Example

Example one, calculation of the actual filling cycle: The roller ball bearings are to be provided in a parts bin.

Delivery of roller bearings in one part bin:

1) In order to start the calculation, always type in for delivery per process the number of parts processed with a process for a product: In the example, the two roller bearings.
2) In the field planned filling cycle enter the product amount to be provided for the parts.

➢ In the example it is 100 products: in order to meet the requirements for the planned filling cycle of 100 products, 200 roller bearings must be provided or refilled in the parts bin.

3) If you confirm the entries with **OK**, the dialog is closed.
4) In order to see the result of the calculation, open the dialog again.

Figure 41: Example One Calculation of the Actual Filling Cycle

Result

Figure 42: Result

According to these specifications, the parts should be provided after 40 products.

What can you do?

If this result is not satisfactory, make some corrections. For example, you could increase the number of parts bins.

3.3.2.1 Increasing the Number of Parts Bins

Example

Example two, calculation of the actual filling cycle: The roller ball bearings are to be provided in three parts bins.

One way is to increase the number of parts bins for the provision of the roller bearings.

1) Increase the number of parts bins, for example, to three parts bins.

Figure 43: Example Two – Delivery in Three Parts Bins

Result

Figure 44: Result

According to the increased number of parts bins, the parts should be provided after 120 products.

What can you do?

This result also does not completely fulfill your expectations.

In this case, you could make yet another correction. You could, for example, deliver the roller bearings in a larger bin. The required bin volume can be found in the field **Required parts bin volume**.

3.3.2.2 Changing the Parts Bin Sizes

Example three, determining the actual filling cycle: The roller ball bearings are to be provided in a larger parts bin. The basis of the size of the parts bin is the ascertained necessary parts bin volume.

To do this, you must select another parts bin with a corresponding parts bin volume from the library.

Figure 45: Example 3 – Use Larger Parts Bin

Result

Figure 46: Result

This result might be satisfactory for you. The ascertained result corresponds to the planned filling cycle for 100 products.

What can you do now?

You could, for example, change the planned filling cycle. From the first two calculations you know that 80 parts (roller bearings) can be provided in the linked parts bin if the actual parts bin volume is unchanged. You can change the planned filling cycle based on this information.

3.4 Display Logistics Data

You can use this script to display the logistics data of the product structure in an Excel table. Logistics data, such as product name, linked loading units for the transport of the products, or required amounts determined by the refilling cycle, are displayed in the exported table. The workplaces for individual parts or raw materials linked to a workplace are determined using the script and displayed in the table.

The script *Export logistics data* is started via the context menu of the product structure. The logistics data of the assigned product structure on which you start the export are displayed in the table.

You can save Excel tables and use them, for example, for the evaluation of the logistics units of the product structure.

3.4.1 Starting Logistics Scripts

The script can be executed on all plantype that are assigned to the plantype variants.

1) Open the context menu. Select **Reporting/Export logistics data (Excel)**.

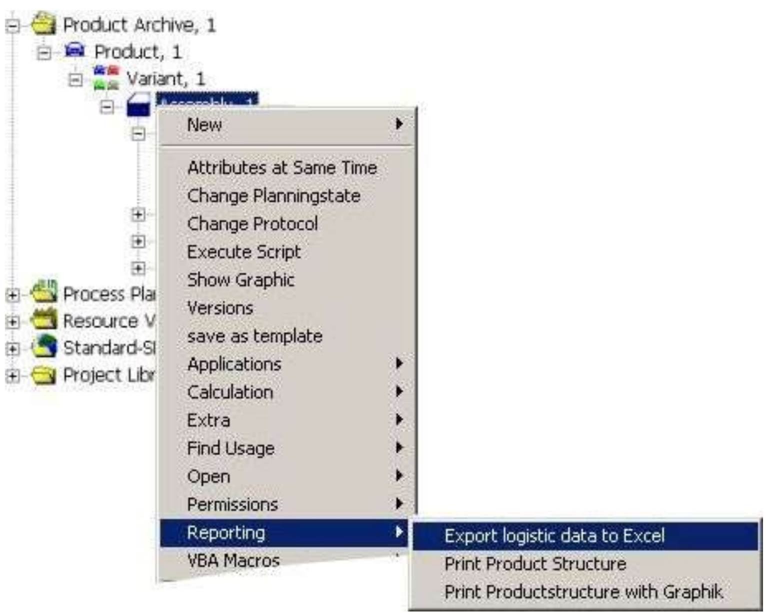
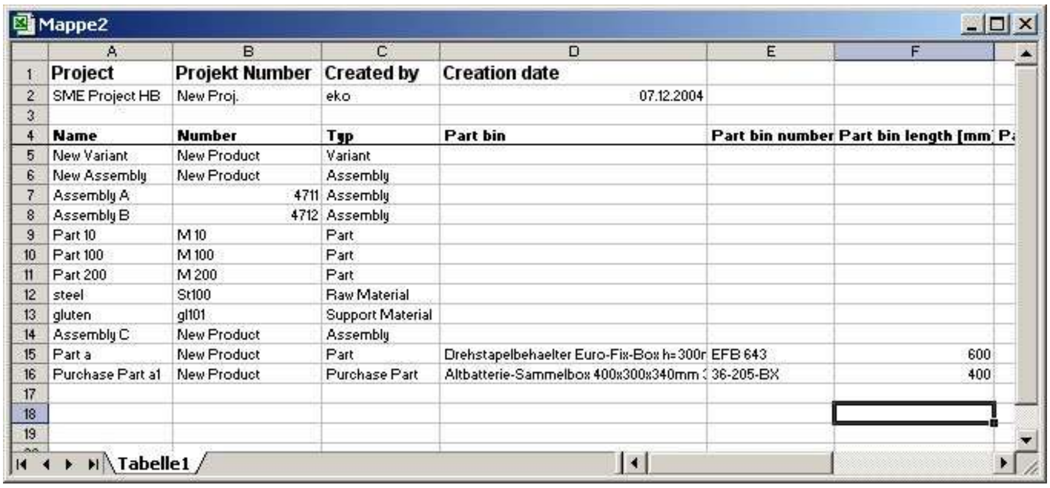


Figure 47: Starting a Script for Logistics Data

Example

The exported files of the product structure with their linked loading units are displayed in the table.



Mappe2

	A	B	C	D	E	F
1	**Project**	**Projekt Number**	**Created by**	**Creation date**		
2	SME Project HB	New Proj.	eko	07.12.2004		
3						
4	**Name**	**Number**	**Typ**	**Part bin**	**Part bin number**	**Part bin length [mm]**
5	New Variant	New Product	Variant			
6	New Assembly	New Product	Assembly			
7	Assembly A	4711	Assembly			
8	Assembly B	4712	Assembly			
9	Part 10	M 10	Part			
10	Part 100	M 100	Part			
11	Part 200	M 200	Part			
12	steel	St100	Raw Material			
13	gluten	gl101	Support Material			
14	Assembly C	New Product	Assembly			
15	Part a	New Product	Part	Drehstapelbehaelter Euro-Fix-Box h=300r	EFB 643	600
16	Purchase Part a1	New Product	Purchase Part	Altbatterie-Sammelbox 400x300x340mm	36-205-BX	400
17						
18						
19						

Tabelle1

Figure 48: Example of a Table – Logistics Data Exported

3.5 Print Product Structure

A product structure in Excel is printed using the script *Print product structure*. You can, for example, further process a print-out in Excel and save it separately in a directory. The processing of the values in Excel has no effect on the product structure in the PPR-Navigator.

You can print as many times as you want at any time. All changes which you have made before printing the product structure are included in the print-out.

You must have Excel installed in order to print.

Proceed as follows

The script **Print product structure** can be found in the context menu of the individual hierarchical levels of a product structure. The script is available for all hierarchical levels of the **Product structure variants**.

1) Select the hierarchical level in the product structure and open the context menu.
2) Select **Attributes at same time** in the context menu.

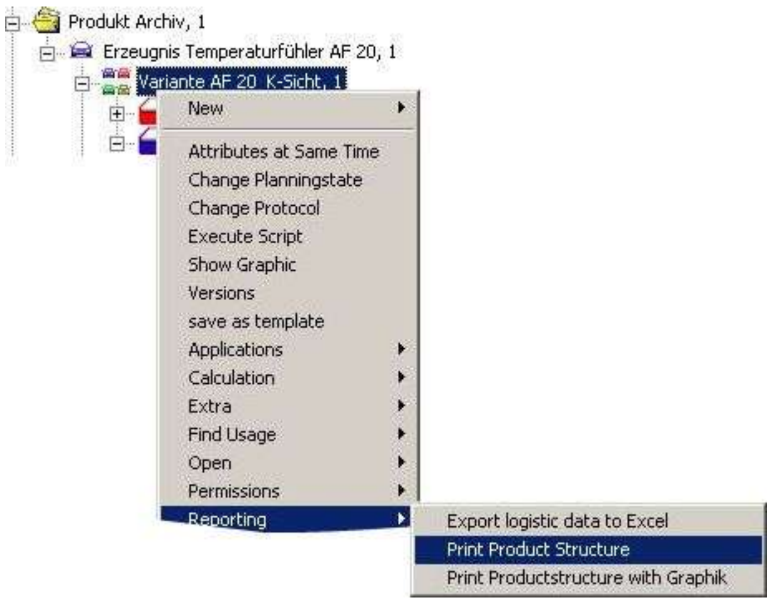


Figure 49: Execute the Script Print product Structure

3) The selected product structure with all its objects is depicted in the Excel table.

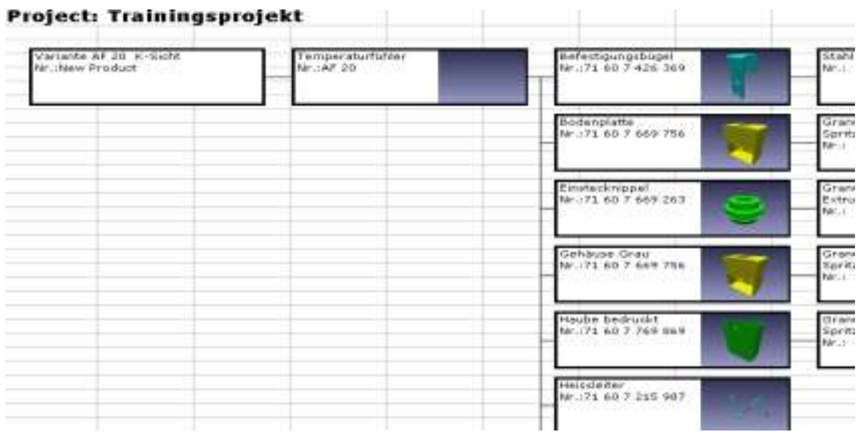


Figure 50: Example of a Product Structure in Excel

3.6 Displaying Graphics

Use the script **Graphic Show and Graphic Hide** to show and hide individual graphics from an overall graphic.

Both scripts are available in the product structure for the plantypes variants, subassembly, parts, purchased items, raw materials, and support materials.

An overall graphic is formed from the sum of the individual graphics of the assigned structure. The overall graphic can be seen using the context menu under **Show graphic** in the respective plantype: for example, a product group.

The procedure is shown on the example of a product.

3.6.1 Showing and Hiding Graphics

A product group consists of an unlimited number of individual parts to which graphics can be assigned. With both scripts you can show and hide the individual graphic elements from the overall graphic, for example, in order to display individual part elements in more detail.

In the example, **Hood stamped** is to be shown and hidden from the overall graphic, the product group.

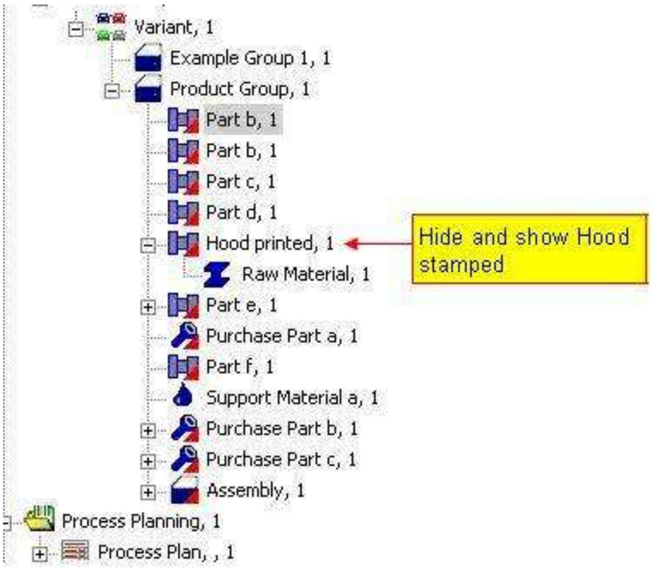


Figure 51: Product Subassembly

3.6.1.1 Show Graphic – Product Subassembly

1) In order to view the overall graphic, open the context menu on the product group and select **Show graphic**.

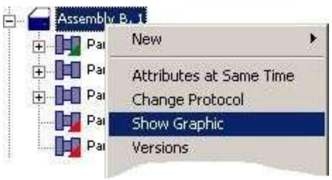


Figure 52: Show Overall Graphic – Product Subassembly

The image shows the overall graphic of the product group, with all graphics of the assigned items.

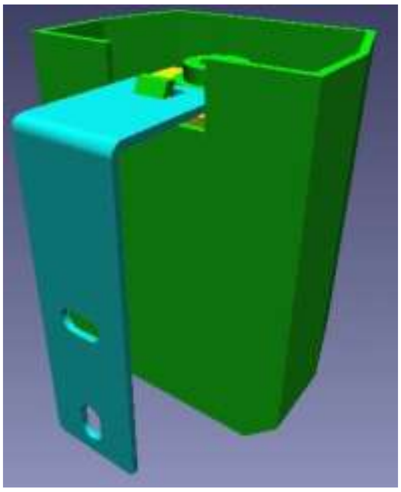


Figure 53: Overall Graphic - Product Subassembly

3.6.1.2 Hide Graphic - Part

1) n order to hide individual graphics in the overall graphic, open the context menu on the part and select **Graphic Hide**. The example refers to *Part 2*.

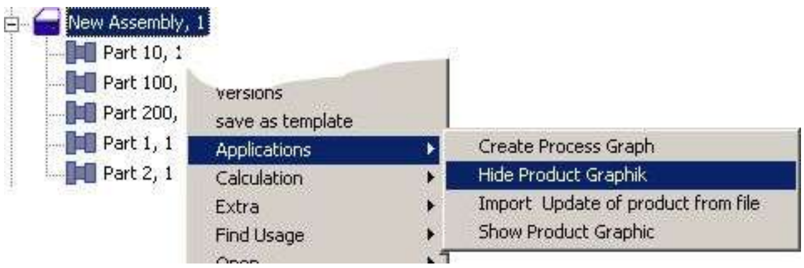


Figure 54: Hiding Graphics

2) Open the context menu on the product group and select **Show graphic**. The graphic is displayed without the hidden part (hood stamped).

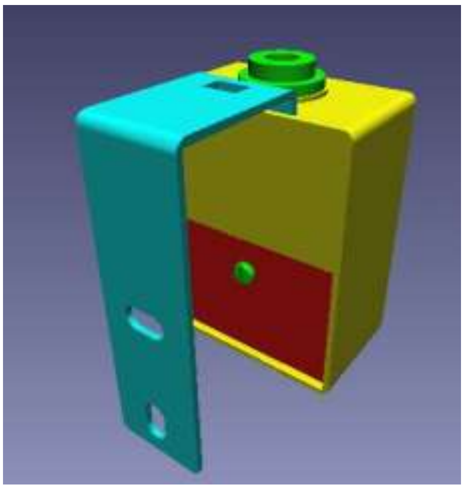


Figure 55: Product Group – Part Hidden

3) If, for example, you want to hide product groups in the overall graphic of the plantype variants, execute the script **Graphic Hide** on the product group.

4) In order to hide raw materials and support materials in the overall graphic of the plantype Part, execute the script **Graphic Hide** on raw materials and support materials.

➢ You can have graphics displayed again in the overall graphic in the same way: Script, **Graphic Show**.

3.6.1.3 Show Graphic - Part

1) In order to show individual graphics in the overall graphic, open the context menu on the part and select **Graphic Show**. The example shows **Hood stamped**.

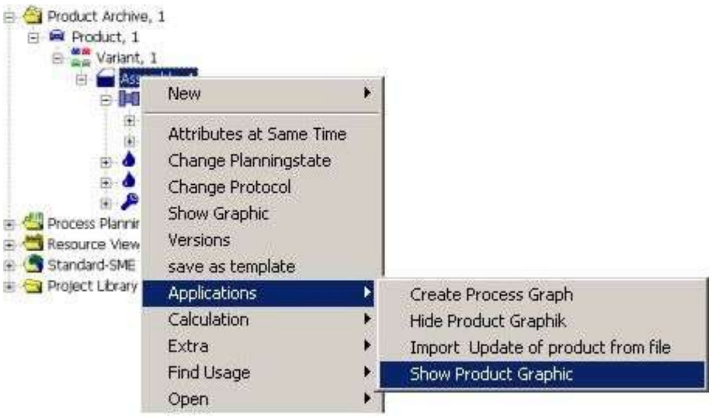


Figure 56: Show Graphic

2) Open the context menu on the product group and select **Show graphic**. The graphic is shown with the part (hood stamped). *Please refer to the* Figure 53.

In this way you can use these two scripts to display overall graphics that differ in detail, as shown by the example for the product subassembly

3.7 Set EBom

The script *Set EBom* is used to align coordinates of graphics between EBoms and manufacturing BOMs (product structures) created in the Process Engineer: During the alignment the system re-calculates the absolute coordinates for use in the manufacturing BOMs on the basis of the relative coordinates from the EBom.

Graphics can be displayed on the basis of both relative and absolute coordinates:

Relative Coordinates

- After the product structure is imported from an external system into the Process Engineer, the imported structure corresponds to the EBom. The relations between the individual structure elements and hierarchical levels are unambiguously defined; they contain the correct relative coordinates.

Absolute Coordinates

- Product structures created in the Process Engineer, on the other hand, show manufacturing BOMs. These manufacturing BOMs no longer directly refer to the EBom. In the case of elements from the EBom which are linked to elements of the manufacturing BOM, the reference to the specified hierarchical level from the EBom is lost, along with the relative coordinates.

- In order to display graphics of the manufacturing BOMs in the same way as the positioning of the elements in the EBom, the absolute coordinates must be calculated. The calculation is made based on the relative coordinates of the EBom.

After the script is executed, the system recognizes which absolute coordinates are available for linked elements of the manufacturing lists.

- The script is executed in two steps: In the first step, the bill of materials entries of the EBom (with correct relative coordinates) are marked as such so that they can be differentiated from the bill of materials entries of the manufacturing BOMs (invalid relative coordinates).
- In the second step, the absolute coordinates are calculated. These are then available to the product components even when used within a manufacturing BOM.
- The script must be executed again after every change in the EBom whenever new parts are added or existing parts are moved, that is, if the relative coordinates in the EBom are changed.

You can execute the script only on the plantype Variants.

1) Always start the script on the imported product structure.
2) Open the context menu of the plantype Variants and select **Set EBom**.

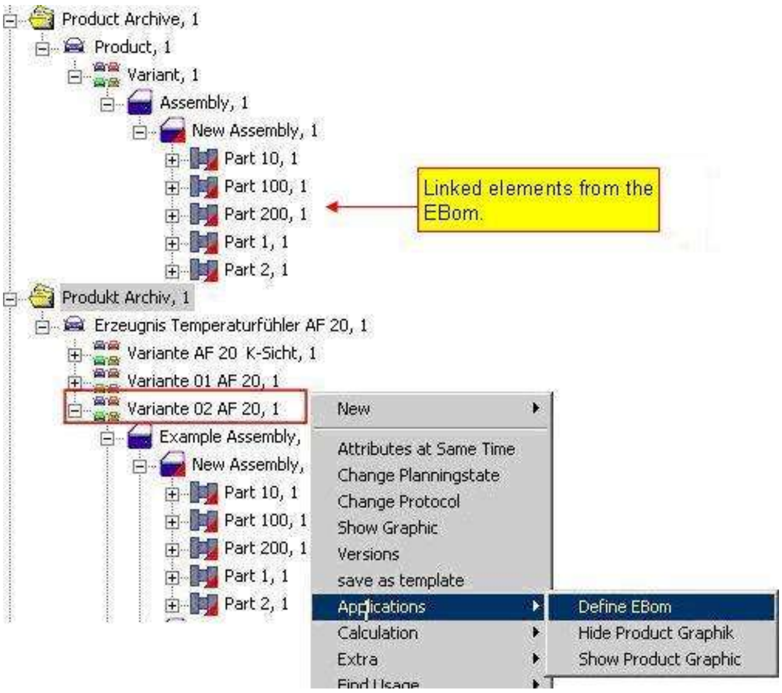


Figure 57: Start Script Set EBom

3) Confirm the message with **OK** in order to finish the calculation.

3.8 Calculating Material Costs for Products

Use **Calculation / Recalc Costs** to determine the material costs of products. The values used in the calculation of the material costs are those which are planned on the lowest hierarchical level of the product structure for the products, i.e. values to which no further structures can be assigned -- for example raw materials, support materials, purchased items, or parts for which no further structure should be assigned.

- For the calculation you can specify both material costs and an indirect material costs allowance in percent.

Set the material costs plus indirect material costs allowance for the plantypes if the product structure features the following:

- **Always** specify the material costs for the **plantype part** if no other structure is assigned to this part.
- **Always** specify the material costs for the **plantype purchased item**.
- **Always** specify the material costs for both **plantypes raw materials** and **support materials**.

3.8.1 Executing the Calculation of Material Costs

The calculation of material costs can be started on any hierarchical level of the product structure – the material costs of the corresponding structure are calculated accordingly.

The procedure is shown in an example of a product subassembly. The product structure is characterized by the following features:

- Parts with assigned structure
- Part without assigned structure
- Purchased item, raw materials, and support materials

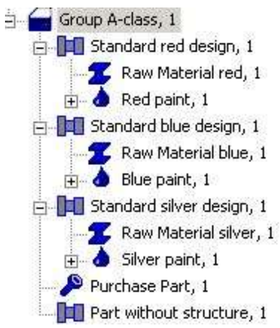


Figure 58: Product Structure Subassembly

3.8.1.1 Entering Material Costs

Example

In order to calculate the complete material costs, specify the costs for the following plantypes.

The same amount of individual material costs (10 Euros) as well as the indirect material costs allowance of 10% is specified for all plantypes in the example. In this way the result of the calculation can be more easily comprehended.

1) Enter the values for **Part without structure**.

Figure 59: Enter Values for Material Costs – Part without Structure

2) Enter the values for **purchased item**.

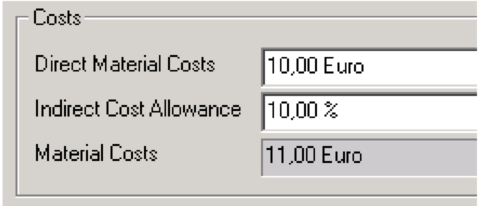


Figure 60: Enter Values for Material Costs – Purchased Item

3) Enter the values for all **Raw material and support materials**. The raw material and support materials are assigned to the respective structure of the parts.

Figure 61: Entering Values for Material Costs – Raw Materials, Support Materials

Example

4) For **parts** to which a **further** structure is assigned – in the example the raw materials and support materials – you do **not** need to enter **any** values.

If, however, you enter values for these parts, they are not used in the calculation -- only the values of the assigned raw materials and support materials are used. The result of the calculation is displayed in the field **Material costs subproducts**.

Figure 62: It is not necessary to Enter the Values

5) Start the calculation after you have specified the values for the material costs.

6) Open the context menu on the product subassembly – in the example Group A class.

7) Select **Calculation / Recalc Costs**.

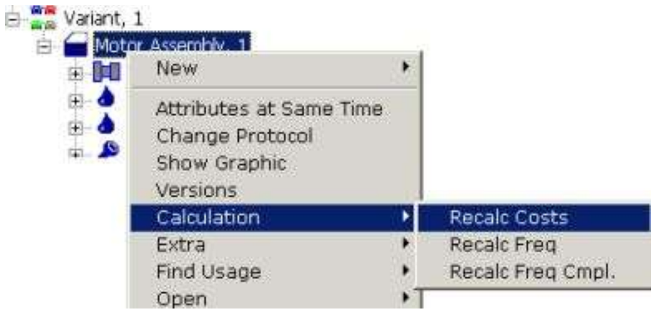


Figure 63: Start the Calculation of the Material Costs

8) After the calculation open the properties dialog of the product subassembly.

9) The result is displayed under **Material costs subproducts**. If you have entered all the information on the material costs just as is shown in the example, the result should be **88 Euro**.

Figure 64: Result of the Calculation - Properties Dialog of the Subassembly is Shown

3.9 Creating Process Graphs Using a Script

You can use this script to directly create a process graph for a product group.

This process graph, created from a product group, provides you with a first rough estimate of the type of processes – assembly or working process - and how many processes - i.e. the number of processes for the individual hierarchical levels - for which the respective product group is planned. Further processes can then be assigned to the process graph.

Note

The script Create process graph can be executed only on the product plantype group.

For a process graph which is to be created in the PPR-Navigator from the product structure, at least the plantype process plan (*project node/context menu/ process plan*) must be created manually – i.e. the uppermost node for process structures in PPR-Navigator must always be available. All further nodes of the process structure (*Process plan, Process*) are created by the script itself upon execution.

What process types are created?

- Subassemblies are created as assembly processes
- Parts as working processes

The script includes three alternative possibilities for creating a process graph:

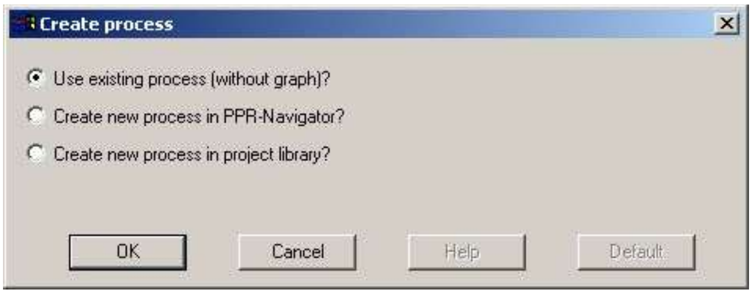


Figure 65: Three Alternatives – Creating a Process Graph

Using an existing process: You can use an existing process, if the node Process is available in the process structure and no process graph has been assigned to it. If no processes without process graphs are available in the project, a new process must be created or the process must be aborted.

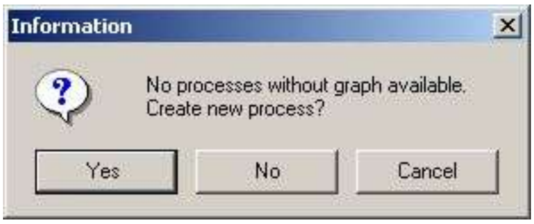


Figure 66: Message – Create New Process

- **Create new process:** You can always create a new process if the plantype Process plan is available in the PPR-Navigator. You must always create a new process if a process graph is already assigned to the existing processes.
- **Create new process in the project library:** You can always create a new process in the project library, even if the plantype Process plan has not yet been created in the PPR-Navigator.

Setting the product structure for the script

Depending on the product structure on which the script is to be executed, in this message you can set the number of hierarchical levels of the product structure for which the processes are to be derived.

The message always shows the maximum number of possible hierarchical levels.

Figure 67: Setting the Possible Number of Hierarchical Levels

Setting Relation Effectivity

Here you can set whether the relation (*project-wide*) is valid for all of the process graphs in the project or only for this single process graph.

Figure 68: Setting Relations for Process Graphs

3.9.1 Executing the Script Create Process Graph

Call up the script *Create process graph* via the context menu of a group.

- The script creates the process structure under the plantype **Process** as well as the corresponding process graphs
- In order to open the process graph, switch to the process view.

You will learn about the procedure for the script in the following example:

The group standard version has three hierarchical levels – group standard version, group A class, and the parts structure (red, blue, and silver version).

A process graph must be created for the group standard version. In addition, the plantype Process plan has been manually created.

What process types can the script create?

- For the groups, assembly processes
- For the parts, working processes

3.9.1.1 Starting the Script

1) Open the context menu on the group standard version. Select **Scripts / Create Process Graph**.

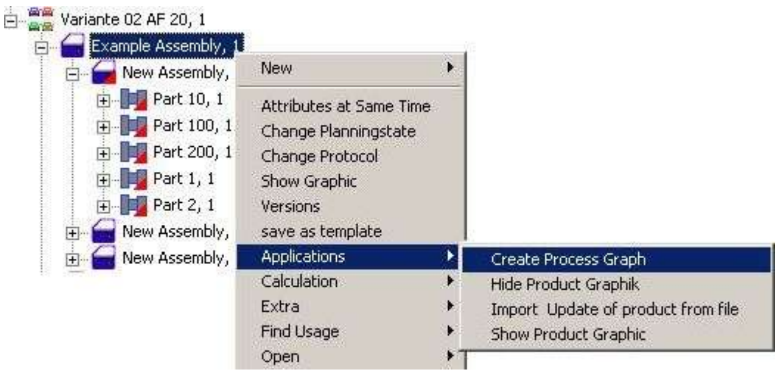


Figure 69: Starting the Script Create Process Graph

In this example, a new process is required since no plantype process has yet been created.

2) Select in the dialog Create new process (in the PPR-Navigator)?

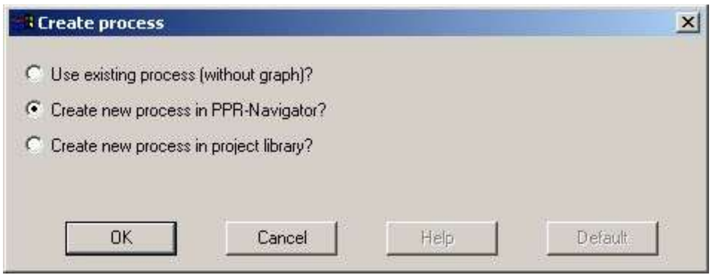


Figure 70: Create New Process

3) A maximum number of three hierarchical levels are possible for this subassembly.

Figure 71: Setting Hierarchical Levels

- Processes are derived from the product structure, the three existing hierarchical structures are the maximum number of hierarchical structures that can be planned for the product structure of this subassembly.
- A reduction of the hierarchical levels is possible at any time; in this case only processes are planned using the script for the specified hierarchical levels.
- The specification of the hierarchy levels should always lie within the specified product structure, in the example this is the maximum three hierarchical levels. A **zero** or a **four** would, for example, lie outside the possible value range.

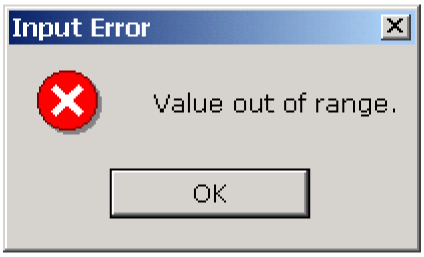


Figure 72: Specification of the Hierarchy Levels is not Correct

Confirm both messages with **OK** in order to create the process structure.

- If several *Process planning* or *Process flow planning are* in the project, you could select an alternative in this dialog. Select the entry you want in the following dialogs.

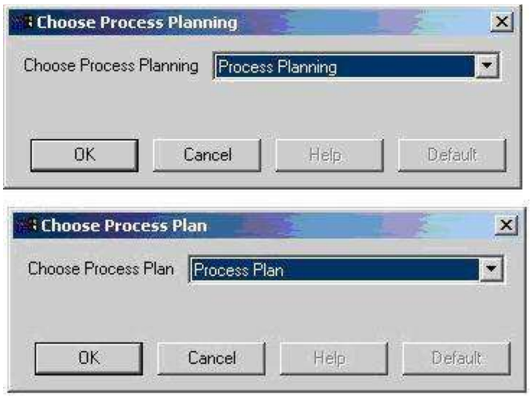


Figure 73: Message for Confirming the Process Structure

4) Select the relation effectivity.

Figure 74: Message: Relation Effectivity

5) Confirm the message with **OK**. The process structure is created.

6) Update the view after executing the script in the PPR-Navigator (press the **F5** key or select the context menu **Reload**).

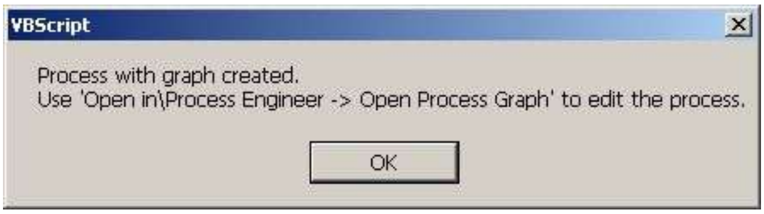


Figure 75: Script Executed – Confirm Message with OK

3.9.1.2 Result Process Structure in the PPR-Navigator

The process structure has been created under **Process planning / Process plan / Process** for the group standard version.

Now open the process graph: *Please refer to the* Opening the Process Graph.

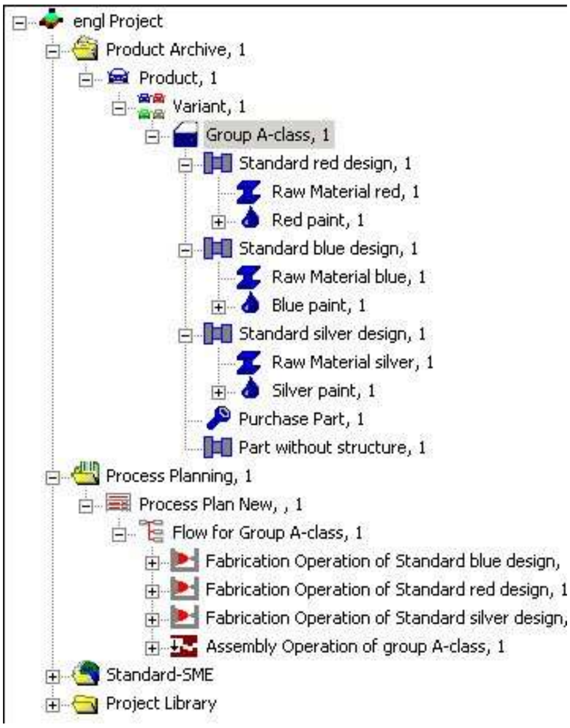


Figure 76: Process Structure created via Script in the PPR-Navigator

3.9.1.3 Opening the Process Graph

All of the processes required for the product structure have been created in the process graph. In accordance with the specified product structure, the links were set between the process types - working processes and assembly processes.

The links to previous or subsequent processes and products can be displayed via the context menu of a process: *Please refer to the* Display Linked Objects.

1) In order to open the created process graph, switch to the process view.
2) Open the context menu on **Process flow to group standard version**. Select **Open in Process Engineer**.
3) In the process view, use the context menu to select **Open process graph**.

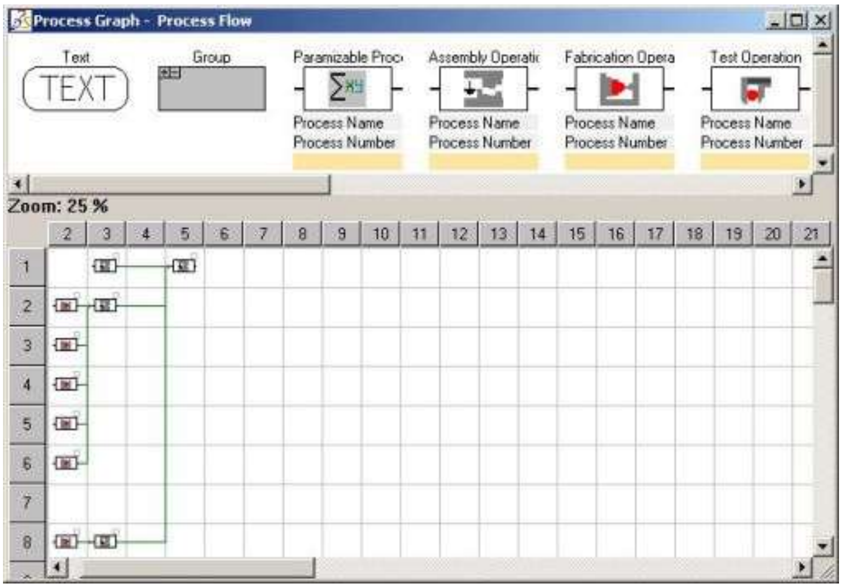


Figure 77: Process Graph for Product Subassembly created using Script

3.9.1.4 Display Linked Objects

The existing links are displayed under both tabs **Process** and **Product** in the dialog.

1) Open the context menu on a process.

2) Select **Linked Objects**.

Figure 78: Show Links between Processes

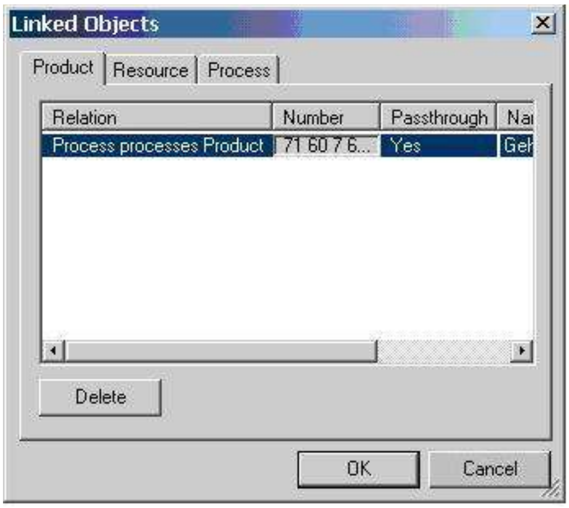


Figure 79: Links to Products

3.10 Import Processes

With this script you can import an unlimited number of processes of a hierarchical level that are set for the plantype **Process flow** in the plantype set. Since no other structured plantypes are available under the plantype *Process flow*, a flat (one level) structure is imported.

Prepare processes that you import in an Excel table separated with separators, and save it as the file type ...csv.

3.10.1 Templates

The templates can be found in the directory:

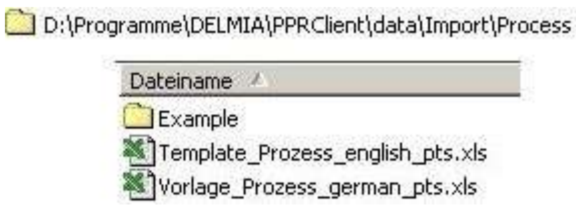


Figure 80: Tempalte Directory

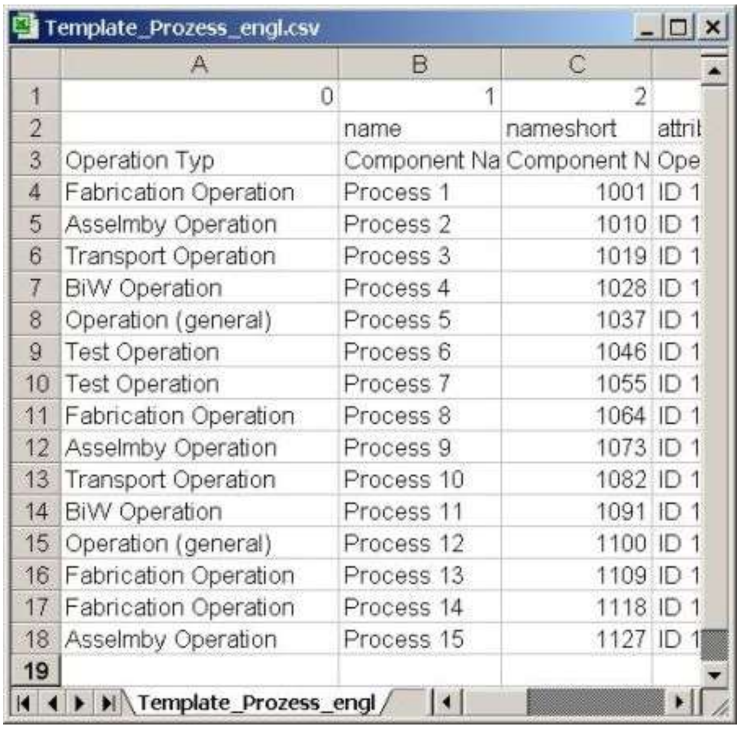
3.10.2 Execute Process Import

A process structure up to the plantype *Process flow* must be created for the process import. You can execute the script *Import process from file* only on this node.

- In order to create an import file, use the format template and save it as the file type **...csv.** Save this import file in a directory of your choice.
- If the attributes in the script and in the template are insufficient, other attributes can be implemented. To do this, the script must be adapted and the corresponding attributes must be configured.

Note

Ensure for the process you want to import that you use only the plantypes that are assigned to the plantype Process flow in the plantype set. Only the *processes that correspond to the plantype are imported. You should therefore make sure that you use correct spelling.*


Template_Prozess_engl.csv

	A	B	C	
1	0	1	2	
2		name	nameshort	attrit
3	Operation Typ	Component Na	Component N	Ope
4	Fabrication Operation	Process 1	1001	ID 1
5	Asselmby Operation	Process 2	1010	ID 1
6	Transport Operation	Process 3	1019	ID 1
7	BiW Operation	Process 4	1028	ID 1
8	Operation (general)	Process 5	1037	ID 1
9	Test Operation	Process 6	1046	ID 1
10	Test Operation	Process 7	1055	ID 1
11	Fabrication Operation	Process 8	1064	ID 1
12	Asselmby Operation	Process 9	1073	ID 1
13	Transport Operation	Process 10	1082	ID 1
14	BiW Operation	Process 11	1091	ID 1
15	Operation (general)	Process 12	1100	ID 1
16	Fabrication Operation	Process 13	1109	ID 1
17	Fabrication Operation	Process 14	1118	ID 1
18	Asselmby Operation	Process 15	1127	ID 1
19				

Template_Prozess_engl

Figure 81: Example of an Import of Processes

3.10.2.1 Start the Script from the Process Import

1) Open the context menu on the plantypes **Process flow** and select **Import process from file**.

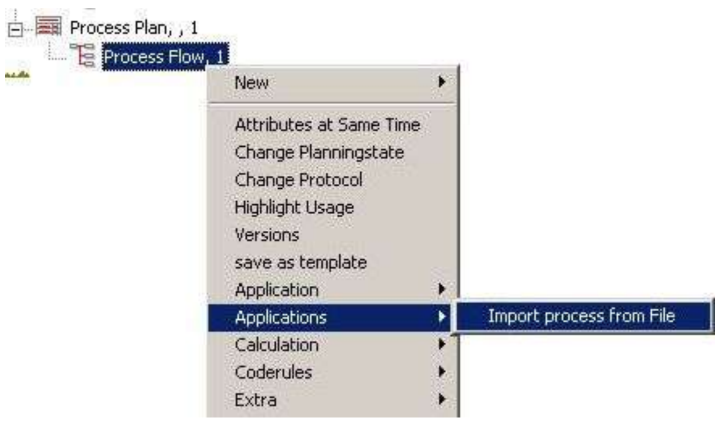


Figure 82: Execute the Script for the Process Import from the Context Menu

2) Open the directory. Select the import file and click **Open**. The import is executed.

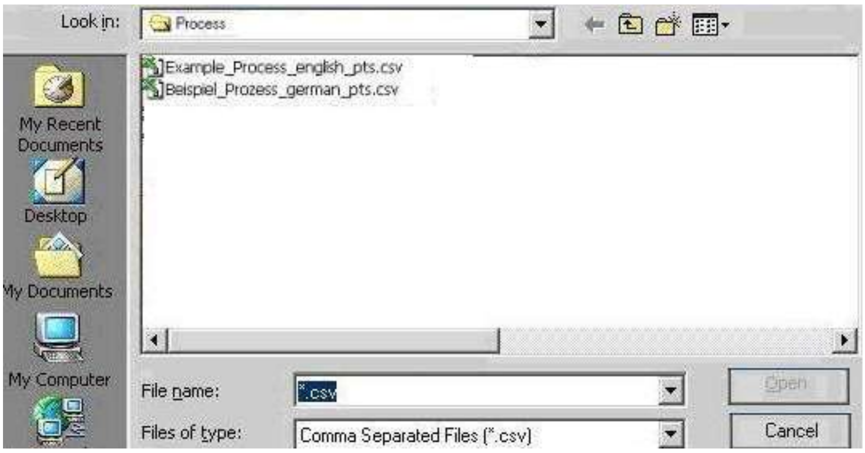


Figure 83: Example of Directory – Import File

3) In order to finish the import, confirm the message with **OK**.

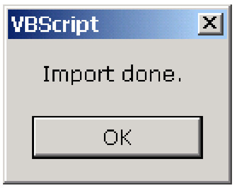


Figure 84: Message: Process Import Completed

4) The processes are displayed under the plantype **Process flow** after the import.

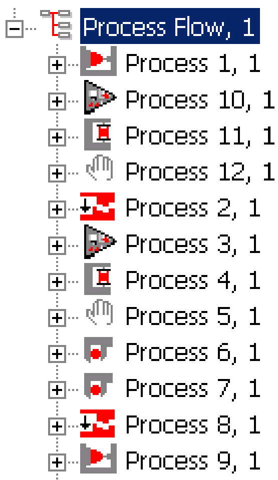


Figure 85: Imported Processes Assigned

3.10.3 Exporting Processes

You can use this script to export the processes that are assigned to the plantype **Process flow**. The exported process are displayed on the screen in an Excel table with the respective process information – for example data for analysis, such as the cumulated process times.

You can save and edit the Excel table in any directory. Changes to the data in the Excel table do not directly affect the process structure in the Process Engineer.

3.10.3.1 Start the Process Export

1) Open the context menu on the plantype **Process flow**.
2) Select the **Export operation List** (**Excel**).

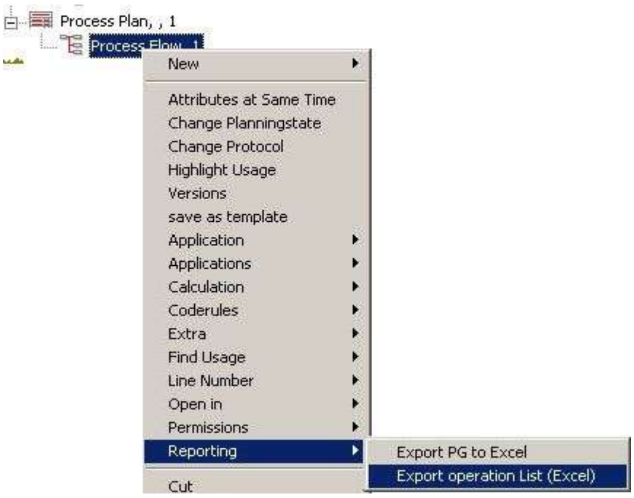
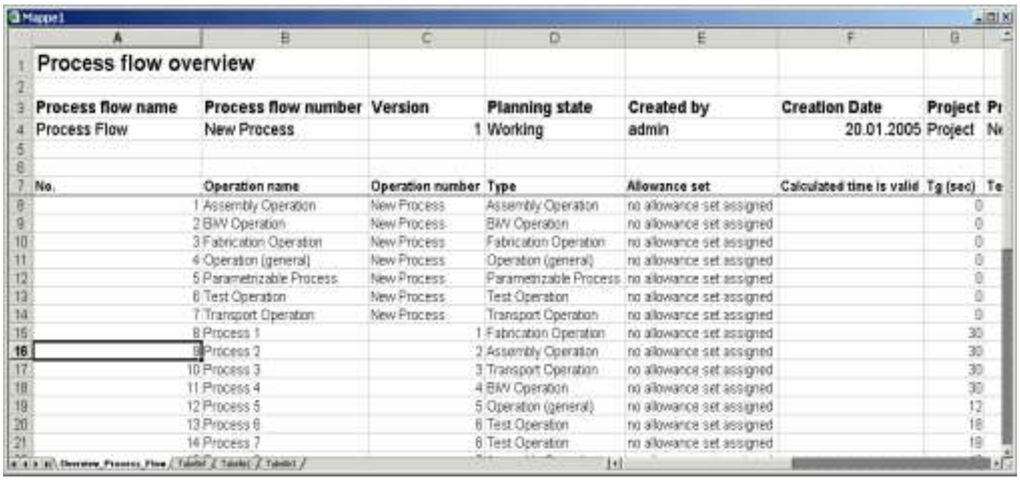


Figure 86: Exporting Processes

Display of the process data in the Excel table

Process data can be saved for evaluation as an Excel file.



	A	B	C	D	E	F	G
1	Process flow overview						
2							
3	Process flow name	Process flow number	Version	Planning state	Created by	Creation Date	Project
4	Process Flow	New Process	1	Working	admin	20.01.2005	Project
5							
6							
7	No.	Operation name	Operation number	Type	Allowance set	Calculated time is valid	Tg (sec)
8	1	Assembly Operation	New Process	Assembly Operation	no allowance set assigned		0
9	2	BW Operation	New Process	BW Operation	no allowance set assigned		0
10	3	Fabrication Operation	New Process	Fabrication Operation	no allowance set assigned		0
11	4	Operation (general)	New Process	Operation (general)	no allowance set assigned		0
12	5	Parametrizable Process	New Process	Parametrizable Process	no allowance set assigned		0
13	6	Test Operation	New Process	Test Operation	no allowance set assigned		0
14	7	Transport Operation	New Process	Transport Operation	no allowance set assigned		0
15	8	Process 1	1	Fabrication Operation	no allowance set assigned		30
16	9	Process 2	2	Assembly Operation	no allowance set assigned		30
17	10	Process 3	3	Transport Operation	no allowance set assigned		30
18	11	Process 4	4	BW Operation	no allowance set assigned		30
19	12	Process 5	5	Operation (general)	no allowance set assigned		12
20	13	Process 6	6	Test Operation	no allowance set assigned		18
21	14	Process 7	6	Test Operation	no allowance set assigned		18

Figure 87: Example of an Export of Processes – Excel Table

3.11 Assigning Products to Resources

This script is used to create processes if you want to link products directly to resources.

Note

Products can not be linked as a default.

Processes are created whenever you make a link between products and resources for subsequently executed plantypes:

Product plantypes

- Group
- Part

- Support material
- Raw material

Resource plantypes

- Processing station
- Assembly station
- Test & measuring station
- Workplace

3.11.1 How Does the Script Work?

You can use existing processes or create new processes for a linked object. Set the type of linked object while the script is running.

The running of the script is controlled via menus. While the script is running, set the process operation, whether a new or existing process is used, the type of process (e.g. assembly process or working process), and the relation with which a process is linked to the product via the corresponding menus. In addition you can set the process and setup time for the selected process.

Whenever existing processes are linked, the only processes that can be used for the link are those that are linked to the product and are not assigned to the resource.

After the script is completed, the selected process is linked to both the product as well as the resource.

You will learn about the various processes for linking between a product and resource in a simple example. *Please refer to the* Create Process - Create Link.

3.11.1.1 Scheme for the Link

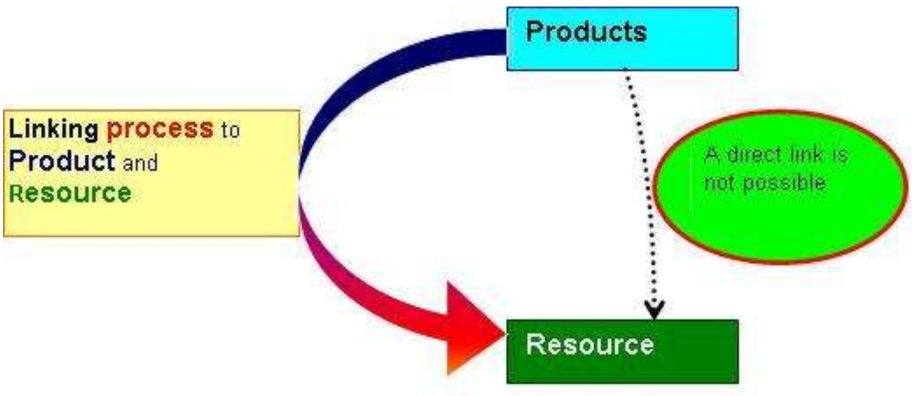


Figure 88: Scheme for the Link

1. Create a new operation

- Select the type of operation and set the process parameters
- Select the location for creation
- Select existing process
- Process is available -> select process -> operation is assigned to this process

- No process available in the project -> create new process in the project library -> procedure is assigned to this process
- No **suitable** process available in the project -> create new process in the project library -> procedure is assigned to this process

2. Create operation only in the project library

- Create a new operation -> deactivate field use existing process -> operation is created only in the project library for the respective plantypes.

Select existing operation

- Select operation -> if no operation is available -> create new operation

3.11.1.2 Setting Process Parameters for the Link

After you have created a link between a product and a resource, the script will start and you can assign a process directly to this link.

3.11.1.3 Setting the Process Operation for the Link

Select the process operation in this dialog -- whether you want to use a new process or existing processes for the link.

Figure 89: Selecting the Process Operation for the Link

Create new operation

If you select this operation, you create a completely new process for the link.

Use existing operation

If you select this process, you will use an existing process. Only the processes already linked to a product are available for selection.

3.11.1.4 Setting the Process Type for the Link

Select the type of process in this dialog. In addition you can also enter information on the times, frequency, and classification of the process. This information can also be created or changed after the linking.

- This dialog appears only whenever you create a new operation.

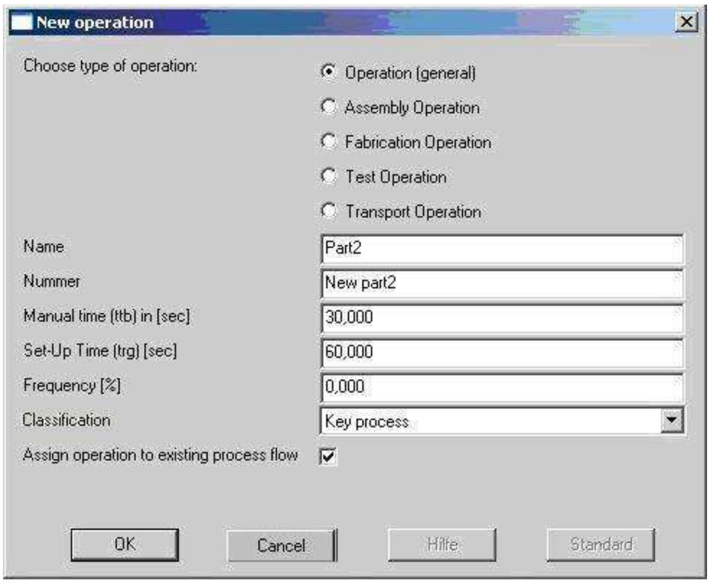


Figure 90: Select Process type for New Operation

3.11.1.5 Selecting the Process Flow

In this dialog you can choose between using an existing process flow or creating a new process flow in the project library.

- This dialog appears only whenever you create a new operation.

1) If you use an existing process flow for the new process, all existing process flows from the process structures in the PPR-Navigator and the project library will be available for selection.

Figure 91: Select Dialog Process

2) If you want to create a new process flow in the project library, activate the field **No suitable process flow available**...

3) Enter the name of the new process flow in this dialog.

Figure 92: Enter the Name of the Process Flow

3.11.1.6 Setting the Relation for the Link

In this dialog you can set the relation for the link from the process to the product.

- This dialog appears only whenever you create a new process.

Figure 93: Setting the Relation for the Link

3.11.2 Messages When the Script is Executed

Certain messages will provide you with information when the script is executed.

3.11.2.1 Create Another Operation? Message

Whenever this message appears, you can create additional operations or select existing ones without the script being aborted.

- This message appears when new processes are created and when existing processes are used.

1) If you confirm the message with *No,* the script is terminated.

Figure 94: Create another Operation? Message

3.11.2.2 'No Operations Linked' Message

If this message appears, no process is assigned to the product linked to a resource.

1) If you confirm the message with **Yes**, you can create a new operation. The further running of the script corresponds to one in which a new operation is created.

Figure 95: Message: Product already Linked with Resource

3.11.2.3 Operation Already Linked with Resource Message

Whenever this message appears, the resource has already been linked to the selected process. The script is aborted.

What do I need to do?

1) Start the link again and select either another operation or create a new operation.

- This message appears only if you select an existing process for the link.

Figure 96: Message: Operation already Linked with Resource Message

3.11.2.4 No Processes Exists Message

This message appears whenever no process flows have been created in the project. You can receive this message whenever you create a new process or a new parameterizable process.

- This message appears only if you have activated the field **Assign operation to an existing process flow** in the dialog **New operation**. *Please refer to the* Figure 90.

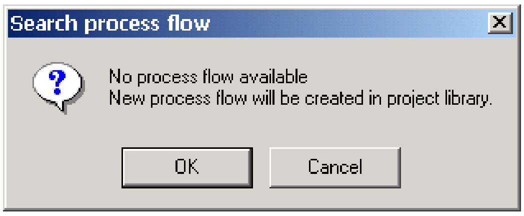


Figure 97: Message: No Process Flow Exists

Please refer to the Create New Process Flow in the Project Library.

3.11.3 Create Process - Create Link

You can create a link between a product and a resource. A direct link between product and resource is not possible for this set plantype. A link is created only if you define a process with the script.

The following examples will show the various possibilities the script provides for creating processes for the link between product and resource.

1) In order to create a link, drag the product to the resource. After this link has been created, the script is started, and you can define the process for the manufacture of the product.

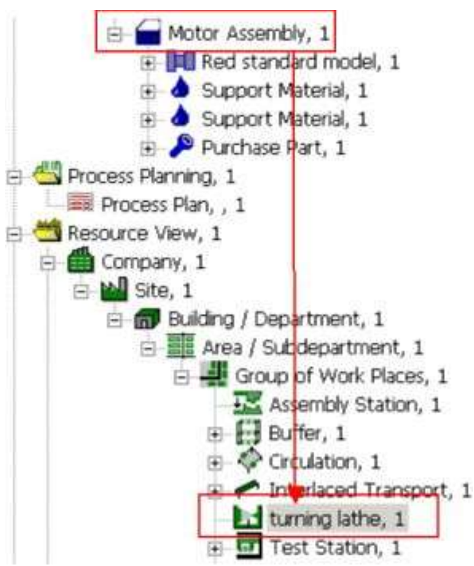


Figure 98: Structure – Link between Product and Resource

Figure 99: Message: Confirm Operation

2) Confirm the message with **OK**. Then select the operation.

3.11.3.1 Create Operation

Example

Example of creating a new operation.

In this example two new operations are created for the link.

1) Activate the field **Create operation**. By following this procedure, you create a new process for the link.

Figure 100: Select New Operation

2) Select the operation type and enter the operation parameters. Enter the times in seconds.

3) The new operation is assigned to an existing process in the example. Activate the field **Assign operation to an existing process**.

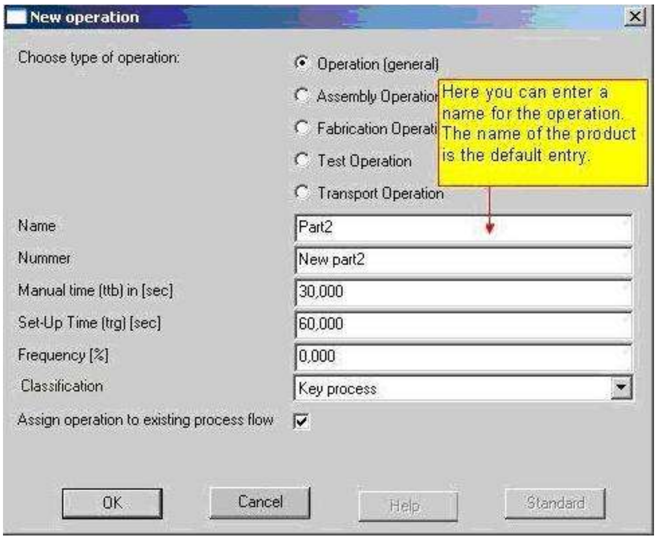


Figure 101: Select Operation Type – Enter Operation Parameters

4) Select an existing process.

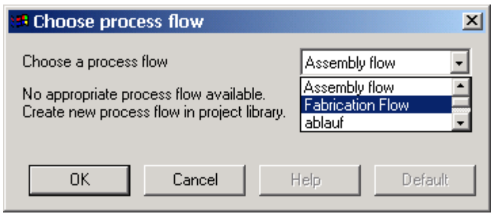


Figure 102: Select Process

5) Select the relation.

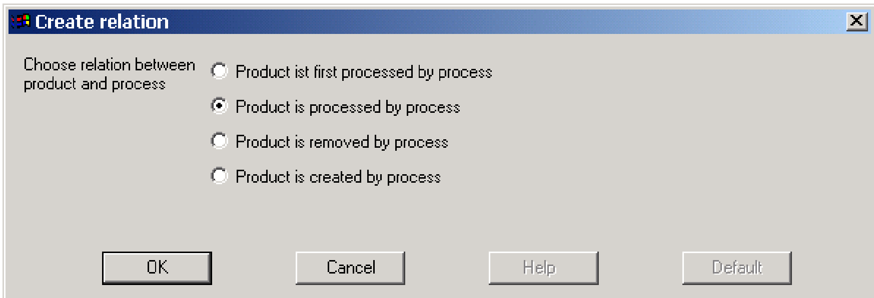


Figure 103: Select the Relation for the Link

3.11.3.2 Create Operation in the Project Library

Example

Another operation is created in the example. This operation is to be created in the project library only. Select this procedure if you are planning this operation for a later point in time in the process structure plan view.

1) Confirm this question with **Yes**.

Example of the creation of a new operation in the project library.

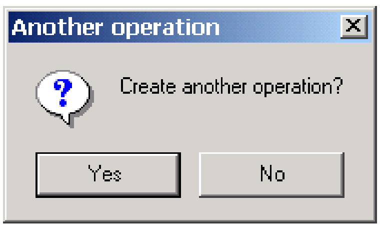


Figure 104: Creating another Operation

2) Deactivate the field **Assign operation to an existing process** and enter the process parameters. In the example, a new fabrication operation **rotate** is created.

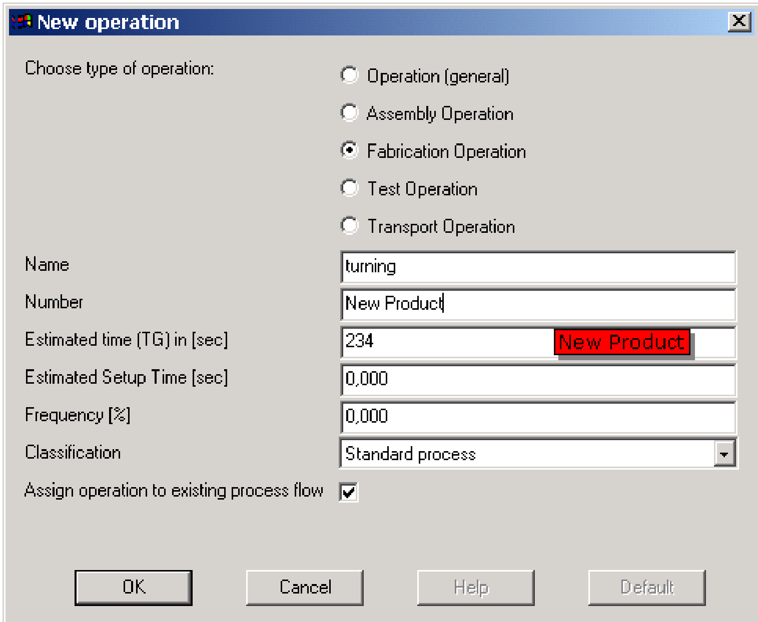


Figure 105: Creating a New Fabrication Operation

3) Then select the relation for the fabrication operation. In the example, the relation **Operation is processed by product** is selected.

4) Confirm the message **Create another operation with No**. See also .The new operation is created in the project library.

3.11.3.3 Showing the Result of the Link

Example

Showing the result of a link.

The results of the link are shown in the respective list view, project library, and in the plan views in the PPR-Navigator.

Result for new operations engine block and rotate

- The new operation **engine block** is shown in the project library and in the process structure.

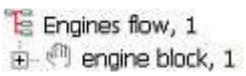
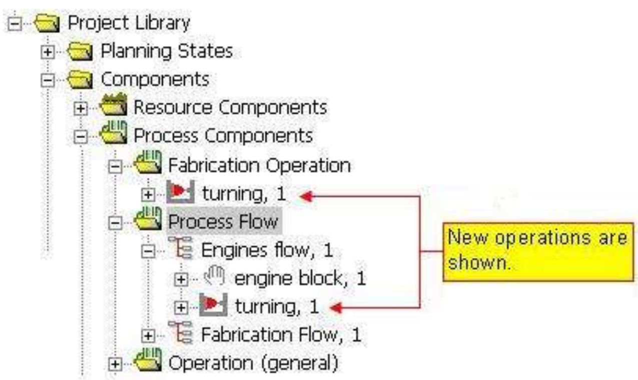


Figure 106: New Operation Engine Block – Process Structure

The new operation **rotate** is shown only in the project library.

Example



Show in the list view.

Figure 107: Show New Operations - Engine Block, Rotate

Show the new operations in the list view

- In the list view of the selected product group (engine block in the example), the new operations (processes) are shown under the respective relation.

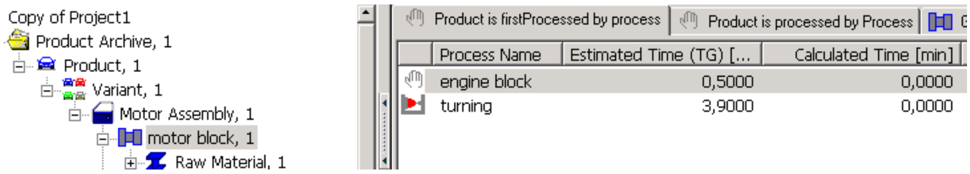


Figure 108: Show New Operations – List View Engine Block

- The new operations (processes) are shown under the relation *Resource runs process* in the list view of the selected resource (a lathe in the example).

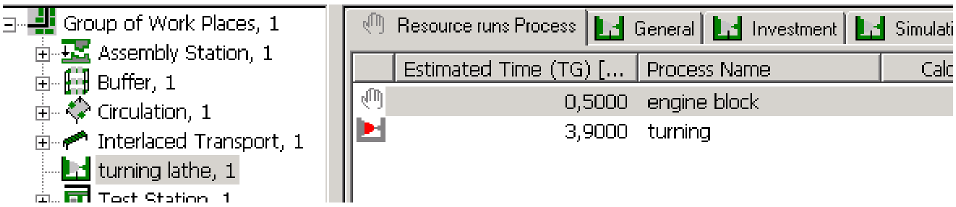


Figure 109: Show New Operations – List View Lathe

1) In order to see the process parameters, open the properties dialog of the new operation (process).

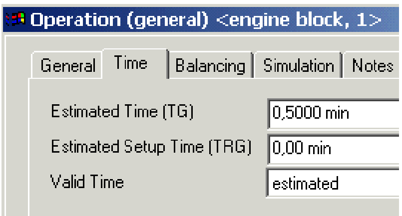


Figure 110: Show Process Time

3.11.3.4 Using an Existing Process

Example

Use an existing operation.

Existing processes can be used only if they have been previously linked to the product.

1) The operation **New test & measuring operation** is created in the project library and from there it is linked to the product.
2) Drag the product to the resource. *Please refer to the* Figure 98.
3) Confirm this message with **Yes**. *Please refer to the* Figure 99.
4) Activate **Use existing operation**.

Figure 111: Use Existing Operation

5) Select the operation (in the example, New & test & measuring station).
6) Click **OK** button to confirm.

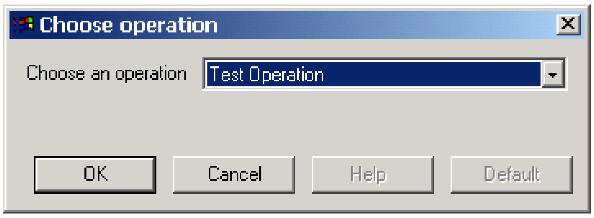


Figure 112: Select an Existing Operation

7) Confirm the message **Create another operation** with **No**.
8) The link is created, and the results are displayed as described in the chapter Showing the Result of the Link.

3.11.3.5 Create New Process Flow in the Project Library

Example

Example: Create new process flow in the project li-

A new process flow is created in the project library in this example. You can create a new process flow only if you also create a new operation. Follow this procedure either if no suitable process flow is available in the plan view of the PPR-Navigator or if there are no process flows at all in the project.

1) Drag the product to the resource. *Please refer to the* Figure 98.
2) Confirm this question with **Yes**. *Please refer to the* Figure 99.
3) Select the operation type and enter the operation parameters. Enter the times in seconds.

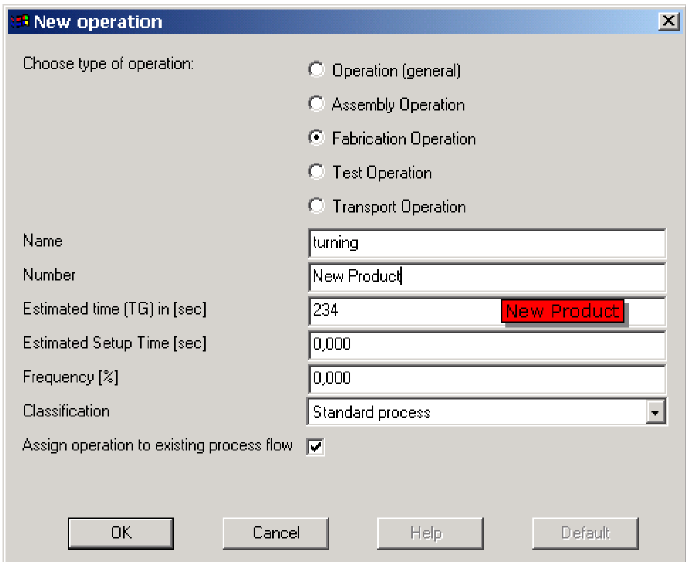


Figure 113: Create New Operation for New Process Flow

4) Activate the field **No suitable process flow exists**.

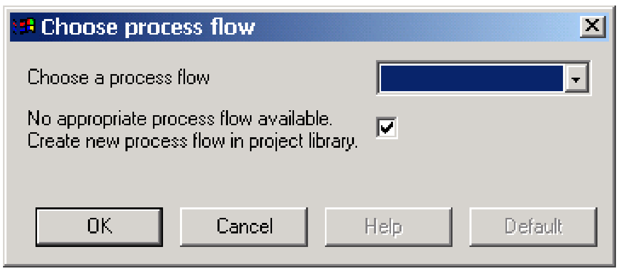


Figure 114: No Suitable Process Flow Exists

5) Enter the name of the new process flow. This new process flow is created only in the project library.

Figure 115: Enter the Name of the New Process Flow

6) Confirm the message **Create another operation** with **No**.

7) The link is created, and the results are displayed as described in the chapter Showing the Result of the Link.

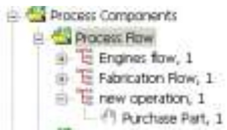


Figure 116: New Process Flow with Operation – Project Library

3.12 Updating Operation Times of Processes

Use the script *Update operation times* to update the operation time and setup time only for processes that are linked to resources of a manufacturing concept. The operation time and setup time are shown under the tab Capacity in the extended properties of a resource. You can enter operation times and setup times manually, or you can assign them using a script.

- The process time is automatically used as the operation time for manufacturing concepts that have been created on the basis of a process graph.
- Valid process times are either estimated times or calculated process times that are allocated to the process with an analysis.
- The extended properties of a resource can be accessed only if the resource has been assigned to a manufacturing concept.

The following examples will familiarize you with the procedure.

Note

Execute the script Update operation times only if you want to apply the process times and setup times from the processes. The script writes over previously existing operation times and setup times with the process time and setup time of the processes.

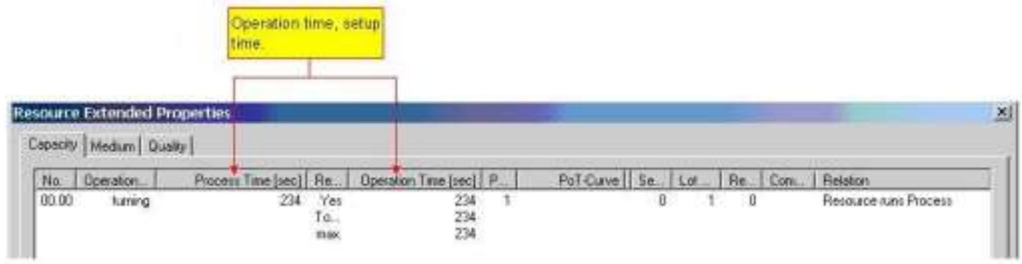


Figure 117: Extended Properties, Resource - Manufacturing Concept

For more information on manufacturing concepts and process graphs, *please refer to the* Manufacturing Concept Manual and Process Graph Manual.

3.12.1 Starting the Update Operation Time Script

The script *Update operation time* is executed on the plantype workplace group for which a manufacturing concept has been created.

1) If you make any changes you should save them to ensure that they will definitely take effect.
2) After the script is executed, update both views in the PPR-Navigator and in the manufacturing concept using the context function **Reload**.

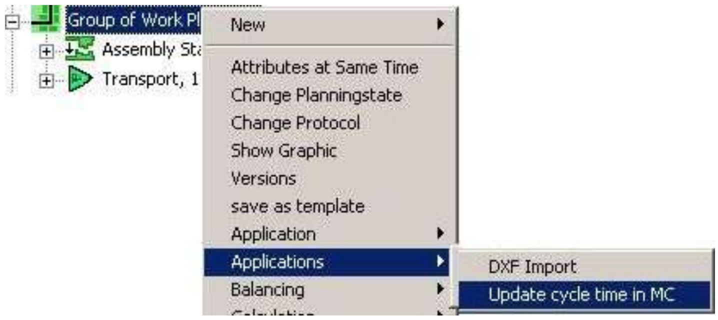


Figure 118: Starting the Update Operation Time Script

3.12.2 Opening Extended Properties

The extended properties can be accessed from the context menu of the resource:

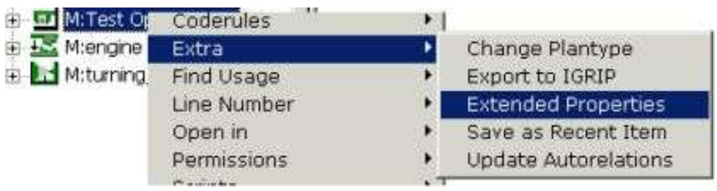


Figure 119: Extended Properties – PPR-Navigator

3.12.2.1 Extended Properties in the Manufacturing Concept

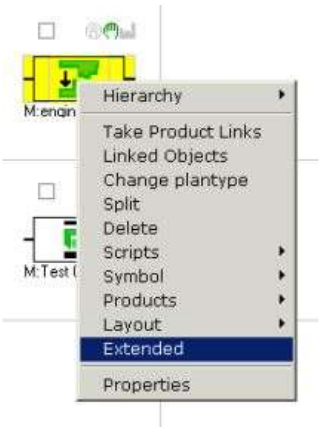


Figure 120: Extended Properties – Manufacturing Concept

3.12.3 Examples of Operation Time and Setup Time Updates

In the following examples, the manufacturing concept has been created on the basis of a process graph. The resources M:P1, M: P2 and M:P3 have been created from the processes of the process graphs.

The example showing resource M:P2, which is linked to process P2, will familiarize you with the procedure for estimated and calculated process times.

3.12.3.1 Using Estimated Times of the Process

According to the following criteria, the process time, operation time, and setup time are calculated after the script is executed on the basis of the estimated process and setup times specified in the process:

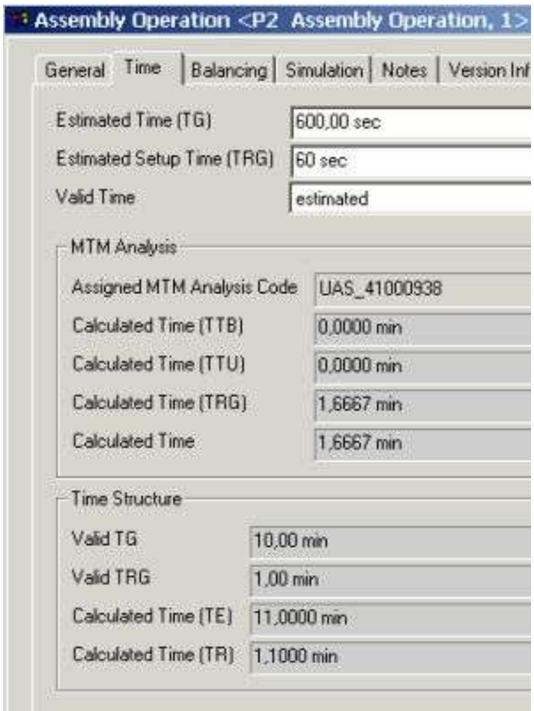


Figure 121: Default Times - Estimated Times

Process time, operation time

The process time and operation time are calculated on the basis of the valid basic time, TG (valid TG).

Setup time

The setup time is calculated on the basis of the valid setup time (valid TRG).

3.13 Using Block Layout for the Layout

Activating the field Use Block Layout for a resource sets whether the assigned graphic is displayed in the layout.

In addition you can change the dimensions of the resources or assign another graphic, just like with both the resources transport tool and buffer. Make all of the following settings in the properties dialog of the resources: the changes will take immediate effect in the opened layout.

You can make changes to the opened layout in the PPR-Navigator, in the opened resource view, or directly in the opened layout for the respective resources.

1) If you make any changes you should save them to ensure that they will definitely take effect.
2) Users who use the simulation program ***QUEST*** must deactivate the field **Show Block Layout** before transferring the data to ***QUEST***.

Figure 122: Activate Block Layout

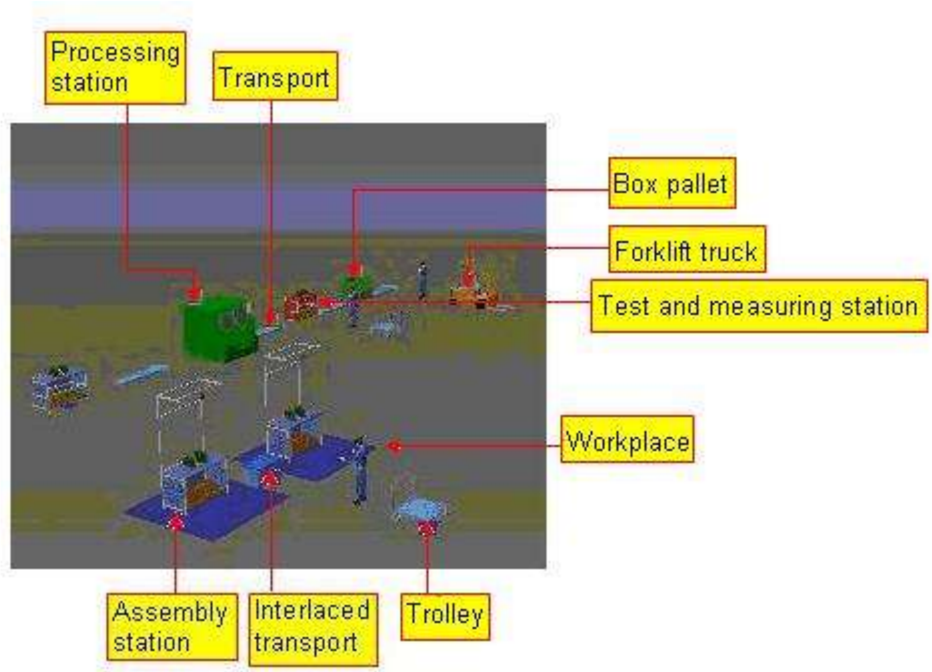
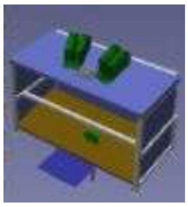


Figure 123: Layout with Resources Plantypes

The table shows the default assigned graphics for the plantypes with the respective dimensions that can be changed. In addition, further graphics can be assigned directly using the properties dialog for buffers and means of transport, for example, a trolley as the transport tool.

Table 1: Plantypes for Layout Planning

Pos.	Plantype	Dimensions	Graphic

Pos.	Plantype	Dimensions	Graphic
1	Workplace Block layout has no function. Workplace is always shown in the layout.	None	
2	Processing station	Length, width, height:	
3	Assembly station	Length, width, height:	
4	Test & measuring station	Length, width, height:	
5	Buffer	Length, width, height:	
6	Transport	None	
7	Means of transport	Length, width, height:	
8	Interlaced transport	Length	

3.13.1 Making Resource Settings in the Layout

The procedure involves the following steps:

3.13.1.1 How is a Layout Created?

A layout is created for a manufacturing concept.

For more information, *please refer to the* Manufacturing Concept Manual.

Here is a brief description of the basic procedure for creating a layout:

1) Open the manufacturing concept in a free cell of the context menu.
2) Select **Layout / New**. Enter the name of the layout in the properties dialog.

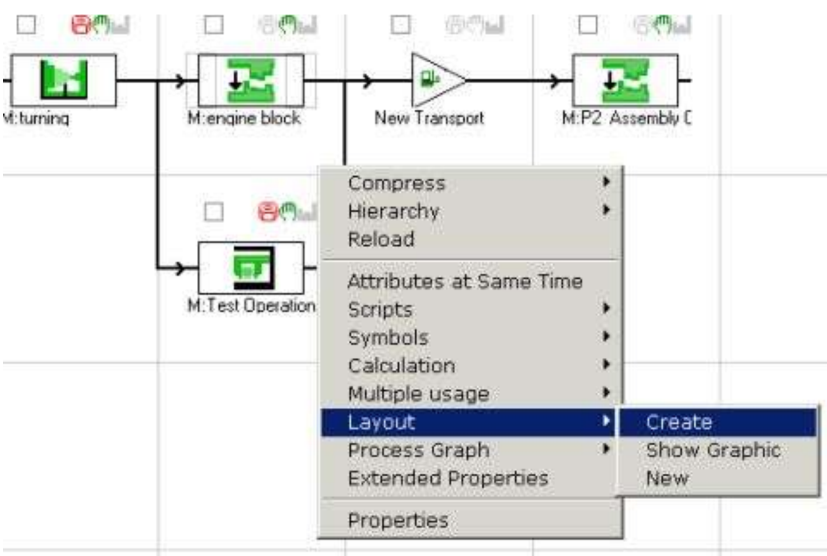


Figure 124: Create Layout in the Manufacturing Concept

3) Confirm the message with **OK**.

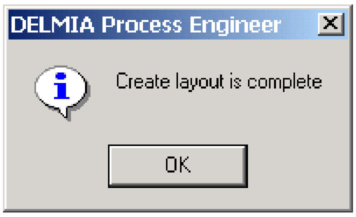


Figure 125: Layout Message

3.13.1.2 Open Layout for Editing

1) In the PPR-Navigator select the workplace group for which the manufacturing concept was created.
2) In the list view select the new layout under **Layouts**.
3) Open the context menu and select **Open in / Process Engineer.**

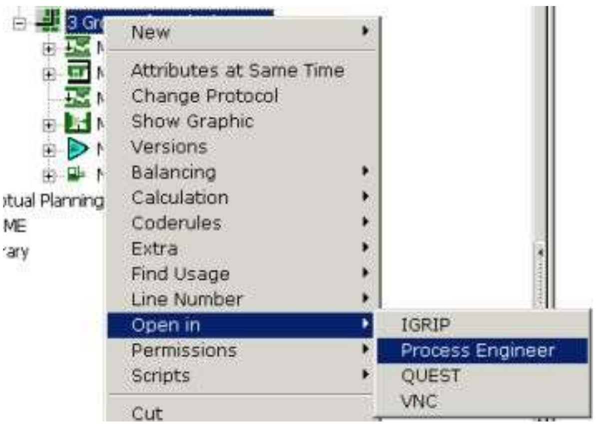


Figure 126: Open Resource View for Layout

4) Open the context menu and select **Graphic / Edit** in the resource view. You can edit the layout in this mode only. (*Please refer to the* Figure 123).

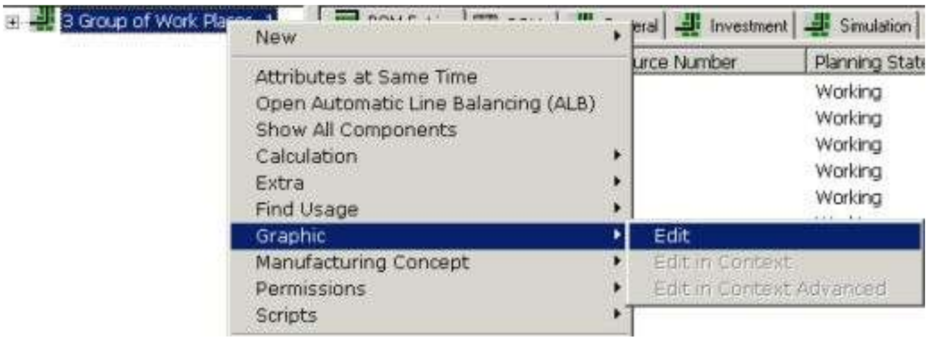


Figure 127: Open Layout for Editing

3.13.1.3 Hide Block Layout Resource

The block layout has no function with regard to the **workplace** plantypes; a workplace is always displayed in the layout as block layout. You can neither show nor hide a workplace.

1) Select the resource in the layout; assembly station in the example.
2) Open the context menu. Deactivate the field **Show Block Layout under General**.
3) Click **OK**.

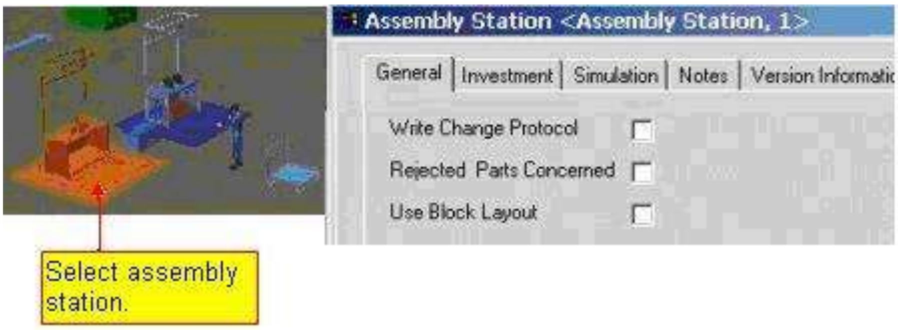


Figure 128: Deactivate Block Layout

4) The block layout resource (assembly station) is no longer shown in the layout.

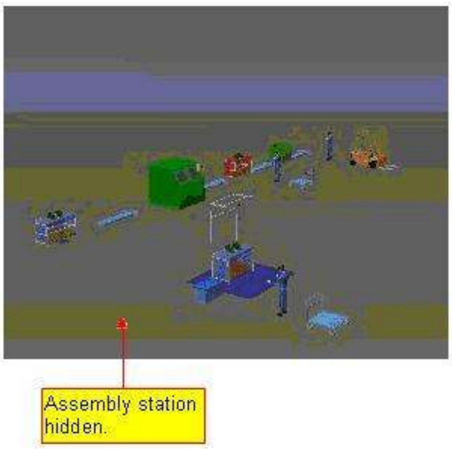


Figure 129: Block Layout Resource Hidden

3.13.1.4 Show Block Layout Resource

1) Select the resource (assembly station in the example) in the resource structure.

2) Open the context menu. Activate the field **Show Block Layout under General**.

3) Click **OK**.

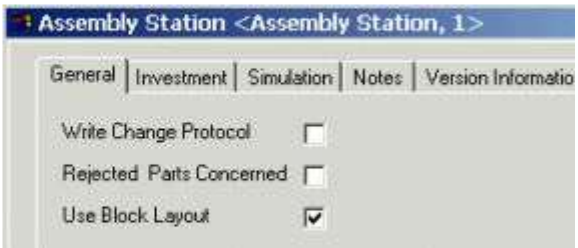


Figure 130: Activate Block Layout

4) The block layout resource (assembly station) is shown in the layout.

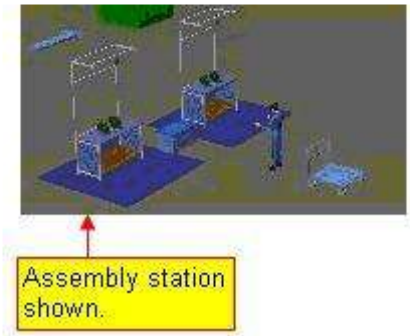


Figure 131: Block Layout Resource Shown

3.13.1.5 Change the Dimensions of Resources

The dimensions help in displaying the required space of the resources in the block layout. If you set the dimensions to zero, the block layout, as a rule, will not be displayed. Exceptions are forklift truck and transport.

Set required space and area

The required space and area are set with the dimensions length, width and height. You can set the required space and area for the following resources:

- Assembly station, processing station, test & measuring station, box pallet, shelf.

Set required area

The required area is calculated using the dimensions length and width. If the length or width is changed, the area is recalculated after the properties dialog is closed. The calculated area can be changed manually.

You can set the required area for the following resources:

- Area buffer, material trolley, and trolley.

Set length

The length is set for an interlaced transport. The length corresponds to the simple transport path between the linked processes along which the interlaced transport takes place.

- Interlaced transport.

No changes

Changes to the dimensions have no effect on the block layout with regard to both of these resources. The required space and area of a transport is set in the properties dialog of the transport's assigned transport tool and bunch. A forklift truck and a transport can be shown and hidden.

- Forklift truck
- Transport

Example of required space and area

Example

1) Select the resource in the layout. The assembly station is shown in the example.
2) Open the context menu. The dimensions are shown under **General**.

Figure 132: Dimension of the Resource - Assembly Station

3) Change the dimensions. In the example, the length, height, and width are each set to four meters. This means that changed space and area requirements are specified.

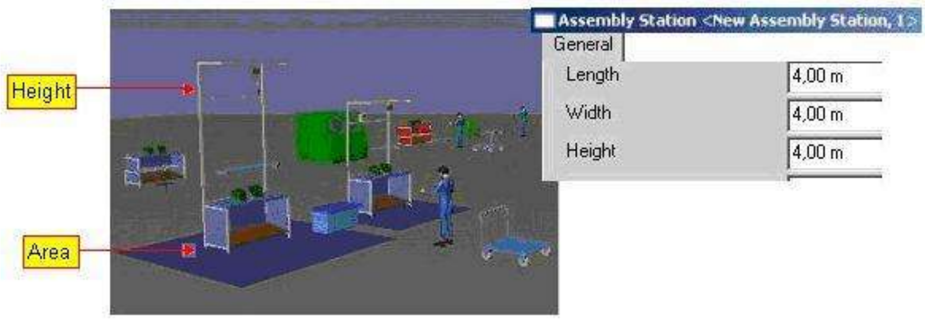


Figure 133: Required Space and Area Increased

Example of required area

Example

Only the required area is calculated for trolleys and material trolleys; the height is irrelevant.

4) Select the resource in the layout: trolley in the example.
5) Open the context menu. The dimensions are shown under **General**.

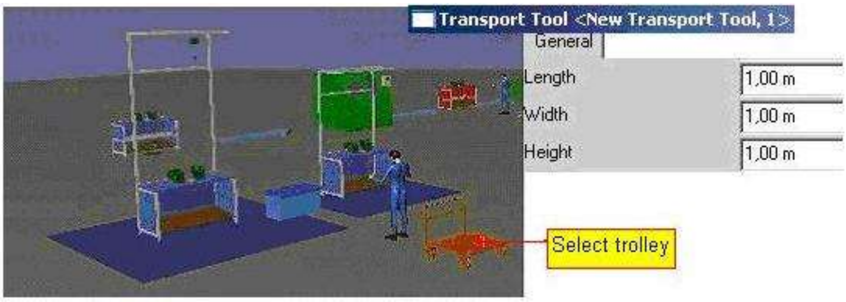


Figure 134: Dimension of the Resource – Trolley

6) Change the dimensions. Length and width are increased to 1.50 meters each in the example. Therefore a changed required area for the trolley is specified.

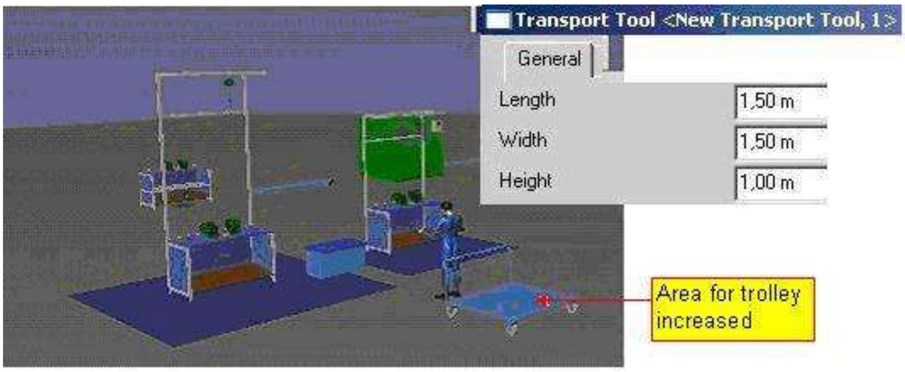


Figure 135: Required Area for Trolley Increased

Example: length

Example

Only the length can be changed for interlaced transports.

7) Select the resource in the layout: interlaced transport in the example.
8) Open the context menu. The dimensions are shown under **General**.

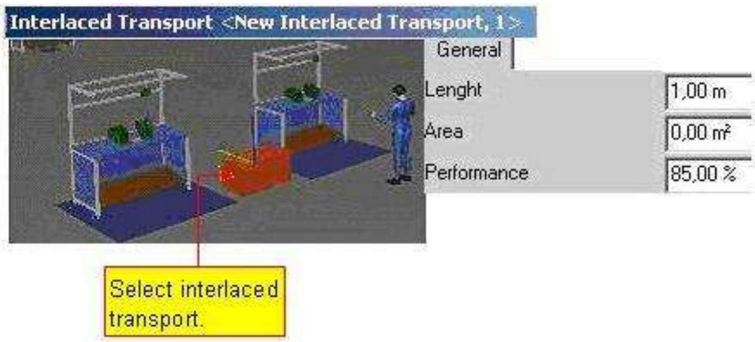


Figure 136: Dimensions of Interlaced Transport

9) Change the dimensions. in the example, the length is increased to 3.00 meters.

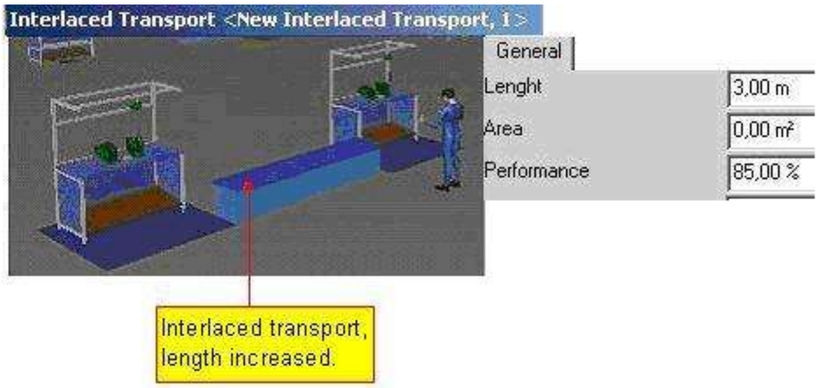


Figure 137: Length Increased to Three Meters

3.13.1.6 Assign Graphics

You can assign a forklift truck, trolley, and material trolley to the resource means of transport. The procedure is demonstrated in the following example (with a trolley):

Example

Assign trolley

The default means of transport assigned to the resource is a forklift truck.

1) Select the resource in the layout: forklift truck in the example.

2) Open the context menu. The transport tool set is displayed under **General / Means of transport data.**

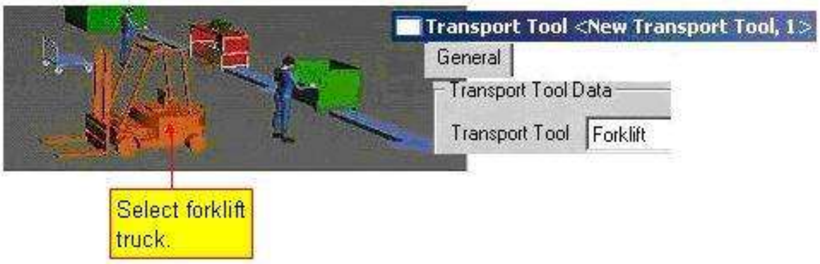


Figure 138: Transport Tool Forklift Truck

3) Select trolley.

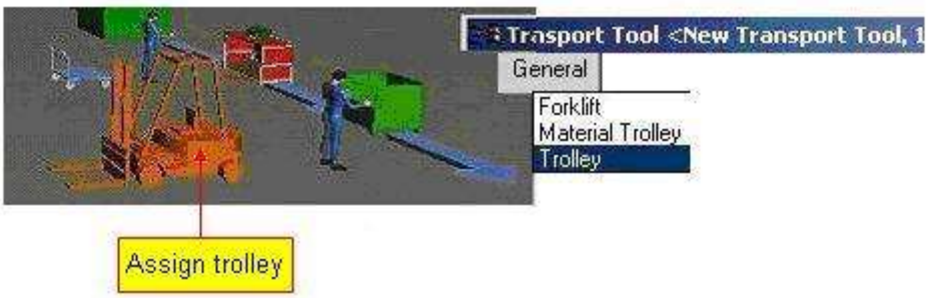


Figure 139: Select Trolley

4) Click **OK**. In the layout, the trolley is inserted instead of the forklift truck.

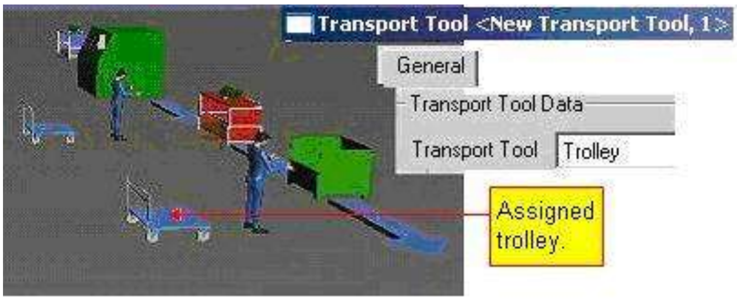


Figure 140: Trolley is Displayed in the Layout

Example

You can assign a box pallet, shelf and area buffer to the resource buffer. The following examples with a shelf and area buffer will familiarize you with the procedure.

Assign shelf

A box pallet is assigned as a default to the resource buffer.

5) Select the resource in the layout: box pallet in the example.

6) Open the context menu. The set buffer is displayed under **General / Buffer data**.

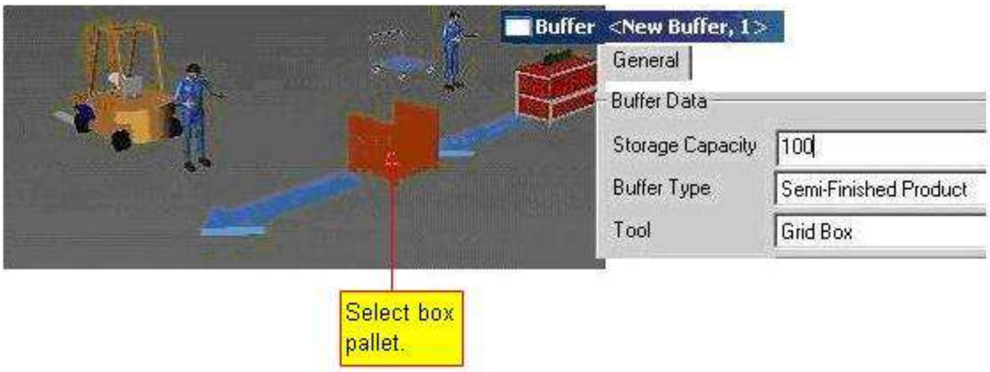
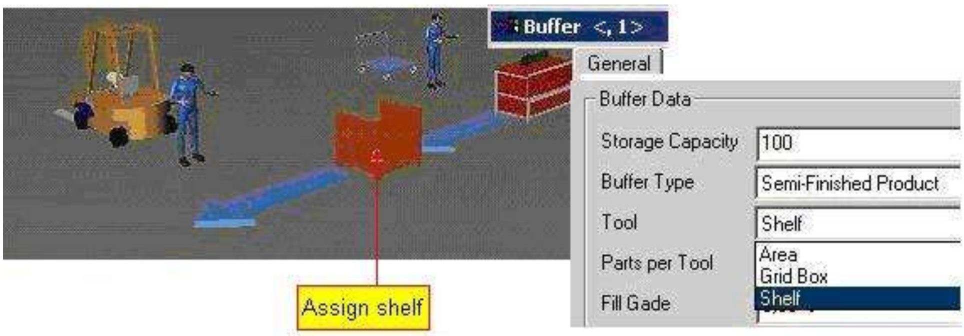


Figure 141: Box Pallet Buffer

7) Select the shelf.



8) Click **OK**. The shelf is inserted in the layout instead of the box pallet.

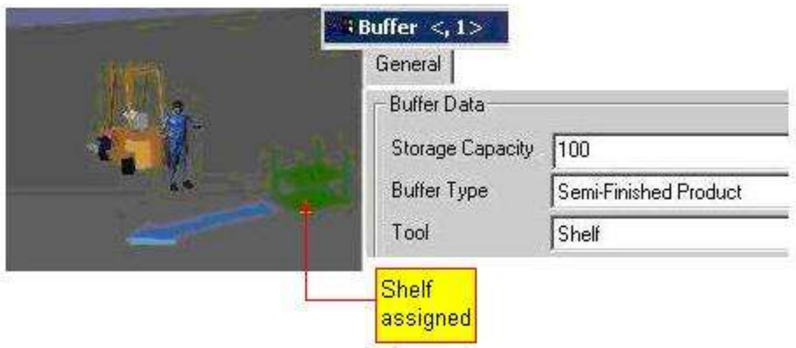


Figure 142: Buffer Shelf

Assign area buffer

9) Select the shelf in the layout, then open the properties dialog.
10) Select the area. Click **OK**. An area is inserted in the layout instead of the previously set shelf.

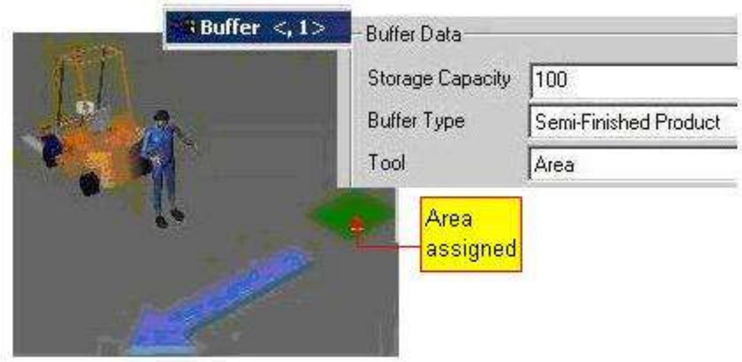


Figure 143: Area Buffer Inserted

Increase area buffer

The height is irrelevant to the area buffer.

11) Select the area buffer. Change both of the Dimensions length and width. In the example, the length and width of 1.00 meter have both been increased to 1.50 m.

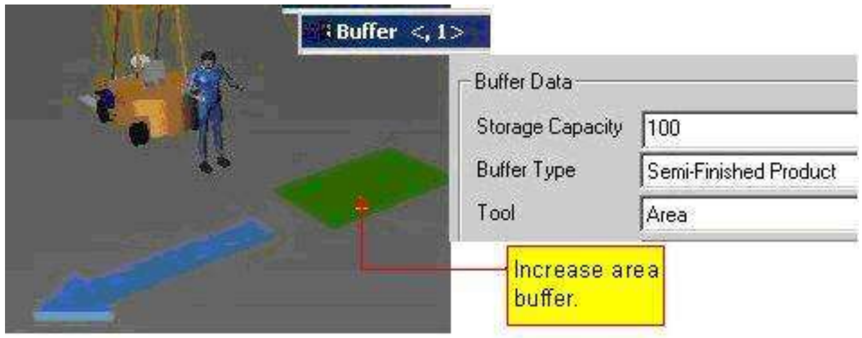


Figure 144: Area Buffer Increased

3.14 Importing DXF files

You can import DXF files for a Group of Work Places, a Building/Department and Area/Subdepartment with help of this script.

What is to be considered with an import of DXF files?

In directory ***\\DELMIA\PPRClient\Program\bin*** one of the two executable files "DXF2VRML.exe" or "DXF2VRMLWF.exe" has to be available.

DXF files can be imported only on the following plantypes:

- Group of Work Places
- Building/Department
- Area/Subdepartment

3.14.1 Starting DXF Import

Start and execution of the import are very easy.

1) Open in plantype Group of Work Places, Building/Department or Area/Subdepartment the context menu and select **Applications / DXF Import**.

➢ A dialog opens for selection of the DXF file. By default folder **\\DELMIA\PPRClient\data\cadpath\dxf** is open.

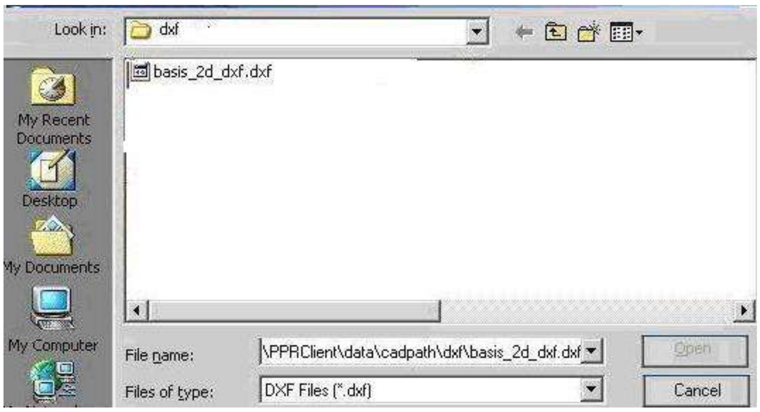


Figure 145: File Selection

2) Select the file, which is to be imported and click **Open**. With the help of button **Cancel** you can close the File Selector and also the DXF import.

3) The import will start immediately after the selection. A further action is not necessary.

➢ If you open now the graphic view, the imported DFX file will indicated.

➢ In the property dialog you can find the path and the imported DXF file under attribute graphic.

Figure 146: File Path

The scaling of the DXF files is defined in import script and can only be changed manually through editing the script.

In each case only one DXF file can be indicated.

In order to delete the DXF file, the entry in attribute graphic has to be deleted.

3.15 Calculate Depreciation Costs for Logistics Resources

Use the script *Calculate depreciations* to calculate the depreciations for the resource plantypes:

- Buffer
- Means of transport
- Interlaced transport and circulation

These plantypes are assigned to the resource plantype workplace in the structure. You can calculate the cumulated depreciation costs of the assigned resource for the plantype workplace.

The script calculates the annual depreciations costs on the basis of the investment data and the depreciation duration of a resource.

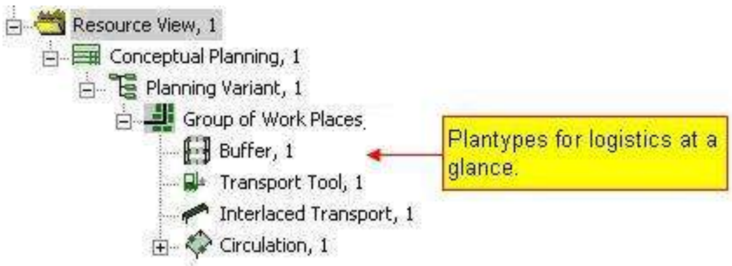


Figure 147: Logistics Resources

3.15.1 Set the Parameters for the Depreciation Costs

You can take the area costs and area side costs into account when calculating the depreciation costs. These costs are set in the premises that are assigned to a resource. Area costs are only calculated if an area value is defined for a resource.

The following examples will familiarize you with the various procedures. The calculation of the depreciation costs are shown with the resource means of transport in this example. The workplace group is assigned a further resource buffer for the calculation of the accumulated depreciation costs.

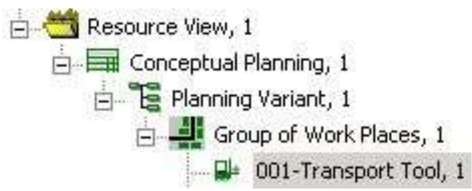


Figure 148: Depreciation for Means of Transport – Structure

No premises assigned

Area costs are taken into account only if premises are assigned to a resource. This message then appears when the calculation is executed.

Figure 149: Message – No Premises Assigned

3.15.1.1 Set Premises in the Project Library

The area costs are taken into account in the calculation of the depreciation costs on the basis of the premise data and the planned area of the resource.

Specify the following for the premises

- Area costs and area side costs
- Area multiplier and the percentage wage costs

Figure 150: Example of Premises Data

3.15.1.2 Set Parameters for Resources

Specify the following on the page General and Investment for the calculation of the depreciation costs of a resource:

General page

- Area, availability (performance) of the resource. In addition, the premises are assigned on this page. In the example, the DELMIA premises with the data on the area costs.

Figure 151: Parameters for General Page – Depreciation

Investment page

On this page the parameters of the investment costs are specified, for example investment sum, tool costs, or software costs.

It is absolutely necessary to specify the term of the depreciation duration for the calculation of the depreciation costs, three years in the example. *Please refer to the* Table 2.

Figure 152: Parameters for Investment Page - Depreciation

3.15.2 Calculate Depreciation Costs

In this example, the depreciation costs for the resource means of transport are calculated.

3.15.2.1 Start Calculation

1) Open the context menu of the resource and select **Scripts / Calculate depreciations**. The resource is means of transport in the example.

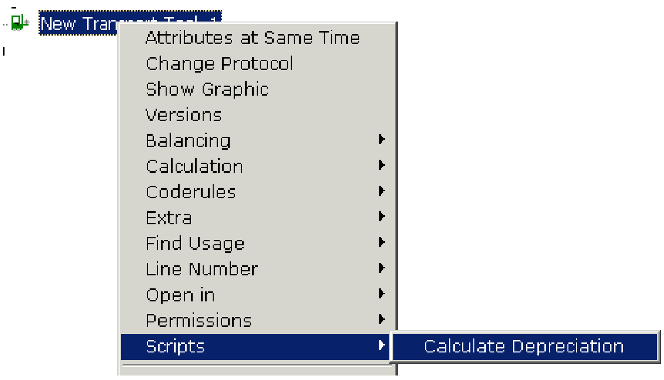


Figure 153: Start Calculation

2) Confirm this question with **Yes**. The area costs are taken into account

Figure 154: Message: Consider Area Costs

Result of the calculation with area costs

The calculated result is displayed on the page Investment under depreciation costs.

Figure 155: Result with Area Costs - Depreciation

Result of the calculation without area costs

10) Confirm the message with *No*. The area costs are not taken into account.

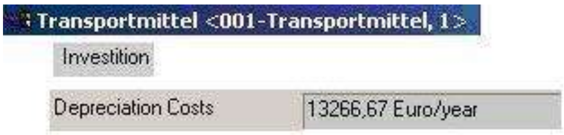


Figure 156: Result without Area Costs - Depreciation

3.15.3 Workplace Group

For the calculation of the sum of the depreciations, another resource buffer has been assigned to the workplace group in this example. The parameters of the investment data are shown on the Investment page.

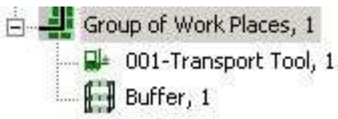


Figure 157: Structure of Workplace with Two Resources

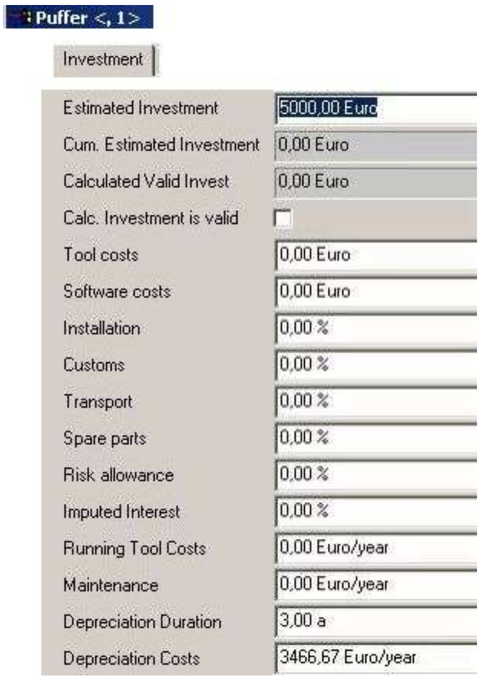


Figure 158: Investment Parameter Buffer

1) Open the context menu of the resource workplace group and select **Scripts / Cumulate Depreciation Costs**.

➢ The calculation yields a result only if the depreciation costs have previously been calculated for the individual resources (means of transport and buffer in the example).

Figure 159: Start Calculation - Workplace Group

2) The result is then shown on the page investment under Cumulate Depreciations.

➢ The results of the depreciation costs of both resources with area costs are considered in the calculation. The costs are shown in the workplace group in euros / hour.

Figure 160: Depreciation Costs for Workplace Group

3.16 Calculate Manufacturing Cost Multiplier for Resources

Use the script **Calculate space cost multiplier** to calculate a manufacturing cost multiplier (which in turn has been calculated on the basis of fixed and variable costs) for the resource plantypes.

- Assembly station
- Processing station and test & measuring station on the basis of a manufacturing costs multiplier calculated by fixed and variable costs. You can also enter this multiplier manually. In addition you can calculate the depreciation costs for this resource using this script.

Note

Either the calculated or manually entered manufacturing costs multiplier with a value greater than zero is considered for the calculation of the manufacturing costs per item. If no values exist, the default values are used for the calculation of the manufacturing costs per item; these default values are those that are set when entered in the dialog of the manufacturing costs calculation. Please refer to the Calculating Manufacturing Costs.

➢ If you have activated the field **Calculated investment is valid**, the multiplier is applied to the calculation of the manufacturing costs per item.

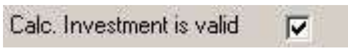


Figure 161: Activate Calculated Manufacturing Costs Multiplier

3.16.1 Calculation Rules

Please refer to the Introduction to Calculation Methods.

Manufacturing Costs multiplier

Calculated manufacturing costs multiplier = *Fixed manufacturing costs multiplier + variable manufacturing costs multiplier*

➢ The fixed manufacturing costs multiplier is calculated on the basis of the depreciation costs, working hours of the shift model, and the availability of the resource.

➢ The variable manufacturing costs multiplier is calculated on the basis of the variable costs specified for the resource multiplied by the wage costs.

➢ The wage costs consist of the wage cost group multiplied by the wage side costs of the premises. *Please refer to the* Table 4.

➢ The depreciation costs are calculated on the basis of the investment costs of a resource. (*Please refer to the* Figure 163).

3.16.1.1 Table of Definitions of Terms for Space Cost Calculation

Table 2: Definitions of Terms for Space Cost Calculation

POS	Department	Multiplier	Unit	Comments

POS	Department	Multiplier	Unit	Comments
1	I_g	Estimated investment	€	Enter investment
2	I_{kumg}	Cum. estimated investment	€	Sum of the children
3	I	Calculated valid investment	€	Sum of the children
4	K_{wz}	Tool costs	€	Component invest
5	K_{sw}	Software costs	€	Component invest
6	$K_{install}$	Installation	%	with regard to invest I_g
7	K_{zo}	Customs	%	with regard to invest I_g
8	K_t	Transport	%	with regard to invest I_g
9	K_{et}	Spare parts	%	with regard to invest I_g
10	K_r	Risk allowance	%	with regard to invest I_g
11	K_Z	Imputed interest	%	with regard to invest I_g
12	K_{lwz}	Running tool costs	€/year	
13	K_{wa}	Maintenance	€/year	
14	K_v	Other variable costs	€/h	
15	A	Depreciation duration	a	
16	K_a	Depreciation costs	€/year	Investmest divided by years of depreciation
17	FK_f	Fixed fabrication costs	€/h	
18	FK_v	Variable fabrication costs	€/h	
19	FK_1	Manufacturing costs multiplier	€/h	
20	FK_2	Entered manufacturing costs multiplier	€/h	
21	t_{min}	Total working minutes	min	Derived from the shift model, assuming a personnel utilization of 100%
22	V	Performance (availability)	%	See General page
23	LK	Wage costs	€/a	Wage group
24	NLK	Wage side costs	%/wage costs	Filed as wage side costs in premises

3.16.1.2 Formulas for the Calculations

Manufacturing costs multiplier

$$FK_1 = FK_f + FK_v$$

Figure 162: Formula for Manufacturing Costs Multiplier

Depreciation costs

$$K_a = \frac{I_g \times \{1+(K_{install} + K_{zo} + K_t + K_{et} + K_r)/100\} + K_{wz} + K_{sw}}{A} + \frac{I_g \times K_z}{2\times 100} + K_{lwz} + K_{wa}$$

Figure 163: Formula for Depreciation Costs - Space Cost Calculation

Fixed fabrication costs

$$FK_f = K_a / t_{min} \times 60 \times V/100 + A_{kh}$$

Figure 164: Formula for Fixed Manufacturing Costs

Variable fabrication costs

$$FKv = LK \times (1 + NLK/100) / t_{min} \times 60 + K_v$$

Figure 165: Formula for Variable Fabrication Costs

For definitions of terms for space cost calculation, *please refer to the* Table 2.

For the calculation of the depreciation costs and manufacturing costs multiplier for a resource, *please refer to the* Table 4.

3.16.2 Set Parameters in the Project Library

You can take the area costs and area side costs into account when calculating the manufacturing costs multiplier. These costs are set in the premises that are assigned to a resource. Area costs are only calculated if an area value is defined for a resource.

Set the parameters in the project library:

- Premises,
- Wage groups,
- Shift model.

An example involving the resource assembly station will show you how to use the script *Calculate space cost multiplier* to calculate the depreciation costs and the manufacturing costs multiplier. *Please refer to the* Example: Calculate Depreciation Costs and Example: Calculate Manufacturing Cost Multiplier.

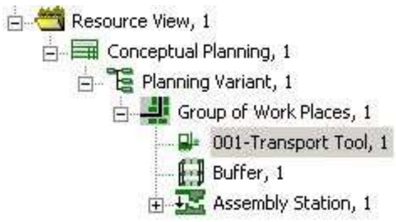


Figure 166: Calculate Manufacturing Costs Multiplier for Assembly Station

3.16.2.1 Set Premises in the Project Library

The area costs are taken into account in the calculation of the manufacturing costs multiplier on the basis of the premise data and the planned area of the resource.

Specify the following for the premises

- Area costs and area side costs
- Area multiplier and the percentage wage costs

Figure 167: Premises for Space Cost Calculation

3.16.2.2 Set Shift Model in the Project Library

You can execute the calculation of the space cost multiplier only if a shift model is assigned to the resource. A three shift model is used in the example.

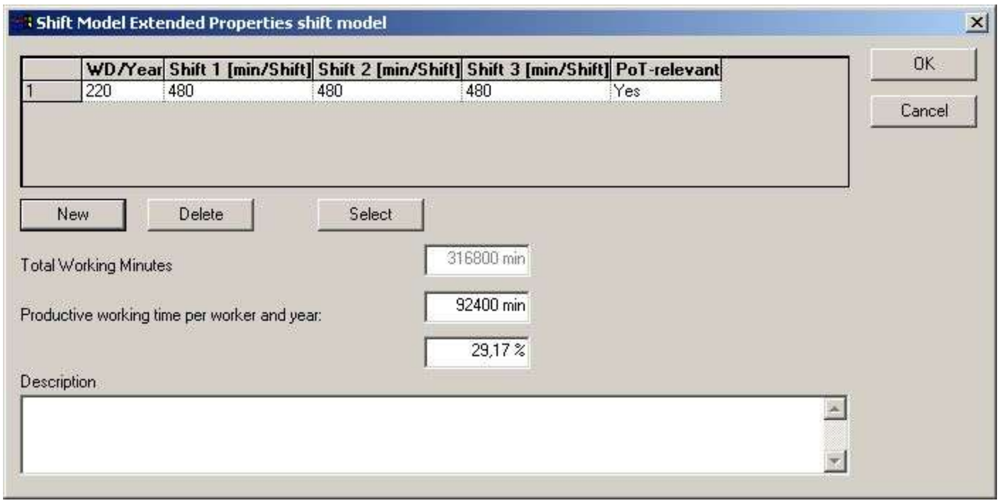


Figure 168: Assign Shift Model to the Resource

3.16.2.3 Set Wage Group in the Project Library

The wage group plus wage side costs of the premises are considered in the calculation of the variable costs.

1) Enter the annual cumulated wage costs for the amount of wage costs.

If variable costs cannot be calculated, only the fixed manufacturing costs multiplier is calculated:

- If you not assign a wage group, the space cost multiplier is set to zero for the calculation.
- If you have entered a value for the investment data of the resource in the field **Other variable costs**, only this value is used in the calculation of the variable cost multiplier.

Figure 169: Assign Wage Costs Group to the Resource

3.16.3 Messages When Executing the Space Cost Calculation

When executing space cost calculations, messages notify you that the space cost calculation either cannot be executed or can be executed only to a limited degree.

3.16.3.1 Start Calculation

1) Open the context menu of the resource and select **Scripts / Calculate space cost multiplier**. The resource is assembly station in the example.

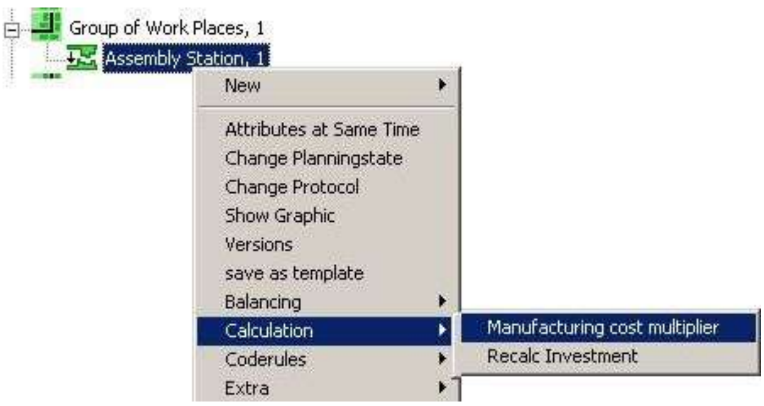


Figure 170: Start Space Cost Calculation

3.16.3.2 No Depreciation Duration Specified

The space cost calculation is not executed if this message appears.

What do I need to do?

1) Specify the depreciation duration on the Investments page.

Figure 171: Message: Depreciation Duration is Missing

3.16.3.3 No Shift Model Assigned

The space cost calculation is not executed if this message appears.

What do I need to do?

1) Assign a shift model on the General page.

Figure 172: Message: No Shift Model Assigned

3.16.3.4 No Premises Assigned

The space cost calculation is not executed if this message appears.

What do I need to do?

2) Assign a premises on the General page.

Figure 173: Message: No Premises Assigned

3.16.3.5 No Area Parameters Assigned

When this message appears, the space cost calculation is executed only to a limited extent, and the area costs are not calculated.

What do I need to do?

1) Either assign premises to the resource or specify an area for the resources on the page General.

Figure 174: Message: Area costs cannot be Calculated

3.16.3.6 No Wage Group Assigned

If this message appears, the space cost calculation can be executed only to a limited extent, and the variable costs are either calculated on the basis of *Other variable costs* or they are not considered at all.

What do I need to do?

1) Assign a wage group on the General page.

Figure 175: Message: No Wage Group Assigned

3.16.3.7 No Cumulated Investment Entered

If this message appears, the space cost calculation is executed only to a limited extent, and the depreciation costs may not be calculated at all if no further investments, for example tool costs, are specified.

What do I need to do?

1) Enter a cumulated investment for the resource.

Figure 176: Message: No Investment Specified

3.16.4 Example: Calculate Depreciation Costs

You can use the script *Calculate space cost multiplier* to calculate the depreciation costs for the resource plantypes *assembly station, processing station,* and *test & measuring station*.

- In order to be able to calculate the depreciation costs, a shift model and premises must be assigned to the respective resource. If these are not specified, the script *Calculate space cost multiplier* cannot be executed.

An example will familiarize you with the procedure.

The depreciation costs calculation for the assembly station is executed according to the parameters described in the following:

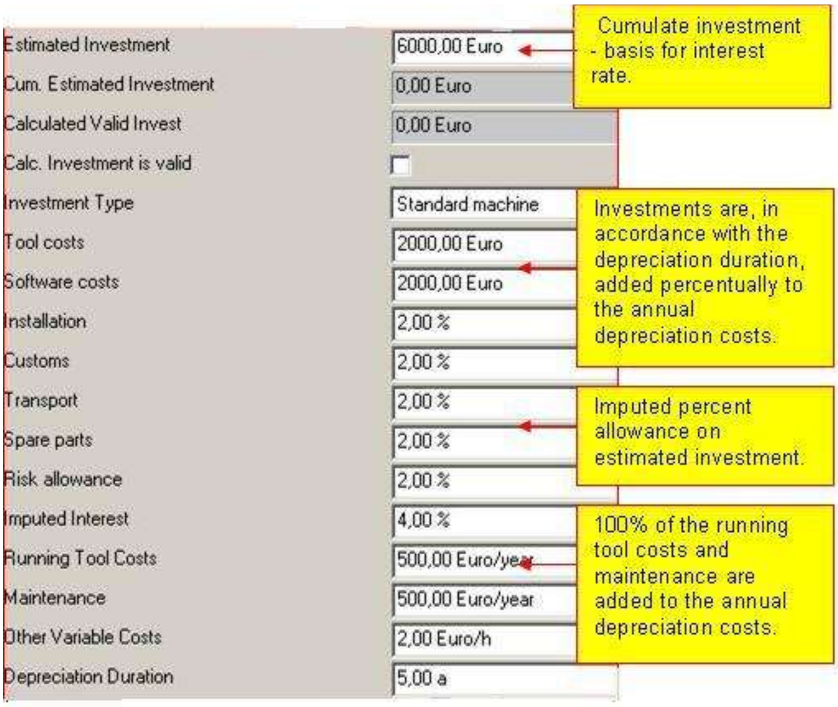


Figure 177: Example: Calculation of Depreciation Costs - Assembly Station

The annual depreciation costs are calculated with this formula (*Please refer to the* Figure 178). Hundred percent of the costs for annual maintenance and running tool costs are added to the calculated result of the formula.

The annual depreciation costs depend on the values you specify for the calculation:

- Estimated investments, tool costs, software costs
- Interest rate
- Percent allowances for installation, customs, etc.

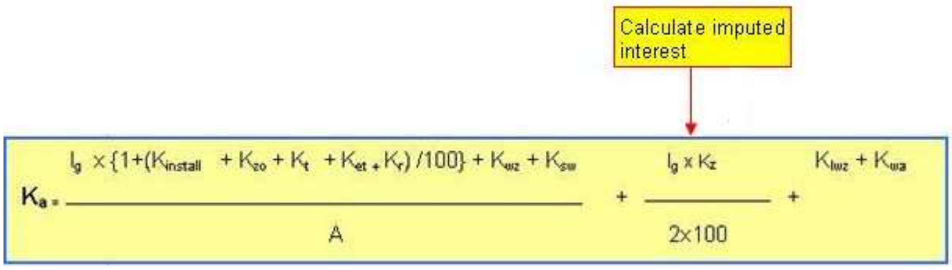


Figure 178: Formula for Depreciation Costs Space Cost Calculation

1) Start the calculation using the context menu. *Please refer to the* Figure 170.

An outline of the calculation of the annual depreciation costs is shown in the table. The calculation of the annual depreciation costs correspond to the values of the assembly station.

The results of this calculation example can be found in the table (positions 001, 002, 003, 004, 005) and in the chapter Results for the Example of an Assembly Station - Depreciation Costs.

Table 3: Example: Calculation of Depreciation Costs

	Calculate depreciation costs					
Pos.	**KZ.**	**Unit:**	**Calculation parameters**	**Values**	**Formulas**	**Calculation**
1	I_g	Euro	Estimated investment	6000 euros		
2	K_{wz}	Euro	Tool costs	2000 euros		
3	K_{sw}	Euro	Software costs	2000 euros		
4	A	a	Depreciation duration	5 years		
001	$\mathbf{K_{a1}}$	Euros / year	Calculate annual depreciation costs for investment costs		$\mathbf{K_{a1}} = I_g + K_{wz} + K_{sw}$ / A	**2000** = 6000 + 2000+ 2000/ 5 years
7	K_z	%	Imputed interest	4%		
002	$\mathbf{Z_{kal}}$	Euros / year	Calculate annual imputed interest costs		$Z_{kal} = I_g \times K_z$ / 2 x100	**120** = 6000 x4 /2x 100
003	$\mathbf{K_{a2}}$	Euros / year	Calculate annual depreciation costs with positions 001 + 002		$\mathbf{K_{a2}} = K_{a1}$ **+** Z_{kal}	**2120** = 2000 + 120
8	$K_{install}$	%	Installation	2%		
9	K_{zo}	%	Customs	2%		
10	K_t	%	Transport	2%		
11	K_{et}	%	Spare parts	2%		
12	K_r	%	Risk allowance	2%		
004	$\mathbf{K_{a3}}$	Euros / year	Calculate annual depreciation costs with the allowance from positions 8+9+10+11+12 + 2 + 3 + 002		$\mathbf{K_{a3}} = I_g \times$ (1+ ($K_{install}$ + K_{zo} + K_t + K_{et} + K_r) /100) +K_{wz} + K_{sw} A + **Zkal**	**2240** = 6000x (1+ 2% +2% +2% +2% +2% / 100 + 2000 + 2000 5 years + 120 euros / year
13	K_{lwz}	Euros / year	Running tool costs	500 euros / year	100% of the respective value is added to the annual depreciation costs.	2240 + 500
14	K_{wa}	Euros / year	Maintenance	500 euros / year		2240 + 500
005	$\mathbf{K_a}$	Euros / year	Annual depreciation costs with allowance of positions + 13 + 14		$K_a = K_{a3} + K_{lwz} + K_{wa}$ Also see the formula: Figure 178	**3240** = 2240 + 500 + 500

3.16.4.1 Results for the Example of an Assembly Station - Depreciation Costs

The results of the calculation are shown in outline form.

Depreciation costs - investments

In this example, the annual depreciation costs are calculated on the basis for the investments: estimated investments, tool costs, and software costs.

This result corresponds to line **001** in the table: *Please refer to the* Table 3.

Figure 179: Annual Depreciation Costs – Basic Investments

Depreciation costs plus imputed interest

In this example, the imputed interest is calculated on the basis of annual depreciation costs:

This result corresponds to line **003** in the table: *Please refer to the* Table 3.

Figure 180: Annual Depreciation Costs – Imputed Interest for Investments

Depreciation costs plus allowances

In this example, the allowances for installation, customs, transport, spare parts, and risk allowance are calculated on the basis of annual depreciation costs:

This result corresponds to line **004** in the table:

Figure 181: Annual Depreciation Costs – Allowance for Transport, Customs, etc.

Total depreciation costs

In this example, the annual costs for maintenance and tools costs are calculated on the basis of the annual depreciation costs:

This result corresponds to line **005** in the table.

Figure 182: Annual Depreciation Costs – Total

Depreciation costs – resource assembly station

All parameters for the calculation of the depreciation costs with result at a glance.

Figure 183: Result of Depreciation Costs – all Parameters

3.16.5 Example: Calculate Manufacturing Cost Multiplier

In this example, the manufacturing costs multiplier (FK_1) is calculated for the resource assembly station. The manufacturing costs multiplier is calculated on the basis of fixed and variable costs.

Apart from the specifications from the premises and the wage group, a value of two euros is specified in the field **Other variable costs** for the calculation of the variable costs. Hundred percent of this value is added to the calculated variable costs. *Please refer to the* Table 4.

3.16.5.1 Parameters for the Calculation Example – Assembly Station

Parameters for assembly station – General page

Figure 184: Parameters for Assembly Station Example – General Page

Parameters for assembly station – Investment page

Figure 185: Parameters for Assembly Station Example – Investment Page

The results of this calculation example can be found in Table 4 (positions 006, 007, 008 an in the chapter Results of the Example of an Assembly Station - Manufacturing Costs Multiplier.

Table 4: Example: Calculate Manufacturing Costs Multiplier

	Calculate manufacturing costs multiplier					
Pos.	**KZ.**	**Unit:**	**Calculation parameters**	**Values**	**Formulas**	**Calculation**
005	**K_a**	Euros / year	Annual depreciation costs with allowance of the positions		$K_a = K_{a3} + K_{lwz} + K_{wa}$ Also see the formula: Figure 178 plus .	**3240** = 2240 + 500 + 500
Calculate fixed manufacturing costs multiplier						
1	t_{min}	Minutes	Total working minutes from the shift model	316 800 min		
2	V	%	Availability of the resource	95%		
3	A	m²	Area of the resource	10 m²		
4	A_k	Euros / m²	Area costs per square meter (from premises)	80 euros / m²		
5	A_{kn}	Euros / m²	Area side costs from premises	40 euros / m²		
6	A_{kf}		Area multiplier from	1,5		

	Calculate manufacturing costs multiplier					
			premises			
0001	A_{kj}	Euros / year	Calculate area costs per year		$A_{kj} = A \times (A_k + A_{kn}) \times A_{kf}$	**1800** = 10x(80 + 40) x 1,5
0002	A_{kh}	Euro/h	Calculate area costs per hour		$A_{kh} = A_{kj} / t_{min} \times 60$	**0.341** = 1800/31680 0 x 60
006	FK_f	Euros / h	**Calculate fixed manufacturing costs multiplier**	**1 euro / h**	$FK_f = K_a / t_{min} \times 60 \times V/100 + A_{kh}$	**1.00** = 3240/ 316800 x 60 x 95/100 + 0.341
Calculate variable manufacturing costs multiplier						
7	LK	Euros / year	Wage costs from wage group	100 000 euros /year		
8	NLK	%/wage costs	Percent rate of the wage side costs from premises	50 %		
9	K_v	Euros / h	Other variable costs of the resource	2 euros / h		
007	FK_v	Euro / h	**Calculate variable manufacturing costs multiplier**	**30.41 Euro / h**	$FKv = LK \times (1 + NLK/100) / t_{min} \times 60 + K_v$	**30.41** =100 000 X (1 +50/100) /316800 x 60 + 2
008	FK_1	Euros / h	**Calculate manufacturing costs multiplier**	**31.41 euros / h**	$FK1 = FK_f + FKv$	**31, 41** = 1 + 30,41
10	FK_2	Euros / h	Enter manufacturing costs multiplier			

3.16.5.2 Results of the Example of an Assembly Station - Manufacturing Costs Multiplier

The results of the calculation are shown in outline form.

In this example, the manufacturing costs multiplier (FK_1) is calculated on the basis of the parameters on the General and Investment pages:

- The result FK_f corresponds to line **006** in the table
- The result FK_v corresponds to line **007** in the table
- The result FK_1 corresponds to line **008** in the table *Please refer to the* Table 4.

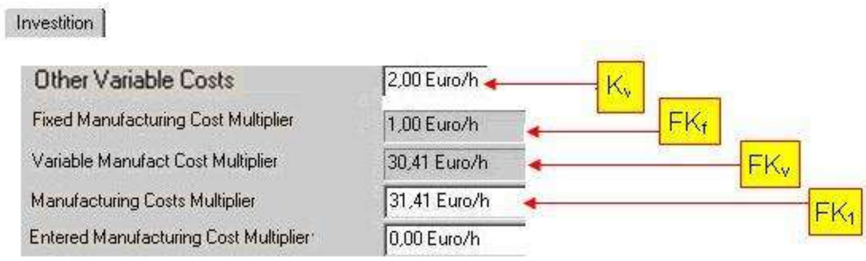


Figure 186: Result of Calculation Example for Manufacturing Costs Multiplier FK_1

Manufacturing costs multiplier – Resource assembly station

All parameters for the calculation of the manufacturing costs multiplier with its result at a glance.

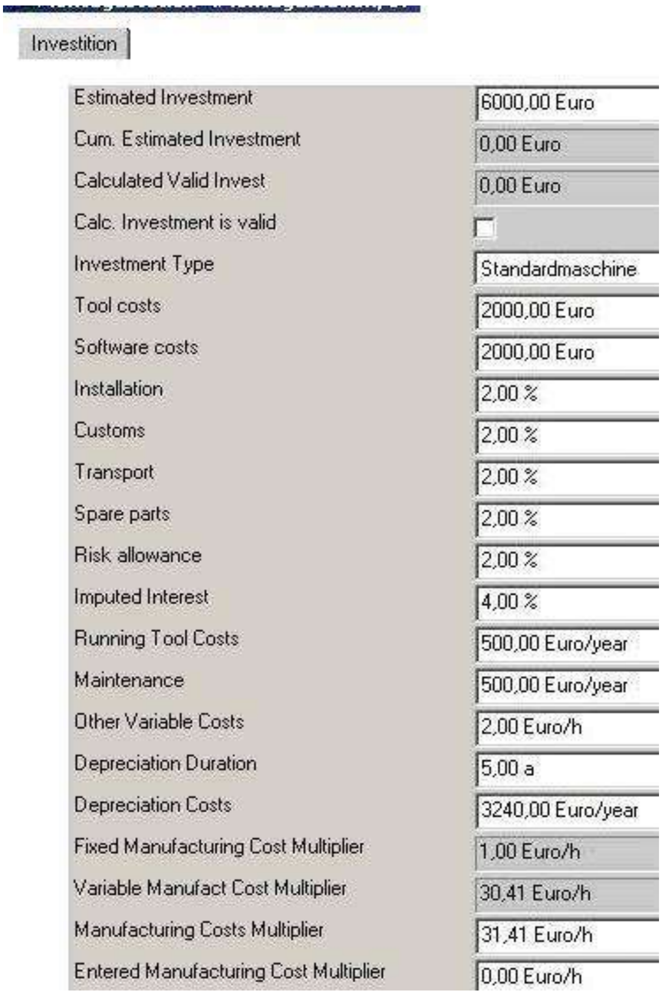


Figure 187: Result of Manufacturing Costs Multiplier – all Parameters

4. Calculating Manufacturing Costs

Use this script to calculate the manufacturing costs for a product per item. The calculation of the manufacturing costs is based on the well-known REFA methods.

On the basis of the calculation of manufacturing costs you will receive individual evaluations of the item costs for material and tool depreciation costs and manufacturing costs, which, when added together, result in the product's manufacturing costs per item.

You can execute the calculation of manufacturing costs only if you have linked the product, processes, and resources with one another. The process times are used in calculating the fabrication costs for the evaluation.

The manufacturing costs per item can be calculated for the following resources assigned to the workplace group:

- Assembly station
- Processing station
- Test & measuring station
- Workplace

The calculated results of the evaluation are shown in an evaluation table created in Excel. The result of the evaluation has no effect on the ascertained calculation parameters (for example, depreciation costs or manufacturing costs multiplier) of the linked resources.

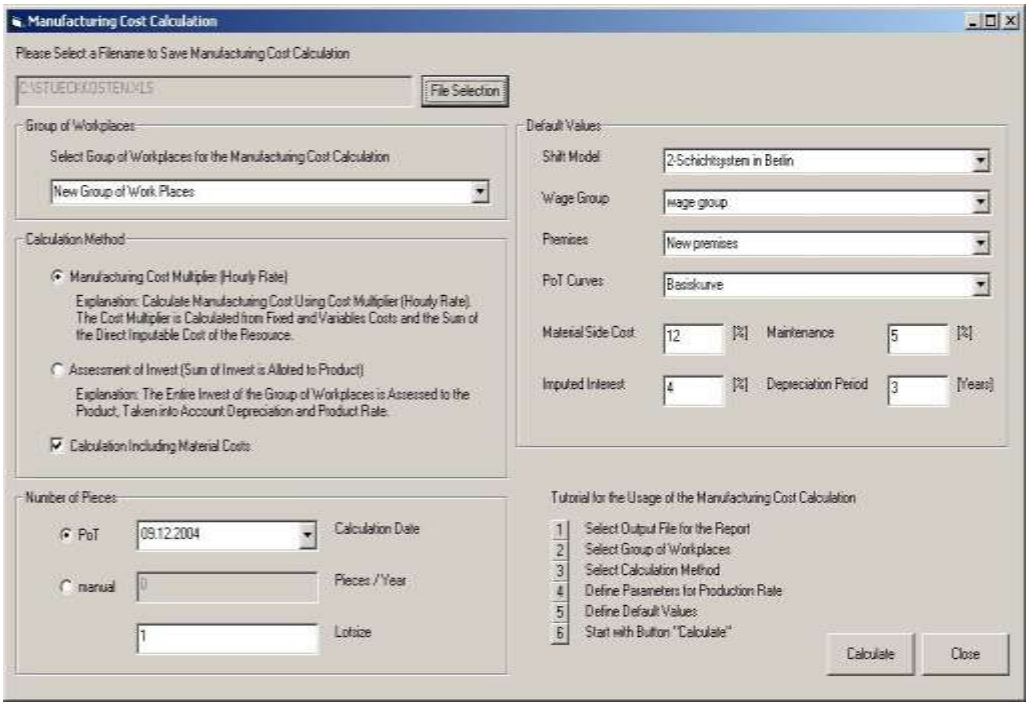


Figure 188: Manufacturing Costs Dialog

4.1 Calculating Manufacturing Costs

The calculation of manufacturing costs per item is based on several calculation steps that will be discussed in this chapter. Major calculation steps will be explained in more detail with examples.

- For information on calculation methods, *Please refer to the* Introduction to Calculation Methods.
- For information on calculating the tool costs, *Please refer to the* Calculating Tool Costs for Product.
- For information on the calculation of the depreciation costs, *Please refer to the* Calculate Depreciation Costs Using Manufacturing Costs.
- For information on setting in the calculation of manufacturing costs dialog, *Please refer to the* Edit Calculation of Manufacturing Costs Dialog.

4.2 Introduction to Calculation Methods

There are two ways to calculate the manufacturing costs of a product:

- On the basis of a calculated space costs multiplier. For information on calculating the space costs multiplier, *Please refer to the* Calculate Manufacturing Cost Multiplier for Resources.
- On the basis of an investment allocation. *Please refer to the* Using Investment Allocation.

4.2.1 Using the Space Costs Multiplier

This calculation method is also referred to as the workshop-oriented calculation. The space costs multiplier (euro / h) is used to calculate the manufacturing costs / item:

Manufacturing costs / item =

(TE + (TR/batch size) x space costs multiplier * PoT_parts /100%) / 60

Figure 189: Formula for Calculating Fabrication Costs - Space Costs Multiplier

No manufacturing costs multiplier of the resource is calculated
In this case, the default values specified in the calculation of manufacturing costs dialog are used for the calculation of the space costs multiplier; these values include shift model, wage group, premises, maintenance, depreciation duration and imputed interest.

Manufacturing costs multiplier of the resource is calculated
In this case, the calculated manufacturing costs multiplier (fixed plus variable costs) of the resource is used for the calculation of the space costs multiplier.

Calculate manufacturing costs
The manufacturing costs per item are the result of the workshop-oriented calculation method; this method involves adding the material costs / item, tool costs / item and manufacturing costs / item.

The item number for tool costs is calculated using the assigned PoT curve.

4.2.2 Using Investment Allocation

This calculation method is also referred to as the assembly-oriented calculation. In this calculation method, the fabrication costs / item are calculated using the variable costs (euros / h) of the resource:

Manufacturing costs / item =

(TE + (TR/batch size) x variable costs / PoT percentage)/60

Figure 190: Formula for Calculating the Fabrication Costs – Variable Costs

No variable costs calculated for the resource

The default values specified in the Calculation of manufacturing costs dialog are used for the calculation of variable costs, such as shift model, wage group, and premises.

Variable costs calculated of the resource

The calculated variable costs of the resource are used for the calculation of variable costs.

Calculate manufacturing costs

The manufacturing costs per item are calculated based on the assembly-oriented calculation method, i.e. by adding the existing material costs / item, tools costs / item, fixed costs / item – fixed costs are the calculated annual depreciation costs / item - and the fabrication costs / item.

The item number for tool costs and fixed costs is calculated using the assigned PoT curve.

4.2.3 Calculate Material Costs

The material costs are calculated using the individual material costs and indirect material costs. The percentage rate for indirect material costs can be specified for the respective product as well as for the default values in the calculation of manufacturing costs dialog.

If the indirect material costs percentage rate is specified for a product, this percentage rate is always used for the calculation.

The item number is always set for the product. *Please refer to the* Calculating Material Costs for Products.

4.2.4 Calculate Tool Costs

You must link the processes to fixtures in order to be able to calculate the tool costs. *Please refer to the* Calculating Tool Costs for Product.

Tool costs / item = costs of fixtures / item number

Figure 191: Formula for Calculating Tool Costs / Item

The item number is calculated using the assigned PoT curve.

4.3 Calculating Tool Costs for Product

In order to calculate the tool costs, the processes are linked with fixtures that are created when the product and resource are linked to one another. Fixtures are resources, such as tools or transport containers, that are required for the manufacture of a product.

This link is necessary in order to execute a complete calculation of manufacturing costs with tool costs; all further data are calculated either using the default values in the manufacturing costs dialog or the data from the space costs calculation.

In this example, both products *Engine block* and *Roller bearings* are linked to the resource *Assembly station*. The processes *Assembly* and *Roller bearing assembly* have been created for the link.

For information on linking products and resources, *Please refer to the* Assigning Products to Resources.

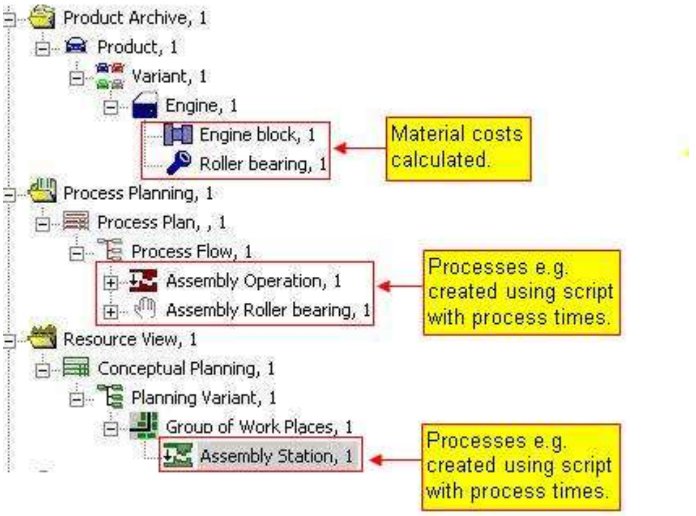


Figure 192: Structure – Link between Product and Resource

4.3.1 Creating Links to Processes

All standardized fixtures are available in the system library in the directory *Work System Components*. You can create a link directly via the system library or via the general finder. In the finder you have the additional option of searching according to parameters, such as the price or dimensions.

In the example, the link is executed via the finder. A table press and a means of transport is assigned to each of the two processes.

1) Open the general finder and enter the search term. In the example, the two search terms are *Pneumatic Tablepresses (WSC)* and *Partbins (WSC).*
2) Click **Search next** button. The system elements searched for are displayed in the list view. In the example, these include various presses and transport units.
3) Select the system element in the list view.

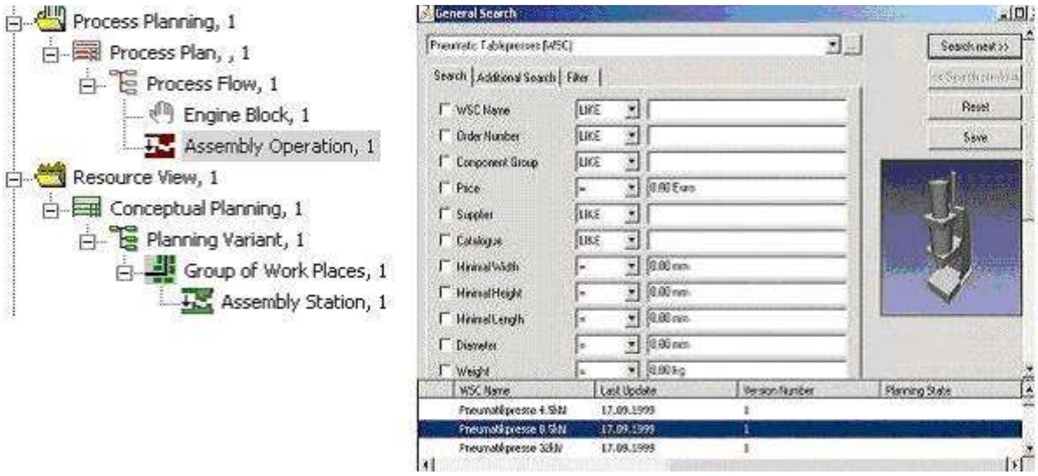


Figure 193: Display and Link System Elements using the Finder

4) Drag the system element to the process.

➢ You can choose whether the price and the dimensions of the system element are applied for the link.

5) If you confirm the message with **Yes**, the price and dimensions are applied. *Please refer to the* Linking Parts Bins to Products.

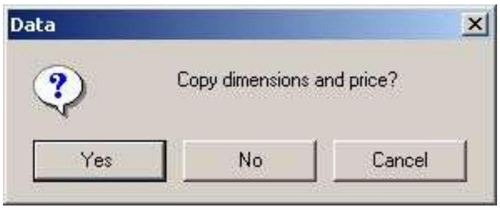


Figure 194: Price and Dimensions Applied

Result of the link

The linked fixtures are displayed in the list view of the selected process, under the relation *Process uses resource*.

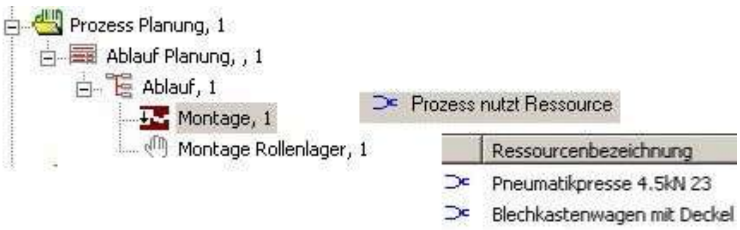


Figure 195: Display the Linked Object

4.4 Execute Calculation of Manufacturing Costs

4.4.1 General Information

The results of the calculation of manufacturing costs are displayed in an Excel table. In this Excel table, the complete calculation method that was used for the respective calculation is shown. The result of the selected calculation method yields the calculated manufacturing costs per item.

The script can be executed only for these products:

Figure 196: Script can be executed only for these Products

4.4.1.1 Start Calculation of Manufacturing Costs

1) Open the context menu of the product and select **Calculate manufacturing costs**.

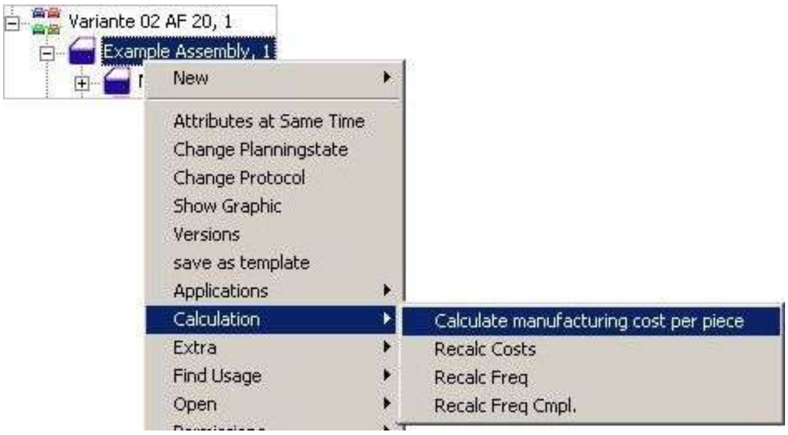


Figure 197: Start Calculation of Manufacturing Costs

4.4.2 Edit Calculation of Manufacturing Costs Dialog

Start the calculation of manufacturing costs in the dialog Calculation of manufacturing costs. The dialog appears of you have started the script *Calculate manufacturing costs* on the product.

In the dialog, you both select the calculation method and set the calculation parameters according to which the calculation of manufacturing costs will be executed.

The calculated values of the calculation of manufacturing costs have no direct effect on the calculation of basic values used for the product, process, and resource structure.

Below all of the calculation parameters are described individually.

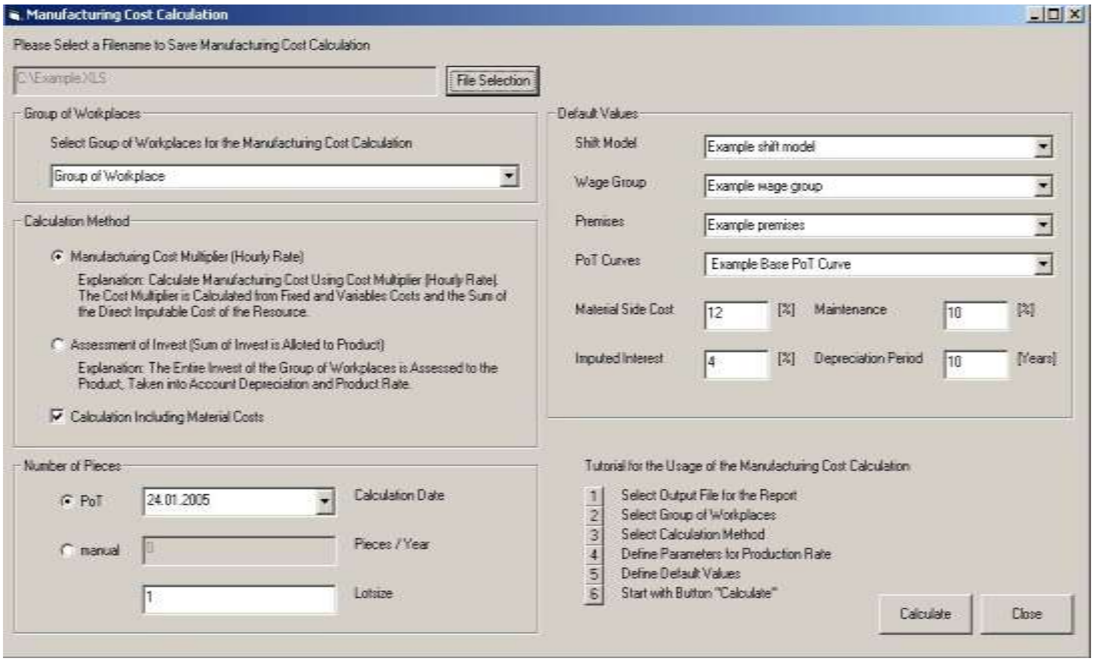


Figure 198: Overview of Dialog Calculation of Manufacturing Costs

The operating instructions show the sequence of work steps briefly and concisely.

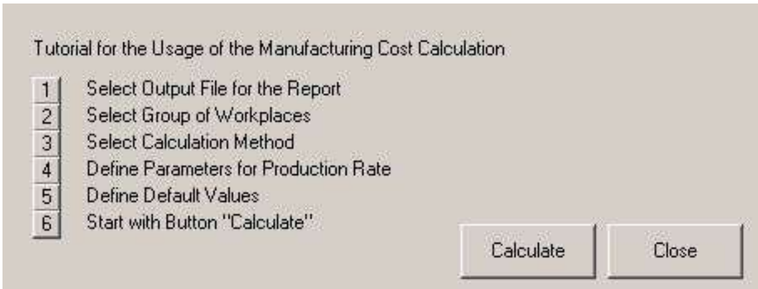


Figure 199: Operating Instructions for the Calculation of Manufacturing Costs

4.4.2.1 Save Evaluation Table

Save the evaluation table under a name in a directory using the button **Select file**. Save a separate file for every evaluation.

4.4.2.2 Select Workplace Group

Under Workplace group select the work group for which manufacturing costs are to be calculated. You can select only workplace groups which were previously linked to the product via the script. *Please refer to the* Assigning Products to Resources.

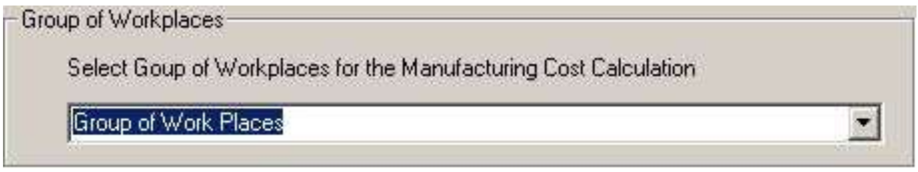


Figure 200: Select Workplace Group

4.4.2.3 Set Calculation Method

Select the calculation method. *Please refer to the* Introduction to Calculation Methods.

The material costs are calculated only if you have activated the field **Calculation Including Material Costs**.

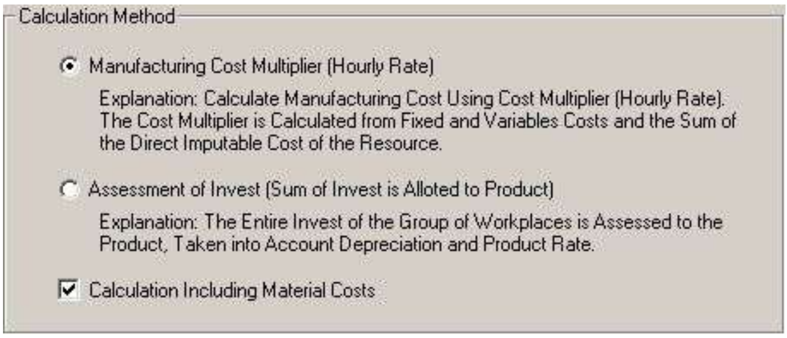


Figure 201: Select Calculation Method

4.4.2.4 Set Annual Requirement

You can specify the annual requirement either manually or by using the PoT curve. If you use the PoT curve, the item number for the annual requirement of a product is specified.

The annual requirement is used for the calculation of the tool costs / item and the fixed costs / item.

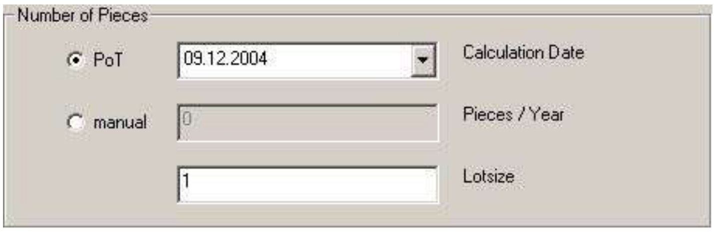


Figure 202: Specify Item Number

1) Manual specification of the annual requirement.

Figure 203: Annual Requirement Specified Manually

4.4.2.5 Set Batch Size

The batch size us used for calculating the manufacturing costs / item. The default batch size is **one**. The batch size takes a proportional effect on the setup time.

Figure 204: Specify Batch Size for Manufacturing Costs / Item

4.4.2.6 Set Default Values

Default values such as shift model, wage groups, premises, and PoT curves must be created in the project in advance. You can choose among these default values in the dialog for the calculation of the manufacturing costs / item.

Default values such as indirect material costs, imputed interest, maintenance, and depreciation duration can be entered directly into the respective fields. These fields are set with these default values, *Please refer to the* Figure 205.

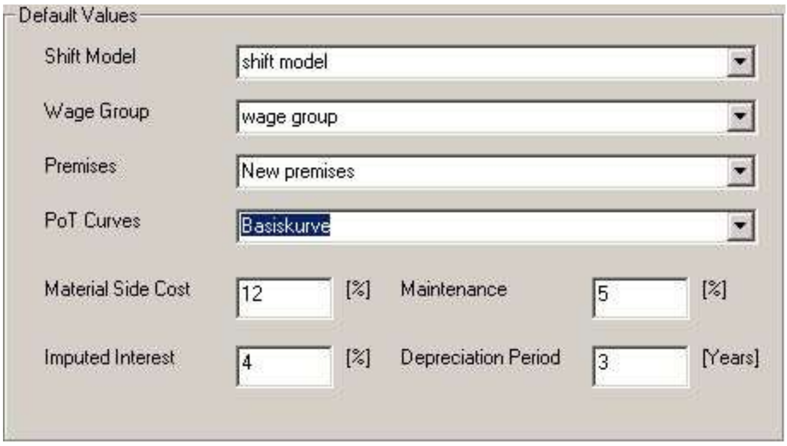


Figure 205: Default Values for Calculation of Manufacturing Costs

4.4.2.7 Using Default Values

Shift Model, Premises, Wage Group

These default values are used for the calculation of the manufacturing costs / item if no manufacturing costs multiplier has been calculated for a resource. *Please refer to the* Example 1 processing station.

Using PoT Curves

The default value **PoT curve** is used for the calculation of the manufacturing costs / item if no PoT curve has been assigned to the process or if the assigned PoT curve is no longer valid on the date of the calculation.

Using Indirect Material Costs

The default value **indirect material costs** is used for the calculation of the manufacturing costs / item if no percentage rate for the indirect material costs of the product is specified.

Imputed Interest

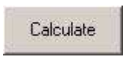
The default value **imputed interest** is used for the calculation of the manufacturing costs / item if no percentage rate for the imputed interest is specified for the resource.

Maintenance

The default value **maintenance** is used for the calculation of the manufacturing costs / item if no value for the annual maintenance is specified for the resource.

Using Depreciation Duration

The default value **depreciation duration** is used for the calculation of the manufacturing costs / item if no time has been specified for the annual depreciation of the resource.



1) Click **Calculate** in order to start the calculation of manufacturing costs.

4.4.2.8 Confirm Item Number

After you have started the calculation, you can confirm the specified annual requirement (PoT curve or manual entry) in the item number dialog before executing the calculation.

1) Click **OK** and the calculation is executed.

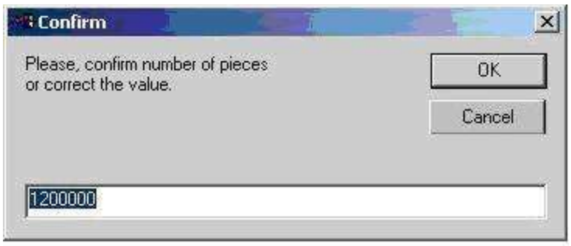


Figure 206: Dialog: Confirm item Number

4.4.2.9 Terminate Calculation of Manufacturing Costs

You can execute an unlimited number of calculations without closing the dialog **Calculation of manufacturing costs**. To close the dialog, click **Terminate**.

4.4.3 Calculation Parameters - Examples of Calculating Manufacturing Costs

The examples of calculating manufacturing costs described on the following pages are shown on the basis of these parameters. *Please refer to the* Calculating Material Costs for Products.

Calculated Material Costs – Group Example

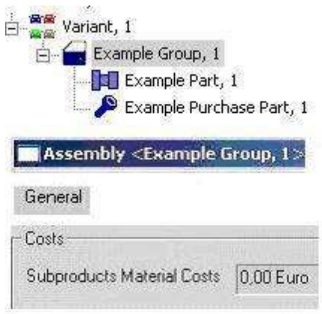


Figure 207: Example of Material Costs for the Calculation of Manufacturing Costs

Calculated valid time - process flow

Figure 208: Example of Cumulate Calculated Times - Process

Calculated depreciation costs – workplace group

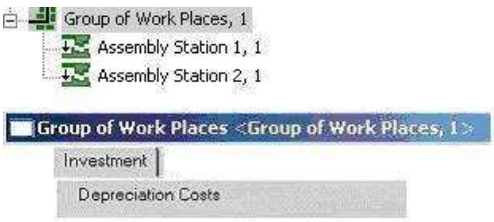


Figure 209: Example of Depreciation Costs for the Calculation of Manufacturing Costs

Please refer to the Table 3.

Calculation parameters, Calculation of manufacturing costs dialog

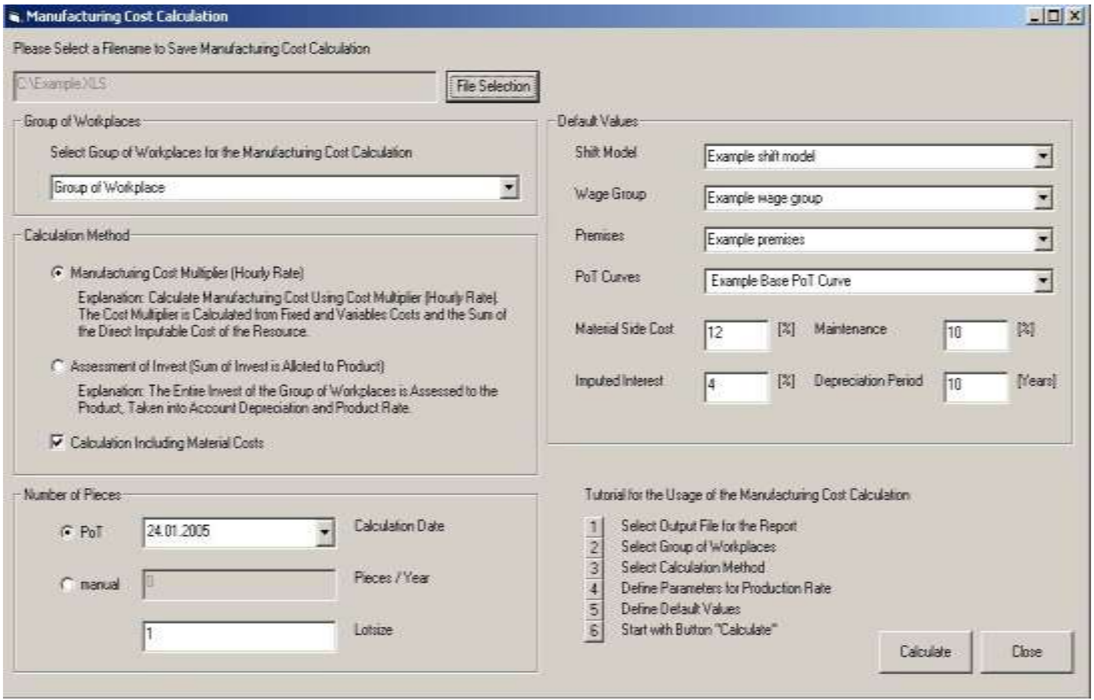


Figure 210: Example Values for the Calculation of Manufacturing Costs

Calculated manufacturing costs multiplier – assembly station

Please refer to the Table 4.

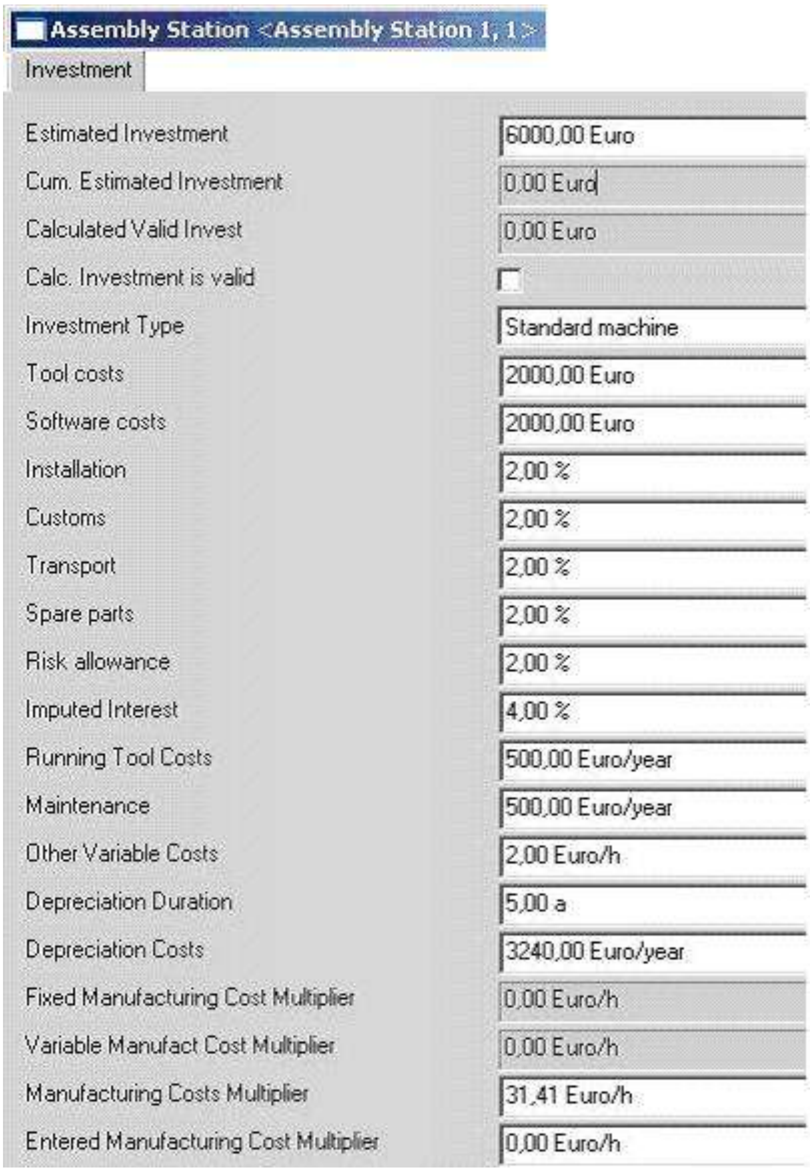


Figure 211: Example of a Manufacturing Costs Multiplier for the Calculation of Manufacturing Costs

Investment costs, processing station

The manufacturing costs multiplier is calculated using the default value of the manufacturing costs

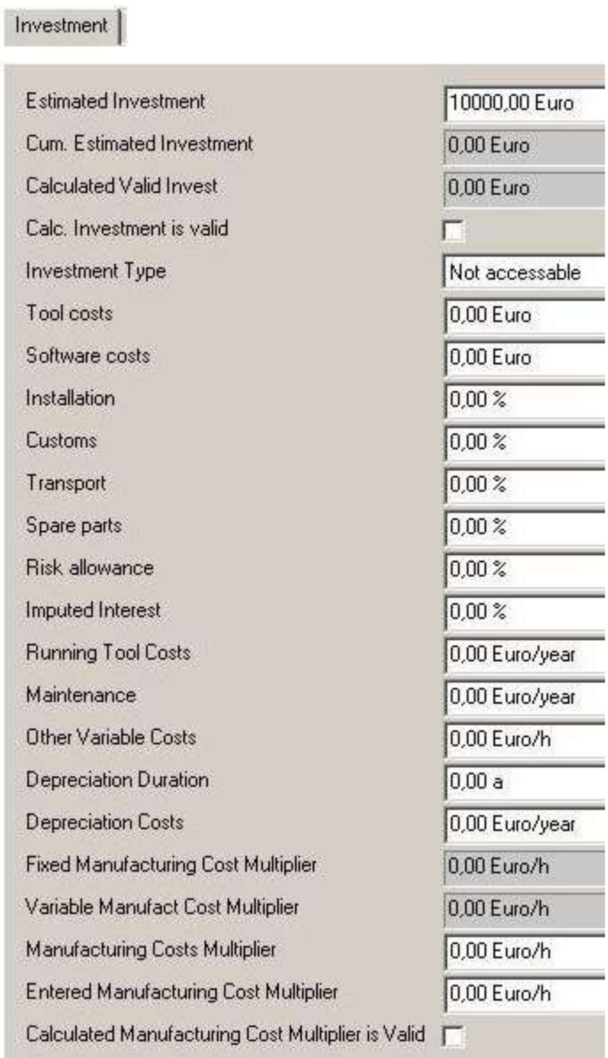


Figure 212: Investment, Processing Station

4.4.4 Calculate Depreciation Costs Using Manufacturing Costs

You are shown the calculation of the annual depreciation costs whenever you execute the calculation of manufacturing costs on the basis of the investment allocation. The calculated annual depreciation costs are shown in a table under fixed costs. *Please refer to the* Figure 216.

The depreciation costs are calculated in the calculation of manufacturing costs on the basis of the depreciation costs of the workplace group and the investments of the resources.

When the depreciation costs of a workplace group are calculated, the ascertained depreciation costs of the resource of a workplace group are added – in the example, for the resources processing station and assembly station. *Please refer to the* Figure 213.

Two examples will familiarize you with the calculation of the annual depreciation costs for the calculation of manufacturing costs. In the examples, a processing station and assembly station are assigned to the workplace group. Different calculation parameters are specified for the assembly stations in both examples. The parameters for the processing station are the same in both examples.

- Example 1, *Please refer to the* Table 5.

- Example 2, *Please refer to the* Table 6.

4.4.5 Example 1

The calculation of the annual depreciation costs for the workplace in the calculation of manufacturing costs is shown in the table in outline form. *Please refer to the* Supplemental Description with Result – Example 1.

Table 5: Example 1 – Depreciation Costs for the Calculation of Manufacturing Costs

	Depreciation costs for calculation of manufacturing costs					
Pos	**KZ**	**Values**	**Calculation parameters**	**Formulas**	**Calculation**	**Result**
Example 1 – calculate depreciation costs						
001			**Processing station**			
1	I_g	10,000 euros Investment resource	Estimated investment	$K_{ainv} = Ig/a$ Calculate annual depreciation costs	10000/10	1000 euros / year
2	K_z	4% Default value of manufacturing costs	Imputed interest	$Z_{kal} = K_{ainv} \times K_z / 2 \times 100$ Calculate annual imputed interest	1000 x4 / 2x100	20 euros / year
3	I_{zins}	10 % Default value of manufacturing costs	Maintenance	$K_{instand} = I_g \times I_{zins} / 100$ Calculate annual maintenance	10000 x 10/100	1000 euros / year
4	A	Default value of manufacturing costs	Depreciation duration	10 years		
0001	K_{a1}		Annual depreciation costs for processing station	Addition of result of lines 1 + 2 + 3	1000 + 20 + 1000	**2020 euros / year**
002			Example of assembly station			
5	I_g	6000 euros Investment resource	Estimated investment	$K_{ainv} = Ig/a$ Calculate annual depreciation costs	6000/5	1200 euros / year
6	K_z	4% Resource	Imputed interest	$Z_{kal} = K_{ainv} \times K_z / 2 \times 100$ Calculate annual imputed interest	1200 x 4 / 2x100	24 euros / year
7	I_{zins}	10 % Default	Maintenance	$K_{instand} = I_g \times I_{zins} / 100$ Calculate annual	6000 x 10/100	600 euros / year

	Depreciation costs for calculation of manufacturing costs					
		value of manufac-turing costs		maintenance		
8	A	Resource	Depreciation duration	5 years		
000 2	**K_{a2}**		Annual depreciation costs for assembly station	Addition of result of lines 5 / +6 / 7 -		**1824 euros / year**
000 3	**K_a**		Annual depreciation costs for workplace (example)	Addition of the result of lines 0001 + 0002	2020 + 1824	**3844 euros / year**

4.4.5.1 Supplemental Description with Result – Example 1

Calculate cumulate depreciations - workplace group

1) Open the context menu on the workplace group. Then select **Cumulate Depreciation Costs**.

Figure 213: Depreciation Costs for Workplace Group

The calculated depreciation costs are displayed under the tab Investments. The result of the example calculation results on an annual depreciation of 1320 euros / year. This corresponds to the annual depreciation of the assembly station example. No depreciation costs are calculated for the processing stations. *Please refer to the* Figure 212.

For information on the calculation of the depreciation costs, *Please refer to the* Table 3.

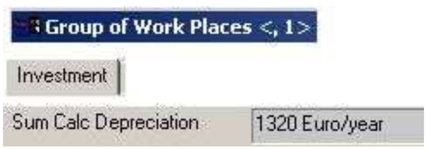


Figure 214: Annual Depreciation Costs For Example 1 Workplace Group

The annual depreciation of 1320 euros / year includes the annual linear depreciation of 1200 euros / year (6000 euros / 5 years) and the imputed interest of 120 euros / year (6000x4/100x2). *Please refer to the* Figure 215.

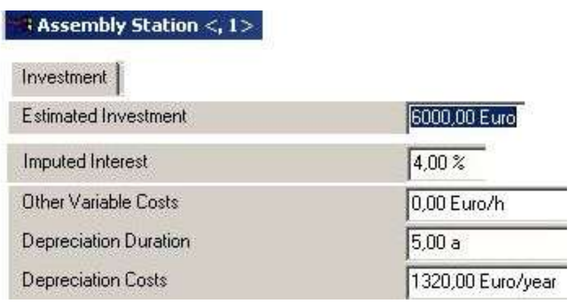


Figure 215: Annual Depreciation Costs for Assembly Station

4.4.5.2 Example 1 – Result

Note

If imputed interest and depreciation duration for a resource are specified, these values are always used in ascertaining the annual depreciation costs for the calculation of manufacturing costs. If, on the other hand, these values do not exist for a resource, the default values are used in the dialog Calculation of manufacturing costs.

Only the investment of 10,000 euros is specified for the processing station. Therefore the default values are used in the calculation:

- Maintenance = 10%
- Depreciation duration = 10 years
- Imputed interest = 4%

$$K_{a1} = I_g \times (1/a + I_{zins}/100) + I_g/a \times K_z/100 \times 2 \Rightarrow 10\,000/10 + 10\,000 \times 10/100 + 10\,000/10 \times 4/100 \times 2$$

$$K_{a1} = \text{euros / year}$$

Note

The basis for the calculation of the imputed interest is the annual depreciation.

The annual depreciation is calculated for the assembly station. Thus the resource's imputed interest of four percent and depreciation duration of five years are used. The maintenance is calculated on the basis of the default value of ten percent.

The imputed interest is re-calculated; the basis for the resource is the investment, the basis for the calculation of manufacturing costs is the annual linear depreciation – 1200 euros in the example.

$$K_{a2} = I_g \times (1/a + I_{zins}/100) + I_g/a \times K_z/100 \times 2 \Rightarrow 6000/5 + 6000 \times 10/100 + 6000/5 \times 4/100 \times 2$$

$$K_{a2} = 1824 \text{ euros / year}$$

The annual depreciation costs for the calculation of manufacturing costs is calculated on the basis of these values (*Please refer to the* Table 5).

$$K_a = K_{a1} + K_{a2} \Rightarrow 2020 + 1824 = 3844 \text{ euros / year}$$

Example1

Fixed Costs Group of work places	Depreciation costs [Euro/Year]
Group of work places example	3844

Figure 216: Result of Depreciation Costs – Example 1

4.4.6 Example 2

The calculation of the annual depreciation costs for the workplace in the calculation of manufacturing costs is shown in the table in outline form:

Please refer to the Supplemental Description with Result – Example 2.

Table 6: Example 2 – Depreciation Costs for the Calculation of Manufacturing Costs

	Depreciation costs for calculation of manufacturing costs					
Pos.	**KZ.**	**Values**	**Calculation parameters**	**Formulas**	**Calculation**	**Result**
Example 2 – Calculate depreciation costs						
001			Example of assembly station			
1	I_g	6000 euros Investment resource	Estimated investment	K_{ainv} =Ig/a Calculate annual depreciation costs	6000/5	1200 euros / year
2	K_{wz}	2000 euros Investment resource	Tool costs	2000 euros		
3	K_{sw}	2000 euros Investment resource	Software costs	2000 euros		
4	A	5 years Depreciation duration of resource				
0002	K_{asum}	10 000 euros Cumulated investment for resource	Calculate depreciation costs, basis is cumulated investment	K_{asum}/a	10 000/5	**2000 euros / year**
5	K_z	4% Resource	Imputed interest	$Z_{kal} = K_{ainv}$ x K_z/2 x100 Calculate annual imputed interest	1200 x 4 / 2x100	24 euros / year
6		10% Resource	Cumulated allowance for installation, risk allowance...	I_g x 10/100/a	6000 / 100 / 5 -	120 euros / year
0003	**K_{a1}**			Addition of	2000 + 24 +	**2144 euros**

	Depreciation costs for calculation of manufacturing costs					
				lines 0002 + 5 + 6	120	**/ year**
7	K_{lwz}	Euros / year	Running tool costs	500 euros / year		500 euros / year
8	K_{wa}	Euros / year	Maintenance	500 euros / year		500 /euros
0004	$\mathbf{K_{a2}}$	Euros / year	Annual deprecia-tion costs for as-sembly station	Addition of lines 0003 + 7 + 8		**3144 euros / year**
0005	$\mathbf{K_{a}}$	Euros / year	Annual deprecia-tion costs for workplace (exam-ple)	Addition of result of lines 0001 (from exam-ple 1, processing station) + 0004	2020 + 3144	**5164 euros / year**

4.4.6.1 Supplemental Description with Result – Example 2

All possible calculation parameters for calculating annual depreciation costs for the assembly station are specified in example 2. In contrast to this, the default value was used for the calculation of the processing station:

- Maintenance = 10%
- Depreciation duration = 10 years
- Imputed interest = 4%

The calculation parameters of the resource are used for the assembly station calculation. Hundred percent of the running annual costs for maintenance and tool costs are added to the depreciation costs. The default value for maintenance is not considered. Instead of this value, the annual amount is always used for maintenance.

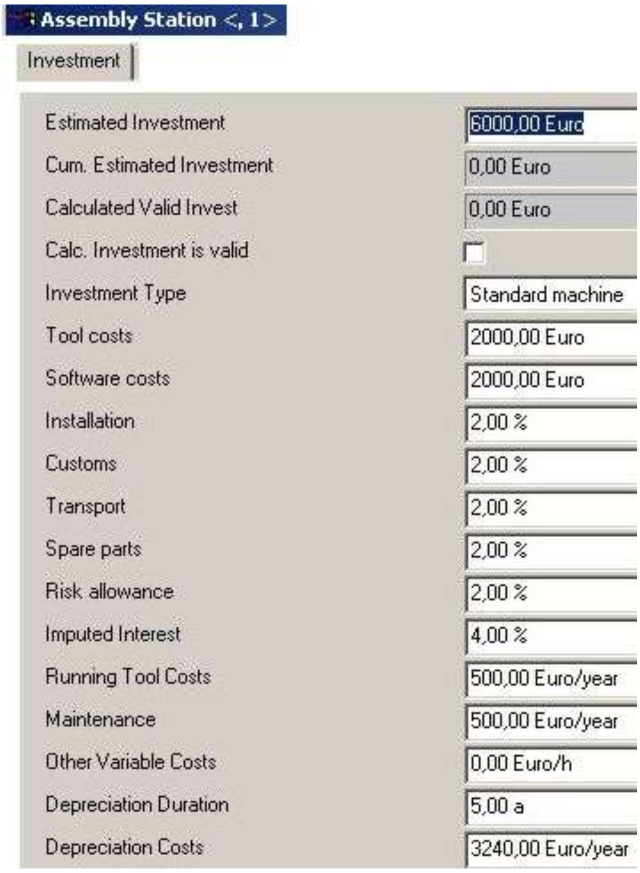


Figure 217: Calculation Parameters for Assembly Station – Example 2

The cumulated depreciation costs for the workplace group in example 2 amounts to 3240 euros / year.

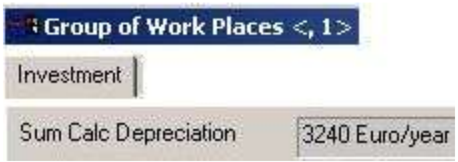


Figure 218: Cumulated Depreciations, Example 2

Result of the annual depreciation costs for the calculation of manufacturing costs:

Calculation for the assembly station

$$K_{a2} = I_g \times (1 + (K_{install} + K_{zo} + K_t + K_{et} + K_r) /100)/ a + (K_{wz} + K_{sw})/a + Z_{kal} + K_{lwz} + K_{wa}$$

$$\Rightarrow 6000 \times (1 + (2\% + 2\% + 2\% + 2\% + 2\%)/100 /5) + (2000 + 2000)/5 + 1200 \times 4/2 \times 100 + 500 + 500$$

$$K_{a2} = 3144 \text{ euros / year}$$

Result of calculation of manufacturing costs

$$K_a = K_{a1} \text{ (example 1 processing station)} + K_{a2}$$

$$\Rightarrow 2020 + 3144 = 5164 \text{ euros / year}$$

The annual depreciation cost for the calculation of manufacturing costs is calculated on the basis of these values.

Example1

Fixed Costs Group of work places	Depreciation costs [Euro/Year]
Group of work places example	5164

Figure 219: Result of Depreciation Costs – Example 2

4.4.7 Calculate Manufacturing Costs for Product

The calculated depreciation costs, as both examples show. *Please refer to the* Calculate Depreciation Costs Using Manufacturing Costs – are an important component in the calculation of the manufacturing costs / item.

This example will familiarize you with complete calculation of the manufacturing costs / item. The basis values are the following calculation parameters, *Please refer to the* Calculation Parameters - Examples of Calculating Manufacturing Costs and Set Premises in the Project Library.

- In the first example, the calculation is executed according to the calculation method **investment allocation**.
- In the second example, the calculation is executed according to the calculation method **space costs multiplier**.

4.4.7.1 Example 1 – Evaluation of Investment Allocation

The manufacturing costs / item are calculated on the basis of the investment allocation in this example. The result of the manufacturing costs / item is 55.55 euros / year.

Default values used

- Annual item number = 50,000 euros from the example of basis PoT
- Premises
- Wage group
- Shift model

Example1

Default Values	
Shift Models:	Example shift model
Wage Groups:	Example wage group
Prämissen:	Example premises
TPZ-Kurve:	Example Basic PoT
Material Side Costs:	12
Maintenance [%]	10
Imputed Interest [%]	4
Depreciation Period [Years]	10

Figure 220: Default Values

The manufacturing costs / item of 55.55 euros / item is the result of the addition of the material costs, fixed costs, and manufacturing costs:

Example1

Evaluation	
Material costs [Euro/Item]:	33,60
Tool costs [Euro/Item]:	0,28
Fixed costs [Euro/Item]:	0,10
Manufacturing costs [Euro/Item]:	21,57
Herstellkosten [Euro / Stück]:	56,55

Figure 221: Manufacturing Costs / Item – Example 1 Investment Allocation

Evaluation of material costs

The calculation of material costs is the result of the addition of the individual material costs plus indirect material costs. The difference of the material costs evaluation to the product of 33.60 to 31.20 = 2.40 euros / item is the result of the calculation of the indirect material costs for the product **Part example**. The default value of 12% has been calculated for this allowance. *Please refer to the* Figure 207.

Example1

Cumulated material costs [Euro]
11,20
22,4
33,6

Figure 222: Cumulated Material Costs

Evaluation of tool costs

The tool costs / item is the result of the cumulated tool costs / annual requirement = 13830/50000. The result of 0.28 euros / item is rounded up.

Example1

Invest [Euro]	Tool costs/Item [Euro/Item]
4415,005394	0,09
4415,005394	0,09
5000	0,1
Summe	**0,28**

Figure 223: Tool costs / item

Evaluation of fixed costs

The fixed costs are calculated by the division of the annual depreciation costs / annual item number = 5164 / 50000. The result of 0.10 euros / item is rounded down.

Example1

Annual item number [Item/Year]	Fixed costs/Item [Euro/Item]
50000	**0,1**

Figure 224: Fixed Cost Evaluation

Evaluation of the manufacturing costs

The processes purchased item and assembly are both linked once each to the resources processing station and assembly example. The process purchased item does not have a setup time. The process assembly has a setup time of 5.5 minutes. The calculation is shown below.

Beispiel1.xls

Prozess	Vorgabezeit te [min / Stück]	Rüstzeit [min]	Ressource
Prozess Kaufteil	11	0	Bearbeitungsstation (BAZ)
	11	0	Montagestation-Beispiel
Prozess Montage	5,5	5,5	Bearbeitungsstation (BAZ)
	5,5	5,5	Montagestation-Beispiel

Figure 225: Process Times for Manufacturing Costs

The manufacturing costs / item are calculated on the basis of the variable costs in this example. Default values such as shift model, premises, wage groups, etc. are used for the calculation of the variable costs of the processing station.

The manufacturing costs multiplier / item is calculated for every link individually according to the formula:

Manufacturing costs / item = (TE + (TR/batch size) x variable costs)/60

Table 7: Calculation of the Manufacturing Costs / Item – Example 1

Example1

Fertigungskosten

Prozess	TE + (TR/batch size) min / item	Resources	Variable: Costs euros / h	Manufacturing costs / item euro / item
Process purchased item	11.00	Processing station (BAZ)	28.41	5.21
Process assembly	11.00	Assembly station - example	30.41	5.58
	11.00	Processing station (BAZ)	28.41	5.21
	11.00	Assembly station - example	30.41	5.58
Sum				21.57

4.4.7.2 Example 2 – Basis Investment Allocation

For the second evaluation, the annual requirement has been increased to 100,000 items and the batch size has been increased 1,000 items. No further calculation parameters have been changed.

Product	
Product:	Example Group
Product number:	New Product
Calculation date:	04.02.2005
number of items:	100000
Lotsize:	1000

Figure 226: Annual Requirement and Batch Size Increased

The increased annual requirement affects the calculation of the tool costs / item and the fixed costs / item. The increased batch size affects the manufacturing costs / item. The increase of both calculation parameters annual requirement and batch size decreases the manufacturing costs / item to 49.97 euros / item.

Evaluation	
Material costs [Euro/Item]:	33,60
Tool costs [Euro/Item]:	0,14
Fixed costs [Euro/Item]:	0,05
Manufacturing costs [Euro/Item]:	16,18
Manufacturing costs [Euro/Item]:	49,97

Figure 227: Evaluation of Investment Allocation – Example 2

4.4.7.3 Example 1 – Evaluation of Space Costs Multiplier

The manufacturing costs / item are calculated on the basis of the space costs multiplier in this example. The result of the manufacturing costs / item is 56.08 euros / year.

The same default values are used for the calculation. *Please refer to the* Example 1 – Evaluation of Investment Allocation.

The manufacturing costs / item of 56.08 euros / item is the result of the addition of the material costs, tool costs, and manufacturing costs. In the space costs calculation, the material costs and tool costs are ascertained in the same way as in the example with the investment allocation. *Please refer to the* Figure 222 and Figure 223.

Space costs

Evaluation	
Material costs [Euro/Item]:	33,60
Tool costs [Euro/Item]:	0,28
Manufacturing costs [Euro/Item]:	22,21
Manufacturing costs [Euro/Item]:	56,08

Figure 228: Manufacturing Costs / Item - Space Costs

Evaluation of the manufacturing costs

The processes purchased item and assembly are both linked once each to the resources processing station and assembly example. The process purchased item does not have a setup time. The process assembly has a setup time of 5.5 minutes. The calculation is shown in Table 8.

Beispiel1.xls

Prozess	Vorgabezeit te [min / Stück]	Rüstzeit [min]	Ressource
Prozess Kaufteil	11	0	Bearbeitungsstation (BAZ)
	11	0	Montagestation-Beispiel
Prozess Montage	5,5	5,5	Bearbeitungsstation (BAZ)
	5,5	5,5	Montagestation-Beispiel

Figure 229: Process Times for Fabrication Costs - Space Costs Multiplier

In this example, the manufacturing costs / item are calculated on the basis of the space costs multiplier. Default values such as shift model, premises, wage groups, etc. are used for the calculation of the space costs multiplier of the processing station.

The manufacturing costs multiplier / item is calculated for every link individually according to the formula:

Manufacturing costs / item = (TE + (TR/batch size) x space costs multiplier)/60

Table 8: Calculation of the Manufacturing Costs / Item – Space Costs Multiplier Example 1

Space costs

Manufacturing Costs

Process	TE + (TR/batch size) min / item	Resources	Space costs multiplier euros / h	Manufacturing costs / item euro / item
Process purchased item	11,00	Processing station (BAZ)	29,17	5,35
Process assembly	11,00	Assembly station - example	31,41	5,75
	11,00	Processing station (BAZ)	29,17	5,25

Space costs

Manufacturing Costs				
Process	**TE + (TR/batch size)** **min / item**	**Resources**	**Space costs multiplier** **euros / h**	**Manufacturing costs / item** **euro / item**
	11,00	Assembly station - example	31,41	5,75
Sum				22,21

4.4.7.4 Example 2 – Basis Space Costs Multiplier

For the second evaluation, the annual requirement has been increased to 100,000 items and the batch size has been increased 1000 items. No further calculation parameters have been changed.

Product	
Product:	Example Group
Product number:	New Product
Calculation date:	04.02.2005
number of items:	100000
Lotsize:	1000

Figure 230: Annual Requirement and Batch Size Increased – Example with Space Costs Multiplier

The increased annual requirement affects the calculation of the tool costs / item. The increased batch size affects the manufacturing costs / item. The increase of both calculation parameters annual requirement and batch size decreases the manufacturing costs / item to 50.40 euros / item.

Evaluation	
Material costs [Euro/Item]:	33,60
Tool costs [Euro/Item]:	0,14
Manufacturing costs [Euro/Item]:	16,66
Manufacturing costs [Euro/Item]:	50,40

Figure 231: Evaluation Result

4.4.7.5 Example 3 – Item Number Material Costs

The calculation of the material costs is identical for both calculation methods. By increasing the item number of both products **Example part** and **Example purchased item** to the amount 2, the material costs per item are increased, and thus also the manufacturing costs / item.

Part <Example Part, 1>

Component Name	Example Part
Component Number	New Product
Drawing Number	
Position	0
Quantity	2,00

Figure 232: Example Part

The calculation was executed on the basis of the investment allocation:

Beispiel3 Materialkosten.xls

Materialgemeinkosten [Euro]	Menge [Stück]	Summe Materialkosten [Euro]
1,20	2	22,40
2,40	2	44,80
	Summe	**67,20**

Figure 233: Amount for Products Increased

The manufacturing costs / item are increased to 89.15 euros / item. *Please refer to the* Figure 221.

Evaluation	
Material costs [Euro/Item]:	67,20
Tool costs [Euro/Item]:	0,28
Fixed costs [Euro/Item]:	0,1
Manufacturing costs [Euro/Item]:	21,57
Manufacturing costs [Euro/Item]:	89,15

Figure 234: Material Costs Increased

4.4.8 Create Stations Report

You can create a report for a workplace or workplace group with this script. The report can be issued with or without system elements. The report is displayed on the screen in an Excel table with the corresponding station information.

You can save and edit the Excel table in any directory. Changes to the data in the Excel table do not directly affect the resource structure in the DELMIA Process Engineer®.

4.4.8.1 Start Station Report

1) Open the context menu on a workplace group, an editing station, an assembly station, or on a test & measure process.
2) Select **Reporting / Station Bom**.

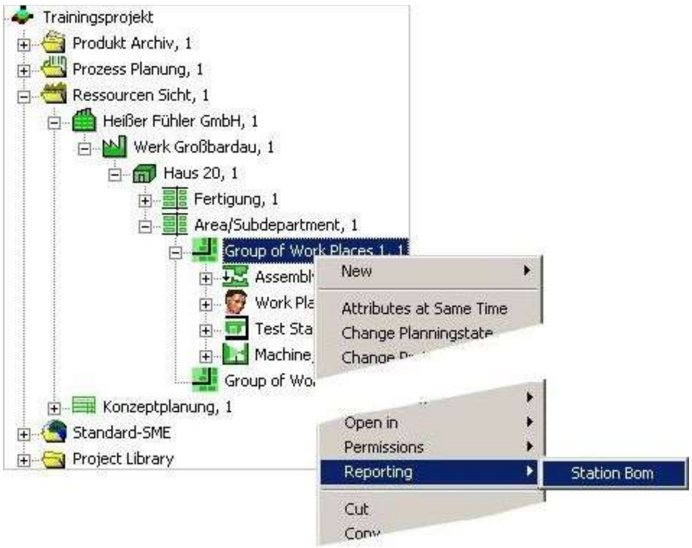


Figure 235: Start Station Report

3) Select whether the station report should be issued with or without system elements in this message.

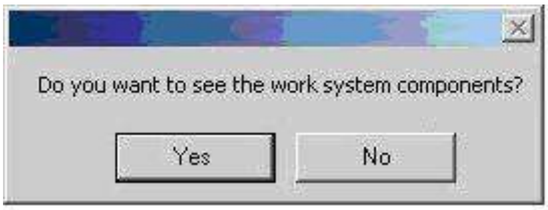
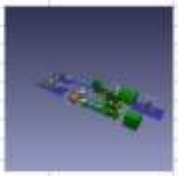


Figure 236: Select whether the Station Report should be issued with or without System Elements

Mappe5

	A	B	C	D	E	F	G
2	**Gesamtstückliste**						
3							
4		Projektbezeichnung	Trainingsprojekt				
5		Arbeitsplatzgruppe	MontageTemperaturfühler (WLB)				
6		Erstellt von	admin				
7		Erstellungsdatum	12.12.2003 11:44				
8		Geändert von	admin				
9		Änderungsdatum	02.09.2004 18:23				
10		Gedruckt von	admin				
11		**Investition (€)**	**145.000,00**				
12							
13		**MontageTemperaturfühler (WLB)**					
14	**POS**	**Systemelementbezeichnung**	**Hersteller**	**Bestellnummer**	**Einzelpreis (€)**	**Anzahl**	**Gesamtpreis (€)**
15	1	Cutting press 800x950x2200mm	DELMIA		0,00	1	0,00
16	2	Stanzmaschine 1000x1040x2830mm	DELMIA		0,00	1	0,00
17	3	Cutting device with motor	Streckfuss	C 066 M	0,00	1	0,00
18	4	Durchlaufregal 1150x1555x2503mm	DELMIA		0,00	1	0,00
19	5	Schneidevorrichtung 160x80x100mm	Streckfuss	C 053 S	0,00	1	0,00
20	6	Arbeitsdrehstuhl, h=595-890mm, Sternfuss	Bima	9781	428,97	1	428,97
21	7	Arbeitsdrehstuhl, h=595-890mm	Bima	9731	255,13	1	255,13
22	8	Schaltschrank	DELMIA		0,00	1	0,00
23	9	Rack 2290x1200	DELTA	RA 22901200	16,77	1	16,77
24	10	Montageautomat 4550x1700x2700mm	DELMIA		0,00	1	0,00
25							
26		**Montagestation 01**	**geschätzte Investition (€)**	15.000,00		**berechnete Investition (€)**	**1.597,19**
27	**POS**	**Systemelementbezeichnung**	**Hersteller**	**Bestellnummer**	**Einzelpreis (€)**	**Anzahl**	**Gesamtpreis (€)**
28	1	Transportbehaelter 1200x1000mm, verzinkt	Braucke	7724-91E	174,35	2	348,70
29	2	Werkstuecktraeger 400x300x120mm	Stucki	LWB2412LF	0,00	1	0,00
30	3	Transportbehaelter 1200x1000mm, lackiert	Braucke	7724-11E	124,24	2	248,48
31	4	Werkstuecktraeger 600x400x320mm	Stucki	LWB2632	1.000,00	1	1.000,00
32	5	Werkbank 1300x750x840mm	Fami	M4-8013-13	0,00	1	0,00
33							
34		**Montagestation 02**	**geschätzte Investition (€)**	**20.000,00**		**berechnete Investition (€)**	0,00

MontageTemperaturfühler (WLB) / Tabelle1 / Tabelle2 / Tabelle3

Figure 237: Print-out of a Station Report

5. Allowance Sets

5.1 General Information

Times can be supplemented by an allowance set. Allowance sets are created in the project library.

For more information on how to create allowances, *please refer to the* Project Library Manual.

Allowance sets are always valid for the project.

Two allowance sets with three allowances each are defined in the example database:

- Personal distribution time
- Actual distribution time
- Recovery time

Another allowance can be configured freely.

How does one assign allowances?
To sequence or sequence level:

1) You can select an allowance set that is valid for all objects lower in the hierarchy on the technical nodes that are located above the processes or procedures. If, as shown in the example, you select the allowance set *Without*, all objects below this node are supplemented by the allowance set *Without (ohne)*.

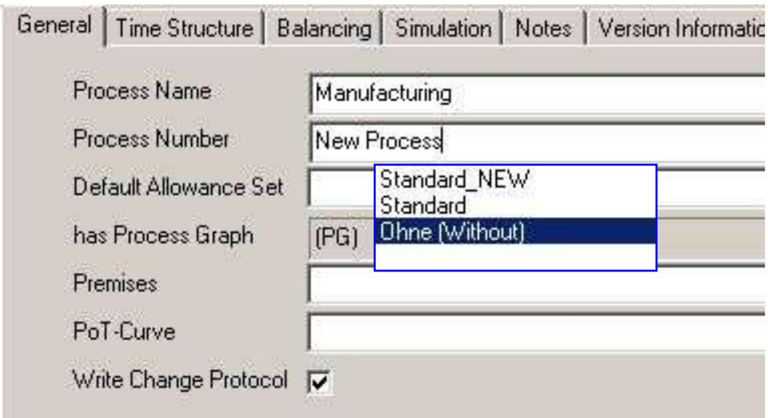


Figure 238: Select Allowance Set

Exceptions

If processes already have an allowance set allocated to them, i.e. the property allowance set is NOT empty; these allowance sets are not overwritten.
™ The Preassignment allowance set is valid only for the objects that have not yet assigned an allowance set.

On the process or procedure itself:

2) Select the allowance set.

- ➢ If you have selected a valid allowance set, the individual allowances are displayed under ***Allowance %*** and the respective time type is supplemented. The supplement value can be found under allowance times.

3) You can overwrite individual percentages of the allowances and thus define allowances that deviate from the allowance set. This is possible only if the allowance set *Standard* has been selected.

Why are two allowance sets used in the example?
Two allowance sets are created in the example database; the allowance set "Standard" and the allowance set "Without".

The allowance set "Standard" is the actual allowance set. All allowances were defined in it.

The allowance set "Without" sets all allowances of the allowance set "Standard" to zero.

If you have assigned an allowance set to an object, the allowances on this object remain active unless you explicitly switch them off. This process is very easy with the allowance set "Without". The effect will be explained in the following example:

Example
You have assigned the allowance set "Standard" to objects A and B.

Both objects are to be calculated without an allowance set in the next step.

- ***No*** allowance set is selected for object **A**. 

- The allowance set "Without" is selected for object **B**. 

Result

Object **A** continues to be supplemented by allowances
Object **B** has no further allowances.

5.2 Importing and Exporting Allowance Sets

Since an allowance set is valid only within a project, but often the same allowance set is to be used in several projects, it is possible to import and export allowance sets.

5.2.1 Exporting an Allowance Set

1) In the project library open the context menu on the allowance set that you want to export.
2) Select **Application / Export allowancesetprocess**.

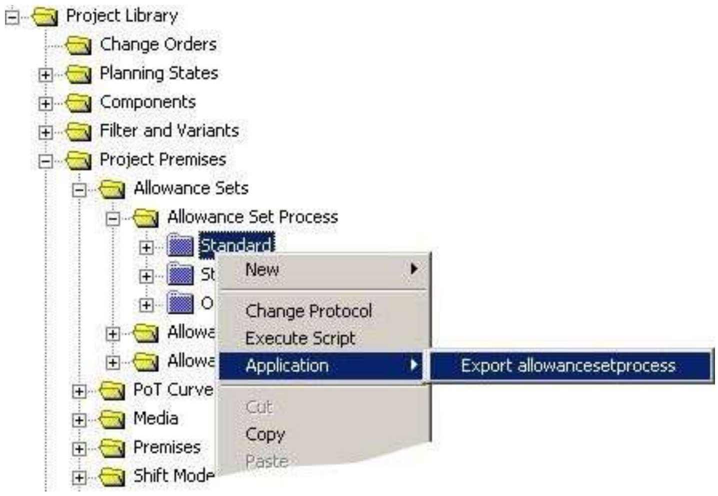


Figure 239: Export Allowance Set

3) Set the location for saving the export file in the dialog that opens. If there is a file with the same name in the directory, you have the option of overwriting it.

Figure 240: Overwrite Existing Allowance Set File

4) After the export has been successfully executed. You will be notified that two export files have been created.

Figure 241: Allowance Set Exported

Both text files must always be used together and they should not be changed manually. One file has the same name as that of the allowance set, the other also has the allowance set name plus the extension ***_childs***. Only the file without the extension is selected when importing.

5.2.2 Importing an Allowance Set

1) Open the project into which you want to import the allowance set.
2) Open the context menu on the project node.
3) Select **Application / Import allowancesetprocess**.

Figure 242: Import Allowance Set

3. Select the allowance set to be imported in the dialog that opens. Always select the file WITHOUT the extension *_childs.*

4. If an allowance set with the same allowance set name already exists in the project library, you will have the opportunity to overwrite it. Click **Yes** button.

Figure 243: Overwrite Existing Allowance Set

5. If you do not want to overwrite the allowance set ('No' button is clicked), you will be prompted to assign a new name for the allowance set in the next dialog.

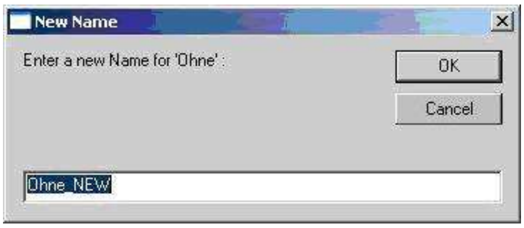


Figure 244: Enter New Name for the Allowance Set

➢ After you have confirmed the input of the new name with **OK**, the import is started and you receive a message with the number of imported allowance sets.

Figure 245: Message after a Successful Import of the Allowance Set

6. Upgrade of Version 5.14 on Higher Versions

Initial Situation Version 5.14
Two databases were used in version DPE 5.14 and previous versions:

- DB–Database
- DB-Ergotime

Processes were saved in the DB database, the time analyses in the DB-Ergotime database. *FinderControl* was necessary to edit time analyses in the DELMIA Process Engineer®.

There are two plantype sets in version DPE 5.14:

- Standard KMU (German plantype set)
- Standard SME (English plantype set)

Version: 5.15 or Higher

- As of version DPE 5.15 there is only one database. The FinderControl is no longer used for the editing of time analyses.
- Only one plantype set is required for different languages now.

6.1 Procedure

In the following, the steps necessary to update the plantype sets and to transfer time analyses from the DB-Ergotime database to the DB database will be shown.

1) Execute the upgrade from version DPE 5.14 to higher versions

➢ The Finder Control continues to work after the upgrade.

➢ There is no datacard directory in the library after the upgrade.

- The configuration is applied only after the *ergoplan.ini* is re-imported.

2) Adjust Plantypeset
Extend the plantype set with the analysis methods that you want to use. The plantype set ***Standard-KMU.ini*** (Standard-SME nameshort = standard-ger) is available for this. With it you can add all analysis methods to your existing plantype set as a new plantype.
You can read more about this in the section Extending the Plantype Set

➢ - The new plantypes for STM are created.
- The configuration is adjusted.
- Some plantypes must be deleted "manually".
The following plantypes are to be deleted in the German plantype set (Standard KMU):
 - MTM1-analysis
 - MTM2-analysis
 - UAS-analysis
 - MEK-analysis
 - STD-analysis
 - Formula

- General time component
- Directory time control (if not used)!
- Parametrizable process (if not used).

- Repeat the procedure for the English plantype set. The following plantypes are to be deleted in the English plantype set (Standard SME):
  - MTM1-Analysis
  - MTM2- Analysis
  - UAS- Analysis
  - MEK- Analysis
  - STD- Analysis
  - Form
  - General Time Element
  - Standard Time Measurement (if not used)!
  - Parametrizable Process (if not used).

➢ The settings for the analysis methods are applied when importing. Despite this, they must be opened for editing and **SAVED** once before creating the first process analysis.

3) Changing the name of the plantype set

- As of version 5.15, plantype sets are translated via rlg files. Therefore only one plantype set is required for different languages now. Change the name of the PTS (Standard KMU to Standard SME).

4) Revising script actions and script assignments

- Manually delete all script actions, script assignments, and scripts from Version 5.14.

- A script is used to import the script actions, script assignments, and scripts for version 5.15.
  Starting from version 5.17 you can alternatively import scripts through menu *Tools / Import / Script*, if these scripts are present as files with the ending *.ini*.

For more information, *please refer to the* System Library Manual.

5) Datacards and datacard entries

- Check whether the datacards and datacard entries are available in the system library. If this is not the case, the datacards must be configured: Configuration Manager > Types > archivroot (Library) > parent-child relation > datacardfolder:: datacard > Parent-child information > tree view to Yes.

- Then the datacards and the datacard entries must be imported. How datacards and datacard entries are imported is described in the PPR-Navigator manual.

6) Converting time analyses

- You can transfer all of the analysis data from the DB-Ergotime database to the DB database by using the **EPDBUpdater**.

For more information, *please refer to the* Administration Manual.

➢ All time analyses including the analyses linked to these time analyses are transferred to the project.

- *Time components / time macros* are also transferred to the project.
- Only formulas are filed in the template of the system library. Formulas are thus always available as project-spanning data.
- Allowance sets can be imported with scripts. Allowance data are not transferred from the allowance set of the DB-Ergotime for processes transferred or upgraded from version 5.14. You can read more about this in the section Allowance Sets.

7) The context menu entries for opening the *FinderControl*.

- If the context menu entries for opening the *FinderControl* are still active, they must be switched off or removed from the configuration.

8) Execute STM Time Update

- You accomplish the Time Update through the menu *Tools/STM-Time Update*. You can accomplish the Time Update only if you activate the field Allow Time Update of the properties dialog of the project.

6.2 Extending the Plantype Set

Every analysis method is represented by its own plantype:

Figure 246: Analaysis Methods

Analysis Method		Plantype
1	STM – UAS	ergocomptimeanalysisUAS
2	STM – MTM-1	ergocomptimeanalysis MTM1
3	STM – MTM-2	ergocomptimeanalysis MTM2
4	STM – MEK	ergocomptimeanalysisMEK
5	STM – STD	ergocomptimeanalysisSTD
6	STM – SAM	ergocomptimeanalysisSAM
7	STM – BasicMOST	ergocomptimeanalysisMOST
8	STM – General Time Element	ergocomptimeanalysisAZB
9	STM – Formula	ergocomptimeanalysisFOR

Proceed as follows in order to extend a plantype set for the aforementioned analysis methods:

1) Open the system library and select the plantype set to be extended.
2) Select **Import plantype set** in the context menu.
3) Select the plantype set ***Standard-SME.ini*** in the file selector that opens.
4) Activate **Keep customization** in the dialog that opens
 - *Create new plantypes* is **not** activated.
 Thus new plantypes are imported and your existing configuration is overwritten. In order to learn how to import plantype sets.

For more information, *please refer to the* System Library Manual.

Figure 247: Import Plantype Set

➢ All analysis methods are available to you after the import is successfully executed.

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