

# **SCE Training Curriculum**

Siemens Automation Cooperates with Education (SCE) | 09/2015

# PA Module P02-01 SIMATIC PCS 7 – HMI Generation



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### Matching SCE Trainer Packages for these curriculum

- SIMATIC PCS 7 Software block of 3 packages Order No. 6ES7650-0XX18-0YS5
- SIMATIC PCS 7 Software block of 6 packages Order No. 6ES7650-0XX18-2YS5
- SIMATIC PCS 7 Software Upgrade block of 3 packages
   Order No. 6ES7650-0XX18-0YE5 (V8.0 → V8.1) or 6ES7650-0XX08-0YE5 (V7.1 → V8.0)
- SIMATIC PCS 7 Hardware Set including RTX Box Order No. 6ES7654-0UE13-0XS0

Please note that these trainer packages may be replaced with subsequent packages. An overview of the available SCE packages is provided at: <u>siemens.com/sce/tp</u>

# **Continuing education**

For regional Siemens SCE continuing education, contact your regional SCE contact partner. <u>siemens.com/sce/contact</u>

# Additional information relating to SIMATIC PCS 7 and SIMIT

In particular, Getting Started, videos, tutorials, manuals and programming guide. <u>siemens.com/sce/pcs7</u>

#### Additional information relating to SCE

siemens.com/sce

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# **HMI GENERATION**

# **TRAINING OBJECTIVE**

After working through this module, the students will be able to design and implement a graphic user interface for efficient process monitoring and control. To this end, they will be familiarized with the objective of process management. They understand the basic concepts of representation and are acquainted with different representation techniques. This enables the students to generate a graphic user interface in **PSC 7** that is useful and efficient.

# **THEORY IN BRIEF**

A modern process control system such as **PCS 7** offers operating staff different screen based windows to the process; with it all process control tasks can be handled. Based on the large amount of information the operator has to take in and process from the technical process, structuring the information makes sense. In addition, certain rules have to be adhered to for navigation and representation in order to establish an interface to the technical process that can be operated well and that supports operators as well as possible in their manifold process control tasks.

**PCS 7** supports the design process of process screens for operator control and monitoring in multiple ways. First, for many of the elementary blocks and individual control functions used in basic automation, operator icons and operator panels are defined that enable project-wide uniform interaction with similar technical equipment. Second, the plant hierarchy can be used to advantageously structure the represented information.

Based on this structure, very many elements of the operating system that have to be executed manually in other systems can be generated automatically and error-free by means of a generation run. The two essential remaining tasks when designing the process screens are the representation of the static process structure (containers, pipes, etc.) for better orientation, and inserting elements to navigate along process flows on a plant hierarchy level.

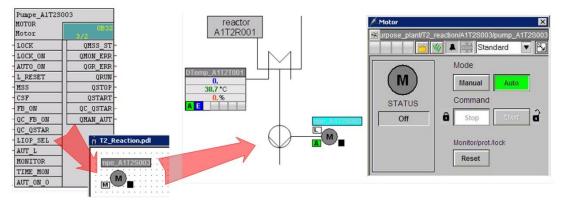


Figure 1: From individual drive function to the operating screen

By means of the generation run, icons are set up for all operable blocks of a hierarchical level. The icons then only have to be moved and enhanced with static elements in order to obtain a complete operating screen (see Figure 1).

# THEORY

# **OBJECTIVES OF PROCESS CONTROL**

The task of an operator in a process plant is to perform the intended operation of this plant economically and environmentally sustainable. This task is called process management. Operators have to ensure consistently high product quality and amount (yield) and keep the amount of rejects as low as possible; they also have to compensate for disturbance factors such as varying characteristics of the raw material used and for faults in the plant or fluctuating throughput. Operators have to ensure that the availability and life of the plant is maximized. Moreover, they have to ensure that the emission limits are observed and energy and material consumption is minimized [1].

To attain these goals, operators have to be constantly in a position to monitor the plant, to diagnose faults and to intervene in the running process to remove faults. The operator's workplace is the operator station at a control desk. This operator station has available all displays and intervention capabilities that operators need to perform their task. The control system provides them with a user interface that enables them to carry out their tasks according to ability, skills and requirements [1].

#### **CONCEPTS OF VISUALIZATION**

The visualization of data and information in the graphical user interface has a deciding influence on operators' performance. For this reason, it has to be in line with their abilities, skills and requirements. The following questions should therefore be answered:

- 1. For whom and for what are we visualizing?
- 2. What is to be visualized?
- 3. How is it supposed to be visualized?

These questions depend on the plant to be configured and, therefore, have to be answered for the respective project. However, the following aspects always have to be considered:

#### Organization of what we want to visualize

The information and data to be visualized has to be organized suitably for the visualization. We have to specify how the existing elements are structured and arranged, how they relate to each other and how it is possible to navigate among the visualizations. To this end, we have to specify how much data and information is to be visualized overall (*quantitative aspect*). We also have to specify which information and data is to be visualized simultaneously and jointly (*qualitative aspect*).

We have to decide in this case what the ratio is to be of what is new (information, dynamic display share) to what is known (data, static display share). The aim is to share information as much as possible but with sufficient data for a correct interpretation of the information suitable to the purpose.

The result is the distribution of information and data to the different operating screens. Now, we still have to define how the operator gets from one operating screen to another (*navigation*).

#### Print growth

Depending on the user interface, only a limited area is available for simultaneously displaying data and information. To ensure that the information and the data is legible and distinguishable in all operating situations, only a certain share of this area is to be assigned characters. This share is called **print growth** of the visualization.

The recommended print growth depends on the type of characters and the display elements as well as on the necessary arrangement of these elements. Thus, it depends on the visualization technique used. For example, the print growth of a process flow diagram should be no more than 50%; for a message page, on the other hand, it may be up to 80% [1].

#### Coding

**Coding** specifies how certain information is represented. Information can be coded through color, shape, form, extension, direction (angle), position and dynamics (flashing). Uniform coding facilitates the assimilation and evaluation of information for the operator.

Good coding is clear, distinguishable and does not contradict existing conventions. For example, the color green should never be used for a STOP signal. If instead a red flashing signal would be used as coding for STOP, this coding should be used consistently for the entire user interface. Also, this coding should not be used for any other information in order to rule out confusion. In addition, good coding should be plausible: the operator learns and remembers it easily.

#### Conspicuousness

A central task of the user interface is directing the operator's attention to important information. Because different information is usually displayed on an operating screen, it is advisable to design this information with varying conspicuousness corresponding to its relevance and priority. The more conspicuous the information, the sooner it is discovered. In addition, based on its conspicuousness, the operator recognizes the information that requires the most attention at the moment. Table 1 shows the stepped increase of conspicuousness of the visualization for different information, based on a few examples.

Increasing conspicuousness of means									
			Combination of means				Application		
	ation		Contrast	Color	Flashing	Acoustical signal			
	ualiz		high	Х	Х	Х	Alarm		
	s of visualization		high	Х	х	-	Change of state (requiring acknowledgement)		
	rsnes		high	Х	-	-	Change of state (not requiring acknowledgement)		
	icuo		high	Х	-	-	Curves		
	Increasing conspicuousness		high	-	-	-	Text of message line, explanatory texts		
	asing		medium	-	-	-	selctable and operator-controllable object (keys)		
	Incre		low	-	-	-	currently not selctable and operator- controllable object		

Table 1: Application of stepped conspicuousness according to [1]

#### Consistency

Often, certain information occurs in several visualizations at the same time. In this case it is important that this information is visualized *consistently* in the entire user interface. This means the information looks identical in all visualizations, and behaves identically. The same terms and icons have to be used. The operation sequence should always be the same, and the system reaction to operations should be similar with respect to time and content.

#### VISUALIZATION TECHNIQUES

#### Basic Structure of the Display Area

The display area should always be structured the same for all types of visualization. For the operator, it facilities orientation, information assimilation and thus process management.

The recommended basic structure according to VDI 3699 [1] is shown in Figure 2. A message line is located in the upper area where the most current messages are displayed as group messages. Below it is an overview field where the available visualizations (for example, process pictures in **PCS 7**) are listed. From here, any visualization can be opened. The working area occupies the largest part of the display area. Here, the currently selected visualization is displayed. The lowest area contains the key field for activating general functions. In the working area, windows with supplementary information (such as different views of **PCS 7** blocks) can be opened in addition. All areas except the working area are reserved and are permanently displayed.

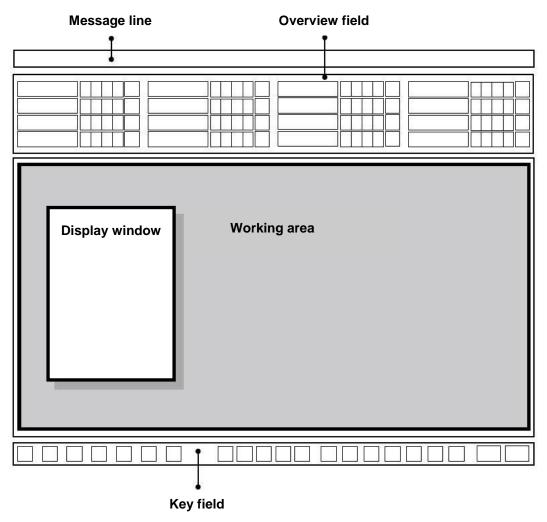


Figure 2: Basic structure of a display area

#### Flowcharts

A flowchart is the "schematic representation of components including their connection through (flow) lines to show relationships in a control plant and in control engineering" [1]. It represents a simplified plant structure and provides information about the paths of material, energy and signal flows between the different plant units. With the aid of flowcharts, process and control information is represented and interventions in the process are made possible.

Flowcharts consist of static and dynamic elements. The static display elements are represented by the *root screen*. This root screen contains the dynamic display elements that are continuously updated.

The static root screen provides the context for the dynamic picture elements, which means it indicates the meaning of the represented objects and their relationship among each other. The root screen represents all data that remains unchanged during the display. This data is the display background, the headings and labels as well as the plant units and the devices (if their representation is not to change).

The dynamic picture elements provide the information for process control. **Display elements** represent the changes, characteristics and relationships of the process values. They reflect the state of the plant, of the control system or of the process. **Selection and operator control elements** make it possible for the operator to intervene for process control. Furthermore, additional information such as function charts or curves can be inserted in the flowchart as a window.

Flowcharts are subdivided as follows:

- Control flowcharts represent only the components of control systems such as regulators, sensors and controllers as symbols. They are connected to each other with signal flow lines.
- Process flowcharts graphically represent plant units in a simplified way using symbols. Here, three different kinds are differentiated:
  - A basic flowchart represents plants, sub-plants or plant units in the form of rectangles. They are connected to each other with flow lines for materials, energy or energy sources.
  - A *process flowchart* represents processes using (simplified) graphic symbols. The symbols represent the corresponding plant units and are connected to each other with flow lines.
  - A pipe and instrument diagram (P&I diagram) represents the technical equipment of the plant using graphic symbols. In addition, process tags, control blocks and actuators are represented. The symbols are connected to each other by lines for pipes and signal paths.

In **PCS 7**, flowcharts are called **process pictures**. In the step by step instructions, different process pictures are generated for the configured plant.

# HMI GENERATION IN PCS 7

**PCS 7** has an extensive operator control and monitoring system that consists of the following subsystems [2]:

- A *graphic system* for displaying process information and for process operation.
- A *curve system* to represent and analyze time sequences of stored process values.
- A *message system* for diagnosing the process.
- A *log system* for documenting the process.
- An *archive system* for storing and maintaining process values, messages and logs

In this chapter, the **PCS 7** graphic systems is introduced. The message system will be described in the subsequent chapter 'Alarm Engineering'.

The graphic system represents the plant in a plant overview, shows process pictures in the working area of the user interface, makes available elements for process and system operation and indicates alarm states. The corresponding user interface is generated on the system's operator station (OS). Thus, the OS is the central station for monitoring and operating a *PCS* **7** plant [2].

#### Configuring the User Interface in PCS 7

The selected plant hierarchy of the project is the basis for the organization of the user interface. The plants and subunits that were set up are represented in the user interface with corresponding process pictures. Picture names and directory names of the plant hierarchy are included automatically. In the process mode, the process pictures are represented in the overview area corresponding to the plant hierarchy.

First, the process pictures of a project are set up at the corresponding location in the plant hierarchy and assigned to an OS. The OS then has to be compiled. After that, the process pictures can be configured in the *Graphics Designer* of the *WinCC Explorer*. The *Graphics Designer* is an editor where static and dynamic picture elements can be inserted, arranged and interconnected.

#### Configuring the Process Pictures in PCS 7

Technological blocks from **PCS 7** libraries that can be operated and monitored include corresponding graphic representations, so-called **block icons**. When the process pictures are configured, they are inserted automatically in the corresponding screen. Overview-like, block icons provide the most important information about the represented block in the process picture.

By means of the block icons, different pre-configured **faceplates** can be called that open as a window in the working area. Faceplates are dynamic diagram elements that are connected to the parameters of the represented block and are updated automatically. They make it possible for the operator to extensively monitor and operate the associated technological block. Depending on the block type, different **views** exist for the associated faceplates. These views enable the access to parameters for very specific tasks. For example, in addition to the standard view there often also is a parameter view for assigning parameters, a message view for diagnostics, or a limit view for setting operational limits of the setpoint. It depends on the represented technological block which views are offered.

The *Graphics Designer* makes additional dynamic standard objects available that can be inserted manually. These objects can be interconnected directly with the I/Os of the blocks in the CFCs and SFCs and thus realize the desired dynamic behavior. Examples for standard objects are input and output fields for entering and displaying values, status indicators for displaying binary states of an object as well as bars for the relative representation of values.

In addition, the *Graphics Designer* provides different libraries with pre-assembled graphic elements such as piping or valves that can be used to generate the static root screen. You can also create and use our own graphics.

In the step by step instructions below, additional characteristics and capabilities of the *Graphics Designer* are presented. Moreover, important *WinCC* tools are introduced.

# LITERATURE

- [1] VDI/VDE 3699 (Ed. 2014-01): Process control using display screens
- [2] SIEMENS (2014): Process Control System PCS7: OS Process Control (V8.1). A5E32785344-AA. (http://support.automation.siemens.com/WW/view/en/103151477)

# **STEP BY STEP INSTRUCTIONS**

# TASK

In this task, the operator station (OS) is created after a few presettings on the **SIMATIC Manager**.

We are creating the following: an overview screen of the multi-purpose plant, and one unit picture each for the educt tank, the reactor and the product tank. First, a solution for a tank is generated for each unit.

#### **TRAINING OBJECTIVE**

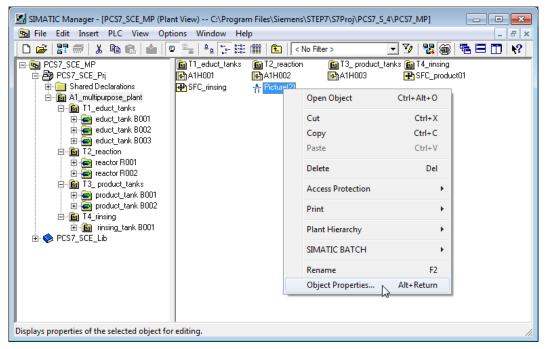
In this chapter, the student:

- Learns to generate the operator station (OS) in the SIMATIC Manager
- Is familiarized with the WinCC configuration environment
- Learns to build pictures in the Graphics Designer

These instructions are based on 'PCS7\_SCE\_0108\_Ueb\_R1504\_en.zip'.

#### PROGRAMMING

- 1. First, change the object properties of your picture on level A1\_multipurpose\_plant.
- $(\rightarrow A1\_multipurpose\_plant \rightarrow Picture(2) \rightarrow Object Properties)$



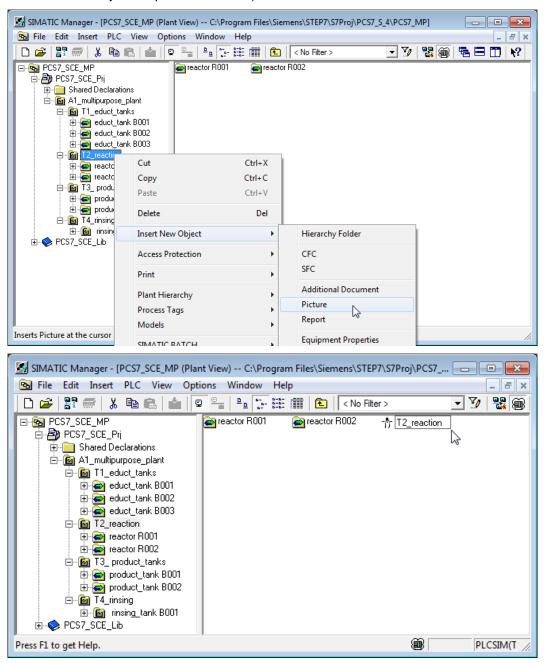
- 2. As the name, enter 'A1\_multipurpose\_plant'.
  - $(\rightarrow \text{General} \rightarrow \text{Name} \rightarrow \text{A1}_multipurpose_plant})$

General Block icons	
Name:	A1_multipurpose_plant
Path:	PCS7_SCE_Prj\OS(1)\GraCS\Picture(2).Pdl
Plant path:	PCS7_SCE_Prj\A1_multipurpose_plant
Storage location of the project:	C:\Program Files\Siemens\STEP7\S7Proj\PCS7_S_4\PCS7_Prj
Author:	
Created:	
Last changed on:	
Comment:	

- 3. Derive the block icons from the plant hierarchy.
  - $(\rightarrow$  Block icons  $\rightarrow$  Derive the block icons from the plant hierarchy)

Properties - WinCC-Picture: Picture(2)	×
General Block icons	
Derive the block icons from the plant hierarchy.	
OK Apply	Cancel

 In the levels T1 to T4, insert pictures with a right click and 'Insert New Object'. Assign names to them as shown in the example below for T2. (→ Insert New Object → Picture → Object Properties → Name)



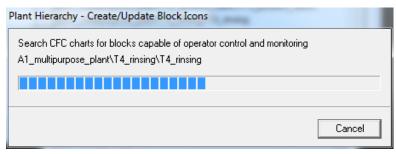
5. Then, the block icons have to be generated and updated. ( $\rightarrow$  A1\_multipurpose\_plant  $\rightarrow$  Plant Hierarchy  $\rightarrow$  Create/Update Block Icons)

SIMATIC Manager - [PCS7_SCE_MP (Plant View) C:\Program Files\Siemens\STEP7\S7Proj\PCS7_S_4\PCS7_MP]							
😼 File Edit Insert PL	C View Options Window Help	_ <i>8</i> ×					
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	Cut Ctrl+X Copy Ctrl+C Paste Ctrl+V Delete Del Insert New Object	ञ्च T2_reaction @ T3_ product_tanks @ T4_rinsing @A1H001 ऒA1H003					
⊡ <u>©</u> T4_rir ⊡⊡	Print	>					
E - I PCS7_SCE_L	Plant Hierarchy	Settings					
	Process Tags Models	Check Consistency Open Check Log					
	SIMATIC BATCH	Create/Update Block Icons					
Creates/updates block icons	Rename F2 Object Properties Alt+Return						

6. In the window that opens, set 'Chart' under '...components of the HID' and the included lower level hierarchy levels to '1'. Confirm with 'OK'. ( $\rightarrow$  Chart  $\rightarrow$  Lower hierarchy levels included  $\rightarrow$  1  $\rightarrow$  OK)

Create/Update Block Icons						
Block icons will be created or updated for the following pictures:						
<ul> <li>A1_multipurpose_plant\A1_multipurpose_plant</li> <li>A1_multipurpose_plant\T1_educt_tanks\T1_educt_tanks</li> <li>A1_multipurpose_plant\T2_reaction\T2_reaction</li> <li>A1_multipurpose_plant\T3_product_tanks\T3_product_tanks</li> <li>A1_multipurpose_plant\T4_rinsing\T4_rinsing</li> </ul>						
The object name TAG is made up of the following components of the HID:						
Chart						
Lower hierarchy levels included:						
Zoom factor (50 - 500%):  100						
Position block icons automatically						
OK Apply Cancel Help						

7. Now the block icons are created and updated.



8. After Create/Update Block Icons, have the log displayed. ( $\rightarrow$  Yes)

Create/Update Block Icons (3283:5053)							
To ensure possible automatic corrections to the WinCC picture interconnections, you must subsequently compile the associated operator stations before making changes to the name components of the associated process variables (HID, chart names,).							
Do you want to view the function log now?							

9. The log shows that no errors occurred. ( $\rightarrow$  X)

	0
Courier New ▼ 11 ▼ A A I II ▼ II ▼ A A	_
Einfügen     F     K     U     abs     X:     X:     X:     Abs     Image: A	
.1	·17
<pre>************************************</pre>	•
following blocks:	-
Project PCS7_SCE_Prj SFC A1_multipurpose_plant\\SFC_product01 SFC of type @SFC_RTS, variant: SFC A1_multipurpose_plant\\SFC_rinsing SFC of type @SFC_RTS, variant: Picture A1 multipurpose plant\T1	
_educt_tanks	
Block icons will be generated/updated for the following blocks: Project PCS7_SCE_Prj CFC A1_multipurpose_plant\T1_educt_tanks	
\educt_tank B001\\A1T1S001	
<pre>Block pump_A1T1S001 of type MotL, variant: </pre>	
CFC Al multipurpose_plant\T1_educt_tanks \educt_tank B002\\A1T18002 Block pump A1T18002 of type MotL, variant:	
CFC Al multipurpose_plant\T1_educt_tanks \educt_tank B003\\AITIS003 Block pump AITIS003 of type MotL, variant:	
BIOCK pump_AITISUUS DI Cype Moth, Variant:	
CFC Al multipurpose_plant\T1_educt_tanks \educt_tank B001\\A1T1X004 Block Valve A1T1X004 of type VlvL,	
variant: /2	
CFC A1_multipurpose_plant\T1_educt_tanks \educt_tank B002\\AITIX005	
Block Valve_AlTIX005 of type VlvL, variant: CFC A1 multipurpose plant\T1 educt tanks	
\educt_tank B003\\AITIX006 Block Valve AITIX006 of type VlvL,	
variant:	
Picture A1_multipurpose_plant\T2_reaction\T2_reaction Block icons will be generated/updated for the	-
	.,4

10. We can now start compiling the OS from the Component view. ( $\rightarrow$  OS  $\rightarrow$  PLC  $\rightarrow$  Compile and Download Objects...)

SIMATIC Manager - [PCS7_SCE_MP (Component view) C:\Program Files\Siemens\STEP7\S7Proj\PCS7_S_4\PCS7								
😼 File Edit Ins	sert PLC View Options		þ	_ & ×				
🗋 🗁 🚼 🐖	👗 🖻 💼 🏄 오 🎴		🗰 🔁 < No Filter >	💽 🏹 📲 🎯 🖷 🗖 📋				
□ · 😪 PCS7_SCE_N □ - 🎒 PCS7_SC □ - 🗐 AS1 □ - 🖳 AS2		tion 🔋 WinC	CAppl. <mark>⊭</mark> ∦IE General					
	Open Object 0	Ctrl+Alt+O						
⊡	Cut	Ctrl+X						
	Сору	Ctrl+C						
	Paste	Ctrl+V						
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	PLC	•	Download	Ctrl+L				
	Access Protection	•	Configure	Ctrl+K				
	Print	•	Compile and Download Objects	La contraction of the second s				
	SIMATIC BATCH	•	Compare					
	Rename	F2						
	Object Properties	Alt+Return						
Compiles/download	Is the objects to be selected (	under the highlig	hted objects.	li.				

11. Before starting, check the settings for compiling the OS. (OS(1) $\rightarrow$  Edit...)

Compile and Download Objects				- • ×
Selection table:				
Objects	Status	Operating Mode	Compile	Download
<u>■</u> 0S			×	
Du Configuration	undefined		<ul> <li>Image: A start of the start of</li></ul>	
E- WinCC Appl.			1	
Connections	undefined		Image: A state of the state	
OS(1)		Not open		
Settings for Compilation/Download Edit Test Status Operating Mode	View L	ogSle ObjectAll	ect Dbjects Select All	Deselect All
Status during Open				
Compile only 🔽 Do not load if compilation error is detected				
Start Close				Help

12. The assignment of areas to operator stations remains unchanged.

Operator Stations			
A1_multipurpose_pl	OS\WinCC Appl.\OS(1)	multipurpose plant for training of prozess control technology wit	
ľ	Area	Area OS Assignment	

13. In the next dialog step, the network connection is checked.

 $(\rightarrow S7\text{-}Program(1) \rightarrow Select Network Connections...)$ 

ettings: Compile OS									
Select the network connections for the	S7 Programs associated with the areas.								
Operator stations and areas:	S7 programs and network connections:								
🖃 🖉 🥐 OS(1)	S7 pro 🖉 Connections Subnet Subnet type WinCC unit Add	Iress Station no. Segment							
🗹 🛐 A1_multipurpose_plant	S7 Progr 1 Ether lad Eth Industrial 09,00.06.01.0	0.00							
	Select Network Connections								
	۲ III	4							
		Connection							
< Back Next >		Cancel Help							

14. As WinCC Unit, TCP/IP should be set. (WinCC unit  $\rightarrow$  TCP/IP  $\rightarrow$  OK)

s	Select Network Connection									
ſ	S7 program: S7 Program(1)									
	Subnet 🛆	Subnet type	WinCC unit	Address	Station no.	Sej				
	Ethernet(1)	Ind. Eth.	Industrial Etheri 💌	08.00.06.01.00.00						
			Industrial Ethernet Industrial Ethernet (II	)		_				
						_				
	•		III			۶.				
	OK			Cancel	Help					

15. Now go to the next dialog step.( $\rightarrow$  Next)

Settings: Compile OS		<b>— X —</b>			
Select the network connections for the	Select the network connections for the S7 Programs associated with the areas.				
Operator stations and areas:	S7 programs and network connections:				
🖃 🖉 🥐 OS(1)		tation no. Segment			
🗹 🔂 A1_multipurpose_plant	S7 Progr         1         Ether         Ind.         Eth.         TCP/IP         192.168.0.1				
		Connection			
< Back Next >		Cancel Help			

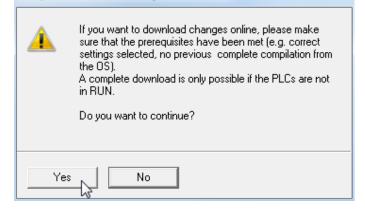
16. In the last setting window, apply the values shown below.

gs: Compile OS		
ect the data you want to com	pile and the scope of the compilation.	
Data	Further options	
<ul> <li>Tags and messages</li> </ul>	Minimum acquisition cycle of the archive tags:	
<ul> <li>SFC Visualization</li> </ul>	With interconnection partner ( SFC option )	
✓ Picture Tree	Compression Settings	
Scope	Create server data	
	th memory reset	
C Changes		

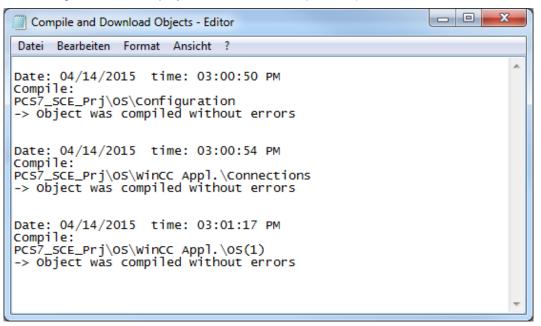
17. Because the operator station (OS) is started on the engineering system (ES) for this plant, we only select Compile here, not Download. After the compile run is started, the warning is confirmed with Yes. (→ Start → Yes)

Compile and Download Objects	-	and the strategy of the state of the		<u> </u>
Selection table:				
Objects	Status	Operating Mode	Compile	Download
Du Configuration	undefined		<ul> <li>Image: A start of the start of</li></ul>	
E- WinCC Appl.			1	
Connections	undefined		<b>V</b>	
S(1)		Not open		
Settings for Compilation/Download Edit Test Compile only Compile only Do not load if compilation error is detected	View L Sin		Objects Select All	Deselect All
Start Close				Help

Compile and Download Objects (3280:822)



18. The log that is now displayed shows no errors. ( $\rightarrow$ 



19. After the compilation, the operator station can be opened ( $\rightarrow$  OS(1)  $\rightarrow$  Open Object)

SIMATIC Manager - [PCS	7_SCE_MP (Component view)	C:\Program Files	Siemens\STEP7\S7F	Proj\PCS7_S	×
🔁 File Edit Insert PL	C View Options Windov	v Help		- 8	×
📘 🗅 😂   🏪 🛲   X 🖻	e 🗈   🏜   오 💁   ºo 🕻	5- 🟥 🏛   🔁   [	< No Filter >	💽 🏹 🔡 🗃	
PCS7_SCE_MP PCS7_SCE_Pri PCS7_SCE_Pri PCS7_SCE_Pri PCS7_SCE_Pri PCS7_SCE_Pri PCS7_SCE_Pri PCS7_SCE_Pri PCS7_SCE_MP PCS7_SCE_MP PCS7_SCE_MP PCS7_SCE_MP PCS7_SCE_MP PCS7_SCE_PRI PCS7_SCE_MP PCS7_SCE_PRI PCS7_SCE_	-ტ- A1_multipurpose_pla -ტ- T3_product_tanks - pl.		∱ T1_educt_tanks	-∱ T2_reaction	
🕀 📄 Shared D	Open Object	Ctrl+Alt+O			
⊡ 😵 PCS7_SCE_L	Cut	Ctrl+X			
	Сору	Ctrl+C			
	Paste	Ctrl+V			
	Delete	Del			
	Insert New Object	•			
	PLC	+			
Opens selected object.	Access Protection	+			1.

20. If the computer name in the WinCC project does not match the local computer name, you will receive the following message which you confirm with 'Yes'. Then you should change the name of the computer. ( $\rightarrow$  Computer  $\rightarrow$  Properties).

s7omwinx		X
The configured server is no with the local computer as	server?	Want to open the project
WinCCExplorer - C:\Program Files\Siemens\STEP7\S7Proj\P File Edit View Tools Help	CS7_SCE\PCS7_Prj\wincp	proj\OS(1)\OS(1).mcp
🗋 🍉   🔳 🕨   🗶 🤨 🏥 🛄 🖀	?	
□[] OS(1)	Name	Туре
Computer	PCS7OSCLIENT	<sup>c</sup> erver
Tag Management		Find
E Structure tag		Cut
		Сору
		Paste
Report Designer		Delete
Global Script		
Text Library		Properties 2
🚽 🙀 User Administrator		
Redundancy		
- Ifebeat Monitoring		
一		
OS(1)\Computer\		1 object(s) selected

21. If the computer name is the same as the local computer name, no changes need be made. If the computer name does not match, it has to be set with the button 'Use local computer name'. Exit the window with 'OK'.

$(\rightarrow$ Use local computer name $\rightarrow$ O	K)
Computer properties	Computer properties
General Startup Parameters Graphics Runtime Runtime	General Startup Parameters Graphics Runtime Runtime
Computer Name: PCS77/2	Computer Name: PCS70SCLIENT3
Use Local Computer Name	Use Local Computer Name
Computer Type:	Computer Type:
Server	Server
WinCC Client	WinCC Client
Server List:	Server List:
Name of the computer in the network	
OK Abbrechen Hilfe	OK N Abbrechen Hilfe

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22. The change of the computer name is applied only after the restart. This means, you have to close WinCC if the computer name is changed.

Change computer name	×
	he computer 'PCS7OSCLIENT3' has changed. comes effective only after you restart WinCC.
	Сск
WinCC Explorer - D:\PCS7\SCE\P02-01\Uebung en\	PCS7_SCE\PCS7_Prj\wincproj\OS(1)\OS(1).mcp
File Edit View Tools Help	
📄 New Ctrl+N 🔚	) 🖀   ?
👔 🗁 Open Ctrl+O	Name Type
Close	PCS70SCLIENT3 Server
Activate	
Print Project Documentation	
Preview Project Documentation	
Set Up Project Documentation	
Recent File	
Exit	
🚽 👖 User Administrator	
🔂 Cross-Reference	Fuit WinCC Fundament
	Exit WinCC Explorer
User Archive	
Time synchronization	This closes the WinCC Explorer.
Lifebeat Monitoring	Close project when exiting
Process Historian	
Component List Editor	Exit Cancel
一	
💮 😯 Web Navigator	
Exits the application; asks whether the documents shou	ld be saved. 1 object(s) selected Licensi

#### 23. The WinCC project can be reopened from the SIMATIC Manager.

SIMATIC Manager - [PCS7_9	SCE_MP (Component vi	iew) C:\Program Files\S	Siemens\STEP7\	S7Proj\PCS7_SCE	\PCS7_MP	]		- • •
🔁 File Edit Insert PLC	View Options Win	dow Help						_ 8 ×
📙 🗅 🚅 🕌 🚟 🕺 🖓 🖺 I	🗟   🏜    9  🏪   4	• 📴 🏥 🗰 🔁 🔍	No Filter >	- Y	🚼 🇐	<b>5</b> 800	<b>№?</b>	
		-슈·A1_multipurpose_plant -슈·T4_rinsing		-† T1_educt_t	anks -∱-	T2_reaction	-∱-T3_product_tank	\$
⊕ _ Shared Decl	Open Object	Ctrl+Alt+O						
È- 💊 PCS7_SCE_Lib	Cut	Ctrl+X						
	Сору	Ctrl+C						
	Paste	Ctrl+V						
	Delete	Del						
	Insert New Object	۱.						
	PLC	+						
	Access Protection	•						
	Compile	Ctrl+B						
	Display compilation lo Display load log	og						
Opens selected object.	Generate server data							//

24. To set the network configuration, open Tag Management.

 $(\rightarrow \text{Tag Management} \rightarrow \text{Open})$ 

KinCCExplorer - D:\SCE_Projekte_en\PCS7_SCE\PCS7_Prj\wincproj\OS(1)\OS(1).mcp [ 4	kctive ]	
File Edit View Tools Help		
□> ■> Х車車  1:5 錄		
□ OS(1)	Name 1	Гуре
	No objec	te evict
Tag Management	1000520	
A Graphics Desi Open		
Alarm Loggin Properties		
Report Designer		
-] 👷 Global Script		
Text Library		
CrossReference		
Bausteinlisten Editor		
ー 品 SFC 		
OS(1)\Tag Management\	Process objects: 30 / License: Unlimited	Licensed mode at

25. Here we can change the system parameters. To this end, select the system parameters in the SIMATIC S7 Protocol Suite under TCP/IP.

(SIMATIC S7 PROTOCOL SUITE  $\rightarrow$  TCP/IP  $\rightarrow$  System Parameter)

ag Management 🛛 🔍	۲ <b>۱</b>	TCP/IP			Find		Q
Tag Management		Name	Data Type	Length	Format adaptation	Connection	
🗄 🍄 Internal tags	1	A1_multipurpose_plant/SFC_product01.BA_EN	Binary Tag	1		S7\$Program(1)	
SIMATIC S7 Protocol Suite	2	A1_multipurpose_plant/SFC_product01.BA_ID	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
- II MPI	3	A1_multipurpose_plant/SFC_product01.BA_NA	Text tag 8-bit character set	32		S7\$Program(1)	
PROFIBUS	4	A1_multipurpose_plant/SFC_product01.CUSEQ	Unsigned 8-bit value	1	ByteToUnsignedByte	S7\$Program(1)	
Industrial Ethernet	5	A1_multipurpose_plant/SFC_product01.DIS_START_STATE	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
- II Slot PLC	6	A1_multipurpose_plant/SFC_product01.EventRaw#1	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
	7	A1_multipurpose_plant/SFC_product01.EventRaw#2	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
S7 💅 New Connection		A1_multipurpose_plant/SFC_product01.EventState	Signed 32-bit value	4	LongToSignedDword	S7\$Program(1)	
PROF		A1_multipurpose_plant/SFC_product01.EventTrans#1	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
	)	A1_multipurpose_plant/SFC_product01.EventTrans#2	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
Indus Brase		A1_multipurpose_plant/SFC_product01.HELDSEQ	Unsigned 8-bit value	1	ByteToUnsignedByte	S7\$Program(1)	
Name II System Paramete	'N	A1_multipurpose_plant/SFC_product01.LI_ERR_STATE	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
Soft PLC	13	A1_multipurpose_plant/SFC_product01.MSG_LOCK	Binary Tag	1		S7\$Program(1)	
Structure tags	14	A1_multipurpose_plant/SFC_product01.MSG_SUP	Binary Tag	1		S7\$Program(1)	
🖲 🔧 @Maintenance	15	A1_multipurpose_plant/SFC_product01.0CCUPIED	Binary Tag	1		S7\$Program(1)	
🐵 🔧 @Enum_Operating State	16	A1_multipurpose_plant/SFC_product01.OP_ERR_STATE	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
🗄 🔧 @SFC_RTS	17	A1_multipurpose_plant/SFC_product01.SFC_ADDSTATE	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
🛓 🕂 Intik02	18	A1_multipurpose_plant/SFC_product01.SFC_CONTROL	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
🗄 🕂 🏤 MotL	19	A1_multipurpose_plant/SFC_product01.SFC_STATE	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
🗄 🕂 VivL	20	A1_multipurpose_plant/SFC_product01.STEP_NO	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
PIDConL	21	A1_multipurpose_plant/SFC_rinsing.BA_EN	Binary Tag	1		S7\$Program(1)	
	22	A1_multipurpose_plant/SFC_rinsing.BA_ID	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
	23	A1_multipurpose_plant/SFC_rinsing.BA_NA	Text tag 8-bit character set	32	-	S7\$Program(1)	
- • -	24	A1_multipurpose_plant/SFC_rinsing.CUSEQ	Unsigned 8-bit value	1	ByteToUnsignedByte	S7\$Program(1)	
	25	A1_multipurpose_plant/SFC_rinsing.DIS_START_STATE	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
Tag Management	26	A1_multipurpose_plant/SFC_rinsing.EventRaw#1	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
	27	A1_multipurpose_plant/SFC_rinsing.EventRaw#2	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	

26. In the 'Unit' tab, set PLCSIM(TCP/IP) as the logical device name.

$(\rightarrow$ Unit $\rightarrow$ Logical device name –	$\rightarrow$ PLCSIM(TCP/IP) $\rightarrow$ OK)
---	--

System Parameter - TCP/IP	×
SIMATIC S7 Unit	
Select logical device name	
CP type/bus profile:	TCP/IP
Logical device name:	PLCSIM(TCP/IP)
V Set automatically	CP_H1_1: CP_L2_1: CP1623(RFC1006) MPI
Job processing	STONLINE
Write with priority	TCP/IP -> Realtek RTL8168C(P)/ TCP/IP(Auto) -> Realtek RTL8168 TS Adapter IE
Enter a new device name or s	select the requested device from the list.
ОК	Cancel Help

#### 27. Now close Tag Management. ( $\rightarrow$ Close)

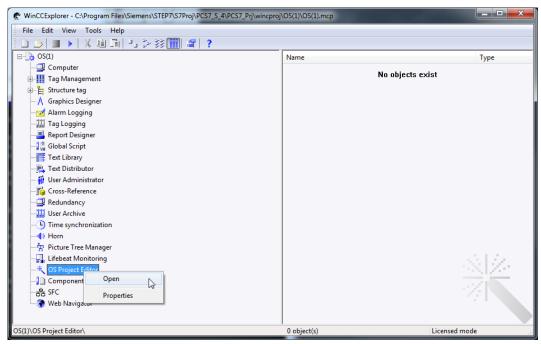
WinCC Configuration Studio			A far hannabar				X
File Edit View Help							
Exit jement «		TCP/IP			Find		0
Tag Management		Name	Data Type	Length	Format adaptation	Connection	
🗄 🍄 Internal tags	1	A1_multipurpose_plant/SFC_product01.BA_EN	Binary Tag	1		S7\$Program(1)	
SIMATIC S7 Protocol Suite	2	A1_multipurpose_plant/SFC_product01.BA_ID	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
MPI	3	A1_multipurpose_plant/SFC_product01.BA_NA	Text tag 8-bit character set	32		S7\$Program(1)	
PROFIBUS	4	A1_multipurpose_plant/SFC_product01.CUSEQ	Unsigned 8-bit value	1	ByteToUnsignedByte	S7\$Program(1)	
Industrial Ethernet	5	A1_multipurpose_plant/SFC_product01.DIS_START_STATE	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
Slot PLC	6	A1_multipurpose_plant/SFC_product01.EventRaw#1	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
	7	A1_multipurpose_plant/SFC_product01.EventRaw#2	Unsigned 32-bit value	4	DwordToUnsignedDword	S7\$Program(1)	
S7\$Program(1)	8	A1_multipurpose_plant/SFC_product01.EventState	Signed 32-bit value	4	LongToSignedDword	S7\$Program(1)	
	0	At an inclusion and all and the first the state	Descendence (Calculus)		N	C740(4)	

- 28. Once you have opened WinCC again, open the Picture Tree Manager.
  - $(\rightarrow$  Picture Tree Manager  $\rightarrow$  Open)

🥐 WinCCExplorer - C:\Program Files\Siemens\STEP7\S7Proj\PCS7_S_4\PCS7_Prj\wincproj\OS(1)\OS(1).mcp				
File Edit View Tools Help				
□ ▷   ■ ▶   X 埴 道   ʰ ▷ 診 録     ] (1)				
	Name	Туре		
	N			
⊞ III Tag Management	No objects exist			
🗄 🗄 Structure tag				
- 🔥 Graphics Designer				
- 🛄 Tag Logging				
] <sup>©</sup> <sub>Ve</sub> Global Script				
Text Library				
🦷 🕅 User Administrator				
User Archive				
-m Picture Tree Manager				
Lifebest Monitoria Open				
* OS Project Editor		T		
Component List Economy     Properties		in the shell		
一品 SFC				
💮 😚 Web Navigator		ALC: NOTE: N		
OS(1)\Picture Tree Manager\	0 object(s) Licensed mo	de		

29. In the Picture Tree Manager we specify the sequence in which the pictures are called later. Retain the structure, save and close the editor. ( $\rightarrow$  Save  $\rightarrow$  Eigen Close)

🚖 Picture Tree Manager - [OS(1).mcp]	
Project Edit View Options Help	
Hierarchy of the containers and pictures	Picture preview:
OS(1).mcp     OS(1).mcp     OS(1).mcp     A1_multipurpose_plant - A1_multipurpose_plant.pdl     OS(A1_multipurpose_plant/T1_educt_tanks - T1_educt_tanks.pdl     OS(A1_multipurpose_plant/T2_reaction - T2_reaction.pdl     OS(A1_multipurpose_plant/T3_product_tanks - T3_product_tanks.pdl     OS(A1_multipurpose_plant/T4_rinsing - T4_rinsing.pdl	
Unassigned containers and pictures	
Container	
Saves the current picture hierarchy.	UF NUM



30. Then open the OS Project Editor. ( $\rightarrow$  OS Project Editor  $\rightarrow$  Open)

31. In the OS Project Editor, we can now select under 'Layout' the motor configuration and the screen resolution. In addition, settings are provided for message display, the visible areas, window arrangement in the Runtime window, and other basic settings. Set the desired layout, the number of area keys and the monitor configuration. Exit the dialog with 'OK'. (→ Select layout → Number of area keys: 4 → OK)

CS Project Editor				S X
Layout •	ion 📃 Messag	ge display 🛛 🙀 Area	🖪 Runtime window   🎒 Basic data   [	General
Current layout: SIMATIC Sta	ndard 1920*1200			
Available layouts:			Layout Description:	
Picture Name SIMATIC Standard 1024*768 SIMATIC Standard 1152*864			SIMATIC Standard-Layout for screen res 1024*768	olution of
SIMATIC Standard 1280*1024 SIMATIC Standard 1600*1200 SIMATIC Standard 1680*1050 SIMATIC Standard 1920*1080 SIMATIC Standard 1920*1200			Number of area keys: Number of server keys: Overview extended configuration:	4 Detail
SIMATIC Standard 2560*1600			Runtime Help available	
	(	Configures the	Project	
Monitor configuration			Configuring the runtime system	
•	•		Copies picture files	
			OK Cance	I Apply

32. The operating screens are generated in the Graphics Designer. Individual screens are opened best by double clicking on the name in the window to the right.

 $(\rightarrow \text{Graphics Designer} \rightarrow A1\_multipurpose\_plant)$ 

WinCCExplorer - C:\Program Files\Siemens\STEP7\S7Proj\PCS7_S_4\PCS7_Prj\wincproj	\OS(1)\OS(1).mcp				
File Edit View Tools Help					
□ ▷   ■ ▶   X 埴 道   □ ▷ 診 該 ((()) 督   ?					
OS(1)	Name	Type ^			
	A @RedStateDispContainer.PDL	Graphics Desig			
🗄 📲 Tag Management	A @screen.pdl	Start picture			
🗄 🗄 🗄 Structure tag	A @ScreenSettings.PDL	Graphics Desig			
Graphics Designer	A @ServersStates.PDL	Graphics Desig			
	👌 @SIGNAL_Test.PDL	Graphics Desig			
Tag Logging	👌 @simatic_batchos.pdl	Graphics Desig			
Report Designer	🙏 @TemplateAPLV7.PDL	Graphics Desig			
Global Script	🙏 @TemplateAPLV8.PDL	Graphics Desig			
Text Library	🙏 @Template_Batch.pdl	Graphics Desig			
Text Distributor	A @Test001.PDL	Graphics Desig			
User Administrator	👌 @Time7SEG.pdl	Graphics Desig			
Cross-Reference	👌 @TopAlarmNew.pdl	Graphics Desig			
	🙏 @TRG_Default.Pdl	Graphics Desig			
User Archive	🙏 @TRG_Standard.Pdl	Graphics Desig			
	A @WarningLevel.PDL	Graphics Desig			
	A @WarningServer.PDL	Graphics Desig			
-	A @WarningTopfield.PDL	Graphics Desig			
	A @Welcome.PDL	Graphics Desig			
Lifebeat Monitoring	A1_multipurpose_plant.Pdl	Graphics Desig			
	A T1_educt_tanks.Pdl	Graphics Desig			
Component List Editor	A T2_reaction.Pdl	Graphics Desig			
一品 SFC	A T3_product_tanks.Pdl	Graphics Desig			
	A T4_rinsing.Pdl	Graphics Desig			
	•	•			
OS(1)\Graphics Designer\	1 object(s) selected Lie	ensed mode			

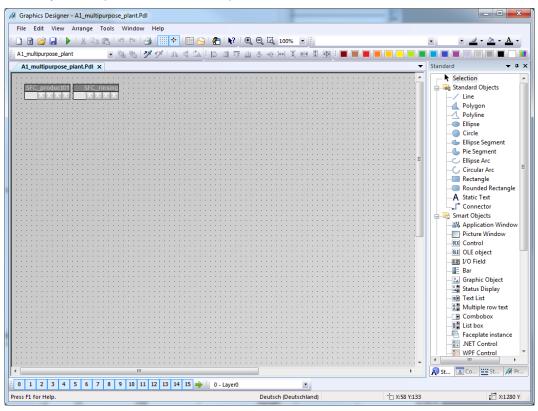
33. The Graphics Designer provides the most diverse functions for generating process pictures. They can be hidden or shown in the menu with View/Tools.

Graphics Designer - A1_r	multipurpose_plant.Pdl			
File Edit View Arran	ge Tools Window Help			
🗅 🖻 🚅 🖬 🕨 🕷	🗈 🖭 🗠 🕒 🔛 🔛 🖬 🔛 🚱 😵	€ € 100% .		• • <u>4</u> • <u>A</u> •
A1_multipurpose_plant	- 5 5 <b>7</b> 9 4 4 5 6 8 9	『프 후 아 버 옷 프 🏾 🖽 🔳 🔳		
A1_multipurpose_plant.l	PdI X		•	Standard 🔻 🕂
	Workspace	Nignment:Palette		<ul> <li>Line</li> <li>Polygon</li> <li>Polyine</li> <li>Ellipse</li> <li>Circle</li> <li>Flipse Segment</li> <li>Pie Segment</li> <li>Cillipse Arc</li> <li>Cillipse Arc</li> <li>Rectangle</li> </ul>
				Rounded Rectangle     A Static Text     J <sup>a</sup> Connector     Smart Objects
< [			•	A Static Text
	m		, , ,	A Static Text Smart Objects W Application Window Picture Window
Constant of the second se			• # X	A Static Text Connector Smart Objects Connector State of the state
Properties Events  Picture Object Geometry Colors Styles Miscellaneous Background Picture Effects	Attribute Object Properties	Static Dynamic Update I		A Static Text Connector Smart Objects Picture Window OLE object DLE objec
Properties Events	Attribute Object Properties	ic Wizard	indir	A Static Text Connector Smart Objects V Application Window Vi Control GL Object Bar Status Display Withipe row text Combobox Faceplate instance NET Control
Properties Events	Attribute Object Properties ayer Palette Dynam	ic Wizard	indir	A Static Text Connector Smart Objects W Application Window Picture Window UE OLE object W OF Field Bar Status Display Text List Combobox List box Faceplate instance W PF Control W PF Control

 $(\rightarrow \text{View} \rightarrow \text{Toolbars})$ 

These toolbars have the following functions:

- Standard tools: contains icons and buttons to carry out frequent commands quickly.
- Color palette: used to assign colors to selected objects (one of 16 standard colors or a user defined color).
- Zoom palette: sets the zoom factor (in percent) for the active window.
- Style palette: changes the appearance of a selected object. Depending on the object, the line/border type, the line/border weight, the line end styles or the fill pattern can be changed.
- Standard: contains the standard objects (polygon, ellipsis, rectangle, etc.), smart objects (OLE control, OLE element, EA field etc.) and Windows objects (button, check box etc.).
- Dynamic Wizard: provides a variety of frequently needed functions. They can be generated using a dialog that guides the operator and also lends support.
- Layer palette: selects which of the 32 levels (level 0 to 31) is visible. Level 0 is selected by default.
- Alignment palette: used to change the absolute position of one or several objects, to change the position of selected objects relative to each other, or unify the height and width of several objects.
- Object properties: enables you to view and change all properties of the selected object.
- Object palette: shows you which object is currently selected and offers different options for manipulation.
- 34. Through creating the faceplates, the block icons are already included in the pictures. They can be positioned within the pictures as desired.



35. In the properties of the block icons, the displayed name can be specified. Otherwise, a very long name is displayed that includes the path.

 $(\rightarrow \text{Properties} \rightarrow \text{Object name} \rightarrow \text{A1_multipurpose_plant/SFC_Product01})$ 

	- A1_multipurpose_pl	ant.Pdl						- • ×
File Edit View	Arrange Tools Wi	ndow Help						
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Displays the properties	s dialog			Deutsch (Deutschland)	A1_multipurpose_plan	X:26 Y:22		I X:90 Y:31
Object Properti	ies							x
								×
	ies rents							×
Properties Ev	rents	Attachada		Chulin .		Durania	Undata	
Properties Ev	object	Attribute		Static		Dynamic	Update	× Indir
Properties Ev	object		A1_multipu		C_product01	Dynamic	Update	
Properties Ev	vents object IV	Object Name		Static rpose_plant/SF	C_product01	Dynamic	Update	
Properties Ev Customized Geometr	vents object IV		A1_multipu 14		C_product01	Dynamic	Update	
Properties Ev Customized Geometri Miscellai General	vents object IV	Object Name			C_product01	Dynamic	Update	
Properties Ev Customized Geometr Miscellar General Styles	vents object IV	Object Name			C_product01	Dynamic	Update	
Properties Ev Customized Geometri Miscellai General	vents object IV	Object Name			C_product01	Dynamic	Update	
Properties Ev Customized Geometri Miscellar General Styles	vents object IV	Object Name			C_product01	Dynamic	Update	
Properties Ev Customized Geometri Miscellar General Styles	vents object IV	Object Name			C_product01	Dynamic	Update	
Properties Ev Customized Geometri Miscellar General Styles	vents object IV	Object Name			C_product01	Dynamic	Update	
Properties Ev Customized Geometri Miscellar General Styles	vents object IV	Object Name			C_product01	Dynamic	Update	
Properties Ev Customized Geometri Miscellar General Styles	vents object IV	Object Name			C_product01	Dynamic	Update	
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Properties Ev Customized Geometri Miscellar General Styles	vents object IV	Object Name			C_product01	Dynamic	Update	
Properties Ev Customized Geometr Miscellar General Styles	vents object IV	Object Name			C_product01	Dynamic	Update	

36. Now, we change the background color of the picture to white. To this end, left click in the background of the picture with activated object properties toolbar. The properties of the picture object open.

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			-i-: x-0 Y-0	I X:1280 Y

- 37. For each object as well as the picture, a variety of properties is provided that can be changed statically or dynamically (for example, interfaced with process variables). Here, the background color is edited.
  - $(\rightarrow$  Picture Object  $\rightarrow$  Colors  $\rightarrow$  Background Color  $\rightarrow$  Edit)

Object Properties					×
Properties Events					
Picture Object Geometry Colors Styles Miscellaneous Background Picture Effects	Attribute Background Color Fill Pattern Color Grid Color	Static Edit	Dynamic	Update	Indir

Color Selection	X
Colors Palette	
║╾╴╴╴╴╴╴╴	
Red	255
Green	255
Blue	255
	ML code: FFFFFF
	OK Abbrechen
	Abbrechen

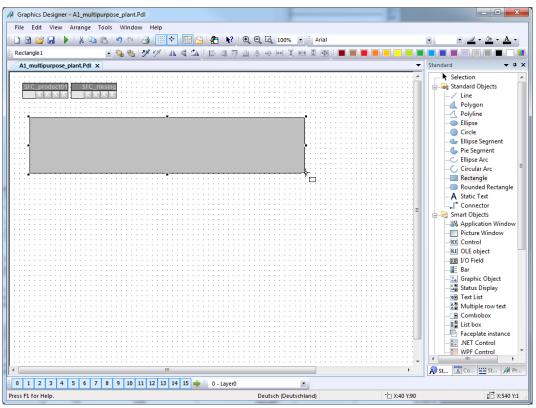
38. Now, select white as the color (255 255 255). (White  $\rightarrow$  OK)

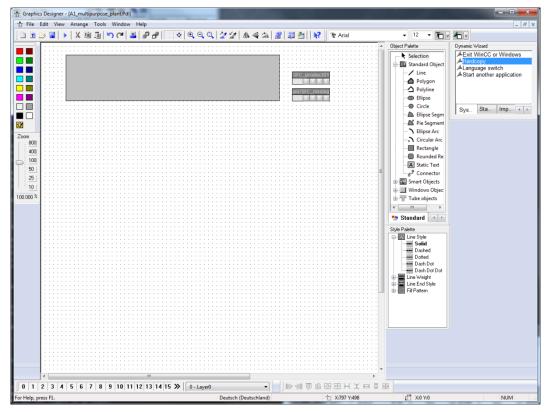
- 39. For the change of the background color to become effective, the global color scheme has to be deactivated.
  - $(\rightarrow$  Picture Object  $\rightarrow$  Effects  $\rightarrow$  Global Color Scheme  $\rightarrow$  No)

Object Properties						×
Properties Events						
Picture Object Geometry Colors Styles Miscellaneous Background Picture Effects	Attribute Global Color Scheme	No	Static	Dynamic Q	Update	Inc
	•		III			P.

- × **Object Properties** Properties Events Picture Object Attribute Static Dynamic Update... Inc Geometry Picture Width 1024 Ô Colors Q Picture Height 616 Styles Grid On Yes Miscellaneous Grid Width 10 Background Picture Grid Height 10 Effects ۰. 111
- 40. Now, change the picture geometry for it to be shown completely at a resolution of 1024x768.

 Next, in the Standard palette, click on Rectangle and draw a large rectangle in the picture. (→ Standard palette → Rectangle)



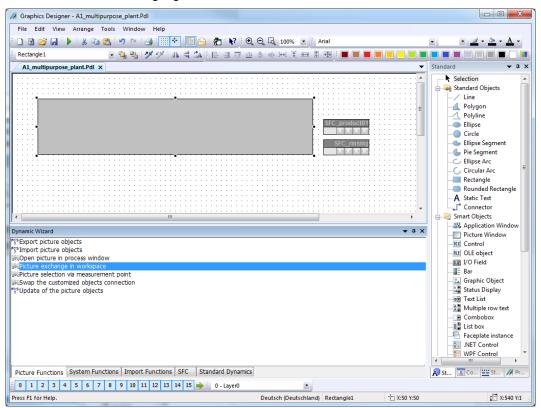


42. Arrange the icons for the SFCs as shown below next to the rectangle you just drew.

43. Open the selection for the toolbars if the Dynamic Wizard is not displayed yet. ( $\rightarrow$  View  $\rightarrow$  Toolbars  $\rightarrow$  Dynamic Wizard)

Graphics Designer - A1_multipurpose_plant.	Pdl			
File Edit View Arrange Tools Windo	w Help	_		
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	✓ Color Palette	╡╵╵╩╶┶╵ <sup>┍</sup> ╶╴═╺╘╼┱╷ <b>╴</b> ╸		
A1_multip Grid	✓ Object Palette		<u> </u>	Standard 👻 🖣 🗙
Zoom •	✓ Font Palette		· · · · · · · · · · · · · · · · · · ·	Selection
Layers	Standard Palette			🖶 🔤 Standard Objects
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	Dynamic Wizard			
	Object properties			Circular Arc
	Process Pictures			
	Standard			
				A Static Text
	✓ Styles			Connector
	Tags			🖃 📑 Smart Objects
	Reset			
		d		Picture Window
				OLE OLE object
				I/O Field
				Bar
				Graphic Object
				Status Display
				- III Text List
				Multiple row text
				Combobox
				List box
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				WPF Control
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				Restant Com - Star Print
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Displays the Dynamic Wizard		Deutsch (Deutschland)	X:41 Y:61	I X:0 Y:0

44. When the toolbar for the Dynamic Wizard is displayed, select here from the 'Picture Functions' the 'Picture exchange in workspace'. (→ Picture functions → Picture exchange in workspace). For this function to be applied to the rectangle you have just created, it must be highlighted first.



45. Read the explanation and go to 'Next'. ( $\rightarrow$  Next)

Welcome to the Dynamic Wizard	X
	This Wizard allows the selection of a frequently used dynamic for the selected object. This takes place in three steps: 1) Select the desired dynamic 2) Select a trigger for the dynamic 3) Set the options The Wizard then automatically generates the required dynamics and assigns them to the object.
	Do not show this page again
< Back	Next > Cancel Help

46. As trigger select 'Mouse click'. ( $\rightarrow$  Mouse click  $\rightarrow$  Next)

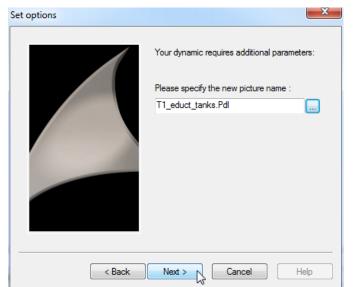
Select trigger	×
	You selected a dynamic that requires a trigger. Please select a trigger: Left mouse key Mouse click Right mouse key Trigger options
< Back	Next > Cancel Help

47. Now select the picture to which you want to change. ( $\rightarrow ...$ )

	Your dynamic requires additional parameters:
	Please specify the picture name :
	\\PCS7OSCLIENT3\WinCC_Project_OS
	<ul> <li>Adapt process window to picture size</li> <li>Process window sizeable</li> </ul>
< Back	Next > Cancel Help

48. In the picture browser, select T1\_educt\_tanks.Pdl. ( $\rightarrow$  T1\_educt\_tanks.Pdl  $\rightarrow$  OK)

Picture Browser	S X
Hierarchy:	
····· 🕐 PCS7OSCLIENT3	File Name
	*** @Welcome.PDL       *** A1_multipurpose_plant.Pdl       *** T1_educt_tanks.Pdl       *** T2_reaction.Pdl
	-^r T3_product_tanks.PdI -^r T4_rinsing.PdI
	OK Cancel Help



49. The name of the picture was accepted; continue. ( $\rightarrow$  Next)

50. The wizard is closed with 'Finish'. ( $\rightarrow$  Finish)

Finished!		x
	The Wizard will generate the following: The current picture: A1_multipurpose_plant.Pdl is exchanged with the picture T1_educt_tanks.Pdl by activating the trigger Mouse click on the object A1_multipurpose_plant	
< Back	Do not show this page again      Finish     Cancel     Hel;	

51. If you would like to view the result, the mouse and the mouse action are located under 'Events'. With a double click on the icon c you can then view the C-script that was generated.

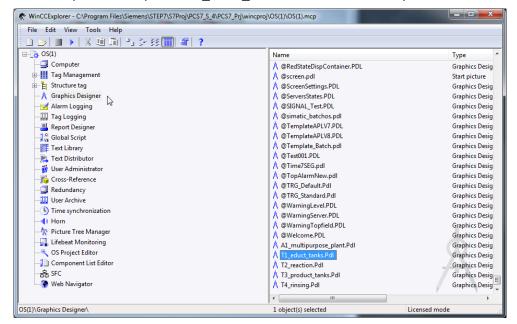
Object Properties Properties Events	x
Rectangle Ex Mouse Me Wiscellaneous Pre Property Topics	ecute on Action use Click ss Left ss Right ease Right Action
Edit Action	CB       Image: Constraint of the second secon
Ready	Cancel

 $(\rightarrow \text{Events} \rightarrow \text{Mouse} \rightarrow \text{Mouse Click} \not {}^{\bullet} \rightarrow \text{OK})$ 

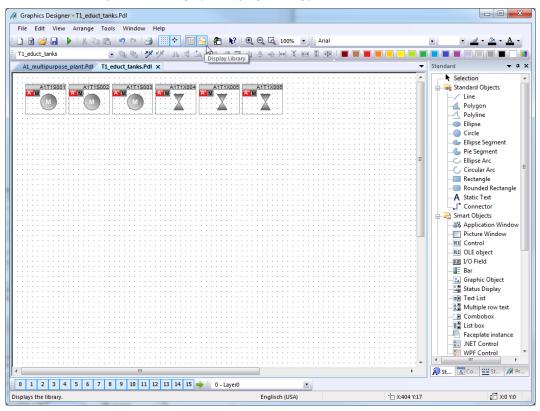
52. Using static texts, rectangles and the dynamic wizard, design your picture as shown here. It is absolutely necessary to ensure that the language 'View' menu corresponds to the desired target language. Here: English (United States).

Graphics Designer - A1_multipurpose_plant.Pdl	
File Edit View Arrange Tools Window Help	
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A1T4B001              0         1         2         3         4         5         6         7         8         9         10         11         12         13         14         15	Catalan (Catalan) Chinese (Traditional, Taiwan) Corsican (France) Croatian (Croatia) Czech (Czech Republic) Danish (Denmark) Dari (Afghanistan) Divehi (Maldives) Dutch (Netherlands) English (United States)

53. The next picture we open is 'T1\_educt\_tanks' from the WinCC Explorer.



54. After you have changed the background–as in the picture multi-purpose plant–to the color white, open the library. (→ Display Library)



55. From the library, first drag a symbol for the pump into the working field.

Graphics Designer - T1_educt_tanks.Pdl					
File Edit View Arrange Tools Wir					
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Conveyors     E-Symbols     ISA Symbols     Miscellaneous1	20_1 20_2 20_4 21_1 21_2 21_3	3644 2 3586 2 3656 2 3634 2 3641 2 3641 2	9.01.13 13:34 9.01.13 13:34 9.01.13 13:34 9.01.13 13:34 9.01.13 13:34 9.01.13 13:34 9.01.13 13:34	н	Status Display       Image: Text List       Image:
Conveyors     E-Symbols     ISA Symbols     Miscellaneous1     Miscellaneous2	20_1 20_2 20_4 21_1 21_2 21_3 22_1	3644 2 3586 2 3656 2 3634 2 3641 2 3641 2	9.01.13 13:34 9.01.13 13:34 9.01.13 13:34 9.01.13 13:34 9.01.13 13:34 9.01.13 13:34	н	Status Display - Ing Text List - Ing Combobox - Ing Combobox - Ing List box - 타 Faceplate instance - Ing NET Control
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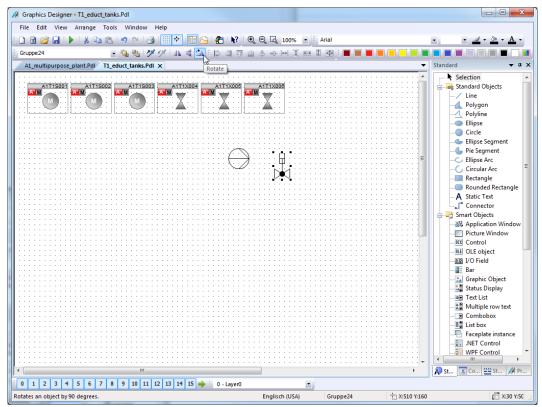
 $(\rightarrow \text{Global Library} \rightarrow \text{Symbols} \rightarrow \text{E-Symbols} \rightarrow 20_2)$ 

56. After the symbol for the pump, drag the valve symbol into the working field.

 $(\rightarrow$  Global Library  $\rightarrow$  Symbols  $\rightarrow$  Valves  $\rightarrow$  45)

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riess i 1 for help.		Englisch (USA)	Gruppe24 1_ A:510 Y:160	1 A:30 Y:50

57. The static symbols can be changed in their orientation by using the button Rotate.  $(\rightarrow \text{Rotate})$ 



58. After you have inserted additional lines and text fields as shown here, draw a rectangle to represent the tank, and select its properties. ( $\rightarrow$  Rectangle  $\rightarrow$  Properties)

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File Edit View Arrange Tools Window Help				
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				1 X:80 Y:14
Displays the properties dialog	Eng	lisch (USA) Rectangle1	X:180 Y:210	I X:80 Y:14

59. To change the color, deactivate the global color scheme once again.

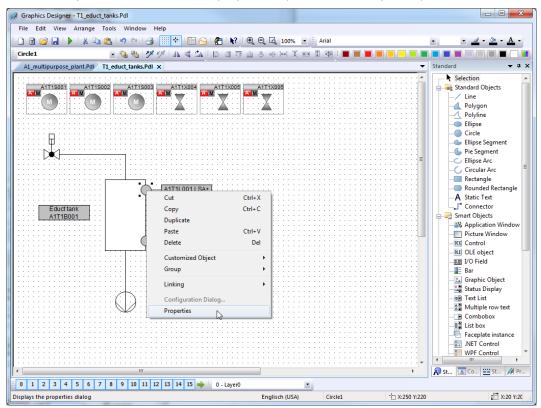
 $(\rightarrow \text{Properties} \rightarrow \text{Effects} \rightarrow \text{Global Color Scheme} \rightarrow \text{No})$ 

Object Properties						×
Properties Events						
Rectangle Geometry Colors	Attribute Global Shadow	Yes	Static	Dynamic Q	Update	Inc
Styles Flashing Miscellaneous Filling Effects	Global Color Scheme Object Transparency	No 0		Ô Ô		
						+

- 60. Now change the background color to white.
  - $(\rightarrow \text{Properties} \rightarrow \text{Colors} \rightarrow \text{Background Color})$

Object Prop	erties					×
Properties	Events					
Rectangle Geom Color Styles Flashi Misce Filling Effect	netry s ing ellaneous	Attribute Border Color Border Background Colo Background Color Fill Pattern Color	Static	Dynamic	Update	
		•				4

61. Next, we configure a display of the digital level sensors. As shown here, draw a circle into the picture. Then, select its properties. (→ Circle → Properties)



62. To have the color displayed dynamically, deactivate the global color scheme.

 $(\rightarrow \text{Properties} \rightarrow \text{Effects} \rightarrow \text{Global Color Scheme} \rightarrow \text{No})$ 

						_
ircle	Attribute		Static	Dynamic	Update	In
Geometry	Global Shadow	Yes		Q		
Colors	Global Color Scheme	No		Ŷ		
Styles Flashing Miscellaneous Filling Effects	Object Transparency	0		Q		

- 63. To implement a dynamic display, select the background color with the right mouse button and then the dynamic dialog.
  - $(\rightarrow \text{Properties} \rightarrow \text{Colors} \rightarrow \text{Background Color} \rightarrow \text{Dynamic Dialog})$

Properties Events			
Circle — Geometry — Colors — Styles — Flashing — Miscellaneous — Filling — Effects	Attribute Border Color Border Background Color Fill Pattern Color	Static	Dynamic Update Inc Dynamic Dialog C-Action VBS-Action Tag Delete
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64. In the following dialog, first select Boolean as data type, then change the color at Yes/TRUE to green, finally select 'Tag' for the dynamic expression.

		2 X
Used Language:	Deutsch (Deutschland)	-
Event Name:		2
Expression/Formula:		
Result Of The Expressi Valid range Yes /TRUE No /FALSE	Back	Chords Tag Function Operator Bit Direct Add Remove
Vali	d range Back	

65. At the variables, select as data source 'STEP 7 Symbol Server' and there, at the symbols, input I70.0 for the 'level monitoring educt\_tank B001 operating point H'.

( $\rightarrow$  Data source  $\rightarrow$  STEP 7 Symbol Server  $\rightarrow$  A1.T1.A1T1L001.LSA+.SA+ / I70.0 / level monitoring educt\_tank B001 operating point H  $\rightarrow$  OK)

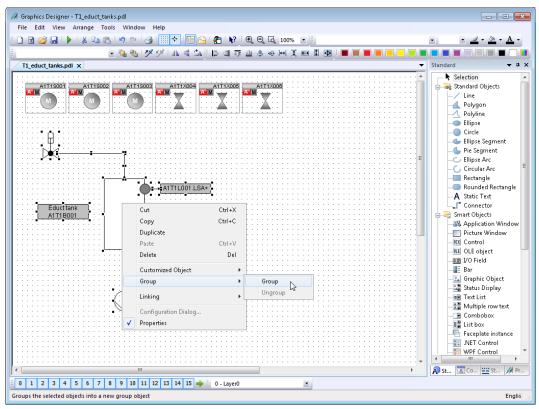
_] \$>\$\$ ∰ ➡ C	ata source: ES Variables WinCC Tags					
🖃 🞒 STEP 7 Symbol Server	Name	Data Type	Ad	dress	Comment	-
🗄 📴 S7 Program(1), PCS7_SCE_	a1.A1H001.HS+START	BOOL	Ι	0.0	Main power switch multipur	
	a1.A1H002.HS+OFF	BOOL	I	0.1	emergency switch OFF	
ia∎ DB	a1.A1H003.HS+LOC	BOOL	Ι	0.2	local operation mode switch	
ia[37] S7 Program(2), PCS7_SCE_	A1.T1.A1T1L001.LSA+.SA+	BOOL	Ι	70.0	level monitoring educt tank	Ĺ
	A1.T1.A1T1L001.LSASA-	BOOL	Ι	70.1	level monitoring educt tank	
	🖶 A1.T1.A1T1L002.LSA+.SA+	BOOL	Ι	70.2	level monitoring educt tank	
	🖨 A1.T1.A1T1L002.LSASA-	BOOL	Ι	70.3	level monitoring educt tank	
	🖶 A1.T1.A1T1L003.LSA+.SA+	BOOL	Ι	70.4	level monitoring educt tank	
	🖶 A1.T1.A1T1L003.LSASA-	BOOL	Ι	70.5	level monitoring educt tank	
4	🖶 A1.T1.A1T1S001.SO+.O+	BOOL	Ι	1.0	pump outlet educt tank B00	
			-			
				ОК	Cancel Help	

**Note:** If you use AS1/S7-400, select the symbols under S7 Program(1). If you are using the AS2/RTX Box, however, then you have to select the symbols under S7 Program (2).

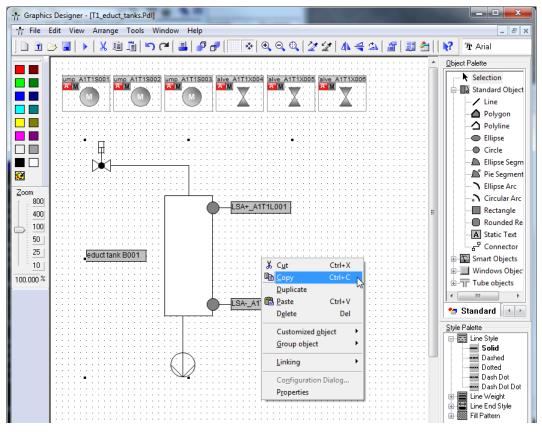
66. We now apply the settings in the Dynamic Dialog. ( $\rightarrow$  Check  $\rightarrow$  OK)

Value Range		? 🔀
Used Language:	Deutsch (Deutschland)	-
Event Name:	Tag	2
Expression/Formula:		
'S7\$Program(1)/A1\$T1\$A1T	1L001\$LSA+\$SA+'	Check
Result Of The Expression/For	mula:	Data Type:
Valid range Ba	ck	Analog
Yes / TRUE		Boolean
No / FALSE		O Bit
		Direct
		Add
		Remove
O not evaluate tag statu:	5	
Evaluate tag status		
Evaluate quality code		
🖃 Quality 🖙 Valid rang	e Back	
S7\$Pr		
	OK	Cancel

67. The steps shown above are also performed for the sensor 'A1.T1.A1T1L001.LSA-.SA-/ I70.1 / level monitoring educt\_tank B001 operating point L'. Then, the elements shown here are jointly highlighted and grouped. ( $\rightarrow$  A1.T1.A1T1L001.LSA-.SA- / I70.1 / level monitoring educt\_tank B001 operating point L  $\rightarrow$  Group  $\rightarrow$  Group)



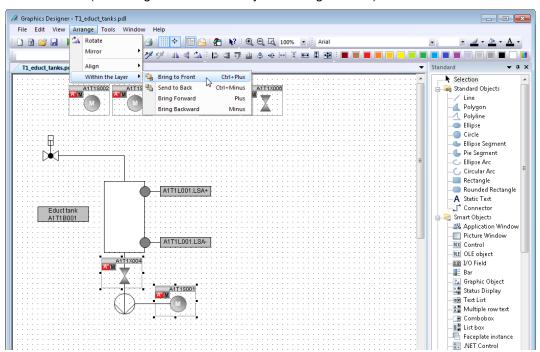
68. The group is then copied. ( $\rightarrow$  Copy)



69. Now we open the library and the group is inserted in the project library. Name the template 'educt\_tank\_V1\_0'. (→ 🔁 → Project Library → Insert)

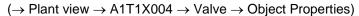
Library				×
📸   🐰 🖻 🙈 🗙   ºº	1- III - 60°			
<ul> <li>Global Library</li> <li>Project Library</li> </ul>	Name View Insert New Folder	Size	Last Change	
Library	÷= 評 Ⅲ ₩			×
Library	∵- 註: ⅲ 66^ Name	Size	Last Change	×

70. Next, in the picture 'T1\_educt\_tank.Pdl' we position the faceplates for the valve 'A1T1X004' and for the pump 'A1T1S001' as shown here. It is advisable to bring the symbols within the layer to the very front so they can't be covered up by other drawing elements. (→ Arrange→ Within the Layer → Bring to Front).



71. The orientation of the dynamic valve faceplates is not yet correct. At runtime, the faceplates are animated in a way that in the closed state, they are situated transversely to the position of the pipe and rotate when opened in the position direction. However, this orientation can be changed only via the CFC of the

respective valve. To rotate a valve, first open the associated CFC and then the object properties of the valve block.



	purpose_plant\T1_educt_tanks\educt_tank B001]	
🖻 Chart Edit Insert CPU Debug Vi		_ <u>-</u> ×
📘 🗅 🚅 🎒 👗 🖻 💼 🛑 🖪 💾 🖛	🖓 🚽   🕅 🏜   🕲 🚳 🕅 🗏	🔳 🔲 🔍 🔍 🤤 🖽 🖿 📢 📢
	Valve AlTIX004	
	♦ VI vL	
nit k02	Valve ou	
Iloc d'S	LocalLi Ctrl	Out AlT1X004
L Out	0osLi Fbk0pen0	Pcs7DiOu 08 Digital 0440
	OpenLoca FbkClose - CloseLoc	$\frac{1}{10}$
st InE	1-Local Set	0-3 im0n PU_0v
	FbkOpen FbkClose	0- SimPU_In PU_ChnS 0- StartVal OosAc
	-Monitor Cut	Ctrl+X MS_Re
	3.0 - MonTiSta	Ctrl+C
	10.0-MonTiDyn Copy 1-MonSafeP Delete	Del
szlock	Permit	Dei
k02 0832	Intlock Predecessor for In	sertion Position Shift+F11
L Out	0-CERICHARS Go to Insert Positi	on
2 Ac	CSF Object Properties.	Alt+Return
tt InE	Object Properties.	
		· · · · · · · · · · · · · · · · · · ·
Press F1 for help.		
riess ritornelp.		11.

72. Now, in the field Create block icon, enter a '2'. This rotates the icons by 90 degrees.

Туре:	VIvL	Block group:
Name:	Valve_A1T1X004	
Comment:	Valve outlet educt tank B001	
Inputs:	76	CCM possible
Internal identifier:	FB1899	OCM
Instance DB:	DB182	
Name (header):	VIvL	Create block icon:
Family:	Drives	
Author:	AdvLib81	MES-relevant
To be inserted in OB	/tasks:	- Special properties
✓ OB100 [Warm re	estart]	Messages
		✓ Readback enabled

 $(\rightarrow \text{Create block icon} \rightarrow 2 \rightarrow \text{OK})$ 

73. After you have made the changes for all valves that are located in a vertical pipe compile the changes.

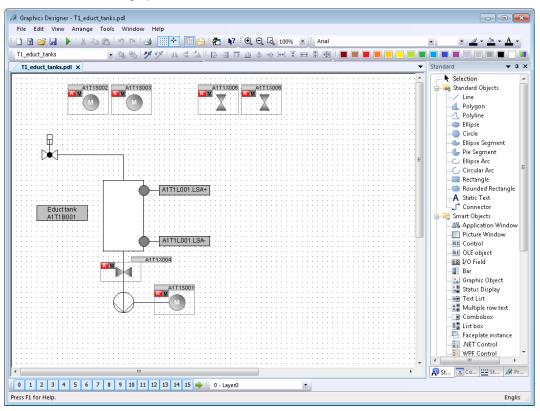
 $(\rightarrow SCE_PCS7_Prj \rightarrow PLC \rightarrow Compile and Download Objects \rightarrow OS(1) \rightarrow Edit)$ 

Selection table:			
Objects	Status	Operating Mode	Compile
E-By PCS7_SCE_Prj			
⊡-Mai AS1			
🛄 Hardware	undefined		✓
- S CPU 414-3 DP		STOP	V
Blocks			
Charts	undefined		<b>v</b>
Connections	undefined		✓
⊡- <u>∎</u> OS			
Du Configuration	undefined		
E- WinCC Appl.			
Connections	undefined		
S(1)		Deactivated	<b>&gt;</b>
Settings for Compilation/Download Update	_ View L	og Se	lect Objects
Edit Test Status Operating Mode	Sir	gle Object All	Select All Deselect All
Compile only IV Do not load if compilation error is detected			
Start Close			Help

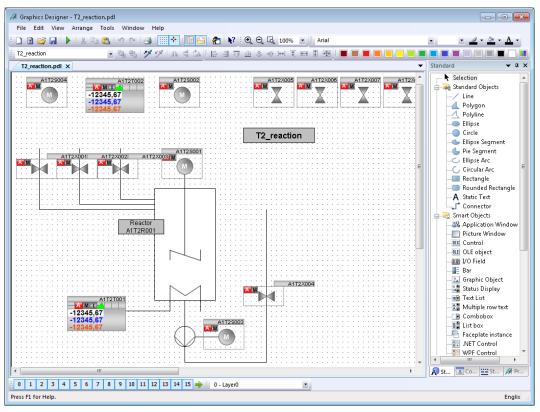
74. In the last dialog for settings, enter the changes at Scope and then start compiling the OS. ( $\rightarrow$  Scope  $\rightarrow$  Changes $\rightarrow$  Apply  $\rightarrow$  Start)

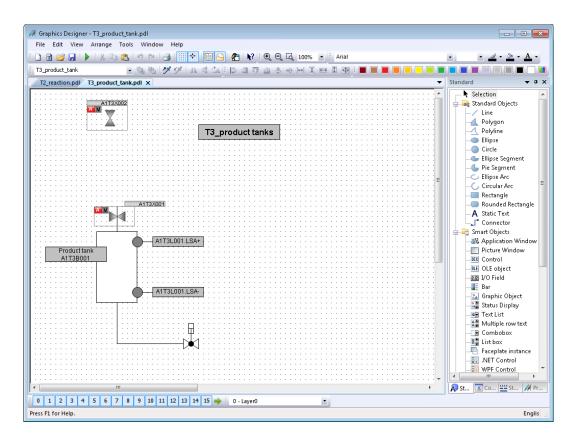
Data Tags and messages		Further options Minimum acquisition cycl	e of the archive tags:	
SFC Visualization		With interconnection	partner (SFC option)	
Picture Tree		Compression	Settings	
-Scope		Create server data		
C Entire OS	🔲 With memory re	set		
Changes				
$\searrow$				

75. In WinCC, the symbol of the valve–for which you made the change shown–is now rotated according to standard. Next, insert a static text 'T1 educt\_tank'; it facilitates orientation during operation. The result is shown below.



76. Just as for the picture T1\_educt\_tank, a tank/reactor is set up in the pictures Product Tank and Reactors, The two figures below can be used as examples. In addition, generate a template for the library from the one reactor as well as from the product tank.



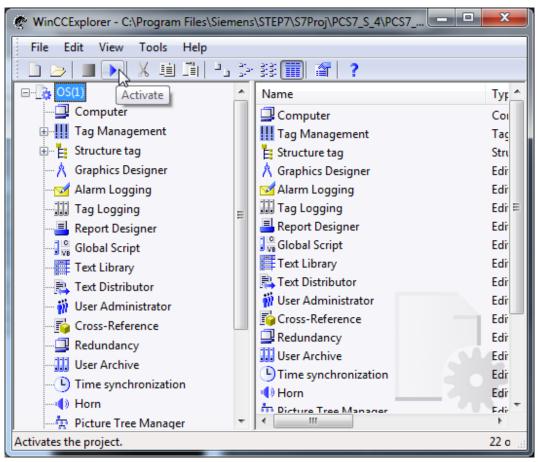


77. To test the HMI with SIMIT and PCLSIM, the charts have to be downloaded to PLCSIM. The plant simulation in SIMIT also has to be started. Set the CPU to the RUN-P mode.

S7-PLCSIM1	• <b>X</b>
File Edit View Insert PLC Execute Tools Window Help	
🗋 🗅 😂 🖬 🖨 (Plcsim(tcp/ip)) 💽 🕹 🖷 📾 🖷 🖶 –24 🕅 😵	
唐 语 话 话 答 答 答 】	
<b></b>	
Image: CPU       Image: CPU <td></td>	
Press F1 to get Help.	Default: //

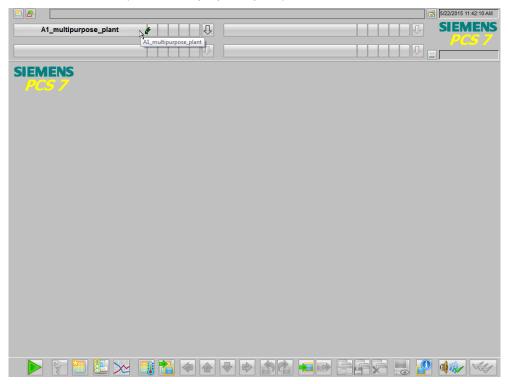
78. In the WinCC Explorer, activation on the ES has to be allowed in the properties of the OS. ( $\rightarrow$  Properties  $\rightarrow$  Allow activation on ES)

KinCC Explorer - D:\SCE_Projekte_en\PCS7_S_1\PCS7_Prj\wincproj\OS	1)\OS(1).mcp		- 0 ×
File Edit View Tools Help			
□▷■ ▶ X 車車 5 > 録冊 4 ?			
	Name	Туре	
Properties	Computer	Computer	
Tag Management	Tag Management	Tag Management	
	A Graphics Designer	Editor	
	Alarm Logging	Editor	
Tag Logging	Project Properties	Editor	X
Report Designer	Project Properties	la mana	
🖓 👷 Global Script		11 11 C 15 1	
Text Library	Operating Mode	User Interface and Desig	
	General Update Cycles	Shortcuts	ptions
	Additional project options		
User Archive			
Time synchronization			
	<b>E A B B B B</b>		
- Picture Tree Manager	Allow activation on ES		
Lifebeat Monitoring			
	Help available in Runtime		
Component List Editor	Color conversion when printing r		
—	Color conversion when printing r	nessages	
	Export text files as Unicode		
	Export text files as officode		
	C scripts with language setting "Dyr	namic" in Runtime:	
	Operating system language for non	n-Unicode programs	
			LAN T
Press F1 for Help.			
	This option disables the project act	tivation interlock on the ES.	
			[]
	L		
		K Cancel	



79. Then, OS Runtime is activated ( $\rightarrow$  Activate)

80. First, open the plant overview by clicking on the area key 'A1\_multipurpose\_plant' in the overview area. (→ A1\_multipurpose\_plant)



81. Picture A1\_multipurpose\_plant with an overview of all areas of the plant and the sequential function charts (SFC) is shown.

		5/22/2015 11:42:25 AM
A1_multipurpose_plant	Ţ Ţ	

A1_multipurpose_plant	
T1_educt tanks	Recipe
A1T1B001 A1T1B002 A1T1B003	SFC_product01
	SFC_rinsing
T2_reaction	
A1T2R001 A1T2R002	f l
T3_product tanks	]
A1T3B001 A1T3B002	
T4_rinsing	
A1T4B001	
	NG 🖘 P FF7 🔜 🖓 🐗

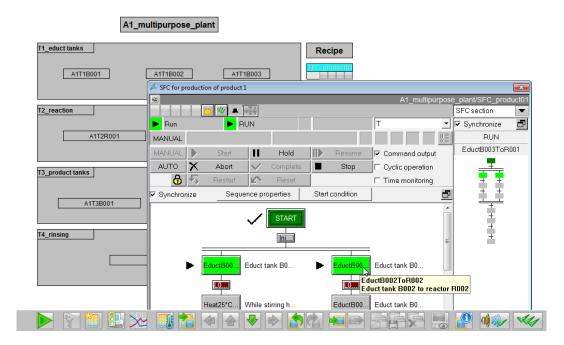
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82. By clicking on the block icon of the sequential function chart, an SFC can be opened and operated. ( $\rightarrow$  SFC\_Product01  $\rightarrow$  Start  $\rightarrow$  OK)

		5/22/2015 11:42:55 AM
A1_multipurpose_plant	x Q	

A1_mu	ltipurpose_plant								
T1_educt tanks			R	ecipe					
A1T1B001	A1T1B002	A1T1B003	SEC	producy					
	SFC for production of				a.				×
		producer	_	_	_	A1_mult	ipurpose	e_plant/SFC_prod	
2_reaction	XXXXX							SFC section	-
	Idle					Т		<ul> <li>Synchronize</li> </ul>	đ
A1T2R001	MANUAL						0.00	RUN	
	MANUAL 🕨 S	Start 📗	Hold		Resume	Command out	put	Active step	
3_product tanks	/ · ·	lbort 🗸	Complete		Stop	Cyclic operati	on	_ <del></del>	
	🔒 🤸 R	estart 🖍	Reset			Time monitori	-	+ +	
A1T3B001	Synchronize	Sequence pr	operties	Start	condition		ð		
			START					+	
[4_rinsing		SFC Co	mmand		-	_			2
	A1	100 SF	C: A1_mult	ipurpo	ose_plan	∜SFC_produc	t01		
		Exe	cuting 'Sta	art' co	mmand				
	Heat								
D 📅 🛅 🖺 🗙		4							
			OK N					Cancel	

📒 🖉	22/05/15 13:45:51.039 0	A1_multipurpose_plant/T2_reactic Valve in	et reactor R002 from reactor R001 Feedback error 🛛 😾 5/22/2015 11:46:17 AM
	A1_multipurpose_plant		

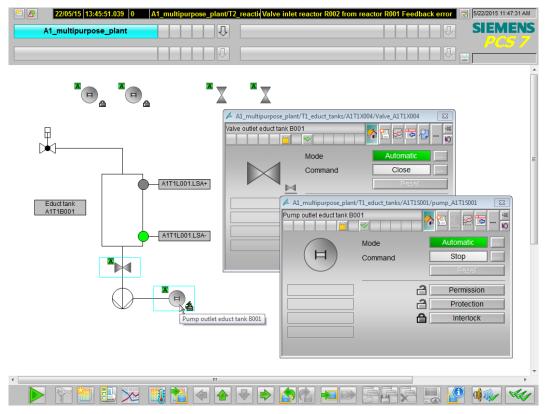


83. You get to the lower level layers either by opening the Picture Tree Navigator or by selecting the picture exchanges you generated.

🔛 🔗 22/05/15 13:45:51.039 0 A1	_multipurpose_plant/T2_reactic Valve	e inlet reactor R002 from reactor R001 Feedback error S/22/2015 11:46:39 AM
A1_multipurpose_plant	Û	I SIEMENS
	Ţ.	
I_multipurpose_plar     I1_educt_tanks     T3_product_tanks     T4_rinsing	A1T1B003	Recipe SFC_product01 SFC_finasing
T2_reaction	A1T2R002	
T3_product tanks A1T3B001	A1T3B002	
T4_rinsing	iB001	
		<b>☆</b> 🔊 🐢 Feet 🔜 🔮 🐗

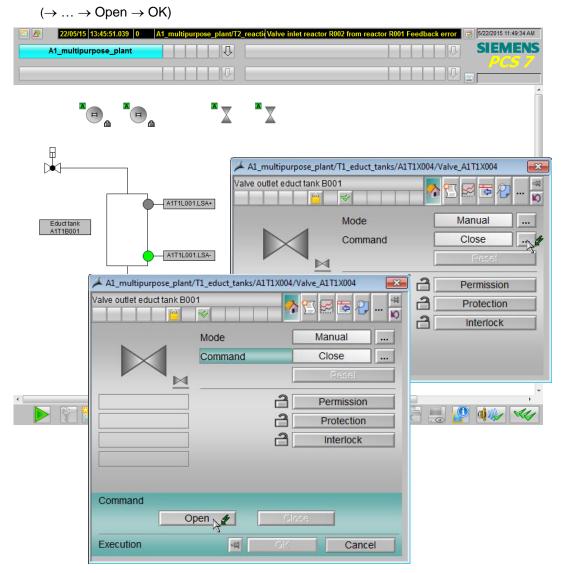
 $(\rightarrow \text{Arrow to the right of the A1_multipurpose_plant} \rightarrow \text{T1_educt_tank})$ 

84. In the operating screen of the educt tank, the faceplates for the valves and the pumps of this level are shown. The faceplates permit the operating mode change and operating the valves and pumps.

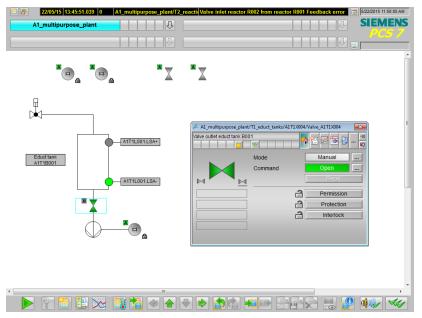


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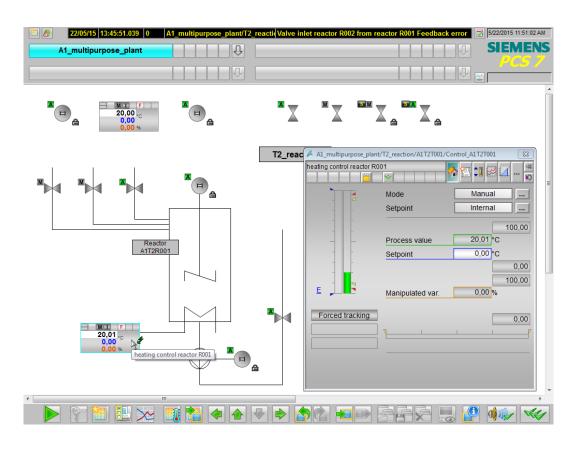
85. To operate a valve (here: open; click on the command button '…' next to Close, select Open and confirm your selection with OK.



86. The open valve position is signaled through the rotation and the green coloring of the faceplate. Pumps can be controlled the same way.



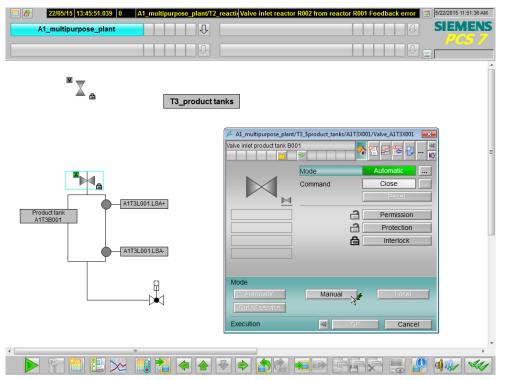
87. The operator screen 'T2\_Reaction' has a faceplate for the PID controller, in addition to the faceplates for valves and pumps, which can be operated and monitored through it.



 $(\rightarrow A1\_multipurpose\_plant \rightarrow T2\_Reaction \rightarrow Temperature control)$ 

88. The operating screen 'T3\_product\_tank' is represented with the faceplate for a valve whose operating mode is just being switched.

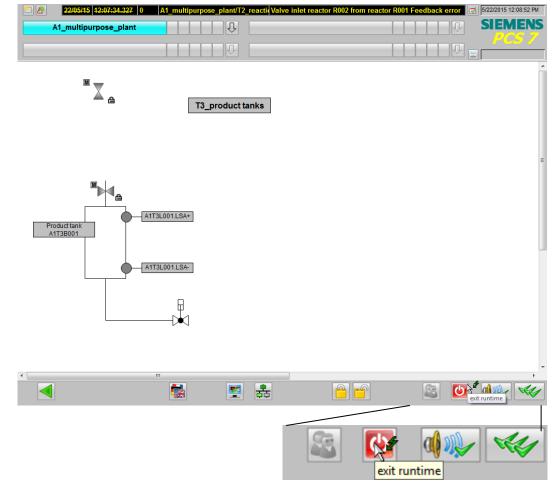
 $(\rightarrow A1\_multipurpose\_plant \rightarrow T3\_product\_tank \rightarrow Valve \rightarrow ... \rightarrow Manual \rightarrow OK)$ 



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- 22/05/15 13:45:51.039 0 A1\_multipurpose\_plant/T2\_reactive Valve inlet reactor R002 from reactor R001 Feedback error 🗟 5/22/2015 11:51:58 AM - 2 SIEMENS A1\_multipurpose\_plant Û T3\_product tanks A A1T3L001.LSA+ Product tan A1T3B001 A1T3L001.LSA->~ **H** keyset change Ì
- 89. Runtime is terminated by first operating the button 'keyset change' in the lower control bar.

90. Then, select 'Exit runtime' and return to the WinCC Manager.



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## **Exercises**

In the exercises, we apply what we learned in the Theory section and in the Step by Step Instructions. To this end, we are using and expanding the existing multi-project from the step by step instructions (PCS7\_SCE\_0201\_R1504\_en.zip).

In the step by step instructions, only one element of the levels T1\_educt\_tank, T2\_Reaction and T3\_product\_tank of the plant hierarchy was implemented. The objective of the exercise is to complete the pictures of the individual levels, or to generate the pictures of the missing levels.

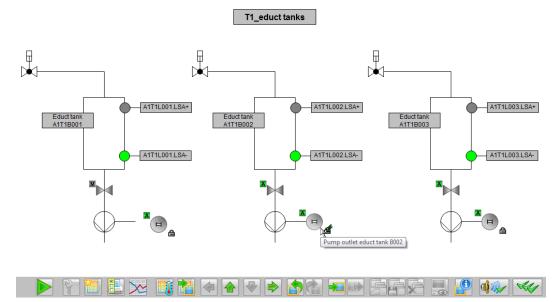
Then, generate a picture for the level T4\_Rinse.

## TASKS

The tasks below are based on the step by step instructions. For each task, the corresponding steps of the instructions can be used as an aid. Regarding the arrangement, the rules of the VDI3699 [1] have to be noted.

 Complete the picture of the levels T1\_educt\_tanks by adding the missing tanks A1T1B002 and A1T1B003. Use the template from the library for this so the representations will be consistent. Adapt the labeling of the tank and of the binary sensors. Do not forget to adapt the variables for visualizing the binary sensors. The valves and motors are already set up, they only have to be positioned. Note, however, that the valves may have to be rotated once more.

🔠 🤷	22/05/15 11:55:34.787 0	A1_multipurpose_plant/T2_re	eaction Valve inlet reactor R002 from reactor R001 Fe 🛃 5/22/2015 11:56:33 AM
A	1_multipurpose_plant	Û.	



- Now, also complete the pictures of levels T2\_Reaction and T3\_product\_tank with the missing elements (tanks or reactors). Use the P&I diagram as a guide so that all valves, motors and controllers are positioned correctly. Take note of the correct rotation of the valves.
- 3. Finally, design the operating screen for the level T4\_rinse. To this end, adapt the background analogous to the step by step instructions. Generate a picture title and a tank based on the educt and product tanks. Connect the variables of the binary sensors and arrange the valves and the motor using the P&I diagram as a guide.