

# **SCE Training Curriculum**

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

PA Module P02-03 SIMATIC PCS 7 – Archiving and Trend Reporting



#### 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**

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#### 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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We would like to thank the Technical University Dresden, particularly Prof. Dr. Leon Urbas and Annett Krause, MS, as well as the Michael Dziallas Engineering Corporation and those who provided support in preparing this SCE training document.

## **ARCHIVING AND TREND REPORTING**

## **TRAINING OBJECTIVE**

After working through this module, the students know the basic requirements and objectives of archiving. They are able to apply different types of archiving to process data and messages. The students know how suitable cycles can be determined for time controlled archiving and they also know the criteria according to which event controlled data archiving is executed. They know the options that PCS 7 provides.

## **THEORY IN BRIEF**

Archiving process values is an important resource for correct and optimized process management.

The archived data allows for the analysis of historical data to optimize the process, for tracking faults as well as for quality assurance.

However, not only process values are suitable for archiving, but also messages and events. Particularly in the case of fault states, the operator has to handle a large number of messages so that only after a return to normal operation or at a plant standstill is it possible to determine the exact cause. To this end, the messages and events in the archive can be resorted to, as well as the archived process values.

Process values are usually archived cyclically, messages and events event-controlled. In the case of process values, the exact cycle depends on the dynamics of the process it is based on. Selecting a cycle independent of the process has great disadvantages. A cycle that is too short requires a large amount of memory and under certain circumstances records the noise of the signal. A cycle that is too long leads to values that cannot be used since the development of the process value can no longer be reconstructed.

In the case of signals that are barely subject to fluctuations or not subject to them at all, the acquisition of almost identical values does not make sense; for that reason, it is possible to compress the data; for example, by setting a dead zone. Only when the process value exceeds or drops below the limit that was set is the value stored again in the archive.

Trend reporting provides the operator with an overview of process development up to the current time. From the course of the process value he can determine whether and perhaps how soon a fault state threatens to occur. Thus, countermeasures can be initiated before the protection mechanisms have to be activated.

## THEORY

#### INTRODUCTION

Automating, safeguarding and monitoring processes are basic requirements for a process control system. Archiving the data that accrues offers the possibility of storing historical data and making it available for analysis.

There are many reasons for the necessity to analyze data. There are legal regulations on the one hand, safety oriented and performance related causes on the other.

The legal regulations include logging faults -for example, exceeding limits or the occurrence of an event. Another legal reason for archiving is the verification for certificates and for conditions such as emission limits. In connection with product liability and product safety, archiving of all process steps and materials used is required for the gapless tracking of the product. [1].

Product related reasons for archiving data are the statistical evaluation of production quantities statistical long term analysis to optimize the process, determining the performance, and reduction of production and material cost. The data is also very helpful to the subsequent analysis of faults regarding their effect and propagation as well as the assessment and possibly the revision of existing countermeasures. Thus, plant shutdowns can be avoided and the economic efficiency of the plant can be increased at the same time. Likewise, the data can be used to analyze normal operation and to locate optimization potential or identify possibilities to improve quality. The data is also interesting with respect to the optimization of the maintenance of production resources based on the existing data.

Safety-oriented reasons refer primarily to the adaptation of operating parameters; i.e., limits and response timing. When performing tests to check safety locks and EMERGENCY STOP functions, recorded data can be used to verify the provided functions. If the data should show safety deficiencies, the cause can be analyzed based on the data.

In addition, storing the data in archives retains the performance capability of the process database and provides for data safety. By storing data in an archive database, it is not necessary to maintain all process runs on paper.

Based on the reasons mentioned, archiving proves to be an important resource for correct and optimized process management. This results in different requirements for archiving. It includes that the data is stored completely uniform and structured. Likewise, access to the data has to be possible in a structured manner, and through filtering, for example, permit a selection of the criteria. This also requires, however, that the data is archived for different time spans or with different cycles, and at different locations.

In principle, two types of data can be distinguished: process data that occurs cyclically, and messages and events that occur acyclically. This topic is discussed in greater detail below.

## **PROCESS DATA**

Process data refers to the analog and digital values that is determined by means of sensors and transmitted to the process control system. It is used to control and visualize the process.

Process data is transmitted cyclically to the process control system. In this case, the changes of the analog process values that take place in a certain interval are very different. The cause for this is the different process dynamics. For example, the process data of flow measurements usually has higher dynamics than temperature measurement; i.e., process data of flow measurement changes within or in fractions of seconds, while the process data for temperature measurement changes rather in time intervals of more than 10s.

Analog values should be archived *time controlled*. It has to be noted in this case that process data of very dynamic processes has to be archived at a considerably higher rate than data of slow processes. One reason for this is that the size of the archive is not unnecessarily increased and the other that representing a slow process in intervals that are too short is inefficient or can contain a strong noise signal.

Binary signals can only switch between two states; they should be archived event controlled.

#### **MESSAGES AND EVENTS**

According to [3], *messages* are reports about the occurrence of an event; i.e., of a transition from a discrete state to another. According to [3] an *event* is the spontaneous occurrence of a defined state. Important information for an unambiguous and complete message is the state that occurred, the time and the location. Additional details regarding messages and events are provided in chapter P02-02.

Messages and events occur acyclically and can therefore not be archived at fixed intervals. Here it is necessary to select the relevant messages and events to ensure efficient archiving. One possibility would be, for example, to archive only safety-critical messages or messages with a certain priority.

Messages and events can only be archived event-controlled.

#### DATA COMPRESSING

The data volume in plants is large; usually, only a limited amount can be archived over a certain interval. The amount of data archived depends largely on the cost for the memory medium and the data transmission rate. On the other hand, acceptable data loss has to be considered. The degree of compression results from weighing these two criteria.

When data is compressed, not only the quantity of the stored data changes but also statistical characteristics such as average and variance. For that reason, such values should be calculated from the original data and if needed, archived also. This should be done time controlled, analogously to the archived process data.

For data compression, direct and mapping methods can be used.

When the direct method is used, the data is archived in real time. There are rules that govern the archiving of individual measured values. The data is reconstructed by connected the data points.

When mapping methods are used, the data is not archived in real time since in the transformation the previous courses are included. The original data is mapped in another area. When this procedure is used it is possible to design the compression adaptively, since the algorithms often have a parameter that decides on the quality of the compression in dependence on the process.

#### **TREND REPORTING**

The term *trend reporting* refers to the representation of process values in trends; i.e. dependent on the time. The time interval for trend reporting includes the present and the recent past. It is important that the trend curves, in contrast to pure history curves, are updated [2].

By representing process values in curves, process values can be monitored, changes identified, actual values compared with setpoints, and faults analyzed. In distinction to the pure display of the process variable, curve diagrams provide information about amplitude, ascents, frequency and the course of a process variable.

## **ARCHIVING IN PCS 7**

In the process control system PCS 7, different data can be archived that was generated during the process mode. These are: process values that are stored cyclically in two different types of system archive, and messages that are written event-controlled to the alarm log. This data is archived on the **OS server** by default for short term archiving as shown in Figure 1. If in addition a **central archive server (CAS)** is configured, OS logs and batch logs can also be archived in addition to the data mentioned above. The data archived on the **CAS** is used for long term archiving and can be transferred periodically to external media. **Storage Plus** is also available; it can be used to generate views to the archived data that can then be viewed using a Web browser [4, 5, 6].



Figure 1: Overview short-term and long-term archiving [Siemens]

## Archiving System on the OS Server

On the OS server, archives for process values and alarms/events can be set up.

As shown in Figure 2, these archives are organized as *circular logs*. They consist of *segments* that are defined either through a time interval or by specifying physical memory. When one of these criteria is met, a segment is closed and a new one is started. If the memory of the server is exhausted, the segment that was set up first is overwritten according to the FIFO principle (First In First Out). In **Fehler! Verweisquelle konnte nicht gefunden werden.**, as an example, time spans are specified that the different archives can have for a cycle. The time specified also is an indication of the time relationships between the individual archives.

The process values are stored in the database compressed. They are compressed by setting a hysteresis. Depending on the signal change, a compression factor between 2 and 10 is reached. By selecting additional calculation functions, important statistical characteristic values can be retained despite compression.

To estimate the required memory for an archive, the average quantity of process values per second or the average quantity of alarms per second is needed. These averages are multiplied with the typical memory capacity for the data and with the desired archiving interval. The interval has to be specified once for one segment and once for all segments together. Typical memory capacity is between 6 and 16 bytes for process values and 4000 bytes for alarms. For reasons of performance, the number of individual segments should not exceed 200 [4].



Figure 2: Circular logs for short-term archiving [4]

In addition to the archives for the processes, user archives can be set up. There, characteristics from other sources can be entered. The operator can use them to compare the actual course with desired course.

## **Central Archive Server (CAS)**

The central archive server is located on the same level as the OS servers. In distinction to the OS servers, it is not connected to the plant bus, but exclusively to the terminal bus, as shown in Figure 3. By means of the terminal bus, the CAS receives the data designated for *long term archiving* from one or several OS servers and from the batch servers. The data is transmitted from the OS server to the CAS automatically after a segment is completed. The data from the batch server is directed by means of the Batch Control Center (BCC) for archiving. For archiving OS logs, a script can be implemented that transmits the cyclically stored OS logs to the central archive server. To increase data security, the CAS can be operated redundantly.



Figure 3: Classification of the Central Archive Server in the structure of the PCS [Siemens]

**Fehler! Verweisquelle konnte nicht gefunden werden.** shows the organization of the archives of the CAS. These archives also are designed as circular logs and work according to the FIFO principle. To save the data periodically, backup strategies can be configured that allow for the transfer of individual segments to an external medium; for example, DVD or network drive. For that reason, the size of the segments on the CAS has to be less than the external medium.



Figure 4: Archives of the Central Archive Server for long-term archiving [4]

## **Storage Plus**

Storage Plus can be used alternatively or as a supplement to CAS. Storage Plus is always installed on a separate computer and is connected to the terminal bus (Figure 5). In contrast to the CAS, Storage Plus cannot be operated in the redundant mode, but makes possible the display and analysis of the data that is stored in the CAS, in the Storage Plus database or on external media; for example, the display of histories [2]. The archived data is displayed by means of views that filter the needed information from the totality of all data. The data is represented in tables, diagrams or reports [7].



Figure 5: Classification of Storage Plus in the structure of the PCS [Siemens]

## TREND REPORTING IN PCS 7

Below, the two possibilities for representing archived process values in PCS 7 are described. The OS servers are accessed exclusively in that case. This makes it possible to quickly trace the development of one or several process values, and a negative trend can be detected or obviated.

## **Curve Groups**

Curve groups can be called using a button on the PCS 7 operator interface. They don't have to be configured; they are provided as a matter of standard. However, certain curve groups can be pre-configured that will then only have to be displayed at execution time. If curves are not pre-configured or if the process values needed at the moment are missing in these groups, a new group can be set up any time.

## **Online und Function Trend Control**

Within process displays, the following ActiveX Controls can be used to represent process value characteristics. Additional information for designing operating screens with ActiveX Controls is provided in chapter P03-03.

- Online Trend Control represents one or several process values over time
- Function Trend Control represents a process value in dependence on another process value

Online Trend Control corresponds to the curve display (refer to section Trend reporting).

Function Trend Control can be used under certain conditions to display dependent process values in a trend: The process values to be represented have to be archived in the same cycle and the archive has to be located on the same OS server. To facilitate analysis, a setpoint curve can be displayed in addition to the actual curve. The data for the setpoint curve is configured and stored in a user archive [6].

## SUMMARY

To archive process data, alarms and events, always an OS server has to be installed. The expanded archiving capabilities are based on it; the data for CAS and Storage Plus is read by the OS servers.

	Short Term	Long Term	Restrictions
OS Server	Yes	No	-
CAS	No	Yes	Display only by means of OpenPCS 7
Storage Plus	No	Yes	No redundancy

Table 1: Overview of Short Term and Long Term Archiving according to Servers

To display data that is located on the OS servers, curve groups and Online Trend Control can be used. Regarding Function Trend Control, only such value pairs can be displayed that are stored on the same OS server and with the same archiving cycle.

Storage Plus has a Web interface for displaying long term archived data.

Table 2: Overview of Short Term and Long Term Archiving

	Short Term	Long Term	Restrictions
Storage Plus	No	Yes	Additional computer, only from Storage Plus Server
Online Trend Control or Curve Groups	Yes	No	Only from OS servers
Function Trend Control	Yes	No	Value pair only from an OS server and with the same archiving cycle

## LITERATURE

- [1] TU Dresden: Vorlesung Prozessrechen- und –leittechnik, July 2010.
- [2] VDI/VDE 3699, Teil 4: Prozessführung mit Bildschirmen-Kurven, August 1997. (sheet 4: Process control using display screens – Curves)
- [3] VDI/VDE 3699, Teil 5: Prozessführung mit Bildschirmen-Meldungen, Februar 1998. (sheet 5: Process control using display screens - Alarms/messages)
- [4] Siemen AG: Configuration Guidelines Compendium Part A, June 2009.
- [5] Siemens AG: Configuration Manual Engineering System (V7.1), March 2009.
- [6] Siemens AG: Configuration Manual Operator Station (V7.1), March 2009.
- [7] Siemens AG: MDM Storage Plus Information System, November 2008.

## **STEP BY STEP INSTRUCTIONS**

#### TASK

This task deals with process value and message archives for the operator station (OS) and their variants and setting possibilities.

As an example, set up archiving of the level for reactor A1T2R001 and display the archived values in *WinCC Runtime* as a curve using curve groups, and as printout using the Report Designer for display.

#### **TRAINING OBJECTIVE**

In this chapter, the student is familiarized with the following:

- Activating the archiving of process variables in CFCs
- The settings for alarm characteristics and alarm archiving in CFCs
- The process object view as tool for archive configuring
- Archive settings for messages in Alarm Logging of WinCC
- Archive settings for process variables in Tag Logging of WinCC
- Curve groups for displaying archive variables in WinCC runtime
- Report Designer for printing curves with archive variables

These instructions are based on 'PCS7\_SCE\_0203\_Ueb\_R1505\_en.zip'.

#### PROGRAMMING

- 1. To program the archiving of the process variable level of reactor A1T2R001 using level monitoring, first open the existing CFC A1T2L001.
  - $(\rightarrow A1\_multipurpose\_plant \rightarrow T2\_Reaction \rightarrow A1T2L001)$



2. To adapt the properties, the object properties of monitor block 'MonAnS' are opened. (MonAnS  $\rightarrow$  Object Properties)



- 3. First, for the block MonAnS enter the comment Level monitoring A1T2L001. By clicking on the button 'Messages', we can perform the settings to configure the messages. These settings are retained. Here, we see the relationship of the text for Event through key word + Text, for example: \$\$BlockComment\$\$ Alarm above; after compilation of the OS, this becomes Monitoring level A1T2L001 Alarm above.
  - $(\rightarrow \text{Comment} \rightarrow \text{``Monitoring level A1T2L001''} \rightarrow \text{Messages} \rightarrow \text{Event} \rightarrow \text{Save})$

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4. By clicking on the button 'OCM', the variables of the MonAnS block Monitor\_A1T2L001 which are set up there during OS compilation are displayed as variables. Only such variables of a CFC block can be archived. ( $\rightarrow$  OCM  $\rightarrow$  WinCC Attributes  $\rightarrow$  OK)

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erator Control and General WinCC Att Parameter PV#Value PV_Hyst PV_Hyst PV_WH_Lim PV_WH_Lim PV_OpScale#High PV_OpScale#High PV_OpScale#High PV_OpScale#High PV_OpScale#High PV_OpScale#High PV_OpScale#High StelOp OnOp OsoSop SimOn SimPV BatchID BatchID BatchID BatchIName StepNo UserStatus PV_Out#Value OsAct#Value	PLC Data Type REAL REAL REAL REAL REAL REAL REAL REAL REAL BOOL BOOL BOOL BOOL BOOL BOOL BOOL STRING DWORD BYTE REAL BOOL DWORD BYTE	OS Data Type 32-bit floating-point number IEEE 75 32-bit floating-point number IEEE 75 Signed 16-bit value 32-bit floating-point number IEEE 75 Binary variable Binary variable Binary variable 32-bit floating-point number IEEE 75 Unsigned 32-bit value 132-bit floating-point number IEEE 75 Unsigned 32-bit value Unsigned 8-bit value 32-bit floating-point number IEEE 75 Binary variable Signed 32-bit value Unsigned 8-bit value Unsigned 32-bit value Unsigned 32-bit value	FloatToFloat     FloatToFloat     FloatToFloat     FloatToFloat     FloatToFloat     FloatToFloat     FloatToFloat     FloatToFloat     FloatToFloat     ShortToSignedWord     FloatToFloat     DwordToUnsignedDword     DwordToUnsignedDword     ByteToUnsignedDword     FloatToFloat     FloatToFloat	Length 4 4 4 4 4 4 4 4 4 4 4 4 1 1 1 1 1 4 32 4 1 1 4 32 4 1 1 4 32 4 1 1 1 4 32 4 4 32 4 4 32 4 4 4 32 4 4 32 4 4 32 4 4 32 4 4 32 4 4 4 4 4 4 4 4 4 4 4 4 4	
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5. Now, we specify in the block properties the archiving of analog input values PV. To this end, select the input PV and in its structure the connection 'Value'. In the properties of 'Value' archiving is activated.

🕂 CFC - [A1T2L001	- PCS7_SCE_Prj\A1_multipurpose_plant\T2_reactio	on\reactor R001]	
🗈 Chart Edit Ir	sert CPU Debug View Options Window	Help _ B ×	
D 🖻 🎒 🐰 🛙	à 🖻   🖺 🚍 🍓 🌩   🎘 🚽   6% 🎪		
1 6° Ж =  №	🔀   🖩 🔲   💽   🍳 🍳   🖷 🖿 🗂	№?	
	Monitor_A1T2L001 MonAn3 Monitori B/2 PV M3 Relea	Ini Analogue Value 1 \reactor R001\\A1: Ini Analogue Value 1 \reactor R001\\A1: Ini Analogue Value 1	
	1000.0     PV_A       900.0     PV_W       150.0     PV_W       50.0     PV_A       100.0     FV_O       100.0     FV_O       100.0     FV_O       100.0     FV_O		
	0.0 - Dead Object Properties	Alt+Return\reactor R001\\A1: In1 Analogue Value 1	
	0-CSF	\reactor R001\\A1	
	Select Structure	e Element	x
	Structure:		
	Value [RE.	] 'Process Value (Analog Input)' : <mark>AL] ' Value'</mark> :] ' Signal Status'	
Press F1 for help.			
Properties - Input/Outpu			
Block::	MonAnS.Monitor_A1T2L001		
1/0:	Value - IN(REAL)		
Value:	Inverted		
	☐ Invisible ☐ Watched		
Comment	Value	Proper	ties
Operator authorization lev	Archive: Archivin No archi et: 0 OS additional text: Archivin Long-ter	hiving	
Force Add forcing Forcing active Force value:	Process object Parameter Signal	и	
ОК	Cancel	Help	

 $(\rightarrow PV \rightarrow Value \rightarrow Archiving \rightarrow OK \rightarrow Close)$ 

#### Note:

Here, we could also select a variable for long term archiving on the CAS.

6. To see and also further edit these changes also have to be compiled in the process object view, AS and OS. To do this and download the AS at the same time, highlight the project in the component view of the *SIMATIC Manager*. Then select for the PLC 'Compile and Download Objects'.

SIMATIC Manager - [PC	S7_SCE_MP (Plant View) C:\Program Files\Si	emens\STEP7\S7Proj\PCS7_S_1\PCS7_MP]
😼 File Edit Insert PL	LC View Options Window Help	_ <i>B</i> ×
🗋 🗅 🛩   🎛 🛲   👗 🖻	e e   🕍   🗣 🐂   ь 📜 🗰 🔳 🖻	
B B PCS7_SCE_MP	Shared Declarations	🗃 A1_multipurpose_plant 🛛 🙀 Global labeling field
	Open Object Ctrl+Alt+	
⊡	Cut Ctrl+	X
⊡- <u>6</u> T2_n	Copy Ctrl+	c l
	Paste Ctrl+	V
	Delete D	21
⊕-     ♥ PCS7_SCE_(	Insert New Object	<b>&gt;</b>
	Multiproject	•
	PLC	Compile and Download Objects
	Access Protection	•
	PCS 7 License Information	
	Shared Declarations	•
	Plant Hierarchy	<b>&gt;</b>
	Process Tags	•
	Models	•
	Control modules	•
Compiles/downloads th	SIMATIC BATCH	•

 $(\rightarrow SCE\_PCS7\_MP \rightarrow PLC \rightarrow Compile and Download Objects)$ 

 Next, select -as shown here- the objects to be compiled and start the process as you learned in previous chapters. (→ Start)

Compile and Download Objects				- <b>X</b>
Selection table:				
Objects	Status	Operating Mode	Compile	Download
E-B PCS7_SCE_Prj			<b>V</b>	<b>V</b>
⊡-m AS1			<b>V</b>	<b>V</b>
💭 Hardware	undefined		¥.	<b>V</b>
E- CPU 414-3 DP		PLC not available	¥.	V.
Blocks				
Charts	undefined		<b>V</b>	<b>V</b>
Connections	undefined		V	
□- <u>□</u> OS				
Configuration	undefined		<ul> <li>✓</li> <li>✓</li> </ul>	
E- WinCC Appl				
Connections	undefined	Netwoo		
S(1)		Not open	✓	
	V1		1011	
Settings for Compilation/Download Update	View L	-	ct Objects	
Edit Test Status Operating Mode	Sin	gle Object All	Select All	Deselect All
Status during Open				
☐ Compile only				
Start Close				Help

 For performing several or even very many changes at the same time in one or different blocks, you have become acquainted with the **process object view**. Archive entries can be edited here, too. (→ View → Process Object View)

File Edit Insert PLC	View	Options Window Help Component view	Filter >		• 7/	98 M	58D	- 5
PCS7_SCE_MP		Plant View	-	- A1_multipurpo:	and shadow in such			bal labeling field
PCS7_SCE_Pri     Shared Declaratio		Process Object View					1.10	
		Process Device Plant View Process Device Network View						
ector RI e reactor RI e f T3_product_I	~	Offline Online						
⊞- 🛐 T4_rinsing ⊞- 📚 PCS7_SCE_Lib								
	✓ Toolbar							
	~	Status Bar						
		Update F5						

 Next, in the process object view, select the CFC 'A1T2L001'. After you have selected the option 'Messages', change the entries for 'Event' as shown here. (→ CFC 'A1T2L001' → Messages → Event)

File Edit Insert PLC View Options Window Help Since Edit Insert PLC View Options View Op
PCS7_SCE_MP     CS7_SCE_Pi     CS5SCCCommentSS PV-Maming full     CSSCCCCommentSS PV-Mam enty     SSBockCommentSS External message 2     CSTA All_multipupose_plant/T2_reaction/searchr/Rotin Mass Procees Control Message Paire     SSBockCommentSS External message 2     CSTA All_multipupose_plant/T2_reaction/searchr/Rotin Mass Procees Control Message Paire     SSBockCommentSS External message 2     CSTA All_multipupose_plant/T2_reaction/searchr/Rotin Mass Procees Control Message Paire     SSBockCommentSS External message 2     CSTA All_multipupose_plant/T2_reaction/searctor
General Biock Parameter Signals Messages Picture dejects Archive tags Herarchytolder Equipment properties Shared declarations  Ref 2 Shared Declarations  Re
Press F1 to get Help.

 The settings for the archive tags can be made in the process object view also. Under the option 'Archive tags', change the 'Archiving cycle' to 10 seconds. (→ Archive tags → Archiving cycle → 10 seconds)

SIMATIC Manager - IPCS7 SCE MP (Proces	s Object View) C:\Program Files\Siemens\STEP7\S7Proj\PCS7_SCE\PCS7_MP]
Tile Edit Insert PLC View Option	
🗋 🚅 🚼 🛲 👗 🛍 🛍 🖆 🔍	
Image: Solution of the	✓ General Blocks Parameters Signals ✓ Messages Picture objects ✓ Archive tage Herarchy folder Equipment properties Shared declarations         Filter by colum:       Delay:         Filter by colum:       Exceeded         M Bock /       Block comment         Million toring level A 112L001       Million toring level A 112L001         Seconds       Seconds         Seconds       Exconds         Diminutes       Sinnutes         Sinnutes       Sinnutes         Diminutes       Diminutes         PLCSIM(TCP/IP)       PLCSIM(TCP/IP)
ricer i a to ger rice.	(EV Precompres/JP)

11. We accept these changes by only compiling the OS this time. To this end, highlight the 'OS' in the component view of the *SIMATIC Manager*. Then, select for the PLC 'Compile and Download Objects'.

 $(\rightarrow OS \rightarrow PLC \rightarrow Compile and Download Objects)$ 

SIMATIC Manage	er - [PCS7_SCE_MP (Co	mponent view) C:\P	rogram Files\Siemens\STEP7\S7Proj\PC	S7_S_1\PCS7_MP]		
🔁 File Edit Ins	ert PLC View Opt					_ 8 ×
🗅 😂 🚼 📾	X 🖻 💼 🚺		🗰 🕅 < No Filter >	• 7   🗞 👜	¶a ⊟ 🔲	<u>k?</u>
	E_Prj PU 414-3 DP	figuration 👔 WinC				
B-1	Open Object	Ctrl+Alt+O				
	Cut	Ctrl+X				
🗄 🔶 PCS7	Сору	Ctrl+C				
	Paste	Ctrl+V				
	Delete	Del				
	PLC	•	Download	Ctrl+L		
	Access Protection	•	Configure	Ctrl+K		
			Compile and Download Objects	N		
	Print	•	Compare	2		
	SIMATIC BATCH	· · · ·				
	Rename	F2				
	Object Properties	Alt+Return				
Compiles/downloads	s the objects to be sele	cted under the highlig	hted objects.			

12. Next, select -as shown here- the objects to be compiled and start the process as you learned in the previous chapters. ( $\rightarrow$  Start)

Compile and Download Objects				- 🗆 🗙
Selection table:				
Objects	Status	Operating Mode	Compile	Download
			<b>V</b>	
Configuration	undefined		<b>V</b>	
E- WinCC Appl.			1	
Connections	undefined		<b>&gt;</b>	
S(1)		Deactivated		
Settings for Compilation/Download       Update         Edt       Test         Status       Operating Mode         Status       Operating Open         Compile only       Ø Do not load if compilation error is detected		gle Object AlL.	t Objects	Deselect All
Start Close				Help
				пер

13. After the successful compilation, open the OS. ( $\rightarrow$  OS(1)  $\rightarrow$  Open Object)

SIMATIC Manager - [PCS7_S		-	emens\STEP7\S7Pro	oj\PCS7_S_1\PCS7_I	MP]	
	View Options Window H			7. 99.		_ 8 ×
🗋 🗅 😂 🚼 🛲 🖌 🖻 🛙					8 2 3 0	
	-☆ A1_multipurpose_plant ☆ T4_rinsing	ħ	T1_educt_tanks	¶- T2_reaction	-∱ T3_product_tar	iks
	Open Object	Ctrl+Alt+O				
⊕-� PCS7_SCE_Lib	Cut Copy Paste	Ctrl+X Ctrl+C Ctrl+V				
	Delete	Del				
	Insert New Object PLC	) 				
	Access Protection	+				
	Compile	Ctrl+B				
Opens selected object.	Display compilation log Display load log Generate server data					

14. Then, in the WinCC Explorer, first open 'Alarm Logging' to configure the alarm system.
 (→ Alarm Logging)



 Select the AS messages. In the center window of Alarm Logging, you will find the individual messages and can edit their properties in the Properties area in the right margin. (→ AS Messages → PV – Warning full)

	X 画画画 三シ珍華 Y 大 盧安				
	Message blocks Message classes Group messages S		es value locks		
	Source	Area	Event		
Ches such	A1_multipurpose_plant/T2_reaction/A1T2X008/Valve_A1T2X008	A1 multipurpose plant	Valve inlet reactor R002 from reactor R001 External er	ror has occurred	_
_	A1_multipurpose_plant/T2_reaction/A1T2T002/Control_A1T2T002	A1_multipurpose_plant	heating control reactor R002 External message 2		
_	A1_multipurpose_plant/T2_reaction/A1T2T002/Control_A1T2T002	A1_multipurpose_plant	heating control reactor R002 PV - High warning limit	violated	
_	A1_multipurpose_plant/T3_Sproduct_tanks/A1T3X001/Valve_A1T3X001	A1_multipurpose_plant	Valve inlet product tank 8001 External error has occu	rred	
_	A1_multipurpose_plant/T3_Sproduct_tanks/A1T3X002/Valve_A1T3X002	A1_multipurpose_plant	Valve inlet product tank 8002 External error has occu	rred	
_	A1_multipurpose_plant/T4_rinsing/A1T4S001/pump_A1T4S001	A1_multipurpose_plant	Pump outlet rinsing tank 8001 Motor protection trig	gered	
	A1_multipurpose_plant/T4_rinsing/A1T4X001/Valve_A1T4X001	A1_multipurpose_plant	Valve outlet rinsing tank 8001 External error has occu	rred	
_	A1_multipurpose_plant/T4_rinsing/A1T4X002/Valve_A1T4X002	A1_multipurpose_plant	Valve outlet rinsing tank B001 External error has occu	rred	
	A1_multipurpose_plant/T4_rinsing/A1T4X003/Valve_A1T4X003	A1_multipurpose_plant	Valve inlet rinsing tank B001 External error has occur	ed	
	A1_multipurpose_plant/T4_rinsing/A1T4X004/Valve_A1T4X004	A1_multipurpose_plant	Valve inlet rinsing tank 8001 External error has occur	ed	
	A1_multipurpose_plant/T2_reaction/A1T2L001/Monitor_A1T2L001	A1_multipurpose_plant	Monitoring level A1T2L001 PV - Warning full		1
	A1_multipurpose_plant/T2_reaction/A1T2L002/Monitor_A1T2L002	A1_multipurpose_plant	Monitoring level A1T2L002 PV - High warning lim	Copy cell contents CTRL+C	
	S7 Program(1)/@(1)/DP_master_syst_1		DP master @1%d@: Failure	Paste cell contents CTRL+V	
	S7 Program(1)/@(1)/CPU_414-3_DP_1		DP master @1%d@: Failure		
	S7SProgram(1)/@(2)/AS1_1		Time-of-day interrupt OB@3%d@ elapsed (time j	Copy Line	
_	S7SProgram(1)/@(2)/AS1_1		Interface error	Append Copied Line	
	S7SProgram(1)/@(2)/AS1_1		CPU loss of redundancy in rack @8%d@	Delete Line	
_	S7SProgram(1)/@(2)/AS1_1		Priorities of cyclical OBs not conforming to PCS 7		
_	S7 Program(1)/@(2)/UR2ALU_1		Failure connection ID: 16#@3%X@	Append New Line	
_	57 Program(1)/@(2)/UR2ALU_1		Failure connection ID: 16#@3%X@	Properties N	
	57 Program(1)/@(2)/UR2ALU_1		Failure connection ID: 16#@3%X@	riskeinen V	

16. In the parameters we can select, for example, if we want to archive the corresponding message. (will be archived  $\rightarrow$  OK)

Parameters	Text Tag/Action		
Number: Class: Type: Group: Hide mask: Priority: This mes: is sing Contro sis creat is creat trigger	679477343       Warning       Warning High       A1_multipurpose_plant       0	Connections Message tag: Message bit: Acknowledge tag: Acknowledge bit: Status tag: Status bit: Format DLL	S7\$Program(1)#Raw R 0 S7\$Program(1)#Raw R 0 R 0 NRMS7PMC.NLL R DLL-Parameters
Select the	e message parameters and connect the	message	

17. In the shortcut menu of the messages, under the item 'Archive Configuration', you can now select the 'Properties' of the 'Message archive' (→ Messages → Archive Configuration → Properties)

	arm Logging - [OS(1).mcp] Edit View Messages Tools Help	-				- 0 ×
	X 通道書 马尔铁田 Y 大 留 X					
	Group messages	essage reheve	Reset Link archive Disconnect from a	echive		
	Source	Ar	Reload after powe	r failure		
	A1_multipurpose_plant/T2_reaction/A1T2X008/Valve_A1T2X008 A1_multipurpose_plant/T2_reaction/A1T2T002/Control_A1T2T002	Ar A1 A1	Properties .		r R002 from reactor R001 External error has occurred eactor R002 External message 2	
-	A1_multipurpose_plant/12_reaction/A1121002/Control_A1121002 A1_multipurpose_plant/12_reaction/A1121002/Control_A1121002		multipurpose_plant	heating contro	eactor R002 External message 2 of reactor R002 PV - High warning limit violated	
_	A1_multipurpose_plant/T3_Sproduct_tanks/A1T3X001/Valve_A1T3X001		multipurpose_plant		duct tank 8001 External error has occurred	
-	A1_multipurpose_plant/T3_Sproduct_tanks/A1T3X002/Valve_A1T3X002		multipurpose_plant		duct tank B002 External error has occurred	
_	A1_multipurpose_plant/T4_rinsing/A1T4S001/pump_A1T4S001		multipurpose_plant		insing tank 8001 Motor protection triggered	
_	A1_multipurpose_plant/T4_rinsing/A1T4X001/Valve_A1T4X001		multipurpose_plant		nsing tank B001 External error has occurred	
_	A1_multipurpose_plant/T4_rinsing/A1T4X002/Valve_A1T4X002		multipurpose plant		nsing tank B001 External error has occurred	
-	A1_multipurpose_plant/T4_rinsing/A1T4X003/Valve_A1T4X003		multipurpose plant		ing tank B001 External error has occurred	
_	A1_multipurpose_plant/T4_rinsing/A1T4X004/Valve_A1T4X004		multipurpose plant	Valve inlet rins	ing tank 8001 External error has occurred	
	A1_multipurpose_plant/T2_reaction/A1T2L001/Monitor_A1T2L001	A1	multipurpose_plant	Monitoring lev	vel A1T2L001 PV - Warning full	
-	A1 multipurpose plant/T2 reaction/A1T2L002/Monitor A1T2L002	A1	multipurpose plant	Monitoring lev	el A1T2L002 PV - High warning limit violated	
	57 Program(1)/@(1)/DP_master_syst_1			DP master @1	%d@: Failure	
	S7 Program(1)/@(1)/CPU_414-3_DP_1			DP master @1	%d@: Failure	
	S7SProgram(1)/@(2)/AS1_1			Time-of-day is	nterrupt OB@3%d@ elapsed (time jump)	
	S7SProgram(1)/@(2)/AS1_1			Interface error		
	S7SProgram(1)/@(2)/AS1_1				dundancy in rack @8%d@	
	S7SProgram(1)/@(2)/AS1_1				clical OBs not conforming to PCS 7	
	S7 Program(1)/@(2)/UR2ALU_1				tion ID: 16#@3%X@	
	S7 Program(1)/@(2)/UR2ALU_1				tion ID: 16#@3%X@	
	S7 Program(1)/@(2)/UR2ALU_1			Failure connect	tion ID: 16#@3%X@	
4						
Ready			English (United Sta	(es)		Number of Messages: 1023

- 18. Under Archive Configuration, we can now parameterize the size of the entire archive and the distribution into the segments.
  - $(\rightarrow$  Archive Configuration  $\rightarrow$  Archive size  $\rightarrow$  Time of the segment change)

Archi	ive size					
	x 327.200.80	of all segments all segments		1000 <del>(</del>	Week(s)	
		covered by a sing a single segment		1 🚖 100 🜩	Day(s)  Megabyte(s)	
Time		gment change	▼ Year	2012	Day of the	
1.05.62	ekday	Wednesday	+ Hour	0	month	

19. Under 'Backup Configuration' it is possible to activate storing the archive data in a destination path to ensure gapless process documentation. By default, backup is started after the first time related segment change. After the settings were applied with

'OK', exit Alarm Logging 🔀 after the save	
	•

 $(\rightarrow \text{Backup Configuration} \rightarrow \text{OK} \rightarrow \square \rightarrow \boxtimes)$ 

mLogging	
rchive Configuration Backup Configuration	
Signature activated	Backup to both paths
Destination path	Browse
Alternative destination path	
	Browse
	OK Abbrechen Übernehmen Hilfe

20. Now, in the WinCC Explorer open 'Tag Logging' for configuring the process value archives. (→ Tag Logging)

WinCCExplorer - C:\Program Files\Siemens\STEP7\S7Proj\PCS7_SCE\PCS7_Prj\wincp	proj	\OS(1)\OS(1).mcp	- • ×
File Edit View Tools Help			
[ ] ] >   X iii ]ii   1, 5 ≥ ≋ [iii] 21 <b>?</b>			
⊡ OS(1)	^	Name	Туре
		No objects exist	
🗄 🛄 Tag Management		NU UDJECIS EXIST	
🗄 🕂 📙 Structure tag			
Graphics Designer			
Report Desig Open			
Text Library			
	=		
👬 User Administrator			
Cross-Reference			
Time synchronization			
() Horn			
····米 OS Project Editor			
一			
Web Navigator	*		
OS(1)\Tag Logging\		0 object(s)	Licensed mode

21. Process values can be archived according to different time patterns. This is important in order not to generate data volumes that are too large in the case of large archives. The shortest time is 500ms. ( $\rightarrow$  Timers  $\rightarrow$  500ms)

_ Tag Logging - [OS(1).mcp]	1 Statement		
File Edit View Help			
] 🖬   🗶   🚢   → ⇒ 🐼 🗐	i 🖆 😽		
] OS(1).mcp	Timer name	Time base	Ti *
Timers	🔊 500 ms	500 ms	1
Archives 🗟	1 second	1 second	1
Archive Configuration	1 minute	1 minute	1
	1 hour	1 hour	1 ≡
	🕗 1 day	1 day	1
	② 2 seconds	1 second	1 2 5
	🐼 5 seconds	1 second	5
	10 seconds	1 second	10
	② 20 seconds	1 second	20
	🗇 2 minutes	1 minute	2
	(2) 5 minutes	1 minute	2 5
	* III		ř
There are no properties for	the selected configuration area.		
< 🔲			•
Ready		16 Time object(s).	

22. A 'Process Value Archive' called 'SystemArchive' is set up automatically for the PCS 7 project. Additional archives can be set up in the subitems 'Process Value Archives' and 'Compressed Archives'. We are doing this now for a 'Compressed Archives'. The differences between these two types of archive are described in the property dialogs in the pages below. (→ Archives → Archive Wizard)



#### 23. Then, assign a name to the 'Compressed\_Archive'.

#### $(\rightarrow \text{Next} \rightarrow \text{Archive Name} \rightarrow \text{Compressed}_\text{Archive} \rightarrow \text{Finish})$



- 24. Now, look at the properties of such a 'Compressed Archive'.
  - $(\rightarrow \text{Compressed Archive} \rightarrow \text{Properties})$

	the state of the second states	The second s	
File Edit View Help			
Image: Second system       Image: Second system       Image: Second system       Image: Second system         Image: Second system       Image: Second system       Image: Second system       Image: Second system         Image: Second system       Image: Second system       Image: Second system       Image: Second system       Image: Second system         Image: Second system       Image: Second	Archive name SystemArchive Compressed_Archive	Archive mode Process Value Archive Compressed Archive Selection Tag Delete	Last change 2013-01-22 11:58:34 2013-01-22 12:13:03
Tag name		Properties N	Source archive S

- 25. In the section 'General Information' you can specify if this archive is already enabled when WinCC is started (not locked) and archiving of the data is to start, or if this is to take place at a later time by means of a C script. You can also link an action under 'General archive properties' with the start/enable of the archive.
  - $(\rightarrow$  General Information  $\rightarrow$  Enabled)

- Andrian	name:	ion Compressed_Archive
Server	name:	PCS70SCLIENT3 ~
Commer	nts:	
Archiving		Archive type
Enabled		Process Value Archive
C Locked		Compressed Archive
Action when arch	ive started/	/enabled Select
The general inform	mation tab o	of the archive properties changes basic parameters

- 26. In the section 'Compression', the compression time period and the processing method are selected.
  - $(\rightarrow$  Processing method: Calculate  $\rightarrow$  Compression time period: 1 day  $\rightarrow$  OK)

General Information       Compression         Compressed_Archive         Compressed archive         Processing method       Compression time period:         Calculate       1 day         On this tab, you describe the properties of a compressed archive.	perties of compressed archive	<u></u>
Processing method Compression time period:          Calculate <ul> <li>I day</li> <li>I day</li> </ul>		
		Compression time period:
On this tab, you describe the properties of a compressed archive.	Calculate 🗸	1 day 🔹
	On this tab, you describe the properti	es of a compressed archive.

27. Tags are assigned to the compressed archives from the tags that were set up in the process value archives. ( $\rightarrow$  Compressed Archive  $\rightarrow$  Selection Tag  $\rightarrow$  SystemArchive  $\rightarrow$  A1\_multipurpose\_plant  $\rightarrow \bigcirc \rightarrow OK$ )

File Edit View Help				
🖬   🐰   📕   🗉 🌫 😂 🕅   🖀 🖹	2			
OS(1).mcp	Archive name	Archive mode	Last change	
-⑦ Timers 	SystemArchive	Process Value Archive		
	Compressed_Archiv	Selection Tag	2013-01-22 12:13:03	
		Delete		
Tag name	1	Properties	Source archive	
	Select Co	mpressed Tags		S X
	- SCIMADOLOGIC	entation of the archive tag	Compressed Archive	(Alternative second
		(1).mcp Archives	Compressed_A	
		SystemArchive	_ 🖆 👘 🖓 🕹 🕹 🕹 🕹 🕹	ultipurpose_plant/T2_
		A1_multipulpose_plant		
			>>	
			<<	
( 🗌				
eady			<	
		III. F	4 111	

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28. For the properties of the compressed tag archiving we want to display above all the parameters for editing or calculating the compression.

 $(\rightarrow \text{Compressed Archive} \rightarrow \text{Tag name} \rightarrow \text{Properties} \rightarrow \text{Parameters} \rightarrow \text{Processing:}$ Mean value  $\rightarrow \text{Unit: ml} \rightarrow \text{OK}$ )



29. Now look at the properties of the process value archive.  $(\rightarrow \text{Process value archives} \rightarrow \text{SystemArchive} \rightarrow \text{Properties})$ 

	Archive name	Archive mode	Last change
⑦ Timers Ⅲ Archives ြ Archive Configuration	SystemArchive	New Tag New Process Controlled Ta Delete	- 2012 01 22 11:58:34 12:13:03
Tag name A1_multipurpose_plant/T2_reaction/	Proc /A1T2L001/Monitor_A1T2(A1_mul	Properties tipurpose_plant/T2_reaction/A	A1T2L001/Monitor_A1

- 30. In the section 'General', again specify whether this archive is to be enabled when the OS is started, or whether an action is to be linked with the enable/start of the archive.
  - $(\rightarrow$  General Information  $\rightarrow$  Enabled)

General Information Archive na Server nan	Memory	y location			
	name:	System	Archive		
	er name: PC		SCLIENT3 -		
Comments:					
Archiving		-	Archive type		
Enabled		Process Value Archive			
C Locked		Compressed Archive			
Action when arc	a	- 1 ( 1-1			
Action when arci	nive start	ed/enabl	ed Select		
The general infor	mation ta	b of the a	archive properties changes basic parameters		

- 31. In the section 'Memory location', select where the archive is to be stored. If the main memory was selected, memory consumption has to be limited.
  - $(\rightarrow \text{Memory location} \rightarrow \text{On the hard disk} \rightarrow \text{OK})$

General Information Memory loc	ation
Memory location	
◎ On the hard disk	In the main memory
	Number of records: 1000
	Size in kBytes/Tags: 31
In this option tab, you select the	e properties of a buffered archive compressed in
main memory (RAM) or on the h	ard disk (HD).
In this option tab, you select the	e properties of a buffered archive compressed in
main memory (RAM) or on the h	ard disk (HD).
In this option tab, you select the	e properties of a buffered archive compressed in
main memory (RAM) or on the h	ard disk (HD).
In this option tab, you select the	e properties of a buffered archive compressed in
main memory (RAM) or on the h	ard disk (HD).
In this option tab, you select the	e properties of a buffered archive compressed in
main memory (RAM) or on the h	ard disk (HD).

32. Now, look at the 'Properties' of the process tag that you set up previously in the CFC.

 $(\rightarrow$  SystemArchive  $\rightarrow$  Tag name  $\rightarrow$  Properties)

] Tag Logging - [OS(1).mcp]	The Property lies		
File Edit View Help			
] <b>■</b>   X   <b>■</b>   <sup>3</sup> > ≋ 📰	ar 💦		
] OS(1).mcp	Archive name	Archive mode	Last change
<ul> <li>⑦ Timers</li> <li>↓↓↓ Archives</li> <li>↓↓↓ Archive Configuration</li> </ul>	SystemArchive Verdichtungsarchiv	Process Value Archive Compressed Archive	2012-11-30 09:22:27 2012-11-30 09:50:09
Tag name		Process tag	Tag type
A1_multipurpose_plant/T2_rea	Delete Properties	2 A1_multipurpose_plant/T2_react	ion/A1T2L001/Monitor_A1 <sup>:</sup> Analog
Ready		1 Tag(s)	

- 33. In the section 'General', basic settings have to be made for the 'Archive Tag', such as Supplying tags through WinCC and not through 'Manual input', or the possible assignment to a central archive server (CAS) via 'Long term relevant'
  - $(\rightarrow$  Supplying tags: System  $\rightarrow$  Archiving: Enabled)

Archive Tag	Archiving Parameters Display Compression	
1 100 march	Name of the archive tag Tag Type	
5	reaction/A1T2L001/Monitor_A1T2L001.PV#Value Analog	
	Name of the process tag	
	A1_multipurpose_plant/T2_reaction/A1T2L001/Mc Select	
Comments		
	Supplying tags	
	System     Manual input	
	Archiving	
	<ul> <li>Enabled</li> <li>Relevant long term</li> </ul>	
	Also put archived value in tag	
	Select	
	The general tab of the tag properties changes basic parameters.	

34. The archive tag is recorded according to a fixed data collection cycle. The following can be set: whether archiving follows an archiving cycle (acquisition cycle) also cyclically or whether it is to be acyclical (event controlled/if there is a change). In the field 'Hysteresis' we specify if only the process value is archived that is located absolute (abs.) or relative (in %) above or below the specified threshold.

$(\rightarrow \text{Archiving})$	$\rightarrow$ Archiving type:	cyclic $\rightarrow$ Acquisition:	1 second $\rightarrow$	Archiving: 1	x 10
seconds)					

-		A1 multipurpose plant/T2 reaction.	A1T2L001/Monitor A1T2L00	1.PV#Value
<b>S</b>		Analog		
Archiving type		cyclic	Events	
Acquisition:		1 second -		- and 1
Archiving		<b>N</b>	C script:	1.00
Factor		Cycle	Actions	
1	x	10 seconds 🔹	Start:	
Hysteresis:		Absolute      in %	Tag	
Archive a	fter :	segment change	C script:	
Display			Stop:	
Factor		Cycle	Tag	
1	x	10 seconds 🛛 👻	C script:	(((m+()))

- 35. For the other parameters, functions can be specified that are to be calculated also during archiving. The unit of the respective value can be defined here also.
  - $(\rightarrow \text{Parameters} \rightarrow \text{Processing: Current value} \rightarrow \text{Unit: mI} \rightarrow \text{OK})$

rchive Tag Archiving	Parameters Display Com	pression	
A	_multipurpose_plant/7	Analog	
Processing		Number of values	
<ul> <li>Current value</li> <li>Mean valu</li> </ul>	Sum Max. value	Leader In	
	Select	Trailer 0	
Unit		Save on error	
Direct	mi Cz	Last value	
O Structure elem.	Select	Subst. value	
Settings for cyclic an	alog measurement points		

36. Now, we turn to the 'Archive configuration'. At Tag Logging, there are two 'Archive types': 'TagLogging Fast' and 'TagLogging Slow'. The differences become evident in the parameters. Here, first TagLogging Fast.

] Tag Logging - [OS(1).mcp]	1 Stations				
File Edit View Help					
] <b>■</b>   X   <b>■</b>   → > ﷺ [⊞	A 1				
]_ OS(1).mcp	Archive mode				
- O Timers	🕞 TagLogging Fast				
Archives	🕞 TagLogging Slow	Reset Link archive Disconnect from archive			
		Properties			
There are no properties for the	e selected configuration are	ea.			
1 Ready		2 Type(s).			

 $(\rightarrow \text{Archive mode} \rightarrow \text{TagLogging Fast} \rightarrow \text{Properties})$ 

- 37. Under Archive Configuration, the size of the entire archive and the division into segments can be parameterized. For the archive type TagLogging Slow, this option looks like this.
  - $(\rightarrow$  Archive Configuration  $\rightarrow$  Archive size  $\rightarrow$  Time of the segment change)

rchive Configuration	Backup Configuration	Archive	e contents			
Archive size						R
Time period of	f all segments		1 ≑	Week(s)	•	U
Max. size of a	Il segments	1	1000 🚔	Megabyte(s)	•	
Time period c	overed by a single segm	ent	1	Day(s)	•	
Max. size of a	a single segment		100 ≑	Megabyte(s)	•	
Time of the seg		Year	2012	Day of the	21	
Weekday	Wednesday 🔹	Hour	0	month Minute	0	
	Concernation of the Concern 7 of the					

38. Under 'Backup Configuration', it is possible to activate archive data storage in a 'Destination path' to ensure gapless process documentation. The backup is started by default after the first time related segment change. (→ Backup Configuration)

TagLogging Fast	X
Archive Configuration Backup Configuration	Archive contents
Signature activated Activate Backup Destination path	Backup to both paths Browse
Alternative destination path	Browse
(	OK Abbrechen Übernehmen Hilfe

39. In the tab 'Archive contents' the difference regarding TagLogging Slow becomes evident. Here, the archiving criteria for TagLogging Fast are specified. The other tags with longer cycle time are located in TagLogging Slow. For the archive type TagLogging Slow this option does not exist. After accepting the settings with 'OK'

close Tag Logging with	after the save	
------------------------	----------------	--

	1		
$(\rightarrow \text{Archive contents} \rightarrow \text{OK} \rightarrow$		$\rightarrow$	P

Archive Confi <u>c</u>	guration Backup Configuration Archive contents
	☑ Measuring values with event-driven acquisition
	Cyclic meas. values with cycle <= 1 x 1 minute -
	Compressed values with cycle <= 1 x 1 minute -
	Proccontrolled meas. values
	Note All Tag Logging tags that do not fulfill the above-mentioned conditions will be archived in Tag Logging Slow.



**Note:** An additional individual variant of archives are the user archives. User archives are database tables where users can set up their own data fields. User archives are used to store data and offer standardized access to this data according to SQL database description. However, this variant is not shown here, since generating it is very individual and complicated. ( $\rightarrow$  User Archive  $\rightarrow$  Open  $\rightarrow$  ...)

WinCCExplorer - C:\Program Files\Siemens\STEP7\S7Proj\PCS7_S_1\PCS7_Prj\wincproj	\OS(1)\OS(1).mcp	
File Edit View Tools Help		
□ ▷ ■ ▶   X 埴 単  5 5 録 (   ) 當   ?		
	Name	Туре
🖵 Computer	No objecto esciet	
⊕	No objects exist	
🖶 🗄 Structure tag		
···· 👌 Graphics Designer		
Alarm Logging		
Tag Logging		
- I Report Designer		
- Ex Distributor		
User Administrator		
Cross-Reference		
Redundancy		
User Archive		
Time synchr Open		
Horn Properties		
Picture Tree Manager		
S Project Editor		
- <mark>]</mark> Component List Editor - 윰 SFC		
Web Navigator		
OS(1)\User Archive\	0 object(s)	Licensed mode

40. To display the archive data, OS Runtime has to be started first, of course. (→ Activate OS runtime)



41. To display the plant, select the down arrow to the right of "A1\_multipurpose\_plant" and then "T2\_Reaction". (→ ↓ → T2\_Reaction)

A1_multipurpose_plant	0
	₽
	₽
	₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽
	↓ ↓ ↓ ↓
A1_multipurpose_plant T1_educt_tanks T2_reaction T3_product_tan 2_reaction T4_rinsing	Recipe A1T1B003 OK antUSEO_nosing
T2_reaction	
A1T2R001	A1T2R001 Level 0 ml

42. The simplest method to display archive data in curve form is by clicking on Assemble groups/Call.

 $(\rightarrow \text{Assemble Groups/Call} \boxtimes)$ 

2	30.11.12 11:02:41,650 0	A1_mult	ipurpose_plant/T2_reaction/A PV	- Untere Alarmgrenze verletz	zt	111 1
	A1_multipurpose_glant	0				
	I	3				
	11					
	1.	2				
	- I.	0				
1						





43. In the dialog below, assign a name to the 'New Trend Group' and select 'Archive' as content. That means: the displayed values come from an archive. As an alternative, all other online variables can be displayed directly. (→ New → Name:Trend\_Group01 → Contents: Archive → Create)

Trends Online			<b>—</b> X	
Trend Groups	New Trend Group	Changed last	Display New Delete	×
	Name: Trend_Gr Contents	oup01 Template Pictures 17: @TRG_Default.Pdl 17: @TRG_Standard.Pdl		Create

44. In the tab 'Trends' select at data connection – Tag name the folder icon and in the next dialog the tag A1\_multipurpose\_plant/.... ( $\rightarrow$  Tag name  $\rightarrow$  SystemArchive  $\rightarrow$  A1\_multipurpose\_plant/...  $\rightarrow$  OK)

1	1 F		
Toolbar Status Ba		Export	
Trends General Font	Trend window Time axes	Value axes	
Trends:	Object name:		
Trend 1	Trend 1		
	Trend window:		
	Trend window 1	<b>-</b>	
	Time axis:		
	Time axis 1	<b>-</b>	
	Value axis:		
	Value axis 1	<b>•</b>	
	Label:		
Data connection Data source:	Tag name:		
Data source: 1 - Archive tags	Tag name:		
Data source: 1 - Archive tags Effects			
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags			2
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags 1 Selection of Archives/Tags			2
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags is it if			
Data source:          1 - Archive tags         Effects         Tre       Selection of Archives/Tags         1       Image: SystemArchive         Hierarchy:       SystemArchive         Image: SystemArchive       Image: Sy			
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags 1 Effects I Hierarchy: SystemArchive PGS70521873 Effects Tre Compressed Archive SystemArchive	Tag name	7	Comm   Tag type   Acquis   Last ch   Ac
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags 1 Line Hierarchy. SystemArchive 0 Dot 2 - SystemArchive	Tag name	7	Comm Tag type Acquis Last ch Ac
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags 1 - Hierarchy: SystemArchive\ 0 - PCFS7SCLENT3 • Compressed_Archive SystemArchive	Tag name	7	Comm Tag type Acquis Last ch Ac
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags 1 Line Hierarchy: SystemArchive 0 0 0 0 0 0 0 0 0 0 0 0 0	Tag name	7	Comm Tag type Acquis Last ch Ac
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags 1 Line Hierarchy: SystemArchive 0 PCS70SCLIENT3 Hisrarchy: SystemArchive I SystemArchive	Tag name	7	Comm Tag type Acquis Last ch Ac
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags 1 Line Hierarchy: SystemArchive 0 PCS70SCLIENT3 Hisrarchy: SystemArchive I SystemArchive	Tag name	7	Comm Tag type Acquis Last ch Ac
Data source: 1 - Archive tags Effects Tre Selection of Archives/Tags 1 Line Hierarchy: SystemArchive 0 PCS70SCLIENT3 Hisrarchy: SystemArchive I SystemArchive	Tag name	7	Comm Tag type Acquis Last ch Ac

45. In the second tab 'Value axes' deselect 'Automatic' and set the value range to 0 ... 1000. ( $\rightarrow$  Value axes  $\rightarrow$  deselect 'Automatic' $\rightarrow$  Value range: 0 ... 1000)

Toolbar	Status Bar	Online configuration Export
Trends Genera	I Font	Trend window Time axes Value axes
Value axes:		Object name:
Value axis 1		Value axis 1
		Trend window:
		Trend window 1
		Label:
		Alignment:
New Remov	e Up Dow	n Scaing: 0 - Linear
Value range		o Enda
from:	to:	
0	1000	Automatic
		63
Effects		Color:
Decimal places:	Automatic	
2	Automatic	a a a a a a a a a a a a a a a a a a a
Exponential no	tation	Use trend color
11		Área names
User scaling	-	
	Use 📃 👔	Show 🔳 👘

46. In the tab 'Time Axes' select the time range 1 x 1 minute. ( $\rightarrow$  Time Axes  $\rightarrow$  Time range: 1 x 1 minute)

Toolbar	Status Bar	Online Configuration Export
rends Gene	ral Font	Trend Window Time Axes Value Axe
ime axes:		Object name:
Time axis 1		Time axis 1
		Trend window:
		Trend window 1
		Label:
		Alignment:
		0 - Bottom
New Remo	ve Up Dov	wn 🔽 Refresh
Time range		
Setting:		Start time:
0 - Time range		▼ 22.05.2015 🔍 ▼ 13:01:10
		End time:
		22.05.2015 📃 🔻 13:02:10
Number of meas	urement points:	Time range:
120		1 X 1 minute 👻
Effects		
Time format:		Color:
	-	
Automatic		
Automatic Date format:		<ul> <li>Use trend color</li> </ul>
	-	Use trend color
Date format:	-	Use trend color
Date format: Automatic		Use trend color
Date format: Automatic	•	Use trend color

47. You now have a trend display for the archive tag that you can modify conveniently using the task bar in the window Trendgroup01 regarding range and segment. To display it, the corresponding SIMIT model as well as the simulation has to be started in PCS7.

	22/01/13 12:29:05.592 0	A1_multipurpose_plant	T2_reaction Monitoring level A1T2L002 PV	- Low alarm limi	1/22/2013 12:40:00 PM
,	1_multipurpose_plant	Û.		1 I	SIEMENS
				JII	



48. Another variant for displaying trends from the archives is using the 'Report Designer' as printout. Here it is important that WinCC remains started in runtime. In the Report Designer, print requests with the layout they contain can be started. For this reason, first select a layout '@CCTIgRTCurves\_ENU.RPL' matching the archive data in order to adapt it.

File Edit View Tools Help				
〕 ▶   X 単 刵 占 > 終 🏢 🖀 ?				
🕞 OS(1)	*	Name	Туре	
		CCAIgRtOnlineMessagesNewWithToleranc	Layout	
🖶 📶 Tag Management		@CCAlgRtOnlineMessagesNew_ENU.RPL	Layout	
🔅 📲 Structure tag		@CCAlgRtOnlineMessagesOld_ENU.RPL	Layout	
		@CCAlgRtOnlineMessages_ENU.RPL	Layout	
		@CCAlgRTSequenceArchiveJournal_ENU.RPL	Layout	
Tag Logging		@CCAIgRTSequenceArchiveOperation_ENU	Layout	
Report Designer		@CCAIgRTSequenceArchiveProcess_ENU.RPL	Layout	
Layouts	E	CCAlgRtSequenceArchive_ENU.RPL	Layout	
		CCAlgRtShortTermArchive_ENU.RPL	Layout	
German (Germany)		@CCCurveControlContents_ENU.RPL	Layout	
English (United States)		CCFunctionTrendCtrl-CP_ENU.RPL	Layout	
Spanish (Spain, Traditional Sort)		CCOnlineTableCtrl-CP_ENU.RPL	Layout	
French (France)		CCOnlineTrendCtrl-Curves-CP_ENU.RPL	Layout	
Italian (Italy)		CCTableControlContents_ENU.RPL	Layout	
Print jobs		CCTIgRtCurves_ENU.RPL	Layout	
Global Script		@CCTIgRtTables_ENU.RPL	Layout	
Text Library		Control Center CS (compact)_ENU.rpl	Layout	
Text Distributor		Function Trend Control - Picture_ENU.RPL	Layout	
User Administrator		Global Script single Action (landscape)_EN	Layout	
		Global Script single Project Funtion (landsc		
Cross-Reference		Global Script single Standard Function (lan	Layout	
	-	@oscract ENU.rpl	Lavout	

 $(\rightarrow \text{Report Designer} \rightarrow \text{Layouts} \rightarrow \text{English} \rightarrow @\text{CCTIgRTCurves}\_\text{ENU.RPL})$ 

49. In the 'Report Designer Layout', the layout can now be edited as in the usual graphic tools. Here we show how the dynamic view of the tag trend has to be parameterized.
 (→ Tag Logging Runtime.Trend → Properties)



50. In the following dialog, select under 'Connect' the 'Tag Selection' for editing. Likewise, the time range, time base and the format can be specified here.  $(\rightarrow \text{Connect} \rightarrow \text{Tag Selection} \rightarrow \text{Edit})$ 

Object Properties		2 ×
-🛱 🦅 🖉 🛛 Dynamic m	etafile DynM	etafile1 🔹
Properties Connect		
Tag Loggir Name	Parameter	Edit
Trend Time r	election	Delste

51. We still have to select a tag. Click on 'Add'. ( $\rightarrow$  Add)

urrent selection and sequence:	ОК
Variable	Cancel
	Add
	Move Up
	Move Down
	Delete
	Properties

52. From the 'SystemArchive': select 'A1\_multipurpose\_plant as tag.

```
(\rightarrow SystemArchive \rightarrow A1\_multipurpose\_plant \rightarrow OK \rightarrow OK)
```

Archive Selection		? <mark>×</mark>
🖬   1- 🗄 🏢		
Hierarchy: SystemArchive\		
Compressed_Archive SystemArchive	Tag name * * * * * * * * * * * * * * * * * * *	Comm     Tag type     Acquis     Last ch     Acquis       *     *     *     *     *     *     *     *       Analog     Cyclic     2013-1     1 seconc
	< III	OK Cancel Hep
Current se Variable System4	ng Runtime: Tag selection for reporting lection and sequence: rchive\A1_multipurpose_plant/T2_reaction/A1T2L	OK Cancel Add Move Up Move Down Delete Properties
This dial	og box allows you to select tags for reporting from existing Tag Logg	jing archives.

53. Close the Properties dialog and save the modified layout under the same or a different name. ( $\rightarrow$  Close  $\rightarrow$  Save



54. In the print request for online trends '@Report Tag Logging RT Curves New' the properties are now set.

 $(\rightarrow \text{Report Designer} \rightarrow \text{Print jobs} \rightarrow @\text{Report Tag Logging RT Curves New} \rightarrow \text{Properties})$ 

WinCCExplorer - C:\Program Files\Siemens\STEP7\S7Proj\PCS7_SCE\PCS	7_Prj\wincproj <sup>\</sup>	\OS(1)\OS(1).mcp [ Active ]		
File Edit View Tools Help				
D >>   ■ >   X = □ □   N > 38 (□ □)				
□ 💽 OS(1)	*	Name		Туре 🖍
		📕 @internal Global Script Standard	d-function	@gsc_sfc.rpl
🗄 🛄 Tag Management		昌 @internal Global Script Actions		@gsc_act.rpl
🐑 📴 Structure tag		Occumentation Tag Logging		@TIgCS.RPL
🔥 Graphics Designer		ا Documentation Alarm Loggin	g	@AlgCS.RPL
		🗏 @Report Alarm Logging RT Rev	olving archive	@ALRtUmA.
Tag Logging		昌 @Report Alarm Logging RT Seq	uence archive	@ALRtFoA.R
🖶 🔳 Report Designer		🖨 @Report Alarm Logging RT Mes	ssage sequence	@CCAlgRtSe
🖶 🔚 Layouts	E	@Report Alarm Logging RT Onl	-	@CCAlgRtO
		📕 @Report Alarm Logging RT Onl	-	@CCAlgRtO
		@Documentation Signal Collect		@SCollect.Rl
English (United States)		@Documentation Lifebeat Mon	-	@LBMCS.RP
Spanish (Spain, Traditional Sort)		@Documentation Picture Tree N	-	@PTMCS.RP
French (France)		📕 @Report Alarm Logging RT Onl	-	@CCAlgRtO
Italian (Italy)		@Report Tag Logging RT Tables		@CCTIgRtTa
Print jobs		@Report Tag Logging RT Curve		@CCTlgRtCu
		@Report Alarm Logging F	New print job	
Text Library		@Report Alarm Logging F	Delete print job	1=
- Rext Distributor		@Documentation Text Lib	Preview print jol	ь
User Administrator		@Documentation User Ac	Print the print jo	b
To Cross-Reference		@Documentation Global		1
		Socumentation Global	Properties	2
User Archive	-	•		Þ
DS(1)\Report Designer\Print jobs\	,	59 object(s)	Lie	censed mode

55. In the dialog 'General', a suitable 'Layout file: @CCTIgRTCurves.RPL' is displayed. If own layouts were created, they can be selected here also. (→ Layout file: @CCTIgRTCurves.RPL)

10001	roperties			National
ieneral	Selection	Printer	Setup	
8	Name:	Report	Tag Logging RT Curve	es New
T	Project:	C:\Prog	ram Files\Siemens\ST	EP7\S7Proj\PCS7
Layout	name:	@CCTIg	RtCurves.RPL	
Layout	file:	. ec	CTIgRtCurves.RPL	• (i
		🗌 Line	layout for line printer	
		🔲 Sele	ction for print job list	
	Dialog:	No dialo	pg	
	Last prir	ntout on:		
	Next pri	ntout on:	5	23 21 
	Start P	arameter		
	E o		2012 - 11 - 30	HH : MM
	Sta	t Time:	2012 -11-30	10.20
	Сус	le:	Daily	Ŧ
		-		
			OK Ca	ncel Help

56. Under Selection of the print job properties, the pages and the time range are specified. ( $\rightarrow$  Selection  $\rightarrow$  Page Range  $\rightarrow$  Time range)

Print Job P	Properties	y x
General	Selection Printer Setup	
Ð	Page Range	
	Pages from 1 to 9999	
	Data time range	
	Number: 1 All	•
	Absolute YYYY - MM - DD HH : MM	
	From 2015 05 22 13:05	
	To 2015-05-22 13:05	×.
	OK Abbrechen	Hilfe

57. In 'Printer Setup', several printers can be specified sorted according to priority. ( $\rightarrow$  Printer Setup  $\rightarrow$  OK)

ieneral	Selection Printer Setup	
-2	Print Output To	
P	V Printer	
	Printer Priorities	
	1.) <standard printer=""></standard>	•
	2.) <none></none>	•
	3.) <none></none>	
	Minimum space required on the h	ard disk in MB
	Generate warnings	150
	Discard trigger for logging	100
	File (*.emf)	
	Tray:	
	PRT_OUT\_YYYYMMDDhhmms	ssmmm\
	PRT_OUT\_YYYYMMDDhhmms	ssmmm.pdf
	PRT_OUT\_YYYYMMDDhhmms Minimum space required on the h	

58. Now, we are ready to print. To save paper, the print job can be previewed.  $(\rightarrow @$ Report Tag Logging RT Curves New  $\rightarrow$  Preview print job)





## **Exercises**

In the exercises we apply what we learned in the Theory section and the Step by Step Instructions. The existing multi-project from the step by step instructions (PCS7\_SCE\_0203\_R1305\_en.zip) is used for this and expanded.

The objective of this exercise is this: to configure two trend groups that represent different archive values for the reactors. To this end, combine the temperature and controller relevant data in the first trend group and the level relevant data in the second trend group.

#### TASKS

- 1. Archive all values that are level, temperature and controller relevant. Edit the corresponding blocks in a way that these values are archived.
- 2. Now, define a trend group for reactor R001 that represents the values of the PID controller. Add all relevant archive tags. Do the same for reactor R002. Try different time and value axis settings.
- 3. Next, the level relevant data of the reactors is to be visualized together. Select them and display them.
- 4. Test different settings in the configuration dialog. Search for a function that can be used to select and deselect individual trends and trend groups.



The tasks below were not realized in the exercise project. However, they are typical for planning archive systems.

- 5. Which process values should be archived for an easy-to-follow and gapless representation? Develop a concept and implement it.
- 6. Calculate the memory needed for the tag "Tag Logging Fast". As the number of process values, utilize the results from the first task. For the analog process values, once assume 6 bytes for each process value and once 16 bytes for each process value. One segment is to store the process values for 2 weeks and all segments at least half a year.
- 7. Now calculate the memory requirement for Alarm Logging by assuming 4 messages per minute. One message requires 4000 bytes memory.
- 8. Based on the results, distribute the assumed 10 GB memory to Archive Tag Logging Fast, Alarm Logging and Tag Logging Slow. Then set the properties of the archives in your project.