

4 - Day PCS7 Maintenance Training

Target Audience:

This training is designed for Technicians and Site Engineers who will perform hard- and software related maintenance work and troubleshooting on the installed PCS7 system. The training focusses on the installed components at the customer site and will only cover hard- and software applied.

Prerequisite:

Participants should have a general knowledge about PLC/DCS hardware and software applications and be familiar with the task at hand.

Goal:

After completion of the class the student will be able to use the PCS7 Engineering Tools for logic and screen modifications as well as the PCS7 diagnostic capabilities to analyze the system status and retrieve diagnostic information by using various tools. The trainee will be enabled to trouble shoot problems in the hardware and software of the system, to replace components utilized in the project and will be familiarized with preventative maintenance.

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PCS7 System Overview

(Presentation only)

- Introduction into PCS7
 - PCS7 Control System Structure
 - AS410 and S7 – 400 single and redundant processors
 - Safety System (Fail Safe)*
 - PROFIBUS I/O modules
 - Operator stations
 - Engineering station
 - Network
- Support
 - Pre-installed documents
 - On-line help within PCS7
 - Web support
 - Catalog
 - Manuals
 - FAQ
 - Hotline
 - Newsletter

Objective: Trainee will get an overview of the installed system. During the class, we will set-up a support login for each trainee and activate several newsletters. Trainee will download a catalog and a manual of his/her choice (subject to internet availability in classroom).

*only applicable if Safety Instrumented System is used

Understanding S7 Hardware Status Indications

(Presentation and exercise)

- S7 Main rack (DCS and SIS):
 - PS407
 - AS410/S7-417
 - CP443-1
- PROFIBUS DP (non-SIS)
 - IM153-2
 - AI modules
 - AO modules
 - DI modules
 - DO modules
 - MODBUS
- PROFIBUS DP (SIS)*
 - IM153-2
 - AI modules
 - DI modules
 - DO modules
- SCALANCE

Objective: Trainee will be introduced into the various indications the modules can display with the onboard LED's. An exercise will give the participants the possibility to perform a status analysis on the S7 hardware.

* only applicable if Safety Instrumented System is used

Engineering an Analog Input from the Module to the Screen

(Guided Training)

- S7 Manager
 - Wizards for PCS7
- HW-Config
 - Add Et200M
 - Add I/O card
- Symbol table
- CFC
 - Libraries (PCS7 / S7)
 - MonAnL
 - Generate Module Driver
 - Compile
- PLCSim
- Download to the controller
- Map to WinCC
- Configure WinCC
- Create a simple graphic with one analog display
- Tag logging
- Trend
- Start WinCC in Runtime
- Test application

Objective: Trainee will get a basic overview of the engineering process. All important tools are needed in this small example. This lesson is positioned here to give the trainee an idea on how the PCS7 tools interact with each other early, so that the in-depth look in all tools will be better received.

The trainee will create a project from the start. Future lessons will build on this project.

SIMATIC MANAGER

(Presentation and exercise)

- SIMATIC Manager
 - Open project
 - Reorganize project
 - Archive
 - Retrieve
 - Project views

Objective: Trainee will be introduced to working with the SIMATIC Manager as the central platform for all ES troubleshooting tasks. The exercise will train the proper administrative handling of a PCS7 project.

HW-Config: Online diagnostic of modules

(Presentation and exercise)

- Offline / online views
- Diagnostic buffer
 - AS410/S7-417
 - CP443-1
 - IM153-2
 - AI modules
 - AO modules
 - DI modules
 - DO modules
 - MODBUS
 - SIS AI modules*
 - SIS DI modules*
 - SIS DO modules*

Objective: Trainee will learn to apply the tool HW-Config to retrieve diagnostic information from the various modules used in the Linde project. The exercise will provide a variety of hands-on trouble shooting (subject to availability of hardware).

* only applicable if Safety Instrumented System is used

Continuous Function Chart Editor: Trouble shooting and modifying the software

(Presentation and exercise)

Troubleshooting:

- CFC chart
 - Function block
 - Property window
- Cross Reference: how to find ...
- Online view
 - View actual data
 - Online Trend View
 - Modify parameters

Logic changes:

- Intro in OB, FB, FC
- Add or Remove an Interconnection
 - On same CFC
 - Across different CFCs in the same controller
 - Across different CFCs in different controller
- Add or Remove a Function block
 - Block libraries
 - Help on blocks
- Block Run Sequence
- Compile CFC changes
- Download CFC changes
 - into PLC simulator PLCSIM
 - into live system
- Pre-test software changes in PLCSIM

Objective: Trainee will be introduced to the concept of the continuous function chart and the trouble shooting support provided by the CFC online function. Furthermore, the trainee will learn the first steps into the function block libraries, on how to add or remove logic, compile and download changes into the controller.

The trainee will become familiar with the CFC editor to modify settings and read parameter and port values online, modify logic, compile and download changes and test the logic changes on the PLCSIM.

PCS7 OS Graphic Changes

(Presentation and exercise)

- Using PCS7 OS Graphic Editor
 - Find a screen
 - Add static graphic
 - Add dynamic graphic
 - Read Tag
 - Dynamic Dialog
 - C-Script (presentation only)
- Transfer Graphic to Live System
 - OS-Server
 - Web-Server

Objective: This lesson will introduce the trainee into how to modify graphics, to test the graphic and how to distribute graphic to the live system. During an exercise the trainee will change an existing graphic and test it.

PCS7 OS Maintenance Support

(Presentation and exercise)

- Using PCS7 OS to troubleshoot
 - Finding events
 - Trending
 - Understand graphic indications
- PCS7 OS Client trouble
 - Communication problems
 - System behavior server swap
- PCS7 OS Server trouble
 - Diagnostic file location
 - Archive swap
 - Directories
 - Re-import swapped archives
 - Process Messages
 - Redundancy and other system messages

Objective: First part of this lesson will show how to apply the features of the PCS7 OS runtime system to analyze problems with the process.

The second part will introduce the trainee how to troubleshoot malfunctions of the PCS7 OS using the WinCC diagnostic features.

An exercise will require the trainee to find and check the diagnostic files on the live system (OS Client and Server).

Troubleshooting the Scalance

(Presentation and exercise)

- Diagnostic feature of the Scalance

Objective: Trainee will be introduced to diagnostic features provided by the Scalance Switch including access to the HTML pages via a web-browser (if possible).

Replacing PCS7 components

(Presentation and exercise)

- Controller Hardware
 - S7 Main rack:
 - PS405
 - AS410/CPU 417
 - CP443-1
 - PROFIBUS DP
 - IM153-2
 - AI modules
 - AO modules
 - DI modules
 - DO modules
 - MODBUS
- Disaster recovery
 - ES
 - OS-Client
 - OS-Server
 - Web-Server

Objective: Trainee will learn how to safely replace all components used in the Linde project. Swapping of Controller hardware will be trained in the exercise (subject to availability of test rack and hardware).