

# PCS7 Engineering Training

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# DAY 1

## *Overview*

(Presentation only) 1 hours

- Introduction into PCS7
- History of PCS7
- New Features of the current version
- Support
  - Pre-installed documents
  - On-line help within PCS7
  - Web support
    - Catalog
    - Manuals
    - FAQ
  - Hotline
  - Newsletter

Objective: Trainee will get a basic overview of the system. During the class we will set-up a support login for each trainee and activate several newsletters. Trainee will download a current PCS7 catalog and a manual of his/her choice (subject to internet availability in classroom).

## ***Engineer an Analog Input from the Module to the Screen***

(Guided Training) 3 hours

- S7 Manager
- HW Config
  - Wizards for PCS7
  - Add Et200M
  - Add I/O card
- Symbol table
- CFC
  - PCS7 Libraries
  - PCS7AnIn and MonAnL
  - Generate Module Driver
  - Compile
- PLCSim
- Download software
- Map to WinCC
- Create Graphic
- Start WinCC in Runtime and test

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 into all tools will be better received.

The trainee will create a test project which will be built upon in the following training classes.

## ***HW-Config in depth***

(Presentation and Training) 2 hours

- Catalogs – Standard versus PCS7
- Properties of S7 CPU
  - PROFIBUS DP/PROFINET bus
  - Start-up behavior of CPU
  - Priority levels – run-time behavior of PLC
  - HW Interrupts
  - Memory
  - Time Synchronization
- Properties of S7 CP
  - CP443-1 Ethernet
- Redundancy feature
- Remote I/O
  - ET200M
  - IM153-2 selection
  - Module Selection
    - AI modules
    - AO modules
    - DI modules
    - DO modules
  - I/O redundancy
  - CP341 - Modbus
- Training: Set-up final Hardware for training project per I/O list

Objective: Trainee will be introduced to the most common SIMATIC Hardware components and their basic operational features. Configurable items and attributes will be explained in detail.

## Day 2

### *Continuous Function Chart*

(Presentation and Guided Training) 6 hours

- Function diagram for training project
- Identify structure – Plant View
- Create Plant Hierarchy
- Create CFCs
- Work with APL library
- Add channel driver
  - Quality code
  - Simulation
  - Substitution
- Add MonAnL
  - Limits
  - Alarm texts
  - Archive
  - Create Block Icon
- Add control block: e.g. valves
  - On-line help
- Add remaining logic to CFCs
- Compile
- Download
- Add simulation logic
- Test logic
- Create a Cross reference
- Check analog values by using Trend View of the CFC

Objective: Trainee will learn how to convert a function requirement (e.g. SEMA logic) into PCS7 executable code. An in-depth look at the CFC Editor will point out all major on- and off-line menu items and how to utilize them best. Libraries will be explained in some detail. Compilation and Download options are explained. The trainee will engineer a complete function and will be able to test it – thereby learning not only offline, but also online features of the CFC Editor.

## ***Step Function Chart - The Sequencer***

(Presentation and Training) 2 hours

- SFC
  - Build a step sequence
  - Connect I/Os
  - Representation in CFC
  - Modes and trouble-shooting
  - Interface to WinCC
  - SFC Visualization
- Training: create a step sequence to control two valves and a pump to start and stop.

**Objective:** By implementing a simple step sequence the trainee will become familiar with the SFC Editor and its features, including the interface to the CFC logic.

## DAY 3

### *Networking with NetPro*

(Presentation and Training) 2 hours

- Communication objects in NetPro
  - S7 controller
  - WinCC station
  - CP1623
- Functionality of the NetPro tool
  - Project view
  - Multi-Project view
  - Communication types and their properties.
    - S7 communication
    - S7 redundant communication
    - Point-to-Point
    - Others
  - Setup various communication types
  - Compile and download
- Training: establish communication for the training project.

Objective: Trainee will learn to properly setup and configure the network environment for a PCS7 project.

## ***WinCC configuration***

(Presentation and Training) 3 hours

- WinCC components
  - Single Station
  - Server – Client
  - Redundant Server
  - Web Server, Web Client
  - Maintenance Station
- Compile OS
- OS-Project editor
- User Administration
- Picture Tree Hierarchy
- Time Synchronization
- Training: Setup a complete WinCC project for the training project.

**Objective:** Trainee will know the steps required to setup a WinCC station. Trainee will learn how to configure a project environment, setup User Accounts.



## ***WinCC Graphics***

(Presentation and Training) 3 hours

- Graphics Elements
  - Object library
  - Symbol library
- Symbol dynamics and faceplates
  - Connecting Tags
  - Dynamic Dialog
  - Direct Connect
  - C-Script
  - Dynamic Wizard
- Block Icons
  - @PCS7Typicals\_APL
  - @TemplateAPL
  - Create/Update Block Icon Wizard
- Settings impacting the performance
- Training: Create WinCC screens for the training project

Objective: Trainee will know how to create a graphic, use the wizards provided by PCS7 to efficiently build graphics and implement dynamics to symbols. The concept of the type relationship between a Function block, Block Icon and Faceplate will be explained.

## DAY 4

### *WinCC: Archives, Alarms and Trends*

(Introduction) 2 hours

- Tag Logging
  - Archive groups vs System Archive
  - Archive parameter
  - Slow archive
  - Fast archive
- Trends
  - Online trend
  - Archive trend
  - Pre-configuration of trends
    - Options
- Alarm Logging
  - Configuration of alarm logs
    - Linde Message Template
    - Options
- Storage
  - Tag logging storage
  - Alarm logging storage
- Training: Configure the alarm window (status text, background color), create a trend screen and a report.

Objective: Complete WinCC training by learning how to set-up tag and alarm logging and create predefined trends.

## ***Diagnostic and Maintenance***

(Presentation) 2 hours

- HW diagnostic
  - LEDs
  - Module Information
  - OS alarms regarding HW errors
- SW diagnostic
  - Online view for CFC and SFC
  - VAR – table
  - Online view in Process Object View
- OS diagnostic
  - Cross reference
  - Driver Status to AS, Clients
  - Online information in Tag Manager
  - Alarm filtering

Objective: Trainee will learn how to effectively troubleshoot a PCS7 installation by utilizing the tools provided.

## ***Bulk engineering features***

(Presentation and Training) 2 hours

- Process Object View tabs
  - General
  - Parameter
  - Signals
  - Messages
  - Picture Objects
  - Measured Value Archives
- Control Module Type (CMT)
- Technological list editor
- Process Automation Accelerator (PAA)

Objective: Trainee will learn to use the process object view for bulk engineering tasks like changing a group of messages, setting up archive scan rates etc.

## ***ESXi Overview***

(Guided Training) 1 hours

- Hardware Overview
- Accessing VMs/Thin Clients
- Vsphere
  - How to connect
  - How to manage computers
  - Managing networks
  - Copying/Adding VMs
- ESXi Diagnostics

Objective: Trainee will get a basic overview of the ESXi system. Trainee will understand how to navigate and troubleshoot the ESXi system. The trainee will be able to perform basic maintenance tasks.