TIA Portal Master Siemens PLC Programming

32 Hours

Course Description

The Advanced Siemens PLCs Programming Course is an advanced-level training program that delves deeper into Siemens SIMATIC S7-1200 PLC programming. This course equips participants with the skills required to work with advanced programming languages, sequential programming with graphs, high-level language programming with SCL, and PID control. Participants will gain a deep understanding of these topics through theory, hands-on exercises, and practical examples.

Audience

This course is intended for experienced industrial automation professionals, control system engineers, and individuals looking to enhance their knowledge of Siemens PLC programming. Participants should have prior experience with basic PLC programming concepts.

Pre-requisite Knowledge/Skills

This course is intended for experienced industrial automation professionals, control system engineers, and individuals looking to enhance their knowledge of Siemens PLC programming. Participants should have prior experience with basic PLC programming concepts.

Should have completed TIA Portal Basics of Siemens PLC Programming and TIA Portal Advance Siemens PLC Programming.

Course Objectives

Upon completion of this course, participants will be able to:

- Master advanced Siemens PLC programming languages.
- Design and implement sequential control systems using graphs.
- Develop high-level language programs using SCL.
- Configure and fine-tune PID controllers for precise process control.

Course Outline

Module 1: Introduction to Advanced Siemens PLCs Programming

- Goal
- Requirements
- Required Hardware and Software
- Theory
- Notes on S7-GRAPH Programming Language
- GRAFCET According to EN 60848
- Task
- Description of Control Task
- Technology Diagram
- Switching On
- Operating Mode Selection
- Manual Mode
- Automatic Mode
- Indicator Lights

Module 2: Sequential Programming with Graph and Simatic 7

- Sequence Diagram of the Sorting Station
- Structured Step-by-Step Instructions
- Retrieving an Existing Project
- Importing "Tag Table Sorting Station"
- Creating Function Block FB50 "AUTOMATIC_MODE"
- Block Properties of FB50 "AUTOMATIC_MODE"
- Specifying the Interface of FB50 "AUTOMATIC_MODE"
- Structure of the Sequencer
- Programming of FB50 "AUTOMATIC_MODE"
- Programming the Organization Block OB1
- Result in the LAD Programming Language
- Saving and Compiling the Program
- Downloading the Program
- Monitoring Program Blocks
- Sequencer in Test Mode

- Synchronization of the Sequencer
- Creating Function Block FB30 "SIGNAL_LAMPS"
- Specifying the Interface of FB30 "SIGNAL_LAMPS"
- Programming of FB30 "SIGNAL_LAMPS"
- Creating Function Block FB20 "CLOCK_PULSE"
- Specifying the Interface of FB20 "CLOCK_PULSE"
- Programming of FB20 "CLOCK_PULSE"
- General Notes on Use of Events
- Creating Function Block FB10 "RELEASE"
- Specifying the Interface of FB10 "RELEASE"
- Programming of FB10 "RELEASE"
- Creating Function Block FB40 "OPERATING_MODES"
- Specifying the Interface of FB40 "OPERATING_MODES"
- Programming of FB40 "OPERATING_MODES"

Module 3: High-Level Language Programming with SCL and Simatic S7-1500/1200

- The S7-SCL Programming Language
- The S7-SCL Development Environment
- Example Task: Tank Volume
- Expansion of the Sample Task
- Planning
- Global Data Block "Data_Tank"
- "Calculate_Volume" Function
- Expansion of the "Calculate_Volume" Function
- Structured Step-by-Step Instructions
- Retrieving an Existing Project
- Saving the Project Under a New Name
- Creating the "Data_Tank" Data Block
- Creating the "Calculate_Volume" Function
- Specifying the Interface of the "Calculate_Volume" Function
- Programming the "Calculate_Volume" Function
- Programming the "Main [OB1]" Organization Block
- Compiling and Downloading the Program
- Monitoring and Testing the Organization Block
- Expansion of the "Calculate_Volume" Function
- Customizing the Organization Block
- Compiling and Downloading the Program
- Monitoring and Testing the Organization Block
- Monitoring and Testing the "Calculate_Volume" Function

Module 4: PID Controller S7-1500/1200

- Tasks of Closed-Loop Controls
- Components of a Control Loop
- Step Function for Analysis of Controlled Systems
- Controlled Systems with Self-Regulation
- Proportional System Without Time Delay
- Proportional System With Time Delay
- Proportional System With Two Time Delays
- Proportional System With N Time Delays
- Systems Without Self-Regulation
- Basic Types of Continuous Controllers
- The Proportional Controller (P Controller)
- The Integral Controller (I Controller)
- The PI Controller
- The Derivative Controller (D Controller)
- The PID Controller
- Controller Tuning Using the Oscillation Test
- Controller Tuning With Tu-Tg Approximation
- Tuning the PI Controller According to the Ziegler-Nichols Method
- Tuning the PI Controller According to the Chien, Hrones, and Reswick Method
- Digital Controllers
- PID_Compact Closed-Loop Control Block
- Technology Diagram
- Call PID_Compact Controller in a Cyclic Interrupt OB
- Save and Compile the Program
- Monitor PID_Compact
- PID_Compact Pretuning
- PID_Compact Fine Tuning