TIA Portal Advance Siemens PLC Programming

40 Hours

Course Description

The Siemens PLC Programming Course is designed to provide participants with a comprehensive understanding of Siemens SIMATIC S7-1200 PLC programming. This course covers essential concepts, programming techniques, and hands-on exercises to help individuals become proficient in designing, configuring, and troubleshooting industrial control systems using Siemens PLCs. Participants will gain practical skills in programming logic controllers for various automation applications.

Audience

This course is ideal for:

- Electrical engineers
- Automation engineers
- Control system technicians
- Maintenance professionals
- Industrial automation enthusiasts
- Students pursuing careers in industrial automation.

Pre-requisite Knowledge/Skills

Participants should have a basic understanding of industrial automation concepts and electrical circuits. Familiarity with PLC hardware and software will be beneficial.

Should have completed "TIA Portal – Basic of Siemen's PLC Programming"

Course Objectives

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

- Understand the fundamentals of Siemens SIMATIC S7-1200 PLCs.
- Develop PLC programs for various automation tasks.
- Implement motor control in both manual and automatic modes.
- Utilize IEC timers and counters for precise control.
- Diagnose and troubleshoot PLC programs and hardware.
- Configure and use web-based diagnostics for remote monitoring.
- Work with analog signals for precise control of processes.
- Create and manage global data blocks for efficient data handling.

Course Outline

Module 1: Introduction to Siemens PLC Programming

- Goal
- Prerequisite
- Required Hardware and Software
- Theory
- Operating System and Application Program
- Organization Blocks
- Process Image and Cyclic Program Processing
- Functions
- Function Blocks and Instance Data Blocks
- Global Data Blocks
- Library-Compatible Code Blocks
- Programming Languages

Module 2: FC Programming

- Retrieve an Existing Project
- Create a New Tag Table
- Create New Tags Within a Tag Table
- Import "Tag_table_sorting_station"
- Create Function FC1 "MOTOR_MANUAL" for the Conveyor Motor in Manual Mode
- Define the Interface of Function FC1 "MOTOR_MANUAL"
- Program FC1: MOTOR_MANUAL
- Program Organization Block OB1 – Control of the Forward Belt Tracking in Manual Mode
- Program Organization Block OB1 – Control of the Backward Belt Tracking in Manual Mode
- Save and Compile the Program
- Download the Program
- Monitor Program Blocks
- Archive the Project

Module 3: FB Programming

- Process Image and Cyclic Program Processing
- Functions

- Function Blocks and Instance Data Blocks
- Global Data Blocks
- Library-Compatible Code Blocks
- Create a New Tag Table
- Create New Tags Within a Tag Table
- Import "Tag_table_sorting_station"
- Create Function Block "MOTOR_AUTO"
- Define the Interface of Function Block "MOTOR_AUTO"
- Program Function Block "MOTOR_AUTO"
- Program Organization Block - Control of the Forward Belt Tracking in Automatic Mode
- The Result in the LAD (Ladder Logic) Programming Language
- Save and Compile the Program
- Download the Program
- Monitor Program Blocks
- Archive the Project

Module 4: IEC Timers and Counters

- Instances and Multi-instances
- Instance Data Blocks/Single Instances
- Multi-instances
- Automatic Mode - Conveyor Motor with Time Function
- Structured Step-by-Step Instructions
- Retrieve an Existing Project
- Addition of an IEC Timer TP to Function Block "MOTOR_AUTO"
- Update the Block Call in the Organization Block
- Save and Compile the Program
- Download the Program
- Monitor Program Blocks

Module 5: Basic Diagnostics

- Fault Diagnostics and Hardware Faults
- Hardware Diagnostics
- Diagnostics for Program Blocks
- Retrieve an Existing Project
- Download the Program
- Go Online
- Online & Diagnostics of the SIMATIC S7 Controller

- Online/Offline Comparison
- Monitor and Modify Tags
- Force Tags

Module 6: Diagnostic via Web

- System Diagnostics: Automated Creation of Error Messages
- Diagnostics via Web Server
- Diagnostics with the Integrated Display
- Retrieve an Existing Project
- Configure the Web Server
- Configure the Display
- Configure System Diagnostics
- Activate the Diagnostics of the Power Supply for the Analog Output Module and Download the PLC
- Trigger Error Message
- Display Alarms in Online & Diagnostics
- Diagnostics for the S7-1200 via the Web
- Diagnostics for the S7-1200 via the Integrated Display

Module 7: Analog Values

- Analog Signals
- Measuring Transducers
- Analog Modules – A/D Converter
- Data Types of the SIMATIC S7-1200
- Reading/Outputting Analog Values
- Normalizing Analog Values
- Analog Control of the Conveyor Speed
- Technology Diagram
- Reference List
- Structured Step-by-Step Instructions
- Retrieve an Existing Project
- Create the "MOTOR_SPEEDCONTROL" Function
- Configuration of the Analog Output Channel
- Expand the Tag Table to Include Analog Signals
- Call the Block in the Organization Block
- Save and Compile the Program
- Download the Program
- Monitor Program Blocks

Module 8: Global Data Blocks

- Data Blocks
- Data Types of SIMATIC S7-1200
- Optimized Blocks
- Download Without Reinitialization
- Task Planning
- Global Data Block for Speed Control and Speed Monitoring of the Motor
- Technology Schematic Diagram
- Reference Table
- Structured Step-by-Step Instructions
- Retrieve an Existing Project
- Create the Global Data Block "SPEED_MOTOR"
- Access to Data of the Data Block in the Organization Block
- Save and Compile Program
- Download the Program
- Monitor/Modify Values in Data Blocks
- Initialize Setpoints/Reset Start Values
- Snapshots in Data Blocks
- Expand Data Block and Download Without Reinitialization
- Archive the Project