SIEMENS

TIA Portal Programming 2 - Virtual

General Information

Course Code	SCT-PTOILTIAP2A
Global Code	TIA-PRO2
Length	5 Days - 5 hours per day
CEUs	2.5

Audience

This virtual course is for SIMATIC S7-1500, S7-1200, S7-300, and S7-400 PLC users with basic engineering experience in the design and sustaining of SIMATIC automation systems and their application programs.

Prerequisites

- TIA Portal Programming 1 (F2F or Virtual)

OR

- AB to S7 Migration Engineering (F2F or Virtual)

OR

- AB to S7 with TIA Portal

OR

- Bridging STEP 7 5.x to TIA Portal Programming (F2F or Virtual)

OR

- TIA Portal Service 2: SCT-PTTIAS2A

Profile

This virtual course is the second in a three-part series which increases skills with Siemens SIMATIC TIA Portal. Students will learn to leverage the power of TIA Portal software with advanced structured programming techniques. A systems approach to efficiently programming the S7-1500, S7-1200, S7-300, and S7-400 PLC is covered. Integration and connectivity of PROFINET IO, HMI, and G120 Drive are the central focus of this course. Programming emphasis centers on Ladder (LAD), and Statement List (STL) logic with an introduction to Structured Control Language (SCL), and S7-GRAPH. Both direct and indirect addressing are an integral part of the course.

The core issues of efficient use of CPU resources, establishing communications, passing information, and managing integrated diagnostics are included. Skills in error management and extended diagnostics are reinforced throughout this agenda. This course includes instructor-led instruction, demonstrations, and considerable virtual exercises and lab work. Access to fully functional TIA Portal programming software, a virtual conveyor, and exercises are provided through a cloud-based application.

Objectives

Upon completion of this course, the student shall be able to:

- Leverage the power of Block and Function libraries.
- Use LAD and STL for Programming required functions
- Employ direct and indirect addressing in a program.
- Incorporate System Functions (SFC) in a program.
- Integrate an HMI and Drive system with the PLC on a PROFINET network.
- Program Instance and Multi-Instance Block calls.
- Use interrupt-driven and error processing program execution blocks.
- Leverage STEP7 advanced diagnostics.

Topics

1. Training Devices and Addressing: Configuration and set up of the S71500, ET200SP, Conveyor, and HMI.
2. Hardware Commissioning
   a. TIA Portal Devices and Networks Manager
   b. Creating, Parameterizing, Compiling and Downloading the Device and Network Configuration to the PLC
   c. Uploading the Actual Configuration
   d. Online Hardware Tools
   e. CPU Memory concept
   f. Resetting the CPUs Memory
3. Program Design Methods
   a. S7 Block Types
   b. S71500 Organization blocks
   c. Structured Programming with FCs, FBs and OBs
   d. Programming with IEC Counters
   e. Programming with IEC Timers
   f. Programming with Mathematical Data Types
4. Jump and Accumulator Functions
   a. Overview of Accumulator Functions
   b. Shift and Word Logic Instructions
   c. Overview of Jump Functions
   d. Programming the Jump Distributor
   e. Loop Programming in LAD and STL
5. Analog value Processing and Arithmetic
   a. Principal of Analog Value Processing
   b. Analog Input and Output Module Commissioning
   c. Peripheral Reading and Writing of Analog Channels (Direct Access during the Scan)
   d. Loading and Transferring Data
   e. Programming Enable In and Enable Out Bits of a Block
   f. Explicit and Implicit Data Type conversion
6. FCs, FBs, and Multiple Instances
   a. Parameter Declaration in Blocks

sitrain.registrar.industry@siemens.com

b. Managing the Local Data Stack
c. Properties of FCs and FBs
d. Local vs Global Variable Use in FCs/FBs
e. TEMP vs STAT Variables
f. Instance and Multi-Instance Programming with FBs

7. Complex Data and Addressing
   a. Review of Elementary Data Types
   b. Overview of Complex Data Types
   c. Programming with Complex Data Types
   d. User Defined Data Types (UDTs)
   e. Indexed Array Accesses
   f. Extended Move Function
8. Optimized Block Accesses
   a. S71500 System Architecture
   b. Block Attributes
   c. Optimizing Blocks
   d. Automatic Temporary Variable Initialization
   e. Data Block Initialization
   f. Resetting data block Memory Reserve
   g. Initializing Setpoints in the Online Program
9. HMI Alarm Messages.
   i) Structure of Alarm Messages
   ii) Alarm Classes
   iii) Alarm Message Procedures
   iv) Configuring and Displaying Discrete Alarms
   v) Configuring and Displaying Analog Alarms
10. System Diagnostics and Error Handling
    a. Principal of CPU Diagnostics
    b. Report System Error - Setting up Automatic Hardware Diagnostics Reporting
    c. Diagnostic with Web Server
    d. Asynchronous Error Handling with OBs
    e. Synchronous Error Handling with OBs
    f. Reporting System Diagnostics to the HMI
    g. Configuring the CPU Life Bit
11. Introduction to SCL
    a. Overview of Structure Control Language (SCL)
    b. Creating, Programming, Downloading, and Monitoring Blocks in SCL
    c. Basic SCL Instructions.
    d. Control SCL Instructions
    e. Direct Addressing with SCL
    f. Indirect Addressing with SCL
12. Introduction to S7-GRAPH
    a. Overview of Sequential Functions
    b. Creating, Programming, Downloading, and Monitoring Blocks in S7-GRAPH
    c. Sequence View of an S7-GRAPH Block
    d. Interlocks and Supervision
13. Integration and commissioning a Drive with Startdrive
    a. Communication standard PROFIdrive
    b. Standard Telegrams
    c. Control Word and Status Word
    d. Speed Setpoint and Feedback
    e. Parameterizing the G120 Drive
    f. Connecting and Running the G120 Drive