

## SIMATIC® S7 Totally Integrated Automation Programming Level 2

Course Code: S7TIAP2A

Length: 4½ Days

### Target Audience:

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

### Prerequisites

S7 TIA Programming Level 1

### Profile:

This course is the second in a three part series which builds skills with Siemens STEP7 engineering software. Advanced programming tools, techniques, functions, data management and diagnostics are the focus of this course. This course takes a systems approach addressing the S7300 / 400 PLCs, plus basic connectivity and functionality of an HMI and Drive system on a PROFIBUS network.

This second level programming course is designed to help the student understand the techniques and benefits of structured programming. Students will also learn to leverage the efficiencies and power of Siemens program editors (LAD, STL, FBD), block and function libraries. Managing and manipulating data is a key focus in this course.

Connectivity to system peripherals including an HMI and Drive system provide a realistic program integration environment. The core issues of establishing communications, passing information and leveraging integrated diagnostics are included. Skills in error management and extended diagnostics are reinforced throughout this agenda. This course includes considerable hands-on lab work.

### Objectives:

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

- Understand the concepts of structured program creation.
- Leverage the power of Block and Function libraries.
- Use STL for advanced program development.
- Employ indirect addressing in a program.
- Incorporate System Functions (SFC) in a program.
- Integrate an HMI and Drive system with the PLC.
- Use Instance and Multi-Instance data Blocks.
- Use interrupt-driven and error processing program execution blocks.
- Leverage STEP7 advanced diagnostics

## Topics:

- 1) Training Units
  - a) Simulator variants
  - b) I/O Addressing
  - c) Symbols
- 2) STEP7 Review
  - a) Hardware Configuration
  - b) Blocks review
  - c) Memory review
  - d) Debugging review
  - e) Analog review
- 3) Program Design Methods
  - a) Structured program design
  - b) Program creation
  - c) Structograms
  - d) Program testing
- 4) Jumps and Accumulators
  - a) Status bits and words
  - b) EN, ENO, BR
  - c) Jump functions
  - d) Program breakpoints
  - e) Accumulator functions
  - f) Math instructions
  - g) Word logic instructions
- 5) Multi-Instance FC and FB
  - a) Blocks review
  - b) Data stacks
  - c) IEC timers and counters
  - d) Function parameters and properties
  - e) Instance and multi-instance models
- 6) Indirect Addressing
  - a) Addressing possibilities
  - b) Memory indirect addressing
  - c) Using pointers
- 7) Drive System Integration
  - a) Configuring PROFIBUS
  - b) Command source and setpoints
  - c) Control and status words
  - d) Drives ES and starter tools
  - e) Diagnostics overview
- 8) Error Organization Blocks
  - a) OB review
  - b) Synchronous errors
  - c) Asynchronous errors
  - d) PROFIBUS diagnostics
- 9) Diagnostic Data
  - a) Diagnostics function review
  - b) Writing user messages (SFC52)
  - c) Diagnostics buffer
- 10) HMI Messages
  - a) Message system basics
  - b) Event and alarm pointers
  - c) Creating tags