# FACTORY AUTOMATION

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# SIMATIC S7-1200 BASIC | TIA-MICRO1 | 4 days

## DESCRIPTION/ OBJECTIVE

The Totally Integrated Automation Portal (TIA Portal) for SIMATIC S7-1200 forms the work environment for integrated engineering with SIMATIC STEP 7 Basic and SIMATIC WinCC Basic.

After attending this course, you can do the following:

- Understand the fundamentals of the interaction of the SIMATIC S7-1200 with an operator control and monitoring device.
- Reliably operate the "TIA Portal" engineering platform
- Create, change, and expand small STEP 7 programs
- Configure, parameterize, and exchange SIMATIC S7-1200 modules
- Diagnose and fix simple hardware faults using the wiring test
- Diagnose and fix simple program errors using the status block
- Perform simple commissioning of the SIMATIC S7-1200

## REQUIREMENTS

- Basic knowledge of automation technology
- You can use the available online entry test to ensure that the selected course matches your area of expertise.
- This blended learning course combines web-based training (WBT) on the Internet with a 3-day attendance course: To prepare for the attendance course, you will receive the WBT "PLC Knowledge for Beginners". This allows you to improve your personal learning achievement in the attendance course.

## TARGET GROUP

- Programmers
- Commissioning engineers
- Engineering personnel
- Maintenance personnel
- Service personnel
- Operators

## CONTENT

- Overview and significant performance characteristics of the SIMATIC S7-1200 system family
- The components of the TIA Portal: SIMATIC STEP 7 Basic and WinCC Basic
- Program execution in automation systems
- Binary and digital operations in the function block diagram (FBD)
- Setup and assembly of the SIMATIC S7-1200 automation system
- Addressing and wiring the signal modules
- Hardware and software commissioning of the SIMATIC S7-1200 with the TIA Portal
- SIMATIC S7-1200 hardware configuration and parameterization
- Introduction to the Touchpanel
- Saving and documentation of the implemented program changes with the TIA Portal
- Deeper understanding of contents through practical exercises on SIMATIC S7-1200 system model

## ADDITIONAL COMMENTS

For more in-depth knowledge, we recommend the course TIA-MICRO2.

## SIMATIC S7-1200 ADVANCED | TIA-MICRO2 | 4 days

### DESCRIPTION/ OBJECTIVE

The Totally Integrated Automation Portal (TIA Portal) forms the work environment for integrated engineering with SIMATIC STEP 7 Basic and SIMATIC WinCC Basic.

The second part of the SIMATIC S7-1200 training is based on the knowledge of the TIA Portal gained in the SIMATIC S7-1200 basic course, including SIMATIC STEP 7 Basic and HMI. You will expand your knowledge of programming in SCL, connecting drives, use of the TIA Portal diagnostic tools for clearing hardware faults and software errors, and PROFINET IO. You will also learn about the technology functions of the PID controller and drive functions that are offered by the SIMATIC S7-1200. You will thus be able to adapt your plant to new demands.

### TARGET GROUP

- Programmers
- Commissioning engineers
- Engineering personnel
- Maintenance personnel
- Service personnel
- Operators

### REQUIREMENTS

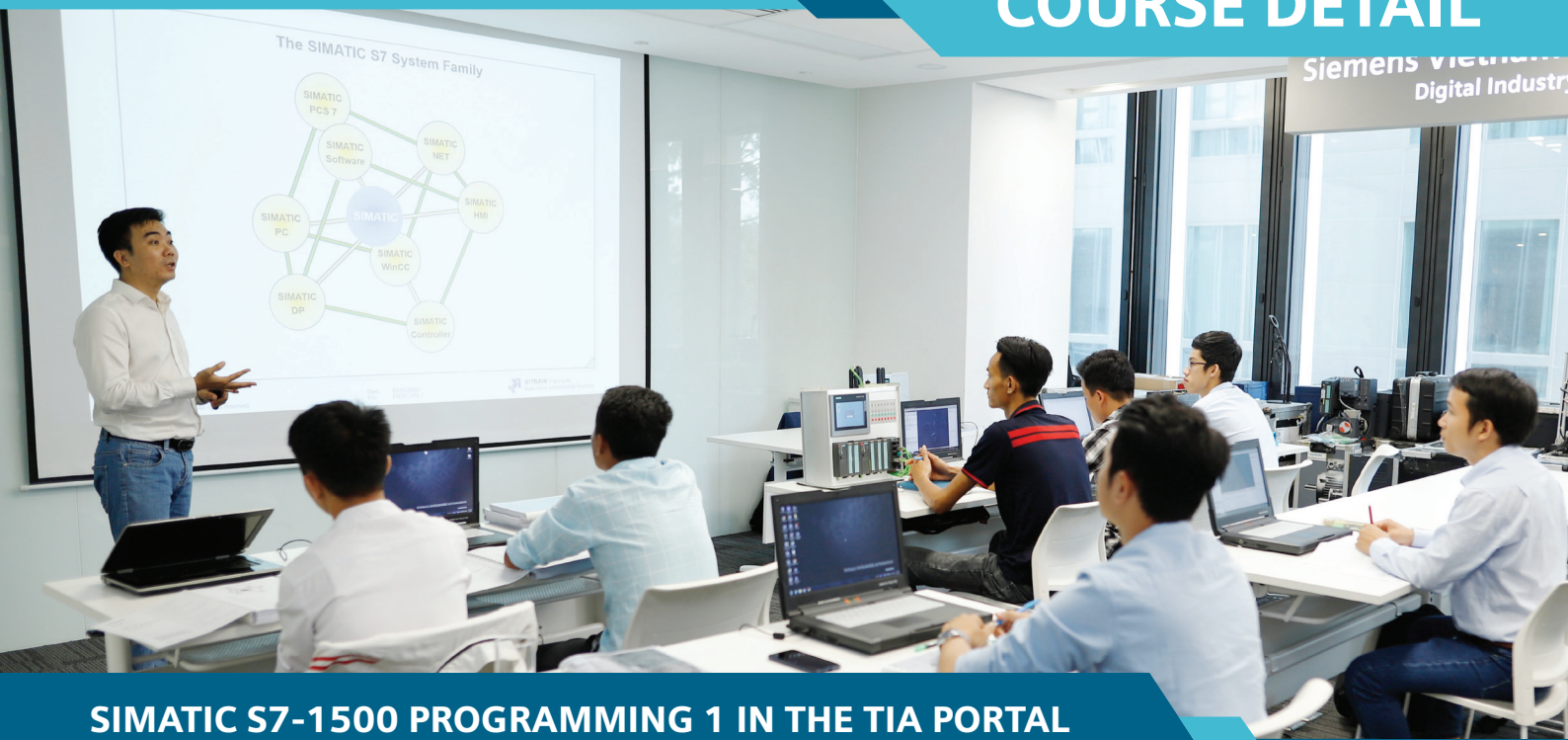- Completion of SIMATIC S7-1200 Basic course

### CONTENT

- Set up SIMATIC S7-1200 PROFINET IO networks
- Understand the interaction of TIA components
- Perform specific commissioning of TIA components
- Use the PID controller technology functions and drive functions of the SIMATIC S7-1200
- Systematically diagnose and correct hardware and software errors in the SIMATIC S7-1200 automation system with the diagnostic tools of the TIA Portal engineering portal
- Create simple programs in the programming languages LAD, FBD, and SCL

### ADDITIONAL COMMENTS

For more in-depth knowledge, we recommend the course ST-BWINCCS.

# SIMATIC S7-1500 PROGRAMMING 1 IN THE TIA PORTAL
| TIA-PRO1   | 5 days

## DESCRIPTION/ OBJECTIVE

The Totally Integrated Automation Portal (TIA Portal) forms the work environment for integrated engineering with SIMATIC STEP 7 and SIMATIC WinCC.

After attending the course, you can do the following:

- Understand the fundamentals of interaction of the TIA components
- Solve simple programming tasks using elementary STEP 7 instructions
- Reliably operate the "TIA Portal" engineering platform
- Program simple plant functions with basic STEP 7 instructions in the ladder diagram (LAD) or function block diagram (FBD)
- Perform simple commissioning of TIA components

## TARGET GROUP

- Programmers
- Commissioning engineers
- Engineering personnel

## REQUIREMENTS

- Basic knowledge of automation technology
- You can use the available online entry test to ensure that the selected course matches your area of expertise
- This blended learning course combines web-based training (WBT) on the Internet with a 5-day attendance course: To prepare for the attendance course, you will receive the WBTs "PLC Knowledge for Beginners" and "SIMATIC TIA Portal Structured Programming"
- This allows you to improve your personal learning achievement in the attendance course

## CONTENT

- Overview and significant performance characteristics of the SIMATIC S7 system family
- The components of the TIA Portal: STEP 7, WinCC, Startdrive
- Program execution in automation systems
- STEP 7 block types and program structuring
- Binary and digital operations in the function block and ladder diagram (FBD/LAD)
- Programming of parameterizable blocks
- Data management with data blocks
- Programming organization blocks
- Test tools for system information, troubleshooting, and diagnostics
- Hardware configuration and parameterization of the SIMATIC S7 modules, a PROFINET IO system (ET-200), a Touch Panel
- Program Cycle, Process Image and Process Image Partition
- Explanation and using different organization blocks
- Deeper understanding of contents through practical exercises on the SIMATIC S7-1500 system model

## ADDITIONAL COMMENTS

In this course you will work with SIMATIC S7-1500 and software SIMATIC STEP 7 based on TIA portal – for SIMATIC S7-1200 we offer the trainings TIA-MICRO1/2.

## SIMATIC S7-1500 PROGRAMMING 2 IN THE TIA PORTAL
## | TIA-PRO2 | 5 days

### DESCRIPTION/ OBJECTIVE

The Totally Integrated Automation Portal (TIA Portal) forms the work environment for integrated engineering with SIMATIC STEP 7 and SIMATIC WinCC. The second part of the SIMATIC TIA Portal programming training is based on the knowledge of the TIA Portal gained in the SIMATIC S7 TIA Portal programming 1 course (TIA-PRO1), including STEP 7, HMI, connection of drives, and PROFINET IO.

You will expand your knowledge of complex operations in statement lists (STL) and in Structured Control Language (SCL). Along with analog value processing and data administration with complex data types, the evaluation and handling of program-related errors are also considered. Building on this, you will learn how to display messages on the operator control and monitoring system (HMI).

### TARGET GROUP

- Programmers
- Commissioning engineers
- Engineering personnel

### REQUIREMENTS

- Completion of TIA-PRO1: SIMATIC S7 TIA Portal programming 1 course

### CONTENT

- Tools for program creation (e.g. structograms)
- Analogue value processing
- Functions, function blocks, and multi-instances using the IEC-compliant timer/counter as an example (International Electrotechnical Commission)
- Jump commands
- Indirect addressing
- Classical software error handling and evaluation with error organization blocks (OBs)
- Evaluation of diagnostic data
- Troubleshooting and alarms with a HMI device (Touchpanel)
- Introduction into Structured Control Language (SCL) and S7-GRAPH
- Deeper understanding of contents through practical exercises on TIA system model

### ADDITIONAL COMMENTS

In this course you will work with SIMATIC S7-1500 and software SIMATIC STEP 7 based on TIA portal – for SIMATIC S7-1200 we offer the trainings TIA-MICRO1/2.

# SIMATIC WINCC ON THE MACHINE LEVEL IN THE TIAPORTAL
## | TIA-WCCM   | 4 days

## DESCRIPTION/OBJECTIVE

The Totally Integrated Automation Portal (TIA Portal) constitutes the work environment for integrated engineering with SIMATIC STEP 7 and SIMATIC WinCC. The course provides you with the knowledge to quickly and easily configure machine and plant-specific HMI tasks using the SIMATIC WinCC software based on the TIA Portal. After attending the course, you can do the following:

- Efficiently and reliably operate SIMATIC WinCC based on the "TIA Portal" engineering platform
- Understand and edit SIMATIC WinCC projects for machine-level applications
- Optimally create graphic images
- Implement archiving concepts for alarms and values
- Access specific values from the SIMATIC S7 and display and further process them in the operator control and monitoring system (HMI)

## REQUIREMENTS

- Basic knowledge of automation technology.
- You can use the available online entry test to ensure that the selected course matches your area of expertise.
- This allows you to improve your personal learning achievement in the attendance course.

## TARGET GROUP

- Programmers
- Commissioning engineers
- Engineering personnel
- Maintenance personnel
- Service personnel
- Operators

## CONTENT

- System overview TIA Portal, SIMATIC WinCC (machine-level)
- Creating a SIMATIC WinCC project
- Configuration of connection to the SIMATIC S7 automation system
- Basics of graphic image creation for operator control and monitoring
- User administration
- Alarm display, alarm logging, alarm configuration
- Tag logging, trend configuration, trend display
- Recipes
- Use of various HMI stations
- Deeper understanding of contents through practical exercises on SIMATIC S7-1500 system model

## ADDITIONAL COMMENTS

In this course you will work with the SIMATIC WinCC Comfort and WinCC Advanced (both products are based on TIA Portal), and a SIMATIC S7-1500 as a communication partner.

# SIMATIC WINCC SCADA IN THE TIA PORTAL
| ST-BWINCCS   | 5 days

## DESCRIPTION/ OBJECTIVE

The Totally Integrated Automation Portal (TIA Portal) provides the working environment for end-to-end engineering with SIMATIC STEP 7 and SIMATIC WinCC.

The SCADA functionality (Supervisory Control and Data Acquisition) of WinCC is designed for visualization and operation of processes, manufacturing cycles, machines and plants. The course is based on the possibilities of WinCC SCADA in TIA Portal at the time.

After attending the course, you can do the following:

* Use SIMATIC WinCC efficiently and reliably on the basis of the "TIA Portal" engineering platform
* Understand and edit SIMATIC WinCC projects for use in the SCADA area
* Optimally structure the user interface
* Implement logging concepts for messages, alarms and measured values
* Selectively access values in the SIMATIC S7 and display and further process these values in the HMI system

## TARGET GROUP

* Programmers
* Commissioning engineers
* Engineering personnel
* Maintenance personnel
* Service personnel
* Operators

## REQUIREMENTS

* Basic knowledge of automation technology.
* You can use the available online entry test to ensure that the selected course matches your area of expertise.

## CONTENT

* System overview TIA Portal, SIMATIC WinCC (SCADA)
* Creating a SIMATIC WinCC project
* Configuring the connection to the SIMATIC S7 automation system
* Structuring the operator interface
* Fundamentals of creating graphics displays for human machine interfacing
* Navigating through the plant displays
* User administration
* Message representation, message logging, message configuring
* Variable logging, trend configuring, and trend plotting
* Trend plotting, and message representation including logging of data in the database
* Recipes
* Faceplates for reuse and centralized modification of graphics blocks
* Background processing Global Scripting
* Reinforcement of the content by means of practical exercises on the SIMATIC S7-1500 system model

## ADDITIONAL COMMENTS

In this course you will work with the SIMATIC WinCC Professional (SCADA system software based on TIA Portal) and a SIMATIC S7-1500 as a communication partner.

## TIA PORTAL SERVICE 1 | TIA-SERV1 | 4 days

### DESCRIPTION/ OBJECTIVE

The Totally Integrated Automation Portal (TIA Portal) forms the work environment for integrated engineering with SIMATIC STEP 7 and SIMATIC WinCC.

In this first part of the SIMATIC TIA Portal service training, we teach you the handling of the TIA Portal, basic knowledge about the structure of the SIMATIC S7 automation system, configuration and parameterization of hardware, and the basics of programming. You also receive an overview of HMI, PROFINET IO, and connecting drives.

After attending the course, you can do the following:

- Understand the fundamentals of interaction of the TIA components
- Understand, change, and expand small STEP 7 programs
- Configure, parameterize, and exchange SIMATIC S7 modules
- Diagnose and fix simple hardware faults using the wiring test
- Diagnose and fix simple program errors using the status block

### REQUIREMENTS

- Basic knowledge of automation technology
- This blended learning course combines web-based training (WBT) on the Internet with a 5-day attendance course: To prepare for the attendance course, you will receive the WBT "PLC Knowledge for Beginners".

### TARGET GROUP

- Maintenance personnel
- Service personnel
- Operators

### CONTENT

- Overview and significant performance characteristics of the SIMATIC S7 system family
- The components of the TIA Portal: STEP 7, WinCC, communication
- Program execution in automation systems
- Binary and digital operations in the function block diagram (FBD)
- Setup and assembly of the automation system
- Addressing and wiring the signal modules
- Hardware and software commissioning of the SIMATIC S7 automation system with the TIA Portal
- SIMATIC S7 hardware configuration and parameterization
- Presentation of a Touchpanel
- Presentation of the drive
- Setup and parameterization of PROFINET IO
- Deeper understanding of contents through practical exercises on the SIMATIC S7-1500 system model

### ADDITIONAL COMMENTS

In this course you will work with SIMATIC S7-1500 and software SIMATIC STEP 7 based on TIA portal – for SIMATIC S7-1200 we offer the trainings TIA-MICRO1/2.

# STEP 7 Safety Advanced for SIMATIC TIA Portal
## | TIA-SAFETY  | 4 days

## DESCRIPTION/ OBJECTIVE

The Totally Integrated Automation Portal (TIA Portal) forms the work environment for integrated engineering with SIMATIC STEP 7 and SIMATIC WinCC. In this course, you will learn about configuring, programming, starting up, diagnosing and troubleshooting of the failsafe CPUs of the SIMATIC S7 Safety PLC (no H systems) and the failsafe distributed ET200 systems.

After attending the course, participants should be able to do the following:

- Starting up failsafe CPUs of the SIMATIC PLC
- Programming of safety-related programs in the languages F-FBD and F-LAD
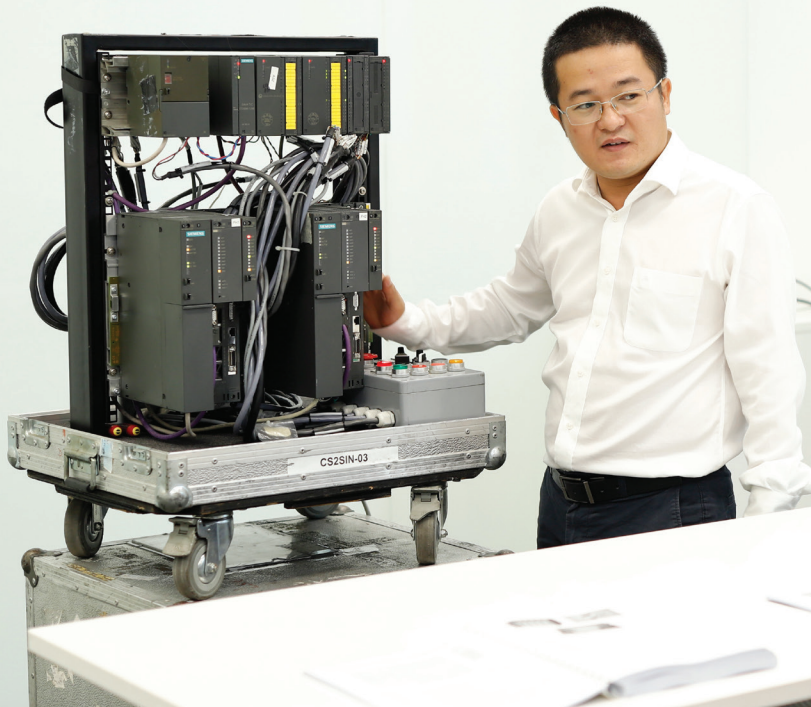- Diagnosing and troubleshooting of safety-related programs.

## TARGET GROUP

- Programmers
- Commissioning engineers
- Engineering personnel

## REQUIREMENTS

- To attend this course, participants MUST have attended the Siemens SITRAIN TIA-SERV1 and TIA-SERV2 or TIA-PRO1 and TIA-PRO2 courses.

## CONTENT

- Overview and guidelines
- AS S7 Safety (principle, system configuration and I/O)
- Configuring of the failsafe I/O with STEP 7 Safety Advanced
- Programming of a safety-related user program
- Failsafe communication PROFIsafe (CPU-CPU communication, master-slave communication)
- Diagnostics facilities (CPU diagnostics, I/O diagnostics, advanced diagnostics)
- Exercises for I/O configuration, communication, troubleshooting
- Programming examples (emergency stop, protective door, safety-related shutdown, passivation, special programming features
- Deeper understanding of contents through practical exercises on the system SIMATIC S7-1500F

# TIA Portal System Upgrade Course
| TIA -SYSUP   |  5 days

## DESCRIPTION/ OBJECTIVE

The Totally Integrated Automation Portal (TIA Portal) forms the work environment for integrated engineering with all automation devices - controller, HMI and drives.

In this course you will learn about the major differences between SIMATIC S7-300/400 and SIMATIC S7-1500, the engineering tools SIMATIC Manager and TIA Portal, as well as STEP 7 V5.x and STEP 7 based on TIA Portal.

## TARGET GROUP

- Programmers
- Commissioning engineers
- Engineering personnel

## REQUIREMENTS

- To attend this course, participants MUST have knowledge about STEP V5.x, SIMATIC S7-300/400, WinCC flexible, distributed I/O and Drives.

## CONTENT

- Introduction of the SIMATIC S7-1500 hardware
- Configuration of devices and networks of the SIMATIC S7 system family using SIMATIC S7-1500 as an example
- Working with the PLC Tag Table in TIA Portal
- Program blocks and editor
- Advanced programming possibilities of a SIMATIC S7-1500
- Troubleshooting with TIA Portal tools and the SIMATIC S7-1500 CPU display
- Presentation of the Structured Control Language (SCL) editor
- Presentation of the SIMATIC WinCC operator control and monitoring system
- Migration of a SIMATIC STEP 7 V 5.x project to SIMATIC STEP 7 based on TIA Portal
- Adaption of a SIMATIC S7-300/400 program to the SIMATIC S7-1500
- Migration of a SIMATIC WinCC flexible project to SIMATIC WinCC based on TIA Portal
- Presentation of the "Startdrive" engineering tool with interfacing to a SINAMICS G120 drive
- Deeper understanding of contents through practical exercises on the SIMATIC S7-1500 TIA system model