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Increased productivity

Our learning services integrate best practices and new learning technologies to deliver real business value

Siemens technical learning services provide students with the critical knowledge they need for their job directly from the equipment manufacturer. Our training solutions build the competence to make informed decisions in the daily operation of your plant’s automation and drives systems. Employees will achieve increased productivity (studies say up to 230%), while staying up to date with new technologies and best practices. We offer your people complete learning solutions and competency management programs.

Professional instructors who have in-depth understanding of your equipment, processes and systems, conduct scheduled classes using simulation workstations at our world-class facilities, online, or on-site.

Our practice-based learning approach with associated exercises makes it possible to gain theoretical knowledge reinforced with hands-on experience. Students simulate real-world situations to learn programming and troubleshooting techniques that will help them commission, maintain, and operate your equipment with greater efficiency and an enhanced focus on safety.

SITRAIN curriculum families
- Automation
- Machine Tool
- Drives & Motion
- Electrical Maintenance & Safety
- Power Systems & SIMOCODE
- Process Analyzers
- Process Automation
- Process Control
- Process Instrumentation
- Industrial Networking
- Process Safety Management

Siemens offers Continuing Education Credits (CEUs) for most of our courses. For more information, please contact our SITRAIN Registrar at sitrain.registrar.industry@siemens.com or 1-800-333-7451.

Easy registration options!

Online – Visit usa.siemens.com/sitrain
By phone – 1-800-333-7421
Get in touch with us today. See page 16 for your regional contact.
The right learning path

Providing innovative and adaptive learning services resulting in extraordinary business performance

In today’s competitive market, a highly skilled workforce is vital for success. However, understanding how to deploy an effective learning strategy is a challenge. Siemens SITRAIN learning programs offers a variety of delivery methods designed to meet every training need.

**Foundation/Basic courses**
QuickSTEP Introductory, web-based courses for those new to industrial technologies.

**Safety series**
Focused on protecting your people and equipment, while minimizing risk; courses address OSHA and NFPA compliance, risk assessment, arc flash, and electrical safety.

**Online courses**
Self-paced learning paths for students who need the flexibility to set their own schedule and study pace for completion.

**Virtual courses**
Live, Instructor-led courses delivered via cloud-based format.

**Classroom courses**
Presented in a Siemens classroom with proven materials and quality systems-level work-stations for the most effective training possible.

**On-site courses**
Course material and learning paced to match the needs of your team; delivered at your location, saving you travel and overtime costs.

**Custom courses**
Audience targeted training designed for special projects, applications, or groups; custom tailored to meet your time and budget constraints.

**Simulator workstations**
Engineered to provide real-world, hands-on experience, Siemens simulators are available in formats ranging from simple PLCsim to fully functional motion control systems.

**How-to Videos**
On-demand, high-impact videos designed to retrain or refresh critical skills needed for performing specific tasks.

**Certification programs**
Service technician and programmer training provide specialized knowledge and skills to meet the requirements of DIN EN ISO 9001.

SITRAIN courses provide the flexibility to choose the style of delivery method most suited to the students’ knowledge and pace of learning.

Building Expertise

Novice
- **Basic Industrial Awareness**
- **Preparation Skill Builders**
- **Core Skill Builders**
- **Performance Assist Tools**

Expert
- **Performance Optimization**

SITRAIN Learning Portfolio
- quickSTEP Safety Courses
- Online Self-paced Learning
- Virtual Instructor-led Learning
- Classroom Learning
- Onsite Learning
- Custom Learning
- Virtual Instructor-led Learning
- How-to Video Library
- Simulation Systems
- Virtual Mentoring
- On-the-Job Learning
- Certification Programs, Advanced Courses

Delivery Methods
- Cloud-based streaming
- Cloud-based, instructor-led online
- Instructor-led classroom, Cloud-based streaming
- Cloud-based streaming, hardware, software
- Instructor-led courses
Workforce Performance Improvement Consulting

Siemens experts can develop a comprehensive learning plan that improves productivity for your entire workforce.

A recent report from Deloitte and the Manufacturing Institute (MI) projects more than three million U.S. manufacturing jobs will open up over the next decade. Two million of those vacancies are expected to go unfilled.

Experts have warned for years about the manufacturing workforce reality created by retiring baby boomers taking decades of knowledge with them as they leave. While candidates are lining up for these jobs, many do not yet have the digital skills required for the changing workplace creating a manufacturing skills gap challenge.

The solution to bridging the skills gap is to improve performance by identifying and increasing the related competencies for the specific job/role, thereby increasing job performance as well as overall organizational performance.

Workforce Performance Improvement Consulting

Siemens Workforce Performance Improvement consulting is a well-defined, six-stage cyclic program providing transparency into employee job skills for success. Our program begins by aligning current worker competency to business targets.

Each of the six stages have been carefully designed with the end in mind. The improvement process begins by identifying your key performance indicators (KPI) related to workforce learning.

As part of the process, employees are evaluated and set on purposeful and sustainable performance-based skill development paths – paths which result in a highly skilled, confident and motivated workforce. This, in turn, results in less downtime, reduced turnover and, ultimately, an improved bottom line for your operation.

Siemens approaches the learning process from your business perspective. We have a common goal: improving job performance based on your business needs.
Online Self-paced Learning – technology courses

Programs with maximum flexibility so students can easily fit courses into their busy schedules

With Siemens Online Self-paced Learning, students select the topics and set their own pace for completing chosen courses. All course material can be accessed online. Instruction starts upon completing the purchase of a subscription.

Students can choose from over 650 courses consisting of high-quality graphics, on-screen text, supporting voice-over narration, and interactive exercises. Features include printable course content for reference and underlined key vocabulary terms with definitions displayed with a simple mouse-over action.

Depending on the subscription purchased, you can choose to provide students with access to any 10, 25, or 50 courses or select the entire online self-paced course catalog. These courses are offered 24/7/365, so students can begin their subscription at any time. From the date of registration, students are given one year to complete their course selections.

To see if an Online Self-paced course is for you, and to find information about our online course interface system requirements, please visit: usa.siemens.com/sitrainonline

50% of the average worker’s skills will be outdated in 3 to 5 years. Keep current with online learning.

Online self-paced learning courses
- Additive Manufacturing
- Assembly-Final Stage Processes: Adhesives
- Assembly-Final Stage Processes: Coatings
- Assembly-Final Stage Processes: Fasteners
- Assembly-Final Stage Processes: Soldering
- Automation: Siemens
- Foundational: Inspection
- Foundational: Materials
- Foundational: Quality
- Foundational: Rigging
- Foundational: Safety
- Foundational: Shop Essentials
- Foundational: Supervisor Essentials
- Machining: Abrasives
- Machining: CNC
- Machining: Manual Machining
- Machining: Metal Cutting
- Machining: Siemens CNC
- Machining: Workholding
- Maintenance: Electrical Systems
- Maintenance: Hydraulics & Pneumatics
- Maintenance: Mechanical Systems
- Maintenance: Motor Controls
- Maintenance: PLCs
- Maintenance: Robotics
- Maintenance: Siemens PLCs
- Maintenance: Siemens PLCs in Spanish
- Stamping-Forming-Fabricating: Press Brake
- Stamping-Forming-Fabricating: Stamping
- Welding
Teamed with Underwriters Laboratories (UL), Siemens Online Self-paced Learning offers courses focused on subjects including Crane Safety, Electrical Safety (including arc flash), Hazardous Materials, OSHA Essentials, Fire Safety, Personal Protection Equipment and many more! This addition to the SITRAIN Online Self-paced library brings the total catalog to over 650 courses including Industrial Technologies and Health & Safety.

When discussing training plans with your customers or for your own staff training needs, consider adding a selection of SITRAIN Online Self-paced courses. Courses can be purchased in bundles of 10, 25, 50 or unlimited access for as little as $250 per user. Online Self-paced Learning delivers focused, flexible learning at an exceptional value.

»Studies have shown a $4 to $6 return for every dollar invested in safety and health.«

www.osha.gov

Self-paced safety classes at sitrain-lms.com/ospl

- Crane Safety
- Electrical Safety & Arc Flash Awareness
- Environmental
- Fire Safety/Combustibles
- Hazard Communication
- Hazardous Material Transportation
- Hazardous Materials
- HAZWOPER
- Health and Wellness
- Injury Prevention
- OSHA Essentials/General Safety
- Personal Protective Equipment
- Powered Industrial Trucks
- Respiratory Protection
Virtual Instructor-led Learning

Classroom lectures delivered in the convenience of your home or office

Siemens Virtual Instructor-led courses offer students a live, classroom experience with the convenience and cost savings of online learning. These courses provide hands-on instruction and live interaction, delivered anywhere an internet connection is available.

Scheduled courses are typically 10-hour agendas presented Monday through Friday, in two-hour sessions. These sessions provide students with lecture, demonstration, lab exercises, and Q&A sessions – all presented by Siemens subject matter experts. For the full course duration, students can complete assignments and reinforce classroom instruction using a virtual cloud-based application providing 24/7 access to fully functional Siemens software such as SIMATIC STEP 7 and PLCSIM.

Virtual Instructor-led courses include:
- Scheduled lectures and demonstrations
- Live group and individual Q&A sessions
- 24/7 access to fully functional Siemens application software (ex., SIMATIC STEP 7)
- Working automation projects using Siemens PLCSIM simulation tools
- Lab exercises and solution reviews
- Full student and instructor desktop sharing
- Access to recorded lectures

Virtual Instructor-led classes help build critical skills and knowledge and are ideal preparation for attending one of our classroom learning courses. These classes help maximize the training experience by leveraging expert instruction and access to real-world software applications.

Visit usa.siemens.com/VIL to view all Virtual Instructor-led learning
Classroom Learning

Expert and professional instructors, proven course-ware and quality workstations combine for the most effective classroom experience possible.

Studies indicate that when students practice what they have learned in a classroom setting they will retain 75% of the lesson, as compared with lecture-only settings where they retain just 20% of the lesson. Designed to mimic real-world environments, Siemens simulator workstations provide a safe and risk-free platform for job training, project testing, design engineering, and troubleshooting.

Our learning content is reviewed and approved by Siemens technical and operational experts to ensure compliance with the highest industry, health, safety, and environmental standards.

For more information visit usa.siemens.com/classroom

We combine technology and industry experience to deliver a highly effective, customized learning programs:

- Job targeted courses
- Hands-on learning and skill building
- System-level training approach
- Extensive schedule of classes
- Various media and course length options
- On-site and custom courses
- Multiple training center locations
- Packaged services and products

SITRAIN learning programs provide your employees with the opportunity to achieve personal goals, while at the same time, positively impacting your operating and financial goals. Benefits include:

- Increased productivity and efficiency
- Reduced employee turnover
- Decreased downtime and faster error resolution
- Improved safety and risk management
- Flexibility to adopt new technologies/methods
- Enhanced company image and talent recruiting
How-to Video Library

Quick, affordable, performance assist tools that covers a broad range of automation topics

This extensive library of short videos was created by our instructional experts to meet the real-world needs of industry, with all levels of experience in mind. By providing on-demand, how-to instruction in easy-to-understand bites, the How-to Video Library helps maintain the critical industrial and manufacturing knowledge and skills developed during instructor-led training courses. Videos are typically three-minutes long and conveniently available via any computer or mobile device with Internet access.

**Learning begins once you've completed registration**
- Start your subscription at any time – videos are available 24/7/365
- Purchase one, three, six or 12 month subscriptions by technology or in one complete bundle
- Take advantage of our most-flexible option – ultimate access with a full, one-year subscription

**Want to learn more?**
Browse our complete library of How-to Video Library at: usa.siemens.com/sitrainonline

»A Big Three automotive customer avoided costly downtime using their Siemens SITRAIN How-to Video Library. When a main production line went down in the middle of the night, the technician pulled up the appropriate How-to Video and got the line back up and running within just a few minutes. The customer was quoted as saying that the How-to Video subscription more than paid for itself in just that one case.«
Engined to provide a real-world experience, Siemens simulators are fully functional, ready-to-use systems available in formats ranging from simple P LCSIM to fully integrated motion control systems. System-level design makes the simulators an invaluable tool for program testing and debugging, reinforcing learning, shop floor troubleshooting, and more. With portable construction and hard-shell cases, they can be easily transported. Custom-built systems are also available.

For additional details and pricing, please call 1-800-333-7421 or email: sitrain.registrar.industry@siemens.com.
SIMATIC S7-1200 Training Case

Related courses: S7-1200 System Course
Design Includes:
- S7-1200 Power Supply
- Analog output SM 1234
- Digital input / output module SM 1223
- Switch CSM 1277
- Basic Panel KTP600
- Interface for conveyor belt model

Order number: 6ZB2310-0CG00

SIMATIC S7-1200 ET200S Training Module

Related courses: Optional for S7-1200 courses
Design Includes:
- Interface module IM 151-3 PN
- Power module PM-E 24 V DC
- 2 Digital input modules 4 DI × 24 V DC
- 2 Digital input modules 4 DO × 24 V DC / 0.5 A
- Power module PM-E 24V DC
- 1 Digital input modules 4/8 F-DI × 24 V DC
- 1 Digital input modules 4 F-DO × 24 V DC / 2 A
- DI/DA clamp-type terminal block, 37-pin

Order number: 6ZB2310-0CJ00

S7-1200 Motion Control Module

Related courses: Optional for S7-1200 TIA Portal System Course
Design Includes:
- SIMATIC CPU 1211C DC/DC/DC
- Stepper motor with 360° disc and pulse encoder
- Sensor for the neutral position
- RC element with printed circuit
- 230 V AC power supply

Order number: 6ZB2310-0CP00

SIMATIC PCS7 Training case

Related courses: SIMATIC PCS7 – All courses
Design Includes:
- Industrial PC 647D as ES/OS with a CP1623 and a standard network card for connection to a terminal bus
- PC accessories including mouse, international keyboard and 24" monitor
- AS rack with CPU 410-5H (with System Expansion Card for 100 PO) and an Industrial Ethernet CP 443-1 for connection to a system bus
- ET 200M distributed I/O for PROFIBUS with 4 signal modules (DI/DO/AI/AO), with diagnostics capability and high-precision time stamping
- ET 200M distributed I/O for PROFINET with 2 signal modules (DI/DO) connection to distributed I/O via a connecting cable and 4 front end plugs

Order number: 6ZB2320-0AN00

SIMATIC S7-300F Safety training case

Related courses: S7 5.x Safety – All courses
Design Includes:
- Mounting rail SIMATIC S7
- Operational power supply PS 307
- Main module CPU 315F-2 PN/DP
- Bus slot
- Top assembly IM 151, PROFINET IO
- Power module, incl. terminal module
- F-DI modules, incl. terminal modules
- F-DO modules, incl. terminal module
- F power module
- DI module, incl. terminal modules
- DO module, incl. terminal module
- Emergency cutoff switch
- Reset
- Contacts
- Mechanical systems

Order number: 6ZB2310-0CQ00

SINAMICS G120 TIA with PM240 Training module

Related courses: SINAMICS G120- All courses
Design Includes:
- Power Module PM240-2 1 AC 230 V
- Control Unit CU240E-2 PN F
- Induction motor 1LA7 with encoder and brake
- Switches & LEDs for control via terminal strip
- SIMATIC S7 CPU 1211C
- Upgrade set servo:
  - Adapter cable for Control Unit CU305 to Sub-D
  - Servo motor SIMOTICS S 1FK7
  - Motor and encoder cable
  - Mounting and cover
  - Screws and mounting parts

Order number: 6ZB2480-0CS00
Servo motor upgrade: 6ZB2480-0CR00

Register today at usa.siemens.com/sitrain or call 1-800-333-7421.
**SINAMICS S120 Training case**

Related courses: SINAMICS S120 - All courses

- Transformer, 1 115 V AC (USA)
- Drive system consists of:
  - CU320-2 control unit & TB30 terminal board
  - Smart Line module 5 kW, double motor module 3A
  - 1 synchronous motor 1FK7022-SAK71-1DG3 with incremental transmitter sin/cos 1Vpp 2048 S/R and DRIVE-ClIQ interface
  - 1 synchronous motor 1FK7022-SAK71-1LG3 with absolute value transmitter 2048 S/R
  - Referencing discs for situation monitoring
  - Operating box for set-point/actual value coupling by means of clamps
  - Connection-ready for an external motor

Order number: Profinet – 6ZB2480-OCN00
Order number: Profibus – 6ZB2480-OCM00

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**SINAMICS DCM Training case**

Related courses: SINAMICS DCM - All courses

- Control units: one Advanced CUD and one Standard CUD
- CBE20 Communication Board
- AOP30 Advanced Operator Panel
- TM15 and TM31 terminal modules
- Operator box, with connected terminal strips
- 30 A power unit, 4-quadrant operation
- Separately excited DC motor 3.9 A with analog tachometer and incremental encoder
- Gauges for armature voltage, armature current, speed and field current
- Line filter, line reactors, semiconductor fuses
- PROFIBUS cable
- Storage and transport case with transport rollers

Order number: 6RX1800-0SM00

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**SIMOTION D425-2 DP/PN Training case**

Related courses: SIMOTION - All courses

- Drive system comprising
  - SIMOTION D425-2 DP/PN control with TB30 Terminal Board
  - Smart Line Module 5 kW
  - Double Motor Module 3 A
  - 1 synchronous servo motor with incremental encoder sin/cos 1 Vpp via SMC20
  - 1 synchronous servo motor with absolute encoder 2048 and DRIVE-ClIQ interface
  - Reference disks for position monitoring
  - Operator box for set-point/actual value linkage via terminals
  - Connection option for an external motor, e.g. asynchronous motor

Order number: 6ZB2470-0AL00

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**SINUMERIK 840D sl compact Training case**

Related courses: SINUMERIK 840D sl - All courses

- SINUMERIK 840D sl (NCU720.3 for SW 4.x)
- SINAMICS drive for 2 axes
- 2 x 1FK7022-SAK71 servo motors with DRIVE-ClIQ interface
- 1 incremental and 1 absolute measuring system
- The SINUMERIK 840D solution line training rack completely assembled with CE marking, the adaptation programs are installed

Order number: 6ZB2410-0BG00

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**SINUMERIK 840D sl operator panel Training case**

Related courses: SINUMERIK 840D sl - All courses using 840D sl compact training case

- Operator panel OPO10C with PCU50.5
- Software SINUMERIK Operate 4.x
- Machine control panel MCP 483C IE
- The SINUMERIK 840D sl OP training case can only be used together with the SINUMERIK 840D sl compact training case.

Order number: 6ZB2310-0CQ00

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**PROFINET TIA Training module**

Related courses: TIA Portal Profinet – All courses

- CPU 1510SP-1 PN with digital I/Os
- PN/PN Coupler
- SCALANCE X 208

Order number: 6ZB2520-0AJ00
SINUMERIK 840D sl Training rack

Related courses: SINUMERIK 840D sl – All courses

Design includes:
• Simulation field incl. SIMATIC ET 200S input, output and IM modules
• OP 012 with PCU 50.5
• MCP4B3 IE machine control panel
• SINUMERIK 840D sl (NCU 720.3 with SW 4.x)
• NX10
• SINAMICS S120
  • 1-axis module 3 A
  • 2-axis module 2 × 5 A
• 1 x synchronous motor 1FK7044-7AF71 with incremental encoder
• 1 x synchronous motor 1FK7060-5AF71 with absolute encoder
• 1 x standard asynchronous motor 1LA7070-4AB10 with HTL encoder
• Prepared for wiring for Safety Integrated functionality

Order number: 6ZB2470-0AL00

PROFINET Training Case

Related courses: SIMATIC S7300 PROFINET

Design includes:
The training module comprises a CPU 315-2PN/DP, SCALANCE X208, IE/DP Link PN IO, and a modular ET 200S PN. A 37-pin terminal block permits the connection of a simulation model.
• CPU 315-2PN/DP
• SCALANCE X 208 switch
• IE/DP Link PN IO
• ET200S PN (IM 151-3PN interface module)
• 2 digital input modules 4 DI x 24 V DC
• 2 digital output modules 4 DO x 24 V DC/0.5 A
• 37-pin terminal block DI/DO

Order number: 6ZB2520-0AG02

SIMATIC S7 Training Case

Related courses: SIMATIC S7-300 – All courses

The training case comprises a SIMATIC S7-300 automation system, a Touch Panel including a simulator. The automation system is mounted in a carrying case for transportation purposes. It consists of:

<table>
<thead>
<tr>
<th>Training Case S7-300 PROFINET Touch Panel</th>
<th>Training Case S7-300 PROFINET with Comfort Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU 315-2PN/DP</td>
<td>CPU 315F-2PN/DP</td>
</tr>
<tr>
<td>CPU 315 2PN/DP</td>
<td>PROFIBUS connecting cable</td>
</tr>
<tr>
<td>CPU/SCALANCE X208 switch</td>
<td>PROFIBUS connecting cable</td>
</tr>
<tr>
<td>ET200S PN (IM 151-3PN interface module)</td>
<td>PROFINET connecting cable</td>
</tr>
<tr>
<td>2 digital input/output modules 4 DI x 24 V DC/0.5 A</td>
<td></td>
</tr>
<tr>
<td>2 digital input/output modules 4 DO x 24 V DC/0.5 A</td>
<td></td>
</tr>
<tr>
<td>37-pin terminal block DI/DO</td>
<td></td>
</tr>
</tbody>
</table>

Order number: 6ZB2 31-0CD00

PROFINET Touch Panel 6ZB2 31-0CD00
PROFINET Comfort Panel 6ZB2 31-0CM00
Build a more efficient, effective, and highly motivated team – with Siemens classroom learning

Siemens U.S.-based training is offered at our headquarters in Atlanta, Georgia, as well as regional locations across the country. Each facility provides students with access to a full-time instructor and offers an advanced learning environment featuring our training simulator systems.

**Order Management & Support**
Contact Andrea Perry-Scardina
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andrea.perry@siemens.com

**West Region**
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**East Region**
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Building applicable, practical know-how

Siemens Cooperates with Education – support for schools interested in engaging with leading edge industrial technologies.

Through the Siemens Cooperates with Education (SCE) initiative, universities, K-12 schools and community colleges are afforded the opportunity to partner with Siemens on leading edge industrial technologies in their classrooms, research projects and workforce development programs. We provide support through equipment, software, instructor training and technical guidance.

The SCE program offers curriculums and automation training based on Massive Open Online Courses (MOOC) and blended learning concepts for conveying know-how on the digital enterprise. Educational institutions benefit from special conditions, support and partnerships.

For more information, see Siemens Cooperates with Education usa.siemens.com/sce

Curriculum

- Course material and instructional tools

Workshops & Classes

- Know-how transfer. Products, innovations and solutions.

Trainer Packages

- Leading technologies, with deep discounts for schools.

Learning Systems

- Professional systems offered by our Didactic Partners.

Promoters

- Face-to-face support worldwide—in many regions.

»By teaching Siemens, our students are much more attractive in the job market. Companies come from far away to recruit at our school (a small rural community college). We now have a German company recruiting students to take to Germany and train there for 2 years and then come back to work in the US for them.«

Accounties Smith, Tri-County Technical College

Register today at usa.siemens.com/sitrain or call 1-800-333-7421.
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**Automation**

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- Length of course in days
- Length of course in hours
- Click to register online

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# Automation – S7-300 / S7-400 / STEP 7 V5.X

## Learning Map

**Foundation and Prerequisite training available from the Online Self-paced Learning Automation: Siemens and Maintenance: Siemens PLCs categories. An arrow indicates a prerequisite for the next course.**

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### Simulators available for S7 5.x courses

**All S7-300 Courses**
SIMATIC S7 Training Case S7-300 TIA Order number: 6ZB2310-0CK00 (w/ control panel)
Order number: 6ZB2310-0CM00 (w/ comfort panel)

**All safety courses**
SIMATIC S7-300F Safety training case Order number: 6ZB2310-0CQ00

See pages 12-15 for more information

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## How to Video Library

Automation - SIMATIC S7 with STEP 7 v5.5 over 350 titles
## Automation – SIMATIC S7 with STEP 7 v5
### S7 Programming 1

**Course code:** SCT-S7TIAP1C

**Target audience**
This course is for SIMATIC S7-300/400 PLC users who are involved with developing or sustaining automation systems and their application programs.

**Prerequisites**
- MS Windows Expertise.

**Course Profile**
This hands-on course is the first in a three part series which builds basic programming skills using Siemens STEP 7 software. Students will learn S7 project management, program design and application development. This is an aggressively paced curriculum covering S7 programming with Ladder logic. The basics of programming with Function Block Diagram (FBD), Statement List (STL) languages and key software tools are also covered. Participants use Totally Integrate Automation concepts by integrating an S7300 PLC, HMI, ET200S remote I/O station and a desktop conveyor system connected by PROFIBUS.

**Objectives**
Upon completion of this course, the student shall be able to:
- Configure, parametrize, communicate with and commission a Totally Integrated Automation System.
- Program, document, test and troubleshoot a structured STEP 7 program.
- Program using absolute and symbolic addressing.
- Use core application instructions to program Organization Blocks (OBs), Function Calls (FCs), Function Blocks (FBs), and library blocks.
- Program using binary, digital & analog processing.
- Create and use data blocks.
- Create and call reusable blocks employing parameter passing techniques.
- Cross reference where and how addressed are used, program call structure, and comparing online to offline programs.

**Topics**
- Using SIMATIC Manager
- Configuring the Hardware system
- Introduction to Programming
- Basic Troubleshooting Concepts
- Symbolic Addressing
- Data Blocks
- Binary Operations

### S7 Programming 2

**Course code:** SCT-S7TIAP2B

**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 1

**Course Profile**
This course is the second in a three part series which increases skills with Siemens STEP 7 Totally Integrated Automation. Students will learn to leverage the power of SIMATIC software with advanced structured programming techniques. A systems approach to the integration of efficiently programming the S7-300/400 PLCs, plus connectivity and functionality of an HMI and Micro Master Drive are the central focus of this course. Emphasis on Statement List (STL) programming for both direct and indirect addressing is an integral part of the course.

**Objectives**
Upon completion of this course, the student shall be able to:
- 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 STEP 7 advanced diagnostics.

**Topics**
- Programming review
- Data Blocks and complex variables
- HMI event and alarm messages
- Introduction to Micro Master 4 Drives
- Program control
- Organization Blocks
- Parameter Passing with FC, FB, SFB, SFC
- Indirect Addressing
- Troubleshooting the automation system

### S7 Programming 3

**Course code:** SCT-S7TIAP3B

**Target audience**
This course builds advanced skills in control system programming in a control systems environment. Workstations will include the S7 PLC, Touch Panel HMI, Drive system and both PROFIBUS and Ethernet networks. Students will be challenged with a number of advanced programming techniques including data management routines, advanced system functions, new program efficiency tools and error handling. Advanced level blocks, functions, tools and libraries are discussed and demonstrated.

**Objectives**
Upon completion of this course, the student shall be able to:
- Efficiently apply Data Blocks.
- Efficiently use the various Data Types.
- Manage program errors.
- Build and manage Recipes.
- Understand the advantages of each networking type.
- Set up a basic Ethernet network.
- Understand the optional program editors and their advantages.

**Topics**
- Training Units and Addressing
- Block calls and Multi Instance Model
- Complex Data Type Applications
- Indirect Addressing & Registers
- Block Calls & Parameters
- Error Handling
- Recipes
- S7 Communications
- S7 Ethernet
- S7 Engineering Tools Overview

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# Automation – SIMATIC S7 with STEP 7 v5

## S7 Programming with S7 Graph

**Course code:** SCT-S7GPHP1A

**Target audience**
This course is for SIMATIC S7-300/400 PLC users involved in developing or sustaining automation systems that use of S7Graph.

**Prerequisites**
- S7 TIA Programming 1

**Objectives**
Upon completion of this course, the student shall be able to:
- Structure and process a program using the program elements of S7 GRAPH
- Create, document, test and troubleshoot an application program.
- Identify the components and performance characteristics of an S7 GRAPH structure.
- Structure and process a program using the program elements of S7 GRAPH
- Create, document, test and troubleshoot an application program.

**Topics**
- S7 GRAPH Programming Elements
  - S7 GRAPH Block
  - Program Editor Screen
  - Using the Help and Tutorial files
  - Using the Menus and Toolbars
  - S7 GRAPH Property Settings
- Principles of S7 GRAPH Programming
  - Calling the Graph Program
  - Monitoring the operation of a Sequencer
  - Program execution and scan
  - Running an Example Program
- S7 GRAPH Program Structures
  - Alternative and Simultaneous Branching
  - Terminations and Jumps
  - Interlocks and Supervisions
  - Event Dependent Actions
  - Permanent Operations
- Interaction with Other Program Modules
  - Operating Modes
  - Handling System Faults
  - Initializing the Sequencer
  - Manual control of the Sequencer
- Documentations and Storage
  - Documenting program blocks and networks
  - Creating cross-reference lists
  - Printing programs with documentation
  - Archiving projects and programs
  - Symbolic programming

## S7 Programming with SCL

**Course code:** SCT-S7SCLP1A

**Target audience**
This course is for engineering and maintenance personnel, who create, diagnose and troubleshoot SIMATIC STEP 7 applications with Structured Control Language (SCL) content.

**Prerequisites**
- S7 TIA Programming 1

**Course Profile**
This course provides an in depth look at STEP 7, SIMATIC Manager and the basic diagnostics and editor tools. This is a hands-on course filled with programming exercises in SCL. Students will use advanced software tools of STEP 7 including PLC SIM to complete system integration programming, troubleshooting, and functional testing of applications.

**Objectives**
Upon completion of this course, the student shall be able to:
- Efficiently use the SIMATIC Manager program editor tools.
- Use the STEP 7 program monitor, diagnostics and troubleshooting tools.
- Build or modify SCL programs.
- Package an SCL program into a custom library block and use within a STEP 7 project.
- Explore the SCL syntax requirements and the system debug functions.
- Use PLC SIM to software

**Topics**
- The SIMATIC Manager
- SCL Overview, Program Structure and Syntax
- SCL Data Types and Declarations
- SCL Control Instructions

## S7 Programming with STL

**Course code:** SCT-S7STLP2A

**Target audience**
This course is for SIMATIC S7-300/400 PLC users with basic engineering experience in designing and sustaining SIMATIC automation systems and associated application programs.

**Prerequisites**
- S7 TIA Programming 2

**Course Profile**
The Advanced Statement List course is designed to provide participants with STL programming skills using hands-on tasks. These tasks increase Siemens STEP 7 Totally Integrated Automation (TIA) skills through the creation of a Siemens TIA project.

The central focus of this course is through a systems integration approach – from efficiently programming S7-300/400 PLCs using Statement List (STL) programming to connecting to an HMI and MICROMASTER drive. Students will gain knowledge in advanced Statement List (STL) instructions and instantiation.

A majority of this course is hands-on, practical exercises with approximately 10% theory. The goals are to aggressively guide the participant through a basic system project design, creation, and implementation.

**Objectives**
Upon completion of this course, the student shall be able to:
- Apply concepts of structured program creation.
- Use and create Block and Function libraries.
- Use STL for advanced program development.
- Employ indirect addressing in a program.

**Topics**
- Hardware review and configuration setup
- Key Topics from S7 TIA Programming
- Data Blocks and complex variables
- HMI integration
- Introduction to MICROMASTER 4x drives
- Organization Blocks
- Parameter passing with FC, FB, SFB, SFC
- Indirect Addressing
- Troubleshooting the automation system
Automation – SIMATIC S7 with STEP 7 v5

S7 Automation Maintenance 1

Course code: SCT-S7300S1C

Target audience
This course is the first of a two part series designed for maintainers and "first responders" to Siemens S7 automated control systems. Maintenance technicians, electricians, supervisors and others, who need to develop active skills using their Siemens hardware system, should attend this course to maximize line uptime. This course also provides a great platform for those new to automation systems and state-of-the-art industrial electronics.

Prerequisites
• MS Windows Expertise
• SUGGESTED PREREQUISITE: Introduction to PLCs and Languages - Virtual Instructor-led course (S70ILPLC18).

Course Profile
This course is designed with brief instructor led discussions followed by numerous hands-on exercises using a Totally Integrated Automation (TIA) plant model develop and reinforce practical experience. The TIA plant model consists of an S7-300 automation system, ET200S distributed I/O station, SIMATIC HMI Touch Panel, and a working conveyor model. Students perform visual and multi-meter wire checks, hardware component diagnostics and troubleshooting as well as equipment replacement and restoring a failed PLC system to a normal operating state. Upon completion of the course, maintenance technicians should be able to establish communications to a Siemens PLC system, diagnose, troubleshoot, and restore basic faults on an S7 hardware system, reducing costly downtimes.

Topics
• PLC Hardware, Cabling and Configuration
• STEP 7 and the SIMATIC Manager
• The STEP 7 Program Editor
• Binary and Digital Operations

4.5 Days Register Here More Information Product Support

Automation – SIMATIC S7 with STEP 7 v5

S7 Automation Maintenance 2

Course code: SCT-S7300S2C

Target audience
This course is the second of a two part series designed for maintainers of and "first responders" to Siemens S7 automated control systems. Maintenance technicians, electricians, supervisors and others, who need to develop active skills using their Siemens hardware system, should attend this course to maximize process uptime. This course also provides a great platform for those new to automation systems and state-of-the-art industrial electronics.

Prerequisites
• S7 Automation Maintenance 1.

Course Profile
Automation Maintenance 2 is a course designed with brief instructor led discussions followed by numerous hands-on exercises using a Totally Integrated Automation (TIA) plant model to develop and reinforce practical experience. The TIA plant model consists of an S7-300 automation system, ET200S and ET200pro distributed I/O stations, SIMATIC HMI Touch Panel, and a working conveyor model, all communicating over PROFINET. Students perform hardware and software diagnostics and troubleshooting as well as restoring a faulted PLC system to a normal operating state.

Topics
• Commission the Hardware Station over PROFINET
• Commission the HMI over PROFINET
• How to set up the CPU's Report System Error (RSE) function
• Hardware Troubleshooting and Diagnostics
• Monitor conveyor system functionality
• Absolute addressing & Symbolic addressing
• Managing symbol names in Data Blocks (DB)
• Monitoring, debugging Math/Comparison Logic Timers and Counters
• ET200Pro I/O station
• Basic Software Troubleshooting skills and debugging of simple code functional errors
• Analog
• Intro to Function Block Diagram (FBD)
• Statement List (STL) instructions
• Reusable Blocks

4.5 Days Register Here More Information Product Support

Automation – SIMATIC S7 with STEP 7 v5

S7-300F Distributed Safety Engineering

Course code: SCT-S75FTE1A

Target audience
This course is for engineers and personnel responsible for implementing SIMATIC Distributed Safety systems, including:
• Selecting the appropriate architecture
• Selecting the components and understanding their specific purposes and limitations
• Specifying the module and system wiring
• Developing the safety PLC program
• Starting up and supporting the system.

Prerequisites
• MS Windows Expertise
• AB-S7 Fastrack OR S7 Automation Maintenance 1 OR S7 TIA Programming 1

Course Profile
This course introduces the student to a Siemens Distributed Safety PLC application. Participants receive knowledge on applying the system per relevant standards, FailSafe Hardware Module details and parameterization, Safety Program structure and implementation, Safety Communications, System Diagnostics and introduction to Drive Safety.

Objectives
Upon completion of this course, the student shall be able to:
• Locate and understand the applicability of the detailed documentation and development resources
• Select and configure the FailSafe Hardware components, and understand their application restrictions.
• Properly implement a Safety program in the PLC.
• Document, test, and troubleshoot the system.

Topics
• Introduction to Distributed Safety
• Standards discussion
• Hardware introduction and safety wiring
• STEP 7 quick tour
• STEP 7 Distributed Safety overview and labs
• Reintegration
• Safety Logic
• System Communication overview
• Diagnostics
• Throughput Calculations

4.5 Days Register Here More Information Product Support

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### Automation – SIMATIC S7 with STEP 7 v5

#### S7-300F Distributed Safety Sustaining

**Course code:** SCT-S7SFST1A

**Target audience**
This course is for SIMATIC S7 300F PLC users who install or maintain automation safety systems and their application programs.

**Prerequisites**
- S7 Automation Maintenance 1 OR S7 TIA Programming 1

**Course Profile**
This course introduces the student to a Siemens Distributed Safety PLC application. Participants will build skills on commissioning, troubleshooting and upgrading an automation safety system. FailSafe Hardware Module details and parameterization, Safety Program structure and implementation, and System Diagnostics are covered.

**Objectives**

Upon completion of this course, the student shall be able to:
- Understand the concept of the Siemens S7 safety integrated system.
- Identify S7 safety components.
- Know how to remove and replace S7-300 and ET200S safety components.
- Identify the wiring diagrams of the S7-300 and ET200S safety components.
- Identify the LED diagnostics.
- Identify the addressing of the S7-300 safety components.
- Understand the structure of an S7-300 safety program.
- Troubleshoot using the Hardware Configuration diagnostics to identify system faults.
- Troubleshooting using the VAT to monitor the I/O modules’ diagnostic bits.
- Troubleshooting using the status of program logic.

**Topics**
- Safety Systems Overview
- Introduction to Standard & Safety Block Structure
- Safety Products
- S7 Safety CPU and ET200S Hardware
- Safety PLC Hardware Configuration
- Safety Program Code
- Testing and Diagnostics

---

#### Siemens Certified Programmer Refresher

**Course code:** SCT-S7TIAR3A

**Target audience**
This course is for SIMATIC S7 300F PLC users who install or maintain automation safety systems and their application programs.

**Prerequisites**
- S7 Automation Maintenance 1 OR S7 TIA Programming 1

**Course Profile**
This is a hands-on, instructor led course providing a focused review and skills refresher of topics taught in TIA Programming 1, 2, and 3 courses. This refresher is intended to prepare the student for the Siemens Certified Programmer Test (course code SCT-S7TIAC3A) held at the conclusion of the course.

**Objectives**

Upon completion of this course, the student shall be able to:
- Successfully Complete the Siemens Certified Service Programmer Test.

**Topics**
- Course Overview
- Hardware
- Tag (Symbol) Table
- Program principles
- Troubleshooting Program errors
- HMI
- MICROMASTER Drive
- Independent Project

---

#### Siemens Certified Programmer – Test

**Course code:** SCT-S7TIAC3A

**Target audience**
This Siemens Programmer Certification Test is intended for experienced STEP 7 programmers who have met the prerequisites below.

**Prerequisites**
- Advanced Programming Experience
- S7 TIA Programming 1
- S7 TIA Programming 2
- S7 TIA Programming 3

**Course Profile**
This is a comprehensive performance test designed to assess the skills of a PLC programmer applicant for Siemens PLC systems. This is a practical, skills-based certification test covering topics taught during TIA Programming 1, 2, and 3. It is recommended that the student attend the “Siemens Certified Programmer Refresher” in preparation for the test (course code SCT-S7TIAR3A).

**Topics**
- Skills and abilities of a Siemens Certified Programmer
  - Parameterization of the CPU
  - Configuration of the distributed I/O
  - Configuration of a drive
  - Programming of an HMI device
  - Structuring of a program using a structogram
  - Implementation of the program taking account of the aspect of reusability through the use of:
    - Functions, function blocks and multi-instances
    - Complex data structures
    - Library functions for integrated error handling

- Passing the test entitles the participant to be awarded “Siemens Certified Programmer” status recognized globally by Siemens, distributors, partners and other companies.

- At minimum, prerequisites must be met in order to take the test.

- Taking the recommended Siemens “Certified Programmer Refresher” provides a quality hands-on review of all needed skills prior to taking the certification test. The test is included as part of the review course.
Introduction to SIMATIC
PLCs and Languages
(Virtual Instructor-led)

Course code: SCT-S7OILPLCP1B

Target audience
This course is for engineers and maintenance personnel who are new to PLC programming — who will be creating, modifying or troubleshooting S7 PLC systems with SIMATIC STEP 7 software.

Course Profile
This course is designed to provide the student with core SIMATIC PLC program fundamentals. For learners new to PLC applications, this course is an ideal preparation to the S7 Programming 1 or S7 Automation Maintenance 1 courses. Whether designing a PLC program or troubleshooting a control system, this course builds fundamental skills and confidence in key concepts, navigation, tools and procedures for a successful continuous learning path.

Students needing a solid introduction to the core PLC programming languages will find this a great fit. Three program editors, LAD, FBD and STL are introduced with the primary development and troubleshooting tools. Basic logic development and data memory management complete the curriculum and help the student build skills in PLC program basics.

This is a live, virtual instructor led course delivered in 2-hour learning modules through an innovative web application. Access to fully functional STEP 7 software will be provided through a cloud based application. Learners are encouraged to complete assigned lab exercises during and after each session to reinforce the learning modules throughout the week. Professional Siemens instructors are available to answer student questions outside of scheduled class times.

Topics
- Number Systems & IEC61131 Standard
- SIMATIC Development Tools
- PLC Inputs and Outputs
- PLC I/O Addressing
- Ladder Logic & FBD Instructions

STEP 7 v5 Programming with SCL
(Classroom or Virtual Instructor-led)

Course code: SCT-S7SCLP1A (classroom) or SCT-S7OILSCLP1A (virtual)

Target audience
This course is for engineering and maintenance personnel, who create, diagnose and troubleshoot SIMATIC STEP 7 applications with Structured Control Language (SCL) content.

Prerequisites
- S7 Programming 1

Course Profile
This course provides an in depth look at STEP 7 programming and program troubleshooting with a focus on the Structured Control Language (SCL) – a PASCAL similar high level text language for programming mathematical algorithms, data management and organization tasks for Siemens automation systems.

Students should have a solid working knowledge of STEP 7, SIMATIC Manager and the basic diagnostics and editor tools. This is a hands-on course filled with programming exercises in SCL. Students will use advanced software tools of STEP 7 including PLC SIM to complete system integration programming, troubleshooting, and functional testing of applications.

Objectives
Upon completion of this course, the student shall be able to:
- Efficiently use the SIMATIC Manager program editor tools.
- Use the STEP 7 program monitor, diagnostics and troubleshooting tools.
- Build and modify SCL programs.
- Package an SCL program into a custom library block and use within a STEP 7 project.
- Explore the SCL syntax requirements and the system debug functions.
- Use PLC SIM software to simulate PLC hardware and test user defined SCL program code.

Topics
- The SIMATIC Manager
- SCL Overview
- SCL Program Structure
- SCL Syntax
- SCL Data Types
- SCL Declarations
- SCL Control Instructions
Automation – TIA Portal S7-1200 / S7-300 / S7-1500

Learning Map

Foundation and Prerequisite training available from the Online Self-paced Learning Automation: Siemens and Maintenance: Siemens PLCs categories. An arrow indicates a prerequisite for the next course.

Core courses
- Introduction to TIA Portal (Virtual Instructor-led)
  - SCT-PTOILPLCI1A

Virtual instructor-led courses
- TIA Portal Service 1
  - SCT-PTTIAS1A
- TIA Portal Service 2
  - SCT-PTTIAS2A
- TIA Portal STEP 7 Integrated Technologies Systems
  - SCT-PTTIAP1A
- S7 TIA Portal Programming with SCL (Virtual Instructor-led)
  - SCT-PTOILSCLP3A
- TIA Portal WinCC Comfort / Advanced Configuration
  - SCT-PTWCSU2A
- TIA Portal WinCC Professional (SCADA) Configuration
  - SCT-PTWCPSP1A

Reinforcement
- TIA Portal Programming 1
  - SCT-PTTIAP1A
- TIA Portal Programming 2
  - SCT-PTTIAP2A
- TIA Portal Programming 3
  - SCT-PTTIAP3A

VIDEO
- How to Video Library
  Automation - SIMATIC S7 with TIA Portal

Online Product Support
- Industrial Automation
## Learning Map (cont.)

Foundation and Prerequisite training available from the [Online Self-paced Learning](#) Automation: Siemens and Maintenance: Siemens PLCs categories. An arrow indicates a prerequisite for the next course.

### Advanced & Optional Courses (cont)

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Bridging STEP 7 5.x to TIA Portal Programming</td>
<td>4.5 days</td>
</tr>
<tr>
<td>SCT-PTTTIAU2B</td>
<td></td>
</tr>
<tr>
<td>Same course onsite above OR online below*</td>
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<tr>
<td>Bridging STEP 7 5.x to TIA Portal Programming (Virtual Instructor-led)</td>
<td></td>
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<tr>
<td>SCT-PTOILTIAU2A</td>
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</tr>
<tr>
<td>AB to S7 with TIA Portal</td>
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<tr>
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</tr>
<tr>
<td>SCT-PTOILSCLP3A</td>
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</tr>
<tr>
<td>TIA Portal Safety Engineering</td>
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<td>SCT-PTSFTE1A</td>
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<tr>
<td>All TIA Portal courses</td>
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<td>Order number: 6ZB2310-OCW00</td>
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<tr>
<td>SIMATIC S7-1200 Training Case</td>
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<tr>
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<td>Optional for S7-1200 courses</td>
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<td>SIMATIC S7-1200 ET2005 Training Module</td>
<td>Order number: 6ZB2310-OCJ00</td>
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<td>S7-1200 Motion Control Module</td>
<td>Order number: 6ZB2480-0CS00</td>
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<tr>
<td>Servo motor upgrade: 6ZB2480-OCR00</td>
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</tbody>
</table>

*The S7 Classic to TIA Portal Bridge course is offered in two formats, virtual and classroom with different course codes. Student's taking the classroom course can jump right to the level two courses instead of taking the introductory and level 1 classes.

Simulators available for TIA Portal Courses:

- Automation - SIMATIC S7 with TIA Portal
  - How to Video Library
  - Online Product Support

Register today at usa.siemens.com/sitrain or call 1-800-333-7421.

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Automation – SIMATIC S7 with TIA Portal
AB to S7
with TIA Portal
Course code: SCT-PTABSP1A

Course Profile
This course concentrates on STEP 7 software, program structures, System Functions, advanced block libraries and custom block design. STEP 7 engineering tools and programming instructions are demonstrated to guide the student through the development of a realistic application. The course format consists of instruction, demonstration, and hands-on exercises. Students utilize test, debug and diagnostic tools to complete extensive programming exercises.

Objectives
Upon completion of this course, the student shall be able to:
• Utilize STEP 7 TIA Portal engineering tools
• Insert an HMI device into a project
• Locate Tags using Cross-Reference tool
• Utilize System Diagnostic Functions to test and troubleshoot an application program.
• Create custom code blocks
• Create reusable program code (FB, DB, FC, etc.) and insert in Library
• Assign tags in STEP 7 TIA Portal
• Create, Store, and Retrieve Library Objects

Topics
• System Overview
• AB-STEP 7 TIA Portal Navigation
• AB-STEP 7 TIA Portal Communication
• Hardware
• Memory Allocation and Usage
• Tag Handling
• Programming Instructions in STEP 7 TIA Portal
• Programming Blocks
• HMI
• Reference Data
• System Diagnostics
• Simulation
• Library Options
• System Diagnostics
• Simulation
• Library Options

4.5 Days
Register here
More information

Automation – SIMATIC S7 with TIA Portal
AB to S7 Fast Track
with TIA Portal
Course code: SCT-PTABFP1C

Target audience
This course is for experienced AB programmers interested in an advanced training on Siemens SIMATIC S7 PLC family and STEP7 engineering software.

Prerequisites
None

Course Profile
This course concentrates on STEP 7 software using TIA Portal. It covers program structures, System Functions, advanced block libraries and custom block design. Engineering tools and programming instructions are demonstrated to guide the student through the development of a realistic application. The course format consists of instruction, demonstration, and hands-on exercises. Students utilize test, debug and diagnostic tools to complete extensive programming exercises.

Objectives
Upon completion of this course, the student shall be able to:
• Use STEP 7 TIA Portal engineering tools
• Insert an HMI device into a project
• Locate Tags using Cross-Reference tool
• Use System Diagnostic Functions to test and troubleshoot an application program.
• Create custom code blocks
• Create reusable program code (FB, DB, FC, etc.) and insert in Library
• Assign tags in STEP 7 TIA Portal
• Create, Store, and Retrieve Library Object

Topics
• System overview
• AB-STEP 7 TIA Portal Communication
• AB-STEP 7 TIA Portal Navigation
• Hardware
• Memory Allocation and Usage
• Tag Handling
• Programming Instructions in STEP 7 TIA Portal
• Programming Blocks

3 Days
Register here
More information

Automation – SIMATIC S7 with TIA Portal
Introduction to TIA Portal
Course code: SCT-PTOILPLC11A

Target audience:
This course is for engineers and maintenance personnel who are new to SIMATIC S7 PLCs and who will be creating, modifying or troubleshooting S7 PLC systems using SIMATIC TIA Portal software.

Prerequisites
• MS Windows Expertise
• Basic industrial technology skills

Course Profile
This is a live instructor led on-line course delivered in 2 hour learning modules through the web. Access to fully functional STEP 7 Professional V13 software is provided through a cloud based application. Students are encouraged to complete assigned lab exercises during and after each session to reinforce the learning modules throughout the week. Professional Siemens instructors are available to answer student questions outside of scheduled class times.

Objectives
Upon completion of this course, the student shall be able to:
• Use STEP 7 Professional V13 (TIA Portal) to create a new development project.
• Navigate through an existing project using both the Portal View and the Project View.
• Configure an S7-1500 PLC with local I/O modules.
• Assign PLC tags.
• Identify key characteristics of program blocks.
• Identify important features of the automation languages LAD and FBD.

Topics
• Number Systems & IEC61131 Standard
• Introduction to the TIA Portal Development Environment
• PLC Program Blocks and Variables in the Program Editor
• Introduction to I/O and Addressing
• TIA Portal Automation Languages

4 Days
Register here
More information
Product support
Automation – SIMATIC S7 with TIA Portal
Bridging STEP 7 5.x to TIA Portal Programming
(Classroom or Virtual Instructor-led)

Course code: SCT-PTTIAU2B (classroom) or SCT-PTOILTAU2A (virtual)

Target audience
 Experienced S7 5.x Engineering and Maintenance personnel who are, or will be, involved with developing or sustaining TIA PORTAL projects.

Prerequisites
• SIMATIC S7 Version 5.x Project Experience
• Ver. 5.x S7 Programming 1 or S7 Tools and Troubleshooting 2 or S7 Automation Maintenance 2

Course Profile
The course begins with a brief overview of the latest SIMATIC S7-1200 and S7-1500 systems. It is followed by in-depth discussions and hands-on exercises covering, Engineering Software Framework, Network configuration, Distributed I/O, PLC Tagging, and Troubleshooting. The course covers using TIA Portal and Project tools to efficiently build a system project. This is a live, virtual instructor led course delivered in 3-hour learning modules through an innovative web application.

Objectives
Upon completion of this course, the student shall be able to:
• Configure the components and feature functions of the S7-1500 system.
• Navigate the STEP 7 Portal software and use the basic and advanced tool set.
• Use the STEP7 tools to monitor and troubleshoot the system.
• Build, document, test and troubleshoot a structured STEP 7 Basic program using the multiple address types and data blocks.

Topics
• SIMATIC S7 TIA Portal overview
• Devices and Networks
• PLC Tags
• Program Blocks and Program Editor
• Advanced Programming Topics
• Troubleshooting
• Structured Control Language

Automation – SIMATIC S7 with TIA Portal
TIA Portal Service 1

Course code: SCT-PTTIAS1A

Target audience
This course is designed for “first responders” to industry operations utilizing Siemens S7 automated control systems. Maintenance technicians, electricians, supervisors and others, who need an understanding of their Siemens control system, should attend this course to maximize line uptime.

PLEASE NOTE: If training in S7 PLC programming is required, please consider the SIMATIC TIA Portal Programming 1 course.

Prerequisites
• MS Windows Expertise

Course Profile
This first level service course teaches the basic S7 system concept, hardware configuration and parameterization, S7 software (SIMATIC TIA Portal) basics, and an overview of programming fundamentals. Human Machine Interface (HMI) and PROFINET IO basics are also included.

Objectives
Upon completion of this course, the student shall be able to:
• Use standard STEP 7 tools and methods for Testing, Diagnosing, and Correcting hardware & software problems in a running program.
• Operate, Monitor, & Maintain components of a typical SIMATIC TIA system.
• Perform basic hardware assembly, cabling, wiring and testing.
• Establish PLC communication with multiple technologies.
• Retrieve, Archive, and Download S7 programs.

Topics
• System Overview
• Introduction: Engineering Software “TIA Portal”
• PLC Installation & Maintenance
• Device and Network
• Symbol Table
• Hardware Commissioning
• Program Blocks
• Binary Operations
• Introduction to Distributed I/O
• Introduction to HMI
• Introduction to the MicroMaster Drive

Automation – SIMATIC S7 with TIA Portal
TIA Portal Service 2

Course code: SCT-PTTIAS2A

Target audience
This course is designed for SIMATIC S7-300-400 PLC users with basic SIMATIC control system knowledge who install or maintain automation systems and their application programs.

Prerequisites
• TIA Portal Service 1

Course Profile
This course continues skill development in troubleshooting and modifying a control system. Participants will use SIMATIC TIA Portal software tools to build new features, diagnostics and communications into the application project. Program development using organization blocks, system functions and instruction libraries build software troubleshooting efficiency. Analog signal processing and alarming are included in this application. Configuration and integration of an HMI and Drive system into the student’s application builds experience managing a Totally Integrated Automation (TIA) project.

Objectives
Upon completion of this course, the student shall be able to:
• Use advanced STEP 7 tools and methods for Testing, Diagnosing, and Correcting hardware & software problems in a running program.
• Utilize the different block types (FC, FB, OB, and DB).
• Eliminate logical software errors, such as multiple assignments.
• Utilize principles of analog value processing.
• Use the data block access functions.
• Access and use the processed analog values utilizing STEP 7 GRAPH.
• Backup and document executed program changes

Topics
• Hardware and Software Review
• Data Blocks and Organization Blocks (OBs)
• Analog Processing
• Troubleshooting
• HMI
• Drive System
Automation – SIMATIC S7 with TIA Portal

S7-1200 TIA System

Course code: SCT-S712TP1A

Target audience
This system course is for SIMATIC S7-1200 PLC users who are involved with developing or sustaining automation systems and their application programs. This course is for users needing advanced programming and configuration skills and who may use the extended system functions.

Prerequisites
• MS Windows Expertise

Course Profile
Additional Prerequisite: Solid industrial technology skills.

The goal of this course is to help the student build skills utilizing in programming and extended system functionality of the S7-1200 system, STEP 7 engineering tool and WinCC Basic, Human Machine Interface (HMI).

This course begins with a brief review of the SIMATIC S7-1200 system, its components and the HMI Basic Panels.

Objectives

Upon completion of this course, the student shall be able to:
• Identify the components and features of the S7-1200 system.
• Navigate the STEP 7 Portal software and identify the basic tool set.
• Complete a system hardware configuration including basic PC - PLC communications.
• Use the STEP 7 tools to monitor and troubleshoot the system.
• Build, document, test and troubleshoot a structured STEP 7 Basic program using the multiple address types and data blocks.
• Build a basic HMI project and integrate into the STEP 7 program.
• Use core application instructions, functions and blocks to build and test a basic control program.
• Efficiently used the diagnostics tools of STEP 7.

Topics
• SIMATIC S7-1200 family overview
• Introduction to STEP 7 Basic
• Device and Networks Portal with monitoring

Automation – SIMATIC S7 with TIA Portal

TIA Portal Programming 1

Course code: SCT-PTTIAP1A

Target audience
This course is for SIMATIC S7-300/400 PLC users who are involved with developing or sustaining automation systems and their application programs.

Prerequisites
• MS Windows Expertise

Course Profile
This course is the first in a three part series which builds basic programming skills with Siemens STEP 7 software. Students will learn S7 project management, program design and application development. This is an aggressively paced curriculum covering the S7 programming editor with Ladder, Function Block Diagram, and Statement List, and SCL programming languages, and key software tools. This course takes a systems approach to the S7-300/400 PLCs, plus basic connectivity and functionality of an HMI, Drive, and PROFINET I/O.

Objectives

Upon completion of this course, the student shall be able to:
• Complete a system hardware configuration.
• Build, document, test and troubleshoot a structured STEP 7 program.
• Program using the multiple address types.
• Use symbolic addressing.
• Use core application instructions, functions and blocks.
• Program using the processed analog values.
• Generate data blocks.
• Establish connections to an HMI system.

Topics
• System Overview
• Introduction: Engineering Software “TIA Portal”
• Devices and Networks
• Symbol Table
• Program Blocks
• Binary Operations
• Digital Operations
• Introduction to Distributed I/O
• Introduction to HMI
• FCs and FBs
• Troubleshooting
• Introduction to the MICROMASTER Drive

Automation – SIMATIC S7 with TIA Portal

TIA Portal Programming 2

Course code: SCT-PTTIAP2A

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
• TIA Portal Programming 1

Course Profile
This 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 the integration of efficiently programming the S7-300/400 PLC, connectivity using PROFINET IO, functionality of an HMI, and integration of Micromaster Drive are the central focus of this course.

Objectives

Upon completion of this course, the student shall be able to:
• Leverage the power of Block and Function libraries.
• Use STL and SCL 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.

Topics
• Analog value processing
• Functions, function blocks, and multi-instances using the IEC-compliant timer/counter
• Jump commands and battery operations
• Indirect addressing
• Integration of a Micromaster drive (420) using PROFIBUS DP
• Monitoring and control of drive with “Starter” software
• Classical software error handling and evaluation with error organization blocks (OBs)
• Troubleshooting and alarms with an HMI device (Touch Panel 277B)
Automation – SIMATIC S7 with TIA Portal
TIA Portal Programming 3

Course code: SCT-PTTIA P3A

Target audience
This 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 2

Course Profile
The third in a three part series, this course will teach students 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. Students will expand their knowledge regarding the reusability of STEP 7 blocks and their storage in user libraries while gaining introduction to programming languages statement list (STL), Structured Control Language (SCL) and S7-GRAHP.

Objectives
Upon completion of this course, the student shall be able to:
- Apply knowledge of the advantages of optimally created blocks and be able to program them.
- Efficiently implement the concepts of multiple Instances.
- Declare variables of complex data types.
- Commission a given SCL block.
- Configure alarms using Alarm Number Method.
- Commission a PID controller with automatic optimization.
- Create user-specific blocks for reporting, handling and analyzing program errors.
- Manage recipes in SIMATIC HMI.
- Set-up communication between SIMATIC CPUs based on Industrial Ethernet.
- Integrate and connect to PROFINET IO, HMI, and the SINAMICS G120 Drive.

Topics
- Training Units and Addressing
- Hardware and Software Commissioning
- Reusable Blocks
- Complex Data and their Addressing
- Structured Control Language - SCL
- Recipes and Alarm Number Method
- Introduction to Industrial Communication
- Technology Objects

Automation - SIMATIC S7 with TIA Portal
S7 TIA Portal Distributed Safety Engineering

Course code: SCT-PTSFTE1A

Target audience
This course is for engineers and personnel responsible for implementing and maintaining SIMATIC S7 TIA Portal Distributed Safety systems.

Prerequisites
- TIA Portal Programming 1 OR
- TIA Portal Service 1

Course Profile
This course introduces the student to a Siemens Distributed Safety PLC application. Participants receive knowledge on applying the system per relevant standards, Failsafe Hardware Module details and parameterization, Safety Program structure and implementation, Safety Communications, System Diagnostics and introduction to Drive Safety. The course format is a combination of instruction and hands-on exercises. A realistic model is used for demonstrations and student exercises. Exercises allow students to practice tasks such as configuration, programming, and code debugging.

Objectives
Upon completion of this course, the student shall be able to:
- Locate and understand the applicability of the detailed documentation and development resources
- Select and configure the Failsafe Hardware components, and understand their application restrictions.
- Properly implement a Safety program in the PLC.
- Document, test, and troubleshoot the system.

Topics
- Introduction to Distributed Safety
- Standards discussion
- ET 200SP distributed I/O system
- Hardware Configuration
- Safety Advanced: Programming
- Fail-safe Communication
- F-system Response Times
Automation – TIA Portal S7-1200 / S7-300 / S7-1500

Siemens Certified Programmer Refresher

Course code: SCT-PTTIAR1A

Target audience
This course is intended for experienced STEP 7 TIA Portal programmers seeking a Siemens Certified Programmer Certification which is recognized globally. This refresher course will help prepare the participant for the Siemens Certified Programmer Certification Test.

Prerequisites
• S7 TIA Portal Programming 1
• S7 TIA Portal Programming 2
• S7 TIA Portal Programming 3

Course Profile
This is a hands-on, instructor led course that provides a focused review and skills refresher of topics taught in TIA Portal Programming 1, 2, and 3 courses. This refresher is intended to prepare the student for the Siemens Certified Programmer Test (course code SCT-S7TIAC3A) held at the conclusion of the course.

Objectives
Upon completion of this course, the student shall be able to:
• Successfully Complete the Siemens Certified Programmer Test.

Topics
• Course Overview
• Hardware
• Tag (Symbol) Table
• Program principles
• Troubleshooting Program errors
• HMI
• MICROMASTER Drive
• Independent Project

Siemens Certified Programmer – Test

Course code: SCT-S7TIAC3A

Target audience
This Siemens PCS7 Certified Engineer Test is intended for experienced STEP 7 TIA Portal programmers who have met the prerequisites below.

Prerequisites
• Advanced Programming Experience
• S7 TIA Portal Programming 1
• S7 TIA Portal Programming 2
• S7 TIA Portal Programming 3

Course Profile
This is a comprehensive performance test designed to assess the skills of a PLC programmer applicant for Siemens PLC systems. This is a practical, skills-based certification test covering topics taught during TIA Portal Programming 1, 2, and 3. It is recommended that the student attend the “Siemens Certified Programmer Refresher” in preparation for the test (course code SCT-PTTIAR1A).

Topics
• Skills and abilities of a Siemens Certified Programmer
• Parameterization of the CPU
• Configuration of the distributed I/O
• Configuration of a drive
• Programming of an HMI device
• Structuring of a program using a structogram
• Implementation of the program taking account of the aspect of reusability through the use of: Functions, function blocks and multi-instances
• Complex data structures
• Library functions for integrated error handling
• Passing the test entitles the participant to be awarded "Siemens Certified Programmer" status recognized globally by Siemens, distributors, partners and other companies. At minimum, prerequisites must be met in order to take the test.
• Taking the recommended Siemens "Certified Programmer Refresher” provides a quality hands-on review of all needed skills prior to taking the certification test. The test is included as part of the review course.
Automation – SIMATIC HMI / SIMATIC HMI with TIA Portal

Learning Map

Foundation and Prerequisite training available from the Online Self-paced Learning Automation: Siemens and Maintenance: Siemens PLCs categories. An arrow indicates a prerequisite for the next course.

TIA Portal

WinCC Professional

- TIA Portal WinCC Professional Configuration (SCADA)
  - SCT-PTWCSP1A

WinCC Comfort/Advanced

- TIA Portal WinCC Comfort / Advanced Configuration
  - SCT-PTWCSU2A

Simulators available for SIMATIC HMI / SIMATIC HMI with TIA Portal

TIA Portal Courses

SIMATIC S7-1500 Training Case
Order number: 6ZB2310-0CW00

S7 Classic Courses

SIMATIC S7 Training Case
S7-300 TIA
Order number: 6ZB2310-0CK00 (with control panel)
Order number: 6ZB2310-0CM00 (with comfort panel)

See pages 12-15 for more information

Classic

WinCC SCADA

- SIMATIC WinCC SCADA Engineering
  - SCT-S7WINI2A

- SIMATIC WinCC SCADA Advanced Database
  - SCT-S7WINC2B

- SIMATIC WinCC SCADA Sustaining
  - SCT-S7WINM1A

WinCC Flexible

- Introduction to WinCC Flexible (Virtual Instructor-led)
  - SCT-S7OILWFXC1A

- SIMATIC HMI Panel with WinCC Flexible
  - SCT-S7WFXC1A

- WinCC Flexible with HMI Lite
  - SCT-S7TLWM1A

How to Video Library

Reinforces learning in the Automation - SIMATIC S7 with STEP 7 v5.5 and CNC - SINUMERIK Power Line categories.

Online Product Support

Industrial Automation

Register today at usa.siemens.com/sitrain or call 1-800-333-7421.
Upon completion of this course, the student shall be able to:

- Create and manage a WinCC project.
- Integrate components between WinCC Flex and STEP 7.
- Create tags from the STEP 7 symbol table.
- Design graphic screens and tools.
- Configure internal and external tags.
- Define & administer user security.
- Set and test the Alarms and Messages.
- Configure, archive and display trends.
- Understand basic recipe building.
- Understand basic scripting services.
- Understand Sm@rt Services.

**Topics**

- WinCC Flexible System Overview
- Basic Graphics Design
- Advanced Graphics Design
- User Management
- Process Value Archiving
- Recipe Management
- Run-Time Scripting
- Sm@rt Access and Service

Course Profile

This course provides a comprehensive review of the features and capabilities of Siemens WinCC Flexible software. Students will perform a complete system configuration including project configuration, graphics design and system integration. Students will also build skills with the user management tools including security, access, alarms and messaging. Advanced functionality such as recipe creation and scripting are briefly introduced through scenario applications. The course concludes with Siemens unique Sm@rt services for plant wide web and system access. Throughout this course lecture materials are complimented with hands-on exercises which build a working WinCC Flexible application.

**Objectives**

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

- Create and manage a WinCC project.
- Integrate components between WinCC Flex and STEP 7.
- Create tags from the STEP 7 symbol table.
- Design graphic screens and tools.
- Configure internal and external tags.
- Define & administer user security.
- Set and test the Alarms and Messages.
- Configure, archive and display trends.
- Understand basic recipe building.
- Understand basic scripting services.
- Understand Sm@rt Services.

**Topics**

- WinCC Flexible System Overview
- Basic Graphics Design
- Advanced Graphics Design
- User Management
- Process Value Archiving
- Recipe Management
- Run-Time Scripting
- Sm@rt Access and Service
Automation – SIMATIC HMI with TIA Portal

TIA Portal WinCC Comfort / Advanced Configuration

Course code: SCT-PTWCMP1A

Target audience
This course is for automation control engineers or maintenance staff designing, configuring or maintaining a control system application configured with SIMATIC TIA Portal WinCC Advanced software. *NOTE: This TIA Portal course is for configuring Panels and/or Machine mounted HMI.

Prerequisites
- Basic knowledge of automation technology.

Course Profile
This course provides a comprehensive review of the features and capabilities of Siemens SIMATIC TIA Portal WinCC Advanced software. Students will perform a complete system configuration including project configuration, graphics design and system integration. Students will also build skills with the user management tools including security, access, alarms, and messaging.

Objectives
Upon completion of this course, the student shall be able to:
- Create and manage a WinCC Advanced project.
- Integrate components between WinCC Flex and STEP 7.
- Create tags from the STEP 7 symbol table.
- Design graphic screens and tools.
- Configure internal and external tags.
- Define & administer user security.
- Set and test the Alarms and Messages.
- Configure, archive and display trends.
- Configure a basic recipe.

Topics
- WinCC Advanced System Overview
- Creating and transferring a Project
- Basic Graphics Design
- Advanced Configuration Functions
- User Management
- The Message System
- Tag Logging (Archiving), Trends, and Trend Configuration
- Recipe Management

Automation – SIMATIC HMI with TIA Portal

TIA Portal WinCC Professional Configuration (SCADA)

Course code: SCT-PTWCSWP1A

Target audience
This course is for PLC users with engineering or maintenance experience who will be designing and configuring automation systems and their application programs using Siemens TIA Portal Windows Control Center (WinCC) Professional SCADA (Supervisory Control and Data Acquisition). *NOTE: This TIA Portal course is for configuring WinCC.

Prerequisites
- Basic knowledge of automation technology.

Course Profile
Using a model application, this course provides a system overview of WinCC Professional with emphasis on its capabilities and special features. Detailed configuration procedures will be studied in an order compatible with the typical development of an industrial application.

Objectives
Upon completion of this course, the student shall be able to:
- Create and manage WinCC Projects.
- Integrate components between WinCC and TIA Portal.
- Create WinCC tags in STEP 7 symbol table.
- Design complex graphic.
- Configure internal and external tags.
- Set and test the WinCC Alarms and Messages.

Topics
- System overview TIA Portal,
- SIMATIC WinCC (SCADA)
- Creating a SIMATIC WinCC Professional project and user administration
- Configuring the connection to the SIMATIC S7 automation system
- Establishing the operator interface.
- Fundamentals of creating graphics displays for human machine interfaces.
- Navigating through the plant displays
- Message representation, message logging, message configuring
- Variable logging, trend configuring and plotting

Automation – SIMATIC HMI with TIA Portal

Introduction to WinCC Flexible
(Virtual Instructor-led)

Course code: SCT-570ILWFXC1A

Target audience
This course is for automation control engineers or maintenance staff who will be designing, configuring or maintaining a control system application configured with Siemens WinCC Flexible software.

Course Profile
This course provides a rich introduction to the features and capabilities of Siemens WinCC Flexible software. Students will perform a system configuration including project configuration, graphics design and system integration. Throughout this course, lecture materials are complimented with hands-on exercises which build a working WinCC Flexible application. This is a hands-on course filled with configuration exercises in WinCC Flexible. Students will use advanced software tools of STEP 7 including PLCsim to complete system configuration, troubleshooting, and functional testing of applications. Messaging, alarms, security, and archiving will not be covered in this introduction.

Objectives
Upon completion of this course, the student shall be able to:
- Create and manage a WinCC Flex project.
- Integrate components between WinCC Flex and STEP 7.
- Create tags from the STEP 7 symbol table.
- Design graphic screens and tools.
- Configure internal and external tags.
- Use PLCsim software to simulate PLC hardware and test user defined WinCC Flexible project.

Topics
- WinCC Flexible System Overview
- The Project
- Basic Graphics Design
- Advanced Graphics Design
Automation – NETWORKING

Learning Map

Foundation and Prerequisite training available from the Online Self-paced Learning Automation: Siemens and Maintenance: Siemens PLCs categories. An arrow indicates a prerequisite for the next course.

<table>
<thead>
<tr>
<th>Maintenance</th>
<th>Engineering Core</th>
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</thead>
<tbody>
<tr>
<td>SIMATIC NET PROFIBUS, Ethernet, PROFINET</td>
<td>SIMATIC NET PROFIBUS, Ethernet, PROFINET</td>
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<tr>
<td>4.5 DAYS</td>
<td>4.5 DAYS</td>
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<tr>
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<td>SCT-S7NETS1A</td>
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<tr>
<td>PROFINET with Industrial Ethernet</td>
<td>PROFINET</td>
</tr>
<tr>
<td>4 DAYS</td>
<td>3 DAYS</td>
</tr>
<tr>
<td>SCT-PTTIAPNA</td>
<td>SCT-S7PNTP1B</td>
</tr>
</tbody>
</table>

Simulators available for networking

- **S7 Classic**
  - PROFINET Training Case
  - Order number: 6ZB2520-0AG02

- **TIA Portal**
  - PROFINET TIA Training module
  - Order number: 6ZB2520-0AJ00

See pages 12-15 for more information

How to Video Library

Reinforces learning in the Automation – SIMATIC S7 with STEP 7 v5.5.

Online Product Support

Industrial Automation
Automation – SIMATIC NET

SIMATIC NET PROFIBUS, Ethernet, PROFINET

Course code: SCT-S7NETS1A

Target audience
This course is for maintenance personnel involved with sustaining or commissioning S7 industrial Ethernet / PROFINET network.

Prerequisites
- S7 TIA Programming 1 OR
- S7 Automation Maintenance 1 AND S7 Automation Maintenance 2

Course Profile
This course provides a working knowledge of Industrial Ethernet, PROFIBUS and Actuator-Sensor Interface (AS-i) networks within an S7 PLC automation system. Students will build skills with the basics of network installations, configuration and troubleshooting. This course covers sensor, field and enterprise level networks including hardware and software requirements, topologies and installation rules.

Objectives
Upon completion of this course, the student shall be able to:
- Describe and view Industrial Network architecture and components.
- Install and configure a simple PROFINET network including, PC connection, interface modules, couplers, software and cables
- Configure and troubleshoot SEND/RECEIVE connections
- Perform network diagnostics using the NCM and SIMATIC Net tools
- Install and address various network connections and components.

Topics
- Introduction to Industrial Ethernet
- PROFIBUS I/O
- PROFIBUS Topology
- Network Troubleshooting
- I-Shared Devices
- Web Server Overview
- Exercises

Topics
- Introduction to SIMATIC NET
- Network components and installation guidelines
- ISO Transport Protocol (IE and FDL)
- TCP/IP Protocol
- Communication Processor (CPs) Options
- NCM software overview
- S7 Communication functions
- SIMATIC Manager network projects
- Network Configurations
- Error trapping diagnostics for PROFIBUS DP
- Network performance
- AS-i Network Overview
- Introduction to OPC Server

Automation – TIA PORTAL

PROFINET with Industrial Ethernet

Course code: SCT-PTTIAPNA

Target audience
This course is for PLC users with programming, engineering or maintenance experience who will be maintaining automation systems and their PROFINET networks in the TIA Portal.

Prerequisites
- TIA Portal Service2 OR
- TIA Portal Programming1 (or Bridging STEP 7 5.x to TIA Portal Programming)

Course Profile
Siemens, a member of PROFIBUS International (PI), offers you the opportunity to learn about the future-oriented PROFINET, the open Industrial Ethernet standard for automation. Using SIMATIC NET components, you will learn how to parameterize, commission and troubleshoot a PROFINET network quickly and effectively. Numerous practical exercises reinforce the acquired theoretical knowledge.

Objectives
Upon completion of this course, the student shall be able to:
- Troubleshoot/manage PROFINET networks.
- Configure and program using PROFINET IO.
- Commission media redundancy.
- Utilize integrated Web-services in PROFINET devices.
- Use and configure Shared Device.
- Parameterize/utilize applications of I-Device.
- Parameterize/utilize Links (PN/PN coupler).
- Configure an S7 connection and program using the S7 communication blocks, PUT/GET, SEND/RECEIVE.
- Configure Ethernet connections (ISO on TCP, TCP, UDP) and program using the T-communication blocks, T-SEND/T-RECEIVE.

Topics
- Basics of Industrial Ethernet and PROFINET
- Overview of Network Components / SIMATIC NET Selection Tool (SCALANCE SW)
- Commissioning a PROFINET IO Device
- Topology Editor
- Diagnostics
Automation – SIMATIC S5

S5 Maintenance & Programming 1
Course code: SCT-S5SPS5G1A

Target audience
This course is for maintenance technicians and controls engineers who are responsible for sustaining and upgrading SIMATIC S5 systems and their programs.

Prerequisites
• Computer Expertise

Course Profile
This course provides the basic skills necessary to troubleshoot S5 hardware and modify programs using STEP5 software. Students will build skills with a typical S5 hardware sustaining ranging from module wiring and configuration to parameterization and addressing.

Objectives
Upon completion of this course, the student shall be able to:
• Build a basic S5 hardware configuration
• Troubleshoot the system hardware using status indicators and STEP5 software tools
• Program discrete logic operations (AND, OR, etc.)
• Create and edit documentation
• Program timers and counters (time, count events, etc.)
• Program comparison operations
• Program integer math operations
• Troubleshoot common software errors

Topics
• Fundamental control concepts
• Programming basics
• Hardware overview
• Digital operations
• Counters, compares, and arithmetic
• Timer operations
• Introduction to Data and Function blocks
• Troubleshooting

4.5 Days
Register here
More information
Product support

Automation – SIMATIC S5

S5 Maintenance & Programming 2
Course code: SCT-S5SPS5G2A

Target audience
This course is for maintenance technicians and controls engineers who are responsible for advanced troubleshooting and program modifications for the SIMATIC S5 system.

Prerequisites
• S5 Maintenance & Programming 1

Course Profile
This course provides advanced level skills in system troubleshooting and program modifications. Students will concentrate on the Supplemental Operation Set and the creation and diagnostics of system function blocks. Students will also gain experience with Statement List instructions (STL). Advanced hardware, communications and diagnostics will be reinforced in this course. Students will build skills in analog signal processing and troubleshooting. Students will also modify or develop programs that will be loaded into a SIMATIC S5 controller with field simulation using a PG740 programming unit (or equivalent) to test its operation.

Objectives
Upon completion of this course, the student shall be able to:
• Utilize STEP 5 instructions from the supplemental operations set.
• Write or modify programs for analog I/O.
• Create user defined function blocks without formal operands.
• Create user created function blocks with formal operands.
• Utilize indirect addressing techniques.
• Create and use basic STL program code.
• Perform advanced hardware configuration and troubleshooting tasks.

Topics
• Program structure
• Function Blocks (FBs)
• Programming user-defined function blocks
• Organization Blocks (OBs)
• Analog input and output

4.5 Days
Register here
More information
Product support
Simulators

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# Machine Tool – Power Line / HMI Advanced

## Learning Map

Foundation and Prerequisite training available from the **Online Self-paced Learning** Machining: Siemens CNC and Machining: CNC categories. An arrow indicates prerequisite for next course.

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<td>SCT-SN84DP1B</td>
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<td><strong>840D Power Line Maintenance</strong></td>
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<tr>
<td>S7 Programming 1</td>
<td><strong>4.5 DAYS</strong></td>
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<td>S7 Programming 1</td>
<td><strong>4.5 DAYS</strong></td>
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<tr>
<td>840Dpl Maintenance 1 w/ HMI Advanced</td>
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</table>

### How to Video Library

Reinforces learning in the **CNC-SINUMERIK Power Line** category.

### Online Product Support

SINUMERIK CNC
CNC – SINUMERIK Power Line
840Dpl Maintenance 1 w/ HMI Advanced

Course code: SCT-SN84DM1A

Target audience
This course is for maintenance personnel of CNC machines that utilize the SINUMERIK 840D / 810D controls, using the MMC-103 or PCU-50 Operator Interfaces. Personnel using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

Prerequisites
- Microsoft Windows XP Expertise

Course Profile
This course emphasizes the maintenance aspects of the control. A complete overview of the softkey menus of the SINUMERIK D-series control is provided, including the basic principles of operating the control. Demonstrations are given on how to competently manage maintenance functions and how to backup and restore the PLC program and control data. Class format is predominately hands-on exercises.

Objectives
Upon completion of this course, the student shall be able to:
- Edit and store machine data.
- Back-up and restore control data to the internal hard drive.
- Back-up and restore PLC program data to the internal hard drive.
- Back-up and restore data to an external data medium.
- Diagnose problems using Siemens generated alarm displays.
- Use on screen help functions to help diagnose alarm related problems.
- Understand the hardware configuration.
- Access and utilize major operating areas of the control.

Topics
- SERVICES, DIAGNOSIS AND START-UP navigation
- Data back-up and restoration
- Diagnostic functions using Siemens generated alarms and LED displays
- Hardware Overview

CNC – SINUMERIK Power Line
840Dpl Maintenance 2 w/ HMI Advanced

Course code: SCT-SN84DM2A

Target audience
This course is for maintenance personnel of CNC machines that utilize the SINUMERIK 840D / 810D controls, using the MMC-103 or PCU-50 Operator Interfaces. Personnel using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

Prerequisites
- 840Dpl Maintenance 1 w/ HMI Advanced

Course Profile
This course provides a complete overview of the system hardware, software and configuration of the SINUMERIK 840D CNC, and it and apos;s integrated SIMODRIVE 611D Digital Servo drive system. The course includes information regarding the hardware, configuration, and commissioning procedures for utilization of the SIMODRIVE 611D. Class format is predominately hands-on exercises.

Objectives
Upon completion of this course, the student shall be able to:
- Back-up and restore all data to the MMC-103/PCU-50, using Symantec GHOST software.
- Access and interpret the control's status displays for troubleshooting purposes.
- Analyze system messages, alarm messages, and LED indications to identify failures.
- Set and/or adjust specific machine data in the control.
- Optimize a closed loop position control system.

Topics
- Initialization of the control
- Initialization of the digital servo system
- System data back-up and restoration
- PLC User program back-up
- Interface signals and status display function
- Axis position control
- Spindle control
- Identifying OEM generated alarms and operator messages
- NC Auxiliary functions
- Identification and setting of 611-D module and motor data in the 840D
- Diagnosis of servo problems in the 840D

CNC – SINUMERIK Power Line
840Dpl Safety Integrated Maintenance

Course code: SCT-SN5SSIM2A

Target audience
This advanced course is designed for controls engineers and service specialists who use the SINUMERIK 840D and Safety Integrated (SI) functions in machine tool applications.

Prerequisites
- 840Dpl Maintenance 2 w/HMI Advanced

Course Profile
This course provides the knowledge and skills that controls engineers and/or maintenance technicians require for familiarization and the operation of an automated machine tool, equipped with a SINUMERIK 840D CNC which uses the optional Safety Integrated System.

Objectives
Upon completion of this course, the student shall be able to:
- Understand the concepts of safety technology and the system requirements for Safety Integrated.
- Have a working knowledge of safety-oriented inputs and outputs for DMP Modules.
- Have a working knowledge of safety-oriented inputs and outputs for Profi Safe Modules.
- Understand the principles related to safe communication.
- Identify, understand, and use Machine Data and interface signals related to Safety Integrated applications.
- Perform error detection procedures related to Safety Integrated applications.
- Evaluate diagnostics and alarm displays
- Understand and perform Test Stop procedures.
- Understand Safety Integrated systems with SAFE SPL and without SAFE SPL.

Topics
- Safety-oriented inputs and outputs
- Safe Standstill
- Safe operational stop
- Securely reduced speed
- Safe software limit switches
- Safe stopping process
- Safe programmable logic
- Safety related Machine Data
- Understand OEM safety related alarms
- Understand checksums
Target audience
This course is for Operator/Programmers of CNC machines that utilize the SINUMERIK 840D / 810D / 840Di controls, with MMC-103 or PCU-50 Operator Interfaces. Personnel who are using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

Prerequisites
- MS Windows Expertise

Course Profile
This course provides a complete overview of the softkey menus of the SINUMERIK D-series CNC and describes the basic principles of operating the control. Demonstrations are given on how to manage part programs, define offsets, and restore programs and control data. Class format is predominately hands-on exercises. Students use SINUMERIK 840D CNC simulators to build proficiency in moving through various menus and in managing part programs.

Objectives
Upon completion of this course, the student shall be able to:
- Edit and store part programs in editing mode, using Siemens-installed editors.
- Back-up and restore workpieces, part programs, and control data to/from internal hard drive.
- Back-up and restore workpieces, part programs, and control data to/from an external data medium.

Topics
- Program management
- Program and subprogram directories
- The Workpiece directory
- Editing subprograms and part programs
- Saving programs to the hard disk
- Saving workpieces and programs to an external data medium

4.5 Days
Register here
More information
Product support

CNC – SINUMERIK Power Line
D Series Operations & Programming 2
w/ HMI Advanced

Course code: SCT-SN84DP2B

Target audience
This course is for Programmers/Engineers who need an advanced understanding of the programming dialect used in the SINUMERIK 840D controls, with a PCU-50/70 Operating Interface.

Prerequisites
- D Series Operations & Programming 1 w/ HMI Advanced

Course Profile
The programming language of the control still retains G-codes, and in fact, can be programmed exclusively using the traditional G-code functions. However, the D-series controls (840D, 840Di, 810D) offer many additional preparatory commands and functions which are currently unique. The course format is a combination of instruction and hands-on exercises. SINUMERIK 840D CNC simulators are set up in the classroom, and configured to simulate an application. Students are assigned practice programs to complete and are encouraged to present machine specific program applications for review within the classroom environment.

Objectives
Upon completion of this course, the student shall be able to:
- Write simple programs for standard machining operations.
- Explain the use of machining (canned) cycles.
- Describe how predefined subroutines and preparatory functions are used.
- Define essential terms
- Describe some of the more sophisticated programming functions

Topics
- Program definitions: Axis coordinating systems, machining cycles and transformations
- File management
- Contour definitions: Interpolation commands, tool compensation/frames, and transition commands
- Variables and arguments
- Advanced functions including NC/PLC Synchronized actions

4.5 Days
Register here
More information
Product support
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Machine Tool – Solution Line / HMI Advanced / HMI Operate

Learning Map

Foundation and Prerequisite training available from the Online Self-paced Learning Machining: Siemens CNC and Machining: CNC categories. An arrow indicates prerequisite for next course.

- **840D Solution Line HMI Advanced Maintenance**
  - S7 Programming 1
    - SCT-S7TIAP1B
  - 840Dsl Maintenance 1
    - SCT-SN84SM1A
  - 840Dsl Maintenance 2
    - SCT-SN84SM2A

- **840D Solution Line HMI Operate Maintenance**
  - S7 Programming 1
    - SCT-S7TIAP1B
  - 840Dsl Maintenance 1
    - SCT-SN84SM1A-OP
  - 840Dsl Maintenance 2
    - SCT-SN84SM2A-OP

- **840D Safety Integrated Maintenance**
  - S7 Programming 1
    - SCT-S7TIAP1B
  - 840Dsl Maintenance 1
    - SCT-SN84SM1A-OP
  - 840Dsl Maintenance 2
    - SCT-SN84SM2A-OP

- **840D Solution Line HMI Advanced Operator**
  - D Series Operations & Programming 1
    - SCT-SN84DP1B
  - D Series Operations & Programming 2
    - SCT-SN84DP2B
  - 840Dsl Maintenance 2
    - SCT-SN84SM2A

- **840D Solution Line HMI Operate Operator**
  - D Series Operations & Programming 1
    - SCT-SN84LP1A-OP
  - 840Dsl Maintenance 2
    - SCT-SN84SM2A

- **840D Safety Integrated OEM**
  - 840Dsl Safety Integrated for OEMs
    - SCT-SNDSL1A

Simulators available for Machine Tool courses

- **S7 Programming 1 Course**
  - S7 Training case
    - Order number: 6ZB2 310-0CM00

- **All SINUMERIK 840D sl courses**
  - SINUMERIK 840D sl Training rack
    - Order number: 6ZB2470-0AL00
  - SINUMERIK 840D sl compact Training case
    - Order number: 6ZB2410-0BG00 1
  - SINUMERIK 840D sl operator panel Training case
    - Order number: 6ZB2310-0CQ00 1

See pages 12-15 for more information.

How to Video Library
Reinforces learning in the CNC-SINUMERIK Solution Line category coming soon.

Online Product Support
SINUMERIK CNC
## CNC – SINUMERIK Solution Line

### 840Dsl Maintenance 1 w/ HMI Advanced

<table>
<thead>
<tr>
<th>Course code: SCT-SN84SM1A</th>
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**Target audience**
This course is designed for electrical/electronic end-user maintenance personnel for machine tools using the new SINUMERIK 840Dsl (Solution Line) controls. The course assumes the customer is using the PCU 50.3, Windows XP-based HMI Advanced software. Personnel using the PCU 20 / HTB / or HMI TCU (Thin Client Unit) interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

**Prerequisites**
- Microsoft Windows XP Expertise

**Course Profile**
This course emphasizes the maintenance aspects of this new version of the SINUMERIK 840D. An overview of the softkey menus of the control is provided, including the basic principles of operating the control. Demonstrations are given on how to competently manage maintenance functions, and for back-up/restore functions of the NC and PLC series start-up.

**Objectives**

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

- Identify the major SINAMICS S120 hardware and indicators in an 840Dsl application.
- Access and utilize the major operating areas of the control.
- Edit and store machine data.
- Back-up and restore NC data to the internal hard drive.
- Back-up and restore PLC program data to the internal hard drive.
- Back-up and restore PROFIBUS drive data to the internal hard drive.
- Back-up and restore NC data to an external data medium.
- Back-up and restore PLC program data to an external data medium.
- Back-up and restore PROFIBUS drive data to an external data medium.

**Topics**
- Data back-up and restoration
- Diagnostic functions
- Hardware Overview

### 840Dsl Maintenance 1 w/ Operate

<table>
<thead>
<tr>
<th>Course code: SCT-SN84SM1A-OP</th>
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**Target audience**
This course is designed for electrical/electronic end-user maintenance personnel for machine tools using the new SINUMERIK 840Dsl (Solution Line) controls. This course assumes the customer is using the PCU 50 or an HMI TCU (Thin Client Unit), with the SINUMERIK Operate system platform.

**Prerequisites**
- MS Windows Expertise

**Course Profile**
This course emphasizes the maintenance aspects of this new version of the SINUMERIK 840D. An overview of the soft key menus of the control is provided, including the basic principles of operating the control. Demonstrations are given on how to competently manage maintenance functions, and for back-up/restore functions of the NC, PLC and PROFIBUS Drive series start-up archive files.

**Objectives**

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

- Identify the major SINAMICS S120 hardware and indicators in an 840Dsl application.
- Access and utilize the major operating areas.
- Edit and store machine data.
- Back-up and restore NC data, PLC program and PROFIBUS drive data to the internal hard drive or System CF Card.
- Back-up and restore NC data, PLC program and PROFIBUS drive data to an external data medium.
- Diagnose problems using SIEMENS generated alarm displays.
- Use on-screen help functions to help diagnose alarm related problems.
- Perform file management functions using System Data Management.

**Topics**
- Data back-up and restoration
- Diagnostic functions
- Hardware Overview
- PLC communications and basic diagnostic functions.

### 840Dsl Maintenance 2 w/ HMI Advanced

<table>
<thead>
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<th>Course code: SCT-SN84SM2A</th>
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**Target audience**
This course is for maintenance personnel of CNC machines that utilize the SINUMERIK 840D / 810D controls, using the MMC-103 or PCU-50 Operator Interfaces. Personnel using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

**Prerequisites**
- 840Dsl Maintenance 1 w/HMI Advanced

**Course Profile**
This course provides a complete overview of the system hardware, software and configuration of the SINUMERIK 840D CNC, and its integrated SIMODRIVE 611D Digital Servo drive system. The course includes information regarding the hardware, configuration, and commissioning procedures for utilization of the SIMODRIVE 611D.

**Objectives**

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

- Back-up and restore all data to the MMC-103 / PCU-50, using Symantec GHOST software.
- Access and interpret the control’s status displays for troubleshooting purposes.
- Analyze system messages, alarm messages, and LED indications to identify failures.
- Set and/or adjust specific machine data in the control.
- Optimize a closed loop position control system.

**Topics**
- Initialization of the control
- Initialization of the digital servo system
- System data back-up and restoration
- PLC User program back-up
- Interface signals and status display function
- Axis position control
- Spindle control
- Identifying OEM generated alarms and operator messages
- NC Auxiliary functions
- Identification and setting of 611-D module and motor data in the 840D
- Diagnosis of servo problems in the 840D
CNC – SINUMERIK Solution Line

840Dsl Maintenance 2 w/ Operate

Course code: SCT-SNSLM2A-OP

Target audience
This advanced maintenance course is designed for electrical/electronic end user maintenance personnel, and supporting manufacturing/production engineers who wish to know more about the new SINUMERIK 840Dsl (Solution Line) CNC Controls.

Prerequisites
• MS Windows XP Expertise
• 840Dsl Maintenance 1 w/ Operate

Course Profile
This course includes information regarding system hardware, system software, configuration, and commissioning procedures related to both the 840Dsl and its integrated SINAMICS S-120 servo/spindle drive system. Course format is a mixture of lecture and hands-on exercises. SINUMERIK 840Dsl simulators are utilized to allow the student to build proficiency with the hardware and software systems.

Objectives
Upon completion of this course, the student shall be able to:
• Back-up and restore all NC data to the control
• Back-up and restore all PLC data
• Back-up and restore all PROFIBUS drive data
• Access and interpret control status displays for troubleshooting purposes
• Analyze system messages, alarm messages, and LED indications to identify failures
• Set and/or adjust machine data
• Optimize a closed loop position control system
• Perform practical start-up and servicing.

Topics
• Drive configuration and fundamentals of optimization
• Adaptation of control functions
• Start-up of compensations, synchronous actions, and axial coupling
• PLC Interface
• Axis position control
• Spindle control
• NC Auxiliary functions

840Dsl Operations & Programming 1 w/HMI Operate

Course code: SCT-SNSLP1A-OP

Target audience
This course is for Operator/Programmers of CNC machines that utilize the new SINUMERIK 840Dsl (Solution Line) controls. This course presumes the customer is using the PCU 50.3 or an HMI TCU (Thin Client Unit), with the SINUMERIK Operate system platform.

Prerequisites
• MS Windows Expertise

Course Profile
This course provides a complete overview of the soft key menus of the SINUMERIK 840Dsl controls, and describes the basic principles of operating the control. Demonstrations are given on how to manage part programs, define offsets, save and restore programs and control data.

Objectives
Upon completion of this course, the student shall be able to:
• Edit and store part programs in editing mode, using Siemens-installed editors.
• Back-up and restore work pieces, part programs, and control data to/from internal hard drive or the system CF Card.
• Back-up and restore work pieces, part programs, and control data to/from an external data medium.
• Use all Manual Mode operations.
• Use all MDI Mode operations.
• Use all Automatic Mode operations.
• Set and edit work offsets.
• Set and edit tool offsets.

Topics
• Program and subprogram directories.
• The Work piece directory.
• Editing subprograms and part programs.
• Saving programs to the hard disk.
• Saving work pieces and programs to an external data medium.
• Manual Mode operations.
• MDI Mode operations.
• Automatic Mode operations.
• Parameter editing operations.

840Dsl Safety Integrated for OEMs

Course code: SCT-SNDSLI1A

Target audience
German Course Code equivalent: NC-845LSIW. This advanced course is designed for controls engineers and service specialists who configure and commission the SINUMERIK 840Dsl Safety Integrated (SI) functions in machine tool applications.

Prerequisites
• 840Dsl Maintenance 1 w/HMI Advanced
• 840Dsl Maintenance 2 w/HMI Advanced
• S7 TIA Programming 1 OR
• 840Dsl Maintenance 1 w/Operate
• 840Dsl Maintenance 2 w/Operate
• S7 TIA Programming 1

Course Profile
During this course, the student will learn about configuring and commissioning the function Safety Integrated using the SINUMERIK 840Dsl.

Objectives
Upon completion of this course, the student shall be able to:
• Understand the concepts of safety technology and the system requirements for Safety Integrated.
• Have a working knowledge of safety-oriented inputs and outputs for PROFIsafe Modules.
• Understand the principles related to safe communication over PROFINET and PROFIBUS.
• Commission, understand, and use SAFE Machine Data and interface signals related to Safety Integrated Inputs and Outputs.
• Commission Safety Integrated systems with SAFE SPL (Safe Programmable Logic)
• Commission Safe Operational Stop, Safe Standstill, Safe Velocity, and Safe Cams.
• Commission SAFE limits and understand the User Agreement and its implications.

Topics
• General information on safety technology; new standards
• Description of the safe basic functions
• Procedure during startup and troubleshooting
• Description of the machine data and interface signals
### CNC – SINUMERIK Solution Line

**840Dsl Safety Integrated Maintenance**

- **Course code:** SCT-SNLSM1A
- **Target audience:** This advanced course is designed for controls engineers and service specialists who use the SINUMERIK 840Dsl and Safety Integrated (SI) functions in machine tool applications.

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<thead>
<tr>
<th>Prerequisites</th>
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<td>840Dsl Maintenance 2 w/ HMI Advanced AND</td>
<td>S7 TIA Programming 1 OR</td>
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<tr>
<td>840Dsl Maintenance 2 w/ Operate</td>
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**Course Profile**

This course provides the knowledge and skills that controls engineers and/or maintenance technicians require for familiarization and the operation of an automated machine tool, equipped with a SINUMERIK 840Dsl CNC which uses the optional Safety Integrated System. The goal of the class is to teach the students to identify the various types of applications associated with the Safety Integrated System, to achieve a working knowledge of the concepts, and to identify and diagnose Safety Integrated related problems.

**Objectives**

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

- Understand the concepts of safety technology and the system requirements for Safety Integrated.
- Have a working knowledge of safety-oriented inputs and outputs for PROFISafe Modules.
- Understand the principles related to safe communication.
- Identify, understand, and use Machine Data and interface signals related to Safety Integrated applications.
- Perform error detection procedures
- Evaluate diagnostics and alarm displays

**Topics**

- Safety-oriented inputs and outputs
- Safe operational stop
- Securely reduced speed
- Safe software limit switches
- Safe programmable logic

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### CNC – SINUMERIK Solution Line

**D Series Operations & Programming 1 w/ HMI Advanced**

- **Course code:** SCT-SN84DP1B
- **Target audience:** This course is for Operator/Programmers of CNC machines that utilize the SINUMERIK 840D / 810D / 840Di controls, with MMC-103 or PCU-50 Operator Interfaces. Personnel who are using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

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<tbody>
<tr>
<td>MS Windows Expertise</td>
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**Course Profile**

This course provides a complete overview of the SINUMERIK D-series CNC and describes the basic principles of operating the control. Demonstrations are given on how to manage part programs, define offsets, and restore programs and control data.

**Objectives**

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

- Edit and store part programs in editing mode, using Siemens-installed editors.
- Back-up and restore workpieces, part programs, and control data to/from internal hard drive.
- Back-up and restore workpieces, part programs, and control data to/from an external data medium.

**Topics**

- Program management
- Program and subprogram directories
- The Workpiece directory
- Editing subprograms and part programs
- Saving programs to the hard disk
- Saving workpieces and programs to an external data medium

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### CNC – SINUMERIK Solution Line

**D Series Operations & Programming 2 w/ HMI Advanced**

- **Course code:** SCT-SN84DP2B
- **Target audience:** This course is for Programmers/Engineers who need an advanced understanding of the programming dialect used in the SINUMERIK 840D controls, with a PCU-50/70 Operating Interface.

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</table>

**Course Profile**

The programming language of the control still retains G-codes, and in fact, can be programmed exclusively using the traditional G-code functions. However, the D-series controls (840D, 840Di, 810D) offer many additional preparatory commands and functions which are currently unique.

**Objectives**

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

- Write simple programs for standard machining operations.
- Explain the use of machining (canned) cycles.
- Describe how predefined subroutines and preparatory functions are used.
- Define essential terms
- Describe some of the more sophisticated programming functions

**Topics**

- Program definitions
- File management
- Contour definitions
- Variables and arguments
- Advanced functions

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# Drives & Motion – MASTERDRIVE / SINAMICS / SIMOTION

## Learning Map

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### How to Video Library

Reinforces learning in Low-voltage Drives.

### Online Product Support

Drive Technology
Drives – MASTERDRIVE

6RA70 DC
Setup & Maintenance

Course code: SCT-DVR70M1A

Target audience
This course is for engineering and maintenance personnel responsible for installing, maintaining, and troubleshooting drive systems that utilize the 6RA70 DC Drive base unit.

Prerequisites
• Completion of the following quickSTEP online course: Basics of AC Drives

Course Profile
This course provides the knowledge and skills necessary to setup and maintain the operation of the 6RA70 “Base Unit.” An analysis of the required hardware and the relationship between the various operational components is presented at the beginning of the course. Standard DC motor data and the relationship of this information as applied to the standard features of the drive is discussed.

Objectives
Upon completion of this course, the student shall be able to:
• Identify hardware configurations and verify required connections.
• Configure “base drive” logic and Self-Tune the drive for proper operation.
• Identify the use of the available fixed function and programmable analog & binary Inputs/Outputs.
• Troubleshoot the Armature and Field converters.
• Troubleshoot an invalid configuration of the drive by utilizing the MPU Board logic level prints.
• State the basic use and operation of the 6RA70 regulators.

Topics
• Introduction to LOW & LARGE HP Drive Hardware
• Power section connections and signal flow
• Parameter settings & logical grouping
• Motor data & related drive settings
• Base Drive initial setup requirements
• Self-Tuning capabilities
• Overview of MPU board logic diagrams
• Analog & Binary I/O configuration
• Analysis of “software” connectors
  • (BICO Technology)

4.5 Days

Drives – MASTERDRIVE

6SE70 CUMC
Setup & Maintenance

Course code: SCT-DVS70M1B

Target audience
This course is for personnel responsible for installing, maintaining, and commissioning drive systems that utilize the CUMC basic and supplementary functions.

Prerequisites
• Completion of the following quickSTEP online course: Basics of AC Drives

Course Profile
This course provides training on the advantages of the motion control and apos - s innovative technology for easy installation, troubleshooting and diagnostics.

Objectives
Upon completion of this course, the student shall be able to:
• Configure logic and set-up the drive for proper operation.
• Identify the use of the available programmable analog & binary Inputs/Outputs.
• Develop a logical and concise method of effectively troubleshooting indicated drive FAULTS and WARNINGS.
• Configure and operate the CUMC using “Simolink.”
• State the basic function and/or use of the CUMC option boards.
• Identify hardware configurations and verify required connections.
• Use motor and drive data for proper initialization of the CUMC.

Topics
• Introduction to CUMC Drive Hardware
• Parameter settings
• Motor data & related drive settings
• Initial setup requirements
• Overview of MPU board logic diagrams
• Analog & Binary I/O configuration
• Interpretation of WARNING & FAULT codes
• Overview of the CUMC communication capabilities
• Overview of the CUMC OPTIONS

4.5 Days

Drives – MASTERDRIVE

6SE70 CUV C
Setup & Maintenance

Course code: SCT-DVS70M1C

Target audience
This course is for personnel responsible for installing, maintaining, and troubleshooting drive systems that utilize the 6SE70VC AC Drive base unit.

Prerequisites
• Completion of the following quickSTEP online course: Basics of AC Drives

Course Profile
This course provides the knowledge and skills necessary to setup and maintain the operation of the 6SE70VC “Base Unit.”

Objectives
Upon completion of this course, the student shall be able to:
• Configure “base drive” logic and Self-Tune the drive for proper operation.
• Identify the use of the available fixed function and programmable analog & binary Inputs/Outputs.
• Effectively troubleshoot an invalid configuration of the drive by utilizing the Function Diagrams; representing firmware logic level prints.
• Identify hardware configurations and verify required connections.
• State the basic use and operation of the 6SE70VC regulators.
• Develop a logical and concise method of effectively troubleshooting indicated drive FAULTS and WARNINGS.
• Configure and operate the 6SE70VC using the “USS” and SIMOLINK (Peer-to-Peer link) protocols.

Topics
• Introduction to available “Base Unit” Hardware
• Power section connections and signal flow
• Parameter settings & logical grouping
• Motor data & related drive settings
• Base Drive initial setup requirements
• Self-Tuning capabilities
• Analog & Binary I/O configuration
• Usage of CONTROL & STATUS words
• Converter and Inverter

4.5 Days
Motion Control - SIMOTION
SIMOTION
System Course
Course code: SCT-DVSMOM1A

Target audience
This course is for SIMOTION system developers and users who are responsible for creating, commissioning, or maintaining SIMOTION based motion control systems.

Prerequisites
- STRONG RECOMMENDATION: SINAMICS S Setup and Maintenance (SCT-DVSNAM1A) is highly recommended.

Course Profile
This course is intended to provide knowledge and skills related to SIMOTION systems as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises. This course will utilize the D425-2 DP/PN motion control module and the SINAMICS servo drive controller for all exercises. The skills acquired will be portable to SIMOTION C-based and P-based controllers.

Objectives
Upon completion of this course, the student shall be able to:
- Locate modules, terminals, options, and features of the SIMOTION Controller and the SINAMICS S120 Drive.
- Commission the SINAMICS servo controller for use with SIMOTION.
- Upload, back-up, and download projects to SIMOTION and SINAMICS.
- Create, document, test, and troubleshoot a SIMOTION program.
- Create and monitor system variables.
- Interpret diagnostic codes and messages.

Topics
- SIMOTION and SINAMICS construction, options, and features
- Commissioning SINAMICS and SIMOTION
- SIMOTION Execution System
- Configuring axes - Drive optimization and SCOUT configuration
- Programming in MCC, Ladder, Structured Text
- Monitoring and Troubleshooting User Programs
- Communications and HMI
- Diagnostics and Troubleshooting
- Monitoring the system with IT DIAG

Motion Control - SIMOTION
SIMOTION
System Maintenance
Course code: SCT-DVMSYM1A

Target audience
This course is for Maintenance Technicians and Site Engineers who are responsible for maintaining systems with Siemens motion based control systems including SIMOTION and SINAMICS S.

Prerequisites
- Basic computer skills
- Basic Industrial Electronics experience

Course Profile
This course is intended for sustainers of Siemens motion based systems. The goal of this course is to build foundation skills for quick diagnostics, troubleshooting and repair of the motion system controls. Students will learn the system hardware, basic software tools and communications to a level necessary to troubleshoot common problems and support system commissioning and operation.

Objectives
Upon completion of this course, the student shall be able to:
- Commission a SINAMICS S120 drive controller for use with SIMOTION.
- Navigate a typical motion systems project and use the software tools, documentation and help system for efficient troubleshooting.
- Perform project backup and restoration, and firmware migration.
- Properly utilize the various types of motion system tasks, such as the background task, interrupt tasks, cyclic tasks, fault tasks and motion tasks.

Topics
- SINAMICS Family Overview
- Commissioning and Diagnostic Tool Scout
- SINAMICS Commissioning
- Totally Integrated Automation
- Analog & Set-point Channels and Control loops
- Closed Loop Control
- The SIMOTION System
- Starting up the SIMOTION control
- Programming in MCC and ladder and testing simple user programs
- Using IT DIAG

Motion Control - SIMOTION
SIMOTION
System Programming
Course code: SCT-DVSMOP1A

Target audience
This course is for SIMOTION system developers and users who are responsible for creating, commissioning, or maintaining SIMOTION based motion control systems.

Prerequisites
- SIMOTION System Course

Course Profile
This course enables the participant to structure, generate and put in operation complex SIMOTION control program using MCC-charts and Structured Text. Examples of different applications user programs will be generated and ways of structuring programs will be shown. The focus lies on programming with Structured Text, Ladder and MCC.

Objectives
Upon completion of this course, the student shall be able to:
- Create programs in Structured Text, Ladder, and MCC.
- Use commands for motion control within the user program.
- Assign programs to execution system.
- Create structures and subprograms (FC and FB).
- Use function blocks of certain libraries.
- Use variables and data structures.
- Use tools for testing and diagnosis of the program.

Topics
- System Design Functionality
- Programming
- Structured Text
- POS Axis Output CAM
- Gear CAM
- Libraries
Drives - SINAMICS

SINAMICS Drives

Introduction

Course code: SCT-DVSINM1A

**Target audience**
This course is intended for personnel responsible for the long term maintenance and diagnostics of Siemens Drives. It is intended as the entry level SINAMICS drive course and provides the foundation for SINAMICS G120 and S120 Drives setup and maintenance classes.

**Prerequisites**
- Basic Computer Skills
- Basic Industrial Electricity / Electronics experience
- Competent in safe use of common electrical test tools such as VOM, DMM, oscilloscope, etc.

**Course Profile**
This course provides a basic review of electrical and electronics principles pertaining to industrial applications and develops skills pertinent to variable frequency drives. It also provides an introduction to SINAMICS drives and SINAMICS STARTER commissioning software. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

**Objectives**
Upon completion of this course, the student shall be able to:
- Operate and Test Drive Functionality via Operator Panels
- Perform Basic Drive Set Up and Hardware Commissioning
- Get Connected to a Drive with STARTER Commissioning Software
- Operate and Test Drive Functionality via STARTER Control Panel

**Topics**
- Basic Electricity for industry review
- Introduction to Motor Construction and Operating Principles
- Introduction to AC Drives
- Drive Safety
- Introduction to SINAMICS Low Voltage Drives
- SINAMICS drive basic Setup/commissioning
- Utilizing Operator Panels
- Introduction to SINAMICS STARTER

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Drives - SINAMICS

SINAMICS S 6RA80 DCM Setup & Maintenance

Course code: SCT-DVDCMM1A

**Target audience**
This course is intended to provide knowledge and skills related to the 6RA80 SINAMICS DC MASTER or DCM Control Module as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

**Objectives**
Upon completion of this course, the student shall be able to:
- Locate modules, terminals, options, and features of the SINAMICS DC MASTER Converter
- Perform commissioning using the BOP20 and AOP30 operator panels and SINAMICS STARTER
- Perform all required Drive optimizations
- Upload, back-up, and download projects to the Drive system
- Firmware Upgrade/Downgrade
- Compare and analyze parameter files
- Configure Analog, Digital, and Comm. I/O
- Configure, Trace, and Evaluate BICO connections in the drive control logic
- Configure common Drive Functions
- Evaluate drive system performance using the trace function
- Evaluate operating states, alarms and fault codes

**Topics**
- DCM Drive construction, options, and features
- SINAMICS STARTER
- Commissioning
- DCM Drive Functions
- Diagnostics and Troubleshooting
- Maintenance and Repair
- Integration into an Automation System
- Peer to Peer Interfaces
- Drive Control Chart (DCC)

---

Drives - SINAMICS

SINAMICS G130/G150 Setup & Maintenance

Course code: SCT-DVSNMG1A

**Target audience**
This course is intended for engineering and maintenance personnel responsible for installing, maintaining, and troubleshooting drive systems that utilize the SINAMICS G130/G150 Drive.

**Prerequisites**
- IPOV Online Courses, 20 AC Motor Basics, 24 AC Drive Basics

**Course Profile**
This course is intended to provide knowledge and skills related to the SINAMICS G130/G150 drive as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

**Objectives**
Upon completion of this course, the student shall be able to:
- Locate modules, terminals, options, and features of the SINAMICS G130/G150.
- Commission the Drive with AOP30 and SINAMICS STARTER
- Perform all required Drive optimizations
- Take local control of a drive using the AOP30 and the STARTER Control Panel
- Upload, back-up, and download projects to the Drive system
- Firmware Upgrade/Downgrade
- Compare and analyze parameter files
- Configure Analog, Digital, and Comm. I/O
- Configure, Trace, and Evaluate BICO connections in the drive control logic
- Configure common Drive Functions
- Evaluate drive system performance using the trace function
- Evaluate operating states, alarms and fault codes

**Topics**
- Drive construction, options, and features
- SINAMICS STARTER
- Commissioning
- Drive Functions
- Diagnostics and Troubleshooting
- Maintenance and Repair
- Integration into an Automation System
# Drives & Motion – MASTERDRIVE / SINAMICS / SIMOTION

## Drives - SINAMICS

### SINAMICS G120

**Basic Maintenance**

**Course code:** SCT-DVG12M1A

**Target audience**

This course is intended for personnel responsible for the long term maintenance and diagnostics of the Siemens Drive.

**Prerequisites**

- Completion of the following quickSTEP online course: Basics of AC Drives

**Objectives**

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

- Trace voltage waveform from Input rectifier to Motor output.
- Utilize G120 Architecture to troubleshoot Hardware Modules.
- Troubleshoot the Power Electronics.
- Operate the Drive via IOP Keys.
- Perform Basic Commissioning and Set Up via IOP.
- Backup and Restore the Operating Program via Memory Card and IOP.
- Establish communication with STARTER.
- Upload, Archive, and Restore G120 Configuration via STARTER.
- Control Drive via STARTER Control Panel.
- Trace Signals within the G120 configuration utilizing BICO technology.
- Troubleshoot Drive failure to respond to a Command Source and Setpoint Channel Source.
- Use the Diagnostic Fault and Warning Buffer to troubleshoot the system.
- Troubleshoot Regulation (speed or torque) problems.
- Install or Replace a Motor, Power Module, and Control Unit.
- Replace a Cooling Fan.
- Obtain technical support online or via hotline.

**Topics**

- Safety, PPE, and ESD.
- Perform Hardware Module Diagnostics.
- Set up and Operate the G120 via Intelligent Operator Panel (IOP).
- Back-up and restore operating program via IOP and Memory Card.
- Utilize STARTER software to Upload, Archive and Restore G120 Project.
- Troubleshoot a SINAMICS drive system using STARTER application diagnostics.
- Evaluate Drive System Performance.
- Replace Defective Hardware.

### SINAMICS S120

**Basic Maintenance**

**Course code:** SCT-DVS12M1A

**Target audience**

This course is intended for personnel responsible for the long term maintenance and diagnostics of the Siemens Drive.

**Prerequisites**

- Completion of the following quickSTEP online course: Basics of AC Drives

**Objectives**

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

- Trace voltage waveform from Input rectifier to Motor output.
- Utilize S120 Architecture to troubleshoot Hardware Modules.
- Troubleshoot the Power Electronics.
- Operate the Drive via AOP30.
- Perform Basic Commissioning and Set Up with AOP30.
- Save the Operating Program to Memory Card.
- Establish communication with STARTER.
- Upload, Archive, and Restore S120 Configuration via STARTER.
- Control Drive via STARTER Control Panel.
- Trace Signals within the S120 configuration utilizing BICO technology.
- Troubleshoot Drive failure to respond to a Command Source and Setpoint Channel Source.
- Use the Diagnostic Fault and Warning Buffer to troubleshoot the system.
- Troubleshoot Regulation (speed or torque) problems.
- Install or Replace a Motor, Power Module, and Control Unit.
- Replace a Cooling Fan.
- Obtain technical support online or via hotline.

**Topics**

- Safety, PPE, and ESD.
- Perform Hardware Module Diagnostics.
- Set up and Operate the S120 via AOP30.
- Save operating program to Memory Card via AOP30.
- Utilize STARTER software to Upload, Archive and Restore S120 Project.
- Troubleshoot a SINAMICS drive system using STARTER application diagnostics.
- Evaluate Drive System Performance.
- Replace Defective Hardware.
- Obtain technical support.

### SINAMICS S

**Setup & Maintenance**

**Course code:** SCT-DVSNA1A

**Target audience**

This course is for engineering and maintenance personnel responsible for installing, maintaining and troubleshooting drive systems that use the SINAMICS S (S110, S120, S150) drive systems.

**Prerequisites**


**Course Profile**

This course is intended to provide knowledge and skills related to the SINAMICS S drive as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

**Objectives**

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

- Locate modules, terminals, options, and features on the SINAMICS S series drives.
- Commission the Drive with SINAMICS STARTER.
- Perform all required Drive optimizations.
- Take local control of a drive using the STARTER Control Panel.
- Upload, back-up, and download projects to the Drive system.
- Firmware Upgrade/Downgrade.
- Configure Analog, Digital, and Comm. I/O.
- Configure, Trace, and Evaluate BICO connections in the drive control logic.
- Configure common Drive Functions.
- Evaluate drive system performance using the trace function.
- Evaluate operating states, alarms and fault codes.

**Topics**

- Drive construction, options, and features.
- SINAMICS STARTER.
- Commissioning.
- Drive Functions.
- Diagnostics and Troubleshooting.
- Maintenance and Repair.
- Integration into an Automation System.
- Drive Control Chart (DCC).
- Technology Functions.
Drives - SINAMICS

SINAMICS G120
Setup & Maintenance

Course code: SCT- DV120M1A

Target audience
This course is for engineering and maintenance personnel responsible for installing, maintaining and troubleshooting drive systems that use the SINAMICS G120 series AC drives.

Prerequisites
• Siemens Online Self-paced Learning, Automation: Siemens, 20 AC Motor Basics, 24 AC Drive Basics

Course Profile
This course is intended to provide knowledge and skills related to the SINAMICS G120 as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

Objectives
Upon completion of this course, the student shall be able to:
• Locate modules, terminals, options, and features of the SINAMICS G120 series drives.
• Commission the Drive with Operator Panels (IOP, BOP-2) and SINAMICS STARTER
• Perform all required Drive optimizations
• Take local control of a drive using Operator Panels and the STARTER Control Panel
• Upload, back-up, and download projects to the Drive system
• Configure Analog, Digital, and Comm. I/O
• Configure, Trace, and Evaluate BICO connections in the drive control logic
• Configure common Drive Functions
• Evaluate drive system performance using the trace function
• Evaluate operating states, alarms and fault codes

Topics
• Drive construction, options, and features
• SINAMICS STARTER
• Commissioning
• Drive Functions
• Diagnostics and Troubleshooting
• Maintenance and Repair
• Integration into an Automation System
• Technology Functions

4.5 Days

Register here
More information
Product support
## Drives & Motion - SINAMICS GH180 – Perfect Harmony Medium Voltage Drives

### Learning Map

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### GH180 Air Cooled – Operations
- Drives – Air Cooled Operations
  - LDA-LDNAOT1

### GH180 Air Cooled – Orientation
- Drives – Operation & Orientation
  - LDA-LDNGADO1

### GH180 Air Cooled – Advanced
- Drives – Operation, Maintenance & Repair
  - LDA-LDNGAS1B

### GH180 Liquid Cooled - Operations
- Drives – Liquid Cooled Operations
  - LDA-LDNGLOT1

### GH180 Liquid Cooled – Orientation
- Drives – Operation & Orientation
  - LDA-LDNGLDO1

### GH180 Liquid Cooled - Advanced
- Drives – Operation, Maintenance & Repair
  - LDA-LDNGLS1C

### Legacy Air/Liquid - Advanced
- Drives – Air/Liquid Cooled Operation Maintenance and Repair
  - LDA-LDLALS1A

### Next Generation WC2 - Advanced
- Drives – Liquid Cooled Operation Maintenance and Repair
  - LDA-LDGLS1B

### Next Generation HV - Advanced
- Drives – Liquid Cooled Operation Maintenance and Repair
  - LDA-LDHVGE1A

---

**How to Video Library**
Reinforces learning in Medium-voltage Drives.

**Online Product Support**
SINAMICS GH180 Perfect Harmony
SINAMICS GH180 Perfect Harmony
Air Cooled
Drives Operation and Orientation

Course code: LDA-LDNGAD01

Target audience
This course is intended for maintenance and electrical personnel who need to obtain an understanding of the Variable Frequency Drive (VFD) operation and monitoring capabilities.

Objectives
Upon completion of this course, the student shall be able to:
- Understand SINAMICS GH180 operation
- Understand safety concerns
- Identification of power source required for the VFD to operate via customer drawings
- Use keypad for basic programming
- Use keypad for monitoring (speed demand, speed feedback, motor voltage and motor current) (alarm and fault logs)
- Monitor the V/Hz curve
- Monitor the current draw per the process
- Record baseline variables for future reference

Topics
- Introduction to the SINAMICS GH180 VFD
- Safety
- Identify isolation
- Keypad operation
- Control door options - operation
- Operating the SINAMICS GH180 VFD
- Record baseline variables

Prerequisites
- Understanding facility safety requirements
- Operation fundamentals of non VFD equipment and your process, as well as, electrical operation and safety.

Course Profile
(6SR3 - Gen3, 3E) (6SR4-Gen4, 4E) (6SR5-Gen5) (Controls – NXG and NXGPro)
This course will cover: Theory of Operation, Safety variables related to the VFD, Hardware identification, Power Supply sources required to run the VFD, Operation of the VFD, General overview of the Keypad, Alarms and Faults, Spare Parts, and the Cooling System – Air Cooled Drives Operation and Monitoring capabilities.

Prerequisites
- Understanding safety requirements of your facility.

SINAMICS GH180 Perfect Harmony
Air Cooled
Drives Operation

Course code: LDA-LDNGADO1

Target audience
This course is intended for Operations personnel or site personnel to obtain an understanding of the Variable Frequency Drive (VFD) operation and monitoring capabilities. Equipment safety will be covered.

Objectives
Upon completion of this course, the student shall be able to:
- Have an understanding on how the SINAMICS GH180 operates
- Understand the safety concerns when working around the VFD
- Identification of all input power sources
- Identify isolation, lockout/tagout, verification, grounding procedures
- Operate VFD in automatic and manual mode
- Identify customers permissive’s required for the VFD to operate
- Use the keypad for basic programming (accel/decel rates, min/max speed)
- Use the keypad for monitoring (speed demand, speed feedback, motor voltage and motor current) (alarm and fault logs)
- Monitor the V/Hz curve
- Monitor the current draw per the process
- Record baseline variables for future reference

Topics
- Introduction to the SINAMICS GH180 VFD
- Safety
- Identify isolation
- Keypad operation
- Control door options - operation
- Operating the SINAMICS GH180 VFD
- Record baseline variables

Prerequisites
- Understanding safety requirements of your facility.
## Drives & Motion - SINAMICS GH180 - Perfect Harmony Medium Voltage Drives

### SINAMICS GH180 Perfect Harmony Air Cooled

**Drives Operation**

**Course code:** LDA-LDNGLOT1

**Target audience**

This course is intended for operations personnel who need to obtain an understanding of the Variable Frequency Drive (VFD) operation and monitoring capabilities. Equipment safety issues will be covered.

**Prerequisites**

- Understanding of safety requirements for your facility

**Course Profile**

(6SR3 - Gen3, 3E) (6SR4-Gen4, 4E) (6SR5-Gen5) (Controls – NXG and NXGPro)

This course session includes general VFD theory, safety, and operation in manual and automatic control. Covered in this course are: Keypad for monitoring dynamics of operation, alarms and faults. The course will be performed with the VFD. All training is hands-on.

**Objectives**

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

- Have an understanding on how the SINAMICS GH180 operates
- Understand the safety concerns when working around the VFD
- Identification of all input power sources
- Identify isolation, lockout/tagout, verification, grounding procedures
- Operate the VFD in automatic and manual mode
- Identify permissives required for the VFD to operate
- Use the keypad for basic programming. (accel/decel rates, min/max speed)
- Use the keypad for monitoring (speed demand, speed feedback, motor voltage and motor current) (alarm and fault logs)
- Monitor the V/Hz curve
- Monitor the current draw per the process
- Record baseline variables for future reference

**Topics**

- Introduction to the SINAMICS GH180 VFD
- Safety
- Identify isolation
- Keypad operation
- Control door options - operation
- Operating the SINAMICS GH180 VFD
- Baseline variables

### SINAMICS GH180 Perfect Harmony Liquid Cooled

**Drives Operation and Orientation**

**Course code:** LDA-LDNGLDO1

**Target audience**

This course is for maintenance and electrical personnel who need to obtain an understanding of the Variable Frequency Drive (VFD) operation and monitoring capabilities. Equipment Safety issues will be covered. All power connections and safety issues will be covered.

**Prerequisites**

- Understanding safety requirements of your facility
- Operation fundamentals of non VFD equipment and your process, as well as, electrical operation and safety

**Course Profile**

(6SR325 – WC3) (6SR327- Base) (Controls – NXG and NXGPro)

This course will cover: theory of operation, safety variables related to the VFD, hardware identification, power supply sources required to operate the VFD, operation of the VFD, general review of the keypad, alarms and faults, spare parts, and the cooling system

**Objectives**

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

- Understand SINAMICS GH180 operation
- Identification of power source required for the VFD to operate via customer drawings
- Identify isolation, lockout/tagout, verification, Grounding procedures
- Operate the VFD - automatic and manual modes
- Identify customers permissive’s required for the VFD to operate per drawing
- Use keypad for basic programming
- Record base-line variables for future reference
- Navigate through customer schematics - power and control connections
- Understand spare parts required and how to replace a power cell and control boards
- Monitor the digital inputs/outputs on the control boards
- Understand Tool Suite and its capabilities.
- Monitor the cooling cabinet – identify level of liquid, conductivity, flow, internal liquid temperature - navigation HMI

### SINAMICS GH180 Perfect Harmony Liquid Cooled

**Drives Operation, Maintenance & Repair**

**Course code:** LDA-LDNLGSL1C

**Target audience**

This course is for maintenance and electrical personnel who operate, maintain and troubleshoot the Variable Frequency Drive (VFD). Personnel will learn how to safely operate, maintain, and troubleshoot the VFD.

**Prerequisites**

- Compliant with Safety requirements of NFPA 70E and your facility
- PC with administrative rights required
- Strong fundamental electrical background

**Course Profile**

(6SR325 – WC3) (6SR327- Base) (Controls – NXG and NXGPro)

This advanced course includes VFD operation, safety, PPE, and operation in automatic/manual modes. Also includes theory of operation, component details, and troubleshooting. It is formatted to provide both instructional and hands on tasks used in maintaining, analyzing and troubleshooting the VFD.

**Objectives**

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

- Identify/isolate/verify/lockout-tagout
- Identify power/hardware components
- Identify all control hardware components
- Navigate site specific assembly/schematics
- Monitor, navigate and program via the keypad
- Load/connect/monitor/navigate/program via Tool Suite
- Upload alarm/fault/historic/event/parameters
- Operate VFD in manual/automatic modes
- Obtain VFD operating baseline values
- Recommend and correctly install spare parts
- Understand the liquid cooled cabinet, components and functionality

**Topics**

- Introduction SINAMICS GH 180 – air cooled
- Basics of VFD’s and motors
- Specifications and configuration
- Power electronics
- VFD power topology
- Equipment drawings
- Control hardware
- Tool Suite/Tool Host
- Configuration
- Key parameters
- Cooling system/HMI/heat exchanger
SINAMICS GH180 Perfect Harmony
Air/Liquid Cooled - Legacy
Drives Operation, Maintenance & Repair
Course code: LDA-LDLALS1A

Target audience
This course is for maintenance and electrical personnel, who operate, maintain and troubleshoot the Variable Frequency Drive (VFD). Attendees will learn how to safely operate, maintain, and troubleshoot the VFD.

Prerequisites
• Compliant with safety requirements of NFPA 70E and your facility
• PC with administrative rights required
• Strong fundamental electrical background

Course Profile
(WC2) (Controls – Legacy/NXG)
This advanced course includes VFD operation, safety, PPE, and operation in automatic/manual modes. Also includes theory of operation, component detail, and troubleshooting. It is formatted to provide both instructional and hands on tasks utilized in maintaining, analyzing and troubleshooting the VFD. Use of hyper terminal is the software tool utilized to upload and download files from the VFD.

Objectives
Upon completion of this course, the student shall be able to:
• Identify/Isolate/Verify/lockout-tagout
• Identify power/hardware components
• Navigate site specific assembly/schematics
• Monitor, navigate and program via keypad
• Connect – via hyperterminal and upload alarm/fault/history/parameters
• Use a laptop to extract valuable information which can be utilized for troubleshooting, and backing up the original files: i.e. parameters, EEPROM, SOP, historic, and fault logger
• Operate VFD in manual/automatic modes
• Recommend and correctly install spare parts
• Understand the liquid cooled cabinet, components and functionality

Topics
• Introduction SINAMICS GH 180 – legacy
• Basics of VFD’s and motors
• Specifications
• Safety
• Power electronics & VFD power topology
• Equipment drawings
• Control hardware
• Key parameters
• Cooling system/HMI/heat exchanger

SINAMICS GH180 Perfect Harmony
Liquid Cooled - WCII
Drives Operation, Maintenance & Repair
Course code: LDA-LDNGLSLS1B

Target audience
This course is for maintenance and electrical personnel, who operate, maintain and troubleshoot the Variable Frequency Drive (VFD). Attendees will learn how to safely operate, maintain, and troubleshoot the VFD.

Prerequisites
• Compliant with safety requirements of NFPA 70E and your facility
• PC with administrative rights required
• Strong fundamental electrical background

Course Profile
(WC2) (Controls – Legacy/NXG)
This advanced course includes Drive operation, safety, personal protective equipment, and operation in automatic/manual modes. Also includes theory of operation, component details, and troubleshooting. It is formatted to provide both instructional and hands on tasks utilized in maintaining, analyzing and troubleshooting the VFD.

Objectives
Upon completion of this course, the student shall be able to:
• Identify/Isolate/Verify/lockout-tagout
• Identify power/hardware components
• Navigate site specific assembly/schematics
• Monitor, navigate and program via keypad
• Load/Connect/monitor/navigate/program via Tool Suite
• Upload alarm/fault/historic/event/parameters
• Operate VFD in manual/automatic modes
• Recommend and correctly install spare parts
• Understand the liquid cooled cabinet, components and functionality

Topics
• Introduction SINAMICS GH 180 – air cooled
• Basics of VFD’s and motors
• Specifications
• Power electronics and drive power topology
• Equipment drawings
• Control hardware
• Tool Suite/Tool Host
• Configuration
• Key parameters
• Cooling system/HMI/heat exchanger

SINAMICS GH180 Perfect Harmony
Liquid Cooled - High Voltage
Drive Operation, Maintenance & Repair
Course code: LDA-LDHVGE1A

Target audience
This course is for maintenance and electrical personnel, who operate, maintain and troubleshoot the VFD. Attendees will learn how to safely operate, maintain, and troubleshoot the Variable Frequency Drive (VFD).

Prerequisites
• Compliant with Safety requirements of NFPA 70E and your facility
• PC with administrative rights required
• Strong fundamental electrical background

Course Profile
(High Voltage Design - 1375 Vac Cell) (Controls – Legacy/NXG Control)
This advanced course includes VFD operation, safety, Personal Protective Equipment, and operation in automatic/manual modes. Also includes theory of operation, component details, and troubleshooting. It is formatted to provide both instructional and hands on tasks for in maintaining, analyzing and troubleshooting the VFD.

Objectives
Upon completion of this course, the student shall be able to:
• Identify/Isolate/Verify/lockout-tagout
• Identify power/hardware components
• Navigate site specific assembly/schematics
• Monitor, navigate and program via keypad
• Load/Connect/monitor/navigate/program via Tool Suite
• Upload alarm/fault/historic/event/parameters
• Operate VFD in manual/automatic modes
• Recommend and correctly install spare parts
• Understand the liquid cooled cabinet, components and functionality

Topics
• Introduction SINAMICS GH 180 – air cooled
• Basics of VFD’s and motors
• Specifications
• Power electronics and drive power topology
• Equipment drawings
• Control hardware
• Tool suite/tool host I (4 MORE LINES BELOW)
• Configuration
• Key parameters
• Cooling system/HMI/heat exchanger
Health and Safety Catalog Siemens now offers an entire Online Self-paced Learning catalog of courses dedicated to safety. Partnered with Underwriters Laboratory, over 150 interactive titles are available along with our 400 unique technology courses. www.usa.siemens.com/ospt.

### Electrical Maintenance & Safety

#### Learning Map

**Core courses**

- **OSHA Electrical Safety & Arc Flash**
  - SCT-EMESOM1A
  - 2 DAYS

- **Risk Assessment Management**
  - SCT-MSRAMG1A
  - 1.5 DAYS

**Optional learning**

- **Electrical Maintenance**
  - SCT-EMEMTM1A
  - 4 DAYS

- **Evaluating Electrical Tests**
  - SCT-EENEETM1A
  - 4 DAYS

### Optional and specialty courses:

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<td>840Dsl Safety Integrated Maintenance</td>
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<td>S7-300F Distributed Safety Sustaining</td>
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<td>SCT-TUVFSE1A</td>
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Maintenance & Safety

840Dpl Safety Integrated Maintenance

Course code: SCT-SNSSIM2A

Target audience
This advanced course is designed for controls engineers and service specialists who use the SINUMERIK 840D and Safety Integrated (SI) functions in machine tool applications.

Prerequisites
- 840Dpl Maintenance 2 w/HMI Advanced

Course Profile
This course provides the knowledge and skills that controls engineers and/or maintenance technicians require for familiarization and the operation of an automated machine tool, equipped with a SINUMERIK 840D CNC which uses the optional Safety Integrated System.

Objectives
Upon completion of this course, the student shall be able to:
- Understand the concepts of safety technology and the system requirements for Safety Integrated.
- Have a working knowledge of safety-oriented inputs and outputs.
- Have a working knowledge of safety-oriented inputs and outputs for PROFISafe Modules.
- Understand the principles related to safe communication.
- Identify, understand, and use Machine Data and interface signals related to Safety Integrated applications.
- Perform error detection procedures related to Safety Integrated applications.
- Evaluate diagnostics and alarm displays.
- Understand and perform Test Stop procedures.
- Understand Safety Integrated systems with SAFE SPL and without SAFE SPL.

Topics
- Safety-oriented inputs and outputs
  - Safe Standstill
  - Safe operational stop
  - Securely reduced speed
  - Safe software limit switches
  - Safe stopping process
  - Safe programmable logic
  - Safety related Machine Data
  - Understand OEM safety related alarms
  - Understand checksums

Maintenance & Safety

840Dsl Safety Integrated for OEMs

Course code: SCT-SNDSL1A

Target audience
This advanced course is designed for controls engineers and service specialists who configure and commission the SINUMERIK 840Dsl Safety Integrated (SI) functions in machine tool applications.

Prerequisites
- 840Dsl Maintenance 1 w/HMI Advanced
- 840Dsl Maintenance 2 w/HMI Advanced
- S7 TIA Programming 1 OR 840Dsl Maintenance 1 w/Operate
- 840Dsl Maintenance 2 w/Operate

Course Profile
During this course, the student will learn about configuring and commissioning the function Safety Integrated using the SINUMERIK 840Dsl.

Objectives
Upon completion of this course, the student shall be able to:
- Understand the concepts of safety technology and the system requirements for Safety Integrated.
- Have a working knowledge of safety-oriented inputs and outputs for PROFISafe Modules.
- Understand the principles related to safe communication over PROFINET and PROFIBUS.
- Commission, understand, and use SAFE Machine Data and interface signals.
- Commission Safety Integrated systems with SAFE SPL (Safe Programmable Logic)
- Commission Safe Operational Stop, Safe Standstill, Safe Velocity, and Safe Cams.
- Commission SAFE limits and understand the User Agreement and its implications.

Topics
- System requirements
  - General information on safety technology
  - Description of the safe basic functions
  - Procedure during startup and troubleshooting
  - Description of the machine data and interface signals

Maintenance & Safety

840Dsl Safety Integrated Maintenance

Course code: SCT-SNDSLSM1A

Target audience
This advanced course is designed for controls engineers and service specialists who use the SINUMERIK 840Dsl and Safety Integrated (SI) functions in machine tool applications.

Prerequisites
- 840Dsl Maintenance 2 w/HMI Advanced
- S7 TIA Programming 1 OR 840Dsl Maintenance 2 w/Operate

Course Profile
This course provides the knowledge and skills that controls engineers and/or maintenance technicians require for familiarization and the operation of an automated machine tool, equipped with a SINUMERIK 840Dsl CNC which uses the optional Safety Integrated System. The goal of the class is to teach the students to identify the various types of applications associated with the Safety Integrated System, to achieve a working knowledge of the concepts, and to identify and diagnose Safety Integrated related problems.

Objectives
Upon completion of this course, the student shall be able to:
- Understand the concepts of safety technology and the system requirements for Safety Integrated.
- Have a working knowledge of safety-oriented inputs and outputs for PROFISafe Modules.
- Understand the principles related to safe communication.
- Identify, understand, and use Machine Data and interface signals related to Safety Integrated applications.
- Perform error detection procedures.
- Evaluate diagnostics and alarm displays.

Topics
- Safety-oriented inputs and outputs
  - Safe Standstill
  - Securely reduced speed
  - Safe software limit switches
  - Safe stopping process

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Electrical Maintenance

**Electrical Maintenance**

Course code: SCT-EMEMTM1A

**Target audience**
This course is for Maintenance electricians and technicians, supervisors and people in the process of cross training from non-electrical trades.

**Course Profile**
This course is designed to increase knowledge in the areas of basic electrical theory and the preventive maintenance of many types of electrical equipment. The typical voltage range of equipment covered is 480V to 15kV.

**Objectives**

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

- Identify Various Power Distribution System Arrangements.
- Explain Techniques for Evaluating Insulation Tests.
- Solve Electrical Maintenance Problems Using Basic Mathematics.
- Determine preventive Maintenance Procedures for Many Types of Electrical Equipment.
- Identify Governmental Safety Regulations
- Describe Safe Work Practices

**Topics**
- Power System Fundamentals
- and Documentation
- Electrical Tests
- Fundamental Principles of Power System Equipment
- Equipment Maintenance
- Fundamentals of Power System Analysis
- Electrical Safety

---

**Electrical Maintenance**

**Evaluating Electrical Tests**

Course code: SCT-EMEETM1A

**Target audience**
This course is recommended for technicians, maintenance engineers and maintenance planners who have the responsibility to evaluate the electrical tests of motors, generators, transformers, switchgear and power cables of an industrial plant or a commercial building. This course is valuable whether you perform tests yourself or evaluate the test data that is supplied by a testing contractor.

**Course Profile**
The Evaluating Electrical Tests Seminar explains the interpretation of those electrical tests that are most frequently performed on power system apparatus. Emphasis is on the evaluation of test data. The techniques for performing tests are briefly explained to provide background information.

The opportunity to work through classroom exercises that are based on actual-case scenarios in a “teamwork” setting sharpens the evaluation skills of every participant.

**Objectives**

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

- Describe Various Methods of Electrical Testing.
- Interpret Electrical Test Results.
- Predict Expected Operational Equipment Life More Accurately.
- Apply Fundamental Concepts of Electrical Testing to Actual Equipment.
- Select Recommended Testing Procedures for New Equipment.

**Topics**
- Fundamentals of Electrical Measurements
- Evaluating Insulation Tests
- Evaluating Applied-Potential Tests
- Evaluating Circuit Resistance Tests
- Evaluating Overcurrent Tests
- Fundamentals of Cable Fault Localization

---

**Safety**

**TUV SUD Functional Safety Certification**

Course code: SCT-TUVFSE1A

**Target audience**
- Application engineers and system integrators with some experience in Functional Safety
- Project and safety managers
- Designers and safety specialists working in machinery applications

**Prerequisites**
- MS Windows Expertise
- Basics of Functional Safety according to IEC 61508 (SIL) and ISO 13849 (PL)
- Basic exposure to machine safety concepts

**Course Profile**
The objective of this course is to relate the safety concept of IEC 61508 and cover the main principles for Functional Safety. ISO 13849 and IEC 62061 are covered by demonstrating safety principles according to these standards and how they relate to IEC 61508. Software development of safety related control systems is covered in day three followed by a fourth day question and answer session with resulting final exam.

**Objectives**

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

- Analyze the main requirements of IEC 61508 (SIL) and ISO 13849 (PL) for the design of safety related parts.
- Identify risk analysis and selection of protective devices to achieve required risk reduction.
- Review the documentation requirements for machine safety applications typical safety circuits, schematics.
- Identify safety validation requirements.
- Review the software related to safety related control systems.

**Topics**
- IEC 61508 Safety Concepts
- Safety Principles relating to ISO 13849 & IEC 62061
- Software Development of Safety Related Control Systems
- Final Exam
Safety
OSHA Electrical Safety & Arc Flash

Course code: SCT-EMESOM1A

Target audience
This course is designed for anyone specifically cited in paragraph 1910.332 of CFR 29. Included are supervisors of personnel, engineers, technicians, electricians and others facing a higher than normal risk of electrical accidents.

Course Profile

Objectives
Upon completion of this course, the student shall be able to:
- Review the Required Procedures for Locking, Tagging and Grounding of Electrical Equipment.
- Define elements of an Approved Safety Program.
- Determine the Flash Protection Boundary.
- Assess the applicable Hazard/Risk category and select proper Personal Protective Equipment.

Topics
- Electrical Safety Practices
- Working Safely in Electrical Switchgear
- Working Safely with Power Transformers
- Arc Flash Hazards

Days: 2

Register | More Information | Product Support

Safety
S7-300F Distributed Safety Engineering

Course code: SCT-S7SFTE1A

Target audience
This course is for engineers and personnel responsible for implementing SIMATIC Distributed Safety systems, including:
- Selecting the appropriate architecture
- Selecting the components and understanding their specific purposes and limitations
- Specifying the module and system wiring
- Developing the safety PLC program
- Starting up and supporting the system.

Prerequisites
- MS Windows Expertise
- AB-S7 Fastrack OR S7 Automation Maintenance 1 OR S7 TIA Programming 1

Course Profile
This course introduces the student to Siemens Distributed Safety PLC application. Participants receive knowledge on applying the system per relevant standards, Failsafe Hardware Module details and parameterization, Safety Communications, System Diagnostics and introduction to Drive Safety.

Objectives
Upon completion of this course, the student shall be able to:
- Locate and understand the applicability of the detailed documentation and development resources
- Select and configure the Failsafe Hardware components, and understand their application restrictions.
- Properly implement a Safety program in the PLC.
- Document, test, and troubleshoot the system.

Topics
- Introduction to Distributed Safety
- Standards discussion
- Hardware introduction and safety wiring
- STEP 7 quick tour
- STEP 7 Distributed Safety overview and labs
- Reintegration
- Safety Logic
- System Communication overview
- Diagnostics
- Throughput Calculations

Days: 2

Register | More Information | Product Support

Safety
S7-300F Distributed Safety Sustaining

Course code: SCT-S7SFTS1A

Target audience
This course is for SIMATIC S7 300F PLC users who install or maintain automation safety systems and their application programs.

Prerequisites
- MS Windows Expertise
- S7 TIA Programming 1 OR S7 Automation Maintenance 1

Course Profile
This course introduces the student to a Siemens Distributed Safety PLC application. Participants will build skills on commissioning, troubleshooting and upgrading an automation safety system. Failsafe Hardware Module details and parameterization, Safety Program structure and implementation, and System Diagnostics are covered.

Objectives
Upon completion of this course, the student shall be able to:
- Understand the concept of the Siemens S7 safety integrated system.
- Identify S7 safety components.
- Know how to remove and replace S7-300 and ET200S safety components.
- Identify the wiring diagrams of the S7-300 and ET200S safety components.
- Understand the hardware configuration of the S7-300 safety components.
- Identify the LED diagnostics for the S7-300 safety components.
- Identify the addressing of the S7-300 safety components.
- Troubleshooting using the Hardware Configuration diagnostics to identify system faults.

Topics
- Safety Systems Overview
- Introduction to Standard & Safety Block Structure
- S7 Safety CPU and ET200S Hardware
- Safety PLC Hardware Configuration
- Safety Project Overview
- Safety Program Code
- Testing and Diagnostics

Days: 2

Register | More Information | Product Support
Electrical Safety

OSHA Electrical Safety and Arc Flash
(Virtual Instructor-led)

Course code: SCT-EMOILESOM1A

Target audience
This course is designed for anyone specifically cited in paragraph 1910.332 of CFR 29. Included are supervisors of personnel, engineers, technicians, electricians and others facing a higher than normal risk of electrical accidents.

Course Profile
The Electrical Safety and OSHA Requirements Seminar reviews the principles, governmental regulations, work practices and specialized equipment relating to electrical safety. Demonstrations of lockout/tagout and personal protective equipment are provided.


Objectives
Upon completion of this course, the student shall be able to:
- Review the Required Procedures for Locking, Tagging and Grounding of Electrical Equipment.
- Define elements of an Approved Safety Program.
- Determine the Flash Protection Boundary.
- Assess the applicable Hazard/Risk category and select proper Personal Protective Equipment.

Topics
- Electrical Safety Practices
- Working Safely in Electrical Switchgear
- Working Safely with Power Transformers
- Arc Flash Hazards

DAYS
8

Risk Assessment Management

Course code: SCT-MSRAMG1A

Target audience
This course is for users who are involved with developing or sustaining machine safety automation systems and their application programs.

Prerequisites
- Basic knowledge of machine safety standards
- MS Windows Expertise

Course Profile
The objective of this course is to methodically, transparently and comprehensibly present the process of risk assessment as a necessary step in analyzing hazards before risk mitigation. Participants will be introduced to the risk evaluation method outlined in ANSI B11.0 2010 with the aid of pre-completed templates and a real example. Throughout this course students will work on identifying different hazards, defining machine limits, assessment of the original risk, risk reduction techniques, documentation requirements and exercises based on practical examples.

Objectives
Upon completion of this course, the student shall be able to:
- Understanding the Risk Assessment process.
- Identify different hazards during the Risk Assessment process.
- Understand ways of creating customized Risk Assessment templates
- Do a practical implementation of Risk Assessment
- Understand the documentation requirements for Risk assessment.
- Look into conducting a standard-compliant Risk assessment implementation.

Topics
- Introduction to Machine Safety
- Overview of Machine Safety Standards
- What is a Risk Assessment
- Differences - Risk Assessment
- Understanding the Risk Assessment Process
- Types of Risk Reduction
- Benefits of Risk assessment
- Instructor led Risk Assessment
- Exercise based on practical example
- Discussion
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## Power Systems, Switchgear & SIMOCODE

### Learning Map

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- **Foundation and Prerequisite training courses** are available for beginners in the form of the **Online Self-paced Learning**. Our Technology catalog offers general and Siemens-specific titles including Intro to PLC’s, Siemens PLC Programming concepts, and Function Block for Siemens PLC’s. Visit [www.usa.siemens.com/ospt](http://www.usa.siemens.com/ospt) for a complete list of course offerings.

*Online Product Support*

**SENTRON Protection, Switching, Measuring and Monitoring Devices**

**Motor Management and Control Devices SIMOCODE 3UF**
Power & Controls
ACCESS/WinPM.net

Course code: SCT-PSACCE1A

Target audience
This course is intended for individuals who require a detailed introduction to and understanding of how to use and administer ACCESS intelligent devices and the WinPM. Net software package. It is expected that the students of this course have some experience with Siemens ACCESS Power Meters and the WinPM.Net software package.

Course Profile
The Siemens SITRAIN Training Center offers a variety of courses taught by a dedicated team of Siemens training professionals in an environment that promotes quick, efficient learning and encourages active class participation. Our US ACCESS headquarters is located in Norcross, GA., a suburb of Atlanta. Our courses provide an interactive “hands-on” learning environment demonstrating real world scenarios. Each student is provided a personal workstation to use connected through an Ethernet LAN to a range of Siemens ACCESS advanced digital devices. This 3-day course provides hands-on, introductory training for our ACCESS power meters and for the WinPM.Net software system.

Objectives
Upon completion of this course, the student shall be able to:
- Identify the primary applications, features, and advantages of the entire Siemens meter product range.
- Configure meters using their front panel interfaces and through WinPM.Net software.
- Understand the features and functions of the various WinPM.Net software components.
- Enable security features, manage user accounts and assign control privileges.
- Use and configure the analog and/or digital inputs and outputs of Siemens ACCESS meters.
- Install WinPM.Net software for each type of workstation configuration.
- Establish communication to Siemens.
- ACCESS meters using a variety of communication options.
- Generate reports.

Power & Controls
SIMOCODE Pro Motor Management System

Course code: SCT-SCSIMG1A

Target audience
This course is intended for SIMOCODE Pro Motor Management System users who are involved with implementation, startup, operation or maintenance of systems containing the SIMOCODE Pro.

Course Profile
This course introduces the SIMOCODE Pro Motor Management System and its components. Using representative hardware, the student will configure and operate the system. Unit controls allow the student to experience the reaction of the SIMOCODE Pro to over-current, undervoltage or over temperature. SIMOCODE ES software is used to configure the system for operation of a reversing motor and modification of the controls to adapt to user and apos’ requirements.

Objectives
Upon completion of this course, the student shall be able to:
- Configure the SIMOCODE Pro for use as any particular motor starter.
- Set the SIMOCODE Pro to match the motor parameters.
- Modify the SIMOCODE program as required.
- Wire the Inputs, Outputs and Control Power.
- Recognize fault indications and how to reset them.
- Upload/Download the SIMOCODE program.
- Use Diagnostic functions in SIMOCODE ES.
- Replace a SIMOCODE device.
- Install SIMOCODE program.
- Set the SIMOCODE communication address using the addressing plug.
- Integrate SIMOCODE ES into the Step 7 environment.

Topics
- Response to Fault Conditions
  - Device Configuration
  - Protection
- Monitoring Functions
- Inputs/Outputs
- Additional Function Blocks
- Diagnostics
- Communications

Power & Controls
Industrial Switchgear Maintenance

Course code: SCT-EMISGM1A

Target audience
Personnel responsible for the daily operation and maintenance of Medium and Low Voltage Switchgear and Motor Control.

Course Profile
The Industrial Switchgear and Motor Control course provides the basic skills required to safely operate and maintain Medium Voltage switchgear, Low Voltage Switchgear, Medium Voltage Control and Low Voltage Motor Control Centers. Classroom instruction, video tapes, and demonstrations on typical equipment are employed. Sample circuit breakers are used for troubleshooting and replacement of typical parts.

Objectives
Upon completion of this course, the student shall be able to:
- Perform proper safety procedures
- Identify MV & LV switchgear and its ratings
- Identify MV & LV motor control and its ratings
- Identify Insulated case circuit breaker ratings
- Identify Molded case circuit breaker ratings
- Proper and safe racking procedures
- Perform Rack out - Lock out - Tag out procedure
- Verify operation of protective interlocks
- Perform Mechanical and Electrical operation
- Locate and replace close and trip coils and motor
- Interpret Siemens schematics and wiring diagrams

Topics
- Safety procedures around Electrical Equipment
- Introduction to Switchgear Ratings
- Handling, storage and assembly
- Circuit breaker and Motor control ratings
- Cable and control wiring connections
- PT and CPT units
- Current Transformer safety
- Circuit breaker racking procedures
- Rack out, Lock out, tag out procedures
- Explanation of Vacuum Interruption
- Disassembly for maintenance
- Replacing Trip coil, closing coil, and charged motor
- Lubrication
- Insulation testing (Megger)
- Dielectric testing (High Potential)
Power Systems, Switchgear & SIMOCODE

**Power & Controls**

**WL Low Voltage Switchgear Maintenance**

Course code: SCT-EMWLM1A

**Target audience**
For personnel involved in installation, operation, maintenance or testing of Siemens Type WL low voltage switchgear with Electronic Trip Units (ETU).

**Course Profile**
Proper methods for installing the equipment to assure satisfactory service and typical operations such as racking, charging, closing and tripping are explained as well as how to respond should the breaker trip. Typical maintenance and parts replacement are covered.

Features and benefits of the electronic trip units and expansion modules are explained and methods for setting the trip units using front panel controls or by connection to a PC are covered.

**Objectives**

Upon completion of this course, the student shall be able to:
- Identify Siemens WL low voltage switchgear
- Understand the installation requirements for satisfactory service
- Properly rack, charge, close and trip the WL circuit breaker
- Determine the appropriate response to a breaker trip condition
- Perform typical maintenance
- Read and adjust settings on the Electronic Trip Unit using front panel or electronic means
- Recognize the safety features of the lockouts provided and how to use them
- Replace an electronic trip unit, charging motor, closing coil or trip coil
- Perform field testing of the circuit breaker
- Interpret Siemens drawings related to the WL switchgear line

**Topics**
- Introduction to Type WL Low Voltage Switchgear
- Cubicle Structure and Components
- Circuit Breaker Components
- Cubicle and Circuit Breaker as a Unit
- ETU Protective Device
- Maintenance
- Parts Replacement

---

**Electrical Maintenance**

**RL Switchgear Maintenance**

Course code: SCT-EMRLSM1A

**Target audience**
For personnel involved in installation, operation, maintenance or testing of Siemens Type RL low voltage switchgear

**Prerequisites**
- None

**Course Profile**
Proper methods for installing the equipment to assure satisfactory service and typical operations such as racking, charging, closing and tripping are explained, as well as how to respond should the breaker trip. Typical maintenance and parts replacement are covered.

**Objectives**

Upon completion of this course, the student shall be able to:
- Identify Siemens Type RL Low Voltage switchgear and its components
- Perform maintenance checks on the various switchgear circuit breaker components
- Insert, rack, and lift a breaker
- Set and communicator with the Static Tripp III Protective Device
- Interpret Time Current Curve
- Perform maintenance operations such as Rack-Out, Lock-Out, Tag-Out, cleaning, lubrication, resistance testing, etc.
- Close and trip coils
- Replace spring charging motor
- Replace closing springs
- Replace Static Trip III

**Topics**
- Introduction to Type RL Low Voltage Switchgear
- Cubicle Structure and Components
- Circuit Breaker Components
- Cubicle and Circuit Breaker as a Unit
- Static Tripp III Protective Device
- Maintenance
- Parts Replacement

---

**Electrical Maintenance**

**GM Switchgear Maintenance**

Course code: SCT-EMGMSM1A

**Target audience**
For personnel involved in the maintenance and testing of Siemens GM switchgear.

**Prerequisites**
- None

**Course Profile**
Proper methods for maintaining the equipment to assure satisfactory service and typical operations such as racking, grounding, and testing explained, as well as safety related topics. Typical maintenance and parts replacement are also covered.

**Objectives**

Upon completion of this course, the student shall be able to:
- Identify Siemens GM switchgear and its components
- Perform maintenance checks on the various switchgear circuit breaker components
- Insert, rack, and lift a breaker
- Perform safety maintenance operations such as Rack-Out, Lock-Out, Tag-Out, cleaning, lubrication, resistance testing, etc.
- Close and trip coils
- Replace spring charging motor
- Replace closing springs
- Replace racking mechanism
- Ground and test the device

**Topics**
- Introduction to GM switchgear and the theory of vacuum interruption.
- Cubicle Structure and Components
- Circuit Breaker Components
- Cubicle and Circuit Breaker as a Unit
- Maintenance
- Parts Replacement
- Grounding and testing
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Process Analyzers

Learning Map

Maxum Application Courses

Maxum HRVOC Operations & Maintenance

PIA-PAMAXHRV

Maxum HRVOC Operations & Maintenance

PIA-PAMAXHRV

Maxum Operations with GC Portal Level 1

PIA-PAMAXGCP1

Maxum Operations with GC Portal Level 2

PIA-PAMAXGCP2

Maxum Simulated Distillation

PIA-PAMAXUM8

Maxum Analyzer Networks

PIA-PAMAXUM5

Maxum Gas Chromatograph Portal Workshop

PIA-PAMAXGCPWS

Continuous Gas Analyzer Courses

ULTRAMAT

ULTRAMAT 6 Service & Repair

PIA-PACONAC2

OXYMAT

OXYMAT 6 Service & Repair

PIA-PACONAC3

FIDAMAT

FIDAMAT 6 Service & Repair

PIA-PACONAC4

NOXMAT

NOXMAT 6 Service & Repair

PIA-PACONAC5

CEMS

CEMS System Overview

PIA-PACONAC1

ULTRAMAT 23 Service & Repair

PIA-PACGAC23

LDS-6 LASER 6 Operations & Maintenance

PIA-PACGLDS6

Online Product Support

Process Analytics
Process Analyzers

CEMS System Overview
Course code: PIA-PACONAC1

Target audience
This overview course is intended for individuals responsible for the operation and calibration of Siemens Continuous Analyzers as well as CEMS systems.

Course Profile
This course covers maintenance and calibration of the Siemens Continuous Monitoring Analyzers Systems. This course covers hardware and software associated with each analyzer - Ultramat 6, Oxymat 6 and Noxmat 6. This course also covers sample systems associated with each analyzer and sample system with continuous emissions monitoring. Siemens Monitors and generic data collection systems are covered.

Objectives

Upon completion of this course, the student shall be able to:
• Calibrate Ultramat 6, Oxymat 6 and Noxmat 6 analyzers
• Replace the primary modules in these analyzers and the CEMS sample system.
• Perform a bench alignment on the Ultramat 6
• Set parameters in the 6 series analyzers thru the HMI.
• Clean the detector cells

Topics
• Sample Systems
  – Disassembly & Assembly
  – Speed Loops
  – Gas sample probe
• Sample gas cooler
  – Condensation Outlet
  – Operation & Adjustments
• Liquid membrane separator
• Condensation monitors
  – Balston coalescing filters
• ULTRAMAT
  – Cell Cleaning and Maintenance
  – Pneumatic Pump
  – Electronic Board Identification
  – Infrared Analysis
• OXYMAT
  – Bench Disassembly
  – Analyzer Bench Identification
• NOXMAT
• Data Acquisition Systems

FIDAMAT 6 Service & Repair
Course code: PIA-PACONAC4

Target audience
This hardware course is intended for individuals responsible for the maintenance and operation of Siemens Fidamat 6 Continuous Gas Analyzer.

Course Profile
In this course students will setup, calibrate and perform basic maintenance functions on the Siemens Fidamat 6 Flame Ionization Continuous Gas Analyzer. This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives

Upon completion of this course, the student shall be able to:
• Calibrate the Fidamat 6 analyzer using zero and span gasses.
• Replace the primary modules in Fidamat 6
• Light and adjust the FID
• Set parameters in the 6 series analyzers thru the HMI.
• Clean the detector cells

Topics
• Principle of FIDAMAT Operation
  – Electronic Board Identification
  – Analyzer Bench Identification
  – Flame Ionization
• FIDAMAT Maintenance
  – Calibration
  – Cell Cleaning
  – Bench Disassembly
  – Panel Operation
  – Software
• Labs
  – Calibration
  – Hardware Assembly
  – Hardware Disassembly
  – Software and Communications
  – Familiarization and Identification of Hardware and Parts

LDS-6 LASER 6 Operations and Maintenance
Course code: PIA-PACGLDS6

Target audience
This overview course is intended for individuals responsible for the maintenance and operation of Siemens LDS-6.

Course Profile
This course covers maintenance and calibration of the Siemens Laser LDS-6 Analyzer including hardware and software. This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives

Upon completion of this course, the student shall be able to:
• Calibrate the LDS-6 analyzers
• Replace the primary modules in the controller, transmitter and receiver.
• Set parameters thru the HMI and in the LDS Com PC software.
• Perform an alignment between the transmitter and Detector.
Process Analyzers

Maxum Analyzer Networks

Course code: PIA-PAMAXUMS

Target audience
This course is intended for individuals responsible for maintaining the Maxum Process Gas Chromatograph (PGC). Engineers and technicians who will design and maintain the communication network connecting the Maxum PGC, maintenance workstations and the plant Distributive Control Systems (DCS).

Course Profile
This course gives the students hands-on experience with the Maxum Gas Chromatograph Network systems. Students will learn skills they can use to design, install, and maintain Maxum Ethernet networks, Advance Data Hiway systems, Gateway units, Modbus tables, and OPC servers.

Objectives
Upon completion of this course, the student shall be able to:
• Design a Maxum Ethernet network
• Configure a Maxum to communicate on a Maxum Ethernet network.
• Setup ADH to Ethernet Gateway.
• Configure a Maxum to communicate via Modbus or OPC with a DCS interface.
• Edit a Maxum Modbus Map.
• Install and configure a typical Maxum OPC server.

Topics
• Network Overview
• Advance Data Highway (ADH)
  – Design Advance Data Hiway Networks
  – Conduct 9V Battery Loop Test
  – Gateway ADH to Ethernet Configuration
  – Convert ADH Network to Maxum Ethernet
• Ethernet
  – Design Ethernet Networks for Maxum PGC systems with Switches and Fiber Optic Cables
  – Configure Subnets and Gateways
  – Configure Maxum Database for Ethernet
• Modbus
  – Develop Modbus Maps using Excel
  – Troubleshoot communications
  – Simulate DCS communications
• Maxum OPC Server
  – Configure Maxum Tables for OPC
  – Setup Maxum OPC Sever
  – Setup COM/DCOM to Client software

Maxum Gas Chromatograph Portal Workshop

Course code: PIA-PAMAXGCPWS

Target audience
This course is designed for users experienced with Maxum System Manager / EZChrom workstation software who want to learn how to use Siemens Gas Chromatograph Portal (GC Portal) workstation software to perform maintenance on the Maxum Gas Chromatograph.

Prerequisites
• Maxum Operation Level 1
• Maxum Operation Level 2

Course Profile
In this course users will get an overview of the Maxum GC Portal workstation software and complete the same exercises done in Maxum Operation Level 1 and Level 2 using GC Portal.

Topics
• Maxum GC Portal Overview
• Maxum GC Portal Network View
• Backup and Restore Database
• View Chromatograms
• Setup Method
• Analyzer Calibration
• Modify Validation Sequence
• Adding hardware
• Adding user specified alarms
• Add Auto Validation
• Editing a Method
• Formula Editor
• DB Converter
• Upgrading the analyzer

Maxum HRVOC Operations & Maintenance

Course code: PIA-PAMAXHRV

Target audience
This hardware course is intended for individuals responsible for maintaining the HRVOC Maxum Gas Chromatograph. This class is for users who need to perform routine maintenance and calibration of the Maxum Gas Chromatograph used in HRVOC Flare and Cooling Tower Applications.

Prerequisites
• Basic Chromatography skills
• Process Gas Chromatography Technology

Course Profile
The course covers operation, maintenance, and calibration of the Maxum Gas Chromatograph. It also covers the hardware and related programming as well as covering the operation of the Maxum Workstation, which includes Table Editor and EZChrom. Maxum II Gas Chromatographs with HRVOC Cooling Tower and Flare Gas applications and sample systems are used in this class for the labs and lectures.

Objectives
Upon completion of this course, the student shall be able to:
• Perform basic maintenance on the Maxum Hardware modules.
• Balance the carrier gas flows.
• Setup the analyzer valve and EPC times
• Configure an EZChrom Instrument
• Adjust peak times using EZChrom
• Calibrate the analyzer with EZChrom
• Backup and Restore the analyzer database

Topics
• Maxum HRVOC Hardware Overview
• HRVOC Regulations Overview
  – Siemens Cooling Tower HRVOC Solution
  – Siemens Flare HRVOC Solution
• Maxum Applet Maintenance
  – Setting Flows at Pressure
  – Plumbing Configurations
• Maxum Detectors Maintenance
• Maxum Chromatograph
• Alarms
• Advance EZChrom Software
• Sample Systems
Process Analyzers
Maxum HRVOC Operations & Maintenance Short

Course code: PIA-PAMAXHR3

Target audience
This hardware course is intended for individuals responsible for maintaining the HRVOC Maxum Gas Chromatograph. This class is for users who need to perform routine maintenance and calibration of the Maxum Gas Chromatograph used in HRVOC Flare and Cooling Tower Applications.

Prerequisites
- Maxum Operation Skills
- Maxum Operation Level 1 OR Maxum Operations with GC Portal Level 1

Course Profile
The course covers operation, maintenance, and calibration of the Maxum Gas Chromatograph HRVOC Application. Maxum II Gas Chromatographs with HRVOC Cooling Tower and Flare Gas applications and sample systems are used in this class for the labs and lectures.

Objectives
Upon completion of this course, the student shall be able to:
- Perform basic maintenance on the Maxum Hardware modules.
- Balance the carrier gas flows.
- Setup the analyzer valve and EPC times
- Configure an EZChrom Instrument
- Adjust peak times using EZChrom
- Calibrate the analyzer with EZChrom
- Backup and Restore the analyzer database

Topics
- HRVOC Regulations Overview
  - Siemens Flare HRVOC Solution
  - Siemens Cooling Tower HRVOC Solution
- Maxum Applet Maintenance
  - Plumbing Configurations
  - Setting Flows at Pressure
- Maxum Detectors Maintenance
  - Flare Sample System
  - Cooling Tower Sample System
- Sample Systems
- Labs
  - Set Flows per Plumbing Diagram
  - Set Valve Switching Cooling Tower Application

Process Analyzers
Maxum MaxBasic Software Development

Course code: PIA-PAMAXUM3

Target audience
This software course is intended for individuals responsible for programming of the Maxum Gas Chromatograph and for users who need to perform routine software changes.

Prerequisites
- Maxum Operation Level 1

Course Profile
This course gives the students hands-on with the Workstation MaxBasic language editor for the Maxum Gas Chromatograph. The course covers operation of the software modules that come with the Maxum Workstation as well as options that can be added to the system. A fully functional copy of the MaxBasic Language Editor CD is included with the course at no additional charge.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
- Modify a MaxBasic programs
- Compile and save the program to the Maxum database.
- Create SQL statements to read and write to the Maxum database.
- Use parameter table entries and IARGs for variables in programs
- Create simple MaxBasic programs

Topics
- MaxBasic Overview
  - Making a Program Basics
  - Coding Standards
  - Online Reference
- Maxum Basic
  - If Then commands
  - Structure, Variables
  - Arithmetic Operators
  - Arrays and Sub Procedures
- Maxum Database
  - Foreign and Primary Keys
- Standard Query Language (SQL)
- Writing and Using Programs

Process Analyzers
Total Sulfur Application - Vapor Samples

Course code: PIA-PAMAXUTSA1

Target audience
This course is intended for individuals responsible for routine maintenance and calibration of the Maxum Gas Chromatograph Total Sulfur Application measuring vapor samples such as flare gas.

Prerequisites
- Maxum Operation with GCP 1 Course

Course Profile
The course covers operation, setup, validation and calibration of the Maxum Gas Chromatograph Total Sulfur Application. This course uses interactive presentations and discussions on the four key areas of this application - multiple range dilution system, FID combustion to convert Sulfurs to SO2, SO2 chromatograph application, the FPD detector and validation setup. Course includes hands on exercises in an off-line database using GCP workstation software. Contact us for site specific customization.

Objectives
Upon completion of this course, the student shall be able to:
- Understand the basic operation and maintenance of the FID and FPD.
- Adjust pressures and timing for the sample dilution system.
- Setup FID combustion for Sulfur conversions
- Setup and Calibrate the SO2 analytical Method.
- Setup sequences and validation for multiple sample gasses.

Topics
- Introduction
- FPD Detector Theory, Flow Setup, flame check and auto ignite
- SO2 Analytical Method, Flow setup, Backflush setup, Adjust Retention Times and Calibration
- FID Combustion System, Conversion of Total Sulfur to SO2, FID Operation, flame out and auto ignite
- Sample Dilution Operation, Setup, Adjust EPC pressures in each method/range based on peak size, Range Change Program
- Validation of Multiple Sample Gasses
- Maintenance Planning, Validation and Calibration, Sample System Pressures, temperatures and flows.

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Process Analyzers

Maxum Operations with GC Portal Level 1

Course code: PIA-PAMAXGCP1

Target audience
This course uses Siemens Gas Chromatograph Portal (GC Portal) workstation software. Users wanting training using EZChrom, the legacy workstation software, should enroll in the Maxum Operation Level 1 Course. This course is intended for individuals responsible for maintaining the Maxum Gas Chromatograph and for users who need to perform routine maintenance and calibration.

Prerequisites
• Basic Chromatography skills
• Process Gas Chromatography Technology

Course Profile
This course covers operations, setup, and calibration of the Maxum Gas Chromatograph, an overview of the Maxum GC Portal workstation software. (GC Portal replaces both System Manager and EZChrom).

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Perform basic maintenance on the Maxum Hardware modules
• Balance the carrier gas flows.
• Setup the analyzer valve and EPC timing
• Access Maxums using GC Portal
• Adjust peak times with the GC Portal workstation software.
• Calibrate the analyzer with GC Portal
• Backup and Restore the analyzer database

Topics
• Maxum System Overview
• Maxum GC Portal Overview
• Maxum Hardware Overview
• Maxum Valve Maintenance
• Maxum Detectors Maintenance
• Maxum Chromatograph
• Parallel Chromatography
• GC Portal Method Software
• Color Touch Screen CIM

Maxum Operations with GC Portal Level 2

Course code: PIA-PAMAXGCP2

Target audience
This course uses Siemens Gas Chromatograph Portal (GC Portal) workstation software. Users wanting training using EZChrom, the legacy workstation software, should enroll in the Maxum Operation Level 2 Course. This course is intended for individuals who have completed the Maxum Operation with GC Portal Level 1 or the Maxum Operation with EZChrom Level 1 course and are responsible for maintaining the Maxum Gas Chromatograph.

Prerequisites
• Maxum Operations with GC Portal Level 1 OR Maxum Operation Level 1

Course Profile
This course provides the students with more hands-on training with the Maxum GC Portal workstation software. (GC Portal replaces both System Manager and EZChrom). This course continues reviewing the software table structure and how it can be modified to add functionality to the Maxum Gas Chromatograph. Students learn how to create methods and sequences from scratch, as opposed to modifying an existing method or sequence.

Objectives
Upon completion of this course, the student shall be able to:
• Setup and calibrate using the Color Touch Screen Control Interface Module (CIM).
• Run multiple level calibrations in GC Portal.
• Add Methods and Sequences in GC Portal.
• Perform Analyzer software upgrades
• Setup Chromatogram and Data Logging
• Add User Specific Alarms
• Add peaks, valves and programs by creating a Method in GC Portal.
• Create STATMON files

Topics
• Advance Maxum System Overview Maxum
• GC Portal Overview
• Maxum Chromatograph
• GC Portal Methods Software
• Advance Utilities
• GC Portal Analyzer
• Integrated Control Environment

Simulated Distillation

Course code: PIA-PAMAXUM8

Target audience
This software course is intended for individuals responsible for the maintenance and operation of the Maxum Gas Chromatograph with the Simulated Distillation or Motor Gasoline Application.

Prerequisites
• Maxum Operation Level 1

Course Profile
This course covers setup and calibration of the Maxum Gas Chromatograph with a Simulated Distillation Application. This course covers the specific hardware and software associated with this application.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Calibrate a Simulated Distillation Maxum
• Configure Simulated Distillation functions
• Evaluate Motor Gasoline Application specific alarms
• Setup Temperature Ramp parameters

Topics
• Simulated Distillation Overview
  – Calibration
  – ASTM 2887
  – Sample Calibration
  – K Factor Select
  – Null
• Motor Gasoline Application
  – Basic Principle
  – Functional Description
  – Theory of Operation
  – Baseline Correction Options
  – Factor Select
  – MOGAS Alarms
  – Boiling Point Table
  – Calibration Standards
Process Analyzers

MicroSAM Maintenance

Course code: PIA-PAMSAMS1

Target audience
This software course is intended for individuals responsible for maintaining the MicroSAM Gas Chromatograph. This class is for users who need to perform routine maintenance and calibration of the MicroSAM Gas Chromatograph.

Prerequisites
• Maxum Operation Level 1

Course Profile
The course covers operation, maintenance, and calibration of the MicroSAM Gas Chromatograph. It also covers the hardware and related programming as well as covering the operation of the Maxum Workstation, which includes Table Editor and EZChrom.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Perform basic maintenance on the MicroSAM hardware modules.
• Balance the carrier gas flows.
• Setup the analyzer valve times and EPC pressures.
• Configure an EZChrom Instrument.
• Adjust peak times using EZChrom.
• Calibrate the MicroSAM with EZChrom.
• Backup and restore the analyzer database to a PC.

Topics
• Hardware Overview
• Chromatograph
• Workstation
• Advance EZChrom Software
• Table Editor
• Labs

Process Analyzers

NOXMAT 6 Service & Repair

Course code: PIA-PACONAC5

Target audience
This hardware course is intended for individuals responsible for the maintenance and operation of Siemens Continuous Analyzer.

Course Profile
This course covers maintenance and calibration of the Siemens Noxmat 6 Paramagnetic Continuous Gas Analyzer hardware and software.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Calibrate the Noxmat 6 analyzer using zero and span gasses.
• Replace the primary modules in Noxmat 6.
• Set parameters in the Noxmat 6 analyzers thru the HMI.

Topics
• Principle of NOXMAT Operation
  – Electronic Board Identification
  – Analyzer Bench Identification
  – Infrared Analysis
• Noxmat Maintenance
  – Calibration
  – Cell Cleaning
  – Condensate Trap
  – Bench Disassembly
  – Panel Operation
  – Software
• Labs
  – Calibration
  – Hardware Assembly
  – Hardware Disassembly
  – Software and Communications
  – Familiarization and Identification of Hardware and Parts

Process Analyzers

OXYMAT 6 Service & Repair

Course code: PIA-PACONAC3

Target audience
This hardware course is intended for individuals responsible for the maintenance and operation of Siemens OXYMAT 6 Continuous Gas Analyzer.

Course Profile
In this course students will setup, calibrate and perform basic maintenance functions on the Siemens Oxymat 6 Paramagnetic Continuous Gas Analyzer.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Calibrate the Oxymat 6 analyzer using zero and span gasses.
• Replace the primary modules in Oxymat 6.
• Set parameters in the Oxymat 6 analyzers thru the HMI.
• Clean the detector cells.

Topics
• Principle of OXYMAT Operation
  – Electronic Board Identification
  – Analyzer Bench Identification
  – Paramagnetic Oxygen
• OXYMAT Maintenance
  – Calibration
  – Cell Cleaning
  – Bench Disassembly
  – Panel Operation
  – Software
• Labs
  – Calibration
  – Hardware Assembly
  – Hardware Disassembly
  – Software and Communications
  – Familiarization and Identification of Hardware and Parts
Process Analyzers

ULTRAMAT 6 Service & Repair

Course code: PIA-PACONAC2

Target audience
This hardware course is intended for individuals responsible for the maintenance and operation of Siemens Continuous Analyzer.

Course Profile
In this course students will setup, calibrate and perform basic maintenance functions on the Siemens Ultramat 6 Infrared Continuous Gas Analyzer System including hardware and software.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Calibrate the Ultramat 6 analyzer using zero and span gasses.
• Replace the primary modules in Ultramat 6
• Replace and align the detector bench
• Set parameters in the Ultramat 6 thru the HMI.
• Clean the detector cell

Topics
• Principles of ULTRAMAT Operation
  – Electronic Board Identification
  – Analyzer Bench Identification
  – Infrared Analysis
• ULTRAMAT Maintenance
  – Calibration
  – Cell Cleaning
  – Condensate Trap
  – Pneumatic Pump
  – Bench Disassembly
  – Panel Operation
  – Software
• Labs
  – Calibration
  – Hardware Assembly
  – Hardware Disassembly
  – Software and Communications
  – Familiarization and Identification of Hardware and Parts

ULTRAMAT 23 Service & Repair

Course code: PIA-PACGAC23

Target audience
This hardware course is intended for individuals responsible for the maintenance and operation of Siemens Ultramat 23 Continuous Gas Analyzer.

Course Profile
In this course students will setup, calibrate and perform basic maintenance functions on the Siemens Ultramat 23 Infrared Continuous Gas Analyzer System including hardware and software.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Calibrate the Ultramat 23 analyzer using zero and span gasses.
• Replace the primary modules in Ultramat 23
• Replace and align the detector bench
• Set parameters in the Ultramat 23 thru the HMI.
• Clean the detector cell

Topics
• Principles of ULTRAMAT 23 Operation
  – Infrared Analysis
  – Analyzer Bench Identification
  – Electronic Board Identification
• ULTRAMAT 23 Maintenance
  – Software
  – Panel Operation
  – Bench Disassembly
  – Pneumatic Pump
  – Condensate Trap
  – Cell Cleaning
  – Calibration
• Labs
  – Familiarization and Identification of Hardware and Parts
  – Software and Communications
  – Hardware Disassembly
  – Hardware Assembly
  – Calibration

Introduction to Process Gas Chromatography

(Virtual Instructor-led)

Course code: PIA-PAOLOPTIA1

Target audience
This class is intended for individuals seeking to gain a conceptual understanding of process gas chromatography and associated hardware. The course will provide the student with the fundamental principles of chromatographic parts and their inter-relationships. The operation and maintenance of Siemens Process Gas Chromatographs are taught in later courses.

Course Profile
This course introduces the student to process gas chromatography theory and technology. This is a live, instructor led, on-line course delivered in 2 hour learning modules through an innovative web application. Students are encouraged to complete assigned lab exercises during and after each session to reinforce the learning modules throughout the week. A professional Siemens instructor will also be available to answer student questions outside of scheduled class times.

Objectives
Upon completion of this course, the student shall be able to:
• Identify the various hardware components used in a Process Gas Chromatograph and know their general functions.
• Conceptually setup a Sample System using the custom documentation.
• Conceptually adjust column-valve times based on chromatograms and oven plumbing diagrams.
• Conceptually adjust peak times and integration windows to measure the correct peaks.
• Conceptually troubleshoot general problems in a Process Gas Chromatograph.

Topics
• Chromatographic Principles
• Sample Systems
• Chromatograph Column Theory
• Valve Operation and Maintenance
• Detector Operation and Maintenance
• Temperature Control
• Component Integration
• Analytical Techniques
Siemens How-to Video Library consists of short (3 minutes on average), on-demand videos refreshing specific tasks and skills acquired during a SITRAIN instructor-led class. Each video is developed by a skilled training professional and offer a high impact experience designed to refresh individuals on industrial automation skills and job-related tasks. These How-to Videos provide on-demand, self-paced instruction for all experience levels. They are viewable in various formats, including mobile devices, providing you with instant access right at the machine location.

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Learning Map

Operators

PCS7 System Operator
On-site Only

PCS7 System Operator
(Virtual Instructor-led)

PCS7 SIMATIC Batch

BRAUMAT Compact Workshop

SIMATIC TDC Engineering with D7 and CFC

PCS7 Process Safety Sustaining

APACS+ to PCS7 OS Migration

Control Engineers
System Integrators

SIMATIC PCS7 System Engineering 1

SIMATIC PCS7 System Engineering 2

Siemens SIMATIC PCS 7 Basic Engineer

Siemens SIMATIC PCS 7 AS-Engineering

Siemens SIMATIC PCS 7 OS-Engineering

Siemens Certified SIMATIC PCS 7 Engineer

Plant Engineers Maintenance

PCS7 System Service 1

PCS7 System Service 2

Optional and specialty courses:

Course name: 200 APACS+ Maintenance & Configuration
Course code: SCT-AP200M1A
Duration: 5 days

How-to Video Library from the Process Control - PCS7 category.

Online Product Support
Process control systems
Process Automation – APACS+

200 APACS+ Maintenance & Configuration

Course code: SCT-AP200M1x

Target audience
Technicians, Site Engineers and Integration Engineers using APACS+ 4mation to develop a process system solution.

Prerequisites
• Computer Expertise

Course Profile
This course is designed for controls technicians and engineers who are responsible for project design, development and commissioning an APACS+ system. This course covers system architecture, as well as capabilities of system hardware components. These include control modules, I/O modules, system network components, servers and clients. Additionally, the student will be prepared to make changes and additions to an existing APACS+ controller configuration. Finally, the student will learn to navigate and interpret a controller configuration, modify an existing configuration and add new elements such as I/O tags and control loops.

Objectives
Upon completion of this course, the student shall be able to:
• Describe the architecture and hardware
• Move and connect field I/O points.
• Perform preventive maintenance.
• Troubleshoot a problem and identify the system component that has failed.
• Shutdown and restart a system as required
• Select appropriate hardware elements
• Diagnose the system using system diagnostics
• Navigate and interpret a controller configuration
• Modify existing controller configuration
• Read and force real-time data values
• Prepare a controller configuration for use

Topics
• ProcessSuite System Architecture Overview
• Module Mounting and Power Distribution
• Introduction to 4-motion™
• APACS+® ProcessSuite Troubleshooting
• Introduction to Controller Configuration
• Configure I/O Tags And Variables
• Ladder Logic Diagrams
• Managing The Resource Blocks

Process Automation – APACS+

APACS+ to PCS7 OS Migration

Course code: SCT-PCAPSP1x

Target audience
Technicians, Site Engineers and Integration Engineers familiar with APACS+/ProcessSuite should attend this course.

Prerequisites
• Working knowledge of the APACS system and HMI.

Course Profile
This course is designed to help existing users of APACS+/ProcessSuite systems transition into PCS 7/APACS+ OS as their HMI platform. This course builds upon previous APACS+/ProcessSuite knowledge gained in the 101 APACS+ Maintenance course, 201 4mation Configuration course and the 203 ProcessSuite Framework Configuration course. The student will learn to easily use PCS 7/APACS+ OS with a previously existing 4-motion configuration.

Objectives
Upon completion of this course, the student shall be able to:
• Compare APACS+ ProcessSuite, APS and PCS 7 / APACS+ Architecture
• Log on and off the runtime PCS 7 OS
• Operate a running APACS+ PCS 7 OS including Navigation, Process symbols, Faceplates, Alarm Messages
• Review the Types of HMI Comments
• Configure a DBA project for migration
• Start the migrated OS project into runtime
• Add External Variables manually
• Add an Internal Variable for Text Reference
• Edit graphic object properties
• Edit Customized Objects
• Insert and configure Trend objects
• Create and configure online Trends.
• Modify APACS+ alarms
• Customize PCS 7 OS Alarm Logging
• Identify the requirements for creating custom Trends, Faceplates and symbols using DBA

Topics
• Using PCS 7/APACS+ OS as an operator
• Creating an OS project from scratch
• HMI comments and Graphics Designer
• The OS Database and DBA type editor
• Alarms and Creating Custom Points

Process Automation – PCS7

BRAUMAT Compact Workshop

Course code: SCT-PCBRCE1x

Target audience
The target audience for this workshop includes PCS7 planning and brewery engineering personnel, software project engineers, system integrators, service and maintenance personnel.

Prerequisites
• PCS7 System Engineering 1
• PCS7 System Engineering 2

Course Profile
PLEASE NOTE: Prerequisite PCS7 System Engineering 1 is mandatory. Prerequisite PCS7 System Engineering 2 is recommended. The BRAUMAT Compact workshop is designed to provide participants with an opportunity to apply their PCS 7 engineering skills to hands-on tasks associated with creating, configuring and modifying a Braumat Compact project. This workshop is more hands-on practical exercises than theory (theory approx. 10 - 20%). The goals of this workshop are to aggressively guide the participant through a basic system project design, creation, and implementation using the BRAUMAT Compact library.

Objectives
Upon completion of this course, the student shall be able to:
• Configure BRAUMAT Compact within the PCS7 programming area.
• Create a recipe based on single sequences for multiple units.
• Configure a BRAUMAT Compact project utilizing the basic components of BRAUMAT Compact such as tag generator, Phasecon Matrix, batch trending, and batch reporting.

Topics
• Installation of BRAUMAT Compact
• Creation of a BRAUMAT Compact project
• Create a system with three interdependent subsystems
• Reporting and trending
• Scheduler
• Extending the recipe with logical functions
• Creation of function blocks using the BRAUMAT Compact concept

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Process Automation – PCS 7

PCS 7 AS
Advanced Engineering

Course code: SCT-PCSASE1x

Target audience
This course is intended for PCS 7 users already proficient at engineering PCS 7 AS/OS projects.

Prerequisites
• PCS7 System Engineering 2

Course Profile
This is an advanced AS engineering course designed for experienced PCS 7 users, engineers and Solution Partners. The goals of this course are to enhance the student’s skill-set by exploring advanced AS configuration topics and solutions to common application problems.

Objectives
Upon completion of this course, the student shall be able to:
• Calculate memory, systems structure and architecture requirements
• Configure automatic archives/read-back jobs and a distributed Engineering Station
• Compare project versions and use access protection
• Engineer with Advanced ES tools
• Use advance features of SFCs, SFC types and alarm messaging
• Use advanced Process Control (APC) strategies

Topics
• Common simulation tools
• PCS 7 Documentation and Online Support
• Requirements and functional process description
• System design and component specification
• PCS7 Project handling
• Advanced ES
• SFC Advanced
• Advanced alarm engineering
• Advanced Process Control (APC)

Days: 4.5

Process Automation – PCS 7

PCS 7 OS
Advanced Engineering

Course code: SCT-PCOSCP2x

Target audience
This course is intended for PCS 7 users already proficient at engineering PCS 7 AS/OS projects.

Prerequisites
• PCS7 Experience Credentials
• PCS7 System Engineering 1

Course Profile
This is an advanced OS engineering course designed for experienced PCS 7 users, engineers and Solution Partners. The goals of this course are to enhance the student’s skill-set by exploring advanced OS configuration topics and solutions to common application problems. This course begins with an existing AS project and a brief but thorough introduction to it. Using this “base” project and advanced programming techniques, various OS architectures will be added. OS graphic development will include “best practice” methods as well as advanced topics such as C-script, VB script, Faceplate functionality and custom solutions.

Objectives
Upon completion of this course, the student shall be able to:
• Perform a typical process system configuration
• Configure a fully functioning PCS7 OS project
• Configure and use SIMATIC Logon
• Configure Autostart for all OS stations
• Create and configure custom graphics as well as custom faceplates
• Create and configure various PCS 7 architectures including Server/Client, Redundant Server, Web Server/Client and Multi-project set up.
• Setup and use OS Simulation

Topics
• Introduction to training
• PCS 7 Documentation and Online Support
• Basics of OS configuration
• The Client/Server Configuration
• The Server Redundancy
• Extended Configuration of Multi-user Projects
• The Web Option
• Long-term Archiving
• Graphic Configuration
• The Graphic Object Update Wizard
• Syntax Rules

Days: 4.5

Process Automation – Siemens PCS7 Basic

Engineer Testing

Course code: SCT-PC7BT1x

Target audience
This Siemens PCS7 Basic Engineer Test is intended for PCS7 engineers who have met the prerequisites below.

Prerequisites
• PCS7 Engineering 1
• PCS7 Engineering 2

Course Profile
This is a multiple-choice written performance exam designed to assess the basic skills of a PCS7 Engineer. This is a skills-based certification test covering topics taught during PCS7 Engineering 1 and Engineering 2.

Topics
• PCS7 Documentation and Online Support
• PCS7 system overview
• Station and network configuration - Principles and relationships
• Component View and Plant View
• Basic control functions
• Basics of operating and monitoring
• Locking functions and operating modes
• SCL Basics
• Server-Client System
• Syntax Rules
**Process Automation – PCS7**

**Siemens PCS7 Certified Engineer Testing**

Course code: SCT-PCS7T2x

**Target audience**

This Siemens Programmer Certification Test is intended for experienced PCS7 engineers who have met the prerequisites below.

**Prerequisites**

- Advanced PCS7 Engineering Experience
- PCS7 Engineering 1
- PCS7 Engineering 2
- PCS7 OS Advanced
- PCS7 AS Advanced

**Course Profile**

This is a comprehensive performance exam designed to assess the skills of a Certified PCS7 Engineer. The examinee will be required to create and configure a proper PCS 7 Multi-project based on a set of instructions and requirements. This is a practical, skills-based certification test covering topics taught during PCS7 Engineering 1, Engineering 2, OS Advanced and AS Advanced courses.

**Topics**

- Automation System
- Station and network configuration
- Component View and Plant View
- Server-Client System
- Master Data Library

**Process Automation – PCS7**

**PCS7 Process Safety Sustaining**

Course code: SCT-PCSFTS1x

**Target audience**

This course is for site engineers and maintenance staff responsible for the sustaining and operation of a Siemens PCS7 based Safety Instrumented System (SIS).

**Course Profile**

This course builds skills for sustaining and operating a Siemens PCS7 Process Safety system. The course begins with an introduction to Process safety system concepts, purpose and typical process control architectures. The course then builds skills in hardware components, basic SIMATIC project management and system troubleshooting. A light review of system program elements and tools is included to support systems level troubleshooting. The Safety Matrix, a tool available for safety cause and effect configuration is also covered. The class will use a functioning safety demo project with minimal system programming.

**Objectives**

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

- Use the basic knowledge of a process safety control system to properly sustain an existing system.
- Configure the proper hardware of the CPU and signal modules to ensure appropriate system response.
- Navigate a safety project
- Configure the Safety Library blocks to manage a safety shutdown program.
- Configure using the Safety Matrix programming tool
- Operate, control and troubleshoot a safety system using the Safety Matrix tool.
- Troubleshoot the system using various software tools and status indicators.

**Topics**

- Process Safety Overview
- Siemens Process Safety
- Project Management
- Configuring Hardware (HW)
- Continuous Functions Charts (CFC)
- Safety Matrix
- System Troubleshooting

**Process Automation – PCS7**

**PCS7 SIMATIC Batch**

Course code: SCT-PCBATP1x

**Target audience**

This course is for PCS7 system design engineers, configuration engineers, programmers, commissioning personnel, and OEMs working with the SIMATIC Batch option.

**Prerequisites**

- PCS7 System Engineering 1
- PCS7 System Engineering 2 (Recommended)

**Course Profile**

This course is an introduction to Siemens SIMATIC Batch processing. Using the same project created during the prerequisite PCS 7 System Engineering training courses, students will review a typical batch process model to understand process elements and terminology. Students will then use the same sample batch process to learn batch tools, management and control skills. Security, system administration and batch control techniques topics are included. Recipe generation and planning considerations are also discussed.

**Objectives**

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

- Define the terms and procedural model according to the ISA S88.01
- Set up the hardware configuration; define SIMATIC Batch structure, a P-Cell, Unit, Functions in Plant View and CFC
- Properly compile and download a Batch project.
- Navigate file structures on BATCH Server.
- Utilize BATCH faceplates and other OS Batch controls in the OS.
- Execute all configuration steps on the ES to start up a BATCH server successfully
- Create a new P-Cell, handle materials, write/edit/release master recipes.
- Create new users and set up user rights.
- Set up batches based on the quantity of the order and batch dependencies.
- Access data of finished and archived batches.
- Perform Online Structure Changes.

**Topics**

- PCS 7 Documentation and Support
- Functional Process Description
- Batch Systems Basics
- SIMATIC Batch in SIMATIC Manager and OS
- SIMATIC Batch offline and offline
Process Automation – PCS7 / TDC / APACS+

Process Automation – PCS7
PCS7 System Engineering 1
Course code: SCT-PCSYSE1x

**Target audience**
Controls engineers using PCS7 to develop a process system solution.

**Prerequisites**
- Basic automated controls experience
- Industrial electronics experience
- Solid computer skills

**Course Profile**
This course is designed for controls engineers who are responsible for project design, development and commissioning a PCS7 system. The goals of this course are to aggressively help the student learn a basic system configuration and project design using standard system tools and libraries.

**Objectives**
Upon completion of this course, the student shall be able to:
- Define the requirements and components of a PCS7 system solution.
- Configure a multiproject complete with Component and Plant Hierarchy
- Configure basic Continuous Function Charts using standard system tools and libraries.
- Configure basic Sequential Function Charts using standard system tools and libraries.
- Configure a basic Operator Station configuration using standard system tools and tag interfacing.
- Configure and test basic network communications including, Ethernet and PROFIBUS DP.
- Perform a basic system check out using standard system tools and diagnostics.
- Use the Help, Documentation and On-line tools.
- Perform basic system administration and project management functions.

**Topics**
- PCS7 Documentation and Online Support
- Requirements and Functional Process Description
- System Design and Component Specification
- Project setup
- Station and network configuration
- Connection to the process
- Basics control functions
- Basics Operating and Monitoring
- Basics Automatic Mode Control

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Process Automation – PCS7
PCS7 System Engineering 2
Course code: SCT-PCSYSE2x

**Target audience**
Controls engineers using PCS7 to develop a process system solution and need an advanced level system configuration and integration skills.

**Prerequisites**
- PCS7 System Engineering 1

**Course Profile**
This is an advanced process control course for engineers. The goals of this course are to aggressively help the student learn advanced level system configuration and project engineering. This course begins with the project configured in the System Engineering-1 course and elevates the functionality through advanced Engineering Station programming, Operator Station graphics development and, Automation Station hardware integration.

**Objectives**
Upon completion of this course, the student shall be able to:
- Perform typical process system configuration.
- Configure functioning PCS7 project.
- Perform fast bulk engineering.
- Configure custom blocks using SCL.
- Configure custom graphics.
- Set up Operator Station user administration.
- Replicate Plant Hierarchy using the models tool.
- Create and configure alarm and tag archives.
- Configure Ethernet communications.

**Topics**
- Customizing the OS
- Archiving System
- Locking functions and operating modes
- Mass data engineering
- Final steps of configuration
- User blocks: Attributes and Visualization
- Demonstration Server-Client System
- Syntax Rules

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Process Automation – PCS7
PCS7 System Operator
Course code: SCT-PCPCSU1x

**Target audience**
This course targets PCS7 system operators, production supervisors, and administrative staff who require a working knowledge of the system. Additionally, anyone in need of building a basic, operational understanding of the PCS7 process control system. The Day 2 option is targeted for operators with basic technical diagnostic responsibilities and backgrounds.

**Course Profile**
This course provides the student with a working exposure to the PCS7 OS control system. This is a flexible agenda with a 1 day core agenda plus a “Day 2 option” with advanced system diagnostics. Using a prebuilt Siemens demo project, the students will learn PCS7 system operational functions and procedures in a safe and controlled environment. The Day 2 option is targeted for those operators with additional system diagnostics responsibilities. This course is a hands-on curriculum working with a typical simulated production process.

**Objectives**
Upon completion of this course, the student shall be able to:
- Understand the PCS7 control system architecture
- Navigate the system screen hierarchy
- Control and monitor a production process
- Use the system keysets and functions
- Use the Trending and Messaging systems
- Use the Reports and Archive systems
- Use the system Hardware Configuration and Diagnostics tools (Day 3 option)

**Topics**
- PCS7 Overview
- Demo Project Screen Review
- PCS7 OS Process Mode
- System Operator Inputs
- Graphic System Control
- Trend, Message and Reports Systems
- Archive System
- Maintenance Station (Day 2)
- PCS7 System Hardware Overview (Day 2)
- System Troubleshooting Basics (Day 2)
Process Automation – PCS7
PCS7 System Service 1
Course code: SCT-PCSVC51x

Target audience
Plant Engineers, Technicians and Users responsible for operating, optimizing and troubleshooting a PCS7 system should attend this course.

Prerequisites
• Computer Expertise
• Industrial electronics experience

Course Profile
This course is designed for individuals receiving an engineered PCS7 system and are responsible for system sustaining and service. The goals of this course are to help the student learn to efficiently use, optimize and troubleshoot their process through the PCS7 system.

Objectives
Upon completion of this course, the student shall be able to:
• Navigate PCS7 documentation.
• Navigate a PCS 7 OS runtime station.
• Use the system architecture to aid in diagnostics.
• Identify which part of the database is responsible for each part of the configuration.
• Navigate PCS 7 Multiproject structure.
• Identify different causes of errors/faults.
• Analyze problems efficiently.
• View messaging system.
• View the Asset Diagnostics system.
• Perform diagnostic maintenance of CFC and SFC charts using various PCS 7 tools.
• Analyze AS, OS, PC and communication diagnostics.
• Configure and use the SDT (SIMATIC Diagnose Tool).
• Replace faulty modules/devices.

Topics
• Introduction to training
• SIMATIC PCS 7 Documentation and Online Support
• Requirements and Functional Process Description
• System Design and Component Specification
• Project-specific settings
• Project-specific architecture and Configuration
• Methods for problem analysis
• Diagnostics options with PCS 7
• Procedure for eliminating problems

Process Automation – PCS7
PCS7 System Service 2
Course code: SCT-PCSVC52x

Target audience
Plant Engineers, Technicians and Users responsible for operating, optimizing and troubleshooting a PCS7 system should attend this course.

Prerequisites
• PCS7 System Service 1

Course Profile
This course is designed for individuals receiving an engineered PCS7 system and are responsible for system sustaining, service and basic modification. The goals of this course are to help the student learn to efficiently use, optimize and troubleshoot their process as well as replacements and additions to it.

Objectives
Upon completion of this course, the student shall be able to:
• Navigate PCS7 OS runtime station
• Use the system architecture
• Navigate PCS 7 Multiproject
• Identify different causes of errors/faults
• View messaging system
• Enable/repair OS Simulation, Asset Diagnostics
• Enable/repair SIMATIC Logon
• Enable/repair OPC Server functionality
• Force block values in run-time
• Use ApDiag.exe
• Use SIMATIC Diagnostics Tool (SDT)
• Implement alarm management techniques
• Use the built-in PID tuner
• Modify basic configurations of charts
• Add/modify basic DP, PA & HART field devices
• Expand networks
• Create/restore Siemens computer images
• Follow link to view full description on the website

Topics
• Introduction to training
• SIMATIC PCS 7 Documentation and Online Support
• Requirements and Functional Process Description
• System Design and Component Specification
• Project-specific settings
• Project-specific architecture and Configuration
• Methods for problem analysis
• Diagnostic possibilities with PCS 7
• Plant Optimization
• Plant expansion
• Adding an OS station

Process Automation – TDC
SIMATIC TDC Engineering with D7 and CFC
Course code: SCT-PCTDCP2x

Target audience
Programmers, Commissioning engineers, configuring engineers and service personnel should attend this course.

Prerequisites
• S7 Automation Maintenance 1 OR
• S7 TIA Programming 1

Course Profile
This course is designed for service technicians and commissioning/configuration engineers who are responsible for project maintenance, design, development and commissioning a TDC system using CFCs. This course provides you with the knowledge for programming and commissioning the control system SIMATIC TDC. After the training you will be able to configure technological functions with CFC and establish the communication via PROFIBUS, Industrial Ethernet and GDM-connection.

Objectives
Upon completion of this course, the student shall be able to:
• Obtain help using the online documentation
• Configure rack hardware
• Copy, archive and restore a project
• Configure the PG/PC interface
• Create and edit a program using CFC blocks
• Configure the processing sequence of CFC blocks
• Configure scan times and interrupts
• Create run-time groups
• Save, compile, and load the program to the memory module
• Monitor program and hardware operation using Test Mode
• Create and use reference data for a program
• Convert a task to a program (Chart in chart, chart as block)

Topics
• Working with the SIMATIC-Manager
• Hardware configuration for the system
• Preparation of CFC charts for this system
• Working with own blocks and chart in chart
• Communication-Hardware and its ranges
• Introduction to the communication
• Processor communication
Process Automation - PCS7

PCS7 System Operator
(Virtual Instructor-led)

Course code: SCT-PCOILPCSU1x

Target audience
This course targets PCS7 system operators, production supervisors, and administrative staff who require a working knowledge of the system. Additionally, anyone in need of building a basic, operational understanding of the PCS7 process control system.

Course Profile
This course provides the student with a working exposure to the PCS7 OS control system. Using a prebuilt Siemens demo project, the students will learn PCS7 system operational functions and procedures in a safe and controlled SIMULATED plant environment. All core operational tasks and system tools are discussed and practiced by the students. Typical operator system inputs, acknowledgments, control and monitoring tasks are included. This course is a hands-on curriculum working with a typical simulated production process.

This is a live, instructor led, on-line course delivered in two hour learning modules through an innovative web application. Access to fully functional PCS7 software will be provided to the student through a cloud based application.

Objectives
Upon completion of this course, the student shall be able to:
• Identify the PCS7 control system architecture
• Navigate the OS system screen hierarchy
• Control and monitor a production process
• Navigate the system keysets and functions
• Access the Trending and Messaging systems
• Create / access the Reports and Archive systems

Topics
• PCS7 Overview
• Demo Project Screen Review
• PCS7 OS Process Mode
• System Operator Inputs
• Graphic System Control
• Trend System
• Message System
• Functions and Outputs of the Report System
• Archive System

Register here
More information
Product support
SITRAIN® courses for the Process Industries

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Process Instrumentation

Learning Map

The Siemens process instrumentation training curriculum offer students a variety of options for learning specific technologies and also applications within different industries. Technology courses provide an in depth theory of operation, product selection criteria and provides hands-on labs for maintenance, troubleshooting and repair. Our industry courses provide an overview of how devices are applied into each specific industry and covers process overviews, technology comparisons, application pitfalls, and basic hands-on labs for start-up and commissioning.

Technology Courses

- **Process Instrumentation Level Fundamentals**: 2 DAYS
  - PIA-PRFLTC1A
  - PIA-PRFLTC2A

- **Process Instrumentation Advanced Level**: 2 DAYS
  - PIA-PRFLTC2A

- **Process Instrumentation Flow Fundamentals**: 2 DAYS
  - PIA-PRFFTC1A
  - PIA-PRFFTC2A

- **Process Instrumentation Advanced Flow**: 2 DAYS
  - PIA-PRFFTC2A

- **Process Instrumentation Pressure, Temperature & Valve Positioner Fundamentals**: 1 DAY
  - PIA-PRPTVC1A

- **Process Instrumentation Advanced Pressure & Temperature**: 1 DAY
  - PIA-PRPRTC2A

- **Process Instrumentation Advanced Valve Positioners**: 2 DAYS
  - PIA-PRVALC2A

- **Process Instrumentation Clamp-on Fundamentals**: 2 DAYS
  - PIA-PRFCOC1A

- **Process Instrumentation Advanced FUS/FUE Clamp-On**: 2 DAYS
  - PIA-PRFCOC2A

- **Process Instrumentation Advanced FUG Clamp-On**: 2 DAYS
  - PIA-PRFLHC2A

- **Process Instrumentation Advanced FUH Clamp-On**: 2 DAYS
  - PIA-PRFNGC2A

Industry Courses

- **Water Industry**: 3 DAYS
  - PIA-PRWATC1A

- **Oil & Gas Upstream**: 3 DAYS
  - PIA-PROGUC1A

- **Midstream Gas**: 3 DAYS
  - PIA-PROGGC1A

- **Midstream Liquid**: 3 DAYS
  - PIA-PROGLC1A

**Online Product Support**
Process Instrumentation
Process Instrumentation

Level Fundamentals
Course code: PIA-PRFLTC1A

Target audience
This introductory course is intended for technical individuals responsible for routine maintenance and calibration of level instrumentation. Additionally sales representatives responsible for selling and specifying these meters will benefit from this class.

Prerequisites
• Basic knowledge of level instrumentation

Course Profile
This course covers basic theory, programming, and installation of the level instrumentation such as the LUT 400, LR 560, CLS 200, and LG 250. It includes a complete review of the hardware components, installation guidelines and commissioning process. The course includes a hands-on exercise with the level instruments to reinforce the training presentation.

Objectives
Upon completion of this course, the student shall be able to:
• Select the appropriate level instrument and sensor for their application.
• Select a suitable installation location
• Fully program their level instrument for the selected application
• Perform system start-up

Topics
• Ultrasonics
• Radar
• Capacitance
• Guided Wave Radar
• Point Level for Liquids
• Point Level for Solids
• Labs

2 Days

Process Instrumentation

Advanced Level
Course code: PIA-PRFLTC2A

Target audience
This advanced course is intended for technical individuals responsible for routine maintenance and calibration of level instrumentation. Additionally sales representatives responsible for selling and specifying these meters will benefit from this class.

Prerequisites
• Basic Level Course (PIA-PRFLTC1A)

Course Profile
This course covers programming, installation, and troubleshooting of level instrumentation such as the LUT 400, LR 560, and LG 250. It includes a complete review of Sonic Intelligence features, installation guidelines, and troubleshooting parameters. The course includes a hands-on exercise with the level instruments to reinforce the training presentation.

Objectives
Upon completion of this course, the student shall be able to:
• Fully program their level instrument for the selected application
• Install level instruments correctly in vessels
• Take Echo Profiles
• Troubleshoot the instrument and application if issues arise

Topics
• Level Theories
• Installation Considerations - Ultrasonics
• Installation Considerations - Radar
• Sonic and Process Intelligence
• Echo Profiles
• Troubleshooting
• Hand Programmer
• Labs

2 Days

Process Instrumentation

Flow Fundamentals
Course code: PIA-PRFFTC1A

Target audience
This introductory course is intended for technicians, engineers and other individuals responsible for installation, commissioning and basic maintenance of flow instrumentation. Additionally sales representatives responsible for selling and specifying these meters will benefit from this class.

Prerequisites
• Basic knowledge of flow fundamentals and process instrumentation.

Course Profile
This course covers basic theory, applications, and configuration of field instrumentation. Pressure technologies will cover the entire Siemens portfolio, focusing on the SITRANS P DSIII/P410. Temperature technologies covered will include sensor and transmitter options in the SITRANS T family. This comprehensive class will cover specific applications, as well as accessories required for these applications, such as diaphragm seals, shut-off fittings, and more.

Objectives
Upon completion of this course, the student shall be able to:
• Understand different pressure measurement types and apply them in a variety of applications.
• Configure a SITRANS P DSIII pressure transmitter via the local pushbuttons and HART (PDM software).
• Troubleshoot pressure and temperature transmitters in the field.
• Recognize and select different temperature sensor types and technologies.

Topics
• Pressure Measurement
• Temperature Measurement

4 Days
Process Instrumentation

Advanced Flow

Course code: PIA-PRFFTC2A

Target audience
This advanced course is intended for technicians, engineers and other plant individuals responsible for installation, routine maintenance, verification and troubleshooting of flow instrumentation. Additionally sales representatives responsible for selling and specifying these meters will benefit from this class.

Prerequisites
• Fundamentals of Flow Technologies (PIA-PRFFTC1A)

Course Profile
Building on the knowledge from the basic flow course, this course teaches participants advanced flow applications including installation, programming and troubleshooting. The flow instrumentation to be covered includes Electromagnetic, Coriolis and Vortex flowmeters. The course includes a hands-on exercise to reinforce the training presentation.

Objectives
Upon completion of this course, the student shall be able to:
• Correctly perform installation and setup
• Fully program the flow instruments for various applications
• Perform verification on select Electromagnetic flow meter
• Troubleshoot all instruments and application if issues arise.

Topics
• Electromagnetic Flowmeters
• Coriolis Flowmeters
• Vortex Flowmeters

Process Instrumentation
Pressure, Temperature and Valve Positioner Fundamentals

Course code: PIA-PRPTVC1A

Target audience
This introductory course is intended for technical individuals responsible for routine maintenance and calibration of field instrumentation. Additionally, sales representatives responsible for selling and specifying these technologies will benefit from this class.

Prerequisites
• None

Course Profile
This course covers basic theory, applications, and configuration of field instrumentation. Pressure technologies will cover the entire Siemens portfolio, focusing on the SITRANS P DSIII/P410. Temperature technologies covered will include sensor and transmitter options in the SITRANS T family. Valve positioner technologies will focus on the SIPART PS2, also covering general valve, actuator, and positioner types.

Objectives
Upon completion of this course, the student shall be able to:
• Understand different pressure measurement types and apply them correctly
• Configure a SITRANS P DSIII pressure transmitter in the field
• Recognize different temperature sensor types and technologies
• Program a SIPART PS2 for the selected application.

Topics
• Pressure Measurement
• Temperature Measurement
• Valve Positioners

Process Instrumentation
Advanced Pressure and Temperature

Course code: PIA-PRPRTC2A

Target audience
This course is intended for technical individuals responsible for routine maintenance and calibration of pressure and temperature instrumentation. Additionally, sales representatives responsible for selling and specifying these technologies will benefit from this class.

Prerequisites
• None

Course Profile
This course covers basic theory, applications, and configuration of field instrumentation. Pressure technologies will cover the entire Siemens portfolio, focusing on the SITRANS P DSIII/P410. Temperature technologies covered will include sensor and transmitter options in the SITRANS T family. This comprehensive class will cover specific applications, as well as accessories required for these applications, such as diaphragm seals, shut-off fittings, and more.

Objectives
Upon completion of this course, the student shall be able to:
• Understand different pressure measurement types and apply them in a variety of applications.
• Configure a SITRANS P DSIII pressure transmitter via the local pushbuttons and HART (PDM software).
• Troubleshoot pressure and temperature transmitters in the field.
• Recognize and select different temperature sensor types and technologies.

Topics
• Temperature Measurement
• Pressure Measurement
Process Instrumentation

Advanced Valve Positioner

Course code: PIA-PRVALC2A

Target audience
This comprehensive course is intended for technical individuals responsible for routine maintenance and calibration of valve positioners. Additionally sales representatives responsible for selling and specifying these pneumatic positioners will benefit from this class.

Prerequisites
• None

Course Profile
This course covers programming, installation, and troubleshooting of electro-pneumatic valve positioners. It includes an in-depth review of onboard features, installation guidelines, and diagnostic parameters. The course includes a hands-on exercise with complete valve assemblies to reinforce the training presentation.

Objectives
Upon completion of this course, the student shall be able to:
• Program PS2 valve positioner for the selected application
• Troubleshoot common setup issues
• Optimize valve assembly performance
• Know how on extracting stored data inside PS2
• Replace/Install common parts and option modules

Topics
• Introduction to valves and actuators
• Positioner theory and construction
• Applications and mounting
• Initialization and configuration
• Onboard features for optimizing performance
• Diagnostics menu
• Demonstration of PDM and diagnostic data
• Common parts replacement

Process Instrumentation

Clamp-on Fundamentals

Course code: PIA-PRFCOC1A

Target audience
This introductory course is intended for technical individuals responsible for routine maintenance and calibration of SITRANS FUS/FUE/FST clamp-on flowmeters. Additionally sales representatives responsible for selling and specifying these meters will benefit from this class.

Prerequisites
• Basic knowledge of pipes and piping system terminology.

Course Profile
This course covers basic theory, programming, and installation of the SITRANS FUS/FUP/FUE and FST020 flowmeter types. It includes a complete review of the hardware components and software menu structure, installation guidelines and commissioning process. This course also gives the students an overview of fundamental diagnostics for validation of meter operation. The course includes a hands-on exercise with actual flowmeter systems to reinforce the training presentation.

Objectives
Upon completion of this course, the student shall be able to:
• Select the appropriate flowmeter type and sensors for their application.
• Select a suitable installation location
• Fully program their meter for the selected application
• Perform a sensor installation
• Perform system start-up
• Verify system performance

Topics
• Fundamental Clamp-on Flowmeter Theory
• System Hardware
• Software Menu
• Installation
• Startup
• Verification
• Labs

Process Instrumentation

Advanced FUS/FUE Clamp-On

Course code: PIA-PRFCOC2A

Target audience
This advanced course is intended for technical individuals responsible for diagnosis and corrective action, routine maintenance and calibration of SITRANS FUS/FUE/FST clamp-on flowmeters.

Prerequisites
• SITRANS FUS/FUE 1010 Clamp-On Products (PIA-PRFCOC1A)
• Knowledge of pipes and piping system terminology

Course Profile
This course reviews ultrasonic theory, programming, setup, and operation, of FUS/FUP/FUE and FST020 flowmeter types. To build on this basic knowledge the students will receive in-depth instruction on application review, diagnosis and troubleshooting of operational issues, Utilization of the SiWare software package for data communication, analysis and reporting. The course includes hands-on exercises with actual flowmeter systems to reinforce the training presentations.

Objectives
Upon completion of this course, the student shall be able to:
• Evaluate a potential application and select the appropriate flowmeter type and sensors
• Fully program and install and commission their meter
• Verify system performance
• Troubleshoot, diagnose and correct operational issues
• Utilize system test modes
• Communicate with and collect operational data utilizing SiWare
• Create reports and data graphs

Topics
• Clamp-On Flowmeter Theory
• Review of System Hardware & Software
• Installation & Start-up
• System Verification
• Troubleshooting
• SiWare Intro & Utilization
• Labs
### Process Instrumentation

#### Advanced FUH Clamp-On

**Course code:** PIA-PRFLHC2A

**Target audience**
This is an advanced course intended for technical individuals responsible for maintenance and operation of SITRANS FUH Hydrocarbon clamp-on flowmeters.

**Prerequisites**
- SITRANS FUS/FUE 1010 Clamp-On Products (PIA-PRFCOC1A)
- Knowledge of Hydrocarbon Industry terminology

**Course Profile**
This advanced course builds on the information covered in the basic clamp-on flowmeter training class. It covers the specific theory, programming, setup, operation, and verification of the SITRANS FUH flowmeter systems designed for the Hydrocarbon Industry. This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Select the appropriate flowmeter type and sensors for their application.
- Fully program their meter for the selected application.
- Select a suitable installation location.
- Perform a sensor installation.
- Perform system start-up.
- Create and modify (optimize) a liquid table.
- Verify system performance.
- Troubleshoot, diagnose & correct operational issues.
- Communicate with and collect operational data utilizing Siemens SiWare Software.

**Topics**
- Clamp-On Flowmeter Theory
- System Hardware & Software Menu
- Installation & Start-up
- System Verification
- Troubleshooting
- Communications
- Labs

#### Advanced FUG Clamp-On

**Course code:** PIA-PRFNGC2A

**Target audience**
This is an advanced course intended for technical individuals responsible for maintenance and operation of SITRANS FUG010 Natural Gas clamp-on flowmeters.

**Prerequisites**
- SITRANS FUS/FUE 1010 Clamp-On Products (PIA-PRFCOC1A)
- Knowledge of Natural Gas Industry Terminology

**Course Profile**
This advanced course builds on the information covered in the basic clamp-on flowmeter training class. It covers the specific theory, programming, setup, operation, and verification of the SITRANS FUG flowmeter systems designed for the Natural Gas Industry. This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Evaluate and select the appropriate sensors for their application.
- Program meter for selected application.
- Create and upload an AGA-8 table.
- Select a suitable installation location.
- Perform a sensor installation.
- Perform system start-up.
- Enable local compensation for gas parameters.
- Use a flow computer for standard volume compensation.
- Verify system performance.
- Troubleshoot, diagnose & correct operational issues.
- Communicate and collect operational data utilizing Siemens SiWare Software.

**Topics**
- Clamp-On Flowmeter Theory
- System Hardware & Software Menu
- Installation & Start-up
- System Verification
- Troubleshooting
- Communications
- Labs

#### Water Industry

**Course code:** PIA-PRWATC1A

**Target audience**
This course is intended for individuals responsible for start-up and general maintenance of process instrumentation within the water and wastewater industry.

**Course Profile**
This course is designed to provide students with technical knowledge required to specify, apply, install, and maintain process instruments utilized in both drinking water and waste water applications. This course will cover basic theory of operation, applications, installation and commissioning considerations of flow, level, pressure and temperature technologies.

**Objectives**
Participants will gain an understanding of the various technologies and theories of operation for level, flow, pressure, and temperature products used in the Water and Waste Water Industry.

**Topics**
- Overview of conventional WWTP & WTP processes
- Ultrasonic level measurement
- Electromagnetic Flow meters
- Clamp-On Ultrasonic Flowmeters
- Digital Differential Pressure Transmitters
- Temperature Transmitters and Sensors
Process Instrumentation
Oil & Gas Upstream

Course code: PIA-PROGUC1A

Target audience
This course is intended for individuals responsible for start-up and general maintenance of process instrumentation within the upstream oil & gas industry.

Course Profile
Using hand-on labs and applications in the oil and gas upstream process, this course gives participants an overview of several process technologies in flow, temperature, pressure, level, and positioners. Working with the P1 product portfolio, students gain an understanding of theory, installation and setup of flow, pressure, level, and positioner technologies.

Objectives
Students will learn how to install and setup instruments in flow, temperature, pressure, level, and positioners. They will also gain knowledge on specifications of the instruments and theory of the technologies.

Topics
- Overview of the Oil and Gas Upstream Process
- Injection Well Head
- Christmas Tree
- Separators
- Heater Treater
- Manifolds
- Vapor Recovery Unit
- Tank Batteries
- Chemical Injection at Production Well Sites

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Process Instrumentation
Midstream Gas

Course code: PIA-PROGGC1A

Target audience
This course is intended for individuals responsible for start-up and general maintenance of process instrumentation within the midstream gas industry.

Course Profile
This course will provide students with knowledge to enable specification, application, and installation of Siemens process instruments utilized in midstream Natural Gas applications. With a combination of Theory, detailed description, and hands on labs the students will gain a working understanding of flow, pressure temperature, level and valve positioner technologies and how they apply to their applications. The course will review the processes and challenges faced in midstream applications and the solutions Siemens process instrumentation provide to meet these challenges.

Objectives
Upon completion of this course, the student shall be able to:
- Perform basic installation and commissioning of a range of Siemens process instruments
- Understand the capabilities of each product variant and where to apply which model for optimum performance
- Identify applications that may benefit from utilization of Siemens process instrumentation

Topics
- Midstream Gas process overview
- Detailed Review of Midstream Stages
- Product-Specific Tutorials & Hands-On Labs

Process Instrumentation
Midstream Liquid

Course code: PIA-PROGLC1A

Target audience
This course is intended for individuals responsible for start-up and general maintenance of process instrumentation within the midstream liquids Industry.

Course Profile
This course will provide students with knowledge to enable specification, application, and installation of Siemens process instruments utilized in midstream Liquid applications. With a combination of Theory, detailed descriptions, and hands on labs the students will gain a working understanding of flow, pressure temperature, level and valve positioner technologies and how they apply their applications. The course will review the processes and challenges faced in midstream applications and the solutions Siemens process instrumentation provide to meet these challenges.

Objectives
Upon completion of this course, the student shall be able to:
- Perform basic installation and commissioning of a range of Siemens process instruments
- Understand the capabilities of each product variant and where to apply which model for optimum performance
- Identify applications that may benefit from utilization of Siemens process instrumentation

Topics
- Midstream Oil process overview
- Detailed Review of Midstream Stages
- Product-Specific Tutorials & Hands-On Labs
Certification for Engineers
Security in Industrial Networks
Course code: IEN-SECINS1A

Target audience
Users involved with developing or sustaining automation networks in an industrial environment.

Course Profile
This course is one of three certification courses offered under the Siemens Certified Engineer for Industrial Networks (CEIN) program. The curriculum includes an introduction of the potential threats and risks associated with industrial networks, as well as a deep dive into defense in depth strategies. Students will be shown numerous ways to implement access control measures to protect and mitigate security incidents.

Topics
- Comprehensively protecting productivity
- Maintenance
- Risks
- Basics of security
- Cell protection
- Access protection
- Standard machines
- Remote maintenance

3 Days
Register
More information
Product Support

Certification for Engineers
Switching and Routing in Industrial Networks
Course code: IEN-IKSWROU1A

Target audience
Users involved with developing or sustaining automation networks in an industrial environment.

Course Profile
This course is one of three certification courses offered under the Siemens Certified Engineer for Industrial Networks (CEIN) program. The curriculum covers Network solutions and how they connect to real-time systems in theory and in practice. It also addresses the requirements and fundamental principles of industrial routing solutions.

Topics
- Switching
  - Ethernet Basics
  - On-site networking in automation
  - Increased availability in automation
  - Coupling automation segments
  - Networking with IT standards
  - Coupling automation and IT system
  - Seamless redundancy in the ring
  - Seamless redundancy
  - Separating different communication types
- Useful Features
- Routing
  - Internet Protocol in Automation
  - Connecting to the IT Network
  - Redundant Connection to the IT Network
  - Extending an Existing Network
  - Dynamic Routing Protocols
  - Best Practices - Routing

3 Days
Register
More information
Product Support

Certification for Engineers
Wireless LAN in Industrial Networks
Course code: IEN-IKWLAN1A

Target audience
Users involved with developing or sustaining automation networks in an industrial environment.

Course Profile
This course is one of three certification courses offered under the Siemens Certified Engineer for Industrial Networks (CEIN) program. The curriculum covers the basic physics of WLAN, and the various wireless standards and access methods. Throughout the course, students will learn how to plan, configure and operate wireless solutions in industrial applications, in interaction with real-time systems.

Topics
- Introduction to Industrial Wireless (IWLAN)
- Wireless Theory
- Antenna technology
- WLAN access procedures
- WLAN Standards
- Radio field planning
- Typical industry protocols
- IPCF
- IPCF-MC

3 Days
Register
More information
Product Support
Industrial Networking

Fundamentals of Industrial Networking

Course code: IEN-NETFUND1A

Target audience
This course is for anyone interested in learning about the fundamentals of networking, either as an introduction or as a refresher. Ideal candidates include, but are not limited to:
- Application Engineers
- Automation Engineers
- Commission Engineers
- Communication Engineers
- Control Engineers
- Facility Managers
- Operations or IT Network Engineers
- Plant Engineers
- Project Engineers
- Sales Engineers
- Substation Engineers
- System Engineers

Prerequisites
- None

Course Profile
This course is an introductory course to networking technology and mechanisms – the foundation of today’s digital communication. Designed as a recommended prerequisite for our suite of certification courses, it will take you on a tour through the seven networking layers. At the end of the course, students will have a broad understanding of networking terminology, as well as a deeper knowledge of the principles of building Ethernet networks.

Objectives
Upon completion of this course, the student shall be able to:
- The OSI Reference Model
- The Physical Layer (Copper, Fiber, Wireless)
- The Data Link Layer (MAC, VLAN)
- The Network Layer (TCP/IP, Routing Protocols)
- IPv4 vs IPv6 Addressing
- Upper Layer Communications

Topics
- Introduction to Industrial Ethernet
- Layer 1 – Physical Layer
- Layer 2 – Data Link Layer
- Layer 3 – Network Layer
- Layer 4 through 7 – Upper Layers

Security in Industrial Networks with RUGGEDCOM

Course code: IEN-RCMSECCROX

Target audience
This course is for users who are involved with developing or sustaining networks in rugged environments where RUGGEDCOM equipment is required. This includes, but is not limited to:
- Application Engineers
- Automation Engineers
- Communication Engineers
- Control Engineers
- Facility Managers
- Operations or IT Network Engineers
- Project Engineers
- Substation Engineers
- System Engineers

Prerequisites
- Basic knowledge of the "Ethernet". Familiarity with network topologies, Media Access Control (MAC), Internet Protocol, data transport and associated technical vocabulary. Familiarity with the principles of switching operations, hubs and the OSI reference model. Recommended: Industrial Ethernet Fundamentals training course (IEN-NETFUND1A) or pass a written examination.

Course Profile
This course is one of three networking certification courses which incorporate RUGGEDCOM products into the curriculum. At the end of the course, students are equipped with the knowledge to plan, configure, operate and provide support for networks in their specific market.

Objectives
Upon completion of this course, the student shall be able to:
- Security in Industrial Ethernet Networks
- Threats to Industrial Ethernet Networks
- Security Defense-in depth approach
- Security measures and guidelines
- Protecting Control Networks translation
- Site to Site and Remote access via VPN
- Hardening the RUGGEDCOM ROX Security

Topics
- Protecting Industrial Networks
- Hardening the Switch
- Control Networks Protection
- Concealing Internal IP network Identity
- Building Virtual Private Networks

Switching & Routing in Industrial Networks with RUGGEDCOM

Course code: IEN-RCMSWROU

Target audience
This course is for users who are involved with developing or sustaining networks in rugged environments. This includes, but is not limited to:
- Application Engineers
- Automation Engineers
- Communication Engineers
- Control Engineers
- Facility Managers
- Operations or IT Network Engineers
- Project Engineers
- Substation Engineers
- System Engineers

Prerequisites
- Basic knowledge of the “Ethernet”. Familiarity with network topologies, Media Access Control (MAC), Internet Protocol, data transport and associated technical vocabulary. Familiarity with the principles of switching operations, hubs and the OSI reference model. Recommended: Industrial Ethernet Fundamentals training course (IEN-NETFUND1A) or pass a written examination.

Course Profile
This course is one of three networking certification courses which incorporate RUGGEDCOM products into the curriculum. At the end of the course, students are equipped with the knowledge to plan, configure, operate and provide support for networks in their specific market.

Objectives
Upon completion of this course, the student shall be able to:
- Security in Industrial Ethernet Networks
- Threats to Industrial Ethernet Networks
- Security Defense-in depth approach
- Security measures and guidelines
- Protecting Control Networks translation
- Site to Site and Remote access via VPN
- Hardening the RUGGEDCOM ROX Security

Topics
- Switching
- Routing
SITRAIN® courses focus on plant floor safety

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Process Safety Management

Learning Map

- **Process Safety Engineering**
  - Disposal System Best Practices
    - OGM-DISYG1A
  - Pressure Relief Analysis Best Practices
    - OGM-PRAG1A
  - Process Safety Pressure Protection Manager
    - OGM-PSPPMG1A

- **Process Safety – Maintenance and Inspection**
  - Process Safety Asset Integrity Manager
    - OGM-PSAIMG1A
  - UltraPIPE
    - OGM-ULPIPEG1A

*Core courses*
Process Safety Engineering
Disposal System Best Practices

Course code: OGM-DISYSG1A

Target audience
Personnel who have the responsibility of maintaining and auditing the pressure relief system design basis documentation for OSHA 1910.119 compliance. The intended audience includes auditors, process engineers, technical managers, and project managers.

Course Profile
In recent years, refining and petrochemical facilities have experienced tremendous growth in response to increasing demand for fuels and chemical precursors. At the same time higher expectations were established to be in compliance with corporate, local, and federal regulations. Under these circumstances it has become more challenging to keep an eye on the update and maintenance of the flare header adequacy analysis during fast paced engineering design and debottlenecking projects. This course provides the learner with skills to maintain and audit the pressure relief system design basis documentation for OSHA 1910.119 compliance.

Topics
- Overview of relief disposal system design
- Global scenario identification
- Network equipment rating
- Acoustic fatigue
- Dispersion modeling
- Dynamic simulation for flare analysis
- Flare quantitative risk analysis (QRA)

Process Safety Engineering
Pressure Relief Analysis Best Practices

Course code: OGM-PRAG1A

Target audience
Personnel responsible for maintaining and auditing the pressure relief system design basis documentation for OSHA 1910.119 compliance. The intended audience includes auditors, process engineers, technical managers, and project managers.

Course Profile
Approximately twenty years after the initial push for compliance and the implementation of the OSHA National Emphasis Program (NEP), companies have some breathing room to apply a best practice approach to complying with PSM mandates. Those best practice approaches are covered in this course.

Topics
- Introduction and Historical Perspective
- General approach to pressure relief system design - Standardization of equipment based analysis
- Identifying and implementing RAGAGEPs
- Overpressure scenarios and required relief rates
- Relief Devices
- Overview of relief disposal system design
- Low pressure tank vents
- Relief device inspection, maintenance and removal
- Coupling PRA documentation to management of change processes

Process Safety Engineering
Process Safety Pressure Protection Manager

Course code: OGM-PSPPMG1A

Target audience
Personnel who have the responsibility of maintaining and auditing the pressure relief system design basis documentation for OSHA 1910.119 compliance. The intended audience includes auditors, process engineers, technical managers, and project managers who will be using PSPPM and #153.

Course Profile
This 2-day course is designed to offer focused training, networking, and best practice exchange during an interactive experience with Process Safety Pressure Protection Manager (PSPPM and #153). It provides users of PSPPM with the skills and tools necessary to complete a pressure relief and flare analysis in PSPPM and #153.

The course covers navigation, data entry, scenario and global scenario identification and required rate calculations, relief devices sizing, disposal system component sizing and report generation. This course will also discuss features and customization using the tools built into PSPPM and #153.

Topics
- General Approach to pressure relief system design
- Navigation, interface conventions
- Site level information
- Unit/Case level information
- Data population
- Equipment related calculations
- Overpressure scenario identification
- Required rate calculations
- Relief device sizing
- Low pressure tanks
- Reporting
- Flare/Case information
- Relief header analysis overview
- Global scenario analysis summary
- Network model development
- Using PSPPM with VisualFlare/Flare System Analyzer
- Network equipment rating analysis
- Evergreening
Process Safety Asset Integrity Manager

Course code: OGM-PSAIMG1A

Target audience
This course is primarily intended for personnel who will be using or are evaluating Process Safety Asset Integrity Manager and reg - (PSAIM™)

Course Profile
This course provides attendees with knowledge and skills to implement and utilize PSAIM and #153 – for inspection data management, monitoring corrosion rate and remaining life, scheduling activity and corrosion monitoring inspections in compliance with established inspection codes.

Topics
- Introduction
- Overview
- Master Equipment List
- Corrosion Monitoring Piping Examples
- Corrosion Monitoring Vessel Example
- Ultrasonic Data Loggers
- Corrosion Monitoring: Analytical setting and remaining life
- Corrosion Monitoring Management Reports: When & What is due?
- Inspection Activity Scheduling (Visuals, Internals, etc.)
- Inspection Reports (MS Word, .pdfs, etc.) and Recommendations
- Inspection Activity Management Reports: When & what is due?
- Equipment drawings
- Valve Testing & inspection
- Localized Corrosion - Piping
- Custom reports
- Settings (Databases)
- Database Append Cost

UltraPIPE

Course code: OGM-ULPIPEG1A

Target audience
This course is primarily intended for personnel who will be using or are evaluating UltraPIPE and reg –

Course Profile
This course provides attendees with knowledge and skills to implement and utilize UltraPIPE and reg - for inspection data management, monitoring corrosion rate and remaining life, scheduling activity and corrosion monitoring inspections in compliance with established inspection codes.

Topics
- Introduction
- Overview
- Master Equipment List
- Corrosion Monitoring Piping Examples
- Corrosion Monitoring Vessel Example
- Ultrasonic Data Loggers
- Corrosion Monitoring: Analytical setting and remaining life
- Corrosion Monitoring Management Reports: When & What is due?
- Inspection Activity Scheduling (Visuals, Internals, etc.)
- Inspection Reports (MS Word, .pdfs, etc.) and Recommendations
- Inspection Activity Management Reports: When & what is due?
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- Valve Testing & inspection
- Localized Corrosion - Piping
- Custom reports
- Settings (Databases)
- Database Append Cost
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