COURSES CATALOGUE

CONTROL systems and visualization

Siemens S7-300/400
Siemens S7-300/400 TIA Portal
Siemens Safety Integrated
Siemens S7-200
Siemens S7-1200
Siemens S7-1500
HMI/SCADA
Industrial networks
SIMATIC PCS7
CoDeSys
Industrial robots
Drive systems
Industrial sensors
TABLE OF CONTENTS

- About us ................................................................. str. 1
- Quality policy ............................................................. str. 2
- Prizes and awards ....................................................... str. 2
- The authorized training partner .................................... str. 3
- Specialized training in the field of industrial automation ................................................................. str. 4
- Training laboratories .................................................... str. 18
- PLC SIEMENS SIMATIC S7 programming – basic and advanced courses ................................................................. str. 19
- Programming and designing with Distributed Safety and Safety Advanced in SIMATIC SAFETY INTEGRATED controllers ................................................................. str. 22
- Industrial networks ....................................................... str. 23
- CoDeSys software ......................................................... str. 26
- HMI/SCADA software .................................................. str. 27
- Drive systems ............................................................. str. 28
- SIMATIC PCS7 .......................................................... str. 30
- Industrial sensors ......................................................... str. 30
- Industrial robots .......................................................... str. 31
- Experts ................................................................. str. 32

emt-systems.pl
We specialize in providing training courses in the field of broadly defined engineering techniques. Our main training sections are:

- Visualization and control systems
- Mechanical engineering
- Material engineering
- Design and engineering
- Optimization of production processes

We organize workshops, conduct consultations, advice and support implementation, sale software and systems automation products, as well as running measurements and tests.

EMT-Systems has been operating in the field of engineering and technical training since 2006. We approach the subject of technical training for industrial personnel in an innovative way. We have sophisticated courses and new courses are created in response to the growing demand for training in certain fields of automation and modern technology.

They are often created to suit the specific requirements of the customer.

The courses offered by EMT-Systems are based on years of experience in training programs for corporations, government agencies, schools and individual and industrial customers.

We aim to help our customers achieve success.

Our mission is to conduct high quality training for industrial personnel to help them adapt to modern jobs using innovative technologies.

We help to identify the real qualifications of the participants and plan the correct training path for them.

During the courses we check the knowledge growth of participants, which automatically allows us to illustrate the effectiveness of our work.

Because we are the only center that provides so many technical training courses as we do, we are the leader in technical qualifications development in Poland.

We have been on the training market since 2006.
Quality policy
Prizes and awards

Because we are constantly improving the quality of our training services, we have implemented the Product Certification System according to the following standards:

- PN-EN ISO 9001:2009
- ISO 29990:2010

The awarded certificates encourage us to constantly improve and update our services.

We have been a member of the Polish Chamber of Training Companies since June 2013. We are obliged to obey the regulations of the Code of Good Practice and use them in our everyday work.

We have also signed the Training Service Standard document. We are driven by the rules of professional ethics and business integrity.

We have received numerous awards and prizes:

- **Silesian Innowator 2012** during the conference „Innowacja. Cię rozwija” InnoSilesia
- **The award of the Marshal of the Silesian Voivodeship** during the conference „Innowacja. Cię rozwija” InnoSilesia
- **The 1st place in the category: innovative company - National Leader of Innovation and Development 2012** during V edition of the „National Leaders of innovation and Development” contest
- **Awards in the category: dynamically developing company** during V edition of the „National Leaders of Innovation and Development” contest

- **Grand prize 2014 Training Company of the Year** obtained from Centralne Biuro Certyfikacji Krajowej
- **Grand prize 2014 Training Program of the Year** obtained from Centralne Biuro Certyfikacji Krajowej
- **Certificate 2015 Company of the Future**
Lectures and training rooms
Training sessions take place in laboratories and training rooms fitted with professional equipment and teaching aids. Under the supervision of the tutor, participants have access to advanced machines, devices and systems included in the course program.

Coaching staff
The coaching staff in the field of automation and control systems are industry representatives with extensive experience in implementation projects. Our trainers are control engineers and designers involved in the implementation of automation systems in major industrial plants both in Poland and worldwide.

Training materials and course documentation
Participants receive professional documentation in the form of textbooks, technical documentation, instructions and other publications. There is also the option of using materials and diagrams provided by the client.

Extra lessons
Participants are entitled to participate in free extra classes on the chosen day, after the scheduled classes.

Training methodology
We focus on practical exercises and application of our tutors' knowledge backed up by real-life examples. As a rule, 30% of the time devoted to theoretical training and 70% of the time is devoted to practical training - workshops and exercises which allow the participants to gain practical skills of operating machines and systems.

Two different course types: open and closed
We have introduced two types of courses: open and closed. Such a solution provides the participants with the opportunity of choosing the best option. Open courses are aimed towards individual participants while closed courses are dedicated to firms.

Catering
For courses carried out in our training rooms we provide daily coffee breaks, hot and cold drinks, cookies and two course lunches.

Post-training and implementation support
We also provide support and help within the topics included in the courses in your everyday work.
# Specialized training in the field of industrial automation

## SIEMENS S7-300/400

<table>
<thead>
<tr>
<th>Course symbol</th>
<th>PLC1</th>
<th>PLC2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course name</strong></td>
<td>SIEMENS SIMATIC S7-300/400 programming basic course</td>
<td>PLC SIMATIC S7-300/400 advanced course</td>
</tr>
<tr>
<td><strong>Course aims</strong></td>
<td>Introduction to PLC issues; design and functions of the Simatic S7-300/400 logic controller and Simatic Step 7 software; learning about the S7 environment with its basic programming functions, configuration and diagnostic tools; setting and performing simple controlling tasks in graphic language (LAD, FBD).</td>
<td>Structure and operation of logic controllers SIEMENS Simatic series S7-300/400; advanced programming, configuration, operation and diagnostic functions of logic controllers SIEMENS Simatic S7-300/400; information about advanced programming STL methods and its application in practice.</td>
</tr>
<tr>
<td><strong>Course summary</strong></td>
<td>Modular structure of controllers; connecting the PLC to PC; starting a project in STEP 7; configuring the connection with the PLC; hardware configuration; PLC inputs / outputs; CPU - basic operation; table of symbols; principles of writing programs - structure and elements of programs; logic operations; LAD and FBD languages; monitor and testing tools; basic of structured programming - using the functions with no parameters; PLC memory; flip flops and edges; integers in STEP7; numeral systems; counters; comparison operators and jumps; timers; project management; memory cards; introduction to STL language.</td>
<td>Hardware configuration; STL programming; REAL variables; analogue modules; status word; data blocks OB; function blocks FB; CPU error diagnostics; referenced data.</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>5 days 35 hours</td>
<td>5 days 35 hours</td>
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<tr>
<td>Course symbol</td>
<td>PLC3</td>
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<tr>
<td><strong>Course name</strong></td>
<td>PLC SIEMENS SIMATIC S7-300/400 - diagnostic</td>
<td></td>
</tr>
<tr>
<td><strong>Course aims</strong></td>
<td>Learning to use available functions, identify, diagnose and eliminate problems that may arise while working with control systems based on SIEMENS Simatic S7-300/400 controllers</td>
<td></td>
</tr>
<tr>
<td><strong>Course summary</strong></td>
<td>SIEMENS Simatic S7-300/400 controllers – design, operation modes, additional modules, selection criteria; hardware configuration; connecting to PLC control program; diagnostic tools; analogue modules configuration; pulse outputs; error handling.</td>
<td></td>
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<tr>
<td><strong>Duration</strong></td>
<td>5 days 35 hours</td>
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<table>
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<tr>
<th>Course symbol</th>
<th>PLC5</th>
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<tbody>
<tr>
<td><strong>Course name</strong></td>
<td>S7-GRAPH sequence programming</td>
</tr>
<tr>
<td><strong>Course aims</strong></td>
<td>Acquiring the sequence programming in Simatic Step 7; developing simple and advanced sequence algorithms in S7-GRAPH; monitoring and diagnostics possibilities of the developed sequence and its integration with the rest of the control program; presentation of the useful programmable conditions in LAD and FBD; learning about interlocks and supervisions, presentation of the examples of using timers and counters.</td>
</tr>
<tr>
<td><strong>Course summary</strong></td>
<td>Operation principles of a sequencer; basic elements and structures; S7-GRAPH; editor, users interface, setup; edition and monitoring of the user’s program; its parameterization in the user’s program; interlocks and supervisions; programming standard and event-dependent actions; timers and counters; programmable conditions in LAD and FBD; Documenting and source files.</td>
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<tr>
<td><strong>Duration</strong></td>
<td>3 days 20 hours</td>
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<table>
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<tr>
<th>Course symbol</th>
<th>PLC6</th>
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<tbody>
<tr>
<td><strong>Course name</strong></td>
<td>S7-SCL programming</td>
</tr>
<tr>
<td><strong>Course aims</strong></td>
<td>The principles and concepts of using structured programming languages on the example of the environment Simatic S7-SCL; overview of application examples for which SCL language should be used; learning software development with practical examples using the SCL language; familiarization with the process of diagnosing and monitoring programs error.</td>
</tr>
<tr>
<td><strong>Course summary</strong></td>
<td>Create blocks: OB, FC, FB, FB1, DB with SCL Simatic Step 7; conditional instructions: IF, CASE, CP, FOR, WHILE, REPEAT; condition instructions; EXIT, RETURN; examples of using built-in functions: declaration of variables SCL; using functions DB FBD SCL; compiling and debugging; integration with the rest of the program; exercises and practical examples of using SCL.</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>3 days 20 hours</td>
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</tbody>
</table>

| Workstations | Individual workstations fitted with actual manufacturing equipment: PLC1 - S7-300 controller, PLC2 - S7-300 controller, PLC3 - software STEP 7, PLC4 - sets of actuators, PLC5 - details on page 18-21 |
### SIEMENS S7-300/400 TIA PORTAL

<table>
<thead>
<tr>
<th>Course symbol</th>
<th>TIA1</th>
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<tbody>
<tr>
<td>Course name</td>
<td>Project migration from STEP 7 do TIA PORTAL</td>
</tr>
<tr>
<td>Course aims</td>
<td>Learning the latest version of STEP 7 software available within TIA Portal; using new functionalities introduced to TIA Portal STEP 7, including operator panels; learning the process of creating configuration for SIEMENS Simatic S7-300/400, PROFIBUS DP network as well as edition, implementation and diagnostics of the controller application; software migration to TIA Portal STEP7 with identification of potential difficulties and their solutions.</td>
</tr>
<tr>
<td>Course summary</td>
<td>Introduction to TIA portal; presentation of the interface; starting a project; programming languages overview, exemplary programs; program analysis; basics of network configuration; project migration from STEP7; operator panels.</td>
</tr>
<tr>
<td>Duration</td>
<td>3 days</td>
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<td></td>
<td>23 hours</td>
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<table>
<thead>
<tr>
<th>Course symbol</th>
<th>TIA2</th>
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</thead>
<tbody>
<tr>
<td>Course name</td>
<td>PLC Siemens Simatic S7-300/400 programming in TIA PORTAL - basic course</td>
</tr>
<tr>
<td>Course aims</td>
<td>Understanding the concept of automatic control of devices using logic controllers; introduction to the TIA environment (Totally Integrated Automation Portal); maintenance, configuration and programming Simatic S7 300/400 controllers with the use of TIA Portal STEP7 software; learning about three basic programming languages for Simatic controllers: LAD, FBD, and STL.</td>
</tr>
<tr>
<td>Course summary</td>
<td>TIA PORTAL STEP7 Professional v1 - creation and management of the project in STEP7; connection between PLC and PC; hardware configuration; input/output modules; basic CPU maintenance; principles of writing programs in LAD/FBD using logic and arithmetic operations, timers and counters; STL language – programming; testing and monitoring tools for LAD/FBD/STL languages; project archiving.</td>
</tr>
<tr>
<td>Duration</td>
<td>5 days</td>
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<td></td>
<td>35 hours</td>
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<table>
<thead>
<tr>
<th>Course symbol</th>
<th>TIA3</th>
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<tbody>
<tr>
<td>Course name</td>
<td>PLC Siemens Simatic S7-300/400 programming in TIA PORTAL - advanced course</td>
</tr>
<tr>
<td>Course aims</td>
<td>Learning the detailed structure and functions of SIEMENS Simatic S7-300/400 logic controllers; knowledge of the advanced programming functions, configuration, maintenance and diagnostics of the Simatic S7 controllers; learning about the methods of programming industrial objects in TIA Portal STEP 7, with the use of different types of blocks and STL; extension of the knowledge and skills acquired during the basic course.</td>
</tr>
<tr>
<td>Course summary</td>
<td>Hardware configuration - parameterization of the CPU and modules of the SIEMENS SIMATIC S7 300 controllers: programming in STL language using advanced programming techniques; indirect addressing in STL - pointers; D8 blocks, functions and function blocks; parameterized blocks FB and FC; analogue processing and programming; cyclic interrupts; advanced diagnostic functions using Reference Data.</td>
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<tr>
<td>Duration</td>
<td>5 days</td>
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<td></td>
<td>35 hours</td>
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**Workstations**
- Individual workstations fitted with actual manufacturing equipment:
  - TIA 1: S7-300 controllers,
  - TIA 2: software STEP7,
  - TIA 3: sets of actuators.

*Details on page 28-31*
## Siemens Safety Integrated

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>SAF300</td>
<td>Programming and designing with Distributed Safety in Simatic Safety Integrated S7-300 Controllers</td>
</tr>
<tr>
<td>SAF1500</td>
<td>Programming and designing in Step 7 Safety Advanced in SIMATIC Safety Integrated S7-1600 controllers</td>
</tr>
</tbody>
</table>

**Course aims:**
- Learning how to use PLC Simatic S7 in F (FalSafe) versions used to perform tasks connected with safety functions; explanation of the concept of Safety Integrated and Distributed Safety in the Siemens Simatic family. Introduction to the certified library „S7 Distributed Safety“ and rules of creating S7 programs illustrated with practical exercises; using IEC-61508 standards connected with functional safety; overview of the safety functions available in converters and exercises with examples of uses.

**Course summary:** Functional safety in practice: components used in safety systems; principles of connecting safety system signals to PLC: PROFSafe – operation principle; solutions for Simatic Safety Integrated; configuration of the PLC S7 project; preparing a user program for PLC; preparing a user program for the operator panel of the HMI visualization system; preparing a user program for the frequency converter; principles of creating safety programs in PLC; overview of standard functions of Distributed Safety libraries; safety modes of converter drives as illustrated with Siemens Sinamics G1 converter.

**Duration:** 4 days 31 hours

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## Siemens S7-200

<table>
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<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>PLC7</td>
<td>PLC S7-200 programming – basic course</td>
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<tr>
<td>PLC8</td>
<td>S7-200 programming – advanced course</td>
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</tbody>
</table>

**Course aims:**
- Introduction to the design and functions of the Simatic S7-200 logic controllers; developing the skills of programming Simatic S7-200 logic controllers; configuration and diagnostics of the controllers, presentation of the available tools: LAD and FBD programming.

**Course summary:** Short history of PLC; compact controllers S7-200, connecting the PLC to PC; STEP7-Micro/Win software; PLC input/output; table of symbols; program structure; logic operations; LAD and FBD languages; monitor and testing tools; basics of structure programming; PLC memory; flip-flops and edges; timers; numerical systems; counters; comparison operators and jumps; timers.

**Duration:** 5 days 35 hours

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**Workstations**
- Individual workstations fitted with actual manufacturing equipment:
  - SAF300: S7-315F 2PN/DP controllers
  - SAF1500: S7-1516 2PN/DP controllers

*Details on page 22*
SPECIALIZED TRAINING
IN THE FIELD OF INDUSTRIAL AUTOMATION

■ SIEMENS S7 -1200

Course symbol  PLC9

Course name  PLC SIEMENS SIMATIC S7-1200 programming
- basic course

Course aims  Learning about the design and functions of the S7-1200 logic controllers; learning the basics of programming, configuration, maintenance and diagnostics of SIEMENS SIMATIC S7-1200 logic controllers; SIMATIC HMI Basic Panel programming in the SIMATIC STEP7 Basic environment.

Course summary  General information about the S7 1200 products; assembly, installation and exploitation of the PLC controller; steps Basic software installation; hardware configuration of S7-1200 systems; using available editors (LAD, FBD languages); symbols; binary and digital operations (including timers and counters); analogue values processing; using Data Blocks (DB) and Organization Blocks (OB); introduction to HMI and basics of the PROFINET network; variables management PLC 1 HMI; project management – documentation, archiving and saving the program; identifying basic errors of the use; each of the above topics areas are backed up by practical exercises.

Duration  5 days
35 Hours

Workstations  Individual workstations fitted with actual manufacturing equipment:
PLC9  - S7-1200 controllers,
- TIA PORTAL software,
- sets of actuation
Details on page 18-21

Course symbol  PLC10

Course name  PLC SIEMENS SIMATIC S7-1200 programming
- advanced course

Course aims  Introduction to the rules of configuration and application of analogue modules, interrupts, counters, PIO, PWM and PIID; using technological functions, data logging and WWW servers; modifications on operator panels; writing advanced applications in SCL; introduction to configuration and launching data exchange between controllers via Ethernet.

Course summary  DB blocks – differences between S7-1200 and S7-300/400; analogue inputs and outputs; interrupts handling; test counters; pulse outputs; instructions libraries; application of SCL programming in S7-1200; principles of writing programs; basic operations available in SCL; spectrum of application; S7-1200 communication; indirect addressing; PID regulation; operator panels; logging data in CPL; embedded WWW server.

Duration  5 days
35 Hours
TIA1500-1

SIEMENS SIMATIC S7-1500 programming

basic course

Course aims: Introduction to the idea of automatic control using logic controllers; introducing participants to Totally Integrated Automation Portal environment; mastering the skills of operating, configuring and programming SIMATIC S7-1500 controllers using TIA Portal software STEP 7; knowledge of the three major programming languages Simatic, i.e., LAD, FBD and STL.

Course summary: Modular design of S7-1500 controllers; connection between the programmer and controller; creating a project in TIA Portal STEP 7; setting up the connection with the controller and its modules; input and output addressing; CPU – basic operation; the concept of a tag and its use; rules of writing programs - the structure and components of logical operations; programs in LAD and FBD; monitoring and testing the program; basics of structured programming – working with functions; memory controller; flip-flops and slopes; integer numerical types in TIA Portal STEP 7; arithmetic instructions: number systems; counter systems; comparisons and jumps; timers; Project Management; the role and use of memory cards in the PLC monitoring Support Trace function: introduction to STL.

Duration: 5 days
35 hours

TIA1500-2

SIEMENS SIMATIC S7-1500 programming

advanced course

Course aims: Introduction to the design and functions of the Siemens SIMATIC S7-1500 logic controllers; learning about the advanced programming functions, configuration, maintenance and diagnostics of the SIMATIC S7-1500 logic controllers; introduction to the methods of programming industrial objects in the TIA Portal STEP7 environment using different types of blocks and STL language; broadening the knowledge and enhancing the skills acquired during the basic course.

Course summary: Hardware and CPU configuration of S7-1500 systems; analogue modules configuration; STL programming; real type and its arithmetics; other types used in programs; status word and jumps; Data Blocks, functions and function blocks; analogue signals handling; cyclic interrupt; fast counters; indirect addressing; diagnostic functions of the software; diagnostic front panel; project analysis – reference Data; security settings of the project and controller.

Duration: 5 days
35 hours

SAF1500

Programming and designing in Step 7 Safety
Advanced in SIMATIC Safety Integrated

S7-1500 controllers

Course aims: Knowledge on using PLC Simatic S7 in F (FailSafe) versions used to perform tasks connected with safety functions; explanation of the concept of Safety Integrated and Distributed Safety in the Siemens Simatic family; introduction to the certified library „S7 Distributed Safety“ and rules of creating safe programs illustrated with practical exercises; using ISO-EN standards connected with functional safety; overview of the safety functions available in converters and exercises with examples of use.

Course summary: Functional safety in practice: components used in safety systems; principles of connecting safety system signals to PLC: PROFIsafe – operation principle: solutions for Simatic Safety Integrated; configuration of the PLC S7 project; preparing a user program for PLC; preparing a user program for the operator panel of the HMI visualization system; preparing a user program for the frequency converter; principles of creating safety programs in PLC; overview of standard functions of Distributed Safety libraries; safety modules of converter drives as illustrated with Siemens Simatic G converter.

Duration: 4 days
31 hours

Workstations:
- TIA 1500-1
- TIA 1500-2
- SAF1500

Individual workstations fitted with actual manufacturing equipment:
- S7-1516 3PN/DP controllers.
- S7-1516F 3PN/DP controllers.
- TIA PORTAL software.
- sets of actuators.

Details on page 18-21
SPECIALIZED TRAINING
IN THE FIELD OF INDUSTRIAL AUTOMATION

CODESYS

Course symbol CDS1
Course name CoDeSys - BASIC COURSE
Course aims Introduction to the popular controller programming environment CoDeSys; learning the essential and in accordance with the IEC standard programming languages applied in the industry; acquiring basic skills of writing and analyzing control programs; mastering the basics needed for further development in the field of modern automation systems.
Course summary The concept of controlling; PLC operation principles; starting a new project and basic parameterization of devices; controller memory organization and addressing principles; CPU maintenance; role and defining symbolic variables; different types of data; programming languages for the controllers, structure of PLC program block; logic operations in LD and FBD languages; monitoring and testing the program; basic of structured programming – different types of blocks and their application; flip-flops and jumps; PLC number systems; arithmetic instructions; counter instructions; comparison and jump instructions; timers; project management; introduction to IL.
Duration 5 days
35 hours

Workstations
CDS1 Individual workstations fitted with actual manufacturing equipment.
Details on page 26
**HMI / SCADA**

### Course W2
**Course name:** WinCC flexible

- Gaining expert knowledge on creating new visualization project and typical maintenance tasks; learning the useful functions and capabilities of the WinCC flexible suite on specific examples/tasks for individual solution. Trainers make a great effort to adjust the course content to the client's requirements so that the trainees gain an overview which is applicable specifically to the client's activity profile at the same time preparing the participants to face new challenges.

**Course summary**
- Introduction to HMI systems; project creation; basic menu and tools; basics of screens creation; navigation within a project; variables management; textual and graphic lists; multilingual application; advanced panels; screen objects; functions; basics of programming - Visual Basic Script; communication; communication area; users management; alarms management; archives; diagrams; recipes; multiplexing; reporting; additional functions and tools.

**Duration**
- 5 days
- 35 hours

### Course W4
**Course name:** Industrial process visualization - InTouch

- Learning about visualization systems used in industrial environment illustrated with an example of SCADA - InTouch Wonderware.

**Course summary**
- Introduction to InTouch software, its components, available functions and principles of licensing; starting a new project; creating symbolic displays; standard graphic objects and Archiva X objects; creating variables; configuration of the communication software, communication with PLC; scripting, explanation of embedded scripts; alarms configuration; configuration of current and historic trends; recipe management, users management, maintenance of multilanguage translations.

**Duration**
- 4 days
- 31 hours

### Course W3
**Course name:** Migration from text to graphic panels

- ProTool / WINCC

- Acquiring the skills of adjusting the used machine control system to the new HMI devices manufactured by SIEMENS; familiarizing the engineer with the software WinCC flexible used to create applications for graphic panels; using the existing projects of text panel applications to create the basic version of software on the graphic panel; understanding the procedure of migration from panels OP3/OP7/OP17.

**Course summary**
- Introduction to HMI systems; types of operator panels; list of graphic and text panel WinCC Flexible software; software versions, migration-oriented installation, migration procedure; migration from panels OP3/OP7/OP17; - workshop on new software, screen elements, layout of elements on the screen; navigation methods in the application, panel keys, variables; communication with PLC, multilanguage applications, communication areas, functions, occurrences, tasks, trends, alarms, user management, reports, recipes.

**Duration**
- 5 days
- 35 hours

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**Workstations**
- Individual workstations fitted with actual manufacturing equipment;
- W1: control panels;
- W2: PLC systems;
- W3: software for HMI;
- W4: sets of actuators

**Details on page 27**
## INDUSTRIAL NETWORKS

### Course

#### SP1

**Course symbol**: SP1  
**Course name**: AS-Interface  
**Course aims**: Practical skills of designing and implementing control systems of machines based on AS-Interface. Explanation of the communication problems occurring in the network built of devices made by different manufacturers. Introduction to ASI diagnostics. The knowledge gained in the course is universal and does not depend on the equipment used, it relates to the open and manufacturer-independent AS-Interface.

**Course summary**: Introduction to the physical layer of the industrial network AS-Interface: design, installation, network diagnostics; cooperation of interconnected devices within AS-Interface network (system initialization, Master-Slave communication); configuring and launching the AS-Interface network; software development, digital and analogue variables addressing; error analysis in the physical and logic layers; examples of visualization screens created in CoDeSys; maintenance replacing devices within your system; maintenance - diagnostics of devices operating within AS-I network; diagnostics of modules and transmitters; setting reaction time; maintenance - methods of optimizing transmissions in the AS-I network; ways to improve the operation of the whole network.

**Duration**: 2 days
**Duration**: 14 hours

### Course

#### SP2

**Course symbol**: SP2  
**Course name**: PROFIBUS DP diagnostics  
**Course aims**: Broadening participants' knowledge by including advanced knowledge about DP protocol; transmission media and advanced PROFIBUS DP diagnostics; practical exercises in analyzing typical elements of networks, diagnostic problems and errors common for PROFIBUS DP network; detailed information about maintenance, functions and diagnostic methods of PROFIBUS Test Set 4. The course includes the theoretical part relating to PROFIBUS DP/PA necessary to begin practical exercises.

**Course summary**: PROFIBUS DP/PA network - at the background of the industrial communication networks: network topology, physical and logic connections of the network; OSI model and physical elements of the network; transmission media and installation guidelines; network segmentation with the use of the available network equipment: configuration, parameterization and launching the PROFIBUS network with the development software Simatic Step 7; common diagnostic problems and errors in the PROFIBUS network: network diagnostics with Step 7 software and communication processor (CP); PROFIBUS diagnostics at the OSI model first level using basic and specialized diagnostic tools: PROFIBUS protocol architecture: functionality of engineering software PC-Diag-suite by Softing AG: error analysis at the protocol level using PROFIBUS Test Set 4: diagnose errors in PROFIBUS DP and its diagnostic functions: PROFIBUS Inspector as a monitoring tool for PROFIBUS DP.

**Duration**: 4 days
**Duration**: 28 hours

### Course

#### SP3

**Course symbol**: SP3  
**Course name**: PROFINET  
**Course aims**: Knowledge and detailed information on the PROFINET system; explanation of the differences resulting from the comparison with installations based on the communication in PROFIBUS DP; knowledge on the configuration of PROFINET and integration of devices made by different manufacturers; acquiring practical skills of implementing, controlling and diagnosing systems based on PROFINET.

**Course summary**: Ethernet in control systems: beginnings and development of PROFINET (CBA, ID); comparison of PROFIBUS and PROFINET; Ethernet network: TCP/IP protocol and its functions; PROFINET Installation with a physical layer; PROFINET IO: configuration, parameterization and launching PROFINET IO; other bus systems and possibilities of integration with PROFINET: using diagnostic interrupts in error handling in PROFINET IO; using SMTP protocol for diagnostic purposes: communication processors in PROFINET IO; PROFINET CBA as a modular production system; PROFINet as a real-time network, operation modes; elements of radio communication in PROFINET IO.

**Duration**: 5 days
**Duration**: 35 hours
### CAN and CANopen

**Course symbol**: SP4  

**Course name**: CAN and CANopen  

**Course aims**: Introducing the CAN standards; learning the structure and capabilities of networks based on CAN bus; gaining specialist knowledge on the CAN bus configuration; acquiring practical skills of connecting and configuring devices plugged into the CAN bus.

**Course summary**: General CANbus characteristics; basic standards applied in CAN bus; CAN in Automation; physical layer; network topology according to ISO 11898-2; electrical connection to the bus; voltage levels; basic connections; data link layer; base and extended data frame arbitration; data frame, Remote Transmission Request, error frames, status of the bus node; CANopen® application layer; CIA specifications; CANopen device model; CANopen protocols (NM, SDO, PDO, EMCY, SYNC), identifier structure, object dictionary, operational status, Layer Setting Services (LSS), CANopen Safety (BN 50125-5); exercises in the CAN bus configuration tools for the CAN bus configuration and diagnostics, configuration of typical sensors (pressure, I/O module, hydraulic distributors etc.); launching CANbus and testing, reconfiguration.

**Duration**: 2 days  
**Duration**: 14 hours

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### PRORBUS DP - SIEMENS SIMATIC S7-300/400 communication

**Course symbol**: PLC4  

**Course name**: PRORBUS DP - SIEMENS SIMATIC S7-300/400 communication  

**Course aims**: Learning about the functions of Step7 software, PROFIBUS DP, FMS, MPI and other protocols used for data exchange between devices of the control system; getting familiar with the elements, tools, and principles of configuring connections and communication in industrial networks supported by Siemens SIMATIC S7-300, SIMATIC S7-400; acquiring detailed information about integration solutions, data exchange and diagnostics relating to drives, operator panels and master/slave devices made by different manufacturers.

**Course summary**: Preparing a project for Programmable Logic Controller; using communication networks in the industry; physical layer of the AMI/PROFIBUS network; practical configuration of the PROFIBUS network - CPU with embedded port OP configuration - connection via PROFIBUS; overview of PROFIBUS DP operating principles; PLC error handling with regard to communication networks; PROFIBUS diagnostics using dedicated testers - illustrated with Softing PROFIBUS Tester 4 and Procon tec (PROFIBUS) products; operating CPU working in the Slave mode; communication process as for the PROFIBUS network.

**Duration**: 5 days  
**Duration**: 35 hours

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### Automation system Integrate AS-I/S7

**Course symbol**: SP5  

**Course name**: Automation system Integrate AS-I/S7  

**Course aims**: Independent designing, configuration and launching the AS-interface network which cooperates with the PROFINET and PROFINET networks; configuration of the network in Siemens TIA Portal and STEP 7; fast and efficient diagnosis of the AS-interface network.

**Course summary**: Introduction of the AS-interface industrial network: designing, installation, network diagnostics; cooperation of interconnected pieces within AS-interface network (system initialization, Master/Slave communication); configuration and launch of the AS-interface network; basic components of the network; modules: electro-pneumatic sensors with integrated network interface, specializations, applicable accessories, RFID barcode; application possibilities in terms of ensuring the safety of machinery and devices - Machinery Directive and AS-Interface Safety at Work aspects of the software development and addressing variables; introduction to TIA Portals environment; configuration, offline and online testing; software projects development, the semantics of binary and analogue variables addressing, starting the application; configuration from the master controller using the PROFINET protocol Siemens controllers S7-300/400, S7-200 and S7-1200 series; running your own applications using industrial sensor technology; maintenance - expansion, maintenance and replacing equipment within your system; diagnostics devices in the AS-I (modular diagnostics, transmission diagnostics, determination of reaction time).

**Duration**: 2 days  
**Duration**: 16 hours

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**Workstations**: Individual workstations fitted with actual manufacturing equipment:
- **SP1**: 5-700 controllers,  
- **SP2**: dedicated software,  
- **SP3**: operator panels,  
- **SP4**: PROFIBUS / PROFINET modules,  
- **SP5**: many other, PLC4 Details on page 23-25
SIMATIC PCS7

PCS1

Course name: PCS7 AS - configuration of the PLC station
(automation station)

Course aims: Gaining detailed knowledge regarding the configuration of automation stations (controllers) to co-operate with the PCS7 operator stations; acquiring skills of programming in CFC, SCL and SFC languages available in the PCS7 suite; learning to use the additional PCS7 library.

Course summary: Presentation of the Siemens DCS system - application options for small and large control systems; project creation - standard and multi-projects; technological division in PCS7, using CFC language in PCS7; standard PCS7 library (Advanced Process Library); diagnostic capabilities of the system; explanation of the issues connected with the PCS7 project compilation on the individual layers of the application (SCL,CFC,SFC,OS); OS management with regard to using the PCS7 application (basics of application editing); integration of master systems (MES/ERP) and SIMATIC IT: direct connection to the IT environment using OPC/PCS7, Web OS or OPC/PCS7 suites.

Duration: 5 days
36 hours

Workstations: Individual workstations fitted with actual manufacturing equipment.

Details on page 30

PCS2

Course name: PCS7 OS - configuration of the WinCC visualization station (operator station)

Course aims: Acquiring knowledge on using the visualization capabilities of the integrated PCS7 system to create and modify projects for the operator stations; learning the functions and characteristics of the PCS7 software backed up with practical examples and tasks performed during the course.

Course summary: Presentation of the OS system based on WinCC: creating visualization projects integrated with STEP7; configuration of technological connections inherited from the STEP7 project and individual connection mechanism: creating masks in the project generated by means of the OS-Project Editor; generating data to the visualization based on the STEP7 project; construction of graphic objects, using and creating graphic icons; creating control units based on the standard editor (faceplate designer); reports based on the previously gathered historical information; configuration of client-server structures; using additional options of the WinCC application.

Duration: 5 days
36 hours
# DRIVE SYSTEMS

## Course
### NAP1
### Basics of drive systems
- Acquiring knowledge and skills regarding broadly defined drive systems:
  - learning diagnostic and selection methods of systems featuring frequency converter and electric motor;
  - gaining knowledge on the analysis and maintenance of electric drive systems.

### Course aims
- Construction and operation principles of electric motors; history of control systems; advantages and disadvantages of various control methods; economy in drive systems; proper applications of control systems; connection and operation principles of frequency converters; control systems in medium voltage motors; selection of control systems; different methods of realizing variable dynamics of drive systems; recognizing hazards when operating with frequency converters; drive system protection; servicing and maintenance of drive systems; object communication in drive systems; industrial control systems—applications; functionality of frequency converters; frequency converter programming.

### Duration
- 3 days
- 21 hours

## Course
### TNS1
### Siemens SINAMICS G120
- Acquiring knowledge and skills regarding Siemens Sinamics G drives:
- familiarizing diagnostic and selection methods of systems featuring the Sinamics G frequency converter and electric motor; gaining knowledge on the diagnostic analysis and maintenance of Sinamics G electric drives.

### Course aims
- Fundamentals of frequency converters; electrical properties of drive systems; the first configuration of the drive system; setting up a project for PLC; controlling drive systems via PROFINET IO; advanced drive system control via PROFINET IO; operation of a drive system in the PROFINET network; other methods of drive system control; drive system diagnostics; local operator panels; different drive data sets – CS/DS1; Free Modules; functions enhancing capabilities of drive systems; automatic safety functions.

### Duration
- 5 days
- 35 hours

## Workstations
- Individual workstations fitted with actual manufacturing equipment:
  - S7-300 controllers
  - STEP 7 and Starter software
  - Sets of actuators
  - Details on page 28-29

## Course
### TNS2
### Siemens MICROMASTER 4
- Acquiring knowledge and skills regarding Siemens Micromaster 4 drives:
- Familiarizing diagnostic and selection methods of systems featuring Micromaster 4 frequency converter and electric motor; learning how to use the diagnostic analysis and maintenance of Micromaster 4 electrical drives.

### Course aims
- Fundamentals of frequency converters; electrical properties of drive systems; the first configuration of a drive system; drive system diagnostics; setting up a project for PLC; different methods of connection with a drive system for the configuration purposes; basic drive system control via PROFINET IO; advanced drive system control via PROFINET IO; other methods of drive system control; different drive data sets – CS/DS1; Free Modules; functions enhancing the capabilities of drive systems.

### Duration
- 4 days
- 20 hours

## Course
### TNS3
### SIEMENS SINAMICS S120
### Configuration, launch, diagnostics
- Learning about Sinamics S120 frequency converters and electric properties of drive systems; gaining practical abilities of using the PLC to control Sinamics S120 Drive Systems; presentation of the methods of drive systems diagnostics; overview of the positions and safety functions.

### Course aims
- Fundamentals of frequency converters; electrical properties of drive systems; setting up a project for PLC; operation of a drive system in the PROFINET IO/PROFINET IO network; different methods of connection with a drive system for the configuration purposes; the first configuration of the drive system; controlling drive systems via PROFINET IO/PROFINET DP; advanced drive system control via PROFINET IO/PROFINET DP; drive system diagnostics; different drive data sets – CS/DS1; Free function blocks – DCC (Drive Control Chart); functions enhancing capabilities of drive systems; positioning function in the S120 drive systems; embedded safety functions.

### Duration
- 5 days
- 35 hours
DRIVE SYSTEMS

Course symbol: TNS4

Course name: SIEMENS SIMOTION

Course aims: Learning about Siemens Motion solutions; acquiring knowledge about properties of electric drives; gaining practical skills of preparing projects in the SIMOTION system; learning to program, operate, and diagnose SIMOTION systems; learning about the way SIMOTION system interacts with operator panels.

Course summary: Basic information about SIMOTION systems; electrical properties of drive systems; fundamentals of Sinamics S120 converters used in the SIMOTION system; setting up a project for the drive system used during the course; basic information about the SIMOTION system; setting up a project for the SIMOTION system used during the course; programming of the SIMOTION system; diagnostics and operation of the SIMOTION system; interaction of the SIMOTION system with HMI devices such as operator panel.

Duration: 5 days - 35 hours

Workstations: TNS4

- Individual workstations fitted with actual manufacturing equipment:
  - Sinamics S120 converter,
  - Motion controller SIMOTION D,
  - Stepper motors,
  - SIMOTION Scout software

Details on page 28-29

INDUSTRIAL SENSORS

Course symbol: S1

Course name: Sensors in industrial applications

Course aims: Unassisted exercises in identifying different types of sensors; unassisted exercises in selecting sensors for particular installations; operating a range of sensors and calibrating range of the quantity measured in relation to the measurement being taken; determining the influence of the material on the sensor reading; adapting the sensors to actual measurement systems.

Course summary: Sensors - general information, standardization of nomenclature; identifying the proper powering option, process connections; basic parameters of sensors; acquiring the skill of proper parameter selection; types of series; selecting the right housing; characteristics of the main output signals; theoretical basics of the proximity sensor operating principle; operating principles of sensors with energy emission; temperature and pressure sensors and monitors; selecting the right medium flow sensor; basic types of flow meters used in the industrial applications; proper selection of ultrasonic sensors, radar probes and level control of bulk materials; applications that require rotary angle encoders, incremental and absolute encoders in the aspect of high rotational speed and position memory; RFID identification, matrix codes, barcodes; capabilities and limitations of the IO-Link interface; identifying the proper powering option, process connections, cabling options; basic parameters, system components, essential software ICDU file support and parameter configuration for optic sensors, flow and temperature monitors, proximity sensors and rotary angle encoders; launching the application via PROFINET-I/O-Link communication modules; independent configuration of the application controlling the parameters of the selected sensor via Siemens TIA Portal software.

Duration: 3 days - 21 hours

Course symbol: S2

Course name: IO-Link interface - quick reconfiguration of the sensor process parameters

Course aims: Independent application launching using the communication modules - Profinet - IO-Link; configuring the application controlling the parameters of the selected sensor via Siemens TIA Portal software; diagnostics of systems using IO-Link interface.

Course summary: General information, capabilities and limitations of the IO-Link interface; identifying the proper powering option, process connections, cabling options; basic parameter, system components, essential software ICDU file support and parameter configuration for optic sensors, flow and temperature monitors, proximity sensors and rotary angle encoders; launching the application via PROFINET-I/O-Link communication modules; independent configuration of the application controlling the parameters of the selected sensor via Siemens TIA Portal software; the practical exercises focus on the topic of quick change of sensor process parameters.

Duration: 1 day - 7 hours

Workstations:

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S1$</td>
<td>Individual workstations fitted with actual manufacturing equipment</td>
</tr>
<tr>
<td>$S2$</td>
<td>Details on page 30</td>
</tr>
</tbody>
</table>
SPECIALIZED TRAINING
IN THE FIELD OF INDUSTRIAL AUTOMATION

INDUSTRIAL ROBOTS

Course symbol: RF1
Course name: Online industrial robots programming
Course aims: Learning the design of an industrial robot; gaining the skills of configuring a robot; online programming with self-learning function; practical exercises in online programming.
Course summary: Safety regulations at robotic workstations; structure of an industrial robot (basic information); preparing a robot for work; self-learning online programming in the scope of trajectory design; self-learning online programming in the scope of operation instructions.
Duration: 3 days
21 hours

Course symbol: RF2
Course name: Online programming and basics of FANUC industrial robots maintenance
Course aims: Design of an industrial robot; maintenance and repairs of industrial robots.
Course summary: Structure of an industrial robot (basic information); safety regulations at robotic workstations; self-learning online programming in the scope of operation instructions; periodic inspections and maintenance; problem solving.
Duration: 5 days
35 hours

Course symbol: RF3
Course name: Integration of Fanuc RJ3iB robots with SIEMENS SIMATIC S7 controllers
Course aims: Design of an industrial robot rules of integrating robots with logic controllers; configuring PROFINET network to S7 controller and Fanuc robot communication; safety regulations at robotic workstations; online self-learning programming; performing manipulation activities.
Course summary: Fanuc configuration in the PROFINET network; Siemens S7 configuration in the PROFINET network; basics of PROFINIBUS diagnostics in HWConfig; Fanuc robot configuration in the PROFINET network; Siemens S7 configuration in the PROFINET network; basics of PROFINIBUS diagnostics in HWConfig; standard U/UO interface of Fanuc robots; examples of integrating Fanuc robots with Siemens S7 controllers (general part); examples of integrating Fanuc robots and Siemens S7 controllers (process-related part); analysis of programs selected and provided by the user; introducing illustrative modifications into PLC and the robot.
Duration: 4 days
30 hours

According to customer's needs we organize courses with FANUC RJ2 and FANUC RJ3 controllers. We can organize tailor made courses based on individual needs of our customers.

Course symbol: RK1
Course name: Launch, maintenance and programming of KUKA industrial robots – basic course
Course aims: Learning the design of a KUKA industrial robot; gaining the skills of configuring a robot; practical exercises in online programming.
Course summary: Safety regulations at robotic workstations; safety procedures during programming and automatic operations; general structure of a robot (mechanical manipulator, electrical control system, HMI panel (KCP)); structure and functions; options available on the menu at the operator level; archiving programs; moving the manipulator using the direction buttons and 6D mouse; determining system coordinates; robot mastering using SM and LHR; robot working scheme programming – PTP, LIN, CIRC moves; programming logical operations; parameterization of manual motion; overview of robot applications.
Duration: 4 days
30 hours

Course symbol: RK2
Course name: Launch, maintenance and programming of KUKA industrial robots – advanced course
Course aims: Knowledge of the advanced robot programming using robotic workstations.
Course summary: Menu available in expert mode; programming positions in application instructions; additional instructions available with motion commands; system and user variables; programming logical operations; improving logical instructions; description of available programming instructions and basic structures; programming loop and logical conditions; controlling the program: incremental programming; analysis of the structure and operation of executive programs; explanation of program scheme; configuration of the robot to automatic work in Auto/DTI-main program mode and cooperating of the sub-programs; running program in manual and automatic AIP mode; programming software and dwgs.
Duration: 4 days
30 hours

According to customer's needs we organize courses with KRC 1/2, VRKRC 1/2 and KRC 32 controllers. We also offer courses in the application of welding, bonding, etc. We modify the course program based on customer's needs.

Workstations:
R1
R2
R3
Professional robotic workstation featuring FANUC robots.
Details on page 31
Training laboratories

We provide modern training sets, built on the basics of actual components for industrial automation.

Courses in the field of visualization and control systems are characterized by using special equipment. Below we present a description of the workstations and individual training positions used by participants during the VISUALIZATION AND CONTROL SYSTEMS courses.
PLC programming
Siemens SIMATIC S7
- basic and advanced courses
Courses symbols: PLC1 - PLC10,
TIA1500-1; TIA1500-2; TIA1 - TIA3

Participants have individual training positions at their disposal, where they perform industrial tasks based on adequate Siemens S7 controller. The training position consists of the PLC fitted with analogue and digital input/output modules combined with a digital and analogue signal simulator.

Training positions are fitted with many elements, which are used during various levels of training advancement. The main elements of equipment and software are:

- Siemens SIMATIC S7 300/400, 200, 1200, 1500 controllers, which constitute the based training systems
- computer with engineering software package connected to PLC
- input/output modules and input/output signal simulators
- analogue input/output modules and input/output signal simulators
- STEP7, TIA Portal, Micro/WIN software
To enrich the training, we added actual industrial components and automation control systems based on PLC Siemens SIMATIC S7 to workstations. Each participant has at his disposal the following actuators:

- air service unit with valve manifold with 3/2, 5/2, 5/3 electropneumatic valves,
- an actuator built of two pneumatic cylinders and a gripper,
- reed sensors informing about end positions of the cylinders,
- digital I/O module (basic course)
- pulse ON/OFF switch (basic course)
- a diode (basic course)
- a safety switch (basic course)
- electronic proportional regulator (advanced course)
- stepper motor (advanced course)
- angle encoder (advanced course)
- PT100 temperature sensor with a z 0-10V transcoder (advanced course)
- frequency converter (advanced course)
- servo motor with permanent magnets (advanced course)
- binary signal simulator
- analogue I/O (0-10V) simulator with electronic voltage indicators (advanced course)
- analogue and digit input/output by Turck connected with PROFIBUS network (PLC4)
- valve manifolds by Parker (PLC4)
- pneumatic cylinder by Parker (PLC4)
- position sensor by Turck (PLC4)
Programming and designing with Distributed Safety and Safety Advanced in SIMATIC SAFETY INTEGRATED controllers

Courses symbols: SAF300, SAF1500

Participants of the course in Programming and designing with Distributed Safety in SIMATIC Safety Integrated controllers have at their disposal individual workstations fitted with the necessary equipment:

- PLC solutions – CPU 315F 2PN/DP, 1S16F 3PN/DP and S7-1500 I/O modules in the FAIL-SAFE version
- CPU 315F 2PN/DP connected via Profinet communication network with ET-200S I/O modules in the FAIL-SAFE version
- Complex solutions based on the ET-200S CPU in the F version

Additionally, workstations feature the following actuators:

- Optical barriers with a travelling product (muting – forcing the barrier to switch off when the product passes)
- „mini doors“ fitted with limit switches
- Sets of two-hand pushbuttons
- Safety „poppets“ with double joints
- Ignition with key
- Double – „safe“ actuating contactors
Participants of the courses in industrial networks, PROFIBUS and PROFINET (SP2, SP3, PLC4) in particular, have at their disposal multi-element sets forming the extensive network, which allows performing a variety of exercises and tasks. The positions are fitted with:

- binary signal simulator
- analogue I/O (0-10V) simulator with electronic voltage indicators
- safety and START/STOP buttons
- a PC with the proper software for the training (STEP7 v.5.5, STEP7 v.11, Diagnostic Suite)

- Siemens SIMATIC S7-300 PN/DP (PROFINET/PROFIBUS) controller
- remote digital I/O modules Siemens ET200S
- remote analogue I/O modules TURCK
- remote digital I/O modules TURCK
- Siemens OP177B operator panel
- remote analogue and digital I/O modules I/O-Link Balluff
- remote valve manifold (digital I/O) PNEUMAX
- diagnostic device Softing PROFIBUS Tester 4
- pneumatic regulation valve Parker
- analogue position/rotation sensor
- a set of different types of sensors by Balluff
- valve manifolds by Parker, TURCK, BNEUMAX
- a set of pneumatic cylinders with position sensors by Parker
- a set of pneumatic cylinders with position sensors by PNEUMAX
During the courses in AS-I network (SPI) we use workstations fitted with dedicated controllers and actuators, like:

- buttons, input/output modules enabling to connect sensors, pneumatic valve terminals controlling the work of cylinders.
During the courses in CANopen (Sp4) we use:

- CAN-USB converter with appropriate software (PC)

- Elements of CAN network with wiring

- CANstudio software, which is an advanced tool created for designers, integrators and maintenance technicians of the devices and networks using CAN technology.
CoDeSys software

Course symbol: CDS1

- We offer training positions to the participants of the course, designed to teach them the tasks and industrial solutions based on the application of controllers made by different producers, but still compatible with CoDeSys:
  - Devices manufactured by TURCK and ifm electronic

- The training position is fitted with a controller featuring I/O module and input signal simulator adjusted to the course program

- Each participant is also provided with a PC featuring CoDeSys software
Participants of the courses in WinCC, WinCC flexible (W1, W2) have at their disposal:

- the training position consists of the PLC fitted with analogue and digital input/output modules combined with a digital and analogue signal simulator

- SIMATIC WinCC/SCADA software (W1 course) used for visualization and control of industrial processes

- computers with WinCC flexible software (W2 course)

- Siemens OP177B operator panel (W2 course)
Drive systems

Courses symbols: NAP1, TNS1, TNS2, TNS3, TNS4

Participants have at their disposal individual training positions designed to teach them the tasks and industrial solutions based on the electrical drives using frequency converters. Each position is fitted with the frequency converter featuring digital and analogue signal simulator. Each converter is connected to the asynchronous electric motor.

Siemens SIMATIC S7-314C PN/DP controllers:

- 24 digital inputs, 16 digital outputs
- 5 analogue inputs, 2 analogue outputs
- PROFIBUS DP of PROFINET interface
Drive sets:

- frequency converter SINAMICS S120, MICROMASTER 440, SINAMICS G120
- module of motion controller SIMOTION version D
- asynchronous motors
- incremental encoders
- brakes and digital and analogue output state signals
- analogue and digital signals adjuster for local controlling
SIMATIC PCS7
INDUSTRIAL SENSORS

SIMATIC PCS7
Courses symbols: PCS1, PCS2

Participants have at their disposal workstations fitted with operating software PLC7 and hardware modules based on SIMATIC S7-400 controllers.

The task for the participants is the configuration of the PLC station (automation station) and the WinCC visualization station (operator station).

Industrial sensors
Courses symbols: S1, S2

Courses are conducted using modern sets equipped with most popular types of sensors technology elements currently used in industrial automation. Each participant receives the training set including: optical sensors, temperature sensors, liquid flow sensors, positioning sensors, inductive, proximity, capacitive, magnetic, color sensors and temperature monitors.

During the course we describe new standards of configuration files and creating projects in SIEMENS PLC systems with application of IO-Link devices created by ifm electronic, Balluff, Siemens or Pepperl-Fuchs.

Classes take place in a modern Laboratory of Sensors, where the participants have a chance to study and operate different sensors and industrial monitors from various manufacturers. A wide range of equipment and automation elements facilitate individual work on the discussed theoretical problems, which means that each participant has a chance to single-handedly connect and operate a system with IO-Link sensors. Participants will learn how to plan the new installation or effectively modernize existing applications.
During courses we use a professional robotized workstation featuring:

- industrial robots FANUC AM100iB with the RJ3iB controller
- industrial robots FANUC AM100iC with the RJ3iC controller
- pre-picking areas and reorientation positions
- unique teaching aids (tables, grippers, technological tools, signaling systems) to facilitate practical exercises
**Experts**

**Msc eng. Andrzej Kasprzyc**

An expert automation engineer with 30 years of experience gained from the starting of extensive industrial automation installations and maintenance of large production lines, i.a.: the first installation of PCS7 in Poland. He specializes in products and systems from SIEMENS, i.e.: Simatic S7 300/400, Simatic STEP 7, TIA Portal, ProTool, PCS7, WinCC Flexible, WinCC, WinCC Profesional, Micromaster and Sinamics S.G drives. He is the author of many excellent documentations and teaching programs. His trainings are particularly appreciated by the students.

**Msc eng. Piotr Świeszcz**

He is the author of over 70 publications and a few books, as well as many programs and course documentations. He was a designer and executor of many technologies involving coal and steel, petrochemicals and chemicals as well as technologies for the food industry. He has managed over 30 commissioning processes involving PLCs and DCS. In his projects, he uses devices by SIEMENS, ABB, OMRON, BECKHOFF, GE FANUC and DANFOSS, hence his knowledge of multiple environments, i.a: Simatic STEP 7, AC300M, FREELANCE, CX ONE, Twin Cat, Proficy Machine Edition, APOS.

**Msc eng. Krzysztof Polczyk**

A control engineer and PLC programmer, whose considerable experience allows him to work as a valued, independent specialist both home and abroad. Completed commissioning and development projects. In addition to his thorough knowledge of SIEMENS Simatic S7, WinCC Flexible and ProTool, he has much experience in working with ALLEN BRADLEY drives, INTOUCH SCADA system, PNOZ safety relays, SIEMENS S7 Distributed Safety, SICK and PROFINET, PROFINET, Ethernet, AS-1 Interb, Controlnet and DeviceNet.

**PhD eng. Piotr Gaj**

He is a doctor of technical science in the field of information technology. He specializes in designing industrial IT and automation systems and he actively participates in numerous industrial application projects involving PLC, PROFINET and PROFINET industrial networks, drive systems, SCADA, HMI and MES systems from different manufacturers. He has over 20 years of teaching experience in higher education institutions.

**PhD eng. Piotr Michalski**

He is a specialist in the field of design and operation of machines, industrial sensors and industrial networks with 17 years of industrial experience. He holds certified qualifications in the field of integrated automation systems, issued by such companies as Siemens, IFM electronic, Mitsubishi Electronic and S&R. He has many years of experience in teaching about industrial automation systems. He specializes in writing software for PLC, TIA Portal, STEP-7, CoDeSys, with particular emphasis on AS-Interface.
**Msc eng. Michał Witek**

He has extensive knowledge on various control systems, as well as fluent command of multiple programming languages. This all contributes to the fact that he is particularly valued as a trainer and co-author of training programs. He has participated in many interesting automation and control projects, i.e.: world’s first project of running fully automated saturation systems for deep sea divers on 2 ships. He is an expert in automatic control systems based on Siemens SIMATIC S7-300 and 400, WinCC Flexible, WinCC, PCS7, Industrial networks PROFINET, PROFIBUS, PROFISAFE, controllers MITSUBISHI and GX DEVELOPER, TELEMECANIQUE, UNITY XL, INTOUCH and many others so he has had the opportunity to work with both at sea and on land.

**Msc eng. Jacek Barcik**

An expert programmer-automation engineer with 15 years of experience gained in the development of software for mobile drivers, microprocessors systems and MS Windows environment. He has participated in many R & D projects considering design of control systems, special and civilian vehicles based on CAN / CANopen® in cooperation with companies from Poland and Europe Union. Developer of professional software called CANstudio for CAN bus to configuration CANopen® nodes, network monitoring of CAN logging. He specializes in writing software for PLCs, micro-controllers and MS Windows in C, C++, Delphi, CodeSys with particular emphasis on the CAN bus, CANopen® and J1939 in designing CANopen® stacks and drivers for CAN micro-controllers.

**Msc eng. Łukasz Wita**

He is an independent automation specialist. His professional career is primarily focused on PLC and SCADA: he mostly runs foreign projects. He has a gift of explaining even the most complicated issues to his students in a comprehensible manner. Apart from his thorough knowledge of SIEMENS SIMATIC S7 controllers and WINCC FLEX visualization systems, he also often works with ALLEN BRADLEY, PRO-FACE, IFIX controllers and with PROFIBUS, PROFINET, Ethernet, MPI and DeviceNet industrial networks, as well as with SIEMENS, STÖBER and PARKER drives.

**Phd eng. Jacek Ślój**

He is an expert in Industrial Information Technology with 10-years of experience in software design and configuration, as well as modernization and maintenance of industrial computer systems. He has a broad spectrum of relevant expertise regarding PLCs, communication networks, SCADA and MES systems, embedded systems and monitoring systems (including systems based on GSM). He specializes in Siemens SIMATIC S7 300/400, STEP 7, PROFIBUS and PROFINET networks, as well as hardware and software solutions from many other manufacturers (i.a.: GEIP, Beckhoff). He has many years of experience in teaching about industrial systems, including specialist courses and workshops.

**Msc eng. Grzegorz Czekala**

A design engineer of automation systems involving components from Siemens, SEW, Mitsubishi and LabView. He participated in a trainee program at the Faculty of Mechanical Engineering of the University in Macedonia. Due to his extensive experience, he is the author of many excellent teaching programs.