INDUSTRIAL MACHINES
MACHINES MAINTENANCE
WELDING
SOLDERING
COATING AND LACQUERING
ADHESIVE AND PACKING SPREAD
PALLETTIZATION
UNLOADING
LADING

FANUC ABB KUKA WITTMANN

COURSES CATALOGUE

INDUSTRIAL ROBOTS

MACHINES MAINTENANCE
WELDING
SOLDERING
COATING AND LACQUERING
ADHESIVE AND PACKING SPREAD
PALLETTIZATION
UNLOADING
LADING

FANUC ABB KUKA WITTMANN
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>About us.</td>
<td>1</td>
</tr>
<tr>
<td>Quality policy. Prizes and awards</td>
<td>2</td>
</tr>
<tr>
<td>The authorized training partner</td>
<td>3</td>
</tr>
<tr>
<td>Specialized training in the field</td>
<td>4</td>
</tr>
<tr>
<td>of industrial robots</td>
<td></td>
</tr>
<tr>
<td>Training laboratory of industrial robots</td>
<td>7</td>
</tr>
<tr>
<td>Experts</td>
<td>16</td>
</tr>
<tr>
<td>Welcome</td>
<td>17</td>
</tr>
</tbody>
</table>
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
- Production quality
- **Industrial robots**
- Production quality management
- Machinery safety
- SIEMENS PLM

We organize workshops, conduct consultations, implementation advice and support; we sell software and systems automation products, as well as run measurements and tests for specific purposes.

EMT-Systems has been operating on the training market for many years. We offer innovative approach to training engineers and technicians working in different branches of industry. Our courses are based on comprehensive programs focused on the needs of maintenance services and designers working with CAD/CAM/CAE software.

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

Trainings offered by EMT-Systems are the guarantee of high quality and professionalism resulting from years of experience in developing course programs for firms, public institutions, education units and individual clients. **Success of our clients is our best recommendation.**

Our mission is to conduct highest quality trainings for industrial personnel to help them adapt to modern jobs using innovative technologies. We help to identify training needs of each participant and suggest the optimal course path for them. Through the comparison of initial and final tests’ results we monitor the increase in knowledge and skills, which automatically allows us to prove the effectiveness of our work.

---

**EMT-Systems - training people since 2006**
QUALITY POLICY, PRIZES AND AWARDS

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 9001:2015
■ 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:

■ 2018 Golden Statue of Polish Business Leader.

■ 2018 Innovation Laurel for the training: Chemoset and thermoset polymeric composites - introduction to polymer chemistry, composite properties and manufacturing methods

■ 2018 European Medal for all trainings in: „Industrial Robots”

■ 2017 Training Company of the Year emblem received from Central Office of National Certification.

■ 2017 European Medal for all trainings in: „Plastics”.

■ 2016 Caesar of Silesian Business awarded at the solemn Business Centre Club gala.

■ 2016 European Medal for the training „CNC1: CNC Operator/Programmer”.

■ The prestigious Highest Quality Gold Emblem 2016 a grand prix in the category Services in the most pro quality program in Poland, organized under the patronage of the Polish Agency for Enterprise Development, Polish Committee for Standardization and Polish Forum ISO 9000.

■ 2016 Training Company of the Year emblem received from Central Office of National Certification.

■ 2015 Enterprise of the Future.

■ 2014 Training Company of the Year emblem received from Central Office of National Certification.


■ The award of the Marshal of the Silesian Voivodeship during the conference „Innowacja. Cię rozwija” Innosilesia.
Training laboratories
Participants can enjoy well-equipped training positions, which enable the practical exercises. We provide cutting-edge workstations built on the basis of actual components for industrial automation.

Experienced trainers
Trainers from the departments of maintenance and design firms with extensive technical knowledge to the design, implementation, and maintenance and repair of equipment and automation systems and high educational qualifications.

Training material 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 classes
Participants are entitled to participate in free extra classes on the chosen days, 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 time is devoted to theoretical training and 70% of time is designated to active forms of participation – workshops and exercises which allow the participants to gain practical skills on operating machines and systems.

Two different course types: 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.

The Engineering Training Center EMT-Systems is the authorized training partner for the producer of PLC, PLM, CNC – Siemens CNC Training Partner, Siemens PLM Software, MITSUBISHI Electric Europe Bwadz.V. The contracts signed between the institutions enables us to run certified courses. Constant supervision of industrial partners ensures the highest quality of and access to the latest software and training materials.
On-line programming of industrial robots FANUC – basic course

**Course aims**
Learning the design of an industrial robot; gaining the skills of configuring a robot; familiarizing on-line programming with self-learn function; practical exercises in on-line programming.

- Structure of an industrial robot (basic information)
- Safety regulations at robotic workstations
- Preparing a robot for operation
- Performing manipulation activities
- Self-learning on-line programming in the scope of trajectory design
- Self-learning on-line programming in the scope of operation instructions
- Practical exercises at the robotic workstation in the scope of on-line programming

**Duration**
3 days - 21 hours

**Course type**
Open training

---

On-line programming of industrial robots FANUC – advanced course

**Course aims**
Gaining advanced skills of robot configuration; learning the advanced programming methods; practical exercises in on-line programming.

- Additional instructions available with motion commands – Tool offset, Time Before etc.
- DCS – Dual Check Safety
- Image Backup – execution, recovery after failure
- Controlled launch
- Network functions CGTP, FTP
- Background Logic
- Axis limits
- Motherboard replacement
- Group inputs and outputs
- Setting user passwords
- Tool weight identification
- Engine replacement
- Mastering
- Creating HMI interface
- Function of program correction and conversion

**Duration**
3 days - 21 hours

**Course type**
Open training

---

Migration to operation and on-line programming of FANUC industrial robots

**Course aims**
Identification of basic differences in programming FANUC robots as compared to other manufacturers (ABB, KUKA); unassisted programming and configuration of Fanuc robots; understanding of the design and operation of Fanuc robots.

- Basic features of Fanuc robots as compared to robots from other manufacturers
- Controlling the robot in manual mode
- On-line programming
- Starting the program in automatic mode
- Manual manipulation of a point
- Backup of programs and system files
- Network functions of the robot
- Assigning macros to user keys
- Coordinate systems – creation and modification
- Collision detection function
- Basics of program optimization
- Position registers
- Palletizing using Position Register offset
- Additional instructions available with motion commands
- Tool offset, Time Before etc.
- Creating a virtual robot in Roboguide
- DCS – Dual Check Safety
- Image Backup – execution, recovery after failure
- Controlled start
- Background Logic
- Axis limits
- Tool weight identification
- Engine replacement
- Mastering

**Duration**
3 days - 21 hours

**Course type**
Open training
# ABB ROBOTS

<table>
<thead>
<tr>
<th>Course symbol</th>
<th>Course name</th>
<th>Course aims</th>
<th>Course summary</th>
</tr>
</thead>
</table>
| RA1 | Operation, programming and starting ABB robots - basic course | Knowledge about general design of the industrial robot ABB; ability to configure the robot at the robotized workstation; introduction to programming; practical exercises in on-line programming. | • Safety regulations for working with robots, general guidelines
• Safe operation in manual and automatic mode
• Safety regulations for programming
• Mechanical design of a robot
• Teach pendant – operator console controller
• Console handling
• Description of the selected options available in the console menu
• Robot’s input and output system
• DeviceNet configuration
• Communication with the controller and peripherals
• Robot calibration
• Determining a tool coordinate system
• Description of industrial robot programming
• Program structure
• Types of movements and points and the situations that determine using certain types
• Logical operations included in the program
• Linear motion
• Circular motion
• Controlling the logic
• Jumps, program references
• Parameterization of the motion instructions
• Program modification
• Position corrections
• Testing the implemented changes |
| Duration | 3 days - 21 hours |
| Course type | Open training |

# KUKA ROBOTS

<table>
<thead>
<tr>
<th>Course symbol</th>
<th>Course name</th>
<th>Course aims</th>
<th>Course summary</th>
</tr>
</thead>
</table>
| RK1 | Programming industrial robots KUKA – basic course | Learning the design of an industrial KUKA robots; gaining skills in configuring KUKA robots; learning programming methods; practical exercises in on-line programming. | • Safety of working at and with robot – safety procedures during programming and automatic operation
• General structure of a robot (mechanical manipulator, electrical control system)
• Operator panel (KCP), Structure and functions. Options available on the menu at the operator level
• Archiving programs
• Move manipulator using the directional buttons and using 6D Mouse
• Determination of coordinate systems
• Mastering of robot with MEMD and UHR
• Programming working scheme of robot – PTP, LIN, CIRC moves
• Programming logical operation
• Parameterization of manual motion
• Overview of robot applications
• Program realization in manual and automatic AUTO operation modes |
| Duration | 2 days - 14 hours |
| Course type | Open training |

| RK2 | Programming industrial robots KUKA – advanced course | Gaining advanced skills in configuring KUKA robots; learning advanced programming methods; practical exercises in on-line programming. | • Menu available in Expert mode
• Programming the position in application instructions
• Additional instructions available with motion commands
• System and user defined variables
• Programming selected logic instructions
• Adjusting logic instructions
• Description of the available programming instructions and basic structures
• Programming loops, logic conditions, controlling the program sequence
• Incremental programming
• Analysis of the structure and operation of executive programs. Explanation of the program’s operating scheme. Configuration of the robot for automatic operation in Auto-EXT mode – main program and subprograms
• Execution of the program in manual and automatic mode AUTO |
| Duration | 2 days - 14 hours |
| Course type | Open training |
SPECIALIZED TRAINING IN THE FIELD OF INDUSTRIAL ROBOTS

### WITTMANN ROBOTS

#### RW-1

**Course name:** On-line programming of WITTMANN manipulation robots - basic course

**Course aims:** Starting up a WITTMANN robot; understanding of design and operation of WITTMANN robot system; understanding of basic on-line programming methods.

**Course summary:**
- Robot’s design
- Safe operation:
  - Manufacturing cell
  - Safety package
  - S5/S6
- Gripper design
- Euromap 67/12
- Control panel
  - Emergency block, buttons
  - TEACHBOX
- ALWAYS program
- PROGRAM EDITOR - basics
- conditional function IF
- palletization programs
- edition of a ready program
- reference program
- Practice

**Duration**
- 2 days - 14 hours

**Course type**
- Open training

---

#### RW-2

**Course name:** On-line programming of WITTMANN manipulation robots - advanced course

**Course aims:** Starting up a WITTMANN robot; acquiring the skills of configuring a WITTMANN robot; understanding the design and operation of WITTMANN robot system; understanding the advanced on-line programming methods.

**Course summary:**
- Design
- Control cabinet
- Peripheral I/O
- ADMIN level passwords
- Euromap 67/12
- PROGRAM EDITOR - advanced
- Types of motion
- EUROMAP
- edition of a ready program
- quick edit, autoswitch, counter
- Practice
- Conditional functions
  - IF, ELSE, ELSEIF
- AND, OR
- Jumps
  - Absolute/unconditional
  - Conditional
- Subprograms, JUMP, RET
- Reference program
- Parallel programs - communication
- ALGORITHM

**Duration**
- 2 days - 14 hours

**Course type**
- Open training

---

### INDUSTRIAL ROBOTS INTEGRATION

#### R1

**Course name:** The integration of KUKA / ABB robots and PLC Siemens SIMATIC controller

**Course aims:** Integration of KUKA / ABB industrial robots and solving complex production dilemmas; designing production cycles with the use of industrial robots; PLC: Siemens SIMATIC programming of parent processes which control industrial robots.

**Course summary:**
- Different types of robots and PLC controllers used in industry
- Industrial safety when working with robots in a manual mode
- Industrial safety when working with robots in an automatic mode
- Industrial machines and devices communication methods
- DSQC652 card configuration of digital inputs / outputs for industrial robot controller
- Communication between PLC controller and industrial robot
- Launch of robot working cycles via PLC controller
- Alarm prevention and handling
- Testing of programs’ performance and communication between devices
- Robotic station performance in an automatic mode with the use of production line simulation
- Program modifications of PLC controller and industrial robot controller according to the needs of the process

**Duration**
- 1 day - 7 hours

**Course type**
- Open training

---

#### R2

**Course name:** The integration of KUKA / ABB robots and SINUMERIK controlled CNC machine

**Course aims:** Idea of KUKA / ABB industrial robots integration with CNC milling machines; designing production cycles with the use of industrial robots.

**Course summary:**
- Safe operation of robots
- Safe operation of machine tools
- Safe operation in semi-automatic mode
- Calibrating the robot and a machining center
- Preparing the machining program
- Setting the machining base
- Program simulation in the machine controller
- Retrieving and assembly of the semi-finished product in the machine handle
- Producing a piece in the automatic mode of the machine tool
- Measurement control
- Receiving ready element
- Alarm handling
- Communication between the robot and machine tool via digital signals

**Duration**
- 1 day - 7 hours

**Course type**
- Open training
During training courses in the field of industrial robots participants will learn about the design and operating principle of a FANUC, ABB or KUKA robot and will acquire the skills of starting the robot and configuring it by themselves. For the purposes of the courses we have designed unique, robotized student workstations that ensure fast and effective acquisition of knowledge.

During the trainings in the field of industrial robots FANUC we use professional robotic workstation featuring three educational cells:

**FANUC LR Mate 200iD 4s with R-30iB Mate controller**
Extremely compact, this 6 axis short arm robot has been designed for confined spaces and compact machines, designed to handle small payloads of 4 kg or less.
- Max. reach: 550 mm
- Load capacity: 4 kg
- Repeatability: +/- 0.013 mm
- Mechanical weight: 20 kg
- Compact Mate 30iB controller

**A robotized station is equipped with:**
- LR Handling Tool software
- A compact controller Mate 30iB
- A panel with touchscreen (iPendant) dedicated to a transfer application
- 20 digital inputs and outputs in standard

**Course software:**
- Collision detection
- DCS speed/position controller
- DCS safe inputs/outputs
- Motion optimization
- Constant Path
- Program trajectory shift
- Multitaking
- FTP interface
- Condition Monitor
- High Speed Skip
FANUC A-520i Robot - dedicated to applications related to handling and assembly.
FANUC AM 100iB Robots controlled by RJ3iB controllers
FANUC AM 100iC Robots controlled by RJ3iC controllers

In addition, the stations are equipped with:
- pre-picking areas and reorientation positions
- unique teaching aids (tables, grippers, technology tools, and signaling systems) to facilitate practical exercises
Training courses are carried out in our Training Center in Gliwice. At the disposal of our participants there are:

**ABB IRB120 Robot with IRC5 controller**

ABB’s smallest ever multipurpose industrial robot weighs just 25kg and can handle a payload of 3kg (4kg for vertical wrist) with a reach of 580mm. It is a cost-effective and reliable choice for generating high production outputs in return for low investment. A white finish Clean Room ISO 5 (Class 100) version, certified by IPA, is also available.

- Reach: 0.58 m
- Payload: 3 kg
- Position repeatability: +/- 0.01 mm
- Number of axes: 6
- Weight: 25 kg
- Working mode: manual/automatic

Robotic station is equipped with:
- digital I/O
- DeviceNet Master/Slave card
- PROFINET IO Slave module
- systems: Motion Supervision, SoftMove, World Zones, Path Recovery, Multitasking, Flexpendant Interface, PC Interface
Robot ABB IRB1200 robot with IRC5 compact II generation with control panel

Industrial robot with a payload of 5 kg and reach of 900 mm, it addresses the needs of material handling and machine tending applications for flexibility, ease of use, compactness and short cycle times while still maintaining large working envelopes.

- Reach: 0.9 m
- Payload: 5 kg
- Position repeatability: +/- 0.02 mm
- Number of axes: 6
- Weight: 54 kg
- Working mode: manual / automatic

Robotic station is equipped with:

- button panel 15’
- HMI Siemens operating panel
- independent pneumatic system
- PLC S7 - 1200 controller with additional 16 in, 15 out I/O module
- DeviceNet Master / Slave card
- systems: Motion Supervision, World Zones, Path Recovery, Multitasking, Flexpendant Interface, PC Interface, Integrated Vision
The universal ABB IRB2400 is the world’s most popular industrial robot. Its main applications are arc welding, cutting/deburring, glueing/sealing, grinding/polishing, machine tending and material handling. It comes with the latest ABB IRC5 controller.

Robot parameters:
- Reach: 1.55m
- Payload: 20kg
- Position repeatability: ±0.03mm
- Number of axes: 6
- Weight: 380kg
- Working mode: manual/automatic/semi-automatic

ABB 2400 gives excellent performance in material handling, machine tending and process applications where the required accuracies are necessary while keeping the position repeatability at 0.03mm despite large additional load. Thanks to its robust construction and IP54 classification it can work in harsh production environment.

Robotic workstation is equipped with:
- digital I/O
- DeviceNet Master/Slave card
- Profinet IO Slave and Profibus communication modules
- systems: Motion Supervision, World Zones, Path Recovery, Multitasking, Flexpendant Interface, PC Interface, Integrated Vision

TRAINING LABORATORY OF INDUSTRIAL ROBOTS
Training courses are carried out in our Training Centre in Gliwice. During the KUKA courses we use original robotics workstations which include the following industrial robots:

**KUKA KR10 R1420 Robot - CYBERTECH NANO**

Robot is equipped KRC4 Compact controller and SmartPad control panel. Compact design - significantly reduced volume with greater payload capacity and longer reach. This robot is able to work in confined spaces at and in machines or workpieces. With its very large working envelope to the rear and long downward reach. It can work in areas inaccessible to conventional robots and thus has a wide industrial application. KRC4 Compact controller together with the latest software allows for intuitive communication with other devices via Profinet and PROFIBUS network modules.

**Parameters:**
- Max. reach: 1.42 m
- Payload: 10 kg
- Pose repeatability: ±0.04 mm
- Weight: 160 kg
- Quantity of axes: 6
- Operation mode: manual / automatic

The robotics workstation is equipped with:
- SmartPad control panel
- KRC4 Compact controller
- Profinet i Profibus network modules
KUKA KR6 R900 SIXX robot KR AGILUS series

Robot wyposażony jest w kontroler KRC4 Compact and SmartPad control panel.
- Max. reach: 901 mm
- Payload: 6 kg
- Pose repeatability: +/- 0,03 mm
- Weight: 52 kg
- Quantity of axes: 6

A small and light (52 kg) robot that may be used in many different applications thanks to its compact size. It may be mounted on the floor, wall or ceiling. Due to its sleek design, robot KR6 can work even in tight spaces. A Safe Robot function facilitates effective cooperation between a human being and a machine. For manipulation tasks, especially Pick and Place tasks, it is characterized by high speed. It ensures high performance with minimum cycle times.

Robot KUKA R700 SIXX AGILUS KRC4

Solution used in production processes which include loading and unloading, packaging, welding, fastening, palletizing.

Parameters:
- Max. reach: 0,7 m
- Payload: 6 kg
- Pose repeatability: +/- 0,03 mm
- Weight: 51 kg
- Quantity of axes: 6

The robotics workstation is equipped with:
- HMI control panel
- Siemens S7-1200 controller
- Profinet modules which allow a quick and easy system extension
A manipulation robot WITTMANN with R8.3 controller
- Control system: WITTMANN CNC 8.3 with emergency block
- Manual operator - TEACHBOX
- 2 x Venturi vacuum circuit with a digital differential pressure switch
- 1 x pneumatic valve S/2 with control function, to control pneumatically operated gripper elements
- Servo-drives in all 3 axes
- A rotary axis
- Low noise emission and high operation comfort

Injection molding machine from – series ECO 180
Hurnak ECO series is a traditional line of toggle clamp machines. It consists of eleven different models between 100 and 750 tons of clamping force.

Hydraulic injection molding machine is fitted with the energy saving system based on a Baumuller/Marzocchi servo pump. The system is perfectly compatible with company’s own KEBA software and it has been designed to achieve a long lasting balance between efficiency and operating costs.

ECO series has been designed with simplicity, low operating costs and easy maintenance in mind. Just as in case of basic models, the machines of ECO series may be successfully used for special applications requiring high speed and precision, like manufacturing thin-wall products.
Training sessions in the field of industrial robots are carried out by automatic technicians with implementation experience in the largest industrial plants both in Poland and abroad. They combine extensive substantial knowledge and long-standing experience in design with interpersonal skills, which ensures easy acquisition of practical knowledge by participants of our courses.
Training Areas

**Mechanical Engineering**
- Industrial Pneumatics
- Power Hydraulics
- Training courses in Operating and Programing CNC lathe and milling machines
- Conventional Machine Tools
- Mechanical Engineering
- Machine Diagnostics

**Production Quality**
- Quality Management
- Metrology
- Analysis of Measurements
- Quality Management Systems

**Visualization and Control Systems**
- Electrical Engineering and Automation
- SIEMENS S7-300/400
- SIEMENS S7 Migration STEP 7 - TIA Portal
- SIEMENS S7-300/400 TIA Portal
- SIEMENS S7-1200 TIA Portal
- SIEMENS S7-1500 TIA Portal
- SIEMENS S7-SCU/GRAPH in TIA Portal
- SIEMENS Safety Integrated
- SIEMENS S7-SCU/GRAPH w TIA Portal
- SIEMENS Safety Integrated
- HMI/SCADA
- Industrial Networks
- SIMATIC PCS7
- CODESYS
- Drive Systems
- Industrial Sensors
- C/C++ Programming

**Industrial Robots**
- FANUC
- ABB
- KUKA
- WITTMANN
- COMAU
- Industrial Robots Integration

**Material Engineering**
- Plastics
- Polymer Composites
- 3D Printing
- Heat Treatment
- Casting
- Plastic Forming
- Resistance Welding

**Machinery Safety**
- Standards and Directives for Machinery
- Safety Systems

**Production Quality Management**
- Total Productive Maintenance
- SMED Methodology
- FMEA Methodology
- Lean Manufacturing

**SIEMENS PLM**
- SIEMENS NX
- SIEMENS Solid Edge

**SIEMENS PLM Software**
- Siemens NX
- Siemens SOLID EDGE
- Siemens FEMAP
- Siemens FIBERSIM
- Siemens TECNOMATIX
- Siemens TEAMCENTER