Plastics
Heat treatment
Casting
Plastic forming
Resistance welding
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.

Prizes and awards

We have received numerous awards and prizes:

- „Medal Europejski 2016” obtained by „CNC1: CNC Operator/Programmer” courses from Business Centre Club.
- Grand prize 2016 Training Company of the Year obtained from Centralne Biuro Certyfikacji Krajowej
- Certificate „2015 Company of the Future” obtained from Centralne Biuro Certyfikacji Krajowej
- Grand prize 2014 Training Program of the Year obtained from Centralne Biuro Certyfikacji Krajowej
- Grand prize 2014 Training Company of the Year obtained from Centralne Biuro Certyfikacji Krajowej
- Awards in the category Dynamically Developing Company during V edition of the „National Leaders of Innovation and Development” contest
- 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
- The award of the Marshal of the Silesian Voivodeship during the conference „Innowacja. Cię rozwija” Innowlesia
- Silesian Innovator 2012 during the conference „Innowacja.

About us

EMT-Systems has been operating in the field of engineering and technical training since 2006. We approach the subject of technical trainings 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 to corporations, government agencies, schools and individual and industrial customers. We aim to help our customers achieve success.

Our mission is to conduct high quality courses 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 courses 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 trainings courses as we do, we are the leader in technical qualifications development in Poland.

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, software and systems automation products, as well as running measurements and tests.

emt-systems.com
Specialized courses in the field of Material engineering and metalurgy

**PLASTICS**

### Course TS1
**Course Type:** Plastics and their properties

- **Course Name:** Designing components made of plastics
  - **Course Aim:** Acquiring comprehensive knowledge about plastics: terms, design, classification, groups, identifying properties of plastics in operational and processing state and methods of their testing, effective selection of processing parameters that are significant for quality of the manufactured elements. Analysis of the chemical and physical processes occurring in the process of plastics processing. Unavoidable assessment of the influence of components on the properties of plastics. Proper analysis of the influence of operational conditions on the properties of plastics.

- **Summary:**
  - Basic concepts relating to polymeric materials.
  - Molecular and supermolecular structure.
  - Classification of polymeric materials.
  - Design and processes occurring in the injection-molding machine.
  - Devices aiding the operation of injection molding.
  - Diagnosis of defects of the elements produced through injection molding method and their prevention.
  - Modern injection molding methods.
  - Practical exercises with injection molding machine.

- **Duration:** 3 days - 21 hours
  - **Open / Closed:** Closed

### Course TS2
**Course Type:** Plastics processing - extrusion

- **Course Name:** Designing injection molds
  - **Course Aim:** Increasing technical awareness of the employees working with injection molding machines. Introduction to operation principles of injection molding machines: independent assessment and selection of the method of repairing damage to injection molding machines; Operation and repairs of hot runner systems.

- **Summary:**
  - Basic information about the injection molding process.
  - Design principles of the injection mold.
  - Input data for the injection mold project.
  - Principles for the selection of the number of cavities.
  - Structure of the mold cavity.
  - Principles for the design of gating systems.
  - Thermoset polymerization system of the injection mold.
  - Injection and demolding principles.
  - Reagent system.
  - Connecting, fixing and guiding elements.
  - Principles of selecting materials for injection mold elements.
  - Categorization and standardization of the mold elements.
  - Computer-aided mold design.

- **Duration:** 3 days
  - **Open / Closed:** Open / Closed

### Course TS3
**Course Type:** Injection molding machine operation

- **Course Name:** Processing of plastics - injection molding
  - **Course Aim:** Acquiring comprehensive knowledge about plastics processing with injection molding method: Gaining skills of designing injection molding process. Acquiring the skills of evaluating the quality of the injection-molded product. Acquiring the skills of diagnosing the injection and preventing potential defects of the product.

- **Summary:**
  - Basic concepts relating to polymeric materials.
  - Molecular and supermolecular structure.
  - Classification of polymeric materials.
  - Design and processes occurring in the injection-molding machine.
  - Devices aiding the operation of injection molding.
  - Diagnosis of defects of the elements produced through injection molding method and their prevention.
  - Modern injection molding methods.
  - Practical exercises with injection molding machine.

- **Duration:** 3 days - 21 hours
  - **Open / Closed:** Closed
Course symbol: TS8
Course name: Polymer composites - processing
Course aims: Overview of the properties of plastics in their operational and processing state. Overview of the properties of particular groups of plastics. Acquiring knowledge about basic techniques of manufacturing elements made of plastics (injection molding, extrusion and their modifications). Overview of the injection molding and extrusion blow molding processes. Acquiring the skills of designing the process of manufacturing elements using the blow molding technology. Overview of the plastics used in the production of elements using blow molding. Acquiring the skills of selecting the parameters of manufacturing the elements and the proper method.
Course summary:
- Theoretical basis of the production process involving blow molding and thermoplastic materials.
- Extrusion blow molding technology.
- Injection blow molding technology.
- Thermoplastic materials used in blow molding.
- Influence of the particular parameters of the process on the quality of manufactured elements.
- Processing parameters of the blow molding technology.
Duration: 2 days
Course type: Closed

Course symbol: OC1
Course name: Heat treatment - basic course
Course aims: Acquiring the skills of selecting the appropriate kind of heat treatment. Acquiring knowledge about heating and cooling.
Course summary:
- Heat and cooling processes.
- Chemical composition and its influence on thermal conductivity; Heating media: liquid, gas, fluidizing.
- Protective atmospheres in heat treatment: Heating steel and chemical reactions accompanying the heating process.
- Protective atmospheres in heat treatment.
- Protective atmospheres in heat treatment: Heating and cooling processes.
- Protective atmospheres in heat treatment.
- Protective atmospheres in heat treatment: Heating equipment.
Duration: 2 days
Course type: Closed

Course symbol: OC2
Course name: Heat treatment
Course aims: Acquiring essential knowledge on the subject of processes of normal thermal treatment in metal working. In-depth examination of annealing and hardening of metallic materials. Technological aspects of heating processes of normal materials.
Course summary:
- Annealing.
- Homogenizing and overheating treatment: Normalization.
- Annealing (conventional and soft annealing).
- Annealing (conventional and soft annealing).
- Annealing (conventional and soft annealing).
- Annealing (conventional and soft annealing).
- Annealing (conventional and soft annealing).
Duration: 2 days
Course type: Closed

Course symbol: OC3
Course name: Chemothermal treatment
Course aims: Learning about the basic rules regarding the chemothermal working processes of materials. Learning about the technological aspects, choice of parameters and the influence of the parameters on the quality and properties of the materials from the chemothermal working process.
Course summary:
- General principles of chemothermal treatment.
- Diffusion alloying with nonmetallic chemical elements.
- Diffusion alloying with nonmetallic chemical elements.
- Diffusion alloying with nonmetallic chemical elements.
Duration: 2 days
Course type: Closed

Course symbol: OC4
Course name: Thermal methods of producing surface layers
Course aims: Learning the basic methods of thermal treatment for the modification of the surfaces of materials. Learning about chemothermal, heat treatment and thermomechanical processes for surfaces.
Course summary:
- Thermal methods.
- Thermal methods.
- Thermal methods.
Duration: 2 days
Course type: Closed

Course symbol: OC5
Course name: Technology of heat treatment of machine and tool parts
Course aims: Learning about the fundamental theories and practices of thermal processes for constructional steel. Learning about the effects of thermal processes on steel with special properties. Analysis of the influence of the parameters of the thermal process on the resultant properties of the piece depending on which metals were used.
Course summary:
- Heat treatment of construction steel (fringes, springs, gear wheels, roller bearings).
- Heat treatment of steel with special properties.
Duration: 2 days
Course type: Closed

Course symbol: OC6
Course name: Equipment for heat treatment processes
Course aims: Becoming familiar with the different equipment used in the thermal processes of metallurgy. Analysis of the effect of the equipment used on the resultant properties of the piece.
Course summary:
- Heat treatment of steel and iron castings.
- Heat treatment of tools:
- Cutting tools:
- Tools for cold forming of metals:
- Tools for press forming and shaping other products:
- Tools for plastics processing:
- Tools for glass forming processes:
- Moulding tools:
- Thermomechanical processing of tools:
- Cutting tools:
Duration: 2 days
Course type: Closed
CASTING

### Basics of casting technology

**Course name:** Acquiring knowledge of the importance of casting – the fundamental technique of manufacturing machine parts; learning basic casting technologies and methods of manufacturing molds and cores; Skills of producing simple casting molds using quartz-clay molding sand.

**Course aims:**
- Introduction to foundry casting - the oldest and basic technique of manufacturing machine parts,
- Classification of casting techniques with particular focus on traditional methods based on sand matrices,
- Casting process from deoxidizing to treating,
- Methods of manufacturing molds and cores,
- Assisting process (process of producing a mold) using quartz-clay molding sand – practical exercise.

**Duration:** 2 days

**Course type:** Closed

### Casting metal alloys and smelting methods

**Course name:** Acquiring basic information about the materials (metal alloys) used to produce casts; learning about the smelting processes in typical foundry furnaces; Gaining skills of preparing and performing the smelting process in the electric induction furnace.

**Course aims:**
- Classification of foundry furnaces – iron alloys and non-ferrous metals,
- Tendencies in the development and application of modern casting alloys (Austempered Ductile Iron, vermicular cast iron, nickel superalloys, aluminum alloys, skeleton castings etc.),
- Types of foundry furnaces and smelting processes: Electric arc furnace; Electric induction furnace; Cupola; Other (less commonly used) types of foundry furnaces.
- Calculating the material in the feed to sustain the smelting process in the foundry furnace – practical exercise.
- Iron smelting in the electric induction furnace – practical exercise.

**Duration:** 2 days

**Course type:** Closed

### Modern technologies of producing casts

**Course name:** Acquiring knowledge about the development of casting technologies, including mechanization, automation and robotization of casting processes, familiarizing concepts relating to modern pressure casting; Gaining skills of producing precise casting using lost wax technology.

**Course aims:**
- Tendencies in the development of the international casting industry.
- Automated flask casting lines.
- Automated flaskless casting lines.
- Pressure casting as the most automated and robotized casting technology.
- Combining casting technologies with other manufacturing techniques (squeeze casting, rheocasting, hybrid mold casting metal-plastic etc.).
- Production of precise castings using lost wax technology – practical exercise.

**Duration:** 2 days

**Course type:** Closed

### Defects of castings and prevention techniques

**Course name:** Gaining advanced knowledge on terminology and causes of defects occurring in iron and non-ferrous metal alloys; Familiarizing the rules of defect diagnosis minimizing the risk of casting casting defects.

**Course aims:**
- Classification of casting defects and used terminology.
- Standards relating to casting defects and castings quality.
- Casting selection criteria.
- Crystal defects.
- Raw surfaces defects.
- Breaks in continuity.
- Internal defects.
- Defect prevention techniques including:
  - Influence of molding material on the castings quality.
  - Influence of liquid alloy quality and its parameters on the seriousness of defects.
  - Influence of mold geometry on the occurrence of defects.
  - Casting solidification and crystallization and its influence on internal defects.
  - Computer-assisted casting production process as a tool minimizing the risk of producing faulty defects.

**Duration:** 3 days

**Course type:** Open training

### Resource and waste management in a foundry

**Course name:** Familiarizing current legal provisions with regard to industrial waste, including casting waste; Gaining knowledge on the methods of regenerating molding material; Find out about rules of casting processes optimization (melting, molding, cleaning castings etc.) with regard to resource management and minimizing the waste.

**Course aims:**
- Casting waste management regulations.
- Methods of regenerating molding material – application, advantages and disadvantages.
- Modern methods minimizing the use of different resources in fundamental casting processes and technologies, including:
  - Monitoring furnace chimney wear.
  - Reducing energy consumption in the alloy smelting process.
- Modern methods of mold filling to reduce the amount of liquid alloy and increase the amount of final product.
- Possibilities of utilising casting waste in the foundry and other branches of industry.

**Duration:** 2 days

**Course type:** Closed
<table>
<thead>
<tr>
<th>Course symbol</th>
<th>Course name</th>
<th>Duration</th>
<th>Course type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZO1</td>
<td>Programming and parameterization of resistance welding machines – basic course</td>
<td>3 days</td>
<td>Closed</td>
</tr>
<tr>
<td>ZO2</td>
<td>Programming and parameterization of resistance welding machines – advanced course</td>
<td>3 days</td>
<td>Closed</td>
</tr>
<tr>
<td>203</td>
<td>Programming the adaptive weld control system made by BOSCH – specialist course</td>
<td>2 days</td>
<td>Closed</td>
</tr>
</tbody>
</table>

**Course aims**
- Overview of the principles related to resistance welding technology; Overview of the adaptive welding technology; Parameterization and activation of the system in the Adaptive mode; Optimization of the welding process in the Adaptive mode.

**Course summary**
- Characteristics of welding processes:
  - Source of energy/hot in welding; Transport of energy in welding.
- Welding devices:
  - Source of energy/hot in welding; Design, identification and assembly of essential elements of welding machines; manually and automated processes; Electromagnetic Transformer for welding machine; Thyristor connector; Steaming systems and critical systems; Cooled systems; Welding devices.
- Weld materials:
  - Types and characteristics of the welded materials; Changes of materials' properties as a result of the thermal process.
- Basics of parameterization in welding technology:
  - Welding devices; Weld materials; Sources of energy/hot in welding; Transport of energy in welding.
- Basics of regulation in the Adaptive technology:
  - Influence of flashing on the regulation; Graphs of dynamic resistance of the weld; Quality evaluation of the produced welds.

**Course aims**
- Overview of the principles related to resistance welding technology; Overview of the adaptive welding technology; Parameterization and activation of the system in the Adaptive mode; Optimization of the welding process in the Adaptive mode.

**Course summary**
- Characteristics of welding processes:
  - General characteristics; Sources of energy/hot in welding; Transport of energy in welding.
- Welding devices:
  - General characteristics; Sources of energy/hot in welding; Transport of energy in welding.
- Basics of parameterization in welding technology:
  - Sources of energy/hot in welding; Design, identification and assembly of essential elements of welding machines; Powered elements of the welding machine (DC/AC); Frequency of current; Powering electrodes of the welding machine with a medium frequency; DC/AC current; Powering electrodes of the welding machine with a medium frequency; DC/AC current; Sources of energy/hot in welding.
- Basics of regulation in the Adaptive technology:
  - Monitoring; Diagnostics, maintenance and calibration.
- Basics of optimization in the Adaptive technology:
  - Influence of flashing on the regulation; Graphs of dynamic resistance for different types of materials; Quality assessment; System calibration; Specialist welding; Practical exercises.

**Course aims**
- Overview of the principles related to resistance welding technology; Overview of the adaptive welding technology; Parameterization and activation of the system in the Adaptive mode; Optimization of the welding process in the Adaptive mode.

**Course summary**
- Characteristics of welding processes:
  - General characteristics; Sources of energy/hot in welding; Transport of energy in welding.
- Welding devices:
  - General characteristics; Sources of energy/hot in welding; Transport of energy in welding.
- Basics of parameterization in welding technology:
  - Sources of energy/hot in welding; Design, identification and assembly of essential elements of welding machines; Powered elements of the welding machine (DC/AC); Frequency of current; Powering electrodes of the welding machine with a medium frequency; DC/AC current; Powering electrodes of the welding machine with a medium frequency; DC/AC current; Sources of energy/hot in welding.
- Basics of regulation in the Adaptive technology:
  - Monitoring; Diagnostics, maintenance and calibration.
- Basics of optimization in the Adaptive technology:
  - Influence of flashing on the regulation; Graphs of dynamic resistance for different types of materials; Quality assessment; System calibration; Specialist welding; Practical exercises.
Closed courses at Client’s site:

- During the practical part of the course we use the equipment found in any given factory - extrusion and injection moulding machines.

- The course includes the discussion on the most common faults when using injection moulding machines and setting the parameters, discussing the most common faults found in the products, the fundamental rules when setting the parameters and starting process and also optimizing the injection process.

Laboratory Heat treatment

Courses: OC1-OC7

Depending on the level and location of the course, we have a variety of equipment we use in the machine park of the enterprise for which the course is prepared - hardening baths and ovens, heating coils.
Our trainers are industry as well as higher education representatives with a lot of experience in implementation and research. They also work closely with large manufacturers. Their experience is based on many years of working in industries as technologists in plastics production, heating and moulding processes, resistance welding and casting.

The trainers have a lot of experience in tailoring the courses to the needs of the clients and the technology used in metalworking and plastic production. They have also designed parts and tools used in the production processes.
Our clients include:

![Client Logos]

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Niniejsza broszura ma charakter informacyjny i nie stanowi oferty handlowej w rozumieniu art. 64 § 1 Kodeksu Cywilnego. EMT-Systems sp. z o. o. nie bierze odpowiedzialności za wykorzystanie, kompletność i poprawność zamieszczonych w niej materiałów. Wszelkie nazwy własne, pozostałe zastrzeżone znaki towarowe i handlowe należące do podmiotów trzecich, są używane przez EMT-Systems Sp. z o.o. wyłącznie w celach identyfikacyjnych i informacyjnych. Wszelkie prawa zastrzeżone.