Training More efficiency in injection moulding.





More knowledge. More productivity. With ENGEL training.

ENGEL training gives you the chance to get the most out of your injection moulding process. Everyone sets goals to be the best. The target is to have the highest efficiency, which is a combination of the fastest production and the best quality of parts. To be the best, you need a thorough understanding of your injection moulding machines and robots and how they work together. What simple program changes can you make to get the most out of your equipment? ENGEL training assists you in achieving this goal. With a comprehensive programme of practical training courses available for all experience levels of your team. This ranges from seminars and specialised workshops to certified training courses, which can, upon request, be tailored to your company's specific needs.

Whether for beginners or the more advanced - ENGEL training will help you and your employees be ready to face the challenges of your injection moulding process.



ENGEL



The seminar programme at a glance

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ENGEL operation

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Standard and specialised seminars

Standard seminars cover a large range of topics on operation, maintenance and process technology. The following pages provide an overview of the training modules.

Specialised seminars are tailor-made to reflect the customer's individual requirements and are also available for older or custom-built machines - on your premises, using your own machines, or - thanks to the ENGEL e-trainer live - directly via the Internet.

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Highest quality level for trainers and training centres. Worldwide.

International companies benefit from the global presence of ENGEL training centres. Thanks to our sophisticated quality assurance system, ENGEL guarantees a uniformly high standard of our training programmes worldwide. This applies to both the trainers and the training centres.

Ongoing training is the key to ensuring that trainers can offer a consistently high level of quality: ENGEL trainers keep on top of the latest technological advances thanks to workshops with the development department and product management and at train-the-trainer seminars. Plus, we make training success measurable, with the trainers themselves undergoing regular testing to assess their knowledge levels.

A sophisticated quality assurance system ensures top quality standards at all training centres around the world. The Certified Training Centre logo documents this claim and confirms that the respective training centre has successfully participated in regular auditing and certification processes.

The benefits

Modular and concise.

Fast track learning. The modules of the ENGEL seminar programme take a maximum of three days. It is ensured that participants can absorb and implement the skills communicated to them. Depending on knowledge level, seminars are available for beginners, advanced learners, or experts.

Small groups. Big impact.

The groups are typically restricted to a maximum of eight participants which gives trainers the ability to adapt to the needs of the individuals. This in turn ensures perfect pace of learning and a personal atmosphere in which participants can learn more effectively. Applications for seminars are dealt with on a first come, first served basis.

Hands-on: practice on the machine and the PC.

Hands-on exercises on state-of-art injection moulding machines are an important part of our training programme. The theoretical knowledge taught at the ENGEL Training Centres is immediately put into practice on real machines, helping to reinforce acquired skills. Additionally, injection moulding skills can be practised on a PC with the ENGEL e-trainer. For more details on the ENGEL e-trainer, see the next page.

Specific training for your company. On your premises if so desired.

Are you looking to add training that is precisely tailored to your company's needs for staff development? We would be pleased to help you develop individual training plans. We start by collaborating in defining the target groups and then move on to test your staff's knowledge base. You determine the time, place, content and scope of the training.

On request, specialized seminars can also be held on your premises, using your machines, your moulds and your peripheral technology. This saves travel time and expenses for your staff.

Certified learning success: the respected Certified Training certificate.

It is becoming increasingly important for training participants to receive objective feedback on how much knowledge has actually been conveyed. This is why ENGEL offers final exams for all regular courses worldwide. Upon passing the exam, participants receive the Certified Training certificate which is recognised throughout the industry.



Training 7

ENGEL e-training

ENGEL e-trainer

Developed for the CC200 generation of control units, the ENGEL e-trainer provides a unique injection moulding machine simulation on a CD and has established itself as a state-of-art component complementing the ENGEL training concept. A "virtual ENGEL e-trainer" is also available for the current CC300 generation of control units. This can be obtained when buying a new machine or from ENGEL Customer Service. ENGEL e-trainer does not, and is not designed to replace the trainer, but it does complement training sessions.

As in a dry cycle, users can set up and operate a machine with an ENGEL control unit. Participants can realistically learn and experiment on the injection moulding machine at their own pace and without any risk.

The ENGEL e-trainer eliminates all concerns related to the use of expensive machinery, especially for inexperienced users. The virtual machine cannot be damaged even with serious programming errors. This machine simulator depicts the complete ENGEL machine control unit on the PC screen as well as every movement that results from operator input. This gives participants even more time for practical trials on a real machine.



ENGEL e-trainer live

ENGEL also offers seminars via the Internet. This saves travelling expenses and time. Each training session can be stored on disk and repeated as individual need arises. The participants can easily link up with trainers via their PCs and the Internet.

ENGEL e-trainer live CC300 upgrade training

Seminar objectives:

After the seminar, the participants will know the differences between the CC200 and CC300 control units. Participants will gain the necessary know-how to switch to the new generation of control units and use all their advantages.

Seminar content:

- Components of the CC300 control unit
- Operation concept
- New functions
- Differences from CC200

Duration of seminar: 4 hours

Seminar venue: Online

Target group: Staff involved in setting up and operating machines

Prerequisites:

A solid understanding of the operation of the CC200 control unit

Required items:

Internet access

- Headset/speakers and microphone
- Microsoft Skype for Business software

ENGEL e-learning platform: the new independence in learning and training

ENGEL has bundled the knowledge and experience of our experts and trainers, which is made accessible to your staff on the ENGEL e-learning platform. This well-proven online knowledge management system is now available worldwide, providing access to the information under the headings of first steps, competence assessment and standard seminars for all interested parties. Simply request your access code and you can benefit from the comprehensive ENGEL know-how and professional ENGEL competency checks. Please turn to your local training centre or contact e-learning-support@engelglobal.com directly for details.

What the ENGEL e-learning platform offers

- Basic skills in English (German also available)
- Training manuals in English (German also available)
- Knowledge testing with analysis option (both structured according to the ENGEL seminar programme)
- Customer-specific and global content
- Any-time access just like a public website
- Learn at your own pace



The ENGEL e-learning platform access packages

Single Access: access permission for the released platform content for individual employees for one month. Company Access: unrestricted use of the released platform content for all authorised staff

in the company for one year.

Please note: All e-training content is offered as a supplement to and not a replacement for personally attending classroom training.

The benefits the ENGEL e-learning platform offers

- Maximum flexibility
- User friendly
- Uniform level of competency for all staff
- More motivation
- Saves travel expenses
- Perfect knowledge management
- Concise ENGEL expertise accessible at any time



ENGEL operation

ENGEL operator basics (EOB)

Basic skills for operating ENGEL injection moulding machines

Seminar objectives:

After the seminar, the participants will be capable of operating and setting up the clamping and injection units of ENGEL injection moulding machines. Participants will be capable of performing set-up operations and configuring production settings independently and effectively, taking EN-GEL-specific machine control units into consideration.

Seminar content:

- Design of an injection moulding machine
- Design and operation of the machine control unit
- Design and settings of the clamping unit
- Design and settings of the injection unit
- Alarms and malfunction identification
- Practical exercises:
- Settings
- Test injections
- Simulation of alarms

Duration of seminar: 2 days

Target group: staff involved in setting up and operating machines

Prerequisites:

Basic knowledge of the injection moulding process, seminar TPB

ENGEL operator advanced (EOA)

Operating ENGEL injection moulding machines for advanced users

Seminar objectives:

Improve participants' ability to operate ENGEL injection moulding machines. After the seminar, the participants will be able to set up more complex sequences quickly and effectively, and perform production and quality optimisation.

Seminar content:

- ENGEL micrograph and microplast
- ENGEL autoprotect
- User-programmable machine sequences
- User-defined screen pages and advanced configurations
- Practical exercises:
- Setting up user-programmable sequences
- Operating the programmes under production conditions

Duration of seminar: 2 days

Target group: Advanced operating staff - staff involved in setting up and operating machines, sampling staff, processing engineers

Prerequisites:

Good knowledge of the injection moulding process and machine operations, seminar EOB

ENGEL robotics basics (ERB)

Basic skills for operating ENGEL viper linear robots

Seminar objectives:

Basic operations with ENGEL viper robot systems. After the seminar, the participants will be familiar with the mechanical layout and the controls, and capable of setting up and using standard programmes.

Seminar content:

- Design of the robot system
- Work area set-up
- Function, operation, standard programmes
- Interpreting error messages
- Practical exercises:
 - Setting up standard programmes under production conditions

Duration of seminar: 2 days

Target group: staff involved in setting up and operating machines

Prerequisites:

Basic knowledge of injection moulding machines, seminar EOB



ENGEL robotics advanced (ERA)

Operating ENGEL viper linear robots for advanced users

Seminar objectives:

Advanced operating skills with ENGEL viper robot systems. After the seminar, the participants will be capable of editing ENGEL viper robot systems' programme sequences, as well as quickly and effectively changing or adapting various sequences.

Seminar content:

- Work area set-up
- Sequence editor basics
- Explanation of ENGEL standard sequences
- Explanation of ENGEL sequence instructions
- Practical exercises:
- Creating various programme sequences

Duration of seminar: 3 days

Target group: Advanced operating staff staff involved in setting up and operating machines, sampling staff, processing engineers

Prerequisites: good working knowledge of ENGEL viper robots, ERB seminar

ENGEL articulated basics (EAB)

Basic skills for operating ENGEL articulated robots (AR)

Seminar objectives:

After the seminar, the participants will be familiar with the design, the individual coordinate systems and how to operate the six-axis robot. Correcting positions and changing standard sequences are also part of the seminar. After setting the sequence, it is executed step-by-step. Participants will then receive an overview of the easix AR's safety features.

Seminar content:

- Design of the robot
- Understanding the coordinate systems
- Types of six-axis robot movements
- Measuring and using user coordinate systems and tools
- Reviewing set positions
- Testing a sequence with step acknowledgement
- Practical exercises

Duration of seminar: 2 days

Target group: Staff involved in setting up and operating machines and robots

Prerequisites: Basic knowledge of injection moulding machines, EOB seminar

ENGEL pick & place basics (EPB) Operating ENGEL e-pic robots

Seminar objectives:

After the seminar, the participants will be familiar with the mechanical layout and the controls, and capable of setting up and using standard programmes.

Seminar content:

- Pick & place robot system design
- Work area set-up
- Function, operation, standard programmes
- Explanation of ENGEL standard sequences
- Explanation of ENGEL sequence instructions
- Practical exercises:
- Setting up an e-pic robot
- Sequence settings and edits

Duration of seminar: 2 days

Target group: Staff involved in setting up and operating machines and robots

Prerequisites: good working knowledge of injection moulding machines and robot systems

ENGEL articulated advanced (EAA) Operating ENGEL articulated robots (AR) for advanced users

Seminar objectives:

After the seminar, the participants will be familiar with the structure of the sequence programme and use of the individual sequence instructions. In addition, the easix AR's safety features will be examined in greater detail. The configuration of work areas and prohibited areas is also part of the course content. More complex sequences can be adapted and optimised based on this knowledge.

Seminar content:

- Structure of the sequence programme
- Editing standard programmes
- Creating new user programmes
- Create circular movements
- Safety features
- Practical exercises

Duration of seminar: 2 days

Target group: Advanced operating staff, staff involved in setting up and operating machines, sampling staff, supervisors

Prerequisites:

Good working knowledge of sequence programming, EAB seminar





ENGEL Maintenance

ENGEL operator maintenance (EOM)

Operating ENGEL injection moulding machines for maintenance staff

Seminar objectives:

The participant will understand the basic sequences in the injection moulding process. They will learn and understand the technical terms used in plastics engineering (mould protection, holding pressure, back pressure, etc.). They will be able to more easily assess the consequences of their actions. Target and actual values can be changed and checked for troubleshooting purposes. Maintenance staff can autonomously perform manual functions and run a dry cycle, in coordination with commissioning staff.

Seminar content:

- Basic knowledge of injection moulding technology
- Layout and function of an injection moulding machine
- The injection moulding process and its technical terms (mould protection, switchover point, etc.)
- Design, operation and set-up of the ENGEL control unit
- Working with the injection moulding machine's comprehensive help functions
- Practical exercises:
- Basic injection moulding machine set-up with trial injection

Duration of seminar: 1 day

Target group: Maintenance and repair staff for mechanical and electrical systems

Prerequisites: None

ENGEL machine maintenance (EMM)

Performing maintenance on ENGEL injection moulding machines

Seminar objectives:

Perform preventative work to improve machine availability. After the seminar, the participants will know the mechanical components of the injection moulding machine, regular machine maintenance of the machine and of the safety devices.

Seminar content:

- Mechanical and hydraulic maintenance
- Error messages in the context of maintenance
- Testing safety equipment
- Optimising heating closed loop control
- · Practical exercises:
- Mechanical and hydraulic maintenance tasks

Duration of seminar: 1 day

Target group:

Maintenance and repair staff

Prerequisites:

Good working knowledge of machine operation, EOM seminar



ENGEL control basics (ECB)

Basic knowledge of control technology and engineering for ENGEL injection moulding machines

Seminar objectives:

Quickly troubleshoot and correct electrical faults. Become familiar with the control elements and their functions, and how to troubleshoot electrical systems.

Seminar content:

- Interpreting a circuit diagram
- Explanation of the electrical monitoring circuits
- System design of the machine control unit
- Electronics modules, troubleshooting tools
- Alarm messages and how to resolve them
- Practical exercises:
- Troubleshooting
- Replacing components
- Loading software updates
- Calibrating stroke transducers

Duration of seminar: 2 days

Target group: Maintenance and repair staff for electrical/electronic systems

Prerequisites:

Good working knowledge of electrical technology and machine operation, EOM seminar

ENGEL electrical machine (EEM)

Control technology, control engineering and maintenance for all-electric ENGEL injection moulding machines for advanced users

Seminar objectives:

Seminar participants will be familiar with the layout of the all-electric injection moulding machine and will have mastered the drive functions, and sensor and electrical system. To increase machine availability, participants will be able to perform preventive maintenance work on the machine and safety equipment.

Seminar content:

- Design of the machine and drive systems
- Functional operation of servodrive components
- Service tools for maintenance purposes
- Replacing drive components
- Calibrating motors and sensors
- Testing safety equipment
- Practical exercises:
- Troubleshooting
- Adjustments on the machine

Duration of seminar: 2 days

Target group: Maintenance and repair staff

Prerequisites:

Basic knowledge of electrical technology and machine operation (CC200, CC300)

ENGEL control victory (ECV)

Control technology and engineering for ENGEL victory injection moulding machines for advanced users

Seminar objectives:

After the seminar, the participant will be familiar with the control technology and engineering and is capable of calibrating and adjusting the closed loop controls.

Seminar content:

- Valve and pump functions
- Variable displacement pump closed loop control
- Heating closed loop control
- Practical exercises:
- Adjusting pump control
- Optimising heating control

Duration of seminar: 1 day

Target group:

Maintenance and repair staff for electrical and electronic systems

Prerequisites:

Good working knowledge of electrical technology and machine operation, ECB seminar

ENGEL hydraulic basics (EHB)

Basic knowledge of hydraulic components on ENGEL injection moulding machines

Seminar objectives:

Acquire basic knowledge of hydraulics and prepare for the EHV seminar. After the seminar, the participants will be familiar with the functions of the individual hydraulic components on an ENGEL injection moulding machine.

Seminar content:

- Basics of hydraulics
- Function of individual hydraulic components
- Practical exercises:
- Getting to know a machine's hydraulic system

Duration of seminar: 1 day

Target group:

Beginners, maintenance and repair staff

Prerequisites:

Good working knowledge of machine operation, EOM seminar





ENGEL hydraulic victory (EHV)

Hydraulic systems on ENGEL victory injection moulding machines for advanced users

Seminar objectives:

Effective and quick recognition as well as elimination of hydraulic problems. After the seminar, the participants will understand the hydraulic system and its functional sequences as well as troubleshooting procedures.

Seminar content:

- Set-up of variable displacement pumps
- Interpreting hydraulics schematics
- Component functions
- Possible hydraulic system malfunctions and how to remedy them
- · Practical exercises:
- Troubleshooting
- Adjustments on the machine

Duration of seminar: 1 day

Target group:

Maintenance and repair staff

Prerequisites:

Good working knowledge of hydraulic components and machine operation, EHB seminar

ENGEL hydraulic duo (EHD) Hydraulic systems on ENGEL duo injection moulding machines for advanced users

Seminar objectives:

After the seminar, the participants will be familiar with the design of duo injection moulding machines and will have mastered the functions of the drive, sensor and electrical systems. To increase machine availability, participants will be able to perform preventive maintenance work on the machine and safety equipment.

Seminar content:

- Hydraulics set-up of a duo machine
- Functions of individual hydraulic components
- Interpreting wiring diagrams and hydraulics
- schematics
- Service tools for maintenance purposes
- Calibrating pumps, valves and sensors
- Testing safety equipment
- Practical exercises:
- Troubleshooting
- Adjustments on the machine

Duration of seminar: 2 days

Target group:

Maintenance and repair staff

Prerequisites:

Basic knowledge of hydraulic technology, electrical technology and machine operation (CC200, CC300)

ENGEL ecodrive system (EES)

Servohydraulic systems on ENGEL injection moulding machines for advanced users

Seminar objectives:

After the seminar, the participants will be familiar with the design of hydraulic injection moulding machines' servomotor pump drives and will have mastered the functions of the drive, sensor and electrical systems. To increase machine availability, participants will be able to perform preventive maintenance work on the machine and safety equipment

Seminar content:

- Design of the pump drive of an injection moulding machine
- Functional operation of servodrive components
 Interpreting wiring diagrams and hydraulics schematics
- Service tools for maintenance purposes
- Calibrating motors, pumps and sensors
- Testing safety equipment
- Practical exercises:
- Troubleshooting
- Adjustments on the machine

Duration of seminar: 1 day

Target group:

Maintenance and repair staff

Prerequisites:

Basic knowledge of hydraulic technology, electrical technology and machine operation (CC200, CC300)

ENGEL robotics maintenance (ERM) Control technology and maintenance of ENGEL viper linear robots

Seminar objectives:

The goal of this seminar is for participants to effectively perform maintenance tasks on ENGEL viper robot systems, and quickly troubleshoot and correct faults. After the seminar, the participants will be familiar with robot control elements and their functions, and will have mastered troubleshooting procedures.

Seminar content:

- System components
- Control modules, drive calibration
- Robot set-up
- Error messages and correcting errors
- Practical exercises:
- Referencing and calibrating
- Troubleshooting electrical systems

Duration of seminar: 2 days

Target group:

Maintenance and repair staff

Prerequisites:

Good working knowledge of electrical technology and machine operation, ECB seminar

ENGEL process engineering

Technology plastic basics (TPB)

Basic knowledge about plastics technology for injection moulders

Seminar objectives:

This seminar provides newcomers to the industry and career changers with the necessary tools to understand the injection moulding process. Besides theoretical explanations, participants will be introduced to the world of plastics and injection moulding technology in comprehensive practical exercises to prepare them thoroughly for working in the production of plastic components.

Seminar content:

- Basic knowledge of plastics: production, chemical structure, properties and applications
- Design and functions of an injection moulding machine
- The process sequence injection cycles and their phases
- Basics of mould technology
- In-depth examination of special technologies
- Practical exercises on the injection moulding machine

Duration of seminar: 2 days

Target group: Newcomers and career changers entering the plastics industry

Prerequisites: None

Technology plastic surface (TPS)

Identifying and correcting surface and injection errors

Seminar objectives:

Enable seminar participants to recognise and classify defects in injection moulded parts. Give them the necessary tools to correct these defects, improving part quality. Learn the correct sequence and the injection error optimisation procedure

Seminar content:

- Identifying and correcting surface and injection
 defects
- Classification of defects
- Physical causes and possible remedies
- Practical exercises on an injection moulding machine

Duration of seminar: 2 days

Target group:

Experienced operating staff, quality assurance staff, sampling staff, foremen

Prerequisites:

Good working knowledge of plastics and injection moulding technology, seminars TPB and EOB

Technology iQ programmes (TIQ)

Using iQ weight, clamp and flow control

Seminar objectives:

Understand the iQ weight control, iQ clamp control and iQ flow control programmes, and learn how to set and practically use these programmes. This involves learning the basics about how the programmes work and how to operate the programmes

Seminar content:

- How iQ weight control, iQ clamp control and iQ flow control work
- How to use the programmes properly
- Monitoring production with the iQ programmes
- Handle error messages in the programmes
- Practical exercises:
- Setting and referencing
- Limitations of the programmes
- Changing process conditions
- Test run examples

Duration of seminar: 1 day

Target group:

Staff involved in setting up and operating machines, sampling staff

Prerequisites:

Working knowledge of the injection moulding process, EOB seminar







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Technology mould proving (TMP) Systematic mould trials and proving

Seminar objectives:

After the seminar, the participants will have learned about the mould proving sequence. They will have mastered mould and machine preparation, as well as how to mount new moulds. Using quality assurance specifications to maintain and optimise mould filling, moulded part quality and cycle time are an important part of the seminar

Seminar content:

- Sequences and advance information for mould proving
- Material, mould and machine preparations
- Ideal mould mounting
- Finding injection parameters and basic settings
- Cycle and part optimisation taking into consideration of the influence of parameter changes on moulded part quality
- Practical exercises on the injection moulding machine

Duration of seminar: 2 days

Target group:

Advanced operating staff: Process optimisation and sampling staff, processing engineers, mould builders

Prerequisites:

Good working knowledge of plastics and injection moulding technology; EOB, EOA and TPS seminars

Technology process and quality control (TPQ)

Quality assurance in injection moulding

Seminar objectives:

Teach the steps required to achieve optimum quality monitoring in injection moulding. After the seminar, the participants will be able to determine the set specification limits with the relevant process parameters, which affect the quality characteristics of the moulded part. They will have mastered the documentation necessary with the help of the quality assurance programmes, and will be able to identify and eliminate any disturbance variables that occur

Seminar content:

- Strategies for optimising the injection moulding process
- Characteristics of moulded parts, machine optimisation with relevant process parameters
- Setting the specific limits with ENGEL micrograph and process data graphics
- micrograph and process data graphic
- Activating process data monitoring
- Viscosity monitoring with ENGEL microplastDocumentation of production with ENGEL
- process data log
- Practical exercises:
 Optimisation and quality monitoring of the injection moulding process with ENGEL quality assurance programmes

Duration of seminar: 2 days

Target group:

Foremen; heads of production; process optimisation, sampling and quality assurance staff

Prerequisites:

Good working knowledge of plastics and injection moulding technology; EOB, EOA and TPS seminars







ENGEL training. A prize-winning concept.

2005 Initiative Prize for Vocational Training.

ENGEL's e-trainer was recognised as one of the seven most innovative training concepts by the Otto-Wolff Foundation and DIHK, Germany's Assembly of Chambers of Industry and Commerce.

2007 International German Training Prize.

Gold award for ENGEL's training philosophy from the BDVT (Berufsverband Deutscher Verkaufsförderer und Trainer e.V. - Professional Association of Sales Promoters and Trainers in Germany) in the face of competition from many other international training concepts.

2009 and 2010: ENGEL offers certified training. The high standard of training and quality established over many years was examined by external auditors and certification organisations for adult education. The positive results: IBE and CERT certification in Austria (2009/10) AZWV certification in Germany (2009).

Starting 2011: Worldwide roll-out of the ENGEL Training Centre certification. All ENGEL training centres are evaluated and certified using uniform high standard."

2014, 2016 and 2019: Ö-CERT certification of the ENGEL Austria GmbH Training Centre according to Article 15a of the Austrian Federal Constitutional Act.

The Ö-CERT certification process created uniform national quality standards for educational programmes in Austria and as such is of pioneering character in Europe.

^{*)} This certification is performed every three years at all ENGEL training centres worldwide.



If the seminar schedule and registration details are missing, please contact your local ENGEL representative.

For detailed information about ENGEL training and to register for a seminar online, please visit:

www.engelglobal.com/training



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