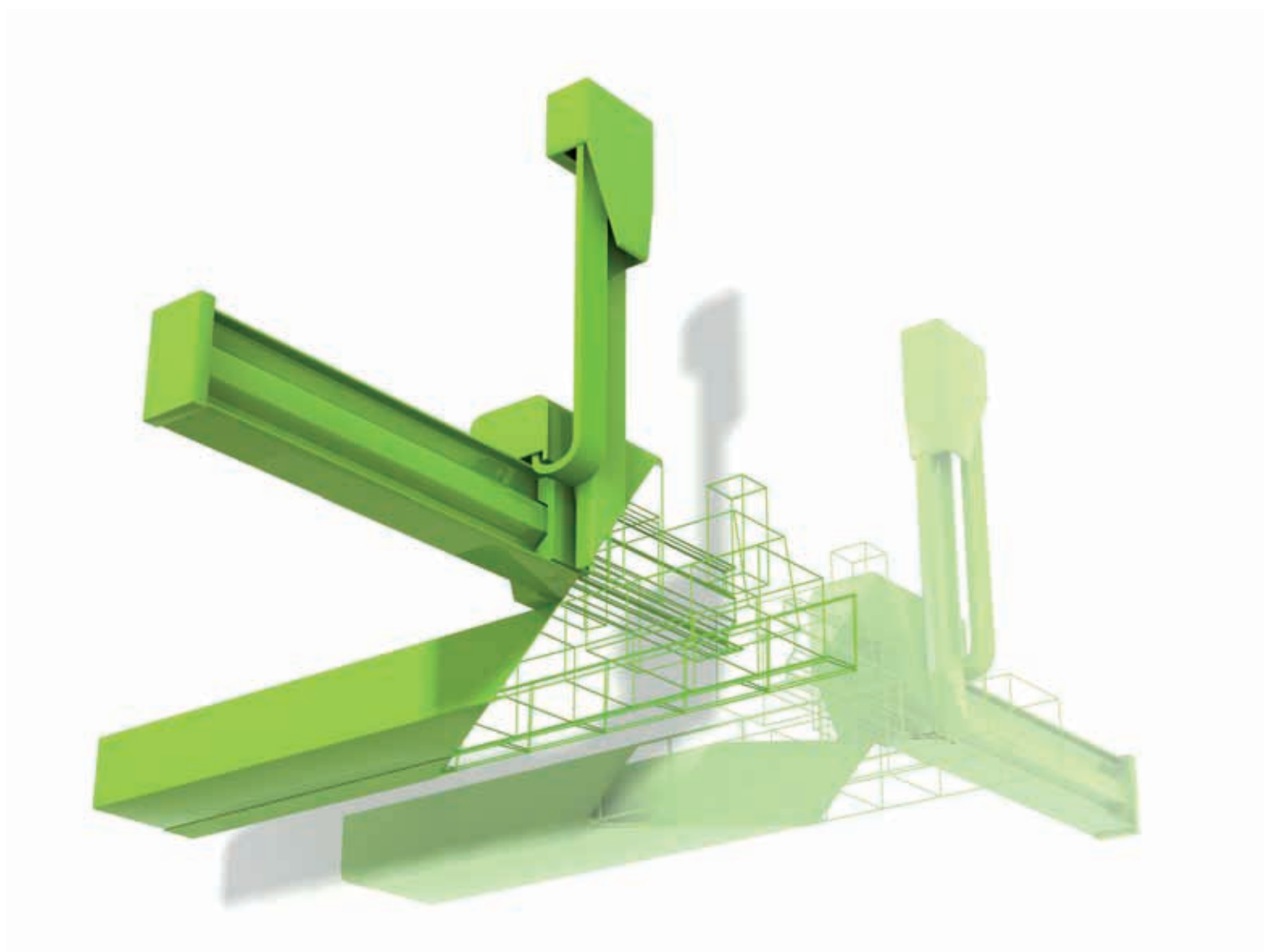


robot



ENGEL
be the first.



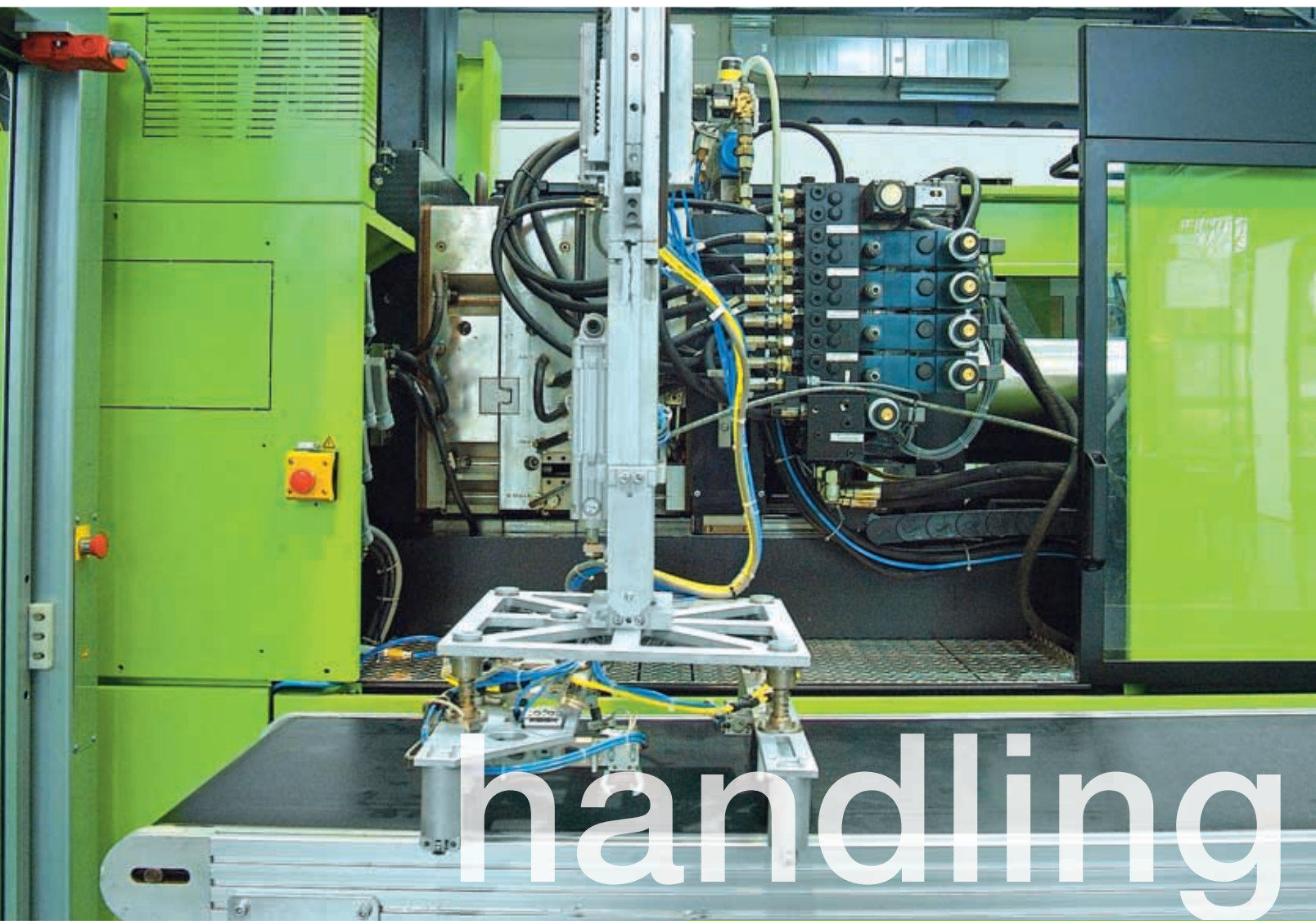
movement

Automated handling: Transforming an injection moulding machine into a production cell

Maximum efficiency in injection moulding – with ENGEL robot:

- > “Time is money – and quality is a matter of course” – this is the concept behind the design and specification of all ENGEL robots
- > ENGEL ERC linear robots are available for injection moulding machines with clamping forces ranging from 400 kN to 55,000 kN
- > ENGEL robots can be used not only with all makes and models of injection moulding machine but also for handling applications and other tasks in the general mechanical engineering field
- > Full integration of the RC 200 robot control in the ENGEL CC 200 machine control minimizes communication time between the robot and the machine, thereby considerably shortening the overall cycle time
- > ENGEL robots are fast and accurate: linear speeds of up to 5 m/s and positioning tolerances of within ± 0.05 (small and medium-sized units) and ± 0.1 mm (large units) are standard
- > The use of standard software considerably reduces the work of the operator. Using optional teach-in software, even the most complicated operating sequences can be programmed
- > The extreme reliability and durability of ENGEL robots can be attributed to the consistent use of high-quality materials and components and to more than 25 years' experience in the development and construction of robots

Constant production cycles are an important factor that not only increases production efficiency but also improves the quality of the moulded part. In this regard, automated parts handling systems make a vital contribution. ENGEL offers a comprehensive range of linear robots and automation modules of all types and ratings, thus setting new standards in the automation of the injection moulding process.



Added value through automated parts handling

The quality of a product and the efficiency of a production line depend on the consistency of the individual processes. This applies particularly to such cyclical production processes as injection moulding. For optimum results, the parts handling system must be free from all variable influences. ENGEL linear robots and components for the handling, conveying and storing of moulded parts are the perfect complement to an injection moulding machine - and also turn the machine into a high-quality production cell.

ERC with servo drive – the very essence of efficiency

ERC			13 F	23 F	33 F, FA, FH	63 F	93 / 123 F
For injection moulding machines: (clamping force in kN)		kN	280 - 1500	280 - 4000	600 - 7000	3500 - 17000	13000 - 55000
Demoulding stroke	X	mm	300 - 400	400 - 600	500 - 900	1000 - 1500	1300 - 3000
Vertical axis	Y	mm	400 - 1000	400 - 1200	600 - 1600	1000 - 2200	1800 - 3000
Horizontal axis	Z	mm	1040 - 2960	1040 - 2960	1400 - 6200	1880 - 8120	2360 - 11600
Max. handling weight (parts + gripper)		kg	3	6	3 - 10	20 - 30	30 - 80
Max. speed (Y-axis) Asynchronous servo drive	FA	m/s			2		
Servo drive	F	m/s	3,5	4	3	3	2,5 - 3
High-speed drive	FH	m/s			5	4	
Repeatability		mm	±0,05	±0,05	±0,05	±0,05	±0,2

ENGEL ERC 13-23 F

Fast and compact

- > Special compact design for use on small machines
- > 3 servo axes (XYZ) as standard for high acceleration and high linear speeds
- > 2 pneumatic rotary axes available (BC)
- > Up to 3 or 6 vacuum and/or compressed air circuits possible
- > Modular system for flexibility of axial length
- > Highest precision and repeatability within a tolerance of ± 0.05 mm
- > ERC 13 and 23 are also available as "Servo-HLi" versions for optimized combination with tiebarless injection moulding machines

ENGEL ERC 33 F

(alternative options FA and FH) – Fast and flexible

- > Rated for injection moulding machines with clamping forces of between 400 kN and 7,000 kN
- > Available with a choice of three different drive variants:
 - **Asynchronous servo drive (FA)**
for long and medium cycle times
 - **Servo drive (F)**
for fast, highly dynamic cycle times
 - **High speed drive (FH)**
Digital servo drive for extremely fast parts removal (demoulding times as fast as 0.5 sec where the total cycle time is only 5 sec)
- > Precision and repeatability within a tolerance of ± 0.05 mm
- > Machine/robot mounting interface on stationary platen
- > Moulded parts can be deposited on either the operator or non-operator side of the injection moulding machine, or, at the end of the machine if the robot is installed to operate along the longitudinal machine axis.
- > Modular system for flexibility of axial length
- > Compact design ensuring low overall machine height
- > Vertical axes also optionally available in tandem arrangement



System layout of the
ENGEL ERC series of robots

ENGEL ERC 63 F

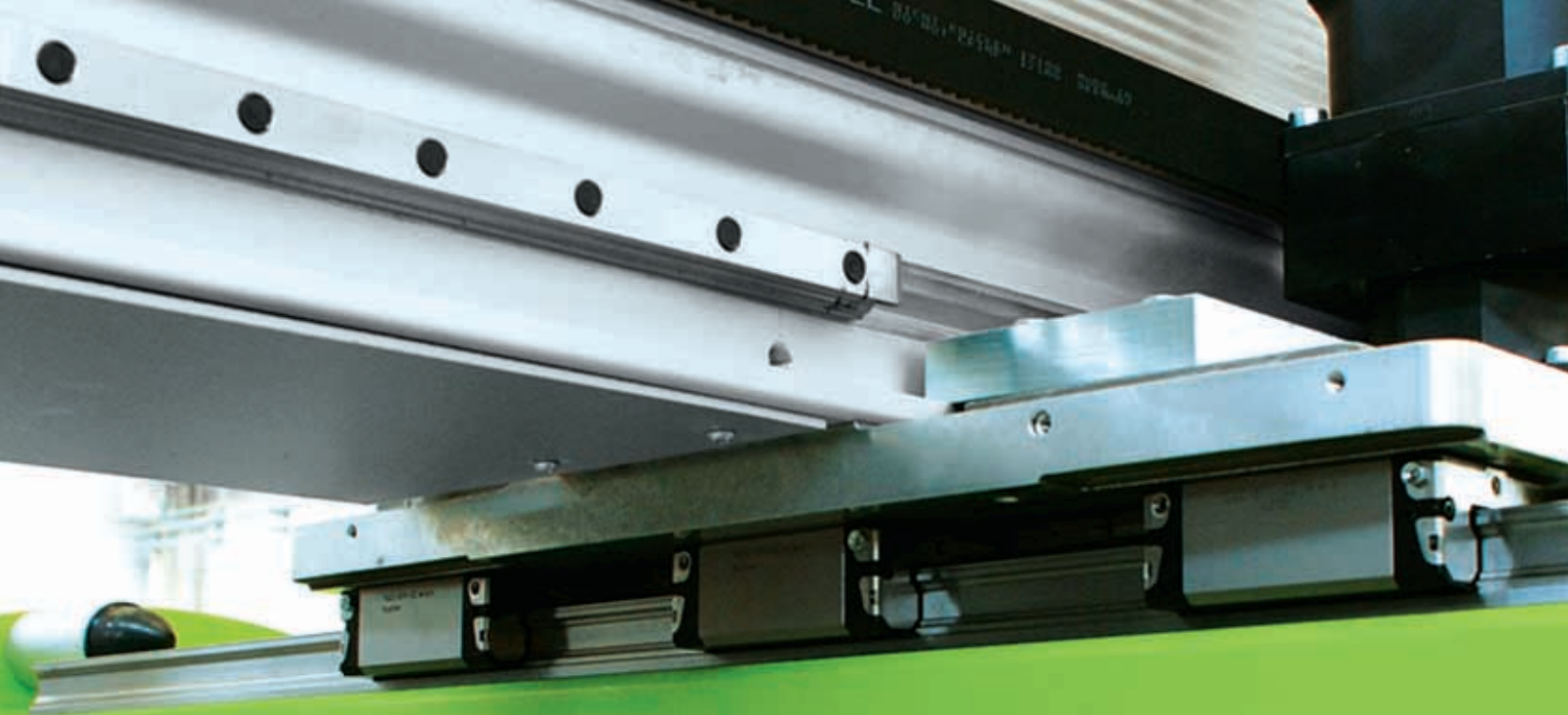
The power class

- > Rated for injection moulding machines with clamping forces of between 2,500 kN and 18,000 kN
- > Particularly sturdy mechanism for the handling of weights up to 30 kg
- > **Servo drive (version F)**
Linear speeds of up to 3 m/s when handling a working load of 30 kg
- > **High speed**
With digital servo drive capable of linear speeds of 4 m/s when handling a working load of 20 kg
- > Precision and repeatability within a tolerance of $\pm 0,05$ mm, like the ENGEL ERC 33-53, therefore suitable for insert-placing and assembly operations
- > All ENGEL ERC models are generally compatible with such cycle time reduction functions as advance response, synchronized positioning, parallel movements etc.

ENGEL ERC 93-123 F

The power packages for large injection moulding machines

- > Rated for use of large-capacity machines with clamping forces 13,000 kN upwards
- > Axes amply dimensioned for extreme stability
- > Compact height requirement
- > Servo motor drives only
- > Telescopic vertical axis is standard
- > Helical rack-and-pinion drives, sturdily built and permanently lubricated for low-noise operation
- > Special sequence control software for the synchronized operation of robot and machine – a valuable cycle time saving feature when demoulding “deep-draw” parts



precision

Designed for **long-term quality** and performance

Amplly dimensioned precision guides, light yet absolutely rigid axis supports, and a comprehensive assortment of modules for dedicated adaptation to the actual handling application are characteristic features of ENGEL automation systems.





The rack-and-pinion drives are permanently lubricated for long service life and minimum maintenance



All ENGEL robots are equipped, from size ERC 63 upwards, with a telescopic vertical axis as standard, thus keeping the overall height of the machine within an acceptable limit. The double guide system ensures optimum rigidity



Minimum changeover times thanks to rapid-action coupling system mounted directly on the vertical axis



The clearly arranged display of vacuum and compressed air circuits and the simple means of switching over from vacuum to compressed air and vice versa considerably reduces the work of setting up and adjusting the robot



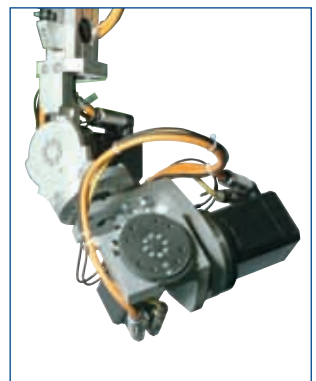
Example of a possible combination of rotary axes: C-axis for 90 degree swivel and 180 degree A-axis, both pneumatically actuated



Rotary axis combination with servo motor for B-axis and pneumatic swivel axis (C-axis)



Rotary axis combination with servo-driven B- and C-axes



Rotary axis combination for highly complex handling tasks with 3 servo motor drives

The RC 200 robot control system – either integrated in the EC / CC 200 or as a stand-alone unit



The touchscreen operator interface of the ENGEL CC 200 machine control system is the universal interface for the programming of both the machine and the robot



Besides the programming facility via the machine control system, the robot functions can be programmed and activated via the hand-held C30 or C100 operator terminals. This is convenient, for example, when the machine operator is working in immediate proximity to the peripherals

One system for both machine and robot

With the EC / CC and RC 200, ENGEL offers a new control system for the extended integration of machine and robot. The machine and robot can now be set and monitored via the same control panel for optimum logical coordination.

The generously configured touchscreen operator interface, with its choice of graphical or alphanumeric input, offers state-of-the-art operator comfort. The already familiar, service-proven ENGEL operating logic has now been augmented by new capabilities for both the machine and the robot.

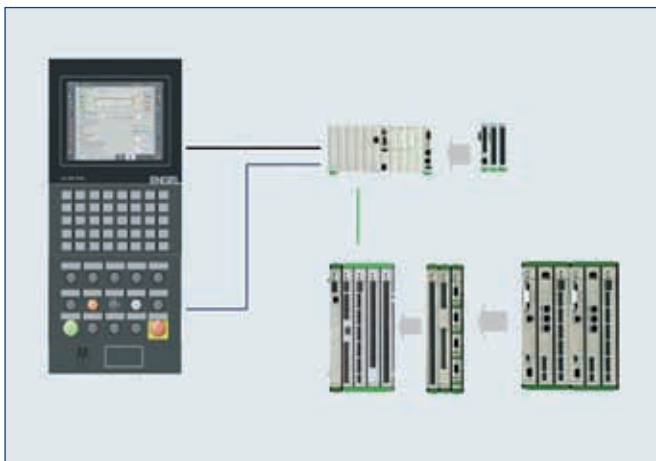
Uniform process visualization for both machine and robot and the same logical system configuration for control elements and sequences not only facilitate operation but also make for greater clarity and consequently greater confidence.

Optimized hardware and operator comfort

The new RC 200 permits separate and simultaneous operation of several individual axes and/or several groups of axes (up to 6 axes per group).

Thanks to the new control hardware and operating system, the robot software can now be run on a PC, permitting link-up with machine simulation systems and therefore off-line programming for both machine and robot.

In order to ensure an optimum overview during the teach programming of complex robot sequences, hand-held mobile operator terminals permit activation not only of the robot functions but also of the most important machine functions. The terminals are ergonomically designed and can be used by both left-handed and right-handed operators.



The ENGEL CC 200 machine control integrates the modules of the robot control as “add-ons” to its hardware rack – the best possible prerequisite for fast data exchange



For use on a “non-ENGEL machine”, the robot control is available as a stand-alone unit with the C 100 operator terminal

Programming made easy

Modular system based on standard, tried-and-tested operating sequences with predefined parameter masks makes programming skills unnecessary. Using the “QuickSet” function, the operator can immediately import the actual position of the robot into any function command, thereby considerably assisting the set-up operation. The “QuickPos” function allows the operator to move the robot to an exactly predefined position at the push of a button. The Graphic Sequence Editor permits visual, flow-chart programming of machine and robot sequences.

Predefined standard sequences may serve as the starting point for configuration. Any small changes or additions no longer require “teaching” of the entire standard sequence program (for the parts-removal operation, for example). The control system has its own Mask Editor for configuring parameter masks for individual sequences. Parameterization and augmentation of the robot equipment are achieved with the aid of the Equipment Editor.

Safety with a capital “S”

As a safeguard against operating errors, the control system is equipped with a monitoring function for predefined working areas and operating radii, with the option of increased scope for additional user areas if required. The 3D image displayed by the Working Area Editor assists with configuration of the individual areas to be safeguarded.

The function “On-line help” provides a comprehensive catalogue of answers to possible hardware and software problems.

Basic automation: ER-USP sprue removal robots

Sprue removal robots ER – USP 5, ER – USP 7

Sprue removal and separation are central to the automation process. Under the product designation USP (Universal Speed Picker), ENGEL offers a high-speed universal robot for injection moulding machines with clamping forces ranging from 250 kN to 2,200 kN.

This robot is available in two sizes:

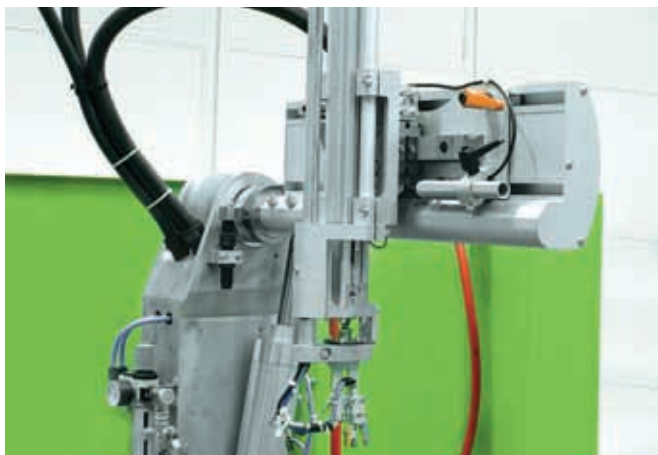
- ER - USP 5 with 500 mm Y stroke
- ER - USP 7 with 700 mm Y stroke

The ER – USP is distinguished by its particularly fast operation (the minimum sprue removal time is between 0.8 and 1.2 seconds).



The ER – USP is compact and sturdily built. As the robot itself is mounted on the stationary platen, the safety guard of the machine also safeguards its working area. The discharge chute for the sprue is likewise an integral part of the machine's safety guard. The robot can be swung to one side in order to allow easy access whenever mould change is required.

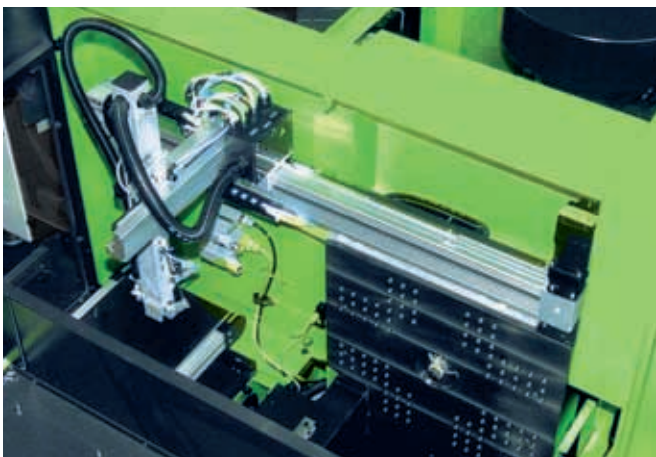
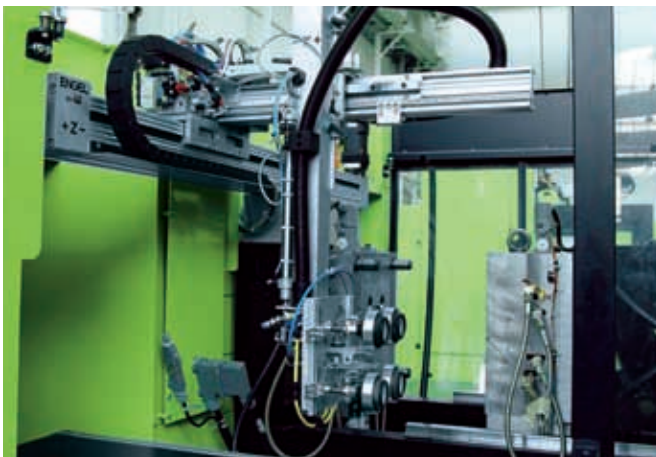
The robot control takes the form of a mobile hand terminal (RC 15) which is attached to the machine during automatic operation by means of a magnetic holding device. "Easy Logic" programming – with a choice of 11 preprogrammed standard sequences and 10 storage locations for individual teach-in programs – sets new standards in operator comfort. Back-up data for the sequence programs of the injection moulding machine, injection mould and sprue removal robot can be stored on the same diskette.



HLi robots: fully benefiting from the tiebarless machine concept

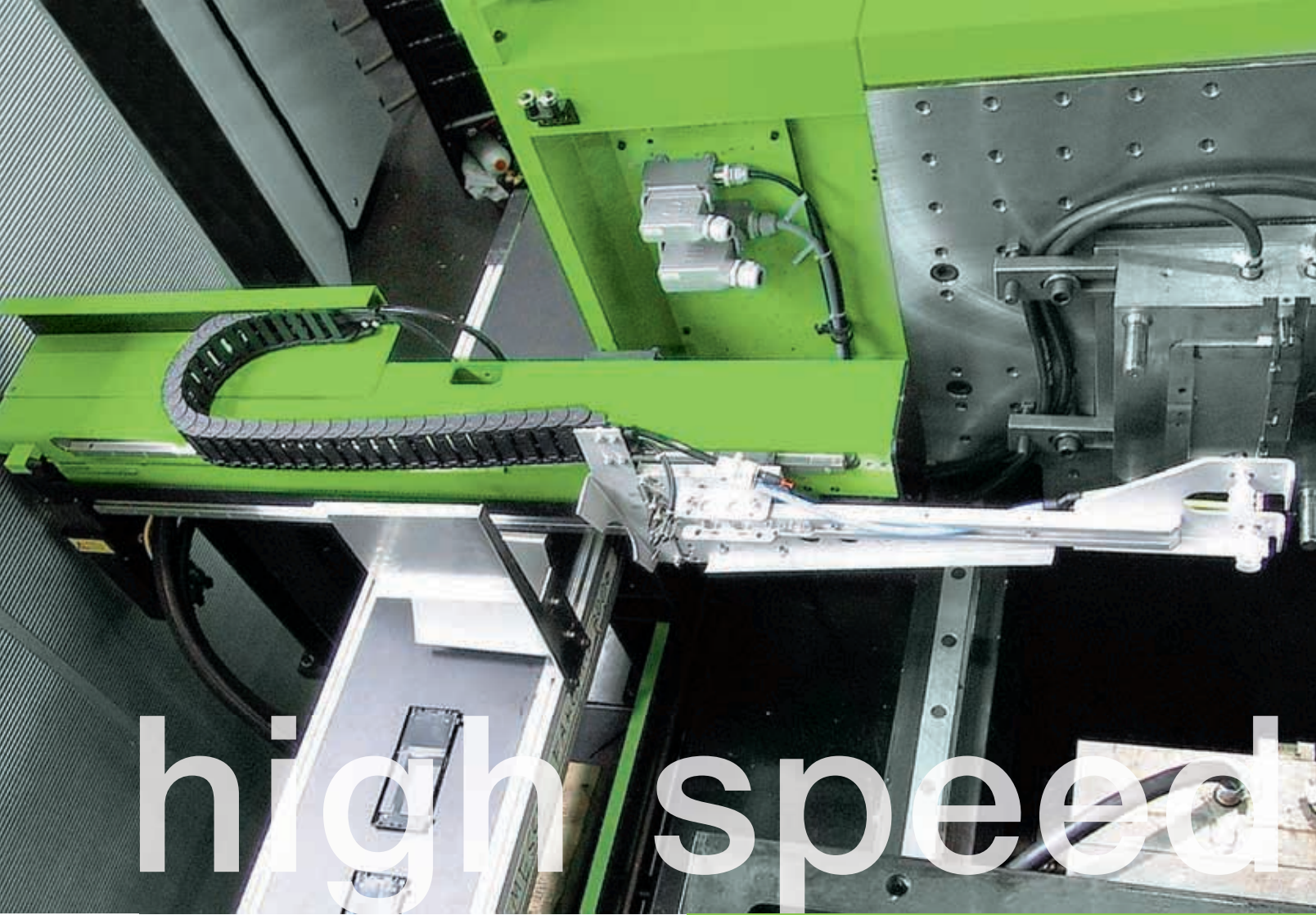
Integrated handling robots for tiebarless injection moulding ma- chines: ER-HLi

For standard “pick and place” applications on ENGEL tiebarless machines within the 200 to 6,000 kN range, the ENGEL ER-HLi robots represent a low-cost means of automation.



The ER-HLi robot is used in cases where moulded parts cannot be gravity-discharged from the mould because they are still hot and easily damaged, or in cases where the parts are to be packed directly at the machine. Normally, the ER-HLi robot is mounted on the stationary platen and the parts are deposited on an integrated conveyor belt located within the safety guard. In order to provide easy access to the mould, the position of the conveyor belt can be shifted side-ways in the machine direction. The system can also be optionally equipped with a reversing conveyor as well as a clear up switch. For multi-colour machines equipped with vertical injection units, the ER-HLi robot can also be mounted on the moving platen.

The Z-axis of the ER-HLi is freely positionable by means of a servo motor, which means that the moulded parts can be deposited on the conveyor belt in rows. Separate positioning of the parts according to quality criteria is also possible. The control system is completely integrated in the machine's control system allowing for ease of set-up and adjustment. The robot settings are stored together with the machine settings on the same diskette. Due to the integrated design of robot and machine, the distances travelled by the robot, and therefore also the demoulding times, are extremely short. Moreover, such cycle time reducing functions as “Advance Response”, and “Parallel Ejection” can also be used to further speed up the demoulding time.



Highest speeds for the thinnest lightweights

ERS high-speed parts-removal robots: (Speedy)

Product development generally reveals a marked trend towards increasingly thinner and lighter parts – and increasingly faster production times. The answer to this trend – in terms of automation – is the ERS (Speedy). This high-speed parts-removal robot has been designed for the handling of thin-wall or thin-section parts in conjunction with fast-cycling injection moulding machines.

Working principle

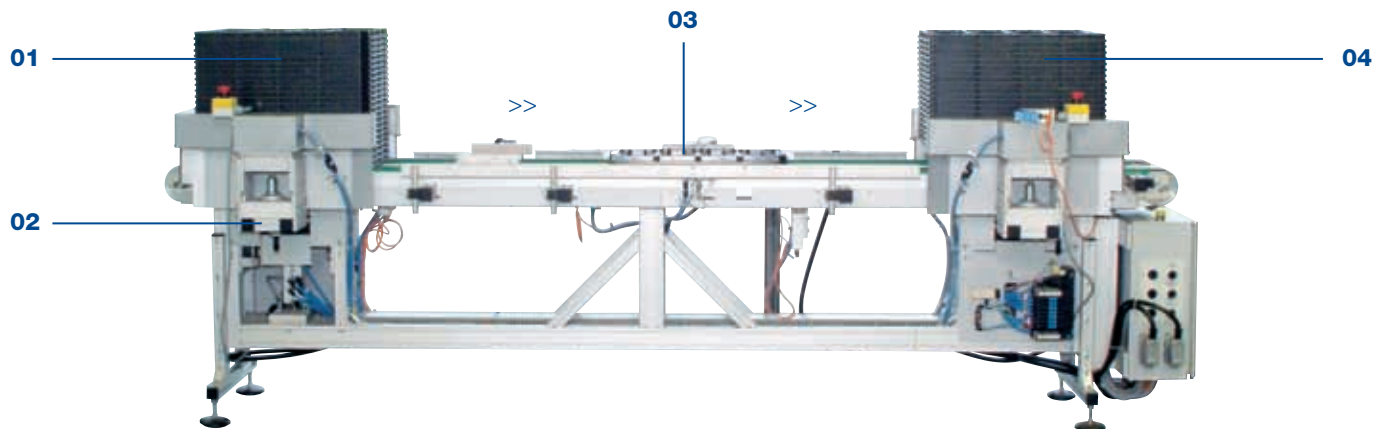
The working principle of the ERS (Speedy) consists of the lateral removal of parts from the mould by means of a high-speed linear axis. A highly dynamic servo motor and the use of high-strength, lightweight materials together guarantee the very shortest demoulding times. The linear axis can be combined with a rotary or swivel axis.

The performance features of this series are:

- > Linear speeds of up to 10 m/s
- > Max. acceleration 120 m/s². That's approx. 12 times faster than acceleration due to gravity!
- > Minimum demoulding time is 0.3 sec

The "Speedy" high-speed parts-removal robot can be easily combined with such ENGEL peripherals as the ENGEL Tray-server, converting a fast-cycling injection moulding machine, for example, into a fully automated high-speed production cell.

Logistic modules for the systematic storage of moulded parts



- 01 De-stacking unit A-B with empty trays
- 02 Lifting units
- 03 Tray loading position for robot
- 04 Stacking unit A-B with full trays

Trayservers: ETS

ENGEL Trayservers (ETS) are units for the automated feeding of special plastic storage trays into the injection moulding machine for automatic filling with moulded parts. The Trayserver ideally complements the injection moulding machine and the robot, and the resulting combination is a fully automated production cell for unattended operation. An operator is required merely to remove of the filled trays and replenish the Trayserver with empty trays.

ENGEL Trayservers are used in cases where the moulded parts have to be protected in transit and/or have to be stored in the right position in readiness for downstream automatic processing. Storage in specially adapted plastic trays fully meets this requirement.

ENGEL Trayservers have been developed for use with standard tray sizes, e.g. 60 x 400 mm. As well as plastic trays, the ENGEL Trayservers can also be used in conjunction with plastic boxes conveyed on flat or studded belts.

ENGEL Trayservers are equipped with an integrated stand-alone control which can be synchronized via interfaces with the robot control.

Automation Tools – ENGEL's flexible range of accessories



ENGEL Grip Tools Kit



ENGEL Conveying Systems



ENGEL Safety Components

ENGEL Grip Tools Kit

The D.I.Y. construction kit for robot grippers.

Your advantage:

- You get exactly what you need
- Components are properly sized for each handling category
- Correct choice of materials for optimized, requirement-oriented gripper weight
- The Grip Tool Kit permits gripper construction without any need for design engineering, thus saving considerable time at the project planning stage
- Optimum assortment of components based on 20 years' of experience
- Optimized price/performance ratio of all components
- Fast and easy assembly thanks to clear arrangement of components
- Global purchasing concept ensures fast supply of component parts

ENGEL Conveying Systems

Conveyor belt systems are the ideal complement to machine automation systems. They are an indispensable part of downstream part accumulation or pre-packaging cooling after removal of the parts from the mould, or for linking the injection moulding machine – as the central production unit – with the production facility's logistics or material handling systems. In its own special competence centre for automation peripherals, ENGEL develops and manufactures a wide range of conveyor belt systems. Special-purpose and integrated systems are also available. Remember: a complete production line is only as good as the sum of its individual component units. For further details please request ENGEL's product catalogue "automation tools".

ENGEL Safety Components

Particular care and attention must be paid to the safeguarding of automated production processes – without adversely affecting the user-friendliness and easy maintenance of the individual component units of the production system. This is where intelligent solutions are called for. ENGEL has developed a system component concept for retrofittable safety devices. (See product catalogue "automation tools") Special authorized access systems with interfaces for machine monitoring are part and parcel of this safety system. Special solutions and adaptations to special requirements necessitated by in-house or national standards are available. Please inquire.

Linear robots – suitable for all injection moulding machines



ENGEL ERC robot on a Battenfeld machine



ENGEL ERC robot on a Mitsubishi machine



ENGEL ERC robot on a KraussMaffei machine

ENGEL ERC robots – the perfect complement to any make of injection moulding machine

ENGEL linear robots are designed for universal application. It makes no difference whether they are used on ENGEL injection moulding machines or on other makes of injection moulding machine.

For such applications, ENGEL offers its ERC robots with the “RC 200 Stand-Alone” control, enabling communication with the injection moulding machine via the EUROMAP 67 interface.

The “RC 200 Stand-Alone” control is equipped with a hand-held operator terminal and offers the same scope of functions as ENGEL’s standard RC 200 robot control system.

ENGEL ERC – designed for injection moulding but with the potential for universal application

ENGEL ERC linear robots are also suitable for handling operations in areas of application other than injection moulding. Typical examples are the handling of workpieces on machine tools or in palletizing stations as integral parts of logistical systems. The modular concept of ENGEL ERC linear robots and their accompanying range of accessories (Grip Tools, conveying and palletizing system components) permits individual adaptation to the actual application without any costly engineering.

The sturdy design of ENGEL’s automation components is reflected in the durability and efficiency documented in countless applications in many different branches of industry – yet another argument for universal application.



ENGEL ERC robot for the handling of workpieces on a CNC lathe

ENGEL linear robots – the modular foundation for efficient production cells



Production cell consisting of two ENGEL victory injection moulding machines each equipped with an ENGEL ERC handling robot for automatic demoulding and stacking on a joint assembly station between the machines. Photo: PARltec GmbH, Weilheim / Germany



Example of a production cell based on one ENGEL duo large-capacity injection moulding machine. An ENGEL ERC 134 with two vertical axes simultaneously places inserts into the injection moulding machine, demoulds the moulded composite parts and transfers them to the downstream finishing station. Photo: Mobis Slovakia s.r.o., Zilina / Slovakia

“Standard” modules for customized production cells

“One Stop Shopping” – everything from one supplier – is ENGEL’s motto. The range of ENGEL automation equipment is optimally adapted to the ENGEL range of injection moulding machines – no matter whether the requirement is for simple sprue pickers, special linear robots for application on tiebarless clamping units or standard three-axis linear robots that can be augmented with a comprehensive range of auxiliary axes.

ENGEL also offers from its own production a wide selection of peripheral units, such as conveyor belts, testing and assembly stations, palletizing and box loading systems.

Systematic planning for absolute efficiency

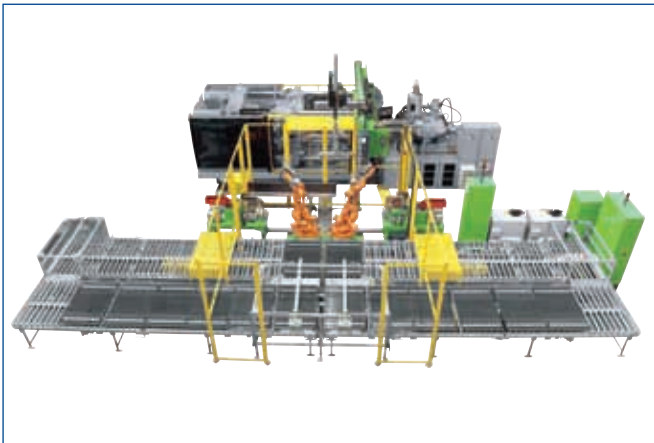
In keeping with its motto “One Stop Shopping”, ENGEL offers all the necessary system components for the design and manufacture of efficient production cells as a turn-key solution. The range of products and services includes machines and robots, automation technology, production system planning and project management.

The availability of these areas of competence within one company and their close proximity to one another reduces the interfaces and improves interdisciplinary coordination – for the benefit of the customer. A further prerequisite for optimum production results is ENGEL’s across-the-board modularity of all system components, permitting the development of special systems with largely standard components. This allows for fast installation and set-up.

System integration at ENGEL is not a theoretical buzzword but actual practice for the benefit of the customer.

Complex assembling tasks – Solutions from ENGEL's automation centres

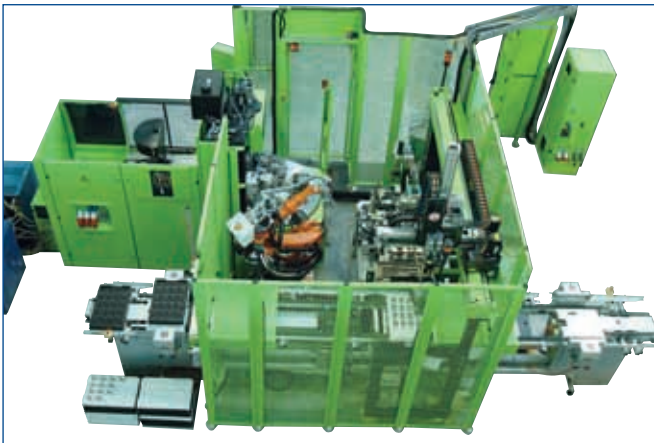
robot



When complex downstream finishing and assembling tasks need to be performed

In cases where the automation of the injection moulding machine requires more than the straightforward demoulding, depositing or stacking of the moulded parts, even the most sophisticated modular system will push against the limits of its standard components. This is when the special, non-standard solution is called for.

At your service for such special solutions is the engineering and production expertise of the ENGEL automation centres in Dietach / Austria and Hagen / Germany. These centres are special engineering facilities within the ENGEL Group that specialize exclusively in the solving of complex automation problems.

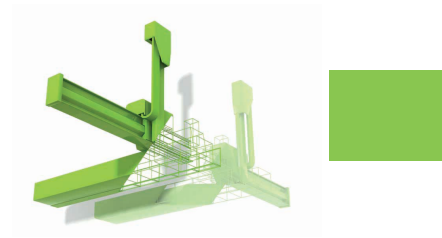


The automation centres at Dietach and Hagen provide the engineering and equipment for the automation of highly integrated production systems, with the focus not on the actual injection moulding process but rather on the downstream finishing and assembling processes. Depending on the complexity of the automation task and the required degree of integration, standard modules are combined with specially designed and fabricated components and/or with equipment from other competent manufacturers, such as industrial robots, for example, as their particular capabilities often ideally complement those of linear robots.

ENGEL's automation centres:

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E-Mail: eav@engel.at

ENGEL AUTOMATISIERUNGSTECHNIK
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Lange Eck 1, D-58099 Hagen
Tel: +49 2331 7880-0
E-mail: eaz@engel.at



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ENGEL e-max
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ENGEL insert
ENGEL elast / LIM
ENGEL PETsystems

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- ENGEL control

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ENGEL e-factory

Application technology

ENGEL application technology

Industry sectors

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ENGEL teletronics
ENGEL packaging
ENGEL medical
ENGEL technical moulding

Summary

ENGEL portfolio

Language

- german
- > english
- french
- italian
- spanish

ENGEL
be the first.