

# automation

Perfectly matched components and system solutions



**ENGEL**  
be the first



The dynamics of the market pose increasingly complex challenges to your production. ENGEL offers you solutions that precisely match your desired level of automation: from modular to tailor-made systems solutions.

Automation expertise at all levels: We design and supply complete production systems in which all processes, from the injection moulding machine and the robot to the automation peripherals, are perfectly matched. You can therefore rely on the highest part quality, stable processes and maximum productivity – and that your entire production is running smoothly.





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# Automation at ENGEL

Your partner for efficient injection moulding applications

ENGEL leads the global market for injection moulding machines. And is number 1 in the automation of entire production cells. In addition to our sales subsidiaries and our worldwide service network, more than 450 experts at ENGEL are dedicated to the development and production of modular and customised systems solutions for innovative technologies in all sectors. Our competence centres provide you with experts in applications, all certifications required and efficient overall project engineering.

## Comprehensive product portfolio

The entire production cell from a single source

ENGEL develops and manufactures all essential components for the automation of your injection moulding cell. Your optimal solution is designed and built using a multitude of products and a variety of options. Experienced engineering companies supply us with selected support equipment. From the conceptual idea to implementation and service, you have a designated contact person at your side.

## Optimally matched products

More than the sum of all its components

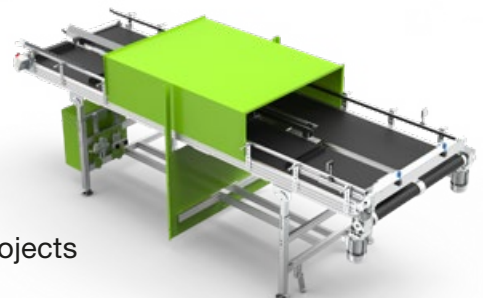
Mechanical and control integration of the individual components results in compact solutions, which function is optimised with regard to performance and user-friendliness. Many components are perfectly matched as early as during the design phase.

**1,900**  
robots  
per year



Over  
**25,000**  
robots and automation  
solutions installed

**300**  
systems projects  
per year



## Worldwide automation centres

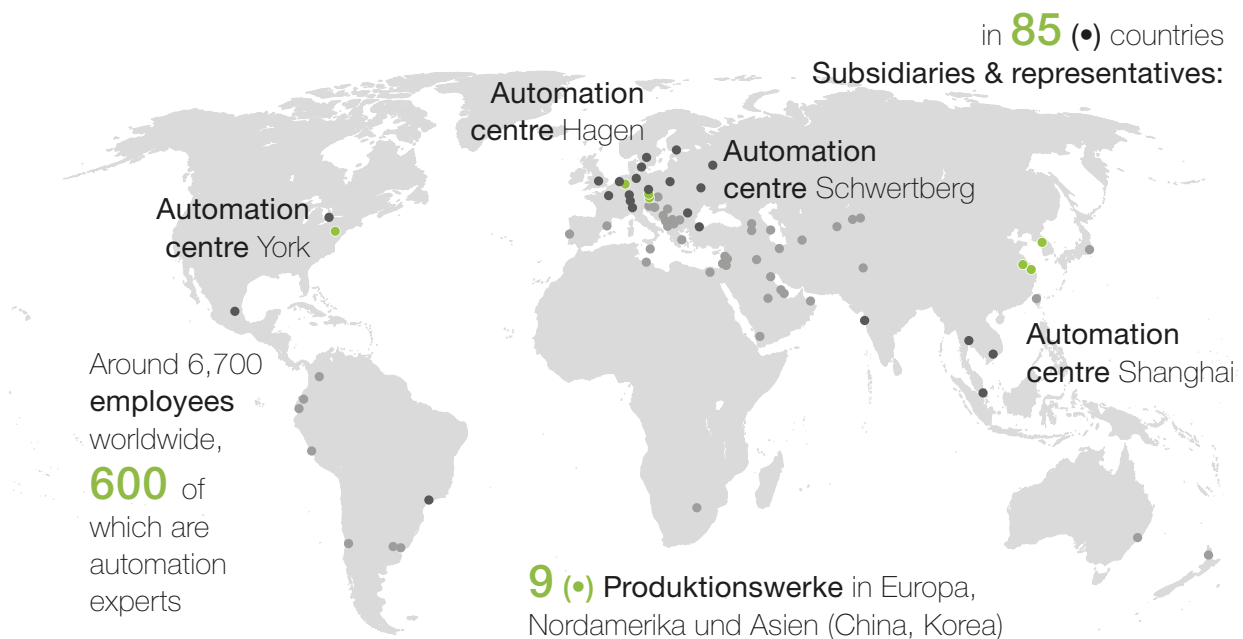
The consistent solutions and best service from Europe to Asia and America

Experts from our worldwide automation centres offer support in the design of your automation cell, drawing on the expertise of the entire ENGEL network. If you intend to set up production cells with the same standards in different countries and continents, ENGEL is the perfect partner for solutions and support.

## More than 40 years of experience in automation

Benefit from the technology leader's long-standing expertise

ENGEL has been developing and manufacturing injection moulding machines since the 1950s, and robots since the 1980s. Gain from the diverse applications and the well-engineered as well as continuously developed products and services. Thousands of automation cells with ENGEL robots and thousands of new applications installed each year create confidence and continue to inspire our customers.



# ENGEL automation – added value

## The unique innovations for your decisive technical advantage.

As an innovative leader, our focus has always been on the continuing development of product functions and the entire line of products. We set new standards in automation technology for entire production cells with injection moulding machines. Numerous unique characteristics in mechanics, control technology and software result in faster start-ups, more efficient and precise processes, longer product life cycles and higher energy savings.





## inject 4.0

### Our solutions for the smart factory

Continuously increasing customer benefit has always been a top priority for ENGEL. Whether the complete integration of peripherals, customised automation concepts or the launch of the CC300 control unit generation, the optimised production cell is the focus of our development work. In addition to many innovative solutions related to mechanics, drive, electrics and pneumatics, extensive inject 4.0 functions, which significantly increase automated cell productivity in the age of Industry 4.0, have already been tried and tested in practice.

## smart production

### Increase productivity



#### ■ virtmould

The innovative simulation software for ENGEL machines and robots.

The virtmould program is available as an option for the ENGEL CC300 control and used to simulate ENGEL injection moulding machines and robots on a PC or laptop. virtmould gives users the ability to create, edit and test part data sets without having to interrupt the production process.

#### ■ authentig

The Manufacturing Execution System for optimal production control.

Keep production under control with this intelligent MES – it is perfect for managing data sets, optimising set-up times and fulfilling documentation requirements. With the help of its various modules, you can very easily create production plans on your PC at any time or check the status and progress of production from your desk.

## smart service

### Increase availability



#### ■ e-connect and e-connect.24

The ENGEL services available any time and any place.

The free ENGEL e-connect customer portal collects all the information you need for your entire system. A single login gives you access to all necessary information at any time, regardless of whether this is machine status or service activities. ENGEL e-connect.24 provides you with qualified 24/7 remote maintenance and online support. 560 service engineers worldwide help you quickly identify the problem and restore control.

## smart machine

### Increase process stability



#### ■ iQ vibration control

Active vibration compensation for quick and precise positioning

Our ENGEL viper linear robots measure the vibrations at the end of the vertical axis close to the gripper using acceleration sensors and compensates for the vibration via the closed-loop control in the control unit and the servo drives. This innovation also compensates for vibrations of a robot mounted on a vibrating machine or touching the mould or an ejector.

This results in shorter cycle times and higher process reliability during loading, part removal and depositing.

#### ■ event control

Self-optimising cycle times

Our ENGEL robots use sensors to monitor analogue values, such as vibrations, vacuum and weights, and continue the process when defined values are reached. This eliminates the need for tedious adjustment and waiting times that are too long, resulting in shorter process cycle times.

#### ■ multidynamic

Load-dependent speed optimisation for best performance

ENGEL viper linear robots optimise their speed as a function of the load and stroke. Maximum speed is achieved with lower loads and shorter strokes, while the speed is reduced with higher loads and longer strokes to meet the requirements of a stable process. This applies to both the linear and the rotation axes.

The result is a perfect blend of cycle times, precision and durability.

#### ■ efficiency control

Cycle-time dependent speed optimisation.

ENGEL robots adjust the speed in the machine's depositing sequence. The robot moves only as fast as required by the injection moulding cycle. This results in lower energy consumption and increased robot service life.

#### ■ maintenance control

Permanent monitoring of robot parameters for scheduled maintenance

ENGEL robots come with a great deal of intelligence built in.

If the drive temperatures change, a warning is issued and the dynamic range is reduced from a critical threshold value. Reliable and precise lubrication by means of a controlled central lubrication system is guaranteed, as is monitoring and signalling when lubricants need changed. In any case, uninterrupted production is guaranteed until the next scheduled maintenance window.

## integrated control

The integrated control concept for machine, robot and auxiliary equipment

ENGEL robots are available as stand-alone devices with their own control unit and Euro-map 67 interface to the injection moulding machine. However, most customers choose the Integrated Control Concept from ENGEL for good reasons. The robot can be operated entirely from the CC300 machine panel while software variables enable an advanced signal exchange directly between the control units. The result is optimal interaction between the two devices. The same strategy is used for the integration of other intelligent auxiliary devices, such as complex feed and part removal systems or processing stations.

- Centralised, uniform operation of machines, robots and auxiliaries – less training overhead and faster commissioning
- Advanced exchange of machine data – fast and error-free cell configuration and set-up
- Joint parts data management for robot and machine – faster retooling and error prevention
- Centralised variable and message management of the entire cell – easy access for Industry 4.0 and fast trouble shooting
- Real-time synchronisation of robot and machine conditions and movements (mould, ejector, core pulls) – shorter cycle times, avoiding collisions and any number of mould functions



## integrated sequence

The optimal programming experience for beginners and professionals



Basis view, showing a predefined pick & place sequence



Extended view, showing a complex sequence

## sequence assistant

Guided and intuitive creation of simple sequences directly on the robot

Particularly for the quick set-up of simple sequences, the ENGEL control unit comes with a smart assistance system to guide the operator through the configuration of the part removal and depositing sequence.

## function library

The extensive library of predefined sequences and practical subprograms.

Our robotics technology enables flexible use, ranging from simple pick & place applications to extensive processes including loading, quality inspection, reworking, assembly and complex depositing. ENGEL robots therefore have a large selection of predefined and extended sequences which are fully integrated in operating modes and operating menus and can be easily added or removed. Fast configuration of sophisticated automation sequences and tested stable features add value for the customer.

## Individual programming

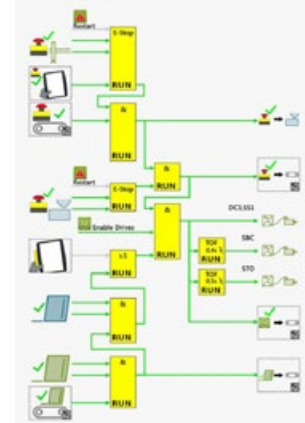
Free programming with macros and program structuring commands.

For professionals who prefer to set up their applications completely independently, ENGEL offers the option of intuitively creating the simplest or most complex sequences using macros and program structuring commands, like in PLC programming. This means that even the most individual customer requirements can be covered by control technology.

## integrated safety

The integrated safety technology for flexible production cells

- All individual components, as well as the system solutions of ENGEL automation are already CE certified. This also facilitates the inspection of customised solutions.
- ENGEL offers built-in safety for personal protection related to heights, distances and strengths for machine and safety clearances.
- The integrated safety technology includes standardised electrical safety packages for connected or stand-alone operation of the machine and automation.
- The safety control and a safety bus system make it easy to expand the system's emergency stop circuit:
  - Fast overview of the system's safety status,
  - Identifying status during remote maintenance,
  - Less wiring necessary, with reduced error-proneness.



## integrated mechanics

The mechatronic system design solutions for the most compact production cells

According to CE, if a machine is equipped with a robot and, specifically, if the machine is small or medium-sized, the safety gate and other parts of the safety cover must be 2200 mm high. ENGEL offers numerous options for injection moulding machines that perfectly integrate conveyor belts, chutes, and the robot itself. This is the fastest possible way we can create a safety-certified and space-saving automation cell for your application.



ENGEL victory 80 with sprue chute and e-pic B servo-motorized sprue picker



ENGEL e-motion 50 with expanded safety gate, integrated belt conveyor HLi and e-pic Z robots

# Ready-to-run systems solutions

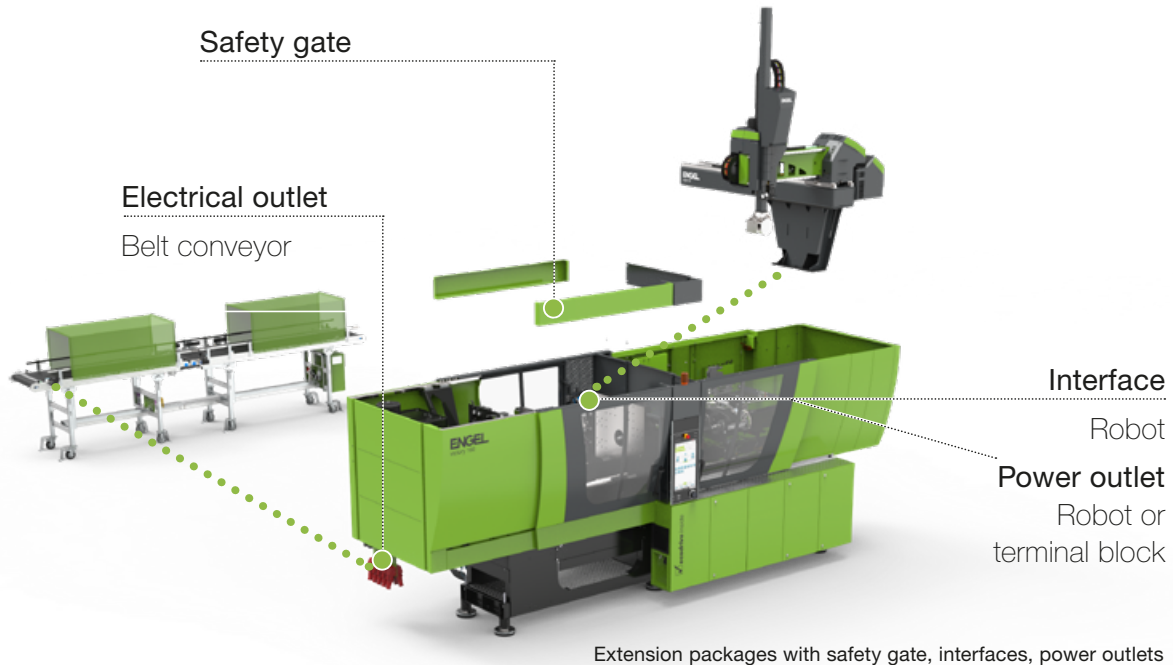
## The modular automation solutions





# Ready-to-run systems solutions

## The modular automation solutions



## Automation options for injection moulding machines

### Facilitates the connection of the automation to the machines

Numerous automation options are available for the injection moulding machine when you purchase the injection moulding machine together with the robot, or retrofit the injection moulding machine with a robot, which facilitates the interaction and safe functioning of the individual cell components.

According to CE, if a machine is equipped with a robot and, specifically, if the machine is small or medium-sized, the safety gate and other parts of the safety cover must be 2200 mm high. There are also numerous options such as conveyor belts, chutes, expansions, etc., which can be integrated directly into such a safety gate – integrated mechanical system. With or without robots, ENGEL offers a safety-certified and space-saving automation cell in the fastest possible way.

Our machines can be equipped with all commercially available signal interfaces to the robot. When the robot controls are running on the machine controller – control integrated – the ER-IS interfaces are used for advanced communication between machine and robot.

Power outlets for robots and belt conveyors supply power directly from the machine. The cycle and reversing mode of the conveyor belts are controlled by the robot controller. All local voltages and connector standards are available.



## Separator and conveyor belts for free-falling parts without robot

Simple and precise positioning under the injection moulding machines

Chutes and switches in the machine are used to distribute sprues, rejects and good parts to multiple conveyor belts. These conveyor belts are available in numerous design variants and for all machine depositing sides.



### IMM options

Reject/sprue selection

### IMM options

Clocked power outlet/zero-voltage contacts for IMM

### Injection moulding machines

victory  
e-motion  
e-mac  
duo <= 700 t



### IMM options

Belt conveyors for free-falling parts  
GFB, WFB or ZFB

## Pickers with discharge chutes integrated in the safety gate

For part production on the most compact of footprints

Durable pneumatic or dynamic servo sprue pickers are mounted on the stationary mould mounting platen. Ready-to use CE-certified solutions for discharge chutes are integrated directly into the machine guarding.



## Robot and conveyor belts integrated into safety gate

### For the most compact of injection moulding cells

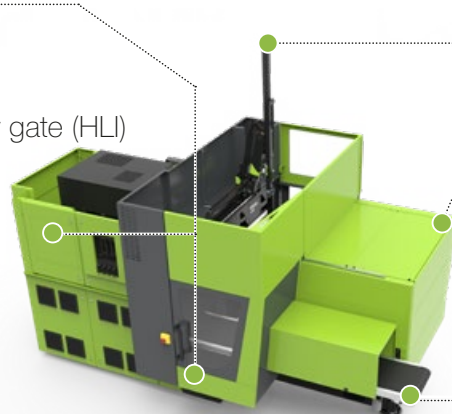
Expanded safety gates for small and medium-sized machines are the easiest method to allow a robot to deposit parts on a belt conveyor. Combined with tie-bar-less injection moulding machines and horizontal part removal, this enables very short cycle times.

#### IMM options

e-pic Z extension package

viper extension package

Chute integrated into safety gate (HLI)



#### Robots

e-pic Z

viper

#### Injection moulding machines

victory

e-motion

e-m ac

#### IMM options

Conveyor belts integrated into the safety gate HLI

## Robots and conveyor belts with integrated safety structure

### Automation for large injection moulding machines made easy

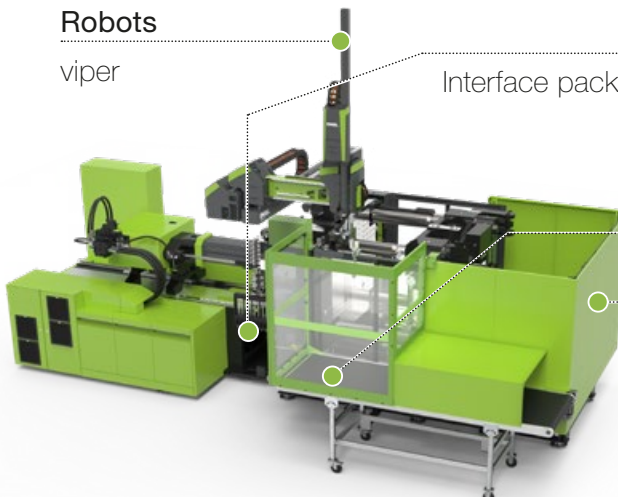
The belt conveyor with its safety structure is docked to the safety gate of a standard machine using but a guide rail. Moving the belt conveyor gives access to the mould area and stops both robot and machine operation.

#### Robots

viper

#### IMM options

Interface package for integrated robot (ER-IS) or stand-alone robot (EM 67))



#### IMM options

Conveyor belts with integrated safety structure ESC 2

#### Injection moulding machines

duo <= 900 t

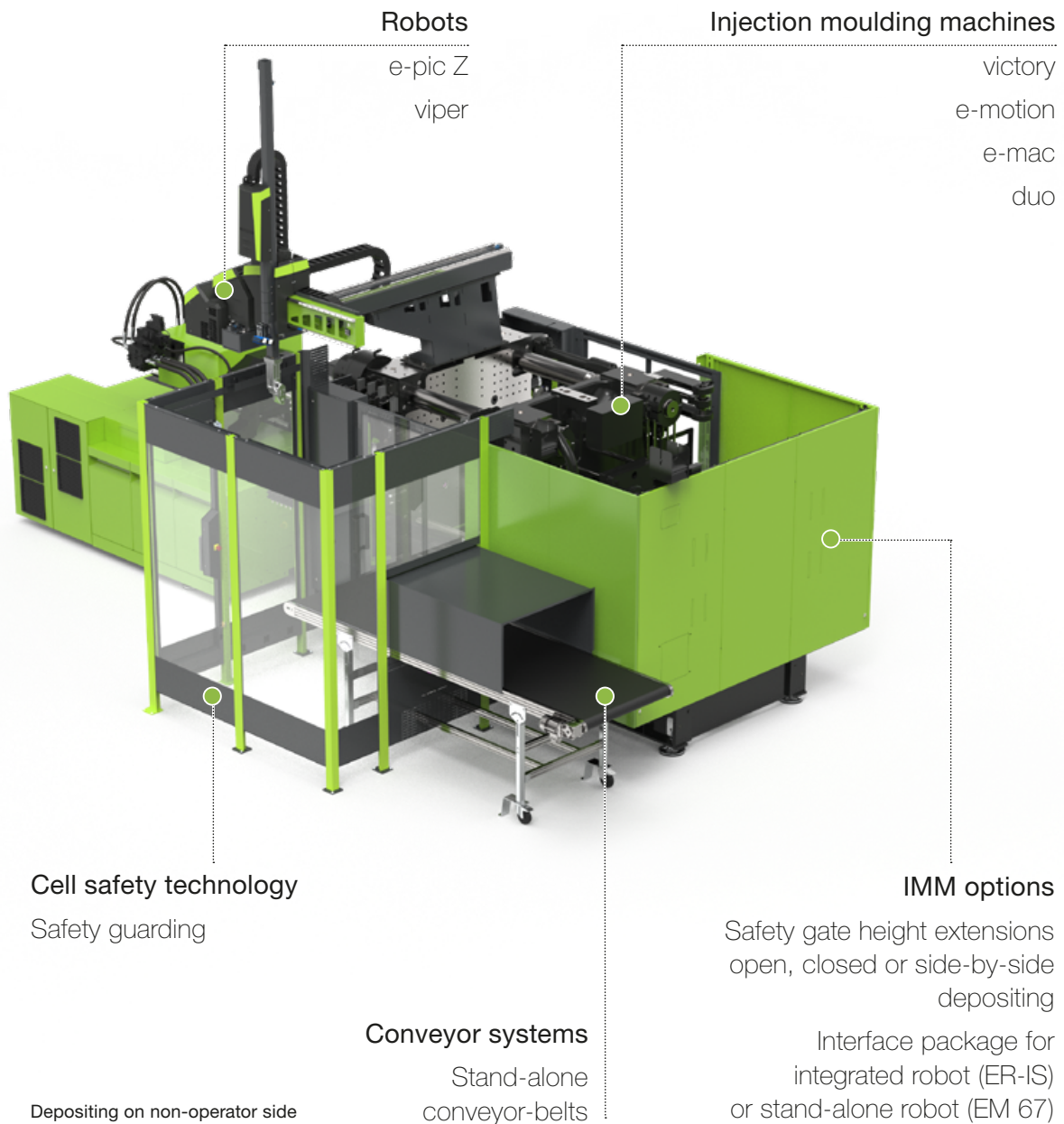
e-motion

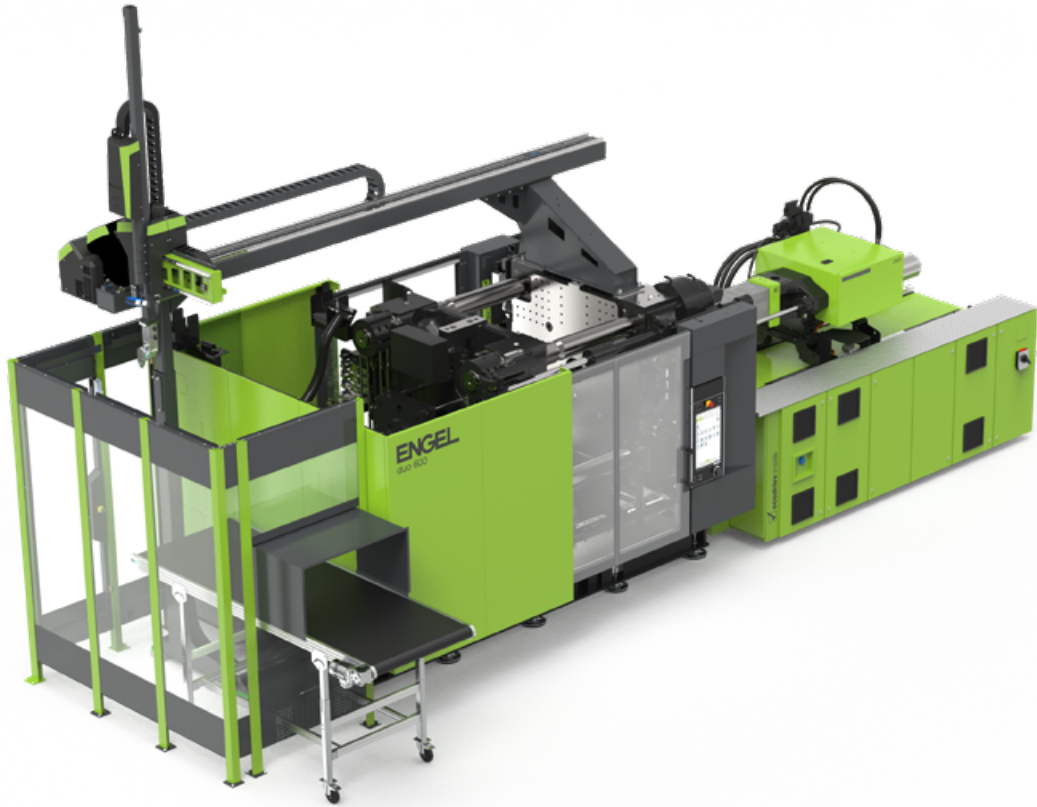
e-mac >= 280 t

# Robot with free-standing conveyor belts and safety guarding for all depositing sides

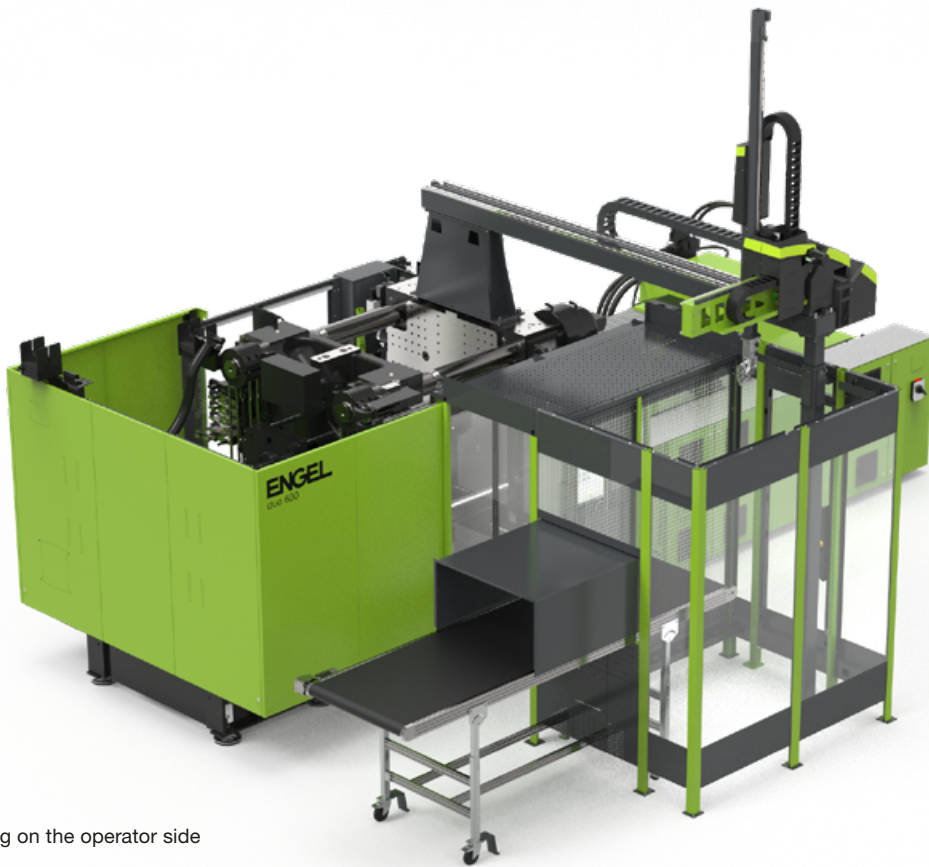
Standard layouts make adding a robot to a machine easy

Preconfigured standard layouts can be selected from numerous combinations of ENGEL injection moulding machines with ENGEL linear robots, depending on the depositing side (operator, non-operator, side-by-side). safety systems, the modular cell safety technology, offers full freedom of design for individual cell layouts, ensuring perfect connection to the machine, an attractive overall design and CE certification.





Depositing on end side of machine



Depositing on the operator side

Project systems solutions  
Customised automation solutions





# Project systems solutions

## Customised automation solutions

If you are looking for more than a combination of modular automation components such as robots, conveyor belts, safety guarding, etc., the ENGEL team is happy to develop customised system solutions to meet your individual requirements.

Our specialists have access to a comprehensive modular assembly kit system with proven process modules; they additionally develop components and features in line with your specific requirements, and integrate your preferred components and standards.

### Conveyor systems

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## Professional project implementation

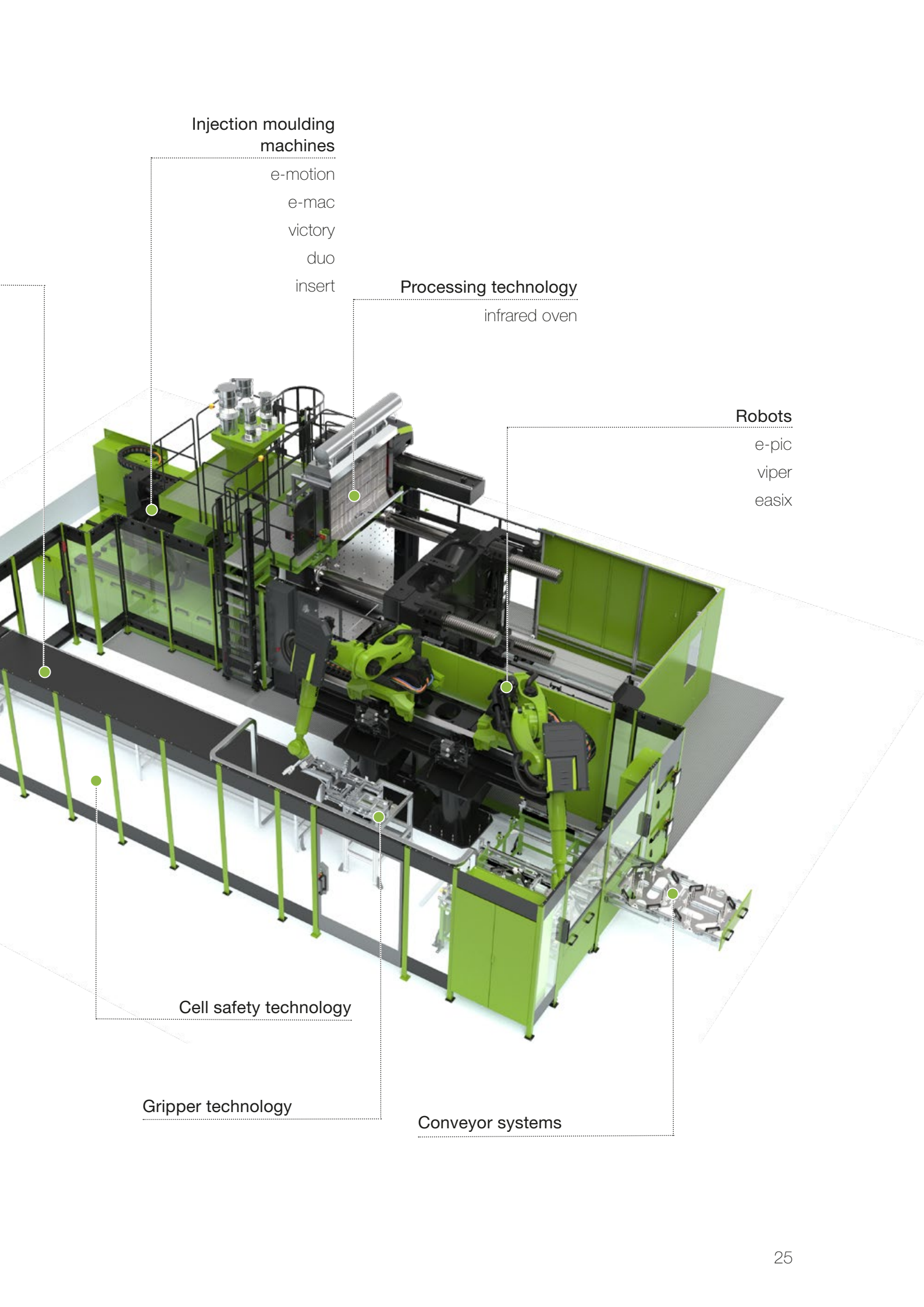
From the first enquiry to providing service for your automation project

Parallel to our global network of subsidiaries for injection moulding machines, ENGEL automation centres in America, Asia and Europe are your local partners.

- Development of solutions for your individual part requirements
- Design, programming and documentation in line with your standards
- Production and commissioning at ENGEL and your global plants
- Training of operators and maintenance personnel for your independence
- Service for maintenance and repairs for maximum availability







**Injection moulding machines**

- e-motion
- e-mac
- victory
- duo
- insert

**Processing technology**

- infrared oven

**Robots**

- e-pic
- viper
- easix

**Cell safety technology**

**Gripper technology**

**Conveyor systems**

## Flexible process modules

The building blocks for short system integration times and stable production processes

Over many years, ENGEL has standardised the process steps necessary to successfully integrate customised automation solutions for injection moulding machines. Individually required components can be quickly added to pre-configured, stable running modules enabling short installation times of reliable solutions for your application.

The trend towards increasing the degree of automation with pre- and post-treatment of feed parts and injection-moulded parts parallel to the machine cycle increases the production flow, reduces the production space and staffing levels and increases your productivity.





## Solution concepts for specific types of applications

### Pre-developed solutions for cost effective parts logistics

While some applications require basically the same overall automation solution, a high degree of flexibility is needed when it comes to the details. We offer different basic concepts for a variety of applications, that can be adapted quickly to your individual requirements.

These concepts include configurable modules that can be combined for a tailored solution. Of course, the focus is always on achieving the smallest possible footprint while at the same time ensuring the best possible access to the machine. You will find two concrete examples on the following pages.

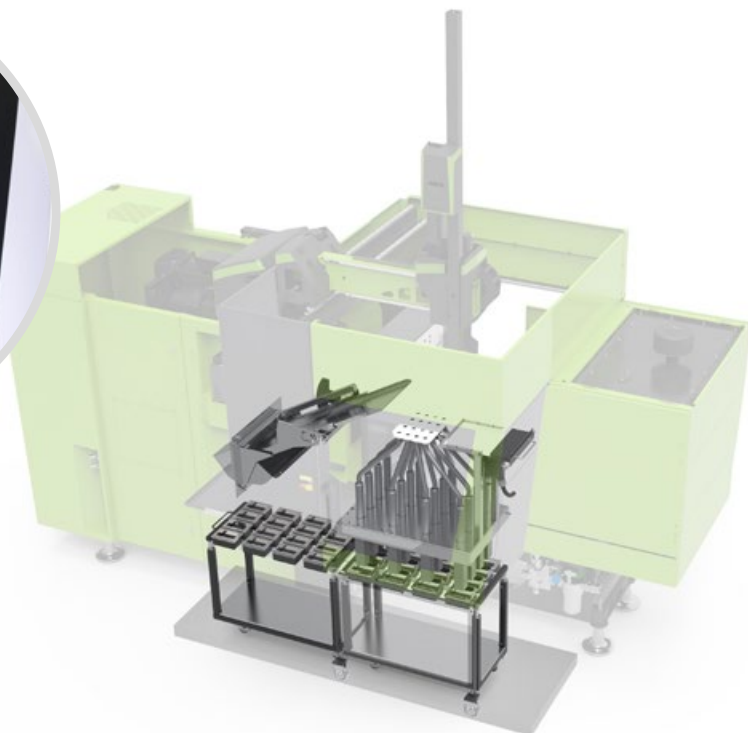
#### EKS cavity separator\*

##### The configurable cavity separator integrated in the safety gate

- Integrated into the expanded safety gate or the compact cell
- Replaceable module for different cavity numbers and patterns
- Configurable container trolley
- Storage function for container changes without interrupting production

#### Options:

- Automatic container trolley feed
- Chute and quality drawer integrated into safety gate



## IML cell\*

### The compact solution for flexible labelling

This space-saving production cell for versatile in-mould labelling (IML) applications offers everything you need. It comprises an ENGEL injection moulding machine, an ENGEL linear robot and an ingenious labelling and part removal station with a stacking system that are integrated into the ENGEL CC300 control unit to create a complete solution.

Maximum flexibility is also assured as you can use the pick & place solution with stacking system without labelling. In addition, the IML cell can be upgraded with a Vision Control system.

- The IML cell saves space at the plant, the complete installation is less than 1 meter wide.
- Easy access to the labelling magazine for inserting new labels ensures high availability.
- Easy reconfiguration makes the cell very flexible. The label cassettes can be easily replaced through the sliding table (for the production of lids, and round and rectangular cups).
- A fast and precise stacking system ensures high capacity.
- Fast mould set-up is ensured by the flexible connection to the machine and easy access to the cell.



A close-up, low-angle shot of a modern industrial robot arm. The robot is primarily grey with bright green accents on its panels and top surfaces. The word 'ANGEL' is printed in white on a grey panel. The robot is mounted on a vertical track system, with various cables and connectors visible. The background shows a blurred industrial ceiling with a grid of lights.

# Robots

The innovative technology optimised for all injection moulding applications



## pic A

### The innovative pneumatic sprue picker

ENGEL pic A is the name of the new pneumatic sprue picker, which features a swivel arm instead of the classic, rigid X-axis, allowing it to operate in the tightest spaces. The sprue picker does not need to be manually loosened and swivelled to the side for mould set-up. When completely folded in, the swivel arm lies flush against the housing and does not protrude into the mould mounting space.

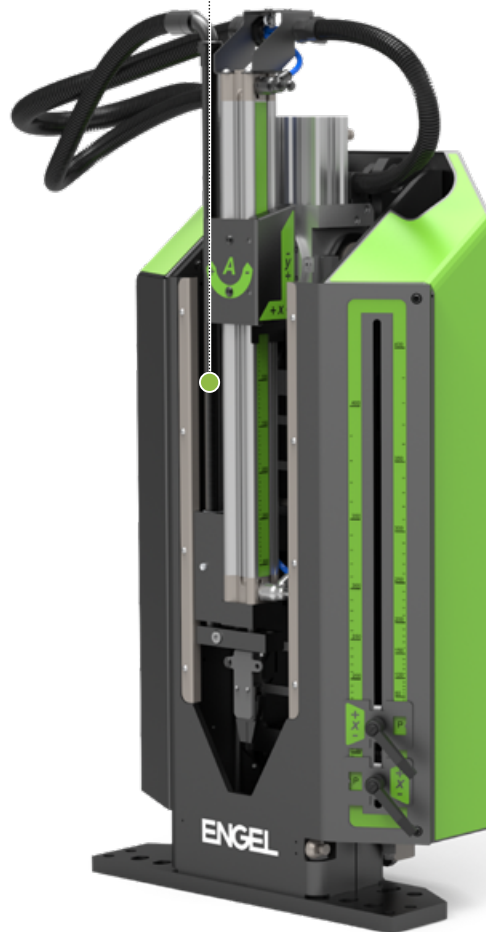
Maximum compatibility with the predecessor ER-USP is a matter of course, as it deposits in the same chute and is integrated with the CC300 via the same interface.





**For fast mould set-up**

X swivel arm folds in completely



## Compatible and reliable

### For a long service life

Durable and compact design

### Fast and efficient operation

Integrated control – the integrated control concept for machine, robot and peripheral equipment

### Simple configuration of injection moulding machine, robot and peripheral devices

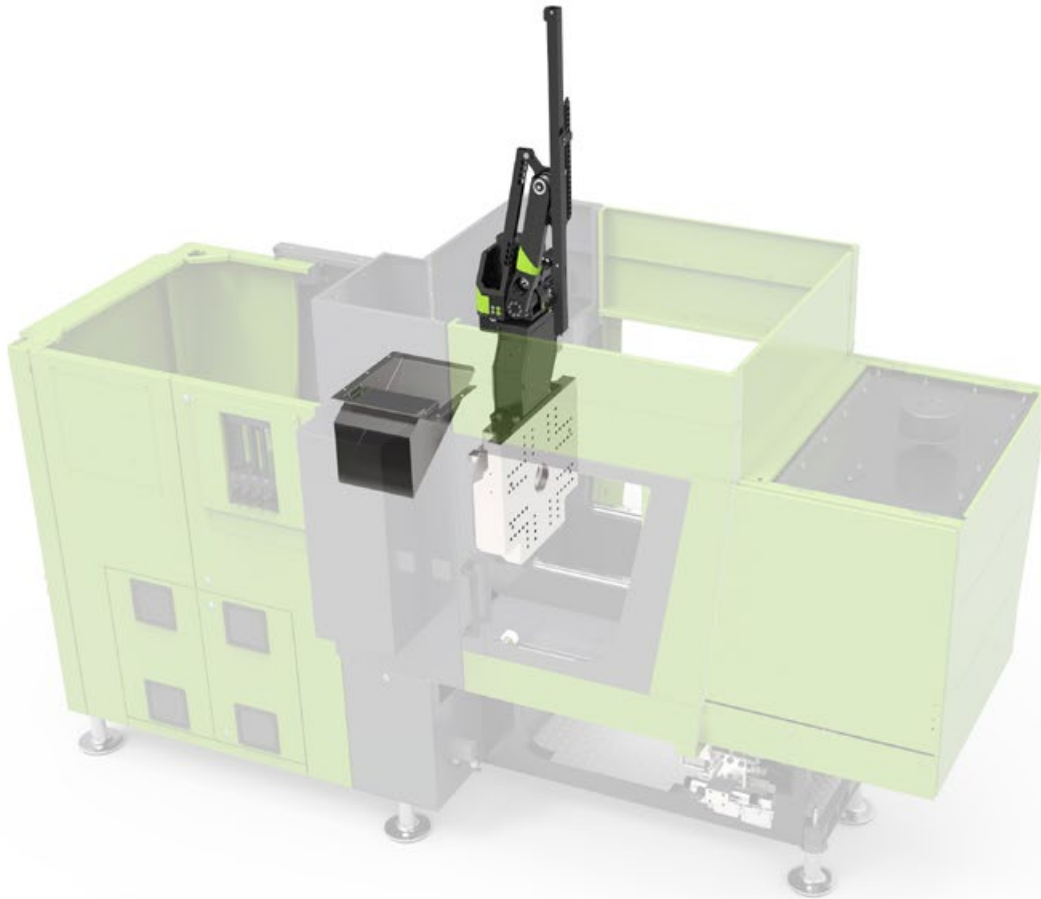
Ready-to-run systems solutions – the modular automation systems

## e-pic B

### The dynamic servo sprue picker

Based on the technology of the proven pick & place robot e-pic Z, the e-pic B combines linear movements with a swivel arm to achieve totally new kinematics. It is in particular an economic choice for the fast removal of sprues, if the parts have to be removed manually or fall out of the machine freely.





## **Programmable and energy saving**

### **ROI after 3 years of operation**

Low power consumption as compared to pneumatic sprue pickers

### **Fast and efficient operation**

Integrated control – the integrated control solution for machine, robot and peripheral devices

### **Can be used as a stand-alone robot**

With Euromap 67 interface

### **Minimum maintenance cost and power consumption**

All-electric

### **Can be used on any power grid**

Single-phase multi-voltage input

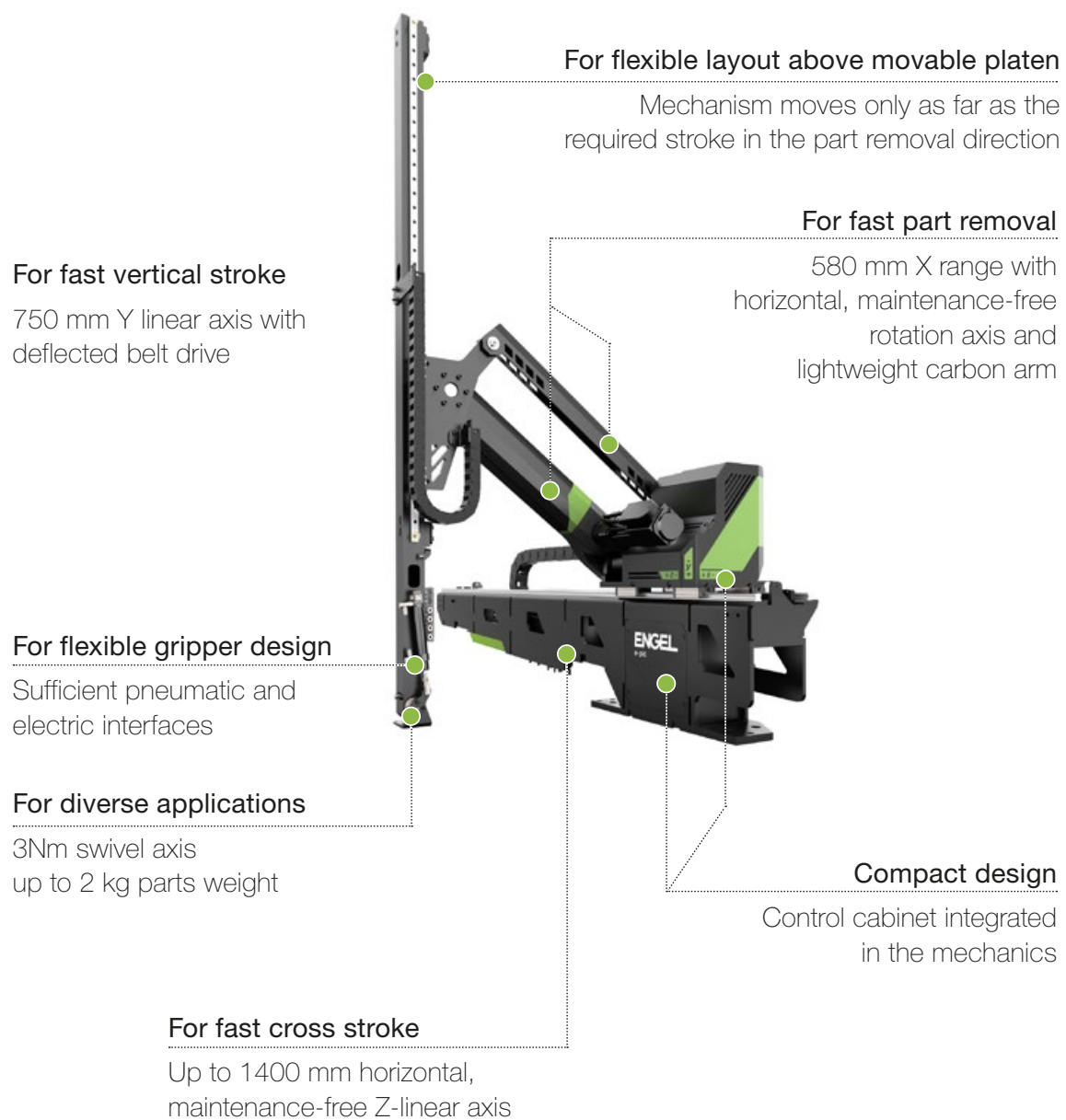
### **Simple configuration of injection moulding machine, robot and peripheral devices**

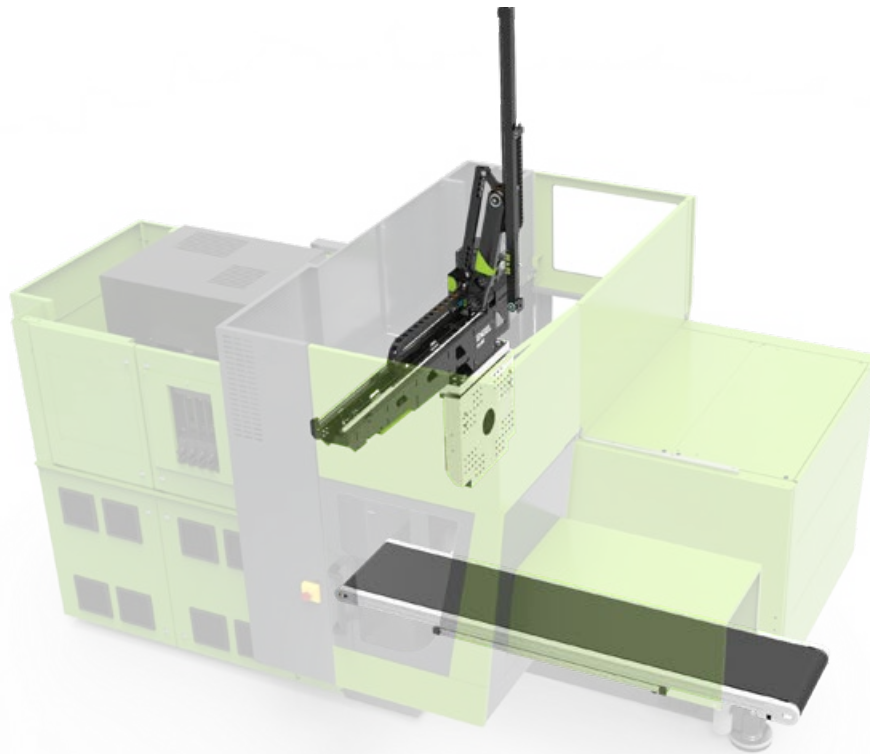
Ready-to-run systems solutions – the modular automation systems

## e-pic Z

### The smart pick & place linear robot

Out-of-the-box – simply plug it in, turn it on and get started: the ENGEL e-pic offers a cost-effective and energy-efficient introduction to automation. It guarantees you quick, safe and simple manipulation of the parts and together with the short intervention times, a trouble-free production process. As an added bonus the new swivel-arm kinematics make the system highly compact, saving space by integration into the injection moulding machine.





## Compact and efficient

### Easy setup

Dynamic swivel movements with linear positioning data

### Precise depositing

Including rasteriser

### Fast and efficient operation

Integrated control – the integrated control solution for machine, robot and peripheral devices

### Can be used as a stand-alone robot

With Euromap 67 interface

### Minimum maintenance cost and power consumption

All-electric

### Can be used on any power grid

Single-phase multi-voltage input

### Simple configuration of injection moulding machine, robot and peripheral devices

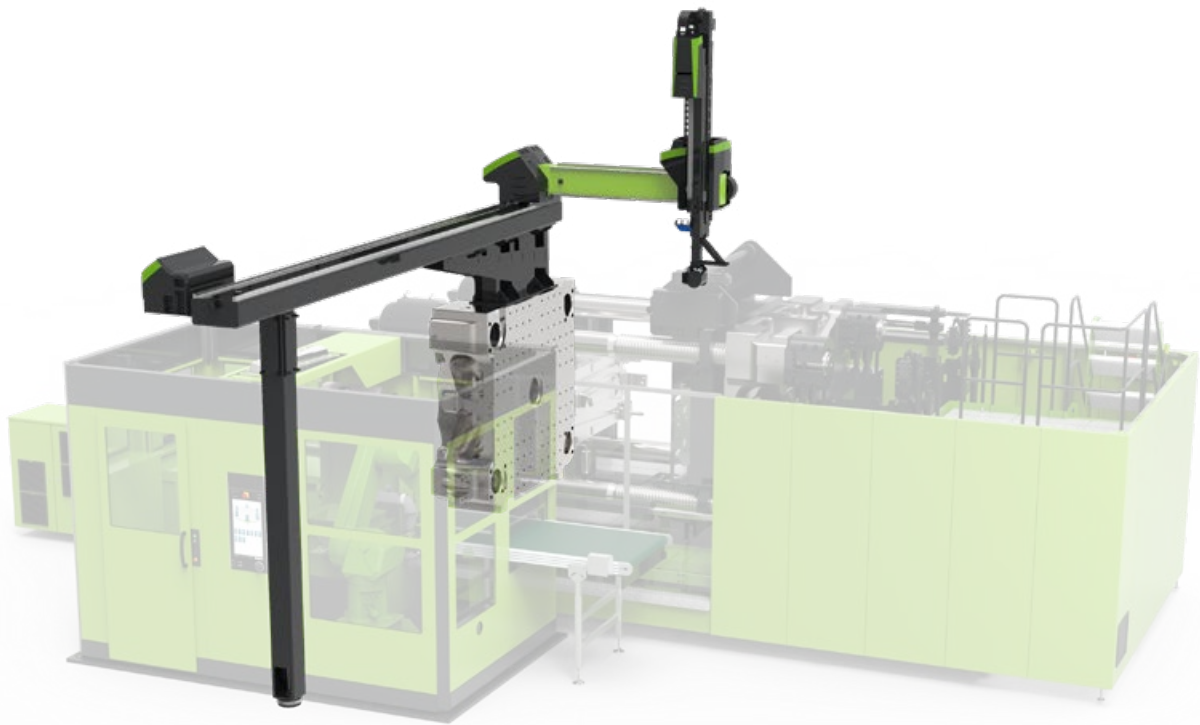
Ready-to-run systems solutions – the modular automation systems

# viper

## The powerful linear robot

Benefit from our long-standing experience: ENGEL has been building high-performance linear robots since 1980. The ENGEL viper perfectly complements your efficient production cell and its innovative design gives you improved load-carrying capacity with a low dead-weight. Smart software packages ensure that all movements are perfectly harmonised.





## Versatile for all machine sizes

### **Effort-saving and synchronous parts removal**

Soft-Servo – torque control of horizontal axial forces

### **Fast and efficient operation**

Integrated control – the integrated control concept for machine, robot and peripheral equipment

### **Precise, fast, energy-efficient and smooth movements**

smart machine/robot with all intelligent functions

### **Simple configuration of injection moulding machine, robot and peripheral devices**

Ready-to-run systems solutions – the modular automation systems

## Special viper configurations

Based on the extensive, flexible viper modular product matrix, there are special versions for longer strokes, higher speeds and the arrangement of additional axes for parts and sprue handling.

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### viper 12 und 20 sprue

For three plate moulds – second vertical pneumatic arm



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### viper 60 and 120 double arm

For tandem moulds – second vertical servo arm



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### viper 40 up to 120, double robot

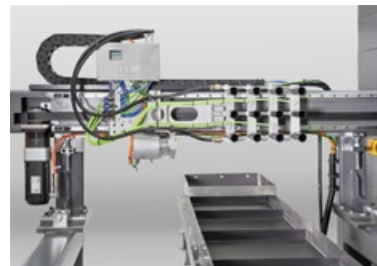
For dual machine operation



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### viper side entry\*

For fast side-entry applications



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### viper 20 speed\*

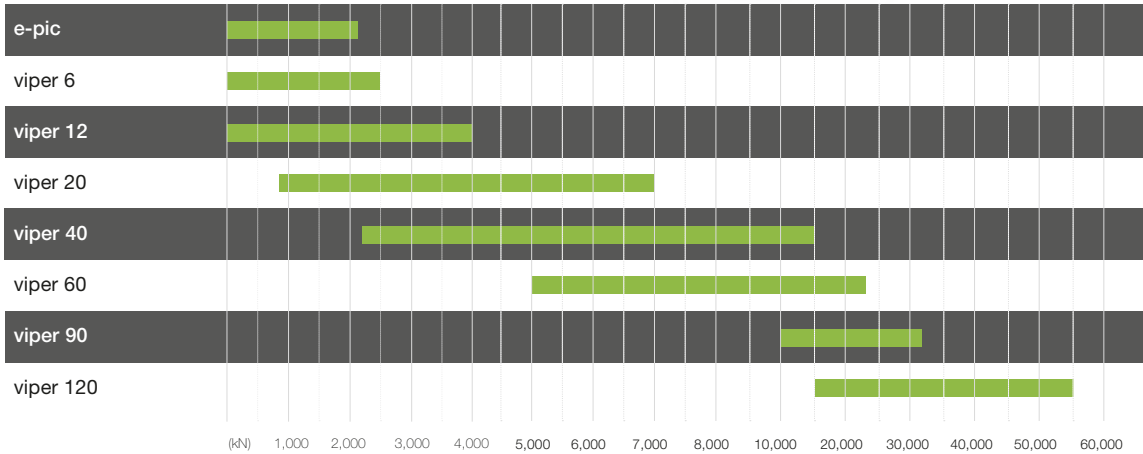
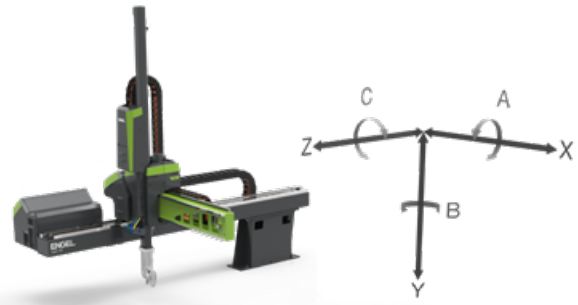
For fast top-entry applications





# e-pic/viper

## Technical data



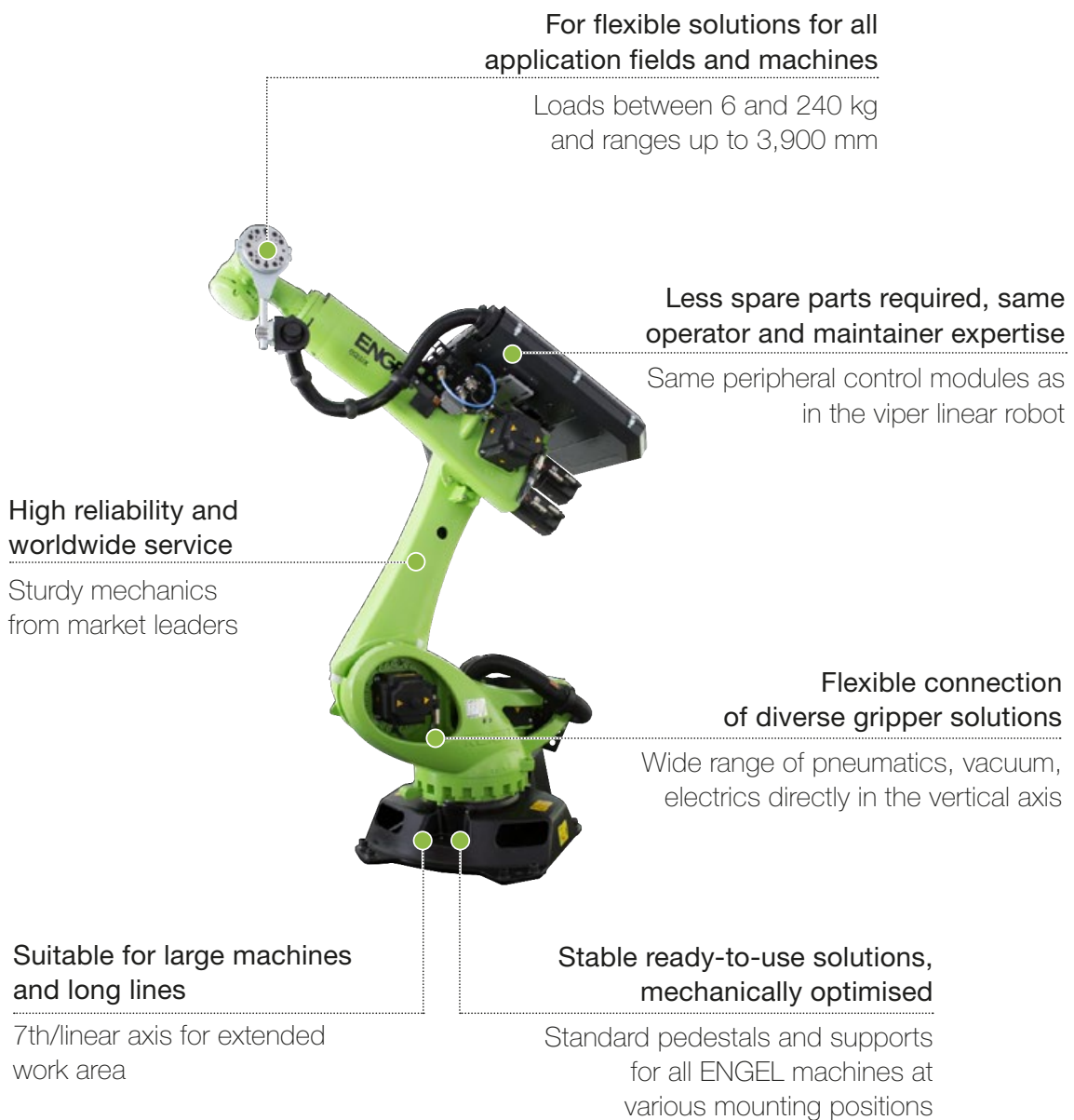
Type	Part removal stroke X [mm]	Part removal stroke X Range [mm]	Vertical stroke Y single [mm]	Vertical stroke Y tandem [mm]	Cross transport Z [mm]
e-pic Z	400	X+180	750		1140-1400
viper 6	400	X+184	600/800/1000		1160-2840
viper 12	400/600/800	X+214	600/900/1200	900/1200	1160-3320
viper 20	500/700/900/1100	X+296	800/1000/1300/1500	800/1000/1300/1500	1400-6200
viper 40	700/900/1200/1400	X+318	1100/1500/1900	1100/1500/1900	1880-8120
viper 60	1000/1300/1500/1800	X+375	-	1400/1800/2200/2600	2360-9080
viper 90	1500/2000	X+547	-	1800/2400/3000	2360-9080
viper 120	2000/3000	X+547	-	1800/2400/3000/3600	3320-9080

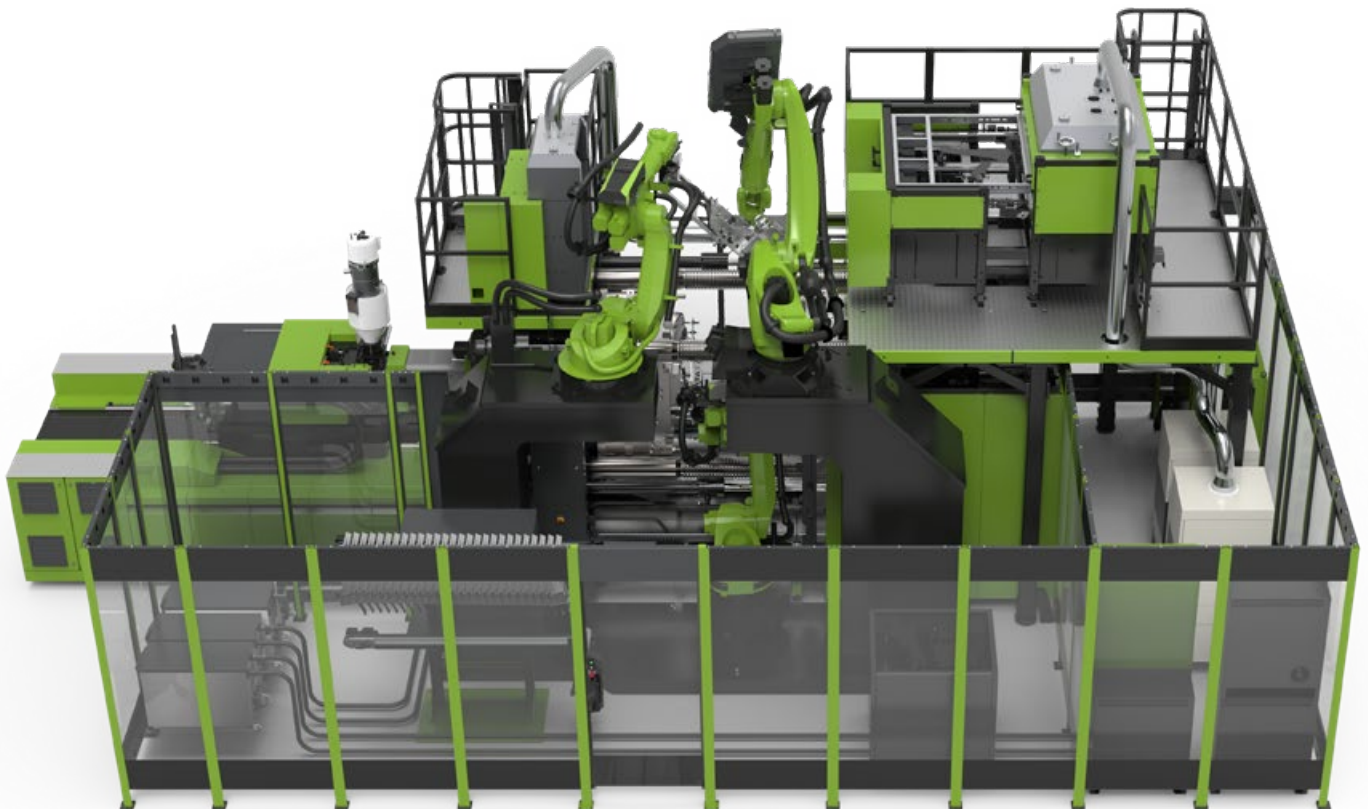
Type	IMM Clamping force [kN]	Nom. load capacity [kg]	Max. load capacity [kg]	Servo-driven rotary axes			Pneumatic driven rotary axes		Dual robot	Dual tower	Mirrored version Y
				A	B	C	B	C			
e-pic Z	280-2200	2	2					3			
viper 6	280-2500	6	6		25	25	5	6			
viper 12	280-4000	15	15		25	25	9.3	30			
viper 20	900-7000	20	30	25/70	25/70	25/70		30/75			
viper 40	2200-15000	40	55	70/210	70/210	70/210		75/150	•		•
viper 60	5000-23000	60	75	210	210	210		120/240	•	•	•
viper 90	10000-32000	90	90	125	390	390			•		
viper 120	15000-55000	120	120	125	390	390			•	•	

## easix KR/TX/RX

### The multifunctional articulated arm robot

Work in all dimensions: the easix articulated robot is ideally suited for positioning tasks with full freedom of orientation and for machining tasks with precise tracking characteristics. Making your production even more efficient, no matter whether you need a particularly flexible automation solution or face special requirements, such as cleanroom production.





## As easy to use as a linear robot

**For flexible handling tasks and precise parts processing**

Full range of orientation and consistent path travel

**Fast and efficient operation**

Integrated control – the integrated control concept for machine, robot and peripheral equipment

**Precise, fast, energy-efficient and smooth movements**

smart machine/robot with all intelligent functions

**Professional project management by our ENGEL team**

Project automation – the customised automation solutions

## easix TS

### The fast SCARA robot

Ideally suited for fast pick & place tasks when sorting inserts or depositing finished parts. An additional kinematic type in ENGEL's modular robot portfolio.

#### High reliability and world-wide service

Sturdy mechanics from the market leader

#### Flexible solutions for sorting and depositing applications

Loads up to 7 kg and range up to 800 mm



#### Stable ready-made solutions, mechanically optimised

Standard supports for diverse mounting positions

## pick & place: separation and sorting

For minimum cycle times and high-speed tasks

Innovative four-axis robot kinematics

**Fast and efficient operation**

Integrated control – the integrated control concept for machine, robot and peripheral equipment

**Precise, fast, energy-efficient and smooth movements**

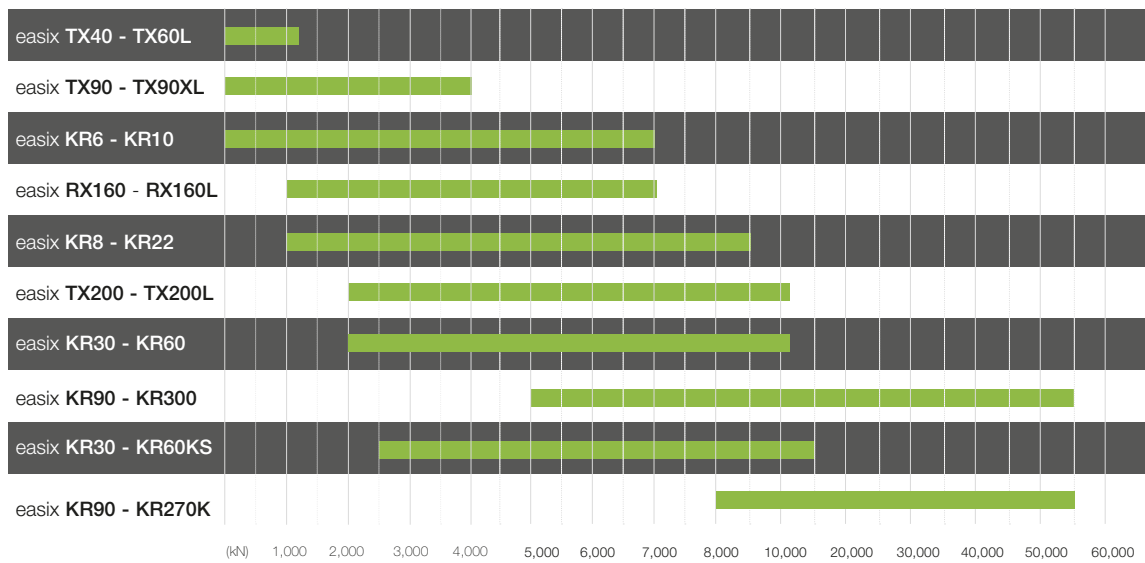
smart machine/robot with all intelligent functions

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# easix

## Technical data



ENGEL	Type	Max. load capacity	Axis 5 range	Repeatability	Cleanroom class ISO 14644-1	Floor	Wall	Ceiling	Support
		[kg]	[mm]	[mm]					
TS40-TS80	SCARA	2 (max. 8)*	R400-800	+/- 0.01	6*	●	●		
TX40	6 axes	1.7 (max. 2)*	R450	+/- 0.02	5/2-4**	●	●	●	
TX60-TX60L	6 axes	2-3.5 (max. 3.7-4.5)*	R600-850	+/- 0.02-0.03	5/2-4**	●	●	●	
TX90-TX90XL	6 axes	5-7 (max.9-14)*	R900-1350	+/- 0.03-0.04	5/2-4**	●	●	●	○
KR6-KR10	6 axes	6-10	R700-1820	+/- 0.03-0.04	Agilus: 4/2** Cybertech nano: 8/5-7**	●	●	●	○
RX160-RX160L	6 axes	14-20 (max.20-30)*	R1600-1900	+/- 0.05	5/2-4**	●		●	○
KR8-KR22	6 axes	8-22	R1610-2010	+/- 0.04	6/4-5**	●	●	●	○
TX200-TX200L	6 axes	60-100 (max. 80-130)*	R2000-2400	+/- 0.06-0.1	5	●		●	○
KR30-KR60	6 axes	30-60	R2030-2430	+/- 0.06	6/5**	●		●	
KR120-KR300	6 axes	120-300	R2500-3100	+/- 0.06	8/4-5**	●			
KR30-KR60 KS	6 axes	30-60	R2230-2630	+/- 0.06	6/5**	○			●
KR90-KR270K	6 axes	90-270	R2900-3900	+/- 0.06	8/4-5**	○			●

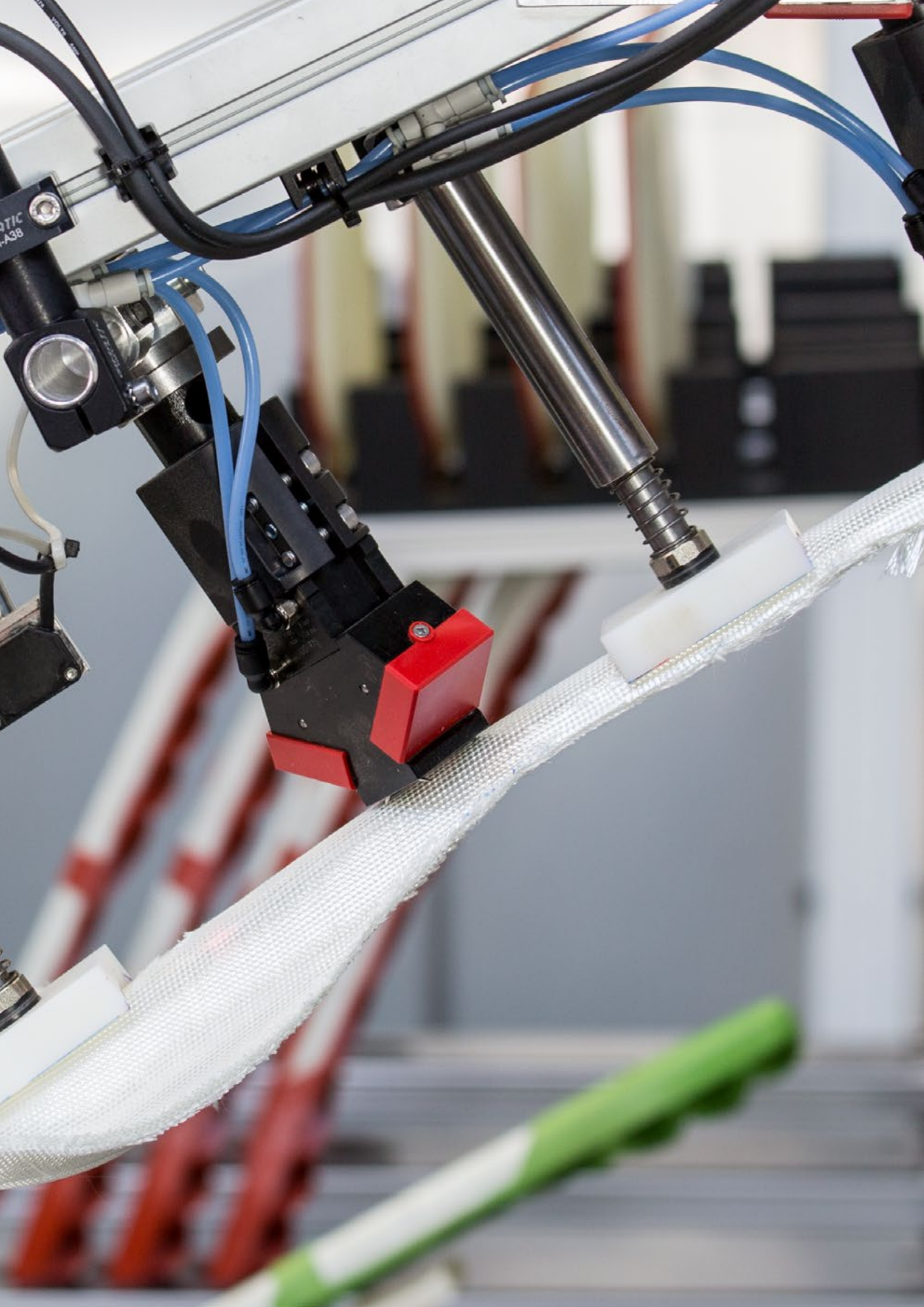
\*\* Option

- limited recommendation
- Recommended

# Gripper technology

Ingenious tools for inserting, removing,  
measuring and processing





## Gripper technology

Ingenious tools for inserting, removing, measuring and processing

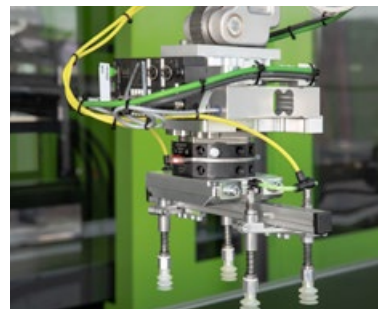
In order for your robot to fully utilise its potential, the robot arm and gripper have to be perfectly coordinated with each other and with the mould: The grip tools by ENGEL ensure even more efficient and productive use of the robot. Our standard grippers are the ideal solution for many different areas of applications.

ENGEL is also your best choice whenever special gripper technology is required: we have a grip on everything, and can provide you with individually designed, custom solutions. We supply everything from a single source – take advantage of our comprehensive product portfolio.

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### Ready-to-use end-of-arm tooling

With 2 or 4 vacuum suction pads in different sizes



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### Customised end-of-arm tooling\*

Designed by ENGEL tailored for your application



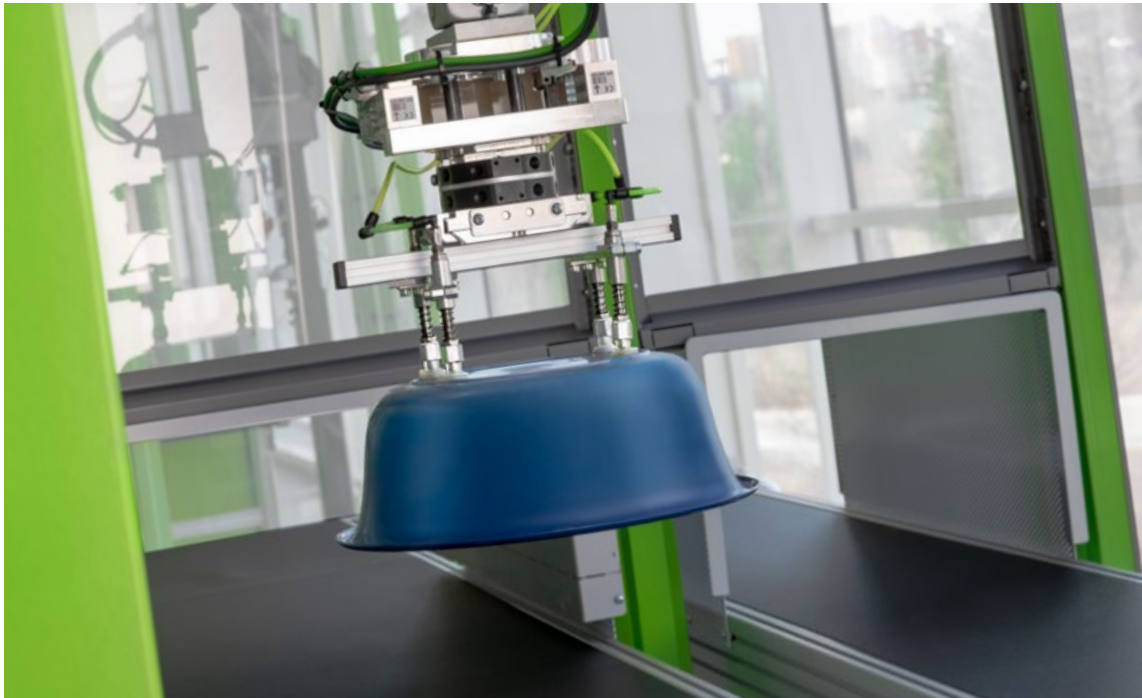
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### End-of-arm tooling kits

The practical cases with a wide range of universal components for do-it-yourself assembly







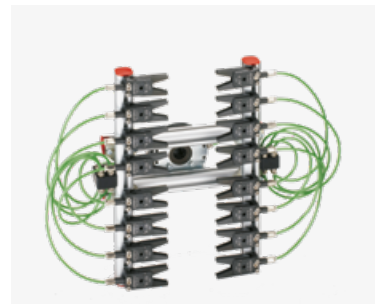
### EOAT quick-change systems – efficient

Retool for a new part fully automatically or in just a few steps



### Sprue cutters – robust

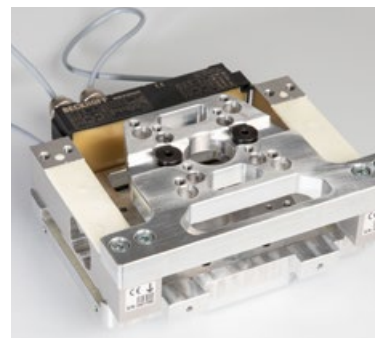
Pneumatic or electrical grip tools for secure hold



### Weight measurement systems – precise\*

Determine the part weight directly on the end-of-arm tool.

- Compact system
- Quality check and logging of weight without intermediate deposit of the part
- Reduced cycle time



\*available on request

# Conveyor systems

Flexible solutions for  
efficient parts transport





# Conveyor systems

Flexible solutions for efficient parts transport

- **Everything from a single source**

The machine and conveyor systems are perfectly integrated with each other.

- **The optimum solution for any requirement**

ENGEL conveyor systems are available in belt, box, pallet, slide and tray versions.

- **Integrated controller**

The conveyor system controls are integrated into the machine control unit.

- **TÜV/CE certified**

Each conveyor system is certified by ENGEL, together with the production cell. This saves you time, money and risk.

- **Fast and trouble-free start-up**

From the planning stages through to you taking over your system, ENGEL bears full responsibility.

- **Maximum output**

All processes are optimised and perfectly synchronised.

- **Top ENGEL quality**

15,000 conveyors on the market and more than 2,000 conveyors produced each year are the best reference for our expertise and competence.

The whole is more than the sum of its parts. This is why ENGEL, as a system supplier and world market leader in injection moulding technology, highly values intelligent solutions, as well as trouble-free workflows and processes. From production and automation through to the management of ready-to-ship individually packaged goods with our tried-and-trusted ENGEL conveyor systems. These are intelligent conveyor solutions, which quickly and carefully transport the high-quality moulded parts from your production cell.

Whether with or without a robot, stand-alone or as an integrated solution, in bulk or in boxes, on pallets or on trays: ENGEL conveyor systems offer exactly the right solution that gives you a decisive competitive advantage in your market.

## GFB/WFB/ZFB conveyor systems

The optimised belt conveyors for free-falling parts

- Perfectly suited for the injection moulding machine
- For installation on machine operator side, non-operator side or side-by-side
- Guide plates
- Standard PVC belt, temperature resistant up to 80° Celsius
- Load capacity 12 kg/m

Options\*

- Special belts
- Guide plate extensions
- Universal chute
- Height-adjustable casters
- Medical version WFB



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### Straight belt conveyor GFB60

Conveying length: 1,000 to 5,000 mm

Belt width: 300 to 600 mm



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### Angled belt conveyor WFB60

Conveying length: 1,000 to 4,700 mm

Belt width: 300 to 600 mm



---

### Z belt conveyor ZFB60

Conveying length: 1,000 to 4,700 mm

Belt width: 300 to 600 mm



## HLi conveyor systems

The conveyor technology integrated into the safety gate for viper and e-pic Z

### Minimum footprint and free access

Options\*:

- Reverse mode
- Clearing system with light barrier
- Guide plates/cross supports/special belts



### Belt conveyor HLi integrated into safety gate

Movable for free access  
during mould change

Load capacity: 15 kg/m

Conveying length: 1,900 to 5,200 mm

Belt width: 350 to 600 mm

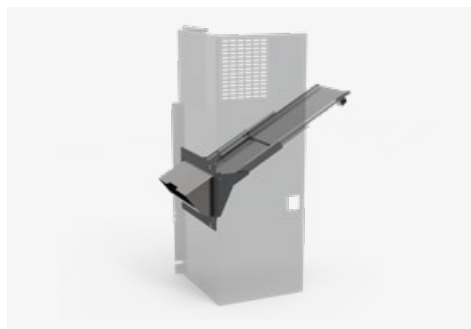
Belt speed: 9 m/min



### Chutes integrated in expanded safety gate HLi\*\*

Can be extended and folded  
pneumatically for free access  
during mould change

Chute width: 375 mm



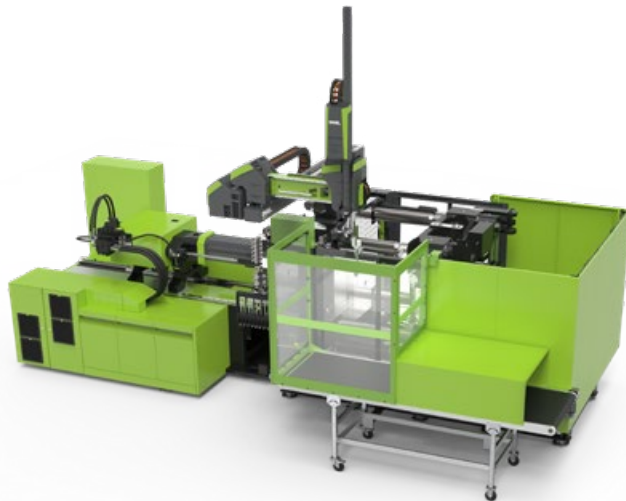
## ESC 2 conveyor systems

The extendable conveyor belts with integrated safety structure

- Easy to dock with the machine
- **PVC belt, temperature resistant up to 80°C** (briefly up to 100°C)

Options\*:

- Control panel with clearing switch
- Guide plates/cross supports/special belts
- Docking device for safe removal if not required for production



---

### ESC 2 belt conveyor with integrated safety structure

#### For best-in-class process monitoring

Polycarbonate panes including a safety tunnel for the operator side of the machine

For easy removal during mould set-up or maintenance – rollers and handles

**Load capacity:** 15 kg/m

**Conveying length:** 3,000 to 4,000 mm

**Belt width:** 600 to 1,600 mm

**Height:** 2,500 mm



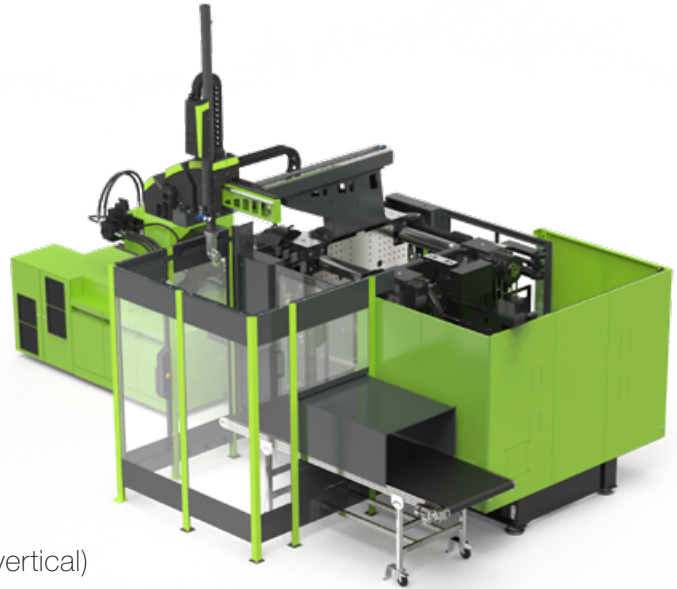
## FB conveyor systems

The versatile free-standing conveyor belt in all dimensions

- Infinitely adjustable belt inclination
- Underride guard
- Depositing height infinitely adjustable 1,000 – 1,200 mm
- Standard PVC belt, temperature resistant up to 80°C (briefly up to 100°C)
- Belt speed 6 m/min

### Options

- Safety tunnel
- Reversible version
- Motor mounting position changed (right, vertical)
- Control panel with clearing switch
- Light barrier (loading/unloading position)
- Baffle plates (standard height 60 mm).
- Different belt versions (e.g., anti-static, wear-resistant, temperature-resistant up to 90° C/120° C,...)
- Height adjustable – 750 mm – 900 mm (limitations for EN ISO 13857), 1,200 – 1,500 mm.
- Frequency inverter for adjusting belt speed
- Additional lock in the floor
- Cleanroom version\*
- Multi-tier belt conveyor version\*



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### FB60 belt conveyor free-standing

**Load capacity:** 15 kg/m

**Conveying length:** 1,000 to 5,000 mm  
(in 500 mm steps)

**Belt width:** 250 to 600 mm





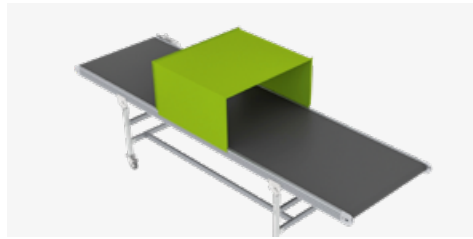
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### FB100 belt conveyor free-standing

**Load capacity:** 25 kg/m

**Conveying length:** 1,000 to 8,000 mm  
(in 500 mm steps)

**Belt width:** 350 to 1,600 mm  
(in 250 mm steps)



## EFB conveyor systems

The individual multi-tier belt conveyor for minimum space requirements

Thanks to the multi-tier design of the belt conveyors, even more parts can be deposited in an extremely space-saving manner, enabling production on a smaller production footprint.

- Underride guard
- 2 or 3 tiers
- Lengths, widths, heights and distances individually selectable\*\*
- Clearing system with emergency stop for each tier

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### EFB multi-tier conveyor



## RFB\* conveyor systems

Flexible belt conveyors for parts with little surface contact

### Options:

- Manual width adjustment

---

### RFB belt conveyor

#### Underride guard

**Depositing height:** infinitely adjustable 1,000 – 1,200 mm

**Belt inclination:** infinitely adjustable

**Belt speed:** 6 m/min

**Load capacity:** 30 kg/m

**PU belt:** temperature resistant up to 80° C (briefly up to 100° C)

**Conveying length:** 2,000 to 6,000 mm (in 1,000 mm steps)

**Belt width:** 500, 1,000 and 1,500 mm



## ECB conveyor systems

The perfect box transfer for bulk material

Diverse solutions to automatically pass on and fill cartons, boxes or small load carriers by the robot

- Operator panel for EMERGENCY STOP button
- SLC sizes:
  - KLT 6 147 (600 x 400 x 147mm)
  - KLT 6 280 (600 x 400 x 247mm)
- Load capacity 12 kg/tote
- Light barriers for position detection

### Options

- Centring position accuracy increased to  $\pm 1$  mm
- Intermediate layers magazine integrated (not available for ECB 2/2 & 3/1)
- Cleanroom version\*

---

**ECB 1/1 box transfer with belt conveyor and accordion roller conveyor\***

**Box orientation:** crosswise or lengthwise  
**Capacity:** 11 boxes crosswise, 9 boxes lengthwise  
**2 operator sides**  
**Box changing time:** 11s



---

**ECB 1/2 box transfer system with belt conveyor and roller conveyor\***

**Box orientation:** crosswise or lengthwise  
**Capacity:** 11 boxes crosswise, 9 boxes lengthwise  
**2 operator sides incl. 2 safety tunnels**  
**Box changing time:** 11s



---

**ECB 2/1 box transfer system with 2 conveyor belts**

**Box orientation:** crosswise or lengthwise  
**Capacity:** 11 boxes crosswise, 9 boxes lengthwise  
**2 operator sides**  
**2 safety tunnels**  
**Box changing time:** 11s



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**ECB 2/2 box recirculation unit 1-tiered with 2 conveyor belts\***

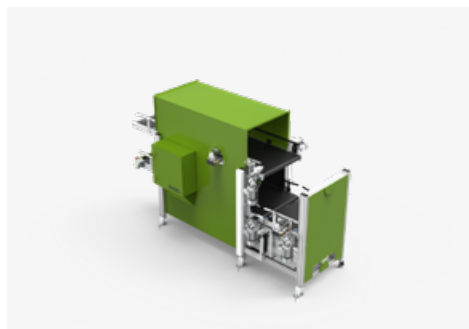
**Box orientation:** lengthwise  
**Capacity:** 9 boxes  
**1 operator side incl. 1 safety tunnel**  
**Box changing time:** 12s  
**Functions as belt conveyor**  
**Clearing switch**



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**ECB 3/1 box recirculation unit 2-tiered with 3 conveyor belts\***

**Box orientation:** crosswise  
**Capacity:** 11 boxes  
**1 operator side incl. 1 safety tunnel**  
**Box changing time** 17s  
**Clearing switch**



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## ECB M intermediate layers magazine

**Intermediate layer:** max. 590 x 390 mm

**Max. stack height:** 480 mm

**Stack weight:** max. 5kg

**Separate insertion/part removal positions**



## ECS conveyor systems

The ergonomic sliding tables for feeding and discharging parts

The ideal solution if you need to convey parts into or out of the production unit during the production process.

- Operating panel for open request/loading acknowledgement/emergency stop
- Light barriers for position detection
- Magazine platen support (base plate)

Options

- Cleanroom version\*

---

### ECS 1 Sliding table single

**Box orientation:** lengthwise

**Operation:** manual or electric

**Table size versions:**

640 x 440 x 100 mm or 840 x 640 x 100 mm

**Load capacity:** 60 kg manual, 40 kg electric

**Max. part height:** 100 mm



---

### ECS 2 Sliding table double

**Box orientation:** lengthwise

**Operation:** manual

**Table size versions:**

640 x 440 x 100 mm or 840 x 640 x 100 mm

**Max load capacity:** 40 kg per drawer

**Max. part height:** 100 mm



## ETS conveyor systems

The automatic tray servers with transfer unit for smooth transfer of bulk materials

- Stacking in the smallest spaces
- Light barriers for position detection
- Clearing switch
- Lengthwise box orientation
- SMC pneumatics components (5-8 bar operating pressure)
- Tray size: 600 x 400 mm (please refer to data sheet for minimum requirements)
- Capacity 5 trays
- Tray change time 5 s
- Max. stack weight 25 kg

### Options

- Additional conveyor belts for feed and discharge of tray stacks
- Accurate tray centring for robot deposition; centring tolerance:  $\pm 0.5$  mm
- Check tray alignment external contour/internal contour
- Tray swivelling unit for correct alignment (detection of tray position)
- Enhanced unstacking function via suction pads
- Guide plates unstacking unit incl. tray orientation aid
- Independent control unit S7, operator terminal with touch screen and emergency stop (only for VIPER 1.0 or older).
- Stack height monitoring
- Signal unit (2, 3 or 4 signals)

---

### ETS 4 tray server 2 sides

**Trays loaded and unloaded:** on two opposite sides of the cell

**Conveyor line:** with 2 tunnels and underride guard (excl. safety guarding)



---

### ETS 5 tray server 1 side

**Loading and unloading:** on the same side of the cell

**Conveyor line:** with 1 tunnel and underride guard (excl. safety guarding)



## ECP conveyor systems

The robust EURO pallet transfer unit for large parts

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### ECP pallet transfer unit\*

Light barriers for position detection

Box orientation: lengthwise

Operator panel: emergency stop and clearing switch

Foundation bracket

Crash protection

Positioning accuracy: +/- 10 mm

Pallet size: EURO DIN 1,200 x 800 x 166 mm

Capacity: 3 or 5 pallets

Pallet change time: 20 s

Weight per pallet: 250 kg max.



---

### ECP M pallet magazine\*

Capacity: 10 pallets vertically arranged

Box orientation: lengthwise



## ECC conveyor systems

The universal chutes for all applications

### Options:

- Cover
- Separating web
- Assembly from the top

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### ECC chute

**Length:** 1,250 to 2,000 mm

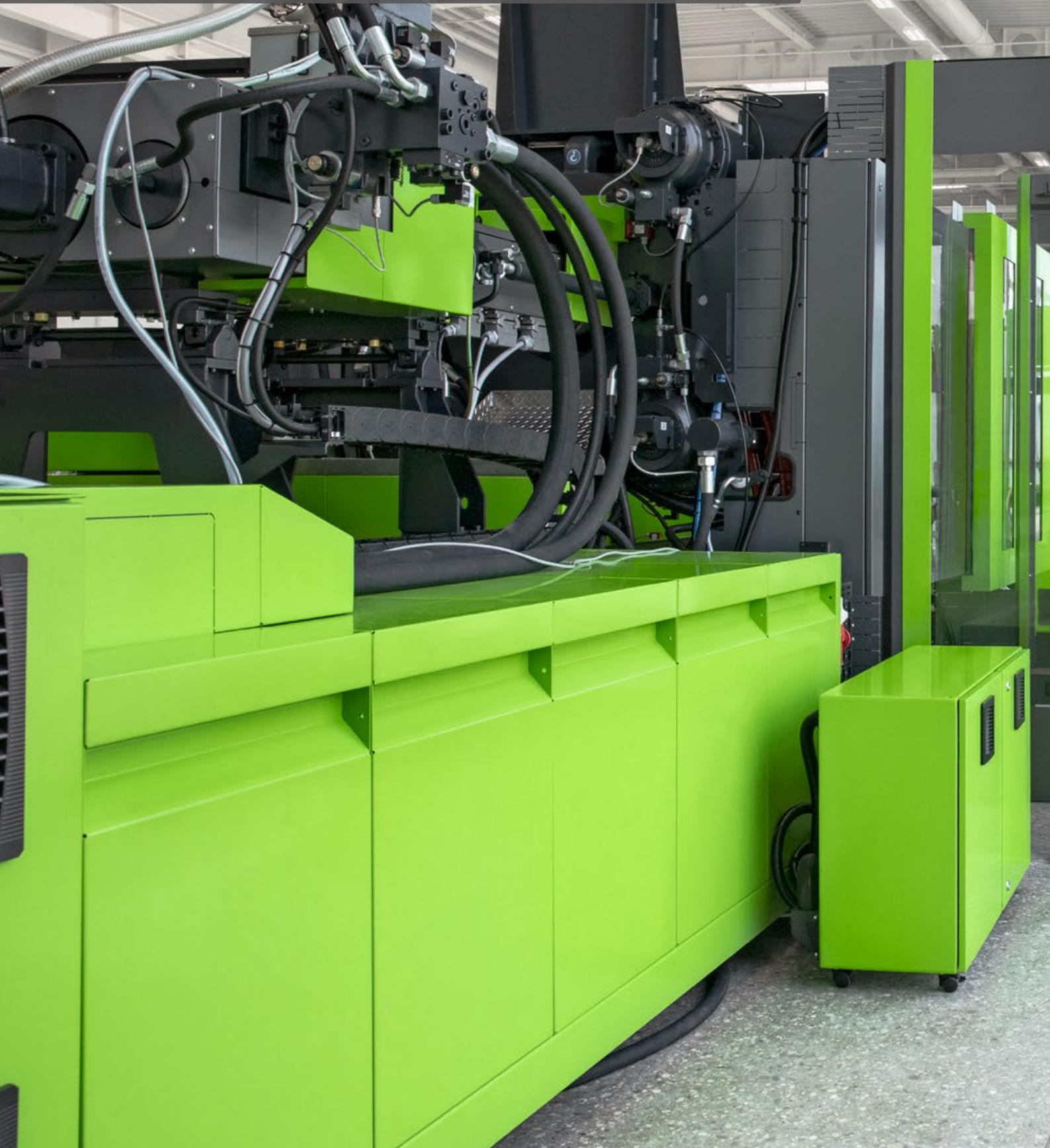
**Width:** 250 to 850 mm

**Height:** 1,150 to 1,550 mm (at the fulcrum)



# Plant safety technology

Safety solutions for trouble-free production  
and personal protection







# Plant safety technology

Carefully considered safety solutions for trouble-free production and personal protection

## Safety guarding

The modular assembly kit system for individual cell configuration

An ingenious complete system offers all-round safety: ENGEL safety systems is a sophisticated personal protection system for plant construction in accordance with EN ISO 14120. You benefit from all the advantages and safety of a CE-compliant cell.

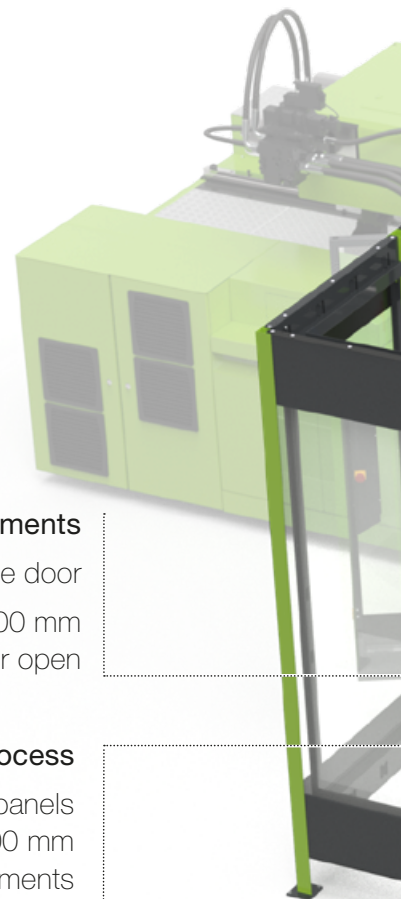
- Standard layouts for numerous machine/robot combinations – easiest availability of certified safety technology
- No time-consuming and expensive additional certification required
- Overhead protection for machine operator side design variants of the automation cells

### For the best use of space for all requirements

Swivel and slide door  
Widths from 750 to 1,500 mm  
top closed or open

### For perfect insights into the running process

Extensive selection of protective panels  
Widths 250, 500, 750, 1,000 mm  
or special dimensions in 50 mm increments  
Height 2,500 mm,  
Polycarbonate panes, or wire mesh  
Cable ducts bottom, top, vertical



**Flexible solutions for operating injection moulding machines with a cell**

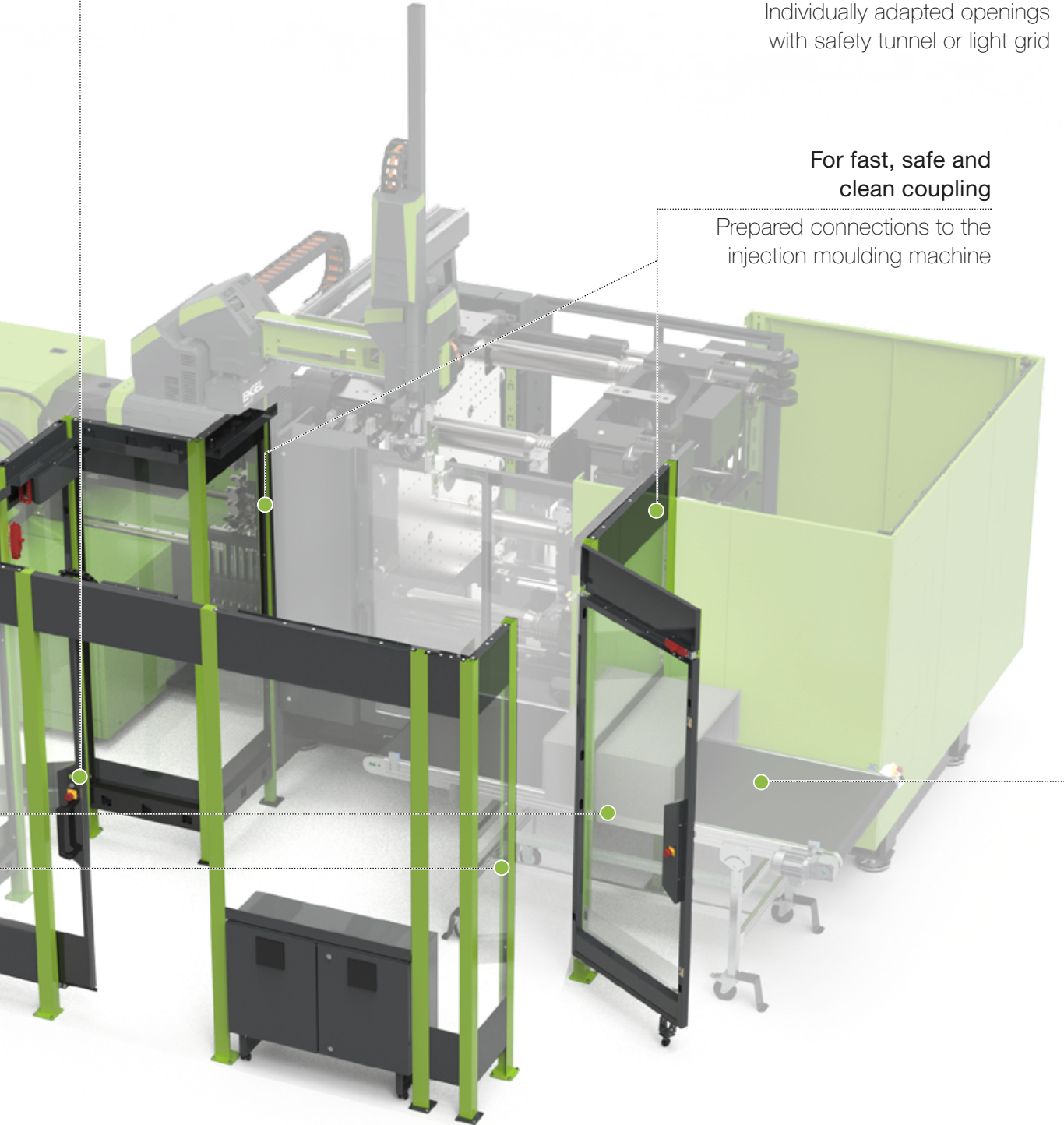
Safety package 2 for a closed and 3 for an open safety gate

**For safe removal or feeding of parts in the production process**

Individually adapted openings with safety tunnel or light grid

**For fast, safe and clean coupling**

Prepared connections to the injection moulding machine



## compact cell\*

### The expandable safety gate for modular conveyor technology

Derived from the added value of the expanded HLi safety gate, compact cell, the scalable safety cell, offers the smallest possible footprint on the customer's production floor and easy access to the mould and machine installation space; CE certification included.

Since all extensions can also be easily implemented outside the standard, ENGEL offers the most compact and individual solution tailored to your needs.

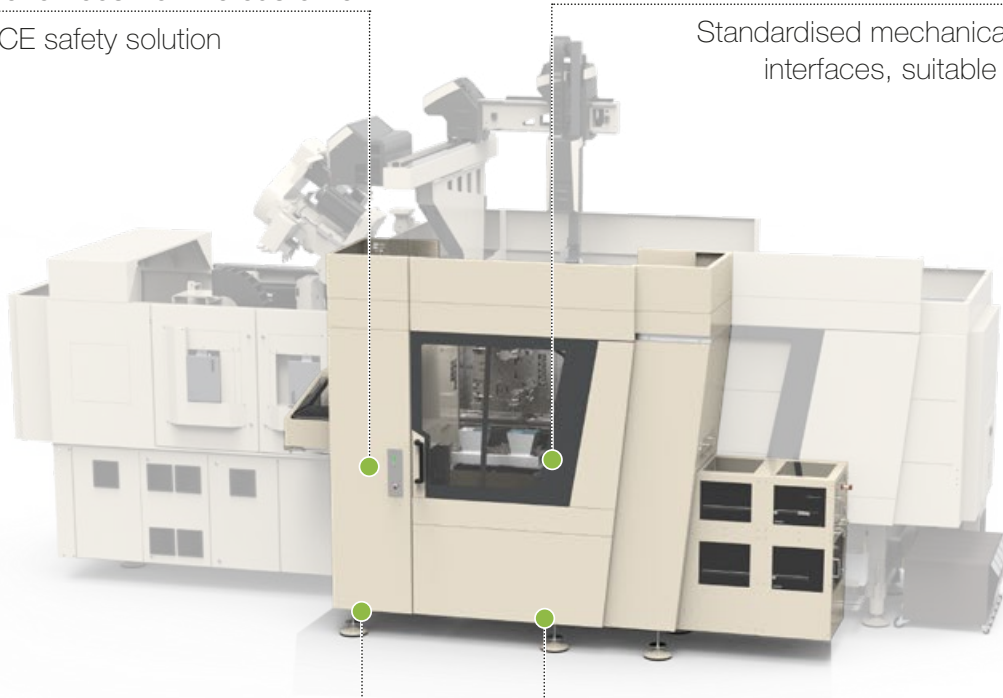
For example, all ENGEL conveyor systems – such as the ECB box transfer, EFB multitier conveyor, ETS tray server or ECS safety gates – can be integrated, and this modularity gives you a quick and cost effective application solution.

#### No inspection cost for the customer

Turn-key CE safety solution

#### Can flexibly dock with another machine

Standardised mechanical and electrical interfaces, suitable for crane hook



#### Easy access

Conveyor systems can be pushed out of the way

#### Quick and inexpensive application solutions

Modular use with box transfer, multi-tier belt conveyor, tray server, sliding drawers, ...

## easicell\*

### The universal cell for encapsulated processing tasks

Thanks to its standardised but modular design, the ENGEL easicell makes it easy to integrate robots and processing units upstream and downstream of injection moulding, such as laser processing.

These components can be quickly removed from the system to replace them with other units. Long downtimes and associated outages during production changeovers are a thing of the past.

#### For practical handling

Integrated control panel

#### For laser tightness

Completely closed



#### For practical handling

Integrated control panel

#### For flexibility

Opening with safety tunnel

Processing technology  
Precise products for parts processing





# Processing technology

## Precise products for parts processing

ENGEL offers numerous solutions for processing parts before insertion into the injection moulding machine or after part removal. In this way, completely finished products are created on an automated production cell comprising all processing steps.

### **infrared oven**

#### Compact infrared ovens for efficient heating of preforms

The ENGEL infrared oven adapts to the requirements of the respective parts and is available in various sizes and with or without a sliding table. To heat up the parts in the best possible way, the heating field can be divided into various zones and controlled separately. This means that smaller parts can still be heated efficiently in a large oven if necessary. Thanks to its compact design, the oven can easily be installed in any production cell and easily transported by forklift or crane.

The control unit is fully integrated into the familiar ENGEL CC300 control software and can therefore be handled intuitively and ergonomically by the operator. The setup overhead is minimal and the oven can be adapted to different preforms at any time. All process data can be constantly monitored and recorded.

- Integration of the oven control unit with the machine control unit – standardised operation for the machine and peripherals at the panel and at the hand-held unit
- Modular control of the heater panels – energy efficiency with a homogeneous surface temperature
- Pyrolysis function for material residues – self-cleaning

#### **For heat dissipation**

Optional extraction system for heating unit and sliding table

#### **For best absorption and maximum depth effect**

Heat input by infrared radiator 2.5 to 3.5  $\mu\text{m}$

#### **For optimum setting of the clearance between the part and the heater**

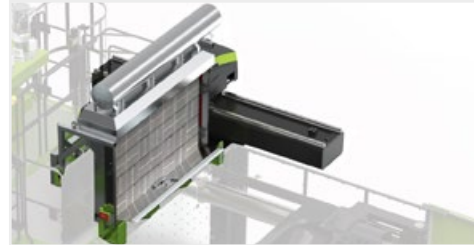
Height adjustment of the heater panels





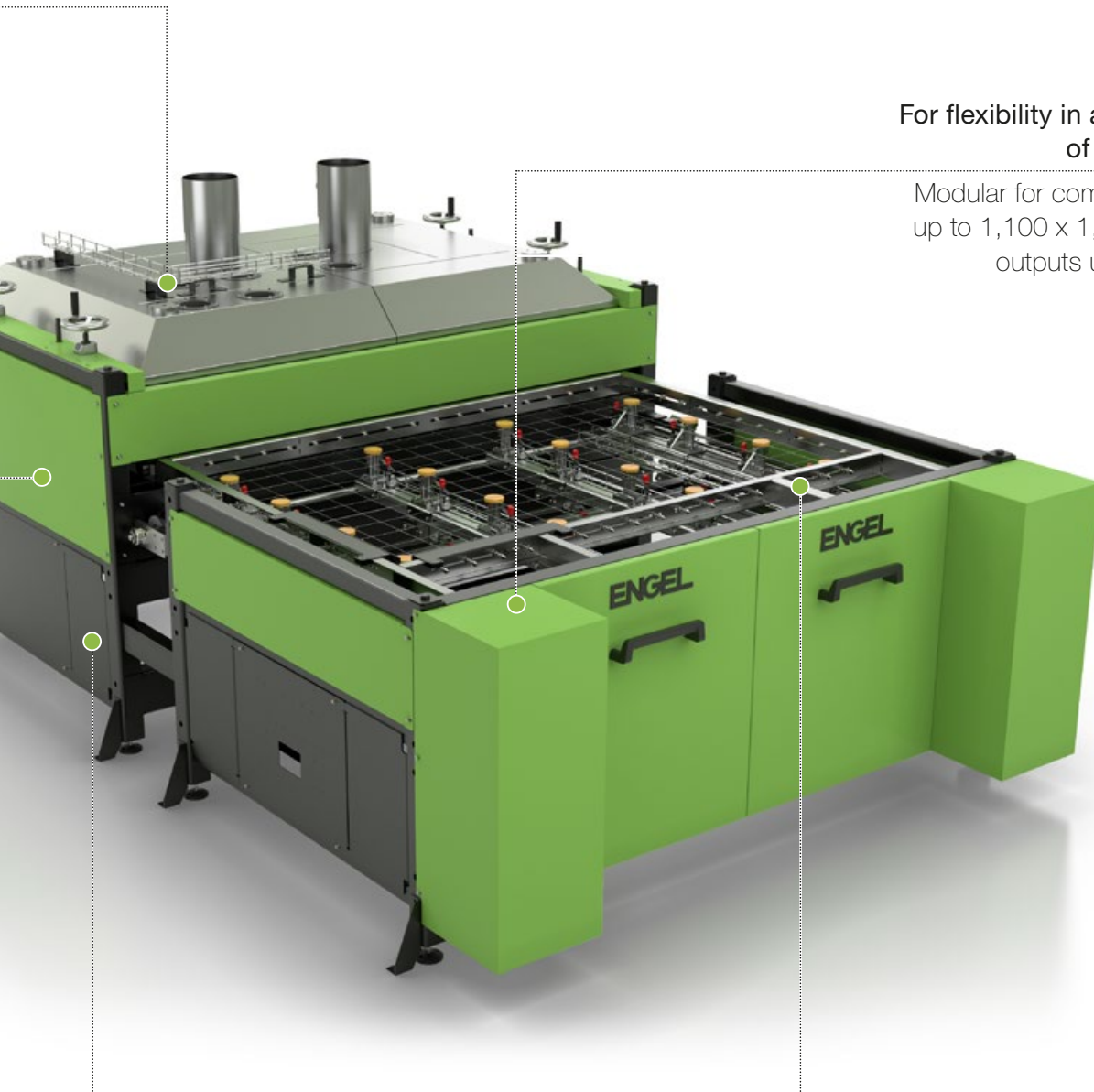
### vertical infrared oven

For materials that have to move from heating to the mould very quickly, the infrared oven can also be installed in a vertical arrangement near the mould on request.



### For flexibility in a wide range of applications

Modular for component sizes up to 1,100 x 1,610 mm and outputs up to 175 kW



### For fully automatic operation

Optional servo-controlled sliding table

# Training

More efficiency in injection moulding





# Training

## More efficiency in injection moulding

Enhanced product quality, more stable processes and higher output with a maximum yield of good parts – a thorough understanding of the injection moulding machine, the robot, and interaction of individual process steps empowers you to get more out of your injection moulding system. 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,

### **ENGEL robotics basics (ERB)**

#### The basic skills for operating ENGEL viper linear robots

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

- Overview of the robot system
- Work area set-up
- Function, operation, standard programmes
- Interpreting error messages

**Practical exercises:** Setting up standard programmes under production conditions

**Prerequisites:** Basic knowledge of injection moulding machines.

### **ENGEL robotics advanced (ERA)**

#### Operating ENGEL viper linear robots for advanced users

After the seminar, participants will be capable of programming ENGEL viper robot systems and also of quickly and effectively changing or adapting various sequences.

- Work area set-up
- Sequence editor basics
- Explanation of ENGEL standard sequences

**Practical exercises:** Creating various program sequences

**Prerequisites:** Good working knowledge of ENGEL viper robots and completion of the ERB seminar.

## ENGEL robotics six axis (ERS)

### Operating ENGEL articulated robots easix KR

After the seminar, the participants will be familiar with the build-up, the coordinate systems and operations and/or programming the six-axis robot. More complex program sequences can be created and adapted based on this knowledge.

- Overview of the robot
- Sequence editor
- Coordinate systems

#### Practical exercises

**Prerequisite:** Good working knowledge of sequence programming and seminar ERA.

## ENGEL robotics control (ERC)

### Control technology and maintenance of ENGEL linear robots

Effective performance of maintenance tasks on ENGEL viper robot systems, and quick troubleshooting and error correction. After the seminar, the participants will be familiar with robot control elements and their functions, and will have mastered troubleshooting procedures.

- System components
- Control modules, drive calibration
- Robot set-up
- Error messages and correcting errors

**Practical exercises:** Adjusting and calibrating, troubleshooting

**Prerequisite:** Good working knowledge of sequence programming, seminar ERA

In addition to the training classes described above, you can also book basic or advanced training for the ENGEL e-pic. Or why not book an individually arranged special training course for your entire team at your location?

More information at [www.engelglobal.com](http://www.engelglobal.com).



## ENGEL services

### Superb individual support

- **OEM parts**  
A perfect fit, reliable, durable
- **ENGEL formula 24**  
Our formula for success and enhanced safety
- **Plasticising units**  
For improved cost effectiveness, performance and service life of injection moulding machines
- **Retrofit**  
Continuous high quality output and availability
- **ENGEL care**  
Our maintenance packages for continuous high results and optimal quality output
- **ENGEL Protect**  
Intelligent system protection by ENGEL
- **Oil maintenance unit**  
Reduced maintenance costs and less unplanned machine downtime
- **Hose service**  
Improved safety by regular replacement of hoses
- **ENGEL everQ**  
Verified process reliability of production-relevant sensor data with test certificate
- **ENGEL relocation service**  
The optimal solution for machine relocations – whether within the company, within a country or across borders
- **ENGEL training**  
Be ready for your production requirements
- **Consulting & Coaching**  
Find and leverage hidden potentials
- **e-connect**  
Your complimentary portal for ENGEL services
- **e-connect.monitor**  
Monitoring of process-critical components during operations for predictive maintenance
- **e-connect.24**  
The 24/7 remote maintenance package

## A broad machine portfolio – a comprehensive service portfolio

At ENGEL, we not only offer the latest technologies and state-of-the-art production systems, but also a broad range of services to ensure your long-term success. A versatile team of experts provides service and on-site support, quickly available, high-quality retrofitting and optimisation tools, as well as professional consulting and training. With our support you get the best out of your production cells.

### **Support – we assist you on-site!**

- save on downtime costs
- immediate worldwide 24/7 support
- expert support from the ENGEL service team
- for any ENGEL injection moulding machines no matter the generation
- for all ENGEL technologies and any control unit version

### **Upgrade – install reliable added value!**

- for all ENGEL injection moulding machines
- individual upgrading of your machine in OEM quality
- to add and optimise functionality
- equip machines for use with new applications and technologies
- utilise machines with even greater cost effectiveness

### **Know-how – Boost your expertise!**

- comprehensive training with a focus on knowledge transfer
- make the most of your machine's potential
- individual seminars and training programs for you and your employees
- informative events on industry-specific topics
- take advantage of efficient, targeted and practical information, instruction and training
- either at your own facility or at one of the worldwide ENGEL training centres



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