



speed

Series

- ENGEL victory
- ENGEL e-motion
- ENGEL e-max
- ENGEL duo
- > **ENGEL speed**
- ENGEL combimelt
- ENGEL insert
- ENGEL elast / LIM
- ENGEL PETSsystems

Integrative technology

- ENGEL robots
- ENGEL control

Services

- ENGEL training
- ENGEL e-factory

Application technology

- ENGEL application technology

Industry sectors

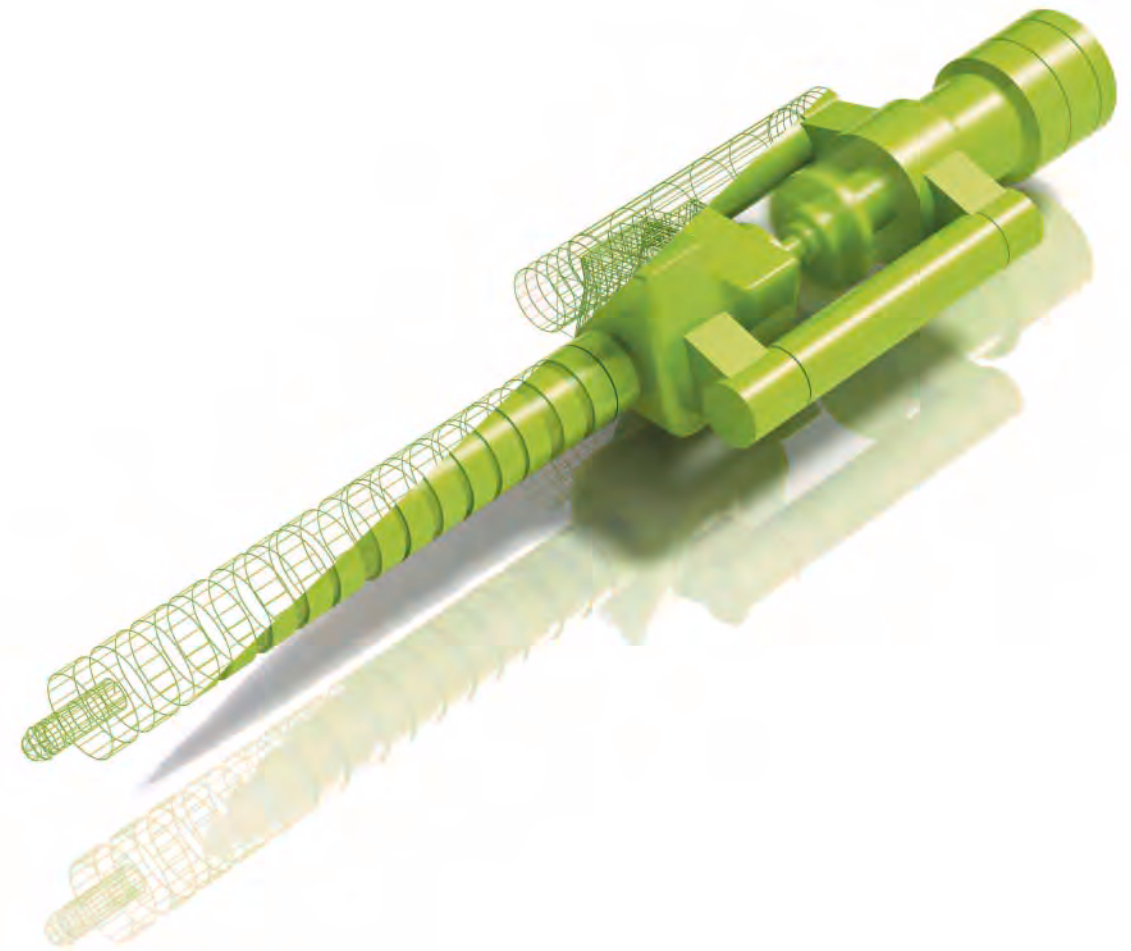
- ENGEL automotive
- ENGEL teletronics
- ENGEL packaging
- ENGEL medical
- ENGEL technical moulding

Summary

- ENGEL portfolio

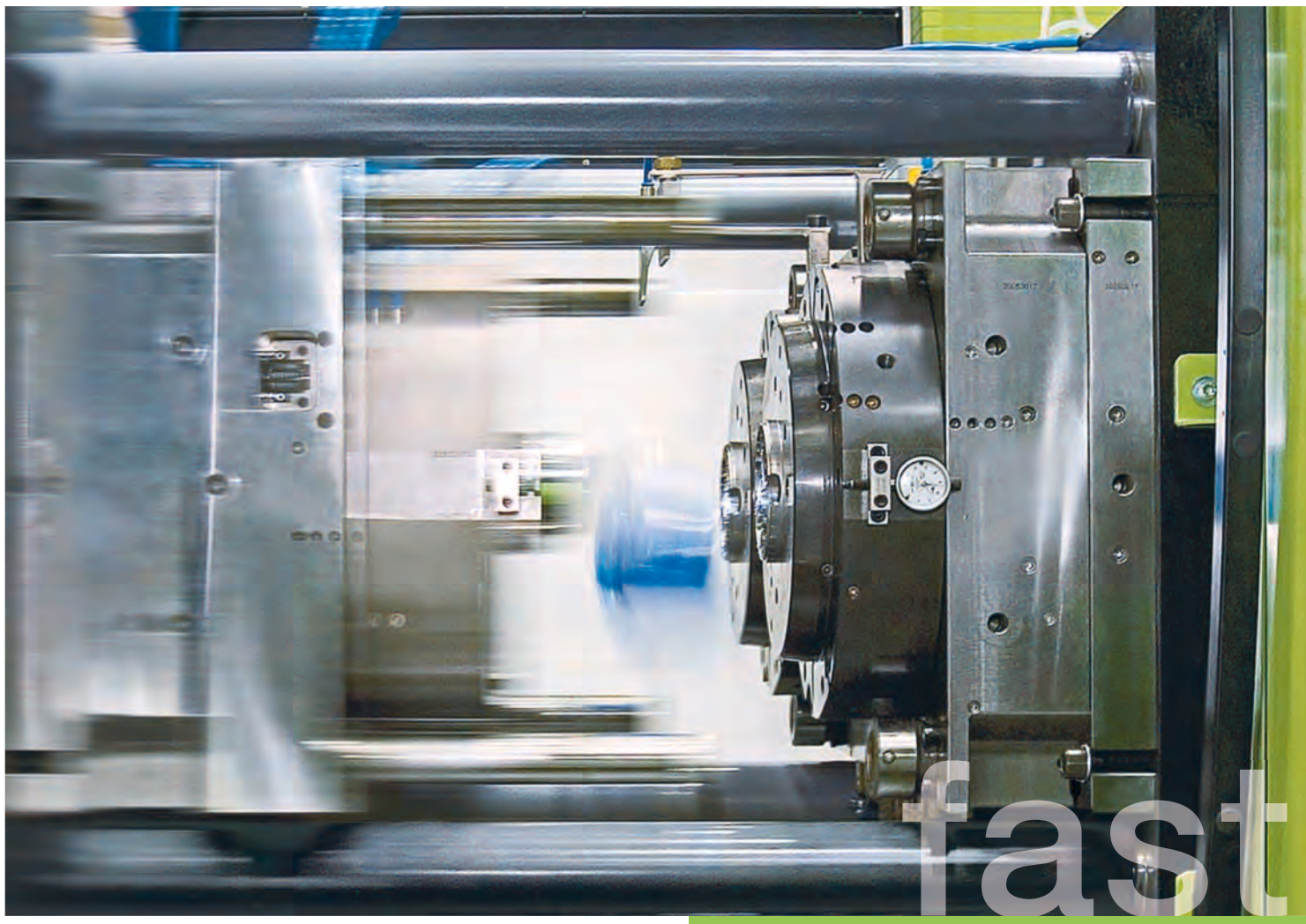
Language

- german
- > **english**
- french
- italian
- spanish
- chinese
- russian
- polish



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Premium performance for maximum output

speed

High-performance and durability in a single system

- > Toggle style clamping mechanism: Fast – smooth – robust
- > Toggle geometry designed for fast movements with smooth acceleration and braking phases
- > „Wide platen“ option for optimized clamping force even for high cavitation moulds
- > Plasticizing unit with highly responsive „in-line“ injection unit design and barrier screw for high-performance processing of HDPE, PP, and PS. All injection units are available with a choice of hydraulic or electric motor for plasticizing
- > Short overall cycle times thanks to fast dry cycle times of 1.2 to 1.7 seconds, fast injection speed (up to 1000 mm / s) and parallel motion
- > Machine system geared for high-performance and durability: Stable base frame / modular system components / tried-and-trusted high-performance hydraulics / maintenance-free ultrasonic sensors
- > Complete system range with four sizes

With its introduction of the speed series, ENGEL continues its tradition of toggle clamp technology in line with state-of-the-art developments. Systematic re-engineering in conjunction with an efficient hydraulic drive system are the essential basis of this series of high-performance injection moulding machines.



High performance **for thin-wall injection moulded parts** – from packaging to medical technology

Thin parts require high-performance production. The right drive design, and the right technical team to back it up, guarantee ultimate performance. ENGEL offers both.

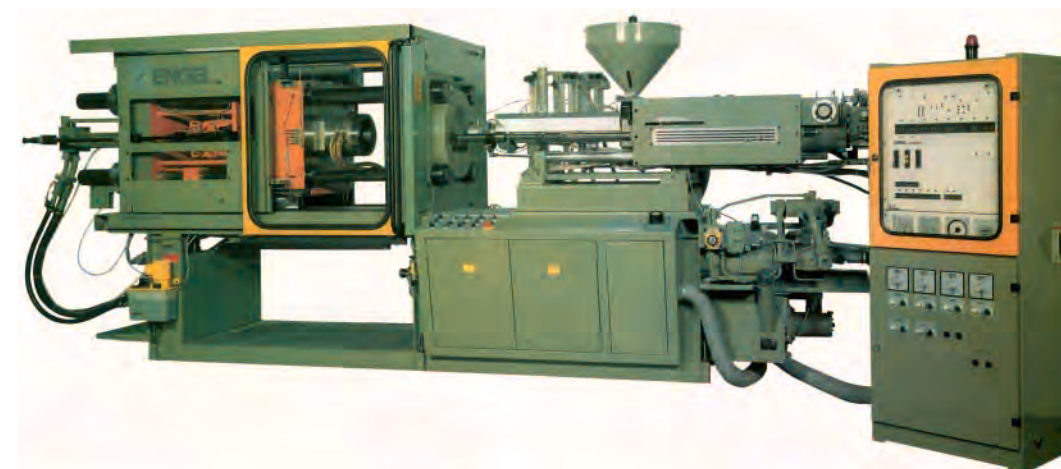
To be able to guarantee high performance in packaging injection moulding, ENGEL „reinvented“ the tried-and-trusted toggle-style clamping unit design. Fast, and at the same time smooth movements, and lasting precision – even under constantly changing conditions – are the results. New in-line-injection units set standards for injection performance and precision – all in all, a good foundation for your economic success.

New machines for short cycle times

speed

Screw diameter	40	45	50	55	60	70	80	90	105	120
Machine type	Available screw diameters in mm per injection unit									
speed 180 / 45										
speed 180 / 55										
speed 280 / 45										
speed 280 / 55										
speed 280 / 70										
speed 380 / 55										
speed 380 / 70										
speed 380 / 90										
speed 500 / 70										
speed 500 / 90										
speed 500 / 120*										

* In development



Experience with high-performance – the foundation for the Speed series

ENGEL has had machines for high-speed products in its portfolio for 30 years. Back then, the technology was based on the toggle / tie-bar clamping unit, as it still is today, and was specifically geared to meet the requirements of the packaging industry. The legendary ES 60 SO and ES 120 SO models,

which began production in 1980, were employed by packaging manufacturers for years.

To meet the industry's requirements, the range was extended up to the 350 and 500 SL machines, which have now been replaced by the machines in the new ENGEL speed series.

ENGEL speed 180 / 55 Hydraulic screw drive

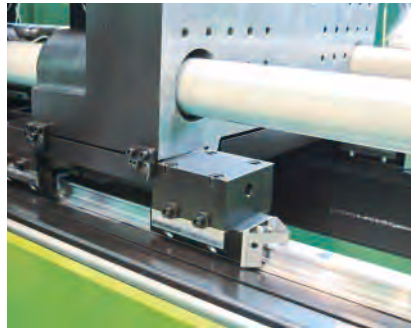


ENGEL speed 500 / 90 Electric screw drive

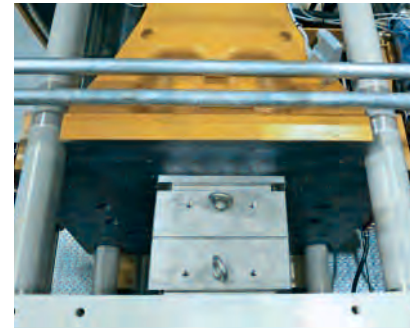


„Speed“ and „Marathon“ – characteristics combined in a single system

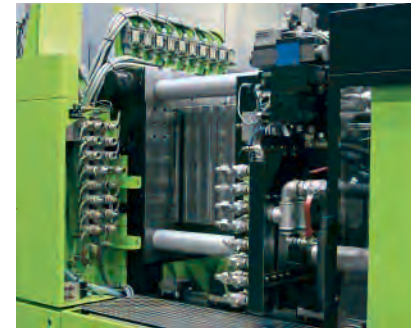
speed



Toggle style clamp with precise platen positioning on base frame. Tie-bars are tierods only, which do not support guidance of the platen



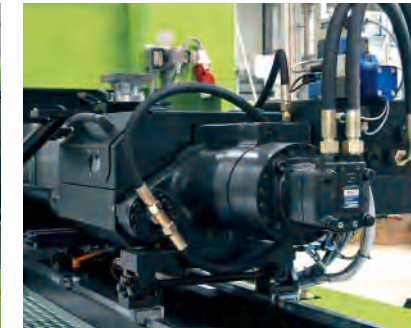
Every machine size, even the „wide platen“ types (see figure) are available with larger tie-bar spacing (optional)



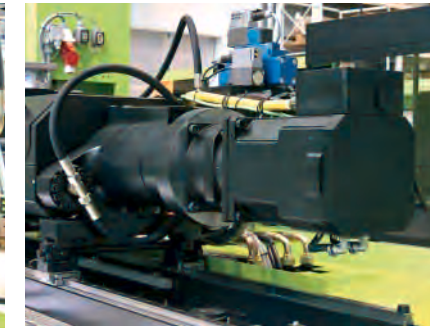
The machine design provides sufficient space for routing high-performance media lines



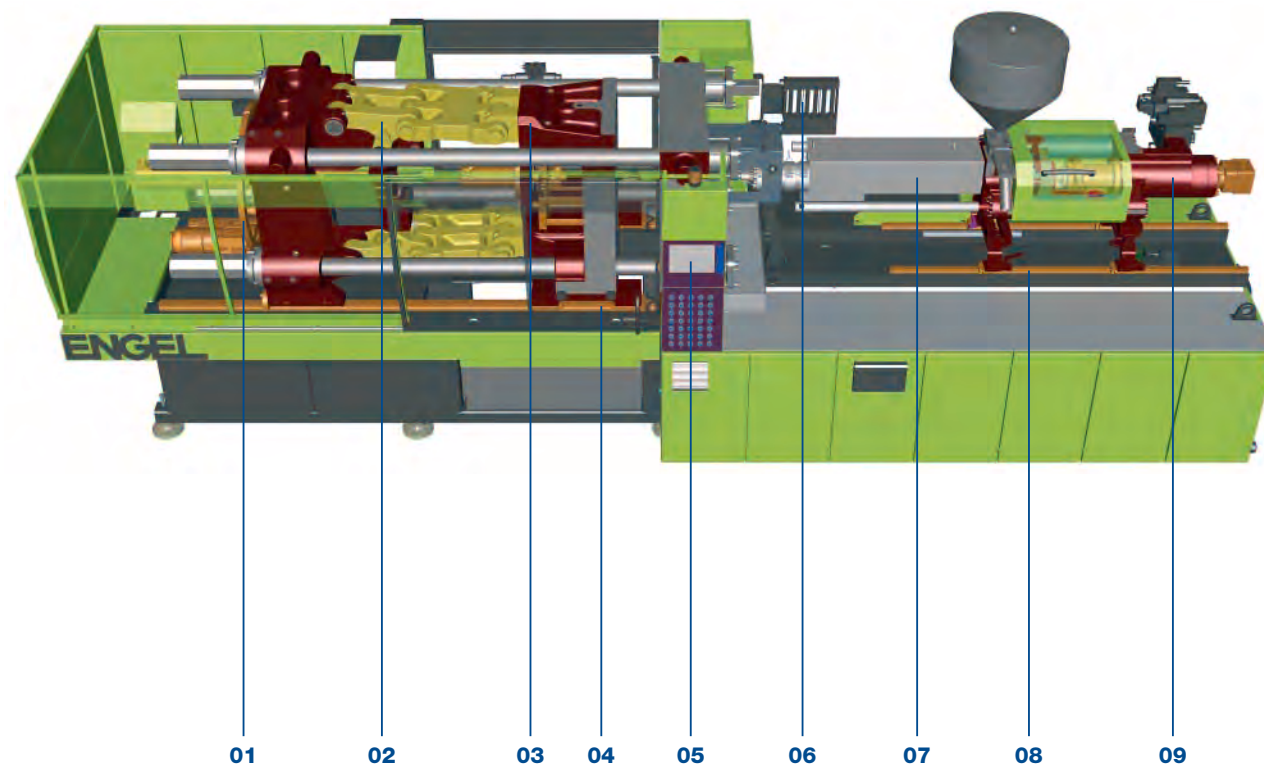
The swivelling injection unit simplifies maintenance work on the plasticizing assembly



Hydraulic screw drive (standard)



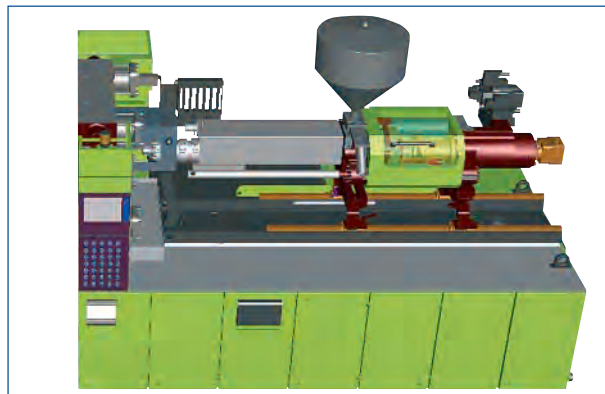
Electric screw drive available as standard with screw diameters of 80 mm and larger; available as an option with smaller screw diameters



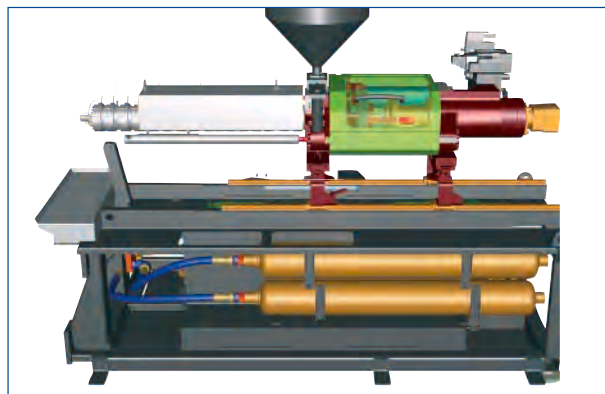
- 01** Mechanical mould height adjustment via gear ring and tie-bar nuts
- 02** Newly developed 5-point toggle style system for fast, harmonious movements guarantees effortless running and less wear and tear on the injection mould
- 03** The moving platen is designed as a rigid box-type platen for ultimate mould support and minimal mould breathing
- 04** Precision guidance of the moving platen on linear bearings. The tie-bars do not provide guidance functionality, and therefore require no lubrication. This results in a mould space that is virtually oil-free
- 05** ENGEL CC 200 machine control with touch screen and graphical user interface
- 06** Mold cooling water lines are sized for high capacity requirements
- 07** Low inertia injection unit for fast responsiveness
- 08** Injection unit supported by low-friction precision bearings
- 09** Either hydraulic or electric motors available for screw drive

The power package with quick reactions

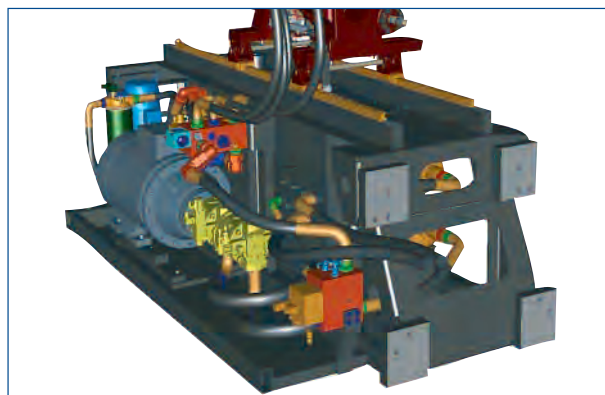
The injection unit



For the development of the ENGEL „speed“ injection unit, it was not the injection volume that took priority but rather the plasticizing capacity and the high injection rate. The plasticizing process is performed as standard by melt cylinders equipped with barrier screws with an L/D ratio of 24:1 or 28:1. The peripheral speed of 1 m/s and over gives a high plasticizing capacity while at the same time ensuring a gentle treatment of the melt.



To achieve the injection speeds needed for thin-wall parts, the injection unit uses an in-line design. The screw drive motor (hydraulic, optionally electric) is mounted in-line with the screw. This design means a drastic reduction of moving masses. In combination with accu-hydraulics, this allows screw stroke speeds of more than 1000 mm/s. Specific injection pressures upward of 2000 bar are available.



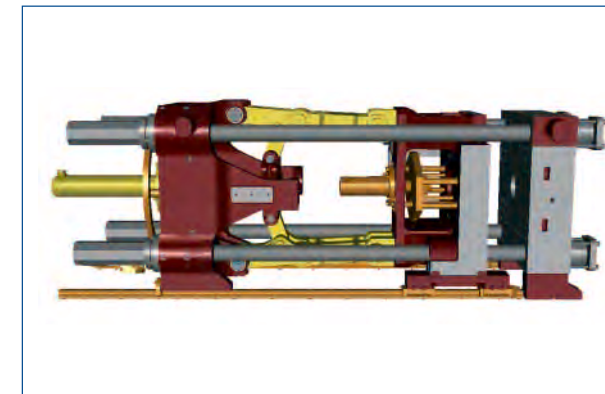
The short distances between the pump assembly, control block and accu system guarantee minimal pressure loss and best-possible reaction speed.

speed

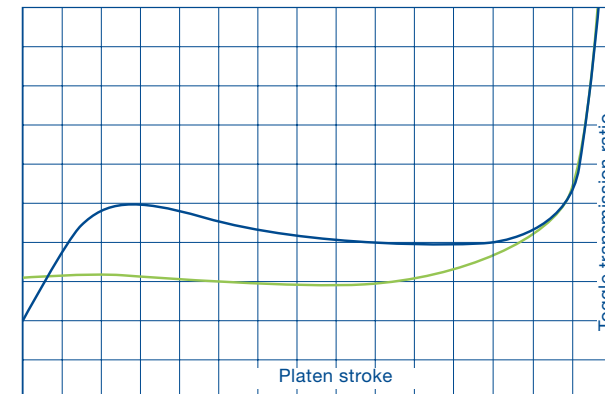


New toggle-clamp – smooth, fast, robust

The clamping unit

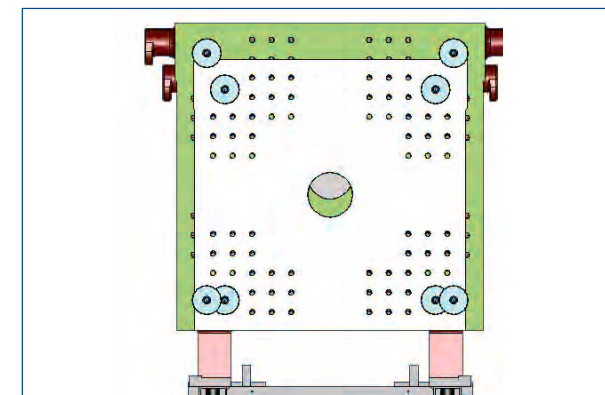


The toggle-style clamp was specially redesigned for high-speed applications. Mechanical transmission gives the system excellent overall rigidity and permits opening forces of 10 to 15% of the clamping force. This allows for safe demoulding of injection moulded parts with minimum draft. To ensure best-possible mould support, the moving platen is implemented in a rigid, box configuration. It is guided on a generously dimensioned moving carriage with low-friction linear bearings.



The key characteristic of the new 5-point toggle clamp is its virtually constant stroke/velocity ratio at high platen speeds (green curve). This allows for far smoother running than previous types (blue curve).

■ Previous toggle transmission ratio
■ New toggle transmission ratio



For all sizes of machine, the platens are available either for a standard distance between tie bars or as „wide platens“ for a larger distance between tiebars (these are standard platens belonging to the next larger machine model). The advantage of the „wide platen“ version lies in the optimum utilization of the clamping force, above all on machines working with large multicavity moulds but requiring a relatively low clamping force, e.g. for the production of screw caps.

ENGEL CC 200:

Time-proven standard in a new design

speed



The reliable control system **for fast-cycling injection moulding applications** with a higher degree of operator comfort

Basic functions

- Switch on,
- User identification,
- USB interface

Settings: Clear-cut control logic

The control logic for the machine and robot support simple programming of an individual cycle sequence without special programming skills. The cycle sequence for the injection moulding process is subdivided into separate basic sequences. These basic sequences – closing, injection and opening – along with the additional subsequences are mapped to characteristic function icons.

“Function library“ for easier programming

Programming modules can be compiled from a comprehensive “function library“. Sequences are compiled in the Sequence Editor by inserting or removing functions. “Drag and Drop“ gives users the ability to select functions from a menu and integrate them with the sequence for serial and parallel execution.

Dialog-based customization supported

To change a parameter, users simply press the corresponding dialog box on the touch screen and change the setting (e.g. for clamping force, closing or opening speed etc.). A plausibility check occurs after saving the modified data set to prevent incorrect settings.

Controls

Flexibly configurable keys for individual machine functions

Standard functions mapped to fixed keyset

For details of hardware and systems, please refer to the special brochure ENGEL control (EC 200 / CC 200)

- > Uniform – intuitively logical – operator interface for machine and robot
- > Featuring the traditional ENGEL operating logic but now further developed and adapted to the Windows world
- > Touchscreen input either with function graphs or numerical data

- > Sequence programming with modular system comprising standard sequences
- > Free programming for special sequences
- > Ample number of interfaces for standard, commercially available peripherals from the PC world



Screen pages: Active Speed Setup

Time is money!

Software for the reduction of non-productive times

Active-Speed-Setup

is a software module specially developed for fast-cycling injection moulding machines. It automates the process of harmonizing and synchronizing the opening and closing movements with the greatest possible speed, thus essentially helping to prolong the service life of the machine. The operation of the software is easy. All the operator has to do is set the desired mould opening stroke and speed on the touchscreen of the control system. The machine control system automatically computes the optimum acceleration profile and the speed of the machine movements, taking even the slightest inherent movements of the machine into account.

This applies both to the normal operation of the machine and to „start-up“. For „start-up“, the virtual slide control on the screen must simply remain set to „slow“ until the basic settings have been made. The speed is then set back to „fast“ and the dynamic of the machine’s movements adapts itself automatically. As the speeds are not only computed but also measured, the resulting times can be indicated both while the machine is at a standstill and while it is in operation.



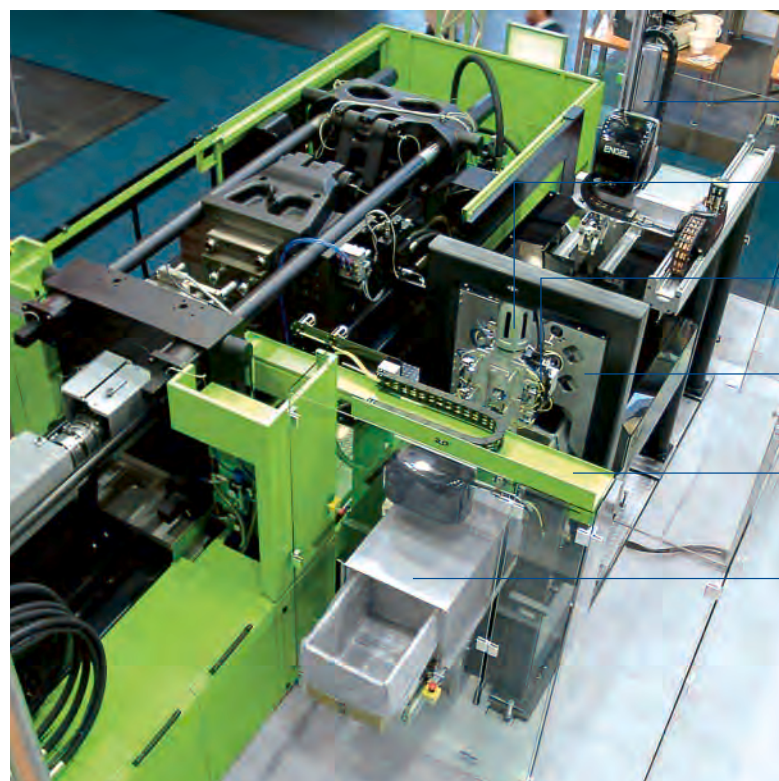
Zero Time Communication

The „Zero Time Communication“ software module serves to minimize the non-operative times of the mould when demoulding is done by means of an ENGEL ERS-Speedy high-speed demoulding robot. With this new software, the computing times normally required by the robot control prior to each machine movement now mostly run concurrently with the machine movements. In a concrete example, with a conventional communication system operating between the machine and the robot, 120 milliseconds are required for signal transfer and computation prior to the entry of the gripper head into the open mould, with an additional 100 ms prior to withdrawal from the mould and 150 ms for computation after withdrawal. Of this total of 370 ms, as many as 310 ms can be programmed with this innovative software to run concurrently with the machine movements. In terms of a conventionally attained cycle time of 1.06 seconds, this corresponds to a reduction of the cycle time to 0.75 seconds.

Automation: ENGEL supplies turnkey systems

Manufacture of machines „Made by ENGEL“

speed



ENGEL ERC 13 small-size robot

Servo B axis

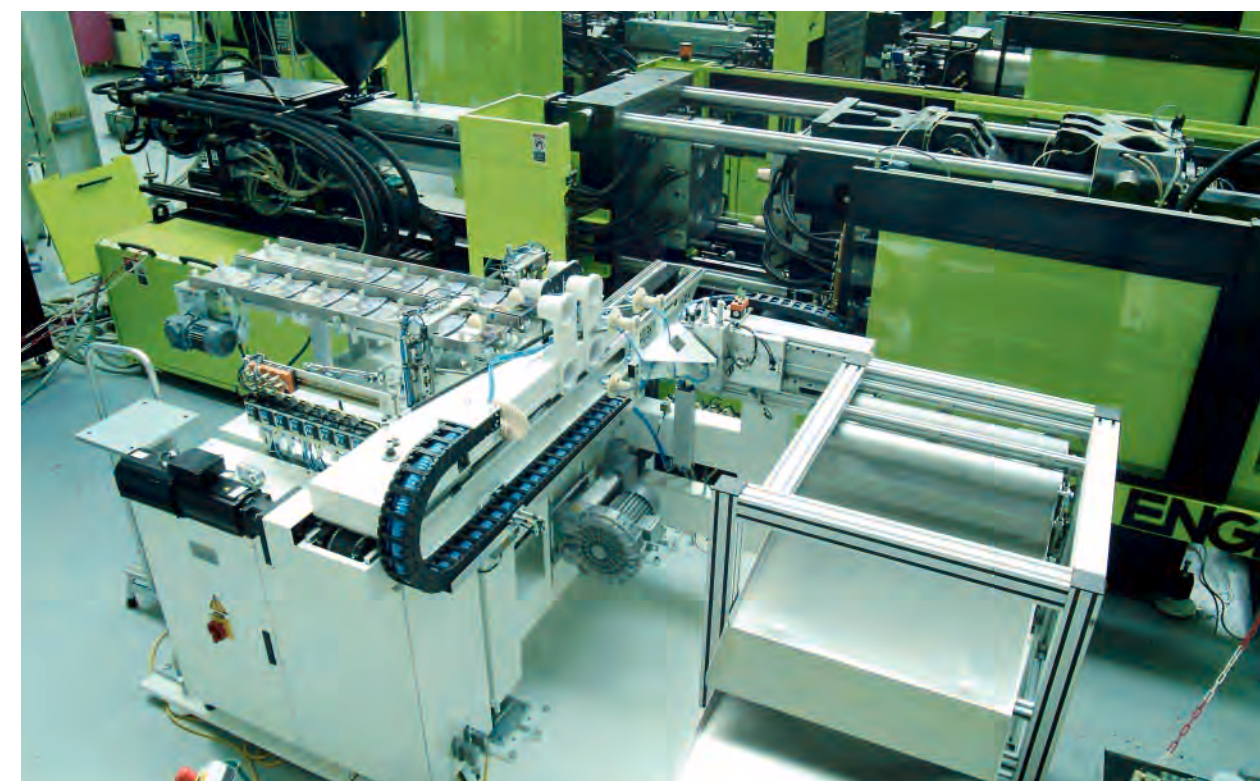
End-of-arm tooling from the
ENGEL GRIP TOOLS tool kit

Product-specific stackers

ENGEL ERS
High-speed part removal robot

Carton feeder

Standard components for automating the high speed machine production cell

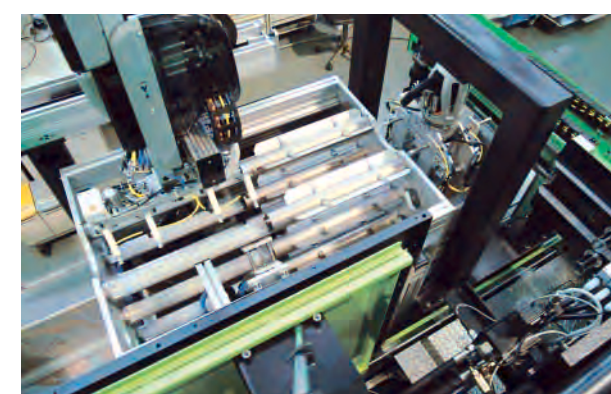


ENGEL ERS (Speedy)

The ENGEL ERS series of high-speed demoulding robots has been systematically designed for the fast-cycling injection moulding of thin-wall parts and is thus the perfect complement to the ENGEL „speed“ injection moulding machines.

The main performance data of the ERS series are:

- > max. speed of movement: 10 m/s
- > max. acceleration: up to 120 m/s² (12 G)
- > min. parts removal time: approx. 0.3 seconds



Tub stacker from Engel's own production

Single-source supplier – with strong partners:

The manufacture of machines has a longstanding tradition at ENGEL, not least because ENGEL offers a comprehensive range of machine components and units from its own production. The range extends from injection moulding machines of every size and capacity and for every application through to high-performance demoulding systems, peripheral equipment, injection moulds and complete production cells.

For special technologies, such as the testing and printing of screw caps or the feeding of labels into injection moulds (in-mould labelling), ENGEL cooperates with the market leaders in the respective technologies.

Machines for containers of any kind – including „in-mould labelling“

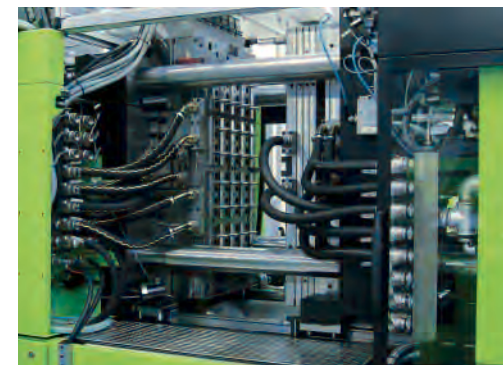
Machines for caps and closure production

speed



Production cells

ENGEL's design of production cells for the production of containers with decorated surfaces draws on technology modules from experienced partners. This applies predominately to inserting and placing of films and labels. Close cooperation of the partners involved in a project ensures highest-standard performance and state-of-the-art technology. Regular maintenance is imperative to ensure peak performance in continuous operations. If needed, Engel's global network of service and training centres will be pleased to assist.



Generously dimensioned media lines

ENGEL speed clamping units are equipped with generously dimensioned media (cooling water) lines and manifolds, geared to match your requirements. „Wide platen“ type machines give you lots of space around the injection mould. The larger horizontal tie-bar clearance in particular provides more space for attachments (cables and hoses, or automation components). The resulting larger tie-bar clearance, and the greater width of the drop out chute, facilitate collision-free demoulding, and thus support best-possible part hygiene.



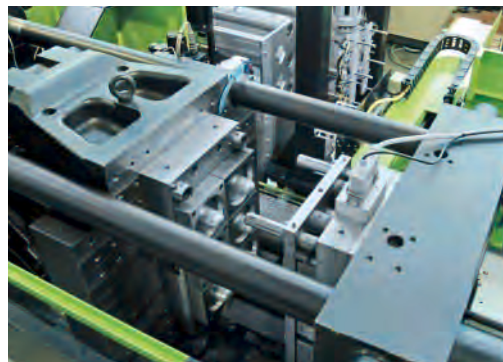
In-Mould-Labeling

Offset printed labels offer a full spectrum of colours and fonts, thereby maximising your potential for premium marketing presentations. Separating and inserting in the mould without losing cycle time requires special automation equipment. The ENGEL speed machines, especially the „wide platen“ designs, give you plenty of space to perform parallel moulding activities, utilising robot potential to the max.



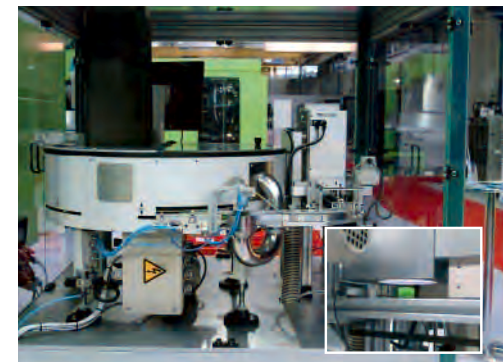
Application-specific conveying technology

Fast cycle times in the production of screw caps necessitate demoulding while the parts are still in their soft, elastic state. The parts must therefore be post-cooled outside the mould. To this end, and to ensure the dimensional stability of the parts, the injection moulding machines operate with downstream conveyor systems equipped with post-cooling sections.



Speed for standard cups

Automation components from ENGEL's own automation technology production are available for standard products - from the ERS (Speedy) type robots, to stacking and conveying equipment. The figure shows a production cell designed for manufacturing pedestal cups with automation modules from ENGEL's own product range.



Quality control

Vision systems can be utilized to guarantee 100% quality control. They are used to for visual checks and measuring of injection moulded parts. The test system can be integrated into a production cell.

Leading packaging manufacturers trust the Engel „speed“ series

speed



Photo of the ALPLA works, Gefell-Sonneberg / Germany



Photo of the MeadWestVaco-Calmar / Hemer, Germany

ENGEL high-performance machines in production globally

Several decades of cooperation between ENGEL and household names in the soft drink, and general packaging industry have led to the utilization of ENGEL machines of various versions, sizes and types throughout the industry. As cap and packaging manufacturing covers a wide range of requirements and performance needs, ENGEL's injection moulding portfolio gives our customers the versatility to match – from

tie bar-less standard machines, fully electric precision machines, to speed machines, up to large-capacity ENGEL duo machines for production of crates, pallets, and large-scale containers.

Within this range of options the ENGEL speed series covers the premium segment where customer demands with respect to speed, precision and efficiency are the most exacting.

Plant planning and project management

ENGEL's position as a supplier of a complete portfolio of injection moulding technology puts us in a unique position to offer you comprehensive plant planning and project management services. Our services range from capacity planning, facility planning, logistics planning for internal processes, through to project management and operator training.

We will be happy to provide you a quote for these services on request.

This service portfolio is particularly useful if you are looking into injection moulding for the first time, or considering moving to the industry, but also a valuable service for companies looking to expand their current production operations.