ENGEL victory.

Machine system with **freedom to move**

ENGEL
be the first.

Machine system with lots of

Space

Freedom in every respect.

No tie-bars. Lots of space. The unique tie-bar-less technology of the ENGEL victory improves efficiency and economy in injection moulding production.

Tie-bar-less. Flexible. **ENGEL.**

Automation – ideal conditions

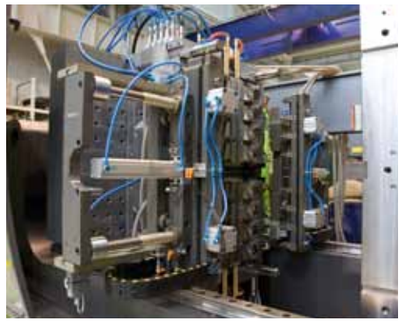
- Faster part take-off, smaller footprint and lower ceiling heights thanks to free access to the mould area for robots and automation equipment.

Machine availability – excellent

- Faster mould changing due to shorter set-up times – even for high and bulky moulds. Lower maintenance costs due to robust, low-friction design.

Mould dimensions – unbeatable

- Better utilisation of the barrier-free mould area. Large moulds or bulky core pulls. The generously dimensioned mould fixing platens can be used to the limit – and often beyond.



Minimum mould wear

The patented ENGEL Flex-Link system and standard **platen parallelism** setting ensure unbeatable platen parallelism.

Outstanding energy efficiency

Low friction, closing pressure lock-in and electro-hydraulic variable capacity pumps ensure low energy consumption. And the optional drive system, the ENGEL ecodrive, raises **energy efficiency** to a new level hitherto only achieved by fully electric machines.

ENGEL victory

The **success** in **figures** more than…

... 20 years ... 10,000 satisfied customers ... 55,000 machines on the market

Production with machines which are one or two clamping force classes smaller

The mould size and not the maximum clamping force is often the key to optimum machine dimensioning. An exact calculation of the required clamping force pays off. The tie-bar-less machine has a smaller footprint and requires less investment costs, particularly with:

- Moulds with multiple cavities
- Non-full-surface moulded parts
- Multiple colour applications

Technical parts and thick-wall injection moulding

With its tie-bar-less advantages the ENGEL victory is the optimum machine for technical and thick-walled parts.

Tie-bar-less. Modular. **ENGEL.**

The versatile ENGEL victory machine series. The construction kit for cost-effective injection moulding production.

The tie-bar-less ENGEL victory covers the clamping force range from 280 to 5000 kN. **In fact, the range of applications is considerably broader**, as the moulded part to be produced is not limited by the clamping force but by the platen size. Large mould fixing platens and the wide delivery chute of the ENGEL victory guarantee low machine investments, because with the ENGEL victory a machine with a lower clamping force will do the job just as well. Particularly when using large and bulky moulds, substantially lower investments are required for machines.

ENGEL victory			80			200			330			500			650			750			1050			1350			1800			2050			2550			3550			4550			5550			7050		
			18	22	25	25	30	35	30	35	40	35	40	45	40	45	50	45	50	55	50	55	60	55	60	70	60	70	80	60	70	80	70	80	85	70	80	90	80	90	105	80	90	105	90	105	120
ENGEL victory 28	30 US	280 kN																																													
ENGEL victory 40	45 US	400 kN																																													
ENGEL victory 50	55 US	500 kN																																													
ENGEL victory 60	65 US	600 kN																																													
ENGEL victory 70	75 US	700 kN																																													
ENGEL victory 80	85 US	800 kN																																													
ENGEL victory 90	100 US	900 kN																																													
ENGEL victory 110	120 US	1100 kN																																												
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ENGEL victory 140	160 US	1400 kN																																												
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ENGEL victory 220	240 US	2200 kN																																												
ENGEL victory 260	285 US	2600 kN																																													
ENGEL victory 300	330 US	3000 kN																																												
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ENGEL victory 400	440 US	4000 kN																																												
ENGEL victory 450	500 US	4500 kN																																													
ENGEL victory 500	550 US	5000 kN																																												

Subject to change!

ENGEL victory tech **ENGEL victory spex & tech**

ENGEL victory spex

- The special series to mark the 20th anniversary of tie-bar-less machines.
- Selected models
- Sequential machine movements
- EHV hydraulics (alternatively ENGEL ecodrive)
- Practice-oriented option pool
- ENGEL CC 200 control unit
- Best price/performance ratio

ENGEL victory tech

- The tie-bar-less machine for all applications.
- Extensive range of models
- Wide range of EHV hydraulic versions (alternatively ENGEL ecodrive)
- Comprehensive range of options, including customised solutions
- ENGEL CC 200 control unit

ENGEL victory combi

- The optimum machine for multi-colour applications
- Additional compact injection units in W, V and L position
- High degree of flexibility and plenty of space for a rotary table or index plate
- Increased mould installation height
- Rotary table optionally with hydraulic or servo-electric drive unit
- Wide range of EHV hydraulic versions (alternatively ENGEL ecodrive)
- Comprehensive range of options, including customised solutions
- ENGEL CC 200 control unit

ENGEL technology modules

The optimum supplement to the ENGEL victory tech and ENGEL victory combi.
Special process technologies or applications also call for special equipment on injection moulding machines. Making special machines from standard machines.

rubber
Screw injection unit adapted to rubber processing

LIM
Equipment package for liquid silicone processing, depending on the case in question with screw or plunger injection unit.

HTV
Plasticizing unit and process software for processing solid silicone. Stuffing unit optionally available.

HART-PVC
Equipment package and plasticizing unit for processing hard PVC.

duroplast
Plasticizing unit and process software for processing Duroplast.

cleanroom
Adaptation of the complete machine in several stages for production under clean room conditions.

foammelt
Equipment package and plasticizing unit for preparation for parts production with microfoam structure.

gasmelt
Gas injection technology for creating cavities in moulded parts.

watermelt
Water injection technology for creating cavities in moulded parts.

The **most innovative clamping unit** of the past decades.

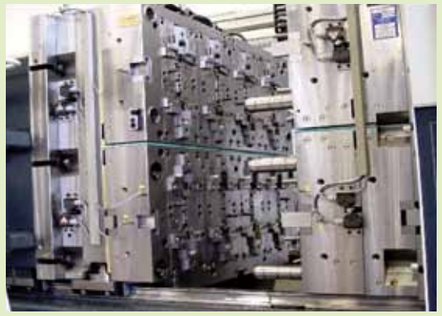
A symbiosis of flexibility, precision and customer orientation.

High-precision mould parallelism

Platen parallelism – and thus mould wear – in the tie-bar-less ENGEL victory is not left to the sum of manufacturing tolerances of the single components. Each tie-bar-less clamping unit is precisely set prior to delivery using the standard, highly sensitive platen parallelism setting. Subsequent fine adjustment is, of course, possible and **guarantees a long service life of machine and moulds**. During clamping force build-up the platen parallelism automatically adjusts to mould parallelism. This unique advantage is implemented through the patented Flex-Link system.

Heavy moulds

Heavy moulds are no problem for the tie-bar-less clamping unit. The high-precision platen parallelism is adequately ensured by the pre-tension of the patented Flex-Link system and support through the massive C frame. And by using additional guide shoes to support the movable mould halves, **mould weight can be increased virtually without limit**.



Large mould dimensions

The standard version of the ENGEL victory tie-bar-less clamping unit already offers greater freedom for the mould than other clamping units. Wider mould fixing platens and greater platen spacing are available as options if necessary. The mould area can thus be set to the **next size with the same clamping force**.

Outstanding energy efficiency

The basic concept of the tie-bar-less machine already guarantees maximum energy savings. In particularly the bearing-mounted precision guide rails, the absence of tie-bar friction and the closing pressure lock-in significantly increase energy-efficiency. **A wide range of configurations for energy saving are possible** in combination with different hydraulic drives from EHV to ecodrive.

Hydraulic **ENGEL injection unit**

High injection performance and excellent process stability.

Excellent injection process control

The hydraulic ENGEL injection units score extra points with reliable control of the injection moulding process. Compared to conventional injection controllers, the „clamped system“ of injection plungers included in the standard version with the highly sensitive electronic controllers reacts extremely quickly to disturbing influences and any process-related changes. **This guarantees excellent injection moulded parts and a high degree of reproduction accuracy.** Control accuracy is even further improved by the electro-hydraulic variable capacity pumps included in the standard version.

A servo-valve is available as an option (standard feature in the ecodrive option) for further optimisation of extremely low injection speeds.

Accumulator for high injection performance

Extremely high injection speeds of up to 600 mm/s are necessary to achieve the required quality of moulded parts with extremely thin walls. The required injection performance is provided by optional hydraulic accumulators. The injection process is controlled by a servo-valve.

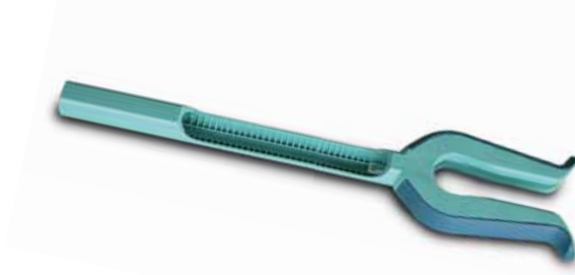
Efficient plasticizing drive

The plasticizing drive is powered by a hydro-motor. These hydro-motors are available in three sizes for each injection unit. Besides the standard hydro-motor, a motor for higher speeds or higher torques is available as an option in each case. This enables the drive unit to be tuned with the respective plasticizing unit and moulding material to be processed, **guaranteeing a high level of energy efficiency**. With the selection of the corresponding hydraulic versions, the plasticizing drive can be operated parallel to the mould movements.

Tuned plasticizing unit

A range of barrel and screw configurations is available **for optimal tuning of plasticizing with the respective application**. The barrel is mounted on the injection unit by means of a quick coupling.

The plasticizing unit is pressed torque-free against the mould; the required force can be set on the machine control unit.

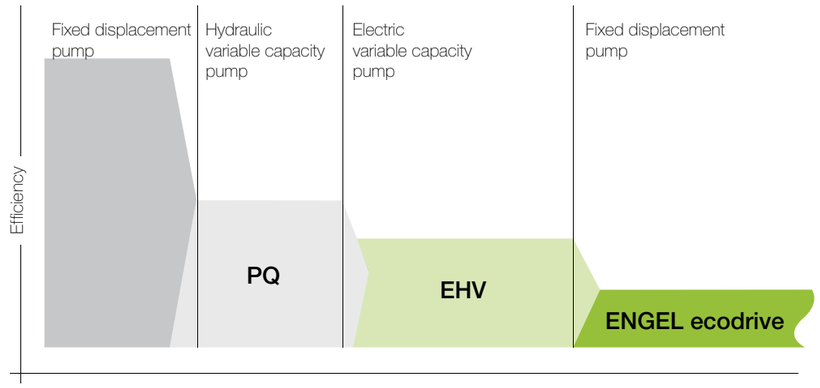


Drive unit.
Energy efficiency.

Efficient ENGEL hydraulics Control of all machine movements: fast, reproducible and energy-efficient

ENGEL is a pioneer in energy-efficient hydraulic concepts. Even more important than efficiency of the hydraulic drive components is the basic hydraulic concept of an injection moulding machine. Since the introduction of the tie-bar-less injection moulding machine ENGEL has had a concept that guarantees in itself very low energy requirements for the central hydraulic system of the respective machine.

Besides the particularly energy-efficient basic machine concept, for many years ENGEL has also been committed to highly efficient hydraulic drive units. ENGEL already set the standard in energy efficiency and control quality over 15 years ago with the replacement of PQ hydraulics by smart pump hydraulics (EHV). And with the new optional ecodrive servohydraulics **ENGEL is now combining the advantages of hydraulics with those of servodrives**. ecodrive offers even better control accuracy and, most of all, sets a new milestone in energy efficiency.



Evolution of hydraulic drive technology

Smart pump hydraulics (EHV)

ENGEL standard hydraulics are based on electro-hydraulic variable capacity pumps. Compared to an old PQ variable capacity pump, an EHV variable capacity pump offers not only a higher level of efficiency of the pump itself, it requires no additional flow control valve for closed loop speed control. The closed loop speed control is activated directly in the pump with a higher degree of accuracy and without the usual pressure or energy loss. **This results in energy savings of approx. 20%.**

Flexibility through modular hydraulic variations.

Whether easily removed moulded parts with a low shot weight, complex moulds with parallel movements or high injection speeds are required. **A sophisticated hydraulic version is available for every requirement profile.**

- Single – pump units for sequential movements.
- Double – pump units for parallel movements.
- Stronger drive units for increased injection and metering performance
- Accumulators for extremely high injection performance
- ENGEL ecodrive for maximum energy efficiency

„Lock-in“ closing pressure

All movements and pressures for the individual machine movements are, of course, closed-loop regulated hydraulically. But where it makes sense – holding clamping and nozzle contact force – the required pressure is hydraulically maintained and thus the holding energy is reduced to zero. **With increasing cycle time, the energy savings grow to a respectable level.**

Drive unit. Milestone. ENGEL.

The „new“ hydraulics - ENGEL ecodrive
Up to 70% energy savings compared to conventional hydraulic machines.
Up to 100% cooling water savings for the oil cooler

ecodrive *inside*

ENGEL ecodrive - a revolutionary hydraulic concept with decisive advantages:

- Excellent energy efficiency
- Substantially lower cooling water requirements
- Extremely low noise level
- Optimum for clean room applications
- Includes „on-board“ hydraulics for operating core pulls

ENGEL ecodrive. The system:

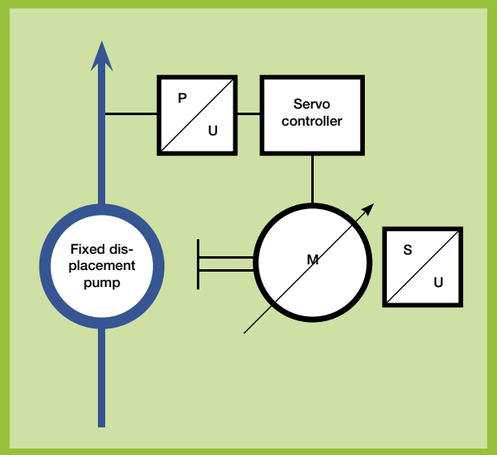
ENGEL ecodrive in the ENGEL victory consists of a servomotor with fixed displacement pump (instead of a permanently running asynchronous motor with variable capacity pump). Energy efficiency depends on various criteria, of which two should be highlighted here:

No control valves in the central drive unit for speed and pressure control

Each control valve causes energy losses due to the pressure differential. ENGEL ecodrive regulates speed and pressure without control valves, permitting a substantial gain in efficiency. The speed is controlled via the fixed displacement pump speed without additional pressure and energy loss. A unique feature is the closed loop pressure control by means of completely new control algorithms directly via the speed of the pump and no longer via a pressure control valve.

No drive operation when no machine operation

When at a standstill, ecodrive eliminates idling and purging energy consumption as occurs in conventional hydraulic systems. An idle pump consumes no energy. This is substantially supported by the energy-efficient machine concept (e.g. closing pressure lock-in)



Oil temperature indicator of the energy efficiency of hydraulic machines

Energy efficiency

ecodrive boosts energy efficiency by radical reduction of the energy dissipation common to conventional hydraulic machines. The portion of supplied energy that is not applied as movement energy for individual machine movements is transformed into heat. The majority of this heat is transferred to the hydraulic oil and via the oil cooler to the external cooling water processing plant.

ecodrive reduces energy losses to such a high extent that – with the exception of high performance applications – only minimal heating of the hydraulic oil occurs. **Cooling water consumption at the oil cooler is reduced to a minimum, in many cases to zero.**

The „noiseless“ machine.

The elimination of permanently running hydraulic pumps considerably **reduces noises emissions from the ENGEL victory with ecodrive**. The only thing that is missing in energy-efficient production with the ENGEL ecodrive is thus excessive noise.

Ideal for clean room applications

The ENGEL victory is extremely suitable for clean rooms alone due to the tie-bar-less technology and elimination of friction. An additional advantage is offered by ecodrive. The servomotors used do not have motor cooling fans, and thus there is **no air turbulence** resulting in a higher particle concentration.

„On-board“ hydraulics

ecodrive offers all the prerequisites for energy-efficient and **space-saving production with hydraulic core pulls**. For parallel movements of the ejector, core pulls and nozzle, ecodrive can also have two completely independent drive units.

ENGEL CC200 control unit
Intuitive. ENGEL. Operation.

The control unit of the ENGEL victory is the perfect interface between operator and machine. Besides the clearly configured basic functions, the CC200 has two further impressive features which assist the operator in coping with today‘s injection moulding production requirements.

Machine and robot sequence at a glance

The freely configurable machine sequence supports simple, individual configuration of sequences throughout the injection moulding cycle. **Even complex programme sequences including robot can be easily and reliably created, visualised and modified using graphical tools.**

The machine sequence can be set in advance on the PC with the supplied „virtual machine“. **Faster mould changing, less risk of mould damage** and ideal training opportunities for operators are among the major benefits.

Quality monitoring

A wide range of modules for monitoring the quality of moulded parts are available as a standard or option.

Both the direct graphic monitoring of all key parameters of the injection moulding process and the recording and statistical evaluation of the same are displayed in a simple and clear manner. This **data can be collected and evaluated at a central point** via an interface to external production planning and monitoring systems.

Energy efficiency with ENGEL ecograph

The standard ENGEL victory control unit incorporates ENGEL ecograph, an energy analysis tool. This tool enables the operator to check the machine's energy consumption and to optimise **the energy efficiency of the injection moulding sequence**.

Robot. Freedom. ENGEL.

The injection moulding machine is in many cases only one element of the overall, often complex production cell. Robot and automation components perform a variety of tasks. These range from insert-placing and take-off actions at the injection mould, including mounting and checking operations, to packaging of the finished product.

The aspect of cost-effectiveness is usually founded in the overall concept and not its individual components. **And this is precisely where the tie-bar-less ENGEL victory has a critical edge.**

Smaller footprint

Because there are no tie-bars in the way, the robot can move in and out of the mould horizontally when the safety gate is open. The automation can thus often be built closer to the machine, which saves space.

Low ceiling height

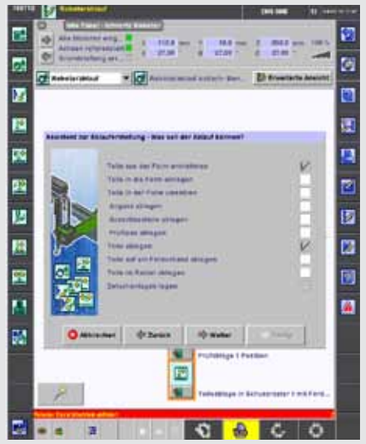
Production can take place without problems and risk of collision in low halls or beneath crane runways, because the robot does not need to move out of the mould in an upward direction.

Shorter production cycle

The cycle time is shortened due to the direct, horizontal in- and outward movements of the robot, particularly in the case of complex automations.

Robot simple to operate

The new wizard for the robot and integration into the machine control unit make it possible!



Integrated automation

Tie-bar-less machine technology is an ideal prerequisite for machine-integrated automation. The robot always moves within a slightly widened machine safety gate. After short horizontal movements it places the parts onto a conveyor belt directly adjacent to the mould fixing platens. Smaller footprints, lower system heights, smaller robot sizes and the elimination of additional safety guarding for each robot secure lower investment costs and better utilisation of the production hall.

Sprue take-off

The ENGEL victory offers optimum conditions for reliable and fast sprue take-off by the sprue picker. Sprue ejection chutes are available as an option for the non-operator side safety gate.

Automation solutions from ENGEL

It goes without saying that ENGEL also supplies automation solutions, according to the motto „All from a single source“. The ENGEL viper and ENGEL ER-USP robot series are ideal for use in combination with the ENGEL victory. Ready automation packages are available for simple take-off tasks. Special advantages are offered by machine control unit operation. In particular, the creation of a common mould data set brings substantial benefits to the user.

Multi-colours. Combimelt. **ENGEL.**

Market leader and pioneer in multi-colour injection moulding. ENGEL combimelt.

Injection unit in „W“ (piggy-back) position

Injection unit in „V“ position

Injection unit in „L“ position

Moulds for multiple-colour applications require a relatively low clamping force for the mould size. This is because the sum of the projected surfaces of the cavities is usually very small.

Particularly here, the generously dimensioned and barrier-free mould area offers more flexibility in machine dimensioning and mould changing. It is especially important to take tie-bar-less technology into account in the concept phase of a project. This can save time and costs.

The right combination of units for each application

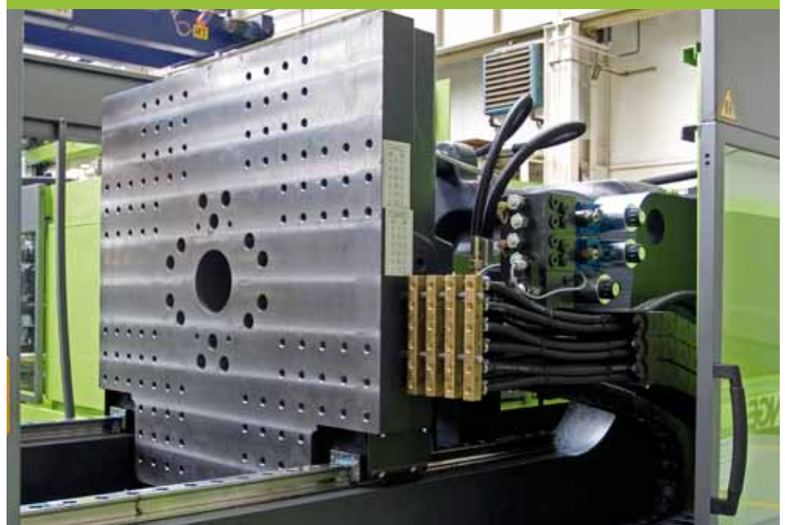
When large shot weights, small footprint, low system heights or full freedom for automation are called for, ENGEL combimelt is the right solution for every application.

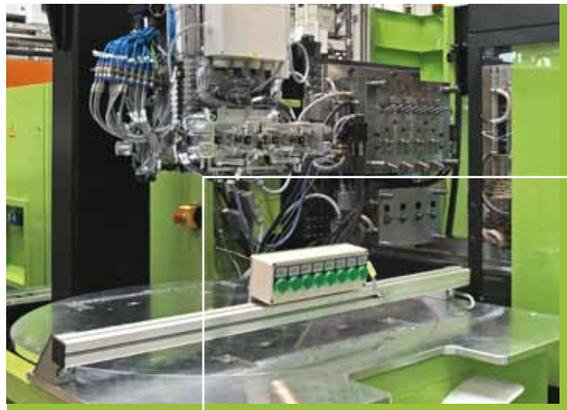
The right technology for every part

The ENGEL victory optimally supports all multi-colour mould concepts: rotary tables, index plates, slide technology, co-injection or transfer of parts by a robot.

Requirements.
Solutions. **ENGEL.**

The tie-bar-less ENGEL victory.
The basis for demanding production cells.





ENGEL has the optimum solution for every requirement. And, above all, the flexibility of the tie-bar-less ENGEL victory series leaves nothing to be desired. It is the ideal machine for an extensive range of technical parts, thick-walled injection moulding and many standard applications.

The extensive standard features and wide range of options are your guarantee. Furthermore, our experienced ENGEL technicians are committed on a daily basis to the satisfaction of special customer requirements.

51030-0051/en/10-2010

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