



insert



**Series**

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

**Integrative technology**

- ENGEL robot
- 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



**ENGEL**  
be the first.

**ENGEL**  
be the first.



## Placing and positioning inserts in the mould

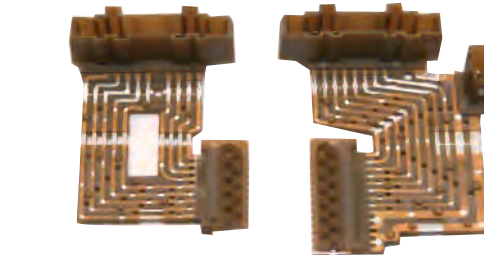
### The right machine combination for every insert

- > Sixty years of experience in the design and construction of vertical machines are the firm foundation of ENGEL's innovative yet highly perfected technology
- > Comprehensive modular system for every conceivable application
- > Service-proven standard structural units are the mark of ENGEL quality – on special machines
- > Additional specifications and new machine combinations are also possible – please inquire
- > All products from one supplier: automation components and injection moulds complete the range of equipment offered by ENGEL

The in-mould assembly of plastic parts with components (inserts) manufactured from other materials is an important aspect of industrial production. Injection moulding machines with vertical clamping units not only eases the automation of difficult parts handling operations but also creates the prerequisites for automatic in-mould component assembly.



## Putting material synergies to optimum use



Team work is so often the key to success. This applies not just to co-operation between human beings but also to the interaction of different materials. Metal and plastic composites are often of great importance to the optimum performance of technical components and equipment. Their quantity and complexity increase with every new generation of equipment. The same applies to plug/cable combinations. Sensors are increasingly important components in this technology. With its series of insert machines, ENGEL can supply the right combination for all applications.

# Vertical injection unit

## ENGEL insert V

Injection units	Available screw diameters in mm per injection unit			Injection units / Vertical*	80	200	330	500	650	750	1050	Rotary table
				Clamping unit								ø in mm
80 / ...	18	22	25	insert ... / 40								1200
200 / ...	25	30	35	insert ... / 60								1200
330 / ...	30	35	40	insert ... / 80								1200
500 / ...	35	40	45	insert ... / 100								1200
650 / ...	40	45	50	insert ... / 130								1200
750 / ...	45	50	55	insert ... / 160								1200
1050 / ...	50	55	60	<b>The basis of success</b> Through the use of standard structural units for the injection unit and drive, ENGEL insert machines offer the same high degree of quality and reliability as the standard range of ENGEL injection moulding machines. These basic types are only the starting point for a wide spectrum of machine variants specifically adapted to all applications.								
1350 / ...	55	60	70									
1800 / ...	60	70	80									

\* International type-size designation, calculated from: max. stroke volume [cm<sup>3</sup>] x max. injection pressure in [bar] / 1000

Vertical clamping units with clamp forces ranging from 400 kN to 1,600 kN, featuring tiebarless C-frame design, similar to the systems featured by the ENGEL victory clamping units.

Advantage:  
Standard injection moulds can be used without any need to convert the injection system. In the simplest case of application, the vertical injection unit is combined with a C-frame clamping unit with only one moulding station. Combinations with multi-station rotary tables or two-station shuttle tables are also possible.



# Horizontal injection unit

## ENGEL insert H

Injection units / Horizontal*	80	200	330	500	650	750	1050	1350	1800	Rotary table
Clamping unit										ø in mm
insert ... / 25										1200
insert ... / 35										1200
insert ... / 40										1200
insert ... / 50										1200
insert ... / 70										1200
insert ... / 90										1200
insert ... / 120										1200
insert ... / 140										1200
insert ... / 160										1200
insert ... / 200										1200
insert ... / 240										1200
insert ... / 300										1200

Bridge-style clamping units with clamp forces ranging from 250 kN to 3,000 kN, and a wide range of horizontal injection units, offer a large variety of combinations for injection moulds for gating either at the parting line or via a hot runner system with a lateral gating point.





## Standard equipment: the best conditions for in-mould component assembly

### Special machines built from standard structural units

Through the use of structural units from the standard range of ENGEL machines, the ENGEL insert machine is a reliable standard machine featuring ENGEL's customary high standard of quality. The application-specific equipment modules are the product of more than 60 years' experience in the manufacture of vertical machines. Reliability and efficiency of operation and production are the result.

### 01 Insert H: Vertically adjustable injection unit for optimum flexibility.

The optional centralized vertical adjustment system permits rapid resetting when changing over from one mould to another.

### 02 Insert H: Operator safety through nozzle guard.

A nozzle guard fitted over the injection nozzle of the plasticizing unit provides protection in the unlikely event of an egress of melt during the injection operation.

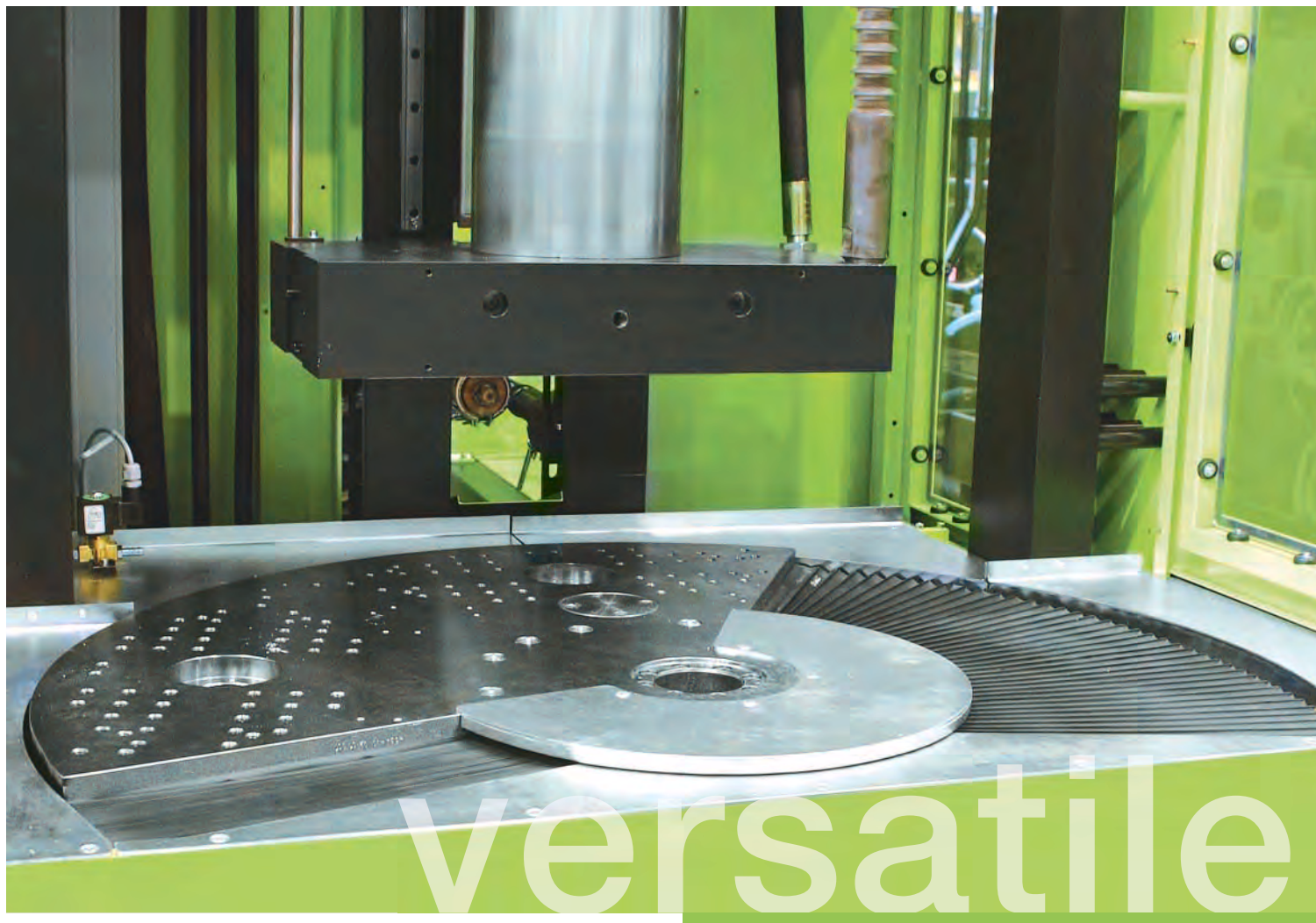
### 03 Insert V and H: Parts handling made easy

The parts handling areas of both machine models are ergonomically designed. The mould area is protected by a light beam guard that allows fast access, as there is no need to wait for mechanical safety gates to open. The safety functions of the light beam guard can be preset according to actual requirements. Combination of the light beam guard with a mirror system permits two-man operation, at two workplaces, with the greatest possible freedom of movement.

### 04 Insert V and H:

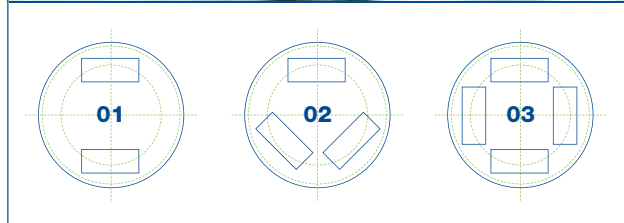
The rotary tables are driven by hydraulic motors – a proportional valve ensures fast indexing and exact positioning. Alternative types of rotary table equipped with servo-electric drives are currently in development. Separately actuating ejectors are available for both moulding stations (see photo).





## Between the platens – Rotary tables as standard

Two-station rotary tables are standard equipment on ENGEL insert machines. The standard diameter is 1200 mm. Rotary tables are optionally available in a 1600 mm diameter as well as other customer specified sizes (please inquire).



### 01 Two-station rotary table

The two-station version permits 180° reciprocating operation, enabling production with either one or two bottom mould halves. With this version, the hoses for the heating-cooling medium, the hydraulic oil and the sensor cables can be routed to the mould via the hollow shaft of the rotary table. Alternatively, a rotary union can be used (available option).

### 02 Three-station rotary table (option)

The three-station version permits indexing operation in 120° increments, enabling production with either two or three bottom mould halves. With this version, a rotary union for supplying the media to the bottom mould half is required.

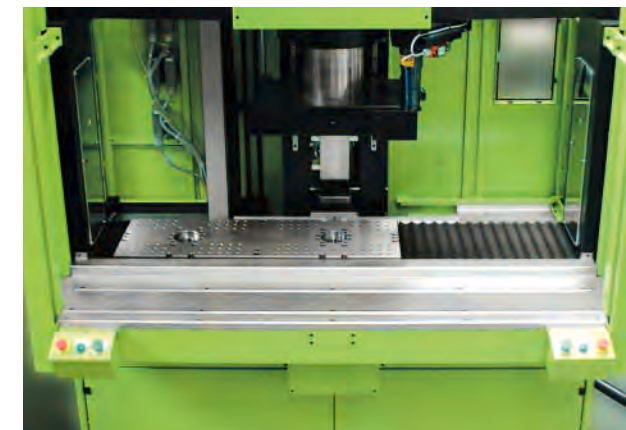
### 03 Non-standard rotary table (option)

Non-standard rotary tables, e.g. segmental rotary tables (see large photo above), are optionally available for special projects. Rotary tables are also available in special dimensions, and with four or more stations, for special machines equipped with two injection units or for projects requiring complex handling systems.

## Shuttle tables available for special applications

### Shuttle table as an alternative for special applications

In cases where the use of rotary tables is impractical, e.g. if the parts to be encapsulated are too long or too awkwardly shaped, shuttle tables can be used as an alternative. Two bottom mould halves move back and forth at right angles to the longitudinal machine axis. Any cables, wires or conduits attached to the insert can hang out of the injection mould at the front and move easily with the mould. The insert-placing and parts-removal operations are generally performed by one operator. Both moulding stations are equipped with separately actuating ejector units.



### Single-cavity station without rotary or shuttle table (option)

Vertical machines without rotary or shuttle tables are the recommended alternative for applications involving awkwardly shaped inserts or for small production runs with standard injection moulds (in cases, for example, where it would not be worth investing in a mould with two bottom mould halves). For such applications, ENGEL offers a machine equipped with a vertical single-cavity mould station. This alternative is available with a choice of either a horizontal or vertical injection unit.





## New design with optimised user ergonomics



### 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 touchscreen 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 controlled through fixed pushbuttons

## ENGEL EC 200 / CC 200

### Tried and trusted machine controls geared to handle new demands

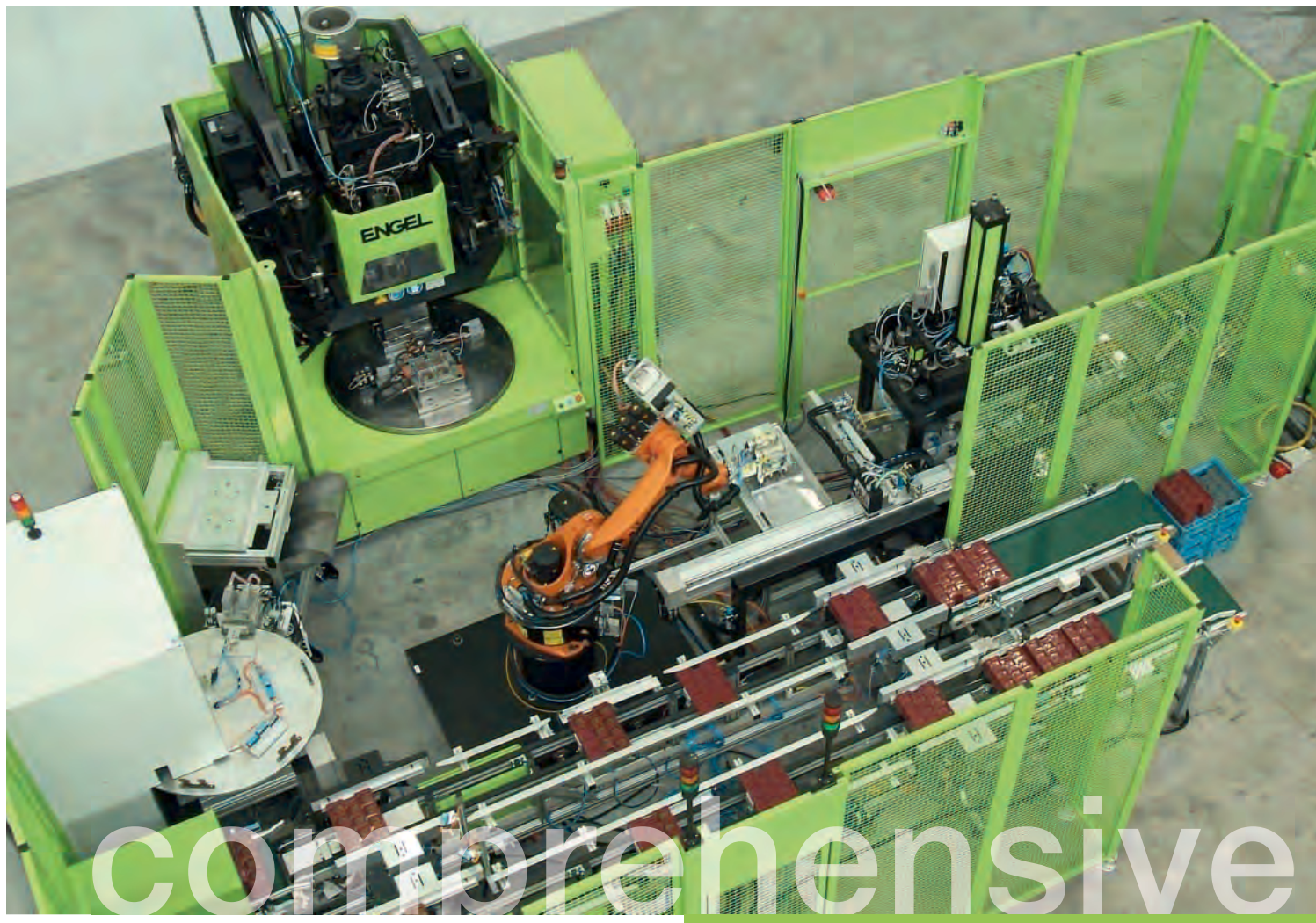
#### New operating convenience

- > Standardized – intuitively logical – user controls for the machine and robot
- > Continues the traditional ENGEL control logic, however, adapted to the world of Windows.
- > Uses a touch screen for input. Input can be entered via functional graphs or keyboard pop ups
- > Free programming of cycle sequence via graphical icons
- > Large selection of interfaces to industry standard peripheral units from the PC world

Depending on the complexity of your injection moulding project, and the resulting feature set, machines can optionally be equipped with the EC or CC 200 control unit variants. The range of additional options defines the difference. The EC 200 has a limited scope of available options and program packages, whereas the CC 200 has enhanced processor performance and a full range of options and custom programs. The basic functionality of the control units, and the control logic of the two variants, are identical.

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





## Highest efficiency through automation – even for complex tasks

### ENGEL insert – ideal for metal and plastic composites

The economically efficient production of working parts for household appliances, automobiles or industrial equipment would be inconceivable without metal and plastic composites. Typical examples are multi-pin plugs and sockets for a diversity of applications and such automotive components as doorlock casings, electrical housings, exhaust and brake sensors, and airbag gas generators.

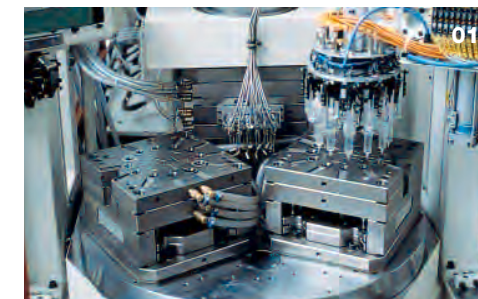
### Flexible automation

The design concept behind the tiebarless clamping unit provides optimum scope for combination with automation equipment, such as linear or industrial robots. The flexibility of this concept is further increased by the broad spectrum of combinations with rotary or shuttle tables.

## Production cells

### 01

Three-position rotary table arranged for 3 x 120° indexing with one injection station and two handling stations (insert-placing and parts-removal). For this particular application, the rotary table rotates in one direction only. Both handling stations are automated, each with an ENGEL ERC linear robot. In this example, two separate parts of a drip chamber for an infusion set are assembled with a plastic ring to form an integral unit.



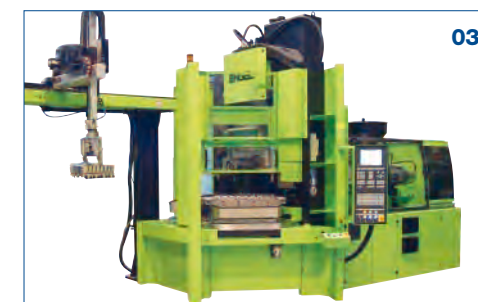
### 02

An example of an automated production cell for the mass production of knives or tools with moulded-on handles. The advantage of this automation concept lies above all in the large number of mould cavities that could not be economically handled by any manual means. The insert-placing and parts-removal operations are performed in this example by an ENGEL linear robot operating as a stand-alone unit.



### 03

The automation of handling operations is possible not only for inserts of compact size and shape but also in cases where flexible parts pre-assembled with cables have to be handled. The production cell illustrated here has been built for the production of electrical cables with connectors at both ends. The insert-placing is done manually. The parts-removal operation is performed by an ENGEL ERC linear robot. Equipped with three work stations, the rotary-table clamping unit fully meets work place safety requirements.



## 60 years' experience with vertical machines – service worldwide

insert



Photo: Conti-Teves / Veszprem / Hungary

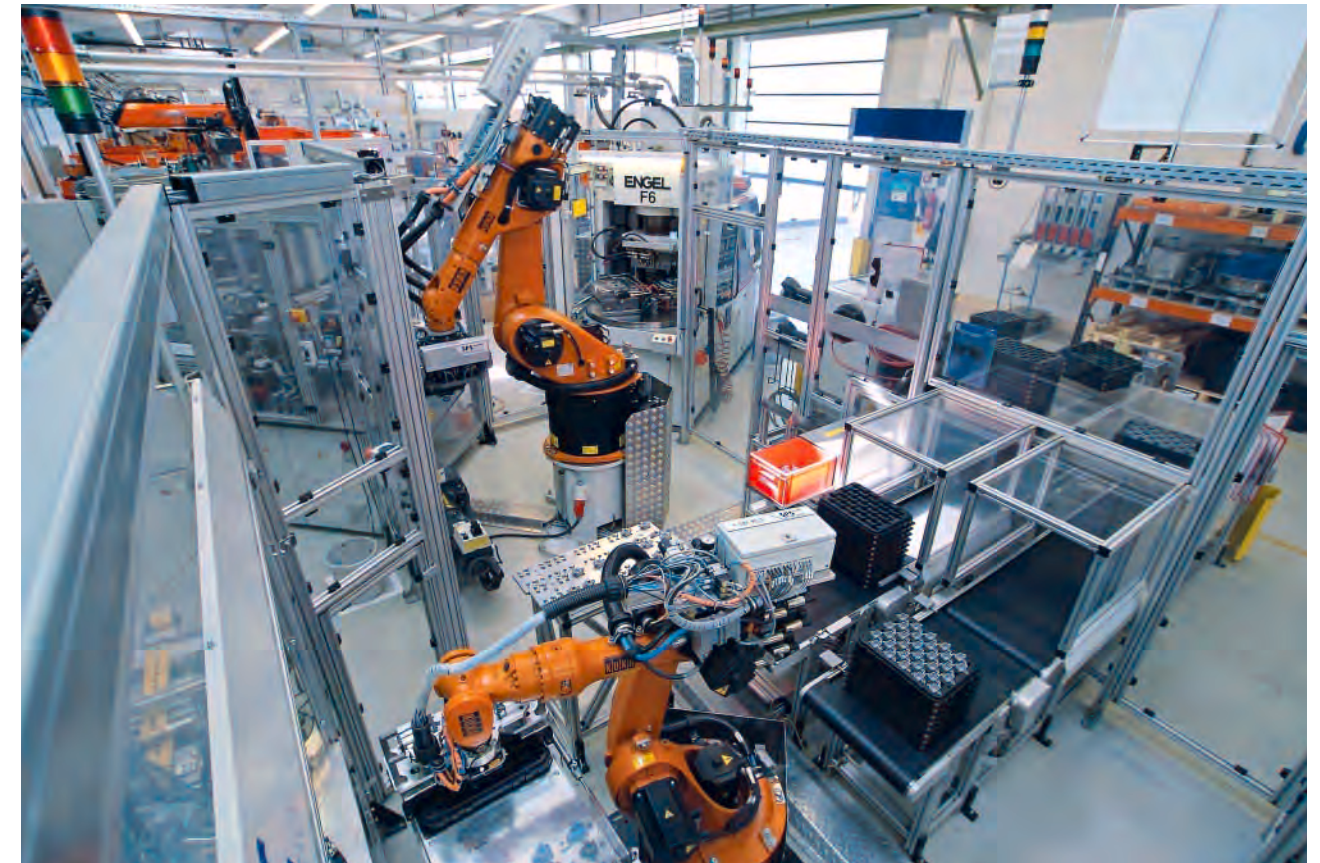


Photo: FCI Framatome / Mattighofen / Austria

### Vertical injection moulding machines for efficient in-mould assembly

ENGEL has been building vertical machines for more than 60 years – all types of presses to begin with, and then injection moulding machines. It is not least to this many years' practical, application-based experience that the ENGEL insert series owes its conception and development. It is based on the practical advantages of the tiebarless clamping unit as featured on the successful ENGEL victory series of standard injection moulding machines.

Although ENGEL's list of customers reads like an industrial „Who's Who“, ENGEL insert machines have proven themselves not only in the service of large international corporations, but also in small injection moulding shops just starting out in business, and in countless small and medium-sized companies – in fact wherever there is a need for the in-mould combination of metal inserts, cables, tubes or profile sections with plastic parts. There is no end to examples and references.

Application is not confined to just one branch of industry. Such high-precision, versatile parts combining different materials and components are required not only in the automotive industry but also in medical technology, teletronics and engineering in general. Consequently, the ENGEL insert is the special machine for the efficient production of innovatively designed composite parts.

ENGEL manufactures its insert machines in its own production facilities in Europe (Schwertberg/Austria) and North America (Guelph/Canada). ENGEL has a network of sales branches and agencies in some 90 countries.