



ENGEL at K 2010 – Inject the Future

ENGEL Nr. 1 in Energy Saving

Schwertberg/Austria – May 2010. Competitive performance and innovation are major criteria for success, especially in difficult economic times. Despite the crisis in the past months, ENGEL has continued to invest in research and development and can thus offer its customers the best conditions for succeeding on today's markets. Numerous innovations and ongoing developments – especially in the area of energy efficiency and process technology - once again demonstrate ENGEL's innovative drive.

Machines with the best efficiency available

The use of energy-saving machines and energy-saving systems is still in the injection moulder's focus. And this makes it all the more important for the machine manufacturer to face these challenges and offer innovative and sustainable energy-efficient solutions for injection moulders. Numerous optimisations to our machines in recent years have helped to continually boost efficiency. Barrel insulation and suction, machine-integrated mould cooling, or the new ENGEL ecodrive servohydraulic drive system have all contributed to considerable increases in the efficiency of ENGEL's injection moulding machines. Today, ENGEL offers the solution that maximises energy savings for more or less any application. Both for small and mid-range machines, and for large-scale machines. ENGEL ecodrive in particular, is a major milestone in energy savings with hydraulic machines.

ENGEL ecodrive's benefits are particularly great when it comes to the tiebarless ENGEL victory and e-victory machines. Deploying electrical injection units along with servohydraulics has an additional positive effect on the energy household, as no energy is consumed while the hydraulics are idle, thus leading to vastly improved energy utilisation.



All told, the use of ecodrive with ENGEL victory machines can save up between 15 and 65 percent of specific energy consumption compared with standard hydraulics. In case of extremely short cycle times, no-load power losses has a fairly insignificant effect. This means that savings are low in this kind of production process. The situation is different in case of long cycle times – minimisation of no-load power losses can lead to savings of up to 65 % in specific energy consumption. As an example, the ecodrive drive system can save 35.6 percent energy in the production of fittings (cycle time: 27.2 s, shot weight: 87.2 g) on a victory machine with a clamping force of 1,200 kN and ecodrive. The use of ecodrive with ENGEL duo large-scale machines is new. As these machines often require longer holding pressure times due to the type of process they run, a servomotor in combination with an electrically adjustable variable displacement pump ensures stable holding pressure control. A specially developed software tool for operating point optimisation guarantees the best overall efficiency of the drive system for any speed and pressure that occurs by optimising the servomotor setting and the pivot angle on the variable displacement pump. Thanks to this ecodrive drive system, the duo machines can achieve energy savings of between 10 and 30%. Ecodrive plus with an additional electrical screw drive for plasticizing opens up an additional energy saving potential of 10 percent.

ENGEL e-cap – A revolution in cap production

Some 730 billion caps are produced worldwide every year, with growth of around six percent per year. The requirements in this segment are correspondingly stringent. Low cycle time and at the same time high output levels, maximum flexibility and low energy consumption are the buzzwords. With the new machine series e-cap – the only all electric solution for this application in the market, ENGEL successfully delivers the requirements in cap production. And does so with a cycle time of less than three seconds. Compared to all the other machines on the market, the e-cap has by far the lowest energy consumption. This is made possible by a new premium quality injection unit, increased ejector force and a reinforced clamping drive.



Small machines for micro injection moulding

ENGEL's development of a new, small-scale electric injection unit with a screw diameter of 15 mm opens up new potential for micro injection moulding.

Using an e-max 50/50 or an e-victory 50/28 it is now possible to achieve shot weights of less than 1 g and part weights down to 0.1 g with a high level of reproduction accuracy.

The performance data of the new 50 unit can handle any challenge. Two new drive variants with injection speeds of 330mm/s (standard) and 550mm/s (high) are available for the new screw diameters (15/18/20 mm). The optimized screw geometry, in combination with a specially designed feed opening throat, ensure trouble-free processing of standard pellets with improved plasticizing and reproducibility, even with this small diameter, thus making it perfectly suited to use in micro injection moulding.

The new ENGEL viper robot series

The new ENGEL viper linear robot generation combines maximum stability with impressive dynamics and best-of-class operator convenience: it saves weight thanks to its innovative design using laser-welded steel sections and impresses users with a substantially higher manipulation weight. Clever software additionally ensures faster cycle times, improved productivity and a longer working life:

- A **mass identification software** detects the current manipulated mass "online", adapts the dynamic values to match, and thus ensures optimised acceleration.
- **"vibration control"** reduces structure-borne vibration, even for large axis dimensions.
- **"efficiency control"** optimises robot movements for maximum productivity while consuming very little energy.

Self-optimisation of acceleration and speed values additionally reduces the handling time, thus avoiding unnecessary stress on mechanical components and the drive train. The new ENGEL viper series will replace the ENGEL ERC series as of the K fair.



Production of optical parts - the right solution for any application

Optical technology is regarded as one of the strongest growth industries. Plastics continue to grab the focus when it comes to material selection. This explains why so many moulders are entering this innovative field.

ENGEL has again developed the right process and machine technology for more or less any application in this field. In particular, injection-compression moulding, multiple layer injection moulding and vario-thermal mould temperature control have set standards in this area. Contour accuracy is one of the major requirements in the production of optical parts. In many cases dimensional tolerances of less than +/- 10 µm are required. Thanks to the positioning accuracy of fully-electric injection moulding machines, the required reproduction accuracy can be achieved. These benefits are critical in injection compression moulding in particular.

The latest optical part production method by ENGEL is multiple layer injection moulding, or overmoulding for short. This involves moulding one or more layers of the same material on top of a prefabricated premould in one or multiple steps. The major advantage is that surface defects can be compensated, thus achieving consistent contour accuracy. On top of this, due to the more pronounced cooling of the interior surfaces, the cooling time can be substantially reduced compared to single layer lens production.

Single stage processes with combination technologies

Combination technology refers to a combination of process technologies to create a new integrated production method. The basic advantages and disadvantages of combination technologies can be described as follows: on the one hand, they guarantee a high level of sustainability for the user of the technology; the energy savings in the whole chain from material preparation through to the moulded part are extremely high; logistic overheads drop dramatically, thus reducing the impact on the environment. On the other hand, this also reduces total cost. More benefits are achieved by the ability to develop a unique selling point as the technologies are less widespread.



Disadvantages are inherent in the increased complexity of the linked systems. It is part of the developer's skill to equip the machine with simple controls and to build it in a way that assures minimal downtime.

ENGEL is the market leader in this area and has developed numerous methods. For example, the ENGEL clearmelt method enables the production of decor parts with a scratch-proof surface and 3D effect. The production system achieves this by using sliding table technology to inject transparent polyurethane over a thermoplastic carrier. Compared to legacy approaches such as multiple layer coating, excellent productivity and thin layers are the major benefits.

The clearmelt technology links the injection moulding machine via an interface to the PUR machine. The carrier part is injected on the first unit. After the cooling time, the machine is opened and the component remains in the core. Using a sliding table or swivelling plate, a 2nd mould is prepared, after previously having been sprayed with a release agent. The release agent prevents the Polyurethane (PUR) sticking to the steel of the mould. The mould is closed again and a mixing head injects polyol and isocyanate into the new cavity – in the following crosslinking reaction, this mixture is converted to cured polyurethane. After take-off, it is necessary to mill the sealing edge and remove the remaining release agent in a polishing step to achieve the required gloss.

Another of ENGEL's developments is the PUR low-pressure technology that enables the integration of foamed PUR seals in components without resorting to multiple component injection moulding. In this case, the seal is applied to the part by a robot head without using a shaping tool. 1K and 2K PUR systems are used for this.



Lightweight construction with organic sheets

Previously, highly-integrated structural parts such as automotive frontends have been implemented as composite using a hybrid technology of steel sheet and glass fibre reinforced polymer such as polyamides in injection moulding. To drive lightweight design, steel and aluminium sheets are now being replaced by thin organic sheets.

They comprise a special fabric of glass or carbon fibres embedded in defined orientation in a thermoplastic matrix of e.g. polyamide or polypropylene and manufactured as a semi-finished product on double belt press lines. The main criterion for force transmission is good bonding between the thermoplastic matrix and the fibres by means of a coupling bonding agent. This makes it possible to create hybrid components that are made completely of polymers. Compared to their metal counterparts they are far lighter, demonstrate an improved area moment of inertia and absorb more energy in case of crash, thus protecting the vehicle's passengers.

Polymer hybrid components with a high level of integrated functionality can be manufactured in automated ENGEL production cells by pre-shaping of the organic sheet and moulding on the reinforcing ribs and functional elements. To allow this to happen, typically extremely thin organic sheet precuts (0.5 to 2.0 mm wall thickness) are heated for a brief period in an infrared radiation field to prevent oxidative degradation of the thermoplastic matrix and then preferably pre-shaped by a robot head en route from the preheating station to the mould and then shaped by the insert-placing process at the mould. Compared to conventional hybrid technologies (only mechanical bonding between the metal sheet and the polymer without bonding agent), preheating of the organic sheet can create a firm bond with a high degree of bonding rigidity which matches the capability of a good adhesion or welding process.



ENGEL AUSTRIA GmbH

The ENGEL brand denotes the world's biggest manufacturer of injection moulding machines and, at the same time, one of the world's leading plastics processing machine manufacturers. Today, the ENGEL Group offers a full range of technology modules for plastics processing as a single source supplier: Injection moulding machines for thermoplastics and elastomers, as well as automation, with the assurance that individual components are also competitive and successful in the world markets. With eight production plants in Europe, North America and Asia (China, Korea) as well as subsidiaries and representatives in over 85 countries, ENGEL offers its customers the optimal global support they need to compete and succeed with new technologies and leading-edge production systems.

Contact for queries:

Gerd Liebig, Group Marketing Director, ENGEL AUSTRIA GmbH,
Ludwig-Engel-Straße 1, A-4311 Schwertberg/Austria, Tel.: +43 (0)50 / 620-3800, Fax: -3009
Email: gerd.liebig@engel.at

Eva Haslinger, Marketing Manager Public Relations, ENGEL AUSTRIA GmbH,
Ludwig-Engel-Straße 1, A-4311 Schwertberg/Austria, Tel.: +43 (0)50 / 620-3833, Fax: -3009
E-Mail: eva.haslinger@engel.at