Warming up for K 2013

We’re always preparing for K. That much could certainly be said even six months before the K trade fair itself – because by that time, our innovations and exhibition programme were already largely in place. This clearly shows how high our company sets the bar in terms of its ambitions. ENGEL stands for innovation in which customer benefit, sophisticated systems and automation play the leading roles. Our aim is to identify trends at an early stage, and present our impressive responses to them at the K trade fair. When it comes to producing lightweight parts, packaging and optical components, our innovations are guaranteed to be out of the ordinary.

For us, innovation stems from applications and machine technology. Twenty-three years on from the introduction of tie-bar-less machines, we are exhibiting some imaginative enhancements to the concept. We have been active in the fields of tie-bar-less technology and electrical machine drives for many years. Now we have succeeded in putting together a small series of electric machines that we plan to unveil at the K fair. The machines – which are compact, precise, fast and tie-bar-less – complement our existing ENGEL e-mac and ENGEL e-motion series of electric machines.

Having presented the large-scale electric machine at our Symposium 2012 event for the first time, we will be demonstrating the ENGEL e-duo in a complex packaging application at the K trade fair.

In a third highlight showcasing totally new applications, we will also be presenting the vertical ENGEL v-duo – an innovation that proved a big hit in the automobile industry within a very short time of being launched.

Customer benefit is at the heart of all our innovations – and the same goes for K, the global innovation fair. If our approach to innovation has taught us one thing, it is how to develop and realise solutions productively and efficiently. That may sound trite, but it certainly isn’t. Realising customer benefit does not mean placing the pursuit of innovation above all else – it means innovating in such a way that developments are affordable and produce a monetary advantage in a business environment.

Here’s to a successful K trade fair!
ENGEL worldwide. around the corner
Facts, events, projects

All-electric – including secondary movements
Technology Talk with Gerhard Dimmler and Friedrich Mairhofer

The ENGEL e-mac tour 2013
Roadshow is touring Europe

ENGEL duo machines used for lightweight construction
ENGEL AUSTRIA supplies BMW’s Leipzig factory with system solutions

Standards set in sustainability
ENGEL hands 1500th injection moulding machine over to the LEGO Group

ENGEL launches new service era with e-calc
New app for mobile devices replaces data slide rule

The new dimension in transparency
ENGEL e-factory 2 with new functionalities

Largest robot in its class
Successful ENGEL viper range expanded

Twice as fast as the competitor
O.C.S.A. uses tie-bar-less benefits for 2-component packaging part

Short tooling times as a competitive factor
nico relies on tie-bar-less machines and flexible clamping claws

Sealing and damping at the same time
Vernay combines two-component injection moulding with insert placing

XXL energy-saving master
ENGEL supplies Sulo Umwelttechnik with largest 5500 ton machine
Production capacity doubled
ENGEL completes plant expansion in Korea

In future, around 1,200 injection moulding machines will roll off the production line every year at ENGEL’s plant in Pyeongtaek. That’s almost double the present amount. In March 2013, ENGEL celebrated the expansion and modernisation of the facility in the company of clients, partners, and high-ranking local politicians. ENGEL has invested more than €8 million altogether in South Korea.

The Pyeongtaek subsidiary plays a key role for ENGEL in the fast-growing markets of Asia. The company has been producing small and medium-sized machines with clamping forces ranging from 25 to 400 tonnes in Korea since 2001. 30% of these machines stay in Korea, with 70% being exported to China and other Asian countries.

“Thanks to our decentralised production facility in Asia, we can offer clients in the region fast delivery times and guarantee to adapt our injection moulding machines and system solutions to the specific requirements of local markets,” says Robert Bodingbauer, President of ENGEL Machinery Korea. “This ensures we have a major advantage over competition in Asia.”

More economical production
Eurostampi 2013 in Parma

At Eurostampi, which took place as part of the MECSPE industrial fair in Parma, Italy, in March 2013, ENGEL focused on precision combined with outstanding economic efficiency. An ENGEL e-mac 310/100 was producing spacer rings for sanitary facilities and once again demonstrated the performance levels of ENGEL’s new all-electric injection machine series by doing so. The spacer rings were made from a highly crystalline polyamide in a four-cavity mould in a cycle time of just seven seconds. The cycle time taken by the ENGEL e-mac to carry out this task is 20% shorter than that required by a hydraulic injection moulding machine. The machine’s outstanding precision levels also ensure that the quality of its products is always high and therefore increase productivity as well.

It’s not just about the car industry
New MuCell seminars

At the end of 2012, representatives from more than 130 plastics processing firms visited the ENGEL AUSTRIA technology centre in Schwertberg to learn about the possibilities of MuCell foam injection moulding. The seminar – arranged by ENGEL together with Trexel and other partners – had a capacity crowd. “The steadily rising numbers of people attending the MuCell seminars prove that physical foaming is continuing to become more and more important,” pointed out Michael Fischer, Sales Manager (Technologies) at ENGEL AUSTRIA. The

“The car industry is still a primary focus, but more and more other sectors are starting to recognise the potential of MuCell technology too.”

Michael Fischer, Sales Manager (Technologies) at ENGEL AUSTRIA.
2013 MuCell seminars take place on 4th and 5th June and 27th and 28th November at ENGEL AUSTRIA’s technology centre in Schwertberg, Austria.

Compact machines in demand

Interplastica in Moscow

ENGEL presented a selection of efficient turnkey solutions at Interplastica 2013 in Moscow. A fast and very compact ENGEL duo 350 pico injection moulding machine with an ENGEL viper 20 linear robot and a tie-bar-less ENGEL victory 50 spex injection moulding machine with an ENGEL viper 6 linear robot demonstrated how extremely short cycle times and outstanding productivity can be combined with very low energy consumption and exceptionally high product quality perfectly.

Rainwater grids measuring 280mm x 280mm x 24mm and weighing 600g were made from polypropylene on the ENGEL duo pico in a cycle time of 45 seconds. With a dry running time of just 2.4 seconds, this machine series makes ultra-short cycle times possible. “The compact design of the ENGEL duo two-platen machines often plays a major role in a customer’s decision to purchase one too,” stresses Olaf Kassek, Managing Director of OOO ENGEL in Moscow.

The second manufacturing cell, which was based around the ENGEL victory 50 spex, proved that it is a real space saver in Moscow as it made base plates for water meters from POM.

Intelligent process control

Medtec Europe in Stuttgart

At the Medtec Europe trade fair, which took place at the end of February 2013 in Stuttgart, Germany, ENGEL AUSTRIA demonstrated how the increasingly high demands on medical technology manufacturers can be met in a cost-efficient way using innovative system solutions. At its stand, ENGEL produced autoinjector parts in a 16+16-cavity index platen mould on an all-electric ENGEL e-motion 80H/80W/180 T WP combi injection moulding machine. A highly automated two-component technique was used and performed in clean-room conditions.

IQ weight control was also used here. The software, which was developed by ENGEL and for which a patent has been applied, detects fluctuations in the ambient conditions and raw material, and compensates for these in the same shot. Any effects these changes may have had on the mould filling process are therefore reliably prevented.

Networking opportunities

at new subsidiary

med.con in Stuttgart

One day before the Medtec Europe trade fair had even started, ENGEL was focusing solely on medical technology. With more than 130 attendees, the med.con medical technology conference organised by the new ENGEL Deutschland Technologieforum Stuttgart attracted a full house. Experts in medical technology had travelled to the conference in Wurmberg from across the southwest of Germany and well beyond: Claus Wilde, head of the new subsidiary, and Christian Pum, CSO of ENGEL Holding in Austria, welcomed numerous attendees from the north of the country, as well as from Italy, Austria, and Switzerland. Awaiting the guests was an absorbing blend of expert talks, live demonstrations, and networking opportunities, as well

High output from a small footprint: An ENGEL duo 2550/350 pico was producing rainwater grids at Interplastica.

Completely enclosed to create clean-room conditions: The ENGEL manufacturing cell with an integrated ENGEL easix robot at Medtec Europe in Stuttgart.
“Our strong market position in the car industry is largely down to the fact that all our automotive expertise has been brought together in a separate business unit for this area.”

Jochen Wallmüller, Sales Manager (Key Accounts) at ENGEL AUSTRIA

Ten of the world’s top 15 automobile suppliers opt for ENGEL’s injection moulding technology, which once again underlines ENGEL’s commanding position in the international car industry. The ENGEL AUSTRIA analysis was based on the list of the Top 100 Automotive Suppliers in the trade magazine Automobil Produktion. Since the list covers the whole supplier market and not just plastics processing businesses, market penetration in relation to the companies relevant to ENGEL is close to 100% in the upper range.

### Sustainable and economical Arabplast in Dubai

At the Arabplast trade show in Dubai in the middle of January 2013, ENGEL produced beverage containers on a tie-bar-less ENGEL e-victory injection moulding machine to show how productivity can be increased and unit costs cut while product quality and sustainability are maximised. Rapid population growth and steadily rising levels of prosperity have made the packaging market one of the fastest expanding sectors in the Middle East.

The stand shared by ENGEL AUSTRIA and its mould construction partners Haidlmair, Otto Hofstetter, and ifw therefore focused on innovative technologies for the packaging industry. “There are many aspects to sustainability,” says Andreas Leitner, ENGEL’s Middle East Sales Manager. “ENGEL has a clear aim to develop environmentally and socially acceptable solutions that meet all technological requirements completely while improving the cost efficiency and thus the competitiveness of its customers.”

### Preview of 2013

- **Plastpol**, Kielce, Poland, 7th to 10th May
- **Technical Fair**, Belgrade, Serbia, 13th to 17th May
- **Chinaplas**, Guangzhou, China 20th to 23rd May
- **Feiplastic**, São Paulo, Brazil, 20th to 24th May
- **International Engineering Fair**, Nitra, Slovakia, 21st to 24th May
- **Drinktec**, Munich, Germany, 16th to 20th September
- **Expo Plast**, Bucharest, Romania, 18th to 21st September
- **MSV**, Brno, Czech Republic, 7th to 11th October
- **K**, Düsseldorf, Germany, 16th to 23rd October
Delivery times substantially cut
Line assembly introduced at robot plant

ENGEL has responded to continuing increases in order volumes for automation technology by introducing synchronised line assembly and modernising the machines at its robot plant. The company has invested a total of € 2.3 million in its site in Dietach.

“The market for automation technology is growing all over the world,” stresses Dr. Stefan Engleder, CTO at ENGEL. ENGEL already supplies 50% of all its large-scale machines and 35% of its small and medium-sized machines with automation included, and these figures are still rising. “Thanks to this new structure, we can now achieve short delivery times for ENGEL viper linear robots and integrated system solutions, despite full order books,” Dr. Engleder adds. “We have also increased production capacity.” One special feature of the line process at ENGEL is that all the work steps are synchronised in the assembly line. This also includes commissioning, which cuts out unnecessary waiting time and provides a reliable basis for the customer’s planning right from the outset.

Hidden potential highlighted
VDI injection moulding conference in Baden-Baden

Stricter quality requirements and increasing cost pressure have drawn more attention to mould temperature control. At the annual VDI injection moulders’ conference in Baden-Baden/Germany at the beginning of February 2013, ENGEL chose to focus on this subject and highlighted the potential of temperature controlling water distribution systems with electronic monitoring both at its information stand and during its presentation. “Optimising flow plays a crucial role in reducing cycle times and keeping the energy costs associated with mould temperature control low,” says Florian Raschke, Developer at ENGEL.

User interfaces of tomorrow
Multifunctional Surface Days

ENGEL once again demonstrated that it is the world’s leader when it comes to combining capacitive electronics with high-quality plastic surfaces on its Multifunctional Surface Days in Schwertberg and St. Valentin in the middle of February 2013. Plastic processors from Australia and Japan even travelled to Austria to spend two days learning about how innovative injection moulding technologies could be used to operate plastic surfaces with electronic intelligence. The event, which was hosted by ENGEL in conjunction with several of its partners, was attended by more than 140 participants.

In the automotive industry, sensitive surfaces dissolve the boundaries between drivers, vehicles, and smartphones. Intelligent plastic surfaces, which are replacing mechanical buttons, sliders, and control dials with the help of capacitive electronics, are now being paid plenty of attention in other sectors too, however. Besides car suppliers, the Multifunctional Surface Days were mainly attended by companies from the teletronics, white goods, and medical technology industries, and the event offered them an interesting mix of theory and practical experience. The presentations covered path-breaking production technologies, market potential, and visions, among other things, before the participants were given the opportunity to watch components in operation live.

The 140 participants attending ENGEL’s Sensitive Surface Days came from all sorts of industries.
All-electric
– including secondary movements

All-electric or hybrid? – Often on an electric injection moulding machine, it is just the three main movements of closing the mould, plasticising, and injecting which are actually carried out electrically, while hydraulics are still used for secondary movements. Electrifying classic secondary movements such as ejection and the movements of the rotary table and core pulls opens up further optimisation potential, which when exploited results in higher production efficiency levels and better product quality.

Why should an injection moulding machine’s secondary movements be carried out electrically as well?

Friedrich Mairhofer: Servo electric drives give mechanical systems sensitivity. This results in higher precision levels, better adjustability, and in some cases, completely new functions. The intelligence of the components and systems, and thus the injection moulding machine as a whole, therefore increases. There is still plenty of potential which can be exploited from secondary movements. Pressure systems are the first to use electrification. They are already being operated electrically by some providers, some of whom offer electric systems as an option – but there is still a long way to go before even that becomes a matter of course.

Gerhard Dimmler: Only servo electric drive technology is able to ensure that movements are synchronised to the extent they need to be for highly integrated processes. This means that the electrification of secondary movements is supporting an important trend in the industry. Think of rotating cube moulds where the rotary table and mould fixing platen move independently of each other, for example. It’s only by using servo drives that we are able to guarantee the precision and repeatability levels required for highly dynamic integrated processes such as the injection moulding process used to manufacture ready-to-fill flex tubes. The flex tubes are made on an ENGEL e-motion injection moulding machine in a rotating cube mould including two-component locking and in-mould labelling – in one work step. The all-electric drive technology makes a crucial contribution to achieving the high
degree of process integration here and, in doing so, to the economic efficiency of the manufacturing process.

**In which secondary movements do you see the greatest potential?**

**Gerhard Dimmler:** The electrification of rotary tables offers a particularly good optimisation potential. The biggest advantage here is that mechanical stops are eliminated, which often leads to shorter rotation times. If the control unit automatically calculates the mould weight and eccentricity when a new mould is put in, it can adjust the movements of the rotary table to suit the current operating conditions exactly. An Austrian patent has been issued for this. In most cases, it reduces the rotation time further. Using servo electric rotary tables instead of hydraulic systems produces four main advantages altogether: shorter cycle times, higher positioning accuracy levels, less wear and tear, and more flexible process control.

**How much extra work is there for the system operator?**

**Friedrich Mairhofer:** As the optimisation aids are integrated into the control unit of the injection moulding machine, there is no extra set-up work for the machine operator. In fact, there is less work involved: When a mould is changed, the control unit automatically works out the best braking and acceleration ramps for the rotary table movements.

**What about the other secondary movements?**

**Gerhard Dimmler:** Because of their high movement precision levels and accurate tracking control, electric ejectors offer potential for process optimisation in many different ways. Like the parking sensor on a car, when an electric ejector is employed, the control unit uses precisely regulated contact between the mechanical components to calculate the best ejection stroke, and in doing so prevents unwanted mechanical contact. If it is necessary to use a mechanical stop for the demoulding process however, the system will control the stopping force considerably more precisely than a hydraulic system is able to. This also prevents the mechanical components from being subjected to unnecessary stress.

**What are the biggest challenges which still have to be overcome at the moment if complete electrification of secondary movements is to be achieved?**

**Gerhard Dimmler:** In our opinion, core pulls present the biggest challenge. We hope that mould manufacturers will start paying even more attention to servo electric drive technology.

**Friedrich Mairhofer:** Overall, there are still quite a few hurdles to overcome, but we can see from the market that more and more plastic processing companies are being persuaded by the benefits of servo electric drive technology. It is just a matter of time before intelligent solutions for secondary movements become established in the market, and the electrification of injection moulding machine secondary movements is progressing at various speeds in the different industries where it is used. One of the main driving forces at the moment is the medical technology industry, whose aim is to do away with hydraulics completely in clean rooms.
Once again, ENGEL will truly live up to its motto by getting ‘close to the customer’ with the ENGEL e-mac roadshow. The new series of all-electric machines will be touring Europe until the summer, spreading the word through innovative applications, specialist lectures and above all windows for personal expert dialogue.

The tour got under way in the French town of Wissous in mid-February, moving on to Hungary, the Czech Republic and Poland before reaching ENGEL locations in Germany. Next stops on the tour will be Italy and the United Kingdom, with more countries to follow. So far more than 600 injection moulding companies have taken the opportunity to discover the high performance of the new ENGEL e-mac on their own doorsteps – and numerous clients have made enquiries regarding specific projects. “Only by knowing and understanding the precise challenges and processes of our customers can we expect to develop solutions that raise their competitiveness for the long term”, emphasises Friedrich Mairhofer, product manager for electric injection moulding machines at ENGEL AUSTRIA. “Personal contact with our clients is critical, therefore, and the roadshow provides an ideal framework for maintaining those links. At the same time, guests can find out what our local subsidiaries have to offer.” All ENGEL branch offices have their own technical centres and training facilities. Training and service are integral elements of ENGEL system solutions.

Maximum effectiveness and precision

It’s powerful, highly accurate, economical and compact – and the all-electric ENGEL e-mac injection moulding machine is poised to set new benchmarks in the production of technical parts and electronic components. During the roadshow, two example applications are used to demonstrate the full potential of the machine series. Most impressively, connector housings will be produced from fibreglass-filled PBT/ASA using an ENGEL e-mac 310/100 with integrated ENGEL viper 6 linear robot. This will show how ultimate precision can be combined with maximum cost-effectiveness.
Outstanding efficiency and maximum flexibility – the new injection moulding system solutions supplied to BMW’s Leipzig factory by ENGEL AUSTRIA meet both of these requirements. They will be used to manufacture lightweight components for car body shells.

Dr. Peter Neumann, CEO of ENGEL Holding in Schwertberg, Austria, says: "Lightweight construction and injection moulding are key concepts for meeting the increasing demands of the transport and mobility sectors. ENGEL recognised this as a trend of the future early on and therefore placed a great deal of emphasis on basing the further development of its machines and technologies for the car industry on it." He adds, "The order from BMW shows that we are seen by the car industry as the leading provider when it comes to lightweight construction."

The current delivery consists of ENGEL duo injection moulding machines with clamping forces of 4000 and 2700 tonnes. They have been set up to perform at the highest possible level and are also equipped with ENGEL's energy-saving system, ecodrive, because sustainability is another main aspect of this project.

**Outstanding efficiency in harmony with maximum flexibility**

One special feature of the injection moulding processing cells in Leipzig is that they are each made up of two large-scale ENGEL duo machines which have been installed back-to-back to create double systems. In master/slave mode, both machines can be controlled together so that two components are injection moulded and completed simultaneously. The bodywork components will however only comply with the high quality requirements if they both undergo exactly the same aging process after the injection moulding stage. Machines which have been linked together can also be separated from each other and fitted with different moulds. This increases the availability of the systems and enables them to guarantee a high degree of production flexibility.

All the injection moulding machines are equipped with industrial multi-axis robots, and as the general contractor for the manufacturing cells, ENGEL took responsibility for ensuring that automation was incorporated in the solution it provided BMW with. This also included a menu-driven mould changing feature, a system display screen, and data tracing. The huge range of parts which the manufacturing cells will be making in the future was taken into consideration from the very beginning. Comfortable and easy to operate, the new machines’ control system also meets the demand for outstanding efficiency and maximum flexibility.
ENGEL hands
1500th injection moulding machine
over to the LEGO Group

ENGEL AUSTRIA handed over its 1500th injection moulding machine to the LEGO Group. LEGO® elements in many shapes and colours are produced on ENGEL injection moulding machines at the LEGO sites in Denmark, Hungary and Mexico. ENGEL and the LEGO Group have enjoyed a good working relationship for over 40 years now and have driven many new developments forward together over the course of this period.

Excellent performance combined with maximum efficiency and sustainability are what ENGEL injection moulding machines and system solutions stand for in markets all over the world. "Like the LEGO Group, we are a family business and decisions are made swiftly and efficiently," says Christian Pum, ENGEL AUSTRIA’s Sales Director. "This allows us to respond to new challenges very quickly and develop individualised solutions to meet the specific needs of each customer. Our close relationship is constantly giving birth to completely new ideas and impulses – from both sides. That's what makes our relationship special."

Investment in energy efficiency
One of the main contributors to the relationship is the interest of both companies in sustainability. "It is our ambition to have a positive impact on the environment," stresses John Hansen, Senior Vice President and Head of Quality & Engineering at the LEGO Group. "We are in the business of play, and children are our vital concern. They inherit both the future and the planet, and they have a right to a healthy and rich environment. That's why we have devoted ourselves to sustainability and place so much emphasis on it. This means that with regard to injection moulding, we invest exclusively in energy-efficient machines. ENGEL technologies are part of this."

The LEGO Group works out which drive system and process technology is the most energy-efficient solution to meet its needs in conjunction with its supplier in each individual case. ENGEL supplies LEGO factories with both servo-hydraulic and all-electric injection moulding machines.

Just under half of the 1500 injection moulding machines supplied by ENGEL in the last four decades are in use at LEGO Group factories today. The demands on the machines have grown continuously throughout this period. Christian Pum says: "We always look forward to new challenges with the LEGO Group. I am sure our partnership will be making an important contribution to the continuous development of both companies in the future as well."
ENGEL now offers customers even more support with a new app for mobile devices. After entering just a few parameters, e-calc automatically supplies the values required for material and component-independent design of injection moulding machines, as well as critical setting data, thus ensuring that the injection moulding machine perfectly matches the application in hand.

The materials data are stored in the software. Based on them, e-calc guides the user step by step to the results. The optimum values for the required stroke volume, the occurring filling pressure, the resulting clamping force and the screw speed and cooling time are computed.

Thus far, ENGEL has supported its customers in machine design with a data slide rule that does not remove the need for the user to perform the required computations. Even the smallest computational error can lead to inefficient injection moulding machine design. The app also offers more safety. Even less experienced plastics processors can rely on the software to find the best-suited machine within the shortest possible time. At the same time, the machine setter benefits in terms of process settings in on-going operation. They no longer need a calculator, nor do they need to enter materials data manually.

Always at hand – always state of the art
The smartphone is something you always have at hand. This permanent availability was what prompted us to develop an app for the first time*, emphasises Dr. Georg Steinbichler, Senior Vice President of Development Technologies at ENGEL AUSTRIA. “Our objective is to continue to facilitate the use of ENGEL injection moulding technology despite increasing functional diversity.”

The materials data for typical thermoplastics, which were previously grouped in a compact way on the slide rule, are now stored in the app. They include, for example, the melt, mould and pre-drying temperatures and times, viscosity and wall thickness factors, temperature conductivities and de-moulding temperatures, permissible peripheral screw speeds, enthalpy values and guidelines for processing loss. Additionally, the new software includes a glossary of technical terms.

Communication with the customer again simplified
“We see great potential for our customer service, and in the long term for our training departments, in app technology,” emphasises Wolfgang Degwerth, Head of Customer Service ENGEL AUSTRIA. “Thanks to e-calc, we have again simplified communication between ENGEL and our customers, and are now entering a totally new service era. e-calc is one of the first apps to be developed for the injection moulding industry.”

The ENGEL e-calc app is available from the provider stores in German and English for Android smartphones. Versions for iOS and Windows Mobile are under development.
With ENGEL e-factory 2, ENGEL sets new standards in production data acquisition. Thanks to the enhanced set of features, the new release of ENGEL’s MES solution can be connected directly to ERP systems such as SAP – even injection molding machines of different brands can now be integrated. This results in higher productivity and efficiency in the injection molding production.

Manufacturing Execution Systems – MES for short – make operations more transparent. Production figures can be observed conveniently in real time from the desk in order to counteract deviations immediately. At present, the ENGEL e-factory 2 includes these modules:

- **e-factory Monitor** provides an overview of the current status information such as production progress, downtime causes and machine alarms. The plant layout and the production recorder are clearly shown next to each other. The system warns automatically of any deviations from the defined limits.
- **e-factory Mobile** provides essential status information, focused and optimized for mobile devices. This information is readily available at any location over the Internet.
- **e-factory Data**, the central management of the parts data set, provides a fast and secure setting-up. The data sets are transferred online to the machines and the applied settings can be fully controlled, thus ensuring continuous quality. All machine settings can be displayed both online and offline, and all changes are documented.
- **e-factory Chart** consistently documents all process data for the statistical evaluation. At the same time, it helps the plastic manufacturers to meet the documentation requirements with respect to their customers.
- **e-factory Reports** automatically generates statistics as to shifts, orders and long term observation, letting the management make informed decisions whenever necessary.

ENGEL continues to enhance its MES solution, and additional functionality is being prepared. Further modules – such as the detailed order planning and maintenance management of machines and molds – will soon complement the newly released ENGEL e-factory 2.
ENGEL AUSTRIA has expanded its ENGEL viper linear robot series once again. The ENGEL viper 120 with a nominal load-bearing capacity of 120 kg is the largest linear robot in its competitive field.

Maximum stability, dynamism and ease of use combined with lightness are the characteristics shared by viper robots in all size groups. An innovative design that utilises laser-welded steel sections has kept the dead weight of the robots low, enabling the load-bearing capacity to be raised.

Opening up potential for even greater efficiency
Smart software packages reduce the structure-borne vibration of the robots – even with longer axis dimensions – and optimise their movement and dynamic values resulting in enhanced efficiency. The viper robots therefore make a crucial contribution towards the reduction of cycle times and the increase of productivity for a range of applications, whilst also demonstrating their high level of energy efficiency.

Since ENGEL supplies both injection moulding machines and robots from a single source, full integration of the two control environments is guaranteed. This ensures that the robots remain easy to use, even for complex applications, and also increases the availability of the manufacturing cell as the operators can independently perform many tasks for which a programmer would previously have been required.

The robots can optionally be supplied with an independent control unit and can then cooperate with injection moulding machines by any vendor via a Euromap 67 interface.

Delivery times cut
ENGEL viper robots can be ordered in conjunction with ENGEL injection moulding machines – yet their high performance and efficiency also make them ideal for replacing old equipment and operating injection moulding machines of other brands. No wonder ENGEL has significantly increased its sales and market shares in the linear robotics range since introducing the ENGEL viper series at Fakuma 2009. In order to continue to meet this growing demand in future, ENGEL introduced synchronised line assembly in its robotics factory in Dietach 2012. ENGEL is therefore in a position to achieve short delivery times for the ENGEL viper linear robot and integrated system solutions, despite full order books.
Twice as fast
as the competitor

En route to even shorter cycle times in the production of coffee capsules for espresso machines, the tie-bar-less design of the ENGEL victory injection moulding machine inspired O.C.S.A. to create a totally new cooling concept. This not only secured the mould maker and injection moulding specialist from northern Italy the ENGEL HL-Award 2012 in Silver, but also follow-up orders from its customer illycaffè.

“The coffee capsules are not just packaging, but an important functional element of the espresso machine”, emphasises Marco Milan, General Manager of O.C.S.A. in Creazzo near Vicenza. The company produces 150 million coffee capsules per year, each comprising four individual parts, which are assembled at illycaffè immediately before filling the coffee powder: the coffee holder, the baseplate, the filter disc and the lid, which is later automatically penetrated in the espresso machine to scald the coffee. “You need a high brewing pressure to release the full aroma”, Milan continues. This is why the illycaffè espresso machines force the hot water through the capsule at a pressure of 16 bar. The requirements on the plastic parts are correspondingly high, both in terms of the materials used, and their precision and fit. The biggest challenge in manufacturing the capsules is, however, that of continuing to increase production efficiency. In the packaging field, it is all about volume and achieving it at low unit prices. To remain competitive as order volumes rise, O.C.S.A. launched an in-house project in 2010 with the objective of reducing the cycle time in the manufacturing of the largest of the four components, the coffee holder.

Pipes instead of hoses for greater cooling water volumes
The coffee powder containers are two-component parts. The body of crystal clear polypropylene is provided with a membrane and a seal of TPE on the underside. The membrane is perforated to allow the scalded coffee to enter the cup. The containers are produced on an ENGEL victory 1350H/200W/220 combi injection
O.C.S.A produces 150 million coffee capsules per year for its customer illycaffè’s espresso machines. Each capsule comprises a total of four moulded parts. The polypropylene cup contains a membrane and seal made of TPE. Both materials are processed in a single step in two component injection moulding.

Initially, wider cooling water hoses were mounted. "We immediately noticed a positive effect", Marco Milan reports, "however, the hoses turned out not to be tough enough for the fast rotary platen movements." Finally, it was company founder, Tarcisio Milan, Marco’s father who commissioned in-house mould making with creating fixed pipes to the cooling water supply – totally decoupled from traditional concepts of mould and cooling. "The barrier-free clamping unit on the tie-barless victory machines and the huge amount of free space this creates gave my father this ingenious idea", Marco Milan says. Today, we achieve extremely short cycle times of 9.2 seconds with this design, and thus produce twice as quickly as our competitor. This put us in a position to substantially improve our supplier rating at illycaffè, so that we have now already been commissioned with further projects.

"If you want to succeed in the packaging industry, you have to be the number one; that is, you need to continually invest in new applications."

Marco Milan, owner and CEO of O.C.S.A.

Business in the packaging division expanded
Now, two identical moulds are working on two victory machines in a parallel layout. The water pipes that are directly connected to the cooling unit jut out upward through the clamping unit. Because there are no tie-bars in the way, the pipes can easily follow the motion of the rotary plate.

The creative mould concept, combined with the plastics processor’s economic success that quickly followed suit, convinced the jury of the HL Award 2012. In the scope of the ENGEL Symposium in Austria in June 2012, Marco Milan accepted the award, accompanied by his sister, Sabrina Milan. The siblings dedicated the award to their father, who passed away a few month before. For O.C.S.A., his legacy means a contribution towards safeguarding the future; after all, it took a high degree of manufacturing efficiency to substantially expand business in the packaging division. "Two years ago, 89 percent of our customers came from the automotive industry", says Marco Milan. "Now we have reached 66 percent and that makes us far more resilient to crises."
Short tooling times as a competitive factor

nico has products that no household wants to be without; nico was chosen as one of the "brands of the century", and nico still produces in Germany and Austria: Norbert Schmid GmbH + Co. KG – nico for short – which has its headquarters in Fellbach near Stuttgart is a traditional company with a great sense of responsibility for future generations. To ensure international competitiveness in the long term, the family managed business relies on two things: state-of-the-art production technology that combines maximum quality with maximum efficiency, and consistently expanding its product portfolio.

When the German athletics team travelled to London to take part in the Olympic Games 2012, each of them had at least one nico product in their luggage. The German Olympic team has relied on nico’s brand of the century shoe trees and shoe horns for more than 30 years. "Each shoe needs a special shoe tree", emphasises Norman Schmid, the Managing Director of nico. Whether sports shoes, boots, city shoes or high heels – the range of shoe trees and shoe shapers seems boundless. Most of the products are made of polymer materials. The machinery at Fellbach includes 21 injection moulding machines for thermoplastics processing. On top of this, there are more injection moulding machines at the Austrian facility in Dornbirn, and machines for polyurethane processing, flocking and assembly in Bensheim, Germany.

"We don’t know today what products our machines will be producing tomorrow", says Ralf Gerst, Works and Production manager in Fellbach, referring to what is presently the greatest challenge. Small batches define business. Some products are only manufactured 2000 times a year. Shoe trees are produced alternately with technical moulding parts; nico has now established a second line of business. Its customers include brand name companies such as Liebherr, Stihl, Freudenberg, Zumtobel, Bosch and Porsche.

The barrier-free mould space on the ENGEL victory injection moulding machine simplifies the mould change process. Additionally, the clamping technology has a major influence on the tooling times.
Tie-bar-less technology accelerates mould changes

Eight to 15 mould changes are on the shift plan each week in Fellbach alone. “The smaller the batch sizes, the bigger the influence of tooling times is on unit cost”, emphasises Schmid. “For us, tooling time optimisation is thus the key to improving efficiency in our production”. We pay particular attention to this when we invest in new production technology.

This explains why the production shops in Fellbach now house two tie-bar-less ENGEL victory injection moulding machines with clamping forces of 220 and 160 tonnes. The impetus for the purchase of the first victory was provided by a project for customer Liebherr. “The mould is relatively large, and it also has hydraulic components on the outside. But the clamping force is relatively low in comparison”, Gerst reports. “It’s thanks to tie-bar-less technology that we can now manufacture this product on a 220 tonne machine.”

Besides ENGEL, nico consulted a second source about a machine for the Liebherr product. They were offered a 350 tonne machine but would have still needed to remove the external hydraulic components each time to change the mould. “Because there are no tie-bars in the way, you can use the mould mounting platens on the ENGEL victory injection moulding machines right up to the edge”, explains Uwe Handschuh, Sales Engineer with ENGEL Deutschland Technologieforum in Stuttgart, the new ENGEL facility for the South West of Germany. “This is the reason why larger moulds fit on a comparatively small injection moulding machine. Additionally, the barrier-free clamping unit facilitates the mould change.”

Even the bulky Liebherr mould can be conveniently mounted and removed, including all its add-on parts. Retooling just takes 15 minutes from good part to good part. “With a tie-bar machine, we would have to schedule two hours for this,” says Ralf Gerst.

Clamping technology ensures flexibility

Besides the tie-bar-less technology of the ENGEL injection moulding machines, the clamping technology has a major influence on short tooling times. nico relies on crocodile type clamping claws and thus on a system from the neighbourhood. The clamping technology supplier AMF – Andreas Maier GmbH & Co. KG – also has its premises in Fellbach.

“The adjustable clamping claws ideally complement the tie-bar-less ENGEL victory machines with their maximum mould fixing platen usability. Even if space is at a premium, that is, where the mould extends almost to the edge of the fixing platen, the crocodile clamp can still hold it reliably in place”, says Wilfried Braun, Product Manager at AMF. But the biggest benefit for nico is the great flexibility. “We can easily move crocodile type clamping claws and thus adjust them to match a new mould format in the shortest possible time”, says Gerst.

All the injection moulding machines at the Technology Centre at the new ENGEL facility in Wurmberg near Stuttgart are also being equipped with clamping systems by AMF.

As a century brand, nico is proud of its roots in Baden Wuerttemberg. Besides AMF, many other suppliers and customers come from this Southern German state. The fact that ENGEL has also opened premises near Stuttgart is “an absolute boon” for nico” says Schmid. “We will definitely be using the new Technology Centre for trials with our moulds. Additionally, our staff can take part in one-day training sessions more often. If you work three shifts, it’s very difficult to send somebody to Austria for two days.”

Whether high-heels or boots: each shoe needs a special shoe tree. This means frequent mould changes for the injection moulding shop.

Looking forward to cooperating with the neighbours: Wilfried Braun (AMF in Fellbach), Norman Schmid and Ralf Gerst (nico in Fellbach) with Uwe Handschuh from the ENGEL Deutschland Technologieforum Stuttgart (from left to right).
Sealing and damping at the same time

Requirements for modern vehicles are getting tougher all the time. Low fuel consumption and minimal emissions need to be combined with maximum driving safety. Sealing systems play a central role. In Oldenzaal in the Netherlands, Vernay produces anchor plates for passenger vehicle fuel systems in two-component injection moulding with insert placing technology. Thanks to the use of different silicon types, the components fulfil two functions at the same time.

Insert-placing applications are one of Vernay’s specialities; Vernay is a global leader in the manufacturing of fluid systems for automotive and other applications. “Thanks to their high level of functional integration, we generate much more value with valve assemblies and metal/plastic composite parts than with solid rubber products,” says Martin Reef, Global Automotive Business Unit Manager with Vernay. At the Dutch site, insert-placing applications account for 70 percent of all turnover. Within the Vernay group, which has its headquarters in Atlanta, USA, Oldenzaal is the lead plant for these technologies. Bosch with its subsidiaries and joint ventures is one of the biggest customers.

The anchor plates are a central functional element in the passenger vehicle. They need to provide a reliable seal, while at the same time possessing crash damping properties. This dual functionality is something you can actually see. The bright red silicon type at the centre of the anchor plate was developed with an optimum seal in mind, and the dark red one at the edges for optimum damping. To be able to process both solid silicon materials in a single step, on a single machine, Vernay uses a vertical ENGEL insert 80V/80V/100 combi HTV injection moulding machine. The plant is designed for a capacity of 2.2 million anchor plates per year. The machine works at full capacity from 6 am Monday to 6 am Saturday in a 3-shift system.

Process integration: from the raw material to the transport packaging

The challenge for injection moulding machine manufacturer ENGEL with this application was that of achieving excellent economy in combination with maximum precision. “The desired properties of the silicon components can only be achieved in a very tight process window,” emphasises Wim Veelders, Advanced Process Development Engineer with Vernay in Oldenzaal. “The vulcanisation degree has a maximum tolerance of one percent. This is why we need very stable plant engineering.” Four factors define the component quality: the metering consistency, the temperature, the pressure and the cycle time. Rejects are not just expensive, but endanger the company’s ability to deliver. “We manufacture just-in-time and thus need to be able to fully rely
on our plant engineering”, says Veelders. “The ENGEL insert injection moulding machine allows us to precisely control and manage the process.”

The extremely high degree of integration of the production cell ensures low unit costs. The raw materials are delivered directly to the production cell without intermediate storage; the metal inserts are pre-treated with a bonding agent in a spraying plant that is located next to the injection moulding machine, then insert-placed into the mould and over-moulded. After the injection moulding and vulcanisation process the two employees on the machine check the quality of every single anchor plate, pack the finished parts in boxes of 2000 and stack them on pallets ready for shipping.

Rotating plate saves time, energy and money

The injection moulding machine uses a 16x rotating plate mould with two stations. “Compared to other in-house silicon applications, this means a considerable efficiency gain”, Veelders reports. “The machine doesn’t need to wait for the operator as all handling steps occur outside of the clamping unit”. During the injection moulding and vulcanisation steps, the employees take off the finished parts and place inserts into the mould half located on the outside. Additionally the rotating plate improves process stability and energy efficiency. The longer the mould is left open – for example, for insert placing – the bigger the risk of raw material quality, vulcanisation degree and temperature fluctuations is. Because the two silicon materials are processed with different shot volumes, two independent injection units are used – each equipped with a stuffing device. ENGEL set them up on an extremely compact footprint parallel to one another above the clamping unit.

“It was very important for us to have a partner in ENGEL who offers an enormous amount of experience in multiple component technology with elastomers”, says Veelders. “After all, this project is our first two-component plant.” Because Bosch in Waiblingen has been producing the anchor plates on two identical plants – both also supplied by ENGEL – for some time, Vernay was able to start up operations with a pre-optimised production cell.
XXL energy-saving master

With edge lengths of 3.5 metres and a weight of 95 tons each, the mould clamping platens of the ENGEL duo 80000H/80000H/5500 injection moulding machine which Sulo Umwelttechnik uses to make four-wheel rubbish containers are the biggest and heaviest ENGEL has ever built. The model has set another record too: There is no other machine of this size on the market which achieves comparable energy efficiency.
Sulo Umwelttechnik is among the world's leading suppliers of high-quality rubbish and recycling collection containers. 40 years ago, the company launched the first plastic four-wheel rubbish containers onto the market. The vast majority of steel containers have now been replaced by plastic successors. By investing in this new large-scale machine, Sulo has increased the capacity at its Herford site and is now able to produce four-wheel containers with capacities of 660, 770, and 1100 litres.

**Tie bar space of 2580mm by 2800mm**
The largest rubbish containers are 1200mm x 1000mm x 1000mm. The space between the large machine’s tie bars is 2580mm in width and 2800mm in height, and therefore allows its mould, which weighs 112 tons, to be inserted and removed without any problems. Two barrier screws with a diameter of 215mm and a length/diameter ratio of 24:1 feed in the material (HDPE), while the narrow design of the injection units means the nozzles can be 2050mm apart. The injection pressure is 2100 bar.

**Lost energy reduced drastically**
As a pioneer in the particularly dynamic waste disposal sector, Sulo also has its own measures in place to ensure that maximum sustainability is always achieved. The energy efficiency of its injection moulding machines plays a major role here, which is why, as the world’s first IMM of this size, its new ENGEL duo has been fitted with the ENGEL servo-hydraulic system, ecodrive. "No drive when idle" is the key to ENGEL drastically reducing the energy consumption levels of its hydraulic machines. During cooling phases for example, the idling and flushing energy consumed by conventional hydraulic systems is saved completely. This lowers Sulo’s annual electricity consumption by more than a million kWh, the equivalent to the annual consumption of 220 four-person households.

**Individualised and made to measure**
Sulo’s record order was not just a special challenge for ENGEL because of the huge mould clamping platens: as XXL class machines are actually planned around the mould or the product to be manufactured. Although the ENGEL business unit Packaging (in conjunction with ENGEL Hanover and the ENGEL large-scale machine factory in St. Valentin, Austria, in this case) is able to provide long-term machine stability as well as extremely high quality and availability from a wealth of tested option packages for this, every new XXL machine is individualised and made to measure. Ultimately, the close cooperation between Sulo, ENGEL Packaging, ENGEL Hanover, and St. Valentin also made a crucial contribution to enabling the project to be completed successfully within a relatively short period of time.