Injection

The magazine from ENGEL for the plastics industry

April | 2025

The duo 5500 combi M at ENGEL's technology centre

55,000 kN injection moulding machine for development of new technologies Page 22

ENGEL
be the first

Dr Stefan Engleder
CEO, ENGEL Holding

ENGEL turns 80, powered by innovation

For eight decades, ENGEL has been shaping the world of injection moulding – laying the foundations for our customers' success stories. We are driven by close partnerships based on mutual engagement. We work with you to rethink existing solutions, pushing the limits of possibility within plastics processing.

In this issue of Injection, we share some striking examples of what this means in practice. We have installed one of the largest injection moulding machines in existence at a technology centre – the duo 5500 combi M – charting a new frontier for large-scale applications. Our iQ process observer demonstrates that as well as boosting efficiency, smart assistance systems also stabilise the process and ensure quality. Our customers already benefit in a variety of ways from the tried-and-tested, AI-assisted process analysis it provides. And with the new CC300 plus control unit, we are taking the machine's operation to the next level of optimisation for even greater precision and usability. Meanwhile, the e-mac 500 shows that energy-efficient injection moulding is practical and cost effective even within the smallest footprints.

We consider our 80-year history as a testament to the efforts we have made over that period to satisfy customer needs by delivering flexible machine solutions. We also recognise the necessity this highlights for us to align our global presence, our processes and our many years of experience with the future demands of our customers and the entire plastics industry.

The industry is undergoing a palpable transformation, and plastics remain materials with huge potential. Whether they are used in medical technology, the automotive industry or as part of a circular economy, it is crucial that plastics are processed in an efficient and sustainable manner. Together, we and you will help forge that path.
We look forward to celebrating our anniversary with you at K 2025 – and setting our sights on the future together.

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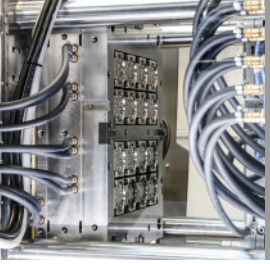

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ENGEL

Ten years of shared success
WINTEC celebrates anniversary

Last September, we marked a significant occasion at our plant in Changzhou: the 10th anniversary of WINTEC. Celebrating “ten years of shared success”, the event brought together staff, partners and customers to look back on a positive and productive decade. Ever since it was founded in 2014, WINTEC has been a cornerstone of the ENGEL Group, and it now maintains a global presence with over 1,000 machines sold around the world.

WINTEC machines, originally made for the Asian markets, are now sold across the globe. The machines are designed to offer both standard and high-performance solutions to cover different market needs. Supporting a wide range of applications has consolidated WINTEC’s status as a dependable partner in plastics processing.

Technological developments mark anniversary year

As part of its anniversary celebrations, WINTEC unveiled its new t-win pro and e-win pro machine series. The t-win pro is a dual-platen injection moulding machine that benefits from ENGEL’s extensive expertise in this field. It includes an energy-saving drive system for strong performance, which also allows for quick cycle times and long lifespans. Despite their space-saving design, this machine offers convenient access to the mould and to important components. This makes it easier and faster to carry out mould changes or any maintenance work. The t-win pro is available with clamping force levels from 400 to 4,000 tonnes.

The all-electric e-win pro machine series provides impressive results thanks to its precision and its energy use is sparing on account of its highly efficient servo-motors. The new plasticising units can be swivelled out for maintenance tasks, making access significantly easier and keeping standstill times to a minimum. The high-stability frame-based design supports the machines' high levels of precision and longevity. They are already available in Southeast Asia with clamping forces ranging from 100 to 380 tonnes.

Both series were developed to support more efficient and sustainable production processes. The developments form part of WINTEC's continual efforts to offer customers around the world solutions that are practical and cost-effective. "For 10 years, WINTEC has been part of the ENGEL Group. Looking forward, it will play a vital role in ensuring our success over the long term. Today we not only serve local markets, but also maintain a global presence through WINTEC. As a brand, WINTEC stands for delivering accessible innovations, which means we create access to innovations for particularly cost-conscious customers – with a focus on certain solutions, including in the automotive sector and technical injection moulding," says Stefan Engleder, CEO of the ENGEL Group, on the development of the WINTEC brand.

Capacity expanded in Changzhou

Expansion of its Changzhou site has enabled WINTEC to significantly upscale its research and development capacity. As a result, the company is able to respond faster to local market needs and offer custom solutions to meet the particular requirements of customers in various regions. Strengthening local production and expanding capacities have been critical steps in enabling us to carry on delivering efficient, high quality machine solutions. "The expansion of our site in Changzhou has enabled us to upgrade our research and development capacities and increase the production of standardised, high performance injection moulding machines. This puts us in a position to respond even faster and more efficiently to developments on the local market, thereby addressing the growing demands of our customers. At the same time, we are offering made-to-measure solutions in various regions and thereby improving the support we can provide on site," explained Gero Willmeroth, Regional President Asia and Oceania, during the expansion in Changzhou. ■

Alexander Hell, Head of Sustainability Management, and Chief Executive Officer Stefan Engleder are delighted with the EcoVadis Platinum rating for 2024.

ENGEL **retains EcoVadis Platinum rating**

Over recent years, we have made considerable progress in our sustainability performance, steadily consolidating our status as a sustainable business – which, in turn, is how we have increased our sustainability score and maintained it at the highest level. In 2024, this achievement was once again recognised by EcoVadis in the shape of its Platinum rating. So what does EcoVadis Platinum signify, and how does it benefit us as a business – and our customers?

EcoVadis ratings measure the sustainability of companies around the world. This internationally recognised method helps businesses to implement sustainable improvements and, in turn, to attain positive environmental and social impacts. Companies are assessed on a scorecard across areas such as environmental, labour and human rights, ethics and sustainable procurement, based on standards such as the Global Reporting Initiative, the UN Global Compact and ISO 26000.

Our route to a Platinum rating

ENGEL began its EcoVadis journey in 2021, immediately reaching silver status, before achieving gold in 2022 and platinum in 2023, putting it among the top 1% of sustainable companies worldwide. Retaining a platinum rating requires ongoing activities and a stricter set of criteria.

Retaining our rating proves that we are adhering to our sustainability principles, even under challenging conditions.

Stefan Engleder, CEO of ENGEL

ENGEL has implemented activities such as 100% green electricity in its Austrian plants, photovoltaic investments, ISO 14001 and 9001 certifications, reduced emissions, lifecycle analyses, circular economy solutions and setting SBTi-compliant goals for 2030. Comprehensive sustainability reporting and external validation are also areas of focus.

Stefan Engleder, CEO of ENGEL, stresses the importance of achieving recognition, especially amid difficult circumstances. Alexander Hell, Head of Sustainability Management, emphasises that as well as demonstrating ENGEL's commitment, high EcoVadis scores also improve customers' sustainability performance and help minimise supply chain risks. ENGEL offers energy-efficient machine designs and circular economy solutions that improve the processing of recycled materials, helping customers cut down on CO_2 emissions and save on energy costs.

The EcoVadis rating confirms ENGEL's sustainable track record over the course of the year, offering an important indicator for suppliers and customers. ENGEL would like to thank each and every member of staff for their dedication to achieving a sustainable future. ■

What can you optimise on injection moulding machines?

ENGEL receives **2024 Austrian National** Innovation **Award**

What can be optimised on injection moulding machines?

On 7 October 2024, the Austrian labour and economic affairs minister, Martin Kocher, handed over the National Innovation Award in Vienna. The award honours the most innovative companies in Austria, with the panel recognising ENGEL's contribution for its pioneering transformation in the recycling process.

In its verdict, the panel emphasised the importance of the two-stage process: "This process is highly innovative and environmentally extremely valuable. We rated both the benefits of the project and the support for an innovative culture within the company very positively. By eliminating an additional process step, significant savings are made in terms of resources and costs. The technology enhances the opportunities for recycling, reduces the global carbon footprint, promotes a circular economy and revolutionises the industry with a 30% reduction in energy consumption."

"The innovative and distinctive aspect of the two-stage process is that it shortens the recycling route. Until now, recycled material has been fed to the injection moulding machine in regranulate form, which was previously processed separately. With ENGEL's new two-stage process, shredded recycling material can now also be made directly into new parts without prior preparation. In the first stage, plastic flakes are melted in a plasticising screw. Impurities and odours are then removed via a continuous melt filter and a degassing unit. The second phase involves injecting and giving shape to the part. This means that the production of plastic parts from recycled materials can be reduced to a single process step and the recycled material can be used directly on the injection moulding machine. This reduces investment costs, energy and CO_2 emissions," explains Dr Klaus Fellner, Head of Application Technologies at ENGEL.

Two-stage process for greater energy efficiency in plastics recycling

Dr. Johannes Kilian, ENGEL Austria

Dr. Johannes Kilian, Vice President of Processing Engineering at ENGEL, stresses: "Being the largest Austrian machine manufacturer, ENGEL is an innovative family company. We have been working on recycling in significant depth for many years. That makes this innovation award an important acknowledgement for ENGEL and the entire plastics industry. The National Innovation Award underscores the relevance of plastics and their recycling, with these materials and the development of a circular economy representing a key building block for a sustainable future in view of climate change and the push for net zero." ■

Left to right.: Dr. Johannes Kilian, Univ.-Prof. Martin Kocher, Dr. Klaus Fellner, DI Stefan Fehringer

Digital Days at ENGEL:

In focus: progress in plastics technology

ENGEL held its Digital Days from 18 to 20 June 2024 in Schwertberg and St. Valentin. They provided specific, real-world answers to key questions facing the injection moulding industry. Over 400 enthusiastic visitors took part, with practical case studies offering them a fascinating, in-depth look into the current state of digital transformation in the injection moulding space as well as exciting opportunities for the near future. The aim of ENGEL's digital transformation activities is to enhance the level of focus on customers even further by optimising production, reducing energy costs, increasing quality and helping confront the ongoing skills shortage.

Gerhard Dimmler, CTO at ENGEL, and Hannes Zach, Sales Manager for Digital Solutions at ENGEL, opened the event with a talk about the importance of digital transformation for the injection moulding industry. ENGEL has developed from a machine manufacturer into a complete solutions provider with a high level of opportunities for harnessing digital innovation. The process of digital transformation touches on process optimisation, sustainability and solutions for navigating the skills shortage, with digital assistance systems and products improving production efficiency and quality. ENGEL sees the use of AI and digital twins for process optimisation as the future of injection moulding. ENGEL is a pioneering force in these areas, also assisting its customers by providing innovative products in the digital transformation field.

FUTURE meets REALITY

Citing this motto, Johannes Kilian, Vice President of Process Engineering at ENGEL, highlighted how digital products can enhance productivity in the injection moulding industry.
ENGEL's Inject 4.0 strategy is aimed at helping customers develop and manufacture higher-quality, more cost-effective parts. The entire production chain is optimised through the use of digital assistance systems and analytics tools such as the iQ process observer and shopfloor monitoring on the e-connect customer portal. These digital solutions lead to energy savings, better part quality and increased machine availability, ensuring competitiveness over the long run.
He summed up ENGEL's one-stop shop for digital transformation as follows:

- ENGEL actively works on the entire product life cycle, from design to maintenance.
- ENGEL does not just offer solutions for ENGEL – it provides them for the entire production process, regardless of who the machine manufacturer may be.
- ENGEL offers solutions for all entry points into digital transformation, no matter whether customers are just looking to get started with the process or whether they are already experts.

ENGEL harnesses artificial intelligence to improve its customers' process efficiency.

Malcolm Werchota, Head of Generative AI at Triple Eight Solutions and Co-Founder/COO at CoatingAI

Unlocking new possibilities

AI evangelist Malcolm Werchota, Head of Generative AI at Triple Eight Solutions and Co-Founder/COO at Swiss company CoatingAI, spoke on the topic of "AI in the industry: Has the future already begun?" and came to a clear conclusion: "ENGEL uses artificial intelligence to improve its customers' process efficiency." In his talk, he outlined the benefits of generative AI, which is already being used in a variety of different areas. He wrapped up his speech by showcasing the prototype for a world first:

ENGEL GPT

This is a large language model which ENGEL uses to offer its customers real added value:

- Reduced need for internal emergency support
- ENGEL GPT can prevent knowledge loss
- Minimal implementation workload at the customer's end

ENGEL GPT makes all machine and process data available to injection moulders' employees right from the shop floor. An extensive and interlinked array of knowledge is accessed via simple voice input. The system is integrated directly into the customer portal.
The prototype for the system was a crowd-puller in the technology centre at ENGEL's large machine plant in St. Valentin. This clearly illustrated the opportunities and possibilities that AI offers for the future of injection moulding. At other points, ENGEL demonstrated the practical implementation of digital products and assistance systems.

Malcolm Werchota, one of the biggest trailblazers in large language models, gave the keynote speech on ENGEL GPT.

The iQ user community discussed customer-focussed developments at the ENGEL Digital Days

Customer talks with practical case studies

Customers who use ENGEL's digital products on a daily basis provided some in-depth insight. Dariusz Barton, Managing Director of SolidPlast Sp. Z O.O., discussed "transparent production" at a medium-sized company. SolidPlast improved its production processes with innovative concepts from ENGEL. Thanks to the ENGEL iQ systems and shopfloor monitoring, the innovative injection moulding company was able to reduce production costs by 4.2% and increase machine availability by 270 hours a year, yielding greater overall efficiency.

Injection moulding in a state of transformation: BIC's digital journey

BIC, the global player in the fields of disposable lighters, disposable razors and ballpoint pens, can already look back on eleven years of successful digital collaboration with ENGEL. The business has significantly enhanced its production as a result. Yiannis Voultzatis, IMM Process and Mould Optimisation Manager at BIC Violex S.A., explains:
"Using ENGEL authentig, we have significantly improved on our production KPIs. Our already high overall equipment efficiency (OEE) for injection moulding has increased by 3% and our rejects levels have dropped by around 40%, which is highly significant and leads to a more sustainable injection moulding process."

Meeting the skills shortage challenge

Piercarlo Balducci, Head of Product Engineering and Head of Maintenance at Interroll SA, also viewed technology as the key to solving staffing challenges. The company relies on ENGEL's digital set-up assistant, which allows less experienced operators to achieve fast set-up times. Machine downtimes caused by mould changes can be reduced by up to 50%. For contract manufacturers, this yields a clear competitive advantage. The company also managed to reduce its energy costs by 15.38% by using iQ flow control, which is why Interroll described ENGEL's digital solutions as game changers in its talk.

AI in the textiles industry

Florian Wurzel, Cluster Leader at KM.ON GmbH, presented an impressive example of how edge computing is revolutionising production. His business uses the edge computing platform from DAIM, a joint venture between ENGEL Austria GmbH and uni software plus GmbH. Edge computing is a method of data processing in which data is not processed and analysed centrally in the cloud, but directly at the edge – at the source of the activity. This means that large volumes of data can be processed on the machine quickly and with little delay. DAIM's edge devices are also used in the e-connect products on ENGEL injection moulding machines.

Using ENGEL authentig, we have significantly improved on our production KPIs.

Yiannis Voultzatis, IMM Process and Mould Optimisation Manager at BIC Violex S.A.

All set for smart operation – the new CC300 plus control unit

A new and improved version of the CC300 machine control unit, the CC300 plus, was another visitor attraction at the technology centre in St. Valentin. This goes the extra mile in terms of ergonomics, assistance and customisation. The expanded control concept, which is already being used successfully by customers, was showcased at the facility.

Boosting efficiency in the service process

ENGEL clearly demonstrated how it currently uses AI via examples the fields of remote support and digital tools. These offer a key method of service optimisation, saving injection moulders a significant amount of time.

Paperless production

ENGEL showed how data-driven decision-making can be used to optimise production. Manufacturers receive item and order- based results and KPIs to significantly reduce rejects and machine downtimes.

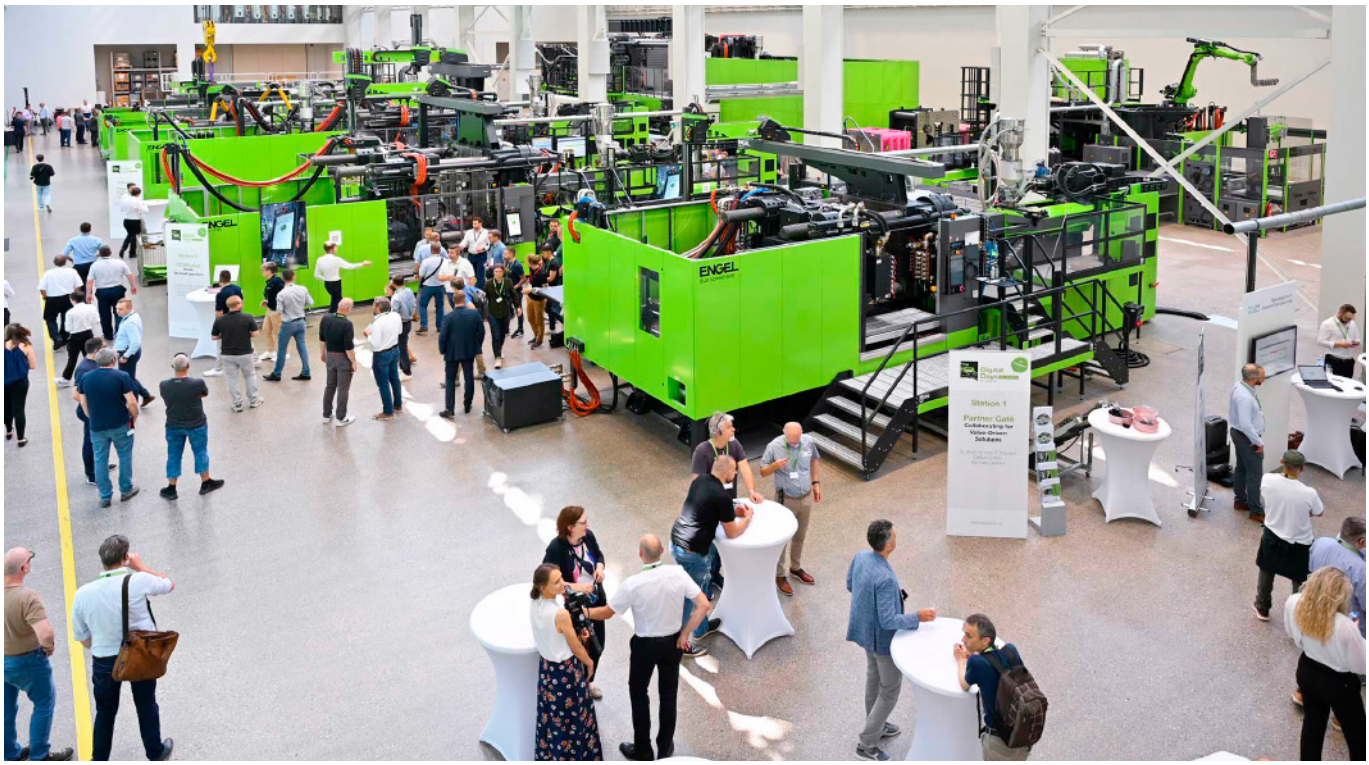
ENGEL – working together to create added value: solutions presented by partner companies

DUALIS GmbH IT Solution:
Production optimisation with the digital factory
DAIM GmbH:
Smart solutions for the Fourth Industrial Revolution focussing on industrial security
Symate GmbH:
Data management using AI, identifying reciprocal effects

iQ user community

iQ user community events were held on both the opening and closing days of the programme. These were aimed in particular at the practical needs of process technicians and machine operators. At these events, users were able to test out and discuss ENGEL's iQ products at the technology centre in Schwertberg.
ENGEL strikingly demonstrated its innovative capacity in plastics technology to an enthusiastic audience at the Digital Days. The developments and technologies showcased illustrate the company's commitment to making a lasting, customer-focussed impact on the industry through digital transformation and futuristic solutions. The event provided valuable insights and inspiration that will pave the way for future progress and collaboration. ■

ENGEL technology centre, St. Valentin



Experience ENGEL's digital assistance systems.

ENGEL CC300 plus

Learn more about digital solutions from ENGEL:

New control unit and AI
for injection moulding machines

Driving innovation and efficiency is always a key priority at ENGEL. During this Tech Talk with Hannes Fritz and Mateusz Rychlik, we examine the evolutionary development of the CC300 control unit and our iQ process observer. As the heads of product management for control units and digital solutions respectively, both provide their share of insights into how ENGEL systems improve both user-friendliness and process efficiency. Our interview provides a detailed rundown of the technical and practical aspects of these customer-focussed innovations.

When it comes to the new CC300 plus control unit, what exactly is its plus point?

HANNES FRITZ: The "plus" in CC300 plus lies in its evolutionary development from our tried-and-tested CC300 control unit – not a radical reinvention, but a carefully thought-out upgrade. We have retained the familiar, proven functions while adding a targeted range of new, customer-centric improvements. One stand-out example is the introduction of haptic buttons. Users now benefit from eight tactile haptic buttons that make the unit's operation noticeably more flexible and intuitive. These are integrated on a state-of-the-art display, which allows for convenient assignment of the pushbuttons and shows the current status of the movement at a glance. This display makes the system much easier to use, as it also supports touch functions and enables operators to interact with it directly on the screen.

Which applications is it useful to custom-assign haptic buttons for?

H.F.: Being able to custom-assign the haptic buttons on the CC300 plus control unit is particularly useful in a series of different application areas. In production environments where there is frequent changing between different moulds or manufacturing steps, the buttons can be customised to make these switches easier and increase efficiency. For machines that require complex movement sequences, the buttons can be configured to control the most frequent or critical movements, simplifying operation and increasing safety. Another advantageous feature is that up to three levels are possible in the pushbutton configuration,

From left: Tobias Neumann, Hannes Fritz, Mateusz Rychlik

offering even greater flexibility and customisability. So essentially, custom assignment of the haptic buttons allows for that high degree of flexibility and customisability, which in turn improves the machine's efficiency, safety and usability.

Does this mean the operator has to relearn how to use it?

H.F.: The basic operating concept of the CC300 plus remains very similar to the CC300, making for a seamless transition for existing users. The central element, the e-move, has been retained – although it is now even easier to assign functions to it. The biggest change for users is the switch from a glass set-up to haptic buttons, which provide direct, tactile feedback. In addition to improving ergonomics, this change also gives operators improved tactile feedback, increasing operating safety and accuracy.

Apart from the haptic buttons, are there any other new additions?

H.F.: Aside from the haptic pushbuttons, there some other differences between the CC300 and CC300 plus control units. The unit's ergonomic properties have been further improved with the double swivelling mechanism, which makes it even more convenient to use. The new, key fob access system (Mifare), available as an optional extra, also comes pre-configured and simply requires a software licence for activation.

Has anything changed in terms of software?

H.F.: From version 5.10, the new process checklist on the CC300 control unit offers groundbreaking support for optimising production processes and reducing energy consumption. Clear instructions and direct recommendations guide the operator through the optimisation process step by step, not only saving time but also ensuring quality results.
Another aspect worth noting here is that this includes seamless integration of the iQ product family, including functions like iQ weight control, iQ clamp control and iQ flow control. These make it possible to control and monitor processes with even greater precision. For additional support, the checklist offers the option of pulling up relevant tutorials at the appropriate time, making it much easier to use and gain familiarity with new technologies. Another highlight is the focus on sustainability. With careful use of the checklist, resource-saving optimisation steps can be taken to deliver "green mode" operation.
The new process checklist makes process optimisation simpler, more transparent and more efficient. It offers clear support with routine work activities as well as playing a significant role in quality assurance and achieving more sustainable use of resources.

To optimise a process, you also have to monitor the process. How does ENGEL help companies in the context of the ongoing skills shortage?

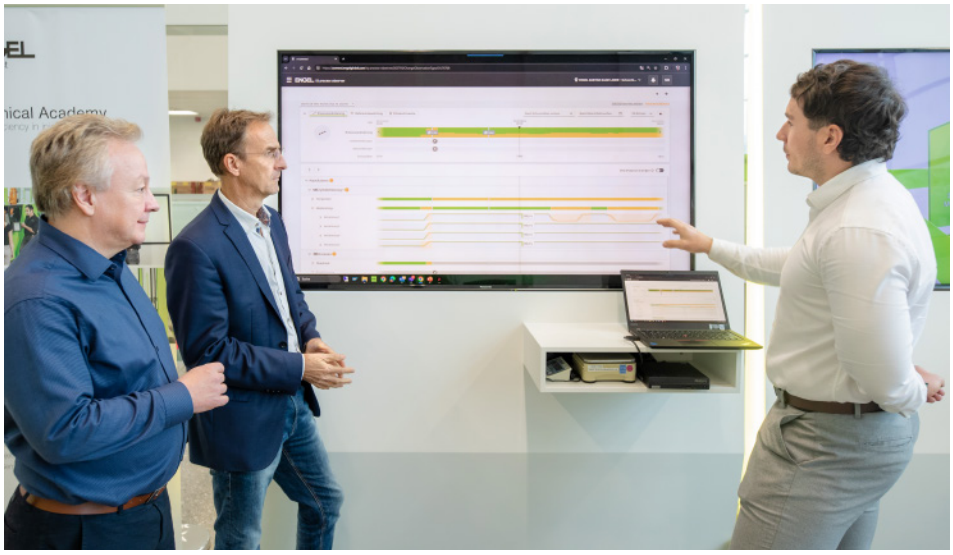
MATEUSZ RYCHLIK: Production is becoming increasingly complex at a time when experienced specialists are in short supply – making it all the more important to put their knowledge to effective use. The iQ process observer is an AI-supported assistance system that analyses production processes in real time and uses intelligent algorithms to detect process irregularities and anomalies at an early stage.
Instead of skilled staff spending time on time-consuming manual troubleshooting, the system automatically prepares the relevant information and provides specific recommendations for action. This enables specialists to concentrate on complex tasks, while decisions on process optimisation are made at faster pace and on a sounder basis.

Ease of use is important to us.

Mateusz Rychlik,
Head of Product Management
Digital Solutions

A control unit with customer-focussed improvements.

Hannes Fritz,
Head of Product Management
Control Unit



We offer AI-supported optimisation and troubleshooting.

Mateusz Rychlik,
Head of Product Management
Digital Solutions

Can the iQ process observer support less experienced employees as well?

M.R.: Yes, the iQ process observer makes complex processes intuitive for all staff members to understand. A traffic light display immediately indicates whether action is required, while clear visualisations and a global timeline help users keep track of process changes. This means that less experienced employees can quickly recognise when something is wrong and intervene in good time to prevent the production of rejects. Thanks to the ENGEL e-connect customer portal, experts have access to the iQ process observer at any time no matter where they are, and direct remote support can be provided if required. This, in turn, allows knowledge to be efficiently shared and applied throughout the team.

Are there any real-world success stories to note?

M.R.: The iQ process observer makes the difference – both in terms of efficiency and making sure skilled staff are spending their time effectively. One plastics processor was able to reduce their reaction time by up to 30 minutes per incident, because they no longer had to rely on their intuition when rejects were produced. Instead of undertaking a lengthy search for the root cause of a fault, the system provides immediate clarity, identifies irregularities at an early stage and provides targeted recommendations for action. This means fewer standstills, faster fixes and more stable production.

The iQ process observer also brings clear benefits in quality assurance – one company that previously spent over ten hours a month on manual SPC measurements in their laboratory has now saved this time. Thanks to smart instability detection, measurements are only taken when process variations are actually identified. This means that skilled staff are assigned to exactly where their expertise is really needed – and valuable resources are conserved.

What distinguishes the iQ process observer from conventional systems?

M.R.: Conventional systems have to be configured manually for each machine and mould, and they only respond when set limits are exceeded. The iQ process observer goes further. It analyses hundreds of parameters fully automatically, detects creeping changes and provides targeted recommendations for action, all without the customer having to configure any manual settings.
Instead of just reporting errors, it enables data-driven decision-making in real time. This empowers companies to minimise rejects, prevent machine downtimes and keep their production on a stable footing.

How does the iQ process observer ensure a reliable pool of data?

M.R.: Clear, well-grounded decisions are based on reliable data. The iQ process observer automatically documents all relevant process events and makes them retrievable at any time. Users and experts no longer have to rely on manual analysis – they have direct access to precise data. This accelerates corrective action, prevents errors and enables sustainable process improvements.

How does the iQ process observer make expert knowledge available to everyone?

M.R.: Knowledge should not be limited to individual specialists. The iQ process observer uses an intelligent knowledge database that is continuously updated with knowledge from real process data and expert analysis.
As well as identifying faults at an early stage, the system also provides clear recommendations for action with precise root cause analysis. Less experienced employees receive targeted instructions, while skilled staff can use their time to complete more complex tasks. This reduces trial and error, optimises resource use and ensures more stable, efficient production.

Why is speed crucial in the context of troubleshooting?

M.R.: Every minute counts in a production process. The faster a problem is recognised and solved, the fewer rejects there will be and the less downtime will occur. The iQ process observer significantly cuts response times by not only issuing warnings, but also providing practical solutions. By detecting irregularities at an early stage, companies can minimise process malfunctions and operate more efficiently – a clear competitive advantage.

Responding at pace is all well and good, but can iQ process observer also help prevent faults in the first place?

M.R.: Absolutely! The iQ process observer identifies creeping changes in real time and provides early recommendations for action before irregularities result in rejects or downtime. By analysing up to 200,000 shots, patterns can be flagged up and processes optimised in a targeted manner. Reference values can be set by the operator with a single click, selecting a point in time when the process was stable. Customisable reference limits then act as an early warning system and safeguard product quality. At the same time, the system continuously monitors relevant parameters, identifies deviations or drifts at an early stage and makes it clear when intervention is required.

Why is it worth investing in right now?

M.R.: The manufacturing industry is under pressure, with increasing complexity, a skills shortage and cost pressures. The iQ process observer is more than just a way to ease the burden – it is a key ingredient for long-term success.
The combination of real-time data, machine learning and expert knowledge enable more efficient, more resilient production. Those who invest now will secure a clear competitive advantage. ■

ENGEL expands **victory series**

ENGEL is expanding its renowned tie-bar-less victory injection moulding machine series with the integration of the previous e-motion TL, now introduced as the victory electric. This innovative addition combines the strengths of tie-bar-less technology with the advanced features of servo-electric drives, setting new standards in production technology.

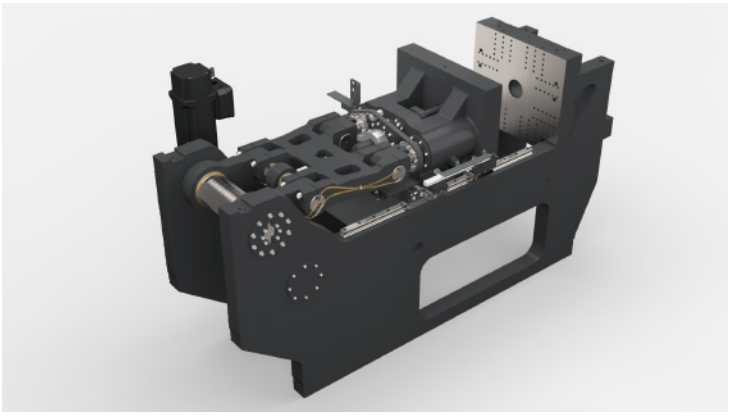
By incorporating the successful e-motion TL into the victory series under the name victory electric, ENGEL has restructured its portfolio of tie-bar-less injection moulding machines, offering three distinct categories within a single series: electric, hybrid, and hydraulic.
The machine has been upgraded with state-of-the-art drive components for improved energy efficiency. New injection units deliver faster injection speeds and enhanced usability. Components are now more accessible and easier to replace, simplifying maintenance tasks such as the servicing of the plasticising cylinder. These improvements result in higher performance, energy savings, and increased machine availability. A further innovation of the victory electric is the integration of hydraulics for clamping forces starting at 80 tonnes. This meets market demands for a variety of moulds requiring hydraulic support. Additionally, this solution is significantly more cost-efficient than externally supplied hydraulics, while maintaining the machine's compact footprint.

High precision with efficiency and speed

The victory electric is available in clamping forces ranging from 30 to 130 tonnes, designed to meet the needs of industries requiring high flexibility, exceptional precision, and short cycle times. On its clamping unit side, it features a three-point toggle lever, which gives the machine the same level of proven high performance as it supplies to other ENGEL electric injection moulding machines. This makes it ideal for applications where large numbers of highly precise pieces are required within short cycle times. The victory electric delivers precision in two stages. The electric injection units ensure highly accurate control of the injection moulding process, shot by shot. The second stage for maximum precision is an even distribution of clamping force across all cavities: part by part within one shot. This is crucial for the production of high-quality parts in high-cavity moulds. This results in significantly improved part quality and exceptionally low scrap

The victory electric combines the best of both worlds – precision through electric drives and the advantages of ENGEL's tie-bar-less technology.

The victory electric offers faster injection speeds and more user-friendly maintenance with its new electric injection units.



High performance and even clamping force distribution with the three-point toggle lever.

rates – a major advantage in cost-intensive production environments. Another benefit of the electric drive system of the victory electric is short response times. This, in turn, allows for speedy cycle times, providing a competitive advantage – especially for high-volume production where every second counts.

Furthermore, the excellent platen parallelism of tie-bar-less injection moulding machines is a key feature for protecting moulds, which translates into reduced maintenance costs.

The large, unobstructed mould area of the tie-bar-less design in the victory electric also simplifies mould changes and accelerates maintenance operations. This increases overall uptime and significantly reduces production costs. It also enables the use of very large and complex moulds without requiring an alternative tie-bar machine with significantly higher clamping force. The compact design and small footprint of the machine make it particularly advantageous for facilities with limited space or cleanroom environments.

Standard feature: encapsulated toggle lever

Since the victory electric is equipped as standard with an encapsulated toggle lever, the risk of oil leaks and contamination is significantly reduced. The absence of tie bars minimises airflow turbulence, which can dislodge particles and debris in the mould area. As a result, the machine plays a significant role in ensuring a clean production environment.

Specialised clean-room package

A specially developed cleanroom package is available as an optional offering, allowing the victory electric to be used in cleanrooms up to ISO Class 7. The special cladding included with this package reduces particle emissions and seals machine components that could be a potential source of contamination. Many of the parts are made of stainless steel and fitted with button-head socket screws to minimise debris and make surfaces easier to clean.

Expanding the victory series to include the victory electric reflects ENGEL's commitment to achieving technological advancements and offering solutions for every injection moulder – enhancing sustainability, saving energy, optimising production efficiency and reducing operating costs while boosting quality. Customers benefit from a future-proof investment that guarantees superior product quality and environmental standards, ensuring competitiveness in demanding markets. ■

Find out more about the victory electric:

The new ENGEL e-mac 500 for **shorter cycle times, including HIGH clamping unit and iQ motion control**

The market demands significantly more from injection moulding machines in the high-volume segment than it used to. Short cycle times, low energy consumption and compact footprints are in particular demand. This is especially true for manufacturers who produce parts in large quantities, such as connectors, pipette tips and plastic packaging. In these situations, the latest version of the HIGH version within the all-electric e-mac series offers compelling benefits when it comes to consolidating or levelling up competitiveness.

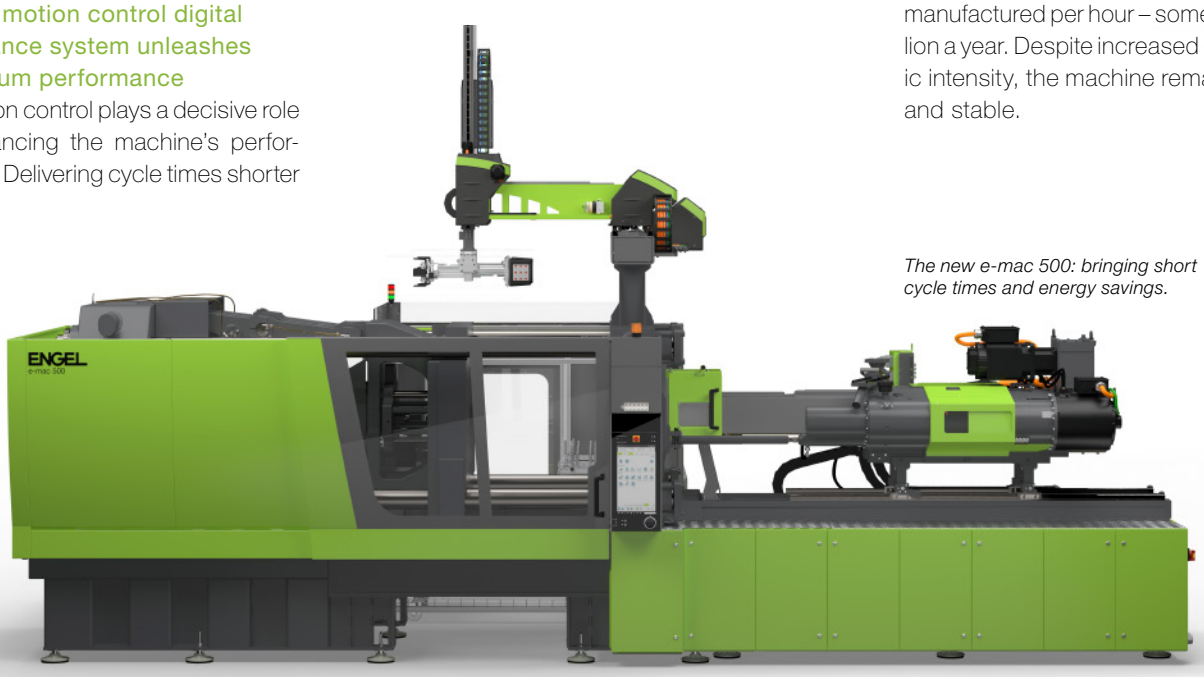
Although machines in the highest performance range achieve the cycle times desirable for this segment, they are considerably larger, have higher energy consumption and generally require higher capital expenditure. In contrast, the HIGH version of the e-mac machine offers the usual combination of a small footprint and low energy consumption while now also offering the added advantage of shorter cycle times. This is achieved through mechatronic optimisation of the drive system and the iQ motion control digital assistance system, which extracts previously untapped reserves from the clamping drive for every application.

The iQ motion control digital assistance system unleashes maximum performance

iQ motion control plays a decisive role in enhancing the machine's performance. Delivering cycle times shorter than five seconds required a more powerful clamping drive and additional development on the mechanical properties, drive technology and clamping drive software, allowing for precise acceleration curve adjustment. iQ motion control automatically optimises this curve by adapting it to the weight, the clamping force and the changing toggle lever ratio. This leads to faster opening and closing sequences and improves cycle times. Operation is straightforward – once the mould installation height and opening stroke have been set, the operator only has to input the mould weight. All other settings are configured automatically via the machine control unit, effective from the first cycle.

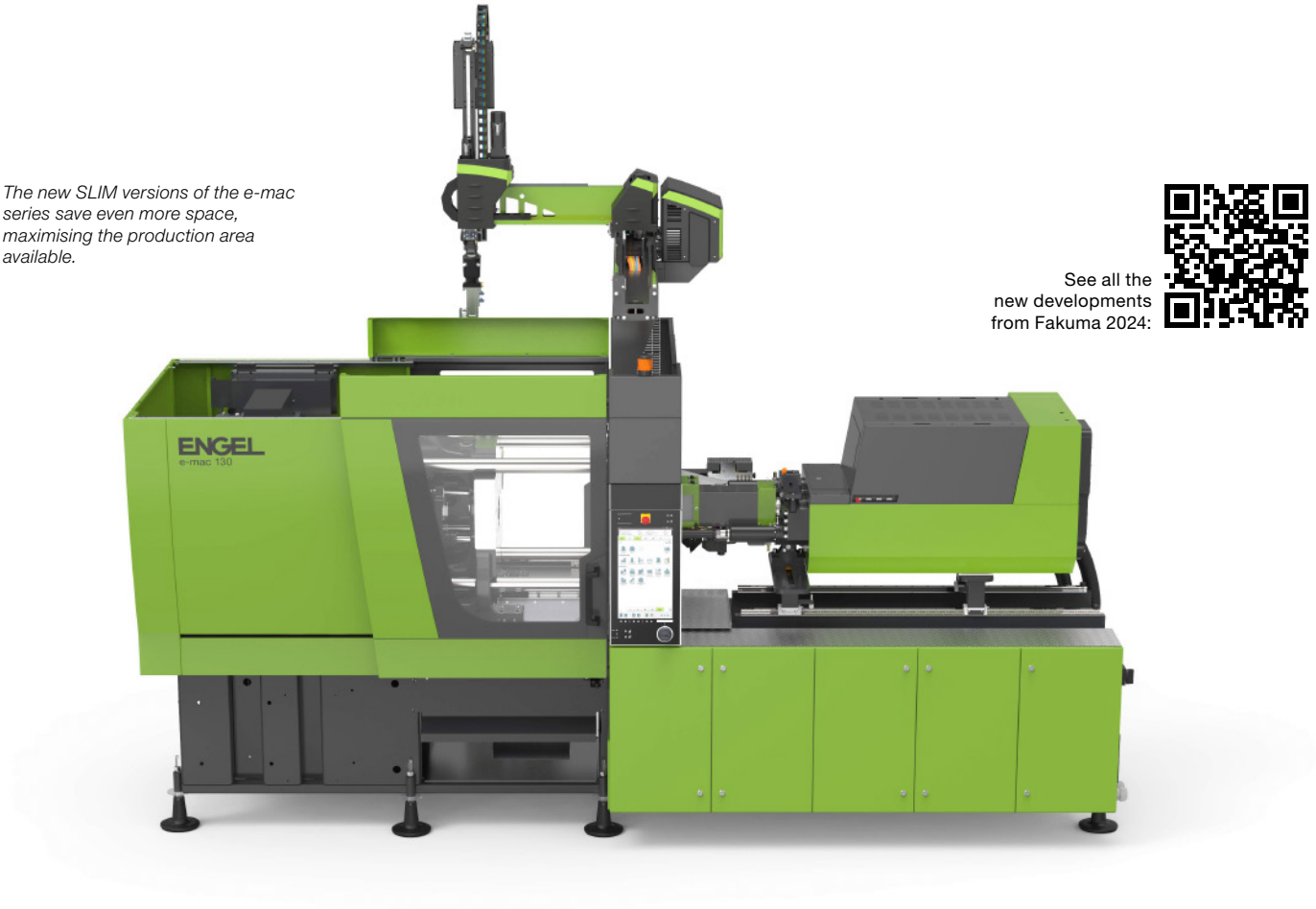
Boosting numbers and metrics

ENGEL can demonstrate the e-mac HIGH clamping unit's efficiency through the example of pipette tip production with a shot weight of 14.55 grams, where every tenth of a second counts. The conventional e-mac 265/130 achieves a cycle time of 5.8 seconds and a production rate of 40,000 pipettes per hour. The process is already designed for maximum efficiency as a result of the mould and injection process being optimised. However, the new e-mac HIGH reduces the mould movement time by 20% from 1.4 to 1.12 seconds, yielding a 5% increase in productivity, in turn boosting overall equipment effectiveness (OEE). This results in 2,000 additional pipette tips being manufactured per hour – some 12 million a year. Despite increased dynamic intensity, the machine remains still and stable.



The new e-mac 500: bringing short cycle times and energy savings.

The new SLIM versions of the e-mac series save even more space, maximising the production area available.



See all the new developments from Fakuma 2024:

New machine size: e-mac 500

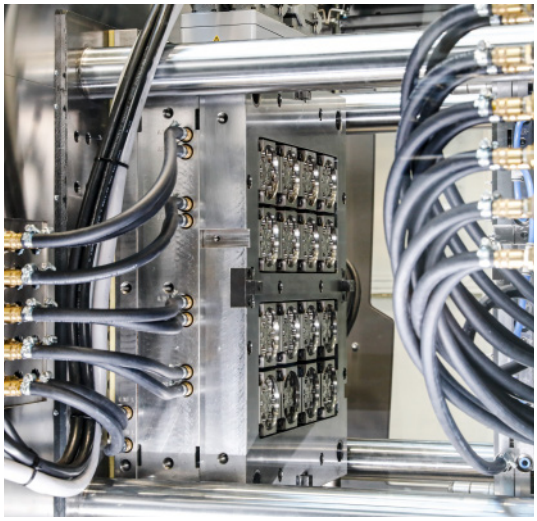
ENGEL's new e-mac 500 injection moulding machine sets new standards in plastics technology. Delivering 5,000 kN of clamping force, it joins the established all-electric e-mac series and combines high performance with energy efficiency and a compact design. Easy to operate and adaptable to a variety of different applications, the machine offers outstanding value for money. As a result, the e-mac 500 provides a cost-effective alternative to higher performance classes, while still providing top performance and reducing operating costs.

Save space: The SLIM version of the e-mac

In creating its SLIM designs, ENGEL has taken the e-mac machines to a whole new level of compactness, reducing their width by up to 16%. This comes as a major plus in production environments with limited space or where less auxiliary equipment is required. The combination of compact design and high performance make the e-mac machines the ideal choice for companies looking to maximise efficiency and space utilisation.

For medical applications: Clean-room package

Wherever a clean production environment is essential, ENGEL offers an optional cleanroom package. Stainless steel cladding, covered connections and raised machine mounts make cleaning easier and meet ISO-7 standards for cleanroom environments. The encapsulated toggle lever design also reduces lubricant consumption by 90% and ensures longer maintenance intervals, even in highly dynamic applications. ■



Using ENGEL iQ clamp control

To cut costs and extend mould lifespans

In creating the iQ clamp control digital assistance system, ENGEL has developed a groundbreaking technology for the injection moulding industry. The system makes it possible to measure and interpret mould breathing without the use of additional sensors. Mould breathing is a powerful signal that provides insights into the process and the products' quality while facilitating efficient monitoring and optimisation of the injection moulding process.

Mould breathing refers to the minimal enlargement of the mould cavity which results from it being filled with melt **(Figure 1)**. This phenomenon provides valuable data on cavity pressure and material distribution inside the mould. Traditionally, mould breathing is measured directly from the mould using sensors, which is time-consuming and expensive. ENGEL offers an alternative with iQ clamp control: mould breathing is calculated in a fully virtual process via the change in clamping force and the mould's spring constant. This patented process eliminates the need for additional sensors and is suitable for any mould.

The signal is particularly powerful during the injection, holding and cooling phases. As well as fluctuations in the amount of material, it also accurately identifies irregularities in clamping, such as problems with the non-return valve. As a result, mould breathing helps operators to optimise clamping force as well as to monitor quality and detect any faults within the process.

Process monitoring made easy

The mould breathing signal is a versatile tool when it comes to process monitoring. It responds sensitively to changes in input parameters such as material properties, mould temperature or switchover point. These properties make it an ideal indicator of process stability and product quality. Mould breathing, for example, flags up clear differences when the mould temperature fluctuates by just a few degrees, while changes in barrel temperature play less of a role **(Figure 2).** This means that even the slightest deviations can be quickly spotted and corrected.

ENGEL offers various options on the CC300 control unit so that operators can use mould breathing for process monitoring. Users can analyse the curve shape using tolerance bands or keep track of peak and mean values. One particularly user-friendly solution is iQ process observer, which automatically monitors all relevant parameters and automatically identifies irregularities. This lightens the operator's workload while increasing process stability.

Optimising clamping force to boost efficiency

Another highlight of the iQ clamp control system is its fully automatic clamping force optimisation. Excessively high clamping force can cause venting issues and shorten the mould's lifespan, while excessively low clamping force leads to overmoulding and mould damage. The system automatically adjusts the clamping force based on the mould breathing, which reduces energy consumption as well as minimising stress and strain on the mould and allowing for longer maintenance intervals.

One example aptly illustrates just how effectively the clamping force optimisation works. Thanks to the

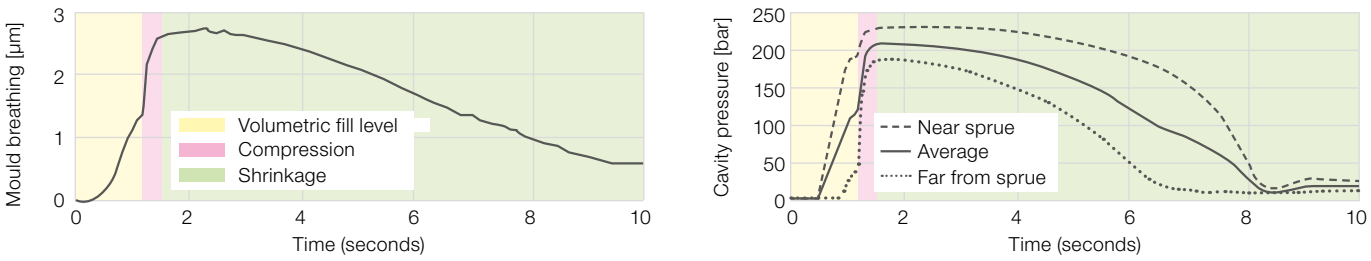


Figure 1: *The trajectories for mould breathing and the average cavity pressures with a demo component provide an insight into the mould without additional sensors.*

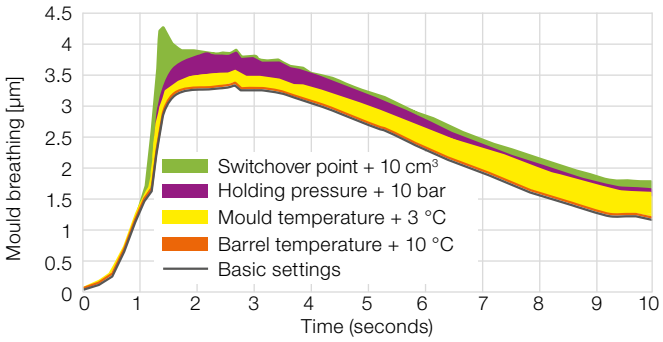


Figure 2: *Evaluation of how changes in selected settings are reflected in mould breathing response.*

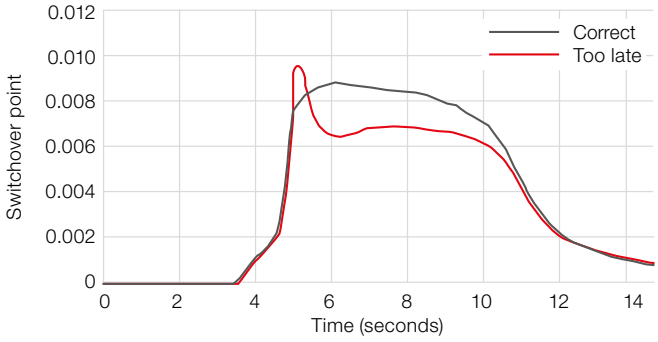


Figure 4: *When a switchover occurs too late, the signal spikes.*

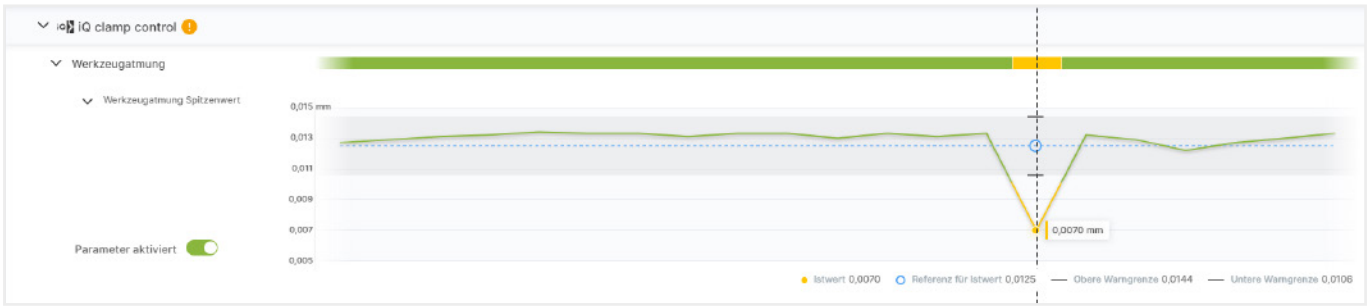


Figure 3: *Automatic mould breathing monitoring on the web version of iQ process observer.*

switchover point being adjusted, the clamping force was reduced by 25% when working on a thick-walled part – all without compromising product quality. This means less stress on the mould, longer lifespans and lower operating costs.

Mould breathing as a diagnostic tool

In addition to improved control, mould breathing also allows for precise fault diagnosis. One example of this is the detection of an insufficient fill level caused by the non-return valve closing too late **(Figure 3).** Diagnosing this fault would have been difficult without the mould breathing signal.

Thanks to the signal's sensitivity, the root causes of faults can be quickly identified and rectified before they result in rejects **(Figure 4).**

The next step towards smart manufacturing

In incorporating iQ clamp control and the mould breathing signal, ENGEL is offering a solution that fits seamlessly into the vision of smart manufacturing. The system combines digital assistance with physical precision and lays the foundation for data-driven process optimisation. The system's usability is a key plus-point – once a mould has been fixed in place, iQ clamp control manages the entire calibration and optimisation process automatically. All the operator has to do is activate the system and take a reference measurement.

Find out more about iQ clamp control:

Summary

The mould breathing signal, supplied by ENGEL's iQ clamp control system, is a valuable tool for the injection moulding industry. It offers a cost-effective alternative to conventional cavity pressure measurement and combines process monitoring, troubleshooting and clamping force optimisation within a single system. In releasing this innovation, ENGEL is demonstrating how digital technologies can make plastics processing more efficient and sustainable. Companies benefit from reduced operating costs, improved product quality and longer mould lifespans – a meaningful advantage for contemporary production environments. ■

The duo 5500 combi M
at ENGEL's technology centre

ENGEL and SABIC, at the St. Valentin technology centre during Battery Innovation Day, showcased innovative solutions for electric vehicles together with leading partners from the plastics and automotive industries. The production of battery trays was demonstrated on one of the world's largest injection moulding machines at a technology centre, setting new standards with its versatility and technological innovations.

On 13 November, ENGEL's technology centre in St. Valentin, Austria, was the focal point for the plastics industry. At the first Battery Innovation Day organised by ENGEL and Sabic, we and our partners presented pioneering technologies for the production of components for the electric vehicles sector. At the heart of the action was the duo 5500 combi M, a powerful dual-platen injection moulding machine capable of realising innovative applications on a mega scale. The live exhibit was the lid for a battery tray developed jointly with Sabic, Forward Engineering, Siebenwurst, Ensinger, DuPont and Freudenberg.

About the duo 5500 combi M: XXL technology

Packing 55,000 kN in clamping force, the duo 5500 combi M is one of the largest injection moulding machines of its kind. At the St. Valentin technology centre, ENGEL gave an impressive demonstration of how this machine plays its part in the production of lightweight components which would previously have been made of metal. The application on display was a battery tray measuring 1.77 x 1.3 metres – a prime example of the duo 5500 combi M's performance in material substitution and cost reduction.

The world's largest injection moulding machine at a technology centre.

This battery tray project uses a long glass fibre polypropylene from Sabic, which has additional flame-retardant properties and is lighter in weight than conventional metal solutions.
The machine's versatility is another impressive characteristic – with three injection units, it supports multi-stage processes in which different materials can be combined in a single component.

Advantages of the new battery components

1. Lightweighting and sustainability

As well as being up to 30% lighter than metal solutions, the use of plastic and thermoplastic sheet also reduces CO_2 emissions by up to 40% – an important step towards greater sustainability in automotive manufacturing.

2. Cost-efficiency

The battery tray's innovative design can directly accommodate additional features, such as fastening or reinforcing elements, during rather than after the injection moulding process. As well as reducing material usage, this also saves time and costs in secondary operations. The technology optimises the use of materials through targeted reinforcement with thermoplastic sheet, creating a highly stable yet cost-effective solution.

3. Thermostability and safety

A key attribute of the battery components is their thermal insulation and protection from heat penetration. The parts meet the highest safety requirements thanks to careful choice of materials and innovative injection moulding processes. For instance, the project uses a special STAMAX™FR polypropylene from Sabic that can withstand both thermal and mechanical strain.

Efficient process integration and automation

Another highlight of the duo 5500 combi M is its extensive degree of automation. Two easix articulated robots are directly integrated with the machine control unit and ensure smooth production. The robots perform tasks such as positioning thermoplastic sheets and removing the finished parts, ensuring that the entire production process is efficient and free of defects.

Wide range of options with the duo 5500 combi M

The duo 5500 combi M is distinctive for its flexibility and offers solutions for a vast array of different applications. The machine makes it possible to injection-mould large parts with high precision and to combine several materials in a single process. A huge variety of innovative technologies are used to ensure a high degree of flexibility:

- **foammelt** is ideal for the production of lightweight parts that are both dimensionally stable and high-strength when combined

with tapes, for example. This involves a foaming process being incorporated into the injection moulding process, which reduces weight and saves material.

- **organomelt** unleashes the possibility of combining thermoplastic composites with injection moulding to produce parts with enhanced stability and functionality. This technology is particularly attractive for the automotive industry, where lightweight yet resilient parts are in strong demand.
- **optimelt** ensures that high-quality optical parts are made from transparent plastics. The material thickness is optimised and lasting stress minimised through precise injection compression moulding (coinmelt), which is particularly important for headlights and light guides in the automotive industry.
- **coinmelt** is used for injection compression moulding to manufacture parts with thin walls and strict optical requirements. It offers an ideal solution for minimising warpage and lasting stress on parts with large surface areas while providing advantages in process engineering such as reduced injection pressure levels.
- **foilmelt** integrates decorative or functional foils directly into the injection moulding process. This technology supports cost-effective production of high-quality surfaces with high durability and functionality, which are primarily used in the electronics and automotive industries.
- **clearmelt** flood-coats visible parts with polyurethane (PUR) inside the mould. This creates coated or decorative surfaces without an additional finishing stage, eliminating certain steps within production while ensuring outstanding surface quality. It is also ideal for combining with other injection moulding processes, allowing for a wide range of different surfaces to be created.

In addition, the duo 5500 combi M permits near-series production of prototypes so that customers can test the moulds and processes out under realistic conditions. In providing this option, ENGEL is cutting the development time on new products for its customers and partners as well as providing the set-up necessary for a fast and efficient market launch.

Project partners' role: collaboration at the highest level

The Battery Innovation Day's success also stemmed from ENGEL's close co-operation with leading partners in the industry:

- **SABIC,** a partner for this event, supplied the long glass fibre polypropylene, which was optimised to meet the battery tray's thermal and mechanical requirements.
- **Forward Engineering** provided support with simulation-based development processes and ensured that

Impressive production of large-format parts with complex automation on the duo 5500 combi M.

The practical knowledge shared at ENGEL Battery Innovation Day was highly acclaimed by an international audience.

the parts could withstand mechanical stress and strain.

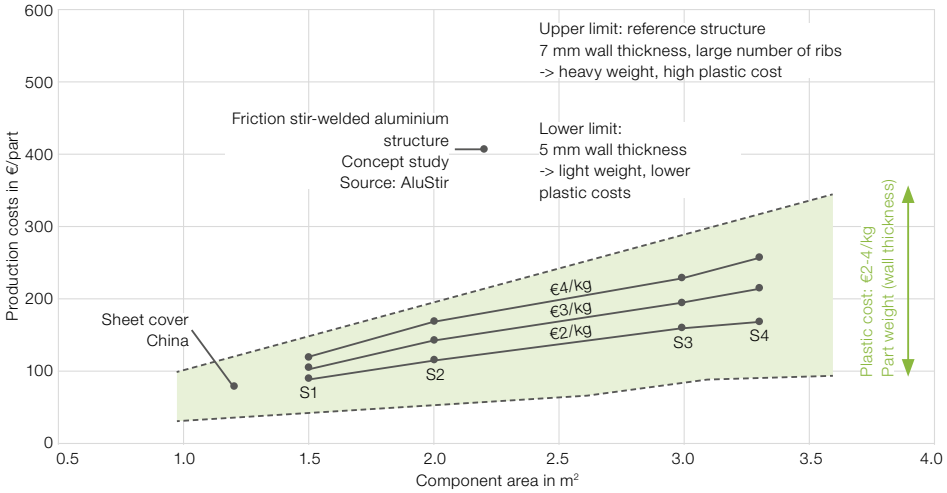
- **Siebenwurst** brought in expertise in mould-making to master the challenges of producing large parts.
- **Ensinger** supplied thermoplastic composite materials that would simultaneously guarantee high rigidity and light weight.
- **Freudenberg** developed specialised valve solutions to safely relieve pressure from the battery housings.
- **DuPont** added its expertise in polymer technology to deliver high-performance materials that ensured thermostability and mechanical reliability for the battery housings.

Driving innovation for the future of electric vehicles

In demonstrating the duo 5500 combi M and hosting the successful Battery Innovation Day, ENGEL is once again demonstrating its leading role in injection moulding technology. The technologies on show offered solutions for a series of current challenges in the electric vehicles market:

- Reducing weight and costs
- Improving thermal and mechanical properties
- Efficiently integrating automation and high functionality

These innovations pave the way for mass production of EV parts and could revolutionise the entire automotive industry in the future. ■



Analysis of the production costs of thermoplastic battery trays compared with a concept study on an aluminium friction stir-welded battery housing.

Visitors showed a keen interest in increasing cost efficiency while reducing weight and carbon emissions.

Summary

The Battery Innovation Day was not only a platform for demonstrating the duo 5500 combi M – it also marked a milestone for the ongoing development of sustainable lightweight solutions. By combining highly developed materials, state-of-the-art injection moulding technology and close collaboration within its partner network, ENGEL is breaking new ground in the production of next-generation components. The duo 5500 combi M impressively demonstrates how futuristic technologies are already being put to use and how customers can benefit from an XXL-sized competitive advantage.

More information about the duo series:

The ENGEL e-speed with iQ weight control makes an impressive impact with its high performance and short cycle times.

Sustainable bucket production with ENGEL machines at JOPA

In a world where sustainability and protecting the environment are becoming increasingly important, it is noteworthy when a business not only follows these values, but has been driving them forward for decades. JOPA, a family-run company based in the German town of Ahlen, is one such pioneer. It has been using recycled plastics for over 35 years, and today nearly every bucket it produces is made from almost 100% recycled material. During a visit to the company's plant, we were able to see its spirit of innovation and commitment to sustainability for ourselves.

JOPA was founded in 1908 and has become an established name in the production of plastic containers over the decades. With turnover of €18 million and a market share of over 50% in Germany, the company is one of the leading manufacturers of buckets, especially for the building trade. Employing 56 staff, the company processes some 8,000 tonnes of recycled plastics from yellow recycling bags (PCR material) alongside 3,600 tonnes of virgin material. JOPA's owner and director Ralf Spohn emphasises that the business was already focussing on recycling long before the current sustainability debate took off. "We turn plastics from Germany's yellow recycling bags into high-quality products. In following this approach, we are not just guided by commercial objectives but by environmental ones too," Spohn explains. The company ensures that at least 92% of the materials it uses are derived from PCR sources.

And the quality of the buckets it produces is a key differentiator from the competition. Working together with TÜV, JOPA has developed a standard

iQ weight control helps us balance out fluctuations when processing recycled material.

Nils Spohn, Head of Research and Technical Development, JOPA

for companies manufacturing packaging and lightweight containers. Thanks to the electric clamping unit and the hybrid injection unit, extremely short cycle times can be achieved without compromising the quality of the parts produced.

For JOPA, as well as an increase in efficiency, this purchase also brings considerable energy savings. "We have already seen cycle time reductions of around 15 to 20%, depending on the quality of recycled material used. In addition, we have achieved energy savings of around 20% relative to our old machines," Ralf reports. These figures are particularly valuable considering the additional challenges associated with processing recycled materials, such as variations in material quality.

iQ weight control: Precision despite material variations

One key success factor of the new machines is iQ weight control, the digital assistance system. This system was developed to compensate for the variations in material viscosity that occur especially frequently in the processing of recycled materials. These fluctuations often result from the varying levels of quality in the recycled material used, which in turn stems from factors including different compositions or impurities.

"The iQ weight control system helps us to balance out these fluctuations by monitoring the injection process in real time and making automatic adjustments," explains Nils Spohn, JOPA's future director. This technology ensures that consistently high product quality is delivered despite the challenges of processing recycled materials. The system continuously analyses

for builders' buckets that sets clear requirements for load capacity and durability. This standard ensures that the buckets are not only functional but also safe to use – a measure that many competitors do not incorporate to nearly the same degree. Whereas some imported products are made of inferior plastic and can easily break when heavily loaded, JOPA guarantees tested and certified quality that can withstand even extreme conditions.

ENGEL e-speed 500: pioneering technological role

In a push to update its machinery, JOPA recently invested in new injection moulding machines from ENGEL's e-speed series. These machines, which have been specially developed for the production of thin-walled plastic parts, offer considerable advantages. The ENGEL e-speed 500 features high production speeds and precision – particularly advantageous

JOPA buckets made with 96% post-consumer recycled material.

the injection moulding process and adjusts the relevant parameters during the injection process to minimise product quality deviations. As a result, stable, high-quality products can be manufactured even in the presence of fluctuating material properties.

Sustainability down to every fibre

Beyond being at the cutting edge of technology, JOPA's production is also a leading example when it comes to sustainability. The company has been using recycled plastics for more than 35 years. By making use of these materials, it prevents around 8,160 tonnes of CO_2 emissions annually. These impressive figures clearly demonstrate JOPA's commitment to protecting the environment. The business also collaborates with German conservation group Nabu and has partnered with Osnabrück University of Applied Sciences in the field of plastics technology and processing, underscoring its role as a pioneer in sustainable manufacturing.

And JOPA's green credentials do not end with the raw materials it utilises. The company has run one of the largest solar arrays in Ahlen for 16 years, further reducing its energy consumption. Sustainability is also a priority in the logistics context, with JOPA operating its forklifts electrically, without fossil fuels, for over ten years. The RAL Quality Mark is a vital piece of JOPA's commitment to sustainability and quality. Awarded by RAL, the German Institute for Quality Assurance and Certification, this status vouches for its recipient's compliance with stringent standards – particularly with regard to the processing of recycled materials. JOPA, one of the initiators of the quality mark, uses it to ensure the transparency and credibility of its products. The mark guarantees that at least 92% of the material comes from the yellow recycling bag: a strong signal of authenticity in today's world.

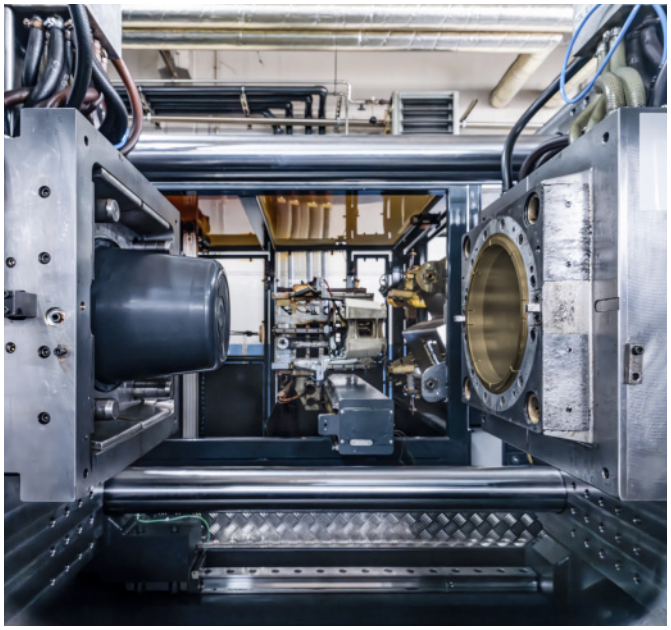
Recycling PET requires innovative technologies to ensure purity and processing compatibility.

Nils Spohn emphasises that the quality mark strictly monitors the materials' origin as well as the production processes. Regular checks ensure compliance with the specifications, giving customers confidence in the products' sustainability. This makes the RAL Quality Mark more than just a label – it is a guarantee of genuine, verifiable sustainability that sets JOPA apart from the competition and assists with consumer decision-making.

Insights into the future: challenges and opportunities

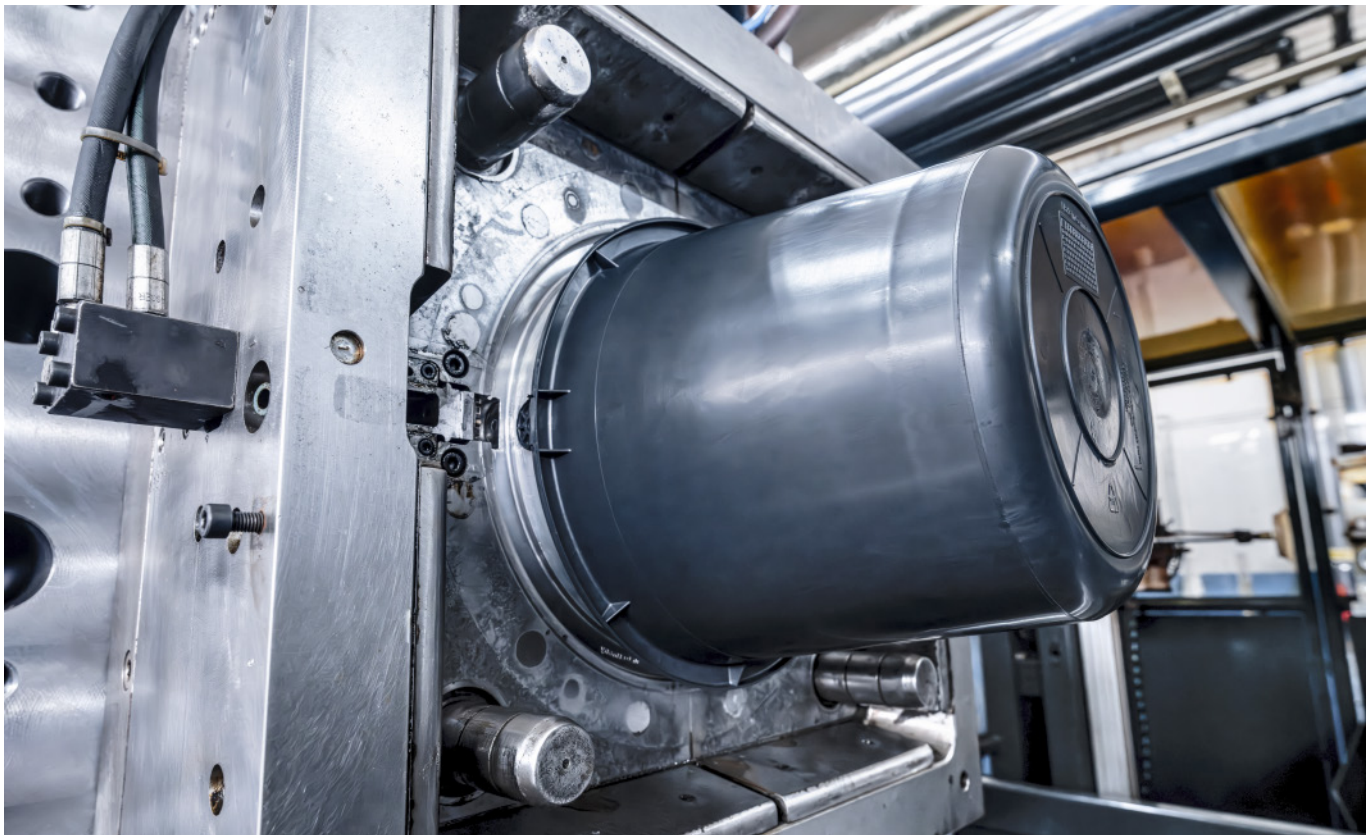
However, processing recycled materials does not come without its challenges. Material quality in particular is always a variable that influences the production process. "We have to constantly work on our processes to ensure that our products meet the high quality standards our customers expect from us," Ralf Spohn explains. This includes working with machine manufacturers such as ENGEL to continue developing the machines and gear them up for the specific requirements associated with recycled material processing.

Nils Spohn, who is closely involved in the company's digital transformation efforts, sees a major opportunity in the automation and connectivity offered by the machinery. ENGEL's digital shopfloor monitoring system, which connects every machine with every other, is set to make production even more efficient and transparent in the future. "We want to be able to



iQ weight control automatically compensates for material fluctuations during injection in applications involving a high proportion of recycled material, delivering perfect results shot after shot.

The ENGEL easix articulated robots make a decisive contribution to the space-saving set-up of the production cells.



Left to right: Michael Wiesinger, ENGEL; Nils Spohn, Head of Research and Technical Development, JOPA; Martin Becker, Plant Manager, JOPA; Stefan Witt, ENGEL; Udo Pape, ENGEL

Find out more about iQ weight control:

automatically compensate for production fluctuations and digitally monitor our machinery. In addition to saving time, this also increases production reliability," Nils Spohn says.

Top takeaway: JOPA's pioneering circular economy status

The visit to JOPA provides an impressive demonstration of how a medium-sized company is mastering the challenges of plastics processing in today's environment. With a clear focus on sustainability and consistent investment in state-of-the-art technologies, JOPA is ideally placed to continue playing a leading role in the plastics processing field going forward. Its products, which are almost entirely made from recycled materials, are not only proof of technological innovation and feasibility – they also embody the commitment of a company that takes responsibility for the environment. At a time when sustainability is no longer just a trend but a necessity, JOPA is setting markers that reach far beyond Germany's borders.

With its forward-looking approach and continual optimisation of its processes, JOPA shows that sustainability and bottom-line success can go hand in hand if the technology is properly geared for it. This is where ENGEL plays its part. Both companies are shining examples of how the plastics industry can help shape a positive future through innovation and responsibility. ■

Tie-bar-less efficiency for water management systems

Alcadrain benefits from ENGEL solution

With over 5,000 different parts and more than 1,200 injection moulds requiring frequent mould changes, there are many reasons why Alcadrain has placed its trust in the tie-bar-less victory series from ENGEL for the production of thermoplastic components. Yet the collaborative relationship between the two companies began in a completely different area ...

Alcadrain s.r.o. is the largest manufacturer of sanitation equipment in Central and Eastern Europe and was founded in 1998, trading as Alcaplast. The family-owned business based in the Czech town of Břeclav began with the manufacture of valves and traps, before expanding its product portfolio at speed. Today, Alcadrain operates from a floorspace of over 110,000 m^2 to make more than 1,000 different sanitation products – valves, traps, toilet assemblies, shower channels, drains, toilet seats, cisterns and many more. Thanks to a strong focus on high quality, innovation and design, Alcadrain has been able to achieve steady growth. Today, Alcadrain is a member and the largest constituent part of the Alca Group. In

Alcadrain uses ENGEL's tie-bar-less victory series for the manufacture of larger thermoplastic components.

the past financial year, the Alca Group generated sales of around €120 million and employed over 1,000 staff (including 700 in Břeclav), operating subsidiaries in 11 countries.

ENGEL solves quality issue

The collaboration with ENGEL began in 2019. While Alcadrain has always produced thermoplastic injection-moulded parts itself, the company sourced elastomer components like seals from an outside supplier. "We have very high standards for the quality of our products. Unfortunately, the seals supplied could not satisfy those requirements," explains Ondrej Slanina, Technical Manager at Alcadrain, by way of background. "As a result, we decided to bring the manufacture of the elastomer parts in-house and ordered moulds from mould-maker EKT GmbH & Co KG. They recommended ENGEL to us as an injection moulding machine supplier."
ENGEL supplied three machines from the elast series, two with a vertical clamping unit and one with a horizontal clamping unit. Time was of the essence, as Slanina stresses: "For us, it was crucial that the overall mould-machine-automation package had to get up and running immediately." Needless to say, ENGEL made it possible to start the machines up shortly after delivery, even though the staff were not familiar with ENGEL injection moulding machines at the time. "It is important to us that our machine operators are really well trained. ENGEL's extensive training ensured that production went smoothly further down the line," Slanina adds. "The rapid, expert support provided by ENGEL's service and sales teams is also essential for us. If required, a service technician is usually with us on site the same day."
Since seal production went live at Alcadrain on ENGEL elast machines, part quality problems have been a thing of the past. Spurred on by this success, the business also began to consider partnering with ENGEL as a machine supplier for the production of thermoplastic components.

Using iQ weight control, we can achieve shorter cycle times.

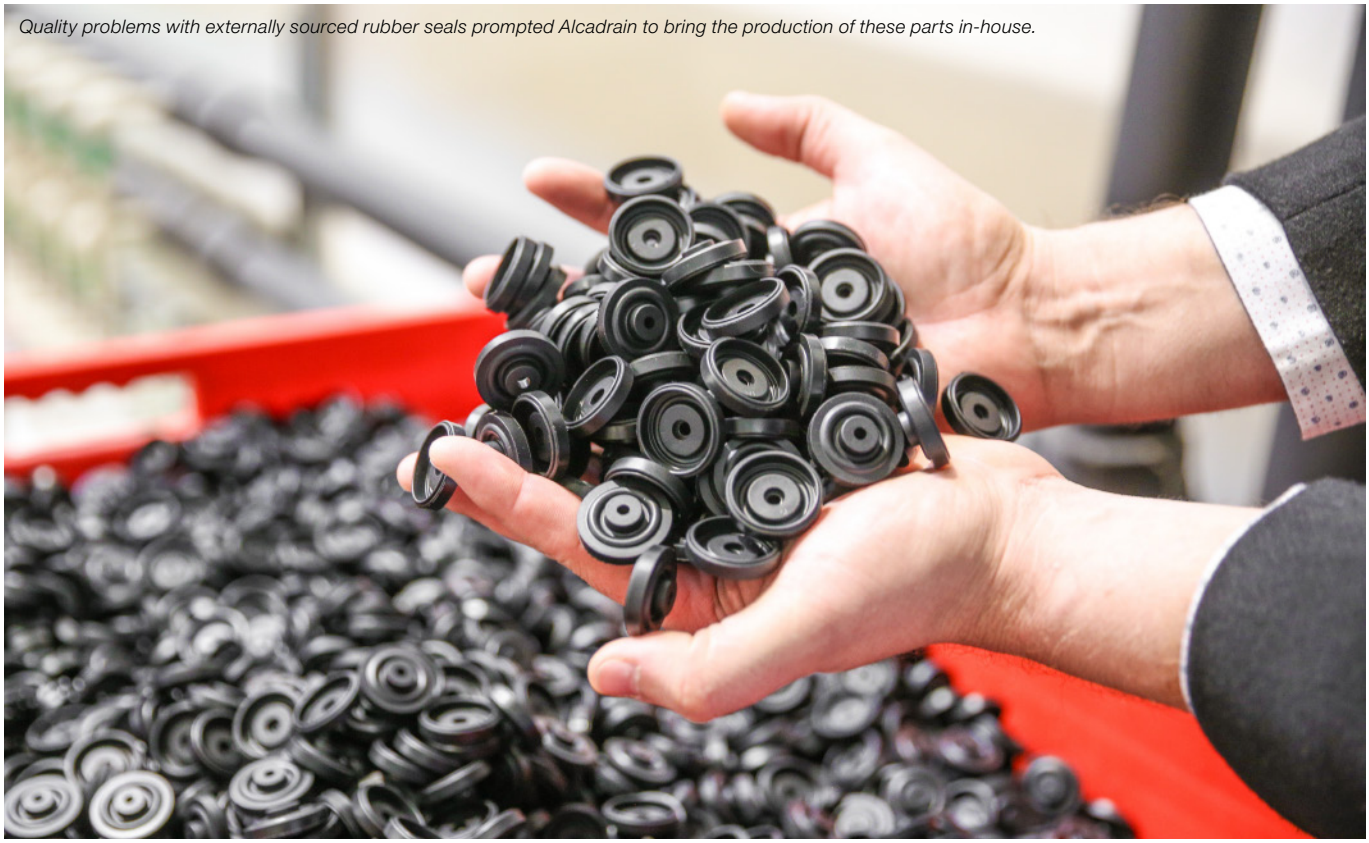
Ondrej Slanina, Technical Manager, Alcadrain

victory by name, victory by nature

A major challenge at Alcadrain is the large number of different parts and moulds, which require frequent mould changes. Slanina knows the facts: "We have over 1,200 different injection moulds and make 15 to 20 mould changes a day. The moulds usually only remain on a given machine for a maximum of three to four days."
This is where the victory series from ENGEL offers a decisive advantage thanks to its tie-bar-less design: "Without tie-bars getting in the way, the time required for a mould change is substantially reduced. Customers with an extensive mould inventory like Alcadrain benefit from significantly higher productivity thanks to reduced downtimes," explains Franz Pressl, product manager for ENGEL's line of tie-bar-less solutions. However, one question remained: How would the hydraulically driven machine affect the manufacturing process' energy consumption?

Alcadrain s.r.o. is the largest manufacturer of sanitation equipment in Central and Eastern Europe.

The collaboration with ENGEL began with elast injection moulding machines.



Quality problems with externally sourced rubber seals prompted Alcadrain to bring the production of these parts in-house.

Ondrej Slanina decided to compare a victory 160 against multiple hydraulic and all-electric injection moulding machines from other manufacturers in the 1,300 to 1,500 kN clamping force range. The results were surprising: "We could see that the power consumption of the 160-tonne victory was significantly lower than that of other hydraulic machines. The difference relative to the smaller, all-electric 130-tonne machine was also smaller than expected." Franz Pressl, on the other hand, was less taken aback: "Our servo-hydraulic ecodrive concept works extremely efficiently – the oil temperature stays well below conventional levels. This is why our victory machines in this clamping force range generally do not require cooling water for the hydraulic systems. Coolant consumption is the best indicator of an injection moulding machine's energy efficiency!"

In addition to the quick and easy mould set-up and comparatively low energy consumption, the tie-bar-less victory offers another benefit – its spacious mould area allows large moulds

ENGEL has ensured that production runs smoothly.

Ondrej Slanina, Alcadrain

to be set up on small machines. The moulds can be larger than the mould fixing platens, and only the cavities have to be inside the platens. "As a result, the victory can accommodate a wide range of moulds and is extra versatile. This reduces the complexity of the machinery and increases flexibility in production," adds Roman Mališek, who works in sales at ENGEL CZ. Owing to its unique advantages, Alcadrain opted for the ENGEL victory, combined with viper linear robots and a highly compact conveyor belt which is integrated with the machine's safety gate.

"The full integration of the downstream equipment into the injection moulding machine offers us several advantages. It saves space, which is always a consideration for us due to our continuous growth, it arrives already CE-certified, and the area around the machine is easy to clean," Slanina states.

Protecting the environment: a rallying cause for Alcadrain

For Alcadrain, conserving resources in production is an important priority. The process water from its manufacturing is used for air conditioning on the production floor, and a photovoltaic system with a peak output of 3.5 MW has been installed on the production facilities' rooftops. The electricity generated from this system is also used to power the injection moulding machines, which is another reason why the ENGEL victory's low energy consumption was a distinctly important factor. Another important aspect is the need to prevent rejects and waste. The sprues produced during injection moulding are regranulated in-house and fed back into the injection moulding process. To keep the processes stable despite the addition of recycled material, Alcadrain uses the iQ weight control digital assistance programme: "We have seen that we can achieve a lower injection pressure and shorter cycle times with iQ weight control. At the same time, the cavities are still filled reliably and precisely, allowing us to prevent unnecessary rejects," says Slanina.

The nearby UNESCO South Moravia Biosphere Reserve, which is the only privately managed biosphere reserve in the Czech Republic, proves that

A small selection of Alcadrain products in the showroom at the company headquarters in Břeclav.

environmentally friendly production is not just a business necessity for Alcadrain. František Fabičovic, a co-owner and founder of the Alca Group, is one of the founding members of this reserve. Every year, a portion of Alcadrain's profits are invested in maintaining and renaturing this unique landscape.

Additional projects with ENGEL in the pipeline

Today, in addition to the four elast injection moulding machines previously mentioned, Alcadrain already has 15 tie-bar-less victory machines – and there will most likely be more on the way: "We are very satisfied with the support and quality that come with the ENGEL machines," Slanina concludes. "On top of that, the CC300 control unit is easy to use, offers extensive customisation capability and brings transparency to our processes. I see a great deal of potential for our future here." ■

Find out more about the victory series:

Left to right: Roman Mališek (ENGEL CZ field sales), Ondrej Slanina (Technical Manager, Alcadrain), Franz Pressl (Product Manager for tie-bar-less machines, ENGEL Austria).

From left: Christoph Fritz, ENGEL; Daniel Tobien, RÖCHLING Medical

Delivering optimisation **in contact dish production**

Röchling Medical is a development partner and contract manufacturer for leading medical equipment and technology companies. In Waldachtal, southern Germany, the company manufactures customised components and assemblies, including Petri dishes, solutions for administering medications, ophthalmology instruments and complex medical devices. Röchling produces innovative contact dishes made of polystyrene, which ensure that medical samples can be transported safely and free of contamination. A distinctive feature of these dishes is their user-friendly, three-point locking mechanism. Unlike conventional threaded systems, this is easy to use while continuing to prevent media from escaping.

Contact dishes are used specifically for the microbiological examination of surfaces. Unlike Petri dishes, they are used for direct sampling on smooth surfaces, which allows for precise analysis of the microbial load. This is particularly important in hygiene-critical areas such as cleanrooms or hospitals to ensure compliance with strict hygiene standards. A lid protects the samples from external contamination and preserves the culture medium's sterile environment. Along with a customer, Röchling Medical has optimised the closure mechanism to ensure that the product is especially easy and convenient for users. Making these contact dishes from polystyrene requires a high level of precision and consistency in the injection moulding process. To ensure high production speed and consistently high product quality, Röchling Medical relies on the all-electric e-motion injection moulding machine from ENGEL.

The solution: ENGEL's all-electric e-motion 160 injection moulding machine

This high-performance machine offers numerous advantages over hybrid and hydraulic alternatives. The all-electric drive minimises mechanical losses and ensures smooth, repeatable motion sequences – a key factor for fast cycle times. Thanks to the high precision delivered by the e-motion, Röchling can reliably stay within the demanding tolerance ranges and keep its contact dishes burr-free, resulting in the consistent product quality vital for medical applications. In addition, the all-electric technology reduces particle emissions, which improves cleanroom quality and makes it easier to comply with stringent hygiene standards.

The machine is equipped with a cleanroom package from ENGEL, which is designed for the ISO 7 cleanroom class. A special cladding system reduces particle emissions and seals off components that could be a potential source of contamination. Many of the parts are made of stainless steel and fitted with button-head socket screws. To minimise debris and make surfaces easier to clean, the tie-bars and clamping units are chrome-plated. The premium version with direct drive is included for the injection unit with a

Improved cleanroom quality thanks to electric drives.

The production of contact dishes requires a high level of precision and consistency in the injection moulding process.

Constant temperature control for short cycle times with e-flomo.

CrN-coated screw. Comparing favourably against the belt drive, it ensures 100% synchronisation and enables higher injection speeds thanks to its more efficient power transmission. In addition, a smart-shut non-return valve is used, which consists of a tip, a sleeve ring and a pressure ring. This offers high reproducibility thanks to controlled forced closure of the sleeve ring and self-cleans effectively thanks to large flow cross-sections.

Precise temperature control for fewer rejects and greater energy efficiency

Short cycle times require constant temperature control. The ENGEL e-flomo water distribution system precisely controls the temperature levels in the injection moulding process. This allows the flow rate or temperature difference to be custom-set for each circuit, helping deliver even temperatures – and, in turn, higher part quality and fewer rejects. The e-flomo system also improves process stability and reduces energy consumption. Integration into the machine control unit optimises the pump speed, which further elevates the process' efficiency and stability.

High piece count with maximum precision

The company makes around 12 million contact dishes from polystyrene every year. Daniel Tobien, Head of Production at Röchling Medical, explains: "The precision offered by the all-electric machines is significantly superior to that of the hydraulic machines. The advantage is especially evident with cycle times of less than ten seconds, which we now achieve – switching electric motors is much easier and faster than doing the same with a hydraulic pump or a valve. In the cleanroom, it was crucial for us to significantly reduce the machine's particle emissions and further improve the cleanroom quality as a result."

Results and user feedback

By putting the ENGEL e-motion to work, Röchling Medical was able to significantly increase product quality and production efficiency. The precise temperature control and automated control guarantee a consistently high contact dish quality, which ensures that they remain safe and user-friendly.
Röchling Medical is highly satisfied with the solution it opted for. After extensive discussions and evaluating several machine manufacturers, ENGEL was chosen as the ideal solution for the company's production process. The smooth communication and excellent service quality also made a convincing impression. There have been no significant failures or service call-outs since the solution was installed in 2018.
Daniel Tobien stresses: "Today, we are really satisfied with the machine. Putting it to use along with the mould and automation system, we achieve high rates of output. So far, we have not had any machine-related downtime, which is extremely important for us as we manufacture around the clock, five days a week." ■

Discover another story about e-motion and medical technology:

Summary

With the all-electric e-motion injection moulding machine from ENGEL, the cleanroom package and several e-flomos installed, Röchling Medical has found an ideal solution for the production of contact dishes. This combination of advanced technology and precision process control ensures high product quality and efficiency, satisfying the stringent requirements of the medical technology and equipment industries. The successful implementation and positive results demonstrate that ENGEL is a reliable partner for innovative and demanding production solutions.

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