



Engel Prepares Ambitious Rollouts for K 2019

Smart, circular, automated are among the key themes for Austrian machine maker

By Robert Grace

Machinery maker Engel Group unveiled a host of new products and advanced technologies during a pre-K 2019 media event at its Schwertberg headquarters on June 24, with a focus on smart manufacturing, the circular economy, process control, automation, and even amorphous metal molding.

The 6,900-employee company, which reported a 6 percent increase in group sales to 1.6 billion euros for its recently completed 2018/19 fiscal year, also said it is nearing completion of its €375 million “2020 investment program” (the largest in its 74-year history). As part of that, Engel this past spring extended the ground-floor assembly space at its headquarters by 2,250 square meters, and added a new customer and 11-press technology center, creating in the process what it calls an “Industry 4.0 pilot plant” for vertical integration that is meant to represent every link in the plastics value chain.

Next year it plans to complete the largest and final construction project of the 2020 program—the expansion of its large-scale machine plant in St. Valentin, Austria.

Using the tagline “innovation at heart” for its new Schwertberg technology center, which includes 1,700 square meters of machine floor space on the new building’s upper floors, Engel describes that facility as “a plastics processing operation in its own right and one of the most modern in the world.” Engel bundles a large number of its products and solutions for the smart factory under the inject 4.0 banner.

“We ourselves are the first users of all newly developed inject 4.0 technologies,” says Engel Chief Executive Officer Stefan Engleder, who noted the company has many new inject 4.0 products in development for the K 2019 show scheduled for Oct. 16 to 23 in Düsseldorf, Germany, where the firm will occupy Stand C58 in Hall 15.

LIT Factory to Advance Polymer Digitization

Engel—together with 24 other mostly German and Austrian partners such as Borealis, Covestro, and Erema—has just opened the Linz Institute of Technology (LIT) Factory at the Johannes Kepler University (JKU) in nearby Linz, Austria. Engleder says the consortium decided only in spring 2018 to proceed with this new plant, and built it in 14 months with the help of government funding.

The JKU website says the 1,480 square-meter LIT Factory “aims to leverage the potential of digitization alongside the value chain of materials ranging from product development and tool-making to production and ecologically recycling plastic.” In the long run, it says, the LIT Factory wants to become an internationally visible flagship for polymer processing and digitization.



Engel opened this 11-press technology center in its Schwertberg, Austria, headquarters in June. The firm plans to use the space as a highly advanced pilot plant to showcase its portfolio of technologies. All photos courtesy of Engel



Engel Chief Executive Officer Dr. Stefan Engleder says economic and political uncertainty is roiling the automotive sector and other key markets.

“Thanks to participation from various disciplines such as mechatronics, IT, or environmental technology, and to the support of various industrial partners,” Engleder says, “it is possible to cover the plastics industry’s entire value chain in a single factory.” It’s being positioned as a long-term project that will help develop smart injection molding, smart extrusion and smart recycling processes.

Bringing the Smart Factory to Life

Meanwhile, Engel claims it will be “bringing the smart factory to life with its inject 4.0 range” at the K show. It plans to demonstrate how production processes can continually self-optimize through the networking of production systems; the

systematic usage of machine, process, and production data; and the deployment of intelligent assistance systems.

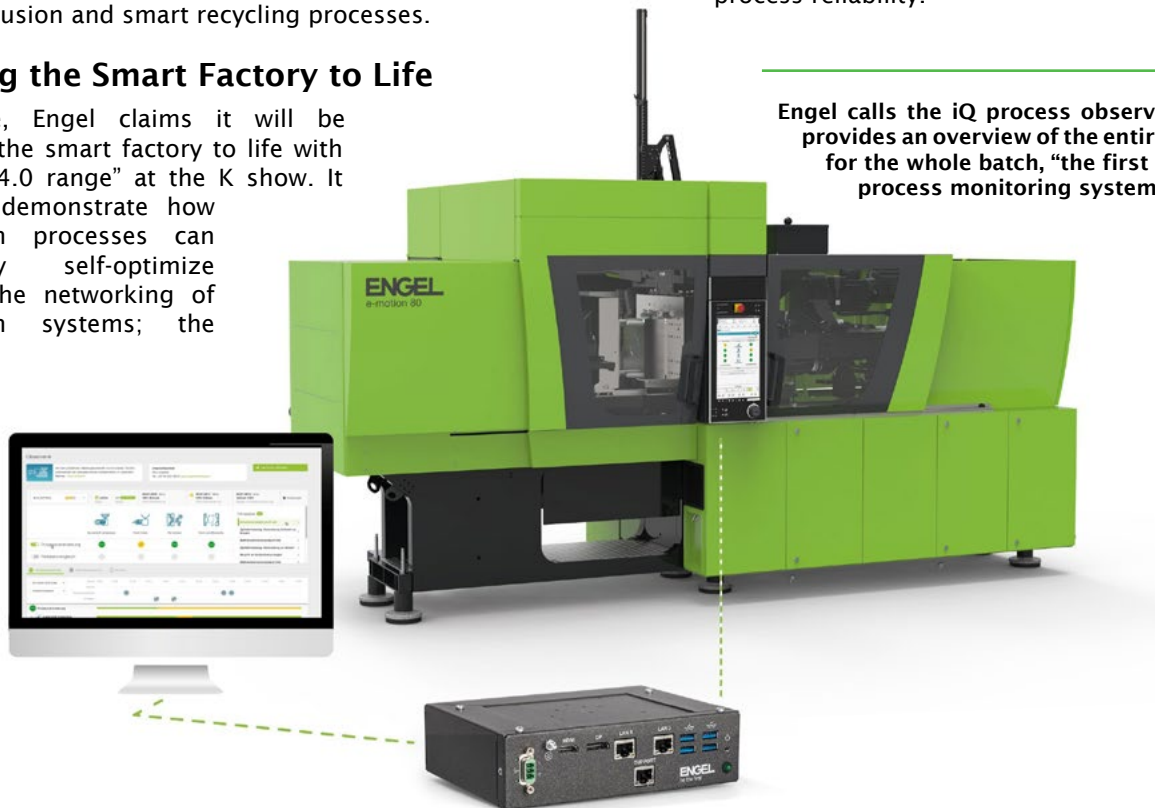
At the fair, the firm will unveil two new assistance systems—iQ process observer and iQ melt control. Additionally, its iQ weight control is set to be used in recycled material processing for the first time.

Rather than optimizing individual steps in the injection molding process, such as injection and cooling, the iQ process observer (which Engel dubs “the first proactive process monitoring system”) goes much further by providing an overview of the entire process for the whole batch. This makes it possible, the firm says, to identify changes in the process at an early stage, allowing operators to determine their causes and find a solution more quickly. The software continually analyzes several hundred process parameters across all four phases of the injection molding process—plasticising, injection, cooling and demolding. The results, split into the four phases, are immediately visible on both the molding machine’s CC300 control unit and on the Engel e-connect customer portal.

The company says its second new iQ development makes it possible to perfect the plasticising process. The goal is to conserve both the material to be processed and the mechanical components of the plasticising unit as much as possible.

“In real-world situations, plasticising is often faster than required by the cycle,” says Günther Klammer, head of Engel Austria GmbH’s Plasticising Systems division. “This generally has an effect on the screw’s working life and the product’s quality.” Improved melt homogeneity, on the other hand, increases process reliability.

Engel calls the iQ process observer, which provides an overview of the entire process for the whole batch, “the first proactive process monitoring system.”



Engel will exhibit its iQ weight control assistance system with a recycled material application at the K show for the first time anywhere. That five year-old system individually adjusts the quality-related process parameters for each shot during injection to suit the prevailing conditions. Working with recycling equipment specialist Erema Engineering Recycling Maschinen und Anlagen GmbH, Engel has now adapted the software to effectively handle recycled material, which naturally yields greater batch variations than virgin material.

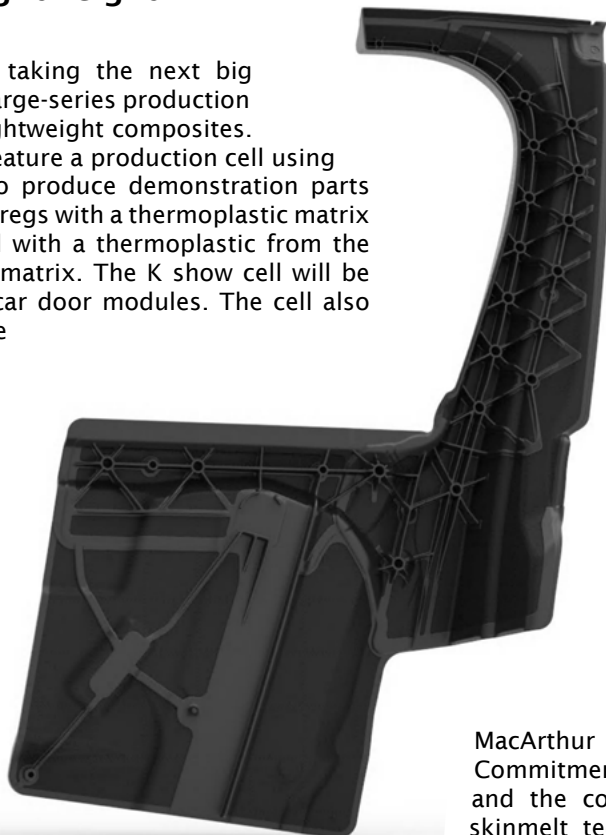
Noting that tests confirmed that iQ weight control maintains a constant melt volume throughout the production process, even when processing recycled material, Paul Kapeller, product manager for digital solutions, says this development opens the door “to a significantly wider range of applications for recycled material, making an important contribution to the circular economy.”

In addition to celebrating the 30-year anniversary of its tie-bar-less injection molding technology—marked by more than 70,000 such machines in the hands of some 10,000 customers—Engel also highlighted a number of other processing and material technologies at its recent event.

Organomelt for Lightweight Composites

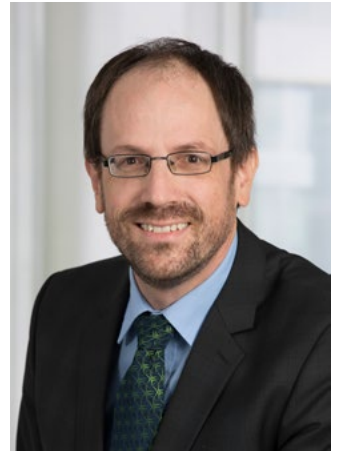
The company says it is taking the next big development step in the large-series production of thermoplastic-based lightweight composites. At the K show Engel will feature a production cell using its organomelt process to produce demonstration parts from fiber-reinforced prepregs with a thermoplastic matrix that then are overmolded with a thermoplastic from the same resin family as the matrix. The K show cell will be making components for car door modules. The cell also will be equipped with three Engel easix articulated

The organomelt molding process—developed with German auto supplier Brose—is said to be the only system that can simultaneously process three differently shaped organic sheets of varying thicknesses in a fully automated process involving integrated infrared ovens. A cell at the K show will be making parts for this car door module.



robots, all operating at the same time—another first.

“Thermoplastic composites are growing in importance when it comes to lightweighting in the automotive industry,” says Dr. Norbert Müller, head of Engel’s Center for Lightweight Composite Technologies. “In the future, several different prepregs will be combined for each component to tailor the lightweight construction characteristics to the relevant component’s shape as well as the different stresses on individual areas inside the component,” he added.



Dr. Norbert Müller heads Engel’s Center for Lightweight Composite Technologies

Engel, which developed this molding process in partnership with German automotive supplier Brose Fahrzeugteile GmbH & Co. KG, says this is currently the only system in the world that can simultaneously process three differently shaped organic sheets between 0.6 mm and 2.5 mm in thickness in a fully automated process involving integrated infrared ovens.

“The different stresses on the individual component areas can be dealt with thanks to the targeted selection of organic sheets on the basis of load distribution—an outcome that Brose has helped to ensure through a variety of simulation processes.” The demo part to be produced at K, for instance, is more rigid in its window frame area than on the inside of the door.

Advancing the Circular Economy

When it comes to sustainability, Engel Group is taking numerous steps. Last fall, it became one of the first plastics machine manufacturers to join the Ellen MacArthur Foundation’s circularity-focused Global Commitment to the New Plastics Economy initiative, and the company is showcasing advances to its skinmelt technology while also promoting design for recycling.

There is growing interest in sandwich-molded components with a core of processed plastics scrap. Engel says skinmelt makes it possible to achieve high recycled content levels, even when working with complex component geometries, and will be producing transport boxes using the process on an Engel duo 450 skinmelt press at its K stand.

“The transport boxes are particularly challenging for sandwich injection molding due to their geometry,” explains Dr. Georg Steinbichler, senior vice president of research and development for technologies at Engel Austria. But, he notes, the company still is able to reach a recycled content level that exceeds 50 percent. Both the recycled and virgin material are polypropylene, ensuring the sandwich-molded products can also be easily recycled at the end of their service life.



Dr. Georg Steinbichler notes that using more recycled resin in products is key to a successful closed-loop, circular system.

Unlike classic coinjection, he explains, the skinmelt process involves fusing the two melts prior to injection. The skin—the virgin material—is first to reach the cavity. It is pushed forward by the inflowing recycled PP and pressed against the cavity walls, while the core is filled



Using its skinmelt sandwich-molding process, Engel can make transport boxes like this with high levels of recycled polypropylene as a core between inner and outer layers of virgin material.

with recycled material. The amount of recycled material possible to accumulate in the core depends crucially on the geometry of the molded part and the flow pattern in the cavity.

Engel is collaborating with partner companies on his

project. It is sourcing the mold from Haidlmair, an Austrian firm that makes molds for producing storage and logistics containers, and getting Systalen-brand PP regrind material from Der Grüne Punkt – Duales System Deutschland, the German Green Dot company.

“Making much wider use of recycled material is exactly what is needed to keep plastics in a closed-loop system,” Steinbichler stresses.

When it comes to designing for recycling, meanwhile, one example involves thin-walled packaging using the in-mold-labeling (IML) process. These is trending toward more mono-material systems in which the label, lid, and pellets of a package are all of the same material. Engel says it offers equipment and processes to help enable such products.

Shortening Thick-Walled Part Cycle Times

The company also plans to showcase how it can use two-component injection molding to shorten cycle times for producing thick-walled housing parts for medical devices.

“The key thing with housing parts is the cooling time,” explains Steinbichler. “Since the wall thickness cannot be decreased for stability reasons, conventional one-component production leaves no opportunity to reduce the cycle time. But in the two-component process, we inject two thin [polypropylene] layers, each of which quickly cools. Since both injection molding steps are carried out at the same time, overall production efficiency increases.” Another advantage of the two-component process, he notes, is that a sight glass can be added to the opaque housing right as it is being molded.

Not Only Plastics (but Metal, Too)

Working with Germany’s Heraeus Group, Engel claims it also is slashing cycle time—by up to 70 percent—for the processing of amorphous metals in injection molding. In doing so, Engel says the two firms will enable the use of these specialized alloys for large-scale production in a variety of end uses. They plan to use a fully automated manufacturing cell to make, for the first time, two-component parts comprising amorphous metal and silicone.

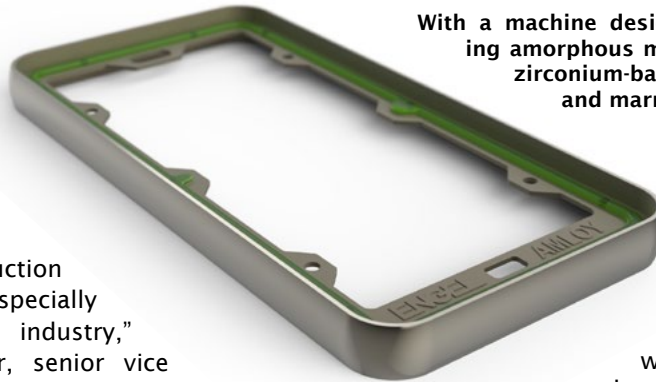
Amorphous metals, with their randomly arranged, non-crystalline structure, are extremely hard, highly elastic, very corrosion resistant, and biocompatible according to ISO 10993-5. This combination of properties, Engel says, makes these alloys superior to steel, titanium, and many other materials. They also are non-magnetic while offering a brilliant surface finish.

Engel has developed a hydraulic, tie-bar-less, vertical injection molding machine for processing amorphous metals from Heraeus’ Amloy product range. Called the Engel victory AMM (for amorphous metal molding), it is said to deliver fit-for-purpose parts with a premium quality surface finish within very short cycle times.



At the K show Engel will be introducing the latest generation of this machine, which will be processing a zirconium-based Amloy alloy and marrying it with a liquid silicone rubber seal.

“Fully automated hybrid production is unlocking huge potential, especially for the consumer electronics industry,” according to Gerhard Dimmler, senior vice president of product research and development at Engel Austria. “Our development work has confirmed that, in multicomponent injection molding, it is possible to create stable combinations not only of silicone, but also of other elastomers and thermoplastics with Amloy materials.” This, he claims, will open up new opportunities for designing housing frames that are almost indestructible while enjoying better protection from dust, water, and radio waves.



With a machine designed specifically for processing amorphous metals, Engel will be molding a zirconium-based Amloy alloy from Heraeus and marrying it with an LSR seal at K.

All About Automation

Engel says that at K it will be showing viper linear robots with an even larger range than before. The long design of the robots reaches longer take-off strokes with identical load-bearing capacities and maximum dynamics, with the viper 20 increasing, for instance, from 900 mm to 1,100 mm.

The firm also will be featuring a new standardized, modular, compact cell on its booth. The cell—which will be running a medical application—includes parts



Engel’s viper linear robots now come with a longer range than before, enabling longer take-off strokes.

handling systems and box changers, and yet is still significantly slimmer than a standard safety guarding. The safety cell, which is easy to increase or decrease in size, is said to provide great flexibility in this area.

Navigating Economic Uncertainty

In the run-up to K 2019, the Engel board offered both a word of caution and one of encouragement. “The declines in the last few months have been drastic and a renewed upturn in the economy is currently not foreseeable,” it said, adding that it also is difficult to predict the extent to which the newly emerging market opportunities will at least partially compensate for the decline.

In assessing the prospects for the automotive sector—Engel’s most important market—company officials said that “the impacts of punitive tariffs and sanctions, the continuing lack of Brexit clarity, and the debate concerning regulatory limits and driving bans for diesel vehicles, are leading globally to uncertainty and a reluctance to buy for consumers and thus also for decision makers in industry.” For the next two to three years, the firm says it expects a further slowdown, with

just lateral movement in the best case.

However, it stressed that with its latest investments in technology development and the expansion and modernization of its production plants, Engel “sees itself well equipped to meet the new challenges.” You can judge for yourself, up close and personal, at the K 2019 show.

ABOUT THE AUTHOR

Robert Grace is a writer, editor and marketing communications professional who has been active in B2B journalism since 1980. He was founding editor of and worked for 25 years at *Plastics News*, serving as editorial director, associate publisher and conference director. He was managing editor of *Plastics Engineering* from July 2016 through October 2017, and is now both editor of SPE’s *Journal of Blow Molding* and directing content strategy for SPE. He runs his own firm, RC Grace LLC, in Daytona Beach, FL., and can be contacted at bob@rcgrace.com.



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