ENGEL showcases lightweight construction expertise at NPE2018

Cost-effective composite technologies for large-scale production

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At NPE2018, which takes place in Orlando/Florida, USA, from May 7th to 11th, ENGEL will present its composite expertise with a special Expert Corner. The Austria-based injection moulding machine manufacturer and system solution provider supplies customized manufacturing cells from a single source to facilitate the highly efficient and cost effective series production of fiber composite components. These are not only used in the automotive industry: innovative composite solutions are also gaining ground in the sectors of teletronics and technical molding.

The automotive industry is driving innovation in the field of lightweight construction. Electromobility is creating many new challenges for vehicle manufacturers. Highly cost-effective new processes are required for FRP lightweight engineering in large-scale production – and ENGEL is developing these processes at its Center for Lightweight Composite Technologies, which was established in 2012. The Technology Center housed in ENGEL’s large-scale machine manufacturing plant in St. Valentin, Austria, is an interdisciplinary research platform. Together with development partners that include other companies as well as universities, ENGEL has set several internationally significant milestones. Thanks to its wealth of experience in injection molding processes and high degree of automation expertise, ENGEL can offer two key success factors for cost-effective composite processes.

Several of the newly developed processes are now in series production and are being applied to more and more customer projects. To effectively meet the rising demand, the machine manufacturer set up ENGEL Composite Systems last fall, which is responsible for project planning as well as project management of composite systems. The Center for Lightweight Composite Technologies can now concentrate more fully on research and develop-
“Thanks to the new structure, we can be sure of covering a broad spectrum of technologies in the future,” stresses Matthias Mayr, head of ENGEL Composite Systems.

With ENGEL as a partner, manufacturers of composite parts have one central contact person from project launch to after sales, even where several companies were involved in developing the processing technology. “We supply turnkey solutions from a single source and help our customers adapt the technology to their specific requirements,” says Christian Wolfsberger, Composite Technologies Business Development Manager at ENGEL AUSTRIA. “This significantly simplifies project management for customers.” Christian Wolfsberger will be on hand to speak to attendees at the NPE event.

In the area of composite lightweight construction, ENGEL makes use of every future-focused technology currently available, from HP-RTM and SMC to the processing of semi-finished thermoplastic composites such as thermoplastic fabrics and tapes, and reactive technologies like in-situ polymerisation (T-RTM). Over the four days of the trade event, ENGEL experts will present innovative technologies and current projects.

**Automotive series production for organomelt**

organomelt – the name given to a fully automatable method of processing and functionalizing continuous fiber-reinforced semi-finished thermoplastic parts, or organic sheets – will be on the threshold of automotive series production at NPE2018. In 2017, ENGEL supplied integrated manufacturing cells to two reputable tier suppliers. For automobile manufacturers, thermoplastic matrix materials are the main attraction of the technology. On the one hand, the thermoplastic approach enables functional bonding of the carrier structure in the injection mold in a single work step; on the other, it simplifies the development of recycling concepts so that components are returned to the material cycle at the end of their lifespan. Fiber-composite components produced with organomelt can replace steel, even in safety-critical areas such as brake pedals.

**In-situ polymerisation combines reactive processing and injection molding**

ENGEL is also a pioneer in the field of reactive processing when it comes to increasing the use of thermoplastic matrix materials. ENGEL has developed a pre-series manufacturing cell that combines the in-situ polymerisation of ε-Caprolactam (T-RTM) with subsequent functionalization of the carrier structure in the injection mold on an ENGEL v-duo machine. Dry,
pre-shaped reinforcing fabrics are inserted into the first cavity and infiltrated with the reactive matrix. Thanks to the low viscosity of ε-Caprolactam, the dry fibers can be wetted particularly well. A highly resilient composite is thus formed when polymerizing to polyamide 6. In the second cavity of the same mold, reinforcing ribs and contours of chopped strand reinforced PA 6 are injected directly in parallel with the reactive processing. With the v-duo, ENGEL has developed a compact and energy-efficient machine specifically for fiber composite applications and multi-component processes with fiber preforms, and one which facilitates cost-effective solutions.

**Complex hollow parts in an automated HP-RTM process**

Eight project partners – including KTM Technologies (Salzburg, Austria), Hennecke (St. Augustin, Germany) and ENGEL – have taken a critical development step towards the industrialization of CAVUS technology by KTM, which enables even complex fiber composite hollow parts to be mass produced in an automated HP-RTM process. The starting point is a core of sand and water-soluble additives, braided with carbon fibers to produce the preform. The fully automated process step enables complex geometries to be mapped very precisely with high material throughput. The preform already has the final contour of the finished part. For the HP-RTM process, the preform is then automatically inserted into the mold on the ENGEL elast machine and the raw material system injected. The whole curing process takes just 125 seconds. The sand core can easily be rinsed with water. One of the first sample parts produced in this way was the motorcycle number plate holder for the KTM Superduke 1290R, which previously was fully injection molded with a shot weight of 765 grams. In the composite version, by contrast, the number plate holder weighs just 265 grams, equivalent to a weight reduction of 62 percent. The hollow version also offers design advantages: the wires for the indicators and the number plate lighting are very well protected as they are connected inside the number plate holder.

**ENGEL at NPE2018: Hall West, Booth W3303**
At its Technology Center for Lightweight Composites in St. Valentin, Austria, ENGEL develops new and highly cost-effective processing methods for the series production of fiber composite components. With the v-duo, ENGEL has its own range for fiber composite applications. (Picture: ENGEL)

The in-situ polymerisation of ε-Caprolactam opens up new possibilities for producing fiber-reinforced plastic parts with a thermoplastic matrix – and not just in the automotive industry. (Pictures: ENGEL)

In the composite version, motorcycle number plate holders are 62 percent lighter than purely injection molded holders. CAVUS technology from KTM enables even complex hollow parts to be mass produced in an automated HP-RTM process. (Pictures: Hennecke)
ENGEL AUSTRIA GmbH

ENGEL is one of the global leaders in the manufacture of plastics processing machines. Today, the ENGEL Group offers a full range of technology modules for plastics processing as a single source supplier: injection molding machines for thermoplastics and elastomers together with automation, with individual components also being competitive and successful in the market. With nine production plants in Europe, North America and Asia (China and Korea), and subsidiaries and representatives in more than 85 countries, ENGEL offers its customers the excellent global support they need to compete and succeed with new technologies and leading-edge production systems.

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