

## **ENGEL unveils lightweight design expertise at Chinaplas 2018**

# **Integrated solutions for highly efficient composite processing**

Schwertberg/Austria – March 2018

**Electric vehicles are gaining ground in China – bringing with them innovative lightweight construction technologies. At Chinaplas 2018, which takes place in Shanghai from April 24th to 27th, ENGEL will present its composite expertise to a Chinese audience for the first time with a special Expert Corner. The Austria-based producer of injection moulding machines and system solutions supplies customised manufacturing cells from a single source to facilitate the highly efficient and cost effective series production of fibre composite components.**

Having established a Center for Lightweight Composite Technologies in 2012, ENGEL has become a preferred partner to the international automobile industry in the field of lightweight construction. ENGEL is working here with other companies and universities to develop highly cost effective new FRP lightweight engineering processes for mass production. Two key success factors for ENGEL are its wealth of experience in injection moulding processes and its expertise in automation. Together with its partners, ENGEL has already set some internationally significant milestones.

Several of the new 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 autumn, 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 development. “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. At the Shanghai site, we recently appointed more employees in the application technology area and the automation centre. As a result, we have both the resources and the expertise to handle complex composite projects on the spot in Asia.” At Chinaplas, Christian Wolfsberger and lightweight construction experts from ENGEL Machinery Shanghai will be on hand to hold discussions with visitors to the trade event.

### **Innovative technologies for automotive, teletronics and technical moulding**

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 use sample parts and videos to illustrate innovative technologies and current projects. It will be shown that the new processing methods open up opportunities not just in automotive construction, but also in teletronics and technical moulding applications, for example.

### **Automotive series production for organomelt**

organomelt – the name given to a fully automatable method of processing continuous fibre-reinforced semi-finished thermoplastic composites, or organic sheets – will be on the threshold of automotive series production at Chinaplas 2018. 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 mould 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.

Fibre composite components produced with organomelt can replace steel, even in safety-critical areas; one example would be for brake pedals. At Chinaplas, ENGEL will use tablet

housings to show how very high stability can be achieved, even with extreme thin-wall technology. Working as development partners, ENGEL, Bond-Laminates (Brilon, Germany) and Leonhard Kurz (Fürth, Germany) have succeeded in producing wall thicknesses of just 0.6 mm, thereby combining extreme thin-wall technology with maximum production efficiency. To reform, overmould and decorate thermoplastic fabrics to a high standard in a single work step, the manufacturing cell combines the organomelt process with IMD (in-mould decoration). Compared to the conventional multi-stage production of decorated housing components, the integrated organomelt process removes the need for several work steps. This reduces time needed and production costs as well as the carbon footprint. The manufacturing cell comprises an ENGEL insert injection moulding machine in a vertical design with a roll-to-roll IMD unit, an ENGEL easix articulated robot and an infrared oven also developed and produced by ENGEL.

The whole process is very easily and clearly controlled via the CC300 control panel of the injection moulding machine. Another advantage of the integrated solution is the fact that the injection moulding machine, robot and infrared oven automatically coordinate their workflows, thereby enhancing overall efficiency.

### **In-situ polymerisation combines reactive processing and injection moulding**

ENGEL is also a pioneer in the field of reactive processing when it comes to increasing the use of thermoplastic matrix materials. In a video, ENGEL will present a pre-series manufacturing cell that combines the in-situ polymerisation of  $\epsilon$ -Caprolactam (T-RTM) with subsequent functionalisation of the carrier structure in the injection mould on an ENGEL v-duo machine. To represent the wide range of possible applications, ENGEL has created a cell for the production of shovels with partners that include Schöfer of Schwertberg, Austria.

The v-duo clamping unit is equipped with a sliding table fitted with two mould halves. Dry, pre-shaped reinforcing fabrics are inserted into the first cavity and infiltrated with the reactive matrix. Solid  $\epsilon$ -Caprolactam is melted to do so, and thanks to its low viscosity, the dry fibres can be wetted particularly well. A highly resilient composite is thus formed when polymerising to polyamide 6. Since reactive processing takes place below the polymer's melting temperature, the composite prepreg can be transferred to the second cavity immediately after being produced in order to inject reinforcing ribs and contours of short glass fibre-reinforced PA 6. Polymerisation and injection moulding take place simultaneously, with an ENGEL viper dou-

ble robot transferring the semi-finished composites and handling the fibre preforms and finished parts.

With the v-duo, ENGEL has developed a compact and energy-efficient machine specifically for fibre composite applications and multi-component processes with fibre preforms, and one which facilitates cost-effective solutions. Since the vertical clamping unit is freely accessible from all four sides, the automation of processes is simplified. When processing dimensionally unstable fibre preforms in particular, it is often advantageous to work in the direction of gravity.

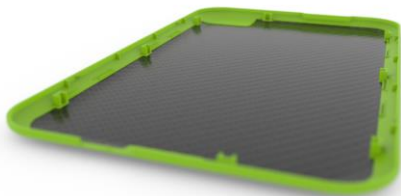
### **Complex hollow parts in an automated HP-RTM process**

Eight project partners – including KTM Technologies (Salzburg, Austria), Hennecke (St. Augustin, Germany) and ENGEL – have taken a critical development step towards the industrialisation of CAVUS technology by KTM, which enables even complex fibre composite hollow parts to be mass produced in an automated HP-RTM process. To demonstrate the new possibilities, the project partners developed a manufacturing cell to produce number plate holders for the KTM Super Duke 1290R.

The starting point for production is a core of sand and water-soluble additives specially developed for the application; this is braided with carbon fibres 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 mould on the ENGEL elast machine. STREAMLINE technology from Hennecke enables precise injection of the raw material system in seconds: the whole curing process takes just 125 seconds. After the robot removes the part from the mould, the sand core is rinsed with water.

Up to now, the number plate holders have been solely made in an injection mould with a shot weight of 765 grams. In the composite design based on CAVUS technology, each 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.

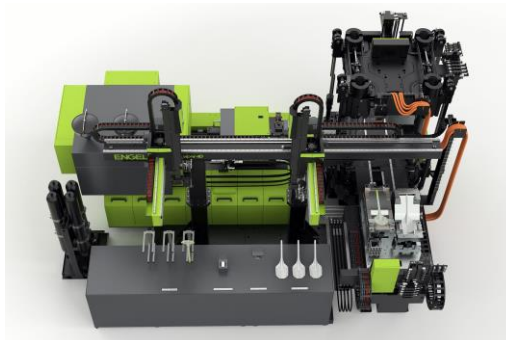
**ENGEL at Chinaplas 2018: Hall 5.1, stand E71**



Highly robust and extremely thin: ready-to-install tablet housings with a wall thickness of 0.6 mm are produced on an ENGEL insert injection moulding machine. (Pictures: ENGEL)



With infrared ovens to heat semi-finished, fibre-reinforced components, ENGEL has expanded its range of peripheral systems developed and produced in-house. The ovens are available in five sizes and special designs that fully meet the needs of the consumer electronics and automotive industries. (Picture: ENGEL)



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



With its v-duo series, ENGEL has developed a compact, energy-efficient machine specifically for fibre composite applications, and one which facilitates cost-effective manufacturing cells. (Picture: ENGEL)



In the composite version, motorcycle number plate holders are 62 percent lighter than purely injection moulded 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 moulding 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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