

ENGEL at JEC World 2020 in Paris

Lightweight and sustainable: efficient production of thermoplastic composite parts

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JEC World 2020 from 3 to 5 March in Paris, France, showcases the entire value-added chain of the composites industry. One important part of this chain is forming thermoplastic fibre-composite preforms. The ENGEL organomelt process takes this one step further. Organic sheets and unidirectional tapes are not just formed, but also functionalised in the same injection moulding step. This will be demonstrated live at the ENGEL Stand in Hall 5.

The main component of the production cell, which is producing demonstration components made of continuous fibre-reinforced polyamide (PA), is a tie-bar-less ENGEL victory 200/50 injection moulding machine equipped with an ENGEL viper 12 linear robot for handling preforms and finished parts, and a double-sided, vertical ENGEL IR oven. It is provided by Brightlands Materials Center in Geleen, Netherlands, which is dedicated to the development of innovative and sustainable material solutions meeting tomorrow's societal challenges. Lightweight Automotive is one of three major shared research programs the international R&D center is focusing on building on its partnership with ENGEL.

Tie-bar-less machines reduce handling times

The composite blanks are heated in the IR oven, placed in the mould, formed in the mould, and overmoulded with PA. Heating the prepregs is one of the process steps that drive the cycle time and quality in the processing of fibre reinforced preforms with a thermoplastic matrix. The thickness defines the heat-up and cool-down time. Heating the material quickly without damaging it is important, as are short paths for transporting the heated preforms to the mould (hot handling). ENGEL offers IR ovens from in-house development and production in various

designs – both horizontal and vertical – and places them in the production cell in the immediate vicinity of the mould. The ovens and the robots are fully integrated with the IMM's CC300 control unit and can be centrally controlled via the machine's display.

The production cell at JEC makes extensive use of the great efficiency potential of ENGEL's tie-bar-less technology for the organomelt process. The victory machine's biggest advantage in this application is its very fast hot handling. Barrier-free access to the mould area makes it possible to position the IR oven even closer to the mould than is possible for injection moulding machines with tie-bars. And the robot can take the shortest path from the oven to the mould. In this way, even very thin preforms can be processed without them cooling too much during transport between the IR oven and the mould.

Brightlands Materials Center additionally benefits from a further advantage offered by ENGEL's tie-bar-less technology: fast mould set-up on the machine. Development work in particular depends on fast and frequent mould set-up.

The thermoplastic composite preforms which ENGEL is processing live at the show are prepared in the ENGEL Center for Lightweight Composite Technologies in Austria. In practice, the production of thermoplastic composite blanks can be placed immediately upstream of the manufacturing process and directly next to the processing machine. ENGEL offers fully integrated systems solutions from a single source, including the processing machine, robots and IR ovens as well as pick-and-place tape stacking units with optical image processing and consolidation units.

Leveraging lightweight potential in a superior way

Composite parts created using the ENGEL organomelt process combine a particularly light weight with excellent crash safety capabilities. This technology, which is already in series production in the automotive industry, is suitable for both organic sheets and unidirectional (UD) glass and/or carbon fibre reinforced tapes with a thermoplastic matrix. Using purely thermoplastic material base enables particularly efficient and fully automated manufacturing processes, because reinforcement ribs or assembly elements, for example, can be injected directly after forming in the same process step. At the same time, the organomelt process makes a contribution towards sustainability. "The consistent thermoplastic approach is the

precondition for developing recycling strategies for composite parts," says Christian Wolfsberger, Business Development Manager Composite Technologies at ENGEL's headquarters in Schwertberg, Austria. "Tapes make it possible to reinforce individual areas in the part in order to adapt them even more specifically to the load," Wolfsberger continues. "In the future, we will be able to combine organic sheets of different thicknesses, and also organic sheets and tapes, in order to leverage the potential for lightweight design in an even better way."

All future-oriented technologies at a glance

ENGEL's lightweight construction experts cover a broad development spectrum from the processing of thermoplastic prepregs through to reactive technologies. As an injection moulding machine manufacturer with great expertise in automation and systems solutions, ENGEL provides important factors for successful, cost effective, high-volume production of composite parts. This prompted ENGEL to establish its own technology centre for the interdisciplinary development of new composites processes in 2012. Together with its customers and development partners from industry and universities, the ENGEL Center for Lightweight Composite Technologies has already set several milestones for the international lightweight construction industry over the past few years.

ENGEL at JEC World 2020: Hall 5, Stand N79



The tie-bar-less ENGEL victory injection moulding machine offers time, space and cost benefits in the production of thermoplastic composite parts in many applications.



At its Center for Lightweight Composite Technologies in Austria, ENGEL develops particularly efficient production processes for composite parts in interdisciplinary teams.

Pictures: ENGEL

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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