

ENGEL at JEC World 2022 in Paris

Lightweight and sustainable: efficient production of thermoplastic composite parts

Schwertberg/Austria – March 2022

JEC World 2022 from 3 to 5 May in Paris, France, showcases the entire value chain of the composites industry. One important step in this chain is the shaping of thermoplastic fibre-composite preforms. The ENGEL organomelt process takes this one step further. Organic sheets and unidirectional tapes are not just shaped, but also functionalised in one integrated step by overmoulding the preforms by injection moulding. 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, an industry focused Dutch R&D centre on sustainable polymer material solutions. Development of innovative lightweight thermoplastic composite technologies for sustainable mobility markets is one of their key research programs that is supported by the 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 injection moulding machine'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.

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.

Tapes make it possible to reinforce individual areas in the part in order to adapt them even more specifically to the load. In order to exploit the lightweight construction potential even

better, organic sheets of different thicknesses and also organic sheets and tapes are combined with each other. ENGEL is also presenting an application here in Paris, the production of vehicle door components. The video shows how three organic sheets with thicknesses between 0.6 and 2.5 mm, which also have different geometries, are heated and formed using IR radiation, and are given a high-quality visible surface using injection moulding in the same process step. The process, which was developed in collaboration with automotive supplier Brose, is fully automated. Three ENGEL easix articulated robots manipulate simultaneously. The load-oriented selection of the organic sheets takes into account the different loads on the individual component areas. For example, the door module is more rigid in its window frame area than on the inside of the door.

ENGEL at JEC World 2022: Hall 5, Stand N79

Brightlands Materials Center: Hall 5, Stand E80+82



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.



Tapes make it possible to reinforce individual areas in the part in order to adapt them even more specifically to the load. The door module, produced in the ENGEL organomelt process, is more rigid in its window frame area than on the inside of the door.



For the production of the door modules, three organic sheets of different thicknesses and shapes are heated, formed and functionalised in injection moulding in a fully automated process.

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.

Contact for journalists:

Ute Panzer, Vice President Marketing and Communications, ENGEL AUSTRIA GmbH,
Ludwig-Engel-Straße 1, A-4311 Schwertberg/Austria,
Tel.: +43 (0)50/620-3800, Fax: -3009, E-mail: ute.panzer@engel.at

Susanne Zinckgraf, Manager Public Relations, ENGEL AUSTRIA GmbH,
Ludwig-Engel-Straße 1, A-4311 Schwertberg/Austria
PR-Office: Theodor-Heuss-Str. 85, D-67435 Neustadt/Germany,
Tel.: +49 (0)6327/97699-02, Fax: -03, E-mail: susanne.zinckgraf@engel.at

Contact for readers:

ENGEL AUSTRIA GmbH, Ludwig-Engel-Strasse 1, A-4311 Schwertberg, Austria,
Tel.: +43 (0)50 620-0, fax: -3009, e-mail: sales@engel.at

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