

Dosing-Mixing Systems Including Vacuum Degassing for Pultrusion

The Art of Processing Resin

Pultrusion is a highly attractive solution for synthetic resin processing. It is regarded as the standard technology for the automated production of lightweight but highly resilient profiles and molded parts made of GRP and CFRP. The provision of a high-quality resin matrix for the continuous impregnation of fiber reinforcements is a decisive process stage here. The dosing, mixing and application systems from Tartler are specially matched to this process step.

One of the first processing stages of pultrusion: introduction of the fiber reinforcement into an impregnation tank or profile mold filled with liquid synthetic resin.

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With automatically controlled mixing ratios and outputs of 0.1 to 100 l/min, Tartler's Nodopur systems meter and mix one or more components with viscosities ranging from 1 to

60,000 mPas. Even with these basic parameters, the system solutions of the German company are a highly attractive solution for synthetic resin processing for users of pultrusion (strand drawing). Especially since, in addition to a simple operating unit, a Siemens touch panel is available for the control system and the company's own programmers can meet almost any customer requirement with regard to the function and operation of the machine. Even in its basic configuration, a Nodopur is mounted on a mobile frame with an integrated collecting tray and can be equipped with containers of different sizes. A wide range of accessories can then be used to make many other individual adjustments. The selection here ranges from volume flow control and a refill system to a heating system with agitator and a melting unit to an automatic vacuum control and many different mixers.

A particular advantage is the possibility to feed material that has been previously freed from any disturbing air and moisture into the dosing and mixing process. This ensures good mixing qualities, which in pultrusion is an important prerequisite for the realization of highly resilient composite solutions from the GRP/CFRP fabric and the synthetic resin.

First Degas, then Mix

Today, pultrusion in its industrial form is a multi-stage process at the end of which lightweight profiles or molded parts made of glass or carbon fiber-reinforced plastic are produced. One of the first processing steps is to guide the fiber reinforcement (nonwovens, mats, knitted fabrics, etc.) through an impregnation trough or a profile mold, which contains a synchronously generated matrix of

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Author

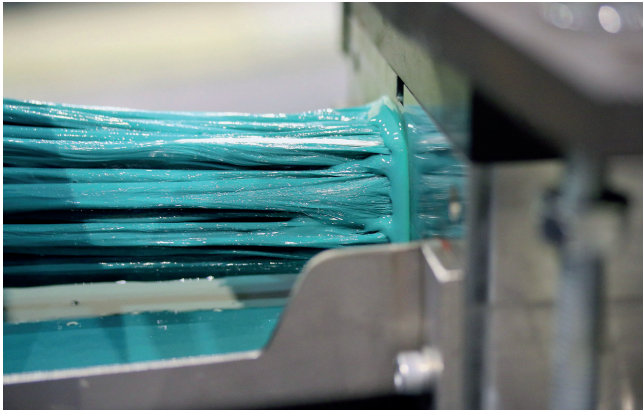
Michael Stöcker works as a freelance trade journalist in Darmstadt, Germany, for Tartler GmbH.
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The GRP/CFRP knit is impregnated with a matrix of liquid polyurethane (PU) or epoxy resin and various additives. © PulNet



The result of pultrusion is a lightweight but highly resilient profile and molded part made of GRP or CFRP. © PulNet

liquid polyurethane (PU) or epoxy resin and various additives (hardener, release agent, color pigments, etc.) and dose it into the pultrusion mold via a pressure control system. Since the quality of the mixture of these components is of decisive importance for the optimum cross-linking of the GRP or CFRP fabrics with the resin matrix produced, Tartler recommends the use of a degassing station of the T-EVAC type to users of pultrusion. This is because, apart from the manifold possibilities of positively influencing the mixing quality via the control of the Nodopur and the use of the most suitable dynamic mixers, this opens up further potential for improving product quality for the operator of a pultrusion plant. The reason for this is quickly summed up: with a vacuum <5 mbar (absolute), the T-EVAC evacuation system removes all air and moisture from the resins and hardeners intended for processing, so that the system can produce homogeneous, high-quality compounds that produce the good composite results in pultrusion.

The vacuum degassing station T-EVAC was developed by Tartler to give users of pultrusion as well as vacuum infusion, wet pressing and resin transfer molding (RTM) an additional possibility to further improve both their molding processes and their product quality to a decisive degree.

Mixing System as Offline Central Station or Inline Module

The standard system, designed for epoxy resin and PU resin degassing, achieves a maximum degassing capacity of 1000 l/h and is offered in two variants: firstly, an offline central station at which several Nodopur systems can be "refueled" with degassed material, and secondly as an inline module integrated directly into the dosing-mixing system and adapted to special process requirements. The special machine builder takes care of all technical adaptations. The customer can therefore rely on a tailor-made complete solution from a single source. The T-EVAC has a



The Nodopur synthetic resin processing system: with automatically controlled mixing ratios and outputs of 0.1 to 100 l/min, it meters and mixes one or more components with viscosities from 1.0 to 60,000 mPas.

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Siemens PLC control system with a 7-inch HMI screen. Their basic equipment also includes an automatic vacuum pump protection system and an automatically controlled water heating system with heat recovery. As an option, the manufacturer offers an automatic water cooling system, an MX feed system with Kamlok connection for 1200 liter IBCs and a vacuum buffer tank with a capacity of 1000 liters. According to Tartler, the quality improvements achieved by using the T-EVAC are measurable and have already been verified and documented in numerous applications at different customers. ■

Pultrusion Theme Day

Tartler Group is a founding member of the network for pultruded lightweight structures PulNet. This interest group, based at the Fraunhofer Institute for Machine Tools and Forming Technology IWU in Chemnitz, Germany, currently comprises eight companies and is funded by the German Federal Ministry for Economic Affairs and Energy. The aim of PulNet is intensive networking along the entire value chain and the further development and establish-

ment of the pultrusion manufacturing process.

On January 18, 2022, the network hosted a theme day entitled "Pultrusion – Giving Lightweight Construction a Profile" with presentations and a virtual trade fair. The focus was on the three thematic blocks of Fiber and Matrix, Technology and Digitalization, and Process and Application. Interested parties can find information on the website www.pul-net.de