

PRESS RELEASE

Filament winding with thermoplastics

New technology at IKV: Processing of in-situ polymerising thermoplastics by filament winding

Aachen, March 2016 – The Institute of Plastics Processing (IKV) in Industry and the Skilled Crafts at RWTH Aachen University is researching a new approach for the production of axially symmetrical composite structures with a thermoplastic matrix. For this purpose, IKV has developed a machine technology that processes so-called "in-situ polymerising thermoplastics" by filament winding.

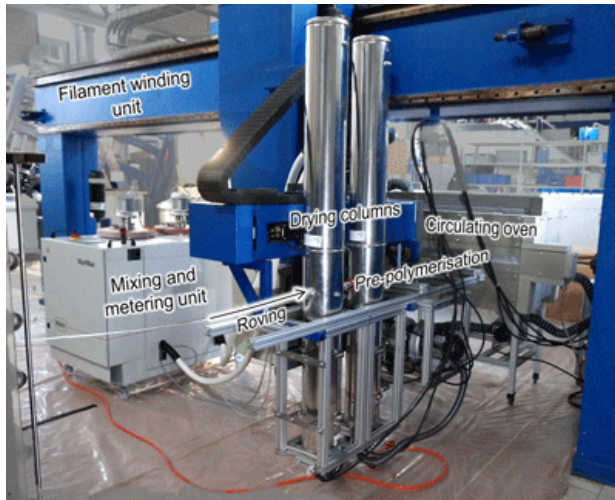
For weight optimisation, axially symmetric parts such as drive shafts or pressure gas tanks are nowadays manufactured from fibre-reinforced plastics (FRP) by the established and economical filament winding process. In most cases, however, the process is restricted to thermosetting matrices. Yet, compared with thermoplastics, thermosets have poorer impact resistance, e.g. to stone chipping, they cannot be welded, e.g. to mould on assembly elements, and they have only limited recyclability.

IKV's new approach involves processing a thermoplastic not in melt form but, similar to a thermosetting reactive resin, by the filament winding process. IKV has developed the necessary machine engineering for this and installed it in the Institute's FRP pilot plant.

The reinforcing fibres (rovings) are first dried and heated to remove the ambient moisture, which is harmful for the polymerisation. The rovings are subsequently impregnated with a low-viscosity monomer reaction system. A mixing and metering unit, Type "MarMax 122B", from Mahr Metering Systems GmbH, Göttingen, adapted specifically for this process, provides the reaction system. The polymerisation subsequently takes place first in an encapsulated pre-polymerisation section in which the viscosity increases far enough to prevent the matrix from dripping off the roving. After this pre-polymerisation, the composite material of roving and pre-polymerised matrix is deposited on the mandrel. The mandrel is heated by a special circulating air oven and encapsulated so that the entire process from the roving to the final product is screened off from the ambient air.

The project is being funded via the AiF as part of the Joint Industrial Research program (IGF) of the German Federal Ministry of Economic Affairs and Energy (BMWi).

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Technology developed at IKV for the processing of in-situ polymerising thermoplastics (photo: IKV)

About IKV

IKV, the Institute of Plastics Processing at RWTH Aachen University, is Europe-wide the biggest research and education institute engaged in the field of plastics processing enjoying outstanding reputation. More than 300 staff are employed in finding solutions to problems connected with processing, materials technology and part design in the plastics and rubber industries. IKV's close contacts with industry and science, together with its outstanding facilities, enable cutting-edge research in plastics technology and ensure that students benefit from a comprehensive, practically oriented course of study. Plastics engineering graduates from IKV are thus sought-after experts in industry. In organisational terms, IKV is divided up into the four specialist departments of Injection Moulding, Extrusion and Rubber Technology, Part Design and Materials Technology, and Composites and Polyurethane Technology. The Institute also takes in the Centre for Analysis and Testing of Plastics, and the Training and Further Education department. IKV is run by an Association of Sponsors, which currently has a membership of more than 230 plastics companies from all over the world. Univ.-Prof. Dr.-Ing. Christian Hopmann is Head of the Institute and Managing Director of the Association of Sponsors. He also holds the Chair of Plastics Processing at the Faculty of Mechanical Engineering at RWTH Aachen University.

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