

Domat/Ems, February 12, 2014

PRESS INFORMATION

Press Release VDI Preview

Metal replacement made easy

Long-fibre reinforced polyamides from EMS-GRIVORY are excellently suited for the replacement of metal, especially in automotive construction. These materials combine extraordinary high stiffness and strength values with low weight. EMS-GRIVORY has again significantly expanded the long-fibre product range with two new innovations.

In 1991, with the market introduction of Grivory GV, EMS-GRIVORY opened the era of challenging metal replacement. Since then, products have been continually further developed and their performance increased. Above all, the long-fibre reinforced thermoplastic materials (LFT) stand out from the wide product assortment. Despite their very light weight, they offer strength values similar to those of metal.

Fibre skeleton improves properties

The reason for this extraordinary coupling of properties is the long reinforcing fibre content. With a length of up to 10mm, these fibres form a fibre skeleton inside the component which provides sustainably improved thermo-mechanical properties without affecting the polyamide-specific features such as resistance to chemicals or surface quality. In this way, LFT materials exhibit high mechanical property values even above and beyond the glass transition point; but that's not all. The fibre skeleton also ensures improved energy absorption, higher heat deformation temperatures, improved behaviour at very high and very low temperatures as well as less warpage. As a rule of thumb, 10% fewer fibres can be used to achieve property values comparable to those of compound materials – a density advantage of around 9%. Long glass-fibre reinforced Grilamid LCL-3, for example, combines a density of only 1.15g/cm³ with a strength value of 250 MPa.

Major weight savings possible

These advantages predestine LFT products for use in challenging metal replacement applications in automotive construction where weight and cost savings play a very important role. This is illustrated, for example, by the rear seatback for an Audi A8 model which is made of Grilon TSGL-50/4 reinforced with 50% long glass fibres. This material offers enormously high stiffness values, even at high temperatures,

and ensures high toughness at break which is an advantage above all for passengers in the case of a possible impact to the side of the car. High notched impact strength and extremely low tendency to warp round off the material profile.

Break the sound barrier

Through new developments in the field of long-fibre technology, EMS-GRIVORY has been able to further increase those properties relevant for metal replacement and to generate new application fields. Using newly developed glass-fibre rovings it was possible for the first time to develop an injection-moulding material (Grivory GVL-6H HP) with no carbon fibre content which exceeded the "sound barrier" value of 300 MPa for tensile stress at break (tensile tests as per ISO 527). The new rovings have a different kind of geometry and therefore, a different length-to-thickness ratio – both in 10 mm granules as in the injection-moulded finished component. In this way, even better surface quality is possible allowing a combination of excellent surface quality and extraordinary mechanical properties to be achieved.

Elimination of weak points

A further new option for light-weight design is the EMS Tape Technology (ETT). This involves oriented endless fibres which are completely impregnated and delivered in the shape of tapes (bands). With their help, for example, a component's weld line strength can be increased massively. In cooperation with the HSR Advanced Technical College at Rapperswil, Switzerland, a technology has been developed for introduction of these tapes into components and, through tests carried out on demonstration parts developed specifically for this purpose, key figures have been compiled. Examination of these findings show that areas around weld lines have up to twice as high strength values when one single tape is applied. The bending strength values achieved were practically independent of the structure of the basic component, with more or less orientation of the fibres or even when weakened by a weld line. Other properties such as creep, long-term, alternating or pulsating fatigue strength were also improved.

With these new developments, EMS-GRIVORY has expanded its range of long-fibre reinforced products and opened up new application fields.

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The long fibres form a fibre skeleton inside the component, thus significantly improving the thermo-mechanical property values of the material.



A rear seatback made of Grilon TSGL-50/4.



The endless-fibre tapes, delivered on spools, can be cut to length and then laid into the component mould (pictured here is the demonstration component developed in cooperation with the HSR Technical College, Rapperswil, Switzerland).

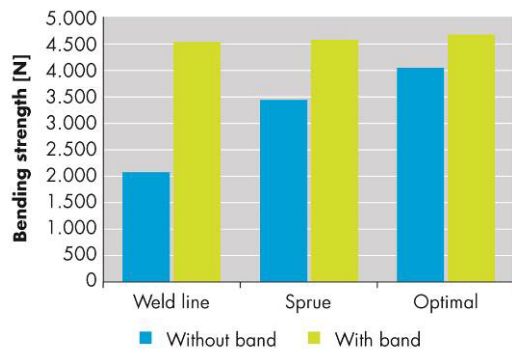


Diagram: Comparison of maximum stress in a component with and a component without endless-fibre reinforcement.



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