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PRESS INFORMATION

Presse release: Light-weight design preview

Light-weight design from one source

Light-weight design in automotive construction is gaining in importance. EMS-GRIVORY is a renowned specialist company in the field of metal replacement, but two other business units of the EMS Group – EMS-GRILTECH and EMS-EFTEC – also provide innovative and high-quality products for this application field.

EMS-GRIVORY is the specialist for metal replacement using high-performance polyamides to achieve weight and cost savings. Whether materials for extremely dimensionally stable parts, highest surface quality, excellent stiffness and strength or the high-temperature operating range, products from this Swiss polyamide manufacturer are well-known in the market and have proven their value for many years. Above all the new high-heat stabilized and long-fibre reinforced polyamides ensure that light-weight design using high-performance polymers is now possible in an increasing number of areas of automotive construction. These high-performance polymers withstand high thermal and mechanical stressing but have a low density and are easy to process. Coupled with clever component optimisation – also a field where EMS-GRIVORY is specialised – striking weight and cost advantages can be achieved.

Targeted reinforcement with tapes

The latest innovation in the field of long-fibre reinforced polyamides is the EMS Tape Technology (ETT) – oriented endless fibres which are fully impregnated and delivered in the shape of tapes (bands). These tapes can be inserted into those areas of a component where the highest mechanical stressing occurs. With this local reinforcement, a less high-performance basic material can be used, thus allowing costs to be further reduced. Even in positions with sub-optimal fibre orientation such as in weld lines, placement of one of these reinforcing tapes can double strength values. In addition, substantial improvements with regard to bending strength and torsion are also achieved.

Improved handling of thermosets

When injection-moulding components reach their limits, thermosetting composites are the materials of choice. One well-known problematic in the manufacture of thermosetting composite components is the shifting of fibres inside the component mould or during manufacture of the preform. If the fibres do not lie at exactly the intended position, an immediate loss of stability is caused. Binding agents are used to prevent this. Under the trade Griltex CE, EMS-GRILTECH supplies specifically developed polymers which make handling much easier. Developed for an epoxy matrix, this product can also be used with other thermoset materials such as two-component polyurethane, phenol or cyanic ester resins. Griltex CE stabilises fibre structures or tapes and prevents shifting of the fibres in resin transfer moulding (RTM) processes. The product does not need a curing time and it is possible that several fibre layers can be bonded onto each other and processed in only one step.

Two in one

But Griltex CE is more than just a binding agent; at the same time it is a toughening agent which strikingly improves mechanical properties of the composite component. Griltex CE exhibits maximum compatibility with epoxy resins, thus creating a strong bond. The residual fracture strength values in compression after impact tests (CAI) increase by up to 65% and the fracture surface is significantly smaller. Shear strength measured in interlaminar shear strength tests also increases by 33%. This means that Griltex CE offers a double advantage: It makes manufacture of thermoset composite components more simple and, at the same time, significantly increases their mechanical properties.

Attractive alternative

EMS-GRILTECH even goes a step further. With Griltex CT, it offers high-performance thermoplastic materials which can replace the cost and time intensive thermoset systems. Composite fibre-reinforced sheets can be pre-manufactured using Griltex CT and fibre material. During a further processing step, these sheets are heated for a short time and can then be shaped into any required form. As composite parts made using this process require no curing, and thus allow very short cycle times for manufacture of composite components, they are extremely interesting for bulk serial production.

Innovative adhesive systems

One consequence of increasing use of high-performance polyamides and composite materials to achieve weight reduction is the need for new innovations in bonding technology. In contrast to aluminium, polymer or composite components can no longer be bonded using conventional methods and welding is not possible due to the wide variety of materials to be joined. As plastic materials are extremely sensitive to local stressing, no local bonding systems such as rivets can be used. The

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Endless fibre tapes, supplied on spools (EMS Tape Technology – ETT) can be cut to the length required and then laid into the component. (Pictured here, the demonstration component developed in collaboration with the advanced technical college HSR Hochschule für Technik Rapperswil, in Switzerland.)

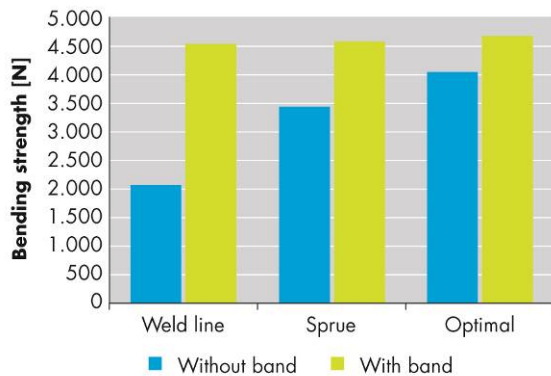


Diagram: Comparison of maximum stressing for a component without endless fibre reinforcement and a component with EMS Tape Technology – ETT.



Application example for Griltex: Bicycle brake lever made of a carbon composite material, the fibre structure of which was stabilised using Griltex.



Application example for Griltech CT: Arm protection for skiers, made of carbon fibres and the high-performance thermoplastic material made by EMS-GRILTECH.



The new adhesives from EMS-EFTEC can be adjusted to exactly fulfil the requirements of the component involved.



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