Providing high-performance car manufacturers with composite advantages

By

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An innovator in advanced composites, Hexcel develops design-enabling technologies for high-performance car manufacturers. For over 20 years, the best known names in the industry have benefited from Hexcel's composite materials to meet a combination of performance requirements that include high temperature resistance, impact absorption and outstanding visual appeal.

Hexcel's strength lies in the knowledge and vertical integration of the technologies involved, combined with strong technical support. From carbon-fibre development to weave style optimization and resin formulation, all of the matrix, reinforcement and surfacing-film technologies are brought together and submitted to rigorous evaluations with customer partners working on engineering calculations, production optimization and quality inspections to determine the best product.

Lamborghini Gallardo bonnet

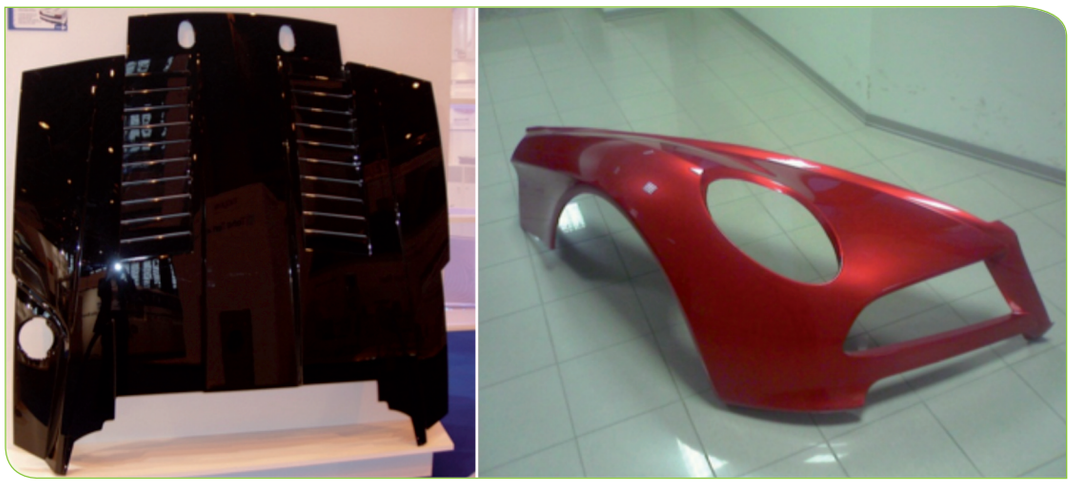
This part is manufactured by ACE using HexForce® NC2 multiaxial carbon fabric for RTM processing. This fabric is easy to process, allowing full infusion. It also makes the surface very smooth, reducing the print-through effect of the carbon fibres and thus resulting in an aesthetic appearance, one of the main requirements for automotive body parts.

Alfa 8C Competizione body panel

This panel is built with HexPly® M49 and M47 prepregs, HexPly® XF3 surfacing film and HexForce® fabrics manufactured with HexTow® carbon fibre.
Hexcel's automotive technical-application team has developed a broad experience with materials and also a diversity of processes. This enables them – simply by viewing a drawing or ply book – to recommend an optimum selection of materials and curing procedures, all adapted to the customer's specifications. As technologies evolve to meet the continuous drive for higher productivity, Hexcel's application laboratories are keeping pace with them. Autoclave curing is being replaced more and more with out-of-autoclave solutions (without compromise on performance), while compression moulding and standard infusion or RTM are evolving towards high-pressure, fast injection RTM.

Sustainable mobility – CFRP for mass-produced cars?

Composite technologies are not new to the automotive industry. Glass and



Lamborghini Gallardo bonnet and Alfa 8C body panel

polyester have been used in mass production for a long time, but the industry has been slow to adopt carbon-fibre-reinforced plastics for mass-produced cars.
However, with OEMs increasingly focusing on sustainable mobility and alternative energy sources, combined with energy saving and reduced CO2 emissions, the search for alternative technologies to bring massive weight reductions and new structural solutions is intensifying.
Bridging the gap between using an exclusive, expensive high-end material suitable for producing four to 20 cars per week at best and finding a reliable, competitive and environment-friendly material able to deliver 400 to 800 cars per week is quite a challenge.
Hexcel is working on a number of technologies to bridge this gap and bring cost-efficient CFRP solutions to the market, whether the chosen production route is based on the compression moulding of prepregs or on the high-speed resin transfer moulding of dry reinforcements. In both cases the company is well prepared, due to its experience, to meet mass production requirements – including efficient automation and scrap reduction.
HexMC® is Hexcel's moulding concept for 3D parts made in high production environments. A decade of experience in the design and manufacture of HexMC® parts has resulted in a broad experience in compression moulding that is now being used to optimize and adapt Hexcel's moulding concept to the requirements of the automotive industry.
Another key technology that will assist car manufacturers seeking more efficient composite solutions and faster production without affecting investment and labour costs is Hexcel's new epoxy resin system, which overcomes the psychological barrier of the 5-minute cure cycle.

Carbon roof of BMW M3

HexMC® component testing

Curing in only two minutes at 150°C, HexPly® M77 brings significant advantages to the market, especially as this reactive system also has a long shelf life of six weeks at 23°C. Other features, such as a Tg of 120°C and good adhesive properties when bonding to aluminium, for example, make HexPly® M77 highly suitable for large-volume production with parts remaining in the tool for a maximum two minutes. In order to deliver performance without expense to the environment, HexPly® M77 is fully compliant with REACH regulations.
HexPly® M77 and HexMC® are two technologies that can help overcome some of the challenges facing the automotive industry. Introducing CFRP into large-volume automotive manufacture in a sustainable way is a huge task, but Hexcel has already made good progress, with a firm commitment to ongoing development and support.

Looking to the future

In addition to improving performance, Hexcel is developing composite solutions for other automotive challenges such as functional integration, enhanced safety features or completely redesigned vehicle structures, while complying with manufacturers' expectations for efficient production processes. Hexcel is committed to initiating only sustainable routes and anticipating future regulatory requirements (while being aware of the need to develop recyclable solutions), and these will be integrated into future technology developments. ■

More information:
www.hexcel.com

Latest innovations

PrimeTex™ is a range of carbon fabrics processed for a smooth weave with a high degree of closure that provides outstanding visual quality. In the patented PrimeTex™ process, the fibre tows are spread in both the warp and weft direction, providing a more uniform weave and a thinner, more closely woven fabric that leads to better mechanical properties and reduced laminate porosity.
These fabrics can also be used to lower the mass in a composite where weight-saving is a prime objective. They can be made with larger-tow fibres without any weight increase and the 12K 200 gsm PrimeTex™ variant has unrivalled quality for a 12K fabric. PrimeTex™ is ideal for automotive applications, where it meets the challenge of cost optimization while providing a unique quality appearance.
Hexcel's weaving expertise combined with carbon-fibre developments could open up even more opportunities with Primetex™ in the future as intermediate-modulus carbon fibres come into the mix.
Hexcel supplies BMW with NC2 and PrimeTex® 3K spread fabrics for the outer skin of the M3 carbon-fibre roof. The company's unique weaving experience combined with new spreading technology allows the aesthetic specifications of BMW to be met.