New mould manufacturing process

ebalta introduces to the market a new innovative manufacturing technique, Fibretemp, as well as their latest cast-to-size material ebablock® P 185 for composite applications.

By

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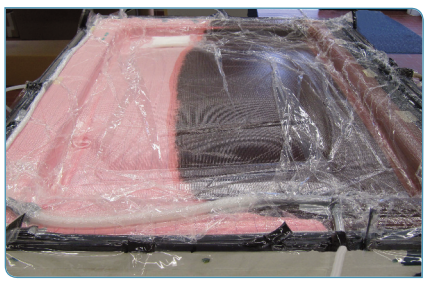
Fibretemp is a process that involves electrically heating a composite mould, allowing the production of composite parts, either through the use of a resin infusion system, resin-filled carbon fibre prepreg or standard wet layup procedures, without requiring heating or post-curing in a large-scale oven or autoclave.

The process is ideal for big moulds with a large surface area, as the system offers a very productive, energy-efficient and cost-effective solution.



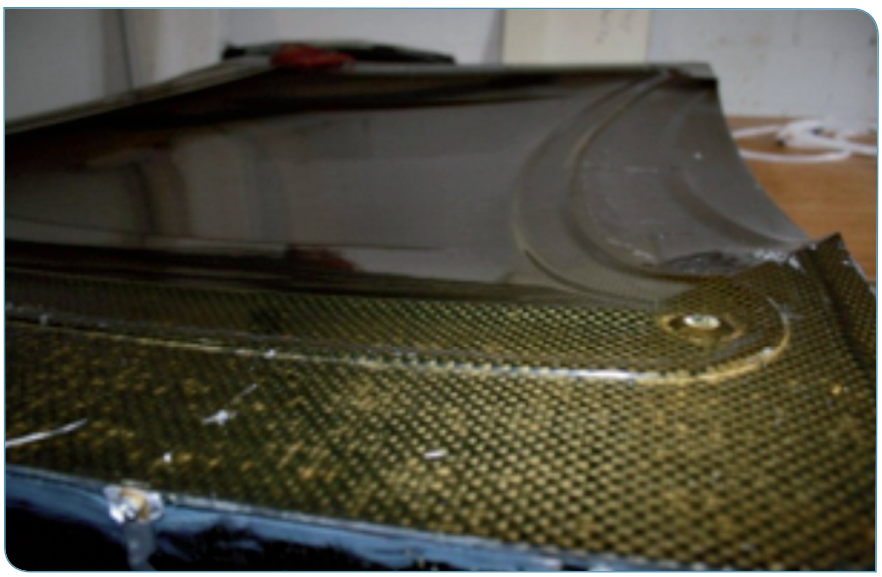
The new Fibretemp process produces large carbon fibre parts without the use of an oven or autoclave

Specific arrangement

Most processes for fabricating composite plastic parts require heating. Different methods for heating moulds have been tried for many years, but have typically run the risk of short circuits and warpage of the moulds due to non-uniform heating. With Fibretemp, these problems have been overcome by the specific arrangement of the carbon fibres and integrated construction of the area to be heated, which is positioned close to the surface of the tool.

The operating principle is very simple. It uses standard carbon fibres which are electrically conductive but when compared with a metal such as copper wire, the electrical resistance is many times higher; so if energized, the carbon fibres heat up due to this electrical resistance. Instead of using single fibre strands, complete fibre patterns are used as heating elements, providing a 2-dimensional structure.

Fibres positioned parallel to current flow act as conductors whereas transverse fibres distribute current over the entire surface, leading to uniform



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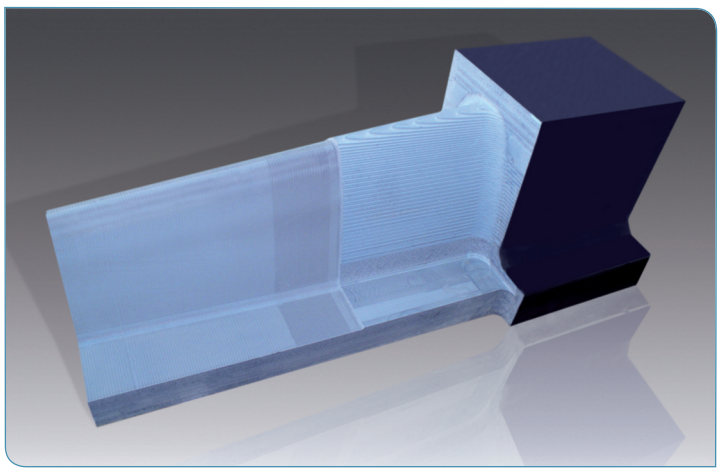
temperature distribution all over the mould surfaces. A flexible copper strip is fed into each side of the mould which is connected to the control module, a low-voltage transformer, allowing the heating of the mould surfaces to be controlled.

The composite moulds can be produced from a number of different ebalta laminating resins including LH 26, LH 28-1 or LH 30 depending on the heat required in the mould, which is determined by the final composite part requirements. The carbon laminates, which form the surface structure as well as the heating element, are quite thin with wall thicknesses of 0.5 mm on small moulds and up to 5 mm on large moulds. Moulds are typically built as a sandwich structure, so the core increases the wall thickness and the flexural strength, which serves as insulation to keep the heat inside the mould. This way, the temperature remains where it is required, on the mould surface, to heat the mould and cure the resin infusion or prepreg material.

Demonstration to customers of the cast-to-size process at the ebalta manufacturing facility

Key advantages

The key advantages of Fibretemp include shorter demoulding times for increased productivity, energy savings as no oven or autoclave is required and a safe working environment as only low voltages are applied to the tool. Moreover, the heating element matrix of carbon fibre ensures full heating functionality with virtually no heat loss even if some of the carbon fibres within the mould become damaged. No investment in ovens is required for the production of large moulds and big lightweight moulds can be built. Finally, as the tool surfaces are heated, the resin flow improves within the mould ensuring the production of accurate, high-quality composite parts.



ebablock® P 185 – Composite application

Fibretemp is a joint development between ebalta and partners Prof. Dr. Funke of the Fachhochschule Dortmund and Dipl. -Ing. Jens Brandes of Fibretech Composites. It has already been trialled and proven for use in both wind turbine and aerospace applications.

Cast-to-size materials

ebalta also introduces cast-to-size material, ebablock® P 185, a polyurethane block material with high heat resistance and a heat deflection temperature (HDT) of 115 ^{0}C. This alongside the recently introduced ebablock® EP 138, the first commercially available epoxy cast-to-size material on the market, provide ideal solutions for composite applications including prepreg tooling.

Cast-to-size blocks are provided through an innovative manufacturing technique which results in individual, bespoke-sized, semi-finished, near-net-size castings that can then be machined accurately by the customer to the final dimensions required.

The blocks can be cast in bespoke dimensions and shapes. Sizes cast to date have ranged up to 8 metres in length with a thickness of up to 400 mm, but sizes are dependent upon the specific material used. The epoxy EP 138 material can be cast in thicknesses up to 350 mm and up to 600 litres in volume.

All blocks are cast in-house by ebalta, providing solutions for applications in the composites, mould and tool making, design and foundry markets. Internal processes ensure all customer information supplied can be securely handled for confidential projects. The key benefits of this technology include minimal wastage, minimal machining, fast turnaround times and no bond lines from joining individual boards.

ebalta develops and manufactures a range of over 20 polyurethane and epoxy cast-to-size materials, including ebablock® 105, P 185, 708, EP138, M007, PW920 and W, along with all the necessary accessories such as colour-matched putties and repair compounds. ■

More information:
www.ebalta.co.uk
www.ebalta.de