Federal Ministry
for Economic Affairs
and Climate Action

Best practice example

for lightweighting in Germany

Waste water tank

750-litre water tank

New design freedom for CFRP tanks through the RTM technique

Fields of application

Aircraft construction

In this example, lightweighting allowed for the following reductions compared to a conventional filament-wound CFRP tank: The rates vary depending on the use case.

Application

The newly developed tank is used as a hot water and waste water tank for civil aviation and meets all the relevant technical requirements of this sector. The final weight of a 750-litre tank with all attachments is 25 kg.

Challenge

Manufacturing a closed tank shell using the resin transfer moulding (RTM) processing technique and ensuring that its watertightness is maintained even in worst-case conditions is a difficult task to solve. To meet this challenge, the RTM technique is used which enhances the degree of design freedom in contrast to conventional filament winding, and designs compliant with KTW standards (German recommendations for polymers in drinking-water systems) and DVGW (Association of German Transmission System Operators) W270 codes of practice are applied for the inner coating and all joints that are exposed to media.

Solution

The solution has been the development of a low-temperature RTM resin system to meet the FST ("Fire", "Smoke" and "Toxicity") requirements according to the FAR 25.853 standard. This system uses precisely configured fabric layers, each of which can be placed precisely in the mould. The cutting itself is done in a reproducible manner using a CNC cutter.

Best Practice Example | Waste water tank

Moulded half shell

RTM mould

Other potential applications

Commercial vehicle construction

Rolling stock vehicle construction

The development and associated tests have been successfully completed and the market launch has already started.

The RTM method offers a high degree of design freedom, as it enables the change from concave to convex surface curvature and allows for wide variations in wall thickness.

In addition, internal components can be inserted prior to bonding to enable significantly better utilisation of the space in the aircraft. The gelcoat does not have to be applied in a subsequent step.

Compliance with all requirements relevant for the sector is being ensured. Research activities are being conducted so as to further improve health and safety, environmental protection and recycling.

The LIGHTWEIGHTING ATLAS

The LIGHTWEIGHTING ATLAS is an interactive web portal that pools information on those active in lightweighting and their skills across different industries and materials. The atlas is free to use and entries into the atlas are also free. You can find the LIGHTWEIGHTING ATLAS at www.leichtbauatlas.de

The Lightweighting Initiative

Modern lightweighting is of pivotal importance for German industry and its competitiveness. The Federal Ministry for Economic Affairs and Climate Action has established the Lightweighting Initiative to support lightweighting in Germany. The Lightweighting Initiative Coordination Office in Berlin, which is financed as part of the initiative, pools all activities relevant to lightweighting and supports German companies, especially SMEs, as they implement lightweighting.

Contacting the Lightweighting Initiative Coordination Office

André Kaufung
Director of the Coordination Office Tel.: +49 30 2463714-0
Fax: +49 30 2463714-1
Email: gsl@initiativeleichtbau.de
www.initiativeleichtbau.de

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