TEIJIN Human Chemistry, Human Solutions

Carbon Fiber Reinforced Thermoplastic

Thermoplastic CFRP Technology Promises to Speed Eco-car Adoption

Moves toward tighter limits on vehicle CO2 emissions, already being seen in Europe and elsewhere, are expected to spread to the rest of the world. Automakers face a pressing need for technical innovation to reduce CO2, such as by making lighter-weight cars and developing electric vehicles (EV).

Against this backdrop of stricter CO2 restrictions, Teijin anticipates growing demand for carbon fiber reinforced plastic (CFRP) replacing high-tension steel and other materials as EVs, hybrid vehicles and other next-generation eco-cars become more common.

Environmentally Viable Material Ready for Mass Production and Recyclable

Carbon fiber is an advanced material ten times stronger than steel at only a quarter of its weight. CFRP, a composite material made of carbon fiber and plastic, has the added advantage of being highly resistant to deformation and to both acid and alkaline corrosion. Its potential for helping to meet demands for energy saving and CO2 reduction in the automotive field has drawn increasing attention of late.

Conventional CFRP used thermosetting resin, which hardens when heated. Requiring several minutes or hours to mold the desired shape, it is not suitable as a material for mass-produced automobiles.

Teijin instead uses thermoplastic resin, which softens when heated and hardens when cooled down. The resulting CFRP can be press-molded in a much shorter time. Using this material, Teijin developed the world´s first mass production technology capable of molding a CFRP structural part in less than a minute.

Molding Process Thermosetting CFRP vs Thermoplastic CFRP

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Not only does the improved production efficiency make mass production feasible, but the ability to modify the shape after molding opens the way to recycling through reuse, reforming, or other means.

A CFRP Concept Car Taking Advantage of Teijin Technology

At the beginning of 2011, a concept car was manufactured with a body structure made entirely of thermoplastic CFRP, making use of Teijin´s newly developed intermediate materials and new technologies for molding and bonding CFRP materials. Weight of the body structure is just 47kg, a fifth that of a conventional steel body.

CFRP body frame light enough to be lifted by two adults

Proven rigidity for actual road use

Worldwide acclaim for thermoplastic CFRP mass production technology

The global market research firm Frost & Sullivan recognized Teijin´s achievements with a 2011 Global Automotive Carbon Composites Technology Innovation Award.

See here for details

ICIS, a leading UK publisher targeting the chemicals industry, chose the technology as Overall Winner and, in the product division, as recipient of the Best Product Innovation award in its ICIS Innovation Awards 2011.

See here for details