Product Data Sheet
TDS-830-39416

TPRC™

ThermoPlastic Reinforced Carbon

Building & Transportation | Oil, Gas & Industrial | Offshore & Onshore | Water & Wastewater

PRODUCT DESCRIPTION

CTech-LLC® TPRC™ ThermoPlastic Reinforced Carbon are becoming increasingly popular in highly cost-driven markets. CTech-LLC® TPRC™ Thermoplastic Reinforced Carbon consist of a thermoplastic matrix combined with various reinforcing materials such as short, long or continuous carbon fibers. Processes for the production of thermoplastic composites include injection molding, compression molding, tape placement, winding and thermoforming.

CTech-LLC® TPRC™ Thermoplastic Reinforced Carbon may be processed on conventional injection molding machines using standard industry practices. Specific attention to processing details will enhance quality and productivity. This summary represents a key subset of the detailed molding information found in the remainder of this molding guide, better surface aesthetics, flow and dimensional stability.

ADVANTAGES

integrated component design

Due to the usage of continuous fiber-reinforced inlays, mechanical properties can be increased significantly in comparison with purely thermoplastic compounds. The ductility of the thermoplastic resin leads to high impact resistance and damage tolerance. Hybrid thermoplastic composite parts enable high functional integration and thus a high potential for cost efficient production. The functional integration can be achieved by injection or compression molding of short fiber reinforced compounds or welding Weather able grades are available.

short cycle times and flexibility of processes

The processing of thermoplastic composites can reach cycle times of one minute and below – defined by the cooling of the thermoplastic matrix – and therefore allows for high-volume production. Flexible manufacturing cells based on state-of-the-art injection molding machines or presses are used for production. Therefore, the same equipment can be used for various parts.

automation and large-scale production

Thermoplastic composites require uncomplicated production processes as no adhesive resins or evaporations are involved. Furthermore, starting and stopping of processes is possible. This leads – in combination with quality-controlled semi-finished products – to a good reproducibility of the thermoplastic composite processes allowing for mass production of thermoplastic composite parts such as car body front ends or seat structures.

recycling opportunities

Due to the re-meltable thermoplastic matrix, thermoplastic materials can be re-used, e.g. as short fiber reinforced plastics and thus improve the life cycle analysis significantly.

TYPICAL USES

- Honda has introduced the world-first development of hybrid-molded rear bumper beam in the hydrogen electric vehicle “Clarity Fuel Cell” using one-shot molding technology. The component is made of continuous- and long-fiber reinforced thermoplastic composites.
- In the BMBF project a multi-material hybrid seat structure is developed combining composite, metal and injection molding parts. An adhesion promoter generates the perfect adhesion between these components. The goal of the project was to use suitable best choice materials and to implement innovative bonding technologies as well as matching polymers to fulfill high-level mechanical requests.
- The trunk floor is composed of a

polypropylene honeycomb core and glass fiber reinforced thermoplastic composite skins. A honeycomb sandwich panel with wood-flour filled PP composite skins is an alternative solution. The laminated honeycomb panel is converted into the final part by conventional thermoforming.

- The local reinforcement of the thermoplastic compression molding compound allows that the cover undergoes no deformation or failure in the hot environment of the rear muffler. The composite improves the strength and impact resistance of the component in freezing temperatures.

DESIGN

Design and Simulation facilitates the stages of early process design phases in order to quickly build up process scenarios via drag and drop, roughly fill in first input parameters and continuously adjust process structure and parameters on the basis of the calculation and modelling results for the best production scenario.

Process Optimization and Consulting helps to quickly model even complex processes in a very transparent manner, analyse the process structure regarding bottlenecks and cost drivers and continuously adapt newly analysed optimization potentials. The company internal database sharing and the open and flexible architecture of the software helps to collaboratively work together in order to realize the best process optimization.

TECHNICAL DATA

	Unit	Thermoplastic Resin
Physical State*	-	liquid
Density	g/cc	0.875
Tensile Strength	MPa	6.3
Hardness	-	43.8
Elongation	%	193

* Temperature at 25^{0}C

TYPICAL CHARACTERISTICS

	Test Method	Unit	TPC*
Specific Gravity	ASTM D-792	-	1.27
Tensile Strength	ASTM D-638	MPa	276
Tensile Modulus	ASTM D-638	MPa	23448
Tensile Elongation	ASTM D-638	Percent	1-2
Flexural Strength	ASTM D-790	MPa	400
Flexural Modulus	ASTM D-790	MPa	19310
Notched Izod Impact	ASTM D-256	J/m	187
Un-notched Izod Impact	ASTM D-4812	J/m	801
DTUL @ 1820 kPa	ASTM D-648	°C	249

* Carbon fiber Content(weight percent):30%

APPLICATION

- Airbag Housing Combination of injection molding and thermoforming of organo sheets in a one-shot process Sporting equipment.
- Engine Compartment Protection with Compression molding process Primary Structures.
- Composite Panels with Lightweight material, high mechanics and weather resistance that improves the cost-efficiency and reduces the environmental impact.
- Rear Muffler Cover with Compression molding

STORAGE & SHELF LIFE

CTech-LLC® TPRC™ Thermoplastic Reinforced Carbon should be stored at +5°C to +35°C and should not be exposed to direct sunlight. Keep the CTech-LLC® TPRC™ in a dry place.

CAUTION

- No cases of health problems due to carbon fiber have been reported, but short fibers may attach to the skin or viscous membrane to cause itchiness or inflammation. When handling carbon fiber, wear a mask, gloves and other protective equipment to prevent carbon fiber from being inhaled or attaching to the skin.
- Incinerating waste material of carbon fiber or carbon fiber composite material may cause fibers to scatter and fly around and cause electrical failures. is appropriate to bury such material as industrial waste.

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IMPORTANT NOTE:
Before using any CTech-LLC® product, the user must review the most recent version of the product's technical data sheet, material safety data sheet and other applicable documents, available at www.ctech-llc.com.

WARANTY:
CTech-LLC® warrants its products to be free from manufacturing defects. Buyer determines suitability of product for use and assumes all risks. Buyer's sole remedy shall be limited to replacement of product. Any claim for breach of this warranty must be brought within one month of the date of purchase. CTech-LLC® shall not be liable for any consequential or special damages of any kind, resulting from any claim or breach of warranty, breach of contract, negligence or any legal theory. The Buyer, by accepting the products described herein, agrees to be responsible for thoroughly testing any application to determine its suitability before utilizing.