MARINE

CASE STUDY: THE SPIRIT OF HUNGARY RACE SAILING PROJECT

Led by sailor and boat builder Nándor Fa, Team Fahajó began building their full-carbon, 60 foot (18.3 meter) racing yacht in April 2012 and plans to launch the vessel by May 2013. Upon completion, the team will compete in five IMOCA World Champion Series races, the last of which is the Vendée Globe 2016-2017 – a 25,000 mile, single handed, non-stop race around the world. ZOLTEK™ Corporation is sponsoring this project and supplying the carbon fiber needed to construct the racing vessel. The entire hull and the mast will be built with ZOLTEK PX35, ZOLTEK's primary carbon fiber product.

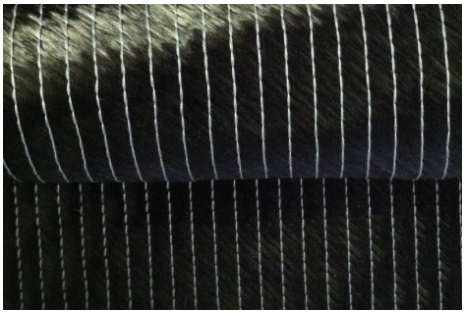
CARBON FIBER USED

ZOLTEK supplied all the carbon fiber needed to construct this racing vessel. The entire hull and the mast was built with ZOLTEK PX35. Uni-directional and Multi-Directional carbon fiber fabrics were used for the lower hull of the deck, the beams, the keels, and the rudders – this comprises 70% of the carbon fiber used. The remaining 30% is used in the interior structure and dividing walls, which was constructed from uni-directional and multidirectional fabrics with vacuum infusion. By using ZOLTEK PX35 carbon fiber, Nándor Fa expects his finished vessel to weigh 30% lighter than same sized boats built with traditional materials such as fiber glass.

MARINE PRODUCTS

MULTI-DIRECTIONAL FABRICS

ZOLTEK'S Multi-Axial Fabric is produced from our ZOLTEK PX35 continuous carbon fiber tow. Quick composite part build-up is cost effectively achieved with our range of low-cost carbon fabric products. Engineers and designers take advantage of the directional stiffness of this carbon fiber fabric when planning the part layup.



	SI	US
Tensile Strength	4,137 MPa	600 ksi
Tensile Modulus	242 GPa	35 msi
Electrical Conductivity	0.00155 ohm-cm	0.00061 ohm-in
Density	1.81 g/cc	0.065 lb/in^3
Fiber Diameter	7.2 µm	0.283

ZOLTEK | 3101 McKelvey Road, Bridgeton, MO 63044
P: 314-291-5110 | F: 314-291-8536 | www.zoltek.com

MARINE PRODUCTS

UNI-DIRECTIONAL FABRICS

ZOLTEK PX35 Stitch-Bonded Uni-Directional Carbon Fabrics are produced from our 50K Continuous Tow Carbon Fiber. Unique fiber spreading techniques are utilized to obtain a wide range of UD fabric weights for a varied set of composite part applications. ZOLTEK PX35 fabrics can be used to produce carbon fiber composite parts including hulls and decks for marine vessels.

	SI	US
Tensile Strength	1600 MPa	232 ksi
Tensile Modulus	120 GPa	17.4 msi
Compressive Strength	1,000 MPa	145 ksi
Compressive Modulus	110 GPa	16.0 msi

PREPREG TAPES

ZOLTEK PX35 prepreg offers an efficient way to build parts for composite watercraft. Pre-impregnated carbon fiber fabric layers are easily molded and cured to produce lightweight, strong parts including hull and deck sections and accessory parts. Often, prepreg is used as the skin layer of the composite with foam or honeycomb cores inside to further reduce weight.

	SI	US
Tensile Strength	1850 MPa	268 ksi
Tensile Modulus	130 GPa	18.9 msi
Compressive Strength	1,320 MPa	191 ksi
Compressive Modulus	125 GPa	18.1 msi
Interlaminar Shear Strength	70 MPa	10 ksi
±45 In-Plane Shear Strength	59 MPa	8.6 ksi
±45 In-Plane Shear Modulus	4.8 GPa	696 ksi
Glass Translation Temperature	120° C	248° F

Fiber Areal Weights: 8.9 - 26.5 oz/yd^2 (300 - 900 g/m^2)
Resin Content: 28% - 50%
Widths: Up to 127 cm
Lengths: Up to 1,500 m
Resin: Epoxy resin formulations are available for processing flexibility and to meet the requirements of diverse applications.

CONTINUOUS TOW (50K)

ZOLTEK's Continuous Carbon Fiber Tow is the premier commercial carbon fiber on the market. It is a 50K lament fiber available in a range of sizings for optimal processing and compatibility with a variety of resin systems.

	SI	US
Tensile Strength	4137 MPa	600 ksi
Tensile Modulus	242 GPa	35 msi
Electrical Conductivity	0.00155 ohm-cm	0.00061 ohm-in
Density	1.81 g/cc	0.065 lb/in^3

ZOLTEK | 3101 McKelvey Road, Bridgeton, MO 63044
P: 314-291-5110 | F: 314-291-8536 | www.zoltek.com