

PRESS RELEASE

June '12

Revolver 42 Speedboat Vacuum Infused and Bonded Using a Foam Sandwich Design with Scott Bader's Crystic[®] Resin and Crestomer[®] Adhesive Materials



Revolver 42 speedboat.

By using high performance composite materials and vacuum infusion, the Revolver 42 speedboat has a dry weight of only 7,500 kg and is capable of speeds of up to 68 knots.

Revolver 42, is a polyhedric monohull speedboat, constructed using high performance composite materials by the Italian shipyard Anselmo Mauri, located in Sirmione, Lake Garda. The Revolver 42 design is a collaboration between the top US speedboat hull designer Michael Peters Yacht Design, whose designs have won over two hundred Offshore Class 1 races worldwide, and the Milan-based studio H3O who carried out the interior design and all the concept engineering. Innovations in the hull and deck design, such as centrally positioning the three structural tanks made of a special aeronautical rubber, in order to concentrate weight distribution in the middle of the boat, have been combined in the final design. The stylish, eye catching Revolver 42 speedboat, with dimensions of 12.6 metres long by 3.4 meters wide and a dry weight of only 7,500 kg, has now become a reality, with its racing design pedigree enabling it to reach speeds of up to 68 knots.

With the hull design finalised, the H3O team worked closely with Resintex Technology Srl, the closed mould technology partner in the Revolver 42 project, to specify the best combination of high performance composite materials available to design and manufacture a light, stylish and very fast speed boat, which would also be comfortable and manoeuvrable at higher speeds, even in rougher sea conditions. They opted for a sandwich laminate structures for the main hull and deck, vacuum infused using Crystic[®] Vinyl Ester (VE) resins and a **Corecell[™]** M-foam core, with carbon fibre used at major load points on the hard top. To further reduce weight, the hull bulkheads were bonded with a Crystic Crestomer[®] structural adhesive.

Vacuum Infusion Production Benefits

Resintex Technology's technical consultant and project manager, Mr Marco Arcuri, recommended vacuum bagging as the best infusion process to produce the hull and deck fibreglass sections as vacuum infused laminates are significantly lighter compared to hand layup, while also providing higher mechanical properties. This is due to the infusion moulding process improving the fibreglass to resin ratio so less resin is used, with the resin being more evenly distributed through the laminate, producing moulded parts with greater consistency. To provide a tough, marine approved laminate construction for the hull and deck, Scott Bader's Crystic VE679-03PA infusion grade low shrink DCPD modified VE resin was specified in combination with a 'matched system' Crystic VE679PA skincoat. Scott Bader developed DCPD modified VE resins and skin coats to provide the mechanical performance needed for marine applications, while also reducing print through to improve the aesthetic finish of the gelcoated surfaces of visible fibreglass parts; this is a key quality area for luxury power boats and yacht manufactures.

As well as having significantly lower resin material costs, compared with open mould hand layup, manufacturing by vacuum bagging infusion provides converters with the added production benefits of reducing overall labour costs, increasing productivity and significantly improving environmental and shop floor health and safety working conditions; styrene volatile organic compounds (VOC) emissions are typically reduced by over 70% when closed moulding.

Strong, Low Weight Laminate Design

To help minimise the overall weight of Revolver 42, carbon fibre fabrics were used to reinforce the points of maximum loading in the cockpit hard top. Other critical performance areas subject to very high stresses and loads in the superstructure, such as the slamming area of the hull, were designed with a foam cored sandwich laminate structure. Marine approved **Corecell™** M-Foam DC core material, which is manufactured by SP-High Modulus, the marine business of Gurit, was specified for the infused hull and deck sandwich constructions. **Corecell™** M-Foam was specified because it provides a combination of high strength with a low density and very low resin absorption to significantly reduce laminate weight. For ease of moulding, the double cut configuration of **Corecell™** M-Foam provides flexibility in two directions in the mould; intersecting flow channels on both sides optimise resin flow and avoids an accumulation of resin in sections of the mould.

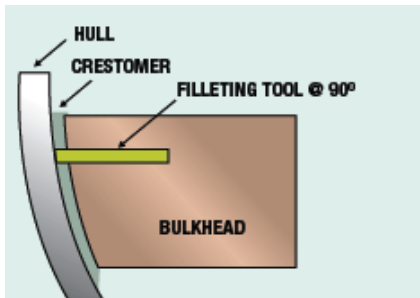


Corecell™ M-Foam Corecell

Corecell™ M-Foam was specified in the sandwich structure as it provides high strength with a low density and very low resin absorption to significantly reduce laminate weight.

Structural Adhesive Reduces Hull Weight

To make further reductions in the hull weight of Revolver 42, while at the same time improving the overall mechanical performance of the hull construction, Resintex Technology also recommended Scott Bader's long established Crystic Crestomer 1152PA urethane acrylate structural adhesive to bond structural bulkheads in the hull. By using Crestomer 1152PA instead of over laminating, Revolver 42's hull weight was reduced by over 45%. Crystic Crestomer 1152PA has a much higher fatigue resistance, flexural modulus and ultimate tensile strength than the fibreglass laminate sections being bonded together, so failure is always in the substrate, with no adhesive or cohesive failure.



Crystic Crestomer in bulkhead bonding

Crystic Crestomer 1152PA structural adhesives is able to absorb the enormous amounts of impact deformation and shock loading which occur in the most critical slamming area of the hull.

According to Scott Bader's technical data sheet, fully cured Crestomer 1152PA achieves a tensile strength of 26MPa, with a tensile modulus of 500MPa. Due to its high yield stress performance and an elongation to break of 100%, Crestomer 1152PA is able to absorb the enormous amounts of impact deformation and shock loading which occur in the most critical slamming area of the hull. Scott Bader's range of Crestomer adhesives have Lloyds Acceptance, as well as DNV and RINA approvals for a variety of GRP marine bonding applications including bulkhead bonding. Resintex Technology was very confident to recommend Crystic Crestomer for this proven hull bulkhead bonding application as it has been specified for many years by leading luxury fibreglass boat builders.

Additional Shop floor Bonding Benefits

As well as significantly reducing the weight of the fibreglass hull, bonding in the bulkheads instead of over laminating offers boat builders a combination of additional quality, shop floor and productivity benefits, such as: improved external hull aesthetics by eliminating shrinkage print through at bulkhead joints; reduced labour costs and increased productivity by not needing to grind surfaces prior to joint over laminating; and improving shop floor health and safety working conditions by significantly reducing styrene emissions.

Resintex Technology, based in Frosinone, central Italy specializes in providing vacuum infusion technical expertise, product selection advice and the distribution of a wide range of composite products from leading suppliers, including Scott Bader, Gurit SP-High Modulus and Umeco. Information about Resintex's range of products and services is available on line at www.resintex.it.

For the complete range of Scott Bader resins, gelcoats and structural adhesives available go to www.scottbader.com. For more details about the Revolver 42 speedboat go to www.revolverboats.com.

About Scott Bader

Scott Bader was established in 1921. Today it is a £200 million multinational chemical company, employing 600 people worldwide. It is a common trusteeship company, having no external shareholders, with a strong commitment to support its customers, workforce and the environment.

Scott Bader's headquarters is based in the UK where they have purpose-built, state-of-the-art technical facilities that provide R & D as well as complete evaluation, testing and application support. They have manufacturing facilities in the UK, France, Croatia, The Middle East and South Africa. For further information regarding Scott Bader, please call +44 (0)1933 663100, visit www.scottbader.com or e-mail : info@scottbader.com