Scout Epoxy-Infused New 42-Foot Sport Fishing Boat

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New Process Reduces Weight, Increases Hydrodynamic Performance, Improves Dark Hull Cosmetic Surface

Scout Boats, Inc. (Summerville, SC) introduced its new, 42-foot long, luxury sport fishing boat in Spring 2015. The largest model in its fleet, the 420 LXF, is the product of nearly three years of in-house research and development aimed at blending the performance of a fishing boat with the aesthetics and design of a high-end, center-console cruiser. Contributing to the innovative new design is the boat's sleek, mirror-finish black hull.

Steve Potts, owner of Scout Boats, explains, "We built our new 420 LXF model to meet and exceed our customers' expectations for a truly next-generation boat." As part of this effort, Scout Boats switched from conventional open-molding of polyester (PE) and vinyl ester (VE) resins for its hulls to closed-mold epoxy infusion. The advanced epoxy resin systems produce stiffer, higher strength, lighter weight hulls with improved structural stability, hydrodynamic performance, higher speed capabilities and greater fuel economy. In addition the low-shrink epoxy resins yield a Class A, blemish-free, black hull surface that requires less maintenance than conventional dark-colored PE boats.

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Background

When Scout management began considering the infusion process for the new hull, they called on Composites One (Arlington Heights, MO, US), a leading supplier of raw materials for composites part fabrication, that could provide guidance for Scout's in-house design engineers. As the project continued, Composites One would also educate the Scout build team on building a vacuum-tight, flanged tool and infusing resins in a closed mold.

A test program was established for infusing a dark-colored hard-top for a small boat using PE, VE as well as epoxy resin supplied by Huntsman Advanced Materials (The Woodlands, TX, US). The goal: to compare the handling and cured performance of each material.

Corbett Leach, Composites One technical support manager for the 420 LXF program, says, "One of the biggest challenges was producing the black hull because imperfections are so easy to see. Fabrication with polyester resins often requires the addition of print blockers and barrier plies to prevent surface distortions and imperfections. In addition, completed hulls typically need time-consuming secondary rework and refinishing." The black 420 LXF epoxy-infused hull requires little, if any, secondary finishing after demolding and thereby provides for significantly reduced labor time and faster overall production speed.

The hard-tops built for the test program confirmed the drawbacks of using PE and VE resins on dark-colored parts. By contrast, the epoxy resin, that has a cured shrinkage of < 2 percent vs 7-10 percent for PE and VE, yielded blemish-free parts direct from the mold. The benefits of using epoxy went well beyond the surface.

Epoxy resin is 20 to 30 percent stronger than PE and VE materials with a higher elongation, tensile strength and modulus/stiffness properties. As a result, Scout was able to decrease the number of laminate layers without affecting strength and performance. Overall weight was reduced by 15% as well, providing for greater hull speed and reduced fuel consumption. The structurally sound, epoxy-infused hulls would also resist osmotic weight gain from water absorption over time.

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420 LXF Hull Production

Scout built a vacuum-tight mold for the new hull using VE/fiberglass/core sandwich construction. To fabricate the hull, the Scout build team and Composites One begin with a polyester gel coat backed by a fiber-filled vinyl ester skin coat. After sanding the skin coat, multiple plies of dry fiberglass, pre-cut according to a computer-designed laminate orientation schedule, are put down. Lightweight, rigid foam core is sandwiched between the fiberglass laminate layers. Next, a tackifier adhesive is sprayed over all plies to secure them in place until the epoxy is infused. To optimize the infusion process, a layer peel ply backed with external flow media is put down.

To prepare for infusion, works install disposable vacuum bag, securing it tightly to mold flanges to eliminate air leaks. A series of resin infusion lines is then added with each line number-coded according to which area of the hull they will feed.

Epoxy resin and hardener are mixed and infused using a high-feed MVP Patriot Pump. The high-performance resin system, specially formulated for use on large parts, has a water-like viscosity that accommodates controlled resin flow throughout the laminate. This ensures complete wet-out of reinforcing fabrics without resin-starved areas even in the notched sections of the stepped hull. After infusion, the epoxy cures at room temperature and is then post-cured under a tarp with a heat blanket that maintains a temperature of 160°F for eight hours.

Corbett explains, “Huntsman’s new advanced epoxy resins post-cure at lower temperatures than previously possible. Light-colored parts can even be cured at room temperature and still achieve high-quality results. As a result, energy costs are minimized while process control is maximized.”

With experience, the build team was able to reduce the number of infusion lines required and decrease injection time from 1-1/2 hours to 45 minutes. They have also found that closed, infusion molding is faster than the previously used open-molding process. Scout is now able to produce each hull in less than a week and a completed boat every 3 to 3-1/2 weeks.

Potts adds, “A further benefit of the infusion process is that it is significantly cleaner than open molding, producing less waste and reducing VOCs. The cleanliness of the environment changes the whole mindset of employees.”

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Conclusion

Based on the outstanding performance of the epoxy resins in Scout's new 420 LXF hull, the company is already planning to build new 35-foot and 32-foot luxury fishing boats via infusion. While the epoxy infusion process has often been used by boat builders for single hull projects in the past, Scout is leading the way for use of infusion for continuous production of boats by the marine industry.

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