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Aquidneck – Bristol, Rhode Island

Faster on the Water and the Shop Floor Plascore Nomex® Honeycomb Reduces Manpower, Weight



Bill Koffler credits the success of his 10-year old composites company to “smart, hard work”. Located in Bristol, Rhode Island,

Aquidneck Composites boasts a growing project portfolio tending toward high-end boats, ranging from smaller rowing vessels to sleek, world-class catamaran stretching 20 meters or more. Bill’s boat building crew is skilled at blending form and function through the use of technology and old world craftsmanship.

Three Little Birds, a sleek 11-meter trimaran designed by Dave Welworth, was constructed from uni-directional S Glass with Plascore Nomex® honeycomb used as the hull core, a change from traditional SAN (styrene acrylonitrile) foam.

and pre-preg applications. Lighter and stiffer than any foam available, Nomex® is a great partner for thermoset epoxies. When bonded, the aramid fiber material has exceptional shear strength and ‘does the work’ of carrying the shear load of the sandwich, freeing the engineer to create sleek, lightweight designs.

“Nomex® honeycomb lets us really push performance,” says Bill. “Just do the basic math; if we’re switching from 5# ft³ foam to 4# ft³ honeycomb, then we reduced core weight by 20%. On top of that, the structure is stronger and the boat is faster with better impact resistance for real world performance.”

Precision Fit, Drapes Easily

Curved surfaces, such as boat molds, are best suited for overexpanded Nomex® honeycomb, which drapes easily in the direction of the overexpanded core cell. The wide cell makes it easy to lay the composite in the mold without fighting core memory and the need for continual trimming associated with foam cores. Out of the mold, Nomex® fairing is dimensionally uniform; the crew can immediately lay in S Glass without repairing core seams, a tedious, dusty and time-consuming process required of SAN foam.

The high shear strength properties of Nomex® core combined with S Glass rivals the strength of carbon fiber and foam without the harshness or noise on the water. This is especially critical on long voyages, where pilot fatigue and crew comfort are all considerations.

(continued on page 3)

“We’ve had excellent results on the shop floor and on the water using Nomex® honeycomb core in bulkheads.”

Nomex® Does The Work

Made of aramid fiber, Nomex® honeycomb is typically used in racing boats for its high stiffness-to-weight ratio; its extremely light, with high temperature stability for both wet prep

Balsa vs. PP Honeycomb

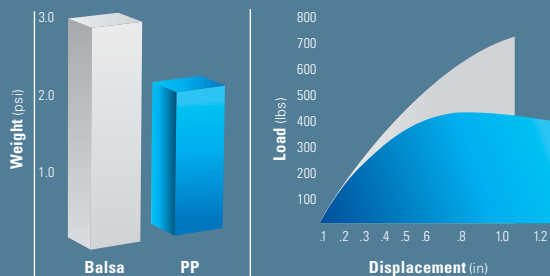
Save Weight and Cost with Plascore
PP Honeycomb Infusion Grade

Recent trials at a leading boat manufacturer compared balsa cored sandwich structures in Lite RTM processes for small and medium sized parts to Plascore PP Honeycomb – Infusion Grade cored sandwich structures in the same closed molding process. The results showed a comparable flexural rigidity in structural performance along with a 30% weight savings with cost and availability benefits.

The same matched tool and Lite RTM process was utilized to build up 7/8" T sandwich panel test coupons with 7/32" T gel coated finish both sides for both core materials.

■ **SAMPLE #1: 1/2" T, 6.2 pcf Balsa**
(typical Shear properties; Strength 260 psi, Modulus 15.3 ksi)
.155" T Glass and polyester resin matrix both sides

■ **SAMPLE #2: 5/8" T, 5.0 pcf Plascore PP Honeycomb**
(typical Shear properties; Shear 85 psi, Modulus 2.2 ksi)
.08" T Glass and polyester resin matrix both sides



	WEIGHT	FLEXURAL RIGIDITY*
#1	2.90 psf	#1 19,000 lbs - in ² / inch width
#2	2.00 psf	#2 16,000 lbs - in ² / inch width

* Tested per ASTM C393 - Flexural Beam Test, 1/4pt, 4pt, 20' span

How much performance does your sandwich structure need for moderate unsupported spans?

In many cases a sandwich structure's main contributor of flexural rigidity comes from bending. This bending resistance is contributed from the laminate schedule and how far apart those two stress skins are from each other or the overall panel thickness. Though important, but to a lesser degree, the shear component of flexural rigidity is contributed by the cores shear resistance. Finding the right combination of laminate schedule, overall panel thickness and core properties can save you weight and money, while still meeting your application performance requirements.



Stealthcraft – Baldwin, Michigan

Drifting Away from Balsa

Lightweight Stealthcraft drift and jet boats are made to draw very little water, motor well, be fast under oar, offer a ton of storage and are cool boats to own. Each hull combines the extreme toughness of Kevlar®, the lasting strength of epoxy, the lightweight strength and sound deadening properties of Plascore PP Honeycomb and the slipperiness of an ultra-high molecular weight Duraslick bottom.

"One of the key elements of PP Honeycomb core is that it does not absorb water," says owner and designer Mike Batcke. "If a normal gel coat is compromised, that scratch or ding will suck outside water into balsa, making much heavier and leading to eventually failure. Not so with PP Honeycomb."

Stealthcraft Boats has grown to offer 10 different models, ranging in size from 12' to 20'. The larger engines make quick work of getting to your favorite spot in the river (or bringing home the catch). The additional weight of the larger outboards is another reason why Mike uses PP Honeycomb.



"In any boat design you can get rigidity and toughness with thickness, but that means weight. That's why we use PP Honeycomb core to allow for more thickness without extra weight."

Prior to assuming the helm at Stealthcraft, Mike was an engineer with several major yacht and sport boat manufacturers, where he grew accustomed to specifying PP Honeycomb to strengthen decks and hulls. Today, as a consulting designer, Mike always specifies Plascore PP Honeycomb wherever lightweight, high shear strength is required.

"If you're using balsa, especially below the waterline, you need to rethink your specifications. I've worked PP honeycomb for many years; it's easy to work with, especially scored, and gives you excellent results. I highly recommend it," continues Mike. "We don't need a bunch of stringers and supports, just the core. Plascore provides us with oversized sheets to help in our production. That makes our job easier, plus it surpasses any other material-design combination. The boat drifts right and holds a lot of gear; there's not a lot of fasteners throughout the bottom."





Cobalt Boats – Neodesha, Kansas

At the Core of Cobalt A25 Innovative Swim Platform



Among the growing portfolio of marine customers, Cobalt Boats was an early proponent of PP Honeycomb, a nod to the core's design and manufacturing quality as being consistent with Cobalt's mission to build world-class performance boats. Cobalt is known for their tireless efforts in creating the most innovative, well engineered and best performing boats imaginable. By arousing the passions of boat owners, Cobalt has carved a distinctive and enviable niche in the performance boat market. While the Cobalt-Plascore relationship began many years ago, and includes PP Honeycomb in hulls, decks, and components, Cobalt's latest innovation exemplifies the value PP Honeycomb brings to product design. With the introduction of the first model in its new "A" line, Cobalt Boats has returned to its marine design roots with fundamental enhancements of the boating experience in the traditional "extended running surface." Cobalt has emphasized the depth of "genuine innovation" on the A25, going well beyond window dressing to offering specific new ideas for making boating more enjoyable.

Incorporating technologies learned in building Cobalt yachts, the A25 presents a profile never before seen in its class. The hull's shape requires a five-piece mold, a no-shortcuts exercise in hand craftsmanship. Because of new structural design mandated by the A25's optional deployable swim step, the running surface is more that of a 27-footer, with reduced bowrise upon acceleration, more stability in turns, and even offers more comfort at cruise for all aboard.



PP Honeycomb and materials are fitted for Lite RTM.

Plascore and its PP Honeycomb has provided Cobalt engineers with a core solution for one of the most intriguing and eye-appealing aspects of the new A25. A quantum leap in safety and convenience in a runabout, the A25's swim platform stretches an extravagant 39 inches aft and the optional step deploys 10 inches below the water's surface for easy entry to and from the water. While certainly not

intended to be an elevator, the step will support a full ton of weight in any position up or down, thanks to oversized hydraulics, in fact, the same type of cylinder used to raise and lower the outdrive.

Plascore's new PP Honeycomb – Infusion Grade has helped eliminate unwanted exotherms during infusion, reduced product weight and scrap material while also improving overall strength. PP Honeycomb totally eliminated the need for the stainless tubing support and allows the part to be produced using LRTM instead bagging. PP Honeycomb – Infusion Grade is designed specifically for Light RTM and Vacuum Infusion closed molding, which eliminates VOC emissions and can produce higher quality parts with closer tolerances.

As an ABA Supplier of Choice, Plascore provides technical assistance, prototyping, testing, customer-specific sheet dimension and value-added fabrication. Unlike other honeycomb core suppliers, Plascore retains total control over PP Honeycomb manufacturing and distribution, including a dedicated production facility and ISO-9001: 2008 certification. As a result, Plascore PP Honeycomb is gaining preference as a superior alternative — in performance and quality — to balsa, foam and off-branded honeycomb. In short, world-class quality for world-class boats.

PP Honeycomb Receives Lloyds Register Certificate of Approval



Plascore PP Honeycomb has received a Lloyds Register Certificate of Approval of a Core Material. Lloyds Register Approval provides verification of a product considered acceptable for use in constructions built under Lloyds' Register's survey and helps ensure an appropriate level of product performance. The approval is recognized and valued in marine, offshore and other composite sandwich applications.

Faster on the Water and the Shop Floor (cont.)



ACC wet prep process saturates the glass fiber while eliminating resin-rich voids that add unnecessary weight. The pattern-cut Nomex® honeycomb is placed on the glass and allowed to settle before being vacuum bagged into plastic. The composite lays down in the mold, easily forming to the tool without the excessive trimming often required to fit foam. This one-step process requires less energy with more dimensional uniformity.

"The thermal formed core process is never exact. You might be working with four or five pieces to refit into the mold, each piece with a memory and awkward fit needing correction before vacuum bagging. With wet prep Nomex®, we take advantage of more controlled fabric to resin ratio and predictable resin binding. When we router cut the Nomex®, we cut the sheets to the exact pattern. Done," says Bill.

The Big Payoff

While Nomex® honeycomb commands a higher material cost compared to foam, that cost is more than recouped in labor savings.

"Nomex® allows us to take advantage of router cutting to the exact dimension and eliminate all the hand trimming, refairing and reworking associated with thermoforming foam," continued Bill, "We've gone from 8 to 12 seven man days down to one seven man day. That's a huge savings and much better utilization of our plant and labor. What's more, we produce a composite that doesn't have the thermal dimensional issues of foam. We mitigate the risk of print-through from the sun, and the ride is much smoother. It's win/win."

"It's simple, really," says Bill. "If a composite of Nomex® honeycomb core and S Glass yields a better boat in the shop and on the water, what's the debate?"

Westerly Marine – Santa Ana, California

Fast, Sleek, Graceful Under Sail ... it Must be Westerly



Westerly Marine is a custom builder of high performance, advanced composite, racing and cruising boats. Meticulous attention to detail in all areas of construction and dedication to making every boat strong, light and of the highest quality assure total customer satisfaction.

Founded in 1970 by owners Lynn Bowser and Steve Lee, Westerly caters to the serious racer and performance cruiser, both power and sail. The company's work, aside from providing breathtaking handling and performance, has won numerous awards, including accolades such as, *Yachting Magazine* editors' quip, "The exemplary expression of the collaborative art and science which is boat building."

Westerly specializes in carbon fiber composite, and is one of a select group of boat builders worldwide that has the experience and capabilities to build complete, pre-preg, oven-cured boats. In fact, the company claims the first pre-preg Kevlar® boat constructed on the West Coast. Typically, each hull, deck and structural component is laminated by hand using pre-preg or wet prep epoxy resin, roller impregnators and employing vacuum bag techniques.

As an industry leader, Westerly Marine keeps abreast of developments and remains on the cutting edge of technology. The company works closely with many of the world's most prominent naval architects building a variety of different and innovative custom projects. Many of those are cored with Plascore Nomex® honeycomb.

"Plascore is our vendor of preference for aramid fiber Nomex®," said Steve Lee, VP of Operations. "It provides excellent lamination and solid blue- water performance. It's a very workable, lightweight honeycomb core that we use with pre-preg carbon or e-glass laminate cured at elevated temperature under vacuum bag. We have done some wet epoxy laminate structures with Nomex® but our preferred build technology utilizes Nomex® in a pre-preg composite."

Westerly's reputation for high-end composites has lead to work in the performance auto racing, international marine and lightweight panel markets.

"We're able to market our composite capabilities outside of the marine industry," continues Steve. "We have an ongoing relationship with local theme parks for custom projection panels, again in e-glass pre-preg laminate, but using Plascore aluminum honeycomb. The aluminum core is furnished to our specifications and offers similar strength-to-weight benefits; it's ideal for that application."



Nomex® honeycomb fit around the chain plate on a 65' hull.

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