



Engineered Honeycomb
Solutions and Services

Marine

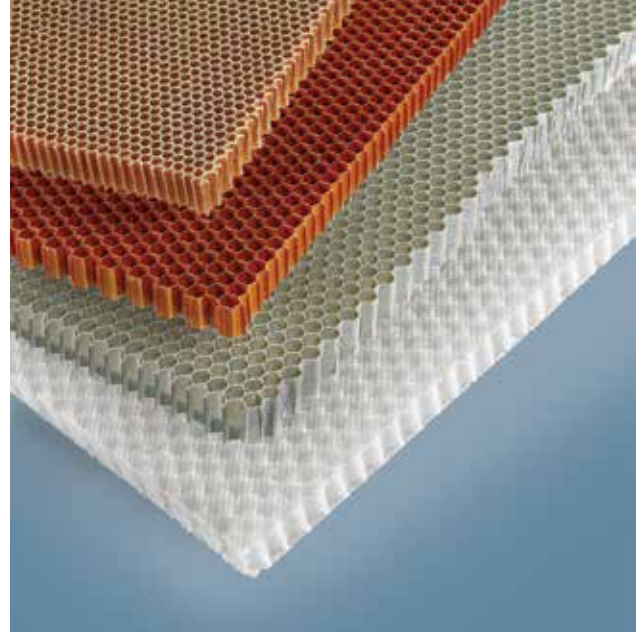
Core and Composite Panels
for Recreational, Performance
and Commercial Boat Building



PLASCORE®

Plascore Honeycomb Core

Makes Boat Structures Lighter, Stiffer, Stronger



Plascore's commitment to the marine industry is evident in our wide range of honeycomb cores, composite panels and assemblies engineered to meet the unique demands of naval architects and design and manufacturing engineers.

From high performance off-shore racers to the recreational runabout, Plascore honeycomb products offer superior strength-to-weight ratios, toughness, moisture and corrosion resistance for even the most demanding applications. These critical qualities are desirable for hulls, decks, bulkheads, stringers, bunks, covers, hatches and more. Low density options matched with superior mechanical properties make Plascore honeycomb products more desirable than traditional balsa and foam products. Providing high strength and stiffness characteristics during normal loading conditions, the shear failure mode of the honeycomb allows it to continue to function after its yield strength has been exceeded. Unlike some competitive core materials, immediate loss of function does not occur.

Whether you need high performance Nomex®, Kevlar®, Aluminum or the popular, user-friendly Polypropylene (PP) Honeycomb, Plascore can provide the honeycomb solution that delivers maximum performance and value for your application.

Plascore Honeycomb Core and Plascore Board™ are:

- Light
- Strong
- Value Engineered / Cost-effective
- Tough
- Stable
- Easy-to-Use
- Moisture and Corrosion Resistant
- Acoustical and Vibration Dampening

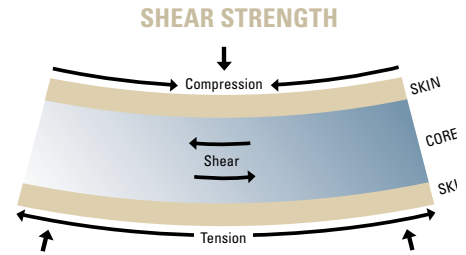
Performance



Exceptional Performance in Marine Applications

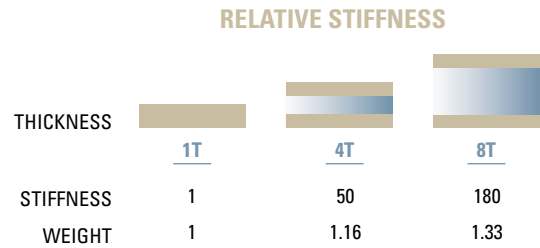
Stronger and Lighter

In simple terms, the core increases the flexural stiffness of a sandwich panel used in hulls, decks and bulkheads by effectively increasing the distance between the two stress skins, much like an I beam. Honeycomb cores also effectively provide shear resistance, a key component to overall flexural stiffness.



Stiffer and Lighter than Single Sheet Laminate

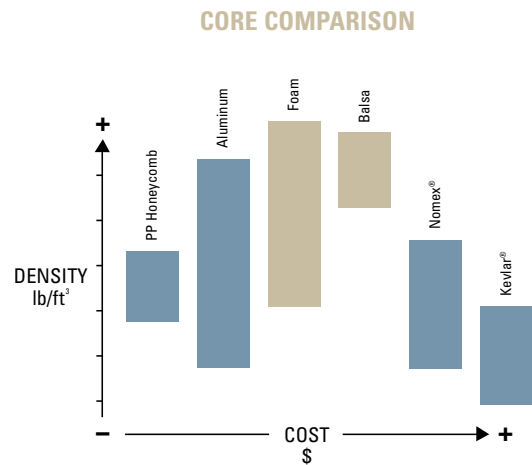
The stiffness of honeycomb laminations and Plascore Board™ allows boat builders to use less material, reducing weight while increasing speed and cargo capacity. Stiffness increases exponentially compared to single sheet material. The use of honeycomb core(s) creates a dramatic increase in stiffness with very little weight gain.



Data obtained through testing of Plascore Board PP4.0-85.

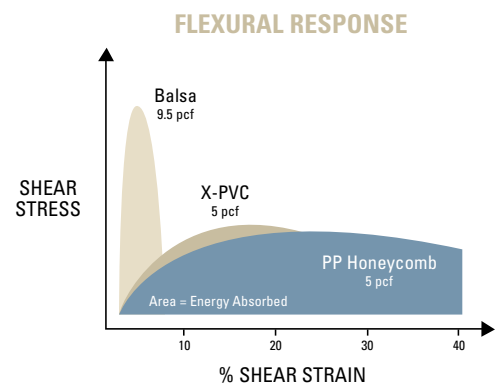
Save Weight and Money

The best of both worlds: Plascore PP Honeycomb and Aluminum Honeycomb are not only lightweight cores, they are more cost-effective than balsa and foam and do not absorb water, while Nomex® and Kevlar®, typically used in racing boats for their aerospace qualities, are extremely light, with high temperature stability for prepreg applications. The value of each core must be weighed in a 'go-to-market' strategy: which core delivers the best performance, is most compatible and is readily available at a competitive cost for the specific application?



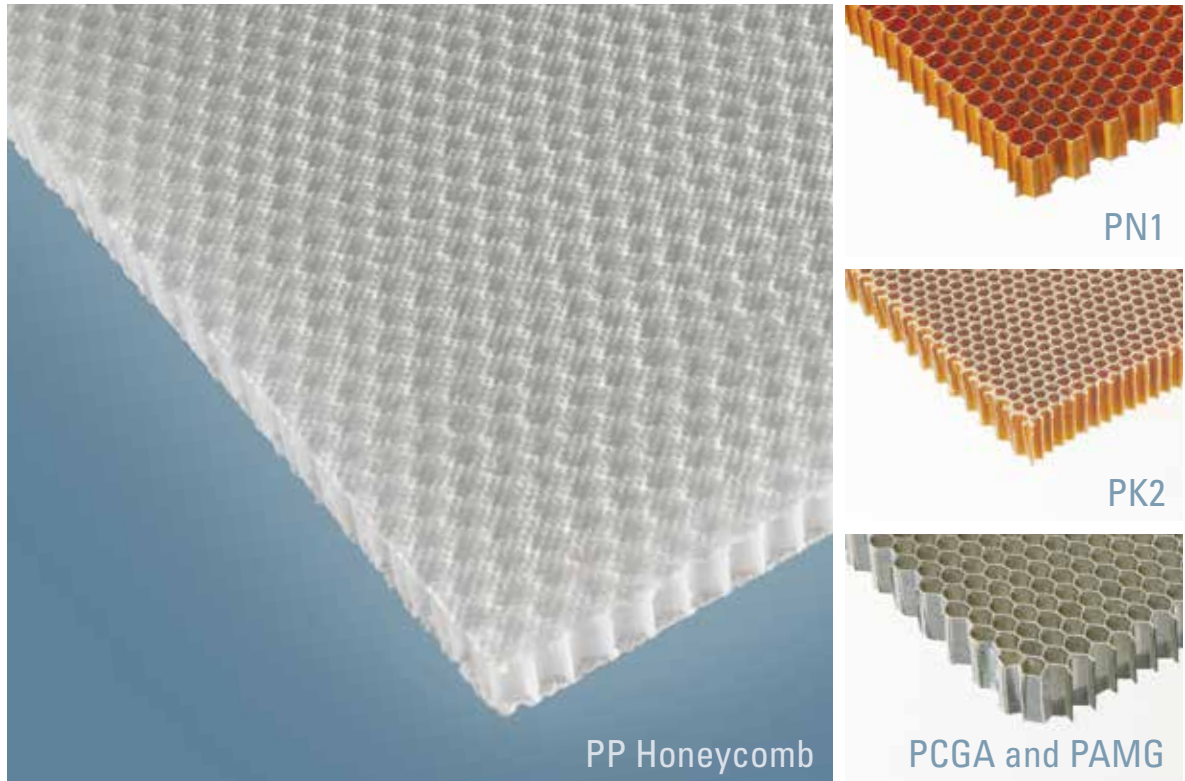
Continued Performance After Failure

Most core materials respond similarly to stress under normal operating loads. As loading increases the core begins to flex to accommodate the increase in shear stress on the core. Unlike other core materials that reach an ultimate yield stress and fail catastrophically, honeycomb, and in particular Plascore PP Honeycomb, continues to respond and perform. This continued response indicates the ability of the honeycomb to absorb energy even after ultimate yield strength failure.



Honeycomb Cores

Choose the Performance for your Application



PP Honeycomb

A light, cost-effective polypropylene core preferred throughout the world in marine applications. Features a unique cell structure with three orientations vs. the two orientations common with other honeycomb. The result is a more uniform cell structure, without seams for greater uniformity and near isotropic performance. Available for open and closed molding processes.

Nomex[®] Honeycomb (PN1)

Commercial grade aramid fiber honeycomb. Nomex[®] Honeycomb is used extensively in the high performance marine industry for sandwich construction in hulls and decks of some of the finest racing vessels around the world.

Kevlar[®] Honeycomb (PK2)

Para-aramid fiber honeycomb. This next generation of honeycomb exhibits improved performance characteristics over Nomex[®] in strength-to-weight ratio, stiffness and fatigue.

Aluminum Honeycomb (PCGA and PAMG)

Commercial and Mil-Spec Aluminum Honeycomb for prepregs applications. Both have the Plascore proprietary conversion coating that exhibits excellent corrosion resistance. The modulus of aluminum provides very high stiffness-to-weight ratios for the most demanding applications.

Plascore Board™



Value Added, High Performance Composite Panels



Plascore Board™ is a stiff, lightweight panel designed to add strength to primary and secondary structures... while saving time and reducing labor on the production floor. Plascore Board is manufactured to tight tolerances and is easy to cut, shape and drill for cabinetry doors, hatches and shelving; easy to veneer or finish as a Class A surface. Available in a range of honeycomb cores with performance facings, Plascore Board offers an exceptionally high strength-to-weight ratio, making these value-added panels an ideal substitute for marine grade plywood in sub-paneling, bulkheads, decking/ceilings, sun shades and swim platforms. Thermal and acoustical insulation is excellent; water absorption is minimal or non-existent.

Designed to add value in boat manufacturing, Plascore Board panels are available cut to a custom size or shape, or in a standard sheet size of 48" x 96" in a thickness of ½", ¾" and 1".

| Plascore Board™ Technical Data | | | | | | | | |
|--------------------------------|------------------------------------|----------------------------|-----------|----|--------|-------|----------------------------|----------------|
| PANEL ID | SKIN | CORE | THICKNESS | | WEIGHT | | TYPICAL FLEXURAL* RIGIDITY | |
| | | | in | mm | lb/ft² | kg/m² | lb-in²/in width | kN-cm²/m width |
| PP4.0-85 | .059" Okume Plywood | PP Honeycomb 4.0 pcf | 0.50 | 13 | 0.68 | 3.3 | 5600 | 6327 |
| | | | 0.75 | 19 | 0.77 | 3.8 | 13000 | 14688 |
| | | | 1.00 | 25 | 0.83 | 4.1 | 20250 | 22879 |
| PP5.0-90 | .014" Glass-Epoxy w/ Peel Ply | PP Honeycomb 5.0 pcf | 0.50 | 13 | 0.66 | 3.2 | 6250 | 7062 |
| | | | 0.75 | 19 | 0.74 | 3.6 | 13000 | 14688 |
| | | | 1.00 | 25 | 0.88 | 4.3 | 19500 | 22031 |
| AA5.2-95 | .018" Glass-Epoxy | Aluminum Honeycomb 5.2 pcf | 0.25 | 6 | 0.53 | 2.6 | 1650 | 1865 |
| | | | 0.50 | 13 | 0.62 | 3.0 | 7750 | 8756 |
| | | | 0.75 | 19 | 0.69 | 3.4 | 17750 | 20054 |
| | | | 1.00 | 25 | 0.82 | 4.0 | 29000 | 32764 |
| AA3.6-80 | .020" Aluminum Epoxy Primer Finish | Aluminum Honeycomb 3.6 pcf | 0.25 | 6 | 0.79 | 3.9 | 5375 | 6073 |
| | | | 0.50 | 13 | 0.84 | 4.1 | 22000 | 24856 |
| | | | 0.75 | 19 | 0.94 | 4.6 | 44000 | 49711 |
| | | | 1.00 | 25 | 1.01 | 4.9 | 71000 | 80216 |

*Data obtained through testing in accordance with ASTM C393/C 393M-06 at a Four-Point, Quarter-Point Loading configuration and span of 20", width 3", except .25" T @ 1.5" width.

Cores for your Process

Including PP Honeycomb for Open and Closed Molding



Plascore honeycomb products come in a variety of sizes, densities and forms that make it efficient for the user. Plascore honeycomb can also improve your manufacturing process by reducing handling and additional material costs.

Plascore PP Honeycomb is ideal for high volume boat manufacturing. It is easily handled and shaped to fit most open mold processes. The non-woven surfacing veil provides a bondable substrate that minimizes resin consumption. Plascore PP Honeycomb can also be provided with a non-porous film layer under the non-woven for standard vacuum bagging processes. Composite surfacing material is also available, making it compatible with closed molding processes like Lite RTM or Closed Cavity Bag Molding. Plascore PP Honeycomb can be provided scored for easy placement and cuts quickly and easily with a razor or knife.

High performance Aluminum, Nomex® and Kevlar® Honeycomb are ideal for processes utilizing prepregs and high temperature curing resin systems. The heat stability and superior mechanical properties of these honeycomb cores are a natural for the extreme demands of processes requiring high heat. These honeycomb cores can be overexpanded for easy draping to contoured shapes.

Plascore composite panels and assemblies provide the user with efficient, ready-to-use sandwich panels. Ideal sub-panels for doors, shelves, bunks, hatches and covers, Plascore composite panels and assemblies come ready to be finished by the end user.

Plascore Honeycomb Products – Process and Material Compatibility

Open Molding

- Wet Lay Up
- Chopper Spray Gun

Vacuum Bag

Closed Molding

- Infusion
 - Lite RTM
 - Closed Cavity Bag Molding

Materials

- Epoxy
- Polyester
- Vinyl Ester
- Urethane
- Prepregs
 - Glass
 - Carbon

Value Added



Custom Assemblies and Kit Cuts



Plascore Board offers the user a ready to use sandwich panel for Primary (Decks and Bulkheads) Structures as well as Cabinets, Hatches, Bunks and Shelving with minimal weight gain.

Plascore custom panel structures deliver:

- High strength to weight benefits
- Built in and added fasteners, latches, connectors and more
- Custom surface finishes
- Exceptional quality

Plascore manufacturing capabilities include CNC Machining, Cold and Hot Laminating, Welding, Finished Edges, Adhesive Bonding and Assembly, Powder Coating, Forming, Destructive and Non Destructive Testing.

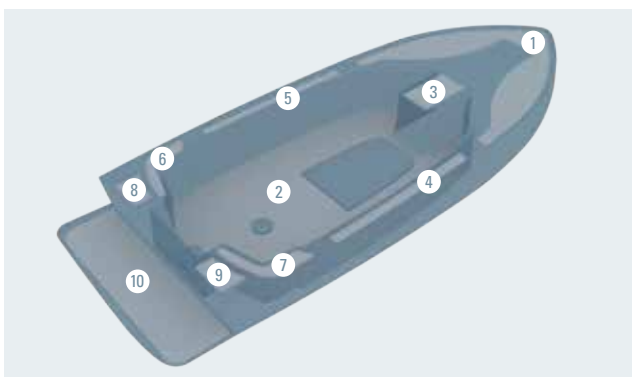
From bow to stern, luxury to runabout, honeycomb core outperforms traditional materials such as plywood, balsa or foam in production boat manufacturing. Boat designers also turn to Plascore for high performance Aluminum and Nomex® Honeycomb in engineering one-off power and sail racing boats.



Kit Cuts

Plascore Kit Cuts are patterned to your exact dimensions, packaged for the production floor and numbered for your lay up in the mold configuration. Kit Cuts reduce build times and labor costs, while eliminating hand-cutting and time consuming trimming. The build cycle is faster and more accurate. Plascore produces Kit Cuts to your Catia, SolidWorks or AutoCAD files.

- Finished Size and Ready to Use
- Accurate and Repeatable
- High quality cut edges
- Speed Manufacturing Time
- Improve Material Yield
- Help Reduce Inventory



World Class Honeycomb Manufacturing, Technical Support and Service

Plascore, Inc. is an ISO-9001 global manufacturer of honeycomb cores and composite boards. In addition to our proprietary honeycomb manufacturing process, our value-added capabilities include adhesive development, CNC machining, powder coating, welding, thermoset and thermoplastic laminating and assembly.

We are dedicated to bringing the marine industry the best combination of competitive products with superior performance and on-time delivery. Plascore honeycomb products engineered for marine manufacturers help reduce material and manufacturing costs, while making boats lighter, stiffer, stronger. Wherever there's a need for greater structural strength with less weight, you'll find Plascore honeycomb cores and technology.

You can rely on Plascore regional sales engineers and in-house service representatives to provide prompt professional attention to your needs. From project inception through delivery and installation, our goal is to ensure your complete satisfaction. We're here to answer your questions regarding order status, technical performance and application.

Plascore honeycomb core and Plascore Board™ are available through marine product distributors throughout the world. For further information, visit www.plascore.com.



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