Featherlight®

marine grade interior panels

- Dimensionally Stable
- Lightweight
- Ready for veneer or final finish
- Expandability
- Kits
- Code approved manufacture available

Specifically designed for non-structural interior applications Featherlight™ Marine Grade panels have been developed to optimise weight and dimensional stability, making them ideally suited for the construction of interiors for luxury and high-performance motor and sailing yachts.

Featherlight Marine Grade Panels are 1200mm x 2400mm, and are available with a choice of PVC X-linked foam or rigid end-grain balsa cores to provide superior levels of stiffness, and thermal, or acoustical, insulating properties.

The panels are finished with either hardwood veneers or peel-plied, reinforced epoxy laminates. The timber-faced panels are supplied with a sanded, calibrated surface that is ready for decorative veneer application, painting or secondary bonding with decorative laminate.

Featherlight Marine Grade Panels are manufactured in a controlled environment and under-go strict Quality Inspections, at all stages during the manufacturing process, to ensure dimensional stability and consistent thickness. Panel thicknesses were chosen to meet industry requirements and to suit standard joinery fittings.

Custom thicknesses can be manufactured, on request, and for example, are ideal for the construction of light, strong and very stable doors which maintain their original dimensions and can be configured to provide excellent acoustic properties.

Applications:

- Furniture
- Non-structural bulkheads
- Cabinetry • Partitions
- Ceilings • Tables
- Doors

Featherlight FB ProBalsa® rigid end-grain balsa core (150kg/m³) with hardwood veneer on both sides

FB009	9mm	3.4
FB013	13mm	4.0
FB016	16mm	4.4
FB019	19mm	4.9

Featherlight FX DIVINYCELL®H60 PVC foam core (60kg/m³) with hardwood veneer on both sides

FX009	9mm	2.8
FX013	13mm	3.0
FX016	16mm	3.2
FX019	19mm	3.4

Featherlight panels surfaced with fibreglass and carbon reinforcements are laminated with a high-performance epoxy resin that has excellent adhesion to the balsa and foam cores, and provides excellent damage tolerance. The laminates are finished with peel ply to protect them from contamination, and to reduce preparation of the surface prior to secondary bonding of veneers or final finishing.

Featherlight FF DIVINYCELL®H60 PVC foam core (60kg/m³) with 1 layer of 600g biaxial E-glass on both sides

FF1009C6	9 mm	2.9
FF1013C6	13 mm	3.1
FF1016C6	16 mm	3.3
FF1019C6	19 mm	3.5

TYPICAL E-GLASS LAMINATE PROPERTIES Laminate thickness 0.53mm per 600gm		Nominal fibre fraction 62-64% by weight	
	Test Method	Biaxial - Warp (0°)	Biaxial - Fill (90°)
Tensile Strength	**ASTM D3039**	371.9 MPa	327.6 MPa
Tensile Modulus	**ASTM D3039**	21.27 GPa	18.22 GPa
Compressive Strength	**ASTM C-273**	293.8 MPa	255.5 MPa
Compressive Modulus	**ASTM C-273**	21.27 GPa	18.22 GPa

- Featherlight Panel size 1200mm x 2400mm
- All timber used in the manufacture of Featherlight Composite Panels is harvested using sustainable methods.
- ATL Composites reserves the right to alter specifications without prior notice.

® Registered Trademark of the Diab Group

Specialty Featherlight Marine Grade Panels can be manufactured with carbon laminates, and foam or aramid honeycomb cores, for projects requiring superior stiffness and ultra-lightweight.

Featherlight FN aramid honeycomb core (48kg/m³)* with 1 layer of 200g carbon double bias on both sides

Order Code	Overall Thickness	Nominal Weight kg/m²
FN1006ZX2	6mm	1.46
FN1012ZX2	12mm	1.74
FN1018ZX2	18mm	1.98

* Cell size 3.2mm: hexagonal

Core Mechanical Properties

A selection of core types and densities have been chosen to provide a range of weight, stiffness and cost options. From the economical balsa core, through to the more expensive aramid honeycomb used in weight-critical, high performance projects, all Featherlight panels provide significant weight savings over traditional plywood panelling.

RIGID ProBalsa® END-GRAIN BALSA		
Nominal Density	**ASTM C-271**	155 kg/m^3
Tensile Strength	**ASTM C-297**	13.5 MPa
Compressive Strength	**ASTM C-365**	12.7 MPa
Compressive Modulus	**ASTM C-365**	4,100 MPa
Shear Strength	**ASTM C-273**	3.0 MPa
Shear Modulus	**ASTM C-273**	166 MPa

DIVINYCELL® H60 FOAM		
Nominal Density	**ISO 845**	60 kg /m^3
Tensile Strength perpendicular to the plane	**ASTM D-1623**	1.8 MPa
Tensile Modulus perpendicular to the plane	**ASTM D-1623**	75 MPa
Compressive Strength perpendicular to the plane	**ASTM D-1621**	0.9 MPa
Compressive Modulus perpendicular to the plane	**ASTM D-1621-B-73**	70 MPa
Shear Strength	**ASTM C-273**	0.76 MPa
Shear Modulus	**ASTM C-273**	20 MPa
Shear Strain	**ASTM C-273**	20%

ARAMID HONEYCOMB Cell size: 3.2mm Shape: hexagonal	
Nominal Density	48 kg /m^3
Compressive Strength	1.9 MPa
Shear Strength - longitudinal	0.6 MPa
Shear Modulus - transverse	1.0 MPa

Designed by Farr Yacht Designs
Built by Westerley Marine
Rosebud STP65 Featherlight FN

Photography - Andrea Francolini

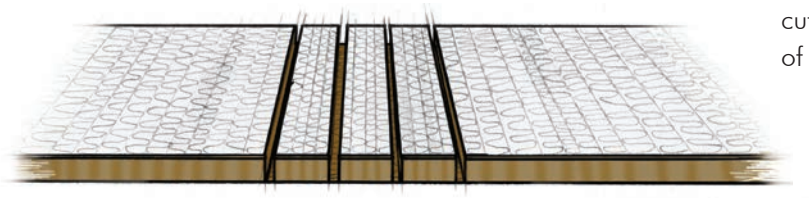
Processing E-glass laminates
Curvatures & Radii

Curved surfaces are achieved without effort by simply kerf-cutting the inside skin. The need for elaborate moulds is not necessary, Featherlight only needs simple jigs to form a variety of corners and curves.

METHOD A: Construction of large radii curves.

Curves that describe angles of 60 to 90 degrees are achievable with no loss of structural integrity.

Step 1: A series of narrow parallel slots (kerfs) are cut into the sandwich panel along the inside of the proposed curve, through the facing skin and core to the rear face of the outside skin. The saw cuts should never break through the outer facing skin, which serves as a hinge.



Initially determine the desired internal angle, and outer corner radius. Following the calculations below, will provide the required details on number of slots, and their spacing, to achieve the required curve.

α – internal angle
0.52 (150°) 1.57 (90°)
1.05 (120°) 2.62 (30°)

s – saw cut width

n – number of slots

t – panel thickness

c – saw cut centres

R – corner radius

$$n = \frac{t.\alpha}{s} \text{ (rounded)}$$

Example:

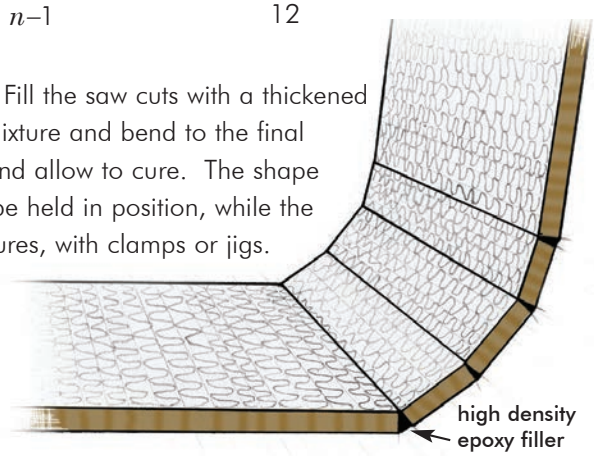
$$\frac{16\text{mm} \times 1.57}{2} = 12$$

$$c = \frac{R.\alpha - s}{n - 1}$$

Example:

$$\frac{50\text{mm} \times 1.57 - 2.2}{12} = 5\text{mm}$$

Step 2: Fill the saw cuts with a thickened epoxy mixture and bend to the final shape and allow to cure. The shape should be held in position, while the epoxy cures, with clamps or jigs.

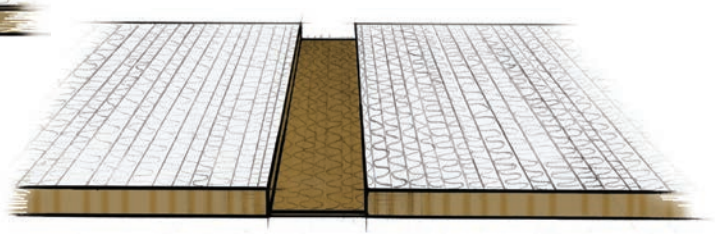


Step 3: An additional layer of fibreglass cloth is applied to the inside of the curve with an epoxy laminating system, covering all the slots and overlapping the end slots by 30 – 40mm.

METHOD B: Construction of small radii corners.

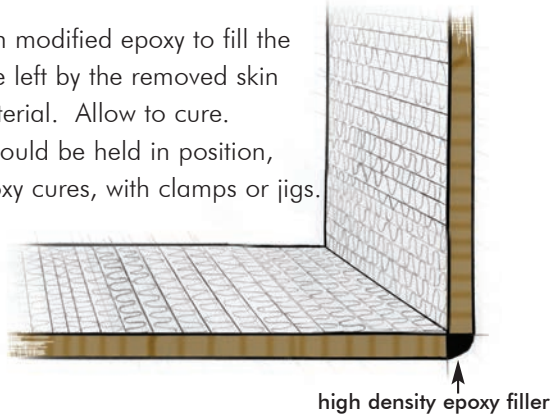
Step 1: A strip of the Featherlight panel is removed by cutting through the facing skin and core to the rear face of the outside skin. The slot width is calculated by:

$$\text{Slot Width} = \alpha.t$$

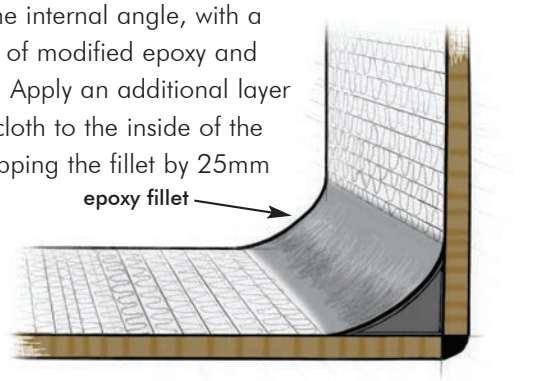


Step 2: The cut should be filled with a mixture of WEST SYSTEM 105 resin with 206 Slow hardener, modified with 405 Filleting Blend. This combination will produce a strong, waterproof bond that will hold the curve when cured.

Apply enough modified epoxy to fill the internal angle left by the removed skin and core material. Allow to cure.
The shape should be held in position, while the epoxy cures, with clamps or jigs.



Step 3: Fill the internal angle, with a 20mm radius of modified epoxy and allow to cure. Apply an additional layer of fibreglass cloth to the inside of the angle, overlapping the fillet by 25mm on each side.



Cutting

Diamond-coated fibreglass tooling is recommended for best tool life, for example, a jigsaw with a Makita No. 10S Type 150 blade to cut out parts. The best edge finish is achieved with circular saws running aluminium cutting blades, however blade life is greatly reduced.

Joining & Bonding

To offset the individual size of the panel, Featherlight can be supplied with both long edges pre-machined to facilitate joining. The Z-Joint is structurally effective and achieves a smooth and fair surface profile.

A high density epoxy adhesive is specified for joining Z-joints.

Recommended adhesives:

- Techniglue® R60 Adhesive
- WEST SYSTEM® 105 epoxy resin and 205 or 206 hardener modified with 413 Microfibre Blend.

Kits

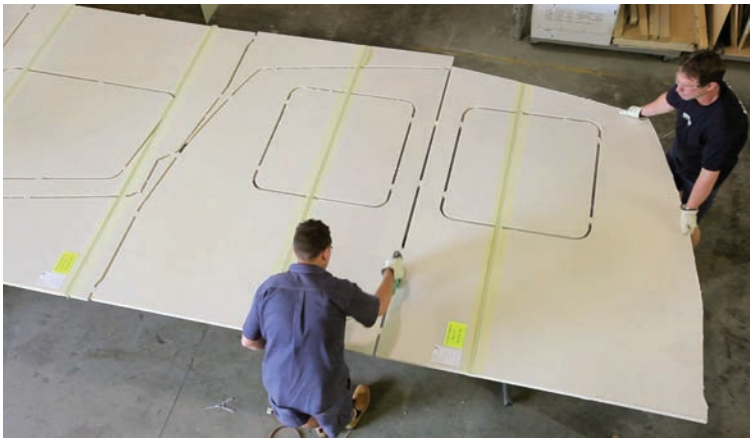
Whether in computers, airplanes or boats, high tech is often associated with high cost. Time is valuable and there is no doubt that Featherlight, especially in Kit Form, speeds up construction.

Computer aided design and manufacture (CAD/CAM) processes combined with computer numeric control (CNC) equipment allows the production of pre-fabricated Featherlight Kits. Parts to be formed into curved surfaces can be translated by design software into the correct flat panel shapes, and this electronic information is supplied to ATL's engineers, by your Naval Architect or designer. All parts required for the project are nested together within the panels to reduce wastage.

Once the panels are manufactured, the CAD information is used by a CNC router to machine the programmed shapes into the panels.

The panels are sequentially numbered to indicate the correct joining sequence, and a nesting diagram, showing part numbers and descriptions is supplied for easy identification.

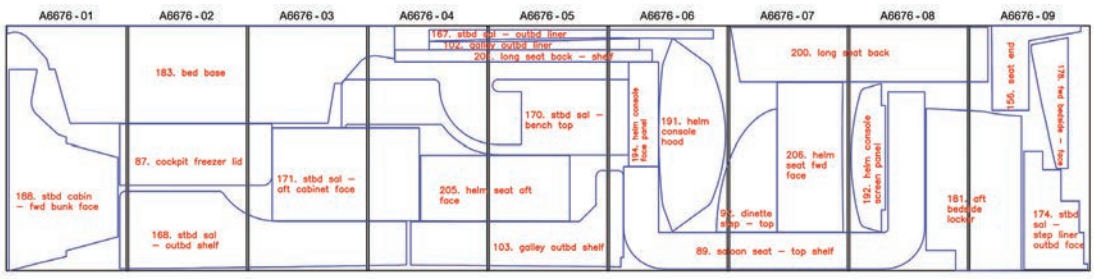
Each pre-cut part is left attached to the panel by small tabs to ensure the kit arrives with all components securely in place. The tabs are easily cut away, when the panels have been joined.



Optimised Kit Technology

Minimises material waste, labour & tooling costs
Maximises mechanical properties
Tightens design allowables
Improves product quality
Simplifies quotations
Reduces VOC emissions

NESTING EXAMPLE - INTERIOR FIT-OUT



All kit parts are computer nested within the panels to reduce wastage.

Edge detailing & hardware attachment

Use a T-router with a ball-trace to run along the laminate to remove core. Over-fill the routed edge with a low density filler compound and allow to cure. Sand the compound flush with the skins when it is fully cured.

Timber or high density foam blocks can be used to replace the epoxy filler in areas where latches or hinges are to be placed.

FRP Bonding Angles

Bonding Angles are supplied in 2400mm lengths

Composite 90° Bonding Angles have been designed to provide a quick and effective means for making right angle joints between Featherlight panels. These pre-cured angles can be bonded in place with an epoxy paste adhesive, speeding up assembly and reducing wet lay-up.

Bonding Angles consist of layers of multiaxial E-glass in a high performance epoxy matrix, peel plied on all surfaces, with the fibre direction tailored for optimum load carrying capability.

Bonding Angle Performance Data

Queensland University of Technology (QUT) Test report CET 4149/3 - Tensile tests to fibreglass connections - fins. Sample Data: Specimen 1 - polyester bonded : Specimen 2 - epoxy bonded Test Equipment : Grade A Tinius Olsen Universal Testing Machine, loading rate = 5mm/min

Test	Specimen Thickness 1	2	Nominal Area Resisting Shear (mm^2)	Failure Load (kN)/ Failure Mode	Apparent Shear Strength (MPa)
1	21	21	48,400	77.6 part shear through polyester bond : part tearing	1.60
2	14	21	30,400	68.5kN shear through epoxy bond	2.25

In both circumstances, failure of the joins was through the adhesive rather than the Bonding Angle.

Storage

Featherlight panels should be stored flat, out of direct sunlight, and kept dry and clean. Panels supplied with fibreglass skins have peel-ply on the surface, which should be left in place as long as possible, to protect them from surface contamination.

Safety

Avoid inhalation and eye contact with machining dust. Wear protective equipment such as hearing protection and safety glasses during cutting operations, and gloves to avoid cuts. Use guards as per machinery manufacturers instructions.

Singularity Lutra 80 Featherlight FN

Luxury interior constructed by McConaghy Boats & Marxcraft Pty Ltd

Company Details

Company Name	ATL Composites Pty Ltd
ABN	26 002 517 777
Established	1977
Location	12-14 Production Ave. Molendinar QLD, Australia 4214
Phone	+61 7 5563 1222
Fax	+61 7 5563 1585
Email	info@atlcomposites.com

Quality Certifications

BESTPRACTICE CERTIFICATION
ISO9001
QUALITY
MANAGEMENT SYSTEM

ATL composites

www.atlcomposites.com