



Sustainable materials can also encourage sustainable products. The LBV35 is made from Basaltex (right), a fibre extruded from volcanic rock, and is powered by sails and two solar-refuelled electric motors. Designed to fit in a shipping container, the charter catamaran can follow the sailing seasons around the world

# Greener materials, better curves

Boatbuilding materials are becoming ‘lighter, stronger and greener’ whilst boats themselves are now more streamlined, often featuring quite tight curves. We explore the latest composite technologies and preview some forthcoming manufacturing expos

WORDS: JAKE KAVANAGH

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**DESPITE THE CURRENT** geo-political turmoil – or maybe because of it – the public continue to buy boats in large numbers. Many OEMs are reporting order books at capacity until at least 2024, whilst the materials suppliers have largely found ways to cope with the ongoing shortages in raw materials. At the same time, the public’s concern for the environment has pushed production towards more sustainable practices, either within the factory itself, or in the products it creates.

Typical examples would be the use of styrene-free polyester and bio-based epoxies, with a greater use of totally renewable reinforcements such as rock fibres or flax. A general trend for more hybrid and fully electric propulsion (see Inboards feature) has also encouraged designers to build ever lighter and more efficient hulls. Foiling technology, made possible by advances in carbon fibre lamination, is being employed for some of the smallest craft to double the range of equally small battery banks. Recycled plastics are being used for

some core materials as OEMs explore a fully ‘circular’ production methods. Unfortunately, what to do with end-of-life fibreglass hulls remains an issue, but progress is being made in the windfarm industry which may offer some solutions.

### EASING SUPPLY ISSUES

Although there are still considerable issues with shipping logistics (see panel), careful planning by the main suppliers has largely mitigated their impact. A major resin and adhesive producer, Scott Bader, is currently expanding its global manufacturing capability to bring its production closer to its customers.

“First we had Brexit and the ‘hangover’ from Covid, and now we have the Ukraine conflict and energy price spikes,” said Scott Bader’s Group CEO Kevin Matthews. “Although there is still some instability in macro economics, we will carry on meeting the significant demand we are seeing. A current trend is the pushing of performance specs, with builders also seeking to take out some of the production costs by improving their processes.” ➡

## Shipping rates up almost 100% YOY

ACCORDING TO NORWAY-BASED Xeneta, a leading market intelligence platform, shipping rates continue to rise, which is impacting the price of raw materials. Figures compiled from over 160,000 trade routes and 300 million contracted container movements suggests long-term shipping rates rose by another 7.6% in March 22, pushing the total to 96.7% year-on-year. The XSI (Xeneta Shipping Index) cites “a combination of relentless demand, port congestion, equipment shortages and Covid disruption, which have driven the rate trendlines to new heights.” Whilst a worrying time for shippers, the carriers are reporting huge profits. The Evergreen line, for example, has just disclosed annual record revenues of US\$17.67bn, a four-fold increase on 2020. However, Xeneta’s CEO Patrik Berglund suggests that these record prices may be unsustainable. “In the slightly longer term,



Xeneta CEO Patrik Berglund. “The picture remains very complex, so get the latest market intelligence before entering into shipping negotiations.”

we have moves by emboldened, cash-rich carriers to consolidate market shares and boost fleet capacity,” he said. “Evergreen, for example, could be looking to take delivery of 40 new vessels by the end of 2025, totalling more than 550,000 TEU (standard containers). Will the market demand continue to develop to absorb this kind of capacity growth, or could we see the carriers go from boom to bust with weaker fundamentals?”

Berglund says it is essential for stakeholders to avail themselves of the latest market intelligence before entering into contract negotiations, as the picture remains “very complex”.

*xeneta.com*

## Scott Bader invests in the US



SCOTT BADER HAS recently invested US\$16m in building a new manufacturing and supply hub in North Carolina in the US. “We are known globally within the composites industry, and have had increasing interest from US-based boatbuilders,” said CEO Kevin Matthews. “We are already shipping a lot of product across from Europe, so it made sense to greatly shorten that 3,000-mile supply chain by setting up a US facility. This also builds in manufacturing resilience for the

global operation. Another key advantage is that it helps us understand the local market better, and this feeds into future product development.”

The new 10,222m<sup>2</sup> facility is in the growing manufacturing centre at Mocksville, and is the second of its type that Scott Bader has established in the US. The new development will focus on gelcoat and adhesive manufacture, and is expected to be operational by early 2023.



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UK-based Wessex Resins and Adhesives has recently added to its wide portfolio of West System epoxies by reformulating a bio-based Pro Set range. David Johnson (right) is seen training Italian boatbuilders in epoxy infusion in their dedicated technical facility

**MORE SUSTAINABILITY**

Improving bio content whilst reducing energy use and waste are key trends within the composites industry and are set to be the new normal going forwards. “Sustainability and eco-responsibility are becoming a major part of manufacturing,” said David Johnson of UK-based Wessex Resins and Adhesive. “Our company provides technical support to our distributors and their customers right across Europe. Training sessions for OEM staff and hobbyist members of the public always prove popular. Over three years ago, our formulation chemists worked on enhancing earlier Pro Set non-bio epoxies, their focus to add respectable bio content with zero loss of the properties required for soundly-engineered boatbuilding. Pro Set epoxies have immense case study in their non-bio form. We now have a Pro Set bio-based ‘Entropy’ range of resins for lamination, infusion and adhesion, now with between 26-30% renewable bio content. When combined with a natural reinforcement such as flax, it is possible – depending on the fibre fraction – to create a finished hull and superstructure that is perhaps 70% made from bio-based material.”

Sustainability is also being extended to core materials, with fast-growing and renewable balsa finding favour again, and also ultra-lightweight foams made partly from recyclates. Companies such as Netherlands-based Lantor and Sweden-

based Diab are pushing at the leading edge of ultra-lightweight foam cores with an eye on circular manufacture.

“The large boatbuilders have wealthy clients who often run their own companies, and many of these companies are already addressing sustainability, so this helps them with sales discussions,” said Scott Baders global technical manager Tom Kugelstadt. “Questions will be asked about what materials the boat builder is using, and from what sources. Sustainability is moving ever higher up the boat buyer’s agenda.”

**KINDER PRODUCTS - STRONGER ADHESIVES**

To assist staff that use resins every day, resin manufacturers are reducing toxicity and volatile organic compounds in their brands to improve the working environment. Styrene-free polyester resin and epoxies that are less harsh on exposed skin are good examples.

“Like all responsible suppliers to the marine industry, Gurit seeks to incorporate sustainable best practices in new product development,” said Thomas Nauer. “With adhesives in particular, end users are seeking exceptional health and safety characteristics along with high



Gurit’s Spabond 400 ‘low sag’ adhesive is a part of an ‘overall focus on more environmentally friendly solutions that ensure worker protection’. The product incorporates a unique Light Reflecting Technology (LRT), which allows users to detect the presence of contamination on clothing and around the work environment with the use of a simple UV light

strength, a wide range of hardener speeds to accommodate variations in working time, and easy-to-use applications both for mixing and dispensing. New formulations improve sag resistance, and use bio-based components as standard.”

**LESS PRODUCT, LESS WASTE**

In the complete reverse of usual business practice, some of the resin manufacturers want their OEM customers to actually use less of their product, and are keen to show them how.

“Boatbuilders are striving to save weight in their products, as this helps with fuel efficiency and performance,” said Scott Bader’s Tom Kugelstadt. “We are serving several other sectors, typically the offshore energy sector, so can bring this expertise to leisure marine. On invitation, we visit our boatbuilding customers and see how they are using our products. We can suggest ways to use less resin, can audit stock, develop techniques to increase shelf life and – in the case of a global shortage – also recommend alternative products.”

Switzerland-based Gurit has also been busy making its products more cost effective, with less waste. “Across the scope of our formulated materials, we have re-engineered our range of resins including the PRIME 37 system,” said Gurit’s Thomas Nauer. “We have also improved the multifunctional Ampreg 3X laminating range, and Ampro Bio epoxies to simplify components, make application easier, and minimise waste generation. This is all part of our commitment to provide customers with products compliant with best-in-class health and safety standards.” ➔

Gurit says it has improved its Ampreg 3X laminating range of epoxies to make application easier and minimise waste



# RECENT PRODUCTS



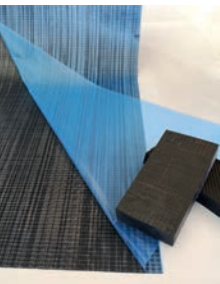
The Couach Fly 86/2600 is the largest structure built to date using Sicomin's InfuGreen 810 bio-based resin

**SICOMIN'S LARGEST INFUGREEN BUILD**  
France-based boatbuilder Couach has used Sicomin's InfuGreen 810 for the infusion moulding of the largest yacht hull to be made to date using bio-based resins. Not only has the 26m, 52-tonne motoryacht been praised for its green credentials, but Couach says that the process itself was also the best technical option for a vessel of this size. "With Sicomin's InfuGreen 810 we have been able to build out Fly 86/2600 yacht in a more sustainable way," a statement from the yard explains. "We produced a lighter, stiffer and more durable composite structure that reduces our impact on the environment." Sicomin says that the new resin is ideal for infusing large structures. "The significantly lower viscosity and increased fibre wetting enable rapid, controllable and void-free infusion of the laminate, particularly when using heavyweight multiaxial and woven reinforcement plies," their statement explains.

Work has already started on infusing the second hull of the 86/2600.  
*sicomin.com*

## HEXCEL'S G-VENT FOR MARINE

US-based carbon-fibre specialist Hexcel has harnessed its aerospace expertise to develop its G-Vent technology for highly-loaded marine structures such as masts and foils. G-Vent is claimed to 'reduce the requirement for debulking steps and ensures super-low porosity (less than 1%) irrespective of the laminate thickness.' Essentially, this means that laminates can be



made with porosity values similar to those produced in an energy-hungry autoclave oven. The technology was rigorously tested by Q.I Composites, a leading evaluator of products for the marine industry, which determined that G-Vent was indeed similar in porosity to autoclave laminates. They also report that key tensile, compressive and interlaminar shear strength tests were actually higher for the G-Vent panels. This means that boatbuilders can reduce time and cost in manufacturing high load items through 'out-of-autoclave' processing techniques.  
*hexcel.com*

## DIAB'S LIGHTER SANDWICH CORE



Sweden-based Diab has recently developed a new foam sandwich core which it claims will give an 80% reduction in resin uptake. Divinycell MC60

is DNV approved and is described as 'the innovative next generation structural core with best in class mechanical properties to low weight.' Suitable for weight-critical applications, MC60 has a small cell size allowing for minimal resin uptake, whilst still being compatible with most common glue and resin systems. Diab says the core has excellent peel strength, low water absorption and good acoustic insulation properties.  
*diab.com*

## SCOTT BADER'S NEW CRYSTIC SPRAY GELCOAT

Scott Bader has announced a new spray-applied gelcoat that has 'superior weathering properties and a high gloss finish.' Scott Bader is a major supplier to international boat builders and the offshore wind energy sector, and has been steadily driving down the styrene content of its resins. At the same time it has been seeking greater gelcoat longevity against UV degradation and environmental weathering, especially in hot climates. The latest product, Crystic GC LS30PA Excel continues the Crystic mission of making materials that not only look good and are long lived but also easy to apply and repair. This latest product is an Iso-NPG gelcoat (a mixture of pre-accelerated neopentylglycol

and isophthalic unsaturated polyester resin with lightfast pigments) ideally suited for warmer climates. The Crystic GC LS30PA formulation has been designed for enhanced air release for porosity control during spray application, consistent batch-to-batch quality and full compatibility with MEKP curing peroxides with no gassing.  
*scottbader.com*

## HEXCEL'S 'PAINT READY' PARTS



The hardtop on Sunseeker's new Ocean 90 has been made considerably lighter by using Hexcel's HexPly XF combined with HexPly SuperFit semi preg

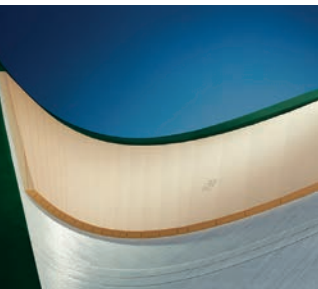
A general trend in motoryachts is to minimise the weight aloft, and Hexcel's new surface technology is said to not only provide lighter parts, but they also come almost ready to paint from the mould. As a result, Sunseeker International has specified the hardtop of the new 90 Ocean model is made from a combination of Hexcel's HexPly XF and HexPly SuperFIT semi-preg. The resulting structure is 'considerably lighter than one made using traditional resin techniques, and also demoulds with a pin-hole free surface that needs minimal preparation to be ready to paint.' Sunseeker claims to have saved three days of manufacturing per hardtop due to an overall production time reduction of 30%. HexPly HF is described as a lightweight, non-woven semi-preg that eliminates the need to use a traditional in-mould gel coat, so greatly reduces any refinishing work. Hexcel worked with Sunseeker to develop the materials and processes that satisfied the structural requirements whilst also allowing for lay up and curing in a single shot. This is achieved because the HexPly XF surface layer and the following layers of HexPly Superfit don't need adhesive resin films to bond them to the core. Instead, Hexcel's rapid-curing M79 epoxy resin content within the ply's has been adjusted to make the necessary adhesion in a much faster time frame. ➔



**MACHINES AND PROCESSES - SHAPING THE FUTURE**

In order to create some eye-catching shapes as well as make a hull more efficient, many designers are adding more curves. Construction is being helped by cost-effective solutions to use less resin and other consumables, ultimately cutting costs and reducing waste.

**DIAB'S ADVANCED KITS**



Core makers Diab have developed a system of machine-cut kits to allow the core to fit snugly into a curved mould, saving up to 50%-75% in resin

consumption. Custom software especially designed for the process works with a CNC machine that cuts the core partway through it's thickness. This process eliminates the need for a scrim backing and leaves a smooth, curved side against the mould. The core can also be perforated to allow for better resin flow, and additional grooves can be added to aid resin distribution without the need for a flow mesh. On receipt of the design files, Diab can also include additional slots and cuts for the correct fitting of beam structures. The high quality laminate produced by this type of advanced kitting programme is claimed to decrease costs by dramatically reducing the need for post-grinding and finishing work. The optimum grid directions can also be calculated for each detail, so the process is ideal for all types of leisure craft and for some of the curved mouldings such as antenna masts. The kits are easily repeated for series production. [diab.com](http://diab.com)

**Q-SANDING'S CONCAVE SANDER TECH**

Belgium-based Q-Sanding Technologies has just won a 2022 World Tooling award for its solution for machine-abrading concave mouldings. The original concept was developed by Quintin Broussard, a professional yacht painter who wanted a much quicker way of attaining the accurate hand-sanding finish when working on complex shapes. His Q Backing pad has a soft foam layer that allows it to adapt easily to the radius of a component, including



the inside of portholes. When combined with a Q-Sanding machine that is especially developed for a good ergonomic fit the result is a very effective radius sander. The judges of the World Tool Awards agreed and gave the Q011 pneumatic sander the top award in the 'Professional' category (pneumatic). [qsanding.com](http://qsanding.com)

**VABO'S ROBOTS SPEED UP PRODUCTION**

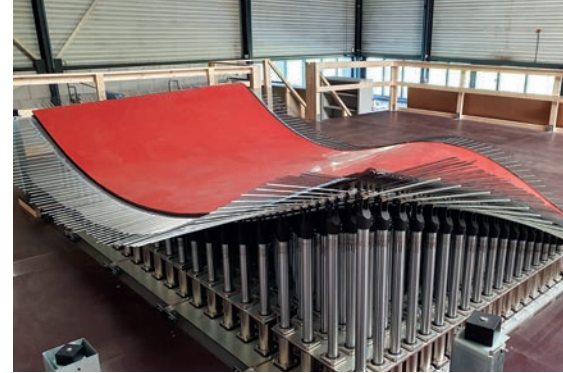


Netherlands-based Vabo Composites manufactures custom mouldings for a variety of boatbuilders, most notably in the superyacht sector, and has recently been using sophisticated robots to make some of the tightest curved structures of all - masts. The first mast completed, and since shipped to a customer, was created using a combination of additive and subtractive manufacture by the same robot. Firstly, the platform moulds were made by 3D printing using recyclable material. The robot, which is mounted on a track, then milled the main parts, and also precisely drilled the holes for the fixings required.

Vabo described the results as 'exactly as expected' and said that the co-operation between man and machine was 'promising.' [vabocomposites.com](http://vabocomposites.com)

**CURVED WOOD FROM CURVE WORKS**

Based in the Netherlands, Curve Works specialises in creating curved panels of all kinds and from a variety of materials, including foam cores. The process uses reconfigurable tools, or 'adaptive moulds' by the renowned manufacturer Adapta A/S that can quickly turn a 3D drawing into



curved shape. A machine with an adjustable pin bed and a rubber interpolation layer on top allows for smooth, curved surfaces, whilst an overhead laser projection system marks the areas for trimming. The literal flexibility of the machine allows the company to develop new processing techniques which would normally not be possible. This year, Curve Works has added a new material to the portfolio, wooden panels. With raw materials for the process sourced from sustainable forests, including bamboo, laminated curved typically 3.65m x 1.0m and with a curve of down to 300mm can be produced, although larger sizes are possible. [curveworks.nl](http://curveworks.nl)

SHOWS AND EXPOS

Where to get hands-on with the latest materials and machines, and talk with the experts

**JEC WORLD**

**PARIS-NORDE VILLEPINTE  
MAY 3-5, 2022**

Returning after a three-year absence, and slightly later in the year than usual, JEC World will once again be at the huge Villepinte exhibition hall just outside Paris, and very close to Charles de Gaulle airport. Visitors can even take advantage of a free shuttle bus from airport arrivals directly to the show's main entrance. For those who can't attend in person, a series of presentations will be available on-line.

"JEC World is the leading global event for composites innovation, business and ➡

networking and we know that the industry is eager to meet again this May,” said organiser Nelly Baron. “We are expecting more than 1,250 exhibitors from 100 countries, with 43,000 participants overall during the three day event. The JEC World Connect platform will allow people to visit the show virtually.”

This year, there will be a strong focus on sustainability, with a series of conference presentations aimed at ‘net zero’. “It’s essential to us to put sustainability at the centre of this 2022 edition,” Baron explained. “Four main conferences covering the topic will be held during the event. These include ‘Sustainability of Raw Materials for Composites: Fuelling the Circular Revolution’ and ‘Rethinking Composite Materials Production: The Path to Sustainable Manufacturing.’ Of particular interest to the marine sector, with its high waste production, will be ‘Design for Circular Composite Products: Turning Waste, Recycling & Reuse into Opportunities’ and ‘Applications of Composite Materials for Circularity: Towards a Net-Zero World’.

In addition to a vast array of materials, machines and applications there will be an area dedicated to education and training, and a ‘Countries on Stage’ feature. Topics discussed here will be South Korea’s ‘Hydrogen unleashes sustainable mobility’,

The Netherlands view on ‘Boosting the Value Chain and Sustainable Excellence’ and from the USA ‘Sustainability and Innovation – Driving the future of the US composites industry’.

For more details of times and ticket pricing, visit: [jec-world.events](http://jec-world.events)

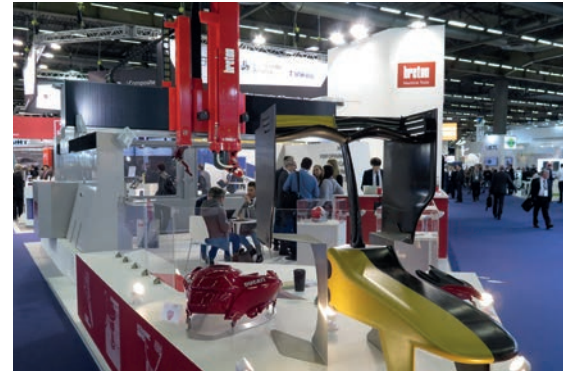
## MARINE AM CONFERENCE AND EXHIBITION

ST MARY’S STADIUM, SOUTHAMPTON, UK  
JUNE 15-16, 2022

This two-day conference focuses on advanced materials for the marine sector and will give participants the opportunity to learn about the latest innovations, developments and applications from leading manufacturers and suppliers.

Organised by Fluency Marketing, the event has welcomed Scott Bader as its platinum sponsor. There will be a mix of static stands displaying the latest materials and machines, along with some proven favourites, and a series of conferences to discuss the most recent advances in boatbuilding material science technology.

For those with an interest in speaking at the event, short abstracts and bios are invited to email [info@fluency.marketing](mailto:info@fluency.marketing). “We would love to hear from people throughout the industry as we build



JEC World in early May will bring together composite advances in all transport sectors, including aerospace, automotive, rail travel and marine

our informative and thought-provoking programme,” said Gemma Smith, Fluency Marketing’s managing director. “The whole team is excited to be back in Southampton for another year. We look forward to discovering the latest developments from across the supply chain, reviewing developments from last year’s sustainability workshop, and taking a deeper dive into all things MarineAM.” The closing date for speakers who would like to address the delegates is 2nd May 2022.

For more information about how to get involved, please visit: [advancedmaterials.events/marine](http://advancedmaterials.events/marine)

# Movers and shakers

## MATERIALS

### BASALTEX

Netherlands-based company harnessing the proven technology of fibres drawn from pure basalt rock to make recyclable and renewable reinforcements. [basaltex.com](http://basaltex.com)

### DIAB

Based in Sweden and founded in 1950, Diab is a major manufacturer of foam core materials and sandwich technology development, with a strong focus on sustainability. [diabgroup.com](http://diabgroup.com)

### GURIT

Founded in 1835 in Switzerland, Gurit has since developed into an advanced composites specialist, and has acquired several companies such as SP Systems and ATC Structural Cores. [gurit.com](http://gurit.com)

### HEXCEL

Founded in 1948 and based in the US, Hexcel is a major producer of carbon fibre reinforcements and resin systems for the aerospace, industrial and marine sectors. [hexcel.com](http://hexcel.com)

### SCOTT BADER

Established in the UK in 1921, and recently expanded

into the US, Scott Bader produces resins and compounds for composites in 6 major production facilities. [scottbader.com](http://scottbader.com)

### SICOMIN

Based in Southern France, Sicomin formulates and manufactures a range of advanced epoxy systems, including bio resins, as well as high performance core materials and fabrics. [sicomin.com](http://sicomin.com)

### WESSEX RESINS & ADHESIVES

A family-run business based in the UK, Wessex Resins & Adhesives manufactures the US-patented West System brand of epoxies and offers training to boatbuilders. [wessexresins.co.uk](http://wessexresins.co.uk)

## MACHINES

### CURVE WORKS

Based in the Netherlands, Curve Works is a specialist in creating curved panels in a wide range of materials, from foam core to clear acrylic, using 3D drawings and a pin-bed machine. [curveworks.nl](http://curveworks.nl)

### VABO COMPOSITES

A specialist composite company based in the Netherlands and increasingly using robotics for the production of large structures for superyachts. [vabocomposites.com](http://vabocomposites.com)

## Q SANDING TECHNOLOGIES

Founded on an invention by a yacht painter in 1989, this Belgium-based company now manufactures a range of orbital sanders specifically designed for abrading radii. [qsanding.com](http://qsanding.com)

## EXPO ORGANISERS/RESOURCES

### JEC WORLD

Formed in 1963, the JEC Group is a French-based non-profit association dedicated to the promotion of composite materials and the development of their market. [jeccomposites.com](http://jeccomposites.com)

### MARINE AM

Annual marine composites and technologies show organised in Southampton UK by Fluency Marketing, a PR company focussed on advanced materials and engineering. [fluency.marketing](http://fluency.marketing)

### FIBRE4YARDS

An initiative with EU backing to disseminate information and technologies from other sectors with the aim of improving the efficiency and sustainability of marine construction. [fibre4yards.eu](http://fibre4yards.eu)