

the official magazine of  **Composites**  
Australia

# Connection

## Magazine

Issue **63** • November **2023**



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# President's Letter

Genelle Coghlan **President**



**W**ith renewed commitment to sovereign manufacturing capability by the Australian government, this edition features the sector of Australian-made commercial service vessels, including Pilots, Police, and Rescue, Research, and passenger vessels enabled by composite materials.

These professional vessels, essentially floating workspaces, are designed to endure. They embody resilience, designed for extended durations at sea, prioritizing safety, built for speed, agility, and stability, and are durable. Their operational efficiency is critical for servicing and safeguarding our marine environment and the essential infrastructure for safe navigation, supporting our primary industries and extensive coastlines.

Consider our feature on Victoria's Hart Marine pilot boats, which could be likened to a civilian battleship in their robustness. These self-righting vessels are honed for speed, their beak bow structure ensuring functionality even amidst the chaos of turbulent seas.

We also spotlight Dongara Marine's new site now in Geraldton, 424 km north of Perth. Their 24-metre state-of-the-art fisheries patrol vessel, designed for extended missions accommodating a crew of 10, showcases twin keel hull design for stability and minimal roll. Advanced navigation systems and infra-red night vision capabilities are essential for both research and nocturnal patrols.

In the specialized field of Marine Mine Countermeasures, the selection of materials is paramount. Our feature on Steber International highlights fibreglass, which distinguishes itself through its non-magnetic properties, durability, design flexibility and resistance to corrosion; characteristics which are essential for equipping our vessels to tackle the sophisticated demands of MMCM operations with precision, safety and finesse.

Leading the charge in innovation, we highlight the high-speed passenger ferry, Ika Rere, a trailblazer as the southern hemisphere's first fully electric ferry. Launched by East by West Ferries and crafted by Wellington Electric Boat Building Company (WEBBCo) in New Zealand, this vessel integrates advanced engineering and composite materials supplied by GURIT, setting a precedent in marine transportation.

In our feature on the Whiskey Project Group, we highlight the company's significant achievement in securing a contract with the United States Defence Innovation Unit. The fleet of advanced tactical watercraft are set to play a pivotal role in developing operational concepts for the United States Marine Corps and represent a leap

forward in Australia's military maritime capabilities.

Our recent event, documented in a double-page spread, showcased technological prowess: Edencraft International unveiled Australia's most advanced high-speed 5-axis CNC machining centre. This demonstration brought together nearly 100 industry specialists, each witnessing the strides being made in efficiency and scale—not only for marine craft construction but also for the broader manufacturing sector. The introduction of this cutting-edge machinery marks a leap in precision and promises to be a significant strategic enhancement to our national manufacturing capability.

Each article in this edition shares a common thread in the concept of 'Marine 4.0' which is the use of cutting-edge engineering, the precision of robotics, innovative construction methods and the application and resilience of advanced materials, along with critical problem-solving skills that have long been the backbone of boat construction. Join us in this edition as we explore these milestones in Australian maritime excellence and the steps being taking towards a resilient and self-sufficient future.

Warm regards,  
Genelle Coghlan

# Steber International Sovereign capability in Marine Mine Countermeasures

Written by Kerryn Caulfield, Executive Director, Composites Australia Inc.

**A**ustralia's vast maritime expanse ranks as the world's third-largest marine jurisdiction, covering nearly 14 million square kilometres. The country's unique marine environment, characterized by warm, shallow waters, coupled with its economic reliance on seaborne trade, necessitates a robust system to ensure the safety and continuous flow of these sea routes. Mines, both from historical conflicts and modern digital types with low target strengths, pose a significant challenge, making them difficult to detect.

Vessels with a fibreglass hull offer distinct advantages in mine countermeasure missions. Fibreglass's non-magnetic nature diminishes the risk of triggering magnetic mines, which are sensitive to magnetic fields emanating from metal ship hulls. Additionally, the use of fibreglass hulls can contribute to the reduction of the vessel's acoustic signature, a critical aspect as some mines react to sound.

"In the complex world of mine countermeasures, the choice of materials is paramount. Fibreglass, with its non-magnetic properties, durability, design flexibility, and resistance to corrosion, stands out as the preferred option. It equips our boats to tackle the intricate challenges of MMCM operations effectively," stated Alan Steber, Managing Director of Steber International.

Steber International, located in Taree, NSW, is known for its design and construction of high-quality boats suitable for a variety of purposes. These commercial motor vessels, which range from 8.5 metre (28') to 15.8 metre (52'),



serve diverse functions including charter, commercial fishing, patrol, shark meshing, sea rescue, support, surveillance, and recreational activities.

The Steber 3800 stands as a testament to the company's capability to tailor vessels for specific operational requirements. This particular vessel has integrated into the Royal Australian Navy's (RAN) countermeasure toolkit, emphasising its significance in maritime operations, often utilizing the Steber hull in custom configurations to support scientific research and hydrography.

Under the Sea 1778 Phase 1 (Deployable MMCM) initiative, the Royal Australian Navy (RAN) procured five 3800 Steber fibreglass support vessels. Three of these were recently commissioned by the RAN for mine countermeasure activities. Notably, two vessels among these purchases were configured as unmanned surface vessels (USVs). While the specifics of deployment remain classified, the vessel's capacity to operate from larger ships

and conduct sweeping operations in harbours, both within Australia and overseas, is of national importance.

"Since Steber's inception in 1946, we have upheld a commitment to training and preparing the future marine craftsmen. Ten apprentices, enrolled in the Certificate III in Marine Craft Construction at NSW TAFE, were involved in the construction of our recent defence vessels," stated Alan Steber.

The Department of Defence Science and Technology Group (DSTG) recently commissioned an additional vessel, the Steber 40 (40ft). This marks the 21st vessel constructed by Steber for DSTG, which plays a pivotal role in research, notably in support of the RAN's mine countermeasures programs. The Steber 40 will serve as a multifaceted coastal trials platform, furnishing DSTG with a distinctively Australian base for assessing a broad spectrum of robotic innovations. The Defence's historical reliance on Stebercraft vessels is evident in its extensive operations nationwide.

steber.com.au



# Hart Marine At the heart of sovereign boat building

Written by Kerry Caulfield, Executive Director, Composites Australia Inc.

**From its boat building hubs** in Mornington and Yaringa Boat Harbour, southeast of Melbourne, Hart Marine builds mighty boats designed for the speed, agility and stability required to navigate both Australian and international waters with industrial purpose. The family-owned company's offering, comprising of high-end commercial and government-authority craft for the police, pilot services, port authorities and border security, sets standards in maritime reliability and efficiency.

Described as the civilian equivalent of a pocket battleship, the ORC Pilot Boat is designed to withstand rapidly changing hydrodynamic loads, shunning the extreme physical phenomena of slamming.





The ORC Pilot Boat, with its design rooted in the expertise of Pantocarene, a naval architecture firm based in Arzon, France, garners global recognition for its unmatched functionality and design. Described as the civilian equivalent of a pocket battleship, the ORC Pilot Boat evolved to suit the needs of Europe's armed forces, police, search and rescue services and other bodies needing small vessels that operated largely regardless of weather conditions.

Didier Marchand of Pantocarene, draws a parallel between vessels designated as ORC, standing for Offshore Rescue Craft, and the ORCA whale. Both signify attributes of speed and aggression, characteristic of certain marine mammals. ORC vessels are constructed to Pantocarene's detailed specifications and drawings, ensuring the desired weight, location of the centre of gravity, performance and stability. The range comprises of five models, with hull lengths spanning from 12.5 to 18 metres.

The beak bow design, also known as a polyhedral bow or rostrum, is optimized for high-speed vessels. The principle behind it is that when a ship encounters a wave, the beak bow induces negative lift, which prevents the vessel from being propelled upwards off the wave and subsequently descending harshly – or slamming. The main objective is to reduce vertical acceleration, allowing the vessel to move through the wave rather than over it.

Such a design approach aims to counteract the unfavourable sea-keeping attributes often experienced by conventional planing hulls, especially in head seas. Beyond its performance in head seas, the beak hull design also leads to a noticeable reduction in fuel consumption

and offers improved course-keeping in following seas. With this design, boats can maintain higher speeds in rougher conditions, specifically in seas ranging from 4 to 5 metres. Overall, these durable vessels are designed to withstand rapidly changing hydrodynamic loads and efficiently navigate challenging sea conditions shunning the extreme physical phenomena of slamming.

The vessel's self-righting design is also a paramount feature, ensuring operational functionality even during a rollover in steep, short and turbulent seas. The principle is rooted in the relationship between the centre of mass, the centre of buoyancy and force derived from its strategic underwater hull shape; the vessel will naturally return to its upright position when capsized. This design not only enhances safety standards for pilots and crew but also aligns with the requirements of the Workplace Safety Legislation Amendment (Workplace Manslaughter and Other Matters) Bill 2019, effective from July 2020. Key elements facilitating this self-righting ability include dampers on all ventilation ducts, rollover-designed engine mounts, safety belts, inversion-ready fuel tanks and components and a capstan to secure the anchor chain, minimizing damage in turbulent conditions.

In pilot boats, the wheelhouse design prioritizes comfort and functionality to reduce operator fatigue. The interior showcases resiliently mounted ergonomic seats, complete with integrated suspension. These seats come with a heating option, ideal for colder periods. To counter warmer climates, the wheelhouse integrates advanced custom air-conditioning systems.

Efforts to maintain noise levels below 72 db include an insulated superstructure designed for noise dampening, crucial for long operations and ensuring clear communication among crew members. Attention to functionality also includes low-glare finishes on the dash and other surfaces to aid night navigation.

The wheelhouse windows are constructed to be 10 millimetres thick, while the windscreen is 12 millimetres thick, ensuring durability and clarity. Additionally, to prevent reverberation from the hulls, the engineered suspension system is designed with a focus on damping vibrations, incorporating a 2-millimetre thick rubber layer.

The OCEAN 3 fender system, seamlessly integrated around the gunwale, contours the boat's shape, absorbing impacts and offering continuous protection to ensure that no shocks are transmitted to the hull. Comprising a core of polyethylene (PE) foam, the fender effectively absorbs energy with minimal reaction force, serving as a shock absorber during berthing. The system's polyurethane (PU) coating, reinforced with multiple textile layers, not only ensures tear and abrasion resistance but also enhances energy dissipation efficiency and extends the fender's lifespan. Precisely tailored based on energy calculations and user requirements, this fender system is optimal for workboats, enabling them to efficiently nudge ships and barges. The gunwale fenders, designed to grip rather than deflect, assist in navigation.

The vessel is powered by twin 500kw engines, allowing it to reach speeds of 26 knots. Its fuel efficiency derives from a carefully crafted hull shape and driveline configuration.

Utilizing advanced construction techniques, Hart Marine was an early adopter of resin infusion. According to Ben Switzer, Production Manager of Hart Marine, this technique meticulously controls resin-fibre ratios, resulting in hulls that are dense in fibre and optimally calibrated in weight. As a testament to their durability, these hulls are projected to sustain intense maritime conditions for at least 30 years. Additionally, they offer a more subdued noise signature compared to alternative marine construction materials. To enhance structural integrity further, carbon fibre reinforcements are integrated into the construction.

Ben highlighted the adaptability of the ORC Pilot Boat, specifically tailored for the UAE's ports. To meet the regional demands, the boat was fortified with sand filters against desert particulates. Engines were enhanced with advanced cooling capabilities, air conditioning systems featured built-in redundancies, and engine room ventilation was reinforced with supplementary coalescing filters. Expanding fuel capacity was also essential to ensure reduced operational downtime.

Similarly, for regions with colder climates, pilot boats were adjusted accordingly. Some Victorian vessels, for example, were outfitted for specialized tasks. The after deck was designed for diving, towing, and recovery

operations. With openings on the sides and transom, the door space surpasses the bulwark's span. Moreover, the deck's effective space is augmented by the protective platform situated above the water jet nozzles. For recovery efforts or hoisting equipment such as police jet skis, a 500kg crane stands poised at the aft.

Hart Marine places significant emphasis on training and skill development. At the time of writing the company had 10 apprentices undertaking the Marine craft qualification focusing on both theoretical knowledge and practical expertise through flexible distance learning. Ben Switzer remarked, "Honing their skills for the next generation is not just about ensuring continuity; it's about cementing the future of the marine industry and meeting the industry's rigorous standards."

Hart Marine's comprehensive offering includes its manufacturing hub in Mornington which is complimented by its marine services facility in Yaringa Boat Harbour in Western Port, furnished with multiple travel lifts, designed to accommodate vessels weighing up to 75 tonnes. This infrastructure underscores its stature as a pivotal national industrial asset.

*The energy-absorption behaviour of materials and structures plays a key role in the safety of structures under impact. Energy absorption refers to the process of dissipating the input energy from external loading by plastic deformation or fracture.*

The beak bow design reduces vertical acceleration, allowing the vessel to move through the wave rather than over it.



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# Dongara Marine's Evolution From Dongara to Geraldton

Written by Kerryn Caulfield, Executive Director, Composites Australia Inc.

**Two colossal sheds** now command the landscape, standing tall as they overlook the pristine waters of the Indian Ocean. This is the new site of Dongara Marine, recently relocated to Geraldton. The facility is set to become an integral part of the State Government backed Geraldton Fishing Boat Harbour precinct.

Dongara Marine has been contracted to construct two new pilot boats for the Port of Fremantle. These will be essential for the transportation of the port's Marine Pilots – experienced mariners with extensive local knowledge who safely guide ships in and out of port. (Sister ship shown)



**A**s the primary deepwater port located between Perth (with its port in Fremantle) and Port Hedland, Geraldton Port serves the Mid-West region of Western Australia and is a significant hub for the export of minerals, grain and other commodities. Over time, with land gradually reclaimed, the Port has witnessed expansive growth and infrastructure enhancements, aimed at magnifying its capacity to cater to increased vessel demands including tourism.

The decision to relocate a manufacturing facility is never taken lightly. For Dongara Marine, this shift from Port Denison to Geraldton earlier this year was a strategic move driven by both need and foresight. Rohan Warr, Managing Director of Dongara Marine, emphasized the advantages of the relocation, a mere 50-minute drive up the Brand Highway. “Our newly commissioned waterfront shipyard has more overall space including the ability to hold larger vessels, plus direct access to a boat lift for launching ensuring rapid deployment and efficient sea

trials. This provides us with the capacity to build more vessels more efficiently. Moreover, we're able to offer an all-encompassing range of services under one roof - from vessel maintenance to meticulous refits and repairs.”

The Geraldton facility, enveloping an impressive 9900m<sup>2</sup> within the Fishing Boat Harbour precinct, enables concurrent construction and intensive vessel repairs, optimizing both space and time.

Dongara Marine's portfolio of professional working boats encompasses a range tailored for specific industries. Marine Rescue boats are built for speed, agility and stability, critical for emergency response. Crayfishing boats combine efficiency and durability, catering directly to the rock lobster fishing sector. Fisheries vessels reflect the need to ensure the integrity of fishing activity and develop a deeper understanding of the ecosystems. Meanwhile, pilot boats focus on facilitating safe harbour navigation, and police boats are designed to enforce maritime laws effectively.

## PROJECT TYPE: NEW BUILD

<b>Client :</b>	Fremantle Port Authority	<b>Draft:</b>	1.7 metres
<b>Vessel Type:</b>	Pilot boat	<b>Capacity:</b>	8 Marine Pilots
<b>Hull type:</b>	Monohull	<b>Crew:</b>	2
<b>Designer:</b>	Southerly Designs	<b>Fuel:</b>	4,000 litres
<b>Construction materials:</b>	Aluminium hull and composite superstructure	<b>Fresh water:</b>	300 litres
<b>Survey / Class:</b>	AMSA NSCV 2C	<b>Main engines:</b>	2 x Scania DI16 076M
<b>Length overall:</b>	9.2 metres	<b>Propulsion:</b>	2 x fixed pitch propellers
<b>Beam:</b>	6.1 metres	<b>Maximum speed:</b>	30.0 knots (loaded)
		<b>Service speed:</b>	27.0 knots (loaded)







Dongara Marine's new 9900m<sup>2</sup> facilities at Geraldton's Fishing Boat Harbour precinct.

The resin infused composite deck and wheelhouse also reduces overall vessel weight for better stability and fuel economy, is durable and protected against corrosion, and provides thermal and sound insulation for improved comfort for personnel.



"Recognising that each vessel is fundamentally a workspace, we design and build with more than just functionality in mind. Safety is first, which is why our pilot boats, for example, have self-righting capabilities, essential for protecting the crew in turbulent sea conditions. We've also integrated design features such as the suspension mount between the hull and deck to drastically cut down on noise and vibration. After all, a quieter environment doesn't just mean enhanced comfort; it directly contributes to operational efficiency," advised Rohan.

Many of the vessels are built with an aluminium hull and supplemented with fully infused composite decks and wheelhouses. One distinctive design aspect is the 'resilient' mounting of the deck onto the hull.

As facilitators of imports and exports, including mining exports, the ports of Western Australia (WA) are vital economic and strategic assets for both the state and country. A critical factor for ensuring their continuous and safe operation is the ability to transfer Marine Pilots to and from visiting ships. Getting them to and from those ships typically involves using a specialised pilot boat.

In the latest example of its contribution to this vital activity, Dongara Marine has been contracted to construct

two new pilot boats for the Port of Fremantle. These will be essential for the transportation of the port's Marine Pilots – highly-experienced mariners with extensive local knowledge who safely guide ships in and out of port.

Announcing the contract earlier this year, Western Australia's (then) Ports Minister Rita Saffioti said "Without fast, efficient, reliable and safe pilot vessels, our ports can't operate. These new assets will assist Fremantle Ports in providing the safest and most efficient service to ship owners, operators and the crew and pilots who board them every day and night of the year."

The acquisition of these new pilot boats will benefit port users by improving safety, security and adding capacity to assist in facilitating efficient ship movements. A key feature of their design and construction is a completely removeable wheelhouse. Manufactured in house by Dongara Marine using resin-infusion technology, this is the workplace for the crew and up to eight Marine Pilots as they transit between harbour and ships at sea.

Purpose-designed to be strong, stiff, lightweight and resiliently mounted to the aluminium hull, the wheelhouse can be simply and easily removed to provide access to all major machinery in the vessel, as may be

required for major engine maintenance or replacement.

This feature enables machinery to be located for optimum weight distribution and thus optimal speed and fuel economy without compromising the ability to undertake major maintenance with minimal disruption to vessel availability. This is critical given ports operate 24/7, 365 days per year.

The resin infused composite wheelhouse also reduces overall vessel weight for better stability and fuel economy, is durable and protected against corrosion, provides thermal and sound insulation for improved comfort for personnel, and enables a very high standard of internal finish.

Construction of the two vessels is well underway in the new facility, with the 19.2 metre long aluminium hulls and the composite wheelhouses all structurally complete. This means that work is now focussed on fitting all the machinery, equipment, and internals to the vessels as well as painting prior to launch. The first vessel is due for completion in the middle of 2024, with the second following before the end of the year.

Dongara Marine currently employs over 60 staff. The company expects to complete a total of 11 new vessels and two major refits this financial year.

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# Edencraft International Unveiling Australia's Most Advanced High-Speed CNC Machining Centre

Written by Kerryn Caulfield, Executive Director, Composites Australia Inc.

**Edencraft carries a legacy** of trailer fishing boats that traces back over sixty years, beginning in Miami in the 1960s. The company has become a staple of Australian fishing folklore, with the 233 Formula Classic boasting a timeless hull design known worldwide for its endurance and performance.

A pivotal chapter unfolded in May 2016 when Edencraft found a new horizon under the Maher Family Group's stewardship. Grant Maher, an admirer and customer of the brand, seized the chance to steer the company into a new era. By December 2016, Edencraft established its base in a

purpose-built facility in Moolap, Geelong, featuring dedicated spaces for moulding, joining, fit-out and administrative functions—a testament to the planning and investment that defines the brand.

The Marine Craft Construction, often dubbed 'Marine 4.0', reflects Edencraft's commitment to



Edencraft International unveiled its new cutting-edge five-axis CNC machining centre to delegates from across the country. Featured in the front row are hosts Josie and Paddy Eastman, alongside Grant and Kerri Maher. Image courtesy of Tom Cameron, Wicks Estate Media.





blending traditional boat building with the latest in engineering, robotics and material science. The centrepiece of this technological leap is the introduction of Australia's largest high-speed 5-Axis CNC machine—a mammoth leap forward for the company and the industry.

For this state-of-the-art endeavour, Josie Eastman (nee Maher), General Manager of Edencraft and her team collaborated closely with Innovync, renowned suppliers of high-performance CNC machining centres. Their partnership included an invaluable trip to Italy, where they worked directly with

Josie Eastman, General Manager of Edencraft inside the CNC machining centre which stands ready to shape the world's best trailer boat experience and far beyond. Image courtesy of Tom Cameron, Wicks Estate Media.

Innovync specialists. This collaboration was pivotal in equipping Edencraft with versatile machinery capable of crafting intricate moulds and parts across aerospace, marine, industrial, transport, and pool sectors, ensuring unparalleled milling, trimming, and drilling capabilities for finished components. Its massive 15.5-metre work area and precision in five axes simultaneously demonstrate a leap in operational capability and precision.

On the 1st of November, Edencraft celebrated a milestone with the unveiling of this state-of-the-art machining centre. This remarkable event attracted delegates from across states, all keen to witness the future of manufacturing taking shape. Networking opportunities thrived with professionals connecting to negotiate collaborative futures. Josie delivered an inspiring speech that reflected on the company's journey and projected the possibilities that this technological advancement could bring. Her vision of a future where precision and efficiency drive industry growth captivated the room, solidifying the event as a landmark in Australia's manufacturing narrative.

As Edencraft steps into this new phase, the CNC machining centre stands ready to shape the world's best trailer boat experience and far beyond, ensuring that the enduring legacy of Edencraft continues to ride the waves of innovation and excellence.

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# The Ika Rere Case Study Innovations in Workboat Efficiency

Written by Kerryyn Caulfield, Executive Director, Composites Australia Inc.

**The commercial workboat sector** is undergoing a transformative shift as operators increasingly seek out advanced materials to improve transport efficiency by reducing fuel consumption and greenhouse gas emissions. Central to this transformation has been the strategic integration of composite materials in workboats and ferries, responding to a clarion call for reduced fuel consumption and minimised greenhouse gas emissions. At the forefront of this innovation is the southern hemisphere's first fully electric high-speed passenger ferry, Ika Rere, introduced by East by West Ferries and constructed by the Wellington Electric Boat Building Company (WEBBCo) in New Zealand.

**D**emonstrating the leap to electrification and efficiency, the 19-metre catamaran operates across Wellington Harbour, showing the viability of high-speed electric ferries in commercial settings.

The vessel, capable of transporting 132 passengers at speeds of up to 20 knots, features an extensive energy storage system that charges overnight using a 300 kW shore-based charger, and is equipped to accommodate future infrastructural developments for rapid 1 MW charging.

This project's success stemmed from a synergy of maritime experts focusing on various aspects such as hydrodynamics, energy propulsion, and infrastructural support, all geared towards optimising operational efficiency and achieving a sustainable return on investment—coupled with the significant advantage of zero operational emissions.

The operational cost of ferries, mainly driven by energy consumption and maintenance, can dwarf the initial purchase price. Transitioning to electric propulsion presents a promising avenue for cost

Images by: Simon  
Hoyle, Southlight  
for WEBB



## CONSTRUCTION INNOVATIONS OF THE IRA KERE

### Modular Innovation meets Commercial Maritime

In the competitive sailing world, an extreme lightweighting approach is crucial for performance. Gurit has successfully transferred this high-performance methodology into the commercial maritime sector with Ika Rere. The key was developing a modular construction process that relied heavily on digital manufacturing and the proprietary use of Gurit Hi-Panels.

### Digital Precision in Design and Fabrication

The vessel's design and construction capitalized on comprehensive 3D modeling. Every aspect, from the overarching vessel geometry to the intricate onboard systems, tooling, and jigs, was digitally rendered to ensure millimetre-accurate precision. This meticulous attention to detail provided by a unified digital model guaranteed a seamless fit during assembly, reducing the risk of errors that can occur with traditional construction methods.

### Innovative Use of Carbon Fibre and Corecell™

Gurit's Hi-Panels, crafted from carbon fibre and Corecell™, were essential in achieving the desired weight reduction without sacrificing strength. These components were pre-laminated, CNC cut to exact specifications, and then delivered to WEBBCo for efficient on-site assembly. By shipping these pre-fabricated sections, the construction process became more akin to an assembly line, enhancing speed and reducing overall build time.

### Large Format Panels for Efficiency

The production of large format panels, measuring 9 metres by 2 metres, further enhanced the efficiency of assembly. These oversized panels facilitated quicker construction, as fewer pieces needed to be joined together, significantly decreasing the 'parasitic weight'—the excess weight that typically comes from bonding smaller panels together. Additionally, the vacuum infusion process for these panels ensured precise resin-to-fibre ratios, avoiding the addition of unnecessary weight and optimizing the panel's strength-to-weight ratio.

### Advanced Techniques for Complex Shapes

Female moulds and thermoformed foam cores were utilized for the curved areas of the hull. The thermoforming process shaped the Corecell™ material to the exact curves of the hull, minimizing resin usage and further contributing to the weight-saving objectives. This technique not only reduced the hull's weight but also maintained the integrity and hydrodynamic efficiency necessary for the vessel's high-speed operations.



reduction. Nonetheless, the associated Energy Storage Systems (ESS) bring a significant weight penalty, which paradoxically can hike energy demands. Addressing this, the focus turned to reducing the structural weight without compromising the energy storage capability.

Gurit's approach involved energy modelling and cost analysis to determine the best construction materials, balancing displacement, energy efficiency and durability. The selection of carbon fibre—despite its higher cost per kilogram compared to aluminium or fibreglass—proved crucial. It provided a structure that was not only strong but significantly lighter, enabling considerable energy storage without the added burden. As a result, Ika Rere enjoys a remarkable 75 per cent reduction in energy costs per trip compared to diesel counterparts.

Weight management extended to every corner of the vessel, employing techniques like using heavy multiaxial fabrics for toughness while simplifying the build process. The design also integrated structural seating to further diminish the need for additional support structures.

Gurit applied principles from high-performance yacht construction, known for its pursuit of speed, into a commercial context. Comprehensive 3D modelling served as the groundwork to streamline the assembly process of the vessel modules in parallel with reducing material waste.

To maintain structural integrity while minimising weight, Gurit created large format structural panels, each 9 metres by 2 metres, which could be assembled swiftly and with minimal excess weight from connections. These were vacuum-infused, a technique ensuring optimal resin content, reinforcing the lightweighting initiative.

A critical component of the design was fire protection in the battery space. An A30-rated fire boundary and a resilient composite structure with integrated intumescent materials were crafted to safeguard the ferry's structural integrity. Additional safety features included fireproof sealing and thermally protected hatch fasteners to prevent heat and smoke transfer to passenger areas.

Ika Rere's successful launch and subsequent operation have proven its design's merits. In its first year, the ferry saved an estimated 220,000kg in carbon emissions and decreased East by West Ferries' total fuel consumption by 40 per cent. The cost of energy for a round trip on Ika Rere is a mere quarter of that required for a similar diesel-powered journey.

In conclusion, the Ika Rere is a model of how technical innovation, environmental consciousness, and economic pragmatism can be harmonised. The success of this vessel showcases the potential for such technologies to revolutionise maritime transport, offering a blueprint for future endeavours in the sector.



# The Whiskey Project Group Next Generation Tactical Watercraft

Written by Kerryyn Caulfield, Executive Director, Composites Australia Inc.



**The Whiskey Project Group** (TWPG) has secured a significant contract valued at US\$12.5 million (approximately AU\$19.4 million) with the United States Defence Innovation Unit to supply a fleet of tactical watercraft for use by the United States Marine Corps (USMC). Initially intended to develop operational concepts, these boats are expected to be agile enough for littoral missions, robust for distributed operations, and equipped for a range of activities including reconnaissance, tactical movement and logistical support in maritime environments.

In the realm of tactical watercraft, TWPG has charted a course of remarkable progression from its first-generation 8.5 metre Whiskey Alpha to its latest offering – a formidable 11.9 metre Whiskey Bravo second-generation craft. The range of vessels is evolving to facilitate a broader scope of mission profiles, engineered for greater versatility and payload capacity – crucial factors for Defence Forces that require robust watercraft with multi-role offshore capability in all sea conditions as well as low-speed maneuvering for ship boarding, recovery or disembarking.

The Group's initial vessel, the 8.5 metre Whiskey Alpha that was launched in the shadow of the pandemic has been refined with the integration of a jet drive onto

the diesel engine, marking a decisive shift from traditional propeller systems. This development enhances the watercraft's operational range and maneuverability while minimising the risks associated with underwater obstructions and damage from floating debris. The absence of an exposed propeller significantly reduces the draft, allowing operations in shallow waters – a key requirement for riverine and amphibious missions. This design also lends itself to superior handling and rapid acceleration, both critical in high-intensity maritime engagements.

Strategic foresight and tactical planning have significantly influenced the redesign of the vessels, allowing for effective airdrop capabilities from aircraft like

the C-130 Hercules or C-17 Globemaster. This feature – a fusion of engineering innovation and strategic military planning – provides military forces with a crucial element of versatility that facilitates swift deployment, critical for promptly addressing evolving threats. The SeaBlade hull design in all models has also yielded substantial benefits, including better directional stability and a significant reduction in slamming load impacts on personnel and equipment. This design feature, coupled with a high waterplane area, also enhances fuel economy contributing to the overall efficiency of the vessels.

The watercraft's dual and single-point lift capabilities resonate with the Department of Defence's innovation unit's criteria, which seek to ensure that new acquisitions are versatile and fully compatible with existing military logistics systems.

This compatibility is critical for operations alongside the United States Marine Corps, with whom the innovation unit is closely aligned.

In building a formidable team, The Whiskey Project Group has harnessed a network of Australia's most skilled shipwrights, naval engineers and suppliers. This elite group is led by McConaghy Australia, known for their precision in high-performance marine construction. Gurit, leaders in advanced composite engineering services and materials. Adding to this impressive roster is Farr Design, renowned for their innovative naval architecture. A key figure in this alliance is Brett Ellis, a marine composites engineer whose expertise is underscored by his America's Cup victory, symbolising a blend of experience and triumph in marine engineering. This collective expertise underpins the group's ability to deliver world class maritime solutions.

According to Will Mueller, General Manager for McConaghy Australia, "We utilised a vacuum consolidated wet preg epoxy, a cost-effective building method that ensures good structural outcomes. The fibre matrix combines unidirectional and multiaxial carbon fibre, giving us the lightest and strongest structure possible. For the subfloor framing, cockpit floor, and console



From its first-generation 8.5 metre Whiskey Alpha (above) to its latest offering – a formidable 11.9 metre Whiskey Bravo second-generation craft, TWPG has engineered this craft for a broad scope of mission profiles that are crucial factors for Defence Forces. These require robust watercraft with multi-role offshore capability in all sea conditions as well as low-speed maneuvering for ship boarding, recovery or disembarking.

area, among others, we employed carbon fibre foam panels, conveniently pre-cut and ready to fit into the shell, significantly saving time. Additionally, we have confidently incorporated Gurit's Ampreg™ 31 resin system in our construction process."

Employing savvy foresight, TWPG has been operating on a modest scale in the U.S for several years, primarily to engage with the US military for various projects. In anticipation of fulfilling their first batch of vessel deliveries to the USMC, along with providing initial training and maintenance, TWPG is planning to broaden its operations in the United States in the early part of 2024. Parallel to this expansion, TWPG is also focusing on enhancing its production capabilities. This effort is expected to evolve into the establishment of a comprehensive US-based manufacturing facility, potentially as soon as the following year.

An element of the AUKUS framework is intent to develop and procure robust, technologically advanced, multi-role small watercraft. The business case across all three AUKUS countries becomes compelling when considering the conservative estimate is for at least 180 small combatant and patrol craft in the 9 to 12 metre size category – a powerful projection for this veteran owned company.





# Gallery of Events

Written by Kerryn Caulfield, Executive Director, Composites Australia Inc.

## ELFIN HERITAGE CENTRE. TUESDAY, 19TH SEPTEMBER

CELEBRATING THE EVOLUTION OF COMPOSITES IN AUTOMOTIVE DESIGN



Far left. L to R. Patrick & Fran Chauvet, Raceglass. Helen Attard & Glen King, Kings Fibreglass. Admiring the unique BT17 Brabham.  
Middle. L to R. Bill Hemming, Elfin Heritage Centre. Tony Mercieca, Chem-Trend. Darren Smith, UCCC. Russell Varley, Deakin University.  
Above. L to R. Bill Hemming, Elfin Heritage Centre. Kerryn Caulfield, Glen King & Helen Attard, Kings Fibreglass.

## EDENCRAFT. WEDNESDAY, 1ST NOVEMBER

BEHIND THE SCENES AT EDENCRAFT HQ: AN EXCITING UPDATE!



Top left. L-R. Paul Harris, PRP Corp with Rob Kruber, Summertime Pools.  
Top middle. L-R. Kirby Bourke, Edencraft with Jay Alatom, Alpha1 Marine  
Above. L-R. Dave Higgins with Kirby Bourke, Edencraft.  
Left. L-R. Genelle Coghlan, Colan Australia. Josie Eastman and Kerri Maher, Edencraft.  
Bottom left. L-R. Rohan Gilmore, Concept Fibres with Paddy Eastman, Edencraft.  
Bottom middle. L-R. David Power, ATL Composites. Joe Rokebrand, Matthew Alizzi & Michael Chen, Quickstep Group.  
Below. Kerryn Caulfield with David Power (L) & Nancy Newman (R), ATL Composites.



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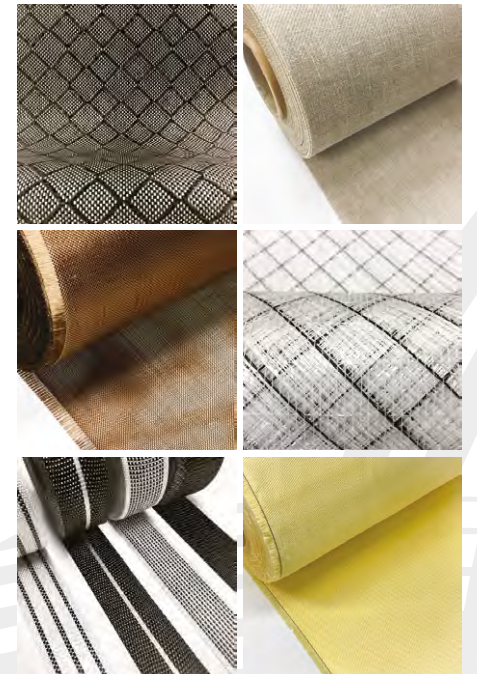
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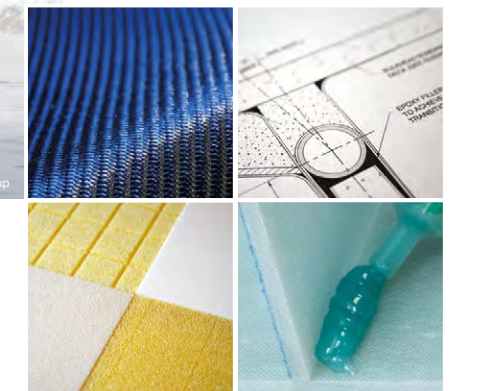


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