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Editor Martin Conway

Editorial & Production Assistant Lydia Perry

Advertisement Manager Aftab Perwaiz

Advertisement Assistant marketing@rina.org.uk

Publications Sales Coordinator Henry Owen

Published by: The Royal Institution of Naval Architects

Editorial & Advertisement Office: 8-9 Northumberland Street,
London, WC2N 5DA, UK

Telephone: +44 (0) 20 7235 4622

Telefax: +44 (0) 20 7245 6959

E-mail editorial mconway@rina.org.uk

E-mail advertising aperwaiz@rina.org.uk

E-mail production krogalaharacz@rina.org.uk

E-mail subscriptions subscriptions@rina.org.uk

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UK - HQ

sales@teignbridge.co.uk

Dubai

teignpro@eim.ae

India

sales@teignbridge.in

Asia

sales@teignbridge.asia

Spain

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IN-DEPTH



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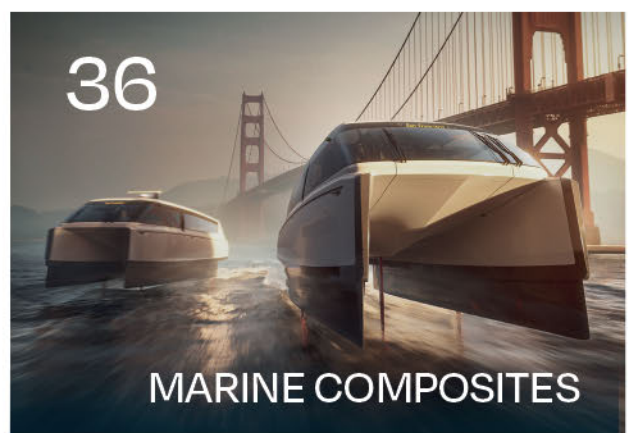
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NEWS

TUGS

MAMELLES TO HELP OUT SEYCHELLES PORT

Turkish boatbuilder Sanmar has delivered a general-purpose harbour tug to Seychelles Port Authority, for deployment at Port Victoria – a fishing, cruise ship and superyacht hotspot, visited by approximately 800 vessels each year. The tug is based on Robert Allan Ltd's RApport 1900SX design, drawn up exclusively for use by Sanmar, and retitled the Bozçay class by the yard.

The tug, christened *Mamelles*, features an overall length of 19.3m, a breadth of 8.2m and a maximum draught of 2.9m, and has been installed with a conventional twin-screw propulsive set-up, with twin nozzles and four rudders for enhanced manoeuvrability. Power is provided by two electronically controlled Caterpillar C32 engines, each rated 970kW at 1,800rpm. Both engines are US Environmental Protection Agency (EPA) Tier III and IMO Tier II-compliant.

This power arrangement grants *Mamelles* a bollard pull (bp) of 33tonnes and a free-running speed of 11.5knots. The tug offers overnight accommodation in the forecabin for a crew of four, split between two cabins, and has tank capacities for 26,000litres of



The 19.3m *Mamelles* will provide support to Port Victoria, including ship-assist duties

fuel oil and 3,100litres of fresh water. Typical duties will include ship-assist work, coastal towing and line-handling operations, as well as general harbour service. *Mamelles* is the second Sanmar-built tug to be delivered to Seychelles Port Authority, the first having been the 28.57m-long, 60bp-capable *Ste Anne*, which was delivered in 2020. ■

OFFSHORE SUPPORT VESSELS

BMT AND STRATEGIC PURSUE GREEN CTV FUTURE

Naval architect and designer BMT has announced a long-term agreement (LTA) with Singapore-based boatbuilder Strategic Marine Group, with the intention of producing sustainable vessels for the offshore wind crew transfer vessel (CTV) sector. The partners

state that they will introduce "cutting-edge design solutions to meet emissions-reduction goals", with a special focus on the StratCat CTV range, previously developed by the two companies.

Martin Bissuel, BMT's head of sales for commercial maritime, comments: "The new long-term contract and partnership confirms Strategic Marine's trust in BMT's naval design and the capability to undertake diverse projects across naval shipbuilding and support programmes globally. This collaboration not only presents an exciting challenge that allows us to accelerate design innovation in the CTV sector but, more importantly, it underscores our industry's commitment to exploring and achieving lower-carbon operations."

Since setting up shop in the 1980s, then called Geraldton Boat Builders, Strategic Marine has come to roll out more than 600 vessels, including small ferries, offshore CTVs, patrol boats and pilot/port vessels. Although the group's Tuas yard has produced newbuilds in steel, its speciality is aluminium boat construction. BMT's drive to develop sustainable solutions, meanwhile, may be familiar to most readers (see, for example, *Ship & Boat International* September/October 2023, pages 14-19). ■



Strategic Marine CEO Chan Eng Yew (left) and Monty Long, global business development director for defence, maritime and security at BMT, pictured at the LTA signing ceremony

FIREFIGHTING VESSELS

FIREFIGHTING DUO ON BUILD FOR MARYLAND

Metal Shark, Louisiana is building two fireboats for Anne Arundel County Fire Department in Maryland. Both are being constructed to the specs of Metal Shark's Defiant NXT monohull pilothouse class, measuring 15.2m x 4.9m and featuring twin inboard diesel waterjet propulsion for a projected top speed of more than 45knots. Each newbuild has a predicted range of 250nm at a more economical cruise speed of 30knots.

Features will include a climate-controlled wheelhouse, with pillarless glass windows for optimal visibility, plus a reverse-raked windshield. Metal Shark says: "A unique window arrangement, with a second tier of side windows below the beltline, provides improved downward-angle visibility" – expected to enhance safety and efficiency when manoeuvring alongside smaller craft or man overboard (MOB) casualties. An overhead skylight will provide unobstructed views when operating alongside large ships or elevated structures.

Each fireboat will deliver a flow rate exceeding 32,100litres per minute, with twin self-priming fire pumps driven via PTO from the main engines. Metal Shark says: "Each pump draws from its own dedicated in-hull sea chest, feeding a central



A render of the Defiant NXT fireboat class that Metal Shark is building for Anne Arundel County

manifold with crossover capability, which in turn supplies the entire system. From the fire control station at the port helm, flow is directed as desired via electronically actuated 8" slow-close valves with manual backup." Each boat will store 416litres of aqueous film-forming foam (AFFF), which is typically mixed with water in a ratio of 3-6% foam concentrate to 97-94% water. ■

TENDERS AND TOYS

HVO APPROVED FOR WILLIAMS' YANMAR SERIES



Williams Jet Tenders is now offering hydrotreated vegetable oil (HVO) as a fuel for all of its Yanmar 4JH engine-powered tenders, including the DieselJet 415, 455, 505 and SOLAS 505 lines. The HVO will be produced

Williams Jet Tenders is now offering UCO HVO as a fuel for its Yamaha 4JH-powered yacht tenders

via used cooking oil (UCO HVO), which produces fewer particulates, and less NOx and SOx, than conventional diesels. Sarah Moore, who was hired as a full-time sustainability specialist at Williams Jet Tenders in 2023, comments: "We hope that by using HVO in our fleet and in our approved test boats, we will raise awareness of the benefits of switching to alternative fuels."

Williams says that this update is one of several sustainability initiatives being undertaken by the company. In October 2023, Williams secured a £13,000 (US\$16,439) grant from Innovate UK EDGE for the testing of alternative, more sustainable composite materials for its tender newbuilds. "Through the life cycle analysis [LCA] of its tenders, the team has identified composites as having the greatest material impact and associated carbon emissions," Williams claims. This project, conducted in partnership with the UK's National Composites Centre, has involved full mechanical testing of panels fashioned from natural fibres, GRP and a hybrid of both. The composites project is due for completion this January. ■



EQUIPMENT

LIFE-SAVING EQUIPMENT

SEA-FIRE AT TARGETS SMALL SPACES

North American marine fire suppression system manufacturers Sea-Fire and Fireaway have teamed up to roll out the new Sea-Fire AT series, developed as an “exceptionally compact” solution for onboard compartments and spaces containing lithium-ion (Li-ion) batteries. Alternatively, the partners say, the Sea-Fire AT can be used to protect areas too small to accommodate traditional fire suppression systems, including constricted engine spaces.

Sea-Fire AT contains a potassium-based aerosol agent that does not produce harmful levels of CO, CO₂ nor NO_x, Sea-Fire says – a fact that has earned the system US Coast Guard (USCG) approval. It also features a detection mechanism that automatically discharges the aerosol agent when ambient temperatures reach fire conditions.

The system is housed inside a double-walled stainless-steel container. “The housing is non-pressurised and sealed with a non-permeable membrane that ruptures upon activation,” Sea-Fire explains. “Upon release, the space is filled with the aerosol that quickly suppresses the fire.” The device can also be activated manually. Sea-Fire adds: “The thermally activated devices have an operating range of 0°C to 54°C, while the manually activated units operate down to -40°C. Both function in a relative humidity environment up to 98% at 35°C.”



Sea-Fire AT could be fitted in compartments containing Li-ion batteries, where traditional fire suppression systems would be too big to install

The Sea-Fire AT range comprises six models, offering between 0.55m³ to 18.18m³ of volume protection. “Additionally, up to four units may be linked together – though only in manual activation mode – providing up to 72.7m³ of volume protection,” Sea-Fire says. Size-wise, the units start at 109mm (l) x 51mm (w) and go up to 329mm (l) x 127mm (w). The systems are also bracket-mountable, to bypass the need for piping and wiring. ■

ENGINES

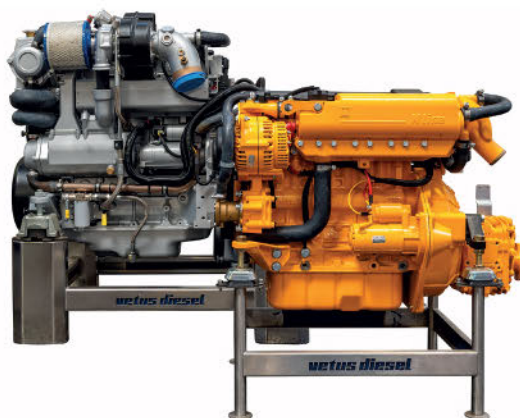
VETUS ENGINE LINES FINE FOR HVO

Marine power solutions provider VETUS has obtained approval to burn HVO in its D-Line and M-Line marine diesel engine series, following the conclusion of bench and field tests. The approval was granted by the engine block suppliers of each series (Deutz for D-Line and Mitsubishi for M-Line) and covers application of pure HVO (EN 15940) and blended diesel/HVO (EN 590), without modification to these engines.

VETUS comments: “The use of renewable fuels such as HVO substantially decreases exhaust emissions by up to 90% in CO₂, CO, hydrocarbons, NO_x and particulate matter. HVO burns more cleanly than first-generation biodiesel or mineral diesel. In addition, due to its good oxidation stability, it is not prone to bacterial growth.” HVO is commonly produced from vegetable oil and used cooking oil, or other lipid sources.

VETUS' D-Line series is primarily aimed at heavy-displacement/semi-displacement and pilot boats, and comprises four models, spanning 122-210hp (approximately 91-157kW) in power output.

Meanwhile, the M-Line family, designed to power smaller sail yachts and canal boats, encompasses 12 different engine models with outputs ranging from 12-52hp (about 9-39kW). ■



VETUS' D-Line and M-Line (pictured) engines can burn both pure HVO and blended diesel/HVO

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The nominees should be undergraduate or postgraduate students whose research has pushed forward the boundaries of knowledge in the Strength/Safety/Reliability/ of Marine Structures and related fields. Nominations are now invited for the 2024 Peter Contraros Award. Individuals may not nominate themselves. The nominated paper should be by an individual describing the research and its potential contribution to improving Strength, Safety or Reliability of Marine Structures.

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A panel of members of RINA will deliberate and the winner will be announced at the Institution's Annual Dinner.

For Queries about the Award contact the Chief Executive at: hq@rina.org.uk

DRONE TECH

SURVEY SOLUTIONS

NEW SIZES FOR SURVEY DRONES

Unique Group reports that it will launch two new USV types, the Uni-Mini and Uni-Max, both of which have been engineered for surveying operations, and tailored to meet "diverse optional needs across challenging environments", the group says.

Built in carbon fibre, the Uni-Mini measures a compact 1.675m x 0.8m and weighs 65kg, suiting it to shallow-water surveys. This model is designed to be operated by two people, and runs on 5,000Wh of electric power – sufficient

The Uni-Mini and Uni-Maxi have been engineered to survey shallow and remote waters respectively



for a speed of 3-5knots and an operational charge of about four hours. The unit can be controlled remotely over Wi-Fi within a distance of 2km, and has the ability to "integrate seamlessly with a wide range of transducers and GPS systems", Unique Group says.

Meanwhile, the 5m x 2.2m Uni-Max incorporates a hybrid power system, integrating twin Torqeedo Cruise 6.0RS engines with a 300litre diesel tank and solar PV cells, for prolonged missions in remote waters. This unit matches a pair of linear low-density polyethylene (LLDPE) hulls to a marine-grade aluminum deck, weighing in at 1,200kg overall, and is capable of speeds of 6-8knots. The Uni-Max can be controlled over wireless mesh radio at a distance of 5-8km.

Sahil Gandhi, CEO of Unique Group, says that the Uni-Mini has already been adopted on projects in the Middle East, where it was used to conduct shallow-water bathymetric surveying.

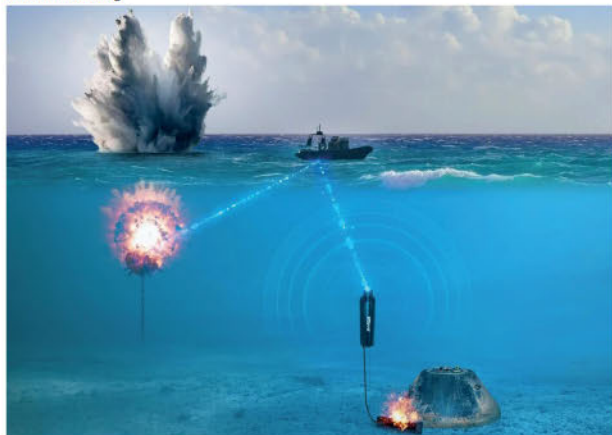
The newcomers join Unique Group's existing 3m x 1.6m Uni-Pact catamaran USV, which was originally developed and launched to assist larger survey vessels in accessing hard-to-reach waters. ■

UXO MANAGEMENT

DETONATION FROM A DISTANCE

French underwater acoustics and robotics firm RTsys has unveiled a wireless remote triggering solution for unexploded ordnance (UXO), intended to replace conventional wired detonation systems. As such, the new solution, SonaBlow, can be deployed at a greater distance from the target, to

SonaBlow can trigger mines/UXO from at least 2km away



shield UXO disposal teams and naval personnel from potential harm.

Developed in collaboration with the French Navy, SonaBlow comprises an underwater firing unit with an acoustic receiver, linked to a topside/shipboard surface communication module (SCM) with a waterproof transducer. The system can be deployed down to 300m and can trigger mines/UXO from up to 2km away, though this distance could be increased to 4-5km if using in conjunction with a positioning and relay beacon (PRB), RTsys says. All acoustic communications between the SCM, firing unit and target are encrypted.

The firing unit can be triggered by a human diver, using a waterproof tablet, or by an ROV/AUV. A single SCM is able to control multiple firing units, which would enable disposal squads to detonate up to 20 naval mines simultaneously, RTsys claims. Consecutive triggering, countdown and clock modes are also available.

The product is currently undergoing qualification with the French Defense Procurement Agency (DGA), and RTsys intends to commercially produce the system towards the end of 2024. ■

INSPECTION AND SURVEILLANCE

COMPACT R7 ENTERS THE FRAY

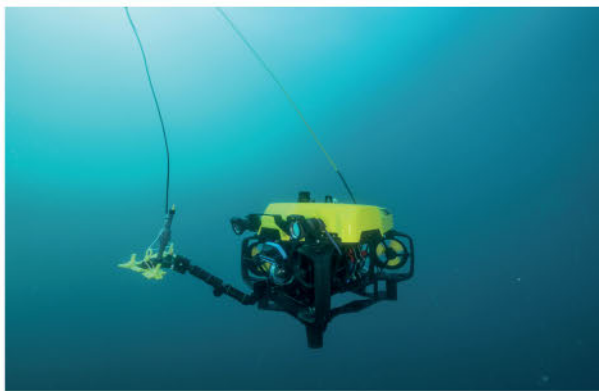
Exail, the company formed in 2022 from a team-up between ECA Group and iXblue, has unveiled its new ROV, the R7, which has been developed for police, naval, customs agency and coast guard support. The unit is reportedly capable of tasks ranging from search and rescue, port/harbour surveillance and diver assistance to UXO identification and pollution management.

The compact bot measures 780mm in length, 551mm in width and 424mm in height, and weighs 32kg – making it “easy to transport and deploy by a team of just two people”, comments Philippe Roumegue, Exail sales director. The ROV can be deployed directly from land or from a small craft. Each R7 comes with an electric powerpack, a 327m-long umbilical cable and a control unit – the latter featuring a mobile console that displays data captured by the R7 and its sensors. The ROV incorporates four vectored horizontal thrusters and three vertical thrusters for

optimal manoeuvrability in three axes, even when up against strong currents, Exail says. The unit has been designed to operate at depths in excess of 300m, and with a forward speed of 3knots in 0knots current.

The R7 also comes equipped with full HD cameras with 4x zoom, enabling it to capture high-quality imagery in low-light (or high-turbidity) conditions, which it then streams to shore in real time. The unit's optronic sensors are supported by two LED projectors, each rated 5,000lumens, for the same purpose. Exail adds: “In underwater environments with low visibility, sonar remains the reference sensor. The R7 can be equipped with imaging sonars, navigation sonars, and side-scan sonars.” The drone can also be fitted with a multifunctional arm, for underwater object manipulation, plus a doppler velocity log, for enhanced precision of movement.

All ROV and sensor data is displayed on a pair of 15” touch screens with anti-glare properties, and the vehicle itself is controlled via a multifunction joystick. Roumegue claims that an operator can achieve “perfect efficiency” of R7 control after two days of training. “Tests have shown that the R7 is incredibly stable on all axes: it can manoeuvre through narrow openings to enter a wreck, or orient itself nose-up to inspect a hull.” The motors are coupled to an attitude and heading reference system for accurate pitch and roll control, and the ROV control system features self-diagnostic functionality. ■



Exail's R7 is designed to slip through narrow openings, and for stability on all axes

IN BRIEF

SEA-KIT sale complete

Fugro reports that it has completed full acquisition of USV developer and frequent project partner SEA-KIT International. SEA-KIT will now work with Fugro on the development of low-carbon emissions solutions, including the launch of the next-gen Blue Eclipse 18m USV, which has been conceived for fast pipeline and deepwater asset inspection activities, as well as a hydrogen-powered USV.

SRV-8 for Canada

The Canadian Department of National Defence has purchased an Oceanbotics SRV-8 underwater ROV. Rated for a depth of 305m, the SRV-8 is piloted remotely using an X-Box controller, and is designed to be deployed within three minutes, Oceanbotics says. Features include an imaging sonar, doppler velocity log, SubNav OS software, and a USBL system supplied by Applied Acoustics Technologies.

DeepTech expands

ROV pool operator DeepTech has purchased three Triton XLS ROVs, bringing its total number of uncrewed vessels to 26. The Triton trio is rated for depths ascending to 3,000m, and will reportedly enable DeepTech to expand its activities in the Eastern Mediterranean. The company is also building two more MiniSpector units, bringing its tally of these mini-ROVs from eight to 10.



SAFETY

CONNECTED TO THE MOB

Exposure Marine's OLAS N2K solution uses a 'wireless kill cord' to cut off the boat's engine in the event of a man overboard incident, in a bid to speed up casualty detection and recovery times



Exposure Marine's wearable OLAS tags pinpoint the current position of each person on board, creating an alert should one fall overboard

The UK Marine Accident Investigation Branch (MAIB) recorded 308 man overboard (MOB) incidents between 2015 and 2023, 40% of which resulted in a fatality. While MOB recovery may look simple on paper, the odds can quickly turn against rescue efforts – especially when weather and wave conditions are harsh, and/or the casualty succumbs to panic, exhaustion, cold shock or hypothermia.

In all the turmoil of an MOB incident, with multiple crew members joining in the rescue effort, there is also a possibility of loss of vessel control. Similarly, the further the vessel moves away from the point of the incident, the more challenging it becomes to pull off a successful and timely rescue. The ideal situation would be for the vessel to safely stop and attend to the MOB casualty as soon as the incident occurs – though, again, that scenario is a lot easier in theory than in practice.

The OLAS N2K hub is connected to the vessel's chart plotter and onboard power supply via NMEA 2000

However, Exposure Marine is hoping to address these incidents with the launch of its new Overboard Location Alert System (OLAS) N2K alert and smart protection hub, developed to immediately alert the skipper should a person fall overboard. Not only that, the technology is designed to respond to a MOB incident by automatically locking the boat's engine(s)/ outboard(s) to bring the vessel to a swift halt, similar to a wireless version of a kill switch.

Tag network

Exposure Marine says that the solution should prove particularly beneficial for crew working on foredecks and aft platforms, where a MOB incident can easily go undetected, especially when personnel are working in the dark, or at the end of a deck loaded with containers, winches and cranes. The OLAS N2K MOB is intended for use on recreational and commercial vessels sized up to 38m, which would include a significant cache of fishing vessels – identified by the MAIB as the boat type with the highest rate of MOB fatalities in the UK.

The Bluetooth-enabled OLAS N2K hub is connected to the vessel's chart plotter and onboard power supply via the NMEA 2000 network. In turn, all crew members wear OLAS transmitters (or 'tags') marking their current onboard positions. An alert is sounded should anyone wearing a tag fall overboard, comprising a loud internal alarm and emergency light.

Tom Harrop, director of marine product and business development at Exposure Marine, tells *Ship & Boat International*: "Upon the activation of an alert caused by a tag falling overboard or moving out of range of the OLAS N2K, a relay is engaged. This relay can initiate the activation of a kill cord system or, in the case of diesel vessels, activate the solenoid, effectively halting the engine." Crew who are still on the boat can unlock the engine again after seven seconds.



"The OLAS N2K is compatible with most chart plotters that accept and display the AIS Safety Broadcast [PGN 129802]," Harrop continues. "This alert emulates the message that is received from an AIS SART device. It includes the GPS location of the boat exactly when the alert was triggered, enabling the chart plotter to set the MOB location."

Locking the engine

For boats running on petrol outboards, the OLAS Smart Lock feature, connected to the engine's cut-off system, prevents the engine from being started – thus doubling up as an anti-theft device. It also enables tag-wearing crew (or crew using the OLAS mobile app) to wirelessly lock the engine when disembarking onto the pontoon. "On arrival back at the boat, the OLAS N2K hub automatically recognises the 'smart key' unlocking the Smart Lock, so the engine is ready for use," says Harrop. "The OLAS mobile app also enables the system to be unlocked using a custom access PIN code."

There is flexibility to tailor the system: to ensure, for instance, that the tags only trigger the alarm and not the engine cut-off, Harrop explains. "Using the mobile application, each individual tag can be paused, enabling crew members to leave the vessel without activating the alarm," he adds.

Adjustable system

Other features have been factored in to avoid false alarms. "Adjusting alert timing is possible, extending it from two seconds up to 15 seconds," Harrop continues. "This provides additional time for a tag to disconnect and reconnect without setting off the alarm, making it suitable for larger, more intricate vessels and operations." Extender units can also be placed in areas of the ship, for expanded onboard coverage.

A crew member doesn't even need to fall over the side of the boat for the system to send an alert. The OLAS N2K hub's Helm Tag firmware enables users to set up an OLAS transmitter as a dedicated driver tag, via the OLAS mobile app. Primarily aimed at powerboats of up to about 9m in length, this function enables users to calibrate the distance the tag can travel before the engine cuts off.

In this way, the engine can be configured to stop should the coxswain fall over inboard on the vessel (either from a trip or slip, or as a result of blacking out) or move too far from the helm position.

As a guide price, the OLAS N2K system costs about £280 (US\$364) excluding taxes – a price point that Exposure Marine describes as being "less than a couple of modern lifejackets". **SBI**



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GREEN PROPULSION

CLEAN, GREEN...DIESEL?

For many workboat operators, the proposed alternatives to marine diesel usually involve technologies they cannot use today – but M&H Engines tells Stevie Knight that direct air capture technology could help vessel operators to decarbonise with minimal disruption

The world's smaller vessels, such as workboats and the like, are going to have an issue with utilising the current crop of alternative, carbon-neutral fuels. However, there is an answer, says Barry McCooey, managing director at M&H Engines.

"I've got a good customer base, ranging from single boat operators and family fishing vessels through to Thames Clippers and Svitzer Tugs," says McCooey. "For workboat operators like these, the proposed alternatives like hydrogen, ammonia and methanol usually involve technologies that they can't use today. To be frank, they just cannot see how they're going to fit them into their vessels."

These are valid concerns: most of the new fuel systems are hefty; almost all require specialised containment kit; and many demand safety zones completely separated from crew or passenger areas. As McCooey notes, working around these constraints usually tends to make vessels heavier, pulling efficiency – along with the carbon count – in the wrong direction.

'Synthetic diesel'

There has already been one drop-in that's gained attention: hydrotreated vegetable oil (HVO). Unlike the earlier fatty acid methyl esters (FAME)-related biofuels, HVO is stable – and, it has been claimed, could reduce CO₂ by 90%. Still, there's a mixed picture for NO_x and particulate matter (PM), plus a backlash followed when it became clear there might be sustainability issues around both feedstock and embedded supply chain emissions.

However, there's another, largely unheeded alternative that could work. Put air-captured carbon through the requisite washing process and into an aqueous solution, then electrolyse it, utilising a green energy source to drive the necessary chemical reaction, and you get a string of interlinked 14 hydrogen and 16 carbon atoms.

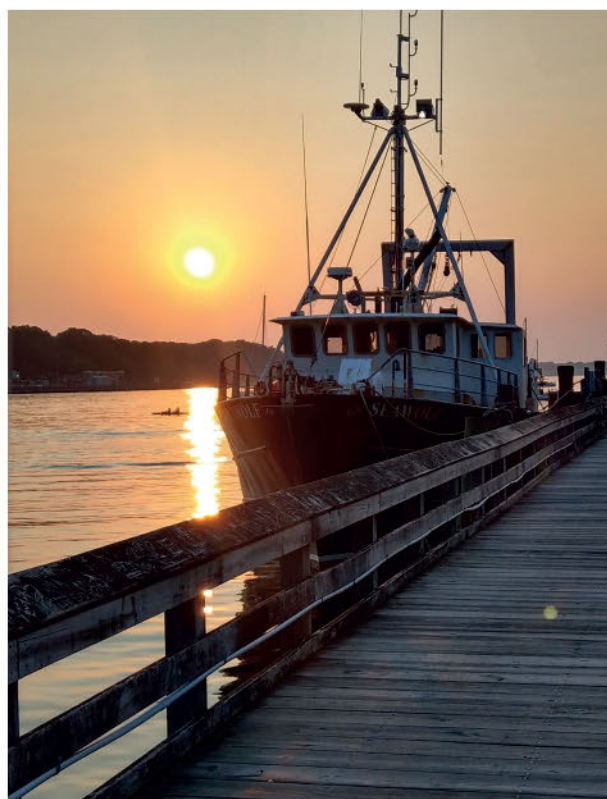
It's been named C14-C16...but you could also call it 'synthetic diesel'. In fact, "what comes out is something that is pretty much indistinguishable from diesel while burning cleaner and just a bit hotter", McCooey explains, adding: "It stores extremely well. It's stable, it's safe, and 99.9% of the marine world understands

how to fill a diesel vessel." So, M&H and partner Carbon Neutral Petrol (CNP) may well have a ready market.

Scaling up

Although this new fuel doesn't have any of the nasties that can be found in common diesel, and its carbon and hydrogen atoms will be net-neutral given a green energy source, it stands to have a few more NO_x particulates as a side effect of that slightly hotter burn – though McCooey points out that can be equally true of ultra-clean fuels like hydrogen, also created by a higher combustion temperature.

Still, it requires a good engine platform and an effective aftertreatment system (EATS), which leads the discussion to M&H's more direct OEM offering. The company offers a family of engine platforms, ranging from 55kW to 667kW, all equipped with a self-contained, fully automated EATS. This combination packs a lot of kit inside a fairly small footprint: a high-pressure fuel injection and lean-burn operation are partnered with recirculated thermal energy and chemistries. In short, it gets the best out of the



Uncertainty over future alt-fuels could bring the sun down on smaller workboat operations – but direct air capture tech might provide a fix (image: SueChem/Pixabay)



An M&H test engine, running on C14-C16: the company's engines range from 55-667kW (image: M&H Engines)

EATS which deals with particulates along with other emissions. "In fact, we could actually meet a lot of the UK government targets and still run on fossil fuels," says McCooley.

That's a 'lot' of the targets, but not all – the carbon content requires a net-zero approach. However, verified results for M&H marine engines running EN590 Diesel show that NOx is lowered by 99.79%, PM by 99.81% and CO by 99.78%.

Despite that, creating C14-C16 is an energy-intensive process. For every joule of energy in the fuel, it uses two joules to produce, "so it takes twice as much power as you get out at the end", McCooley admits. Certainly, production could be more efficient: "We are still making extremely small quantities; however, we have a road map for reducing energy through scaling up," he says, "but we do need a wind farm connection to provide the green electricity. If we had a 2MW wind turbine, and we got 1MW out of it, we could produce a tonne of zero-carbon fuel a day."

Transitional technology

Some claim the price of direct air capture (DAC) carbon is currently unfeasible and that, if it can't gain investment, it might not scale up enough to be useful: one commentator estimates costs of somewhere between US\$600-1,000 per tonne of CO₂, saying that that it needs to drop to below US\$200 per tonne by 2050. But this isn't the most appropriate calculation, as it includes both complete carbon removal and 'forever' storage – which is not what M&H and CNP are aiming at.

Instead, they are focused on providing a net-neutral carbon cycle, but, according to McCooley, there have been roadblocks. "The industry is being told to move away from 'dirty, polluting' diesel engines", he says, commenting that many fail to understand there could be an alternative that won't demand an unfeasibly large jump for those at the smaller end of this commercial segment.

Interestingly, Chara Georgopoulou, head of maritime R&D and advisory, Greece at class society DNV, is very much in favour of "exactly this kind of transitional technology" to help achieve a fully zero-carbon target. She says: "As engineers, we can see that a number of approaches will be needed to solve the decarbonisation puzzle" – especially given the variety of different stakeholders engaged in any operation.

Despite this, there's "a big issue" that's proving difficult to address, Georgopoulou says. "These alternative recycled carbon fuels that the EU is proposing – first of all, they're not available yet," she points out. "And when they are...they will be extremely expensive – who is going to take it first? Is it aviation? Is it land-based transport?" Further, even if the marine industry gets a slice, it'll be the big power players rather than smaller businesses. For most operators, the reality will likely be "uncertainty about availability, uncertainty about prices and uncertainty about who is going to carry the extra costs", she underlines.

Portside collaboration

Therefore, it's back to M&H and partners. How do they believe their supply chain would stand up to these pressures?

In contrast to securing a source on the open market, McCooley outlines how the proposed operation could allow a local, scalable approach as there are some places notable for their energy resource – even if it's largely overlooked. "Most docks and ports are fairly windy; I've found there's always a draft coming from one direction or the other," he says. "So, let's start producing at the quayside – from carbon capture to fuel."

Needless to say, success will rest on collaboration. "We are looking for partnerships with operators as we need this to support the investment to get the production plant built," McCooley explains. As that's an expensive business, "we have to know that there is a long-term market demand for the fuel", he points out. McCooley is also forging links with the Workboat Association, among others, as there will be a need for some kind of third-party oversight, and possibly certification, to make sure the venture is functioning as it should: after all, this initiative needs to be taken seriously to gain traction.

There is also a need for port involvement. Initially, the partners are looking at creating a facility housed in four 40ft ISO containers, and with a suitably sized tank, plus access to a wind turbine or other green energy feed. It's a demanding path, but as DNV's Georgopoulou concludes: "Whenever there is a challenge, there are also opportunities for new endeavours, for technology improvements and upscaling." This venture could prove a win for those willing to throw their hat into the ring.

The idea is that once the demand for this corner of the industry has been met, it will be possible to grow this facility to support other segments – and McCooley is putting out a clear call for innovatively minded ports to get involved – which would also open the door to a carbon-neutral supply chain. He adds: "We are here to work with everyone and welcome them getting in touch." **SBI**



ROVS AND AUVS

A SHIFT IN PERCEPTION

Increased use of augmented and virtual reality, headsets and even ChatGPT may be on the cards for tomorrow's uncrewed vessel ops, the new VideoRay Labs business predicts

VideoRay is anticipating a major shake-up of its ROV inspection offerings, following the group's acquisition of Blue Ring Imaging, a Florida-based producer of 3D visualisation and photorealistic marine environment simulations for uncrewed marine systems. VideoRay will now incorporate Blue Ring's products into its 0.7m x 0.4m Mission Specialist Defender ROV, with the goal of eliminating the need for experienced operators – thereby, making it easier for ground crew to familiarise themselves with the ROV's workings without the need for extensive training, thus saving time and money.

The recent acquisition has also led to the formation of VideoRay Labs, a business unit that will focus on tech developments related to perception, man-machine teaming and autonomy. Casey Sapp, new VideoRay VP of strategy and emerging technology (and Blue Ring CEO), says: "VideoRay Labs will be collaborating with customers on applied research projects and developing emerging technology solutions that any ROV, USV or AUV customer could apply."

Blue Ring's products include its OctoView graphical user interface (GUI) software – which offers mixed reality (for example, VR and AR) views and overlays – and its OctoCAM multi-view 360° camera. OctoView has inbuilt AI assistance, enabling users to control an uncrewed vessel/vehicle with eye tracking, gesture and voice. A future release of the OctoView software will also incorporate ChatGPT, Blue Ring says. The OctoCAM, meanwhile, is expected to enhance the Mission Specialist Defender's operations by enabling its remote pilot to see all around the ROV, as well as above and below. Sapp tells *Ship & Boat International*: "Moreover, the camera will also provide macro-stereoscopy to enable seeing 3D depths at close ranges where manipulators do all of their work."

Manipulator tests

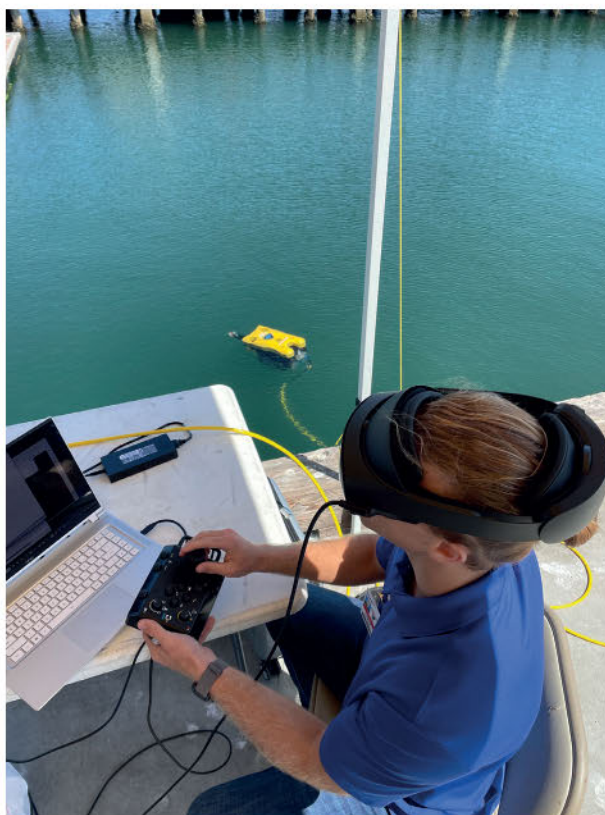
Sapp adds that Blue Ring created a white paper in cooperation with the Monterey Bay Aquarium Research Institute, following a series of tests in which the OctoCAM was used in conjunction with manipulator grabbing and cutting tasks. Manipulators are becoming more common among survey/inspection bots, which can use them for tasks including cutting fish farm nets, opening/closing valves, disconnecting cables, welding pipelines and cleaning underwater equipment.

Headsets will become more integral to ROV operations within five to 10 years, Sapp predicts

The OctoCAM then streamed visual information from the work zone into the end user's headset. The tests found that the time taken to complete each task was "cut in half" for both new and experienced users. "This means a large commercial ROV services company could potentially save hundreds of millions of dollars," Sapp claims.

He continues: "When it comes to using manipulators to defuse bombs and conduct surveys and inspections, a monocular camera does not enable the operator to understand distance, so pilots tend to run into things and not know how to triangulate where the arm positions. With a multi-view, 360° camera, users can swoop in and perform these tasks with much more intuition and speed."

The ability to see through the headset is crucial, Sapp explains, "because things are moving from tablets and mobile phones to headsets over the next five to 10 years". He continues: "The value includes the ability to connect different people in teams, the 3D information and mixed reality overlays. It is important to note that



The 360° OctoCAM enables the remote pilot to see all around, above and below the ROV

headsets give a sense of presence and embodiment where you feel like you are the vehicle, not just controlling the vehicle – which is important when doing complicated tasks.”

Man-machine teaming

Sapp opines that the future of uncrewed systems will inevitably involve man-machine teaming: essentially the act of placing a human in the loop to perform manual tasks while the other autonomy-enabled processes take place. He describes this as “a handoff between what the robot can do on its own and what the human has to do”.

So, for example, Sapp highlights: “The headset accentuates and amplifies the operator’s ability to do manual work when he has to take over. Over time, there is more autonomy taking place, but there are critical times when the operator needs to be in the loop.

“For example, you can set a waypoint for a robot to go from point A to point B, and an operator doesn’t need to control the ROV. However, when he gets to a pier and has to thread through it to do a survey



or inspection, the ROV is not capable of doing that autonomously. That’s when a human takes over.

“In that example, tether management is a big issue. People will go under a pier or a piling: they don’t know which way they went in, they don’t know how to get out, their cable gets wrapped up in the piling and they can’t see behind them. So, the Blue Link technology lets them see completely 360° in all directions, and they are able to see physically through both the camera and synthetic information how to get in and out.” **SBI**



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LAUNCH AND DELIVERY

MOVERS AND SHAKERS

The launch of the Goal Zero Consortium's all-electric Hydromover is hoped to be the first of many such vessels to remove diesel propulsion from Singapore's harbour craft fleet

Late November 2023 saw the launch of the 18.5m Hydromover, hailed as Singapore's first fully electric cargo vessel concept – and possibly the blueprint for numerous further electric craft in the city state's waters, in line with the Maritime & Port Authority's (MPA's) drive for a complete transition to battery, biofuel and/or hydrogen power for all harbour vessels by 2030.

The Hydromover was produced by Singapore's Goal Zero Consortium, comprising: SeaTech Solutions, which provided the vessel's design; boatbuilder/workboat operator Lita Ocean, which handled construction duties; RINA Hong Kong, which provided classification; Shift Clean Energy, which managed the battery tech; and renewable energy specialist Yinson GreenTech (YGT), which led the project and arranged the onboard systems.

The aluminium-built vessel will serve as a "living lab" for the future roll-out of zero-emission vessels. For instance, Lita Ocean, DM Sea Logistics, OPL Services, RW Marine Service and Tian San Shipping will put the

Hydromover through its paces in sea trials, with the longer-term aim of converting their fleets to electric power. The consortium has also received support from the Technology Centre for Offshore and Marine, Singapore (TCOMS) and the Singapore Institute of Technology (SIT), both of which are currently working on a digital twin of the vessel type, to enable further, in-depth research related to factors such as vessel hydrodynamics, propulsion options and optimisation of battery performance and safety.

Swappable batteries

Featuring a catamaran hull for reduced drag, 60m² of cargo deck space and the capacity to carry up to 25 tonnes of cargo in a single trip, the Hydromover is equipped with solar panels, and utilises interoperable swappable batteries as an alternative to reliance on a shore-based charging station. MPA CEO Eng Dig Teo explains: "Using batteries that can be swapped out within minutes, the Hydromover can minimise its operational downtime and spend more time serving the needs of port users. With less downtime, electric harbour craft can be more

The Hydromover is powered by swappable batteries and electric motors



productive...a smaller fleet can do the work of several conventional harbour craft."

The swappable batteries are provided through Shift Clean Energy's pay-as-you-go Pwr-Swäp service, which has been designed to eliminate the upfront costs (and additional vessel weight) that would be incurred by installing complete electric powertrains. "Pwr-Swäp's stations provide fresh energy within minutes, where and when you need it," the company states.

Emissions savings

When it comes to energy efficiency and maintenance costs, the Hydromover could achieve up to 50% cost savings, the consortium predicts. Additionally, Shift Clean Energy CEO Brent Perry forecasts that, by adopting batteries over diesel, the Hydromover would prevent approximately 752tonnes of greenhouse gas emissions from polluting the atmosphere.

The vessel is equipped with two 235kW electric motors, plus azimuth thrusters for enhanced manoeuvrability in fairly congested waters. The Hydromover has also been fitted with two electric fire pumps and 10 electric bilge pumps. The bridge, meanwhile, features a single-screen vessel operating system relaying real-time data to the crew, and the vessel uses autonomous systems to enable advanced decision-making in areas such as

TECHNICAL PARTICULARS

Hydromover

Length.....	18.5m
Breadth.....	8m
Draught (full load).....	1.6m
Lightweight.....	37tonnes
Displacement (max).....	62tonnes
Service speed.....	8-10knots
Max speed.....	12knots
Range.....	>40nm (at half load)
Crew.....	4
Passengers.....	>38
Classification society.....	RINA

energy optimisation, collision avoidance, berthing boundaries and waypoint calculation, as added bulwarks against human error.

Eirik Barclay, CEO of YGT, remarks that the consortium has also received enquiries from operators in Indonesia, who may use the Hydromover concept as a blueprint for electrified cargo craft and fishing vessels. At the time of writing, the prototype of a companion electric vessel for Singapore, dubbed the Hydroglyder, was reportedly undergoing sea trials. **SBI**



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PATROL AND RESCUE BOATS

PATROL BOAT ROLL-OUT GAINS PACE

Ship & Boat International rounds up some of the high-profile patrol and rescue boat contracts agreed in recent months, including a notable foray into electric propulsion



Viking Norsafe will deliver 31 Munin S1200 boats and three Metis 750 RIBs to the Hellenic Coastguard up until June 2025

The Hellenic Coastguard is beefing up its fleet with a substantial influx of new patrol boats, courtesy of a mammoth order placed with Viking Norsafe Life-Saving Equipment. The boats will be delivered between February this year and June 2025 via three separate contracts with Viking Norsafe, covering a total of 31 patrol boats and three high-speed RIBs. The orders were placed as part of an EU-supported Hellenic Coastguard procurement programme, initiated four years ago.

The 31 patrol boats are spread across two contracts: one co-funded by the Greek Operational Programme for Fisheries, covering 10 vessels; and the second co-funded by the country's Internal Security Fund (ISF), covering 21 vessels to undertake border controls. "In this case, one boat is also being co-funded by the Ionian Islands Regional Operational Programme," Viking Norsafe says.

The company tells *Ship & Boat International*: "All 31 patrol boats are based on the Munin S1200 model." While the vessels in this class are typically 12m in length, those supplied to the Hellenic Coastguard will measure 11.3m. "The difference in dimensions is minimal and has to do with the fender dimensions rather than the hull itself," Viking Norsafe continues. "All of them feature twin inboard diesel engines and stern drive propellers, to support a service speed of 35knots and a top speed of 50 knots." Each boat will carry 12 operatives.

The third contract, which was also co-funded by the ISF, will see Viking Norsafe supply the Hellenic Coastguard with three high-speed Metis 750-class RIBs, to be utilised for rapid patrol and rescue missions. Each RIB features a length of 7.5m and can carry up to five operatives. The powertrain for each of the trio comprises twin 200hp (149kW) Mercury outboards, enabling service speeds of 35knots, increasing to a potential 45knots.

These most recent orders have helped Viking Norsafe to consolidate a foothold in the Greek patrol and rescue market: the group previously delivered four Munin S1200 boats to the Hellenic Army Special Forces, as well as eight ambulance boats to the Hellenic Coastguard and 11 Metis RIBs to the Hellenic Navy.

Customs clearance

Meanwhile, Thailand's Customs Department has taken delivery of a new monohull patrol vessel, built domestically by Seacrest Marine, which oversees a facility in Thai Ban. The 20.5m x 5.5m, six-crew *Customs Boat 523* will operate off the coast of Thailand at speeds of up to 35-37knots, drawing on two MTU 10V2000 M96L engines, rated a combined 2,386kW at 2,450rpm. The engines will drive twin propellers. More typically, though, the vessel will operate at a service speed of 20knots.

Designed by Incat Crowther, *Customs Boat 523*'s features include a depth of 3.1m and a draught of 0.85m. "The design of the vessel has been tailored to the Customs Department's operations, with a low draught allowing for operation in shallow coastal waters," Incat Crowther comments. The aluminium-built vessel has a relatively large wheelhouse on the main deck, designed to optimise the crew's lines of sight, and deploys searchlights, sidelights and floodlights for all-round visibility during night-time and low-vis operations. The hull deck also features a galley and overnight accommodation for three crew on rotation.

Tank capacities include 4,680litres of fuel oil, 479litres of fresh water and 365litres of sullage, and the boat has a claimed cruising range of 300nm. *Customs Boat 523* will sail under the Thai flag and has been accorded Lloyd's Register's SSC Patrol G3 class notation. Prior to this order, Seacrest and Incat Crowther had jointly produced six vessels for government agencies in Thailand, namely the Customs Department and the Thai Police Department.

Electric patrols

Patrol and rescue vessels have been relatively slow on the uptake of electric propulsion systems, which is understandable: unlike ferries on fixed coastal routes,



The 20.5m *Customs Boat 523* has a cruising range of 300nm

patrol boats need the guarantee of a certain level of speed and range, especially when undertaking surveillance and interception duties, as well as casualty recovery missions, that take them far from shore – something that today's e-propulsion cannot always provide.

Not that this has ruled out electrification of patrol boats. For example, Washington, US-based boatbuilder SAFE Boats International recently announced that is collaborating with Vita Power to put an all-electric patrol craft on the water in the next 12 months. "The first objective of this partnership was to develop a 100% electric patrol boat that is a first-class solution and is both reliable and practical," SAFE Boats comments.

The proposed solution would adapt SAFE Boats' established 23' Center Console design for use with Vita Power's V300 electric motor (rated 300hp, or 224kW) and battery package. This modified boat would then be known as the 223e. As with the previous model, the electric boat would measure 7m x 2.6m and feature a V-shaped hull and 25° deadrise, for optimal stability.

Lakes and harbours

There is an element of compromise: the 223e's primary focus is on range, making the boat better suited to responders operating at low speeds for longer hours. Potential examples include the teams responsible for lake patrols, as well as harbour masters, or indeed anybody operating in sensitive waters, where gruelling offshore work and constant pursuits are not necessary.

SAFE Boats explains: "Performance calculations with the 300hp electric motor predicts the 223e will maintain an operational battery life of 10 hours at 5knots, and one hour at cruise speed." However, the boat will be able to move fast enough when the crew needs it to, with the capability to attain a sprint speed of 34knots. The group adds: "Initial calculations predict the 223e will run at 28knots continuously for 37

minutes and over an hour at lower planing speeds. At 5knots, the range significantly increases to provide battery life for a full eight-hour work shift."

Vita Power's sister company happens to be Aqua superPower, producer of fast chargers for battery-powered boats (see, for example, *Ship & Boat International* September/October 2022, page 13). SAFE Boats and Vita Power have calculated that, when using an Aqua superPower charger, the 223e should be able to recharge its batteries within one hour, and possibly even sooner. "Compared to an outboard-powered engine, the 223e is expected to save thousands in annual fuel and maintenance costs," SAFE Boats predicts, adding that the reduced noise signature will also benefit the crew in conducting discreet surveillance work without alerting targets – and while protecting sensitive ecosystems from the effects of underwater radiated noise.

The 223e is now available for orders, and deliveries of the first units are expected to commence in late 2024. Clive Johnson, Vita Power CEO, comments: "The Vita propulsion system is designed to offer a complete electrification solution for a broad range of marine applications from commercial vessels to superyacht tenders. With local and state government bodies offering increasing support for businesses wanting to decarbonise their operations, the US and organisations like SAFE Boats are paving the way to a clean marine future." **SBI**



SAFE Boats will commence deliveries of its electric patrol boat, the 223e, in late 2024



#SAFERSAR AIMS FOR A GLOBAL OVERVIEW

An initiative launched by the International Maritime Rescue Federation aims to address the current lack of a global info-hub for maritime search and rescue (SAR) incident data – a system that could impart valuable learnings to the international SAR community

Maritime search and rescue (SAR) processes have evolved significantly in recent years, boosted in part by cutting-edge technologies such as AI and object recognition software. However, and perhaps surprisingly so to many, the task of sorting and storing global SAR incident response data in one central hub has proven more vexing.

As Caroline Jupe, CEO of NGO the International Maritime Rescue Federation (IMRF), highlights: "All leading marine accident investigation branches, like the UK's Marine Accident Investigation Branch [MAIB] or Germany's Bureau of Maritime Casualty Investigation [BSU], as well as SAR organisations and government bodies, analyse and publish reports on maritime SAR incidents and lessons learnt." However, she adds: "There is no global system that collates this SAR incidence data, analyses it for trends, patterns or particular safety concerns, and then disseminates these findings more widely."

The IMRF now intends to plug this gap with the launch of its #SaferSAR initiative, which aims to enable global SAR organisations to better collect, analyse and share data on SAR incidents and accidents on a globally accessible platform, and to use these findings to inform future maritime SAR missions and develop best practices. Putting this data into an international context is important for the IMRF, given that its membership comprises nearly 130 SAR organisations spread across more than 50 countries. In late 2023, it was announced that the 12-month initiative had received funding from the Lloyd's Register Foundation, giving the project a prestigious and welcome pump.

Obstacles to info

One question may be: why has it previously been so difficult to obtain truly global SAR incidence data? Jaakko Heikkilä, IMRF international programme manager, tells *Ship & Boat International* that the barriers to this information are varied and complex.

For example, he says, the maritime SAR sector currently lacks standardised reporting structures. "There is no unified global SAR incidence reporting structure: instead, different countries may have varied protocols and standards for data collection and analysis, making it challenging to aggregate and compare data on a global scale," Heikkilä explains. "SAR is a global effort,"

he continues. "The diversity in languages and cultural practices can present challenges in the sharing of SAR data on a global platform."

There is also the issue of confidentiality. "Some countries might be hesitant to share data due to data confidentiality issues. Also, issues related to data privacy laws, intellectual property rights and jurisdictional boundaries may create obstacles," he says.

Finally, there is the hurdle of resource constraints. Heikkilä says: "A key question the #SaferSAR programme is looking at is how the data/information will be shared with the global system. In the end, it is unlikely to be fully automatic. Finding the resources and smooth practices for such sharing may prove challenging." As well as fostering "a culture of openness and collaboration," he adds, #SaferSAR will need to provide support to those countries with fewer resources for this project to be successful.

"An ideal database would need to be online, with access and data submission being as freely available as possible for the benefit of all SAR organisations and the wider maritime sector," says Heikkilä. "Communication remains one of maritime SAR's core strengths, with SAR personnel and organisations working together harmoniously for the benefit of those they look to protect. In the same manner, we hope any potential database like this is a truly collaborative effort."

Knowledge transferral

While it's still early days for the initiative, Heikkilä says that the realisation of a global database could result in a vital trickle-down transferral of SAR knowledge. "If the programme can be proven successful in high-density traffic areas such as Europe and North America, it can already be used to derive many valuable results," he says. "But we are interested in finding information that can be used to improve SAR globally, in particular in less mature SAR services, as these services often lack in-house risk assessment capabilities."

Jupe adds: "By sharing data and experiences more effectively, global SAR organisations can develop greater understanding and safer operations to drive that principle. This way, the global community can also assist organisations that do not yet have the adequate

"We can gain insight on how vessel designs impact SAR"



The #SaferSAR initiative aims to develop a global hub for SAR incident data

resources to collect such information themselves, by providing information on identified safety risks."

In theory, Heikkilä says, the global SAR knowledge portal may even benefit some naval architects, helping them to determine suitable sizes, capabilities and equipment itineraries for rescue boats ordered by SAR agencies in particular countries. However, he adds: "Although weather and coastline conditions vary in different parts of the world, much of the rescue operations themselves, and the risks associated with them, are fundamentally similar. Through sharing information on incidents and accidents, but also through sharing best practices, we can gain insight on how vessel designs impact SAR operations and potentially what improvements could be made."

The current phase of #SaferSAR will run until September 2024. "By then, we should have answers as to whether building a system is possible and feasible, and what the main components of the system should look like," Heikkilä says, adding that the IMRF aims to develop some small-scale pilot systems this year, which would at least give the federation and its members the ability to conduct 'dry runs' of the platform and how it would work. "After that, pending funding, would be the time to build the operational system," he says. [SBI](#)

Interested parties can share their views with the IMRF via a baseline survey, located online at:

www.surveymonkey.com/r/saferSAR



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MARITIME INNOVATION AWARD

To enable the sustainable growth of maritime industries, innovation is paramount. RINA in association with QinetiQ are launching the 2024 Maritime Innovation Award. The award will distinguish an individual, company, or organisation, whose research has pushed forward the boundaries of design, construction, or operation of vessels, particularly in the areas of: Hydrodynamics, propulsion, structures, or materials.

HOW TO PARTICIPATE?

Nominations may be made by any member of the global maritime community. Individuals may not nominate themselves, although employees may nominate their company/ organisation. Nominations should include a 750 word summary, describing the research and its potential contribution to improving the design, construction and operation of maritime vessels and structures.

Nominations are open until the 31 January 2024.

Online at: <https://rina.org.uk/about-rina/medals-prizes-awards/maritime-innovation-award/>

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A panel of members of RINA and QinetiQ will deliberate and the winner will be announced at the Institution's Annual Dinner. For Queries about the Award contact the Chief Executive at: hq@rina.org.uk



OFFSHORE SUPPORT

HERE FOR THE LONG HAUL

Recent project delays and cancellations in the US offshore wind sector have prompted some disquiet and uncertainty in the market. However, St Johns Shipbuilding of Florida believes that dedicated wind farm CTVs are here to stay, and still in high demand



Florida's St Johns Shipbuilding sees a strong future for CTVs in the US offshore wind sector, including the three vessels under construction for WINDEA Offshore(class pictured)

Having gone through its first, exciting growth spurt, the US offshore wind sector has hit its next step – the 'challenge phase', perhaps – where the country's ambitions for clean, renewable energy come up against harsh market realities.

For example, the second half of 2023 featured frequent news reports confirming delays to some of the leading American offshore wind projects. In August, Vineyard Wind, developer of the US' first commercial-scale offshore wind farm, announced that it was delaying its project off Massachusetts by a year, citing permit delays and supply chain disruptions. This was followed, in late October, by Orsted's decision to halt development of its Ocean Wind 1 and 2 projects – a move blamed, again, on supply chain delays.

Last year also saw the New York State Energy Research and Development Authority (NYSERDA) warn that project delays could railroad the state's attempt to establish 9GW of offshore wind power in its waters by 2035, as well as potentially increasing the cost of such projects – with the ratepayer picking up the bill. Naturally, there are also concerns that these delays could sap investor confidence in this burgeoning sector.

However, rather than submit to panic, some builders remain stoic when assessing these developments. As Jim Cutts, CTV programme director at St Johns Shipbuilding, Florida, put it recently during a podcast

with class society Bureau Veritas: "Various big developers are cancelling their power purchasing agreements and even walking away from major development projects. It'd be easy to assume that this new industry's about to falter, but there are actually many other projects that are still ongoing. The US offshore wind industry is definitely here to stay."

Building boost

After its acquisition by Americraft Marine in the summer of 2022, the formerly privately owned St Johns yard underwent an extensive overhaul, expanding its facilities specifically to boost its production of CTVs and other offshore wind support ships. "[We] recognised very early on that there had to be some level of real commitment to meet the challenges of the shortfall of suitable Jones Act-compliant vessels to meet US offshore wind industry requirements," says Cutts. "While the yard is too small to build SOVs or other large vessels, the actual CTV size was right in our wheelhouse."

Equipped with an 850tonne dry dock, a crane capacity of 500tonnes and a waterfront spanning more than 730m, St Johns has traditionally specialised in steel vessel construction, with some limited aluminium experience. This is about to change: as a result of the site overhaul, the yard has added more undercover facilities to permit year-round aluminium boatbuilding. "We've gone from being able to build three vessels to something like eight vessels a year," Cutts adds.

This increased boatbuilding capacity is a crucial feature, given the expected increase in demand for these CTVs, and especially when set against another serious challenge: a dearth of qualified manpower. "These lightweight, thin-skinned, heavy-duty workboats are somewhat new to the US," Cutts continues. "With the large number of vessels required, all the [US] yards are competing for the same pool of skilled labour." As a result, St Johns struggled to source enough qualified welders, for example, to meet overall demand, forcing the group to rely on subcontractors. "While more subcontract labour assists with the immediate requirements, it doesn't add to the overall skillsets of St Johns," he says.

As a result, the builder has set up its own onsite welding school, so that it can train up its workers to handle ongoing aluminium CTV production. "We even brought in a couple of British production experts, who have built many CTVs over in the UK, to advise on general construction practices, material preparation techniques and detailed welding approaches," says Cutts.

European experience

As former director of engineering at the now defunct UK builder CTruk Boats – one of the pioneers of offshore wind CTV development in the early-to-mid-2010s – Cutts believes that his experience in building UK and European crewboats to class rules grants St Johns a particular advantage when it comes to securing domestic US contracts for newbuilds.

Additionally, Cutts says: “St Johns took an approach to the CTV-building business that other yards perhaps were not prepared to do. We spent some time getting to know the design and engineering details, and discussing various construction methodology options, to understand the vessel configuration. Being able to discuss this directly with the naval architects – who I had worked with before – did give St Johns a big advantage when talking to the customer.”

The yard has secured two domestic customers so far. St Johns is currently building three Incat Crowther-designed CTVs for WINDEA Offshore, originally intended to be chartered at the Vineyard Wind site, each featuring a length of 30m, a breadth of 10m, a draught of 1.4m and the capacity to carry 24 turbine technicians and six crew. Fashioned from marine-grade aluminium, each of the trio will run on four Volvo D13 main engines, rated a combined 2,060kW, for a service speed of 26knots and a top speed of 29knots.

These WINDEA Offshore CTVs will be classed by Bureau Veritas (BV) and flagged by the US Coast Guard (USCG). “Because of the current CTV designs already built in the UK and Europe, BV had the experience that really helped in our overall approach – in obtaining classification for the structural material and ensuring the system and parts and equipment met all the requirements,” says Cutts. He elaborates that selecting a class society with a “flexible but pragmatic approach” will be an important consideration for US CTV newbuild projects going forward.

“We’ve gone from being able to build three to eight vessels a year”

St Johns is also building a pair of 24m CTVs for Rhode Island-based operator Atlantic Wind Transfers, both of which are being produced to the specs of Chartwell Marine’s Ambitious class. This series includes dimensions of 23.9m x 8.7m, a 1.3m draught and a 24-technician capacity. These twin vessels will be classed solely by the USCG, Cutts says.

Wait for innovation

While Cutts appears optimistic about the US offshore wind industry’s anticipated growth – and the increasing reliance of vessels suited to serve this market – he adds that it’s worth bearing in mind that most CTVs developed for the UK/European sectors are a good 10-12 years ahead of the curve, and that innovative US-built CTV designs may take a while to break through.

“We already know that Europe and the UK have a well-established offshore wind industry, and there are many 10s, if not 100s, of CTVs in operation there,” he says. “Because of that, those operators have the confidence to be a little more adventurous in the vessel designs that they’re ordering, with features that they believe will be able to transfer in higher sea states, or be more fuel-efficient. In Europe and the UK, we’re seeing hybrid propulsion systems being installed on [CTVs], and surface effect ship [SES]-types are being ordered as well” (see, for instance, *Ship & Boat International* May/June 2021, pages 18-22).

Cutts continues: “Whether the US market will get to that stage any time soon is debatable – but there’s no doubt, as the industry matures, and specific US operational conditions and challenges are better understood, we will see some level of vessel development. I think we may see CTV-type vessels staying offshore for longer periods: either operating as more capable daughter craft to the large walk-to-work or floatel-type vessels, or as larger CTVs with technicians’ accommodation actually on board.” While conceding that these developments “will definitely take some time,” Cutts optimistically concludes: “The standard CTV that we all know is definitely here for the long haul.” **SBI**



One of the WINDEA Offshore trio, pictured nearly ready for launch, at St Johns in Q4 2023 (image: St Johns Shipbuilding)



SMART CHARGING

Damen's new 7017 E electric SOV concept uses a drop-down umbilical system to top up its batteries directly from existing offshore infrastructure, including wind turbines. Stevie Knight reports

The new 7017 E service operation vessel (SOV) from Damen has a trick up its sleeve – or more accurately, at the end of its gangway. Importantly, it's a trick that promises to allow the vessel to run on battery power alone.

This recent 4,300gt design will, like its SOV 7017 predecessor, provide hotel and access for windfarm technicians and crew in 60 single cabins. Its 70m length, 17m beam and 4.5m service draught yield enough room for 90m³ of cargo (it can carry six 20ft containers) on a weather deck area of about 300m². The SOV also houses a 420m² covered warehouse on the main deck, which can be directly accessed via an adjustable platform and walkway from the steel boat landing at the stern. This landing holds the utility links and refuelling station: the vessel has capacity for around 260m³ of fuel oil and 90m³ of potable water.

There are other useful points: the design makes room for a 15m daughter craft with its own launch and recovery system, and there's a helideck option as the winch area can be fitted with a 17m-diameter landing spot. Finally, the ship is DP2-enabled with targetless laser position reference technology, combined with two extremely accurate, corrected differential systems (DGPS) plus high-speed auto-tracking.

The propulsion makes use of Damen's DPX-DRIVE, featuring four 900kW azimuthing thrusters in a double-ended arrangement. At summer draught, this yields 10knots in eco-mode, with a maximum speed of 12knots, and grants the vessel independent propulsion in any direction, assisting between-tower manoeuvres.

Although Damen has scoped out a smaller 10MW battery for this ship, which is tailored for a 75% electric endurance, the main design has a capacious 15MW of energy storage, allowing fully electric running almost all (that is, 98%) of the time. As a result, the battery room of the 7017 E is somewhat larger than that of the original hybrid 7017. It is positioned in the last third of the vessel – just before the aft-end kit – though, as Damen project engineer Rebecca Belmer explains, "it hasn't made so much difference to the layout", as this newer vessel takes advantage of both the space left by the original methanol system and that reserved for battery upgrades.

Gangway charging

Central to the 'stepless access' for the technicians, tools and parts is a fully motion-compensated crane and tower-mounted, 25m gangway. The gangway comes with an integrated elevator, adjustable to yield working heights of between 14-25m above sea level. Further,

Damen's 7017 E SOV concept is designed for electric charging directly from offshore infrastructure, via its walk-to-work gangway



it can be intertwined with wave radar and motion prediction systems that anticipate vessel movement over one minute in advance, yielding smoother, safer transfers.

Given that the gangway is already a sophisticated piece of kit, it's a clever move to avoid reinventing the wheel and instead utilise the existing technology to deliver an onsite charge: this was accomplished with the help of MJR Power & Automation, and follows earlier demonstrations aboard Tidal Transit's 20m CTV *TIA Elizabeth*, which MJR used to demonstrate how the single-point mooring and umbilical system would work in practice.

After slot booking and confirmation, the vessel approaches the tower, where a fully automated reel drops a connector into a receptacle on the vessel. For the SOV, it has been developed into a slightly slicker system with the connection point on the shipboard side suspended just below the very tip of the extended gangway.

As the operation is entirely controlled from the wheelhouse, there is no manual interaction. MJR managing director Paul Cairns underlines that the system is safe, "with rapid connection and disconnection of the charge umbilical". Having made the connection, the ship can then back away from the tower and settle into what Damen calls 'green' DP mode – which, the company claims, has a lower energy demand than the hotel load.

Using MJR's 4MW, 11kV connector design means a typical recharge will entail just a couple of hours at the turbine. Even if the charging time is disrupted or cut short, the SOV's energy storage should be sufficient to power it for a full day of operations. Furthermore, the 7017 E retains a pair of 1,200kW HVO/diesel generators to provide back-up, emergency and mobilisation power. Since the ship has one less diesel engine to accommodate, this

has left room to locate the machinery for the mission equipment here, below deck in the engine room.

The 7017 E promises to be quieter than conventional SOVs – the comfort level, says Damen, being assisted by the low-motion design, plus climate control and internet on demand. It also covers the basics, such as a hospital area, multiple conference rooms and offices, as well as entertainment and activity spaces including a large gymnasium, game rooms, a cinema and a café/restaurant.

Business case

Damen's business case analysis took in a broad swath of diverging scenarios with parameters (validated by developers and stakeholders) that embraced replacement of the energy storage element, the charging technology, energy prices, variable operational profiles and charge times at the tower – plus the expected carbon cost. The combination makes the return on investment (ROI) predictions a little fuzzy, but all came back with a ROI of between five and 15 years, Damen reports.

Mark Couwenberg, Damen's SOV product manager, says that the potential OPEX reduction from harvesting wind farm energy "implies a business case for this model", but it does require buy-in. As the notes on this vessel point out: "Charge stations, fully compatible with the vessel, are to be installed on offshore wind turbines and/or offshore substations."

"We cannot do this alone," underlines Couwenberg: "To make this a reality will require collaboration throughout the chain, with shipbuilder, vessel operator and wind farm developer working together [to] make our offshore energy production more sustainable." MJR, however, is betting that there will be future interest: the company already has an 8MW charger-connector in the pipeline, suitable for a larger, 90m vessel. **SBI**

A recharge
would take just a
couple of hours at
the turbine

IMCA urges "fairer allocation of risk"

The International Marine Contractors Association (IMCA) has published what it claims to be the offshore wind energy sector's "first standard contract for transport and installation [T&I] works" for new wind turbine site projects.

"The contract has been written to ensure a fairer allocation of risk," IMCA says. "In recent months, several high-profile projects have been deferred in both the UK and the US. For the offshore wind sector to be truly sustainable, there needs to be a fairer allocation of risk across the supply chain, including for offshore contractors, to avoid more projects potentially falling through."

Speaking shortly after the standard T&I contract was released, Iain Granger, CEO of IMCA, commented: "It's not hyperbole to suggest that net-zero targets around the globe are at risk if offshore wind projects continue to be delayed and cancelled. I also know, from my discussions with [IMCA] members, how concerned and frustrated they are with current market conditions and having to deal with inappropriate contracts." Such contracts can prove to be real time-killers, he added, often necessitating "lengthy and costly rounds of renegotiation".



MEETING IN THE MIDDLE

The new Midi-SOV concept will bridge the size gap between offshore CTVs and SOVs, with a view to creating a cost-effective solution to tackle high inflation and rising costs

Traditionally, offshore wind crew transfer vessels (CTVs, used to move turbine technicians from shore-to-site and back) and service operation vessels (SOVs, serving as offshore motherships for long-term deployment of technicians) have fulfilled quite distinctive, separate roles. However, global economic pressures, and demand for vessel utilisation, may see these boat types merged closer together in future.

Andy Page, director of UK-based naval architect Chartwell Marine, tells *Ship & Boat International* that a combination of inflation, higher interest on borrowing and increased shipbuilding costs are behind some of the disruption (including offshore wind project cancellations) that we have seen lately. While SOVs are useful in eliminating daily return trips between site and shore, they require a substantial investment. This high rate of CAPEX could see the energy majors try to pass the increased costs on to the consumer – but there is no guarantee that they will be willing to pay for this.

At the same time, Page says, there is growing demand for CTVs that can carry more than 30 technicians to and from work, which has necessitated a rethink regarding that vessel type's capacity limits. In short, the current dimensions we associate with CTVs are not feasible when it comes to seakeeping or technician comfort/hospitality for overnight stays. So, to create a 'halfway house', Chartwell Marine has teamed up with ship designer and builder VARD to introduce what it calls the Midi-SOV: a 57m offshore vessel, intended to hit the "sweet spot" when it comes to commercial and operational viability, Chartwell says.

Developed from scratch

The Midi-SOV concept was drawn up by Chartwell about two years ago, designed "from the ground up" as a vessel type in its own right, rather than a mish-mash of previous designs. Extensive simulation and model tests (incorporating a 1:20 scale model of the vessel) were then conducted in collaboration with Seaspeed Marine

The Midi-SOV is intended to offer the benefits of full-size SOV utilisation without the accompanying high costs



TECHNICAL PARTICULARS

Midi-SOV

Length.....	57m (oa)
	48.8m (bp)
Breadth.....	19.6m (moulded)
	16m (wl)
Depth, moulded	5.9m
Max draught.....	4.5m
Deck cargo area	200m ²
Warehouse area	150m ²
Service speed.....	10knots
Max speed.....	12knots

Consulting and Qinetiq, and with maritime firms Clarksons, North Star and Voith providing additional support. In the summer of 2023, VARD partnered with Chartwell with a commitment to bringing the design to market.

Chartwell says: "The concept incorporates a low waterplane shape that broadens above waterline, effectively minimising and dampening roll motion. This allows the vessel to remain stable during operations, facilitating walk-to-work capabilities that were previously challenging for smaller-scaled traditional SOV forms." The Midi-SOV will feature 36 single-berth cabins for the turbine technicians, plus 20 crew cabins, in addition to facilities including a gym, auditorium, meeting rooms and day rooms.

The DP2-capable, monohull vessel will also be equipped with a 3D-compensated gangway with a length of 21.6m, six degrees of freedom and a cargo-lifting capacity of 3tonnes. Options exist for a 1tonne deck crane and boat landing. The deck will offer 200m² of space for cargo, and tankage capacities will include 190m³ of fuel oil, 800m³ of potable water and 1,525m³ of ballast water/drill water.

The plan is to license the design to various shipbuilders around the world, which will then provide the Midi-SOV to their local markets. This includes what Page calls Chartwell's main two customer groups: those in 'mature' offshore wind markets (such as the North Sea and Northern Europe) and those in 'emerging' markets, including the US, Japan, South Korea and Taiwan. It will be important, for instance, that US builders handle the vessels intended for domestic use, in line with the country's Jones Act. As such, the Midi-SOV's design had to be 'Americanised' to an extent, to meet this requirement.

The customer will get to determine the final powertrain for their Midi-SOV newbuild(s). Chartwell explains: "With a strong focus on energy efficiency, this vessel can be equipped with methanol-diesel dual-fuel engines, electric propulsion and a supporting energy storage system." **SBI**



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MARITIME SAFETY AWARD

Safety at sea is a crucial collective responsibility of the maritime industry. Naval architects and other engineers involved in the design, construction, and operation of maritime vessels; have a significant role in maritime safety. To raise awareness and promote further improvements in this important field, RINA in association with Lloyd's Register are launching the 2024 Maritime Safety Award. The award will distinguish an individual, company, or organisation, who has made a significant technological contribution to improve maritime safety.

HOW TO PARTICIPATE?

Nominations may be made by any member of the global maritime community. Individuals may not nominate themselves, although employees may nominate their company/ organisation. Nominations should include a 750 word summary, describing the technological contribution made towards the advancement of maritime safety.

Nominations are open until the 31 January 2024.

Online at: <https://rina.org.uk/about-rina/medals-prizes-awards/maritime-safety-award/>

Or, by email: awards@rina.org.uk

A panel of members of RINA and Lloyd's Register will deliberate and the winner will be announced at the Institution's Annual Dinner.

For Queries about the Award contact the Chief Executive at: hq@rina.org.uk

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FERRIES

SETTING AN ELECTRIC STANDARD

Boeing's drive for standardisation within the aviation sector has proved the inspiration for Incat Tasmania's new global series of lightweight electric ferry catamarans, developed to grant operators better access to low-/zero-emission stock

Incat Tasmania has taken inspiration from the skies, having unveiled plans to "do for short-sea ferry services what Boeing did for the aviation industry" with a brand-new range of electric ferries. And, just as Boeing reduced its development and manufacturing costs by incorporating standardised components and processes, so Incat Tasmania predicts that the new e-ferry range will "make zero-emission battery electric vessels more readily available for the world", comments the boatbuilder's founder, Robert Clifford.

"Boeing was able to do it with aircraft over the last 100 years, and we are working on an expansion plan to enable the Incat shipyard to produce multiple battery-electric vessels each year," Clifford highlights. "We are offering the global ferry market options for series-produced vessels both small and large, just like Boeing did with the mass-produced 737 and Airbus did with the larger Airbus 380: you can play around with the seating and toilet arrangements, but you don't change the wings."

Set to initially target ferry operator customers in Europe, before expanding its output to Asia, Incat makes no bones about its desire to establish itself as a leading global producer of reliable and efficient electric ferries. "To reduce emissions in line with ambitions around the world, and to meet customer expectations over the next decade, hundreds – if not thousands – of zero-[direct] emission ships need to be built," the company comments. "Battery-electric

propulsion coupled with lightweight aluminium constructed ships on shorter sea routes will be the ideal choice to cut emissions.

"Our plan is to revolutionise the world shipping industry by delivering more zero-[direct] emission ships more efficiently than anyone else. This will benefit ferry owners, their customers, and importantly, our environment."

Yard redevelopment

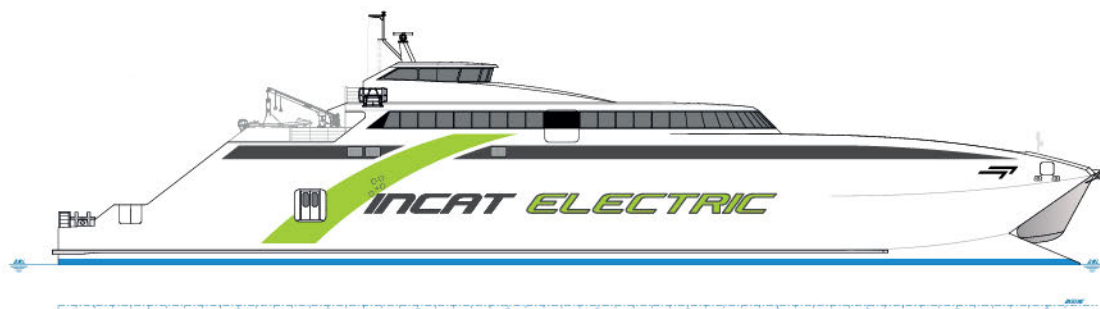
Incat's e-ferry production plan will see Incat roll out multiple 70m vessels, plus one larger, 140m+ newbuild, from its Hobart facility each year – built to hullform specs developed jointly by Incat and Australian naval architect Revolution Design. Clifford tells *Ship & Boat International*: "The shipyard has two large construction halls with dry docks and a third construction hall with a launch area: hence, we can build multiple vessels simultaneously." At present, the yard's largest dry dock, Wilsons, is working on a 130m version of the e-ferry for South American operator Buquebus, with delivery slated for 2025. Meanwhile, Clifford adds: "We are currently setting up our Coverdales building hall in readiness for construction of the first 70m electric vessel, to start in January 2024."

The third shed at the Hobart site, Inches, is currently being used for the pre-fabrication of newbuild modules, and houses a training facility. To start off,

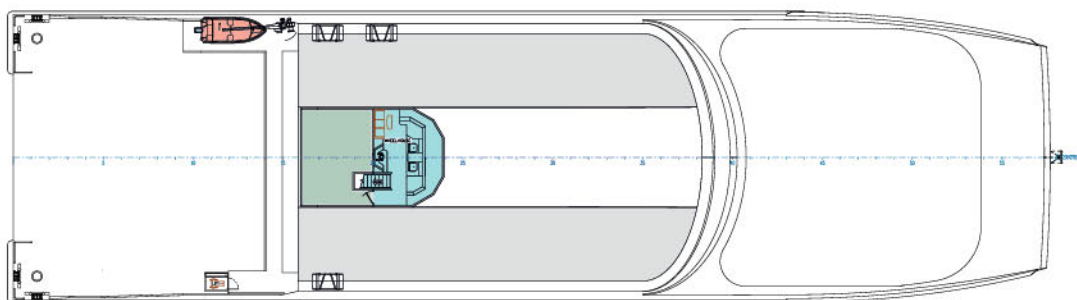


Incat Tasmania's forthcoming 70m electric ferry will offer a simple, standardised arrangement for a top speed of 25knots

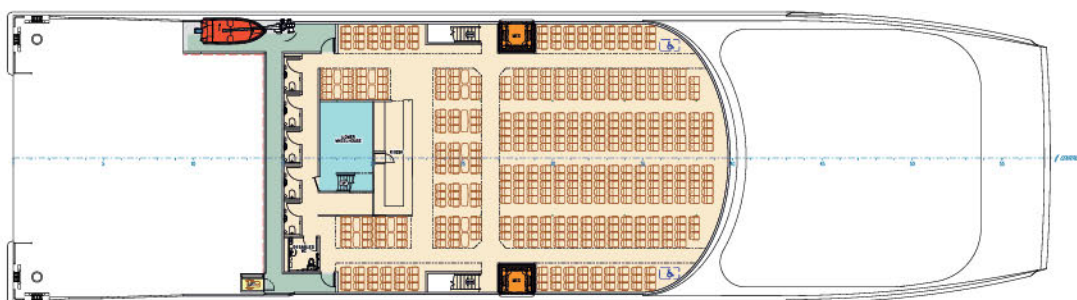
The general arrangement of Incat Tasmania's 70m electric ferry



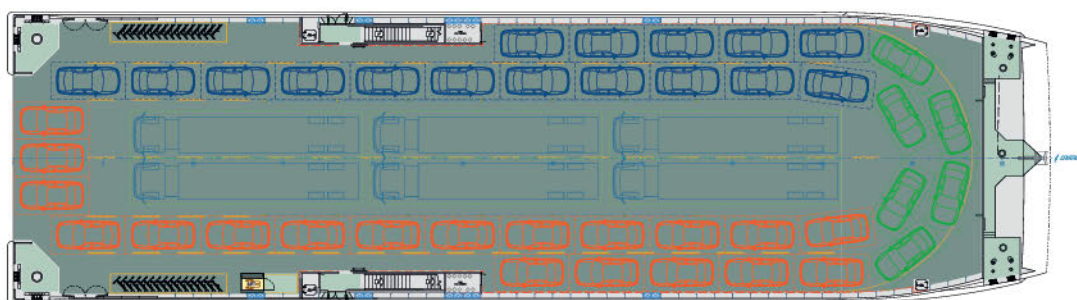
OUTBOARD PROFILE



UPPER DECK PLAN



TIER 2 PLAN



TIER 1 PLAN



Incat anticipates an initial orderbook of three electric ferries per year, which will hopefully increase as demand picks up.

This proposed workflow will be enabled by ongoing upgrades at Hobart. For example, Clifford reveals: "We have just completed building extensions which doubled the design office facility. We have also constructed a large new mezzanine level in one of the building halls, which doubles the available fit-out department floor space, and increased aluminium storage facilities, subsequently releasing more construction floor space."

Further yard expansion is planned. The builder also plans to double its workforce to more than 1,000 onsite personnel in the next few years, having welcomed 11 qualified and experienced welders from the Philippines to its production team in 2023. "Another overseas intake is due in early 2024," Clifford says. "Although our focus is on local engagement, the growth projections will require interstate and overseas recruitment." The builder currently has more than 70 apprentices on its books and is actively recruiting more.

Weight analysis

The 70m e-ferries will each feature a moulded breadth of 19.1m, a maximum deadweight of 250tonnes and the capacity to carry 450 passengers and 71 cars or 105 truck lane metres plus 41 cars (or, alternatively, 132 cars in 4.5m x 2.3m parking spaces if mezzanine decks are introduced). Incat says: "With a beam of just over 19m, [the arrangement] will reduce vessel turnaround time by allowing for cars to turn on the vehicle deck and exit via the stern." The 130m version under build for Buquebus, meanwhile, is envisaged to carry more than 2,000 passengers and 225 vehicles.

As part of its standardisation strategy, and to reduce costs where possible, the new electric ferries will be kept simple in terms of design. An important part of the efficiency drive has been to make the vessels as lightweight as possible, which is where Incat's expertise in aluminium craft construction has proven useful, enabling the group to reduce the heavier weights typical of steel-built e-ferries. Similarly, the weight of every onboard component, from the seating to the fire detection and suppression systems, was scrutinised and analysed for potential weight savings.

"Once the weight is under control, we start to see efficiency gains in energy consumption, which in turn make these vessel types a viable option for high-speed, short-range routes," says Clifford. "For those customers who want to travel longer distances, the lightweight design concept can be extended to include larger vessel designs that operate at lower speeds but can carry more cargo load, thus maintaining high overall transport efficiency." A typical diesel-powered ferry, Clifford suggests, might notch up: "400tonnes for the engines; 100tonnes for the gears and gearboxes;

100tonnes for the fuel tanks; and 100tonnes for the fuel itself". Replacing these requirements with a 250tonne battery pack, he adds, slashes the vessel's weight by nearly two-thirds.

Power and range

The batteries will be located in the e-ferries' catamaran hulls, perhaps in two or four compartments for added redundancy, Clifford says. It's likely that a diesel genset would also be installed, to provide back-up in the event of an emergency or unexpected power loss.

The powertrain includes fixed-pitch propellers driven by permanent magnet motors, all based on a DC electrical propulsion system – again, for a lightweight set-up. Incat expands: "The vessel will have DC/DC charging through an automated charging arm, allowing rapid connection and disconnection to maximise charge time while alongside."

A 250tonne battery pack could slash the ferry's weight by nearly two-thirds

At the time of writing, a supplier for the ferries' batteries was still to be confirmed, though Clifford comments: "We have several battery suppliers to choose from for marine-grade battery systems in the multi-MWh range of energy storage for this type of vessel design." Incat intends the vessels to be capable of a speed of 25knots at 150dwt, with sufficient range for six daily trips, including the ability to complete a 20nm route at 25knots and a 90nm route at 12knots (based on the use of a 5,900kWh energy storage system, with charging scheduled for both ends of the journey). Depending on in-harbour charging facilities, it would take approximately 30-45 minutes to recharge the 70m ferry between trips, Incat estimates.

Battery options

The batteries should also keep the e-ferries running for approximately 10 years. Clifford adds: "At the rate at which battery technology is developing, we're bound to have cheaper, more efficient and more powerful technology in the future...we could possibly see charging times halved." When the batteries are 80% consumed, the operator can transfer them to shore for general wharf and harbour use, where they could theoretically serve for another 10 years, before being recycled after passing the 20-year mark: all sustainable benefits for a sector that's eager to demonstrate its commitment to green propulsion, he says.

Beyond the initial newbuilds for 2024/2025, Clifford hints that Incat has five or six potential orders under consideration, as well as plans for a 160m-long version of the e-ferry. The electric ferries will be made available for sale or for charter, which could perhaps see them plug a crucial role in developing countries, where the high costs usually associated with ordering battery-powered ferries could be offset by somewhat cheaper and faster newbuild production costs and turnaround times – thereby reducing the reliance of these countries' operators on less well-built, less safe and ageing ferry stock. **SBI**

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ALL ABOARD THE 'BIKE BUS'

BMT's proposed EF-500 pure-electric ferry concept will transport up to 500 passengers and 20 bicycles per run, for truly green trips all round

Decarbonisation of the ferry sector continues to gain pace, with naval architect and designer BMT recently providing a preview of its EF-500 all-electric passenger vessel. Developed to meet international demand for low- and zero-emission ferry services, the EF-500 concept was unveiled at the International WorkBoat Show in New Orleans, hosted between late November and early December 2023, accompanied by a 3D scaled model.

The e-ferry is perhaps best imagined "as a tailor-made 'bike bus' on water, seamlessly connecting riverbanks, enhancing cross-river links and serving communities emission-free," explains Martin Bissuel, head of sales, commercial maritime at BMT. In addition to its 500-passenger and four-crew member capacity, the vessel will transport up to 20 bicycles – making its operations truly diesel-free in every aspect.

Although the emphasis of the big reveal at the International WorkBoat event was, unsurprisingly, on servicing the North American market, Bissuel adds: "The design is suitable, and is flexible, for operations around the world: its focus on all-electric, low-carbon emissions makes it relevant globally." All the same, e-ferries are gaining popularity across the US – arguably much more so now than in the 2010s – as a cleaner, more sustainable alternative to traditional diesel-powered models.

Key regions of interest, for instance, include: New York City, where efforts are being made to electrify services between Staten Island, Manhattan and the Bronx; Puget Sound, in Washington; Portland, Maine, where the city authorities have pledged support for green transportation initiatives; and, of course, San Francisco Bay Area, California, where the Water Emergency Transportation Authority (WETA) is pushing to electrify its entire fleet by 2025.

Batteries and range

The all-aluminium EF-500 will feature an overall length of 42.5m (or 41.9m on the waterline) and a moulded beam of 12m, and will draw 1.6m. The onboard batteries will provide a combined 2,200kWh of power, feeding a pair of 770kW motors and enabling an expected service speed of 18knots. This capacity will be ample to enable a range of one hour at a speed of 18knots, or 40 minutes when operating at its top speed of 20knots – factors that could make the ferry "an efficient choice for higher-passenger capacity along coastal and restricted service routes", BMT says.

Bissuel explains that the specific choice of batteries and motors will hinge on the end user's requirements and preferences, given their areas and environments of operation. "We have carried out extensive work on the propulsion set-up, with a number of options," he says. "As independent vessel designers, we always work towards what is better for each particular application: so, in this case, the exact choice of batteries, power management structure and motors will be finalised with our clients for each particular set of circumstances and operational profile."

Wake reduction

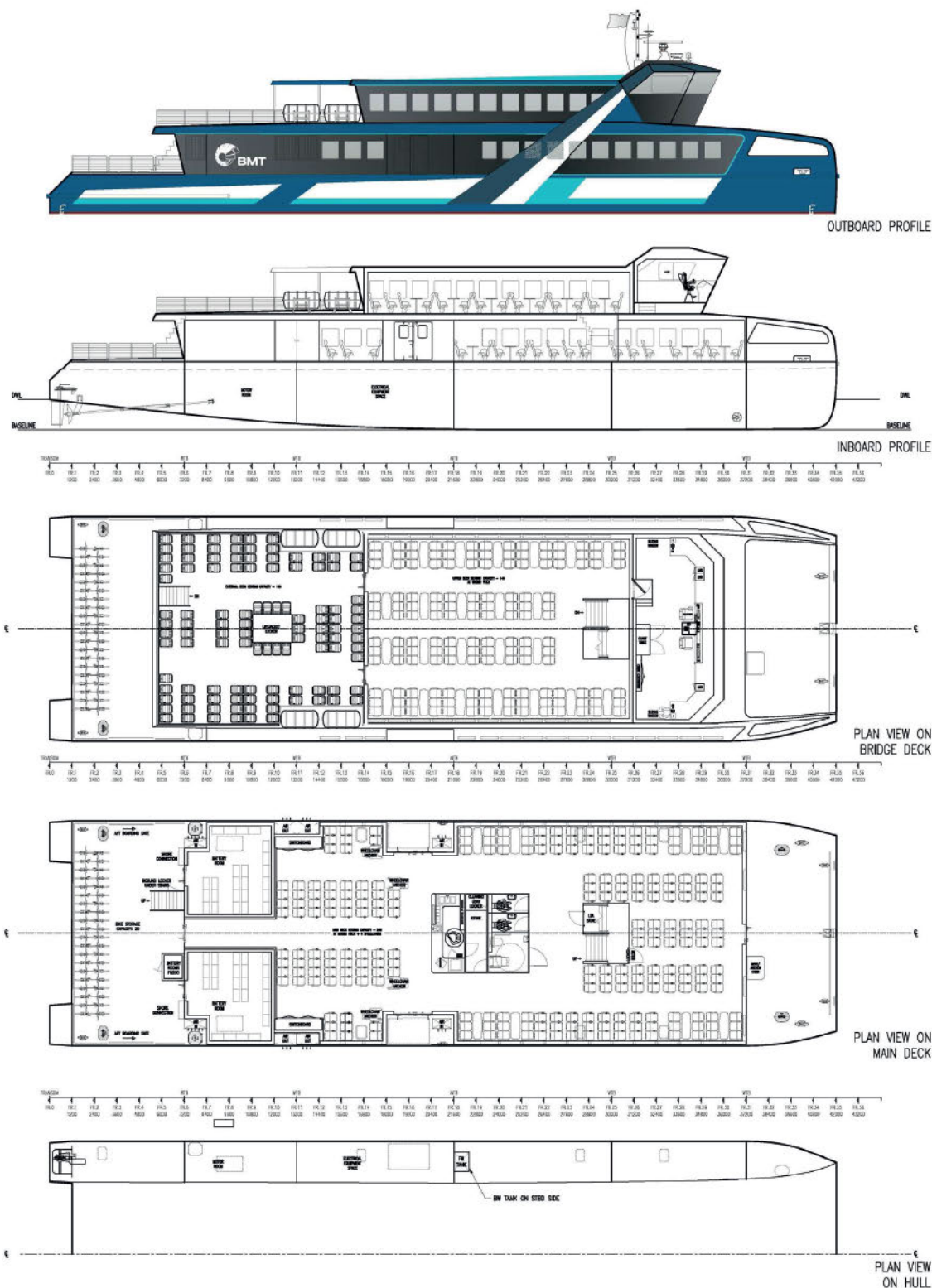
The EF-500 has been designed with a low-wake hull, for minimum disruption to coastal routes and inland waterways as well as enhanced passenger comfort and reduced drag and energy consumption. Low-wake hulls also make it easier for crew to manoeuvre with greater precision, to reduce the likelihood of collisions with harbour infrastructure and/or other vessels.

As of December 2023, Bissuel could confirm that a number of operators had expressed an interest in the EF-500 design, adding: "We expect to be building the first of class very soon." He continues: "Crafting greener ferries involves meticulous consideration beyond blueprints, encompassing passenger experience, adaptability to future transit changes and technological advancements. BMT's electric ferry not only aligns with economic and environmental goals but positions itself as a pioneering project embracing innovative vessel operation and contemporary design trends. All these elements contribute significantly to fostering a positive inclination towards 'purchase'." **SBI**

BMT's 500-pax electric ferry will have a range of one hour at 18knots



The general arrangement of the EF-500



MARINE COMPOSITES

CITY SLICKER

Composite material selection has played a major role in ensuring that Candela's forthcoming P-12 foiling passenger shuttle keeps it together on its daily high-speed runs

2024 will see Stockholm welcome the first Candela P-12 foiling passenger shuttle – a city transport solution that promises zero emissions and favourable efficiency gains compared to conventional diesel inland ferries. For example, Candela says, the 11.99m x 4.5m, 30-pax vessel will only require 44kW of engine power – thanks in part to the foils that will help it to glide across the water surface with reduced friction – compared to the 589kWh typically demanded by a diesel boat.

Similarly, Candela has calculated that while fuel and energy costs will amount to €90 per hour for a typical diesel-powered passenger boat, the P-12 should be able to slash this expenditure to €17 per hour – and that's without taking its emission-free benefits into account. Designed for a range of 40-50nm, and incorporating 252kWh of batteries, the newcomer is expected to halve the times of certain Stockholm journeys typically made by road.

One factor that may have been overlooked, however, is the application of composite materials in the vessel's hull and hydrofoils. For this project, Candela returned to long-term partner Sicomin, which has supplied a complete package of epoxy resins and adhesives to the forthcoming carbon-fibre shuttle.

"Significantly lighter"

Sicomin tells *Ship & Boat International*: "We worked on the very first project, the Candela C-7, which was launched in late 2016 – a key moment in Candela's development of series-built, 100% electric foiling craft." The 7.7m-long C-7 was then followed by the 2023 commercial launch of the slightly larger, 8.5m C-8. "Materials have been constant throughout the development phase, with Candela very happy to continue with the same mix of infusion, laminating and bonding products across the range."

TECHNICAL PARTICULARS

Candela P-12

Length.....	11.99m
Breadth.....	4.5m
Weight.....	9.5tonnes
Passengers.....	30, seated
Propulsion.....	2 x Candela C-PODs
Batteries.....	252kWh
Charging.....	Up to 175kW DC
Service speed.....	25-27knots
Top speed.....	30knots
Range.....	40-50nm@25knots



The forthcoming P-12 will only require 44kW of engine power compared to the 589kWh typically demanded by a diesel boat, Candela says

The full carbon fibre and epoxy construction has led to the P-12 recording a weight of 9.5tonnes. "The P-12 has been developed using the same lightweight, infused-composite, foiling DNA for Candela's C-7 and C-8 leisure craft, and is built using the same DNV-type approved Sicomin resins and adhesives as the previous models," the company says.

The end result, Sicomin adds, has been a foiling vessel "significantly lighter" than if it had been built in aluminium or fibreglass. "The Candela C-7 is around 50% lighter than a conventional "low-tech" E-glass composite vessel," the company continues. "This low weight is what has allowed the Candela craft to carry the batteries that provide their range and performance."

Sicomin says that its SR1710 epoxy infusion resin produces extremely high laminate mechanical properties which optimise performance in hot and wet conditions – and that this is a critical consideration for such a lightweight foiling craft. "SR1710 is optimised in terms of viscosity for wetting out carbon fibres in infusion," says Sicomin. "These are much smaller than glass fibres, so there are smaller gaps in the dry fabric for the resin to flow through and ensure wet-out."

"We were asked by Candela to provide a liquid infusion system – as opposed to a prepreg material delivered frozen on a roll – to keep production costs at a more economical level, and with performance they could count on." Sicomin adds that SR1710 was type-approved by (then) class society DNV GL.

The company's epoxy adhesive Isobond SR7200HTG will also feature extensively in the construction of the P-12: used to bond the carbon fibre hull's internal

structure, and in final assembly of the vessel's composite components. "SR7200HTG is suitable for both thick and thin bond lines [and] is particularly resistant to micro-cracking in long-term fatigue," Sicomin says.

Built to last

While the renders of the lightweight P-12 certainly make the vessel look stylish, sleek and leisurely, the vessel will actually face some gruelling routes. In this light, its epoxy adhesive's resistance to micro-cracking becomes a crucial aspect.

"Commercial traffic, such as short-transit ferry work within the city, will see the boats in much more constant use than, say, a recreational vessel," Sicomin remarks. "This is primarily where the advantages become clear. Sicomin resins have a high thermal stability [Tg] and can therefore operate with batteries, charging systems and components running at temperature with no knock-down on their mechanical performance.

"This is also the case for fatigue performance – over an extended lifetime, the composite materials will



Sicomin has supplied a complete package of epoxy resins and adhesives to the carbon-fibre P-12 passenger shuttle

be much more resistant to micro-cracking and degradation inside the composite laminate – what we could call an interlaminar shear failure. The same is also true for our Isobond SR7200HTG adhesive: it is optimised to maintain performance at higher operating temperatures which are, we understand, important with high-speed charging, small-scale packaging of electronic parts and the aim of keeping the vessel in use with minimal cooling periods." **SBI**

REMIXED FOR SUSTAINABILITY

Dura Composites is expanding its d2 Dura Grating range, which incorporates re-engineered, lower-carbon-content GRP as an anti-slip property for vessel walkways/gangways and pontoons

Dura Composites has introduced a new 30mm Mini Mesh product to its d2 Dura Grating GRP grating range, available to purchase from early 2024. Available in panel sizes of 3,007mm x 1,027 and 4,027mm x 1,267mm, the 30mm Mini Mesh range is designed with anti-slip properties and intended primarily for use in marinas, ports, piers and promenades – as well as on gangways for offshore vessel personnel.

Dean Fuller, new business manager at Dura Composites, comments: "The anti-slip surface of our d2 Dura Grating is tested to withstand the wettest, oiliest and iciest conditions, ensuring a safe and highly durable walkway that allows access throughout the year." He tells *Ship & Boat International*: "It also maintains up to 95% of its anti-slip performance after 1 million footfalls."

Dura Composites opted for GRP due to its high resistance to corrosion – "making it ideal for exposure to saltwater and harsh weather conditions", the company says. "Unlike traditional materials like steel, which can corrode and degrade over time, GRP grating maintains its structural integrity and durability over a long lifespan – so much so, in fact, that we offer a 25-year warranty."

Carbon savings

The d2 Dura Grating product is effectively a 're-engineered' version of GRP, originally launched by Dura Composites in 2019. "We literally took a product that

had been the same in the market for 30 years and re-engineered it to make it safer, stronger and greener: it has an extremely high load capacity and provides excellent impact resistance and exceptional traction on walkways subject to tidal inclines," Dura Composites says.

The 'greener' aspect is key, the company adds. "As well as its small hole size, safety features and strength-to-weight ratio, the d2 30mm Mini Mesh uses 17.33% less embodied carbon than the 30mm grating available elsewhere in the industry, making it a sustainable choice." As such, the company estimates that, since its launch, d2 Dura Grating has saved more than 1,300tonnes of raw materials.

Compared to its previous d1 Dura Grating offering, "or the grating available elsewhere in the industry", d2 Dura Grating has also led to a saving of "nearly 5,000tonnes of CO₂," the group says, adding: "To offset this amount of carbon, you would have needed to plant over 700,000 trees and let them grow for 10 years."

The Mini Mesh range comes in various colours (including green, grey, dark grey and sand) to suit a range of environments, and for aesthetic mix'n'matching. The company explains that the range's 13mm open hole size also meets the requirements of European Ball Fall tests and maintains a 900mm span on 1.5Kn point load at L/500. **SBI**



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