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MAY 2024

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HMAS WARRAMUNGA, ONE OF A NUMBER OF ANZAC-CLASS FRIGATES IN THE ROYAL AUSTRALIAN NAVY. SOURCE: RAN





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Editor: David Foxwell

Production Manager: Nicola Stuart

Publications Sales Coordinator: Henry Owen

Publisher: Neil Hancock

Advertising Sales

Email advertising: advertising@rina.org.uk

Telephone: +44 (0) 20 7235 4622

Published by:

The Royal Institution of Naval Architects

Editorial Office:

8-9 Northumberland Street

London, WC2N 5DA, UK

Telephone: +44 (0) 20 7235 4622

Telefax: +44 (0) 20 7245 6959

E-mail editorial: editorial@rina.org.uk

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UK GOVERNMENT 'HAS NO CREDIBLE PLAN TO DELIVER DESIRED MILITARY CAPABILITIES'

The UK Ministry of Defence (MoD) has not credibly demonstrated how it will manage its funding to deliver the military capabilities the Government wants and is 'unwilling to make difficult decisions needed to balance budgets amid largest ever defence deficit.' So said a March 2024 report published from the Public Accounts Committee (PAC) that called on the Government to get firmer control of defence procurement, amid the largest deficit ever between the MoD's budget and its military capability requirements.

The PAC report comes weeks after a National Audit Office report that said the UK Royal Navy found the predicted cost of the capabilities the UK MoD expects it to deliver 'far exceeds' the funds made available to it. Despite a budget increase of £46.3 billion (US\$57 billion) over the next 10 years compared to last year's Equipment Plan, the PAC found that this year's plan's £16.9 billion deficit "marks an unmistakable deterioration in its financial position."

The PAC warned that the real deficit would actually be £12 billion bigger than the £16.9 billion estimate if all parts of the Armed Forces took the same approach to including the full costs of all the capabilities that the government expects them to deliver. Part of the reason for this deterioration is inflation and adverse foreign exchange movements but the PAC's report finds the greatest cause of cost increases is the UK MoD's decision to fully fund the nuclear enterprise, with costs at the Defence Nuclear Organisation – responsible for the UK's nuclear deterrent – having increased by £38.2 billion since last year's Plan. The report finds the MoD has put off making major decisions about cancelling programmes it cannot afford. Instead, it has optimistically assumed that the plan would be affordable if the government fulfilled its long-term aspiration to spend 2.5% of GDP on defence each year, despite there being no guarantee on whether this will happen.

The PAC's inquiry found that Ministry of Defence is also increasingly reliant on the UK's allies to protect the country's national interests. NATO membership deters hostility, but the report warns such deterrence can only be effective if UK armed forces are credible. This is undermined by issues including more people leaving the armed forces than being recruited, the mothballing of Royal Navy ships due to crew shortages, and the unavailability this year of the only ship able to fully replenish aircraft carriers. Given that many of its allies face similar capability challenges, the report calls on the MoD to develop mitigations for how it would deal with the risk of allied support being curtailed or withdrawn. The report states that MoD's strategy for replacing ageing capabilities is undermined by the slow delivery of new systems, resulting in military capability gaps. Despite the working with prime contractors to better understand its supply chain, increased international demand for key components and skilled workers has contributed to the slow delivery



THE PAC REPORT FOUND THAT ROYAL NAVY VESSELS ARE BEING MOTHBALLLED, SUPPORT SHIPS FOR CARRIERS HAVE NOT BEEN AVAILABLE AT TIMES AND THERE ARE DOUBTS THAT TWO TYPE 23 FRIGATES WILL RETURN TO SERVICE

of defence equipment, including Royal Navy ships. "For example," the report states, "technical issues developing the Type 26 frigate have contributed to delays, and the delivery of new warships for the Royal Navy is considerably slower than in other countries such as Japan," although the Ministry is hopeful that the pace will quicken as projects, such as Type 31 frigates, become more established. In the meantime, the intensive use of existing equipment is contributing to a maintenance backlog that will take more time and money to address, leaving the armed forces having to make do with fewer pieces of ageing equipment nearing the end of their in-service lives. For example, there is uncertainty about whether two Type 23 frigates that have recently gone into refit will return to active service. If they do not, this would further curtail the Royal Navy's already limited capacity to provide escorts because the Type 23 class is coming to the end of its in-service life, and the cost of refitting them has increased from £23 million to £100 million because their age means that the necessary work is now much more extensive and takes almost twice as long to complete.

Speaking at the time that the report was published, Dame Meg Hillier MP, Chair of the Committee said: "In an increasingly volatile world, the Ministry of Defence's lack of a credible plan to deliver fully funded military capability as desired by Government leaves us in an alarming place.

"But this problem is not new. Year-on-year our committee has seen budget overruns and delays in defence procurement. A lack of discipline in the Ministry of Defence's budgeting and approach has led to an inconsistent plan that just isn't a reliable overview of the equipment programme's affordability. "We are disappointed that not only are the same problems we're used to seeing on display here, but they also appear to be getting worse. Despite a budget increase, this year's Plan shows a clear deterioration in affordability." ■



NEWS

WEAPONS & EQUIPMENT

Dragonfire laser programme accelerating to equip Royal Navy



DRAGONFIRE WILL PROVIDE ROYAL NAVY VESSELS WITH A NEW, LASER-BASED DEFENSIVE SYSTEM

The UK DragonFire programme is described as an example of the Government's new Integrated Procurement Model, designed to reform defence procurement and drive increased pace in the delivery of military capability.

UK DragonFire leverages MBDA's weapon system manufacturing expertise, Leonardo's expertise in laser technology, electro-optics and advanced targeting and QinetiQ's experience as the only UK company to successfully develop and safely operate high-energy laser sources in the UK and coherent beam-combining technology.

The latest announcement follows a series of highly successful firing trials that demonstrated the capability of the DragonFire laser weapon system.

The UK DragonFire laser programme – led by MBDA, with partners Leonardo UK and QinetiQ – is being accelerated following a decision from the UK Ministry of Defence to install the weapon system on Royal Navy ships.

The decision, announced by Defence Secretary Grant Shapps, will see the DragonFire laser weapon system rapidly develop from a demonstration programme to an operational capability for the Royal Navy.

The next stages of this development will include further live firings and the manufacture and installation of weapon systems on Royal Navy platforms.

DragonFire was developed through a £100 million (US\$124 million) joint investment by industry and the UK MoD, working with Dstl. The decision by the MoD to progress the programme ensures that the companies involved can retain, maintain and grow the critical hi-tech skills, knowledge and jobs that contribute to the UK economy. Future exports of DragonFire to the UK's allies will further support these benefits.

SHIPBUILDING

Naval Group, PT PAL to build Indonesian subs

On 28 March 2024, Indonesia confirmed that it had selected Naval Group and PT PAL to strengthen the capabilities of the Indonesian Navy with two Scorpène 'Evolved Full Lithium-Ion battery (LiB)' submarines.

The submarines will be built in Indonesia at PT PAL shipyard through a transfer of technology from Naval Group.

Naval Group Chairman and Chief Executive Pierre Éric Pommellet said: "Naval Group is very honoured to be part of this new chapter in the alliance between Indonesia and France. With Scorpène Evolved Full LiB, Indonesia has a highly capable, proven submarine that will strengthen the country's maritime sovereignty and support the Indonesian Navy in achieving regional superiority at sea. In addition to the submarines, our partnership with PT PAL will also support the Indonesian defence industry to develop."

Technology transfer will see French know-how transferred to Indonesian industry, including the

management, operation and maintenance of the Scorpène Evolved Full LiB submarines.

The version of the Scorpène that Indonesia is to acquire will have six weapon launching tubes and a mix of 18 weapons, including torpedoes and missiles. It will be equipped with the latest generation of SUBTICS combat system and be fitted with a cutting-edge energy system based on lithium-ion technology which will reduce the submarines' indiscretion ratio and reduce charging time. Naval Group said the technology will also ensure that high speed "is available no matter the state of charge".

The evolved version of the Scorpène on which the Indonesian boats will be based will have a surfaced displacement of 1,600-2,000 tons; length overall of 72m; submerged speed of in excess of 20 knots; diving depth of greater than 300m; autonomy exceeding 78 days on an 80-day mission; submerged autonomy of greater than 12 days; crew of 31; and is designed to have an operational availability of in excess of 240 days per year.

WEAPONS & EQUIPMENT

Royal Navy selects Ancilia for countermeasures contract

SEA has been awarded a £135 million (US\$168 million) contract by the UK Ministry of Defence to provide a trainable decoy launcher to improve Royal Navy surface ship defensive capabilities.

Ancilia, SEA's highly modular and flexible maritime countermeasures solution, will provide 'Electronic Warfare Countermeasures Increment 1a (EWCM 1a)' to the UK Royal Navy.

Ancilia delivers effective and rapid protection against modern anti-ship threats, as well as other sophisticated systems and tactics. It will be installed across a range of the Royal Navy's surface ships. Its design builds on SEA's knowledge of existing systems in service with the Royal Navy.

"A step-change in decoy launcher technology from traditional fixed solutions, Ancilia's trainable nature removes the need to manoeuvre the vessel to counter incoming threats," the company said. "It's relatively small size and weight enables rapid installation on a wide range of maritime platforms, and it has the capability to configure the firing of multiple decoy types in varying positions, providing the Royal Navy with a truly flexible countermeasures solution."

EWCM 1a forms part of the Maritime Electronic Warfare Programme (MEWP), which is intended to progressively update surface ship electronic surveillance, electronic warfare command and control, and countermeasures capabilities over the next 20 years.

PROPULSION

Leonardo DRS signs lease to build new facility

Leonardo DRS has signed a ground lease in the Charleston, South Carolina metropolitan area to develop a new manufacturing facility, allowing the company to grow its naval propulsion capability and streamline its support of priority US Navy programmes.

When complete, the facility will provide more than 140,000 square feet of purpose-built advanced manufacturing, assembly and testing space representing an approximate net investment of US\$120 million by DRS. The new capabilities made possible by the investment will play a key role in the continued expansion of propulsion system integration and testing for the company. Initial occupancy is targeted for 2026.

"We are proud to be building the next-generation electric propulsion system components for the new Columbia-class ballistic missile submarine," said Leonardo DRS CEO, Bill Lynn. "This new facility in South Carolina expands our capability to support our US Navy customers on this and other critical programmes that enhance the nation's submarine industrial base."

When completed, the facility will have the capability to manufacture, integrate and test large components for DRS's advanced naval electric propulsion systems. The components include solid-state drives, designed and manufactured in the new DRS Menomonee Falls facility; electric motors designed and manufactured in the DRS facility in Fitchburg; control systems designed and manufactured in the DRS facility in Danbury; and cooling equipment designed and manufactured in the DRS facility in High Ridge.

The South Carolina facility will have direct access to barge transportation on the local waterway and out to the open ocean for shipping these large assemblies to the company's shipbuilding customers.

"This facility represents a significant milestone in our ongoing collaboration with the US Navy. We expect the unique capabilities in this new facility to be a national asset capable of addressing the US Navy's current and future needs," said Jon Miller, senior vice president and general manager of the Leonardo DRS Naval Power Systems business.

SHIPBUILDING

ST Marine initiates MRCV construction

Singapore Technologies Engineering has confirmed that its subsidiary, ST Engineering Marine Ltd, has initiated construction on the first of six Multi-Role Combat Vessels (MRCVs) for the Republic of Singapore Navy.

Construction was initiated with a steel-cutting ceremony, which took place in March 2024.

ST ENGINEERING MARINE IS BUILDING SIX MRCVS FOR THE SINGAPORE NAVY



SHIPBUILDING

Austal to build two more Evolved Cape-class patrol boats



THE FIRST FIVE EVOLVED CAPE-CLASS PATROL BOATS WERE DELIVERED WITHIN AN 18-MONTH PERIOD FROM MARCH 2022

patrols, as part of the ongoing Operation Sovereign Borders mission."

The SEA1445-1 project, initially constructing six 58m aluminium monohull patrol boats for the Royal Australian Navy from May 2020, was extended by two vessels in April 2022.

The first five Evolved Cape-class patrol boats, *Cape Otway*, *Cape Peron*, *Cape Naturaliste*, *Cape Capricorn* and *Cape Woolamai* were delivered within an 18-month period from March 2022. Following the sixth and most recent delivery, *Cape Pillar*, in October 2023, there are two Evolved Capes currently under construction.

Austal Limited has announced that Austal Australia has been awarded a contract extension for the construction of two additional Evolved Cape-class patrol boats for the Royal Australian Navy.

The A\$157 million (US\$100 million) contract follows the procurement announcement made by the Commonwealth of Australia (CoA) on 23 November 2023 and brings the total number of Evolved Cape-class patrol boats being delivered to the Navy, under the SEA1445-1 Project, to 10.

Austal Limited CEO Paddy Gregg said: "These additional Evolved Capes, designed and constructed by Austal in Henderson, Western Australia, are helping us to retain and build our sovereign, naval shipbuilding workforce and continue to engage supply chain partners from across Australia.

"The Evolved Capes are also enhancing the Navy's operations throughout Northern Australia, adding greater capability for maritime surveillance and border

The Evolved Cape-class patrol boats feature larger amenities to accommodate up to 32 people, improved quality-of-life systems and advanced sustainment intelligence systems that further enhance the Royal Australian Navy's ability to perform at sea. The patrol boats are utilised for a wide variety of constabulary and naval missions and play a critical role in Australia's national security, as a high-performing, reliable and effective maritime asset.

In-service support for the Cape, Evolved Cape and Guardian-class Patrol Boat fleets operated by the Australian Border Force, Royal Australian Navy and Pacific Island nations is provided by Austal Australia through dedicated service centres located in Henderson, Western Australia; Cairns, Queensland; and Darwin, Northern Territory.

Austal Australia is also contracted to deliver 22 steel-hulled Guardian-class patrol boats to the Commonwealth of Australia under the Pacific Patrol Boat Replacement Project (SEA3036-1) and has delivered 18 vessels since 2018.

WEAPONS & EQUIPMENT

Chess Dynamics to provide surveillance systems for Hunter class frigates

UK surveillance specialist Chess Dynamics has been awarded a contract by BAE Systems Maritime Australia to supply its SeaEagle FCEO surveillance systems for the first batch of the Royal Australian Navy's Hunter-class frigates.

The SeaEagle FCEO surveillance system will provide a state-of-the-art surveillance capability for the detection, tracking, and identification of surface and air targets. The highly accurate tracking data is expected to allow passive targeting for the weapon

systems, reducing overall operator burden.

The SeaEagle FCEO has been selected for integration into several global naval programmes, including the Royal Navy's Type 26 Global Combat Ship, on which the Hunter-class frigates have been designed. The system is equipped with an advanced daylight camera, a high-resolution infrared camera, and an eye-safe laser rangefinder. It also features a sophisticated software suite that provides a comprehensive picture of the maritime environment.

PROPULSION

Kongsberg Maritime to supply Promas to US Coast Guard

Kongsberg Maritime has been selected by Austal USA to supply its Promas propulsion system to the latest ship in the US Coast Guard's new Offshore Patrol Cutter (OPC) Heritage-class programme.

This initial contract is to supply Kongsberg Maritime equipment for the fifth ship, Coast Guard Cutter *Pickering*, which is the first to be built by Austal USA at their yard in Mobile, Alabama.

The OPC programme is a significant investment in maritime capability and is expected to run up to 25

ships. The new vessels will replace the Coast Guard's medium-endurance cutters and meet the need for long-term offshore capability to maintain current and future mission effectiveness.

Promas combines rudder and controllable pitch propeller into one propulsion system which optimises the hydrodynamic properties of the ship and delivers increased efficiency and thrust while using less energy. For the OPC, as well as twin Promas, Kongsberg Maritime is contracted to supply steering gear, rudders, fin stabilisers and tunnel thrusters.

SUBMARINES

New Jersey completes initial sea trials

HII has confirmed that the Virginia-class submarine *New Jersey* has completed initial sea trials. The submarine was built by the company's Newport News Shipbuilding division. *New Jersey* spent several days at sea to test the boat's systems and components.

Testing included submerging the submarine for the first time and conducting high-speed manoeuvres while on

the surface and submerged. NNS teams will continue the testing programme ahead of delivering the boat to the US Navy.

The boat, the 23rd Virginia-class submarine, was named in November 2021. *New Jersey* will be the 11th to be delivered by NNS. It is the first submarine designed with a modification for gender integration.

SUBMARINES

Contract awarded to refit UK nuclear submarine

Babcock and the UK's Submarine Delivery Agency (SDA) have agreed a full cost recovery contract worth an estimated £560 million (US\$698 million) to undertake the planned deep maintenance and life-extension programme for HMS *Victorious*, one of the UK's Vanguard-class nuclear submarines.

The multi-year life-extension programme will deliver HMS *Victorious* back to the Royal Navy modernised and improved, enabling it to continue operational patrols well into the 2030s. Work on the submarine is already underway, following a commitment by the Department to authorise early works from July 2023.

Through the programme, more than 1,000 jobs will be sustained in the southwest. Alongside this, Babcock is continuing to build its workforce through its Plymouth-based Babcock Skills Academy, which includes a focus on submarine support and the critical nuclear skills required to perform deep submarine maintenance.

HMS *Victorious* is the second Vanguard-class to undergo a life extension package at Babcock's Devonport facility.

The programme is being delivered at Babcock's facility in Devonport where a major infrastructure programme is underway to ensure the future capability requirements of the Royal Navy and the submarine enterprise are met for decades to come from state-of-the-art facilities.



HMS VICTORIOUS WILL BE REDELIVERED TO THE ROYAL NAVY IN 2030



SHIPBUILDING

Austal confirms receipt of offer from Hanwha

In early April 2024, Austal Limited confirmed it had received an unsolicited, conditional and non-binding indicative proposal from Hanwha Ocean Co Ltd (Hanwha) to acquire Austal by way of a scheme of arrangement (indicative proposal). Under the proposal, Austal shareholders would receive A\$2.825 (US\$1.81) cash per Austal share.

Hanwha's proposal was subject to numerous conditions, including due diligence, various regulatory approvals including Australia's Foreign Investment Review Board, the Committee on Foreign Investment in the United States and the US Defense Counterintelligence and Security Agency, final approval of the Hanwha Board, the unanimous recommendation of the Austal Board and Austal shareholder approval.

Austal said it invests considerable time and resources into deciding whether it should grant a potential purchaser access to the company's otherwise confidential detailed financial records, forecasts and contracts as part of a due diligence process. "In doing so, it assesses a range of factors, including but not limited to the potential for shareholder value creation, competition concerns and a potential purchaser's ability to ultimately complete a transaction," the company said.

"This latter consideration is particularly relevant in relation to the proposal from Hanwha, given Austal's position as the designer and builder of

defence vessels for the Australian and US navies and ownership clauses associated with defence contracts," said the shipbuilder.

"Austal also notes the announcement by the Australian Government on 23 November 2023 that Austal and the Department of Defence had executed a Memorandum of Understanding (MoU) to negotiate a Strategic Shipbuilding Agreement (SSA), under which Austal would be appointed as the Commonwealth's strategic partner for vessels to be constructed in Western Australia.

"In announcing the MoU for the SSA, the Commonwealth Department of Defence noted that 'a sovereign and enduring naval shipbuilding and sustainment industry at Henderson is central to the Government's commitment to ensuring continuous naval shipbuilding in Australia and delivering the capabilities needed to keep Australians safe.'"

Austal said its board, together with its advisers, considered the proposal in detail and engaged with Hanwha in relation to whether the transaction described in it would obtain the relevant regulatory approvals in Australia and the US to enable it to proceed. "At present Austal is not satisfied that these mandatory approvals would be secured, however the company is open to further engagement if Hanwha is able to provide certainty on whether a transaction would be approved," the company concluded.

POLICY

Norway unveils long-term plan with big boost for navy



PRIME MINISTER JONAS GAHR STØRE SAID THE ROYAL NORWEGIAN NAVY WILL GET AT LEAST FIVE NEW SUBMARINES, NEW 'STANDARDISED VESSEL' AND 18 SMALLER VESSELS

task. We need a defence that is fit for purpose in the emerging security environment. This plan represents a historic boost in defence spending and involves a significant strengthening of all branches of the Armed Forces," said Prime Minister Jonas Gahr Støre.

"Norway is a maritime nation with a strong maritime legacy. The Government commits to strengthening the Navy, with new frigates, submarines and other vessels. The plan also involves a robust air defence package, including Norway's first long-range air defence system. We will also strengthen the land forces by expanding the Army from one to three brigades and increasing the Home Guard to a total of 45,000 soldiers," said Prime Minister Støre.

The Norwegian Government is proposing to parliament a historic increase in defence spending of NOK600 billion (US\$54.6 billion) over the next 12 years

The historic boost for Norway's armed forces will see all of the services strengthened, with more personnel and new capabilities. "Providing security for the people of Norway is the Government's most fundamental

The Government will prioritise a number of areas, including a strong maritime package with a minimum of five new frigates with anti-submarine helicopters, at least five new submarines, and a standardised vessel class of up to 10 large and 18 smaller vessels. In terms of money, the strengthening of the Royal Norwegian Navy is the largest investment in the long-term plan.



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The 2024 conference agenda promises to bring those attending fully up to speed with recent technological, design and policy developments, and cast the minds of attendees into the future landscape for wind propulsion technology.

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FULL LIST OF ABSTRACTS NOW AVAILABLE TO VIEW

<https://rina.org.uk/events/events-programme/wind-propulsion-2024/>

SHIPBUILDING

Final Flight 1 LPD starts trials

In March 2024, HII's Ingalls Shipbuilding division announced the successful completion of acceptance trials in the Gulf of Mexico of the amphibious transport dock *Richard M McCool Jr* (LPD 29), the final Flight I transition ship before Ingalls moves into series production of the LPD Flight II line.

Ingalls Shipbuilding has delivered 12 San Antonio-class

ships and currently has three LPDs under construction, including *Richard M McCool Jr*, the final transition ship; *Harrisburg* (LPD 30), the first Flight II LPD; and *Pittsburgh* (LPD 31). Ingalls was also awarded in March 2023 a modification contract for the procurement of the detail design and construction of *Philadelphia* (LPD 32), the 16th ship in the San Antonio class and the third LPD Flight II.



RICHARD M MCCOOL JR IS THE FINAL FLIGHT I TRANSITION SHIP

SHIPBUILDING

US Navy accepts future LCS 36 USS Kingsville

The US Navy accepted delivery of the future USS *Kingsville* (LCS 36) at Austal USA's shipyard in Mobile, Alabama, on 1 March 2024.

Kingsville is the 18th Independence-variant Littoral Combat Ship constructed and successfully completed acceptance trials on 1 February 2024, marking the last significant milestone before a ship is delivered.

Kingsville will be commissioned later this summer, and will be homeported in San Diego, California.

PROPULSION

Damen Naval turns to Renk for frigate gearboxes

Damen Naval has contracted Renk to supply the gearbox systems for the new anti-submarine warfare frigates that the Dutch shipyard is building, two each for the Royal Netherlands Navy and two for the Belgian Navy.

The contract includes eight gearboxes that are part of the CODLAD (COMbined Diesel-eLEctric And Diesel) propulsion system for the frigates. The first gearboxes are due to arrive for installation in October 2025. The first of the ASW frigates is scheduled for delivery by Damen Naval in 2028.

SUBMARINES

Tonelero, third Brazilian Scorpène sub launched

On 27 March 2024, *Tonelero*, the third of the four Scorpène submarines in the ProSub programme was launched at the Itaguaí Naval base, in presence of the Brazilian President Luiz Inácio Lula da Silva and French President Emmanuel Macron.

The submarine was built entirely in Brazil by Itaguaí

Construções Navais (ICN) following a successful technology transfer and partnership with Naval Group.

Tonelero was launched in Itaguaí a few weeks after the delivery of *Humaita* and will soon start sea trials in order to be delivered in 2025. *Angostura*, the last submarine of the series will be launched in 2025.



The Royal Institution of Naval Architects Presents:

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The conference will provide an opportunity for human factors experts, naval architects, bridge officers and others to get together and discuss the recent developments. It will focus on lessons learned from interventions and applied research that were successful, or even more interesting, unexpected or bad results. For example, implementation of new automation on board that worked out differently or behavioral interventions that had unexpected effects. It is all about applied research that provides learned lessons for future Human Factor research, specifically for the Maritime domain.

As part of the conference, the delegates will have a unique opportunity to visit the new Seven Oceans Simulator centre of MARIN on 10th October 2024, where the attendees will have a chance to:

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Keynote Speakers



Job Brüggén, LVNL

Job Brüggén holds a masters degree from Delft University of Technology in Aerospace Engineering. In 1986 he started working for the National Aerospace Laboratory where he later became the head of the Air Transport Division. His particular interest in safety led him to Air Traffic Control the Netherlands, to become their first safety manager in 2002. He is particularly known for his activities in Just Culture developments and was one of the first to demonstrate the detrimental effect of prosecution of air traffic controllers on incident reporting. In 2003 he re-created the CANSO Safety Standing Committee and chaired it for six years. He also advises in the health care industry on safety matters with a particular focus on safety leadership. From November 2014 he was co-chairman of the Eurocontrol Safety Team, until 2019. For the Air Traffic Controllers academy of LVNL, he is the chairman of the examinations committee.



Dr Rafet Emek Kurt, Reader, in Maritime Safety and Human Factors, Department of Naval Architecture Ocean and Marine Engineering, University of Strathclyde

Dr. Kurt also serves as the Director of the Maritime Human Factors Centre, further demonstrating his commitment to advancing research in this field. Additionally, he holds the position of Associate Editor in Ships and Offshore Structures, showcasing his dedication to the dissemination of knowledge within the maritime community. Dr. Kurt is also a member of the International Ship and Offshore Structures Congress (ISSC), where he collaborates with peers to develop ship design criteria informed by human factors, further highlighting his commitment to the advancement of maritime safety practices.

Over the years, Dr. Kurt has worked on many research projects aimed at integrating human factors, safety, and risk into maritime practices. His work has been published in respected journals and conferences, igniting essential discussions in the maritime community.

<https://rina.org.uk/events/events-programme/human-factors-2024/>

POLAND

POLISH NAVY 'STEPPING UP A WEIGHT CLASS' WITH PLANS FOR SURFACE COMBATANTS AND SUBS

The Polish Navy has ambitious plans to build new frigates, submarines and signals intelligence vessels, as a recent Military Balance Blog from the International Institute for Strategic Studies (IISS) explained



POLAND'S PRINCIPAL SURFACE UNITS ARE THE PULASKI-CLASS FRIGATES, SECOND-HAND US NAVY OLIVER HAZARD PERRY-CLASS UNITS ACQUIRED IN THE EARLY 2000S BUT DATING FROM THE 1980S. SOURCE: US NAVY

Poland's naval expansion plan is starting to become a reality, putting the fleet on course for a step up in capability, as Jonathan Bentham research analyst (maritime) for Defence and Military Analysis at the IISS explained in a recent blog*.

Warsaw has signalled it may increase defence spending to 4% of GDP and double the size of its land forces as it sets about turning itself into a bulwark of NATO in Central and Eastern Europe. This has attracted much attention, alongside its prominent role in supporting Ukraine against Russia's military onslaught. Poland's plans to transform its naval capabilities, while overshadowed by the moves above, are no less dramatic.

With a small, ageing and disparate collection of assets, the Polish Navy has long struggled to make much of an impact even within the confines of the Baltic Sea. Its two principal surface units – the Pulaski-class frigates – are second-hand US Navy Oliver Hazard Perry-class frigates, acquired in the early 2000s but dating from the 1980s. It also operates an ex-Soviet Kilo-class submarine with a chequered operational record. Among an assortment of other patrol and coastal combatants, the only modern platforms are the

offshore patrol vessel ORP *Ślązak* and the Kormoran II-class mine countermeasures vessels.

Like Warsaw's ambition to improve its land forces, the aim to boost the navy predates the latest crisis in European security brought on by Russia's aggression, though Moscow's hostility has added momentum and a sense of urgency to those efforts.

The country's ambition to bolster its naval fleet took an important step forward on 31 January 2024 with the keel-laying ceremony for the first of the navy's new *Miecznik*-class frigates, ORP *Wicher*.

The *Miecznik* frigate programme is the centrepiece of the country's naval modernisation plan, a programme that started over a decade ago as a programme for a new class of corvettes. Now, at 7,000tonnes full-load displacement, they are some 3,000tonnes larger than the navy's current frigates.

The design selected in March 2022 and being built by the PGZ Naval Shipyard in Gdynia is based on the Babcock International Arrowhead 140 that will soon enter service with the UK Royal Navy as the Type-31.

THE POLISH NAVY MINE COUNTERMEASURES VESSEL ORP *DRUZNO* CONDUCTS OPERATIONS IN THE BALTIC DURING EXERCISE BALTOPS22

Warsaw plans to acquire three units between 2028 and the early 2030s, which would constitute a near tripling of the full-load displacement of Poland's current principal surface-combatant force. It also has the option to acquire five more units, which, if realised, would quadruple the country's current escort force from two to eight vessels.

The Polish vessels are set to be better armed than their British equivalents. Their weapons systems will include 32 cells for the Mk 41 vertical launch system (VLS) to house the medium-range variant of the Common Anti-air Modular Missile, with potentially up to 128 missiles accommodated in quad-pack form. They will also feature eight, and possibly 16, Saab RBS15 Mk3 anti-ship missiles.

Consequently, the Polish Navy will be making the leap from a Cold War-era point-defence missile system to a modern NATO system that should enable its platforms to conduct integrated air defence with Poland's other forces and its NATO allies.

The Mk 41 VLS will offer a significantly enhanced rate of fire over the earlier Mk 13 guided-missile launch system. Additionally, the transition from a single launch system to separate dedicated surface-to-surface and surface-to-air launch systems will increase the survivability and flexibility of the *Miecznik*-class over the vessels they replace.

Among other naval enhancements in the offing are two new signal intelligence vessels; the keel laying for the



THE *MECZNIK*-CLASS FRIGATES ARE BEING BUILT BY THE PGZ NAVAL SHIPYARD IN GDYNIA BASED ON THE BABCOCK INTERNATIONAL ARROWHEAD 140 DESIGN



second took place in January. Moreover, Poland has awarded a contract to Kongsberg Defence & Aerospace for several hundred anti-ship naval-strike missiles for its coastal-defence batteries. Warsaw has also expressed an ambition under the Orka programme for a class of three new submarines equipped with land-attack cruise missiles, with several submarine builders expressing an interest.

Should Poland's naval plans come to fruition, they will open the way for the country to play a more consequential role in a transformed maritime environment in the Baltic Sea, where maritime defence is getting more attention. Finland, Germany and Sweden are upgrading their capabilities, and several Baltic states are taking steps to bolster their coastal missile defences. Poland, with its new frigates, will have the potential to integrate more effectively with allied navies further afield as well.

The length and cost of Poland's overall defence shopping list, however, has raised doubts as to whether all these programmes will come to fruition, either because of budgetary or industrial-capacity constraints. And the naval programmes may be the most prone to being squeezed.

As with its ambitious land-forces modernisation plan, Poland's ability to fully staff the naval expansion also remains in question, given its force size of just over 6,000 personnel.

Nevertheless, at the Warsaw Security Forum in October 2023, one of the key themes was the geopolitical shift of gravity towards Central and Eastern Europe as a consequence of the Russia-Ukraine War, with Poland featuring prominently in that shift. In defence terms, this may have a significant land and air focus. But for Poland and the Baltic states, it promises to include an important maritime component as well. ■

**This article was first published on Military Balance+ on 28 February 2024.*





NAVAL GROUP'S BLACK SWORD BARRACUDA DESIGN HAS BEEN SELECTED AS THE REPLACEMENT FOR THE ROYAL NETHERLANDS NAVY'S WALRUS-CLASS SUBMARINES (PICTURED BEHIND)

SUBMARINES

FRANCE'S NAVAL GROUP SELECTED BY THE NETHERLANDS FOR WALRUS-CLASS SUBMARINE REPLACEMENT PROGRAMME

Black Sword Barracuda design will replace ageing Dutch submarines in the mid-to-late 2030s

The Netherlands Ministry of Defence has provisionally selected Naval Group – offering its Black Sword Barracuda design – to deliver a replacement submarine capability to succeed the Royal Netherlands Navy's current Walrus-class boats.

Announcing the decision on 15 March 2024, State Secretary for Defence Christophe van der Maat said that the French naval shipbuilding, support and services group had emerged as clear winner ahead of rival proposals from Sweden's Saab (teamed with Damen Group) and German shipbuilding contractor thyssenkrupp Marine Systems.

The Netherlands plans to procure four new conventionally powered submarines – to be named HNLMS *Orka*, HNLMS *Zwaardvis*, HNLMS *Barracuda* and HNLMS *Tijgerhaai* – to replace the ageing Walrus-class boats on a one-for-one basis. Designed during the latter stages of the Cold War, the Walrus-class submarines were commissioned into the Royal Netherlands Navy between 1990 and 1994. Three boats remain in service.

The provisional award milestone concludes the selection process and opens up a period of exclusive

negotiations intended to lead to a full delivery contract. The delivery contract will be signed after the tender assessment has been debated and approved in the Netherlands' House of Representatives. The contract will stipulate that Naval Group delivers the first two submarines within 10 years of contract signature, said van der Maat. The intention is to have both boats operational between 2034 and 2037.

The Netherlands government in 2013 outlined plans to acquire a replacement class in order to maintain a longer-term submarine capability. Identifying the Royal Netherlands Navy's submarine force as a strategically important niche capability for both NATO and the EU, the Defence Material Organisation – renamed last year to become the Commando Materieel en IT (Command Material and IT [COMMIT]) – in December 2019 shortlisted Naval Group, Saab and thyssenkrupp Marine Systems to compete for the contract.

The requirement developed for the Walrus-class replacements called for a submarine with extended range and endurance to be able to deliver a true expeditionary capability. Saab offered the C718

expeditionary derivative of Sweden's A26 design; thyssenkrupp Marine Systems proposed the Type 212CD E expeditionary variant of the German/Norwegian Type 212CD submarine; and Naval Group pitched Black Shark Barracuda (a smaller conventionally powered derivative of the French Navy's Suffren-class nuclear-powered attack submarine).

Bids from the three contenders were submitted at the end of July 2023. Over the next seven and-a-half months, the evaluation team within COMMIT completed a comprehensive evaluation of each tender response against many hundreds of individual requirements/metrics.

Naval Group has not released detailed information on the characteristics of the Black Sword Barracuda variant offered to the Netherlands. However, an open source data sheet issued by the company suggests a design with a surface displacement of 3,300 tonnes, a length overall of 82m and an 8.2m diameter pressure hull. Other features include a payload of up to 30 weapons, six torpedo tubes, and a standard crew of 35.

The Netherlands government has also demanded strategic independence in the delivery, operation and in-service sustainment of the new boats, tying this into a major role for the Dutch industrial and intellectual base in the programme. Allied to this, the Ministry of Economic Affairs and Climate Policy evaluated proposals for an Industrial Cooperation Agreement (ICA) intended to strengthen the Dutch defence and security-related technological and industrial base: the conclusion of an ICA with the winning shipyard is a condition for the award of a contract.

A memorandum of understanding (MoU) will also be concluded between the Dutch government and France. The areas covered by this MoU will include rights of use, information security and knowledge sharing.

Naval Group said its selection "commits [us] to implement a full-scale strategic partnership with the Netherlands aimed at supporting the Royal Netherlands Navy submarine service and at intensifying cooperation with the Netherlands' Ministry of Defence, industry and R&D partners".

The company added that its industrial cooperation plan will involve the company's existing network of Dutch partners on key systems and components "ensuring that the Netherlands ecosystem develops and retains expertise and involvement over the submarine life cycle."

A pre-contract viewgraph released by Naval Group has identified a number of candidate Dutch subcontractors. These include RH Marine (platform automation and power management), Combimac (low-noise electric motors), Solico (composite structures), Bolidt (deck systems and acoustic cladding), Royal IHC (module manufacture and steel structures), Van Halteren Technologies (hydraulic systems), (filtration systems)

and Verebus (logistics). Two knowledge institutes – MARIN and TNO – are also expected to make a prominent contribution.

According to the Netherlands Ministry of Defence, the new design submarines will represent a significant improvement over the Walrus class with respect to their overall design and operational capabilities. For example, they will embody improvements in signatures, weapons (both heavyweight torpedoes and cruise missiles), and special forces facilities. Also, their improved sensors and communications systems will leave them better equipped to collect, analyse and share intelligence, reconnaissance and surveillance information.

The new submarines will also have greater energy capacity through the adoption of a lithium-ion battery technology. This will allow them to remain submerged for much longer periods, and significantly reduces the indiscretion ratio (that period when the submarine must come to periscope depth to raise a snorkel mast in order to run its diesel engines to charge the batteries).

Maintenance and in-service support of the new submarines will be the subject of separate arrangements. The Netherlands Ministry of Defence has stated that it wishes to be able to perform general maintenance and minor repairs itself, although it has at this stage not foreclosed the option for Naval Group – as original equipment manufacturer – to take responsibility for larger overhauls given its specific in-house knowledge, experience and equipment. A final decision on the preferred support strategy will be worked out in consultation with the Directie Materiële Instandhouding (Directorate of Material Conservation, DMI) in Den Helder.

Two Walrus-class submarines will remain in service into the mid-2030s in order to sustain a credible submarine capability until the arrival of the replacement boats. First-of-class HNLMS *Walrus*, decommissioned in October 2023, and one other boat will be used as a source of spares by DMI to keep the two operational submarines in an operational condition for another decade of service. ■



FOUR EXAMPLES OF THE WALRUS-CLASS SSK WERE BUILT, OF WHICH THREE REMAIN IN SERVICE



AUKUS SUBMARINE BUILD AND SUSTAINMENT PARTNERS ANNOUNCED

Key roles delegated to BAE Systems in the UK and ASC in Australia



The Australian government has selected BAE Systems and ASC Pty Ltd to jointly build Australia's new fleet of nuclear-powered submarines in the latest significant development in the AUKUS trilateral security pact.

SSN-AUKUS is a new class of nuclear-powered attack submarine (SSN) being developed in partnership with the US and Australia to satisfy the needs of the Royal Navy and the Royal Australian Navy. The first-of-class for the Royal Navy is due to enter service in the late 2030s; and Australia expects to deliver its first SSN-AUKUS submarine in the early 2040s.

Announcing the move on 21 March 2024, the companies said they would work closely together to establish the foundations of the complex project and will initially form a collaborative arrangement. This will in due course lead to the establishment of a long-term incorporated joint venture company within Australia that will bring together the skills, expertise and resources of the two partners to deliver Australia's SSN-AUKUS submarines under AUKUS Pillar 1.

As previously highlighted by *Warship Technology*, Australia in September 2021 revealed plans to acquire a fleet of SSNs under a tripartite arrangement with the US and UK governments. In March 2023, after an 18-month consultation period, the three AUKUS partners unveiled a so-called 'Optimised Pathway' outlining a staged approach to the Commonwealth's acquisition and sustainment of a force of eight SSNs by the mid-2050s.

The plan envisages Australia initially purchasing three Virginia-class SSNs from the US government, to be followed by the acquisition of a new SSN-AUKUS submarine design. SSN-AUKUS will be the future attack submarine for both the Royal Australian Navy and Royal Navy, with production lines being established in both countries.

THE FIRST ROYAL NAVY AUKUS SUBMARINE IS DUE TO ENTER SERVICE IN THE LATE 2030S – AUSTRALIA EXPECTS ITS FIRST SUBMARINE TO BE DELIVERED IN THE EARLY 2040S

This arrangement demands that, alongside acquiring world-leading submarine technology, Australia must also establish in-country a new production line, supply chain and sustainment capability for conventionally armed, nuclear-powered submarines. The expectation is that the SSN-AUKUS programme – as the single biggest capability acquisition in Australia's history – will create around 20,000 direct jobs over the next 30 years.

At the same time, Australia is investing significant amounts in building up submarine industrial bases in both the US and UK. This funding is intended to ensure that both nations can upskill and upscale to a level sufficient to deliver the transfer of technology and associated support required by Australia.

Alongside the build of the future submarine construction yard in Osborne, facilities at HMAS Stirling and other supporting facilities in Western Australia will be expanded to support the scale of infrastructure required for the berthing and support of nuclear-powered submarines. Plans are also being developed for a second submarine base, to be located on Australia's east coast.

SSN-AUKUS

The construction and delivery of the new SSN-AUKUS submarine is intended to provide an enduring SSN capability for both Australia and the UK. Capitalising on concept design activities previously performed under the UK's national SSN(R) programme, the SSN-AUKUS design will additionally incorporate technology inputs from all three AUKUS nations, including US-developed technology such as propulsion plant systems and components, a common vertical launch system and weapons. The ambition is to engineer a high degree of commonality and interoperability across all three navies' SSN platforms and combat systems.

With the UK delivering its first SSN-AUKUS in the late 2030s and the first SSN-AUKUS submarine built in Australia set to follow in 2042, subsequent boats will be delivered at three-year intervals thereafter. Again, Australia will make a proportionate financial investment in the UK submarine industrial base to accelerate delivery of the SSN-AUKUS programme.

The UK government in October 2023 announced the award of Detailed Design and Long Leads (D2L2)



contracts for SSN-AUKUS worth an aggregate £4 billion (US\$5 billion) to BAE Systems, Rolls-Royce Submarines, and Babcock. Running through to 2028, this D2L2 funding covers detailed design and development activity together with procurement of critical long lead items.

The D2L2 award includes significant infrastructure investment at BAE Systems' Barrow-in-Furness site – which will see the site's facilities double in size from 80,000m² to 160,000m² by the late 2030s – investment in its supply chain, and recruitment of a more than 5,000 people. BAE Systems has already increased its UK submarines workforce to 13,500, with plans to grow to around 17,000 at its peak to support SSN-AUKUS in the UK.

Rolls-Royce Submarines in Raynesway, Derby, will provide the reactors for all Australian SSN-AUKUS boats as well as for Royal Navy submarines. Reactors and nuclear material will be shipped to Australia in complete welded power units that will not require refuelling during their lifetime: Australia will not enrich uranium or reprocess spent fuel as part of this programme, will not produce its own nuclear fuel for its SSNs, and has committed to managing all radioactive waste generated through its nuclear-powered submarine programme, including spent nuclear fuel, in Australia.

Sovereign build partner

ASC has been at the centre of Australia's submarine programme for more than three decades, having built the Royal Australian Navy's six Collins-class conventionally powered submarines and taken responsibility for their through-life sustainment. Through these activities, the company has built up its experience in submarine construction, testing, commissioning and certification, including physical integration of US-supplied combat systems.

According to the Australian government, bringing ASC and BAE Systems together represents the best structure for the build of the SSN-AUKUS submarines destined for the Royal Australian Navy. In particular, it enables Australia's Sovereign Submarine Build Partners to develop and expand an Australian industrial base and supply chain for long-term submarine construction

AUSTRALIA NEEDS NEW SSNS TO REPLACE ITS COLLINS-CLASS CONVENTIONAL SUBMARINES

in Osborne, South Australia. The Commonwealth will hold sovereign protection rights in relation to the governance of the joint venture to preserve national interests in the build programme.

BAE Systems' involvement ensures an integral connection between the SSN-AUKUS design led by BAE Systems in the UK, where Australian personnel are already working, and the SSN-AUKUS build strategy in Australia. ASC and BAE Systems – and once established, the new joint venture – will operate collaboratively within a wider enterprise and be accountable and responsible for the delivery of Australia's SSN-AUKUS submarines, as well as ensuring safety, security, and regulatory compliance throughout the build programme.

ASC Pty Ltd will also be responsible for the sustainment of nuclear-powered submarines in Australia. This will commence with the Virginia class in the early 2030s, to be followed by the SSN-AUKUS boats.

Congressional approval for the National Defense Authorization Act in December 2023 has established exemptions allowing Australian workers to sustain US submarines. As a result, there will be opportunities to embed Australian workers from ASC in the Pearl Harbor Naval Shipyard to train on sustainment of US Navy SSNs. ASC will also provide sustainment support to visiting US and UK submarines at HMAS Stirling in the lead up to the establishment of Submarine Rotational Force-West from 2027. ■



AUSTRALIA WILL INITIALLY ACQUIRE THREE VIRGINIA-CLASS SSNS FROM THE US, TO BE FOLLOWED BY THE ACQUISITION OF THE SSN-AUKUS DESIGN



FRIGATES & CORVETTES

ST ALBANS RETURNS TO SEA AS TYPE 23 'LIFEX' PROGRAMME APPROACHES COMPLETION

A decade-long programme of upgrade work on the UK Royal Navy's ageing Type 23 frigates is nearing completion, with one ship left to complete the process



THE UPGRADED *ST ALBANS* LEFT DEVONPORT DOCKYARD ON 1 MARCH 2024

At the end of February 2024, the UK Royal Navy frigate HMS *St Albans* returned to sea after what the Royal Navy described as a “massive revamp” at Devonport Dockyard in Plymouth.

After nearly 20 years of constant service in the Atlantic, the Mediterranean and the Gulf, *St Albans* arrived in Plymouth in 2019 to begin preparations for the refit.

Back at sea for the first time in four and a half years, HMS *St Albans* is the penultimate Royal Navy frigate to undergo a massive overhaul. One further Type 23 remains – HMS *Sutherland* – remains to complete the LIFEX programme, a process that is due to be completed in June 2024. The LIFEX programme commenced in 2016, when the Type 23 HMS *Argyll* entered Devonport Royal Dockyard.

The ‘LIFEX Upkeep’ for the Type 23 frigates is a particularly extensive programme of capability update and upgrade developed and co-ordinated through the Surface Ship Support Alliance, which consists of the UK Ministry of Defence, Babcock and BAE Systems.

Led by Babcock, the programme brings together major changes to equipment and systems, encompassing the Capability Sustainment Programme (CSP) and the opportunity to address equipment obsolescence, as well

as extending the life of the hull and superstructure to operate well beyond its original design life.

Among the major upgrades and updates under the CSP, HMS *Argyll* was the first of class to receive the Future Local Area Air Defence System (FLAADS), or Sea Ceptor, replacing Sea Wolf as the primary weapon system. In a further first, *Argyll* saw significant change to the chilled water system with the introduction of a ring main.

This first refit under the Type 23 life extension programme incorporated a number of challenges, among them being the efficient and successful delivery of the extensive hull and superstructure preservation work, involving the superstructure being blasted back to bare, repaired and repainted, following pre-upkeep assessment and surveys to ensure sound knowledge of the extent of the work required. The overall aim of the project is to make significant changes to equipment and systems to address obsolescence, whilst incorporating lessons identified in the recent delivery of upkeeps on other vessels in the class. *Argyll* left Devonport Royal Dockyard in 2017 for sea trials and final acceptance of her new primary weapon system, before returning to the fleet with significantly improved structural sustainability and fighting capability, a process that has since been adopted with the other vessels in the class, right up to *St Albans*, nearly a decade later.



THE TYPE 23 FRIGATES HAVE BEEN THE SUBJECT OF A ROLLING, 10-YEAR UPGRADE PROGRAMME SINCE 2016

Having completed the upgrade, *St Albans* left Devonport Naval on 1 March 2024, on the first stage of her regeneration to return her to front line duties later this year.

The ship's 178-strong crew moved back aboard in mid-November, after which they worked hand-in-hand with contractors and engineers from Babcock to prepare the vessel move under its own power for the first time since 2019.

"Going back to sea is a huge milestone. Today is the result of a real team effort where ship's company, Babcock, other specialist contractors, shore-based support organisations, Devonport Naval Base and even some people from other Devonport-based ships have come together to help us transition from engineering project back to being a warship," said HMS *St Albans*' Commanding Officer Commander Helen Coxon.

Work on HMS *St Albans* alone demanded more than 1.2 million working hours by sailors, civilian engineers and shipwrights, software specialists and many more. Around 350 structural enhancements to strengthen the ship and allow her to carry new equipment have been carried out, demanding more than 4km of welding.

All four diesel generators were replaced, meaning the ship can produce more power, and the main engines removed, overhauled, and reinserted – a complex engineering feat, and a first for her project team. More than two dozen new pumps with 4km of pipework have been fitted, and some 10,000 square metres of paintwork refreshed, leaving the vessel more efficient and reliable, with the living quarters overhauled to better meet the needs of sailors in the 2020s, such as the installation of more plugs and USB ports.

Now fitted with the Sea Ceptor air defence system, *St Albans* now also has one magazine that has been adapted for the new Martlet missile, which has recently entered service with the Fleet Air Arm, and aviation facilities enhanced to support the latest variants of Merlin, Wildcat and most NATO maritime helicopters. As a dedicated submarine hunter the ship has been fitted with Sonar 2150 in place of 2050, which can detect underwater threats at greater range and is easier to operate. ■

VARD UNVEILS 'RESILIENCE' SERIES

Best known as a designer and builder of merchant and offshore vessels, Fincantieri-owned Vard Group also has significant experience building military vessels, experience it has drawn on in the design of a new class of warships, the Resilience Series.

Unveiled in April 2024, the Resilience Series draws on Vard's experience in the military sector, and that of parent company Fincantieri. The unveiling of the new series of medium-size vessels coincided with an announcement that the Norwegian Government is to significantly boost defence spending and build a minimum of five new frigates with anti-submarine helicopters, at least five new submarines, and a standardised vessel class of up to 10 large and 18 smaller vessels.

The company did not reveal much detail about the vessels but noted that as a group the company owns several yards and is "in control and ownership over the full value chain". The company also highlighted its expertise and experience in integration weapons, sensors and communication systems. "Our focus and experience on life cycle management (LCM) and the provision of integrated logistic support will be a major asset to the navy," the company said.

"Vard has great capacity and flexibility for the construction of naval vessels in Norway. In addition, Vard focuses on using a large proportion of Norwegian suppliers with service networks in Norway and good access and short lead times for spare parts."

Vard Langsten has a lengthy experience of building naval vessels, most recently with the construction of three Jan Mayen-class coast guard vessels for the Norwegian Coast Guard.



VARD'S RESILIENCE SERIES RESPONDS TO THE NORWEGIAN GOVERNMENT'S PLANS TO BEEF UP DEFENCE SPENDING



LAUNCHING & RECOVERY

HII BEGINS TOPSIDE TESTING OF SECOND ELECTROMAGNETIC LAUNCHER FOR US NAVY'S FORD-CLASS CARRIERS

First 'dead loads' launched from carrier *John F Kennedy* as ship's launch and recovery equipment is commissioned

In February 2024, Huntington Ingalls Industries (HII) confirmed that its Newport News Shipbuilding division (NNS) had initiated topside testing of the electromagnetic aircraft launch system (EMALS) on the US Navy's aircraft carrier *John F Kennedy* (CVN 79).

EMALS, first integrated into USS *Gerald R Ford* (CVN 78), replaces the existing steam catapults currently in use on the US Navy's Nimitz-class aircraft carriers.

The launching system is designed to expand the operational capability of Ford-class carriers, providing the US Navy with the capability to launch all current and future carrier air wing platforms, from lightweight uncrewed aircraft to heavy strike fighters. The mission and function of EMALS remains the same as the traditional steam catapult – however, it employs entirely different technologies. EMALS uses stored kinetic energy and solid-state electrical power conversion. This technology permits a high degree of computer control, monitoring and automation.

The technology adopted in EMALS has a number of benefits. These include increased reliability and efficiency; more accurate end-speed control and

smoother acceleration; expanded operational capability with increased sortie rates; cost reduction over time due to decreased manning and maintenance requirements; and the ability to launch a broader range of naval aircraft with less stress on the ship and aircraft. The electromagnetic launcher also provides higher launch energy capacity, substantial improvements in system weight, volume and maintenance, quieter and cooler work and living spaces for sailors compared to older steam-driven systems, and more intuitive maintenance software that will reduce troubleshooting times.

US Navy and industry partners worked together to launch the first dead loads from the flight deck of the carrier on 14 February 2024. The dead-load testing yielded important performance data for the ship's EMALS and marked the first of many test launches from the carrier as the ship's aircraft launch and recovery equipment is commissioned.

A joint test team including personnel from Naval Air Systems Command (NAVAIR), HII, Supervisors of Shipbuilding, Conversion and Repair, General Atomics and Carrier and Field Service Unit used one of the



SO-CALLED DEAD-LOAD TESTING OF THE EMALS ON *JOHN F KENNEDY* STARTED IN EARLY FEBRUARY 2024. SOURCE: HII

ship's catapults to launch carts simulating aircraft into the James River. With valuable data in hand, the team is planning and preparing for future testing on the ship's four catapults.

Following successful 'no-load' testing on catapults one and two, known as the 'bow cats', the NNS team, alongside the *John F Kennedy* crew, has now started dead-load testing.

In this phase, large, wheeled, car-like structures of graduated weights up to 80,000 pounds to simulate the weight of aircraft are launched off the carrier's bow into the James River. They are then retrieved and relaunched until the conclusion of the test programme to ensure the catapults are ready for their primary intended purpose, launching all carrier-based fixed-wing aircraft flown by the US Navy.

"As we make sustained progress in the construction, testing and turnover of *John F Kennedy*, reaching the dead-load testing phase is a visual demonstration of how far we've come," said Lucas Hicks, vice president, *John F Kennedy* (CVN 79) new construction aircraft carrier programme.

"It is evident from the thousands of written messages that our shipbuilders and their families appreciate and understand the significance of our work. We are proud of the incredible teamwork that has brought us to this point and remain committed to delivering this mighty aircraft carrier to the fleet so the crew can carry out the important mission ahead."

"The first dead-load launch off the flight deck is a historic moment for PCU *John F Kennedy*, and a testament to the power of great teamwork between our *JFK* crew, HII team, and NAVAIR engineers," said Capt Colin Day, commanding officer, PCU *John F Kennedy* (CVN 79).

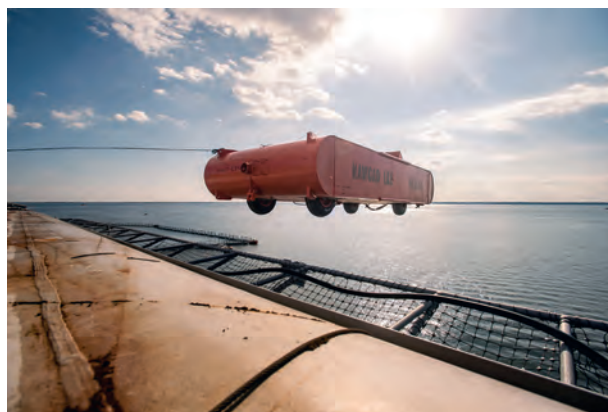
"I am particularly proud of our air department and the hard-working aviation boatswain mates who worked tirelessly alongside the engineering and testing teams to get us to this critical moment."

Traveling more than 300ft down the catapult track at more than 150 miles per hour, EMALS provides expanded operational capability at reduced costs, higher launch-energy capacity, and more accurate end-speed control, with a smooth acceleration at both high and low speeds.

Launch profiles have been optimised to reduce stress on the aircraft, in contrast to the sudden acceleration of steam catapults.

Lead EMALS test engineer Joseph Wolfe, who has worked on the EMALS programme for 18 years, supporting the technology from its inception and

EMALS CAN LAUNCH ALL CURRENT AND FUTURE CARRIER AIR WING PLATFORMS, FROM LIGHTWEIGHT UNCREWED AIRCRAFT TO HEAVY STRIKE FIGHTERS. SOURCE: HHI



A JOINT TEST TEAM INCLUDING NAVAIR PERSONAL, SUPERVISORS AND INDUSTRY USED ONE OF THE SHIP'S CATAPULTS TO LAUNCH CARTS SIMULATING AIRCRAFT INTO THE SEA. SOURCE: HHI

development to its installation and use on *Gerald R Ford* said: "Nearly 20 years ago, our team was very small, working long hours, and under a tremendous amount of pressure to bring success to a programme we knew would be monumental for the US Navy. Fast forward to where we are now, not only did we commission [CVN] 78, but she finished her deployment with great success, and we can bring that success to 79."

Wolfe and the EMALS test team utilised lessons learned from USS *Gerald R Ford*'s first operational deployment as they began testing for EMALS on *Kennedy*. Additionally, EMALS test efforts benefit from the collective knowledge of *Kennedy*'s ships force who are already trained on Ford-class launch and recovery systems.

EMALS for *Kennedy* also bears all the same improvements delivered to CVN 78, including several engineering change proposals, software upgrades, and knowledge garnered from testing and deployment. "We re-wrote our certification manual based on the lessons we learned on CVN 78 and incorporated them into appendices and procedures for CVN 79," said Wolfe.

Kennedy is the second Gerald R Ford-class aircraft carrier under construction at NNS, which is the sole designer, builder and refueler of nuclear-powered aircraft carriers in the US. In addition to *Kennedy*, two other Ford-class carriers are under construction at NNS, *Enterprise* (CVN 80) and *Doris Miller* (CVN 81). ■



UNCREWED VESSELS

UPPING THE GAME FOR NEXT-GENERATION AUTONOMOUS SYSTEMS

As uncrewed vessels continue to be developed for naval applications, the US Navy is seeking what it describes as 'next-generation autonomy' for maritime units of all types

The US Navy is seeking proposals for what it describes as 'next-generation autonomy' that will increase the capability and scope of utility of uncrewed maritime vehicles (UMVs), whilst reducing the level of remote human operator involvement required to operate them. The term UMV refers to uncrewed surface vehicles (USVs) and uncrewed underwater vehicles (UUVs).

Via its Small Business Innovation Research (SBIR) programme, and its Intelligent Autonomous Systems Science and Technology Strategy, it is seeking proposals that will contribute to the development of smaller, more numerous, and distributed uncrewed systems, as a complement to larger, more powerful, proven capabilities. In particular, it is seeking proposals for technology that can enhance the capability and scope of utility of UMVs by enabling them to be used in a much greater number of situations than they can be today.

The SBIR notes that UMVs are "constrained by low bandwidth and intermittent communications, including extended periods of time without communication with remote human operators". Also, it says: "their utility is also affected by substantial limitations in situational awareness." This necessitates highly capable autonomous control software on uncrewed platforms that can make decisions without the involvement of a human operator, using incomplete, uncertain and sometimes inaccurate information.

The Navy SBIR says advancements are needed in autonomy's "ability to handle complex tasks and dynamic, unstructured, uncertain and harsh maritime environments

without the assistance of a human operator." It continues: "Autonomy must be able to perform more complex tasks than currently possible, for example, to manoeuvre around another vessel, or multiple vessels, which are uncooperative and to counter another vessel, or multiple vessels, which are manoeuvring in an adversarial manner (to counter the UMV's manoeuvres or to threaten the UMV, such as 'herding' or 'blocking' tactics)." The SBIR says UMV autonomy needs to support the ability of uncrewed units to cooperate with each other to 'work as a team' to undertake complex tasks, such as optimising the performance of a distributed sensor network.

Next-generation autonomous control

Technologies needed to realise these advancements are assessed currently to be at technology readiness level (TRL) 1-4, but in the recent solicitation, the SBIR is seeking to raise TRLs and facilitate the introduction of next-generation autonomous control for UMVs that will increase their capability and scope of utility. Higher level technology will, it hopes, enable autonomy to be used in a much greater number of situations, with high degrees of resilience and reliability.

The desired future autonomy for UMVs that the SBIR wants include the ability to perform complex tasks with little to no human intervention; ability to handle dynamic, unstructured, uncertain and harsh maritime environments; support a variety of diverse missions and tasks; and support many heterogeneous UMVs that cooperate autonomously on their perception and decision-making, with the UMVs in that group performing a variety of different tasks.



AN UNMANNED SURFACE VEHICLE CONDUCTS MANOEUVRES – THE US NAVY WANTS UNITS SUCH AS THIS TO HAVE MUCH HIGHER LEVELS OF AUTONOMY

THE US NAVY WANTS UNCREWED UNITS THAT CAN BE USED IN A MUCH GREATER NUMBER OF SITUATIONS THAN THEY CAN TODAY

The autonomy should have the four capabilities listed above while operating with constraints including low-bandwidth and intermittent communication with a human operator including extended periods of time with no communication between the UMV and human operator; and be robust to uncertain, inaccurate and intermittent perception information.

The SBRI says approaches to multi-UMV autonomy should require 'modest computing resources' aboard UMVs. "UMV autonomy should also be portable so that it can operate on various UMVs with minimal integration effort and cost," it says.

The Navy expects that in Phase 1 small businesses will have developed a concept for a workable prototype for maritime autonomy for UMVs. Using results from Phase I, a Phase II effort will develop, demonstrate and validate prototype next-generation autonomy software for UMVs that addresses the above-mentioned requirements and constraints. It is anticipated that testing to support development of the next-generation autonomy software will consist of, at a minimum, simulation-based testing and in-water testing with physical-small scale models. Testing with full scale UMVs is costly and time-consuming



and is not a requirement for a successful proposal. Validation of next-generation autonomy software will also be carried out in simulation and with small-to-medium scale physical models in water. The Phase 2 period of performance is four years; a 24-month base, and 24-month option, if exercised. Following on from successful completion of Phase 2 and subject to availability of funding, the software is expected to transition for use in USV and UUV programmes.

AI system-equipped USV

In other developments, Robosys Automation has secured a contract from Legacy Marine in South Africa for the supply and integration of AI systems for a



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The rapid technological development in the field of Maritime Autonomy is creating an opportunity for the marine industry as well as a challenge for the regulatory framework. In recent years, various ships projects involving coastal and ocean-going routes with different degrees of autonomy are being tested. Those will have great implications for naval architects, shipbuilders, shipping companies, and maritime systems providers.

In December 2024, the International Maritime Organization (IMO) will host 109th session of the Maritime Safety Committee (MSC) where the Maritime Autonomous Surface Ships (MASS) group will meet again. The Royal Institution of Naval Architects and the Danish Society of Engineers (IDA Maritime) are organising the 3rd Autonomous ship conference on 20-21 November 2024 ahead of the IMO meeting.

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THROUGH THE SBIR, THE NAVY IS SEEKING THE DEVELOPMENT OF SMALLER, MORE NUMEROUS AND DISTRIBUTED UNCREWED SYSTEMS TO COMPLEMENT LARGER UNITS

fully autonomous uncrewed surface vessel (USV). The bespoke fully autonomous AI-driven system has been designed by Icarus Marine and will be constructed by Legacy Marine. The 9.5m USV can be launched from shore or from floating platforms such as logistic support ships, frigates and other mothercraft to undertake patrol, surveillance, interdiction and search and rescue functions, amongst others.

The USV has an aluminium hull, powered by a Volvo Penta D-6-400 engine, with steering and onboard systems, monitoring and controls, which includes payload and surveillance sensors. Its control system for autonomous navigation uses Robosys' Voyager AI system, which provides for the onboard navigation, visual and autonomous control of the USV at various levels of autonomy. Robosys' Voyager AI system, which will be installed on the USV, enables any motorised

vessel or waterborne craft to become fully autonomous. Its features include collision avoidance, including COLREGS compliance.

In March 2024, Kraken Technology Group and Auterion announced a partnership to develop autonomous capabilities for vessels in the littoral security boat sector. The partnership is focused on the development and implementation of modular, low-cost autonomy software and control systems for the maritime domain. The agreement will initially focus on integrated autonomy architecture for Kraken's K3 SCOUT and K4 MANTA uncrewed platforms.

Auterion's Skynode X, AuterionOS and numerous capability 'Apps' have already been developed and integrated into Kraken's K3 SCOUT USV, which is currently undergoing open water sea trials. ■

LOW-PROFILE VESSELS PARTICIPATE IN PROJECT CONVERGENCE CAPSTONE 4 EXERCISE

Two Leidos-designed uncrewed and autonomous-capable 'low-profile vessels' (LPVs) recently participated in Project Convergence Capstone 4 military exercises in California. The company delivered the vessels to the US Marine Corps in 2023.

Dave Lewis, Leidos senior vice president, sea systems said: "The prototypes we delivered will help create disruptive logistics capabilities for the Marine Corps. Their low profile and long range are intended to help the vessels achieve a higher mission success rate supporting dispersed Marine fire units than conventional methods."

The LPV's low-to-the-water visual profile helps to reduce probability of detection. The vessels are intended to transport a logistics payload of up to 5tonnes over a range of 2,000niles and were built to accommodate different autonomous control systems.

The LPV prototypes were delivered to the Marine Corps' Warfighting Laboratory for testing and technical assessment. Participation in the joint and multi-national Project Convergence Capstone 4 exercises was the latest stage of testing and experimentation with the vessels' capabilities.

Leidos designed the LPVs under contract with MilTech, a Montana State University research lab and an authorised National Government Partnership Intermediary.



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Sponsored by BMT, Babcock, Defence SA, ANSYS, and SH Defence, and Supported by the RINA Australian Division, the Royal Institution of Naval Architects is once again hosting the highly popular Warship International Conference in June 2024.

The increasing complex warship design requires an effective engineering assistance, design configuration control, supply chain and inventory management to meet operational requirements. With the introduction of autonomy and disruptive developments such as quantum technologies, could future operating concepts evolve leading to a step change in design requirements. With vessel design lives between 25 and 50 years naval architects need to consider the effects of current and future technological and operational developments now.

For the first time, RINA Warship Conference will be a 2-stream event with more talks available to hear from than ever before! The event will be a fantastic learning and networking opportunity, filled with many presentations, interactive Q&A panel discussions, and chances to catch up with old friends as well as make new connections from the Warship industry.

Keynote Speakers



Rear Admiral Rachel Durbin CSC, RAN

A distinguished leader in the Royal Australian Navy, RADM Durbin's career encompasses pivotal roles in marine engineering and strategic naval operations. With her extensive experience in naval capability development and engineering workforce management, her insights will be a cornerstone of the conference.



Glenn Callow, Chief Technology Officer, Austal Limited

An expert in autonomous systems and naval technology, Glenn brings a unique perspective from his time at BAE Systems and Rio Tinto, where he led innovative projects in autonomous and digital technologies. His expertise is vital in understanding the future of warship design and construction.

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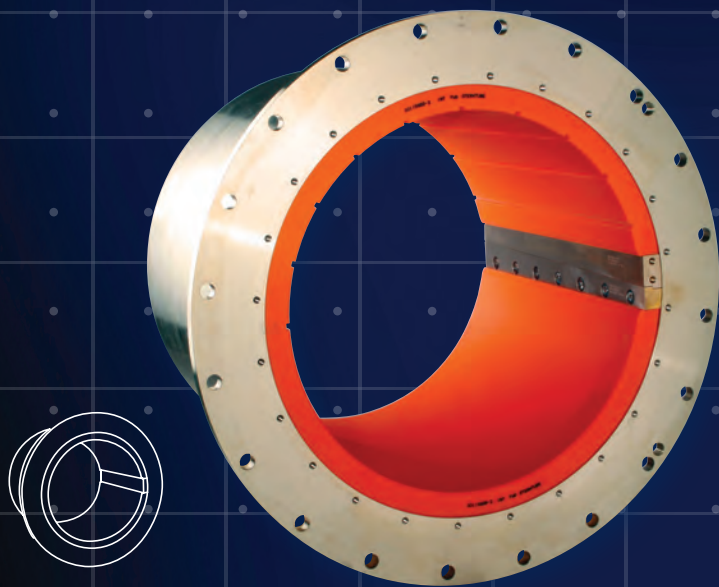
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