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All aspects of applying Digital Technology across the industry are addressed, such as:

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- Transitioning current computing systems with future developments, to maximize the use of captured data
- Collaborative working and data sharing across all platforms and regulatory bodies
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- Advancements and Innovative applications of visual technologies.
- Use of digital data to optimize ship operational performance and cost effectiveness.

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CONTENTS

July/August 2024

EDITORIAL COMMENT

New threats emerge as forces struggle with limited resources 5

NEWS 6-11

FEATURES

SHIPBUILDING

Unstable design has compromised schedule for US Navy's next-generation frigate 12-13
Better design practice could improve delivery timeliness, GAO tells US Navy 14-16

REPAIR & CONVERSION

100-year-old naval yards sorely in need of modernisation 17-19

FRIGATES & DESTROYERS

Keel laid for German Navy's first F126 frigate as two more vessels ordered 20-21
Construction initiated of first Canadian surface combatant 22-23

OFFSHORE PATROL VESSELS

Abu Dhabi-based EDGE and Fincantieri to build new-generation OPVs for UAE Coast Guard 24

UNCREWED VESSELS

Aussie autonomy trial acclaimed as a success 25-26

FEATURES

SHIPBUILDING

12

REPAIR & CONVERSION

17

FRIGATES & DESTROYERS

20

OFFSHORE PATROL VESSELS

24

UNCREWED VESSELS

25





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NEW THREATS EMERGE AS FORCES STRUGGLE WITH LIMITED RESOURCES

The challenges faced by Western naval forces are growing, but not just because of Russia's invasion of Ukraine, which has caused several to develop plans to beef up the number of warships they operate and to invest in new-generation platforms.

The expansion of the People's Liberation Army Navy is the main factor underlying massive investment in warships in Australia and plans to build nuclear-powered submarines. Western navies have recognised the need to invest in – and reinvigorate – naval forces, but the war in Ukraine has highlighted the need to address an entirely new threat, from uncrewed surface vessels (USVs) and other remotely operated units.

But other threats abound. As the Royal United Services Institute (RUSI) in the UK noted, in January 2024, Iran successfully tested the launch of ballistic missiles housed in containers from the deck of a container ship, giving it the ability to launch strikes from new and previously unexpected vectors. RUSI said the launch of two Fateh-class ballistic missiles from containers on the deck of Shahid Mahdavi, "represents a significant increase in the Islamic Revolutionary Guard Corps Navy's capability to deliver naval strike."

Addressing another potential threat to Western security, in May 2024, experts from the North Atlantic Treaty Organisation (NATO) held the first meeting of NATO's new Critical Undersea Infrastructure Network. With rising challenges to undersea infrastructure, the alliance is putting in place new tools to enhance the security of undersea cables and pipelines and to monitor potential threats.

Secretary General Jens Stoltenberg, who opened the conference, said Allies must continue to step up. "The increasing dependency of our societies on undersea infrastructure means we need to do more to enhance their security," said Stoltenberg, noting that Russia "is carrying out an intensifying hybrid campaign against Allies." Undersea infrastructure is essential for economic activity between increasingly interconnected nations in northern Europe and any disruption to it – whether malign or accidental – would have a major effect on our daily lives.

At the meeting, participants discussed ways to enhance information-sharing and situational awareness, as well as ways to deter and defend against threats to undersea infrastructure. They talked about using innovative technology to enhance infrastructure security and resilience, including for the growing number of offshore windfarms that underpin the energy transition. Allies are also establishing a Maritime Centre for the Security of Critical Undersea Infrastructure within NATO's Maritime Command in Northwood in the UK. Not long after the meeting, NATO's Joint Expeditionary Force (JEF) started a month-long series of military activities that saw multiple maritime and air units contributing to the security of undersea infrastructure across Northern Europe. The JEF



NORDIC WARDEN FOCUSED ON THE SECURITY OF UNDERSEA INFRASTRUCTURE IN NORTHERN EUROPE (SOURCE: JEF/NATO)

Response Option activity, called Nordic Warden, involved ships, aircraft and personnel from JEF participant nations operating in numerous areas from the North Atlantic Ocean through to the Baltic Sea, with activity coordinated by the JEF from Northwood.

Ironically, challenges such as these have arisen at the very time that questions are being raised about the West's ability to respond. Most US Navy shipbuilding programmes are running behind schedule. The shipbuilding industry in the US is in poor shape and not ready to respond to an increase in demand. And as highlighted elsewhere in this issue, without massive investment, naval repair yards – some around 100 years old – are in no shape to respond to increased demand for either.

In the UK, the general consensus is that UK armed forces have been significantly 'hollowed out.' Recently retired Chief of the General Staff, General Sir Patrick Sanders, said the military is being tasked well beyond what it is funded for or capable of doing. On a recent exercise in the Baltic, the UK representation was just a handful of patrol craft, even though this has been identified as a priority area of UK interest.

As Nick Childs, Senior Fellow at the International Institute for Strategic Studies noted in July 2024, a funding squeeze has raised doubts about ambitious new shipbuilding plans for the Royal Navy which the new Labour government has inherited. "There is also the challenge of integrating new technology, such as uncrewed systems, which have had significant impact in recent and ongoing conflicts," Childs concluded.

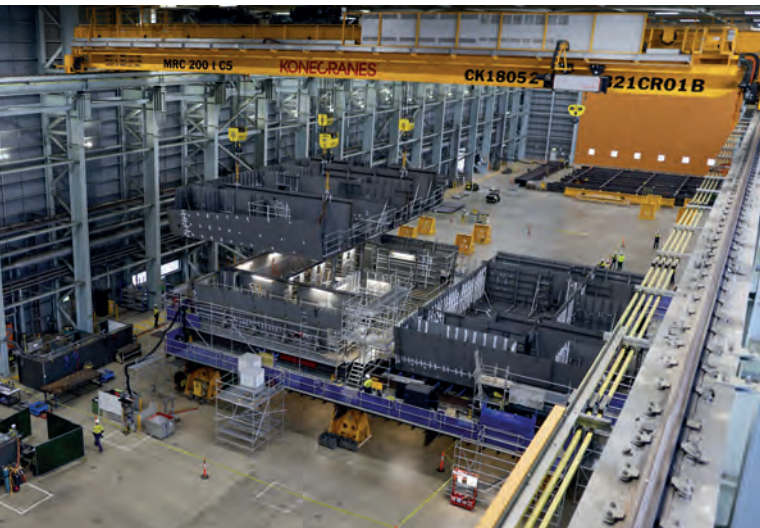
Western governments are certainly responding to evolving threats, but a recapitalisation of naval forces on a scale not seen in many decades is essential. ■



NEWS

FRIGATES & DESTROYERS

FIRST STEEL CUT FOR AUSTRALIA'S HUNTER-CLASS FRIGATE



THE HUNTER-CLASS FRIGATES FOR THE ROYAL AUSTRALIAN NAVY ARE BEING BUILT AT BAE SYSTEMS AUSTRALIA – IMAGE SHOWS CONSTRUCTION OF A PROTOTYPE UNIT FOR THE NEW VESSELS

The contract for the construction phase for the first three Hunter-class frigates has now been signed by Defence and BAE Systems Australia, with the first frigate expected to be operational in 2034.

Construction of the frigates will take place at the Osborne Naval Shipyard, with this phase set to run for 20 years. At its peak the programme will support around 3,000 direct jobs and will support a further 5,000 indirect jobs across the Australian supply chain.

Deputy Prime Minister, the Hon Richard Marles MP said: "This first milestone is not just about cutting steel; we are supporting Australian workers to build frigates in an Australian yard, supporting Australian industry.

"Continuous naval shipbuilding is how Australia will grow its shipbuilding and sustainment workforce, industry, and infrastructure. This milestone exemplifies our government's commitment to deliver continuous naval shipbuilding in South Australia and a future made in Australia, by Australians."

On 21 June, construction commenced of the first Hunter-class frigate for the Royal Australian Navy.

The milestone was marked by the Deputy Prime Minister and the Premier of South Australia cutting the first piece of steel to be used on the first ship of the class.

SHIPBUILDING

VIGOR BEGINS LOW-RATE PRODUCTION OF ARMY LANDING CRAFT

Vigor shipyard has begun low-rate initial production (LRIP) of the Manoeuvre Support Vehicle (Light) (MSV(L)) vessel at its facility in Vancouver, Washington.

The new generation US Army landing craft replaces the Vietnam-era Landing Craft Mechanised 8 (LCM-8).

Vigor completed and launched the prototype vessel, SSG *Elroy F Wells*, in 2022 and is now commencing work on the next phase of the programme under a US\$1 billion contract.

Vigor was originally awarded the contract in 2017 and secured the Vancouver, WA facility to complete the prototype, multiple vessels under low-rate production, and several more over a period of 10 years.

After undergoing sea trials throughout 2023, Vigor and the US Army completed the DD 250 handoff of the prototype vessel in February 2024 and began planning for production of future vessels. The next phase of fabrication will continue for the next five years.

SUBMARINE RESCUE

OCEANEERING AWARDED SUPPORT CONTRACT

Oceaneering International has been awarded a US\$17,775,259 cost-plus-fixed-fee modification to a previously awarded contract for continued support of the US Navy's domestic and international

submarine rescue programme.

Work will be performed in San Diego, California, and is expected to be completed by September 2024.



MINE COUNTERMEASURES

EXAIL TO PARTICIPATE IN E=MCM PROJECT

Exail in France has been selected to participate in the European Extended Mine Counter Measures (E=MCM) project.

E=MCM is being developed by a consortium led by Naval Group Belgium. The aim is to establish a future European sovereign capacity in mine warfare.

The European Commission is supporting European navies in enhancing their mine countermeasures capabilities. The primary aim of the E=MCM project is to integrate new functionalities into a 'next-generation toolbox' – Toolbox 2.0 – that will effectively address the

threat posed by drifting, tethered and buried mines.

Toolbox 2.0 will go beyond the current new generation stand-off MCM Toolbox that Exail is developing and will be delivered as part of the replacement of the current MCM capabilities for the Belgian and Dutch navies.

Leveraging scalable unmanned autonomous systems and intelligent platforms developed by Exail's teams in France and Belgium, the new functionalities and improvements will be integrated into Exail's MCM ToolBox offer, enhancing operational efficiency and optimising MCM operations.

SUBMARINES

GOVERNMENT APPROVES NEXT PHASE OF COLLINS-CLASS LIFE-OF-TYPE EXTENSION

HMAS *Farncomb* will be the first of Australia's six Collins-class submarines to undergo sustainment and capability enhancement under a life-of-type extension programme being implemented by the Albanese Government.

The life-of-type extension programme is part of the Government's commitment to invest A\$4-5 billion to ensure the Collins-class submarines continue to provide a potent strike and deterrence capability.

The life-of-type extension of HMAS *Farncomb* will be undertaken by workers at ASC and commence in 2026 at Osborne in South Australia. It will ensure the future availability of the Collins-class submarines, without compromising on submariner safety.

The Government's decisions on the life-of-type extension programme have been informed by advice from Defence as well as independent expert advice. An optronics upgrade for the Collins class, announced by the former Coalition government, will not proceed, following advice that it would have added complexity and risk to the life-of-type extension programme. The SSN AUKUS nuclear-powered conventionally armed submarines will likewise not be fitted with this particular technology.

The Government has also received advice from Defence, in consultation with the US, that adding Tomahawk cruise missile capability to the Collins-class submarines is not viable and does not represent value for money.

The Virginia-class nuclear-powered submarines Australia will receive in the early 2030s will come with the Tomahawk as standard equipment. Tomahawk cruise missiles will also be used by Royal Australian Navy's Hobart-class destroyers and the Government has agreed in-principle to fit the Hunter-class frigates with Tomahawks, subject to a feasibility study.

The Department of Defence said these decisions "will reduce risk for the Collins-class programme and will help maximise Collins-class availability as we transition to our future nuclear-powered submarine capability."



THE ROYAL AUSTRALIAN NAVY'S COLLINS-CLASS SUBMARINES WILL BE UPGRADED, BUT WILL NOT RECEIVE TOMAHAWK MISSILES OR NEW OPTRONIC MASTS



SHIPBUILDING

PARTNERS SELECTED FOR AUSTRALIAN SUBMARINE YARD

The Albanese Government is continuing to progress Australia's conventionally armed, nuclear-powered submarine programme and has announced the concept design partners for South Australia's new Nuclear-Powered Submarine Construction Yard (NPSCY).

Kellogg, Brown and Root (KBR) and an AECOM and Aurecon Joint Venture have been announced as design partners for the NPSCY.

KBR has extensive experience in supporting design and project management for defence infrastructure facilities across the nation and will design the area of the NPSCY that will be used for steel processing and fabrication facilities.

The AECOM and Aurecon Joint Venture will deliver the concept design for the rest of the NPSCY site which will support outfitting, consolidation and commissioning of the submarines.

The design teams collectively bring together nuclear infrastructure specialists and experienced personnel from previous shipyard infrastructure projects at Osborne, Henderson and in AUKUS partner nations.

The NPSCY development will be in excess of 75 hectares and will create up to 4,000 direct jobs at the peak of construction, with a further 4,000-5,500 direct jobs expected to build Australia's nuclear-powered submarines in South Australia.

Preliminary enabling works required to support the future construction of the NPSCY at Osborne commenced in December 2023 with site mobilisations and early works for a new carpark.

Constructing the infrastructure at the NPSCY will rely on

Australian engineering and design consultants, project controls specialists, project managers, tradespeople and construction workers.

In partnership with the South Australian Government, the Albanese Government is also designing and building the new Skills and Training Academy at Osborne to educate and train the elite naval shipbuilding workforce.

In mid-June 2024, it was also announced that the first cohort of submarine workers from ASC had departed for Pearl Harbor in the US for comprehensive sustainment training.

Around 30 skilled ASC Pty Ltd workers are the first to deploy to the Pearl Harbor Naval Shipyard to directly participate in training in the maintenance of US Virginia-class nuclear-powered submarines alongside their US counterparts.

The ASC workers from South Australia and Western Australia comprise mechanical fitters and electricians as well as electrical, mechanical and safety engineers and submarine maintenance and battery crew.

In total, more than 100 Australian shipyard workers at ASC are expected to depart by mid-2025 for naval propulsion skilling at Pearl Harbor. Once they have completed their overseas training – a mix of classroom and on-the-job learning – they will take up key roles in Western Australia as part of Submarine Rotational Force-West, where they will lead the sustainment of rotating US and UK nuclear-powered submarines. They will also pass on their skills and train other ASC workers through their lead roles.

One UK Royal Navy Astute-class submarine and up to four US Virginia-class submarines will be involved in a rotational presence through Submarine Rotational Force-West.



CONCEPT DESIGN PARTNERS FOR THE NUCLEAR-POWERED SUBMARINE CONSTRUCTION YARD THAT WILL HELP BUILD AUSTRALIA'S AUKUS SUBMARINES HAVE BEEN ANNOUNCED (SOURCE: UK MOD)

NAVAL CONSTRUCTION

FMV BEGINS PROCUREMENT OF NEW BARGES

Sweden's FMV has started the procurement process for four new tugs for the Swedish Armed Forces. The tugs will function as transport ships and ships for supplies and technical service.

FMV project manager Carl Johan Widmark said the tugs are "a capability requested in the defence decision 2020 and part of supplying material to the newly established naval base battalions." He said the FMV "is currently finalizing the requirements

specification for the ships," which will also have the ability to supply the Swedish Navy's ships and submarines at sea.

A call for applications, to qualify suppliers, has been published, which is the first step in procurement. The FMV said it plans to acquire a civilian design that can be adapted to military requirements. The plan is for FMV to deliver the first two tugs to the Swedish Armed Forces by 2029 and the last two by 2030.

SHIPBUILDING

FREMM FRIGATE *EMILIO BIANCHI* LAUNCHED

A launching ceremony took place in May 2024 for the frigate *Emilio Bianchi*, the last in a series of 10 FREMM European Multi Mission Frigates units built by Fincantieri for the Italian Navy.

Following launch, the unit will continue outfitting at Fincantieri's Muggiano shipyard in La Spezia and will be delivered in 2025.

The FREMM programme was developed to replace the Lupo- and Maestrale-class vessels built by Fincantieri in the 1970s and 1980s. *Carlo Bergamini* was delivered in 2012, *Virginio Fasan* in 2013, *Carlo Margottini* in 2014, *Carabinieri* in 2015, *Alpino* in 2016, *Luigi Rizzo* in 2017, *Federico Martinengo* in 2018 and *Antonio Marceglia* in 2019. *Spartaco Schergat* is currently under construction at the Muggiano factory with delivery scheduled for April 2025.



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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:

- Tour in the brand new Seven Oceans Simulator centre.
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SUBMARINES

ANSON EDGES TOWARDS FRONT-LINE OPERATIONS



HMS ANSON IS THE FIFTH OF THE ROYAL NAVY'S ASTUTE-CLASS SUBMARINES (SOURCE: ROYAL NAVY)

The UK Royal Navy's latest hunter-killer submarine is on the verge of joining the operational cycle following intensive tests in the Atlantic.

HMS *Anson*, the fifth of the Royal Navy's Astute-class boats, conducted trials off the east coast of the US and in the Caribbean. *Anson* spent time in waters off the UK coast and then sailed further north of Scotland to test her weapons systems with successful firings of both Spearfish and Tomahawk test missiles.

The tests and trials transitioned into the Atlantic as *Anson* headed to the Atlantic Undersea Test and Evaluation Centre (AUTEC) in the waters around the Bahamas.

AMPHIBIOUS VESSEL

AUSTAL USA STARTS CONSTRUCTION OF NEW LANDING CRAFT

Austal USA has celebrated the start of construction on the first of three LCU 1710 Landing Craft Utility vessels for the US Navy at the company's Mobile, Alabama shipyard.

Austal USA was awarded a US\$91.5 million to build the vessels in September 2023.

Austal Limited chief executive officer Paddy Gregg said the start of construction on Austal USA's latest steel vessel programme highlighted the shipyard's growing capacity and capability to efficiently manufacture multiple steel vessel projects.

"The Austal USA team is already constructing the US Navy's Towing, Salvage and Rescue (T-ATS) ships and the Auxiliary Floating Dry Dock Medium (AFDM), with more steel projects to commence soon, including the Navy's

Ocean Surveillance (T-AGOS) ships and the Coast Guards' Offshore Patrol Cutters," Gregg said.

LCU 1710 are carried aboard the US Navy's amphibious assault ships to the objective area and used for a range of military operations to deliver vehicles, personnel and cargo from sea-to-shore and back. The vessels provide an essential heavy-lift capability and can carry approximately the same payload capacity as seven C-17 aircraft.

The Austal USA yard also recently celebrated the naming of the company's 19th Independence-variant Littoral Combat Ship (LCS) today – the future USS *Pierre* (LCS 38). *Pierre* is the last Independence-variant LCS to be named. Following delivery, the ship will join her sister ships homeported in San Diego and deploying to the INDO-PACOM region.

AMPHIBIOUS VESSELS

US NAVY ACCEPTS DELIVERY OF ANOTHER SSC

The US Navy took delivery of its latest Ship to Shore Connector (SSC), Landing Craft, Air Cushion (LCAC) 109 from Textron Systems on 29 May 2024.

Delivery of LCAC 109 comes after completion of acceptance trials conducted by the US Navy's Board of Inspection and Survey, which tested the readiness and capability of the craft to effectively meet its requirements.

LCAC 109 is the first delivery of 15 craft from a follow-on contract to the original detail design and construction contract.

The SSCs are built with configurations, dimensions, and clearances similar to the legacy LCACs they replace – ensuring that this latest air cushion vehicle is fully compatible with existing, well deck-equipped amphibious ships, the Expeditionary Sea Base and the Expeditionary Transfer Dock.

The SSCs are capable of carrying a 60-ton to 75-ton payload. They primarily transport weapon systems, equipment, cargo, and assault element personnel through a wide range of conditions, including over-the-beach.

PATROL VESSELS

FUTURE HMCS FRÉDÉRIC ROLETTE NAMED

A naming ceremony took place in June 2024 for the future HMCS *Frédéric Rolette*, the fifth Arctic and Offshore Patrol Ship (AOPS) for the Royal Canadian Navy.

A total of six AOPS are being built for the Royal Canadian Navy. Irving Shipbuilding's Halifax shipyard will deliver one AOPS per year to the Royal Canadian Navy ending with the sixth ship in 2025.

A further two AOPS variants are being built for the Canadian Coast Guard, with the first under construction at Halifax Shipyard and the second commencing construction in July.

HMCS *FRÉDÉRIC ROLETTE* IS THE FIFTH ARCTIC AND OFFSHORE PATROL SHIP (AOPS) FOR THE ROYAL CANADIAN NAVY (SOURCE: IRVING SHIPBUILDING)



EQUIPMENT & TECHNOLOGY

IHC DEFENCE SIGNS CONTRACT FOR WINCH/HANDLING SYSTEMS

IHC Defence has signed a contract with the Defence Materiel & IT Command (COMMIT), part of the Netherlands Ministry of Defence, for the supply of six winch and handling systems (WHS).

The newly built systems will be installed on four future antisubmarine warfare frigates, two of which are being built for the Royal Netherlands Navy and two for the Belgian Navy. Two systems will also be installed on the vessels *Karel Doorman* and *Johan de Witt*.

The winch and handling systems are intended for the deployment and recovery of a towed combined passive and/or active sonar.

The winches will be manufactured in Kinderdijk by SAS-Hytop, a division of Royal IHC that already has long experience in supplying winches.

The winches will be delivered in phases, with the first in January 2026 and sixth winch in 2029.

SUBMARINES

HII, BABCOCK LAUNCH NEW COMPANY FOR AUKUS

Defence companies HII and Babcock have formed a new joint venture – H&B Defence – to accelerate development of the AUKUS conventional-armed, nuclear-powered submarine programme for the Royal Australian Navy.

"H&B Defence combines world-leading nuclear submarine and shipbuilding experience from Australia, the UK and the US," said the companies. "Together, HII and Babcock bring comprehensive expertise in every aspect of nuclear-powered submarine activities to support the development of Australia's sovereign capability.

"H&B Defence has been established to support all steps of Australia's optimal pathway to sovereign nuclear-powered submarines under AUKUS Pillar 1 – including workforce, nuclear infrastructure design and build, submarine defueling and decommissioning, nuclear waste and future sustainment."

The company, headquartered in Canberra, Australia, will work with government and key stakeholders from industry and academic sectors to develop a comprehensive programme to promote and grow a skilled sovereign nuclear workforce in Australia.

Tim Brown AM has been appointed H&B Defence managing director. Brown, of Brisbane and a 33-year veteran of the Royal Australian Navy, has extensive knowledge and experience of Australia's submarine programme and Defence and Industry strategy.

"H&B Defence's mission is to transform Australia's submarine industrial landscape to position the nation to operate nuclear submarines," said Brown. "This joint venture will focus on equipping Australia with the requisite industrial base, supply chains, and workforce required to support and manage all aspects of the nuclear-powered submarine lifecycle."



SHIPBUILDING

UNSTABLE DESIGN HAS COMPROMISED SCHEDULE FOR US NAVY'S NEXT-GENERATION FRIGATE

The US Navy embarked on construction of its latest frigate before the design was finalised, a decision that is creating ongoing problems



CONSTRUCTION OF THE LEAD SHIP IN THE FFG 62 PROGRAMME IS NOW WELL BEHIND SCHEDULE

Construction of the US Navy's FFG 62 Constellation-class multi-mission frigate – a programme it embarked on because of failures in its Littoral Combat Ship (LCS) programme – has slowed and construction has 'stalled' according to a Government Accountability Office (GAO) report published in May 2024.

The US Navy recently reported a delay of at least three years in the delivery of the lead ship, from 2026 to 2029. According to the GAO, this is in large part because the design was not completed before construction began and because the Navy has 'poor metrics' for reporting design progress.

"The biggest thing in our report is that the US Navy has proceeded with construction of the first ship without completing the design," says Shelby Oakley, Director Contracting & National Security Acquisitions at the GAO, "so they are building the ship without actually having it designed."

When the US Navy planned the acquisition of the guided-missile frigates, it hoped to deliver the ships faster than other classes that recently entered service. To reduce the risk of design and technology problems, it chose to use some technology that had already been proven on other ships. The design itself is based on that of a European frigate.

"However," says the GAO, "the Navy undercut this approach by starting construction on the first frigate before finishing its design. Due to this and ongoing design challenges, construction on the first ship is at a standstill."

Remarkably, despite the problems with the programme, in May 2024 the Department of Defense recently announced that Fincantieri's US subsidiary, Fincantieri Marinette Marine, had been awarded a contract worth more than US\$1 billion to build the fifth and sixth Constellation-class frigates. The contract for the lead frigate – and nine options – was signed in 2020 and has a cumulative value of US\$5.5 billion, including post-delivery availability support and crew training. Construction began on the first ship, FFG 62, in August 2022.

Having selected the European design, the US Navy and its shipbuilder modified it to incorporate US Navy specifications and weapon systems. "However, the decision to begin construction before the design was complete is inconsistent with leading ship design practices and jeopardised this approach," the GAO says. "Furthermore, design instability has caused weight growth."

Another issue highlighted by the GAO is that the programme office tracks and reports design progress, but its design stability metric hinges largely on the quantity – rather than quality – of completed design documents.



THE DESIGN OF THE CONSTELLATION-CLASS FRIGATES IS DERIVED FROM A EUROPEAN DESIGN, MODIFIED WITH US TECHNOLOGY

This limits insight into whether the programme schedule is achievable. "If the Navy begins construction on the second frigate without improving this metric, it risks repeating the same errors that resulted in construction disruptions and delays with the lead frigate," the GAO states.

Also potentially problematic is that although the programme is using many mission systems already proven on US Navy ships, but the Navy has yet to demonstrate two systems – the propulsion and machinery control systems. A planned update to the frigate test plan – combined with the opportunity afforded by schedule delays – could provide the chance to conduct land-based testing of these unproven systems and reduce the risk of discovering issues after the ship is at sea.

The GAO also notes that the programme is using a conventional, linear development approach for design and construction, even though the US Navy has historically experienced schedule delays, cost growth or both in other shipbuilding programmes using this approach.

In response, the US Navy has incorporated elements

of leading practices from commercial shipbuilding into its acquisition strategy, and the GAO believes that further incorporating these practices in an updated acquisition strategy could position the programme – when contracting for future frigates – to better respond to evolving mission needs.

In response to the problems plaguing the FFG 62 programme, the GAO made five recommendations, including that the US Navy restructure its design stability metric to measure progress based more on the quality than quantity of design documents; use the improved metric to assess the design stability before beginning construction of the second frigate; incorporate additional land-based testing into the frigate test plan; and identify opportunities to further incorporate leading practices for product development into the frigate acquisition strategy.

The US Navy agreed with four recommendations and partially agreed with the recommendation related to updating the test plan. For its part, the GAO maintains that all five recommendations should be fully implemented. ■



CHIEF OF NAVAL OPERATIONS ADMIRAL LISA FRANCHETTI WATCHES AS THE INITIALS OF THE SHIP'S SPONSOR ARE WELDED INTO THE KEEL DURING THE KEEL LAYING CEREMONY FOR THE LEAD SHIP OF THE CONSTELLATION CLASS



BETTER DESIGN PRACTICE COULD IMPROVE DELIVERY TIMELINESS, GAO TELLS US NAVY

The US Navy suffers from 'cumbersome practices' and lacks the capability needed to bring new designs into service on time, a new report suggests

A May 2024 report from the US Government Accountability Office (GAO) has suggested that the US Navy make use of the kind of design practices employed by leading commercial shipowners and shipbuilders in order to reduce the time it takes to design and build warships.

An investigation by the GAO found that leading commercial shipping companies and the yards that build vessels for them prioritise shorter, predictable periods for design and construction, which results in the delivery of timely vessels that meet current user needs.

"In contrast," says the GAO, the US Navy's approach "often results in significantly longer design and construction cycle times for the lead ships in its shipbuilding programmes."

The GAO notes that the US Navy continues to face what it described as 'persistent challenges' in its ability to design and deliver timely, affordable new ships that perform as expected. It also noted that changes in the maritime threat environment mean that the US Navy urgently needs to find ways to expedite the design and delivery of new and innovative ships.

"Application of modern ship design practices used by commercial companies provides the US Navy with a mechanism to confront these threats and create more consistent, predictable outcomes for its shipbuilding programmes," says the GAO.

"This includes application to ongoing programmes and major future programmes planned for the coming decades, which the Navy expects will provide the next generation of destroyers, attack submarines and amphibious assault ships, among other new additions to its fleet."

The GAO says best practice from the commercial shipbuilding industry "can be applied thoughtfully to US Navy shipbuilding acquisition to improve outcomes, even when cultural and structural differences yield different sets of incentives and priorities."

The accountability office says: "Commercial ship buyers and builders employ practices that ensure high levels of knowledge at key junctures throughout the acquisition process, in order to achieve successful results."

The May 2024 report examines leading design practices used by commercial shipowners and shipbuilders to inform their understanding of design maturity and readiness for construction; and how the US Navy's ship design practices compare with the leading practices in commercial ship design.

To identify leading design practices used by commercial shipowners and builders, the GAO interviewed and reviewed documentation from leading companies in the US and internationally. It selected the companies based on criteria that validated their



11 YEARS ELAPSED BETWEEN THE START OF THE DDG 1000 PROGRAMME AND CONSTRUCTION OF THE LEAD SHIP



AFTER LENGTHY DEVELOPMENT OF THE DDG 1000 DESIGN, THE US NAVY DECIDED TO BUILD MORE DDG 51 CLASS DESTROYERS INSTEAD, SUCH AS THE JACK H LUCAS, SHOWN HERE

prominence in the design, construction and acquisition of large, complex, and specialised commercial ships.

As part of the review, the GAO gathered quantitative data from commercial companies relating to design and construction cycle times for different ship types and response timelines when reviewing ship design products. Then it drafted summaries of each company's key design practices, which included data on the cycle times for design. It shared the summaries with the companies to review for technical accuracy and exclusion of company proprietary information and determined the data were reliable.

To identify ship design practices used by the US Navy and compare them with the leading practices found in commercial ship design, the GAO reviewed documentation and interviewed Navy officials and representatives from US Navy shipbuilding companies. The review included six US Navy shipbuilding programmes and reflected a range of different ship types.

According to the GAO, leading design practice involves effective management of a ship's business case and a balance of customer needs and the resources needed to develop and produce the ship. Leading commercial practice also focuses on efficiently maturing new designs to better inform decisions on schedule, cost, and performance. This includes using consistent, meaningful design maturity measures to determine readiness to move from design to construction.

Commercial design "prioritises timeliness of ship design and delivery" says the GAO and "avoids overly prescriptive requirements." It "maintains a sound business case through continued re-evaluation," whereas US Navy practice "progresses through an extensive requirements process, with significant time elapsing before detail design and construction contracts." What

is more, it claims, in the US Navy, "there is no regularly required re-evaluation of approved requirements to confirm continued relevance."

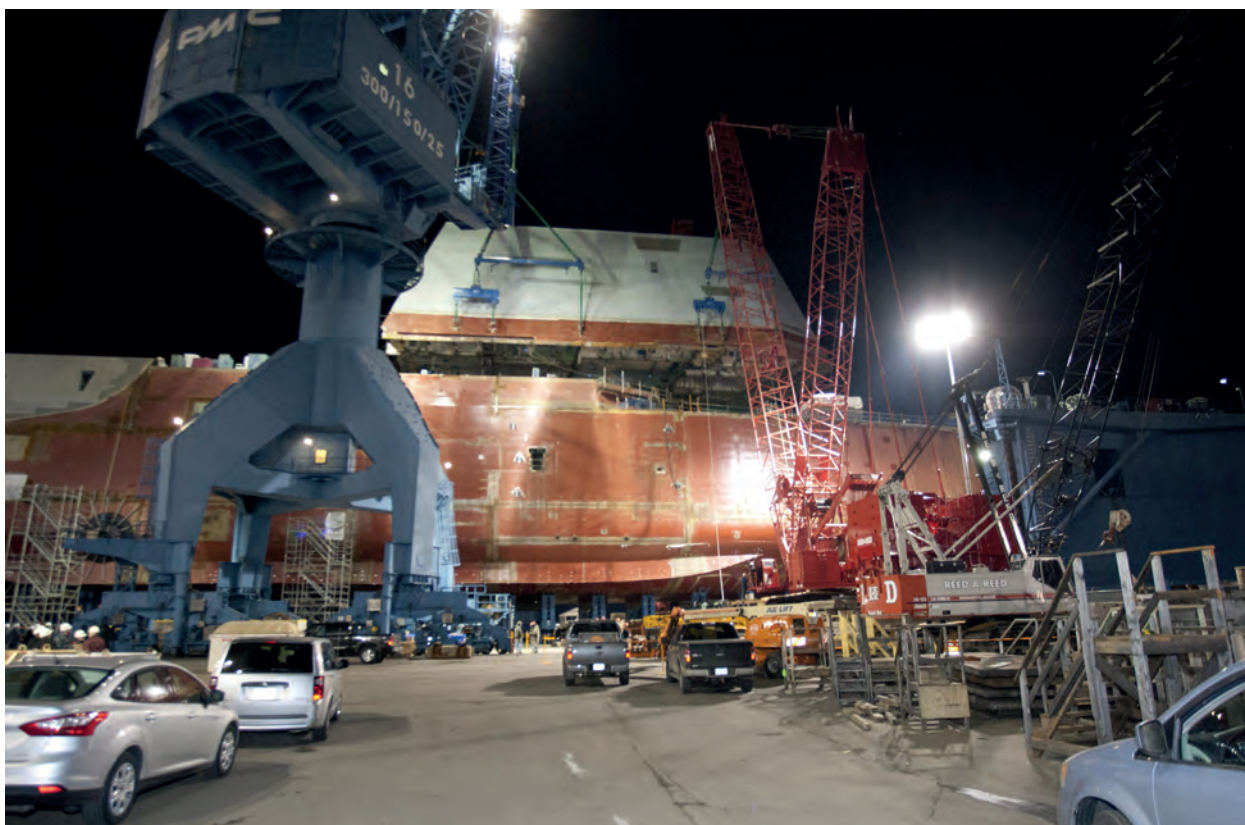
Commercial design "uses processes that support timely design decisions and aligns decision-making with design maturity measures," says the GAO, whereas the US Navy "lacks streamlined, time-constrained processes, with numerous stakeholders having decision-making authority, contributing to extended cycle times to finalise designs." The US Navy also "lacks consistent design maturity measures and a clear connection between those measures and decision-making," adds the GAO.

Whereas commercial practice requires strong in-house design capabilities and uses ship design tools to shorten cycle time, the US Navy is only now evaluating ways to address acknowledged shortfalls in its in-house design capability and adopt modern design tools.

Commercial design practice ensures that schedule, cost, and requirements expectations are informed by sufficient design knowledge, says the GAO. It prioritises user involvement in the ship design process, leverages existing ship designs and systems in digital libraries and prioritises timely vendor decisions and information. In contrast, the US Navy sets expectations for schedule, cost, and operational requirements when designs are unstable, resulting in less design knowledge available to inform key decisions and increased programme risk.

The military process also has a longer, more linear approach, with less consistent user involvement, focusing on new designs with extensive and novel capability rather than speed to delivery. It makes some use of existing ship designs, but the military lacks a robust design library to support iterative design and shorten time needed to mature new designs and takes too long to finalise vendor decisions for ship systems





THE GAO REPORT FOUND THAT THE US NAVY HAS SIGNIFICANTLY LONGER DESIGN AND CONSTRUCTION CYCLE TIMES FOR LEAD SHIPS THAN COMMERCIAL VESSELS

and receive vendor-furnished information needed to mature ship designs.

"The US Navy's layered review practices extend the time needed to make design decisions, and key programme decisions lack the clear connection with design maturity measures in the commercial ship industry," the GAO states. "The US Navy's shortfalls in its in-house design capabilities and tools create challenges for achieving the shorter cycle times achieved for commercial ships. We found a notable contrast in the design and construction cycle times that are typical for selected types of commercial ships compared to the lead ships for Navy shipbuilding programmes. Lengthy cycle time creates business case challenges as threats and mission needs can change."

A notable example of this is the 11 years that elapsed between the start of the DDG 1000 programme and construction beginning on the lead ship. During that time, the US Navy shifted from a focus on capability needs for operations in nearshore waters to deeper water operations. With this shift, it determined that the DDG 51 class of destroyers would be a more effective option to meet operational needs and reduced the total number of DDG 1000 class ships from 32 to three ships.

"Our analysis of the practices used by commercial ship buyers and builders indicates that the Navy has additional opportunities to embrace leading ship design practices to support timely, predictable outcomes for its shipbuilding programmes.

"These opportunities involve improving consistency and communication of ship design maturity measures that support decisions to begin construction," says the GAO, "ensuring validated requirements continue to reflect operational needs before making decisions to proceed with the construction of each ship." The report also recommends increasing the level of design maturity achieved before making decisions on detail design and construction contract awards; improving the Navy's digital ship design resources to increase its inventory of existing design knowledge; and its efficiency in maturing and validating new ship designs.

"Without additional action to better align its ship design efforts with leading practices, the Navy will be significantly challenged in its ability to rapidly confront evolving maritime threats with new ships that have the capabilities to combat those threats," the GAO concludes. "These challenges affect current programme timelines for delivery of new ships. They also create headwinds from the outset for future programmes to deliver the next generation of destroyers, attack submarines and amphibious assault ships. Without increased use of leading ship design practices, US Navy shipbuilding programmes will continue to regularly take a decade or more to move from concept to ship delivery. This increases the risk that capabilities approved in the earlier stages of a programme lose their relevance and puts the US Navy perpetually on the defensive because it cannot deliver timely, new capability to match the pace of new threats." ■



REPAIR & CONVERSION

100-YEAR-OLD NAVAL YARDS SORELY IN NEED OF MODERNISATION

The Head of US Navy's Shipyard Infrastructure Optimisation Programme says upgrading shipyards requires 'a holistic plan' but cost estimates won't be available until 2025

The Program Executive Officer for the US Navy's Shipyard Infrastructure Optimisation Programme says the US Navy knows a "major effort to recapitalise all four of its nuclear shipyards," is urgently required to enable them to continue to support the US fleet.

Mark Edelson, Programme Executive Officer (PEO) for Industrial Infrastructure, who is responsible for overseeing the cost, schedule and performance of the Shipyard Infrastructure Optimisation Programme, commonly known as SIOP, made the remark during a recent visit to Puget Sound Naval Shipyard & Intermediate Maintenance Facility in Bremerton, Washington.

The organisation Edelson leads is responsible for industrial infrastructure at PSNS & IMF, along with Pearl Harbor Naval Shipyard in Hawaii, Norfolk Naval Shipyard in Virginia, and Portsmouth Naval Shipyard in Maine.

In late 2023, a Government Accountability Office (GAO) report found that conditions at the US Navy's shipyards – which maintain its aircraft carriers and submarines – are poor and much of their equipment is outdated. As previously highlighted by *Warship Technology*, inadequate facilities and equipment have led to maintenance delays that contributed, in part, to more than 1,300 lost operational days for carriers and 12,500 lost operational days for submarines in recent years. Shipyard infrastructure historically lags behind new platform development; the average production shop facility age for all shipyards is 76 years; average annual facilities, sustainment, restoration and modernisation

investment has consistently been below the level required, as has at average capital investment; and infrastructure improvements have often been made in ways that do not accord with master plans, resulting in inefficient layouts and configurations.

The US Navy is working to improve the shipyards, but GAO was critical of the way costs for projects – such as one that is already underway to improve the dry docks at its Portsmouth Naval Shipyard – have been estimated.

The GAO said the estimated cost for this particular project had increased from US\$528 million to US\$2.2 billion between 2019 and 2021 and the US Navy "has had trouble accurately estimating project costs, partly because its estimates were based on preliminary designs and not updated to reflect the final designs."

The report said the US Navy had not developed a full cost and schedule estimate for SIOP. The GAO was told it won't be able to do so until fiscal year 2025. In the interim, it plans to provide annual updates of the estimated costs of SIOP projects it intends to undertake during the next five years.

Reportedly, the US Navy cannot develop an estimate for the full SIOP until each shipyard completes detailed infrastructure plans identifying specific facility projects. In 2022, the US Navy completed its first plan for Pearl Harbor Naval Shipyard. Its estimated cost for Pearl Harbor increased significantly, from an estimated US\$6.1 billion in 2018 to US\$16 billion in 2022. The GAO said the US Navy



A NORFOLK NAVAL SHIPYARD EMPLOYEE GRINDS METAL ABOARD THE NIMITZ-CLASS AIRCRAFT CARRIER USS HARRY S TRUMAN





THE VIRGINIA-CLASS ATTACK SUBMARINE USS TEXAS PREPARES TO UNDOCK FROM DRYDOCK 3 AT PORTSMOUTH NAVAL SHIPYARD

"faces challenges developing a reliable cost and schedule estimate for the full SIOP and its associated efforts, including project uncertainty, volatile commodity prices, and a lack of expertise completing dry dock projects."

A US Navy cost and schedule estimate for the Portsmouth Naval Shipyard dry dock project followed most, but not all, GAO best practice and the GAO identified two issues with the estimates: the first is that the cost sensitivity, risk, and uncertainty analyses were based on the preliminary design and were not updated to reflect the final design; the second that the US Navy's schedule "did not accurately determine key tasks or document the flexibility available in its activities without affecting the programme's finish date."

In its 2023 five-year plan, the US Navy estimated it would cost US\$3.6 billion for the dry dock project at Pearl Harbor and US\$2.2 billion for the dry dock project at Portsmouth. As of March 2023, the US Navy had received US\$1.6 billion for the projects and requested, or planned to request, an additional US\$4.2 billion.

During his visit, Edelson discussed what SIOP is and its importance for the US Navy. He said it recognised in 2018 that it needed to do a major effort to recapitalise all four of its nuclear shipyards. "These are national treasures," Edelson explained. "The organic industrial base for nuclear ships operated by the US Navy. You can't go contract this stuff out. So those four shipyards and the 37,000 or so people who work those shipyards every day, as well as the sailors who call them home, are critical."

The problem the US Navy is facing, however, is that those shipyards are all more than 100 years old and were designed and built for an entirely different mission. Many of them were created to build wooden ships, not to repair, maintain and modernise nuclear warships.

According to Edelson, they need to be upgraded to serve the US Navy and the US for the next 100 years, but the improvements required need careful planning and

consideration to ensure they all make sense for the US Navy and the workforce.

"The Navy has said we've got to make more than once-in-a-generation investment, but a once-in-100-years investment into them, to pull the shipyards into the future," Edelson said.

"It may sound overused, but SIOP is a holistic plan. What's good for the ships? What's good for the workers? What's good for safety? What's good for efficiency? It's all in there."

Edelson said the programme executive office he leads "is continually gathering facts and opinions from all levels, throughout all the shipyards to help design area development plans (ADPs) for each shipyard, that factor in things unique to each location.

"One of the things that is impressive about the area development plans is the connection to the shipyard workers and their supervisors, as we build those," said Edelson. "There are three or four different interview rounds to ask, how do you do things; where do you go for your materials; where do you walk day to day; what's missing from your current shipyard?

"It's those existing conditions we will overlay optimisation onto," he continued. "What would be the perfect shipyard? The nice thing is, we don't have to make individual decisions here, because it will take us decades to go through this."

Edelson said SIOP is being organised along three lines of effort. The first is the waterfront: where the ships are tied up, with the infrastructure needed to support them. The second is facilities, that is, infrastructure and utilities that need to be completely recapitalised; and the third is industrial plant equipment, that is, all of the equipment used to repair and fabricate parts and components for carriers and submarines.

Future technology is also being considered as part of SIOP. "Maybe you won't hammer things in forges like you used to," Edelson explained. "Maybe you will use 3D printing machines and five-axis routers or high-speed shaft lathes. We have to uplift the facilities for the equipment our shipyard workers will be using then."

As he explained, industrial equipment is already being upgraded throughout the shipyards, and infrastructure upgrades have also started across the shipyards. "Right now, we have more than a half-a-billion dollars of equipment in procurement," he said. "We've already delivered 138 pieces of new equipment into the shipyards. One of the great things SIOP is doing is the standardising of equipment. We've already standardised what we will buy for all of the Shop 31s and they are working through the rest of the shops now. All four of the shipyards will have the same suite of modernised equipment."

However, as he also explained, shipyard facility upgrades

US NAVY AWARDS CONTRACT TO UPGRADE USS CARTER HALL

BAE Systems has been awarded a US\$87.2 million contract from the US Navy for repair work aboard the dock landing ship USS *Carter Hall* (LSD 50).

The contract includes options that, if exercised, would bring the cumulative value to US\$92.2 million.

Under the competitively awarded contract, *Carter Hall* will undergo a year of restorative work at the company's shipyard in Norfolk, Virginia, which is also the ship's homeport. BAE Systems will begin working aboard the ship in July 2024, undertaking a combination of maintenance and preservation work on the ship's hull, its internal fuel and ballast tanks, and the engineering plant.

"Our team looks forward to working with the Navy to perform the substantial sustainment work necessary to ensure *Carter Hall* remains a highly capable amphibious combatant ship," said David Thomas Jr, vice president and general manager of BAE Systems Norfolk Ship Repair.

Carter Hall recently returned to its homeport following an eight-month overseas deployment. It was commissioned in September 1995.

will take a little bit longer. "These early years of SIOP are heavily focused on dry docks," he said. "That's just a fact of life. We have more than US\$6 billion of construction happening right now. That's just the start of it. It is amazing the support we've had from Congress, the Department of Defense and from the highest levels in the US Navy to make this happen. It's not Puget Sound fighting for one project anymore. It is the US Navy pushing to upgrade all of our shipyards to the same level in one programme."

As Edelson also explained, the US Navy is making big investments in quality of service, in areas such as where workers go for medical care. "If we look at all the ADPs, I can show you where we approved where the two parking garages will go at Pearl Harbor. Pearl Harbor has a plan approved by the US Navy. We still have to execute it, which is no easy task, but it is approved. Puget Sound's parking plan is the next one in the hopper. It's in the draft, even if the Chief of Naval Operations hasn't signed off on it yet."

Tomorrow's US Navy will look drastically different than it does today, Edelson concluded. "Today's ships are bigger, faster and more electric than they ever used to be; Virginia-class subs and Ford-class carriers in particular. Tomorrow's shipyards need to be ready for that generation of ships, which are going to last 50+ years. SIOP is designed to support those vessels, while hopefully making the four public shipyards safe and rewarding places to work.

"The fleet is growing, and the Navy is investing in it. There is plenty of work we need to do to gain the efficiencies and produce readiness in the short term. We want to gain those efficiencies to turn ships around faster. There are other things our people can do that are easier than working in a nuclear shipyard. We want them to be able to tell their buddies that this a great place to work. They are investing in the workplace. I see new equipment. I see new buildings. There are construction workers here. That gets people coming back." ■



THE LOS ANGELES-CLASS SUBMARINE USS CHEYENNE PASSES THROUGH A BASIN AT ONE OF THE NAVAL SHIPYARDS



FRIGATES & DESTROYERS

KEEL LAID FOR GERMAN NAVY'S FIRST F126 FRIGATE AS TWO MORE VESSELS ORDERED

Germany has laid the keel for the first of a new generation of frigates, and confirmed plans to build two additional vessels



GERMANY IS NOW EXPECTED TO BUILD SIX, RATHER THAN FOUR F126 FRIGATES

A keel-laying ceremony took place on 3 June 2024 for the German Navy's first F126 frigate, the first ship in what is the largest procurement project in the history of the German Navy. The first frigate will be christened *Niedersachsen*.

At the keel-laying ceremony at Peene Shipyard, part of NVL Group, German Defence Minister Boris Pistorius confirmed that the German Government is to provide an extra €323 million in funding for the F126 programme, to take into account the effect of inflation.

The Minister also indicated that the government had decided 'in principle' to fund another two frigates, bringing the total number of F126's to be built to six. Then, on 19 June 2024, after the Budget Committee of the German Bundestag gave the green light for the procurement of a fifth and sixth vessel, the Procurement Organisation of the German Armed Forces gave Damen Naval the go-ahead to expand the original contract for four vessels to six.

"This is good news, and we are honoured that our German client has the confidence in us and the F126 design to order two more ships," said Damen Naval managing director Roland Briene.

Damen Naval said the first frigate is due to be delivered in 2028. Ships five and six will be delivered in 2033 and 2034 respectively. Construction of the frigates will take place entirely in Germany.

In a statement, the Bundeswehler said: "The contractor is aiming for around 70% of the value added in the project to be created in Germany. More than

65 German subcontractors will be involved in the construction of the ships."

The Bundeswehr said the procurement of two additional frigates "is a strong signal to NATO partners" and "a significant contribution to credible deterrence within the alliance."

The Federal Minister of Defence said the F126 programme "is a turning point in Germany's commitment to the international order and German competitiveness."

The F126 frigates are 167m long with a breadth of 21m and have a displacement of around 10,000tons. With a crew of 125, the ships will be capable of worldwide deployment and of undertaking air, surface and underwater warfare.



THE BUDGET COMMITTEE OF THE BUNDESTAG GAVE THE GREEN LIGHT FOR THE PROCUREMENT OF A FIFTH AND SIXTH F126 IN JUNE 2024

SHIPS FIVE AND SIX IN THE NEW SERIES OF FRIGATES WILL BE DELIVERED IN 2033 AND 2034 RESPECTIVELY



The ships will be built under a contract awarded by BAAINBw (the Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr, Germany's Federal Office of Bundeswehr Equipment, Information Technology and in-Service Support). Damen Naval is prime contractor for the project and Blohm+Voss and Thales are principle sub-contractors.

Steelwork and pre-assembly for the stern sections of the

vessels will take place at Naval Vessels Lürssen's (NVL's) Peene-Werft yard. The foreship will be built in Kiel, where it will be assembled with the stern and towed by sea to Blohm+Voss in Hamburg.

Final outfitting, commissioning, testing and delivery, along with the outfitting of the on-board systems, will take place at Blohm+Voss. Delivery of the first ship is scheduled for 2028. ■



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CONSTRUCTION INITIATED OF FIRST CANADIAN SURFACE COMBATANT

The River-class project is the largest and most complex shipbuilding initiative in Canada since the Second World War and a key part of the country's National Shipbuilding Programme



THE CSC IS BASED ON BAE SYSTEMS' TYPE 26 FRIGATE, WHICH IS BEING BUILT IN THE UK FOR THE ROYAL NAVY AND IN AUSTRALIA FOR THE ROYAL AUSTRALIAN NAVY

On 28 June 2024, construction was initiated of the first Canadian Surface Combatant (CSC), a new class of destroyers for the Royal Canadian Navy.

The Honourable Bill Blair, Minister of National Defence, joined by Vice-Admiral Angus Topshee, Commander of the Royal Canadian Navy and Dirk Lesko, President of Irving Shipbuilding Inc celebrated the start of construction at the shipyard in Halifax.

Speaking at the time, Minister Blair announced that the new fleet of warships will be known as River-class destroyers, and the first three ships will be named His Majesty's Canadian Ships (HMCS) *Fraser*, *Saint-Laurent*, and *Mackenzie*.

The CSC project is the largest and most complex shipbuilding initiative in Canada since the Second World War and a historic investment in the recapitalisation of the Royal Canadian Navy's surface fleet. Delivery of the first River-class destroyer, HMCS *Fraser*, is expected in the early 2030s, with the final ship expected by 2050.

The project will equip the Royal Canadian Navy with new, state-of-the-art warships to bolster Canada's naval capabilities at home and abroad. The new vessels will be Canada's major component of maritime combat power, enabling the Royal Canadian Navy to continue to monitor and defend coastal waters and contribute to international naval operations alongside allies. The vessels will undertake a range of missions with North American Aerospace Defence Command (NORAD), 5-Eyes nations, NATO, coalition partners, and with other Canadian government departments and agencies.

The June event marked the start of construction of the production test module (PTM), through which the

Government of Canada and Irving Shipbuilding will be able to test and streamline processes and implement lessons learned into the build process, to enable the start of full rate production in 2025.

In addition to being a major component of Canada's naval recapitalisation, the CSC project will support growth in Canada's marine supply chain and the build phase will create and/or maintain approximately 10,800 jobs annually throughout the 25-year construction period across the country.

The design phase of the project will create and/or maintain approximately 5,000 Canadian jobs annually across the economy. In total, this project will generate at least C\$40 billion (US\$29.2 billion) in cumulative gross domestic product.

As indicated in the Department of National Defence's review, 'Our North, Strong and Free,' the Government of Canada is committed to a renewed relationship with Canada's defence industry, based on clarity, certainty, and long-term partnership. "The CSC project is an example of how the Government of Canada is investing in Canada's domestic shipbuilding industry, while also equipping the Royal Canadian Navy with a fleet of modern and effective ships to support operations well into the future," the Department said in a statement.

As highlighted previously by *Warship Technology*, the CSC is based on BAE Systems' Type 26 frigate design, that is being built in the UK for the Royal Navy and in Australia for the Royal Australian Navy.

The official NATO Ship Designator for the River-class warship will be DDGH – a destroyer (DD), guided (G) missile, helicopter (H) capable. As the Royal Canadian

Navy's next-generation combat ship, it replaces both the Iroquois-class destroyers and the Halifax-class frigates.

Minister Blair said: "Today we launch construction on the largest Canadian shipbuilding project since the Second World War, marking an historic milestone for the Royal Canadian Navy.

"The River-class destroyers will provide the Canadian Armed Forces with the tools that they need to defend our national interests for decades to come – and ensure that Canada can deploy a state-of-the-art, combat-ready fleet of warships to defend our country and support our allies. As we invest in this new fleet, we are also supporting Canada's shipbuilding industry and thousands of well-paying, skilled jobs."

The Honourable Jean-Yves Duclos, Minister of Public Services and Procurement, who was also present said: "The Canadian Surface Combatant project is at the core of our government's commitment to revitalise Canada's marine industry through the National Shipbuilding Strategy.

"The start of construction is a significant milestone in the efforts to re-build Canada's shipbuilding industry, bringing highly skilled jobs and economic benefits to Canadians during construction and throughout the operational life of the class. These modern ships will be critical to ensuring the ongoing ability of the members of the Royal Canadian Navy to continue their important work protecting Canadians."

The CSC will replace the capabilities found in both the retired Iroquois-class destroyers (four vessels) and Halifax-class frigates (12 vessels) with a single, and combat-capable ship to meet multiple threats on both the open ocean and in the highly complex coastal environment.

The project is currently budgeted at between C\$56-60 billion and includes the cost for 15 new, state-of-the-art warships, as well as all the components required to design, build, and bring these ships into service, including design work, infrastructure, ammunition, technical data, initial training, project management, and contingency costs.

The PTM will enable the shipyard to develop and test CSC-specific build processes, with the aim of benefitting from lessons learned and achieving process improvements to support the efficient start of full rate production on the first CSC ship, under an implementation contract, in 2025. Design work on the more complex sections of the ship will continue in parallel to the start of construction activities.

The Government of Canada's National Shipbuilding Strategy is a long-term, multi-billion-dollar programme focused on renewing the Canadian Coast Guard and RCN fleets to ensure that Canada's marine agencies have the modern ships they need to fulfil their missions, while revitalising Canada's marine industry, creating good middle-class jobs and ensuring economic benefits are realised across the country. Canada's Industrial and Technological Benefits Policy applies to the CSC project, which requires the companies to make investments and provide business activities in Canada equal to the value of the related contracts.

To help bring the CSC into service and support them throughout their lifecycle, National Defence will build a land-based testing facility on a portion of DND-owned land at Hartlen Point in Halifax, Nova Scotia. Work to determine the building's specifications is currently underway and the design phase will run until December 2024. Construction is expected to begin this summer on early work packages and full mobilisation in Winter 2025 with expected completion in 2027.

In late 2023, the Government of Canada announced an investment in shipbuilding infrastructure to support and accelerate construction of the CSC and ensure timely delivery to the Royal Canadian Navy, with Public Services and Procurement Canada, on behalf of the Department of National Defence, amending a definition contract with Irving Shipbuilding for an additional C\$463 million.

The enhancements at Irving will expand and modify the site and facilities at the Halifax yard and support facilities at Woodside Industries and Marine Fabricators in Dartmouth, Nova Scotia. The required enhancements were identified during the design phase and from lessons learned during the construction of ships in the UK and Australia. ■

BABCOCK, SAAB COLLABORATE ON SWEDEN'S FUTURE SURFACE COMBATANTS

Babcock has been selected by Saab to support the design of the Swedish Navy's new Luleå-class surface combatant. Saab, which was commissioned by the FMV, the Swedish Defence Materiel Administration, will design four ships for the Swedish Navy. Babcock will initially provide engineering support, including structural design and auxiliary systems, supporting Saab to complete the basic design phase.

During a visit to Babcock's Rosyth facility in Scotland, senior representatives from the Swedish Navy, UK Royal Navy, FMV, Saab and Babcock met to mark the beginning of their collaboration, which follow a collaboration agreement signed in September 2023.

Babcock and Saab will also work closely together to identify potential export markets for the Luleå design. The Luleå class will complement the Visby-class corvettes, first launched in 2000. Anti-air warfare will be one of the main capabilities of the new ships.



OFFSHORE PATROL VESSELS

ABU DHABI-BASED EDGE AND FINCANTIERI TO BUILD NEW-GENERATION OPVS FOR UAE COAST GUARD

10 offshore patrol vessels to be built in Italy and the United Arab Emirates by newly formed joint venture



A joint venture formed by Fincantieri and Abu Dhabi-based EDGE Group is to build a new class of offshore patrol vessels (OPVs) for the Coast Guard in the United Arab Emirates (UAE).

In May 2024, the companies formalised the creation of the joint venture between them that will build a total of 10 OPVs for the UAE Coast Guard under the terms of a €400 million contract. A signing ceremony for the new venture took place in the presence of His Highness Sheikh Khaled bin Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi.

The decision to form the joint venture was first announced in February 2024. EDGE will hold a 51% stake in the venture. Together, the companies plan to target the market for naval vessels for non-NATO countries and selected NATO member countries, a market they estimate has a potential value of approximately €30 billion.

Signing of the agreement was immediately followed by the announcement of the contract from the UAE Coast Guard Force for the new class of 51m OPVs.

The 'P51MR Class' OPVs as they will be known are based on the proven Saettia class and will be characterised by a high level of modularity, stability in rough sea conditions, low radar signal signature and high operational flexibility.

Several versions of the Saettia class were built by Fincantieri, based on the first of the type, the Saettia Mk 1. These include the Diciotti-class OPV (Saettia Mk2),

SEVERAL VERSIONS OF THE SAETTIA CLASS, ON WHICH THE NEW UAE OPVS WILL BE BUILT, WERE BUILT FOR CLIENTS IN THE MIDDLE EAST AND ELSEWHERE

which was built for the Italian Coast Guard, Iraqi Navy, Armed Forces of Malta and other users. Saettia Mk3 vessels were also built for the Armed Forces of Malta, and the Mk4 version of the Saettia class was built for the Iraqi Navy.

His Excellency Faisal Al Bannai, Chairman of EDGE Group said: "In just three months since first announcing the creation of the joint venture with Fincantieri, we are announcing a significant order for these sophisticated OPVs, to be built here at our shipyards in Abu Dhabi and in Italy.

"Not only does this demonstrate the speed with which EDGE and its partners can operate, and the resources we can mobilise, but fully underscores our strategy of international export growth through mutually beneficial partnerships, the exchange of knowledge and expertise, and the pursuit of technological excellence through innovation."

EDGE Group's chairman said formation of the Maestrale JV "also opens up opportunities to promote an extensive portfolio of diverse maritime solutions, including a series of technologically advanced vessels, to navies and coast guards around the world".

Pierroberto Folgiero, Fincantieri CEO and managing director said: "We are proud to announce the creation of MAESTRAL and a first major order since the start of our collaboration with EDGE Group."

Folgiero said the contract was "concrete evidence of how the joint venture is an industrial platform of great value," that would enable the companies to "seize opportunities arising in a strategic market such as the UAE" and "further develop commercial capabilities, creating new and important opportunities for growth and expansion in the international defence sector".

Based in Abu Dhabi, capital of the UAE, EDGE consolidates more than 25 entities in five core clusters: platforms and systems; missiles and weapons; space and cyber technology; trading and mission support; and homeland security. ■



AUSTAL ADAPTED THE FORMER ROYAL AUSTRALIAN NAVY PATROL BOAT *MAITLAND* TO UNDERTAKE THE PBAT

UNCREWED VESSELS

AUSSIE AUTONOMY TRIAL ACCLAIMED AS A SUCCESS

Former Royal Australian Navy patrol boat demonstrates locally developed control systems and ability to operate within requirements of regulatory framework

In a noteworthy development in the Australian maritime sector, a collaborative patrol boat autonomy trial (PBAT) project recently completed sea acceptance trials – including endurance trials – of a remote and autonomously operated vessel, *Sentinel*.

The trials, conducted by Austal Australia, consisted of a series of remote and autonomous navigation events conducted off the Western Australian coastline during March and April 2024, utilising Greenroom Robotics' Advanced Maritime Autonomy (GAMA) software to reliably navigate *Sentinel*, a de-commissioned Armidale-class patrol boat.

Throughout the trials, a limited number of project team members, observers and a crew from International Maritime Services (IMS) were on board the vessel, ensuring a swift response in case of

any unforeseen deviations or necessary manual interventions.

Funded by the Commonwealth of Australia, PBAT is a collaboration between Austal Australia, Greenroom Robotics, Trusted Autonomous Systems and the Royal Australian Navy Warfare Innovation Navy (WIN) branch to establish robotic, automated and autonomous elements on a former Royal Australian Navy patrol boat to provide a proof-of-concept demonstrator, for optionally crewed or autonomous operations. The trial has also explored the legal, regulatory pathways and requirements of operating an autonomous vessel.

In 2022, Austal Australia took possession of the decommissioned patrol boat HMAS *Maitland* from the Commonwealth of Australia, renamed the



AUV DEMO COMPLETED AS PART OF US NAVY LDUUV PROGRAMME

Kongsberg Discovery has completed in-water demonstrations of the Hugin autonomous underwater vehicle (AUV) as part of the commercial evaluation of large diameter unmanned underwater vehicle (LDUUV) systems by the Defense Innovation Unit (DIU) and the US Navy.

Kongsberg Discovery was awarded a contract by the DIU earlier in 2024 to deliver a Hugin AUV. A delegation from the US visited the company's facilities in Horten, Norway in April 2024 for a week-long demonstration.

Kongsberg produces three AUVs that fall into the LDUUV category as defined by the US Navy. The newest and most capable is the Hugin Endurance, which has greater endurance than earlier models, and can undertake long-term, unsupported missions.

vessel *Sentinel*, and commenced planning, modification, testing and evaluation of autonomous and remotely operated systems for the PBAT.

At 57m length overall, *Sentinel* is, by a significant extent, the largest vessel operated in Australia to be operated remotely and autonomously and was extensively modified to enable remote and autonomous operations, including modifications to navigation, communications, bilges, CCTV, and electrical systems. Sensors and computer units were also added by Greenroom Robotics to inform and host the GAMA. TAS chief executive officer Glen Schafer said the autonomous and automated features on a vessel the size of *Sentinel* and regulatory considerations were "complex."

Among the objectives of PBAT were to significantly progress the concept of remote operations and the autonomous certification approach; increase

understanding of fuel management, communication, and navigation systems to be made autonomous; investigate and understand the sustained operation of shipboard mechanical systems without crew intervention, including systems of redundancy and reliability to support operations at sea for extended periods; provide input to long-term risk reduction for future naval projects, considering remote or autonomous vessels; and transfer lessons learned on the application of remote or autonomous systems to the Royal Australian Navy's current fleet to potentially optimise crew workload.

Austal Limited chief executive officer Paddy Gregg said the completion of sea trials was a significant milestone in the PBAT, successfully demonstrating the capability of the locally developed autonomous systems and their integration within a full-size, Australian-made naval vessel. He said the PBAT team had worked exceptionally hard and achieved the objectives of the trial – to demonstrate the autonomous technology successfully within a complex regulatory and operating environment.

"Looking ahead," said Gregg: "we are excited about the potential opportunities to work with the Royal Australian Navy to further advance the autonomous technology demonstrated during the trial, on projects such as the Large Optionally Crewed Surface Vessels (LOSV), recently announced by the Australian Government as part of the Surface Combatant Fleet Review."

Greenroom Robotics chief technology officer Harry Hubbert said: "PBAT has been a very successful collaborative project. The insights from all parties has been instrumental in steering us toward success. Together, we have harnessed collective expertise to deliver this groundbreaking project. This collaborative effort not only has the potential to enhance current operations and platforms but also paves the way for unprecedented advancements on the horizon."

Commodore Michael Turner, the Royal Australian Navy's Director General Warfare Innovation Navy said PBAT "has successfully demonstrated autonomous technology and its practical application to operational vessels." ■

ANDURIL TO BUILD AUV FACTORY

Anduril Industries has confirmed that it is to build a production facility in Quonset Point in Rhode Island to support large-scale production of its Dive-LD family of autonomous underwater vehicles (AUVs).

The company said the facility will enable it to immediately increase production capacity for its Dive-LD family of AUVs to more than 200 hulls a year. Anduril plans to create more than 100 jobs within five years of the facility opening in 2025.

The announcement comes amid growing demand from defence and commercial customers for AUVs. The US Navy recently awarded Anduril a US\$18.6 million contract to cover an initial buy of Dive AUVs through the Defense Innovation Unit's (DIU) Large Displacement Unmanned Underwater Vehicles (LDUUV) prototyping effort.





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In December 2024, the International Maritime Organization (IMO) will host the 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 Maritim) are organising the 3rd Autonomous ship conference on 20-21 November 2024 ahead of the IMO meeting.

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