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currents

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Foreword

By Neil Hodges, Managing Director

At Blue Zone Group Pty Ltd, we are driven by a vision of innovation, excellence, and sustainable growth. As pioneers in the Diving, Remote, and Autonomous Systems (D-RAS) sector, we work alongside our overseas partners to push the boundaries of technology and deliver cutting-edge solutions that meet the evolving needs of our customers.

This magazine reflects our commitment to sharing knowledge, fostering collaboration, and celebrating the remarkable achievements within the D-RAS field. Through insightful articles, expert perspectives, and the latest developments, we aim to keep you informed, inspired, and connected to the advancements shaping our industry.

As we look to the future, our focus remains on delivering quality, reliability, and value to our partners and stakeholders. We invite you to explore these pages with curiosity and enthusiasm, and we look forward to continuing this journey of progress together.

Thank you for being a part of the Blue Zone Group community.

From the Editor

Welcome to the Autumn Edition — The Second Release of BlueZone's Undercurrents Magazine!

Read Undercurrents online at:
https://bluezonegroup.com.au/newsletters/

As technology continues to evolve at an incredible pace, the undersea domain is experiencing significant advancements across a wide range of applications. With so much innovation taking place, we wanted to take this opportunity to highlight some of our most insightful articles—bringing key developments back into focus for our valued customers.

From cutting-edge progress in uncrewed systems to advancements in well-established technologies like side scan sonar, the pace of change is accelerating. New solutions and capabilities are emerging rapidly, making it easy to overlook the latest breakthroughs. Undercurrents aims to keep you informed and ahead of the curve, ensuring you never miss an important development in the field.

At BlueZone, we remain dedicated to fostering strong, long-term relationships with global OEMs that deliver the best equipment for subsea applications.

The challenges presented by the global pandemic underscored the risks of relying on extended supply chains, reinforcing the importance of local support and service. That's why we stand by our commitment to "service what we sell"—so our customers can trust in reliable, long-term equipment performance with minimized downtime.

We hope you find this edition of Undercurrents insightful and informative. If you have any questions or feedback, we'd love to hear from you at sales@bzg.com.au.

Stay Ahead of the Tide™

Tamara Alonso

If you are interested in advertising opportunities contact Tamara at marketing@bzg.com.au

The BlueZone Team at the Land Forces Expo 2024.

BlueZone exhibitor booth displaying Diver, Robotic and Autonomous systems at Land Forces 2024.

BlueZone Director, Mr Neil Hodges and General Manager of Defence Andrew Hazell with Mr Stewart Dunn from Eomap and Mr Nick Goodwin Regional Business Development Manager, HII.

BlueZone's Successful Participation at Land Forces 2024

Record Attendance and Exhibitors Mark a Milestone Year for Land Forces 2024

BlueZone exhibited at the largest Land Forces International Land Defence Exposition 2024 from the 11th – 13th September in Melbourne, Australia. This year marked the 10th anniversary of the event and broke records with 995 exhibitors from 31 countries, showcasing the future of defence technology and innovation for Australia and international partners. The three-day event held the first Chief of Army Symposium including Army Innovation Day and Quantum Technology Challenge. The event attracted over 20,000 attendees over the three days, which involved 77 conferences and presentations, over 130 official defence, government and industry delegates from 30 nations, 16 Chief or Counterparts and 11 Representatives.

"We've had record numbers of delegates and an impressive 995 exhibiting companies from 31 countries around the world. Not only has this been the biggest and best Land Forces yet, it is also the largest defence exposition ever held in Australia, "said Justin Giddings, CEO of Land Forces 2024 organiser AMDA Foundation. "The undoubted success of the event is the result of a very strong partnership between the Victorian Government, Australian Army, our sponsors, defence industry participants and the Melbourne Convention and Exhibition Centre staff

and management. Together with our own AMDA team we have managed to successfully stage a world-class event."

The BlueZone booth showcased the latest Remote, Robotic and Autonomous Systems (RAS) for maritime applications in Australia and New Zealand. The equipment included SUEX Diver Propulsion Vehicles (DVPs) and Blueprint's Artemis Pro Diver Navigation System, Strategic Robotic System's FUSION ROV, SEABER's YUCO-SCAN micro-AUV and HII's REMUS 300 AUV. BlueZone maintains key partnerships with international leading OEMs to supply quality marine and subsea products and services to offshore, oceanographic, hydrographic, energy and defence communities.

Throughout the event, the BlueZone team connected with existing clients and partners, whilst establishing new partnerships. The offerings from BlueZone highlighted a range of technology relevant to Land Forces and the challenging littoral environment. The team at BlueZone extends a warm thanks and our sincerest gratitude to the State Government of Victoria and the Victorian Police supported by their team of federal and other state police officers, for their extraordinary planning and cooperation towards the Land Forces event.

TELEDYNE MARINE

Teledyne Marine, part of Teledyne Technologies Incorporated, unites industry-leading subsea companies to deliver advanced Imaging, Instruments, Interconnect, Seismic, and Vehicle solutions. Supporting industries such as hydrography, offshore, dredging, defence, and marine research, our technology enables Autonomous Underwater Surveys, Pipeline Inspection, Hydrographic Mapping, and more. With a comprehensive product suite, global support, and expert technical solutions, Teledyne Marine simplifies subsea challenges.

To learn more, visit *teledyne.com/en-us*

BlueZone Group Achieves JOSCAR-AU Registration

BlueZone Group's JOSCAR-AU Accreditation Marks a Milestone for Commitment to Australian Defence

BlueZone Group is proud to announce its successful registration with JOSCAR-AU (Joint Supply Chain Accreditation Register - Australia), the premier supplier compliance system for the Australian Defence, aerospace, and security industries. This milestone solidifies BlueZone Group's commitment to excellence in compliance, risk management, and partnership within these critical sectors.

JOSCAR-AU, managed by Hellios Information Pty Ltd, is a streamlined supplier management platform endorsed by major Defence primes and the Australian Department of Defence. It simplifies the compliance process by centralising supplier data, reducing administrative duplication, and ensuring alignment with stringent industry standards.

By achieving this accreditation, BlueZone Group joins a trusted network of vetted suppliers recognised by leading organisations such as BAE Systems, Boeing Defence Australia, Lockheed Martin Australia, Raytheon Australia, and Saab. This certification reinforces BlueZone's dedication to delivering innovative and reliable solutions to Defence and security partners.

"We are thrilled to be part of the JOSCAR-AU community," said Neil Hodges, Managing director at BlueZone Group. *"This registration not only validates our adherence to high standards but also positions us to collaborate more effectively with key stakeholders across the Defence sector. It reflects our unwavering commitment to meeting and exceeding the expectations of our customers."*

The JOSCAR-AU system enhances supply chain efficiency by covering key compliance areas such as cybersecurity, health and safety, trade controls, and environmental, social, and governance (ESG) commitments. BlueZone Group's inclusion in this platform ensures a seamless engagement process with Defence primes while reducing time and cost burdens for all parties.

This achievement represents another step forward for BlueZone Group as a trusted partner in advancing Australia's Defence capabilities. The company looks forward to leveraging the opportunities provided by JOSCAR-AU to strengthen relationships and deliver exceptional value across its projects.

BlueZone Group's Certification for JOSCAR-AU registration.

SUEX

SUEX is at the forefront of underwater mobility technology. Over the years, the evolution of SUEX DPVs has met the demanding needs of extreme technical and professional applications while also delivering an exceptional and immersive experience for recreational divers.

Combining advanced technology with proven reliability, SUEX DPVs ensure high performance with absolute safety. Each model undergoes rigorous real-world testing to optimise performance, reliability, and manoeuvrability. With cutting-edge DPV and integrated communication systems, SUEX offers a seamless and innovative underwater experience—where innovation simplifies exploration.
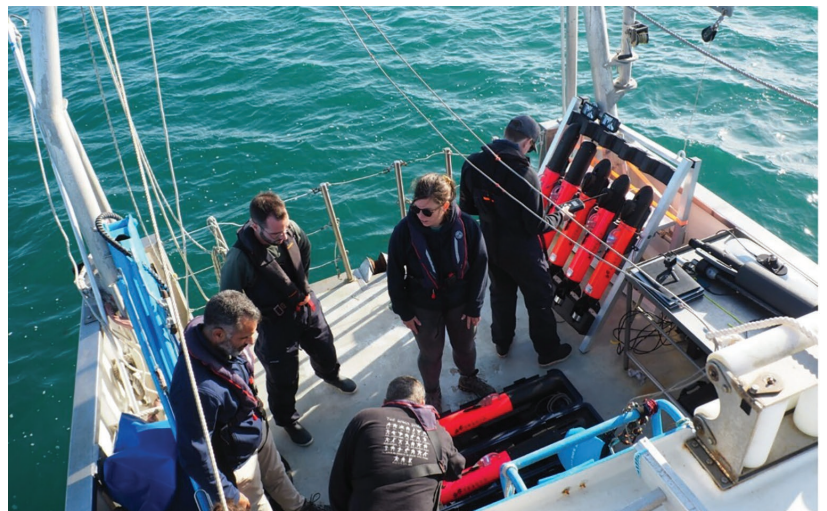
To learn more, visit *suex.it/en/*

YUCO Range Micro-AUVs waiting to be deployed. (Photo credit: SEABER)

SEABER's micro-AUV fleet deployed and beginning their mission to survey the ocean floor. (Photo credit: SEABER)

Team working together to survey Brest with SEABER's micro-AUVs. (Photo credit: SEABER)

SEABER's Milestone in Underwater Exploration

Deploying 10 Micro-AUVs to Survey Marine Biodiversity for SEAMAP Project

Recently, SEABER in collaboration with CNRS LEMAR and MARine Biodiversity Exploration and Conservation (MARBEC) successfully deployed 10 micro-AUVs for the joint project SEAMAP. The team deployed a fleet of 10 micro-AUVs in Brest, all equipped with acoustic positioning for real-time tracking and advanced sensors for large-scale biodiversity mapping.

SEABER's flagship project is funded by the French government under France 2023 program. The fleet of micro-AUVs will be equipped with state-of-the-art sensors to survey, map and characterise the biodiversity on the ocean's floor on a large-scale. SEABER's vision encapsulates marine biology and ecology, and precise engineering sciences to usher a new era of underwater biodiversity and ecosystem exploration. The deployment of 10 micro-AUVs at the same time is a major milestone for the project and future of underwater exploration.

This latest achievement is the beginning of SEABER's capability and commitment to stand at the forefront of the latest deep-sea exploration. The next set of challenges include surveying remote areas around Saint Pierre, Miquelon and Antarctica, which will test the vehicle's capabilities and limitations.

Mine Warfare: A Persistent Challenge

Author: Neil Hodges, Managing Director BlueZone Group

Mine warfare is often described as dull, dark, and dangerous, qualities that, as this author would argue, also make it particularly difficult. Its unglamorous nature belies its strategic importance, as sea mines remain one of the most cost-effective tools for controlling maritime operations and denying access to adversaries.

A stark reality underpins naval history: every recent maritime conflict has involved the use of sea mines. These weapons disrupt shipping lanes, safeguard critical zones, and impose significant costs on those attempting to clear them. Despite their undeniable importance, mine warfare has long been regarded as the neglected sibling of naval operations. It is perennially underfunded and overlooked, only to be hurriedly revisited when a conflict arises. At that moment, leaders inevitably ask, "What is the state of our countermine capability?" This question triggers a familiar scramble: outdated equipment is hastily refurbished, budgets are reallocated, and personnel rush to relearn the intricacies of mine warfare.

In recent years, the phrase "man out of the minefield" has gained traction. While it conveys an aspirational vision of fully automated mine clearance, the reality is far more complex. The technological, logistical, and ethical challenges of achieving such a goal remain formidable. This essay explores the enduring challenges and emerging prospects of mine warfare, with a focus on the feasibility of fully automating underwater minefield clearance to eliminate human risk.

The Challenge of Locating the Minefield

The first hurdle in mine warfare is identifying the minefield's location. Accurate intelligence is critical, providing insights into where adversaries are likely to deploy mines.

Once a minefield is located, the next challenge is clearing the mines that pose a threat to operations and hinder military objectives. Speed is vital yet achieving both rapid and safe mine clearance is a delicate balance. How can the process be expedited without compromising safety?

Since World War II, purpose-built mine warfare vessels, engineered to withstand the shock of nearby mine detonations, have been central to the detection and neutralisation of sea mines. However, advancements in unmanned systems have introduced new strategies. Today, the mine warfare community is split between two approaches: one favours traditional mine-resistant ships capable of operating directly within minefields, while the other supports less-protected mother ships that operate from a safe standoff distance outside the minefield.

Regardless of the approach, both rely on external naval assets to provide broader protection against threats from enemy ships, submarines, and aircraft. These supplementary forces are critical to ensuring the safety and effectiveness of mine warfare operations in contested environments.

One advantage of traditional mine-resistant vessels is their capacity for self-defence. Built to withstand mine blasts and with ample deck space, they can accommodate advanced protective equipment, making them better suited to withstand attacks while operating in hostile environments.

In contrast, operations relying on less-protected mother ships require these vessels to remain outside the minefield. From these standoff positions, they deploy uncrewed surface vessels (USVs) equipped with uncrewed underwater vehicles (UUVs) or towed sonar systems to locate and classify mines. Technological advancements have greatly enhanced the effectiveness of these systems, providing innovative tools to tackle the challenges of minefield detection and clearance.

Both approaches have advantages and disadvantages that require more consideration depending upon the threat scenario or operation likely to be encountered.

Critical Vulnerabilities

Despite technological advancements, significant vulnerabilities persist. Adversaries are likely to monitor and defend the minefields they deploy, utilising increasingly sophisticated and accessible explosive aerial drones and small explosive drone boats. These threats provide a straightforward means to neutralise costly uncrewed surface vessels (USVs), either during transit or while they conduct search operations.

While high-speed USVs can reduce risks during transit, mine clearance presents unique challenges. Current methods, such as employing clearance divers or remotely operated vehicles (ROVs) launched from near stationary USVs, remain fraught with danger. Deploying divers into a minefield directly contradicts the goal of keeping personnel out of harm's way, while stationary USVs deploying ROVs are highly vulnerable to enemy attacks.

As well as being vulnerable to enemy attacks, the environmental conditions will place ROV operations from a USV at great risk. Launching a ROV from a crewed vessel in heavy seas is hazardous to safety of personal and equipment. A USV remotely launching a ROV and then maintaining station to avoid damaging the tether in adverse weather is extremely hazardous.

A further challenge is maintaining reliable communications and precise positional accuracy. To successfully destroy a mine identified by a UUV or towed sonar system, ROV operators must have accurate positional data to reacquire the target. Any degradation in positional accuracy prolongs the reacquisition process, increasing the USV's exposure to enemy attacks.

Similarly, robust communication between the mother ship and the USV is essential. Any disruption during ROV operations can hinder efforts to locate and neutralise mines, further compromising mission effectiveness. Addressing these issues is critical to improving the viability and safety of unmanned mine clearance operations.

Double Eagle MuMNS. (Photo Credit: SAAB)

Double Eagle MuMNS. (Photo Credit: SAAB)

REMUS 100 man portable UUV. (Photo Credit: HII)

Artificial Intelligence

Artificial Intelligence (AI) is often heralded as the solution to many modern challenges, and mine warfare is no exception. AI-driven systems hold immense potential for tasks such as mine detection, classification, and operational decision-making, enabling faster and more accurate responses. However, AI alone cannot resolve the fundamental dilemmas of mine warfare, particularly when it comes to engaging and neutralising threats.

One of the primary obstacles is regulatory and ethical. Current international rules and conventions impose strict limitations on the use of autonomous systems in lethal or destructive roles. Robots carrying explosives, for example, are not yet permitted to independently determine when or how to engage targets, such as triggering mine detonation. These restrictions are in place to mitigate risks of unintended harm, such as collateral damage or accidental detonations in inappropriate locations.

Additionally, trust in AI systems for critical, high-stakes decisions like mine clearance is not yet universal. Questions about reliability, accountability, and the potential for system errors further complicate their deployment. Until global rules governing autonomous weapons systems are revised and technology matures to the point of widespread acceptance, AI will remain a valuable tool for assisting in mine warfare, but it will not replace human oversight and decision-making in explosive clearance operations.

In this context, the promise of AI is significant but not yet a panacea. For now, advancements in AI will enhance detection and analysis capabilities, but the human role in mine clearance remains indispensable.

Integrating AUKUS Pillar 2 into Mine Warfare

The AUKUS security partnership, particularly its Pillar 2 focus on advanced technologies, has the potential to redefine the future of mine warfare. Pillar 2 emphasises the development and integration of cutting-edge capabilities such as autonomous systems, artificial intelligence (AI), and quantum technologies. These innovations align directly with the needs of modern mine warfare, offering pathways to address critical vulnerabilities and enhance operational effectiveness.

For instance, autonomous systems supported under AUKUS Pillar 2 could accelerate the transition toward uncrewed mine detection and clearance. Enhanced UUVs and USVs, equipped with AI-driven mine classification tools, could provide more rapid, accurate, and scalable solutions to identifying and neutralising threats. Advanced communication technologies developed through the partnership could strengthen the reliability of links between mother ships and unmanned systems, even in contested environments.

Furthermore, the incorporation of quantum sensing and navigation technologies—a key area of focus under AUKUS—could revolutionise underwater positioning. These tools would enhance the accuracy of mine reacquisition and neutralisation operations, even in GPS-denied environments, reducing exposure to enemy countermeasures.

The Way Forward

The development of unmanned systems—such as USVs, UUVs, and remotely operated mine disposal technologies—marks a significant step toward reducing the risks to human operators in minefields. These advancements promise faster and safer mine detection and clearance operations. However, their success is contingent upon addressing critical vulnerabilities: the threat of adversarial countermeasures, the reliability of communications and navigation systems, and the ethical and regulatory constraints on autonomous systems.

Adversaries armed with low-cost but highly effective drones present a growing threat to uncrewed platforms. Without robust counter-drone strategies, these assets are vulnerable to disruption, undermining their operational value. Equally important is the need for reliable communication links between mother ships and uncrewed systems, as well as accurate navigation solutions to ensure efficiency and minimise exposure to enemy attack.

A promising path forward may lie in hybrid approaches. Purpose-built mine-resistant ships could serve as operational hubs, deploying a large number of UUVs to expedite mine detection and classification. These vessels would integrate counter-drone technologies, advanced communication systems, and repeatable navigation solutions to enhance their survivability and effectiveness.

The hybrid ships would conduct the mine disposal operation, launching and controlling the ROV directly from the ship. This would allow the ship crews to better control the ROV launch and recovery (if recovery is required) removing the stability difficulties and communication difficulties that a USV would have in heavy seas.

Furthermore, the potential of Artificial Intelligence (AI) must be leveraged. While AI may not yet replace human oversight, it can significantly enhance detection, analysis, and decision-making processes. Coupled with human expertise and robust technological protections, AI-driven systems could transform mine warfare from a reactive endeavour into a proactive strategy.

By leveraging the collaborative framework of AUKUS, member nations can pool resources, share expertise, and deploy interoperable systems that strengthen collective mine warfare capabilities. This approach not only enhances individual national security but also contributes to a more resilient, allied response to maritime threats.

In conclusion, mine warfare will remain a persistent challenge, demanding continued innovation and investment. By addressing the vulnerabilities of unmanned systems, integrating emerging technologies, and balancing automation with human oversight, the naval community can build a more resilient and effective mine warfare capability. Only through such efforts can the vision of "man out of the minefield" move closer to reality, ensuring the safety of personnel and the success of maritime operations.

HII Delivers Advanced REMUS 620 UUVs to NOAA

Innovative UUVs Set to Transform NOAA's Oceanographic Missions

HII has successfully built and delivered two REMUS 620 uncrewed underwater vehicles (UUVs) to the National Oceanic and Atmospheric Administration (NOAA) for enhanced high-resolution ocean floor mapping. The REMUS 620 is the first medium-class UUV designed to deliver a comprehensive range of above- and below-water capabilities over long distances. (Image credit: HII)

HII Mission Technologies division has successfully built and delivered two REMUS 620 Uncrewed Underwater Vehicles (UUVs) to the National Oceanic and Atmospheric Administration (NOAA) for enhancing high-resolution ocean floor mapping. Unveiled in November 2022, the REMUS 620 is the first medium-class UUV designed to deliver a comprehensive range of above- and below-water capabilities over long distances.

"The rapid delivery of the REMUS 620 underscores HII's exceptional agility and efficiency in producing and deploying uncrewed systems that meet the needs of our customers," said Duane Fotheringham, president of Mission Technologies' Unmanned Systems business group. *"The swift production and delivery timeline to NOAA demonstrate our commitment to supporting our customers' mission requirements with rapid development and deployment of new capabilities and technology."*

The REMUS 620 vehicles incorporate cutting-edge modular design and engineering. Like all the REMUS UUVs built by HII, the NOAA REMUS 620 vehicles have been modified with customized enhancements for NOAA's advanced underwater mapping and habitat restoration missions. Upgrades include a synthetic aperture sonar module, additional energy module, and auxiliary equipment.

NOAA plans to use the REMUS 620 vehicles for high-resolution mapping in the Gulf of Mexico, with a focus on restoring Mesophotic and Deep Benthic Communities — or dim and sunlight-free seafloor habitats — injured by the 2010 Deepwater Horizon oil spill. The timely delivery of these UUVs will allow NOAA to accelerate its critical environmental restoration and exploration missions, building on its existing use of other REMUS models for habitat characterization, marine archaeology, and various oceanographic studies.

"The market interest in the REMUS 620 has been tremendous," Fotheringham said. *"The rapid delivery to NOAA, alongside our growing backlog of REMUS 300 orders, reinforces the market's confidence in the continued capabilities and versatility of the REMUS series."*

Over than 600 REMUS UUVs have been sold globally and are in operation in more than 30 countries, including 14 NATO members. Over 90% of the vehicles delivered in the past 23 years are still operational today, demonstrating the platform's durability and the ability to integrate new technologies as they are developed.

BlueZone Group, HII's authorized REMUS depot level service centre in Australia, plays a crucial role in supporting the deployment and maintenance of REMUS vehicles within the region. Established as a service centre in 2022, BlueZone provides comprehensive depot-level support, including maintenance, repairs, upgrades, and sensor integration for REMUS AUVs. This partnership ensures that Australian and regional users, such as the Royal Australian Navy, benefit from minimized downtime and enhanced operational availability of their REMUS systems.

HII, A TRUSTED PARTNER

Based in Canberra, HII Australia builds on HII's proven expertise in constructing nuclear-powered submarines, developing advanced technologies, and delivering infrastructure solutions, including workforce and supply chain development, to support the AUKUS security partnership between Australia, the United Kingdom, and the United States.

To learn more, visit *hii.com*

MARTAC Revolutionising Maritime Operations: the Muskie M18 and Devil Ray USV

High-Performance, Versatile USV Solutions for Littoral and Open Ocean Missions

MARTAC M18 USV offers high performance capabilities for littoral & open ocean missions. (Photo credit: MARTAC)

Introducing the Muskie M18 and Devil Ray Small Class USVs from MARTAC, offering high-performance capabilities for littoral and open ocean missions. The Muskie M18 excels in speed, range, and endurance for one-way operations, while the Devil Ray supports large payloads, superior stability, and subsurface sensor management for ISR, EW, MCM, and more. Both systems integrate seamlessly with third-party technologies, including AI-driven missions. Stay tuned for more on how these advanced USVs are transforming maritime solutions.

Contact the BlueZone team for more information on the M18, T18 and the Devil Ray Small Class USVs.

BLUEPRINT SUBSEA

Since 2006, Blueprint Subsea has been delivering a leading range of compact, robust, intuitive, and cost-effective underwater acoustic products, meeting the demanding needs of the global subsea, offshore, and defence markets. We specialise in imaging sonars, acoustic positioning beacons, and diver navigation systems. Designed in-house and manufactured with cutting-edge techniques, our systems deliver exceptional performance without compromise.

To learn more, visit *blueprintsubsea.com*

Seafloor System's HyDrone Uncrewed Surface Vessel (USV)

AutoNav Plus Enables Autonomous Surveys without Operator Supervision

In marine and hydrographic surveying, the need for precision, real-time data, and operational efficiency has never been higher. Seafloor System's HyDrone Uncrewed Surface Vessel (USV), equipped with AutoNav Plus, is at the forefront of a new wave of technology that simplifies these tasks and makes them more reliable than ever before. With the HyDrone USV, operators can now perform fully autonomous surveys while monitoring their data in real time.

Seafloor System's Hydrone USV is an advanced, uncrewed vessel designed for hydrographic surveys and marine data collection. Combining automation, cutting-edge sensors, and real-time monitoring the HyDrone offers significant benefits for marine and coastal surveying, environmental monitoring, and infrastructure inspection. The integration of AutoNav Plus – Seafloor's advanced autonomous navigation software – turns the HyDrone into a highly capable and reliable platform, capable of operating autonomously without constant operator supervision.

Hydrone USV with AuotNav Plus provides precision, real-time data and operational efficiency. (Photo Credit: Seafloor Systems)

For high-quality, reliable data collection, Seafloor's HyDrone USV integrates seamlessly with Teledyne Marine's RiverPro ADCP. This integration provides a suitable solution for a wide range of surveys including river and coastal mapping, dredging, and hydrodynamic studies. The RiverPro ADCP is renowned for its precision and robustness, delivering accurate measurements of water velocity, depth, and critical parameters.

Teledyne's RiverPro ADCP is specifically designed for shallow water and riverine environments, offering superior performance even in challenging conditions like turbulent flows and variable water depths. Together, the RiverPro and HyDrone USV allows surveyors to capture precise velocity profiles, depth data, and water column information with unmatched accuracy. The RiverPro ADCP also provides real-time data, making it the perfect complement to the HyDrone's autonomous surveying capabilities.

Unmanned Surface Vessels: Revolutionising Amphibious Logistics Sustainment

MARTAC's Mantas T12. (Photo credit: MARTAC)

Effective logistics sustainment has always been critical to military success, as echoed through history by leaders from Sun Tzu to U.S. Marine Corps General Robert Barrow. The U.S. Navy and Marine Corps are applying this timeless principle in modern amphibious warfare by leveraging unmanned surface vessels (USVs) to support logistics during assaults.

In the INDOPACOM Joint Exercise Valiant Shield, the Navy-Marine Corps team tested a small 12-foot MANTAS USV, successfully delivering supplies to forces ashore. Though its 54.5kg capacity was limited, it proved that unmanned systems can reduce risk to human operators and free up manned craft for other missions.

Building on this success, the Navy and Marine Corps requested a larger USV prototype for scaling up logistics capabilities. The result is the 38-foot Devil Ray (T38), capable of carrying 2041kg, of supplies at a cruise speed of 25 knots. With a shallow draft of 18 inches, the T38 can operate close to shore and rapidly deliver critical sustainment to forces ashore.

A formation equipped with four T38s could deliver over 8,000 kg of material per hour from amphibious ships positioned 20 nautical miles offshore—totalling more than 181,000 kg per day. This scalable, continuous resupply capability enhances the survivability and lethality of Marines engaged in beach assaults.

As the Navy and Marine Corps continue to refine this concept in upcoming exercises, other amphibious forces around the world would benefit from exploring the use of USVs for rapid, reliable logistics sustainment.

Kraken's MINSAS Demonstrates Capabilities at REPMUS 2024

Kraken Robotics Announces More than 50 Mine-Like Targets Found with MINSAS During Annual REPMUS Exercise

Kraken Robotics recently announced that their Miniature Synthetic Aperture Sonar (MINSAS) was demonstrated to five NATO navies at the Portuguese Navy annual Robotic Experimentation and Prototyping with Maritime Unmanned Systems (REPMUS) exercise.

Five Kraken MINISAS modules were integrated onsite into various American, Dutch, Swedish, Belgian, and Portuguese uncrewed underwater vehicles (UUVs) such as HII's REMUS UUV. Throughout the exercises, the systems located over 50 mine-like targets, including reductant coverages.

"REPMUS has been an invaluable experience for our team at Kraken, providing the opportunity to work directly with end-user navies, demonstrate the capabilities of MINSAS, support the rapid processing of data from multiple missions, and get real-time feedback from users that we can integrate into our product roadmap," said Greg Reid, President and CEO of Kraken Robotics. *"Our team supported integration of SAS modules on several different UUV configurations including legacy REMUS systems that were more than 10 years old, [including] the U.S. Navy's MK-18 Mod-1 [and] REMUS 100 NGR. This illustrates the versatility of our technology to be rapidly deployed and exchanged between both new and legacy platforms, providing a significant capability enhancement for mine countermeasure operations from UUVs."*

During the exercises, Kraken's MINSAS was used for a wide range of tasks including area search and reacquire/identify. The systems real-time beamforming and georeferencing facilitated the rapid recovery of acquired data from payloads, enabling immediate post-mission analysis of data when the UUVs returned to shore using SeeByte's SeeTrack C2 System. The Kraken SAS was used in a multi-nation collaborative autonomy exercise to survey mine-like objects in a full 'Find-Fix-Finish' mission. Together, SeeByte's SeeTrack and Neptune collaborative autonomy software and the U.S. Navy's C2 and TAK (Team Awareness Kit), were used to successfully plan and execute the mission.

Overall, Synthetic Aperture Sonar (SAS) offers greater resolution and higher area coverage rates when compared with legacy Side Scan Sonar, and hence serves as an option for mine countermeasure (MCM) operations. The integration of Kraken's MINSAS into REMUS UUVs increasingly provides opportunities to enhance the Mine Hunting and MCM capabilities for several NATO nations.


Kraken's MP-SAS was integrated on Belgian, Dutch, American, and Swedish REMUS 100 UUVs during the annual REPMUS exercise. (Photo Credit: Kraken Robotics)
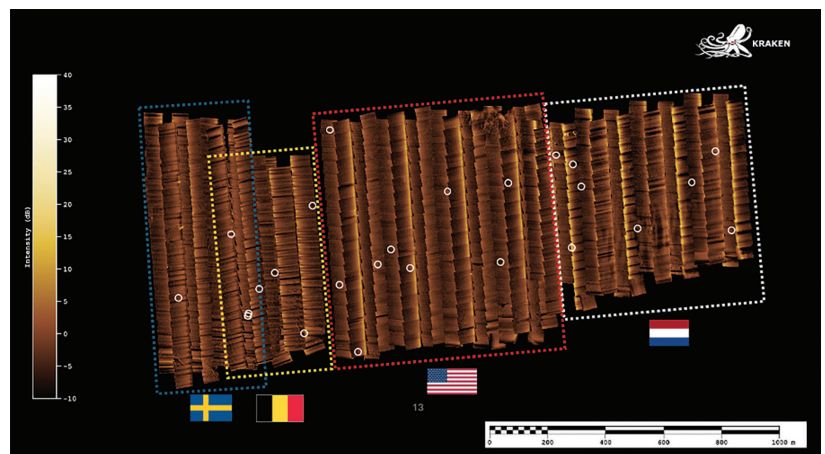

During REPMUS, data from four different MP-SAS modules integrated on REMUS 100 UUVs were combined to identify 25 mine-like targets across 1.6 km2. (Photo Credit: Kraken Robotics)

Australia's Sea Mine Disposal: The Critical Role of DAMDIC and Double Eagle ROVs

BlueZone Group's Strategic Support for Sea Mine Disposal Operations
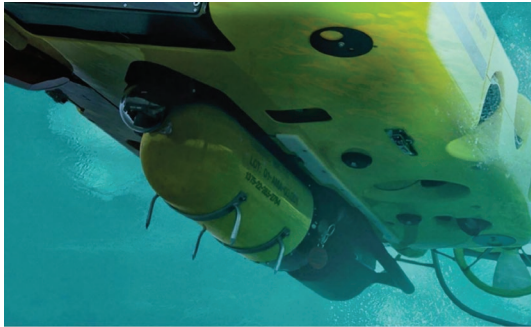
The DAMDIC is integrated as a payload on the Double Eagle MDS and SAROV. (Photo credit: SAAB)
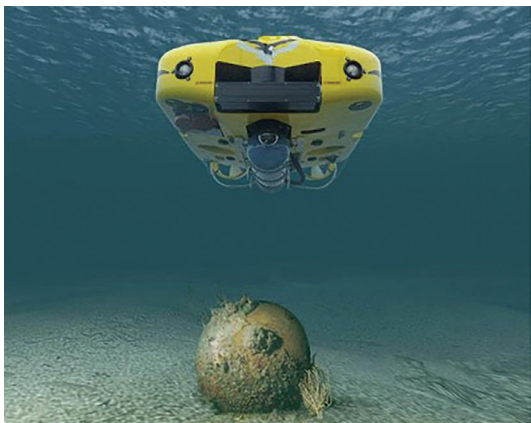
The DAMDIC is an advanced mine disposal charge (MDC) designed for deployment from Remotely Operated Vehicles (ROVs) like the Saab Double Eagle MKII. In collaboration, BlueZone Group, Thales Australia, and Saab work to sustain the Double Eagle Mine Disposal System's capability, ensuring it remains effective beyond the Huon Class Minehunter Coastal ships end-of-life. The DAMDIC MDC is a vital component of Australia's sea mine countermeasures, providing a safe and efficient method for destroying sea mines across various environmental conditions.

The primary purpose of the DAMDIC is to keep personnel out of harm's way. This is achieved by engineering the DAMDIC for precision and safety. It employs a bulk charge principle and is designed to be laid with high accuracy. One of the key safety features of the DAMDIC is that it does not contain batteries or other energy sources and can only be detonated when submerged.

When a sea mine is detected, the Double Eagle ROV is launched carrying the DAMDIC. When the Double Eagle ROV is in position, the DAMDIC is deployed positioning it near the target using precise, pre-calibrated hydrodynamic glide technology. The DAMDIC's design balances size and weight—large and powerful enough to effectively neutralise conventional bottom sea mines, yet light enough to maintain the ROV's speed and manoeuvrability. This

balance ensures both maximum impact against mines and efficient handling by the ROV.

The DAMDIC charge is a critical asset in Australia's mine disposal operations, and the Saab Double Eagle MKII ROV is specifically designed to carry and deliver this essential tool with precision. The synergy between the DAMDIC and the Double Eagle system is paramount for enabling effective mine neutralisation. By maintaining a dedicated stock of DAMDIC charges, Australia secures a reliable capability chain for mine disposal. The Double Eagle's capability assurance program is key to leveraging Australia's substantial investment in DAMDIC ammunition, ensuring these charges are deployed effectively and securely.

BlueZone Group Pty Ltd has supported the Double Eagle MKII ROV in Australia for over 25 years, ensuring the nation's mine disposal capabilities remain at the cutting edge of technology. BlueZone's longstanding commitment has been instrumental in sustaining and enhancing the operational readiness of the Double Eagle systems. Our team's expertise in technical support, maintenance, and obsolescence upgrades has kept the Double Eagle a reliable and effective tool for sea mine disposal. Through the partnership between BlueZone, Thales, and Saab, continues to maintain a robust mine disposal capability, safeguarding maritime operations and personnel.

The Double Eagle Mine Disposal Vehicle has the capability to accurately deploy the DAMDIC mine disposal charge for the neutralisation of seabed mines in harsh ocean conditions.

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