

ACUA
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USV PIONEER



THE UK'S FIRST REMOTELY OPERATED AND
UNMANNED VESSEL CERTIFIED UNDER THE
MCA WORKBOAT CODE 3



ROBUST RELIABLE RECONFIGURABLE

ACUA Ocean's Pioneer-class USV is built to provide reliable and persistent offshore capability. This platform is designed to operate effectively in inclement sea conditions that challenge or prohibit operations for many uncrewed vessels of a similar size and price.

A diesel-electric hybrid powertrain gives the Pioneer-class multi-week endurance, while its unique SWATH hull form ensures exceptional stability. The integrated central moonpool simplifies the installation and safe deployment of payloads, from sensors to robotics, even in high sea states.

With a payload deck capacity of up to 6.5 tonnes, the Pioneer-class can support a wide variety of systems for commercial and defense missions. The moonpool is designed to accept standardised 10 and 20-foot ISO container footprints, significantly easing integration and logistical management. We collaborate with technical partners to provide pre-engineered integration solutions for several payloads, including towed arrays, underwater sensor bodies, ROVs, and weapons systems.

Configurable C3 and surface sensor suite

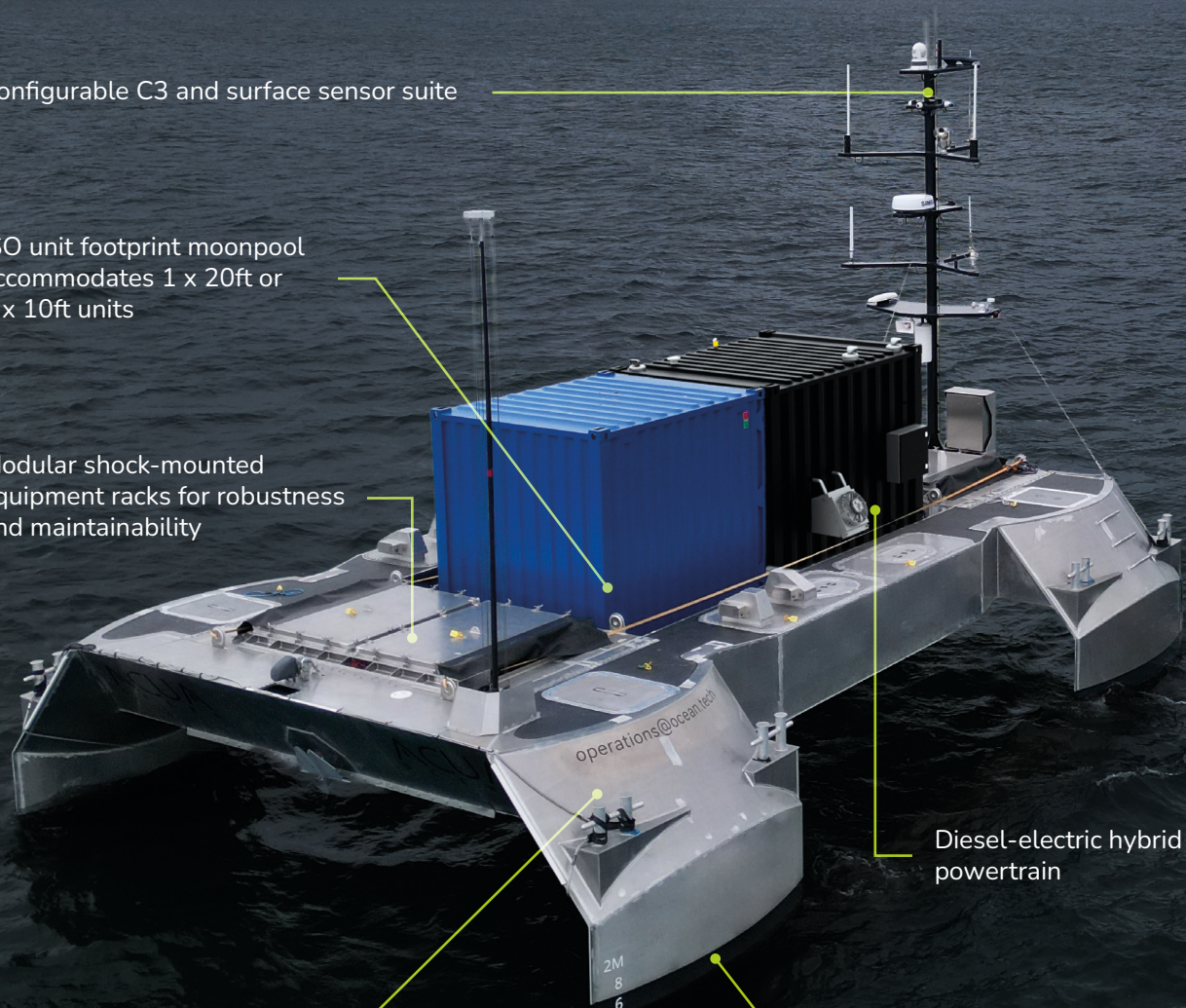
ISO unit footprint moonpool accommodates 1 x 20ft or 2 x 10ft units

Modular shock-mounted equipment racks for robustness and maintainability

Diesel-electric hybrid powertrain

Aluminium Small Waterplane Area Twin Hull (SWATH) form for seakeeping and stability

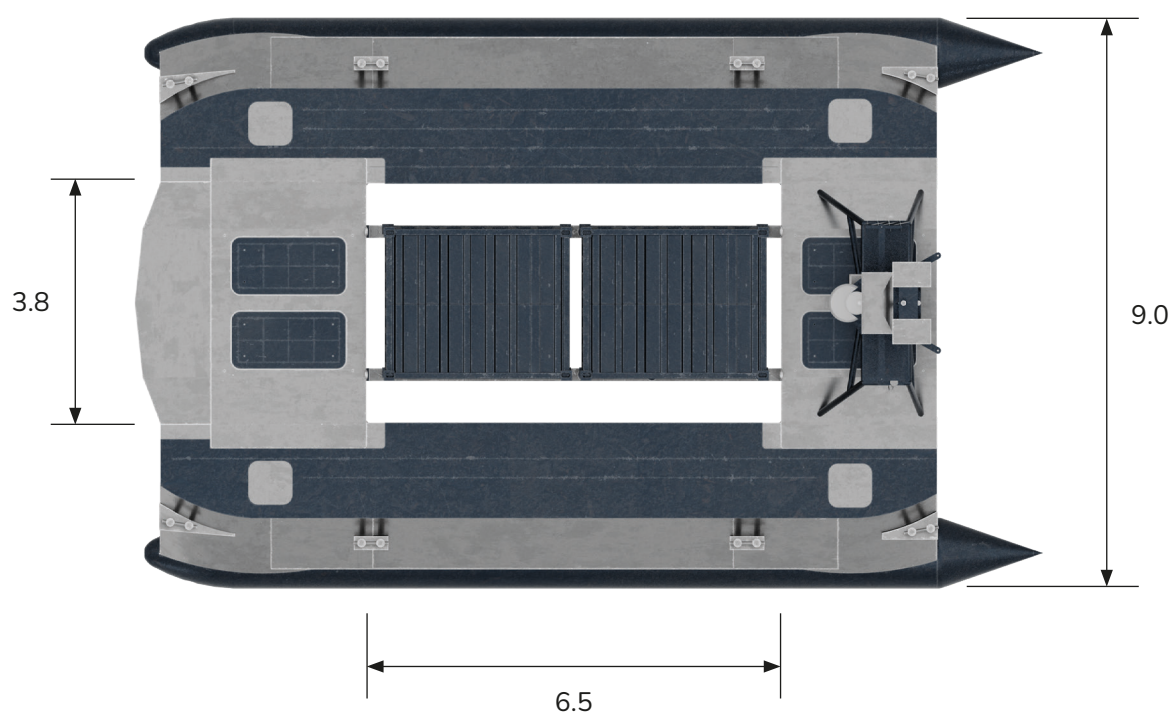
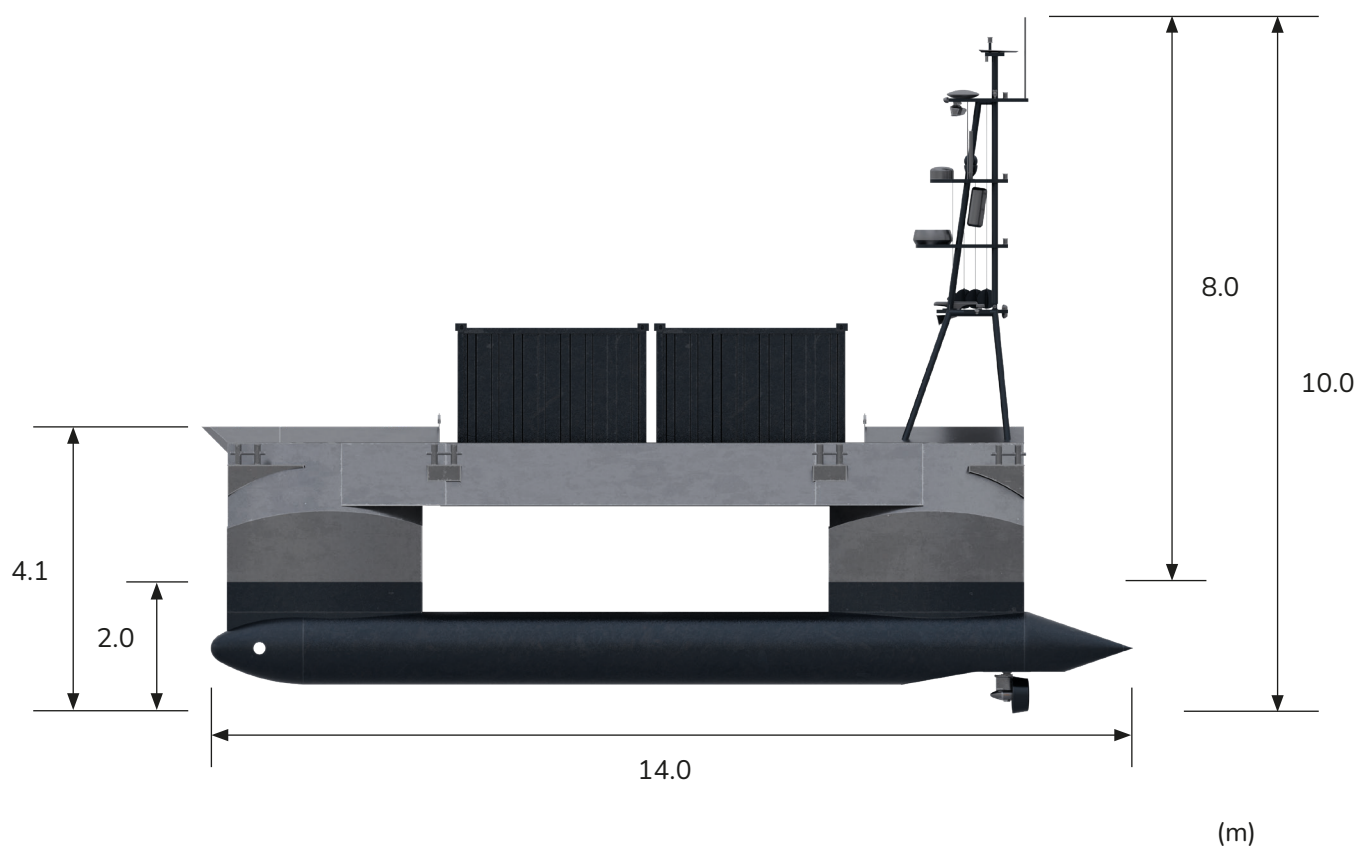
Modular road-transportable hull components for ease of final assembly and fit-out at a site of the customer's choice



BAREBOAT SPECIFICATIONS

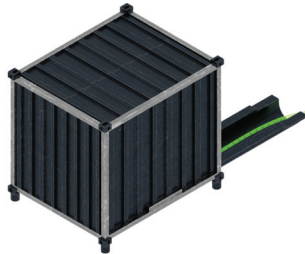
CONSTRUCTION	• Constructed in 4 modular component parts of aluminium
DIMENSIONS	• LOA - 14m • Beam - 9m • Draft - 2m • Masthead sensor height - circa 8m • Seagoing displacement - circa 28 tonnes
PAYLOAD & LARS OR CARGO CAPACITY	• Circa 7 tonnes dependant on payload and USV configuration
OPERATING SPEEDS & MANOEUVRING	• Optimum cruise/survey speed 4.5 knots • Sprint speed 8 knots • Twin Azipod drive and bow thrusters - able to station keep in heavy sea states
OPERATIONAL LIMITS & RANGE	• Hull certified for unlimited ocean operation • 5500nm+ range dependant on task operations cycle
SENSORS & SITUATIONAL AWARENESS	• 360 degree fixed camera view • 2 x PTZ camera incl. infra-red night vision • Radar • Class A AIS transceiver • Dual watch VHF & NAVTEX • Ambient sound receiver • Weather station • Loud Hailer • Searchlight/signal light • 2 x GNSS • Pitch/roll/yaw feedback • 2 x depth sounders
C2 & COMMS	• Over-the horizon WAN SATCOM Primary and Reversionary for offshore operation • 4G for near-shore operation • UHF RC for berthing and pilotage control
POWER FOR PAYLOAD OPERATION	• Upwards of 50kW dependant on USV and payload configuration
REGULATORY COMPLIANCE	• Commercially coded under UK Flag Maritime and Coastguard Agency USV build and operation rules.

DIMENSIONS



SIMPLIFIED SENSOR AND PAYLOAD INTERFACING AND INTEGRATION:

PIONEER's flexible and utilitarian ISO-dimension payload bay offers ultimate flexibility, versatility and maintainability of payloads. ACUA Ocean is developing a variety of payload and LARS designs for integration with USV PIONEER. Contact us if you have an idea for payload integration that you would like us to consider.



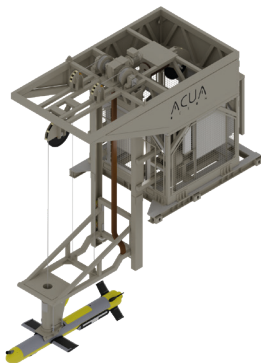
TOWED ACOUSTIC
RECEIVER ARRAY



AUV DEPLOYMENT



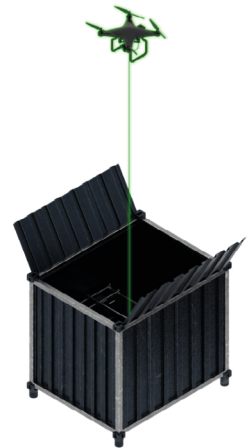
ROV



REMOTELY OPERATED
TOWED VEHICLE



SONAR FLOAT SENSORS



UNMANNED AERIAL
SYSTEMS



GONDOLA-MOUNTED
ECHO SOUNDERS



2 x 10ft / 1 x 20ft
ISO CONTAINER

SCALABLE OPERATIONAL PERSISTENCE:

PIONEER is designed such that several USVs and their payloads can be operated offshore in concurrency from a Remote Operations Centre, permitting expansive coverage and rapid response to task requirements.



OPERATIONS

PIONEER's operational control is managed through a dual-system approach. For close-quarters manoeuvres like berthing and in-harbour pilotage, a handheld UHF radio controller is used. For all beyond-line-of-sight control, including mission management and real-time data transfer, the vessel is operated via satellite communication from a dedicated Remote Operations Centre (ROC).

The ROC is equipped with the necessary computing power and proprietary software to control USV PIONEER and monitor its missions. To ensure mission continuity and UK regulatory compliance, the ROC is designed with redundancy in its power supply and internet connectivity.

This can all be configured from temporary or mobile ROCs, thereby enabling flexible operations and collocation with other partners. For longer term operations, the ROC can be integrated in traditional maritime operations centres providing proximity to decision makers or other platform and payload operators to deliver the best insights from operational situations.

SOFTWARE AND CONTROL

FleetMind™ is a proprietary software solution for the remote monitoring and control of the vessel's internal systems from the Remote Operations Centre (ROC).

Our integrated software solution for safe pilotage and navigation provides:

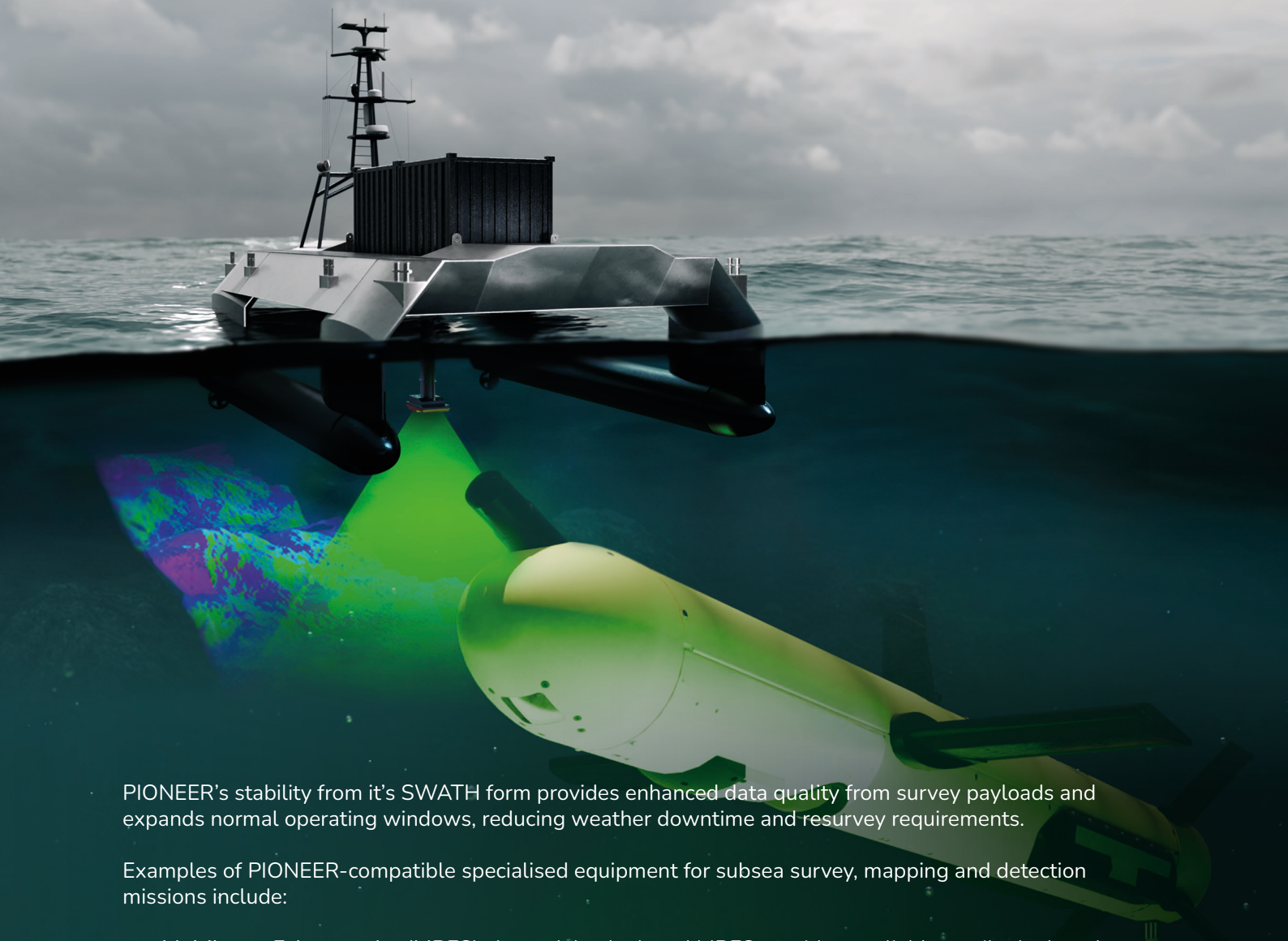
- Excellent situational awareness
- Charting and passage planning
- Vessel control and pilotage
- External voice and text communications
- Adherence to UK regulatory requirements for the commercial operation of USVs

PIONEER's open-architecture, CAN-based control system is designed for easy integration of a wide range of third-party software products, giving operators the flexibility to choose their preferred solutions. This system can support:

- Autonomous or automated USV operation
- Goal-based mission planning and management
- Station keeping and dynamic positioning
- Autonomous or automated payload operation and control

ACUA Ocean is available to support the integration of additional software products and will work to ensure regulatory compliance, whether under UK or other national requirements.

CONCEPT OF USE: GEOPHYSICAL SURVEY AND UNEXPLODED ORDNANCE DETECTION



PIONEER's stability from its SWATH form provides enhanced data quality from survey payloads and expands normal operating windows, reducing weather downtime and resurvey requirements.

Examples of PIONEER-compatible specialised equipment for subsea survey, mapping and detection missions include:

- **Multibeam Echosounder (MBES):** A gondola-deployed MBES provides a reliable, easily deployed, energy efficient, high to very high-resolution seabed mapping system capable of meeting all relevant survey standards.
- **Remotely Operated Towed Vehicle (ROTV):** An all-in-one ROTV system can enable high-resolution data collection and object detection and classification. They can host various sensors, such as multi-aperture sidescan sonar, MBES and magnetometers.
- **Sub-bottom Profiler:** Integrated alongside the MBES system on a retractable gondola, enabling high resolution multi sensor surveys in support of cable, pipeline and pre-installation worksopes.
- **Deepwater Sonar:** For trans oceanic cable route survey and deepwater energy operations Large deep water multibeam systems can be integrated into a fixed gondola solution.
- **Moving Vessel Profilers:** In support of geophysical data gathering Moving vessel profiler enable continuous monitoring of sound velocity in the water column enabling optimum data gathering without the need to stop the vessel enhancing operational efficiency.



CONCEPT OF USE: AUV OPERATIONS AND UAS AERIAL INSPECTIONS

PIONEER's SWATH form provides stability for moonpool deployment of AUV and UAS systems. The large moonpool enables swarms of small AUVs to be deployed or for the cage deployment of larger AUV systems. For above water inspection scopes UAS in a box systems can be hosted to enable aerial inspections, 3 to 4 inspection class drones can be hosted simultaneously enabling wide area continuous inspection campaigns.

Small AUVs for survey can typically operate in over 1000m depth with up to 24 hours endurance. High accuracy is maintained via INS/DVL. Payloads include MBES, sidescan sonar and magnetometers for high-resolution bathymetric and acoustic imagery data acquisition. Operating as a swarm to enable high area coverage rates.

Large AUVs for longer endurance or resident missions. AUVs capable of deep sea operations as well as hovering and light intervention work. Ideal for support of pipeline inspection in deep water or more complex monitoring campaigns.

Inspection UAS for inspection of offshore infrastructure. Host of multiple UAS systems to enable high coverage aerial inspections at pace. Including data rebroadcast to onshore operators and recharging to provide extended offshore operations.



CONCEPT OF USE: SUBSEA INSPECTION & INTERVENTION

PIONEER's SWATH form provides stability for moonpool deployment of electric light work class Remotely Operated vehicles (ROV), weighing up to 1 tonne, in sea states of over 4m significant wave height. Increasing operational availability.

Examples of PIONEER-compatible specialised payloads for subsea inspection and intervention missions include:

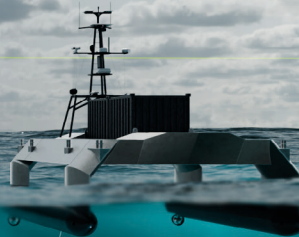
- Small electric **Inspection-Class ROVs** equipped with powerful thrusters can handle currents of several knots and many have depth ratings over 1000 metres, and are extremely cost effective payloads. They can be fitted with multibeam or scanning sonars and rotating manipulators for light intervention.
- Larger **Light Work-Class ROVs** offer excellent inspection, maintenance and repair (IMR) capability. Modern hybrid AUV/ROVs provide tether-free operation and manoeuvrability ensure easy and safe access inside and around complex structures, ideal for offshore survey work and autonomous IMR of subsea installations and tunnels.

CONCEPT OF USE: MARITIME DOMAIN AWARENESS, ANTI SUBMARINE WARFARE, INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE (ISR)

PIONEER is designed to revolutionize maritime domain awareness, ISR and deterrence by enabling persistent aerial, surface and sub-surface detection and classification operations at extremely cost efficient levels.



Pioneer supports the installation of a variety of detection, classification, identification and tracking sensors and electronic warfare payloads, enabling a multi-layered approach to maritime ISR missions.



CONUSE PAYLOAD EXAMPLE OPTIONS

- Navigation radar, electro-optical and infra-red cameras come as standard within PIONEER's sensors suite
- Low power, thin line towed arrays providing directional acoustic sensing to passively detect surface and sub-surface targets of interest facilitated the latest edge-processing techniques and open interfaces.
- Modern lightweight dipping sonars are deployable from any surface vessel, including smaller ships and USVs, all of which increase the endurance of the sonar operations compared with helicopter-deployed variants.
- Marineised/ruggedised Unmanned Aerial Systems (UAS), capable of operating in high winds, with multi-mission payloads and infinity tether for persistent overwatch and surface vessel identification.
- Sonar floats or buoys, capable of multi-month operation once deployed; PIONEER is capable of hosting and deploying dozens of such floats.



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