



SEAScout Capabilities

Over the past 60 years, QinetiQ has successfully completed over 16,000 projects with adherence to the most stringent quality standards AS9100, ISO 9001, CMMI Level-3

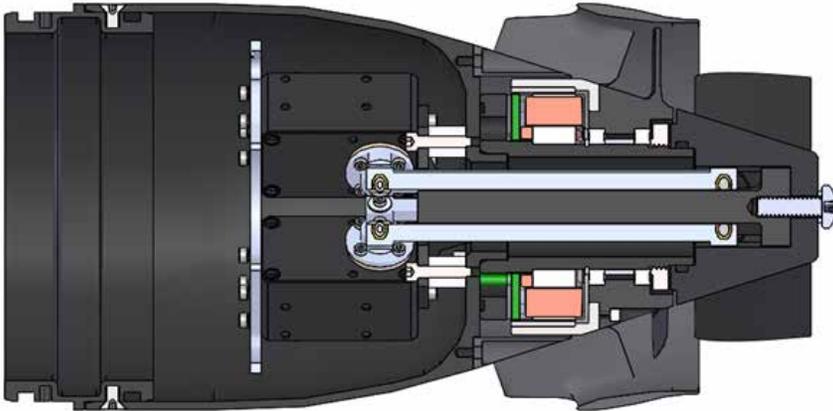
Our products promote asset readiness and increase end user efficiency to protect and support the warfighter and increase your readiness and capability in the contested domain. Our current contract efforts span the design, development, test, and delivery of: the prototype Electronic Grounding Unit (EGU) for Active Shaft Grounding (ASG) with configurability for subsurface and surface vessels, the torpedo cradle lock Electromechanical Actuator Power Conditioner/Controller (EPCC) replacement for the VIRGINIA Class Block V Weapon Stowage and Handling System (WSHS), and the Electromagnetic Aircraft Launch System (EMALS) and Advanced Arresting Gear (AAG) for the Ford Class Carrier Program.

We bring a talented group of scientific, engineering, and technical field staff comprised of diverse backgrounds and experiences to provide our defense, supporting security, commercial, and consumer customers with laser focused technology development.

CAPABILITIES CASE STUDY :

In the development of QinetiQ's commercial variant of the SEAScout system, NUWC's needs have been a primary driver of the design. This includes a fully funded procurement of a commercial SEAScout by the NUWC team to assess the flexibility of its modular architecture, speed and control capabilities, and reliability as a near A-sized alternative for new and changing Navy mission sets. This effort was followed with a CRADA for the demonstration of new capabilities and upgrading of the NUWC system. After several successful demonstrations of new capabilities and upgrades including GPS, software, and circuit boards, the NUWC system was redelivered, and the QinetiQ team shifted its focus to developing an alternative EMATT offering utilizing the tested and reliable subsystems from the commercial SEAScout variant.

When developing the SEAScout EMATT design, careful consideration was placed on meeting current requirements of the US Navy as well as accommodating future design improvements beyond current needs. These include the ability to increase the speed, depth, endurance, and reliability limits where we believe the incumbent cannot. The team avoided the local maxima in subsystem designs that have plagued the legacy EMATT design, a feat only possible with a ground up design with future needs in mind. This allows our offering to not only exceed current EMATT performance specifications but also meet the speed and endurance requirements of the future ASW A-Sized targeting needs as the military landscape evolves. The development of a reliable navigational/propulsion subsystem was the key differentiator to a robust and functionally superior SEAScout EMATT design. Failure-prone components such as high-speed dynamic propulsor shaft seals were avoided completely, allowing for higher top speeds and deeper dives with little to no risk to mission success. Our team does not believe a vehicle with a dynamic shaft seal will meet the US Navy's future needs and instead developed a flooded brushless outrunner motor to remove the need for any dynamic seals on the propulsor. This makes the limiting factor on speed a function of battery output current and control surface impact, two areas we have focused design effort in. The propulsion system is fully scalable in either direction.



The SEAScout control surfaces were designed to provide optimal navigational impact through a pseudo vector thrust. Carefully considering the benefits of the shaftless hollow motor design enabled the placement of the control fins aft of the propulsor. The propulsor flow is directed over the control fins via the shroud to increase efficiencies.

Our independently actuated X fin design allows for active control of the pitch, yaw, and roll with maximal impact to stabilizing and maneuvering the vehicle without saturation of fin angle. With this active control of each fin, the SEAScout EMATT can utilize more robust control algorithms to employ many more maneuvers and the choice to maintain zero roll turns or tighter banked turns at any maneuvering speed.

The SEAScout hollow flooded brushless outrunner motor was designed with ample room for speed upgrades with the propulsor design limits around 15 knots for an A-sized vehicle. The current speed limitation for the EMATT variant is the custom primary battery pack max current draw of 18 amps. This correlates to a top speed of 12 knots and has been witnessed by the NUWC team under the previously mentioned CRADA in a similar vehicle. Field data shows a propulsor power draw of 36 watts at 3 knots and 180 watts at 8 knots. When paired with the hotel load of 15 watts and the expected battery capacity of at least 972 wHr, the vehicle shows a commanding improvement to expected endurance of 16 hours at 3 knots and 4.5 hours at 8 knots.

The vehicle has been designed from the ground up with expandability/scalability in mind. At a high level, we have provided the hooks to leverage the cost savings of this high quantity production system to perform low-cost one-off demonstrators through payload swapping capabilities and disposable to reusable kits if desired. This approach permeates the entire design down to the lowest levels including communication protocol availability and software modularity.

The software is built on the ROS pipeline. This is a modular node-based architecture that fits well into the goals described by PEO USC, PMS 406, and NAVSEA in the UMAA, CCS, and RAIL initiatives. QinetiQ is a firm supporter of all three initiatives. As they come to fruition, QinetiQ will support the migration of our SEAScout system to UMAA, CCS, and RAIL compliance if desired. The modular nature of the software allows for the one-off testing of different navigation stack, controls methodology, pose estimators, sensor fusions, etc. without substantial cost or time. QinetiQ will support any spin off applications looking to utilize the mass-produced system for unique and different applications as desired by the US Navy.

The SEAScout mission planner leverages modern user interfaces to make mission development as intuitive as possible for even the newest operator. The mission planner backbone implements a behavior tree rather than a linear behavior list. This allows mission behaviors to expand as the navigational needs of the system evolves. Such capabilities include interrupts, repeat loops, switches, and fallbacks. QinetiQ will support any additional mission behaviors outside those stated in the current mission set as the USC mission requirements changes.

Collaborating with QinetiQ Inc.

At QinetiQ we bring organizations and people together to provide innovative solutions to real world problems, creating customer advantage. Working with our partners and customers, we collaborate widely, working in partnership, listening hard and thinking through what customers need. Building trusted partnerships, we are helping customers anticipate and shape future requirements, adding value and future advantage.

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