



RTI CUSTOMER
SNAPSHOT

SMD

ENGINEERING EXCELLENCE UNDERWATER



Choosing RTI Connex and DDS opens up a wealth of new opportunities for our Horizon control system and makes our vehicles more intelligent. We now have a more standardized way of streaming data to our subsea vehicles.”

— Dr. Andrew Ambrose-Thurman —
Lead Engineer Autonomous Systems, SMD

HIGHLIGHTS

- » SMD is using RTI Connex to develop a new modular software platform designed to work across its entire range of subsea vehicles, including trenchers, cable layers, and survey vehicles.
- » Connex software provides a data-centric architecture based on the DDS® standard and delivers critical features for supporting autonomy and intelligence not found in standard pub/sub alternatives.
- » Choosing Connex provided SMD with enhanced functionality and faster data flows compared to only ROS 2, thus providing a reliable platform for making subsea vehicles smarter, more reliable, and easier to operate in challenging environments.

About SMD

For 50 years, UK-based SMD has partnered with pioneers in industry and science to take technology and engineering to places that people have never been. The firm specializes in the design, manufacture and deployment of remotely operated and autonomous power and control solutions. They help their partners around the globe to harness the potential of the most challenging subsea environments with maximum safety, efficiency and sensitivity.

Current SMD offerings include a high-power jet trencher (SMD QTrencher) that features a dedicated high sea state launch and recovery system (LARS), SMD Artemis (a pioneering cable and pipeline tracker), and the Quantum EV. Noted as the first electric work-class remotely operated vehicle (ROV), the Quantum EV represents an important milestone in the emerging market for subsea technology and services.



Challenge

As it covers 71 percent of the Earth’s surface and contains more than 1.3 billion cubic km of water, it’s safe to say that the ocean is vast. So not surprisingly, navigating the ocean floor is no day at the beach. Treacherous terrain means subsea explorers and other remotely operated vehicles are of vital importance for getting work done under harsh conditions and in locations where no team can go.

Over such vast expanses of ocean floor, subsea vehicles lay the cables that provide internet, lay the pipes that transport oil, oxygen and gas, and help with scientific marine analysis. These underwater vehicles must also accurately map and survey the seabed in order to construct wind farms, clean biofouling to protect subsea assets, search for abandoned explosives, check structures for damage, manipulate control panels, dig trenches, move rocks and equipment, and much more. And

crucially, all of it needs to happen reliably and safely thousands of meters below the sea.

A number of current and legacy SMD vehicles depend on a Programmable Logic Controller (PLC)-based system. While PLC-based systems can reliably withstand harsh industrial environments, necessary programming and maintenance does require highly specialized expertise. And unlike distributed systems, if a central PLC fails, the entire vehicle or process tends to stop.

The company's commitment to continuously exploring and adopting new and smarter technological solutions led SMD to investigate the advantages of the Data Distribution Service (DDS) standard as the data communication foundation for its upcoming vehicle projects. As the world's leading implementation of DDS, RTI Connex[®] software contains a number of enhanced features that attracted SMD's attention.

Solution

When developing requirements for a new control backbone, SMD started investigating options for a Publish/Subscribe solution, in which data goes only where it is needed and when it's needed to reduce latency and maximize bandwidth. After using ROS 2 extensively, the company considered the pub/sub approach vital for evolving new remote and underwater projects.

For example, SMD's customers may need ROV's for exploration, laying pipes and cables, or digging holes in the seabed. These customers may be deploying one or a whole fleet of SMD vehicles, typically operating them from a control cabin on a surface vessel. This happens via an umbilical cable — a fiber-optic connection down to the vehicle, which might be anywhere from 3,000 to 6,000 meters below the sea. This necessitates highly sophisticated and automated control of vast amounts of data under extremely demanding conditions.

To satisfy these requirements, SMD chose RTI Connex. Discussions with RTI demonstrated the advantages of standardizing on raw DDS instead of ROS 2 alone, which allowed SMD to produce a platform that can interface with third-party software modules in a uniform way. It also enabled easy incremental migration of ROS prototypes to native Connex for higher performance and safety assurance for prototyping and production.

Connex is being run on single-board Linux computers that are either embedded into subsea vehicles or are running topside and connecting to the vehicles using a fiber optic umbilical cable. Another feature of Connex is that it includes RTI Routing Service, a crucial tool that allows SMD to rapidly scale and integrate real-time, disparate or geo-dispersed systems.

As a result, SMD is now able to develop a new flexible and modular data control backbone that can interface with existing and legacy systems and work across all of its vehicle types. The new software modules are adding some exciting new capabilities and flexibility to its Horizon control system. Using a modular design means SMD is free to pick and choose which modules are needed for each particular vehicle type and use case.



Results

Helping its subsea partners thrive in the most challenging underwater environments means that SMD is continuously embracing new capabilities for sustainable growth and advancing the transition to net zero for marine renewable energy.

Connex plays an important part in enhancing the safety and efficiency of SMD products, enabling the company to keep its focus on the wider goal of reshaping the future of subsea exploration and introducing new types of innovative ROVs. And SMD cited RTI customer support as being instrumental in getting their software engineers up to speed quickly, so that all systems can work as one.

Especially in the maritime industry, customers and partners all share a common desire for worry-free integration. Customers in particular must often rely on communicating over third-party networks in remote subsea environments. Because of its data-centric and transport-agnostic communication framework, Connex makes seamless integration priority one, effectively counteracting the issue of vendor lock-in and proprietary systems that cause data bottlenecks and can slow down projects.

To confirm this point, SMD noted that using Connex with ROS 2 has already resulted in a noticeable speed increase over running ROS 2 on its own. On top of useful features such as Keys and Quality of Service, Connex also opens up a reliable path to certifying vehicles for production.

"Connex has already helped us widen the capability for third parties to work with our platform, while also making our systems more accessible for customers," commented Dr. Ambrose-Thurman.

ABOUT RTI

RTI is the real-time data streaming company for intelligent distributed systems. RTI Connex[®] software is the critical nervous system for over 2,000 designs across Aerospace and Defense, MedTech, Automotive, and Robotics.

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