A New Generation of Diving and Rig Support ROVs

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When it comes to subsea intervention for oil and gas, there seem as many opinions as there are platforms to inspect. Some swear by small electric systems for day to day support work while others would not consider anything but a pair of fully redundant hydraulic work systems. Decisions are of course driven by need and availability. Working depth, tooling, payloads, footprint, and power are just a few of the considerations. Ship time is another major factor. It's sometimes more practical to schedule a "fly by" inspection from a ship carrying a pair of 150hp work class systems as it is passing by than to mobilize a smaller system on a dedicated work boat. While getting the job done effectively and safely is the core objective, the preferences for and debate around electric and hydraulic vehicles persists.

Some of the earliest Remotely Operated Vehicle (ROV) systems were electric. The US Navy's "CURVE" was perhaps the best known of these. It successfully retrieved a lost hydrogen bomb from the seabed among other note worthy missions. However, the limitations of electric thrusters rapidly drove development of hydraulic thrusters. Companies began building and offering both hydraulic and electric systems with vigorous competition at times. All electric systems had the advantage of being smaller but seemed relegated to light inspection tasks; the so-called "flying eyeball". Conversely, hydraulic systems continued to grow in size and capability from the early 25-30 horsepower systems to today's very large systems that come in at 150 to 200hp. In parallel some scientific institutions made their own inroads with electric ROVs. These multi-year, multi-millions, development efforts resulted in the Woods Hole Oceanographic Institute's Jason and MBARI's Ventana.

Starting in the 1990's, the electric ROV market experienced another split between the micro-rov's and the light work-inspection class systems. Videoray and Seabotix led in the micro/mini ROV sectors while the acquisition of Seaeye and Sub Atlantic by larger, European parent companies helped to solidify their positions in the mid to large electric ROV sector. In 2000, Oceaneering ventured into the development of a deep water, all electric Magnum series ROV but acknowledged limitations in terms of practical considerations of umbilical size, power distribution, and thruster performance. By making this electric system compatible with the umbilical and topside equipment used by their large hydraulic systems, the electric "head" could be used to best advantage for inspection then changed out for hydraulic vehicle work.

Today, shallow water, light rig inspection work is often done with small electric ROVs. Work tasks and deep water inspection is frequently done on a "drive by" basis by large work class systems as they transit between deployment sites. While this method works for the most part, it means that maintenance might be deferred awaiting a drive by inspection or that costs may run higher than anticipated when a

large ship with dual work class ROV systems must be brought in for routine rig tasks. The compact hydraulic ROV systems built by DOER can be used to support a variety of rig support tasks while working from smaller dive support/supply vessels. Designed and made in the USA, these systems are robust and straightforward to maintain and operate.

DOER offers two basic sizes of these H series ROVs. The smaller size utilizes six each, two horsepower hydraulic thrusters with a twenty horsepower motor. A DOER Sea Mantis five-function manipulator comes included as standard equipment with an option for a second manipulator. It may be operated with or without a tether management system for depths up to 2000m. A 1000m option is also available. With overall dimensions of just 60"L x 39"Wx38"H, it is smaller than many of the large electric systems. DOER originally designed this system to support science, film, and diving operations. However, its small size makes it ideal for diving, ADS and rig support- the kinds of tasks often done with electric systems, but with the benefits of being easier to maintain while capable of light work tasks.

The larger size H series is highly configurable and can be tailored to client needs with motors ranging from 25 to 75 horsepower for operations in depths ranging from 3000m to 6500m. Typical dimensions are 80"Lx55"Wx58"H. Weight in air for a typical 25hp vehicle is 2700 pounds – extremely light for a hydraulic system with this much power. These systems are equipped with seven, four and five HP thrusters, all with proportional control. These systems come standard with DOER's five function Sea Mantis manipulator but are capable of interfacing with Schilling and Kraft manipulator systems as well. While large electric ROVs can also support dual manipulators, users must integrate separate hydraulic systems in order to do so. When starting with a hydraulic system, such integrations are straightforward and more useable payload is retained.

A top hat TMS is typically used with these systems. DOER's TMS utilizes our exclusive capstan drive system ensuring smooth pay in and pay out of tether. The TMS can support two optional thrusters along with cameras and lighting packages. The thrusters allow the TMS to be positioned independent of the ROV, a feature that is especially useful when working from vessels of opportunity.

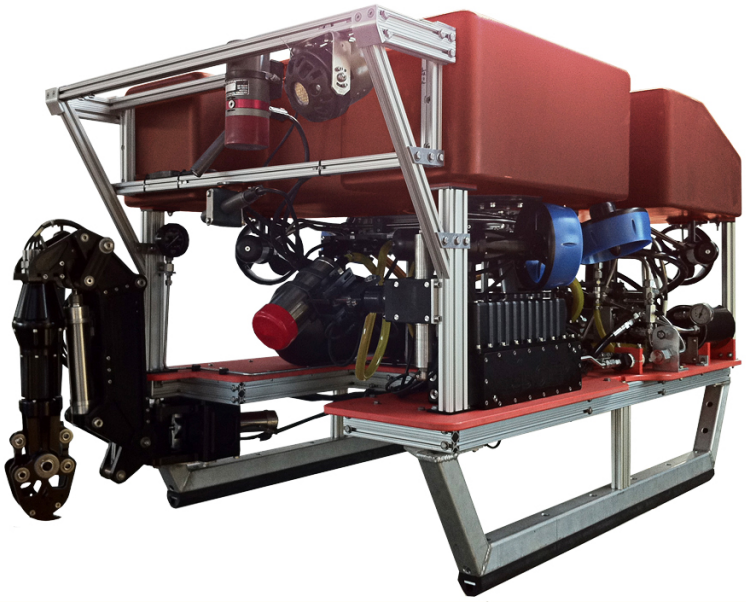
All of DOER's ROV systems are designed for containerization and rapid deployment. The 1000 and 2000m systems can be configured to fit into one twenty-foot van. The 3000 to 6500m rated systems are configured for two-van packing. Winches for up to 4000m of armored umbilical can be containerized while larger winches and LARS systems are designed for shipping via flat rack. This helps owners to control shipping costs and ease logistics planning when shipping by truck, train, or commercial container ship.

Although electric ROVs have come a very long way in the past twenty years, the vast majority of offshore technical support personnel are still most comfortable with operating and maintaining hydraulic systems. Thrusters, manifolds, compensators

and manipulators are all very straightforward to service by any marine technician. The electrical systems on DOER ROVs are robust and nearly all enclosures are oil filled. Connector ports allow a variety of ancillary devices to be integrated to the ROVs without opening enclosures for re-wiring. Software systems can be securely accessed via the Internet allowing DOER engineers to assist with troubleshooting or providing systems upgrades remotely. DOER systems are designed to grow with technology providing superior value over the life of the ROV system.

A typical DOER ROV requires only two or three personnel to operate and support the system; pilot, co-pilot/manipulator operator and technician/data manager. This puts these systems on par with medium to large electric inspection class systems and is more economical to staff than large work class support teams.

The remarkable advances in materials and technology over the past ten years have allowed hydraulic ROVs to come down in size without compromising on capabilities. DOER works hard to ensure that raw materials and ancillary devices come from other US based B2B suppliers whenever possible. As a result, the H series ROV systems provide a solid, value added choice for commercial diving and offshore support firms wanting to better support their clients while also supporting manufacturing in the USA.



DOER H series 2000m system with one five function manipulator

DOER H Series 2000m ROV deployment

DOER H Series 25HP 6000m ROV with top hat TMS deployment

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