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**FOR IMMEDIATE RELEASE:**

**ENABLE-IT REACHES NEW DEPTHS BY DRIVING MINIROVS TO DEEPSEA OCEAN EXPLORATION - OFFSHORE MAGAZINE**

LAS VEGAS, NV - July 2014 --- By David Connors Technical Director at Enable-IT: Ethernet Extension Experts.

In the offshore industry, we tend toward the maxim of "bigger is always better" or "might is usually right," and while the industry's need for large, powerful machinery is undeniable, Lbf/Kgf, in isolation, is merely a statistic that logically cannot decide every application. This is especially so when it comes to ROVs (Remotely Operated Vehicles).

As the field has taught us, above and under water working conditions, including available space, fiscal and time costs, power to weight ratios and tether drag, all need to be considered when using ROVs. And for these reasons, the myth of needing to always employ full work-class ROVs, as a way to ensure one has the capabilities and options to handle any application, now floats in the wake of miniaturized pragmatism.

A new, nimbler class of ROVs, called MiniROVs, is cutting and crawling a path through today's offshore industry. In the process, they have not only rounded out the capabilities of their larger, work-horse brethren, but they have also proven superior for certain offshore applications (e.g. valve replacement, hull inspection, etc.), as the following technical overview will reveal.

**What are MiniROVs, Exactly?**

MiniROVs are larger than pocket-sized "micro ROVs," which have neither the thrust to work in currents nor the available payload to carry more than a single camera, lights and perhaps 1 or 2 sensors. With their larger size, MiniROVs can carry a broader, more a potent suite of sensors, tools, and other technologies, some of which will be detailed below.

MiniROVs are, however, smaller than standard observation class ROVs, which generally require large, complex and expensive Launch & Recovery Systems (LARS). MiniROVs require no such system. Indeed, they can be deployed and retrieved using their own tether, if the tether is strong enough (some can handle a 100 Kg payload), and that is where their more deciding technologies begin…

**Key MiniROV Technologies**

MiniROVs were initially designed for shallow water applications, simply because there were a number of challenges that needed to be met before they could operate at depths greater than 1,000 meters. These included the miniaturization of control electronics, the design of lighter weight pressure housings, power and data transmission over very long cable/tether/umbilical lengths, and more.

Over the past decade, the ROV industry has managed to overcome these challenges, effectively helping MiniROVs emulate the capabilities of much larger systems. Additionally, some MiniROV manufacturers have

developed previously unthought-of technologies that have proven to be uniquely useful to offshore applications.

**Low Drag Tethers and Ethernet Extension**

Tethers become a big problem for MiniROVs in deep water. The longer, thicker, and courser a MiniROV's tether is, the greater the cumulative drag from that tether and, therefore, the greater the thrust these smaller ROVs require to maneuver reliably.

Smoothening a tether is a non-issue, as cable sheathes are now rather smooth, but thinning the cross-section of a tether has been a difficult proposition. MiniROVs must transmit and receive many signals, and, sometimes, a considerable amount of power. This has typically required many layers of wiring, shielding, and fiber.

Now, however, largely thanks to Ethernet extension technology, the cross-section of tethers has thinned to just 8.99 mm, considerably thinner than traditional ROV tethers, which average at least 20mm. Once Enable-IT, Inc., inventors of Ethernet extension technology, were able to miniaturize deep sea-worthy Ethernet extenders, MiniROV manufacturers have been able to multiplex their transmissions –and send Power over Ethernet (or "PoE")- to MiniROVs using just 1-2 pair of standard copper wiring. What is more, these Ethernet extenders seamlessly drive this data and power many thousands of feet, well past Ethernet's distance limit of just 100 meters (328 feet) and with no bridging in between. This means significantly fewer wires and results in a very thin, all-copper tether with significantly less drag upon the MiniROV. This also means that these MiniROVs can often be lowered into the water by hand, without the need for expensive launching systems.

**Vortex Generators (Non-Magnetic)**

Another highly useful advancement is that of non-magnetic vortex generators, which, when utilized as part of a "crawler" attachment, effectively grant MiniROVs the ability to crawl pipelines, hulls, and other structures (See Figure 1). Using an impeller, instead of magnets or thrusters, vortex generators create a low pressure pocket (i.e. venturi effect) beneath their crawling MiniROV, yielding up to 28kgf (62 lbf) of attractive force against any flat and hard surface.

*Figure 1. A MiniROV with Crawler Attachment (tracked option). Photo courtesy of SeaBotix, Inc.*

Such a system holds several attractive benefits for its operators. For one, it yields so much attractive force that it maintains precise operations while a vessel is already in motion at sea or is experiencing strong currents while anchored. This therefore allows operators to survey their vessels more safely and economically than they would have by employing dive teams, particularly in more hostile environments. It also means that cameras and other imaging equipment (e.g. imaging sonar) produce very high quality images and data, because these devices are kept at a consistent distance from the target structure. Furthermore, with such stability, MiniROV operators can enjoy much less fatigue and the occasional choice to focus solely on incoming data.

**Automated Navigation**

*Figure 3. A MiniROV launched into the waters below an offshore platform. Photo courtesy of SeaBotix, Inc.*

Previously, the technologies required for automated navigation, such as Doppler velocity logging, were too difficult to sufficiently miniaturize for MiniROV use. However, some operators would be pleasantly surprised to learn that automated navigation of MiniROVs has indeed become a reality within the past five years. Using a form of sonar tracking, MiniROVs are now able to lock onto a target and navigate by waypoint, hold a position, conduct a programmed search, and more. In fact, at least one MiniROV can reliably orbit around its locked-on target. The benefits of automated navigation are quite clear. Lessening operator effort lessens their fatigue, thereby increasing their chances of successfully completing their other tasks, such as data monitoring. Additionally, to the degree that an application can be automated, such navigation logically holds the potential to save operators inordinate amounts of time and money.

## MiniROVs in Action

**Larger ROV Support**

Due to their size, agility, and newfound capabilities, MiniROVs do well at rounding out the abilities of their larger brethren. Such was the case of FMC Technologies, a prominent oil and gas supply service company, and their need to cap three subsea manifolds which were missing small valve caps but were already installed. Oil production could not begin without these small caps, and the proposition of recovering three 160 ton manifolds to install these caps involved many millions of dollars. FMC naturally turned to ROVs to try and solve the problem but quickly realized that neither work-class nor observation class ROVs could fit into the task's tight operating space.

FMC then turned to MiniROVs and decided upon an operation wherein a MiniROV would be outfitted with a special torque tool (to attach and tighten each cap). Then, due to the North Sea's bad weather, FMC would use a work-class ROV to place the MiniROV, which was to be in a basket, close to each manifold and release its tether. Thereafter, the larger ROV was to provide support as the MiniROV got to work. And work it did.

Navigating through the first manifold was tight but straightforward. The MiniROV operator was able to reach the appropriate valve, use the torque tool to tighten the cap, and recover the MiniROV relatively quickly. The second and third manifolds were a bit more difficult.

It turned out that the second and third manifolds already had temporary test caps attached to their relevant valves, so, each time, the MiniROV had to remove this cap and be recovered before it could try again and attach the actual cap. On the second manifold, this was complicated by the fact that the WROV accidentally opened the MiniROV's basket on the way up, but it was ultimately recovered quickly. By the third manifold, the operator attached a small mirror to the torque tool, so one could see the test cap better, and, after recovering the MiniROV and dropping it back down, he smoothly attached the final cap.

**Supplanting Larger ROVs**

In another example, MiniROVs proved to be uniquely suited for some applications. This is especially so in applications that require crawling and/or attachment, such as the 2009 case of an Inspectahire survey of an oil rig's legs in the Persian Gulf. Inspectahire, out of the UK, was tasked with surveying the legs of an oil rig that belonged to one of the world's largest oil and gas exploration and production companies. As the rig experienced

the Persian Gulf's unforgiving thermally-induced tides, previous attempts to survey the rig's legs by flying an observation class ROV down to them were unsuccessful. Inspectahire needed something new.

After learning about crawling, adhering MiniROVs, Inspectahire decided to give them a try and the results were impressive. Due to their portability and tethering, not only was Ispectahire able to successfully complete their inspections, but they were able to launch and direct their MiniROV from the platform directly above each leg.
As Cailean Forrester, Managing Director at Inspectahire, said, "The LBC [Little Benthic Crawler] is an innovative piece of equipment, and in this instance allowed us to undertake a challenging survey in a safe and effective manner, and overcome some of the issues which had previously been faced. An alternative method would have been to use divers, but they would have had to use magnetic clamps to ensure they didn't get swept away in the current."

**MiniROVs: More-than-Ready for Offshore**

Over the years, MiniROV manufacturers have soundly overcome the significant challenges faced when deploying these smaller, nimbler ROVs in deeper, offshore applications. In the process, they have advanced operators' capabilities with innovative technologies. Vortex generators, for example, now allow MiniROVs to firmly attach to and crawl around structures, saving operators from always having to employ diving teams for tasks like surveys. Similarly, low-drag tethering, via Ethernet extension, helps MiniROVs maintain their extreme maneuverability while offering the ability to be launched by hand.

As such, MiniROVs have proven to deftly and portably complement the capabilities of larger, work-class ROVs. More interestingly still, in certain applications and as evidenced above, a MiniROV may be the only ROV an offshore deployment needs.

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