

THE TELEDYNE MARINE ADVANTAGE: A SEA OF SOLUTIONS FROM A SINGLE PROVIDER

Recently, ON&T sat down with representatives from Teledyne Marine to gain some insight into how the 23 branded companies that operate under the Teledyne Marine banner work together, as well as learning more about some recent product releases. What we heard sounded a lot like the way championship teams operate.



From the 1927 Yankees to the 2004 Red Sox, winning baseball teams have one thing in common; they assemble the right mix of talent, experience, and character. Of course, each player brings formidable abilities to the field, but there have been countless other teams that did not succeed, even with superstar talent on the roster. Why? Because it takes more than individual stars for a team to succeed. It takes teamwork, coordination, and skilled management to truly make a whole greater than the sum of its parts. It takes veterans who are willing to share knowledge with rookies, and specialists, like pinch-hitters and utilitymen, who can offer assistance on an as-needed basis.

Teledyne Marine understands this formula for success. Through acquisitions and

collaboration, they have evolved into an industry powerhouse. For example, in 2005 they acquired RD Instruments, Inc., a leader in the design and manufacture of state-of-the-art acoustic Doppler instrumentation. According to Darryl Symonds, Marine Measurements Product Line Manager for Teledyne RDI, the combined, diverse expertise of the companies operating under the Teledyne Marine banner allows them to make informed, experience-based recommendations to clients.

"We have a lot of experience within the Teledyne Marine group. For any given application, we collectively represent hundreds of years of experience," said Darryl Symonds, who's been with RDI for 35 years.

In fact, Symonds says, "The first-self-contained ADCPs that RDI sold were delivered in 1984. Within two years, they were accepted as the industry standard for accuracy, reliability, and field-proven data quality."

In those early days, RDI developed both shipboard and moored Acoustic Doppler Current Profilers (ADCPs). Moored ADCPs sample currents at many depths, replacing several single-point current meters and eliminating false shears stemming from compass and velocity calibration errors at different levels. It was a groundbreaking advancement.

"When those historical moorings would go out," adds Paul Devine of Teledyne Marine, "they would have a small number



» RDI's ADCPs made quite a splash when first introduced; and the next-generation long-range Pinnacle ADCP from Teledyne Marine sets a new standard. Photo courtesy of Teledyne Marine.

EVERYWHERE YOU LOOK

These days, Teledyne Marine products are everywhere you look. But just as importantly, they can provide a comprehensive list of solutions for large complex projects.

For example, in the case of the Ocean Observatories Initiative (OOI) funded by the National Science Foundation, Teledyne Marine products are the backbone of a highly integrated system, which includes sensors and gliders, as well as infrastructure for underwater networks. More than 50 ADCPs and Doppler Velocity Logs (DVLs) from Teledyne RDI have been supplied to OOI. ADCPs equip each of the seven OOI nodes, in order to remotely measure ocean currents at many depths. At the four global sites, 75 kHz ADCPs measure long ranges in the deep sea. A similar number of higher frequency ADCPs are measuring currents at sites across the US continental shelf.

In addition to that, more than 60 gliders from Teledyne Webb Research also support OOI. They include both coastal and deep options. Coastal gliders dive and rise through the upper 200 m, whereas the deep variety reach to 1000 m. Installed on these Webb Research gliders are Teledyne RDI's Explorer ADCPs, which contribute to navigating and measuring water currents.

But that's not all. Working around the Pioneer Array off New England are a couple of AUVs. These also carry DVLs from Teledyne RDI. Underpinning OOI's network system are power, data, and communication capabilities, also supplied by Teledyne Marine. Data collected at the nodes can be stored at sea or transmitted in real-time to shore. These links contain connectors, cables, and fiber optic assembly solutions from Teledyne ODI.

Many of OOI's nodes also use deep-sea flotation in mooring lines. For these applications, Teledyne Benthos supplies evacuated glass spheres. At some sites, acoustic modems from Teledyne Benthos provide a key link in sending data ashore. Their acoustic messages are picked up by Teledyne Webb Research gliders that act as gateway

of single point current meters clamped to the wire—let's say 10—and now over the same range the ADCP provided them one hundred measurements. So, they provided 10 times more data, allowing users to see minor changes and abrupt shears in the current. If, for example, you were trying to study the upper mixed layer of the water column, maybe you had 2 or 3 current meters installed, but you didn't know exactly how thick that layer was. With an ADCP, since you can measure very high-resolution currents, you can see the edge in the bottom of the upper mixed layer and you know that it's 25 meters thick, due to the higher quality of the velocity data that the customer acquired."

As an example, RDI's narrow-band ADCPs were used in the World Ocean Circulation

Experiment (WOCE), which ran from 1990 to 2002. The project aimed to establish the role of the world ocean in the Earth's climate system by measuring temperature, salinity and other tracer measurements along with direct velocity measurements with floats and moorings. The project resulted in the most comprehensive data set ever collected from the global ocean.

According to Symonds, RDI's ADCPs made a big impact on WOCE during the second half of the data collection.

"The ADCPs could measure a profile of currents," he says, "which meant that people could see important details they've never seen before. They were measuring from research vessels, from moorings, mostly in open oceans, but also in coastal areas."

communication tools. In other coastal nodes, gliders routinely transit the region. They can deliver control data to the system.

And that's not the only example. China's Western Pacific Ocean System (WPOS) is studying ocean currents in this region at depths ranging from 400 to 6,000 meters depth. Six arrays, comprising 29 moorings, form the core of the effort. Each mooring includes Teledyne RDI's 75 kHz Long Ranger ADCP, as well as extra Workhorse ADCPs ranging from 150 to 600 kHz. Research cruises will complement the moorings. Teledyne RDI's 38 kHz shipboard ADCP will collect transects of deep profiles of ocean currents.

Another example is Teledyne Marine's support for real-time, moored deepwater current profiles around oil platforms. You see, within the Gulf of Mexico, the U.S. Bureau of Ocean Energy Management (BOEM) requires the collection of current profiles around deepwater oil platforms. For profiling currents from moorings in these deep waters, the Long Ranger ADCP from Teledyne RD Instruments is the established choice. The ADCPs collect data for at least one year. One operator devised a cost-effective approach to meet the reporting schedule. They opted for real-time wireless communication of the ADCP data. Acoustic telemetry modems from Teledyne Benthos were selected. These modems are uniquely addressable, which simplified communicating with two

ADCPs. From each ADCP, one averaged velocity profile was sent every 20 minutes. The message comprised about 1200 bytes of data. Two moorings were deployed. The one on the seabed was deployed for two years, while, the mid-water mooring held an ADCP in a syntactic foam float and operated for a year.

The examples don't end there, but you get the point. Teledyne Marine's customers have single point access for all of their mooring instrumentation needs, saving time and money during the sourcing and procurement process, while providing them with the peace of mind that comes from working with the industry's leading experts in their fields.

EXPERIENCE MATTERS

The level of experience described above adds value for both new and existing Teledyne Marine customers, explains Symonds.

"Even if we don't have inside knowledge of a specific project at Teledyne RDI, we have access to other people within other Teledyne brands that do. We can bring that together to give a really informed message to a customer. For example, if your project requires a 3D-printed connector, which is outside of what RDI does, we can recommend who you should get it from to match your requirements, whether or not the solution comes from a Teledyne Marine

company, because we want the best solution for your project, even if it comes from a competitor."

The pool of available resources that Symonds describes is vast. Worldwide, Teledyne Marine employs 1600 persons working in sales manufacturing and service centers around the globe for 23 branded companies. Some of these companies were around for decades before being acquired by Teledyne. Other Teledyne Marine companies are industry innovators with shorter, but still impressive histories. All of these experts work together to provide one-stop purchasing capability, worldwide customer support, and the technical expertise to solve the marine industries' toughest challenges.

TWO NEW STARS JOIN THE TELEDYNE MARINE PRODUCT LINE

This past spring, two Teledyne Marine companies released two impressive technology advancement.

Pinnacle 45

This past spring, Teledyne RD Instruments released its next-generation long-range Pinnacle ADCP—which builds upon the 20-year success of Teledyne Marine's industry standard Workhorse Long Ranger. Rated to a depth of 2000 m, the 45 kHz phased array Pinnacle ADCP delivers a 1000 m current profiling range with a decreased size and weight, a game-changing field-swappable



» More than 60 gliders from Teledyne Webb Research support the Ocean Observatories Initiative (OOI). Installed on these gliders are Teledyne RDI's Explorer ADCPs. Photo courtesy of Teledyne Marine.



» The highly versatile Pinnacle 45 can be used for real-time applications, moving boat applications, or self-contained applications. Photo courtesy of Teledyne Marine.

system configuration for real-time or self-contained applications, independent or interlaced long-range and high-resolution modes, as well as many other innovative new features and product enhancements.

The highly versatile Pinnacle 45 can be used for real-time applications, such as oil rig monitoring; moving boat applications, such as mid to deep water oceanographic studies; or self-contained applications, such as bottom-mounted, mid-column, or surface buoys used to collect long range, precision current profiling data.

"There are a few things we've done with regards to this hardware design," says Darryl Symonds, "that are in direct response to customer feedback. If you are doing a mooring, and you want to replace the batteries, you have to open up the instrument. But if you open up the instrument, you take a chance of pinching an O-ring or creating a leak path. The last thing a customer wants to do is have that happen, but if it does, they would like to have the instrument sustain as little damage as possible. So, starting with our last ADCP release, the Sentinel V, we made a compartment within the housing to separate the electronics from the battery compartment. That way, if a battery compartment floods, only the battery is lost. With the Pinnacle, we've just expanded that modular concept."

GNSS/NAV Upgrade for Acoustic Modems/Releases

Two weeks later, Teledyne Benthos announced the availability of a new GPS option for their feature-rich UTS-9000 series Universal Topside Unit, which is

used to command their full line of acoustic modems and releases.

This new feature saves users valuable time and money by allowing them to survey in, and record, precisely where their acoustic releases and/or modems are deployed using only the topside unit and a dunking transducer. This allows for fast and easy detection and recovery using a minimal set of hardware.

The 2.0 upgrade, which includes an intuitive and flexible GUI, is fully self-contained, removing the need for an additional laptop, something particularly useful for deployments from RHIBs or smaller vessels. The real-time operation provides users with the ability to set destinations and waypoints, mark and record exact locations of deployed assets, and download field data to a USB card for safe and easy data storage and review. The upgrade also allows the system to take an "acoustic snapshot" of noise in the environment to help diagnose and overcome difficult deployment conditions.

A COORDINATED APPROACH TO RELIABILITY AND SERVICE

Teledyne Marine is committed to a coordinated approach to systems. To make this happen, Teledyne Marine's test plans are designed to demonstrate how an assemblage of Teledyne products operate as a system. The clear benefit is improved compatibility and reliability when compared to using multiple vendors.

Customers are also rewarded with a streamlined experience. Because Teledyne Marine companies operated under a common banner, customers can utilize a single point of contact, including a single point of origin for terms and conditions, warranties, and purchase orders—across multiple product brands.

Teledyne Marine's selection of mooring solutions include:

- Teledyne Benthos ACOUSTIC MODEMS allow for real-time, wireless communications in shallow or deep water environments.
- Teledyne RDI ACOUSTIC DOPPLER CURRENT PROFILERS (ADCPS) deliver highly accurate current data in up to 6000M of water.

• Teledyne Benthos GLASS HOUSINGS can house other instrumentation and/or relieve dangerous mooring strain.

• Teledyne Benthos ACOUSTIC RELEASES ensure that you get your mooring and critical data back.

And again, it bears repeating: Each of the companies of Teledyne Marine can tap into Teledyne-wide resources. In fact, individual field sales/business development teams and technical field teams from Teledyne Marine are trained to recognize applications where the expanded Teledyne Marine solutions set can add value to customers for bundled and integrated solutions. These field teams act as consultative technical sales resources and can bring subject matter experts (SME) into the conversation, or consult with them as needed behind the scenes.

"For example, Darryl at Teledyne RDI is an ADCP expert, while someone over at Teledyne Benthos is the release expert. I can get those people on the line with me and put the information into a digestible format for the client, or I can set up an advanced meeting with the client as needed," says Paul Devine, "so that someone putting together an observational program saves time and money by having a single point of contact."

"If a client has questions for a moored application, like how long they should deploy, how it should be moored, or which sensors they should have to collect the data they need, we'll have worked with a customer or one of our strategic partners that's done it before," says Darryl Symonds. "We can connect them to communicate, and the confidence level soars for the customer."

But that's not all. Teledyne Marine also leverages strategic partners, such as mooring designers and flotation providers, who share another layer of expertise.

In short, Teledyne Marine truly offers a sea of solutions from a single provider.



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