

Blue Economy wave is breaking on the Cape: WHOI Provides an R&D Foundation for Entrepreneurs

SPOTLIGHT ON HYDROID, TELEDYNE & COASTAL ENGINEERING



This is a Hydroid MK18 Mod 2 Swordfish is deployed to survey the ocean floor. *Photo by Blake Midnight.*

Technology and services companies that work in and around the oceans are forming the basis of a vibrant and growing regional technical blue economy here on Cape Cod. This marine technical economy has a research and development footing in the Woods Hole Oceanographic Institution (WHOI), a giant in the ocean sciences.

Hydroid in Pocasset and Teledyne Benthos in North Falmouth are examples of companies that have commercialized WHOI research to achieve scale and become acquisitions of global leaders in their field. Also important are the Cape's engineering services companies that provide infrastructure support.

Among these is Coastal Engineering Company, which has provided a range of engineering services for more than 40 years. "We try to find a balance between the competing interests," says CEO John Bologna, P.E. "The big push in the blue economy is to find sustainability.

Hydroid, a field-proven technology leader in advanced marine robotics, has grown to nearly 200 professional employees since its founding in 2001. Frank Raspante started working at Hydroid in 2004 after a stint at Datasonics. "When I first joined, I could look around the lunchroom table and count everyone in the company," Raspante says. "Now we have almost 200 people. Many of them are raising families on Cape Cod."

Teledyne's presence on the Cape came about from the acquisitions of two entrepreneurial firms, Benthos and Webb Research. Among nearly 160 Teledyne employees working in Falmouth, Dan Shropshire is director of product line management, overseeing 10 products. He described the Cape as being home to one of a handful of marine technology clusters in the world.

Jim Bellingham, director of WHOI's Center for Marine Robotics, says much innovation at WHOI today is focused on robotics and sensors. "Many of these innovations have applications far outside of ocean science," he says. "The underwater automated vehicles (UAVs), for example, were initially developed for environmental monitoring uses. Now, they are being used by the U.S. Navy for a variety of applications. Hydroid and Teledyne are both playing important roles in building that industry."

Also playing an important role is the Blue Economy Project, a joint effort of the Cape Cod Chamber of Commerce and the Cape Cod Commission to promote and sustain a maritime-focused economy in the region. "We have a massive brain trust of ocean research here," says Bert Jackson, the project's director of community outreach. called the Cape the "epicenter" of ocean research worldwide.

The relationship between WHOI and the surrounding ocean science technical community, and the infrastructure-engineering firms that support the Cape's environment, is symbiotic, and it's pointing toward continued growth in the local entrepreneurial economy. This section is intended to introduce Cape Cod LIFE's readers to companies in this sector.

*By John P. Desmond, Blue Economy Supplement Editor;
jdesmond@capecodlife.com.
Learn more at jdcontentservices.com.*

HYDROID: HOME OF THE REMUS AUTONOMOUS UNDERWATER VEHICLE—MARINE ROBOT—USED BY 18 NAVIES AROUND THE WORLD



Left: Hydroid recently opened a new 40,000 square-foot, eco-friendly applied research and manufacturing facility in Pocasset. The manufacturing floor (pictured) includes a 20-foot testing pool and a 6,000-meter-rated hydrostatic test system. *Right:* Hydroid employees outside the company's new 15,000 square-foot corporate headquarters building in Pocasset.

Hydroid, Inc. epitomizes the technical side of the blue economy on Cape Cod. The company's roots are at the Woods Hole Oceanographic Institution (WHOI), where a group of talented engineers at the Oceanographic Systems Lab invented the Remote Environmental Measuring Units—also known as "REMUS"—autonomous underwater vehicle (AUV) technology. Hydroid was spun out in 2001 to commercialize these hydrodynamic underwater robots.

Acquired by Kongsberg Maritime in 2008 and with more than 400 vehicles sold to-date, this Cape Cod-based company has grown into a leading provider of AUVs, essentially highly-intelligent marine robots that are used by defense, commercial and marine research customers worldwide.

Hydroid recently opened new headquarters and manufacturing buildings in Pocasset (pictured above). The manufacturing facility houses the company's engineering, manufacturing and quality-assurance operations. The building's 6,000 meter-rated hydrostatic test system is used to simulate subsea conditions in order to verify the reliability of hydraulic and electrical components at a specific depth.

"As we continue to grow, we wanted to create a space where our employees can thrive," says Duane Fotheringham, Hydroid's president. "We designed our headquarters with them in mind, creating a campus-feel that allows our team members to be closer together and work in a collaborative, dynamic environment."

The company today employs close to 200 people, many of them scientists, engineers and industry professionals. So, for those questioning whether the blue economy is producing good-paying jobs in the region, the answer is yes.

Frank Raspante, engineering product support manager at Hydroid, can attest to that. He grew up on the Cape and worked at his family's packaging and manufacturing business, then decided to pursue an engineering education at Wentworth Institute of Technology. He looked for an internship to get some real-world experience and landed a job at Datasonics in Cataumet in 1985. "I was living on the Cape and working in oceanography; it was really exciting," Raspante recalls. He wound up working at Datasonics through graduation, then he got a position with Benthos, working with two of the members of the soon-

to-be REMUS engineering team, Tom Austin and Ben Allen. “They were my mentors coming out of college,” Raspante says.

In 2004, Austin and Allen asked Raspante if he wanted to join a start-up founded to commercialize AUV technology developed at WHOI. “I was the first mechanical engineer at Hydroid,” Raspante says.

He sees Hydroid as making a key contribution to the regional blue economy. “Hydroid is a great company to work for,” Raspante says. “They have strong family beliefs. As a company, we want to grow, help the community grow and really make a difference in the industry. We are cutting edge. We are accepted worldwide and we are proud of our products.”

Versatile REMUS has a track record

REMUS AUVs are offered in three vehicle classes, based on their depth ratings of 100 meters, 600 to 1,500 meters, and 6,000 meters. All REMUS AUVs are built on a common technology platform so that maintenance, mission planning, data analysis and cross-vehicle training are consistent across the model line.

Hydroid AUVs are used for a range of applications. The company’s largest user base is the U.S. Navy. Combat-proven in operation, REMUS AUVs are the primary technology of the U.S. Navy’s Expeditionary



The REMUS 6000 is pictured above the 20-foot testing pool on Hydroid’s manufacturing floor. A REMUS 6000 searched and found the wreckage of Air France 447, the passenger flight that crashed in June 2009.

Mine Countermeasures Company currently operating worldwide. First deployed for combat operations in 2003, the REMUS 100 cleared the ports of Umm Qasr and Az Zubayr Iraq. In 2016, a REMUS vehicle conducted the first operational mission from a U.S. Navy Submarine.

Hydroid has also been involved with many interesting projects, including a 2014 mission to survey the site off the coast of South Devon, England, where two U.S. landing ships were torpedoed and sunk during a D-Day rehearsal exercise in April 1944. Hydroid’s REMUS 100 was used to produce the first high-definition sonar images of this tragedy, which resulted in the loss of nearly 1,000 American servicemen, more than the number of deaths at the actual invasion of Utah Beach.

A REMUS 6000 searched and found the wreckage of Air France 447, the passenger flight that crashed in June 2009, under the direction of WHOI using vehicles supplied by the WAITT Institute and GEOMAR. WAITT also used this vehicle to search for the wreckage of Amelia Earhart’s plane, which disappeared in July 1937. While not successful in finding the wreckage, the operation eliminated a 2,500 square-mile area from future searches. The REMUS 6000 was also used in July 2010 to explore the site of the Titanic sinking, capturing the first 3D images of the debris field.

In meeting the needs of its customers, Hydroid has diversified into what is now a broad range of skills. “Our expertise now extends to acoustics, autonomy, hardware, software, launch and recovery, and ocean engineering,” Fotheringham says. “So we are no longer just about AUVs. Our broader capability now is in marine robotics.”

It is evident that Hydroid has come a long way since the REMUS AUV technology was first developed at Woods Hole. With Cape Cod as its home, Hydroid is proud to continue to promote the blue economy in the region. “Hydroid is committed to supporting Cape Cod’s economic growth,” Fotheringham says. “We are pleased to be part of expanding the marine and oceanographic footprint locally.”

Learn more about the company at hydroid.com.

I FIND
WRECKS.
I SOLVE
MYSTERIES.

I AM
REMUS



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work for you to complete your mission
—autonomously—whether solving
underwater mysteries, performing site
investigations or studying the ocean floor.