

Prototype Equipment Design takes ONC innovation from concept to reality

Submitted by Virginia Keast Thu, 2015-05-28 12:55

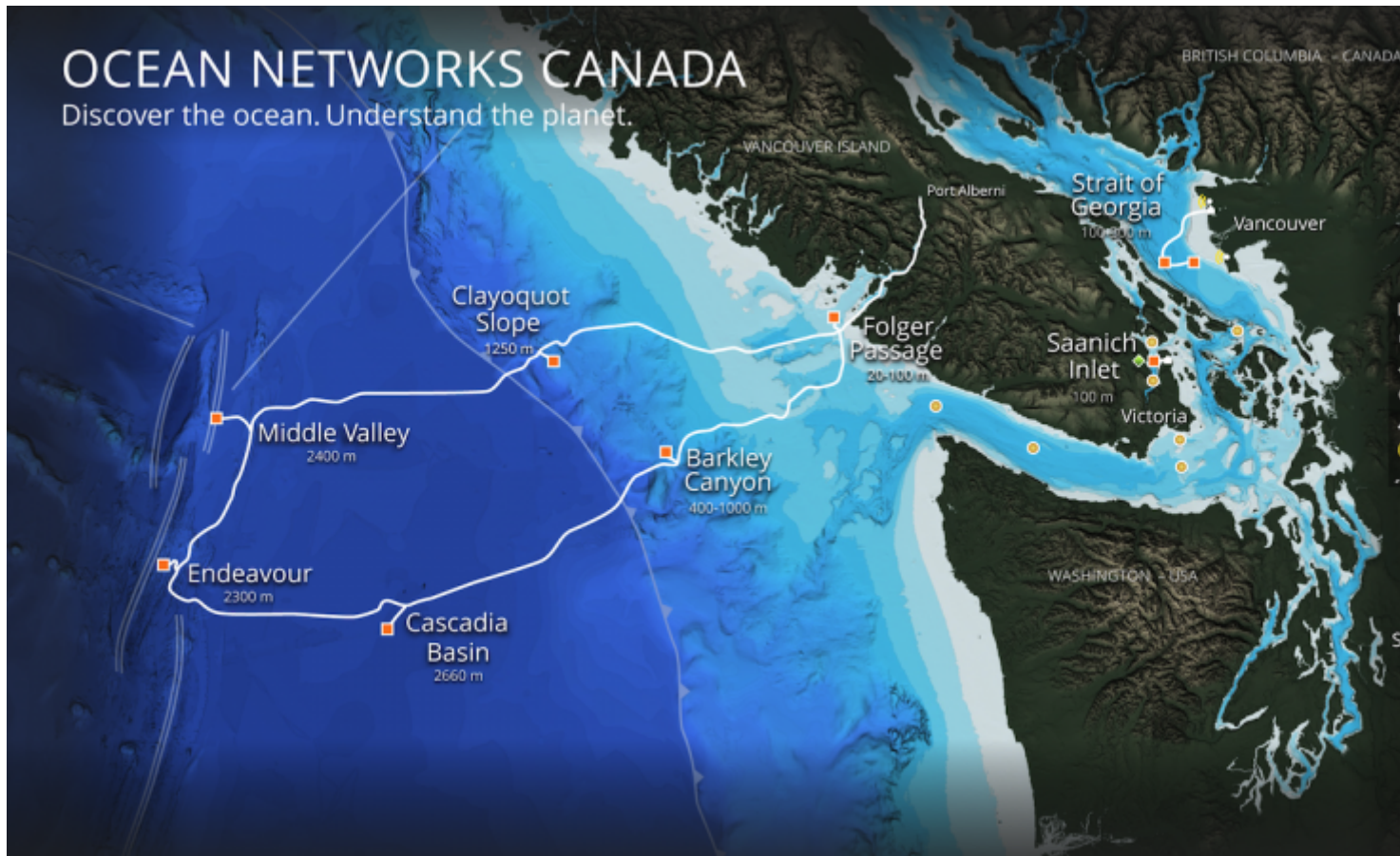
Ocean Networks Canada (ONC) and Prototype Equipment Design (PED) recently collaborated to design and build the world's first low frequency calibration system for digital and analog hydrophones. The calibration system was designed to calibrate the most sensitive low frequency hydrophones on the market, Canada's icListen LF smart hydrophones. These ultra sensitive acoustic sensors detect sounds that are below the range of existing calibration systems: earthquakes, underwater landslides, large baleen whales and the rapidly growing undersea shipping noise that can impact marine ecosystems and environments.

Founded in 2001, with beginnings in the University of Victoria's Engineering Lab, PED is a full service machine shop based on Canada's west coast that consistently meets the demanding needs of the military, aerospace, medical and scientific industries in providing customized equipment design and production.



Machine shop at Prototype Equipment Design, Victoria, British Columbia

?Our company specializes in unique solutions for very specific problems,? says Ray Brougham, PED?s founder and President. ?When ONC presented a complicated challenge with tough design criteria, I felt our expertise would provide them with precision manufacturing, but also stringent quality control and the collaborative process they were looking for.?



ONC, a University of Victoria initiative, operates world-class cabled ocean observatories off the west coast of Canada and at Cambridge Bay in the Canadian Arctic. ONC?s Innovation Centre operates a Technology Demonstration Facility to help ocean instrumentation manufacturers develop, test and demonstrate new technologies used in the ocean. And they had a problem they wanted to solve for an industry partner with an exciting new acoustic technology.

Nova Scotia's Ocean Sonics designs and manufactures the icListen series of hydrophones, the world's first smart hydrophones used for ocean observation and environmental monitoring. While the icListen LF has remarkable low frequency performance, there was no way to accurately calibrate its sensitivity at frequencies from 20 hertz down to 20 millihertz, which reduced the effectiveness of the data.

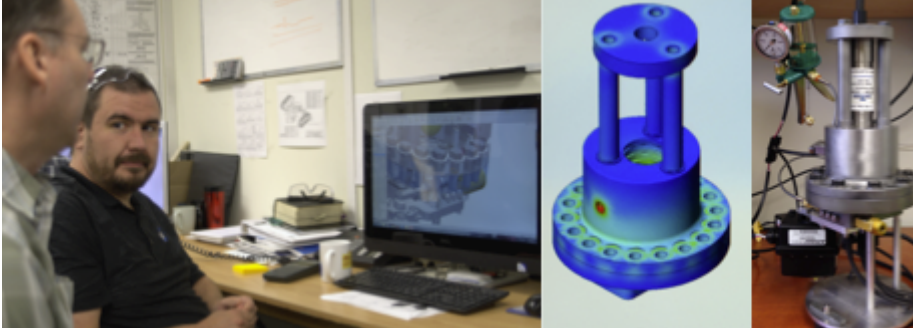


The icListen LF hydrophone, ready for deployment at ONC's Endeavour observatory site (June 2013)

ONC's Innovation Centre team took up the challenge to devise a prototype for a very low frequency digital hydrophone calibration system. However they lacked the expertise and facilities required to develop and produce a sophisticated, laboratory grade calibration system that would pass provincial pressure vessel certification.

Choosing the right partner was crucial to success, according to Tom Dakin, head of Sensor Technologies at the Centre.

?PED has an excellent reputation for being able to design and fabricate complex one-of-a-kind systems for a variety of clients,? he said. ?The wide range of precision fabrication and design experts at PED, their willingness to work through the design challenges and certifications required for system operation, made PED our preferred partner.?



Working through the complex calibration design with Kory Pollner, PED's Quality Control Manager, from concept to fully fabricated system.

PED's team embraced the new concept and designed a functional system while maintaining a close collaboration with ONC scientists and engineers. The process included several solid model iterations, design simulation, fabrication, testing and provincial boiler certification. PED was also instrumental in the production of the patent documentation, and working through challenges that arose as ONC staff began performing hydrophone calibrations at frequencies never before achieved.



ONC's Tom Dakin with PED President, Ray Brougham and the world's first calibration system for low frequency hydrophones.

Since completion, the calibration system has been used for twenty-eight very low frequency hydrophone calibrations. The instruments are being used by ONC's observatories and a growing list of satisfied customers, including:

- Natural Resources Canada
- Cetacea Lab
- Orca Lab
- Saturna Island Marine Research Education Society (SIMRES)
- Ocean Sonics in Nova Scotia
- SAAB torpedo test range in Sweden

New enquiries to purchase calibration systems are also being received from around the world.

Before the year end, Dakin plans to have his team design a similar system that will appeal to hydrophone manufacturers and calibration facilities around the world; one that is less expensive, easier to operate and excels in calibrating production level hydrophones for ambient pressure and temperature.

He's looking forward to future collaborations with PED and sums up the collaboration this way: "When it comes to prototyping and low volume, very specialized designs, PED represents precision manufacturing and design at its best."

For more information about the low frequency hydrophone calibration system, please contact [Tom Dakin](#), Sensor Technology Officer, Innovation Centre.

Related information:

- [Prototype Equipment Design: A Case Study](#)
- "Calibrating hydrophones at very low frequencies." Tom Dakin, Nicolai Bailey, John Dorocicz, Jeff Bosma. International Conference & Exhibition on Underwater Acoustics (2014)

(Updated May 28, 2015)

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