

With Swordfish software, particles and microorganisms can be detected, counted and measured directly from the holographic data saved from the submersible microscope.



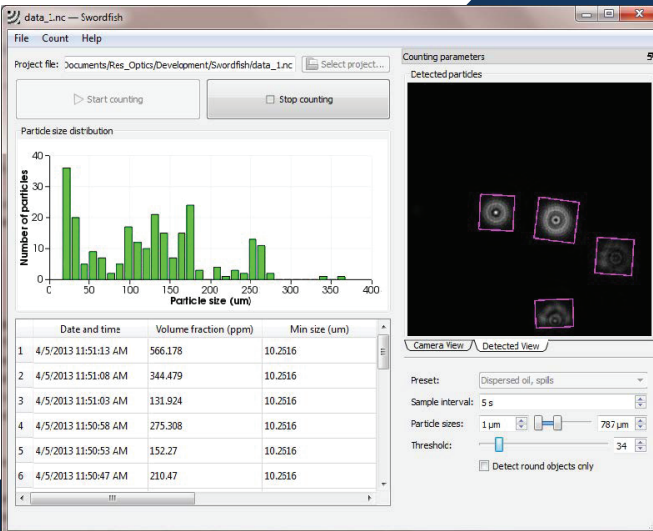
RESOLUTION OPTICS SUBMERSIBLE MICROSCOPE

A submersible holographic microscope for real-time, in-situ water monitoring.

<http://www.resolutionoptics.com>
6589 Chebucto Rd
Halifax, Nova Scotia, Canada B3L 1L9
1-902-444-4449
info@resolutionoptics.com

FEATURES / CAPABILITY / BENEFIT

Feature	Capability	Benefit
Submersible - Device can be used for a broad range of studies and applications.	- Brings microscopy to non-traditional areas like oceans, rivers, lakes, reservoirs. - in-situ, real-time water monitoring	- No longer limited by sampling for analysis in the laboratory, which is tedious, time consuming and costly - No sample preparation - Qualitative data combined with images: not just counting, sizing and identifying - Applications in water quality and monitoring, harmful algae bloom monitoring, phytoplankton, bacteria, oil detection.
Small / lightweight / robust / no pumps or tubes	- Portable - Easily deployed from boat, mooring, AUV	- Can be used in "the field" - Easily shipped, deployed, serviced and cleaned - Virtually no installation, moving parts or training.
405nm laser in line with a 0.5µm pinhole	- 1.0 µm resolution - Magnifications up to 200X	- The best resolution to price ratio while still having a broad application base.
Camera: 16fps with 10µs minimum exposure time	- Can achieve maximum resolution with a flow rate of 0.1 m/s - Capturing dynamic movement	- Ideal instrument for tracking moving samples - Can calculate flow velocities - High definition quality in 3D and 4D representations.



The Swordfish application counts and analyzes particles

RAPID DEPLOYMENT

The microscope does not require costly and time-consuming calibration, needs no pumps, priming or plumbing, and has no warm-up delay. The microscope is extremely robust and can be carried in one hand for fast deployment, and images can be obtained immediately.

SUBMERSIBLE SPECIFICATIONS

Resolution	1 micron
Power	5 W
Size	30 cm x 10 cm
Weight (air / water)	1.81 Kg / 1.39 Kg
Data transfer	Gigabit Ethernet
Computer operating system	Windows 7 or later
Communication & power	13 pin SeaConn
Hologram size	from 2048 x 2048 to 512 x 512
Frame rate	from 16 to 50 fps
Flow chamber space	8 mm

GO UNDER THE SEA

Resolution Optics submersible holographic microscope uses a 405 nm laser as a light source to detect and analyze objects in fresh and saltwater. It is commonly deployed to depths of 100 meters with capabilities to go to 6000 m on special models. Objects as small as 1 μm and as large as 2 mm can be accurately measured, imaged and counted.

Resolution Optics Submersible Holographic Microscope



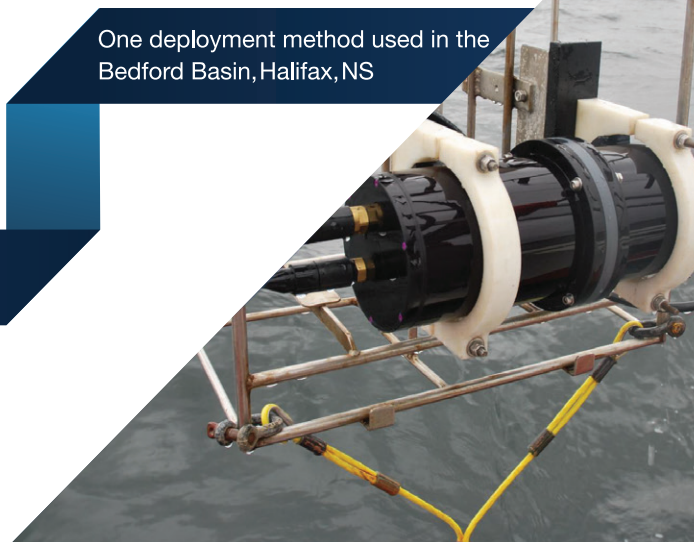
SEE VOLUMES

The submersible has a 3D holographic imaging sensor that rapidly samples objects within a volume (equivalent to 60 ml / min).

Sampling through a volume allows a larger number of objects to be detected and measured than with traditional optical lens microscopes without a need for focusing. The submersible is also ideal for tracking fast moving objects.

DURABLE HOUSING READY FOR DEPLOYMENT

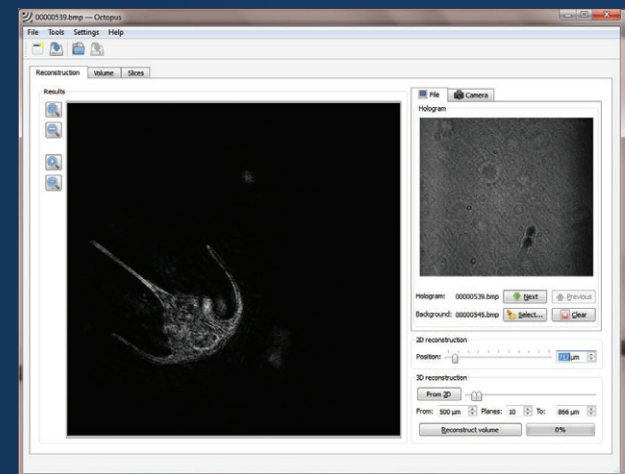
One deployment method used in the Bedford Basin, Halifax, NS



The anodized aluminium housing (stainless steel or titanium upon request) is rugged, low maintenance, and capable of being deployed from a buoy, ROV, AUV or from the deck of a vessel.

REAL TIME ANALYSIS OF THE WATER

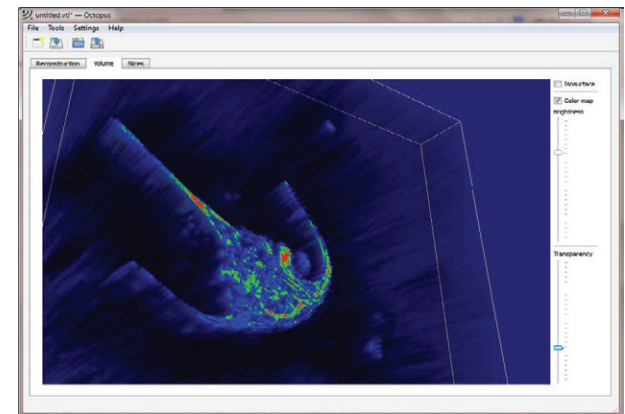
The Submersible can collect and reconstruct holograms at a rate of 16 frames per second at full size, and up to 50 frames per second with binning. A 4 Mpix hologram can be reconstructed in under 65 ms; up to 1000 times faster than the closest competitor. The tethered cable of the submersible serves as a power source and Gigabit Ethernet connection. With real time data flow and image analysis users have the advantage of on-line results. The stored holograms also contain all information for off-line processing.



PERFECT PARTNERS

The Submersible System works seamlessly with either of two software options; Octopus or Swordfish.

The Octopus software offers researchers advanced imaging features, and has the capability to move freely through the holograms in volume and time, giving real 4D analysis capabilities and velocity calculations.



The Octopus application delivers dynamic 3D imaging capabilities