

Key Design Requirements

Functional Requirements

Platform

Depth: depth of Robison dives

ROVs: must be functional for Robison mid-water dives on all platforms

Weight: must be able to mount laser to the front of ROVs

Size of system: laser must fit in front of ROV and remaining system must fit on vehicle

Electrical

Power: must provide adequate power for selected laser (Laserglow 1 W 671 nm DPSS laser), controller, and related components

Voltage: must use available voltages with sufficient wattage from each ROV

Communications: must be able to control the laser from the host ROV

Environmental

Temperature: stay within the range of the laser specifications

System Design Requirement

Platform

Depth: 4000m

ROVs: Ricketts, Ventana, MiniROV

Weight: laser housing <30 lbs

Size of system: TBD

Electrical

Power: +12V, 125 W peak, < 60 W nominal

Voltages:

Ricketts: 240 VDC, 110 VAC

Ventana: 375 VDC, 110 VAC

MiniROV: 400 VDC

Communications: RS232

Environmental

Temperature: 2 - 35° C

Key Design Requirements

Functional Requirements

Cameras

Resolution: must be able to resolve a minimum of 1 Mpixel

Frame rate: sufficient rate to minimize particle streaking

Light sensitivity: sufficient to image light in the wavelength of the laser in low light environments

Laser

Wavelength: frequency of laser light shall minimize changes in organismal behavior and response

Optical power: should be sufficient to illuminate particles in sheet of 0.5 m^2

Sheet thickness: Laser and optics shall generate a sheet thin enough to isolate flows

Sheet area: Laser and optics shall generate a sheet large enough to image the motion of a 10 cm animal

System Design Requirement

Cameras

Resolution: the current ROV cameras are sufficient, a camera upgrade may be proposed for 2016

Frame rate: minimum of 30 Hz with ability to change shutter speed

Light Sensitivity: dependent on camera properties

Laser

Wavelength: 671 nm

Optical power: 1 W

Sheet thickness: 1 mm

Sheet area: 0.5 m^2