Canarie IIP-03 "Undersea Window" Project Milestone 2 Report
Appendix 3
Report on Underwater Component Development

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1. Underwater Component Deployment Plan

The underwater component deployment plan is in progress rather than completed. This is due to the fact that the final weight of the equipment package will not be known for a few months when manufacture of the camera case and support structure are more advanced. The exact site for the camera must also be selected and a decision made on whether the camera can be deployed at the same time as other equipment or must be deployed on a separate voyage.

The main points in the deployment plan are as follows:

1. Deployment of tripod using the marine sciences vessel the John Strickland, which is equipped to handle the tripod's large size. The tripod will be lowered using the stern A-frame as a support structure, while the steel cable from the main deck davit lowers the platform into place. Once the tripod has been lowed into place an acoustic release on the main shackle will release the steel cable.
2. Connection of the tether from the tripod to the VENUS node will be handled by the NEPTUNE group purchasing the cable and TRONIC connector. This will involve using the FlexMet ROV and possibly one other depending on the final location and bottom conditions. Due to scheduling of the ROV and Strickland the tether may be connected before, at the same time, or possibly after the tripod is deployed. As such, the deployment plan will be modified to accommodate the groups' schedules. Two possible deployment scenarios are described below:
    a. The ROV will connect the Undersea Window project tether to the Saanich inlet VENUS node prior to the tripod's deployment. The other end of the tether will be buoyed off to be connected to the tripod at a later date
    b. The tripod will be deployed with the tether coiled up in a bundle beside the tripod. At a later date the ROV will connect the tether to the VENUS node.
3. Upon connection to the VENUS network the camera will be released from its docking position on the tripod frame. The docking position is required to ensure the camera and pan/tilt units are not damaged during deployment
4. To recover the tripod the camera will once again be docked and an acoustic release, with a redundant backup, will release a recovery buoy that is tethered to the tripod. This tether will be used to pull the tripod to the surface. As an added safety measure a large shackle on the top of the tripod frame will be available to recover the tripod using an ROV.

2. Underwater Camera Housing

Insite Pacific Inc. of Solana Beach, California, was selected as the manufacturer of the camera housing due to their expertise in the manufacture of similar housings for other projects. The housing is being designed to the following specifications:

- A 3, 000 meter Aluminum pressure housing with glass hemispherical dome port.
- A corrected optical lens system. The lens system will correct for zoom tracking, and minimize chromatic and geometric distortion. This will not just be a basic diopter lens system. An optical holder for the lens elements will also be fitted into the pressure housing. Due to the large focal length range requirements this is a highly specialized system that is one of a kind
- An internal chassis assembly to capture the Canon zoom lens and Panasonic HD camera

3. Connector Mounting Specifications

Each connector has been specified for the HD camera and controller enclosures.

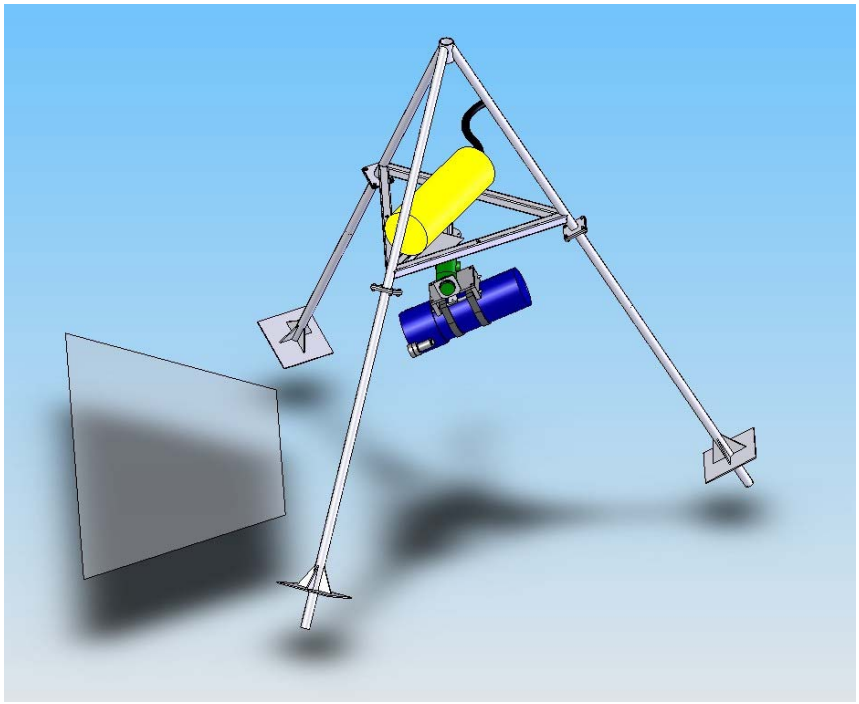
The two most critical connectors are:

- 1 optical/copper hybrid connector used to connect the umbilical from the VENUS node to the controller enclosure on the Undersea Window tripod.
- 2 BIRNS Inc. coaxial connectors complete with one 75-ohm coax and six 22 AWG copper contacts. This connector will be used to connect the HD camera enclosure to the controller enclosure.

The coaxial connector was chosen to reduce the cost and complexity of using optical connectors between the HD camera and controller enclosures.

4. Design of Underwater Camera Support System

The camera support system design was completed. See diagram below:



The area shown beside the tripod is the field of view of the camera when it is tilted at 25 degrees and the lens is set at maximum wide angle.

The Undersea Window tripod frame is comprised of a four-piece assembly (upper instrument cage bolted to three lower tripod legs). The frame is made of welded aluminum that has been type III anodized and then powder coated for protection from the corrosive underwater environment. The size of the cage has been optimized to stay compact, yet large enough to encompass the HD camera and controller enclosure for protection. The height of the tripod's legs provides the optimal viewing angle for the HD camera to the see the sea floor. The tripod design, with a hanging camera, was chosen to provide the maximum viewable field of vision for scientists to observe the surrounding environment.

Attached to the frame is a spool assembly containing the buoyant cable attached to a float. The float and cable are retrieved by remotely releasing the cable using an acoustic release. Upon deployment, retrieval and non-use of the HD camera, the camera will be moved to a docked position, protecting the optical window and further securing the camera housing to the frame.