

AUV Dock Camera Housing Failure, Fall 2022

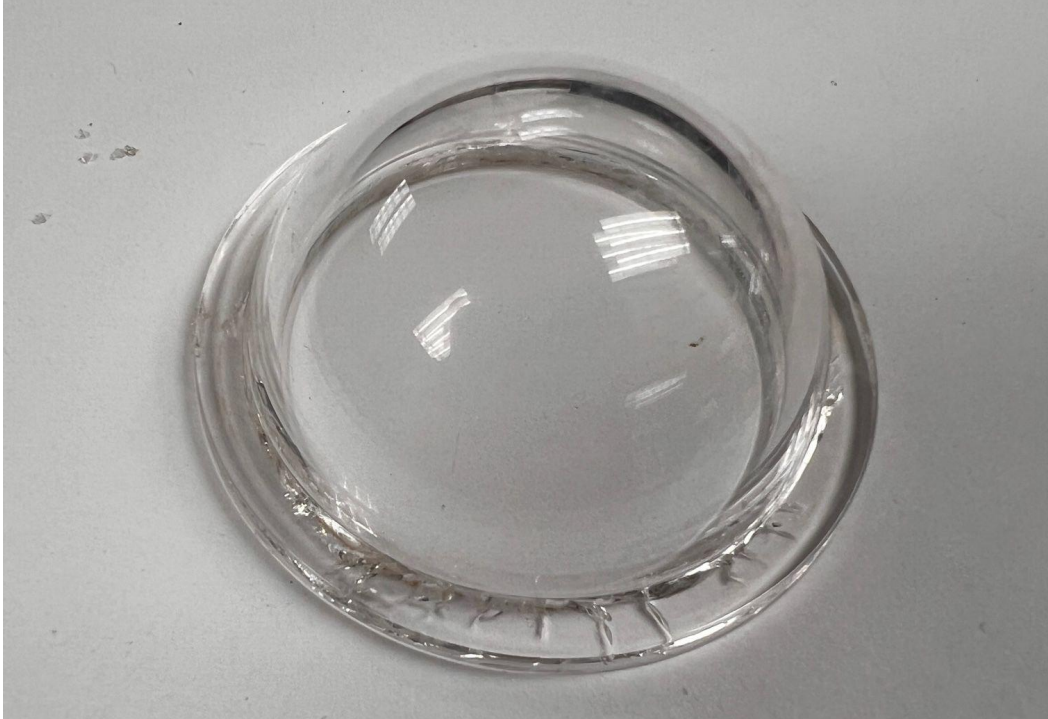
The upward looking camera on the AUV docking station failed about four months into a six month deployment. When the dock was recovered on Dec. 8th, it was clear the camera housing was full of water, so it appears there was a delayed pressure housing failure. On Dec 16th I finally took a close look at the housing and it is clear that the acrylic tube failed across the o-ring seals. The diagram below shows the endcap with two radial O-rings. The tube failed in tension (cracked) above the O-rings, letting water rush past the seals. The housing is a COTs housing from Blue Robotics rated to 200m. We had planned to use an aluminum tube, rated to 950m but switched to plastic to reduce the corrosion potential. This was a bad decision because acrylic is known to have long-term creep problems. In addition to this failure there were three other problems which are all listed below.

1. Seal failure due to cracks in the tube above the O-rings

*Additional images below



2. crazing/cracks on camera dome - didn't fail, yet



3. Endcap corrosion: Significant corrosion around the dome retainer plate screws. We know stainless steel screws in an aluminum housing are trouble, but the extent of this seems quite excessive. There was a copper ring added for biofouling reduction, which was galvanically connected to the stainless steel screws, then to the aluminum endcap which likely accelerated the corrosion of the aluminum due to the large surface area and galvanic potential. Recommend isolating the copper next time, and using Lanocote on the stainless steel screws.



4. Hose clamp failure - Hose clamp camera strap failed due to corrosion. This component was galvanically isolated, and all stainless, so it isn't clear why it would have failed, but maybe the heat shrink tubing which was added to cushion the strap against the acrylic tube caused a local environment of oxygen depletion which accelerated crevice corrosion.





