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# OOI Cabled Array: Vertical Mooring Shallow Profiler

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# VM-SP Metallurgy



Problem: Mixing Metals

Solution: Training. Clearly labeled and color coded bins. Discarding layabouts.

Description: Wet metal is supposed to be Titanium. Sometimes SS bolts have been used. The two are difficult to tell apart.

Lesson: In the push of production, only solid procedure can prevent accidental deployment of incorrect metal.



# VM-SP Metallurgy



Problem: Mixing Metals



# VM-SP Metallurgy



Description: Different metals in contact create a Voltaic junction. Adding salt water allows a conduction path resulting in one of the metals getting eaten!



# VM-SP Metallurgy



## Solution:

1. All parts bins are color coded and labeled:  
Yellow = SS  
Red = Titanium
2. All unidentified loose parts are discarded.
3. All assemblers are trained.
4. Assemblies are inspected after salt water tests.



# VM-SP Metallurgy



## Lessons Learned:

Very easy to mistake SS and Ti parts. Good procedure and identification of parts bins along with training and discard of unidentified parts has made assembly safe.

Testing in salt water tank usually causes darkened parts to indicate a mismatch within a few hours. Assemblies are inspected for dark bolts after tank tests.



# VM-SP Cable Assembly



Problem: Many connectors failed after deployment

Solution: Require vendor re-certification or local review for any changes in product

Description: Vendor changed recipe for molding compound without notification.

Lesson: Don't assume vendor quality. Contract for it.







# VM-SP Shared Files



Problem: Shared Files collisions

Solution: Google Docs could have helped but they are not perfect due to the sharing mechanism.

Description: Shared Files are fine when one author but when 2 or more, file locking led to multiple copies and missed info.

Lesson: Face this issue up front and have procedures suitable for crunch time.



# VM-SP Device and Connector Use



Problem: Devices difficult to assemble. Connectors difficult to connect

Solution: Evaluate connectors and devices for actual use

Description: 0 for 6 on beacons and flashers in 2015 due to assembly. Many connectors very difficult to correctly assemble in actual use.

Lesson: If there is a way for a connector/device to be difficult to use, look for other choices





# VM-SP Cable Vendors



Problem: Failures in expensive hybrid wet-mate connectors and cables

Solution: Test all cables. Follow inspection procedures.

Description: Had a few events of connector failure and lost ship/ROV time due to mechanical failure or manufacturing defect

Lesson: Trust nothing when you only have one chance at deployment.



# VM-SP Design for Extremes



Problem: Mechanical failure of shear pin.

Solution: Strap/latch Science Pod securely for deployment (In Design)

Description: Levelwind shear pin designed for 500 lbs break strength sheared probably due to Science Pod being moved at air/sea IF or possibly by ROV

Lesson: Design must consider extremes of real world use, not just normal use.







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