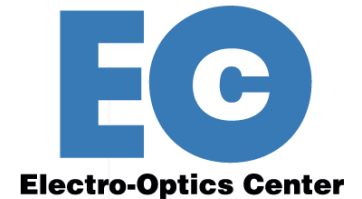


PENNSSTATE



Fiber Optics Installation on Ships

Navy Manufacturing Technology Project S2437

National Shipbuilding Research Program All Panel Meeting March 2015

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Electro-Optics Manufacturing Technology Center



DISTRIBUTION STATEMENT A:
Approved for public release.



Technology Discussion

Problem

High rework during installation of optical fiber in shipyard.

Project Approach

This project will decrease costs of fiber optic installation in ships at Ingalls Shipbuilding emphasizing defect reduction:

- PROCESS: Optimize cable routing, installation sequence, and test sequence.
- TECHNOLOGY: Assess latest available hardware and equipment.

OPTIX Engineering
LLC



Project Team

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- Kim Jovanovich

S2437 Technology Discussion

PROJECT TASKS-

- 1) Optimal scheduling and sequencing; avoid conflicts with operations that cause conflicts such as contamination and cable crushing.
- 2) Manufacturing process improvements that come from recent products for installation and test. Testing technology improvements that come from newer components.
- 3) Installation methods for single mode fiber, cable, and termini, for future upgrades.
- 4) Experience with simple COTS based networks which use single mode fiber.
- 5) Evaluate new tools for connector / terminus assembly.

TASK	DESCRIPTION
1	Optimize routing, sequencing, and scheduling.
2	Engineering and system improvements.
3	Interconnection methods.
4	Single mode fiber.
5	Assembly tool evaluation.

Project Metrics

DESCRIPTION	BASELINE	THRESHOLD	GOAL	CURRENT
Failure modes identified	2	2	10 (100%)	5/10 (50%)
Root cause analysis complete	0	2	5 (100%)	5/5 (100%)
Root cause known	0	2	5 (100%)	6/5 (120%)
Mitigation plan established	0	2	6 (100%)	4/6 (100%)*
Mitigation complete	0	2	6 (100%)	3/6 (0%)**

* One of the mitigation plans covers three of the root causes.

** Mitigation to be complete upon final implementation.

Cost reduction goal per hull resulted from 10% reduction in defects. Analysis supports 78% from cable deployment improvements, and connector damage reduction 22%.

Corrective Actions

DEFECT	MITIGATION
Damage to un-deployed cable.	Cable racks and awareness training.
Damage during cable pulling.	Tools to decrease friction and kinks.
Damage cable after deployment.	Color coded cable.
Defects in cable termination.	Introduction of splice-on connectors.
Defects in end face equality.	Introduction of splice-on connectors.
Defects in end face geometry.	Introduction of splice-on connectors.

Cable Rack



Cable Deployment Tools

Examples of cable deployment tools:



Courtesy ManTech S2472 and NSRP
Cable Deployment projects.

Splice-On Connectors (COTS)



www.aflglobal.com



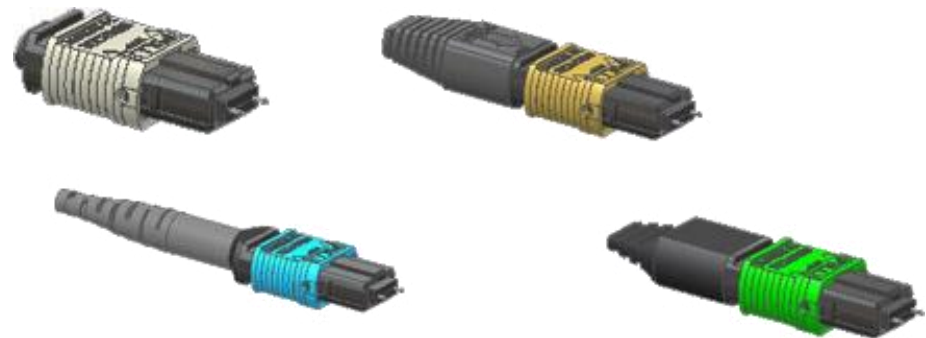
www.fitel.com



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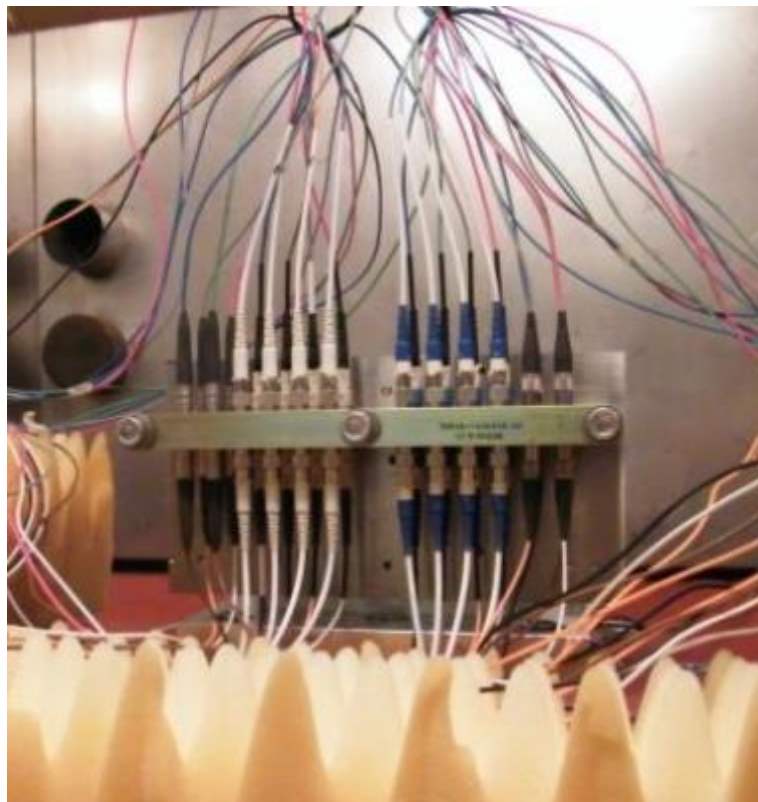


Mil-ST Connector

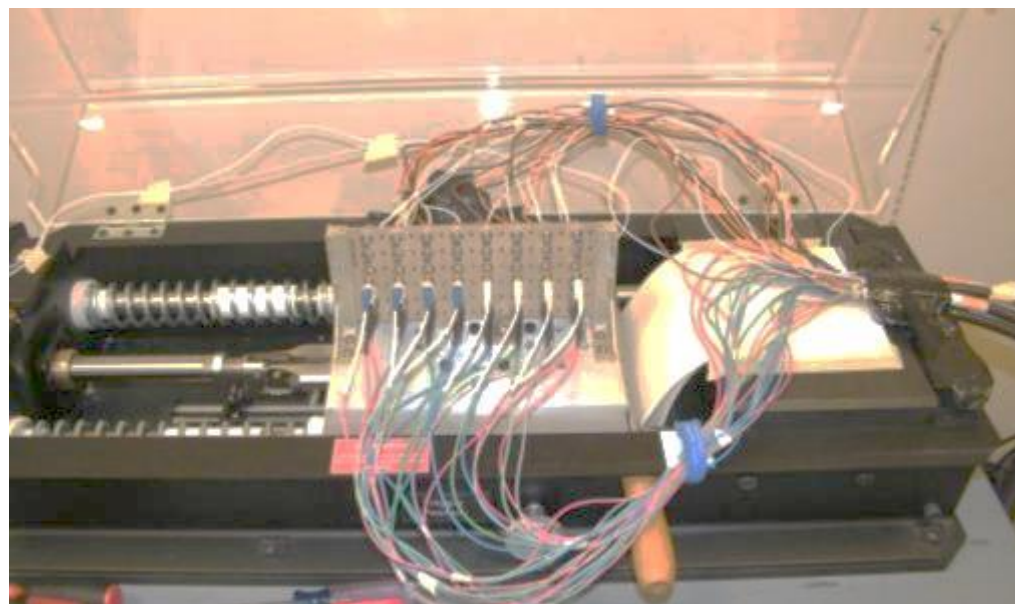


www.usconec.com

Splice-On Connectors

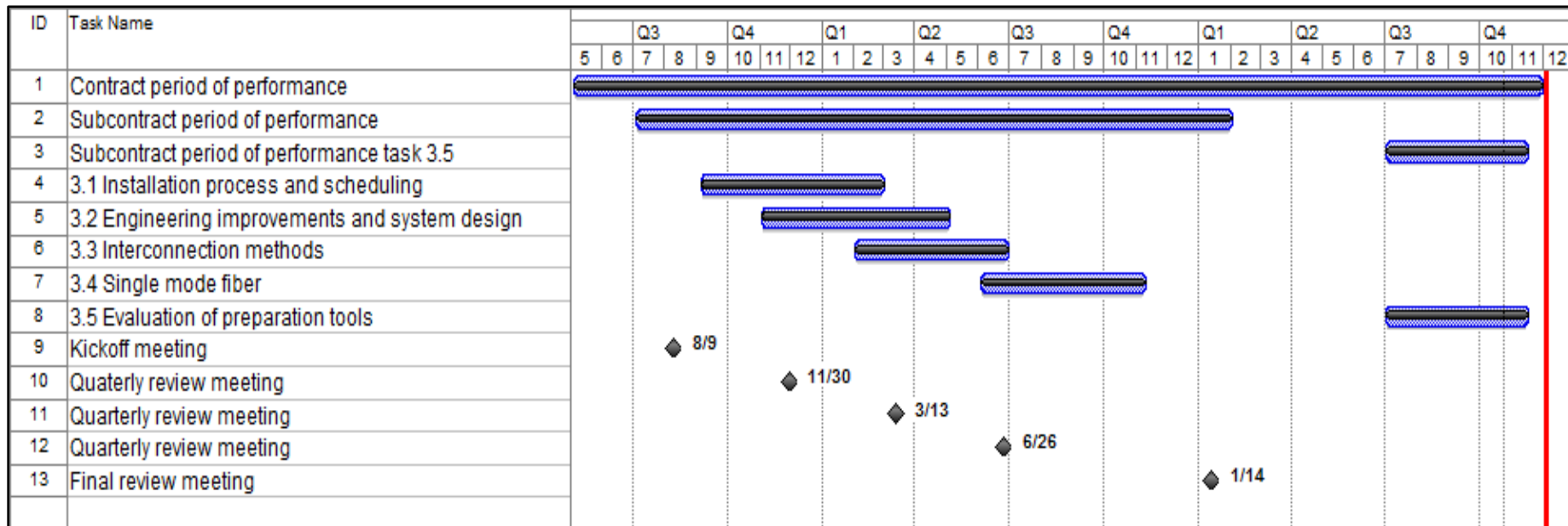


VIBRATION



SHOCK

Project Schedule



Project re-plan / extension was used for Task 3.5 Preparation Tool Evaluation.

Transition / Implementation

TRANSITION STRATEGY: Documented in ManTech Technology Transition Plan (TTP), submitted August 2013.

IMPLEMENTING ORGANIZATION: Ingalls Shipbuilding (Pascagoula).

SUPPLY CHAIN: ManTech project S2472 has documented designs; stands will be fabricated by shipyard personnel; COTS connector supply chain.

FUNDING SOURCES: Ingalls Shipbuilding is funding internal transition.

DEMONSTRATION: Verification by Ingalls Shipbuilding Industrial Engineering.

BENEFITING PLATFORMS: DDG51, LPD, LHA.

PROJECT ACTIVITY	IMPLEMENTATION ACTIVITY	DATE
Data Tracking	Tracks effectiveness of improvements.	FY14-16
Hardware Changes	Requirements, design, implementation, certification.	FY16
Process Changes	Design, incorporation, training, approval.	FY16

Next Steps

- Assist TWH and shipyard with implementation of splice-on connectors.

- Subsequent NSRP project “Alternatives to Fiber Optic Connectors.”

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