SHIPBOARD CABLE TRAYS

Project Update: 5/12/2020

Greg Stevens – 207.442.5870

GENERAL DYNAMICS
Bath Iron Works

AGENDA

- Mission Statement
- Project Participants
- Completion Summary
- Task Descriptions
- Task Updates
- Schedule
- Third Quarter Status
- Next Steps

MISSION STATEMENT

Determine and demonstrate how cable tray technologies can be integrated into ship design to expedite cable installation, reduce safety incidents, and improve first time quality

PROJECT PARTICIPANTS

- BIW
  - Dave Breton – Project Technical Lead
  - Andrew Trueworthy
- ATI
  - Nick Laney – Business Manager
- NASSCO
  - Paul Hengst – TPOC
- HII
  - Jason Farmer – PTR
- Laboratory
  - AeroNav Laboratories
- NAVSEA
  - Christopher Nemarich

PRIMARY ACTIVITY LIST COMPLETION SUMMARY

- Collect cable installation data – **100% complete**
- Assess cable tray products – **100% complete**
- Design demonstrator units – **100% complete**
- Construct demonstrator units – **100% complete**
- Conduct a pilot demonstration of a cable tray installation and corresponding cable installation – **100% complete**
- Conduct time study by measuring the performance of a cable installation – **100% complete**
- Conduct demonstrator shock testing – 0% complete
- Perform a cost benefit assessment – 0% complete
- Recommend a technology transition plan – 0% complete

TASK UPDATES

- **Collect cable installation data – 100% complete**
- Assess cable tray products – 100% complete
- Design demonstrator units – 100% complete
- Construct demonstrator units – 100% complete
- Conduct a pilot demonstration of a cable tray installation and corresponding cable installation – 100% complete
- Conduct time study by measuring the performance of a cable installation – 100% complete
- Conduct demonstrator shock testing – 0% complete
- Perform a cost benefit assessment – 0% complete
- Recommend a technology transition plan – 0% complete

COLLECT CABLE INSTALLATION DATA

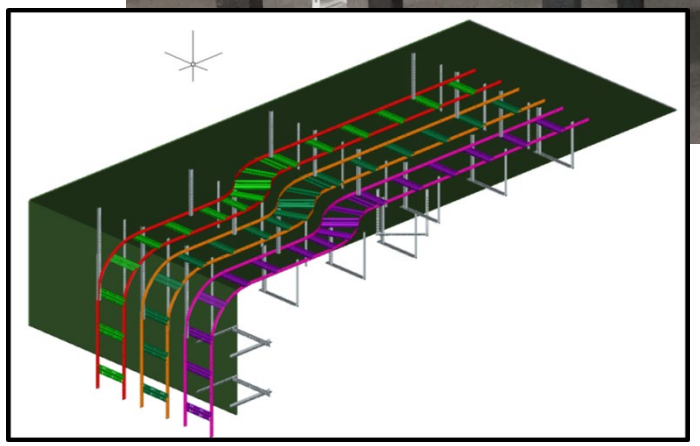
- Cable hangar, cable pulling injury data
  - BIW Shipyard Electrician related injury & ergonomic data
    - Injury data has been reviewed and summarized into major categories
    - Researching industry averages for comparison
- Cable installation data
  - Shipyard data has been collected, and is being organized for report presentation
  - Shipyard data being reviewed
    - Navy Standard cable hanging systems
    - Commercial cable hanging systems
  - Differences in installation being considered to support data analysis and comparison
    - Complexity of installation
    - Performance needs

TASK UPDATES

- Collect cable installation data – 100% complete
- **Assess cable tray products – 100% complete**
- Design demonstrator units – 100% complete
- Construct demonstrator units – 100% complete
- Conduct a pilot demonstration of a cable tray installation and corresponding cable installation – 100% complete
- Conduct time study by measuring the performance of a cable installation – 100% complete
- Conduct demonstrator shock testing – 0% complete
- Perform a cost benefit assessment – 0% complete
- Recommend a technology transition plan – 0% complete

ASSESS CABLE TRAY PRODUCTS

- We have chosen, purchased, and installed three cable tray products from:
  - MP Husky
    - I-Beam Configuration
    - C-Flange Configuration
  - Research Tool & Die
    - Rack-Style Configuration
- Installed beside Navy standard hangers for comparison
  - Trapeze Style



TASK UPDATES

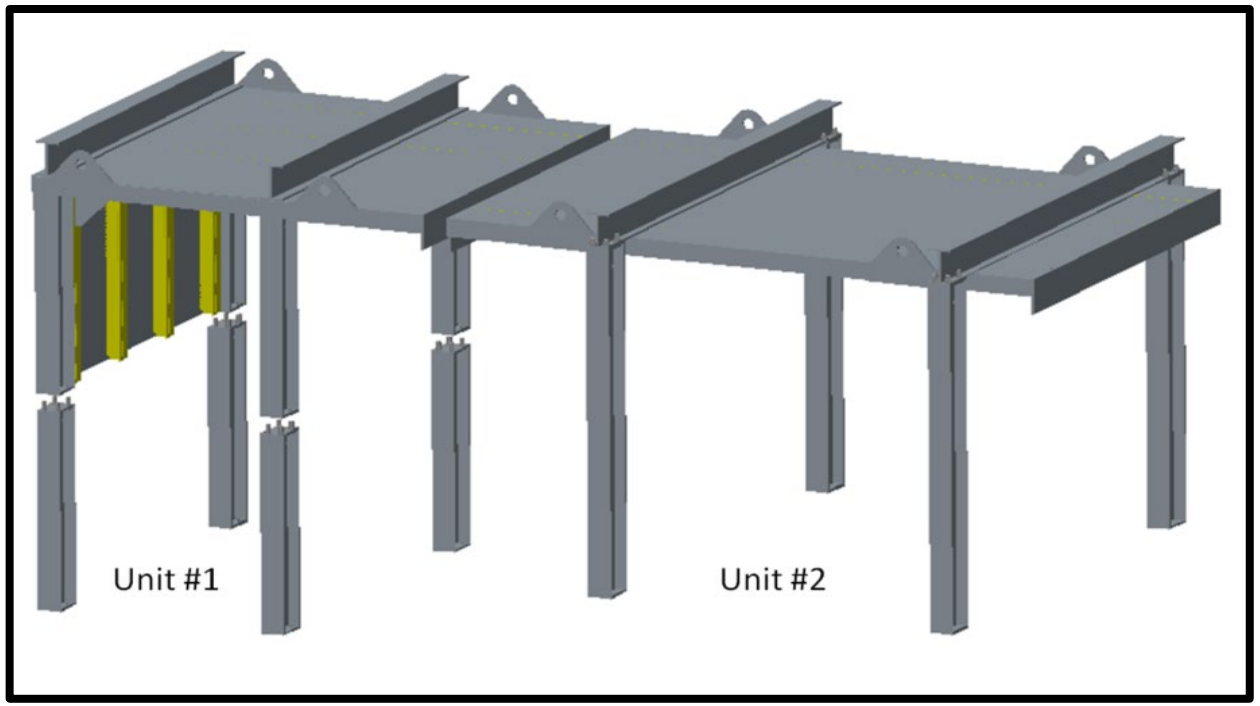
- Collect cable installation data – 100% complete
- Assess cable tray products – 100% complete
- **Design demonstrator units – 100% complete**
- Construct demonstrator units – 100% complete
- Conduct a pilot demonstration of a cable tray installation and corresponding cable installation – 100% complete
- Conduct time study by measuring the performance of a cable installation – 100% complete
- Conduct demonstrator shock testing – 0% complete
- Perform a cost benefit assessment – 0% complete
- Recommend a technology transition plan – 0% complete

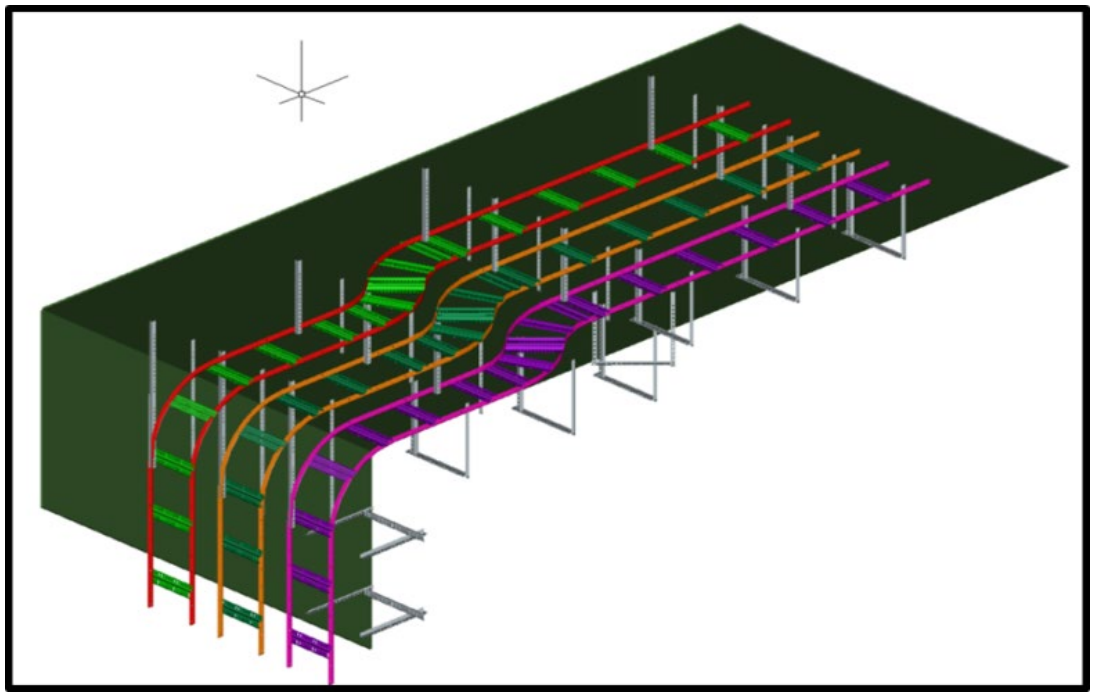
TASK UPDATES

- Collect cable installation data – 100% complete
- Assess cable tray products – 100% complete
- Design demonstrator units – 100% complete
- **Construct demonstrator units – 100% complete**
- Conduct a pilot demonstration of a cable tray installation and corresponding cable installation – 100% complete
- Conduct time study by measuring the performance of a cable installation – 100% complete
- Conduct demonstrator shock testing – 0% complete
- Perform a cost benefit assessment – 0% complete
- Recommend a technology transition plan – 0% complete

CONSTRUCT DEMONSTRATOR UNITS

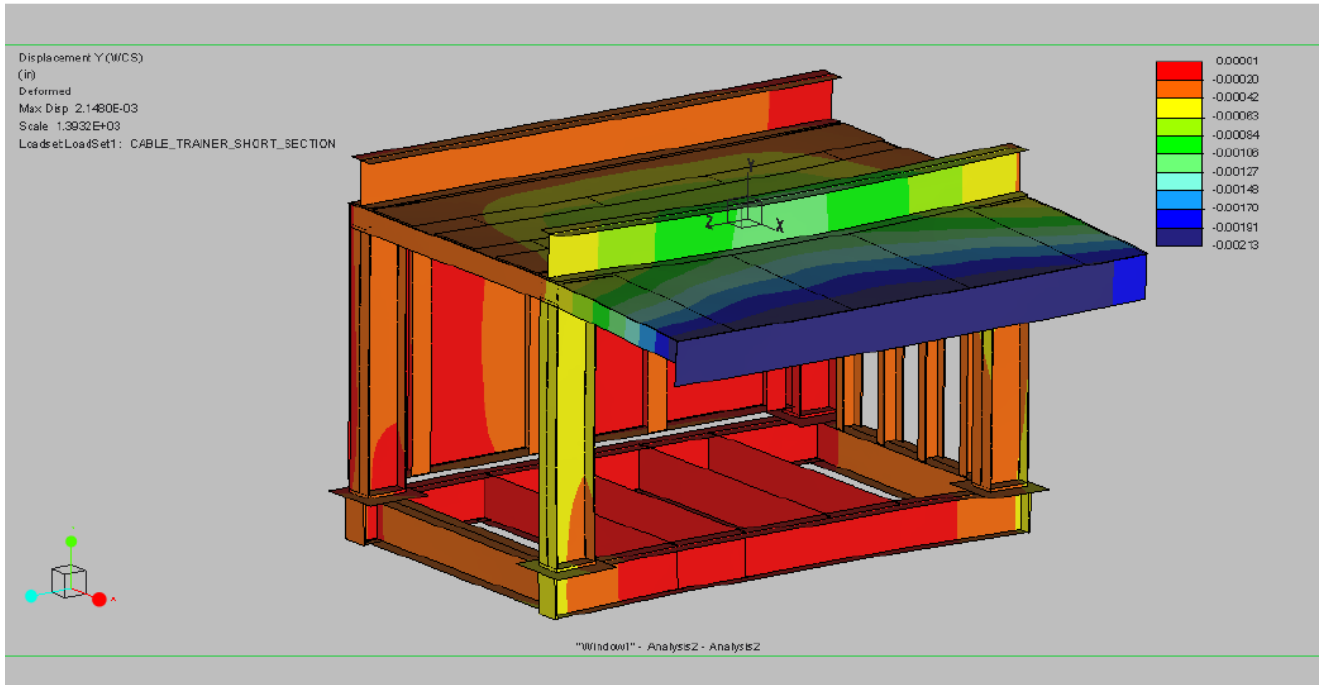
- Build In-Process
  - The Unit #1 ‘Short’ vertical section is complete
  - The Unit #2 ‘Long’ section is complete
  - They were installed together for the time trials and taken apart to send the short section for shock testing



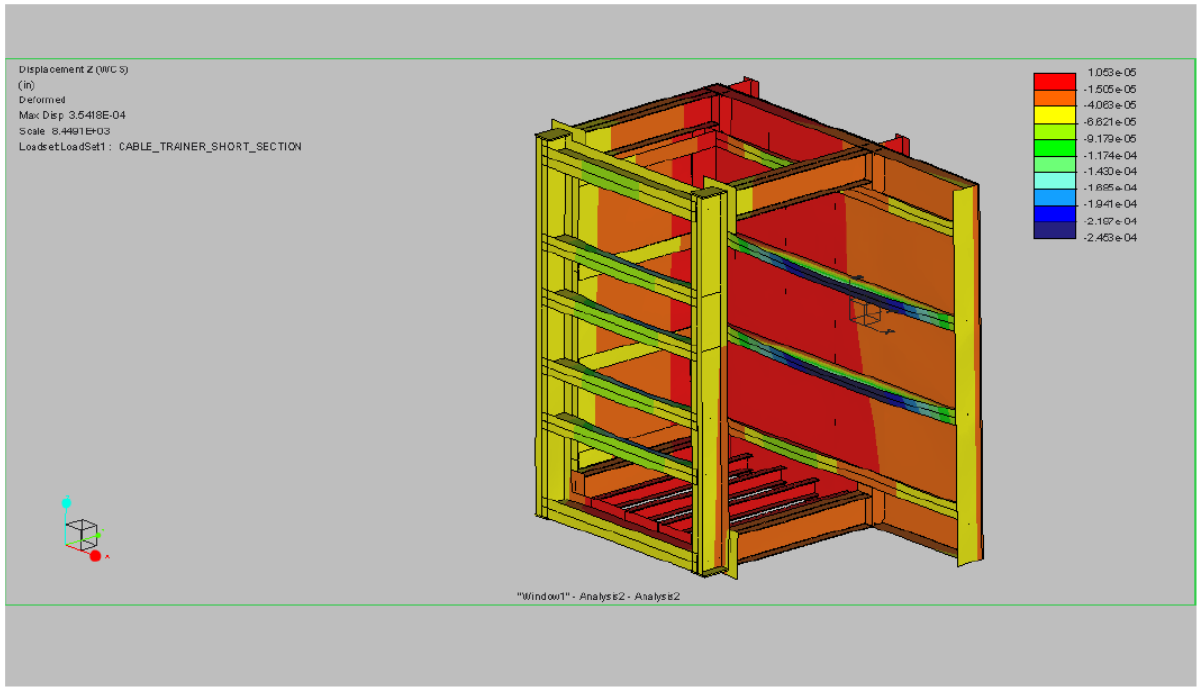


Conducted FEA on Design

50 G Vertical Shock Load
Total Mass of structure and cable ways = 5,257 lbs.
Total Load on Egg Crate = 262,863 lbs.
Static Deflection = 0.002 inch



15 G Side Shock Load
Total Mass of structure and cable ways = 5,257 lbs.
Total Load on Egg Crate = 78,866 lbs.
Static Deflection = 0.001 inch



- Small deflection, but no issues with shock loading

TASK UPDATES

- Collect cable installation data – 100% complete
- Assess cable tray products – 100% complete
- Design demonstrator units – 100% complete
- Construct demonstrator units – 100% complete
- **Conduct a pilot demonstration of a cable tray installation and corresponding cable installation – 100% complete**
- **Conduct time study by measuring the performance of a cable installation – 100% complete**
- Conduct demonstrator shock testing – 0% complete
- Perform a cost benefit assessment – 0% complete
- Recommend a technology transition plan – 0% complete

Demonstrators

Both Demonstrator Units (pre cable population); elevated to simulate installation space

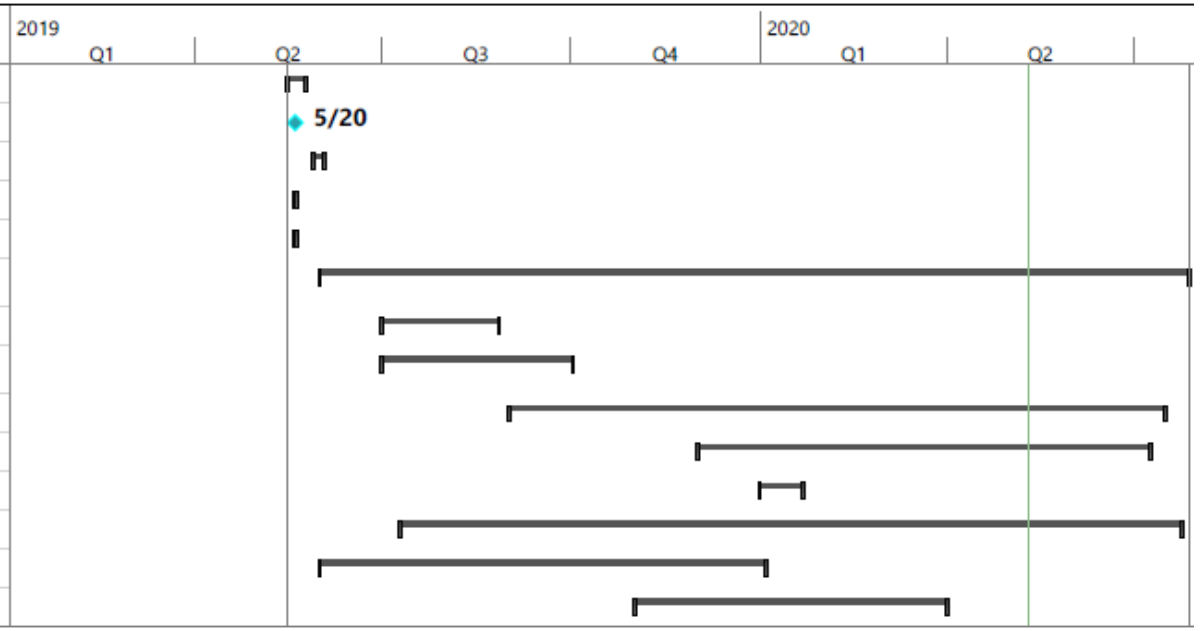
Shock demonstrator removed (pre foundation)

Ready for shipment to shock lab

Shock Testing Demonstrator Section

PROJECT SCHEDULE – OVERVIEW

Task Name	Start	Finish	Duration	% Complete
NASSCO Initial SOW Meeting and ISA	Thu 5/16/19	Fri 5/24/19	7 days	100%
Project Kickoff meeting	Mon 5/20/19	Mon 5/20/19	0 days	100%
Initial Plan Development	Wed 5/29/19	Mon 6/3/19	3 days	100%
Internal Project kickoff	Mon 5/20/19	Mon 5/20/19	1 day	100%
NASSCO tasking	Mon 5/20/19	Mon 5/20/19	1 day	100%
Gather and Analyze Installation Data on Muliple Ship Programs - TASK #1	Sat 6/1/19	Mon 7/27/20	291 days	67%
Research Industry Cable Tray Products - Task #2	Mon 7/1/19	Mon 8/26/19	40 days	100%
Design and Build Demonstrator for Installation Assessment - Task #3	Mon 7/1/19	Tue 10/1/19	65 days	100%
Design and Build Demonstrator for Withstand Assessments - Task	Sun 9/1/19	Wed 7/15/20	219 days	50%
Analyze Install and Testing Data - Task #5	Mon 12/2/19	Wed 7/8/20	152 days	28%
Cost Benefit Analysis - Task #6	Wed 1/1/20	Tue 1/21/20	14 days	25%
Create Report - Task #8	Wed 7/10/19	Fri 7/24/20	263 days	55%
Communications - Task #9	Sat 6/1/19	Fri 1/3/20	145 days	95%
Panel Meetings - Task #10	Fri 11/1/19	Tue 3/31/20	100 days	47%



- Project schedule updated to reflect contract extension approved on 3/18/2020
- Period of performance ends 7/30/2020

THIRD QUARTER STATUS

- Project is about 60 days behind the original schedule
- BIW received a contract modification for a no cost extension to finish with testing and inspection
- The unit has shipped to the test lab (5/11)
  - Testing will occur within the month
- Recent COVID-19 issues have caused some delay in the testing schedule
- The test schedule not expected to negatively impact the new projected project completion

NEXT STEPS

- Complete shock testing
- Conduct inspections of the unit
- Review test report
- Complete the draft of the final report and distribute for review, and a delivery of 7/15/20

GENERAL DYNAMICS

SHIPBOARD CABLE TRAYS

NSRP ETP