

Navy Standard Bookend Fixtures for Shock Testing (Update)

SDMT Presentation
20 - 22 August 2024
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Agenda

- Problem Statement / Goals / Objectives
- Project Participants
- Milestones / Schedule
- Bookend Test Fixture Designs
- Project Status
- Questions

Problem Statement

- When shock testing common equipment like valves, eductors, and other in-line pipe components, bookend test fixtures are typically designed and fabricated by a certified shock test facility. The bookend fixture designs are considered, “non-standard” and require submission of associated drawings, models, and analyses to the Delegated Approval Authority for review and approval prior to execution of testing.
- This is a costly process which adds labor and delays which could be avoided if there was an option to utilize a standardized, pre-qualified bookend fixture.

Goals / Objectives

- The goal of this project is to create up to four, qualified Navy Standard Bookend Shock Test Fixtures for “in-line” pipe components to be used on Lightweight and Medium-weight Shock Test Machines.
- The objective is to reduce cost and schedule associated with test fixture development, for all shock hardened, US Navy ships.

Goals / Objectives

- Review Bookend Test Fixture designs used in previously approved Lightweight and Mediumweight Shock Testing.
- Determine maximum and minimum sizes / weights of components to support.
- Determine common interfaces to support (ANSI Standard flanges, hardware, etc.).
- Design and analyze test fixture designs.
- Perform Lightweight Shock Testing on a bookend fixture (at Ingalls).
- Compare shock data to analysis.
- Review results with the Navy Delegated Approval Authority (NAVSEA 05P1).
- Create Navy Standard Drawings of each Bookend Test Fixture for inclusion in the next revision of MIL-DTL-901.

Project Participants - NSRP

Jim House – Senior Program Manager
ATI / NSRP

Victoria Dlugokecki – Program Technical Representative

Project Participants - NAVSEA 05P

Tom Brodrick – Senior EM, Shock – Submarines
Domenic Urzillo – DAA Submarines

Project Participants – Gibbs & Cox (Leidos)

Mike Poslusny - Project Manager

Michael Parnin – Design

Allison Vella – Engineering

Nikki Washington - Contracts

Dominic Price - Drafting

Terrence Nelson- Drafting



Project Participants – Ingalls Shipbuilding

Michael S. Thompson – Mechanical Engineer

Jamie Breakfield – Project Manager



INGALLS
SHIPBUILDING
A Division of HII

Project Participants – NASSCO

Nour Chihwaro – Electrical Engineer

Dr. John Moatsos – Principal Engineer

GENERAL DYNAMICS
NASSCO

Milestones

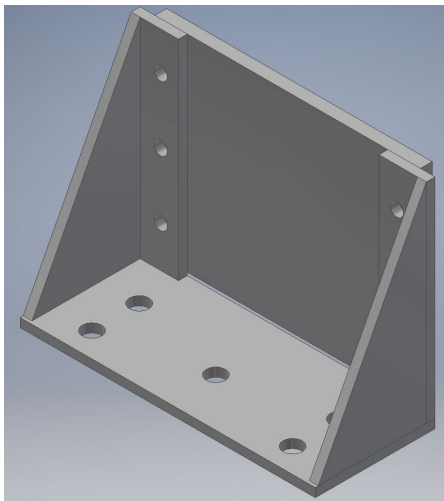
		Project Start:	3/7/2024
Deliverable		Due Date (Days After Award)	Estimated Date
01	Project Plan & Schedule	14	3/21/2024
02	Kick-off Meeting (Minutes/Presentations)	14	3/21/2024
03	Project Status Report 1	60	4/22/2024
04	Project Status Report 2	120	6/21/2024
05	Project Status Report 3	220	9/27/2024
06	Project Status Report 4 and Final Drawings	260	11/8/2024
07	Final Report with Recommendations	320	1/6/2025

Schedule

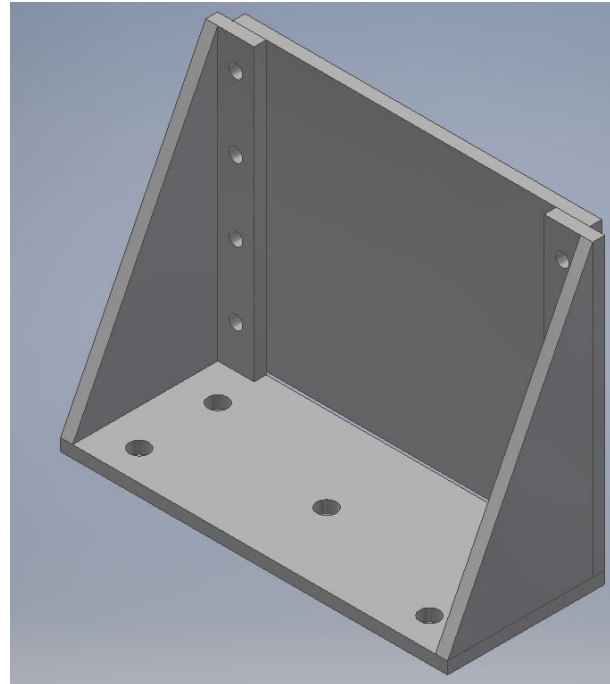
Task Name	Duration	Start	Finish
Task 1	23 days	Thu 3/21/24	Complete
Review Bookend Test Fixture Designs	4 days	Thu 3/21/24	
Determine Max and Min Sizes / Weights of components to support	4 days	Wed 3/27/24	
Determine Common Interfaces	4 days	Tue 4/2/24	
Investigate standard materials	5 days	Mon 4/8/24	
Brain-storm Bookend Designs, show preliminary designs	6 days	Mon 4/15/24	
Task 2	44 days	Tue 4/23/24	Complete
Design Lightweight and Medium-weight Test Fixtures	18 days	Tue 4/23/24	
Present Designs to the Team and the Navy	26 days	Fri 5/17/24	
Task 3	70 days	Mon 6/24/24	Working
Analyze Test Fixtures (transient / Static G)	24 days	Mon 6/24/24	Working
Perform Lightweight Testing	24 days	Fri 7/26/24	Wed 8/28/24
Compare Data	22 days	Thu 8/29/24	Fri 9/27/24
Task 4	30 days	Mon 9/30/24	Fri 11/8/24
Create Navy Standard Drawings of each Bookend Test Fixture	30 days	Mon 9/30/24	Fri 11/8/24
Final Report	41 days	Mon 11/11/24	Mon 1/6/25

Bookend Test Fixture Designs

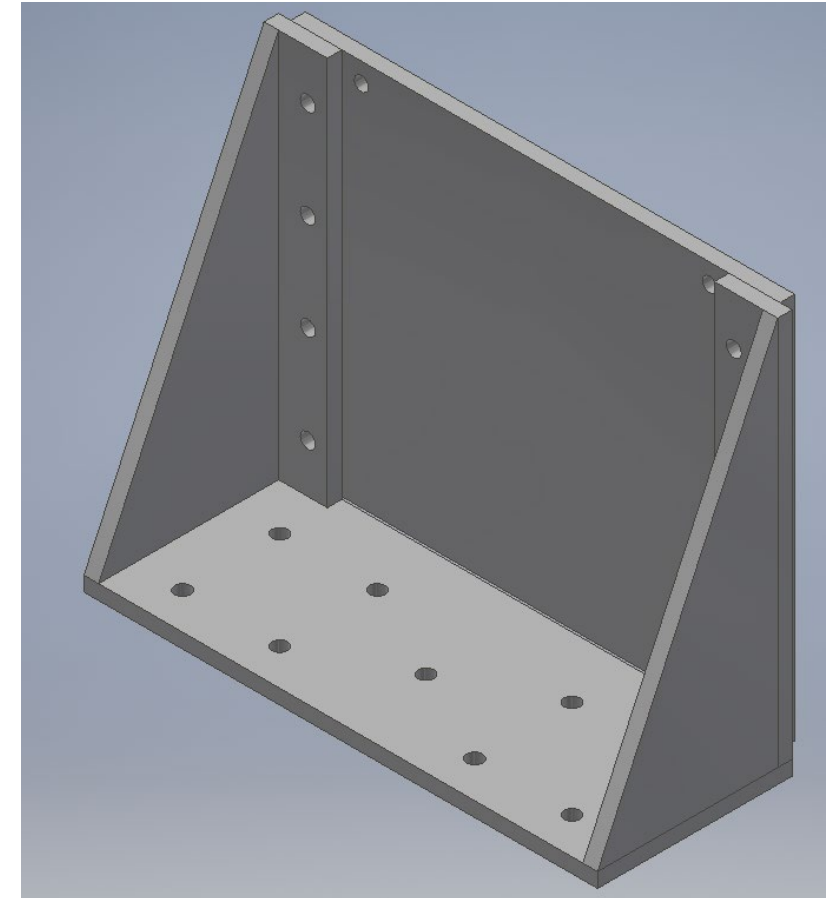
Small Fixture



Medium Fixture



Large Fixture



Bookend Test Fixture Designs

- Small bookend fixture
 - Suitable for up to 3" nominal pipe components
- Medium bookend fixture
 - Suitable for up to 6" nominal pipe components
- Large bookend fixture
 - Suitable for up to 12" nominal pipe components

Bookend Test Fixture Designs

- Incorporate re-usable interface plates.
 - Modal analysis meets MIL-DTL-901E requirements.
- Fixture dimensions and weld tolerances ensure easy installation of interface plates using standard wrenches and tools.
- Interface Plates allow for pressurization of pipe components using standard NPT fittings / clearance holes.
- The Small and Medium fixtures easily adapt to the LW Machine.
- All three fixtures adapt to the MW Machine, utilizing an adapter plate (design TBD).
- Designed to support the weight of standard in-line pipe components while staying within the limitations of each shock machine.

Project Status - Next Steps

- Lightweight Shock Testing of the Medium Size Fixture
 - 3ft & 5ft Vertical Blow of a single bookend to obtain interface plate resonance.
 - 3ft & 5ft Vertical Blow of a typical setup, installing a pipe component between two bookends.
 - Obtain accelerometer data and compare to the analysis.
 - Validate the analysis model and extend results to the Small and Large Fixtures.
 - Present results to NAVSEA 05P for approval.
- Create Navy Standard Drawings of the Bookend Fixtures
- Final Report

Questions

