

Suspension
Rockers
Redesign and
Implementation
Using 3D-
Printed
Material

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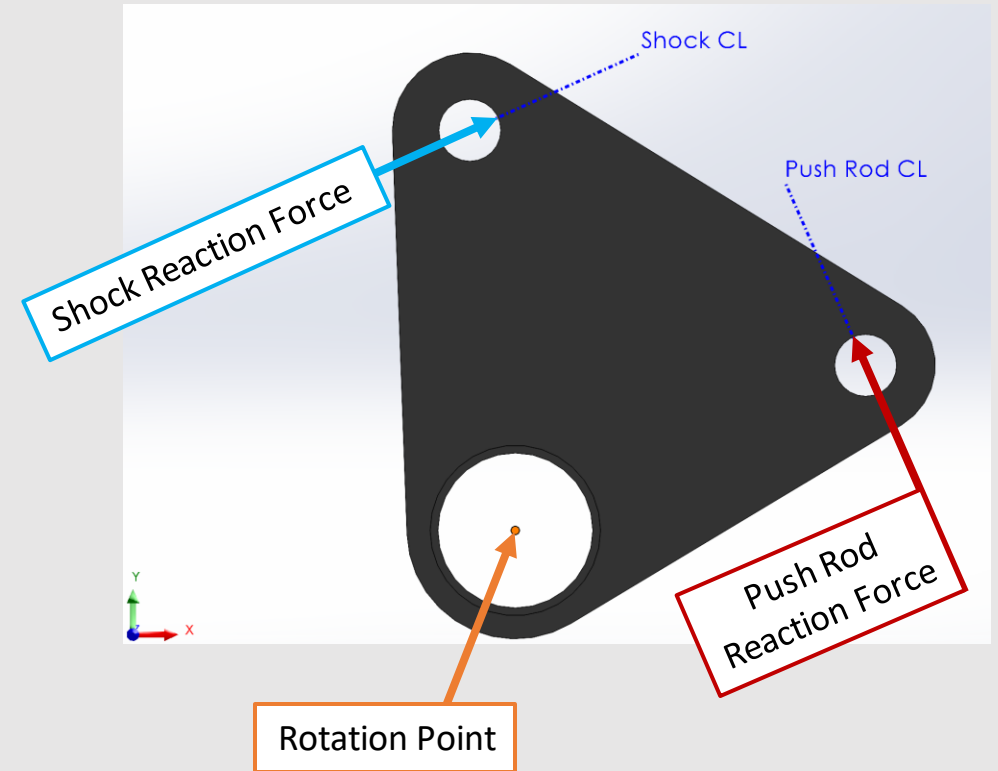
Graduate Student Advisor: Bryce Thacker



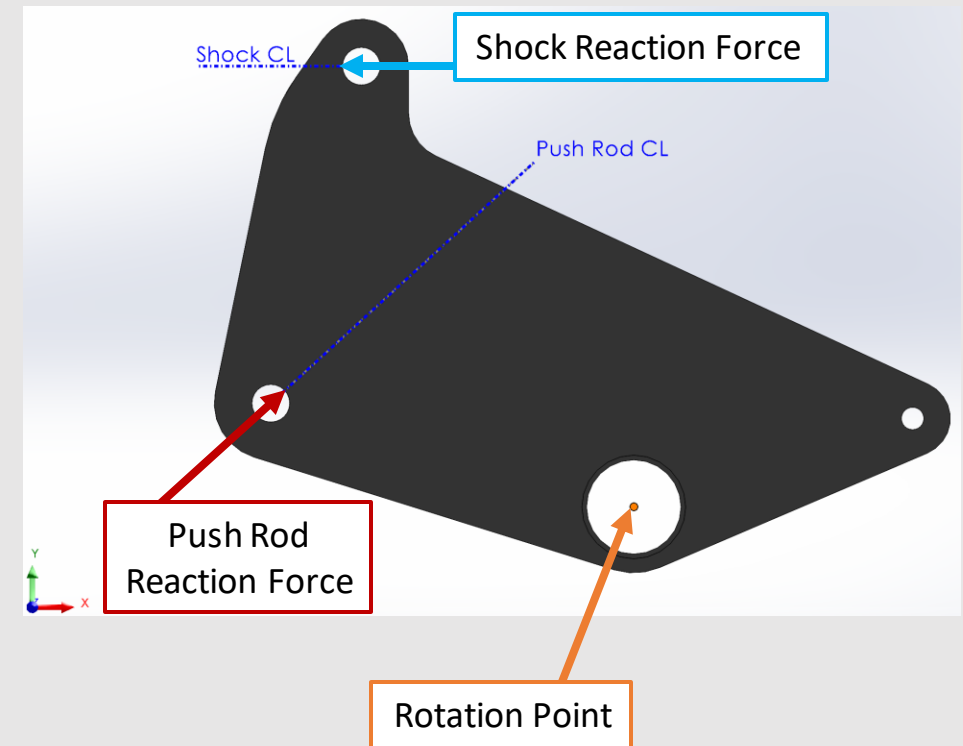
Project History and Background

- Background: the ODU FSAE Team produces a racing vehicle every two years and competes nationally.
- Project was undertaken because the previous aluminum rockers were:
 - Expensive to produce
 - Heavy
 - Inconvenient (untimely) to obtain through outside vendors
- Objective: to determine if the FSAE Race Car can operate using PA-6CF 3D-Printed Rockers, which can be made on-campus with the AM Lab, are cheaper to produce, and made of a lighter material than aluminum.

Front Rocker



Rear Rocker



Project Items

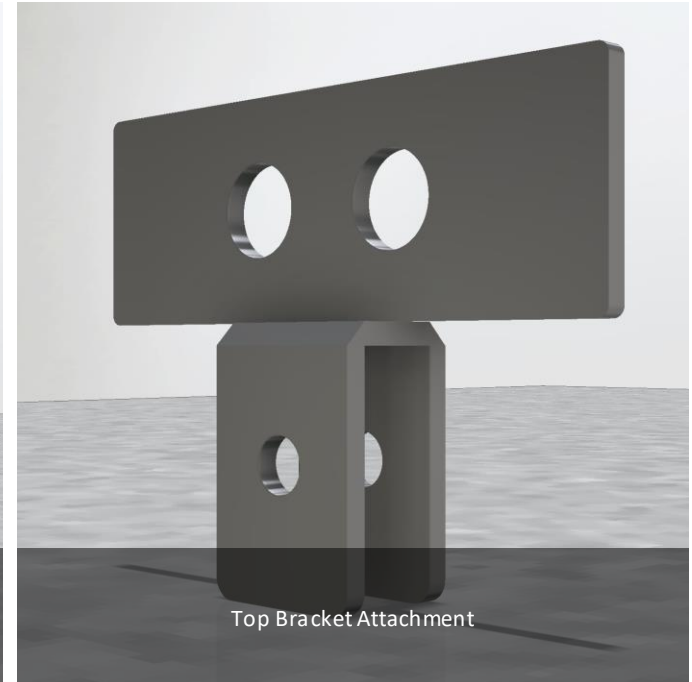
Completed

- Static Simulations (SolidWorks)
- Dynamic Calculations
- Re-run of the Topology Simulations (SolidWorks)
- Basis/Template of the Test Plan (ASTM-E606)

Upcoming/In-Progress

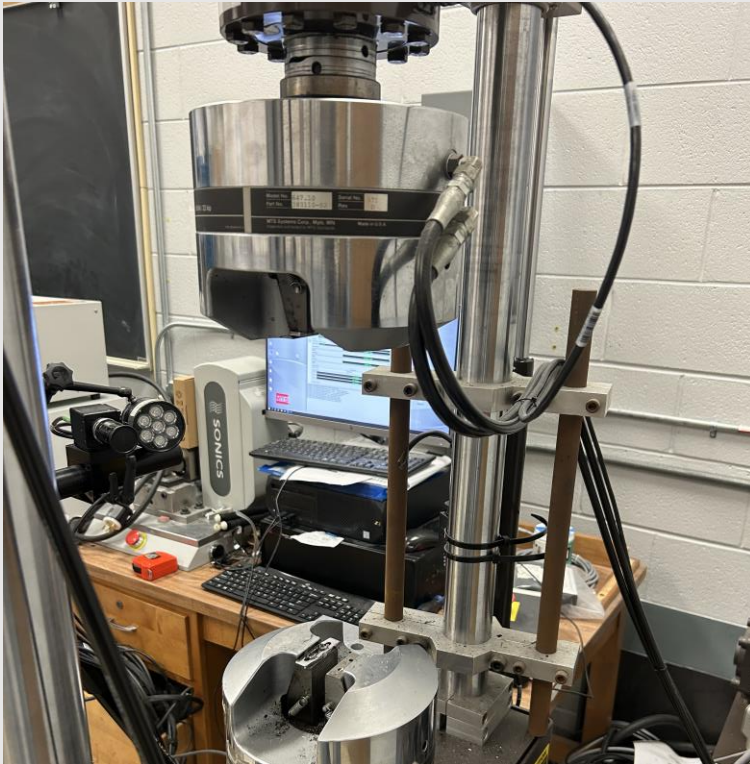
- Manufacture of the Rockers
- Completion of Test Rig Bracket Designs (ASME Y14.35 & 14.5)
- Creation of the Test Rig Brackets (AWS D1.3 & ANSI Z49.1)
- Design Annealing Process
- Ordering of the Bushings and Shocks

Bracket Design



Test Rig – MTS

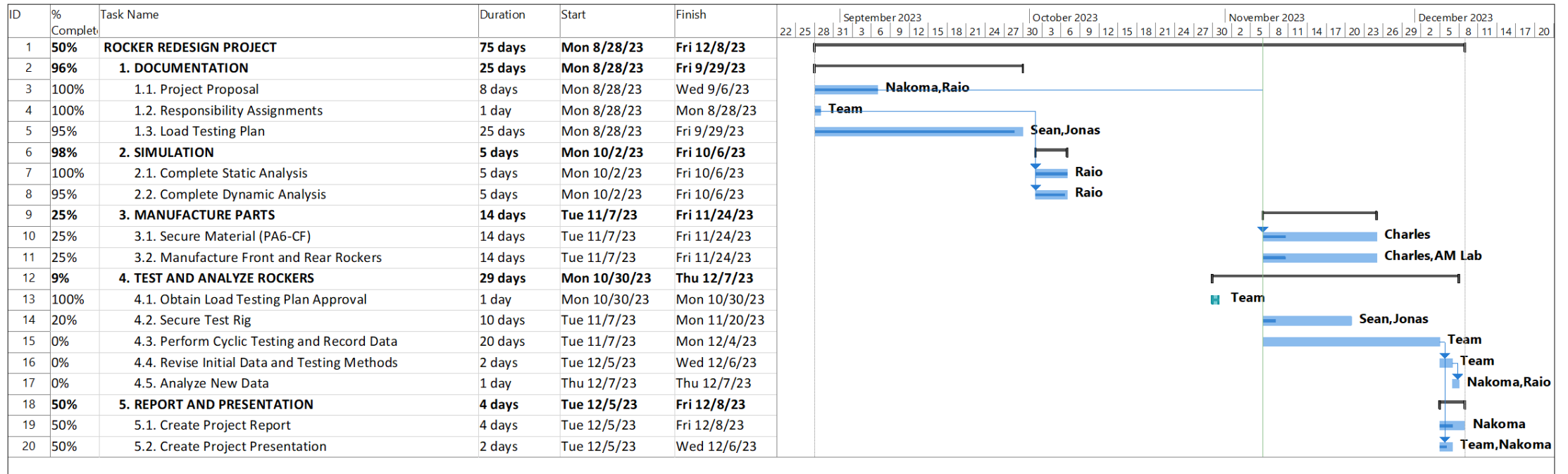
- Picture 1: Full MTS
- Picture 2: Bottom Attachment of MTS
- Picture 3: Top Attachment of MTS



Bracket Motion



Gantt Chart



Complete List of Engineering Standards

- ANSI Z49.1: covers all aspects of safety and health in the welding environment, with an emphasis on oxyfuel gas and arc welding.
- ASME Y14.35: establishes the practice for revising drawings and associated documentation and demonstrates methods for identification and revisions.
- ASME Y14.5: establishes the rules, symbols, definitions, requirements, defaults, and recommended practices for stating and interpreting Geometric Dimensions and Tolerances on engineering drawings, models defined in digital data files, and related documents.
- ASTM-E606: fatigue testing by cyclic load simulated by typically used by servo-hydraulic testing until failure.
- ASTM-B438: specifies requirements of bronze-based bearings produced from mixed metal powders using powder metallurgy technology and then impregnated with oil to supply lubrication.
- AWS D1.3: structural welding of steel sheet metal to other structural sheet steels or to supporting structural steel members, including Tungsten Inert Gas (TIG) welding.
- ISO 9001: international standard that specifies requirements for a quality management system.

The background of the image is a dense, repeating pattern of gray question marks of various sizes and orientations. In the center, there is a white rectangular box with a thin black border.

Questions?