

Mechanical Design Engineering Portfolio

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INTRODUCTION

Welcome, and thank you for taking the time to view my portfolio. The goal of this portfolio is to give you deeper insight into my experiences and skills I have gained over my recent history.

It is my hope that this will allow you to better assess how my skills can be applied to your company.

I would be happy to talk in more detail and can be reached using the contact information at the bottom of this page.

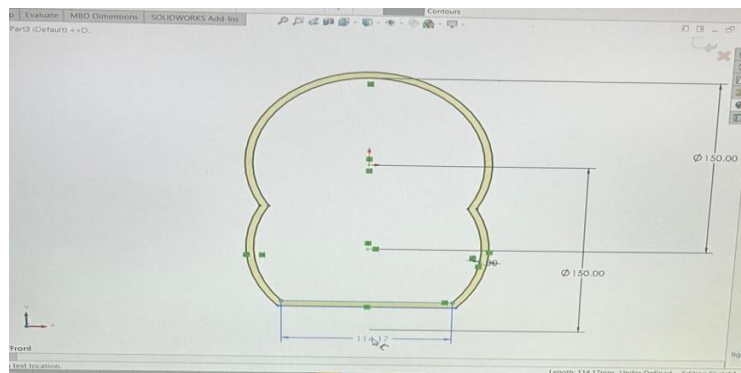
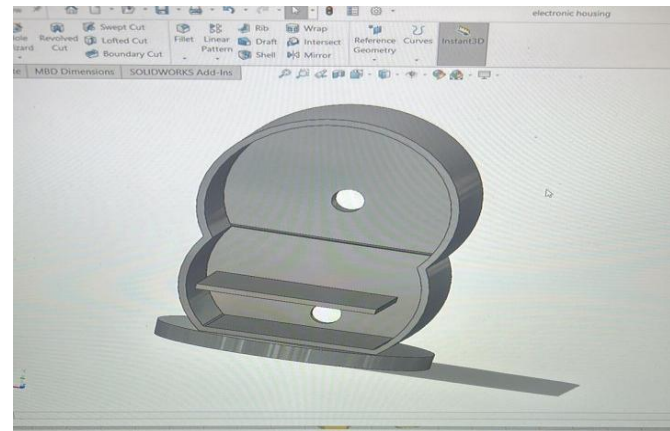
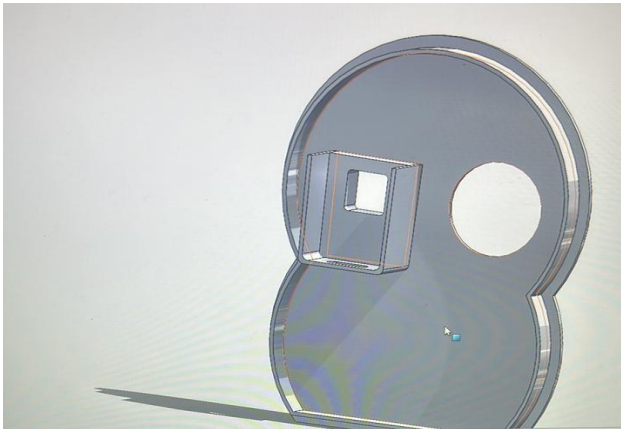


CAD Projects as A Design Engineer (Mechanical)

Here is my CAD project portfolio, consisting of pictures from CAD design and 3d printed models.

1. Electronic enclosure for comp-Eng students.

This enclosure was built to accommodate Breadboard, camera, speaker,



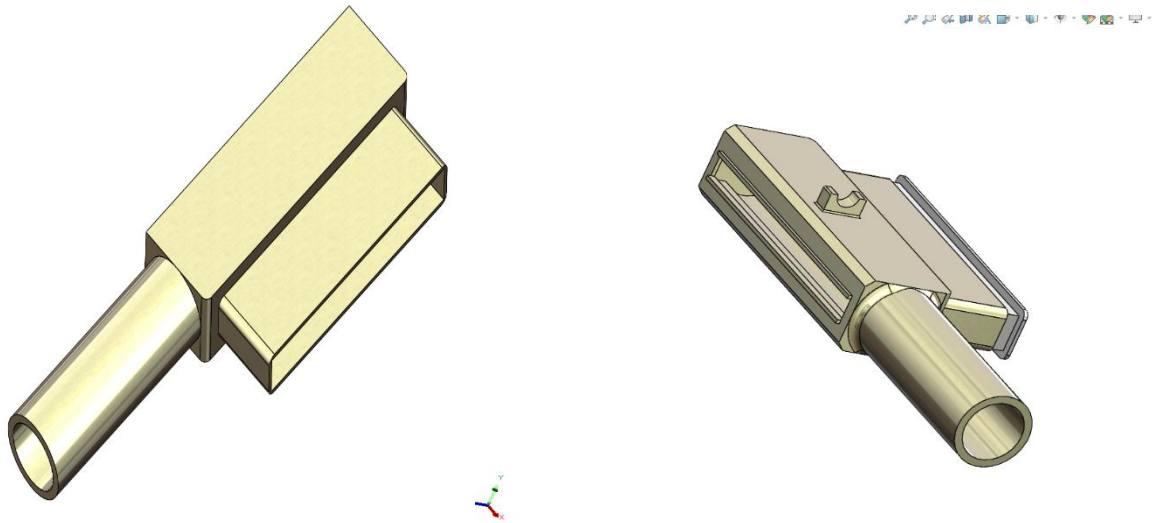
3D Printed Encloser



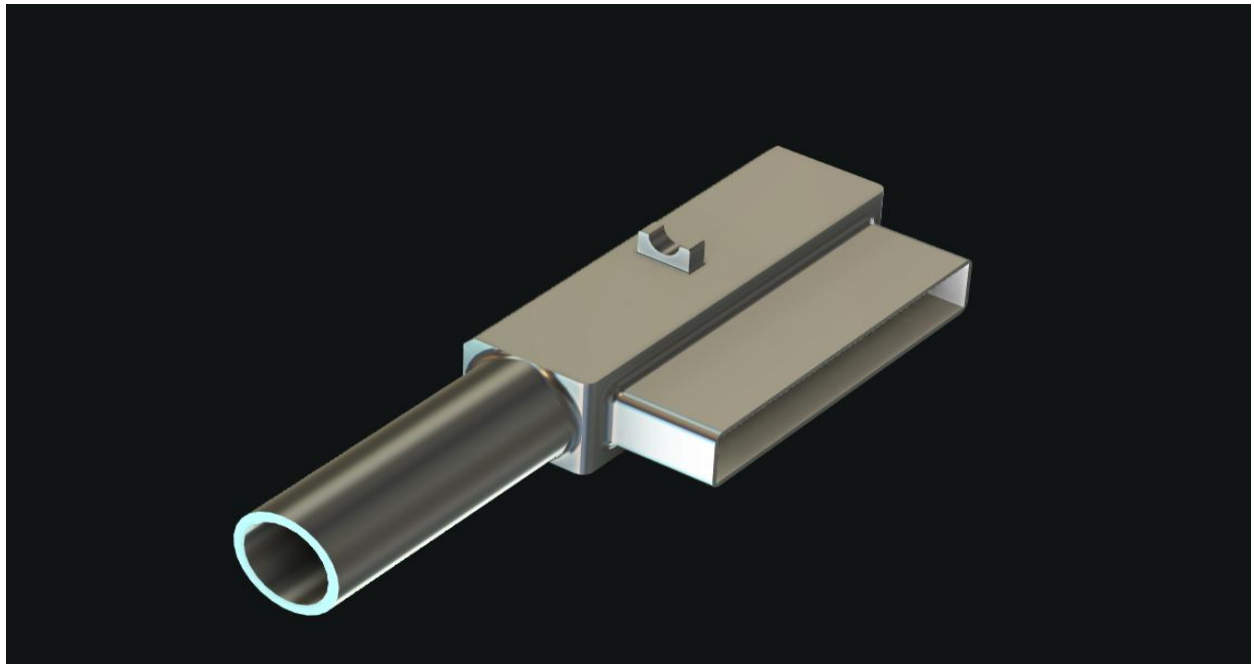
2. Automatic SMAW electrode reloader 1st edition (revolver inspired)



2nd edition Assault rifle inspired housing and mechanism



Housing with magazines well

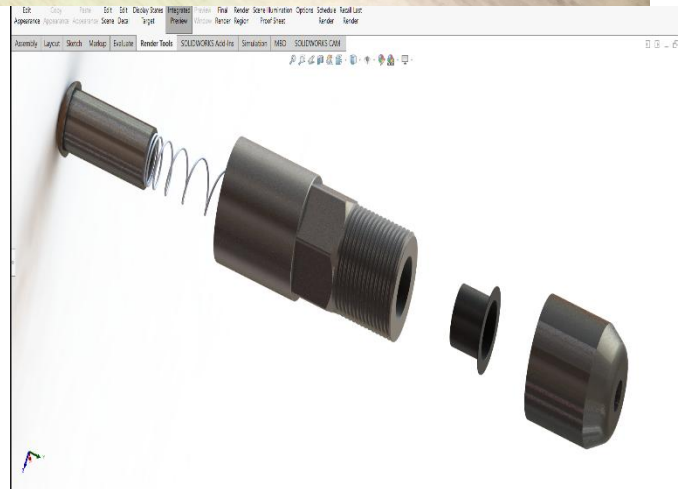
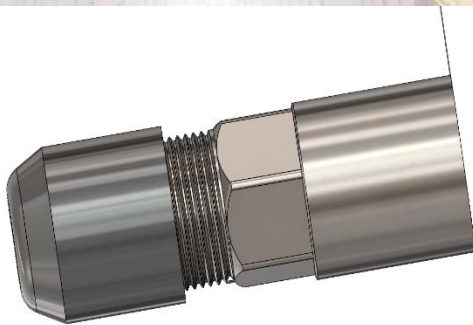


Housing prototype



Collet

This collet is responsible for clamping the bare tip of the electrode once it chambers in the housing



♦ This work is currently under patent filing.
To safeguard the originality of the design, critical sections are intentionally not shown.

3.Static Structural FEA – Stress Concentration Analysis

Software: ANSYS Mechanical

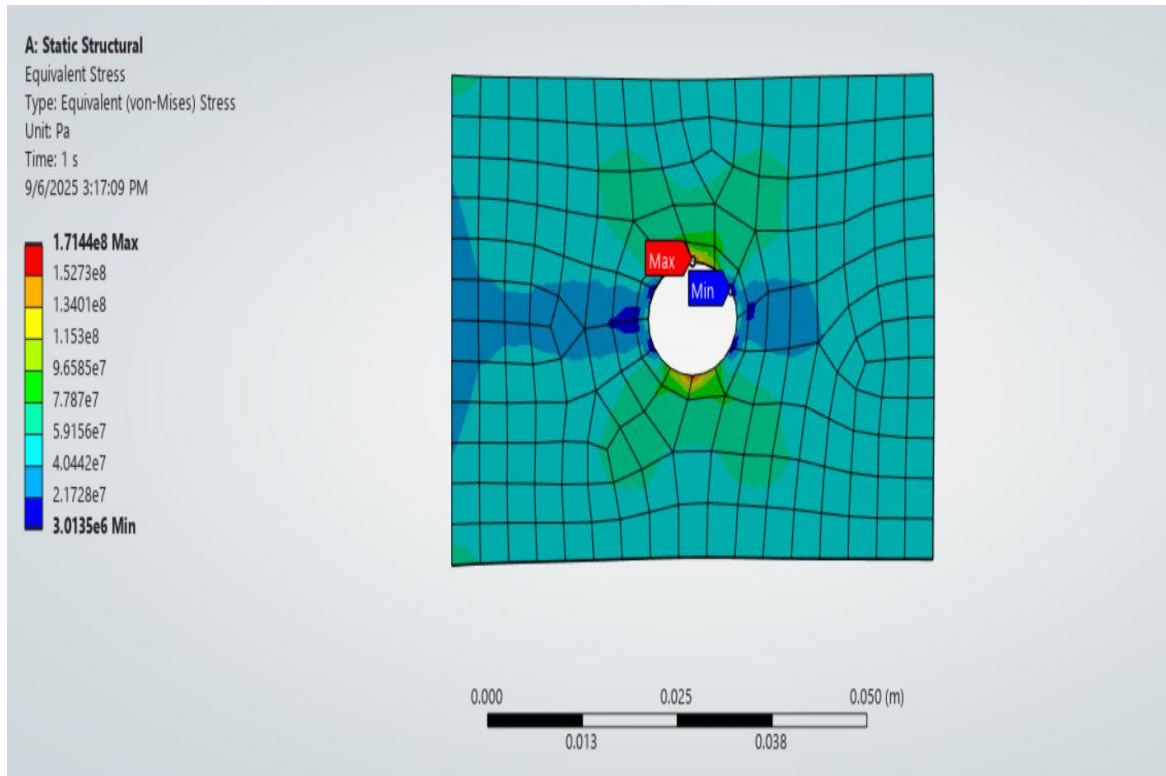


Figure: Equivalent stress distribution

Material: Aluminum Alloy

Boundary Conditions: One edge fixed, tensile load applied on the opposite edge

Max von Mises stress: 1.71×10^8 Pa

Factor of Safety: ≈ 1.46

Insight: Refined mesh captured the peak stress at geometric discontinuity.

4 Static Structural FEA – Total Deformation

Material: Structural Steel ($E = 200 \text{ GPa}$, $\nu = 0.3$)

Software: ANSYS Mechanical

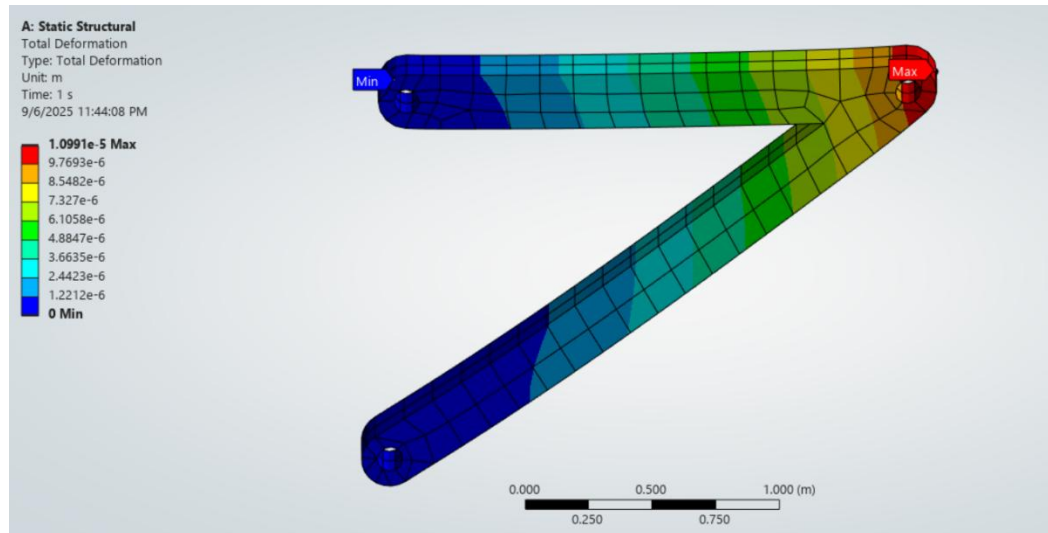


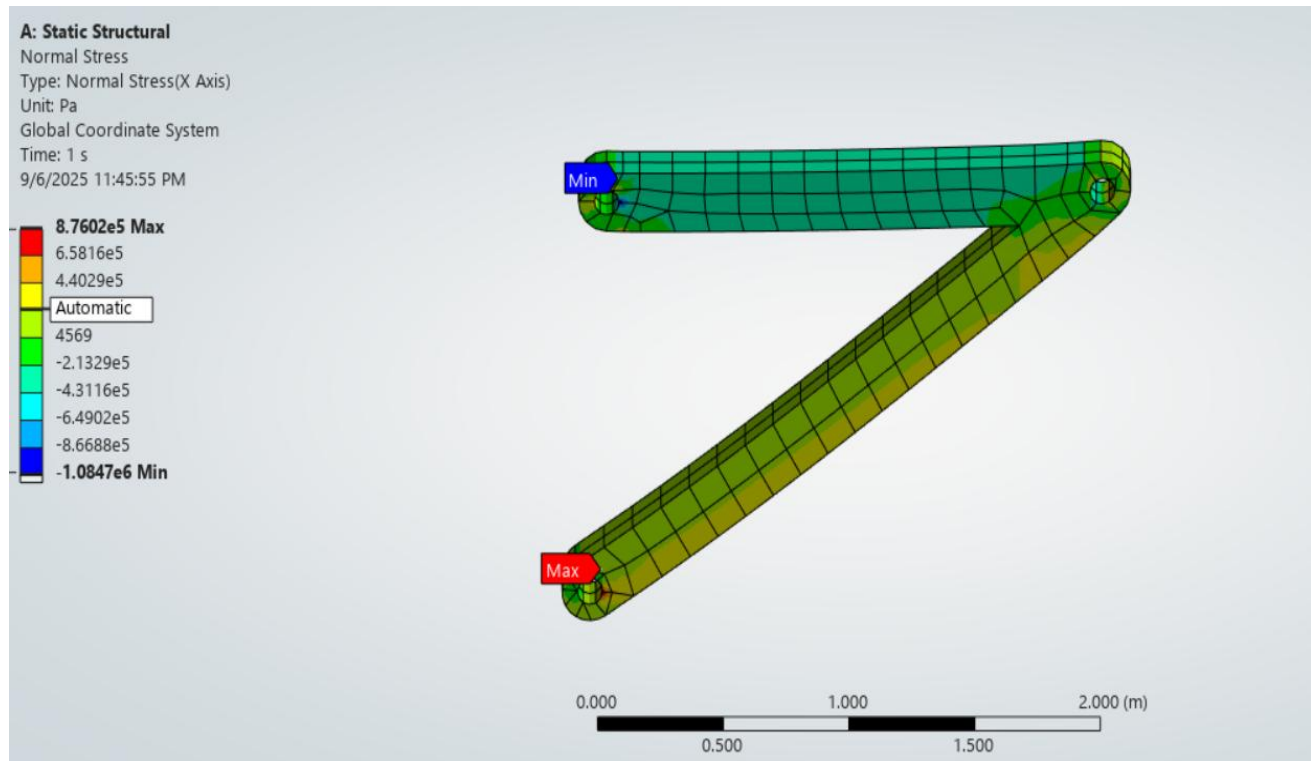
Figure: Total deformation distribution.

Max deformation: $1.09 \times 10^{-5} \text{ m}$ at the loaded end.

Insight: Deformation pattern validates proper load transfer and boundary conditions.

Static Structural FEA.

NORMAL Stress



Material: Structural Steel

Max normal stress: 0.876 MPa

Boundary Conditions: One eye end constrained (fixed support), axial tensile load applied at the other end.

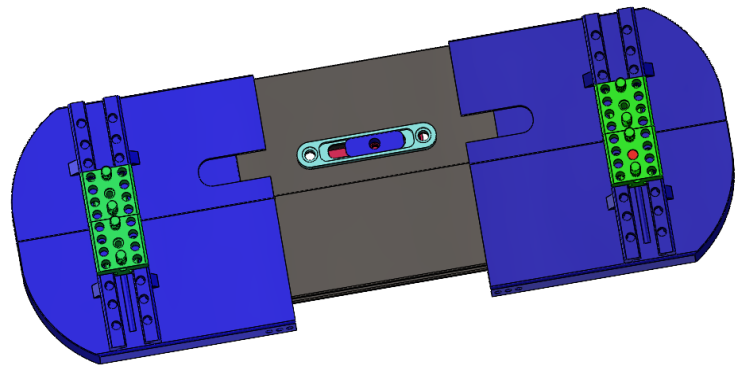
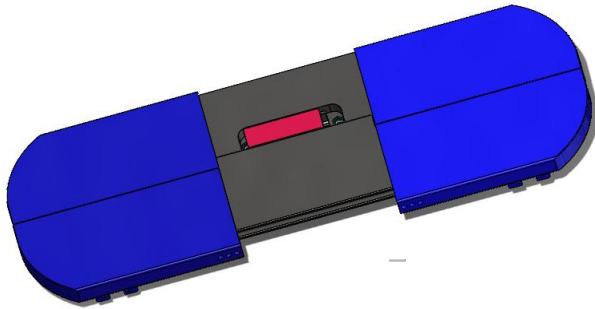
Factor of Safety: ≈ 285

Max deformation: 1.09×10^{-5} m

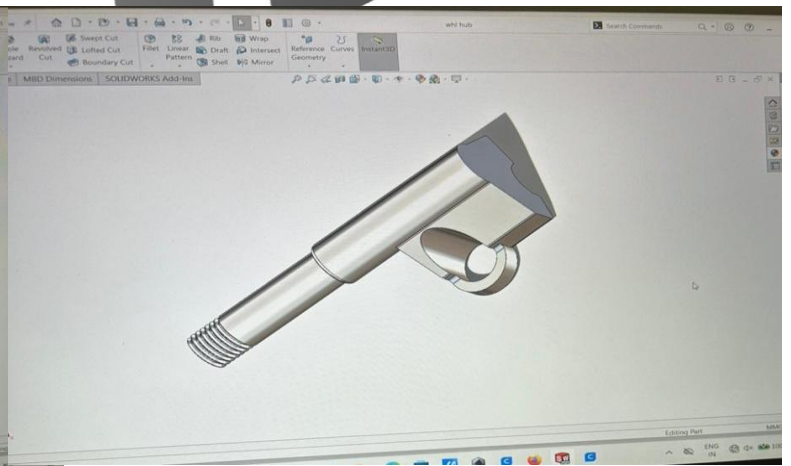
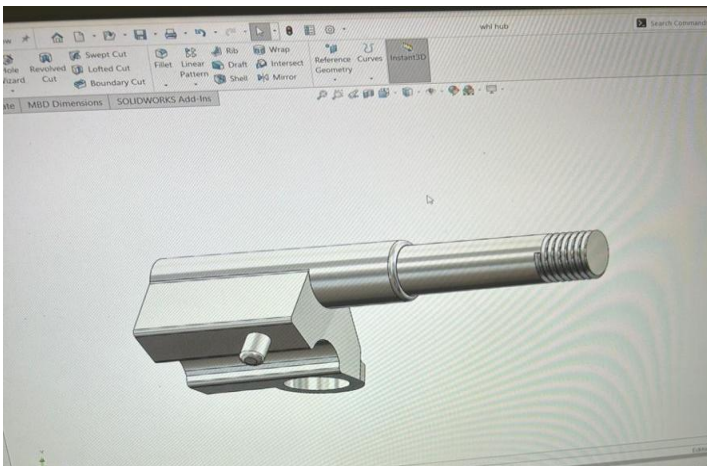
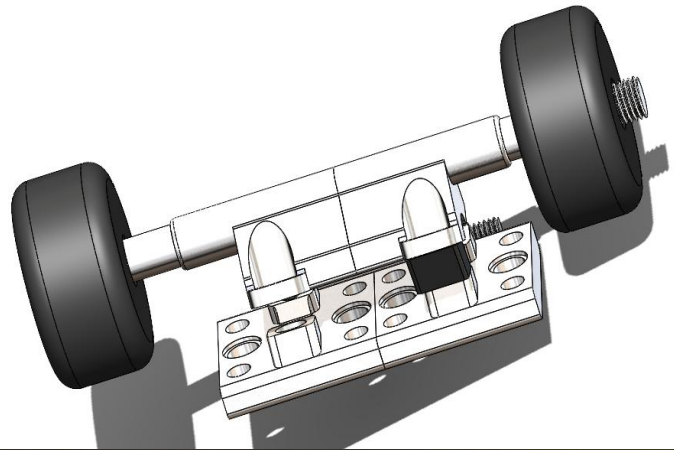
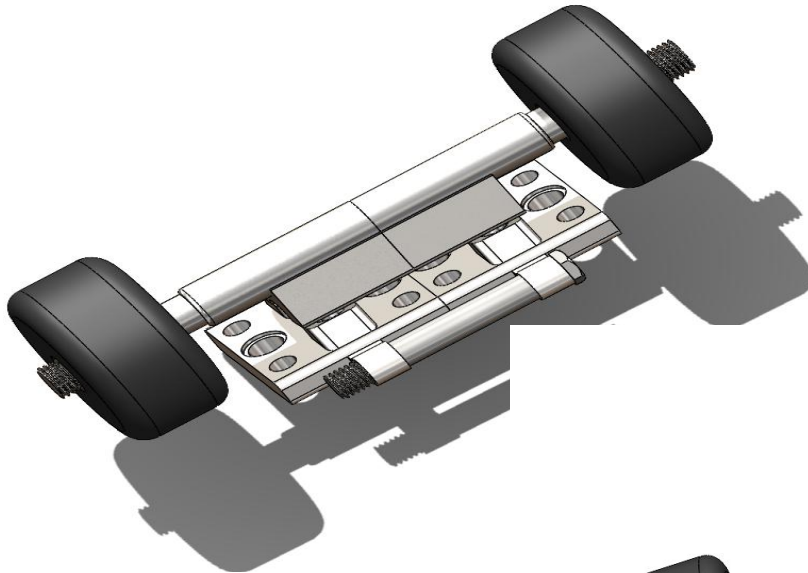
Result: Stresses are far below yield, indicating a very stiff and safe design.

5 Transformable Quad Roller to Skateboard.

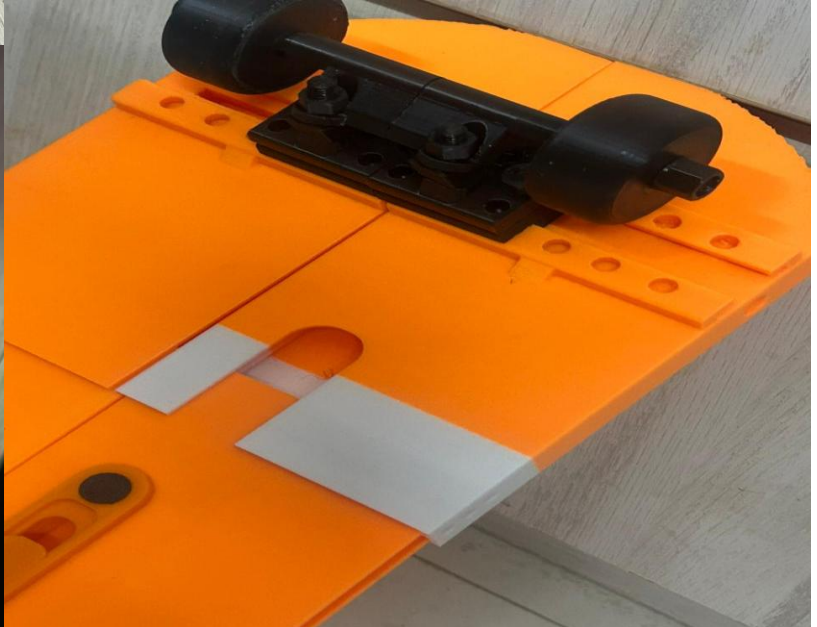
Deck (CAD model)



Wheel hub



PROTOTYPE



DECK PROTOTYPE



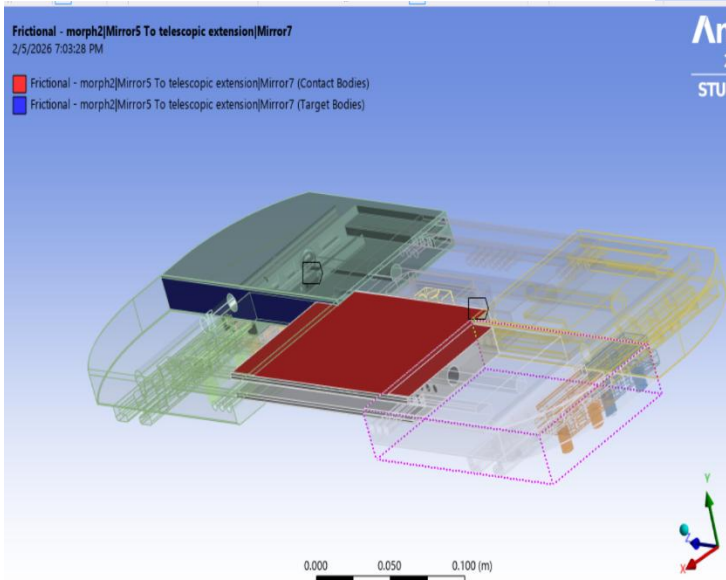
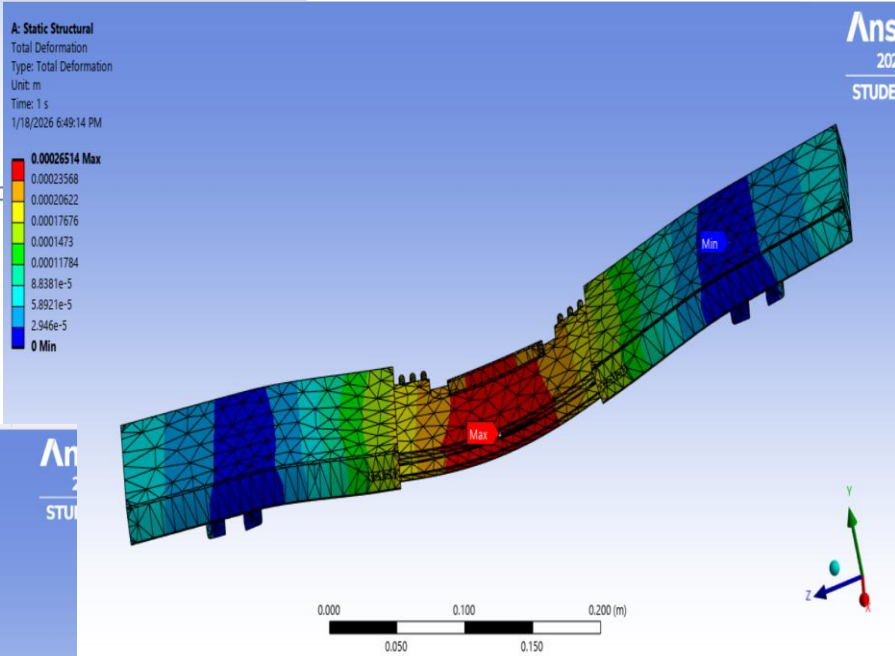
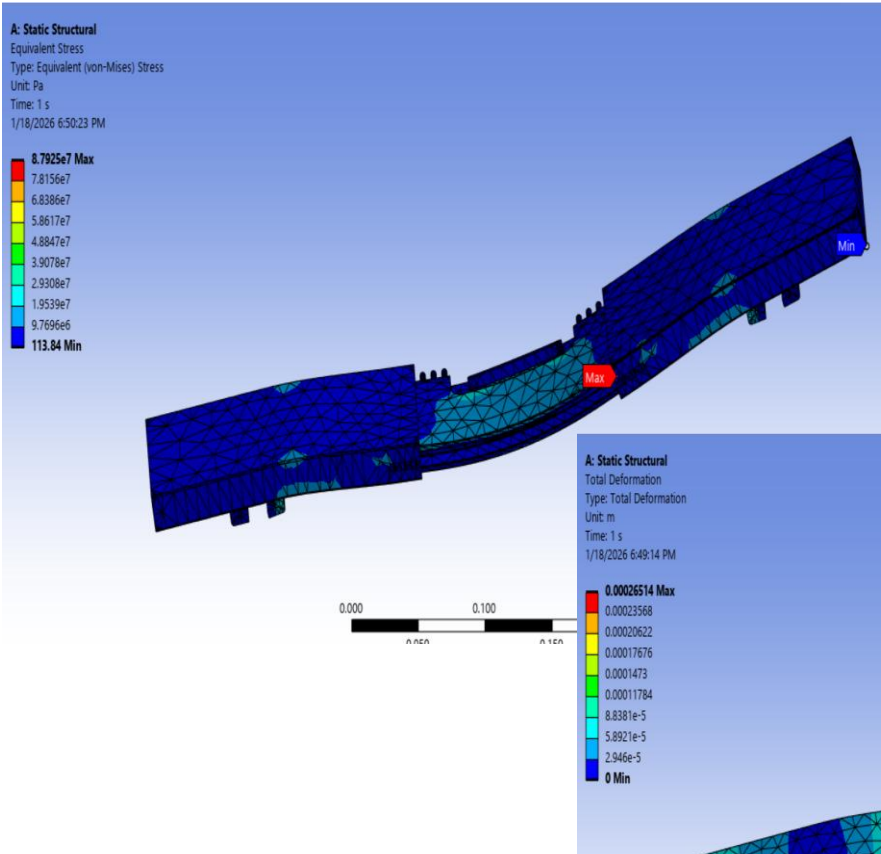
Quad roller



Skateboard mode



Simulation



RESULTS

For the selected material the static analysis was conducted the results are as follows

- Maximum stress came out to be 87 MPa which is way below the yield point of the selected material
- Total deformation was 0.27mm making the deck extremely safe.
- Selecting the dynamic amplification factor of 2 which doubles the maximum weight the factor of safety was above one.
- Total weight was kept under 3.5 kgs

♦ *This work is currently under patent filing.*

To safeguard the originality of the design, critical sections including certain results are intentionally not shown.