Robotic Arm Platform

Team Victory Lap

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Model Breakdown

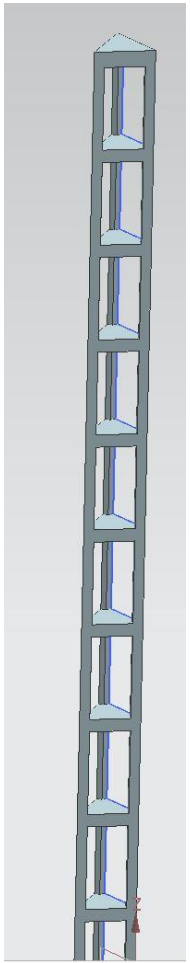
Part 1: Trusses

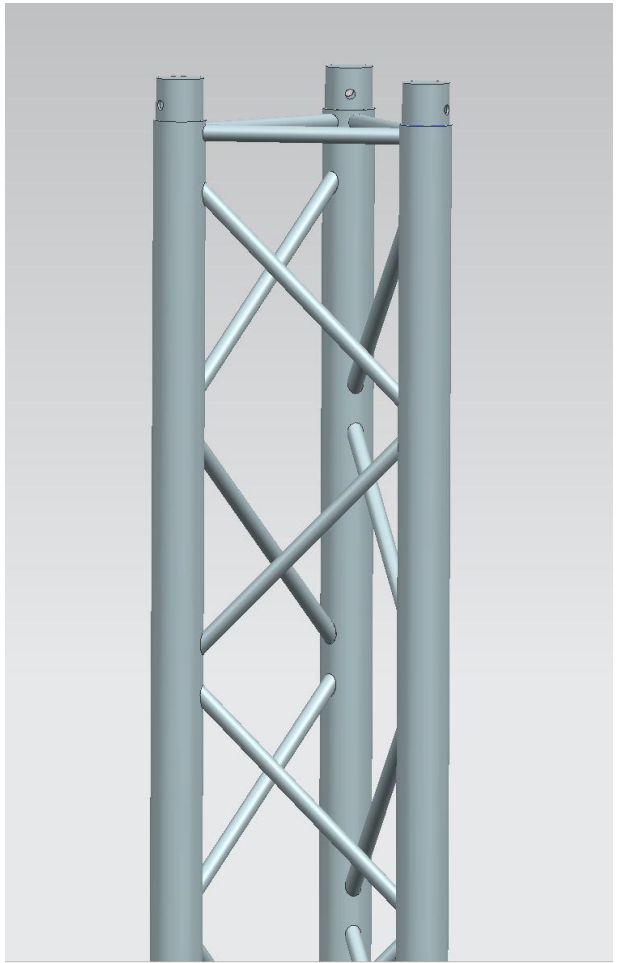
Part 2: Base Platform

Part 2: Lift Mechanism

Part 4: Assembly Method

Overhauled Truss Design



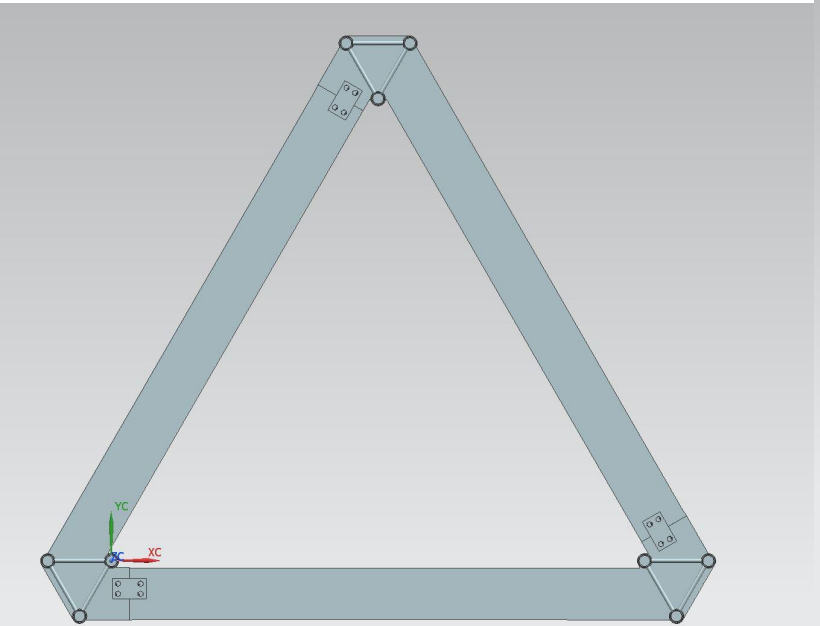


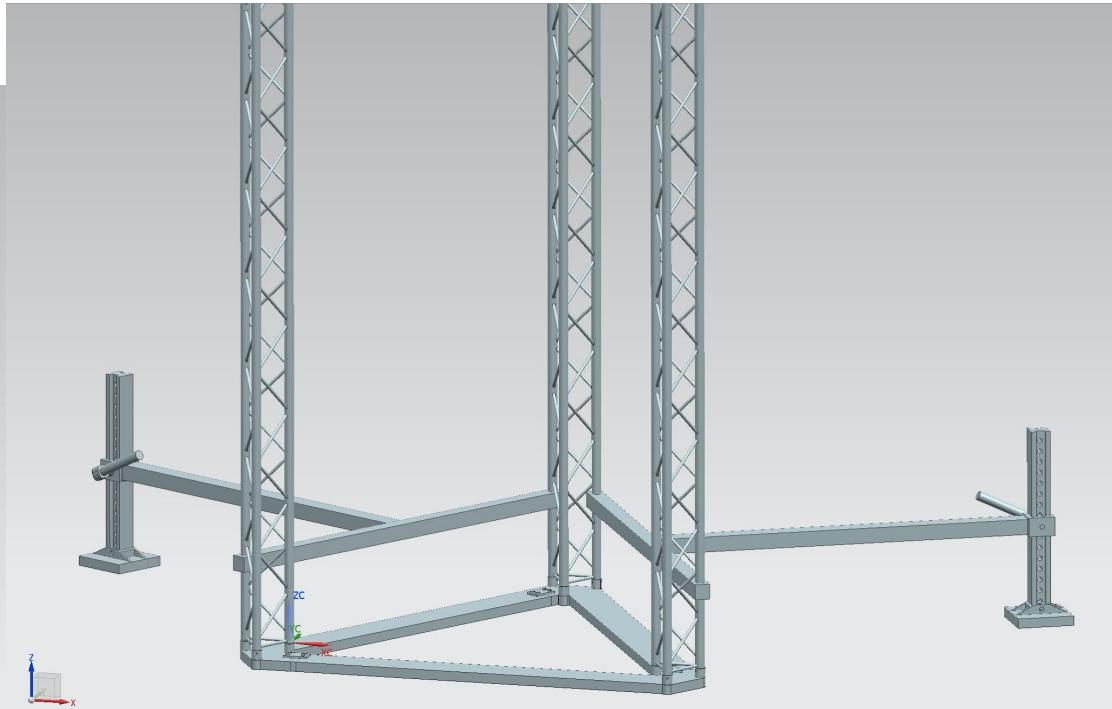
Truss details:

- Accurate to Prolyte Group's XU30D Truss design
- Aluminum 6061
- 4 Meters in length (using 3 pieces for total assembly)
- Link: https://www.prolyte.com/en/products

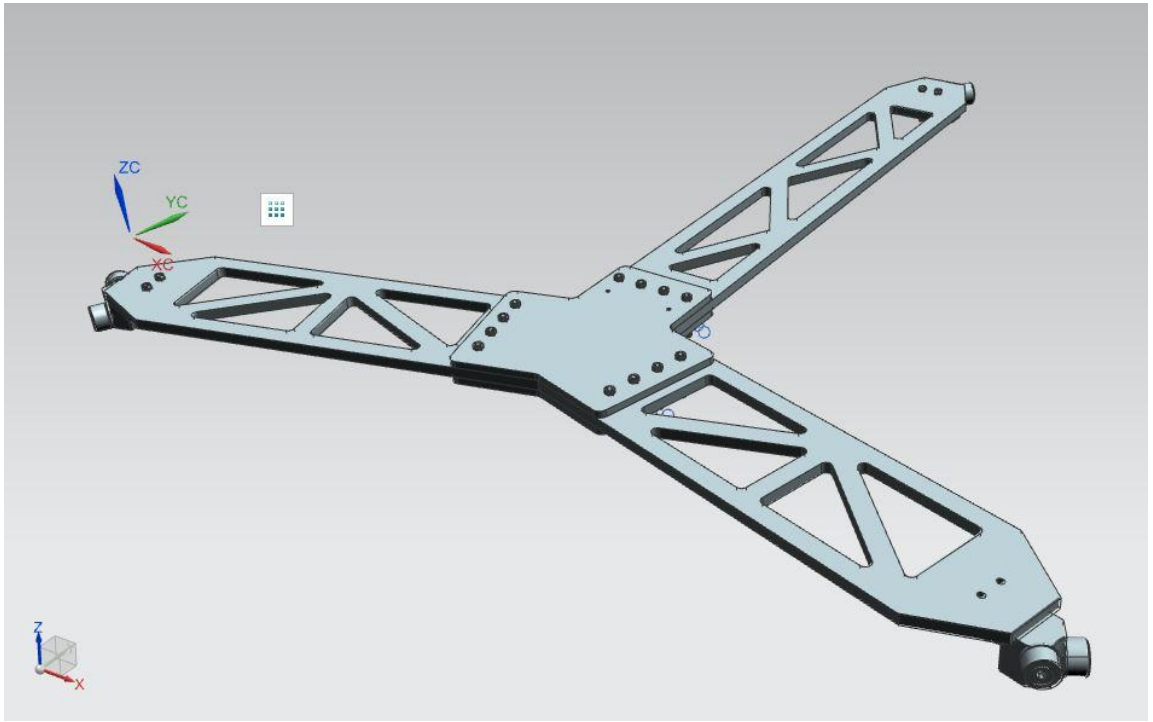
Trusses

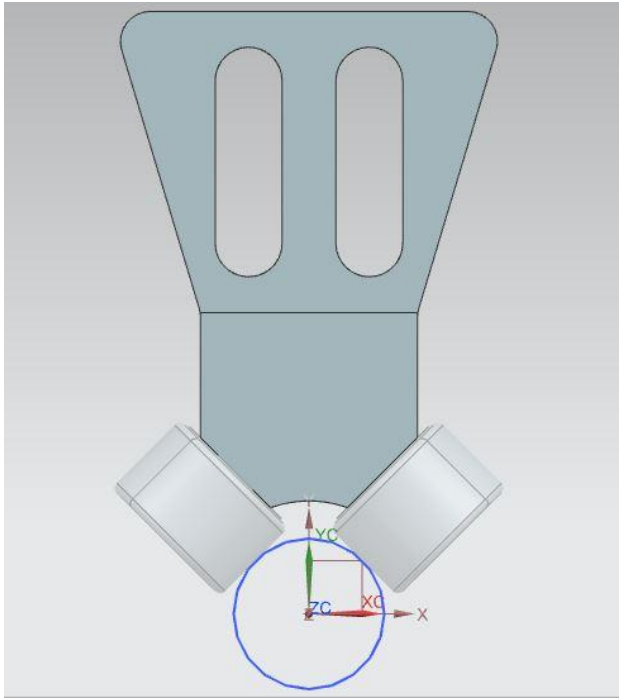
- Trusses at 45 degrees
- Inside beams are 2m apart in an equilateral triangle
- Plates to connect the bases





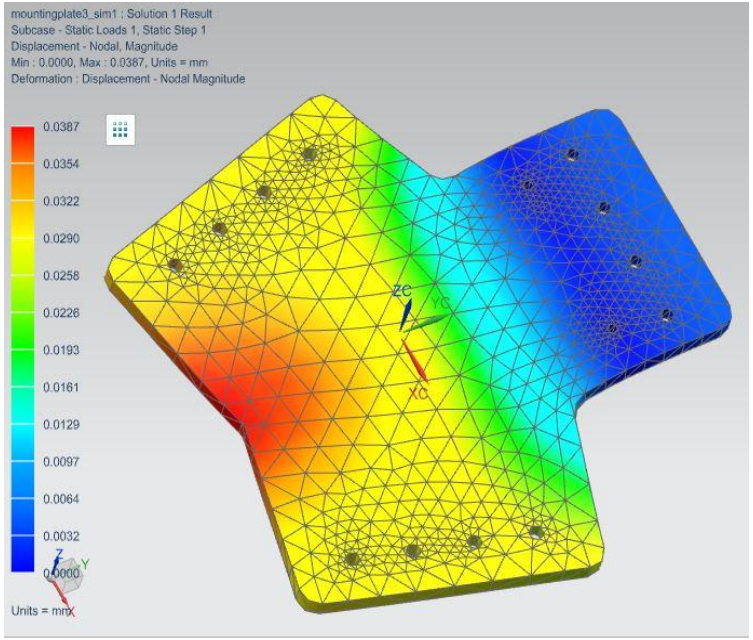
Platform





Arm Plate

Max Displacement: 0.0387 mm



Max Von Mises: 63 MPa

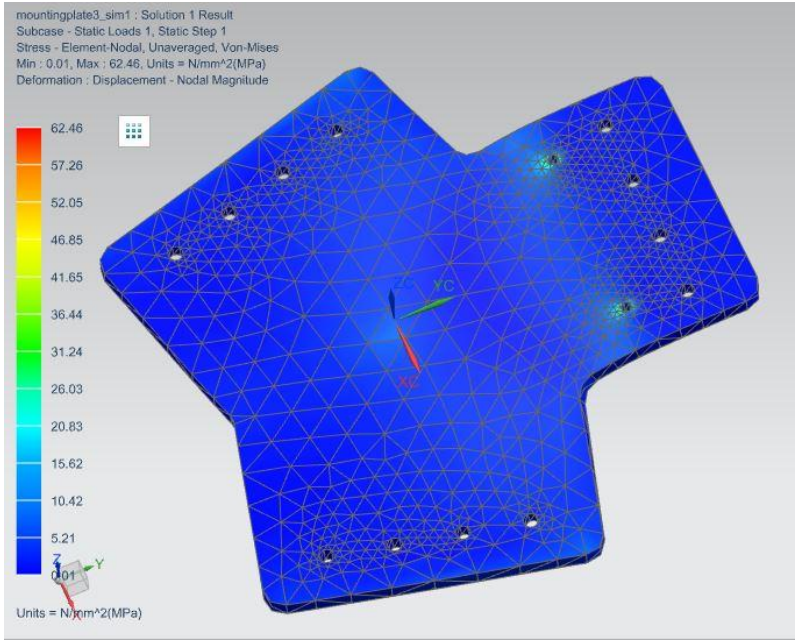
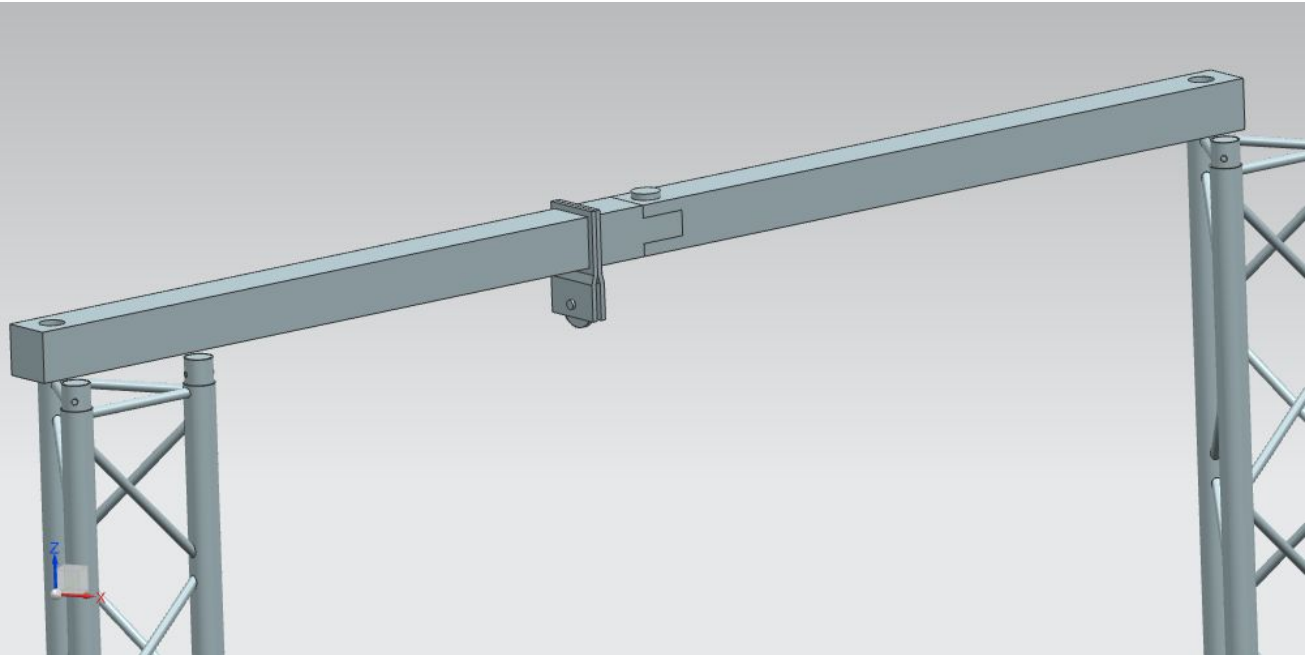


Plate Thickness: ½” (12.7 mm)

Yield strength of steel: 250 MPa

Lift Mechanism

- Winch - 750 lb payload
- Snatch Block Pulley



Assembly Methods

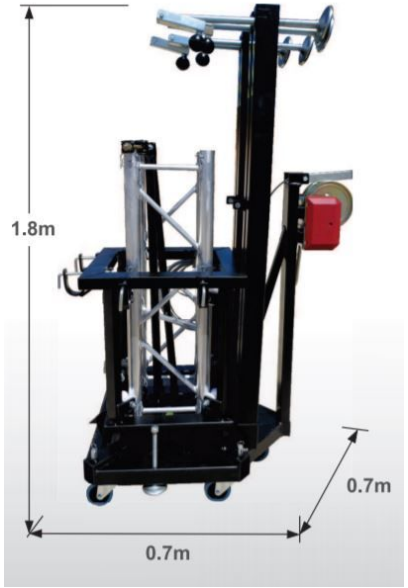
Options:

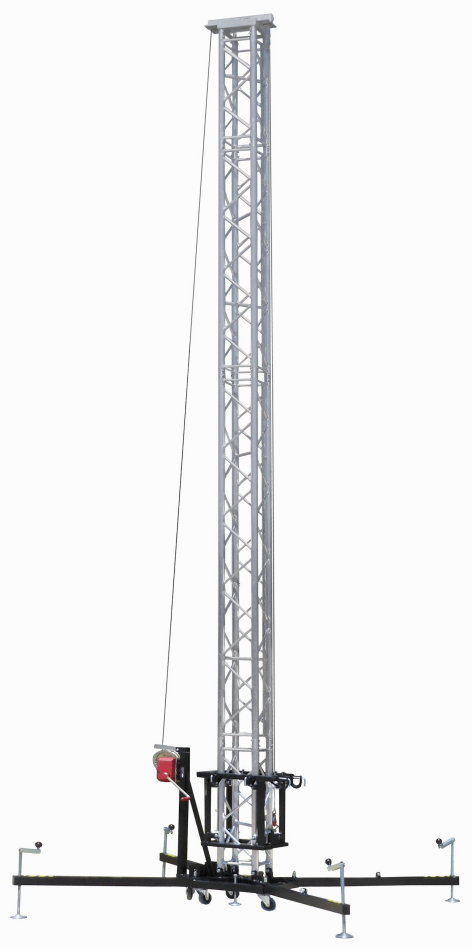
1. Use a truss lifting device

   Negative: Only feasible if tank if diameter is larger than height

   Positive: Quick assembly, commercial sourcing option

2. Use our platform (like a crane)





Next Steps: FEA

- Static Analysis:
  - Test for rigidity when arm is static (F = 375.7 N)
    - Test when oriented straight up
  - Test for rigidity when arm is static (M = 209.75 N m)
    - Test when oriented straight forward
    - Test when oriented straight backward
    - Test when oriented straight left/right (symmetry)
  - Test for rigidity when arm is moving (M = 294.21 N m)
    - Test when a clockwise and a counterclockwise moment is applied on each axis (x, y, z)
- Vibration Analysis
  - Determine natural frequency and modes