

4-DOF Video Jib System

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Opportunity

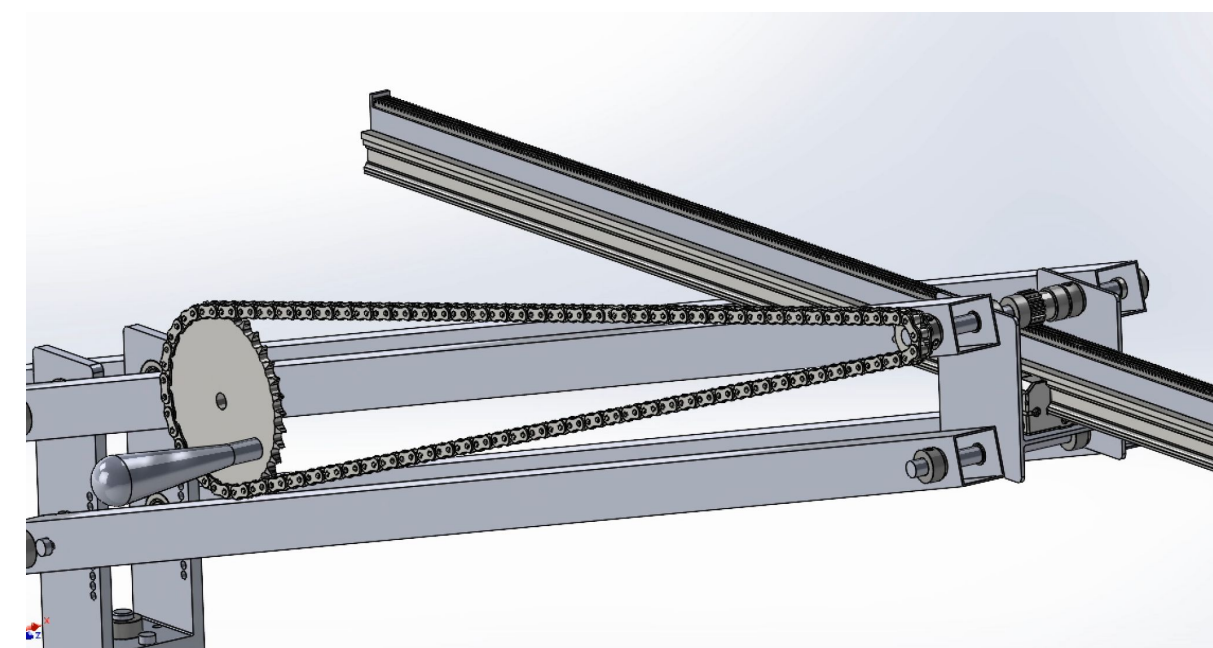
Growth of self-media, e.g. Youtubers, creates a rising demand for reliable and affordable videography equipment.

- Existing equipment does not offer 3 degrees of motion in one device.
- Market lacks a balanced option meeting both **affordability and versatility**

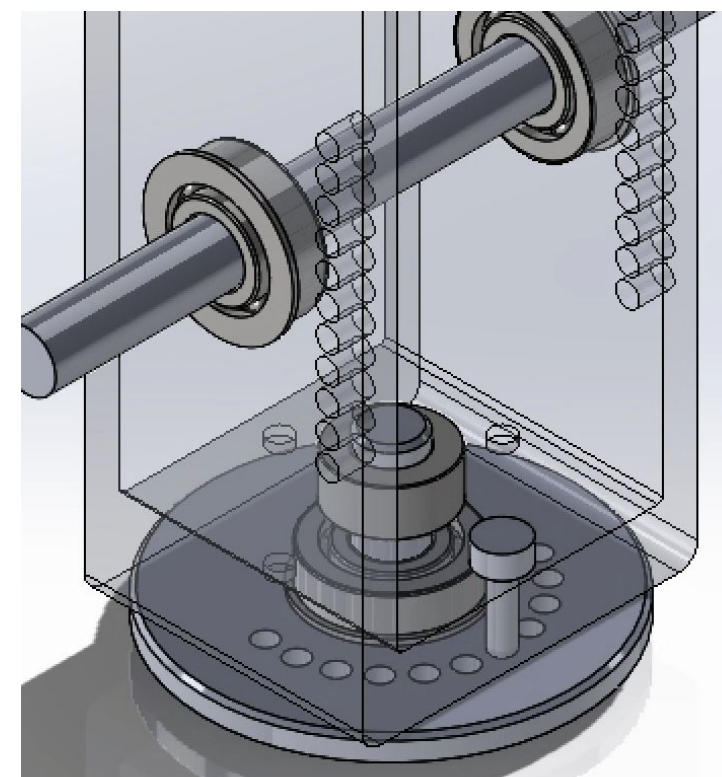
Design Solution

Our balanced solution blends the advantages of tripods, jibs, dollies, sliders, camera head mounts and gimbals into **one Jib arm system** with three degrees of motion for professional shots.

Additional Subsystems

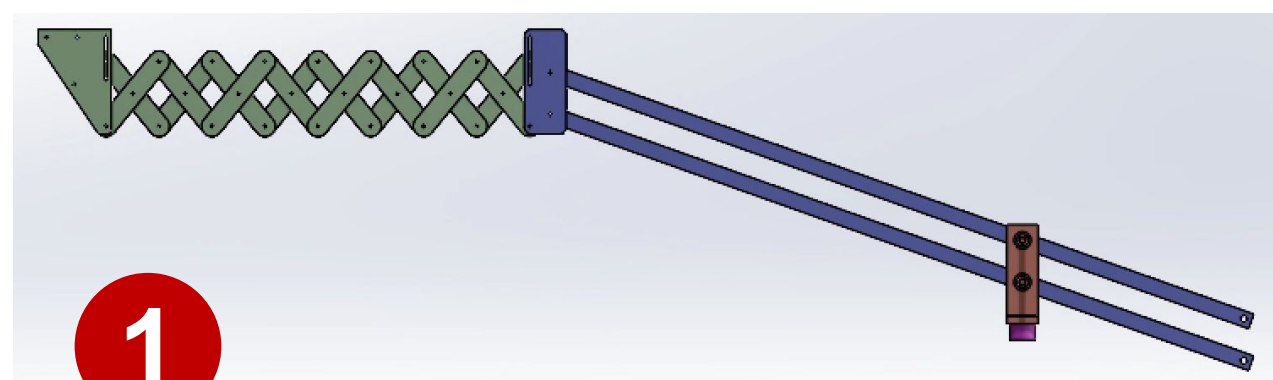


Chain-Sprocket and
Rack-Pinion Extension System

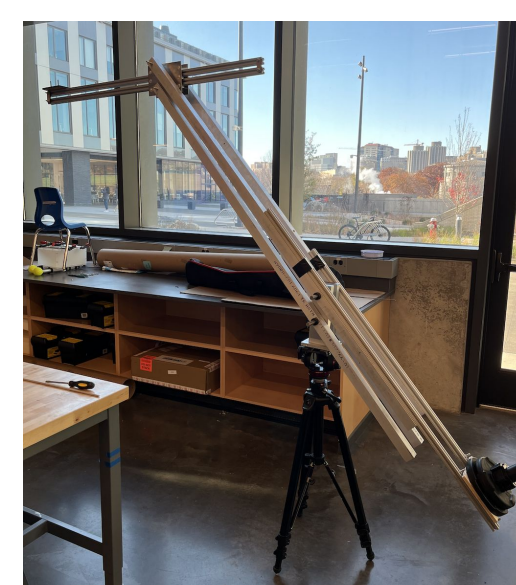
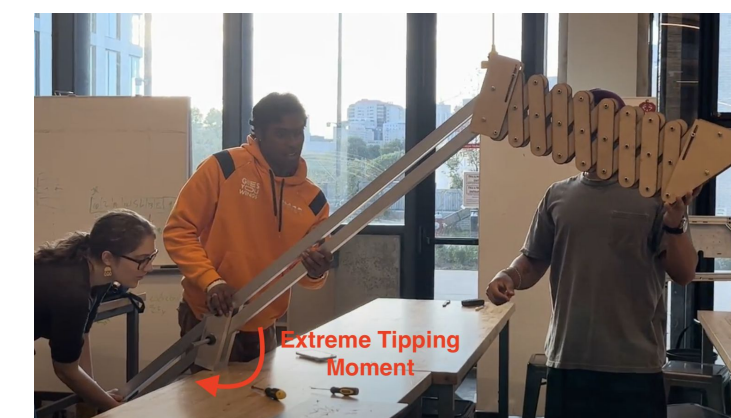


Locking System

Prototype Evolution



1

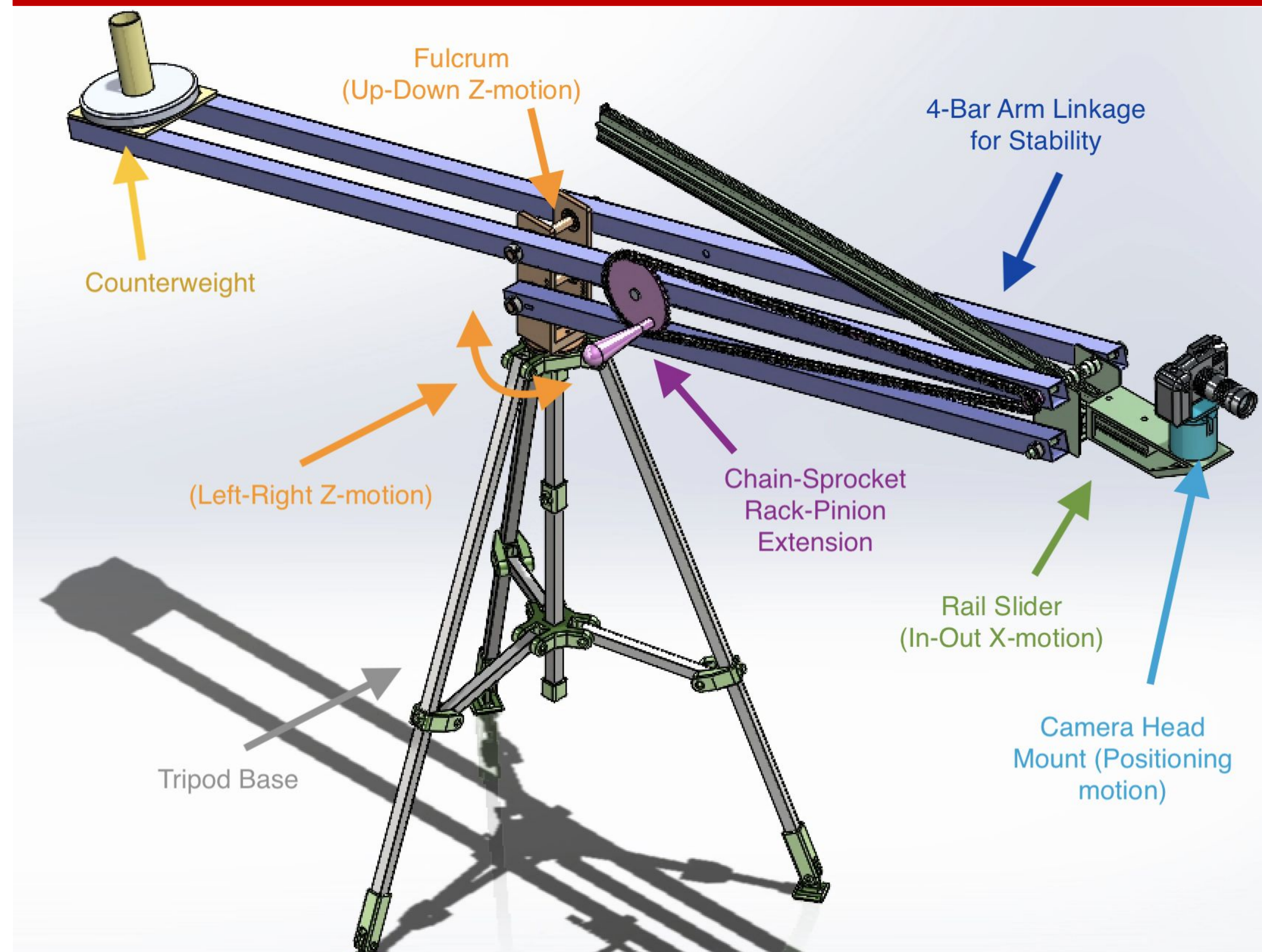


2

- Scissor for X-motion
- Fulcrum and stabilizing 4-bar linkage

- Rail Slider for X-motion
- Counterweight
- Locking System

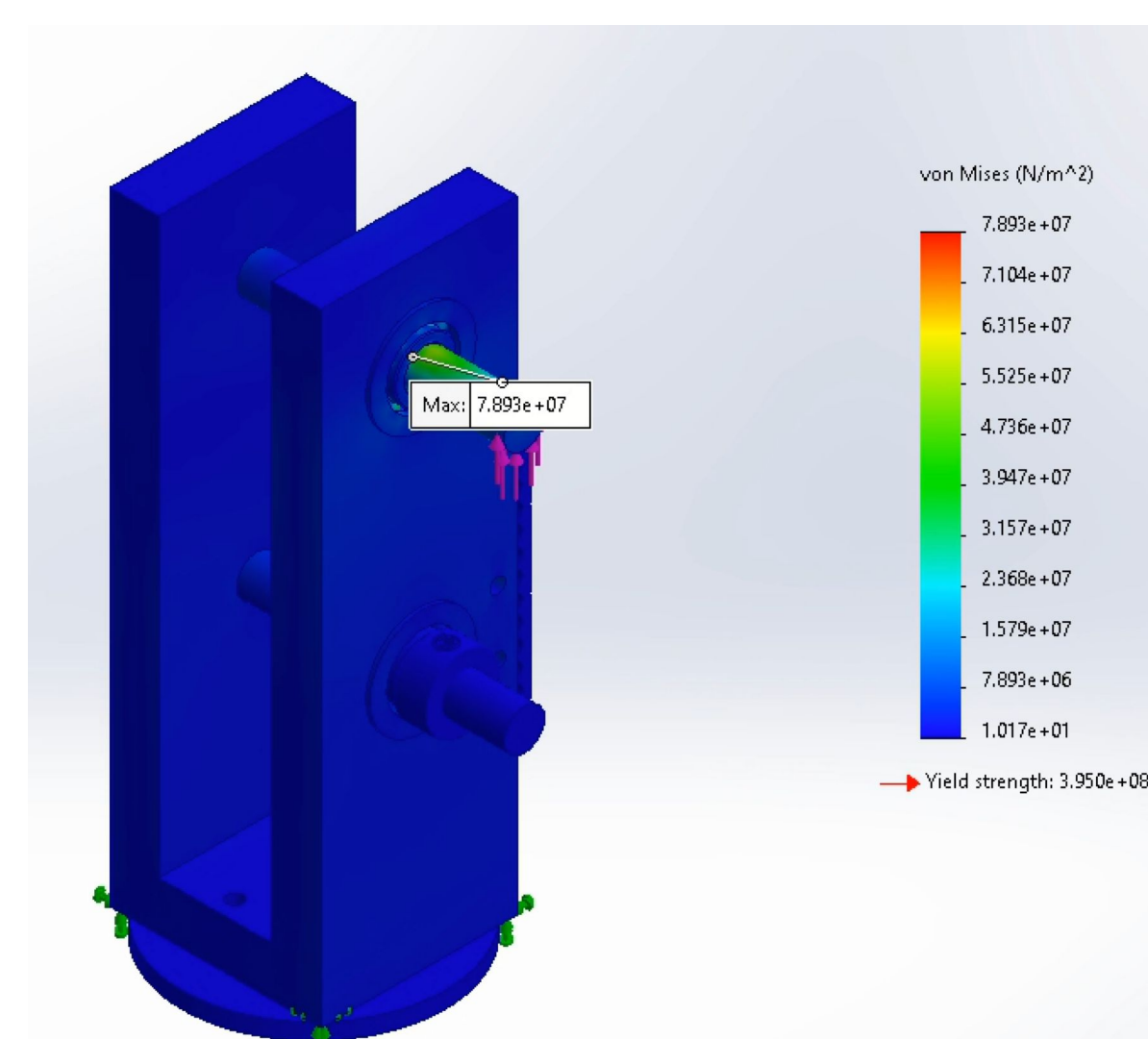
Final CAD Model



Engineering Analysis

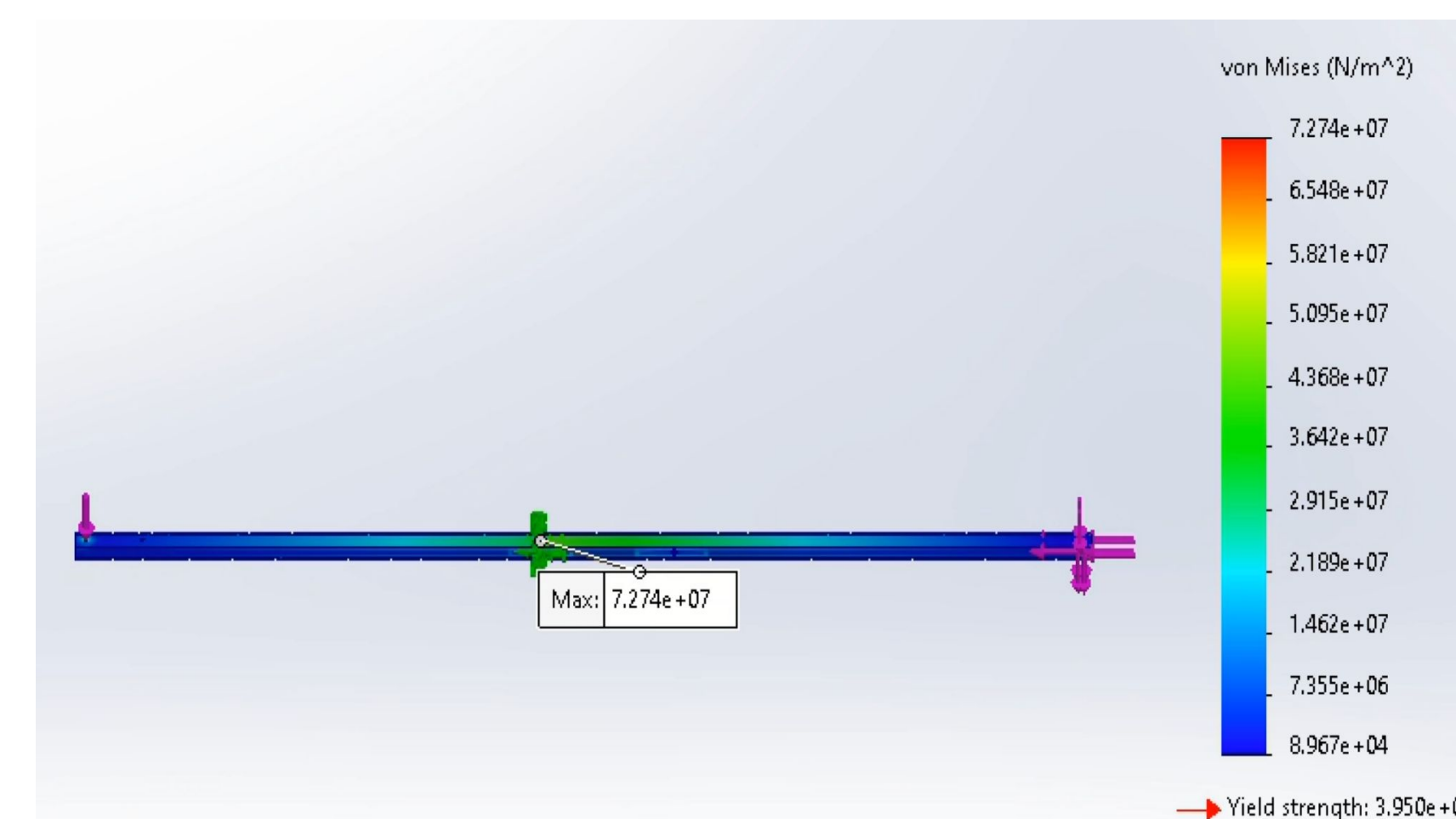
Custom Fulcrum Pin

FEA gives Factor Of Safety (FOS) of 5.0 with Aluminum.

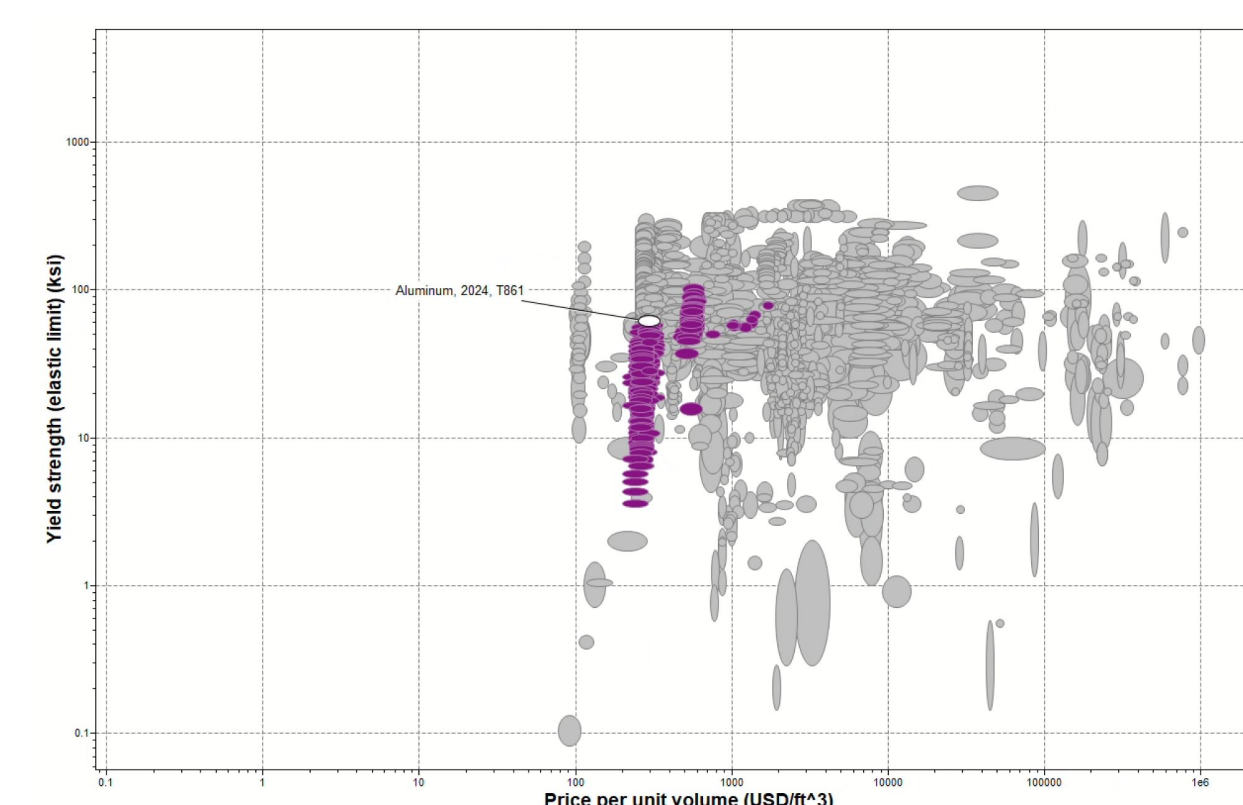
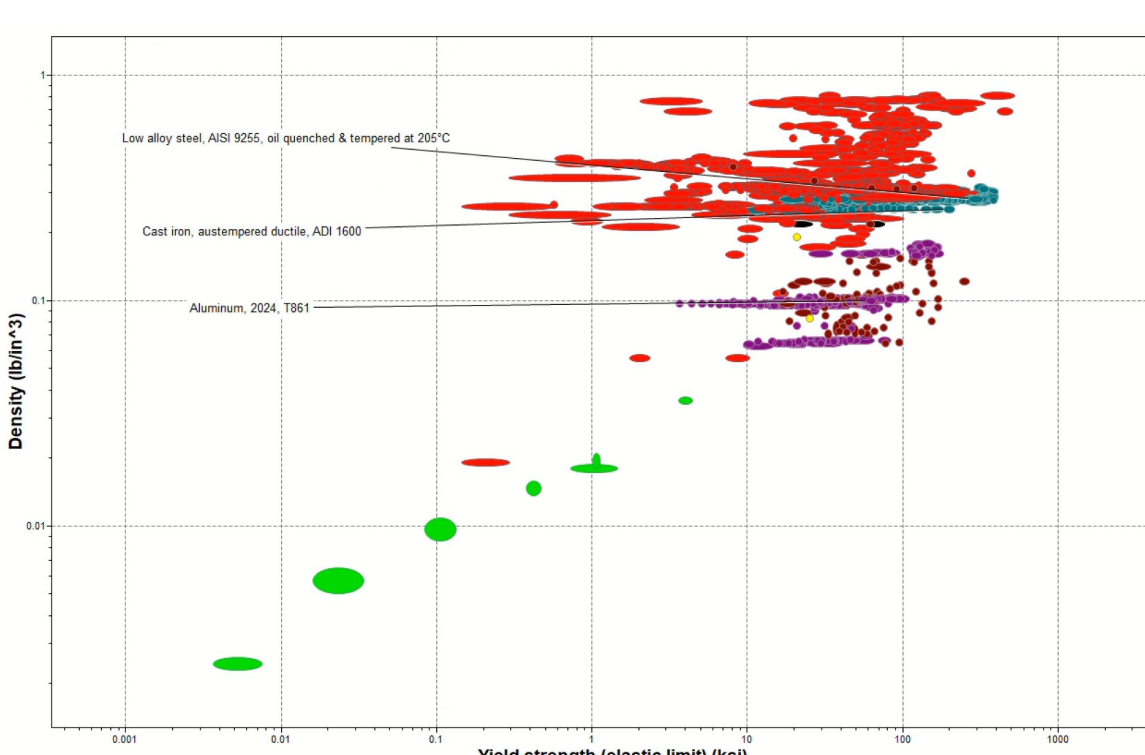


Custom Top Arm

FEA gives Factor Of Safety (FOS) of 5.2 with Aluminum. This abides by OSHA's FOS for Hoisting and Rigging.



Material Selection
Aluminum,
2024, T861



Market Research

- Each of six standard equipments, i.e., tripods, jibs, dollies, sliders, camera head mounts and gimbals are designed only for a specific kind of motion
- Lack of affordable options with multiple motion capabilities
- Interviewed Stakeholders:**
 - a professional filmmaker
 - three amateur photographers
 - a student filmmaker
- For amateur stakeholders**, the cost to purchase all types of equipment is prohibitive

Benchmarking

- Jib Proaim**
Pros: stability, durability, affordability, and transportability
Cons: no in-and out camera motion
- Tripod Dolly**
Pros: adjustability, lightweight, and compactness
Cons: no vertical movement
- Camera Gimbal**
Pros: extendibility and lightweight
Cons: stability and payload
- Jib Tripod**
Pros: adjustability and compatibility
Cons: affordability

Video Stability Results

Using an Optical Flow Algorithm we compared shots from our Jib System with a hand-held camera to get a roughness value.

Shot Type	Our Jib	Hand-held Camera
Left - Right	0.83	4.00
Up - Down	1.13	1.44
In - Out	3.56	4.12

Requirement	Check
Pan 6 ft Person	Yes
Under 30 min assembly	Yes
Holds 10 pounds	Yes