

## Background

Overbed tables are a ubiquitous feature of hospital rooms around the world. Predominantly used for dining, grooming and storing personal items, they serve a critical role in facilitating inpatient activities. However, patients and staff express dissatisfaction with the amount of effort required to adjust the table, storage versatility, and poor compatibility with hospital beds.

**Problem statement:** Hospital inpatients need a more maneuverable, ergonomic and storage-optimized alternative to improve patient independence and reduce burden on hospital staff.



**Figure 1.** The Michael Graves with Stryker Overbed Table, commonly seen at the Mayo Clinic in Phoenix

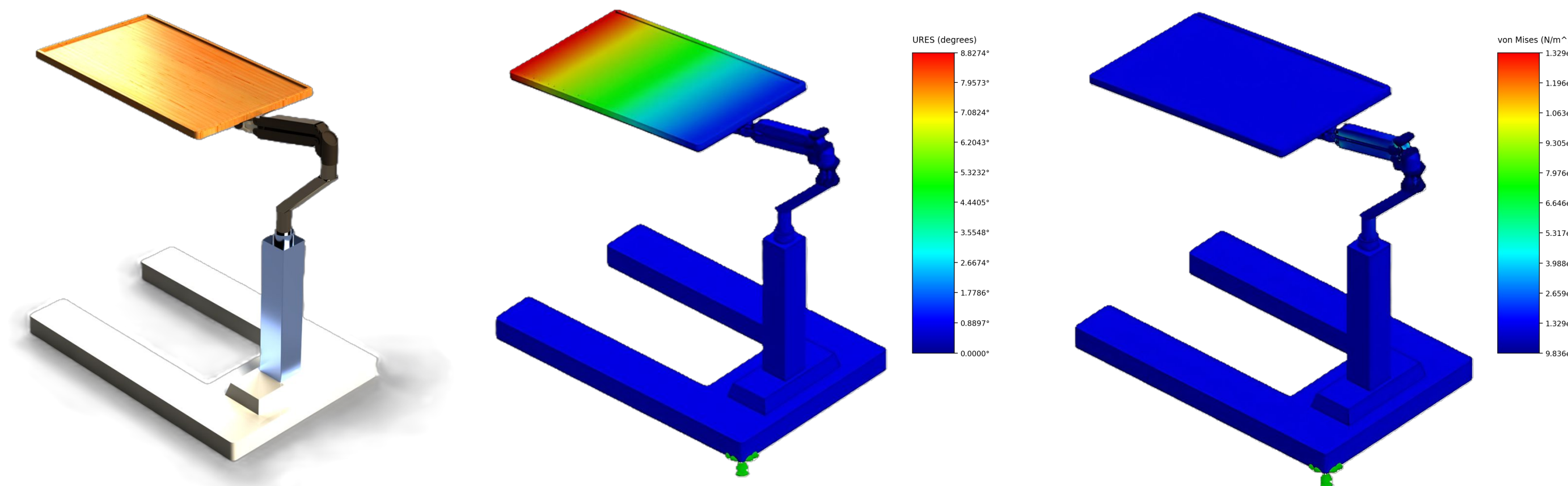
## Mission Statement

AtlasWorks seeks to improve **independence, safety** and **satisfaction** for both **adult inpatients** and **caregivers** through streamlined and innovative hospital furniture technologies.

## Final Product Specifications

Needs/Metrics	Target Value
Vertical adjustability range	30-42 in.
Arm reach	≥ 24 in.
Axes of Rotation	≥ 3
Required push/pull force	≤ 2.5 lbf
Weight capacity	20 lbs.
Table surface (length x width)	30 x 15 in. minimum
Storage feature availability	Yes
Urinal bottle hook availability	Yes
Cupholder availability	Yes
Unit weight	≤ 70 lbs.
Estimated unit cost	≤ \$250

## Final Technical Model



**Translational Equilibrium**

$$\sum \vec{F} = 0$$

**Cantilever bending deflection**

$$\delta = \frac{FL^3}{3EI}$$

**Torsional twist**

$$\theta = \frac{TL}{GJ}$$

**Rotational Equilibrium**

$$\sum \vec{\tau} = 0$$

**Bending stress**

$$\sigma = \frac{FLc}{I}$$

**Euler buckling**

$$P_{cr} = \frac{\pi^2 EI}{(KL)^2}$$

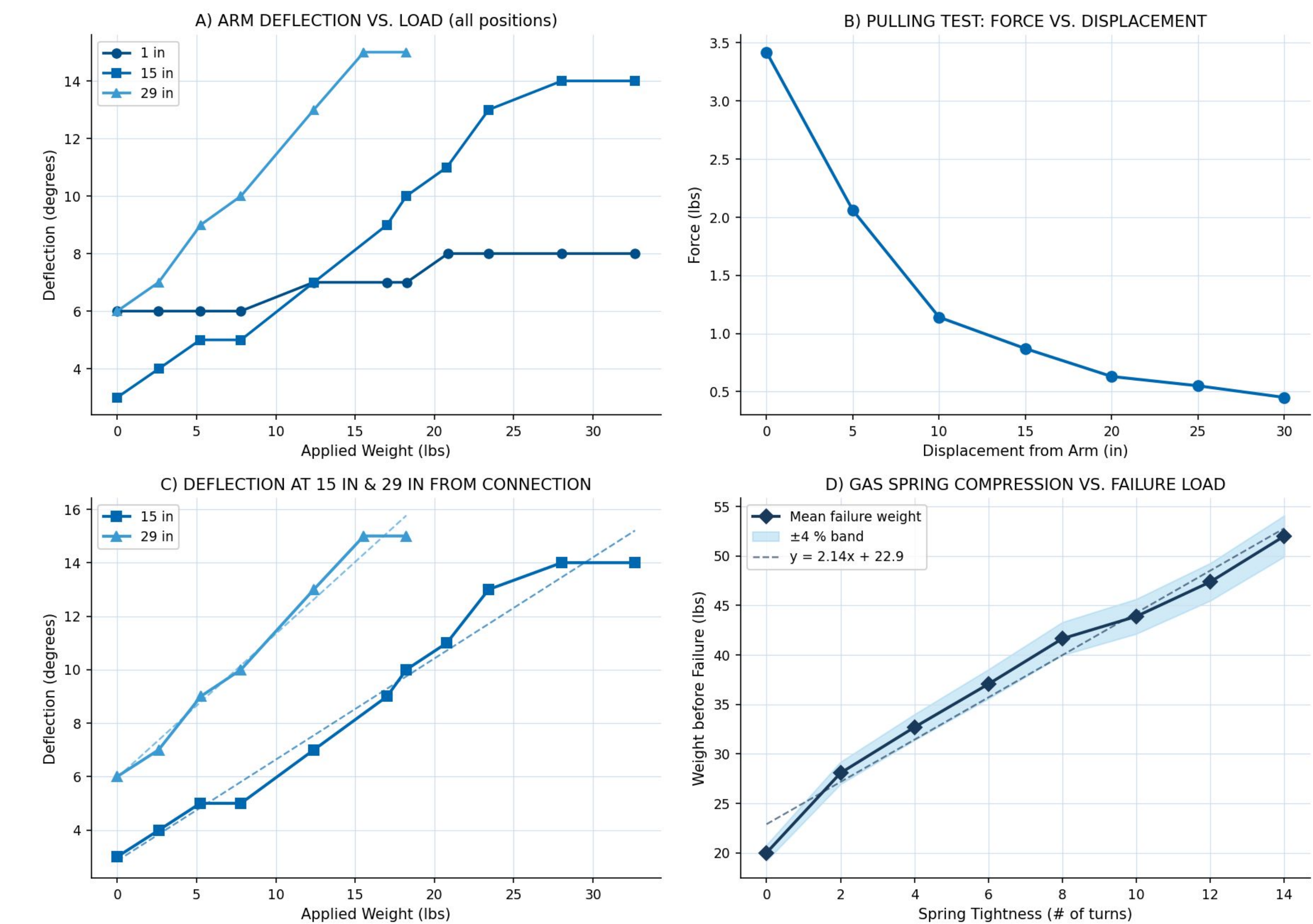
**Figure 2.** SOLIDWORKS render and simulations of proof-of-concept Omni-Axis. Von Mises stresses and deflection results under 110 N of load project acceptable load-bearing capabilities, allowing prototyping to begin.

## Prototyping



**Figure 3.** Alpha prototype constructed out of a wooden base and adapting articulating monitor arm. Key innovations are a new set of casters, a beam-mounted urinal bottle hook, and additional rotational degree of freedom for improved handling. Future iterations will add a storage compartment, a cupholder, and a lip to prevent spill overflow.

## Verification Results



**Figure 4.** Deflection, pulling and compression testing results of the alpha prototype. Pulling tests confirm ease of movement at 5 in. or more away from the arm, and arm deflection+compression tests show promising results for load-bearing capabilities.

## Design Status/Future Steps

### NEXT STEPS



### Future steps include:

1. Fixing arm/tabletop joint to improve stability
2. Adding handle to edge of table for ease of use
3. Adding cupholder below table surface to optimize usable surface area
4. Move urinal bottle hook further up for improved patient accessibility

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