

Problem Definition

- Disabilities and mobility issues restrict people from accessing up to 53% of their storage space
- Stakeholders would like to quickly and safely access high storage in their kitchens without exerting more than 5 lbs of force or reaching above 48 inches from the floor
- Stakeholders require a solution that fits within existing cabinets and does not cause permanent damage

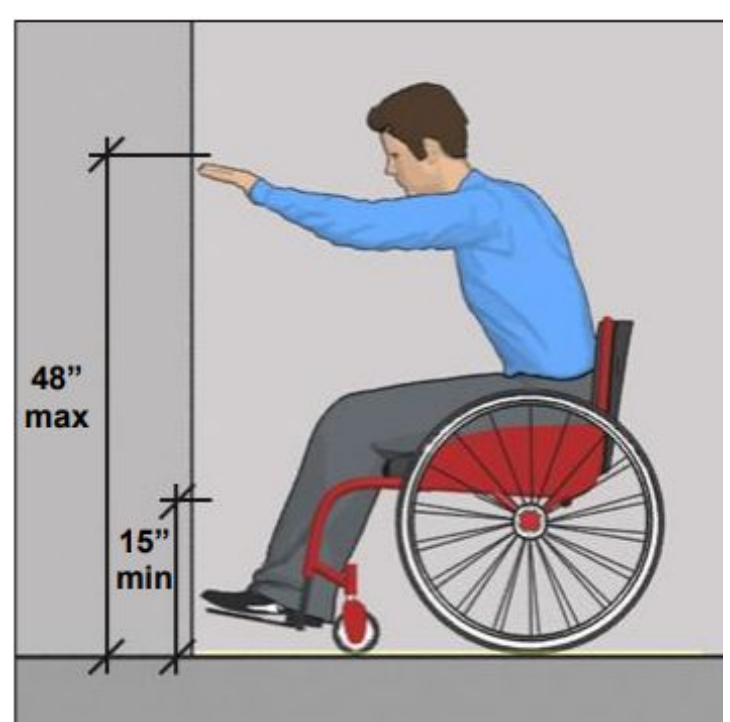


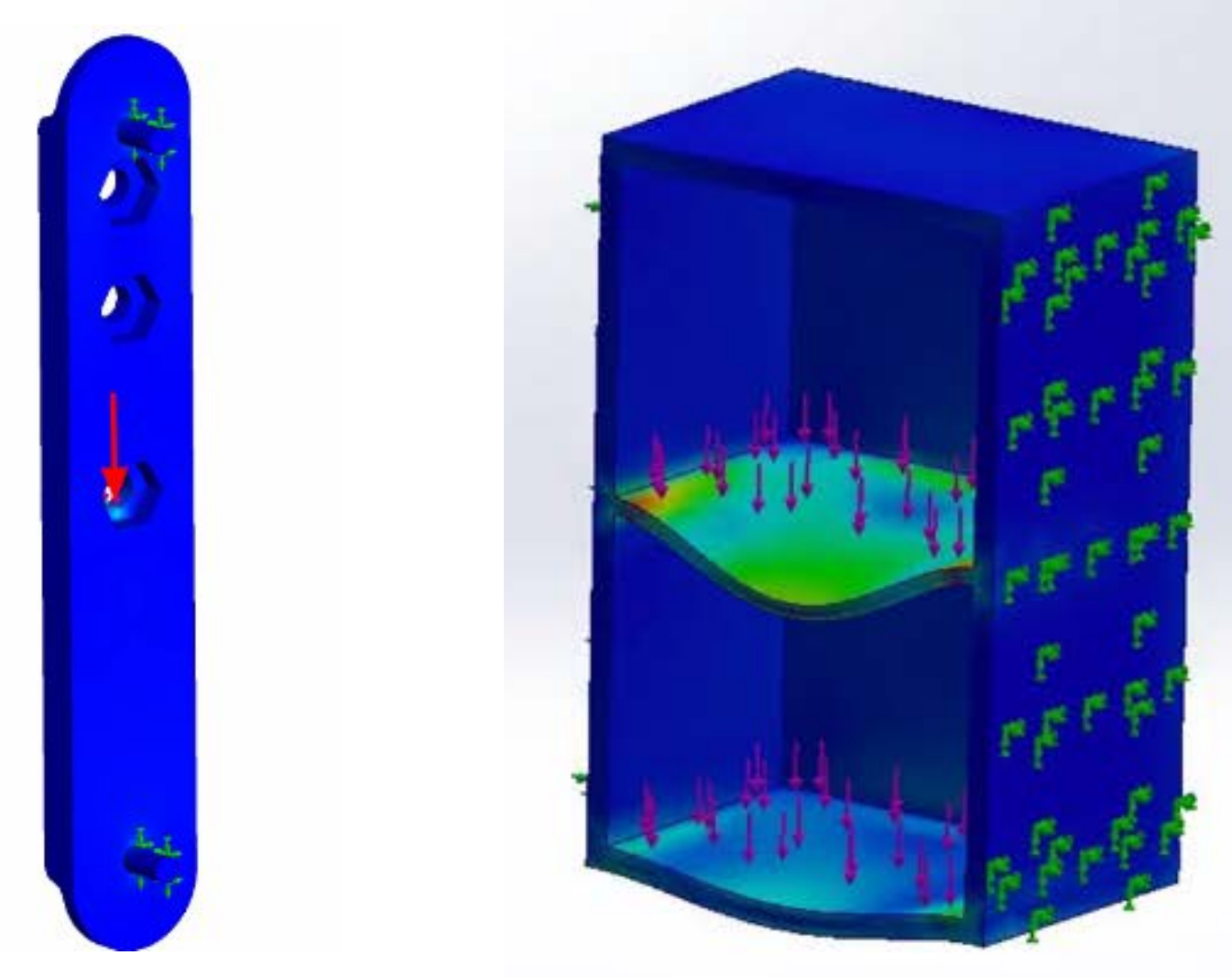
Image retrieved from Operable Parts, U.S. Access Board Technical Guide

Image retrieved from Modern Kitchen Cabinets in Fresno: The Ultimate Guide, Fresno Cabinet Outlet

Design Calculations & Analysis

Validation Requirements

- Holds and translates 40 lb of items vertically and horizontally
- Extends 36 in vertically to meet ADA standard
- Extends 12 in horizontally to clear the cabinet



FEA of load bearing custom parts raised no flags. Manufacturing specs were used to validate weight capacity for purchased components.

CAD assembly validated size and range of motion.



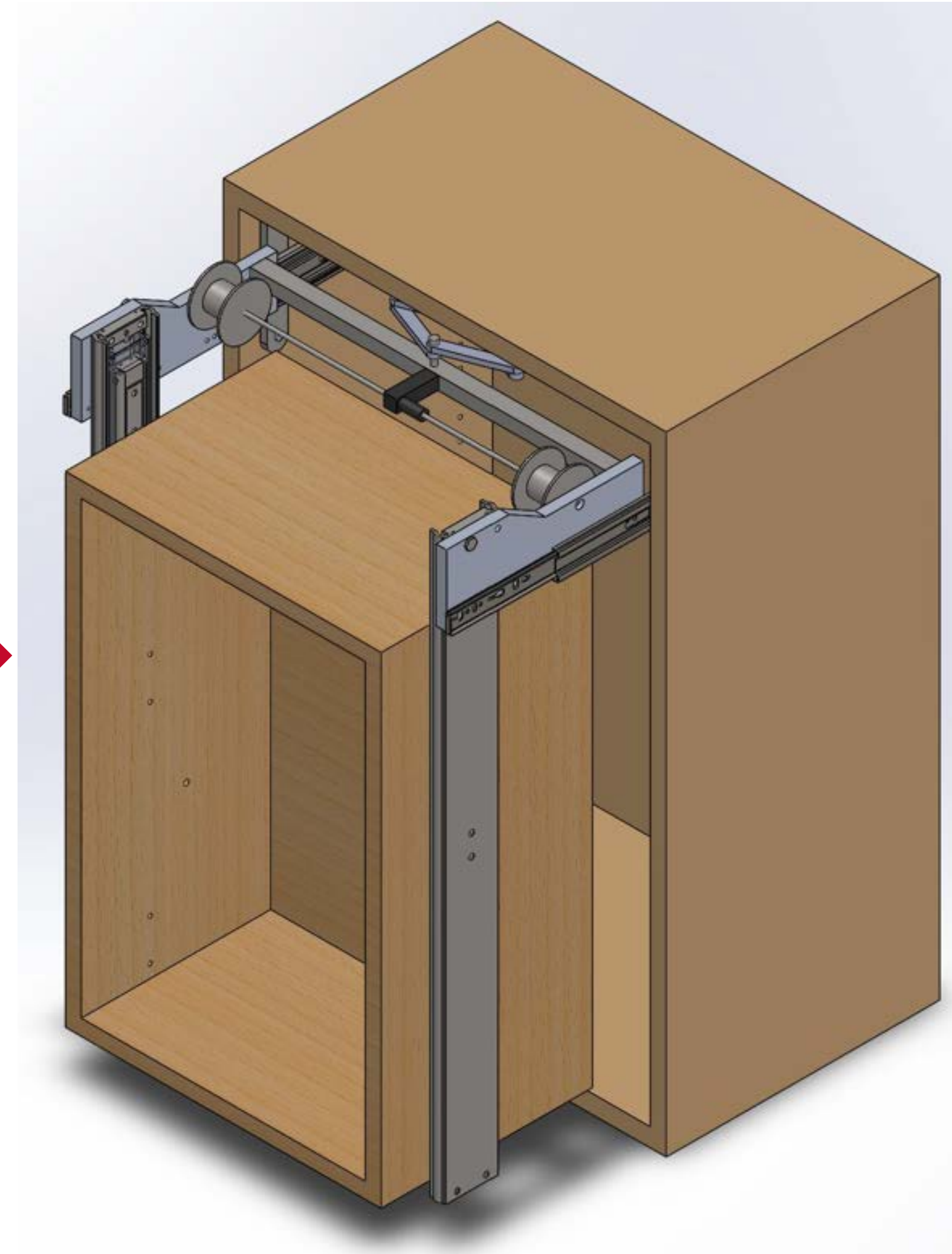
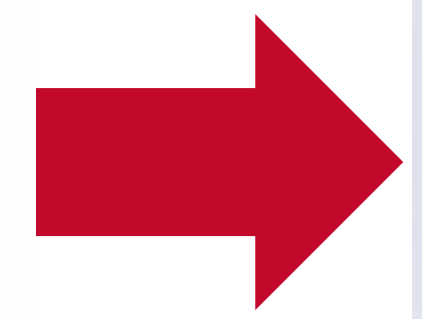
Motor	Torque (lb-in)	Speed (rpm)
Vertical	47	3.2
Horizontal	Further Testing	920

Motor selection validated translation capability.

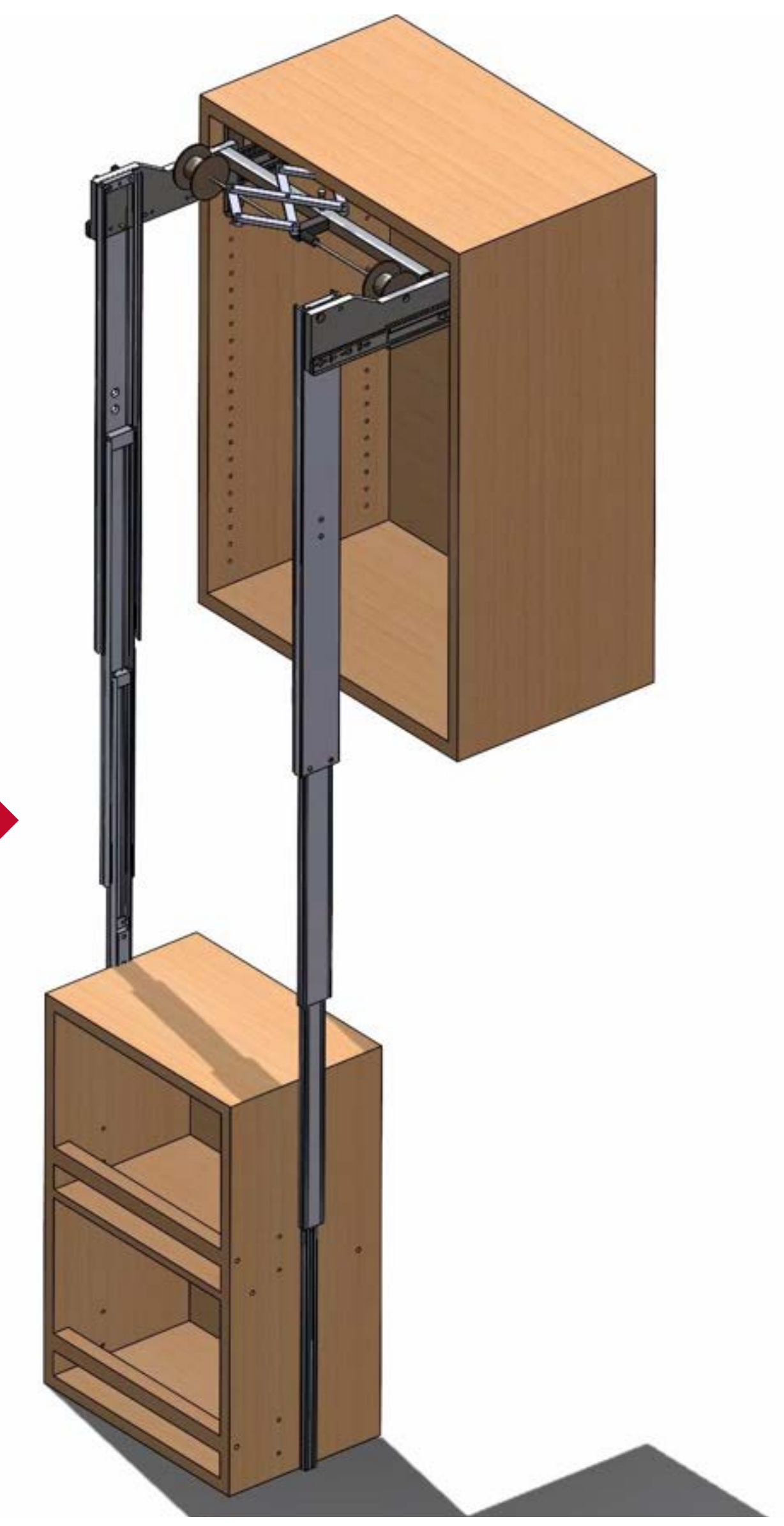
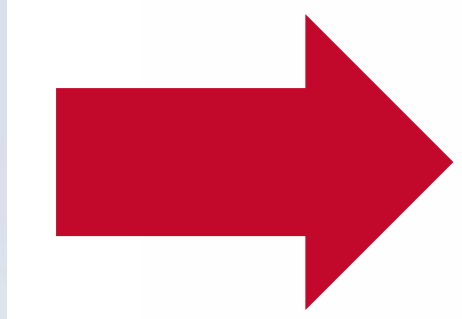
Final Design



System stows inside existing cabinet and mounts with custom part

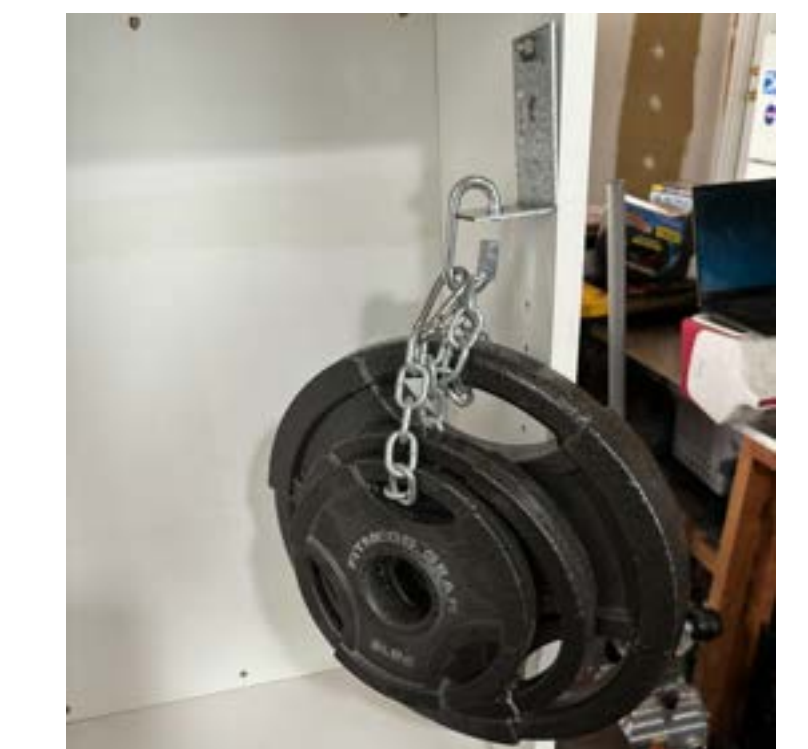
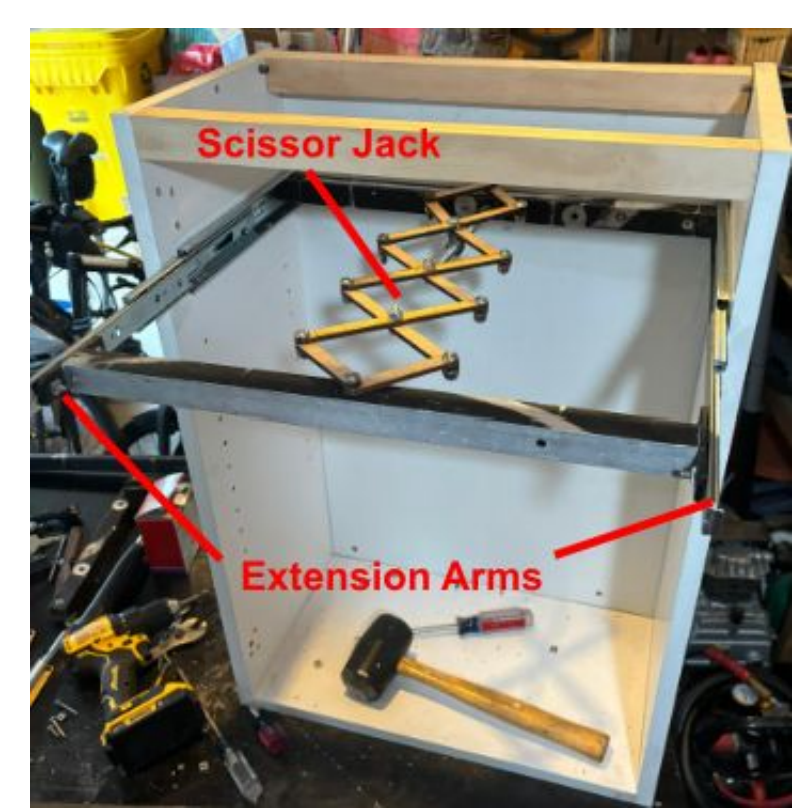


Upon user remote actuation the system extends horizontally out of the cabinet controlled by a motor driven scissor mechanism



Items extend by a motor driven spool and cable to be accessible. To stow, the user actuates the system via remote again and an opposite process occurs.

Prototype & Test Results



Full Prototype Tests

- System weight capacity
- Lateral play of shelving at full extension for perceived safety
- Lateral movement of items during translation for perceived safety

Cabinet mounting hole weight capacity testing

- 56 lb per hole
- 130 lb for our system