

MOTIVATION

SoCal Truck Accessories sought a solution to enhance efficiency and safety during the installation of specific racks and accessories. Previously, they had to halt other tasks to assist with loading items onto a forklift for installation. Our goal was to find a way to lift these items safely with fewer people, allowing for continued workflow without disrupting other jobs.

OBJECTIVE

- Must be operable by one person
- Avoid tilting or rotating
- Lift 250 lbs
- Safety factor of two
- Lift a variety of truck and van accessories

SAFETY

Safety was a top priority for this project. Numerous precautions were implemented to protect workers, particularly when the lift is elevated. All load-bearing components have a safety factor of at least two. A stopping mechanism is in place to prevent the system from raising too high and damaging the rafters. The motor is equipped with a built-in clutching mechanism, allowing it to hold loads for extended periods. OSHA guidelines were followed to ensure safe practices and local regulations were adhered to for proper reinforcement of the rafters.

THE TEAM



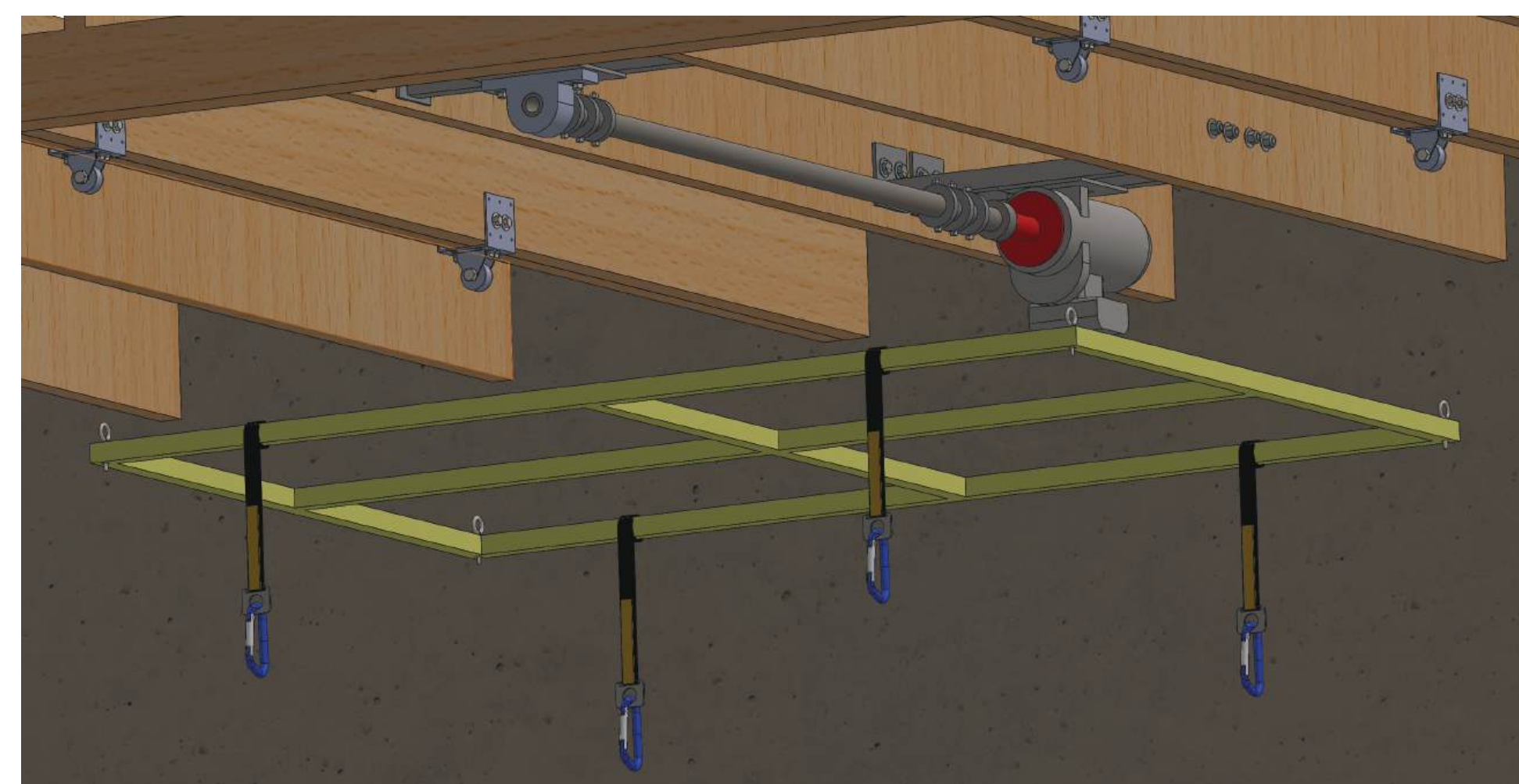
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HOW IT WORKS

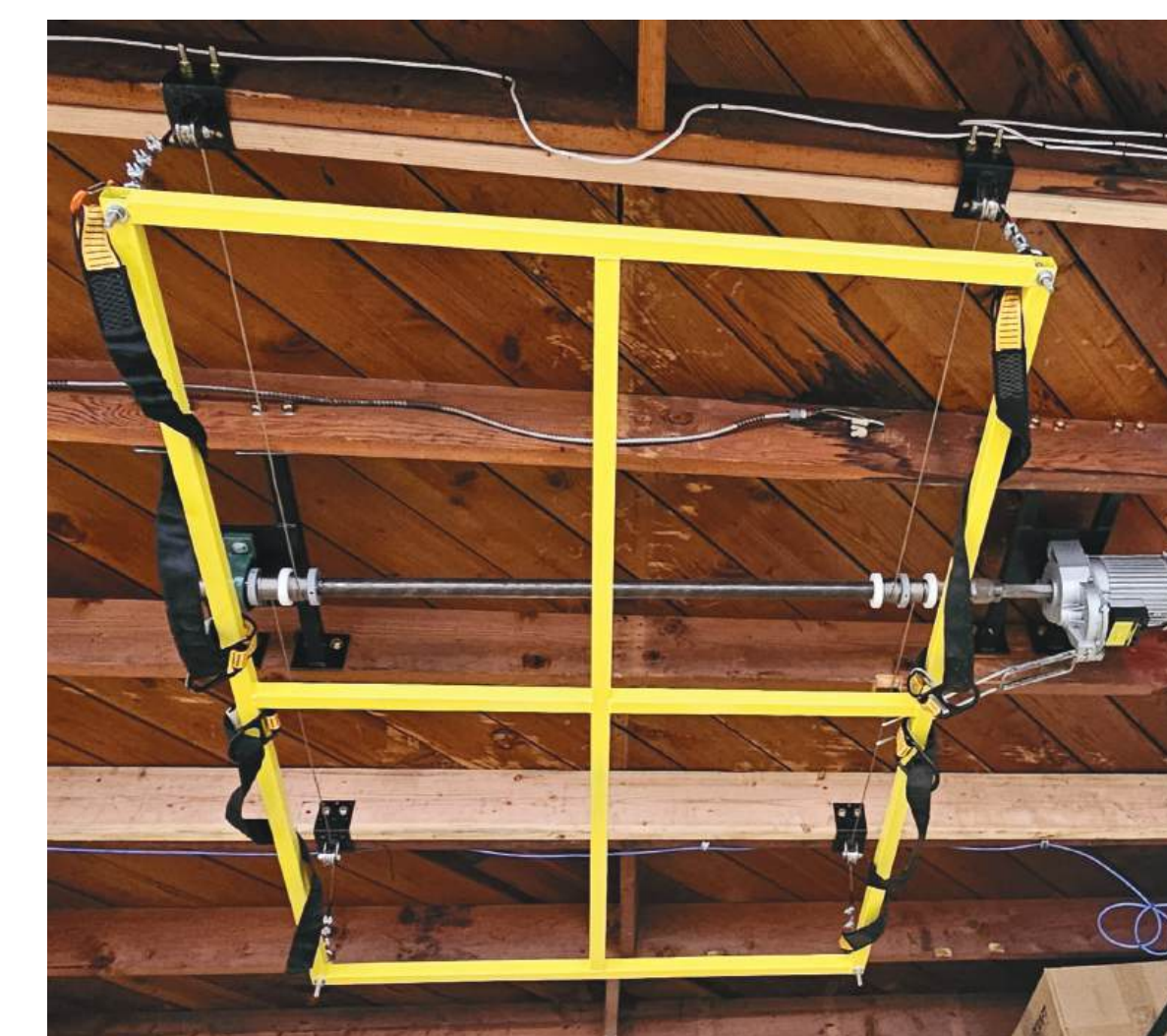
The system features a modified motor connected to a central jackshaft. These components are mounted on recessed brackets in the rafters, optimizing vertical space for taller vehicles. Four steel cables, two at each end of the shaft, are routed through pulleys positioned at the corners of a 4' x 6' rectangle. This configuration is ideal for handling truck and van accessories. The other ends of the cables are attached to a 4' x 6' steel frame, which supports and loads the accessories, ensuring ease of installation while minimizing tilting and rotation. When the motor operates, the cables spool evenly, raising each corner of the frame simultaneously, providing a stable lift for the 250 lbs of accessories while facilitating a smooth installation process.

RESULTS

The lift was successfully tested through SolidWorks simulations and real-world experiments. It demonstrated the ability to lift 500 lbs, including uneven loads, while minimizing tilt and rotation. This contributed to a smoother and more efficient installation process for truck accessories, enhancing both shop efficiency and safety.



INITIAL DESIGN



FINAL DESIGN

LIFTABLE ACCESSORIES



Ladder Rack



Camper Shell



Van Rack



Fuel Tank



Fifth Wheel



Tool Box

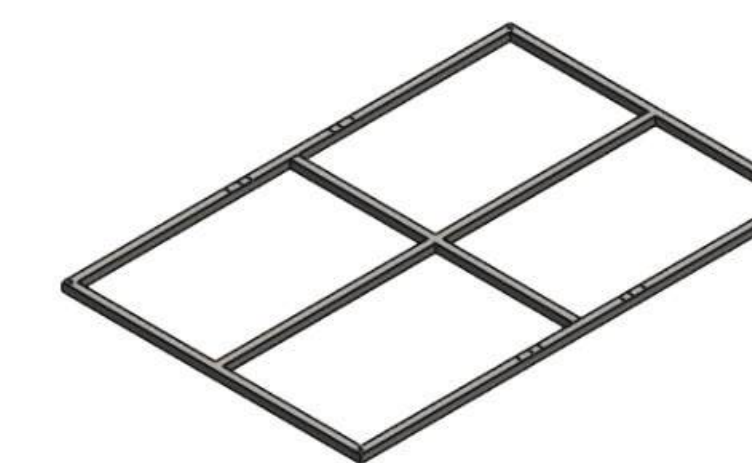
COMPONENTS



1600W Hoist Motor



Motor and Bearing Mount



Base Frame



1.5" Jack Shaft with Cable Caps and Shaft Adapter



1.5" Bearing



Pulley



D-ring Straps



1/8" Steel Cable

ACKNOWLEDGMENT

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