

Elevating Wheelchair Relocator

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Figure 7. Prototype of Elevating Wheelchair Relocator



Figure 8. Rotating Mechanism of Elevating Wheelchair Relocator

INTRODUCTION

An elevating wheelchair relocator was developed, designed and manufactured to address the issue of lifting up a wheelchair user. Typically this is a process that involves either great upper body strength by the wheelchair user to elevate himself, manual lifting of the individual by assistive care professionals, or the use of sling lifts. We notice that, when the personal upper body strength is not available, assistive care professionals often sustain injuries from lifting wheelchair users, and the use of sling lifts requires excessive time and cumbersome equipment to relocate paraplegic individuals. To come up with an improved method, we propose to integrate a mechanism into a wheelchair such that the user could operate it to lift and relocate himself onto a platform. The prototype consists of an offset rotating platform mounted atop a hydraulic lift. Once the platform is positioned atop the elevated surface, the user can manually slide himself on and off the surface with minimal effort. It eliminates the need of a separate machine or other assistants, and the user would have full control over the process.

SUMMARY OF IMPACT

By mechanizing and motorizing the process that once would have required intensive physical labor, the elevating wheelchair relocator minimizes the effort of the wheelchair user and relieve assistive care professionals from the potential of injuries. Moreover, the use of a separate and expensive device, such as sling lift, becomes unnecessary, and the time to move onto a platform is largely reduced. Overall, the quality of life of the paraplegic user is improved as he would have more control over getting on and off a raised surface instead of depending on assistants.

TECHNICAL DESCRIPTION

A 660-pound capacity hydraulic scissor lift table was chosen as the base for the project as it provided a sturdy base capable of elevating and was compact enough to fit through standard door sizes. The capacity satisfied the 250-pound lifting weight expectation, with a safety factor included.

Components were attached to the lift table to incorporate the other features of the proposed design. Atop the table, an aluminum plate was vertically mounted using bolts and brackets. Two pillow blocks were bolted onto the plate and a steel shaft was placed within these blocks such that they could guide the shaft's rotation. This shaft sat atop a thrust bearing embedded in a block of aluminum bolted onto the tabletop. Between the two pillow blocks and around the shaft, a large diameter sprocket was located. A chain was wrapped around this sprocket as well as another smaller sprocket mounted onto the output shaft of a DC Leeson right angle motor. This was done to both reduce the speed output and increase the torque output of the motor.

A flat steel plate was welded on top of the shaft, with the shaft positioned along one of the edges of the plate. This was done so that the plate rotation would be offset, allowing for lateral movement of the user atop the plate while the shaft rotated. With a seat mounted on the plate for comfort, flip-up armrests were added for safety and ease of sliding onto an elevated platform. A seatbelt was also utilized to keep the user secure, and elevated leg rests were mounted onto the chair so that the legs would be kept parallel to the floor and away from obstacles during the rotating process.

Base extensions were mounted to the bottom of the lift table to increase the footprint of the device and prevent tipping during operation. A handheld control box was fitted with a DPDT switch and a momentary push button switch so that the user could alternate between the rotating directions, and the chair would only rotate if the push button was physically pressed down, as a measure of safety.

The cost of the parts and supplies for this project was \$1210.

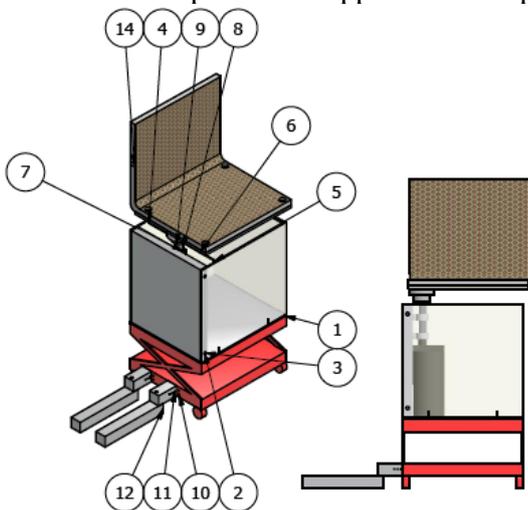


Figure 9. Design of Elevating Wheelchair Relocator