

Project Title: Portable Recliner

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Problem Statement: There are handicapped people who require a mechanized recliner to sleep in, but these devices are too heavy and cumbersome to be portable and used when traveling. This device needs to be light enough and small enough to be transported in the trunk of a car, while being comfortable enough to sleep in and strong enough to fit the client's requirements. The goal is to design it to be mechanically controlled to lower down to prone position and be able to lift/tip the person up to or close to a standing position

Function: To develop a portable reclining chair that can accommodate the specifications of our client, Mrs. Constance Fox. This device should ideally be comfortable enough to sleep in, and be able to recline and have a footrest, as well as assist in lifting the individual from a sitting to a standing position. Additionally, this device should be portable; it should ideally be collapsible and weigh no more than 40 lbs.

Client Requirements

- Collapsible; should be able to fit in the trunk of a car Cadillac (<0.42 cubic meters)
- Able to recline
- Should contain a footrest
- Able to lift the individual sitting in it to a standing position
- Able to allow individual 175 cm to sit or lay comfortably
- Able to support 1350 N/136 kg
- Is comfortable; can be slept in
- For travel use

Design Requirements

1) Physical and Operational Characteristics

- a. Performance Requirements:** This recliner should be able to support 1350 N of weight for up to 16 hours at a time (max foreseeable time is 16 hours). It should also be able to hold a 136 kg person who sits from a standing position. It also must be able to lift this individual from a sitting to a standing position. Finally, it must be able to support this individual in a reclining position.

- b. Safety:** This chair may be sat in for hours at a time and should not cause body strain (back, neck or other) during this time. Additionally, the chair should never buckle or collapse under the weight of the individual. The chair should also not pinch or otherwise harm the user. Finally, the seat should not move while the individual is being seated or raised.
- c. Life in Service:** This product should be able to be used for up to 24 hours at a time and should be able to be sat in and the individual lifted or seated multiple times in a day (standing to sitting or vice versa 8 times per day). Similar products have a three-year warranty on the electrical mechanisms. However, the product will only be used for traveling which only occurs 3-4 times per year over a 1-5 day span.
- d. Operating Environment:** For indoor and stationary use only. However, will be used in many different locations. This will be primarily be used in hotel-room locations (18-24 degrees C, 35-50% humidity), but could be stored in potentially hot or humid environments (in the trunk of a car) for several hours. Thus, this environment could range up to 100% humidity and have a temperature range between -23 and 93 degrees C for 8-12 hours maximum). This product will primarily only be handled and used by the client and their spouse, but other individuals may also be around or be handling the product. Therefore, the product should be relatively safe for people of smaller size and the mechanisms to use it should be relatively intuitive.
- e. Ergonomics:** Should be able to comfortable seat a man that is 175 cm. The seat should also not cause back, neck, shoulder, or leg pain if an individual is sleeping in it when it is reclined. The seat should also be able to raise and recline without causing strain to the person who is sitting in it.
- f. Size:** Product should be able to fit in the trunk of a car (<0.42 cubic meters) or be checked as baggage on a plane (68x53x35 cm to not be considered oversize). Therefore, chair should be collapsible.
- g. Weight:** For portability reasons, product should weigh less than 18 kg. As stated previously the chair should be able to seat, recline, and raise a person who is 136 kg.
- h. Materials:** The materials used should be lightweight in order to keep the chair within the weight limit and should be mildly non-corrosive. Soft materials should be used for the outer portion of the chair so that it is comfortable for the user.

2) Production Characteristics

- a. **Quantity:** 1
- b. **Target Product Cost:** Similar non-portable lift chair range between \$600 and \$1600. Client budget is \$200.

3) Miscellaneous

- a. **Client:** Our client was very unsatisfied with the previous result of this design project, which she described as a “dolly with a lawn chair.” Additionally, the individual that this chair is being designed for must undergo daily dialysis treatment, involving 2 needles, which should be taken into account in the design of this product.
- b. **Competition:** There are many non-portable lifting recliners in market and also many portable lift systems/chairs. However, there are no known portable recliners with built in lift systems currently on the market.

Lifting Recliner examples:

<http://www.la-z-boy.com/Furniture/Lift-Chair-Recliners/>

<http://www.usmedicalsupplies.com/Lift-Chairs.htm>

<http://www.livingincomfort.com/indoor-store-back-pain-relief-lift-chairs.html>

Portable Lift System examples:

<http://www.oakpointmedical.com/mangar-camel-86.html>

<http://www.portableliftchairsllc.com/>

<http://www.dynamic-living.com/product/upeasy-power-lifting-cushion/#clear>