

Patient Transfer Device

Client: Dr. Ashish Mahajan, MD

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BWIG: Alex Bloomquist

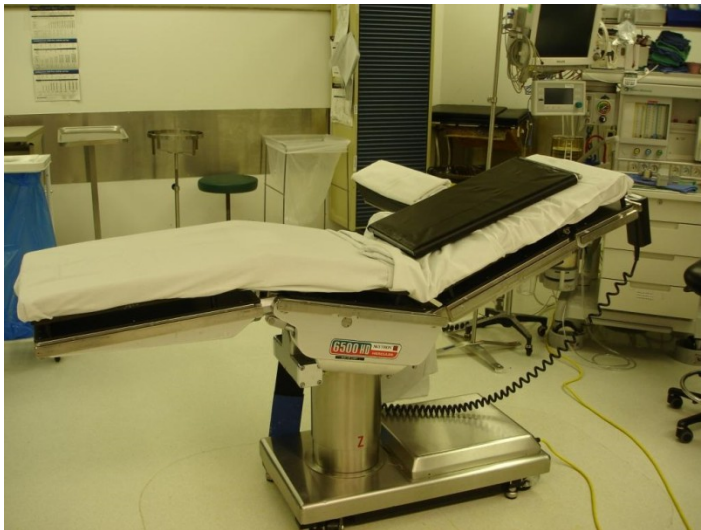
Communicator: Jamon Opgenorth

Overview

- Background
- Problem Statement
- Current Design
- Project Design Statement
- Design Alternatives
- Design Matrix
- Future Work
- Questions?

Background

- ❑ Client and co-workers need to transfer possibly sedated patients.
- ❑ Some patients must remain in the sitting or “scrunched” position.
- ❑ Difficult to transfer patients with flat roller board.



Current Design

- ❑ Currently using single 24" aluminum roller board.
- ❑ Lightweight, rigid and dependable.
- ❑ Difficult to use when patients are in Fowler's position
- ❑ Uses pins and holes instead of ball bearings.



Universalmedicalinc.com

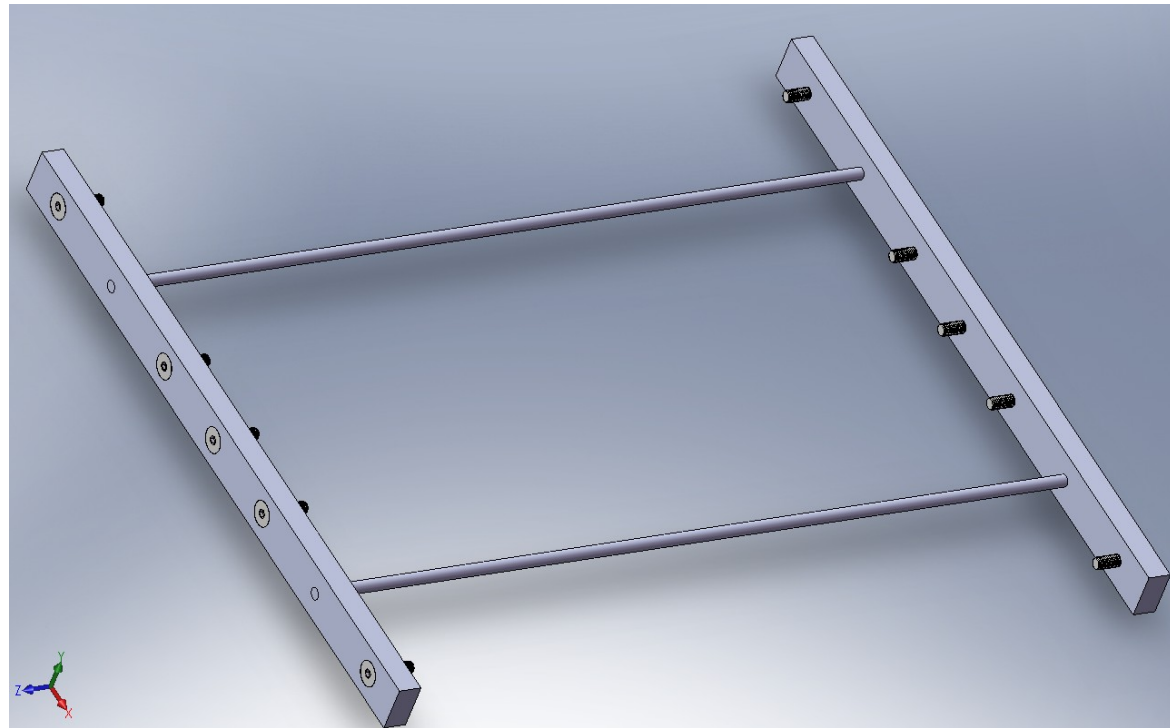


Project Design Statement

- Dr. Ashish Mahajan has asked us to create a safe, sturdy and efficient patient transfer device for moving awake or sedated patients in semi-Fowler's position.
- Parameters:
 - Safety
 - Ease of Use
 - Cost
 - Durability
 - Simplicity
- Specifications:
 - 300 lbs max load
 - < 50"
 - < 20 lbs

Design Base

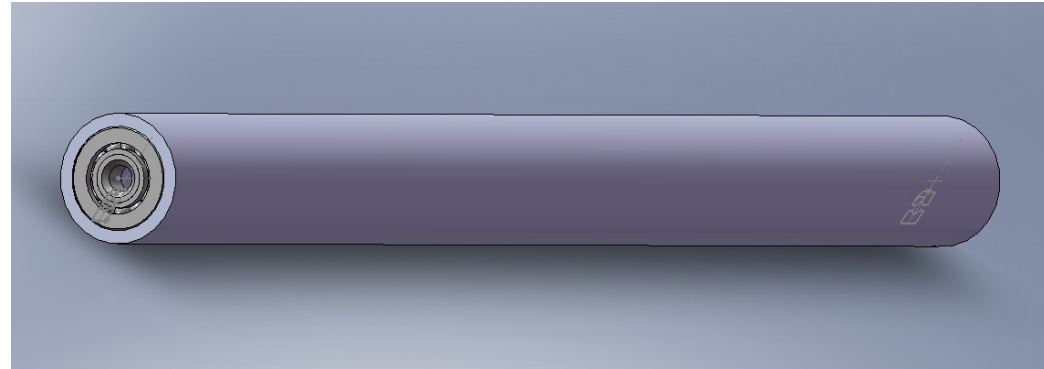
- Aluminum Plates
 - Alloy=6061
 - Machinable
- Aluminum Rods
 - 0.5" OD
 - 17" long
 - Light Weight
- Steel Bolts
 - Strong



End plates, rods, and bolts

Aluminum Tubing and Bearings

- Aluminum Tubing
 - Alloy=6061
 - .125" Thick
 - Easily holds weight requirement
- Ball Bearings
 - “Frictionless”
 - Steel
 - Radial Load > 450lbs



(Above) Aluminum tubing with bearing.



Steel ball bearing (McMaster.com)

Vinyl Cover



Patient transfer roller board,
with vinyl covering (Universal
Medical Inc.)

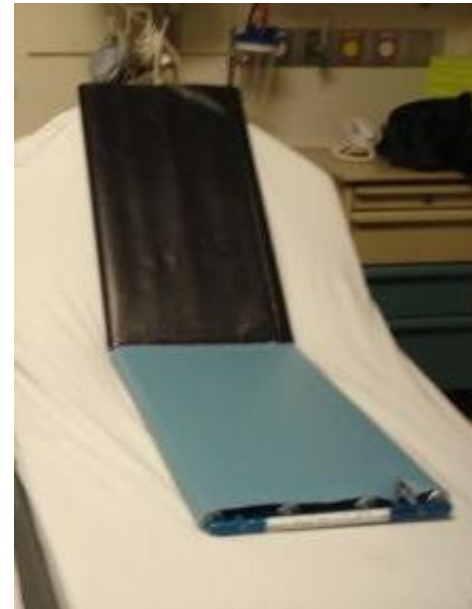
- Strong
 - ▣ Won't tear
 - ▣ Doesn't hinder rollers
- Easy to Clean
- Safe
 - ▣ Doesn't hurt patient
 - ▣ Covers all moving pieces

Design Alternatives

- Connect two existing boards with hinge
- Board from raw materials with no bearings and an integrated hinge
- Board from raw materials with bearings and L-shaped hinges

Design One

- Plan
 - ▣ Buy two boards
 - ▣ Modify boards to connect using a hinge
- Problems
 - ▣ No guarantee the boards are identical
 - ▣ Boards would have to be modified to be shorter
 - ▣ Cost

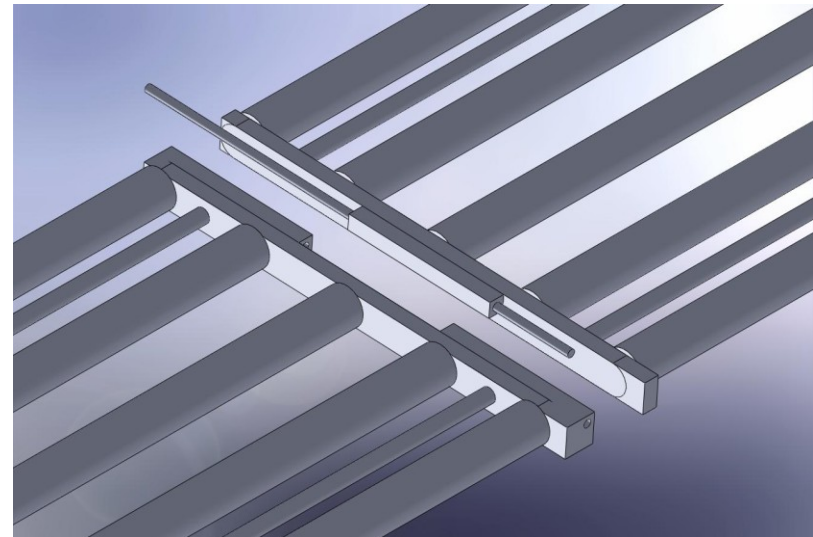


Design Two

- Fabricate everything ourselves
- Integrated end plate/hinge
 - ▣ Solid milled piece of aluminum
- No bearings
 - ▣ Cap inserted into end of aluminum
- Problems:
 - ▣ Hinge fabrication is complex and creates too much waste
 - ▣ Product wear is a gray area
 - ▣ More friction with no bearings



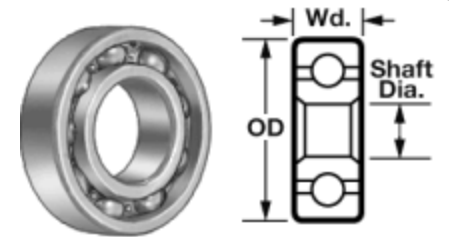
Tube Cap



Integrated Hinge

Design Three

- ❑ Fabricate almost everything ourselves
- ❑ L-Shaped Hinge
 - ❑ Cheap
 - ❑ Simple
- ❑ Ball Bearings
 - ❑ Ease use of product
 - ❑ Wear is much more predictable
- ❑ Problems
 - ❑ More parts than design two



Ball bearings

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



“L-Hinge”

Design Matrix

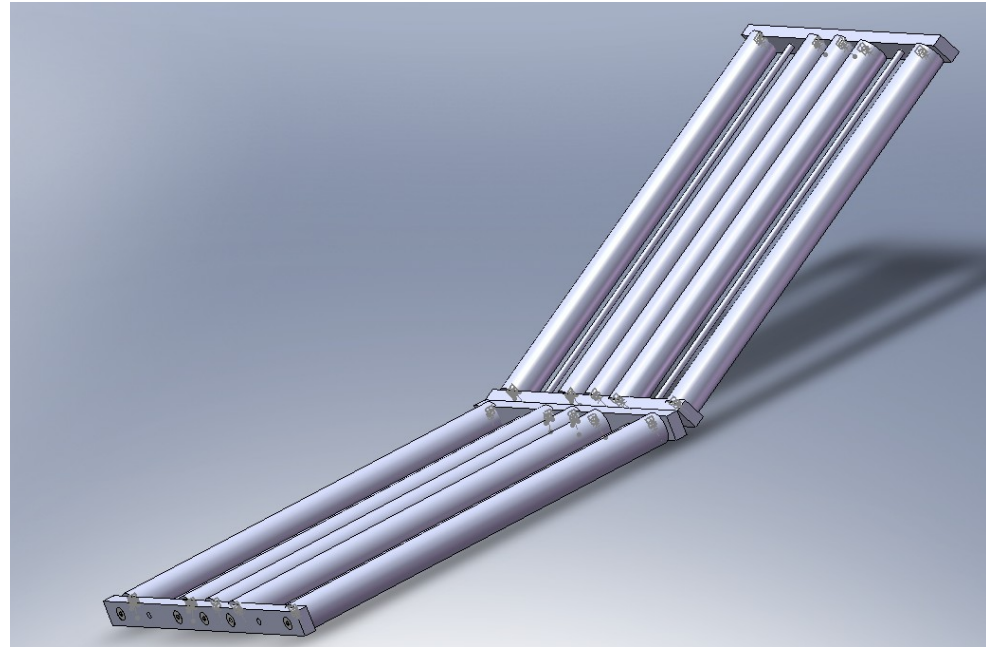
Design	Safety (25)	Ease of Use (30)	Cost (10)	Durability (20)	Simplicity (15)	Total (100)
Design 1: Two boards w/ hinge	22	25	4	20	15	86
Design 2: Homemade	20	25	7	15	10	77
Design 3: L-shape hinge	25	30	7	20	13	95

Final Design

- Fabricate two boards
- Attach via “L-Hinge”
 - ▣ Non-Locking hinge, for any angle
- 40”x14.5”x1”



“L-Hinge”



Final Design

Future Work

- Finish Ordering Parts
- Build the Design
- Test Design
- Present
- Deliver

Acknowledgements

- Client: Dr. Ashish Mahajan
- Advisor: Prof. Brenda Ogle
- Guidance: Dave Bloomquist

References

- McMaster Carr
- Universal Medical Inc.
- AliMed Inc.

Questions?

