ErgoForm Design

Assisted Toilet Seat

Simon Fraser University
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Presentation Agenda

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11	System Design • Lift System • Controls • Seat
19	Business Aspect • Budget and Financing • Scheduling • Current Competitors
27	Summary • Learning outcomes • Future Plans • Conclusion • Acknowledgement

Introduction

ErgoForm Design Team Members

Nick Cheng (CEO)

- User Interface
- Documentation

Abbas Jafari (CFO)

- Lift Implementation
- Lift Design

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ErgoForm Design Team Members

Faraz Khan (VP Operations)

- Electrical Design
- Electrical Implementation

Ashkan Mirnabavi (CTO)

- Seat Design
- Seat Implementation

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ErgoForm Design Team Members

Feifan Jiang (VP QA)

- Lift Design
- Lift implementation

Motivation

Problem:

- Due to injury or illness, one's range of motion becomes limited and thus using the toilet becomes very difficult.

Solution:

- A device that allows one to be raised and lowered onto the toilet.

Motivation

Who can benefit from our device:

- Lost upper/low/lower body strength

- Lost of mobility due to:
  1. Muscular dystrophy
  2. Lou Gehrig's disease
  3. Degenerative joint disease (Arthritis)
  4. Parkinson’s disease

Goal

- Affordable
- Simple Installation
- Intuitive User Interface
- Universal Design

Our Product

Introduction

- The ability to control easily
- Install anywhere, using existing facilities
- Simplified design

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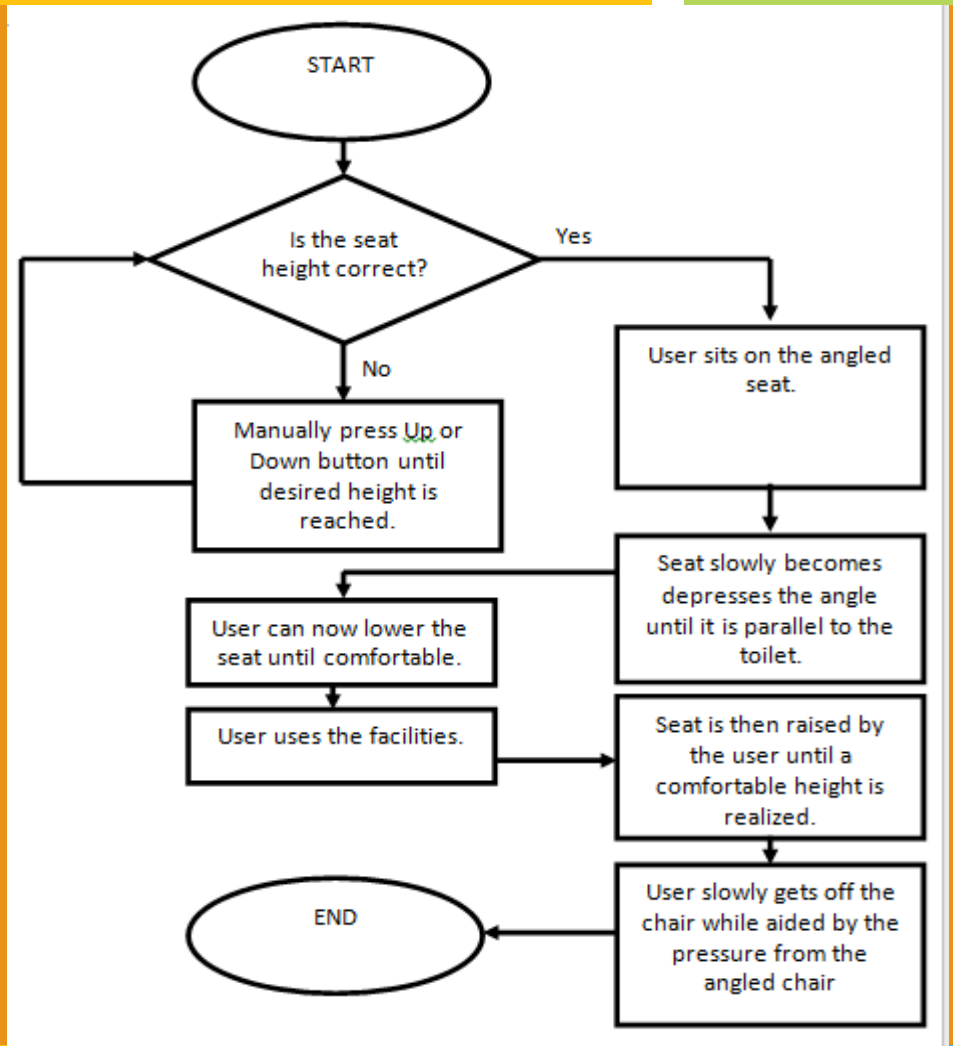
Design


System Design

System Overview

System Design



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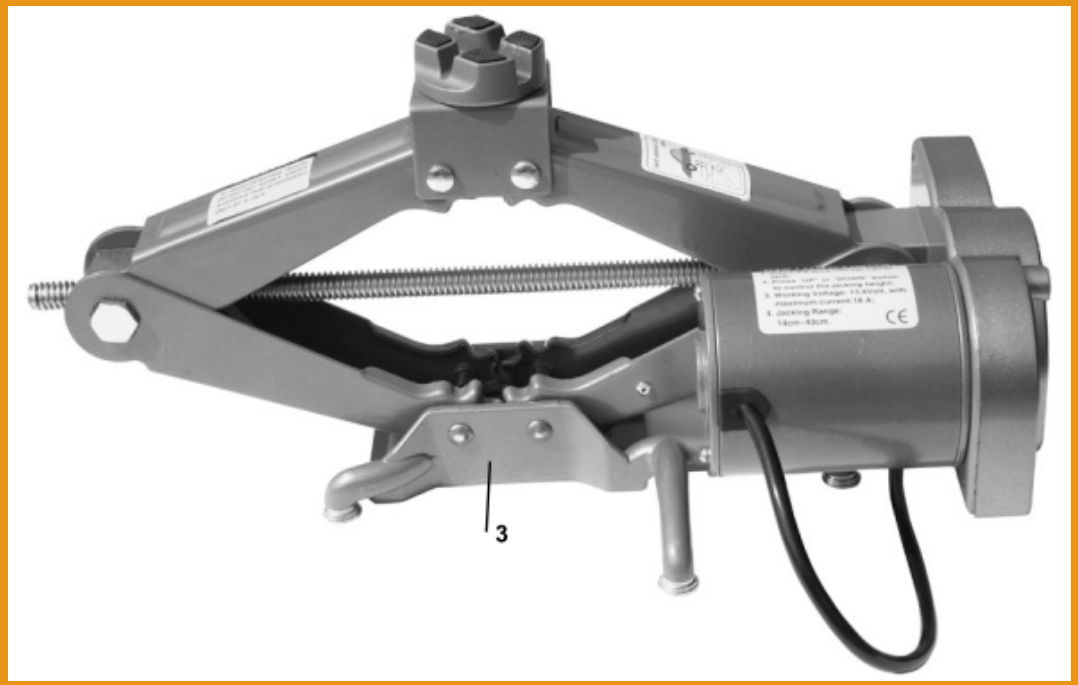
The Lift

We Used:

- 2 x 1000lb (453.59 Kg)

Motors ratings:

- 12 volts
- <10 amps (runs at 2 A with a starting current of 2.4 A each)



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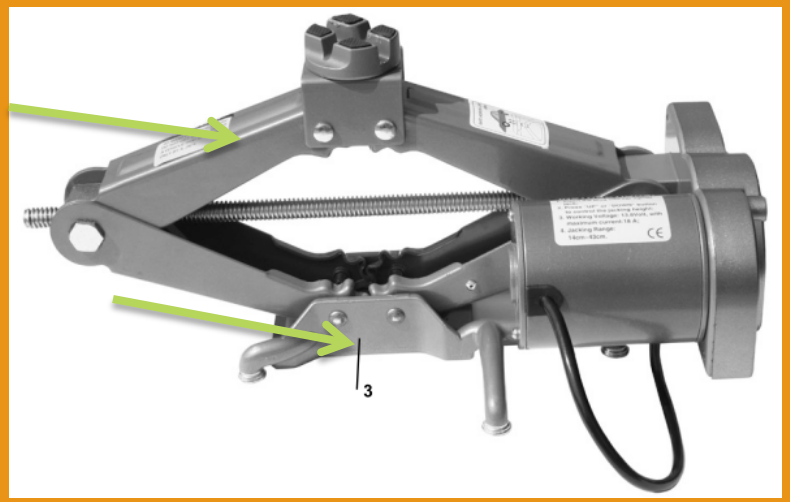
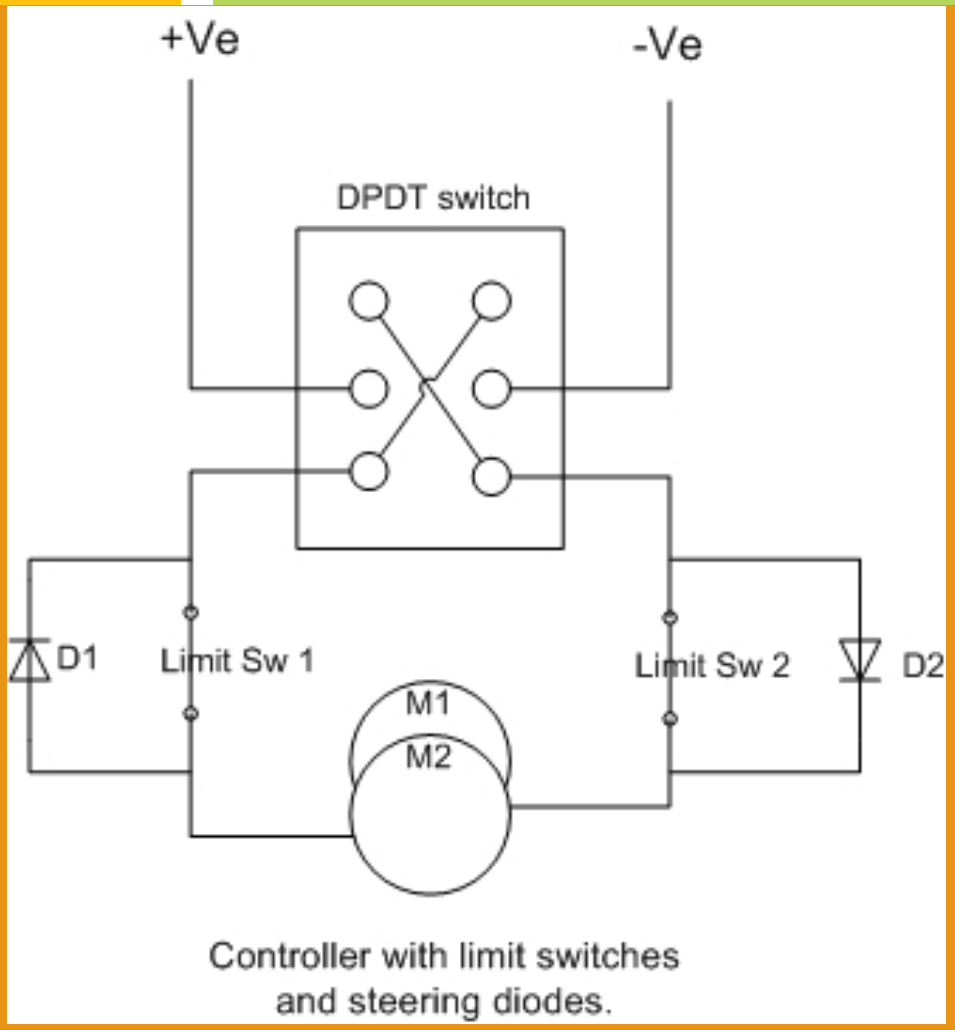
The Lift

System Design

- Limit Switches integrated into the jack assembly





Controller with limit switches and steering diodes.

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The Controller

- Simple Design
- Intuitive controls
- One switch 3 position

- Ideal placement
- Allows for grabbing the handles

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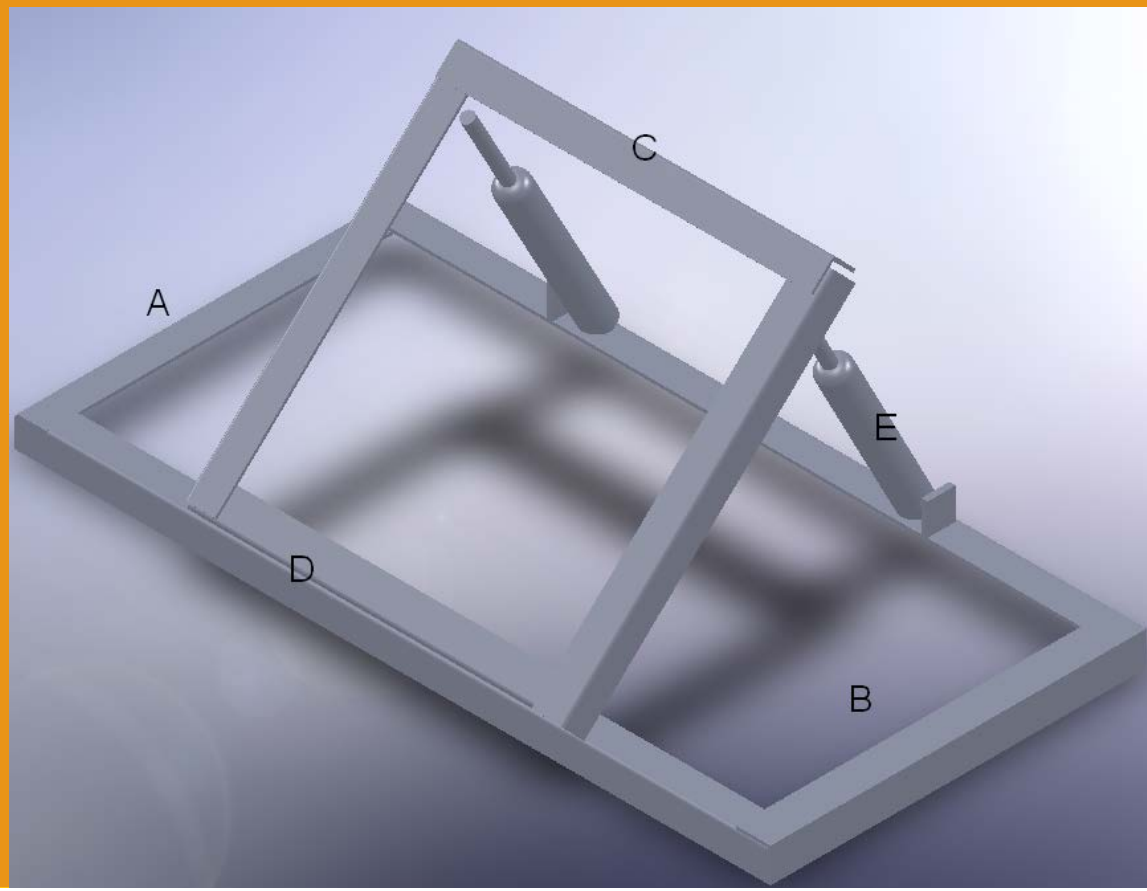
The Seat

System Design

- The Need
- For assisting in sitting and getting up

- Implementation
- Gas charged supports
- Mounted on angled iron



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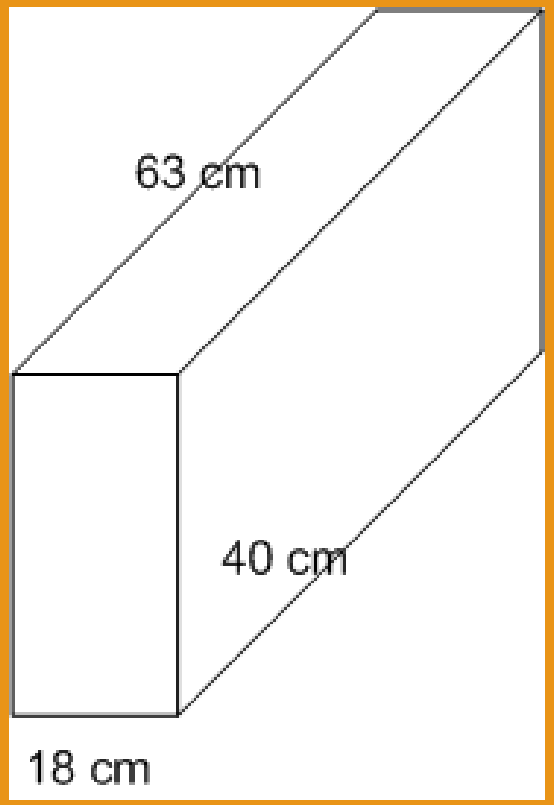
The Jack Housing

System Design

The Need

- Protect the jacks
- Reduce noise
- Provides a sturdy base
- Keeps dry and out of the way



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The Seating Assembly

System Design

The Need

- Allows comfortable sitting
- Back rest
- Handles
- Manually adjustable height modules

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Business Aspect

Budget

Business Aspect

Primary Source of funding

- ESSEF - $800

Proposed Budget

Equipment	Cost
Fingerprint reader (Control)	$90
Linear Actuators (Motors)	$400
Power supply	$100
Microcontroller	$140
Construction materials	$100
15% Contingency Cost	$150
Total	**$980**

Actual Budget

Equipment	Cost
Control	$50
DC Motors	$180
Power supply	$0
Construction materials	$368
Miscellaneous Cost	$20
Total	**$678**

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Timeline

Business Aspect

Number	Task	Start	End	Duration
1	Project Planning	1/8/2011	1/24/2011	10
2	Research/Brainstorm	1/8/2011	4/6/2011	59
3	Project Proposal	1/8/2011	2/2/2011	17
4	Functional Specification	1/8/2011	2/24/2011	31
5	Ordering of Parts/Hardware	1/26/2011	2/11/2011	13
6	Progress Report Presentation	2/4/2011	2/16/2011	8
7	Design Specification	2/16/2011	2/25/2011	7
8	Assembly of Modules	2/16/2011	3/30/2011	29
9	Actuators Working	2/2/2011	2/28/2011	17
10	Software Developed for MCP	2/2/2011	2/28/2011	17
11	Mechanical System Designed	2/2/2011	3/15/2011	28
12	Integration/Prototype Testing	3/2/2011	4/1/2011	22
13	Debugging	2/1/2011	4/1/2011	41
14	Post-Mortem Report	3/18/2011	4/15/2011	21
15	Project Presentation	4/12/2011	4/15/2011	4
16	Documentation	1/1/2011	4/15/2011	71

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Market Analysis

Business Aspect

Primary users of assisted toilets

- The elderly
- Persons with disabilities

Primary locations

- Hospitals
- Care homes
- Personal homes

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Competition

Business Aspect

Uplift Commode Assist

Advantages
- Small profile
- Portable
- No need for electricity

Disadvantages
- Height not adjustable
- Many interlocks/latches

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Competition

Business Aspect

TOTO electric raise toilet

Advantages
- Automated
- Built-in bidet
- Seat tilts

Disadvantage
- Height not adjustable
- Overly complicated
- Maintenance

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Competition

Business Aspect

Toilet seat accessories

Advantages

- Simple to install
- Cheap
- Many combinations

Disadvantages

- Serves specific function
- Fix height
- Fixed seat

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Our Product

Business Aspect

The Assisted Toilet Seat

Advantages

- Simple controls
- Simple to install
- Wide verity of users possible
- Adjustable height
- Angled seat

Disadvantages

- Profile
- Horizontal rocking
- Motor Noise

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Summary

Learning Outcomes

Summary

Professionalism

- Planning and Scheduling
- Teamwork
- Communications

Business

- Budgeting
- Part Procurement

Troubleshooting and project integration

Improved research skills

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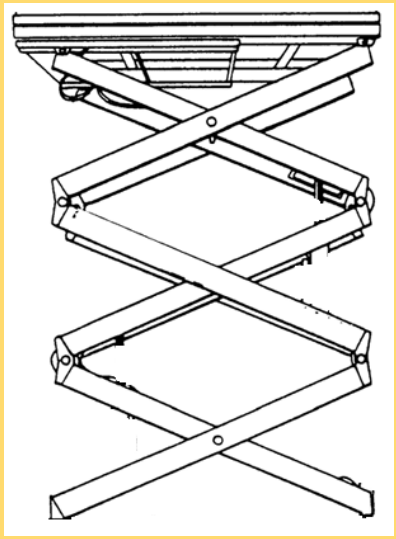
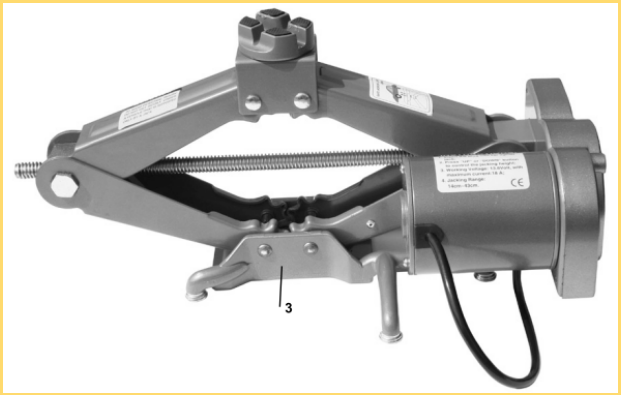
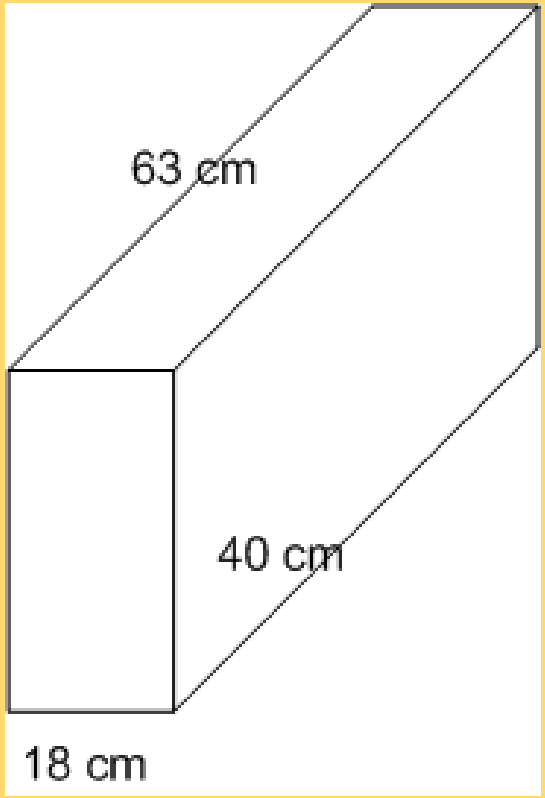
Future Improvements

Summary

- Smaller profile







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Future Improvements

Summary

- Reduce horizontal rocking
- Quieter lifting mechanism
- Smaller power supply
- Uni-body construction

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Conclusion

Summary

- Can lift and lower a person
- Can control the device
- Meets our safety requirements

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Acknowledgements

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Summary

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Questions and Answers