

## Design Review 5

# Team 502: Retractable Storage Rack for Inert Atmosphere Glove Box

Jacqueline Matthews, Micheal Rodino, Evan Ryan



# Team 502



Jacqueline Matthews  
Project Manager/  
Mechanical Engineer



Micheal Rodino  
Manufacturing Engineer



Evan Ryan  
Design Engineer



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ENGINEERING

# Sponsor and Advisor



Sponsor: Bill Starch



Advisor: Dr. Eric Hellstrom

Evan Ryan

# Overview

- Objective
- Background
- Past work
- Challenges
- Prototyping
- Final Design
- Budget
- Future Work



# Objective

The objective of this project is to create fully functional retractable racks that will be implemented into an inert atmosphere glove box. The retractable racks will be used to store materials, tools, scales, etc., inside the glove box, creating an organized, uncluttered working area for the user.

# Inert Atmosphere Glove Box



- Controlled atmosphere apparatus which uses inert gas to provide a stable and sterile work environment.
- User reaches into box through gloves and conducts experiment/ test.
- Can manipulate air properties and allow for more accurate testing.

Evan Ryan

# Background

## Current Storage

- Stationary shelves
- Back of glove box
- Hard to reach with gloves on
- No efficient storage in double sided glove box



Evan Ryan

# Past Work

- ✔ Project Scope
- ✔ Customer Needs
- ✔ Functional Decomposition
- ✔ Targets and Metrics
- ✔ Concept Generation
- ✔ Concept Selection

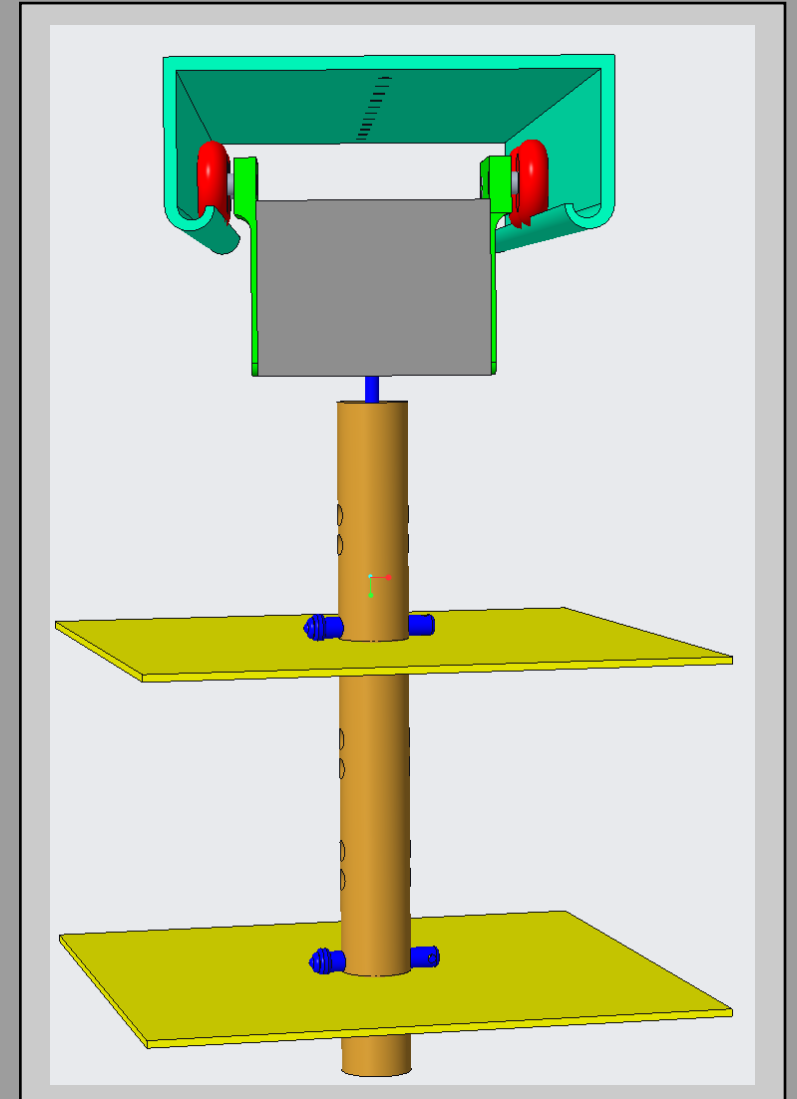




# Our Initial Design

## Inverted Lazy Susan:

- Provides the most useable space without compromising experimental space
- Combines rotational and linear movements to have a retractable and rotating shelving system
- Hangs from the ceiling to reduce wasted floor space
- Can be implemented in single or double sided glove boxes



Jacqueline Matthews

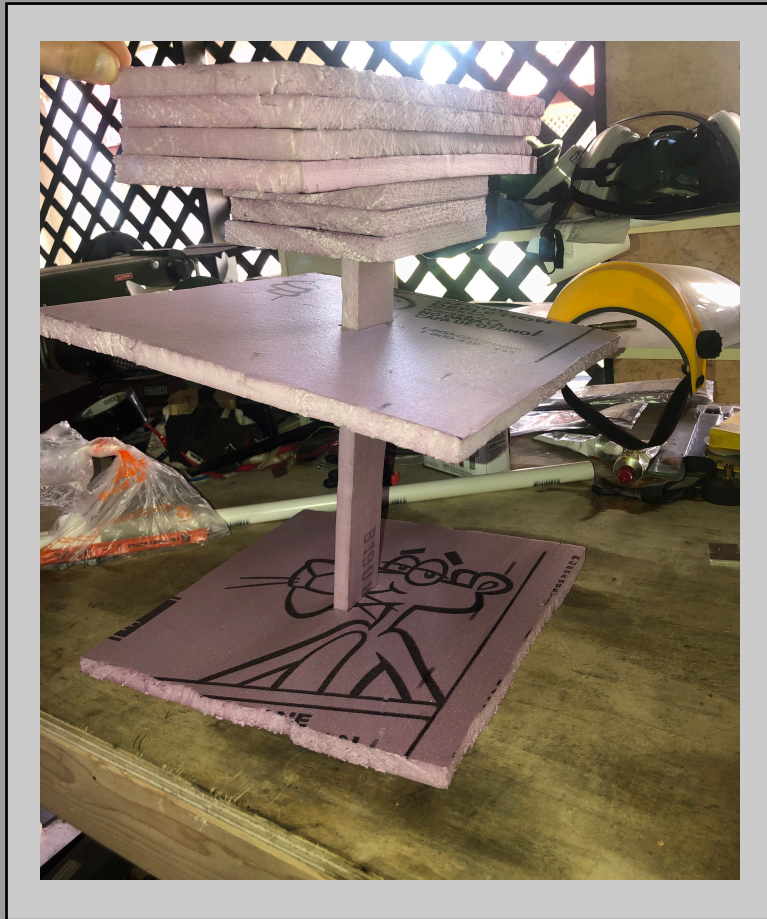
# Challenges



- Designing for decommissioned glove box, but has to work and fit into active glove box
- Fitting the Inverted Lazy Susan through antechamber
  - Length: 20" (diagonal)
  - Diameter: 16"
- Assembling inside the glove box

Jacqueline Matthews

# Rough Prototype



Fits into top, left corner



Jacqueline Matthews

# Rough Prototype



Fits into top, left corner

Space to add shelves



Jacqueline Matthews

# Rough Prototype



Fits into top, left corner

Space to add shelves

Open work space



Jacqueline Matthews

# Prototype

Galvanized Steel frame



Jacqueline Matthews

# Prototype

Galvanized Steel frame



8 wheels for linear movement

Jacqueline Matthews

# Prototype

Galvanized Steel frame

Screw

8 wheels for linear movement



Jacqueline Matthews



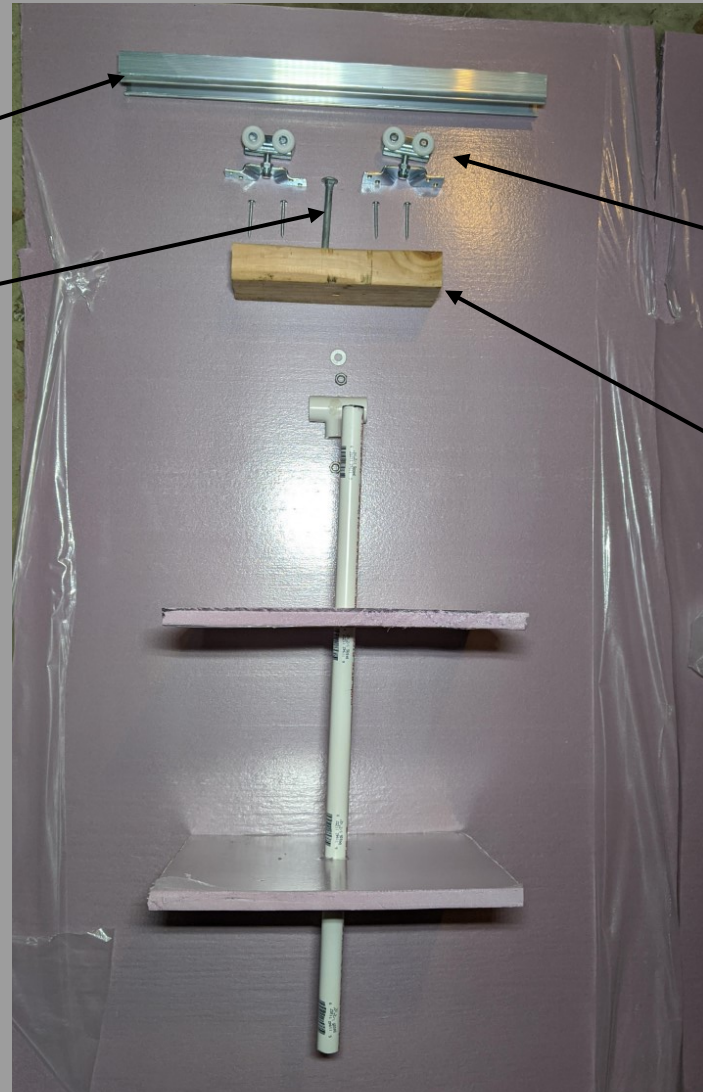
# Prototype

Galvanized Steel frame

Screw

8 wheels for linear movement

2"x4" wood for attachment



Jacqueline Matthews

# Prototype

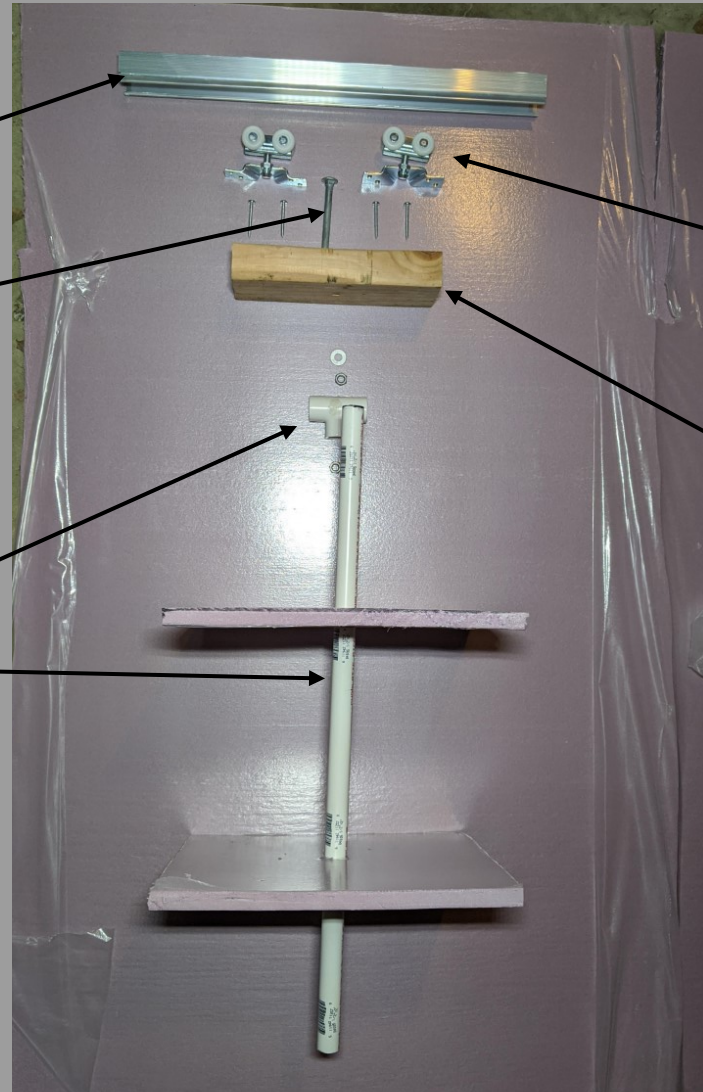
Galvanized Steel frame

Screw

PVC pipe and fitting

8 wheels for linear movement

2"x4" wood for attachment



Jacqueline Matthews

# Prototype

Galvanized Steel frame

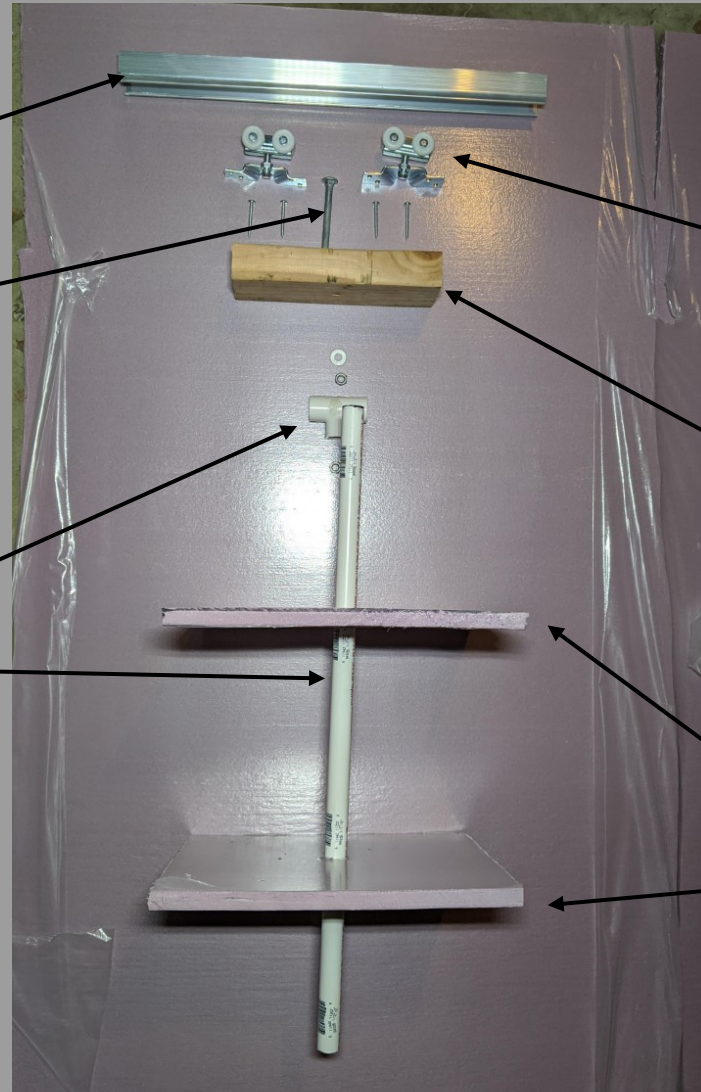
Screw

PVC pipe and fitting

8 wheels for linear movement

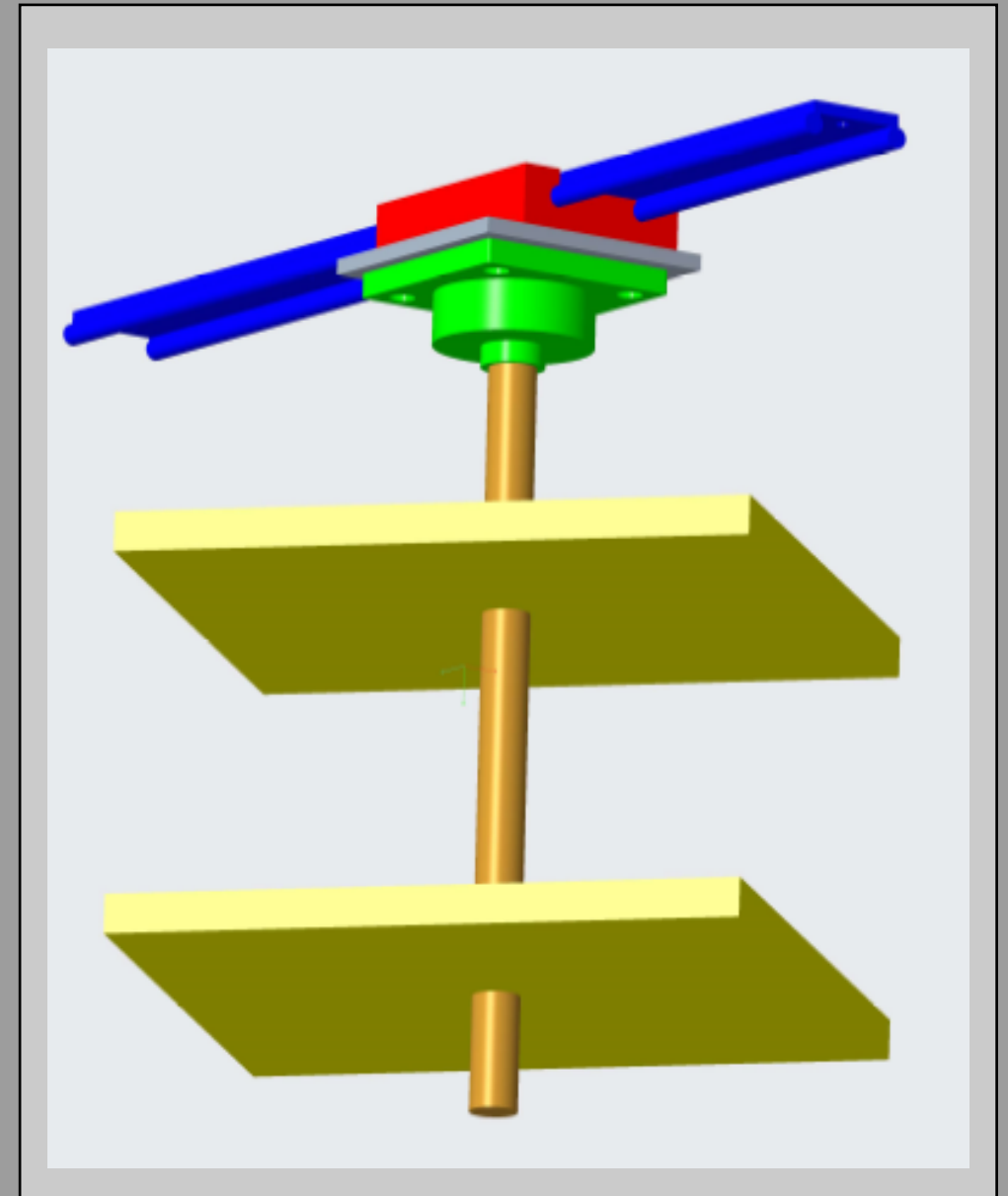
2"x4" wood for attachment

12"x12" foam board



Jacqueline Matthews

# Final Design



# Budget

\$1,000

# Future Work

- Purchase materials
- Build final design
- Test and validate targets



# Test and Validate

Category	Targets	Metrics
Quantitative	Cost	Budget of \$1,000 USD
	Dimension	7in x 10in x14in
	Weight	~10 lbs
	Carrying Capacity	~40 lbs
	Longevity	The life of the glovebox (~40-50 years)
Qualitative	Functionality	Surface area gained by storage solution (1ft <sup>2</sup> )
	Wall Support	Screw fasteners or magnets
	Usability	Storage solution within the back of the glovebox wall for easy reach (1.5ft)
	Material	Stainless Steel and/or Aluminum

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# Summary



# References

- Cleartech. “Inert atmospheres glove box.” *Cleatech.com*, 2018, 31 January 2020.

<https://www.cleatech.com/inert-atmosphere-glove-box/>

- Inerttechnology, “Gloveboxes.” *Inerttechnology.com* , 31 January 2020.

<https://www.inerttechnology.com/gloveboxes/>

# Questions



# Team 502

- Jacqueline Matthews

[jrm16b@my.fsu.edu](mailto:jrm16b@my.fsu.edu)

- Micheal Rodino

[mar15x@my.fsu.edu](mailto:mar15x@my.fsu.edu)

- Evan Ryan

[ecr15b@my.fsu.edu](mailto:ecr15b@my.fsu.edu)

