

# P21011: CHAD for Toilets

## Comfortable Handicap Assistive Device



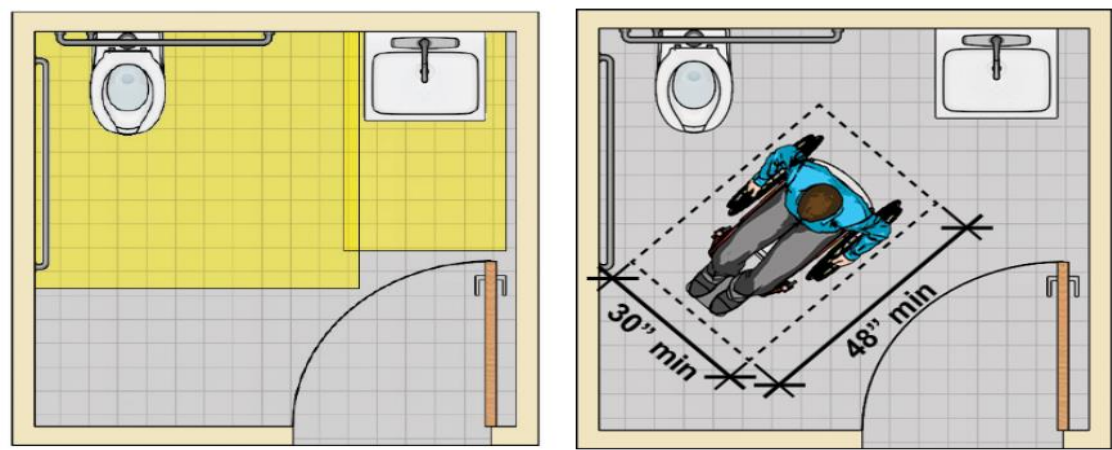
Current public and at home restroom facilities are expected to accommodate the needs of any user. Unfortunately, wheelchair users with little to no lower body mobility still encounter issues when using designated handicapped facilities. The process of using the restroom can take them upwards of 1 hour, and the support required to be installed in these restrooms by the ADA is not enough to support the user.

### Customer Requirements

- Safe to use with little to no risk of injury
- A hygienic transfer process
- Compatible with both public and private restrooms
- Visually appealing to the user

### Engineering Requirements

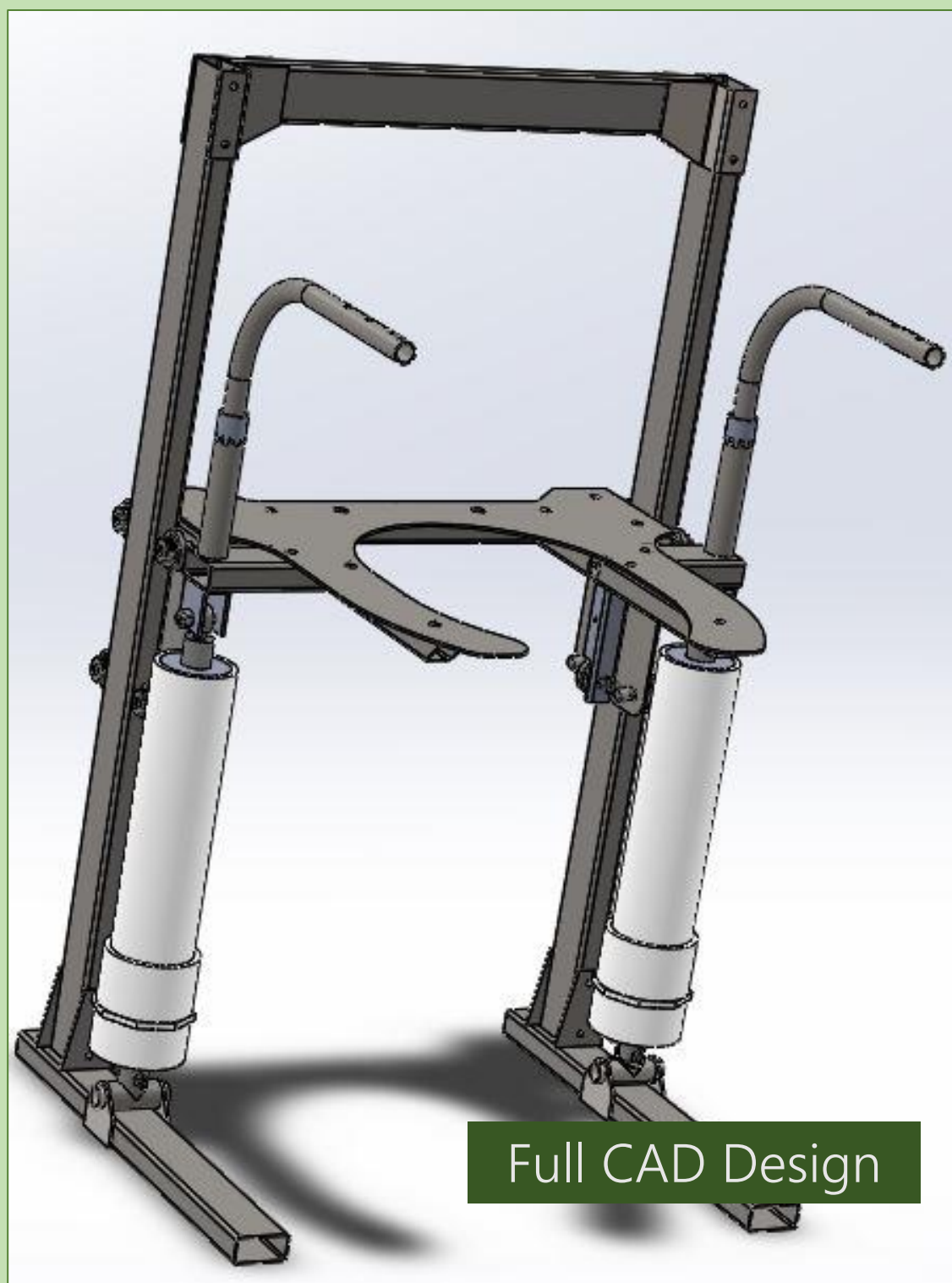
- Adjustable seat height starting at 23in. and raising to a max of 30in.
- System supports a weight of maximum 400lbs
- System seat can raise or lower at a max velocity of 2in/sec
- Meets ADA requirements



The Assembled Device

### Concept

Our goal is to design a functioning hydraulic powered seat lift that is easily installed over any toilet. It will vertically raise and lower the user as needed to aid in the transfer process from wheelchair to toilet and support them during the restroom process.



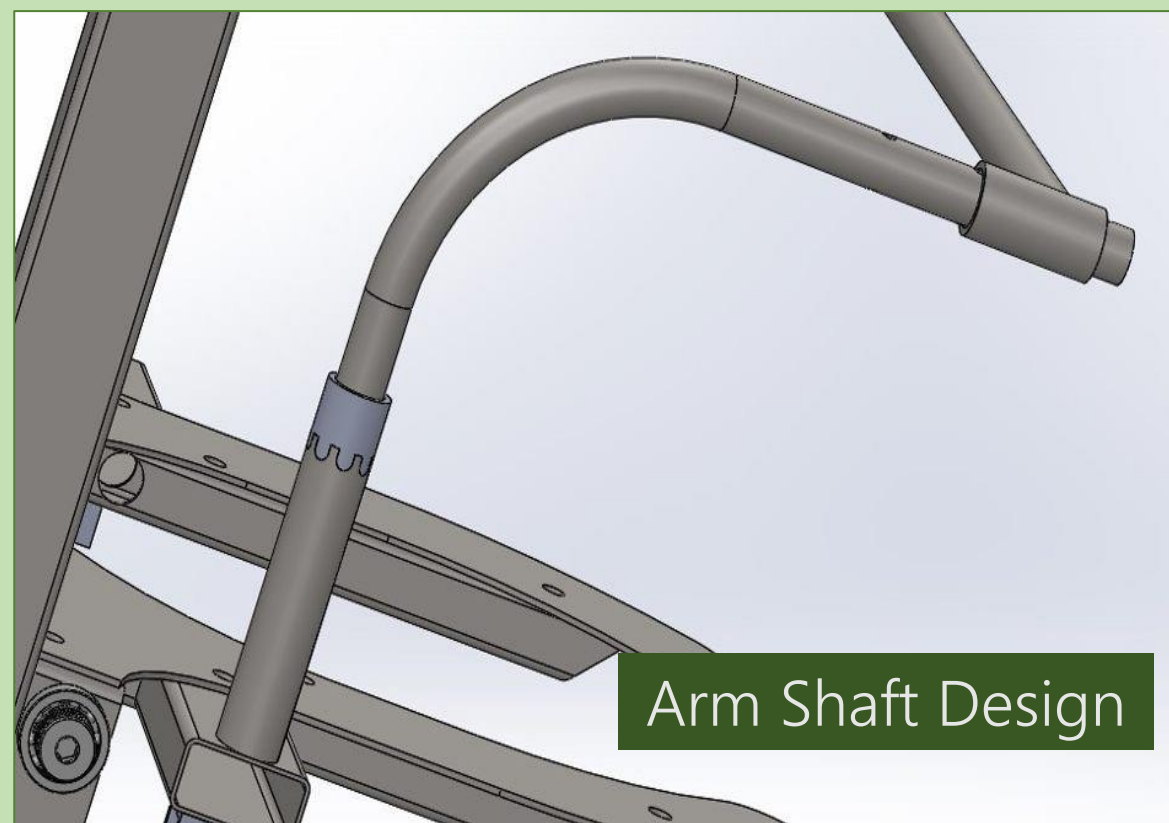
Full CAD Design



Weight Capacity Testing

### Testing

1. Test the hydraulic system's lift and lowering functionality
2. Test the device's ability to function under a variety of loads
3. Test the maneuverability of all moving parts
4. Use naturally anti-microbial material such as steel and aluminum studied previously



Arm Shaft Design



L-R: Cam Slenker – Welding, Jared Moore – Mechanical Engineering, Gina Wilson – Mechanical Engineering, Kaylie McEntire – Biomedical Engineering, Hannah Husarek – Mechanical Engineering, Chad Wake – Mechanical Engineering, Kimberly Gomez – Industrial Design (not shown)



### Design

- The hydraulics are composed of a piston that is connected to the seat plate to lift the user, a puck and spacer, and a cap for sealing in the water at high pressure
- Our arms are made to be easily lifted and locked into 8 different positions
- The full CAD design includes the seat plate we machined from aluminum, the steel frame and arms, and the hydraulic system including the pressure valve
- Sealant is used to ensure the device does not rust, and padding was added to the arms for comfort



**Kate Gleason** College of Engineering  
**Multidisciplinary**  
**Senior Design**

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