

# Wheelchair Seat Elevation Mechanism

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## Abstract & Background

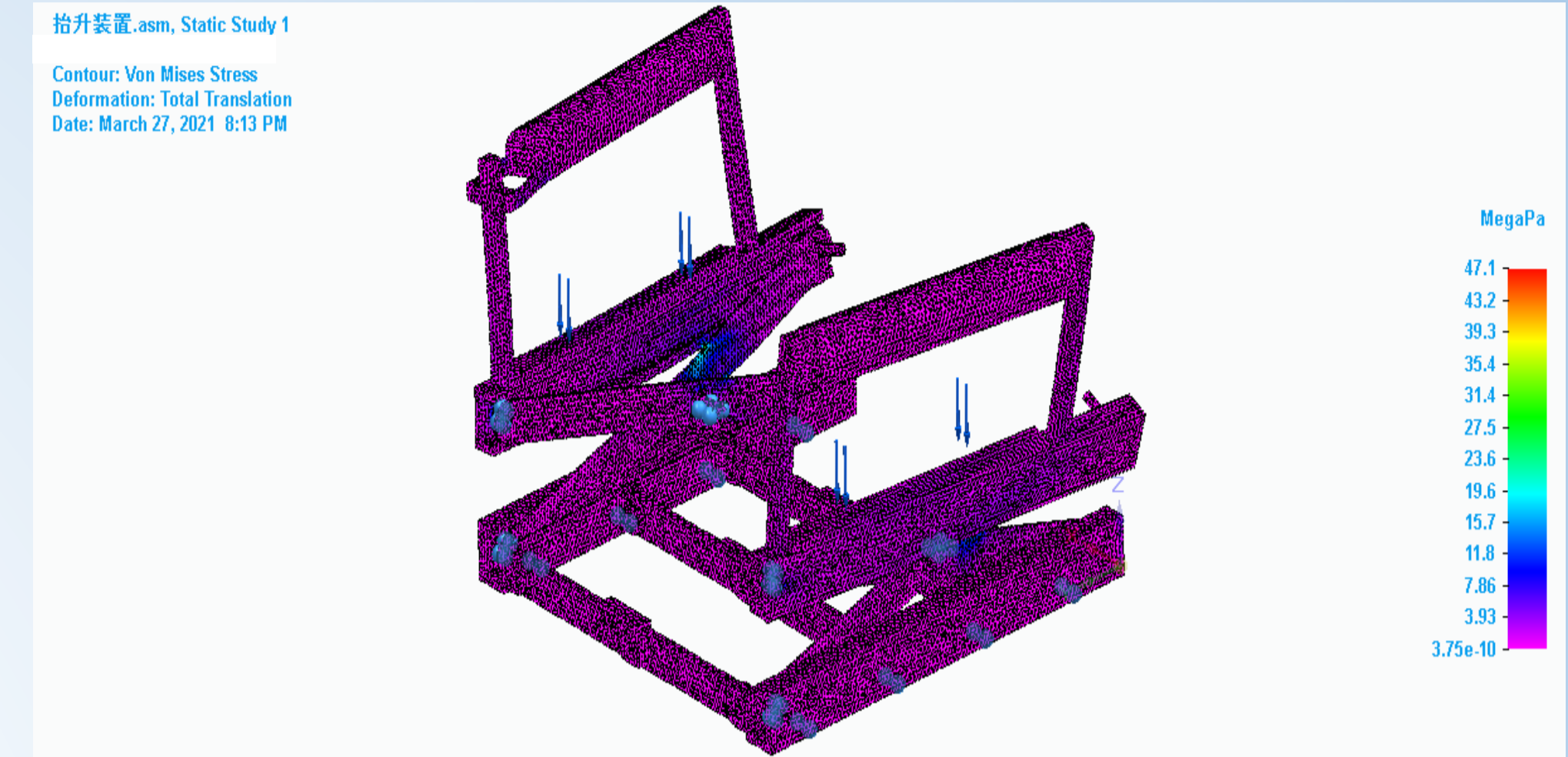
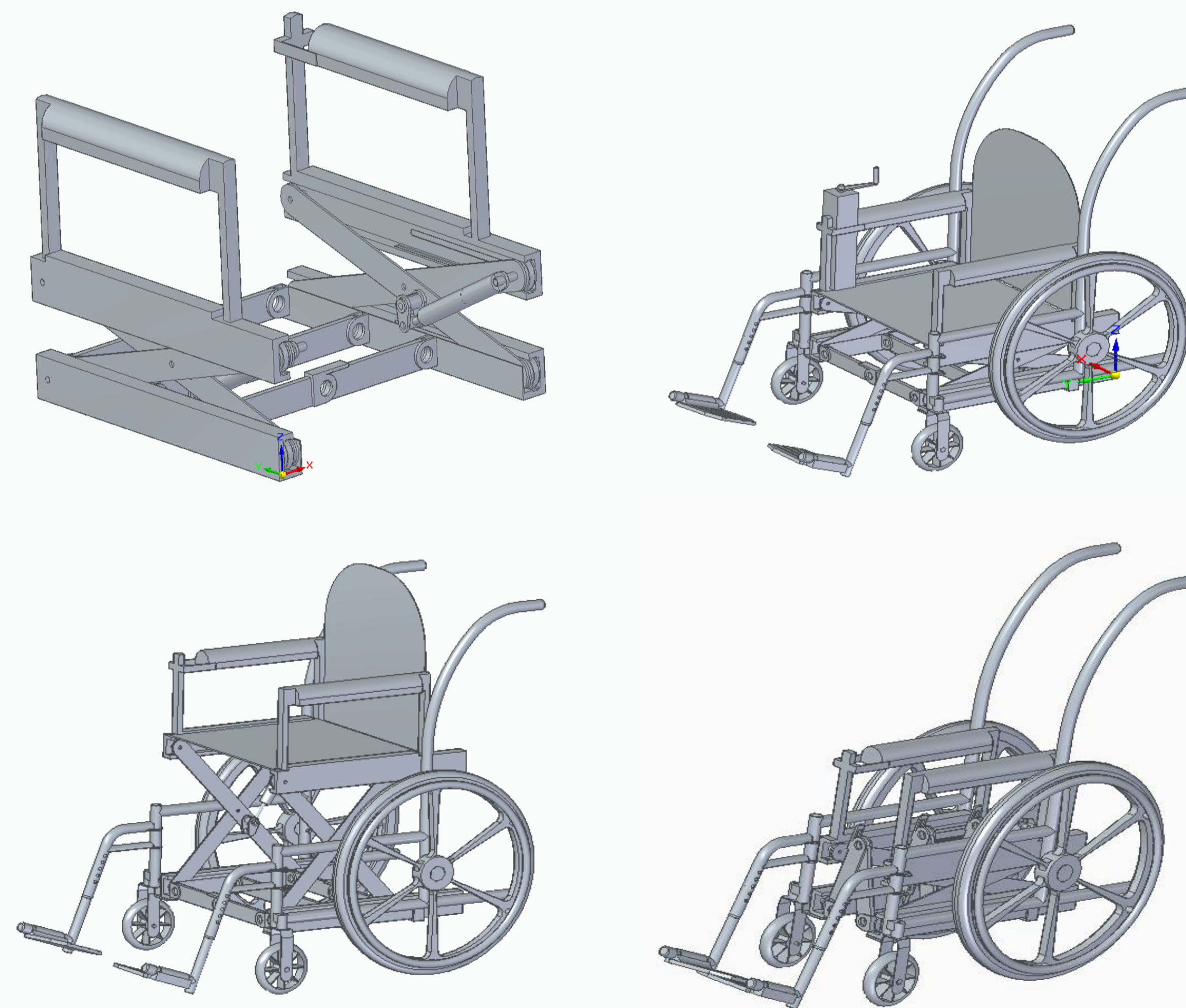
The topic of the project is to develop a manual wheelchair seat elevation mechanism. There are 200,000 manual wheelchair users in Canada. For them, a wheelchair is a mandatory daily tool. Current manual wheelchairs have fixed seat which limit the users' reaching range. By applying the elevation mechanism, the accessibility of the wheelchair will increase dramatically. The possibility of injuries will also reduce. Consider that the manual wheelchair users are upper body muscles capable, therefore, they can manually operate the mechanism.

## Project Objectives

- To develop a mechanism that allows user to manually adjust the seat height.
- Foldable.
- Affordable.

## Methods/Process

- Produce CAD drawings for all the components.
- Choose proper lifting structure.
- Select appropriate power method.
- Demonstrate the calculation for the maximum force the frame needs to withstand.
- Perform FEA to test the rigidity of each component of the mechanism.
- Select proper material for the mechanism.
- Construct a prototype with 3D printing.



## Results & Outcomes

- Scissor lifting structure.
- Two Hydraulic Cylinders - Lifting Capacity: 113kg per cylinder and Weight: 10kg.
- 300 mm Lifting Range.
- 150kg Design Lifting Capacity.
- Reduce 20% required force by applying energy storage mechanism (from 62 N to 48 N).
- 30 kg overall weight.
- \$400 for the mechanism.
- Remain foldable by redesign the structure.

## Conclusions

- Purely manual operation.
- Energy Storage Mechanism (Reduce required operational force by 20%)
- Increase overall accessibility
- Remain foldable
- Affordable for the majority of wheelchair users

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