

PROJECT FOUR: MILESTONE 4 – COVER PAGE

Team Number: Tues-26

Please list full names and MacID's of all *present* Team Members

Full Name:	MacID:
Jackson Lippert	lippertj
Borna Sadeghi	sadegb1
Ahmed Mohamed	mohaa97
Andrew Krynski	krynskia

MILESTONE 4.1 – REFINED PROTOTYPE + PROTOTYPING TEST PLAN

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1. Take picture(s) of your refined prototype.
 - Insert your photo(s) as a Picture (Insert > Picture > This Device)
 - **Do not include more than two pictures per page**

Insert picture(s) of your previous prototype(s) below.



*Limit screenshots to no more than 2 per page. For additional screenshots, please copy and paste the above on a new page.

Insert picture(s) of your refined prototype below.

ENGINEER 1P13 – Project Four: *Power in Community*



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2. Include details on how design concept was refined (what feedback was incorporated, what features are different than previous refined concept (initial prototype), etc.).

To increase stability of the design, a second castor wheel was added to the design in order to eliminate the twisting motion on the axis track. A non-slip pad has been added to replace the clamp in order to reduce the amount of force needed to hold the system in place, also allowing for it to be used on multiple surfaces (tables, floors, etc.) A comfortable nonslip material was added to the armrest in an effort to relive the pain associated with staying in one position for a longer period of time.

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3. Create a detailed prototype testing plan. (Max 500 words)
 - Consider what is feasible with the resources you have
 - “Testing” can include analytic solutions such as hand calculations, motion simulations in Inventor
 - Explore what you might do if you had more time, money, tools, etc.
 - Use IEEE referencing if any research is done

*Insert your **Present Testing Plan** (how you would test your prototype with the resources that you have available).*

Non-slip test: Test ability of wheels and non-slip pad to stay stationary when they are supposed to

- Test the required applied force that would cause a locked castor wheel to slip out from beneath the user
- Test various angles as well
- Effectively, this is determining the coefficient of static friction of the rubber caster wheels
- Repeat for the non-slip pad to ensure that it doesn't shift

Centre of mass / stability Test: Test the maximum amount of force the axis track can withstand.

- With the help of Inventor and the stress test option find the centre of mass of the axis track and how much force will it require to break
- Physical test: Where we use our measurements to find the center point in the axis track and with the help of the pan-balance theory, the track will act as a balance and other materials will be placed on the side to help make sure if it's accurate or not.
- Re-test with all the side components connected to the axis track for a more accurate outcome.

Hinge torque test: Test the force at different distances from the hinge that is required to move the armrest

- Since the length of the lever arm changes with the distance between the armrest and the hinge, it may take a different amount of force to move the armrest about its hinge (more force is required the closer you are to the hinge)

- Examine the consistency and significance of the torque difference, and its effect on usability

Simulated Material Stress Tests: Use software to test the ability of different materials to withstand realistic stresses

- Using a variety of materials, run stress tests using Autodesk inventor to simulate real life strain on the designed components

For a future testing plan with alternate resources, we would use the client to have an accurate representation of how it would assist her in day to day life.

Client discomfort test:

- Have the client resume work on a surface of her choice without the device, and time how long she is able to remain in that position without taking a break
- Have the client use the device on the same surface and time how long she is able to remain in that position without a break
- Repeat on several different surfaces on different days to account for environmental variables

Design longevity test

- Record evidence of wear and tear on the essential parts (the hinges, the wheels, the arm rest) to determine a bottlenecking component (the one that wears out first)
- Examine the causes of wear (e.g. excessive force)

Paint interference test:

- Using a set amount of force, push the arm support down the track and measure the distance it can travel
- Paint the insides of the track and wait to dry
- Using the same amount of force repeat the test and measurement to see if the dried paint causes a significant impediment to the performance

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4. Fill out the table below, detailing each team member's contribution to this stage

Team Member's Full Name:	Contribution:
Borna Sadeghi	Further research on telescopic rails, and other existing methods we can use to move our armrest in two dimensions
Jackson Lippert	Worked on the refined prototype by carrying out the suggestions that were given last week.
Andrew Krynski	Testing descriptions and 3D modelling
Ahmed Mohamed	Physical Testing of centre of mass/ stress-strain for the concept

MILESTONE 4.2 – DESIGN REVIEW

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Include feedback from peers in this row.

- Make it easy to clean.

Include feedback from science students in this row.

- Material of the armrest should be soft and non-irritating, and take the weight of the arm
- Casters must not slip out of place
- Personalize the aesthetic of the design (e.g. a breast cancer ribbon) so that she feels like it was meant for her

If applicable, include feedback from the client in this row.