GNG2101 Deliverable-B

Portable Ramp - Group 11

Submitted by

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Introduction

The meeting with Austin and Jill provided our group with a clear understanding of the needs that must be satisfied by our design. At this point in the design process, we are translating what we learned from the client interview into a list of ranked customer needs statements. From there we will make a table of metrics which assigns units to the quantitative needs. Metrics will then be used to compare our ideas with those that already exist on the market through the process of benchmarking. Once we have researched similar products, we can develop target specifications which will set ideal values that we strive to meet in our own design.

1.0 Client Statements/Observations

Problem

- Wheelchair accessibility
 - Hiking obstacles (boardwalk [height of one step]), and some curbs
 - The hiking trail she mentioned this problem about was "BeaverTrail"... Field trip?

Characteristics of Solution

- PORTABLE
- LIGHTWEIGHT (to be carried or to be attached to the back of the wheelchair)
- COMPACT (Fits in a bag or a case)

Wheelchair

- o Permobil "Standard Chair"; M300 model; electric
- 488 LBS including our client Austin is sitting on it
- Footrest raises
- Measurements
 - Width: 2ft
 - Full Length(front wheel to back wheel): 3ft
 - Additional chair to feet: Max 2ft
 - Clearing between the floor and the base of chair: 3 ½ in
 - Height from the head of the chair to the base of the chair: 2 ft 2 ½ in
 - Width of backrest: ~15 in
- Shoulder straps (like on a backpack) can hang off the back

Concerns

- Austin falling off the side
 - Make it level and wide enough for a clearance
 - No slip

- Weather conditions
- Adjustability/flexibility
 - Ideas mentioned post-meeting:
 - Springs
 - Not too high
 - Lip of ramp connecting to the obstacle could be hazardous
 - Reduce the weight?
 - Tracks?

2.0 Customer Needs & Ranking

(Ranking scheme: The needs are ranked on a scale of 1-5; 5 being of critical importance)

#	Needs	Ranking
1	portable/modular	5
2	cost-effective	2
3	durable	4
4	lightweight	5
5	easy to operate	5
6	adjustable	3
7	compact	4
8	works in different climates	3

3.0 Problem Statement

A need exists to provide a lightweight, compact, portable ramp within \$100 that will enable Austin to access areas which are not otherwise accessible to people in wheelchairs.

4.0 Benchmarking

4.1 Existing Products

- 1. HOMCOM 2ft Wheelchair Ramp link
- 2. YardWe Heavy-Duty Curb Ramp link
- 3. Canhill uphill ramps link

4.2 Existing Product Ranking

Legend:



The cells will be coloured according to how well the products fulfill the needs. The colours are associated with a value (1,2 or 3) which will be multiplied by the rank of importance of the corresponding need to determine a total score by adding the cells in the column. The total scores will be compared at the end. The highest total score indicates the "best option". For example, the least expensive option will be coloured in green (3 points) and since the need to be cost-effective is ranked 2, that cell will obtain a value of 6).

Metric/Needs	номсом	HOMCOM YardWe	
Cost(\$)	139.99	42.04	163.87
Total Mass(kg)	11.19	3.04	11.02
Compact Size (in)	24 x 15.4 x 3.5	11 x 20 x 4	16 x 12 x 5
Extended Size (in)	24 x 28.3 x 3.5	11 x 20 x 4	16 x 12 x 8
Max. Load(Ibs)	600	2000	4000
Ease of use (Style)	Unfold & Put-Down	Place	Place & Turn wheel
Adjustability	Slightly	No	Yes
Thermal Resistance (W/m*K)	88-251	0.2-3.0	80-350
Total Score	60	65	62

5.0 Metrics

Needs Associated	Metric	Units
2	Cost	\$ CAD
1,4	Total Mass	kg
1,6,7	Size	in
3	Maximum Load	N
5	Set Up/Fold Down Time	sec
8	Thermal Conductivity	(W/m*K)

6.0 Target Specifications

#	Needs Associated	Target Specifications	Marginal Value	Target Value	Unit
1	2	Cost	<=100	<100	\$CAD
2	6	Width	>= 24	26	in
3	3	Maximum Load	>= 448	>600	lbs
4	1,4	Total Mass	<= 15	<7	kg
5	5	Setup Time	<= 60	<20	sec
6	8	Thermal Resistance	0 < R < 350	200	W/(m*K)

7.0 Reflection

Meeting with our client Austin and his mother Jill gave our group a clear idea of the problem at hand. Jill and Austin enjoy hiking but their fun is often limited by the obstacles prohibiting the wheelchair to pass. Boardwalks and sidewalk curbs are frequent barriers to our clients. Through conversation and asking open-ended questions, our group learned portability, ease of operation and being lightweight were notably the most important requirements. Once we ranked the entire list of needs statements, we derived a corresponding list of metrics to give us the proper lenses while researching previous attempts made to satisfy these needs. Upon completing benchmarking, the top-scoring product was Yardwe. Therefore we determined this would be a good model to base our design on since it fulfills the majority of the needs. In the near future, we will utilize this document to screen our design ideas leaving only the most feasible, favourable designs.