Deliverable D - Detailed Design, Prototype 1, BOM, Peer Feedback and Team Dynamics

GNG 2101- Introduction to Product Development And Management For Engineers

Submitted by

Section A, Team 7

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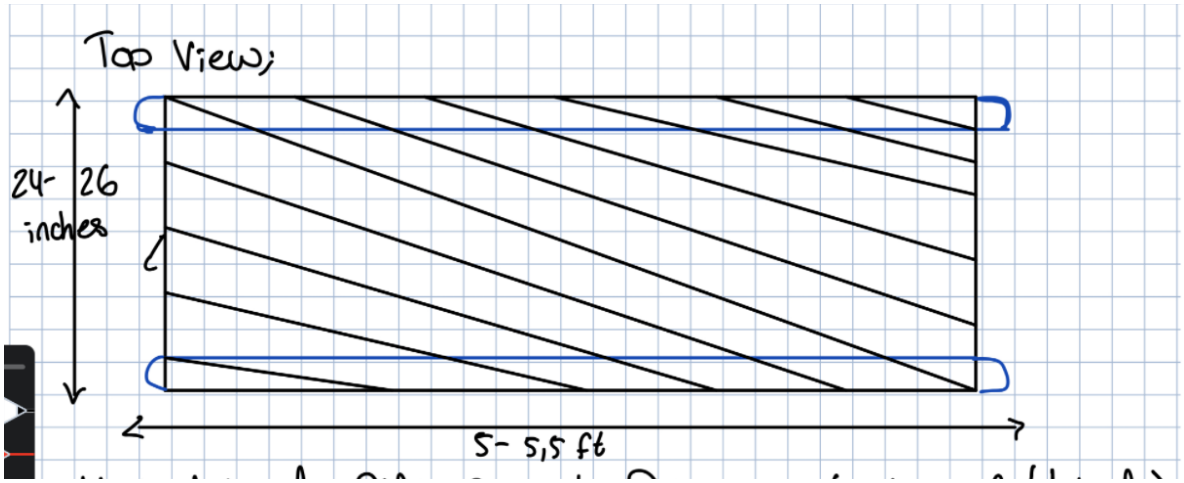
1. Summarize the client feedback that you received during your second meeting for your conceptual design and clearly state what needs to be changed or improved in your design.

Here is the information that was gathered from the second client meeting that occurred last Wednesday, the 30th of September 2021:

- Really likes concept 1.2 a lot
    - Stretcher piece is good
    - Concerns about the stability be with the way the legs are anchored
- Prefered a cot like change table than a foldable table (risk of it being too heavy and
- Concept 2.3
    - Mesh is great, lightweight, drys quick, easy to clean,
    - Concerns about the weight support
    - Can it accommodate for weight over time without stretching too much
    - Bar under to stop deformation
    - Webbing like what seat belts are made of
- Concept 3.1
    - Concerns about the overall weight of the table
    - Cushions are not necessary at all
    - Mesh or canvas are better seating materials
- sturdy than lightweight and portable)
- The clients would like to prevent the material from sinking over time
- Prevent the use of seatbelt fabric (heats up very quickly/easily)
- The clients prefer the change table to be lightweight over comfort (ie. prioritize lightweight over comfort)
- Cushions are not necessary for the table
- Changing is the main function of the table, stretching is secondary
- Accommodate for leaving in a car (preventing it from heating up inside a car during the summer)
- Preferably less than 24-26 inches in width.
- Maximum weight of the table is 10 pounds, can be more if there are wheels attached

From this client feedback, we understood that some of the characteristics of the concept had to be changed. We removed the idea of cushions being on the change table to the clients request. The team also did a lot of fundamental changes to the previous design based on the client's feedback. The overall design was swapped from a sturdy three piece folding change table to a two way folding change table. We also decided on a material of the change table, it being PVC Coated Polyester. This material accommodates the user because it is waterproof and latex proof. Also, by changing the material and design of the table, the overall weight of the new design is more lightweight and portable. With the feedback obtained from the clients, the team was able to update the change table design in order to accommodate the client's needs to a more accurate degree than previous.

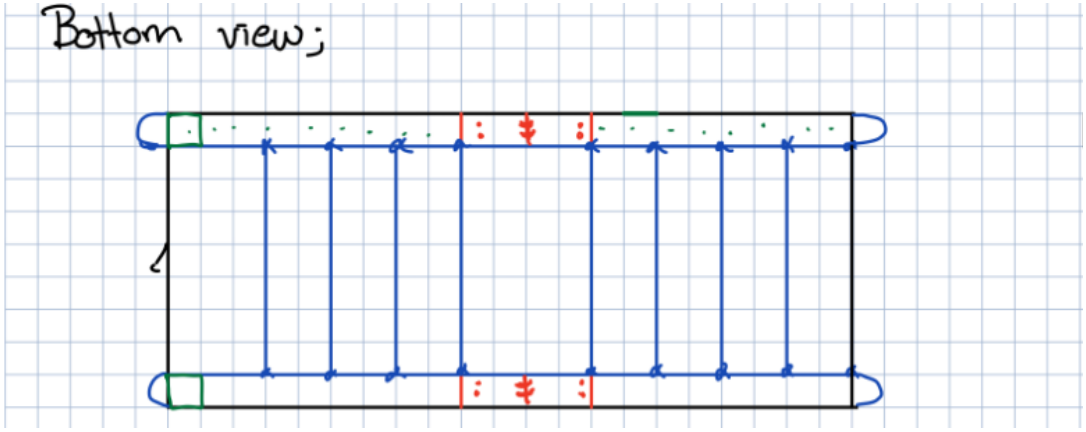
2. Develop an updated and detailed design of your concept, based on your client meeting,



-Mesh Material: PVC Coated Polyester (waterproof, latex free)

-Aluminum rods on the side to hold the mesh in tension

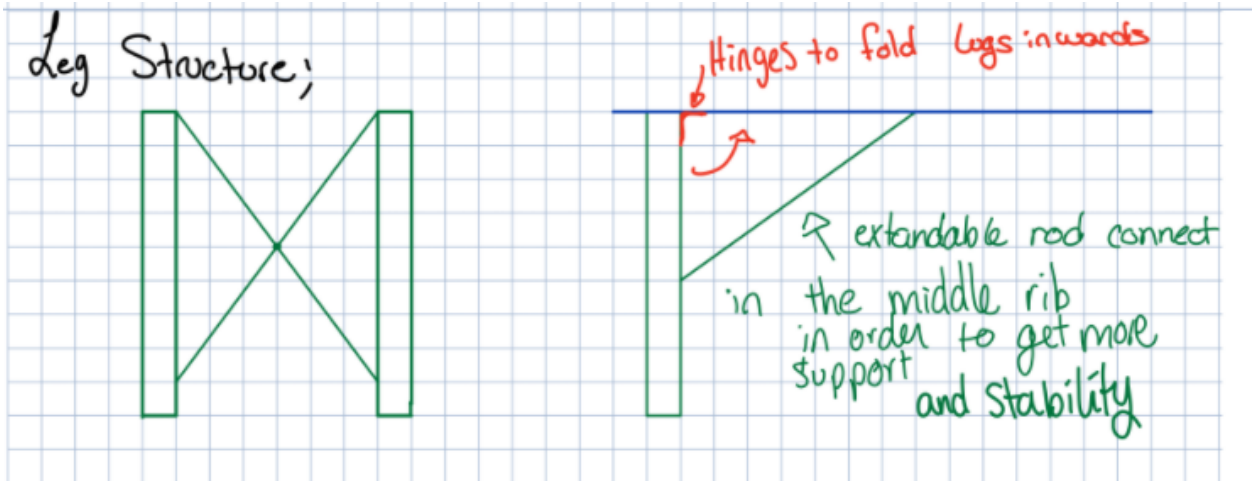
-24-26 (60.96 -66.04 cm) inch wide for 5-5.5 ft (152.4-167.64 cm)



Metal rods soldered to the Rods on the side in order to hold the mesh in tension , while reducing the sinking effect to its maximum and providing back support.

2 hinges in order to fold the table in two.

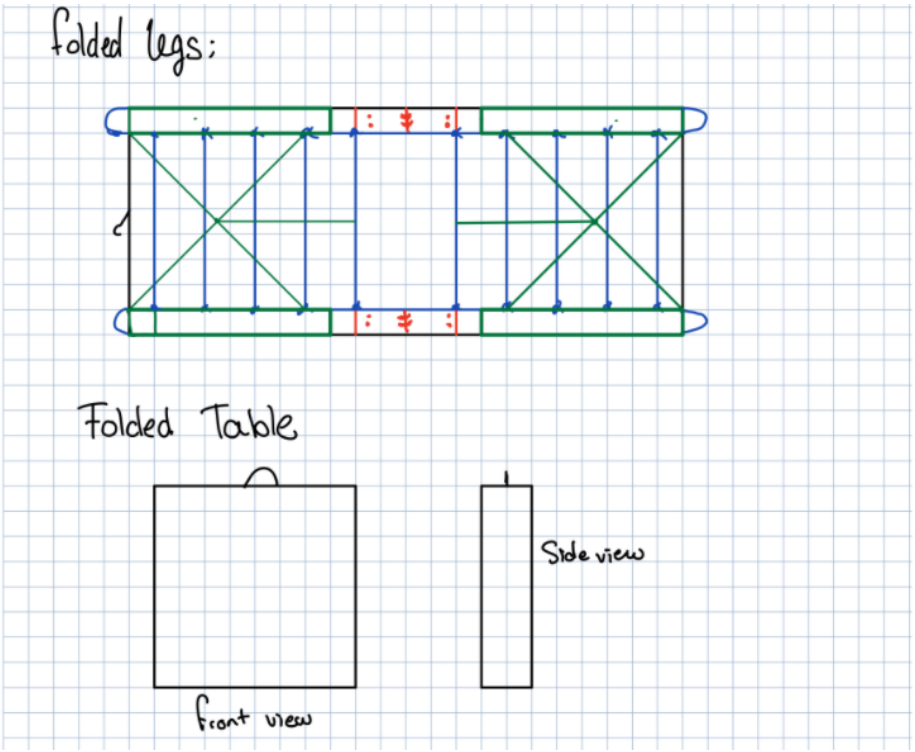
A hook in order to keep the table closed when needed.



X-structure for stability. This will be achieved with aluminum rods that will be soldered to the corner of the legs.

The legs will be connected to the frame with hinges in order to let them fold out and fold back when done.

The legs will also support the middle of the frame with a periscopic rod that will extend until the legs are fully extended and locked in place. This will help with stability and will distribute the weight all over.



The rod in the middle will shrink allowing the legs to fold in and lock in place, the hinges will then unlock allowing the table to fold in half and the small hook on the side will hold the table in its closed position.

3. Define your most critical product assumptions such as the acceptable values for a spec, availability of material, or a critical functionality.

Target specifications:

Client Needs	**Target specification**	**Range of acceptable values**	**units**
Need to support 60kg	**60kg load**	**50 <load<70**	**kg**
Can be hung on the chair or carried like a backpack	**weight**	**3.6 < Weight < 4.5**	**kg**
Assembly Time	**Under 5 minutes**	**3<setup time <5**	**min**
Height of change table	**58 cm**	**56 < height < 60**	**cm**
Width of change table	**56 cm**	**54 < width < 58**	**cm**
Length of change table	**168 cm**	**166 < length < 170**	**cm**
Firm, water resistant Material with no latex	**40% RH**	**30 < RH < 50**	**Relative humidity**
Folds flat	**180 deg**	**170< deg <190**	**degrees**

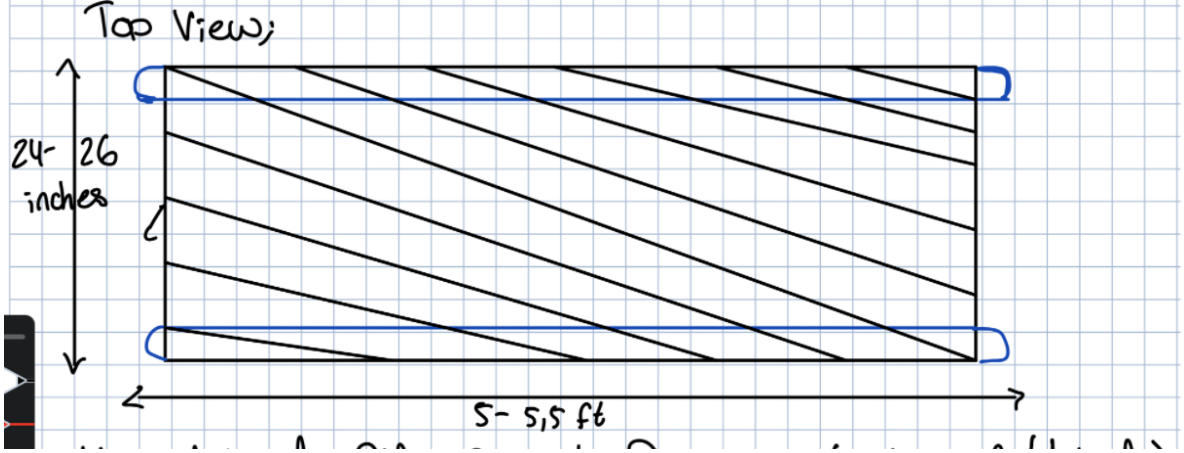
Availability of material options:

Material sourcing : RONA, Home Depot, Amazon, Makerspace

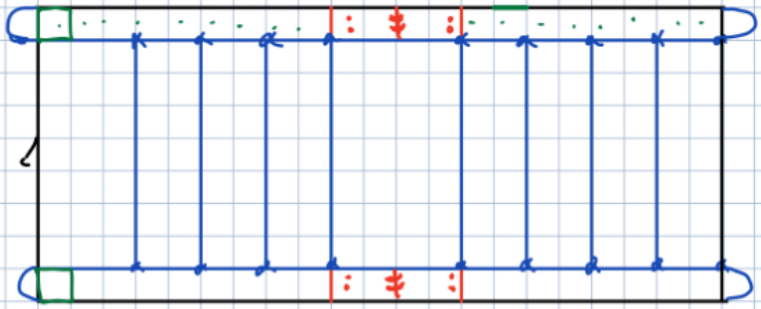
Critical functionality : The prototype will meet target specifications listed above.

4. Create your first product prototype that will be used to test those assumptions.

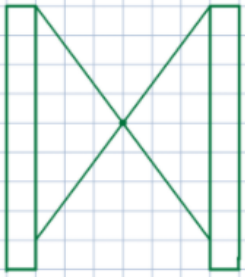
Top View;

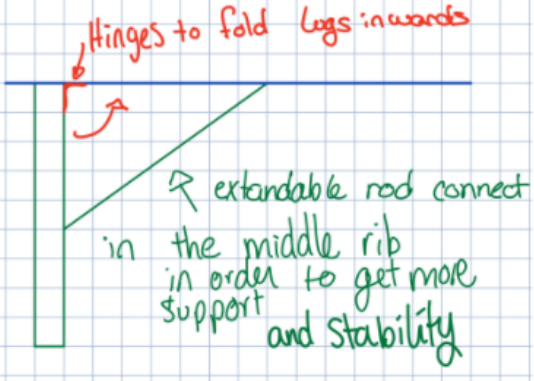


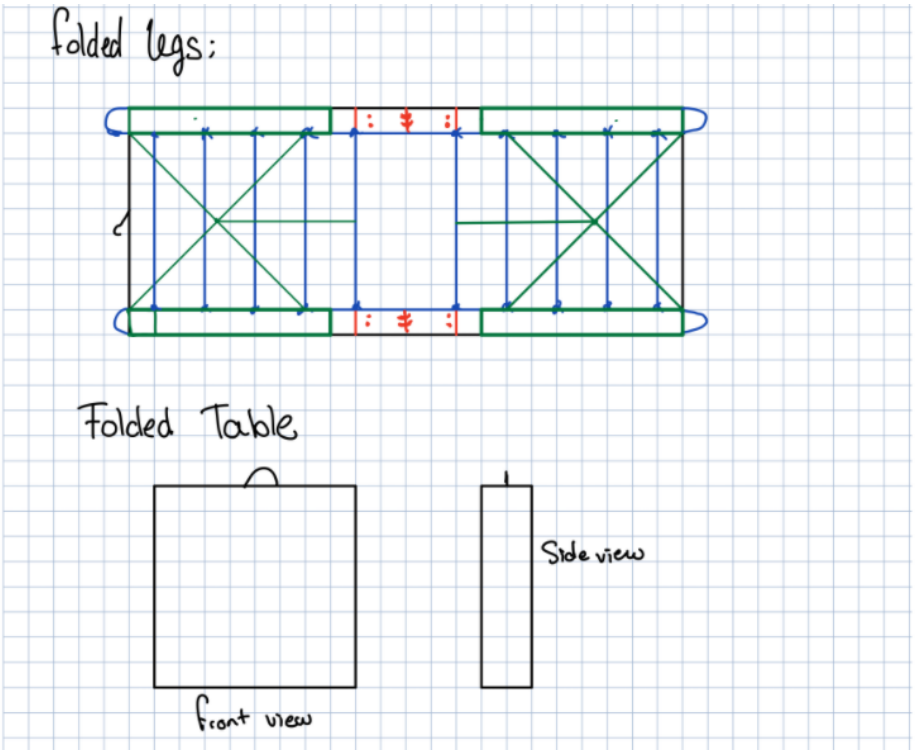
Bottom view;



Leg Structure;







5. Document your prototype using as many sketches/diagrams/pictures as required and explain the purpose and function of your prototype.

The purpose of this prototype is to give a visual representation of our end product so that the client can give their feedback on it. It is also an analytical model which we can easily make revision for future prototypes. The function for this prototype is to define what parts will be involved in our product and simulate full assembly performance under load, and simulate assembly time and process.

6. Carry out prototype testing, analyze and evaluate performance compared to the target specifications developed in Project Deliverable B and document all your testing results. Your target specs can evolve from PD B. Present your testing in an organized, tabular format that shows expected versus actual values. Important reminder: Every prototype you create must have a purpose and must be tested. What product assumption is each prototype trying to verify?

We will create the solidworks assembly and test the stress and strain of the junctions under load specified in

the target specifications, as well as the functionality of the assembly along with its ability to adequately compact or store.

Need to support 60kg	Can be hung on the chair or carried like a backpack	Assembly Time	Width of change table	Height of change table	Firm, water resistant Material with no latex	Length of change table	Folds flat
yes	**yes**	**Less than a minute**	**24-26 inches**	**28 inch**	**yes**	**5,5 feet**	**176 deg**

7. Outline what your team intends to present to your client(s) and what information you would like to gather at your next client meeting.

Our first prototype will be an analytical model in solidworks. In the next client meet,we will ask the client to give us more details about the following:

- Material used- pvc acceptable?
- Stability established 4 legs or 8 legs?
- 1 support beam or two through the middle of the table?

8. Provide a detailed preliminary bill of materials and parts (BOM) for your final prototype

Item	Quantity	Cost per item($)	Total Cost($)
Metal Rods	12(3 set)	43.00	129.00
Aluminium rods	3	5.30	10.59
PVC Coated Polyester “bed”	1	33.67	33.67
washers	20	3.38	3.38
Bolts	160 pieces	19.19	19.19
Total Expected Cost (Without Tax)			195.83$

References:

https://www.amazon.com/Telescoping-Legs/s?k=Telescoping+Legs

https://www.amazon.ca/Inches-Height-Adjustable-Office-Furniture/dp/B07JR33TJC/ref=sr_1_1_sspa?dchild=1&keywords=Adjustable+Table+Legs&qid=1633641090&sr=8-1-spons&psc=1&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUEyTkU4RkY2OUI4U09HJmVuY3J5cHRlZElkPUEwMDU1NzcxMjY3NzRSUzY5U1NJVyZlbmNyeXB0ZWRBZElkPUEwNzAwMDgwMVYwWENPSUJMMUY3TCZ3aWRnZXROYW1lPXNwX2F0ZiZhY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvZ0NsaWNrPXRydWU=

https://www.canadiantire.ca/en/pdp/hillman-flat-head-square-drive-wood-screw-zinc-8-x-1-1-2-in-1611028p.1617490.html#store=174 - screws link, canadian tire

https://www.canadiantire.ca/en/pdp/bow-cpvc-pipe-0631902p.html#srp
https://www.canadiantire.ca/en/search-results.html?q=aluminim%20rod - aluminium rod

https://www.amazon.ca/Waterproof-Fabric-Material-Neotrims-Upholstery/dp/B07PBWQBP6/ref=asc_df_B07PBWQBP6/?tag=googleshopc0c-20&linkCode=df0&hvadid=430917603310&hvpos=&hvnetw=g&hvrand=6656602977576168070&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9000662&hvtargid=pla-820575473217&psc=1 - pvc fabric

https://www.canadiantire.ca/en/pdp/plumbshop-flat-washers-assorted-0630624p.0630624.html#store=174 - washers

https://www.canadiantire.ca/en/pdp/hillman-pan-head-stove-bolts-assorted-160-pk-1617340p.html#srp - bolts