uOttawa

TIC PROTECTION

Project Deliverable D: Detailed Design, Prototype 1, BOM, Peer

Intro. to Product Dev. and Mgmt. for Engineers

GNG 2101 A02

Group A6

Ritaj Abdoulla 300063032

Ethan Parkhouse 300185929

Eric Wan 300194673

Etinosa Amadasu 300208545

Date Submitted: October 7, 2021

D.1 Detailed design, prototype 1, and BOM. As a group:

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.

Summary

- The client is worried about materials like “terry cloth” being less breathable however the client is yet to test the material.
- The client is concerned that Silicone being fitted on the palm of the gloves would get uncomfortable after a while.
- The client stated a preference for the polyethylene spandex fiberglass palm however the client is yet to test the material.
- The client approved of the aesthetic choices of Erics design so we would try to work on this.
- Client approved of the exposed fingertips concept design.

Improvements

- We decided to have the padding sown unto the knuckles with a piece of cloth instead of being attached directly for practicality and aesthetic reasons.
- The entire front of the glove is covered in the abrasion resistant material instead of just the palm.
- Exposed fingertips in accordance with the clients wishes and to make it more breathable.

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

Overall Design

Subsystem 1 - Rubber material

For the palm region of our first prototype we decided to embed a rough rubber textured material for the purpose of preventing cut, burn or heat related injuries. This system is expected to be good at preventing injuries, but our concern is that it might affect the breathability, weight, and movement of the glove.

Subsystem 2 - Breathable Cotton material

We decided to test out a polyester/ cotton material for everywhere other than the palm and knuckle regions. This material should prove to be breathable, lightweight, and easy to clean.

* The green colour is just a placeholder and not final

Subsystem 3 — Knuckle protection

For the knuckle region we've decided to add memory foams that is extremely soft. We hope that this will prevent the client from knuckle dislocations. We will add this material by stitching it inside breathable cotton material then onto the glove itself.

We expect this subsystem to not affect other subsystems. For example, destroying the shape of the glove during the stitching process. We shall proceed with extra care.

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

- Would be able to be worn in both winter and summer therefore it should either be thermo-adaptive or thin enough to wear winter gloves over
- The padding should be hard enough to absorb the force from hitting surfaces without hurting the client while being small enough to be visually discreet.
- We are assuming we would be able to purchase the paddings and the textile to make the body of the glove from stores near the campus.
- We are assuming that having extra padding on the gloves would not feel bulky or uncomfortable for the client.
- Material on the palm should have an R-value(insulation) large enough to protect from a hot cooktop.
- Padding should be able to absorb enough force to prevent pain and dislocation on the knuckles.

4. Create your first product prototype that will be used to test those assumptions. Important reminder: The objective of your prototype is to validate the assumptions you have made about the product and your prototype must be used test these assumptions.

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

Figure 1: Palm view of the prototype

Figure 2: Back view of the prototype

Figure 3: How the knuckle padding was stitched on

The main goals of this first prototype was to test the different material as well as the overall shape and design of the glove. The breathable fabric in yellow was chosen due to the light but durable fabric. The rubber on the bottom of the glove is extremely cut resistant, as well as slightly heat resistant. For the first prototype we chose not to heavily focus on the heat resistance and will be adding much more protection in later models. The foam padding surrounding the

knuckles was stitched on to offer protection from blunt force and protect the client. More padding will be added in further prototypes but testing of the memory foam and location was the main focus for prototype 1. The glove also leaves the tips of the fingers exposed to allow the client to the ability to have full use of the fingers for their art.

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?

Function	Expected	Actual
Heat Resistance	>100C	Slightly below 100C, must add more padding to protect palms.
Blunt Force Protection	>800N	Not met. More padding must be added to protect hand/knuckles
Durability in washing	Machine Washable	Held up through the wash without losing integrity of design/fit
Fit of the glove	Up to client	No feedback yet
Cut Resistance	Index 2	The bottom of the glove is latex coated industrial quality. The material has a high resistance to both abrasions and punctures. Index not yet confirmed.

Measurements:
23 cm around the knuckles without the thumb
17 cm around the wrist
Around 6 cm for each finger

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.

We intend to present a physical prototype that roughly represents our initial concept. It will consist of cheap materials that will act as placeholders for the materials we intend to use for our final product. These placeholder materials include a pair of thin winter gloves, memory foam and other random bits of padding, sewing thread and the palms of a pair of construction/gardening gloves.

At the next client meeting, we would like to know how the glove fits and whether it needs to be made bigger or smaller. We would also like to know what materials or concepts the client likes and dislikes and what they would like us to replace it with. Lastly, we would like to conduct some basic tests to see what is functional and what needs to be improved.

8. Provide a detailed preliminary bill of materials and parts (BOM) for your final prototype, which will be presented to your project managers for approval and purchase. Include web links for each product in your BOM. You will be given up to $100 for the development of your final prototype only. Before making any purchases, you must review the following guide: https://en.wiki.makerepo.com/wiki/Purchasing_Guide.

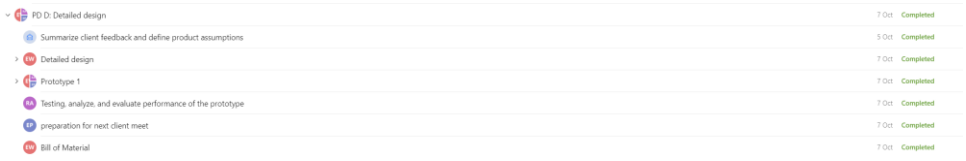
Materials needed for prototype III

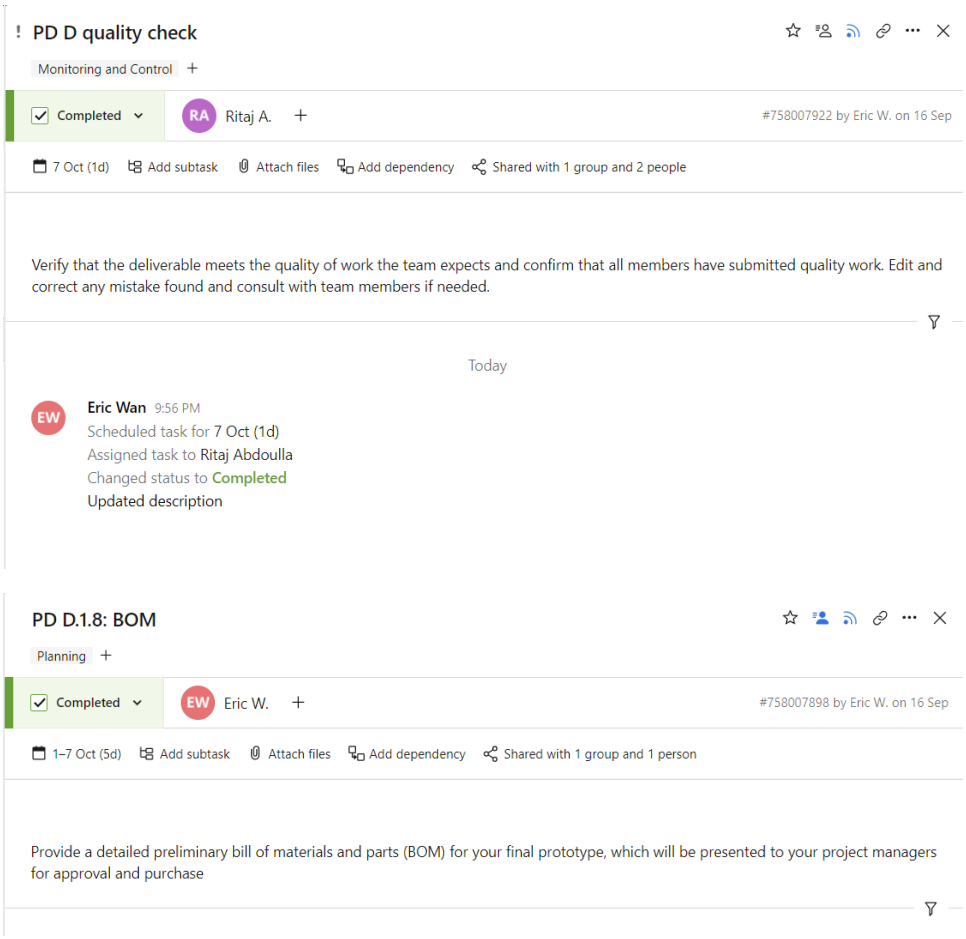
Item	Cost	Link to item
Polyethylene, spandex, and fiberglass glove	CDN$19.99	link
Memory foam	CDN$1.99	Found at Dollarama
Stitching Needles Kit	CDN$1.99	Found at Dollarama
Microfiber material	CDN$9.99	link
Rough rubber textured material	CDN$5.99	Found at Dollarama

*The final cost will be approximately $50 CAD after tax and shipping.

Project plan update: Wrike has been updated with new milestone, due dates, and task dependencies.

*Here are some screenshots




! PD D quality check
Monitoring and Control
Completed
RA Ritaj A.
#758007922 by Eric W. on 16 Sep
7 Oct (1d)
Add subtask
Attach files
Add dependency
Shared with 1 group and 2 people
Verify that the deliverable meets the quality of work the team expects and confirm that all members have submitted quality work. Edit and correct any mistake found and consult with team members if needed.
Today
EW Eric Wan 9:56 PM
Scheduled task for 7 Oct (1d)
Assigned task to Ritaj Abdoulla
Changed status to Completed
Updated description

PD D.1.8: BOM
Planning
Completed
EW Eric W.
#758007898 by Eric W. on 16 Sep
1–7 Oct (5d)
Add subtask
Attach files
Add dependency
Shared with 1 group and 1 person
Provide a detailed preliminary bill of materials and parts (BOM) for your final prototype, which will be presented to your project managers for approval and purchase