Deliverable H – Prototype III and Customer Feedback

GNG 1103[B]

B04-18

Jake Brown 300112518

Nathan Malench 300353993

Andrick Grant 300396296

Greyson Lee 300364983

Connor Harrison 300346496

Jonathan Swyer 300311549

November 26th, 2023

Table of Contents

List of Figures

List of Tables

For our next prototype we will be making a few changes, for example, we will be making our tester jig from the 3D printer and no longer wood to ensure accuracy and mimic the door hinges different sizes and backsets. We will also be taking some two-part members and creating them as one-part members to decrease the chance of breaking and eliminating the potential moving parts. Our C clamp arm will be becoming one part. We will add a metallic paint finish to our jig to give it an aesthetic finish. Our C clamp screw is perfectly flush and moves freely within our wanted constraints. We will then test these changes and confirm if they work. Then we will create the final prototype for the 4.5 inch and repeat the same design for the 5-inch jig.

Prototype III

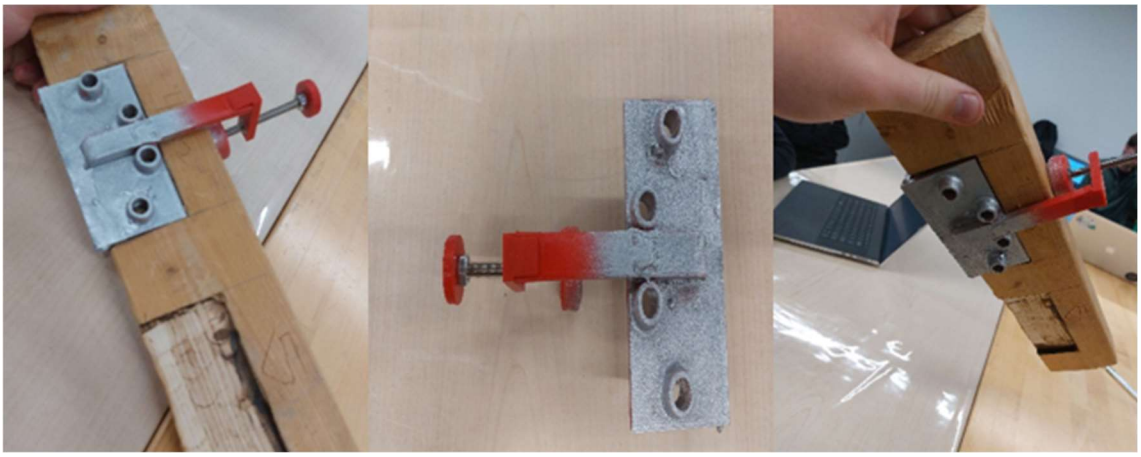

Figure 1: Prototype III in Action

Destructive section / Test:

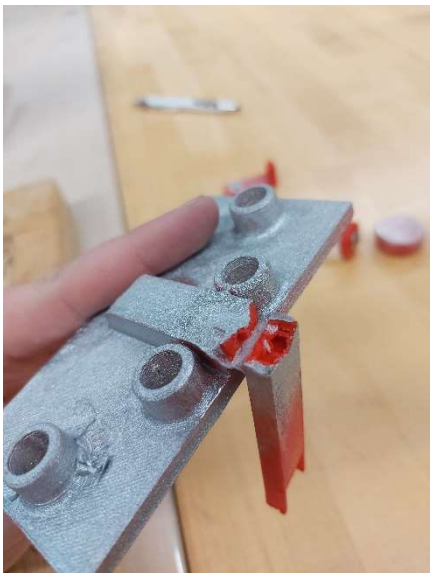

Figure 2: Destructive Testing Part A

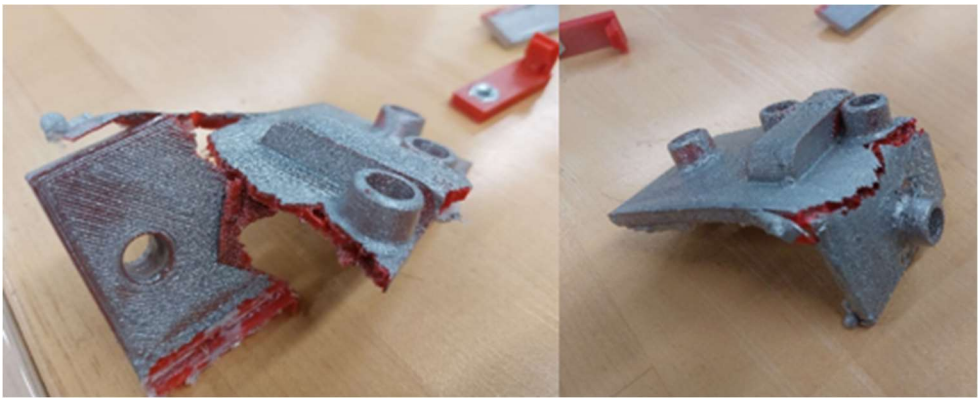

Figure 3: Destructive Testing Part B

Bill of Materials

Table 1: BOM for 4.5" Hinge Jig

Component	Workhours	Labour	Material	Material Cost	Total
Base	2.25 hours	N/A	PLA	2.35in3 (38.51 grams)	5.01

				x $0.13/gram [1]	
Base Plate	1.5 hours	N/A	PLA	0.69in3 (11.31 grams) x $0.13/gram [1]	1.47
C-Clamp Base	1 hour	N/A	PLA	0.18in3 (2.95 grams) x $0.13/gram [1]	0.38
Thumb Screw, Knurled 3/8-16x2.5L	N/A	N/A	Stainless Steel	1 x $19.00 [2]	19.00
Screw Head Mount for 3/8 thread	N/A	N/A	Plastic	1 x $1.5 [3]	1.50
				Total	$27.36

Table 2: BOM for 5" Hinge Jig

Component	Workhours	Labour	Material	Material Cost	Total
Base	2.25 hours	N/A	PLA	2.35in3 (38.51 grams) x $0.13/gram [1]	5.01
Base Plate	1.5 hours	N/A	PLA	0.69in3 (11.31 grams) x $0.13/gram [1]	1.47

C-Clamp Base	1 hour	N/A	PLA	0.18in3 (2.95 grams) x $0.13/gram [1]	0.38
Thumb Screw, Knurled 3/8-16x2.5L	N/A	N/A	Stainless Steel	1 x $19.00 [2]	19.00
Screw Head Mount for 3/8 thread	N/A	N/A	Plastic	1 x $1.5 [3]	1.50
				Total	$27.36

Updated feedback

The client feedback was very informative, the c-clamp idea was met with positive reception, but the screw mechanism that we 3D printed was suggested to be replaced with a real, store-bought screw that we could integrate into the 3d printed mechanism. This was because it would prove difficult to 3d print the threads accurately. The store-bought screw will have minimal effect on the overall cost.

Target Specifications

- Rigid (resistant to pressure from the drilling/tapping)
- Functional (fits the design criteria of both the 4.5” jig and the 5”.)
- Fits together, works when the screw is included.

Testing rig

Our first model testing rig was a plank of wood that is routered to the specifications of the 5 in and 4 ½ in hinges. It wasn’t a great way to test the jig as the wood had warped making the routing inaccurate and the depth uneven. When we made the testing rig, we eyeballed the

depth with a combination square, this mixed with the warping of the wood's surface caused the inaccuracies. When the jig was mated with the testing rig, it was established that a new method to test accuracy would be needed. We then devised the plan for a 3D printed test platform that would be more accurate and be able to tell us if our jig would be accurate while the older model would be used to test the drilling capability. The 3D model would be like the wooden model where it's a plank with a cutout for the jig with markings for the drilling holes of the 5 in and 4 ½ in hinges. Since it's 3D printed the precision will be much higher.

Testing Results

- screw test: screw functioned properly, exerted too much torque on the base, further designing of the base is needed.
- Durability: when subjected to repetitive force, the base of the jig snapped.
- Heat test: when subjected to an open flame, parts of the c-clamp arm melted.

Wrike Link

https://www.wrike.com/workspace.htm?acc=4975842&wr=20#/folder/1215239062/timeline3?viewId=202489442

References

[1] "3D printing Cost," MakerSpace, [Online]. Available: https://makerstore.ca/shop/ols/products/abs-per-gram.

[2] "Thumb Screw," Grainger, [Online]. Available: https://www.grainger.ca/en/product/THUMB-SCREW%2CKNURLED%2C3-8-16X2-1-2-L/p/WWG5PY38.

[3] "Hex Nut," McMaster-Carr, [Online]. Available: https://www.mcmaster.com/94052A046/.