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Abstract

For this deliverable, we will show the plan for the creation of the third prototype of our jig based on the customer feedback we received from the first and second prototype. To do this, we will go over the customer feedback and how we will fix the problems of the second prototype. Finally, this document will show how the third prototype will be useful for testing and finding the requirements for the final prototype.

Customer Feedback

Customer feedback was positive. However, the prototype lacked metal nozzles and cladding to protect the wood of the door. This did not make our ideas clear to the customer. We will be sure to make our final prototype with all those elements in mind so the customer can understand exactly what the product does.

Results from Prototype I and II

The results from the first prototype were overall good and also provided some flaws within the design to be fixed for the following design. Overall the general shape and sizing of the first prototype was good. The prototype was made for the 5 inch hinge, while a model for the 4.5 inch was made as well. Since the prototype was the 5 inch hinge it was able to be tested with the door frame at Ambico and the sizing of the jig is good. Another good quality of the prototype was that the offset lengths of the u shape was very good since the longer side can easily be hooked onto the door frame and the shorter side does not get in the way of it. The handle is also a good quality of the jig since it is able to easily be pulled across the door with one hand. The handle design is simple making it easy to use and understand which may help with the workers willingness to use the jig. The nozzle shapes also were found to be good with a minor adjustment needed to be made as pointed out by an Ambico employee while testing our jig at the warehouse. For the jig prototype the strength of the jig was found to be a concern due to the jig already breaking with this prototype. Ideally this would be solved in the final design due to the final design being made out of metal or a similar material. Another weakness of this design was the slider part was not strong and had to be improved for a longer lifecycle and so the jig would not break. Also the slider part of the jig works well but the tolerances had to be made a bit bigger due to the slider working with a lot of friction which is not ideal for our design. Also the nozzles do not remove which should be improved for the following design since it is an aspect of our design that we want to implement to help with the long lifecycle of the jig. During the creation of the second prototype these mistakes were attempted to be corrected. The second prototype comes in a 5 inch and 4.5 inch model now. The second prototypes were created using much stronger methods, the model was redesigned to have better supports for critical parts of the design found from what parts broke or seemed to be weak during the testing of the prototype one. This prototype two was also made using a better method of printing with a better infill pattern which corrected the strength concerns in some aspects of the design. The slider was also made bigger to help with strength and to be inline with the rubber band part so the rubber bands do not put any unnecessary twisting pressure on the sliding mechanism. The nozzles were also made to be removable in order to demonstrate the removability of the nozzles for possible future replacements for a long life of this model.

Prototype III

Prototype III is the final prototype. It hasn't changed much in the way of design and functionality from prototype II. We have done research into the use of metal nozzles that could be removed and replaced. This would eliminate the need to change the whole jig every time the nozzles got worn out due to friction. This would cut down on overall costs of the jig. Based on all the feedback we received from the client we have implemented and there wasn't much else to change. We plan to try it on wood to make sure it's functional and then to see how other people who are not familiar with using jigs, try it out. We will also see how well different metals handle the friction from the drilling and tapping.

Prototype III Results

The results from the prototype were very positive. We tested the durability of the prototype by dropping it off a desk to see the results and it held up, we weren't able to break it by doing that. We also tested the functionality and how easy the jig could be used by non-trained people. The result from this was overwhelmingly positive, the jig was easy to use for the people and they enjoyed how well it worked. The test for the right metal to make the nozzles from was found to be a hardened steel. The steel held up the best against the friction, the only issue with that is it is a more expensive metal to start with. If you compare cost to longevity it can be seen that it is worth it in the long run.

We are happy with prototype III and feel this would greatly increase the speed of prepping the door for a hing and thereby increasing the revenue for AMBICO.

Updated Bill of Materials

Table 1 Bill of materials

BILL OF MATERIALS

Item #	Item Description	Measurement	Quantity	Unit Price	Amount
1	3D Filament	kg	1	$ 33,90	$ 33,90
2	Elastics	bags	1	$ 1,00	$ 1,00
3	Nuts & bolts	bags	1	$ 5,00	$ 5,00
Total					**$ 39,90**

Due to budget restrictions we opted to continue using 3D filament for the prototype. Manufacturing a final product made of steel would greatly exceed the $50 budget and would be time intensive. We believe the 3d printed model would adequately display the efficacy of the product to the client.

Reflection

Due to relatively minor modifications to the prototype, this delivery is relatively straightforward compared to the previous two deliveries. In the first two deliveries of the prototype, the product has met the basic requirements and achieved a good wearable effect. As the project progressed, we largely kept the first two modifications of the prototype and shaped it accordingly. On this basis, only minor changes have been made in the direction of resisting wear and increasing service life according to customer feedback. In addition, we confirmed the final production plan, the detailed cost of each part and the procedure is provided with careful practical research. To meet the budget requirements, we finally opted for 3D printing, the most economical production mode. In special areas, we have performed thickening and reinforcement treatments to ensure that the product continues to have greater durability. Group members are focusing on product improvement, production testing and the final design exhibition, known as Design Day. We hope all goes well.