Research Article

ALENTA: Prototype of a Mini Washing Machine for College Students

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Abstract: *A prototype mini washing machine will be developed for college students to assist them when doing laundry. Doing laundry manually takes a lot of time and may cause physical exhaustion. Even though communal washing machines are provided, students staying on the higher floors must carry their clothes down which can be exhausting. Furthermore, using the communal washing machines requires the student to wait for their laundry to finished because afraid that their clothes might be misplaced or stolen. Thus, it is necessary to design a portable washing machine that can be operated at the convenience of the user. This project aims to design a mini washing machine which is portable and easy to use. Manufacturing processes such as welding and sheet metal bending, were used to successfully complete this project. This project provides a solution for college students who wants to do their laundry without any hassle and fuss. The portable washing machine will improve college students' lives by saving time and energy while offering convenience and mobility. The prototype will be named ALENTA, and its development will provide a viable alternative to portable washing machines on the market.*

Keywords: Mini, Washing Machine, College students.

1. INTRODUCTION

Doing laundry has often been the staple of troublesome household chores (Gatea, 2022) and students living in colleges. Currently, students often must wash their clothes by hand or use communal washing machines, which can be inconvenient and time-consuming. To solve this problem, a mini washing machine that is portable, affordable, and eco-friendly was developed called ALENTA. The aim of this project is to create a product that is both effective and compact, with a design that can fit into small living spaces such as dormitories or shared housing. ALENTA will provide an easy and convenient alternative to traditional washing methods, enabling college students to keep up with their laundry without sacrificing their time or health. ALENTA has the potential to significantly improve the quality of life for college students, by promoting good hygiene and health practices. Additionally, the eco-friendly approach to design and materials will contribute to a more sustainable future. Even though there are other types of portable washing machine being developed (Kaur, A. et. al, Sahani, R. et. al, Sakidin, H et. al) ALENTA has the potential to become a viable alternative in the way that college students approach laundry, making it a more manageable and enjoyable task.

2. METHOD & MATERIAL

The process flow chart for this project is shown in Figure 1. All five process criteria' were completed within four months.

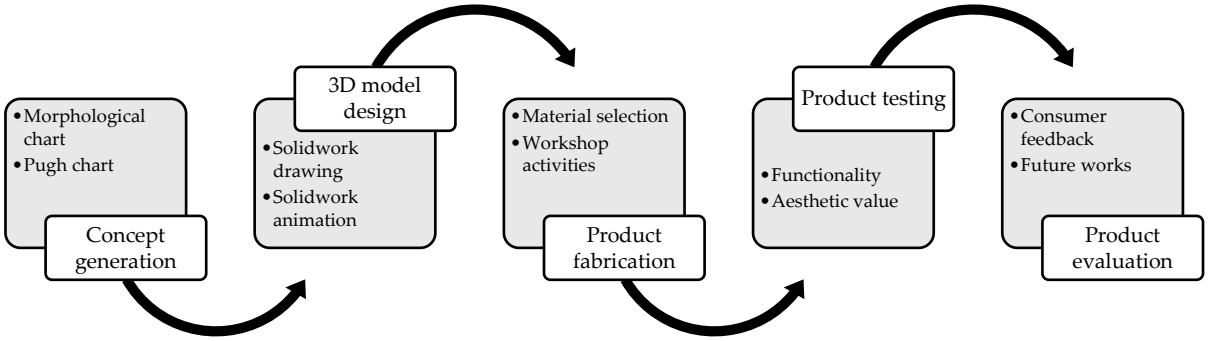

Figure 1. Process flow chart

Concept generation was conducted by identifying the main criteria involved for the project. Criteria such as size, capacity, power source, water supply, control function, materials, and additional features were identified. The options for these criteria were then systematically combining them to generate design concepts. The generated concepts were then evaluated using Pugh chart. Scores are given to each design concept based on the following criteria, performance, ease of use, durability, ergonomics, and maintenance. By comparing and scoring each concept against the base, the most promising option was identified and further improvement for the design was made.

Based on the chosen design concept, a 3D model design was drawn using Solidworks software. This process was conducted at the computer lab in UiTM Cawangan Johor, Kampus Pasir Gudang. Based on the 3D model design drawn, an animation study was conducted to visualize the moving parts for the product. Product fabrication was conducted using the tools provided at the workshop in UiTM Cawangan Johor, Kampus Pasir Gudang. Workshop activities, such as cutting, welding, drilling was conducted to complete the product. Product testing was conducted to ensure the functionality of the product and to enhance the aesthetic value. Finally, product evaluation was carried out to obtained feedbacks from potential consumers, and to identify potential product improvements and future works.

3. FINDINGS

The final design concept is shown in Figure 2 below. The final dimension for the product was 530mm height with a diameter of 400mm.

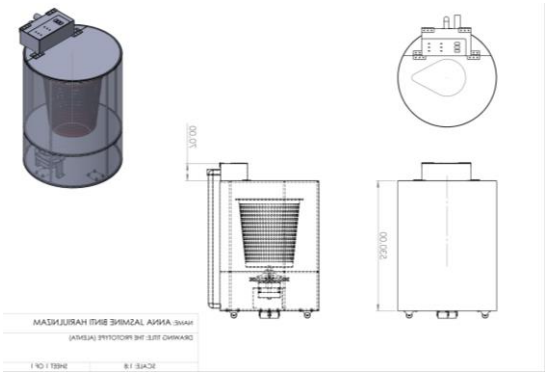

Figure 2. Final design concept

Table 1 shows the names of the main components for ALENTA. The materials used for the components were mostly from recycled parts to keep the production cost down and some were purchased from the local hardware store. Figure 3 shows the exploded view for ALENTA highlighting the main components which makes up the product.

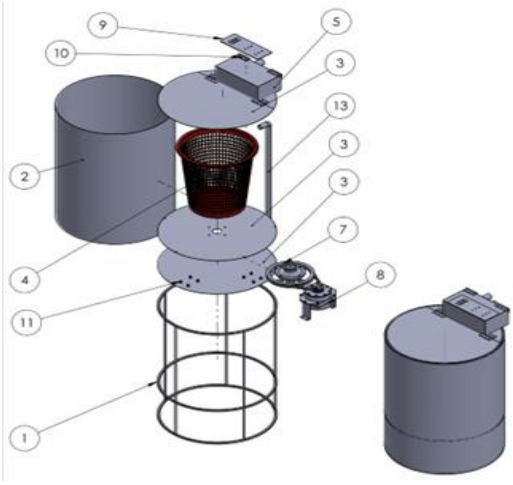

Figure 3. Exploded drawing

Table 1. Bill of Material (BOM)

Part No.	Part Name
1	Frame (body)
2	Cover (body)
3	Platforms (top & bottom)
4	Washing basket
5	Controller housing
6	Wheel
7	Pulley and belting
8	Motor
9	Control panel
10	Hinges
11	Bolts and nuts
12	Screw
13	Water pipe

Figure 4 shows the final production for ALENTA. When compared with the design concept, a near similarity can be observed. Minor adjustments or modifications involving the dimensions for the components involved were made to ensure ALENTA could be fitted together.

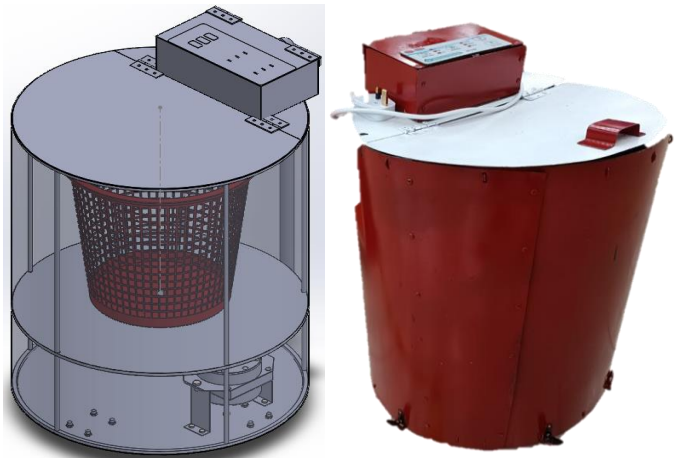

Figure 4. Design concept and product comparison

4. DISCUSSION

One of the important factors which had to be determined was how much load can the shaft connecting the washing basket and motor can support during wash and spin cycle. A simple simulation analysis conducted showed that a theoretical maximum of 3kg of load can be supported by the shaft without signs of deformation. However, for product safety reasons a safety factor of 10% is recommended making the actual maximum load is 2.7kg. Figure 5 shows the example for simulation conducted for this project.

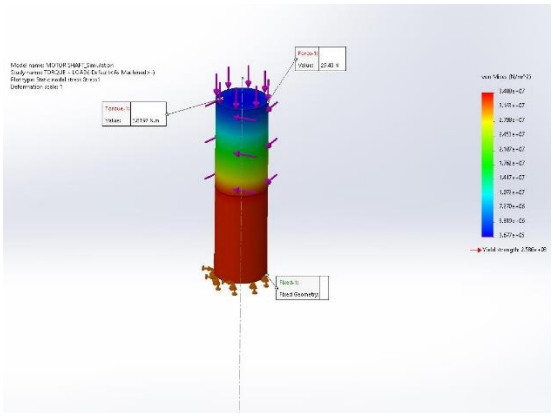

Figure 5. Simulation analysis

To operate ALENTA consist of only six (6) simple steps. Figure 5 shows the step-by-step on how to operate ALENTA. The user manual will be provided with the product when sold.

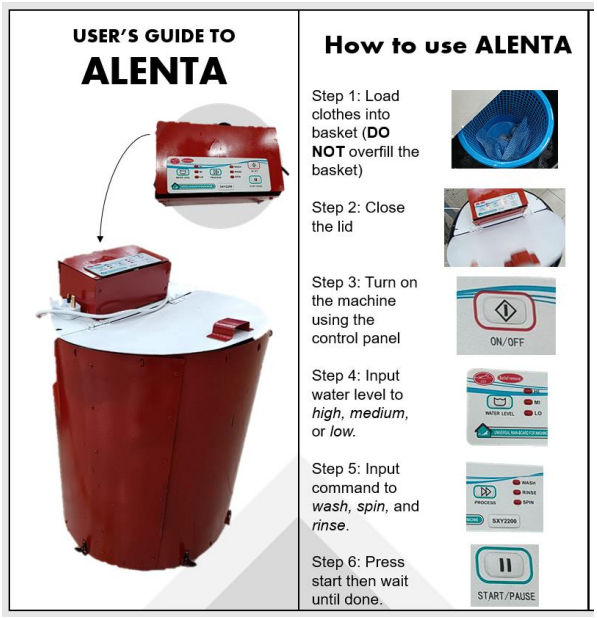

Figure 5. ALENTA user manual

ALENTA was tested with a load of 2kg. The result from the testing showed that the total time taken to complete the wash, rinse, and spin/wring cycle was reduced by 24%. Similarly, user of the product felt less tired as using ALENTA did not require any physical labour. Table 2 below shows the time comparison between ALENTA and manual washing.

Table 2. Time comparison between ALENTA and manual washing

Process	ALENTA	Manual
	Time	Time
Wash	20 minutes	20 minutes
Rinse	10 minutes	15 minutes
Spin/Wring	8 minutes	15 minutes

5. CONCLUSION

In conclusion, the development of a mini washing machine to aid college students when doing laundry was achieved. ALENTA is a lightweight, easy to use, requires minimal space suitable for college students living in dormitories or shared housing. This project demonstrates the potential for innovative solutions in addressing common challenges faced by college students. Future works include including a dryer function as a feature for the mini washing machine. With further development and commercialization, the portable washing machine has the potential to improve the quality of life for many students by providing them with a practical and efficient means of doing laundry.

References

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