

Hwa Chong Institution

Project Work

Category 3

Inventions Log Book

(Revised for 2020)

Title of Project: Ez Brush
Group Name:3-27
Group Members: <ol style="list-style-type: none">1) Ang Teng Cher (1)2A1 Leader2) Chong Kai Zhe(6)2A13) Qian Yi(24)2A14) Zong Zi Chao(34)2A1

1. Problem Finding

(The beginning...)

Identify a problem you would like to solve. You may want to brainstorm for problems using different approaches e.g. thematic, survey or general brainstorming etc.

1 A Document a list of problems you have identified. Your documentation should show clearly how your group came up with the problems.

We noticed our classmates are struggling with their homework and we surveyed some of them which led to us identifying homework issues as one of the problems. We also realised that we were spending a lot of time queuing for our food in the canteen and made the survey to which most students voted as the queue is too long and inconvenient. That is how we thought of queueing as one of the problems. Our group has interviewed our parents and domestic helpers. Results were that cleaning the gaps between floor tiles is the most tedious as it is not easily reached and making it dirty. We decided to focus on this problem because almost every household is facing it so it impacts the most number of people so we chose to solve this problem.

1 B You should have selected a problem based on some considerations. Identify and justify these considerations.

Our first consideration is the number of people affected by the problem, this is because we wanted to solve an issue that impacted most people. Our second consideration was the consequences brought about by the problem, we wanted to make a significant impact on the lives of others. Our last consideration was the feasibility of solving the problem, we wanted to be able to come up with a solution for the problem and not end up with a failed project.

1 C List some problems your group would like to solve. List also the considerations for selection of problems in the evaluation grid below. Score the considerations, against the problems, with points 1 (least significant) to 4 (most significant). Sum up the total points for each problem. Identify that problem you would like to solve.

Considerations for selection	Problems			
	#1: Don't know how to do homework	#2: Toilets are hard to clean	#3: Long Queues	#4: Items on shelves are unorganised
Consideration 1: Number of people affected	4	3	5	2
Consideration 2: Consequences brought about by problem	1	3	3	3
Consideration 3: Feasibility of solving the problem	1	5	1	4
Total Score	6	11	9	9

2. Define the Problem (This is one...)

Now that the problem has been identified. It is important to gather information on the extent of the problem and/or evaluate the usefulness of existing solutions based on *some criteria*. You may need to conduct surveys and research on existing solutions.

2 A Extent of problem (Research and discuss the problem and write down the problem statement)

Cleaning is something that is necessary as it can prevent the spread of bacteria and germs, most see cleaning as difficult and troublesome, our product will be able to relieve some of the burden. While cleaning toilets/restrooms, people need to lean over the bathtub and scrub the floors and baseboards. These actions require you to stay in a bent or stooped position which can be hard on the back, sometimes causing strain and injury to the area. Up to 90 percent of people in the United States suffer from back pain at some point in their lives, and routine activities such as chores often cause flare-up. Much unwanted mould, dirt and fungi can be

found in between tiles or in corners of toilets occasionally. Mould can be cleared using mould remover, however, fungi and dirt stuck deep in between tiles are very hard to clean even with tile brushes. The bristles on brushes wear out very fast as a lot of strength is used to force the bristles between the tiles to clean the dirt. Another problem is higher areas of toilets' walls are sometimes hard to reach and very troublesome to clean.

2 B Compare and contrast the existing or similar solutions

Brushes on the market come with only a single type of bristle. What they can do is very limited. Bristles can also wear out fast as they are forced between tiles and gaps and damage the tiles. There are also non-abrasive type-cleaners that are easily replaceable but damage easily and get dirty quickly. Commonly switching between these cleaners also waste materials. Whereas our product has 2 different types of bristles, people are able to use the right bristles depending on the situation and are able to complete their cleaning more effectively. Our product also has other functions such as a spray and an extendable handle, making it far more versatile than other brushes on the market. It is also able to last longer and save materials as you are able to switch between functions and such.



3. Your BIG IDEA# (Developing the idea....)

Write down your proposed invention and why you want to do it. State also how you think your proposed invention is better.

3 A Describe your proposed invention.

Our invention will have 2 detachable brushes which can be attached to a frame that has an in-built spray for dispensing cleaning liquids and an extendable handle to allow for greater reach.

3 B Explain the purpose of your proposed invention and the potential benefits to users.

Our invention will allow people to save space as owning 1 of our brushes would equal to having 2 brushes, a long handle and a spray. With just one equipment, users will be able to complete their cleaning tasks.

3 C In what ways would your proposed invention be different and/or better than existing solutions, if any?

Firstly, we can use different designs that possibly can improve the ergonomics and the brush's ability to reach different, harder places to clean. We can have a better support structure for the extension so there is a smaller chance of it breaking. Lastly, we can have more extra functions that can help with cleaning up the mess or help clean faster such as using sponges to dry up the dirty water.

3 D What are some problems you expect in the course of your proposed invention?

The handle might not be able to support the weight of the brush when extended as the pressure when cleaning would be placed on the extension part. The brush is also not able to store much water due to its small size, and the liquid might not be able to be sprayed as we do not know if we can fit the mechanism properly.

3 E What and when are the major milestones (project timeline) in your invention?

In January this year we first formed and registered our project groups and was excited to work with each other. Followed by in February we brainstormed different ideas and went through the ideation process which we finally decided to embark on the current project. In March our project was "deemed" successful as we passed the first evaluation which was a signal for us to continue. Throughout April, May and June, COVID 19 hit and we had no choice but to adapt to the changes and use online social platforms to meet online to discuss. Mid term evaluation was cancelled and we welcomed final evaluation in August. It was another major milestone for us, as this was where most of our marks weighed. We got our slides ready and rehearsed many times, at times we stayed up rehearsing till 11 pm.

#must be able to be constructed based on current / emerging technologies, must not violate the laws of Science or go against the laws of nature.

4. Proposed Construction or Modelling Process*

(This first... then that...)

You are now onto the fabrication of your prototype/ product. You need to select material and understand how to put them together so that your prototype/ product can perform its function.

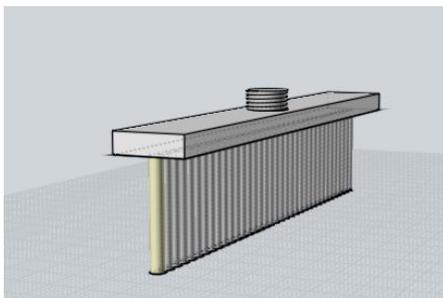
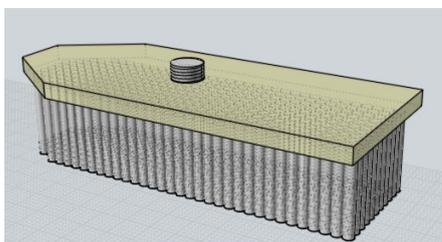
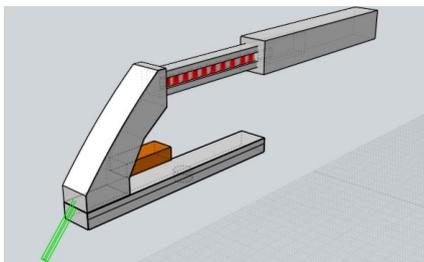
4 A Explain how and why the materials were chosen for the prototype/ product of your invention

We decided to use polycarbonate for the body of the brush, as it is lightweight and is 30x stronger than the other popular clear plastic, acrylic. Nylon, which is commonly used to make bristles in items such as household brooms and is strongly abrasive, would be used to make the bristles on our brush. It's abrasiveness would help clean and polish the hard surface better, therefore making the brush effective. Rubber would be used so that our handle has a good grip. The remaining materials like springs, a pump, tubing and a small water tank for mechanisms.

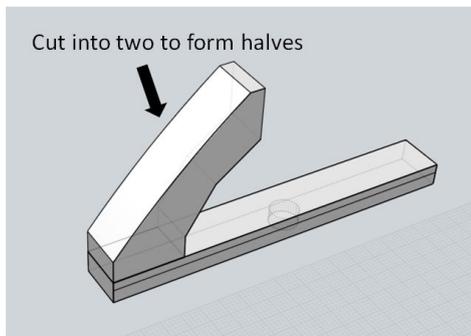
4 B Explore these considerations that may guide the construction of your prototype/ product.

When deciding the material to use for the body of the brush, we thought about 3 deciding factors, the strength of the material, the weight of the material and cost of the material. Finally setting our eye on polycarbonate, which had many advantages like being lightweight and many times stronger than acrylic. We then contemplated on the durability of different materials and decided to go with nylon to make the brush bristles. As nylon is a durable material, the bristles will not break easily. We also pondered about whether the material can create a lot of friction, nylon which is abrasive seemed perfect for the task.

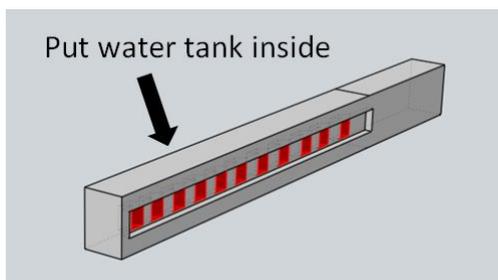
4 C Propose how the prototype/ product will be constructed or developed. You may use drawings and photographs.



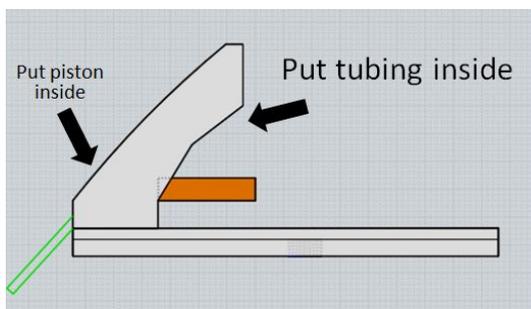
To construct the brush, we would first make the halves of the handle and its brush attach mechanism.



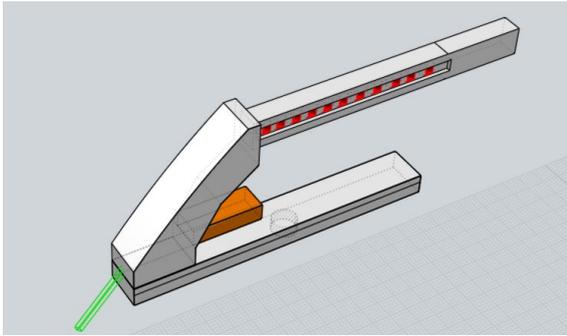
Secondly, make the inner layer handle and with gaps for the extension mechanism. Place a water tank inside and add a cap for the water tank to be refilled.



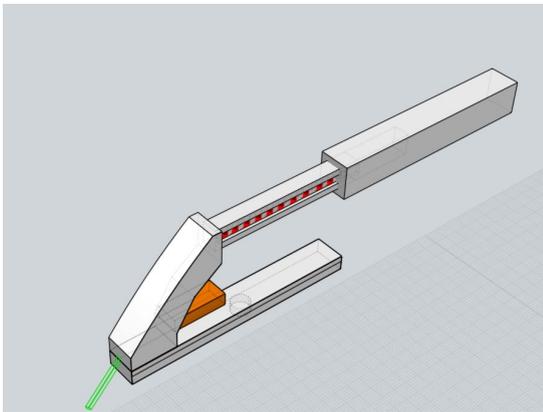
Thirdly, we would place the button, tubing, spring and pump into it to make the water spray.



Fourthly, we connect two halves with inner handle.

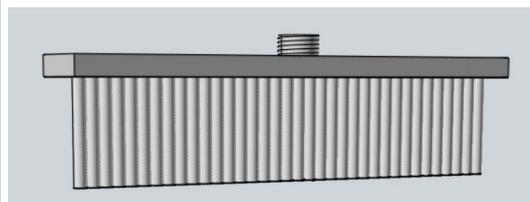
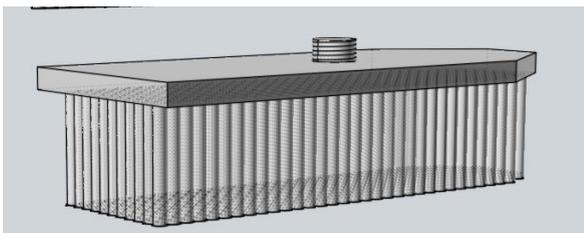


Next, make and add outer layer (extendable) handle onto inner layer handle.



Sixth step, make the base of the brush and the attachment mechanism, which would be holding the brush head.

Lastly, add the bristles onto the respective brush heads. Then, you can attach and detach the brush heads onto the main body.



OR

If construction of the prototype is not possible, then you have to create an animation / as a proof of concept that it can be applied in a bigger scale.

4A Explain why construction of a prototype is not possible and the proof of concept is needed in your case.

4B Briefly explain how the video / animation can effectively show how your invention will work and the different considerations.

Warning:

- *Video / animated simulation only if prototyping is absolutely not possible.*
- *Video / animated simulation must be logical and convincing that the invention works.*
- *Constraints must be clearly included in the logbook or the project will be heavily penalized.*

5. References

Read <http://www.bibme.org/citation-guide/apa/> on how to cite references.

6 A Cite the references you have used for your project work. Your source of reference should come from different types (eg books, magazine, websites, journal articles, interview, photographs, product brochure, reviews etc.)

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