

Hwa Chong Institution

Project Work

Category 3 Inventions Log Book

Title of Project: Multi purpose marker whiteboard marker refill
Group Name: 3-17
Group Members: 1) Javier Ho 2) Liam Lim 3) Richard Tang 4) Zeng Qingda

Our Meetings

1. The first meeting we were asked to generate 20 different problems to tackle. We chose our problems by looking at major problems the world is facing, for example plastic waste and diseases. The first time we came up with big problems like car pollution, coronavirus, climate change, etc..
2. The second meeting, we still discussed the problems but then we realised that most of the problems were too hard to solve, and we had to give up on a lot of them and narrowed our 20 problems down to 10.
3. The third meeting, Mdm Tham gave us some ideas by showing us pictures and videos of inventions that changed everyday objects like a coffee cup with a foldable lid, which is more environmentally friendly to reduce the amount of plastic waste from coffee cup's lid, and this gave us some inspiration
4. The fourth meeting, we decided to narrow down the problems to 5 good problems.
5. The fifth meeting, we were tasked to generate 3 ideas per problem.

6. The sixth meeting, we were tasked to narrow down all the solutions to the 5 best solutions.
7. We then met up in the June holidays once and we researched about the existing solutions.
8. The eighth meeting we were tasked to finalise the slides for the expert mentor presentation.
9. The ninth meeting we presented our 3 ideas and solutions to the expert mentor and they gave us their feedback.
10. The tenth meeting we presented our slides to the expert mentors and got their feedback.
11. The eleventh meeting we were told to finish our logbook.
12. The twelfth meeting we finished up our preliminary judging slides.

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.

- 1) **Plastic Waste**
- 2) **Starvation and water shortage**
- 3) **Diseases**

We came up with these problems as the theme for our project was towards a sustainable and liveable future, and we decided that we focus on problems that is already causing harm to our environment and surroundings and that will have an even bigger impact in the future.

We came up with these problems by narrowing down the first few problems we had to just 3. We chose these 3 because they are the biggest problems that we are facing today and are also not that hard to solve.

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

1) Target audience

- a) For target audience, we feel that it is important to have a wide range of audience that are interested in the product
- b) Allows for greater impact of our invention to the target audience, otherwise known as the consumer

2) Feasibility (It has many aspects, including:)

a) Cost-effectiveness

- i) Cost effectiveness is important as the budget must not be too high, or it is not very feasible for us to make the invention
- ii) For e.g. Aluminium composite marker etc.

b) Time Management

- i) We must be able to finish prototyping and building the final product in the given project timeframe or we risk not being able to finish the project and hence being heavily marketised.

c) Is it easy to make?

- i) Being easy to make is not always a good thing, because we would be able to make it very easily. However, at the same time, we must ensure that the invention is doable and not “impossible” for us at our level of knowledge.

3) Originality

- a) Our idea must be original and not be invented already or our invention would be pointless, and original ideas will usually be more attractive as the target audience / consumer have not thought of such an idea before.

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 Plastic Waste	#2 Starvation and Water Shortage	#3 Diseases
Target Audience	5	3	5
Feasibility	4	2	3
Originality	4	3	2
Total Score	13	8	11

¹Note: The scores are rated out of 5, followed by 4, 3, 2, 1 and 0.

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)

- 1. We feel that the extent of the problem of marker wastage is very serious and we have to do something about it.**
 - a. When people have finished using a marker, the entire marker might be thrown away.**
 - b. This gives way to major environmental problems when the plastic is wasted when it is sent to the landfills.**
 - c. We feel that we could prevent this from hapmarkering by making refillable marker cartridges.**

2 B Compare and contrast the existing or similar solutions.

Existing solution 1

- Ink cartridge refills
- Refillable fountain pens (with ink bottles)

However:

Some companies instead sell many pens together, which wastes plastic



Existing solution 2

Fairphone:

Smartphone with Enviro and Social Responsibility Cred

- Phone companies such as Fairphone produce phones that emit less Carbon Dioxide (16.4 g CO₂-eq)
- In comparison, making a cup of black coffee produces 21g CO₂-eq.



Existing solution 3

Brelli:

Blocks UVA and UVB rays

Able to withstand winds of up to 40 mph (64 km/h)

Made from sustainable materials and 100% biodegradable PVC plastic



SN 78-973,423, ZONSIUS, PAMELA, CHAPPAQUA, NY.
FILED 9-13-2006.

BRELLI

THE MARK CONSISTS OF STANDARD CHARACTERS
WITHOUT CLAIM TO ANY PARTICULAR FONT, STYLE,
SIZE, OR COLOR.
FOR BIODEGRADABLE UMBRELLA (U.S. CLS. 1, 2, 3,
22 AND 41).
MICHAEL ENGEL, EXAMINING ATTORNEY

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.

1)Refillable marker cartridges. After the marker ink is finished, the owner can easily refill it and reuse it, therefore not wasting plastic

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

1)Most users of markers finish their marker ink and thus throw away the marker cartridge which is very wasteful.

2)However, there may be no refill for some particular markers and thus people will choose to throw the whole marker away.

3)Firstly, this refillable marker cartridge can reduce plastic waste because users will not throw the marker or the cartridge away.

4)Secondly, this also helps the user because most users of markers feel frustrated when their markers run out of ink and thus would have to buy another marker that would still run out of ink.

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

1) Currently, the existing solutions are only refillable cartridges which wastes a lot of plastic which we are trying to reduce.

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

1)We might not be able to make the ink as it might be slightly complicated and needs some sense of chemistry.

2)We might have trouble trying to find a suitable material to replace plastic for making the marker cartridges.

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

1st meeting: Came up with first 20 problems

2nd meeting: Narrowed down 20 problems to 10

5th meeting: 5 problems to choose from and we came up with 3 solutions to each problem.

8th meeting: Finalised the slides for mentor presentation

12th meeting: Finished up on our preliminary judging slides

During the June hols, we worked on how we are going to construct the prototype, but due to covid, there was a limitation of how much we could do in terms of construction. Once we discussed, we made significant progress on constructing the prototype and we completed it in the makerspace.

#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.

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 use a self sealing rubber to seal the marker cartridge on the inside while allowing the needle to poke through to refill the marker.

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

We have to ensure that the cartridge is sealed properly or the ink will leak out and make a mess.

4 C Document the prototype/ product development stages. You may use drawings, photographs or videos.



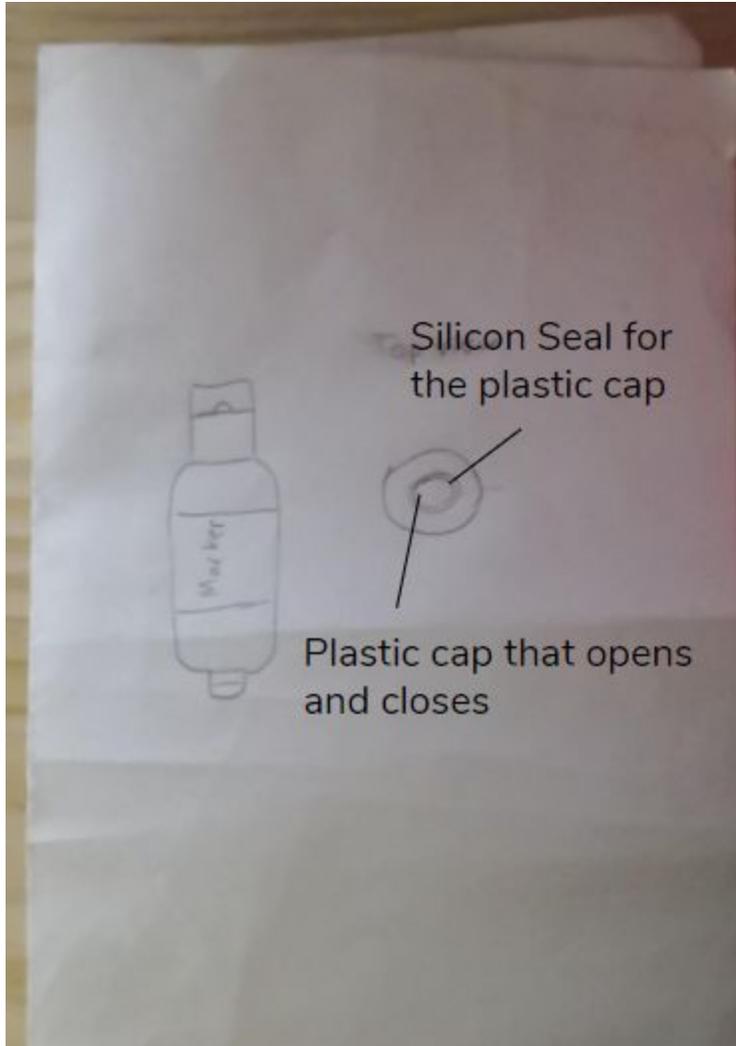
OR

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 on a bigger scale.

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

The prototype construction is very hard as there are many equipment and materials which we cannot get, therefore we have to rely on a concept or drawing to show it to others clearly

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



We have a philosophy of keeping things simple, hence our invention is very simple to use. There are three steps, being opening the plastic cap, refilling the marker, and closing the cap. This idea is still considered an invention as this type of product is currently not in the market.

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.*

Modification and Evaluation

Upon the completion of your prototype/ product, you would need to see if it is working the way you want it to work. Check if your product has met the identified purpose and the user's need; and implement necessary modifications and improvements. This process may take several rounds.

5 A Write down your prototype/ product test criteria and check against it if it works. Identify areas of weakness for modification. Indicate the test iteration and date of test.

Test Iteration:	Tick			Remarks
	Pass	Fail	Potential Failure	
Test Date: 4/8/20				
Needle passes through the rubber	✓			The needle passes through the rubber
Completely sealed	✓			

*Add more rows for more criteria

** Repeat table for next test iteration

OR if you are creating an animation / video to show how your invention will work, write down the different possibilities / outcomes [success or failure] if a full-scale prototype is to be constructed.

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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