



DigiEduHack Solution

Lappeenranta - Digital Twins & Raw material sustainability - Global better future for next generations

Challenge: Lappeenranta - Digital Twins & Raw material sustainability - Global better future for next generations

Challenge 2020

Plastic Brick Design Software

Transforming Plastic Waste into a Prefabricated Building Material

World produces about 381 millions tonnes of plastic waste every year. Only 9% has been recycled and 91% of it will end up in landfill or oceans. Basically, plastic takes 400-1000 years to degrade. Hence, this software will help to convert the plastic waste into a brick which will be a building material.

Team: REBELLIOUS

Team members

1. Siti Nur Adibah Syahirah Binti Mohamad Dasuki 2. Sharonie Loris James 3. Nurulfarhana Binti Azmi

Members roles and background

Undergraduate 2nd Years in Bachelors of Electronic (Computer) Engineering with Honors at University Malaysia Sabah.

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Solution Details

Solution description

Plastic bricks is another way of recycling plastic waste into other products. However, the choice of recycling plastic waste into plastic bricks is the best since it is cheapest and this plastic brick will help to reduce the use of clay and other non-renewable substances in the construction industry. To ensure that this plastic brick has market and ability to replace the clay brick, the software is designed to generate the plastic brick with the lowest cost but still fulfill the request of the customer.

The process of manufacturing the plastic brick started with buying the plastic waste. Next the plastic waste is shredded to small pieces. Then, it will be boiled with a superheated water and will be compressed into a brick shape by a hydraulic compactor based on the design given by the software. Information for the software will be collected from the clients and this information will be inserted to the software. Thus, the software will generate the design which consists of thickness, size and density of the plastic brick according to the customers requirement and needs.

Solution context

The problem that we are focusing on is the environmental problems where the numbers of unrecycled plastic waste in the world are increasing day by day. This problem has caused environmental pollution such as oceans and land pollution due to the ineffective management of plastic waste. Other than that, the illegal import activities of plastic waste to other countries, especially those countries that are incapable of recycling should be overcome.

Solution target group

Our target market is in design, construction, manufacturing, fabrication industries and NGO.

Solution impact

- An effective and convenient plastic waste management.
- Help to decrease the number of unrecycled plastic waste.
- Promote an eco-friendly house made from plastic brick.
- Protect the world from oceans and land pollution.

Solution tweet text

Save our Earth by building a house using a plastic brick. Design your own eco-friendly house using our plastic brick design software and we will make it reality. #PlasticBrickDesignSoftware #MyEco-FriendlyPlasticBrickHouse

Solution innovativeness

The plastic brick idea had already been done before which they used the plastic waste and stuff it inside the plastic bottle. These plastics would be compressed inside the bottle for a certain density to make it strong enough as a brick. Other than that, there is research in mixing the plastic into the

clay brick to help decrease the amount of the plastic waste in the world and this research manages to produce a stronger brick. However, our plastic brick idea was different from others as we used different methods to make the brick. To ensure the lowest cost of making this plastic brick, the plastic wasted does not need to be separate according to the type of plastics. The process of making the plastic bricks starts by shredding the plastic waste, boiling it with a certain temperature, and compressing it into a brick shape based on generated information given by the software that fulfil the customer requirement. This innovation gave customers time and chance to design their own plastic brick with their preference of the plastic brick proposed. With the help of software, the cost for the plastic brick will be minimal since it will give the exact size, thickness, density of the plastic brick to ensure the customer requirement is fulfilled.

Solution transferability

Our plastic brick design software can be used in other contexts for example in stimulating the complete 3D design of a house using the plastic brick. Not only that, this software will help to provide all information about the eco-friendly house such as the thickness of the wall, shape and size. Moreover, the clients can use this software to monitor and do maintenance for their house from their smartphone.

Solution sustainability

This plastic bricks idea is the way to overcome the plastic waste problem and at the same time improve the material need for the construction. The use of plastic brick which is a good insulator will help to maintain the temperature especially in the extreme temperature. The use of plastic brick will help to decrease the dependence on the clay brick and this plastic brick has a longer lifespan which is at least 450 years without maintenance compared to clay break 100 years without maintenance. The plastic brick also has 670 - 870 psi rather than usual hollow brick that was 150 psi, this showed that plastic brick was four times stronger than usual brick. Therefore, creating a plastic brick was a good idea to decrease the amount of plastic waste in the environment rather than burn it or throw in the ocean that would lead to pollution. In other words, the more plastic waste that is made when the population of humans increases, the more houses can be builded for human shelter.

Solution team work

As a team, we worked very well in developing the solutions for this challenge. On the first day, each members were suggesting and providing their ideas for the solution. Then, together we analyze our ideas and decide to choose our main solution for the challenge on behalf of everyone' agreement. Next, we started to do a detailed research on our solutions. At the end of the day, every member has contributed directly or indirectly to our outcome solutions which is the plastic brick design software.