The Power Sales Company

The Retoted Garden

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EDSGN 100

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Executive summary:

Our team, Power Sales, had a problem within their hands to find a way to recycle/reuse some material that ArcelorMittal had no use of anymore. Eventually, they leaned towards using their industrial totes to create a planter that would attract urban customers, instead of rural as seeing to that they already own a vast land suitable for gardening, unlike urban customers. Different designs were outlined, but each had its own flaws and advantages. Therefore, several concepts had to be developed in order to decide which design is most attractive, yet efficient, until it was narrowed down to just about four concepts that Power Sales found most critical, such as; cost, beauty, weight, durability, and etc. It was then decided which design was the winner based on those criteria. The design involves an aesthetic shape that’s similar to a fountain. It’s large enough to be striking, yet small enough to fit inside apartments even.
Introduction:

The problem with Industrial Totes vary. The main problem or question is what do we do with the container when it’s done? There aren’t many viable solutions that use all of the tote and cheap. There isn’t much you can do with both metal pipes and a plastic box. We decided to create it into a self-watering garden. The garden is contained inside the box while the pipes are used for the sprinkler or pump to water the plants. The garden doesn’t create its own energy. It waters itself making it easier for the owner not have to worry about it. It’s also a green option rather than throwing the tote away. It gives the customers a better feel that they are caring for the environment. The final question about going green is the cost. People want to know whether it will be cheap or expensive. The process was created after researching the problems with being green and how to clean these totes. Cleaning the totes is probably the most expensive part to creating this garden. We searched up the process to cleaning these totes. There is no clear and specific way to clean these totes. There are many options that include a 3-step process. The main reason we decided with this project and design was because we want to give back to nature. By making it a garden we are giving it literally back nature. Our final product arose from what we think buyers would want. By being lazy they can purchase this item and be green. If every person got one then Earth’s sustainability would be so much easier to
achieve. Sustainability is the ability to survive on a limited number of resources. That is what we believe and why this product was created.

**Problem Statement:**

We envisioned reducing the amount of ArcelorMittal’s plant waste through the process of re-using their industrial totes. Currently, the totes are used for storing, with the ability to store all kinds of things, even fluids. Thus, we decided to investigate reusing the totes as a garden that they hope will appeal to urban costumers, which is also interconnected with a water pump that waters the plants manually.

**Research:**

This table shows the pumps that we as a team came across, to make a decision about choosing the right pump for their design. They’re all from Home Depot.

![Fig 1.1](image)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>300-GPH Fountain Pump</th>
<th>140-GPH Fountain Pump</th>
<th>80 GPH Submersible Fountain Pump</th>
<th>130 GPH Auto Shut-Off Fountain Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth x Height x width</td>
<td>3.47in x 7.95in x 5.75 in</td>
<td>2.87in x 5.61in x 6.72in</td>
<td>2.5in x 1.8in x 2in</td>
<td>3.1in x 2.2in x 2.5in</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Price</td>
<td>$ 29.92</td>
<td>$ 19.92</td>
<td>$18.98</td>
<td>$ 29.98</td>
</tr>
<tr>
<td>Max capacity (gallons)</td>
<td>300</td>
<td>130</td>
<td>80</td>
<td>150</td>
</tr>
<tr>
<td>Amperage (amps)</td>
<td>1</td>
<td>1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Horsepower (hp)</td>
<td>1 hp</td>
<td>1 hp</td>
<td>0.007 hp</td>
<td>0.01</td>
</tr>
<tr>
<td>Adjustable valve</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Power Sales considered all of these criteria that varied from size, price to power. All of these specifications are important, in order to make the design simple and suitable for home gardening. The design didn’t need a very powerful pump, or a large one. Power Sales also wanted to make the product affordable, so the price was important as well. Accordingly, any design that defied with the definition of simple was overlooked. Power Sales also researched about the process of cleaning the industrial totes from all the leftover residues. It came to their attention that the totes might need more than just moderate cleaning, but extremely efficient and professional since some of the residues might be toxic. Gamejet cleaning systems was the number one option. They offered systems
and products that Power Sales could have use of like; Gamejet TiteBlast Station and Gamejet IX.

Fig 1.2 these pictures describe the before and after cleaning of an orange oil tote.

![Before and after: orange oil tote](image)

### Customer Needs:

<table>
<thead>
<tr>
<th>Customer Statement</th>
<th>Customer Need</th>
<th>Target Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean out the anti-edges because it is being changed into a garden where plants are situated.</td>
<td>There will be a 3-step process in order to clean the tote. That way they can be reused and made into our garden.</td>
<td>The cleaning process can take a day we can clean roughly 200 a day.</td>
</tr>
<tr>
<td>How do we reduce byproducts by recycling what we don’t use?</td>
<td>Our product uses everything and has no byproducts.</td>
<td>Having any byproducts makes it almost completely perfect.</td>
</tr>
<tr>
<td>How are we going to shape the tote?</td>
<td>Harvest the plastic and use it to build the parts. We are also going to cut holes in the pipe to make a spiderline to water the plants.</td>
<td>We would cut it in half diagonally to make two pieces to be a step. The smaller ones would just cut parts out.</td>
</tr>
<tr>
<td>How are we going to install them?</td>
<td>There are two different ways that they can be installed. For the larger bags they can be placed on a larger object that can withstand weight. For the smaller ones they could be hung from the ceilings.</td>
<td></td>
</tr>
<tr>
<td>Does it require any suitable source of power to work?</td>
<td>Yes and no. There is one where you can water it yourself and the pump requires power.</td>
<td>The pump is the only object that would be used outside of the original product.</td>
</tr>
<tr>
<td>How much outside resources will be required to make it work?</td>
<td>We need a pump.</td>
<td>You are using water. The plastic would last for three times as much.</td>
</tr>
<tr>
<td>Does the product need constant care?</td>
<td>No unless you wear it yourself.</td>
<td>The plastic would last for hundreds of years.</td>
</tr>
<tr>
<td>Does the product last?</td>
<td>It is made out of durable plastic that aging is maintained.</td>
<td></td>
</tr>
<tr>
<td>How heavy is the product?</td>
<td>It is made based on the size.</td>
<td>All four seasons can be withstand.</td>
</tr>
<tr>
<td>Can it handle the different seasons?</td>
<td>It should withstand the weather.</td>
<td></td>
</tr>
<tr>
<td>What is the cost?</td>
<td>The manufacturing and cleaning will be the only costs to make the product.</td>
<td>The biggest and average cost is $200 and the rest vary depending on the soil and plant that it contains.</td>
</tr>
<tr>
<td>Can it handle a high amount of weight or stress?</td>
<td>It should be able to handle the weight and stress since it is able to withstand the weight of the liquid it once contained. Instead we would add reinforce meta to the stop and make it stronger.</td>
<td>Instead of using the plastic or throwing it away it will reduce each and every persons carbon footprint by 1.</td>
</tr>
<tr>
<td>How much will it reduce to the overall carbon footprint?</td>
<td>By reducing weight is always a good thing. If everyone used this garden the world would be a much better place. The footprint should be high because we expect a lot of people to use it.</td>
<td></td>
</tr>
<tr>
<td>Can the garden be moved?</td>
<td>It can be moved if needed. The heavier one might require assistance to move.</td>
<td></td>
</tr>
<tr>
<td>Is the garden going to get in the way and be hassle?</td>
<td>It shouldn’t be a problem. The smaller ones can hang from the ceiling while the bigger ones can move.</td>
<td></td>
</tr>
<tr>
<td>How big is the product?</td>
<td>It comes in all different sizes based on the needs of the customer.</td>
<td></td>
</tr>
</tbody>
</table>

The product comes in all sizes but has a maximum of 25*35*52l.
The Customer Needs is the most important part of this project. Without them this project would not exist. There were many goals to making the customer want to buy this project. That’s why we tried making a product that a customer would want whether they use it or not. We wanted the product to look nice and have a meaning for the people that buy it. We had our own specifications however. We wanted to make a bunch of different sizes so it can be useful for more people. That’s why we also make it small so it’s not a hassle. That’s why it’s also in box so it could be moved with ease. Our specifications are meant to improve the product and make it more desirable to be purchased by the customer.

**Concept Generation:**

In order to produce a complete product that efficiently and effectively used the material available to turn it into something without producing any wastes, several ideas were generated. 6 concepts were generated in two brainstorming session that were based on easy process, minimalistic design and overall aesthetics. Some designs had favorable features while others didn’t and some held both. Based on features deemed vital to our product, the 6 concepts were analyzed. Using concept selection and scoring, the favorable features were compiled together to create a design and produce the final product.

**Concept Selection:**
There was a total of six different designs we had. Number six turns out to be the winner because it is higher than all the others. We also, liked the design better than the others. It used every part of the Industrial Totes. It also fits our description well for our customer needs analysis and target specifications.

**Final description:**

The final product we made uses a pump to water itself. The item has two boxes that are used for different parts of the self-sustained garden. The interior box is lifted above the actual central box that houses the actual plants. By lifting it above the plants it acts as a fountain and is able to water the plants. By hanging it over the top it doesn’t require as much power to operate. The water is meant to just trickle down as to not kill the plants. That way the perfect amount of water rolls down. The outside box is larger in width and length and can be any length and width in order to fit all different types of flowers or vegetables. Other features have been included to improve the convenience and reduce the waste from our product. Drains have been cut out at the base that allows excess water from the soil to drain out and stay at the base of the product. Complimenting this design, an ingenious system was added to reduce
the water consumption of the product. By adding a layer of filter paper and a layer of soil, we can reuse the excess water that drains out. By passing through a new layer of soil, the nutrients and minerals in the water are restored. This then passes through a filter system that filters out solid particles and soil. This water goes back to the pump to be pumped back to the garden. This feature might need more care from the customer, replacing the filter paper, soil and water regularly. Therefore, it has been used as an optional extra on our existing products.

**Systems diagram:**
Implementation plan:

1. Raw material production
   - HDPE (England)
   - Steel (France)
   - Wood (England)

2. Ship + Truck
3. Truck

5. IBCs production
   - England

6. Truck

7. Filling of IBCs
   - Akzo Nobel, Stenungsund, Sweden

8. Reconditioning of IBCs
   - Worldwide

9. Transport
10. Transport

11. Transport

12, 16. Incineration with energy recovery

13, 15. Landfill

14. Transport

Recovered energy
We are going to take the totes from ArcelorMittal directly, as it is, and then
clean it themselves. They’ll use Gamejet cleaning products, which they’ll buy, in
order to clean the totes from all the residues they might contain. After that,
Power sales, will shave the go to start making their product. When all is done
and finished, we decided to sell it to retailers, who already have a built
reputation in selling home products to costumers, instead of spending large
amounts of money to generate advertisement that promote their product. We
will then only worry about cleaning and manufacturing the product without the
hassle of selling it.

**Waste stream analysis:**

According to our research, realistically, 40% of the Intermediate Bulk Containers
(IBC) end up in landfills and 40% is cleaned and reused for the same purpose.
Ideally, our method of reusing and repurposing the IBCs to make another
product would reduce the IBC’s going to the landfills by 50%. Therefore, we
would be diverting 20% of the IBCs from ending in the landfills. Similarly, this
would decrease the energy required to process the IBC’s wastes to landfill and
replacing it with our energy requirement to repurpose them into our products.

**Conclusions:**
Our final product is a culmination of two of our main ideas. Attract customers by having a wide range of products varying in size and functionality and a Green Product that recycles wastes efficiently and effectively.

Features have been included to make sure that the customers are able use it with ease. We plan to implement multiple designs ranging in size to attract customers with different needs. By increasing the sales of the product, we will be able to further decrease the waste that goes into landfills. Our aim is to increase our productivity. Our productivity is directly proportional to the amount of waste we are able to redirect from landfills. The ultimate goal is to redirect 100% of the waste and repurpose them into our products.

Our product is self-sufficient. It requires very little care from the customers. It has an expected life of 5 years. It has a modular design that allows the easy replacement of parts. Keeping in mind, the parts that are prone to fail such as the pump, filter or the pipe. All of which are easily replaceable and the failed components could easily be recycled and used in the same product.
Appendices:

The only part of the entire project that was created from an external part other than the tote was the pump or sprinkler. However, the pathway leading to the plants uses the industrial totes pipes. That way it uses every single part of the tote and it becomes completely efficient in going green.

References: