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Design and Fabrication of Plastic Cleaning and Drying Machine for Eco-Bricks

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Abstract: ***In this project we try to overcome the problem associated with plastic waste. In India huge number of plastics are used for various purposes such as for making of water bottle, soda bottle & bag, etc. which are not disposable. Because of these various problems occurs below. After studying the problem, we developed the effective way to overcome this problem. Bottle brick are light in weight and withstand high amount of load or pressure. Eco-bricks, polyethylene terephthalate (PET) bottles filled with mixed inorganic waste, have become a low-cost construction material and a valid recycling method to reduce waste disposal in regions where industrial recycling is not yet available. Because Eco-bricks are filled with mixed recovered materials, potential recycling of its constituents is difficult at the end of its life.***
Keyword: Plastic Waste, Bottle Bricks, Plastic Bottles, Reduced Waste, PET Bottle, Better Recycling Option.

I. INTRODUCTION

Over the past 70 years as huge has 8.3 billion metric tons of plastic has been produced, and in a usual cycle only 9 percent of produced plastic is recycled and 12 percent is incinerated, and the leftover 79 percent of produced plastic ends up in landfills or as waste, and in the biosphere, plastic does not decompose, and thus contaminates the Earth or our water bodies. Plastic in no way can be absorbed or consumed in ecological system and hence its presence disturbs the natural fabric of the current earthly ecosystem. Ecobricks pose a great potential solution for storage and effective application of waste single- use plastic. They are cheap, simple, and effective materials.

They are strong and are immune to rot and water damage. They can act as insulators and are Earthquake resistant as well. Eco bricks are an Eco friendly and sustainable substitute for construction materials, they are PET bottles filled usually with inorganic waste, which are now a very cheap construction material, with twofold benefits. Eco bricks provide us a ground breaking and cheaper alternative to building materials, with an edge of providing storage solutions for the inorganic non-biodegradable waste we generate for human consumption. An ecobrick is a plastic bottle packed with used plastic to a set density. They serve as reusable building blocks. Ecobricks can be used to produce various items, including furniture, garden walls and other structures. Ecobricks are produced primarily as a means of managing consumed plastic by sequestering it and containing it safely, by terminally reducing the net surface area of the packed plastic to effectively secure the plastic from degrading into toxins and micro plastics. Ecobricking is a both an individual and collaborative endeavor.

The ecobricking movement promotes the personal ecobricking process as a means to raise awareness of the consequences of consumption and the dangers. Any size of transparent polyethylene terephthalate (PET) plastic bottle can be used to make an ecobrick.

The bottle and the packed plastic are clean and dry to prevent the growth of bacteria. Plastic is cut or ripped into small pieces then packed little by little, alternating between adding the plastic and compacting it, layer by layer. The bottle is rotated with each press to ensure the plastic is evenly compacted throughout the bottle. This helps prevent avoids and allows the packing to reach the requisite solidity needed for building block applications.

Completed ecobricks are packed solid enough that they can bear the weight of a person without deforming—a density range between 0.33 g/ml and 0.7 g/ml. Maximizing density minimizes the flammability of the ecobrick while increasing its durability and re-usability. Plastic recycling is the reprocessing of plastic waste into new products. When performed correctly, this can reduce dependence on landfill, conserve resources and protect the environment from plastic pollution and greenhouse gas emissions. Although recycling rates are increasing, they lag behind those of other recoverable materials, such as aluminum, glass and paper. Since the beginning of plastic production in the 20th century, until 2015, the world has produced some 6.3 billion tons of plastic waste, only 9% of which has been recycled, and only ~1% has been recycled more than once. Additionally, 12% was incinerated and the remaining 79% disposed of to landfill or to the environment including the sea.

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II. COMPONENTS

1) *Rotary Drum*: A Rotary Vacuum Filter Drum consists of a cylindrical filter membrane that is partly sub-merged in a slurry to be filtered. The inside of the drum is held lower than the ambient pressure. As the drum rotates through the slurry, the liquid is sucked through the membrane, leaving solids to cake on the membrane surface while the drum is submerged. A knife or blade is positioned to scrape the product from the surface. The technique is well suited to slurries, flocculated suspensions, and liquids with a high solid content, which could clog other forms of filter. It is common to precoated with a filter aid, typically of diatomaceous earth or Perlite. In some implementations, the knife also cuts off a small portion of the filter media to reveal a fresh media surface that will enter the liquid as the drum rotates. Such systems advance the knife automatically as the surface is removed.
2) *Water Jet*: A jet of water under pressure, like in an ornamental fountain. Pump-jet, a marine propulsion mechanism for other types of boat. Water jet cutter, a tool for cutting the machining of engineering materials. Water jet, a personal use water cannon that can be turned to spray in different directions and is usually found in water parks. Water jet printer, a printer that makes use of water instead of ink. Dental water jet, see oral irrigator.
3) *High Torque High Speed Motor*: A torque motor is a specialized form of DC electric motor which can operate indefinitely while stalled, without incurring damage. In this mode of operation, the motor will apply a steady torque to the load. A torque motor that cannot perform a complete rotation is known as a limited angle torque motor. Brushless torque motors are available; elimination of commutators and brushes allows higher speed operation. Torque motors normally use toroidal construction. Their main differences from other similar motors are their wide diameter, to allow for high levels of torque, and their thermal performance, to allow their continuous operation while drawing high current in a stalled state.
4) *Pipe*: Plastic pipe is a tubular section, or hollow cylinder, made of plastic. It is usually, but not necessarily, of circular cross-section, used mainly to convey substances which can flow—liquids and gases (fluids), slurries, powders and masses of small solids. It can also be used for structural applications; hollow pipes are far stiffer per unit weight than solid members. Plastic pipework is used for the conveyance of drinking water, waste water, chemicals, heating fluid and cooling fluids, foodstuffs, ultra-pure liquids, slurries, gases, compressed air, irrigation, plastic pressure pipe systems, and vacuum system applications. Plastic pipes are capable of fulfilling the specific requirement for each application. They do so over a long lifetime and with reliability and safety. The key success factor is achieved by maintaining consistently high quality levels. For plastic pipe products, these levels are defined by the different standards. Two aspects are fundamentally important for the performance of plastic pipes: flexibility and long lifetime.
5) *Hot Air Blower*: A heat gun is a device used to emit a stream of hot air, usually at temperatures between 70 °C and 120 °C with some hotter models running around 115 °C, which can be held by hand. Heat guns usually have the form of an elongated body pointing at what is to be heated, with a handle fixed to it at right angles and a pistol grip trigger in the same pistol form factor as many other power tools. Though it shares similarities to a hair dryer, it is not meant as a substitute for the latter, which safely spreads out the heat out across its nozzle to prevent scalp burning and has a limited temperature range, while heat guns have a concentrated element and nozzle, along with higher temperatures, which can easily scald the scalp or catch the hair on fire.
6) *Micro-controller*: Micro-controller is a small computer on a single VLSI integrated circuit (IC) chip. A micro-controller contains one or more CPU's (processor cores) along with the memory and programmable input/output peripherals. Micro-controller controls the speed of double acting pneumatic cylinder, the pressure of double acting pneumatic cylinder, rotation of conveyor belt.



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III. STUDIES AND FINDINGS

Material selection is based on the application, strength, toughness and machinability. The design of cleaning unit is performed in such a way that the plastic which can contain a lot of wastage material such as junk food or etc. is cleaned. The mechanism of drying unit is placed in such a way that the plastic waste is dried in front of the hot air blower.

IV. CONCLUSION

The design procedure of choosing micro-controller for regulating the commands to cleaning and drying unit. The proposal made in this paper is very intensive and includes the problem of recycling of non-degradable plastic waste. Through this design we reduce manpower.

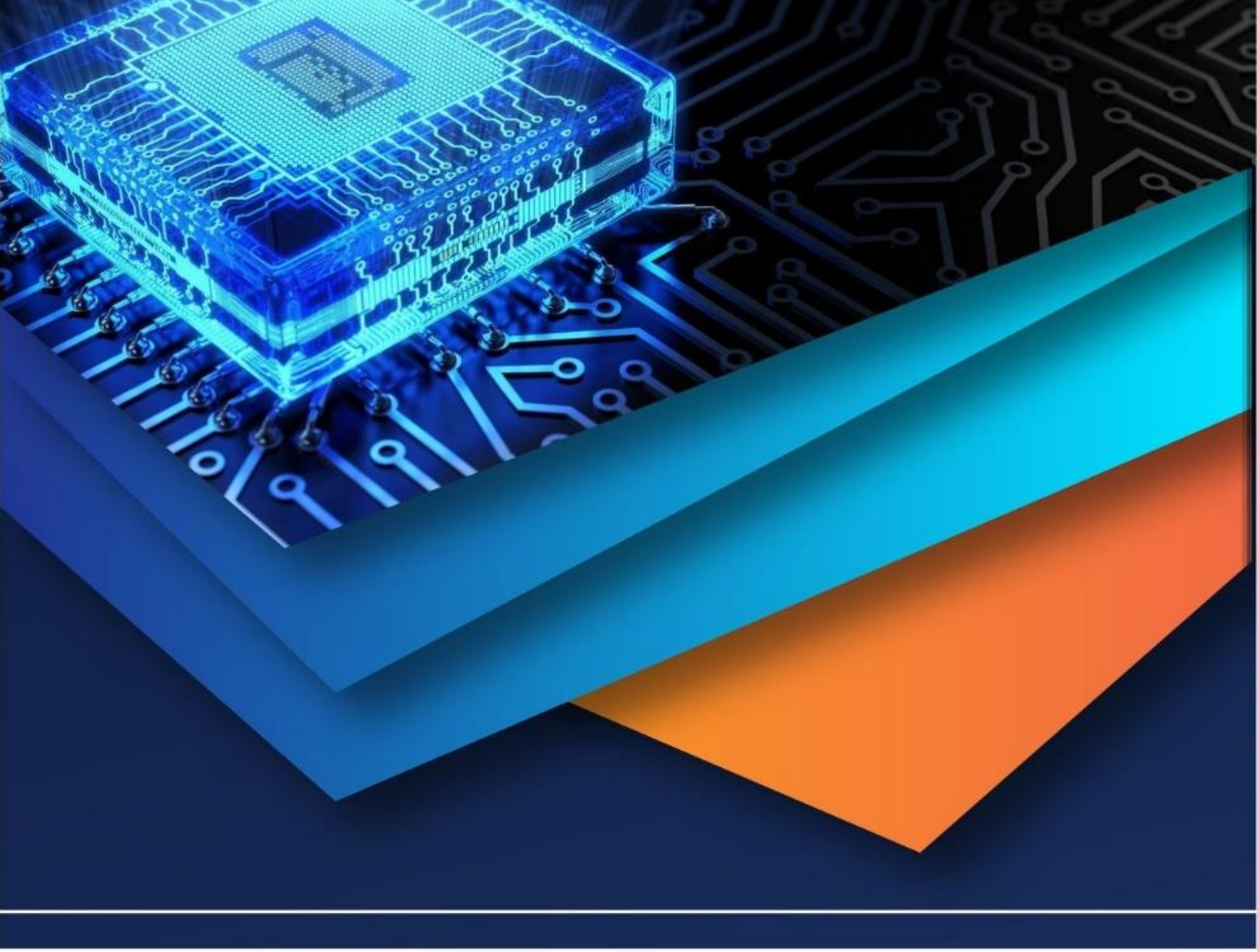
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REFERENCES

[1] Antico, F. C., Wiener, M. J., Araya-Letelier, G., & Retamal, R. G. (2017). Eco-bricks: a sustainable substitute for construction materials. Revista de la Construcción. Journal of Construction, 16(3), 518-526.
[2] Pokale, S. S., Gund, P. H., Gholve, D. R., Lagad, S. K., & Chauhan, S. R. ECO-BRICK: A WASTE PLASTIC USED AS CONSTRUCTION MATERIAL.
[3] Dadzie, D. K., Kaliluthin, A. K., & Kumar, D. R. (2020). Exploration of waste plastic bottles use in construction. Civil Engineering Journal, 6(11), 2262-2272.
[4] Taaffe, J., O'Sullivan, S., Rahman, M. E., & Pakrashi, V. (2014). Experimental characterisation of Polyethylene Terephthalate (PET) bottle Eco-bricks. Materials & Design, 60, 50-56.
[5] Mohana Priya, N., Nirmala, M., & Dhanalakshmi, G. (2018). Replacement of Bricks with Plastic Bottles in Construction. International Research Journal of Engineering and Technology, 5, 1551-1555.
[6] Simanshu, P., Pandey, S. G., & Wankhade, S. A. (2017). Waste plastic bottle as construction material. International advanced research journal in Science, engineering and technology (IARJET), Jawaharlal Darda Institute of Engineering and technology, Yavatmaltim, 4.
[7] Ariyani, D., Warastuti, N., & Arini, R. N. (2020). Ecobrick Method to Reduce Plastic Waste in Tanjung Mekar Village, Karawang Regency. Civil and Environmental Science Journal (CIVENSE), 4(1), 22-29.
[8] Taaffe, J., O'Sullivan, S., Rahman, M. E., & Pakrashi, V. (2014). Experimental characterisation of Polyethylene Terephthalate (PET) bottle Eco-bricks. Materials & Design, 60, 50-56.
[9] Raj, S. M., Gopal, M. N., Kumar, T. P., Prasath, G. G., & ME, S. R. (2018). An experimental study on the strength and characteristics of eco-bricks from garbage dump.
[10] Fitri, R., Siregar, H. F., & Asmy, A. E. (2021). Valuation of Ecobricks as an Artificial Resource in Hardscape Materials. Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences, 4(3).

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