

Design and Fabrication of Water Bottle Crusher

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Abstract - *This project is to increase the recycling habit of the people and to keep the city clean, to minimize the core material consumption. Our main intension is to keep the city clean. Nowadays in India, recycling is one of the areas which rapidly increasing day by day. The amount of waste coming is in a tremendous quantity. A bottle crushing machine is used for crushing plastic bottle for recycling purpose and also for easy storage in recycling bins. This project is based on electromechanical system. We can place this instrument in railway stations, bus stands, and colleges, normally water bottle are thrown on road this make city looks ugly and in rainy season mosquitos will also grow.*

1. INTRODUCTION

A water bottle crusher can be defined as a device used for crushing plastic bottle for easier storage in recycling bins thereby giving you extra space by flattening the bottles. This project consists of designing and fabrication of an automated water bottle crusher machine along with coin dispenser. In order reduce the waste, to increase recycling habit of people we planned to create an automatic bottle crusher. Bottle crusher is primarily used to save space and recycling. It helps to reduce the environment pollution. Thus helps us to create better place to leave.

A mechanical water bottle crusher is basically one of the most aid able machines. It helps to reduce the pollute environment of this world. Thus helps create a better place to live in. Apart from that, this bottle crusher can actually be the future mode of recycles apart from the

recycle bins. It can be placed everywhere, in the park, houses, bus stand, railway stations.

This project is mainly about generating a new concept of can/bottle crusher that would make easier to bring anywhere and easier to crush the can or bottle. This machine is developed solely for the purpose of recycling as plastic bottles are harmful to environment and aluminum to plants growth. Many people recycles items like paper, glass, and aluminum, While these efforts are a vital part of the process, the true recycling path continues long after recyclables are collected from household bins or community drop-off centers etc. Collecting, processing, manufacturing, and purchasing recycled products create a closed circle or loop that ensures the value of recycling. Recycling is a series of activities that includes the collection of used, reused, or unused items that would otherwise be considered waste, sorting and processing the recyclable products into raw materials, and remanufacturing the recycled raw materials into new products.

The maintenance cost for cleaning the garbage is also very expensive to avoid this problem we have planned to design automated garbage collection system along with coin disperser which attract the people. This design is to encourage development of collecting/recycling programs to provide children and young people an opportunity to learn about conservation of resources, economics supply and demand and important environmental issues using simple, attractive and an easy manipulative device as crusher.

2. WORKING PROCEDURE

This project is based on electromechanical system. This project consist of electronic and mechanical part mainly electric AC geared motor of 80 rpm, crushing drum, flange bearing, V belt, two gears of 130 mm, pcb that consist of micro controller. Two crushing drum are will rotate in opposite direction to squeeze the bottle and those two drums are driven by a single motor. In order to perform this opposite rotation we have adopted external gear meshing arrangement and a belt driven pulley from the motor. The machine is provided with two opening at the top side to insert the bottle and tin. When we insert the bottle it is detected by IR sensor or Proximity sensor, plastic bottle is detected by IR sensor whereas proximity sensor is for metal. This sensor detects the bottle and sends the signal to the micro controller that will give command to the geared motor to rotate and dispend the coin. There are two motors; one motor will rotate at once depending on the bottle we have inserted. If the bottle is plastic motor one will rotate to dispend one rupee, if it is aluminum can motor two will rotate to dispend two rupees. Simultaneously the bottle will fall on crushing drum on the bottle gets squeezed between the two rollers. This crushed bottle will fall on the bin which is placed below the rollers.

3. OPERATING MECHANISM

In the operation of crushing there are two rollers which are rotating in opposite direction. These rollers are driven by gears; the rollers are attached with gears at the one end of the shaft. Both rollers are driven at the right end. Out of two rollers one roller is directly connected to the driven shaft through belt; and two gears of same diameter and same number of teeth's. The two rollers should rotate in opposite direction in order to crush the bottle, to perform this action the gears are meshed externally as shown in figure 1



Fig 1 Gears and Belt driven mechanism

3.1 Coin Dispersive Mechanism

Two DC - Motors of 5v are used for coin dis pensive mechanism. The motors are programmed to rotate 90 degree for one signal from the microcontroller.



Fig 2 5v dc motors with coin dispersive mechanism

3.2 Crushing Drums.

There are two crushing drums made of sheet metal of having thickness of 3mm. Its length is 60cm and it is having diameter of 10cm. the rollers are welded with spikes on the periphery. The drum which will squeeze the bottles .the drums are driven by gears. The gears are having 40 teeth. By using tachometer we have found out the speed of the drum is 80 rpm.



Fig 3 crushing drums

3.3 3D- Model

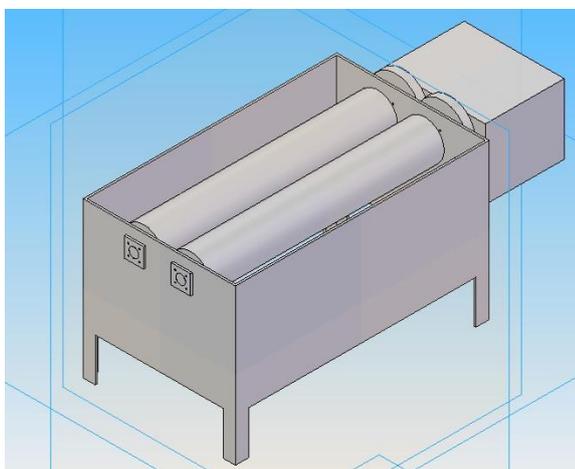


Fig 4 Front View 3D model

3.4 2D-Designs

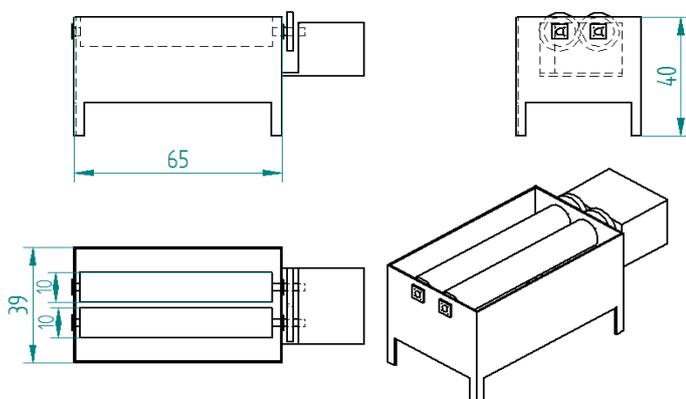


Fig 5 2D-Design

4. CONCLUSION

The volume of the bottle and tin is reduced to 60-70 % and the transportation charge will reduce due to the reduction of volume of bottle.

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REFERENCES

- [1] **“Can Crusher Using Scotch Yoke Mechanism”** Shadab Husain, Mohammad shadab sheik, JOSR Journal of Mechanical and Civil Engineering (JOME-JOCE) e-ISSN: 2278-1684, p-ISSN: 2320-334X PP60-63
- [2] **“Design Of Mechanical Crushing Machine”** Senthil Kannan, Naveen Prasad”, , International Research Journal of Engineering and Technology(IRJET-2016),Vol. 1,Issue 1,e-ISSN 2395-0056, p. ISSN 2395-0072
- [3] **“Can Crusher Design In Response To Environmental Concern”**, Dr. Sc. Kastriot A. Buza, Dr. Sc. Shaban A. Buza , Journal of Trends in the Development of Machine yard Associated Technology Vol. 18, No. 1, 2014, ISSN 2303-4009, p.p. 179-182.
- [4] **“The Design And Built Of Crusher Machine Plastic Bottles”** Bin Uzir, Khairuddin Bin Ishak, , Journal of Mechanical Manufacturing(J-Mfac -2014)

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