



# DESIGN AND FABRICATION OF PLASTIC BOTTLE AND CAN CRUSHER FOR RECYCLING PURPOSE

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## ABSTRACT

*This paper describes about the design of various components of can and plastic bottle crusher machine. The can and bottle crusher machine is widely used in beverage industries/scrap dealers shop to reduce the volume of the cans&bottles solely to increase the transportation volume and thus to reduce the transportation cost. Its wide usability (bottle and can) is backbone of this project. There are so many researchers who have done work on crusher, but still there are so many areas of scope regarding this design, analysis and usability. Even though there are many types of the can crusher machine in the market, the completion of this new model provides a more usage than previous one.*

## 1. INTRODUCTION

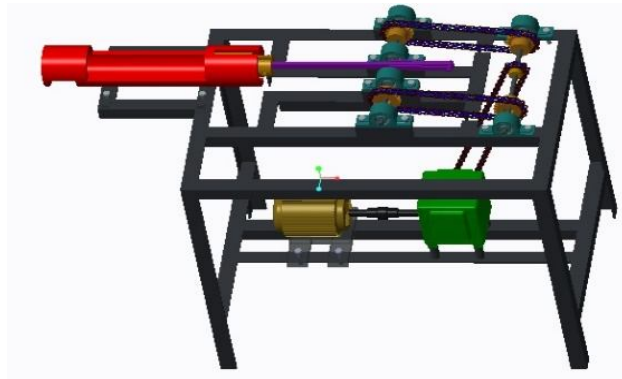
The sole purpose of this paper is to understand the fundamental knowledge of design, mechanism and fabricate new model with wide usability (Bottles as well as Cans) to reduce cost and space for different machines Crushing is the process of transferring a force amplified by mechanical advantage through a material made of molecules that bond together more strongly, and resist deformation more, than those in the material being crushed. This project hold material between two parallel solid surfaces, and apply sufficient force by single slide mechanism driven by electric motor to bring the surfaces together to generate enough energy within the material being crushed so that its molecules separate from (fracturing), or change alignment in relation to deformation. World throw away 230 billion plastic bottles and cans every hour. Thus this crusher machine will help to recycle them and maintain an eco-friendly environment also.

## 2. DESIGN PROCEDURE

In this, the explanations and some other parameters related to the project are included. With references from various sources as journal, thesis, design data book, literature review has been carried out to collect information related to this project.

Design consideration

- Maximum Force required to crush the Can and Plastic bottles
- Considered elements
- Standard size of cans and plastic bottles



**Figure No. 1:-** 3D model of project

Determination of crushing force experimentally

Force required to crush the plastic bottle

Force required to crush the Soda/Pepsi Can So, we considering maximum of it.

Mass of Bottle=26 gm

Distance travelled by piston= $d=0.32\text{m}$

Time for Stroke=5 sec

Velocity= $V=\text{Distance}/\text{Time}=0.32/5$

$=0.064\text{m}/\text{sec}$

Acceleration  $=0.064/5=0.0128\text{m}/\text{s}^2$

F is required crushing Force

$F= m \times a$  (By Newtons 2<sup>nd</sup> law)

$=26 \times 0.0128 = 0.3328 \text{ N}$

Torque,  $T = F \times r$  Where, r is radius or length of the crank.

$T = 0.3328 \times 0.32 = 0.1065\text{Nm}$

$\omega$  is angular velocity  $= 2\pi N/60$

$= 2 \times \pi \times 28.8/60 = 3.015 \text{ m/s}$

where, N is speed of the crank.

$N=28.8 \text{ RPM}$

Power is given by,

$P = T\omega / 60 = 0.1065 \times 3.015 / 60$

$= 5.352 \times 10^{-3} \text{ Nm/S}$

T is torque required

### 3. FABRICATION

Mechanical Components

- Shaft (2 Nos.)
- Chain(3 Nos.)
- Sprocket(2 Nos.)
- Plummer Block (6Nos.)
- Single Slider Mechanism.
- Crushing Tray.
- Angles (For Frame).

### 4. CONCLUSION

The above design procedure is been adopted for the fabrication of Automatic Can/Plastic Bottle Crusher machine which can crush both can as well as bottle. Thus, with help of this design and some other electronic components we can fabricate an automatic can/plastic bottle crusher machine to simply reduce the volume of cans/plastic bottles as well as to reduce the human fatigue.



## **REFERENCE**

- [1]. Vishal N. Kshirsagar<sup>1</sup> Dr. S.K Choudhary, Prof. A.P Ninawe published paper on Design Consideration in an Automatic Can/Plastic Bottle Crusher Machin international journal of engineering Research and General science Volume2 , issue 4 junjuly 2014 ISSN2091-2/30
- [2]. Vishal N. Kshirsagar published paper on Experimentation and Analysis of an Automatic Can/Plastic Bottle Crusher Machine IJRST-International Journal for Innovative Research in Science & Technology Vol. 1, Issue 2, July 2014 | ISSN(online): 2349-6010
- [3]. Cao Jinxi, Qin Zhiyu, RongXingfu, Yang Shichun presents a paper on " Experimntal Research on Crushing Force and its Distribution Feature in Jaw Crusher "2007 Second IEEE Conference on Industrial Electronics and Applications. 1-4244-0737-0/07/\$20.00© 2007 IEEE
- [4]. C. LAROUCI, G.FELD, JP.DIDIER presents a paper on "Modeling and control of the vehicle transmission chain using electric actuators". 1-4244-0136-4/06/\$20.00 © 2006 IEEE.