



# Design & Development of Automatic Pneumatic Can Crusher Machine

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## ABSTRACT:

Can crushing has been used by people for compression of cans after usage for a long time. Crushing cans by bare hands is a difficult and very strenuous process. So here we propose a pneumatic based can crushing system that allows for fully automated can crushing. This is a very useful system for hotels/restaurants/public places where a large quantity of cans need to be disposed off. The can crusher can automatically hold cans in queue and crush them one at a time. The system uses pneumatic piston in a particular arrangement with supporting frame having vertical holders and can pushing system. The vertical roller based system is used to push cans through the arrangement. Once the cans reach the bottom a sensor detects this and pushes one can at a time through the roller into the crushing chamber. After a can is pushed the electronics system now operates the pneumatic piston. The piston now pushes the can to compress it against the bed mounted on the other side. This helps to achieve desired compression of can. Once this is done the piston pulls back and the system automatically and the compressed can is ejected by the mechanism from the bottom of the machine and next can is pulled in. This ensures efficient compression which helps in easy storage and disposal of cans.

## I. INTRODUCTION

The main purpose of the project is to get knowledge of design and fabrication. The design is an environment friendly and uses simple properties such as mechanical single slider and automation properties which uses microcontroller and sensor. The design is done so that knowledge of designing, mechanism and forces analysis are increased. In order to reduce the waste, we planned to create a can crushing machine that will reduce the volume of aluminum cans by approximate eighty percent. This machine primarily usage is to save space and for recycling. It can be placed anywhere in park, restaurant, canteens, etc. in today's life most of the food items are packed in canned. Cold drinks and other beverages are also comes in cans. Commercial establishments like cafeteria and bars, have to deal with leftover cans. Storage is often a problem and cans consume lot of space, thereby increasing total volume of trash. The transportation cost is also high for moving such a huge number of cans. Thus this machine will help to recycle and maintain eco-friendly environment also. This project involves the process of designing the different parts of the crusher machine considering the forces and ergonomic factor for people to use. This project mainly about generating a new concept of can crusher that would make easier to bring anywhere and easier to crush cans. After design has completed, it was transformed to its real product where the design is use for guidelines.

## II. LITREATURE REVIEW

Can recycling is very important part of any family and community recycling program. Aluminum recycling is one of the easiest things you can do to help the environment. Recycling of can began a long ago and started to become common place back in early 1970's. Can is 100% renewable. This means that can you take to your local recycling Centre today becomes a new aluminum can. There are no waste products in the process of making a 100% renewable resources and one of the best things can recycle. You might be surprised to know that within 60 days an aluminum can is able to go from your recycling Centre and becomes a brand new can to be used by consumer.

2.1. Crusher A crusher is a machine designed to reduce large solid material object into a smaller volume or pieces. Crusher reduces the size or change the form of waste material so they can more easily disposed or recycles.

2.2. Pneumatics Pneumatics is a section of technology that deals with the study and application of pressurized gas to produce mechanical motion. Pneumatic system, which are used extensively in industry and factories are commonly plumed with compressed air or compressed inert gases.

2.3. Welding Welding is done to make frame work look oriented and to make it strong. The vibration inducted through the compressor and the cylinder are absorbed through the frame work and made it strong enough that it moves vigorously.

## III. DESIGN

The main aim of this is to study the complete design of Automatic can crusher machine. In this design and calculation procedure parameters have been taken into consideration from design data book, thesis, journals to carried out this project

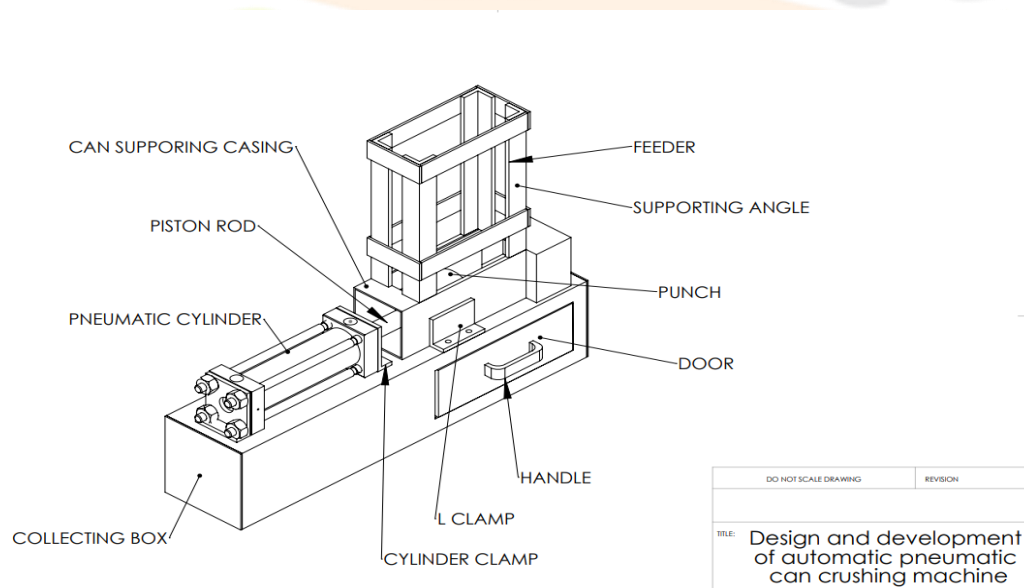


Figure 1 Modeling of machine

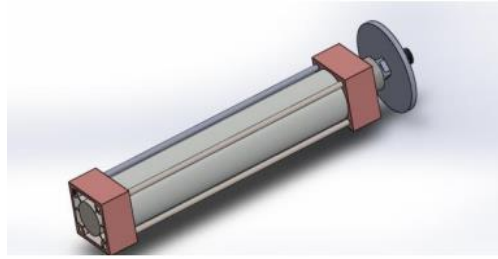


Figure 2 Cylinder

The material used for the cylinder is aluminum, which is having specification of 62 mm diameter, 145 mm in length and permissible load (ft) 180N/mm<sup>2</sup>. We have selected 62 mm diameter cylinder so as to get proper force intended on can and it get crushes, here is the calculation carried out :-

$$\text{Thickness} = D/2 \{ ft + P/ft - P \} - 1$$

$$t = 0.68\text{mm}$$

$$\text{Therefore } t = 3\text{mm}$$

The outer diameter of the cylinder,

$$\text{Outer diameter } D_o = D_i + 2(t)$$

$$= 62 + 2(3)$$

$$= 62 + 6$$

$$= 68 \text{ mm}$$

Therefore, Force generated by cylinder

$$F = P \times A$$

$$A = 3.14 / 4 \times D^2$$

$$A = 3.14 / 4 \times 62^2 \quad A = 3015.54 \text{ mm}^2$$

$$F = 2.45 \times 3015.54 = 7388.073 \text{ N} = 620 \text{ kg}$$

## Objectives of the project work

A high-quality product must have good efficiency, durability, and effectiveness. To obtain a good level for our project, we have set specific objectives to be able to provide the best results at the end of the project completion. The main objectives for our project implemented are as follows:

1. To design and produce a cans crushing machine using a pneumatic cylinder.
2. To make it easier to crush cans.
3. To save cost, time, and energy

