

CAM FOLLOWER CAN CRUSHER VENDING MACHINE

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Abstract - Swacha Bharat Abhiyan is a cleanliness campaign run by the government of India, which started on 145th birth anniversary of the great person Mahatma Gandhi. Today due to increase in demand of beverages, the used cans must be recycled in short duration. The main aim of the paper is to promote and contribute towards the cleanliness drive and to reduce the recycle duration of can with minimum cost. This paper is about disposal of beverage cans for which a cam and follower crusher mechanism is used. The crusher compresses the can and reduces the size of can so as to facilitate storage of more number of cans in a small space and it is also easier to transport. Initially we have considered only a standard size of can but with further modification the machine would be able to accept cans of various size and even plastic bottles.

Keywords – Can Crusher, Vending Machine, Cleanliness.

I. INTRODUCTION

Recycling primarily usage is to save space and for recycling of aluminum cans wastes (used for the temporary storage of aluminum cans) and improves workplace safety and neatness. It helps reduce waste disposal costs (since the aluminum cans are removed from the waste stream). For example, recycling one ton of aluminum cans saves 10 cubic yards of landfill space. This paper involves the process of designing the different parts of the crusher machine considering the forces and ergonomic factor for people to use. This paper 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.

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. This phenomenon is in a dangerous stage problem, which technologically needs to solve. Recycling or reusing of cans wastes is one of the options currently being utilized internationally to beneficially reuse wastes and clean our environment. 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.

The main purpose of the paper is to get knowledge of design and fabrication. The design is an environment friendly and uses simple properties such as mechanical Cam and follower and automation properties which uses PLC and sensor. In order to reduce the waste, we planned to create a can crushing machine that will reduce the volume of tin cans by approximate seventy percent. Along with the crushing mechanism there will be a card vending mechanism that will dispense gift coupons each time a can is recycled thus promoting people towards recycling.

II. LITERATURE SURVEY

The development of recycling tin can crusher requires an amount of good understanding of the knowledge of the design, analysis and fabrication. Therefore, executing a research is necessary to obtain all the information available and related to topic. The information or literature reviews obtained are essentially valuable to assist in the construction and specification of this final year paper. With this basis established the paper can proceed with guidance and assertiveness in achieving the objective of purpose.

The topics which are covered in this chapter are various can crusher machines which are in use till date like Manual Crusher, Hydraulic Crusher, Pneumatic Crusher, Geared Crusher, Scotch Yoke Crusher. But the Slider crank Crusher was commonly used, so we have developed a crushing mechanism using Cam and follower for crushing can quickly and easily. The chapter also covers the software which are used for designing and analysis.

A. Various Can Crusher Machine

- Manual Can Crusher Machine
- Hydraulic Can Crusher Machine
- Pneumatic Can Crusher Machine
- Geared Can Crusher Machine
- Scotch Yoke Can Crusher Machine
- Slider Crank Can Crusher Machine
- Cam And Follower Can Crusher Machine

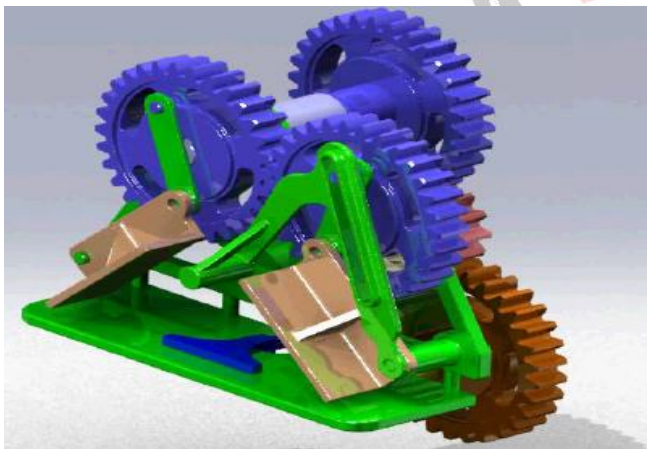


Fig.1 Geared Can Crusher Mechanism

B. Slider Crank Can Crusher Machine[8]

This machine is basically works on the principle of Single Slider Crank Mechanism which is the heart of this machine and it converts rotary motion into a reciprocating machine to crush the Cans/Plastic bottles. In this, link 1 is fixed and link 2 which is a crank is rotating about fixed link 1 and converts this

rotary motion into the reciprocating motion of slider (corresponds to the link 4) by means of connecting rod which corresponds to the link 3. This is the inversion of single slider crank which is obtained by fixing link 1.[8]

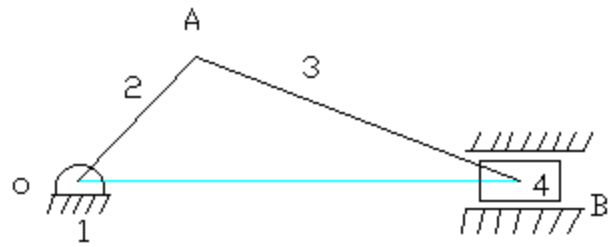


Fig.2. Single Slider Crank Mechanism[8]

Surve Qais et al. carried out a research on Fully automatic can crusher. Recycling of can began a long ago and started to become common place back in early 1970's. 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. The main aim of this is to study the complete 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 paper.

III. SYSTEM ARCHITECTURE

The mechanical design of the can crusher is a new design that allows people to compact cans using an machine at low price and compact size. Firstly, we need to evaluate different design ideas and finding the feasible idea for can crushing.

A) Linear bearing

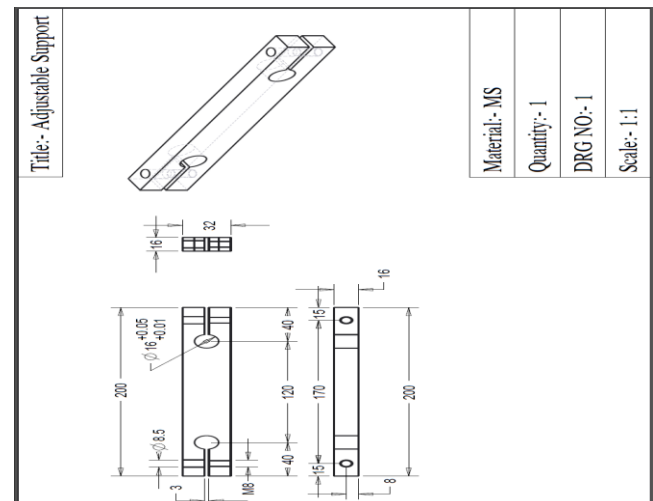


Fig. 2 Linear Bearing

B) Linear bearing 2

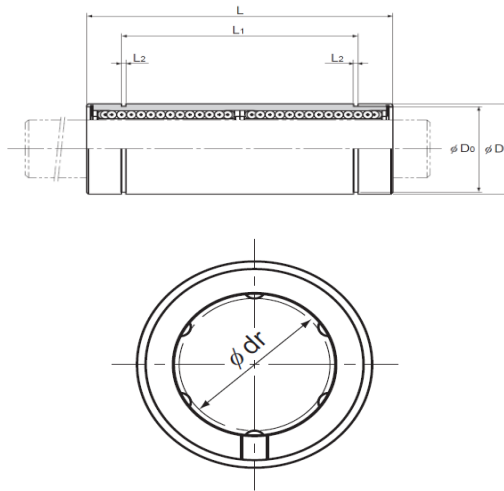


Fig. 3 Linear Bearing 2

Bearing specification:-

- Bearing company:-THK
- Bearing model :- LM-L 16
- Total bearing length (L) = 70mm
- Outer diameter (D) = 28mm
- Inner diameter (dr) = 16mm
- Ball rows = 5
- L1 = 53mm
- L2 =1.6mm
- Eccentricity = 15µm
- Radial clearance = -7µm
- Basic load rating:-
 - 1) Dynamic load (Co):- 1230 N
 - 2) Static load (C):- 2350 N

- Speed rating:-
 - 1) Reference speed = 43000 rpm
 - 2) Limiting speed = 28000 rpm
- Basic load rating:-
 - 1) Dynamic load (Co)= 8.06 KN
 - 2) Static load (C) = 3.75KN

C) Roller bearing

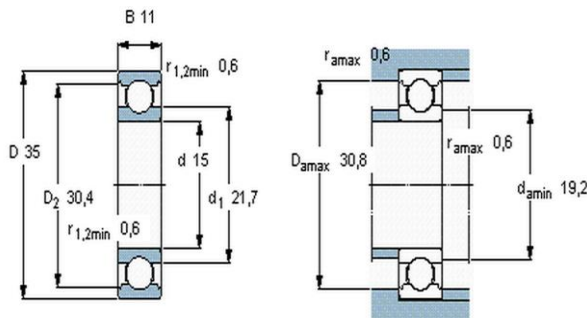


Fig. 4 Roller Bearing

Bearing specification:-

- Bearing company:-SKF
- Bearing model :- 6202-2Z
- Bearing type :- single row, deep groove
- Total bearing length (L) = 11mm
- Outer diameter (D) = 35mm
- Inner diameter (dr) = 15mm

IV. RESULT ANALYSIS

A. Manufactured Assembly



Fig. 5 Manufactured Assembly

Due to the economic and environmental benefits, recycling of aluminum drink cans is the world’s most recycled packaging container nowadays. In 1972, approximately 26,500 tons of aluminum cans were recycled and today that number is estimated to be as high as 800,000 tons. Even though the billions of cans recycled around the world, there are still billions of aluminum cans every year that are being disposed of roadways and in trash cans. This attributed to that recycling still facing some difficulties. Besides, sorting is a time consuming and costly. One of other difficulties of recycling aluminum cans is the necessity to reduce costs of shipping of these cans due to transportation of huge cargo.

B. Finished Model



Fig. 6 Complete Demo Model

Recycling primarily usage is to save space and for recycling of aluminum cans wastes (used for the temporary storage of aluminum cans) and improves workplace safety and neatness. It helps reduce waste disposal costs (since the aluminum cans are removed from the waste stream). For example, recycling one ton of aluminum cans saves 10 cubic yards of landfill space. This paper involves the process of designing the different parts of the crusher machine considering the forces and ergonomic factor for people to use. This paper 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.

V. CONCLUSION

After carrying out trial on the Cam Follower Can Crusher it was observed that the crusher was giving more precision and efficiency in crushing operation as compared to Previous Crushing system.

The desired objectives were achieved with maximum elimination of the drawbacks of the previous system. This also reduced the operation time. The labour cost was reduced. The damages caused during manual crushing were also reduced.

In this paper we studied different mechanical motion transmission mechanism for crusher. We implemented programming for controlling the crushing and vending operations where we got to know the programming software.

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