International Journal of Research in Engineering, Science and Management
Volume-2, Issue-2, February-2019
www.ijresm.com | ISSN (Online): 2581-5792

Design and Development of Aluminium Can Crusher

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***Abstract*: The reason behind that to make such mechanical project is to decrease the volume of cans which would be beneficially for storage as well as transportation. This paper talks about design and development of aluminium can crushing machine. In this project we use compressor, which would be simple and economical. The methods and processes involve in this project are cutting, bending, drilling, welding. After the completion of design process, it is manufactured and transformed into machine which would help in crushing. It helps to achieve 70% volume reduction out of total size of the can.**

***Keywords*: Aluminium can crusher, Compressor, Design, Economic, Simple, Size reduction.**

1. Introduction

This project consists of designing and development of pneumatically operated aluminium can crushing machine. The design is environment friendly as well as economical. For reducing the waste, we create a can crusher which would reduce the 70% volume of can out of its total volume. Also because of crushing storage area increases and transportation cost decreases since there is reduction in transportation volume. Can crusher can be defined as, "A device which reduces the volume of cans for easier storage by flattening." In this project, we uses 5/2 DCV, FCV, double cesses is very important to carry out this project to ensure what are needs to do. This project involves various manufacturing processes such as cutting, bending, drilling, welding. After the completion of design, it is transferred into a real product for crushing aluminium cans. This machine helps to crushing as well as maintain ecofriendly environment.

A. Problem statement

As the cans are in original size, volume required for the storage is large and hence increases the transportation cost.

B. Objectives

- Reduce the volume of aluminum cans.
- By reducing the size, increases the space for storage.
- Reduces transportation cost.

2. Literature review

- Elfasakhany, J.Marquez, E.Y.Rezola, J.Benitez has studied, "Design and Development of an Economic Autonomous Beverage Can Crusher" by using mechanical, electrical as well as electronics components. The system includes servometer (Hextronic HX12K), light sensor of the type DF Robot ambient, and Arduino microcontroller. The machine was built on a compilation between both of horizontal as well as vertical crushing design. The software is maestro for operating and controlling system components. The machine components was tested in both particular element and overall [1].
R. zRajesh, S.Selvadurai, S.Sivakumar, M.Vino has performed,"Design and Fabrication of Can Crusher" using mechanical single slider and automation properties which uses crank mechanism. The machine is basically works on the principle of single slider crank mechanism which converts rotary motion into reciprocating motion to crush bottles. They fabricate an automatic can crusher machine to simply reduce the volume of cans as well as human fatigue [2].
- K.Sontakke, H.Yadav, C.Wakchaure, P.Samere has performed , "Design and Fabrication of Automatic Can Crusher". They fabricate recycle bin tin can crusher to help the peoples to crush tin cans. They uses arduino microcontroller to control overall system, ultrasonic sensor, hopper, electric motor and compressor. By using this machine, they dispose more number of cans in less space [3].

3. Design and Calculations

Table 1
Aluminium Properties

Description	Specifications
Symbol	Al
Atomic no.	13
Electronic configuration	[Ne]3s2,3p1
Melting point	660
Boiling point	2467
Thermal conductivity	237

A. Calculations

Cylinder specifications:
Bore diameter =40mm
Rod diameter =16mm
Available pressure =5bar = 0.5 N/mm²

For Double Acting Cylinder :
Cylinder force , F = A*P
A = π/4 *D²

Where, F = Required force (N)
A = Area of cylinder (mm²)
D = Bore diameter (mm)
D = Rod diameter (mm)
P = Available pressure (N/mm²)

1. For Forward Stroke
Area of cylinder, A = π/4 * D²
= π/4 * (40)²
=1256.637 mm²

Extension Force, F = A*P
= 1256.637*0.5
= 628.3185 N

2. For Return Stroke
Area of cylinder, A = π/4 [D²-d²]
= π/4 [40²-16²]
=1055.5751 mm²

Retraction Force, F = A*P
=1055.5751*0.5
=527.7875 N

B. CAD Model

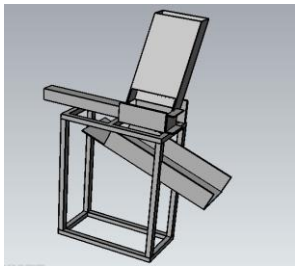

Fig. 1. CAD Model

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4. Future Scope

Here, we found the force required for crushing the can by using cylinder diameter and available pressure. After that we built can crushing machine for crushing aluminium cans.

5. Summary

At this stage, we determine the cylinder force required for crushing and model design is done on software.

Table 2
Results

	Area (mm²)	Force (N)
Forward Stroke	1256.637	628.3185
Return Stroke	1055.5751	527.7875

6. Conclusion

This paper presented design of aluminium can crusher and with the help of this design we can develop can crushing machine to easily reduce volume of cans.

References

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