ISSN 2349-6193
Impact Factor: 2.805

IJESMR

International Journal OF Engineering Sciences & Management Research

ALUMINIUM CAN CRUSHING UNIT AND RECYCLING

Ms.Gadge T.G.*[1], Ms. Kale K.J.[2]& MS Matele P.J.[3]
*[1]Dipoma Student, Mechanical engineering, Jaihind Polytechnic, Kuran, Pune, India.
[2]Dipoma Student, Mechanical engineering, Jaihind Polytechnic, Kuran, Pune, India.
[3]Dipoma Student, Mechanical engineering, Jaihind Polytechnic, Kuran, Pune, India.

Keywords: Aluminum, crushing, scrap, manufacture.

ABSTRACT
Aluminum can be recycled without any loss of quality and hence aluminum scrap has significantvalue. This property of infinite recyclability has led to situation where today around 75% of the almost one billion tons of aluminum ever produced is still in productive use, some having been through countless loops of its lifecycle. The energy needed to manufacture a single beverage can be used to recycle 10 beverage cans with the same amount of energy. Aluminum can is most recycled packing material because of the high value of the scrap and ease of collection , unlike other material aluminum retains its properties throughout the process so, no matter how many times can is recycled . Recycling saves energy, reduce wastage, and reduce use of city landfills. Our research deals with the recycling of aluminum can and its casting into aluminum ingots which can be supplied to aluminum steel manufacturer who provide row material for manufacturing aluminum foils and beverage can.

INTRODUCTION
Important metal and is the third most common elementAluminum is the word most, compare to 8 percentage of the earth crust. The versatility of aluminum makes it the most widely used metal after steel. Aluminum compounds have been used for many years, aluminum metal was first produced around 170 years ago. World wide demand for aluminum is increasing up to 29 million per year. It is the second most available metal in the world, being lighter of weight and possessing non-corrosive properties. Compared with iron, aluminum has a fast growing future. The application of aluminum in the packaging industry has already been a long practice, due to its low weight, good heat conductivity, strength and non-corrosiveness. These outstanding properties also led to the application in areas such as automation, construction, the aero plane and car industry and (fast) shipbuilding. Because of these reasons aluminum production has doubled in the past 20 years. In Western Europe the consumption of primary aluminum grew at an average rate of 2% to 4.7 million tons per year; this is approximately 20% of the world-wide consumption.

MATERIALS AND METHODS

Material
- Pneumatic cylinder for can crushing (10 bar pressure)
- Conveyer system for material handling
- Furnace (volume -251200 mm^2)
- Motor to run conveyor (10 rpm , 4to 12 volt)
- Adapter
- Direction control valve (5/2 DCV)
- Mould

Methods
The setup was assembled and the process are carried out thoroughly the fig shows the setup. In that crusher is design for a single can at a time. a single can placed one after other the time required for crushing a single can was considered then crushed can passed to conveyer conveyor was designed for handling material for crusher to the furnace . The time taken for transmitting the crushed can from crusher to furnace is note down. then fuel required was 1.5 kg the furnace was designed a volume 251200mm^2 then check the temperature of furnace for melting the aluminum 660 degree Celsius temperature required then next one is casting of molten metal, the mould was used to cast ingots of a certain dimension the time required for cooling a certain set of melted cans was note down.

ISSN 2349-6193
Impact Factor: 2.805

IJESMR
International Journal OF Engineering Sciences & Management Research

RESULTS

Crushing
The crushing of can take place in the crusher. The crushing time of crusher is 16 can per minutes by consideration

Material handling
The material handling is done by the conveyor which carries the material from crusher to the furnace. The conveyor is powered by 10 rpm 12 v dc motor

Melting
The material is carried to the furnace by the crushed the crushed cans are dropped into the furnace the heating time for the furnace is 40 min the the capacity of crucible is 18 can the material of the crucible is stainless steel the melting point of the crucible is 1340 degree Celsius the melting of the cans takes 20 min

Casting
The cast is made up of mild steel the melting temperature of the mild steel is 1100 degree Celsius. The molten metal is poured in the cast. The cooling time for the ingot is 15 minutes .the dimensions of the cast billet is 650*650mm

DISCUSSION
This is research for existing system in the world which would be similar to our project but we find some research paper about our project which is electrically operated and very smile in that we improve and operate pneumatically

FORMULE
Cylinder force (kg)
The cylinder Force is a function of:
F = Cylinder force in N.
D = Diameter of piston in cm
D = Diameter of piston rod in cm.
p = Operating air pressure in “bar”.
f = spring force in Kg.
fr = frictional resistance.(Though in case of static thrust, the frictional resistance is zero.)
Thrust exerted by various types of Cylinders:
1) Single acting push type:
$F = \{\pi \times D^2 \times P\}/4 - f$
2) Single acting pulls type:
$F = \{\pi \times (D^2 - d^2) \times P\}/4 - f$
3) Double acting in forward stroke
$F = \{\pi \times D^2 \times P\}/4$
4) Double acting in return stroke
$F = \{\pi \times (D^2 - d^2) \times P\}$
Example:-
Bore:- 40mm
Pressure:-5bar
$F = \{\pi \times D^2 \times P\}/4$
$= \{3.14 \times 4^2 \times 5\}/4$
= 60.1 kg/s

TABLES

Table 1: material properties.

MATERIAL	Max Stress (N/mm^2)	Maximum Deformation, (mm)	Maximum Temperature, (^OC)
Aluminum	Value	Value	Value
Mild steel	Value	Value	Value

ISSN 2349-6193
Impact Factor: 2.805

IJESMR
International Journal OF Engineering Sciences & Management Research

CONCLUSION

The actual aluminum recycling process which is on a large-scale was prototyped on a small scale the large scale factory was prototyped on a small scale involving each and every detail of the actual processes with this project we were able to achieve

1. optimize how scrap is recycled into processed aluminum ingots
2. employ recycling of aluminum on a small scale especially in rural market
3. enable the selling of processed aluminum ingot on the scrap commodity market
4. also the processed aluminum obtained can be used forvarious industrial application

AKNOWLEDGEMENT

With immense pleasure, we are presenting this paper as a part of our curriculum. We wish to thank all the people who gave us endless support right from the stage the idea was conceived. We would like to thank Prof. Dighe M.D. (project coordinator) for giving us the opportunity to deliver a project on this interesting topic.
We are heartily thankful to Prof. Hodger S. P. whose encouragement, guidance and support from the initial to the final level enabled us to develop an understanding of the subject. This project would not be possible without help of our internet department & library department who helped me gathering the information from various sources. Lastly, we want to thanks to all of those who supported us in any respect during the completion of the project.

REFERANCES

1. *J. G. Kaufman, Aluminium Alloy Castings, 2010.*
2. *J. L. D. William F Hosford, "The aluminum Beverage Can," 2012.*
3. *K. A. A. Dr, Recycling Od Aluminum Beverage Can, 2008.*
4. *K. K. Dimos Paraskevas, "Environmental Modelling Of Aluminum Recycling," 2011.*
5. *S. Tabacu, Axial Crushing Od Circular Structure With Rectangle Multi Cell Insert, 2013.*
6. *J. Bhillai, "Can Crusher Manufacturing Sector Project Design," 2009.*
7. *V. Bhandari, Machine Design.*
8. *B. Nishet, Design Of Machine Elements.*
9. *G. R S Khurmi, Machine Design.*