

Design and Fabrication of Hydraulic Aluminium Tin Can Crusher

Submitted in partial fulfilment of the requirements for the award of Bachelor of
Engineering Degree in Mechanical Engineering

By

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SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **JEGATH RAKSHGAN G (38150712)**, and **DWARAKESH P (38150704)** who carried out the project entitled "**Design and fabrication of Hydraulic aluminium tin can crusher**" under my supervision from 01.11.2021 to 09.05.2022.

A handwritten signature in purple ink, appearing to read 'Anish', with a horizontal line underneath.

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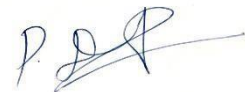
DECLARATION

I, **JEGATH RAKSHGAN G (38150712)** and **DWARAKESH P (38150704)** hereby declare that the Project Report entitled “**Design and fabrication of Hydraulic aluminium tin can crusher**” done by me under the guidance of **Dr.M.ANISH.M.E.,Ph.D.**, is submitted in partial fulfilment of the requirements for the award of Bachelor of Technology degree in Mechanical Engineering.

1)



2)



DATE: 09.05.2022

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ABSTRACT

It has been noted that this tin cans are an important part of garbage in public place. In order to recycle and & these cans their collections and distribution are required. And this paper discusses the detailed design of tin can crusher. The can crusher helps achieve a 70% of reduction in volume and reduce travel costs. It is small in size and the can work manually. It will help to keep's the world clean & tidy and eco-friendly as in model. The new Can Crusher was introduced as one of the examples of overcoming the problem of mass wastage. Reduction of landfill can be handled by flattening and compressing the tins. The project which crush the aluminium tin can & it can use in commercial industries. This main objective of this project, to build a Can Crusher machine to reduce the volume of this tin cans scrap and use the cans to move them to the recycling area easily. Nowadays, a large counts of cans are used in restaurant, bars etc. and a large mass of space is required to store or dispose of the scrap Cans. This project involves a production of Can Crusher using a single slider crank method that reduce the volume of cans by at least 75%. The report shows the required construction of the machine. Under this project work Crushers were built. In this model, less input power is used to generate greater power. This model is applicable to community, disabled and children use. It takes a little effort with the crushing process regardless of the size of the can. The presence of this model in a public place can raise awareness of community regeneration.

TABEL OF CONTENT

CHAPTER NO.	TITLE	PAGE NO.
	Abstract	i
	List of figures	iv
1	INTRODUCTION	1
1.1	Introduction of aluminium tin can crusher	1
1.2	Invention of tin can crusher	2
1.3	Main aim of can crusher	2
1.4	Advantage of can crusher	3
1.5	Applications of can crusher	3
1.6	Automation & further modifications in can Crusher	3
1.7	Advantages of automation	4
1.8	Application and purpose of automation	4
1.9	Methods of Can Crusher	4
1.10	Types of can crusher	7
1.10.1	Liters of can crusher	8
1.10.2	Can\pet baler	8
1.10.3	Drum crusher	8
1.11	By installation or placement can crushers can be classified as	8
1.12	Selection of Materials	11
1.13	Keys	12
1.14	Objective	12
1.15	Reasons to use a can crusher	13
1.16	Benefits of using can crushers in commercial Industries	14
1.17	Cleaning a can crusher	15

TABEL OF CONTENT

CHAPTER NO.	TITLE	PAGE NO.
2	LITERATURE SURVEY	16
3	AIM AND SCOPE OF THE PROJECT	21
	3.1 Aim	21
	3.2 Scope	21
4	MATERIALS AND METHODS	22
	4.1 Materials selection for different components	22
	4.2 Material and components	23
	4.3 Problem Statement	27
	4.4 Commercial automatic can crusher	27
	4.5 Semi-automatic variation	27
	4.6 Maintenace Tips	28
5	RESULTS AND DISCUSSIONS	29
	5.1 different types of structural crushers available on the market	30
	5.2 Here are some general tips for using and maintaining a commercial can crusher	30
	5.3 Other types of structural crushers include	31
	5.4 How Steel is better than Wood	35
	5.5 How Cast iron is better than Wood	35
	5.6 Innovation	36
6	CONCLUSION	38
	REFERENCES	39

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE NO.
1.1	MANUAL CAN CRUSHER	5
1.2	SEMI-AUTOMATIC CAN CRUSHER	6
1.3	AUTOMATIC CAN CRUSHER	7
1.4	HORIZONTAL CAN CRUSHER	9
1.5	VERTICAL CAN CRUSHER	10
1.6	MULTI POSITION CAN CRUSHER	11
4.1	PERFORMANCE & SAFETY	22
4.2	MATERIAL AND COMPONENTS	23
4.3	MS PIPE	23
4.4	MANUAL HYDRAULIC JACK	24
4.5	PRESSING DISC	25
4.6	PROJECT OUTCOME	26
5.1	PACIFIC MOUNTED ALUMINIUM CAN CRUSHER	31
5.2	METAL CAN CRUSHER	32
5.3	ELECTRIC CAN CRUSHER	32
5.4	PNEUMATIC CAN CRUSHER	33
5.5	HAND OPERATED PACIFIC MOUNTED CAN CRUSHER	34
5.6	PRICES OF DIFFERENT TYPES OF CAN CRUSHER	36
5.7	COUNTS OF DIFFERENT TYPES OF CAN CRUSHER	37
5.8	ALUMINIUM CAN BEFORE AND AFTER CRUSHING	37

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION OF ALUMINIUM TIN CAN CRUSHER:

Mostly crushers are used in the machinery and compacting industries are made of various materials. The Can Crusher machine is mostly used in the beverage industry or in a discard retailer to reduce the volume of cans. As a result, it helps to a reduction in transportation costs. The machine is widely uses for space saving and recycling it. Actually it be placed anywhere, in modern life most of the foods is packed in cans such as hot and cold drinks and other beverages. In commercial centers, such as restaurants hotels and bars, they have to deal with the remaining cans. Storage of these cans are often some problems and increase the volume of waste. Therefore, using a can crusher in such areas seems to be beneficial.

Commercial centers, such as restaurants and hotels, they have to deal with the remaining cans. Storages is often problematic and cans consumes a more lot of space, this increases the total volume of waste. Travel costs are also high by delivering such a large amounts of can. So this machine will help to regenerate and it maintains an eco-friendly environment as well. The project involve the process of designing parts of a crusher machine taking into account the strength and ergonomic factor that people should use. The project is mainly about producing a new concept of can crusher and that will make it easier to deliver anywhere and easier to crush the cans.

The main purpose of this project is to get the knowledge of "Design and fabrication of hydraulic aluminium tin can crusher". This design is environmentally friendly and uses simple materials such as a Hydraulic jack with a cylinder to crush cans. It will reduce waste, we planned to build a tin press that would reduce the volume of aluminum cans by about 80 percent. The machine is mainly used to save space and recycle. It can be placed anywhere in the commercial industries, and in park, restaurant, bars, etc. In modern life most of the foods is packed in cans. Hot and cold drink sand other beverages also canned. In commercial centers, such as restaurants and bars, have to deal with the remaining cans.

1.2 INVENTION OF TIN CAN CRUSHER:

There are many models suitable for crushers. Some models are pneumatic, hydraulic, aluminum and wood. Jesse M. Wright invented the aluminum can crusher in 1937, but it was not patented until August 30, 1938. Restoration is a wonderful way to help the environment, even if you think differently when you drag large items, and our recycling machine is more integrated, a crushing machine. Can crushers are available in a variety of styles, sizes and speeds, and models that are suitable for everyone from a soda drink to a man's digestion center.

The project is mainly about producing a concept of can crusher, it will make it easier to deliver anywhere and easy to crush cans. After the design was completed, and it was transformed into its actual product where the design was used in guidelines. Travel costs are also high by delivering such a large amount of cans. This model is applicable to community, disabled and children use. It takes a little effort with the crushing process regardless of the size of the can. The presence of this model in a public and commercial place can raise awareness of community regeneration.

1.3 MAIN AIM OF CAN CRUSHER:

The main purpose of a can crusher is to break a hollow aluminum tin into a very small units. Anyone who can drinks a few sodas in a week may not see the need to mix cans, but some heavy drinkers may find these devices very useful in restaurants, dining halls, recycling plants, and commercial areas are where a crusher can be most needed. So this machine helps to rebuild and maintain an environmentally friendly environment. This project involves the process of designing different parts of a crusher machine, keeping in mind the strength and efficiency factor that people need to use.

1.4 ADVANTAGE OF CAN CRUSHER:

- Aluminum recycling usually saves significant cost on new aluminum production.
- Although the cost of collection, segmentation and recycling is taken into account.
- Large national savings can also be made in the long run when considering the reduction in capital costs associated with international shipping of landfills, mines and crude aluminum.

1.5 APPLICATIONS OF CAN CRUSHER:

Many cans thrown away by one person can drink soda during a lifetime. This creates a lot of space here and not these crusher. A can crusher can significantly reduce the size of cans.

You may have notice the crushers in supermarkets, hotels and bar even in schools and offices. They really enjoy using these items. By installing these crushers on all road riders can go a long way in protecting Mother Nature and our selves. Many countries will follow this example and be open about this. This can make the whole world a beautiful, clean place to live. Here is a list I could put together that would sell you one idea for your home. It is really fun for kids to use this can crusher. Kids love the satisfaction comes with a used aluminium tin or oil tin.

1.6 AUTOMATION AND FURTHER MODIFICATIONS IN CAN CRUSHER:

Automation is a use of machinery, control systems and information technology to improve productivity in the production of goods and the delivery of services. The proper motivation for using automation is to increase productivity, and/ or quality in addition to what is possible with current levels of human resources in order to realize that the economy of scale, and / or achieve predictable quality standards.

1.7 ADVANTAGES OF AUTOMATION :

The main advantages of an automations are

- Increase productivity.
- Improve quality or increase quality forecasting.
- Improve durability and processes or product.
- Increase output consistency.
- Reduction of costs and costs of human labor.

1.8 APPLICATION AND PURPOSE OF AUTOMATION:

Automations used in operation to reduce cycle time.

- Automatic equipment is used in high accuracy is required.
- Switching hard-working people into jobs that involve physical exertion. Changing people in activities that take place are in dangerous areas (e.g. fires, volcanoes, nuclear facilities, underwater, etc.)
- They perform tasks beyond human capabilities: size, weight, speed, and endurance.
- Economic development Automatic development may improve the economy of a business, community or the general public.
- Reduce working time and lead time significantly.
- Releases staff to hold other roles.
- Provides advanced services for the development, maintenance and operation of automated processes.

1.9 METHODS OF CAN CRUSHER:

In operations, can crushers can be classified as:

- Manual can crusher
- Semi-automatic can crusher
- Automatic can crusher

Manual can crusher:



Fig 1.1 Manual can crusher

Manual Can crushers are the most common and almost commercially available manual Crushers. By default it means we can only add one can to Crusher. Can the pressing process be done manually, and we need to pull the level, which lowers the crush plate and compresses the aluminum can. After crushing the tin, we need to discard the pressed tin and insert the next tin into the Crusher. This process can take a long time, if many cans need to be crushed. This is where semi-automatic Can Crushers come in handy, as shown in figure 1.1

This work is to improve and its performance so that there is no doubt about the design and concept. The design required minimal crushing of aluminum cans, which could crush a can at a time.

Strong, durable and heavy work so you will not have to worry about it breaking when you crush your recycled cans. Basically metal crushers are better than strong and durable plastic but can start to rust when too much liquid gets to the metal parts and need extra lubrication from time to time because when the metal comes in contact with the hollow metal they usually make. It is harder to manage the sounds and it becomes harder to work as the tension increases.

Semi-automatic can crusher:



Fig 1.2 Semi-Automatic can crusher

Semi-automatic crushers differ from manual crushers in that they have a collecting chute on top of the crusher. You can put many cans in this tray and crush them one by one. Each crusher has a different power tray, some shredders can hold only 4 cans and some can hold up to 10 cans. Semi-automatic crusher speed up the can compaction process as there is no need to put new cans into the crusher after the previous compaction. This allows the grinding process to be accelerated several times. However, the crushing process must be carried out directly by us, and there is no automatic system in the semi-automatic can crusher, as shown in figure 1.2

This process is slow and if you have to crush hundreds of cans then it becomes ineffective and you need something simple. Here the best solution would be an automatic can crusher but at the moment there are no crushing units available in the major market and those that are more expensive or slower. So the best bet is to get a semi-automatic can crusher with a high-capacity feeder that will allow you to grind several cans one by one without loading them inside that crushing method. These semi-automatic top crushers also have an automatic canning mechanism that uses gravity to remove those puck-sized cans and load them into toxic waste under the device.

Automatic can crusher:



Fig 1.3 Automatic Can Crusher

The automatic can crusher is a device that automatically shreds aluminum cans. After putting it in through the inlet, you just need to come out from the other side in a completely shredded state. These materials are expensive (thousands of dollars) and are designed for large recycling areas or other large materials where hundreds of cans must be shredded. Basically, if you plug this automatic printer into an outlet, insert a can, and press the button, it will break at once. This automatic shredder is superior to conventional semi-automatic shredders, but it shows amazing performance when you need to shred a lot, as shown in figure 1.3.

1.10 TYPES OF CAN CRUSHER:

There are different types of can crusher and their concepts are Manual can crusher, Semi-automatic can crusher, and Automatic can crusher, and further can crushers are;

1.10.1 LITRES of CAN CRUSHER:

- This is a viable options that if you have a lot of cans to crush, although it still cracks in sequence and when properly placed it is a great asset. This can be a ventilator or a hydraulic. Volume reduction - up to 95%.
- With our electric grinders, you can easily reduce waste and save money. Easy to install and easy to operate.
- For general voltage, single-phase 230V and three-phase 380V can be selected as an option.

1.10.2 CAN/PET BALER:

Although it will not contain as thick cans as one can crush - the volumes are still reduced to 85% for a good clean barley.

1.10.3 DRUM CRUSHER:

If these need to be assembled (up to 210 liters) a special machine is required. Safe density and liquid removal and volume reduction by 80%.

1.11 BY INSTALLATION AND PLACEMENT CAN CRUSHERS CAN BE CLASSIFIED AS:

- Horizontal can crusher
- Vertical can crusher
- Multi position crusher

Horizontal can crusher:

The horizontal can crusher can be installed on a horizontal area such as a table. These can crushers are less common than regular can crushers as there is no easy way to dispose of empty cans after compression. This means that we personally have to tin can crusher and throw it in the garbage bag.

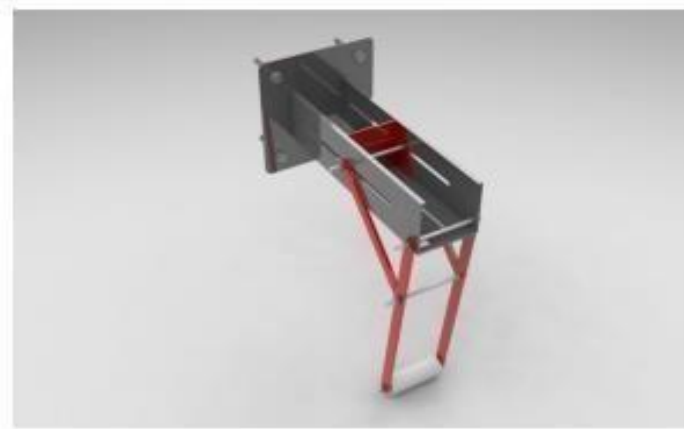


Fig 1.4 Horizontal Can Crusher

Horizontal canned crushers are those devices that work in a horizontal position placed on your table or pushed down. These horizontal crushers include horizontal models fitted with recycled drums designed for these structures for a wide range of options. These horizontal crushers are generally easier to use and take up less space than those straight models as they do not require large levers to operate properly and use gravity to harvest them.

These Horizontal can crushers come in two types where one works by hand but the other works by foot so there is no single answer that can mean all of its benefits research of these groups has different types of operation. These machines are also designed for heavy cans for crushing cans where you need to crush as many cans in less time as you need to find what you can do on your own and there are often no ways to do this like standing upright models. But as the strength goes these horizontal crushers are usually made of steel so they are stronger and will eventually outperform all plastic and wood models, as shown in Figure 1.4.

Vertical Can Crusher:

Vertical can crusher is the most popular type of aluminum can crusher. Vertical can crushers are usually wall mounted. These crushers come with special insert plates or screws and can be installed on a variety of materials such as plastic, wood, etc. What sets the can crusher apart is that it can be installed in a very convenient location. For example, we could install a can crusher right on the wall in our garage or kitchen, or we could place a trash can under the crusher so that a can of soda or beer is ejected immediately or automatically when pressed, Crusher, as shown in Figure 1.5.



Fig 1.5 Vertical can crusher

Vertical can crushers are those devices that can be attached directly to your wall or to another wooden boom and to other recycled drums next to it. These crushers are the main type of crusher and you will find many different models from the many manufacturers that make these designs. These Vertical crushers can be designed in a way that uses other hinges or pistils to turn the circular motion that makes the handle into a straight movement to break those cans. But the best part of these printers is that most of them use gravity to disperse the canned can in a container or box in any other container you have.

Multi position Can Crusher:

This Multi position Can Crushers are installed horizontally & vertically too. This can crushers operate worldwide and this may be used almost in anywhere. By its shape, size and compressed aluminum cans, they are much more horizontal than straight crushers. Basically, crushers have many similarities to horizontal crushers, but they have additional computer programs that allow you to, as shown in Figure 1.6.



Fig 1.6 Multi-position Can Crusher

1.12 SELECTION OF MATERIALS:

Once you know the models you have to make a decision and it is not easy to do as each of those styles is made for different occasions but usually you will choose those specific models because they are very different and diffuse. Availability is very important. Horizontal crushers can be ideal for situations where you need to crush the cans and not always and you need to hide the crusher all the time or they can be used over long recycled barrels. In the end it all depends on your personal preference but if you can choose, I would suggest you go with those specific models as they have a much wider choice.

1.13 KEYS:

- A canner crusher is a tool used to store it easily in recycled bins. Although mostly recyclers do not required you to crush cans. If you overuse it, your regular container may quickly fill up. The crusher gives you extra space by softening one or more cans.
- The air cylinder can crusher, simply press the lid to lock almost all types of aluminum cans. Operating pressure: 100psi; Air Compressor is required to drive the tin crusher.
- There are about 24 aluminum cans per pound. Modern aluminum cans are less than 10 millimeters in diameter, but hold 90 pounds of liquid per square inch (about six times the air pressure).
- Cans have no known role in biological systems. It is poorly absorbed by animals and humans. Low toxicity is associated with widespread use of jars in tableware and preserves. Nausea, vomiting, and diarrhea have been reported after consuming canned food containing 200 mg/kg tin.

1.14 OBJECTIVE:

- The inspiration behind this invention came from the wastage observed at different parties and Malls and festivals where people use a lot of canned beverages. The people who use it throw it away without further attention.
- Therefore, a new way must be developed so that the garbage at those gatherings could be reduced. The objectives of this project include.
- It is to reduce the volume of the cans at least by 70%.
- To study about different can crusher machine.
- To familiarize with different part of it.
- To design and fabricate the can crusher that required low force to crush the cans.
- To design and fabricate the can crusher that can crush a can at a time.
- To construct can crusher machine for better recycling.
- The design must be capable of volume reduction by 75-80%.
- The design must be Human powered and economical.
- The fabricated product must be easy to transport from one place to another.
- The system must be energy saving and less time consuming.

1.15 REASONS TO USE A CAN CRUSHER:

- Simplify your life by buying a cannabis crusher and using it to reduce the size of bad drinks. Here is a helpful list I have included that might sell you with one extra idea for your home.
- Can crushers will increase your chances of recycling used drinks. Not only will you do well in nature here, but you will also make extra money in the process.
- Stop crusher can be really fun for kids to use. Mostly kids love the satisfaction that comes from breaking down a used can.
- Organize your space by minimizing clutter. Imagine the chaos that ensued as the finished 24-pack of beverages sat on the counter. Crusher can greatly reduce space, freeing up space for more important things.
- It helps to keep your kitchen clean. Crushed tin can makes it very difficult for anything to reach these cans and the smell will not go as far as everything has come together.
- Can crushers are really cheap. Some of them can be purchased for as little as \$ 10 per unit, so there are no excuses when it comes to purchasing.
- The electric can crusher makes things even easier. Are you tired of the craftsmanship that comes with crushing used can, then go electric and make the job even easier for you.
- There are crusher units that can take up to 6 or more at a time. This saves the valuable time and makes everything easier for you.

1.16 BENEFITS OF USING CAN CRUSHERS IN COMMERCIAL INDUSTRIES:

However, if you work in an industry that usually uses paint cans and pails, cans or metal cans, the canned crusher offers many benefits. Depending on your industry conditions, there are several crusher options available: manual, semi-automatic and automatic.

Handmade crushers work best in the home environment as they have the ability to crush one can or canister at a time. The process is performed directly with a lever, which is pulled to crush the product up to 1 / 6th of its actual size.

There are many benefits to having an automatic can crusher in the commercial industry. First, it allows a much safer and smarter workplace. Normally, waste is left behind until dumping experts are taken to a recycling center. Can crushers quickly reduce the size of your waste, make the workplace smarter and, most important, safer. Using a tin crusher to reduce the amount of waste means reducing the cost of transporting the waste. Whether it is an outdoor garbage collector or your business is putting it in recycling facilities, a can crusher means that fewer collections / deposits are needed, saving valuable money and time.

If you worried that the can crusher for commercial use will need regular maintenance and cleaning, put aside your worries. Crushers are very easy to clean and do not required electrical repairs. They do not even need training to be used; there are one of the easiest machines available and can be used by anyone. While the initial cost of purchasing a crusher to be used in the industry may seem expensive.

1.17 CLEANING A CAN CRUSHER:

Even after you have emptied the contents of the container, you may find that the liquid residues persist inside it. Unless they are completely removed, they will also put you in the crusher. Do not be afraid! If this happens occasionally and in small quantities, it is unlikely that it will cause any major damage to the machine. Doing so now will ensure its continued effectiveness.

Leaving the liquid to stay inside you in the crusher is not a very good idea. They can cause your machine to rust, especially if the crusher can be exposed to moisture or temperature changes. They can damage the hinges and internal mechanisms of the machine, reducing their movement. Apart from anything else, they can accumulate and cause a foul odor.

You can clean the crusher as you would any other metal tool: using a damp cloth. If the liquid has already dried, you may want to look for common household cleaning products to remove stains. Be sure to check the materials used in the can crusher. Is it made of metal or plastic? This will help you to choose the product that works best and that does not hurt the most.

CHAPTER 2

LITERATURE SURVEY

Anusha et.al. (2019) [1]. The task of the project is design and create a tin crusher that will reduce the minimum volume of aluminum can by 70%. The crusher will be made up of various components that contain as part of all that is considered to be the lever, base frame, can bin, piston cylinder arrangement, sprocket chain mechanism and bearing. The inspiration for this design came from the destruction of supermarkets, canteens of large companies often holidays that include large parties where the people gather and eat large quantities of drinks. So it only makes sense that there should be an easy way to dispose of cans properly during these large gatherings. So this can crusher was created, with a portable and man-made machine.

Bengtsson et.al. (2015) [2]. There is a growing need to increase yields and to increase the crushing capacities of plants. Research in the area has resulted in the developments of many development tools, and recent research has shown that quality production factors that have a significant impact on development outcomes. Product quality and power are influenced by a few parameter, that in order to control all these parameters it is necessary to use some kind of optimization software. In this paper, a new method is developed to analyze product volume and quality. For example the can crusher and vertical shaft impact crusher (VSI) are imitated in the higher education sector. The simulation shows how the product capacity and quality of the product list will be affected if the parameter is changed.

Cleary et.al. (2017) [3]. Imitation of Discrete Element Method (DEM) with non-circular particles and including's cracks used to understand this breakdown behavior and performance of the industrial scale can crusher using a standalone tool. The fracture model use and replacement strategy and the impact of a specific energy size data from the Drop Weight Test (DWT). There is a strong difference in the behavior of cracks and heights in the congestion area as different concave and mantle profiles form five different regions with monotonically reduced diameters and different levels of interaction between areas. These controls the rate of movement and the ability to load and break the particles, and determine whether high energy is produced by

Pressure chains of multiple particles or as particles loading directly from the liner area.

Elfasakhany et.al (2012) [4]. One of the problems with modern canning machines is that they are mechanical. However, independent or electric canned crushers are large and expensive due to the complexity and application of compactor technology. Therefore, it is necessary to have a small, low-cost, and independent crusher equipment. The purpose of this project is to design and develop a small, economical and independent machine for crushing aluminum beverage cans. This work involves the processes of design, development, production, testing and verification. The machine is built on the combination of both horizontal and vertical crushing designs, and, the strength required to assemble very small tins.

Grondahl et.al. (2018) [5]. In extraction processes, equipment is often operated under adverse condition and due to poor access to crusher and poor maintenance, this information is not available. The cone crushers have a crushing chamber around the center axis and crushing does not occur simultaneously but in a circular motion. This structure creates potential crushing potential through the force of gravity due to the variability of the feed across this crushing chamber relative to e.g. large flow, particle size distribution and other material. This paper suggests that changes in crusher performance, due to differences in between feed material properties such as segregation can be diagnosed and determined in order to improve the process of future continuity.

HanifiCanakciand et.al. (2016) [7]. In this work presents an investigation into the impact of canned aluminum can on the strength and inflammatory properties of soft clay. Disposable beverage cans (WBC) are cut into 5 mm strips mixed with soil at 2, 4, 6, 8, and 10% (dry soil weight) before in use. Three general tests were performed on this prepared samples compound, free radical, and the California Bering Ratio (CBR). Experimental and their results showed that WBC had a profound effect on the properties of aggregates, inflammation, and potency of clay structures.

Erik Hulthen et.al. (2011) [8] Can crusher are used in the mineral, mining, and composite industries to separate stone, mineral and metal objects. The systems are used to control closed side setting (CSS) on can crushers, and thus to reduce

Size, are widely used to compensate for the aging of manganese crushing layers and to protect equipment from overloading. With frequency converter and flawless speed in the can crusher can be adjusted in real time over CSS. The unique speed affects the dynamic interaction between the rock material and the crusher liners. In particular the concentration of the material produced is affected and the local pressure of the stone material is affected, thus the distribution of the particle size of the product.

Khanapure Laxmikant et.al. (2015) [10]. In this study, a double stroke can crusher empty cans and it's designed to crush only aluminum cans. This wire is used to crush aluminum cans to make them easier to store in recycled bins thus providing more space for flattening cans. A crank mechanism with a single slider is the basis of this project. This project is dedicated to the design and manufacture of an aluminum can shredder that can shred tins and take them anywhere. A feature of this project is the automatic removal of crushed cans from the crushing zone and the automatic feeding of new cans to be crushed without human intervention.

More.S.R. et.al. (2013) [12] We have presented a review of jaw plate filter studies that tell us that crusher are large size reduction devices uses in the machinery, metal and composite industry. The crush various types of soft and solid materials. The paper provides the background of Jaw crusher jaw plate and kinematic as well as dynamic analysis performed to the design.

SathishPaulrajGundupalli et.al (2016) [13]. An important requirement for recycling is to form an integral parts of municipal solid waste management to filter resources from resource-allocated MSW. Researchers were experimenting with automated filter to improve the overall efficiency of the digestion process. The paper review the latest developments in visual processes, sensors, and actuators used as well as issues related to control and autonomy in the field of automatic filtering and recycling of MSW-separated source. We believe this article will provide a comprehensive overview of the state of the art and will help future designers in the field. This article presents research challenges in the field of automatic recycling.

SenthilKannan et.al (2016) [15]. The paper is about building a mechanical crusher that can help crush used cans of juice, cans of paint and scrap sheet. This paper aims to design a crusher that can be installed anywhere and can help crush used waste. The paper includes a crusher design process taking into account the strength required for grinding and the ergonomic factor required by the operator. The design of this machine is such that you will need a large load to crush the metal and will not press the user or operator. After the design process is completed, it is produced and converted into a machine that will help control waste. Crushing of used can will also ensure that the cans are not used in addition to metal life. So this paper will prove to be a useful asset in many ways. We made a crushing machine using Modeling software.

Shinde et.al. (2017) [16]. Research has been done on conventional can crushers and the various mechanisms used. Some technical aspects, such as robust construction and volume reduction, have been successfully implemented. Overall, the project was very rewarding in terms of the technical fabrication and design process. Current prototypes reduce the volume of cans by 65%. The automatic feeding mechanism has problems with speed and needs improvement in the near future.

Surve Qais et.al. (2015) [18]. The main purpose of making such a machine-controlled project is to reduce the space of the scrap and use it for the purpose of recycling accordingly. Nowadays in the days when can are widely used in restaurant and bars and for some space they need a lot of space. This research paper includes an analysis of the design and structure of the can crusher. There are many researchers who have done design and analysis work, but there are still many areas of scope for this design and analysis. Microcontroller forms the backbone of this project. The project involve processes such as prototype, construction and integration processes. While there are many types of crusher machines on the market the completion of the new model offers more practical uses than before.

Suryakant et.al. (2016) [19]. Swacha Bharat Abhiyan is a sanitation camp run by the Government of India, which started celebrating the 145th birthday of the great Mahatma Gandhi. The main purpose of this work is to contribute to the hygiene campaign. Our proposed machine is a cam and follower based can crusher

Mechanism combined with a sales method that removes a token or discount coupon by exchanging a recycled can using a machine. The main purpose of a sales pitch is to attract a number of beverage buyers to re-use their can to exchange a discount coupon, a coupon can be a discount on the next drink purchase or a bus or movie ticket discount depending on the company that will do this. Equipment.

Johannes quist et.al. (2016) [20]. Stress crushing has been proven to be one of the most effective methods for breaking down rock particles (Schönert, 1979). In this paper the can crusher, which uses this machine, is investigated using a discrete element (DEM) method and an industrial scale test. The aim of the work is to develop a visual simulation environment that can be used to gain a basic understanding of internal processes and operational responses. The visual crushing platform can be used not only for understanding but also for developing new crushers and development objectives.

Kumar.N et.al. (2016): They presented a paper on the manufacture of crushing machines that can help crush used cans of juice, cans of paint and scrap sheet waste. The crusher is designed to operate on the crank machine and slot lever and the power of the crusher's electrical power is taken from the electric engine. This Crusher crushes cans effectively and the production as well as the cost of repairing them are very small for small-scale recycled plants.

From the above research papers, we've discovered that some of techniques are used for fabricating the Can Crusher which includes pneumatic device with IC's, cars and so forth. Pneumatic Can Crushers use automation reducing human intervention. However the use of air compressor, valves and pipelines make the equipment more expensive which isn't always suitable for small scale recyclingplant. Further within the manually operated fashions of the studies papers the overwhelmed cans need to be eliminated manually, and also new cans need to be positioned whenever. Consequently we have selected this challenge to fabricate an auto-feed cost effective can crusher in which the elimination of crusher in which the elimination of crushed cans isn't always guide.

CHAPTER 3

AIM AND SCOPE OF THE PROJECT

3.1 AIM:

The aim of the project is to “Design and Fabrication of hydraulic aluminium tin can crusher”.

3.2 SCOPE:

Project Scope gives us many benefits of learning a new process to produce this products and we can either get many benefits or not realize it. Scope of this project can crusher is the most important part of the project. Make sure the scope is fully aligned with the project line to achieve, what the project needs. The scope of work in the project is given below.

- Review design literature from all available resources.
- Develop a model of a can crusher. Build the structure using the material of your choice.
- Test your design in the demo.
- Design the mechanical parts of the can crusher using Solid Work CAD.
- Design a can shredder that requires less operator effort.
- Design can grinders using bending, welding, drilling and cutting processes.
- For making can shredders that crush more cans in less time.
- It can also be driven by an electric motor while maintaining the gear ratio.
- You may also consider breaking plastic bottles.
- Adjustable mechanism for bottles and bottles of various sizes.
- A belt drive can be provided to separate aluminum cans and plastic bottles.

CHAPTER 4

MATERIALS AND METHODS

4.1 MATERIAL SELECTION FOR DIFFERENT COMPONENTS:

Various material selections for components are based on three main perspectives:

- Light in Weight
- It's Strength
- Materials are available in the market and it is shown in figure 4.1.

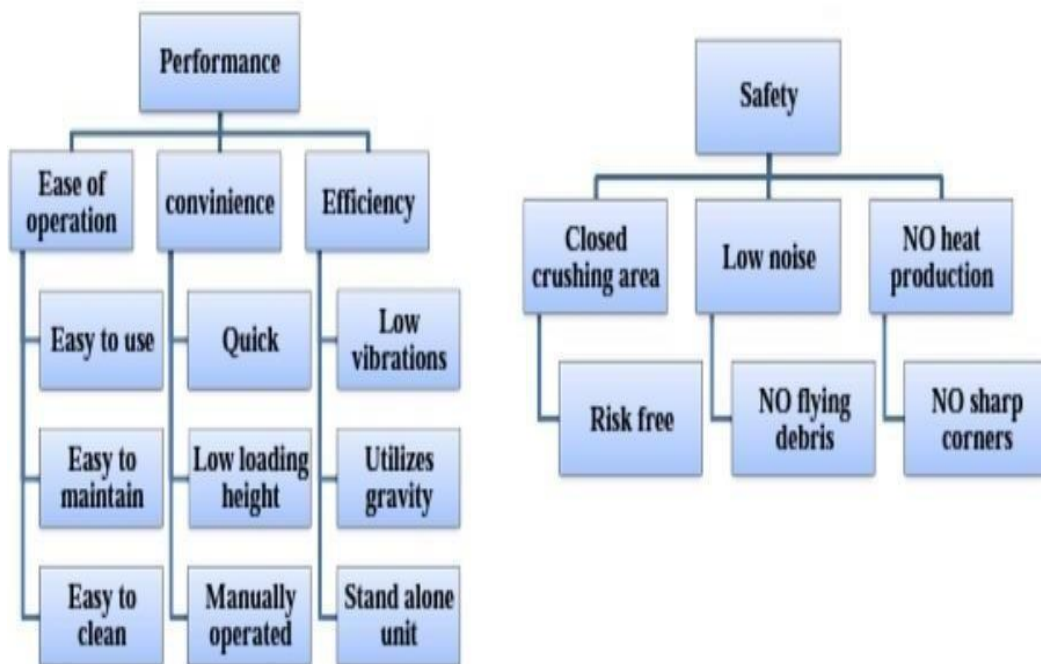


Fig 4.1 Performance and Safety

4.2 MATERIAL AND COMPONENTS:

It is shown in figure 4.2.

- MS pipe 40sq
- Manual hydraulic jack
- Pressing disc 2no
- Bottom leg plate



Fig 4.2 Materials & components

MS Pipe



Fig 4.3 MS Pipe

The pipe is part of an empty tube or cylinder, usually but not really round, which is used to transfer liquids and gases (liquid), slurries, powders and a host of small solids. It can also be used for building applications; the empty pipe is much stronger by the weight of the unit than the solid members, as shown in figure 4.3.

In normal use the names of pipes and tubes are often changed, but in industry and engineering, words are defined differently. Depending on the efficiency at which it is produced, the pipe is usually defined by a fixed external diameter and a system that describes the size. The tube is usually defined by and wall thickness, but can be defined by any dual in internal diameter and wall is thick. The pipeline is usually produced to be one of the standards of international and national industries. Although the same standards exist in industry operating tubes, the tube are usually made with various sizes and a wide range of widths and tolerances. Many industries and government standards exist for the production of pipes and tubes.

There are a number of processes that can be used to produce ERW pipes. Each of these processes leads to the assembling or assembling of metal parts into pipes. Electricity passes through areas to be heated together; as the welded parts together withstand the force of electricity, heat is produced which forms the weld.

Manual Hydraulic jack



Fig 4.4 Manual Hydraulic jack

A hydraulic jack is a mechanical lifting device used to lift heavy loads. The mechanical jack uses a screwdriver to lift heavy objects. Hydraulic cable uses

Water gravity. The most common form is a car, floor jug or garage jar, which lifts cars for repairs. Jars are usually weighed with a large lifting capacity (for example, 1.5 tons or 3 tons). Industrial jackets can weigh up to tons of cargo, as shown in figure 4.4.

Hydraulic jackets are often used for store-bought work, instead of having an emergency jack handled by a car. The use of unmanned pitchers requires special attention to ground selection, vehicle intrusion site selection, and stability when pitched open. Hydraulic jackets are often used to lift elevators into high-rise, low-rise and medium-sized buildings. A hydraulic vessel using uncompressed fluid that is forced into a cylinder by a pump plunger. Oil is used as a lubricant and for stabilization. When the plunger is lowered, it drains the oil from the water tank into the pump chamber through the suction check valve. The drain valve ball is outside the chamber and opens when oil is forced into the cylinder. At this time, the absorption ball inside the chamber closes and the oil pressure in the cylinder increases.

Pressing disc:



Fig 4.5 Pressing disc

Sheet metal is a metal formed into small, flat pieces by industrial processes. Sheet metal is one of the main materials used in metalworking and can be cut and bent into a variety of shapes. Numerous everyday items are made of sheet metal. Sizes can vary significantly. Very small sheets are considered foil or sheets,

Parts larger than 6 mm (0.25 in) are considered sheet or "structural steel". Sheet metal is made from flat pieces or strands. Rolls are made of continuous sheet metal using roll cutting, as shown in figure 4.5.

In many parts of the world, sheet metal is measured in millimeters. In the United States, the thickness of a steel sheet is usually determined by a traditional indirect measurement known as a gauge. The larger the calibration number, the smaller the metal. The most commonly used sheet metal thickness is 30 to 7 gauge. The gauge differs between stainless steel (steel-based) and stainless steel such as aluminum or copper. Such as aluminum or copper. For example, the thickness of copper is measured in ounces, which corresponds to the weight of copper contained in one square. Historically, the most important use of steel plate was as a rider's protective armor, and the plate is still used for many decorative purposes, including harnesses. Metalworkers are also referred to as "tin hammer".



Fig 4.6 Project Outcome

This is the result of the project, as shown in Figure 4.6. Made entirely of Mild Steel. The pump is a hydraulic manual checker. First the aluminum foil is stored in a blank space between the compact disc, then the pump up and down the hydraulic side lever slightly, the hydraulic piston rises and presses the aluminum can. If there is more space, give us an extra space suggestion so we can do it better.

4.3 PROBLEM STATEMENT:

The population is growing rapidly. Many products are used every day. This means that the amount of waste produced also increases significantly. What's worse is that it takes up more space and due to overcrowding, this space has become a big problem. Therefore, there should be some sort of procedure to reduce the amount of this waste. Drink cans take up a lot of space when used because there is still free space left. This free space can be released after clicking the can. That can save a lot of space. We usually use the leg to crush the can. When crushed on the leg, it can injure and crush in an inclined way. Overcoming these draw backs can crusher was an important achievement.

- Safety
- Easy maintenance
- Durability
- Price Economy
- Reasonable human power input longer lifespan.

4.4 COMMERCIAL AUTOMATIC CAN CRUSHER:

Automatic crushers can be widely used in commercial industries due to their ability to automatically crush cans. This is usually accomplished with an air turbine that presses an air pressure can. There are also automatic crushers that can press objects of different shapes and sizes, although these can be very expensive.

4.5 SEMI-AUTOMATIC VARIATION:

The automatic deviation varies only with hand-made crushers because many products can be placed in the dump tray at once. However, the process remains the same as another method in which the cans can be crushed individually with a lever.

4.6 MAINTENANCE TIPS:

Commercial industries often benefit from the use of crushers. They reduce the cost of littering by reducing the amount of waste. This has the added benefit of saving space and making the workplace safer to roam.

If your workplace needs one but you are concerned about repairs, do not worry! This device requires little care and control. Keep reading to find out more.

CHAPTER 5

RESULTS AND DISCUSSIONS

Can crusher is a very effective, simple, space-saving and easy way to reduce the aluminum waste while doing recycling. They are fun, easy to using and also naturally with friends. Lubricate the tin and save volume, time and energy. The world will thank you. In tile milling is one of the most useful machines, which helps to reduce pollution. So it helps to create a better living environment if not, this can be a crusher it can be a regenerative mode without reshaping the drums. It can be placed anywhere, in park, houses, even cars, use a small cannon crusher. Therefore this work is interesting and has exposed me to the field of machinery and designing in engineering. Designing in one of the mechanical part in crusher cans and making one of the mechanical parts of system.

Can crusher be of many types depending on how it works, it can be mechanical, hydraulic, pneumatic and magnetic. Hydraulic can crusher work without using water and has no noise or balancing. But usually the ones we usually find on this market are electronics. There are various industries such as Ontario limited, Alan Ross Machinery Corporations, can cyclor equipment, Inc., etc. which has gradually taken up the purpose of recycling with the products they sell, and the can crushers is one of those fields and depending on how they are used, their production material or size can be broken down into several categories.

Can crusher can be classified according to the types of cans they can crush. Basically, this means that these printers can crush cans smaller than the maximum beverage volume. For example, an 18oz can crusher can crush differentsize cans up to 7, 12 and 18oz marks. Here is a table of 11 annotations per millimeter with OZ.

5.1 DIFFERENT TYPES OF STRUCTURAL CRUSHERS AVAILABLE ON THE MARKET:

Has the shredder been a priority these days? It is often used to crush and flatten soda cans. However, today it has a variety of uses. Most people prefer to drink their beverages in aluminum cans. Can crushers help recycle hard metals like aluminum. This saves not only space, but also time and money. In the market we can find both plastic and metal grinders, sometimes even a mixture. Made from recycled plastic, these machines are available on the market and are environmentally friendly.

Different types of crushers are available depending on how they work. They can be mechanical, hydraulic, pneumatic and magnetic. The hydraulic crusher can operate without the use of water and there is no noise or balance. But in general, it's a fairly common electronic product on the market. There are various companies such as Ontario Limited, Alan Ross Machinery Corporation, Can Cycler Equipment, Inc. Grinders are one of them, such as gradually taking over the processing of the products they sell.

5.2 HERE ARE SOME GENERAL TIPS FOR USING AND MAINTAINING A COMMERCIAL CAN CRUSHER:

Try and place the QCR can press as close as possible to the area where the say / s have expired. This really helps to reduce labor costs when moving the metal to your recycling facility later. Place the can (s) in the center of the pressure point as you use it. Make the most of your time! After pressing to start the machine, proceed with other tasks. Don't just stop until the end of the cycle - you can remove the crushed can from QCR you can press the next time you use it.

Always use safety gloves when handling cans. The edges will be sharp, and this can be very dangerous. Disconnect all power sources and open the front QCR door that you can press before making changes or adjustments.

5.3 OTHER TYPES OF STRUCTURAL CRUSHERS INCLUDE:



Fig 5.1 Pacific mounted Aluminium Can crusher

Aluminum can crushers break through most cans an inch or so quickly. Just grab the handle and pull it down. In addition, the strong structure of allmetals will last longer. This saves valuable storage space and storage space for cans. Now you can take out 5x more aluminum cans. This means shorter trips to the recycling center will cost you more each trip. Above all, we will do our best to protect the environment. Renewing with Crusher is fun and easier than ever,as shown in Figure 5.1.

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Fig 5.2 Metal Can Crusher

Metal can crusher is a new type of crushing machine, energy saving and environmental protection, used for broken cans, pear cans, pots, bicycles, car bodies, scrap metal, etc. All types of small metal objects are about 5mm or larger. It's most important role is to crush all types of metal into round, granular or flake forms that are easy to move, as shown in Figure 5.2.



Fig 5.3 Electric Can Crusher

In the industry, crusher are machines that uses a metal surface to break or compress objects into a smaller pieces or crowds. The bulk of the crushing and mining part of the process took place under muscle strength as the use of force was centered on the tip of the miner's pin or sledge building driven by a grinding hammer. Before explosives began to be widely used in mines in the middle of the nineteenth century, most of the first metal crushing and weaving was done by hand with a hammer in the mines or hammers for water mines in small burning coal mines and metal works like Renaissance through. The transformation of early to mid-industrial industries, as shown in Figure 5.3.



Fig 5.4 Pneumatic Can Crusher

The Can crush machine is designed to crush aluminum cans by 80%, as shown in Figure 5.4. Volume reduction. It is mainly used to facilitate the transportation of aluminum waste for recycling purposes. The machine is designed to break a barrel with a diameter of 65mm and a length of 120mm to a length of between 25mm and 30mm. It uses compressed air for its operation with the following components: air cylinder, solenoid valve, control unit and piping. Tins are placed in the hopper and the cans go in an orderly manner with a chute into the crushing chamber. The air compressor through the air cylinder provides the required compression strength.



Fig 5.5 Hand Operated Pacific Mounted Can Crusher

With the rapid development of mining technology, as shown in Figure 5.5. Can crusher can be divided into four types: combined cone crusher, spring cone crusher, hydraulic cone crusher and swivel crusher. According to different models, can crusher is divided into VSC series (composite cone crusher), Symons cone crusher, PY cone crusher, cylindrical hydraulic cone crusher, multi-cylinder hydraulic cone crusher, slewing crusher, etc. Can crushers are similar to swing crushers in performance, with the crusher chamber slightly elevated and parallel surfaces between crushing areas. A can crusher is to crush rocks by pressing them between an eccentric rotating spindle covered with strong cloth and a closed concave hopper covered with a concave manganese or vessel.

5.4 HOW STEEL IS BETTER THAN WOOD:

- Frame is much stronger than wood. In fact, it has a much higher value and strength than wood.
- Steel strength and durability are higher than wood.
- Each member of the wood-frame reacts differently and to varying degrees in climate change. Wood movement due to climate change expansion, contraction, fighting, twisting, etc.
- The metal frame will not burn and add fuel to the fire ...
- The steel frame allows for greater flexibility during design, construction and remodeling.
- All metal products are made with strict standards of strength and consistency.
- Iron is the most recycled material in the world. More metal is recycled than paper, aluminum, glass and plastic combined.
- Metal does not rot, does not tolerate rust, is resistant to cracking, is resistant to cracking, is proof-proof, non-toxic and is not as fireproof as wood.

5.5 HOW CAST IRON IS BETTER THAN WOOD:

Cast iron is a type of brittle metal that is denser than wood. It has a relatively low melting point, good fluidity, imitation ability, good efficiency and wear resistance. Cast iron has become an engineering tool used for a variety of purposes, including plumbing, machinery, and automotive parts.

Despite its low melting point, cast iron retains its high energy in case of fire. Typically about 95% iron, 2.14% carbon to 13% silicon. Does not rust as easily as steel.

5.6 Innovation:

In this project, new design is made using the engine or engine as the driving element as discussed above for additional modifications. When we use the engine as a driving component there are speed controls that are used to control the speed of the car. If it is an engine the gearbox is used to provide a variety of speed and torque. An emergency switch is also required near the user to stop the tin printer in the event of an accident, as shown in figure 5.6.

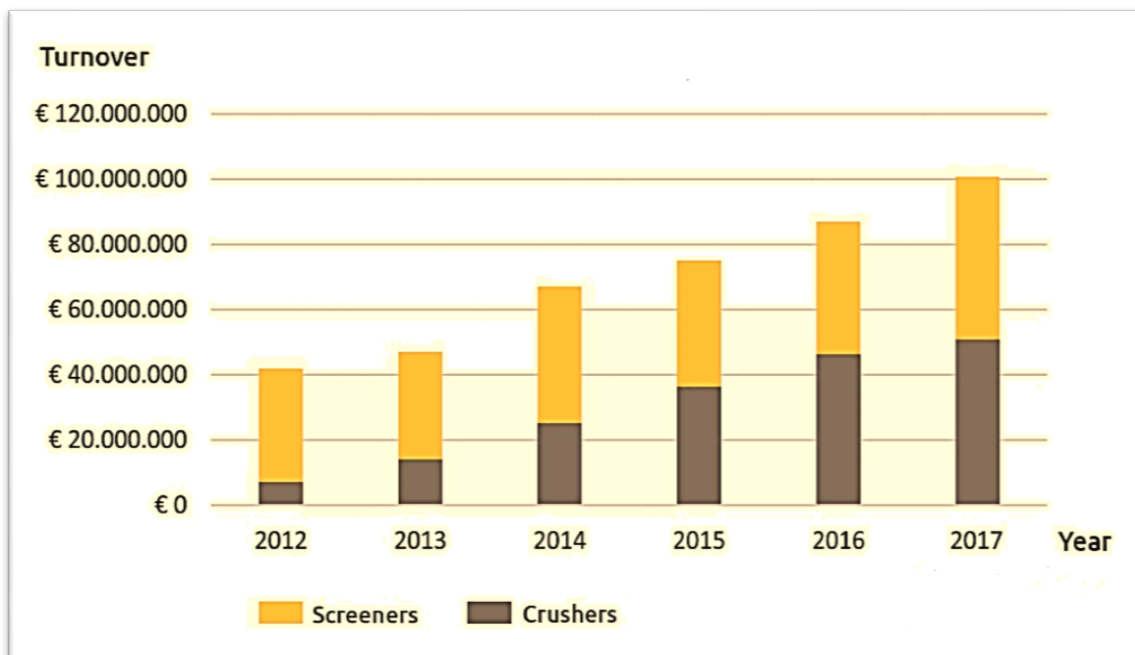


Fig 5.6 Prices of different types of can crushers

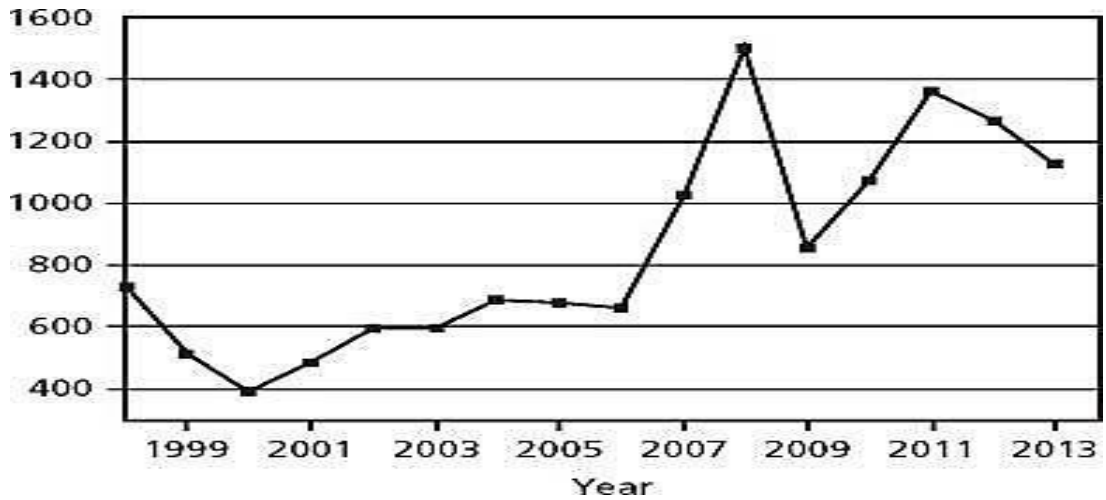


Fig 5.7 counts of different types of can crushers

The process of transforming an idea or innovation into a product or service that creates value or that customers will pay for. To call it a new invention, the idea must be multiplied by the savings and fit specific requirements. Innovation involves the deliberate use of information, thoughts, and actions to obtain large or different amounts of resources and includes any process in which new ideas are born and turned into useful products, as shown in figure 5.7



Fig 5.8 Aluminium can before and after crushing.

CHAPTER 6

CONCLUSION

In this project, we conducted a study of the various mechanisms used with modern can shredders. Some technical aspects, such as robust construction and volume reduction, have been successfully implemented. Overall, the project was very rewarding in terms of the technical fabrication and design process. Current prototypes reduce the volume of cans by up to 70%. The auto-feed mechanics have speed issues and need some improvement in the near future.

REFERENCES

1. Anusha. V, Sandeep, B, Kumar, P. Dinesh, (2019), A Novel Development of a Manual Can Crusher. *International Journal for Innovative Engineering & Management Research*, 8(9), 164-170.
2. M. Bengtsson, E. Hulthén, and C. M. Evertsson, (2015), Size and shape simulation in a tertiary crushing stage, a multi objective perspective, *Minerals Engineering*, 77(5), 72–77.
3. P. W. Cleary, M. D. Sinnott, R. D. Morrison, S. Cummins, and G. W. Delaney, (2017) Analysis of cone crusher performance with changes in material properties and operating conditions using DEM, *Minerals Engineering*, 100(10), 49–70.
4. Elfasakhany, J. Marquez, E. Rezola, J. Benitez, (2012) Design and development of an economic autonomous beverage can crusher, *International Journal of Mechanical Engineering and Technology (IJMET)*, 3(3), 107-122.
5. Gröndahl, G. Asbjörnsson, E. Hulthén, and M. Evertsson, (2018). Diagnostics of cone crusher feed segregation using power draw measurements, *Minerals Engineering*, 127(10), 15–21.
6. N.A.A. Hadi, Lim Hui Yee, K.A.M. Annuar, Zulhilmi Bin Ghani, M.F. Mohd Ab Halim, Amar Faiz Zainal, Abidin, M.B.N. Shah, (2019). Development of an Automatic can crusher using Programmable Logic Controller *International Journal of Electrical and Computer Engineering (IJECE)*, 9(3) 1795-1804.
7. Hanifi Canakci, Fatih Celik, Mohammed O.A. Bizne, Media O.A. Bizne (2016). Stabilization of clay with using waste beverage can. *World Multidisciplinary civil Engineering-Architecture Urban Planning Symposium*. 161(595-599).
8. E. Hulthén and C. Magnus Evertsson, (2011), Real-time algorithm for cone crusher control with two variables, *Minerals Engineering*, 24(9), 987–994.
9. Ikpe Aniekan E., Owunna Ikechukwu, Design of used PET Bottles crushing Machine for small, *International Journal of Engineering Technologies- IJET* 3(3)- 157-168.
10. Khanapure Laxmikant R. , Patil Vijay S. , Madhawai Dnyaneshwar A. , Navale Ashutosh L. , Prof. Dokfode A.B. , Prof. Bhane A. B, (2015), The Dual Stroke Can Crusher, *International Journal of Recent Development in Engineering and Technology* 4(4), 2347-6435.

11. R.Rajesh , S.Selvadurai , S.Sivakumar , M.Vino , R.Veeramuthu (2016), Design and Fabrication of Can Crusher, International Journal of Innovative Research in Science, Engineering and Technology 5(8), 2347-6710.
12. Ramkrishna S. More, Sunil J.Rajpal (2013), A Review on Study of Jaw Plates of Jaw Crusher, International Journal of Modern Engineering Research, 3(1), 2249- 6645.
13. Sathish Paulraj Gundupalli, Subrata Hait, Atul Thakur (2016), A review on automated sorting of source-separated municipal solid waste for recycling. International Research Journal of Engineering and Technology 60, 56-74
14. Schell, K., & Schell, G. (2002). U.S. Patent Application No. 09/771,995.
15. Senthil Kannan.N , Naveen Prasad.D , Nirmal Kumar.R, Premvishnu.R.S (2016), Design of Mechanical Crushing Machine. International Research Journal of Engineering and Technology, 3(1), 2395-0072.
16. A.S.Shinde , A.D. Landge , A.K. Biradar , S.M. Kondawar (2017), Design and Fabrication of Aluminium Tin Can Crusher, International Conference on Ideas Impact and Innovation in Mechanical Engineering, 5(6), 39-44.
17. R. B. Singandhupe, R. R. Sethi (2016). Ground Water Resources Scenario, Its Mining and Crop Planning In Chhattisgarh, Imperial Journal of Interdisciplinary Research, 2(11), 2454-1362.
18. Surve Qais, Sayed Saif, Sayed Jafar, Shaikh Nadeem (2015), Fully Automatic can crusher, International Journal of Mechanical and Industrial Technology, 2(2), 157-159.
19. Suryakant D. Thakur , Akshay B. Patel , Nitin K. Tilekar , Akash B. Wagh, (2016), Design and Fabrication of Automatic Can Crusher and Vending Machine. International Journal of Emerging Technology and Advanced Engineering Volume 6(10), 2250-2459.
20. J. Quist and C. M. Evertsson, (2016). Cone crusher modelling and simulation using DEM, Minerals Engineering, 85(8), 92–105.

