



Automatic Can Crusher Using Micro Controller

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Abstract— This project applies the concept of machine design and manufacturing to design a can crusher that is widely used in the beverage industry and scrap factories. The main goal of this project is to make a product that is more economical and can be used in the daily life of Can crushers are basically used to recycle by reducing the capacity of empty cans for recycling and then mechanically processing those crushed cans into new cans. In various stores and restaurants, discarded cans occupy a large amount and space, so this system can also be used on a commercial scale. capacity of empty cans for recycling and then mechanically processing those crushed cans into new cans. In various stores and restaurants, discarded cans occupy a large amount and space, so this system can also be used on a commercial scale.

I. INTRODUCTION

A can crusher can be defined as “A device used for crushing aluminum cans for easier storage in recycling bins thereby giving you extra space by flattening of cans”. Can Crushers are used in mechanical and allied industries which crush cans made of different materials. The Can Crusher machine is widely used in beverage industries or in scrap dealers’ shop to reduce the volume of the cans. Consequently, it leads to the reduction of the transportation cost. This machine is primarily used to save space and for recycling. It can be placed anywhere. In today’s life most of the food items are packed in cans like Cold and hot drinks and other beverages. Commercial establishments like cafeteria and bars, have to deal with leftover cans. Storage of these cans is often a problem and these increases total volume trash.

II. LITERATURE SURVEY:

Literature survey of the project is divided into 3 main divisions namely:

1. Can Crusher in daily use.
2. Can Crusher used in industries.
3. Usage of Can Crusher in Global waste management.

III. CAN CRUSHER IN DAILY USE:

(N.A.A. Hadi et al. 2018) proposed the invention of a can crusher to reduce the wasted storage space occupied by a large amount of used aluminum cans in commercial facilities such as restaurants, cafeterias, and bars. As a rule, the can crusher can be operated in the can crushing process manually and in time. The main purpose is to reduce the initial capacity of empty used aluminum cans to 50% in a more effective, quick, and easy way, and to develop cost-effective devices suitable for use in small industries. The goal of an automatic can crusher. The automated process is performed in an automated can crusher, as automation is inevitable and nominal for use in the modern world. The Automatic Can Crusher is run by a Programmable Logic Controller (PLC) with the aid of an inductive and capacitive sensor, where it is applied to



detect whether the object is metal or nonmetal. Overall, the system can be controlled manually through the push start and stop button as well as using the Human Machine Interface (HMI) using NBDDesigner, for displaying the total of cans being crushed per day. The average result of empty can could shrink from 31% to 60 % of the original value, by using the attuned and compatible pressure for this system.

which the design quality of those parts will be improved. There are so many researchers who have done work on design and analysis also, but still there are so many areas of scope regarding this design. Overall, this project involves processes like design, fabrication and assembling of

different components etc. After all process has been done, this crusher may help us to understand the fabrication and designing that involved in this project.

IV. CAN CRUSHER USED IN INDUSTRIES:

(Vishal N. Kshirsagar et al.2014) proposed that this paper describes about the experimentation of can or plastic bottle crusher machine and analysis of mechanism used in machine. Hence in this the knowledge of analysis is necessary, and by analysis of various parts the quality and life of machine can be increased and improved. Overall, for experimentation this machine involves processes like design, fabrication, analysis and assembling of different components etc. From this the knowledge of all the parameters like design, fabrication and analysis etc. will get increase but most important the knowledge of analysis, the use of Ansys-Workbench Software is increasing day by day to determine the parameters like stress, strain, deflection etc. for safe design and long durability.

(V. Anusha et al.2019) proposed that the piece of work to be done for this project is to design and create a can crusher that will reduce to the smallest possible amount of the volume of aluminum cans by 70%. The can crusher will be made up of various parts containing as part of the whole being considered a lever, base frame, can bin, piston cylinder arrangement, chain sprocket mechanism and bearing. The inspiration behind this design came from the wastage in malls, canteens of big company often the holidays involve large parties where people gather and consume a lot of canned beverages. Thus, it makes sense that there should be an easy way to dispose of cans properly during these large social gatherings. Thus this can crusher was created, with a portable and manually operated mechanism. Can crushers are primarily used to save space and recycling. Can crushers make it possible to make small stackable piles that save space. There are many designs that can crushers come in. Some of the designs are pneumatic, hydraulic and chain operated with sprockets. Recycling is wonderful way to help the environment. One device that will make our life easier, and our recycling haul much more compact, is the can crushing machine. Can crushing machine are available in a number of styles, sizes and speed, with models to suit everyone from the heavy soda drinker to the recycling centerman. electronics equipment that involved in this project. After the design has complete, it was transformed to its real product where the design is used for guideline. Crushers are major size reduction equipment used in mechanical and allied industries which crushes different types of soft and hard materials. The can or bottle crusher machine is widely used in beverage industries or in scrap dealers shop to reduce the volume of the cans/bottles. Hence in this design and analysis of various parts are necessary. The Electric Motor and a microcontroller make up the backbone for this project. Overall, this project involves processes like design, fabrication and assembling procedures. This project is mainly about generating a new concept of can/bottle crusher that would make easier to bring anywhere and easier to crush the can orbottle.



V. USAGE OF CAN CRUSHER IN GLOBAL WASTE MANAGEMENT:

(Juan Becker et al.2017) proposed that overwhelming amount of waste is generated every year globally. This problem has been shown to be significant interest in solving the waste management, e.g. land filling is a common practice. However, environmental issues are presented. In particular, land filling is an expensive method in terms of the volume cost, so compactors are required to accommodate more waste. Different compactors have been developed for both mobile and static usage mode as the automatic compacting receptacles normally used for fast food areas, mall food courts, airports, parks or any public areas. But, they are designed for mixed waste and prevent for recycling. In that sense, this paper aims to present a proof of concept of an automatic compacting receptacle system exclusively for aluminum cans, the proposal was implemented in a functional prototype. Preliminary results detected strengths and weaknesses of the proposal, also suggesting that the proposal can be applied for public areas in near future.

VI. PROPOSED METHODOLOGIES

A. OBJECTIVE OF BUILDING THE AUTOMATIC CANCRUSHER:

The main objectives of the project are

- i)** To fabricate a simple and easy to use Can Crusher machine involving low cost of construction and easily movable from one place to another.
- ii)** To reduce the volume of the cans at least 85%.
- iii)** To create an eco-friendly environment and dispose waste efficiently and safely
- iv)** Reduce cost to the industry by creating low power consumption Can Crushers.

VII. AUTOMATIC CAN CRUSHER USING MICROCONTROLLERS:

The automatic can crusher is a product that meets the needs of our customers. This project uses many materials such as sheet metal and hollow steel bars. Pneumatic systems and microcontrollers form the backbone of this project. Overall, this project includes processes such as design, manufacturing and assembly procedures. There are many types of can crushers on the market, but the completion of this new model is more practical. A can crusher can be defined as "a device that crushes aluminum cans to make them easier to store in the trash can and flatten the cans to free up extra space." Pneumatics is a technical field related to the research and application of pressurized gases to create mechanical movements. In autonomous mode, the pneumatic system, microcontroller, and sensor system work together to crush the can well, while in assist mode, the pneumatic system can be operated manually. This project includes research on pneumatic systems, computer-aided design software, and

microcontrollers. A microcontroller (or an MCU in the case of a microcontroller unit) is a small computer on a single metal oxide semiconductor (MOS) integrated circuit (IC) chip. The microcontroller contains one or more CPUs (processor cores) and memory and programmable input / output peripherals.



VIII. WORKING

- A bulk of cans is put into the hopper. The opening provided at the bottom of the hopper facilitates cans to fall one after the other on the guideway.
- The guideway which is kept at an angle enables the cans to slide down under gravity.
- The feeding strip which is attached to the can basher allows feeding of only one can at a time into the can placing area.
- Once, the can appears in front of the can basher, the IR sensor which is interfaced with the microcontroller senses the can.
- After receiving the input, from the sensor the microcontroller provides 5 Vol output. This 5 volt output is then given to ULN through an opto-coupler.
- A 24v DC is given to common pin of ULN IC. A 24 volt relay is used to operate solenoid valve.
- When input is given to ULN, relay is operated and 24 volt is given to solenoid valve.
- The single acting spring return 5/2 solenoid operated direction control valve is then operated.
- This enables the pressurized air to pass through and the cylinder extracts to complete the forward stroke.
- The can basher attached to the piston rod of the cylinder crushes the can by pressing it against the opposite M.S. plate.

The crushed can falls under gravity into the bin via the opening provided below the crushed can.

IX. ADVANTAGES OF AUTOMATIC CAN CRUSHER:

- Can crusher in a commercial industry. Firstly, it allows for a far safer and smarter looking workplace. Far too frequently, stockpiled waste material is left until waste removal professionals arrive or they are taken to a waste recycling center. Can crushers can immediately reduce the size of your waste, making the work place smarter and most importantly, safer.
- Using a can crusher to reduce the capacity of waste materials also means cutting the expense of waste transport. Whether an outsourced company collects the waste or your business deposits their own at recycling centers, a can crusher means far fewer collections/deposits are required, saving valuable money and time.

X. DESIGN AND CONSTRUCTION

A. COMPONENTS DESIGN:

- AutoCAD is compatible with other applications like 3D Max. The designers can even import or export DWG & DXG Files to the application. Also, these files can even be exported from AutoCAD to other applications for creating more improved projects & presentations
- 3D printers use various file formats that are not supported by all the CAD software. On the other hand, AutoCAD supports these file formats that are preferred by most of the 3D printers.
- AutoCAD is adaptive to the CAD interface and its usage. AutoCAD allows the professionals to check the workings of the framework within the stage of designing itself. Designers can use this framework for projects & presentations.
- AutoCAD comprises integrated design layouts of various templates specially designed for architectural planning and infrastructure constructions; the users can work on plans that include creating architectural arrangements for construction purposes without having to master the software.
- AutoCAD is not only a powerful application but also has a simpler user interface. It comes with a lot of functions and commands that are to the point and without any confusion. AutoCAD is also used in the



- fashion industry by designers as they can design difficult shapes and designs without any problems.
- Engineers also use AutoCAD as it incorporates easier drafting tools and helps in modeling engineering designs, blueprints, and other components. With AutoCAD, the engineers can design realistic models with minimum errors. AutoCAD acts as a medium to the users for designing mechanical parts and components for their projects.

XI. CONCLUSION

In our project we carried out the study of the current can crushers and the various mechanisms employed. We also successfully implemented some of the technological aspects. Overall the project was very enriching in terms of technical fabrication and design process along with electronics knowledge. The knowledge gained while solving and understanding the complexities of our project would help us in our professional life.

XII. FUTURESCOPE

This project has various futuristic technologies which are still under R&D and hence it'll surely have use in the near future. Much work in the project is constrained because of lack of essential resources and their high-cost.

- With an Industrial grade camera this system can become more robust.
- Image processing is a cheap and comparatively more robust option for environmental sensing for an AGV. It needs to be experimented with to understand its true potential.
- Crushing multiple cans with the help of a strong, rigid and larger can basher.
- Developing code and hardware to calculate number of cans crushed.
- Providing red light to indicate crushing mechanism in operation.
- Yellow light to indicate improper use of machine.
- Crushing plastic bottles can also be thought of.
- Adjustable mechanism to accommodate varying can and bottle sizes.

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