**A**

**PROJECT REPORT ON**

****“**FABRICATION OF PLASTIC RECYCLING BY INJECTION MOULDING MACHINE”**

**2018-2019**

*This project work is submitted in partial fulfilment of the requirement for the award of diploma in*

**Mechanical Engineering**

**Maharashtra State Board of Technical Education**

by

Group-A

Under the guidance of

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**2018-2019**

**SUBMISSION**

We are the students of Department of Mechanical Engineering, Government Polytechnic, Bramhapuri humbly submit that, We have submitted project work from time to time as described in this report by our own skills and studies between the period work from 2018-2019 as per instruction and guidance of **PROF. S.M.BANTE SIR** Lecturer in Mechanical Department Government Polytechnic, Bramhapuri.

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**2018-2019**

**certificate**

This is to certify that **Group-A** of sixth semester **“DIPLOMA IN MECHANICAL ENGINEERING”** has satisfactorily completed this project entitled **“FABRICATION OF PLASTIC RECYCLING BY INJECTION MOULDING MACHINE”**  During this year **2018-2019** in requirement of the partial fulfilment of Diploma course in **MECHANICAL ENGINEERING.**

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*Many people have contributed in bringing this report to its present form. I am the Presenter ascribe my success in this venture to my guide* ***PROF. S.M.BANTE SIR*** *Lecturer in Mechanical engineering Department. They endeavor for perfection, indefatigable zeal, enthusiasm, foresight and innovation contributed in a big way in completing this report with considerable ease in the stipulated time.*

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**ABSTRACT**

Plastic recycling is the process of recovering scrap or waste plastic and reprocessing the material into useful products. Since the vast majority of plastic is non-biodegradable, recycling is a part of global efforts to reduce plastic in the waste stream, especially the approximately 8 million tons of waste plastic that enters the Earth's ocean every year. Injection moulding is a manufacturing process that forms plastic (both thermoplastic and thermosetting) into usable shaped parts, such as a toothbrush. Before any melting of plastic can occur, a mould must first be manufactured. Moulds are typically composed of steel or aluminium and comes in two parts, the injection mould and the ejector mould. The design of the product is precision machined between the two pieces of the mould.

After the mould is complete, it is installed into an injection moulding machine. Plastic resin is poured into the hopper for heating and mixing at high temperatures. The molten plastic is then forced or “injected” into the mould cavity. As the mould remains cool, the injected plastic quickly solidifies and is formed into the shape of the cavity. Plastic resin is stored and feed into the injection moulding machine via the hopper. For most injection moulding machines, the hopper feeds into the injection barrel via gravity. The molten plastic is driven through the injection barrel through one of two different methods. Once the molten plastic is injected into the empty mould cavity, it is allowed to cool and solidify. Some components do not simply fall out, instead an additional ejector pin is added to knock the part out of the mould once it solidifies.

CONTENT

|  |  |  |
| --- | --- | --- |
| CH. NO. | CHAPTER | PAGE NO. |
| 1 | Introduction |  |
| 2 | Literature review |  |
| 3 | Objectives |  |
| 4 | Component details |  |
| 5 | Construction |  |
| 6 | Working |  |
| 7 | Calculation |  |
| 8 | Image of fabrication part  ( project image ) |  |
| 9 | Costing of model |  |
| 10 | Advantage |  |
| 11 | Application |  |
| 12 | Result |  |
| 13 | Conclusion |  |
| 14 | Reference |  |

CHAPTER 1

INTRODUCTION

**INTRODUCTION**

In the process, plastic material in the form of pellets or granules gravity fed from top mounted hopper into the barrel. Additives such as colorants and ultraviolet inhibitors (liquid or pellet form) can be mixed in the hopper. The plastic material enters through the feed throat into contact with the rotating screw. The rotating screw pushes the plastic beads forward into the barrel is heated using the heating elements are used in such ways that gradually increase the temperature of the barrel from the rear to the front. There are three possible zone, the plastic beads melt gradually as they are pushed through the barrel. The plastic material is completely melted in the melting zone. A thermostat is used to maintain the inside temperature of the barrel. The overheating of plastic should be minimized which may cause degradation in the material properties. A cooling fan or water cooling system is used to maintain the temperature of the barrel during the process. At the front of the barrel, the molten plastic leaves the screw and travels through a screen pack to remove any contaminants in the molten plastic. The screen are reinforced by a breaker plate. The breaker plate assembly also serves to create back pressure in the barrel. The back pressure gives uniform melting and proper mixing of the molten plastic material into the barrel. After passing through the breaker plate, molten plastic enters into die. The die gives the desired shape of plastic product. These stresses can cause warping after solidification of molten plastic. Plastic are very good thermal insulator and therefore it is very difficult to cool quickly. The plastic product is cooled by pulling through a set of cooling rolls.

CHAPTER 2

LITERATURE REVIEW

LITERATURE REVIEW

1. As per rohit narod and Suresh paithankar in Plastic causes serious environmental problems. Although they are not intrinsically dangerous, they take up a huge amount of space in landfills and they are made from a non-renewable resources, namely fossil fuels .for this reasons it is important that, where possible plastics are recycled. The use of plastic is increased now days in many industries like automobile, packaging, medical, etc. The reason behind this is that the plastic made things are quiet easier to manufacture, handle and reliable to use. So the plastic goods manufacturing industries are striving hard to produce good quality products at large scale and cheaper cost.
2. As per Chinmay E. Morajkar and Shriyesh N. Kashid in Injection moulding machine is one of the most widely used method for conversion of plastics into various end products application to wide range of plastic material. The main principle is to compress the plastic material in a heating chamber (barrel) with the help of plunger and induction coil convert plastic polymer into molten (semi-solid) state. Then the plastic polymer in predetermined quantity is forced through the nozzle into the die under pressure. After completing the process, final product is obtained from the die. We can use plastics, metals or alloys for this process.
3. As per gurjeet singh and ajay verma the term quality has become a “catch all” term used in describing the various characteristics of an object. It is nearly impossible to define the term consistency. The quality is any particular or specific characteristics of a product development design object that contains or relates information about the object. This is primarily a chunk of geometry distinguished by its ability to perform a function with one or more other.

CHAPTER 3

OBJECTIVES

**OBJECTIVES**

a) The main objective of project is to recycle the plastic material.

b) The human arm force is required for compression.

c) To fabricate product by melting the plastic.

d) Design of spring which is connected to hand lever and extrusion chamber.

e) To create a moulding die for simple plastic components.

f) The fabrication of model is simple in construction.

CHAPTER 4

COMPONENT DETAILS

**COMPONENT OF DETAILS**

1. Hand Lever
2. Coil Spring
3. Die
4. Heating Coil
5. Screw Clamp
6. Cylinder
7. Push Rod
8. Cylinder

**4.1 Hand Lever**

A Lever is simple machine consisting of a beam or rigid rod pivoted at a fixed hinge, or fulcrum. A lever is a rigid body capable of rotating on a point on itself. On the basis of the location of fulcrum, load and effort, the lever is divided into three parts. It is one of the six simple machine identified by Renaissance scientists. A amplifies an input force to provide greater output force, which is said to provide leverage. The ratio of the output force to the force is the mechanical advantage of the lever.A lever is a beam connected to ground by a hinge, or pivot, called a fulcrum. The ideal lever does not dissipate or store energy, which means there is no friction in the hinge or bending in the beam. A lever is model as a rigid bar connected to a ground frame by a hinged joint called a fulcrum.Levers are classified by the relative positions of the fulcrum, effort and resistance (or load). It is common to call the input force the effort and the output force the load or the resistance.

**4.2 PUSH ROD**

1. It is a type of rod which is used to push the material in the extrusion chamber.
2. It is joint to the hand lever via. A knuckle joint.
3. It is completely solid rod.
4. It is made up of cast iron.

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Fig.5.2 Shows Push Rod with Coil Spring.

**4.3 COIL SPRING**

1. A spring is a flexible elastic object used to store mechanical energy. Spring are usually made out of hardened steel. Small springs can be wound from pre-hardened stock, while larger ones are made from annealed after fabrication.
2. Some non-ferrous metals are also used including phosphorous bonze and titanium for parts requiring corrosion resistance and beryllium copper for spring carrying electric current electric current because of its low electric resistance.

**4.4 HEATING COIL**

* 1. A heating element converts electricity heat through the process of resistive or joule heating.
  2. The electric current passing through the element encounters, resistance, resulting in heating of element.
  3. This process is independent of the direction of current flow.

****

FIG.5.4 Heating coil

**4.5 SCREW CLAMP**

A Screw clamp is a type of fastener that uses a screw as the main method of holding the clamp together. There are many different style of screw clamp, each with its own purpose. The only thing they all have in common is the screw used to hold them. The screw are used as the method of clamping item since, once placed in a position, they require a very large amount of force to loosen accidently. The screw is one of the six simple machine; it seems very basic and at first glance, but its application are nearly endless.

There are wide range of weighs to construct a screw clamp, but two of the more common methods are used in the C-clamp and a hose clamp .A C-clamp consists of a soild piece that looks like a later C and a screw that moves up through the bottom of the C until it touches the top. A hose clamp is shaped like a letter O.

**4.6 CYLINDER**

1. Commonly the word cylinder is understood to refer to a finite section of right circular cylinder having a finite height with circular end perpendicular to the axis as shown in figure if the ends are open, it is called an open cylinder.
2. If the ends are closed by flat surfaces it is called a solid cylinder the formulae for the surfaces area and the volume of such a cylinder have been known since deep antiquity.



Fig. 5.6 cylinder

**4.7 NOZZLE**

A nozzle is a device designed to control the direction or characteristics of a fluid flow (especially to increase velocity) as it exits (or enters) an enclosed chamber or pipe.

A nozzle is often a pipe or tube of varying cross sectional area, and it can be used to direct or modify the flow of a fluid (liquid or gas). Nozzles are frequently used to control the rate of flow, speed, direction, mass, shape, and/or the pressure of the stream that emerges from them. In a nozzle, the velocity of fluid increases at the expense of its pressure energy.



Fig.5.7 nozzle

**4.8 DIE**

The goal of this chapter is to introduce the reader to the importance of extrusion die design as well as the complexities inherent in the task extrusion is of vital importance to all plastic processing. In addition to providing raw stock such as sheet for thermoforming and pellets for injection moulding and other extrusion processing, numerous end used products are made with extrusion such as film, tubing and a variety of profiles.

Several unique products are made by extrusion and the dies needed to make these products are classified as :- 1) sheet dies , 2) flat-film and blow-film dies, 3) pipe and tubing dies, 4) profile extrusion dies.

CHAPTER 5

CONSTRUCTION

CONSTRUCTION

It consist of :-

Coils spring, heating coil, die, cylinder, screw clamp, hand lever, stand, push rod.

1. Hand lever is attached to the top of the structure.

2. Heating coil is wounded on the cylinder.

3. A hopper is attached to the cylinder to insert the material.

4. A grill is provided on the heating coil to avoid the direct contact of human hands.

5. The cylinder is fixed to the structure in vertical position.

CHAPTER 6

WORKING

WORKING

* First of all, switch on the power supply to the coil.
* As the heating coil heats up as the heating coil turn red hot.
* Fill the material ( Plastic Pallets) through the hopper to the cylinder.
* Now wait till the material melts as the material melts is start \s to flow out of the cylinder via nozzle.
* As we know the material is melted, press the hand lever suddenly to full the material to fill the material to the die.
* For different types of product we can use different types of dies.
* As the material is filled up in the die wait for few minutes and put the whole die in the water.
* Then remove the product from the die.
* Hence, the product is ready.

CHAPTER 7

CALCULATION

CALCULATIONS

**1. Hand lever**

Length : - 76cm

Width :- 6.5cm

**2. Cylinder**

Height :**-** 15cm

Diameter :- 6.5 cm

Thickness:-0.3 cm

**3. Screw clamp**

Length :- 45cm

Width :- 25cm

**4. Structure**

Length :- 45cm

Height :- 80 cm

**5.Coil spring**

Diameter :- 5cm

No of turns :- 13

Height :- 20cm

CHAPTER 8

IMAGE OF FABRICATION PART

(PROJECT IMAGE)

CHAPTER 9

COSTING OF MODEL

**COST ANALYSIS**

The cost analysis is beings with the preparation of plastic recycling and moulding machines the rates for combination of equipment, material and quantity of parts, labour charge, process charge and GST charges**.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Particulars** | **Quantity** | **Cost** |
| 1 | Hand lever | 01 | 1000 |
| 2 | Coil spring | 01 | 600 |
| 3 | Heating coil | 01 | 750 |
| 4 | Hopper | 01 | 600 |
| 5 | Cylinder | 01 | 650 |
| 6 | Die | 01 | 600 |
| 7 | Frame and screw clamp | 01 | 2700 |
| 8 | Nozzzzle | 01 | 150 |
| 9 | Fabrication cost | -- | 3200 |
| 10 | Total cost | -- | 10.150 |

CHAPTER 10

ADVANTAGE

ADVANTAGES

* Extrusion molding also comes with its own set of advantages
* It`s a less maintenance cost machine.
* Consistent cross-section results in the production of complex shapes.
* Good for producing tube-shaped products such as pipes and hoses.
* High production volumes low cost per pound of materials used.
* It is easy to operate and do not requires skilled operator.
* Machine is simple in construction and is portable.
* It can be useful for reducing plastic pollutions.

CHAPTER 11

APPLICATION

APPLICATION

* It is useful in small scale industry.
* The application of plastic extrusion molding is widely used in the production of parts.
* It is used in production from medical equipments to the toys.
* Plastic molding machine is used in automobile industries.
* Used for making coins , washer , comb , wheels etc.

CHAPTER 12

RESULT

RESULTS

* Plastic recycling and molding machine was found to be working properly.
* The machine operation very accurately without any disturbance or any obstacle is coming during this process and we done our main component and create coin successfully.

CHAPTER 13

CONCLUSION

CONCLUSION

COIN MAKER

* The device has a simple construction.
* Skilled operator is required.
* The machine is safer and productive.
* It can be used for making different types of artifacts.

We are working since last 3-4 months on our project i.e. **FABRICATION OF PLASTIC RECYCLING BY INJECTION MOULDING MACHINE”**

CHAPTER 14

REFERANCE

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**WEBSITE**

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