



Design And Manufacturing Of Flexible Hopper Feeder For Molding Machines

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Abstract: Technological advancements are taking place day today. Industrial growth has been the key on the side of the development of any nation. With an increase in development, there is an equivalent growth in the demand. This increase in demand forces small-scale industries to increase productivity in a limited time. Plastic materials are manufactured by injecting fluidized plastic into the mold cavity. The plastic granules melt into a liquid which is forced through a die, forming a product of required dimensions and shapes. The product is then cooled and forms a solid shape. The fluidized plastic is generated by melting the plastic powder fed to machines. Powder plastic is the main raw material for any plastic injection molding machine. The injection molding machines are purchased along with the provision to transfer powder raw material from the ground to the hopper or it is not provided. The powder transfer can be done manually or with a fixed setup. These systems are generally costly and their use is limited to one machine only as well as it occupies some space. Our main aim will be to solve this issue by manufacturing a flexible system as well as cost-effective. Also in small industries, the shape is a constraint. The machine can be implemented in various hoppers where space is a constraint. The industry in our consideration has many molding machines where they have to fill the material at a height above the ground level. So this process takes time and also human's efforts and leads to wastage of materials, so all these issues can be resolved by our project.

Keywords – Flexible hopper feeder, Material loading, Molding machine, Plastic granules, Time-saving

I. INTRODUCTION

Technological advancements are taking place day today. Industrial growth has been the key side of the development of any nation. With an increase in development, there is an equivalent growth in the demand. This increase in demand forces the small-scale industry to increase productivity in a limited time. A survey of 6 small industries was conducted to get information about the problems due to this increase in demand. During the survey, it was observed that material loss during production was common in most industries. Wasting plastic granules (raw materials) is a major loss since approximately 2 kg of plastic is been wasted per day. This accounts for Rs 250/- day of the raw material. This chunk amount of capital cost for an industry is a major loss since that amount can be contributed to another side of associate trade. All these limitations inspired me to make amends to make for the loss. Hence, the idea of making an automatic feeding machine was established, to reduce the wastage of plastic granules and thereby, decreasing human labor and save capital. This project deals with transferring the plastic granules by means of vacuum through pipe into the mini hopper thereby into the main hopper. Detailed design of component is given below. The machines available for this purpose are quite costly to implement in small or medium scale industries therefore an idea of making machine cheap as well as resembles with each and every machine and reducing human efforts and to minimize the mishaps.

II. METHODOLOGY

Design and Manufacturing of Flexible Hopper Feeder for Molding Machines, problems will overcome by the machine are material can be fed to the main hopper of the machine from the. The setup is movable and compact, so the problem of space constrain is eliminated. Requirements of multiple setups for different machines will feed material to multiple machines. Different types of power can be transferred with the help of a single machine.

The main component of this hopper is a vacuum pump hence its works on the principle of a pump. The basic principle of the vacuum pumps is to remove air molecules (and other gases) from the vacuum chamber (or the outlet side in the case of a higher vacuum pump connected in series) because the pressure within the chamber is reduced, removing molecules further becomes more and more tougher to get rid of.

2.1 Research Objective

The purpose of the research started with the problem faced by the industries majorly by the small-scale industries while transferring the plastic granules to the molding machine. This affected the production rate as well as the wastage of material while transferring it into main machines with human labor. It also showed a major rise in the overall cost estimate for the production.

2.2 Industrial Research

According to our conducted survey, we accumulated the information regarding the process involved in the transfer operation for the plastic granules into the main molding machine. Many industries still use the ancient method of using human labor for the transfer operation, which leads to the wastage of material and escalates the overall production cost of the process. At times industries face a shortage of human labor which eventually slows down the rate of production. So, the ancient method used can cause loss to the industries.

2.3 Proposed Solution

As the above-mentioned problem faced by the industries, we came up with the idea of a FLEXIBLE HOPPER FEEDER (mini hopper) system which will ease the production rate and can also faster the overall rate of production due to the automation of system the human labor will be lessened. During the transfer operation, the wastage occurred as the human error will also be in control.

2.4 Fabrication and Working

Fabrication includes many steps itself for the completion and assembly of the system. Various operations will be carried out to complete the product as per our design. The basic assembly like cutting, fitting, drilling, etc is by default mandatory as per the product requirement. Welding is required for the parts of setup which are ground reservoir, mini hopper, and stand for its support and many more operations are required once the fabrication is done, testing the system is a crucial part of the project. The operating of the setup is represented below.

The air pump recovers gas molecules from the sealed volume to go away behind a partial vacuum. In our case, the mini hopper by the air pump throughout the suction method and at the same time the fabric gets pulled up and is transferred to the mini hopper from the bottom reservoir. With the assistance of hosepipes, the fabric is transferred to the mini hopper. Management electrical device is employed to control the movement of the gate within the mini hopper which ends up within the pressure distinction between the mini hopper and also the ground reservoir, as a result, material moves into the mini hopper.

III. FIGURES AND TABLES

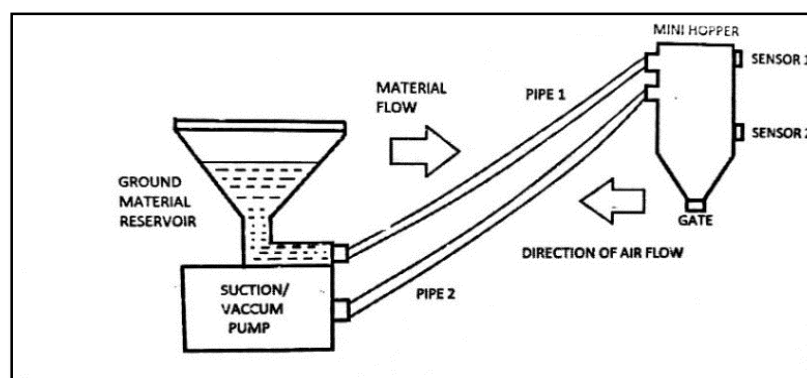


Fig. 1 Schematic Diagram of Flexible Feeder System



Fig. 2 Ground Reservoir



Fig. 3 Mini Hopper

Table.1 Material Procured

Sr. No	Components	Quantity
1	Mini Hopper	1
2	Ground Reservoir	1
3	Vacuum Pump	1
4	5V Relay module	1
5	Hoseipes	2
6	Circuit (breadboard+wiring) and Arduino	1
7	Paint	1
8	Servo motor	1
9	Adapter 5V 1amp	1
10	Plastic granules	7 (kg)

IV. CONCLUSION

From the overall procedure of objective and problem statement for this project, we did the literature review through which we got the information regarding the process like working, operations, manufacturing process, etc. We also did some surveys in the industry to know the actual requirements. This project will mainly focus on saving time and reducing human efforts and also minimizing the wastage of the material.

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