iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** IV **Month of publication:** April 2022

DOI: https://doi.org/10.22214/ijraset.2022.41369

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue IV Apr 2022- Available at www.ijraset.com

Automatic Material Filling Machine for IBM

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Abstract: ***Technological advancements are taking place day- by-day and industrial growth has been the key aspect of development of any nation. In plastic injection moulding machine, the provision is to transfer powder raw material from ground to the hopper is not provided or the powder transfer can be done manually in machine.***
Many small scale industries has moulding machine where they have to fill the raw material at a height where a human efforts are needed which increases the production time rate, leads to increases the wastage of raw materials.
Also limited space and hence the system cost increases design of Raw Material feeding mechanism is made as per small scale industries need by considering the above constraints and accordingly.
Accordingly theoretical design calculations are made for mini hopper, material volume. Types of raw materials Polyvinylchloride, Polypropylene are selected and testing their total fill time, empty time. Power consumption rate with respect to height in a design of raw material hopper feeding mechanism.
Overall, this project involves processes like design, analysis, fabrication and assembling of different components.

I. INTRODUCTION

Technological advancements are taking place day-by- day. Industrial growth has been the key aspect of development of any nation. With increase in development there is an equivalent growth in the demand. This increase in demand forces the small-scale industry to increase the productivity in limited time.

A survey of industry 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 industry. Plastic granules (raw material) are the major aspect in any injection molding industry.

Wasting of plastic granules is a major loss, since approximately 1kg of plastic is been wasted per day. This accounts for Rs.150/- 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 some other aspect of an industry.

Hence, the idea of making an automatic feeding machine was established, to reduce wastage of plastic granules and thereby, decreasing human labor and saving capital.

Flexible hopper feeding machine deals with replacement of standard human effort by automation. It deals with transfer of plastic granules by means of vacuum through a hose pipe to the mini hopper thereby into the main hopper. Detailed design of each and every component is given.

The machines available in the market are quite costly. Therefore, an idea of making the machine cheap as well as resemble with each and every machine, thereby reducing human efforts. An automatic feeding systems available in the market to reduce the raw material wastage and save time. These systems are generally costly and their use is limited to one machine only as well as it occupies some space.

II. OBJECTIVES

A. Load the raw material from ground storage unit to the hopper.
B. To minimize the work load on the labor's to get the outcome more precise.
C. Lower the plastic waste that spills while loading to save the money of waste and use it for the other important problems
D. To increase the overall efficiency of the plant.
E. Increasing productivity and profit of the plant by saving the time and the money
F. Low development cost is the top priority aim by the lower development cost small industries can also afford and grow for better tomorrow.
G. Reduce man power cost.

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III. LITERATURE SURVEY

Sr no	Name Of Paper/journal	Authors Name	Year of	Findings Of the Paper published
1	Automatic hopper loader	Berlin, Conn	1972	The study shows that an apparatus for automatically supplying plastic material to the closed hopper of an injection molding. The plastic material to be supplied to the hopper is maintained in a supply bin which is open at its upper end. A suction wand, including a pair of space con centric tubes which are open at one end, extends into the bin to a point below the level of the plastic material.
2	Literature Review on Automatic Seed Feeder	A.O.Hannure, S.P.Kshirsagar, V.S.Kodam, O.N.Patange, V.S.Nakod	2016	The study shows, in this modern era research in the agricultural field is going on. Plant nursery is important part of agriculture field and facing many problems. The problems are availability of labors, low productivity rate and more manual efforts required for seed feeding. In plant nursery more time is required for plantation which is due to seed feeding process. For reducing these problems of plant nursery research of automatic seed feeder mechanism is used. The mechanism consists of frame, hopper, belt drive, sewing motor, conveyor etc. Hopper consists of seeds are fall down on belt. The customized belt contains conical shaped holes on sheet metal which mounted on cloth material. While movement of belt excess amount of seeds are minimized by stripper plate
3	Central Conveying &Auto Feeding Systems For An Injection Molding Shop	Sanjeev Kumar, Ashu Yadav, Prof. Mohd. Parvez	2011	The study shows transporting large volumes of hazardous or sensitive powders and granules across large distances and height is a challenge as normal conveying systems like bucket elevators or screw conveyors are out of the question. The innovative powder transfer system is used to transfer from almost every receptacle or machine and be charged in to any type of receiver. The system allows powder to be charged directly into Mixer / closed hopper / vessels etc. in a totally safe way preventing dust formation.
4	Automatic Weighing and Packaging Machine	Prajakta Hambir, Nimish Joshi, Pranav Karande, Amol Kolhe	2019	The study show that low cost automatic weighing and packaging machine which can perform operations of weighing, bag filling and dispensing the bag with maximum efficiency is manufactured. The operating of this machine is simple and chances of error in weight calculation are almost negligible. The time consumption and efforts required for the manual weighing and packaging are minimized.
5	Design, Development of Industrial Flexible Hopper Feeding Mechanism	Vinay D. Patel, Latish Vijayan, Jatin K.Patel, Nagesh A. Mane, Ajay R. Maurya,	2021	The experiments were performed for different materials and the following conclusions are made. The power consumption, total fill time, empty time and mass flow rate with respect to height are plotted in the following graphs and it can be discussed as below. The power consumption required for both materials Polyvinylchloride and Polystyrene are almost same for the required height is increases further the required filled time is also increases

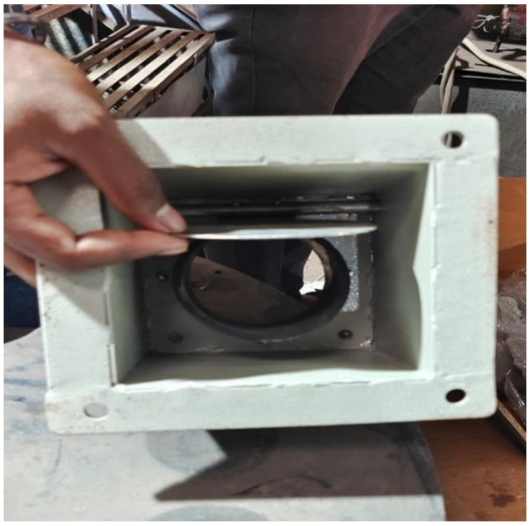
IV. METHODOLOGY

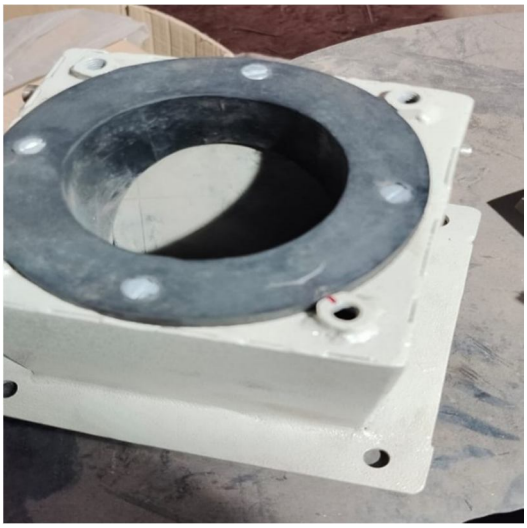
For making of the upper conical funnel first we take raw sheet of the mild steel and then start marking on the sheet as we have to build the funnel shape conical structure. First mark straight line of the 12 inches then after the 12 inches of parallel distance mark the straight line of the 6 inches then draw the angular lines from both the end then the markings are done. Then cut the sheet on markings after cutting put the cut sheet on the roller and make conical structure of it after that we welded the middle portion to make the conical structure as it done conical section is ready.





For making flapper assembly first we make the box on 6 inches by 4 inches of box of 1mm metal thickness sheet. Then we cover upper section of the box and mark the center of the box then make 3 inches diameter hole on it. After making hole grind the hole by grinder to make finished hole without burr of the chips that created while cutting after that mark center from 2 inches from above the bottom to make holes to fit the flapper rod in it after marking drill 0.5 inch diameter of hole to fix the flapper or in it.After that cut the round shape piece of steel sheet of 3 inches of diameter then welded it to center of the flapper rod. Rod length is 5 inches. Then rubber part of 4 inches diameter fitted in the upper hole and then flapper fitted into the place of flapper after all the operation assembly painted into grey color.





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For making of the motor panel box let's make the box of mild steel of 2 feet into 1.5 feet into 3 feet. After that the filter assembly that we made already fitted on the top of the box. For the final assembly. And to make top of the funnel structure let's mark the 12 diameter circle on the sheet then cut the sheet into circular section and welded on the top of the funnel section and 2 inch diameter circle cut on the top and the side of the funnel section after caution MS pipe length 6 inches welded on both the circle as suction and inlet ports for the machine. After this whole process funnel painted into grey color keep it to dry the paint after paint get dried funnel section is bolted to the flapper assembly and after calculating the counter weight is also attached or say welded on the flapper bended rod.

V. RESULTS AND CALCULATION

1) Time required for man to load the plastic granules from storage to hopper.

Detail	Without Loader	With Loader	Saving
Cycle Time	1.30 Min = 90 Secs	30 Secs	60 Secs

Time Saved = 60 Secs
For 32 Operations = 32 Min

2) By improve position of the storage reservoir.

Detail	Existing	Improved	Saving
Cycle Time	30 Secs	10 Secs	20 Secs

Time Saved = 20 Secs
For 32 Operations = 10 Min. 40 Sec
TOTAL TIME SAVED PER DAY: 42 Min/Day

3) Workers Salary Savings
a) Workers Salary = 15000 Rs/Month
b) Per Day Salary of workers = 500 Rs/Month
c) Per Hour Salary of workers = 62.5 Rs/Hr

Detail	Without Loader	With Loader	Saving
Lead Time	Work for 30 Days	Work for 27.5 Days	2.5 Days approx.
Monthly Wage	Rs 15000	Rs 13682	Rs 1318

VI. MODEL





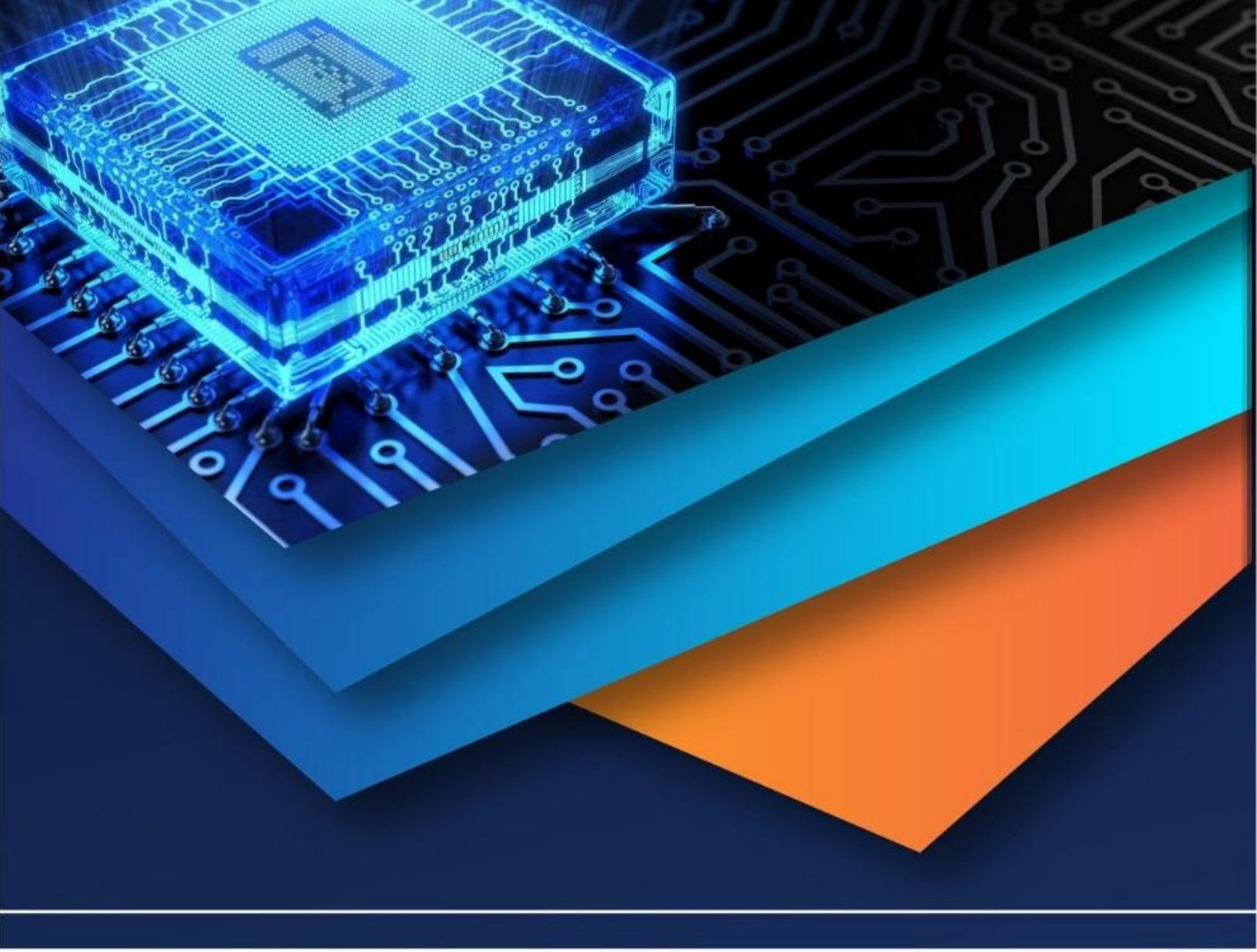
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VI. CONCLUTION

For performing this project model we are finally conclude that the filling time of plastic material is reduce and wasted raw material also reduce, in this project model we used timer controlling system by using this time controlling system the accuracy of filling material is increased compare to the photo sensor system .Overall finally conclude that the system cost is low compare to industrial market system and maintenance cost nearest to zero.

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