e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
Volume:03/Issue:06/June-2021 Impact Factor- 5.354 www.irjmets.com

MANUFACTURING OF PLASTIC SCRAP GRINDING MACHINE

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ABSTRACT

Now days the plastic is one of the most used material in world wide. There are advantages and disadvantages of plastic, but the disadvantages are more than advantages, It take too many years to decompose more than 400 years. Today we have Need of recycle the plastic for reuse and to decrease the use of plastic. Our project is used for cutting and crushing plastic in small pieces to make waste management easier. We are making this project model for recycling of plastic wastage in industry But the available machines used to recycle this waste are very costly.

Keywords: Plastic, Decompose, Shredding Machine, Waste Management.

I. INTRODUCTION

Plastic waste in the company was been thrown away and lead to wastage of the plastic, so the machine manufactured crushes plastic into small particles and then these small particles crushed are collected into collection bin. The collected plastic is then mixed with the Virgin material and the waste plastic is made reusable and this will help in lot of things like reduce in cost of raw material and waste management and also reduce amount of plastic getting wasted.

II. METHODOLOGY

We carried a survey and found out such machines but they were available at a very high price of around 2 to 3 lacs. So we decided to make a compact machine which is movable and can also fir in small places i.e mainly for the small scale industries. Market machine grinds thick and much bigger partial of the (Plastic Nylon Grade 66). Our model machine grinds smallest and fine particles which can be a minimum diameter inside of the (Plastic Nylon Grade 66).

III. MODELING AND ANALYSIS

Design of the Machine is done according to aesthetics and ergonomics. All data is calculated and then designed considering all the parameters and tolerances by help of different journals and books. Motor is also selected by considering parameters necessary for well working of the Machine. Material selection, Corrosion, size of power required, size of machine shaft these were the considerations that we had inculcated.

For Designing the Machine we firstly calculated the numbers needed for example length of the belt etc. few parameters are assumed constants like the length of the blades used. Following are the Calculations carried out

Assumed Constants - 1.Outer diameter (D) = 150mm 2.Motor diameter (D) = 65.5mm 3.Motor RPM = 1440RPM =2HP 4.Motor = three phase 5.Power = 2.2kw 6.Center distance =650mm

Calculation of Belt

Belt length = $\pi \times (150 + 65.5) \times 0.5 + (2 \times 650) + \left(\frac{(150-65.5)}{(4 \times 650)}\right)^2$

Belt length = 1507mm

Velocity of Belt = $_B = \frac{\pi dn}{60 \times 1000} = \frac{\pi \times 150 \times 1440}{60 \times 1000}$ $V_B = 11.30 m/se$

Maximum permissible tension in V-belt = $T_{max} = \sigma t \times A = 1.53 \times 700 = 1071$ N

Centrifugal tension = $Tc = \frac{T_{max}}{3} = \frac{1071}{3} = 357N$

Belt tension on the tight side $(\boldsymbol{T_{ft}})$ = $Tft = T_{max} - T_c = 1071 - 357 = 714N$

Belt tension on the slack side due to friction effect $(\boldsymbol{T_{fs}})$ = $\frac{T_{ft}}{T_{fs}} = 3.12$

T_{fs} = 228.846N

Power transmission capacity of each belt (P)

$P = (T_{ft} - T_{fs}) \times V_B$

$P = (714 - 228.846) \times 11.30$

P = 5482.24W

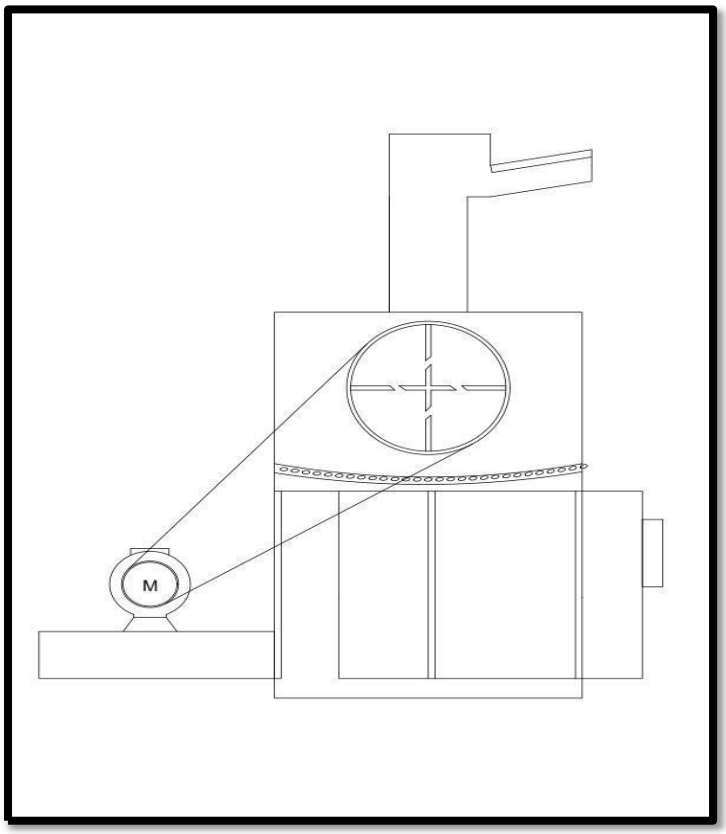

Figure 1: 2D Design of Runner Grinding Machine

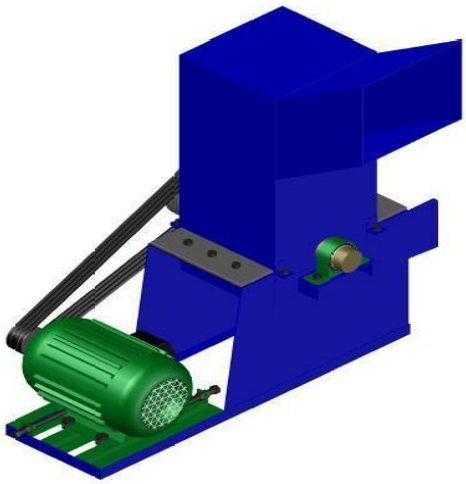

Figure 2: 3D view of Plastic grinding machine

IV. RESULTS AND DISCUSSION

The Manufactured frame is used for mounting motor, collecting bin, shaft, V-belt. All the manufactured components are combined and a working model of it is the result. The machine is compact and efficient. The plastic gets grinded into Small Flakes and then collected in the collecting bin and this material was used by

combining with virgin material. This helps by reducing a lot of waste plastic by making it reusable and also help the environment by reducing plastic waste.

Table 1. Components

Sr. No.	Part Name	Material	Quantity
1	Hopper	Mild steel	1
2	Electric motor	2 HP	1
3	Belt	Leather	2
4	Bearing	Stainless steel	2
5	Shaft	Mild steel	3
6	Flywheel	Mild steel	2
7	Casing	Mild steel	1
8	Blades	WPS	3

V. CONCLUSION

All The result of the performance analysis carried out on waste plastic grinding machine design for domestic and commercial use is shown that the grinding machine was efficient and can be use efficiently. The plastic crushing machine can help to reduce the volume of plastic wastes dump indiscriminately across cities and this will ensure average live in a healthy environment. All the components were designed as per the deterministic method of design, then we manufactured some components and some were selected from manufacturers catalog (standard parts) and finally all parts were assembled. After the actual manufacturing of the machine we physically started the machine and tested by feeding actual plastic water i.e runner waste, the machine was functioning accordingly and is very efficient. Hence, we have successfully fulfilled all the objectives.

ACKNOWLEDGEMENTS

I would like to express my special thanks of gratitude to my Project Guide (Prof. D. P. Patil) as well as our HOD (Prof. J. H. Bhangale) who gave me the golden opportunity to do this wonderful project on the topic (Manufacturing of Plastic Scrap Grinding Machine), which also helped me in doing a lot of Research and i came to know about so many new things I am really thankful to them.

VI. REFERENCES

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