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A Concept on Design and Modelling of Waste Separator Machine

Abhishek Yadav[1], Kapil Yadav[2], Vijay Yadav[3], Pratik Raut[4]

[1]Department of Mechanical Engineering, Mumbai University, Mumbai Maharashtra
Email: absyadav4347@gmail.com

Abstract— *Due to increase in population of India the consumption rate of various goods has increased so as the generation of waste increased simultaneously. In order to provide a proper waste management system we need to design a machine to sort the various waste constituents which can be further processed and recycled to reduce the waste. So to achieve such goals we are designing a waste segregator machine which is capable of separating wastes such as metals, non-metals, organic, inorganic, etc. our design strikes towards an efficient, compact and cost effective machine which is feasible for small organizations also.*

Keywords— cost efficient, eco-friendly, effective design, waste management, waste separator machine.

I. INTRODUCTION

As there is an increase in population rate of India so as the urbanization and industrialization which has created waste management issues in the urban as well as the rural areas of the country. However, the municipal corporation of the country don't have sufficient resources, equipment's or advanced technologies to face the issues. Sweden is one of the country that imports waste from different countries to maintain the continuity of its recycling plant, as it has an efficient waste management system.
As in dumping grounds the wastes are directly being burnt without any proper waste precautions and treatment which causes more severe problems to environment and also the waste which can be reused are burnt. So as to protect the environment from hazardous waste and recycle the useful waste products the waste need to be separated depending upon their constituents. To attain the desired aim we need to design a machine which would be capable of separating waste. So we are designing a waste segregator, Waste segregation is the process in which the different constituents of waste is separated and to achieve this waste sorting machine is used. This will help us to sort the various elements present in the waste like plastics, metals, non-metals and stones particles and other substances out from garbage, to improve the reusing and recycling of waste. At the same time, the separated waste materials can be further re-processed into useful resources. So, the main purpose of the waste sorter is reducing processing and turning waste into treasure.

1.1 PROBLEM STATEMENT

As the waste management system in India is not effective which leads to environment and health issues. As India is price based market so the main obstacle in designing is the product cost, its compactness, efficiency and also its reliability.

- Separating the different metals found in waste.
- Separating plastic from the waste.
- Recycling of waste
- Disposal of harmful waste
- Separation of electronic waste

All the above mentioned problems are affecting the daily life of human being and results decrease in life. Therefore above mentioned problems should be eliminated by designing a mechanical system.

I. DESIGN

I. Conveyor Stand

Table 1

Cross sections of bar	size	height	length	width	material
Angle	40mmX40mm	600mm	900mm	600mm	steel

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II. Roller

Table 2

Material	Shaft diameter	length	Total length
1.Mild steel 2.plastic	75 63	550 520	790 890

III. Belt

Table 3

Belt type	section	Total length	material
V-belt	B	70inch	Rubber

IV. Bearing

Table 4

Bearing no.	Shaft Diameter	Bolt Size
6206	25	M10

V. Motor

Table 5

input	Shaft diameter	Rpm	power	Mounting
Single phase	22mm	1440	2H.P	foot

VI. Pulley

Table 6

Larger pulley	Material	Smaller pulley	Material
12inch	Cast iron	3inch	Cast iron

VII. Conveyor belt

Table 7

Material	Total Length	Width	Thickness	Duty
Fabric ply	2000mm	500mm	3mm	Medium

II. MODELLING

Previous Design

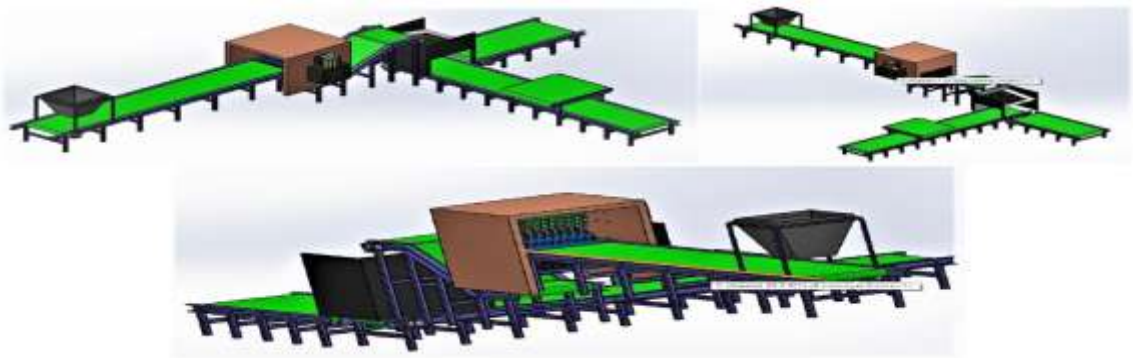

Fig.1 Previously Designed System

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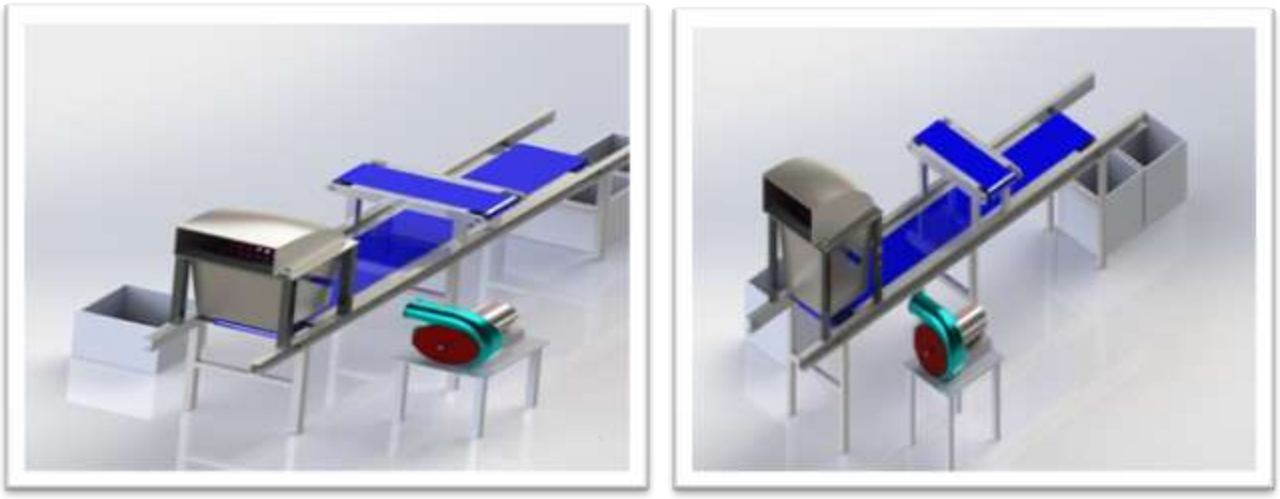
Modified design



(a) **(b)**

Fig.2 Modified design of system

Finalized design

Fig.3 Finalized Design Of System

III. SETUP

The waste segregator consist of various numbers of parts. The base consist of channels which together forms the conveyor stand. The conveyor stand is the support to the system which accompanies rollers, motors, pulleys, bearings, belts, hopper, and bag opener. The rollers are fitted to both the ends with the help of bearings, which consist of conveyor belt for transmission purpose. The pulleys present at the end of the roller and motor helps to attain the motion i.e. helps to achieve the rolling motion. Blower is present at the middle which helps to blow out the plastic from the conveyor to the collecting bin. Electro- magnets are present in the end roller so as to separate ferrous and non-ferrous materials. At the end system consist of bin for collection of the separated waste.

I. ADVANTAGES

- Effective in separating plastics, metals and non-metals from waste.
- It helps to ensure the protection of the environment through effective waste Management measures.
- To ensure the health of people by providing a cost effective Waste sorting machine.
- Generation of employments in the waste management sector.
- To reduce cost spent on artificial sorting.
- To prevent hazardous conditions for resident.

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II. LIMITATION

- Initial investment is high
- Cannot separate organic waste.

IV. CONCLUSION

Hence we have achieved the goal of designing the waste segregator machine, Over- coming the problems arising in the designing process. Thus reducing the cost of the machine as compared to global aspect and which is suitable for the Indian market, the design is compact and has comparatively high efficiency with long time duration of working period. The final design is prepared based on the amount of load acting on it and its working period. With some modification in load acting and parameters affecting the machine it can be designed commercially.

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