

# Design and Fabrication of Cost-Effective Composting for Easy Decomposing of Home Wastes

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**Abstract:** *The primary objective is to develop a Household waste Decomposer that not only composting the kitchen waste but also ensures quick decomposition while minimizing odors. Our design integrates innovative features, such as a compact and user-friendly composting unit, utilizing a controlled aeration system to accelerate the composting process. This aeration system promotes optimal conditions for microbial activity, enhancing the breakdown of organic matter. Another one method added to using decomposer sand. Decomposition sand is a biological process that includes the physical breakdown and biochemical transformation of complex organic molecules of dead material into simpler organic and inorganic molecules. There are two effective system used in Household waste Decomposer. This composting process create a bad smell, so that we are using high suction power exhaust fan. In this suction fans is pull a Odorant particles throw out to the atmospheric air. Food waste and decomposer sand is mixed well before pouring in top of the hopper. Food waste and decomposer mixer breakdown the particles like (leaf and tomato and other kitchen veg, waste food) using grinding method. Traditional composting methods are slow decomposing and high level of odor form. Now odor free decomposer and quick decomposer at a same time cost effective home decomposing. Household waste Decomposer suitable for trace garden*

**Keywords:** Household waste Decomposer

## I. INTRODUCTION

The management of organic waste, particularly from households, poses a significant challenge in today's world where sustainability is paramount. As populations grow and urbanization accelerates, the volume of waste generated increases exponentially, placing strain on existing waste management systems and posing environmental threats. In response to this pressing issue, this project aims to develop a cost-effective composting solution tailored for easy decomposition of home wastes.

Composting, a natural process of organic matter decomposition, offers a sustainable and eco-friendly way to manage organic waste. By harnessing the power of microorganisms to break down organic materials into nutrient-rich compost, composting not only reduces the amount of waste sent to landfills but also produces a valuable resource for soil enrichment and plant growth...

The objective of this project is twofold: to address the need for a practical solution for households to manage their organic waste effectively and to contribute to environmental sustainability by promoting composting as a viable alternative to traditional waste disposal method. This report will detail the methodology employed in developing the cost-effective composting solution, including research and analysis, design and development, prototype construction, optimization, and evaluation. Furthermore, it will highlight the results obtained from testing the prototype composting system, focusing on its cost-effectiveness, efficiency in waste decomposition, odor control mechanisms, and the quality of compost produced. By providing households with a user-friendly and affordable composting solution, this project aims to empower individuals to take proactive steps towards reducing their environmental footprint and fostering a more sustainable future.

**II. LITRATURE REVIEW**

S. No.	Name of author	Title of paper	Outcome
01.	James Chang	Composting of vegetable waste	Experimental results showed that the vegetable waste could be composted successfully in a laboratory-scale reactor
02.	Minna-Liisa Rantalainena LeenaKontiolaa Jari Haimia Hannu Fritzeb Heikki Seta`la`	Influence of resource quality on the composition of soil decomposer community in fragmented and continuous habitat	Results of the present experiment emphasize the pivotal importance of resource quality in determining the structure of local decomposer community: the abundances of most groups of soil organisms were increased by the litter enrichment
03.	Yi-Tui Chen	A Cost Analysis of Food Waste Composting in Taiwan	In addition to the subsidy, a promotion program is also needed to expand the market demand as most farmers are still not aware of the relative advantages of biological compost over mineral fertilizers. The technical analysis between organic fertilizers of compost and mineral fertilizers should be conducted and released to the farmers
04.	Nicole Kennard	Food Waste Management	The complex reasons behind why nearly one-third of all food produced for human consumption is wasted are evident throughout the food supply chain, from production to consumption. Thus, to truly put an end to food waste, citizens of the world must organise to reshape and rebuild local and global food systems in a way that builds food sovereignty, respects nature, nurtures health and wellbeing of people, and ensures the right to food for all people in a sustainable and resilient manner

**IV. MATERIAL SELECTION**

Material selection is a step in the process of designing any physical object. In the context of product design, the main goal of material selection is to minimize cost while meeting product performance goals. Systematic selection of the best material for a given application begins with properties and costs of candidate materials.

**HOUSEHOLD DECOMPOSER BODY**

**Material Used – sheet metal**

Stainless steel is the name of a family of iron-based alloys known for their corrosion and heat resistance. One of the main characteristics of stainless steel is its minimum chromium content of 10.5%, which gives it its superior resistance to corrosion in comparison to other types of steels. Like other steels, stainless steel is composed primarily from iron and carbon, but with the addition of several other alloying elements, the most prominent being chromium. Other common alloys found in stainless steel are nickel, magnesium, molybdenum, and nitrogen.

**FAN SELECTED -SUCTION BLDC FAN**

An Exhaust BLDC (Brushless DC) Fan is a type of fan commonly used for ventilation and air extraction purposes in various applications, including industrial, commercial, and residential settings. Here's an overview of the key features and benefits of Exhaust BLDC Fans

**MOTOR SELECTED - DC MOTOR**

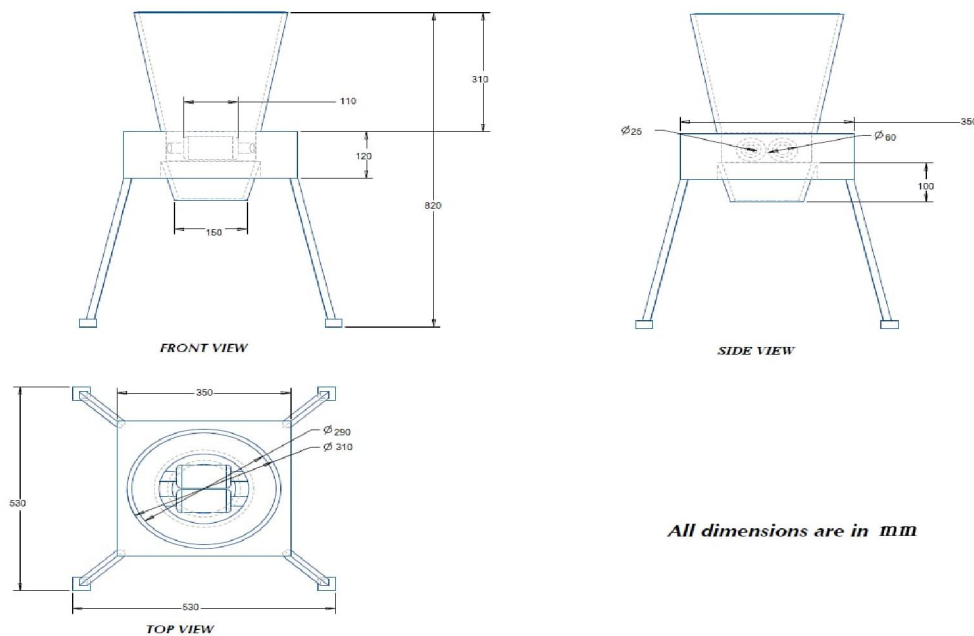
The brushed DC electric motor generates torque directly from DC power supplied to the motor by using internal commutation, stationary magnets (permanent or electromagnets), and rotating electromagnets. Advantages of a brushed DC motor include low initial cost, high reliability, and simple control of motor speed. Disadvantages are high maintenance and low life-span for high intensity uses. Maintenance involves regularly replacing the carbon brushes and springs which carry the electric current, as well as cleaning or replacing the commutator. These components are necessary for transferring electrical power from outside the motor to the spinning wire windings of the rotor inside the motor.

**SAND SELECTED - Decomposer sand**

A decomposer is an organism that decomposes, or breaks down, organic material such as the remains of dead organisms. Decomposers include bacteria and fungi. These organisms carry out the process of decomposition, which all living organisms undergo after death. Decomposition is an important process because it allows organic material to be recycled in an ecosystem.

**GEAR SELECTED - SPUR GEAR**

When the spur gears are Engaged the contact will be to the Entire width parallel to the Axis of the shaft due to this there will sudden application of load. Stress will be Impact and Detrimental (Dangerous) & Excessive sound when they are applied for high speeds so they are for Moderate speeds.



All dimensions are in mm

**CAD MODEL OF DUST COLLECTOR**

**V. PROCESS INVOLVED IN FABRICATION**

**1. Drilling**

- Drilling is used to produce holes in objects. In this
- Project the square type rod required the holes
- Making rake assembly. These holes are done by vertical

## 2. Fine Grinding

- It is nothing but a grinding process, which is done as Smooth with fine grains.
- It is done by convention Grinding machine.

## 3. Welding

Welding is a fabrication process whereby two or more parts are fused together by means of heat, pressure or both forming a join as the parts cool. Welding is usually used on metals and thermoplastics but can also be used on wood. The completed welded joint may be referred to as a element.

## VI. CONCLUSION

We had successfully designed pedal operated household decomposer. The system is also useful for the organic fertilizer maker purpose. The purpose of this technical study is to increase the sustainable solution for waste food, veg convert to organic fertilizer using powered grinding machine. The project works with satisfactory conditions we are able to understand the difficulties in maintaining the odor free decomposer and also quality organic fertilizer. We have done to our ability and skill making maximum use of available facilities. So that cost the cost-efficient household decomposer following conclusion can be drawn

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