

# Semi-Automatic Composter Machine

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**Abstract:** Organic waste and particularly waste matter may be a worldwide problem; it costs to be disposed of and zip is gained from it; on the contrary, it causes the emission of harmful gases like methane. In India, 35- 40 percent of the rubbish is a waste product. Every one of the key problems that face India nowadays is that there are not any serious moves towards solving the waste matter issue. Within the 2030 vision, one in each of their targets is to concentrate on pollution and its causes on that. Composting has proven to be a legitimate solution to the current problem but has not been entirely explored. The objectives of this project are to design a composting machine with certain parameters for planning, process time, ease to use, odorless, and power-saving. The design refuses decomposition system is meant for rapid composting performance. It is utilized by households, restaurants, hotels, schools, apartment buildings, communities, offices, and cafeterias reckoning on the capacity of the machine. The system employs hot temperatures, micro-organisms, and ground into small particles to decompose waste products and organic matter.

**Keywords:** Composter, shredder, composting, food waste, organic.

## 1. Introduction

The world has suffered a rise in human interest in everything organic. According to Forbes, a high number of people prefer food suitable as natural, organic, or locally sourced despite their high price. A natural process in which organic matter perishes aerobically. Organic matter  $O_2 = CO_2 + H_2O + \text{Cell mass}$ . The husbandry system is called organic husbandry. Organic husbandry started in the 20th century. Composting is a cheap environmentally-friendly way to make human food rich in nutrients, to fuel herbs growth, and to restore vitality to depleted soil it's a natural organic plant food since it's an accretion of nature's process in itself, knowing that everything decomposes. Composting is the controlled natural decay and conversion of solid organic material into a compost-like substance called compost Composting is the process of letting nature transfigure organic material into a material with environmentally beneficial uses. The process uses several microorganisms similar to bacteria, paradoxes, and fungi to break down the organic amalgams into simple substances. Composting is organic matter that has been perished in a process called composting. This process recycles various organic matter- otherwise regarded as waste products and produces a soil conditioner.

## 2. Composting

Compost is an organic matter that has been perished in a process called composting. This process recycles much organic stuff else regarded as a waste product and produces a soil conditioner. Compost is rich in nutrients. It's used for sampling, in yards, landscaping, horticulture, urban farming, and organic agriculture. The compost itself is beneficent for the land in numerous ways, including as a soil conditioner, a toxin, addition of vital cloud and humic acids, and a natural fungicide for soil. In an ecosystem, compost is useful for corrosion control, land and sluice recovery, swamp construction, and tip cover. At a simple position, the process of composting requires making a mound of wet organic matter (also called green waste), similar to leaves, lawn, and food scraps, and waiting for the material to break down into cold after months.

However, composting also can take place as a multi-step, closely monitored process with measured inputs of water, air, carbon, and nitrogen-rich materials. The decomposition process is aided by shredding the plant matter, adding water, and ensuring proper aeration by regularly turning the mixture when open oils or "windows" are used. Earthworms and fungi further break up the material. Bacteria required oxygen to function (aerobic bacteria) and fungi manage the chemical process by converting the inputs into heat, carbon dioxide, and ammonium.

## 3. Basic Principle of Composting

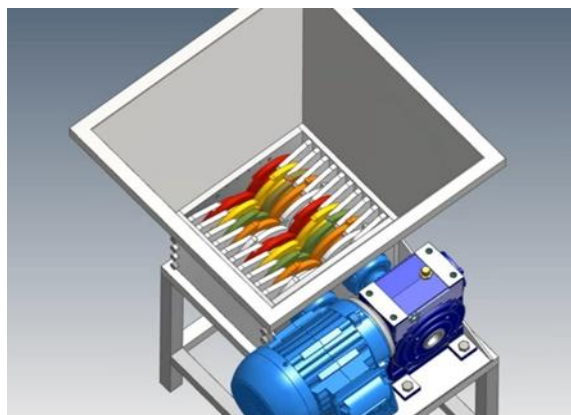


Fig. 1. Structure of machine

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Composting is the controlling natural decay and conversion of solid organic material into a cloud-like substance called compost. Composting is the process of letting nature convert organic materials into a material with environmentally beneficial uses. The process uses various microorganisms similar to bacteria, mystifications, and fungi to break down the organic composites into simpler substances. In their natural surroundings, leaves and branches fall to the ground from a rich, wettish layer of mulch that protects the roots of plants and provides a home for nature’s most basic recycles.

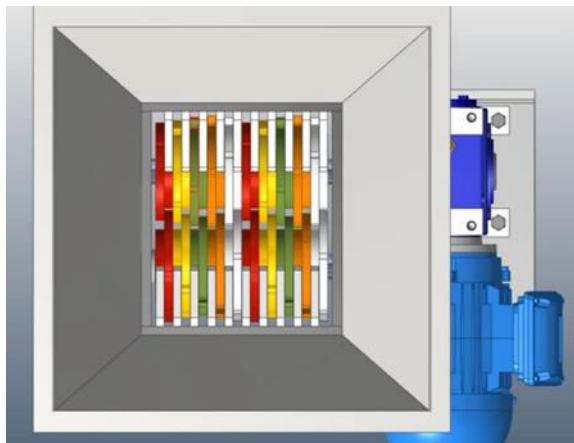


Fig. 2. Design of blades

**4. Methodology**

When input supply is given to the motor, the motor shaft rotates which is connected to the gearbox and this gear box is connected to the shaft of the blade. This shaft is connected with blades.

When operating this shredder machine, the organic waste is placed into the hopper, which feeds the material down to the shredder’s, the two shafts of sharp blades that are rotating. The blades grab the waste and then pull the waste through to turn the large amount into a small amount.

*A. Types of Composters*

*1) Fully automatic compost machine*



Fig. 3. Fully automatic compost machine

When the organic waste is added to it moisture is sensed by humidity sensor, due to which the heater turns on and the composting tank gets heated due to this the water contain in the organic waste is evaporated and it goes out to the atmosphere

as water vapor through the exhaust system. As any organic waste contains 70-80% water content, we achieve 70-80% volume reduction at this stage itself. At the same time, our special microorganisms then decompose the organic waste into compost, and this happens within 24 hours. That is how we achieve 85-90% volume reduction. The process is noiseless as there is no crushing or grinding involved. The blades are just for evenly mixing the waste. The range of machines start from 25 kgs/day to 5000 kgs/day are available in market.

Table 1

Details of fully automatic compost machine

Usage/Application	Organic Waste Composting
Type of Waste	Food waste disposer
Brand	Smart enviro Systems
Grade	Fully-Automatic
Untreatable Items	Inorganic waste
Time for Composting	24 hours

*2) Semi-automatic compost machine*

This composting machine consists of fine shredder and mixer for simultaneously mixing and shredding of waste for uniform size. The machine mixes the composting culture and dry material such as dry leaves, sawdust etc. with the shredded waste for absorption of excess moisture. The output of the machine is raw compost which can be further cured to form compost.

Table 2

Details of semi-automatic compost machine

Usage/Application	To treat the organic waste and convert to compost
Type of Waste	Food waste disposer
Brand	SMART
Grade	Semi-Automatic
Untreatable Items	Inorganic waste
Time for Composting	10 - 15 days



Fig. 4. Semi-automatic compost machine

*3) Aerobic drum compost plant*

The machine is developed on the principle of providing a complete composting system in a single machine. The input is first fed to a built-in shredder which reduces the waste material

size to maximize the surface area to microorganisms for quick composting. Aerobic composting, being an exothermic reaction, generates heat which further helps in removing the moisture by evaporation and renders dry, ready-to-use compost in a few days. The compost can be unloaded at uniform intervals from the discharge end. The air exchanges from the composting chamber ensure adequate availability of air required for aerobic composting.

Table 3  
Details of aerobic drum compost plant

Usage/Application	To treat organic waste and convert to compost
Type of Waste	Food waste disposer
Brand	SMART Drum Composter
Grade	Fully-Automatic
Untreatable Items	Inorganic waste
Time for Composting	10 - 12 days



Fig. 5. Aerobic drum compost plant

### 5. Future Scope

Attaching gear box to the motor to improve performance and motor to enable the blades to withstand a larger amount of waste. Using wheels in the bottom of the machine to make the

machine easier to move. By using microcontrollers and microprocessors, we can build automatic composter machines.

### 6. Conclusion

To find a solution for the food waste disposal problem, those objectives were that the solution should be eco-friendly and it should help decrease garbage volume and the disposal cost; it also should be sustainable and socially responsible. Those objectives were all met by choosing composting to deal with the disposal problem. When trying to design the composting machine, the objectives were that the machine reduces the processing time as much as possible, which was not more than 8-10 days in most of our experiments.

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