

DESIGN AND FABRICATION OF KITCHEN FOOD WASTE DISPOSAL SYSTEM

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Abstract— This paper represents the design and manufacturing of kitchen food waste disposal system. This paper investigated that, as the population of a city grows, so does the waste that it generates. Along with industrial and commercial development of a city, waste management systems have to be revised according to the city's needs. According latest surroundings standing Report by Brihan-mumbai Municipal Corporation (BMC) the 9,400 tonnes of trash that city sends daily to its marketing grounds, 73% (6,862 tons) includes food, vegetable and fruit. Currently days there are heap of waste is generating on the daily the sources of the food waste are an edifice, residential houses, cafe, restaurants etc. kind of these areas excess food can generate these foods are directly drop in to the surroundings. This creates hazards to the surroundings for different deceases. The results of wasting of food results in pastes, odors, toxic liquid and alkane gas for the additional patents than carbon dioxide. Solely 3% of food is recycled in worldwide remaining that thrower which results in the environmental pollution. With this project we have a tendency to be disposing the waste by mistreatment the mechanical systems like motor, drum, shaft, etc. metals used for the components are, stainless steel, cast iron, plastic etc. and design of the components are done in CATIA v5 r20. Because of this project waste management team will find it easier to separate the food waste from other garbage.

Keywords— Food waste, Mechanical systems, Waste Management.

I. INTRODUCTION

As families and communities rummage around for safe and effective ways in which to manage room wastes, composting becomes a lot of enticing management choice, this didn't solely restore worth there to however

additionally result in a discount within the quantity of waste that need disposal. Though informal use activities of waste materials is wide unfold in developing countries, the treatment and use of the perishable organic fractions, particularly for room waste, continues to be fairly restricted.

[1] Ravi Kumar et al (2016), manufactured waste food recycling machine and conclude that with the help this machine maximum utilization of food waste can be achieved. [2] Ijagbemi Christiana et al (2014) studied the biological process of breaking up of organic waste and conclude that an effective composting machine for small-scale agricultural processes is achievable. [3] Karin Schanes et al (2018) studies on households' food waste practices, and distil sociodemographic and psycho-social factors as well as food-related household practices. [4] Swapnil S. Desai et al (2016) studied design and fabrication of a food waste based biogas generation system. [5] Aschemann-Witzel

Jessica et al (2015), Researched regarding psychographic variables play an important role in consumer-related refuse behaviors. [6] Ajinkya S. Hande et al (2014), manufactured Chopping Machine which can automate a skilled manual process which can avoid worker fatigue.[7] Abira Mukherjee et al (2016), studied the different degradation techniques i.e. aerobic, anaerobic digestion, vermicomposting and parameters are controlled effectively in order to have a useful byproduct. [8] Awasif et al (2016) researched that from anaerobic digestion process the methane gas can produce from food wastes. [9] Ogur, E. O et al (2013) manufactured biogas digester which works

on anaerobic digestion of agricultural and animal waste which is effective option to save cost on power. [10] Vivek padole et al (2008) manufactured Organic waste chopping and shredding machine which is Atomized machines and better option to use by farmers instead of manually operations.

The aim this paper is to utilize the kitchen food waste and fabricate the food waste disposer for household purpose.

II. DESIGN

A. DESIGN CONSIDERATIONS

Design factors like convenience of element components, easy machinability, affordability, potency and easy operation were thought of within the style of the room waste composting machine.

B. DESIGN DESCRIPTION

The transfer framework comprises of a drum produced using tempered steel, and is encased by an external barrel mounted straightforwardly on an edge. A sink structure enters from outside through the round and hollow fenced in area into the drum. A 19mm diameter shaft passing through the center of the disposal drum vertically and spans through the one third of the length of disposal drum inside, on which a masher is mounted & is being driven by a 0.5HP motor with an average output speed of 2300rpm. The masher does the undertaking of squashing the waste materials against the inward dividers of the transfer chamber.

C. SELECTION OF MOTOR:

To achieve required speed and stability we select flanged mounted 3 phase motor.

$$P = 0.5 \text{ HP}$$

$$P = 0.5 * 746 \text{ watt}$$

$$P = 0.37 \text{ KW}$$

From design data book (p.s.g 5.125)

Kw rating	RPM	Diameter	P Max.	T Max.
0.37-0.55	2300	19j6	200	3.5

Table no.1 motor parameters

Considering 4% slippage, N= 2238 RPM.

D. DESIGN OF SHAFT :

We select carbon steel (C-45) for the shaft material as it's generally used for spindles of machine tools and it is very economical.

From design data book (p.s.g 1.9)

Designation	Tensile strength	Yield stress	Brinell hardness
C 45	65 kgf/mm ²	36 kgf/mm ²	229 HB

C 45	65 kgf/mm ²	36 kgf/mm ²	229 HB
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Table no.2

From design data book (p.s.g 3.8)

Diameter of shaft = 1.9 cm

Length of shaft = 10 cm

E. DESIGN OF DISPOSER DRUM:

We select stainless steel for the disposer drum material as it is easily available in the market and it is generally use for the casing of the drum.

The disposer drum's volume is given by:

$$V = \pi r^2 l$$

Where,

V = volume of the drum

r = inner radius of the drum

l = total length of the drum

$$\text{Volume} = \pi \times 110 \times 110 \times 350 = 13304.64 \text{ m}^3$$

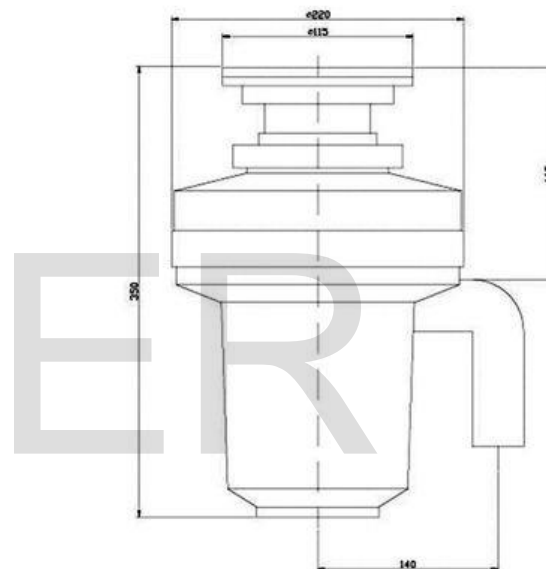


fig 1. schematic layout of system

III. MODELLING & FABRICATION

After completion of design of food waste disposer, development is done on the system. Parameters are selected according to use of system. 3D diagrams & photos of each components assembled machine are mentioned. The instruments used for fabrication of machine are also mentioned. Following are the main components of machine:-

- 1) Hopper/ sink
- 2) 3 phase motor (0.5 HP)
- 3) Disposer drum
- 4) Masher Blades
- 5) Bearings
- 6) Foundation Frame

A. Assembly:

Arrangement of various components of the disposer system are as follows:

1. Supporting frame is selected which holds the total assembly together.
2. sink/hopper is mounted on the frame whereas on other side motor is vertically fitted inside the casing.
3. Output shaft of the motor is connected to the masher blades which mash the waste food in fine particles.
4. Crushed waste sustenance is diverted through the outlet pipe provides just below the masher blades.
5. Disposed waste is collected in the bucket provided below the outlet pipe.
6. Screws and fasteners are used to hold the assembly together and to prevent the any leakages.
7. above assembly of the system are balanced, and center of gravity of the system is also balanced.

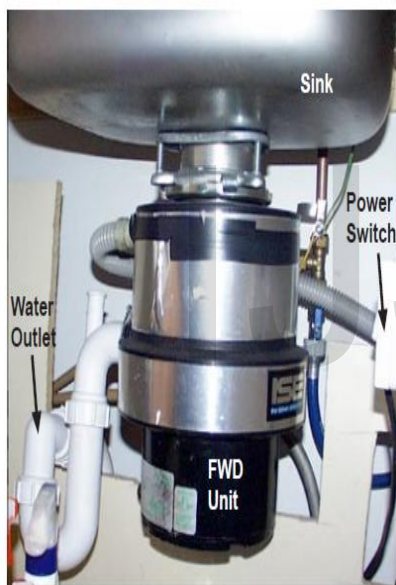


Fig 2. Assembly of food waste Disposer

IV. RESULT & CONCLUSION

Result:

With the help of this machine disposal of food waste achieved within 15-20 minutes depending upon the mass of the waste. Normal disposing for this same amount of waste using traditional techniques will take about 4-5 weeks (about 672-840 hours) to complete the process of disposing.

Conclusion:

- With the help of this machine we can utilize maximum amount of kitchen food waste.
- It can handle all type of kitchen food waste.
- It can reduce the pastes, odors, toxic liquid and alkaline gas that produce from the waste food.

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