



**Sri SAI RAM INSTITUTE OF TECHNOLOGY**



An ISO 9001 : 2008 Certified Institution  
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**INNOVATION AND ENTREPRENEURSHIP DEVELOPMENT CENTRE ( IEDC )**

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# **DEVELOPMENT OF OPTIMISED PELLET FROM SOLID SEWAGE**



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**FINAL YEAR B.E. MECHANICAL ENGINEERING**



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## **1. INTRODUCTION**

Every year, the average citizen of a developed country produces about half a tonne of waste, thus waste management is an essential industry. Old waste management systems based on the collection of mixed waste and transporting it along way to disposal sites has a significant negative impact on environment and humans. Our project will review the available waste management systems for households. The likelihood of our project is it eliminates or reduces the stage of waste collection and transportation. Additionally, they should not require special infrastructure and at the same time should allow garbage to be changed onto safe products or energy sources with no harmful emissions. The aim of the work is to identify the best available waste disposal systems for domestic use.

The main aim of the project is to produce an alternate fuel for cooking in the form of pellet from the solid sewage by using the pellet mill. This project is an Swachh Bharath initiative because the raw material used for the production of pellet is from the solid waste.

## **2. PELLET DESIGN CONSIDERATIONS**

The unique demands of Waste Management system require special considerations in the design of pellets. The drying of the pellet material can be done in two ways. For lesser quantity natural method is selected, while for larger quantity mechanical method is employed. In order to provide high quality pellet, the raw material must contain a moisture of 8-12%. Grinding is the further process, the main aim of the grinding process is to maintain the particles in the uniform size. We can increase the die life by reducing the frictional heat.

We illustrate that the material goes into the die at a temperature, 120°F, it will come out of the die around 160°F, a pick up of 40°F by friction or 33-1/3% increase in heat by friction. But if you raise your mash temperature up to 175°F, your pellet temperature out of the die will be 180°F, a rise of 5°F, a pick up of 3% heat from friction.

### **3. MATERIALS USED**

The materials used for making the pellet are as follows.

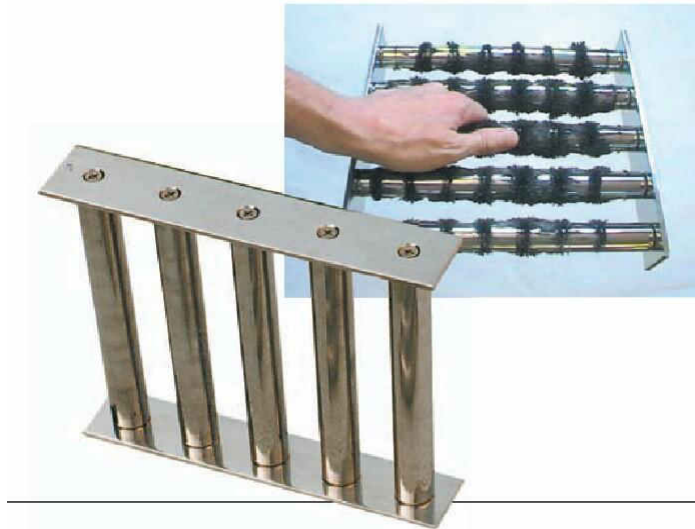
- 1 . Solid domestic waste.
2. DC Motor
3. Worm gear box.



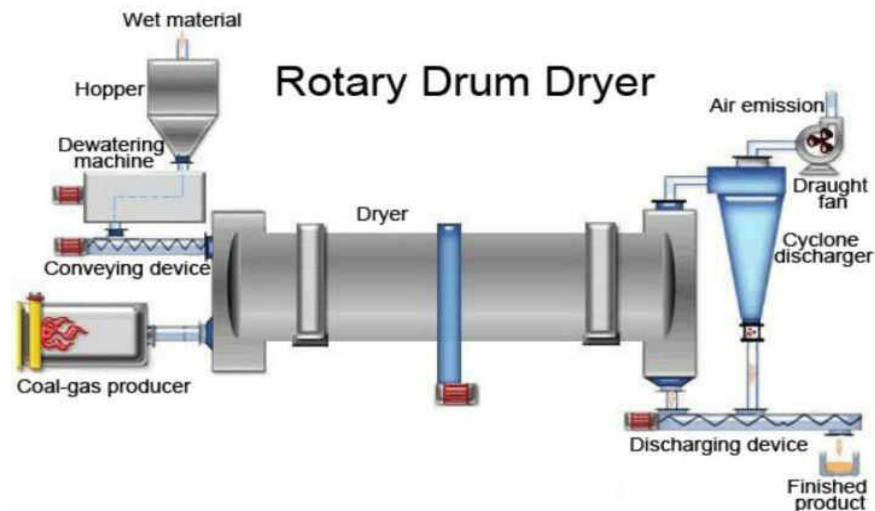
#### 4. MANUFACTURING PROCESS

Step 1: It is a device made with large screening surface vibrated mechanically at high speeds to remove large size wastes, Such as stones , etc.It vibrates in horizontal or vertical manner.

Step 2 : It is a conventional method by placing magnetic rods on the inner side. These magnetic separators are widely used in many industrial and food process to remove ferrous and paramagnetic contamination. Primary separators to eliminate larger particles and secondary separators to remove fine particles. They are in the form of rods, square grids, circular grids.



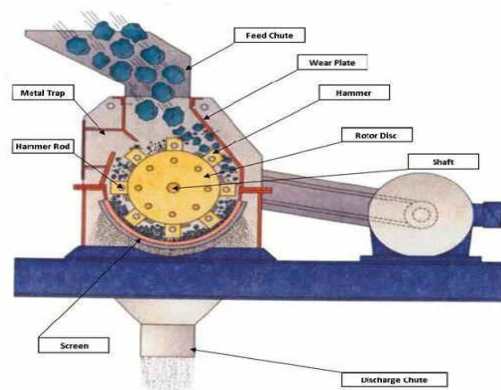
Step 3: The drying of the raw materials is done by both Natural and Mechanical Method. For the less quantity the natural method is mostly employed, while for the large quantities the mechanical method is been employed. The mechanical method is that using of equipments to dry the raw materials in a quicker way. The time to dry the raw materials depends on the condition and nature of the raw materials.



Step 4: This is the process of reducing the size of particles.

Before grinding the raw materials are been powdered using the hammering mill.

The main objective of the grinding process is to maintain the particles in the uniform size.



Step 5: Conditioning is the pre-treatment of the raw material before it reaches the pellet mill.

**Steam conditioning is the most important element in achieving high quality pellets at high production rates at a low cost.** It involves the specific mixing techniques with the addition of water and steam.

### **Reasons for Conditioning:**

1. To lubricate for faster production rate.
2. To lubricate to extend die life.
3. To lubricate to reduce energy costs.

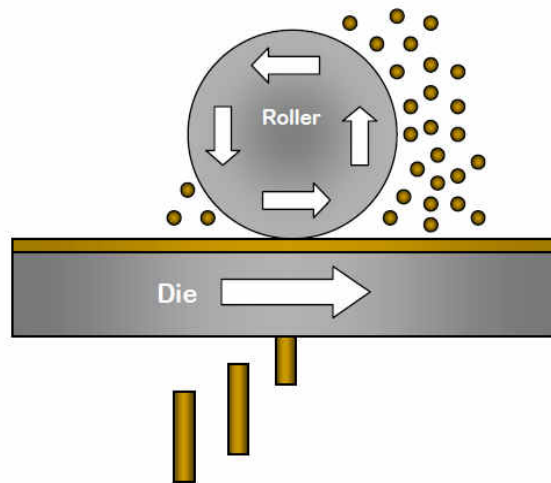
Step 6: It is a process used to create pellets, using a pellet mill.

### **Parameters to be considered:**

The roll acting upon the material compresses the material into the die .

The die itself has a resistance that can hold back the flow of the material through the holes in that die.

The pressure exerted by the rolls combined with the frictional pressures of the formulation itself.



Step 7: Pellets are cooled by passing ambient air through a bed of hot pellets. The principle involved is known as evaporative cooling.

### **The factors that govern are:**

1. Temperature of the ambient air
2. Relative humidity of the ambient air

Step 8: Finally all the process are been completed and the packing is been done to the customers requirements. Then the packed product is ready to sell in the the market for the use of the customer.



## **5.CONCLUSION**

The pellet we made is a good Alternate fuel energy which can be used as an eco-friendly fuel as it does not produce harmful gases. Additionally we can able to produce the pellet fuel in an cheaper rate than the commercial fuels, which will be more helpful for the rural people. This project is also mainly concerns about the waste management system . Thus our project is an initiative to the Swatch Bharath Mission .