

# Design and Modeling of Automatic Cow Dung Log Making Machine



S. Kannaki, S.Nithyapriya, M. Abinesh, N. Gayatri, V. Harish, R. Manikandan, M.S. Kailash

**Abstract:** This paper presents automatic cow dung log making machine. Cow dung logs used as fuel for many purposes such as cooking, heating boilers, chambers and many other purposes. The main aspect is to automate the cow dung log making process. The purpose of study is to replace manual production to semi-automated process and also to increase production rate. The advantage of the process is to increase the production rate of cow dung logs and bhasma at minimum runtime of machine with respect to the environmental condition.

**Keywords:** Screw Conveyor, Cow Dung Log, Electric Motor, Relay switch and IR Sensor

## I. INTRODUCTION

The design and Fabrication of the automatic log making machine is to use the available energy from the cow dung. The machine produces cow dung log in the form of long bar which is used as fuel for many purposes such as cooking, heating boilers, brick chambers, etc. This saves the consumption of wood as a fuel. Automatic log making machine consists of hopper, Motor, Gearbox, coupling, screw conveyor, drum and bearing. This machine uses Cow Dung as raw material. The dry cow dung is fed into the hopper, which is mounted on the top of the cylinder Drum, So that the cow dung slides over the hopper and reaches the cylinder drum. The screw conveyor is fitted inside the drum to transport the cow dung to the die side, compresses the dung and come out of the die as a cow dung log. The screw extruder is driven by the motor which is coupled to the gearbox to reduce the speed from the motor.

## II. PROPOSED METHODOLOGY

### 2.1 COMPONENTS SELECTION AND HARDWARE STRUCTURE

Automatic Cow Dung Log Making Machine is a Mechatronics System which is a combination of Mechanical System, Electrical System and Control System. In this Machine the Input device as sensor, Output device as Motor and Arduino as a Controller are used. The controller reads the input signal from sensor based on the information in the input signals it actuates the Motor.

#### 2.1.1 HOPPER

The cow dung is feed into the hopper. The cow dung slides over the hopper by gravity into the drum. Hence the hopper is designed as conical shape.

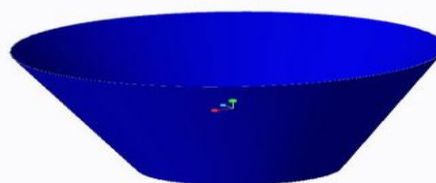


Fig.1.Hopper

#### 2.1.2 DRUM

The drum is used to collect the cow dung from the hopper. It is also used to store the cow dung. The die is attached at the one end of the drum. The screw conveyor is placed inside the drum. It also acts as a support for the screw conveyor.

The cow dung extrude from the drum should acquires a cylindrical shape, So that the circular shaped die is placed at the one end of the drum. The cow dung is made to pass through the die which is push by the screw conveyor hence it acquires the cylindrical shape.

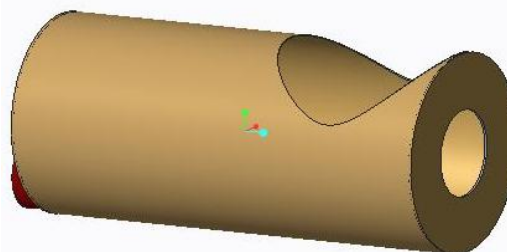


Fig 2: Drum

Bearing Bearing should be attached at the motor side of the drum. Bearing is used to reduce the friction and allow free rotation of screw conveyor.

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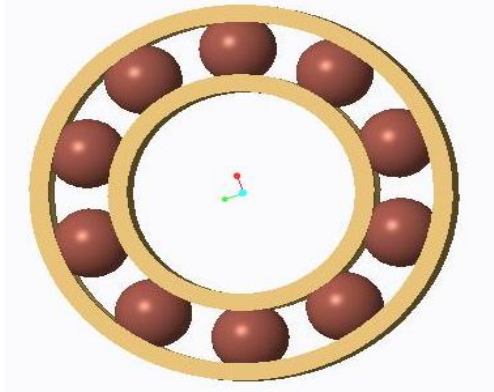


Fig 3: Bearing

### 2.1.3 SCREW CONVEYOR

The purpose of the screw Conveyor is to transfer and compress the Cow Dung and also pushes the cow dung to extrude it through the die. It consists of hollow cylindrical shaft consists of screw plates. The one end of the hollow shaft is coupled with the gearbox and the other end of the shaft is simply mounted at the end of the drum.

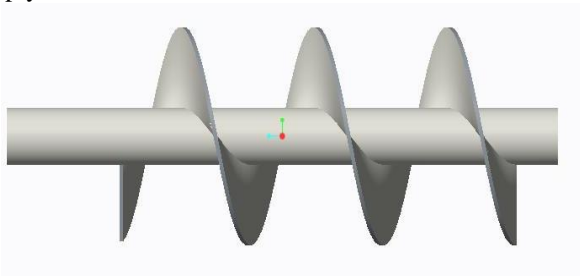


Fig 4: Screw Conveyor

### 2.1.4. MOTOR AND GEAR BOX

The Capacitor Induction Motor is used as a main motor. The Motor Use a capacitor for the starting purpose. It has a cage rotor and a winding stator. The windings are placed at 90 degrees apart from one another. In this motor the single phase supply current is split into two phases so that the motor acts as a balanced two phase motor. For the capacitor Induction Motor the starting torque is high so it is preferred for Automatic Cow dung log making machine. The motor is coupled with the gear box for the speed reduction purpose and also to maintain the constant torque.

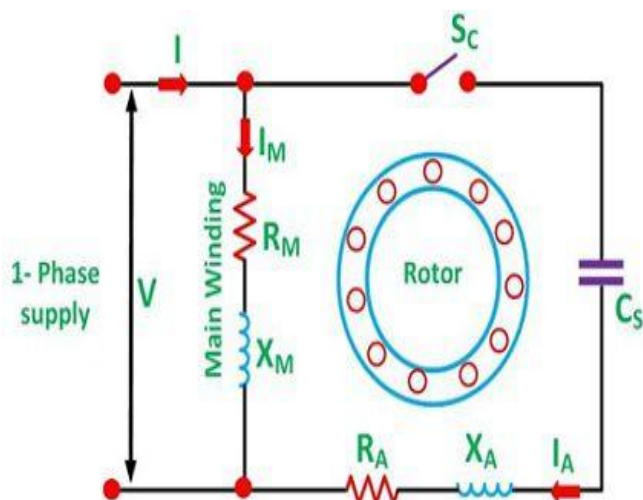


Fig 5: Capacitor Induction Motor

### 2.1.5. CONTROLLER

Arduino is used as a controller for Automatic Cow dung log making machine. It consumes less power. Arduino consists of programmable circuit board and software. The hardware components are CPU, RAM, ROM, FLASH Memory and ATmega 328p Microcontroller. It can also be interface with external devices.



Fig 6: Arduino Controller

### 2.1.6. RELAY

Relay is an electromagnetic switch. It is used to turn on and off the electrical components according to the computer program. In Automatic log making machine the relay is used to turn on and turn off the Capacitor inductive motor, Whenever it receives the signal from the sensor through the controller. The relay is connected with the controller.

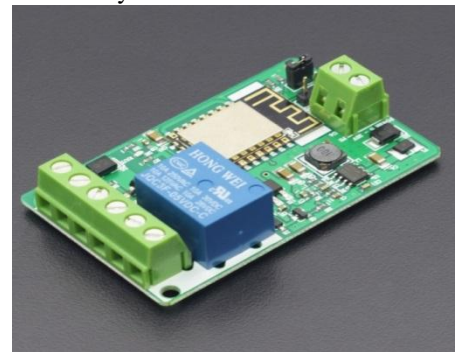


Fig 7: Relay

### 2.1.7. SENSOR

IR sensor is used to deduct the length of the cow dung log. The length of the log is measured by transmitting and receiving the Infrared ray. It consists of transmitter and receiver which is used to transmit and receives IR rays and obtain the information and passes the signal to the controller. Based on the signal from the IR sensor the controller actuates the servo motor for cutting the log.



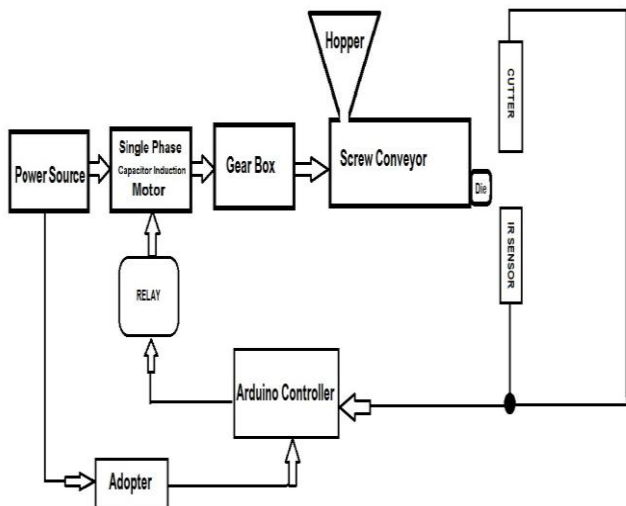
Fig 8: IR Sensor

**2.1.8. CUTTER**

The cutter is used to cut the log at required. The cutting blade is attached to the servo motor which is placed at the die side. Whenever the controller receives the signal from the sensor, the servo motor is actuated by the controller to cut the log. The controller is coded in such a way that the servo motor should move to 180 degree and 90 degree. When servo is at 90 degree, cutting action not occurs and when servo motor is at 180 degree cutting action occurs.

**2.2. BLOCK DIAGRAM**

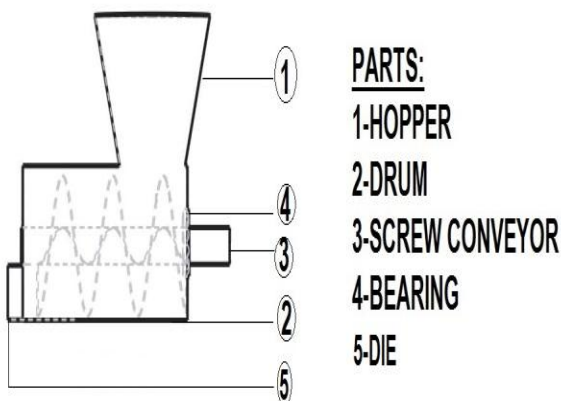
The figure 9 shows the working of the Automatic Cow Dung Log Machine.



**Fig.9. Block diagram**

**III. ASSEMBLY DIAGRAM**

Assembly drawing shows what are all the components are used in Automatic log making machine in a 2 dimensional view. In a technical service manual, this drawing is referred as an exploded view diagram.



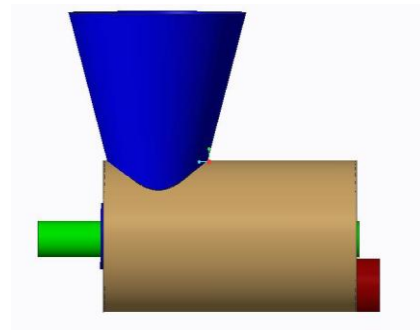
**Fig 10: Assembly drawing**

**IV. RESULT & DISCUSSION**

For Fabricating the Automatic Cow dung Log making Machine the calculations done for extreme condition of load.

Fig 10 shows the Isometric diagram of Automatic Cow dung log making machine.

This Machine is user independent. The extrusion of log from the die and the cutting process is completely automated. This setup is simple, cost efficient and also consumes low power for the operation.



**Fig11: Isometric diagram**

**V. CONCLUSION**

The automatic cow dung log making machine has been successfully designed by implementing mechanical, electrical and control systems concepts. This machine is semi-automated machine to produce the cow dung logs. The entire process is controlled by ATmega338P microcontroller, by receiving the input signal from the IR sensor, actuate the limit switch and servo motor accordingly to automate the process.

With the use of this machine the production rate of the cow dung log and bhasma have been increased at minimum runtime of the machine. The man power for the productions of bhasma and cow dung log have been reduced.

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