



Portable Flour Mill

A. Arun¹, D. Mohanraj²
M.Tech¹, Student²

Department of Mechanical Engineering
IFET College of Engineering, Villupuram, Tamilnadu, India

Abstract:

In Modern days the technological development are rapid and emerging in all fields. It is to be taken into account we need to apply technological aspect in a flour mill fields. Some of the food crops that are valuable and are mostly consumable in India are paddy, wheat, corn. These food crops are needed in powdered form for an effective food product. Therefore a compact product is developed for food crops with easy and effective way. The aim of this project is to powder the food crops into fine particles within a compact area with reliable and most flexible. It will be very useful in rural areas people for grinding the food crops with the most effective way.

Keywords: Flour, Food crops, Grinding

1. INTRODUCTION

India produces more than 70 million tones of wheat. It is mainly consumed in the form of Atta, Suji, Maida and baking flour. Most of the wheat is milled in small capacity disc mills to produce wheat flour(atta) Maida ,the refined wheat flour, used in the bakery industries could be produced in capital intensive and sophisticated flour mills. Flour Mills are among the most traditional units. Taking into consideration the local needs and market requirement, flour mills can be established at different levels domestic flour mills, commercial flour mills, bakery/mini flour mills and roller flourmill. The most useful out of these flour mills are established at a lower cost but is versatile as well since flour can be obtained from it for commercial purposes and it can also take up job work. It is an electrical appliance used to grind flour from grains like wheat, corn, millet, rice etc. It has gained acceptance as an household appliance which can produce pure and good quality flour of a desired size at very economical rate. It is a very safe and user-friendly appliance and does not produce any dust and the entire operation is automatic.

2. LITERATURE REVIEW

Shankara R and Malleshi N.G and Krishnamoorthy H and Naayana M.N and Desikazhar H.S.R (1985) Journal of food and science technology, Development of mini grain mill for dehusking and grinding of cereals. A method for removal of outer bran and for producing semolina and flour with negligible bran content has been studied using a plate grinder (used for small scale production of whole grain flours throughout india) to which is fitted a 4 deck sifter unit with 16, 24, 30 and an aspirator, both deriving power from one motor. Prasad A. Hatwalne, SushiT, Ambadkar R.V, Paropate, Vive R. Gandhavar, A.M. Wankhand New York Science Journal 2011 Design and Development of Pedal operated Flour millThe socio-economic conditions of peoples living in villages of developing countries including India, human muscle power can be good alternative to fulfill the energy requirements for performing many activities like flour milling. Pedaling is the most efficient

way of utilizing power from human muscles. Keeping these things in mind a pedal operated flour mill is developed. The machine consists of a chain drive and belt drive that turns rotates conventional stone wheels, where the poured wheat gets crushed to produce flour.

3. OBJECTIVES

- To reduce human effort
- To reduce labour wages
- To reduce the cost of grinding

4. COMPONENTS

- Circular plate
- Shaft
- Electric motor
- Belt and Pulley

4.1 CIRCULAR PLATE

There is a flat plate are in opposing pairs to crush or grind various materials, such as grain, ore, gravel, plastic, and others... Roller grain mills are an alternative to traditional millstone arrangements in grist mill. Roller mills for rock complement other types of mills such as ball mills and hammer mills. There is a two plates which are meshed together the food grains get crushed and changed to powder form (FLOUR)



Figure.4.1 Circular Plate

4.2 SHAFT

A shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to

another, or from a machine which produces power to a machine which absorbs power. The various members such as pulleys and gears are mounted on it. Axles are an integral component of most practical wheeled vehicles.



Figure.4.2 Shaft

4.3 ELECTRIC MOTOR

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Electric motors can be powered by direct current sources, such as from batteries, or by alternating current sources, such as a power grid, inverters or electric generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, accepting mechanical energy and converting this mechanical energy into electrical energy.



Figure.4.3 Electric Motor

4.4 BELT AND PULLEY

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell that does not transfer power to a shaft, but is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave.

5. WORKING

Initially, the wheat, paddy, corn are dropped into the hopper. There is a two circular plate is involved one is fixed with the square plate and the other is connected to the shaft, the plates are involved with minimum clearance. Whether the shaft is supported by the plummer block bearing and shaft can be rotated by the motor setup through the belt and pulley connection. When the motor is switched on the shaft is rotated with a circular plate when wheat, paddy, corn are comes nearer to the circular plate it gets grinded and make it a powder form (Flour). Then the flour can be collected in a collecting chamber.

- Rice - 6 kg/hr
- Wheat -5 kg/hr
- Millet - 4 kg/hr
- Corn - 5 kg/hr

6. DESIGN CALCULATION

DESIGN OF SHAFT

$$T/J = G\Theta/L$$

$$\Theta = 0.070 \text{ rad}$$

$$T = 2.9 \text{ N-m}$$

$$G = 0.8 \times 10^5 \text{ N/mm}^2$$

$$J = (\pi/32)d^4$$

$$\Theta = T \times L / G \times J$$

$$0.070 = 2.292 \times 26 \times 10^{-3} / 0.8 \times 10^5 \times J$$

$$d = 19 \text{ mm}$$

$$M/I = \sigma/y$$

$$I = (\pi/64) D^4 \quad \{d = 19 \text{ mm}, y = d/2 = 9.5 \text{ mm}\}$$

$$I = 6393.87 \text{ mm}^4$$

$$\sigma = (M/I) y$$

$$= (267000/6393.87) \times 9.5$$

$$\sigma = 396 \text{ N/mm}^2$$

Maximum ultimate Stress of the material

$$\sigma_u = 841 \text{ N/mm}^2$$

$$\text{Factor of safety} = \sigma_u / \sigma = 841/396$$

$$\text{Factor of safety} = 2.1$$

Design of circular plate

$$\text{Diameter} = 30 \text{ cm}$$

$$\text{Thickness} = 1 \text{ cm}$$

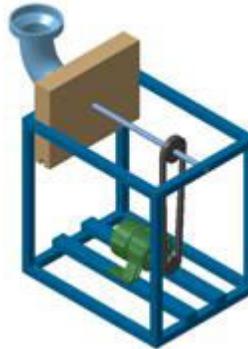
Power required:

$$P = 2\pi NT/60000$$

$$P = 2\pi \times 1440 \times 2.9/60000$$

$$P = 0.437 \text{ KW}$$

7. DIAGRAM



8. PHOTOGRAPHY



9. RESULT AND CONCLUSION

The innovative flour mill design is really simple, less power consuming, safe and cost effective. It can grinding the cereals into powder form. The only power it consumes is for rotating the motor, also it is portable and simple. The materials used for making this machine are safe and long lasting

10. REFERENCES:

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