



RESEARCH ARTICLE

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A DEVELOPMENT ON POLISHER UNIT OF MINIATURE SPLITTER MACHINE

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Abstract

This paper is describing the detail information about Polishing machine. The basic needs of polisher were to polish dal with minimum breakage and increased quality of nutritive value of dal in a single pass and to consume power. The polishing is done to improve the shine texture of dal, which helps in adorable premium price to the processor. Polishing is a process of enhancing the outer surface of dal. Existing polisher unit are very costlier and unaffordable for rural farmer & it requires a skilled person to operate, that why we develop a polisher unit which is low in cost, low maintenance, high production rate & easy design and fabrication. We have done 3 experimentation on polisher with 3 different rpm and the torque at same 3 kg per pulse then we found the result when we rotate the polisher at 90 rpm with 3 kg of pulse for 36 sec we will give the better polished pulse with minimum torque.

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Introduction:-

Pulse polisher is a machine used in various pulse mills for post-treatment and polishing [1W]. Dust is removed as it passes through the screen, and refined pulses exit the machine's outlet at the two ends [2]. Furthermore, these products are designed with advanced techniques to give grain and pulse a shiny and silky finish [3]. Cylindrical rollers equipped with hard rubber, leather, or emery cone polishers, as well as rollers equipped with brushes, are used for this purpose [4]. Rubbing action is used to remove the powder particles. These types of polishers have similar speeds and sizes to the cylindrical dehusking roller [5]. Splitting and polishing are done to extend the life of the pigeon pea. Dal mills are used to split pulses into two cotyledons, which are then polished [6W]. Seed treatment is becoming increasingly important in order to reduce storage losses. In Polishing process, dal is given a coated appearance to increase its consumer acceptance and market value [7]. The removal of sticking powder from the dal surface is sometimes thought to be sufficient to improve the surface coating. [8] With the help of oil, a polisher can be used to condition scratched pulses. Depending on the pulses, this process can be repeated 2-3 times [9].

Types of Polishers:

- 1) Single screw conveyor type polisher

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- 2) Multi-screw conveyor polisher
- 3) Buffer polisher
- 4) Roller type polisher

Single screw conveyor type polisher:

Three to five screw conveyors with full resistance are arranged in the battery to enhance the pulse retention period in the polisher for effective polishing. Different speeds are being used to revolve the screws.

Multi screw conveyor polisher:

This arrangement is normally followed in nylon polisher where the nylon rope of velvet cloth is mounted on shaft and flights for gentle rubbing of grains surface.

Roller type polisher:

It consists of a roller assembly with cylindrical roller inside. The roller can either be leather or rubber mounted or fine emery coated.

Buffer polisher:

Polishing involves the use of products containing abrasive to even out imperfections. It improves the texture and luster of dal.

Literature Review:-

Some of the literature related to fabrication and design of polishing machine has been studied which are based on the above research problem.

Sagar H. Bagade [10], "Design, Fabrication and performance and evolution of polisher machine of mini Dal Mill" above paper investigates the deep information about the polisher machine. The author used the apparatus consist of LDR which defect incoming light in the form of resistance. There are three Dal Sample for testing surface of Polish Dal sample found more reflective than unpolished Dal sample. Author concludes that grains sample of Tur Dal Processed through polisher machine have better shine.

Surya Aksher Raj [11], "Design and Fabrication of a continuous polishing Machine" The author is concluded that the design and fabrication of pulse polishing machine have been studied from this below data .polishing The machine design consist of four spindle leads and each spindle head carries a different grips flat wheel. Polishing the machine design consists of four spindle leads and each spindle head carries a different grips flat wheel. This machine can be used for polishing stainless steel flat bar, rectangular tubes & square tubes. The polishing machine design consist of three types of rollers and used as a guide roller. The mild steel roller is coated with heat resistance rubber and other two rollers are the hylun roller & nylon roller.

Sagareta [12], "Study of Different component of polishing unit" Polishing machines performance evaluation has studied by them. Design consideration of polishing machine is discussed and also concluded as their developed polishing machine has better performance in producing shining surface of specimen.

Need of polisher:-

Dal is also polished for value adding to the product. Dal with sharp edge and shiny appearance is generally preferred over unpolished dal. Dal polishing method depends on pulse crop and choice of the customer. Some customers prefer unpolished dal whereas some others need dry polished dal or even attractively colored dal.

Aim & Objective:-

Increase the nutritive value of the pulse while increasing the machine's production rate and efficiency. Possessed, used, managed, and manned by less skilled people in rural and semi-urban areas. The agriculturally based processing unit at the point of material generation. Unemployment issues and a good household profit based on their own working hours Portable and will be available at a low cost when compared to other polishers.

Methodology:-

It is operated by a motor, and the hopper is located at one end of the machine. A roller made of leather rotates inside the screen, removing dust as it passes through the screen, and the outlet is located at the other end of the machine. Our machines are suitable for polishing various types of pulses. Furthermore, these products are outfitted with advanced techniques to provide grain and pulse with a shiny and silky finish. For this purpose, cylindrical rollers mounted with hard rubber, leather, or emery cone polishers, as well as rollers mounted with brushes, are used. Rubbing action is used to remove the powder particles. The speed and size of these polishers are comparable to those of the cylindrical dehiscing roller. The splitting and polishing are done to extend the life of the dal. Dal mills are used to split pulse into two seed coat which are then polished. Seed treatment is becoming increasingly important in order to reduce storage losses. The following components are described in detail:

Concept sketch of pulse splitter machine:-

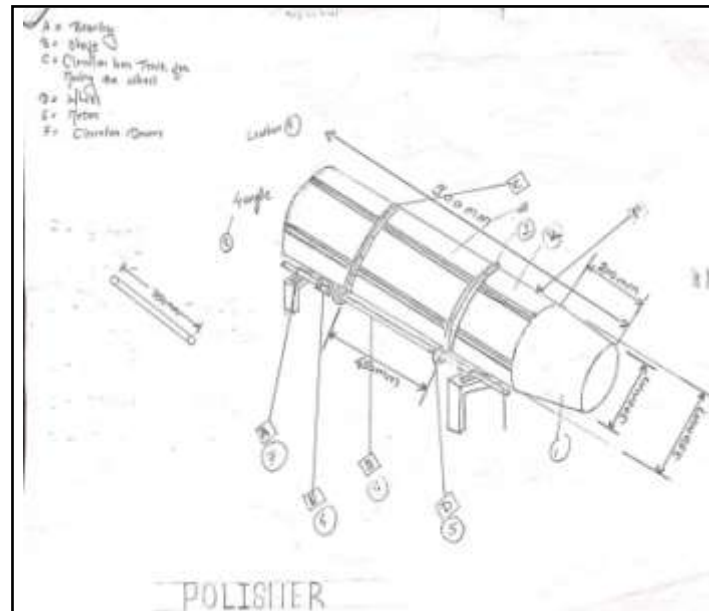


Fig:- 2D sketch of Polisher.

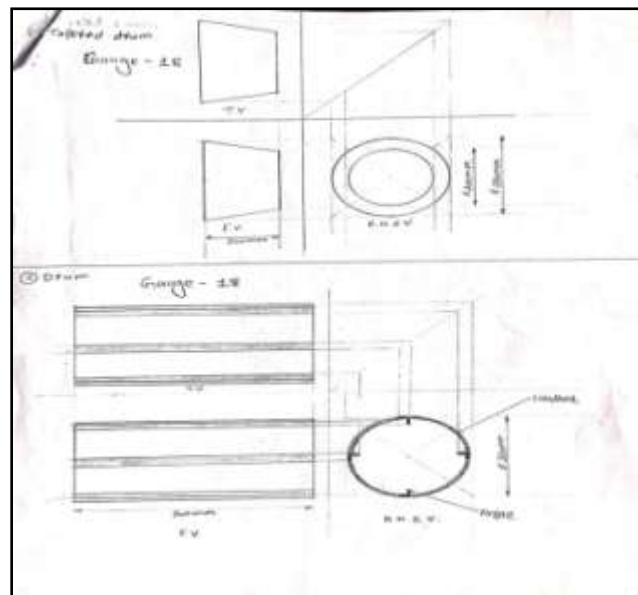


Fig:- Orthographic Sketch of Polisher.

Calculation:-

1. Diameter of Polisher = 270mm
2. Length of Polisher = 900mm
3. Shaft Diameter = 20mm
4. Volume of polisher

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

$$= 3.142 \times 135 \times 135 \times 900$$

$$V = 51536655 \text{ m}^3$$

$$= 0.0515 \text{ m}^3$$

Sr.No.	RPM	Split Pulse (kg)	Time	Quality
			(Sec)	
1	60	3	50	Best
2	90	3	36	Better
3	120	3	25	Good

Table 1:- RPM, Time & Dal Polishing Quality.**Groove:-**

The V-shaped microgroove is an important micro-structure in the miniaturization, which has been widely used for the surfaces of optical devices, the microchannels of microfluidic devices to align the optical fibres and so on. The processing quality will affect the performance of microstructure. And hence, how to fabricate high-quality micro-groove is focused by many scholars. Currently, there are several technologies able to fabricate V-shaped microgroove, such as lithography-based fabrication technology, non-traditional machining, and mechanical machining.

**Fig.1:-** V-groove.**Cylindrical roller:-**

A cylindrical roller is used to polishing the pulses, a roller has two ends and each end is open at one end a pulse is entered and the roller rotates, the pulse is rolling on the surface of leather then the pulse is rubbed and polished. The roller and belt assembly for mounting on spindle or drive shaft comprise a closed loop belt having an inner surface and an outer surface, the inner surface having leather coated, and the outer surface having abrasive material. The assembly further includes a cylindrical roller having an inner and outer cylindrical surface.

Leather is a strong, flexible, and long-lasting material made from the chemical treatment of animal skins and hides to prevent decay.

Types of leather:-

1. Full grains leathers
2. Top grains leathers
3. Genuine leather

4. Bounded leather/ Reconstituted leather
5. Flexibility leather
6. Connected grains leather

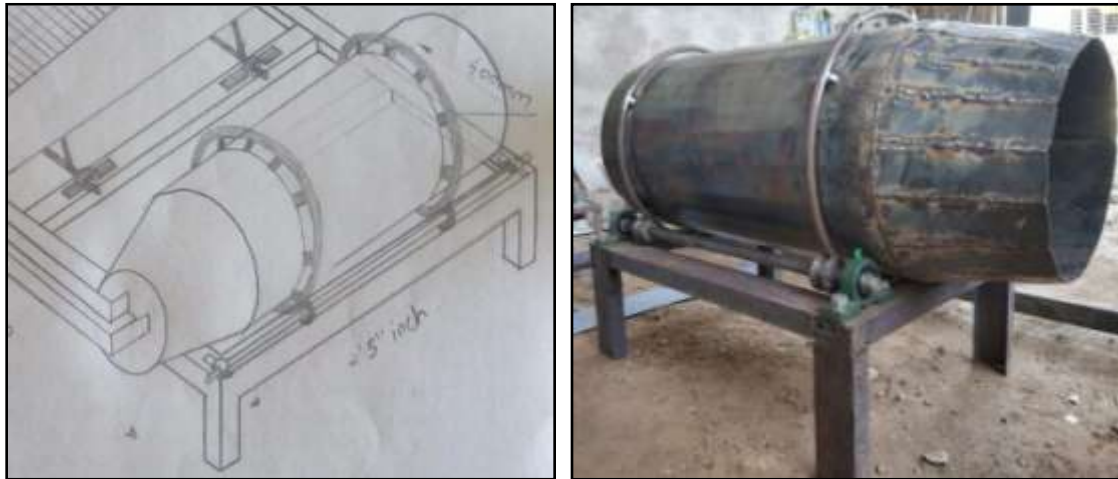


Fig.2:- Cylindrical Roller.

Gear Reduction DC Motor:-

A gear reducer is a mechanical transmission device that connects a motor to a driven load. It is also known as a gearbox. It allows you to modify the torque and speed between a motor and a load. Reduction gear assemblies are made up of series of gears.

The purpose of DC motor speed controller is to generate a signal representing the demanded speed, and to drive the motor at that speed. A geared DC Motor has a gear assembly attached to the motor. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction.

The used of DC motor in various applications has been increased due to the ease with which it speed can be controlled to give the desired performance characteristics under various condition.



Fig.3:- Gear Reduction Dc motor.

Features of pulse polisher machine:-

1. As compared to buffer polisher, this polisher has low cost.
2. Less time consuming, suitable for mass production.
3. Surface finish guaranteed.
4. Compact design occupies less space.
5. Very easy operation required no skilled labor.
6. Unique and reliable design.
7. Retains and proteins and natural shine.

8. Nonstop continuous polishing process.

Bill of Material

Sr. No	Part Name	Material	Quantity
1	Bearing	M.S	4
2	Shaft	M.S	2
3	Wheel	M.S	4
4	Solid Bar	M.S	2
5	Sheet	M.S	1
6	Angle	M.S	2
7	DC Motor	M.S	1

Conclusion:-

The pulse polishing machine is a low-power, simple-to-use, and time-saving machine. To improve the appearance of Pulse, polishing is frequently used. The machine is easy to use and boosts the nutritional value of pulse. The polisher improves the shine of the Dal and increases its nutritional value. To store dal for a long period of time, as its outer layer is removed, it will contain less moisture. Micronutrients are lost as a result of polishing. As a result, it has been polished to resemble a new dal.

1. As the rotational speed of polisher increases the output polish dal increases but having inferior quality.
2. So, on the basis of the experimentation Rotational speed between 60 to 90 rpm is suitable to get best quality polished dal.
3. Torque should be maximum in order to minimum required rotational speed in rpm.

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