

Powder Making Two Chamber Three Stage Pulverizer Machine

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Abstract: A well - established furniture industry is facing a problem of waste produced during production process, which is great loss for the industry because the value of their waste materials is low. The waste generated from existing production process is large wooden pieces which industry sells at lower cost. But management thinks that if waste is created in the form of small particles rather than a powder, they can sell waste at higher cost. The powder form wooden particles are useful to Medicine industry and furniture manufacturing industry. It will be beneficial for organization as waste will generate profit for industry and overall productivity will increase. This study addresses the issue of excessive bamboo waste generated during the manufacturing of incense sticks. Traditional processes yield only 20% usable product, with 80% resulting in waste. To convert this waste into a valuable resource, a two - chamber, three - stage Pulverizer machine has been developed. The machine converts bamboo chips into fine particles ranging from 40 to 100 mesh sizes, which are commercially valuable in industries like droop manufacturing, briquette production, and bio - organic fertilizers. This paper details the design, working principles, cost analysis, and potential returns of the machine, showcasing how effective waste utilization can improve industrial sustainability and profitability. The design and fabrication cost of the machine is estimated in Rs.2.5 lakh and the rate of return will be achieved in a very short period of time.

Keywords: bamboo waste, Pulverizer machine, mesh particle, biomass utilization, sustainable manufacturing

1. Introduction

A ball mill is a Pulverizer that consists of a horizontal rotating cylinder, up to three diameters in length, containing a charge of tumbling or cascading steel balls, pebbles, or rods. A tube mill is a revolving cylinder of up to five diameters in length used for fine. pulverization of ore, rock, and other such materials; the material, mixed with water, is fed into the chamber from one end, and passes out the other end as a slurry.

Both types of mills include liners that protect the cylindrical structure of the mill from wear. Thus, the main wear parts in these mills are the balls themselves, and the liners. The balls are simply "consumed" by the wear process and must be re - stocked, whereas the liners must be periodically replaced.

The ball and tube mills are low - speed machines that grind the coal with steel balls. In a rotating horizontal cylinder. Due to its shape, it is called a tube mill and due to use.



2. Introduction to Pulverize Machine

In bamboo industry bamboo is widely used as a base

material for essence stick (round Stick). For making round stick, one need a group of machines: - Bamboo splitter Sizer Knot remover Sliver machine. Round stick machine Polishing machine. Sizer Packing. Bamboo splitter: a 15 - 20 feet long bamboo is spitted to 6 pieces on the same lengths. Sizer: this machine is nothing but a saw which has a stopper at one end which ensures cutting size. Either 3 feet or 1 foot as per the requirement of manufacturer of round stick. Knot remover: there are compartments in bamboo, once spitted they appear like knot & called as one. They need to remove the knot to process the bamboo. Sliver machine: this machine is used to make slices of bamboo splits into pieces of thickness 1.4 - 1.6mm Round stick machine: this machine makes round sticks from the output of the aforesaid machine. & generated 80 % of waste. Polishing machine: the round sticks then produced are transferred to polisher machine to make them smooth. Sizer: this machine is nothing but a saw which has a stopper at one end which ensures cutting size as per the requirement of Agarbatti maker. Packing: this is a manual process where a bunch of 1 kg of round sticks as per size is made. As per the aforementioned information we came to that in this process the product made is 20% & waste generated is 80 %. This makes the product cost high. To bring it down one need to work on waste management & generate revenue. In comes the Pulverizer. As the waste generated is useless for most of the industries. But when the same is pulverized in different mesh sizes the cost increases & waste generates the revenue.

3. Methodologies

A two - chamber Pulverizer powered by a 5HP motor using a belt - drive mechanism. The rotating blades and mesh - size outputs are logically explained, and the staged particle size reduction.

Power transmission to be carried out by V belt drive. Each rotating blade will have sharp edge blades over it.

Each chamber will consist of 21 liners to collect fine particles and passed it through. Filtration chamber so that fine particles will be collected and then pulverizing process. will again start in second chamber. Bamboo chip dust to be fed into machine with help of in feed belt conveyor through which the material gets into the contact with rotating machine blades at first chamber.

At initial chamber rotating blades will rotate at 1440 rpm and will convert dust into 40 mesh size particles. Then the mesh particle will again pass - through rotating blades rotating at 2016 RPM.

These blades will convert 40 mesh particles into 80 - 100 mesh particles which is of better quality and the machine will have conversion accuracy of around 95%. Machine will convert bamboo chips into fine particles of bamboo.

Machine will recycle bamboo waste and it will make it reusable by converting to 80 mesh size particles.

Bamboo stick will be produced by one side and another side fine powder can be sale at more rate. Tubes and the rotating hot air tube onwards to the classifier. Coal - laden air passes through double cone static classifiers, with adjustable classifier vanes, for segregation into pulverized fuel of the desired fineness, and coarse particles. The pulverized fuel continues its journey towards the coal burners for combustion. The coarse particles rejected in the classifier are returned to the mill for another cycle of grinding.

4. Objectives of Project

Design a new machine which will convert waste bamboo chips into fine particles with 80 mesh size.

To recycle waste produced during bamboo stick producing process.

Better use of waste products for society as fine bamboo particles can be used in dhoop making, pellet making, briquette making, table wares making, vinyl flooring etc.

5. Problem Statement

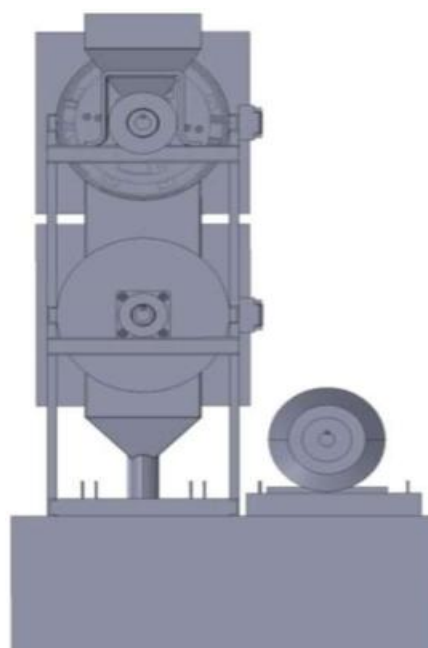
In bamboo industry bamboo is wide used as a base material for essence stick (round Stick). For making round stick, one need a group of machines: - Bamboo splitter Sizer Knot remover Sliver machine. Round stick machine Polishing machine. Sizer Packing. Bamboo splitter: a 15 - 20 feet long bamboo is spitted to 6 pieces on the same lengths. Sizer: this machine is nothing but a saw which has a stopper at one end which ensures cutting size. Either 3 feet or 1 foot as per the requirement of manufacturer of round stick. Knot remover: there are compartments in bamboo, once spitted they appear like knot & called as one. They need to remove the knot to process the bamboo. Sliver machine: this machine is used to make slices of bamboo splits into pieces of thickness 1.4 - 1.6mm Round stick machine The round stick machine converts bamboo slices into sticks but produces up to 80% waste in the process. Polishing machine: the round sticks then produced are transferred to polisher machine to make them smooth. Sizer: this machine is nothing but a saw which

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Pulverized dust is used in dhoop making, pellet making, briquette making, table wares making, vinyl flooring

6. Construction and Working



7. Analysis



8. Conclusion

Pulverizer with 2 chamber and 3 stage with 3 rotating blades in each chamber. Hypothesis calculation in terms of productivity for industry is calculated as; Rate of machine is 2.5 lakh RS. Including taxes. The cost of waste bamboo is 1 - 2 Rs/kg for bamboo industry. If 80 mesh size particles are produced from the waste bamboo chips. cost of thin bamboo particles is 18 - 20 Rs/kg. daily generation of bamboo chips is 50 kg average/day (variation occurs in different weather condition).

This study introduces a two - chamber, three - stage pulverizer machine designed to convert bamboo waste into fine, commercially viable particles. The machine operates with high efficiency and accuracy, significantly increasing the value of production waste. With minimal maintenance and a short return on investment, the solution offers a sustainable and economical approach for bamboo - processing industries. The output can be utilized in various applications, including bio - fertilizers, incense, and biodegradable packaging.

Bamboo Pellet Machine

Bamboo pellet machine is a ring die pellet equipment specialized in bamboo waste pellets. It can turn bamboo powder and bamboo chips into pellet product through heating and compression. It is a type of biomass fuel pellet machine equipment.

The pellets processed by this bamboo pellet mill are mainly used as biomass fuel, cat litter, organic fertilizer, bamboo boards, etc.



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