IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

DESIGN AND FABRICATION OF BANANA AND COIR FIBER EXTRACTING MACHINE

Manoj P
BGS Institute of Technology , Nagar

Mohan Kumar G T
Department of ME ,
BGS Institute of Technology , B G Nagar

Nandan B S Department of ME ,
Department of ME ,
BGS Institute of Technology , B G Nagar

***Abstract*—**Natural fibers have lot of commercial values . The natural fibers such as banana fiber and coconut fiber can be used to make materials such as ropes , furnitures , mattress, etc . The secondary products like cocopeat is also obtained that be used to grow saplings . Currently there are lot of machines that can be used to extract fibers . These machine require lot of initial investment , require frequent maintenance and are bulky . Our research work proposes a compact fiber extracting machine that can extract both banana fiber as well as coir fiber . The single machine shall be designed to extract multi fibers . The design shall be compact and pocket friendly.

***Index Terms* -** Component, formatting, style, styling, insert.

I. INTRODUCTION

Banana fiber is environmentally friendly like jute fiber. It has large export demand from many countries like Japan, Australia, Germany and many. Fiber can be obtained from whole banana plant. After the fruit is obtained, the plant is thrown away giving rise to increase in waste. The proper disposal of this plant is another problem. By using a good fiber extractor machine, a large amount of fiber can be obtained which will give rise to additional income. Banana fiber is a best fiber with relatively good mechanical properties due to its high alpha cellulose and low lignin percentage. Natural plant fibers can easily be sourced in many tropical countries and are available in large quantity all year round.

These fibers are considered as environment friendly materials due to their biodegradability and renewable characteristics. Recently, the interest has turned over on utilizing the natural plant fibers such as bagasse, coir, and oil palm fibers as effectively and economically as possible to produce good quality fiber for various applications.

Production of natural fiber reinforced composite materials involves proper processing of fibers into the required dimensions and then introducing the matrix to form composites.

This work is about extracting coir fibers from coconut husks and processing them to the required geometry for composite board production .Of the numerous available natural fibers, coir fiber is one of the hardest that attracts a lot of difficulty in separating or reducing the fiber size for natural fiber composite production. Coconut fibers come mainly from the coir . The coir is the seed hair fibrous material found between the hard internal shell and the outer coat (known as the endo carp) or husk of a coconut. The matured coconut fiber is coarse, stiff and reddish brown in colour and it is made up of smaller threads, consists of lignin (a woody plant substance) and cellulose . The coir fiber is useful for the production of matrix-bond composites . Due to the stiff nature of the fiber, conventional technology is required to extract its fibers. The traditional production of fibers from the husks is a laborious and time-consuming process which highly pollutes water surfaces and results in the accumulation of large dumps of pith. After manually separating the nut from the husk, the husks are processed by various retting techniques, and generally in ponds of brackish waters (for about 3 – 6 months) or in salt backwaters or lagoons. This requires 10 to 12 months of anaerobic (bacterial) fermentation. By retting, the fibers are softened and can be decorticated and extracted by beating ,usually by hand. After hackling, washing and drying (in the shade) the fibers are loosened manually and cleaned.

Alternatively, mechanical processing using either defibering or decorticating equipment can be used to process the husks after only five days of immersion in water tanks. By using revolving "drums" the coarse long fibers are separated from the short woody parts and the pith. The stronger fibers are washed, cleaned ,dried, hackled, and combed. The quality of the fiber is greatly affected by these procedures. Size reduction is an important operation because it involves the breaking down of larger particles into smaller and required sizes as different types of composite materials require different fiber sizes for proper binding of the components. Milling, crushing and grinding are processes widely used in the composite industries to reduce fiber sizes due to the advantages of high productivity and flexibility in fiber size ratio they provide .

II. PROBLEM STATEMENT

Fiber extraction is a complex process . It requires specially designed machines . Currently there are many fibre extracting machines in use but these machines are bulky and consume lot of space . The current day machines require lot of initial investment and do not serve multipurpose. Since farmers belonging to low income category search for budget friendly machines , integration of machines to achieve multi purpose is necessary . Our main objective is • To develop a low cost, multi fiber extraction concept. • To design the machine based on compactness and low cost . • To carry out necessary mathematical calculations for efficient working of the machine . • To create the 3d model of the machine using solid works . • To fabricate the machine and test its performance .

III. RELATED WORK

In this section, some of the research papers studied to build our arm have been cited. In [1],a compact banana fiber extracting machine is designed and developed . The machine was tested for different samples obtained from different species of bananas . The paper also provided different informations such as properties of banana fibres , differnet process in extraction and dyeing of the fibers . the banana fibre is fed against the rotor , the rotor separates the pulp and water content from the banana fiber and retains the fibre . This fiber can be dried and processed further. The coir fiber extractor has blades that rotate at high speed . The blades inside a perforated drum separate the coir fiber from sends it through the outlet . The cocopeat can be collected below the perforated drum . In [2], a coir fiber extracting machine was designed and developed . The machine was fabricated using locally available materials to fabricate it in low budget . The main intention for the design was to replace the traditional methods of extracting coir fiber . The traditional methods are very slow and requires lot of skill. In [3],the authors built up an exceptionally basic idea to strip a coconut, utilizing a couple of tweezers with pointed tips. His work alludes to enhancements in coconut shell expulsion apparatuses. The created instrument has a couple of winding tweezers, which are provided with the handle and the tips are pointed. The tips are embedded into the shell with manual power. Subsequent to squeezing the handle with the goal that the tip embedded into the fiber endeavors to move away by expelling the fiber from the top. It is profoundly productive and practical, however all things being equal, there is a ton of manual power included and can make damage the specialist. In [4], the authors built up a straightforward however successful apparatus for stripping
coconuts. The shell of coconuts is a difficult, moderate and rather unsafe undertaking. There is by all accounts no settled recipe for dealing with this task, yet it is generally finished with a blade or a cleaver. These can be hazardous, particularly when it is a coconut since it is undesirable. Besides, it set aside a long effort to finish the work, with the goal that it was anything but a gainful activity. This work gives a moderately straightforward device to cutting coconuts and one that is sheltered and can be effectively come to rapidly and without the requirement for past preparing. The device incorporates wedge-formed sharp edges that are constrained into the shell and afterward one of the cutting edges moves from the other to remove some portion of the stringy shell. This is rehashed
until the whole shell is constrained from the seed. The whole task
can be performed rapidly and effectively.

IV. METHODOLOGY

The machine consists of a frame constructed from 20*20 mm mild steel pipe . The machine is provided with a 1 hp motor . The fiber extracting rotor shaft is mounted on bearing blocks . The power is transfered from motor shaft to rotor shaft using pulley and belt mechanism . One side rotor is fitted with banana fiber extractor and other side of the shaft is fitted with coir fiber extractor. The banana fiber extractor has two rollerswhich helps to feed the banana fiber against the rotor. When

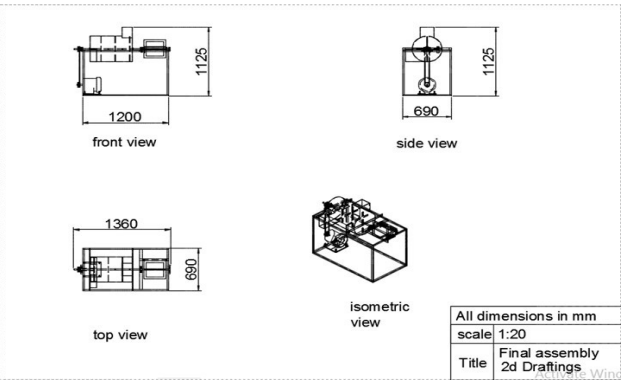

Fig. 1. Schematic diagram

Fig. 1. Schematic diagram Fig. 2. Final Assembly 2D Drafting

V. ADVANTAGES

The machine serves as multi purpose machine and can extract both banana and coir fiber. The machine is pocketfriendly and requires less maintenance. The machine is compact and process a lot in a small floor space

VI. DISADVANTAGES

Both the process cannot be carried simultaneously since motor of low power is being used. For simultaneous useupgradation of motor is required .

VII. CONCLUSION

Our research work shall make an attempt to reduce the initial cost of the machine by making it multipurpose. The proposed design shall benefit the factory owner by saving floor space , cost and maintenance cost .The research shall help to study the demerits of current designs and shall provide data for improvements .

VIII. FUTURE SCOPE

The machine can be fitted with auto feeder for banana fiber extraction .Additional fiber extracting parts to extract other fibres can be incorporated to the same chassis. Convertor belts can be fitted to carry away the cocoeat that accumulate under the machine .

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