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Design and Development of a Novel Machine to Separate Midribs from the Coconut Leaves

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ABSTRACT: Coconut trees are abundant in our country accordingly it has a wide range application. Each part of the tree provides high benefits. This project work deals with the design of coconut leaf midrib removal machine. Aim of this work is to develop a modernized and less stressful operation for removing the midrib from the coconut leaf. Since the several parts of the coconut tree used for lot of industrial and medical applications, the midrib of the coconut leaf is used for preparing the paper pulp and also for the fabrication of the composite fibers. Nowadays composite fiber plays a major role in manufacturing Industries. But the availability of the fibers is less, due to the insufficient quantity of raw materials. The scientists came up with the idea that the midrib can be utilized to fabricate the fiber composite. But the removal process is complicate because it has to be done manually. The manual process needs more man power and it consumes more amount of time. So, this new innovative machine can easily remove the midrib from the coconut leaf with the usage of motor and the crushers coupled with it. By the usage of this machine, the speed of the removal process is 10 times more than the manual process. So that the fabrication time of fiber composite will get reduced. This method will help the farmers to reduce their work and also ease the risks.

KEYWORDS: Coconut leaves, midrib separation, Ease of work.

I.INTRODUCTION

Coconut is a chief thing that provides all sorts of things to human especially provide human beings with food and drink, shelter, fuel and a raw material to make items from. And one such application is a simple yet effective broom for the house, using one of the tree's giant leaves. It's a lot easier to use a leaf that has fallen down of its own accord, as getting up the tree is hard work, and the leaves are large. Another important purpose of midrib in coconut tree is that of medical usage. The midrib of coconut leaf is the large, centre part of the leaf. It is utilized for making brooms. The midrib of coconut palm leaf is investigated for the purpose of synthesis for naturalfiber composite. The tensile and interfacial strength of midribs between midrib and polyester resin are determined by tensile test and fiber pull-out test. Results show that midrib of coconut palm leaves has a potential for development of natural fiber composite. Midrib of coconut palm leaf content 30% cellulose and 16% lignin used for the purpose of reinforcement of that is used for different structural parts where moderate strength is required like door panels, roof sheets, packaging etc. Coconut tree has a wide range of applications such that each and every part of the coconut tree has its unique characteristics provides all sorts of things to human beings especially with food, drink, shelter, fuel and a raw material to make Furniture. Another important purpose of midrib in coconut tree is that of medical usage. The midrib of coconut leaf (MCL) is larger, center, a main vein which support the leaf and facing the sun. It is used for making brooms and also known as broomstick. The midrib of coconut palm leaf is investigated for the purpose of synthesis of a new natural fiber composite. There are several applications such as for making lightweight composite fibers also for making handicrafts. Thus the process of separating midrib from the coconut leaf is usually considered to be a tedious process because of its time consumption and also it should involve human work it will be the disadvantage so we come out with an idea to cure this problem. In order to separate midrib from coconut leave, we designed a machine that will take the coconut leaves as an input and inside the machine there happened to be a spiked roller arrangements in such a way that the taken leaves are crushed and the output midrib are taken away.

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II.EXISTING METHOD

In the most of the villages, the villagers more rely on the coconut tree's product so they tends to do the midrib separation through the means of their own hands with the only help of knives, but it seems to be an unsafe method and also takes a longer time and which may happen to be damage to their hands which shown in figure(1)



Figure(1): Conventional method to remove midrib from coconut leaf

Due to this unsafe existing method, we came out with an idea of removing the midrib with the usage of the midrib separating machine such that the output will be more perfect and also doesn't need any manual work from the humans.

III.SYSTEM MODEL

Construction of the midrib separation machine concern, the input of the machine is the coconut leaves as the leaves were inserted into the opening and it is directed towards the spiked rollers seen from the figure(2)

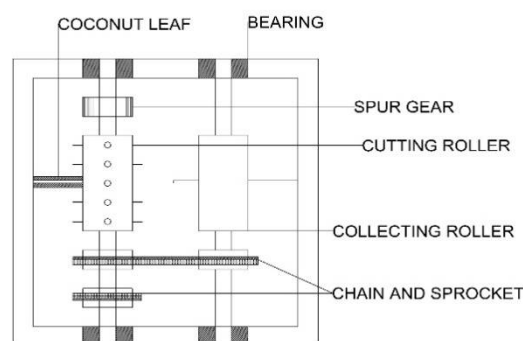


Figure (2): Top view of the machine

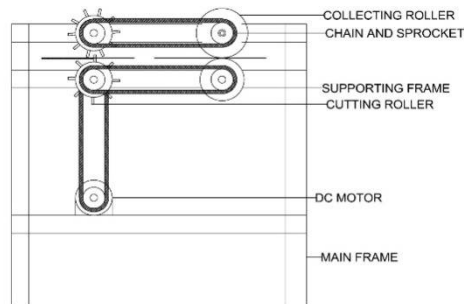
As it consist of a pair of spiked rollers placed in a vertical manner and they are kept rotating on opposite direction such a way that the input leaves are taken in and the function of the spiked roller is to remove the leaf part from the midrib so that the midribs are taken away at the end, the removed leaves from the midrib are taken away as a waste. It consists of the three batch of rollers where one batch roller is off spiked type and the other two batches are off non-spiked type roller.

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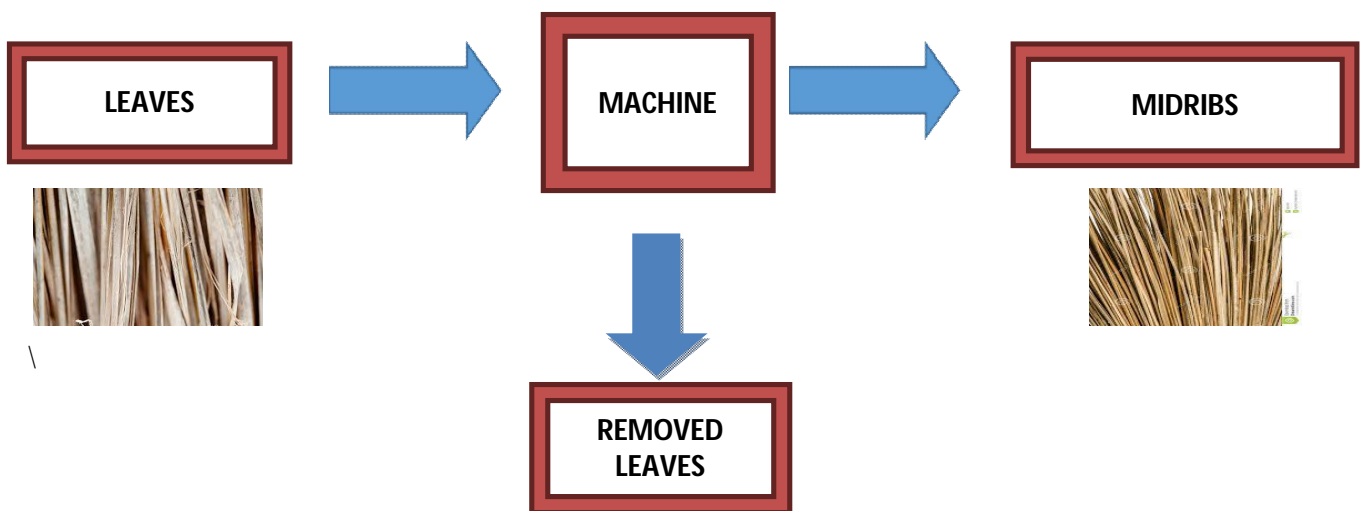


Figure(3): Front view of the machine

The two non-batched rollers are placed at both the entrance as well as at the output end. The function of non-spiked rollers at the opening is to make all the leaves into the machine such a way that it will direct all the leaves directly to the spiked rollers so that the leaf will be separated apart and the midrib can be taken away with help of another non-spiked roller. These rollers are operated through the help of single phase AC motor which will drive the three pairs of rollers during the operation of midrib separation seen from fig(3).

IV. WORKING

The complete operation of the proposed method to separate midrib is explained through means of a Block diagram shown in figure(4).



Figure(4): Block diagram of the proposed method

The bunch of leaves was inserted into the machine's input through a slider. The slider may be of light weight steel so that by putting the leaves into the slider those leaves were rightly directed towards the machine's input.

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Figure(5):Non-Spiked Rollers



Figure(6):Spiked Rollers

The first pair and the last pair of rollers are of non-spiked type which is seen from the figure(5), will collect all the leaves from the slider and put them together into the spiked rollers figure(6) which are all working by the means of single phase AC motor.



Figure(7): Complete model of the machine

As the leaves approach the opening of the machine, the first pair of non-spiked rollers makes the input leaves towards the spiked rollers. As it approaches the spiked roller, the leaves get completely crushed off by the rollers. The removed leaves are taken away as the waste and the complete midrib is taken out from the spiked rollers and the output is received by the last pair of non-spiked rollers and taken from them as output. The complete model can be seen through the figure(7).



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VI.APPLICATIONS

Our project is innovated in a sense that the outcome of the project should make ease the work of farmers and other people who are all related to the coconut based business. Especially in villages, they mostly rely on coconut based works in The coconut leaves and its midrib usually has higher application but the people feels tough to make use of them and they struggle to peel off the midrib from the leaves and hence it's a way that will help to easy makes the farmer utilize these things with less man's work and our product outcome is also more effective. So our idea is to provide these machines to the farmers in the nearby villages and this will make them feel comfortable to make their work easy and it will probably reduce the cost of time also.

VII.MACHINE SPECIFICATION

The specification of the midrib machine is given in the table1.

DIMENSIONS	
Length	6.2 m
Height	1.6 m
Width	1.4 m
INSTALLED POWER	10 kW
	380 V
	50 Hz

Table 1. Specification of the midrib separation machine

VII.CONCLUSION

Thus the project will make easier the work of farmers and all the agriculture-based business people. By using the machine which will highly reduce the manpower but also consider to be eco-friendly to the environment. This will be highly beneficial as compared to commercial fibers. These fiber composite are light weight and they are used to make handicrafts and even for making as the broom to sweep. These are all considered to be eco-friendly to the environment

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G.P.Karthikeyan, currently pursuing B.E final year in the field of Electrical and Electronics Engineering at Kongu Engineering College, Perundurai. Participated in several paper presentations and bag first prize for the paper “FERRO FLUIDS” in Intra college symposium in Kongu Engineering College, Perundurai.



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