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Sugarcane Lifting Machine (Harvester)

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ABSTRACT:-

In India the number of population working under agriculture is nearly about 70% in which rural population is 80%. The agriculture is contributing in India's national income very fast. The agriculture share 20.5% in GDP of India[7], hence we can say that agriculture is the backbone of Indian economy. In today's world of competition, there is need for faster rate of production of agricultural product. In India farmers are facing problems of labor shortage and the Indian agriculture sector is still depends on labors[1] .The need for faster production of agricultural products and labor shortage encourages the need of mechanization in agriculture. Sugarcane is majorly taking crop in India, after cutting of sugarcane starts reducing its weight, hence it is necessary to send sugarcane as early as possible to sugar factory. The speed of loading sugarcane in trucks or tractors is a time consuming process with labors[3]. Thus we are making a mechanism which reduces time of loading and provide prevention to accidents which happens during loading bunches of sugarcane. The project aims at design and fabrication of small sugarcane harvesting mechanism which is operated by engine.

Keywords: *Botte neck, sugaryield, harvester,*

LITARETURE REVIEW

A sugarcane harvester is a complex electromechanical product. The development process commonly uses means of computer-aided, resulting in a large number of files and data. To solve the problem of data integration and sharing, and to provide a rapid designing environment for designers, an integrated design platform was developed. The overall framework and each function modules were analyzed, and the working flow was explained; Based on the data formats which support by each function modules, the data transmission model was expatiated; and the application of the software controls in the integrated design platform was discussed. Using Visual Studio.net as a tool, the integrated design platform was developed, and the functions of this software was validated by a designing example of wheel-type sugarcane harvester. The practical application of the platform shows that it can significantly speed up the design process and shorten the development cycle.

1) INTRODUCTION:-

Sugarcane harvesting is the single most costly operation in sugar cane farming[7]. Harvesting of sugarcane has been the predominant method of harvesting sugarcane in India for many years. Harvesters have the ability to recover more of the sugarcane in the field, compared to soldier harvesters, particularly in fields with lodged sugarcane. Sugarcane cutting, loading and the transport process in the sugar industry in India and even the industry in the world often becomes a "bottle neck". There are so many problems that require attention and require the best solution to solve. In many small agricultural field the harvesting is done manually that is with hand knives, cutting blade or hand axes. It requires skilled labors as improper harvesting of cane leads to loss of cane and sugar yield, poor juice quality and problems in milling[1]. Sugarcane harvesting is done in three stages 1) Cutting 2) Loading 3) Transportation of filled trucks/tractors to the industry.

In addition to risks of accidents and injuries resulting from performing repairs, operator also live with a major accident risk inherent to operation of the machine[4] .During the design of this project we also think about the accident preventions techniques. The process of loading of bunches is more safe than the conventional loading of sugarcane.

Our project aims at minimizing the loading time of sugarcane in trucks/tractors so that we get some time for safe transportation. The Harvesting machine works on engine, with the help of gear box and chain drive. We have made such loading machine which can load truck as well as tractor. We can vary height of loading machine as per need.

2) DESIGN FOR SCREW[5][6]

Known data,

Ultimate tensile strength (S_{ut})=…… N/mm^2

Yield stress in shear (S_{sy})=…….N/mm^2

Assuming Factor of safety =…….

Assuming square thread

Compressive stress $_c$ (permissible) = S_{yt} / f.o.s

$_c$ =…….N/mm^2

We know that

$_c$ = 1.3*w*4 / *(d_c)^2

Core Diameter (d_c)= …….mm.

From standard table corresponding values of pitch and nominal diameter values are Pitch = ….mm.

Nominal dia. = ……mm

Check for maximum shearing stress

Compressive stress = W*4/ *d_c^2

Torque on the screw

Mt = W*tan( )*dm/2

dm =…….. mm

α = tan^{-1}( )

Φ = tan^{-1}(μ)

Mt =…….N-mm

Calculate shear stress

Shear Stress =

Maximum Shear Stress

$_{(max)}$ = √( )^2

$_{(max)}$ =……N/mm^2

Thus (permissible) (max)

Design is safe.

3) DESIGN FOR NUT[5][6]

Assume bearing pressure (p_b) =10 Mpa

For square thread

Thickness (t) =pitch /2

Calculate number of turns p_b =

n= …… mm.

length of Nut

Length Of Nut (H)= n*pitch

Outside diameter of nut, Nut is in tension

/4 *($Do^2 - D^2$)

D= d +0.5

D= …….mm

Assuming nut material is silicon bronze ,S_{ut} = 330mpa

Tensile strength (t) = = ……N/mm^2

$_t$ * /4 *($Do^2 - D^2$) =W

Do = …….mm

4) ADVANTAGES

1) Harvesting time will be less.

2) Efficient work is done by using machine harvester.

3) Limited number of labors required.

4) Cost of harvesting is less as compared to manual harvesting.

5) No skill is required to operate the machine.

6) Running cost is negligible.

5) CONCLUSION

The main aim of this project is to reduce the efforts which were put in by farmers in terms of money, labor, time, physical efforts for optimum performance. Above discussed parameters will definitely provide the basic ideas associated with sugarcane harvesting. Sincere efforts must be made to design a suitable harvester in order to provide more profit, stability in terms of economic considerations and machine to be design will help both whom having small or big farms and definitely farmer can overcome the labor crises problem.

6) ACKNOWLEDGEMENT

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