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Design and Fabricates Of Sugar Factory Bag Lifting Equipment

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Abstract: With the increasing levels of technology, the efforts being put to produce any kind of work has been continuously decreasing. The efforts required in achieving the desired output can be effectively and economically be decreased by the implementation of better designs. Conveyor systems are one of the most commonly used equipment in almost every industry. They help in achieving different kinds of functions and by automating them you can get the added advantages of flexibility and safe practices. Besides, they also help in enhancing the performance and cost-effectiveness of your processes. This conveyor system we can modify according to application and also can be developed as per height and width of job/ application. In this project, we have tried to develop a new mechanism for sugarcane lifter for tractor trolley loading and unloading purpose. Here we have used the chain and sprocket concept to manufacture the proposed mechanism. Our main objective of developing the mechanism is understanding the usage of various mechanical machine tools and also measuring tools. We have tried to develop a mechanism which can be used for loading the sugarcane in both trucks or trolley and bullock cart which is comparatively very small in height for loading purpose. Our project uses special chain drive system, D.C gear motor, bearing, shaft, and carrier. As a consequence of poor management and the under-utilization of equipment, loading has been identified as an inefficient and costly operation. Studies have shown that technology and management can contribute to improved loading accuracy. We have developed a mechanism which will help to increase the loading accuracy and efficiency of the work.

Keywords: Sugarcane, Bearing, Conveyor, Carrier, Cost

I. INTRODUCTION

Sugarcane, a commodity affecting many economies, faces numerous challenges in the Indian sugar industry. The international sugar industry faces profitability challenges due to increasing agricultural input costs, particularly transport costs, which account for 20-25% of the total cost of sugarcane production. This cost is a significant factor in India's annual production, which has increased from 500,000 tonnes in 1950 to 21 million tonnes in 2000. The transfer system in India differs in management, design, and capabilities. Improvements can be achieved by modifying components within the system. Load cells on transporting units can achieve accurate loads, but initial capital costs and increased management requirements often make them less utilized. Weighing devices can be mounted onto loading equipment, but they become unreliable under inclined conditions. Weighing pads are affordable and reliable with 1% accuracy error. Industries are now using cranes to load sugarcanes, which is slow working.

Objectives:

- To find out new method for lifting of sugarcane other than Conventional Method.
- Cost reduction during the operation.
- Reduce human efforts during operation.

Problem Definition:

In Sugar Factory Conveyor systems are essential for transporting heavy or bulky materials, such as belt conveyors, which provide control over load orientation and placement.

Scope of Study:

- This project will help to labour a lot due to their reduced manual effort required to load sugarcane in the trolley / in truck. This will give one standard system to agricultural field so that human accident and stress will get reduced.
- The machines have been designed to support human beings by helping them to do tedious and back breaking works. However, the industry has made only the limited use of high technology production concept. There is general need to nature the development program in automation and robotics.

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- Machines have been employed in various tasks including material handling various interior and exterior finishing task, including material handling the high expectations of the stemmed from the very serious problems the industry is facing.

II. LITERATURE REVIEW

Survey by R.B. Lokapure, A.P.Kadam, V.B.Nerle (2012) It is necessary to take some firm steps to avoid fire risk near storage of bagasse piles & loose bagasse yard and to save this valuable renewable fuel without damaging of plant, bagasse handling machinery & life of human being which captured by sudden huge fire. For protection of the plant against fire, main plant, transformer area, bagasse storage yard etc. are protected by Hydrant system apart from portable &mobile fire extinguishers. Fire water pumps of hydrants are installed in a fire water pump house located with pump suctions connected in the raw water reservoir. (Cap-10 Lac, Ltr) Two fire water pumps one of which is electric motor driven & the other diesel engine driven which would be brought in operation automatically sensed by pressure transmitter. Thus hydrant system will feed pressurized water to hydrant valves located throughout the plant. SantoshKunnur, S. N. Kurbet, M.M. Ganganallimath (2013) in all sugar industries the cane after processing is left with the waste product called “Bagasse”. The Bagasse produced in the mills is used as a fuel to boilers and the generation of steam. The steam thus produced is expanded in turbines and the power is generated. The excess bagasse is then stored in an open area. Lot of human health hazards is taking place due to loading of bagasse. Nowadays, the industries are using the crane systems to load the bagasse into the tippers, which is a very slow task and causing more dust. The bucket conveyors are used to move bulk materials in a vertical or inclined path. Buckets are attached to a cable, chain, or belt. Buckets are automatically unloaded at the end of the conveyor run. The belt conveyor is used for transporting light- and medium weight loads between operations, departments, levels, and buildings, providing considerable control over the orientation and placement of the load. The belt is roller or slider bed supported; the slider bed is used for small and irregularly shaped items

III. SYSTEM DESIGN

We developed a mechanism which is used to load the sugarcane into the trolleys and trucks. In this project we proposed a model of fabrication of Sugarcane lifting machine which replaces the drawbacks of existing manual method. The machines have been designed to support human beings by helping them to do tedious and back breaking works.

Proposed System:

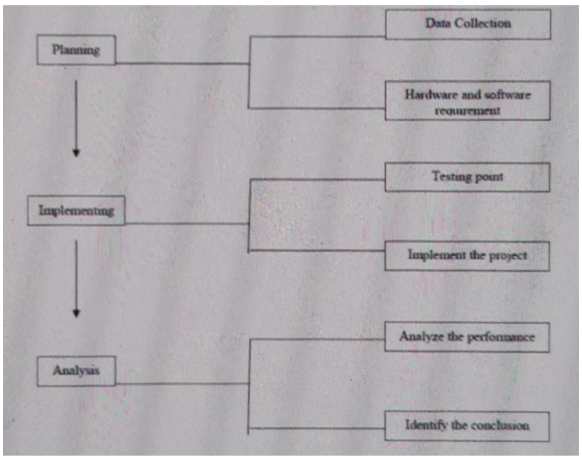

Figure 1: Methodology Steps

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- Constructional Details:

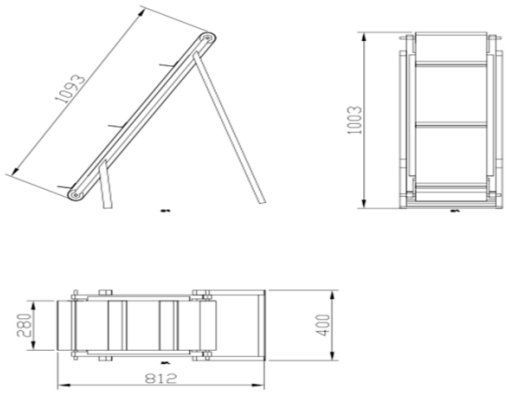
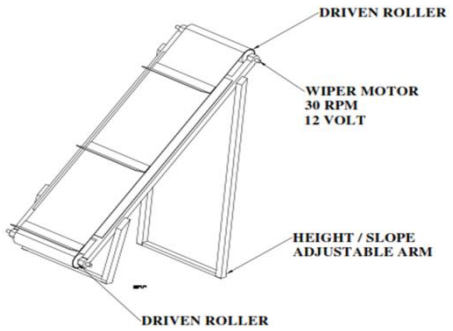


Figure 2: Constructional Details



- Tentative Design

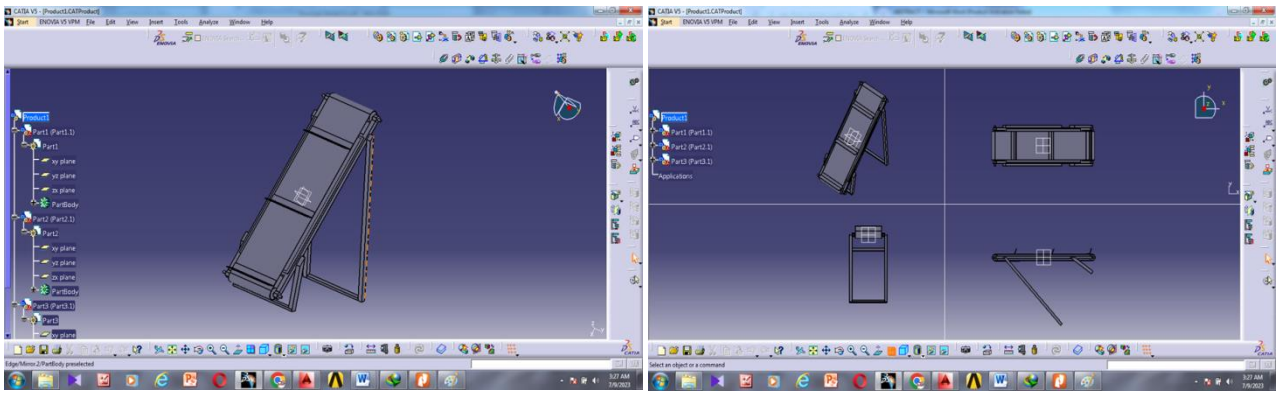


Figure 3: Tentative Design

- Design and Analysis

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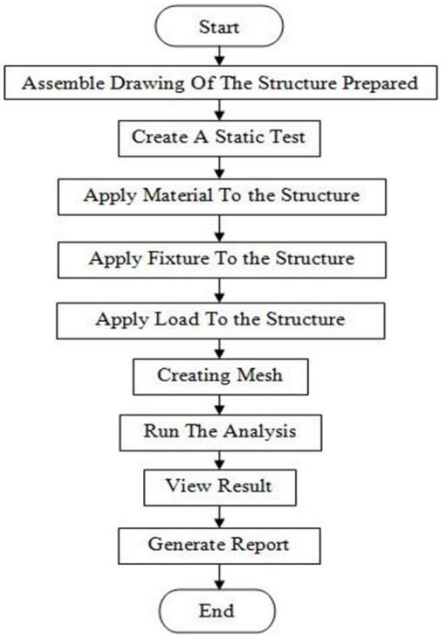
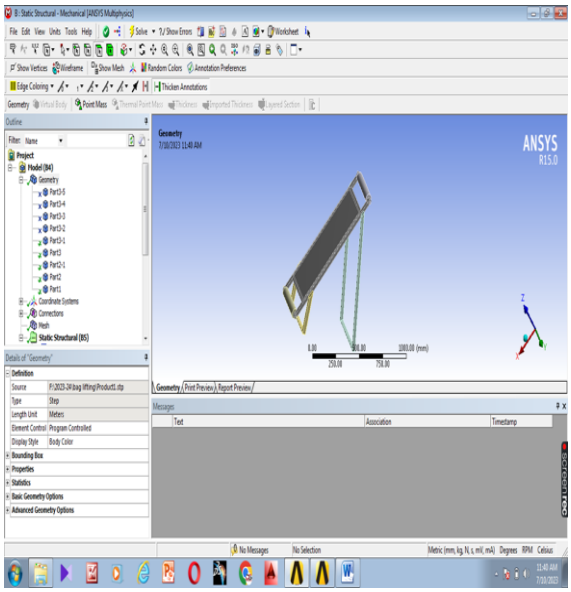


Figure 4: Flow Chart of Analysis Process

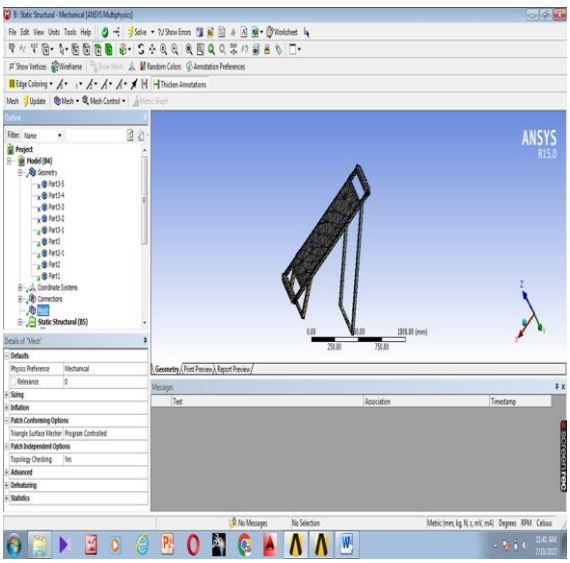
- Finite Element Analysis

The finite element method (FEM) is a numerical technique used to find approximate solutions to boundary value problems for partial differential equations. It subdivides a large problem into smaller, simpler parts called finite elements, which are then assembled into a larger system of equations that models the entire problem. FEM uses variational methods from the calculus of variations to approximate a solution by minimizing an associated error function. Finite element analysis (FEA) is the modeling of products and systems in a virtual environment to find and solve potential structural or performance issues. It is a practical application of the finite element method, used by engineers and scientists to mathematically model and numerically solve complex structural, fluid, and multiphysics problems. FEA software is most commonly used in the aeronautical, biomechanical, and automotive industries. A finite element model consists of a system of points called "nodes" that form the shape of the design. Connected to these nodes are the finite elements themselves, which form the finite element, mesh and contain the material and structural properties of the model. The density of the finite element mesh may vary throughout the material, depending on the anticipated change in stress levels of a particular area. Points of interest may include fracture points, fillets, corners, complex detail, and high-stress areas.

Geometry:



Meshing:



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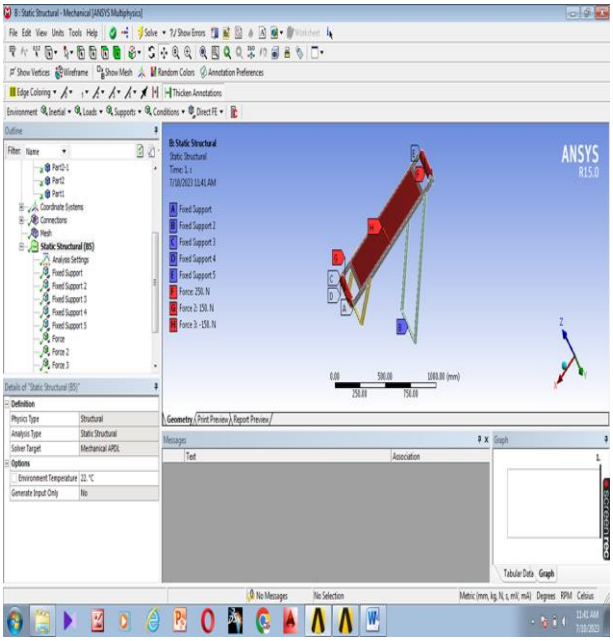
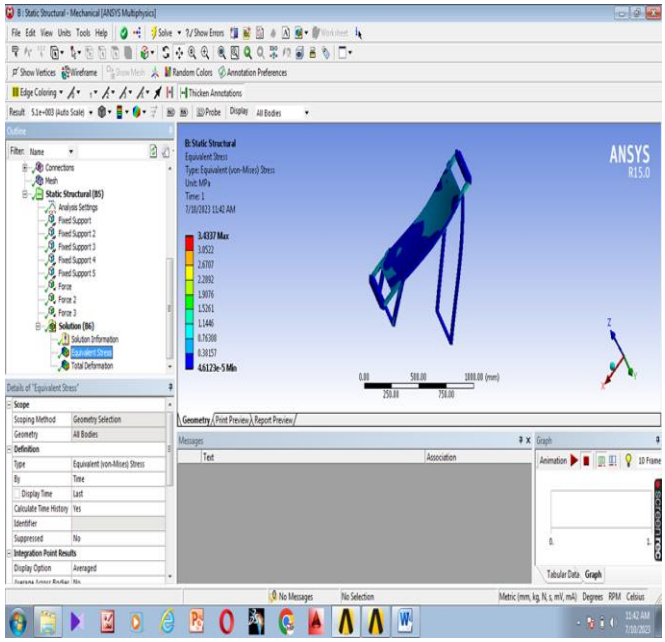
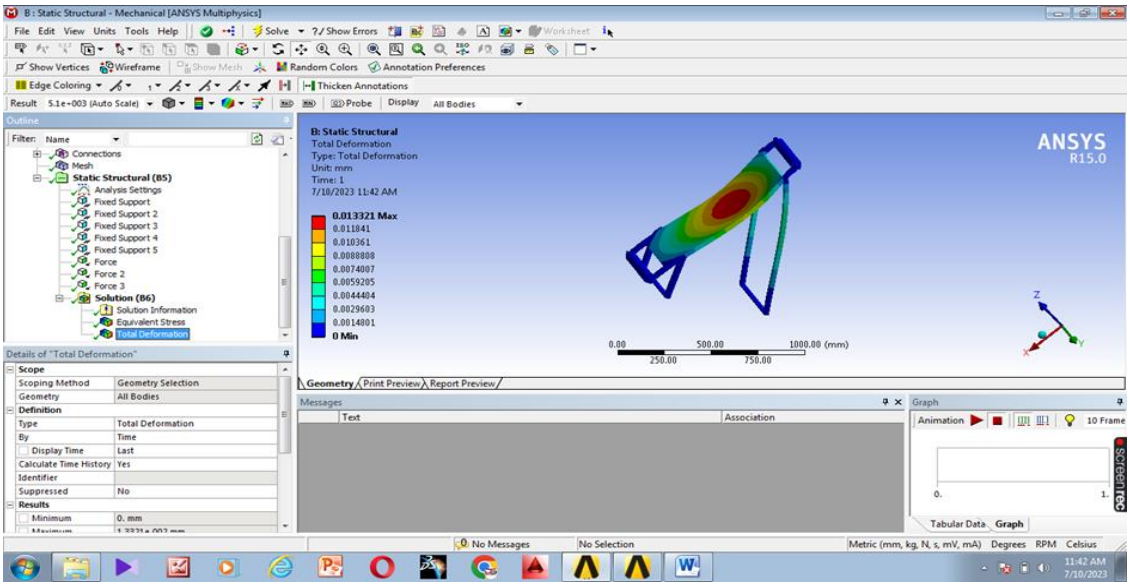
Boundary Conditions:



Equivalent Stress:



Total Deformation:



IV. RESULT AND DISCUSSION

Thinking about all the structure parameters, constant computations, wellbeing standards, cost productivity, material life time and work accessibility; it tends to be presumed that the Mechanism that is proposed is the most fitting for conduction and transportation of sugarcane. To test and confirm the working of developed mechanism for Sugar cane lifter, we have taken practical demonstration and also we have collected the feedbacks and improvements points in developed model.

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Sr No.	Points observed	Conventional method(Existing manual methods	New developed mechanism(sugarcane lifting mechanism)
01	Labour required per day	06	02
02	Time required	More (for 1 trolley loading about 1.5-2 hrs)	Less (for 1 trolley loading about 45-50 min)
03	Manual efforts	More	Less
04	Space required	NA	Storage space required for machine
05	Maintenance cost	NA	10% of initial cost
06	Labour cost	More (as more labours are required)	Less (as less labours are required)

FUTURE SCOPE

This project will help to labour a lot due to reduced manual effort required to load sugarcane in the trolley / in truck. This will give one standard system to agricultural field so that human accident and stress will get reduce. Machines have been employed in various tasks including material handling various interior and exterior finishing task, including material handling the high expectations of the stemmed from the very serious problems the industry is facing. The main outcome of the project work is to minimize handling of sugarcane and also loading time. It is Easy to operate by unskilled worker

CONCLUSION

The main aim of this project is to reduce the efforts which were put in by farmers in terms of money, labour, 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 labour crises problem. In this project we have conclude that the human can face to more problems in industry, especially in sugar industry. They have many hazards to lift the sugarcane , it fill in tractor trolley like that so we have tried to develop a new mechanism for humans in sugar industry, to lift the sugarcanes in tractor trolley. This mechanism is flexible in terms of motion due to the presence of a driving mechanism, above suggested real time application will be the best to suit the company requirements & prevents human labours from hazardous environment. Thinking about all the structure parameters, constant computations, wellbeing standards, cost productivity, material life time and work accessibility; it tends to be presumed that the Mechanism that is proposed is the most fitting for conduction and transportation of sugarcane. The sugar plant is limited by an impediment of using an excavator for 10 hrs. Every day; from now on the utilization of this component which can be created at an onetime venture can serve the plant when required, dispensing with the costs. The system is adaptable as far as movement because of the nearness of a driving instrument which makes it to gather the sugarcane covering the entire plant region over which it is spread. By changing the extent of the beds, the measure of sugarcane that can be gathered can likewise be expanded correspondingly. The complete number of connections present in the system is extensively less making the upkeep cost of the instrument lesser. By this, above recommended continuous application will be ideal to suit the organization prerequisites and keeps human works from risky condition.

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