

Design and Fabrication of Sugarcane Cutting Machine for Cane-Can Industry, Nagpur

Mohammad Zeeshan Ali¹ K. I. Ahmad²

¹M.Tech. Student ²Associate Professor

^{1,2}Department of Mechanical Engineering

^{1,2}A.C.E.T, Nagpur, Maharashtra, India

Abstract— Agriculture is the most important trade of India. In India almost every cultivator (farmer) facing the labor shortage problem and high labor wages. The sugar cane harvesting is a very critical activity which involves great effort or work by labor for cutting the cane. The laborers experience sustained injuries due to intense stress on the joints and muscles of the body. And also modern world need faster rate of production of agriculture products. This research paper is based on design and fabrication of sugarcane cutting machine for Cane-can industry, this machine will be required to cut the sugar cane of size upto 10 ft. to a size of approx. 2ft sugarcane stick should be cut in one cycle. The machine has to be semi-automatic, the operator will be responsible for feeding the machine with sugarcane sticks. The pieces of sugarcane will be finally collected by the operator at the end of operation. It reduces cost of labor as compared to manual operation. Also, consumed less time as compared to manual system and it will be safe.

Key words: Sugarcane Cutting Machine, Harvesting

I. INTRODUCTION

Indian economy is also dependent on Farming. It is the main source of income for many families. Thus, farmers are primarily important for us. The Indian agriculture has facing serious problems such as lack of agricultural labour, not only during working seasons but also in normal time.

Sugarcane is the world's largest crop, Food Agricultural Organization (FAO) evaluate that it was cultivated on about 23.8 million hectares in more than 90 countries, with a worldwide harvest of 1.69 billion tons. In our state i.e. Maharashtra Sugarcane grows in majority. Nearly 35 to 45 % of field is under Sugarcane only. Thus it is important to be focused on it.



Fig. 1: Shows a manual sugar cane cutting

The need of this project is limited to developing a sugar cane cutting machine for Cane-Can industry, Nagpur. Multiple sugarcane stick should be cut in one cycle. The

machine has to be semi-automatic, the operator will be responsible for feeding the machine with sugarcane sticks. The pieces of sugarcane will be finally collected by the operator at the end of operation.

II. LITERATURE REVIEW

A. Rohit J. Masute, S. S. Chaudhari, S. S. Khedkar, B. D. Deshmukh [1]

In today's competitive world there is a need for faster rate of production of agricultural products. Agriculture is the backbone of India. In India almost all farmers facing problems of labour shortage. Day by day labour wages are increasing and in the same way demand of agriculture products. In many countries, sugar cane harvesting is a very labour-intensive activity in which workers usually become fatigued after manually cutting the cane for a few hours. They need frequent pauses for rest, and they experience sustained injuries from excessive stress on the joints and muscles of the body. And also today's world need faster rate of production of agriculture products. This review paper is a small work towards analyzing sugarcane harvester machine aspects for economical harvesting which will help to minimize the working fatigue and to reduce labour cost.

B. E Meyer and L J Fenwick [2]

The South African sugar industry harvests about 20 million tons of sugarcane annually. More than 90% of this tonnage is currently being harvested manually. During 2002, the South African Sugar Association Experiment Station's Agricultural Engineering Department conducted a comprehensive cane cutter survey throughout the South African and Swaziland sugar industries. The primary objective was to identify the productivity ranges for manual cane cutters across various harvesting systems, in both green and burnt cane. Factors impacting on cane cutter performance were also investigated. A small number of time and motion studies were also conducted to identify the time utilisation of the various cane cutter tasks. Results indicate that cane cutter performances vary widely between cutters, farms and regions, and average output is greatly dependent on harvesting systems.

C. Tushar N. Khilosa I, Prof. L. M. Rola [3]

Bamboo sticks are the major raw materials used in the Agarbatti industry. The Agarbatti production generally involves the strips cut from the bamboo sticks. Earlier these processes was carried out by tribal people who make strips and sticks by conventional methods of using knives which is very tedious, time-consuming and risky. After that the hydraulic splitter machine came into existence which can produce the stick within a single machine. But in that machine two different dies were used so the stick could not

be cut in a single operation. Hence to avoid this problem one mechanism has been suggested which could cut the stick in a single operation. Furthermore the selection procedure for the pneumatic drive is also mentioned in this paper.

D. V. Siva Prasad, Syed Altaf Hussain, V.Pandurangadu, K.Palani Kumar [4]

This paper describes design and analysis of Spur gear. In the present work, it is proposed to substitute the metallic gear of sugarcane juice machine with plastic gears to reduce the weight and noise. For the purpose of two different types of plastic materials were considered namely Nylon and Polycarbonate and their viability are checked with their counterpart metallic gear (Cast iron). Based on the static analysis, the best plastic material is recommended for the purpose. Static analysis of a 3-D model has been performed using ANSYS 10.0. Compared to Cast iron spur gears Nylon gears are suitable for the application of sugarcane juice machine application under limited load conditions. To find the suitable design gears with less weight and less cost, corrosion resistance, frictionless also. With less cost, neat and clean hygienic juice. With more material removal of deflection and stress are increased. So for safe operation of my design is more appropriate under limited load conditions for Nylon gear.

E. P. G. Mehar, Dr. A. V. Vanalkar, Dr. S. S. Khandare [5]

Bamboos are a unique group of giant arborescent grasses in which the woody culms arise from underground rhizomes. They are shrubs and have tree-like habit. Their culms are erect and sometimes climbing. It is the fastest growing plant on this planet. Bamboos are characterized by woody, mostly hollow culms with internodes and branches at the culms nodes. India is the second richest country in terms of Bamboo genetic diversity with a total of 136 species under 75 genera. It encompasses about 8.96 million hectares of forest area, which is equivalent to 12.8 per cent of the total forest cover of the country. Generally different types of machines are use in different industries like bamboo cross cutting machine, bamboo splitting machine, knot removing machine, bamboo slicing machine, bamboo stick making machine, bamboo stick sizing machine, bamboo stick policing machine.

III. PROBLEM FORMULATION

This project is a result of agriculture industry need, by developing a semi-automatic sugarcane cutting machine to reduce labor cost as compared to manual operation. Also, consumedless time as compared to manual system and it will be safe.

IV. RESEARCH METHODOLOGY

In present study, we create the CAD model of semi-automatic sugarcane cutting machine. Then analysis of design will be performed. If required the modifications and analysis of modified design will be performed after that results will be discussed and design will be finalized and fabricated.

V. CONCLUSION

With successful completion of this project, the company Cane-can industry will be directly benefited, Design and fabrication of sugarcane cutting machine will reduce labor time of manually cutting the sugarcane, ensure safety of workers working on sugarcane cutting, reduce the cost of labour involved in the cutting operation and it can cut multiple sugarcane stick in one operation

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