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Design & Fabrication of Multipurpose Agriculture Hay Cutter Machine

Md. Amaan[1], Sheikh Junaid Ahamad[2], Sheikh Aifaaz Ahmad[3], Saiyyad Kasif Ali[4], Syed Mubashshir Ali[5], Mohd . Nazim[6], Akib Nasir Sheikh[7], Prof. Shahzad Ahmad[8]

[1, 2, 3, 4, 5, 6, 7] are Student an [8] Assistant Professor, Department of Mechanical Engineering, Anjuman College of Engineering and Technology

Abstract: ***In today's world consisting of huge population due to this there is a need for large scale of production of agricultural products. Agriculture is the backbone of India. In India there is scarcity of labours in agriculture. Day by day labour wages are increasing and in the same way demand of agriculture products are also increasing and today's world need large scale of production of agriculture products due to huge population.***

In today's world there is a heavy demand for sugar and it's by products. The major states growing sugarcane are Maharashtra, Uttar Pradesh and Karnataka. Now India is the leading producer of sugarcane in the world.

This project aims to design and fabricate small scale sugarcane harvesting machine for sugarcane harvesting to reduce farmer's effort and to increase the output of agricultural products.

Keywords: Labours, Agricultural products, Huge population , Sugarcane, Harvesting

I. INTRODUCTION

In India agriculture has facing serious challenges like scarcity of agricultural labour, not only in peak working seasons but also in normal time. This is mainly for increased nonfarm job opportunities having higher wage, migration of labour force to cities and low status of agricultural labours in the society. Sugarcane is the world's largest crop 2010 Food Agricultural Organization (FAO) estimates it was cultivated on about 23.8 million hectares in more than 90 countries, with a worldwide harvest of 1.69 billion tons. India is the largest producer of sugarcane in the world and Brazil in second position. Harvesting is a process of cutting and gathering of mature crop from the field. Harvester is a machine is used for harvesting. Different types of harvesting machines are available in the market namely paddy harvester, Tea harvester, Potato harvester, Wheat harvester and sugarcane harvester as mentioned above all are available in small scale except sugarcane harvesting machine. Sugarcane harvesting is an agricultural machinery use to harvest and process sugarcane. Sugar cane is a hardy crop that is cultivated in tropical and sub-tropical regions for its sucrose content and by-products such as molasses and bagasse (the waste fibrous residue). The plant grows in clumps of cylindrical stalks measuring from 1.25 to 7.25 cm in diameter and reaching 6 to 7 m in height. Under favourable conditions and the appropriate use of pesticides and fertilizers, cane grows rapidly. To ensure the maximum sugar content of 1 to 17% of total weight, the cane must be harvested immediately after it reaches its final growth period.

II. SUMMARY OF THE LITERATURE REVIEW:

After reviewing various journal papers it was found that the existing machines was not economical, having less efficiency and the mechanism involved is complex. To overcome these problems this project work aims to develop low cost sugarcane harvesting machine which is more efficient and having simple mechanism for cutting the sugarcane at a faster rate.

III. OBJECTIVE OF PROPOSED CONCEPT:

To design and fabricate small scale sugarcane harvesting machine which is economical, more efficient and cuts the sugarcane at faster rate. And it will be helpful for small scale formers, unskilled labours can also operate without difficulty.

IV. WORKING

The Fuel from the tank is supplied to the Engine and the power is generated to the shaft inside the engine. The driver sprocket which is attached to the engine shaft rotates the driven sprocket through chain drive mechanism. The driven sprocket that is connected to the longer shaft will transmit the power to the either sides of the Bevel gears through the shaft. The longer shafts will be mounted between the two plumber blocks which provide support to the shaft. The rotating Bevel gears are in turn connected to the cutters

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through vertical rods which rotates the cutters. By this way the small scale sugarcane harvesting machine works. The operations involved are simple and easy to operate.

V. PROPOSED MODEL

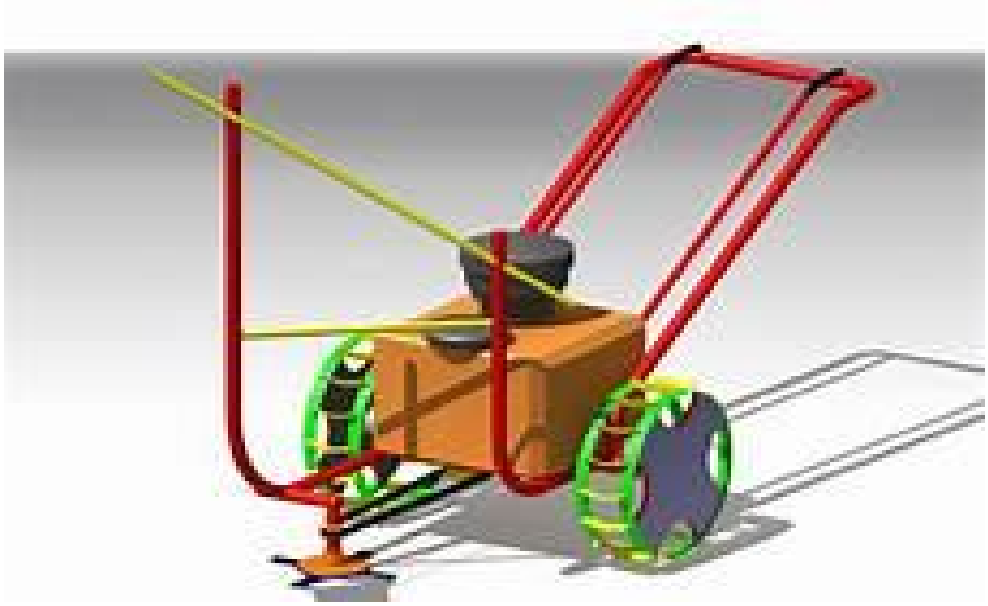

Figure . Design & Fabrication of Multipurpose Agriculture Hay Cutter Machine

VI. MANUAL METHOD

In Manual Harvesting to cut one acre of sugarcane 15-16 labours are required they take 3 days to cut one acre and involves harvesting of 60-70 tons per acre with labors being paid 500-550 Rupees per ton of harvest hence total cost of harvesting per acre comes up to 30,000-35,000 Rupees.

VI. MECHANIZED TYPE OF HARVESTING:

In mechanization now by using large scale harvesting machine takes about 6-7 hours for harvesting one acre averaging about 60-70 tons with labour costing around 3,500-4,000 Rupees per hour hence the total cost of harvesting per acre comes up to 20,000- 25,000 Rupees. The cost of this machine is around 1.2 crore it is not possible to buy the small farmers.

VII. PART DESCRIPTION OF SUGARCANE CUTTING MACHINE

A. Two stroke petrol engine: Selected 98 C.C Kinetic Honda engine with power of 5.741 KW, 2000 rpm.
B. Chain and sprocket: Overall Length 800 mm, driver sprocket 18 teeth and driven sprocket 24 teeth .Distance between two sprockets is 290mm.
C. Plummer block: 6 units.
D. Bevel gears: Pinion 10 teeth's diameter 40mm, gear 16 teeth's diameter 60mm.
E. Upper cutters: Diameter 500mm, 4 blades.
F. Lower cutters: Diameter 250mm, 60 teeth.

VIII.ADVANTAGES OF MACHINE HARVESTING ARE

A. Harvesting time will be less .
B. Efficient work is done by using machine harvester .
C. Cost of harvesting is comparably less as manual harvesting.

IX. DISADVANTAGES OF MANUAL HARVESTING ARE

A. Harvesting time will be more .
B. The cost will be more.

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X. COMPARISON WITH EXISTING TECHNIQUE

The machine has a capacity to cut 3 ton of sugarcane per hour. Comparing with manual harvesting 50% of harvesting time and 70% of labours are reduced (in manual sugarcane harvesting 15-16 labors are required). The cost of harvesting is reduced by 18% when compare to manual harvesting.When comparing with the large scale, though the harvesting time and fuel consumption is less in large scale, but the cost machine is very high (1.85 crore) and the cost of the small scale machine is Rs. 16000. So it will be helpful to our farmer.by comparing with manual harvesting, Rs. 10,000 acre can be saved by small scale harvesting machine

XI. CONCLUSION

The small scale sugarcane harvesting machine is designed and fabricated. After testing small scale sugarcane harvester in the field it is found that the front wheels are struck in mud, due to that the machine was not moving so one more spoke wheel is fixed at the front for the proper and smooth movement of the machine.

The cost of the machine is about Rupees 16,000 and if the farmer buys this machine, farmer can recover the invested money back. By using this machine problem of the labour crises can be reduced. Comparing with manual harvesting only 18% of labours are required. It makes the process faster hence reduces most of the harvesting time and labour required to operate the machine is also less. This machine is helpful for both small and big farms.

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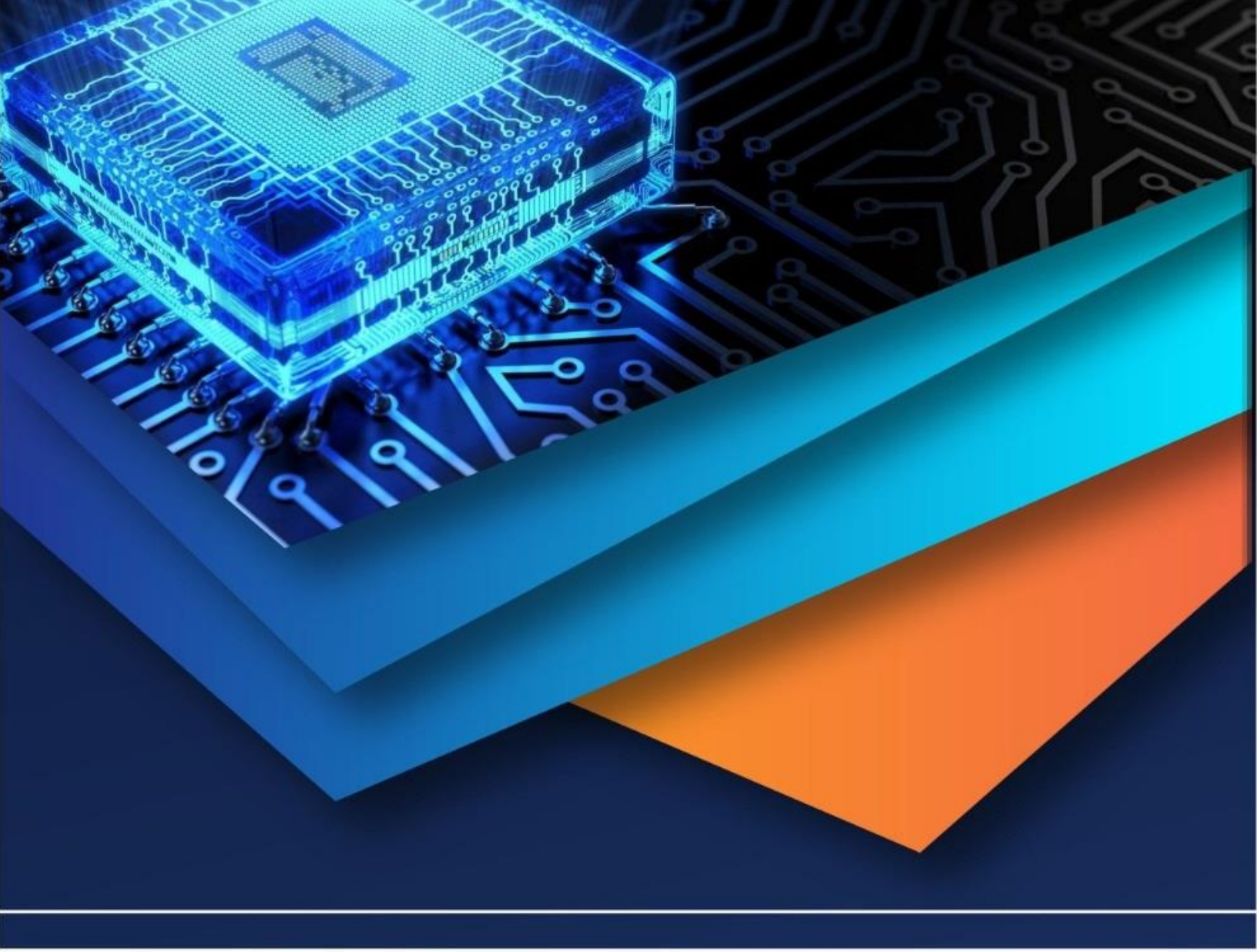

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