Design and Development of Crop Harvester

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ABSTRACT-. Mechanical cotton cutters, i.e. strippers and pickers are commercially available, but these cannot be used for cotton harvesting from varieties presently grown in India due to design constraints and ergonomic practices. Higher initial cost and field capacity make cotton harvesters unsuitable and unaffordable for small and medium farms. Hence, a comprehensive review of cotton harvesting mechanisms developed till date was carried out. The mechanical cotton picker is a machine that automates cotton harvesting in a way that reduces harvest time and maximizes efficiency. To develop a mechanical cotton picker with the intent on replacing manual worker. The first pickers were only capable of harvesting one row of cotton at a time, but were still able to replace up to forty hand laborers.

Keywords- *Braking, Microcontroller, Sensor, Automatic, Vehicle , petrol engine, cutting blade*

I. INTRODUCTION

Developed agriculture needs to find new ways to improve efficiency for uprooting the cotton crops. One approach is to utilize available information technologies in the form of more intelligent machines to reduce and goal energy inputs in more active ways than in the past. Precision Farming has shown benefits of this approach but we can now move towards a new generation of equipment. The introduction of autonomous system architectures gives us the opportunity to develop a complete new range of agricultural equipment based on small smart machines that can do the right device, in the right place, at the right time in the right way. Developed agriculture needs to find new ways to improve efficiency for uprooting the cotton crops. One approach is to utilize available information technologies in the form of more intelligent machines to reduce and goal energy inputs in more active ways than in the past. Precision Farming has shown benefits of this approach but we can now move towards a new generation of equipment. The introduction of autonomous system architectures gives us the opportunity to develop a complete new range of agricultural equipment based on small smart machines that can do the right device, in the right place, at the right time in the right wayDeveloped agriculture needs to find new ways to improve efficiency for uprooting the cotton crops. One approach is to utilize available information technologies in the form of more intelligent machines to reduce and goal energy inputs in more active ways than in the past. Precision Farming has shown benefits of this approach but we can now move towards a new generation of equipment. The introduction of autonomous system architectures gives us the opportunity to develop a complete new range of agricultural equipment based on small smart machines that can do the right device, in the right place, at the right time in the right way. Developed agriculture needs to find new ways to improve efficiency for uprooting the cotton crops. One approach is to utilize available information technologies in the form of more intelligent machines to reduce and goal energy inputs in more active ways than in the past. Precision Farming has shown benefits of this approach but we can now move towards a new generation of equipment. The introduction of autonomous system architectures gives us the opportunity to develop a complete new range of agricultural equipment based on small smart machines that can do the right device, in the right place, at the right time in the right way.

II.: - PROBLEMSTATEMENT

observed that there is shortage of labor available for agriculture. Because of this shortage the farmers have transitioned to using harvesters Cutting crop manually using labourbut this method is very time lengthy and time consuming. The harvestings are available for purchase but because of their high costs, they are not affordable. However, agriculture groups make these available for rent on an hourly basis. But the small holding farm owners generally do not require the full-featured combine harvestings. Thus, there is a need for a smaller and efficient combine harvesting which would be more accessible and also considerably cheaper

1) Design should be ‘Simple’ to operate and ‘Safe’.
2) It should have ‘Low Cost of Maintenance’.
3) It should require Less Man Power.

Selection of engine

P=12watt

X=0.15m=150mm N=100 rpm

Torque required to drive the alternator shaft

$P = \frac{2\pi NT}{60}$

$12 = \frac{2\pi \times 100 \times T}{60}$

T=1.15N-M

1. Shaft design:-

Material selection : -

Selection of blade

Specification

Outer diameter – 180mm

Inner diameter – 65mm

Speed – 7500 rpm

Cutting force-

The force required for cutting the corn is calculated as follows,

Cutting force, $F_{c\ =S\times t\times l}$

Where,

F_c= cutting force S= shear strength of corn= $\frac{Sut}{FOS} = \frac{15}{2} =$ 7.5 Mpa

t= thickness of corn to be cut (for one inch diameter stem) = 25mm

Then,

$F_c = 7.5 \times 25 \times 2 = 375 \times 10^{-3} = 0.375nm$

$T_c = F_c \times$ radial distance

$T_c = 0.75 \times 0.09$

$T_c = 0.03375nm$

$T_c < T$

So, design is safe.

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Fig. Catia Model

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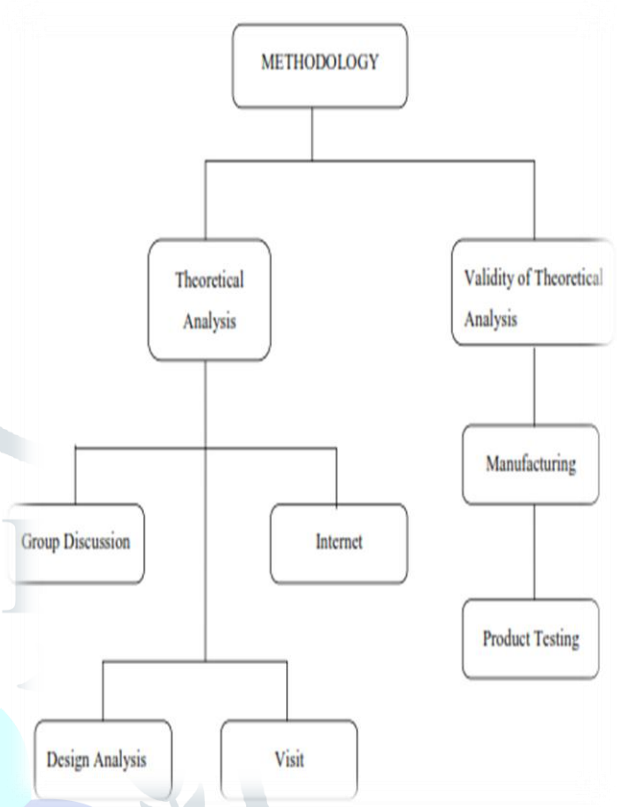
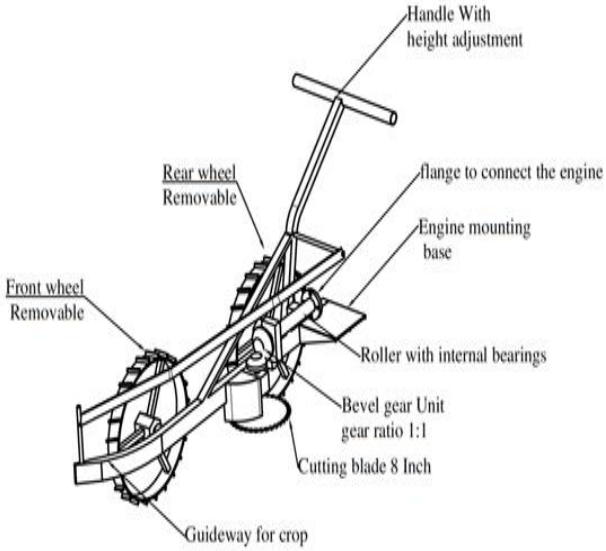
$T_c < T$

So, design is safe.

Tc=0.03375	T=25	12
Fc=0.375	0.75	13

III. METHODOLOGY





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REFERANCES

[1] Design of Small-Scale Grain Harvester: A tool for Urban and Pre-urban Growers; Christopher Boyle, Ian Jutras, Christopher Molica, Earl Ziegler.
[2] Relationship between Stalk Shear Strength and Morphological Traits of Stalk Crops, by Li Liang and YumingGuo.
[3] Farm power sources, their availability and future requirements to sustain agricultural production, by N. S. L. Srivastava.
[4] State of Indian Agriculture 2012-13, Indian Government Analysis.
[5] Asia and Pacific Commission on Agricultural Statistics Twenty-Third Session Siem Reap, Cambodia, 26-30 April 2010.
[6] Mechanization of Agriculture - Indian Scenario Dr. S.D. Kulkarni, Central Institute of Agricultural Engineering (CIAE) Bhopal - 462 038, India [1] Design of Small-Scale Grain Harvester: A tool for Urban and Pre-urban Growers; Christopher Boyle, Ian Jutras, Christopher Molica, Earl Ziegler.
[2] Relationship between Stalk Shear Strength and Morphological Traits of Stalk Crops, by Li Liang and YumingGuo.
[3] Farm power sources, their availability and future requirements to sustain agricultural production, by N. S. L. Srivastava.
[4] State of Indian Agriculture 2012-13, Indian Government Analysis.
[5] Asia and Pacific Commission on Agricultural Statistics Twenty-Third Session Siem Reap, Cambodia, 26-30 April 2010.
[6] Mechanization of Agriculture - Indian Scenario Dr. S.D. Kulkarni, Central Institute of Agricultural Engineering (CIAE) Bhopal - 462 038, India