DESIGN & DEVELOPMENT OF PLANTATION MACHINE

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Abstract: A vegetables planting system consists of set of two drive pulley, cup conveyor belt farrow tray bearing shaft mechanism. A number of cups is attached to the belt and each cup receives a multiple vegetables as the belt travels upwardly between front and rear drive pulley .As the cups pass around the front roller, any extra sample of onion in cups are removed by centrifugal force, differential velocity. These extra multiple vegetables have been reused and returned to the cup. The cups then travel through a generally horizontal simulation section. The working of vegetables planting system is based on placing of vegetables by manually for example onion in cup which arranged or placed on endless conveyor belt. The main drawbacks are arranged by the speed of the cup-belt and the number and location of the cups. The machines determine the time gap between each consecutive onion touching the surface Referring to the results of the mode. Multiple vegetable producers are facing lot of problems in transplanting of multiple vegetables with the shortage of farmers during transplanting seasons. Machine has a unique assembly it consisting rotating cup farrows sitting arrangement multiple vegetable tray frame etc. The rotating wheel is connected to rotating cup alignment when machine is moves in forwarded direction rotating wheel is rotated & transmit the motion to rotating multiple vegetable cup. A human is sit on the sitting bench arrangement uphold the multiple vegetable from multiple vegetable tray & place in rotating multiple vegetable cup with the help of rotating cup we can maintain specified motion between two multiple vegetable.

Keywords- vegetables plantation, onions, transmission system, conveyor belt, driving pulley farrow.

I. INTRODUCTION

Planting of multiple vegetable & other similar vegetable is conventionally done by manually. Which is labour incentive & require large time? In present work a device has been for design & develops planting of multiple vegetable & similar vegetable based on machinery & effectively plant with similar distance. Machine has a unique assembly it consisting rotating cup on belt conveyor. farrows ,ridger two sets drive pulley sitting arrangement multiple vegetable tray frame etc. The rotating wheel is connected to rotating cup alignment when machine is moves in forwarded direction rotating wheel is rotated & transmit the motion to rotating multiple vegetable cup on belt conveyor. A human is sit on the sitting arrangement and the multiple vegetables from multiple vegetable tray placed in rotating multiple vegetable cup manually carries the 2 driving pulley we can maintain specified time period between two multiple vegetable. The planter has vegetables boxed fitted on the machine in which the vegetables are store. A continuous supply of products into the market has a significant effect on the economy. Several transplanting system have been developed to plant tobacco, cabbage, sweet potatoes, tomatoes, rice, and trees for reforestation. The machine arrangement consisting hand operated placing of vegetables in cup but partial parts of system is automatic. A year of over-production and low prices is usually followed by a year of underproduction and high price. Automation will tends to a deduction of workers demand that occurs during short period of time in each growing season. In view of above, our project has been to develop a plan with the objective to produce quality vegetables like onions and potato, with minimum cost. The paper is designed such that we concentrate on following points such as of farmers view and the system is semiautomatic type. By using automation the productivity of the vegetables product can be increases.

II. DESIGN CALCULATIONS

Design of shaft

P = 0.5 KW = 0.5×10^3 Watt,
N = 80 rpm,
Θ = angle of lap = 180°

= $180 \times \frac{\pi}{180} = \pi$ rad/sec,

μ = coefficient of friction = 0.3,
τ_B = 35 N/mm^2

Radius of pulley = $\frac{D}{2} = \frac{80}{2}$ = 40 mm

Power transmitted, P = $\frac{2\pi NT}{60}$ =0.5×10^3

$$= \frac{2 \times \pi \times 80 \times T}{60}$$

T = 59.68 N-m,

T = 59.68×10^3 N-mm

Torque T = (T_1- T_2) R

$\frac{T_1}{T_2} = e^{\mu\theta} = e^{0.3 \times \pi}$

$\frac{T_1}{T_2}$ = 2.566

T_1 = 2.566 T_2

T = (2.566 T_2 - T_2) 40

= 62.64 T_2

59.68×10^3 = 62.64 T_2z

T_2 = 952.74 N

T_1 = $2.566 \times 952.74 = 2.44 \times 10^3$ N

Total load on pulley = W = T_1+ T_2 + W_p

= 2.44×10^3 + 952.74 + 25

= 3.41×10^3 N

Bending moment = M = W × L

= $3.41 \times 10^3 \times 200$

= 682×10^3 N-mm

Equivalent twisting moment (T_e) as shaft is subjected to both twisting and bending moment

$$T_e = \frac{\pi}{16} \times \tau_{max} \times d^3 = \sqrt{(682 \times 10^3)^2 + (59.68 \times 10^3)^2}$$

$$\frac{\pi}{16} \times 35 \times d^3 = \sqrt{(682 \times 10^3)^2 + (59.68 \times 10^3)^2}$$

$$\frac{\pi}{16} \times 35 \times d^3 = 684.60 \times 10^3$$

d = 46.35 mm

∴ The diameter of shaft = 46.35mm.

III. SELECTION OF MATERIALS

The materials used in this project are detailed as follows

Ferrous materials:
a) Mild steel – EN – 4 to EN – 6
Carbon – 0.15% to 0.35%
Tensile strength –1200/1420MPA
Yield strength – 750/1170 MPA

b) C30Carbon – 0.25% to 0.35%
Tensile strength – 620 MPA
Yield strength – 400 MPA
Izod Impact Value – 55 Nm
% Minimum Elongation – 21
Typical composition — Carbon – 0.25% to 0.35%
Manganese – 0.60% to 0.90%
BHN – 207
C30 material is generally used for cold formed levers, hardened and tempered tie rods, Cables, Sprockets, Hubs and Bushes –Steel Tubes.

c) 40C8 Carbon – 0.25% to 0.35%
Tensile strength – 620 MPA
Yield strength – 400 MPA
Izod Impact Value – 55 Nm.

IV. DESIGN OF INTEGRAL PART OF MACHINE

1. BASE FRAME

part weight =40kg
part material =ms
part quantity –=01
part size = 865 x 690 mm

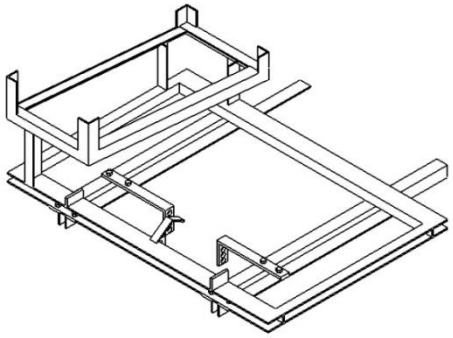

Fig. No.1 base frame

2. SETTING BENCH

part weight –10kg
part material – ms
part quantity – 01
part size - 550 x 150 mm

Fig. No.2 base frame

3. FARROW

part weight =25kg
part material = ms
part quantity –=01
part size =200 x 50 mm

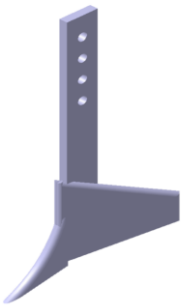

Fig. No.3 Farrow

4. ROTATING PULLY

part material = std
part quantity =02
part size =std

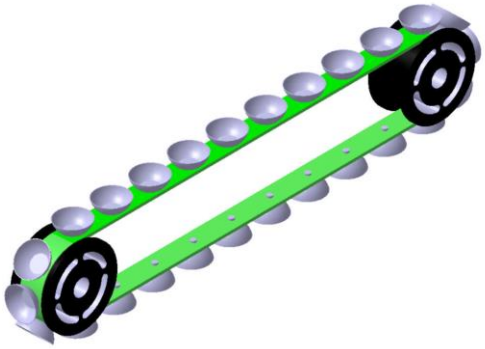

Fig. No.4 Rotating pulley

5. STEEL CUP

part material =ss
part quantity =010
part size =std

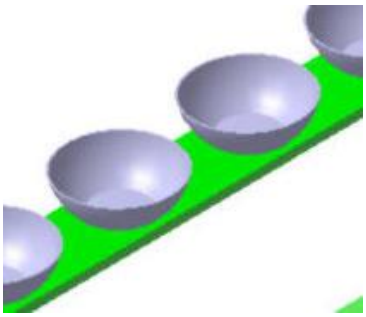

Fig. No.5 Steel Cup

6. GROUND WHEEL

part weight – 5kg
material – ms
part quantity – 02
part size –d280mm

Fig. No.6 Ground Wheel

7. BEARING MOUNTING

Part weight –200gm
Material – STD
Part quantity – 04
Part size –STD

Fig. No.7 Bearing Mounting

8. ONION TRAY

part weight –2 kg
material – ms
part quantity – 01
part size –80x150mm

Fig. No.8 Onion Tray

V. CONSTRUCTION & WORKING:

a) Base frame:- part base frame weighing 40 kg and part size is about 865 x 690 mm. there are two opertions involved .first one is cutting the material as per our required size by fabrication and tools is required for that hacksaw blade.it takes about 70 mins. second process involved wielding the material as per given diagram from engineering department.arc welding tools required. it takes about 70 mins.

b) **Rotating pulley**: transmit the rotating motion to cup assembly. we used set of two rotating pulley, which are covered by endless conveyor belt with ten pieces of cup.

c) Farrow: farrow is used to open the soil and provided the required depth to onion. it involves of two steps, in first cutting the material as per our required size by fabrication, the tool is required for operation is hacksaw blade, it takes about 25 mins. in second step the material welded as per given diagram from engineering department , for that arc machine is used it takes about 25 mins as per given diagram from engineering department.

d) **Sitting bench:** setting bench provided the arrangement to the operator to put onion in the cup assembly. there are two operations involved .first one is cutting the matrial as per our required size by fabrication and tools is required for that hacksaw blade.it takes about 20 mins. second process involved wielding the material as per given diagram from engineering department.arc welding tools required. it takes about 30mins.

e) **Steel cup:** transmit the onion through belt and also maintain the required spacing. we select standard material set of ten cup.

f) **Ground wheel:** transmit the rotary motion of the cup assembly. a pair of ground wheel is used. it consists of two steps, in first cutting the material as per our required size by fabrication, the tool is required for operation is hacksaw blade, it takes about 5 mins.in second stage involves fitting all the material as well as wielding as per the drawing, for that spot welding machine is used it takes about 95 mins as per given diagram from engineering department.

g) **Bearing mounting:** it provide the support to the rotating shaft. we select the standard part as per the requirements.

h) **Onion tray:** it requires storage for planting onion. . it consists of two steps, in first cutting the material as per our required size by fabrication, the tool is required for operation is hacksaw blade, it takes about 10 mins .in second stage involves fitting all the material as well as wielding as per the drawing, for that arc welding machine is used it takes about 30 mins as per given diagram from engineering department. a piece of thin sheet of metal is used.

VI. WORKING PRINCIPLE

In Our vegetable planting machine consists of mainly farrow ridger,vegetable container, set of two pulley drive with cup belt conveyor mechanisms. Firstly dried pieces of onions will be loaded into the onion container . Here shaft supported sets two pulley drive mechanism will be provided. Rear pulley drive for free moment of wheels, carrying heavy load. Front pulley drive will be provided for carrying onions from the container and place it into the land. The belt conveyor carries of set of cups attached to both the front and rear drive pulley. As the tractor pulls or drives the machine then the farrow will make the specified row with required depth. Then pulley drive with cup arrangement on belt conveyor will also rotate along with wheels,

which carry seed onion one by one and place it into the appropriate position made by farrow. Some modification is done for easy operating of machine, for reducing complicated structure and reducing space. We used container box or we can say that storage tray instead of hopper. And also elimination of chain sprocket. And for simplification two ground wheels directly attach to shaft of cup feed of conveyor belt with pulley attached.

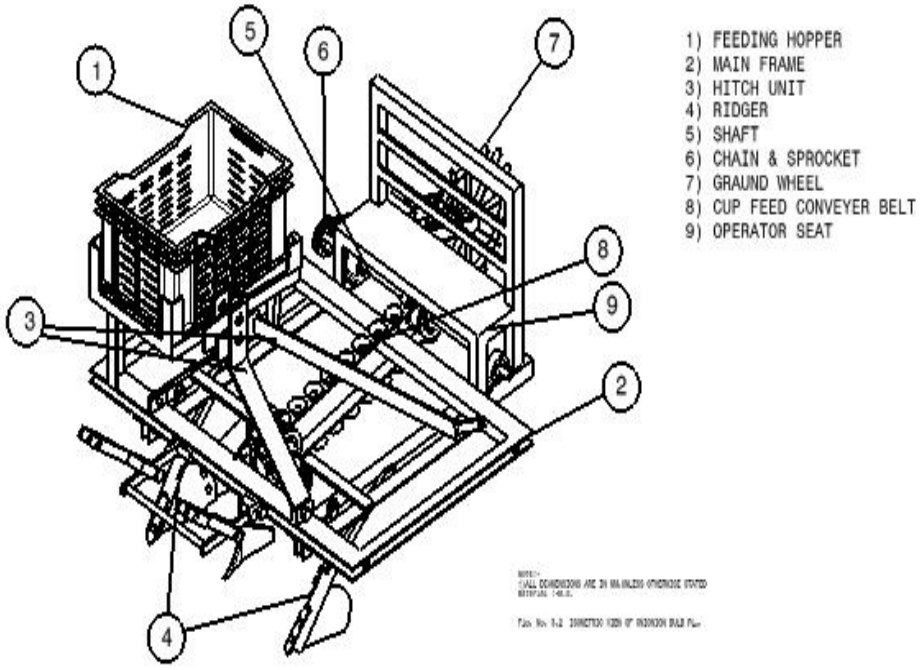

Fig. No.9 vegetables planter.

VII. ACTUAL FABRICATION OF MODEL:

The final construction of prototype is shown in figure below which is designed and fabricated by using above consideration of dimensions and calculation.

Fig.No. 10 Actual fabricated model

VIII. CONCLUSION & FUTURE SCOPE

The onion is one of the essential and famous commercial vegetable crops grown on a wide area in India and outside countries for local purpose as well as export purpose. Onion growing farmers are have lot of problems in transplanting of onion seedlings with the shortage of farm workers during transplanting duration. Therefore, work were made to establish tractor operated semiautomatic onion transplanting machine. Engineering physical properties like height, weight, diameter, moisture content and compressive strength etc

From the discussion so far it has been concluded that this type of planter is very use for onion planting, overall conclusions from the investigations are:

- Increase the production rate.
- Maintain the uniform spacing between two onions
- Maintain uniform depth for each onion.

IX. REFERENCES

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