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Three Wheel Multipurpose Agriculture Vehicle

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Abstract:
India is an agriculture-based country in which, 70% of humans relies upon on the outcome of farming. Farmers are very terrible due to which they are unable to buy tractors and other high-priced equipment's hence they use traditional technique of farming. Basically, many farmers in India additionally use bullocks, horses and he-buffalo for farming operation. This machine performs 4 farming operation (digging, sowing, levelling) which is used small scale farming. In this equipment we used 70cc engine for multi operation like plowing, sowing and soil leveling.

Keywords: plowing, sowing, soil leveling, Agriculture machine.

1. INTRODUCTION

Agriculture is the spine of India. Paddy and Wheat is one of the new goals in agriculture the place still, not many researchers and producers participate. This field faces some problems such as how to maximize the profit, how to enlarge productiveness and how to decrease the cost. In India, two kinds of agricultural equipment are used, manual approach (conventional method) and mechanized type. Mechanization entails the use of a hybrid device between the power supply and the work. This hybrid system normally transfers motion, such as rotary to linear, or affords enough of mechanical advantages such as expand or decrease or leverage of velocity. Agricultural equipment is equipment used in farming or other agriculture. Mechanized agriculture is a procedure of the usage of agricultural equipment to mechanize the work of agriculture, significantly increasing farm worker productivity. In present day times, powered equipment has replaced many farm jobs previously carried out with the aid of guide labor or by working animals such as oxen, horses, and mules. The complete history of agriculture contains many examples of the use of tools, such as the hoe and the plough. But the ongoing integration of machines when you consider that the Industrial Revolution has allowed farming to grow to be plenty less labor intensive. The largest earnings of automation is that it saves the labor. However, it additionally saves energy and substances and to enhance the quality, accuracy, and precision. he multipurpose farming machine is doing four operations i.e. ploughing, seed sowing, irrigation and transportation purpose. The multipurpose farming machine is driven by 70cc engine. The machine is divided into two components assembly. Part-1 meeting is the predominant machine. The part-1 assembly is doing three operations i.e. Ploughing (also called as loosening of soil), seed sowing and irrigation. And the part- 1 assembly operator walks behind the machine in the course of the working duration of machine. For the loosening of soil, the iron plough tool is assembled to device holder of machine and the gripper wheel is additionally attach to the tyre. The gripper is supplying a suitable grip into soil and will end the tyre for skidding motion into soil. At a time solely one row is plough. In seed sowing operation the seed sewing machine is assembled to machine and the furrows will be vicinity returned of plough tool. The seed is keep in hopper of seed sewing machine after storing seed into hopper the seed is come into rotor box. The rotor container comprise rotor (different rotors for special crops) and this rotor wheel is throwing seed into the furrows. The plough device is hoe or plough the soil after ploughing into the soil the seed will be fall into soil and the T-Shape leveler is cover soil. In the seed sowing operation there are two row is sow at a time. The machine is seed sow continuously at the uniform depth and regular plant to plant distance. There are much less wastage of seed and less time required for sowing seed. The pump is additionally assembling into machine for irrigation purpose.

2. DESIGN OF VARIOUS PARTS

Rear wheel axle shaft Design For a foremost shaft which is a power generator, power is given as,

$P=FxV$ ---------- (1)

Our complete assembly will have weight approximately equal to 60kilograms.Thus whole force appearing will be on 5 wheels. Out of these 4 wheels we have maximum load appearing on rear wheels set up on shaft. This shaft is subjected to approximately 50 kilograms of load. So force acting on shaft is given by,

$F=mxg$ ---------- (2)

Putting m=50kg

g = 9.81 m/s2

Thus F = 50 × 9.81 = 490.5 N

Velocity is located out to be 10 cm/s i.e. V = 0.10 m/s

Thus Power, P = 490.5x0.10 = 40.05 watts

We be aware of that torque is given as, $T = Px60/ (2\pi n)$

Assuming No. of Revolution, n=50rpm

Thus, we have Torque, $T = 49.05x60/ (2\pi x25)$

= 9.36 x 103N-mm.

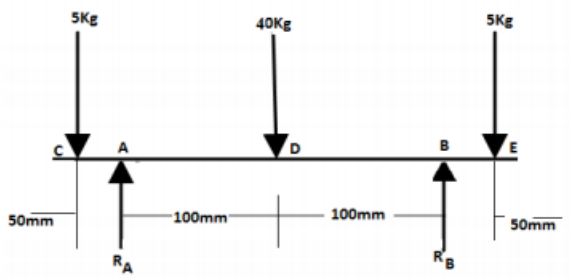
For a given shaft we have from diagram,

Vertical reactions at wheels i.e.

fixed supports, RA = RB = (5+40+5) / 2 = 25 kg

= 25x9.81 = 245.25 N

From bending moment diagram, most bending moment is found to be M = 1750 Kg-mm = 17.167x103 N-mm
The resultant moment on a given shaft is given as
MR= (M + T)1/2
= ((17.167x103) 2 + (9.36 x 103) 2) ½
= 19.552x103N-mm
Also we know that shaft diameter is given as, d = [(MRx16)/ (πxτ)]1/3.



Consider shear stress, τ = 50Mpa
d = [((19.552x103) x16)/ (πx50)]1/3
d = 12.581 mm
This is best diameter of shaft which is needed. Since a shaft may also be subjected to more load as it has to work in difficult prerequisites and from availability factor of view, we chose a safe diameter from DDHB (Table 3.5a) of trendy shaft diameter of 15 mm. Thus diameter of shaft, d = 15 mm.

SHEAR STRESS VALUES

Service Condition	τ_s (MPa)
Heavily loaded short shafts carrying no axial load	48-106
Multiple bearing long shafts carrying no axial load	13-22
Axially loaded shafts (bevel gear drive or helical gear drive)	8-10
Shafts working under heavy overloads (stone crushers, etc.)	4.5-5.3

3. PARTS INVOLVED IN THE VEHICLE

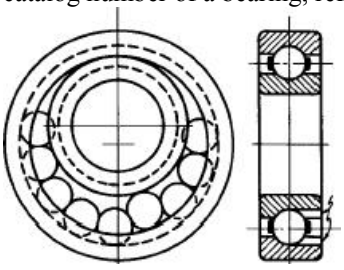
a) *Chassis*
Chassis offers help for each part. Wheels are attached to the chassis. It is made up of rectangle area so as to having extra strength with minimum weight. It is made up of mild steel. The body of machine is made up of mild metal angle. All the meeting of machine is assembling into frame and angles are welded to made a frame. After making frame the engine foundation is additionally welded to the body of machine. engine is bolted to the engine foundation. The fuel tank stand is also welded to machine. The gas tank is bolted to this stand and tank is assembled above the engine. Fuel tank grant petrol to engine. Seed metering machine stand is also welded to the machine frame and this metering machine is bolted into this stand. A cope with is also welded to the body which is deal with or control the machine. The deal with of machine is made up of moderate steel spherical pipe. In the machine frame hole is drill into square-Shape attitude and with the assist of this gap the plough device is gather to the machine frame.

b)Sowing parts
Mainly it consists of hopper, tray, pipes, sowing feed mechanism and assisting structure. There is provision of hopper for storing seeds. This equipment will work automatically by using using energy of engine. This gear will be connected at decrease side to last equipment. Seed is save or location into hopper of seed metering machine. After placing seed into machine, the seed is come into rotor bow. The seed waft is adjusted from hopper to rotor field by means of seed drift adjuster. In rotor container the rotor is mount on rotor shaft and sprocket equipment four is also mount on the rotor shaft. The rotor is carrying seed from rotor container and throws into the furrows. The rotor is rotate according to the machine speed at some gear ratio. The different-different rotors are used. The choice of rotor is based totally on seed to seed distance between crops. For the use of seed metering machine uniform seed to seed distance made. This is most essential machine for seed metering.

c) Ic engine
The motive of the combustion response is to launch energy to power the pistons. The combustion procedure can be carried out in either two or four strokes of the piston, however the four-stroke cycle is most common. Unless in any other case indicated, all engines mentioned in this e book will be assumed to use the four-stroke cycle. Through a blended experimental and analytical technique, it is possible to infer the rate of electricity launch for the duration of the combustion process. The approach depends on dimension of combustion chamber pressures in a going for walks engine whilst concurrently measuring the crankshaft rotation, and computing the extent inside the combustion chamber. The spatially averaged temperature in the combustion chamber can be calculated from the strain and volume. Then, from modifications in pressure, volume, and temperature, the heat loss thru the chamber walls, work done on the piston, and changes in inner energy of the combination in the combustion chamber can be calculated. The power launched from the gasoline is equal to the sum of the heat loss, work, and increases in internal energy. The reason of fuel device in Ic engines is to keep and furnish fuel and then to pump this gasoline to carburetors. The fuel grant gadget also prepares the air-fuel combination for combustion in the cylinder and contains the exhaust gas to the rear of the vehicle.

4. BEARING WITH BEARING CAP

The digit in the third place from the right indicates the series number. Thus, bearing 307 signifies a medium-series bearing of 35-mm bore. For additional digits, which may be present in the catalog number of a bearing, refer to manufacturer's details.

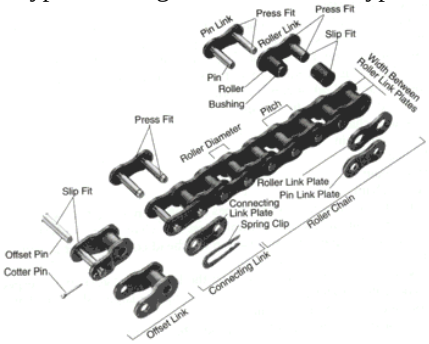


Design of ball bearing:
Bearing No. 6202
Outer Diameter of Bearing (D) = 35 mm
Thickness of Bearing (B) = 12 mm
Inner Diameter of the Bearing (d) = 15 mm
r_1 = Corner radii on shaft and housing
r_1 = 1(From design data book)

Maximum Speed = 14,000 rpm (From design data book)
Mean Diameter (dm) = (D + d) / 2
= (35 + 15) / 2
dm = 25 mm.
Wahl stress factor:
Ks = 4C - 1/4C – 4 + 0.65/C
= (4*2.3)-1/(4*2.3)-4 + 0.65/2.3
Ks = 1.85.
design of bevel gear:
Number of teeth = 17 – 3 Nos.
Large diameter = (N + 2) / D.P
= 19 / 11
= 1.717”
= 43.87 mm
Pitch angle = 45 ^{0}
Pitch cone radius = (PCD)/ (2 SIN Φ)
Where,
Sin Φ - Pitch angle
∴PCD = N / DP
= 17 / 11
= 1.545”
= 39.255 mm
Therefore,
Pitch cone radius = 39.255 / 2 Sin45
Dedendum Angle = Tan^{-} ^{1}{(Dedendum / Pitch cone Radius)}
Where,
Dedendum = 1.157 / DP
= 1.157 / 11
= 2.672 mm
∴Dedendum Angle = Tan^{-} ^{1} {2.672 / 27.749)
= 5^{0} 30”
Cutting Angle = Pitch angle – Dedendum angle
= 45^{0} - 5^{0} 30” = 39^{0} 30”.

5. SPROCKET AND CHAIN DRIVE

Basic Structure of Power Transmission Chain:
A typical configuration for RS60-type chain is shown in Figure.



Connecting Link: This is the ordinary type of connecting link. The pin and link plate are slip fit in the connecting link for ease of assembly. This type of connecting link is 20. Percent lower in fatigue strength than the chain itself. There are also some special connecting links which have the same strength as the chain itself.

6. ADVANTAGES OF MULTIPURPOSE FARMING MACHINE:

• The seed can be positioned at any required depth uniformly
• Seed can be placed uniformly in a row with required distance between plants.
• It was made of long lasting and low-priced material less expensive for the small-scale peasant farmers.
• Time required to seed sowing and ploughing is also decreases.
• Requirement of labor additionally decreased.
• Increase in crop yield and cropping reliability.

8. FINAL MODEL

7. CONCLUSION

Multipurpose agriculture equipment can function quantity of features like Sowing, Weeding, Tillage. This tool can be run on engine. It will have minimum fee and handy handling. Also, there will have minimal weight and compact in size.

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