

To Study of Digging Machine

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Abstract-There are water tanks which are used to provide continuous supply of water to loosen the soil as well water the saplings after the plantation. The auger drill is made of required size by scaling down its original size as per the requirement. The size of the auger is designed as per the sap-ling size. This makes the auger to drill hole in the soil and the return back to its original position. The machine is made automatic by employing a D.C motor which serves as a power source for digging the soil. This machine uses the principle of auger drilling machine which is used in pile foundation during construction. This machine is designed for a preliminary aim of avoiding the use of shovels & levers in plantation of saplings thereby enhancing the plantation process by making it facile. The motor can be rotated both in clockwise and anti-clockwise direction. This paper discusses about the soil digging machine which is used for plantation of smaller saplings. The column of most drill presses is circular and built rugged and solid. The column supports the head and the sleeve or quill assembly. The head of the drill press is composed of the sleeve, spindle, electric motor, and feed mechanism. The head is bolted to the column. The worktable is supported on an arm mounted to the column. The worktable can be adjusted vertically to accommodate different heights of work. or it may be swung completely out of the way. It may be tilted up to 90° in either direction, to allow for long pieces to be end or angled drilled.

Key Words: Drilling, Auger, Digging Machine, Energy Source.

1. INTRODUCTION

Typically large powered augers are used in the farming, building, and utility industries, such auger drilling machines are widely used to drill holes under highways for fence posts, utility poles and large drainage pipes. This machine uses the principle of Auger drilling machine which is employed in pile foundation during construction. It may be noted that Indian agriculture is home to small and marginal farmers[80 percent], Agriculture census shows that in India there are about 121 million farmers, about 99 million are small farmers. This makes the auger to drill hole in the soil return back to its original position. Production of agriculture is one of the mostly discussed problems as a significant part of our population. Today many types of augers are available

in the market. Small scale farming which is the subject of this paper is important for increasing the growth in agriculture and food security. We have inequalities of poverty and unemployment in health, education and agricultural sectors. The motor can be rotated both in clockwise and anticlockwise directions. Agriculture plays a pivotal role in Indian economy. Here the main purpose of this project is to reduce farmer's work and time consumption.

The soil digging machine which is used for the plantation of small plants or crops. Some of these augers are large and cumbersome to operate. The machine is formed automatic by employing a D.C motor which is an influence source for digging the soil. This machine is meant for a preliminary aim of avoiding the utilization of shovels & levers in plantation of saplings thereby enhancing the plantation process by making it facile. Auger drilling can be a form of drilling using an outsized helical shaped screw to remove material from the ground. The auger drilling bit screws into the soil and material is automatically moved up.

There is a stand provided beneath the motor for arranging the saplings so that it can be planted one by one. This paper focuses on reducing the time for plantation of saplings by employing a semi-automated machine in the place of conventional shovels which will greatly reduce the planting time required. A D.C motor can be fitted to the end of the auger shaft and which can be used both in clockwise and anti-clockwise direction thus enabling the shaft to go deep inside the soil as well as come back after the required size is being achieved. There are water containers provided for loosening the soil as well as watering the plants after plantation. The machine uses the help of auger drill which is primarily used in pile foundations in construction sites. The interest of people towards plantation of sapling is increasing due to global warming, rise in global temperature and many such factors, so plantation is being done at a faster rate through many of the N.G.O'S as well as people. The machine is made of stainless steel material since it should withstand a higher impact loading. The machine can be transported easily since there are wheels which are provided at the bottom of the frame. The motor power is brought down to the shaft using spur gear arrangement. The greater advantage in this machine is that it digs only the required area and also does the same in very minimal time. In case of planting sapling in

huge number it is difficult to use shovels & levers for the same it makes the process tiresome and takes very long time.

2. RELATED WORK

Kyada. A. R et al (2014) proposing for seed to seed spacing and depth of seed placement, using mechanisms such as seed meter mechanism, plunger mechanism, lever fulcrum mechanism, cam shaft and power transmission, pulling mechanism. **Joshi S.G et al (2014)** presents a high speed solar powered system in cultivation based on robotic platform and artificial agent which is steered by DC motor remote control. The IR sensor is used and the seed block can be detected and solved using water pressure.

A. Kannan et al (2014) converted the tractor movement into ground wheel rotation is transmitted to the metering mechanism through the power transmission system depending upon the nature of seeds; we can change the metering mechanism arrangement. The flax blades are used in making holes in the soil. These flax blades serve good in removing the soil and throwing it out so that a hole is made in the zone of plantation so that sapling can be easily planted in the soil. The plantation needs only a 1.5" inch diameter hole so that the auger drill is also made of such specification. This avoids making larger holes more than the requirement. On surveying the field of our project it is found that flax blades along with rotating hand wheel and springs are used which requires again a manual operation. One method which uses driller type machine which makes just hole in the ground and also requires in minimum of two members for handling the machine.

Amle Kishore E., Lohote Shiram T., Ghule Vaibhav M., Bahirat Sagar S., Jahind Polytechnic, India, Tractor Operated Auger, IJSRD – In this paper Journal it describes about the methodology used for the manufacturing of Auger machine and material and used for the manufacture. It also describes about the design of auger which includes the calculations like power, torque required, determination of shaft diameter based on strength, resistance to twisting method, transmission of torque approach. In this regard, the project's main objective is to meet the needs of small scale farmers, reduce operating time and manufacturing costs.

Vaibhav Shinde, Akshata Goankar, Mayuri Gavankar, Siddhnath Shetkar, Prof. M.T.Sawant., S.S.P.M college of engineering, Kankavli, Solar Powered Soil Digging Machine, IJTRE - this journal describes about the problems faced by the farmers using agriculture tools. It tells that before the auger machine was used with the help of petrol powered engine which burdens the farmers with the increasing price of the petrol. So the main objective is, therefore, to replace the petrol engine with the rechargeable electric battery and also to reduce the cost of the machine used to dig planting holes.

L.V. Pavan Kumar Maddula, Ibrahim Awara, Concentrated on fuel effectiveness and vehicle outflows and has driven the car business to investigate low weight elective plans for power train framework components. The display work clarifies how a potential outline change of drive shafts driven by a longing to decrease weight and cost can prompt to NVH (Noise, Vibrational & Harshness) issues brought on by driveshaft resonances and clarifies how utilizing numerous dynamic vibration safeguards (DVA) can tackle the issue to meet client desire while enhancing efficiency. **Cuiping Feng, Zhihong Dong, Yuliang Yang**.

Chaoxing Xie, Kai Wanget, With the guide of Finite Element Analysis (FEA) and enhancement programming, communications between various DVA's on a framework was comprehended and ideal damper parameters for compelling damping was distinguished. The last DVA configuration was tried and checked on the vehicle for ideal trait execution.

Victor Baumhardt, Valdinei Sczibor, have concentrated the significance of Halfshafts as Halfshafts are essential segments from vehicle powertrain. They are the components mindful to transmit torque and revolution from transmission to wheels. Its fundamental plan comprise of a strong bar with joints at every outrageous. Be that as it may, contingent upon its length, the regular recurrence of first bowing mode may have a model arrangement with motor, bringing about undesired clamor on vehicle inside.

Joseph V. Gabiniewicz, Douglas M. Dough puncher, Michael Testani, Historically, driveshaft torque information has been gotten utilizing slip rings. Slip rings, in any case, are costly, and require time-serious driveshaft alterations for appropriate establishment. Also, the time and cost required in field overhauling units is restrictive

The power train of vehicle have several parts in which propeller shaft is heart of transmission which encounter unfortunate obstacles called failures. This damage is due to several faults, the main reason is material and its manufacturing and maintenance. Early automobiles often used chain drive or belt drive mechanisms rather than a drive shaft. Some used electrical generators and motors to transmit power to the wheels. Hence now it is challenging to design the drive shaft for an automobile with objective weight deduction by no increase in cost to increase transmission of power produced by engine. Hence material selection is one of the important issues for transmitting variable torque to wheels with different road conditions. In this comparative has been made in analysis of shafts with material differ which leads to weight deduction by analysing in static structural and modal analysis to calculate vibrations in shaft.

2.1 Driveshaft Mechanism

A driveshaft is a rotating shaft that transmits power from the engine to the differential gear of a rear wheel drive vehicles. Driveshaft must operate through constantly changing angles between the transmission and axle. To increase the natural frequency the drive shaft is manufactured in two pieces. The steel drive shaft with two pieces has three universal joints and one bearing at the center. We can improve the power transmission by reducing the weight and mass inertia. So we replace conventional steel with composite materials. The composite materials have high strength and high stiffness. We can use different combinations of composite materials. For purpose of higher strength we use two or three materials at once to get higher strength.

2.2 Categories of composite material

Composites are classified by the geometry of the reinforcement - Particulate, Flake, and Fibres. Particulate composites: It consists of particles immersed in matrices such as alloys and ceramics. They are usually isotropic because the particles are added randomly. Particulate composites have advantages such as improved strength, increased operating temperature, oxidation resistance, etc. Typical examples include use of aluminum particles in rubber, silicon carbide particles in aluminum, and gravel, sand, and cement to make concrete.

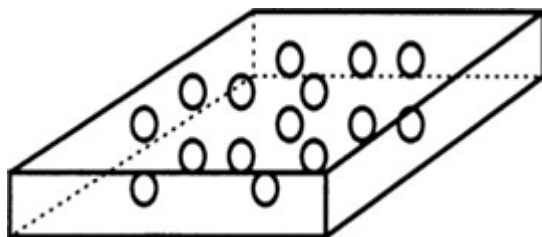


Fig. 2.1 Particulate composite

2.2.1 Flake Composites:

It consists of flat reinforcements of matrices. Typical flake materials are glass, mica, aluminum, and silver. Flake composites provide advantages such as high out-of-plane flexural modulus, higher strength, and low cost. However, flakes cannot be oriented easily and only a limited number of materials are available.

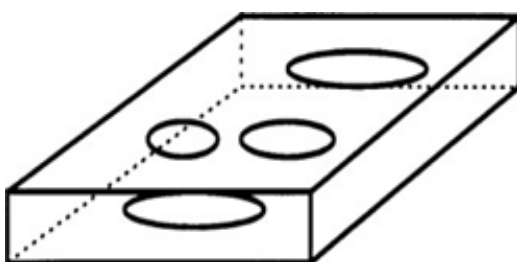


Fig. 2.2 Flake composite

2.2.2 Fiber composites:

It consists of matrices reinforced by short (discontinuous) or long (continuous) fibres. Fibres are generally anisotropic and examples include carbon and aramids. The Examples of matrices are resins such as epoxy, metals such as aluminum, and ceramics such as calcium-alumino silicate. The fundamental units of continuous fibre matrix composite are unidirectional or woven fibre laminas. Laminas are stacked on top of each other at various angles to form a multidirectional laminate.

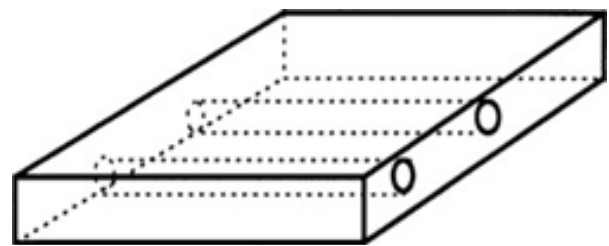


Fig.2.3 Fibre composite

3. METHODOLOGY

Based on the literature reviews above the problems encountered are the machine's cost and its maintenance because the machine is very costly and it runs on petrol engine which increases its running cost and its maintenance cost. And the operating of the machine is difficult which increases the labour expenses. One of the problem encountered is its transportation because of its weight its handling is very difficult and it also produce lot of dust which may cause health issues to the workers. Keeping these points as a note manufacture of the earth auger is done. We also know that petrol is non-renewable energy and is decreasing day by day and the Indian government also proposed a plan which states that by the year 2030 Indian roads will be having a large amount of electric vehicles to reduce environment pollution. Our main focus is to reduce the machine's cost to make it affordable to the small scale farmers. Going through all the problems the solution for the problems is discovered in our project by replacing the petrol engine with the rechargeable battery which reduces the weight and machine's cost and also it is easily operated which saves the farmers hard earned money in labour expenses. So we are feeling very honored by coming up with a project working on electric motors which has no environment pollution.



Fig.3.1 Auger Bit

When designing our attachment, the following considerations were taken into account:

- The device should be suitable for local manufacturing capabilities.
- The attachment should employ low-cost materials and manufacturing methods.
- It should be accessible and affordable by low income groups, and should fulfill their basic need for mechanical power
- It should be simple to manufacture, operate, maintain and repair.
- It should employ locally available materials and skills. Standard steel pieces such as steel plates, iron rods, angle iron, and flat stock that are locally available should be used. Standard tools used in machine shop such as hack saw, files, punches, taps & dies; medium duty welder; drill press; small lathe and milling machine should be adequate to fabricate the parts needed for the machine.
- Excessive weight should be avoided, as durability is a prime consideration.

4. CONCLUSION

From the experimental validation and theoretical analyses it is found that the above project is feasible and can be extensively used in Plantation of Sapling. We have identified the best auger drill design and material such that it operates effectively under different types of soils. During the design

process we have intuitively guessed the value of torque required to dig a hole and found the guessed the value to be satisfactory.

REFERENCES

- [1] Design and Analysis of Drive Shaft with Composite Materials, R.P.Kumar Rompicharla1, (Affiliated to Andhra University) Eluru- 534007, West Godavari Dist, A.P Research Expo International Multidisciplinary Research Journal Volume - II , Issue - II June - 2012 ISSN : 2250 -1630.
- [2] Design Optimization & Analysis of Drive Shaft 1Anup A. Bijagare*, 2P.G. Mehar and 3V.N. Mujbaile VSRD-MAP, Vol. 2 (6), 2012, 210-215 Available ONLINE www.vsrjournals.com
- [3] Kishor Ghatage1, Narayanrao Hargude2 1,2(Department of Mechanical Engineering P.V.P.I.T.; Budhgaon- 416307 M.S. India)
- [4] Optimal Sizing and Stacking Sequence of Composite Drive Shafts Thimmegowda, Vol. 11, No. 2. 2005 Department of Mechanical Engineering, PSG College of Technology, Coimbatore 641004, India Received 23 June 2004; accepted 12 December 2004.
- [5] Pasaman B., Zakharchuk V., 2012 - The determination of the parameters of a ploughshare-rotor potato digger. *Econtechmod an International Quarterly Journal* (2): 43-47.
- [6] Review of Design of Hybrid Aluminum/ Composite Drive Shaft for Automobile Bhushan K. Suryawanshi, Prajitsen G.Damle *International Journal of Innovative Technology and Exploring Engineering (IJITEE)* ISSN: 2278-3075, Volume-2, Issue-4, March 2013.
- [7] Saqib G.S., Wright M.E., 1986 - Vibratory digger for harvesting sweet potatoes in cloddy soils. *J. Agr. Eng. Res.*, 34(1): 53-61.
- [8] Sharma A.P., Verma S.R., Bansal A.S., 1986 - Design, development and field evaluation of oscillatory potato digger. *AMA*, 17(1): 60-62.
- [9] Static, Modal and Buckling Analysis of Automotive Composite Drive Shaft *IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)* ISSN: 2278-1684, PP: 32-42 www.iosrjournals.org
- [10] Structural Design of Composite Drive Shaft For Rear-Wheel Drive Engine K.V.N. Parvathi1, Vizag-531173 Parvathi et al, *International Journal of Advanced Engineering Research and Studies E-ISSN2249-8974*.