ISSN 2349-6193
Impact Factor: 2.805

IJESMR

International Journal OF Engineering Sciences & Management Research

TRACTOR OPERATED AUGER

Amle Kishor E.[*1], Lohote Shiram T.[2], Ghule Vaibhav M.[3]& Bahirat Sagar S.[4]
*[1,2,3&4]Students at Department of Mechanical Engineering,Jaihind Polytechnic,Kuran, India.

Keywords: Soil drilling, Tree plantation, Auger reverse engineering

ABSTRACT

Today 70%of population in our country is based on agriculture. And major income is based on agriculture .Our project main emphasis is on agriculture and its productivity as compare to future is very low.

To increase the productivity and related traditional methods, we are introducing our project named auger based drilling is identical to the traditional drilling. I.e. Drill bit is rotated and made contact to work piece as result a drill hole. In this drilling special attachment is used i.e. Auger (a drill bit) is used. In traditional method crowbar is used to make a drill if i.e. But the drill is made by using auger. The application of this drilled hole to make the pole stand used for tomato farm.

INTRODUCTION

An Earth Auger is an drilling equipment. Used for agriculture purpose. It can be used to drill in soil. It is tractor operated equipment. I can drill holeupto 1.5 feet. It consist of a frame of a cultivator, universal joint, spur gears, bearings, chain sprocket, tractor, drill bit.Frame is attached to the tractor universal joint connects the spur gears and tractors PTO shaft, drill bit is mounted below the frame and is connected to spur gears through chain drive.Power transmission :- tractor's PTO shaft- universal joint - spur gears – chain drive – drill bit.

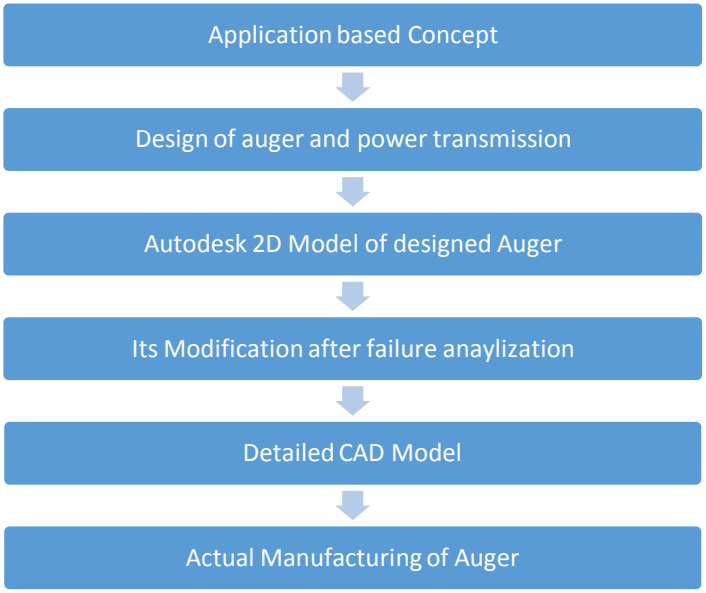
LITERATURE REVIEW

1. Limo KipkoechEliud and Rotich Martin Kibiwott(Project no. SMK 02/2011) from university of Nairobi, is our base for the project, which focuses on tractor driven auger which is used to drill hole for tree plantation. Here the identical drill bit named auger is used. Our project is based on the auger drilling. The author focuses on the drill bit and its types, with the principle of drilling.
2. Dan Wolf, Haifa, AvrahamSteif, Kiriat-Bialik and ArieWolk(United States Patent, 4732227) (Mar. 22, 1988) the paper defines the Continuous Drilling using Auger and related process. As it is based on auger, the process for single drilling and its transmission of power related mechanism, with its conceptual study and its application is published.
3. V.K. Tewari, A. Ashok Kumar, SatyaPrakash Kumar, BrajeshNare*[2012]* In this research papers author have done case study on farm mechanization in west Bengal as being part of India it give clear status about availability and progress in India. This ensured us to take right steps compared to current steps.

ISSN 2349-6193
Impact Factor: 2.805

IJESMR
International Journal OF Engineering Sciences & Management Research

METHODOLOGY



MATERIALS AND METHODS

Material Used
Frame – Mild Steel (Square Tube)
Bevel gears – carbon steel
Auger - Mild steel circular plates of 6 inch diameter

Shaft Material
A good material for the shaft must have sufficiently high strength, good machinability, low sensitivity to stress concentration and to withstand heat treatment operations of high wear resistance. Usually shafts are made of mild steel and carbon steel, the following grades of carbon steel being used C25, C30, C40, C45 and C50.

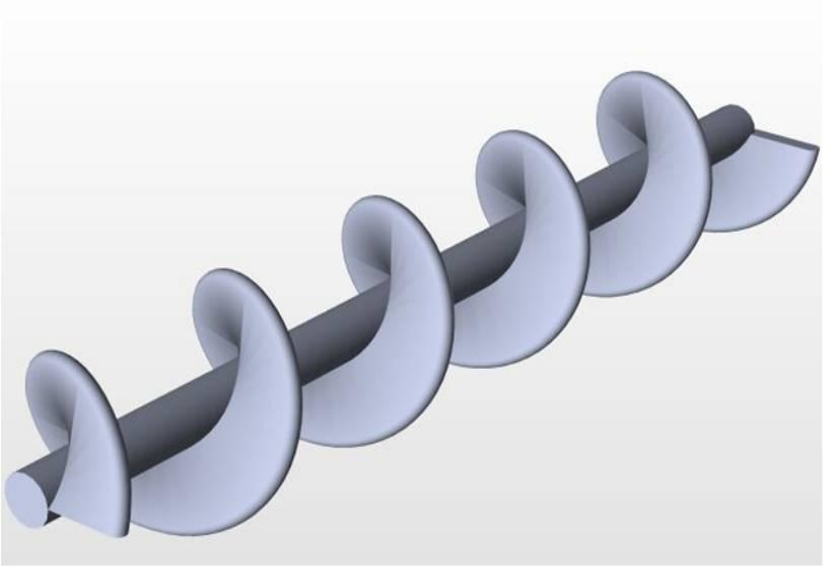


Fig1: Drill bit named Auger used

ISSN 2349-6193
Impact Factor: 2.805

IJESMR

International Journal OF Engineering Sciences & Management Research

Design Of Auger

The Shaft size is dictated by torque, but changes in horsepower and speed (RPM) affect torque as shown in the following equation of determining power;

$P = \omega \times T$

Where T = Toque.
ω= speed (RPM).

$T = \frac{P}{\omega}$accordingly, an increase in horsepower would require more torque, as would a decrease in RPM.

For example, a 100-hp designed for 900-rpm would require twice as much torque as a 100-hp PTO designed for 1800-rpm. Each shaft must be sized for the torsional load it is expected to carry. In determining the shaft size, three approaches can be used:

- Determination of shaft diameter based on strength.
- Resistance to twisting method
- Transmission of torque approach.

Determination of shaft diameter based on strength.

When the shaft is subjected to both torsional and bending loads, the maximum torsional shear stress is given by:

$$\tau_{max} = \frac{16}{\pi d^3}\sqrt{(M^2 + T^2}$$

(From Machine design by R.K. JAIN pg 647)
Where
M=bending moment
T=torque

Resistance to twisting method

The other way to calculate minimum shaft size is to set a limit on the amount of torsional deflection (twisting) that may occur. Resistance to torsional stress is directly proportional to shaft size: the larger the diameter , the greater the resistance to twisting. A rule of thumb with this method is that the shaft must be large enough that it will not deflect more than 1 degree in a length of 20 times its diameter.

To calculate the minimum shaft size to meet this specification, *The Machinery's Handbook* provides the following equation for determining minimum shaft size:30

$D = \sqrt{\frac{P}{N}} \times 4$ (inches)
where:
P = horsepower
N = speed (RPM

Transmission of torque approach.

This method involves determination of the shaft diameter by considering the following cases .

Shaft with keyway.

$D = \sqrt{\frac{60 \times P}{N}}$ (inches.)

Shaft without keyway.

$D = \sqrt{\frac{120 \times P}{N}}$ (inches.)

Source: machinery's handbook.

ISSN 2349-6193
Impact Factor: 2.805

IJESMR
International Journal OF Engineering Sciences & Management Research

The shaft to be keyed hence the formula;
$D = \sqrt{\frac{60 \times P}{N}}$
is used where;
P = PTO horsepower ,N = PTO speed in RPM.

RESULTS AND DISCUSSION

The machine component was successfully designed and has the following specifications:

1. **Shaft**

Diameter = 20mm.
Length = 70mm.

2. **Cutter plate**

Plate thickness (h)= 2mm.
Diameter = 7.5mm

CONCLUSION

After the manufacturing and trial on the "Earth Drilling Machine (Tractor operated Auger)" conclusions which we made are as follows:

1. Based on the overall performance of the machine we can definitely say that the project will satisfy the need of small scale farmer, because they are not able to purchase costly agricultural equipment only for drilling purpose.
2. The machine required less man power and less time compared to traditional methods, so if we manufacture it on a large scale its cost gets significantly reduce and we hope this will satisfy the partial thrust of Indian agriculture.
3. Every farmer can obtain such mechanism just operating the tractor in auger drilling machine.
4. So in this way we solve the labour problem that is the need of today's farming.

BOOKS

1. Design of Machine Element, Prof .V. B. Bhandari, Tata Mc-Graw-Hill Publishing Company Ltd.2007 Edition
2. Strength of Machine Element, Prof. R. K. Rajput S. Chand Publication edition 2008.
3. Fluid mechanics and hydraulic mechanism, R.K.BANSAL, Ninth edition

ACKNOWLEDGEMENT

We would like to thank God almighty for giving us grace and energy throughout the project and the Undergraduate studies.Our sincere gratitude goes out to the project supervisor for his guidance, advise and help he offered us throughout our entire time in the university especially during this project. You have been a constant source of inspiration, encouragement and knowledge, thanks for the time and dedication.

Special thanks to the entire staff offered their assistance during the project period and the department of mechanical and for the monetary funding.

Finally, we appreciate our classmates, friends, parents, brothers and sisters for their support and encouragement.

REFERENCES

1. *Saharawat, Y.S., Singh, B., Malik, R.K., Ladha, J.K., Gathala, M., Jat, M.L. and Kumar, V. 2010. Evaluation of alternative tillage and crop establishment methods in a ricewheat rotation in north-western IGP. Field Crops Res. 116: 260–267.*
2. *Dan Wolf, Haifa, AvrahamSteif, Kiriat-Bialik and ArieWolk(United States Patent, 4732227) (Mar. 22, 1988).*
3. *Dr. C. N. Sakhale , Prof. S. N. Waghmare , Rashmi S. Chimote " Multipurpose farm machine"Volume: 03 Issue: 09 (Sep-2016),e-ISSN: 2395 -0056,p-ISSN: 2395-0072*
4. *Limo KipkoechEliud and Rotich Martin Kibiwott (Project no. SMK 02/2011) June 2011.*