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## A Review Paper on Design and Development of Earth Auger

Guide: Prof. D.I. Sangotra

Akanksha Fule, Pratiksha Kachare, Ishaan Dharashivkar

Dept, of Mechanical Engineering, YCCE, Nagpur, Maharashtra, India

### ABSTRACT

This research discusses about the design and development of an Earth Auger machine for plantation of Horticulture crop. Helical blade arrangements are presented with the potential for removing soil from earth to scale back plantation time - The project aims at design and development of earth auger which would be modified to overcome all the shortcomings of the existing earth auger. The project will be useful to provide a solution for low cost and comparatively safe auger which can be completely used by one person. This project will provide farmers with a cheap and safe alternative to use for plantation or other purposes. This project will help understand the shortcomings of manual and power operated earth augers and provides possible solutions. Hence, this project will reduce the chances of auger related injuries and also increase the stability and usability of the same.

### INTRODUCTION

Since the implementation of the policy of returning farmland to forest and greening policy in recent years and the rapid development of fruit tree planting at the same time, the use of various types of mechanical equipment for a forestation has become the first choice of modern people now, earth auger is this kind of new modern planting tools. Changing and developing technology in agricultural practices has resulted improved agricultural productivity in India. But at the same time the incidence of traumatic injuries and musculoskeletal disorders among agricultural workers seem to have increased also. Study

says that agricultural work related accidents are currently higher than injuries in any other industry all over the world.

The auger drill is made of required size by scaling up and down its original size as per the requirement. There is a water container provided for loosening hardness of soil as well as watering the plants after plantation. The machine can be transported easily since there is a wheel which are provided at the front of the frame. The machine is made of stainless steel material since it should withstand a higher impact loading. 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 minimum time. The modified auger is easy to carry and transport from one place another. Its designed structure helps to reduce the injuries and accidents. Also, its drill bit can drill hole on many type of soils. Material used to make frame able to sustain vibrations and forces acting on it. Our aim to make earth auger more user friendly and to avoid accidents and health disorder related to it.

## LITERATURE REVIEW

The source of data for the literature review were drawn from the available Publication of Auger IJERMCE, SMK, Agricoop.nic.in, ELSRVIER, reports of lower state university, researchgate.net, kirshikosh.egranth.ac.in. An extensive literature search for published research articles was undertaken using key words from different sources like Google; Digital library and online journals. Articles and information published unpublished information was obtained through internet surfing, snow ball techniques and other methods. Information was collected from International journals and from the documents and websites related to agricultural.

1. Auger blade (1952-02-08): The invention deals with a blade structure of the character defined, wherein the teeth of the blade are so constructed and positioned as to form a series of circumferential v-cuts. in the soil and to simultaneously and intermittently lift and break the raised l-portions of the soil intermediate the formed grooves, thus facilitating and expediting the drilling operation.
2. Expanding boring head for earth auger (1968-05-28): This invention relates to a new and improved expanding boring head for earth This invention relates to a new and improved expanding boring head for earth auger. More particularly, the present invention comprises a tooth and tooth holder pivotally mounted on a boring head about an axis substantially parallel to the axis of rotation of the boring head but displaced outwardly relative thereto so constructed that the tooth moves between a retracted or inoperative position to a projected or operative position.

3. Van R. Cox (1978) invented earth drills. An earth auger arrangement wherein a power source is mounted on wheels for moving the power source over the earth's surface with means connected to the power source for relaying power to a transmission with which an auger connected. Handle means are connected to a transmission for manually positioning the auger in relation to the earth's surface to penetrate it at a desired angle with throttle means on the handle means to control the power source. Shaft means are pivotally connected to and external between the power source and the handle means to reduce counter rotation or counter torque from being exerted on the operator when the auger is rotated to penetrate the earth.

4. Huang wei (2013) studied the work principle and structure analysis of the walking type digging machine for planting trees. Based on the principle of the protect environment and the shortcomings of the traditional digging machine, this paper designs a kind of new digging machine which is high quality, fast, safe, reliable, low labor intensity, low cost and can adapt to different requirements of pit depth, topography and soil conditions. This paper analysis the new type digging machines working principle, force analysis of cutter disc. The main parts of the digging machine are established by APDL parameter design language. The result show that the main transmission chain of way can meet the job requirements of loader and the main parts can satisfy the intensity and rigidity requirements.

## PROBLEM IDENTIFICATION

The primary problem with planting these plants/trees is that first, we need to dig small/big holes in the ground for the plants to be planted in, for this we need a large labor and this labor force must be efficient. Even at their best, the efficiencies of the labor will be less, so an alternative to this must be suggested. Current model of the earth auger is difficult to use and also does not allow perpendicular drilling to the ground in all circumstances. Also there are limitations to the mobility of the earth auger making it much difficult to use by single person. Due to vibration during drilling, sometimes it becomes difficult to handle. Body of Earth Auger is heavy due to which it creates trouble while carrying. There are some limitations as follows:

1. Recent model does not allow directional drilling
2. Poor performance on uneven surface.
3. Difficult to carry and transport it.
4. Due to open design, most earth augers are not safe to use and may result in fatal injuries.

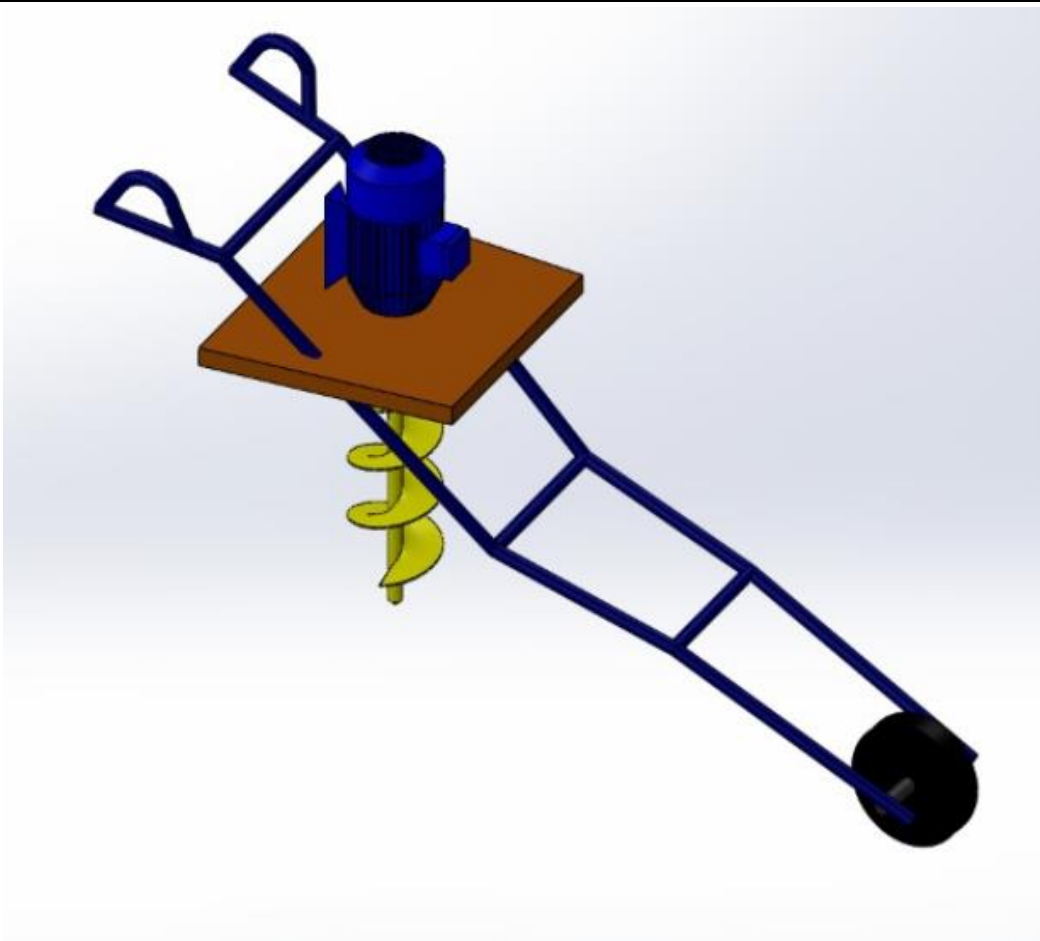
## OBJECTIVES

The objectives of the project are to design a system are

1. To Improve and optimize the present procedure.
2. To improve simplicity.
3. Minimize the time required by using simple mechanical mechanisms.
4. Develop machine which will require less labour and which can be operate with unskilled operator.
5. Efficient
6. User-friendly
7. Transportable
8. Cost-effective
9. Reduce repetitive task
10. Functional requirement of proposed system

## PROPOSED MACHINE DESIGN

It is proposed to design a machine that can easily be used to drill holes for planting trees, electricity or telephone poles and other applicable areas. The machine to be designed can drill a hole of 600mm diameter and a maximum depth of one meter. The holes to be produced by the machine will be of uniform diameter throughout as opposed to the ones drilled by augers, which are usually conical. It is also possible to drill holes of different diameters like 200mm, 300mm and 400mm by just changing the size of the cutter blade. Important features of the proposed machine are: ease of transportation to drilling site, ease of assembly at the drilling site, being able to be attached and detached from the driving power easily.



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.

## CONCLUSION

The following modifications are done while redeveloping the earth auger.

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. Ease in transportation-For easy transportation of developed Earth Auger in field, a wheel of rubber with axle was provided by considering ground clearance and C.G of machine.
4. Stability during operation-For minimizing vibrations supporting frame or trolley and wheel of rubber were provided. So that during operation they would support the machine, maintained the stability and minimized vibrations.
5. Safety of operator – Improvements to ensure operators safety is installed the modified Earth auger, such as frame for increased stability during drilling, etc.
6. Every farmer can obtain such mechanism just operating the tractor in auger drilling machine
7. So in this way we solve the labour problem that is the need of today's farming

## REFERENCES

1. Limo kipkoecheliud, Rotich martin kibiwott, "Design of a tractor driven hole drilling machine for tree-planting" project number: SMK 02/2011, june 2011.
2. A.R. Kyada, D.B. Patel. , "Design and development of manually operated seed planter machine", AIMTDR 2014 December.
3. Gholap Dipak Dattatraya, More Vaibhav Mhatardev, Lokhande Manojkumar Shrihari, Prof. Joshi S.G, "Robotic Agriculture Machine", Volume 3, Special Issue 4, April 2014.
4. A.Kannan, K. Esakkiraja, S. Thimmarayan, "Design modifications in multipurpose sewing machine", Vol.2 Issue.1, January 2014.

## BOOKS:

1. R.S. Khurmi& B.C.Guptha, Theory
2. Mechanical engineering design by Joseph E. shigley.
3. Machine design(Mechanical engineering design) by R.K. JAIN
4. Anonymous, (2018b). Guven Machine Auger Boring Machine
5. V.B.Bhandari, Design of machine elements, Third edition, Tata mcgraw Hill Education private limited, New Delhi. (www.agroproductlimited.com)