

# Design and Development of Earth Auger

Guide: Prof. R.V. Adakane<sup>1</sup>

Sumedh Shastri<sup>2</sup>, Shekhar Kola<sup>3</sup>, Kartik Giri<sup>4</sup>

<sup>1-4</sup>Dept, of Mechanical Engineering, YCCE, Nagpur, Maharashtra, India

\*\*\*

**Abstract** - The Project aims at design and development of earth auger which would be modification 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 provide possible solutions. Hence, this project will reduce the chances of auger related injuries and also increase the stability and usability of the same.

## 1. INTRODUCTION :

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. It is found that every year in India alone there may be 5000-10000 deaths, 15000-20000 amputations & serious injuries due to agricultural related activities. Among these, 10.8% of health disorder and injuries are caused by post hole digger or earth auger.

The modified auger is easy to carry and transport from one place another. Its designed structure help 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 use friendly and to avoid accidents and health disorder related to it.

### 1.1 Literature Review

The source of data for the literature review were drawn from the available Publication of Auger Torque Europe LTD, SciELO, 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 Articles and information published unpublished information was obtained through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.

### 1.2 Problem Identification

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 :-

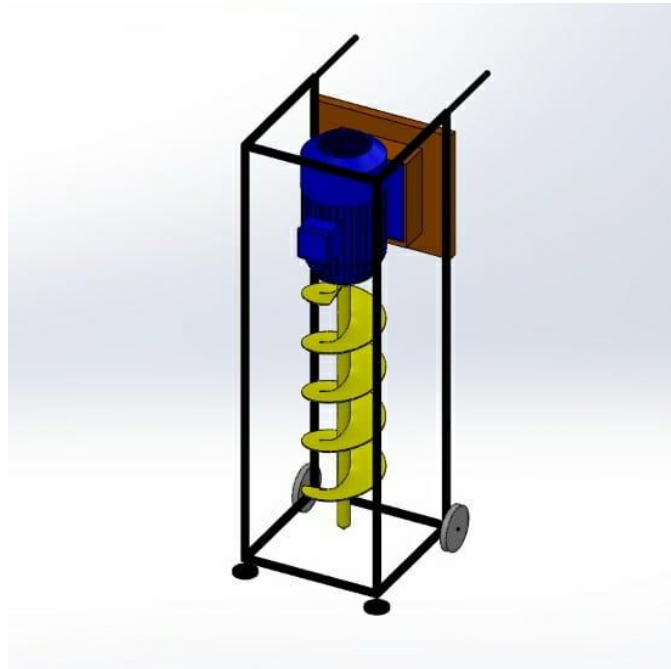
1. Recent model does not allow directional drilling
2. Poor performance on uneven surface.
3. Difficult to carry and transport it.
4. Due to open design, most earth augers are not safe to use and may result in fatal injuries.

### 2. Working

- 1) Ensure that the auger is having sufficient amount of fuel.
- 2) According to the required depth and radius of the hole, select the necessary drill bit and attach to the auger.
- 3) Take the auger to the desired place with the use of wheels attached to the auger.
- 4) Make sure that the auger is placed at a sturdy location and lock the wheels of the auger.
- 5) Start the engine and wait till the drill bit rotate at a uniform speed.
- 6) Rotate the slider rail handle in a clockwise direction to provide positive feed to the drill.
- 7) Rotate the handle at a slow and constant speed to provide uniform feed.
- 8) After the desired depth is reached, rotate the handle in anticlockwise direction to lift the drill nit up to its initial position.

9) Switch off the engine and wait until the drill stops rotating.

10) Unlock the wheels and move the auger to the next drilling location.



**Fig-1:** Earth Auger Solidworks design

**3. CONCLUSIONS**

The following modifications are done while redeveloping the earth auger.

A) Ease in transportation-For easy transportation of developed Earth Auger in field, a wheel pair of tyre with axle was provided by considering ground clearance and C.G of machine.

B) Comfort of operator-Improvements in operators comfort during operation is done.

C) Stability during operation-For minimizing vibrations supporting frame or trolley and wheel pair of were provided. So that during operation they would support the machine, maintained the stability and minimized vibrations.

D) Safety of operator – Improvements to ensure operators safety are installed the modified Earth auger, such as frame for increased stability during drilling, etc.

**REFERENCES**

1. Amle Kishor, Lohote Shiram T, Ghule Vaibhav. Tractor operated Auger. IJESMR, 4(2): February 2017.

2. Li Lianggang, Zhang Bing, Luo Qiang. Study on Vibration Frequency and Rock Fragmentation effect of sonic Drill Rig. Procedia Engineering 73(2014)3-9.

3. Duan Longechen, tan Songcheng , Gao Hui. Study on Auger Drilling Techonolgy for Sampling Drilling in the Lunar Stimulants. Proceidia Engineering 73 (2014)21-217.

4. Martin Larisch, behaviour of stiff, fine-grained soil during installation of screw auger displacement piles. Thesis: 2014.

5. Limo Kipkoech Eliuid and Rotich martin Kibiwott, Design of a Tractor driven Hole Drilling Machine for Tree-Planting . SMK 02/2011.

6. G.G. Boldyrev & G.A. Novichkov, Evaluation of Tip Resistance to Auger Drilling, CP-2016.

7. Liu Fei. Research on drilling-sampling performance based on interaction model between drill and lunar soil [D]. Harbin: Harbin Institute of Technology, 2011.

8. Dan Wolf, Haifa, Avraham Steif, Kiriatic-Bialik and Arie Wolk (United States Patent, 4732227) (Mar. 22, 1988).