

DESIGN & FABRICATION OF INNOVATIVE PLOWING MACHINE

Ramya R¹, K.Ravivarma², Pramod Mannalle³, Sandeep Inamati⁴, Pravesh Rawat⁵,

1Assistant Professor, 2,3,4 & 5UG Students

ravivarma2469@gmail.com sandeepinamati97@gmail.com mannallepramod@gmail.com praveshrawat8@gmail.com

Department of Mechanical Engineering,
Sri Sairam College of Engineering

Abstract— In last few decades we all witnessed the development in each and every field. In the field of agricultural also we had seen remarkable development, big farmers are now a day's using cultivator, harvester, tractor, advance machine tools and advance farm equipment's, but in the country like India, 70% of farmers are small and marginal and they are still doing farming by traditional method. Thus, they are in need of improved agricultural tools that may be hand driven or bullock driven. In this paper similar advanced type of tool is designed. Designing and fabrication of Agricultural Plough is done. Modern competitions take place for ploughing enthusiasts like the National Ploughing Championships in Ireland. Use of the plough has decreased in some areas, often those significantly threatened by soil damage and erosion, in favour of shallower ploughing and other less invasive conservation tillage techniques.

I. INTRODUCTION

A plough is a tool or Farm implement used in farming for initial cultivation of soil in preparation for sowing seed or planting to loosen or turn the soil. Ploughs are traditionally drawn by working animals such as horses or cattle, but in modern times may be drawn by tractors. A plough may be made of wood, iron, or steel frame with an attached blade or stick used to cut the earth. It has been a basic instrument for most of recorded history, although written references to the plough do not appear in English until 1100 CE at which point it is referenced frequently. The plough represents one of the major advances in agriculture.

The primary purpose of ploughing is to turn over the upper layer of the soil, bringing fresh nutrients to the surface, while burying weeds and the remains of previous crops and allowing them to break down. As the plough is drawn through the soil it creates long trenches of fertile soil called furrows. In modern use, a ploughed field is typically left to dry out, and is then harrowed before planting. Ploughing and cultivating a soil homogenizes and modifies the upper 12 to 25 cm of the soil to form a plow layer. In many soils, the majority of fine plant feeder roots can be found in the topsoil or plow layer.

II. PARTS

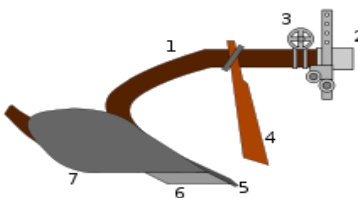


Diagram - modern plough

The diagram (*right*) shows the basic parts of the modern plough:

1. beam
2. hitch (Brit: hake)
3. vertical regulator

4. coulter (knife coulter pictured, but disk coulter common)
5. chisel
6. share
7. moldboard

Other parts not shown or labelled include the frog (or frame), runner, landside, shin, trash board, and stilts (handles).

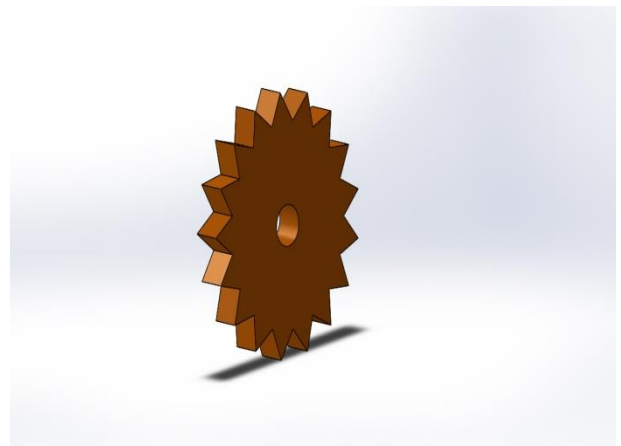
On modern ploughs and some older ploughs, the moldboard is separate from the share and runner, so these parts can be replaced without replacing the moldboard. Abrasion eventually destroys all parts of a plough that come into contact with the soil.

III. CONSTRUCTIONAL DETAILS

| s.no | Components used | specification |
|------|-------------------------|-------------------------|
| 1 | Mild steel wheel - 2nos | 700 mm |
| 2 | Sprocket | 7"x1/2" |
| 3 | Sprocket | 2"x1/2" |
| 4 | Chain | 1/2" |
| 5 | Spur gear | 50 dia, No. of teeth:17 |
| 6 | Cutter | 4" dia x1" width |
| 7 | Handle | |

IV. DESIGN OF PLOWING MACHINE

A. FRONT WHEEL:

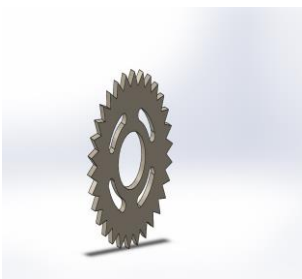


B. BACK WHEEL:



C. SPROCKETS:

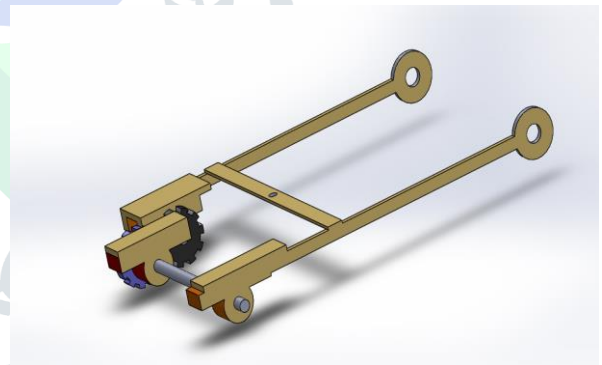
SMALL:



BIG:



G. GEAR SETUP:



D. CHASIS:

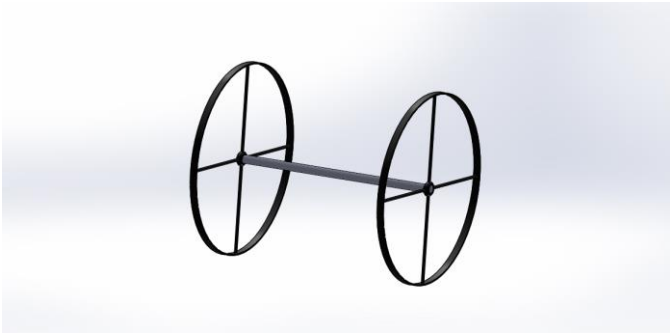


E. GEAR:

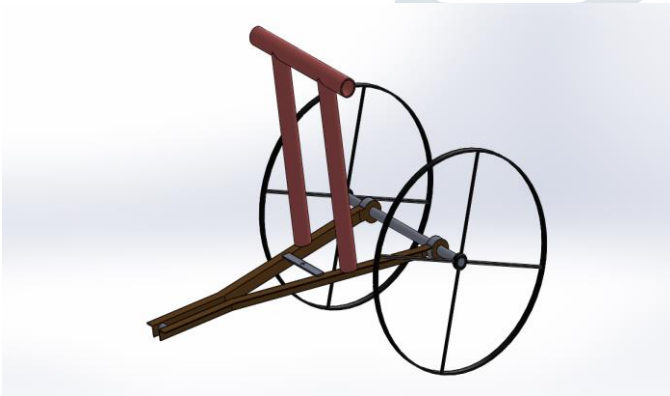
F. HEIGHT CONTROL SCREW:

H. ASSEMBLY STEPS:

STEP 1:



STEP 2:



STEP 3:



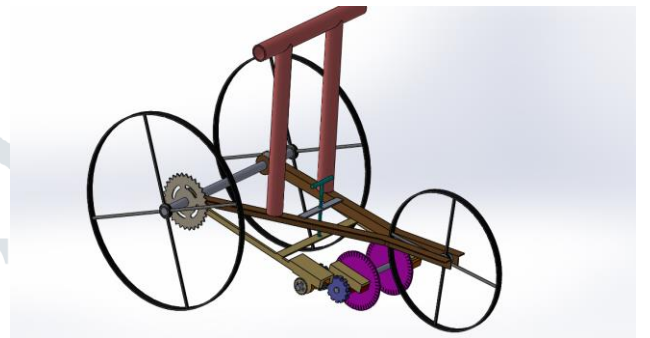
STEP 4:



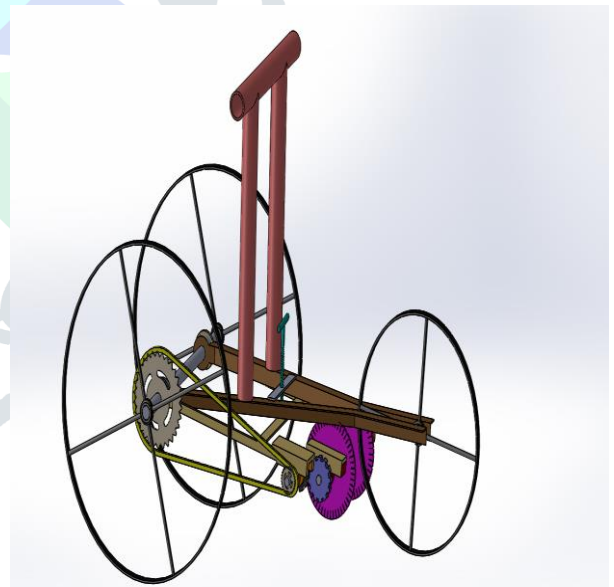
STEP 5:



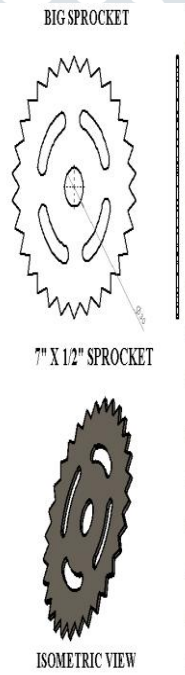
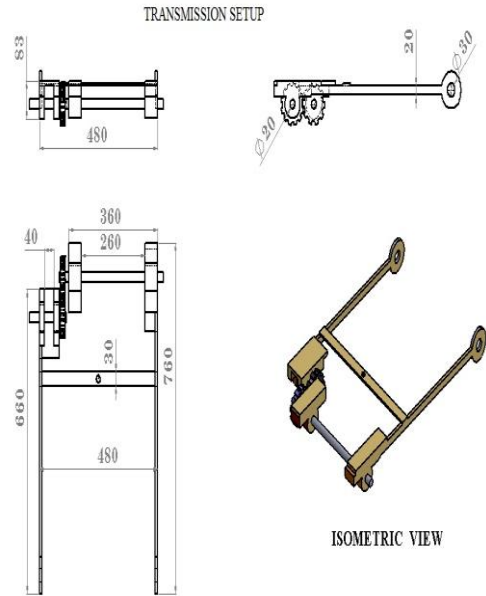
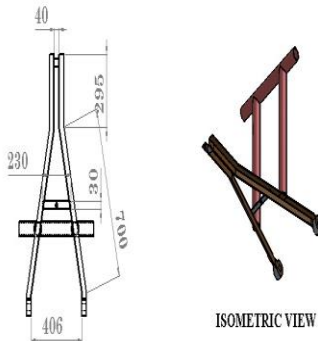
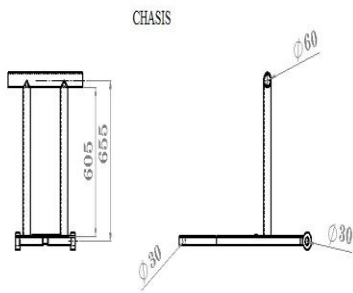
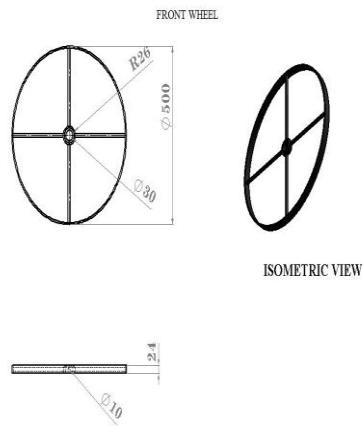
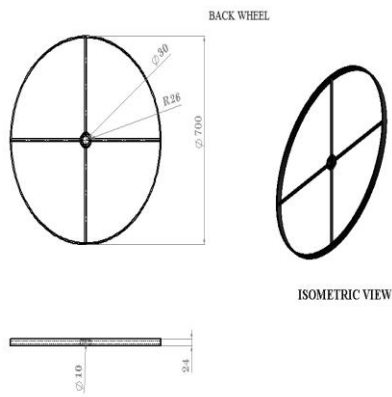
STEP 6:

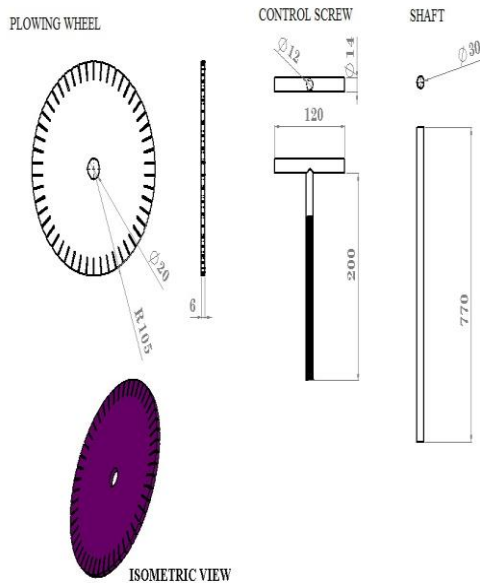


STEP 7:



I. DESIGN WITH DIMENSIONS





- Chip forming - sawing, drilling, milling, turning



etc.

- Shearing - punching, stamping, scissoring.
- Abrading - grinding, lapping, polishing; water-jet.
- Heat - flame cutting, plasma cutting, laser cutting.
- Electrochemical - etching, electrical discharge machining (EDM).

V. WORKING PRINCIPLE AND OPERATIONS USED

A. WORKING PRINCIPLE

- In Plowing machine, initially the depth of plowing on land should be determined and initial adjustment of height control screw is done.
- The force is given on handle in such a way that the cutter touches the ground surface and slow frontward movement is given on the plowing machine.
- When the plowing machine started moving the front two wheels starts its rotation whereby the sprocket attached to the left wheel is also moving.
- The Sprocket is connected with another sprocket and spur gear assembly by means of chain. When sprocket starts rotates the chain moves and it makes the spur gear to rotate.
- Now the spur gear is connected with cutter which in turn rotates in backward side and plowing process starts. A third wheel is fixed in the rear side to safeguard the cutter.
- For effecting plowing we attached two cutters and in future it can be implemented with motor also.

Every method has its limitations in accuracy, cost, and effect on the material. For example, heat may damage the quality of heat-treated alloys, and laser cutting is less suitable for highly reflective materials such as aluminum. Laser cutting sheet metal produces flat parts and etches and engraves parts from complex or simple designs. It is used over other cutting options for its quick process and customizable abilities.

GRINDING:

Grinding uses an abrasive process to remove material from the workpiece. A grinding machine is a machine tool used for producing very fine finishes, making very light cuts, or high precision forms using an abrasive wheel as the cutting device. This wheel can be made up of various sizes and types of stones, diamonds or inorganic materials.



B. OPERATIONS USED IN THIS PROJECT

- CUTTING
- GRINDING
- WELDING
- FACING
- TURNING
- DRILLING
- ASSEMBLY



CUTTING:

Cutting has been at the core of manufacturing throughout history. For metals many methods are used and can be grouped by the physical phenomenon used.

Welding:

Welding is a fabrication process that joins materials, usually metals or thermoplastics, by causing coalescence. This is often done by melting the workpieces and adding a filler material to form a pool of molten material that cools to become a strong joint, but sometimes pressure is used in conjunction with heat, or by itself, to produce the weld.



- Ploughing small agriculture land.
- Study model for agriculture and engineering students.

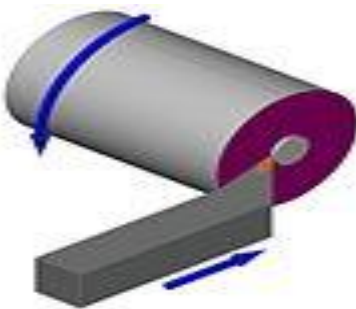
VII. CONCLUSION

In this project we have successfully fabricated a Ploughing machine. Thus, a low-cost machine for Ploughing small agriculture land. The main advantage is that the maintenance cost is very low and renting of tractors is avoided and it helps farmers in great extent. Design of innovative ploughing machine is done using solid works software and fabricated successfully.

VIII. REFERENCE

1. Manufacturing Technology by R.K. JAIN
2. www.google.com
3. Wikipedia on Agri products
4. Ancient Egyptian ard, c.1200 B.C. (Burial chamber of [Sennedjem](#))
5. Design of machine elements text book
6. Production technology by R.K. JAIN
7. PSG Design Data Book

FACING



Facing in the context of turning work involves moving the cutting tool at right angles to the axis of rotation of the rotating workpiece. This can be performed by the operation of the cross-slide, if one is fitted, as distinct from the longitudinal feed (turning). It is frequently the first operation performed in the production of the workpiece, and often the last—hence the phrase "ending up".

DRILLING



Drilling is a cutting process that uses a drill bit to cut or enlarge a hole of circular cross-section in solid materials. The drill bit is a rotary cutting tool, often multipoint. The bit is pressed against the workpiece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the workpiece, cutting off chips (swarf) from the hole as it is drilled

VI. ADVANTAGES AND APPLICATION

A. ADVANTAGES

- Portable and easy to transport one place to another.
- Maintenance cost is low
- Low cost machine used for ploughing small agriculture land.
- No need of power supply when connected to battery
- Working is easy and human friendly

B. APPLICATION