SRI SHANMUGHA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved By AICTE, Accredited by NAAC, Affiliated to Anna University)

Tiruchengode – Sankari Mani Rd, Pullipalayam, Morur (PO), Sankari (Tk), Salem 637304.

AI8611-CAD FOR AGRICULTURAL ENGINEERING

DEPARTMENT OF AGRICULTURE ENGINEERING

Anna University - Regulation: 2017

B.E AGRICULTURE ENGINEERING – VI SEMESTER

AI8611-CAD FOR AGRICULTURAL ENGINEERING

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RECORD NOTE BOOK

REGNO. ______________________

Certified that this is a bonafide observation of Practical work done by Mr/Ms/Mrs…………………………………of the………………………………… Semester……………………………………………. Branch during the Academic year……………in the………………………………laboratory.

Staff–in–Charge **Head of the Department**

INTERNAL EXAMINER **EXTERNAL EXAMINER**

GENERAL INSTRUCTIONS

- All the students are instructed to wear protective uniform and shoes before entering into the laboratory.
- Before starting the exercise, students should have a clear idea about the principles of that exercise
- All the students are advised to come with completed recorded and corrected observation book of previous experiments, defaulters will not allowed to do their experiment.
- Don't operate any instrument without getting concerned staff member's prior permission.
- All the instruments are costly. Hence handle them carefully, to avoid fine for any breakage.
- Almost care must be taken to avert any possible injury while on laboratory work. In case, anything occurs immediately report to the staff members.
- One student from each batch should put his/her signature during receiving the instrument in instrument issue register.

LIST OF EXPERIMENTS

S.No	Date	Name of the Experiments	Page No	Mark Obtained	Faculty Signature

AI8611 CAD FOR AGRICULTURAL ENGINEERINGL TP C

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OBJECTIVES:

- To draft the agricultural engineering related machineries and structures manually and also by computer aided methods.

1. Design and Drawing of Underground pipeline system
2. Design and Drawing of Check dam
3. Design and Drawing of Mould board plough
4. Design and Drawing of Disk plough
5. Design and Drawing of Post harvest technology units (threshers and winnowers)
6. Design and Drawing of Biogas plant.
7. Introduction & demonstration on 3D modeling softwares like Pro/E, Creo, Solid works, Solid Edge etc.

TOTAL: 60 PERIODS

OUTCOMES:

- The student will be able to understand the plan and layout of underground pipes, post harvesting units and check dams.
- The students also will be able to design and draw the components using computer aided methods

REFERENCES :

1. Michael, A.M. “Irrigation Theory and Practice”, Vikas Publishing House, New Delhi, 1999.
2. Rai, G.D. “Nonconventional Sources of Energy”, Khanna publishers, New Delhi, 1995.
3. Srivastava, A.C.”Elements of Farm Machinery”, Oxford and IBH Publications Co., New Delhi, 1990.
4. Vijay Duggal. “A general guide to Computer Aided Design & Drafting, Mailmax Publications, 2000
5. Tadeusz Stolarski et al. “Engineering Analysis with ANSYS Software”, ButterworthHeinemann Publications, 2006
6. Louis Gary Lamit, “Introduction to Pro/ENGINEER” SDC Publications, 2004.

EXPERIMENTS

S.No	Name of the Experiment	Date	Page No	Faculty Signature
1	STUDY OF DRAFTING SOFTWARE (AutoCAD)			
2	DESIGN AND DRAWING OF UNDERGROUND PIPELING SYSTEM			
3	DESIGN AND DRAWING OF CHECK DAMS			
4	DESIGN AND DRAWING OF MOULD BOARD PLOUGH			
5	DESIGN AND DRAWING OF DISC PLOUGH			
6	DESIGN AND DRAWING OF BIOGAS PLANT			
7	DESIGN AND DRAWING OF WINNOWERS			
8	DESIGN AND DRAWING OF CULTIVATOR			
9	INTRODUCTION TO 3D MODELLING			

Expt. No : 1	STUDY OF DRAFTING SOFTWARE (AutoCAD)
Date :	

Aim:

To study AutoCAD Software.

Commands:

1. OPEN Opens an existing drawing file
2. ARC Creates an arc
3. ARRAY Creates multiple copies of objects in a pattern
4. BHATCH Fills an enclosed area or selected objects with a hatch pattern
5. BLOCK Creates a block definition from objects you select
6. BREAK Erases parts of objects or splits an object in two
7. CHAMFER Bevels the edges of objects
8. CHANGE Changes the properties of existing objects
9. CIRCLE Creates a circle
10. COLOR Defines color for new objects
11. COPY Duplicates objects
12. DIVIDE Places evenly spaced point objects
13. DONUT Draws filled circles and rings
14. ELLIPSE Creates an ellipse or an elliptical arc
15. ERASE Removes objects from a drawing
16. HATCH Fills a specified boundary with a pattern
17. HATCHEDIT Modifies an existing hatch object
18. EXTEND Extends an object to meet another object
19. INSERT Places a named block or drawing into the current drawing
20. LAYER Manages layers and layer properties
21. LINE Creates straight line segments
22. LINETYPE Creates, loads, and sets line types
23. OFFSET Creates concentric circles, parallel lines, and parallel curves
24. FILLET Rounds and fillets the edges of objects
25. MIRROR Creates a mirror image copy of objects
26. MOVE Displaces objects a specified distance in a specified direction
27. MSLIDE Creates a slide file of the current view port in model space, or of all view ports in paper space

28. LTSCALE Sets the line type scale factor
29. PAN Moves the drawing display in the current view port
30. OOPS Restores erased objects
31. PLINE Creates two-dimensional polylines
32. POINT Creates a point object
33. POLYGON Creates an equilateral closed polyline
34. PROPERTIES Controls properties of existing objects
35. ORTHO Constrains cursor movement
36. OSNAP Sets object snap modes
37. REDRAW Refreshes the display in the current view port
38. REGEN Regenerates the drawing and refreshes the current view port
39. ROTATE ROTATE
40. SCALE Enlarges or reduces selected objects equally in the X, Y, and Z directions
41. SCRIPT Executes a sequence of commands from a script
42. SKETCH Creates a series of freehand line segments
43. SPLINE Creates a quadratic or cubic spine (NURBS) curve
44. TEXT Displays text on screen as it is entered
45. UNDO Reverses the effect of commands
46. ZOOM Increases or decreases the apparent size of objects in the current view port
47. AREA Calculates the area and perimeter of objects or of defined areas
48. LTSCALE Sets the line type scale factor
49. BACKGROUND Sets up the background for your scene
50. BASE Sets the insertion base point for the current drawing

RESULT

Thus the commands of AutoCAD was studied

Expt. No : 2	DESIGN AND DRAWING OF UNDERGROUND PIPELING SYSTEM
Date :	

Aim:

To design the pipeline system which buried under the ground.

Design procedure:

The design of underground pipe line system requires information on land topography, location of water source and water discharge. Pump stands must be of high elevation to allow sufficient operating head for the pipeline. However, stands higher than necessary may permits high heads of water to build up, leading to excessive line pressures. The working pressures in the pipeline are kept within one-fourth the internal bursting pressures of the pipe. When it is necessary to design pipelines with higher heads, reinforced concrete pressure pipes are used. The sizes of the outlets are selected to suit the flow required at diversion points. The PVC and HDPE are also used for water distribution at low and moderate pressure. The components of the systems such as pipeline size and height of Pump stands and control stands must be designed so as to obtain a balanced water distribution and provide trouble free operation.

The underground pipeline may fail due to i) lack of inspection or maintenance, ii) improper construction, iii) improper design and iv) wrong manufacturing processes and poor quality materials used.

The underground pipelines operate without trouble when it is properly designed and correctly installed. Inadequate procedures in design and installation and unforeseen situations give rise to the following troubles.

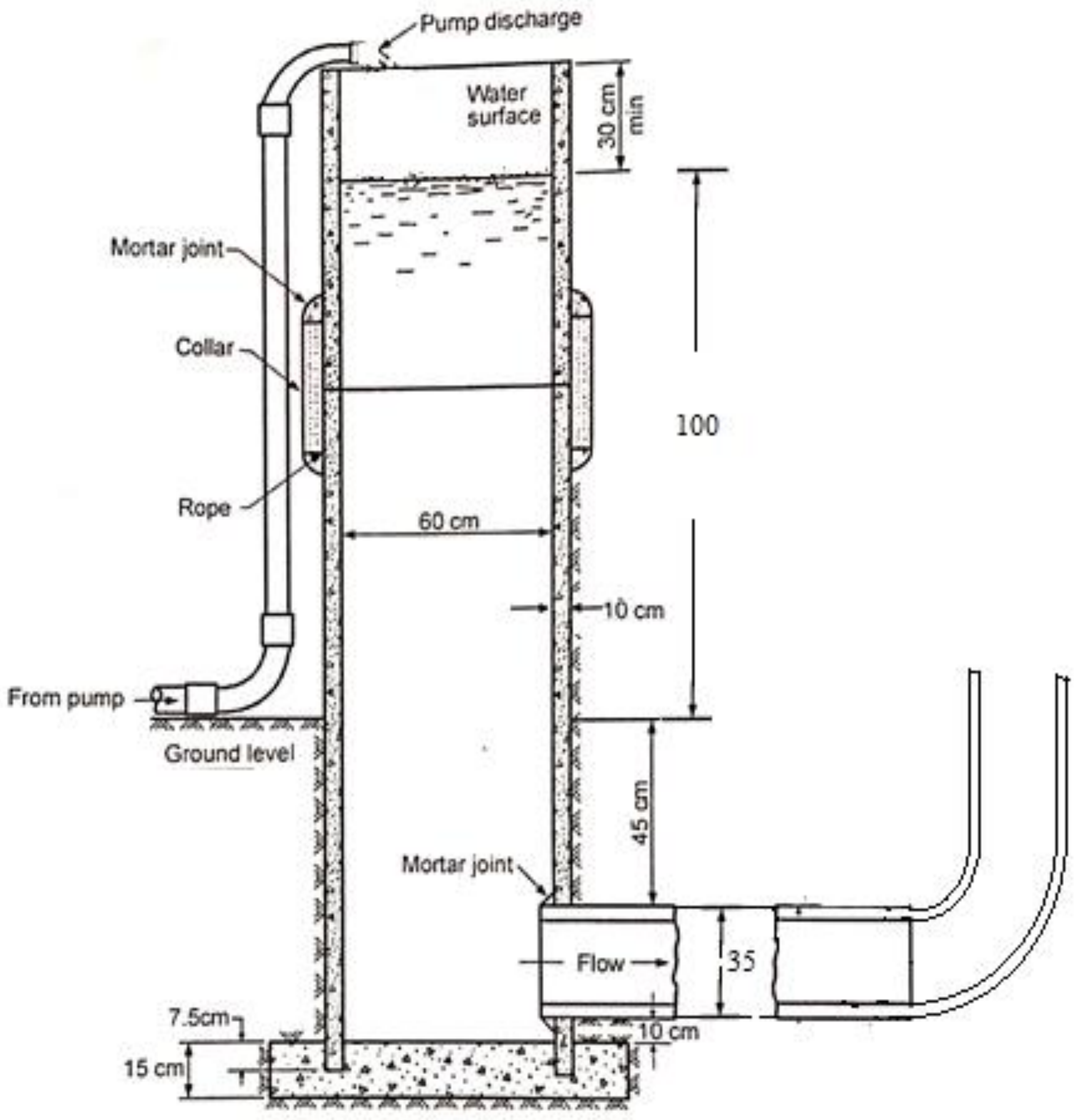
Development of longitudinal cracks in the pipe, usually at the top or both at top and bottom

Telescoping of sections

Pushing of the pipe into the stands

Development of circumferential cracks

Surging or intermittent flow of water



Pump discharge
Water surface
30 cm min
Mortar joint
Collar
Rope
60 cm
100
10 cm
From pump
Ground level
45 cm
Mortar joint
Flow
35
7.5cm
15 cm
10 cm

Leak Testing and Repair:

All buried low pressure irrigation pipelines should be tested for leaks before the trench is filled. The pipeline should be filled with water and slowly brought up to operating pressure with all turnouts closed. Any length of pipe section or joints showing leakage should be replaced and the line retested. The water should remain in pipelines throughout the backfilling of trenches, because the internal pressure helps to prevent pipe deformation from soil loading and equipment crossings. Underground pipelines should be inspected for leakage at least once a year. Leaks may be spotted from wet soil areas above the line that are otherwise unexplained. Small leaks in concrete pipeline can be repaired by carefully cleaning the pipe exterior surrounding the leak, then applying a patch of cement mortar grout. For larger leaks, one or more pipe sections may have to be replaced. Longevity of concrete pipelines can be increased by capping all opening during cold winter months to prevent air circulation. Small leaks in plastic pipe, except at the joints, can sometimes be repaired by pressing a gasket-like material tightly against the pipe wall around the leak and clamping it with a saddle. Where water is supplied from a canal to portable surface pipe, sediment often accumulates in the pipe. This sediment should be flushed out before the pipe is moved. Otherwise, the pipe will be too heavy to be moved by hand and may be damaged if it is moved mechanically. Buried plastic pipelines can be expected to have a usable life of about 15 years, if well maintained. The annual cost of maintenance can be estimated as approximately 1% of the installation cost.

Result:

Thus the design of underground pipe line was completed.

Expt. No : 3	DESIGN AND DRAWING OF CHECK DAMS
Date :	

Aim:

To design the check dams.

Introduction:

A check dam is a small, sometimes temporary, dam constructed across a swale, drainage ditch, or waterway to counteract erosion by reducing water flow velocity. Check dams themselves are not a type of new technology; rather, they are an ancient technique dating all the way back to the second century A.D. Check dams are typically, though not always, implemented as a system of several check dams situated at regular intervals across the area of interest.

Grade control mechanism

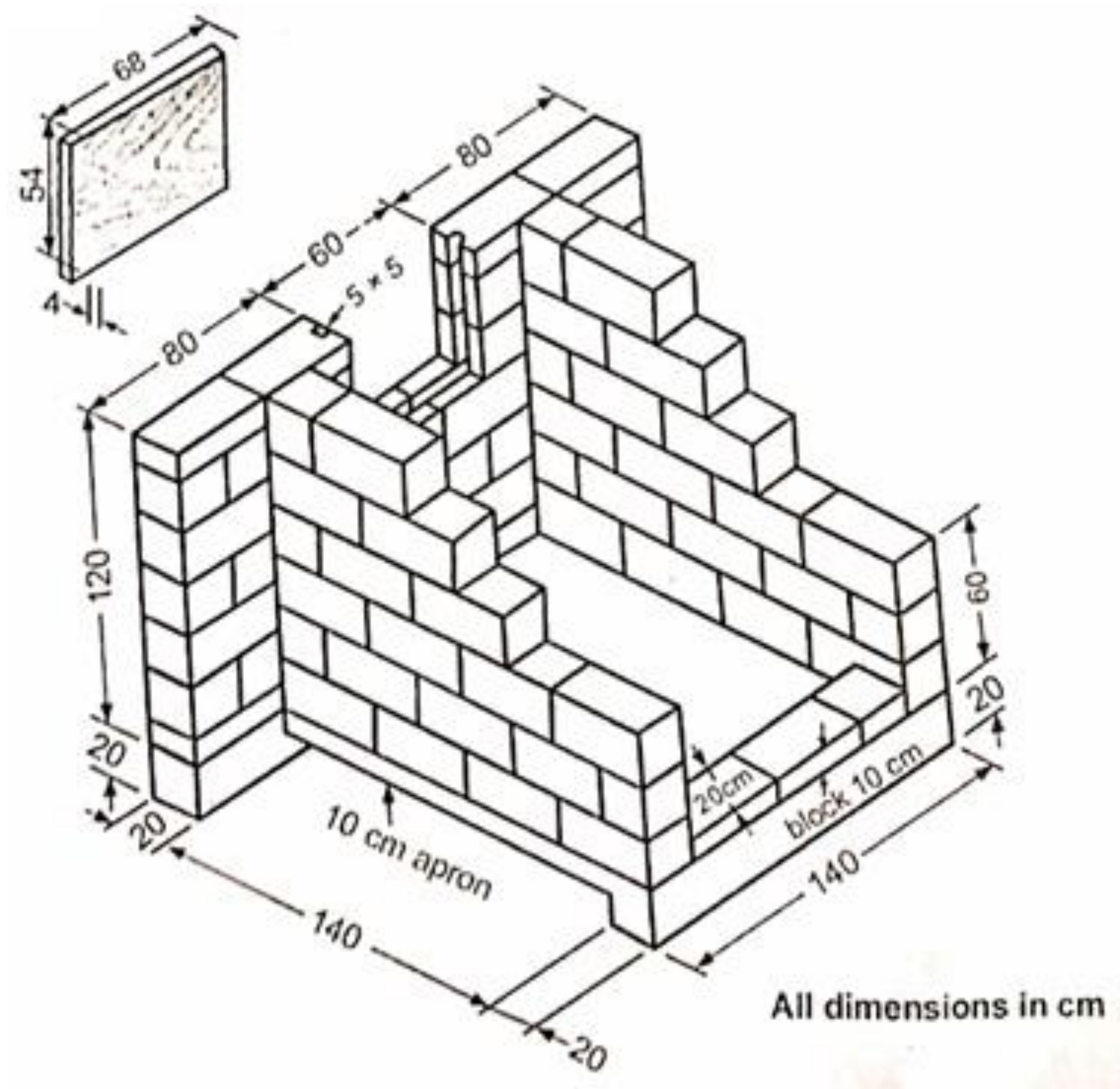
Check dams have traditionally been implemented in two main environments: across channel bottoms and on hilly slopes. Check dams are used primarily to control water velocity, conserve soil, and improve land. They are used when other flow-control practices, such as lining the channel or creating bios wales is impractical

DESIGN CONSIDERATIONS Site

Before installing a check dam, careful inspection of the site must be undertaken. The drainage area should be ten acres or less. The waterway should be on a slope of no more than 50% and should have a minimum depth to bedrock of 2 ft. Check dams are often used in natural or constructed channels or swales. They should never be placed in live streams unless approved by appropriate local, state and/or federal authorities.

Materials

Check dams are made of a variety of materials. Because they are typically used as temporary structures, they are often made of cheap and accessible materials such asrocks, gravel, logs, hay bales, and sandbags. Of these, logs and rock check dams are usually permanent or semi-permanent; and the sandbag check dam is implemented primarily for temporary purposes. Also, there are check dams that are constructed with rockfill or wooden boards. These dams are usually implemented only in small, open channels that drain 10 acres (0.04 km2) or less; and usually do not exceed 2 ft (0.61 m) high.[14] Woven-wire can be used to construct check dams in order to hold fine material in a gully. They are typically utilized in environments where the gully has a moderate slope (less than 10%), small drainage area, and in regions where flood flows do not typically carry large rocks or boulders.In nearly all instances, erosion control blankets, which are biodegradable open-weave blankets, are used in conjunction with check dams.


68
54
4
80
60
5 × 5
80
120
20
20
10 cm apron
140
20
60
20
20cm
block 10 cm
140
All dimensions in cm

Check dam

Size

A check dam should not be more than 2 ft (0.61 m) to 3 ft (0.91 m) high. and the center of the dam should be at least 6 in (0.15 m) lower than its edges. They may kill grass linings in channels if water stays high or sediment load is great. This criteria induces a weir effect, resulting in increased water surface level upstream for some, if not all flow conditions.

Spacing

In order to effectively slow down water velocity to counter the effects of erosion and protect the channel between dams in a larger system, the spacing must be designed properly. The check dams should be spaced such that the toe of the upstream check dam is equal to the elevation of the downstream check dam's crest. By doing so, the water can pond between check dams and thus slow the flow's velocity down substantially as the water progresses downslope.

Result:

Thus the check dam was designed successfully.

Expt. No : 4	**DESIGN AND DRAWING OF MOULD BOARD PLOUGH**
Date :	

Aim:

To design mould board plough.

Procedure:

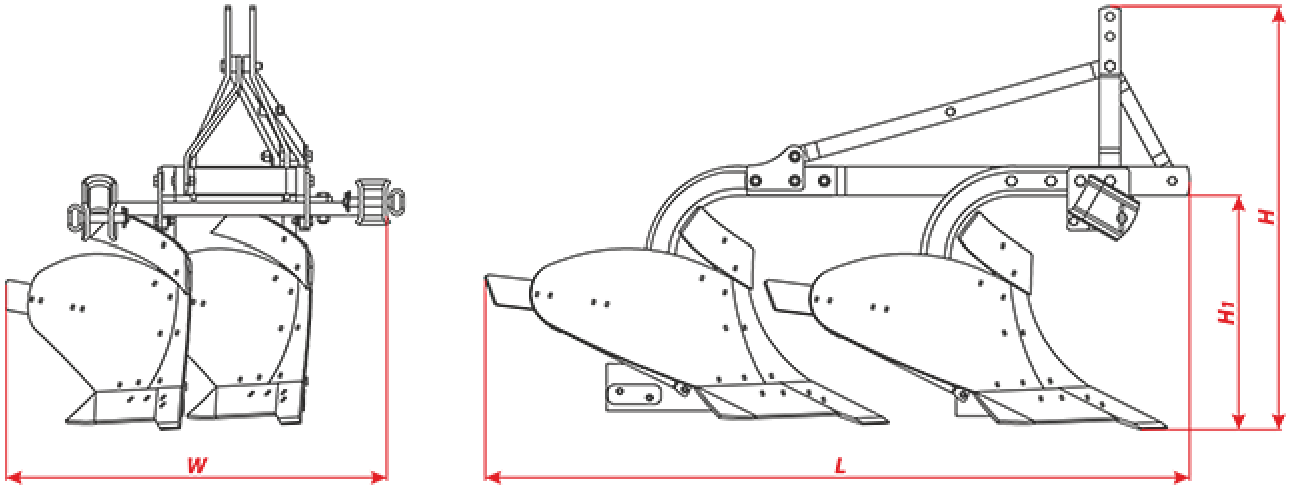
Mould Board Plough is the most important plough for primary tillage in canal irrigated orheavy rain areas where too much weeds grow. The objective for ploughing with a MouldBoard is to completely invert and pulverize the soil, up-root all weeds, trash and cropresidues and bury them under the soil. The shape of mould Board is designed to cut downthe soil and invert it to right side, completely burying the undesired growth which issubsequently turned into manure after decomposition.

Benefits:

- it can handle the toughest ploughing job with outstanding penetrationperformance.
- It is designed to work in all types of soil for basic functions such as soil breaking.soil raising and soil turning.
- it can be used in stony & rooted soils,

Features:

- the under-frame and unit-to-unit clearance are adequate to copy with trashycondition.
- Adding an extra furrow or repositioning units to allow for extra clearance is quickand easy.
- The plough has special wear-resistant steel bottoms with bar points for toughestploughing jobs.
- Bar point bottoms ensure longer life as they can be extended or reversed and reusedfill the last possible length.



Result:

Thus the design of mould board plough was completed.

xpt. No : 5	**DESIGN AND DRAWING OF DISC PLOUGH**
Date :	

Aim:

To design disc plough.

Introduction:

A disc plough consist of a series of individually mounted, inclined disc blades on a frame supported by furrow wheel

A tractor mounted disc plough has only a rear furrow wheel

It works satisfactorily in a soil condition, which is dry rough and stony, where a mould board plough cannot perform well. As the plough is pulled forward, the sharp edge of the disk cuts the soil, and the concave surface of the rolling disk lifts and throws the soil to the side and hence pulverizing the soil to some extent.

Plough adjustments:

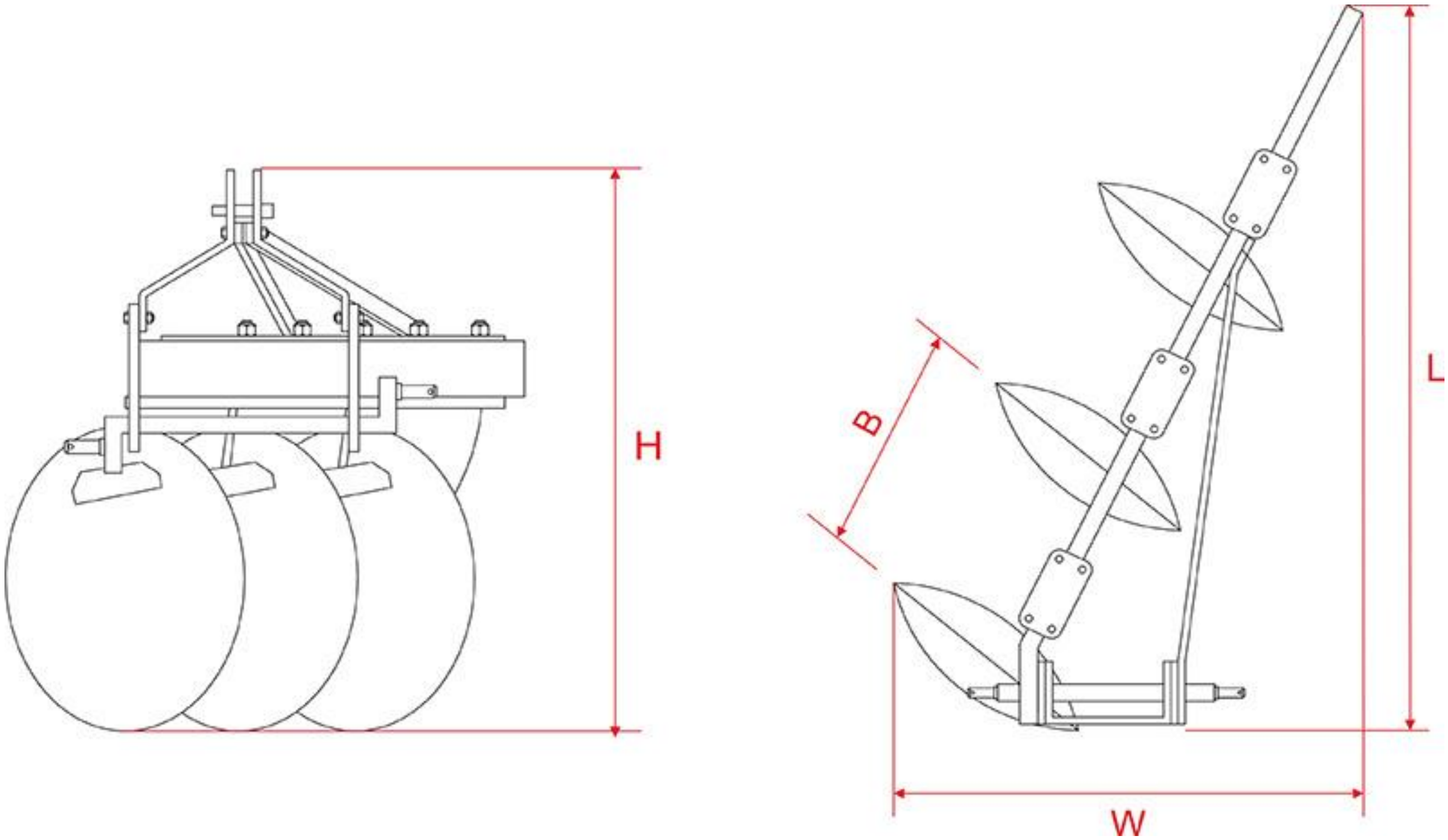
- Disc would not cut if they are rolled straight ahead.
- Provision is made in the plough standard for adjustments of the horizontal disc angle and vertical tilt angle to obtain optimum disc operations.
- Disc angle is the angle at which the plane of cutting edge of the disc is inclined from the direction of motion. It is responsible for width of cut.
- Tilt angle is the angle at which the plane of cutting edge of the disc is inclined from the vertical axis.

Width of cut adjustments:

- Every disc plough has a particular width of cut ranging from 18 – 25 cm. depending on the diameter of the blade.
- Cross shaft has can index line which can be lined up with different (1, 2,3) marking on the cross shaft carrier.

Leveling the plough:

- The level of the plough is controlled by the tractor top link.
- If the rear end of the plough beam is higher than the front end then shorten the top link.
- Lateral levelling is controlled by adjusting the length of the tractor right lower link.



Tightening the bearing:

- Bearings must be kept tight. Tighten the castle nuts until the disc blinds the hub.

Scrapper adjustments:

- Scrapers are set low enough to catch and turn the furrow slice before it falls away from the discs for deeper ploughing.
- The scrapper has to be set a little higher for sticky soils set them closer to the disc.

Adjustments for deeper ploughing:

The depth of the plough can be obtained by the position and draft control levers of the tractor hydraulic system. However more depth can be obtained by

Adding extra weight to the plough

Reducing the tilt angle

If the ground is covered with trashes set the disc in almost vertical position and weight to the plough

Operation:

- Before ploughing check all nuts and bolts of the disc plough.
- Don't plough on stony soil.
- Tractor should be in high first gear.
- If the soil is hard than plough the field at least twice.
- Make sure that the shocker spring is tight.
- Lift the disc plough on every turn.
- Be vigilant about the tree roots and stones.
- Keep proper distance from disc plough when disc plough is in working.

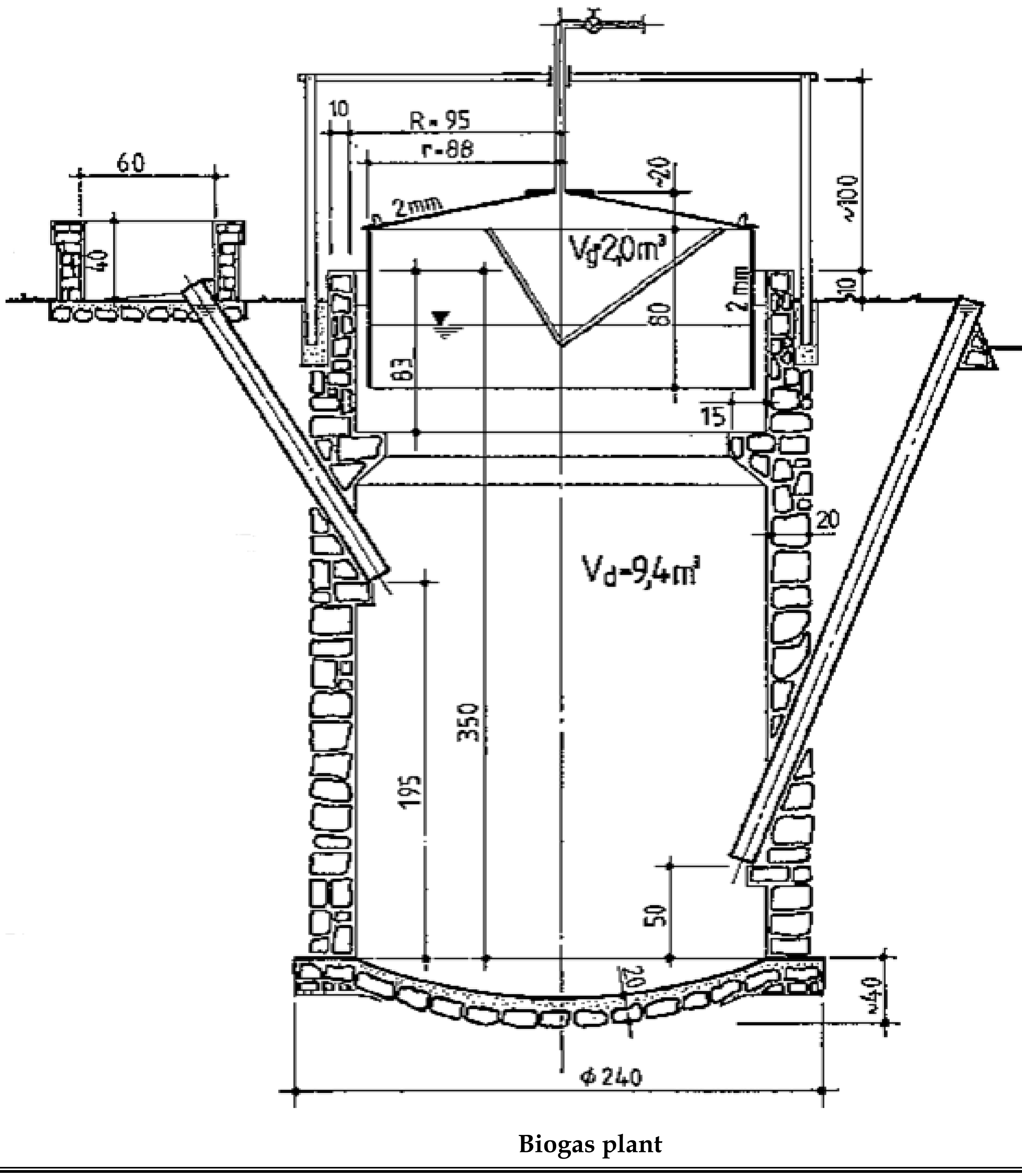
Result:

Thus the design of disc plough was completed.

Expt. No :	DESIGN AND DRAWING OF BIOGAS PLANT
Date :	

Aim:

To design a bio gas plant.



Biogas plant

Command used:

- **Units**
- **Limits**
- **Scale**
- **Line**
- **Offset**
- **Arc**
- **Dimension**
- **Fillet**
- **Hatching**
- **Rotate**

Result:

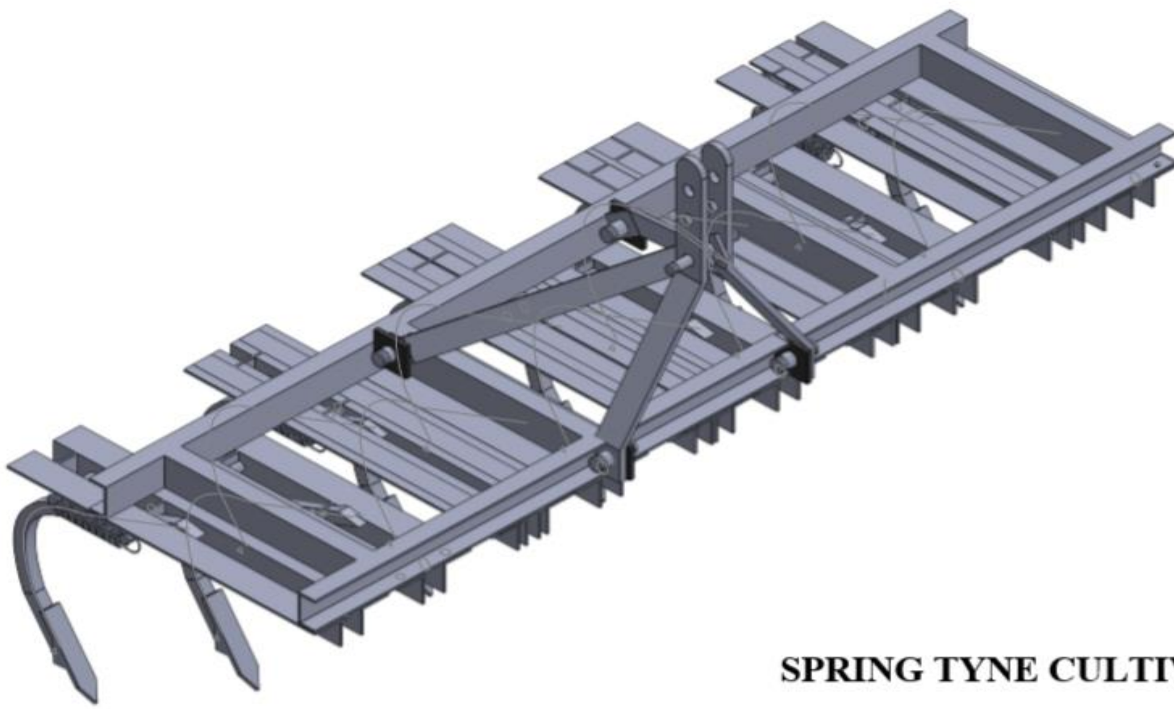
Thus the design of biogas plant was completed.

xpt. No : 5	**DESIGN AND DRAWING OFCULTIVATOR**
Date :	

Aim:

To design cultivator.

Procedure:



SPRING TYNE CULTIVATOR

Result:

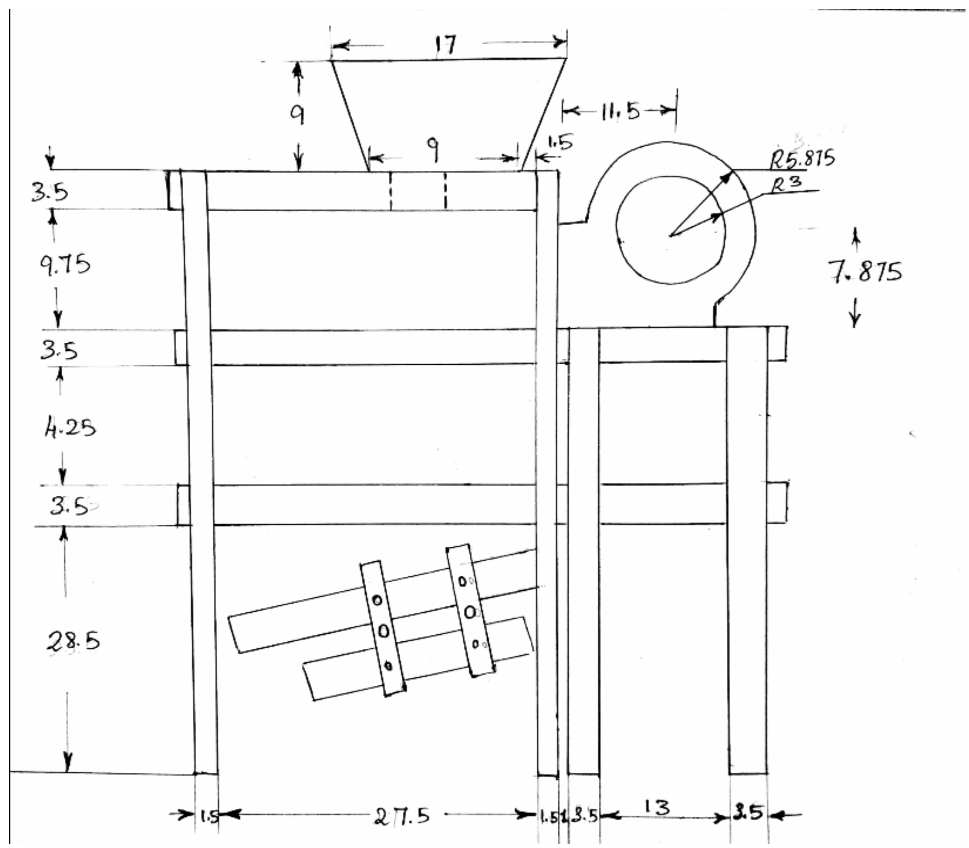
Thus the design of cultivator was completed

Expt. No :	DESIGN AND DRAWING OF WINNOWER
Date :	

Aim:

To design a winnower.

Winnowing is an agricultural method developed by ancient cultures for separatinggrain from chaff. It is also used to remove weevils or other pests from stored grain.Threshing, the loosening of grain or seeds from the husks and straw, is the step in thechaff-removal process that comes before winnowing.In its simplest form it involves throwing the mixture into the air so that the windblows away the lighter chaff, while the heavier grains fall back down for recovery.Techniques included using a winnowing fan (a shaped basket shaken to raise the chaff)or using a tool (a winnowing fork or shovel) on a pile of harvested grain.The rotary winnowing fan was exported to Europe, brought there by Dutch sailorsbetween 1700 and 1720. Apparently they had obtained them from the Dutch settlementof Batavia in Java, Dutch East Indies. The Swedes imported some from south China atabout the same time and Jesuits had taken several to France from China by 1720. Untilthe beginning of the 18th century, no rotary winnowing fans existed in the West.In 1737 Andrew Rodger, a farmer on the estate of Cavers in Roxburghshire,developed a winnowing machine for corn, called a 'Fanner'. These were successful andthe family sold them throughout Scotland for many years. Some Scottish Presbyterianministers saw the fanners as sins against God, for wind was a thing specially made by him and an artificial wind was a daring and impious attempt to usurp what belonged toGod alone. As the Industrial Revolution, the winnowing process was mechanized by theinvention of additional winnowing machines, such as fanning mills.



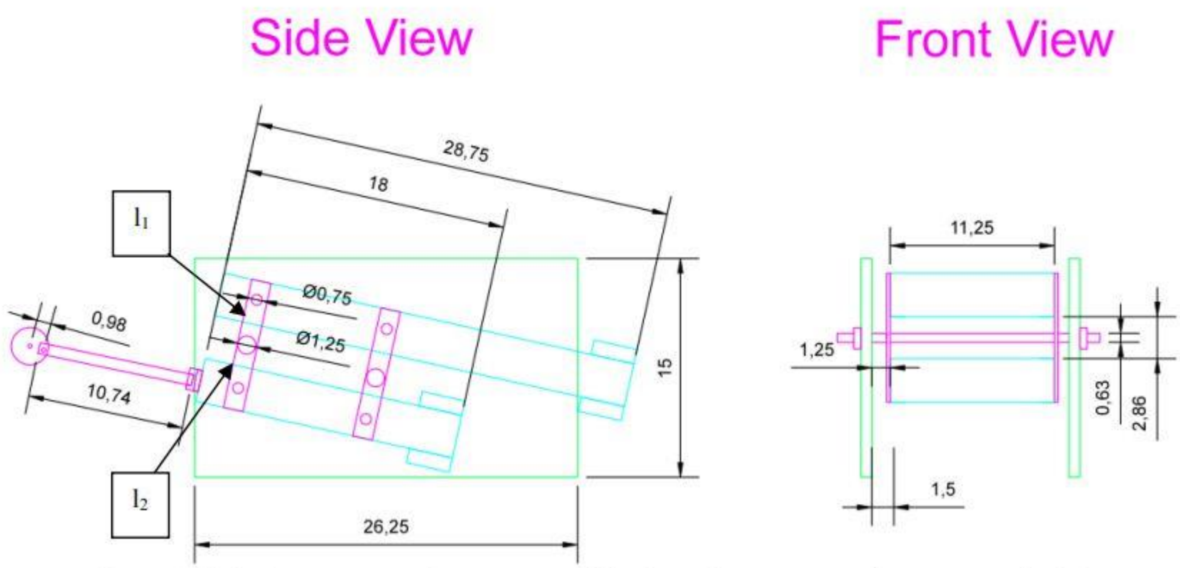


Figure 5: Side elevation view of sieve system (left); front elevation view of sieve system (right)

Result:

Thus the design aspects of winnowers and other recent technologies were studied

Expt. No :	INTRODUCTION TO 3D MODELLING
Date :	

Aim:

Introduction & demonstration on 3D modeling softwares like Pro/E, Creo, Solid works, Solid Edge etc.

Computer aided design or CAD has very broad meaning and can be defined as the use of computers in creation, modification, analysis and optimization of a design. CAE (Computer Aided Engineering) is referred to computers in engineering analysis like stress/strain, heat transfer, flow analysis. CAD/CAE is said to have more potential to radically increase productivity than any development since electricity. CAD/CAE builds quality form concept to final product. Instead of bringing in quality control during the final inspection it helps to develop a process in which quality is there through the life cycle of the product. CAD/CAE can eliminate the need for prototypes. But it required prototypes can be used to confirm rather predict performance and other characteristics. CAD/CAE is employed in numerous industries like manufacturing, automotive, aerospace, casting, mould making, plastic, electronics and other general-purpose industries. CAD/CAE systems can be broadly divided into low end, mid end and high-end systems. Low-end systems are those systems which do only 2D modelling and with only little 3D modelling capabilities. According to industry static's 70-80% of all mechanical designers still uses 2D CAD applications. This may be mainly due to the high cost of high-end systems and a lack of expertise. Mid-end systems are actually similar high-end systems with all their design capabilities with the difference that they are offered at much lower prices. 3D sold modelling on the PC is burgeoning because of many reasons like affordable and powerful hardware, strong sound software that offers windows case of use shortened design and production cycles and smooth integration with downstream application. More and more designers and engineers are shifting to mid end system. High-end CAD/CAE software's are for the complete modeling, analysis and manufacturing of products. High-end systems can be visualized as the brain of concurrent engineering. The design and development of products, which took years in the past to complete, is now made in days with the help of high-end CAD/CAE systems and concurrent engineering.

Model is a Representation of an object, a system, or an idea in some form other than that of the entity itself. Modeling is the process of producing a model; a model is a representation of the construction and working of some system of interest. A model is similar to but simpler than the system it represents. One purpose of a model is to enable the analyst to predict the effect of changes to the system. On the one hand, a model should be a close approximation to the real system and incorporate most of its salient features. On the other hand, it should not be so complex that it is impossible to understand and experiment with it. A good model is a judicious tradeoff between realism and simplicity.

Simulation practitioners recommend increasing the complexity of a model iteratively. An important issue in modeling is model validity. Model validation techniques include simulating the model under known input conditions and comparing model output with system output. Generally, a model intended for a simulation study is a mathematical model developed with the help of simulation software.

Software for modeling:

Solid works

Creo

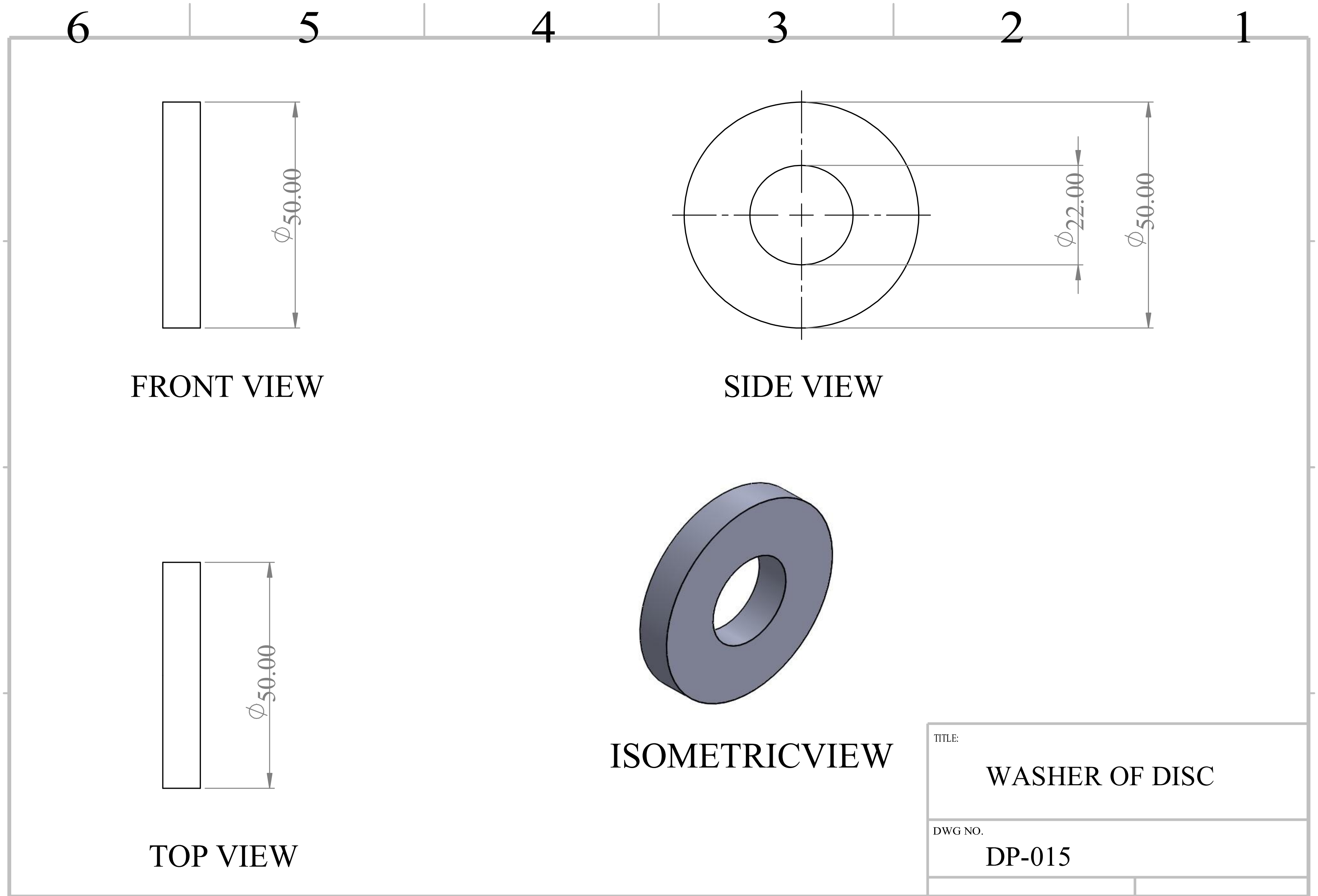
CATIA

Unigraphics, etc

Creo Elements/Pro (formerly Pro/ENGINEER), PTC's parametric, integrated 3D CAD/CAM/CAE solution, is used by discrete manufacturers for mechanical engineering, design and manufacturing. Created by Dr. Samuel P. Geisberg in the mid-1980s, Pro/ENGINEER was the industry's first successful rule-based constraint (sometimes called "parametric" or "variational") 3D CAD modeling system. The parametric modeling approach uses parameters, dimensions, features, and relationships to capture intended product behavior and create a recipe which enables design automation and the optimization of design and product development processes.

Result:

Thus the 3D modelling softwares were studied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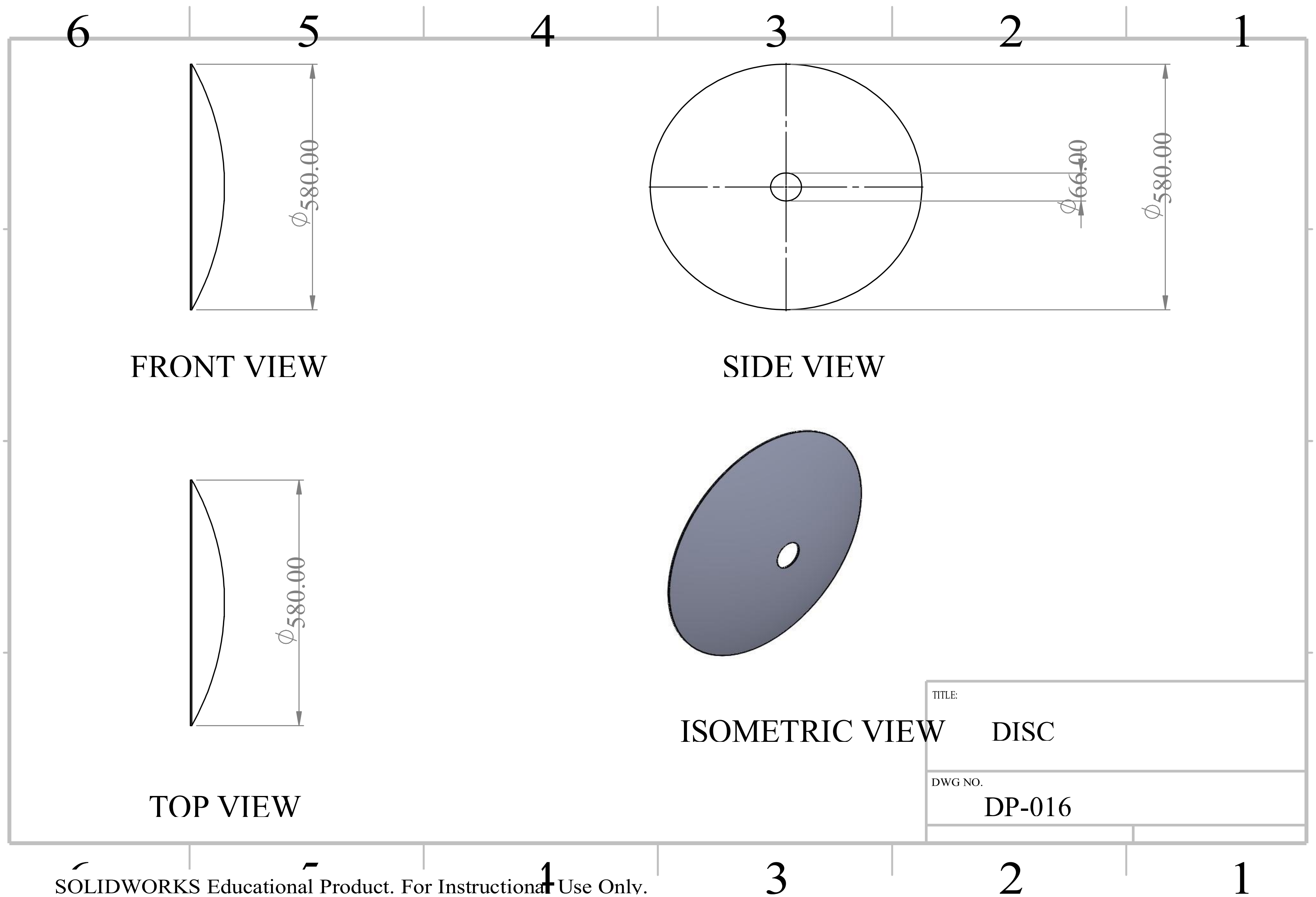

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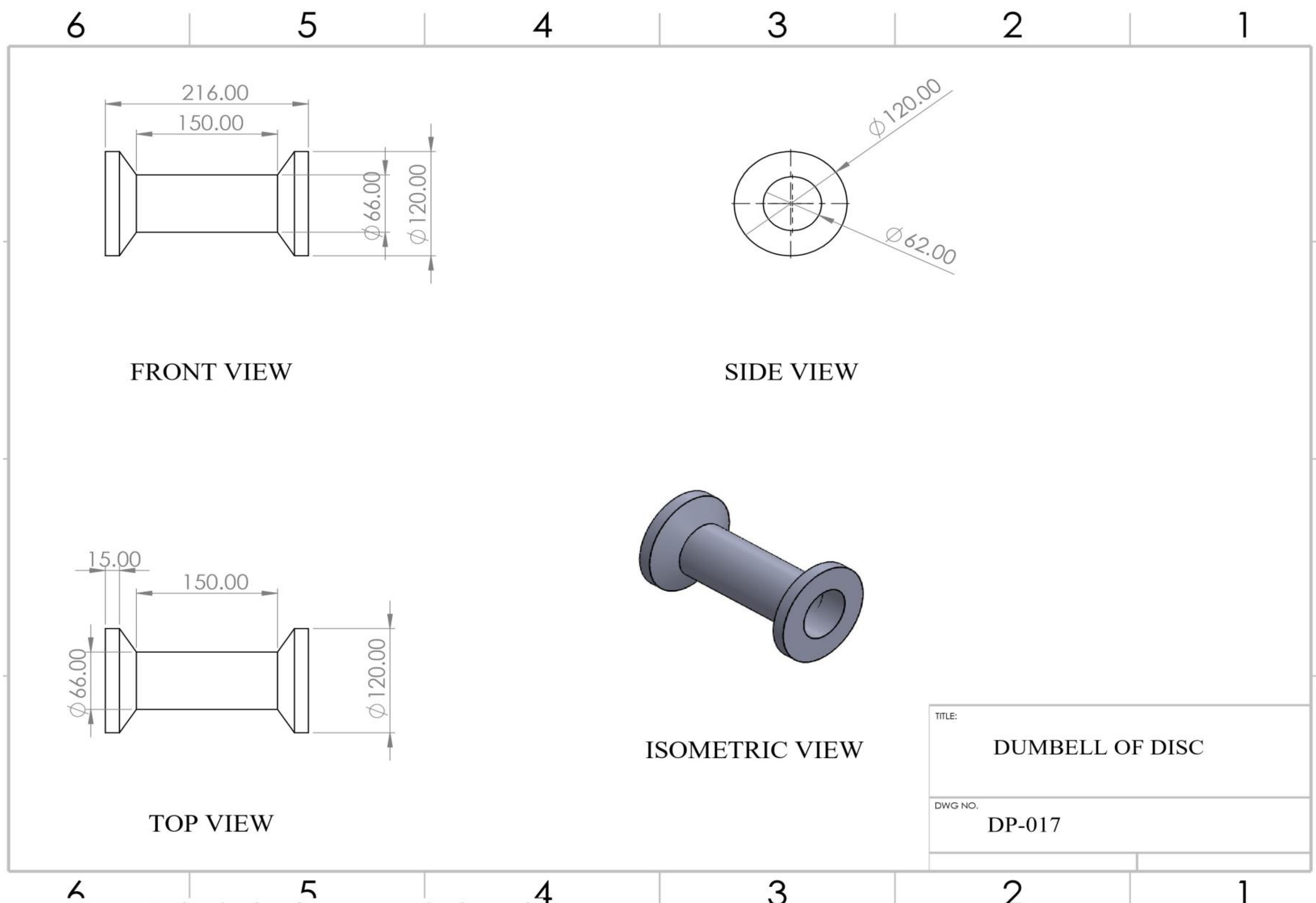

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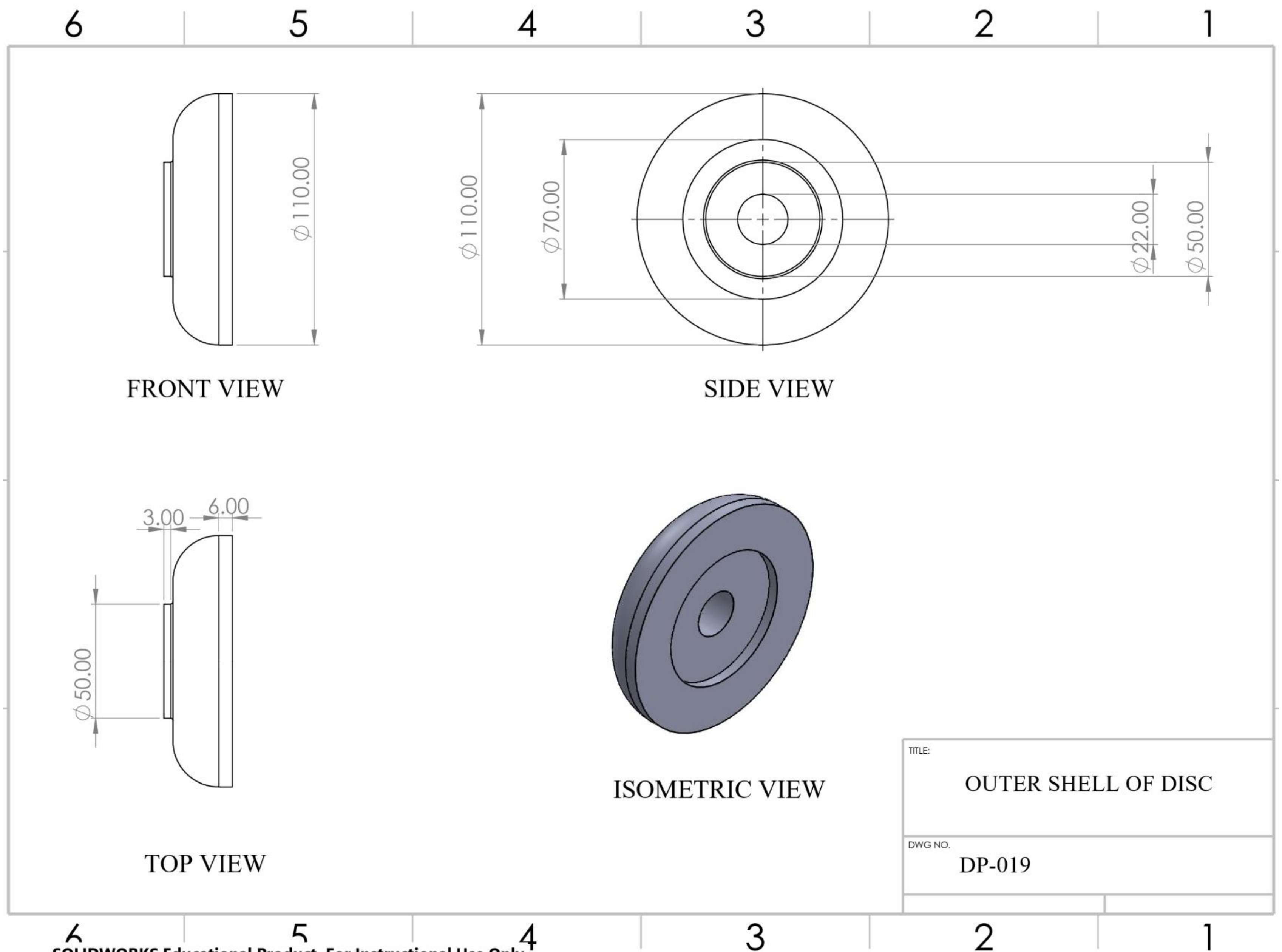
DP-017



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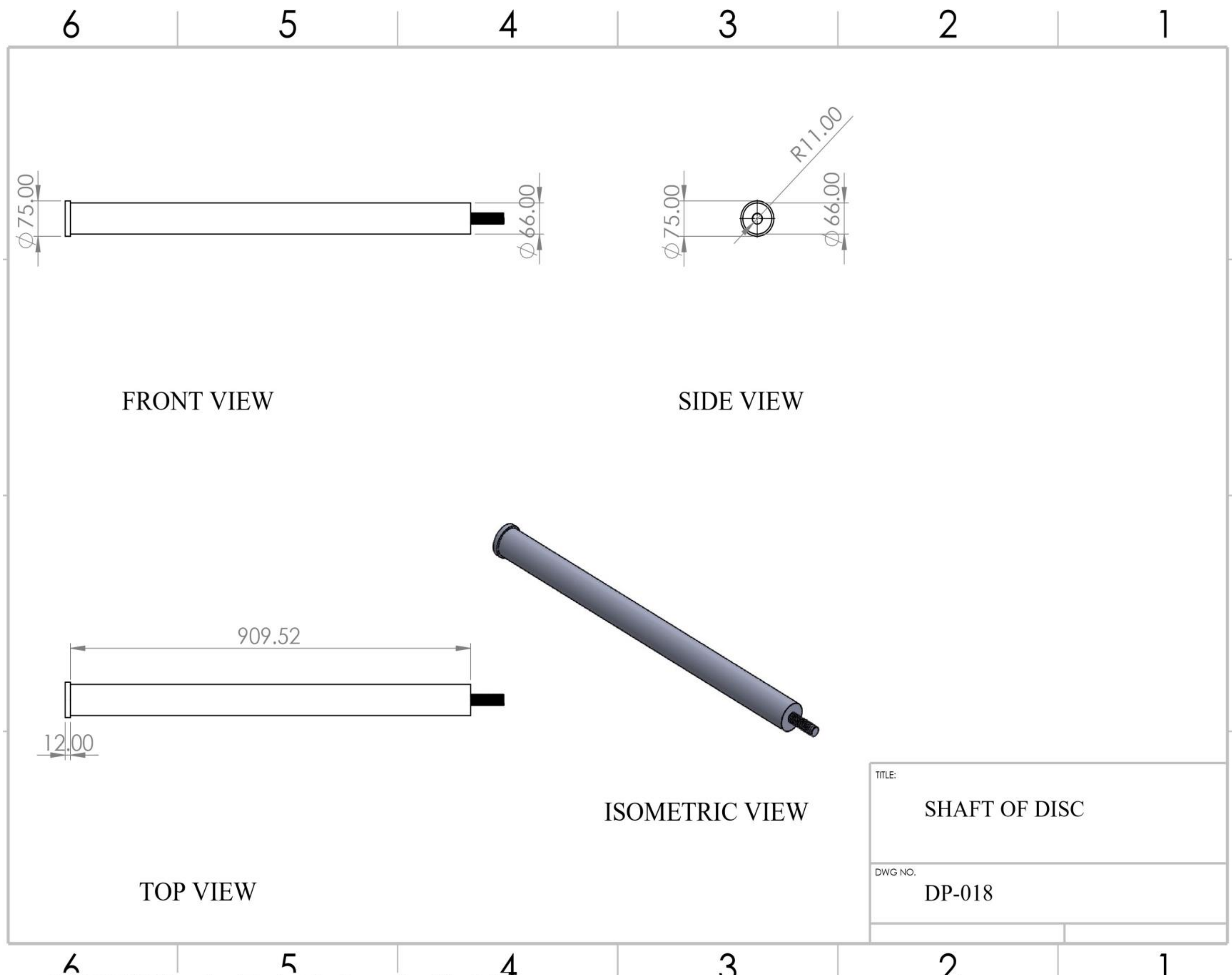
TITLE:
OUTER SHELL OF DISC
DWG NO.
DP-019



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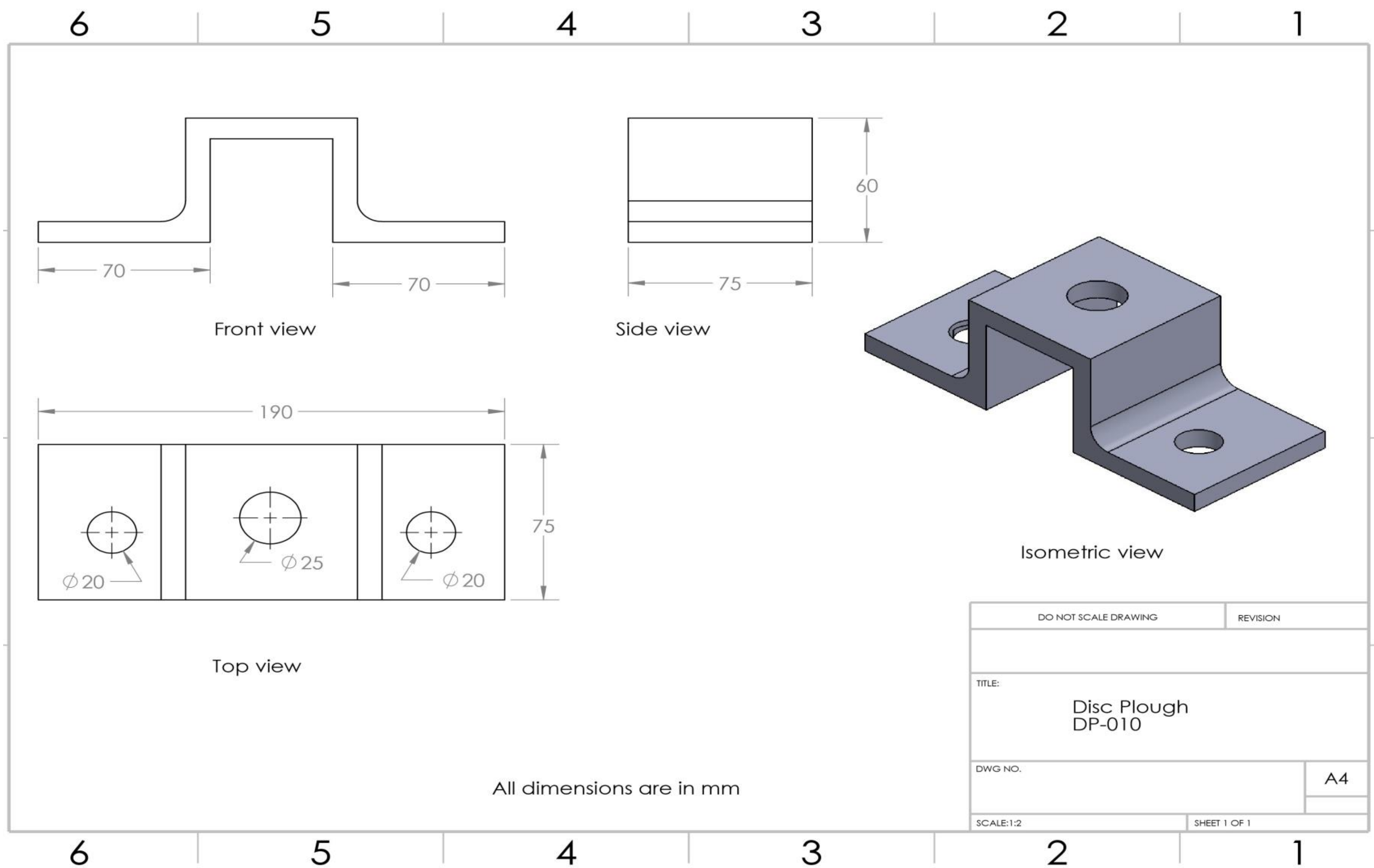
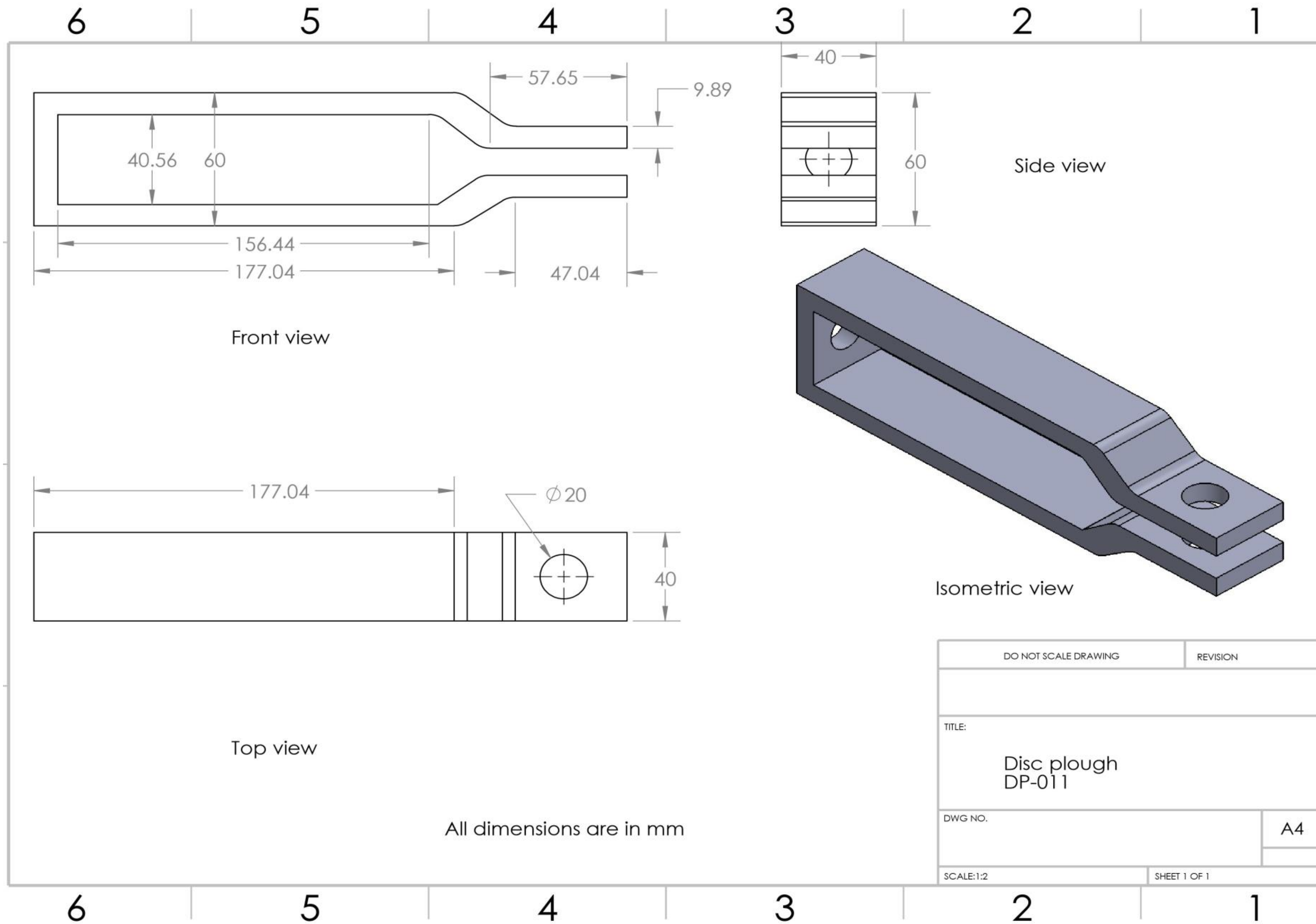
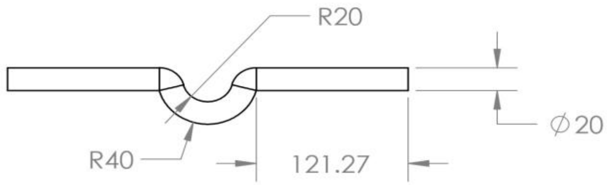
TOP VIEW
ISOMETRIC VIEW
TITLE:
SHAFT OF DISC
DWG NO.
DP-018

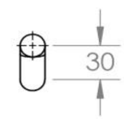


70
70
Front view
75
60
Side view
190
75
ϕ20
ϕ25
ϕ20
Top view
Isometric view
All dimensions are in mm
DO NOT SCALE DRAWING
REVISION
TITLE:
Disc Plough
DP-010
DWG NO.
A4
SCALE:1:2
SHEET 1 OF 1

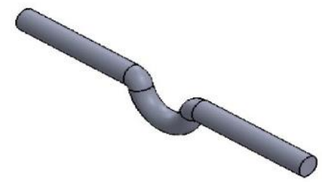

6
5
4
3
2
1
57.65
9.89
40.56
60
156.44
177.04
47.04
Front view
40
60
Side view
177.04
∅20
40
Top view
Isometric view
All dimensions are in mm
DO NOT SCALE DRAWING
REVISION
TITLE:
Disc plough
DP-011
DWG NO.
A4
SCALE:1:2
SHEET 1 OF 1



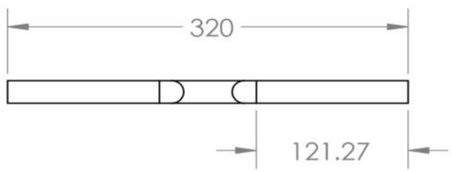
Front view



Top view



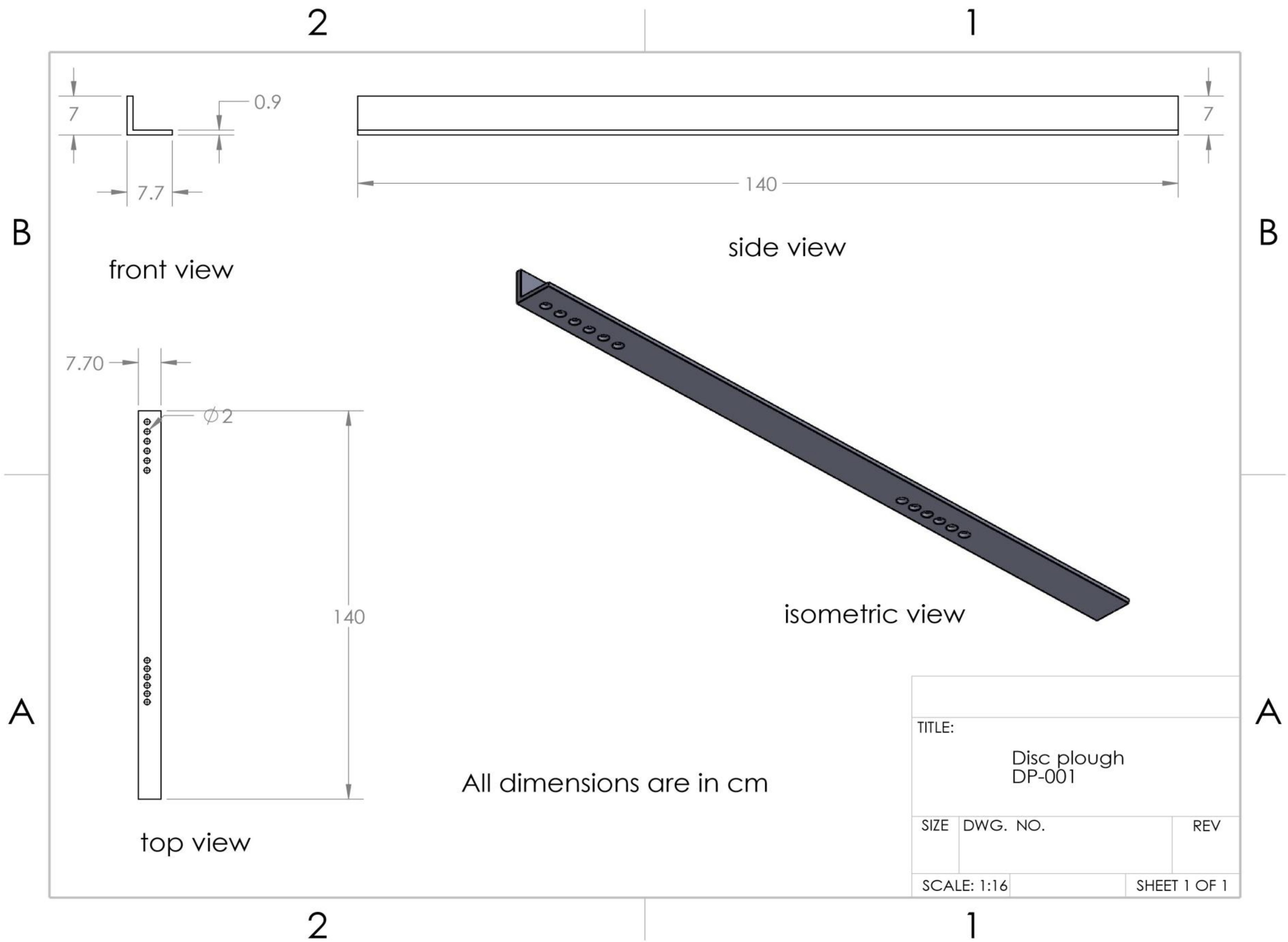
Isometric view

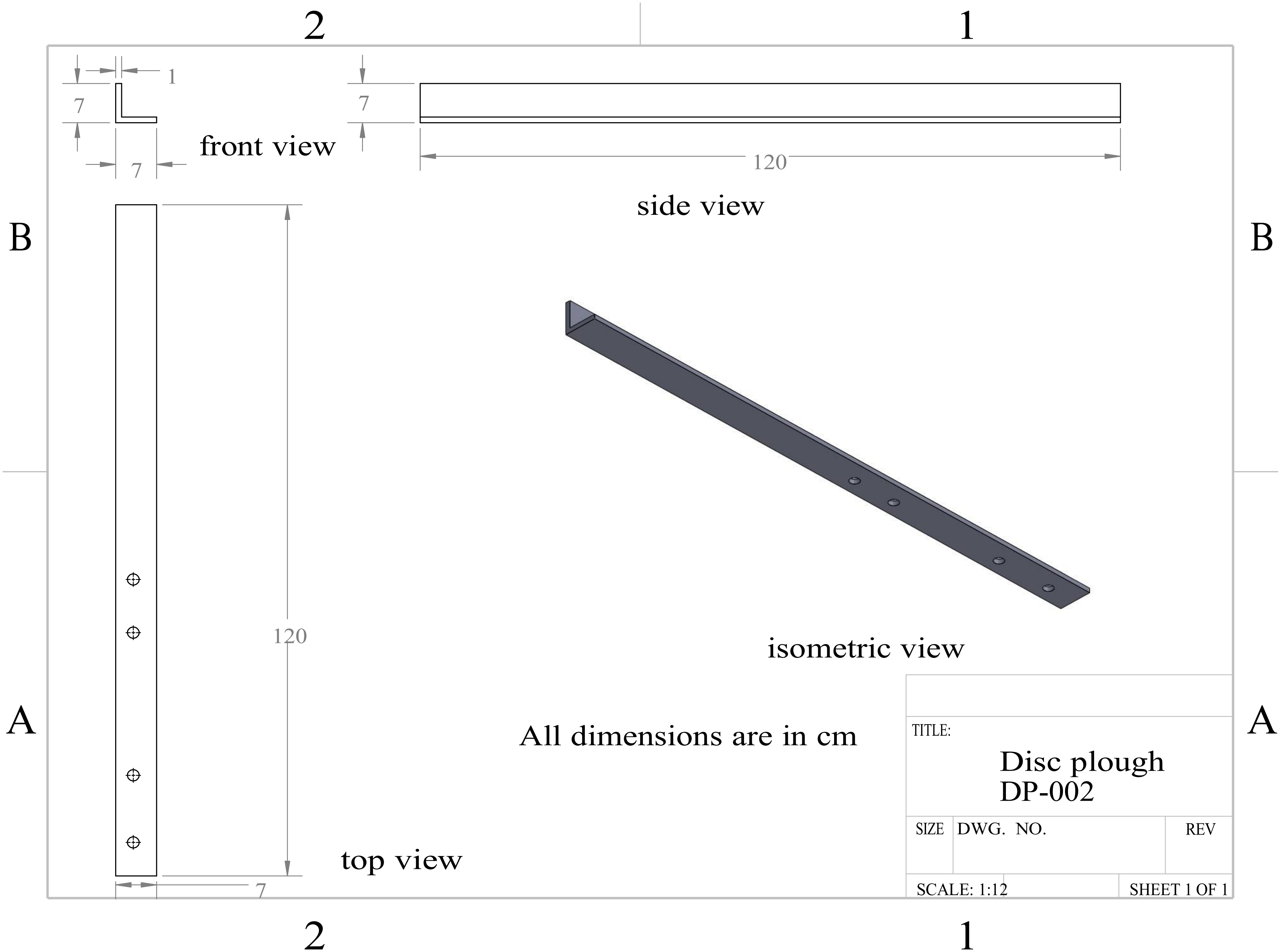


Top view

All dimensions are in mm

DO NOT SCALE DRAWING	REVISION
TITLE: Disc Plough DP-012	
DWG NO.	A4
SCALE:1:5	SHEET 1 OF 1


2
1
B
A
7
0.9
7.7
front view
7
140
side view
7.70
⌀2
140
top view
isometric view
All dimensions are in cm
TITLE:
Disc plough
DP-001
SIZE
DWG. NO.
REV
SCALE: 1:16
SHEET 1 OF 1

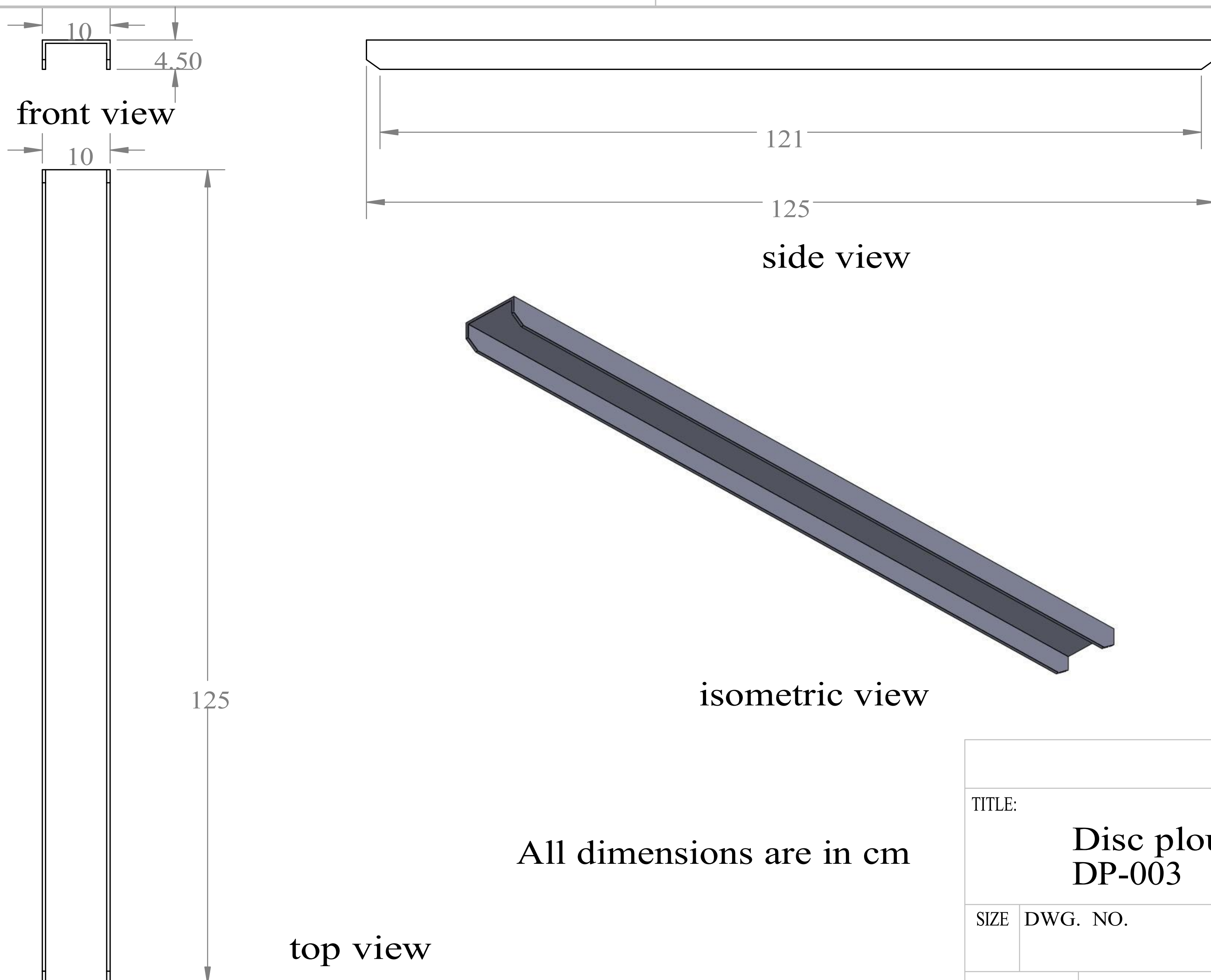


All dimensions are in cm

TITLE:

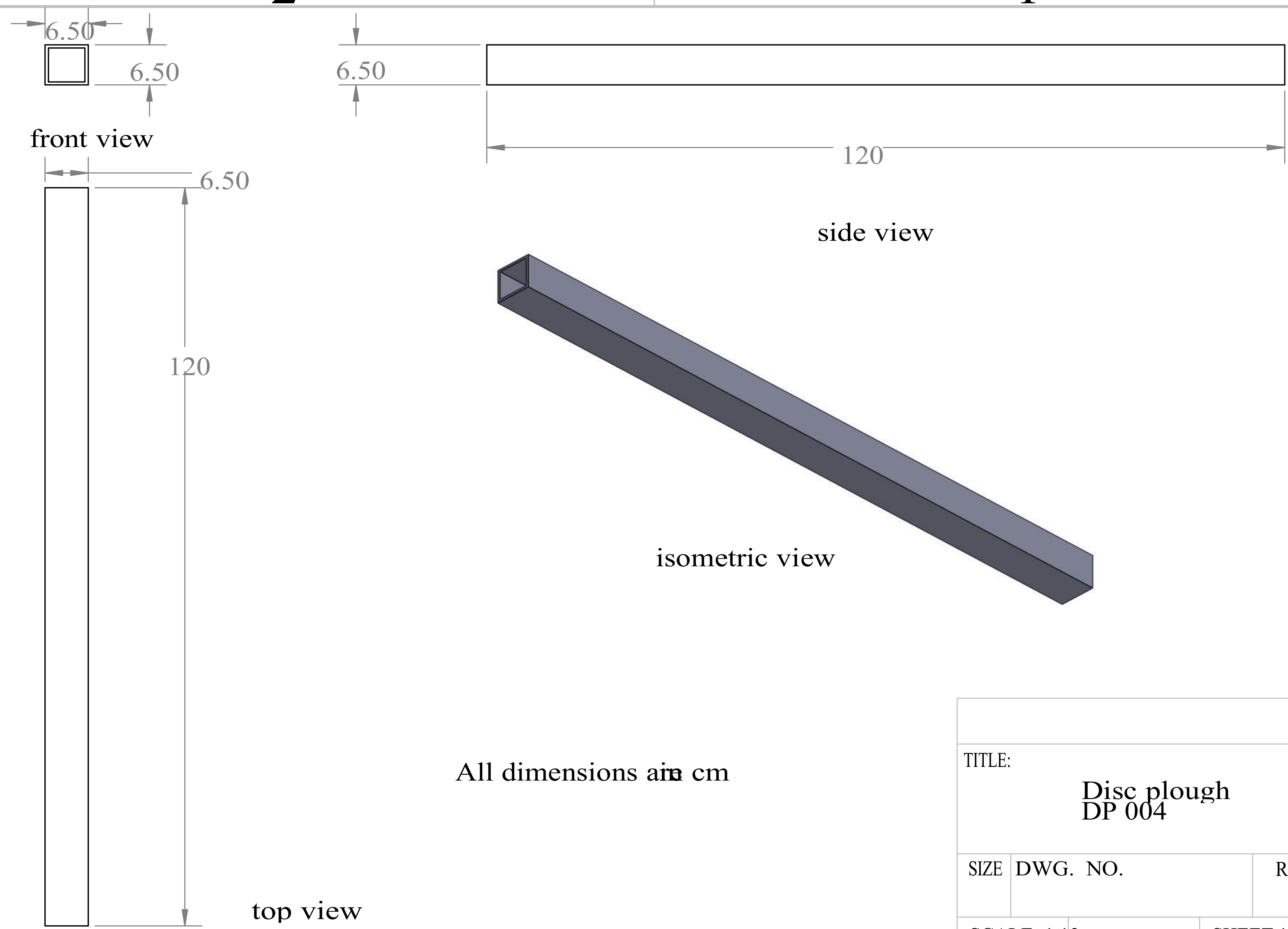
Disc plough
DP-002

SIZE	DWG. NO.	REV
SCALE: 1:12		SHEET 1 OF 1



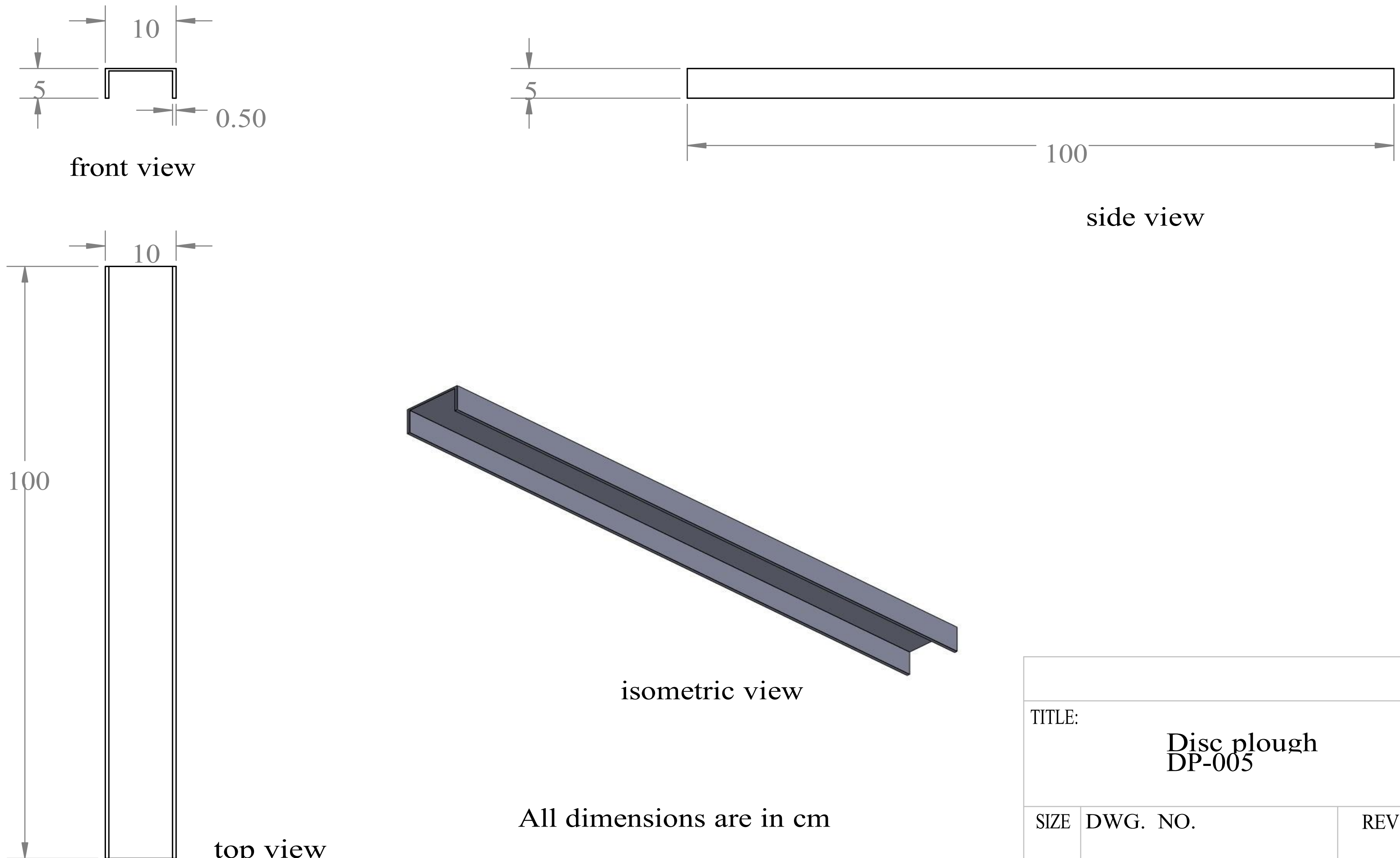
All dimensions are in cm

TITLE: Disc plough DP-003		
SIZE	DWG. NO.	REV
SCALE: 1:12		SHEET 1 OF 1



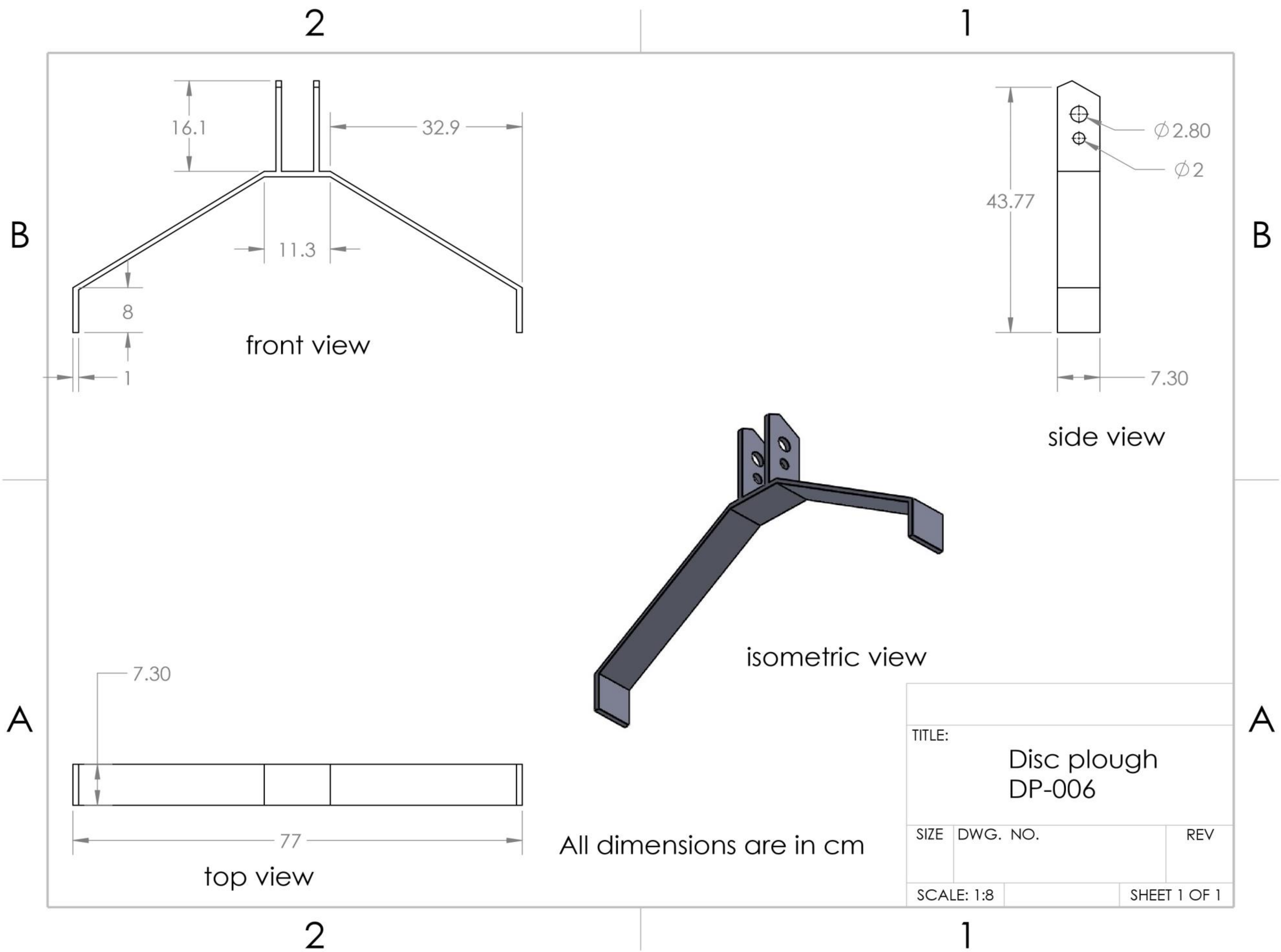
All dimensions are in cm

TITLE: Disc plough DP 004		
SIZE	DWG. NO.	REV
SCALE: 1:12		SHEET 1 OF 1

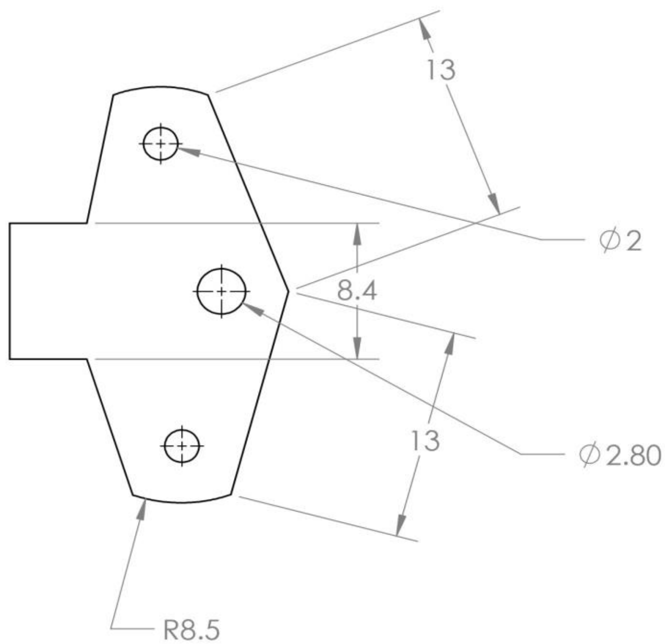


All dimensions are in cm

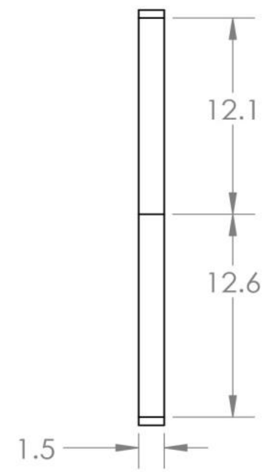
TITLE: Disc plough DP-005		
SIZE	DWG. NO.	REV
SCALE: 1:12		SHEET 1 OF 1



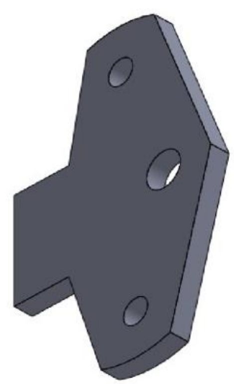
2
1
B
A
16.1
32.9
11.3
8
1
front view
43.77
⌀2.80
⌀2
7.30
side view
isometric view
7.30
77
top view
All dimensions are in cm
TITLE:
Disc plough
DP-006
SIZE
DWG. NO.
REV
SCALE: 1:8
SHEET 1 OF 1



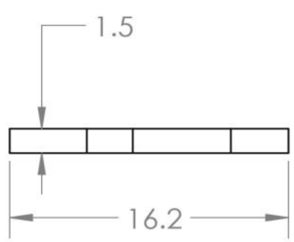
front view



side view



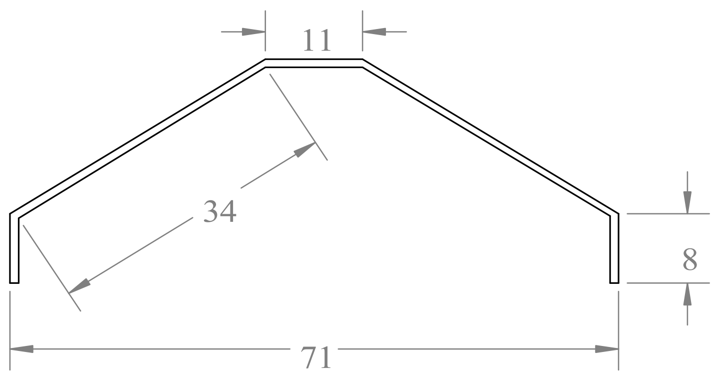
isometric view



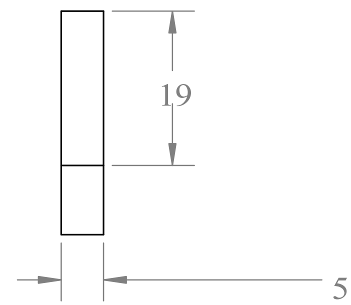
top view

All dimensions are in cm

TITLE: Disc plough DP-007		
SIZE	DWG. NO.	REV
SCALE: 1:4		SHEET 1 OF 1

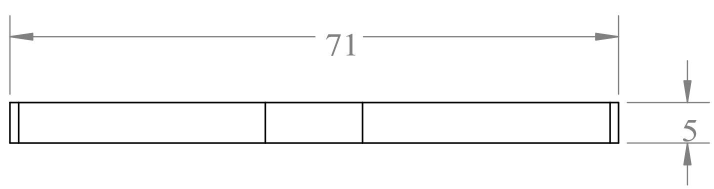


front view



side view

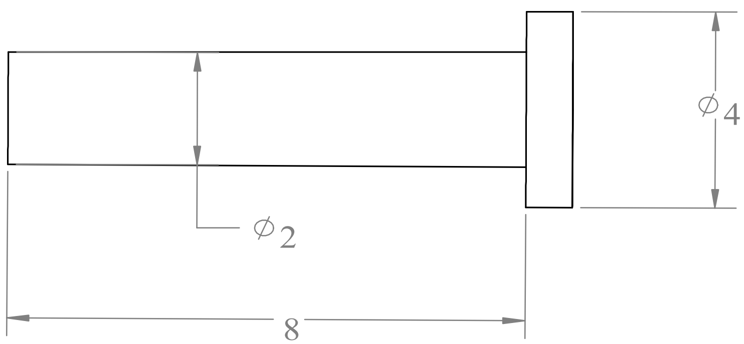
isometric view



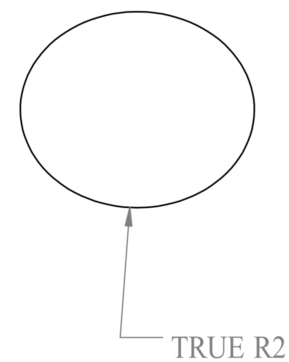
top view

All dimensions are in cm

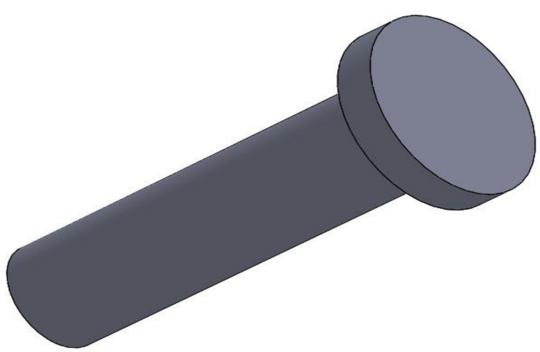
TITLE: Disc plough DP-008		
SIZE	DWG. NO.	REV
SCALE: 1:8		SHEET 1 OF 1



front view



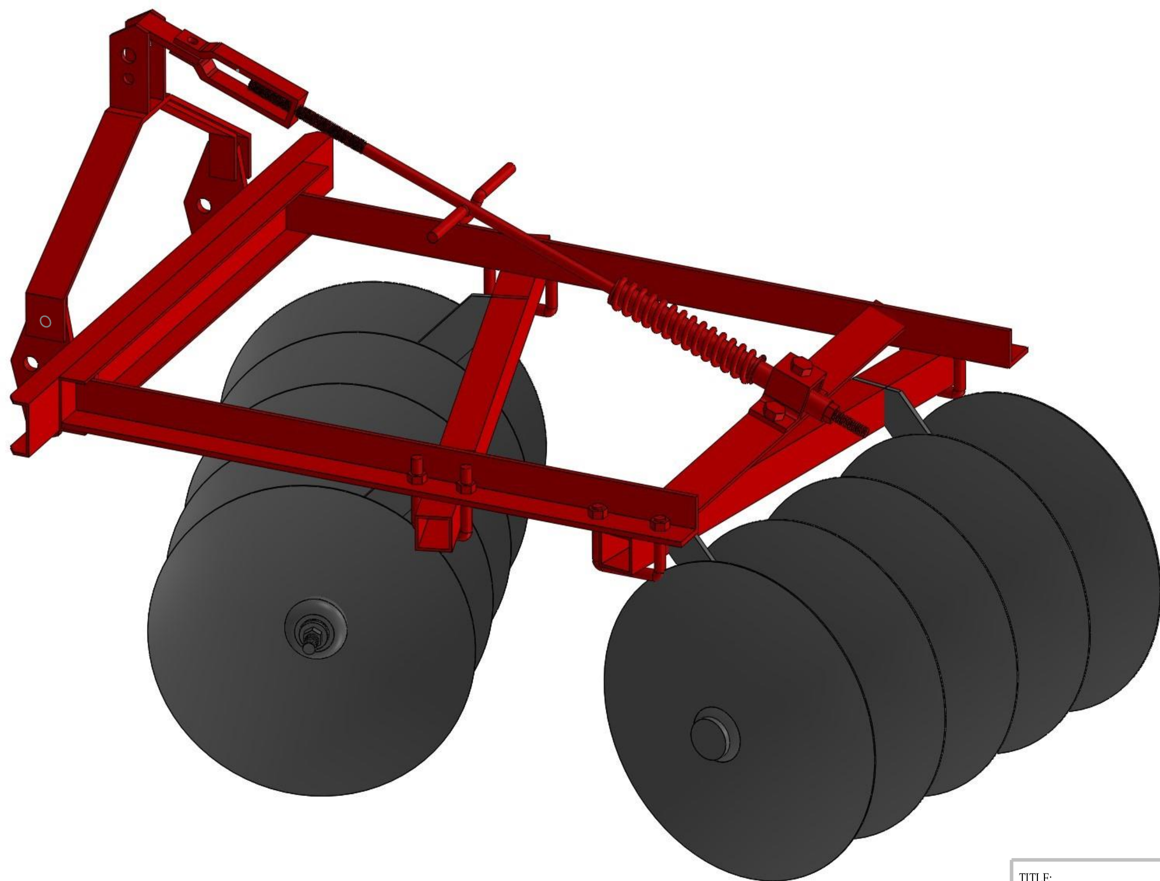
side view



isometric view

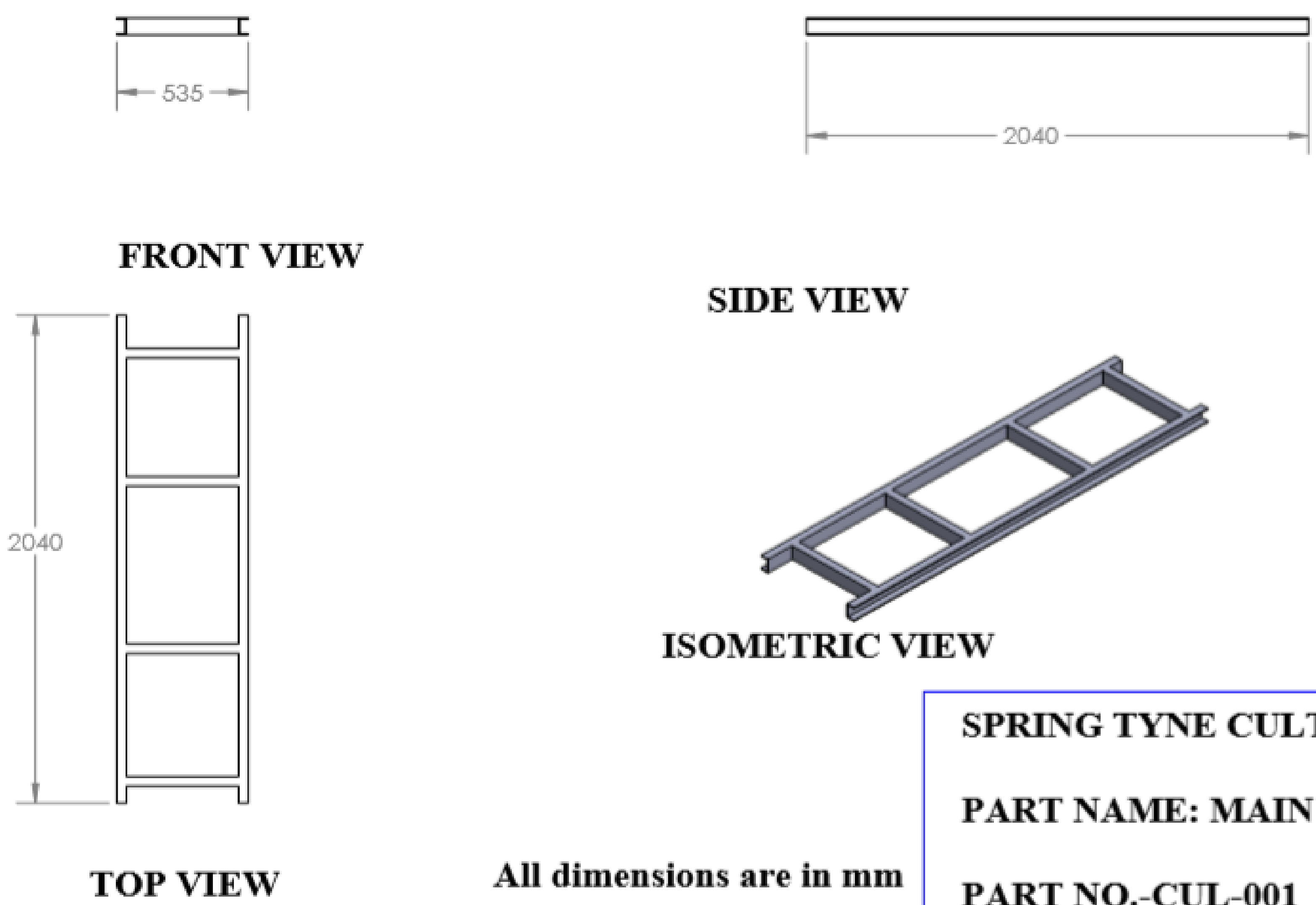
All dimensions are in cm

TITLE: Disc plough DP 009		
SIZE	DWG. NO.	REV
SCALE: 1:1		SHEET 1 OF 1



ISOMETRIC VIEW

TITLE: DISC HARROW		
DWG NO.		A4
SCALE:1:50	SHEET 1 OF 1	

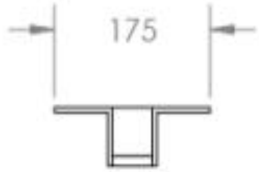


All dimensions are in mm

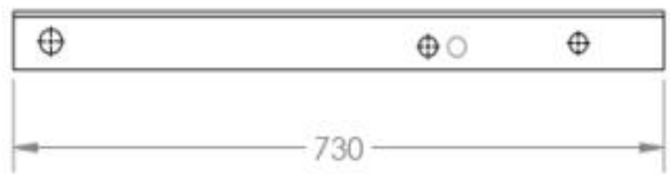
SPRING TYNE CULTIVATOR

PART NAME: MAIN FRAME

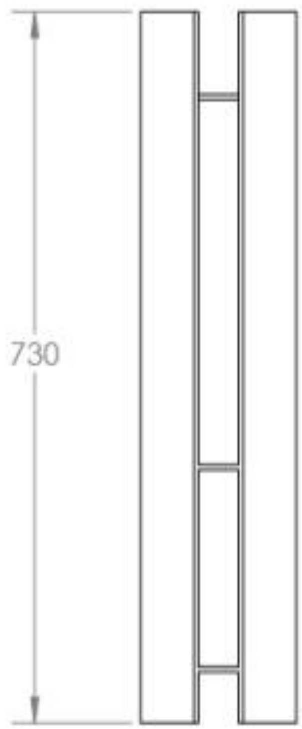
PART NO.-CUL-001



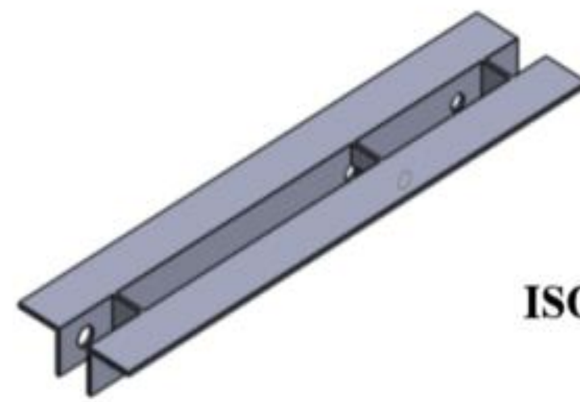
FRONT VIEW



SIDE VIEW



BOTTOM VIEW



ISOMETRIC VIEW

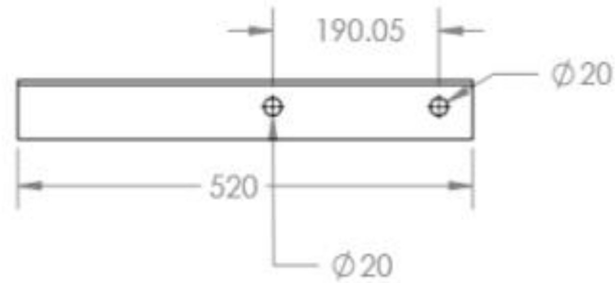
All dimensions are in mm

SPRING TYNE CULTIVATOR

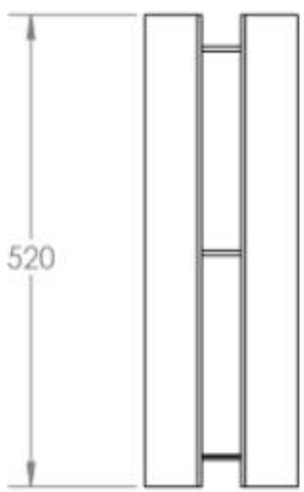
PART NAME- SUB FRAME 1

PART NO.- CUL-002

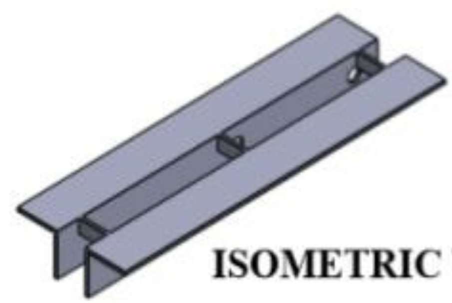
FRONT VIEW



SIDE VIEW



BOTTOM VIEW

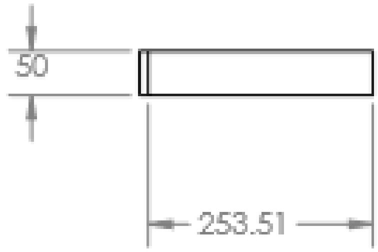


ISOMETRIC VIEW

SPRING TYNE CULTIVATOI

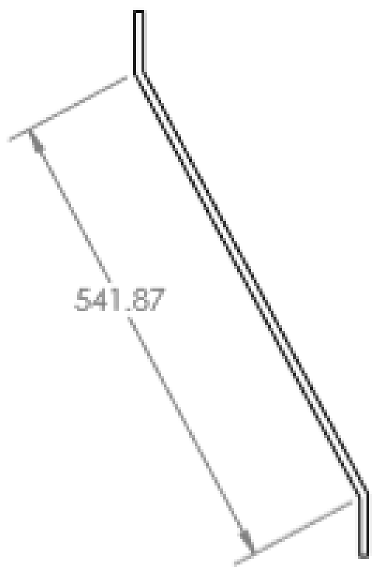
PART NAME: SUB FRAME 2

PART NO. CUL-003

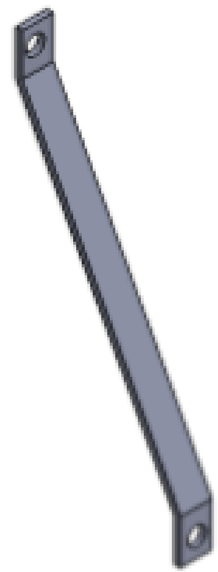


FRONT VIEW

SIDE VIEW



SIDE VIEW



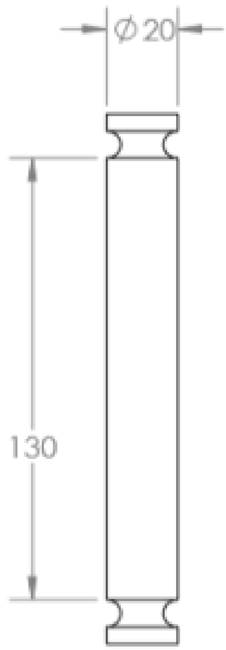
ISOMETRIC VIEW

All dimensions are in mm

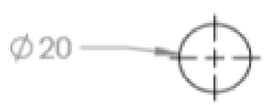
SPRING TYNE.CULTIVATOR

PART NAME-HANDLE 2

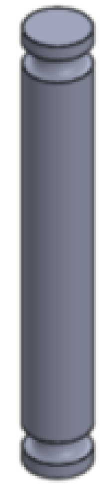
PART NO.-CUL-010



FRONT VIEW



SIDE VIEW



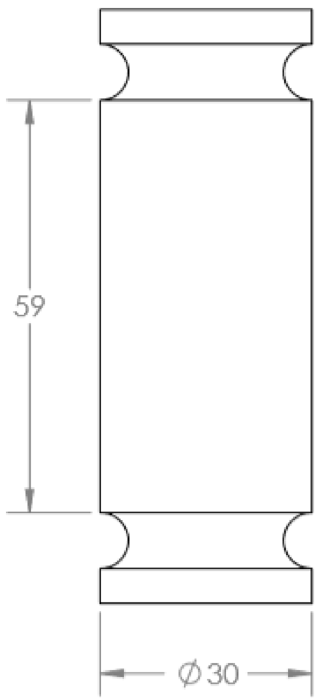
ISOMETRIC VIEW

All dimensions are in mm

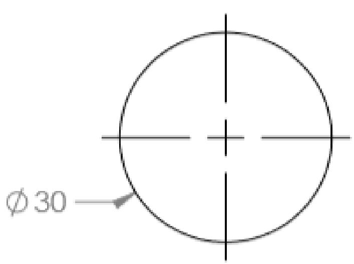
SPRING TYNE CULTIVATOR

PART NAME-JOINT PIN-1

PART NO. - CUL-005



FRONT VIEW



SIDE VIEW

ISOMETRIC VIEW

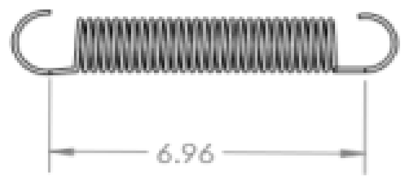
SPRING TYNE CULTIVATOR

PART NAME: JOINT PIN 2

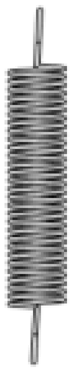
PART N0. CU-008

All dimensions are in mm

FRONT VEW



SIDE VIEW



BOTTOM VIEW

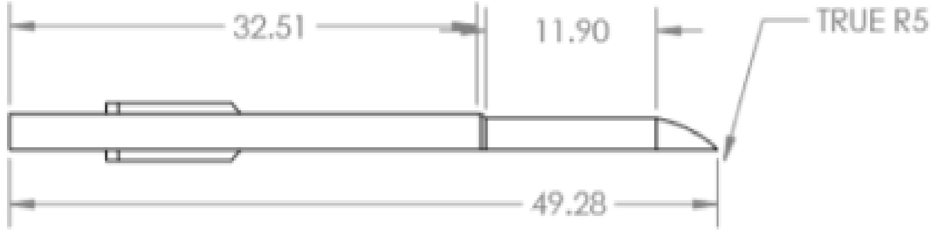
ISOMETRIC VIEW

All simension are in mm

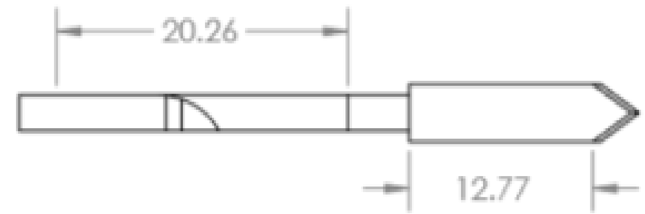
SPRING TYNE CULTIVATOR

PART NAME: SPRING

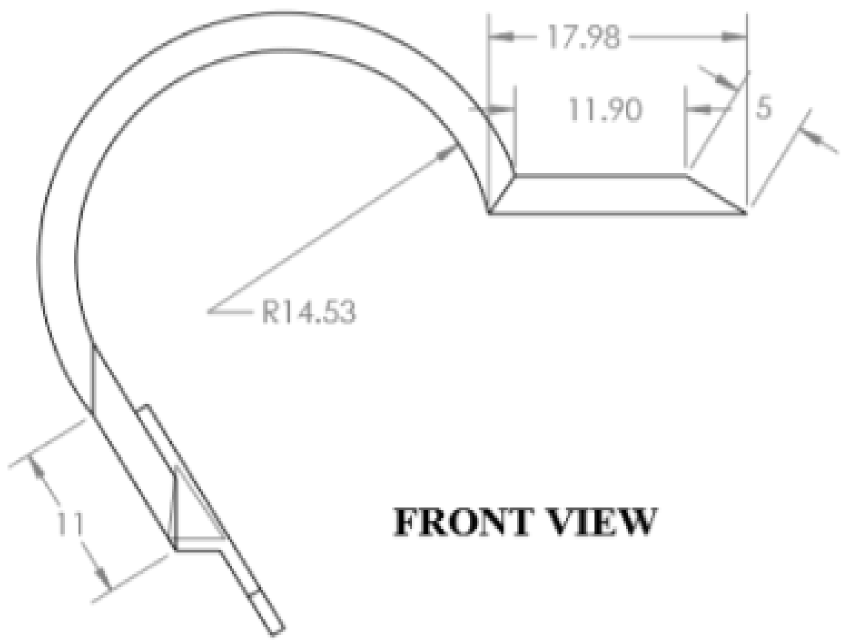
PART NO. CUL-006



TOP VIEW



SIDE VIEW

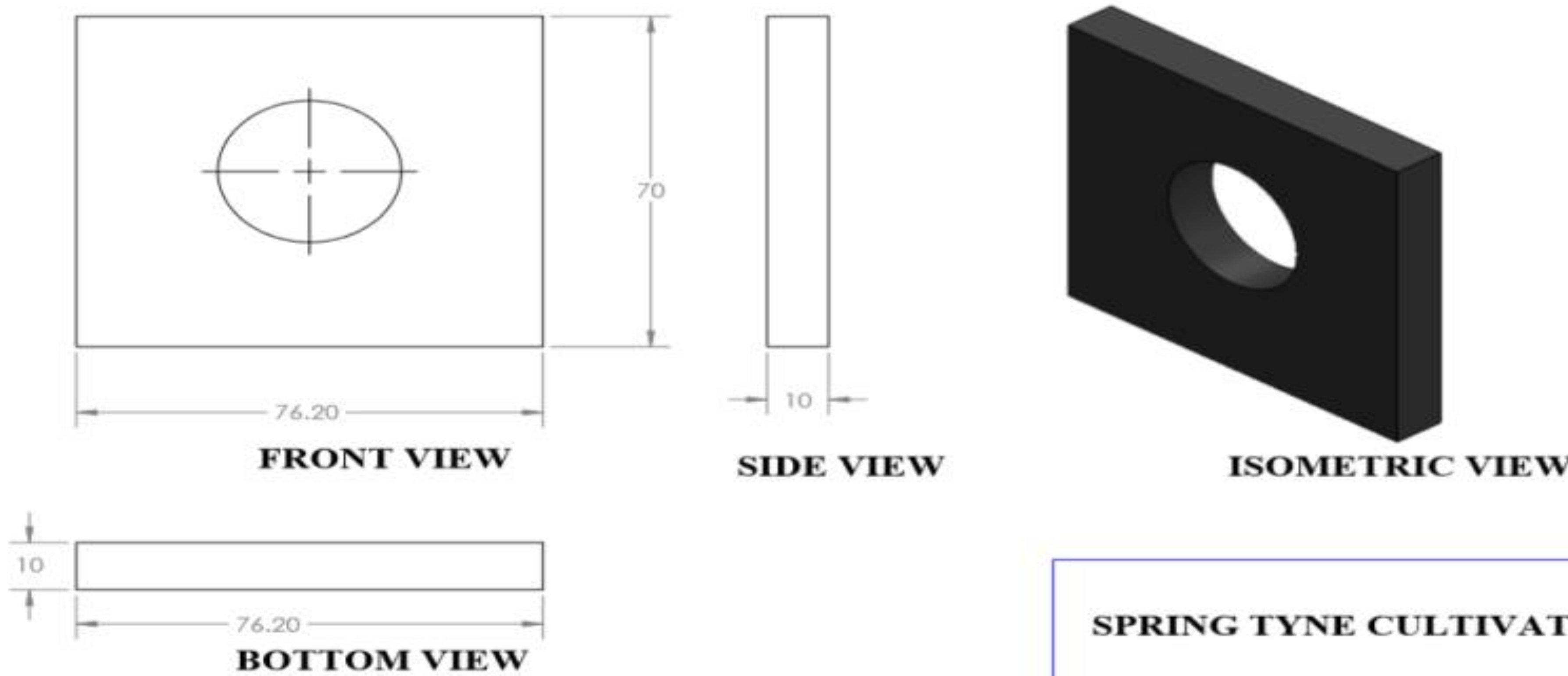


FRONT VIEW

ISOMETRIC VIEW

SPRING TINE CULTIVATOR
PART NAME:TINE
PART NO: CU-007

ALL DIMENSIONS ARE IN MM

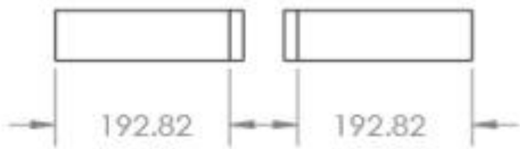


ALL DIMENSIONS ARE IN MM

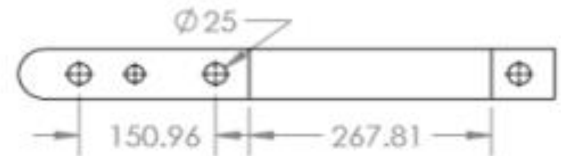
SPRING TYNE CULTIVATOR

PART NAME - SUPPORT

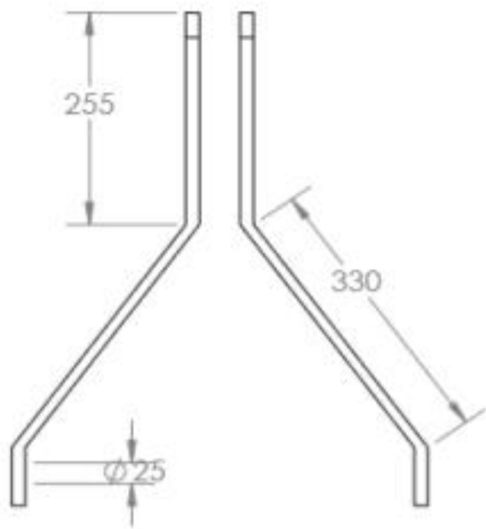
PART NO. - CUL-004



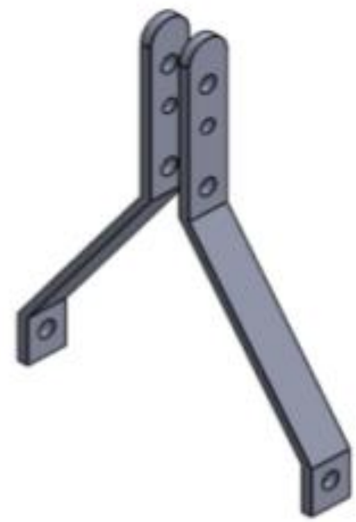
TOP VIEW



SIDE VIEW



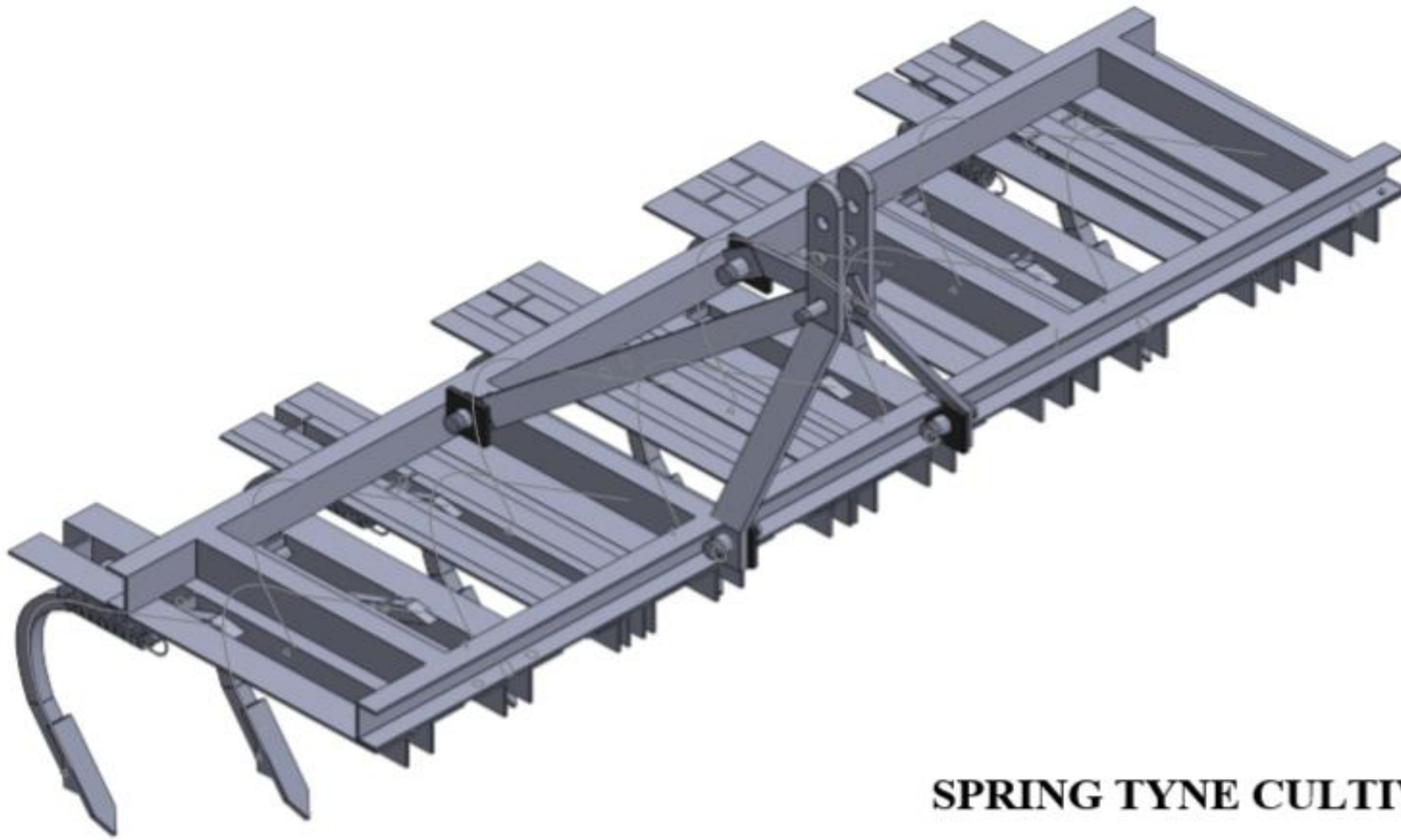
FRONT VIEW



ISOMETRIC VIEW

ALL DIMENSIONS ARE IN MM

SPRING TINE CULTIVATOR
PART NAME:HANDLE 1
PART NO: CU-009



SPRING TYNE CULTIVATOR

ASSEMBLY DRAWING