DESIGN PROJECT

TA 201A - Introduction of Manufacturing Processes-I

Group W1G1

Course Instructor: Prof.Shashank Shekhar

Technical Staff: Mr. Indra Pal Singh

Course Tutor: Mr. Vivek Verma

Folding Table And Chairs

Group-1 Members

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Table of contents

Introduction

Our Project includes a folding table as well as a folding chair. The former one consists of three sectors of equal area on its top which is made up of metal sheet. They rotate about angle fixer when the table folds. Its top is attached with a stand which is made up of four metal rods, one central rod and the rest are around it in a circle of a certain radius. In addition to the folding table, we have three chairs of different designs. All are made up of metal as per the project policy. We have used metal rods, Angle fixers, metal sheets for their manufacturing. We have also described various processes involved in designing them such as cutting, drilling, welding, metal sheet forming, smoothing as well as mechanical joining. We have also taken care that our tables and chairs not only have good design but are also comfortable and stable in use. We have given bent backrests to chairs and have also managed the dimensions of chairs and the table such that the average height user finds himself at a suitable level during their use.

Motivation

To design something unique and useful for our project, we searched many design projects on the internet which could suit our aim as well as the project guidelines, and this navigation took us to one of the “New age things” i.e; the Folding Table and Chair. Folding tables find application in homes, schools, churches, and other buildings that have a room intended for various functions. Folding tables can be used, and easily removed, and stored out of the way when open space is needed. Folding chairs also have almost similar benefits. They can save you more floor space in comparison to the bulky restaurant seating.

Another important reason why we chose this project is that foldable furniture is much cheaper as compared to bulky furniture that takes much of the space inside our homes. They are trendy and eye-catchy as well that enhances the overall interiors and other furnishing items as well when kept inside your homes. Folding furniture is gaining wider popularity these days and is being preferred by most homeowners.

Acknowledgement

The success and final outcome of our project required a lot of guidance and assistance from many people and we are extremely privileged to have got this all for the completion of our project.

We would like to express our sincere gratitude to our tutor **Dr. Vivek Verma** and our lab-in-charge **Mr. Anil Kumar Verma** for their support and guidance in this project. Their support and direction were instrumental throughout the execution of the project.

We thank **Dr. Shashank Shekhar**, Course Instructor TA201- I for providing us with this opportunity to explore our creativity and create something of our own through the lab manufacturing processes. We also thank our TA's **Mr. Anant Srivastava** and **Ms. Shruti Srivastava** for their valuable time and efforts.

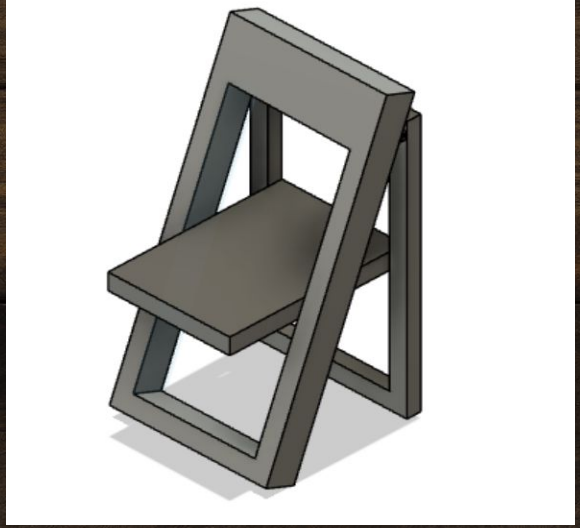
WORK DISTRIBUTION

MEMBERS	Abhigna	Ashutosh	Ayush	Harsh	Sohaib	Preeti	Ritik	Shashank	Tulika
Week 1	Idea discussion	Idea discussion	Idea discussion	Idea discussion	Idea discussion	Idea discussion	Idea discussion	Idea discussion	Idea discussion
Week 2	Idea finalization	Idea finalization	Idea finalization	Idea finalization	Idea finalization	Idea finalization	Idea finalization	Idea finalization	Idea finalization
Week 3	Search for materials required	Search for processes involved	Search for materials required	Search for processes involved	Search for cost of components	Search for cost of components	Search for processes involved	Search for materials required	Search for cost of components
Week 4	Isometric drawing of chair	Isometric drawing of chair	Designing components	Designing components	Designing components	Isometric drawing of chair	Isometric drawing of table	Isometric drawing of chair	Isometric drawing of chair
Week 5	Drawing of parts 1 and 2 of pendulum chair	Drawing of parts 3,4 and 5 of chair cum stool	Drawing of parts 1 and 2 of chair cum stool	Presentation discussion	Presentation discussion	Drawing of parts 3,4 and 5 of folding chair	Drawing of all parts of table	Drawing of parts 3 and 4 of pendulum chair	Drawing of parts 1 and 2 of folding chair
Week 6	Quantity and cost analysis	Quantity and cost analysis	Quantity and cost analysis	Presentation making	Presentation making	Quantity and cost analysis	Quantity and cost analysis	Quantity and cost analysis	Quantity and cost analysis

FOLDING CHAIR

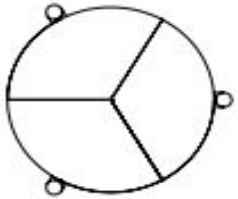
DYNAMIC FOLDING TABLE

PENDULUM CHAIR



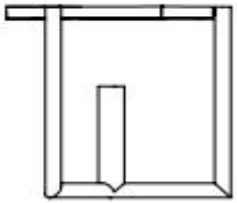
CHAIR -CUM- STOOL

Dynamic Folding Table

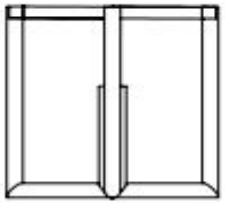


TOP VIEW

ISOMETRIC VIEW



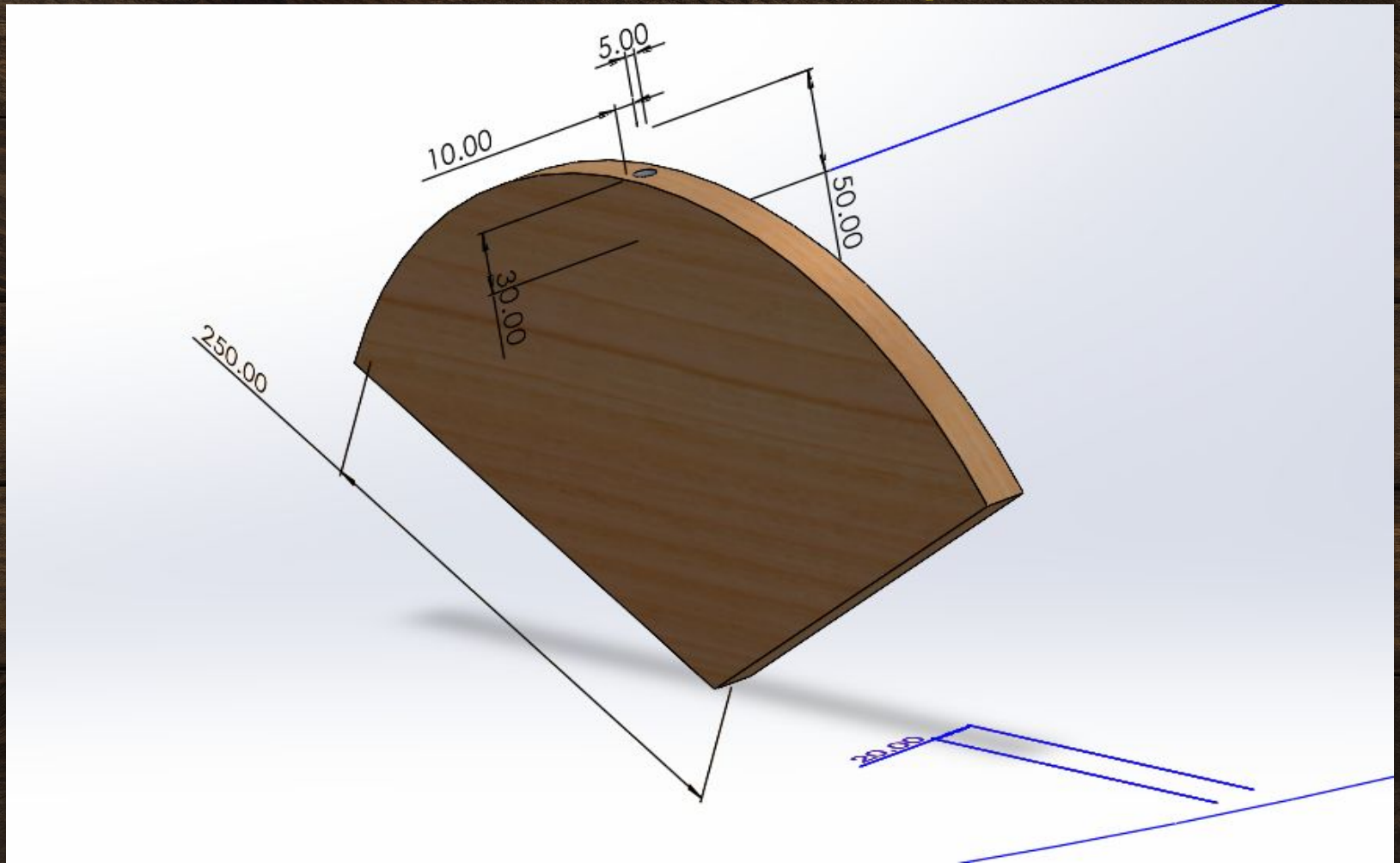
FRONT VIEW

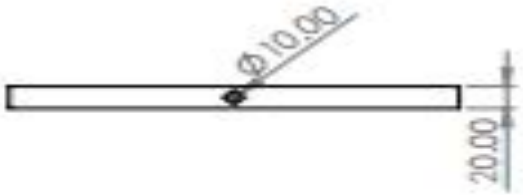


RIGHT VIEW

-Ritik

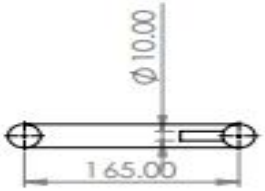
1. Sector of Table Top

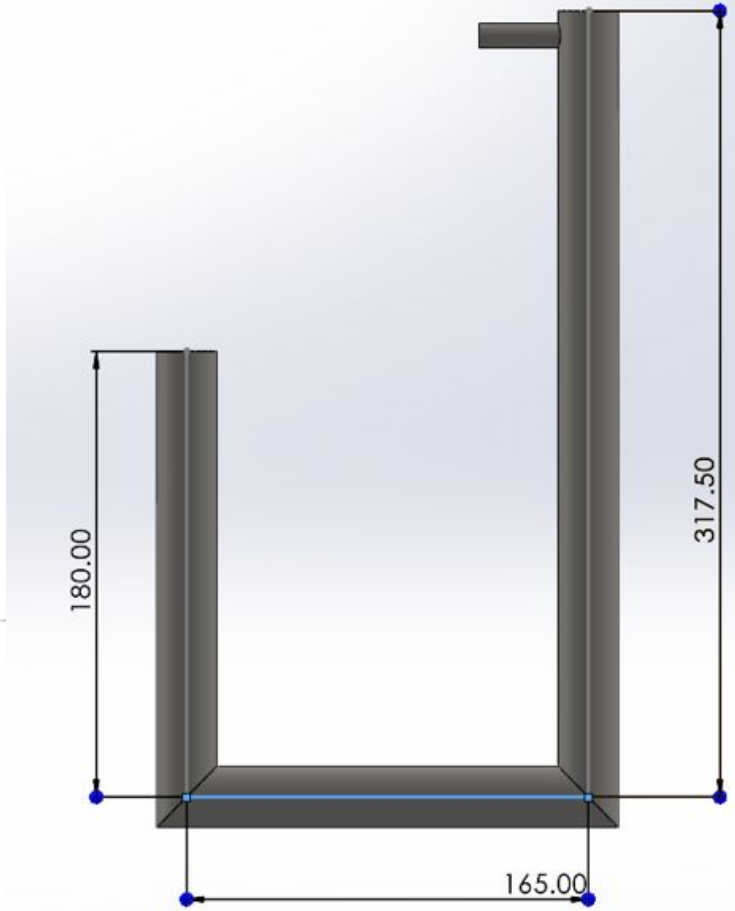


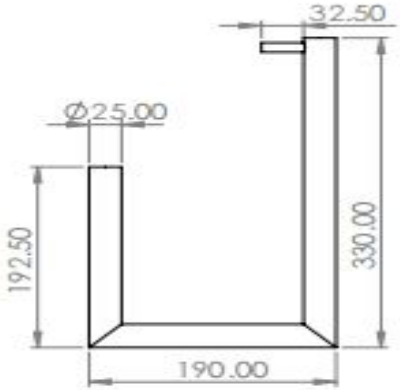

Ø10.00
20.00


160.00

2. Table Stand







1) Table Top:

- Materials used : Mild steel sheet (2mm thickness), thermocol, rectangular strip
- Quantity :
  - Mild steel circular sheet (R=16 cm) : 2
    Area = 804.25 cm^2
    Cost = ₹ 69 * 2= ₹ 138
  - Thermocol
    Circular (R=16 cm+thickness 2 cm) : 1,
    Cost = ₹ 20
  - Rectangular Strip (100.5 * 2011 mm^2 + 6 * 320 mm^2) = 1
    Cost = ₹ 400

2) Chassis of table :

- Materials used : Circular metal rod
- Quantity : 3 * 3 = 9
  - Length : 32.5mm , Radius =12.5mm * 3
    Cost = ₹ 15 * 3= ₹ 45
  - Length : 190mm, Radius:12.5mm * 3
    Cost = ₹ 76 * 3= ₹ 228
  - Length : 330mm , Radius : 12.5mm * 3
    Cost = ₹ 132 * 3 = ₹ 396

3) Hinges for joining chassis :

Quantity: 2

cost = ₹100

4) Angle fixer for folding parts :

Quantity: 4

Cost= ₹ 4 * 20= ₹80

Total cost = ₹80 + ₹396 + ₹228 + ₹45 + ₹20 + ₹138 + ₹100 + ₹400 = ₹1407

Process involved for manufacturing :

1) For table top :

- Cutting each sheets in three 3 sector
- Joining of the metal sheets and strip by gas welding and inserting thermocol within them
- Joining of different sectors with angle fixer
- Making smooth around corners

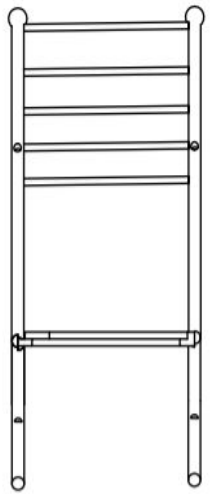
2) For chassis :

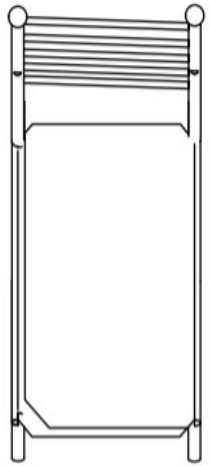
- Cutting metal rods in differ pieces of required heights
- Smoothing them at bottom and top
- Wielding them for required structure
- Joining different chassis with 2 hinges

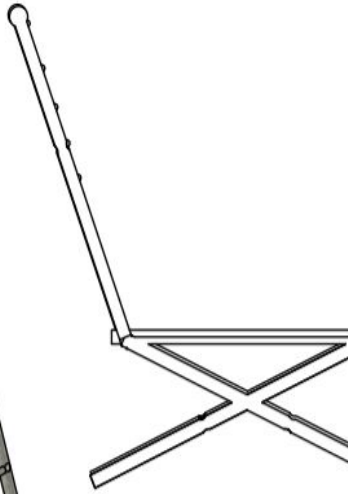
3) Assembly:

- Making holes in table top
- Attaching them to make the final structure


5
4
3
1
2

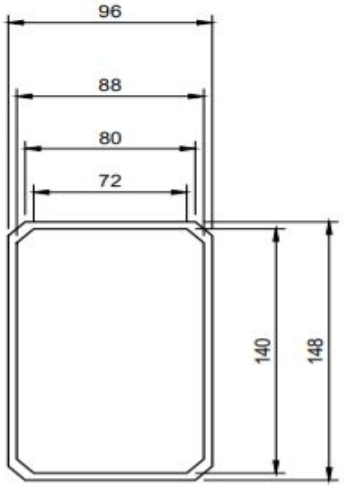


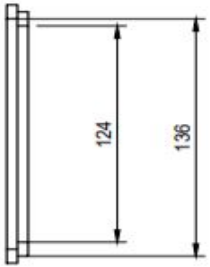


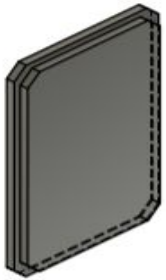


Components of chair

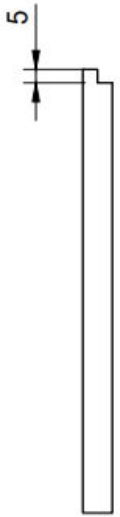
1.Seat

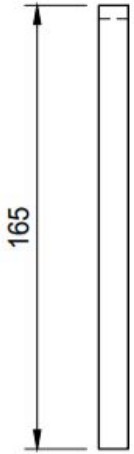


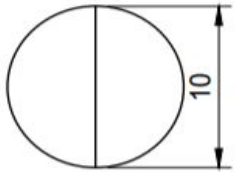




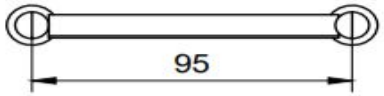
2. Legs

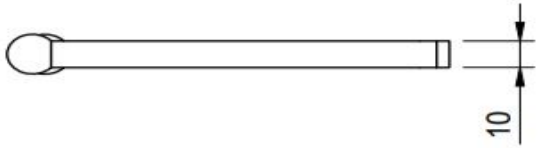


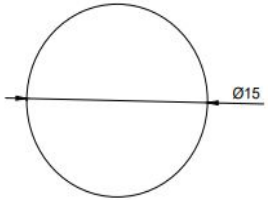


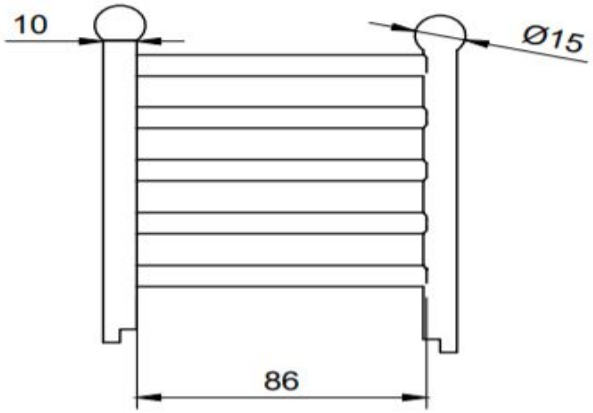


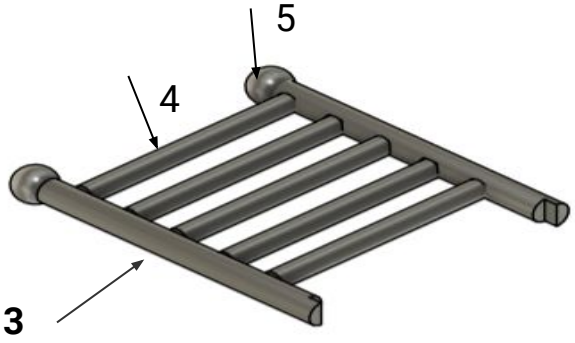
BACK REST

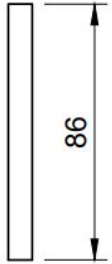


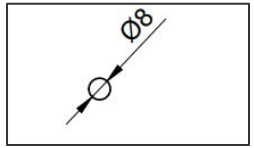












Manufacturing processes involved:

1. Base:

- Cutting: To obtain the mild steel sheet in desired dimensions, we have used the Cutting process.
- Gas welding: To obtain the desired thickness of the base, we have joined 5 mild steel sheets. To make the base comfortable, we have also joined a foam sheet on the top.

2. Support:

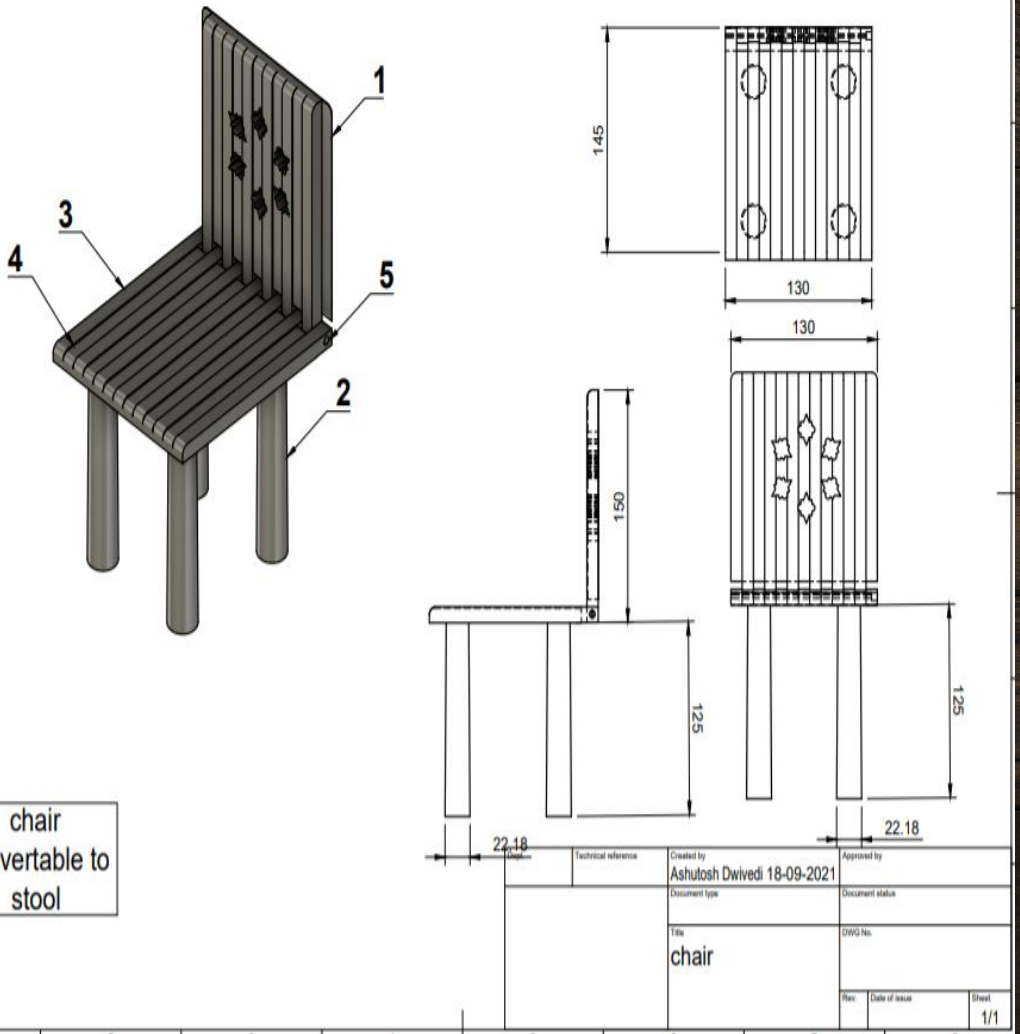
- Cutting: We have cut the rods to obtain desired lengths
- Welding the rods for support with the ones connected to the base. We have used arc welding.
- Casting the spheres and Welding them to both the side rods.
- It is attached to the base with the help of hinge joints.

3. Legs:

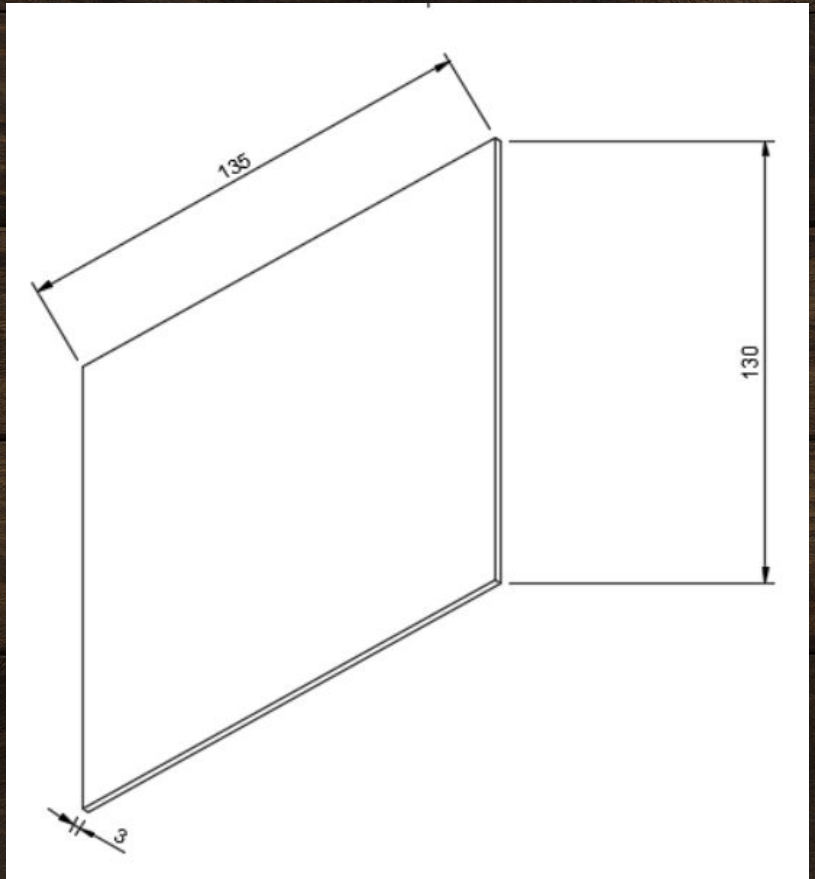
- We have cut the steel rods to obtain them in desired dimensions.
- The legs are attached to the best with the help of hinge joints.

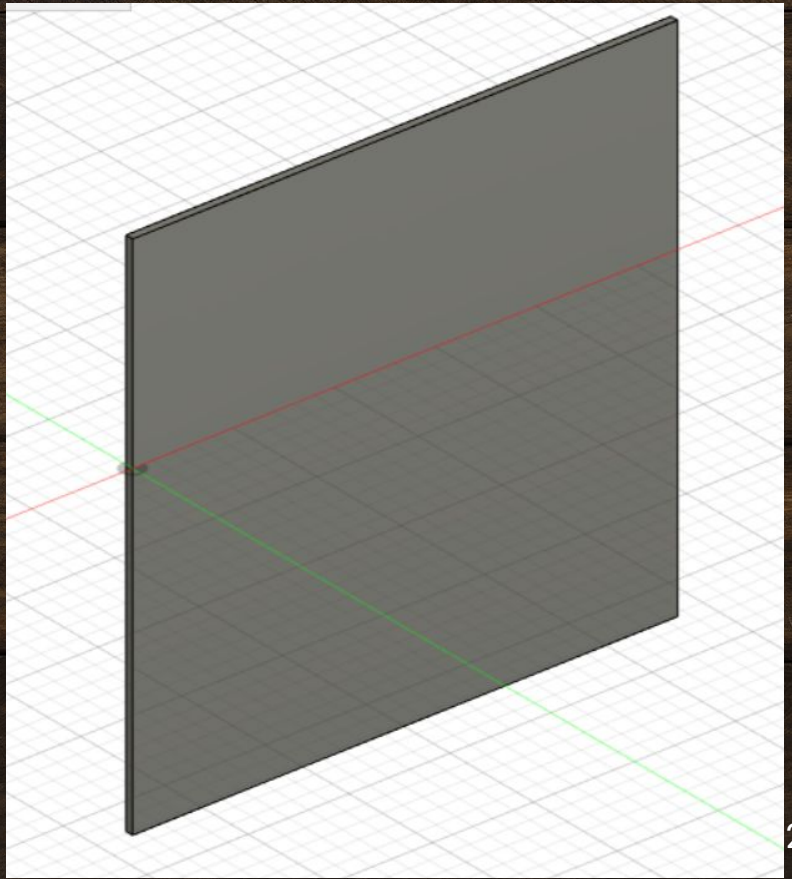
S.No	Objects	Dimensions	Quantity	Cost
1.	Mild steel Round rod	10mm dia (16.5mm Length)	4	₹27.69
2.	Mild steel Round rod	8mm dia (86mm Length)	5	₹11.549
3.	Nut bolt	--	6	₹60
4.	Mild steel Round rod	10mm dia (12mm Length)	2	₹10.06
5.	Mild steel sheet	1mm (thick) (14.8*9.6)	5	₹250
6.	Foam sheet	5mm (14*8.8)	1	18
			Total cost	₹380

Chair cum Stool

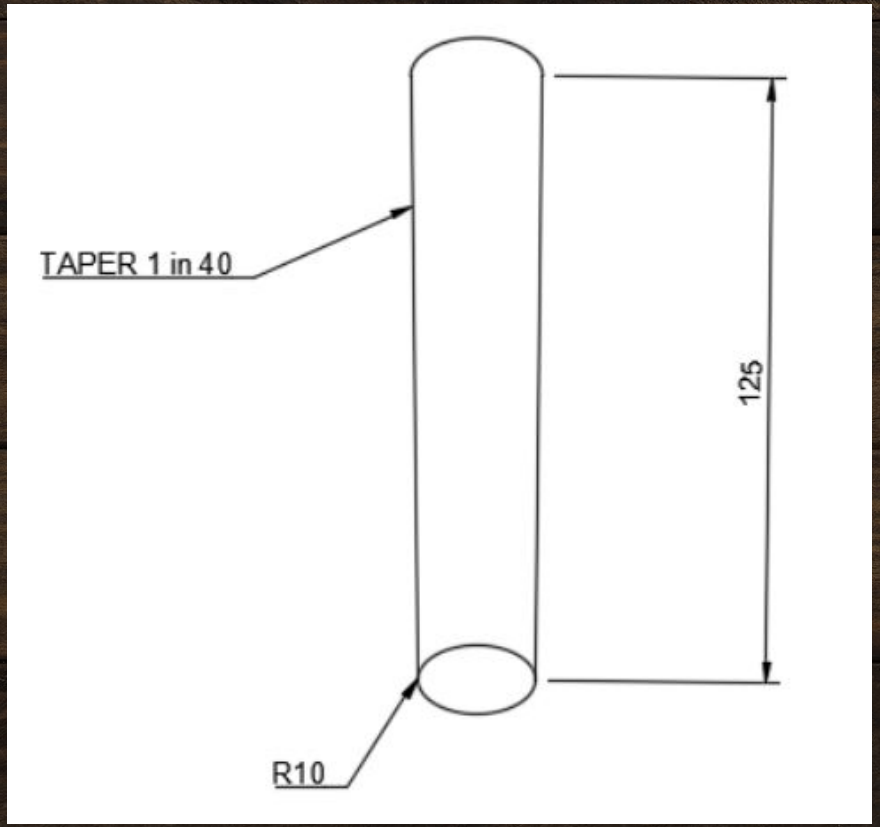


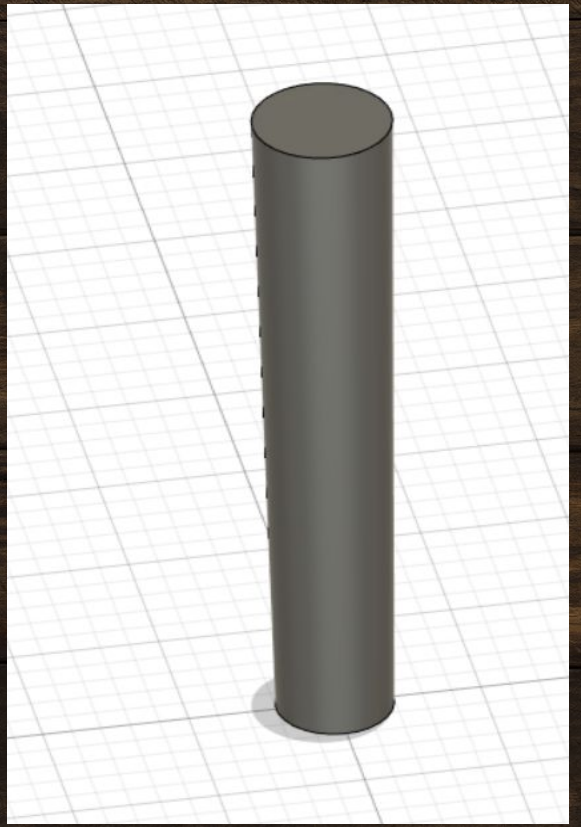
1. SUPPORT PLATE



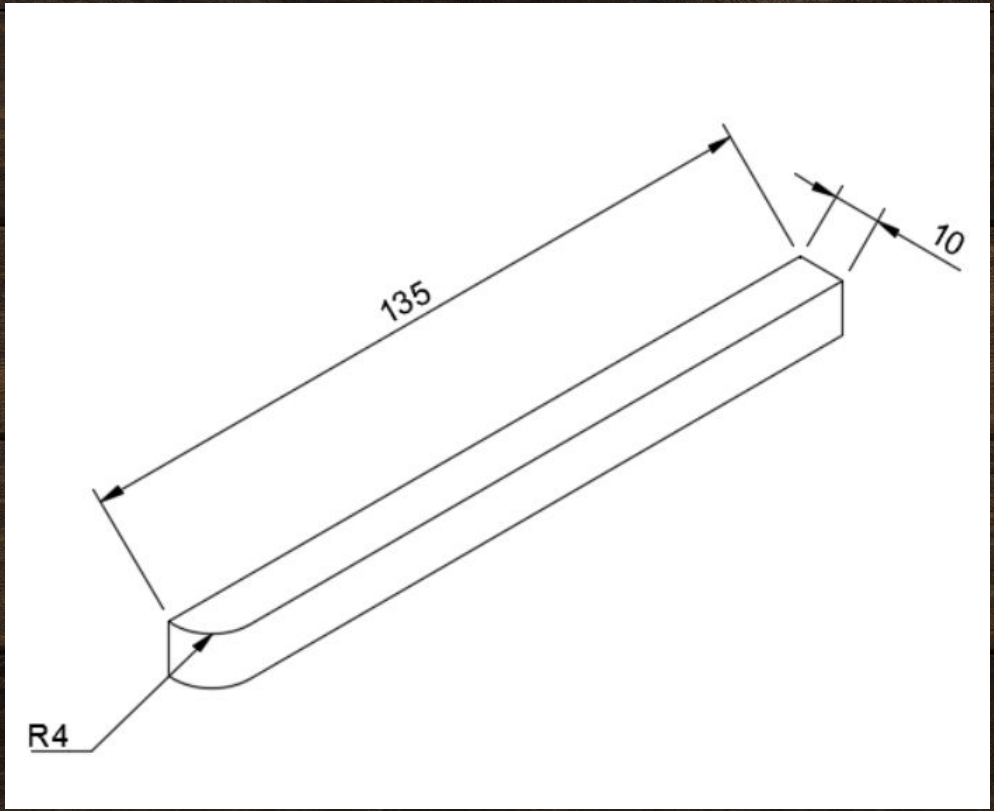


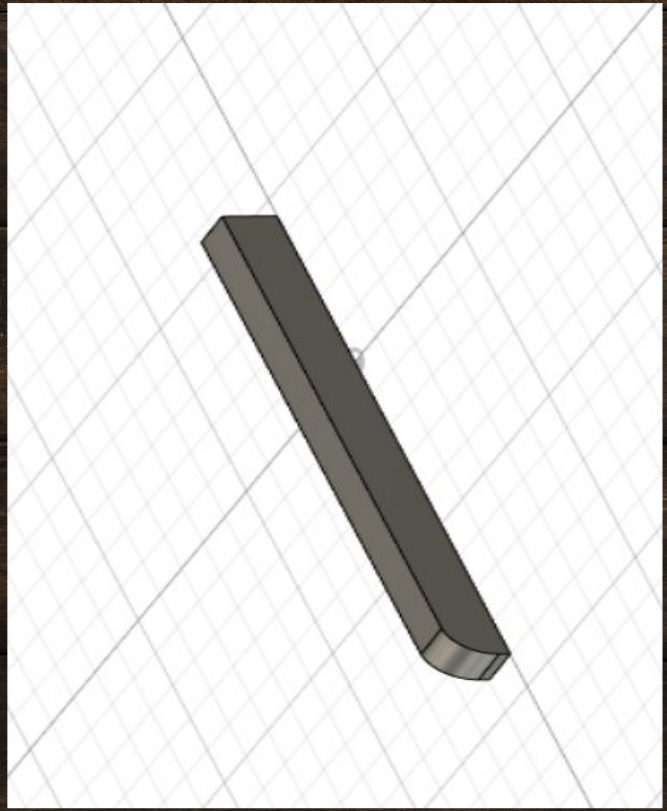
2. LEGS



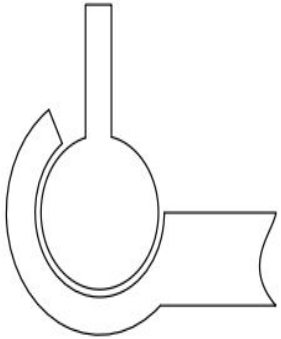


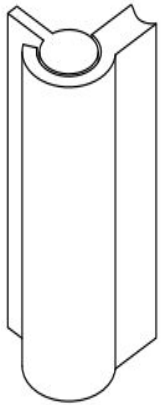
3. & 4. BASE RODS

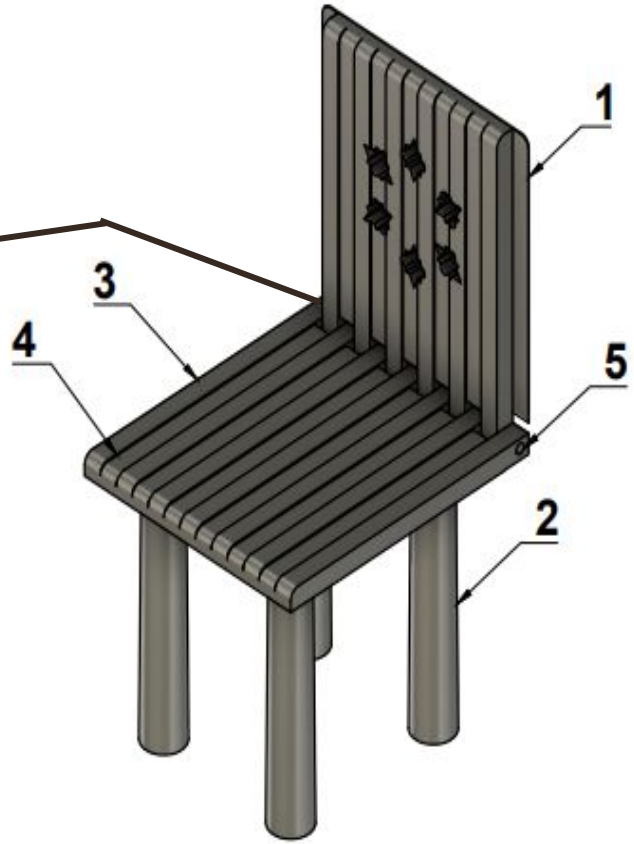




5. ANGLE FIXER







Dept.	Technical reference	Created by: Ashutosh Dwivedi 18-09-2021	Approved by
		Document type	Document status
		Title: angle fixer	DWG No.
			Rev. / Date of issue / Sheet: 1/1

Some Description about Each part labeled in Isometric View (see Previous slide)

1. **Metal Sheet:**
- Quantity used: 2
- Process Involved:
  - Cutting and beating of sheet
  - Making smooth around corners
  - Welding to iron rods
- Analysis:
  130mm x 135mm, cost = ₹100

2. Joined Metal Legs surrounded by Metal sheet:
- Quantity used: 4
- Process Involved:
  - Cutting According to Height
  - Smoothing at base and top
  - Welding to lower sheet
- Analysis:
  125mm Length, 20mm diameter with taper 1 in 20
  Cost = ₹250

3 and 4. **Metal Rods Square:**

- Quantity: 20

- Process Involved:
  - Cutting of rods
  - Smoothing and tapering at ends
  - Welding them together
  - Drilling Hole
  - Welding them to sheet

- Analysis:
  135mm x 10mm x 10mm, cost = ₹350

  135mm x 9mm x 10mm , cost = ₹350

5. **Angle Fixer for Folding Part**

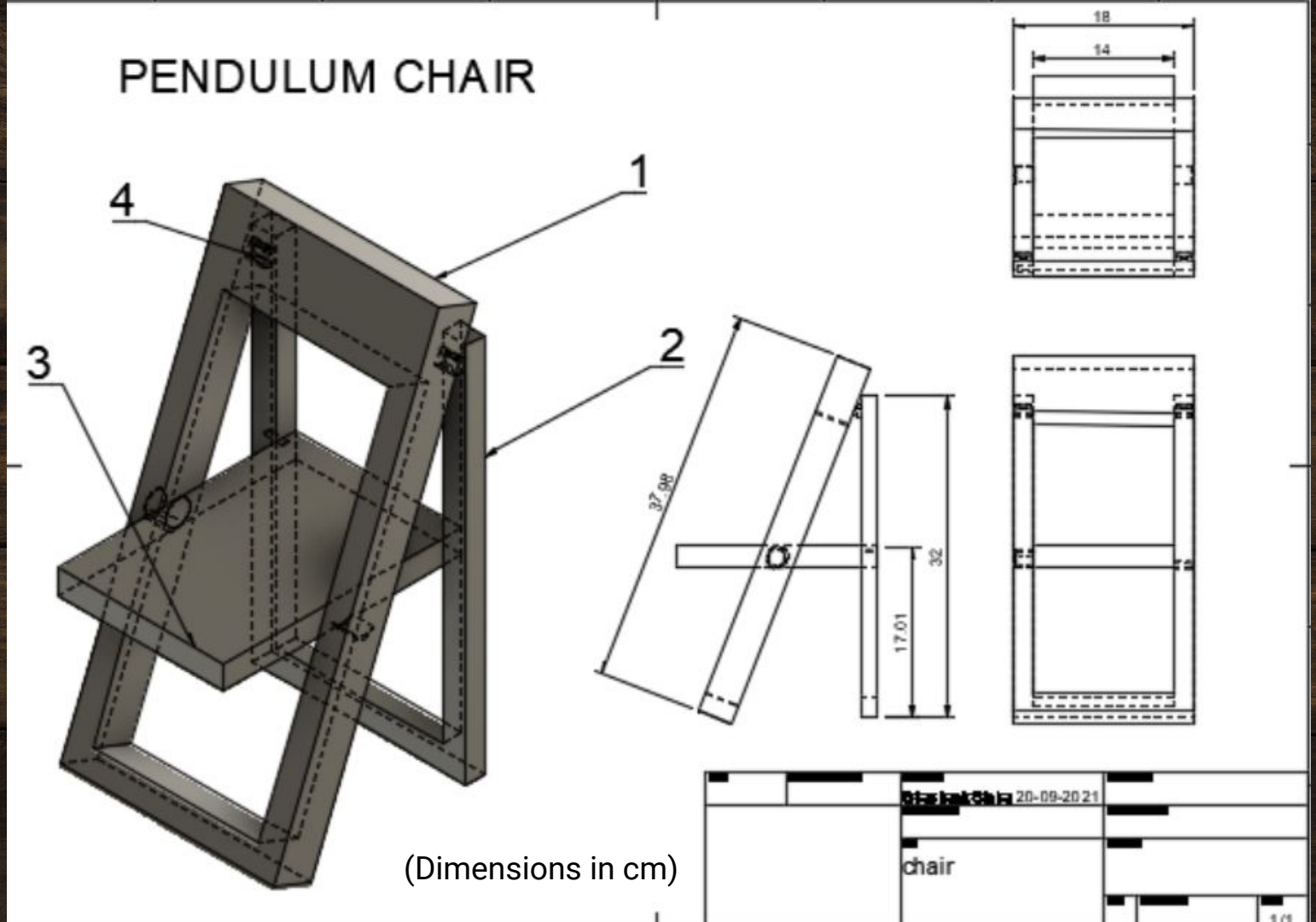
- Quantity: 1

- Process Involved:
  - Attach one end to lower body and other end to upper part.

- Analysis:
  2.5mm diameter, 140mm Length
  Cost = ₹20

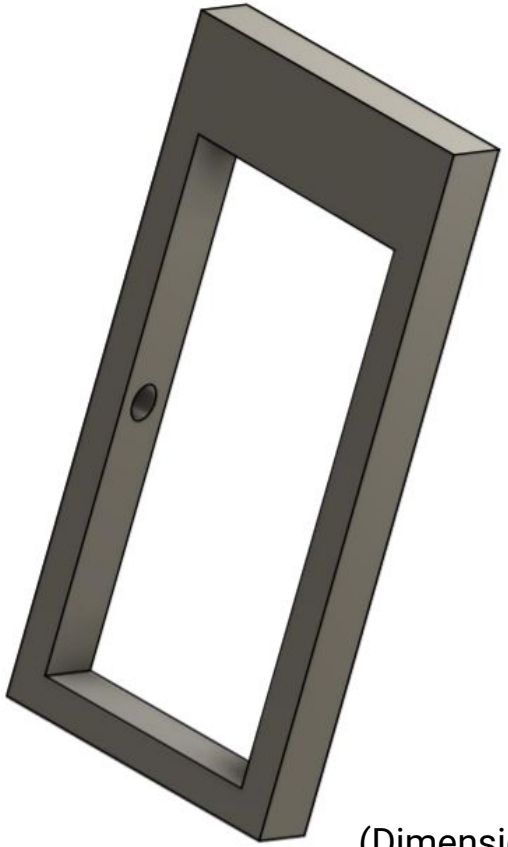
Total cost = 50 + 250 + 350 + 350 + 20 = ₹1020

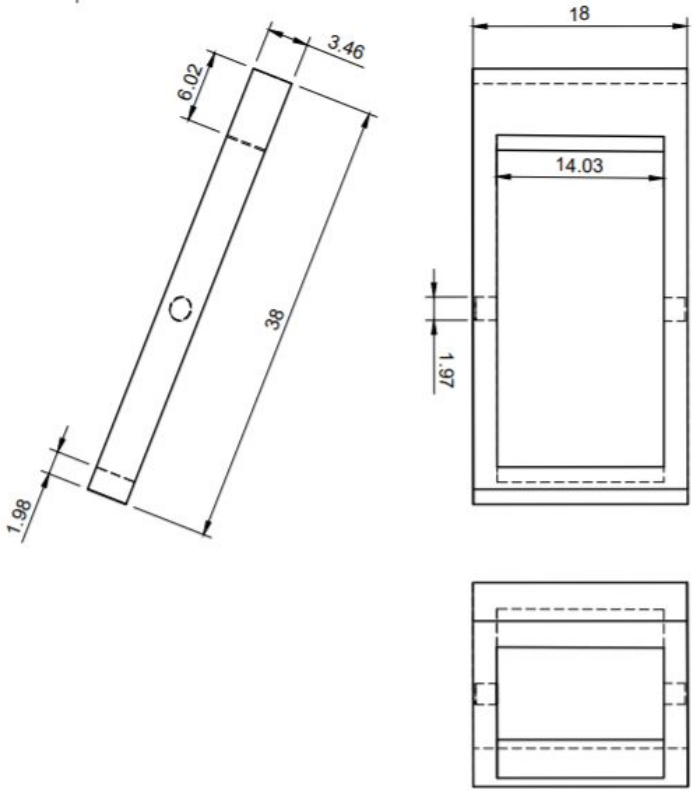
Pendulum Chair



(Dimensions in cm)

1.FRONT SUPPORT

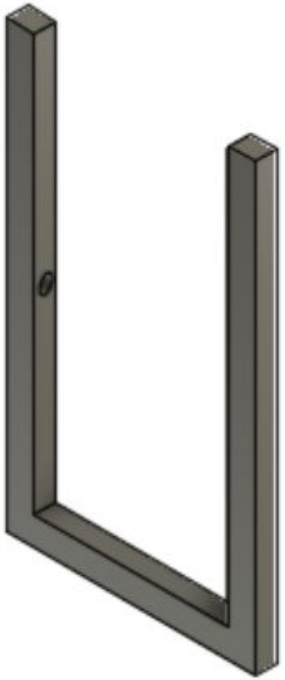


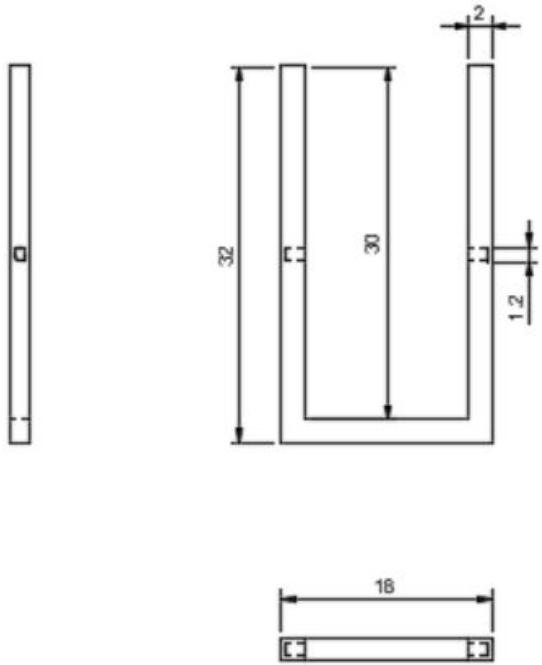


(Dimensions in cm)

Dept.	Technical reference	Created by	Approved by
		Shashank Sinha 20-09-2021	
		Document type	Document status
		Title: chair	DWG No.
			Rev. / Date of issue / Sheet: 1/1

2. BACK SUPPORT

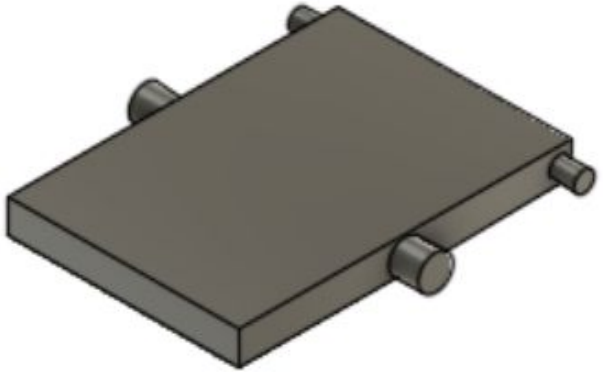


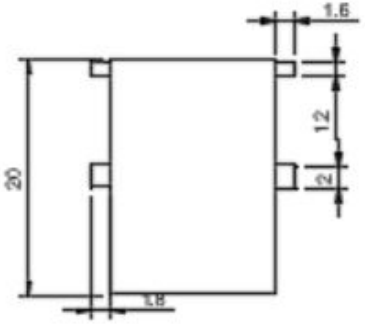


(Dimensions in cm)

	[redacted] 20-09-2021	
	chair	
		1/1

3.SEAT

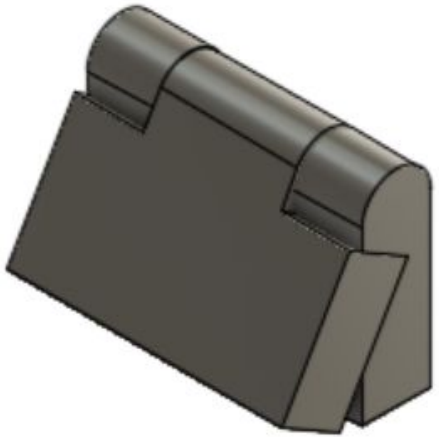


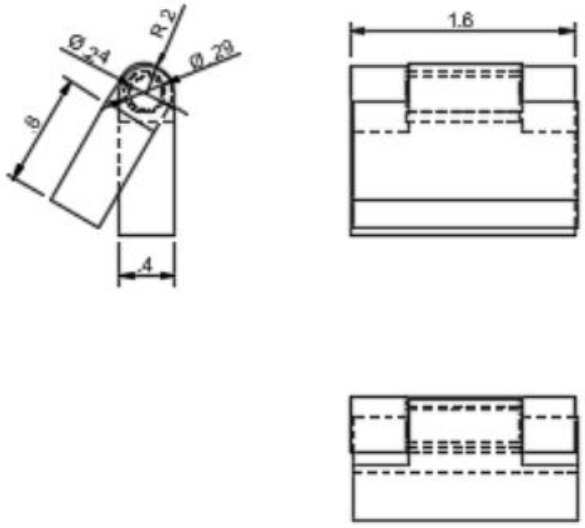


(Dimensions in cm)

	[redacted] 20-09-2021	
	chair	
		1:6

4. HINGE





(Dimensions in cm)

	22-09-2021	
	chair	

Part	Manufacturing processes	Materials required	Cost analysis
1. Front support	Welding sheets to get the desired thickness. Cutting the sheet into desired shape. Drilling holes for the seat.	2mm thick mild steel sheet	180mm x 360mm x 34mm = ₹450
2. Back support	Welding sheets to get the desired thickness. Cutting the sheet into desired shape. Drilling holes for the seat.	2mm thick mild steel sheet	180mm x 320mm x 15mm = ₹345
3. Seat	Welding 2 sheets to get the desired thickness. Cutting the sheet into desired shape. Cutting the rods of length. Welding the rods to the seat.	2mm Mild steel sheet. 25mm dia. Mild steel round rod. 10mm dia. Mild steel round rod.	200mm x 140mm x 20mm = ₹350 2 x (25mm dia, Length 15mm) & 2 x (10mm dia, Length 15mm) = ₹5
4. Hinge	Cutting the sheet into desired shape. Welding rod to the body.	1mm Mild steel sheet. 2.5 mm Mild steel rod.	₹20
			Total cost = ₹1170

Thank you!