

ES 106 B: MANUFACTURING AND WORKSHOP PRACTICE

Indian Institute of Technology (IIT), Gandhinagar



PROJECT REPORT

Topic:

THE ALL ABLE TABLE

By: Group 10613

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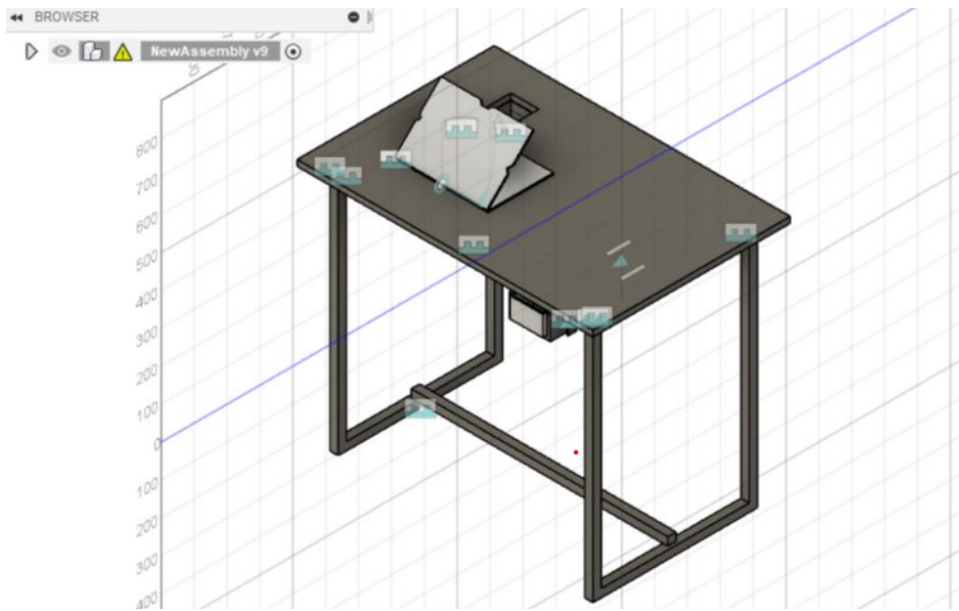
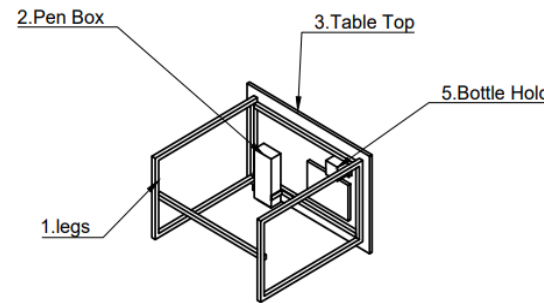
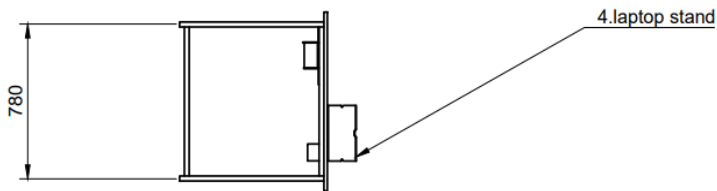
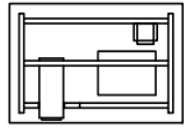
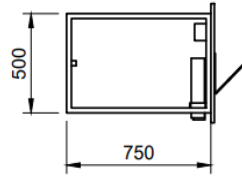
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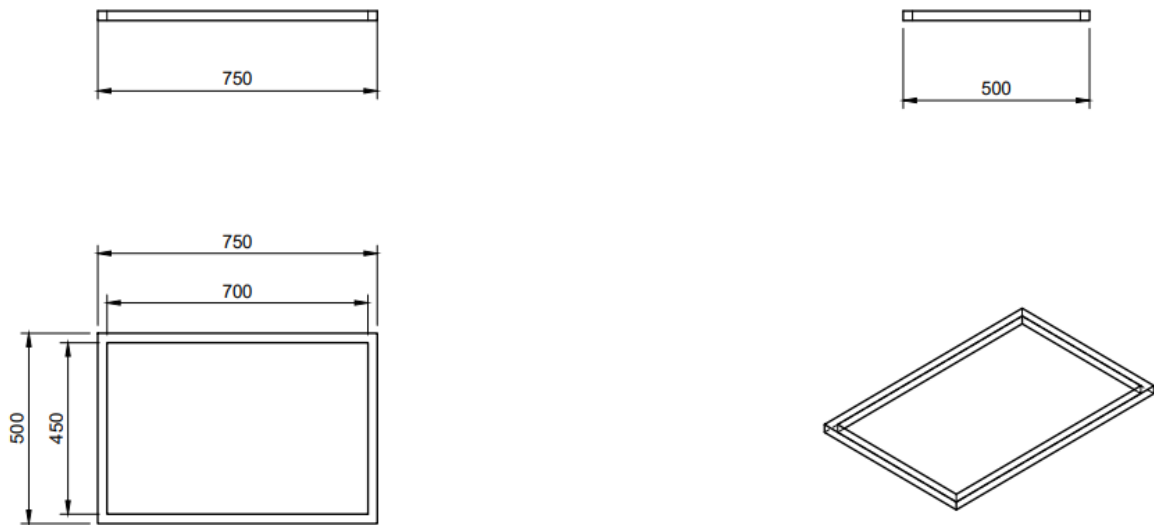
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Mentor: Subhrajit Chand

CAD MODEL OF THE FULL ASSEMBLED PRODUCT



1. Legs



All dimensions in the picture is in mm

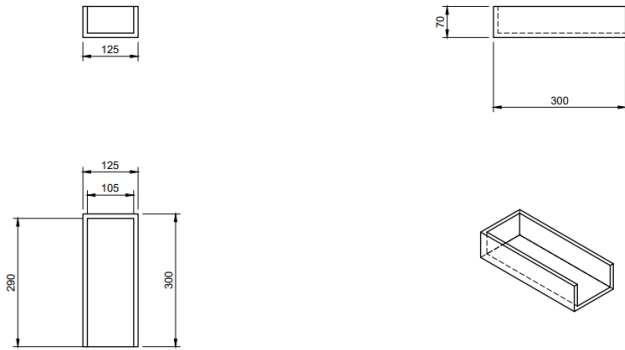
These represent the legs of the table, consisting of two vertically standing rectangular frames and connecting rods to connect in the middle.

Material Used - Mild steel rods

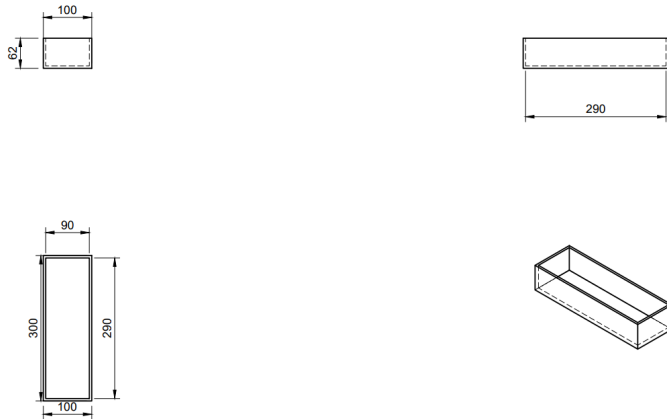
Manufacturing Processes included - welding , cutting , grinding, fitting, sanding

After the 1st Project Review we decided to reduce the dimensions of the rod used for making the legs. This helped us in two ways. First, the welding became better and it held much better without breaking. Second, it made the table lighter in weight and more feasible to move around.

2. Pen Box



Outer case



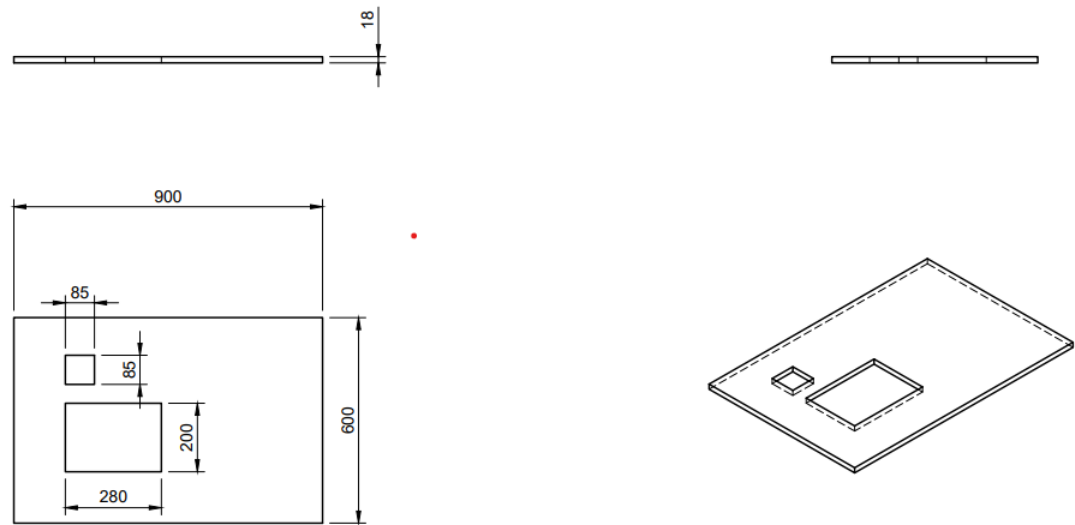
Inner drawer

The Pen box is a slidable component that will be attached to the bottom part of the tabletop. It consists of two parts, the fixed outer case attached to the beneath of the table by the L clamps we made and the inner drawing part fully interlocked by laser cutting on mdf.

Material used - wood and mdf

Manufacturing processes involved - Carpentry (Dimensioning, Cutting, Planing, Filing) , Rapid Prototyping (laser cutting) and Cutting and Fitting

3. Table Top



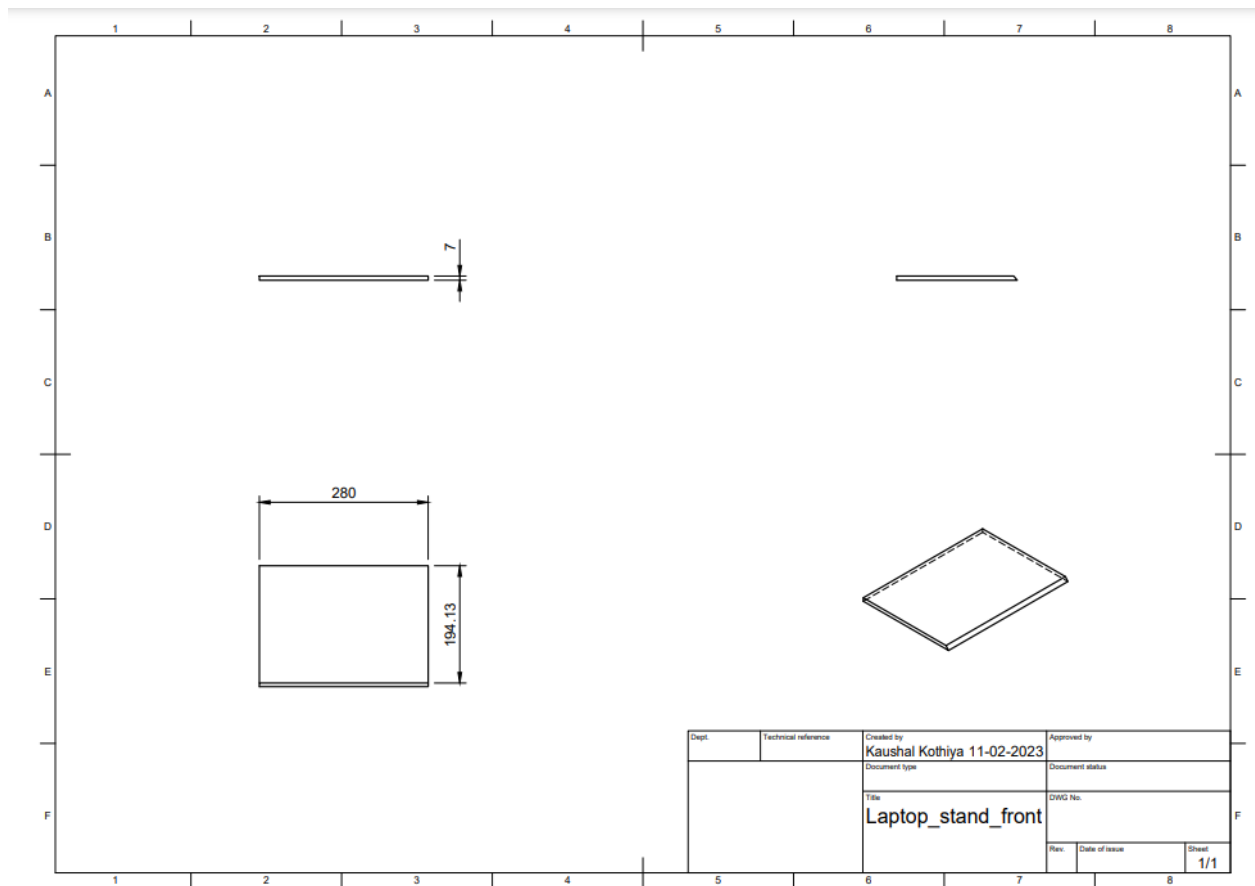
All dimensions in the picture is in mm

The tabletop is the top layer of the table where all the other parts are attached. The laptop stand is embedded on the table top by making it sit in a hole sized with its dimensions and then supporting it with a small ply from beneath. The bottle holder is inserted and screwed in a hole made on the tabletop.

Material used: Wood

Manufacturing Processes used: Carpentry (dimensioning, cutting using machine, filing)

4. Laptop Stand



All dimensions in the picture is in mm

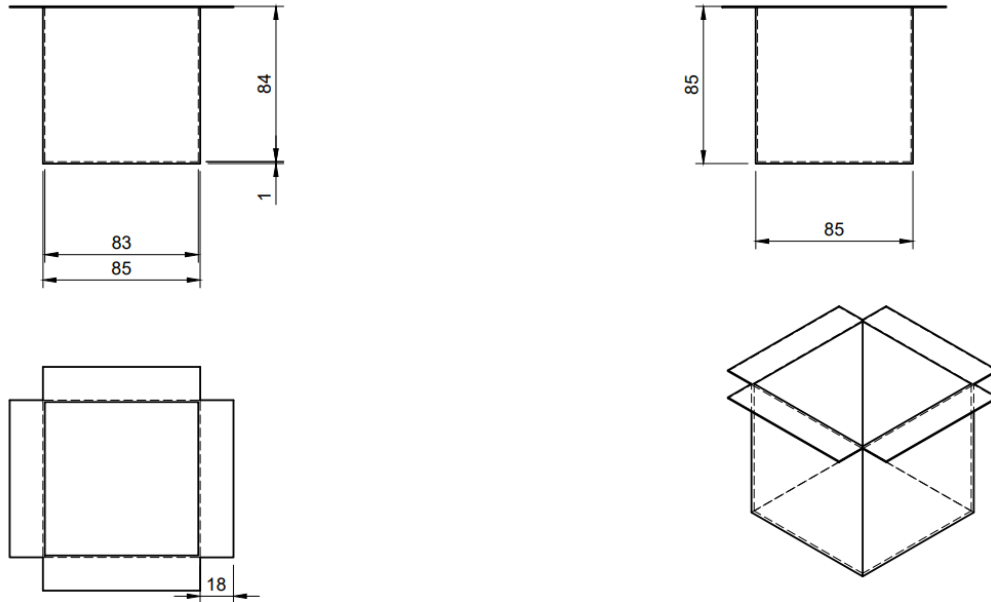
This is the laptop stand designed in the first model. The part is built by the process of laser cutting. The laptop is embedded on the tabletop and made to sit inside the hole carved on the table from support from beneath. The inclination of the laptop stand can be adjusted according to the available slots. The part has undergone some changes in dimensions and logistics.

All Dimensions in mm.

Material used: MDF

Manufacturing Process: CAD modeling on Fusion 360, Laser Cutting on LaserCAD

5. Bottle holder



All dimensions in the picture is in mm

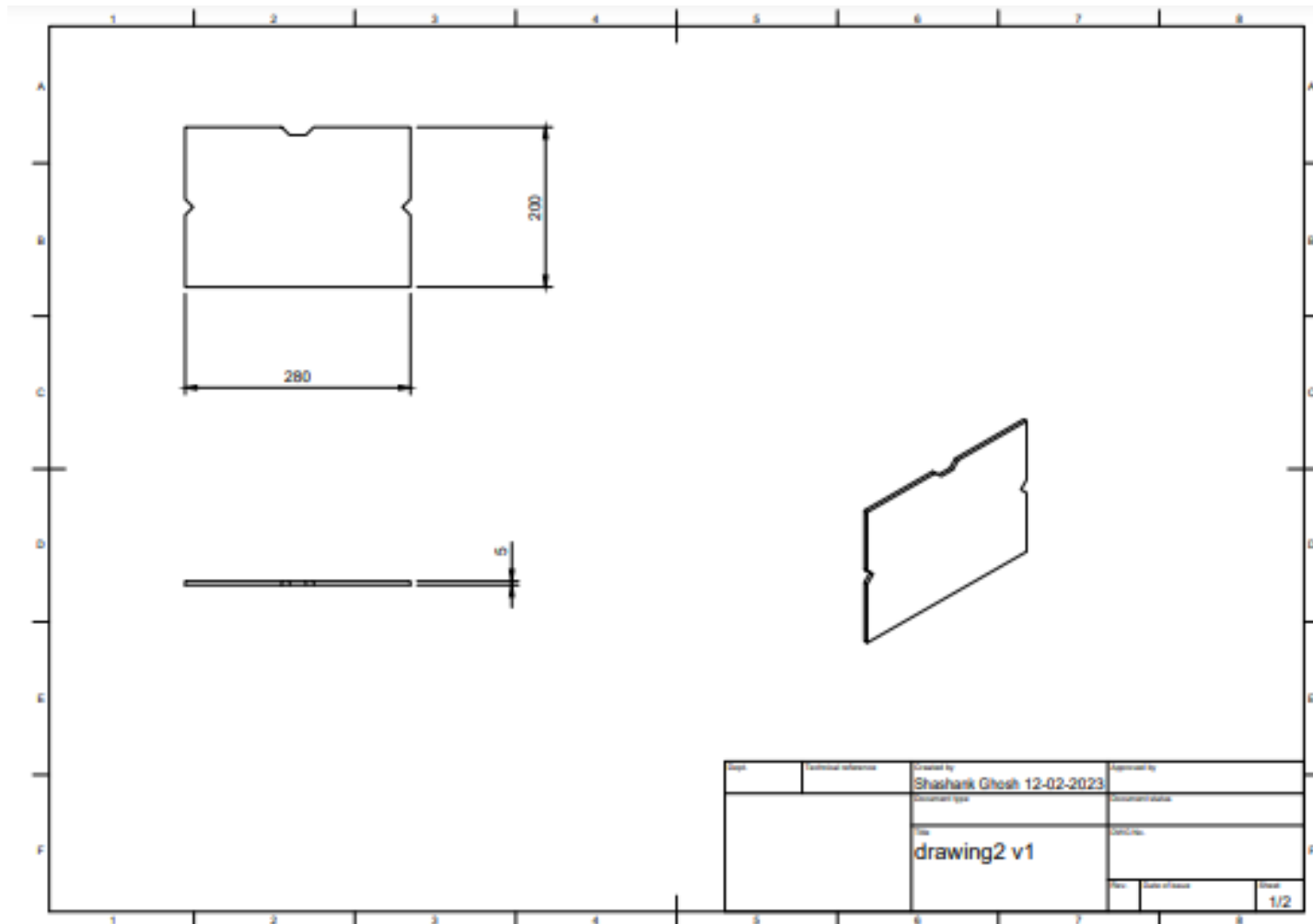
The entire part of the bottle holder is changed due to problems due to embedding and folding, and we got new ideas on brainstorming again. The bottle holder is a space specifically dedicated to a bottle for the arranged appearance of the table and easy utility. The bottle holder is embedded inside the tabletop.

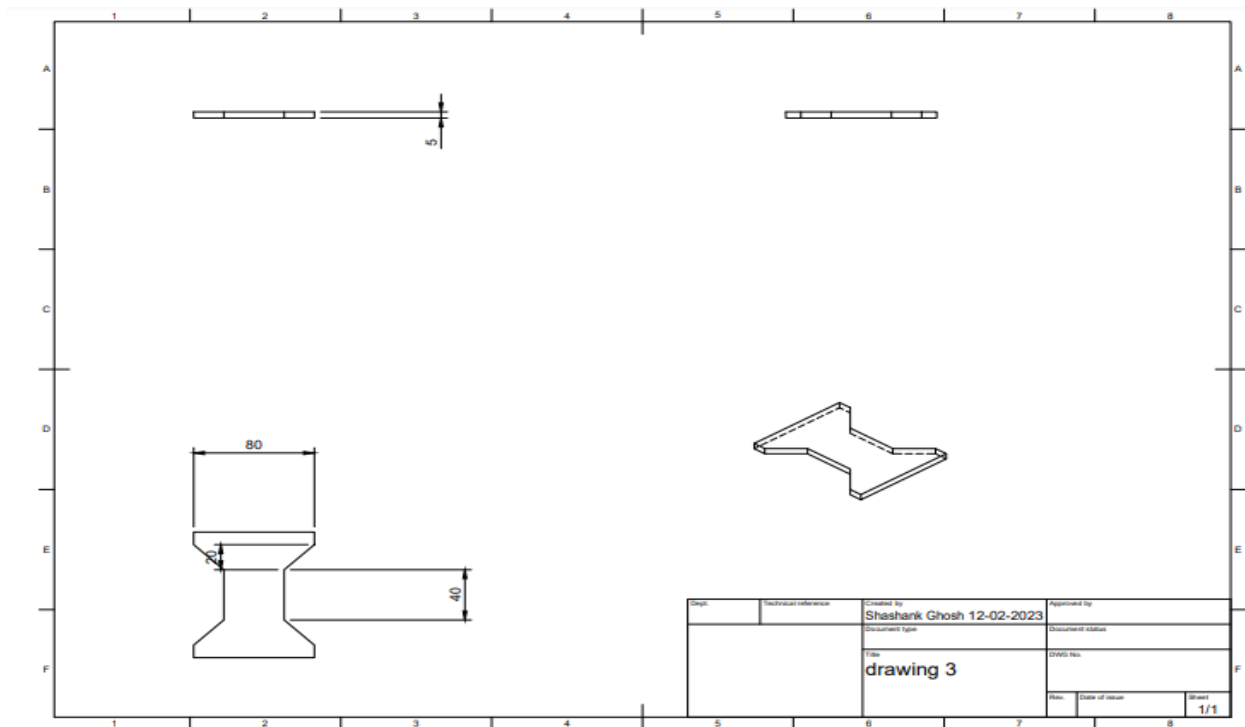
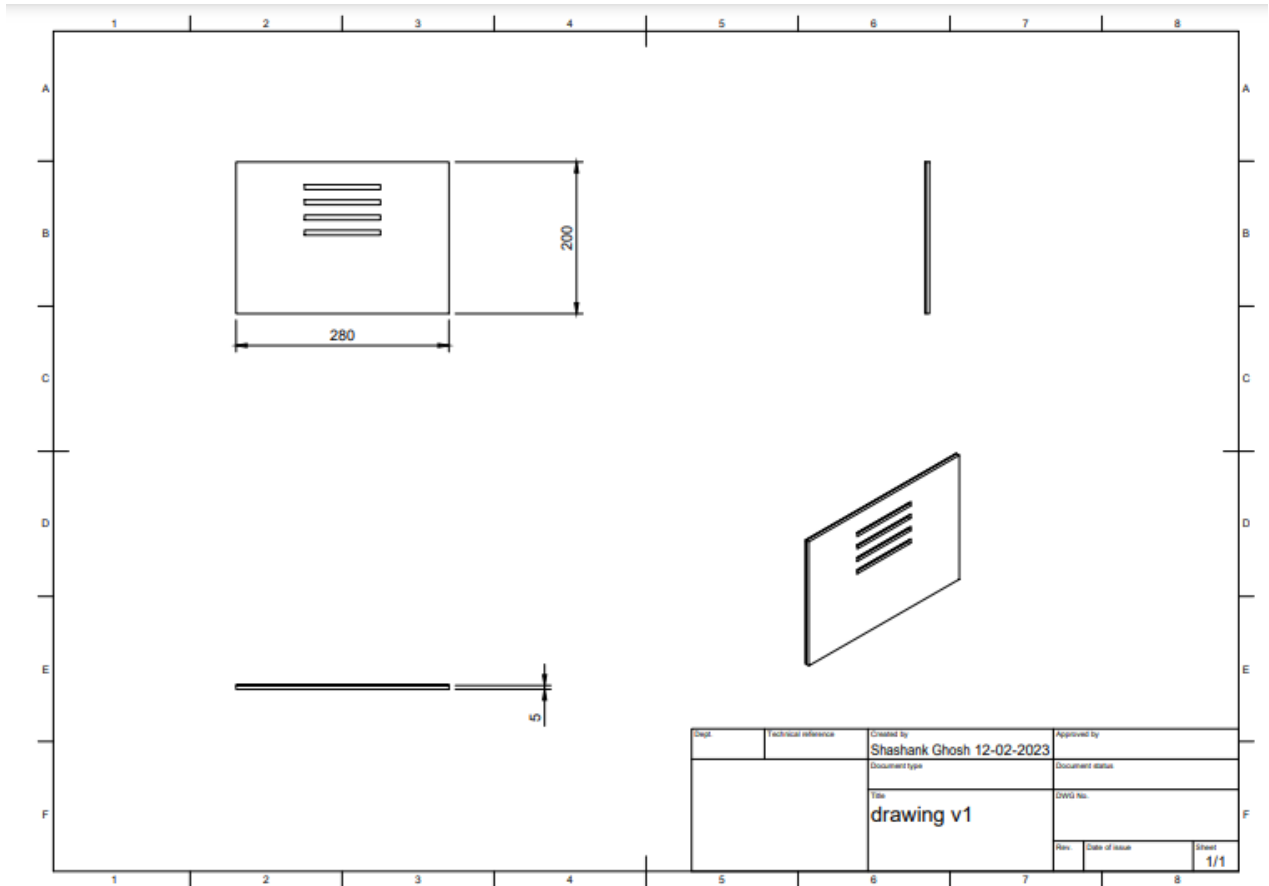
Material used: Galvanized iron sheet

Manufacturing Process Involved: Sheet Metal Operations (dimensioning, cutting, flattening, hammering, bending)

Drawings used for Laser cutting:

All measurements in the pictures below are in mm.





PICTURES OF OUR FINAL MODEL







WORK WHICH WAS DONE TILL REVIEW 1

1. The table top was sized and cut with respect to outer dimensions
2. Two rectangular frames was made but faced a lot of issues
3. Laser cut the laptop stand
4. The bottle holder was made by sheet metal

PROGRESS AFTER REVIEW 1

1. Made the outer part of pen box with wood, modeled the inner part, laser cutted it and fixed by making L clamps and attaching
2. Embedded the laptop stand on the table top
3. Made hole and fitted the bottle holder on the table top
4. Welding of the frame again with finishing
5. Assembling all the parts

CHANGES WE MADE FROM INITIALLY PROPOSED MODEL

- **Bottle Holder:** Cutting the edges from the top and bending it by 90 degrees. After bending, punching a total 8 holes on the 4 sides. Due to cutting, the height of the bottle holder will decrease by 1.8cm. The bottle holder is inserted on the tabletop with the major part below the table. Bottle holder is not fixed at the edge of the tabletop as we decided earlier, instead it is fixed at a distance from the table edge, behind the laptop stand.
- **Laptop stand:** changes in the design so that it suits laser cutting and involves slidability.
- The table top thickness is changed from 3 cm to 1.7 cm as per the available wood and considering other logistics. So we are using only one ply of 1.7 cm instead of 2 plies together with 3 cm. Instead we would be attaching a small second ply under the embedded laptop stand.
- Due to Welding constraints and inaccuracies in the cutting of the metal rods, the dimensions of the leg stands have been reduced by 5-8mm
- We did not use telescopic bar as we thought as the size of our drawer was less and could be done without it using the sliding mechanism

RESPONSIBILITIES

1. Aaryan Darad - Laser Cutting of laptop stand and pen box and assembling these parts
2. Alok Vidyarthi - Bottle Holder by Sheet Metal Operations and assembly
3. Animesh Tumne - AutoCAD modeling and and pen box; deciding the dimensions and finalizing them. Also helped in Laser cutting and tight fitting of drawer.
4. Kaushal Kothiya - Bottle holder using sheet metal operations, AutoCAD modeling and assembly of pen box
5. Pushkar Parakh - Table Top, embedding the bottle holder and laptop stand, making the pen box and assembly
6. Sharika S - Table Top, making the pen box and assembly
7. Shashank Ghosh - Welding for the leg frame and assembly
8. Nishant Tatar - Welding for the leg frame and assembly

Component details and tentative timeline for manufacturing

S. No	Details of the Component	Timeline for Manufacturing	Trade for Manufacturing (mention if the component will be purchased directly)	Remarks by TA Workshop staff (students involved and effective time spent)
1.	Legs of the table	Project Review 1	Welding	
2.	Pen Box	Project Review 2	Carpentry	
3.	Table Top	Project Review 1	Carpentry	
4.	Laptop Stand	Project Review 2	Rapid Prototyping	
5.	Bottle Holder	Project Review 1	Sheet Metal Operations	
6.	Assembly	Project Review 2		
7.	Final demonstration	Project Review 3		