

TA 201

EXPANDING TABLE

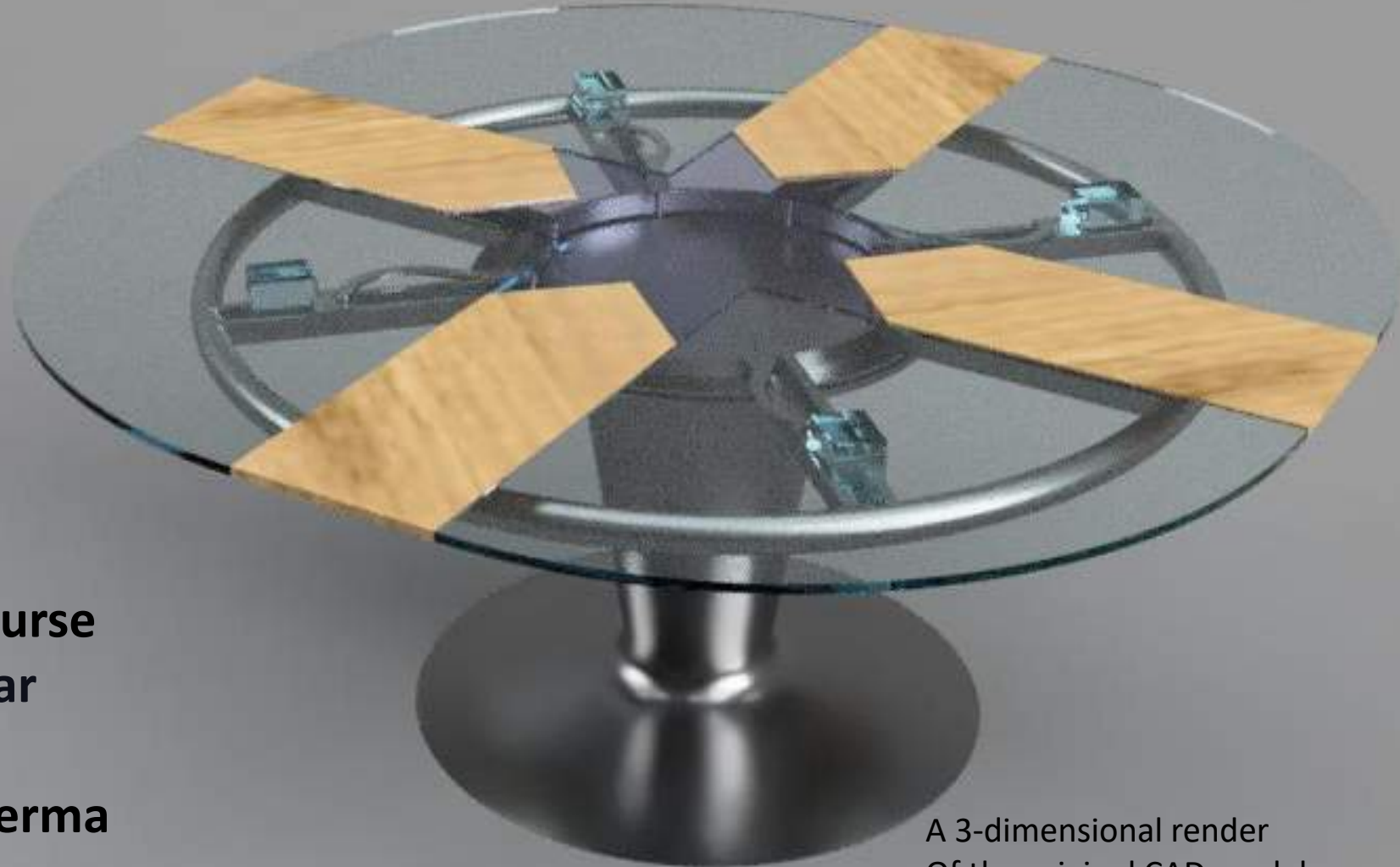
Section W1 G4

Made under the guidance of Course

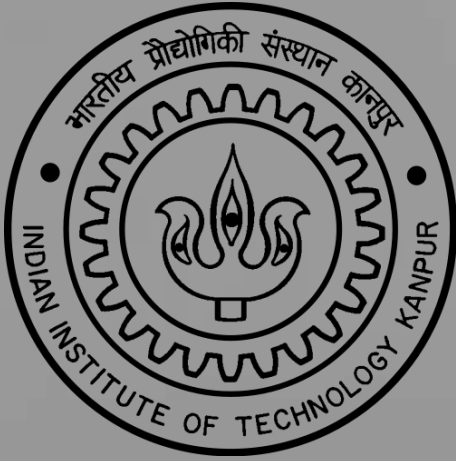
Instructor : Dr. Shashank Shekhar

Tutors : Dr. Vivek Verma

Lab in charge: Mr. Anil Kumar Verma



A 3-dimensional render
Of the original CAD model

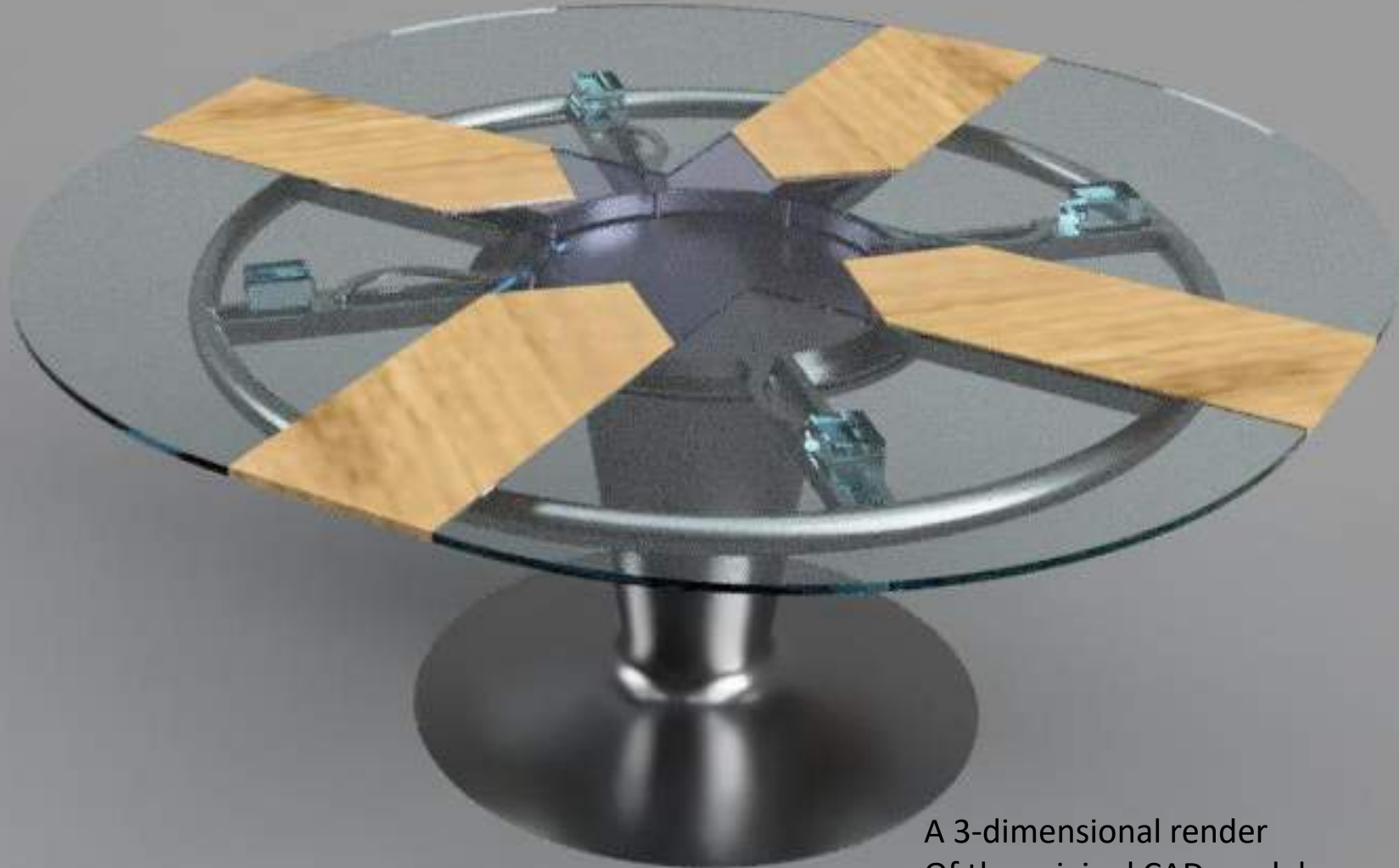


TA 201

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EXPANDING TABLE



A 3-dimensional render
Of the original CAD model

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INTRODUCTION

As the name suggests, an expanding table is a table that has a **572.556 cm²** area when unopened or closed, but when opened or expanded, has an area of **873.757 cm²** area. Over **153%** of its original area.

It has various parts that are interconnected through joints and adhesives. The base roll is the main part on which the entire table is based. It has grooves on which the sliders move, and the table expands.

MOTIVATION

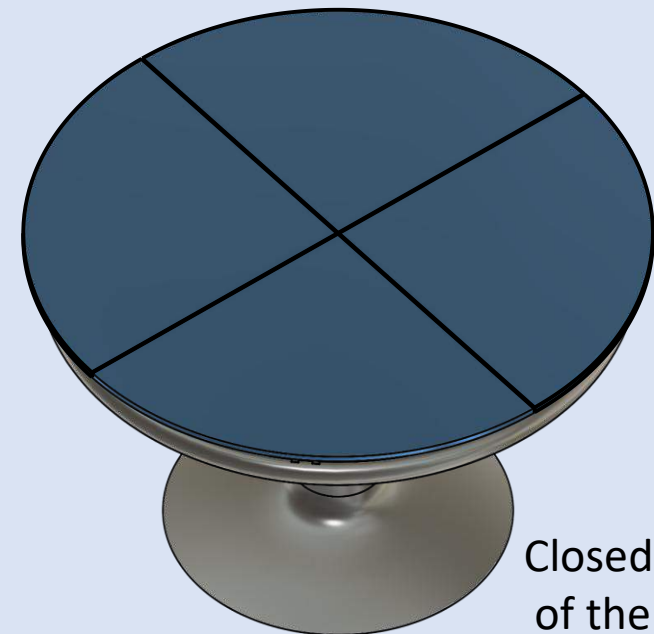
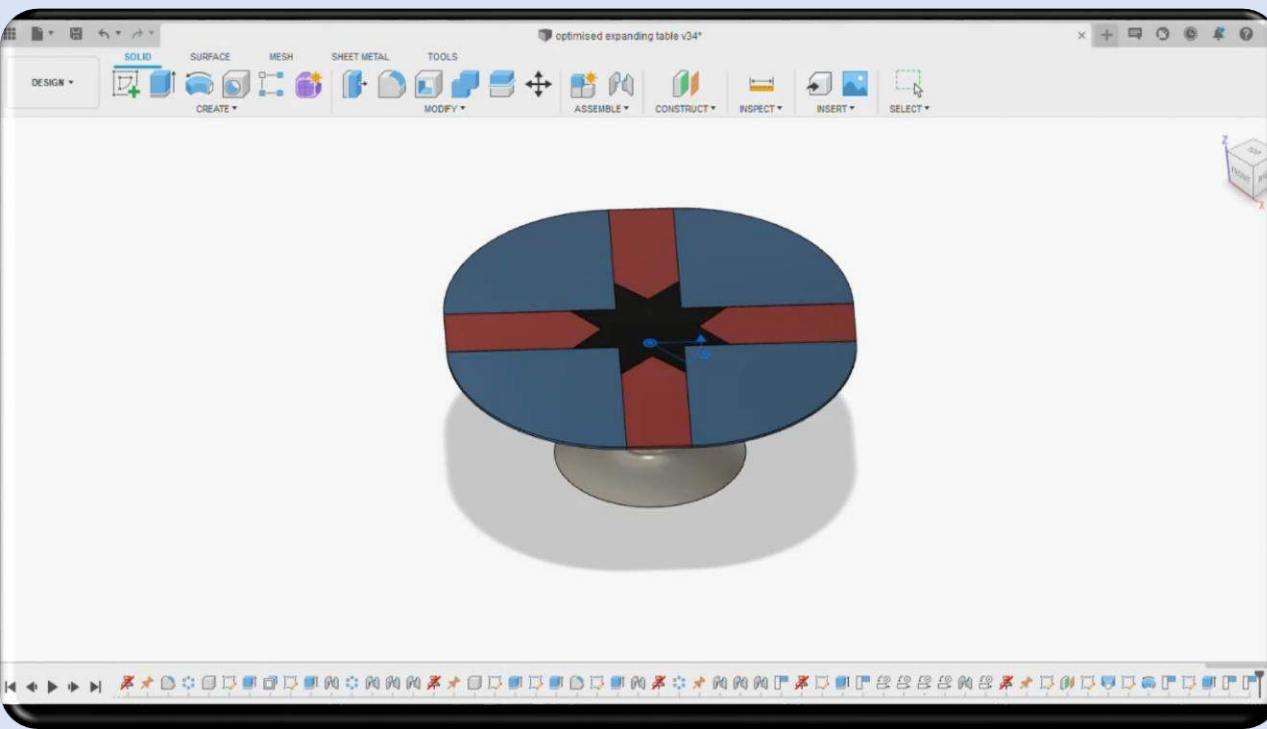
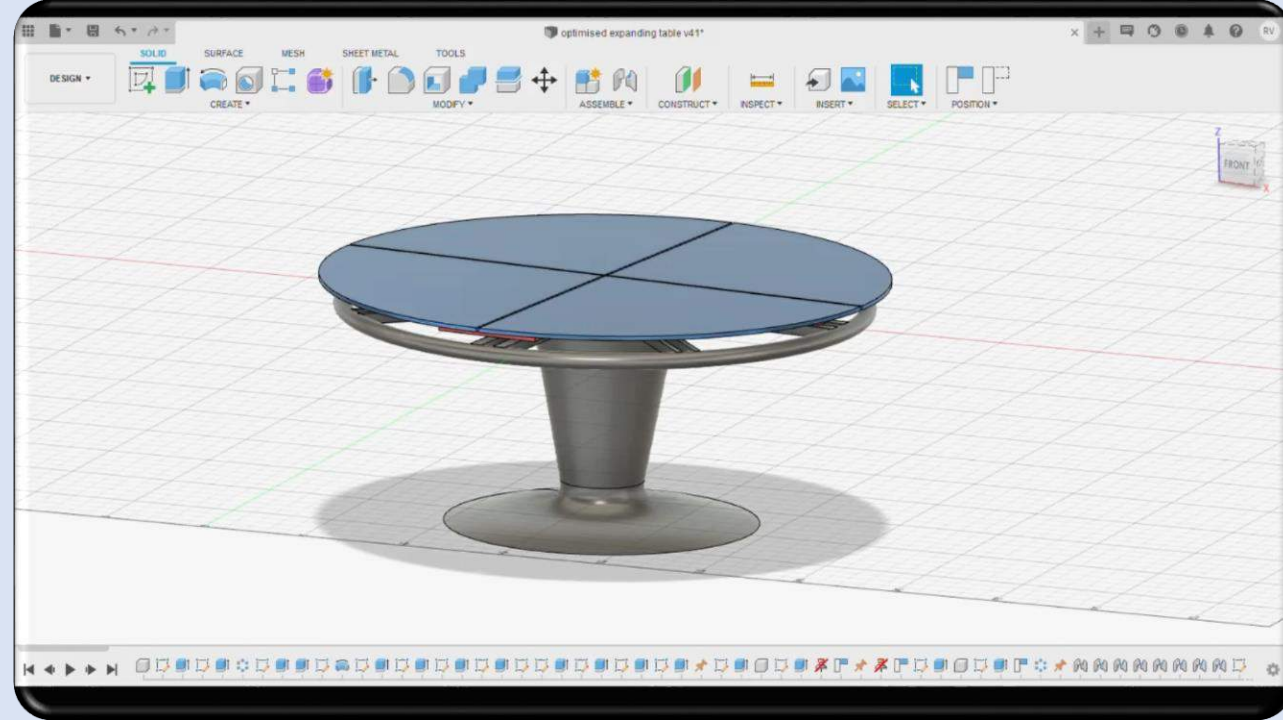
We present an expanding table. This table is designed to expand at the tabletop if an extra area is needed and conveniently closes to save some space. It uses sliders and channels, and tracks to make this possible. This is a lightweight multipurpose table. Our original inspiration was a curtain-style folding door that saves a lot of space but incorporating such a design into a table was difficult. It gave us numerous design challenges. The lack of patents and designs to look upon makes it even challenging but helped us a lot in learning new things. The result was a lovely looking table and when expanded, increasing its area by more than 50%.

ACKNOWLEDGEMENT

We want to express our sincere gratitude to our course instructor- **Dr. Shashank Shekhar** tutor- **Dr. Vivek Verma** and our Lab Technical Personnel- **Mr. Gaurav Mishra**, for their support and valuable insights on this project. Their support was essential to the execution of this project. We would also like to thank Professor Shashank Shekhar, course instructor, for providing us with this opportunity to explore our creativity and design the whole process of manufacturing something through lab processes.

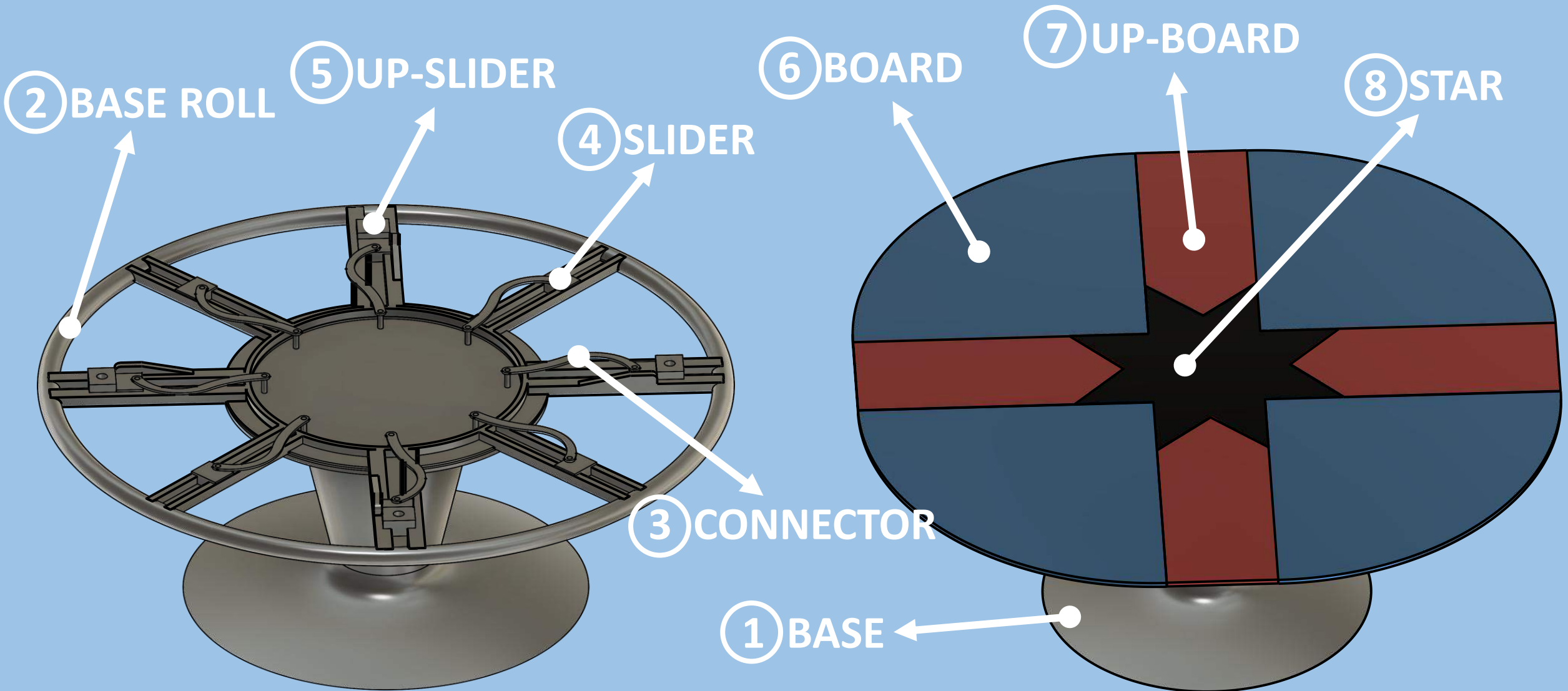
We want to thank our TA's insert name for their valuable guidance. Any omission in this brief does not imply a lack of gratitude.

WORKING VIDEO OF THE EXPANDING TABLE

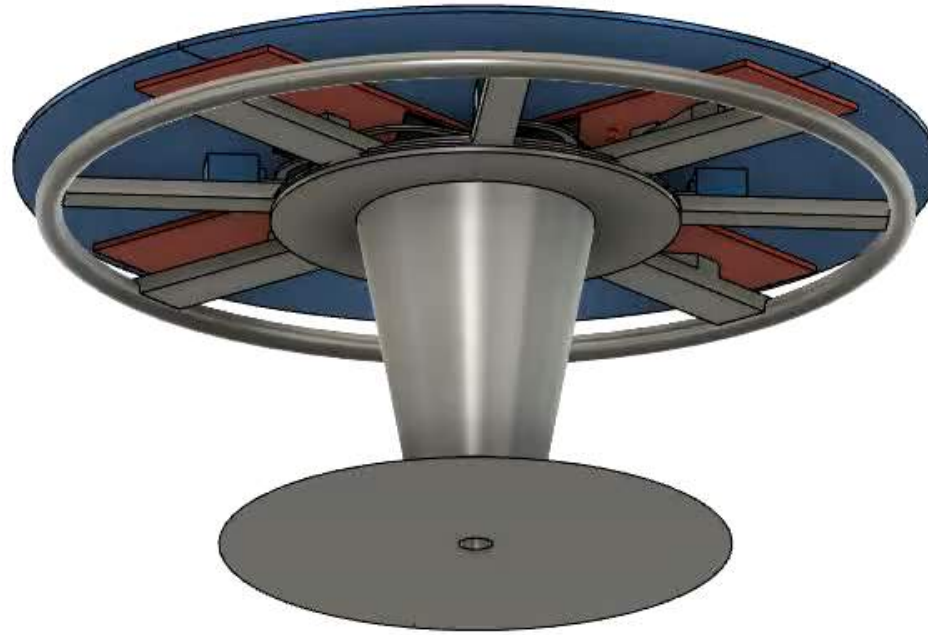


Closed 3D model
of the table

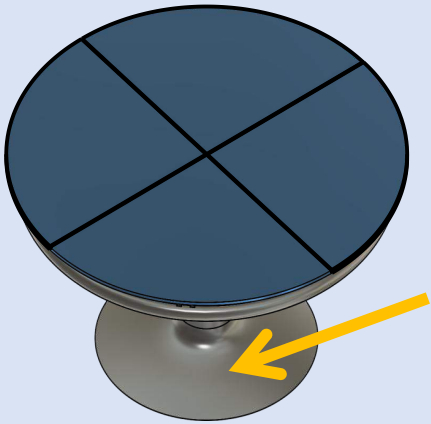
Isometric drawings



ASSEMBLY OF THE EXPANDING TABLE



BASE



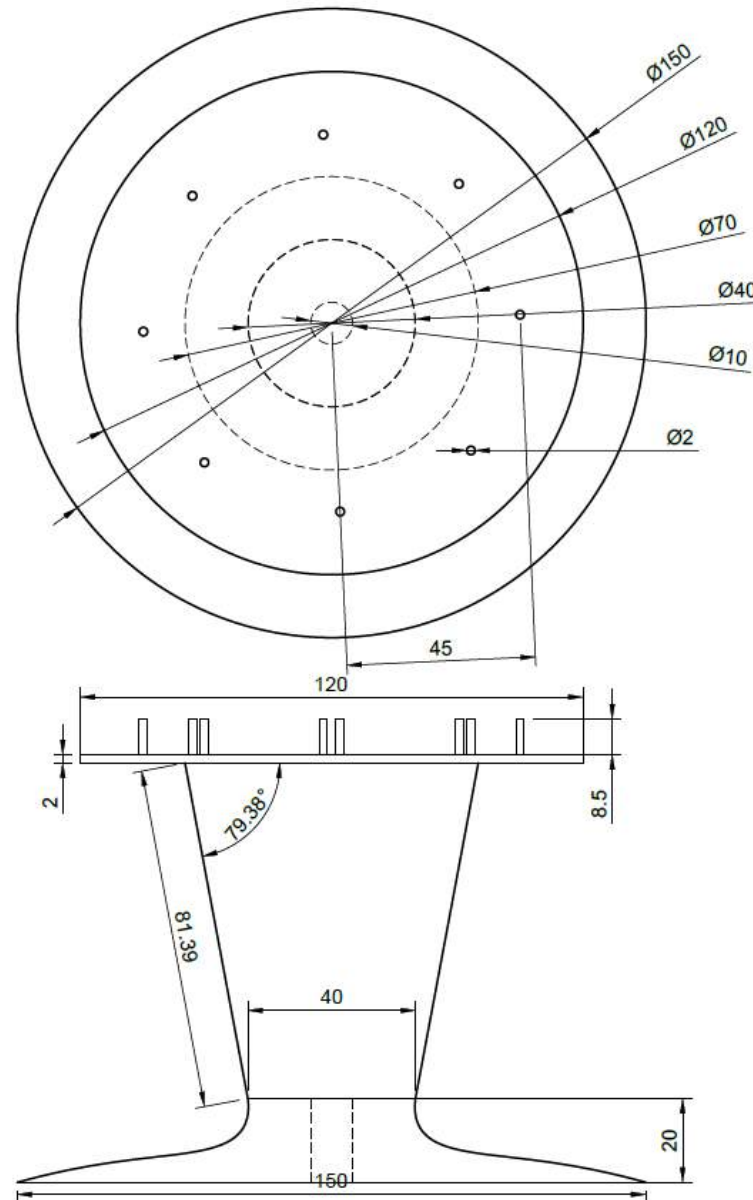
Description : base of the table relatively heavy than all other parts to avoid spinning.

Quantity : 1

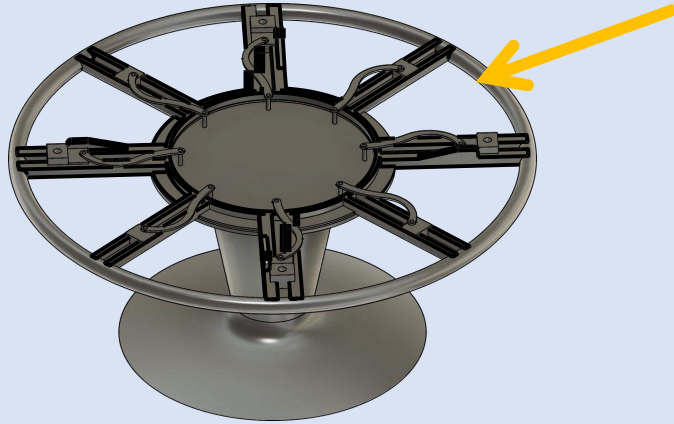
Weight : 2500 grams

Material used : Cast Iron, mild steel rod (2mm dia.)

Manufacturing process : Casting, welding, cutting.



BASE ROLL



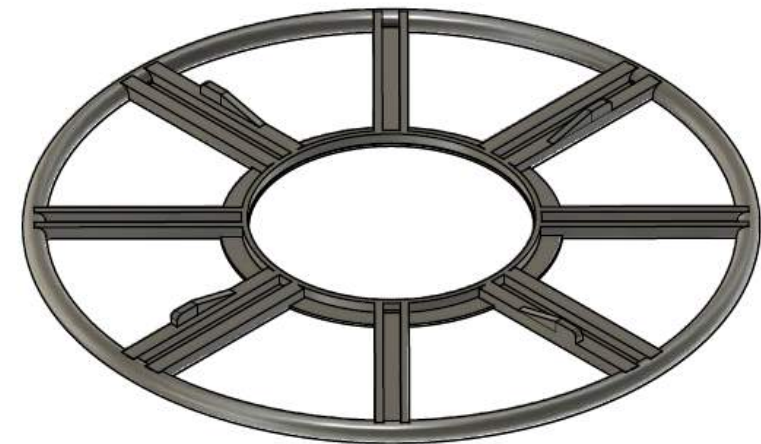
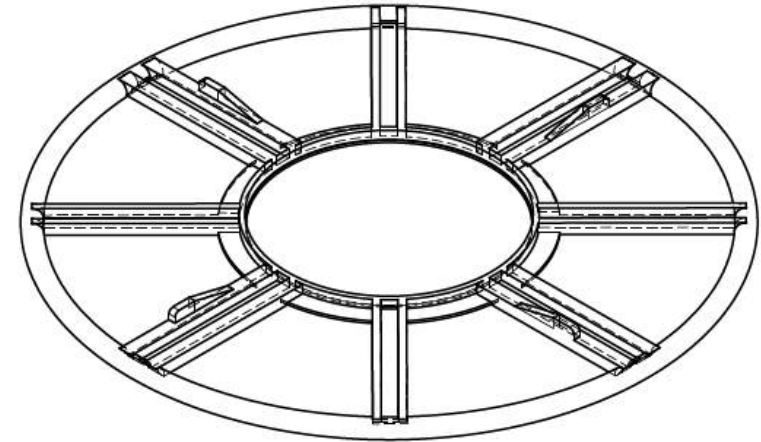
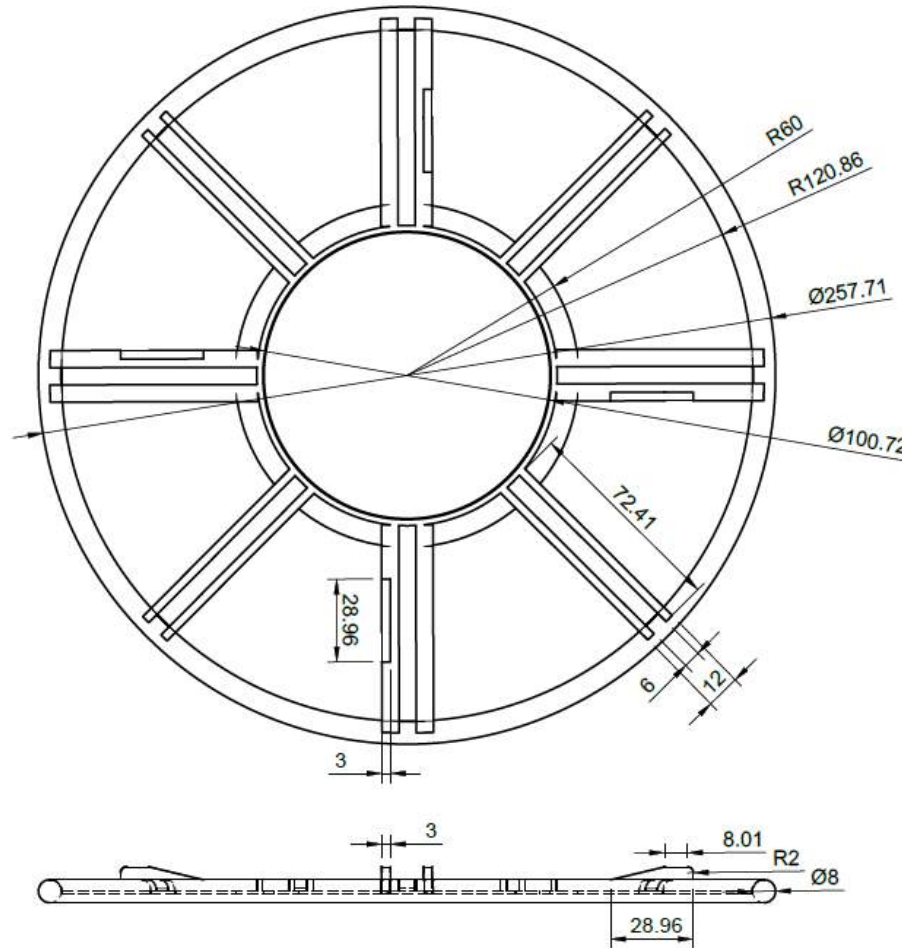
Description : crucial component of the table, spins on base.

Quantity : 1

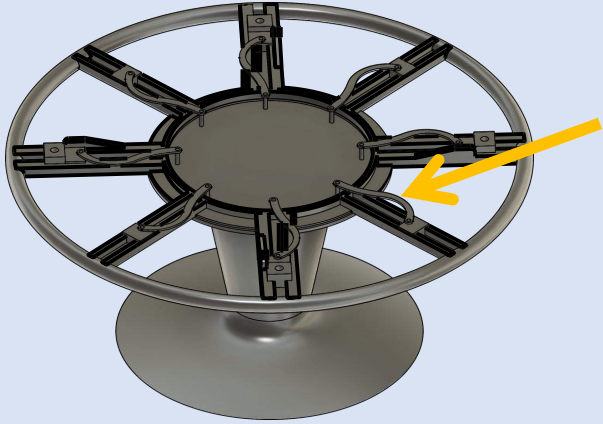
Weight : 581 grams

Material used : Cast Iron, mild steel sheet (2mm), mild steel rod (8mm dia.)

Manufacturing process : Casting, welding, shearing, bending.



CONNECTOR



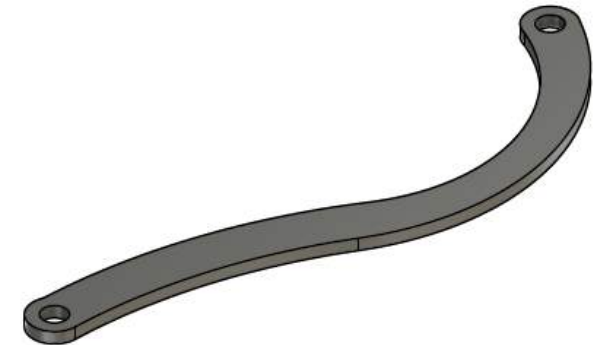
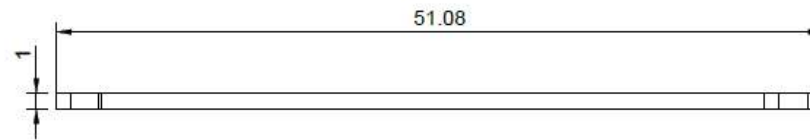
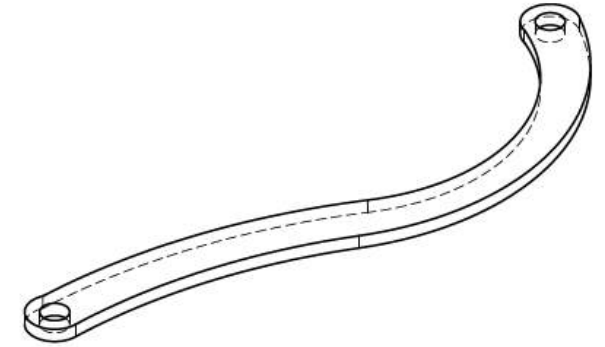
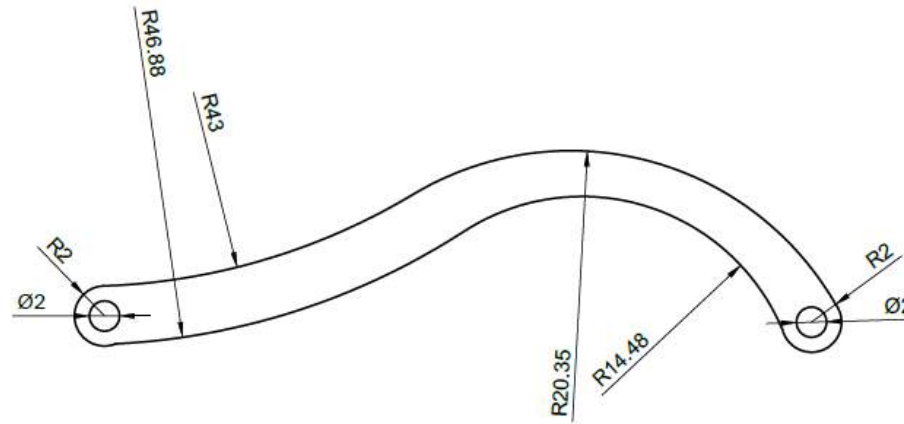
Description : connects the slider to the rods extruding from the base and is responsible for motion of sliders.

Quantity : 8

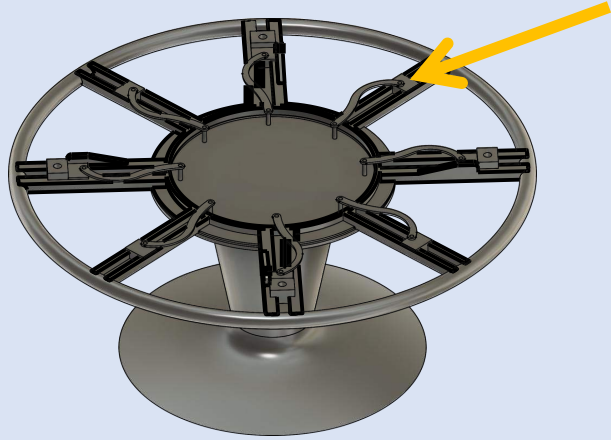
Weight : 2 grams (each)

Material used : mild steel sheet (1mm)

Manufacturing process :
Shearing, punching



SLIDER



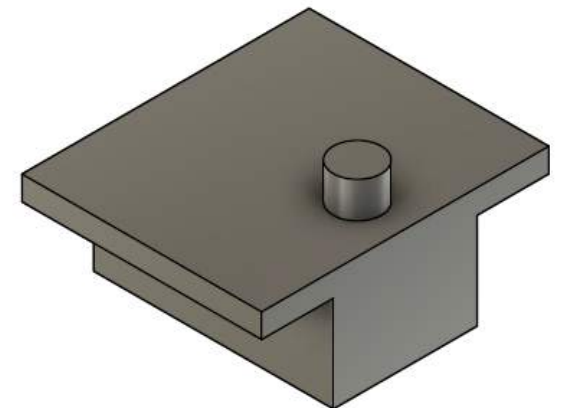
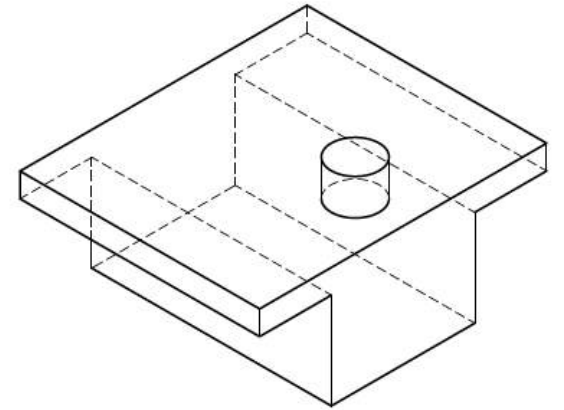
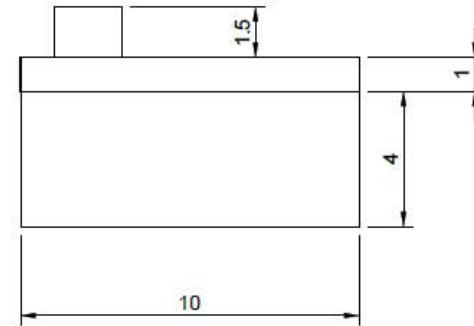
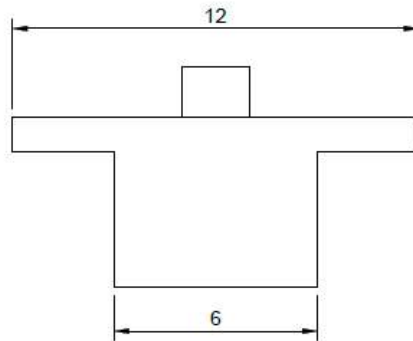
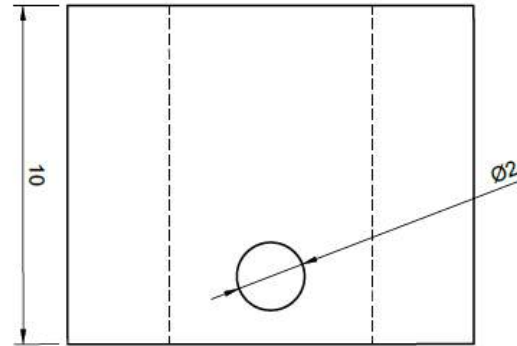
Description : slides in and out in the groove on the base roll.

Quantity : 8

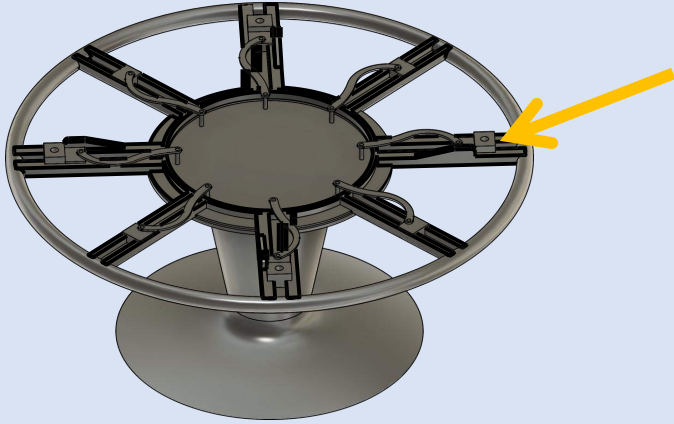
Weight : 3 grams (each)

Material used : Cast Iron

Manufacturing process : Casting



UP-SLIDER



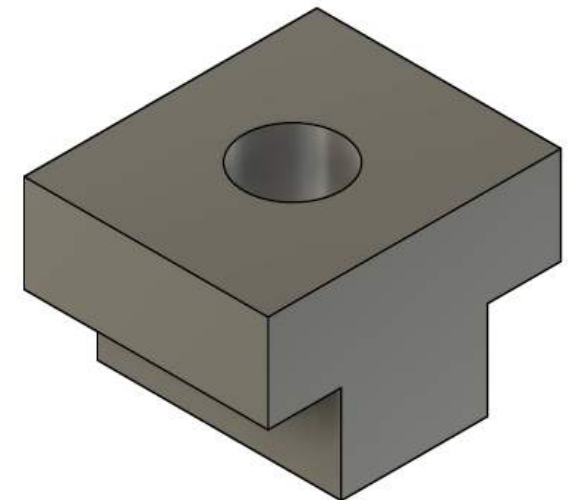
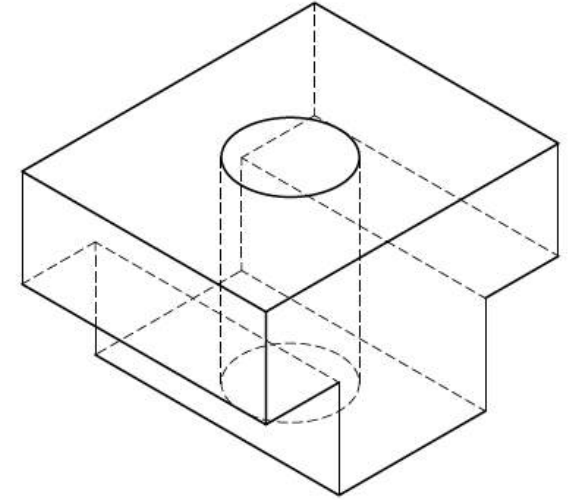
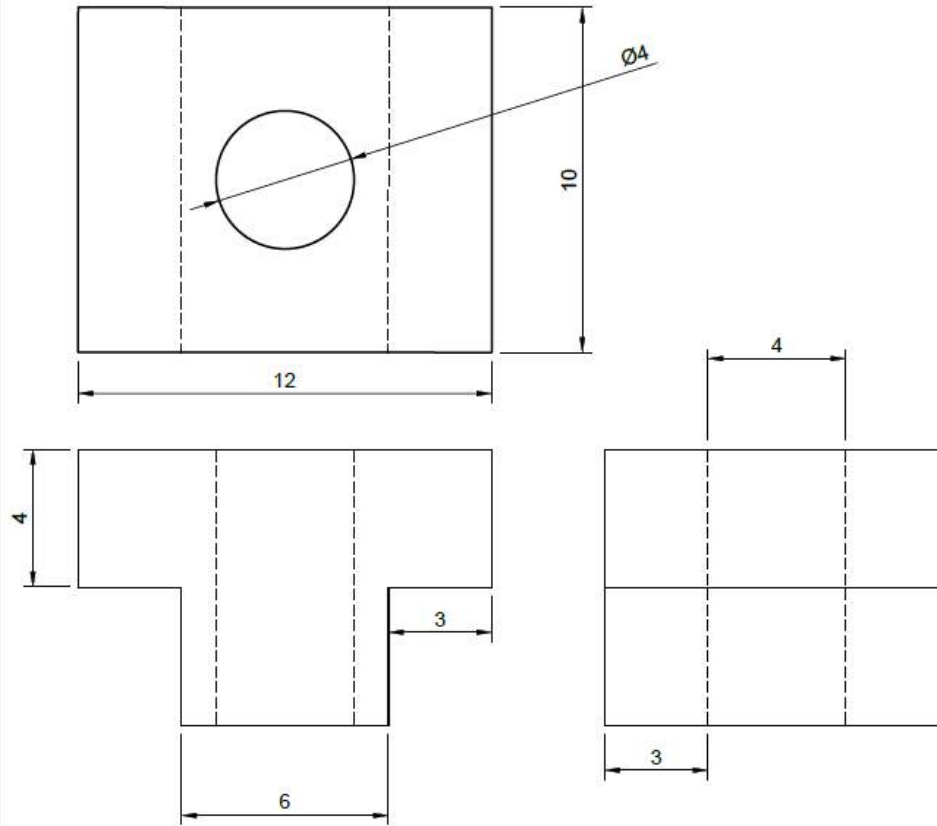
Description : responsible of up and down motion of the up-board.

Quantity : 4

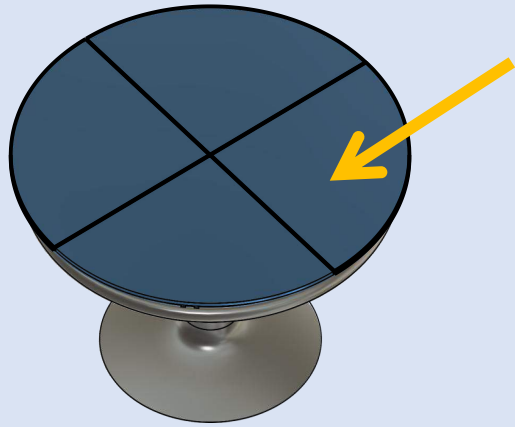
Weight : 5 grams (each)

Material used : Cast Iron

Manufacturing process : Casting



BOARD



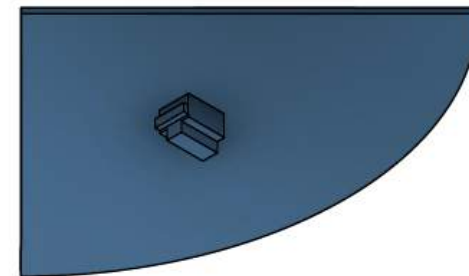
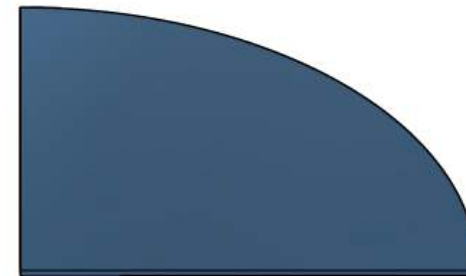
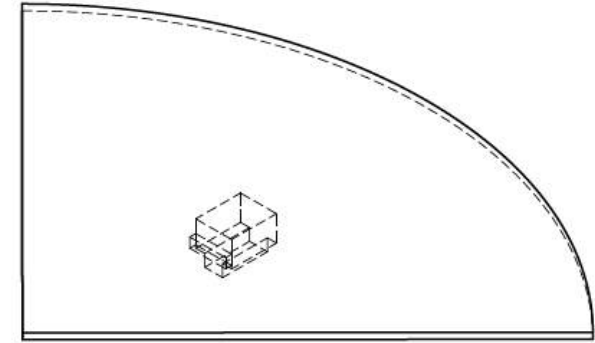
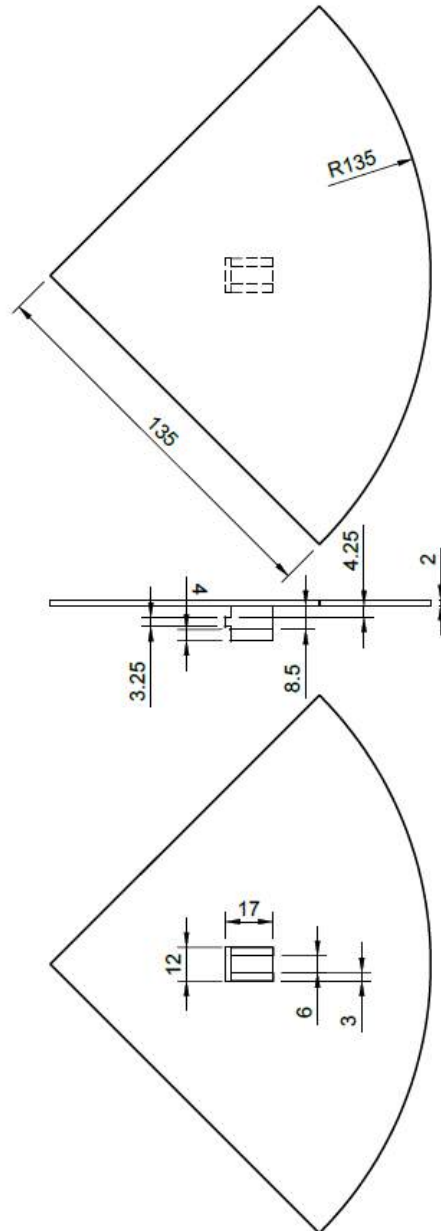
Description : top board of the table remains on top when the table is closed.

Quantity : 4

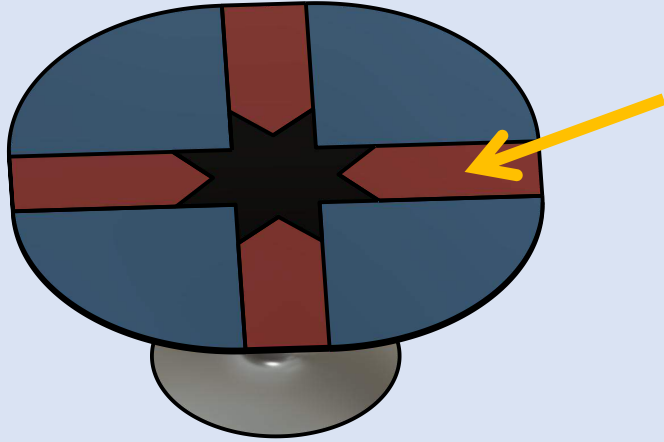
Weight : 240 grams (each)

Material used : Cast Iron, mild steel sheet (2mm)

Manufacturing process : Casting, welding, shearing.



UP-BOARD



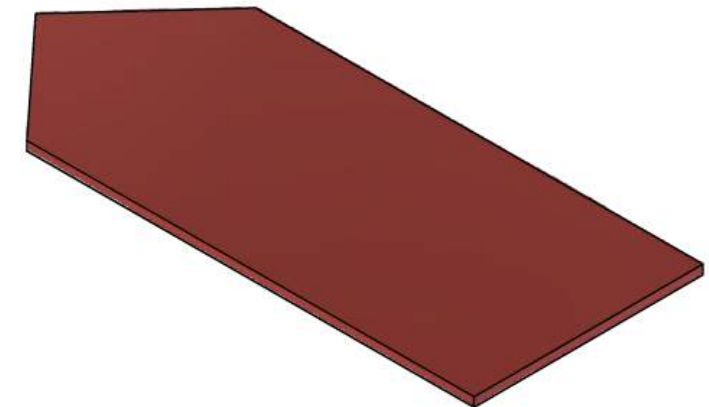
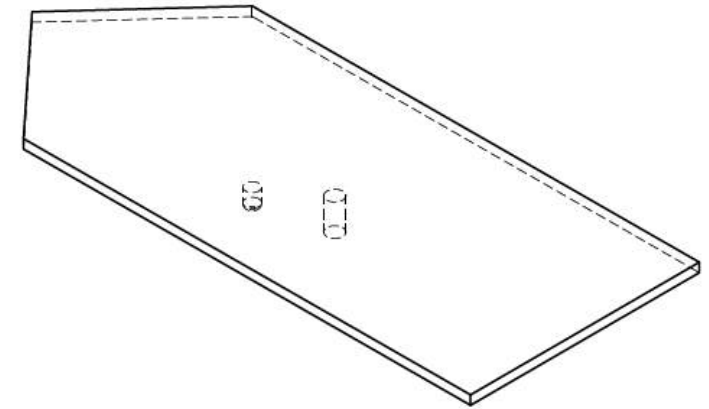
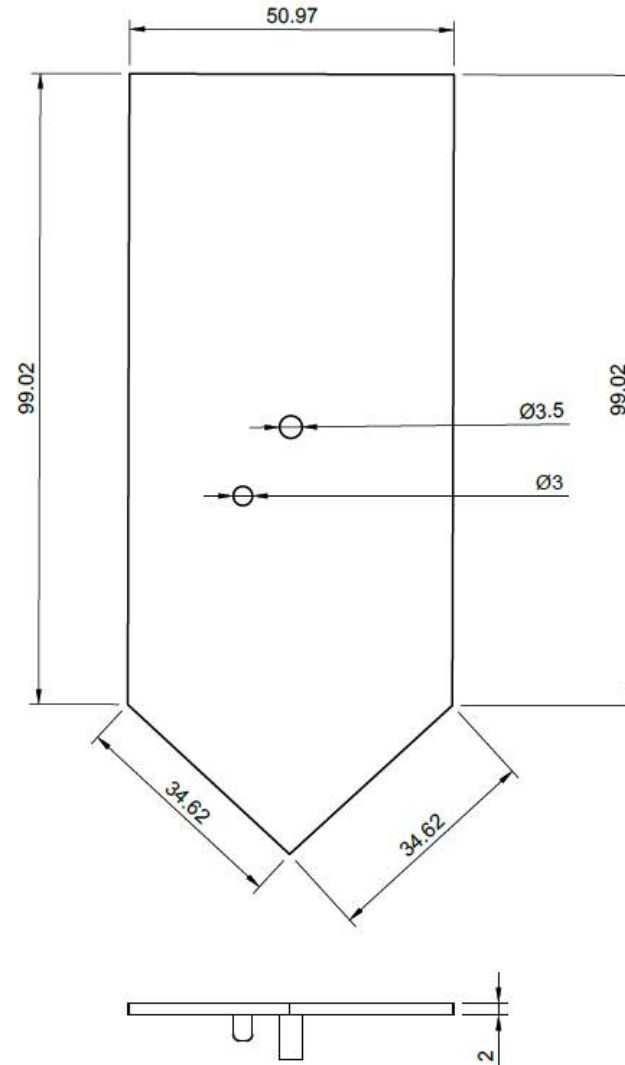
Description : up-board moves out and come out when the table is opened.

Quantity : 4

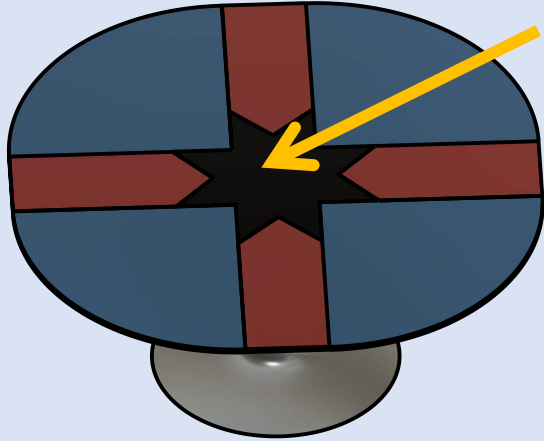
Weight : 90 grams (each)

Material used : mild steel sheet (2mm), mild steel rod(3mm), mild steel rod(3.5 mm)

Manufacturing process :
Shearing, Welding, grinding.



STAR



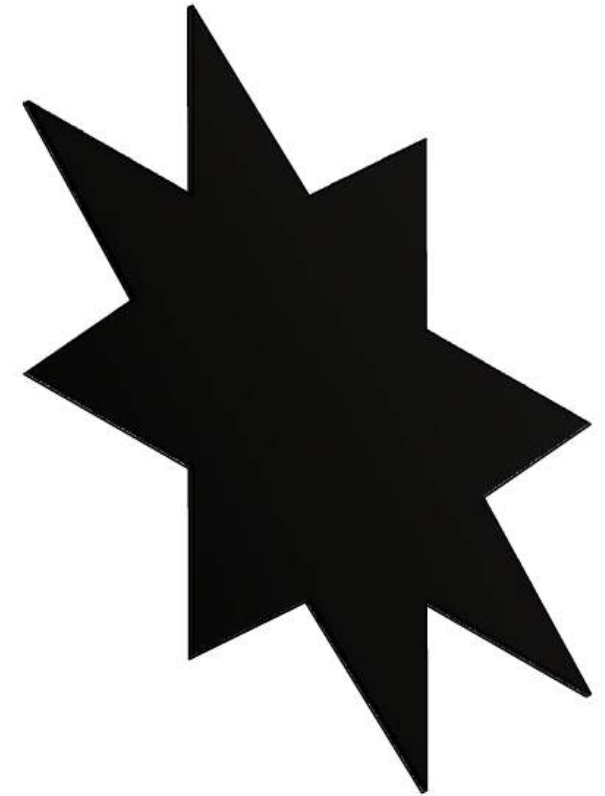
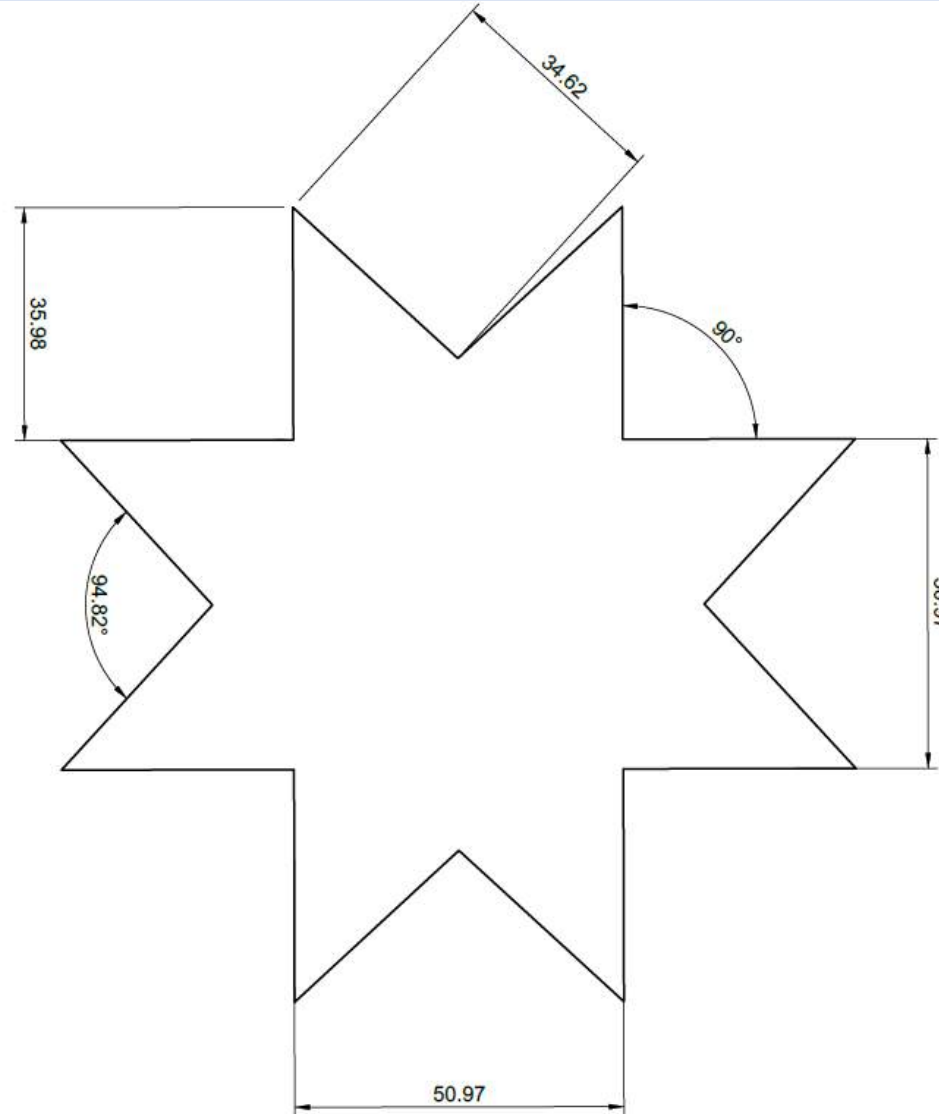
Description : star lies at the below board and up-board an comes in level of them once table is opened.

Quantity : 1

Weight : 60 grams

Material used : mild steel sheet(1mm)

Manufacturing process : Shearing

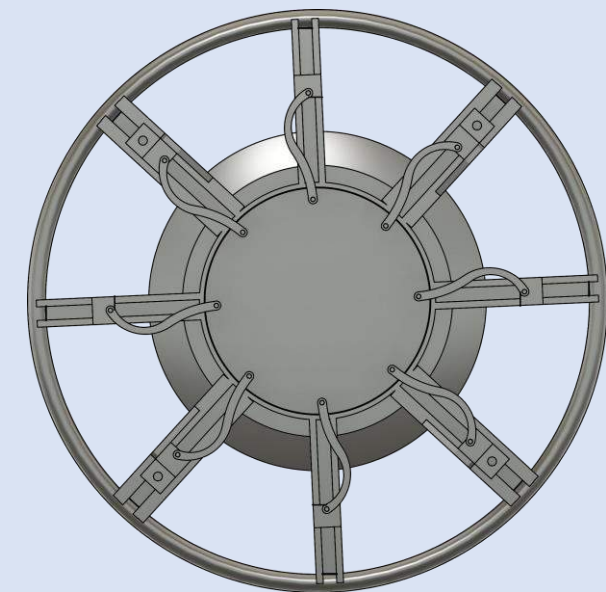


Isometric view

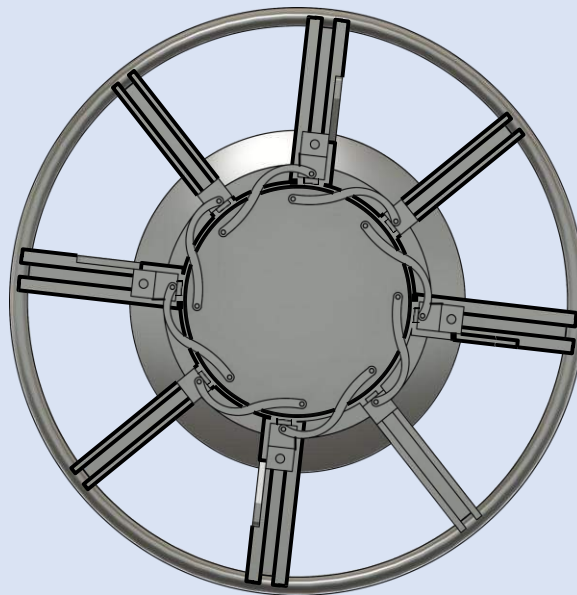
MECHANISM

Radial in-&-out mechanism :

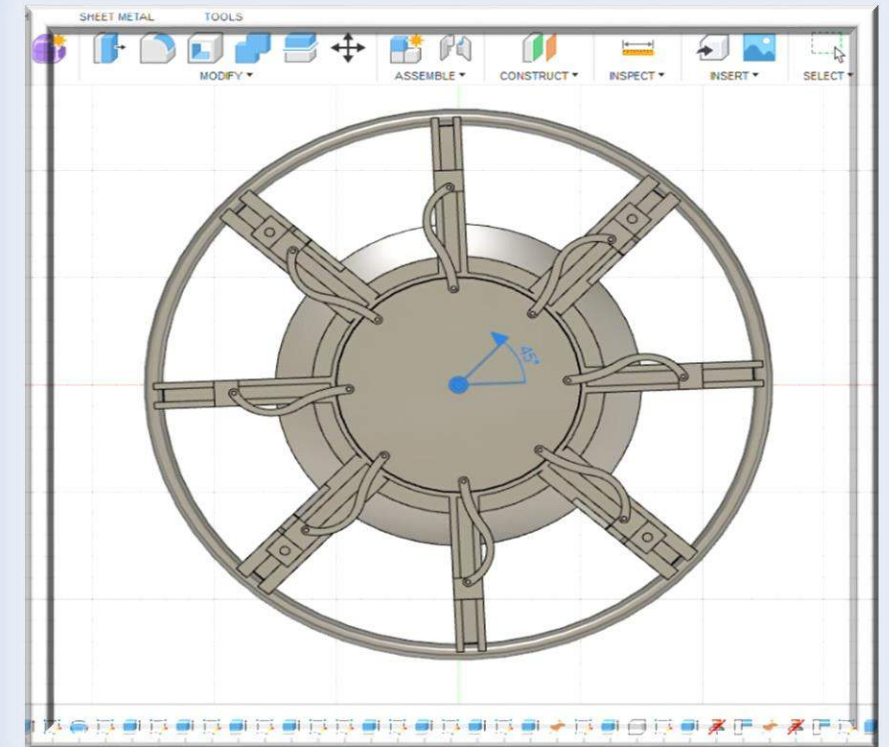
The video shows the mechanism involve in radial motion of Board and Up-Board. The table shows a full range of radial motion on a rotation of 54° . The connector is designed in such a manner that it allows complete closing of the table and the up-boards are designed in such a manner that they don't obstruct the motion of other components



Open table (expanded)



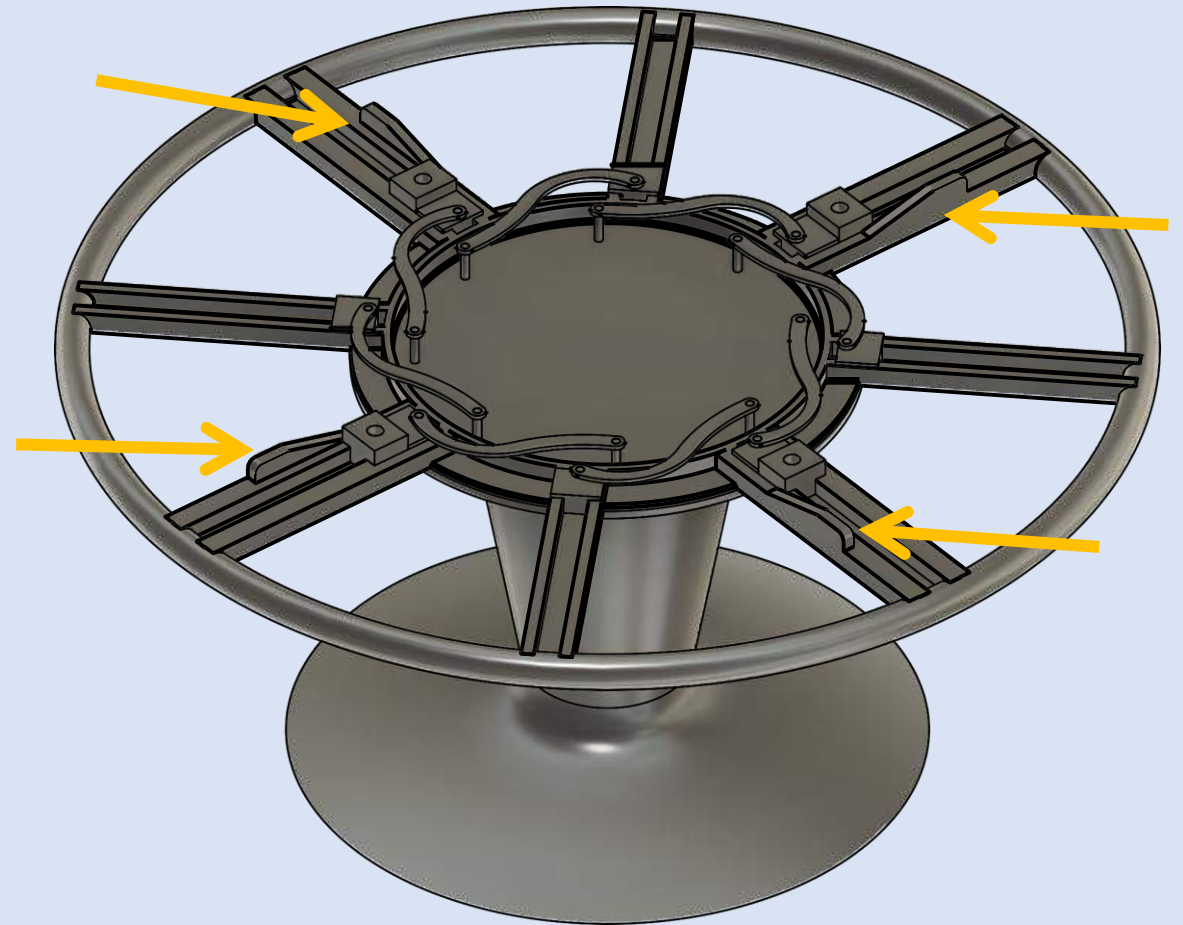
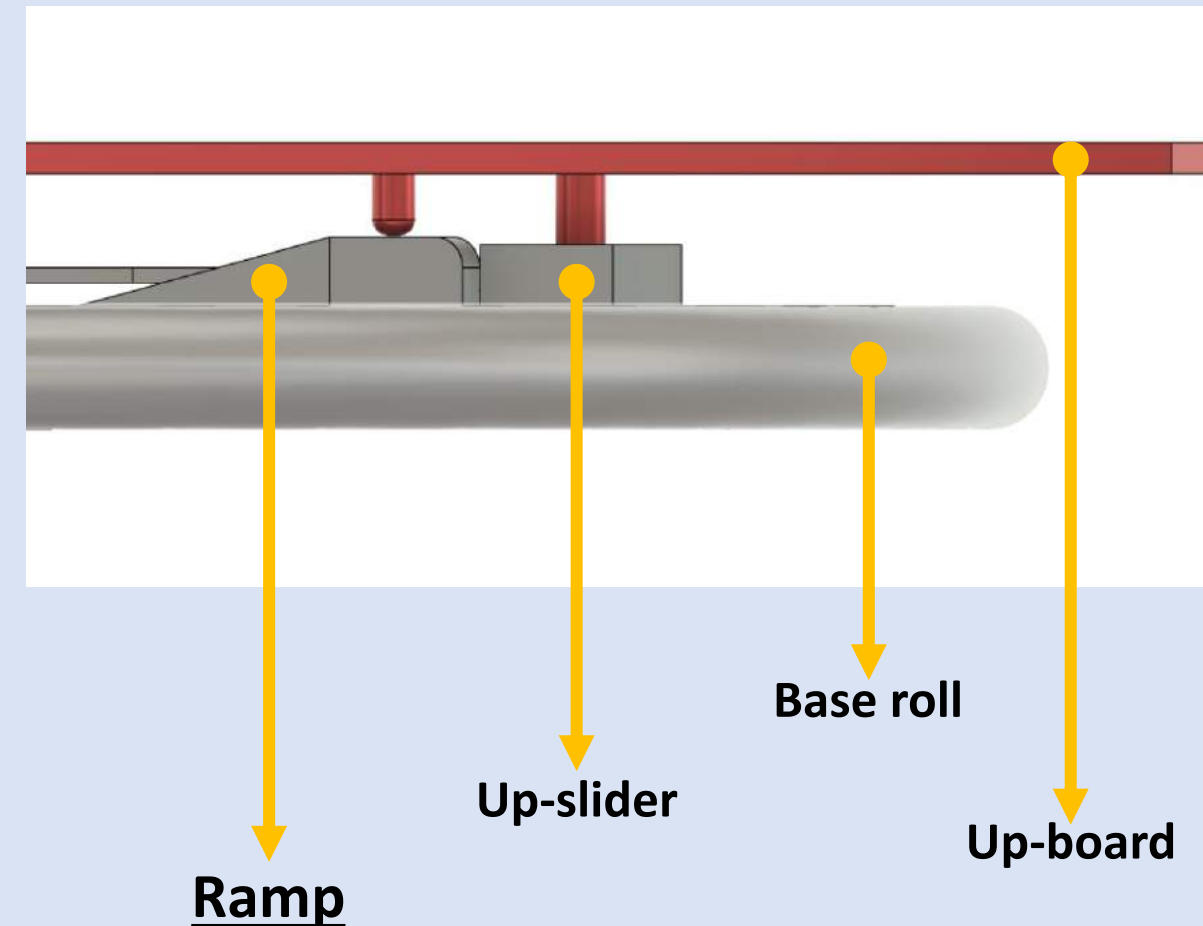
Closed table (collapsed)



Up-board lifting mechanism :

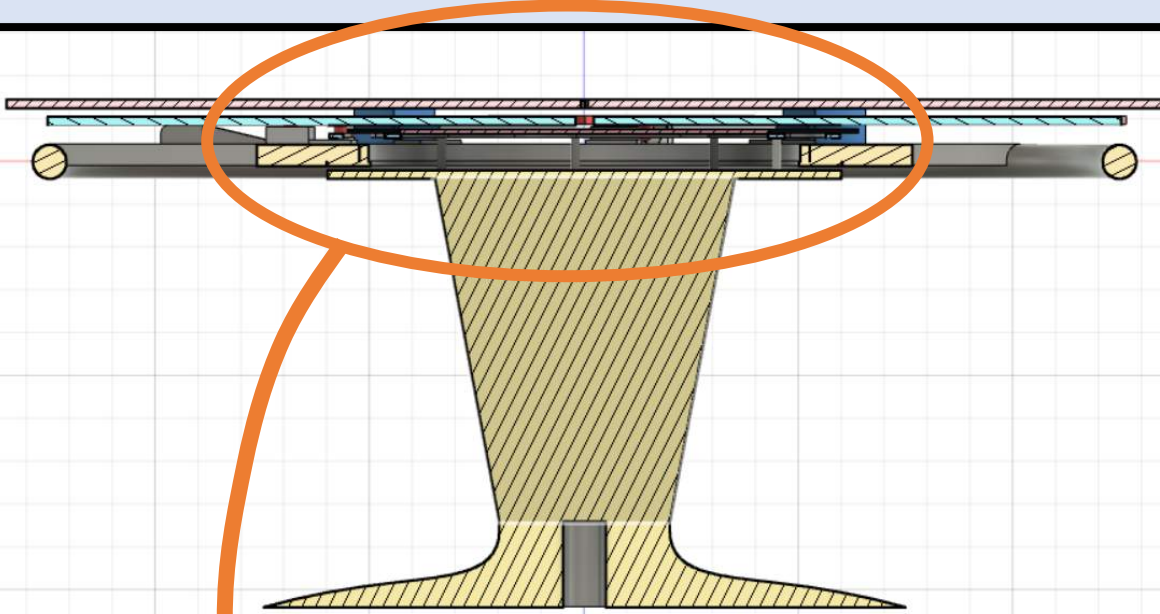
The up-board along with performing a radial motion also has a vertical motion that means it also needed to pop up as table opens.

For this, the base roll is designed with ramps on alternate arms that enables the up-board to pop up when the table expands.

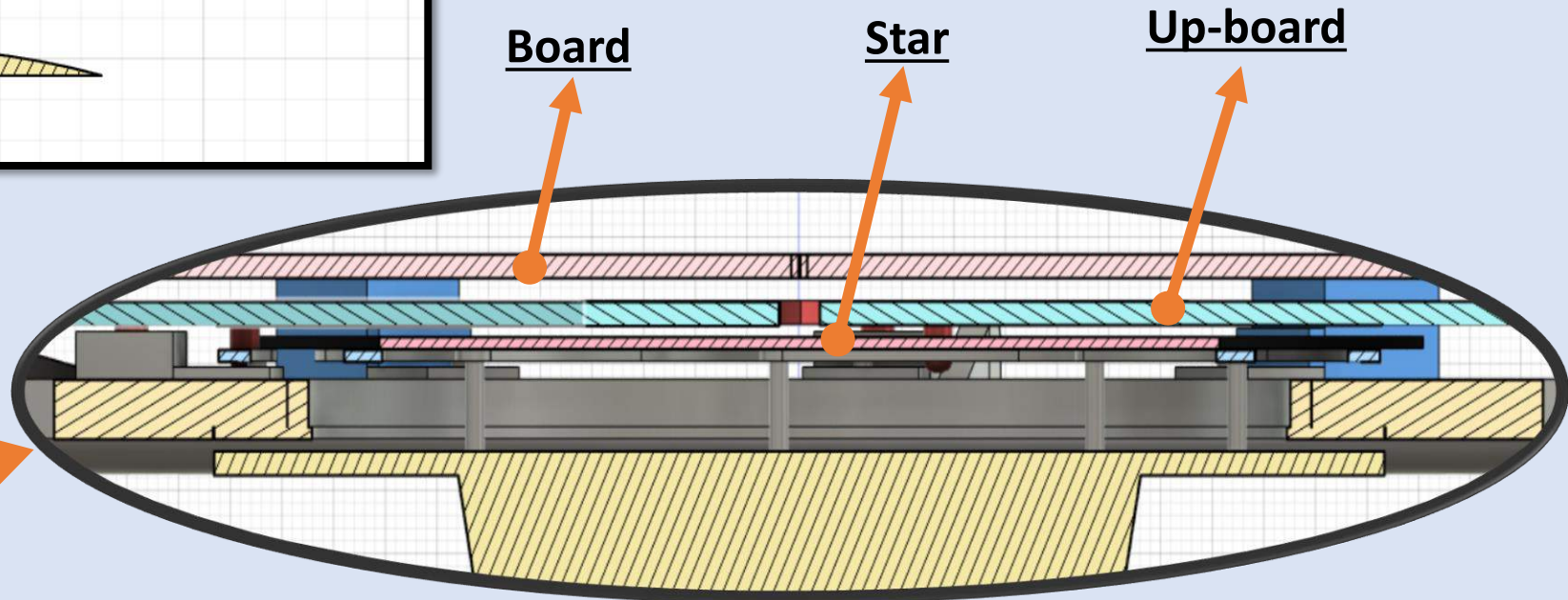


Arrows indicating ramps on alternate arms

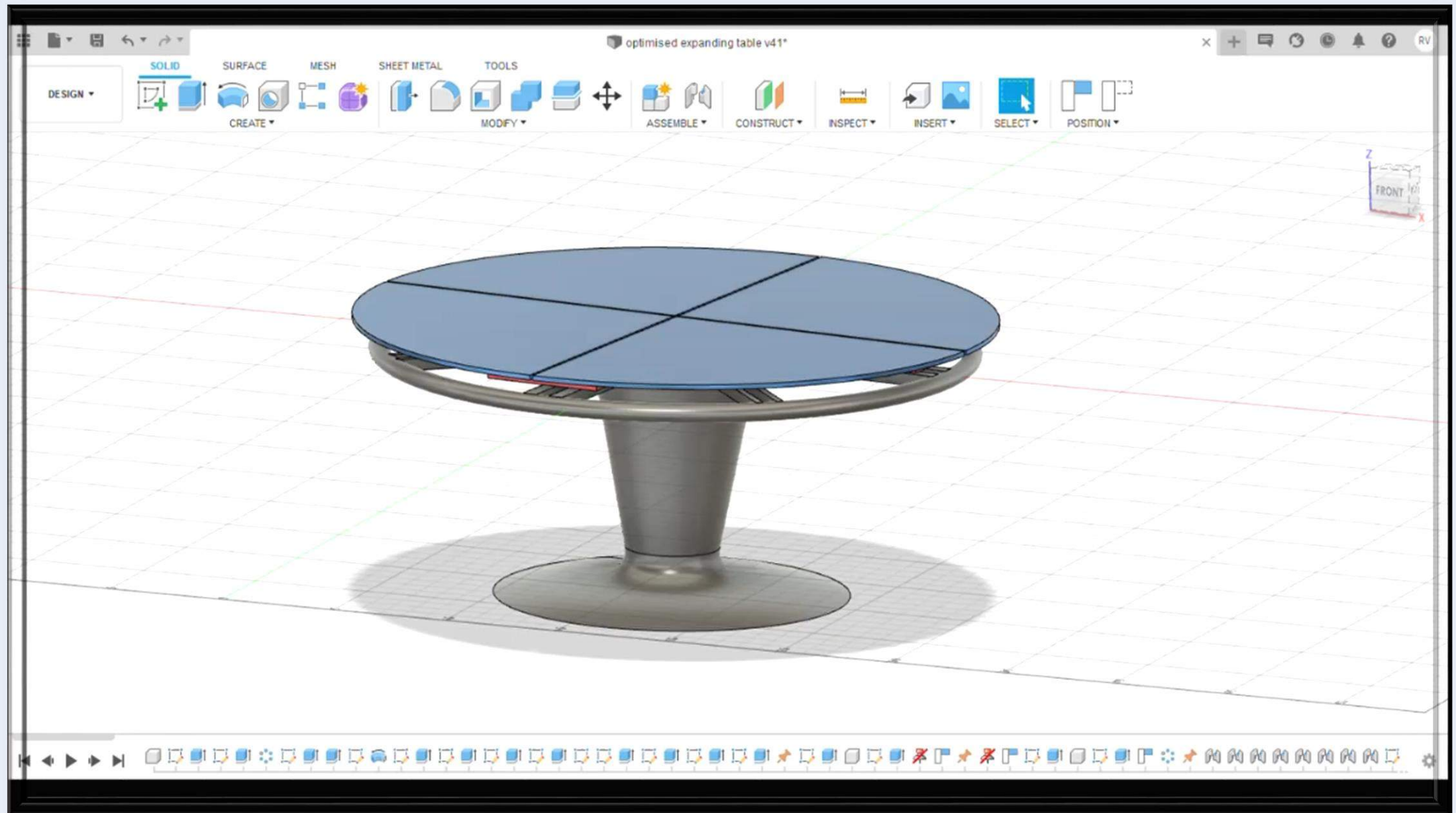
Location of parts when table is closed



The adjacent image and the image below shows the section view of the table when it is closed and all the components along with it.



Result :



Material used & process involved

<u>COMPONENT</u>	<u>QUANTITY</u>	<u>MATERIALS USED (each)</u>	<u>DETAILS (each)</u>	<u>MANUFACTURING PROCESS</u>	<u>JOINING PROCESS</u>
BASE	1	<ul style="list-style-type: none"> Mild Steel sheet (2 mm) Mild Steel rod (2mm dia.) Cast Iron 	114 cm ² 68 mm 2 kg	Shearing Cutting Casting	Welding
BASE ROLL	1	<ul style="list-style-type: none"> Mild Steel sheet (2mm) Mild Steel rod (8mm dia.) Cast Iron 	50 cm ² 76 mm 400 grams	Shearing Cutting, Bending Casting	Welding
CONNECTOR	8	<ul style="list-style-type: none"> Mild Steel sheet (1mm) 	6 cm ²	Shearing, punching	-
SLIDER	8	<ul style="list-style-type: none"> Cast Iron 	3 grams	Casting	-
UP-SLIDER	4	<ul style="list-style-type: none"> Cast Iron 	5 grams	Casting	-
BOARD	4	<ul style="list-style-type: none"> Mild Steel sheet (2mm) Cast Iron 	144 cm ² 50 grams	Shearing Casting	Welding, Mechanical fastening
UP-BOARD	4	<ul style="list-style-type: none"> Mild Steel sheet (2mm) Mild Steel rod (3mm dia.) Mild Steel rod (3.5mm dia.) 	121 cm ² 4 mm 8 mm	Shearing Cutting, grinding Cutting	Welding
STAR	1	<ul style="list-style-type: none"> Mild Steel sheet (1mm) 	160 cm ²	Shearing	-

Weight & Cost Analysis

<u>COMPONENT</u>	<u>QUANTITY</u>	<u>MATERIALS</u>	<u>WEIGHT</u> (each)	<u>TOTAL WEIGHT</u> Quantity × Weight	COST*
BASE	1	Iron	2500 grams	2500	₹113
BASE ROLL	1	Iron, Mild Steel	581 grams	581	₹27
CONNECTOR	8	Mild Steel	2 grams	16	₹10
SLIDER	8	Iron	3 grams	24	₹10
UP-SLIDER	4	Iron	5 grams	20	₹10
BOARD	4	Mild Steel, Iron	240 grams	960	₹44
UP-BOARD	4	Mild Steel	90 grams	360	₹17
STAR	1	Mild Steel	60 grams	60	₹10

TOTAL : ₹241

* Price of iron/mild steel : ₹45/kg

Process & Labour Cost Analysis

<u>PROCESS</u>	<u>COST/UNIT TIME</u>	<u>ESTIMATED TIME</u>	<u>NET COST</u>
Sand Mould Casting for Iron	₹ 150/hr	2 hour	₹300
Welding	₹ 100/hr	1.5 hour	₹150
Shearing, Punching	₹ 50/hr	1 hour	₹50
Bending	₹ 50/hr	0.5 hour	₹25
TOTAL			₹525
GRAND TOTAL COST			₹766



THANK
YOU!

