

# Project 3 Report

## “kopou”

### Lighting design

Exploration with bellmetal of Assam

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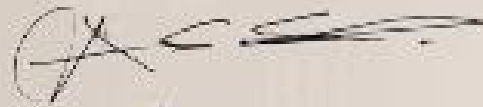


**IDC** School of Design  
अभिकल्प विद्यालय

# Approval

This is to certify that Industrial Design Project III (P3) entitled "**Kopou - Lighting design with bell-metal of Assam**" by Siladitya Samir is approved in partial fulfillment of the Master's Degree of Industrial Design at IDC, Indian Institute of Technology, Bombay.

Signature of the Project Guide:



Signature of the Chairperson:



Signature of the Internal Examiner:



Signature of the External Examiner:



Date:

# Declaration

I declare that this project report submission contains my own ideas and work, and if any pre-existing idea or work has been included, I have adequately cited and referenced the original author(s). I also declare that I have adhered to all principles of academic honesty and integrity and have not misinterpreted, fabricated or falsified any idea/ data/ fact source in my submission.

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November 2022

# Abstract

The ancient art of bell metal craftsmanship in Sarthebari, Assam, has a rich legacy dating back to the 7th century, making it a cultural treasure of India. However, the traditional techniques used by artisans have faced challenges in adapting to modern demands, leading to stagnation in product innovation. The difficulty of working with bell metal, combined with the artisans' adherence to age-old methods, has limited their ability to create new forms beyond the traditional and auspicious items they are known for.

Moreover, the livelihoods of these artisans have been further threatened by mass manufacturers who replicate their designs and sell them at lower prices, diluting the authenticity and value of the original craftsmanship.

In response to these challenges, this project aims to introduce a new product line focused on lighting design, leveraging the inherent qualities of bell metal while respecting and preserving the traditional techniques of production. By collaborating closely with the artisans, this initiative seeks to create contemporary lighting fixtures that showcase the unique beauty and resilience of bell metal, thus opening up new markets and opportunities for the artisans without compromising their heritage or craftsmanship.

Through this endeavor, we aim to not only revitalize the bell metal industry in Sarthebari but also empower the artisans to sustain their livelihoods while preserving and promoting a centuries-old art form.

# Acknowledgment

I would like to extend my heartfelt gratitude to all those who contributed to the successful completion of this project. First and foremost, I express my sincere appreciation to Prof. Avinash Shende, whose invaluable guidance, expertise, and unwavering support were instrumental in shaping this endeavour.

I would like to extend my thanks to the skilled artisan Mr. Hari Das whose meticulous craftsmanship brought this project to life. Without his expertise and passion, this project would not have been possible.

I am also grateful to the community that has worked tirelessly to preserve and promote these ancient art forms and techniques. Your commitment to preserving cultural heritage is inspiring and serves as a beacon for future generations.

Lastly, I would like to acknowledge the support of my family and friends whose encouragement, understanding, and unwavering support were vital sources of motivation and strength throughout this project.

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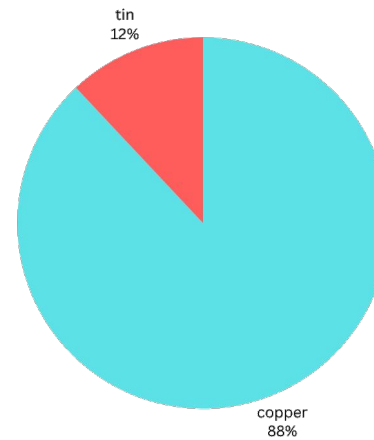
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Chapter 01:

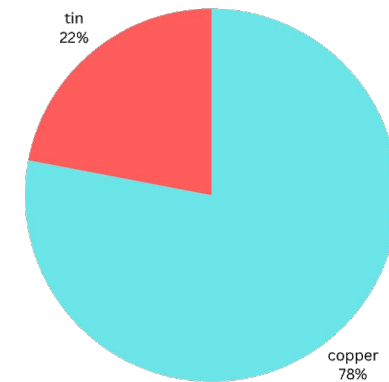
# Introduction

# Introduction: bell metal | Kanh

1.1



Bronze



Bell-metal

Bell metal is a type of bronze alloy that typically consists of approximately 20-25% tin and 75-80% copper. It's recognized for its durability, malleability, and resistance to corrosion.

Fig. source:  
<https://www.belmontmetals.com/product/bell-metal/>

# Introduction: Significance

## 1.2

- The bell-metal industry of Assam is the **second largest handicraft sector** after bamboo craft. If you visit any household in Assam you will come across a form of bell metal utensil in their home. Every Assamese takes great pride in serving their guests in bell metal utensils. People of Assam use bell metal for various ceremonious occasions and domestic purposes.
- Without the bell metal utensil it is not possible to perform the entire ritual practices of **Nava Vaisnava** religion advocated by **Srimanta Sankardeva**.
- Any time visitors visit a family, the family invites them by giving areca nut in a bell-metal utensil (Baata).
- When a baby takes his/her first solid food we hold the Annaprasanna ceremony and this first meal is served in utensils of bell metal. This first set of utensils is gifted by the maternal grandparents with much love and affection. Most of the guests who attend the ceremony also gifts bell metal utensils to the baby.

# Introduction: Existing products

1.3

## Kahi / Plate

A popular product of handicraft bell metal industry of Sarthebari, Assam use more or less in different parts of India. It is a handmade plate with crafted design used to serve meal . It also can be used as a puja thal.

It weighs generally between 600 - 1200 gms depending on your preference.



Fig. source:  
<https://www.kahibati.com/kahi.html>

### 1.3.Introduction: Existing products



Fig. source:  
<https://www.dsource.in/resource/bell-metal-items/making-process>

#### **Bati / Bowl**

It is a handmade bowl used to serve liquid items/gravy items. In assam, traditionally it is used to serve tea.

It weighs generally between 300 - 600 gms depending on your preference.

## 1.3.Introduction: Existing products

### **Ban Kahi / Plate with stand**

It is a distinct type of dish with a stand. It stands out as one of the finest among its various counterparts. Its versatility extends to serving meals, serving as a “Puja Thali” during religious occasions, or functioning as a standing plate.

It weighs generally between 600 - 1200 gms depending on your preference.



Fig. source:  
<https://www.mugasilk.in/shop/bell-metal-ban-kahidish-with-a-stand-1000gm/>

### 1.3.Introduction: Existing products



#### **Ban Bati / Bowl with stand**

These plates are typically round and shallow, resembling a bowl but with a wider, flat rim. They are commonly used in Assamese households for serving meals, particularly during special occasions and festivals also used to serve liquid items like cream, curd etc.

It weighs generally between 300 - 900 gms depending on your preference.

Fig. source:  
<https://brahmaputrafables.in/product/bell-metal-charas-baan-bati-bowl-with-stand-2/>

## 1.3.Introduction: Existing products

### Lota / Pot

The lota has a unique shape that includes a rounded body with a narrow neck and sometimes a handle.

Lotas are commonly used for storing and pouring water. They are also used for various cultural and religious purposes, such as ablution before prayers, rituals, and ceremonies.

The design of the lota allows for easy gripping and pouring, making it a practical and functional vessel for daily use.

Lotas are often adorned with decorative motifs, engravings, or designs, showcasing the craftsmanship and cultural aesthetics of the region.



Fig. source:  
<https://www.indianshelf.in/plain-vintage-brass-holy-water-pot-for-prayer-room/>

## 1.3.Introduction: Existing products



Fig. source:  
<https://www.kahibati.com/catalogsearch/result/?q=boor+taal>

### Taal / Cymbals

"Taal" is a traditional cymbal-like percussion instrument. It is an integral part of Assamese folk music and cultural performances, adding rhythmic accents and embellishments to musical compositions.

The taal typically consists of a pair of small, circular metal plates or discs attached together by a cord or string. Musicians hold one plate in each hand and strike them against each other to produce a bright, metallic sound. The size and thickness of the plates can vary, influencing the tone and volume of the sound produced.

In Assam, the taal is commonly used in various musical forms, including Bihu dances, folk songs, and traditional performances.

## 1.3.Introduction: Existing products

### Xorai

"Xorai" is a traditional ceremonial offering tray used in Assamese culture, particularly during religious rituals, festivals, and auspicious occasions. The Xorai is typically made from bell metal or brass and is characterized by its shallow, circular shape with a wide rim and a flat base. It often features intricate designs, engravings, or patterns on its surface, showcasing the skilled craftsmanship of Assamese artisans.

The Xorai holds symbolic significance as a symbol of hospitality, respect, and prosperity. It is commonly used for presenting offerings such as betel nuts, betel leaves, sweets, and other auspicious items during ceremonies and prayers. In addition to its religious and cultural uses, Xorais are also given as gifts or tokens of appreciation during important events and social gatherings.



Fig. source:  
<https://www.kahibati.com/catalogsearch/result/index/?dir=asc&limit=12&order=price&p=2&q=pooja+oil+lamp+stand>

# Introduction: History

1.4

## Kahn/Bell metal in Assam

The tradition is believed to have started ages back and the craftsmen still prepare the objects manually adhering to the age old technique by implementing the old tools required for burning and shaping the metal. Historically, this craft form dates back to the **7th century AD**. Various written records reveal that the bell metal industry of Assam existed from the time of Kumarbhaskarvarman, the king of the Varman Dynasty, when, the Kumar of eastern India gifted drinking vessels to Harshavardhana of Kannauj. The existence of the skilled bell-metal masters can also be traced through the scriptures, where its written that a pair of 'Bhortal' or cymbal, a musical instrument was gifted to Hieuen Tsang, an eminent Chinese scholar during his visit to India and Kamrup. However, scholars believe that it was only during the period of Ahoms that the industry got highlighted, as special interest was taken by various Ahom kings among whom **Swargadeo Siva Singha** was the most notable.

During the reign of the Ahom dynasty, the bell-metal industry in Assam experienced a period of prosperity. Bell-metal utensils became widely used by all levels of society, including the king, nobles, and common people, leading to a flourishing of bell-metal production in Sarthebari. The Ahom monarch provided incentives to the artisans involved in the Sarthebari bell-metal industry, which further boosted production.

## 1.4.Introduction: History

Under royal patronage, Sarthebari artisans crafted a variety of bell-metal items such as Sarai (platters or trays), Gudgudi (hookah), Temi-bata (lime containers), Pikdani (spittoons), and Bhog-jara (water vessels with spouts). They even created bell-metal cannons for military use. Both the Ahom King and nobility favored the Maihang kahi (metallic plates) and Maihang bati (metallic cups) produced with special care by Sarthebari artisans.

An illustrious example of royal recognition occurred in the early 7th Century when King Siva Singha praised bell-metal artisan Jieu Dhan Kahar for his exceptional talent and dedication to pure art. Jieu Dhan Kahar was bestowed with the title 'Chaudhary' and granted 100 bighas of nispikheraj land in acknowledgment of his artistic prowess. He created a wooden tiger containing bell-metal 'Bhortals' (large cymbals) that produced roaring sounds, a remarkable piece presented to King Siva Singha.

The descendants of Jieu Dhan Kahar continue to carry the prestigious 'Chaudhary' title to this day, showcasing the enduring legacy and esteemed status of the Sarthebari bell-metal industry.

# Introduction: Sarthebari

1.5

Sarthebari is a town and a town area committee in Barpeta district in the Indian state of Assam. Sarthebari is home to the bell metal industry. About 70 km from Guwahati, off National Highway 427, lies the 340-odd small units in the region which employ over 2,200 artisans who work with the hard alloy of copper (78 per cent) and tin (22 per cent) to produce over 40 types of bell metal products, ranging from varieties of thal or kahi (dishes), dofola kahi (large dishes), bati (bowl) and ban bati (mounted bowls), kalah (pot), bells, tal (cymbals), and bota (a type of tray). One who takes a stroll around the village of Sarthebari can hear the sound of hammering the metal at the furnace from every passing household.



Fig. source:  
<https://www.kahibati.com/catalogsearch/result/index/?dir=asc&limit=12&order=price&p=2&q=pooja+oil+lamp+stand>

## 1.5.Introduction: Sarthebari

Aprox. 40 percent of the residents in Sarthebari live upon this craft. The craftsmen of the bell metal industry are referred to as kahar or orja. They still carry through the age-old technique of preparing these utensils by hand which is very tiring and needs great skills. The fact that these utensils are handmade increases their beauty and value.

The technology involved in making the objects is traditional and simple. The main tools are anvils of different sizes locally known as balmuri, chatuli and akue , hammers, pincers, files, chisels and some minor equipment. Locally they are called Dulari, Gasha, Saria, Piri, Khanta (an iron instrument use for polishing the bell metal products), and Pocker etc. The other raw materials are polishing materials, clay, jute fiber, rice bran, mustard oil, Charcoal, Borax, Zinc, shalpatra etc. No machinery is used in the process and from creating the mould to the final polishing, everything is done manually.

The objects made of bell-metal are heavier and bulkier in weight because of the extensive use of metal. This craftsmen inherit the knowledge from their elders and thus the industry runs on hereditary system. Modern tools and technology has not yet touched the lives of the artisans and they still adhere to primitive tools and equipments in bell-metal production.



*Fig: Tools used in Sarthebari*

Chapter 02:

# Primary Study

# Primary Study: Manufacturing process

2.1

The technology used is often conventional and basic in this industry. The production process does not require electricity. The instruments and machinery used are smaller and more or less the same as those used in the metalworking industry. Tools such as Dulari, Gasha, Saria, Piri, Khanta (a bell-metal polishing instrument), etc., are however also used. Old bell metal utensils is the primary raw material. Other raw materials include polishing goods, clay, fibre jute, rice bran, mustard oil, charcoal, borax, zinc etc.



*Fig: The figure here shows the involvement of artisans performing different stages of manufacturing together in a single place.*

## 2.1.Primary study: Manufacturing process

### STAGE 1 : Processing the Raw material

The procurement of raw materials often involves sourcing from Kolkata, as well as from Pakistan and Bangladesh. Artisans diligently adhere to the indigenous method of melting these raw materials. Moreover, they repurpose raw materials obtained from antiquated bell metal objects such as cups, drinking glasses, and plates. Subsequently, the raw material undergoes fragmentation through pounding, after which it is contained within an iron vessel and subjected to the heat of the fireplace, referred to locally as Kah Galuwa Apor. Occasionally, the process involves the utilization of machinery to facilitate the insertion of the fire vent into the flames.



*Apor is a local term used to define the liquid state of a metal produced by heating*

## 2.1.Primary study: Manufacturing process

### STAGE 2 : Solidifying the molten metal

Once the raw metal reaches a fully molten state, the iron container is removed from the heat, and the heated liquid metal is poured onto the smooth, circular surfaces of earthen sinks that have been coated with mustard oil beforehand. The molten metal then solidifies into thin, spherical ingots of bell metal as it cools.



## 2.1.Primary study: Manufacturing process

### **STAGE 3 : Beating the metal to shape**

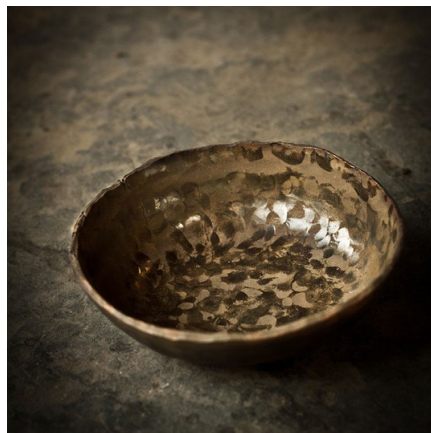
The metal ingots undergo further processing by being exposed to a fire vent to soften them before being repeatedly hammered to shape them. Once the raw bowl shape is achieved, a small hammer is used to give it its final form and finishing touches.



## 2.1.Primary study: Manufacturing process

### STAGE 4 : Filing the edges

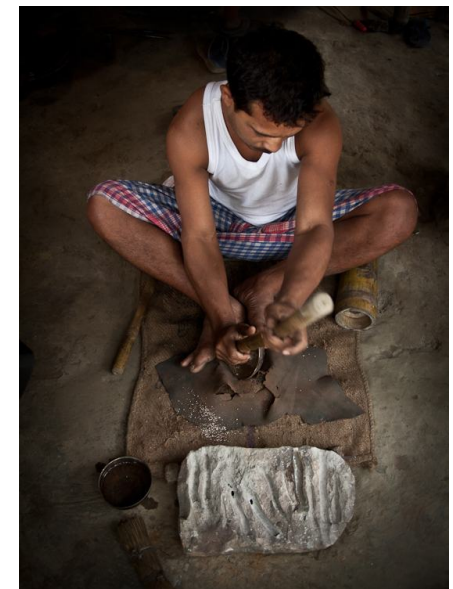
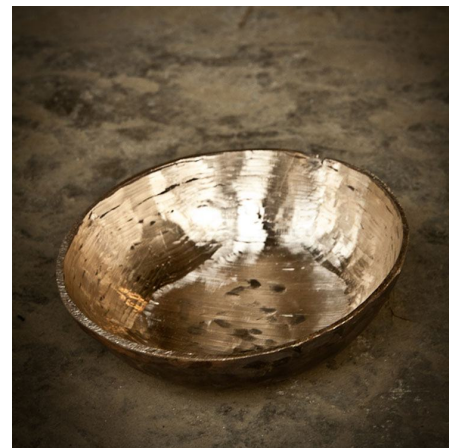
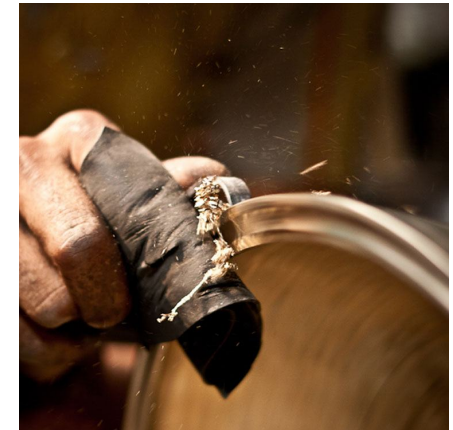
After the metal is shaped, the rough edges are manually filed off using a sturdy and flat iron filer known as the Reti or Ou. This meticulous process ensures a smooth and refined finish for the bell metal bowls.



## 2.1.Primary study: Manufacturing process

### STAGE 5 : Scraping off the burnt layer

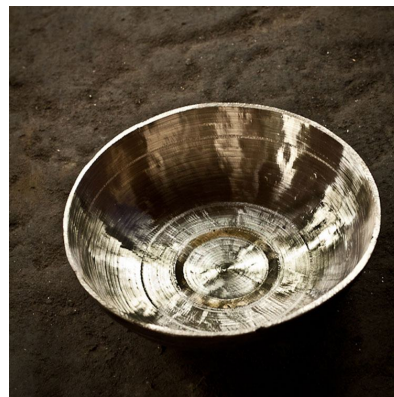
Craftsmen use a long iron rod with sharp edges, known as the Khonta, to scrape off the darkened burnt layer from the bell metal bowl. This process is essential for restoring the shine and glaze to the bell metal ware. It is a labor-intensive task that demands significant strength and pressure from the craftsmen.



## 2.1.Primary study: Manufacturing process

### STAGE 6 : Carving imprints on the metal

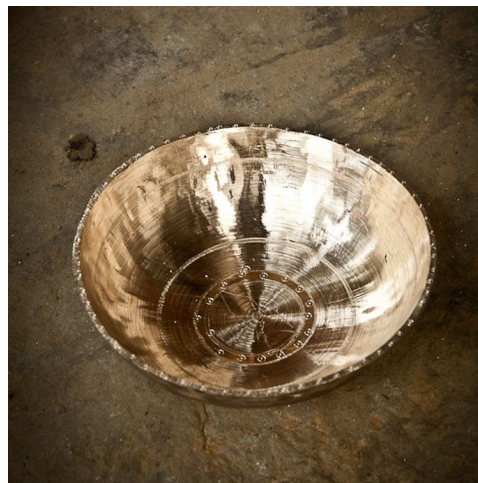
After crafting the basic bell metal bowl, its base is heated using another fire vent known as the Kunda Apor. Subsequently, sealing wax is applied to affix the base of the bowl to a rotating bamboo tool called the Kunda Saal. The Kunda Saal is set in motion by pulling a pulley on one side, while a sharp-edged instrument twisted at the tip, known as the Luwaal, is used on the other side to carve rings into the spinning bowl.



## 2.1.Primary study: Manufacturing process

### STAGE 7 : Bhor mara/Carving rings on the bowl

To add the final touches to the bell metal bowl, artisans employ a sharp iron tool known as the Dhonukar, named for its resemblance to a traditional bow. This tool features one end inserted into a small metallic cup held in the craftsman's palm to apply pressure, while the other end is utilized for carving intricate motifs and patterns onto the bowl's surface.



# Primary Study: Sarthebari Crisis

## 2.2

The tradition of crafting bell metal products has been handed down through generations among the Kahar community. However, there is a noticeable decline in interest among the younger generation in pursuing this trade. Many young artisans only continue in this craft due to limited employment opportunities elsewhere. Notably, not all craftsmen face this lack of interest issue. Nonetheless, urgent measures are needed to spark interest and enthusiasm in this traditional craft, particularly through skill-based training programs initiated by the government.

One of the major challenges faced by these craftsmen is the availability and procurement of raw materials. The absence of a stable market also leads to fluctuations in sales, making it difficult for craftsmen to sustain their livelihoods. Additionally, the substantial investment required in this craft is often beyond the means of these artisans. Moreover, the proliferation of factories producing bell metal products in bulk at lower costs poses a significant threat to traditional craftsmen.

Given these challenges, government intervention is crucial to preserve this traditional craft and support the livelihoods of the craftsmen. Policies and initiatives aimed at providing financial support, establishing stable markets, and promoting the value of handmade bell metal products can help sustain this ancient craft and ensure the well-being of the artisans involved.

Also, abundantly available cheaper objects made with aluminum , plastic etc, slowly engulfing the entire cottage industry market is another threat faced by the craftsmen of Sarthebari.

Chapter 03:

# Secondary Study

# Secondary Study: Shift in the Metal Craft Tradition



Xorai (Image taken at Assam State Museum)



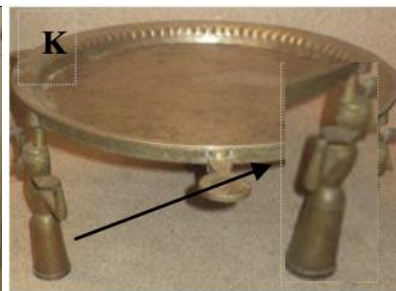
Stacked Xorais



Dunori (Image taken at M.C. Goswami Museum)



Berha or Jat Kahi on Berha (Tripod)(Image taken at Kalashetra)



Jat Kahi (Image taken at Kalashetra)



Jat Kahi

## Earlier Products Made in Sarthebari and Hajo

Artisans, in general, determined the shapes of the utensils and everyday use objects based on their utility; some were also ritually or symbolically influenced. The list includes items used as utilitarian vessels (such as lota, seta or heta, khorahi, karla, khundana) as well as ritualistic ones (such as saki, tal, xorai, gacha or gosa, bota).

### 3.1.Secondary study: Shift in the Metal Craft Tradition



Tal of Several Different Sizes (Image taken at Kalashetra)



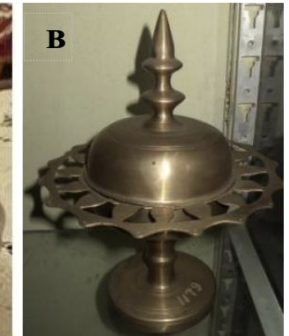
Bortal, 50 Yr Old



The list includes items used as utilitarian vessels (such as lota, seta or heta, khorahi, karla, khundana) as well as ritualistic ones (such as saki, tal, xorai, gacha or gosa, bota).



Owkhulia bota, its dent resembling the concave cover of the medicinal fruit Owtenga (Elephant apple)



Manipuri bota to cater to customers in Manipur

Its denting process that gives it its peculiar shape is difficult to replicate today as new generation of artisans have lost those skills now.

# Secondary Study: Structural Modifications



Neck  
Peripheral Rim  
Stand  
Base



Centre  
Places where designs and motifs were (are)carved or embossing is done

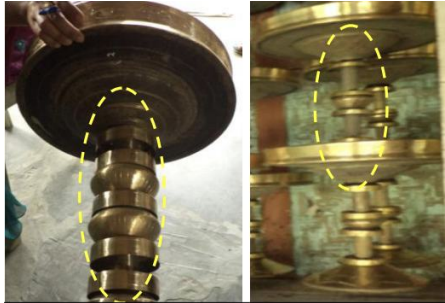


Raised Centre Motif



Raised Pattern through Denting

Embossed Works- The use of good quality and heavy metal sheets also made embossing easier and prominent.



Artisan shave introduced extra knots in between the mounted dish and the base



Design through chipping is rarely done nowadays. As ornamentation gives rise to a higher cost, plain with slight structural modification is preferred over decorated ones even among customers. spacing in between the chisel marks has increased to cover more space in lesser time and with lesser effort

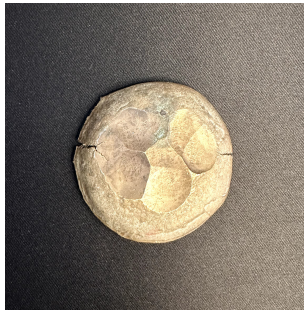
# Who Influences the Design and Make of Bell Metal Crafts?

## 3.3

Artisans produce according to the quantity sought and size demanded. Similarly, artisans receiving orders through middlemen are also guided by the agents on quantity, size and about the design in demand. But as far as the transmutations in designs are considered, it is a spontaneous occurrence mostly due to artisans' inclination to produce objects of beauty but with economic returns.

Traditional objects which could be fitted to emerging utility survived while items which could not be accommodated to the new utility disappeared or are on the verge of disappearance today.

# Opportunities & Constraints: Existing manufacturing process



All products starts as a blob of bell metal



It is then pressed to form a disc of certain thickness



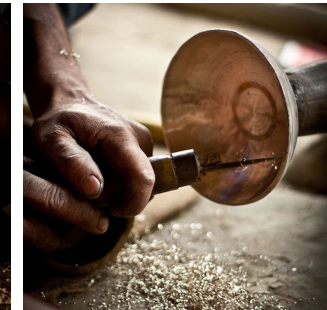
The disc is then heated & beaten to transform into desired shape



The edges are then filed or trimmed to desired length



The soot is then scraped off for the bell metal to shine



Motifs are engraved as a final touch

All products start as a disc therefore products with sharp edges are very difficult to form

Forming irregular shapes is easier cause all shapping is done by hammering

This process leaves a texture on the material which is unique to this process

Since the motifs are made physically, changes are easy to make in designs



### 3.5.Secondary study: Product anatomy



Miri(tree), Phool Buta, Barfi, Satbhoni(seven sisters), Loka  
Paro(Pair of birds facing each other)



# Secondary Study: Existing products

3.6

Bronze- Range of products

Any product that is made of brass can be produced in bellmetal given the necessary craftsmanship is available.



### 3.6.Secondary study: Existing Products

## Ranjan Bordoloi's furniture design

Ranjan Bordoloi's 'The Pitoloi Collection' won the Best of the Best award for its small stools and barstools. Crafted from brass using ancient coal welding techniques and shaped with traditional beating methods, each piece is a blend of heritage and modern design. Bordoloi collaborated with master artisan Emam Ali to revive Assamese brasswork, aiming to make it relevant in contemporary lifestyles.

These utilitarian yet artistic objects represent a fusion of craftsmanship, reflecting the rich cultural heritage while appealing to domestic and international markets. 'The Pitoloi Collection' encapsulates tradition, innovation, and passion in its pursuit of preserving and redefining ancient artistry.



*Fig: Red-dot design award 2017  
in the category of furniture and conceptual Design*

Chapter 04:

# Design Brief

# Problem Statement

4.1

The traditional craft of bell metal artisans faces a challenge in sustaining cultural heritage amidst changing times. As younger generations show declining interest and mass manufactured products flood the markets, the continuity of traditional techniques, cultural motifs, and historical designs is at risk, including the livelihood of thousands of families who come from generations of artisans and are the pioneers of the bell-metal craft in assam.

# Role as a designer

## 4.2

### 1. Product Design and Innovation

- Collaborate with bell metal artisans to create innovative designs that blend traditional craftsmanship with contemporary styles.
- Introduce new product lines or variations to appeal to a broader market.

### 2. Market Research and Branding

- Conduct market research to understand current trends and consumer preferences.
- Develop branding strategies that highlight the unique aspects and cultural significance of bell metal products.

### 3. Market Access and Networking

- Assist in establishing connections with potential buyers, both locally and globally.
- Explore opportunities for exhibitions, trade fairs, or online platforms to showcase and sell bell metal products.

### 4. Collaborative Initiatives

- Initiate collaborative projects with other designers, artists, or organizations to create a collective impact.
- Foster a sense of community and mutual support within the bell metal artisan network.

# Design brief

## 4.3

To create a unique collection of lighting fixtures by closely collaborating with bell metal artisans. The objective is to honour and preserve traditional techniques, cultural motifs, and historical designs inherent in bell metal craftsmanship. The project seeks to seamlessly integrate authentic cultural representation into contemporary lighting designs while maintaining the essence of tradition.

# Design objectives

## 4.4

### 1. Cultural Authenticity

- Infuse the lighting designs with cultural motifs that hold historical and traditional significance.
- Ensure that each design reflects the artisanal craftsmanship and artistic identity of the bell metal community.

### 2. Collaborative Process

- Involve bell metal artisans at every stage of the design process.
- Encourage artisans to contribute their insights, ensuring a shared vision for the final products.

### 3. Traditional Techniques

- Respect and incorporate traditional bell metal crafting techniques into the design.
- Explore ways to enhance and showcase the mastery of these techniques in the final lighting fixtures.

### 4. Functionality and Innovation

- Design lighting fixtures that are not only culturally rich but also functional and adaptable to modern spaces.
- Seek innovative ways to balance tradition with contemporary design elements.

### 5. Material Emphasis

- Prioritize the use of bell metal as the primary material for the lighting fixtures.
- Explore ways to showcase the unique properties of bell metal in the design.

# Project justification: Why lighting design

4.5

## 1. Bell Metal's Unique Aesthetic and Finishing Options

- Although brass is well-known for its bright, golden appearance, bell metal, due to its higher tin content, provides a distinct colour and sheen that can range from silvery-white to deep golden.
- The surface of bell metal can develop a patina over time, which may be desirable for antique or rustic designs

## 2. Staying true to the material and manufacturing process

- Since the aim is to pay homage to the craft of bell metal and revive its usage, one has to stick to the constraints posed by the material and process. Lighting is a product domain which gives some leeway in incorporating this without affecting functionality.

## 3. Greater Hardness and Durability

- Better wear resistance and durability, makes bell metal fixtures more resistant to deformation over time, compared to brass.

# Creating a Family

## 4.6

A family of products refers to a group of related products that share common design elements, features, functionalities, or branding attributes. These products are typically developed and marketed together as part of a cohesive product line or portfolio. Here are some key characteristics and considerations of a family of products:

- a. Common Design Elements:** Products within a family often share consistent design elements such as shapes, colors, materials, textures, or visual aesthetics. This creates a unified and recognizable look across the product line, enhancing brand identity and customer recognition.
- b. Shared Features and Functionalities:** A family of products may have shared features, functionalities, or technological components. These commonalities allow for efficient development, manufacturing, and maintenance processes, as well as providing a consistent user experience across different products.
- c. Variations and Customization:** Despite sharing commonalities, a family of products can also offer variations or customization options to meet diverse customer needs or market segments. This could include different sizes, configurations, performance levels, or accessory options within the product line.
- d. Brand Cohesion:** A well-defined family of products contributes to brand cohesion and consistency. Consistent branding elements, messaging, and positioning across the product line reinforce brand identity and strengthen brand equity in the minds of customers.

# Importance of Module

## 4.7

Creating a module is crucial when designing a family of products for several reasons:

- 1. Consistency:** A module serves as a standardized building block or template that ensures consistency across the family of products. This consistency is vital for establishing a cohesive visual identity, brand recognition, and user experience.
- 2. Efficiency:** Designing a module allows for efficient development and production processes. Once the module is established, it can be replicated and adapted with minor variations to create different products within the family. This streamlines design, engineering, and manufacturing workflows, saving time and resources.
- 3. Scalability:** Modules facilitate scalability by enabling the addition of new products or variations without redesigning from scratch. As market demands change or new trends emerge, designers can easily introduce updates or expansions to the product family using existing modules as a foundation.
- 4. Flexibility:** Despite providing consistency, modules also offer flexibility for customization and differentiation. Designers can modify module parameters, features, or aesthetics to create diverse product offerings that cater to specific user needs or market segments.
- 5. Cost-Effectiveness:** Developing a module-based approach can lead to cost savings in the long run. By reusing design elements, components, and manufacturing processes across multiple products, companies can optimize resources, reduce waste, and achieve economies of scale.

Chapter 05:  
**Ideations**

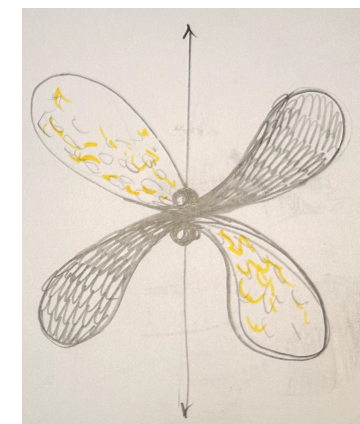
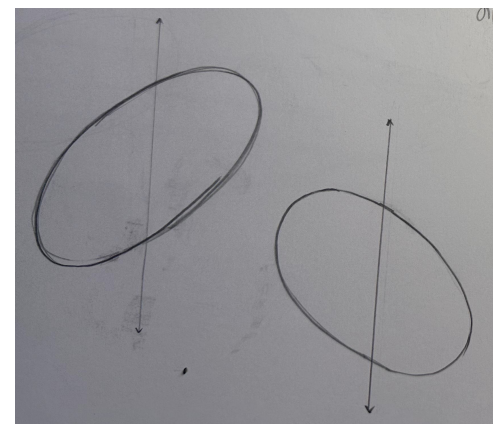
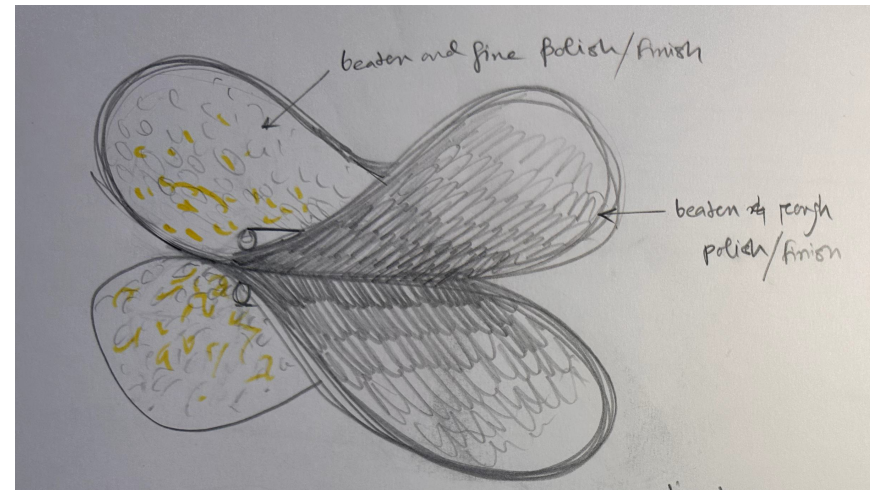
# Biophilic

## 5.1

### Tipu tree seed



The Tipu tree stands as a common sight in Assam, its distinctive seed pods twirling gracefully as they descend. This natural spectacle of spinning "helicopter" seeds can inspire a unique design concept, blending the organic elegance of nature with artistic creativity.

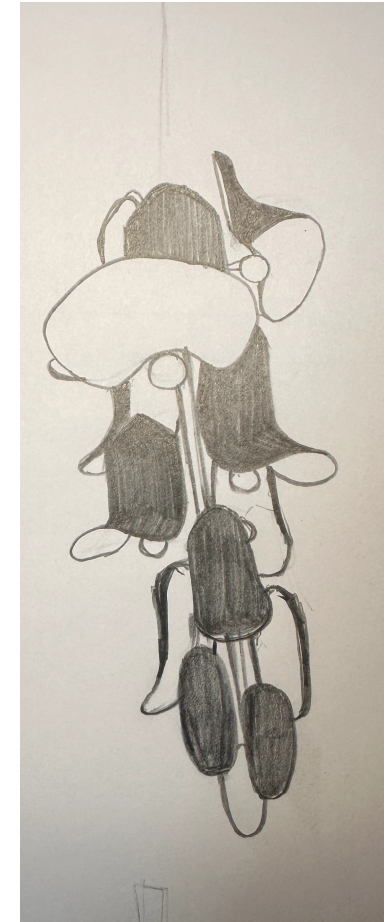
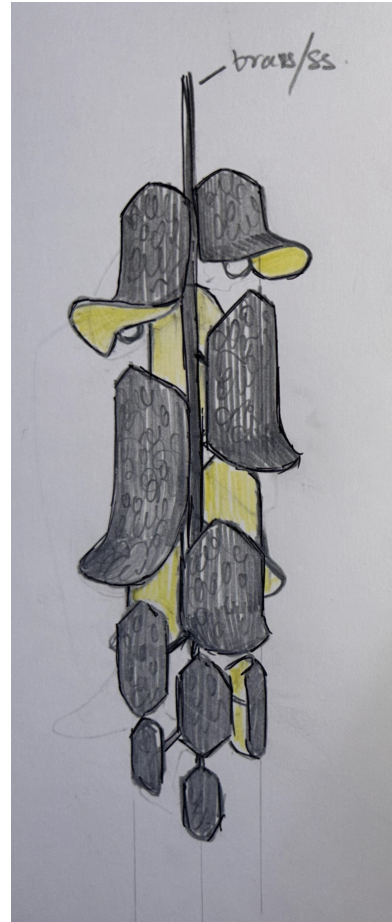


## 4.1. Ideations: Biophilic

# Kopou



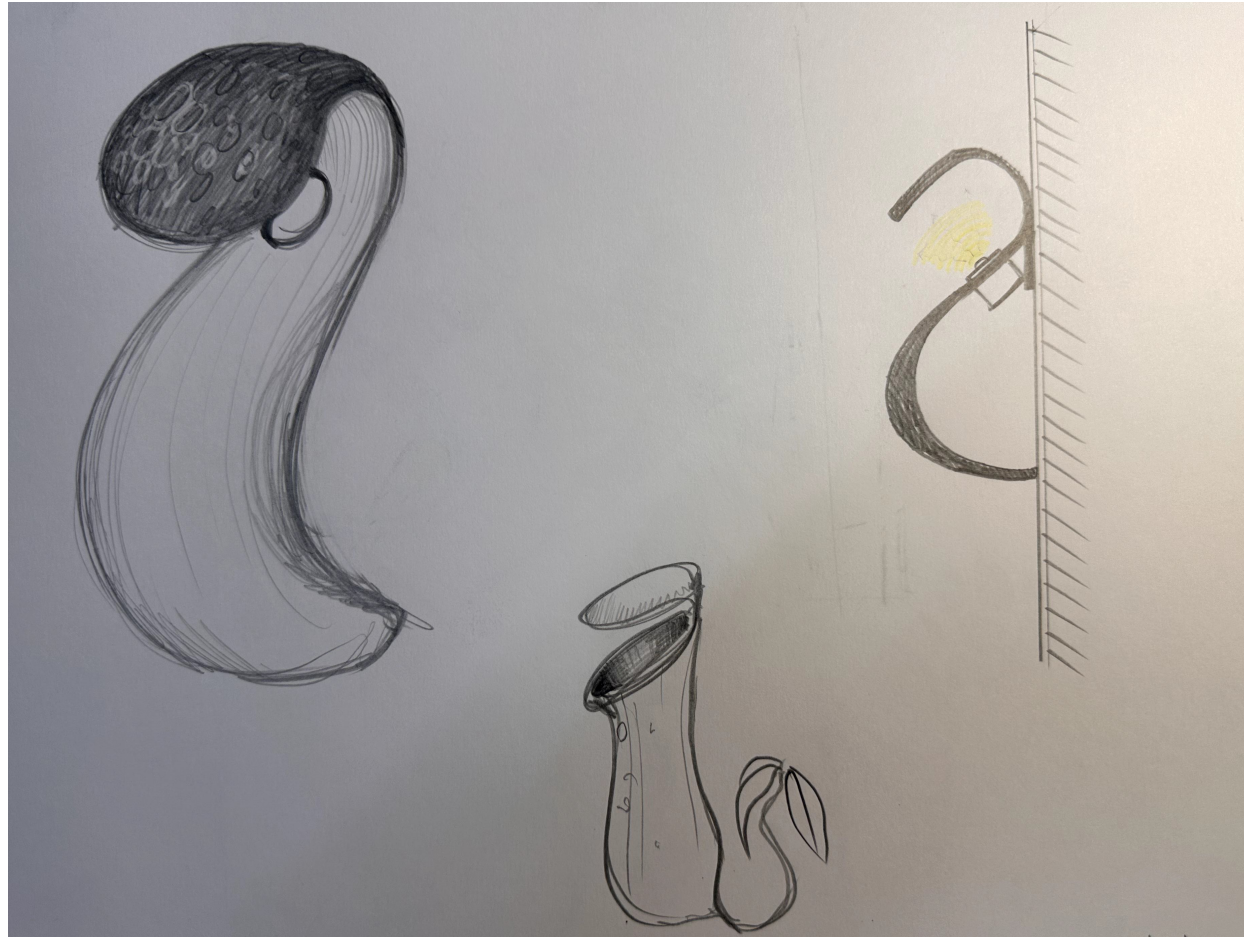
The Kopou or Foxtail Orchid holds deep cultural significance in Assam, symbolizing purity, beauty, and grace. Its delicate and exotic appearance, with long, slender stems adorned with clusters of small, elegant flowers, makes it a compelling concept for Regional context.



## 4.1. Ideations: Biophilic

# Pitcher plant

Pitcher Plants are associated with folklore, myths, or traditional medicine. Integrating elements of these cultural narratives into design concepts can add depth and storytelling to the creations, highlighting the interconnectedness of nature, culture, and heritage in Assam.

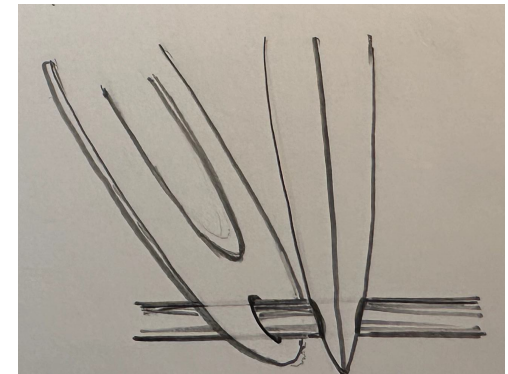
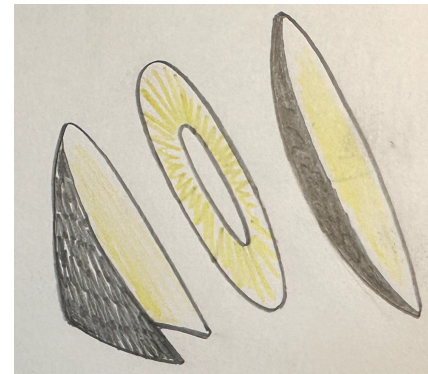
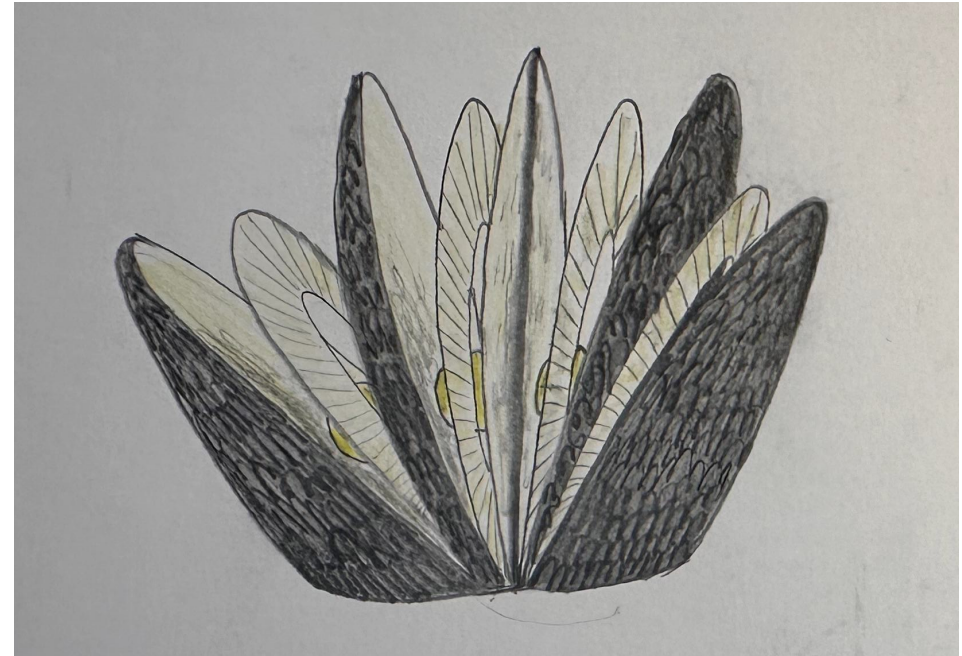


## 4.1. Ideations: Biophilic

# Screw pine

In Assam, the Screw Pine flower holds cultural significance and is often used in religious rituals, traditional ceremonies, and festive decorations. Its presence in various aspects of Assamese culture makes it a meaningful and recognizable symbol that can resonate with local audiences.

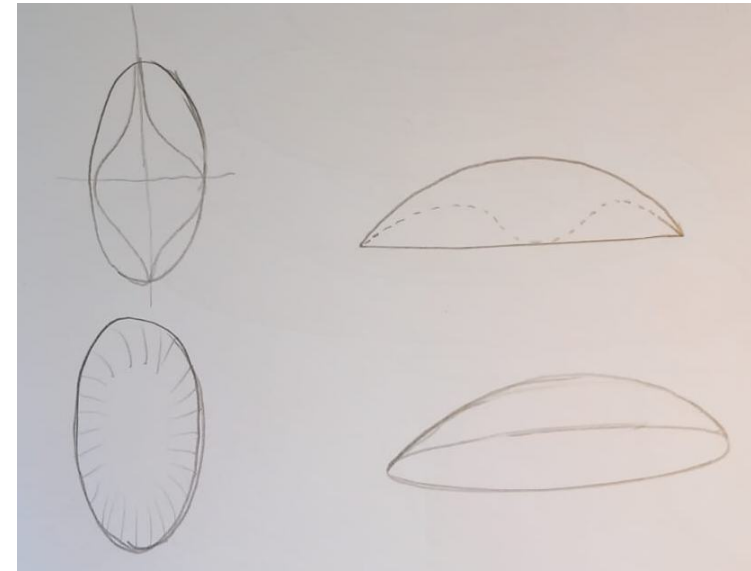
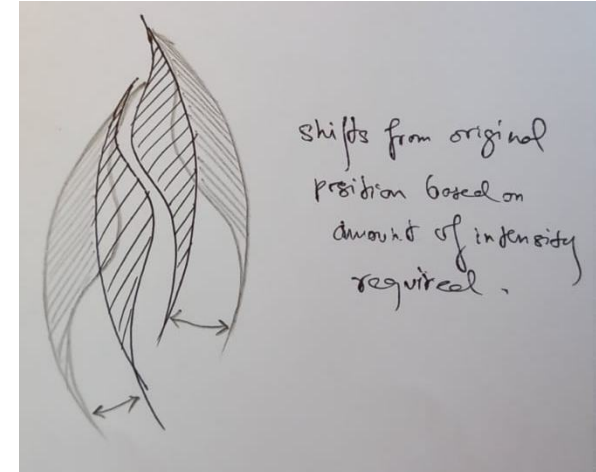
The Screw Pine flower has a unique appearance, with long, slender petals arranged in a spiral pattern around a central core.



## 4.1. Ideations: Biophilic

# Bird of paradise

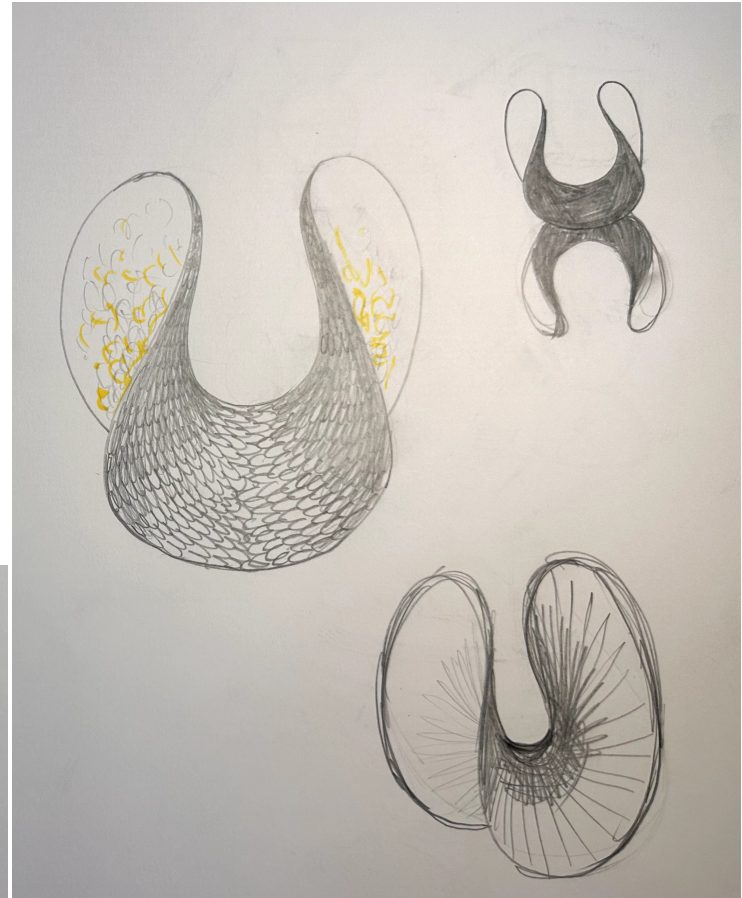
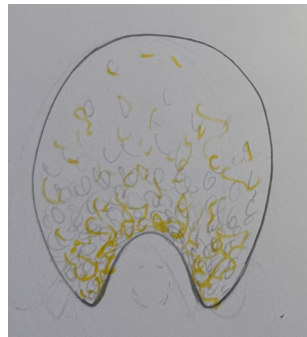
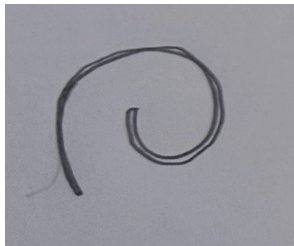
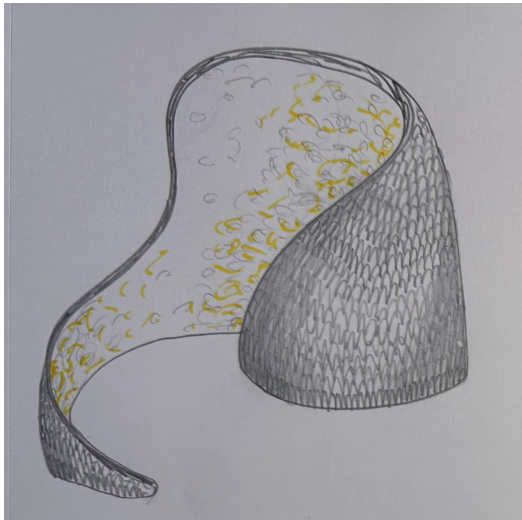
The Bird of Paradise flower, known for its vibrant colors and unique shape, has a striking and exotic appearance, with vivid hues of orange, yellow, and blue, along with its distinctive bird-like shape. The unique shape and form of the Bird of Paradise flower can be adapted and stylized to create diverse design elements. The universal appeal of the Bird of Paradise flower transcends geographical boundaries, making it a design concept that can attract a diverse audience and appeal to global markets while retaining its unique charm and connection to Assam's cultural context.



# Flex

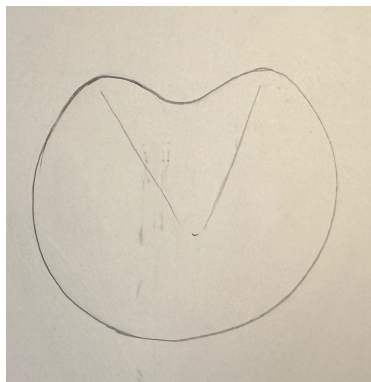
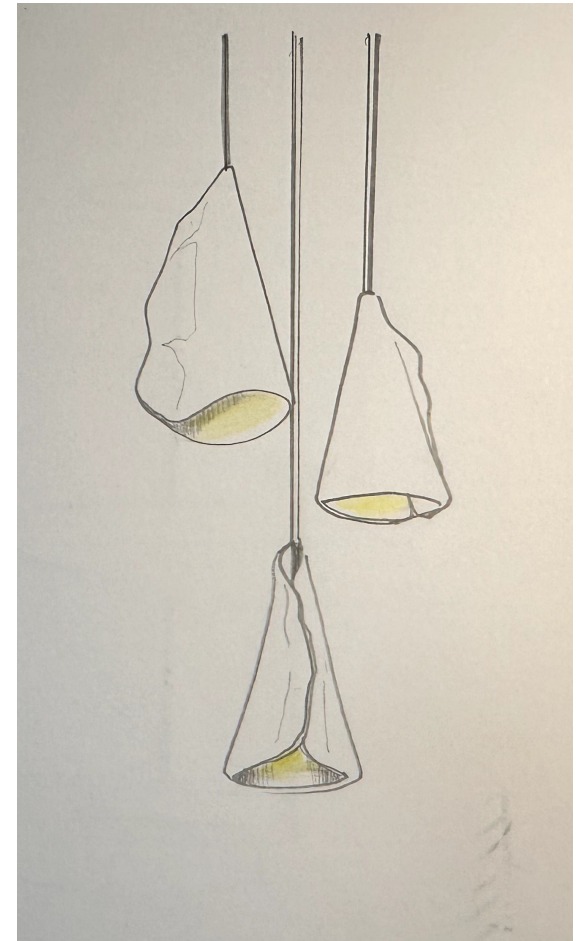
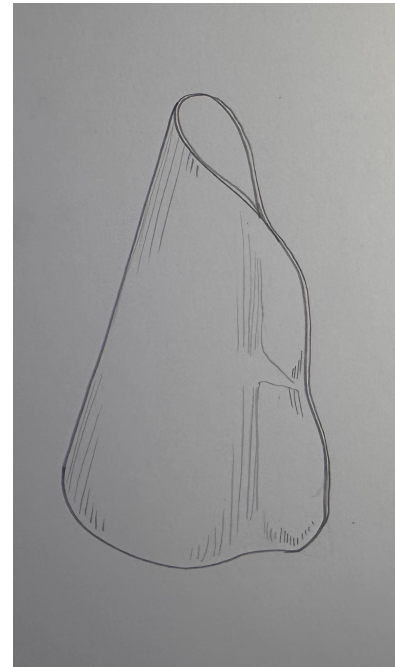
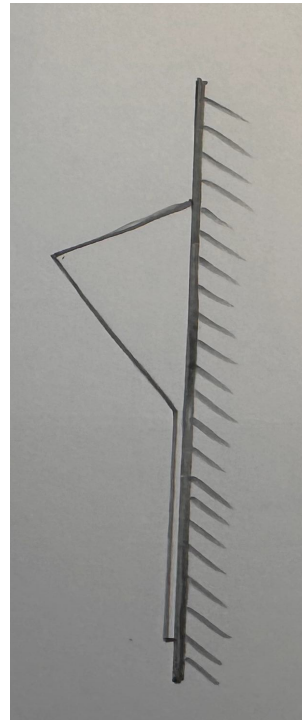
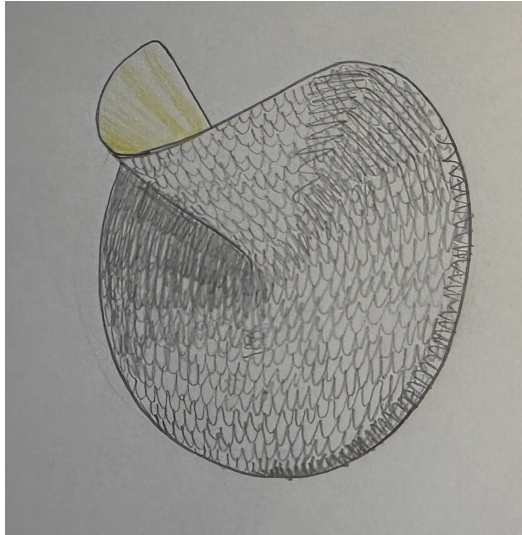
## Table top

By utilizing the malleability and versatility of bell metal, we can sculpt intricate and dynamic forms that play with light and shadow, adding a sculptural element to functional lighting fixtures.



## 4.2. Ideations: Flex

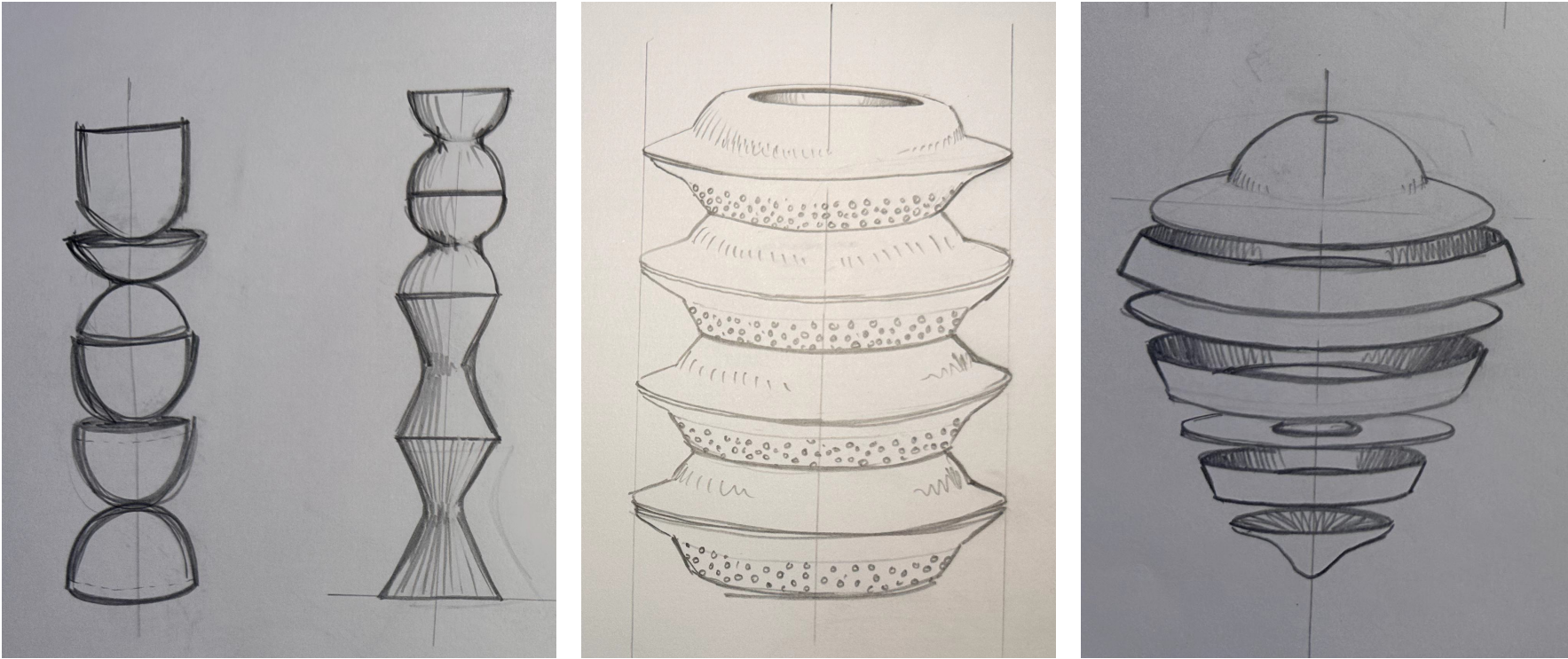
# Wall & ceiling



# Structure

## Stacking

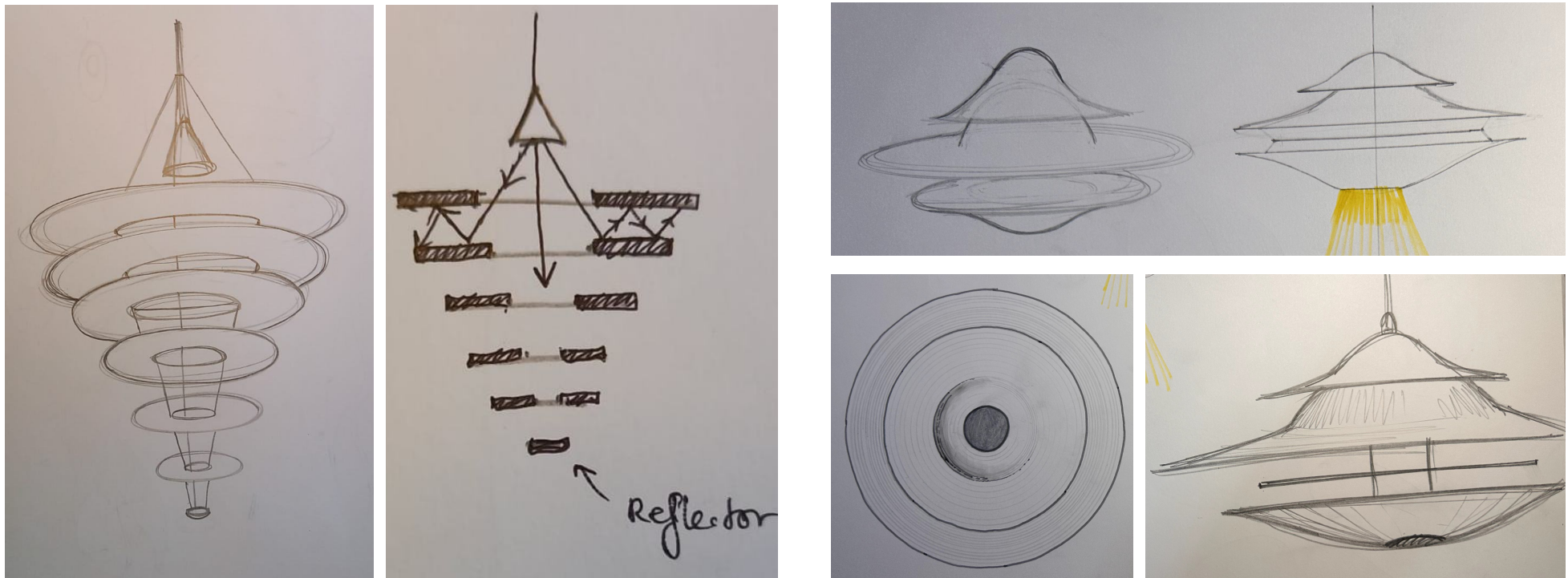
By deconstructing and reassembling these traditional items, we can create unique and bespoke lighting fixtures that celebrate the heritage and craftsmanship of bell metal while infusing a modern twist. Cutting and reshaping bell metal plates can result in geometric wall sconces or sculptural floor lamps, showcasing the material's versatility and strength.



## 4.3. Ideations: Structure

# Stacking

Joining bell metal objects in unexpected ways can lead to artistic chandeliers or suspended installations that redefine traditional forms.



Chapter 06:

# Final concept

# Final Concept



Kopou/  
Foxtail Orchid

# Final Concept: Reasoning

## 6.2

- 1. Symbolism:** The Kopou Orchid is the State flower of Assam and is often associated with traditional Assamese weddings and festivals, symbolizing love, prosperity, and new beginnings. Incorporating motifs or patterns inspired by the Kopou Orchid into designs can evoke these sentiments, making it ideal for celebratory occasions or special events.
- 2. Color Palette:** The orchid's color palette ranges from shades of white and cream to soft pinks and purples. These gentle hues can be translated into a soothing and elegant color scheme for various design applications, such as textiles, home decor, and fashion accessories.
- 3. Texture and Form:** The unique texture and form of the Foxtail Orchid's flowers and leaves provide inspiration for intricate patterns, embroidery designs, and motifs. The elongated shape of the flower clusters can be stylized and adapted to create visually appealing and harmonious compositions.
- 4. Cultural Heritage:** Given its cultural significance in Assam, incorporating the Kopou Orchid into design concepts helps preserve and celebrate the region's rich heritage and traditional motifs. It serves as a reminder of Assam's natural beauty and artistic traditions.
- 5. Versatility:** The Kopou Orchid concept is versatile and can be applied to a wide range of design disciplines, including clothing, jewelry, home textiles, stationery, and decorative arts. Its timeless appeal and aesthetic charm make it suitable for both contemporary and traditional design aesthetics.

# Final Concept: Module extraction

6.3

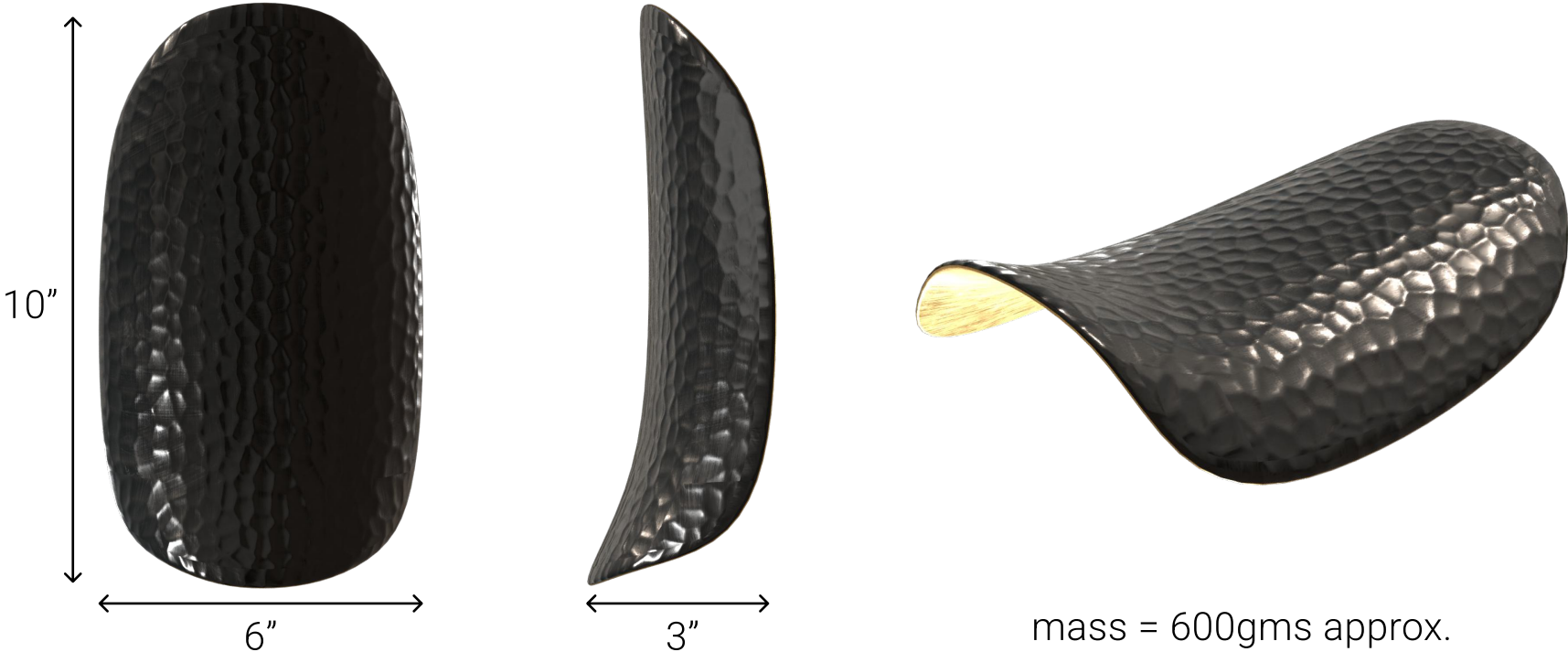


- Translating Kopou's essence, form, and symbolism into a functional and artistic lighting fixture.
- Exploring multiple layers or tiers that represent the Kopou flower's petals. These layers can vary in size and shape, creating a sense of depth and dimensionality reminiscent of the flower's layered structure.
- Strategically place light sources within the form to create an ethereal and luminous effect, similar to how sunlight filters through the Kopou flower's petals.
- Infuse artistic elements into the lighting design to capture the Kopou flower's symbolic significance. This could include intricate patterns, etchings, or engravings on the chandelier's surface that reflect the cultural and emotional associations of the Kopou flower in Assamese tradition.



# Final Concept: Module

The Final module is a half hollow cylinder with rounded corners which raised from one of the elongated end. This module will be used in different ways to create a range of lighting design.



## 6.3.Final Concept: Module

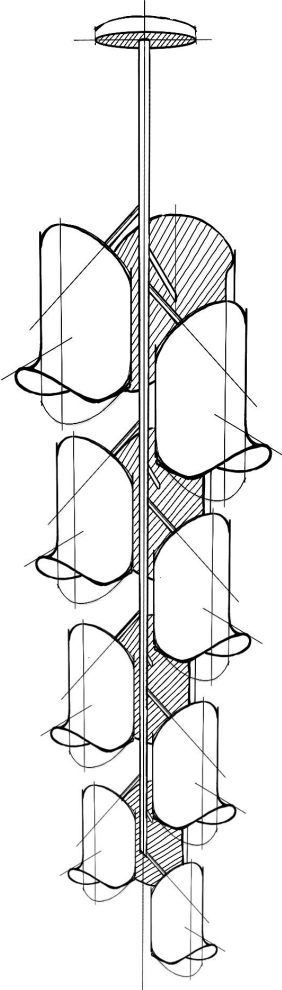
# Finish

There are two types of finish on the module, the burnt hammered/ Beaten metal finish which will be the facing out visible to us and the shiny hand etched finish which will be in the interior side used as a reflector for the light.

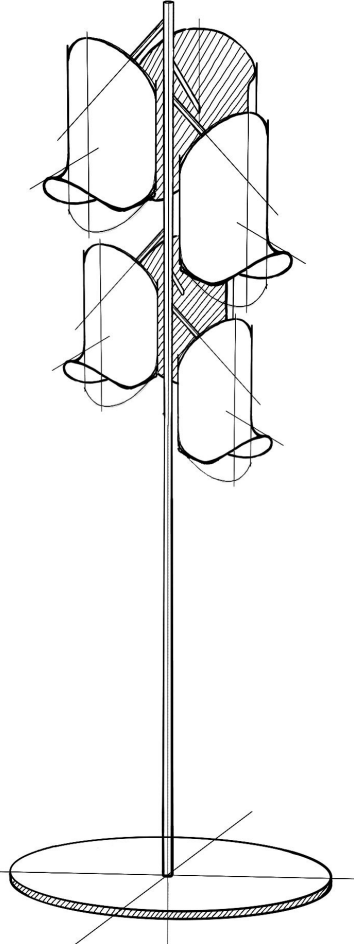


# Product range

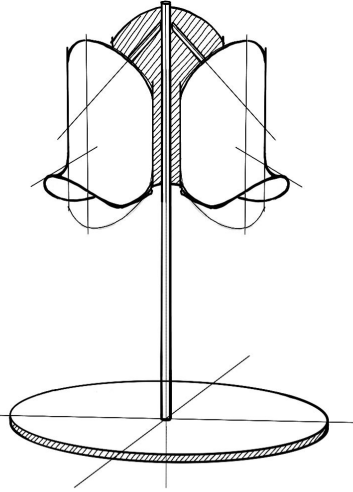
6.5



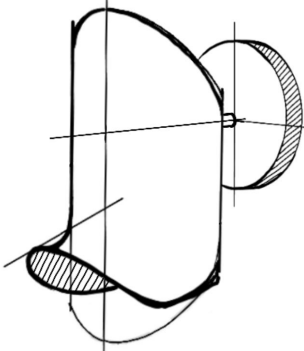
Ceiling/hanging



Floor



Table

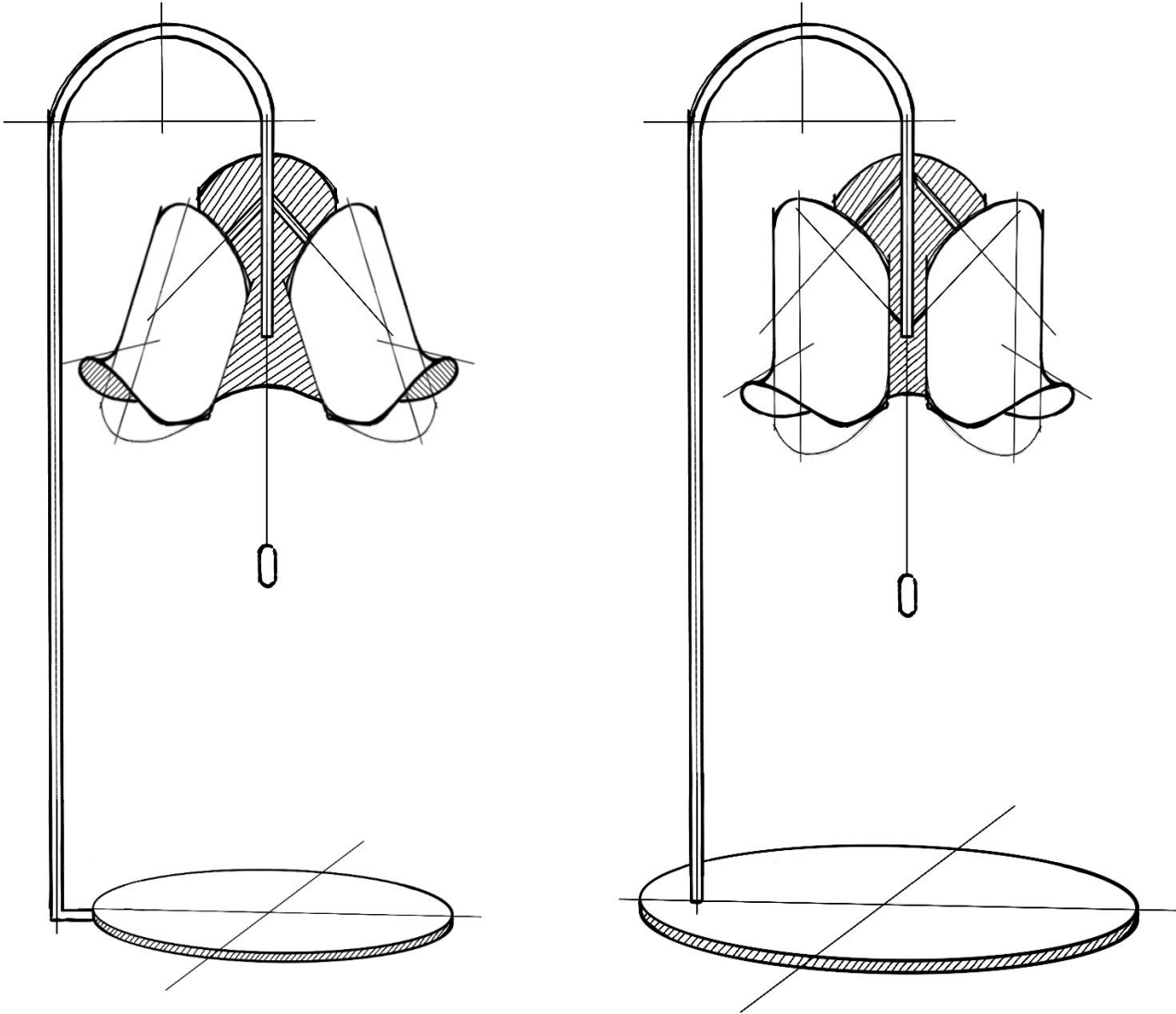


Wall

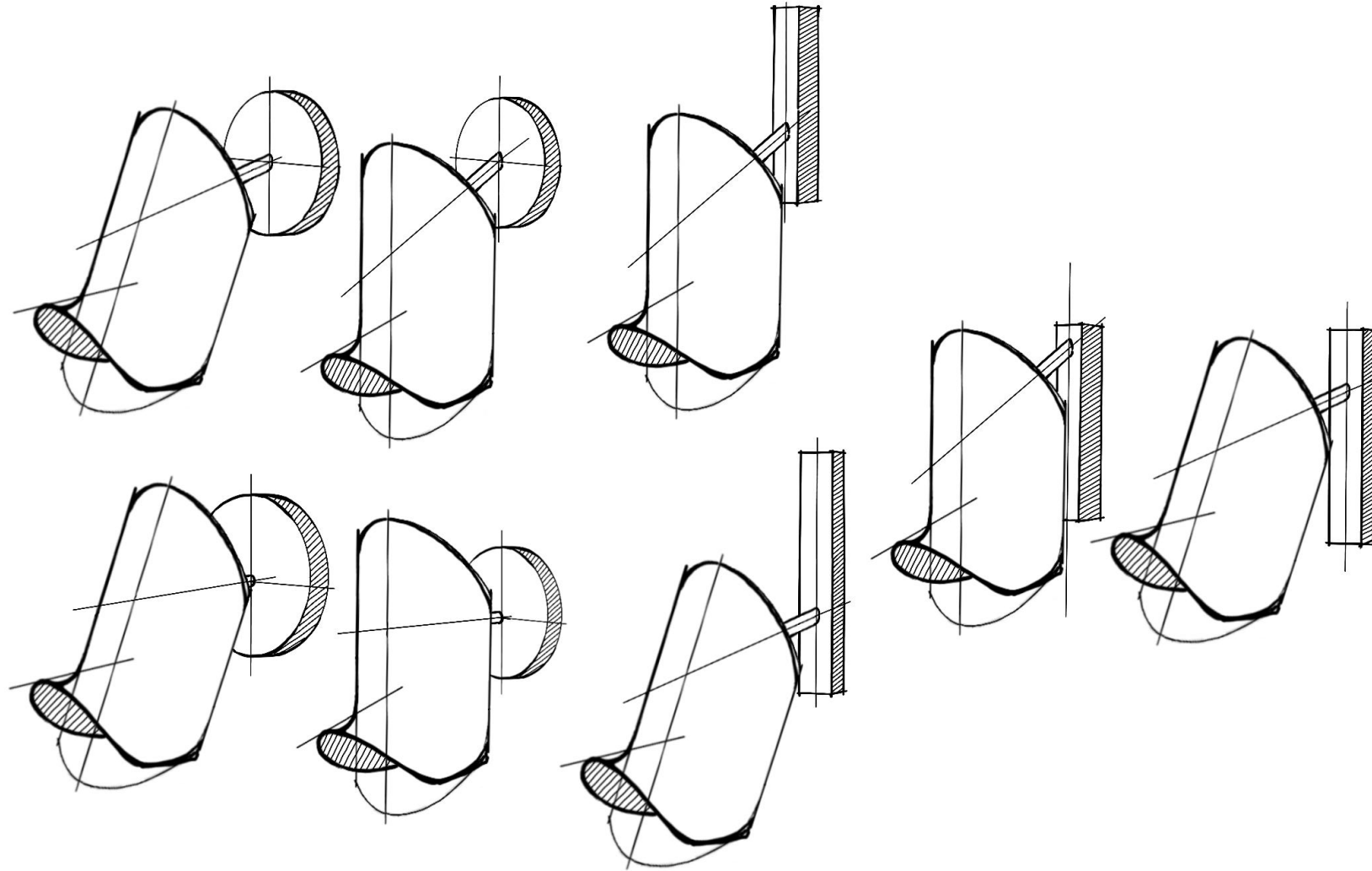
Chapter 07:

# Final Product

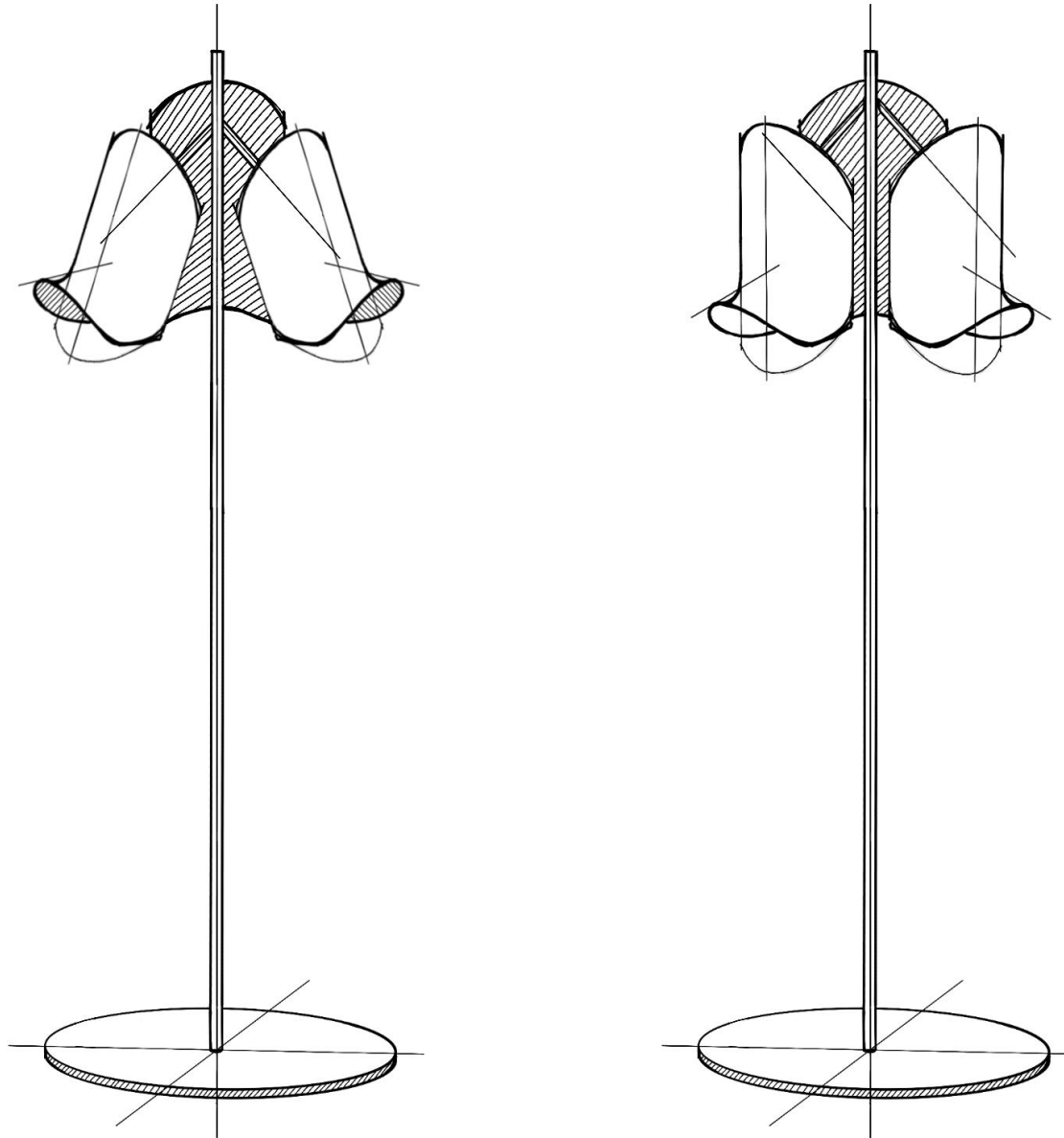
# Ideations: based on scale of module



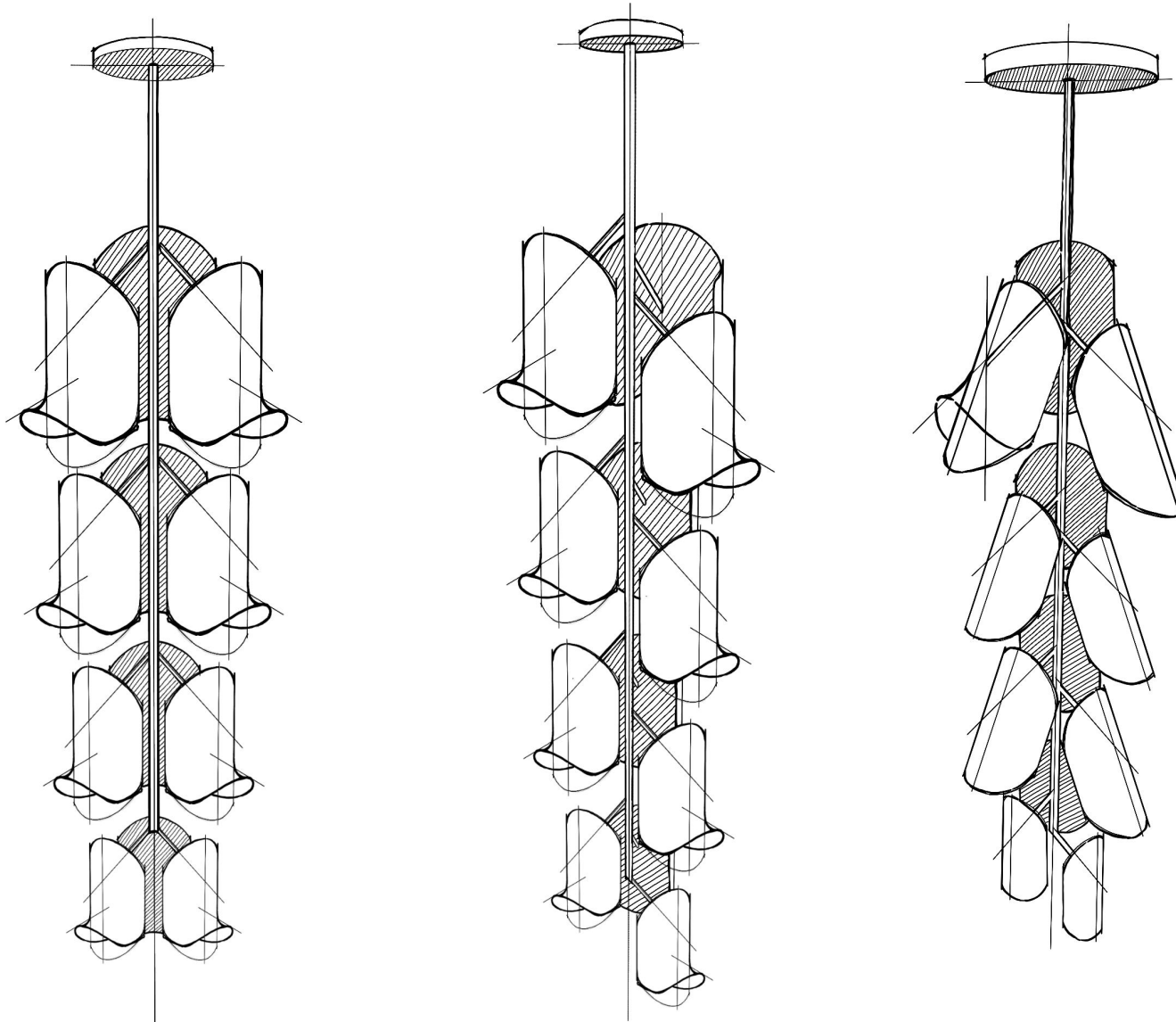
## 7.1. Ideations: based on scale of module



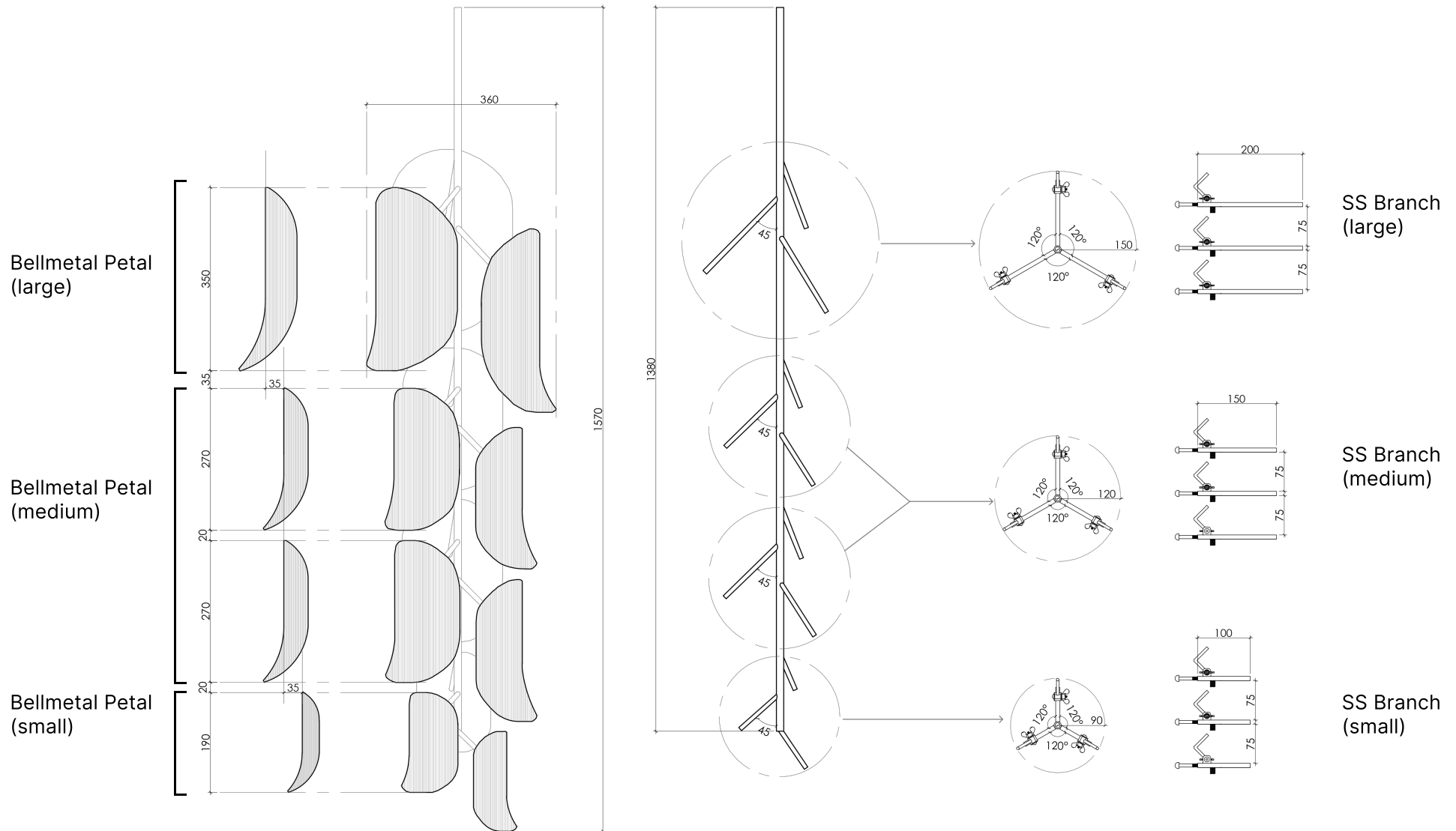
## 7.1. Ideations: based on scale of module



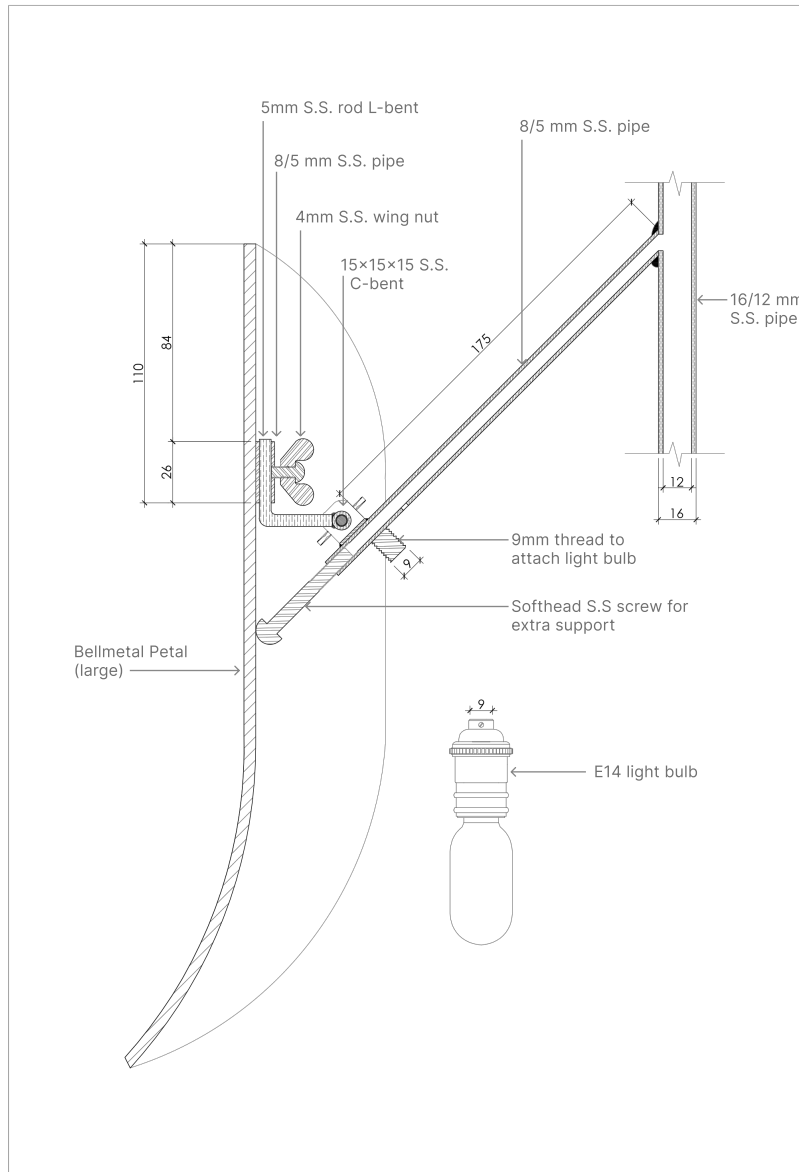
## 7.1. Ideations: based on scale of module



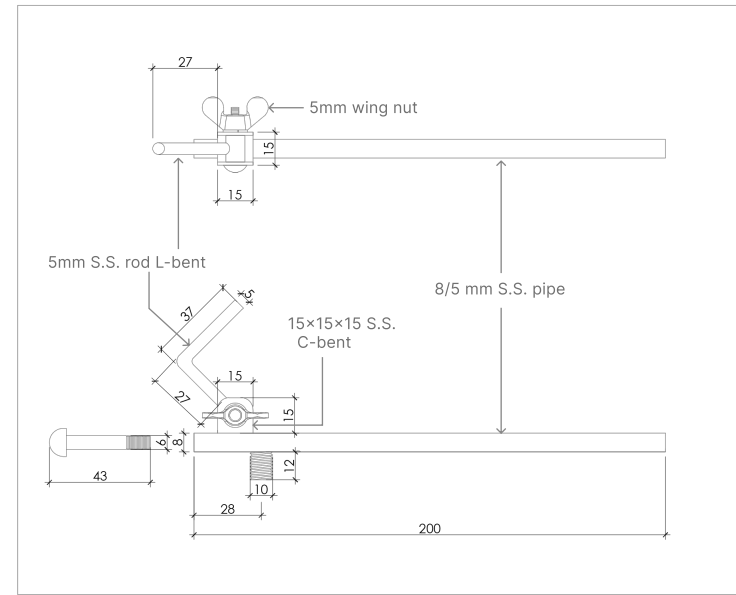
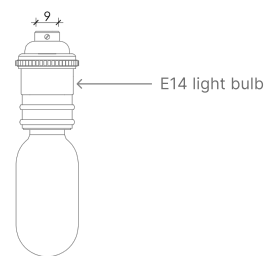
# 7.1. Ideations: based on based on scale of module



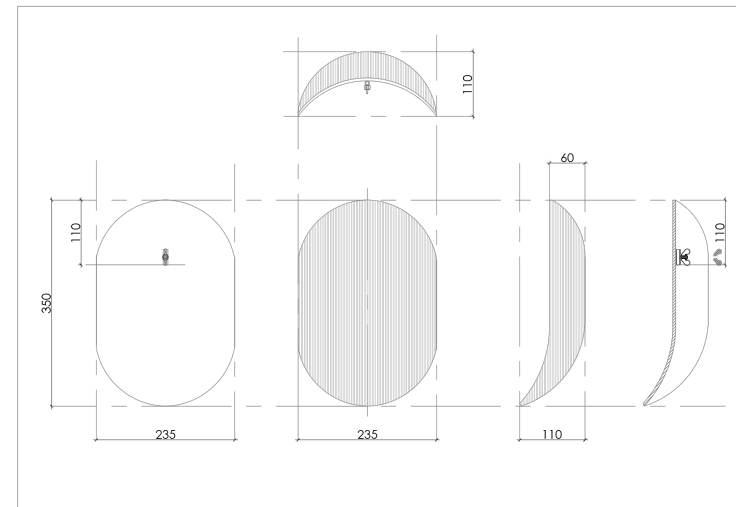
# 7.1. Ideations: based on based on scale of module



01 JOINERY DETAIL (large)  
 scale: 1:2 @ A4



02 S.S. BRANCH DETAIL (large)  
 scale: 1:2 @ A4



03 BELL METAL PETAL (large)  
 scale: 1:8 @ A4

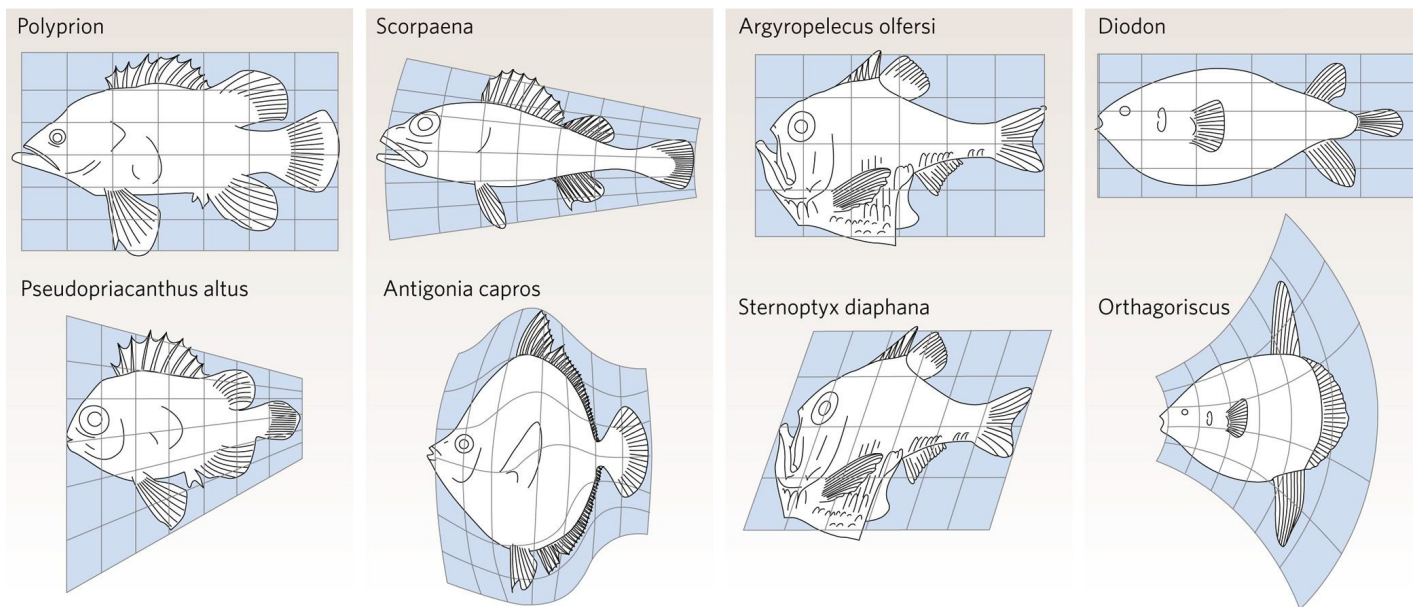
## 7.1. Ideations: based on based on scale of module



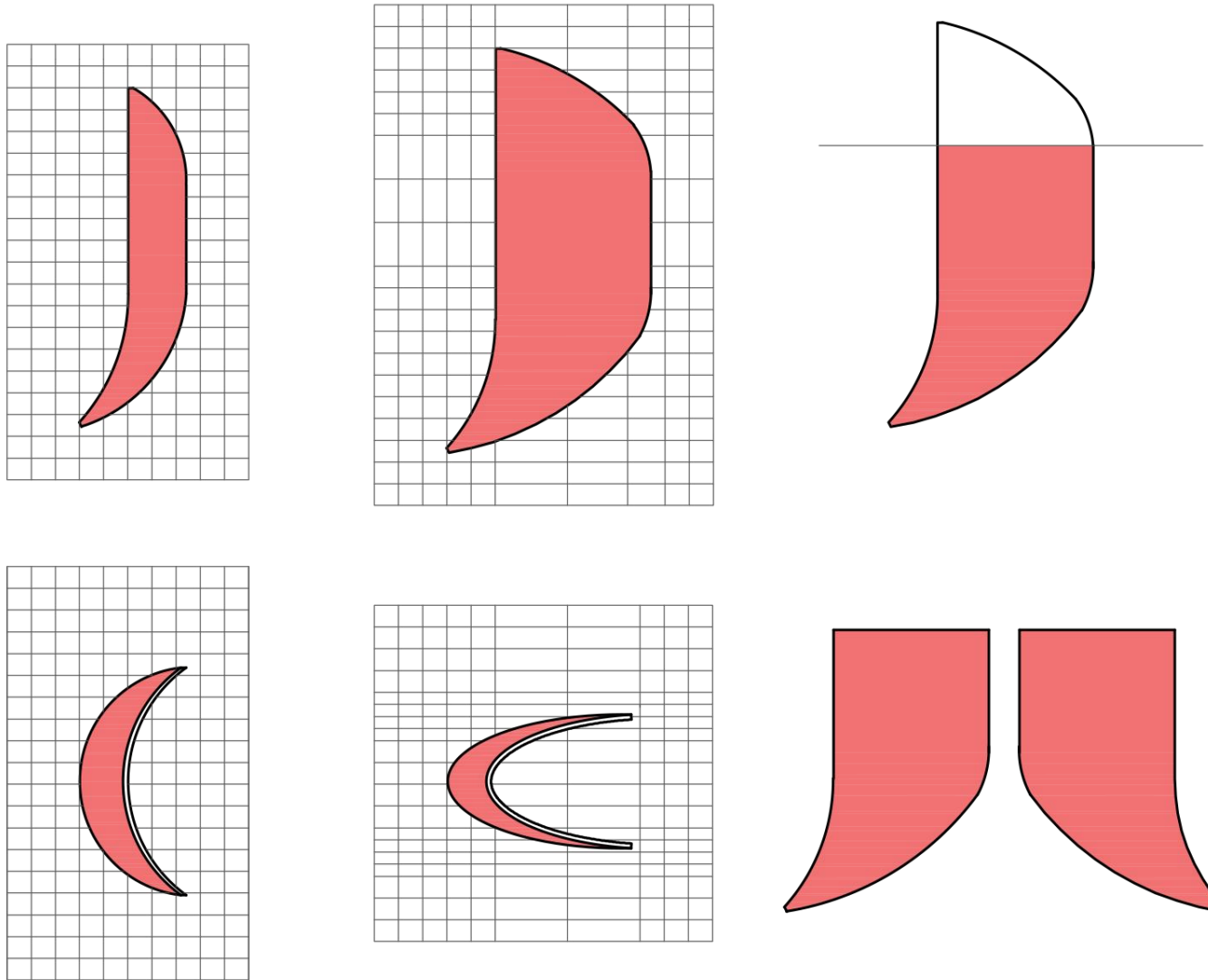
# Ideations: based on D'archy

## Thomsom's theory of Morphogenesis

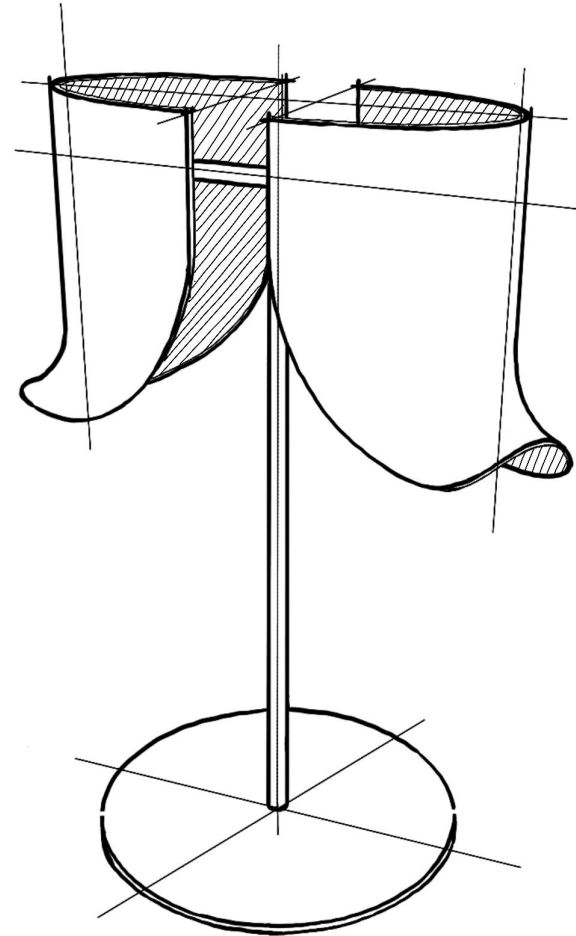
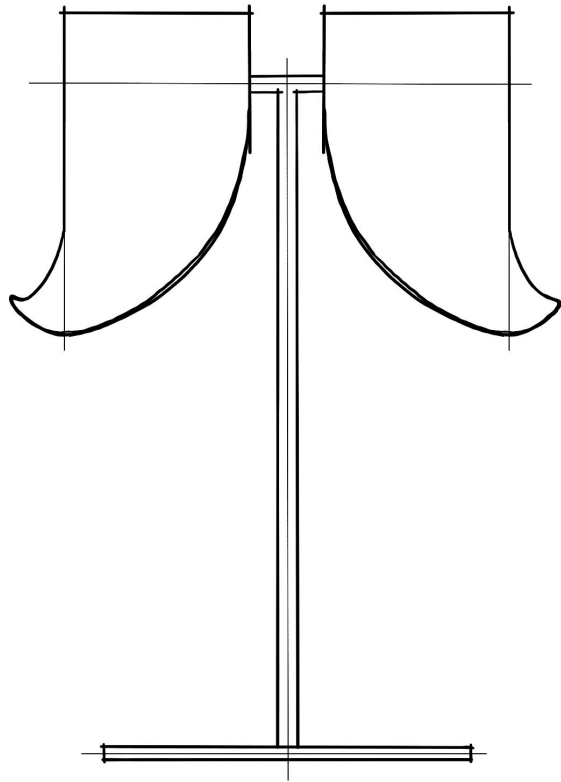
Thompson argued that the shapes of organisms and their parts could be understood through geometric transformations. He introduced the concept of coordinate transformation, suggesting that the forms of related species can be described by transforming the coordinates of a basic shape. For example, the shape of one species of fish can be derived from another by stretching, compressing, or otherwise deforming the coordinate grid underlying the basic form.



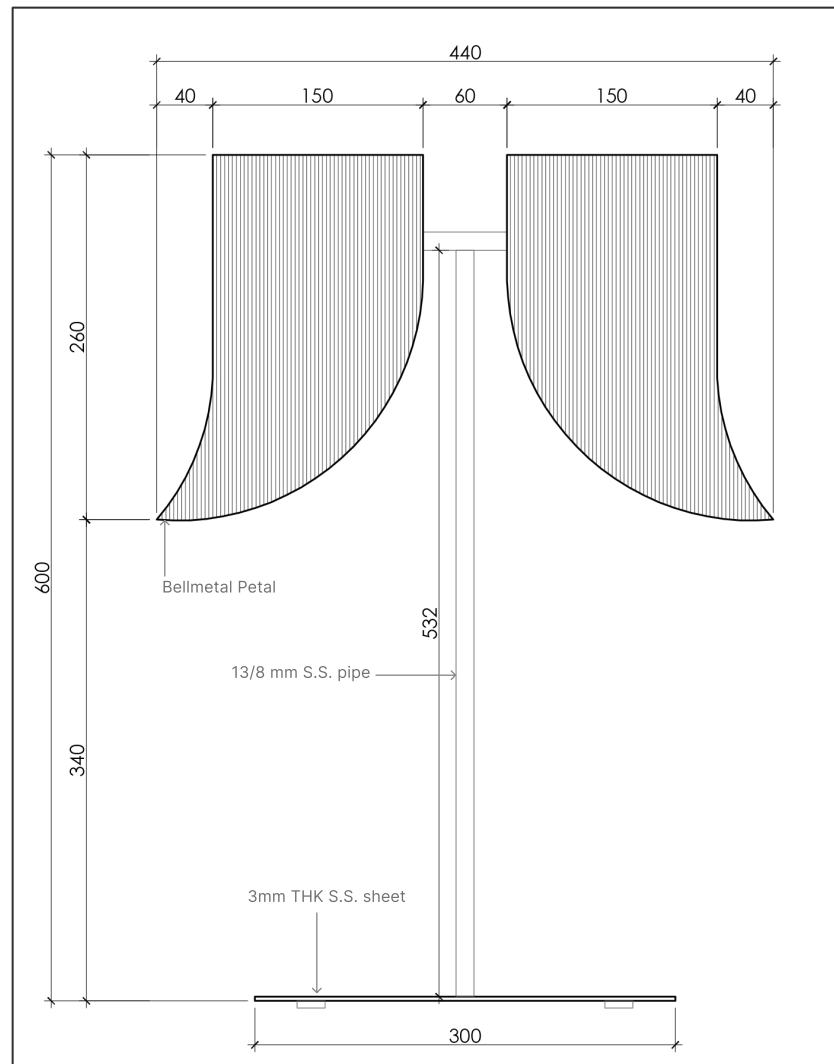
## 7.2. Ideations: based on D'archy Thomsom's theory of Morphogenesis



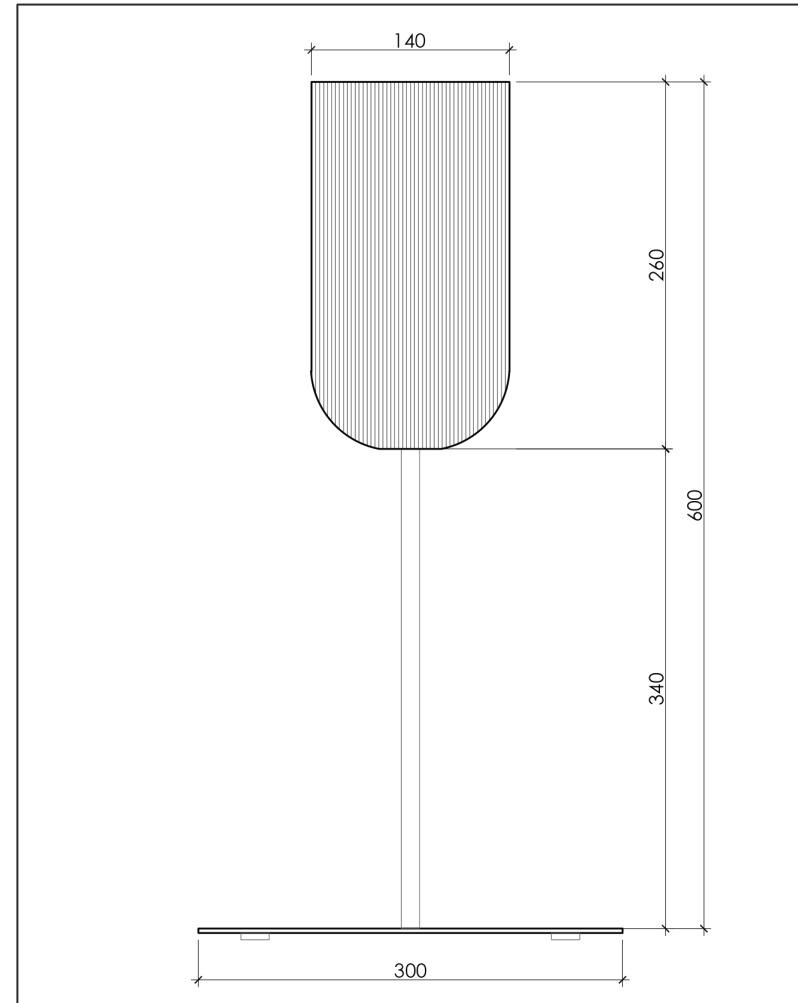
## 7.2. Ideations: based on D'archy Thomsom's theory of Morphogenesis



## 7.2. Ideations: based on D'archy Thomsom's theory of Morphogenesis

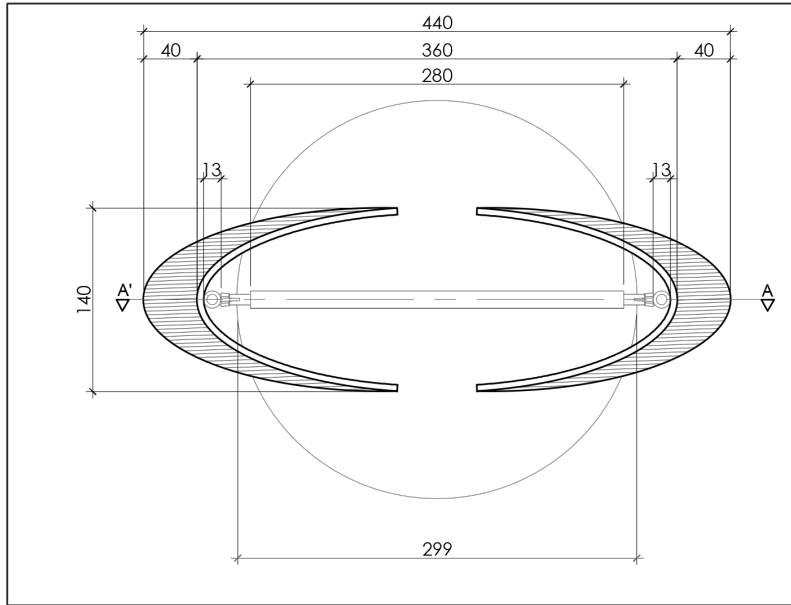


02 ELEVATION  
scale : 1:5 @ A4

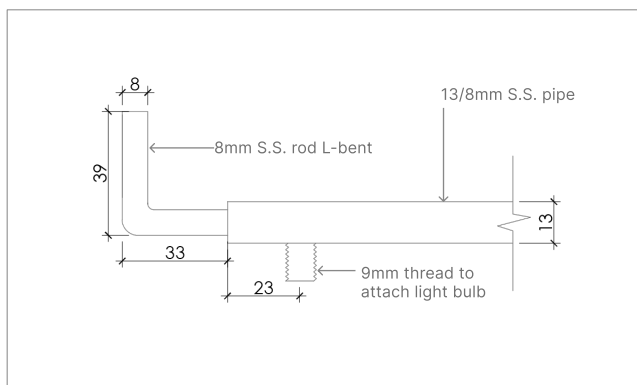


04 SIDE ELEVATION  
scale : 1:5 @ A4

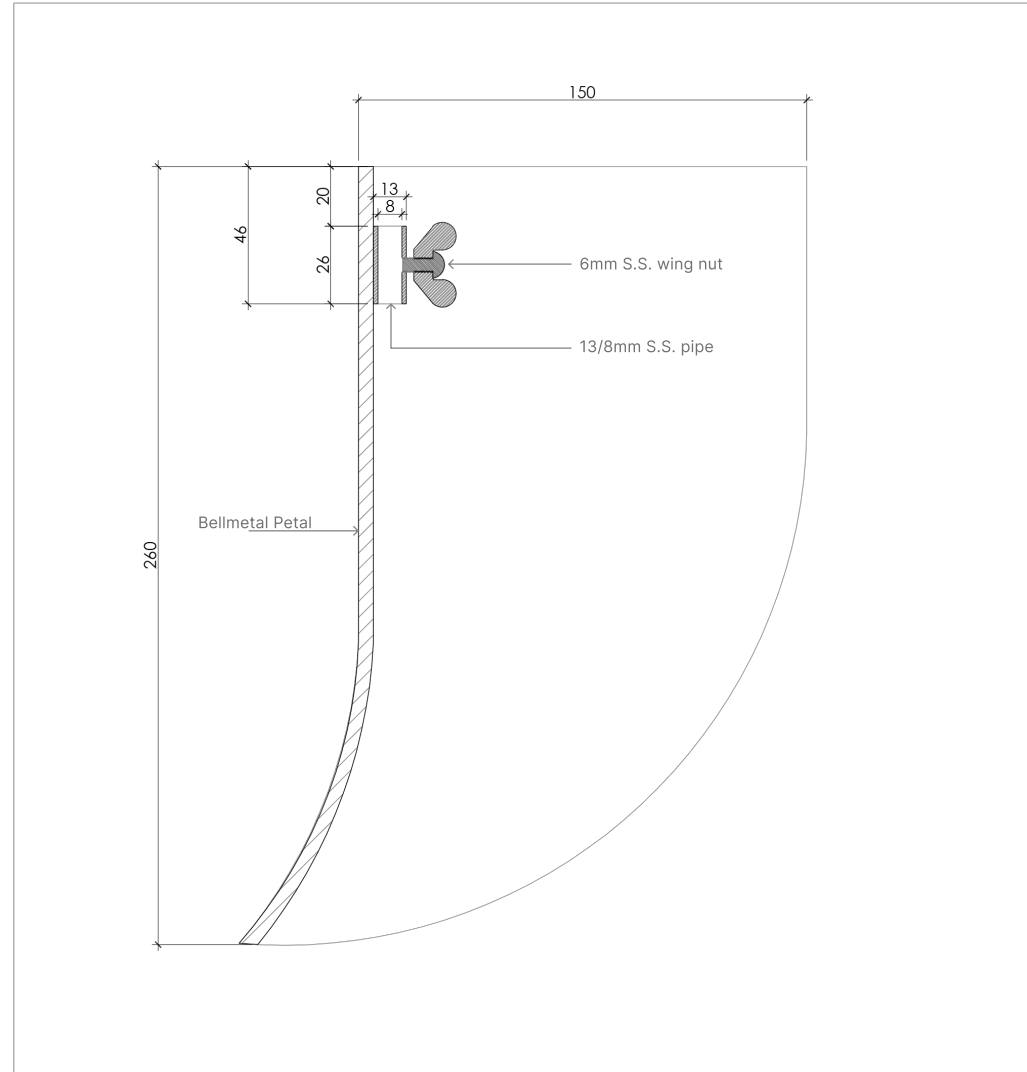
## 7.2. Ideations: based on D'archy Thomsom's theory of Morphogenesis



01 PLAN  
scale: 1:5 @ A4

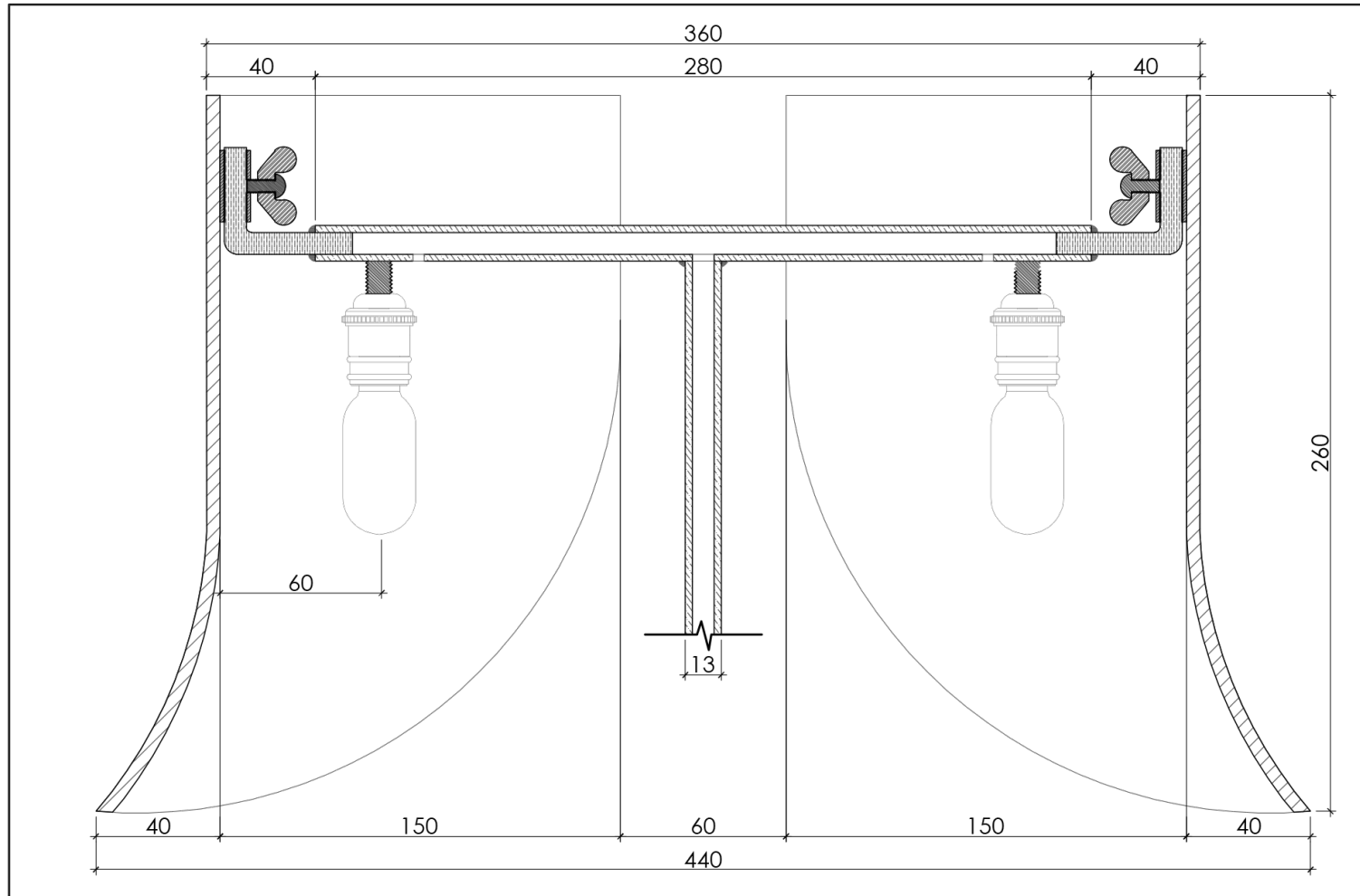


02 JOINERY DETAIL  
scale: 1:2 @ A4



01 JOINERY DETAIL  
scale: 1:2 @ A4

## 7.2. Ideations: based on D'archy Thomsom's theory of Morphogenesis



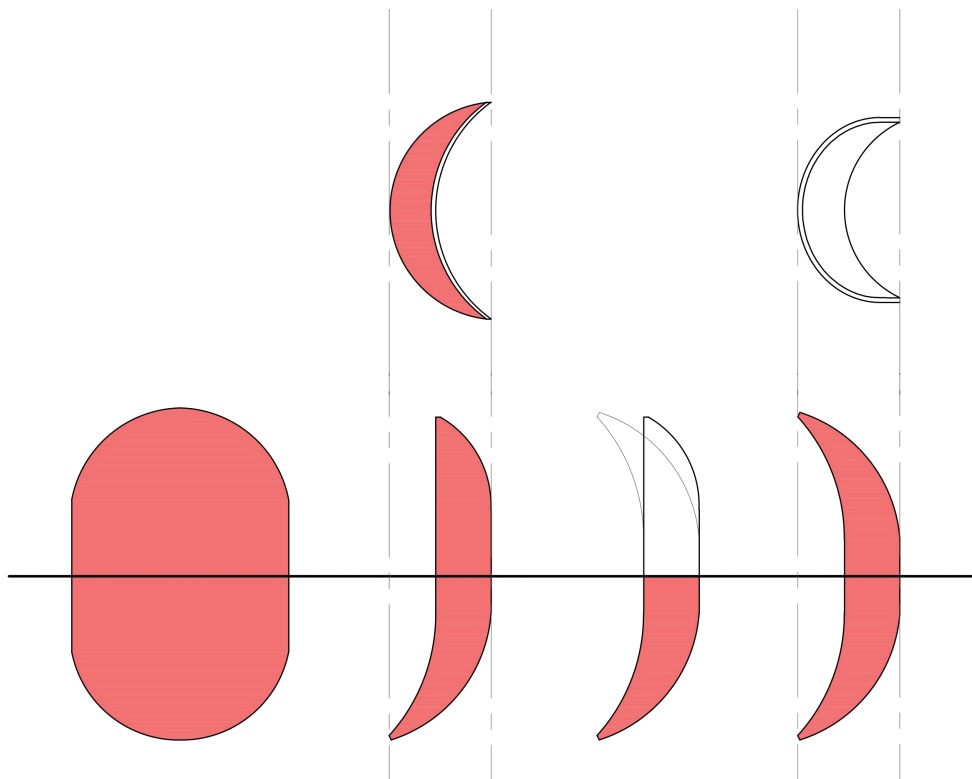
03 SECTION AA'  
scale : CUSTOM

## 7.2. Ideations: based on D'archy Thomsom's theory of Morphogenesis

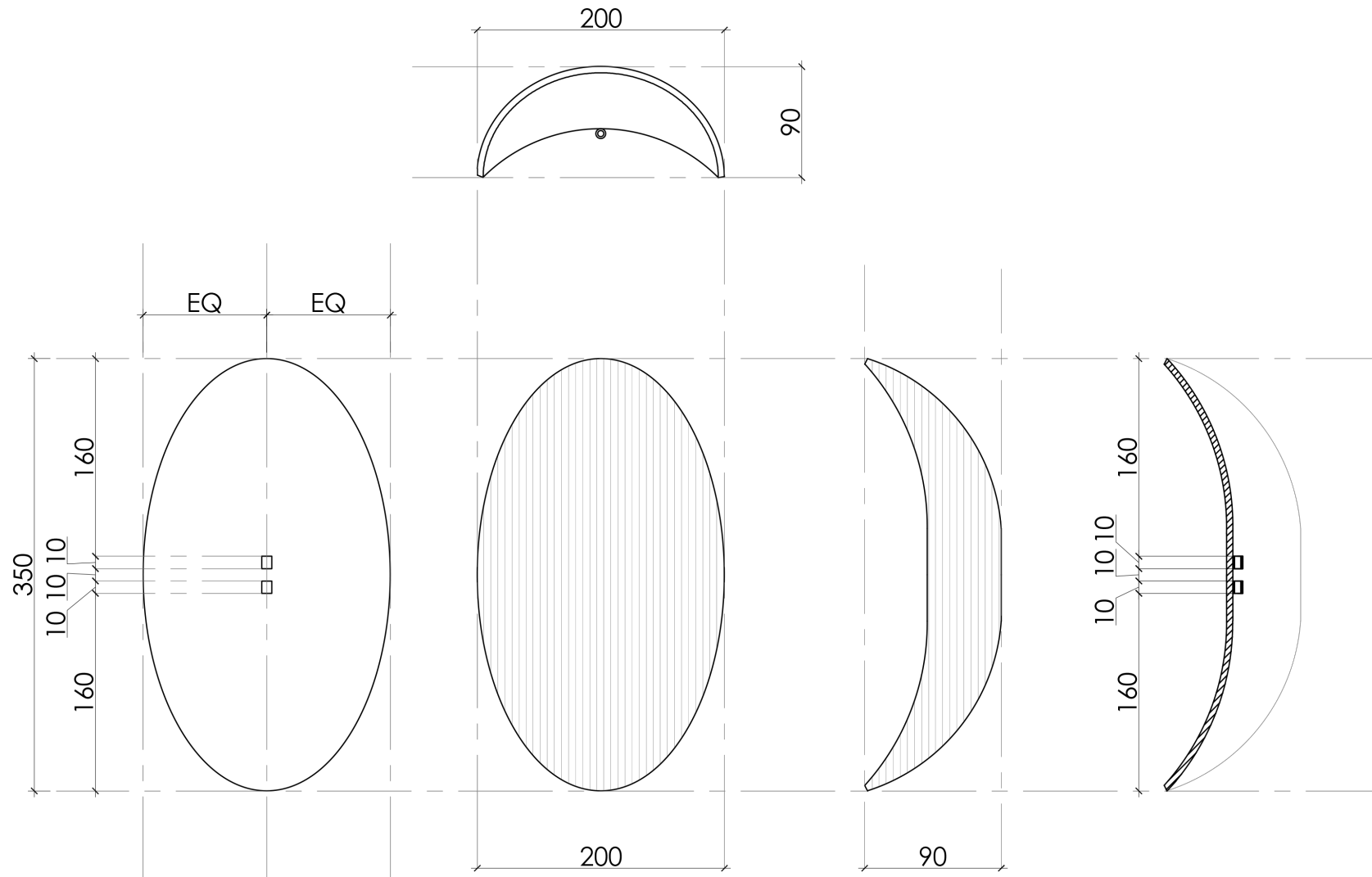


# Ideations: based on Reflection Symmetry

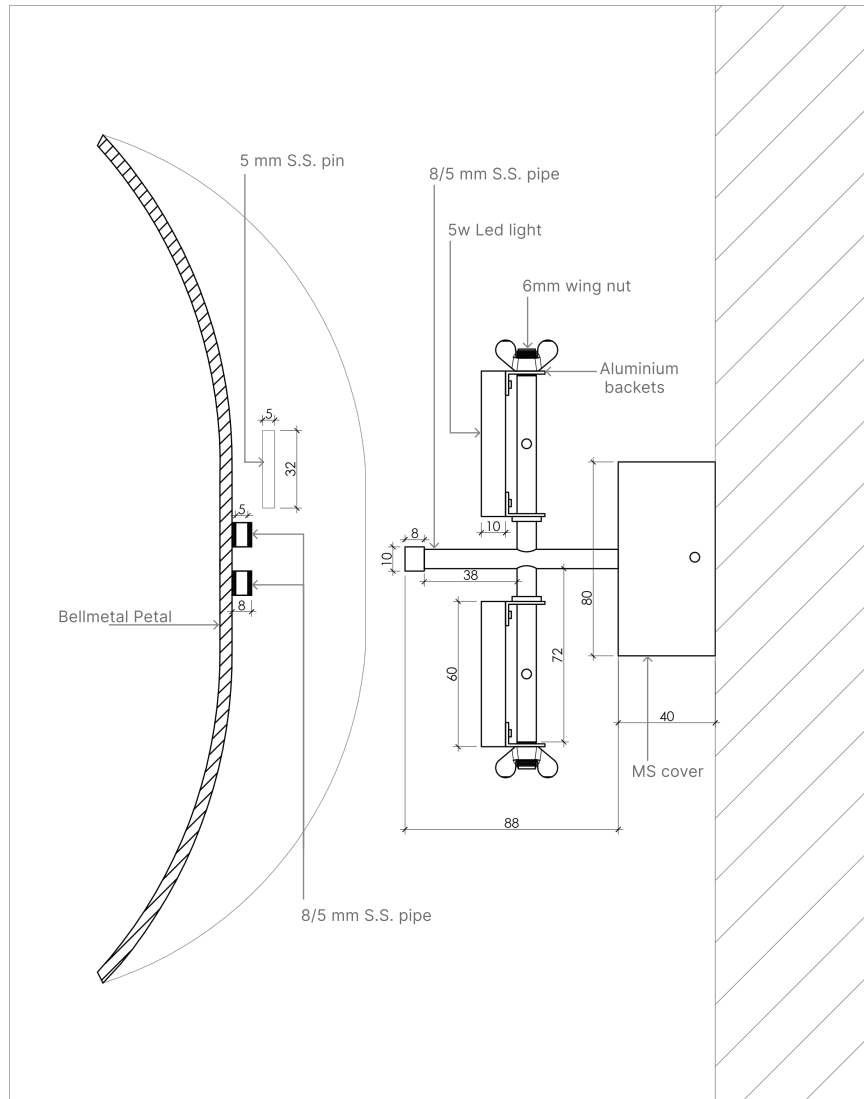
The imaginary line or axis along which you can fold a figure to obtain the symmetrical halves is called the line of symmetry. It is also termed as the axis of symmetry. The line symmetry is also called a mirror line because it presents two reflections of an image that coincide.



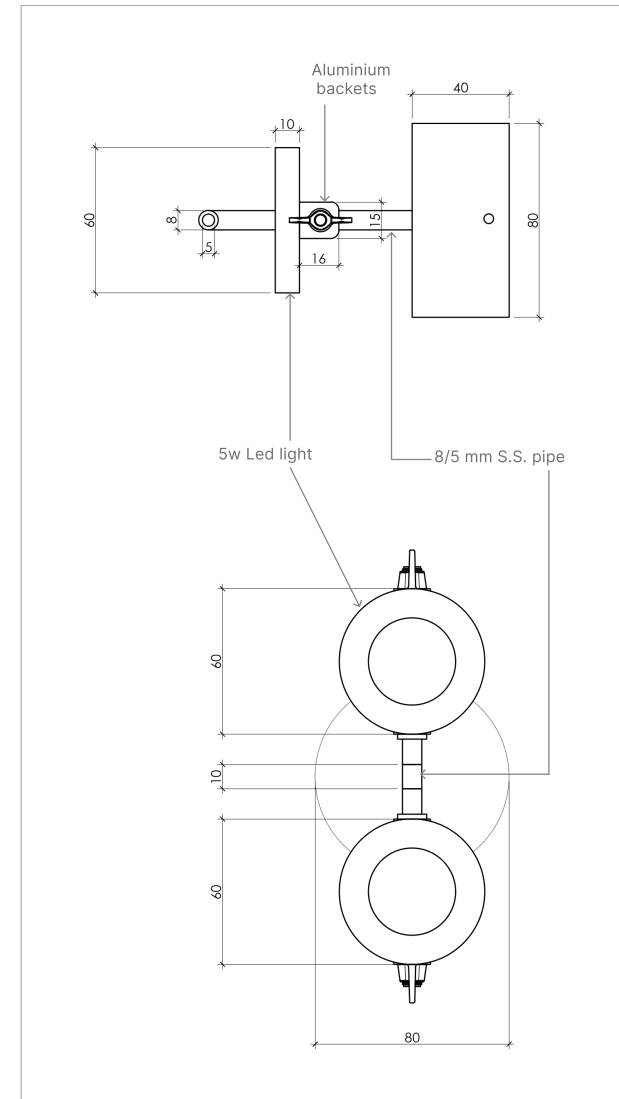
## 7.2. Ideations: based on Reflection Symmetry



## 7.2. Ideations: based on Reflection Symmetry

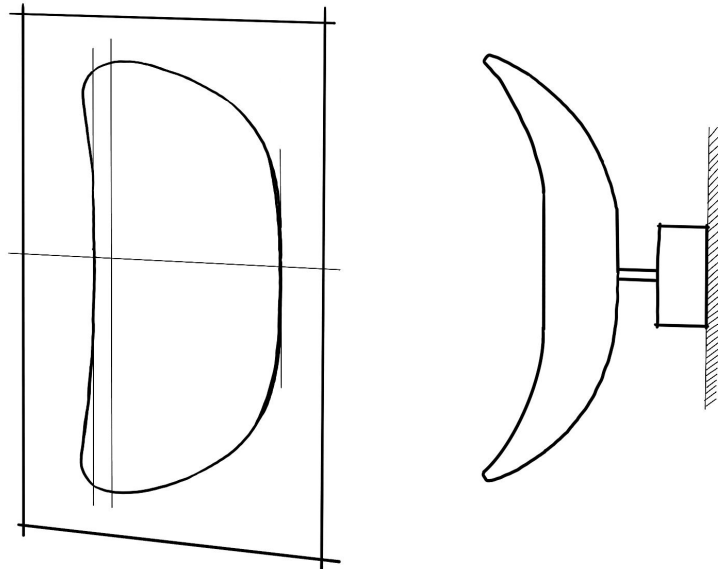


01 JOINERY DETAIL  
scale: 1:2 @ A4



01 HOLDER  
scale: 1:2 @ A4

## 7.2. Ideations: based on Reflection Symmetry



# Family

7.4



Chapter 08:

# Challenges & Learnings

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# Challenges

## 8.1

- 1. Understanding Traditional Techniques:** Gaining deep insights into the intricate and time-honored techniques of bell metal craftsmanship.
- 2. Cultural Sensitivity and Authenticity:** Ensuring the designs reflect cultural authenticity while introducing modern elements.
- 3. Collaborative Design Process:** Establishing a collaborative relationship with artisans who may be resistant to change.
- 4. Material Constraints:** Working within the limitations of bell metal as a material, including its properties and availability.
- 5. Design and Prototyping:** Developing prototypes that harmonize traditional aesthetics with modern functionality.
- 6. Attracting Younger Generations:** Engaging younger generations in a craft they perceive as outdated and economically unviable.

# Learnings

## 8.2

- 1. Deep Cultural Immersion:** Engaging deeply with the cultural and historical aspects of bell metal craftsmanship enriches the design process and ensures authenticity.
- 2. Importance of Collaboration:** Collaborative efforts with artisans not only preserve traditional skills but also foster innovation and mutual learning.
- 3. Design Adaptability:** Flexibility in design is essential to accommodate material properties and artisan techniques, ensuring practical and feasible outcomes.
- 4. Balancing Tradition and Modernity:** Successfully merging traditional craftsmanship with contemporary design creates products that are both culturally significant and marketable.
- 5. Marketing and Branding:** Effective storytelling and branding can highlight the unique value of handcrafted products, distinguishing them from mass-produced items.

# The Team



# References

## 8.4

1. "Sarthebari, The bell metal Industry" - <https://ekbharat.gov.in/images/InstituteActivities/Documents/908420220927094216/Sarthebari,%20the%20Bell%20Metal%20Industry.pdf>
2. "The Sarthebari Bellmetal industry of Assam"- <https://www.abhijna-emuseum.com/exhibition/sarthebari-bell-metal-industry-assam/>
3. D'source - <https://www.dsource.in/gallery/bell-metal-crafts-sarthebari>
4. The Bell Metal Industry of Sarthebari, Assam - <https://spainindustrialdesign.wordpress.com/2020/12/22/the-bell-industry-of-sarthebari-assam/>
5. The bells of Sarthebari - <https://frontline.thehindu.com/photo-essay/the-bells-of-sarthebari-how-bell-metal-industry-in-assam-needs-government-support-gi-tag-to-survive/article67337777.ece>
6. Assamese products get GI tag - <https://economictimes.indiatimes.com/news/india/assam-bihu-dhol-jaapi-and-more-all-about-all-about-the-19-assam-items-that-got-gi-tag/13-bodo-products-get-recognition/slideshow/108944724.cms>
7. Brass Metal Industry of Sarthebari Barpeta - <https://www.tourmyindia.com/states/assam/brass-metal-industry-of-sarthebari.html>
8. <https://www.kahibati.com/kahi.html>

## 8.4. References

9. History and Significance of Bell Metal in Assam - <https://destinationassam.org/2020/11/09/assam-bell-metal-history-and-significance/>
10. Present Handicrafts industries in Assam - <https://industriescom.assam.gov.in/portlet-innerpage/present-handicrafts-industries-in-assam>
11. Bell metal fires fading out in Assam - <https://www.villagesquare.in/centuries-old-sarthebari-bell-metal-industry-struggles-for-survival/>
12. ATTRACTIVENESS OF BELL METAL INDUSTRY IN ASSAM: A STUDY WITH SPECIAL REFERENCE TO SATHEBARI AREA IN ASSAM - [https://iaeme.com/MasterAdmin/Journal\\_uploads/IJM/VOLUME\\_11\\_ISSUE\\_10/IJM\\_11\\_10\\_152.pdf](https://iaeme.com/MasterAdmin/Journal_uploads/IJM/VOLUME_11_ISSUE_10/IJM_11_10_152.pdf)
13. Assam's cultural bell metal industry in Barpeta facing challenges amid price hikes in raw materials - <https://www.aninews.in/news/national/general-news/assams-cultural-bell-metal-industry-in-barpeta-facing-challenges-amid-price-hikes-in-raw-materials20230707181009/>
14. On Growth and Form - Book by D'Arcy Wentworth Thompson

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