



CONT

a versatile and adaptable
luminaire designed for longevity

Project for Bachelor
of Fine Arts in Design
Elvira Stålhammar 2023





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a versatile and adaptable luminaire designed for longevity

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Degree Project for Bachelor of Fine Arts in Design

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Sammanfattning

Syftet med kandidatprojektet är att designa en modulär luminaire med lång livslängd med mål att minska konsumtion. Projektet syftar till att utforska hur design kan bidra till hållbar utveckling, genom att skapa en anpassningsbar ljuslösning. Armatyren är mångsidig och kan användas hängande från taket, på väggen eller på en bordsskiva. Den kan utökas genom att använda flera skärmar eller bara bestå av en.

Abstract

The aim of this bachelor degree project is to design a modular luminaire with a longer lifespan, in order to reduce consumption. The project aims to explore how design can contribute to sustainable development by creating a durable and adaptable lighting solution. The luminaire is versatile and can either be hung from the ceiling, mounted on the wall, or placed on a table. It can be expanded by using multiple shades or simply consist of a single unit.

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I am extremely thankful to my family for their unwavering support and encouragement throughout the entire project. Their invaluable inputs, help with making hard decisions, and the prototype are highly appreciated.

Thank you!

Brief

To design a versatile and adaptable luminaire that can be used for different purposes and spaces. The aim is to create a product that is long-lasting and adaptable to fit the user's needs, thereby reducing the need to buy new luminaires.

Method

The design method employed in this project involved a number of stages. Firstly, extensive research was conducted through analysis of articles, reports, and market analysis related to the subject matter. This allowed for a comprehensive understanding of the issue and facilitated the identification of potential solutions.

Following this, the project progressed to a phase of idea generation, feedback, and decision-making. Various concepts and ideas were explored and later discussed to refine them, leading to a final decision on the best concept for further development.

The next stage involved the creation of sketches and material testing to ensure the feasibility and functionality of the design. Through a combination of manual and digital methods, both physical and digital prototypes were produced, allowing for extensive testing and refinement of the design.

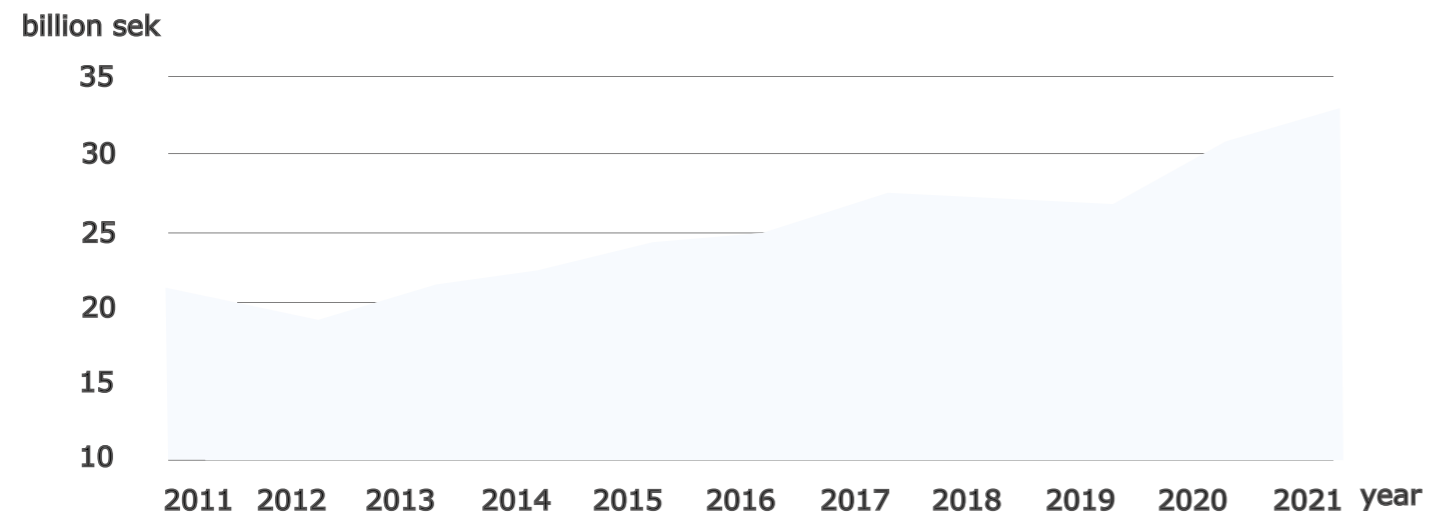


Research

Ideation

Prototyping

Motivation



Sweden has seen a 57% increase in consumption of furniture, household items, and maintenance between 2011 and 2021, according to the Consumption Report 2022 from Gothenburg University. (Hagberg et al., 2022) Climate change is a pressing issue, with individuals and politicians alike calling for changes in behaviour to save the planet, yet consumption continues to rise.

My project started with a desire to understand the furniture industry and why it has become the norm to buy and discard items so quickly. I wanted to explore how, as a designer, I could create products with a longer lifespan.

I believe that a change in how we view furniture is necessary; it should be given value and meaning and be seen as something to take with us when we move or renovate, rather than something to be replaced.

Background: Consumption

When people fulfil their needs, the brain's reward system triggers dopamine release. Primary rewards, such as food and water, are inherent, whereas secondary rewards, such as gadgets and money, are learned. Historically, people consumed to fulfil their most rudimentary needs, including sustenance, hydration, warmth, and security. In contemporary society, consumption has transformed into a lifestyle and leisure pursuit. The upsurge in consumption has had a significant adverse impact on the environment, underscoring the importance of achieving a balance between growth and sustainable consumption. Across most of the world, people have shifted from consuming for survival to consuming for pleasure. Consumption is a multifaceted phenomenon that is challenging to modify. Research reveals that individuals' consumption patterns are only comprehensible when considering the underlying determinants that drive behaviour. Demand and supply, attitudes, and knowledge about consumption all influence an individual's consumption choices. For young individuals, consumption habits play a pivotal role in identity formation.

Despite the escalation in consumption, happiness levels have not increased. Nevertheless, consumption continues to grow, and dissatisfaction remains a major driver of consumption (Alvesson, 2014). Production per capita in affluent countries increased by an average of two percent annually during the 20th century, with each subsequent generation enjoying almost twice the material standard of living of their parents and three to four times that of their grandparents when they were the same age.

In present-day Sweden, the home is a central part of consumer culture. The home serves as a space for identity construction, providing an opportunity to create a life narrative and to communicate who we are as individuals. Commerce and social media have shaped the market for interior design items and furniture, as well as defining the ideals and concepts of what constitutes a home. The creation of a specific image of the home often serves to encourage consumption. (Johansen, A. 2019)

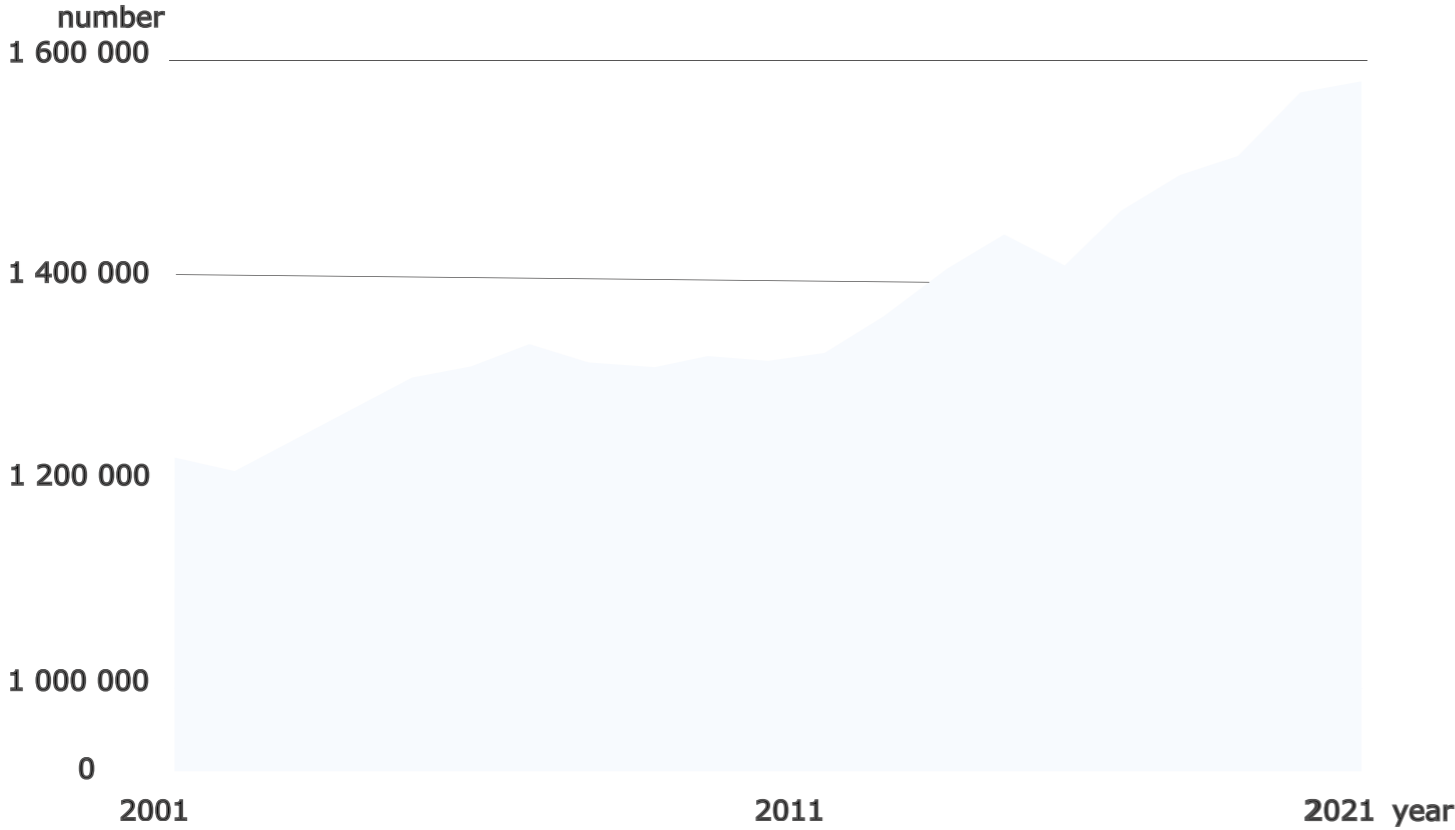
Background: Product value

Products have become devalued in today's society. Instead of lasting a long time and being repaired if needed, we often dispose of products and buy new ones. This creates a consumption culture that can harm the environment and our wallets. However, there is a growing interest in breaking this trend by purchasing higher quality products and repairing them when they break. This will lead to less waste and a more sustainable lifestyle. (Naturskyddsföreningen, 2021)

With the advent of electricity as a power source in the late 19th century, households underwent a significant transformation. Instead of relying on oil or gas lamps for lighting, electricity offered a brighter and more convenient alternative. However, not everyone could afford to purchase new lamps specifically designed for electricity. As a result, many chose to convert their existing lamps to operate on electricity.

In addition, many old lamps were intricately designed and made of high-quality materials, making them valuable possessions. By converting these lamps, people could preserve their antique treasures while also enjoying the benefits of modern electric lighting. (Stadshem, 2023)

Background: Moving



In 2021, a total of 1,579,528 people relocated within Sweden. Among this group, there were 1,357,000 individuals who moved only once, while 185,000 individuals moved multiple times, indicating that 14% of the total moves were by repeat movers.

It is noteworthy that Swedes generally tend to move within short distances. Nearly 80% of all relocations occur within the municipality, and nearly half of all moves in 2021 were shorter than 5 kilometers. However, young adults tend to move longer distances, likely for work or study purposes.

The number of people moving within Sweden has been increasing since 2000. In fact, the number has risen from approximately 1.2 million to almost 1.6 million in 2021, indicating a significant increase in the mobility of the population. (Statistics Sweden, 2021)

In a time where the number of people who move is increasing and the rise in consumption and waste is becoming more prevalent, the need for adaptable home and interior design has become increasingly relevant. Therefore, this project aims to explore the possibilities and challenges of designing adaptable homes and interiors that can cater to the changing needs of their occupants.

Light

Task lighting is focused lighting that is used to light up a specific area for a particular task, such as reading, writing, or cooking. Task lighting is typically brighter and more concentrated than other types of lighting to ensure that the task can be completed safely and comfortably.

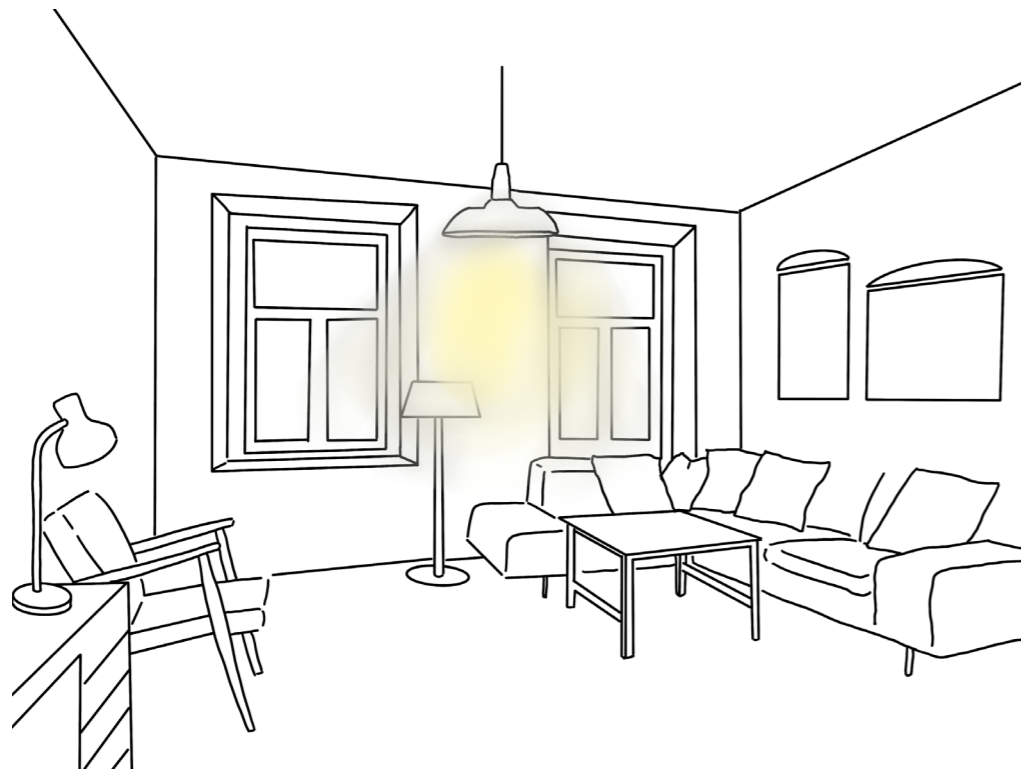
Ambient lighting is used to provide overall light to a space. This type of lighting can be achieved through ceiling fixtures, wall mounted, or other lighting sources that provide a soft and diffuse light. Ambient lighting is important in creating a comfortable and welcoming atmosphere in a room.

Accent lighting is used to highlight a particular object, such as a painting, sculpture, or architectural feature. This type of lighting can be achieved through spotlights, track lighting, or other focused lighting sources. Accent lighting can add depth and dimension to a space, as well as draw attention to specific elements within a room. (Atom Lighting, 2023)

Task light 800-1500 lumen



Ambient light 400-470 lumen



Accent light 220-360 lumen





Lights in living room

To narrow down and define the project, the living room was selected as the primary location for the luminaire. As a space where various activities take place, an analysis was conducted to determine the activities that commonly occur in a living room, such as talking, playing games, watching TV, working/studying, reading, cleaning, and enjoying a cup of coffee.

Additionally, a detailed analysis was performed to identify the different types of luminaires commonly used in living rooms. The analysis revealed that a combination of various luminaires, including ceiling, table, window, floor, and wall luminaires, is often used.

Based on the analysis, it was determined that the luminaire should be versatile and serve as a combination of a ceiling, table, and wall luminaire. The primary function of the luminaire will be to provide ambient light for the living room.

Design decisions

Adaptable Use: the product should be designed to meet the changing needs and requirements of the user. This means that it should be flexible and versatile, able to perform different functions depending on the situation.

Enduring Appeal: the product should not be a novelty item that the user quickly grows tired of. It should have a lasting appeal that makes it a valuable and treasured item for years to come.

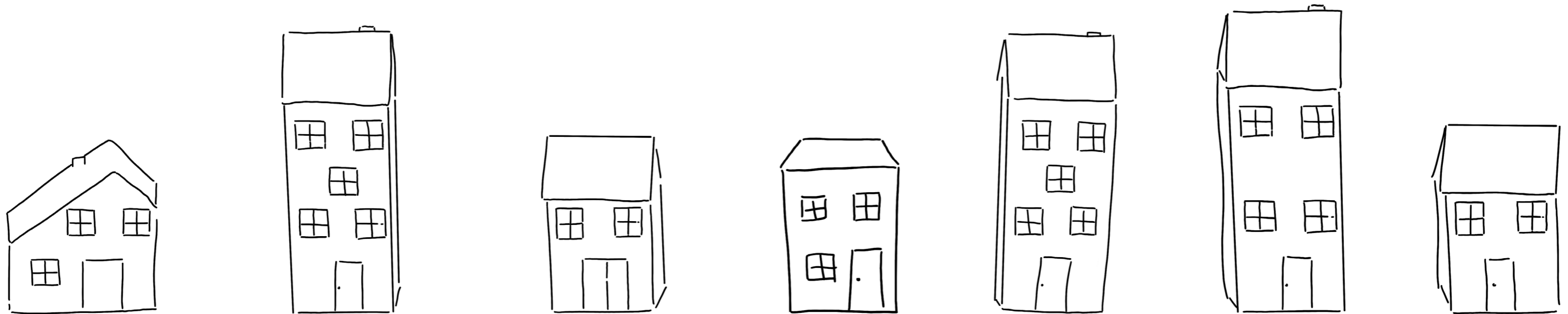
Low Energy Use: the product should be designed to be energy efficient and reduce the user's environmental impact.

Target group

This luminaire is designed for environmentally conscious persons who value sustainability and longevity in their purchases. The objective of this luminaire is to provide a long-lasting and enduring source of illumination, which will accompany the user through different stages of life, interior design preferences, and living arrangements.

Scenario

The consumer initially purchases one ceiling luminaire for use in their small apartment. As the person moves into a larger home a bigger light fixture is wanted, so the person buy two more light fixture to be installed alongside the existing one. The consumer relocates once again, but to a smaller dwelling where three ceiling light fixture are no longer wanted. The consumer decides to use two of the fixture as ceiling fixtures while using the third as wall mounted luminaire.



Changeable

Three categories were chosen to explore ways to change the luminaire: function, light, and form. Through brainstorming, various ways to modify the luminaire were identified within each category.

Change function

Ambient-, accent- and task lighting
Placement
Usage
Point
Different holders

Change light

Light picture
Lumen
Kelvin
Lux
Colour

Change form/look

Add on
Size
How many
Hang separate or as one big
Individual each add on or the hole
Cable

Design decisions

Place: the luminaire is designed to be used in the living room, in consideration of the specific lighting requirements of the area. Nevertheless, it has the potential to be use in other rooms.

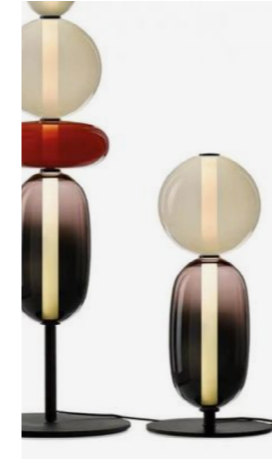
Type of luminaire: the luminaire is limited to interchangeable use as a ceiling, wall, or table luminaire.

Type if light: The main focus of the luminaire is to serve as an ambient light, providing a warm and comfortable atmospheres. However, with the option to switch to a stronger bulb, the luminaire can also function as a general light, providing brighter illumination when needed.

Four ideas of adding

Four different methods were developed to add on and make the luminaire larger when using it as a ceiling lamp. Taking into consideration its function, lighting capabilities, and form.

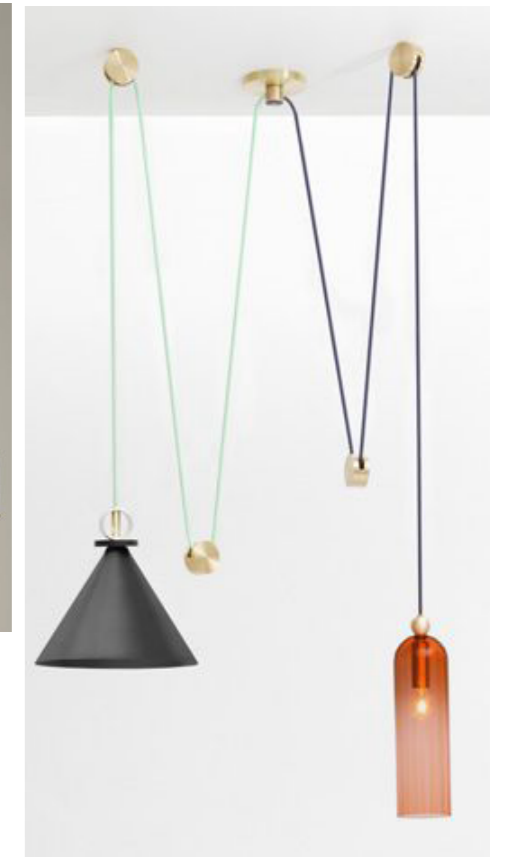
Market research was conducted to explore the existing products in the market for all four methods, ensuring that the modifications were novel and would add value to the product. However, it should be noted that not all luminaires depicted in the pictures are modifiable in the way I am suggesting. Nonetheless, there is potential for similar modifications to be made to those luminaires, providing greater flexibility and adaptability to the product. Overall, this approach offers a sustainable and efficient solution to reduce waste and improve the longevity of the luminaire.



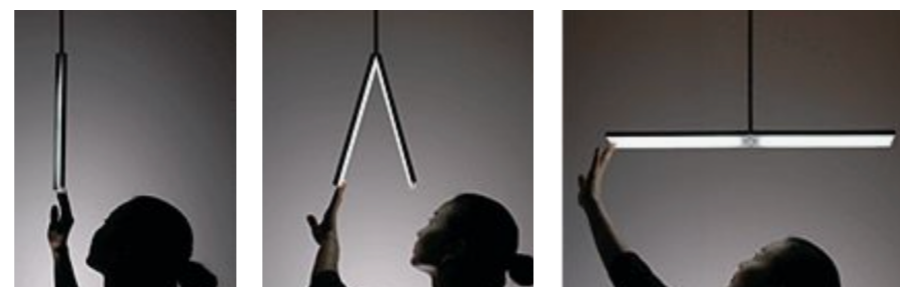
A single light source can be transformed through the use of interchangeable parts to modify its overall form.



To change the appearance, multiple individual light sources can be hung separately.



The shades can be changed individually.

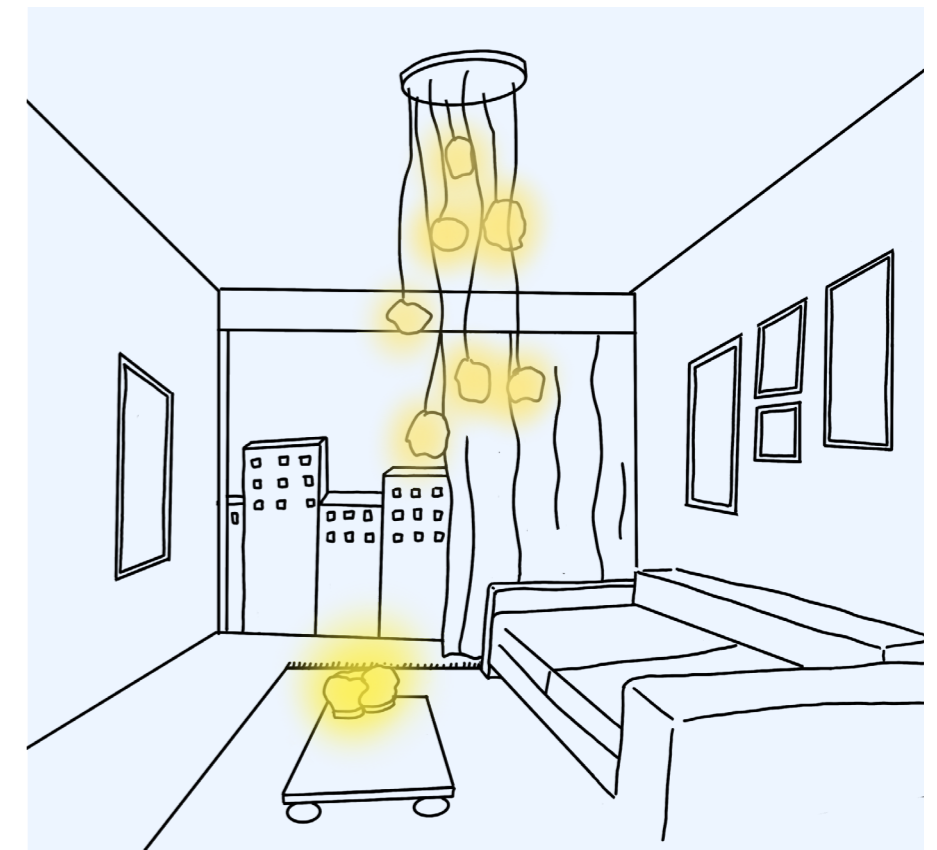
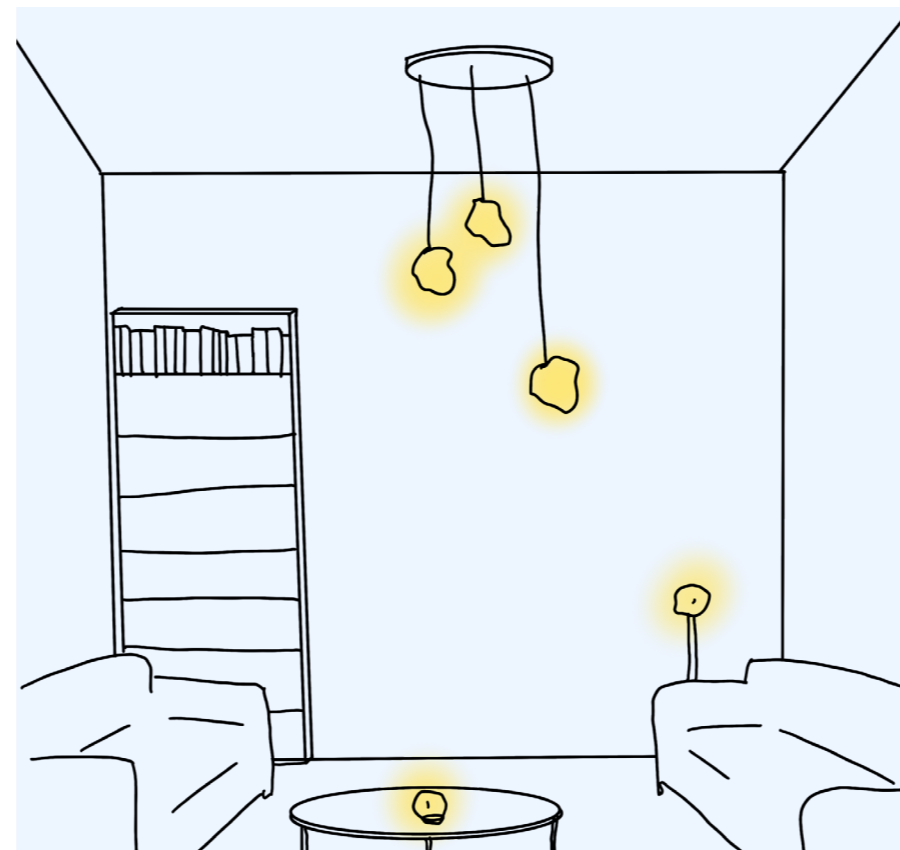
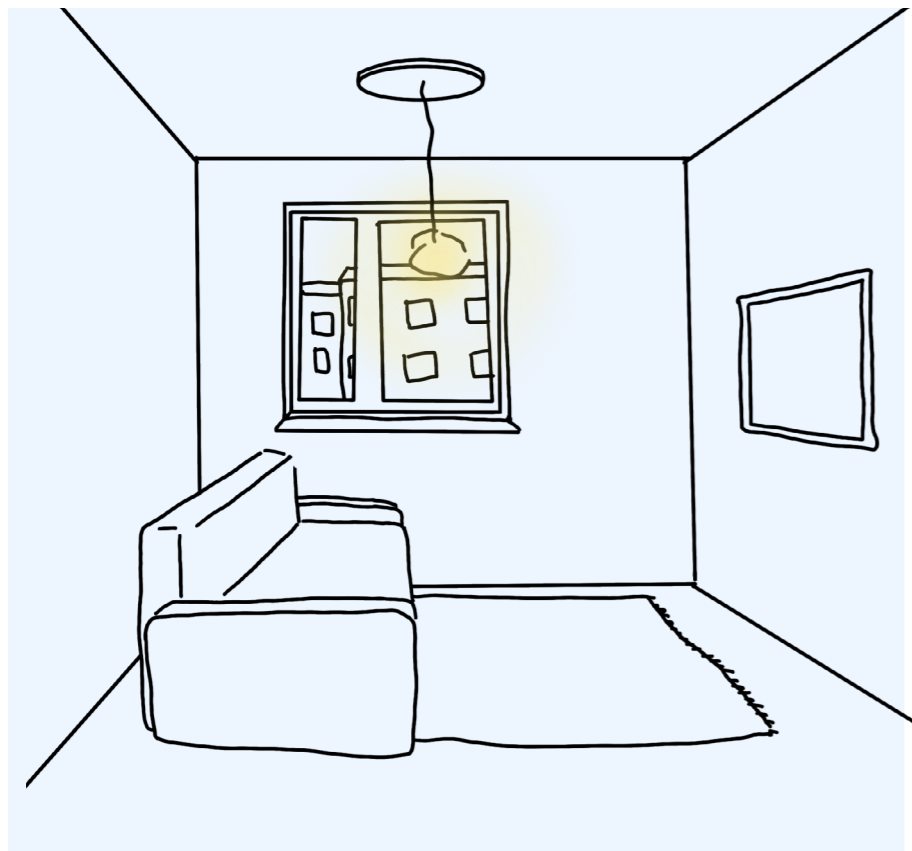


The luminaire features a single light source, which can be paired with various interchangeable add-on parts to modify its appearance.



Hang separately

The method that was chosen for this project was to have multiple individual light sources and shades that hung separately. The individual shades that cannot be modified, the overall appearance and function of the luminaire can be changed to meet specific needs.



Change type of lighting fixture

The luminaire is designed to be a versatile lighting fixture that can function as a ceiling, wall, or table lamp. To make it adaptable and user-friendly, three methods were developed to switch between the different types of luminaires. During the development phase, various factors were taken into account, such as the ease of transitioning between luminaire types, the number of additional parts required, and the overall complexity of the design.

To ensure the best possible design, thorough market research was conducted to explore existing products in the market and gather inspiration for new ideas. The research findings informed the development process and helped identify potential solutions that were both innovative and practical. The goal was to create a luminaire that was easy to use and did not require too many additional parts or complicated steps to switch between the different types of luminaires.

Changeable

The luminaire has the ability to expand and be used as a stand for placement on a table or desk, and can be folded back in when mounted on a wall. This functionality does not require any additional parts or components.



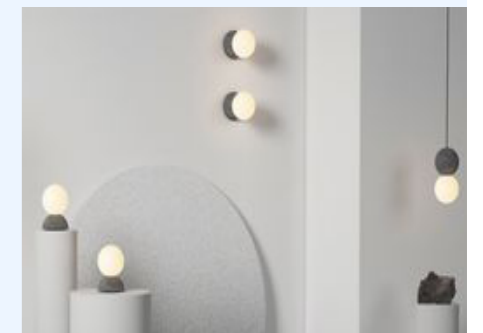
Separate holders

To make the luminaire adaptable to different types of fixtures, an additional part would be required.

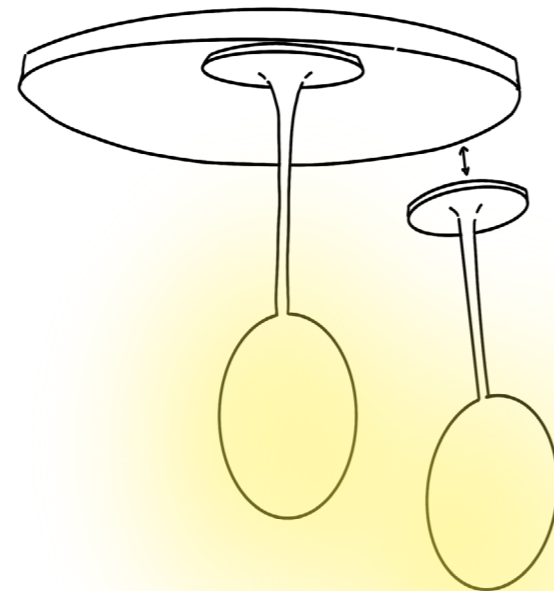
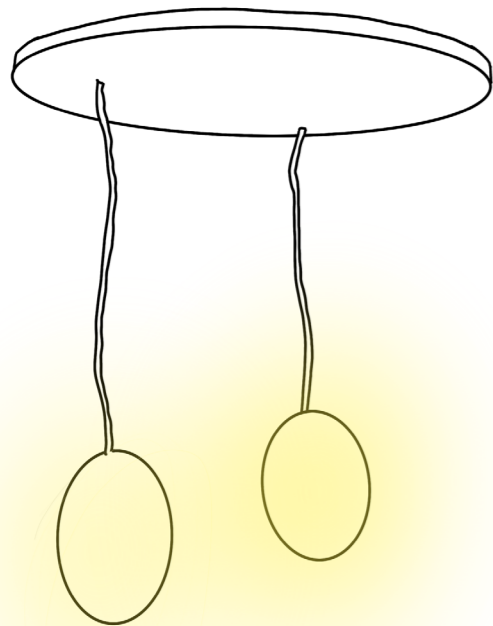


Same

The luminaire can be used in various ways, enabling it to function as different types of lighting fixtures without requiring additional parts or modifications.



With cord or cordless?



Extensive research was conducted to determine whether the luminaire would be equipped with a cord or be cordless. If the luminaire were to have a cord, it would be necessary to develop a mounting system in the ceiling that was both easy and safe for the user to install, as well as to ensure that the lampshades could be easily attached to the fixture. If the luminaire were to be cordless, the holder would require a different design approach to ensure stability and safety.

Two different solutions were developed to address this issue. One solution involved a cord that was equipped with a USB-C connector, which would allow it to be easily moved to other locations. A holder with a transformer would be attached to the ceiling to ensure stability and safety. The second solution involved the use of strong magnets to suspend the lampshades from the ceiling. Due to the limited battery life of existing lamps on the market, it was decided to use a corded solution for this project.

Design decisions

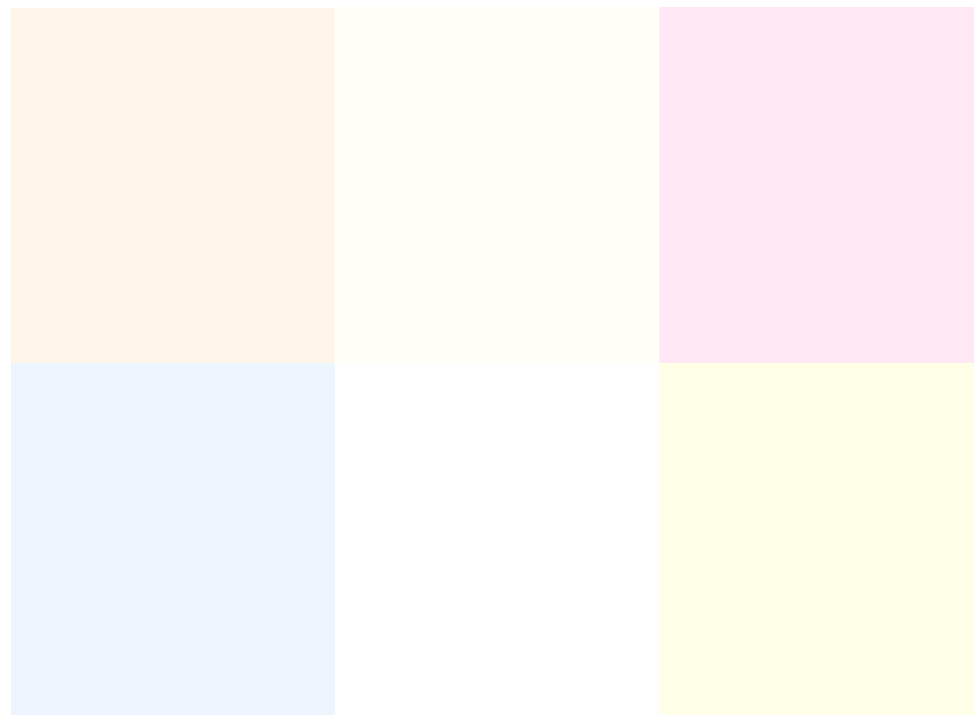
Colour of light: The luminaire can be designed with the option to change the colour of its light, providing the user with a range of options to suit their preferences and needs.

Size: Since the lampshades can be moved, removed or added to enhance the size of the whole luminaire. The lampshade should be relatively small, approximately 250mm in diameter, to function as a standalone luminaire, as well as in combination with others, and as various types of luminaires.

Form: To ensure versatility in different households and stages of life, the design should be simple. Although the lampshade's shape remains unchangeable, the overall structure should offer flexibility to create varied appearances.

Lumen: Of the luminaire can be adjusted to provide different levels of brightness, from ambient lighting to task lighting. This allows the user to adjust the lighting according to their needs and preferences.

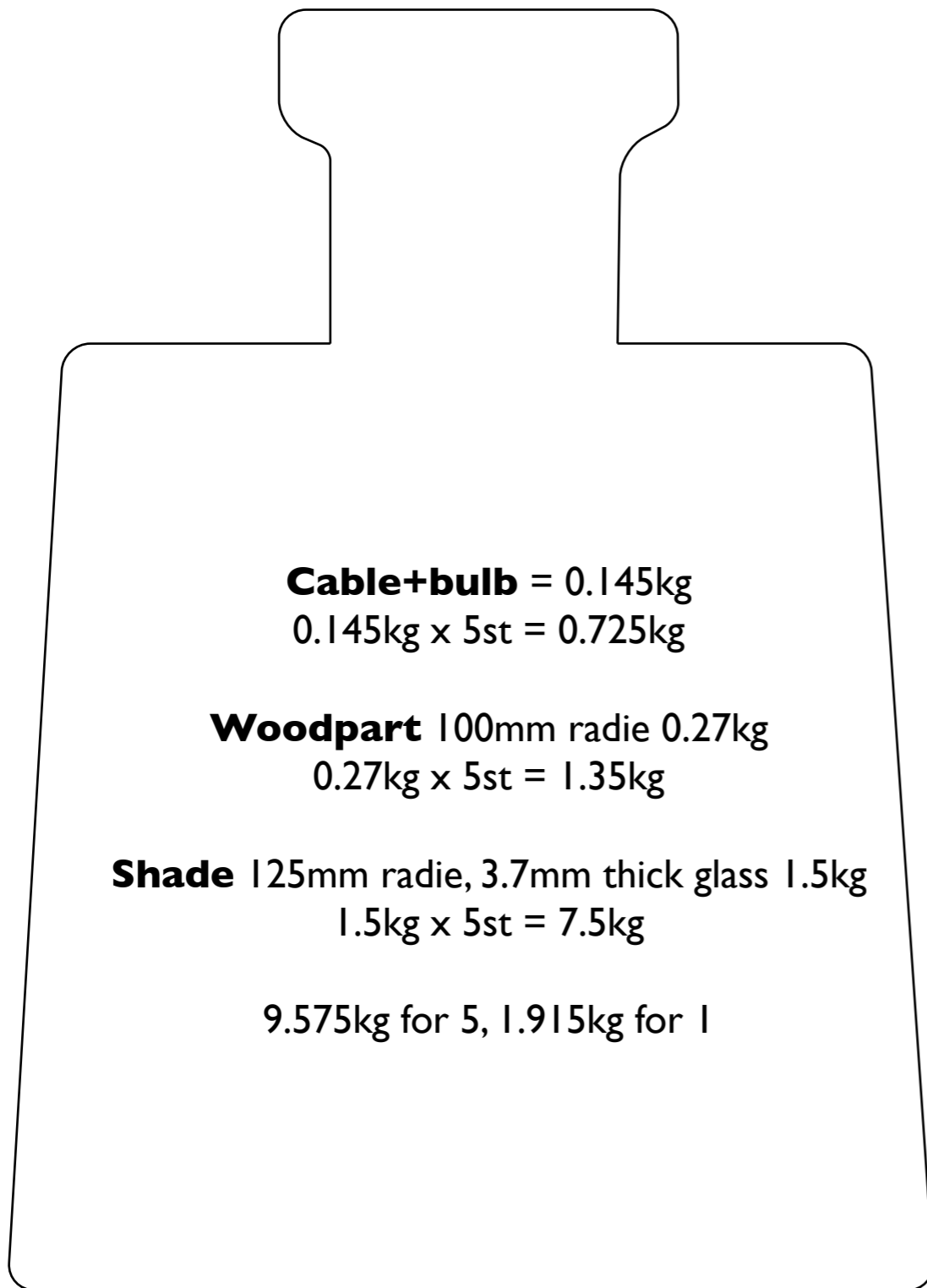
Materials



The material chosen for the lampshade was coloured glass, which effectively allows light to pass through while reducing the intensity of harsh and bluish light emitted by the light source. This creates a more soothing and relaxed atmosphere in a room. Glass lampshades also add an elegant and aesthetically pleasing touch to the luminaire. Furthermore, glass is a durable and long-lasting material that is easy to clean and maintain, making it a practical and useful material for lampshades. It's worth noting that the glass chosen for the lampshade is not transparent to ensure the desired lighting effect. Neutral colour options will be chosen to avoid the light becoming too tinted by the lampshade, although there will be several colour variations available to choose from.

After consideration of various design options, a decision was made to use a wooden plate for the luminaire. The choice of wood as a material was based on its durability and its ability to complement the glass lampshades. Specifically, ash wood was selected due to its colour matching with the intended colour scheme of the glass shades.

The ceiling part will be manufactured either in cast plastic or pressed metal, depending on the cost and environmental impact comparison and the expected lifespan of each option. The decision will ultimately be based on finding a balance between cost, environmental sustainability, and durability. Factors such as material sourcing, production processes, and end-of-life disposal will be carefully evaluated to ensure that the chosen option is both economical and environmentally responsible. Initially, the part will be available in white, and there may be other colours added later on.



Weight and Measurements

According to Swedish standards, a ceiling hook can hold up to 15 kg. Therefore, calculations were made to determine the weight limit of the different components to ensure that the maximum weight limit is not exceeded. This was an important safety consideration in the design process to ensure that the luminaire is safe to use and will not cause any damage to the ceiling or surrounding area.

Max dimensions were established for the lampshade and woodplate to provide a framework for the luminaire's design. To ensure that multiple lampshades could hang side by side, a strict maximum diameter was set. The height was limited by the need to accommodate a lamp and lamp holder. Additionally, the base plate needed to be large enough to support the luminaire when used as a table lamp and when mounted on a wall. These dimensions were crucial to maintain the functionality while also ensuring that it remained visually appealing.

Hight 170
 With 250 diameter
 Flat 200 diameter

The lampshade shape

The design of the luminaire should reflect simplicity and minimalism, without any unnecessary or superfluous features. The goal is to create a cohesive and complementary design that allows the luminaire work in different homes over time, whether it is used as a ceiling, wall, or table lamp.

To achieve this, the luminaire should have a streamlined design with clean lines and a minimalist aesthetic. The functionality is important and ease of use, but also ensuring that the design remains visually appealing. Additionally, the luminaire should have one flat surface so it is possible to mount it on the wall or put it on a table.

Existing luminaire models were analysed to determine the direction for the luminaire's design. This involved examining various models to identify design strengths and weaknesses and gain inspiration. By analysing existing fixtures, insights into the latest trends and preferences were gained, helping to develop a complementary and cohesive design that conveyed simplicity and minimalism without unnecessary features, while also offering a functional profile.

Four words that guided the design process was:

Working together
Simple
Round
Soft



Moodboard light

Warm
Inviting
Secure
Cozy
Ambient
Diffuse

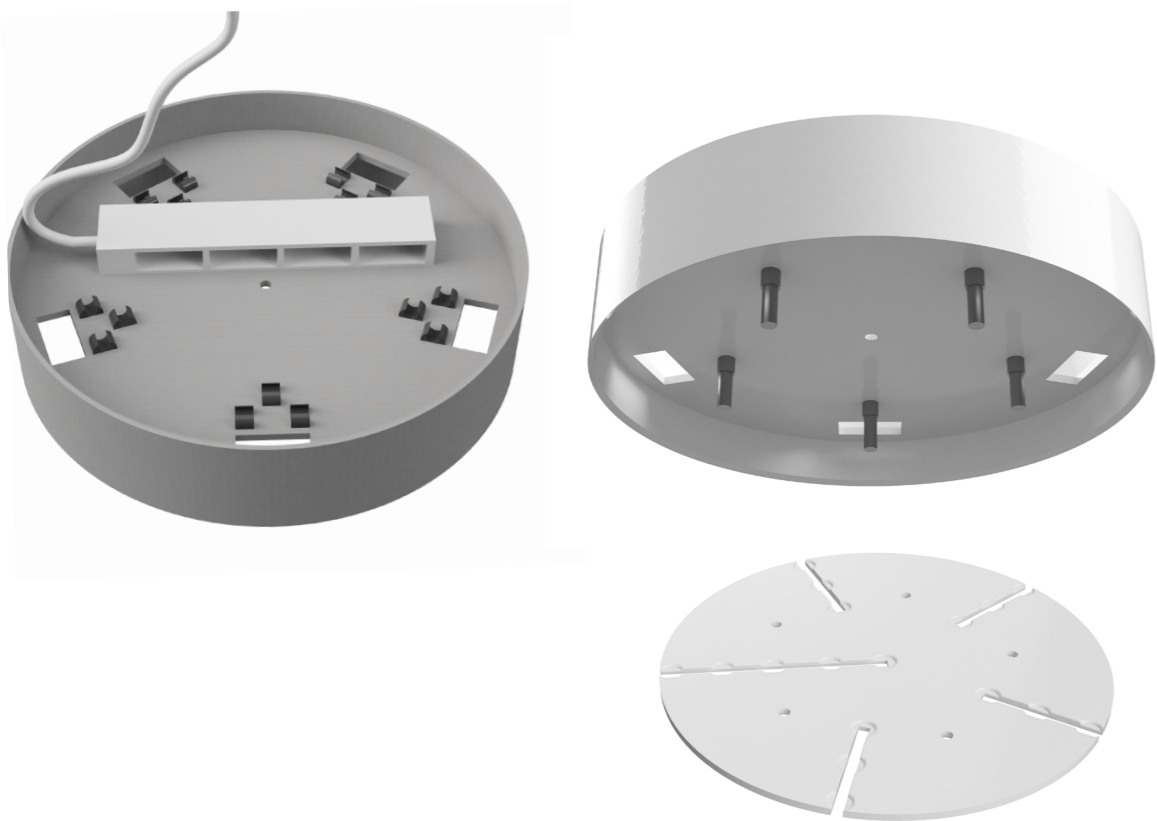




Ceiling part

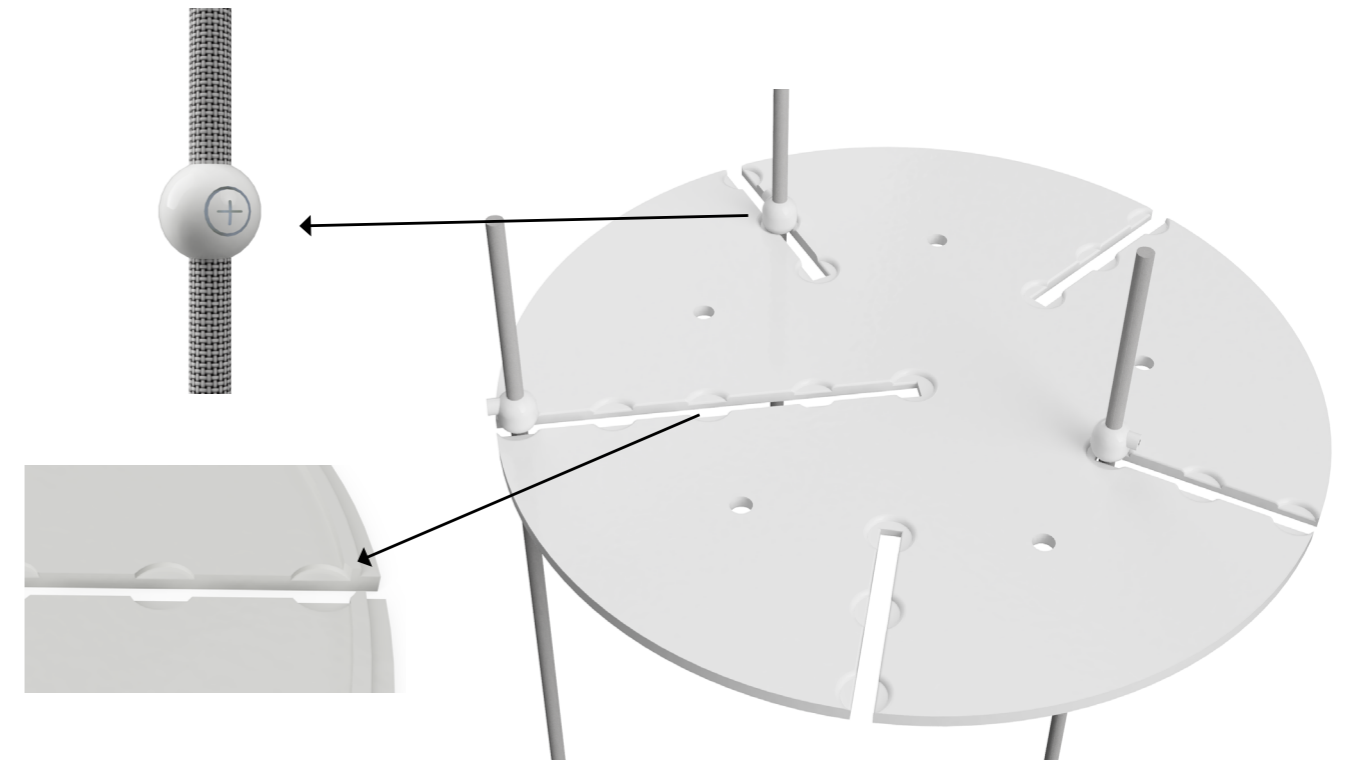
The ceiling part was designed to have a round shape in order to not draw attention and to maintain a simple and understated appearance.

The ceiling part, which measures 300mm in diameter and 65mm in height, was designed to be simple and unobtrusive. It has a standard ceiling socket. On the inside it has regular electrical connectors, which allow for using the same contact on the light cable as when it is used as a wall or table lamp.





The two ceiling parts are designed to fit together in only one specific way so everything will be at the right place



To keep the shades in the right position, there are recesses in the plate where the cable grips fit and are held in place. These cable grips also act as locks and allow for height adjustment.

Mounting

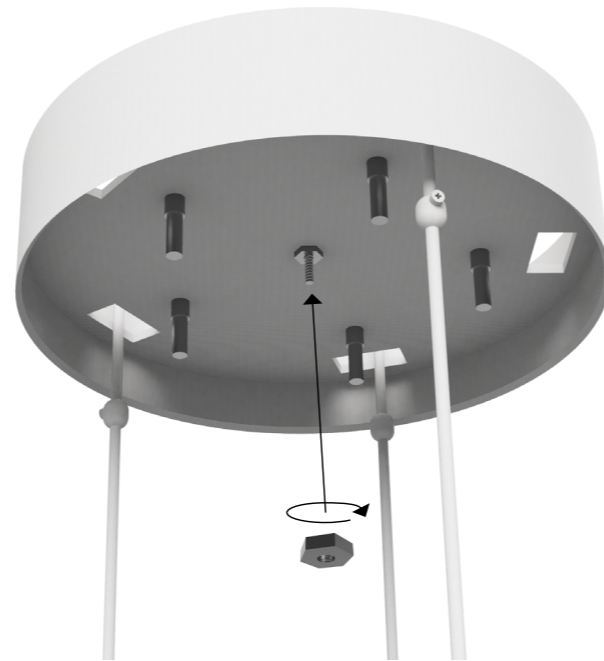
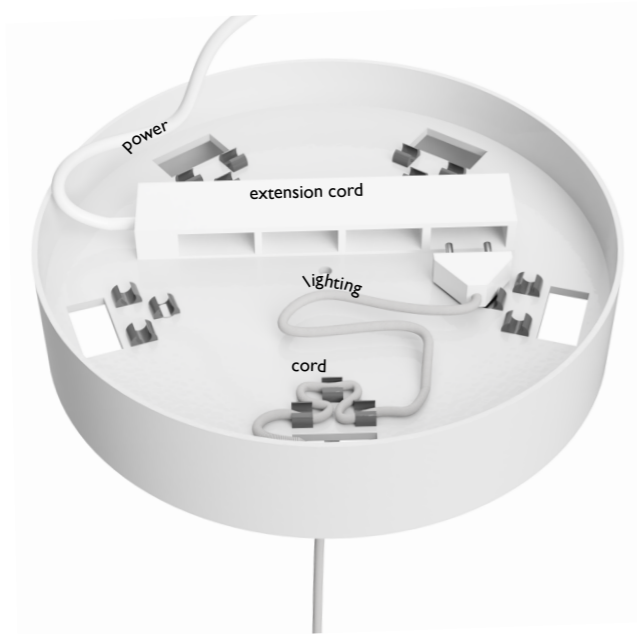
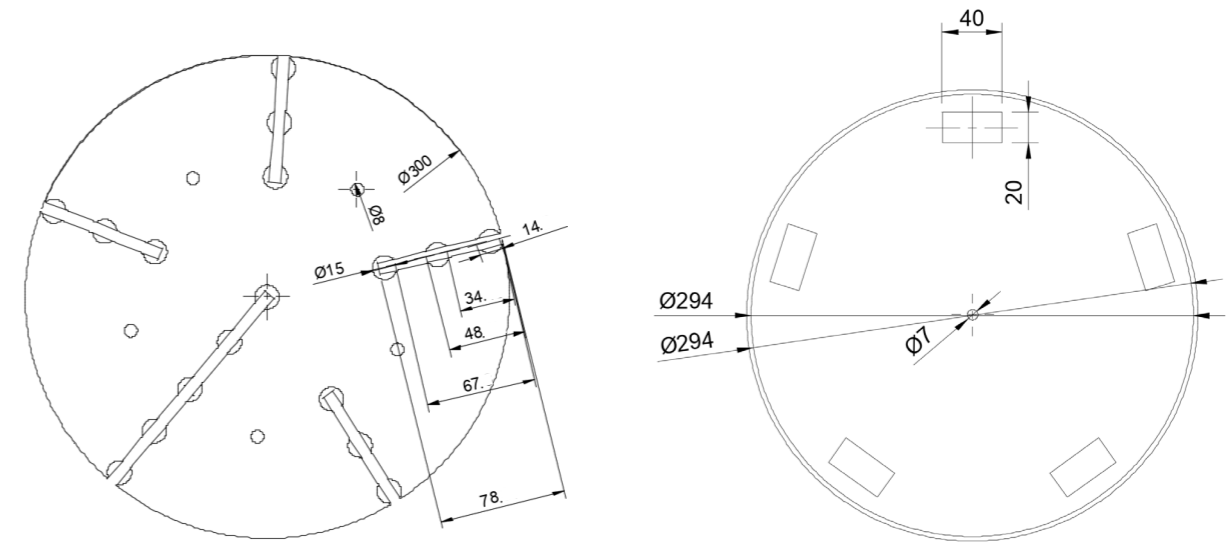
Step 1: Mount the hook on the ceiling hook.

Step 2: Thread the lighting cord (with the wooden part and not the glass shade assessable) though one of the holes and then connect the plug to the extension cord.

Step 3: Connect the plug from the extension cord to the ceiling socket.

Step 4: Thread the hook trough the hole in the middle and then fasten the bolt.

Step 5: Decide on the height and placement on the shades, then snap the cover into place and fasten the screws.



Sketches shade

To initiate the process of selecting the appropriate design, a series of sketches were created to gain a better understanding of the possible options. This helped to quickly identify the potential design directions that could be pursued. A selection of these sketches is presented below to illustrate the initial exploration of design options.





Sketch models

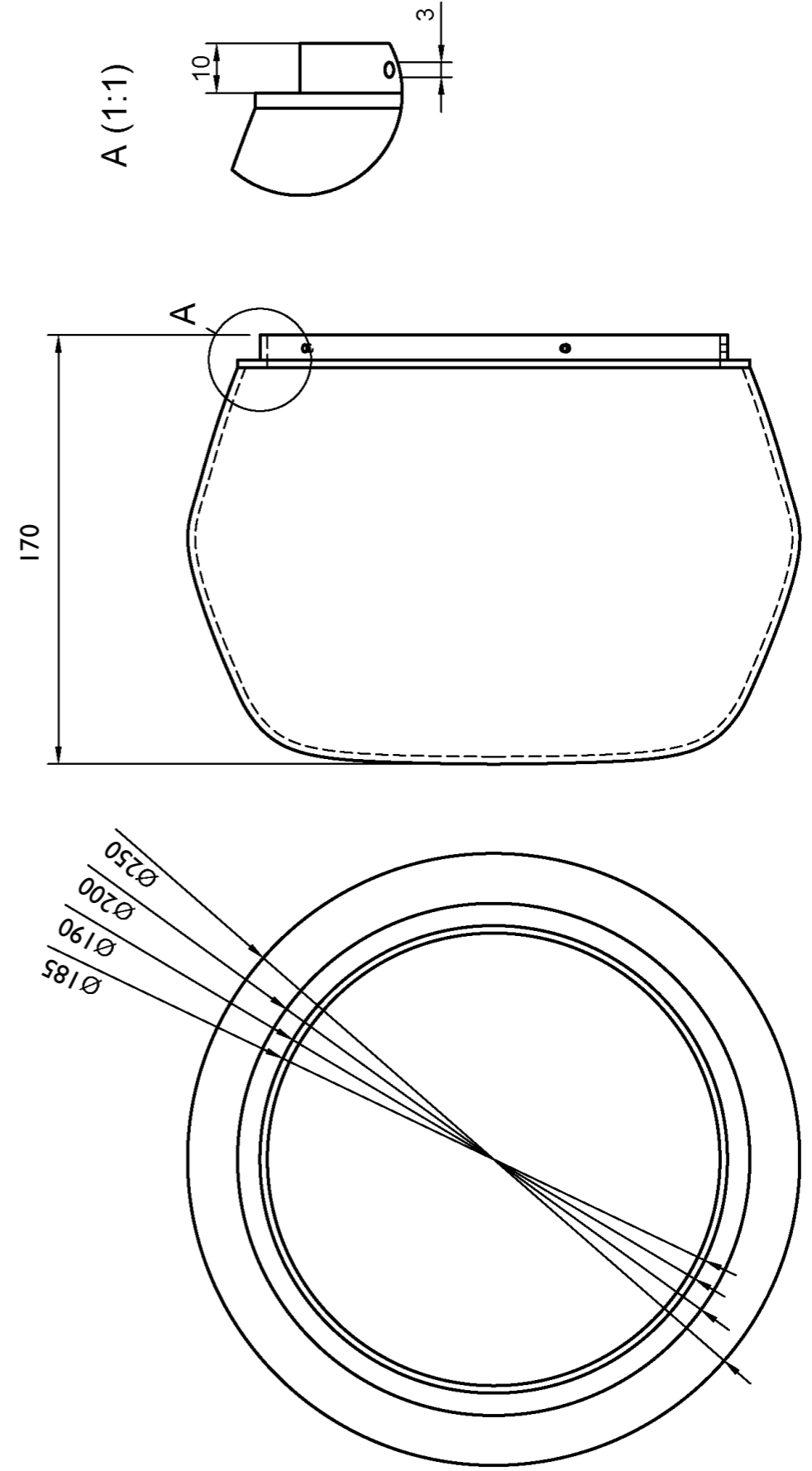
After the initial sketches were completed, the next step was to create 3D renderings of the luminaire designs. These renderings were created with accurate measurements to ensure that the final product would be functional and meet industry standards. The focus during this stage was to produce a wide variety of renderings, with a range of shapes and forms, in order to evaluate and receive feedback on the designs.

Sketch models

From the first sketches, three design categories were chosen to move forward with: a sharper-edged, a rounder, and a more bubble-like. It was important that the forms would complement each other well, and that the final design would look visually appealing when hung, mounted on a wall, or placed on a table.



Final design

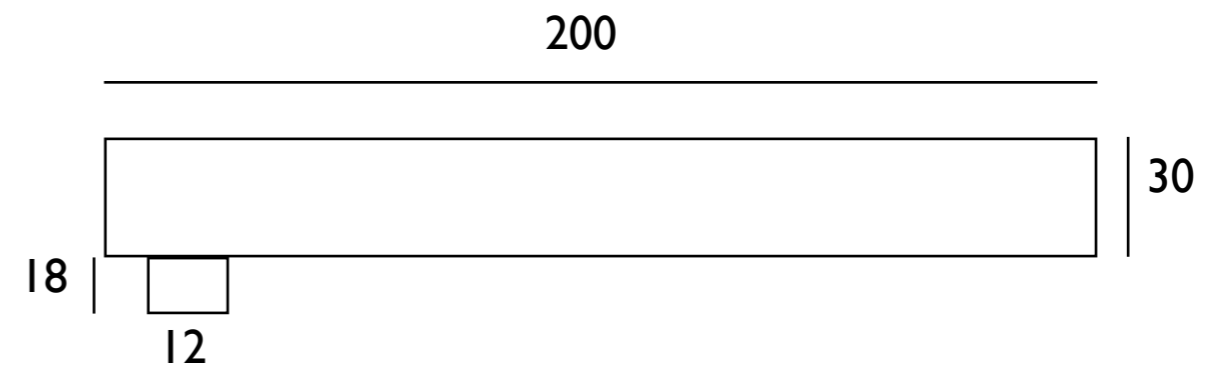


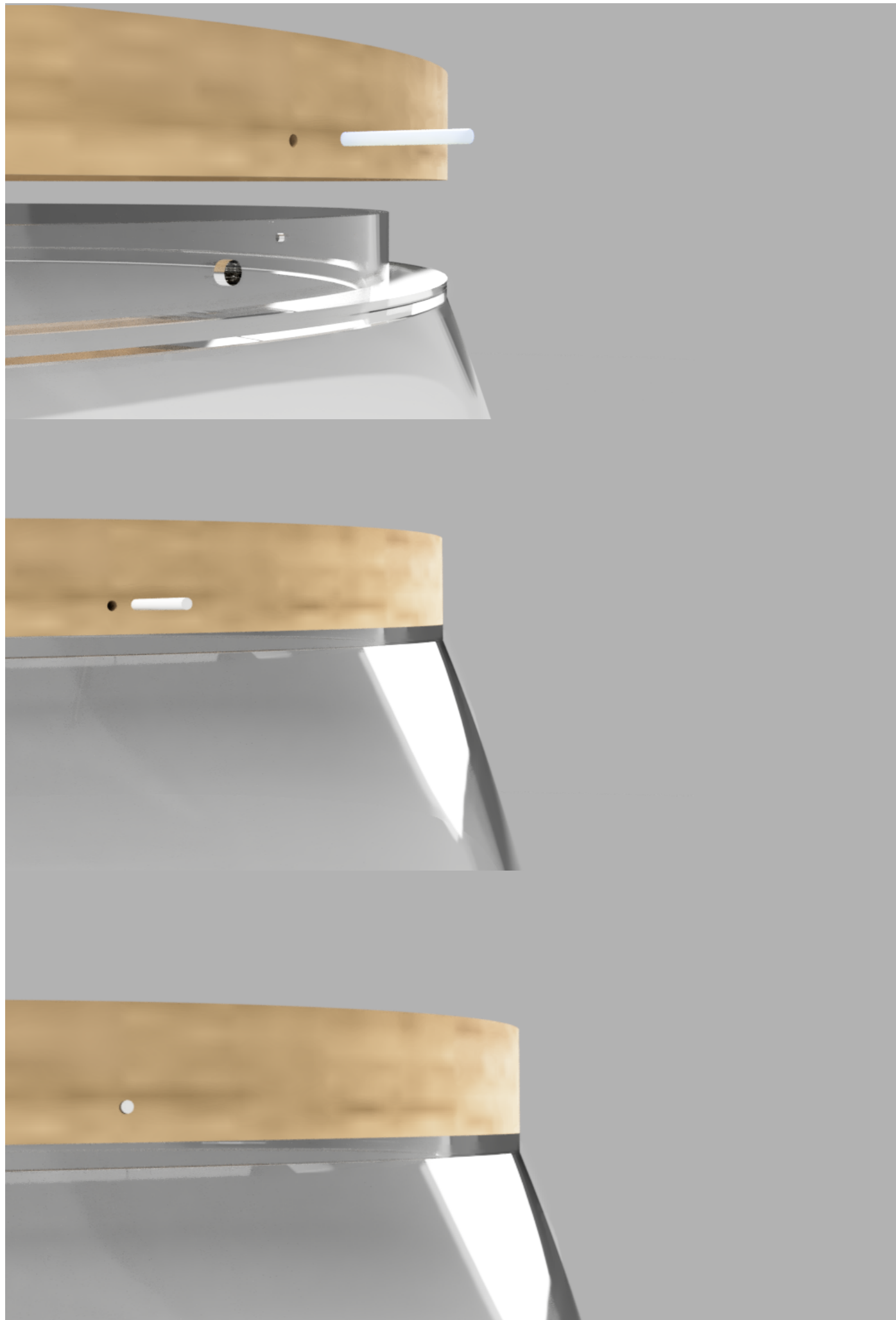


Wood plate

The wooden plate has a diameter of 200mm and is designed to function as both a wall-mounted and table-mounted base for the luminaire. This presented several challenges with regards to its design and functionality. Specifically, the luminaire needed to be suspended in a way that allowed for easy installation and removal of the lampshades, while also ensuring that the plate did not press against the wall or table, thereby allowing space for the cord.

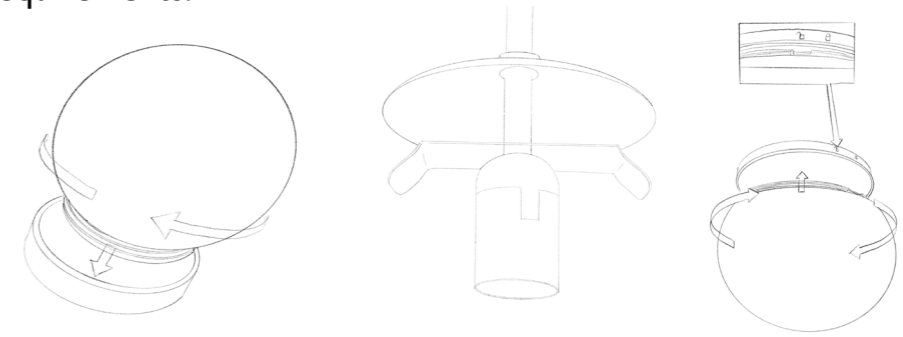
To address these requirements, a design with five feet was chosen to reflect the five lampshades, with holes drilled straight through the plate to enable wall mounting.





Attach the plate

Different methods were considered for attaching the lampshade to the base plate and the lamp holder. Some already known methods were considered, but none of them fulfilled the requirements.



The biggest problem was that the shade would be very fragile and that the assembly and disassembly needed to be easy. Instead a new way was developed.

In the new method, both the wood plate and the lampshade are equipped with five small holes, each with a diameter of 4.1 mm. During the assembly process, these holes are aligned to allow a small acrylic rod to be inserted. The rod, measuring 50mm in length and 4mm in diameter, has undergone testing, confirming its capability to support the weight of the shade. These rods effectively secure the shade in position, preventing any rotation or risk of falling.

To disassemble the shade, you press on the rods, so they fall into the shade. In cases where the assembly is affixed to a wall or ceiling, maintain a firm grip on the shade.



Attaching to the wall

After examining various methods for attaching the plate to the wall, such as different types of locking mechanisms and using different extra parts, a simple approach was selected.

The plate is removed from the lampshade and screwed onto the wall with pre-drilled holes going through both the plate and the feet, after which the shade is reattached.

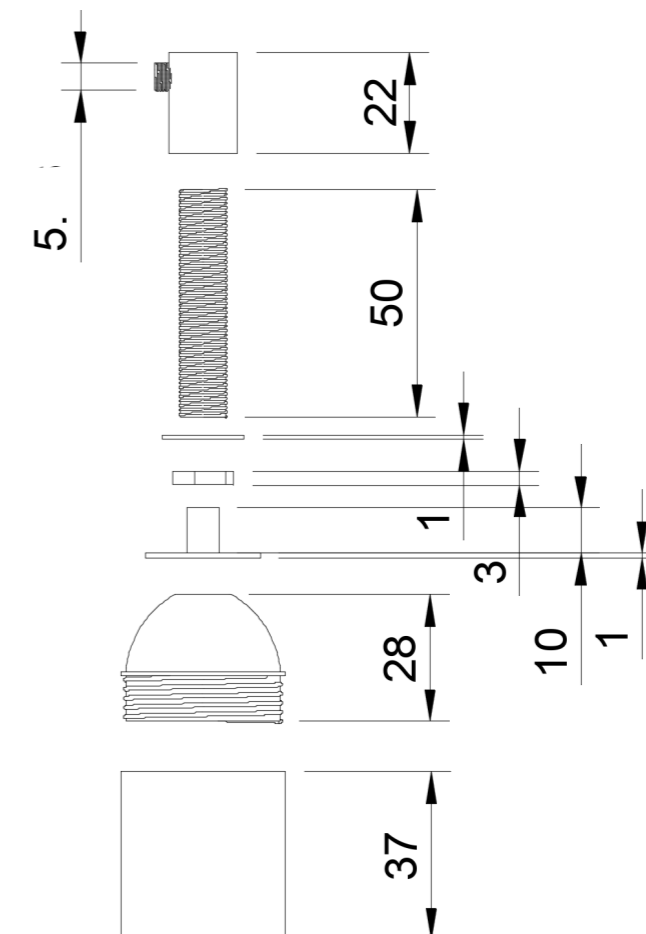
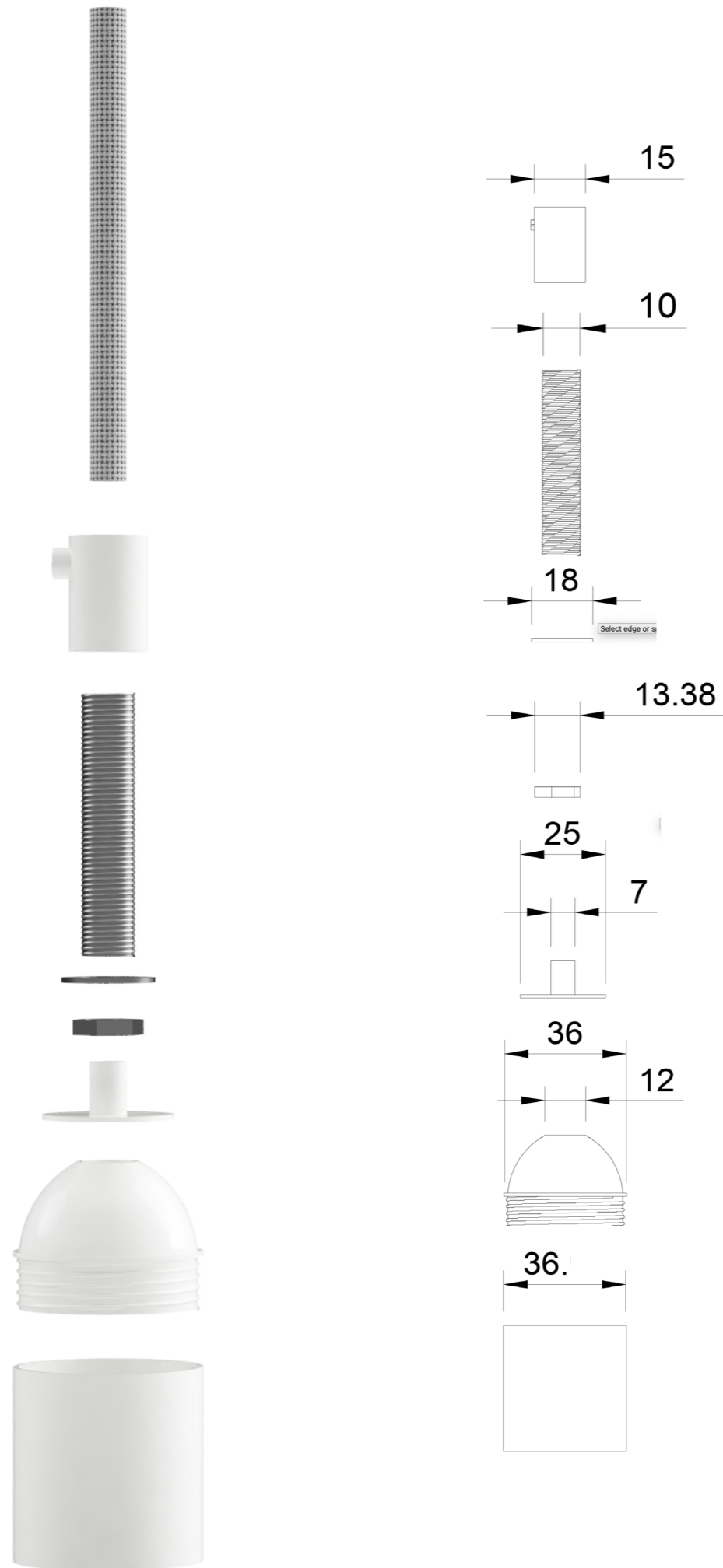
The emphasis was placed on finding a straightforward and easily comprehensible solution, as the lamp has multiple functions and it is crucial for users to understand the installation process.

Lamp holder

The lamp holder is designed to accommodate E27 light bulbs, which are widely available and commonly used. In addition, 12V LED light bulbs are also compatible with the lamp holder and offer energy savings compared to other LED bulbs.

Furthermore, the lamp holder has been engineered to meet industry standards for safety and durability, with all components made of double-insulated plastic. It complies with necessary electrical safety standards and regulations, ensuring a reliable and trustworthy choice for any lighting installation.

The versatility of the lamp holder in accommodating various types of bulbs is a significant benefit. Users can select from a broad range of light bulbs with different wattages and colours, including warm white, cool white, and coloured options. This flexibility in lighting choice allows users to customize their lighting experience to meet their preferences and needs.



Parts







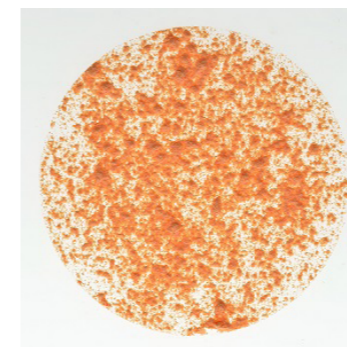
Colouring glass

During the prototype process, different methods of colouring glass were used, including the use of rods, powder, and using both rods and powders at the same time.

Rods is a method of colouring glass that involves melting small pieces of coloured glass onto the surface of a base glass. This creates a smooth and even coloration.

Powder colouring involves applying a mixture of a binder and coloured glass powder onto the surface of the base glass. This method can produce vibrant and intricate patterns, but it can also be more difficult to control and may result in a less uniform finish. The timing of the powder application also affects the final result.

During the prototype manufacturing process, the use of various glass colouring methods enables experimentation with the final product. The choice of method depends on the desired outcome and the level of control required over the finished product.



Powder

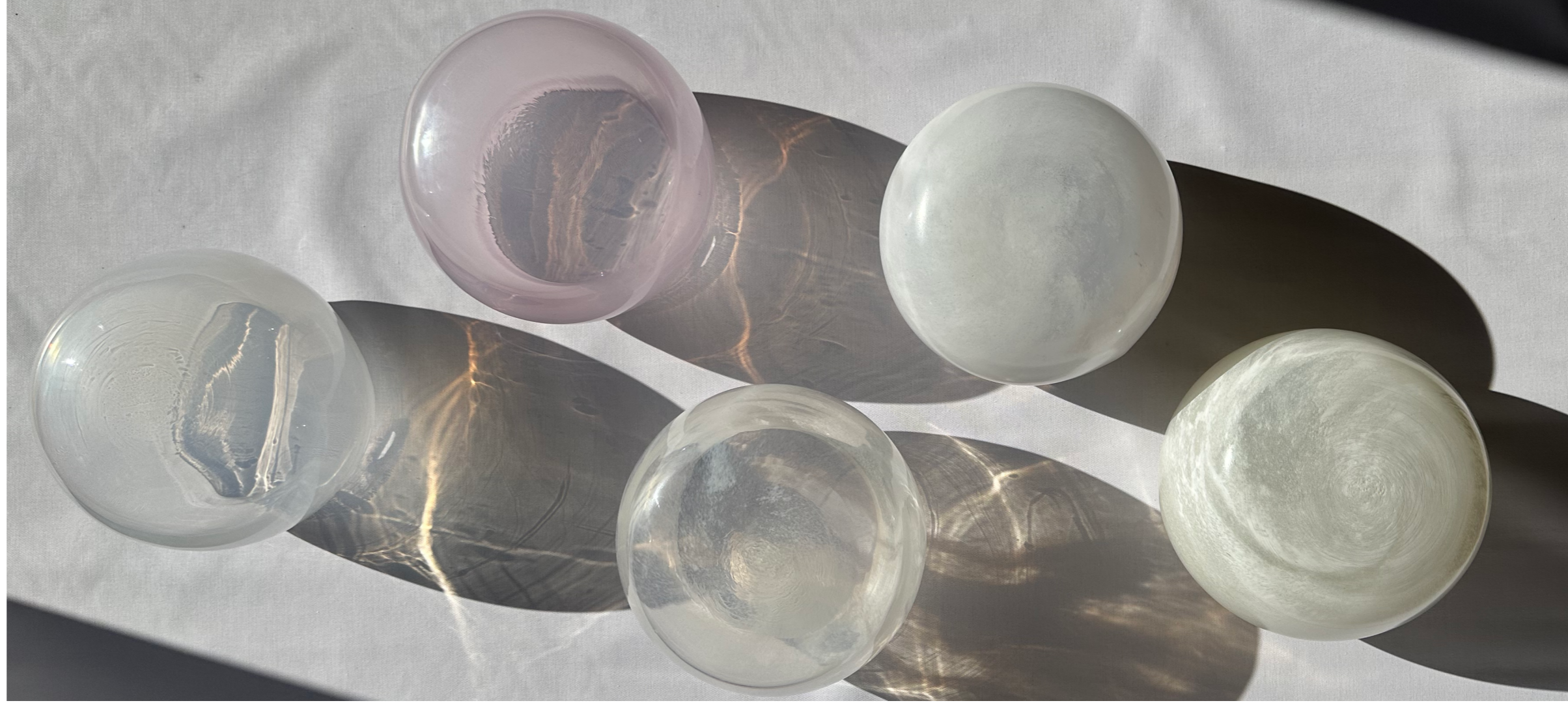


Rods

During the prototyping phase, five different prototypes were created, each with its unique design due to the hand-blown process and testing of various colouring methods. Because of this, the prototypes differed significantly from the CAD model, which was created with a more uniform production process in mind.

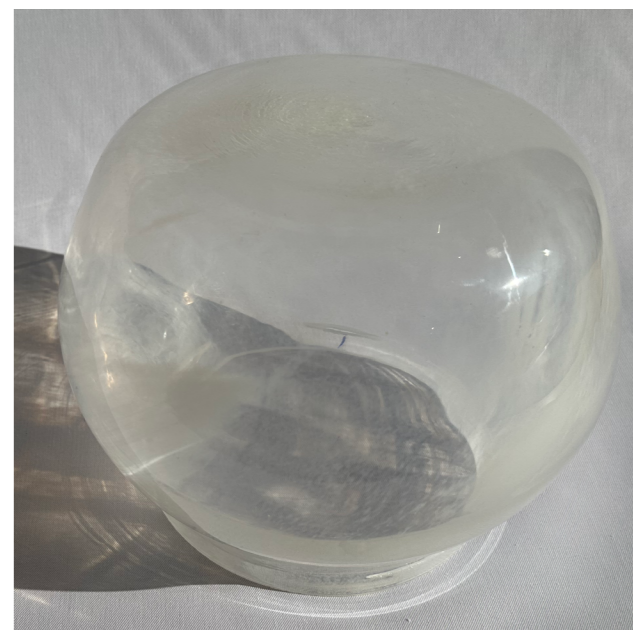
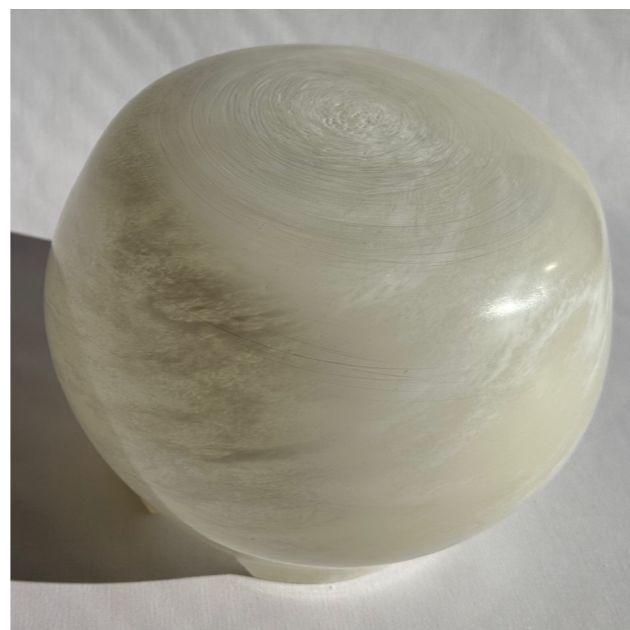
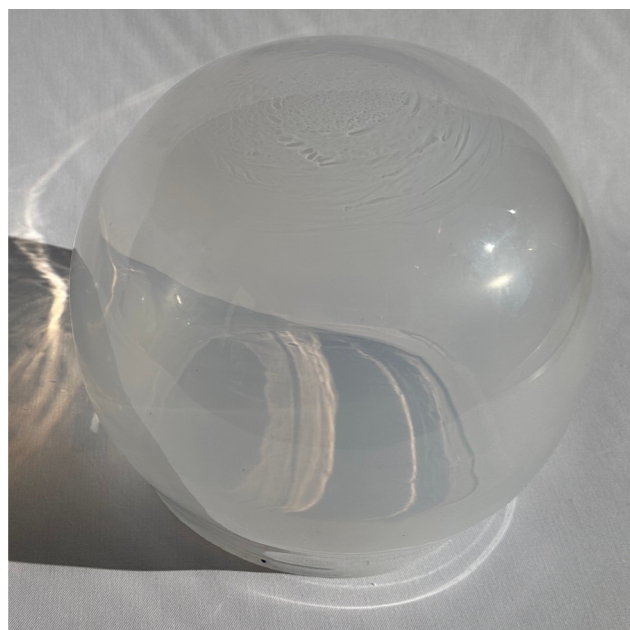
The hand-blowing process allowed for more creativity and experimentation in the prototyping phase. Additionally, the testing of different colouring methods also played a role in the variability of the prototypes.

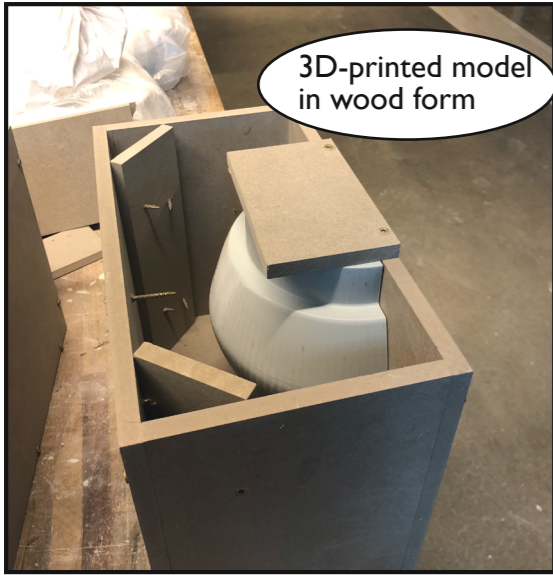
Had the decision been made to move forward with production the final product would have been more uniform in appearance and look more like the CAD.



Five prototypes



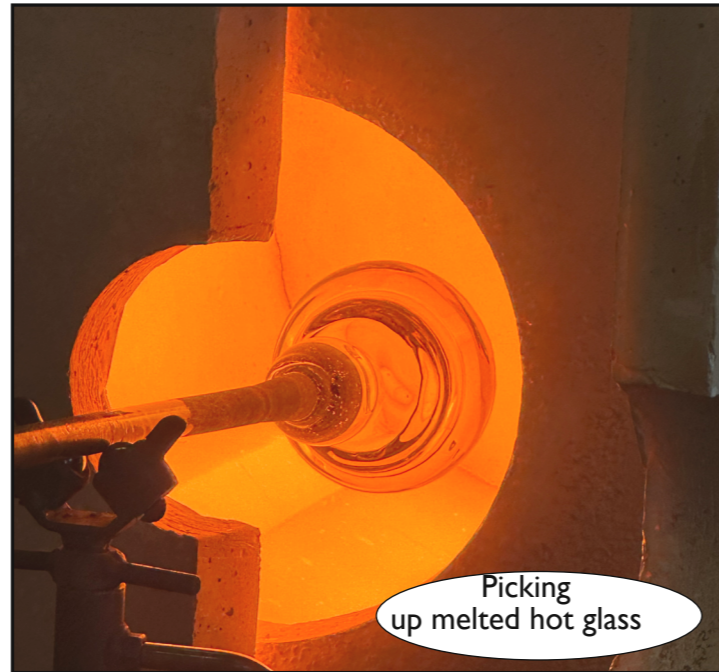




3D-printed model in wood form



Plaster, quartz sand, fibreglass



Picking up melted hot glass



Blowing into the form



Forming hot glass



After forming



Cutting



Making holes



The wood was milled to match the shape of the glass, and then the feet were glued on. Additionally, holes were drilled.





The lamp holder was assembled together with the wooden part, and the electrical wiring was connected.

And finally...



CONT











THANK YOU

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