



# Will

An approach to the revival of a  
dying Chinese street food culture

Degree project

Master of Industrial Design

Tong Liu

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# Abstract

Culture is in danger. Globalization provides an extraordinary opportunity for people from different countries and areas communicate with each other, which leads to culture intersection. Different kinds of culture are dying with the impact, remaining pity. Within those culture fading away, one of Chinese street food culture called 'sugar painting' or 'sugar man' attracts me the most. It was popular even in my childhood but is vanishing now.

Sugar painting now is dying as a result of lack of successors and impact of newly emerging food and foreign food spreading. It will take a long time for green hands to master it, which makes the situation even worse.

Will is a tool that can provides green hands an easy approach to sugar painting. It works like a larger pen with melted sugar inside. User can press it without efforts to suck melted sugar in and draw with it by pressing the sugar out of the tool. Will creates an experience totally different from traditional way. Will is not a tool to replace the normal tools but to provide a change for green hands to feel the charm of sugar painting by offering an easy gained satisfaction and sense of achievement

Key words: Street food culture inheritance, sugar painting, craftsmanship.

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# LIVING IN A DIGITAL WORLD?

Human beings try to overcome all the difficulties and communicate with others. From the silk road (202 B.C.) to Columbus discovering the America, from Magellan circumnavigating the globe to the invention of plane by Wright Brothers, we accomplished such a fantastic history of discovering and communicating.

Communication helps people with different culture background understand each other, bringing the chance for culture intergration meanwhile.

After mass use of the 4th generation mobile phone mobile communication technology standards( 4G in short), long-distance communication makes it possible for people to know what is going on worldwide without efforts, which leads to faster culture blending than ever.





Instagram, Facebook, Youtube and Tik Tok, as represents of social media application, maintain millions, even billions of users. Take Facebook for example, more than 2.45 billion people have registered and keep using it in their daily life. These applications create a huge platform of culture communication.

This results in a great chance, together with problems. Native culture is challenged by the outer culture, offering huge pressure, which leads to disappearance of native culture, especially those niche ones.

# THE CONFUSION OF FOOD ORIGIN



The same situation also occurs in the food culture area.

French fries and hamburger are common food in Europe, and many European know where they come from. In fact, the argument about the origin of French fries still happens between French and Belgian. Hamburger, no matter it starts from Germany or Danmark, it is no doubt that hamburger is a traditional food in Europe.



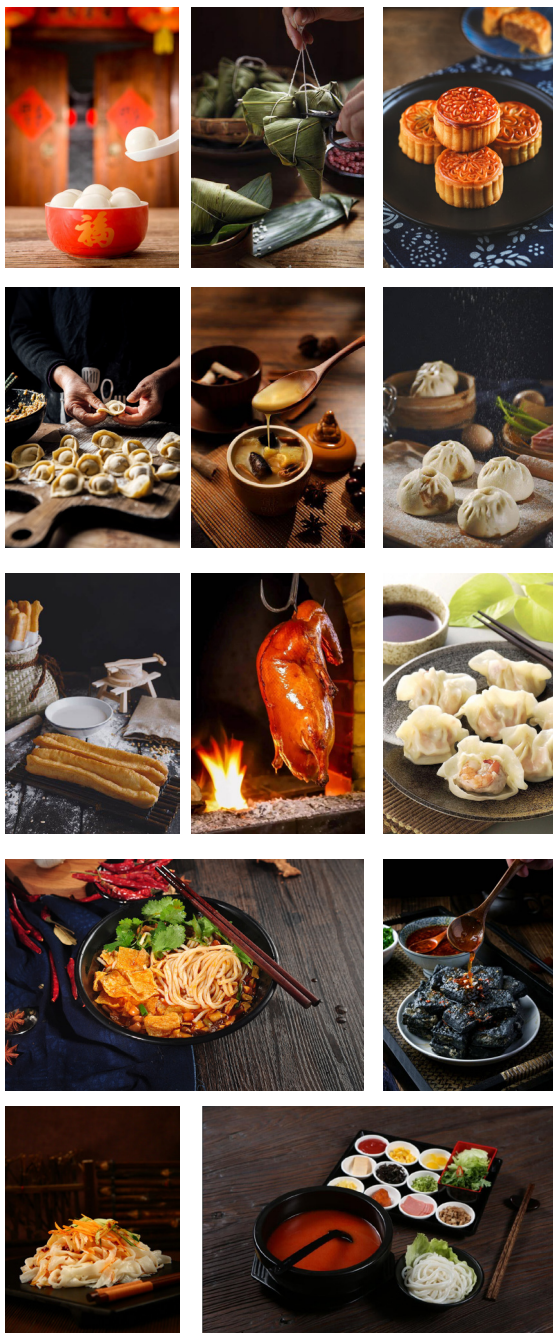
But in China, French fries and hamburger are tagged with KFC and Mcdonald. They are brought by American fastfood restaurants. Especially KFC, which is the most famous and popular fastfood restaurant in China, has nearly 8,000 stores in China after it first arrived China in 1980s.

Also, Japanese Ramen is well known in Europe, but people here will barely know that Ramen started from China and is still hot right now. Ramen restaurant can be easily found in northern part of China, selling ramen that is much different from Japanese ramen. Even tea culture has developed into a unique and special culture in Europe after hundreds of years.



However, even the form of those food are changed, they are still lucky enough to be spread around, accepted and loved by native people with different culture background. This is the result of culture combination.

# THE COLORFUL CHINESE FOOD CULTURE



It is always good to spread culture to different countries, but at the same time we also should know that with the influence of culture intergration, some countries are losing their own culture because of the invasion of other culture. Especially in China, Christmas becomes more popular than Dragon Boat Festival and younger generation consider steak and pasta higher-level-food compared with dumplings.

But foods such as yuanxiao, zongzi, Mooncake, wonton and dumplings are still lucky enough to be inherited by Chinese in a proper way, they are connected with traditional festivals, and some of them are easy to make for Chinese.

Moreover, China is a large country with 56 different nationalities, which makes Chinese food culture complex, with so many treasures.

According to incomplete statistics, there are around 7000 different street food in China, sold in different areas. Street food is popular in China, Stinky tofu, steamed bun, rice noodle and so on.



Among them, there are some street foods are not lucky enough, fading away with time flies. Glutinous rice cake, ziba and roast sweet potato, are vanishing in different extends.

Within these out of style street food, there is one specific that makes feel pity. It is a candy called 'sugar man' or 'sugar painting'.

This project is to find a way to help it survive.

# Research 1.0

About the background

## About the history

Chinese food history is a long story with cooker evolution.

In ancient times, when mankind first appeared in the world, raw meat and fruits are the main dishes.

When it comes to Neolithic until the end of Yin Dynasty ( About 1046 BC), human produced foodstuffs themselves, not only relying on nature. They had the embryonic form of agriculture and animal husbandry. Humanbeings firstly had ownership. During this time, Chinese started to have simple cooked meat, millents and beans. Alcohol was born together containers and tools made from stone and bronze. Bronze containers began to act as Ceremonial vessels.



### Jue

The word appeared many times in oracle bone inscriptions, which was the utensil that people used to hold wine at that time.



### Eight Treasures

Chunao (meat and soy sauce over rice), Chun Mu (meat and soy sauce over yellow rice), Pao Fu (simmered, roasted, fried and stewed suckling pig), Paozhuo (simmered, grilled, fried and stewed lamb), Daozhen (roasted beef, lamb, deer loin), Zuozhen (beef and mutton with wine and sugar), Boozhen (similar to spiced beef jerky) and Ganshi (grilled dog liver with net oil).

Food became a tool to help rule the country.

During Zhou Dynasty (from 1046 BC to 256 BC), people had fully learned how to choose healthy livestock and poultry without disease, special odor, and identify the parts of livestock and poultry before slaughtering them. With the help of newly invented cooker and tools such as stone mill and Fu ancient Chinese finally began to take well prepared grains and better cooked meat as main dishes.

With fixed food resources and cooking methods, "Eight Treasures" appeared. It is not about dishes, but about the cooking methods of eight precious foods.

When eating, all kinds of dishes had fixed positions and utensils for different class people, and eating is also carried out according to certain procedures. That means that a strict and unified cooking style, eating order and social class system formed.

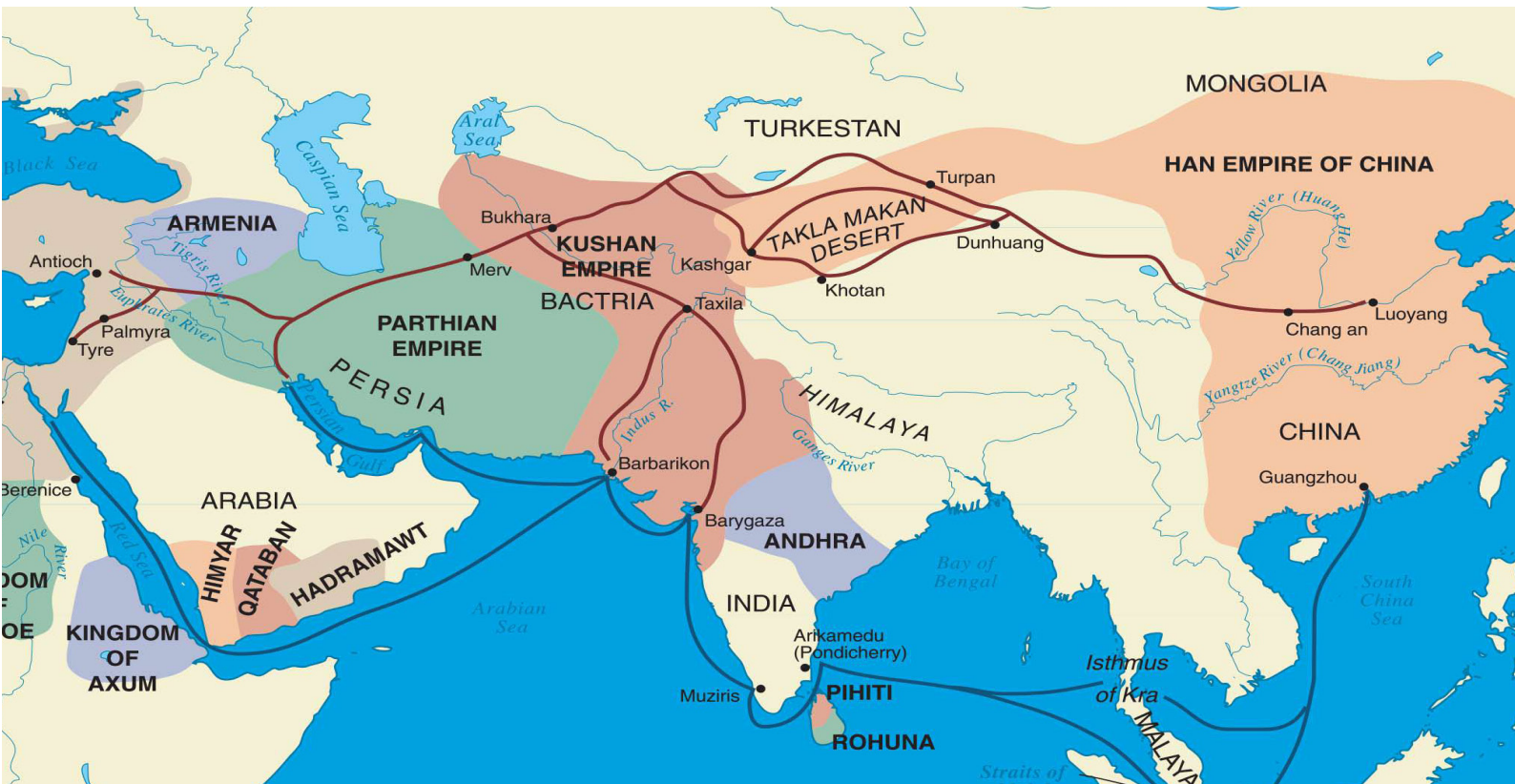
## Chinese expected changes.

After Zhou Dynasty, Four Major Chinese Cuisines appeared, which contains Shandong cuisine (including the flavor dishes from northern regions such as Beijing and Tianjin), Suzhou cuisine (including flavor dishes from Jiangsu, Zhejiang, and Anhui regions), and Cantonese cuisine (including Fujian, Taiwan, Chao, and Qiong regions), Sichuan cuisine (including flavor dishes in Hunan, Hubei, Guizhou and Yunnan).

The birth of Four Major Chinese Cuisines suggests that people lived in different areas began to concentrate on their own taste to make the life better because of getting rid of eating same things all the time.







Alfalfa, Spinach, Brassica, Courgette, Peas, Garlic, Coriander, grapes, almonds, watermelon, pomegranate, pepper, sugar and so on were transported.

## New blood finally arrived.

Thanks to the development of the Silk Road in Han Dynasty (From 202 BC to AD 220), Different food was transported to the palace and combined. Chinese had the chance to enjoy food from other area of Eurasia.

After the Han Dynasty, iron ware gradually replaced copper ware, animal oil became less popular, vegetable oil was used in cooking, and cooking methods such as stewing, boiling, frying, frying, sauce, pickling, and roasting took shape one after another.

The Chinese who are tired of eating the old things before, can finally eat some tricks. Snacks and desserts began to appear.

That also means Chinese began to ask for freedom in the first stage, to make food that fits them better, out of the rules of the feudal system.




## The birth of sugar painting

Sugar painting originated from the Ming Dynasty's "Sugar Cheng Xiang". In the Qing Dynasty novelist Chu Ren's "Supplementary Collection of Jianhuan", it is recorded that every new god of the Ming Dynasty, "melting sugar", printed and cast into various animals and characters as rituals, cast characters

"robe wat Xuan Ang", like a military general of the wenchen, so it was jokingly called "sugar cheng xiang".

That is to say, sugar painting has a history for more than 500 years, which is a fantastic treasure of Chinese food culture.



## The Beauty of sugar painting

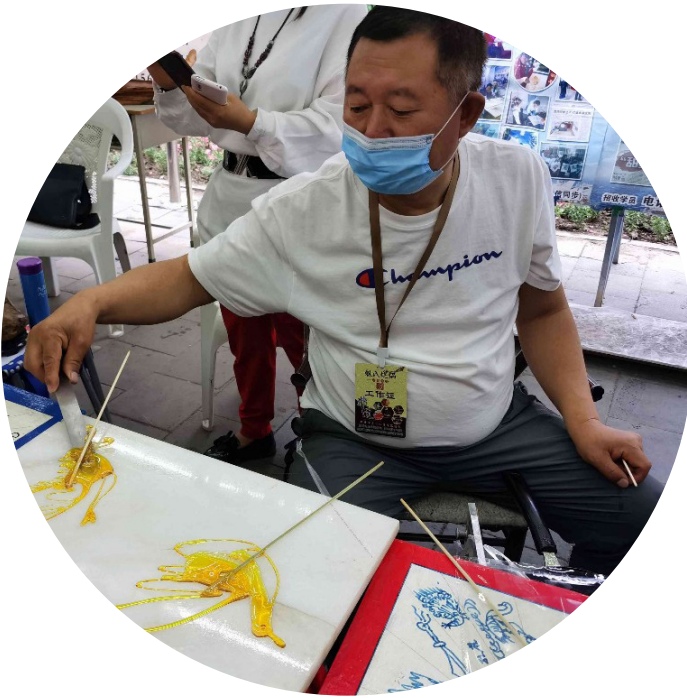
Sugar painting is a Chinese traditional street food, or snack. Normally, sugar painting maker will prepare sugar in the evening before, melt sugar with a copper pot, and take melted sugar out with a spoon and draw with it on a metal sheet. Sugar painting makers have a roulette with different pictures on it, such as Chinese dragon, rabbit, phoenix, horse and so on.

Sugar painters will use their own skill to draw different pictures, and fix it on a bamboo stick before sugar totally cool down. Customers can choose to keep it or to eat it afterwards.

From time to time, sugar painting acts not only a snack, but also a bend between generation and generation. Parents tell stories and mesteries about Chinese ancient times, Kids learn Chinese traditional symbol from it, and enjoy their childhood. Sugar painter, as a guard, spreader and successor, is always on the side, watching younger generation group up day by day.

## About the reason of dying

### Filtered transcription of interviews with craftsmen



#### Interview 1

Name: Qinglin Li

Age: 53 years old

Occupation: Sugar painting maker

Dwelling: Dandong, Liaoning

I have been doing this for more than 30 years.

At the beginning, it was my father who pushed me to learn it, to inherit the business that he was doing through his life.

I can make a living with this craft, but the income is irregular. When it comes to the season of tourism, I usually earn a lot. My customers are mostly the tourists hanging around and some kids living nearby as well. Sometimes I can even earn more than 3,000 yuan in a single day.

I do not know what the younger generation is considering, but I would not choose to earn my bread with sugar painting if I were them. There are many jobs that look more respectable providing a better income. To do sugar painting is too tired for you, you need to stay at the store all day and need to prepare the stuff for tomorrow after you are back home. I guess you are not willing to do it, are you?

It took me one year and a half to learn how to do it properly. My father said that I am talented in sugar painting and it resulted in master it so fast.



## Interview 2

Name: Tianjun Wang

Age: 36 years old

Occupation: Sugar painting maker

Dwelling: Chengdu, Sichuan

When I was a child, I started to feel it amazing. At that time, I always imagined to make my living with it, so that I can eat candy everyday. Now my dream come s true.

I don't care if I can make a fountune with suger painting. It values nothing to me. I do it only because of I like it and I want to inherit the craft from former generation.

You know when I am painting with suger, some customers will stop and watch me doing it, which offers me huge satisfaction. I enjoy painting in the public.

I will never push my son to inherit my business. I will leave some tricks that I summarized in case he needs it after he wants to do it.

When I learned it, I felt the most difficult part is to control the melted suger in a stable flow. Practicing the line control takes so much time and is too boring to insist. I think that is also why fewer people would like to make a living with suger painting.

Now my dream is to make this craft known by more people, especially among the kids. I hope suger painting can keep developing and being inherited.

## Successful cases

### Herbal tea

Herbal tea is a famous kind of drink in southern China, which is not only a drink but also do good to health. However, it was dying with the shock of bubble tea, Coca Cola and other new drinks entering the market. The herbal tea store is fewer than before in southern China.

However, Jiaduobao and Wanglaoji entered the market several years before. Jiaduobao and Wanglaoji do have changed their recipes, putting efforts on commercila propaganda still makes herbal tea known around China, making it popular again.



### Liziqi

She is a famous Youtube uploader, who focuses on making videos about Chinese traditional Culture. She introduces Chinese Culture with her own craft work and cooking ways, which are learned from the Chinese traditon.

More than 16,900,000 Youtubers follow her and one of her videos, "A special program on New Year snacks " has even been viewed more than 110 million times.

With her efforts, people all over the world have an approach to Chinese culture and tradition, which leads to a better understanding of China.



## Summary

Food is changing together with cookers.

Culture changes slower than tools.

Suger painting has a long history of more than 500 years.

Sugar painting is one of China's intangible cultural heritage.

Suger painting is facing a problem of lacking of successors.

The income is not a big issue pushing successors back.

To learn suger painting making takes a lot of time.

It is hard to begin with suger painting.

Suger painting is rarely known by the younger generation now.

The tools are not friendly to green hands

The tools and the experience created are beautiful







## Design brief 1.0

# Design Opportunity

## Wants

Inherit suger painting  
Spread the culture  
Show off  
Better experience

## Needs

Income  
Successors

## Fear

Hard to learn  
Time consuming  
Unable to master  
Lack of income



## Challenges

Introduce a new experiece  
Engage people in suger painting

## How might we

Figure out a way to make the learning process shorter?  
Decrease the difficulty level for green hands to learn it?  
Introduce it to more people through the social media?  
Try to increase its value in a visable way?

## Design brief 1.0

To design device to make the sugar painting interesting and easier for younger generation and others to approach.

## Target group



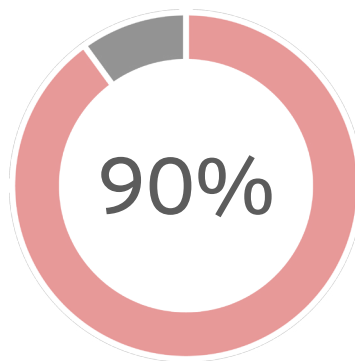
### Generation Z

Generation Z, refers to the generation that was born between 1997-2012, following millennials. This generation has been raised on the internet and social media, with some of the oldest finishing college by 2020 and entering the workforce.

The main target group will be generation Z, especially in China. generation Z is highly receptive to new things. They constantly explore and try new products and follow the fun brought by unknown and mystery.

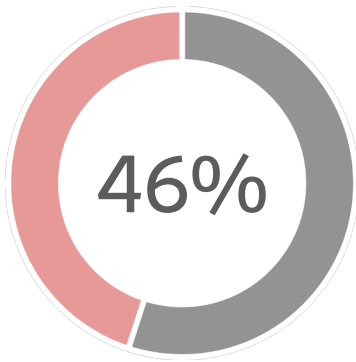


Generation Z, who were born between 1995 and 2009, number about 260 million, accounting for about 19 percent of China's total population, with those born after 1995 accounting for about 38 percent. As a new generation of rising crowd, they have become the consumer potential group that most brands focus on.



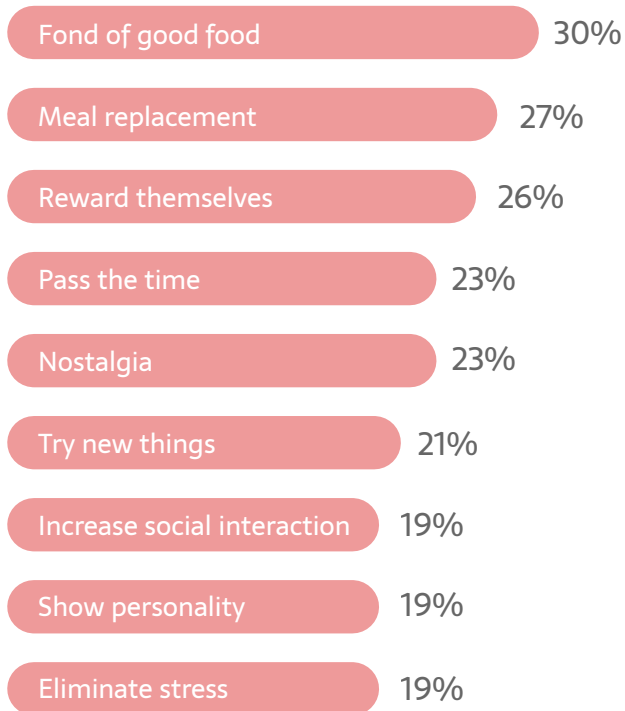
According to Nielsen IQ, more than 90 percent of Gen Z respondents are moderate to heavy food consumers, and nearly half plan to spend more on food and beverage this year. Generation Z's spending power on food and drink continues to increase, and their consumption enthusiasm is further ignited.

Note: Heavy consumers of snacks refer to those who consume snacks more than once a week



Generation Z is also enthusiastic about Chinese fashion brands. 46% of gen Z respondents bought Chinese trendy snack brands in the past three months, and 71% of them increased their purchase frequency of such brands in the past year. Generation Z, with more consumption power, has gradually become an important consumer group of local cultural brands.

#### Generation Z's demand for snacks



For Gen Z, the demands of eating are increasingly diverse. According to Nielsen IQ, in addition to basic functional needs such as satiating hunger and thirst, Gen Z also have additional emotional needs for drinks and snacks, such as rewarding themselves, passing time, and nostalgia. Among them, "treat yourself" ranked third in the consumption demand for drinks and snacks. It can be seen that generation Z consume drinks and snacks as a way to reward themselves.

As the potential consumer group and the future growth engine of the industry, generation Z not only enhances the value and influence of the industry through its own consumption behavior, but also acts as the vane of the food and beverage consumption trend.

## Persona



Name: Wenbin Ning  
Age: 12-16 years old  
Gender: Male  
Career Type: During education

Name: Xiang Ning  
Age: 36-45 years old  
Gender: Male  
Career Type: Employed  
Residence: Northeast of China

Tags: Healthy relationship, green hand,

Experience:

Wenbin: Always feel satisfied with his own work. Has a lot of time for own interests rather than studying. Own good communication with parents.

Xiang: Lead kids to learn with interests and motivation by giving them freedom. Shows respect on Child's choices and spare on effort to support him.



Name: Jiayu Sun  
Age: 25-35 years old  
Gender: Female  
Career Tyoe: Uploader  
Residence: South east of China  
Income: 12,000 yuan per month

Tags: Experience of similar area, upload videos for fun, motivated by income and fans

Experience:

Upload record or live online to attract larger audience. Be good to make craftsmanship and draw. Look for interesting and unique stuff on her own initiative. Be able to have a positive influence on her audience.



Name: Kai Qi  
Age: 25-45 years old  
Gender: Male  
Career Type: Employed  
Residence: Northern of China  
Income: 8,000 yuan per month

Tags: Regular work time, enough time for interests, miss snacks in his childhood.

Experience:

Used to buy sugar painting in his childhood, feel nostalgia, cannot find a sugar painting store nearby home,



Name: Alex  
Age: 12-60 years old  
Gender: Female/male  
Career Type: Whatever  
Residence: Wherever

Tags: Different culture background, Whoever, wherever, whatever they are.

Experience:

Feel sugar painting amazing, different culture background, fall in love with Chinese traditional culture, willing to try new things, totally green hand.



# About the process

## How is a Chinese traditional suger paiting created?

The essence of this process is reshaping the suger by means of heating and waiting until the suger cooling to maintain the form.



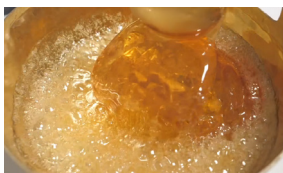
Prepare the tools and suger block.



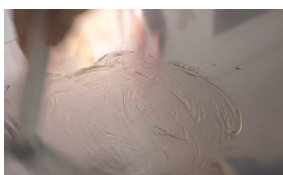
Heat the pot.



Put suger inside the pot.



Melt the suger with slow fire.



Brushing the 'paper' with oil.

Heating



Use spoon to take some melted suger.



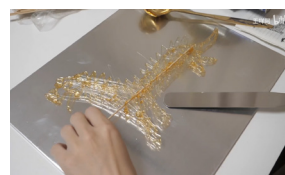
Drawing the out line.



Drawing the details.



Drawing the support.



Fix it on the bar.

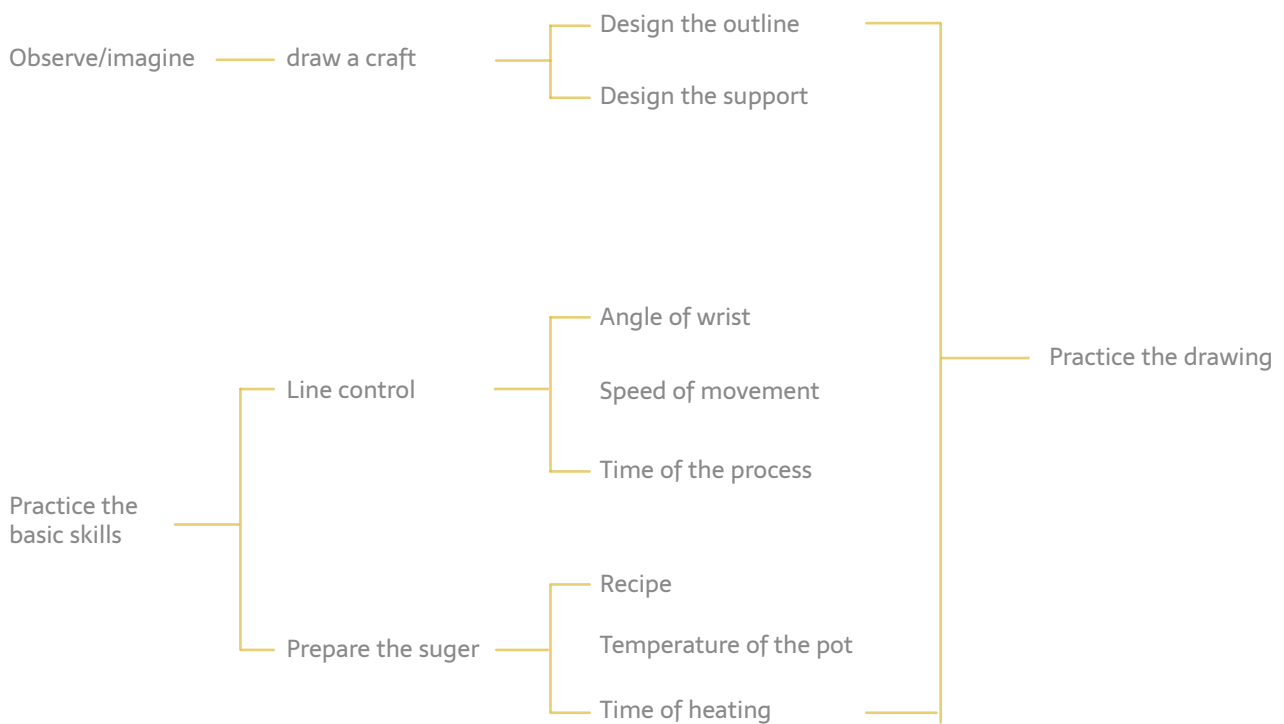


Finish!

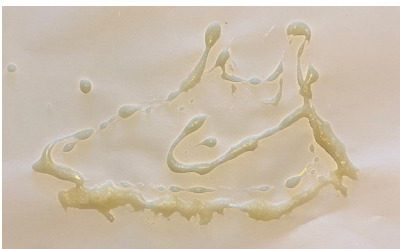
Cooling

## What is the potential process that we can not see normally?

Before man can make an awesome suger painting by himself, the learning and practicing process normally take at least two years, after which he could be a green hand in this profession.



## Half green hand user try-out test



To figure out if it is easy for green hand to make suger painting, I ask some design students to draw whatever they want with melted suger and spoons as the craftman do.

The reason that I choose design students is that they usually have better line control when drawing. Here are the results below.

In the pictures it is obvious that the lines are not smooth. Some even have too much suger, forming a piece of suger rather than suger lines. And the speed of the flow is unstable so that the line looks like having dot in between.

These results can be the evidence that it is hard to control the melted suger with spoon for green hand suger painter.

## Problems

Long potential learning period

Difficult for design students even.

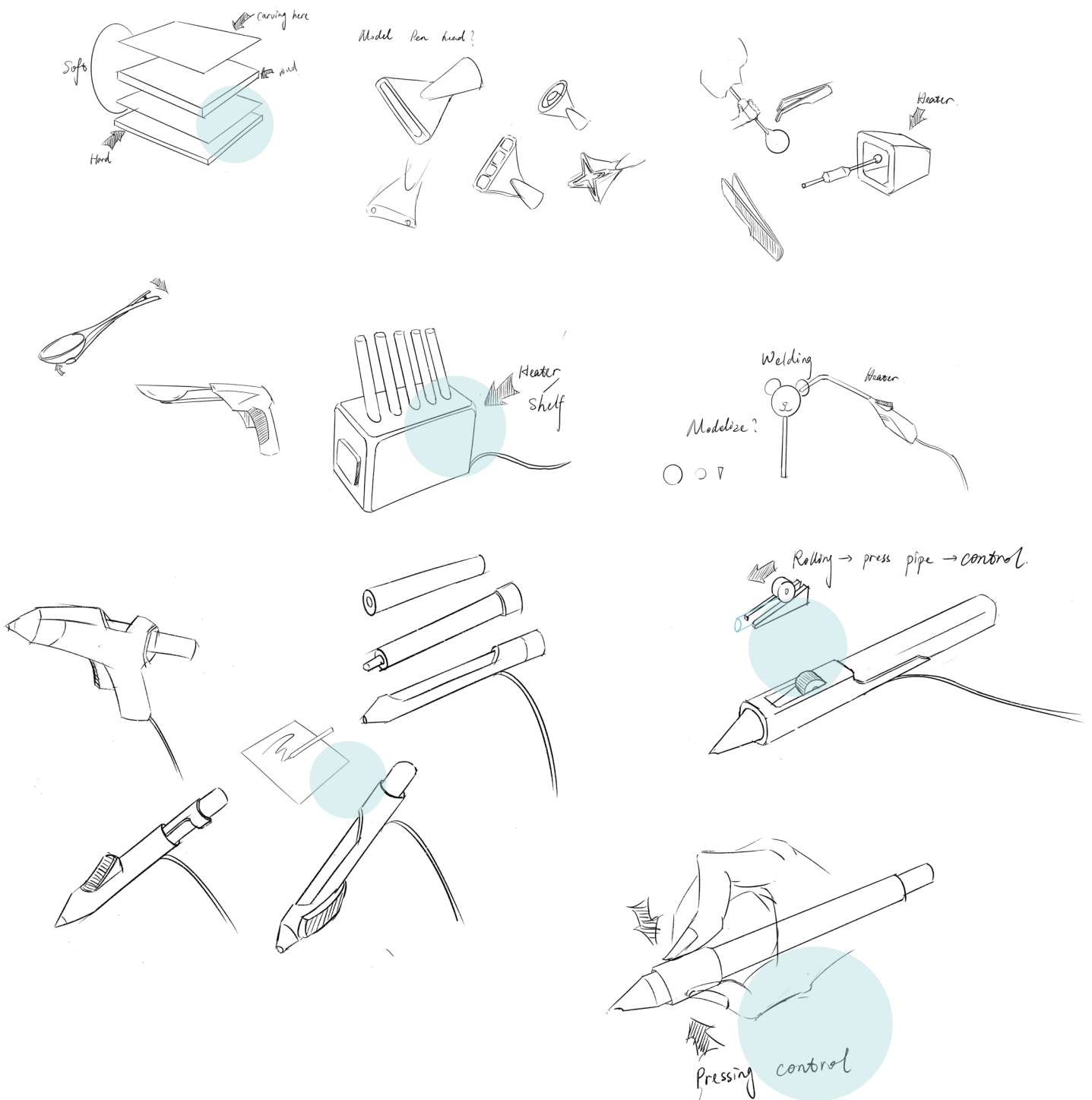
Sugar preparing matters

## Storyboard



# Ideation1.0

Start from similar process that heat first and then cool down.

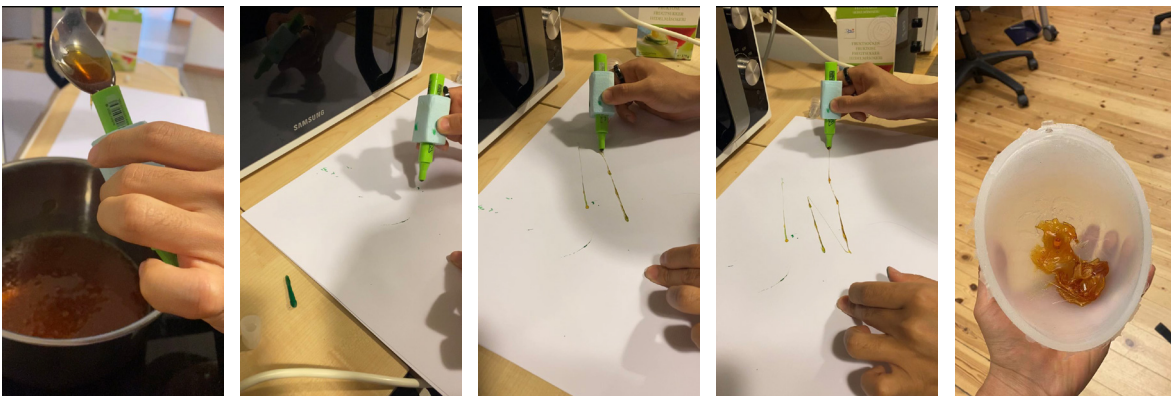


## Initial idea

Melt the sugar inside and make it flow naturally.

Control the speed by some ways like pressing, narrowing the pipe or change the size of the hole.

## Functional test



## Findings

Melted sugar can be forced into piston by air pressure

The sugar will cool down in less than 4 minutes.

Capillary action will do nothing to melted sugar.

The reformed sugar will not stick on silicon.

Silicon performs well against heatness

## Problems

The melted sugar cannot flow down naturally, even without air tightness.

The piston structure takes up twice space.

It is too hot to hold the pen directly.

## Solution

Replace the piston structure with another airpressure structure.

Provide some way to push the sugar out rather than leave it naturally.

## Design brief 2.0

To design a hand-held product that can maintain the melted sugar inside and draw with it by squeezing, to provide an easy approach to green hands, especially to the younger generation.

# Research 2.0

About the market



## Market research



### Automatic sugar painting machine

It is a machine that can melt sugar inside the iron bucket and painting with sugar. The principle simulates the 3D printing machine. This machine replaces all the experience of sugar painting, it might be a good product for industrialization, but is a bad product for inheriting culture.



### 3D printing pen

It is a pen that can do 3D printing. The strength of the product is that it can paint in 3D rather than just on paper. There is a similar product called sugar painting pen in the market, but it cannot paint in 3D. The weakness of sugar painting pen is that it replace the sugar preparing experience and it cannot control the flow of melted sugar well.

## Other Hand-held writing tools



### Copic marker

Length: About 150mm  
 Diameter: About 15.4mm  
 Weight: 20.3g with two caps  
 14.2g without caps  
 Material: Plastic  
 Filler: Ink  
 Principle: Capillarity  
 Refillability: Refillable

Way of grip:



### Pen(Parker IM Black/Gold Reservoir)

Length: About 138.2mm  
 Diameter: About 12.6mm  
 Weight: About 69.74g  
 Material: Anodized alumina  
 Stainless steel  
 Filler: Ink  
 Principle: Capillarity  
 Refillability: Refillable

Way of grip:



### Pencil (Noris Blyertspenna HB)

Length: 180mm  
 Diameter: 8mm  
 Weight: 8g  
 Material: Wood  
 Graphite  
 Filler: No  
 Principle: Friction  
 Refillability: Not refillable

Way of grip:





### White Chalk

Length: 100 mm  
 Diameter: 10 mm  
 Weight: 5g  
 Material: Limestone  
 Plaster  
 Principle: Friction  
 Refillability: Not refillable

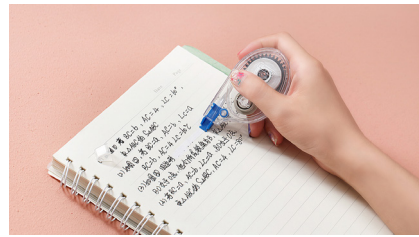
Way of grip:



### Correction tape

Length: About 67mm  
 Height: About 17mm  
 Width: About 31mm  
 Material: Plastic  
 Filler: Tape  
 Principle: Stick  
 Refillability: Not refillable

Way of grip:



### ADIS&Guys Premium Paint Brush

Length: 220mm  
 Diameter: About 7mm  
 Weight: About 12g  
 Material: Wood/plastic  
 Fur  
 Filler: Paint  
 Principle: Adsorbability  
 Refillability: Refillable

Way of grip:





### Ballpoint pen (Rite in the Rain All-Weather Durable Clicker Pen)

Length: About 136.7mm  
Diameter: About 12.7mm  
Weight: 22g  
Material: Rubberized Plastic  
Filler: Ink  
Principle: Capillarity  
Refillability: Refillable

Way of grip:



### Spray paint gun ZHOUSILIN Spray Paint Machine

Length: 150mm  
Cubage: 7ml  
Weight: About 80g  
Material: Iron  
Filler: Spray  
Principle: Air pressure and gravity  
Refillability: Refillable

Way of grip:



### Spray can (MTN Montana Colors Hardcore 2)

Length: About 100mm  
Diameter: About 50mm  
Weight: About 340g  
Material: Plastic  
Metal  
Filler: Spray  
Principle: Air pressure  
Refillability: Not refillable

Way of grip:





**Face cream (Australian Bodycare Face Cream Tea Tree Oil)**

Length: About 157mm  
 Diameter: About 45mm  
 Weight: About 120g  
 Material: Plastic  
 Filler: Face cream  
 Principle: Air pressure  
 Refillability: Not refillable

Way of grip:



**Shampoo(Nivea Strong Power Schampoo)**

Length: 71mm  
 Width: 33mm  
 Height: 182mm  
 Weight: 290g  
 Material: Plastic  
 Filler: No  
 Principle: Friction  
 Refillability: Not refillable

Way of grip:



**Shampoo(Nivea Strong Power Schampoo)**

Length: 180 mm  
 Width: 80 mm  
 Weight: 300g  
 Material: Plastic  
 Metal  
 Filler: Cream  
 Principle: Air pressure  
 Refillability: Refillable

Way of grip:



## Findings

Different material area will suggest the holding position to users.

A soft material, such as rubber and soft plastic, will make user feel safe. People used to hold on the soft and rough material compared with hard and shiny one if it is available. That is to say, we can use material to suggest the hold position of the product.

Fingers always provide the most precise control.

By observing the products above, we can easily tell that we rely on our fingers to finish precise work. Compared with pen and pencil, the way that we use shampoo and piping bag is less precise. Refer to face cream, it is shown that use finger to control the flow is possible and acts well.

The product should not be too wide.

A product should be too wide to hold. the thinner it is, the more precise it works. The perimeter of the product should be no more than one and a half human hand length or perimeter.

The weight should be as low as possible

A product should be too heavy to hold. the lighter it is, the more precise it works. The weight of the product should be no more than 350g, refer to the spray can weight.

# User ergonomics research

## Hand size research

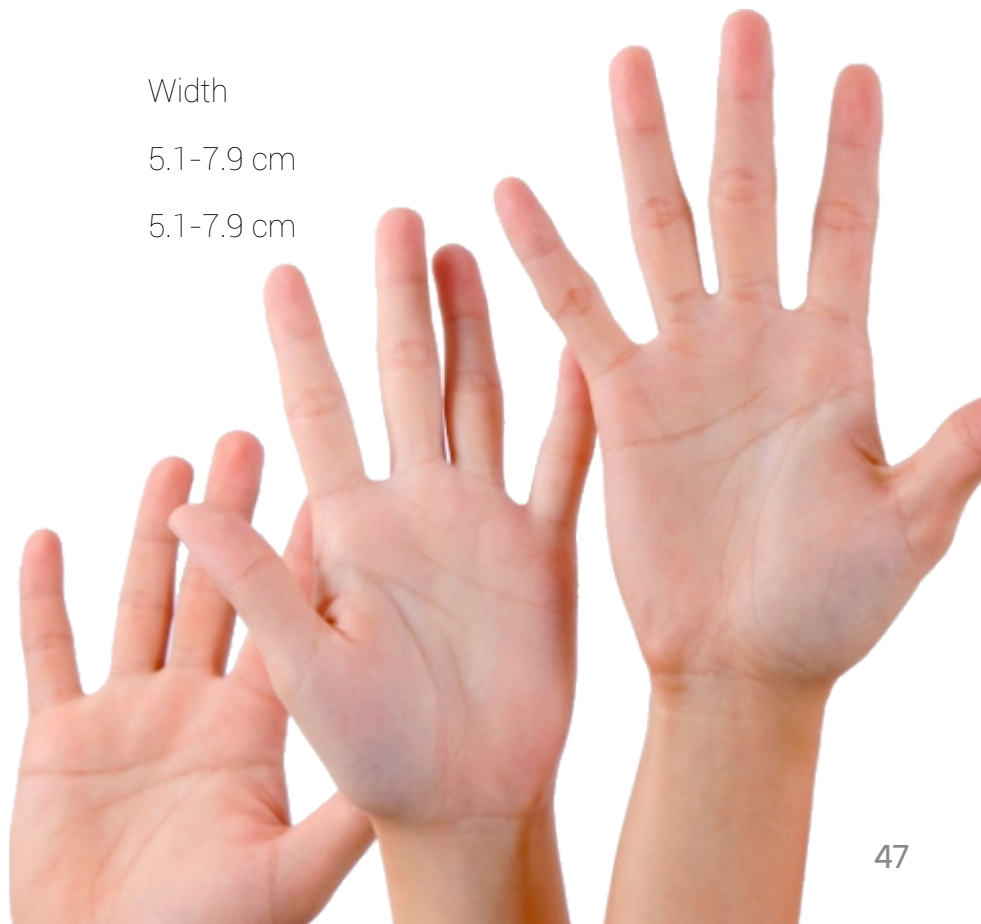
Since the target group has a large age range, including kids as well, it is necessary to reasearch about hand sizes of adults and kids.

### Adult

	Average length	Average width	Average perimeter
Male	19.3 cm	8.9 cm	21.9 cm
Famale	17.3 cm	7.9 cm	17.8 cm

### 11 years old child

	Length	Width
Male	13.9-17.3 cm	5.1-7.9 cm
Famale	14.2-17.9 cm	5.1-7.9 cm



## Product size criteria

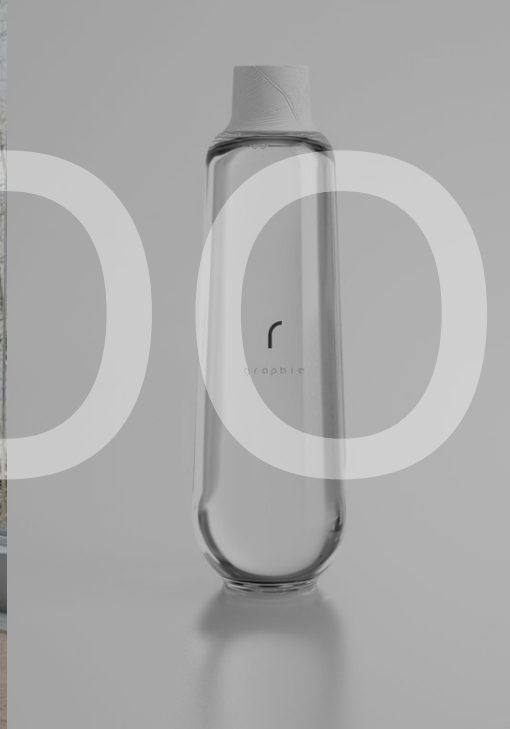
The perimeter of the holding position should be no more than 21cm.

The length of the product should be no more than 200mm.

The Weight of the product should be no more than 350g.



**Design process**





# BOARD



## Design principles



Easy to hold



Geometric



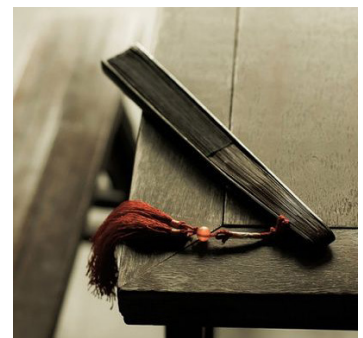
Craftmanship



Easy to Assemble



Intuitive

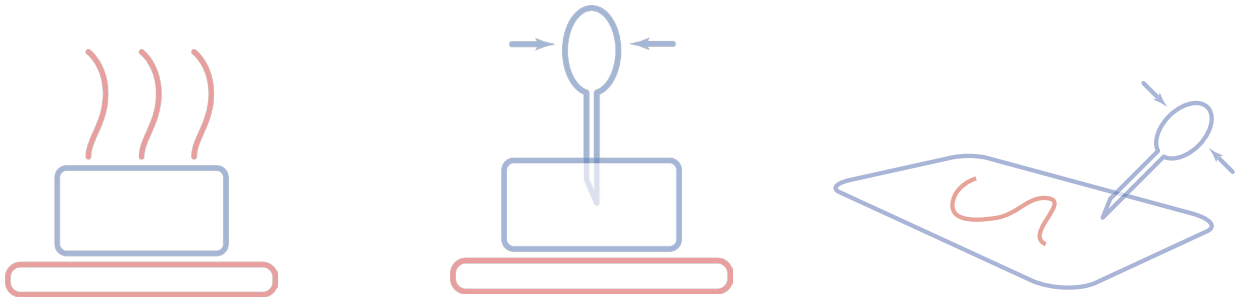


Chinese cultural

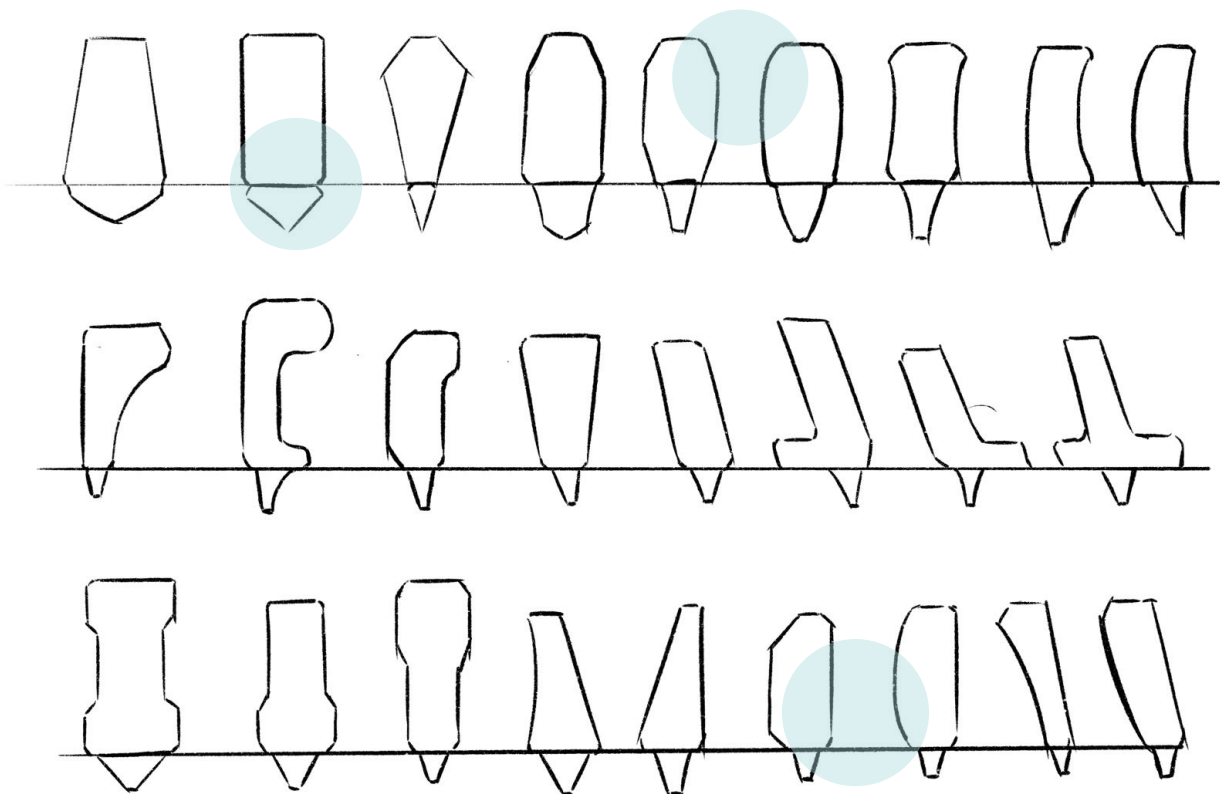


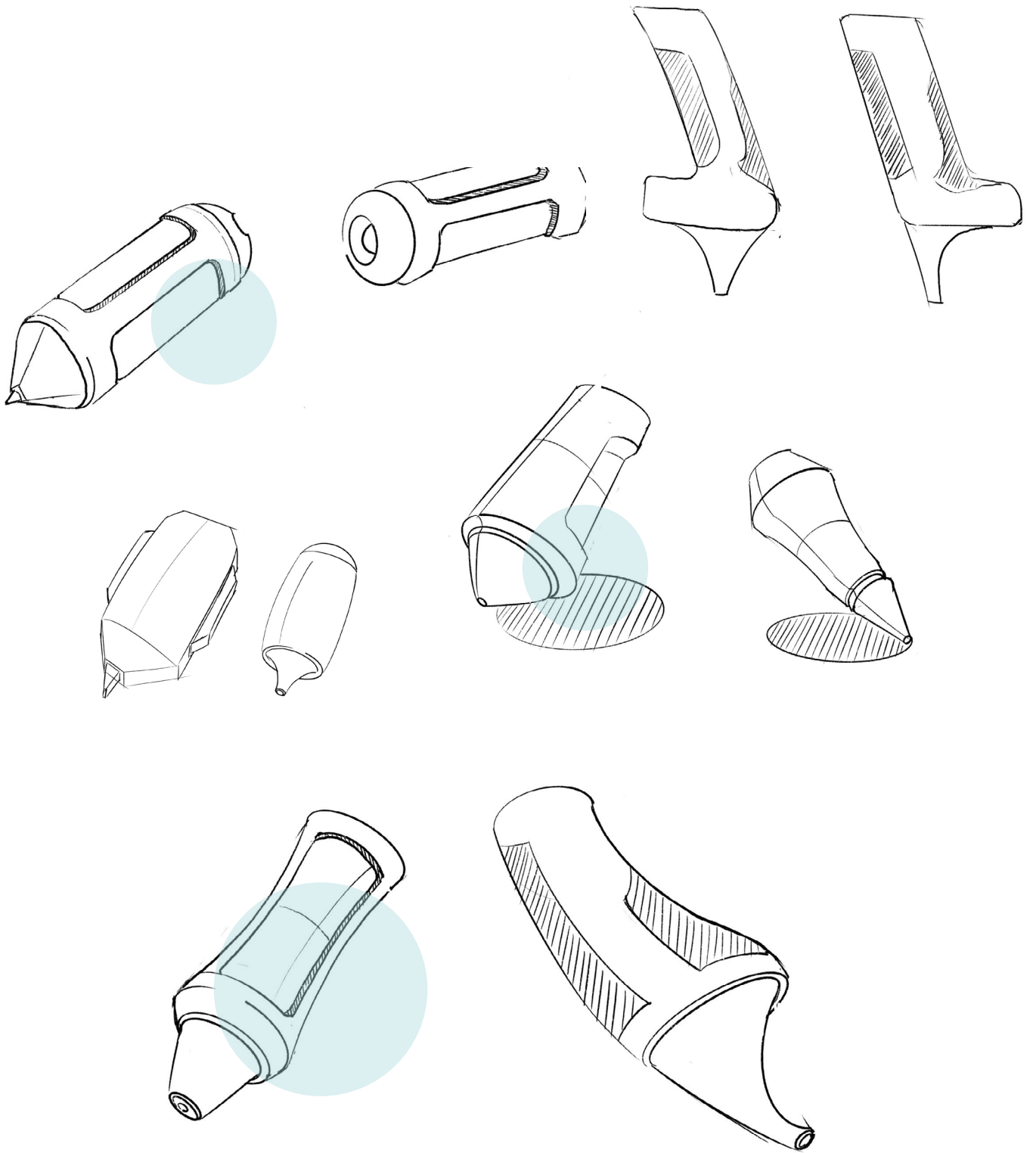
Safe

## Ideation 2.0



The idea is to suck the melted sugar, which is melted in a pot, into the product and slightly squeeze it out to do sugar painting.

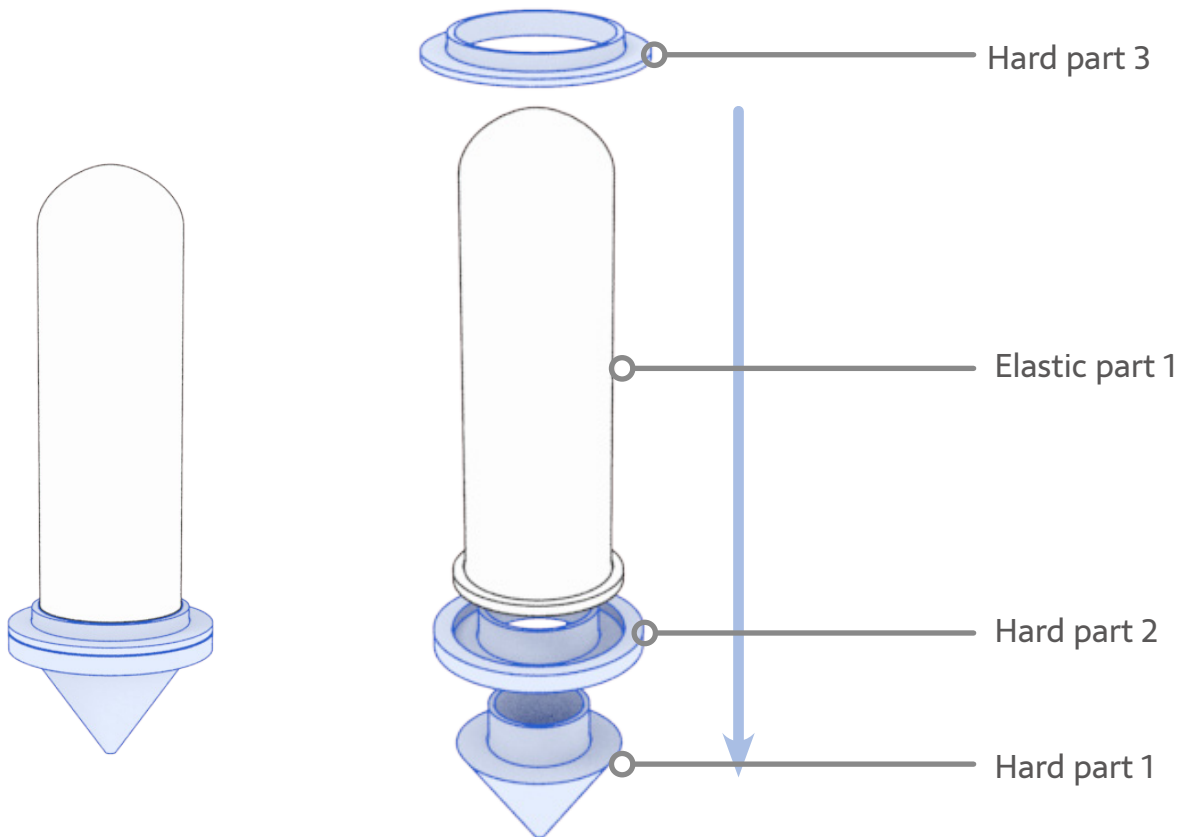




Design iteration



## Structure design 1.0



To make sure that the product is easy to hold and has enough space to maintain the melted sugar, a decision is made to keep the diameter of the silicon part below 35 mm.

For the easy to assemble principle, I decide to use plug-in structure to connect the whole product.

The inner diameter of the elastic material will be smaller than the diameter of the connect part of the hard part 2, which helps to keep the air tightness to make sure that melted sugar can be sucked inside the product.



## Structure design test 1.0



### Problems

Only one silicon will still make user feel hot because of the melted sugar.

The plug in structure is not stable enough.

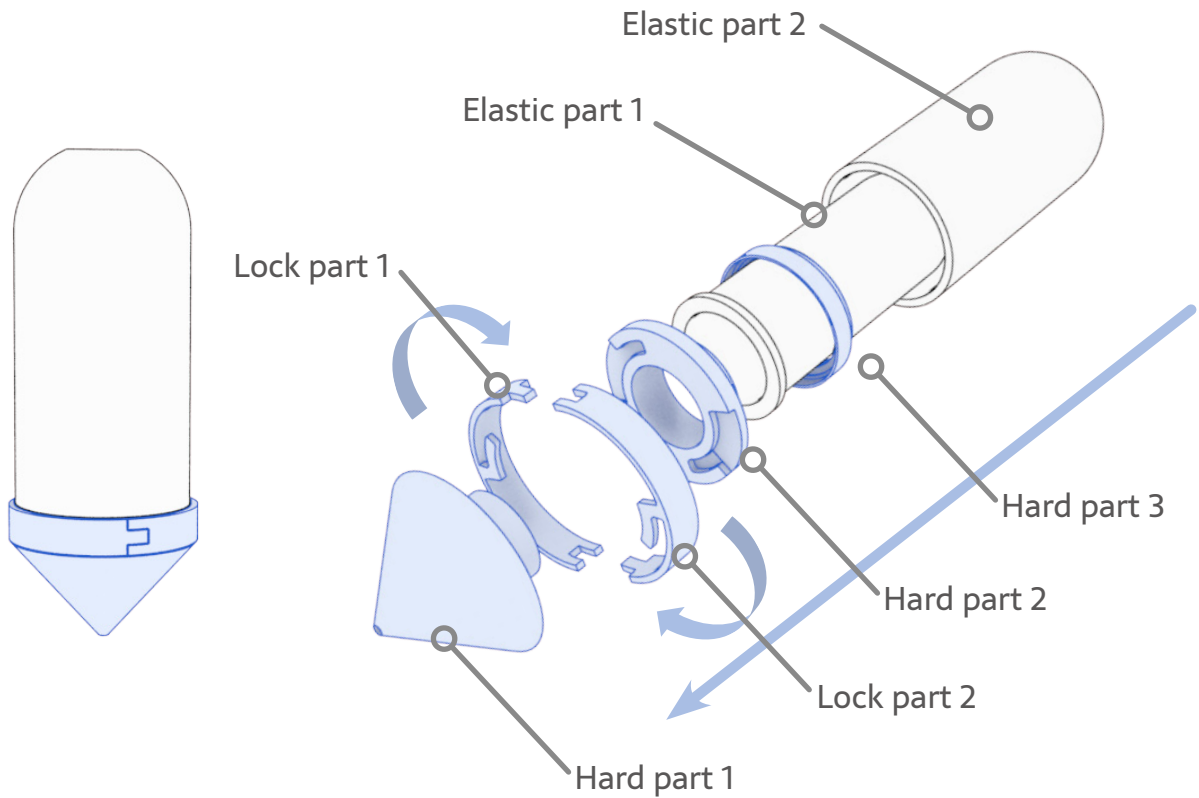
The edge of the product is not comfortable for holding.

### Solution

A double wall design is necessary to make sure it will not be too hot to hold.

A new structure should be introduced to insure the stability of the product and air tightness.

## Structure design 2.0

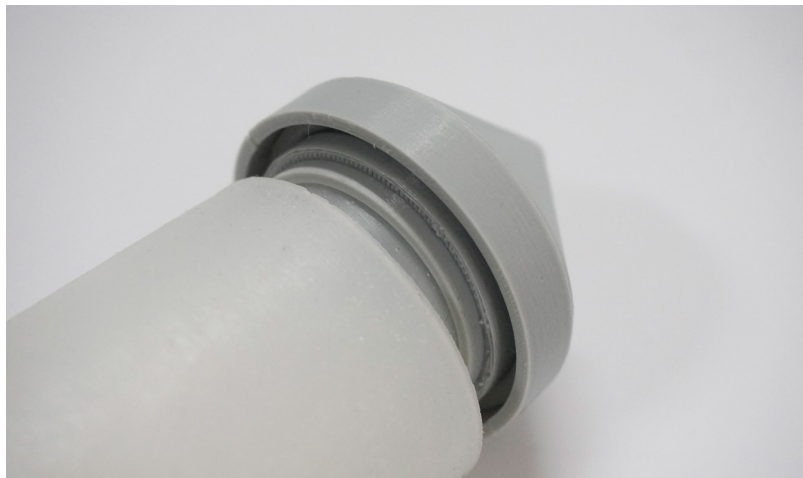
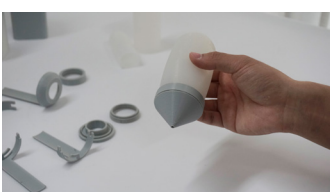


A double wall structure is introduced and the out part and inner part should be elastic material at the same time.

To make the product be able to squeeze, it is necessary to have a hole on the shell to balance the air pressure. Also the inner part should keep air tightness to insure the sugar can be pushed in by the air pressure as well.

A lock system is used to keep the stability of the hard part connection. The two lock part can be firstly plugged in the whole on hard part 2 and then rotate to lock.

## Structure design test 2.0



### Problems

The elastic material will loose after used for several times.

It is hard to rotate the parts.

### Analysis

The lock parts might be too short so that it cannot fix the elastic material in the right position.

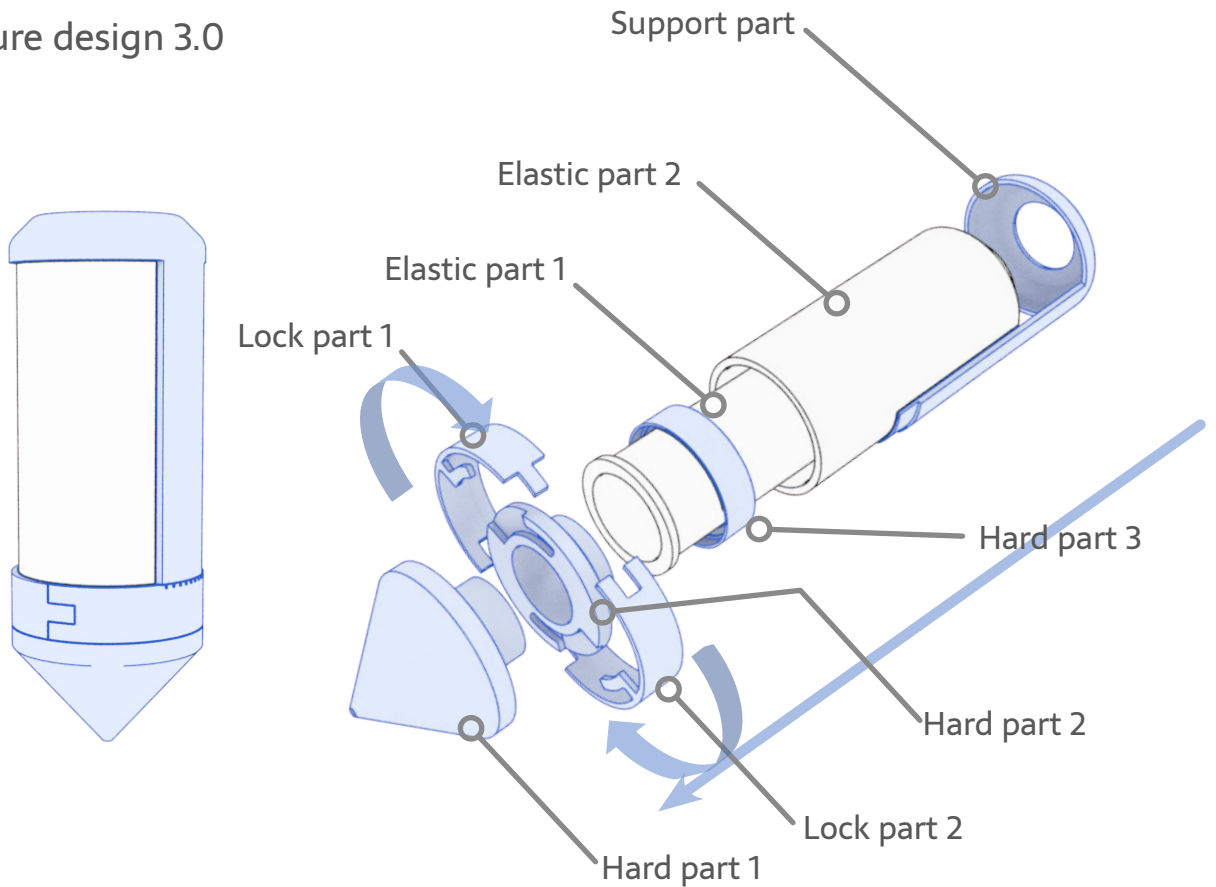
The cone shape of the hard part 1 is not suitable for user to hold when rotating the structure.

### Solution

Try to make the lock part a bit wider and test if it works or not.

Add a cylinder above the cone and make some texture on it to increase the roughness of the surface so that user can rotate it more easily.

### Structure design 3.0



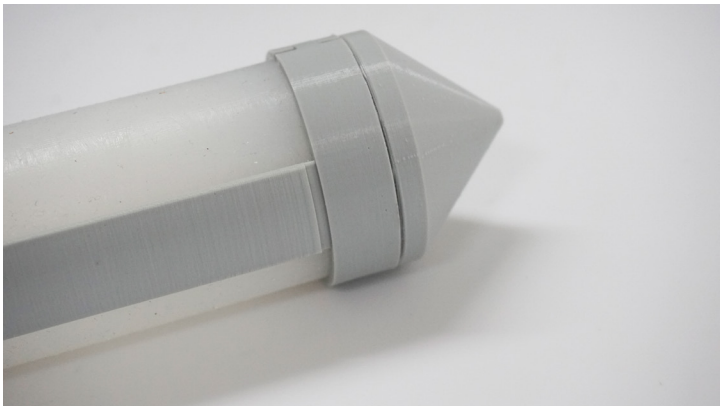
A wider lock part is used in this plan, to check if it works or not.

A small cylinder on the cone-shape hard part 1 is designed, and the height of th cylinder is controlled because of the height criteria of the product that is set before.

A support part is added, to insure that the elastic material will not loose after long term use.

The hole to keep air pressure balance is designed on the bottom of the product, as a result, the support part also has a whole at the same position.

## Structure design test 3.0



### Problems

The 3d printing part will loose a bit after use. It might be pressed by the elastic material when squeezing.

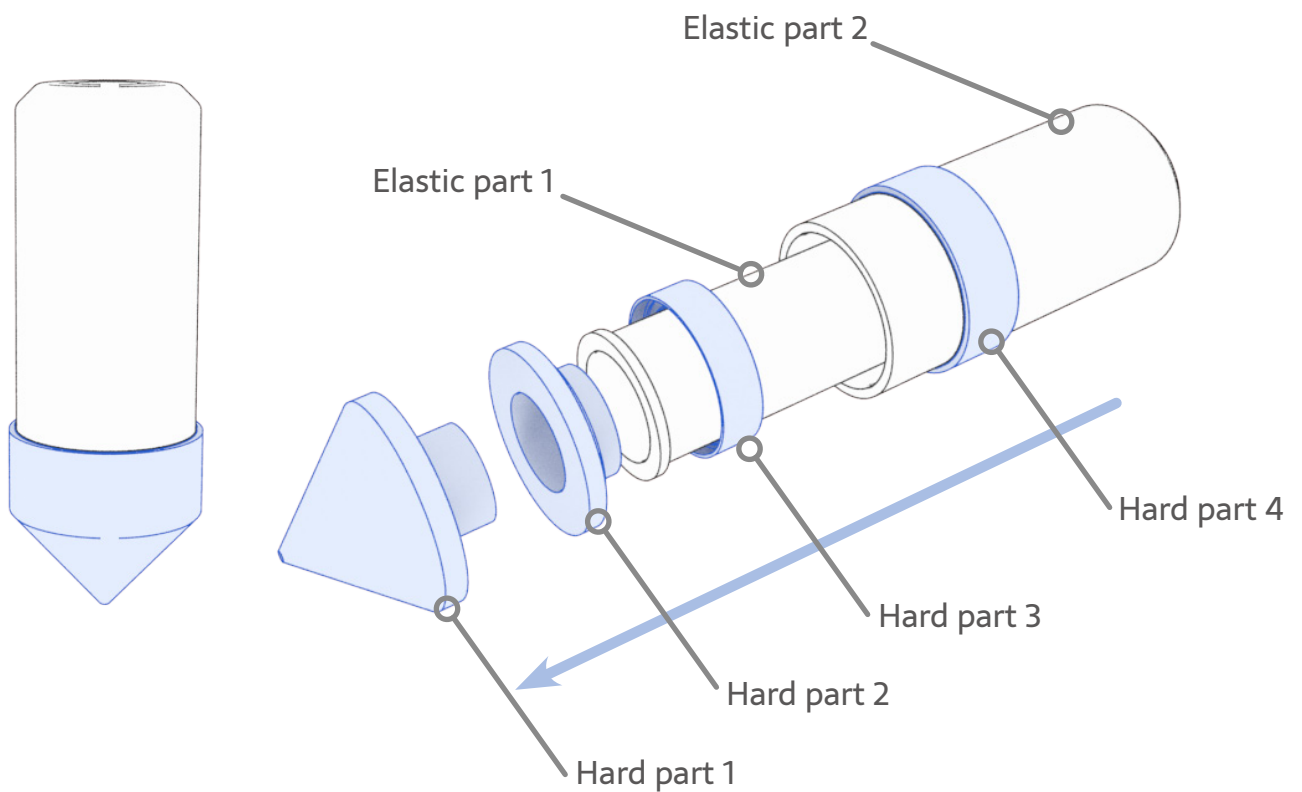
A huge gap will appeared when the elastic material changing form.

### Solution

Use another material that is harder might change the situation.

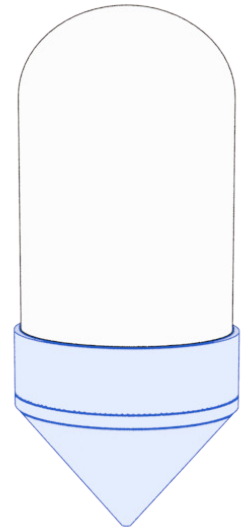
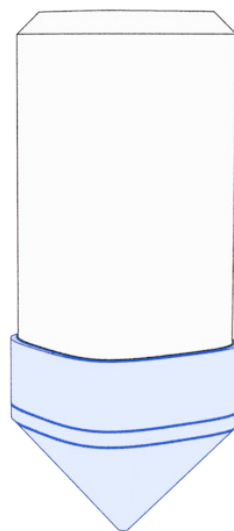
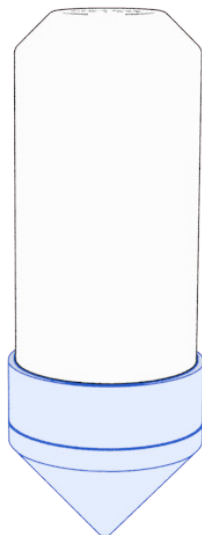
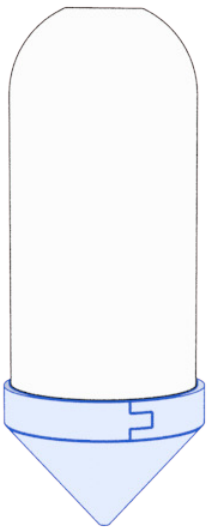
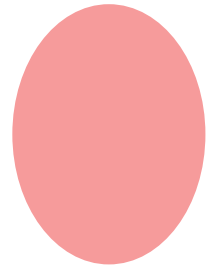
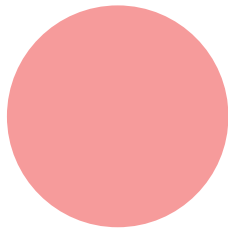
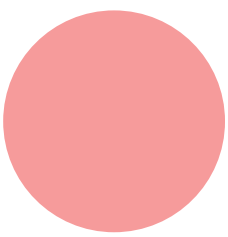
Another way is to simplify the structure.

## Structure design 4.0



Simplify all the complex structure to several plug in structure. After making the inner diameter of the elastic material 1 mm smaller than the connection part diameter, the friction can fix the whole product together.

## Form study



To develop different shape of the product and test with user, to figure out which one fits the best.

The four different shape are cylinder with rounded conner on the bottom, cylinder with straight conner, prism wiht straight conner and a oval shaped cylinder.

# User experience test





## Results

User usually holds the cylinder shaped product in a similar way as a pen, as a result of their comparison the shape of the product to the shape of the pen. Sometimes they also hold it with another way because of smaller hand sizes.

The support part will influence the holding way. User tends to avoid pressing the hard material but press the elastic material instead. They normally put the support against their palm or finger rather than leave it to the air.

The prism shape looks the best, but after several users try it, they said it is not comfortable to hold because of the edge.

The result shows that the oval shape offers users the most possibilities to hold it, so that it can fit more different hand sizes, which is a great potential to go further.

After several different products were tried out, it turned out to be that user will not hold the product on the hard material. They will hold the elastic material without any suggestions or instructions.

## Problem

The elastic part in the test version is about 15 cm, and after connected with the hard part, there is only about 12 cm left, which is a little bit short to hold.

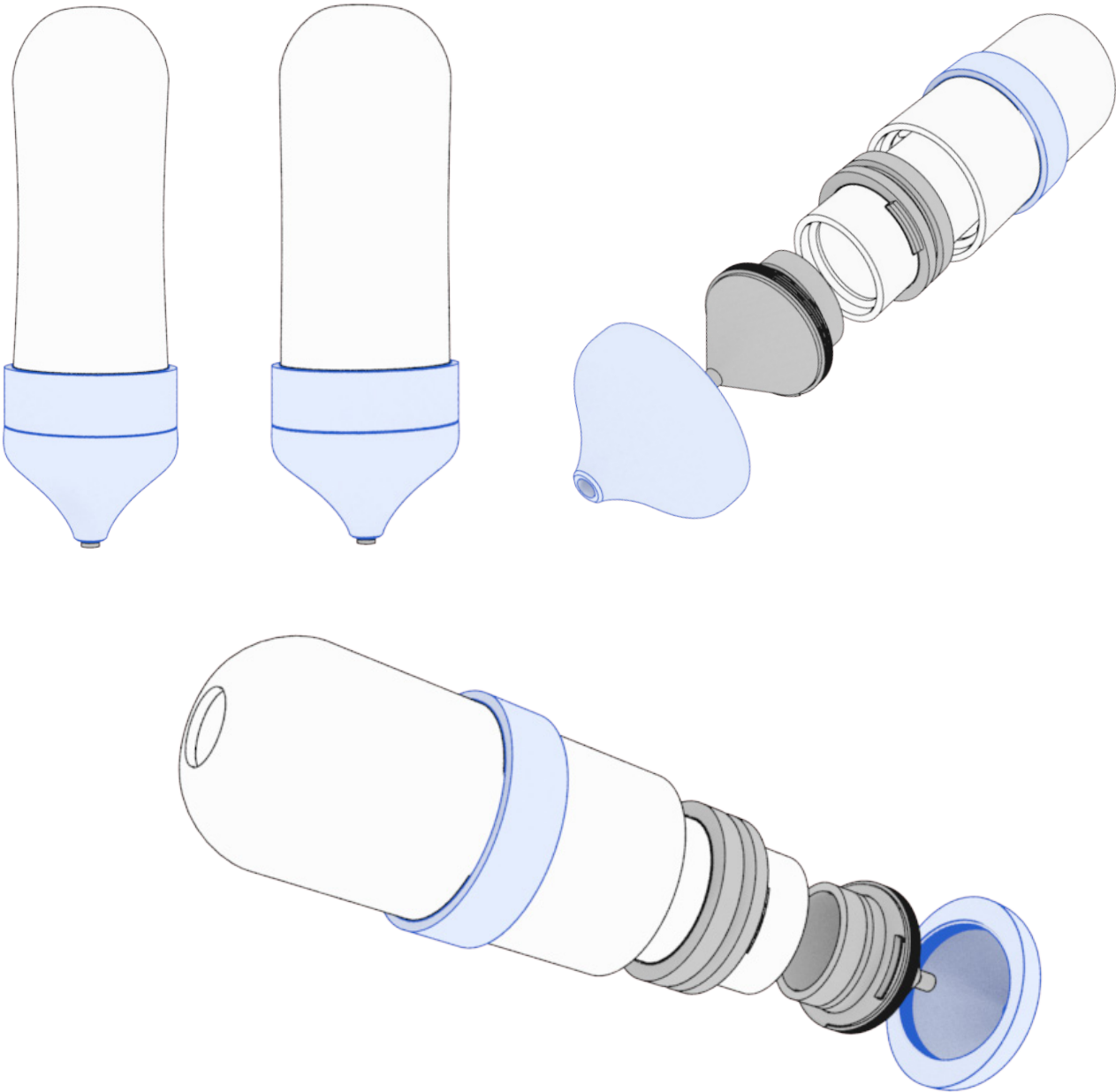
## Decisions

To extend the length of the elastic material for 5 cm.

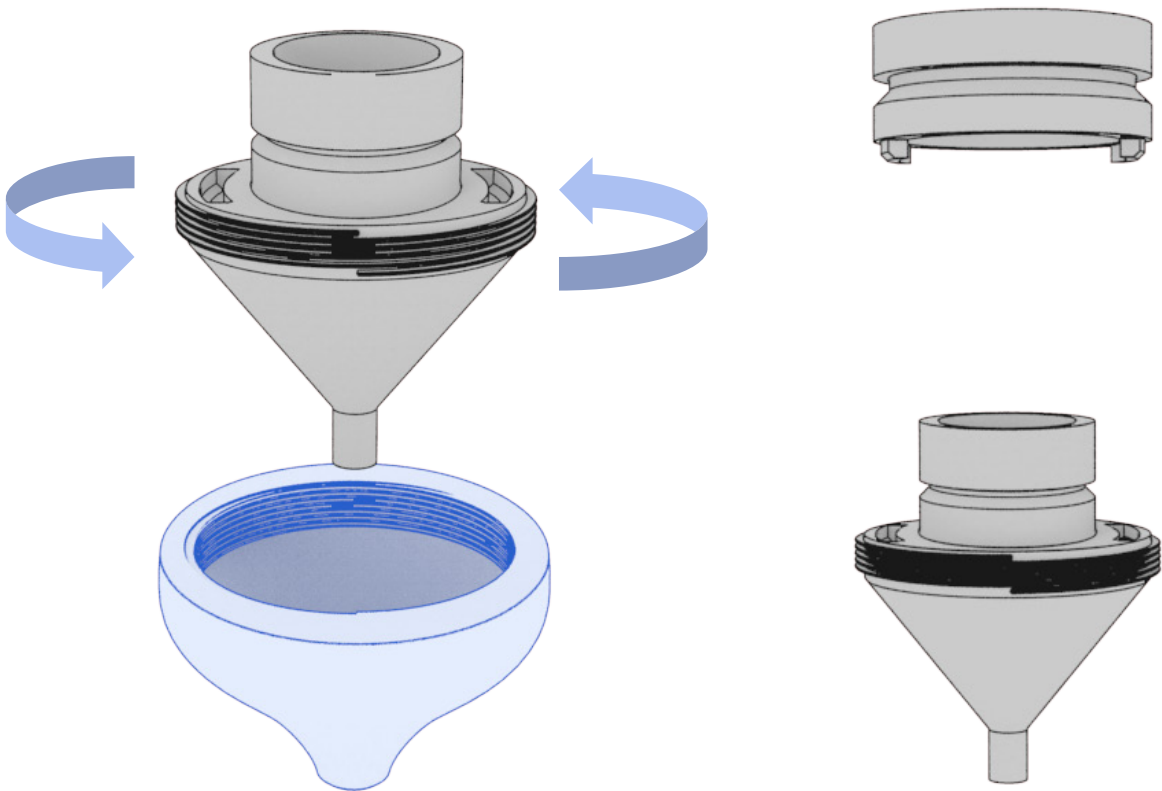
To go further on the oval shape.

To make some curve outline on the side to provide some suggestions of the holding position to users.

Final design

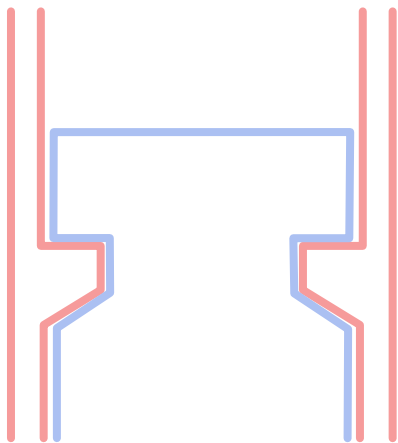
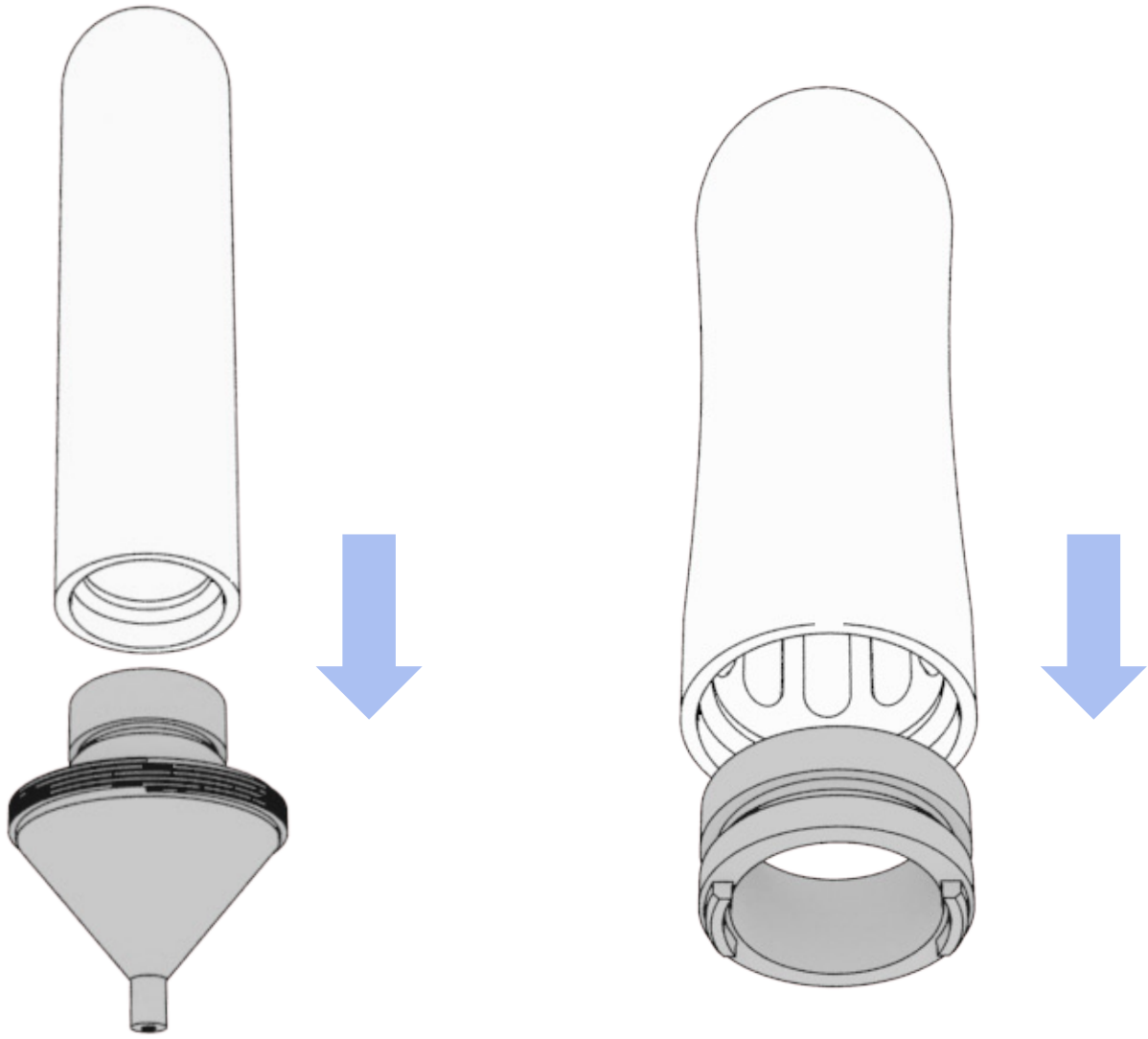


## Connections



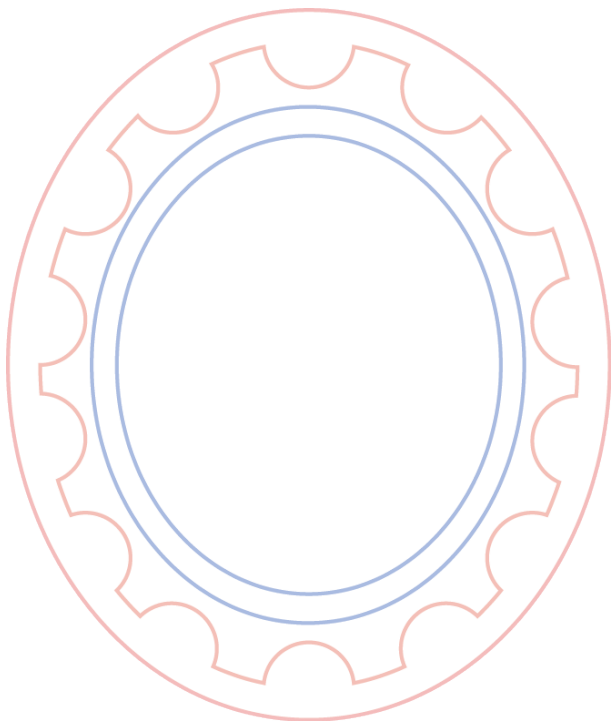
Since the product is oval shape, it will be hard to keep all the lines in the same position when production and the assembly process. So that a precise and strong connection should be used. Thread is a good choice in this situation, it will always finish in the same way after assembled. I decide to connect the blue part and the gray part with thread inside.

The two gray part can be connected with a plug-in structure, which is easy to assemble.



The inside diameter of the elastic material will be 1 mm smaller than the diameter of the connection part of the hard components. And a lock structure is designed to make the elastic part even harder to get out of the hard part but easier to get in when it is assembled.

## Double wall design



To prevent users from being burned by the melted sugar, which can be more than 170 degree Celsius, a double wall design is necessary. To make it conduct even less heatness, I decide to make some partens inside the outer part. With these partens, the contact area will be smaller than a flat surface when pressing, so that the heatness will be conducted more slowly and users will rarely feel the heatness. Since the partern is on the outer part, it will not increase the surface area of the inner part, that is to say, the heat radiating area is the same so that it can maintain the heatness inside better to make the sugar solidification slower.

# Material choices

## Principles

White part are elastic material, it should be transparent or half transparent, so that users can see the melted sugar inside. It will not only have a good performance, but also help user to check how much sugar left inside. And it should be a material with poor thermal conductivity, which can keep the heatness inside and protect the user as well. It should also be food class, for the product is aimed to make sugar painting, which is a snack.

Gray parts should be hard material. It should be thermal conductive material, which has a low heat capacity, or a material with poor thermal conductivity. This will, to some extend, help to avoid sugar cooling down too fast and change into solid inside the product. It should be a food class material as well, because it will contact with melted sugar directly.

Blue parts should be hard material. It should be heat insulation material. Even if the gray parts are thermal conductive material, it can still protect the user from being hurt by the heatness.

All the materials should be able to work at 180 degrees Celsius without occuring any chemical reaction or produce any toxic substances and it should be washable.

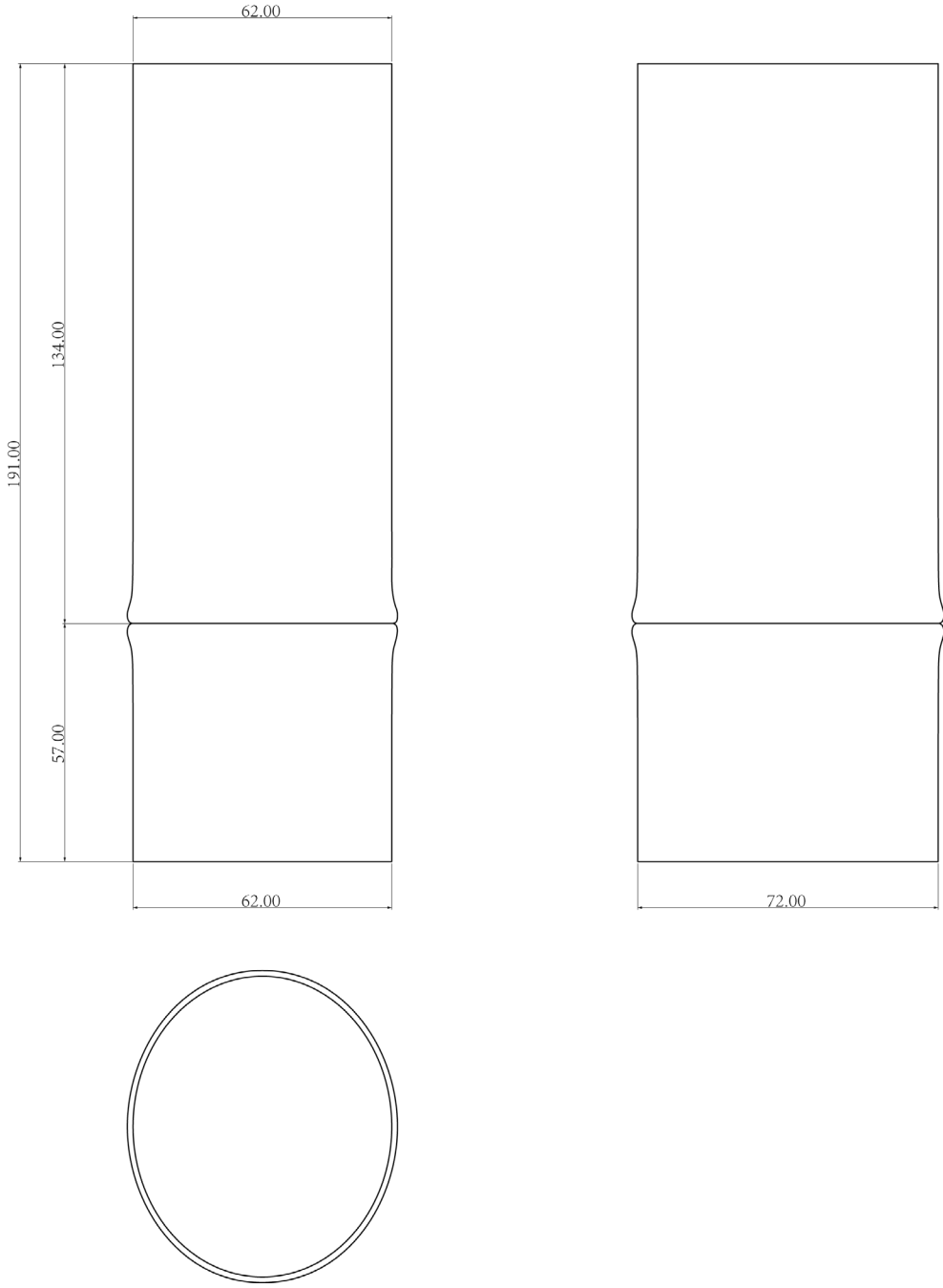
## Choices

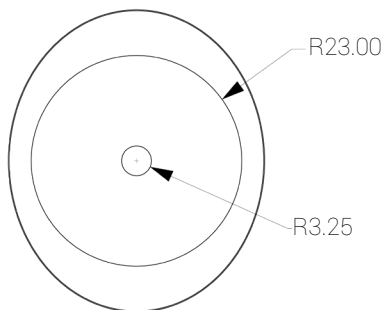
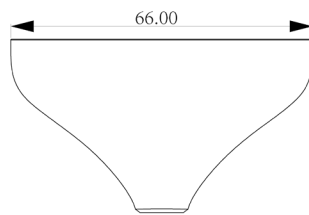
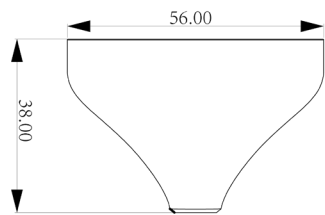
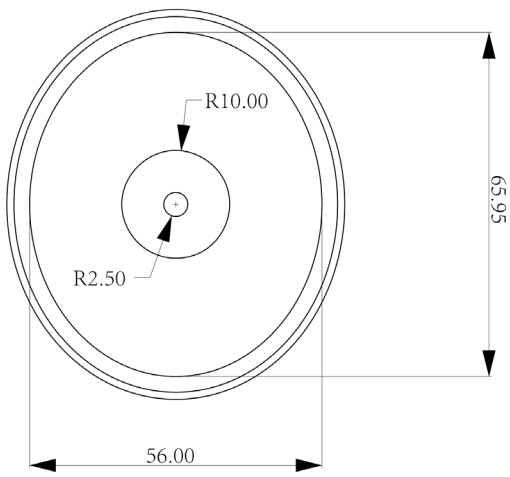
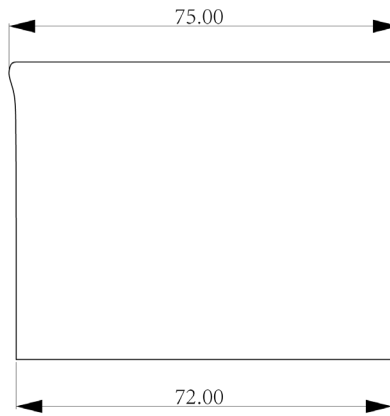
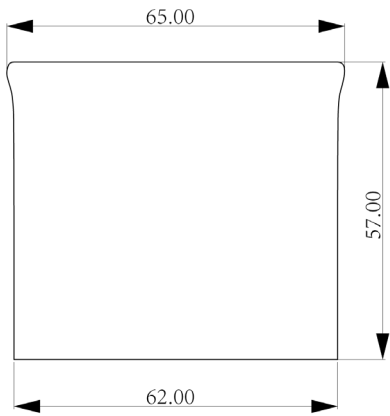
Food class silicon for white part  
Transparent, heat resistant, soft, easy to wash, stable and sugar will not stick on it.

Anodized aluminum for gray part  
Hard, light, stable, low heat capacity

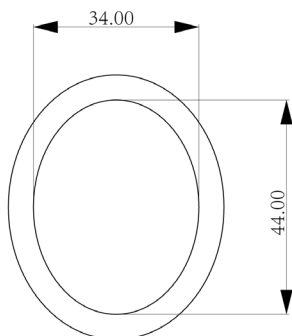
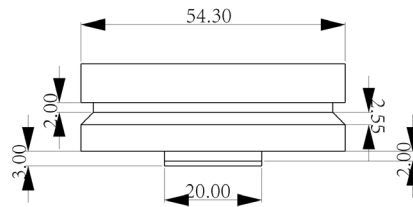
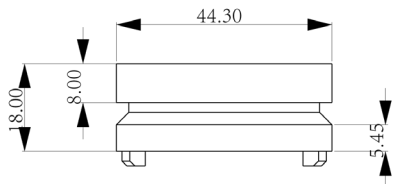
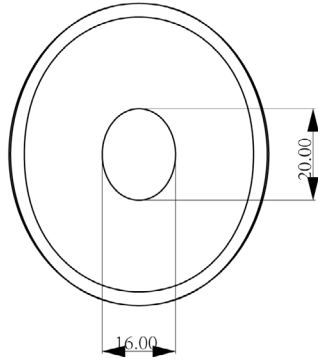
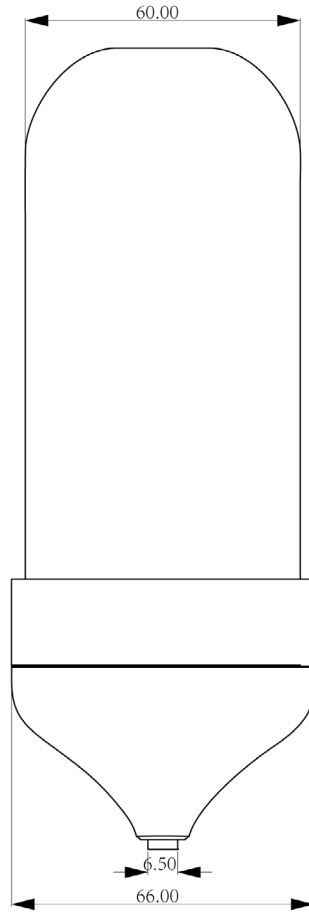
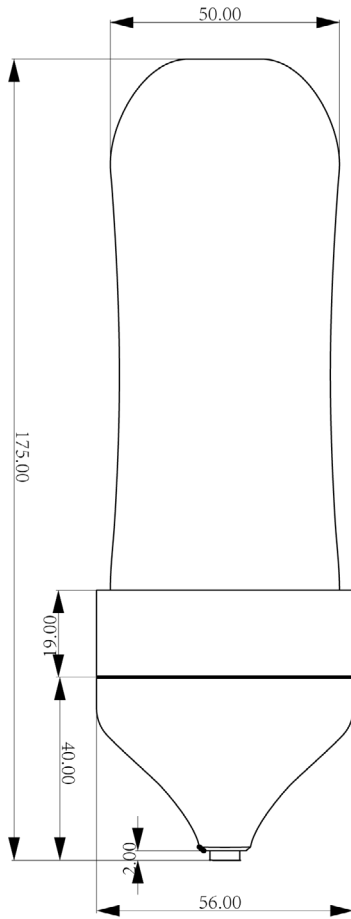
Maple solid wood for blue part  
Hard, poor heat conductivity, nice partern.

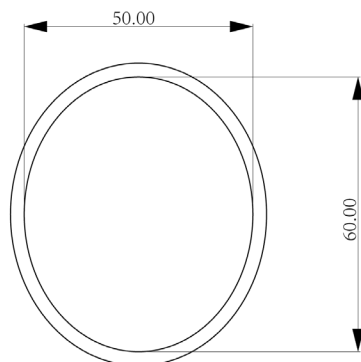
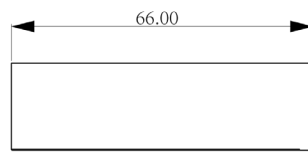
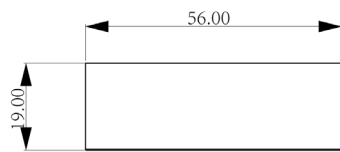
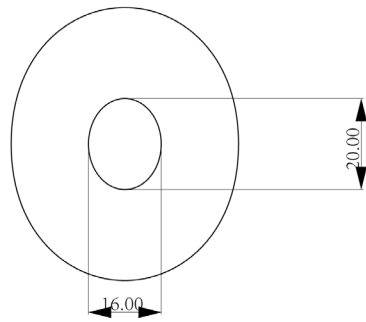
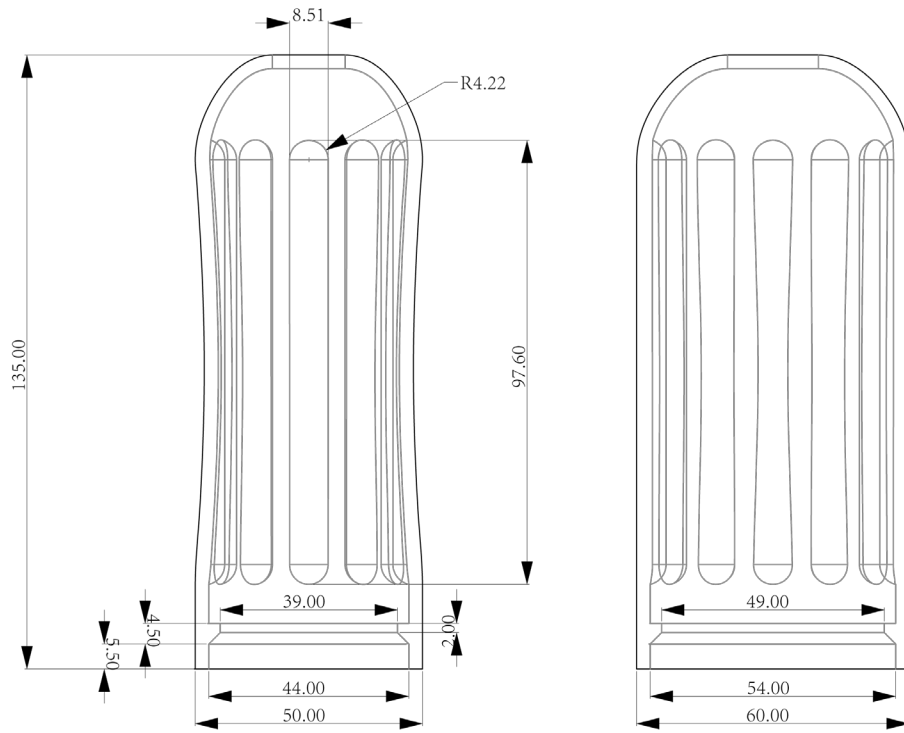
# Dimensions

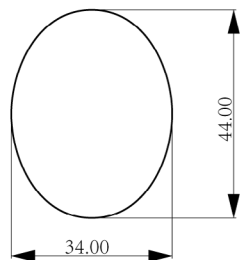
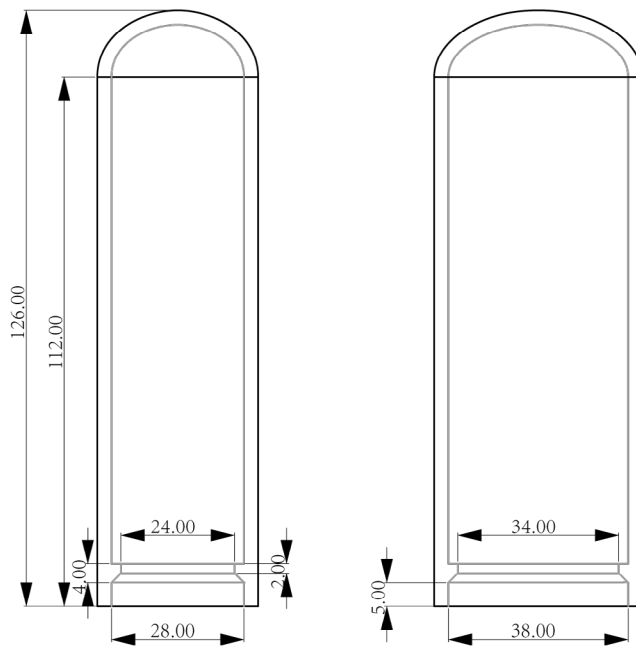
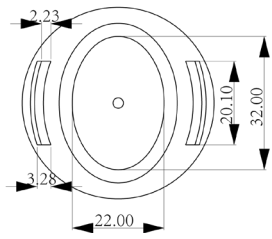
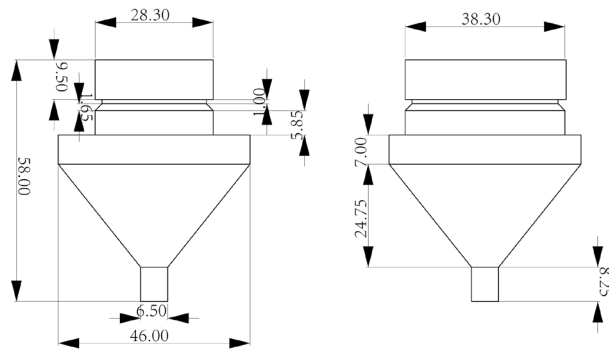










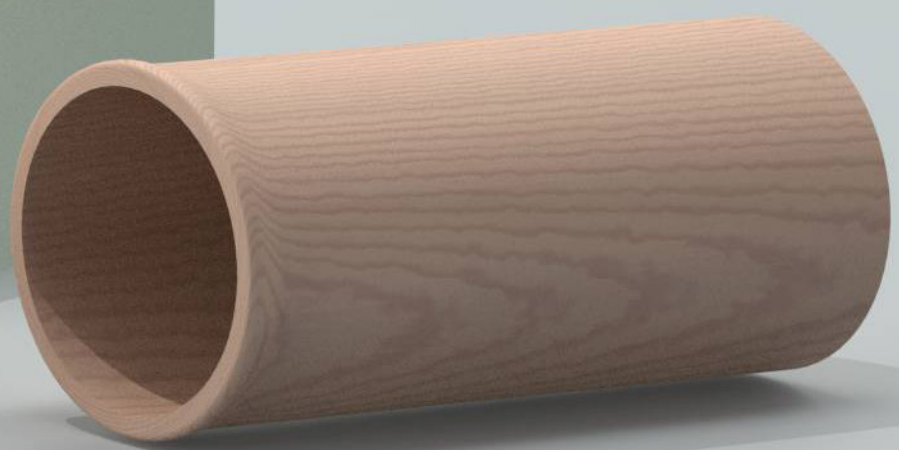
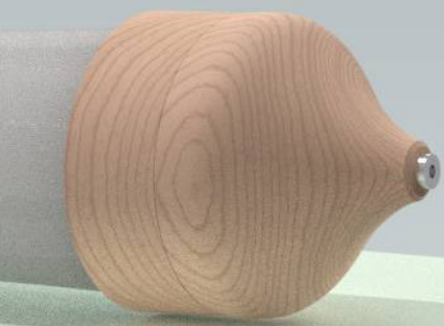


# Renderings



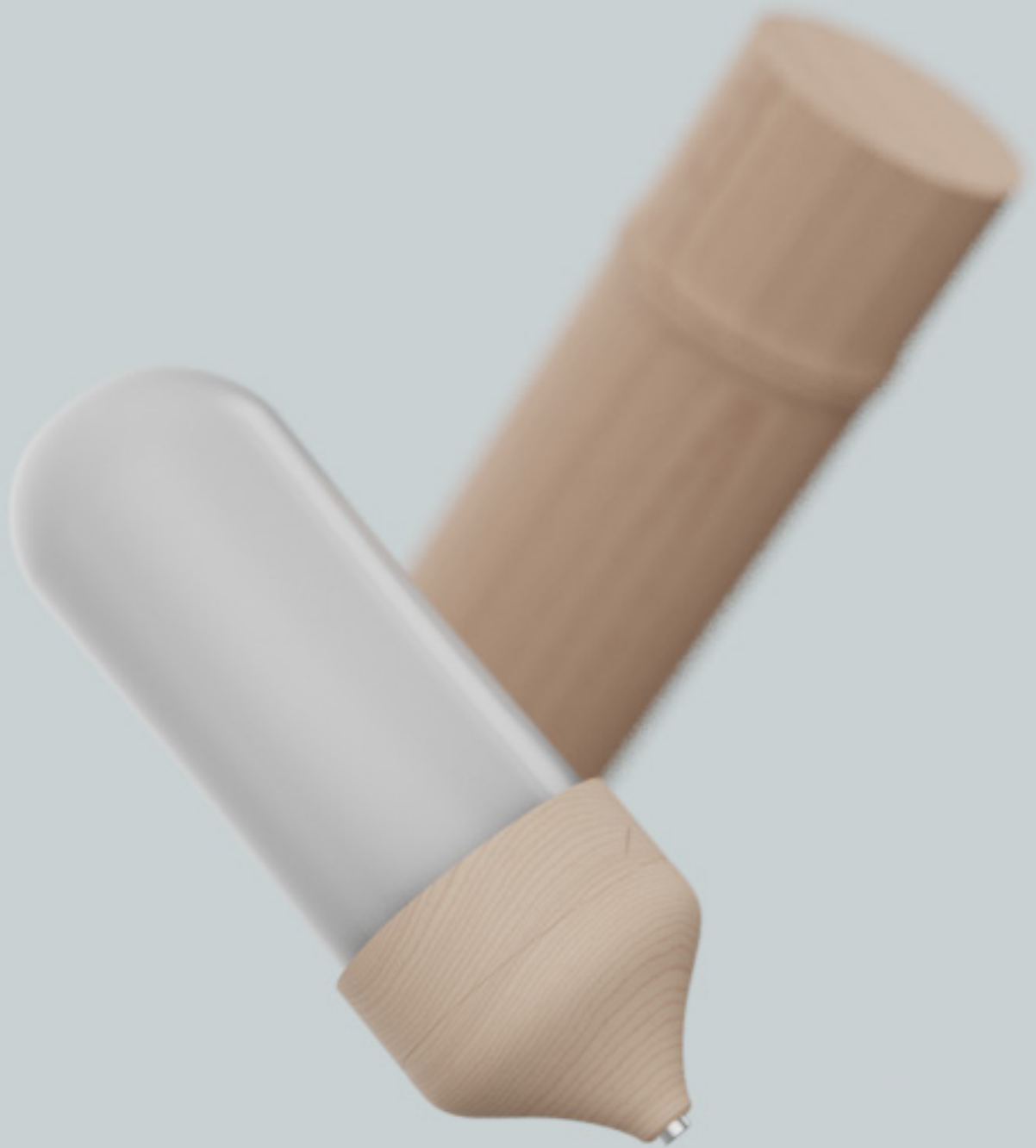








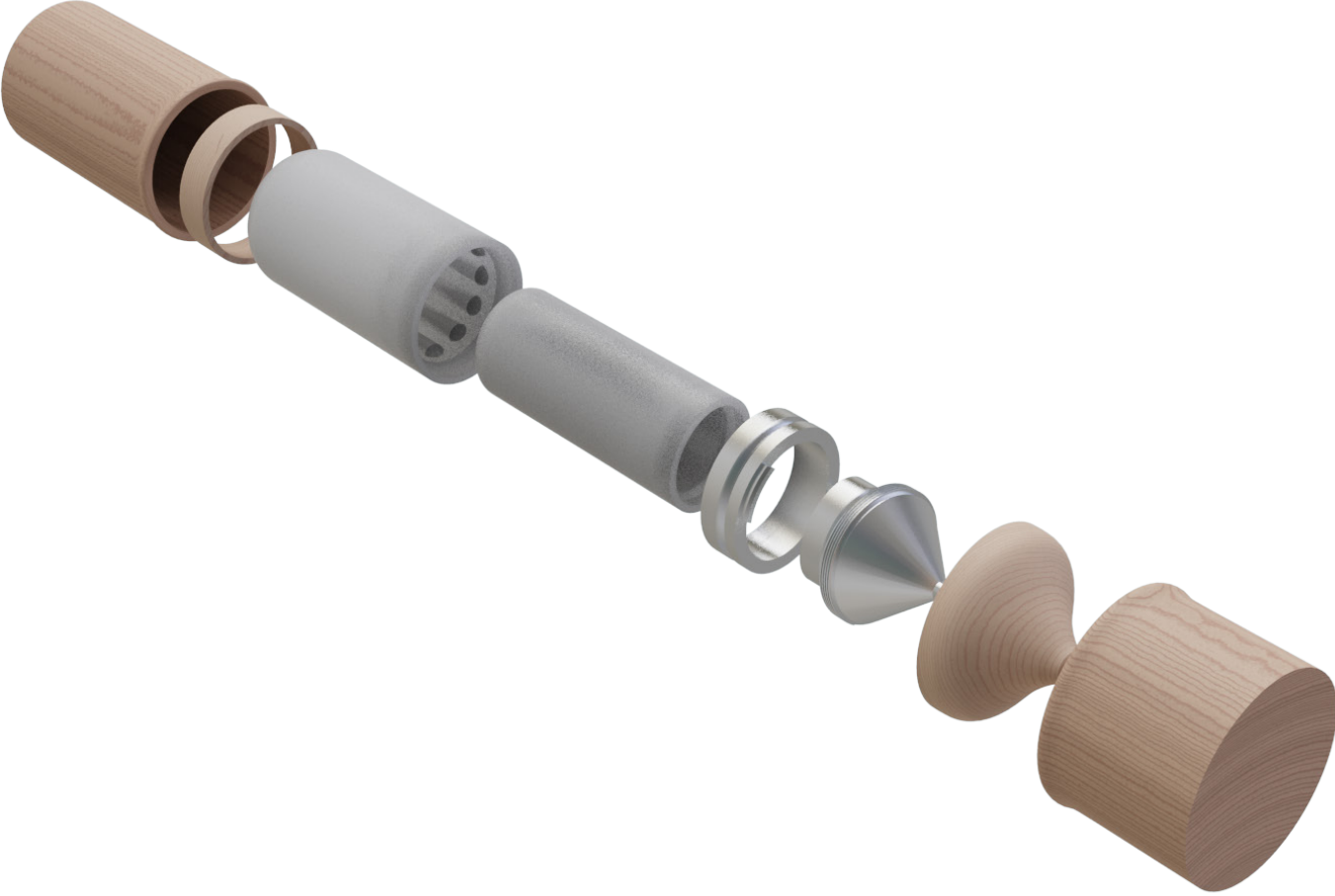


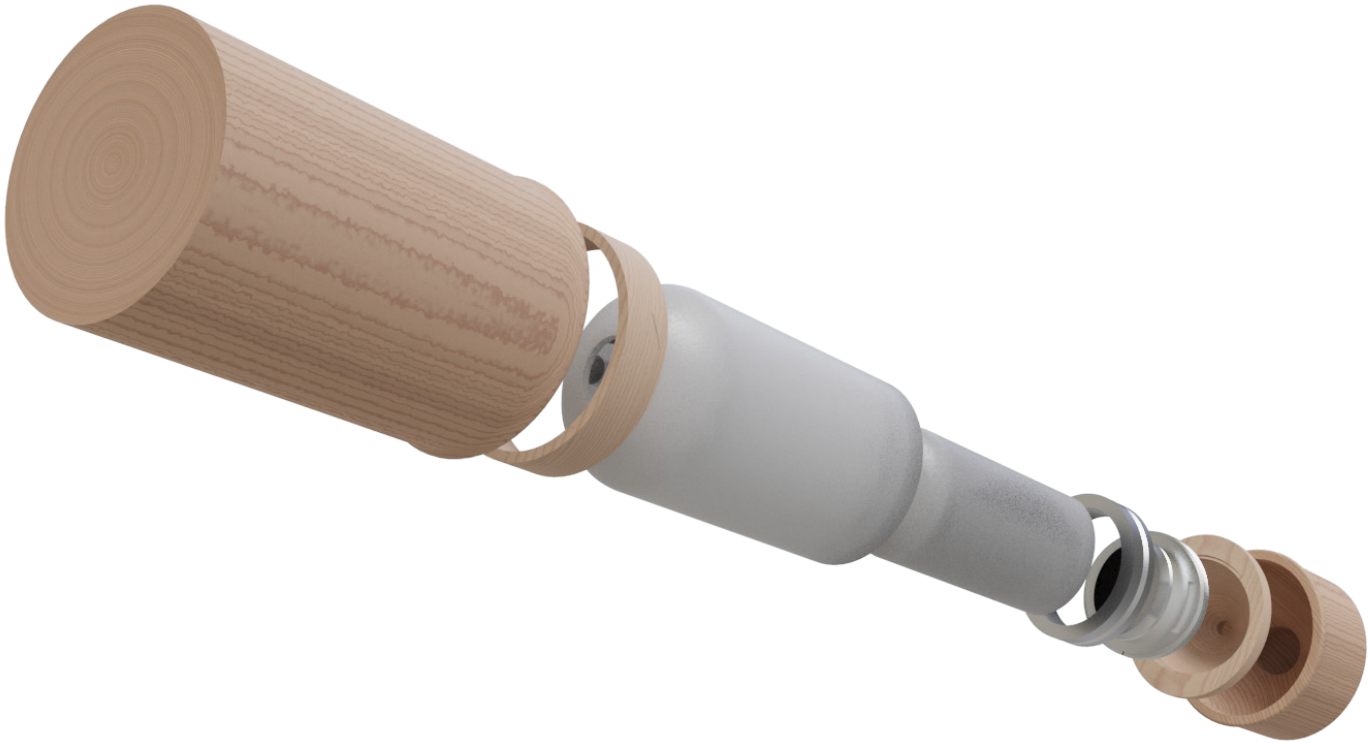


# Will

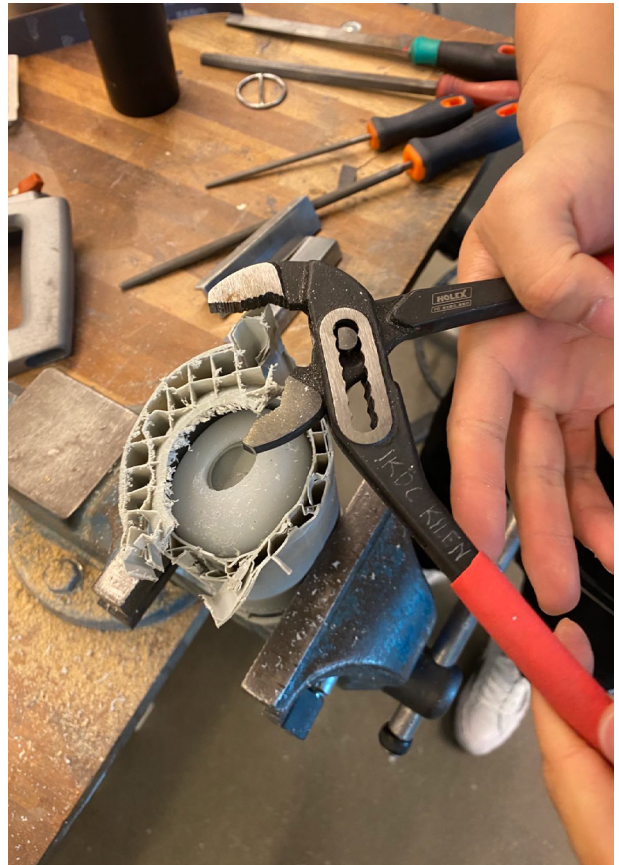
A will to approach, will finally approach.

Exploded view





## Mold process



Since the shape of the silicon is thinner in the middle, it cannot be taken out of the one-piece mold. I have to take it out by destroying the mold.

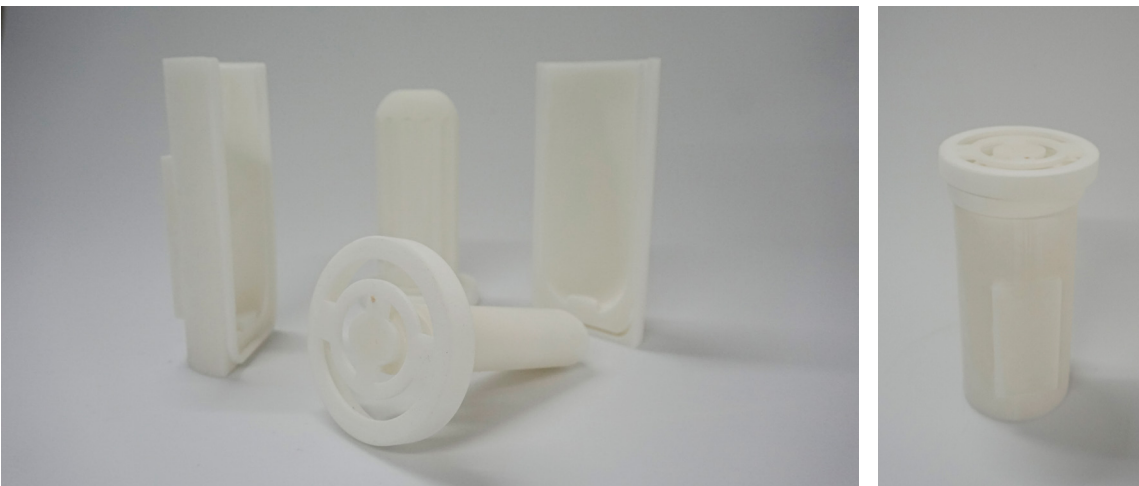
## Test version details



Luckily I got it successfully.  
It performance well with the  
pattern inside.

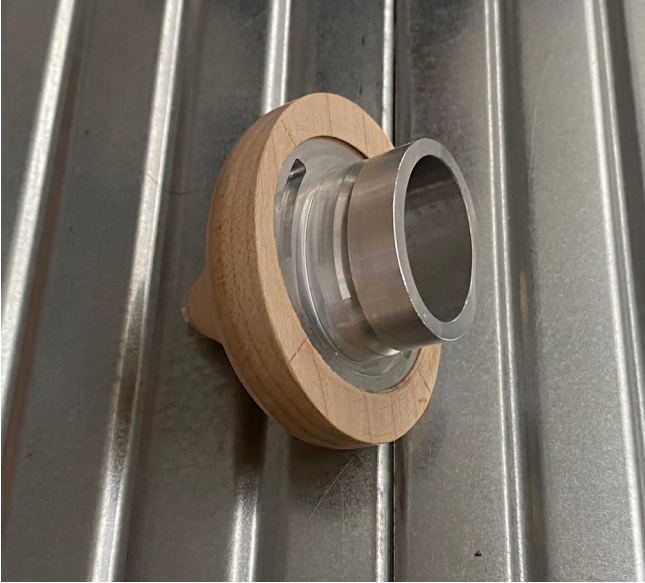
Then what needs to be done is to  
redesign the mold for the silicon.

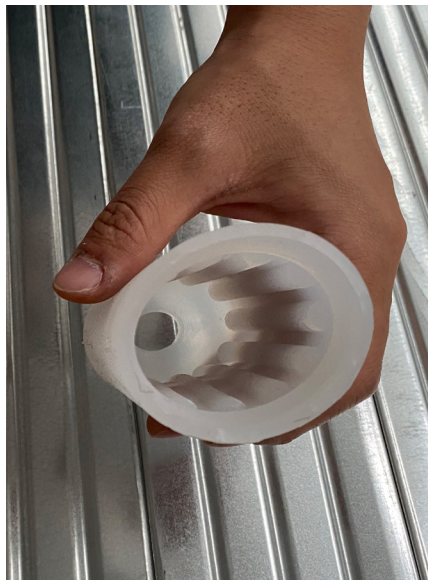
## Mold redesign



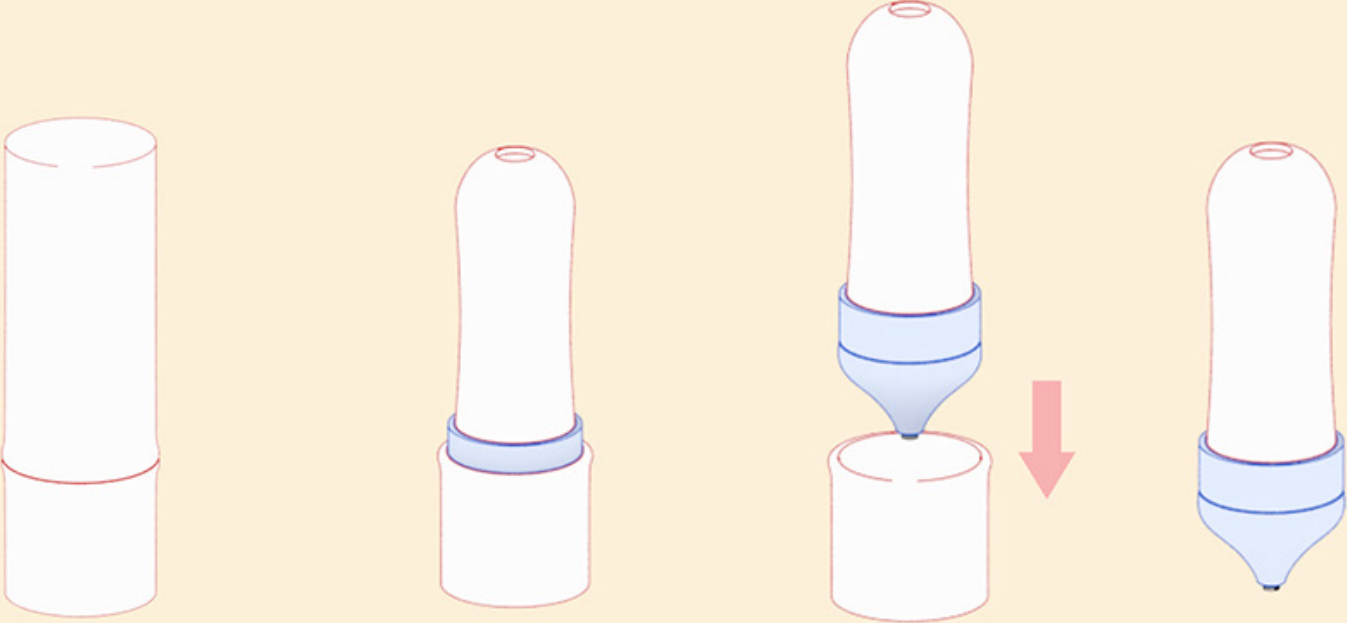
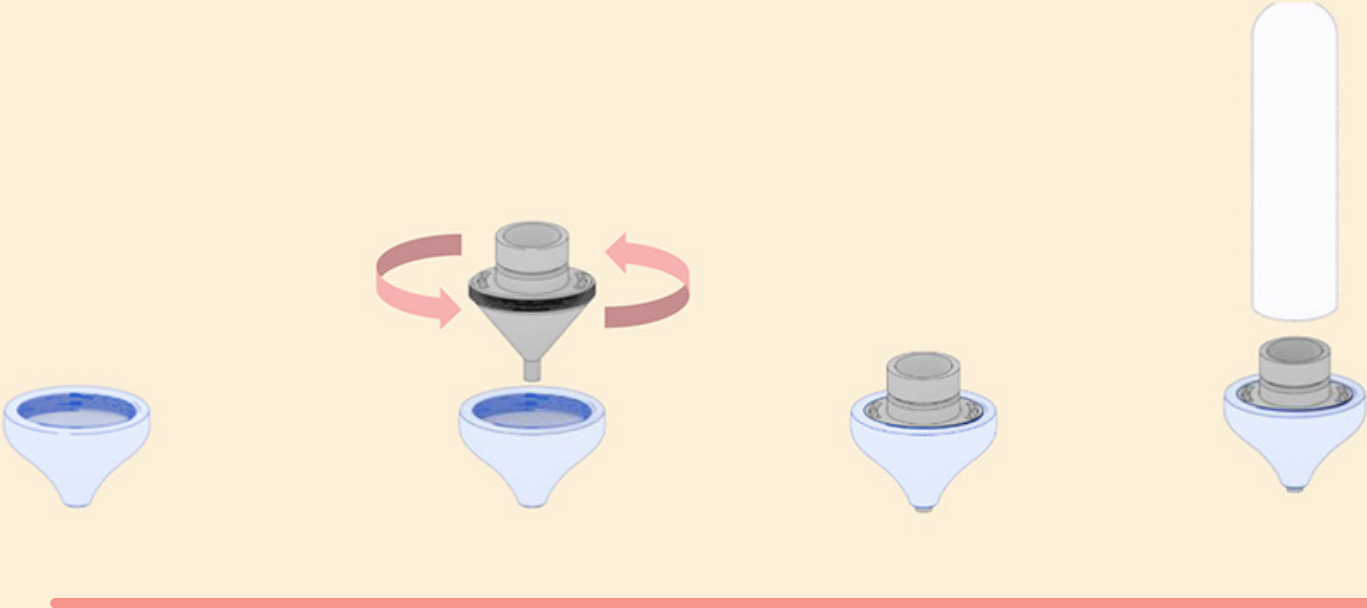
To divide the outer mold into two pieces can make it easier to take the silicon  
inside out. Since the two silicon parts have some space in between, it is  
possible to make the mold into one set to save some material.

Prototype

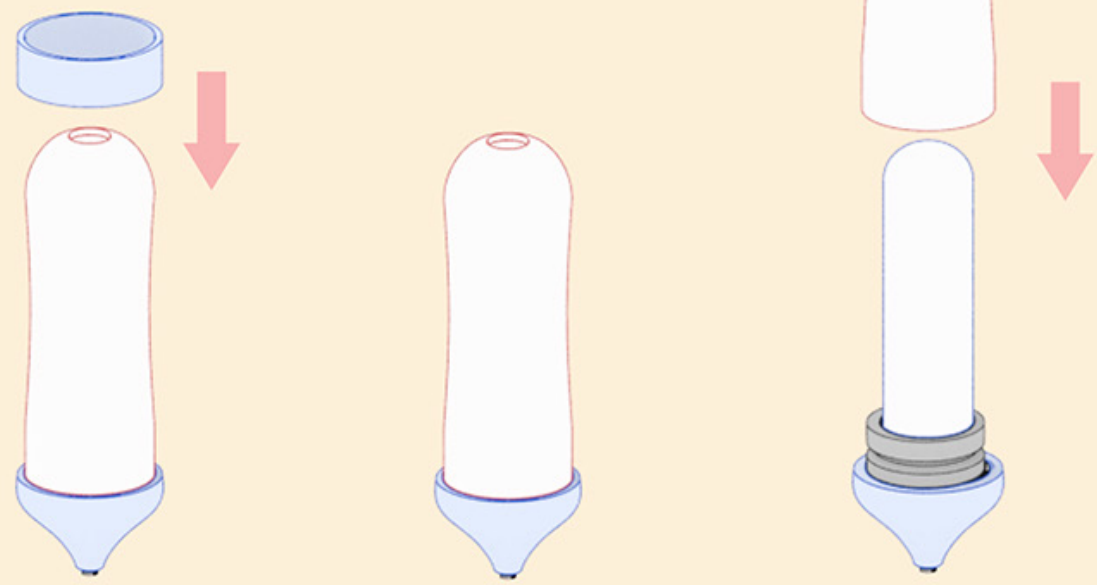
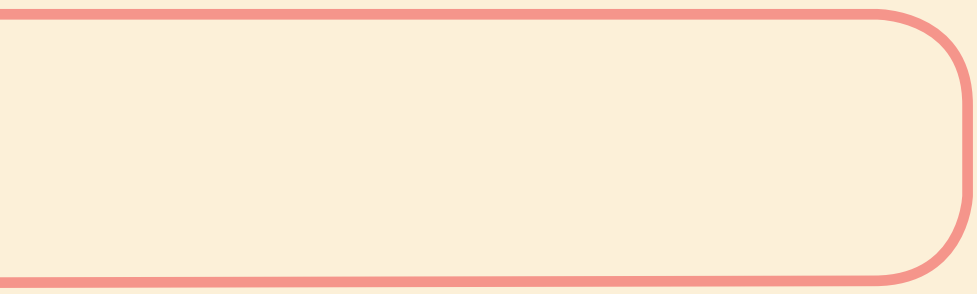
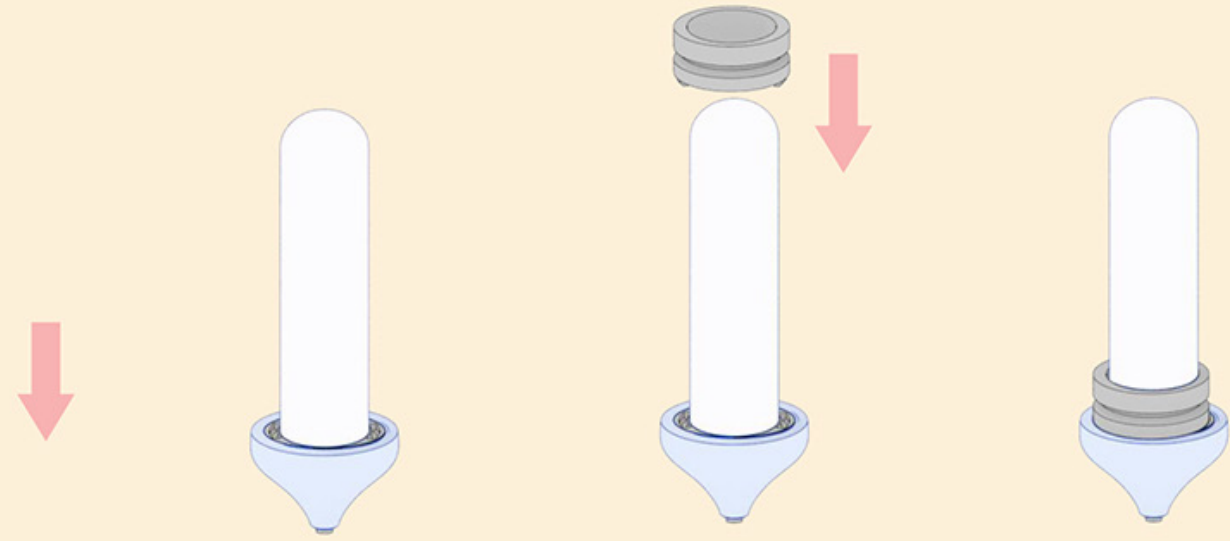




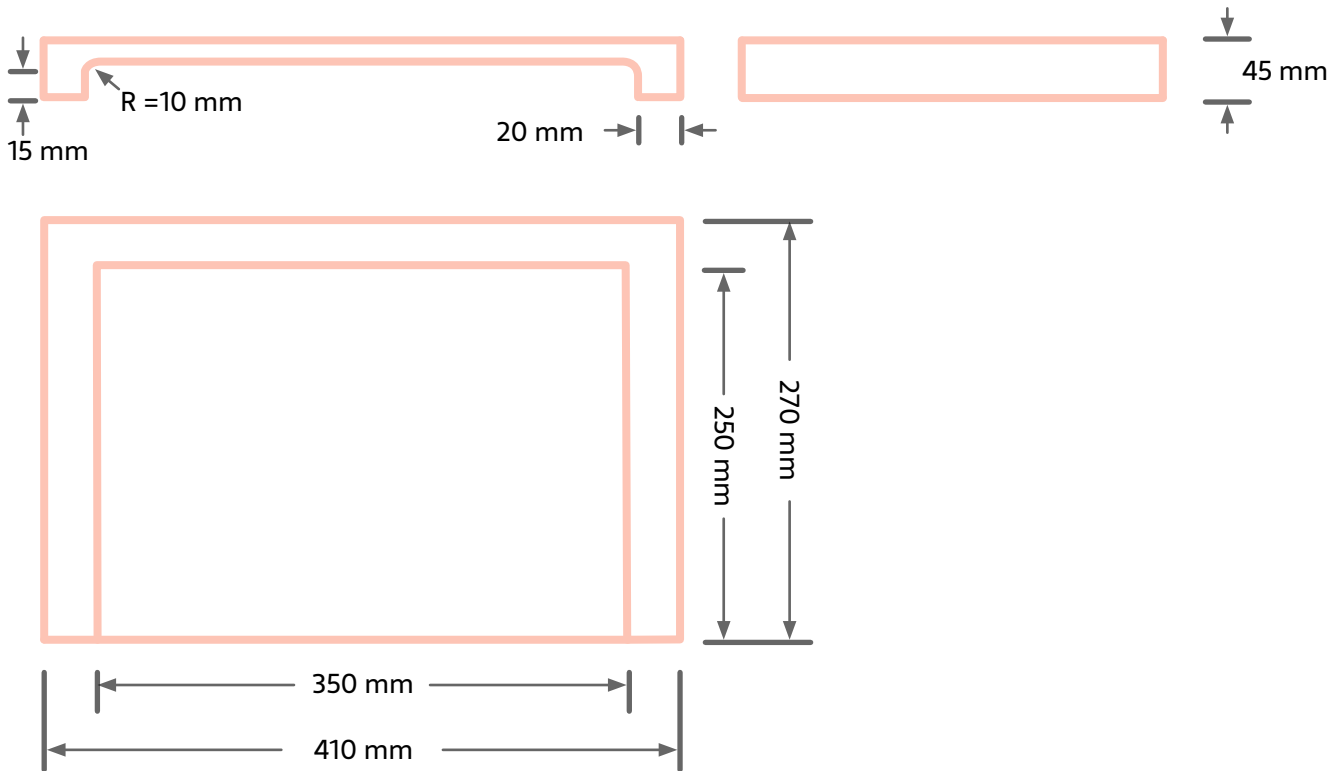
User manual







## Extra desk design



A desk that fits for green hands to paint on is necessary, I choose the same material, maple, to keep it coherent with the painter. Straight line with small round conner comes from typical Chinese furniture. A silicon cover on above can avoid sugar sticking on the desk. Users can easily take the sugar painting off after finishing. A drawing draft can be put beneath the transparent silicon sheet as a guide so that green hands are able to finish it more easily.

## Sugar recipe



### Phase 1

Prepare sugar and water in a 2:1 volume ratio. Water can be more but never be less. If water is more than half the sugar volume, it will extend the time of the whole heating process. If the water is less than half the sugar volume, it will fail because the sugar will not melt in a proper way.



### Phase 2

To heat the mixture with slow fire. The higher the gear, the faster the process. With faster fire it will increase the possibility of failure, since the process is hard to control in the last part. The sugar will rapidly change to fake material.



### Phase 3

After about 5 minutes, the mixture start to boil, and the temperature of the mixture is 105 degree Celsius. The water start to come out and help to melt sugar gently. During this phase, user can slightly stir the mixture to prevent sugar precipitation.



#### Phase 4

After about 15 minutes, the temperature will come to 170-180 degree Celsius, and the color of the sugar turns to gold. Stop the power and put the pot out of the stove. Now the sugar is well prepared and can be used as the filler. The sugar will slowly cool down and solidify, it can be used until totally solidify.

If the sugar is heated for too long, the sugar will burn and turn to brown color, which means that it is not available anymore. And if the sugar is not heated to 170 degree Celsius, it is also not available.



#### Phase 5

The solidified sugar can be used next time as well. Keep it and if users want to use it again, just melt it with slow fire, it will only take about 5 minutes to melt it and as long as it is not brown, it can be used for several times.

Note: The sugar sold in the supermarket is sufficient for use, different kinds of sugar will slightly influence the time of the heating process, normally fruit sugar takes more time to heat and solidifies more slowly than sucrose.

The amount of mixture will also influence the heating time, the more the mixture, the longer the time it costs.

# Reflections

The topic, to look for an approach to the revival of dying Chinese street food culture, attracts me a lot. During the whole project, it pushed me to explore more. However, it is such a niche topic that I can hardly find a proper and logical way to solve the problem. There are several things that might be able to approve below.

At first, the form of the tool is totally changed. I did a lot of research about relationship between food culture and cooks. Although it is evidenced that the food we eat and how we cook it is always relevant to the development of cooks, I can hardly persuade myself that design a totally new tool is good for solving this problem. In fact, to change it from a spoon to a pen-shape or to say a dropper-shape tool will absolutely make it easier for new beginners, but it also introduce a new experience that is different from the formal one. The tool that I design is not aimed to replace the old one, but what will happen to the situation is still unclear. It might be a cure to the dying sugar painting, might it also be a poison. The development and innovation of a tool will always bring both chances and problems.

Secondly, the intuitive principle, semantic design, confused me a lot during the process. The better the semantic design on the product is accomplished, the better it shows users how to hold it and how to use it. That is to say, it will provide limitations on using it. Personally, I don't think it is good to offer too many limitations. If there is only one right way that user can operate it and all the other approach will be uncomfortable, it will never be a good product. Since the product is aimed to have a large audience and their hands are much different from one to another, I try to offer a few instructions on how to use the product. However, the 'good enough design' is worth discussing.

About the material choices and prototype process, there are a lot that could be better. Since the product will work at about 170 degree Celsius, the material will expand because of heatness. The problem is that different material will expand differently in the same temperature, which means it might have some problems with the connections after long term using, especially the thread on the wood. Considering to show Chinese traditional culture and aesthetics, the wood should use rosewood, which is commonly used in Chinese furniture.

Food class silicon is a good material for this product, but it will not solidify in a sLA (stereo Lithography Apparatus) mold. This caused a huge problem for I cannot take the silicon out of the mold even after I divide the mold in two pieces.

The last thing is about the mass production. Since the wooden part is made into oval shape, it is not suitable for mass production. In this project, I decide to show craftsmanship and try to make it difficult to be mass produced, which is quite successful. It will add additional value to the product. However, if it spreads around and is accepted by a large amount of users, to use some other fiber material that can be pressed to form is a good choice for the future.

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