清爽
沁凉

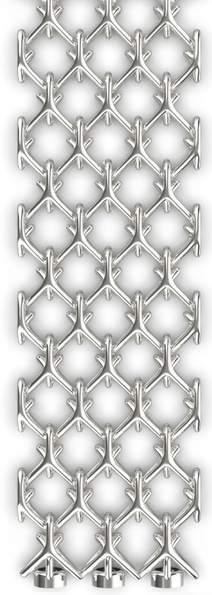
serene

EDWIN
TANU

serene

A collection of jewelry that provides a sense of cooling for the mind and body. Consisting of Crystal: a 3D printed bracelet inspired by ice crystal, Lilia: a scented necklace inspired by white lily.

materialize shanghai
artcenter college of design x neuni
fall 2019



CRYSTAL

Digitally fabricated bracelet inspired by the ice crystal
and the structure of cooling.

LILIA

A scented necklace that releases aromatherapy, inspired by
the local white lily.

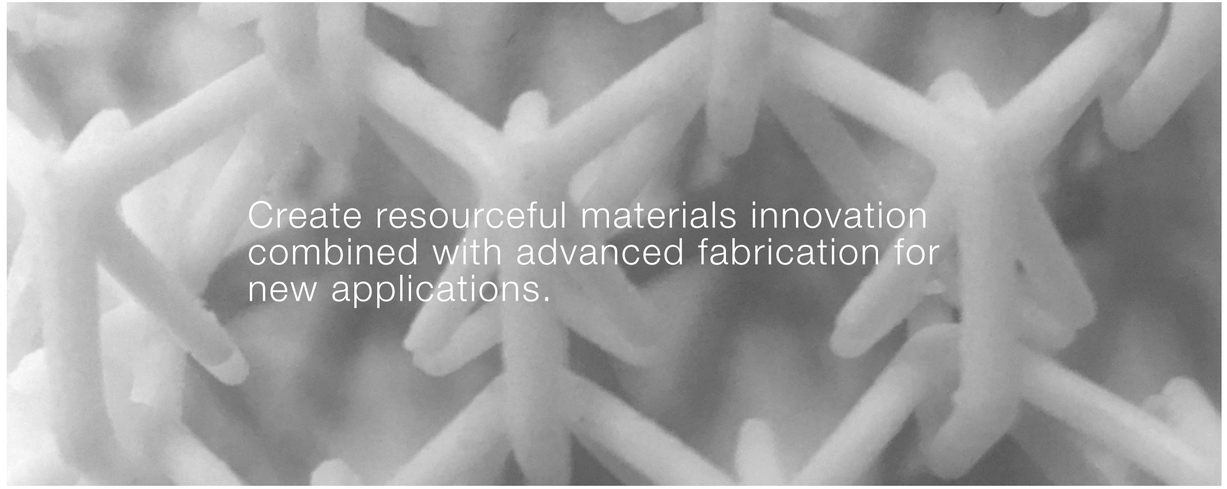
MATERIALIZE SHANGHAI

A study away program through a partnership between Artcenter college of design and Neuni in Shanghai. Aiming for radical material innovations and new applications with Neuni's network.

14 Weeks project

ArtCenter × 连联 neuni

project brief



RESOURCEFUL MATERIALS INNOVATION & APPLICATION

Create resourceful materials innovation combined with advanced fabrication. Develop new materials working with Neuni's network of factories, materials scientists & logistics experts. Design potential applications of these new materials across a range of scales.

FIELD RESEARCH: CREATED IN CHINA

Seek opportunities for materials innovation with Neuni's network of manufacturers, digital fabrication & design studios across China. The design studio will be driven by a real world 3 week field research trip and lectures through out the term.

FROM CLASSROOM TO MARKET

How might young global designers bring unique perspectives, new products & sustainable design thinking to manufacturing? And in turn, how might this direct relationships with manufacturers allow fresh design ideas to be realized.

research
field trip

3-week materials research trip to manufacturers, designers & artisans to discover China's range of making.

Field Research Objectives:
- Identify opportunities for materials innovation with Neuni's network of manufacturers, digital fabrication & design studios.

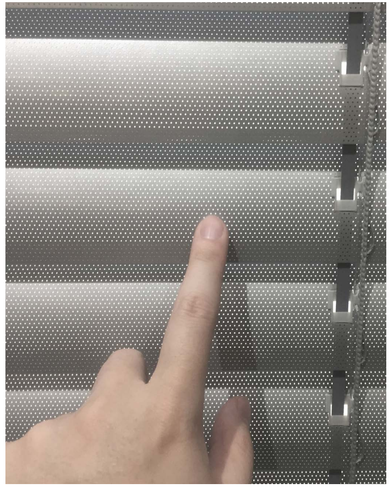
- Seek key opportunitis for design to make an impact and create value.

- Understand unique ecological, cultural, social, and historical contexts.

Field trip started on September 2nd, 2019
From Shanghai - Suzhou - Anji - Beijing - Shanghai

01. NEUNI


02. ENDLESS FORM


03. HUNTER DOUGLAS

research
field trip

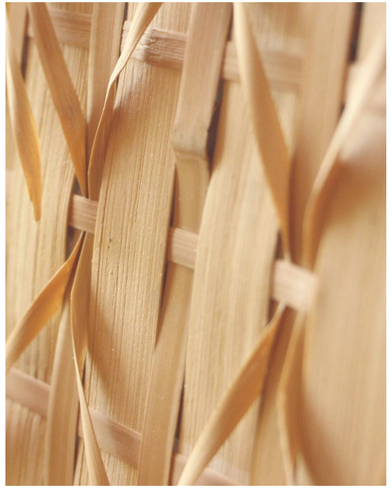
04. SANTONI 3D KNIT

05. CHEN FENG FAST FASHION

06. SMP

07. NEW TIME

08. RONG LIBRARY



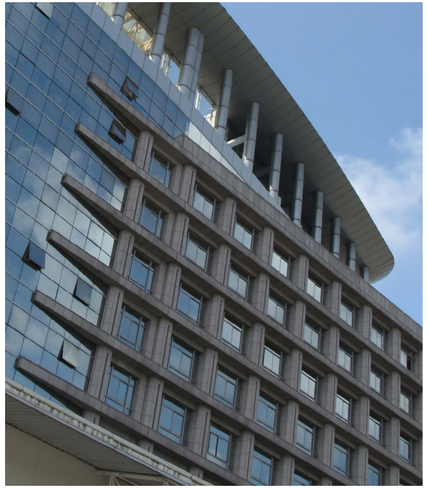
research
field trip

09. QINSHAN BAMBOO WEAVING

10. DATANG FURNITURE

11. ANJI FAN FACTORY

12. BAMBOO EXPO



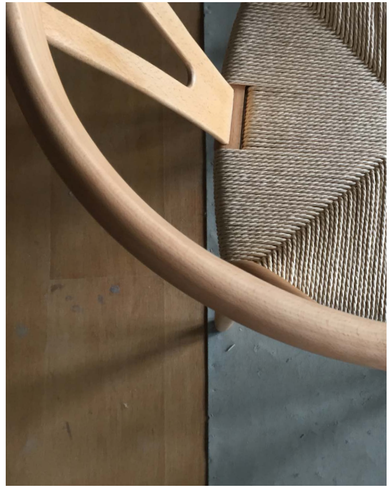
13. ANJI CITY HALL

14. RAMMED EARTH FACTORY

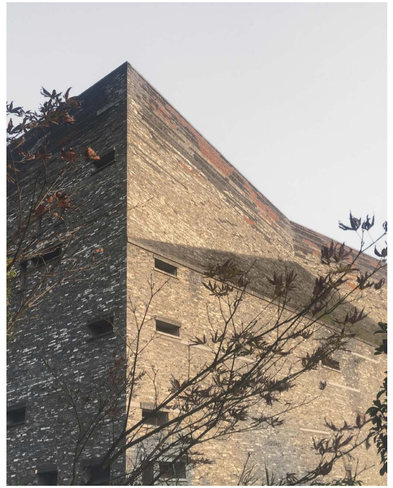
research
field trip

15. BAMBOO FURNITURE

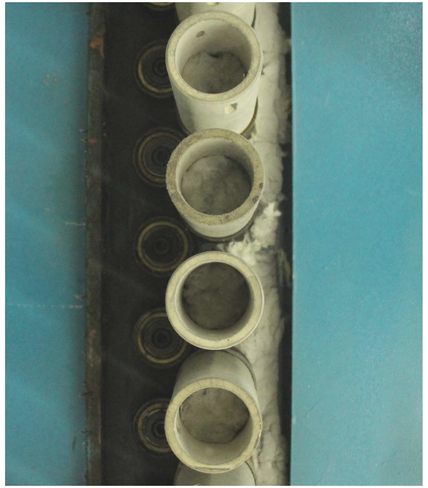
16. CHRISTOPH GUBERAN WORKSHOP



17. EDIMASS FURNITURE



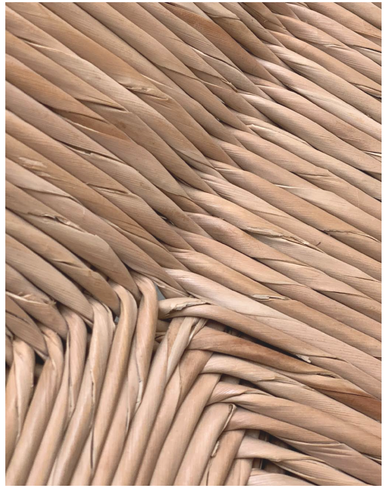
18. NINGBO MUSEUM



19. DONGPENG CERAMIC

20. JOLLYING LUGGAGE

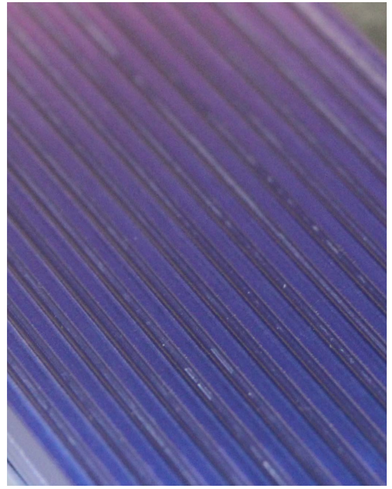
research
field trip

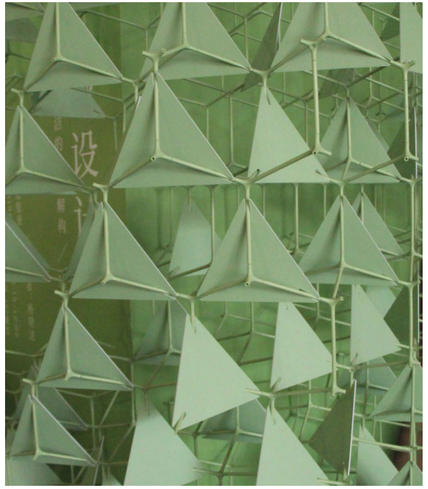


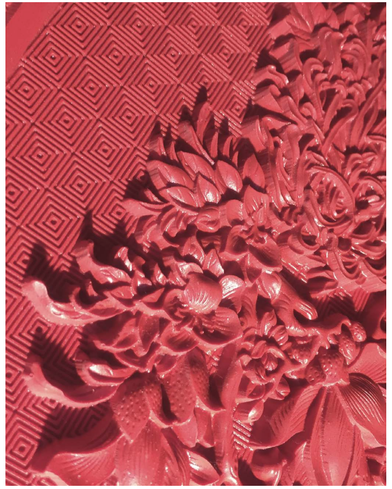
21. LEVIA FURNITURE

22. MORPHEUS HOTEL

23. BEIJING DESIGN WEEK

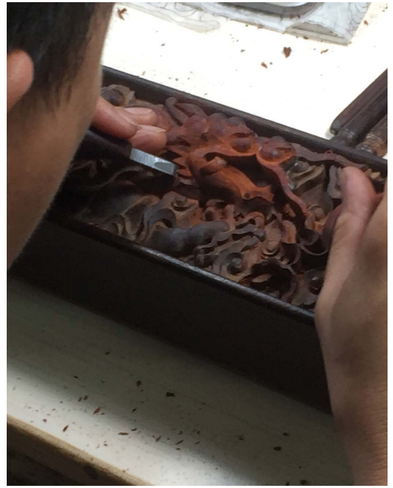






24. LACQUER ARTISAN

research
field trip



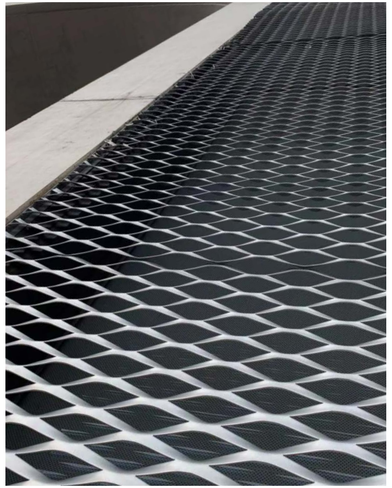
25. BAI BAO QIAN

26. JUNYA ISHIGAMI: FREEING ARCHITECTURE

27. BURGEREE

28. SUZHOU MUSEUM

29. WATER TANK MUSEUM



30. LONG MUSEUM

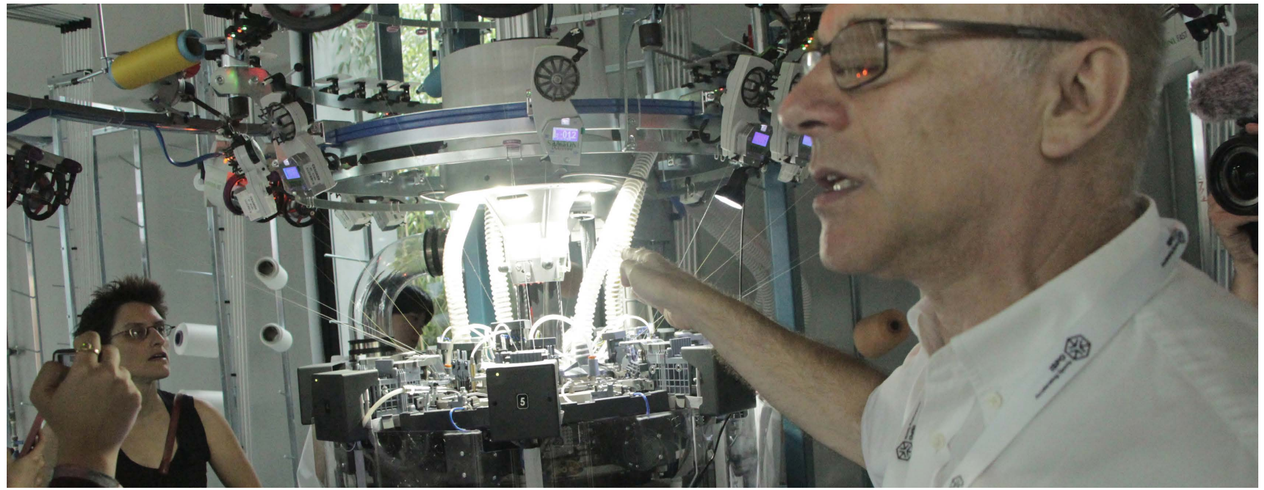
field-trip analysis

source: unsplash.com

We constantly endured the summer heat.

It was a fantastic field-trip, but the summer heat affected us physically and mentally. We are continually heating up physically by the weather, the factory, the fast pace trip.

field-trip analysis



Santoni 3D knit

Endless form

Fast-paced activities.

On top of the heat, we were also bombarded by a large number of new information every time we visited new places and factories

field-trip analysis

Bamboo furniture

The heat affected us physically and mentally.

The heat and the rapid changing of activity tired us down and causing an uncomfortable feeling for us and made us less focus and not presence

however..

There were a few refreshing small moments that help us cool down.

RAMMED EARTH

I was surprised by the rammed earth house when the first time I went inside it. The interior of rammed earth feels a lot cooler, and later I learned that rammed earth has thermal mass properties, which means it can absorb a lot of heat during the day and releasing it during the night.

ANJI BAMBOO TILES

I found bamboo tiles in one of the host's house. These bamboo tiles are made out of condensed bamboo, which has low thermal conductivity. Due to its properties, this material is used to create a cooling effect and refreshing feelings for anyone who seats on it.

CHIFFON FAN & PAPER UMBRELLA

The ancient fan and umbrella are other excellent examples of utilizing materials and crafts in a smart way to create senses of cooling.

jade stone cooling

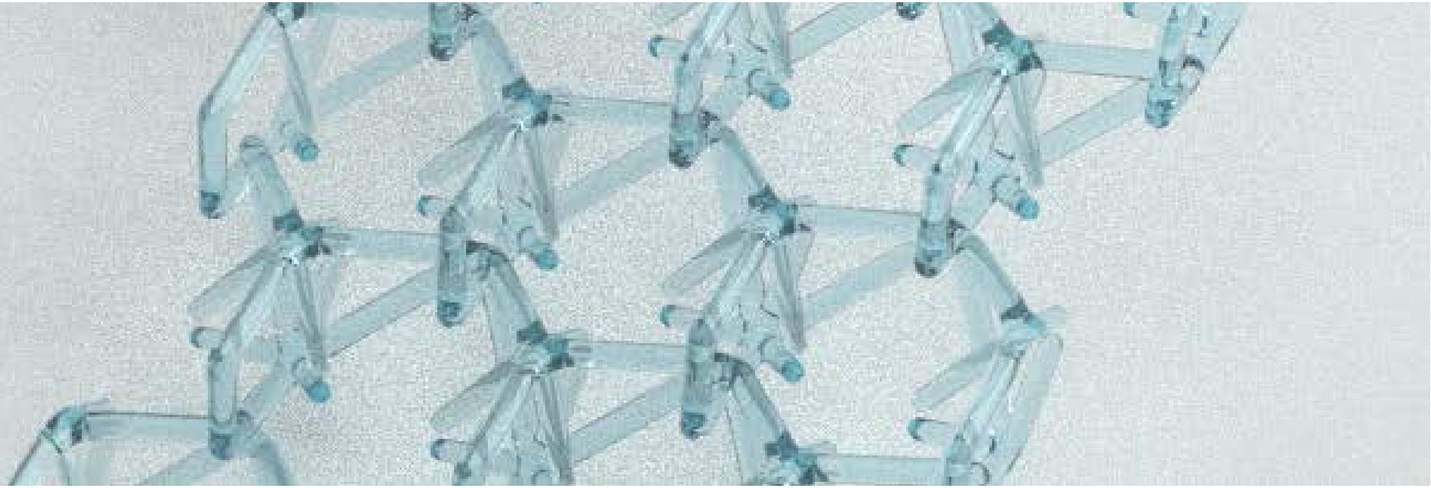
These cooling down moments gave me inspiration to rethink how we perceived cooling.

Let's improve the frequency of these cooling down moments.

source: unsplash.com

design opportunity

How might we create a sense of cooling for our mind and body through designs and material innovations?



design concept

serene.

Sense of cooling for the mind and body.

How can we create a sense of cooling without being affected by the environment?

How can we create a sense of cooling without consuming energy?

How can we utilize materials and crafts to create a sense of cooling?

Can we trick our senses to feel cool?

source: unsplash.com

What is cool? physically.

A fairly low temperature. (n)

When we are talking about “cool”, we often refer it as temperature “cool”, means lack of heat or energy. Our body needs to stay cool all the time.

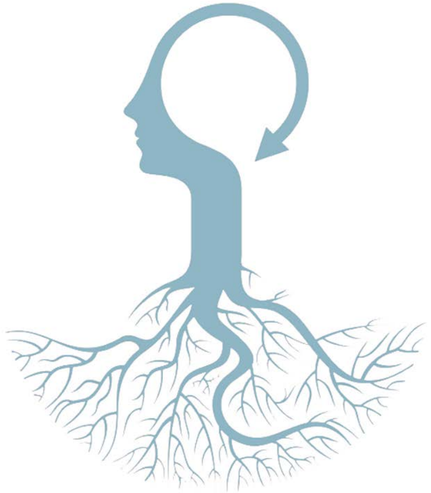
source: unsplash.com

What is cool? mentally.

Calmness; composure. (n)

Mental coolness is as important as physical coolness. But often time we neglect it. Achieving mental coolness will affect physical coolness.

source: unsplash .com



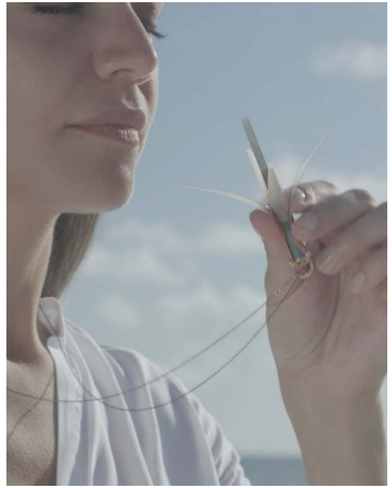
Physical coolness and mental coolness affect one another.

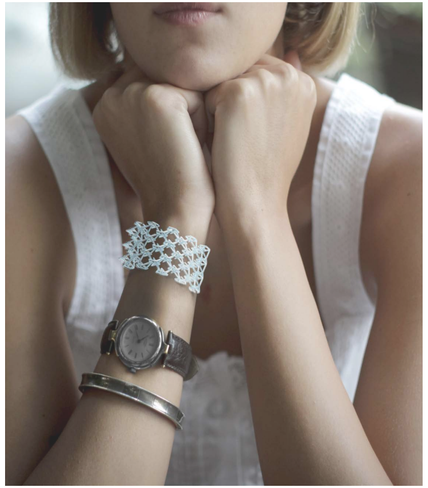
Our body and mind are two sides of one coin. Both affect each other. When we are calm, our body is cool. On the other hand, when our body temperature is rising, our mental state can never be peaceful. It is essential to keep both bodies and mind cool.

source: junya ishiigami house of peace

Design for on-the-go.

source: unsplash.com





Providing moment to moment cooling rituals.

To create a refreshing and cooling down feels before every activity they are doing. To be calm and presence all the time.

source: unsplash.com

design criteria

1 COOL BUT NOT COLD.

I want to create a sense of cooling that is optimal for the body and the mind. I want to avoid creating a design that is too cold to perceived.

2 MENTALLY & PHYSICALLY.

Physical cooling is not enough. Both physical and mental coolness is required to achieve serenity. I want to emphasize on creating a harmony between psychological and physical cooling to create an even more powerful sense of cooling.

3 ZERO ENERGY COOLING.

The current cooling system that we use today consumes a lot of energy. It consumes 17% of electricity worldwide. Besides, it is also creating a devil's loop by making the earth warmer and forcing us to use more cooling system. I want to create a passive cooling system that avoids any energy consumption.

4 ANYWHERE & EVERYWHERE.

I want to be able to manufacture and create my project anywhere without the boundary of places and I want distribute my project everywhere.

I started by experimenting with materials for cooling.

In the beginning, I have several options: peppermint, rammed earth, bamboo, jade, aluminum. Those materials can give a sense of cooling in different ways. Some of them work through thermal conduction with your body. Others work by tricking your senses

material of focus

source: unsplash.com

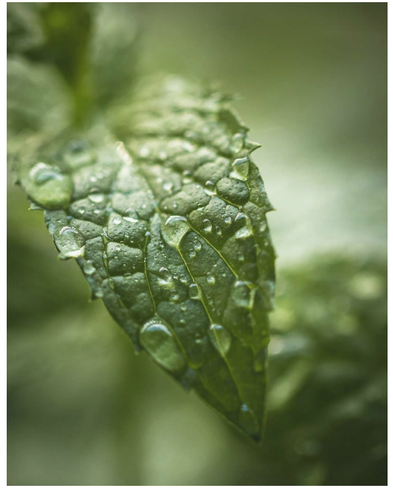
Peppermint

Peppermint is an abundant material in China. It is sometimes considered as invasive plants. It contains menthol, a chemical that can trigger cold receptors in the skin. (TPR-8).Peppermint has three forms; mint powder, dried mint leaves, mint oil.

source: unsplash.com

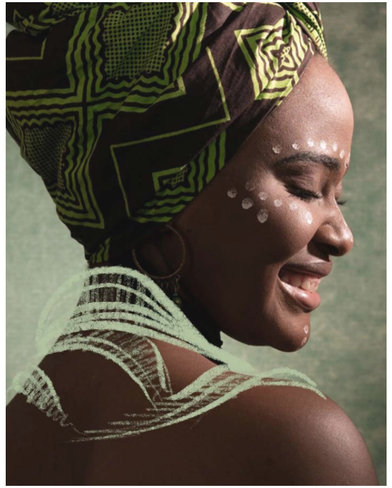
Bamboo

Bamboo is one of the most abundant natural materials in China. It grows fast with minimum care. It has historical value and functional value. It has a cold surface due to its high density. People from China are using it as a cooling mat.



Peppermint

Menthol crystal



Mint infused artifact

1.
THE MENTHOL EFFECT.

My initial thought was to create mint artifacts that can create a sense of cooling through touch. I was thinking about mint artifacts such as jewelry that can be wore and activated by sweat. So I started to explore the possibilities of hybrid material with mint.

mint powder
mint oil
dried mint leaves

+

PLA
rammed earth
bamboo
bioplastic
cement
pumice
resin
paper

MINT + ...

I tried to combine mint with any material I could find. I tested different methods to combine mint and complementary materials. I tried to find the best potential material innovation.

I combined mint with raw materials that I found during the field trip, ranging from traditional and natural material up to industrial materials with advanced manufacturing processes such as PLA and 3D printing.

3D PRINTED MINT

I tried to 3D print mint by combining the mint powder with PLA powder. I extruded the hybrid filament, and 3D printed the pieces. However, the result wasn't as I expected. The menthol effect is gone.

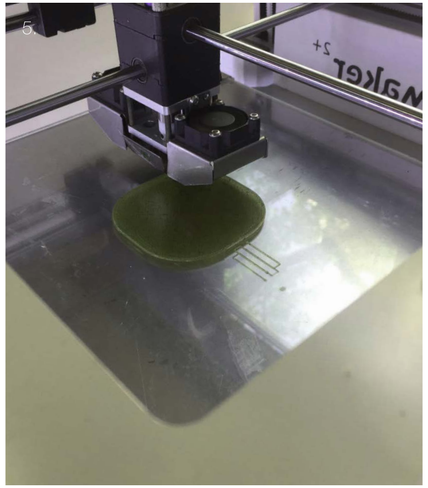
mint printing process

Raw biodegradable PLA + Mint

1% Mint + PLA

Extruding mint

Mint filament



3D printing mint

The result is a unique translucent material with a bit of baked mint scent when in contact with water.

Mint oil
(Menthol extract)

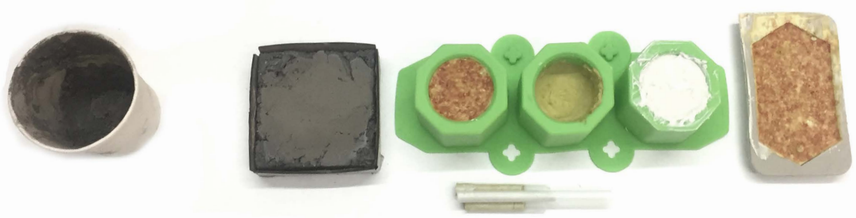
Rammed earth
(high porosity)

Localized +
long lasting scent

MENTHOL SCENT

I tried playing with the mint oil, and I found a satisfying result. I put the mint in porous materials such as rammed earth and pumice — the result: localized scent and last long scent.

mint + resin



mint + cement

mint + paper

LOCALIZED + LONG LASTING SCENT

I played around with cement, resin, rammed earth, and paper to create a localized scent that lasts longer. I found that cement is the best material for the scent and cement also can be molded.

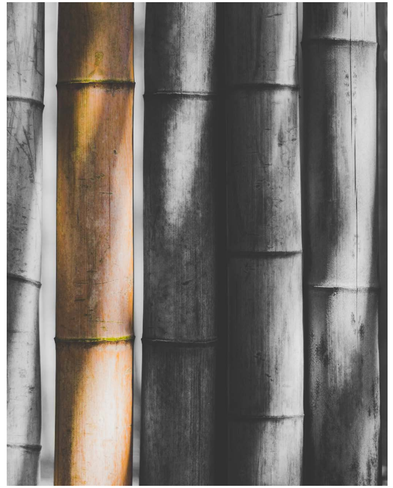
scented concrete

I started with white cement and mint powder.

I combined the cement with mint oil.

I mixed the mint powder to create the desired color.

I started by producing a big piece of concrete. Then I made a smaller piece to see if the scent is holding. The smell on the smaller pieces is not as strong as the scent of the big pieces. However, the scent lasts long.



Bamboo

Cooling surface

Free-form structure

2.
THE BAMBOO EFFECT.

I was thinking about how bamboo tiles can be utilized in other ways. The cooling effect on bamboo tiles is amazing. However, bamboo tiles are heavy and not flexible. What can I do to make it lighter while maintaining the cooling effect?

BEYOND BAMBOO MAT

I began exploring the form of bamboo, starting with a bamboo shoot, to rethinking the structure of bamboo mat to provide a better cooling surface. Weight, flexibility, and comfort is the key in this experiment

surface explorations

1.

Untreated bamboo

2.

Treated bamboo

3.

Bamboo mat

4.

Bamboo chopstick

5.

Treated Bamboo

insight

Bamboo structure 1,2,3 and 5 has a cooling effect like the original bamboo mat. However, bamboo number 5 works the best in terms of flexibility and lightness.

material opportunity

Hybrid material for 3D print

Scented concrete

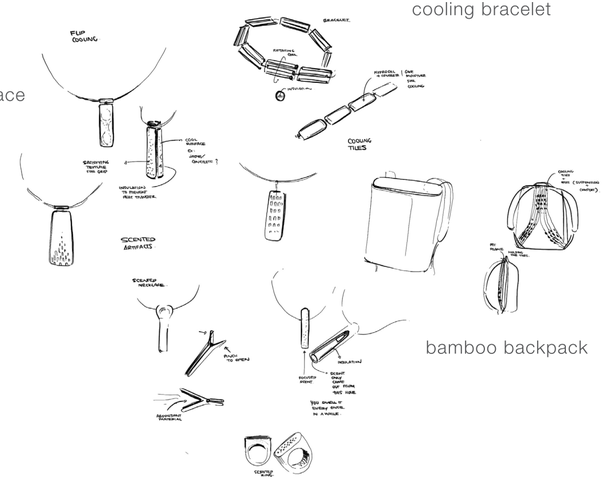
Bamboo cooling

design opportunity

Based on these three reliable exploration results, I want to synthesis the possibility of application for each of the results. I want to create a new sense of cooling for the mind and body.

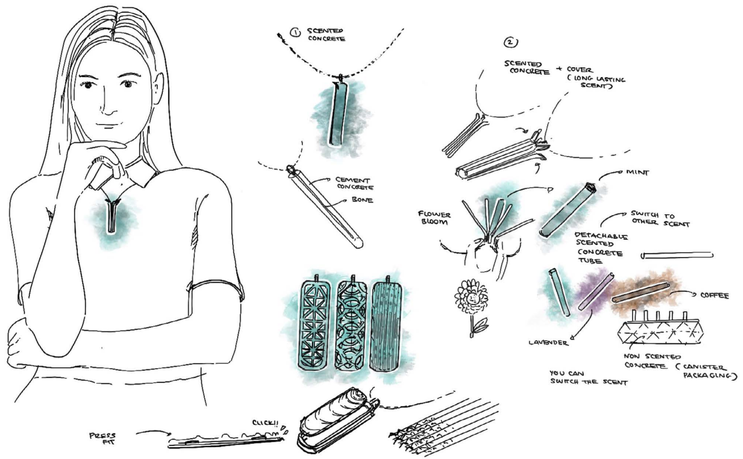
cooling bracelet

scented necklace



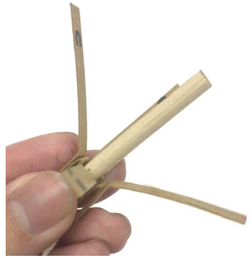
bamboo backpack

1. scented necklace concept development



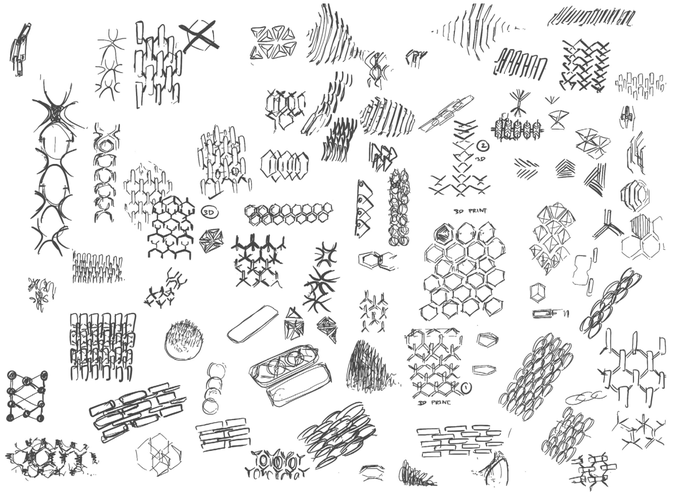
Form development

The necklace is inspired by the blooming flower. Open up by pinching the stem. While it's close, the scent is trapped, and when it's blooming, the scent is released. Later on, I decide to use gravity to make the necklace flourish.

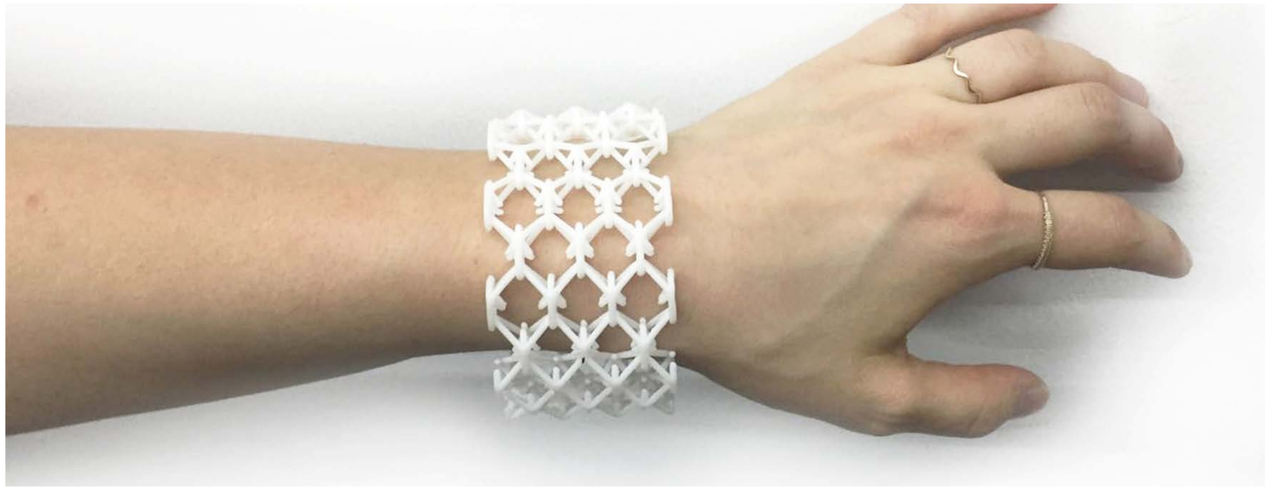


Interaction exploration for releasing the scent.

2. cooling bracelet concept development



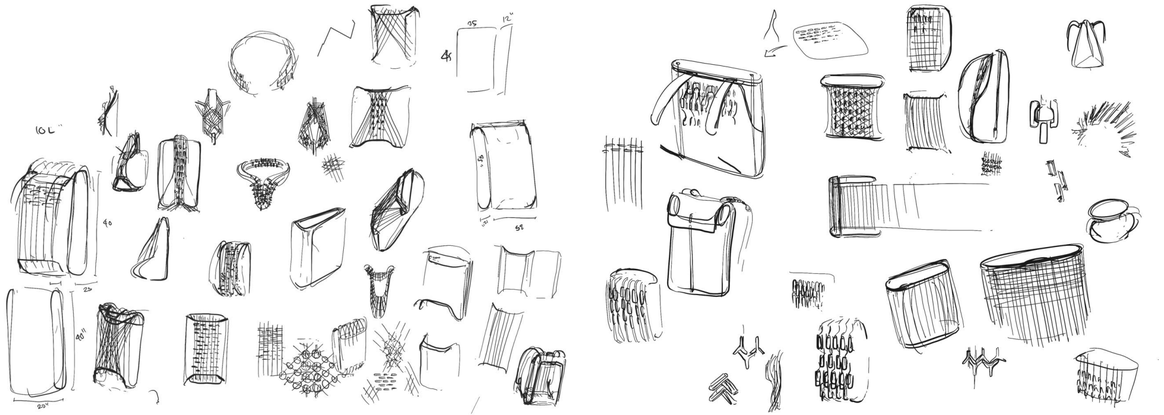
Form development



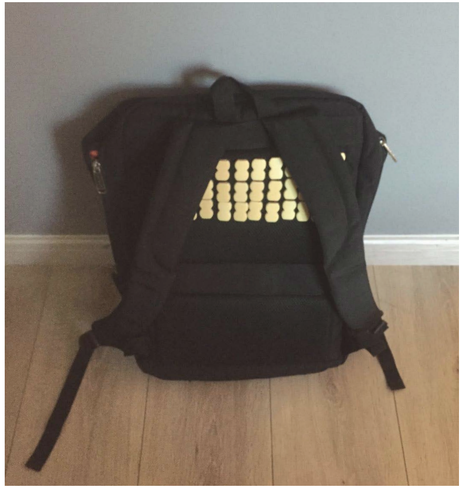
Prototype: SLA printing (white resin)

The bracelet is inspired by ice crystals and mashrabiya; The geometry of cooling achieved by exposing as much surface to the air.

3. bamboo backpack concept development



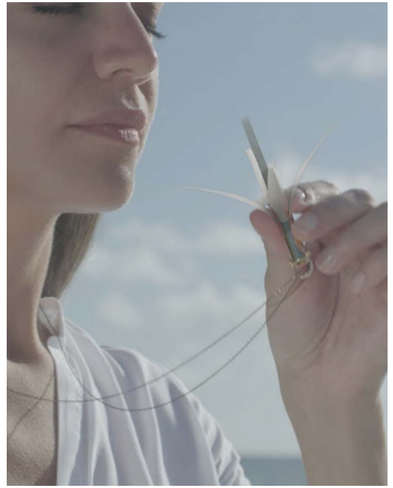
Form development



Concept testing

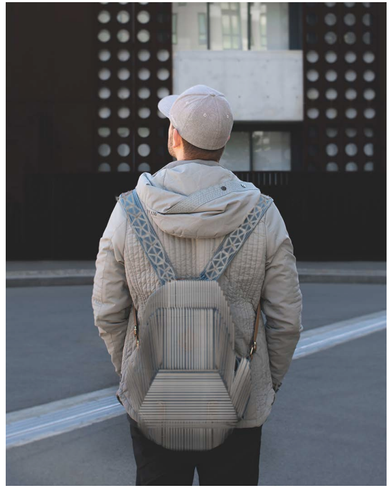
I tried to apply the bamboo cooling mat on my backpack. It feels good to touch the cooling surface every once and a while, however, the bamboo tiles are heavy.

design directions



Lilia: scented necklace
(Scented Concrete)

Crystal: cooling bracelet
(Hybrid 3D print)

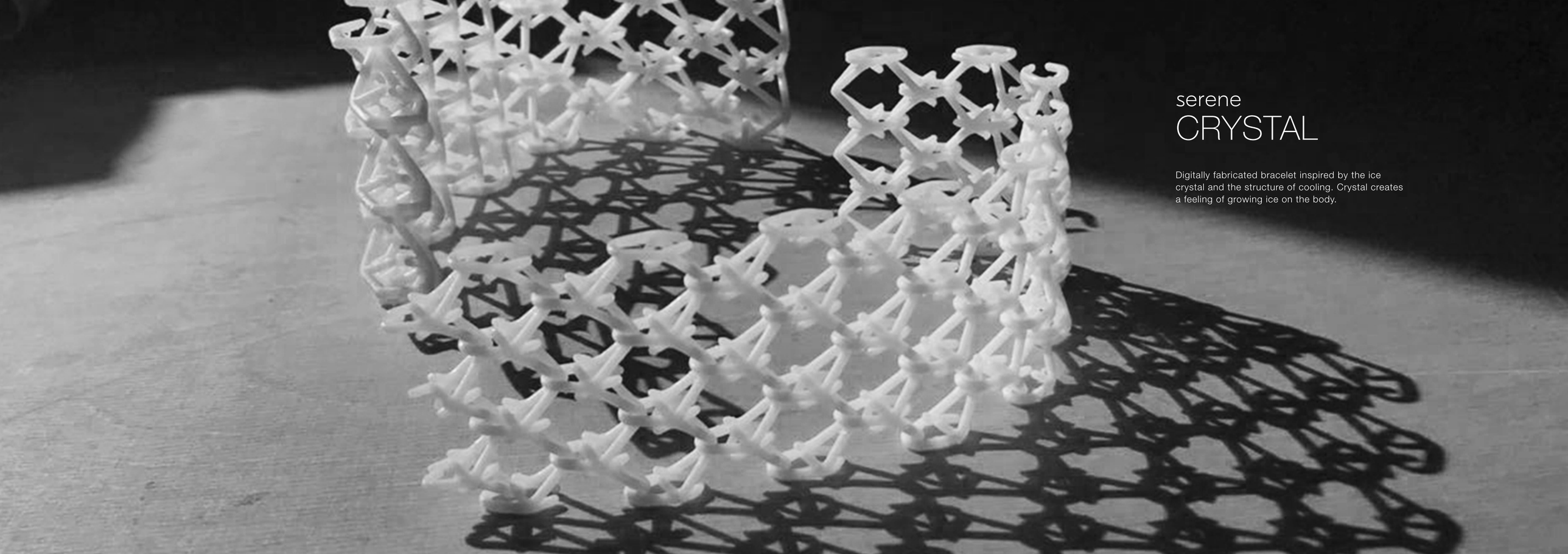


Ere: Bamboo backpack
(Bamboo cooling)

I came up with three design directions based on the concept of explorations. I believe all three directions have a strong potential to be manufactured and sold to the market.

design
concept review

After getting feedbacks, I choose Lilia, a scented necklace and Crystal cooling bracelet, to be developed further due to the better manufacturing opportunity and the possibility of partnering with Neuni.



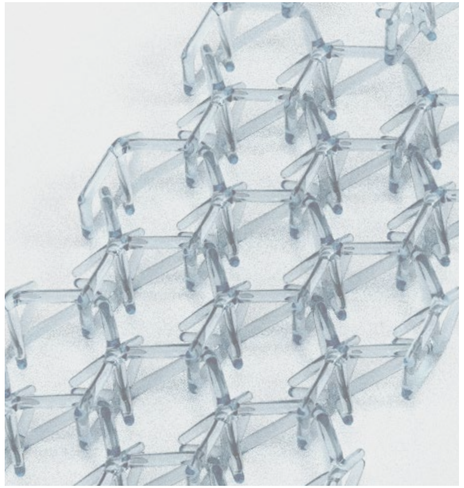
serene
CRYSTAL

Digitally fabricated bracelet inspired by the ice crystal and the structure of cooling. Crystal creates a feeling of growing ice on the body.

serene
CRYSTAL

Crystal is inspired by ice's structure. Through digital fabrication, Crystal is made by reconstructing the geometry of cooling to wrap comfortably on your wrist.

source: unsplash.com



CRYSTAL

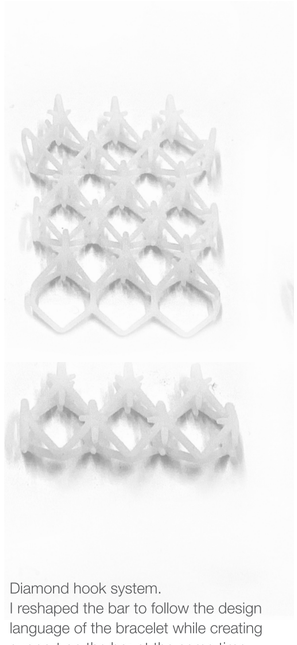
design development

I keep reducing the size of the bracelet to improve the comfort on the wrist. The prototype feels too big and clunky. It doesn't wrap around the wrist properly, but after few iterations, the bracelet fits comfortably on the wrist.

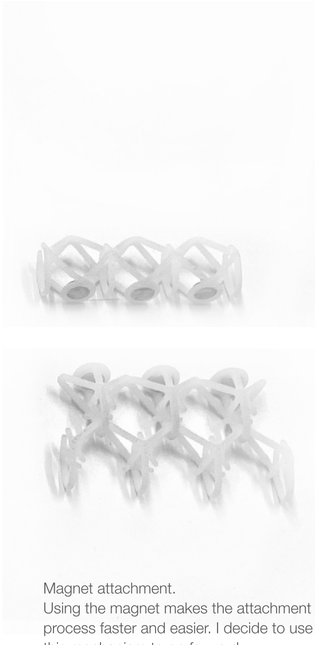
attachment development

Built-in hook system.
It creates a seamless loop on the bracelet, but it's not strong enough and hard to operate with only one hand.

Modified hook system.
I tried to modify the shape of the hook to make the process of putting off the bracelet easier, but the bar is not strong enough

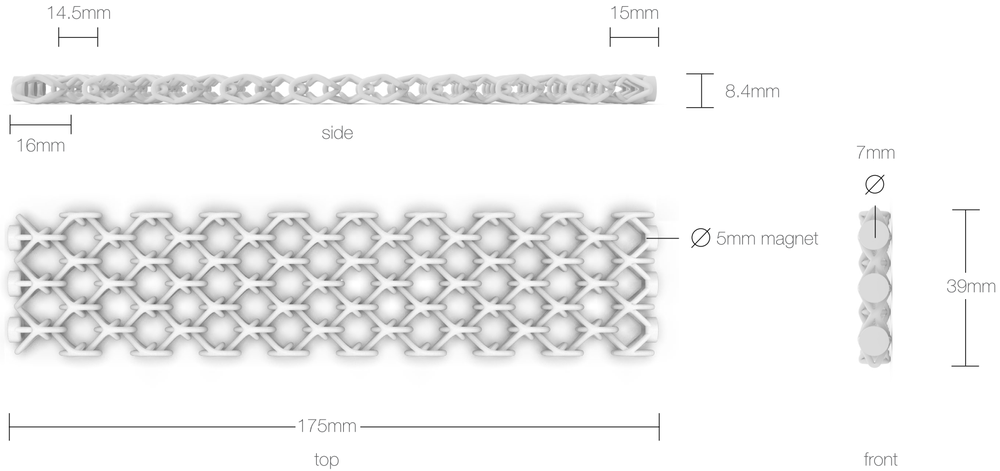


Diamond hook system.
I reshaped the bar to follow the design language of the bracelet while creating support on the bar at the same time.
The overall interaction is better, but it still takes a while.

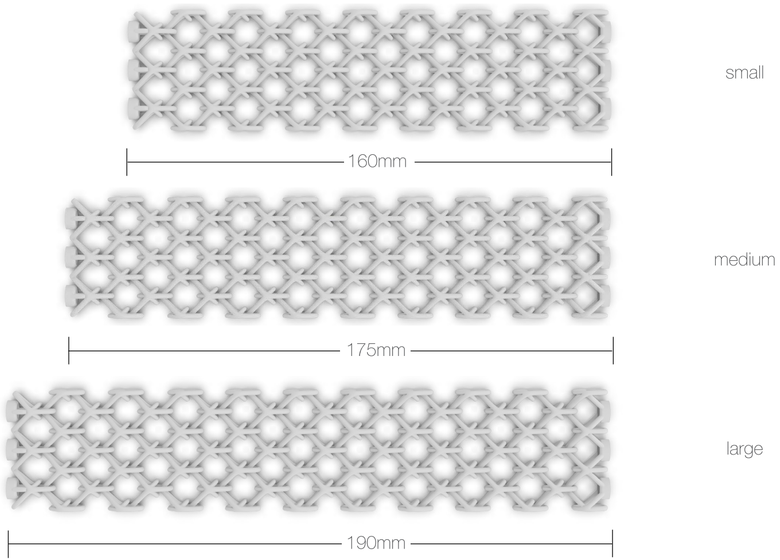


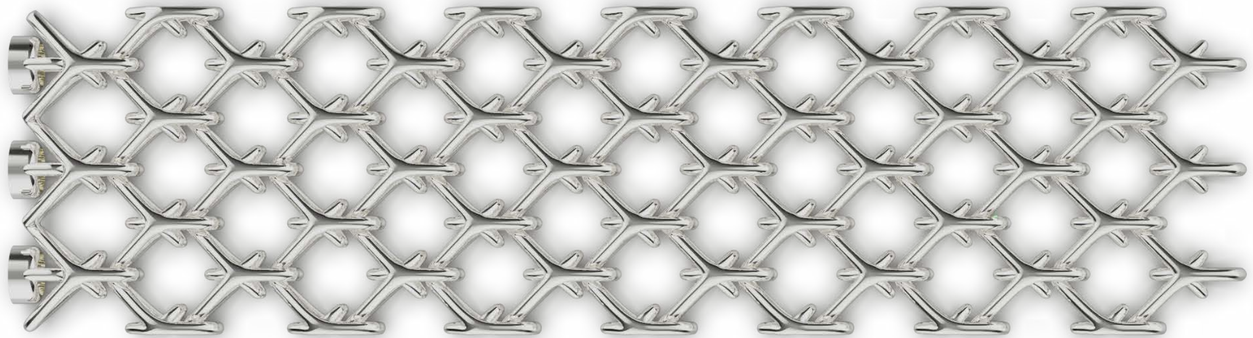
Magnet attachment.
Using the magnet makes the attachment process faster and easier. I decide to use this mechanism to go forward.

dimension profile



size of the bracelet





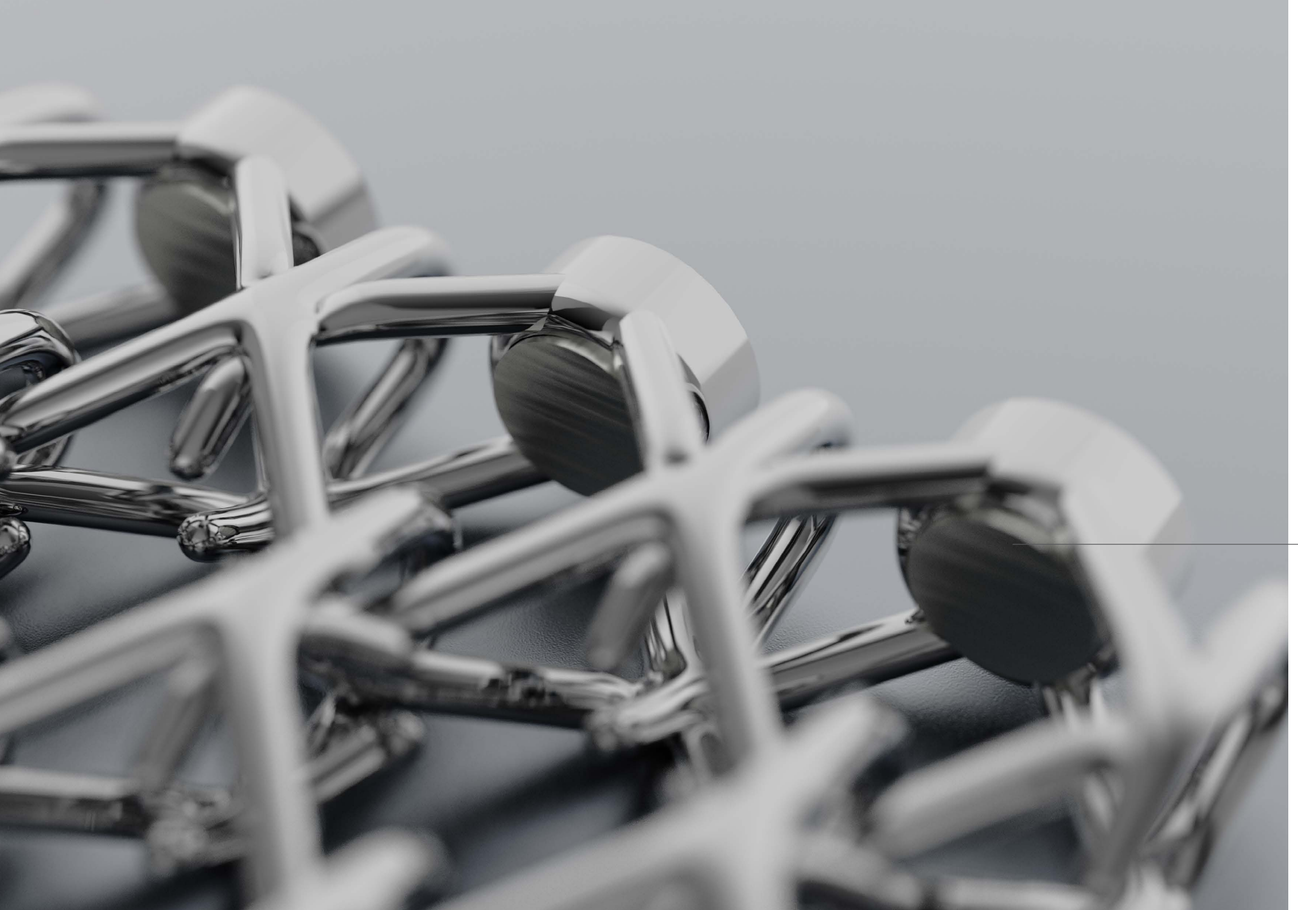
Crystal is assembled during 3D printing, minimizing the manual labor. It consists of three modules

module 1

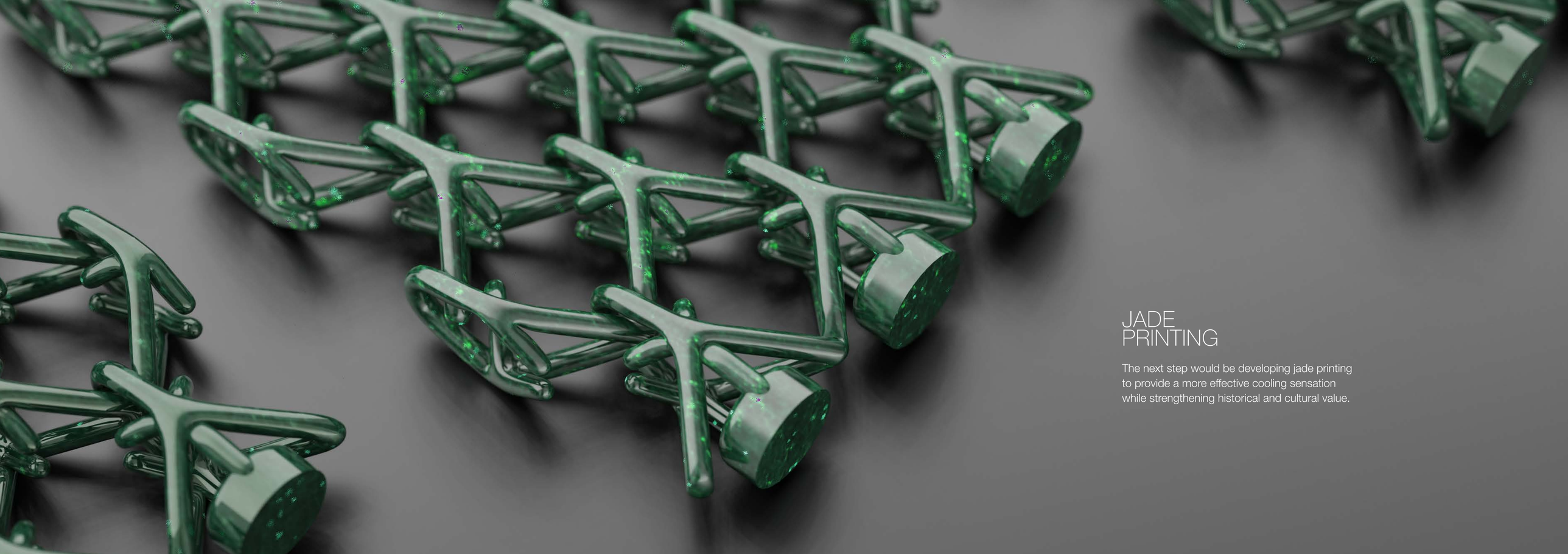
module 2

module 3
(magnet)

Crystal is using hidden magnets as an attachment system, providing a playful interaction while maintaining the elegance of the form.

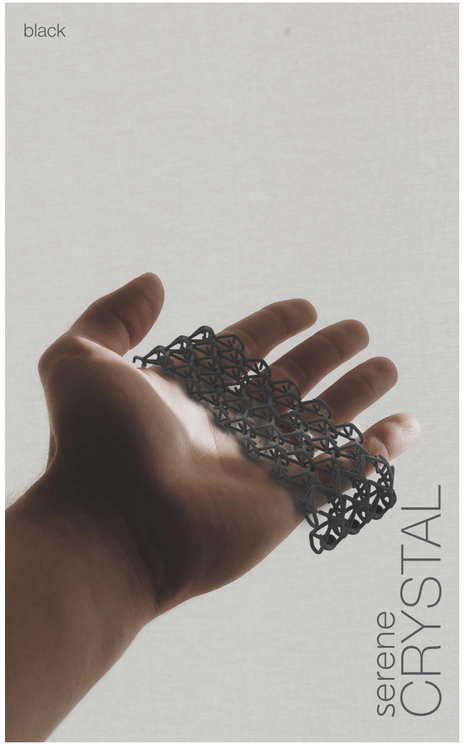


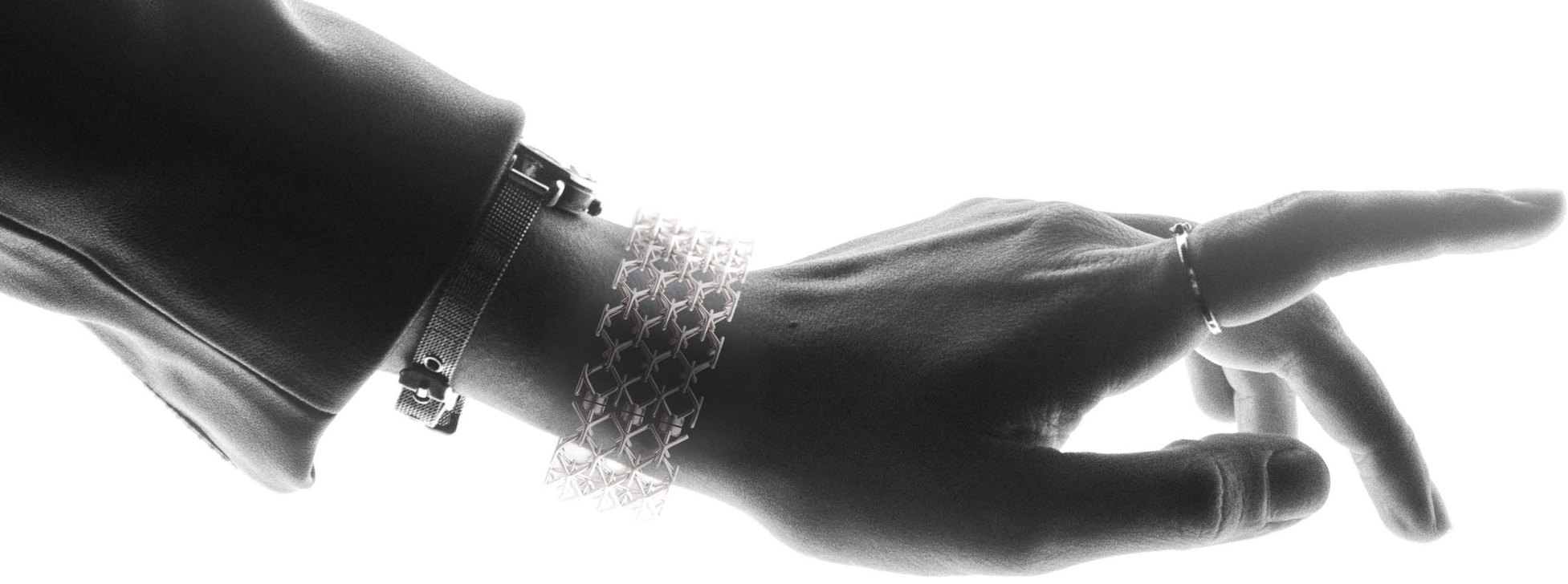
5mm magnets x3
Press fit
No glue required
Same polarity
Start with the middle



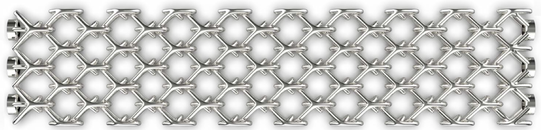
JADE PRINTING

The next step would be developing jade printing to provide a more effective cooling sensation while strengthening historical and cultural value.

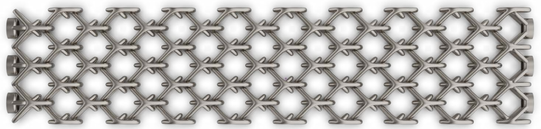

black
serene
CRYSTAL



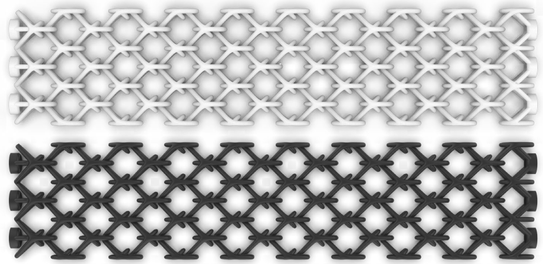
manufacturing options



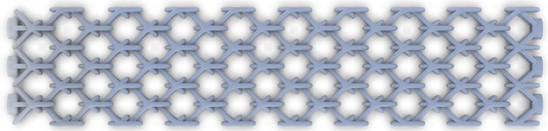
Lost wax
material: silver
fabricator: XiaoPeng
cost: 12,000 RMB
duration: 2 weeks



SLS printing
material: titanium
fabricator: Dee
cost: 4500 RMB
duration: 2 weeks



SLS printing
material: nylon (black, white)
fabricator: WeNext
cost: 23 RMB / 17 RMB
duration: 72 hours



SLS printing + dye
material: nylon + dye
fabricator: Self made
cost: 17 RMB + dye
duration: 72 hours

serene
LILIA

A scented necklace that releases a relaxing scent, inspired by the local white lily. Creating a cooling down ritual for the mind and body in between the moment.

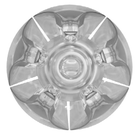
serene
LILIA

Lilia is a necklace that releases aromatherapy,
inspired by the local white lily flower.

source: unsplash.com

Lilia can bloom like a flower. Lifting the necklace closer to the nose will open the necklace, thus releasing the aromatherapy. It utilizes concrete's porous surface to keep the scent longer and localize.

dimension profile



top

25mm

2.5mm ∅

front

side

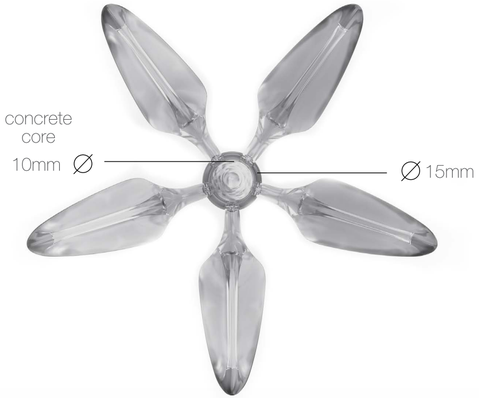
70mm

dormant

When Lilia is facing downward, it closes its petal due to gravity, thus sealing the scent inside the necklace.

concrete core 10mm ∅

∅ 15mm



top

∅ 3mm magnet

15mm

front

bloom

When Lilia is facing upward, the petals are going down due to gravity, making the necklace opens up for scent.

2.5mm ∅

42mm

side

Lilia blooming process

When Lilia is facing downward, it closes its petals due to gravity, thus sealing the scent inside the necklace.

When Lilia is facing upward, the petals fall down due to gravity, thus the necklace is revealing the scented concrete.

Gravity is pulling the petals down.

When Lilia is fully opens, you can smell the aromatheraphy from the concrete core.

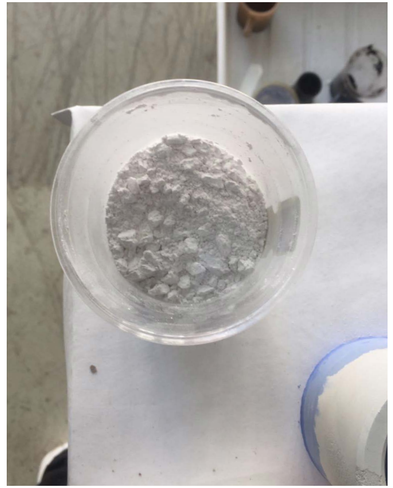
interchangeable concrete core

Essential oil +
concrete +
mineral colorant

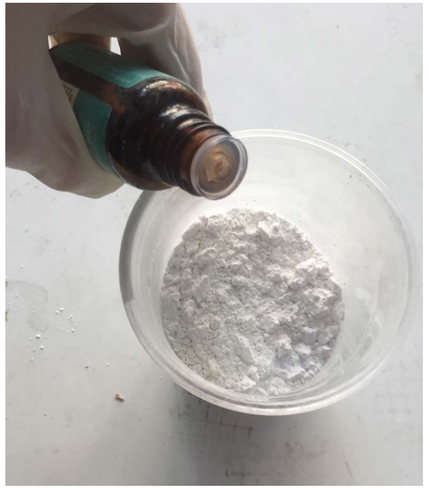
Each scented concrete core has a different scent depending on the user's preference. The scented core can easily be replaced.

The scented core is attached to the main body using 3mm magnets, which makes it easy to switch.

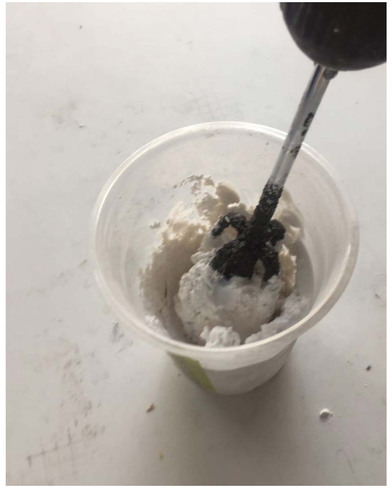
scented concrete manufacturing process



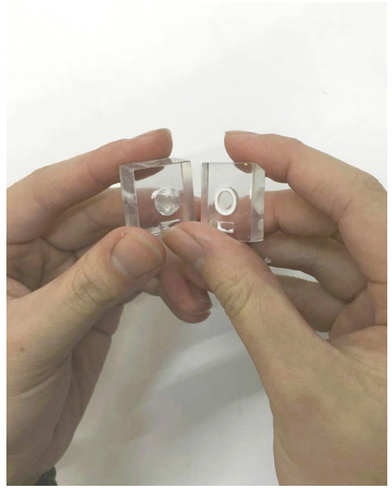
white concrete



infused with menthol

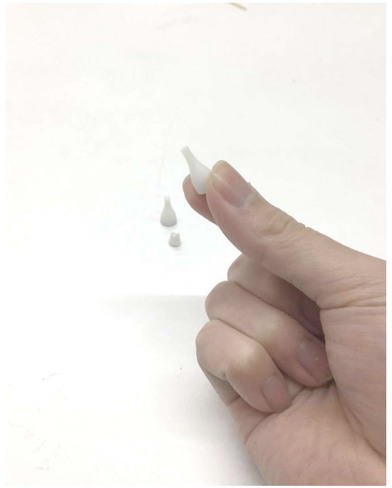


mixed with water



pour in the mold

wait until it dries



scented concrete

serene
LILIA

x

BAI
BAO
QIAN

A special edition Lilia necklace for the K11 foundation. It is a combination of the traditional 1000 treasure inlay technique and modern digital manufacturing.

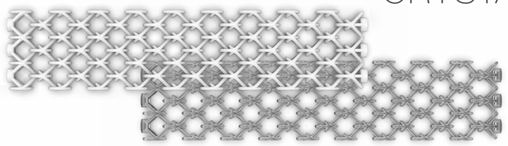
manufacturing options

SLA printing
material: transparent resin
fabricator: WeNext
cost: 26.6 RMB
duration: 72 hours

SLS printing
material: nylon (black)
fabricator: WeNext
cost: 18.55 RMB
duration: 72 hours

SLS printing
material: titanium
fabricator: Dee
cost: 1,631 RMB
duration: 2 Weeks

SLS printing + dye
material: nylon + dye
fabricator: Self made
cost: 18.55 RMB + dye
duration: 72 hours



CRYSTAL

LILIA

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ArtCenter Collage of Design
Product Design
Fall 2019

Materialize Shanghai

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Hosted by Environmental Design Department

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