HC OUT OF GLASS

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Publication date:
2019

Document Version:
Publisher's PDF, also known as Version of record

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Sping 2019

OUT OF GLASS

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Cathrine Roslyng Rasmussen
Kjersti Salberg

32 Jamie Nygaard Martinussen
Amanda Falck Weber

38 Jon Haga Grov
Mathias Berg Henriksen'

44 Nanna Juul Handberg

50 Paulina Tonge
Brita Lie Lysne

62 Jeanette Ruby Nielsen
Victor Bech Mori

The workshop explored glass as material its behaviour and architectonic potential.

Taking advantage of gravity as a condition, we all have to react to as architects we explore inclinations, basins, peaks and other topological conditions with glass through the assistance of heat as energy.

The workshop was divided into the following phases: Drawing a translation of a given exiting transient condition - a "living" "fluctuation." Constructing a mould with a membrane from a given structure and a 3d translation of the transient. Experimenting with casting different types of glass that are made (reuse). Exploring surface conditions as light transmission, solidity etc. Developing a joint composition within a given structure as a site for assembly and disassembly. Exhibition and exploration of the experiments as a membrane of interlocking entities reacting to and modifying the environment.

We encouraged in all phases digital technics and procedures where infused and embedded into the workshop such as drawing, production, capturing etc. relating to the works condition its process and progress.

Students worked in teams We visited the Ebeltoft Glass Museum, where we experienced glassblowing techniques.

Techniques: as Drawing, Casting, Moulding and Cutting where and machines as the Glass oven, Ceramic oven, Router, Paper Cutter were utilised.

GlassmuseetEbletoft, thanks for the inspiration https://glasmuseet.dk/?lang=en.

Materials, for the moulds:

- clay
- mixture of plaster with grog
- ceraform
- iron/chicken mesh
- thermal fabric

If the form is made in the mixture of plaster and grog or milling in ceraform it requiers to be backed in the ceramic kiln so it then can be coated with a formula to prevent the glass to stick to the mould.

When the formwork was made of iron and fireproof fabrick the mould only needed to be coated.


gips


flint (silica)

Proportions of casting mixture:

- 2 plaster (very fine grain, hight densitiy)
- 1 flint (silica)
- 1 grog
- 4 water (approx)

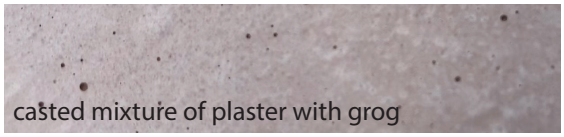

clay


ceraform

The moulds for the glass castings where fabricated both with the aplication of digital and analog techinques.

- forming clay
- casting the form in plaster
- milling
- welding
- draping

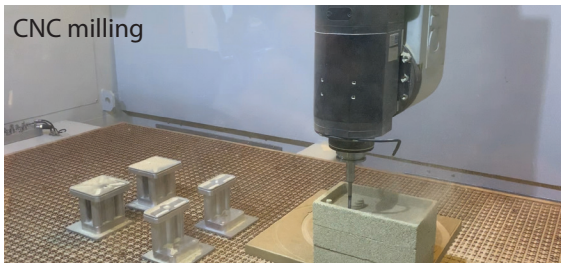

clay


casted mixture of plaster with grog


thermal fabric*

Thermal fabric is an alternative to thick fiber paper in the oven.

*Silicatex Thermodug 0.9mm thick.

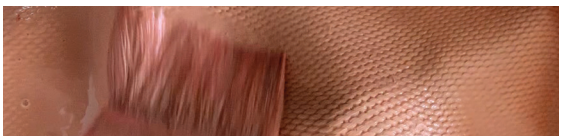

CNC milling


sagging mould


refractory mould


separator

Separator (no. 5 -Powder Item no.: 44151-5 Cerama)is applied to the substrate where fuses are required.

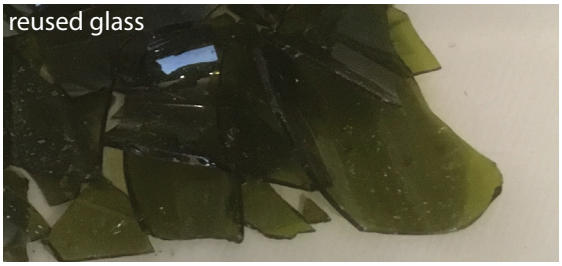


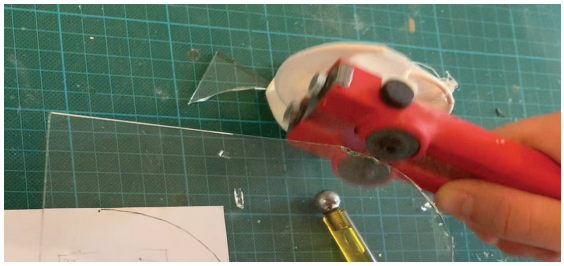
The separator is dyed with a color that disappears after burning so that it is easy to distinguish new and old separator from each other.

The powder is stirred up in water: 1 part to 4 parts water.


refractory mould with separator

Preparation for fussing glass prior to to be arranged on the formwork, this by cutting and crussing.





Burning curves used at workshop:

Glass kiln:

Slumping Program
Applied for melting Bullseye glass. Segments:

1: 282°C by the hour until reaching 500°C – time in same temperature 0 min
2: FULL* 700°C – time in same temperature 0,40 min
3: FULL* 560°C – 0,34 min
4: 18°C by the hour until reaching 540°C – time in same temperature 0,34 min
5: 71°C by the hour until reaching 460°C
6: END

* FULL = as fast as possible

Ceramic kiln:

Slumping Program -.
Applied for melting window glass. Segments:

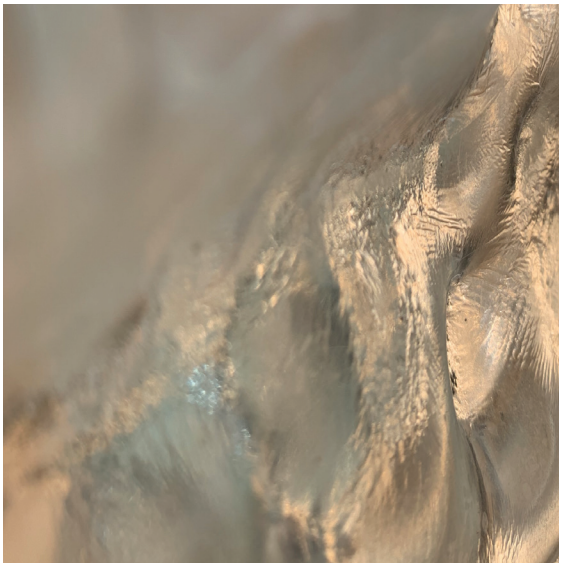
1: 2, 2 hours 500°C
2: SKIP* 670°C
3: SKIP* 560°C
4: 1 hour by 560°C
5: 0,3 hour until reaching 540°C
6: 1 hour by 540°C
7: 1 hour until reaching 460°C
8: END

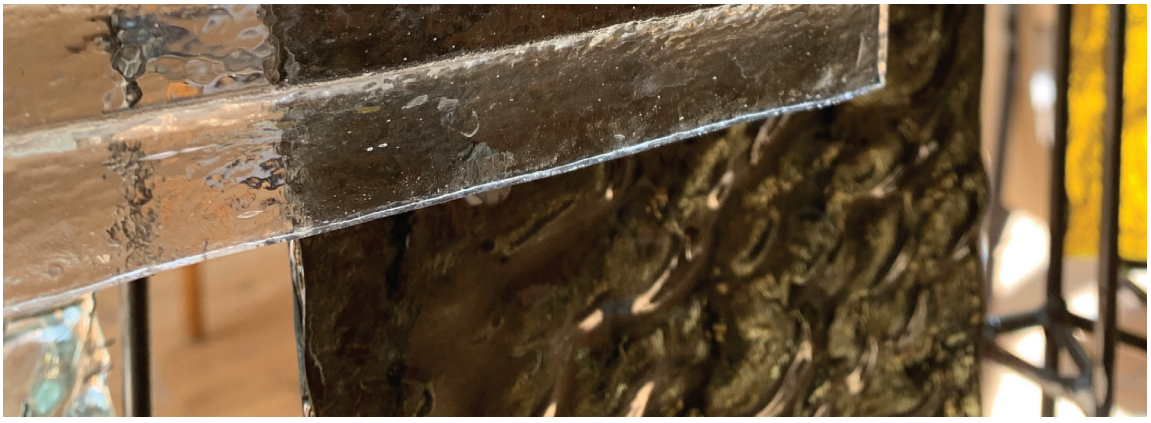
* SKIP = as fast as possible

castings

Surface and edge qualities of the glass castings.

Experiments with casting different types of glass that were made (reuse). Exploring surface conditions as light transmission, solidity etc. resulted in various interesting outcomes.



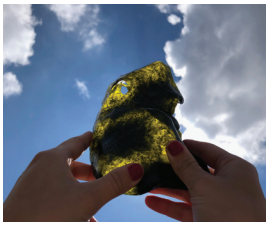


During the workshop a joint composition within a iron structure was tested a site for assembly and disassembly, this became a challenge for the design.

The installation and the experiments demostrated explorations in a membrane of interlocking entities reacting to and modifying the environment.

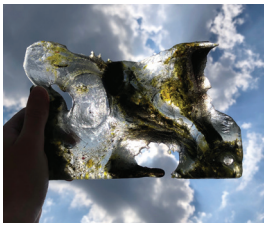
GLASS THROUGH THE ASSISTANCE OF HEAT AS ENERGY

Rebecca Clara Elisabeth Alesci & Mikkel Lars Kieldsen

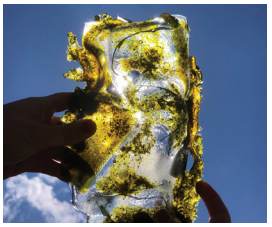


Experiment 01

Experiment 02



Experiment 06



Experiment 07

Experiment 03

Experiment 04

Experiment 05

Experiment 08

Experiment 01- Fabric mould reused wine bottles, first glass oven then ceramic oven. **Experiment 02-** Fabric mould one piece of glass with shattered glas in glass oven. **Experiment 03** - Fabric mould one piece of glass in glass oven. **Experiment 04** - CNC mould one piece of glass in glass oven. **Experiment 05** - CNC mould one piece of glass in glass oven. **Experiment 06** - CNC mould, large of pieces glass in differnt colours combined with shattered glass covered with one piece of transparent glass, in ceramic oven. **Experiment 07** - Fabric mould, large of pieces glass in differnt colours combined with shattered glass covered with one piece of transparent glass, in ceramic oven. **Experiment 08** - Chicken wire on steel bars with one layer of thin window glass in ceramic oven.

Left - Experiment 09 - Chicken wire on steel bars with two layers of thick window glass in ceramic oven.

TECHNIQUES

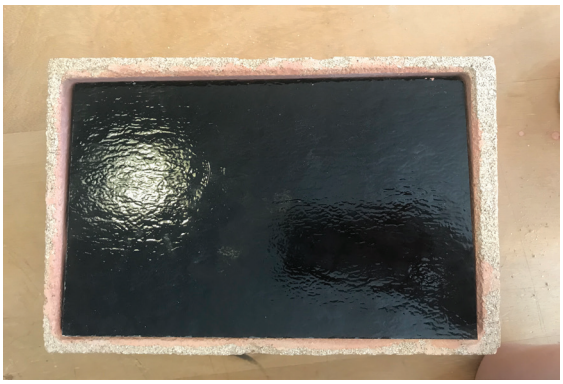
HEAT

We have used two types of ovns, the glass oven that reaces 670 degrees and the cerramic oven that can reach a higher temperature. The outcome of the two ovens is very diffent to each other. The glass oven doesent reach that high of a temperature, therefor the glass stays it keeps its outer shape. The ceramic oven reach a much higner temperature and the glass melts, some times to much.

GLASS

We have woked with three types of glass, bullseye, window, and old winebottles. The harder the glass, hte higher temperature it needs to deform.

Experiment 01- Fabric mould, before getting into the oven.

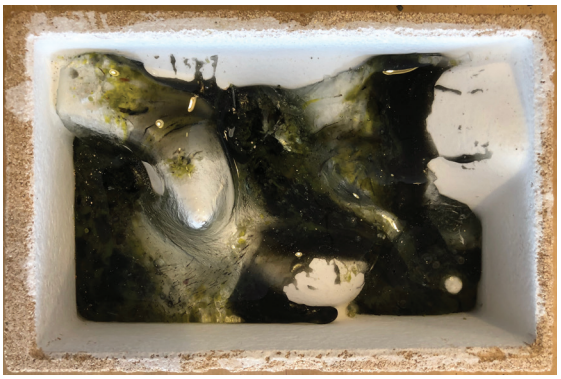


Experiment 04 - CNC mould, before getting in the glass oven.

Experiment 01- Fabric mould reuseds, after getting out of both ovens.

Experiment 04 - CNC mould, after getting out of the glass oven.

Experiment 06 - CNC mould, before getting into the ceramic oven.



Experiment 06 - CNC mould, after getting into the ceramic oven.

Experiment 02- Fabric mould after getting into the glass oven. Same technique as experiment 6, but the different temperature gives a very different outcome.

Experiment 09 - Chicken wire on steel bars layers in ceramic oven. Mould and glass become one.

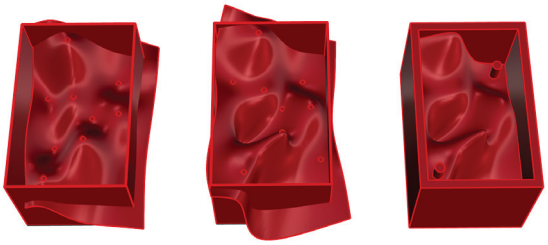
FORM

We have tested four different types of formwork: fabric, chicken wire, filt, and CNC ceraform. When working with fabric, wire and felt we have used a steel plate with a variation of steel bars in different hights to give the surface some movement. We have made the CNC form to make a more presice outcome.

GRAVITY

We have tried to give the glass the freedom to move on its own terms but under the limits of our moulds, type of glass and oven.

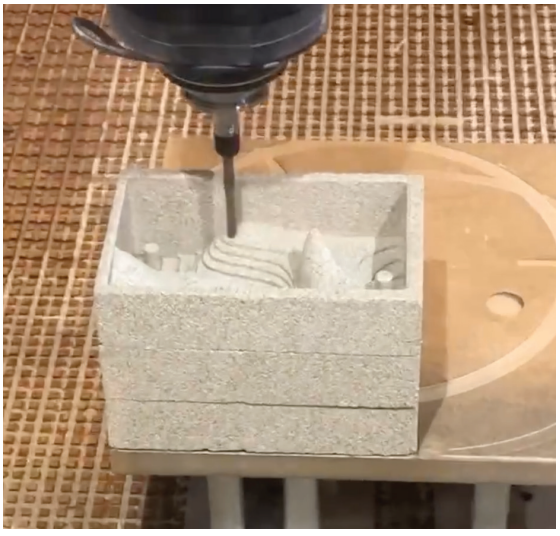
Experiment 04 - CNC mould, the tool lines are very clear and the glass will adapt to the shape.



Experiment 04 - Model work in Rhino.

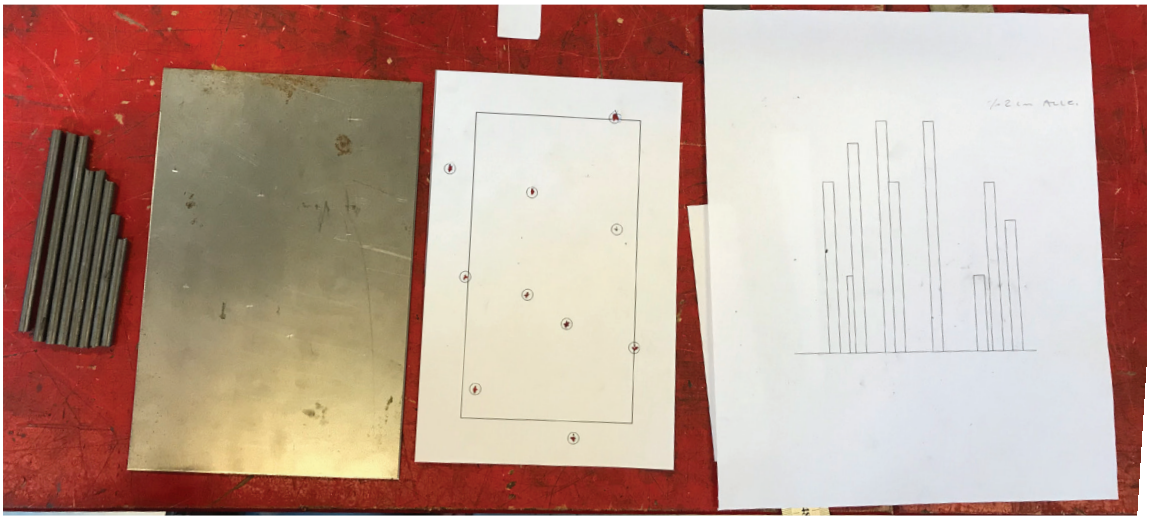
DIGITAL - CNC CUT CERAFORM

Experiment 04 - The glass sticks to the form unless the form is coated with glass slip.

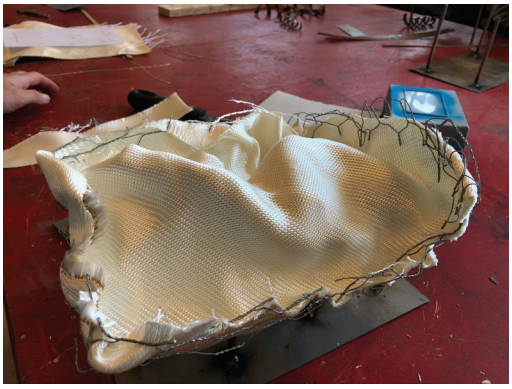


Experiment 04 - The CNC cutter in action.

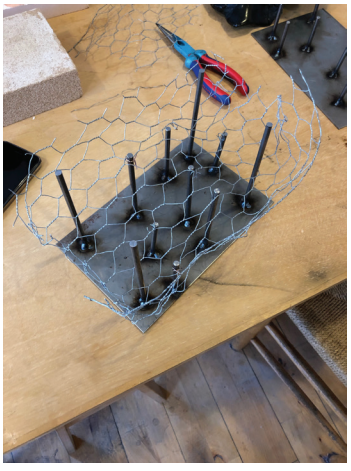
ANALOG



The tool for the location of steel bars on the steel plate.



Fabric mould.

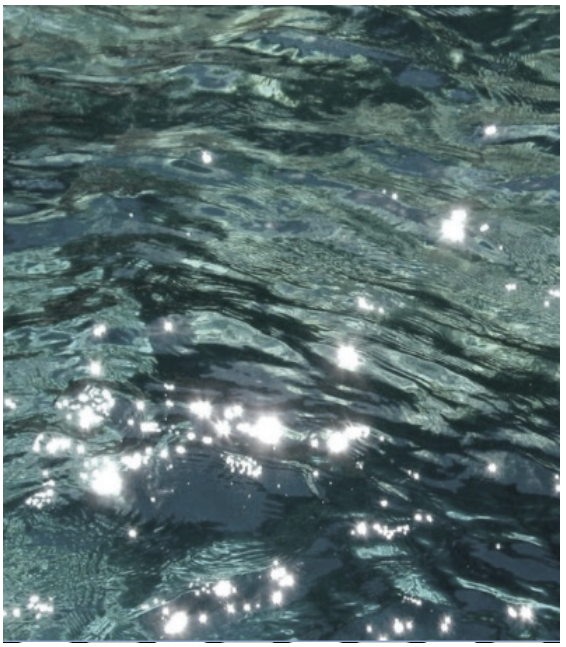


Experiment 08 - Steel plate and steel bars with wire.

OUT OF GLASS

Mai-Britt Svendsen og Therese Kampp Mathorne

Waves



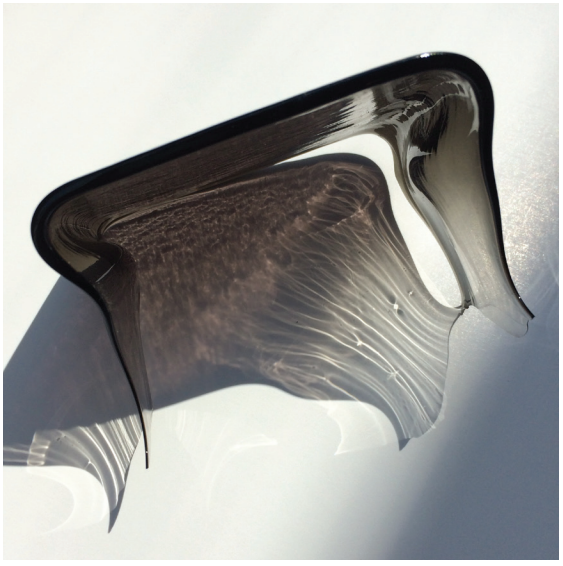
Inspiration from the movement in water

Glass melted over a Ceraform

Scorpion

Glasscasting on the Ceraform with Chamotte clay

Inspiration from the skin of the octupus



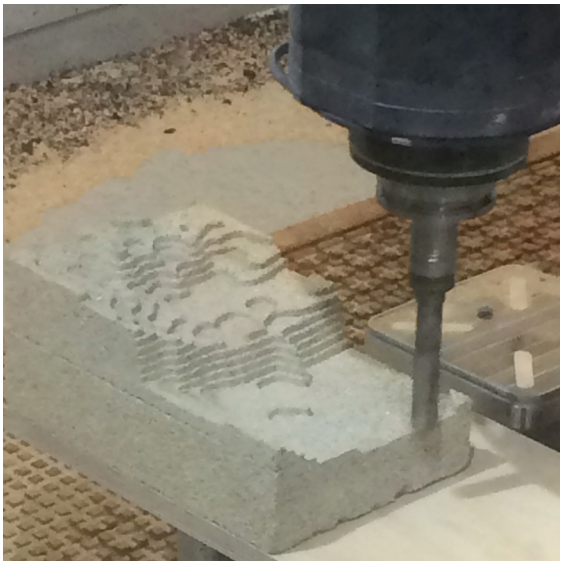
The shades from the way the glass have melted in the process

inspiration of the sanddunes' formation

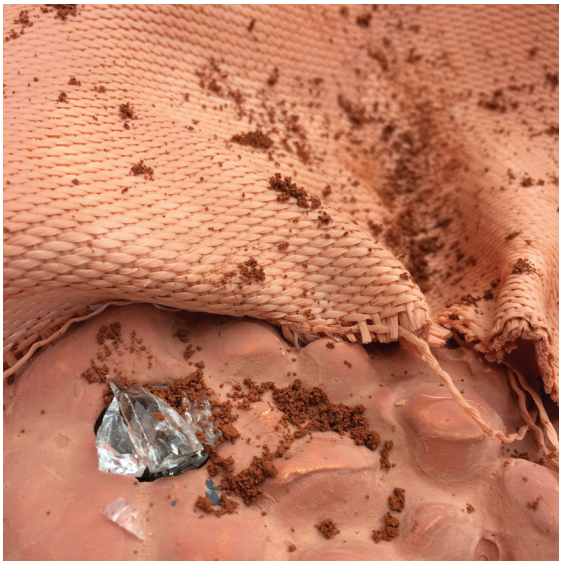
CASTING AND BURNING PROCESS

Mai-Britt Svendsen og Therese Kampp Mathorne

CNC-milling in Ceraform to explore the material and the glass' interaction



CNC-milling a form to melt glas on

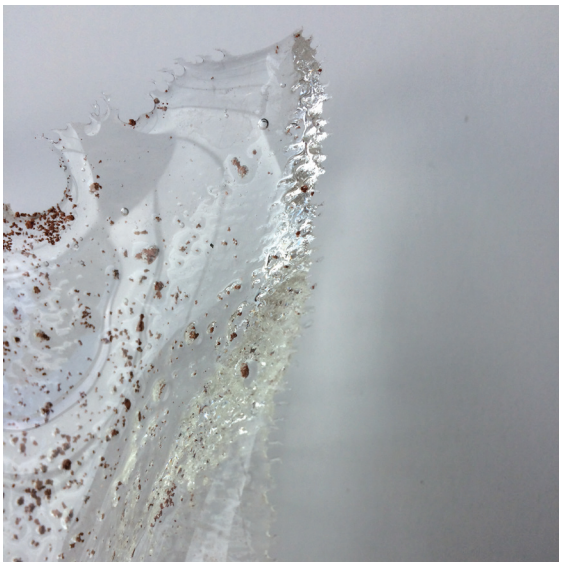


Experimens with a special kind of textile and small pieces of broken glass

After a night in the ceramic oven

REFLECTIONS AND TACTILITY

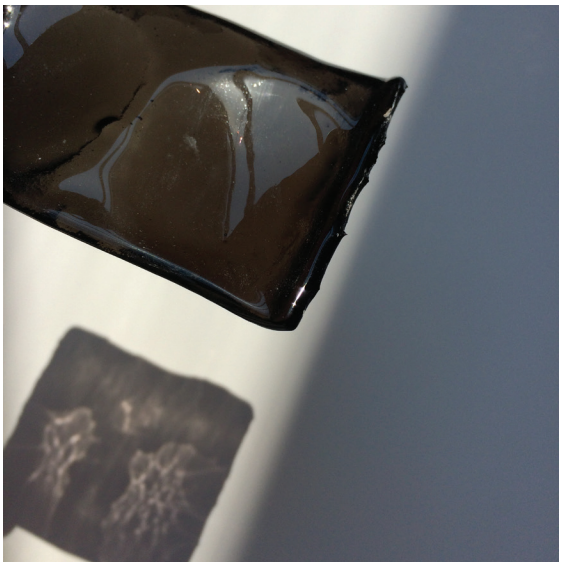
Mai-Britt Svendsen og Therese Kampp Mathorne



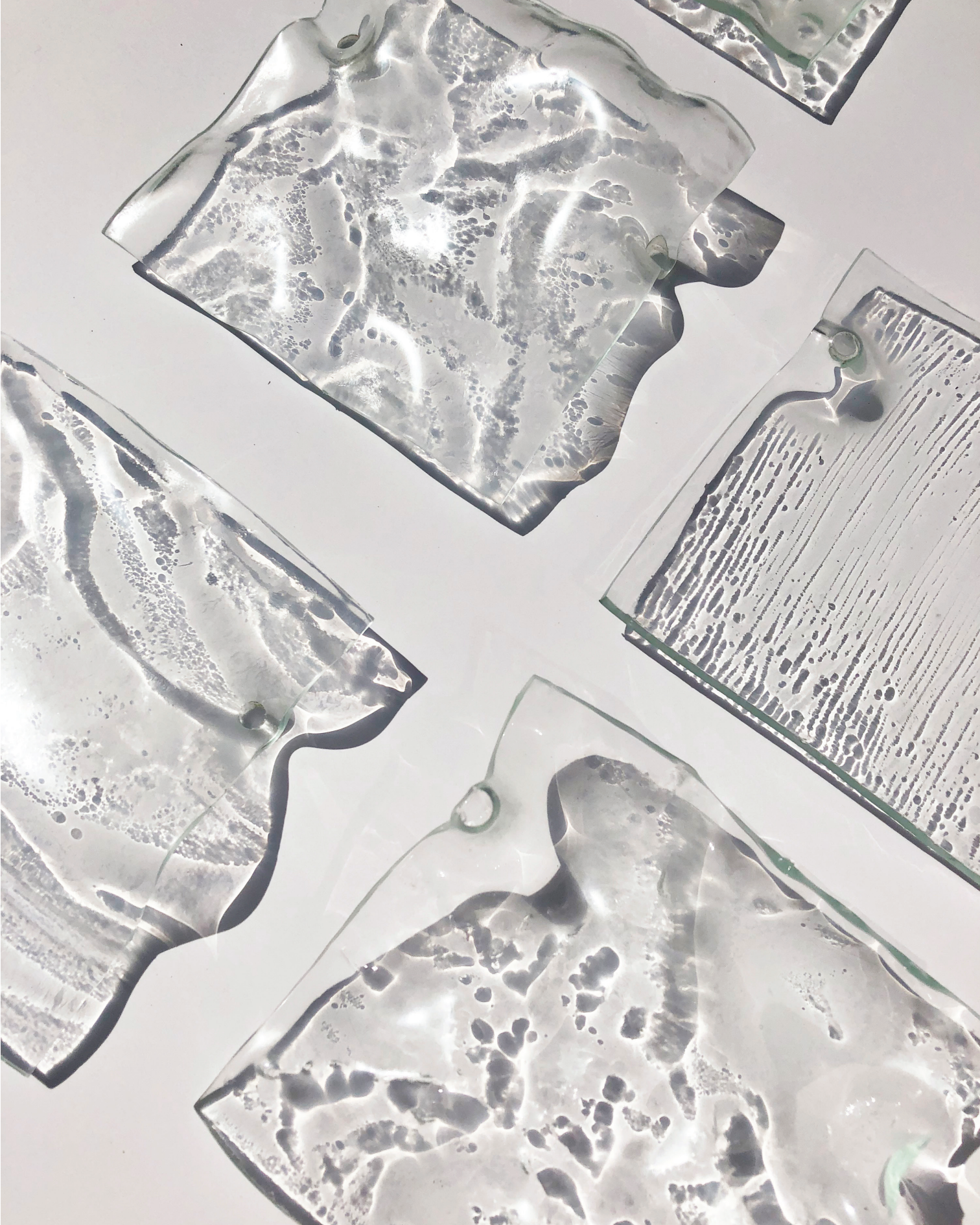
Sharp edges from the meltingprocess

How the glass reflects in the volumens and depts of the material

The thinkness and how its almost crisp in the top part

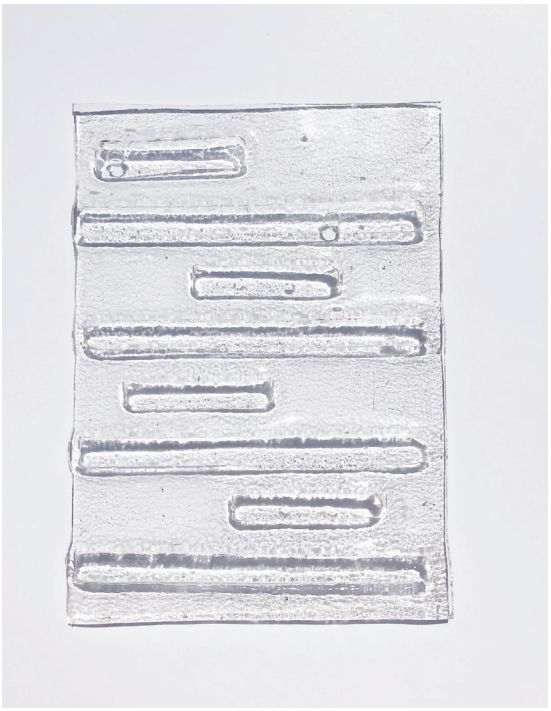


How the glass makes patterns when the sunlight hits depending on the formation of the glass



TRANSITION

Anne Sofie Donslund, Cathrine Roslyng Rasmussen, Kjersti Salberg



In the Workshop "Out of glass" we have been exploring with glass as material. Working with different castings technics and experimenting with texture. The overall theme for the experiments has been nature and movement. Focusing on different aspects of nature, we have found inspiration in the sunlight, the human body and the marine landscape.

The first experiment is built up around the human skin and the waves and movement we can see when looking really close. Translating this curves and movements we have made a collection of five individual pieces which shows different interpretation and degree of this movement.

The second experiment is inspired by seashells and it the rounded shapes. This has led to a dynamic and organic expression in the glass casting.

The sunlight and it's imprint on the curtain has been the influence for the third experiment, addopting the repititive pattern into the formwork and glass casting.

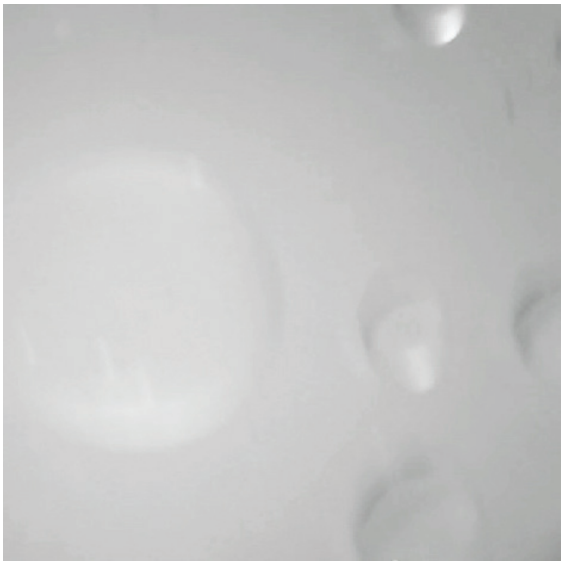
In the process we made a form. The form was made through clay in different wars. Subsequently we cast in plaster. We used stone plaster, flint and chamotte and mixed it with water. After worth we burnt it in the oven, put on glass, and put it into the oven again. The oven was 800 degrees, because we worked whit melting.

Glass oven

Preparing for casting

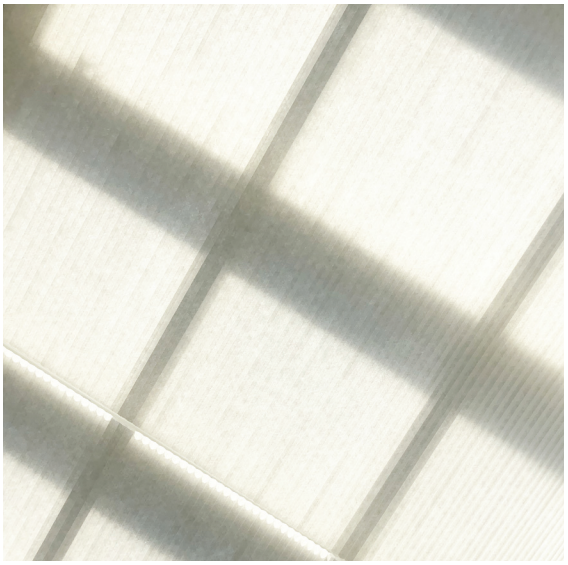
Final result

Inspiration: Seashells



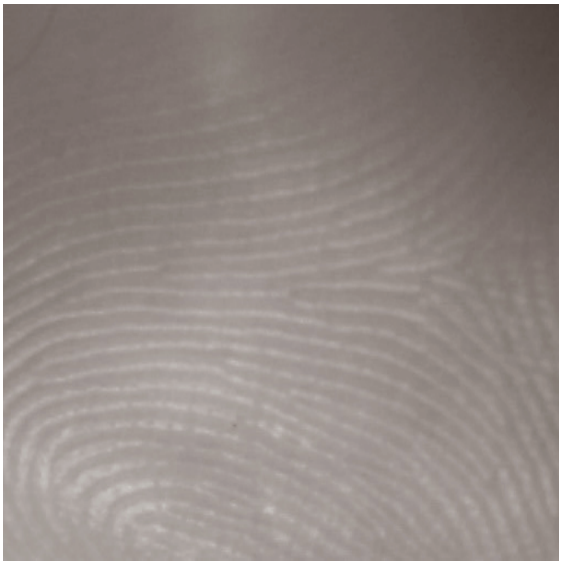
Inspiration: Drops

Translating the natural form from the seashells.



Inspiration: Sunlight imprint

Inspiration: Skin texture



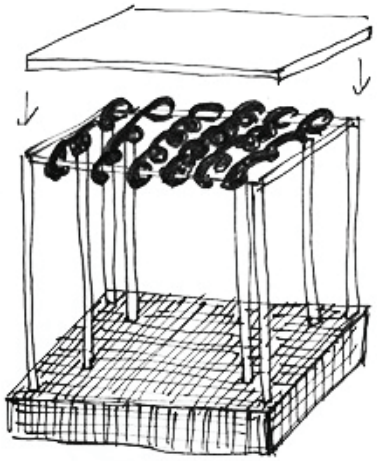
Inspiration: Fingerprint

Forming with clay

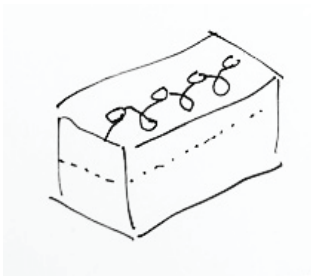
Imprint

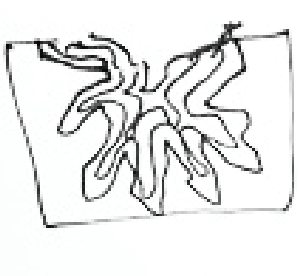
THE IMPACT OF FORM AND MATERIAL

Jamie Nygaard Martinussen, Amanda Falck Weber



Glass changes form through heating. We have investigated this movement through a chosen form and a chosen material. The form we have worked with is the spiral, which is an object in movement. The material we have worked with is chicken wire, which is easily malleable. We have experimented with others materials and glass of different types and properties to see how it affected the result. Extended use in different materials makes it harder to reach your intended result. Keep it simple!

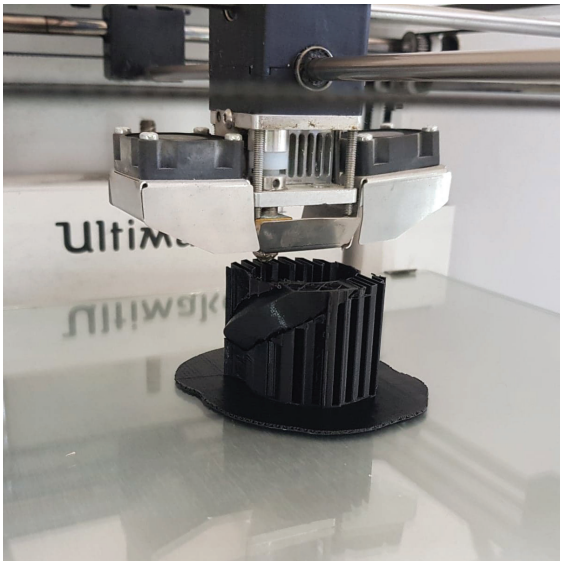




Final result of experiment 1

One of the technics we tried, was 3D-printing a spiral for a lost-wax method to cast crushed glass. We did not succeed, possibly due to the scale of the crushed glass and a too narrow casting mold.

From experiment 1, we learned that the selection of glass is essential for the result because the glass reacts differently to the heat. Repeatedly heating the same piece of glass affects the ability to transform.



3D printing the spiral in PLA Black.

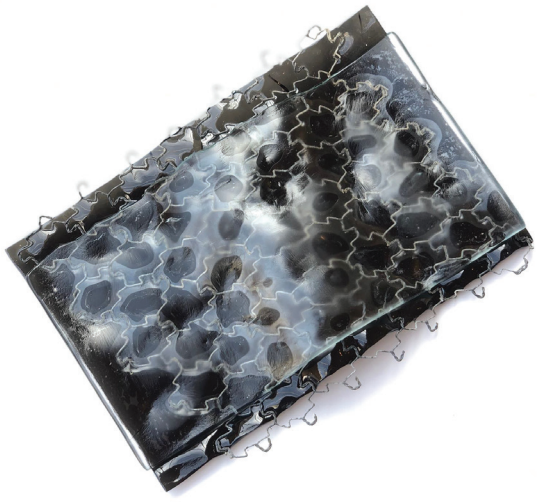
Manuel glass crushing

Experiment 1 before the oven and after the first heating

By limiting the use of material to only chicken wire and glass, we reached a satisfying result. Repeating the experiment with the same chicken wire, we had a different outcome. The glass has unpredictable behavior. Repeating the experiment only with the same priciple, we had a result with a slightly different character.

Instead of using the chicken wire as a shaping element, we tried to implement it as a part of the glass construction and ended up with totally new forms.

Chicken wire after repeated use and the imprint on the glass surface



The result of formed chicken wire between molded glass and plain glass.

The result of half submerched chicken wire in a gypsum form painted repeatedly with release agent.

GRAVITY

Jon Haga Grov, Mathias Berg Henriksen

OUT OF GLASS

The workshop explores glass as a material, its behavior and its architectural potential.

From the beginning of the workshop, gravity was introduced as a condition in the process of creating glass. With this in mind, we decided to explore gravity as a flow in the material.

To get a quick start in working with the material, we decided to make some different experiments in clay, exploring the material - of course with gravity in mind.

As we tried out some different procedures, it was time to move on. We placed the experiments in some moulds made on the paper cutter and then pouring in plaster. As the plaster dried, it was time to get it out of the moulds and into the oven. Here it received heat during the night and was ready for the next day.

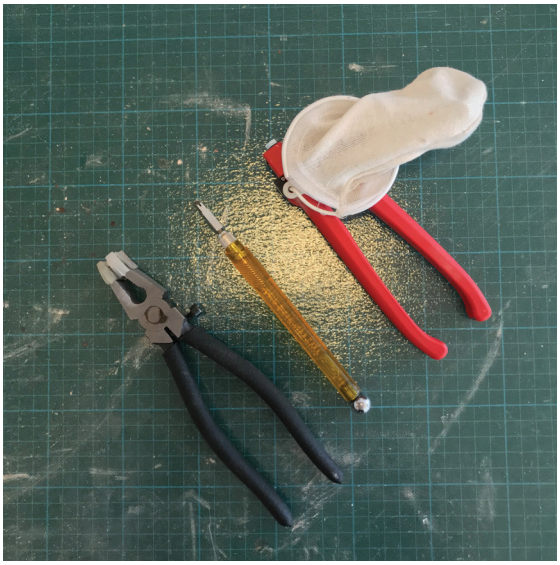
To explore gravity and its influence on the glass, we decided to go with the transparent glass, and then putting random leftovers from the black glass on top of it, to hopefully make the different levels visible, once heated.

The result didn't turn out exactly as we thought it would. The black glass didn't take shape we thought it would, but still made it more apparent what gravity means in the production of glass.

Clay + clear glass + black glass

The materials should be in the oven as it starts to heat, and kept in there throughout the most of a day and a night. Otherwise, the glass will break.

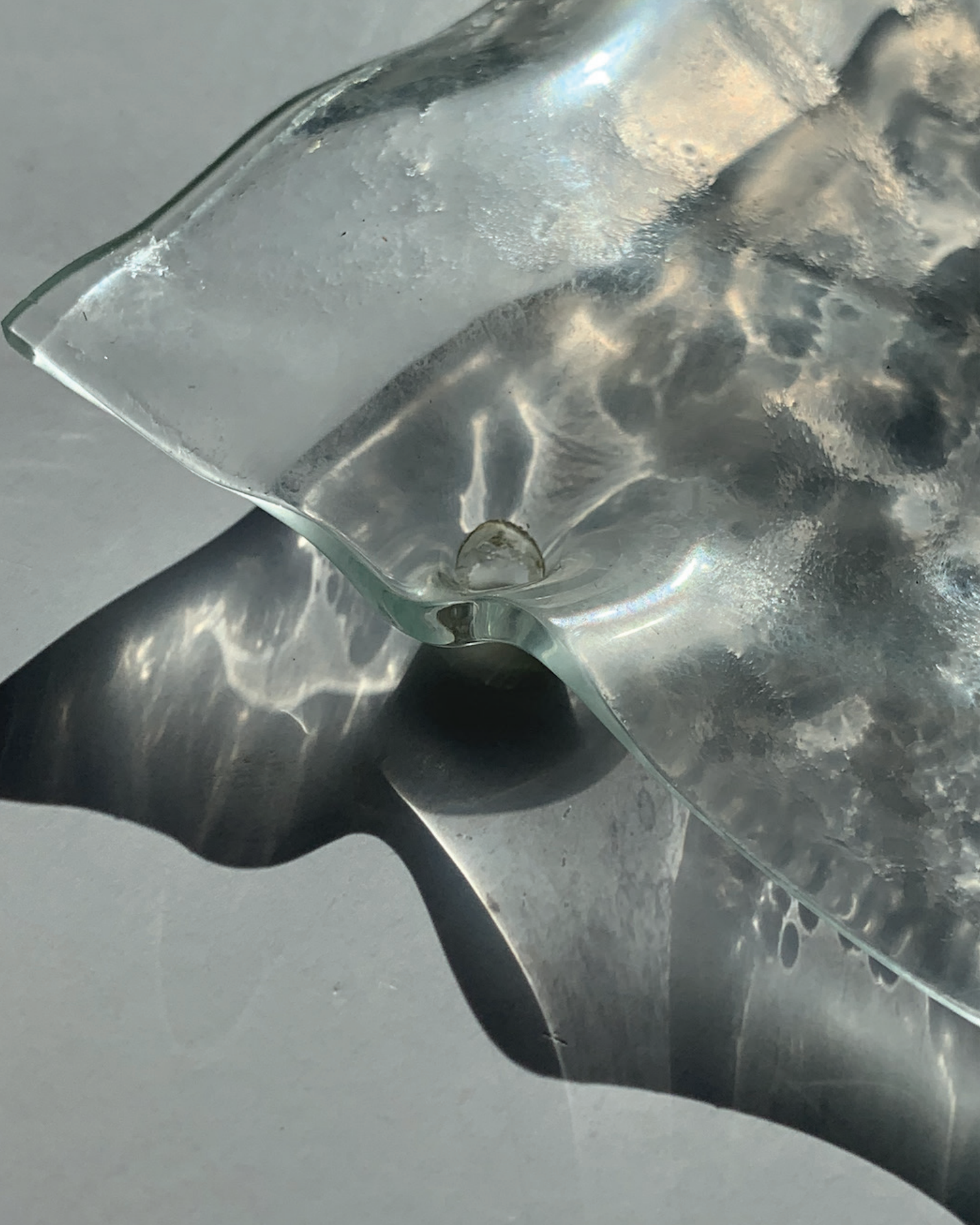
Clay



Tools

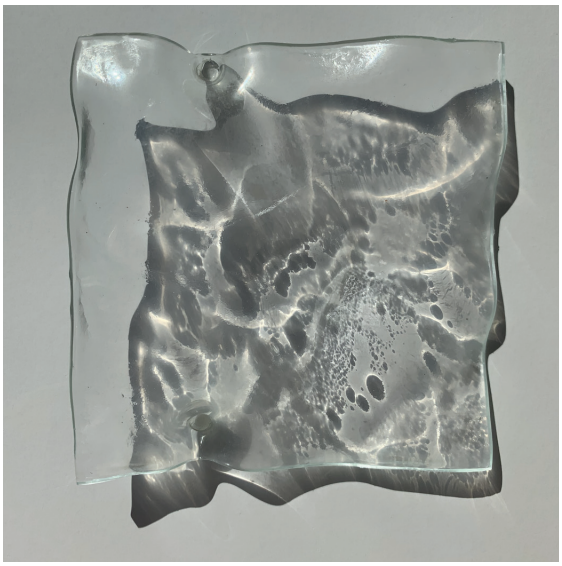
Oven

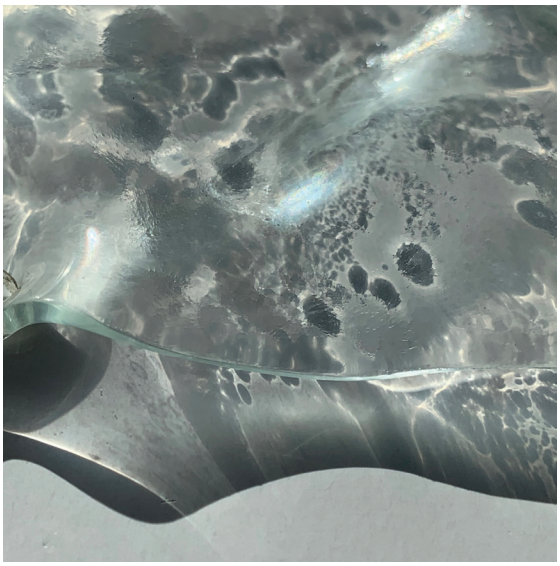
Glass



TRANSLUCENT LANDSCAPE

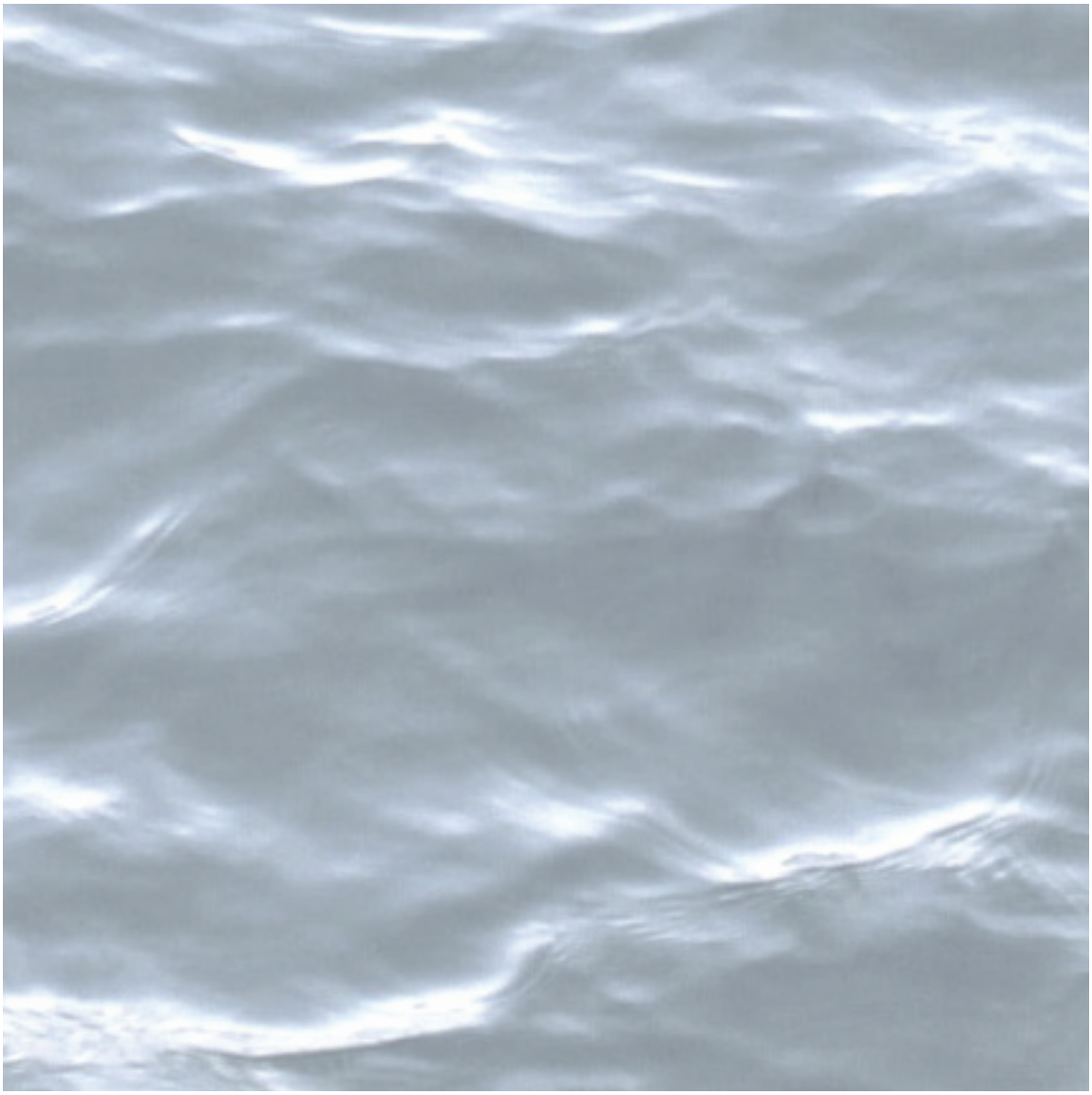
Nanna Juul Handberg





This experiments glass as a material, its behaviour and its architectural potential. Exploring how heating up glass on different textures affects its transparency and how to manipulate patterns into glass. Inspired by how water moves, the theme of fluidity, organity and nature. It explores how glass can be used to capture the motion and reflection of water into a still object.

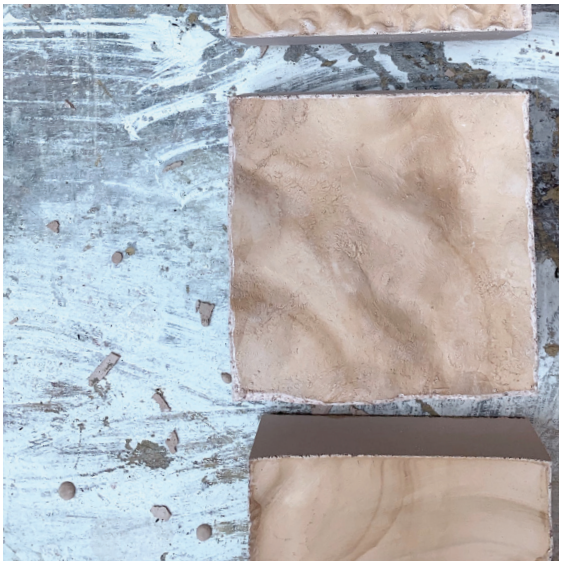
Taking advantage of gravity as a condition, it explore inclinations, basins, peaks and other topological conditions with glass through the assistance of heat as energy. Moreover, exploring how adjusting the heat will assist to form the glass in different ways.



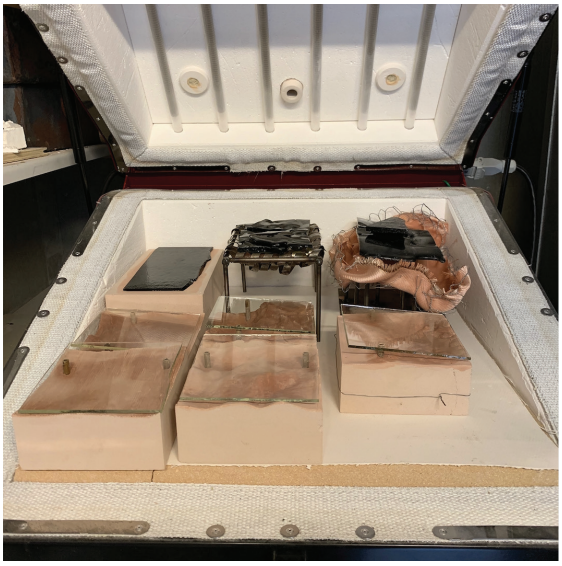
Mimicking water flow

Giving form with clay

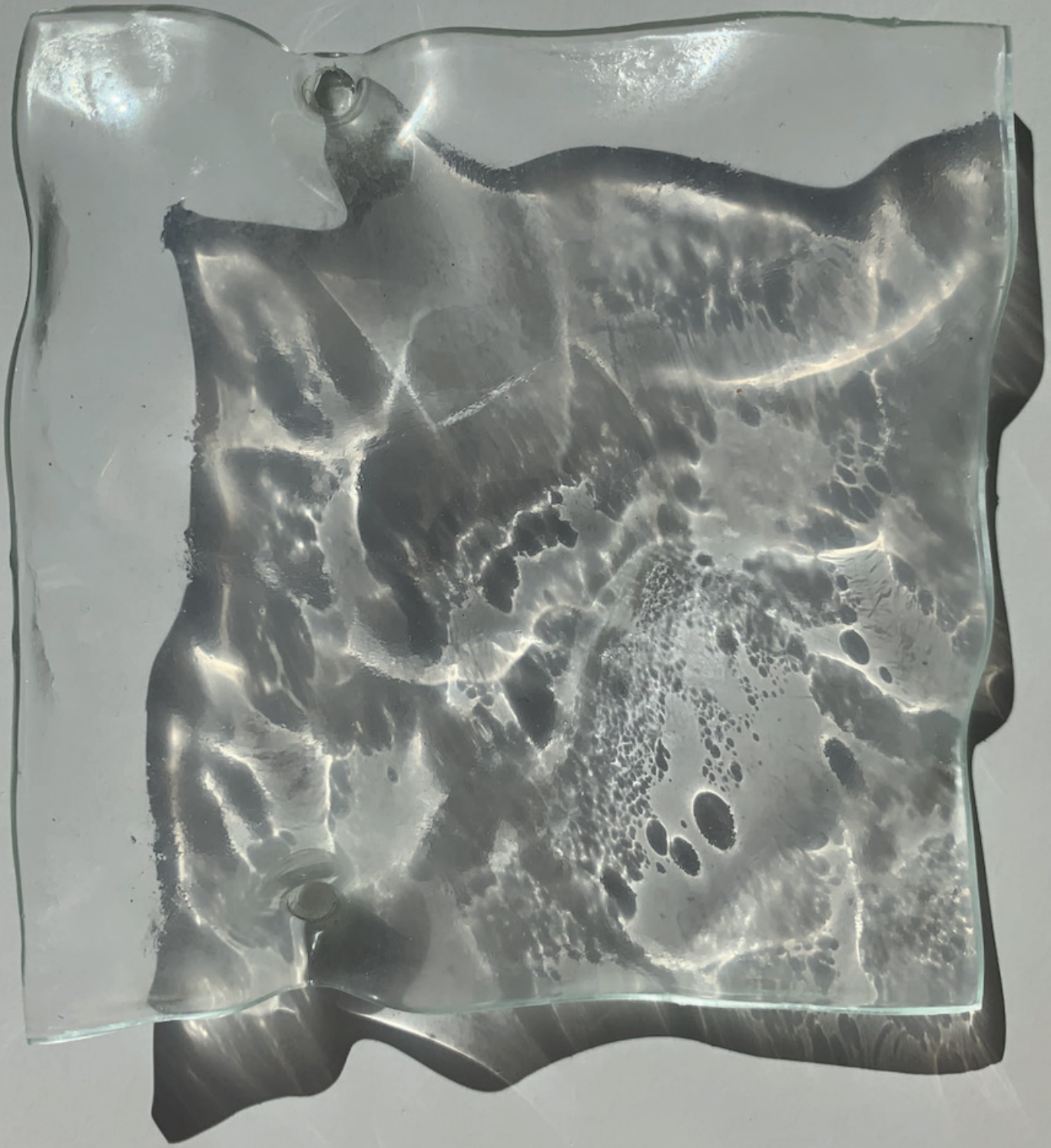
Casting with two part rock cast, one part flint, one part firebrick

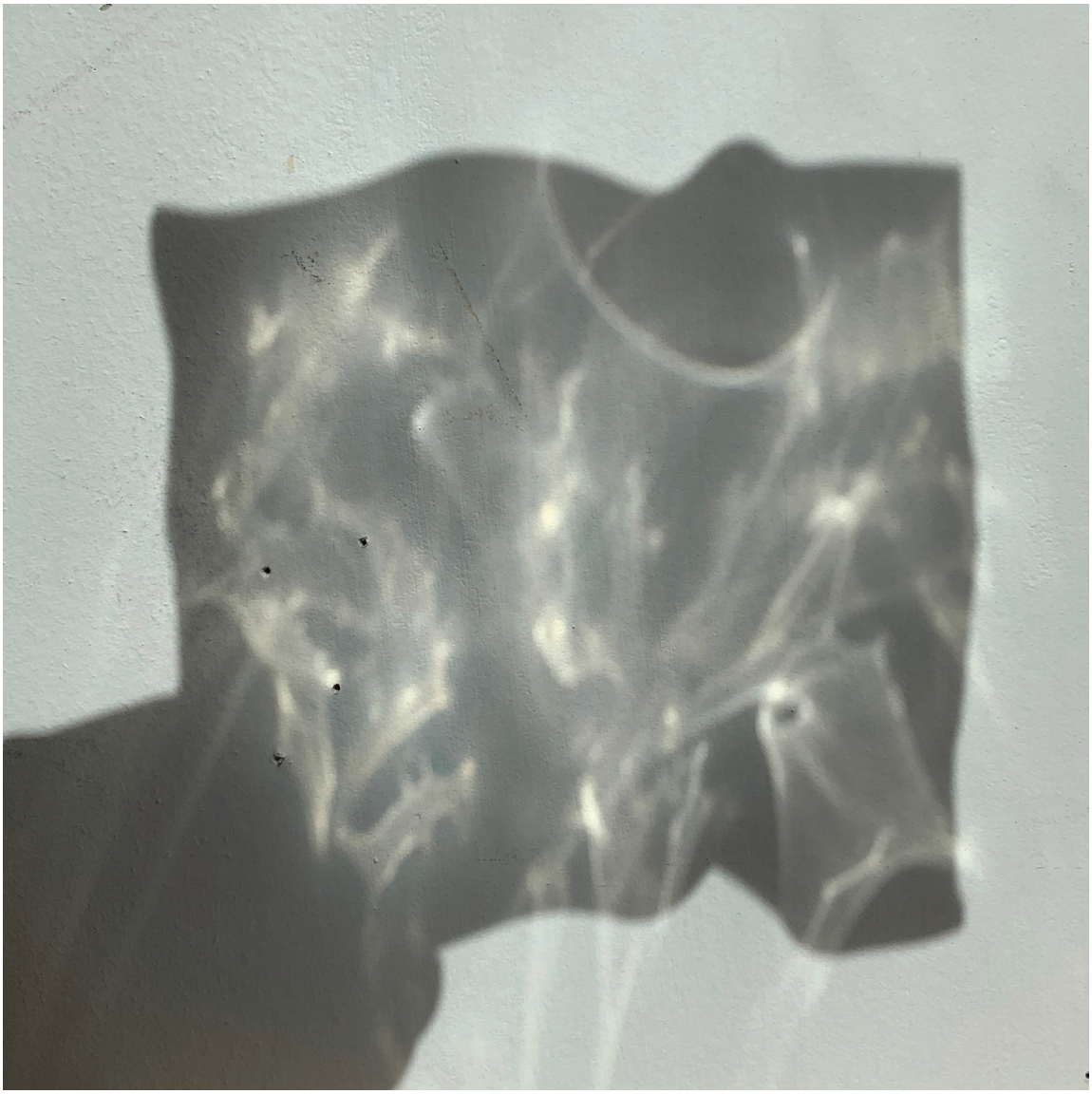


Plaster cast with has to dry and calsine at about 600 degrees.
In 2 hours the ceramic oven reaches 500 degrees, then it goes up to 670 degrees, down to 560 degrees, stays 1 hour at 560 degrees, spend 30 minutes going down to 540 degrees, for 1 hour it stays on 540 degrees, take 1 hour to go down to 460 degrees where the program is finishes.



Window glass is cut out and placed on top of the plaster cast to get formed by the heat in the oven.
The glass oven start at 500 degrees, goes up to 700 degrees and stays for 40 minutes, stays for 34 minutes at 560 degrees, drops and stays for 34 minutes at 540 degrees, drops to 460 degrees and ends and the glass is shaped.





This experiment explores how glass can be used to capture the motion and reflection of water into a still object. Inspired by how water move, the theme of fluidity, organity and nature.

The shadow of the formed glass draws a map of the different landscape throughout the object.

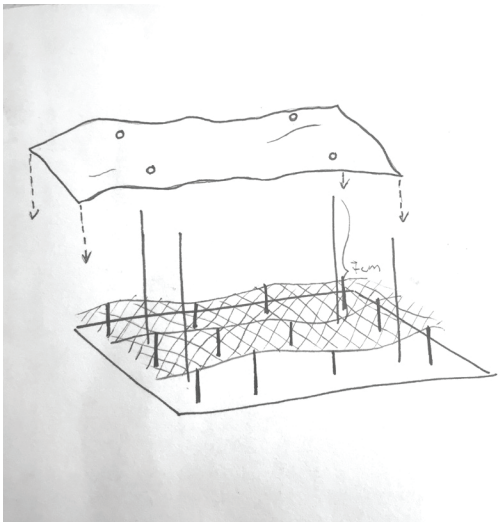
REFLECTIVE GLASS

Paulina Torge og Brita Lie Lysne

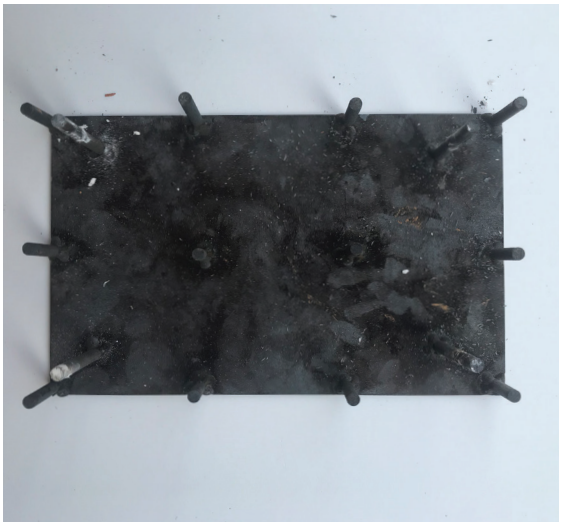
In this experiment we tried exploring how we could translate how to make a water-like surface out of glass by using a steal frame and chicken wire.

We started of making the steal board as a support to the other materials, where we welded pieces of steal in different hights on the board, we did this because we wanted to copy the uneven shape of waves. On top of that we cut out a rectangular piece of chicken wire that would fit on top of the board that would follow the different heights of the steal pieces. To top it of we placed a piece of fiber paper on top, so that the glass surface would have a smooth surface. The material we decided to use in this experiment was a piece of a translucent, black glass to translate the potential water has, which in fact is reflective and translucent.

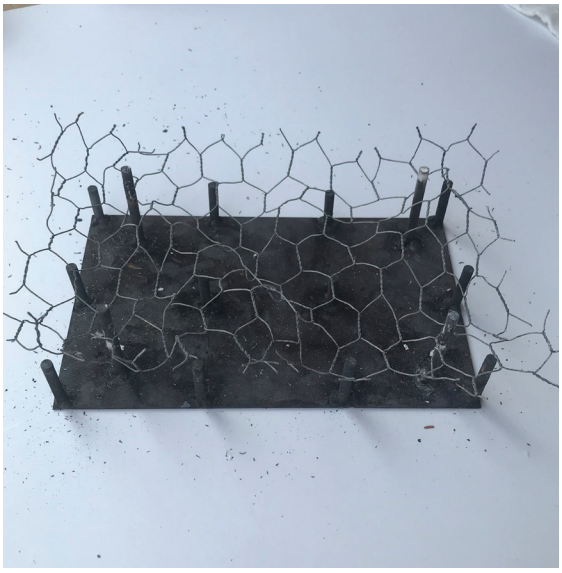
The technique we used here was Slumping. Here we use gravity, heat and time to make the glass material bend to a 3d shaped wave surface. Slumping takes place in between 625 til 780 degrees.



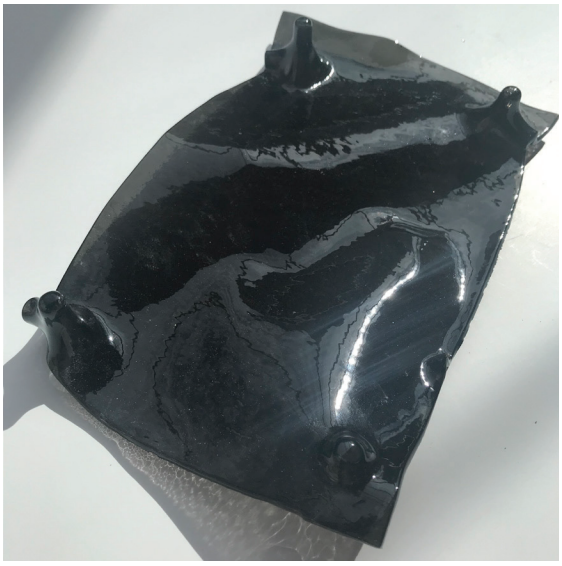
tecnique plan



welded steel frame for support



chicken wire



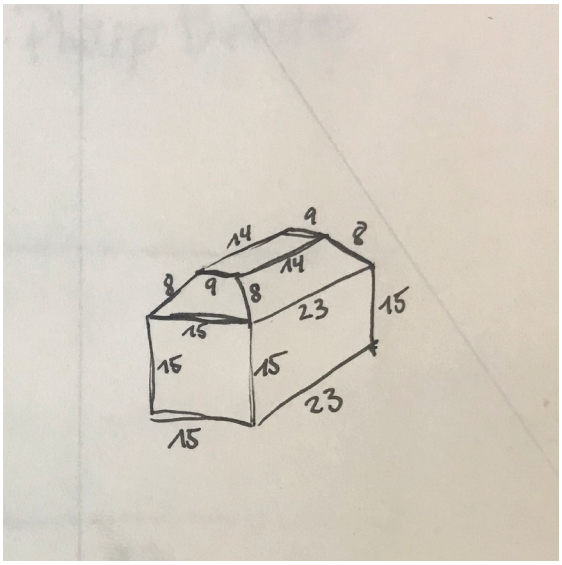
Final result

MELTING THROUGH GRAVITY

Brita Lie Lysne og Paulina Torge

In our second experiment we wanted to explore the glas' behavior by just putting it on a steelframe covered with chickenwire. The shape of the outcome was developed through gravity and heat.
For the form we welded steelpieces together into an rectangular box. Inside of the box we had an rectangle of steel attached to the vertical steel sticks of the box. On top of that we placed chickenwire just to give the glas a bit support when it melts.
For this experiment we used two pieces of glas ontop of each other.

In this experiment we used the sagging technique. Sagging takes place in between 650 to 740 degrees. The heating process of the glass makes the material melt trough the form and result in a water dripping effect.

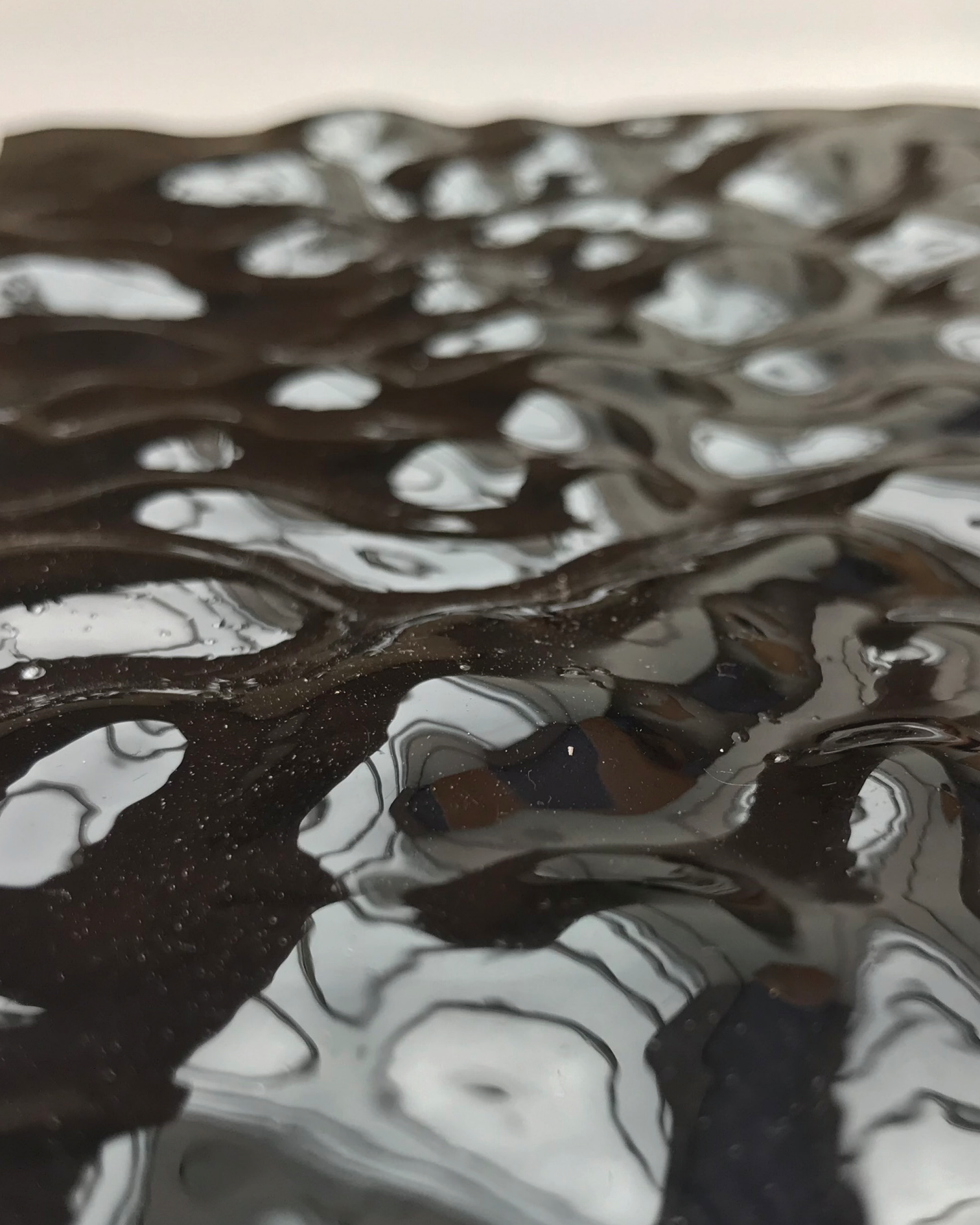


First sketch, the ‘roof’ was moved inside th vox lateron.

In the ceramic oven.

After the sagging-process.

Water dripping structures.



WAVES

Brita Lie Lysne og Paulina Torge

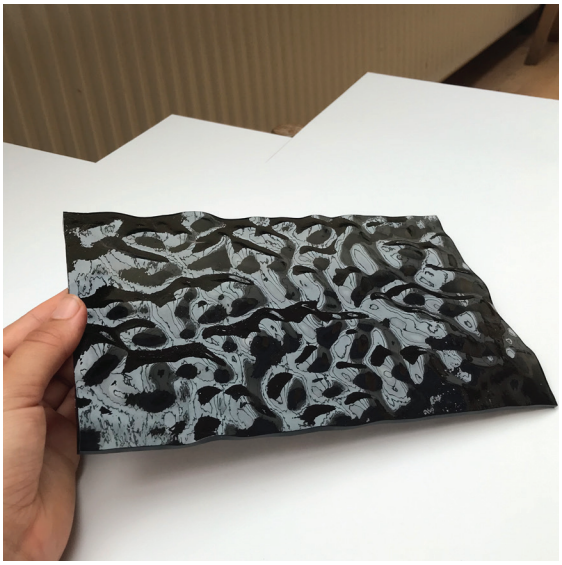
In our first experiment we tried to cast our glass in a way it would get a organic wave-inspired movement in its structure. We made a form using clay and plaster.
We started of shaping the clay with our hands into wavy forms to get a positive print of our suggestion, to then cast the clay on. By that we got our negative print for the glas to melt on. In this experiment we already had a very exact footprint where the glas would melt on. So it was more about the outcome of how the light would behave and cast reflections on the glas.

The technique we used for this experiment is called slumping.
Slumping uses gravity, heat and time to make the glass material bend to 3d shaped surfaces, in this case our casted plaster print. With this technique our glassmeltingprocess took place in between 625 til 780 degrees.

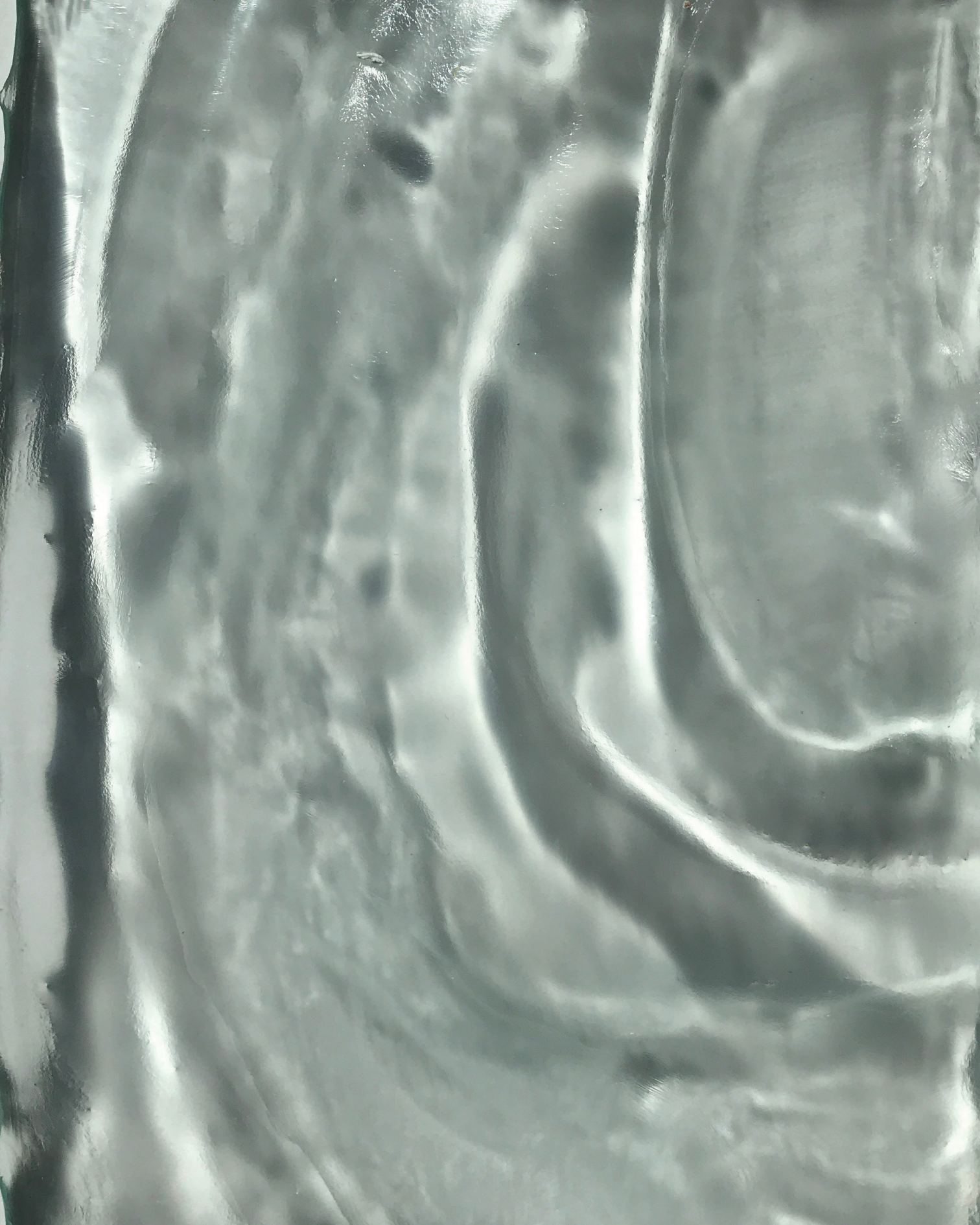
The plaster casted print with the glas ontop before the slumping process.

After the splumping process.

In our first experiment we used clear glas

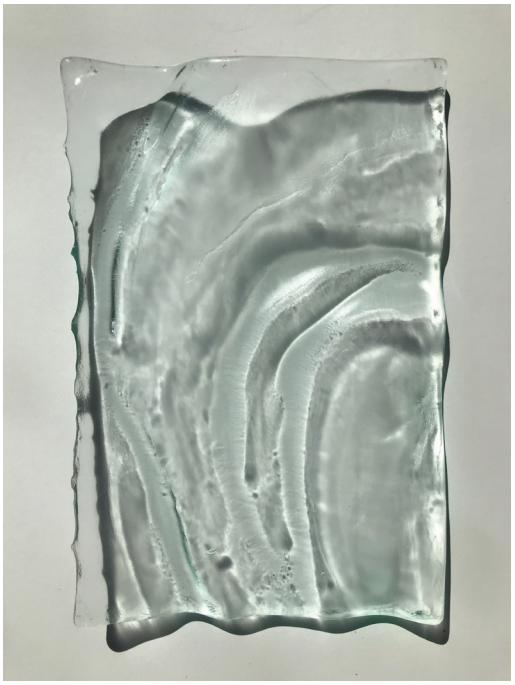


Reflections on black pigmented glas



GLASS AS WATER

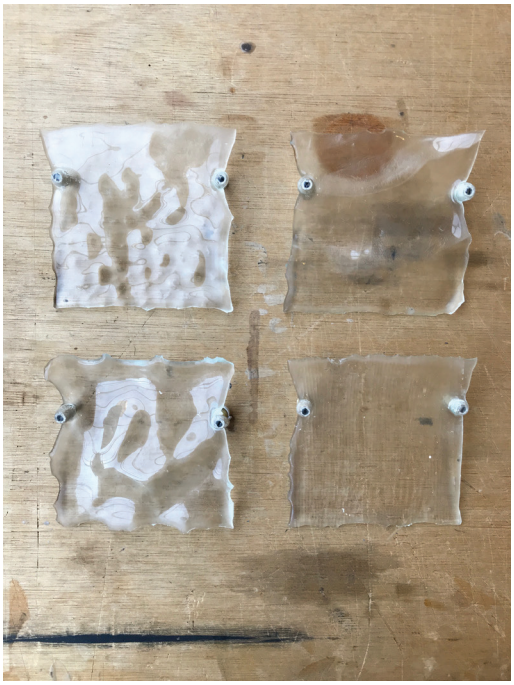
Jeanette Ruby, Victor B. Moritz



During this project, we have been working experimentally with shaping glass, using the idea of waters surface, transparency, and reflection. We wanted to capture the movement of slight motion water in a still picture, therefor we made a surface of clay, which we gave a smooth structure by using a lot of water in the shaping process. After further processing and serval preparation steps the glass is almost identical to the surface of clay, but the material - slightly frosted glass - together with the shape of the surface, is whats turning the glass into water.

EXPERIMENTAL COLLABORATION

Jeanette Ruby, Victor B. Moritz



In this project we focused on the interaction between surfaces. Some of the surfaces are similar, some are standing out, but the project is mainly an experiment that will show how surfaces can support each other. In reference to compare the pieces of glass, we used the same kind of glass, the same measurements, and the holes are equally placed from surface to surface.

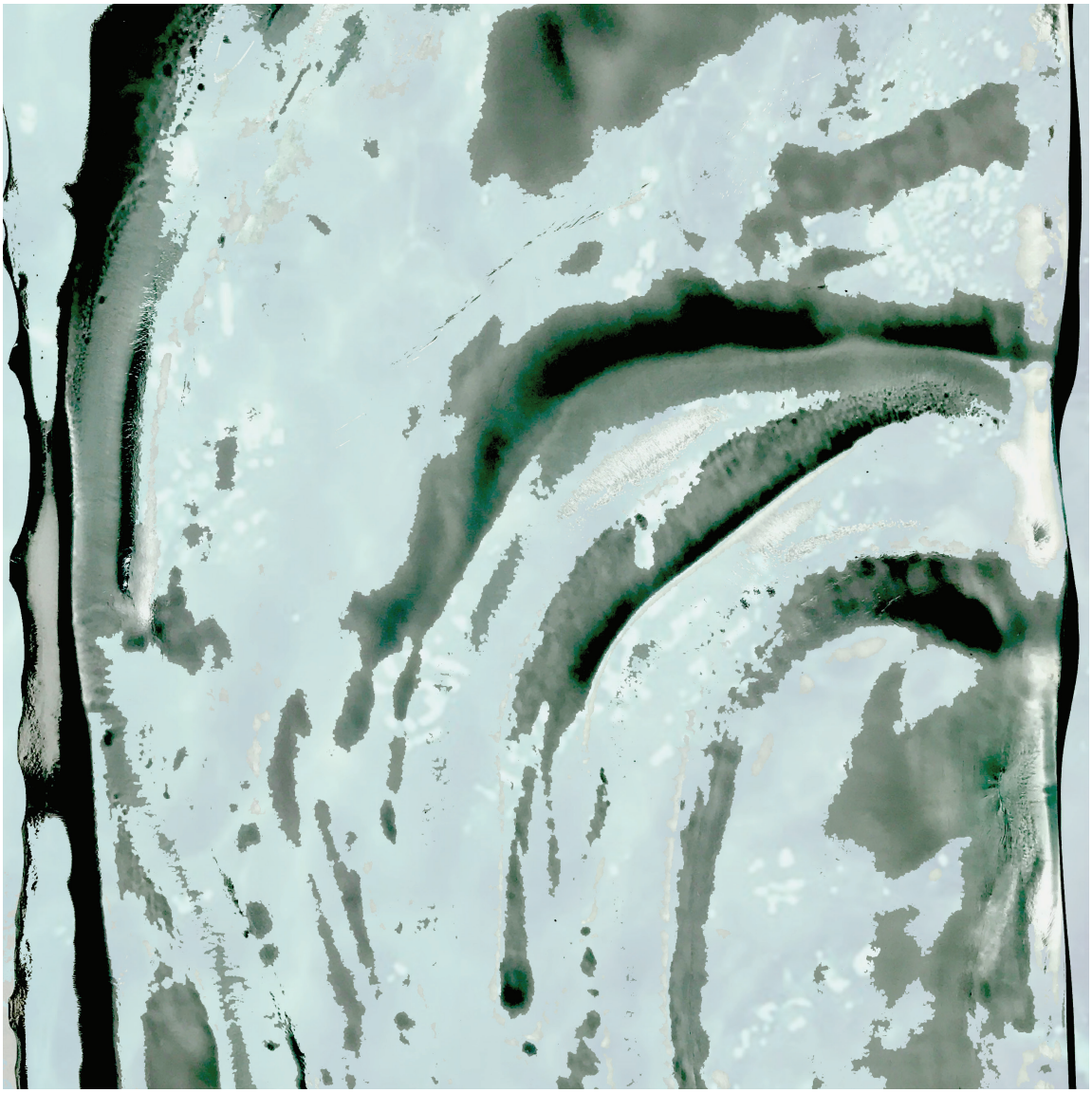
In this project we have been working with clay as the material shaping the surface. First we made a plaster form in the wright measurements. Then we shaped the clay, using a lot of water to make the surface smooth and water-like, then we squeezed the clay surface into the form, and covered all openings to the bottom of the form. Now we made the plaster, using to parts stone plaster, one part flint, and one part fire brick, before adding water until the consistent was wright. Then we filled plaster into the form, waited an hour for it to set, and put it in the ceramic owen over night using this program; it takes the owen 2 hours to reach 500 degrees, then full speed to 670 degrees, full speed down to 560 degrees, it stays 1 hour at 560 degrees, then the temperature falls to 540 degrees in 30 minuts, for 1 hour it stays on 540 degrees, in 1 hour the temperature goes down to 460 degrees where the program is finished.
When the plasters temperature was low enough, we formed and painted it to prevent the glass from sticking to the surface. After this, the glass and the surface went to the ceramic owen (due to the kind of glass we used, we didn't use the glass owen), where we used the same program as we did with the plaster.

The plaster before it sets.

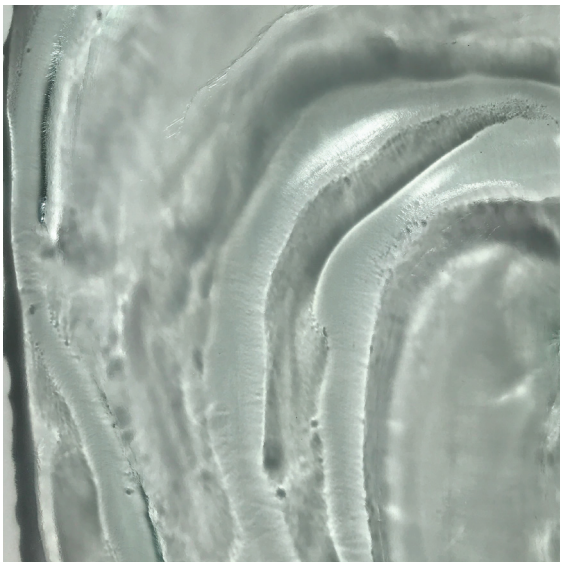
Clay surface before the negative shape will be formed in plaster.

Clay and plaster modelling of the surface, shaped after waves. The structure on the clay is smooth and formed with water, which has a big affection on the surfaces expression.

Plaster modelling. The surface shaping the glass.



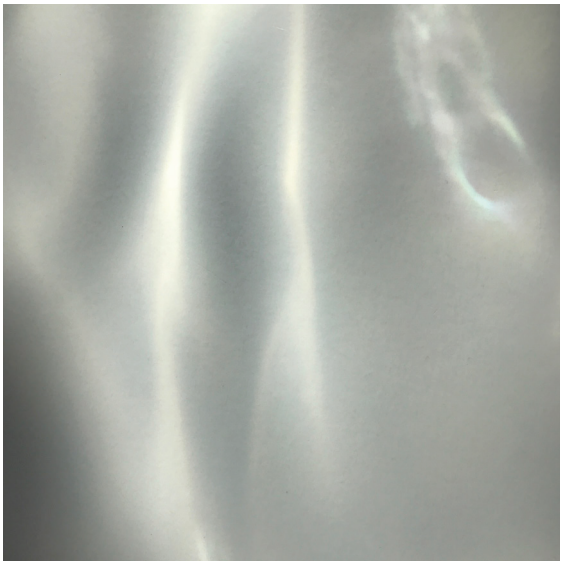
The reflection in the water is conected to the shape of the glass surface.



Part of the final glass surface in relation to the real water surface to the right.

Real water surface, where the movement, transperency and reflection is showen.

Clay and plaster modelling of the surface, shaped after waves. The structure on the clay is smooth and made with water, which has a big affection on the surfaces expression.



Reflection studies explaning the realtion to the reflection on the surface of water.