THE BEAUTY OF STARCHES

Research document
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ABSTRACT

Starch is an impressive and beautiful material. Once widely used by makers in various forms, from binding books to stiffening clothes, it can be shaped into delicate objects or constructed into robust structures. As a designer, I'm attracted to this old recipe of water, starch, and vinegar. My intentions are to show how beautiful this material can be. The starch project is a project where I question the way I use materials. This making process gave me insight into how this material could be implemented in my process as a maker. I demonstrates the value of this material and creates a space in which I can work spontaneously and push the material's limits. The potato starch project is one in which I question the way I use materials and show the qualities that the material has.

INTRODUCTION

Starch is biodegradable, cheap, renewable, and present in most of our food (*Environmental Impact of Bioplastic Use 3*). When we look back in history, starch has played a big role in our lives. developed when Egyptians cemented strips of papyrus together with starch adhesive made from wheat. Even my grandmother used a homemade mixture of starch and water that she applied to clothing to stiffen it and get rid of all the creases. Once widely used by makers in various forms, from binding books to stiffening clothes, it can be shaped into delicate objects that move or constructed into robust structures. As a designer, I'm attracted to this old recipe of water, starch, and vinegar. I'm particularly interested in the binding ability of the material. I want to understand the material and the technique for using it. My material driven exploration is a way of showing how beautiful this starch-based material can be. In this research, I make the process visible and understandable. From understanding and the collecting of the material to the properties that the material has and playing with them in a new way of working to make new connections. My intentions are to show to process of making the material. The aim is to make experiments that I can do at home with the tools I have around, from the process of collecting starch to the experimenting with the material. For me, it's about learning a new craft that could generate a new way of looking at how we use materials in the future. I designed new combinations that I can use as a designer. and be able to make rigid shapes. This is done in a way that I think adds value and meaning to the material itself.

THINKING HANDS

My aim is to create a space where I can experiment and come up with alternative uses for my own starch-containing food waste. I do this by using the design method that we could call "thinking hands" (*Camilla Groth 1*). Thinking hands is a design method for provoking curiosity and investigation of combinations that emerge by doing first and then reflecting on the outcome. The act of making is powerful, as through making we also make meaning, communicate meaning, and share meaning; the act of making has a corporeal cognitive dimension. In sense-making through handling, shaping, and in reacting with various materials, our hands form the connection between mind and material (*Camilla Groth 1*). "Thinking hands" allows designers to explore unusual combinations of making because of a lack of experience with or knowledge of techniques. also, Michael Biggs addresses this in his paper: 'A representation is some sort of translation where we step away from what we are trying to conceptualize and describe it in an alternative way; for example, a landscape painting allows us to see connections that may be less apparent when confronted by the actual landscape itself. Because we have accepted the possibility of representation, we can accept alternative representations'(*Michael A. R. Biggs 5*). In this project, I explored this way of thinking. Instead of trying to capture what I want to conceptualize, I just start making and experimenting with starch, even though I know nothing about the material or how to use it. I do this to make new connections. It can result in a design that looks forward. It processes a path that leads to new territories instead of being stuck in the conventional way of thinking.

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Through the process of designing with my own food waste I am interpreting them in relation to one another, I hope to create an insight into the value that we now see as non-existing. For example, we throw away the water that we cook which contains a lot of starch. In this way, we throw away a lot of useful materials that are available not only for edible purposes but may be useful in other ways away. This project shows what the value of this material can be. By doing this, I broaden the perspective within this context. Through the physical making of the experiments, I show how this waste could become tangible.

The starch project is an ongoing project exploring the range of materials and uses that starch can have. Starch chains bind together via strong hydrogen bonding when you heat them up, which results in a rigid structure. (*Environmental Impact of Bioplastic Use 3*). This makes it extremely useful as a polymer. They have had their use in the food, textile, biofuel, plastic, and pharmaceutical industries until now. Slowly but surely, starch had to make way for artificially based binders. simple because it was less expensive (*Peter Adigwe et al. 1*).

THE BEAUTY OF THE MAKING PROCES

I'm inspired by the work of Formafantasma (*Autarchy FormaFantasma*) where they show the beauty of the making process and design tools for a self-sustaining way of working. All the tools are human powered to provoke a connection with the process (fig 1). In this work, we see the process of making bread in a completely different way. All the tools are made in such a way that the process becomes understandable. Shahar Linven (*aka* "*Metamorphism*") is also designing tools, but for a speculative future where we need to work with different and, for mankind, new materials. She gives a possible example of how that material would be used and what kind of tools we would need to work with it. In this work he states the importance of spending time with what you do (fig 2). The examples above show the importance and beauty of the making processes and making by hand. This is what I want to capture in my work as well. I want to make the process comprehensible and tangible.

Figure 1. Autarchy project Formafantasma

Figure 2. Metamorphism Shahar Linven

THE MAKING PROCES

To use the material, I first need to collect starch. As a source, I used my own waste for this. It's important that I'm involved in every step of the process. from the collection to the application of the material. In this way, I am intimately involved with the process and develop knowledge of the procedures required to obtain starch. I think this is important
to better understand the process and to showcase its beauty. To use the material, I mixed 10 grams of starch with 60 ml of water and 5 ml of vinegar. By heating the material, I trigger the hydrogen bond, and the material becomes thick and sticky (fig 3). With these samples, I notice how much the material shrinks. The shrinking of the material (fig 4.) first appeared as a problem but became a starting point for further experimentation.

Figure 3. Starch, vinigar, water mixture

Figure 4. dry starch, vinigar, water mixture

Starch has been used as a binder. If you add a fiber to the mixture, it becomes stronger, but it also prevents it from shrinking. I explored the possibilities of adding material to the same starch mixture as before and ended up with strong and rigid samples that didn't break (fig 5, 6).

Figure 5. Starch mixt with textile

Figure 6. Starch mixt with textile on 1 part mould.

I taught myself the new skill of winding starch and fiber around a mould. The experimentation with the shrinking material resulted in the design of a mould that released inward (fig 7,). With this mould, I gain control over how to use the material and use the shrinking as a benefit (fig 8, 9, 10)

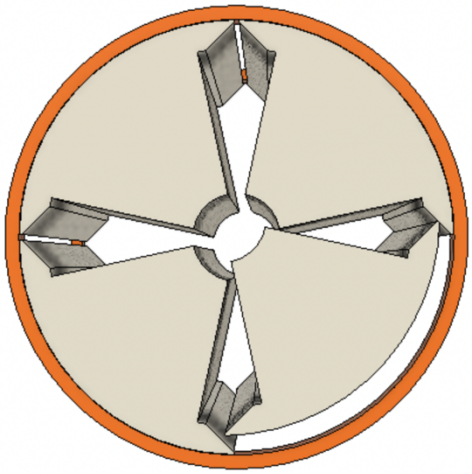

Figure 7. Inward mould.

Figure 8. using new mould.

Figure 9. dry sample from inward mould

Figure 10. dry sample from inward mould round shape

By experimenting, I came to new conclusions. I'm good at analyzing what I saw happening and how it's relevant for the process. I have taught myself a new skill that I use to make the process visible. I did this by using my knowledge and by bringing parts together and modifying them so that they work the way I think is beneficial for the project and by making unique combinations. All the samples are answers to questions that I had while conducting experiments: Does the material still work if I add more water? What happens on a bigger scale? How does shrinking become a good thing? How can I tell how beautiful the process of working with this material is? By looking at the samples, you can see the questions that I ask myself. All these experiments resulted in the creation of a tool (fig 11.), where I combined what I learned from the experiments (fig 12, 13, 14) and stimulated my connection to the material. You need to spend time with the machine to use it. Without me, there will not be an outcome.

Figure 11. winding tool with big inward mould

Figure 12. first experiment on the machine starch mixt with fiber

Figure 13. trying different patterns on machine

Figure 14. trying different patterns on machine small mould

FINDINGS

In the samples included here (fig 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14), I explored the way that starch behaves not only as a binder but also as a material on its own. After experimenting with the material, I noticed that what I put in it influences what I can do with it. There are still a lot of opportunities regarding the project. Until now, I only used the starch from my waste. There is way more in my waste that I could incorporate into the project. For example, color A lot of food waste contains a lot of pigments that I could use to color the material. This could provide an interesting link between the sample and its origin. When I do this, the material will vary in color based on the food that I eat.

The material is water-dissolving, which adds a deep poetic layer to the project and provokes a lot of new thoughts relating to design. For example, is it a bad thing that it's water-dissolving? Or can it add value to the design? In this way, the starch project is a project where I question the way I use materials. All the samples were made to explore the opportunities that arise when using the starch material. And as such, they showcase the veracity of how they can be used as a material in design. The way I work suggests that I find my way by using starch material, from the perspective of an explorer. I search for a way to make the beauty visible to myself, to make myself aware, and to shift it away from being just starch to designing a tool to help in the present.

CONCLUSIE

Through the starch project, I show the beauty of working with starch and fibers. This making process also gave me insight into how this material could be implemented in my process as a maker. The focus on the starch-based material created fruitful grounds for new ways of thinking. While these are difficult to translate into specific design objects right now, they can be seen as a framing mechanism to guide designers in their process of building sustainably made materials and objects. The process is less about finding a use for this material and more about creating value by showing what the characteristics of the material can be. The objects themselves are thus expressions of the qualities rather than applications of them. The project did not only change the way I look at starch in terms of edible content. It also broadens my perspective on the harmful systems that I sustain in my life. We would benefit from working together with nature instead of trying to come up with all of those chemically made materials. Although my search may be a draft and not present a clear solution to this approach, it can inspire further research on the topic.

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