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# Pulp use

Documentation of  
Degree Project for Bachelor of Fine Arts in Design



**LUND**  
UNIVERSITY

**Degree Project for Bachelor of Fine Arts in Design**

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Department of Design Sciences

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# Abstract

Paper pulp is commonly used for packaging, either molded into a shape or rolled into sheets of paper and turned into cardboard. With international shipping and our general consumption, paper and cardboard from packaging is all around us. The recycle rate of the material is high compared to many other materials, but there might still be more potential for all the used packaging than being tossed into a bin.

By looking into how paper pulp is produced and used today I started replicating the production process myself in my home environment. I did this with the goal of understanding the material and it's characteristics, to be able to produce realistic mockups and prototypes.

The process of working with paper pulp became the heart of the project when I realized that more people could do the same thing I was doing. The material surprised me by how easy it was to work with and how little was required to get a product close to what an industrial machine would produce. The results of the project are different production techniques, some visionary and some concrete, presented in this documentation for anyone to engage with today.

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# Introduction

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## Introduction

# Background

Living in a student apartment in Lund, I one day got myself a new bike helmet. It came in a nice cardboard box and was very well-presented. After trying on and fiddling with my new helmet, I couldn't bring myself to throw away the box (actually consisting of two boxes, one fitted into the other). I kept them both to store unknown trinkets.

For some time I had thought of getting a shelf to my small hallway, where I could place my keys and wallet. It wasn't in the top of my todo list but it would have a small improvement to my everyday life. Having played around with the two boxes, organizing them in different ways on my desk, I one day got the idea to make one of them into the hallway shelf I needed. I gave it one extra consideration and then took

two screws and mounted the shelf to the wall. It worked, and it sat there for the rest of the semester until I removed and started using it as a box again. The two small holes are still there but hasn't limited the use of the box. As of writing this in 2023, it's been three years since I mounted the box to the wall and today I use it for storing ongoing soldering projects.

Back to the time of hallway shelves in my student apartment in Lund, I was impressed by the whole situation. I had taken a box, made for storing an "actual" branded product, and put it on a wall. I could just as easily have thrown the box away in the recycling bin, but instead it got a second life, of even more to come. Something about this excited me.



## Introduction

# The four traits

What made the whole thing with the box on the wall so enticing?  
In revisiting this project in 2023, to finalize the documentation, I defined the four traits below. They summarize why I decided to explore paper pulp for my Bachelor project and can be used as a reference when evaluating different results of this project.

### **A new Life**

- The box could have been viewed as trash, but became a shelf.
- The box could be used for a purpose it wasn't initially intended for

### **Self-governance**

- I didn't have to buy anything extra (the box came as packaging for another product)
- I could make utilize the new usage all on my own, any way I liked.

### **Non-destructive**

- After it had served its purpose, the box could be used for something else once again
- The box could also be recycled in the regular waste system

### **Resonance**

- The material of the box precisely met the demands of the functioning as a hallway shelf. Wallet, keys and phone were no problem. A flowerpot, book or glass of water had been pushing its limit.
- The material was also in tune with the area of use as a shelf in a student apartment. Until further notice, but not for ever.



# Research & Exploration

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## Research & Exploration Usage today

To find the potential of paper pulp, a good start was to look at how the material was being used today.

Paper pulp is shaped into many things and I early on decided to focus the project to the material as pulp and not as cardboard. Cardboard is an application of paper pulp and a filled potential in its own. To make cardboard paper pulp is formed in to sheets of paper and reinforced with panels. It is an application in its own and is used in many ways today. Cardboard, even if its made by paper pulp, becomes its own material.

A well known example utilizing paper pulp without having it made into cardboard first, are egg cartons.

The process of molding a paper pulp object is quite fast. In an industrial machine 5-15 parts can be molded per minute. The longest part of the process is the drying, which often needs 15 minutes but can be reduced through hot pressing.

The main Achilles heel of paper pulp is water. It can handle getting moist but easily and quickly degrades in water.

Since it's mainly used in disposable, single use applications today, it is commonly perceived as a material for temporary objects.



# Research & Exploration

## Traditional usage



### Packaging filament

Used to keep many products safe during shipping, often inside a cardboard box. The paper pulp can be custom molded to fit inside a box and hold a product into place.



### Seed pots

Used to plant seeds in soil. The paper degrades within months. Beneficial since they can allow seeds to sprout and then easily be placed into the soil.



### Storage

Not that common, but there are some variants of storage solutions made out of paper pulp. Although a container made out of plastic could be made stronger and without doubt more water resilient, is that always needed?



### Egg carton

More or less the only way eggs are packaged and transported in Sweden. The carton makes use of the pulps flexibility and sturdiness.

# Research & Exploration

## Alternative usage



### Paper USB drive

A concept realized in 2013 by Kurt Rampton: *GIGS2GO*. There seems to have been an interest for paper pulp around 2010, based on some examples on this page. However problematic it is to merge paper pulp and electronics, it's also very interesting. Paper pulp is often perceived as disposable and although probably true even for this concept, it might have been a way to nudge the perception of paper pulp in a new direction.



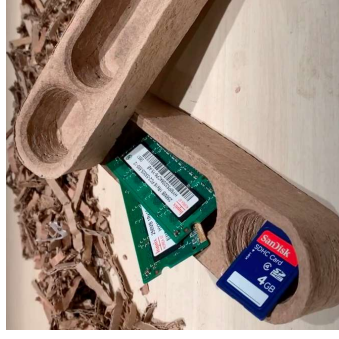
### Light armature

Not a common sight but this is the *Trash Me Lamp* designed by Victor Vetterlein in 2010, here seen at a thrift store in Sweden. It definitely shows that more can be made with paper pulp than just boxes. The name might suggest it's more of a statement piece than a product made of a fitting material.



### Furniture

*Pulp Furniture* by Odelia Lavie and Dan Hochberg in 2008. A realized concept that doesn't seem to have been set into large scale production. It truly shows sides of paper pulp still largely unknown today, more than a decade after the project was made.



### DIY storage

A project made by @XYZAidan in 2019, shared on YouTube and instructable.com. They use paper, water and a water-soluble binder to make this strong paper pulp material and use 3D-printed molds to shape it. This project was an inspiration to my initial material exploration.

# Research & Exploration

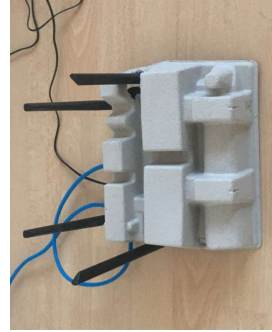
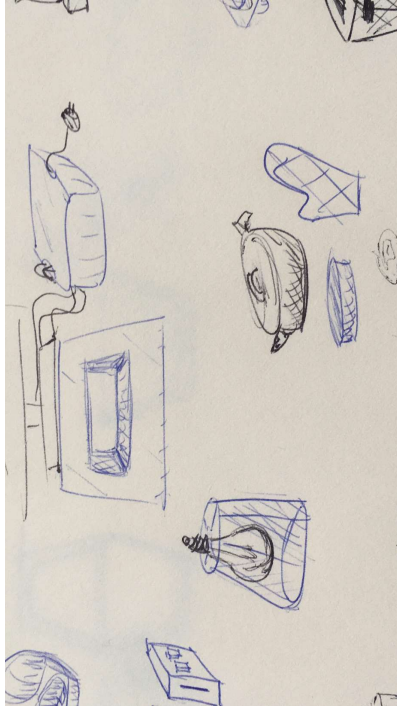
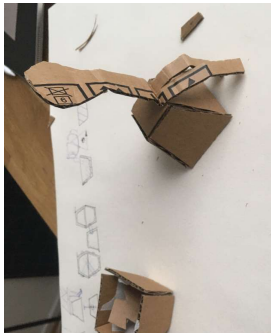
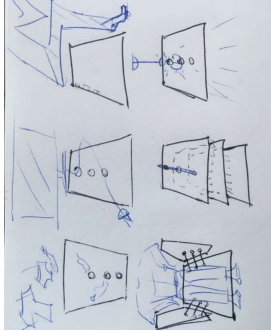
## Initial ideation

I spent some time exploring the merge of molded paper pulp and electronics and found interesting aspects. A home wifi-router for example is rarely exposed to water or force, it generally sits stationary. The plastic shells of two routers I examined were impossible to open up without breaking the material. What type of plastic the machines were made of was also not labeled, even customer service of one of the brands couldn't answer what type of plastic it was made of. My guess is a non-recyclable plastic like many other electronics. After the products lifetime most of the material would have to be burnt to get rid of.

Further on a router could benefit of being made out of paper pulp, in theory. It would be easier to extract electronic parts when recycling. If executed right the shell of paper pulp could emphasize that it is the technology inside that is desirable and has value, not the casing which often looks like a space ship. Also routers are often somewhat confusing to use and hide many of it's functions in an online settings menu. Which, if you find and try out as a beginner, confuses more than it enables. There is potential for a project on wifi-routers.

Despite this I found that this pulp project wasn't the right one. It could be done and it had it's charm, but it's a very specific product and the view of electronics needs a revamp for it to be welcomed. Modular tech can be enclosed in more fitting material than paper pulp. And paper pulp, I believe, can be used for more fitting purposes.

Besides electronics I looked into creating a second use of packaging, without the consumer needing to reshape it. There were possibilities for different applications but they would be very specific and not explore a new use for paper pulp as a material.





## Research & Exploration

# Using paper pulp

During my initial ideation I realized I needed a much better understanding of the material itself to know what directions to go.

In my exploration with the material I found that applying the pulp thin was essential for quick drying. A mold of about 2mm thickness would dry within 24h without extra heat or wind. Certain materials were better suited as molds by releasing the material easily when dried. The best ones proved to be plastics and perforated materials, like a metal net. An advantage with metal nets could have been that they could be put in an oven for the mold to dry faster, but it was more work than benefit and I perceived the dry-time of 24h to be quick enough.

Plastic boxes, like a lunch box, provided great stability and non-stick and served as great mold. However with these I was limited to their shape, and the exploration of what objects and applications were suitable were heavily dictated by the plastic boxes at hand. Having discovered that metal nets worked as molds, initially by applying paper pulp to a pencil holder and a fruit basket, I thought that metal nets would allow me to create my own shapes for a more free form exploration. It worked, but poorly. The pulp could be applied, and it would dry, but to squeeze out water when applying the pulp, which was essential, some force had to be applied, which deformed the net shapes.



## Research & Exploration

# Fixed mold tool

During this process of trying to find ways for custom molding, for me to explore what shapes and products would be suitable for paper pulp, I started seeing a new potential and was again impressed by the material.

Until now I had looked for ways to shape paper pulp for the sake of finding the form of a new product. Was I to find this form, an industrial mold with precise details could theoretically be made with traditional means, to put it in to mass production. However working with the material I found that details and precision in the finished molds were possible. I just didn't have control over the molding tool. Using the pencil holder, with its fine net as a mold, was what led me to this insight. The result was a very precise depiction and had a distinct surface because of the net.

If I were to gain control over the mold tool I could not only make mockups and approximate shapes, I could make precise molds down to the millimeter. And so could anyone, possibly in both large and small scale.



## Research & Exploration

# Flexible mold tool

From here the project turned from the search of novel shape, to the search of a novel production method. A mold tool used in industrial production, be it for metal, plastic or paper pulp is a big financial investment. If you want different shapes, you need different mold tools, each expensive to produce. A mold tool capable of producing different shapes, would of course be very beneficial, and maybe paper pulp was the right material for a tool like this.

From researching egg carton production I had learned that the molds are filled with drainage holes, where water from the applied paper pulp is sucked out of the material. Sort of a reversed way of achieving the same as when I pressed out water through my net molds. The key thing here being that the molds themselves didn't need to be air tight, as opposed molds for many other materials. Liquid metal or plastic would find its way into the holes of a mold, but paper pulp is different. Paper pulp, when you think about it, is not really a liquid. It consists of small pieces of processed wood. Mixed, but not joined, with water. Therefore within pulp, it seems, the processed wood doesn't flow or trickle anywhere, while the water can quite easily be separated from it.

The mold tool did not have to be air tight. The net was flexible but difficult to get rigid enough for a defined shape. In looking for an adjustable mold tool I thought back to the limitations and possibilities of molding, draft angles being a fundamental principle to take into consideration. Draft angles are used in most molded parts to make sure the product can be removed from the tool. A way to visualize the concept is to think of vertical rain hindered by an umbrella, or uncooked spaghetti held in a bulk. They can both adapt to any shape, as long as the shape never drafts "inwards".



## Research & Exploration Discovering the Pinscreen

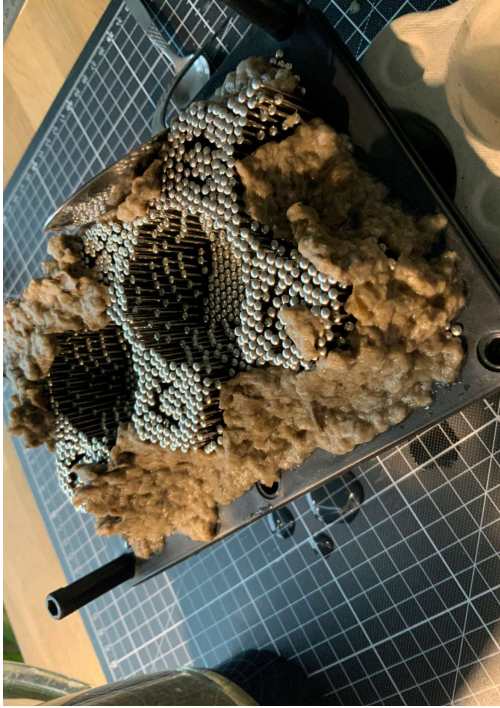
It was with these images of rain and spaghetti on my mind that I came to think of the old Pinscreen toy. To my knowledge at the time only used to display a three-dimensional depiction of the object, often a hand, pressed in to the pins. In a way it is the invert of a net.

The Pinscreen toy was patented in 1987 by Ward Fleming and became popular in particularly museums, where visitors could produce three-dimensional shapes in table sized Pinscreen boards. Smaller variants were produced and sold as personal items and became popular as "executive toys", similar to Newton's cradle. The inspiration to the toy seems to have been an animation device,

developed in the 1930s by Claire Parker and Alexandre Alexeieff. This original Pinscreen consisted of more than a million tiny pins, creating shadows when pushed through a white board. Two artists, one on each side of the board, adjusted the pins back and forth to create images, which were captured in still photos and combined in to motion picture. The device was used for a few films during the years, but gave way to other animation techniques, probably because of the cost of the device and the time required for producing each image. The Pinscreen animation device produced shapes through cast shadows, while the shapes of the Pinscreen toy where conveyed by the pins themselves.



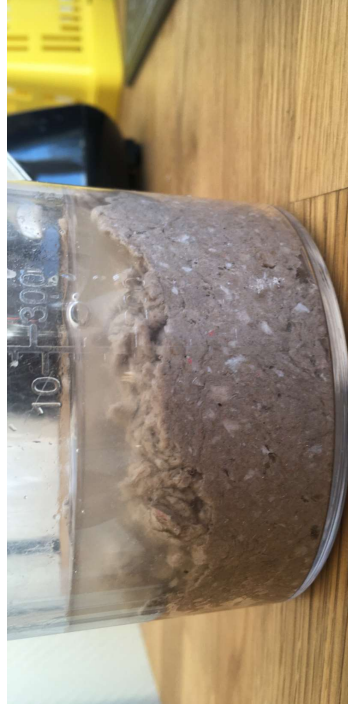




## Research & Exploration Using the Pinscreen

I started experimenting with a Pinscreen I got my hands on and found that the results were not as detailed as when I used the net pen holder. This was probably due to the pin heads utilizing the very opposite of draft angles, leading to parts of the material getting stuck between the pins. What was impressive was that it despite this worked. Paper pulp applied to a board of pins could dry into a shape.





## Research & Exploration

# Evaluating the production process

Knowing that the principle worked, I continued to experiment with paper pulp and using household objects as molds for larger, sturdier, and more detailed results. Although thinking that the process of turning paper and cardboard into pulp and then to custom products could be done at a larger scale, I wanted to explore the most reasonable way to do it yourself at home.

For that I had to find out what could be done from a certain amount of paper or cardboard. I found a pizza box to be a good reference point since they're all roughly the same size. My blender could fit half a pizza box quite easily and that made about 250ml of pulp. With this I could cover two 1 liter boxes. In conclusion one pizza box makes ca 500ml pulp, which is enough for building four 1 liter boxes.



## Research & Exploration

# Refining the production process

Continuing to refine the process of home pulp producing, I first of all skipped the paper shredder I had initially gotten to resemble an industrialized recycling line. The shredder produced fine cut material but was inefficient and an uncommon household product.

Next, I found that the blender also was inefficient for paper mixing. The paper and cardboard had to be cut into quite small pieces to fit, and the blades would often get stuck since the material gathered at the bottom.

I tried a hand mixer instead and it worked much better since you could reposition the vortex and avoid paper getting stuck in a bulk. I started with using the mixer in a bucket but found that my kitchen sink was even larger and also something everyone was sure to have access to. This also cut the step of filling the bucket with water in the shower, or having a water container next to you while mixing. Putting the paper straight into the sink, easily spraying water on it while tearing smaller pieces worked well and was much quicker than my previous methods. It definitely felt a bit strange, especially putting the mixer straight into a paper filled sink, but it worked well and would probably feel more natural after a couple of times. An added benefit of having the whole processed centered around the sink was that it was easy to clean afterwards and only required a hand mixer and an object to use as a mold.



# Concept envisioning

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## Concept envisioning Streamlined home production

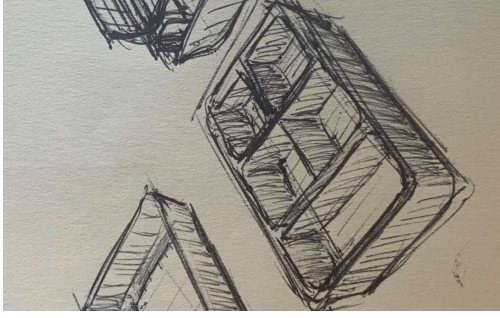
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Having refined the process I actually found the whole thing quite reasonable for an individual to take part in at home. The scale of material needed, and available space at a sink, kept the sizes of producible objects relatively small. If one were to produce a chair, even if structurally possible, it would require a large amount of material and the process should probably be moved from the kitchen to a place like the bathroom.

Not only would bigger molds require bigger objects to mold from, it would also require quite a lot of practice and time. Applying paper pulp to objects you could hold and turn in your hands was quite easy to get a hang of, but larger objects would become more of a craft than a small at home fix.

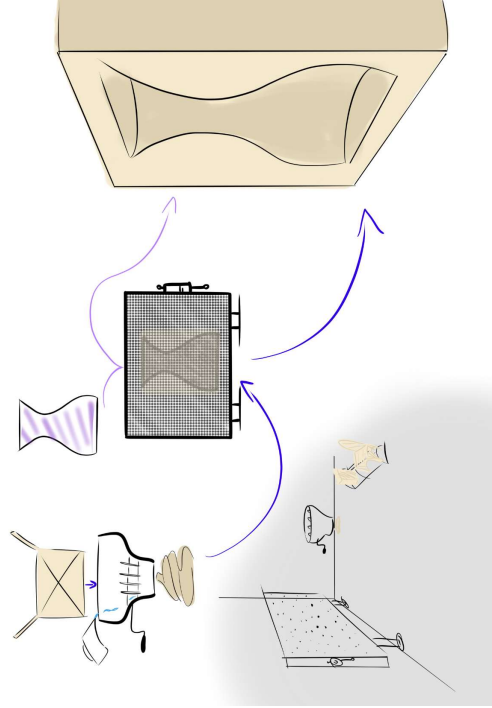


## Concept envisioning Guided home production

So in exploring what objects were reasonable to produce at home, the boxes I had already been using for molds proved to be valid candidates. The principle of shredding pizza boxes to produce other smaller boxes felt a bit comical, and maybe not as a great proof of the grand potential of paper pulp. However many of us surround ourselves with many trinkets in need of an assigned place.

The act of being able to make your own uniform storing solutions with the potential of custom fit, at that completely free and from material you otherwise would have thrown in the recycling bin. In a way it was quite beautiful. I looked into designing a versatile box that would mainly act as a mold, that you could put or borrow. The results were however not much more than any box and I found that the box you already have very well can be the box you make a mold of.





## Concept envisioning Pinscreen production

Still I was indeed striving to push paper pulp to its fullest potential and I thought the Pinscreen device I had tried earlier could enable just that. A device instead of a home project could resonate better with us comfortable citizens, who want to be able to make a decent choice and then be on our way.

To utilize the material in uncommon ways, the physical scale of the products had to be enlarged. The makers of Pulp furniture, Triangle Design Studio, had already proved it possible.

Larger products require a larger device, which of course needs a lot of room and quickly becomes too big for an average home. Moving the device outside the home enables it to be shared which divides the cost as well as the use, which would make the price more reasonable in terms of both money and production resources.

Refinements to the device that had come to mind before were headless pins and more pins, both for more precise results. Also, a larger device would of course need longer pins to enable larger products. The closest place outside the home were a device like this could be placed is by the common recycling bins. In Sweden there are often bins outdoor for packaging made of metal, glass, paper and plastic, meant to be used by people living in nearby houses or apartments. For some apartment buildings there is instead a house or shed with similar bins. In theory a small house like this could have it's own Pinscreen paper pulp molder. It wouldn't be as easy as placing a recycle bin there, but the space makes sense since it would be a form of instant reuse/recycle.







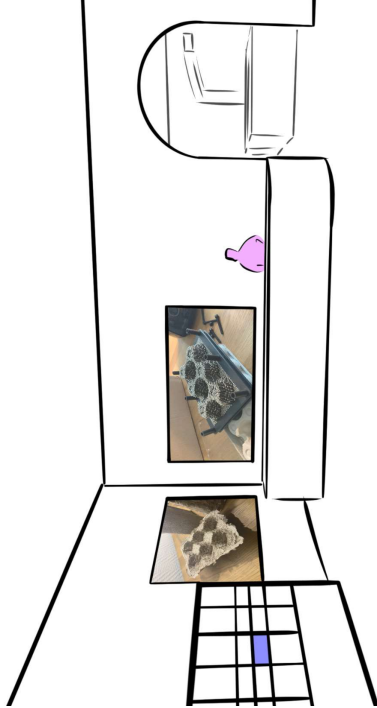
## Concept envisioning Pinscreen placement

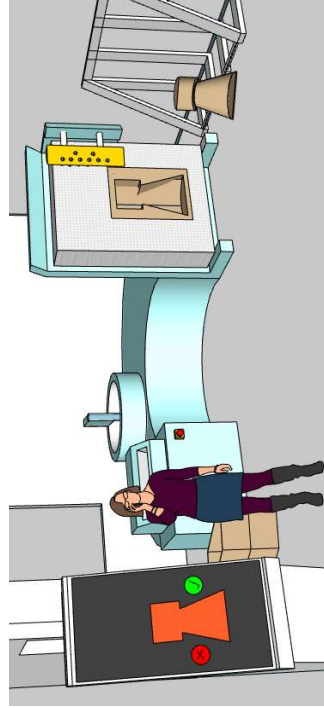
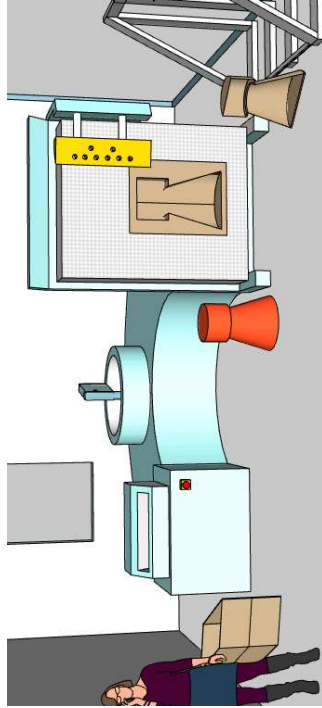
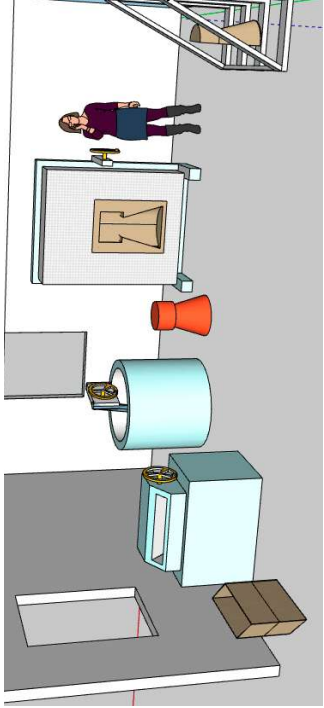
Having moved the molding device outside, we would reasonably move the shredding and mixing outside as well, allowing us to continue taking our disposable cardboard to the bin house as we always do.

However these houses, if they're infact houses and not a group of outdoor bins, are not always the most clean places. They're often, self explanatory, smelling of compost and trash. Not the most pleasant place to have your new product produced.

So the building of the Pinscreen device should maybe be a separate one. If so it won't be as natural to visit as the recycling bin, but again it is a different thing and maybe should be separated by that fact solely.

Raising a new house allows us to make it available for more households and then we begin hearing questions of how many individuals can share and take responsibility over a space, without it degrading. We all know that it differs. The condition of a shared laundry room always seems like a gamble. To be further skeptic to this concept we can look current recycling and how it's handled. It's not uncommon to see plastic thrown with paper, which would not be great for our Pinscreen device, even though a little plastic in the shape of glue our tape is inevitable and actually provides some adhesive.





## Concept envisioning Pinscreen variants

The exploration of scaling up outside the house exposed some potential issues. It made me explore how the device itself would work, if the situation which it was in was reasonable. I visualized three different steps, with the first two being an enlarged version of what you could do at home, and the third taking it to another level.

1. **Manual & physical**  
You bring your paper material and shred it one device, mix it in another and apply it to the Pinscreen. The mold is based on a physical object you bring with you. In this way you can make paper copies of existing objects. The Pinscreen device is basically an enlarged version of what I used in my exploration, with the added ability of fixating the pins at any given position to allow for molding.
2. **Automated & physical**  
This concept starts and ends in the same way as the first, but automates the steps in between. One combined device shreds, mixes and then applies the paper pulp. You still have to provide a physical object for the mold, like you would at home.
3. **Automated & digital**  
This third concept is also automated, but instead of using a physical object to make the mold, a digital 3D model can be used. This of course enables new possibilities and it was this concept that led to the next scale where we fully leave the recycling house and instead envision a Pulp Use Centre.

# Concept envisioning

## Pulp Use Centre

The molding device itself in a centre like this would have room to be large. There could even be many of them to allow for more people and products. The molds would as we've learned have to dry on the device itself, but applying the paper pulp only takes seconds and it is possible that the object could be removed from the device before fully dry, to finish elsewhere. The technique used in making egg cartons could probably be used, where the water is drawn out of the pulp by the mold device itself, greatly cutting the drying time. The main function to develop would be how to control and lock the pins in position.

In research I found that there was a project at MIT in 2016 where they developed a table of moving pins, connected to an optical sensor and projector. It was a concept for communicating and working digitally with physical visualization instead of pixels on a screen. The concept doesn't seem to have been implemented further, but pins creating three-dimensional shapes sure have something alluring. Maybe we'll find the right use for them soon.

Just like the first Pinscreens and the MIT evolution of them, the ones in the centre could be used even without pulp.

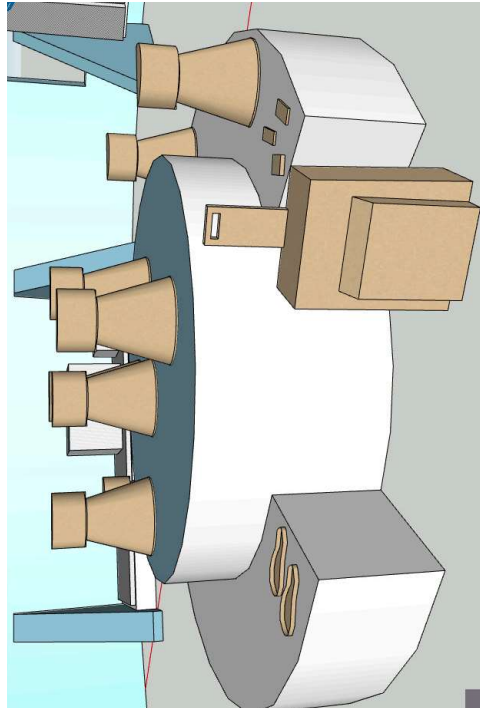
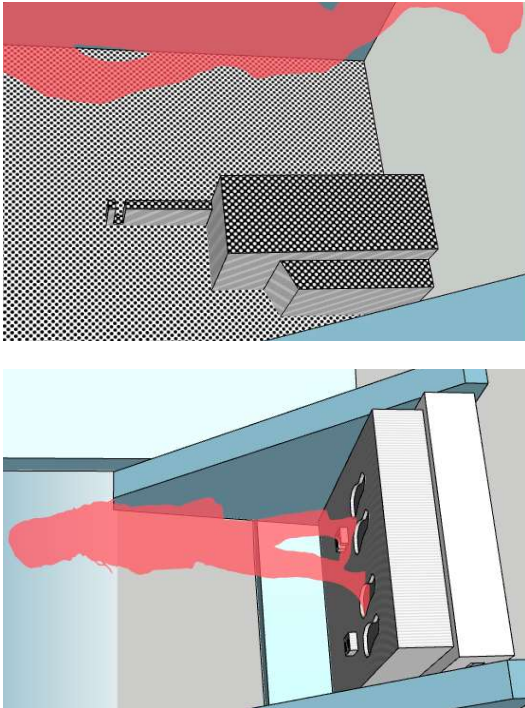
By this point in the process I started exploring creating representation of products in

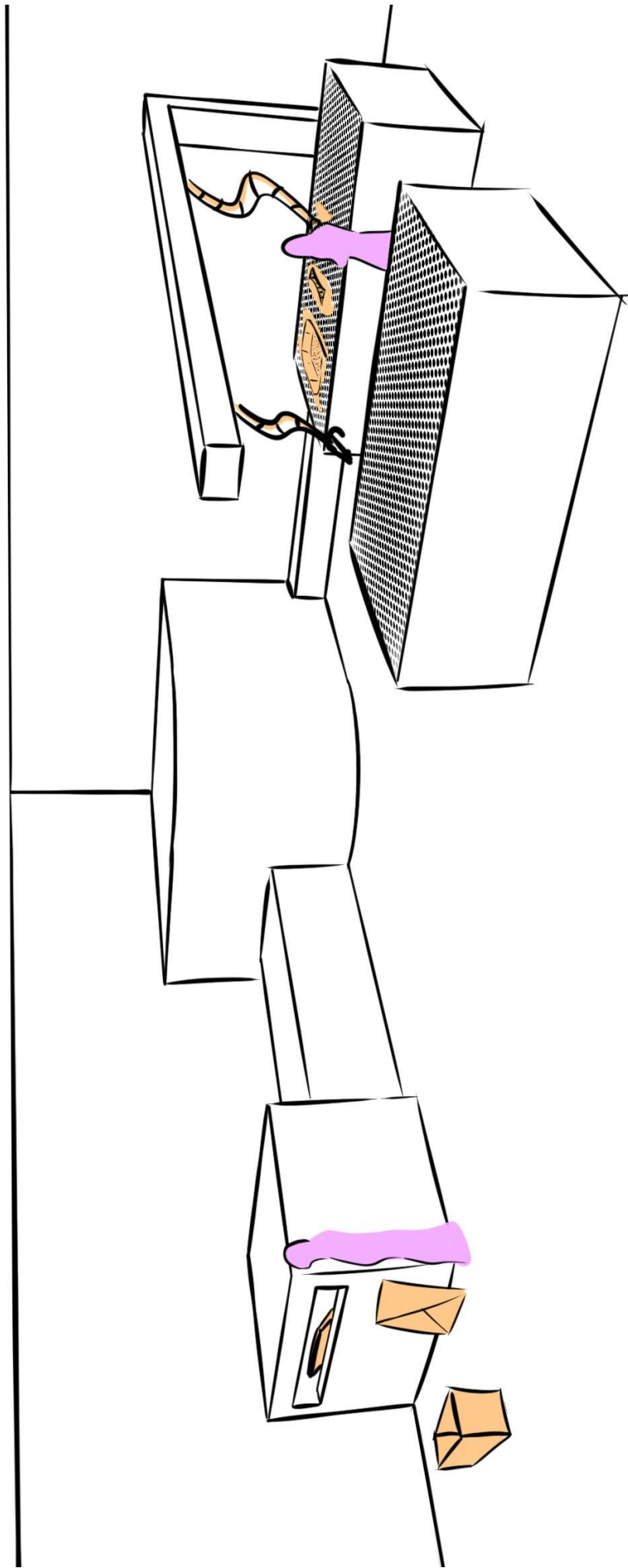
addition to new products. These representations could be efficient ways of decreasing return shipments by utilizing both paper pulp and the Pinscreens themselves to communicate size and fit of various products. It wouldn't be the same as the actual product but it could be a far better representation and provide a more informed purchase, than only seeing products on a screen.

If you're not sure which size of a shoe is right for you, you could have the exact sole molded in paper pulp, our simply shown in the Pinscreen. You wouldn't know exactly how the shoe felt, but you would get a far more precise representation of it than reading a measurement on screen and comparing it to your foot.

The scenarios where clothing, and accessories could be "tried on" are many and there would be other products as well that you wouldn't have to buy to know how big or small the are. With this use the centre could easily be placed in a mall and be a part of the shopping of today.

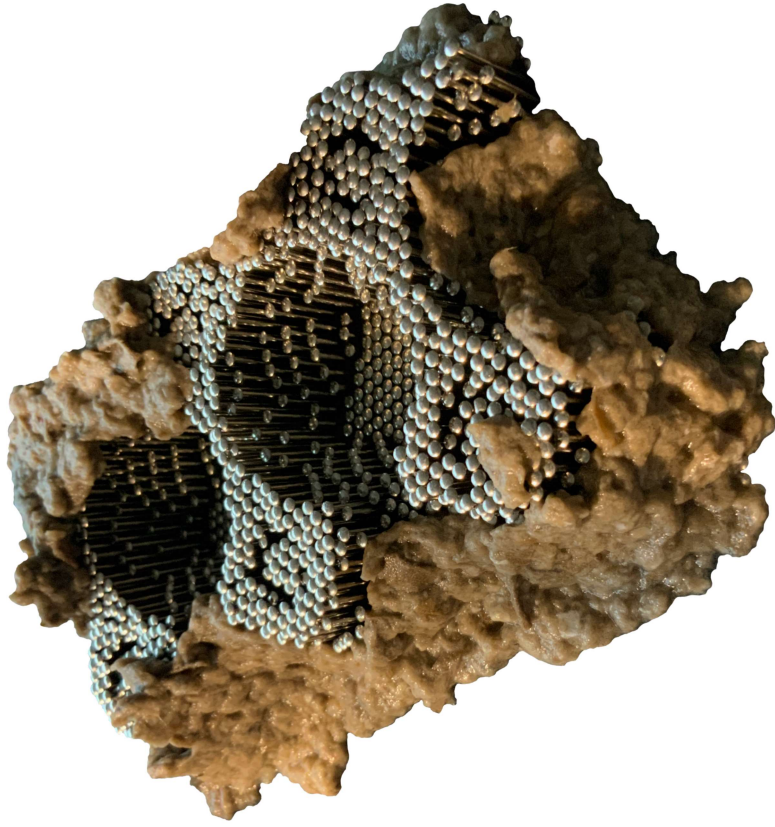
The paper and cardboard needed for producing your products could be brought directly by you, or brought in from regular recycling bins. Depending on if you're trying a fit or producing a product, the cost beyond material prices could be payed you or the company of the product your trying for fit.





# Result for today

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## Result for today Re-evaluating

Around this time in the project I felt that I had made interesting discoveries. I really thought that the Pulp Use Centre had potential, but I realized that the way I myself had come to value paper pulp during the project, probably wouldn't be the same in many other people. I chose to leave the concept of the Pulp Use Centre where it was and instead try and share a view of paper pulp that could be benefited from today.

WHY DON'T YOU

PULP IT YOURSELF!

what you need:  
old cardboard (paper/carton)  
mold object  
water  
hand mixer (or blender)  
bucket  
(cloth for drying)



PAPER INSTEAD OF PLASTIC

For a box this size you need 2 egg cartons and 1 liter of water

what to use for molds:  
lunch boxes, flower pots, strainers, cans and other objects that can get water on them

mixers and blenders have sharp blades, all pulping should be done with care and thought, for questions and contact, contact leo.linden@hotmail.com

## Result for today The Poster

Through the poster I wanted to share the production process I had worked out, and also raise the perception of the material and excitement of the concept of being able to do it yourself.

The poster specifies ingredients, amounts, assessed time and utensils needed. Much like a recipe, fitting on the fridge in your kitchen.



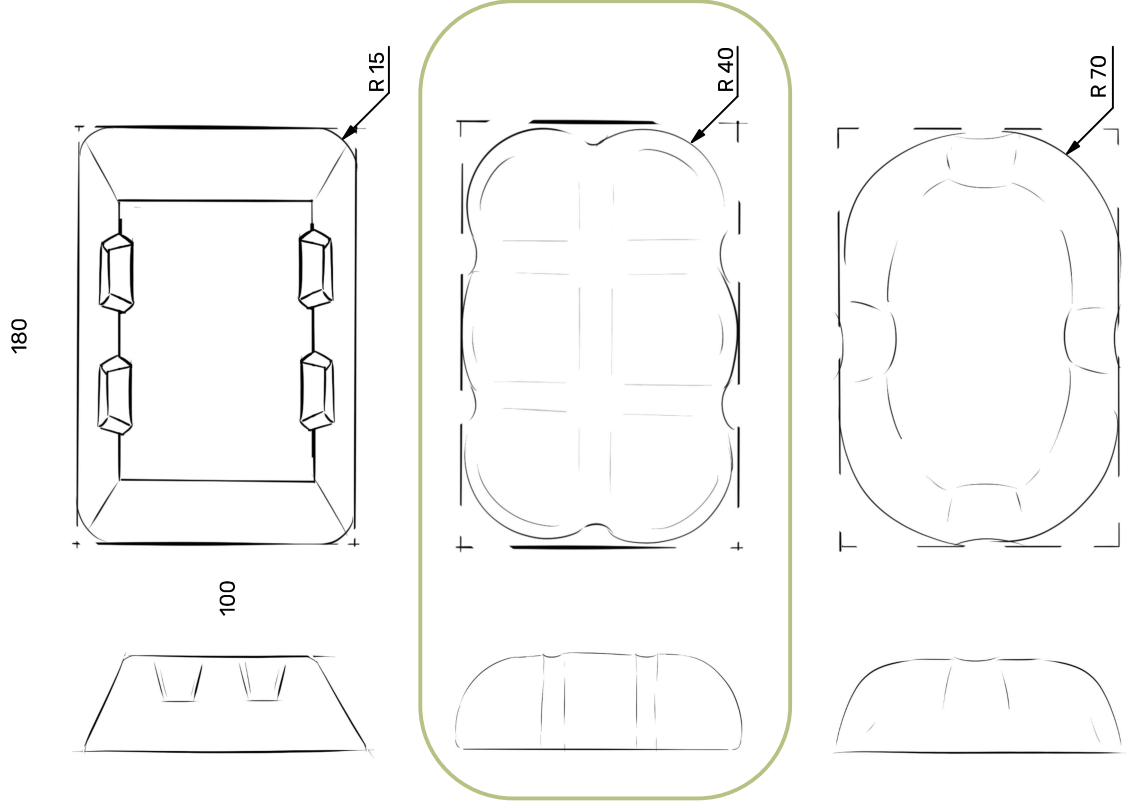
Result for today

## The Brain Box

Having made the poster, a new product to make use of the new production process, seemed fitting. The earlier work on small storing solutions laid ground for another box, the focus here being that it would be easy to mold paper pulp from, but also have structural integrity. I had to produce this product in some way, and decided to try and use paper pulp as the mold itself with plastic wrap between the parts.







## Defining the radius

During my time with the material I had found that round objects were easier to apply pulp to and also easier to extract the mold from. Regarding storage solutions, rectangular shapes are more common and fit more efficiently in most spaces, like shelves, cabinets and other containers. With the aim of providing a mold easy to mold from and a box fitting for storage I constructed this product.





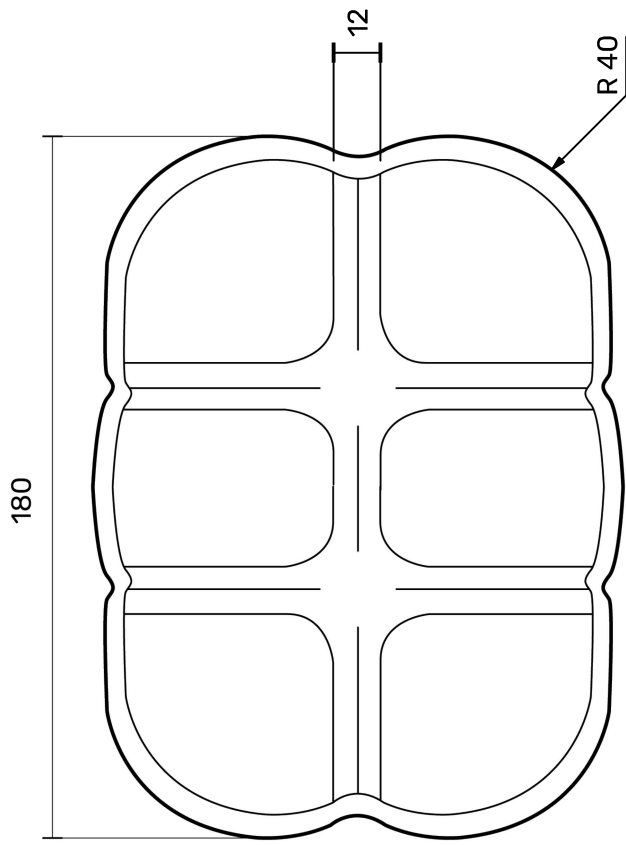
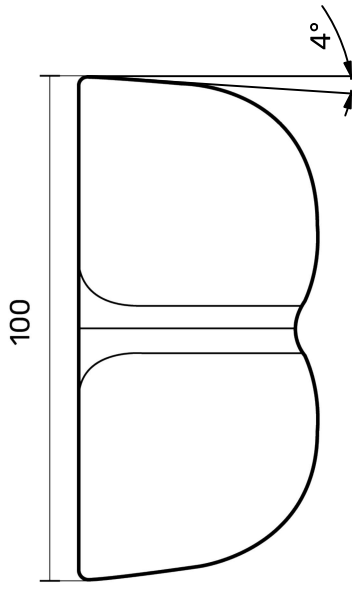
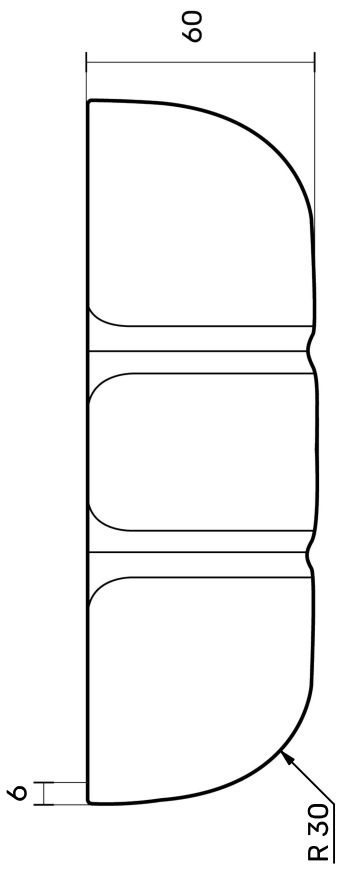
## What's in the box?

As most things in this project, the Brain Box is made of paper pulp. The material needed equals 1/2 pizza box. That's double the amount required for some other boxes of similar volume made earlier in the project. The wall thickness of 6mm is the reason for this. Since the Brain Box is designed to be produced in many copies which can be stored on top of each other, the thicker and sturdier construction encourages this.

The mold tool itself is also made of paper pulp in this case. It requires 2 full pizza boxes, being quite compact to withstand the molding process. However when the first product has been made, this copy can then act as the mold tool, rendering the material of the original tool ready to be made into 4 new boxes. With this technique you can produce identically sized copies or slightly larger ones with each batch, allowing for stacking dolls.



(mm)





# Conclusion

As I finish this documentation in July of 2023, two years has passed since when I thought I would have finished the project. During this time I've now and then returned and tried to summarize this journey. It's been hard. The issue has been that I haven't been sure what my result was, and the times I decided on that I still thought of developing and defining it more.

I believe this might be the last documentation attempt I have to do for this project, since I now feel that I've accepted the process that was. In doing so I have been able to do my best in summarizing the journey of the project in an honest way, without feeling the need to add or adjust things. The results are still vague at times, but they are also many and thought-provoking.

I have named the Poster and the Brain Box as the results of this project. Actually, I have named them Results of today. They were the last things I worked on before the reasonable project deadline.

Both were made for me to have something tangible as a result. I had spent a lot of time molding various objects around my apartment with paper pulp but it wasn't the molds themselves I was proud or excited about, it was the concept. To make that clear and to share it, I made the poster.

The Brain Box was in a way a continuation of this. A way of having something more tangible, even touchable, as a result. A mold that wasn't a random object but something I had produced and defined.

What I've named as an Envisioned Concept is the Pulp Use Center and the idea of using a Pinscreen as molding device. I really, really like this idea. It's the main reason I've had so much trouble tying this documentation together. I wanted this concept to be more and I often wonder how I could have developed it further.

I at least know the reason why I left it where it was and started develop the Poster and the Brain Box. It was because I from the start of the beginning had wanted a project with a tangible, physical result. That's perhaps a bit of an unnecessary bias to enter a project with, but it also shouldn't be too much to ask of an industrial designer doing their bachelors project. But it almost was and so I pivoted to something tangible.

Still, the concept of using a Pinscreen as a molding device is novel, nice and it's in this documentation.



# Further steps

For two years the further step has been to finish this documentation. Now that that's done we can get to business, even if I don't intend to for a long while regarding this project.

The poster could have larger and more visually clear symbols and process communication. That's interesting since I spent a lot of time on them. Contrast on some text should also be adjusted. Other than that it is great and objectively a poster, if it were to be printed.

The Brain Box proves that products can be made using nothing more than paper pulp. I touched the concept of making multiple copies in varying sizes. This is something that could be explored further.

The whole Pinscreen molding and Pulp Use Centre is where I believe time should be put if should be put somewhere. During the project I

could have done more work on market and user research. I was highly focused on the material and ways to shape it and even though I had ideas of the benefits it could provide, they were still quite undefined and I didn't believe I knew enough to ask users or browse markets.

I've realized since, that doing so probably could have answered a lot of questions and made the concept more clear for me.

The mechanism of the Pinscreen molding device itself is relatively unexplored. There are pins that move that have to be locked in position at times. MIT might have had a something going a decade ago. Exploring and defining both the mechanics, and the use, and the business of it all was at the time too much for me. But it would be interested if it was looked into.





# References

- The World Bank, 2019, Solid Waste Management, 2021-06-02, <https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management>
- Wendorf, Marcia, 2019, The Long and Complex Histor of Paper, 2021-06-02, <https://interestingengineering.com/the-long-and-complex-history-of-paper>
- Thompson, Rob, 2007, Manufacturing Processes For Design Professionals, China, Midas Printing International Ltd.
- Jamestown Container Companies, 2019, Corrugated vs Cardboard, 2021-06-02, <https://www.jamestowncontainer.com/corrugated-vs-cardboard-understanding-the-differences-between-these-packaging-materials/>
- Triangle Design Studio, 2010, Pulp furniture, 2021-06-02, <http://odella-dan.blogspot.com/2010/04/pulp-furniture.html>
- XYZAidan, 2019, Recycle Cardboard Into Anything With 3D Printing!, 2021-06-02, <https://www.instructables.com/Recycle-Cardboard-Into-Anything-With-3D-Printing/>
- Tangible Media Group, 2016, Materialle, 2021-06-02, <https://tangible.media.mit.edu/protect/materialle/>
- National Film Board of Canada, 2023, The NFB celebrates Pinscreen animation, 2023-07-08 [https://www.nfb.ca/selection/nfb\\_celebrates\\_pinscreen\\_animation/](https://www.nfb.ca/selection/nfb_celebrates_pinscreen_animation/)
- Kurt Rampton, 2013, Gigs.2.Go, 2023-07-09 <https://www.beriance.net/gallery/7853819/GIGS2GO>
- Amazon.com, 2023, THY Collectibles 3D Pin Art Board, 2023-07-08 <https://www.amazon.com/THY-COLLECTIBLES-Pin-Board-3-dimensional/dp/B07C1GMXBM>

