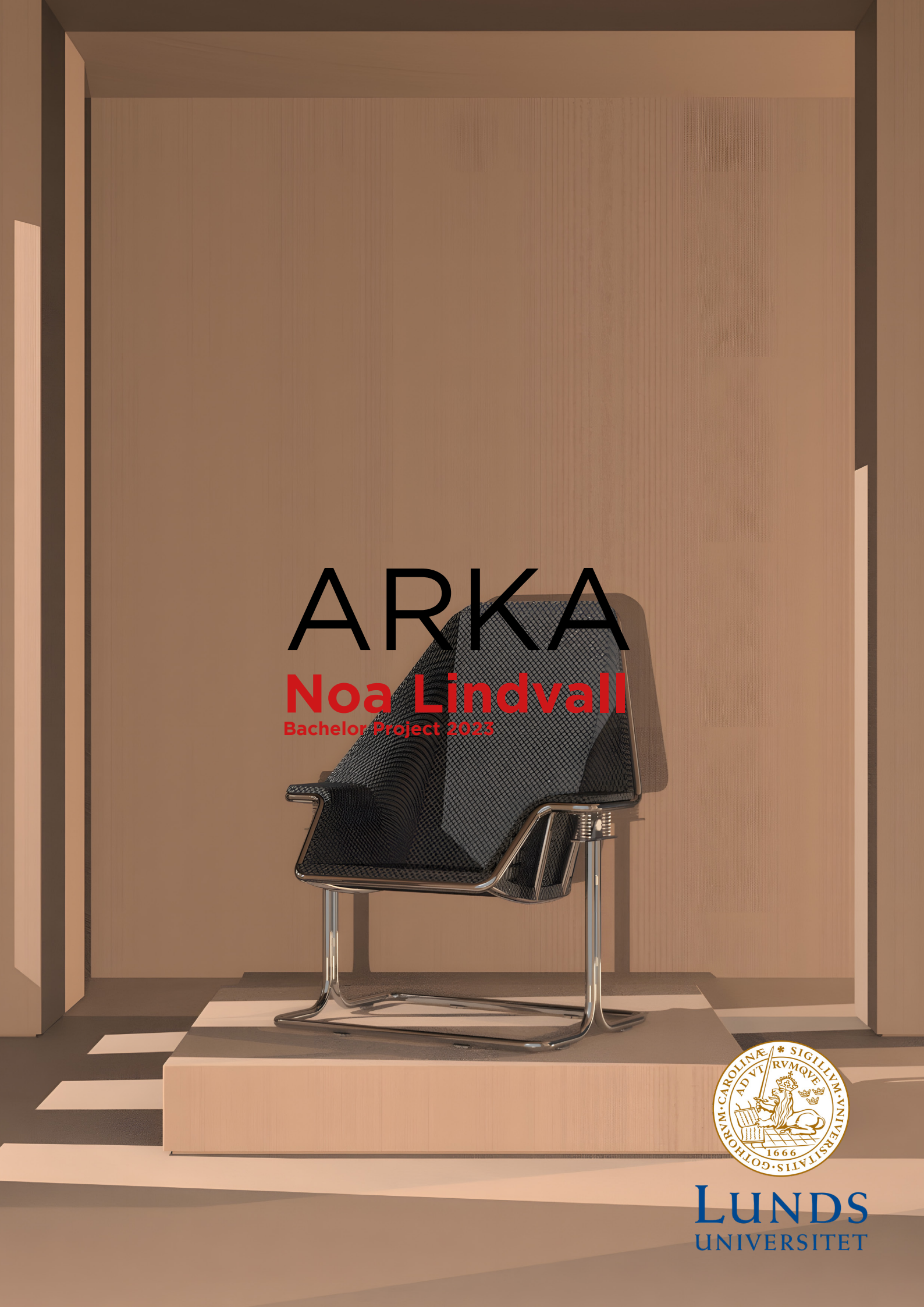
ARKA

Noa Lindvall

Bachelor Project 2023



LUNDS UNIVERSITET

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Degree Project for Bachelor of Fine Arts in Design

Main field of study: Industrial Design

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ISRN: LUT-DVIDE/EX--23/50639-SE

Abstract - english

The Arka is a new re-constructed rocking chair that brings a more aesthetic piece of furniture to your home, at the same time reducing stress, anxiety, pain and discomfort.

Since the outbreak of Covid-19 we were forced to work from home, this meant that all of our stress from work/ school were now in our safe and calming home. This trend is still shown today.

The main focus of this bachelor project was to create a newer and more pleasing rocking chair which you want to use and not just look at. But it also helps to calm your body when at home.

Abstrakt - svenska

Arka är en ny konstruerad gungstol som tillför en mer estetisk möbel till ditt hem, samtidigt som den minskar stress, ångest, smärta och obehag.

Sedan utbrottet av Covid-19 var vi blivit tvungna att arbeta hemifrån, det innebar att mycket av vår stress från jobbet/skolan nu fanns i vårt trygga och lugnande hem. Denna trend visas än idag.

Huvudfokus för detta kandidatprojekt var att skapa en nyare och mer tilltalande gungstol som du vill använda och inte bara titta på. Men den hjälper också till att lugna din kropp när du är hemma.

The urban city

We are living in a world where we are drawn to the city. Where most jobs and opportunities are located today. But now under the covid-19 pandemic. The home office became a thing and you are constantly reminded of work/ school when at home.

The big cities also provide air, noise pollution, and a stressful lifestyle. In this urban city you have to fit in as much as possible, work, school, social life, training. This hectic life often creates the home as its most calm environment.

Motivation

Recent studies on rocking motion. This study showed how adults reacted to being rocked when sleeping and how the rocking motion helped them fall in deeper and faster sleep.

The result also shows that short sleep intervals around 15 minutes helped your body recover. The memory after these 15 minutes of rocking became significantly better than if you weren’t in a rocking motion.

TABLE OF CONTENT

Brief

Design and create A piece of furniture that
promotes relaxation and recovery, and creates a
calm and safe environment at home.

DUX

In my project DUX will be a meteor and a place where I can sit and work, discuss and get consulting advice.

They will help me through the design process, from the start with finances and requirements. Follow up with visits to subcontractors, to get a better understanding what and what isn´t working.

Thanks to Tobias who helps me!

The rocking chair is a timeless and versatile piece of furniture that dates back hundreds of years. With various styles and materials, Curved, sloping legs which help to provide a smooth and gentle rocking motion. Its design and construction hasn't evolved as much over the years.

Rocking chairs can help to reduce stress and anxiety, improve sleep, and relieve pain and discomfort. An excellent way to promote relaxation and feelings of wellbeing.

Hollywood swing/ porch swing originated in the United States in the late 19th century. The original Hollywood swings were made from wood and featured a simple design consisting of a seat suspended from chains or ropes, allowing it to move back and forth.

The design hasn't changed too much except for new material chooses and features such as adjustable backrests and armrests. Hollywood swing provides a comfortable and relaxing place to sit and enjoy the outdoors.

The hammock is a versatile piece of outdoor furniture that can be traced back to indigenous cultures in Central and South America. Its design and cocoon-like structure have evolved over the years. Hammocks are often designed with a curved shape, which helps to reduce pressure points and promote a more comfortable sleeping experience.

Hammocks can help to reduce **stress** and **anxiety**, improve **sleep**, **back pain** and **arthritis**.

The current rocking chair does look kind of similar; either it is big and bulk takes up the whole room or it’s small but doesn’t have great support for the body.

My goal is to be as compact as possible but still support my body. A soft cushion but a stiff outer frame.

What is the definition of a rocking chair? And what way is the best?

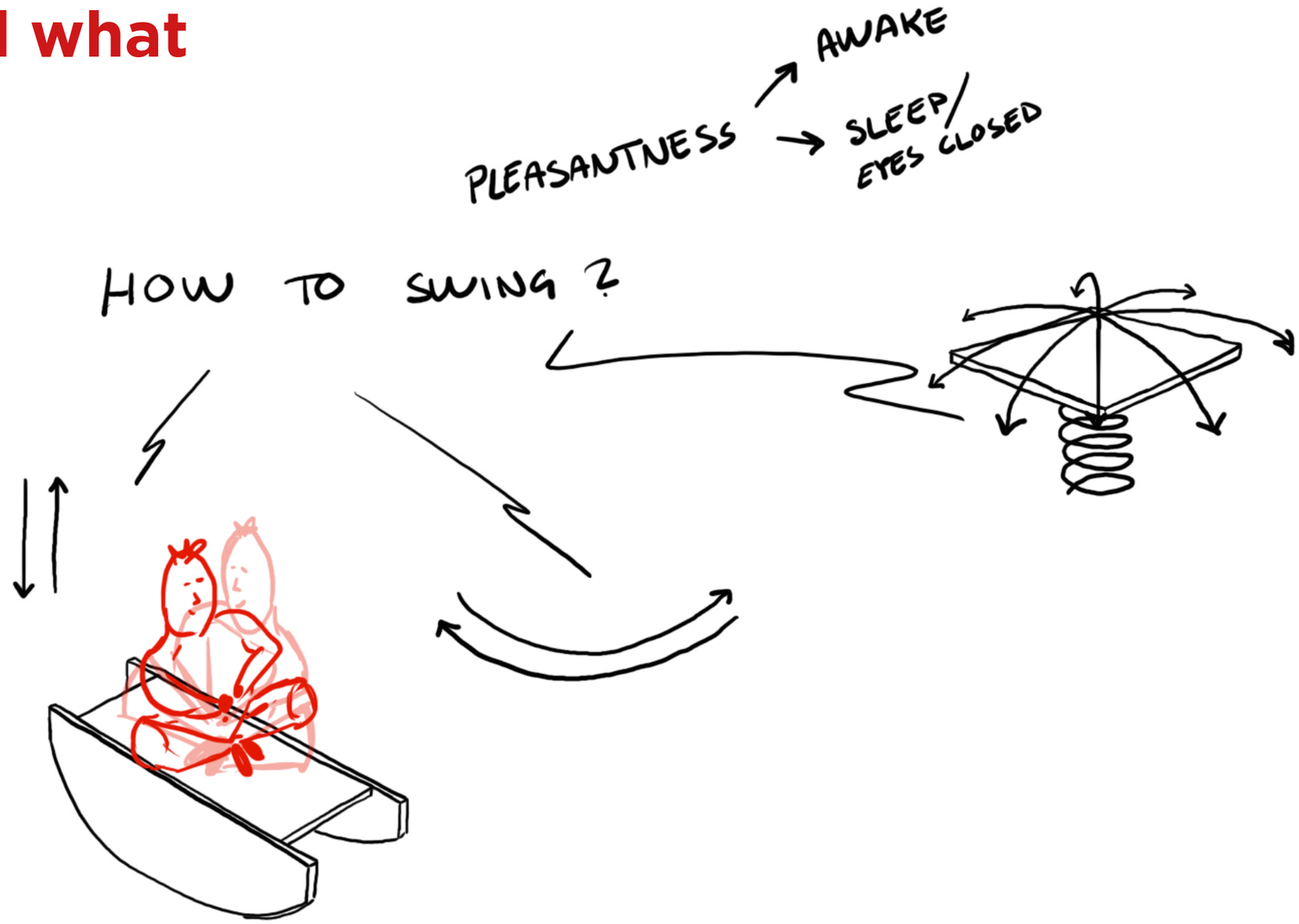
The rocking chair is a unique and distinctive piece of furniture that has a long and fascinating history. Its design is characterized by a curved base or runners that allow for a soothing and comforting rocking motion, as well as a comfortable and supportive shape that is intended to promote relaxation and tranquility. Whether used for reading, lounging, or simply enjoying a moment of peace and quiet, the rocking chair remains a popular and enduring symbol of comfort and Relaxation.

After all these years it hasn't changed!

But what is the best way to rock?

To figure out what the most optimal way of rocking I have built a mockup witch you can sit and lay on both ways.

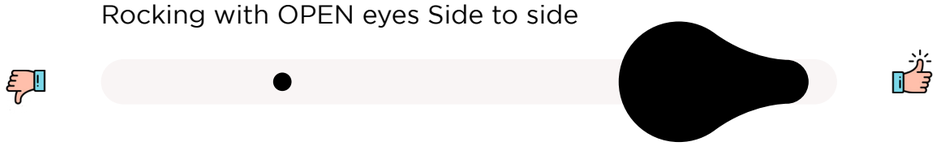
Back and forward
Side to side



What do the people say?

Rocking with OPEN eyes back and forth

Rocking with OPEN eyes Side to side



Rocking with CLOSED eyes side to side

Rocking with CLOSED eyes back and forth

Target group

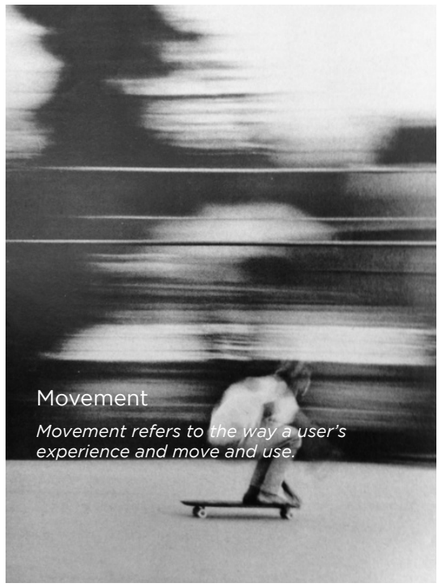
Throughout many of my projects I have had a target group based on students or small living spaces. With my bachelor project I didn't want to have a budget for my target group.

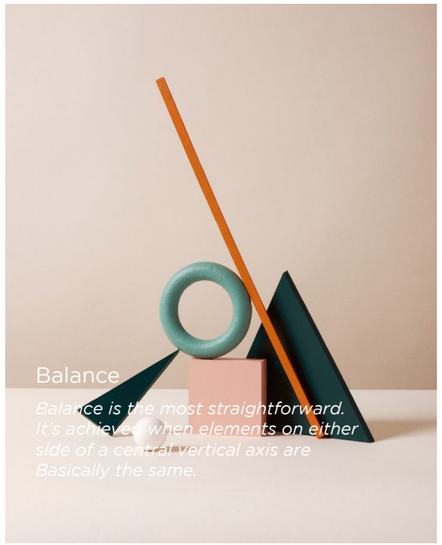
This is my persona:
A group that has a good economy, around 30+

House/ apartment with a lot of designer interior products.

Have had or still has a home office

Key words





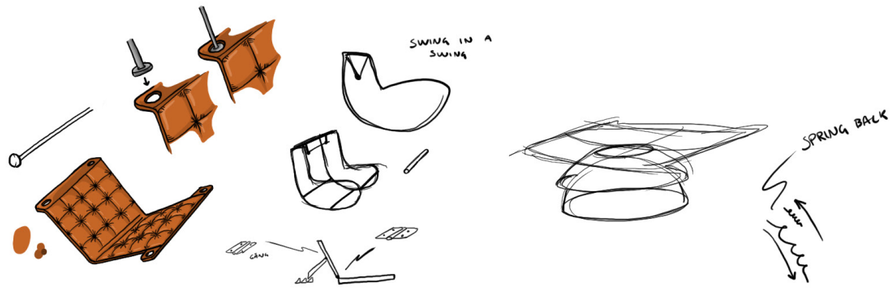
A few words that are with me throughout is this keywords;

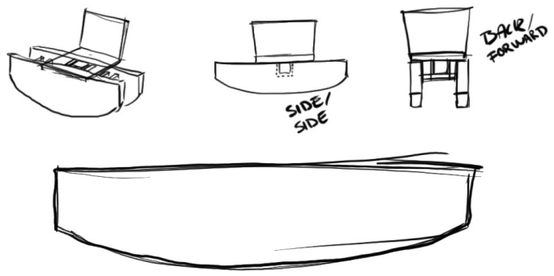
Movement how will the user experience the movement!
Balance finding the perfect point to which the rotation point will be.
Contrast how will this rocking chair look different from every other

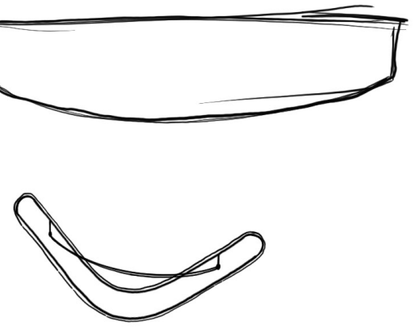
Working at DUX!

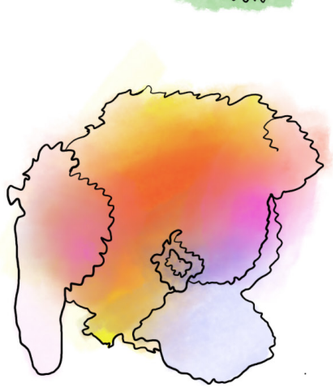
I got the pleasure to be working one day at the DUX production line. To get an insight of the whole production line. How everything is perfectly handcrafted down to the millimeter.

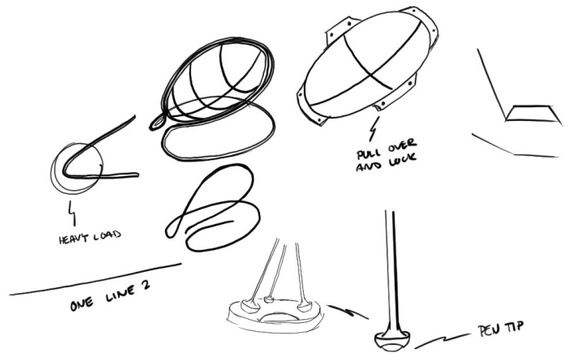
The First Doodels

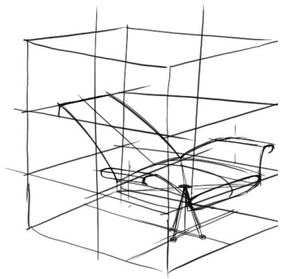


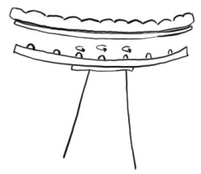


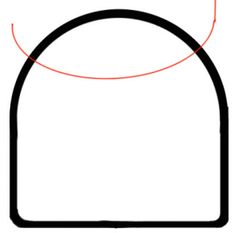


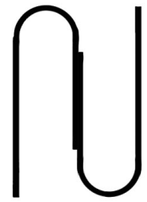


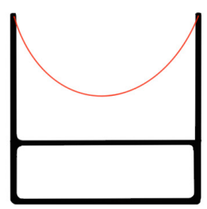


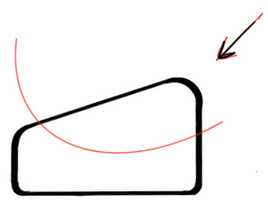


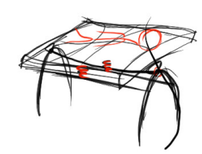


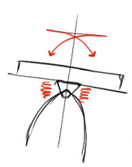


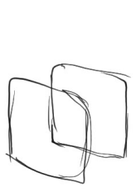


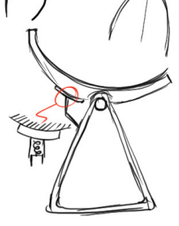


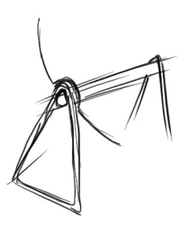










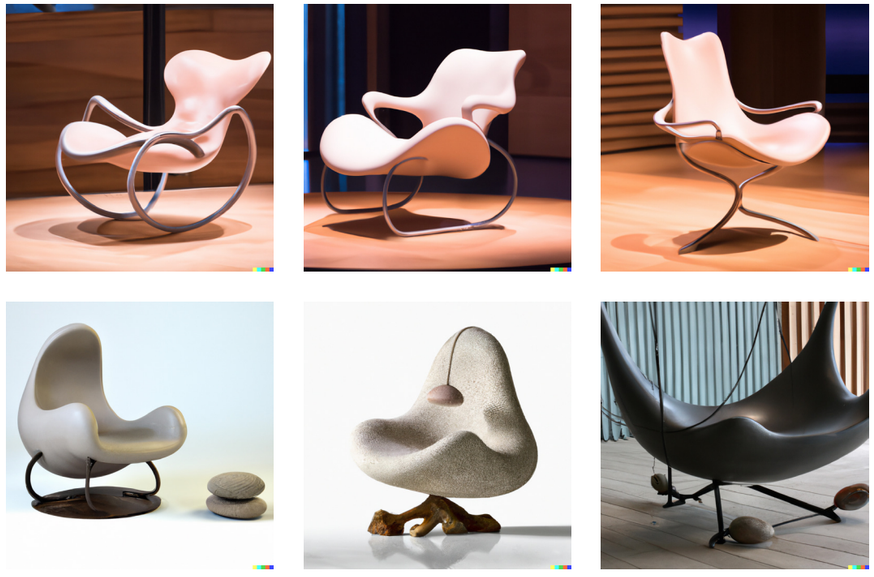


AI

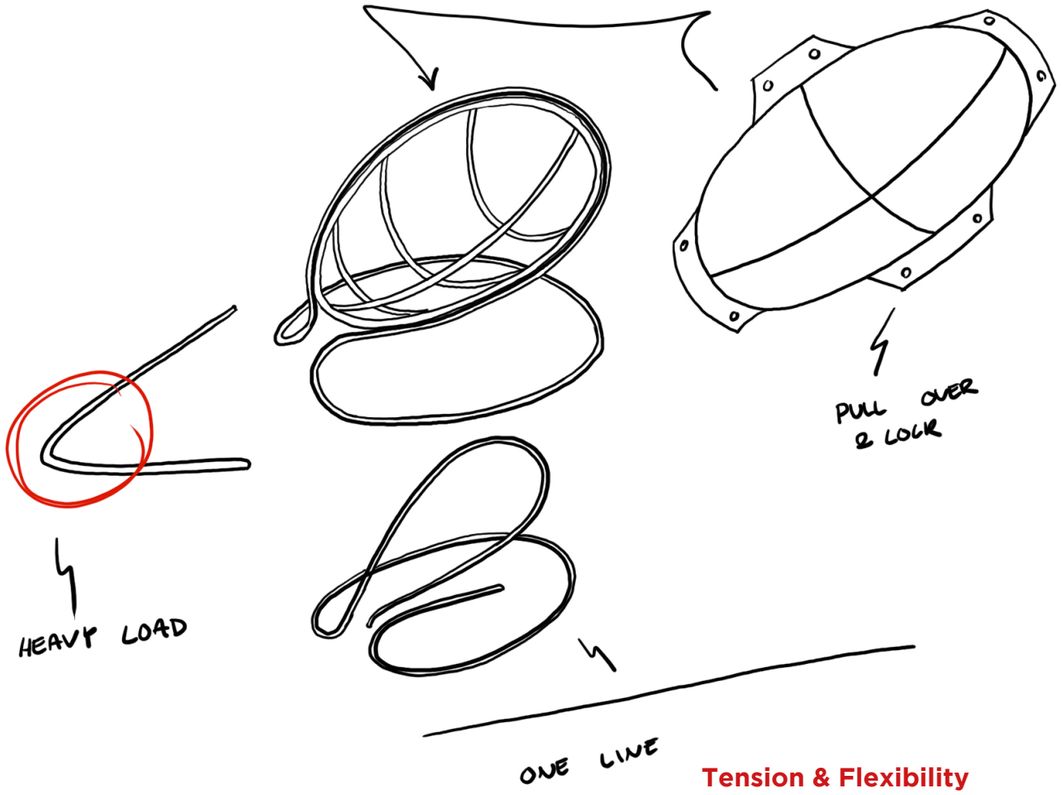
One day at DUX, I didn’t have any motivation. I was looking for inspiration wherever I could find it. Until I came over DALL-E;

DALL-E is capable of producing highly realistic images of objects, animals, and scenes that have never been seen before, based on textual inputs. The neural network is trained on a dataset of millions of images and captions, allowing it to understand the relationship between words and images. DALL-E has been praised for its creativity and potential applications in various fields, including art, design, and advertising.

After some evaluation I quickly decided to forfeit the idea of using AI. Why? after talking to some classmates and supervisors it wouldn’t help me or the product this early in the process, just make me blind.



First concept presentation



Tension & Flexibility

This concept is based on a baby bear swing but an up scaled version. The rocking motion will be determined based on how hard, soft and how much weight the wire frame tolerates.

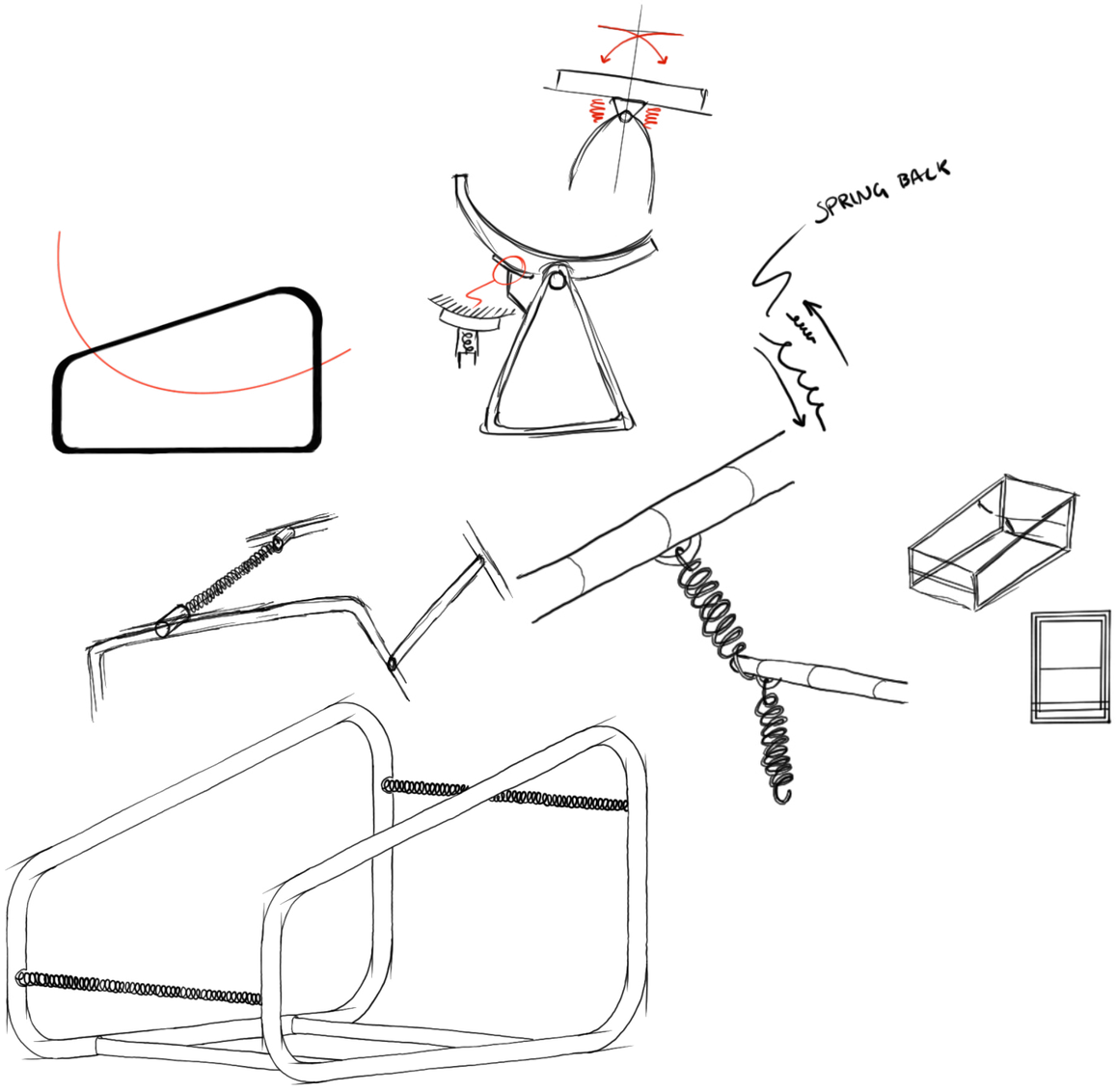
The design consists of two frames; the outer frame that stands on the floor. One inner frame which is attached to the outer frame, this frame is the seating basket.

concept 1

Experimental concept

Looking at nature and all its organic shapes. There is a lot to take inspiration from. In this concept I kept to stones and mushrooms. One hard and one soft. What can I create with these two different organic shapes?
I looked in to concave and convex. How a spherical “seat” shape could fit in a concave base.

concept 2



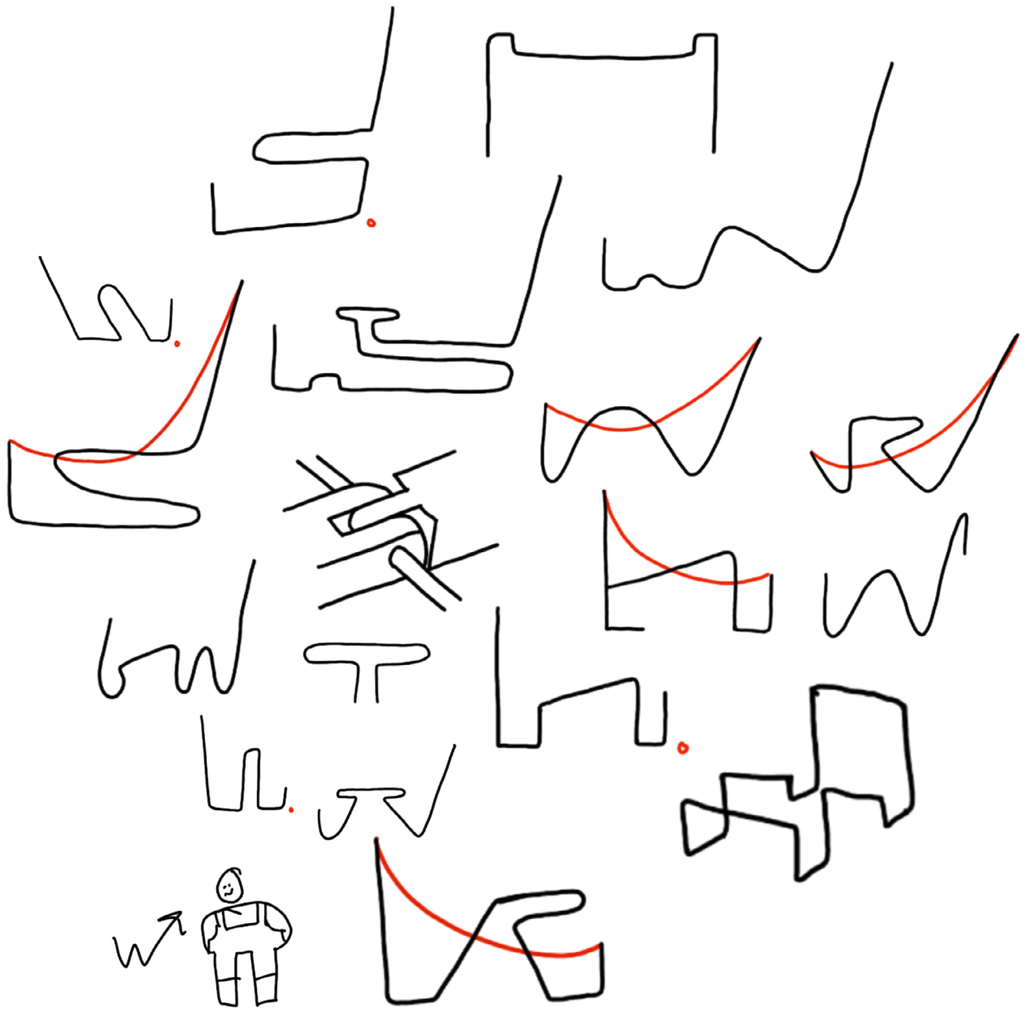
concept 3

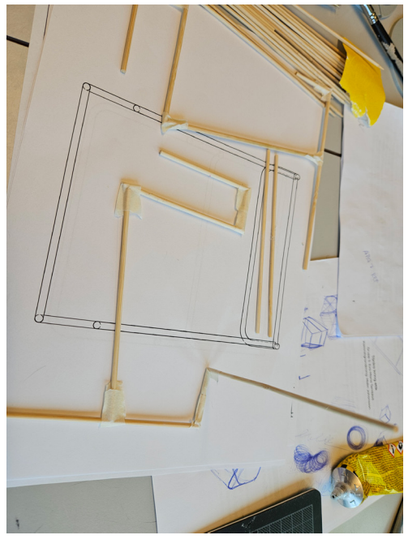
Spring

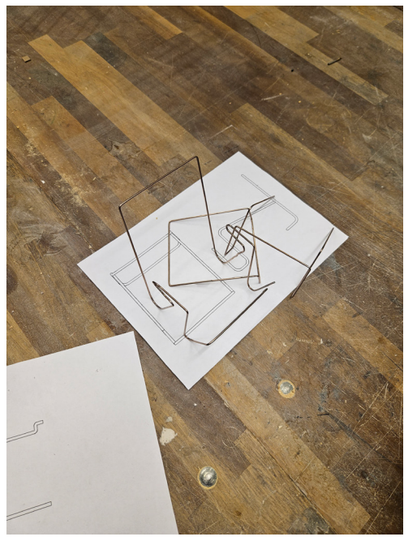
My final concept am I looking into how springs could be a solution and therefore reconstructing the rocking chair. There are a few solutions I thought about. If they work I have no idea. One thing they all have in common is the still standing wire frame. The overall concept is to have the standing base and the seat will be suspended off the floor and will be the only part of the design that´s rocking.

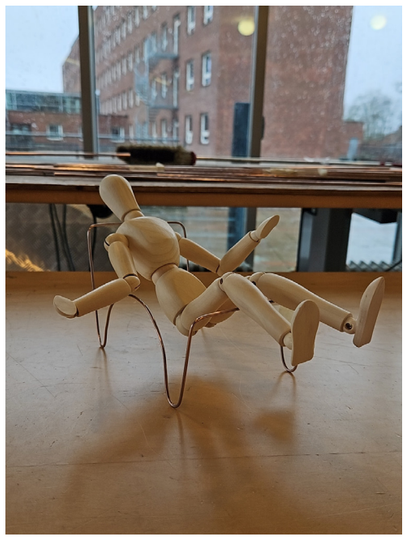
Concept 3 is the concept I picked to work further with. It had some interesting shapes and by choosing springs it had something new that I hadn't seen on the market before. It felt interesting. There are plenty of things I have to figure out. How strong does the spring has to be to not break it´s properties? I don't want it to give out any sound. How will I make it move in a smooth motion back and forth, not just bouncing up and down?

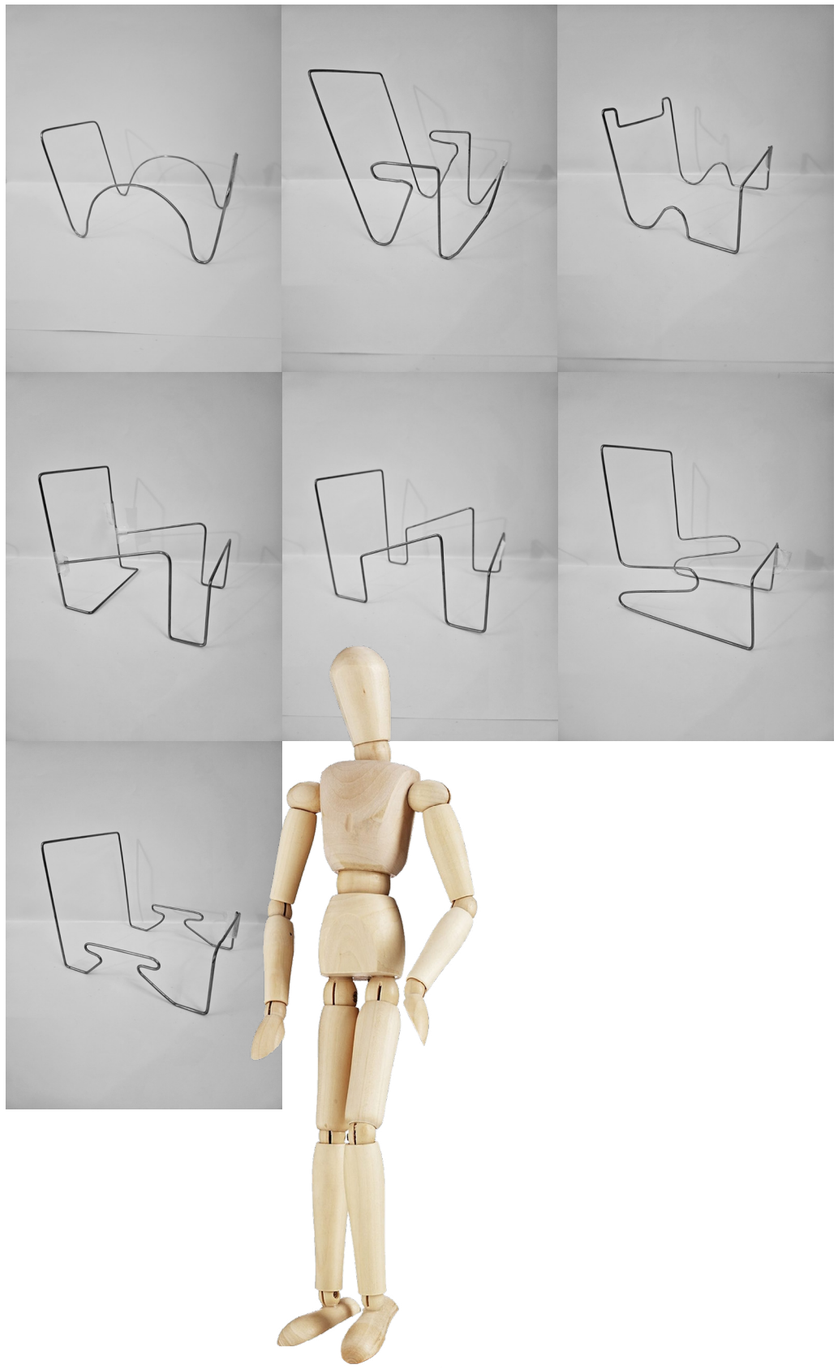
Sketching and sketch models











I bought a mockup doll 30 cm high to get a better understanding when working on scale. It’s not perfect but it works for now, it gives some perspective or feeling for if it would work or not. Does it look uncomfortable for a wooden doll; it’s most likely uncomfortable for me as well.
I continued with four and made some quick seats in cardboard for my doll to be able to take a seat

The mockups are built in the 1:6 scale.

Elastic Materials

Types of materials that get back to their original shape after getting stretched by an external force.

+

Durability: Metal springs are generally durable and can withstand repeated stress cycles without breaking or losing their springiness.

Versatility: Metal springs can be designed and fabricated to meet specific needs.

Cost-effectiveness: They can be produced in large quantities and can be made from relatively inexpensive materials.

-

Noise: Metal springs can generate noise when compressed or released.

Weight: Metal springs can be heavy, which can be a disadvantage in some applications.

Friction: When against a fabric, friction can occur and destroy the fabric.

+

Elasticity: Rubber bands have high elasticity, meaning they can stretch and return to their original shape.

Shock absorption: Thick rubber bands can absorb shocks and vibrations.

Lightweight: Rubber bands are relatively lightweight.

-

Limited durability: Rubber bands are prone to wear and tear and can break or lose their elasticity over time.

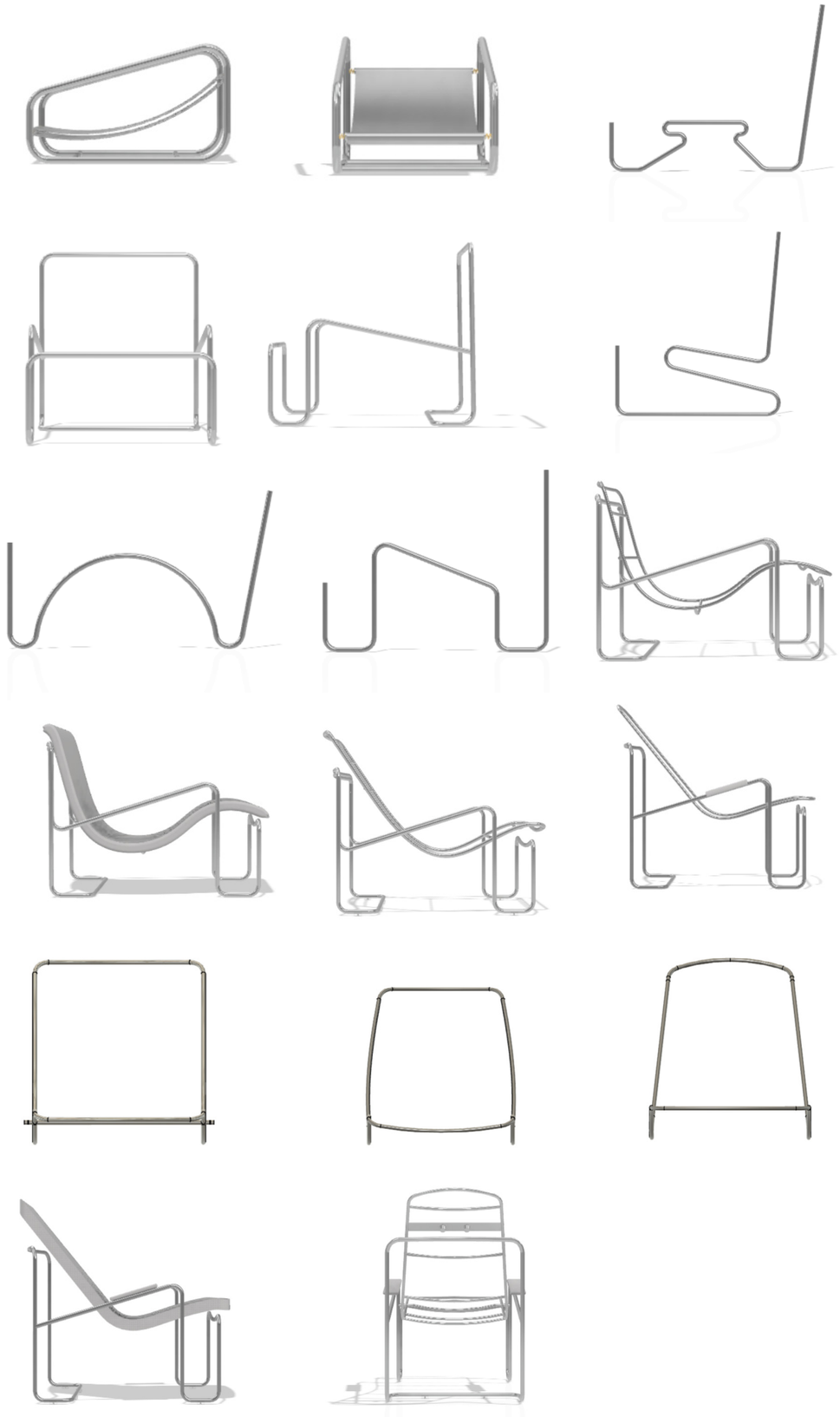
Temperature sensitivity: Rubber bands can become brittle and lose their elasticity in cold temperatures or even melt when exposed to high temperatures.

Full scale realization

Until now I had only been working with scale models. Sure it is a great and quick way of working. But it’s hard to understand the real proportions of the chair. Therefore I decided to build a 1:1 scale model based on my previous models.
It was a good decision! I realized it was way too low to the floor, it was a struggle to sit down and even more to get up. Otherwise comfortable. I had to extend the front to get more support for the legs, also to lift up the seat.

At this point in time most of my time had been spent designing the wire frame and setting specific measurements. Tuse I started to design how the actual seat would look like. Thinking of shapes, materials and how it would connect to the frame.

Damn, there are so many different ways a cushion can be designed! How am I supposed to know what the right choice is and what I want right now? Well, I just had to make a decision. I've always loved cobalt blue. It's a good contrast for the cold chromed steel frame that I plan to use. Now, I just needed a fabric that would match all of this. I went down to Bernt's, a small fabric shop in Lund, and found this hairy sheep fabric.

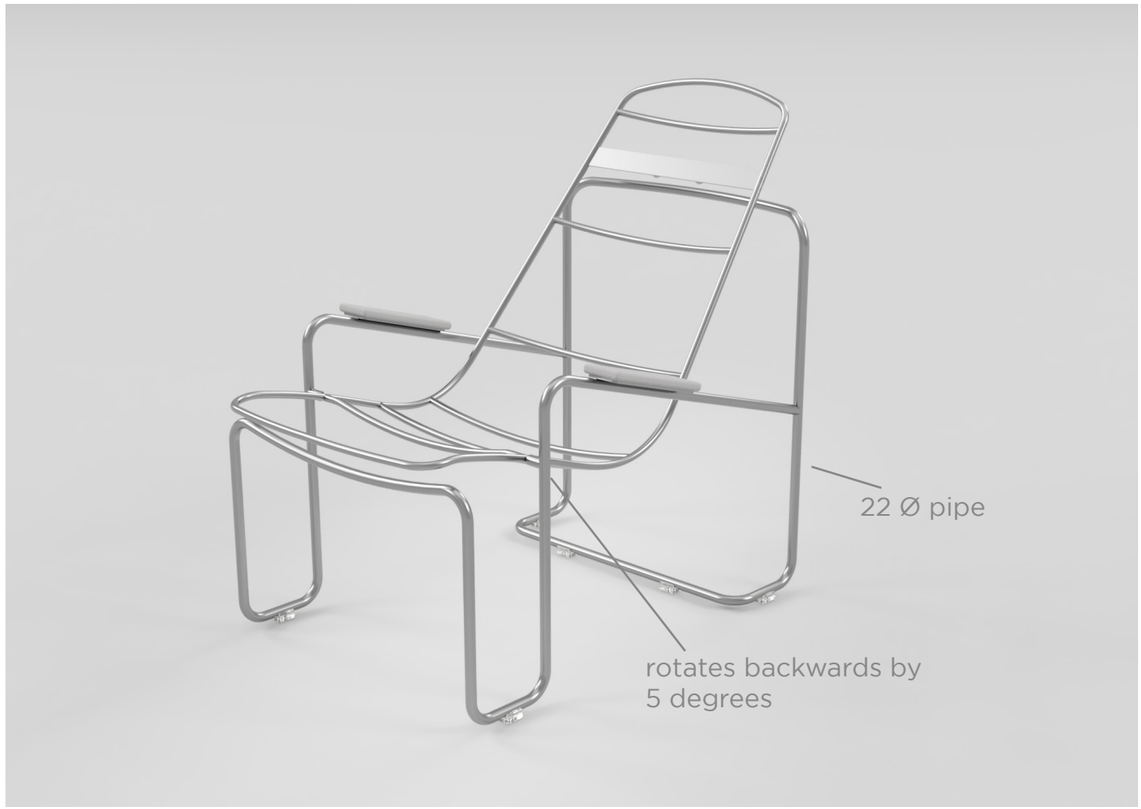


Much of my process has been cad and finding a working design or maybe more of a design language that I'm happy with. This just shows a small timeline from my cad process from first concept up until the last concept before I worked on CMF.

CMF

If I think of what I want for my project. I think sheep fur should be a good compliment to the cold crome stand and I want it to feel welcoming. You should be able to look at it and be wanting to take a seat.

From bending a 22 diameter pipe in chrome you get this redefined rocking chair, with a uniq appearance. The chair is 470 mm to seat height, 1000 mm in length, 700 mm wide and 1084 mm high. The only thing that moves are the seat which are mounted through two inserts on either side of the frame. At assembly you would pull apart the stand to which the seat will slide in. This is the rocking part of the chair. On the back pipe there's two springs in a cylinder for direction. Back at the seat there's also two cylinders, so when rocking this cylinder will fit into the cylinder, push down on the spring and push you back up again. This creates a rocking motion out of 5 degrees back and forth.



I thought i was done but was so very wrong.

The human is a fascinating creation.

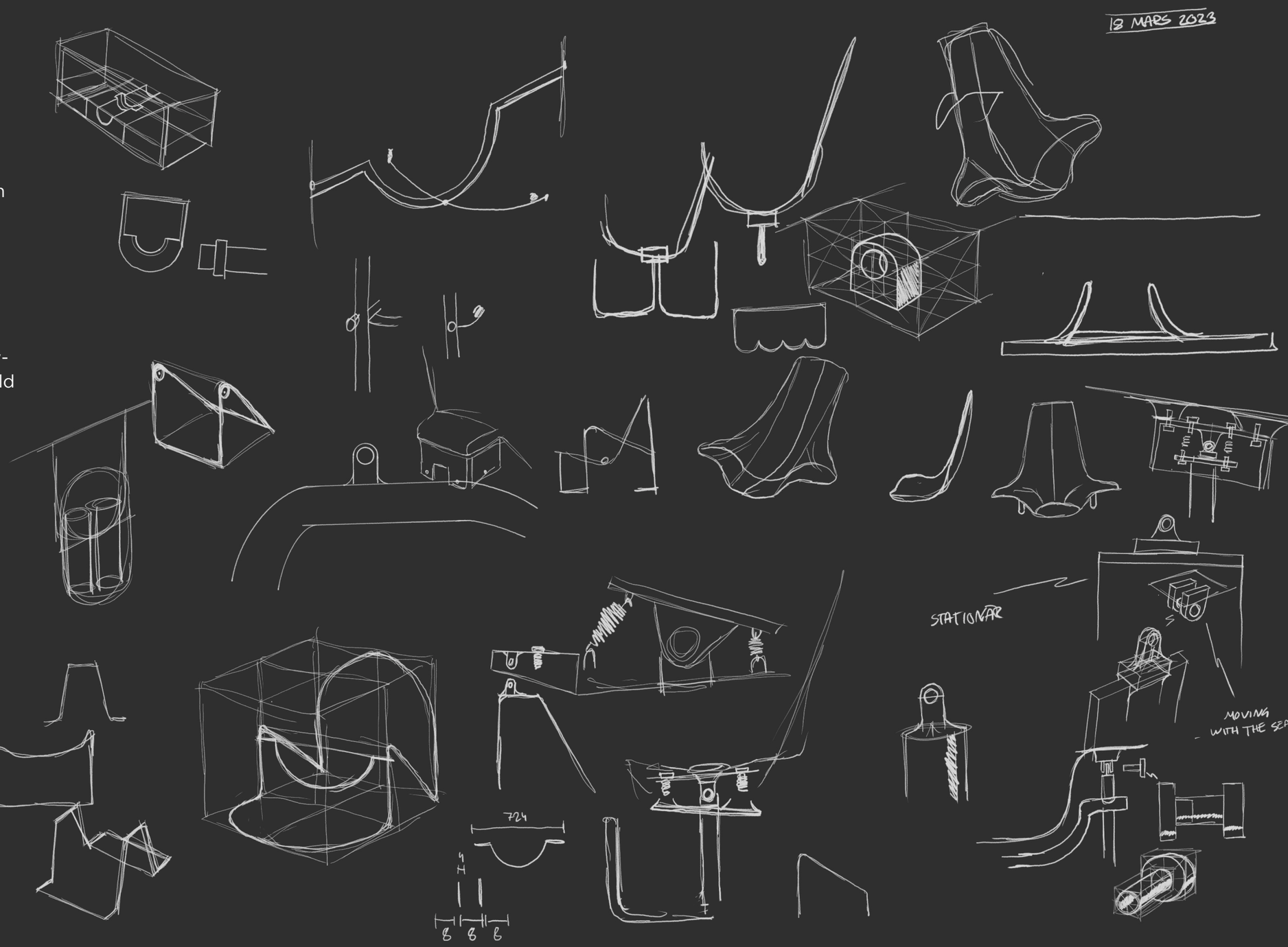
When we stop and reflect on our choices, an average person makes about 35,000 decisions daily, ranging from choosing the environment we move in to deciding whether to bike or walk to school, or adjusting a screw in a CAD model three millimeters to the left! All these decisions have to be made to move forward, but sometimes we have to take a break, pause, and look up to understand what is happening around us.

Taking a break from a project was just what I needed to keep moving forward. After our kick-off presentation, some of my classmates and I decided to do something after school. We agreed not to talk or think about school, have a nice afternoon together, and enjoy the spring sunshine. The next day, when I woke up, I stayed in bed a little longer and thought about the project I had presented. I realized that my design was becoming increasingly overly complicated for what I could achieve as a final product. The furniture was becoming more and more just another lounge chair with unnecessary materials that would not contribute to the goal of creating a rocking chair with relaxing properties to calm our minds and bodies.

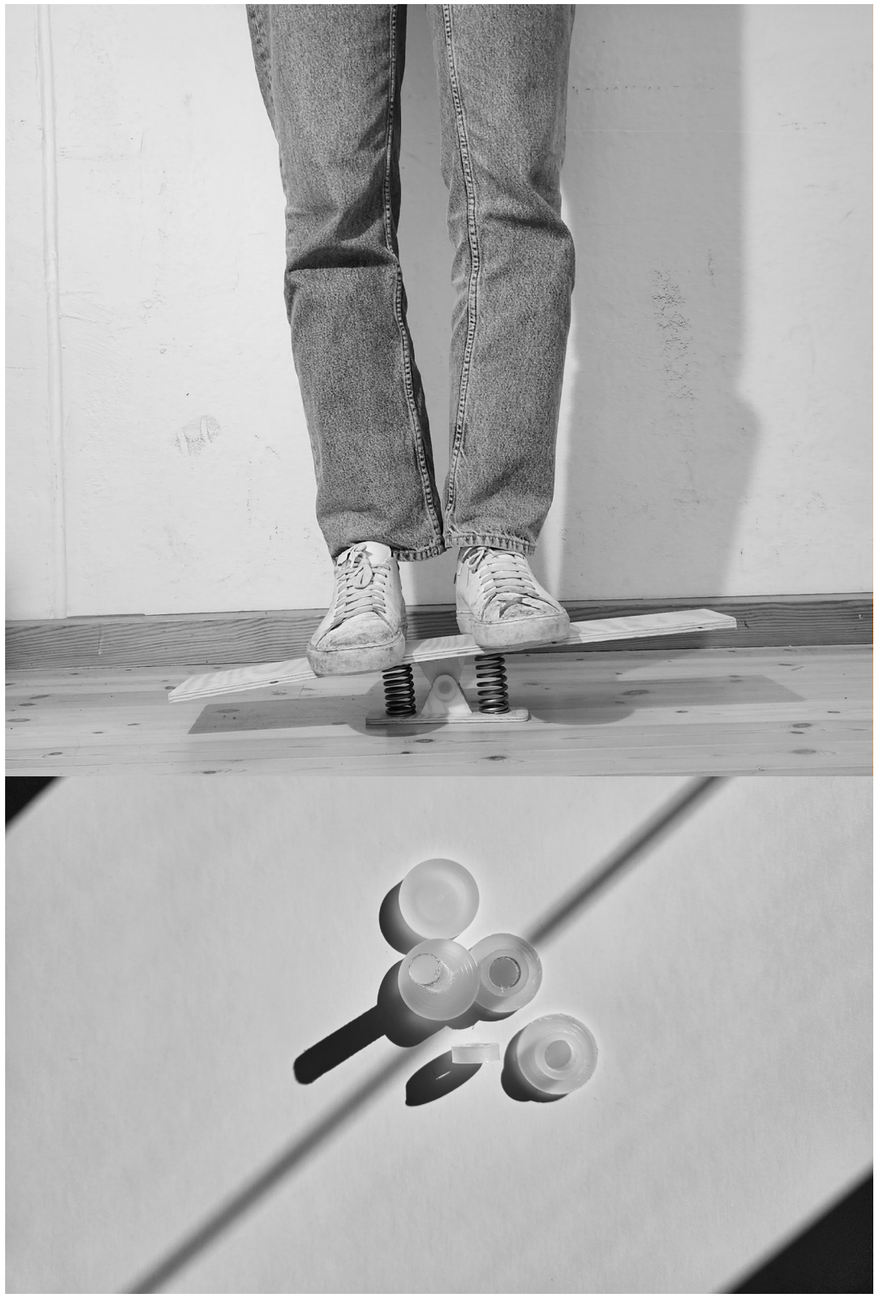
It was difficult but necessary to set aside nine weeks of hard work and start over with new breath and motivation.”

The next day I had new motivation and was excited to continue the project from 0. I sketch new ideas and now I work on the technique first. I got in contact with an professor at mechanical engineering here at the university. We talked about springs and how hard they have to be. He helped me with some simple math to simplify everything. Newton is the most important part. And could be calculated as;

1 kp = 9,80665 Newton, 1 Newton = 0,10197 kp



After my design switch and how my rockingchair would be rocking. I still wanted to use springs as my main source of rocking. I had gained new information from the mechanical engineer professor. But where can I find and buy these springs? Tobias recommended a company Lesjöfors springs AB. When I contacted them, they were super nice to talk to and helped me on my journey to find the perfect spring for my project. We decided to go for their (1866 CS 4,5x30x65 compression spring SS1774) meaning 4,5 is the wire diameter, 30 is the diameter of the whole spring and 65 stands for the maximum Unloaded length.



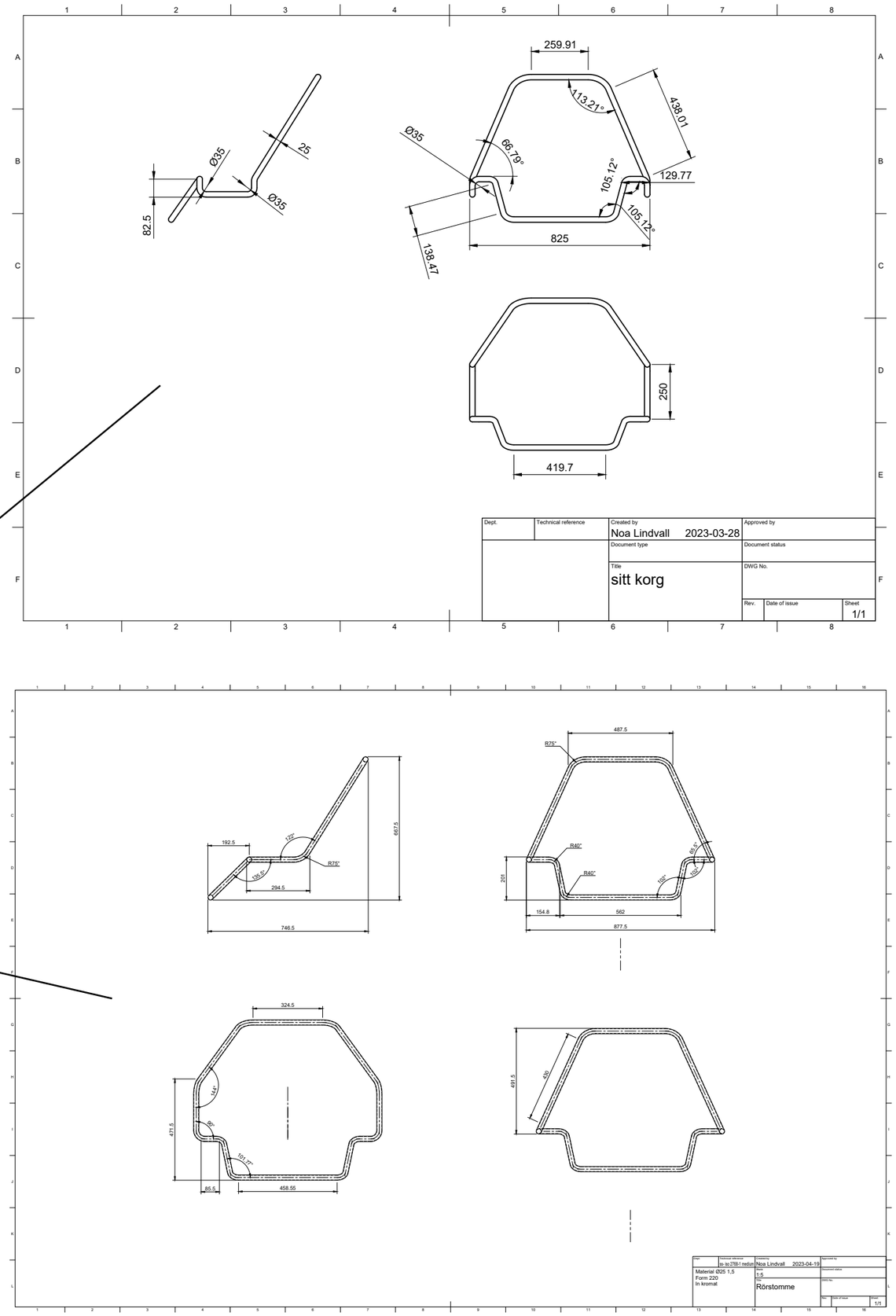
To test my theory I had to build a rig of the rotation movement. This allowed me to explore, test and evaluate if my design would work. I built it out of pine plywood and lathed a acetal plug. This is to prevent the metal in this case the wood from rubbing against eathouter. Causing friction and noise. When testing, it was smaller than I thought of but it worked as I wanted it. A smooth motion, of course now I stood on it and the weather will be a bit different from when you sit.

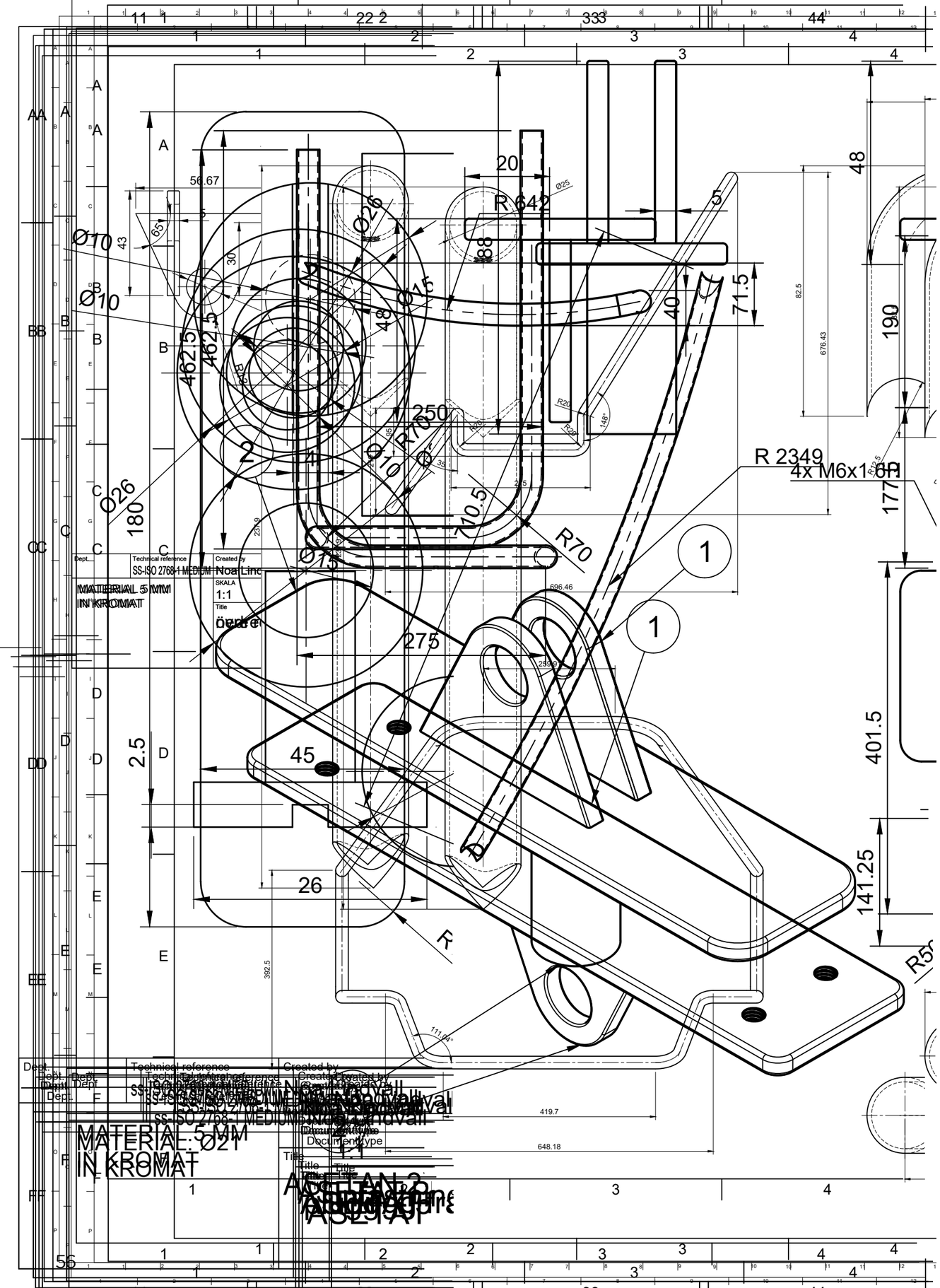
Technical drawings

A big part in my process and working with dux and getting an insight to a design company is to understand different mindsets. With this I mean; sometimes you have to be creative on demand. If you can’t do a specific thing you just have to learn it quickly. Know where to search for technical Soulutions.
There is also a huge amounts of words, meanings on everything from screws to different methods of production and just how to apply these mindsets I have learnt along the way.

But one thing I bring the most is how to create a perfectly technical drawing, witch parts to prioritize, side views and general measurement.

As we can see on the top picture, this my first attempt without any help. It’s messy and with no priorities, I had no centerline; this made me put the measurements at the wrong points.
In the bottom picture this is a drawing I sent to the manufacturer. It has a centerline, better side views and structure. All measurements are at the correct points. Also the textbox has it´s needs including: Skale, material and size, technicalal tolerance (SS-ISO 2768-1 Medium) standing for 0.3 mm tolerance, name and date.



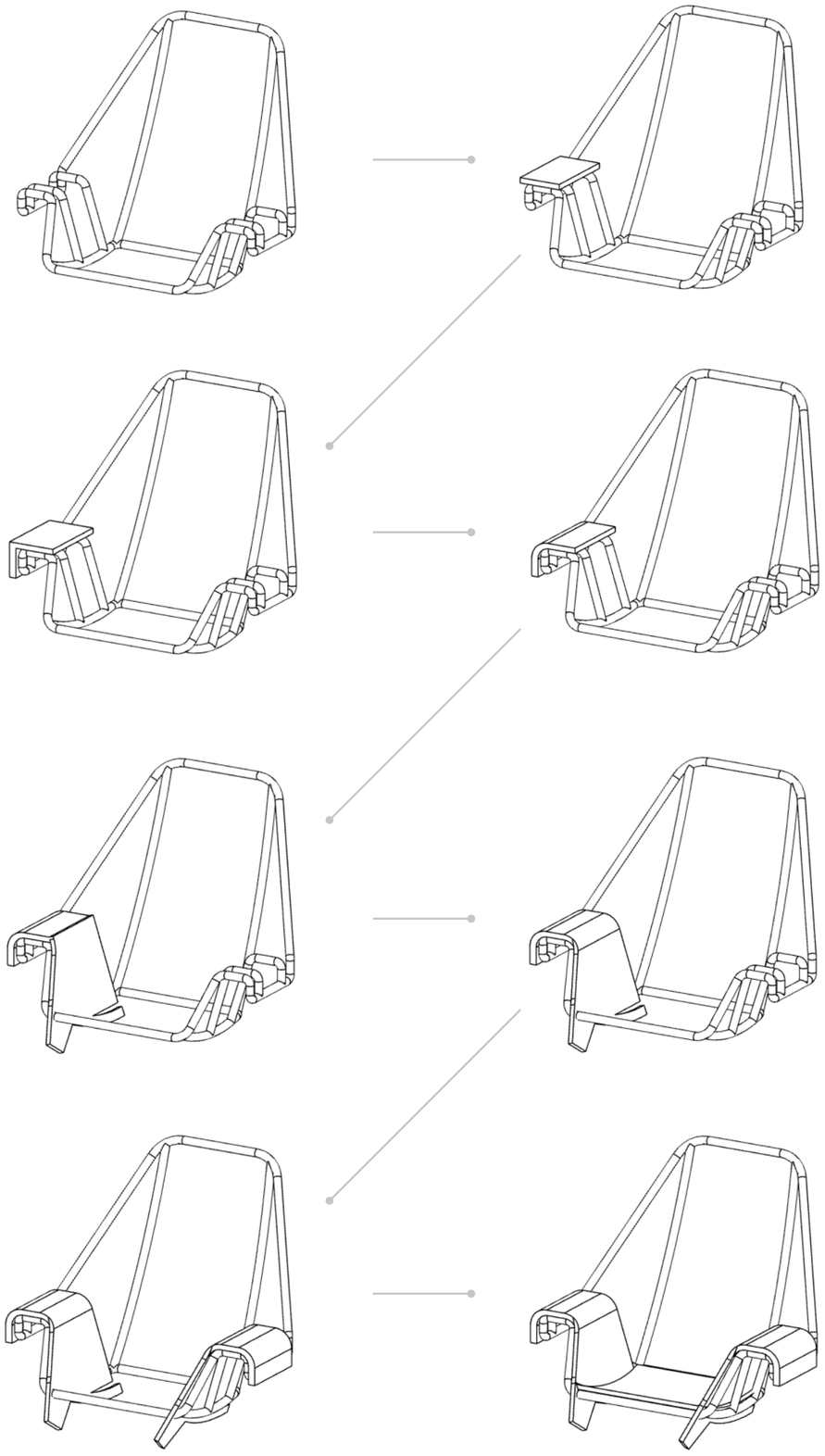


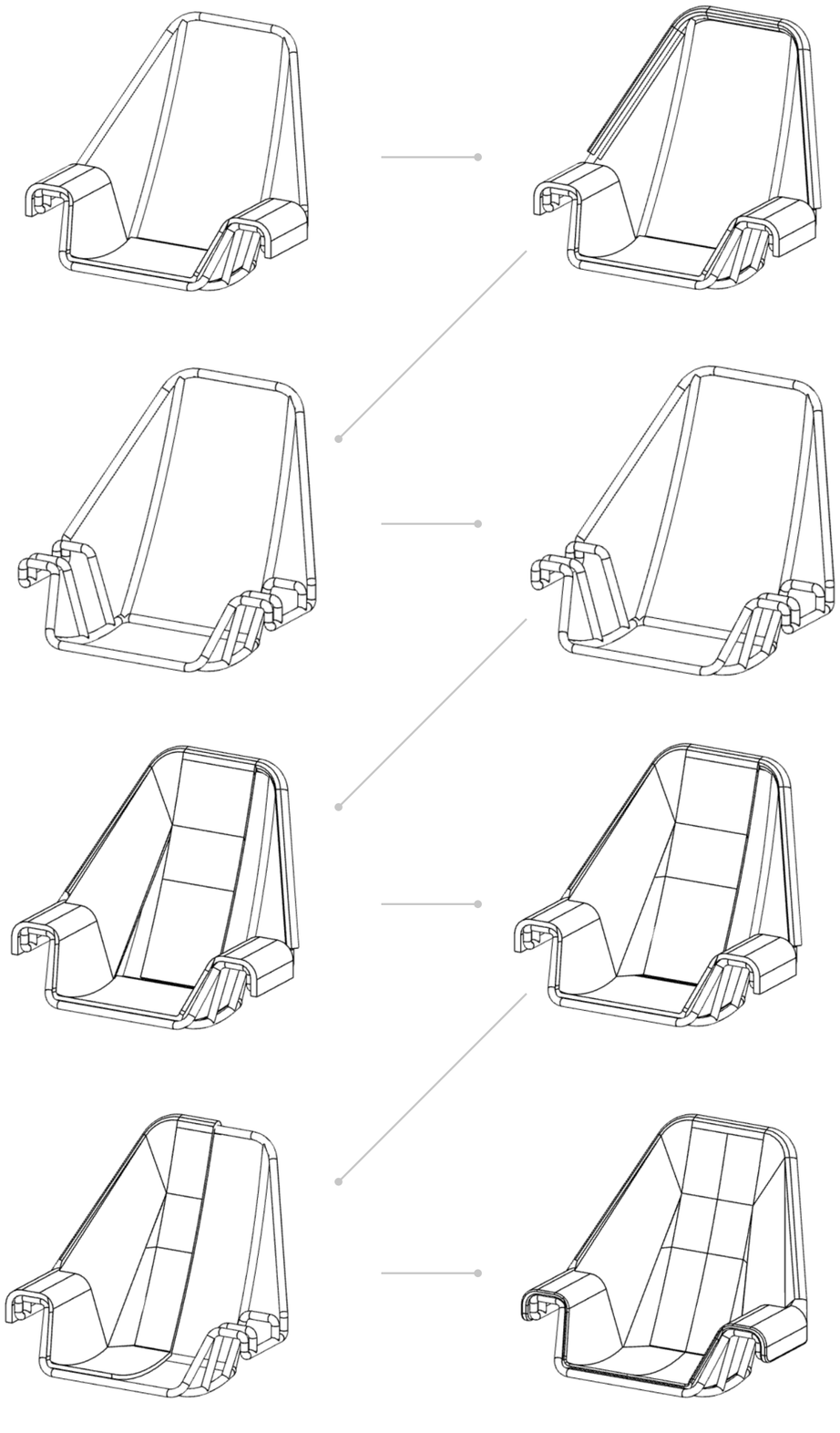
To understand how crazy many technical drawings you have to do, I compiled everyone on top of eachother. It is about 30 and includes every screw, acetal plug, stand, seat basket, rotation movement, upper and lower bars. A compilation of the whole piece with an edition of a balloon drawing.
On top of this the manufacturer needs every part in a DXF file and a STEP file. After all this the total of technical drawings and exported files added up to 54.

When looking through my new design most of my work has been done in cad. When I looked through my cad files I had like 80 versions with just a slight change. It was hard for me to see some of the differences. But here you can see the a small timeline of the new design that I have worked on. How some design changes disappear to reappear later on in the design process. This was because it would be unstable without a cross section bar, thus I added the bar again.

Cushion building

Too cad a cushion in fusion 360 witch are a solid cad
The program is difficult since the cushion is soft. But by working with a trial and error technique I manage to build something I was pleased with. I don´t think my computer or Fusion was as happy but nevertheless I got a result, there were some areas that could have been a bit smoother or closer to the frame.





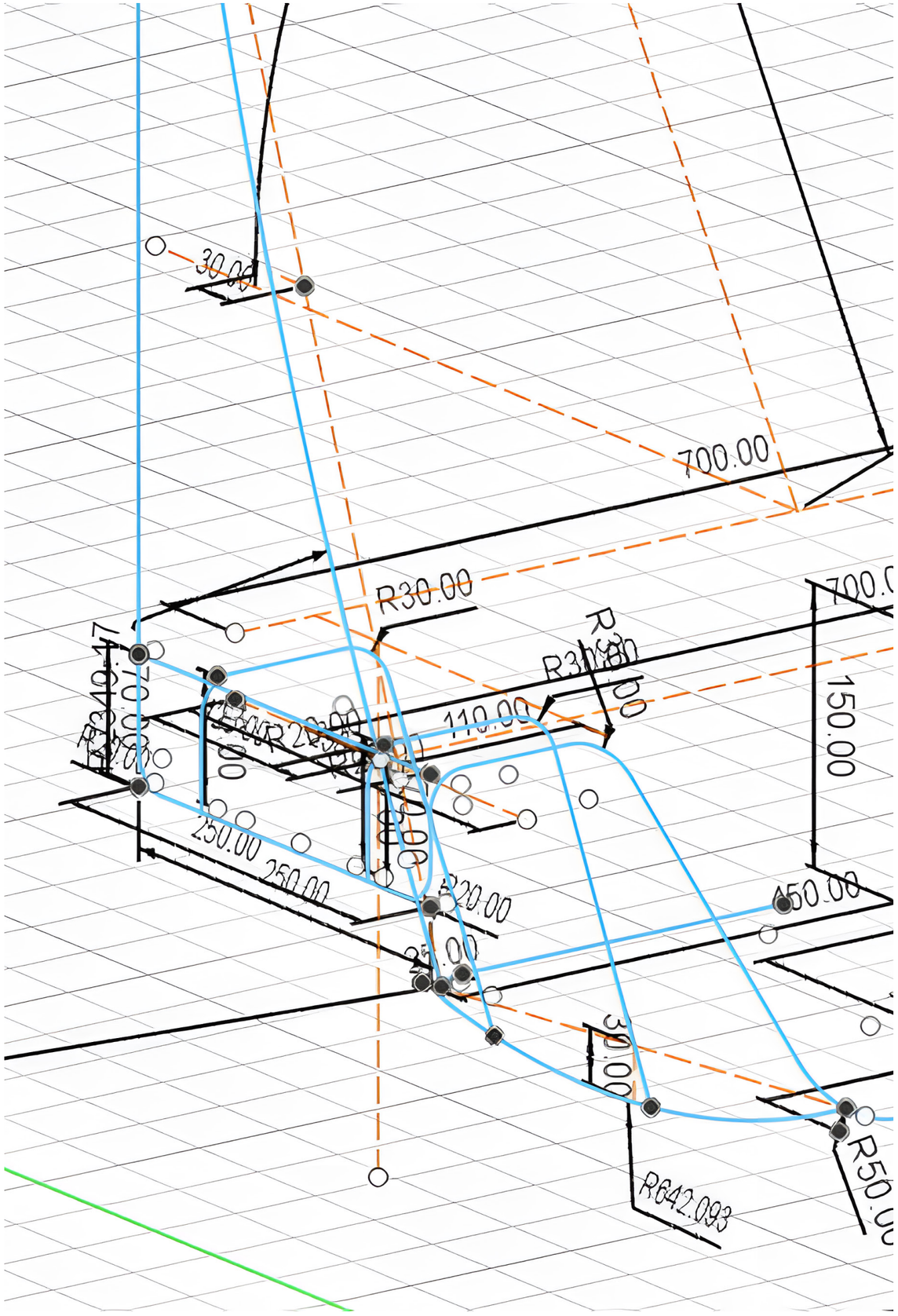
I thought i was done but i was wrong!

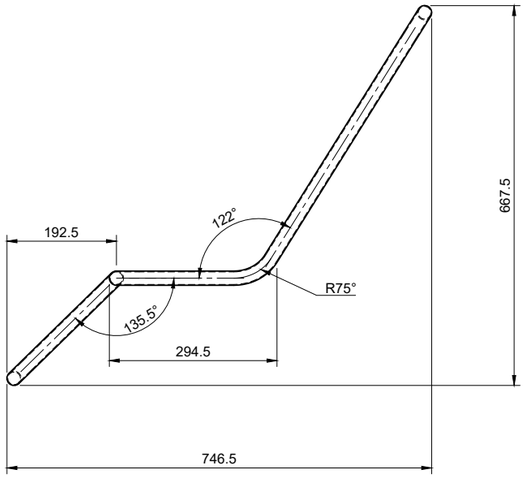
Where R 20 and R 100 change to R 40 and R 75

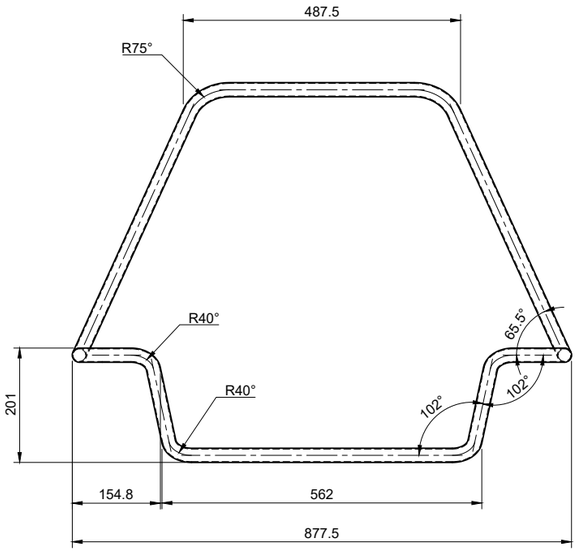
45 mm straigh after a bend

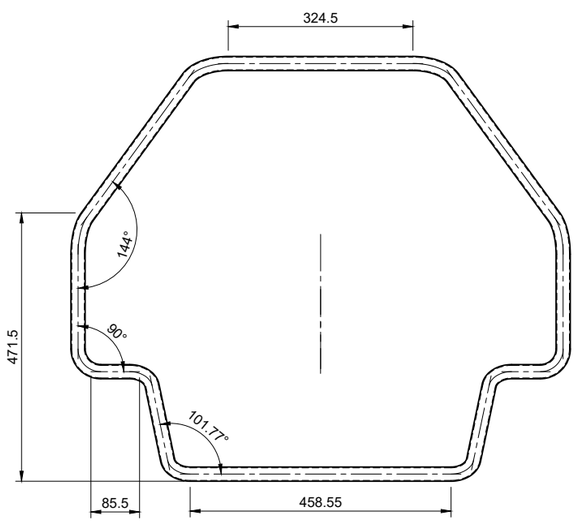
We had just sent the design in to the manufacturer, when they called and said that where radius 20 and radius 100 had to be changed to r 40 and r 75. Since that didn't have a tool for those specific radius. If I were to make new tools it would cost around 100.000 kr per tool. I didn't feel like paying that kind of money. I asked them because I had a few other radius as well if they had to be changed. YES! This just tough me how important the dialog between manufacture and the designer is to
prevent this from happening. Because of this a few changes had to made, it was quickly resolved but had to redo all of the technical drawings it affected.

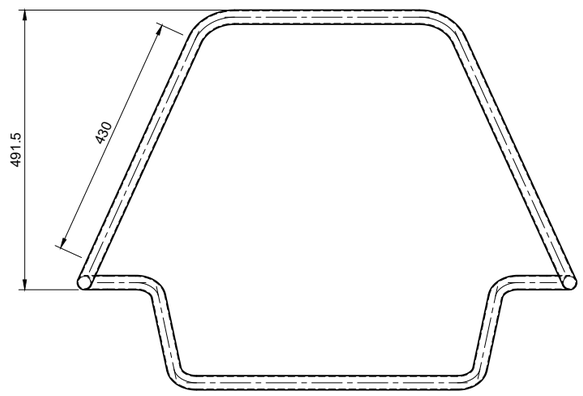
Up with my old cad file and up with my first sketch. One big mess of radius, measurements and lines. Where does one even begin? I copied everything onto another document, I didn't want to risk losing all my work. Then it was just to find a new solution that might be working. Since it had to be 45 mm after a bend it gave me a bit of a struggle to still keep my overhang over the mechanism. This led me to removing this design part and having it be shown instead. By removing this part the manufacturing process would be much faster as well. By getting more time to think through some design choices I had made earlier I had noticed that the seat was getting a bit too tight for my liking. I therefore decided to widened the seat basket a couple of centimeters.









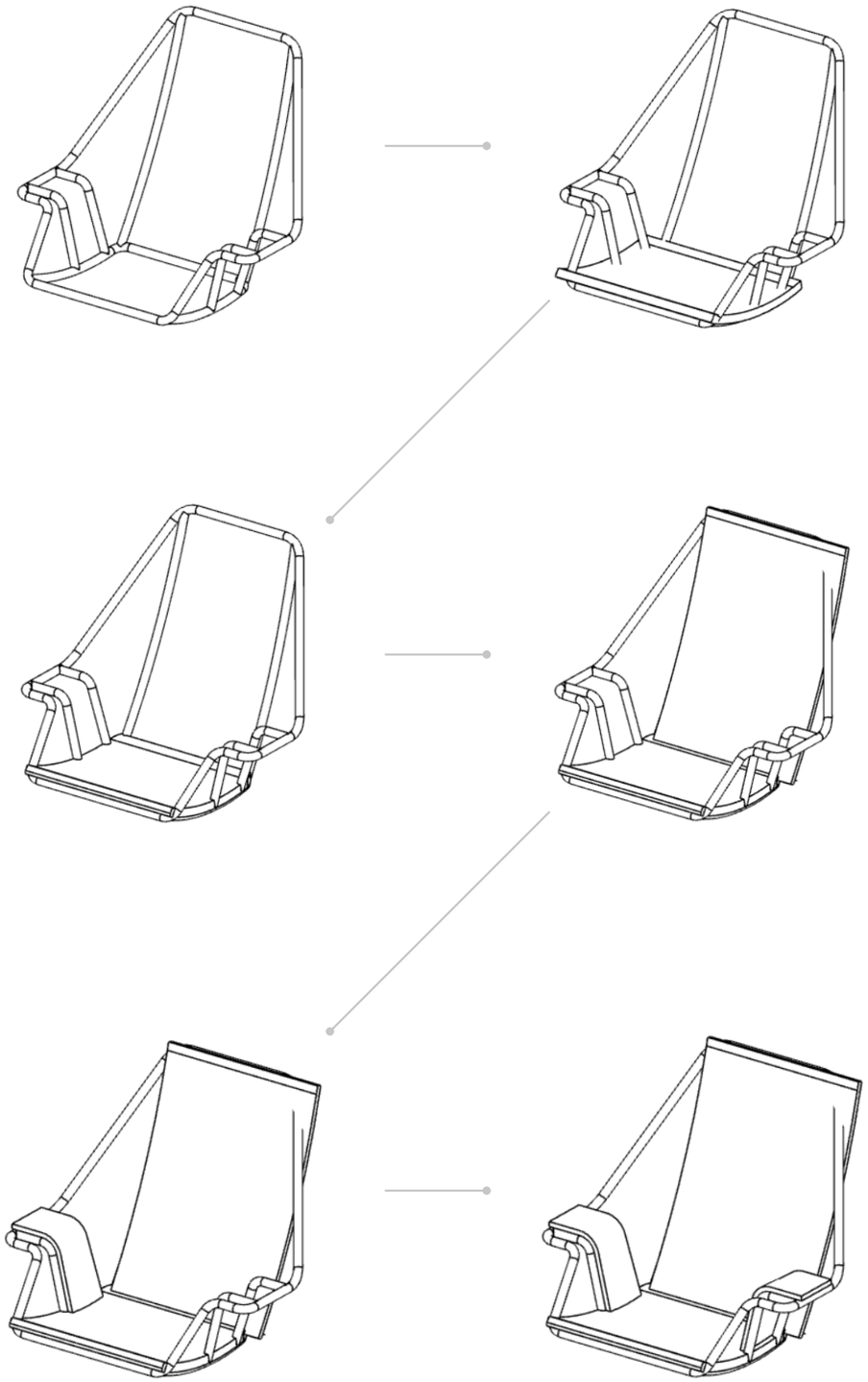


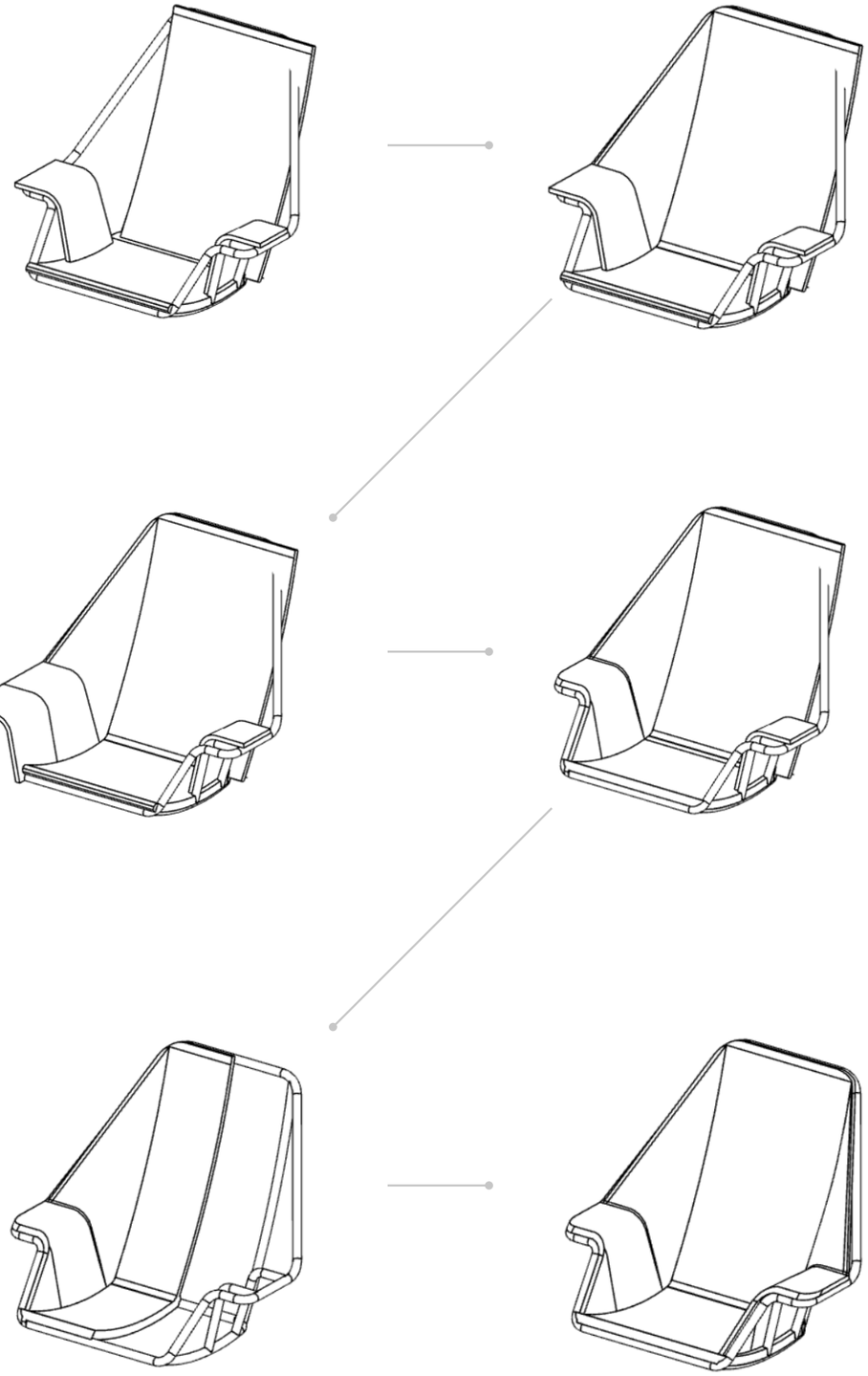
To be able to re send it to the manufacture all of the parts that I now had changed had to get new technical drawings. I worked under a bit of stress because I knew it could take some time to get back a prototype from the manufacturer. I thought this would take as much time as it did last time but it was fairly quick acutely. Witch shows how much one can learn from failing and trying once more until you know what and how to do things. I redid everything on a afternoon.

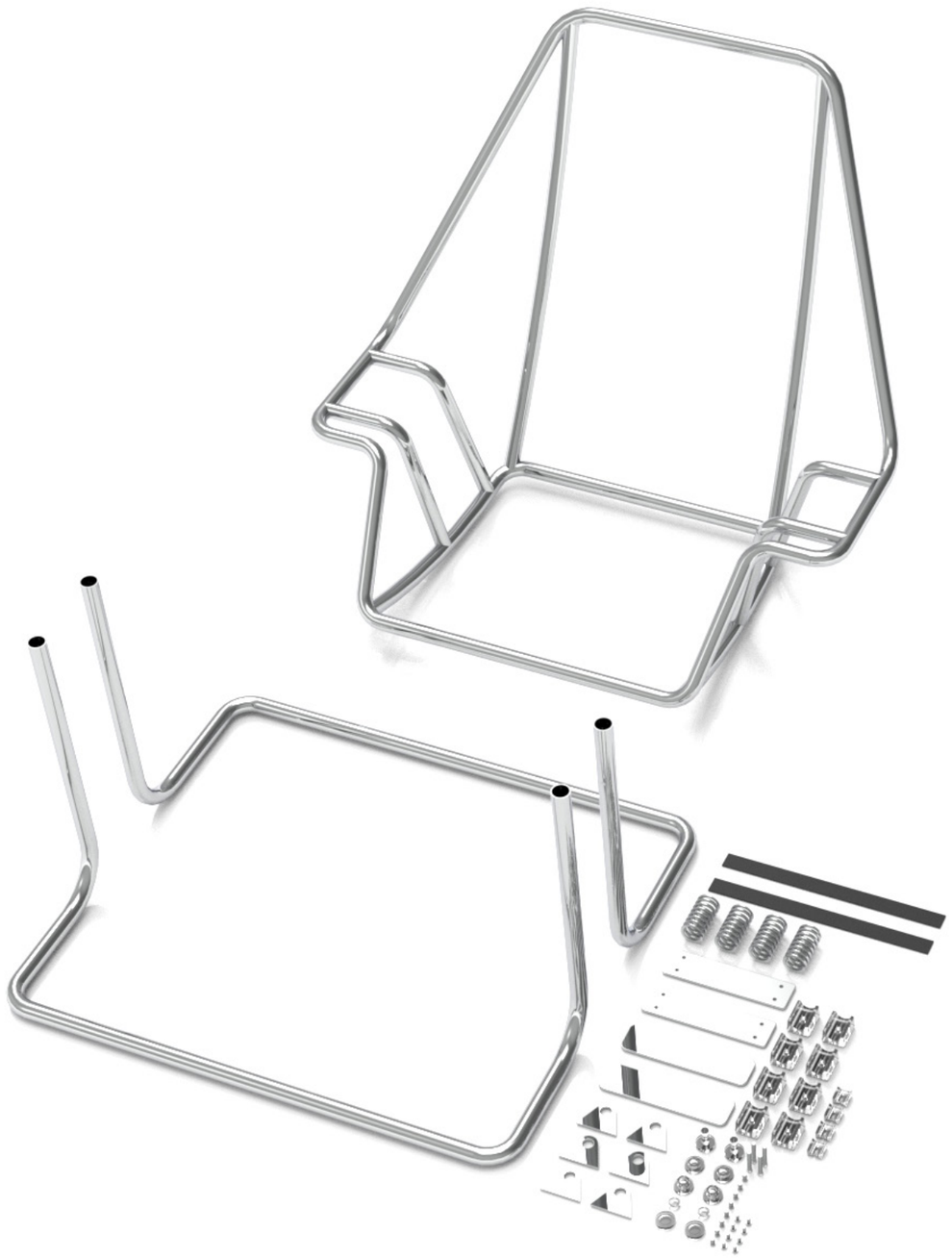
Dept.	Technical reference	Created by	Approved by
	ss- iso 2768-1 medium	Noa Lindvall 2023-04-19	
Material Ø25 1,5 Form 220		Skala 1:5	Document status
		Title Rörstomme	DWG No.
			Rev. / Date of issue / Sheet 1/1

Cushion building nr: 2

By having to re cad my rocking chair the cushion had to be changed. Thus I had to re cad this once more. I had learnt some tricks from last time witch i implemented when doing it over. This meant that it required fewer steps to achieve the same or even a better result.







Result

Let me introduce Arka, a new defined way of the original rocking chair. Arka is spring based from its two armrests. With a combination of 4 springs it will manage everything. The seat is suspended 400 mm from the floor and has a wingspan of 825 mm the total height 1030 mm. It will or is manufactured through pipe bending and consists of 59 parts, it sounds a lot but most of it is just screws or gliders. The cushion will be supported by Pereli straps.

Your home is a place to relax, a place where you can recover and feel safe. Your home shouldn’t be a place of stress.

CMF

If i’m thinking out of a company perspective and what dux does. It is very customizable. Since I have created a more of a luxury rocking chair the customers will have every possibility to pick their cmf to their liking. The only thing that will stay the same is the frame, this part will for now only be in chrome. But if you want leather in different sewed patterns it’s possible but then the cost will be higher. This also applies to different furs tex sheep fur.
If I think of what I want for my project now. I think fur should be a good compliment to the cold crome stand and a welcomed feeling. You should look at it and get a feeling that it’s hugging you. A leather upholstery would also be nice to have. Then it gets more formal. But there’s an endless of different choosies to make. But regardless of this, if it is possible I want to do a fur upholstery.

Sheep fur

Leather with pattern

Linen

Cotton

Leather

Silc

Rocking motion

After the calculations it should be rocking between 15 and 20 degrees back and forth which I am really happy about.

The mechanism is now exposed, this could be a risk of crushing if you were to put your fingers where the spring is. I say don't put your fingers where your fingers shouldn't be! It is furniture for adults and they know better to not put their fingers there.

Evaluation

This project has surely been different from the rest of our school projects. To have been able to work with DUX has given me a lot of knowledge of how it is to be working outside school. Not only the basics of developing a product but also handling everything in between. Technical drawings, time aspects, which screw to use, gliders, spacers. There is more to a project than I have been taught before. Now that I'm working with DUX and that they are helping me produce my rocking chair, it takes a long time to get my prototype back. But everything gets solved itself at the end and at the moment my prototype is under construction and will arrive hopefully until the exhibition.

Overall I´m happy to have been doing this project and that I got the opportunity to be doing it with DUX and Tobias!

Thank you

Claus-Christian Eckhardt, Anna Persson, Jasjit Singh, Charlotte Sjödell, Classmates, DUX and Tobias for all help during this project

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