



# Södergård

a Swedish chair

Master thesis 2013 by Torgil Lassing

Supervisor: Karl-Axel Andersson

Examiner: Claus-Christian Eckhardt



# LUNDS UNIVERSITET

## Lunds Tekniska Högskola

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Department of Design Sciences

Supervisor: Lect. Karl-Axel Andersson  
Examiner: Prof. Claus-Christian Eckhardt

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## Acknowledgements

This project was about designing a chair for serial production in my father's carpentry. The project was carried out at the Division of Industrial Design in Lund. Karl-Axel Andersson, who has been my supervisor, has helped me throughout the project with inspiration, feedback and rewarding discussions about chair design, and I am thankful for this. I would like to thank my examiner Claus-Christian Eckhardt for the comments I've received on my design process, which has helped me improve the results of this project even more. I would also like to mention Carl Lidgard, who has inspired me and had long discussions with me about project management and presentation techniques without being obliged to do so. This has inspired me to work harder with the project. Last but not least I would like to thank my father, Göran Lassing, who worked day and night helping me finish the final prototypes on time.

## Keywords:

Lounge chair, asymmetric, single armrest, Swedish, sustainable, simplicity, Scandinavian, quirky, local production, ash wood, pair chair



## Abstract

This master degree project has had the purpose of designing a chair for small scale serial production in Sweden. Origin has been a big focus point, and the wood has been carefully selected to minimise ecological footprint through transportation of the product. Another focus point has been the complicated process of designing a chair that is unique. The report includes the background of the carpentry where the chair is thought to be manufactured, the process of the design work with methodology and sources of inspiration. Included in the report are also the manufacturing process and a description of the final result.

The outcome of the project was two chair prototypes, designed to be used either one by one in order for the user to be allowed to vary the sitting posture, or two by two to encourage social interaction. The design is simple and typically Scandinavian with the bright ash wood and stretch-erless legs. Despite this a lot of effort has been put into the detailing and the joining technique. Taking a closer look at the design one will see great attention to detail in the joinery of the parts.

## Summary

Building or designing an object meant to be produced only once is an inefficient way of working when it comes to economy and the number of hours put into a project. A company that works in this way has to find customers willing and able to pay the price for this exclusivity. The final price of a product can be significantly reduced by standardisation. Design it to be produced in a series and the work hours per product produced will decrease substantially.

The purpose of this master degree project has been designing a chair for small scale serial production in Sweden. The reason for this is to reduce the thinking and planning required from my father in his carpentry business, because this is usually a very central part of the tasks when producing customised furnishings. The idea has been to give him the opportunity to rest mentally at work for one day every week because he can follow drawings and work up a routine.

Even if serial production will reduce manufacturing costs the chair is still going to be built by hand, which is a relatively expensive production method. Therefore origin has been another big focus point to create product value, and the wood has been carefully selected to minimise ecological footprint through transportation of the product.

Another focus point has been the complicated process of designing a chair that is unique, which turned out to be more complex from both an ergonomic and aesthetic perspective than I thought in the beginning of the project.

The promotion of the project has been planned after the end of the project and so is any possible product extension of the chair. A website was also planned for the company, but has also been postponed.

In order to find my final design I studied existing design furniture through literature and visits to furniture stores. Interesting furniture were analysed and put on a progress wall in our studio at school. A major part of the process has been sketching, and a lot of sketching. Interesting ideas has then been processed through scale model making. Next step has been 3d-modelling in the computer, and the final step before the prototype build was making a full scale model to test the ergonomics.

The end result of the project was not one, but two chairs with the same design, only laterally reversed. The design appears to be catching people's eye in the way I hoped, without the use of a provocative design. I am happy with the way the two chairs completes the design when they stand together, without being dependent on each other for that matter. Looking at them individually I feel like the open design invites the user to sit down and relax.

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A stylized, low-poly illustration of a wooden chair. The chair is composed of several flat, colored surfaces in shades of light blue, tan, and yellow. The backrest is a large, light blue trapezoidal shape. The seat is a tan trapezoidal shape. The four legs are represented by vertical tan and brown rectangular blocks. A yellow horizontal band runs across the middle of the chair, connecting the backrest to the seat. The background is a solid light blue color.

# Södergård

a Swedish chair

Supervisor: Karl-Axel Andersson  
Examiner: Claus-Christian Eckhardt

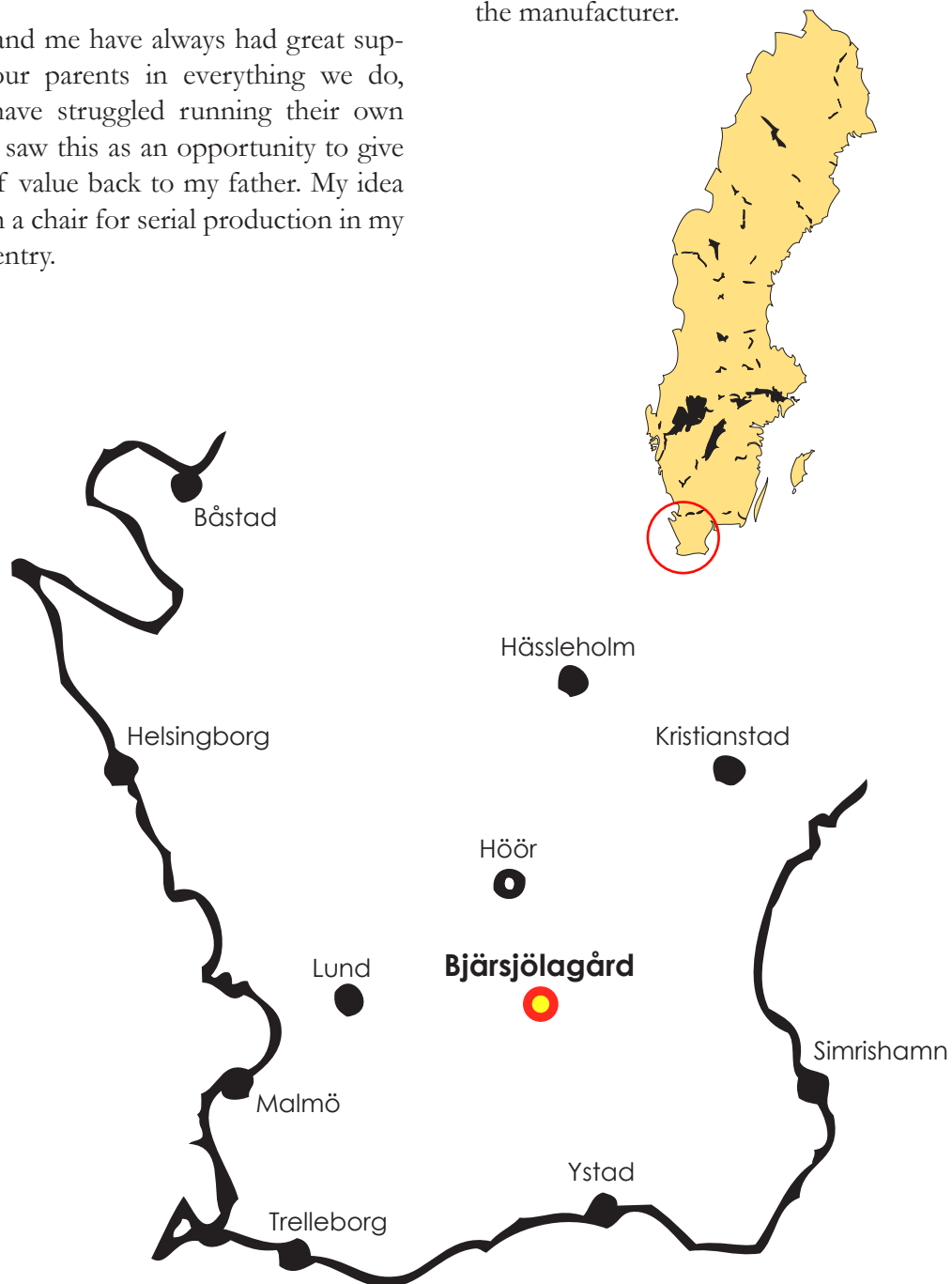
## Introduction

### Project background

The idea of this project popped up during a lecture, when I came to think of one of many ideas my father have had for his carpentry business. His idea was simply to add a product to his business that could be produced in a series for one or two days a week in order to reduce the matter of thinking and planning that is required when you are making customised requests.

My siblings and me have always had great support from our parents in everything we do, while they have struggled running their own businesses. I saw this as an opportunity to give something of value back to my father. My idea was to design a chair for serial production in my father's carpentry.

A chair is a great way for a furniture designer to set a design language for a potential collection. If my father would like to add a table for the chair it's rather easy to implement the design elements from the chair to the table. It works similar to the concept cars in automotive industry. The concept car sets the design elements for the next coming generation of cars produced by the manufacturer.







## Company Background

Göran Lassing is educated in market economy and originally worked as a seller at various companies. During the financial crisis in the early 90s, he was discharged and had to find a new occupation. He tried producing vegetables, but it wasn't lucrative. His brother Ronny was already working as an installer and already had a network in the business. They had found almost complete mechanical equipment for an interior carpentry in Sölvesborg, so they looked for a place to locate a potential business and they found Södergård in Bjärsjölagård that could be rented from the agricultural society.

Södergård is a building that was built in 1875 as a lodge belonging to the castle of Bjärsjölagård. From 1965 up until 1985 it was used for a chicken farm. After that it was empty until the carpentry was started in 1998. The building belongs to Wolmarska Research and Education Foundation, but is conducted by the agricultural society.

Before the building could be used it needed a major restoration. A big step was when the building permit was issued for fire protection. The hatchery became a paint workshop, the mechanical equipment was completed, and G. Lassings Inredning could start up. The initial idea of the business was to build and fit furnishings. This would occupy two men. However, after five years (2003) Ronny left the company and Göran had the business alone with loans and the same fixed costs as before, but with little of the network left.

To quicker build up a network he expanded his services to structure details, windows, doors, staircases, kitchens and structure maintenance. Some attempts of expansion that were not as successful were detailing for leisure boats, large veneering jobs and resale of construction materials. Today, 15 years after the start-up, all original loans are paid.

## Initial brief

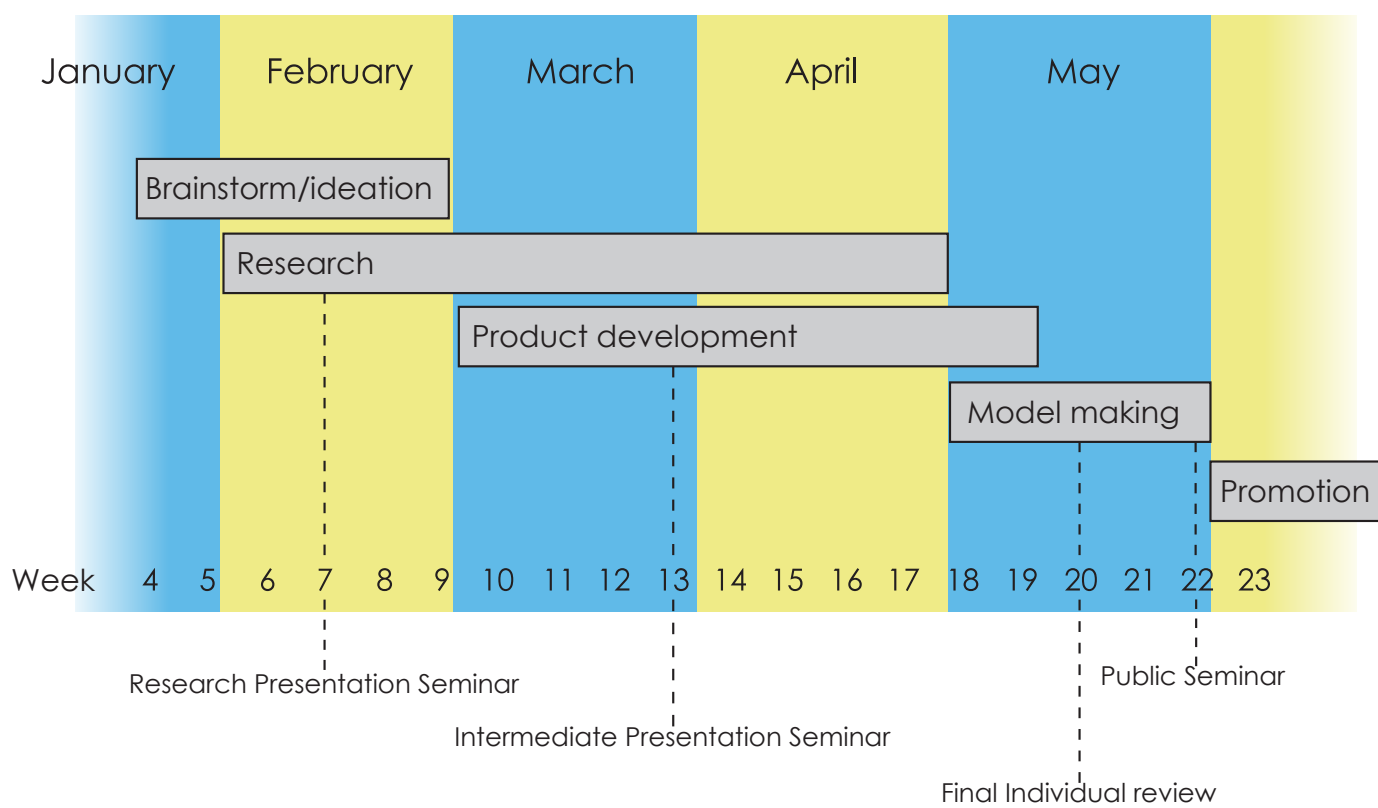
At first I hadn't decided what kind of furniture I wanted to do. The initial brief of this project was to design one piece or a collection of furniture for production occupying one man for one or two days a week. The result should minimize the requirement of planning and thinking during the manufacturing of the furniture, and there should be drawings to follow. The finished product of the project should be a piece of furniture ready for production and a website for the carpentry where this furniture piece can be displayed as well as previous products of the carpentry.

## Personal goals

My goal with this project is to design a proper piece of furniture with a real model that can be displayed on exhibitions. I want to take the opportunity to improve my chances of getting a job in the future by promoting this project and myself as much as possible. I also want to improve my skills in web administration in order to make my personal web page better when I apply for jobs and promote myself in the future.

## Time table

On the right you can see the time plan for the project and it's based on the fixed dates of the seminars. This time plan has been revised from the original one that was set early in the project. It was revised when I realised that the product development would take longer than estimated in the beginning of the process.



Problem definition:

When you build something that is only going to be produced in one copy you get all the developing cost in the end price of this single product. If you would build ten of them the developing cost can be divided on all ten products and the end price gets lower. My father's business offers services that are performed once, which means that he has to find customers able to pay the price for a one time developing cost. Another problem with this way of working is all the planning and thinking that is required for each job. A product that is produced in a series can be made from drawings or experience and memory. The stress would be reduced if the production is made a routine.

A problem I as a designer had before this project was that I am unknown as a designer to most people outside of our school. To easier get a job after the education you need publicity, which I haven't had during my time in design school. Therefore I needed to create something that catches interest.

Goal:

The first goal with the project has been to help G. Lassings Inredning by adding a product to the business that requires less thinking during production. If concurrently it would generate an increased profit that would be a good thing too. Since I have had little or no publicity for my design work during my education this was one of the goals with this project. Some publicity would benefit both me, as a future designer, and my father's business. However, this is planned after the end of this master thesis project.






#### Demarcations:

When I first brainstormed about what would be included in the project I had plenty of ideas and visions. But throughout the project I realised that some parts had to be cut off the project if I was going to have a finished chair at the end. The promotion of the project was the first thing to be set after the deadline of the project. This would include participation in contests and exhibitions, and also promotion through articles in papers. Another thing that was taken out of the time plan at an early stage was product extensions. Initially I wanted to design a collection of furniture, but realised that I only need to design one piece. The design of this piece can later be applied to other furniture pieces to make a collection. In the initial project plan I've added web design as a part of the project. My father had talked about starting a website for his business for years, and I would find it interesting to practice my graphic skills. Halfway through the project I had to remove this from my project plan as well, and I focused on a refined design of the chair itself instead.

#### Methods:

Early in my research I studied existing design furniture through literature and trips to more exclusive furniture stores. My focus was on wooden chairs, but also chairs of which the design caught my interest in one way or another. As soon as I found something interesting or inspiring I took notes of what it was and why it had caught my eye. I then put all the material up on a wall in our studio to get an overview of all my collected data. This method was used throughout the whole project, although more intense during the research process.

In the design process I used my research to develop ideas on a sketch basis. Interesting ideas was investigated further through scaled down mock-ups. The strongest concepts was built in 3D software in order to get the proper proportions right and all the measurements set. The last thing before building the final prototype was to build a full scale mock-up and try the ergonomic properties. The measurements was adjusted and final prototype built.



## Research

### Purpose

The research will be used to help me select what type of furniture that is going to be designed in this project. It's important to establish this as early as possible and not waste time doing further research about something that is not useful in the design process of the project.

Another purpose of the research is to give me an understanding of the importance and complexity of ergonomics when you are designing furniture. It's easy to draw a chair, but to make a functional and comfortable chair takes some research in the area of ergonomics.

Part of the research is also selection of materials for the furniture piece. In a carpentry wood is a given material, but there are hundreds of wood types to choose from. How do you select the right material for this particular piece of furniture?

Inspiration is an important part of the design process and part of the research was used to find interesting furniture to influence my form language and solutions for the final product.

Another purpose of the research was to find alternatives of protecting the surface of the wood, since untreated wood is sensitive to stains and fluids.



### Furniture type

The first thing to do was to select furniture type. Since this was something that was going to be produced in hope of making a profit I wanted to design something where there is a potential demand on the market.

I contacted Norrgavel and Larsson Furniture to see which of their products were most popular among the customers. At Norrgavel the answer was Länstol, which is an armchair with a selection of variations for surface treatment, cushions and the upholstery.

At Larsson Furniture they experienced a great demand for their kitchen chairs and table designed in-house. They offer many options in which kind of wood you can select.

The reason why I contacted these two companies was because they have a similar business idea of what I am looking for - exclusive furniture produced in Sweden.

I knew instantly that I didn't want to make a table. A table is more attractive if you can buy chairs with it and I knew at an early stage that I was not going to have time to design a collection of furniture if I wanted to have a finished prototype in the end. Also a table might not be the easiest thing to make interesting and get publicity for as a new designer.

At first I was interested in the idea of designing an armchair. A chair is more encouraging for variations and playful designs, whether it's an armchair or a kitchen chair. There are more fields of application for a chair than for a table for example.

### First test

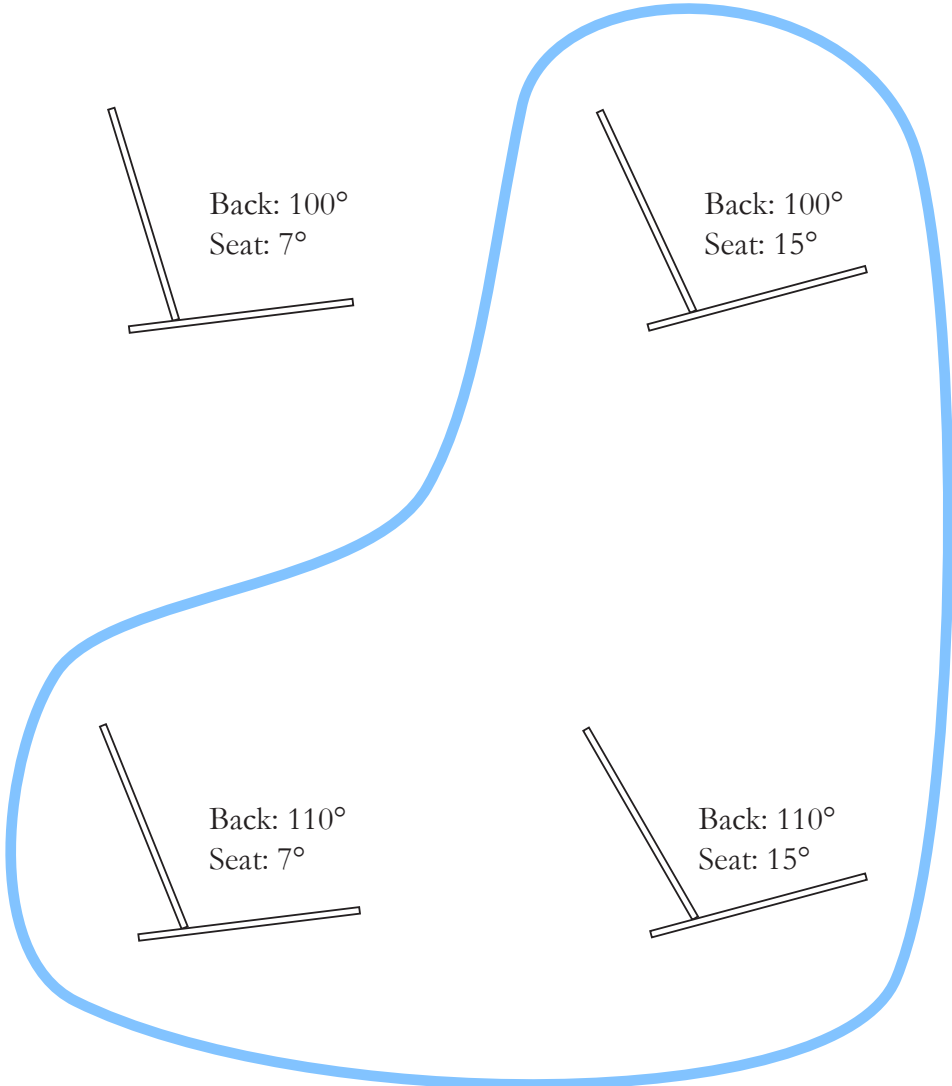
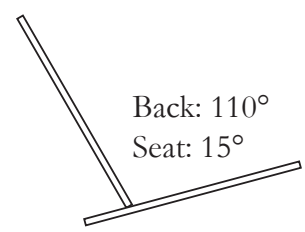
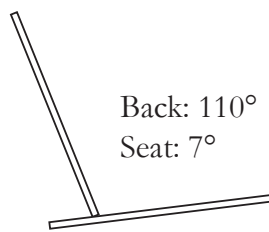
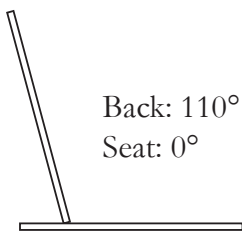
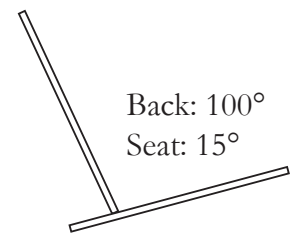
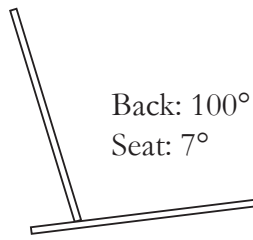
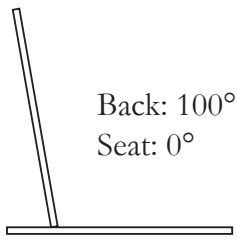
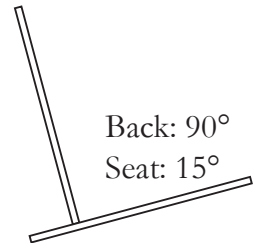
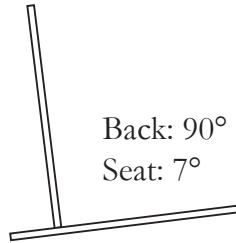
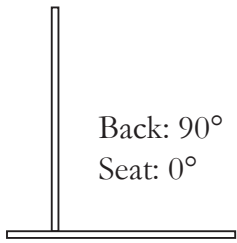
At first I was interested in the idea of designing an armchair. An armchair that is aesthetically pleasing at the same time as it is a more comfortable type of furniture than a kitchen chair, seemed to me like an easier way to catch people's interest as a fresh designer.

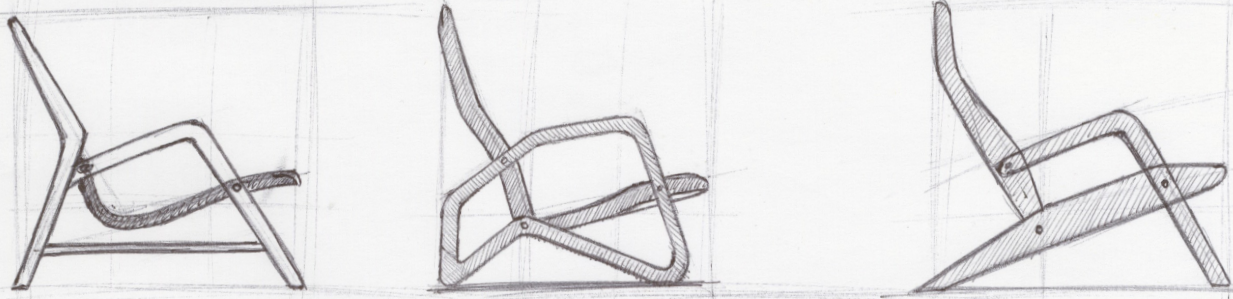
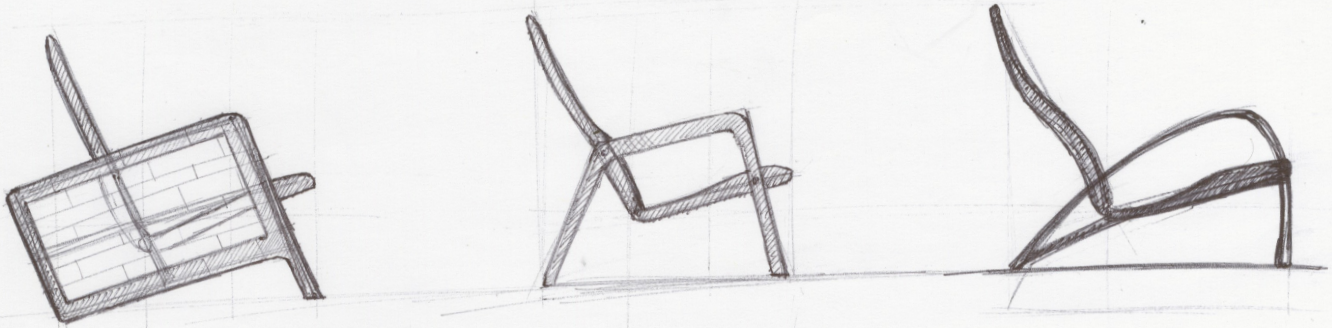
I performed a test of sitting postures with variations in seat angle and backrest angle. The seat I built for this test was made from two sheets of plywood with two connecting back pieces which was used to adjust the angle of the backrest. The angle of the backrest was adjusted by removing the back pieces, cutting them, and put them back together. In order to adjust the seat angle I just put the seat in a snow bank and removed or added snow underneath it until I had the desired angle. This way I didn't have to waste time on building legs with a seat adjustment mechanism for the chair.

The test was performed on me just so I could get a basic idea of how important seat angles are from an ergonomic perspective. I tried out nine different variations of the seat positioning. I made quite extreme variations in the angles so I would really feel the difference between the versions. My selection of angles emanated from a 90 degree angled straight seat and then I wanted to test other angles in even steps up to the extreme angle of a 15 degree tilt of the seat with 110 degrees between the seat and the backrest. Out of the nine positions I found three positions more comfortable than the others, and those were the seats with the largest tilt backwards.



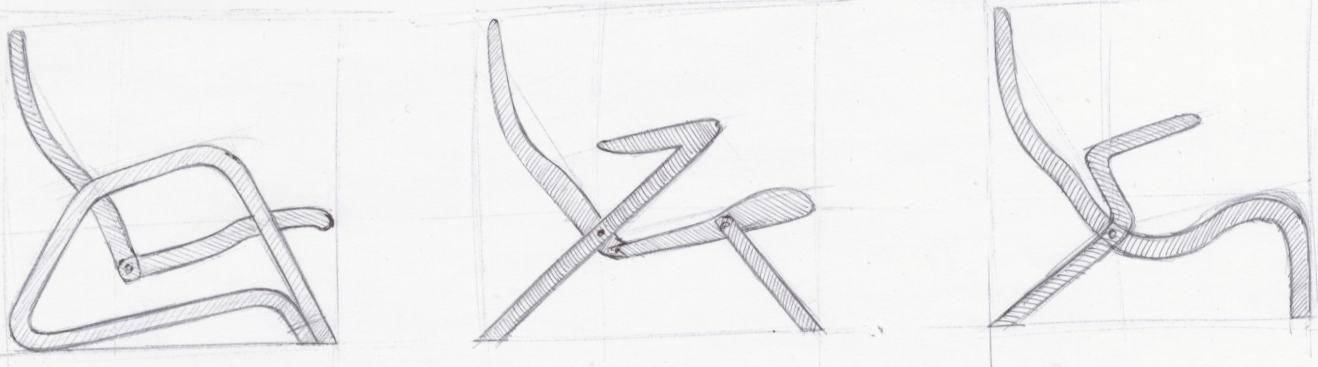
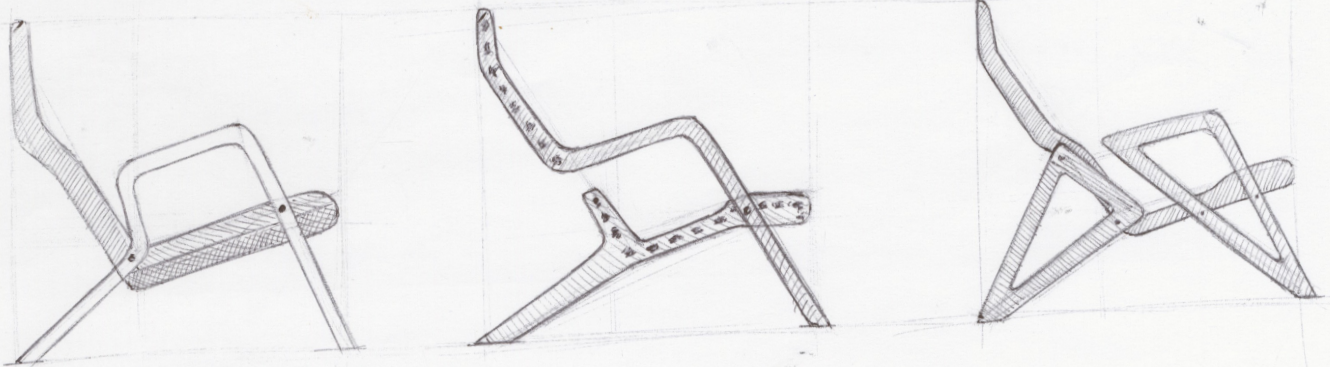







### Armchairs

I proceeded by sketching some armchairs, but when I tried to figure out a way to make an armchair comfortable without using upholstery I realised that this would restrain my freedom of form. The reason why I didn't want to use upholstery was because there is no equipment and little knowledge within the company to handle upholstery. The idea with the project was to keep all of the production in my father's business without outsourcing. This would keep the costs as low as possible. I saw no good reason for designing an armchair at this point.



A man with grey hair, wearing safety glasses and a dark long-sleeved shirt, is working in a workshop. He is leaning over a workbench, focused on his task. The background is a blurred workshop with various tools and equipment. The lighting is soft and even.

### New brief

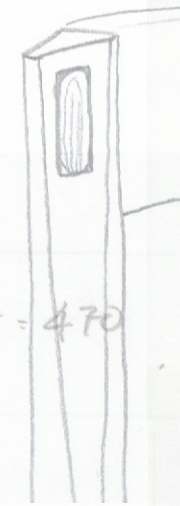
I now updated my first brief to be more precise about where I was going with the project. My new brief was to design a versatile chair that can be used in different situations in the home environment. It should be produced in a series and the manufacturing method should be available at my father's furnishing carpentry. It should be a sustainable chair made from Swedish wood. By the end of the project a high end prototype of the final concept should be presented.



Ergonomics:

When I started to read about the ergonomics for a chair I found that designing a comfortable chair is more complex than I first thought. There are recommendations in minimum and maximum measurements everywhere; for the backrest, seat height, width, depth, height of armrests, angles of seat and backrest, and the relation between all these dimensions. Since not all people in the world are the same size, the recommended measurements of a chair part sometimes are specified with a maximum and a minimum measurement. This means that the designer can choose any measure between these two values without risk of compromising the ergonomics. However, choosing a measurement between these values doesn't mean that the chair will fit everyone, but it might fit the majority. The values in the book *The Dimensions of Seating Furniture* by Erik Berglund are based on statistics about people's length.

I used measurements from this book as a starting point when I was doing experiments, sketches and models and I also took some existing chairs to verify the data that was derived from the book. An interesting fact I found in this book, and maybe logical one as well, was that the best way to sit comfortable in a chair is by varying your sitting posture. You can do this in most chairs and it's nothing special about it, but I thought it would be interesting to try and communicate this through the design. I, for example, often find myself sitting sideways in chairs with a low backrest using the backrest as an armrest.



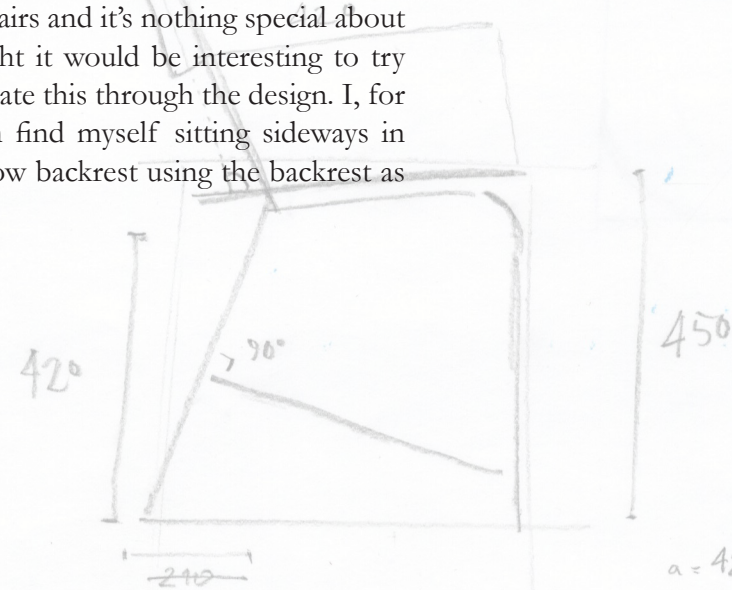
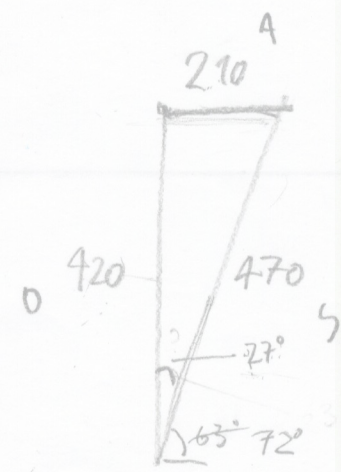
$$\sin(72) = \frac{b}{c}$$

$$\sin(72) = \frac{420}{c}$$

$$\sin(72) = \frac{420}{c}$$

$$\tan \alpha = \frac{A}{O}$$

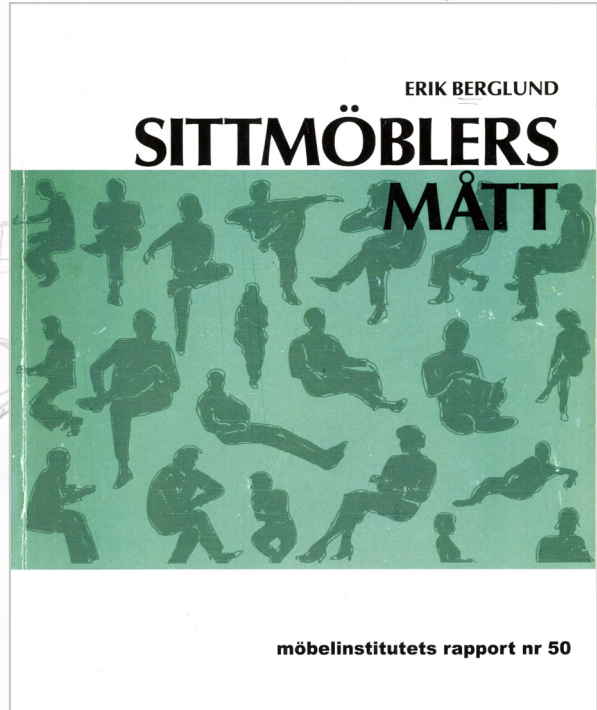
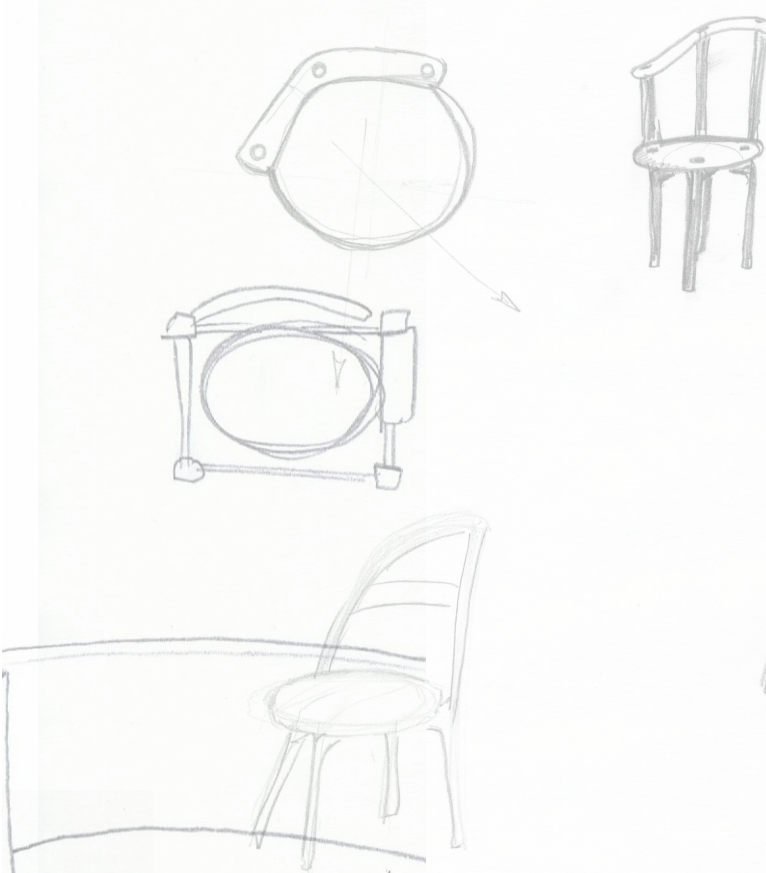
$$\tan \alpha < 0 =$$



$$a = 420$$

$$A = 18^\circ$$

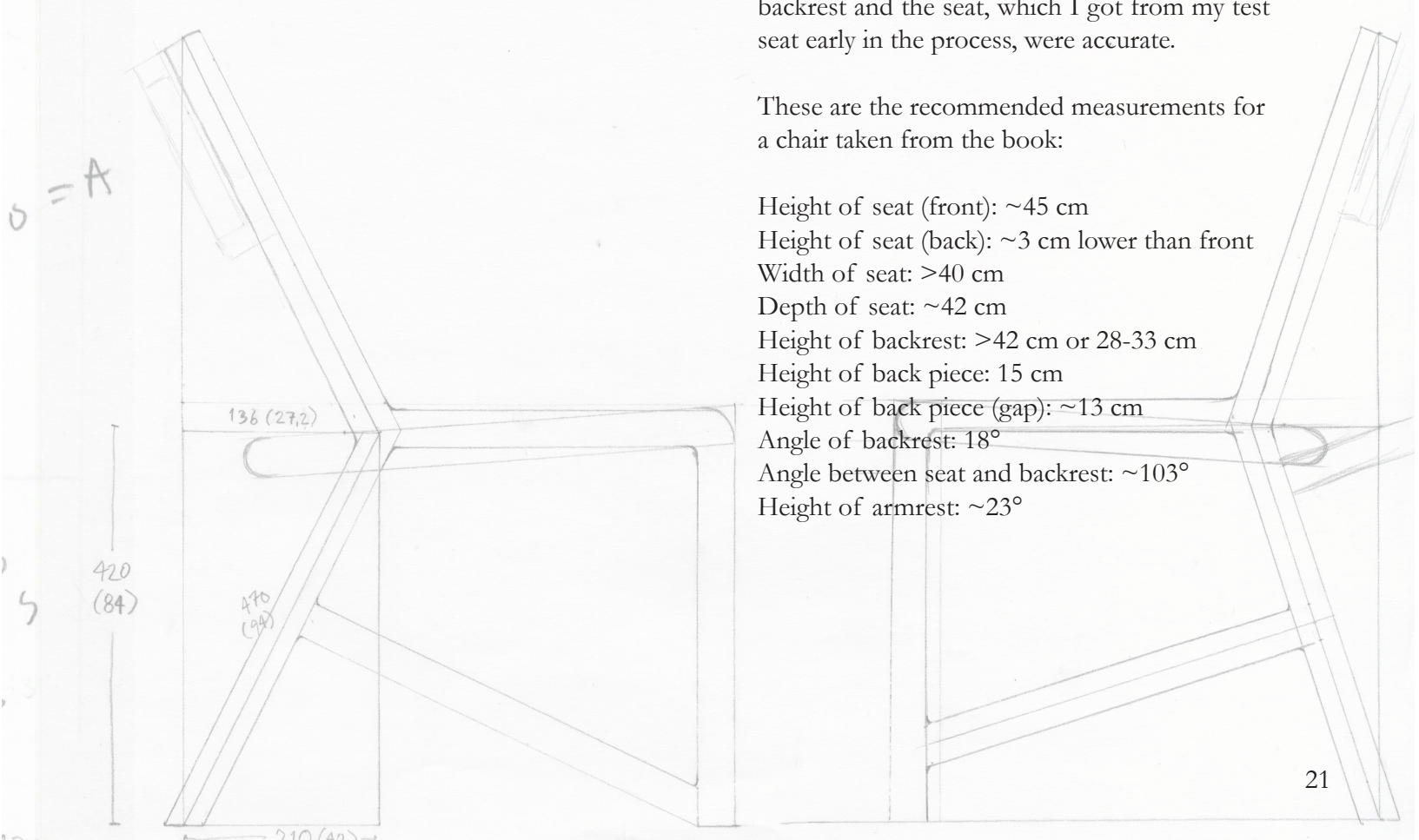
$$\tan A = \frac{a}{o} \rightarrow \tan 18 = \frac{420}{o}$$



From the book I found that the angles of the backrest and the seat, which I got from my test seat early in the process, were accurate.

These are the recommended measurements for a chair taken from the book:

- Height of seat (front): ~45 cm
- Height of seat (back): ~3 cm lower than front
- Width of seat: >40 cm
- Depth of seat: ~42 cm
- Height of backrest: >42 cm or 28-33 cm
- Height of back piece: 15 cm
- Height of back piece (gap): ~13 cm
- Angle of backrest: 18°
- Angle between seat and backrest: ~103°
- Height of armrest: ~23°

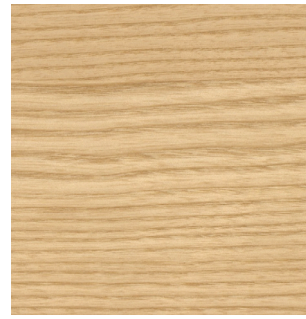




#### Material:

There was never a question of which material I would use for this chair. Wood is almost the only material used in the carpentry. The question was which type of wood I would select. It was important to me that the wood had been grown in Sweden. This reduces the cost and also the ecological footprint caused by transportation. It also reduced my selection of wood. I contacted different suppliers of wood and found that I had six kinds of Swedish wood to choose from: Ash, Beech, Birch, Elm, Oak and Cherry. Considering cost, aesthetic qualities and material properties I could narrow the selection down to Ash wood and Elm wood. I could go for both of these, and I was considering it for a while, but the cost would rise either through storage or by not ordering large quantities. My contact person at Holm Trävaror AB was very helpful when I made the decision, and the availability settled that I would use Ash wood for my chair.

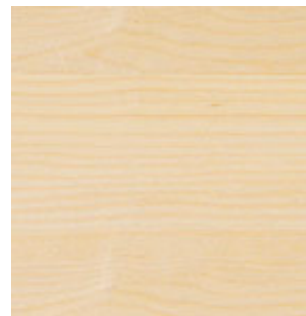
Then why is it so important that the wood comes from Sweden? I think that it's important to support Swedish industry. In Sweden we have high demands on service conditions for employees, so if you buy Swedish raw material you are guaranteed a product that hasn't violated human rights. It's also much easier to track the origin of the wood if it stays in one country. This is desirable in order to know for sure that the wood has not been illegally imported to Europe from tropical rainforests. I read an article about this on the website of Skogsindustrierna (Skogsindustrierna, 2010). One last reason for choosing Swedish wood is to minimise transportation of the raw material. This reduces emissions that affect the environment, especially if the wood comes from outside Europe. The ash wood used in this chair has grown in southern Sweden.



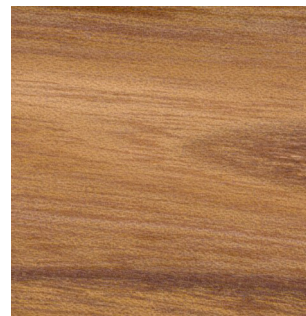
Ash



Beech



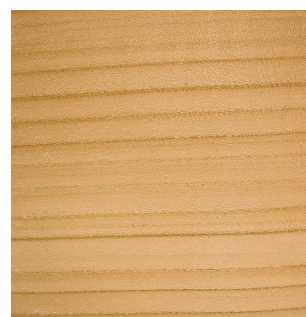
Birch



Elm

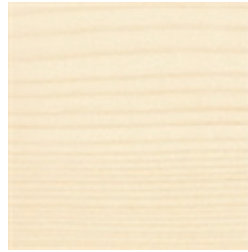


Oak

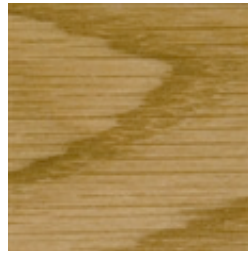


Cherry

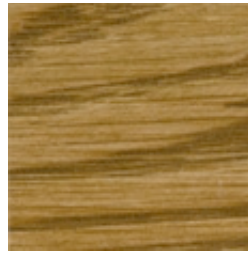
White



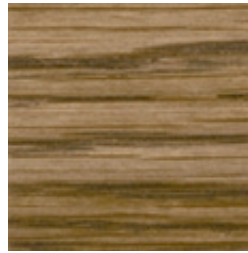
Honey



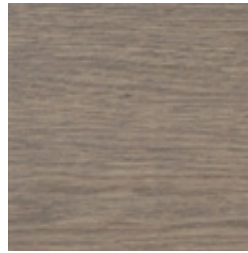
Amber



Terra



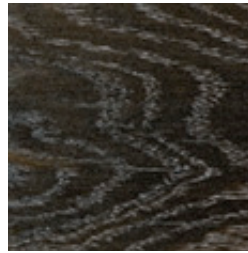
Graphite



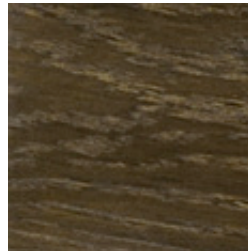
Black



Silver



Gold



Surface treatment:

The surface of the chair needs to be treated in order to be durable and stand rough use because untreated wood is easy to scratch and gets stained easily. From two carpenters and a saleswoman in a paint store I was recommended Osmo hardwax-oil if I wanted the highest surface quality.

Osmo hardwax-oil is a product which is natural and eco-friendly (classed as food-safe according to their product catalog) usually used for surface treatment of floors indoor, which means that the product should make the wood very durable and scratch resistant. Osmo's hardwax-oil is one of the more expensive products on the market, but it has a good reputation among both sellers and consumers.

I was looking for information about this product on the internet when I found that it's available in pigmented variations as well as uncoloured. Using a pigmented hardwax-oil you get to keep the beautiful texture of the wood and can choose which colour tone you like. I personally have a passion for dark wood, and the ash wood is bright, so I wanted to offer the chair in other colours. Using pigmented hardwax-oil would be an inexpensive way to do that.

The decision of which colours I would choose could wait until after the project because this product can be bought in small cans, which wouldn't affect the end price of the finished chair substantially.

## Inspiration

I read *1000 Chairs* by Charlotte and Peter Fiell to find inspiration. In this book you can read about a thousand iconic chairs from a design perspective. I read this to get a picture of the endless opportunities you have designing a chair and this would keep me from locking my mindset on a specific type of chair.

### B1 (Stefan Wewerka)

In my search for inspiration I found a few chairs that later influenced my way of designing my own chair. Early in the process I was hooked by three-legged designs. Stefan Wewerka's B1, designed in 1979, is a black or white lacquered chair made out of Beech wood with leather or fabric upholstery. What really caught my eye about this chair was its' asymmetric design and that it suggests several sitting postures.





### PK11 (Poul Kjaerholm)

Another chair that inspired me was Poul Kjaerholms' chair named PK11 from 1957. The backrest is made out of oiled and waxed Walnut or Ash wood, the structure from stainless steel, and the seat has leather upholstery. This chair was interesting because of the width of the seat (which gives you space to vary your sitting posture) and the joining technique used to shape the round backrest. This technique also gives the backrest a beautiful pattern from the joinery.





Stapelstol USA - 1 (E. K. Agustsson)

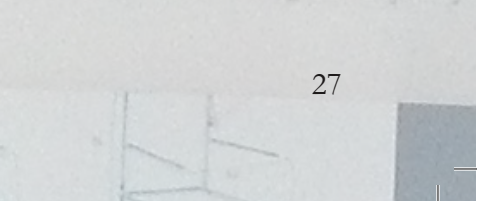
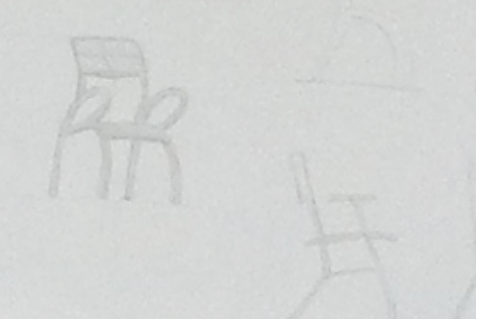
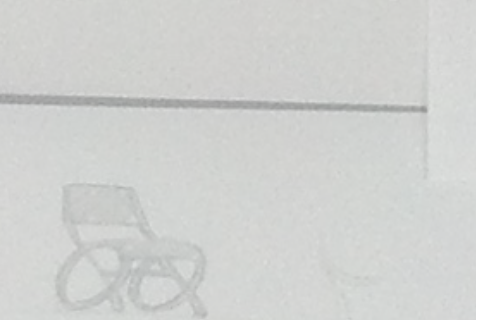
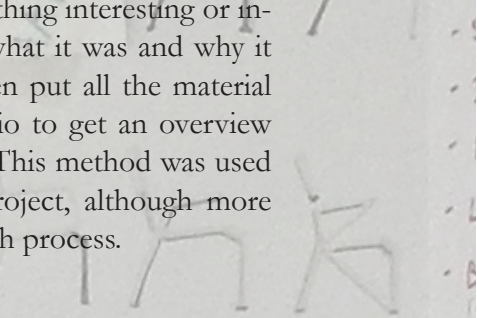
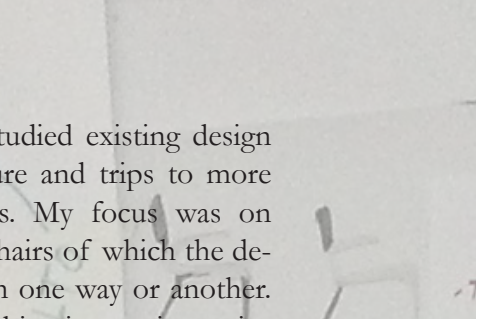
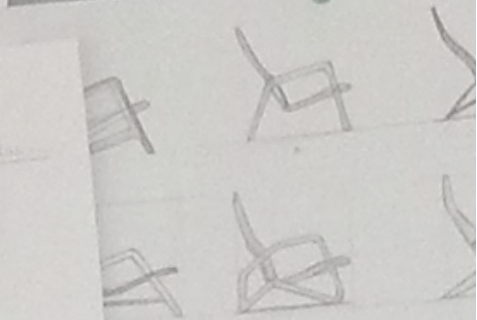
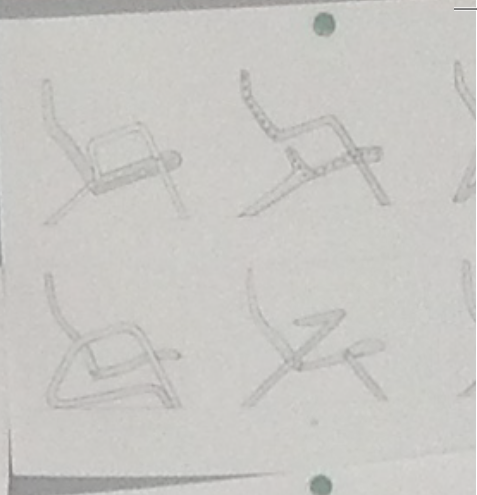
The third chair I've used for inspiration is maybe a little bit unexpected since it's not too famous. It's a four-legged chair from AB Bjärnums Möbelfabriker. It's called Stapelstol USA – 1 and architect E. K. Agustsson designed it in the 60s. The chair is made from beech wood treated with cellulose varnish and has fabric upholstery. I like the simplicity, stability and the rigidity of the design at the same time, as it is comfortable. I also like the fact that it was mass-produced in Sweden.



# MATERIAL

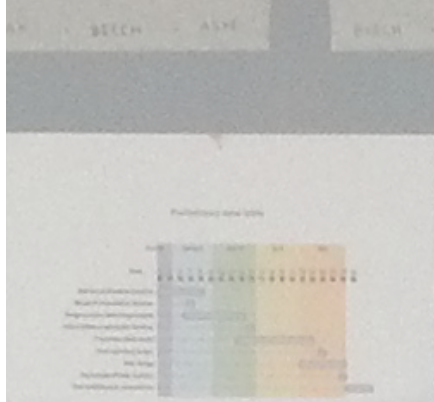


- SKANKTID
- TINGOPUNKT
- LÄRSTAD
- LÖTNING KRISTED

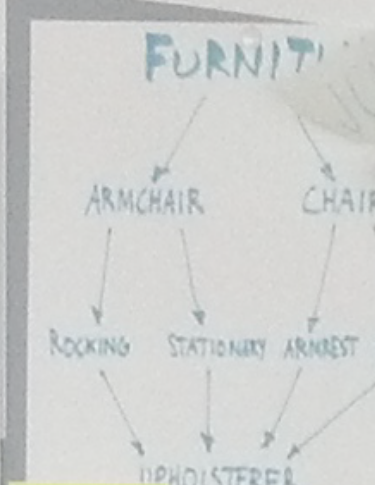


## Methods:

Early in my research I studied existing design furniture through literature and trips to more exclusive furniture stores. My focus was on wooden chairs, but also chairs of which the design caught my interest in one way or another. As soon as I found something interesting or inspiring I took notes of what it was and why it had caught my eye. I then put all the material up on a wall in our studio to get an overview of all my collected data. This method was used throughout the whole project, although more intense during the research process.



**Project Plan**  
 In August 2019  
 Project description  
 The project is to design a new chair for the company. The chair is to be made of wood and have a modern design. It should be comfortable and easy to use. The chair is to be made in a small quantity. The project is to be completed in August 2019.



UPHOLSTERER  
 [20. 04. 2019]  
 [20. 04. 2019]

Checklist for the project:  
 Design the chair  
 Make a prototype  
 Test the chair  
 Make the final chair

# COMPANY

**Financial goal**  
 Total cost: 200 000 SEK  
 100 000 SEK  
 100 000 SEK

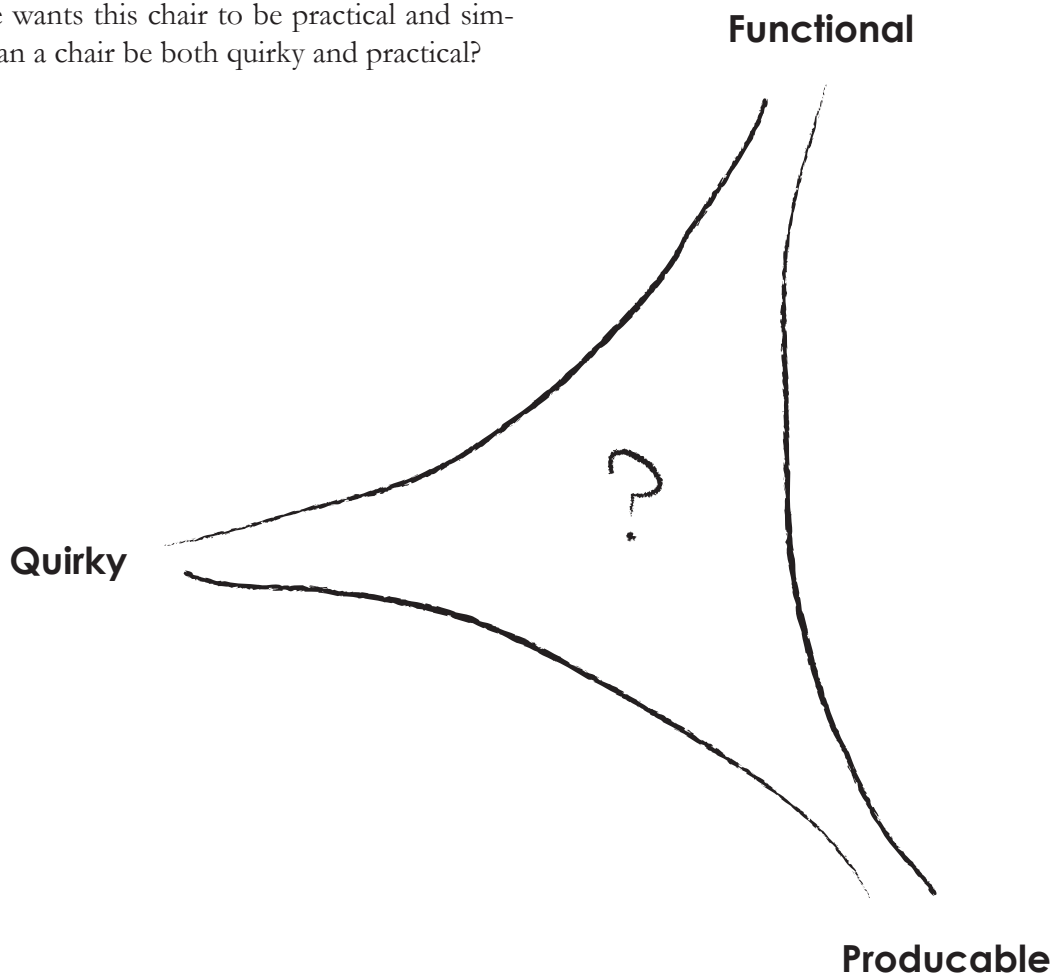
**Machinery**  
 - Sawmill  
 - Lathe  
 - Drill press  
 - Planer  
 - Sandpaper

## Quirkiness

Quirkiness has been an important keyword through my design process. On TheFreeDictionary by Farlex (Thefreedictionary, 2009) quirkiness is described as oddity, strangeness and unfamiliarity.

If you are a new and fameless designer in a competitive business like industrial design it is important to differentiate yourself from the crowd in order to get attention and exposure in media and in that way show the market that you exist.

I am a fameless designer and my father's company doesn't have a big name to rely on, so therefore I should make something that catches attention. But I'm raised in a very practically thinking family, and my high school education was directed towards engineering, so a big part of me wants this chair to be practical and simple. Can a chair be both quirky and practical?





## Chair Types

To the left you can see an example of a quirky chair. This one is designed by Vladimir Tsesler & Sergei Voichenk. I would define a quirky chair as a chair with a shape that has no purpose but to draw attention.



A typical example of a functional chair is a desk chair with adjustable height and angles of the seat, backrest and the armrests to fit any body size. The major focus is on ergonomics and most of them look the same. A desk chair is designed to serve the body, not the eye. However, the desk chairs are designed for the work place and my chair is for a home environment, but the main thing with a functional chair is that you can sit normally and that the appearance is not in the way for the use and purpose of the chair.

Producible chairs are chairs that are easy and cheap to produce in large quantities. The moulded plastic chair is a good example of this. Making a wooden chair is not by far as cheap as moulding a plastic chair, especially not by hand, but the aim is to make my chair as production friendly as possible to keep the final price of the chair as low as possible and attract more potential buyers.



I want to balance between these three factors and come up with a chair that is simple to manufacture and is user friendly at the same time as it is beautiful and interesting from an aesthetic point of view.

## Design Process

### Function Analysis

When I felt that I had gathered enough material to start developing concepts I wrote a function analysis to give me an overview of my priorities and what I had to consider while designing the chair. The order of priority was rated in three levels: Head function (HF), necessary (N) and desirable (D). The head function is the most important factor, and together with the factors rated necessary it had to be considered in the final design. The desirable factors could be compromised with a strong enough concept.

Seat person	HF
Comfortable	N
High quality	N
Attractive	N
Sustainable	N
Production friendly	D
Nimble	D
Versatile	D
Affordable	D
Light weight	D

Why are these important?

*Comfortable:* A chair that is uncomfortable when you try it out is unlikely to be sold.

*High quality:* A handmade chair is probably going to be quite pricey. A high price tag can be justified if it's a high quality chair that lasts for many years. It's not an expensive chair if you spread the cost over many years.

*Attractive:* Usually I don't use "attractive" in my function analysis because everyone has different taste. But in this case I find it necessary because the chair needs to catch attention to compensate for not being designed by a famous designer. The chair needs to create an interest and a desire from the beholder.

*Sustainable:* People get more and more aware of the importance of sustainability. Educated people might be willing to pay more to get a sustainable product, and if you can make a sustainable chair with no big means of investment this could be important.

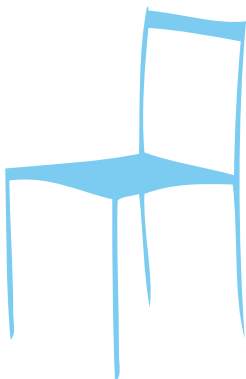
*Production friendly:* Desirable because the production cost should be kept low in order to keep the final price of the product as low as possible. If the shape is too complex and time consuming to produce, the chair will be too expensive for a regular customer. It's not put as necessary because being handmade gives more freedom for detailing.

*Nimble:* A chair can benefit from being easy to move around when you for example clean the floors.

*Versatile:* If the chair can be used in different ways and at different occasions it's more valuable for the user.

*Affordable:* Being affordable was something I tried to reach as far as I could, but I didn't expect the chair to be cheap being hand made.

*Light weight:* A light weight chair is easy to move around, which makes it practical, but on the other hand, a heavier chair breathes quality, stability and trust.





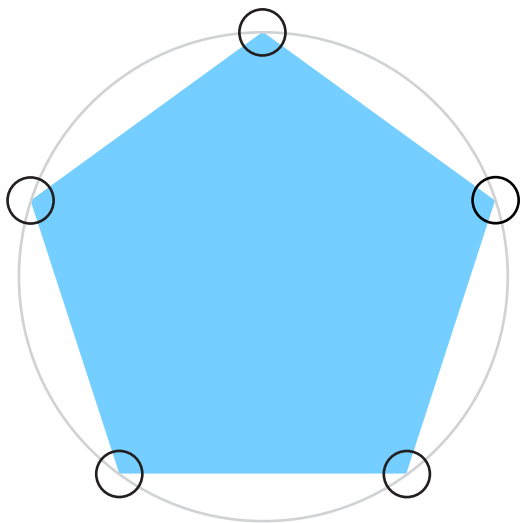
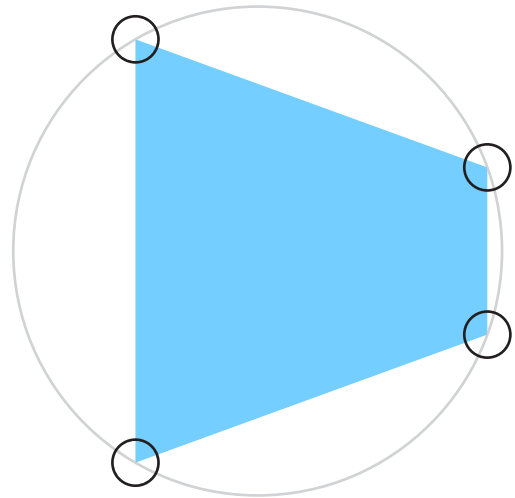
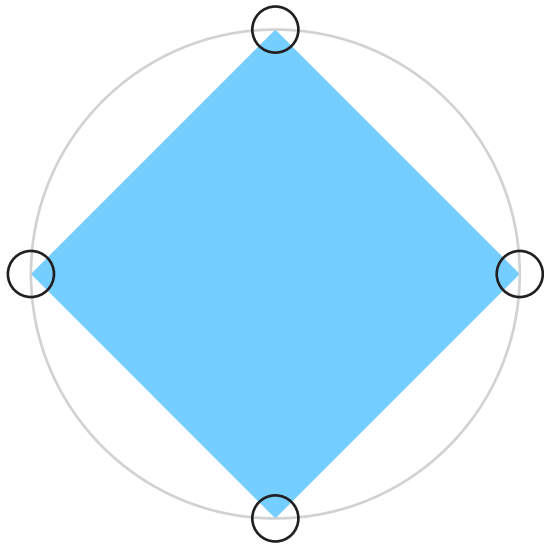
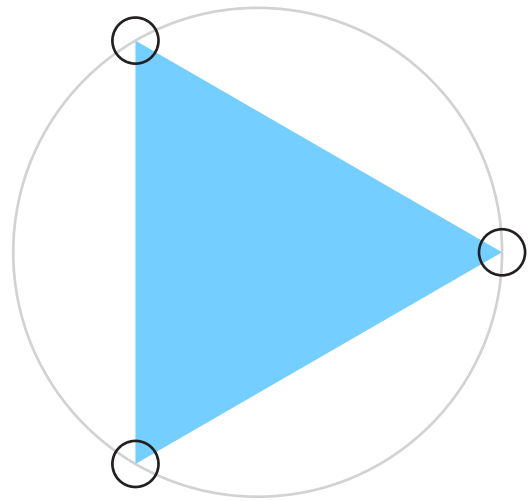
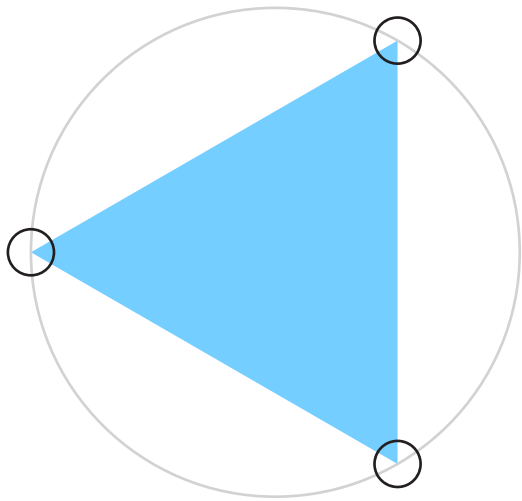
### Number of Legs

When I was reading the book *1000 chairs* by Charlotte and Peter Fiell I took notes about all the chairs that caught my interest in any way. I wrote down which chair it was, the designer, and why I found it interesting. When I had finished the book, I found that many of the chairs I had written down were three legged. I believe that if you would ask people to think of any chair most of them would probably refer to a four legged chair. I started to experiment with the idea of designing a three legged chair and use this as a way to draw attention.

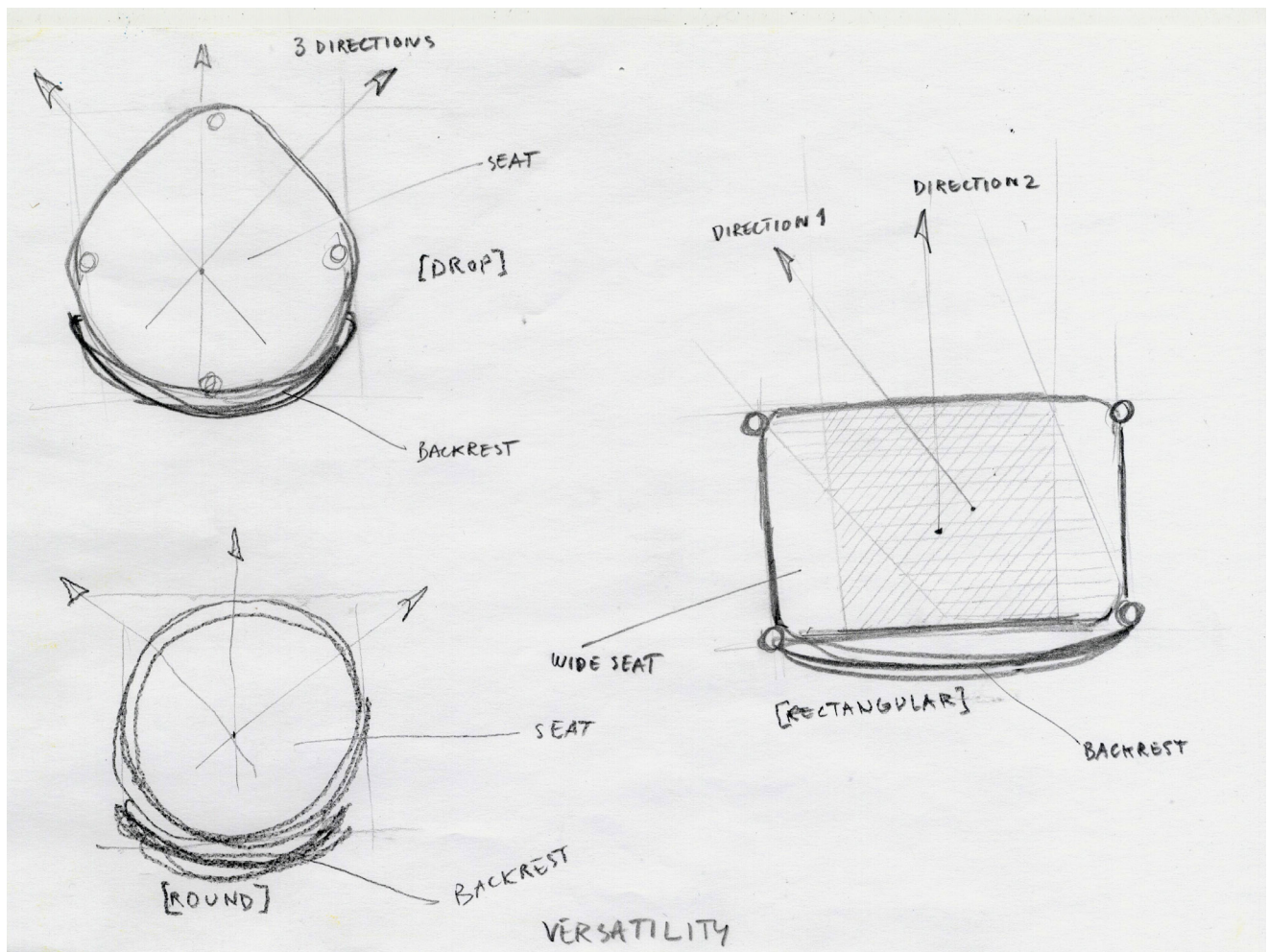
There are some practical benefits of three legged chairs. With a single leg in the back and two in the front you can prohibit the behavior of rocking in the chair, which exposes it to unnecessary wear. Another benefit of three legs is that it always sits on all legs and doesn't get wiggly even if the ground isn't totally flat.

There are some drawbacks as well. The base of support is the area between where the supporting legs meet the ground. The larger base of support, the greater stability you get. The more legs you have, the larger base of support, although using five or more legs doesn't increase the stability considerably compared to a four legged chair. The optimal shape of the legs for maximum stability would be a full circle. But using only three legs compared to four, gives you a significantly smaller base of support, which makes the whole chair less stable.





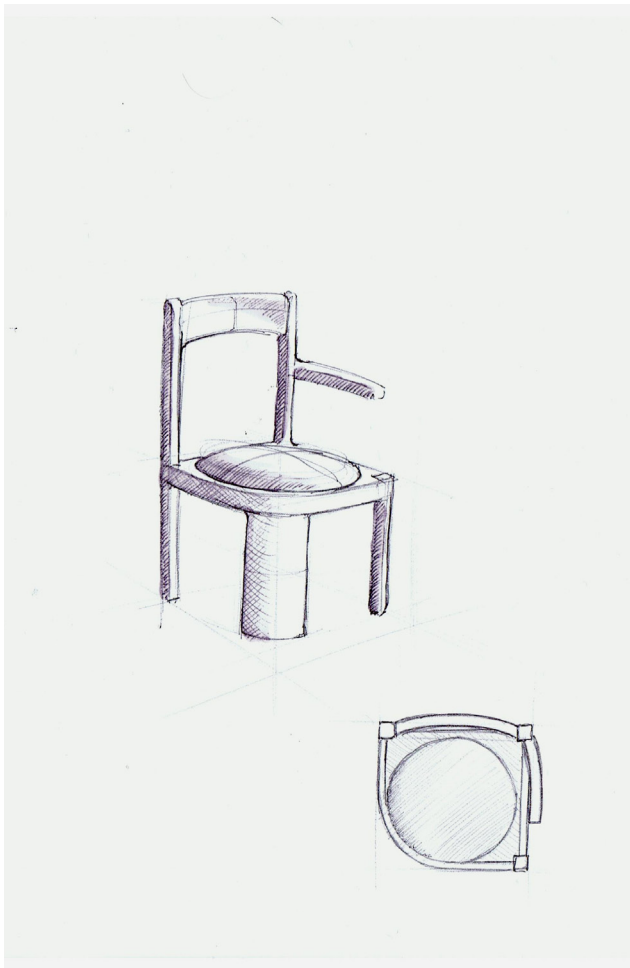
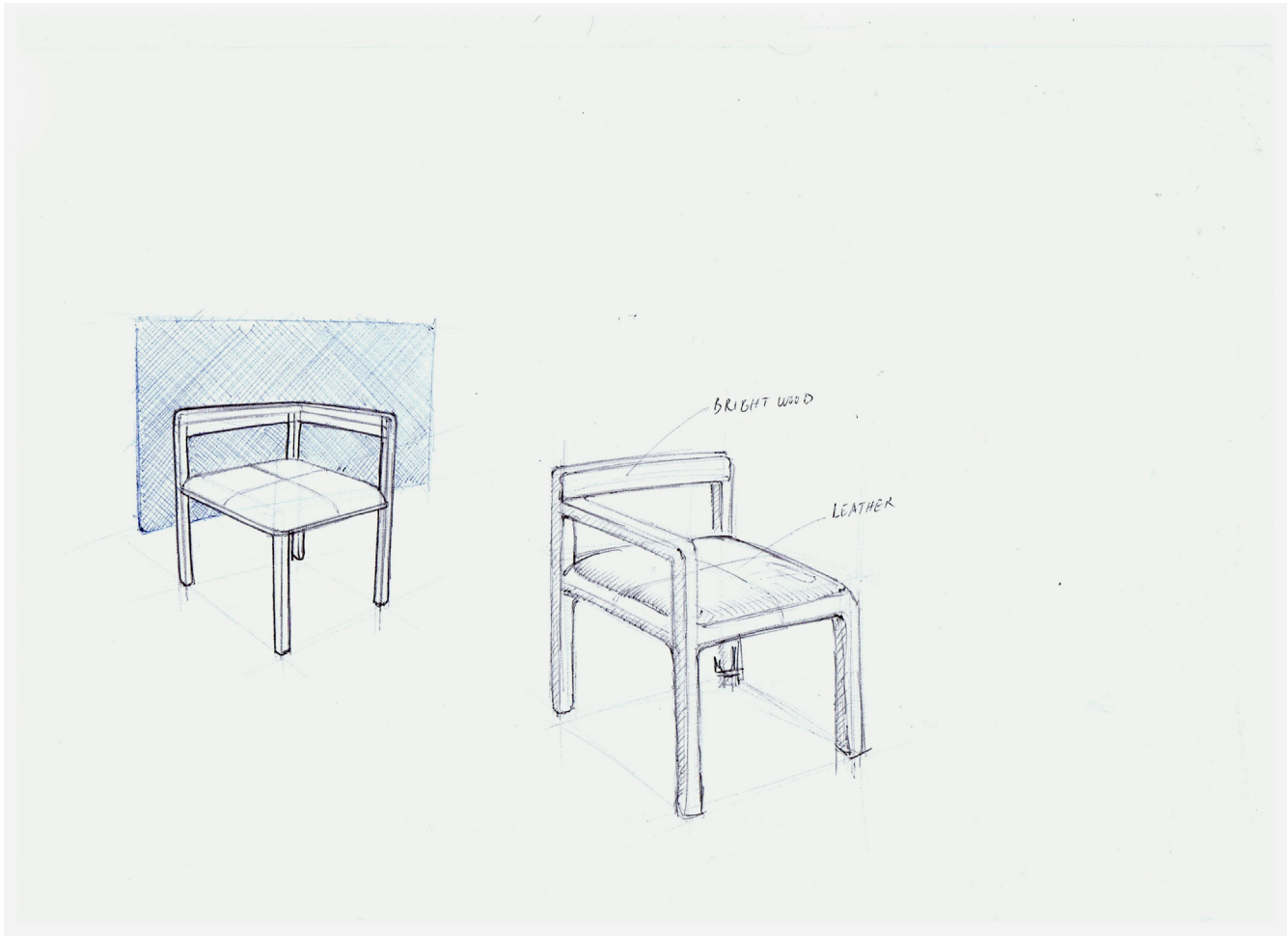
While experimenting with some three legged concepts, sketching and building mock-ups, I discovered asymmetry as a way to achieve quirkiness. This was important for my further design process. But I decided to go for a four legged solution, because I wasn't willing to compromise the functional aspect of the chair. Another important discovery I made through some of my three legged concepts was that I could give the chair different directions. I remembered from the book *The Dimensions of Seating Furniture* by Erik Berglund that an important thing for good ergonomics when sitting for a longer period of time is to vary your sitting position. So I started to develop different shapes of the seat in order to give the user several suggestions on how to sit in one and the same chair.





### Mock-ups

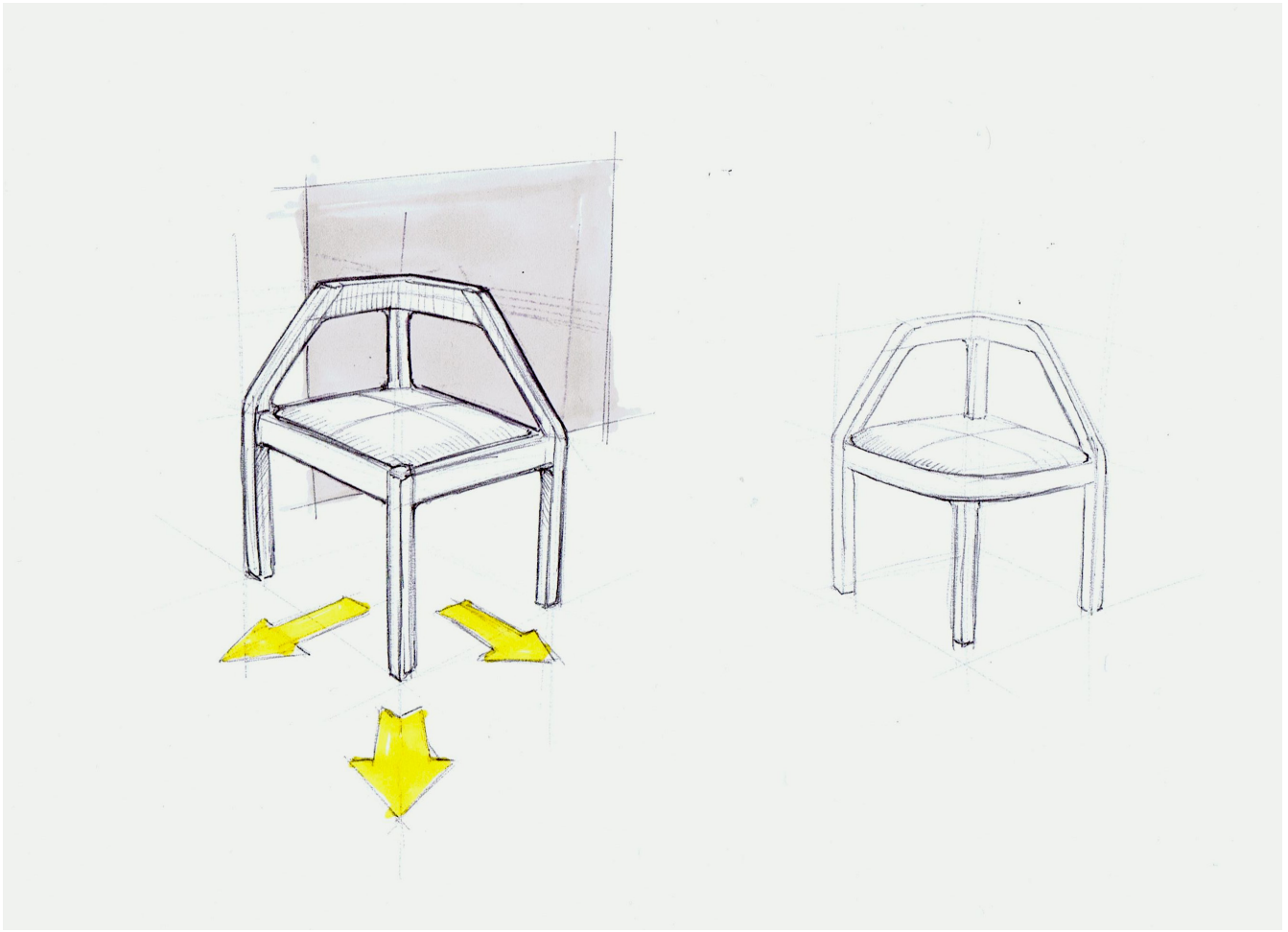
A very helpful tool when developing concepts was making paper mock-ups. When I came up with an interesting concept from the sketching I could quickly take the idea into 3D by cutting, folding, gluing and taping paper into 1:5 scale models. This gave me a good understanding of how my design would work in 3D and made it easier for me to imagine how it would be produced.

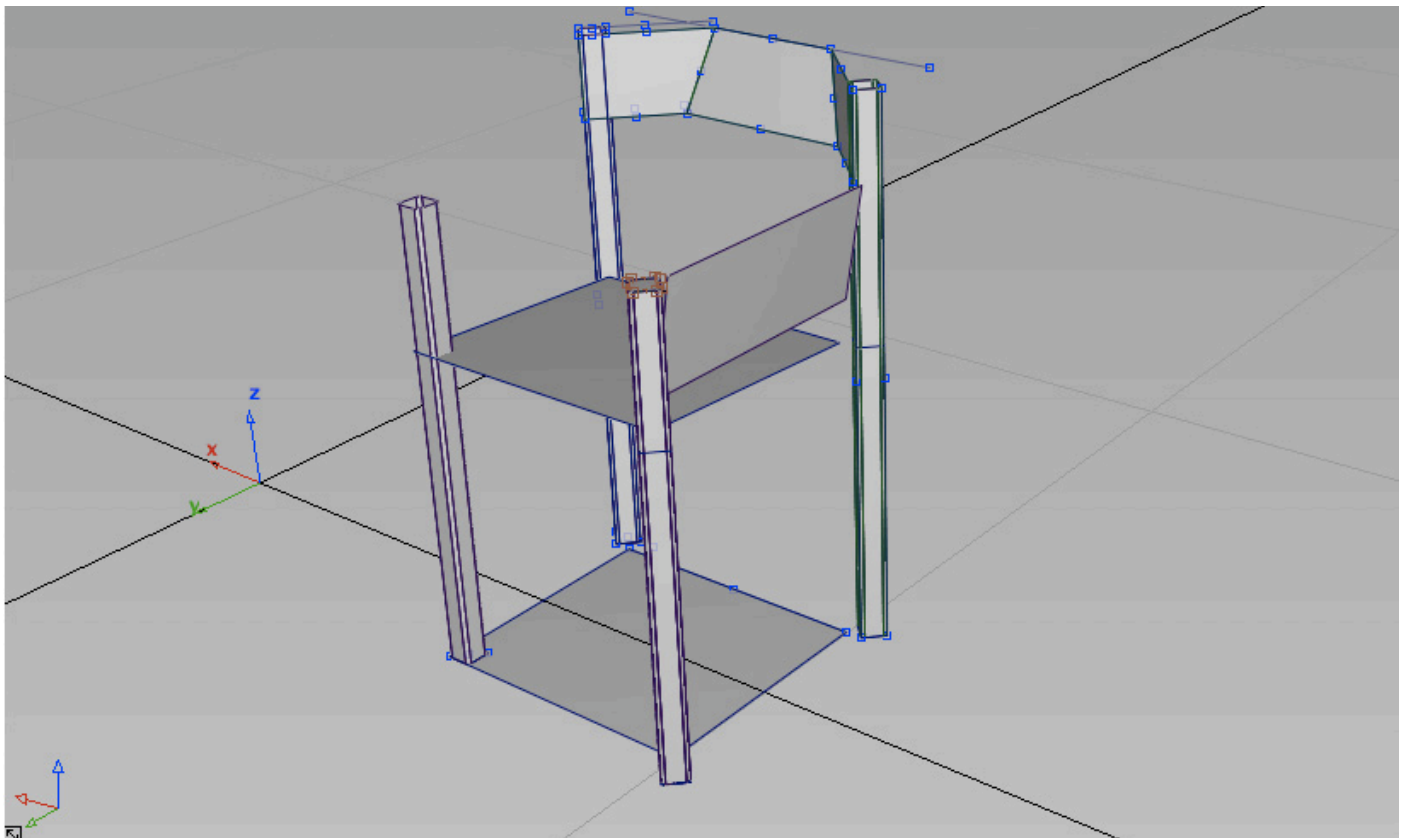
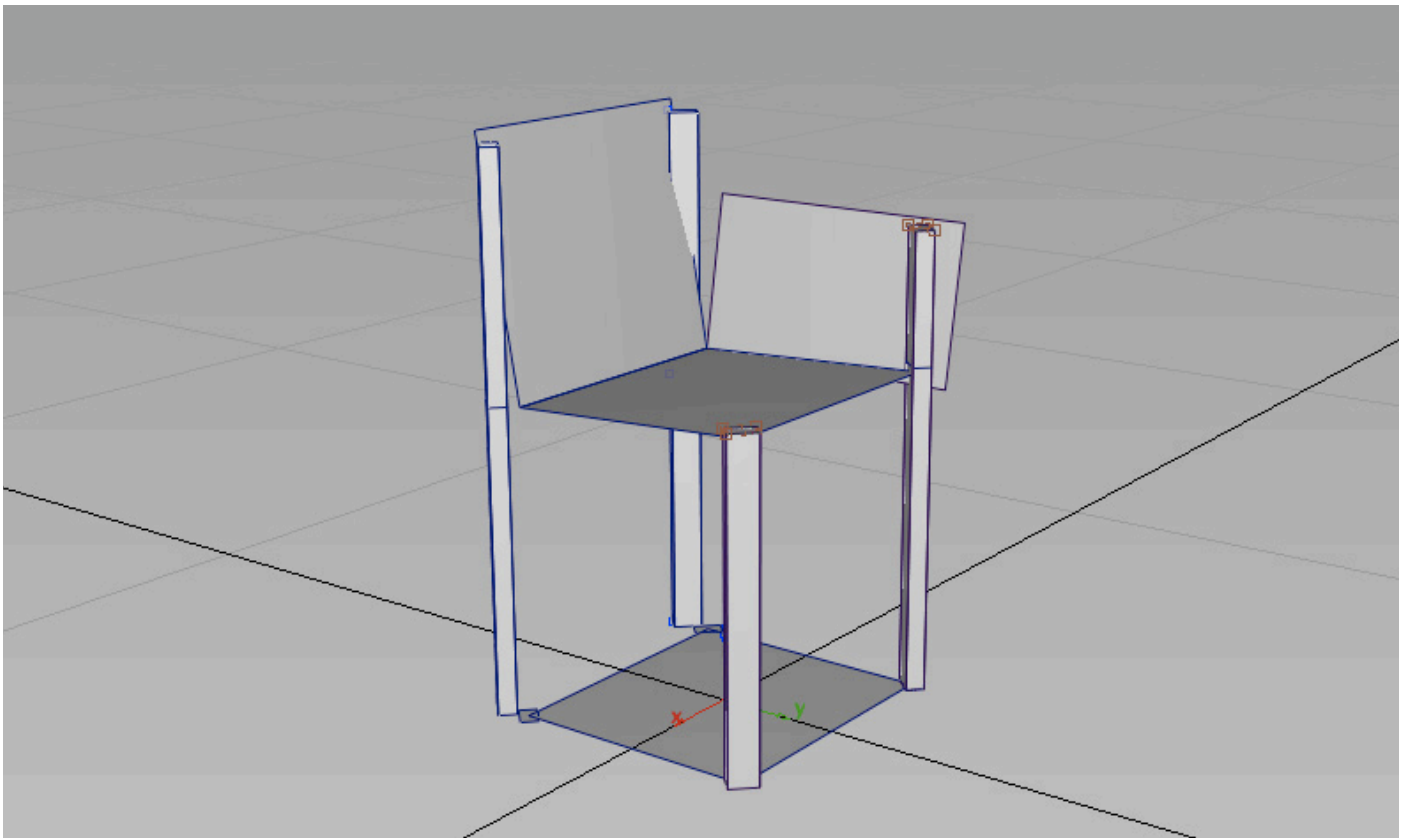


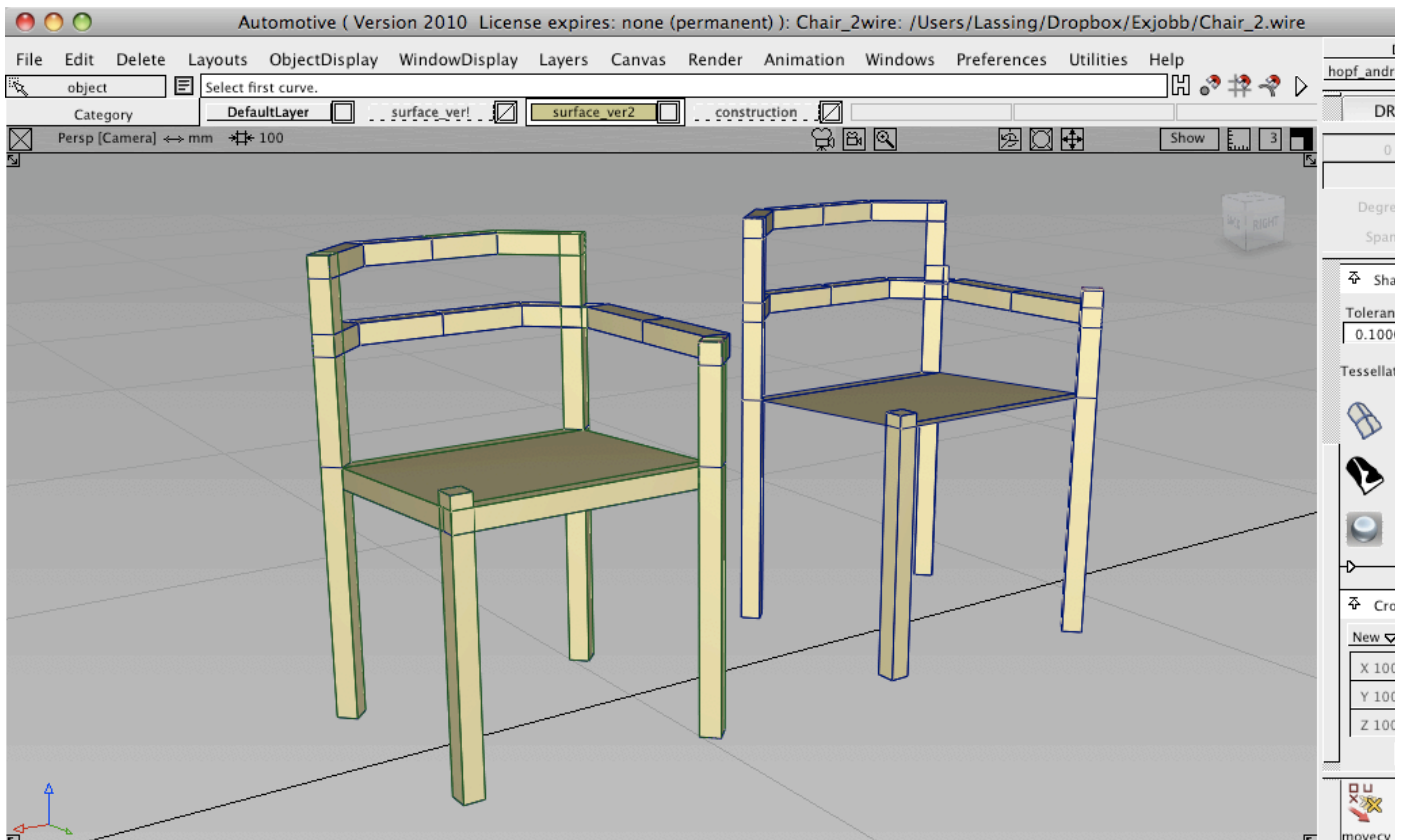
### Sketches

Thinking about the idea of asymmetry combined with the concept of different directions or seating generated an idea about making a chair with only one armrest, so you can sit sideways in it and use the backrest as an armrest if you like to.

The final concept that I decided to go through with and develop further was a concept where I had used four square rods for legs, but turned them 45° in order to round off my design language and make the squarish theme more interesting. The chair also gained a third direction of seating from this. The final sketches are visible to the lower right on this spread.







### 3D modeling

The idea was developed in Autodesk Alias for precision and exact measurements that could be used for the drawings later. I worked on the supposition that the measurements from the book *The Dimensions of Seating Furniture* by Erik Berglund would work well from an ergonomic point of view, so I started by building simple shapes around those. For manufacturing purposes I tried to use as few parts as possible and also simple shapes. Squares and simple angles became the consistent rule for everything that would not affect the ergonomics in a negative way. The problem with 3D software is that you can't try your ideas from an ergonomic perspective in real life.



### Full Scale Model

Before producing the final model I built a full-scale mock-up in order to try the ergonomics and find problems that can't be discovered in the 3D software. I used cheap pinewood and took the measurements directly from the 3D model. This model turned out to be important because it showed me many things that needed further adjustments. The backrest was designed straight, so it cut into your back when you were

leaning backwards. This had to be curved in some way. Other things I discovered that didn't need as extensive design changes were that the seat height was too high, the seat depth too long and the armrest too low. I also had left to decide for a joining technique for the pieces of the backrest. This was discussed and solved through a discussion with my father just before manufacturing of the final prototypes.







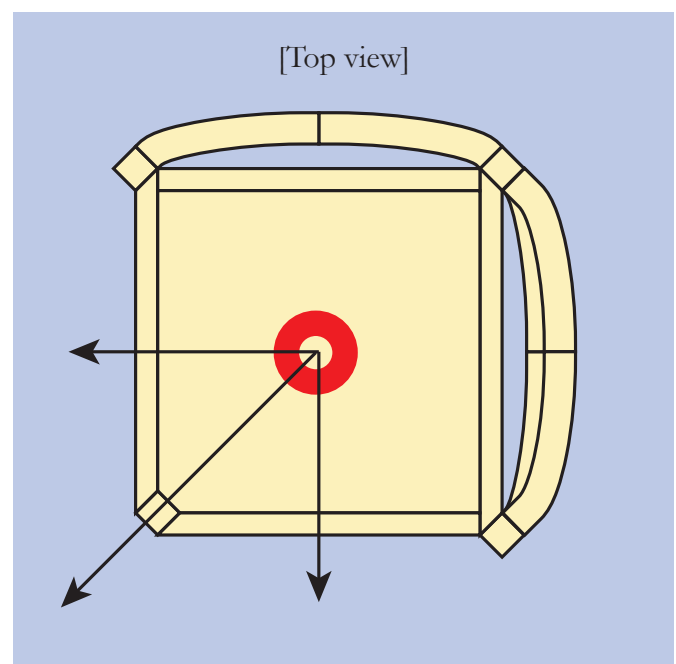


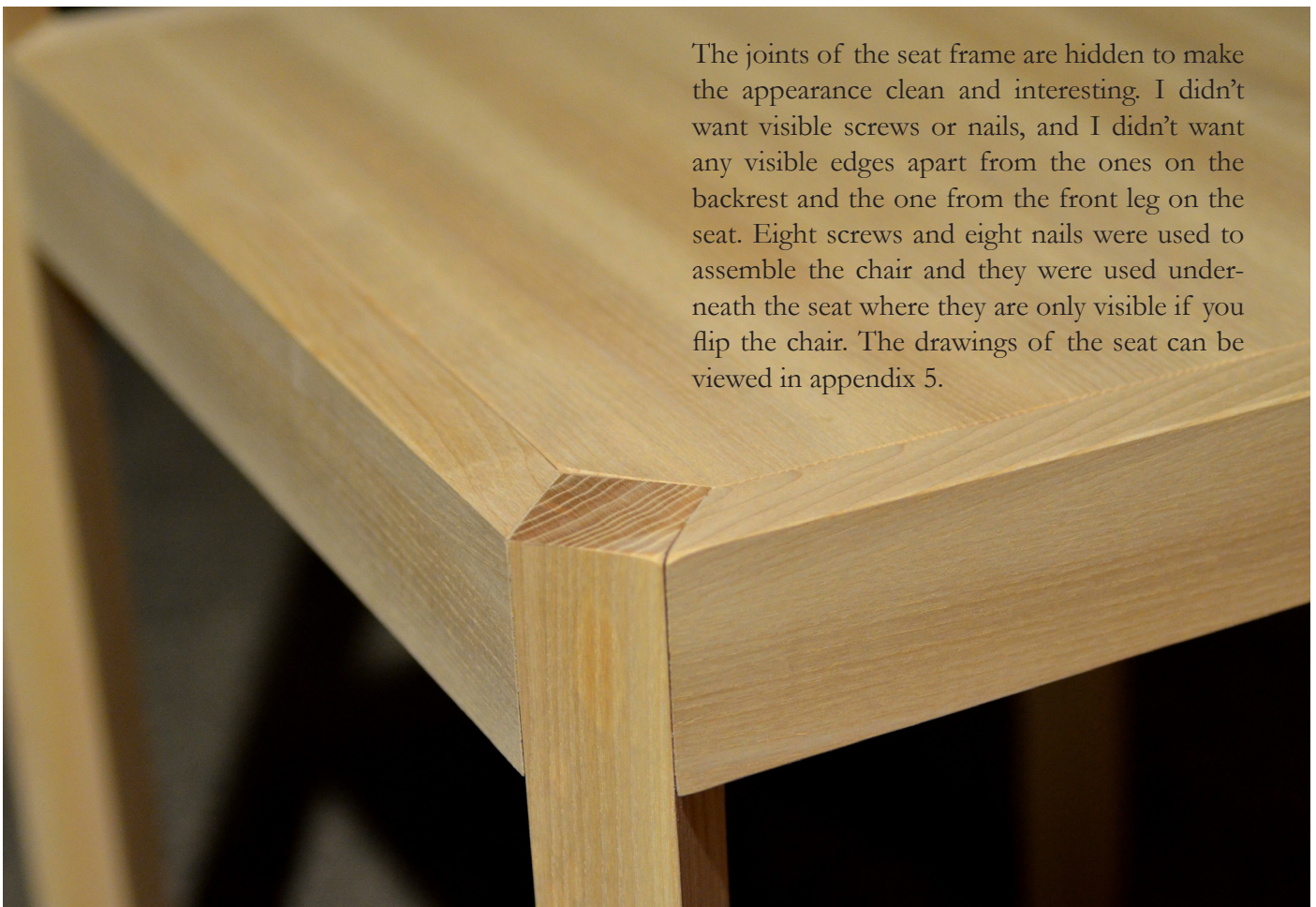
## Results

### Technical description

The overall theme of the design language is squareish shapes and  $45^\circ$  and  $90^\circ$  angles. The seat is slightly tilted backwards for the sake of ergonomics; otherwise the design is characterised by straight and parallel lines.

The legs are made from square rods, which is simple and quick to produce. Squares have two directions - vertical and horizontal. By turning the legs  $45^\circ$  so they are directed towards the center of the chair, the chair acquires a third direction - one sideways, one forwards, and one diagonally. This arrangement of the legs is a bit unconventional and gives it a certain characteristic which differentiate it from other chairs.





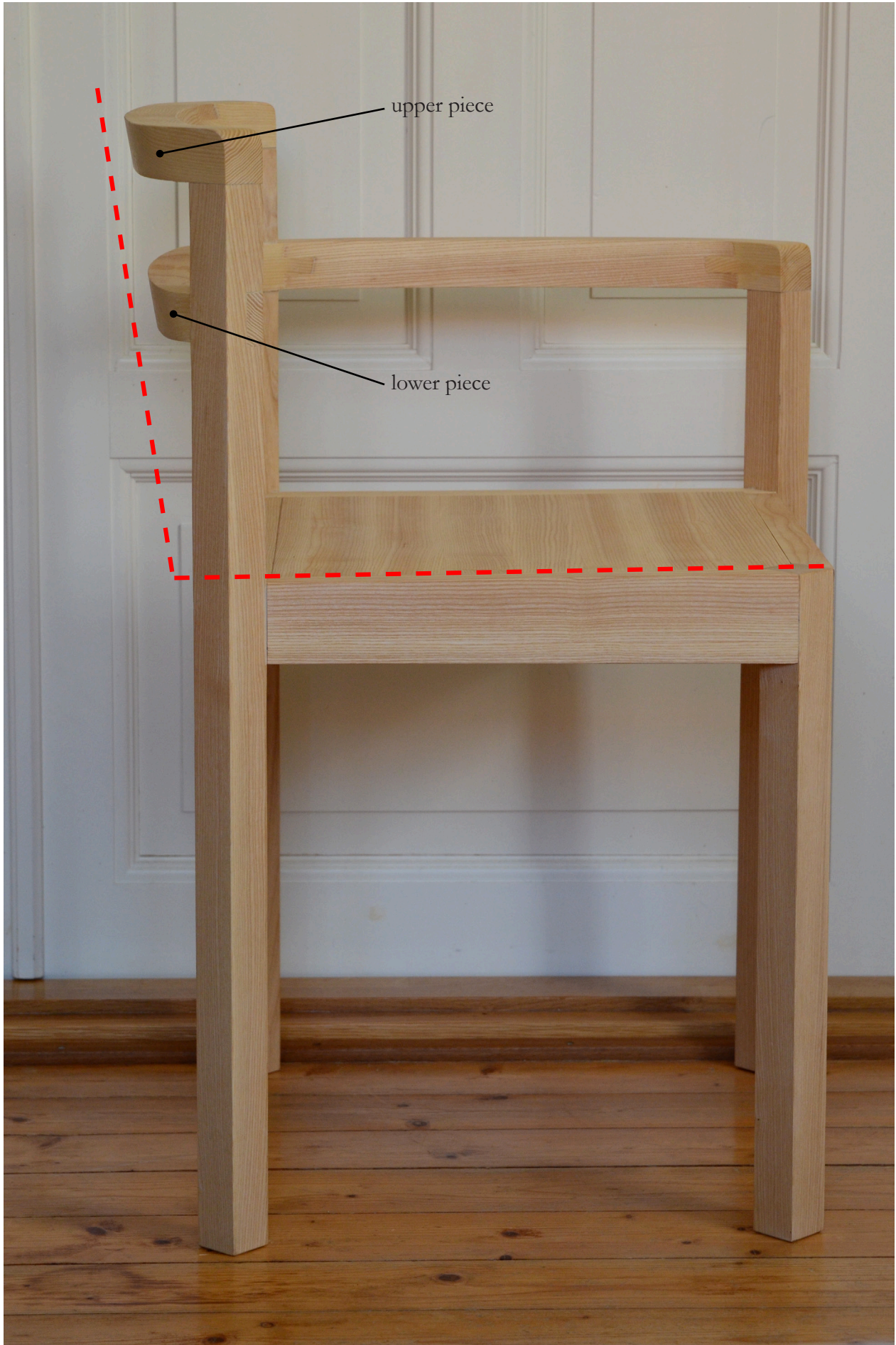
The joints of the seat frame are hidden to make the appearance clean and interesting. I didn't want visible screws or nails, and I didn't want any visible edges apart from the ones on the backrest and the one from the front leg on the seat. Eight screws and eight nails were used to assemble the chair and they were used underneath the seat where they are only visible if you flip the chair. The drawings of the seat can be viewed in appendix 5.

An open backrest that isn't going to cut into your back has to be slightly bent to follow your body. Therefore I had to compromise the straight and parallel theme designing this part. The solution was to make a discrete curve blending into the 45° corners. This curve had to be manufactured using a jig. The shape can be viewed in appendix 6. The lower piece of the backrest continues through the rear leg to become an armrest on the side of the chair. This solution makes the chair very stable and it is thanks to this the chair don't need any stretchers for the legs, and that gives the chair its stylistically pure appearance. This lower piece is made symmetrical so the decision whether the chair should have the armrest on the left or right side can be made in the last minute. This makes manufacturing easier and requires less planning.

The backrest pieces are made from several pieces joined together through tongue and groove joints. This makes for a strong structure and a visual effect where the joints are visible on the bent surfaces. The tongue and groove joint is a common technique used for manufacturing in the furnishing carpentry and therefore a convenient solution for this chair.

In order to make the backrest tilted the upper piece goes further back than the lower piece. Both pieces are slightly cut to make a skewed rhombus cross section. The two pieces are calculated to be aligned and this gives the backrest its angle. Measurements and drawings of the backrest will be found in appendix 4.








### Design description

This is Södergård, a chair named after the building where it is thought to be produced. The purpose of the name is to reveal the chair's Swedish origin using the letters ö and å, because origin has been a big focus during this project. The blonde ash wood comes from southern Sweden and this is also where it has been designed and might be produced, if everything goes well.

The chair has an open and inviting design that suggests several sitting postures. You can use it as a regular kitchen chair when sitting straight forward. During hot discussions with a group of people you might sit sideways leaning forward or leaning on the backrest. Or you can sit diagonally more relaxed and use it as a lounge chair.






The visible pattern from the tongue and groove joints in the backrest reveal a part of the manufacturing process and the craftsmanship behind it. It is a chair for the person who appreciate local production and Swedish manufacturing industry. A chair for the person who likes exclusivity and unique furniture.

Södergård is designed for the home environment, but could fit in some public environments, like waiting rooms or conference premises.







A simplistic and Scandinavian design language was the way to go for me in order to illuminate the origin of the chair. The stretcherless legs give the chair a tall and proud appearance while the thick and straight legs radiate trust and stability. Although it has a very simplistic appearance I managed to apply the quiriness I was looking for through the unconventional solution of the angled legs and the single armrest. It raises questions for the viewer and the chair becomes more interesting. Why are the legs angled? Why is the chair asymmetric? How was the chair assembled?



As you've noticed, the product of this project is not one, but two chairs that are each other's reflection. Working with asymmetry as a way to catch attention I discovered that two laterally reversed chairs placed next to each other creates something different than just two chairs. It becomes a unit and invites you to sit together rather than alone. The armrests frame the users and push them together.







## Discussion.

I am very happy to have made this project. It was a great opportunity to be able to work with family in a large project like this, where you tend to bury yourself deep in work. I am pleased with the result when I look back to the early stages in the process. I am especially satisfied with the simplistic expression I've managed to achieve and still make the design interesting. I think I managed to fulfill my expectations and came out with more than I was hoping for (two prototypes), which is not too common in my projects. I have learned a lot about furniture design and the complexity of it. I am also happy that I have had good use of most of my knowledge that I've gathered during my five year education in industrial design.

During summer I've experienced some reactions from people that have seen the chair. My father told me that he had a customer at the carpentry that happened to see the two chairs standing in the corner. She wondered what it was and wasn't startled when he told her about the production cost of the prototypes. Other reactions has been that people like to experiment with the arrangement of the chairs and not necessarily put them together like a bench, but instead placing them back to back or face to face. The combinations seem unlimited.

I would like to work further with the parts that I didn't have time to fit into the time plan. A more detailed research in the surface treatment is something that I would like to investigate further in order to demonstrate the possibilities in colouring of the chair. Another thing where there is still room for development is the manufacturing of the backrest. In a modern carpentry this would have been CNC-milled, which would have been safer and more even in quality. My father has ideas about offering upholstery for the chair, which I think would benefit the chair. For the promotion I am going to participate in competitions and send the project to furniture magazines. I also wanted to make a website for my father's business, and that is still possible since we are family.

So far the company gained a new supplier of wood from this project. The ash wood we received from Holm Trävaror had a fantastic quality, and they offered very good service in contrast to some of the existing suppliers. The life of this chair has barely started.

## References:

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<<http://www.thefreedictionary.com/quirkiness>>



## Images:

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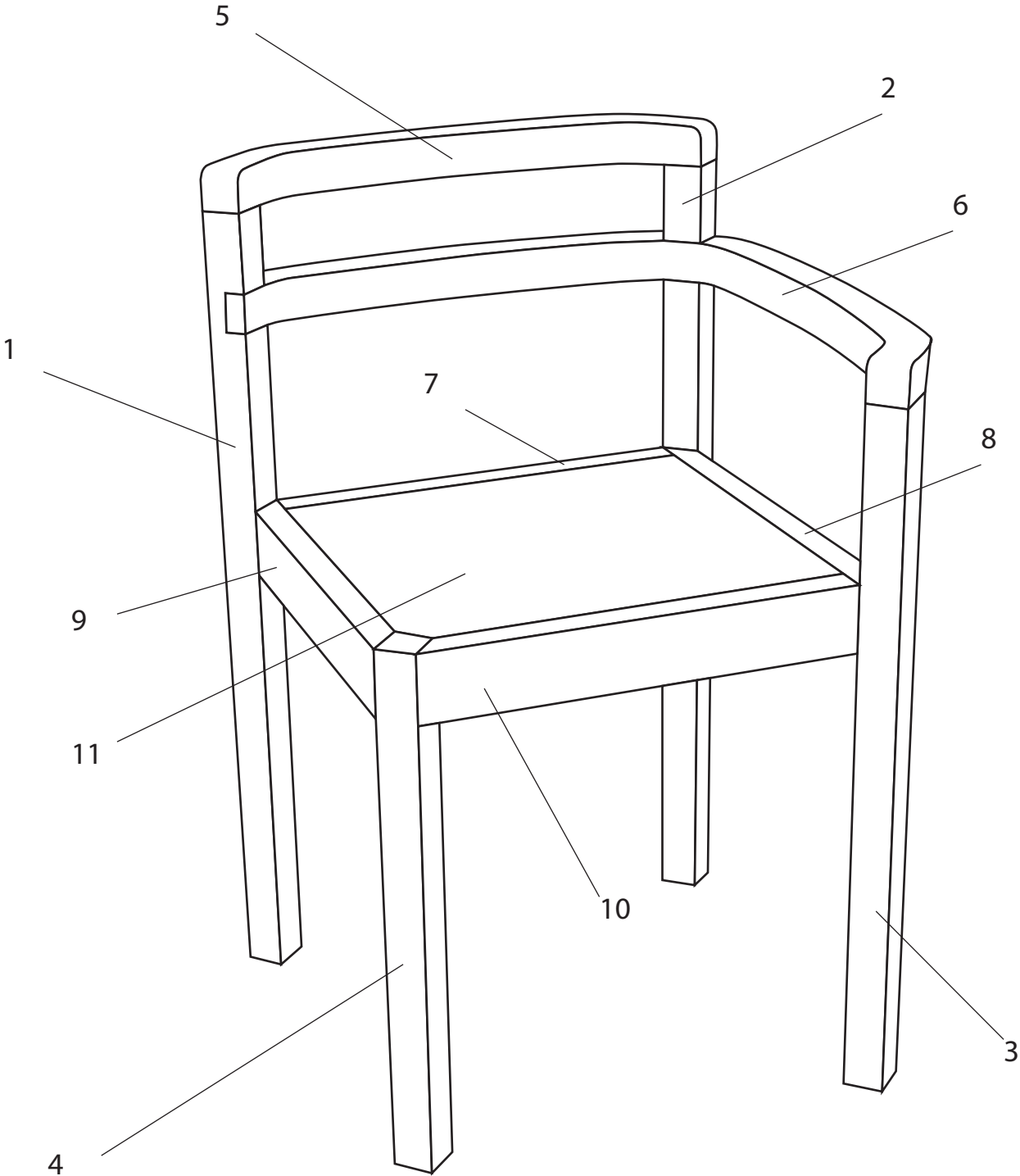
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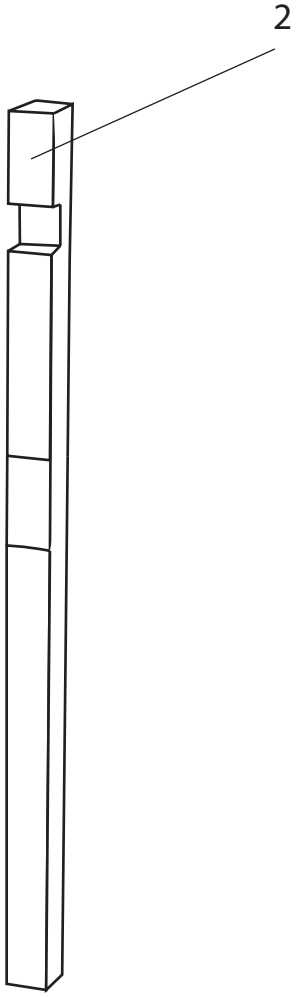
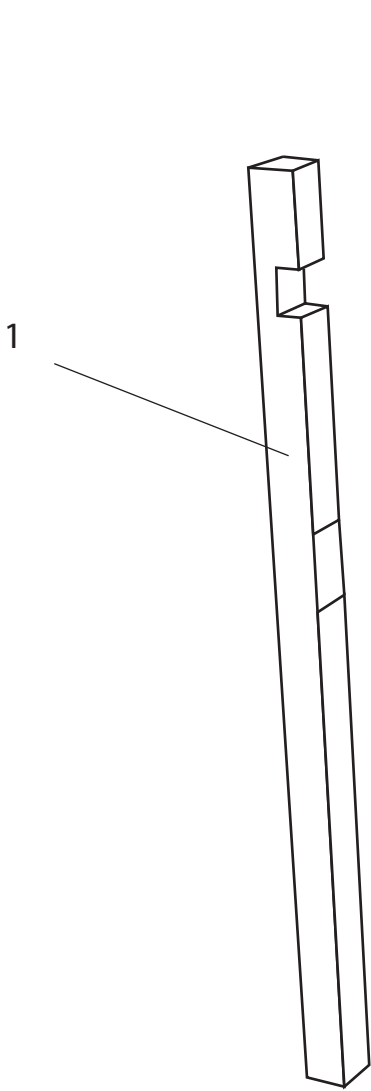
<http://www.donnaheart.com/wp-content/uploads/2011/05/plastic-chair3.jpg>

<http://www.danish-furniture.com/images/arne-jacobsen-ant-chair.jpg>

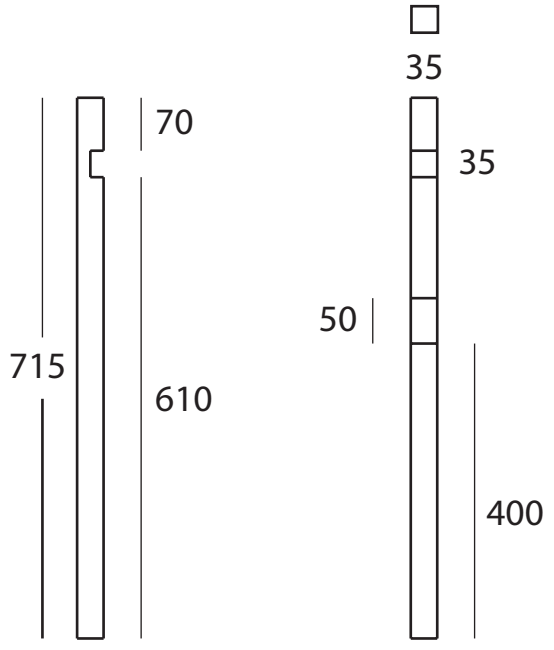
Appendix 1.



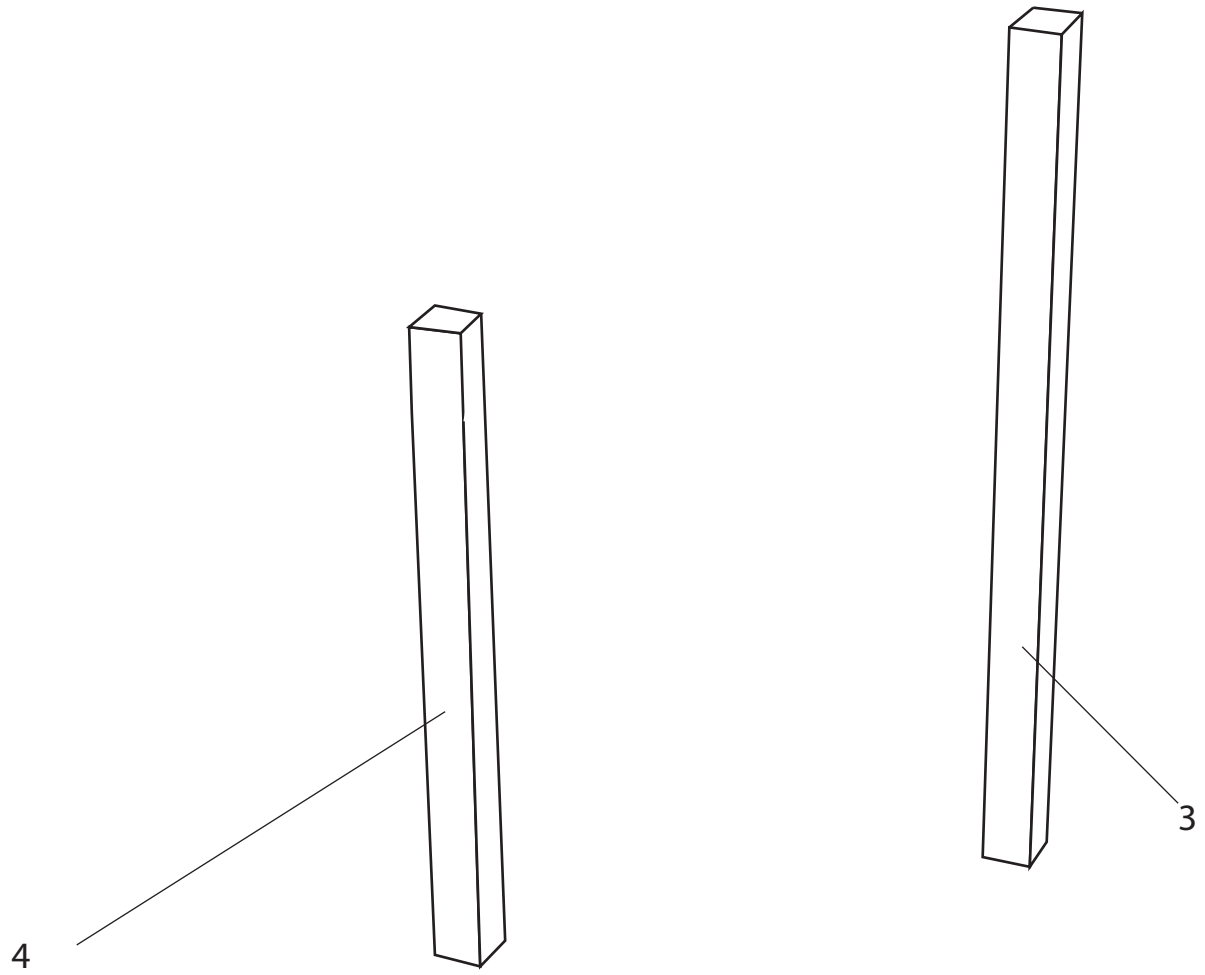
Appendix 2.



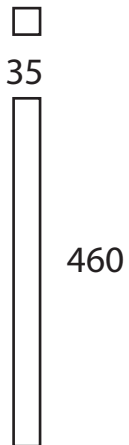
**1. & 2.**



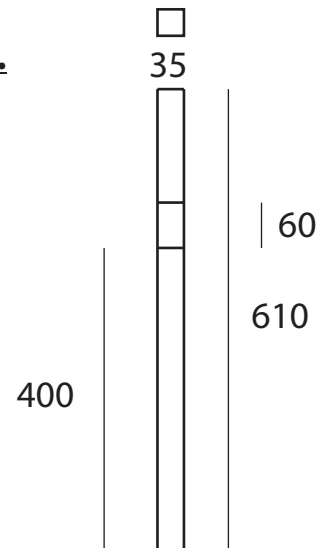
Appendix 3.



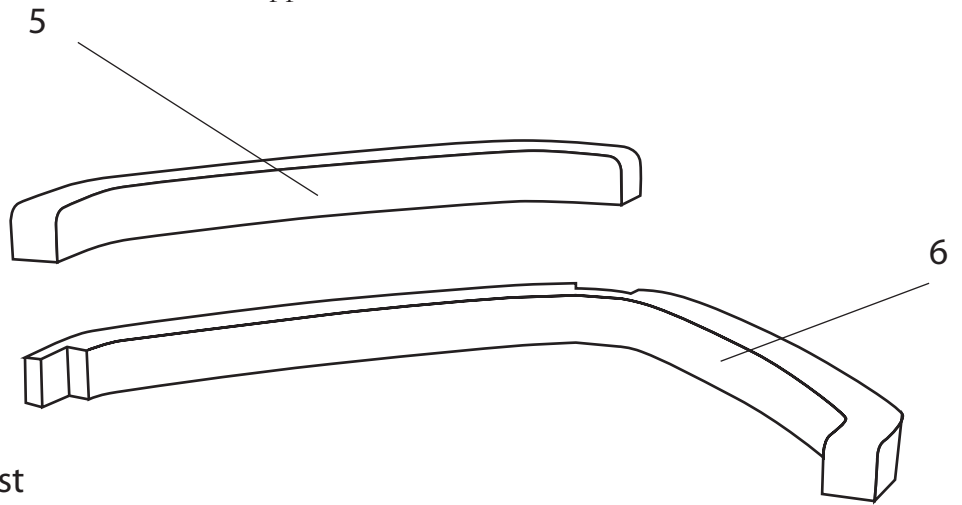
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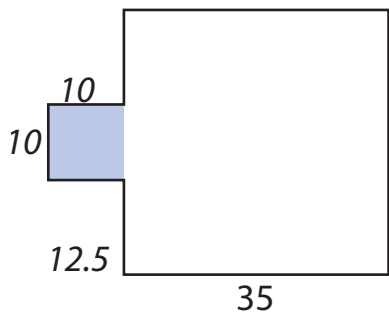
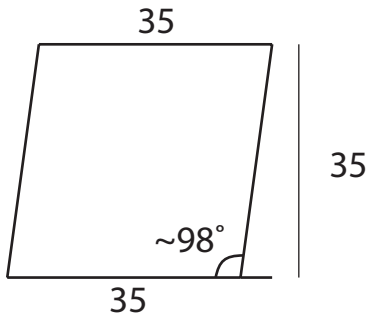
**3.**



Appendix 4.

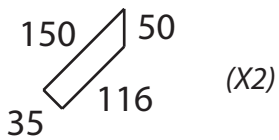
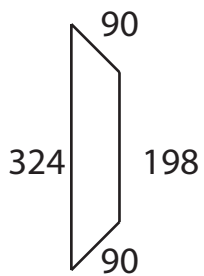


Cut section of backrest

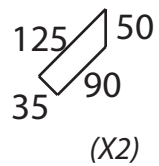
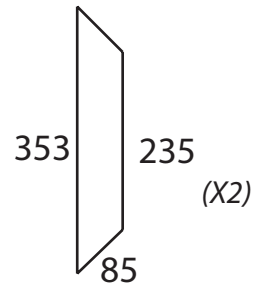
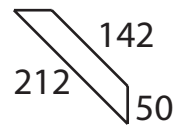
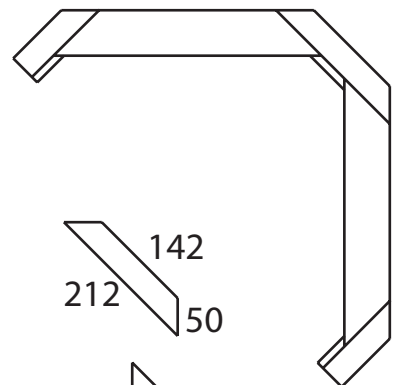


 Tongue not included in measurements

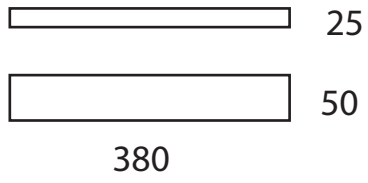
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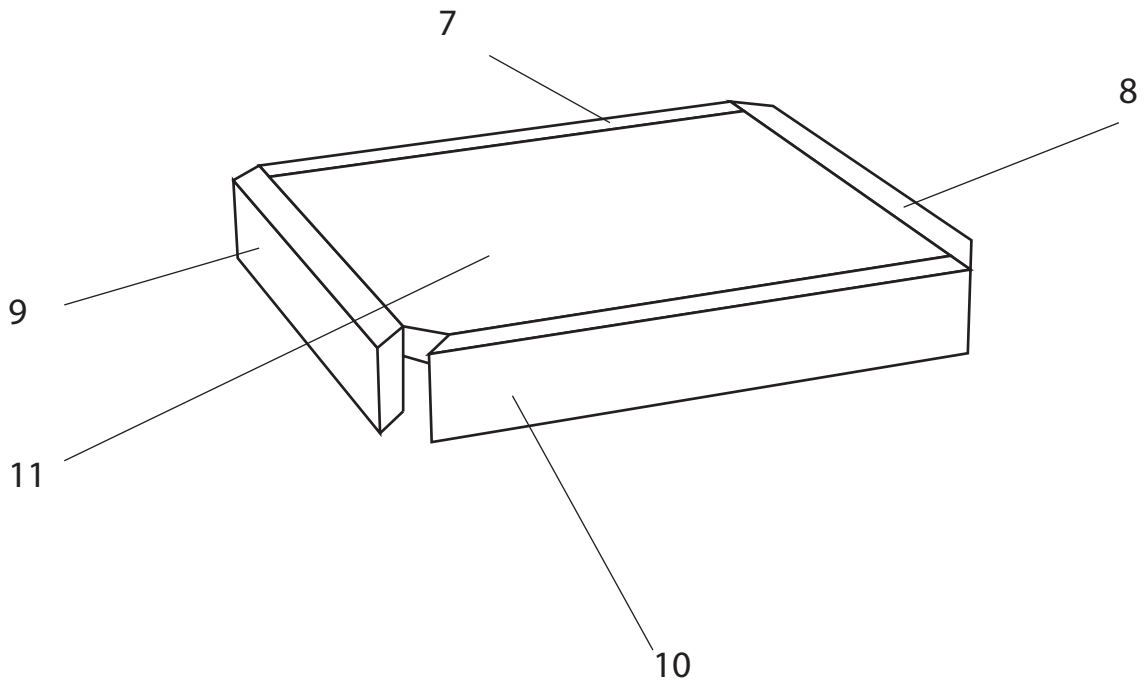
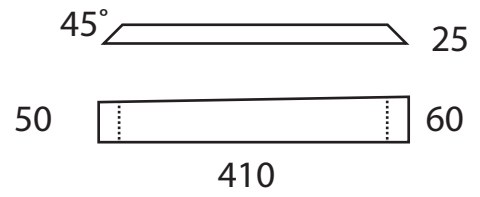
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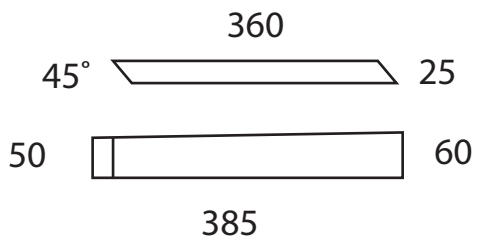
**7.**



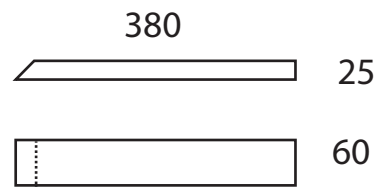
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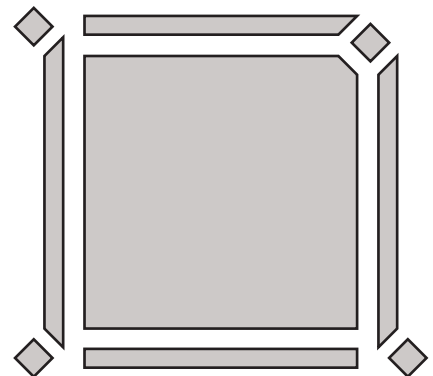
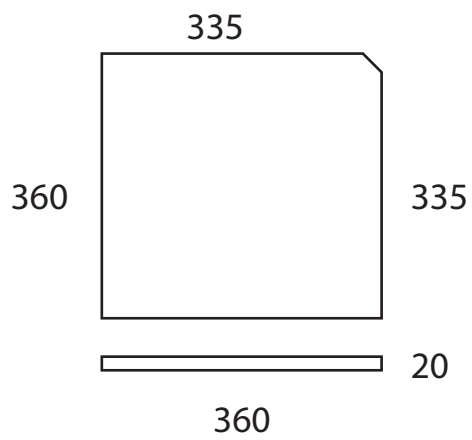
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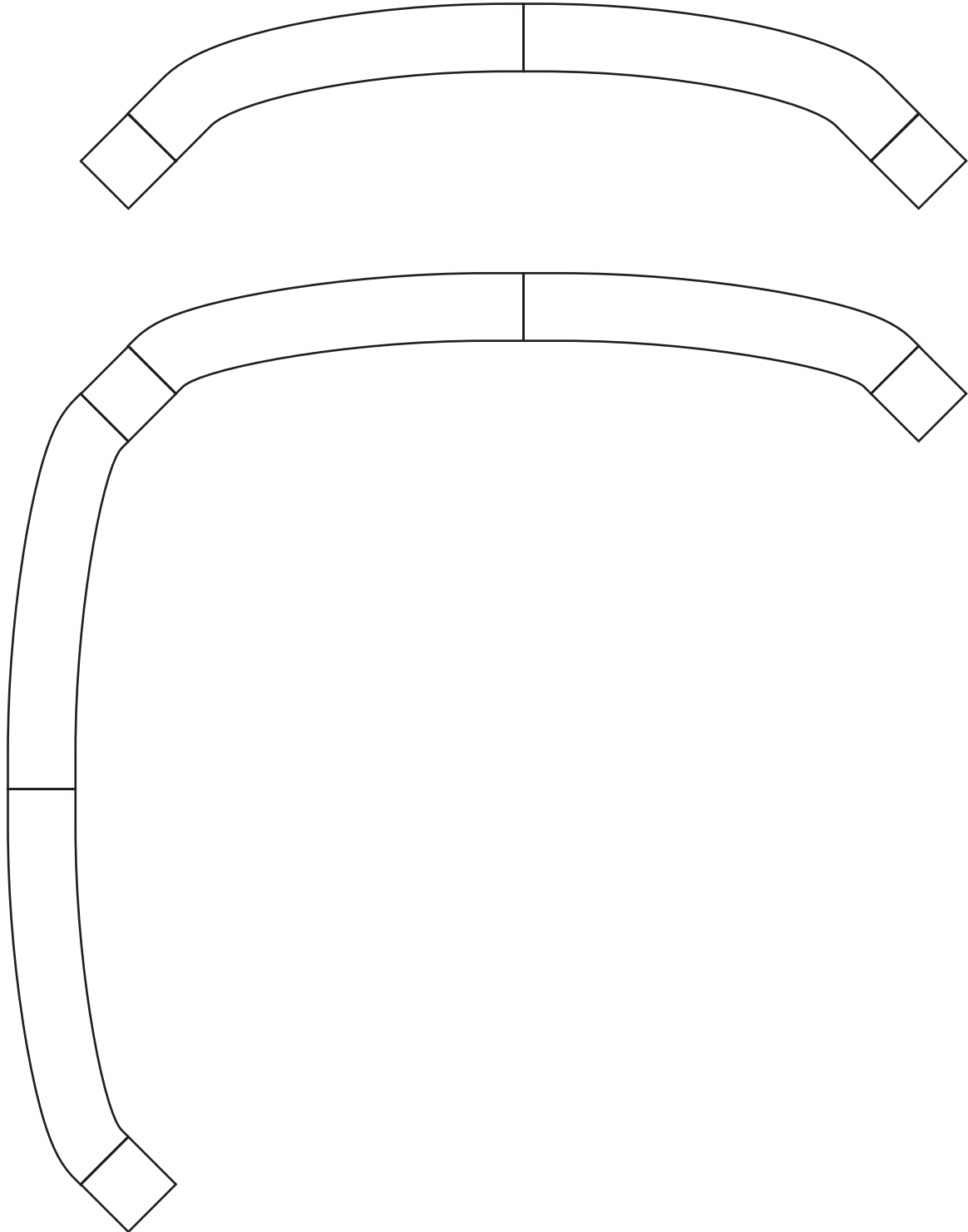
**10.**



**11.**



Appendix 6.



Jig for backrest/armrest pieces



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