Product Report

MSc04-ID17 / June 2020 / Industrial design / Aalborg University
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GROA
BY SPIRE

TITLE PAGE

Project title:	Groa by Spire
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Supervisor:	Thomas Arvid Jaeger
Technical supervisor:	Michael Skipper Andersen
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Team members:	Emilie Rysgaard Trine Nyeng Møller Christiansen

ABSTRACT

This report presents the product Groa. A product designed to provide the right support for mothers during breastfeeding. This assignment is made as a master thesis project by two industrial design students at Aalborg University.
During breastfeeding, the right position and support will help the mother to relax, which is necessary to make the milk flow. The market for products designed for this purpose is very limited, perhaps because it is mainly needed for the first six months, which is a short lifetime for that type of product. Designing a nursing chair that combined with a bedside crib can be transformed into a cot, will create a big business opportunity.
The result is the product Groa. A simple furniture design consisting of a nursing chair and a bedside crib that can be transformed into a cot, and used until the child is seven, by adding an extension. The nursing chair is designed to create a support that fits the individual mother, with a nursing pillow that can be attached around the mother, and thereby create good support under the arms and for the lower back.

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PREFACE

This project is developed by group MSc4ID17 during the master thesis of Industrial design at Aalborg University. This project consists of two reports; a product report and a process report with an appendix and a technical folder. It is recommended to read the product report first together with the technical drawings to see the final result. Then the process report with the appendix where a more detailed understanding of the development process will be documented. The aim of this project is to demonstrate the master keys competencies during the development of an engineering-based self-driven industrial design process. The project is created in collaboration with experts and users who have contributed essential information on the subject. This product report is aimed at potential investors.

A big thank is headed to our two supervisors; Thomas Arvid Jaeger and Michael Skipper Andersen, Hudevad furniture, Louise Marie Holm Nørby the breastfeeding expert, our user panel and Magnus Thomsens Efterfølgere, witch all have been a big help through the process.

THE BACKGROUND STORY OF GROA

In Denmark, new mothers have a challenge in fulfilling the needs of breastfeeding. It is recommended by the Danish Health Authority to breastfeed the child fully the first six months, and breastfeed partly from six to twelve months. It is important to breastfeed because it is proven that it will prevent several diseases for both mother and child. There are many factors that could lead to failing with breastfeeding. Complications during birth, stress, or the anatomy of the nipple. But the fact is that breastfeeding is very time-consuming when you have to do it every third hour for the first months. (Sundhedsstyrelsen, 2018)

To help new mothers succeed with breastfeeding Ingrid Nilsson ph. D and chief consultant at the committee of health information created four guidelines. Number three says that In order to succeed with breastfeeding it is important to sit in a position that gives the right support and makes the mother relax. The market for chairs designed for breastfeeding is very limited. One reason could be that a nursing chair only is needed for the first six months of the child's life.

In Denmark, around 61.000 children are born every year, where 50 % is the firstborn (dst.dk, 2020). This indicates a big potential on the Danish kids' furniture market because all kids need a bed. When becoming new parents, there is a long list of products to provide for the infant. This means they have a lot of decisions to make, and it can be quite expensive. Instead of adding a new product type to the list, the nursing chair is combined with already existing products. Groa consists of a nursing chair and a bedside crib, that combined transforms into a cot.

0 - 6 MONTHS

BEDSIDE CRIB

NURSING CHAIR

6 MONTHS - 3 YEARS

COT

COT

3 YEARS - 7 YEARS

JUNIOR BED

NURSING CHAIR

NURSING CHAIR

The nursing chair gives you the ultimate support during breastfeeding, possible to adjust for your desired positions. The shape of the head support makes it possible to lean to one side and take a highly needed nap. The arm support is created by a specially designed nursing pillow that can be connected in the ends with velcro. This makes it possible to place it so it gives the right support in the lower back and under the arms during breastfeeding. The seating dimension of the chair makes it possible to sit in different positions and easy to get up from when carrying a child with both arms. It is possible to buy an add-on that can be attached to the legs, so the chair turns into a rocking chair. The chair is used from the child is born to around 6 months.

FUNCTIONS

EASY TO GET UP

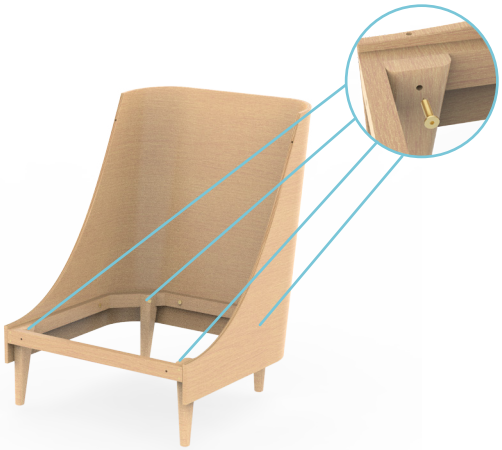
TAKING A NAP

ROCKING FUNCTION ADD-ON

ASSEMBLING

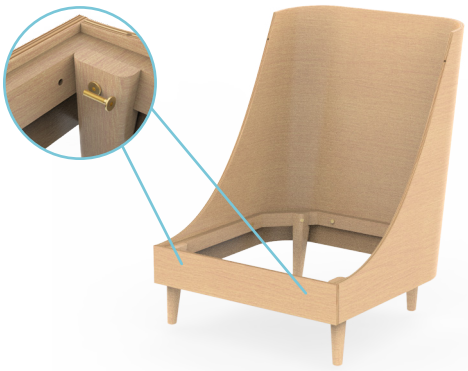
1.

The product arrives at the customer with the construction mounted on the shell.



2.

The four legs are mounted on the construction with one screw through the leg and into the lath.



3.

The front piece for the chair is attached to the construction with two screws.

4.

The bottom plate is placed on the construction.

5.

The seating pillow, back and head support are placed in the chair.

6.

The arm support is placed on top of the seating pillow.

BEDSIDE CRIB

BEDSIDE CRIB

The bedside crib makes it possible to sleep close to the child in a safe way. The bedside crib is designed with five height adjustments to make it possible to adjust it to the height of the parent's bed. Along with the bedside crib comes three different sizes of angle brackets that can be attached to the parents' bed to make sure the crib is not moving. The bedside crib can be used from the child is 0 to around 6 months or to the child is able to sit on its own.

FUNCTIONS

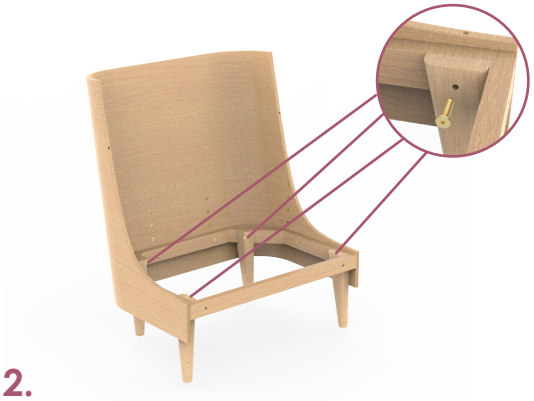
HEIGHT ADJUSTMENT

ATTACHMENT TO PARENTS' BED

ASSEMBLING

1.

The product arrives at the customer with the construction mounted on the shell.



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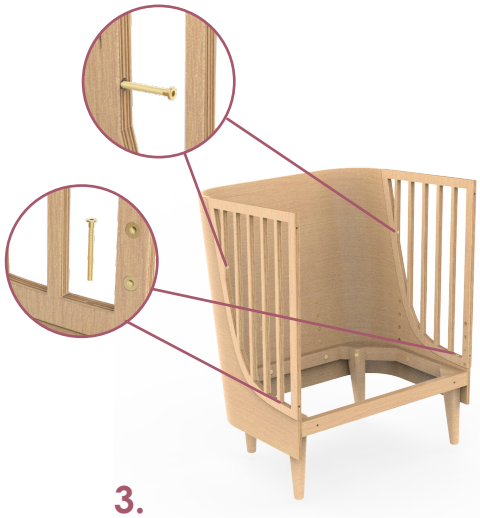
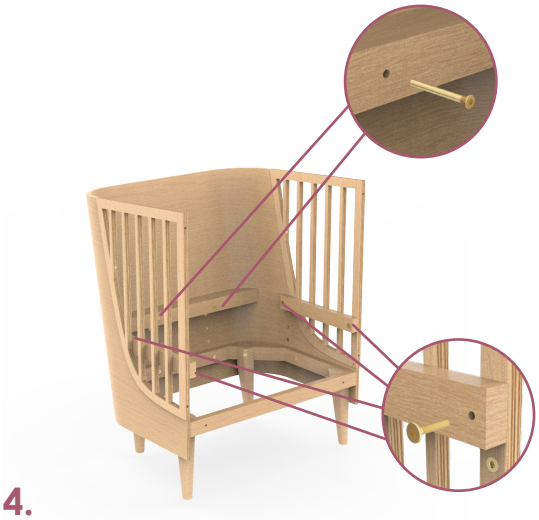


3.

The two bar sections are attached to the shell with one screw in the top and one screw at the bottom of each.



4.

The three construction pieces for the height adjustment are mounted on the shell and bar sections in the desired height, with two screws in each.

5.

The bottom plate is placed on the construction and mounted with two screws.

6.

The mattress is placed on the bottom plate.

COT

COT

The simple design of the cot makes it fit perfectly into every child's bedroom. The cot is used from the child is about 6 months to 3 years old. When the child is able to stand up and tries to climb over the bars, it is possible to remove the bar sections to avoid a dangerous fall. This also makes it possible for the child to get in and out of the bed on its own. As the child grows it is possible to extend the cot into a junior bed by adding an extra section. Then it can be used to the age of 7 depending on the size of the child. The cot comes in five different color variations. One in soap-treated oak and four painted in white, grey, dusty pink or dusty blue.

FUNCTIONS

EXTEND TO JUNIORBED

REMOVEABLE BAR SECTIONS

COLOR VARIATIONS

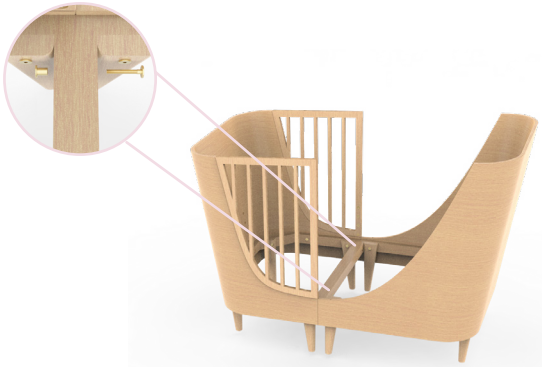
ASSEMBLING

1.

The cot is assembled by connecting the already assembled bedside crib and nursing chair.

2.

The mattress, bottom plate, and the height adjustment construction are removed from the bedside crib, and the pillows and base are removed from the nursing chair.

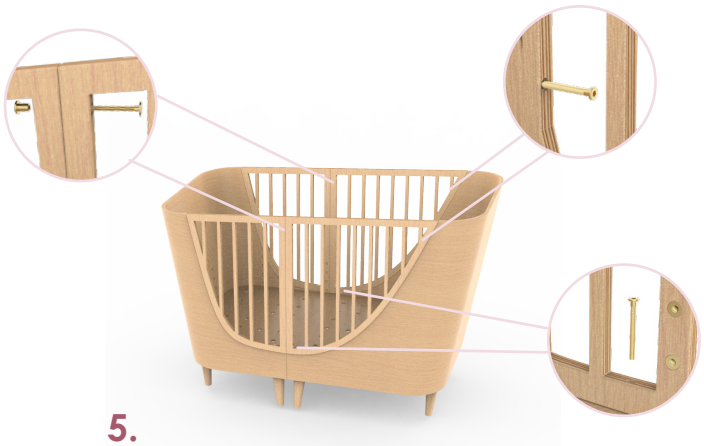


3.

The bedside crib and the nursing chair are connected two places on the construction.

4.

The bottom plates are placed on the constructions.



5.

The final two bar sections are mounted on two places on the shell and connected to the other two bar sections.

6.

The mattresses are placed in the cot.

MANUFACTURING

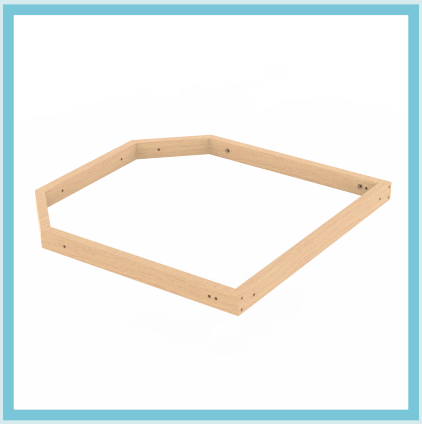
Hudevad Furniture is chosen as the manufacturing company for Groa because of their 50 years of experience in furniture production, their environment-friendly products, and use of sustainable materials. Hudevad Furniture can offer Press molds, Pressing technology, Surface treatment, Upholstery, Assembly, Packaging, and logistics, which covers all the necessary production methods needed to produce Groa.

SHELLS

Materials:
10 pieces of 1,5 mm beechwood veneer, soap-treated or painted

Manufacturing:
Press molds, pressing technology, Milled, Sanded and Surface treatment

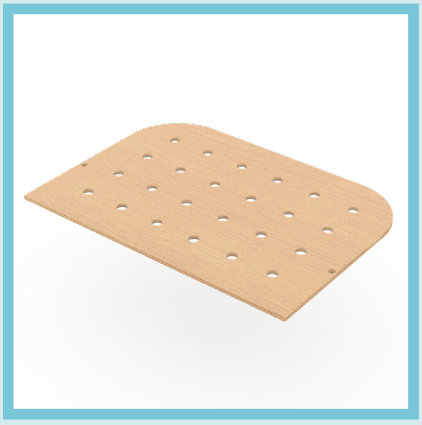
CONSTRUCTIONS



Materials:
48 x 24 cm pine tree laths

Manufacturing:
Cut and Sanded

BOTTOM PLATES



Materials:
10 mm plywood

Manufacturing:
Milled, sanded and surface treatment

LEGS

Materials:
Soap-treated oak or painted beechwood

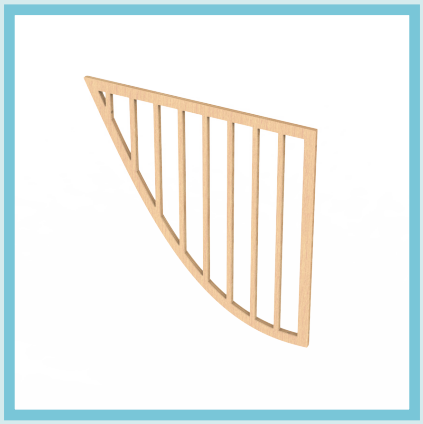
Manufacturing:
Milled, sanded and surface treatment

ROCKING FUNCTION ADD-ON

Materials:
Soap-treated oak or painted beechwood

Manufacturing:
Milled, sanded and surface treatment

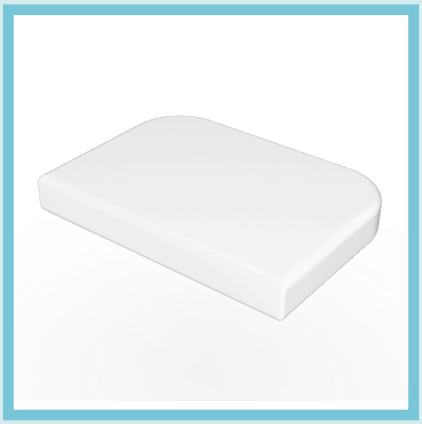
BAR SECTIONS



Materials:
1,5 mm plywood

Manufacturing:
Milled, sanded and surface treatment

MATTRESS



Materials:
8 cm cold foam, 2 cm memory foam and bamboo cover

Manufacturing:
2D CNC cutter and sewn

BACK AND HEAD SUPPORT

Materials:
Cold foam and Neotex Lido cover

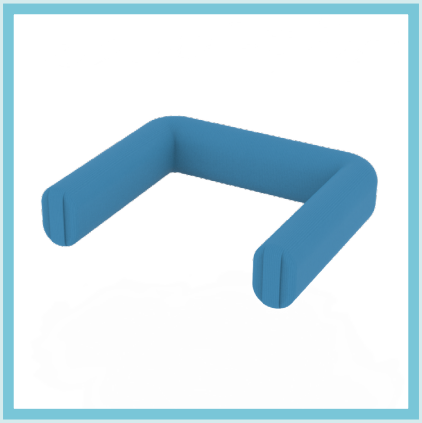
Manufacturing:
3D CNC cutter and sewn

SEATING PILLOW

Materials:
8 cm cold foam, 2 cm memory foam and Neotex Lido cover

Manufacturing:
2D CNC cutter and sewn

ARM SUPPORT



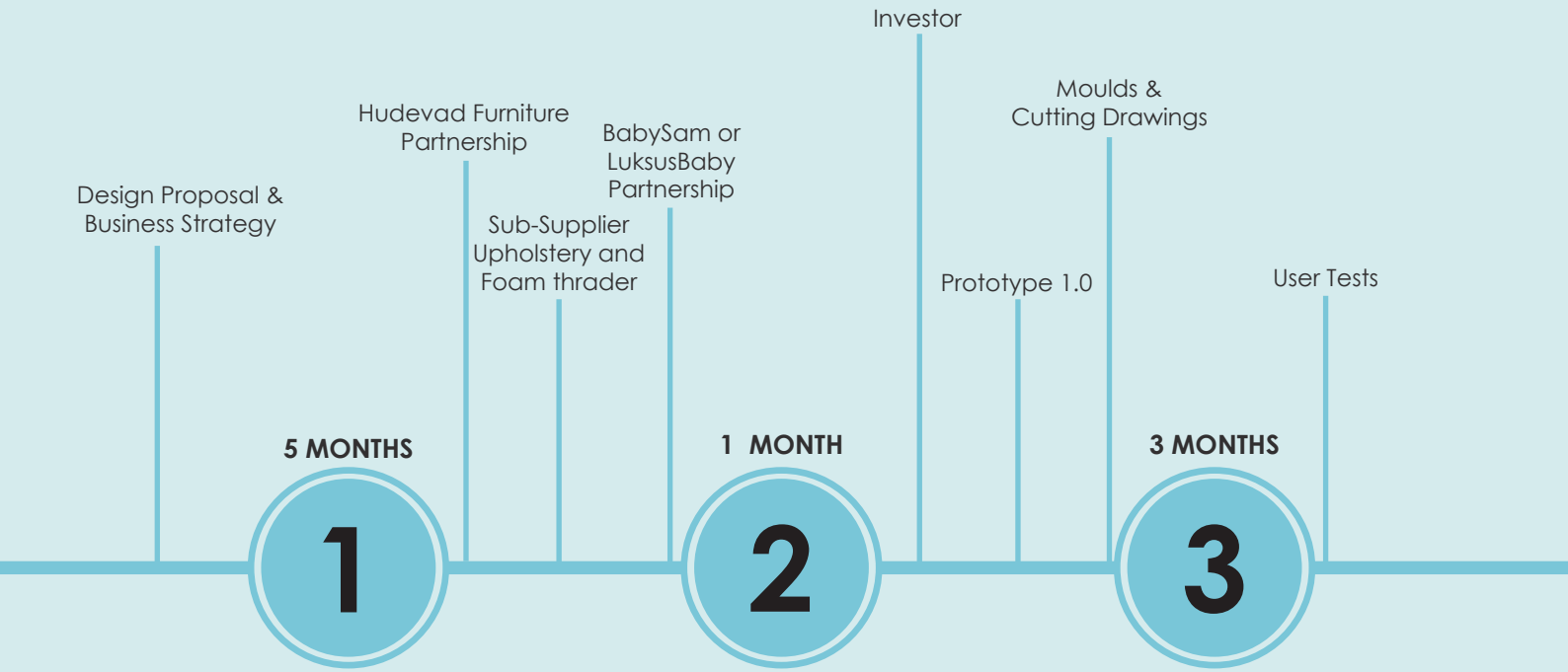
Materials:
100% organic cotton, foss flakes

Manufacturing: Sewn

IMPLEMENTATION

GO-TO MARKET STRATEGY

Here is the Go-To-Market Strategy for Spire as a company. It will create an overview of the plan from now and to the launching of the product, which is estimated to take 7 months.



1. CONCEPT DEVELOPMENT & BUSINESS STRATEGY

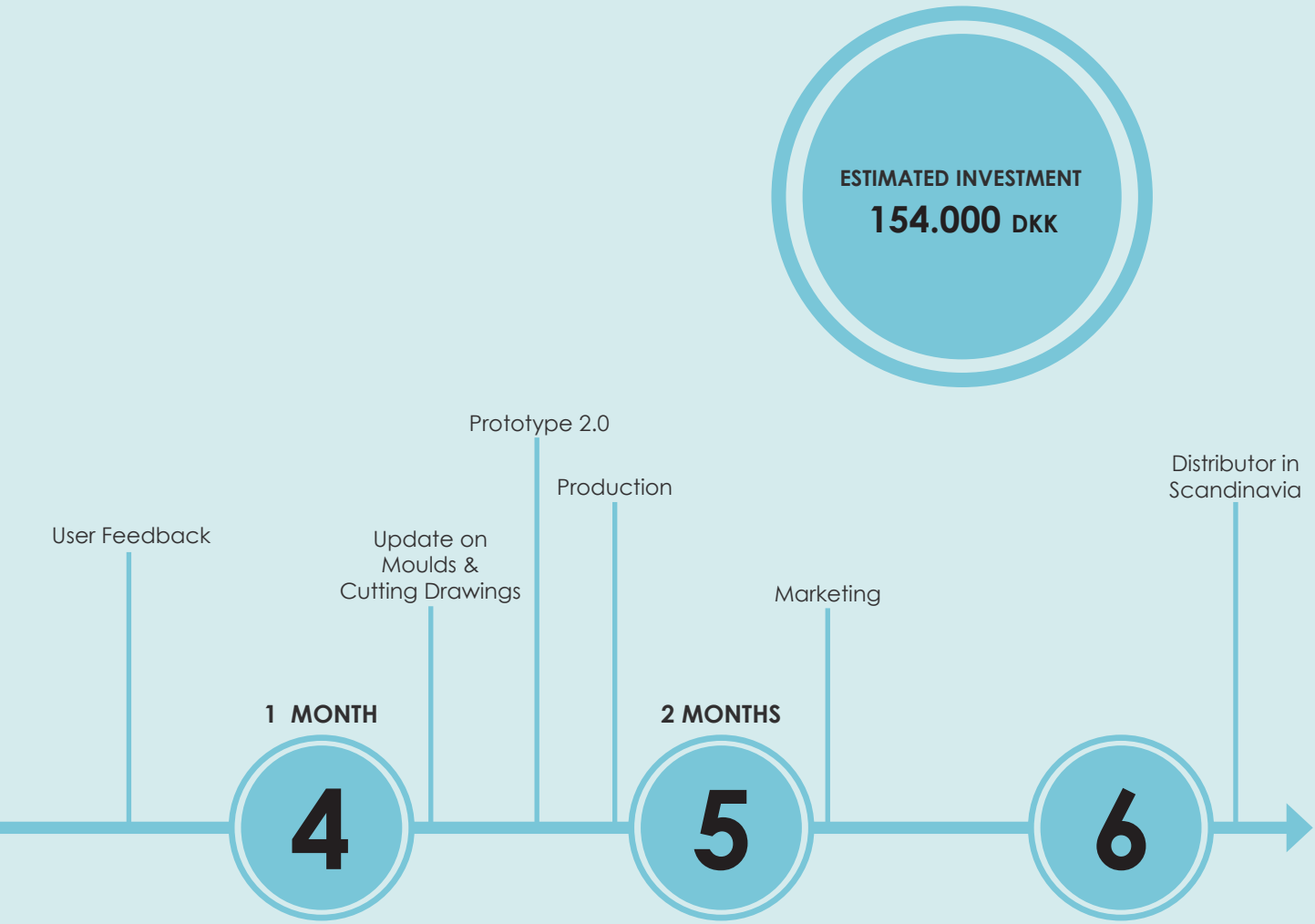
The first 5 months of the development of the concept and the business has been completed. The goal here was to convert an idea into a concept and then further into a product with a long life that will give the new parents the best opportunity for suggesting with breastfeeding. The business strategy is made to create a plan for getting the product out on the market.

2. PARTNERSHIPS

The idea is that Hudevad Furniture is going to be in control over the entire manufacturing of the product. Therefore materials testing is needed to be sure that the use of materials is sustainable and looks the way we want. The materials tests and finding the right subsuppliers for fabric and foam is done together with Hudevad Furniture. Also, an agreement with ether BabySam or LuksusBaby is needed to make a clear guideline on how the corporation is going to run.

3. DEVELOPMENT & TESTING

When the manufacturing company, sub-suppliers, and distributor are found the production can start. The first molds and cutting drawings can be produced to be able to create prototype 1.0. The plan is to produce around 5-10 prototypes to test out in the real context by users. During the test, there will be close contact with the users to collect feedback.



4. IMPROVE DETAILS
Depending on the collected feedback from the users, the product will maybe need an update or adjustment to ensure that all the user need is fulfilled. Besides that, the molds and cutting drawings need to be adjusted. After the adjustment 1-2 2.0 prototypes will be produced to test.

5. MANUFACTURING
Once all details of the product are tested and all partnerships contracts are signed. The production can start. Spire relay on Hudevad and they have the control of the entire manufacturing of the product. In the first pile, the production will be on 200 pieces.
At the same time as the manufacturing runs BabySam or LuksusBaby will start sending out commercials and collect pre-orders of the product.

6. LAUNCH
Now the product is produced and ready to get out to the distributors which already have collected pre-orders. When the product is well established on the market, the next step is to look into the Scandinavian countries to find distributors to sell the product.

SPIRE

WE DESIGN modern high-quality Scandinavian furniture for new parents who want the best opportunities for succeeding with breastfeeding and cares about the quality and lifetime in products. All products designed by Spire are products where every detail is thought through to create the best product solution. Our products are developed in close collaboration with new mothers and experts in breastfeeding and manufacturing, to create the best functional, supporting, stress-relieving and sustainable product for new parents.

WE PRODUCE our products in close collaboration with the manufacturing company Hudevad furniture. The company is carefully chosen based on their 50 years' experience in furniture production and their focus on creating sustainable and environmentally friendly products.
We place great emphasis on creating a sustainable and environmentally friendly product, both in terms of production but also in the choice of materials. Our products are made of quality material that all can be recycled.

BUDGET

PRODUCT COST

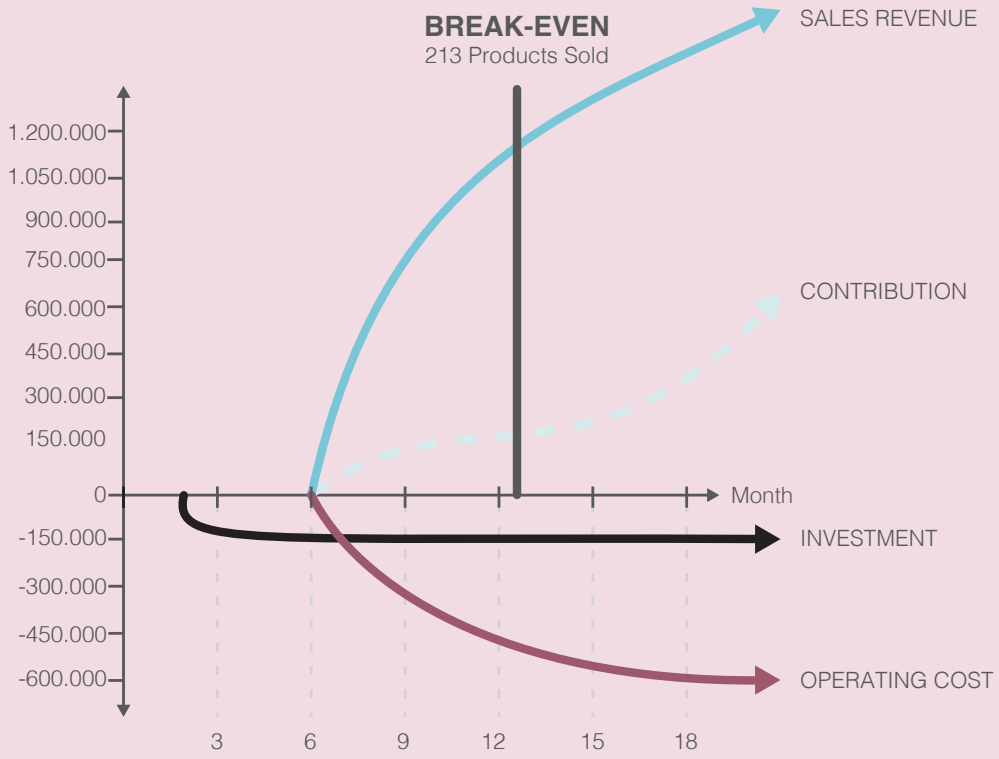
The product cost of Groa is made as an estimation. Prices of all the woodwork including bending of the shell are given from Hudevad Furniture. The fabric and foam are given from and upholstery and a foam retailer.

RETAIL PRICE

The retail sales price for Groa is made based on the prices of existing extendable cots on the market. In the price, a contribution margin for both Spire and the distributor is included.

BREAK-EVEN

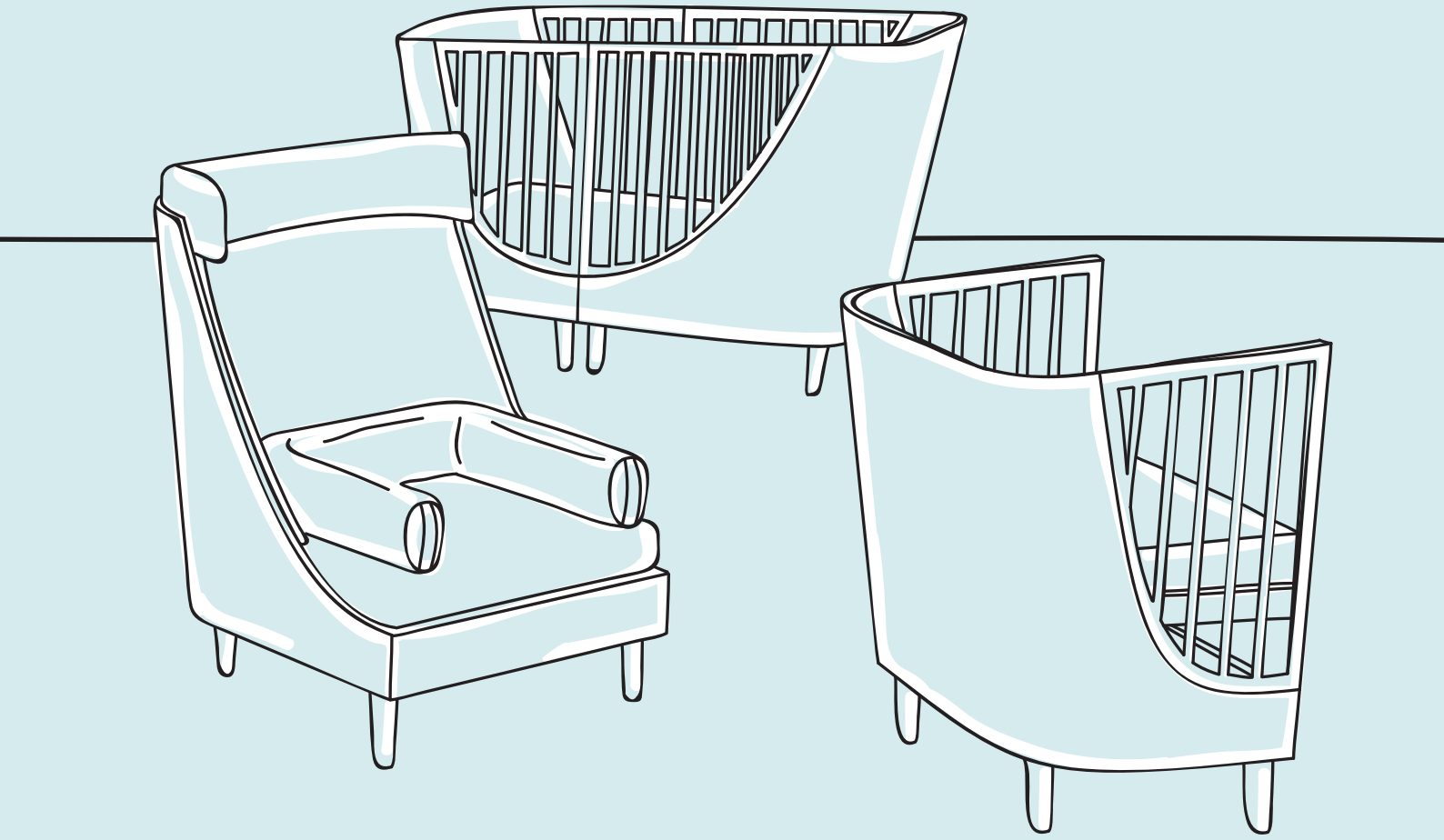
Based on the statistics that 60.000 children are born every year in Denmark, it is estimated that within the first year at least 200 products will be sold. In the second year 1.500 and in the third year the market will expand to Scandinavia and 5000 products will be sold.




SPIRE

Process Report

MSc04-ID17 / June 2020 / Industrial Design / Aalborg University
Emilie Rysgaard / Trine Nyeng Møller Christiansen



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Number of pages:	94
Number of appendix:	16

Team members:	Emilie Rysgaard
	Trine Nyeng Møller Christiansen

PREFACE

This project is developed by group MSc4ID17 during the master thesis of Industrial design at Aalborg University. The project is presented through a product- and process report and technical documentation. The aim of this project was to demonstrate the master's key competencies during the development of an engineering-based self-driven industrial design process. The project is created in collaboration with experts and users who have contributed with essential information on the subject.

A big thank is headed to our two supervisors; Thomas Arvid Jaeger and Michael Skipper Andersen, our user panel, Hudevad Furniture, and Magnus Thomsens Efterfølgere, which all have been a big help through the process.

ABSTRACT

This report illustrates the process of designing a product that can provide the right support for mothers during breastfeeding. This assignment is made as a master thesis project by two industrial design students at Aalborg University.

During breastfeeding, the right position and support will help the mother to relax, which is necessary to make the milk flow. The market for products designed for this purpose is very limited, perhaps because it is mainly needed for the first six months, which is a short lifetime for that type of product. Designing a nursing chair that combined with a bedside crib can be transformed into a cot, will create a big business opportunity.

The result is the product Groa. A simple furniture design consisting of a nursing chair and a bedside crib that can be transformed into a cot, and used until the child is seven, by adding an extension. The nursing chair is designed to create a support that fits the individual mother, with a nursing pillow that can be attached around the mother, and thereby create good support under the arms and for the lower back.

SPIRE

Spire is a Design consultancy startup company formed by two master thesis students from Industrial Design. The vision is to design sustainable products that support new parents and children. The vision is to extend the lifetime of products and utilize the resources.

INSIGHTS

New knowledge collected throughout the process, which has given new insights that need further investigation, confirmed knowledge or new need or wish will be pointed out in the text with the following symbols:

Confirmed and/or updated previous insights

New need or wish

Important new insights that might need further investigation

READING GUIDE

This project consists of two reports; a product report and a process report with an appendix and a technical folder. It is recommended first to read the product report together with the technical drawings to see the final result. Then, the process report with the appendix, where a more detailed understanding of the development process will be documented.
To create an overview of the process, the process report is divided into five sections: Understanding, Ideation and Testing, Detailing, Implementation, and Epilogue.

References are in the text cited using the Harvard Method (Author, year). Figures, tables, and drawings are numbered according to the current phase (Illu: 3.1). The appendix is referred to by its number (appendix 1)

Illustration 0.1 own picture of a child room

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PROCESS OVERVIEW

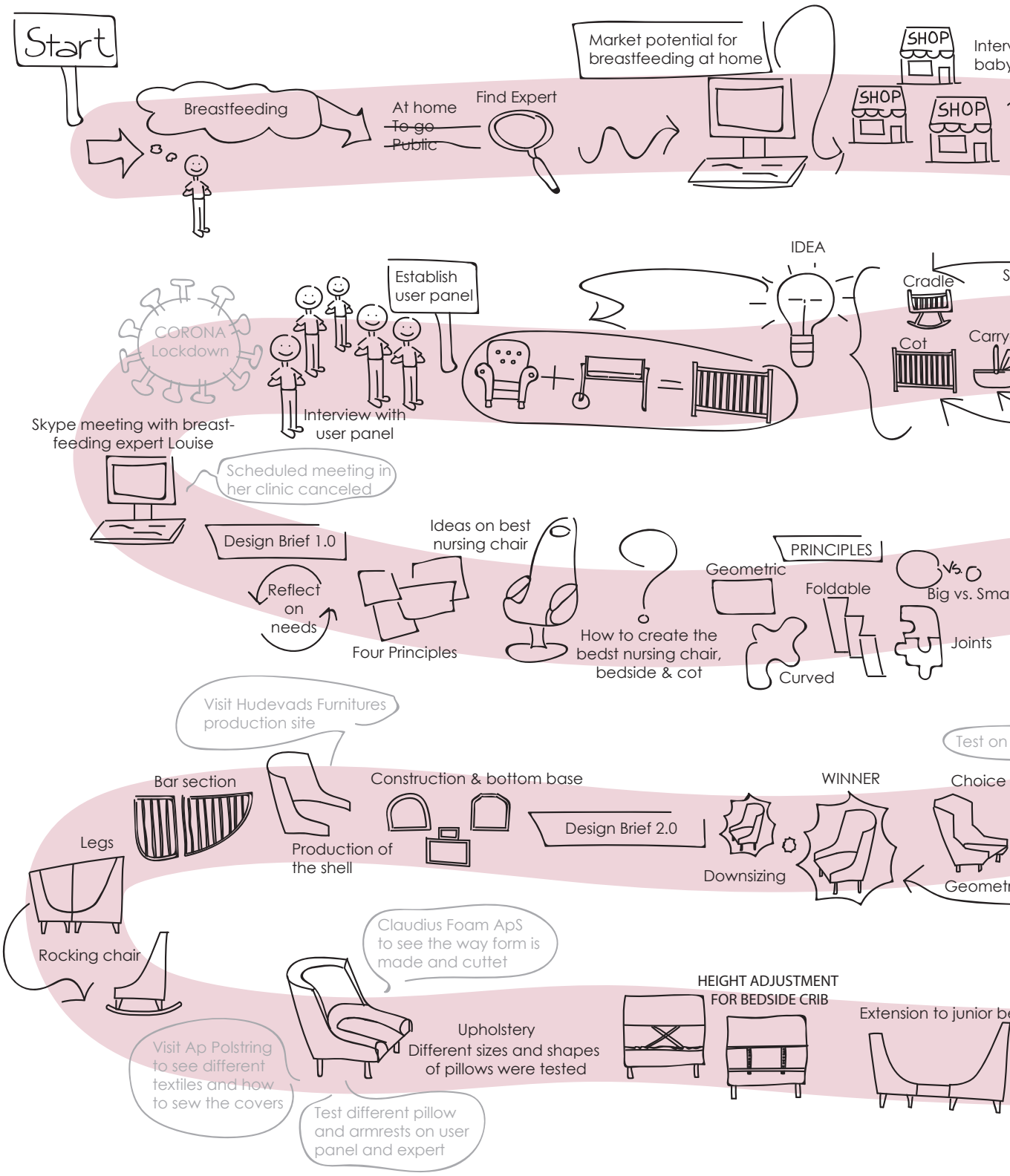
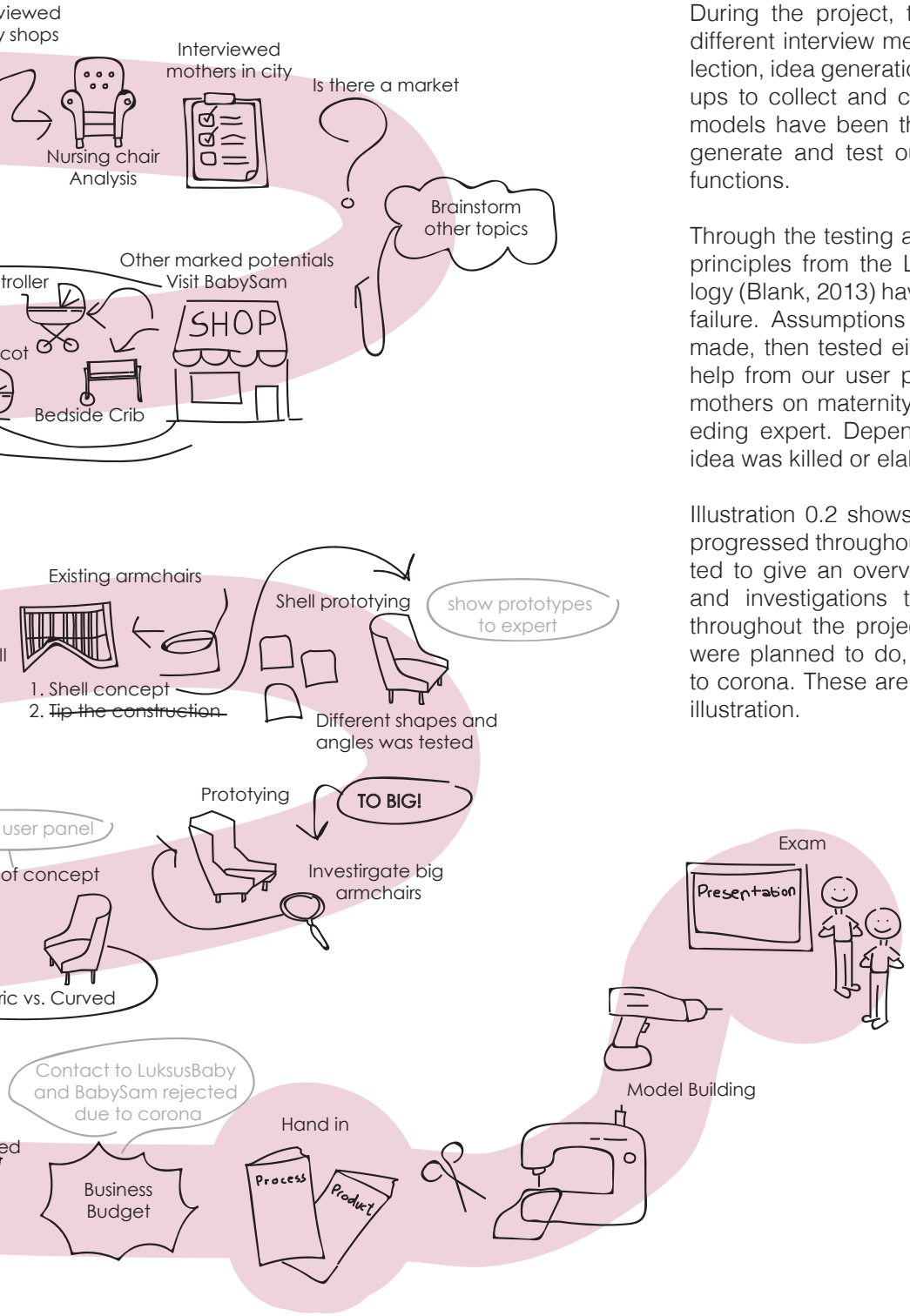


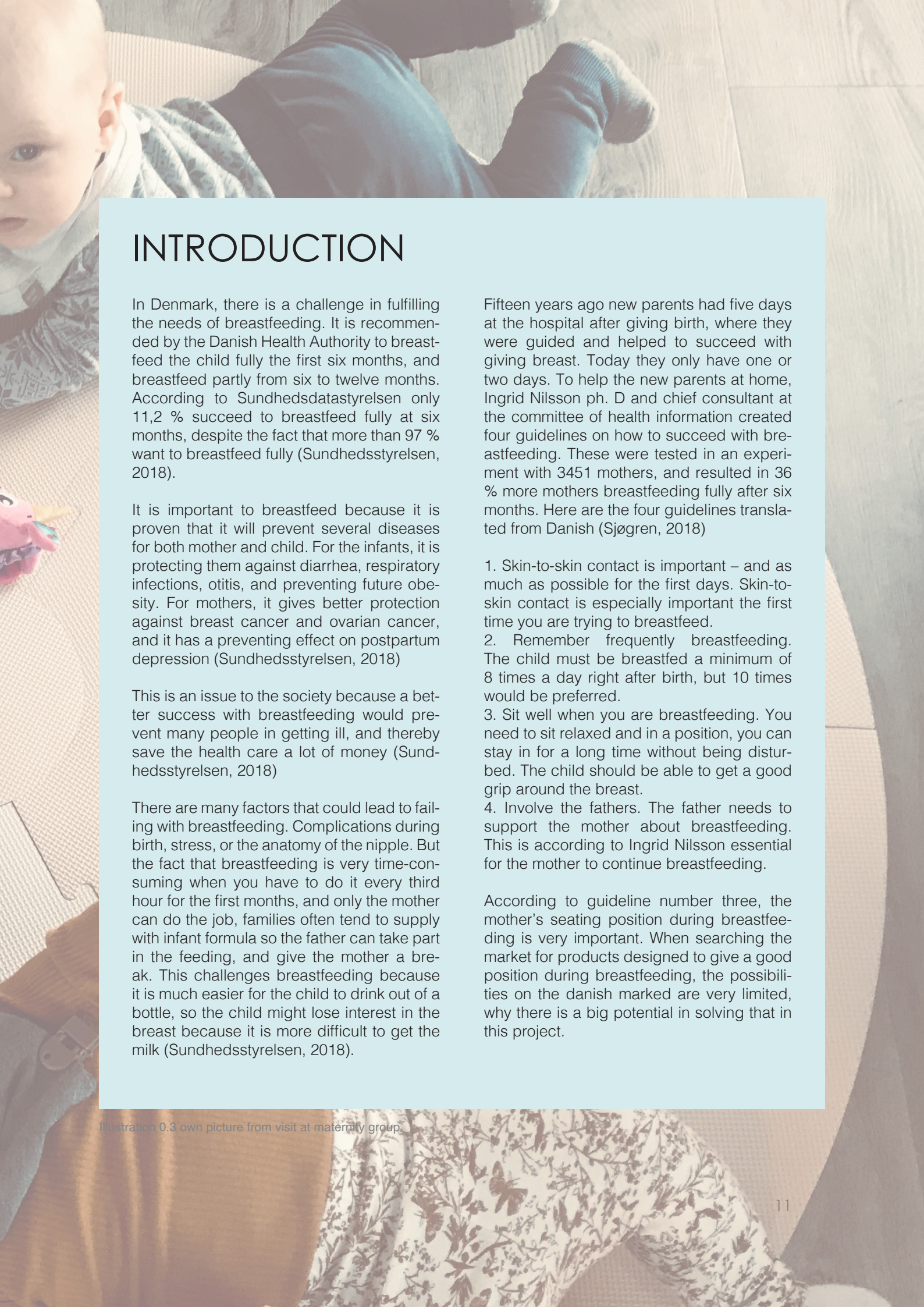
Illustration 0.2 shows the process overview from beginning to hand-in.



During the project, there have been used different interview methods, online data collection, idea generation methods, and mocoups to collect and create data. Cardboard models have been the key method to idea generate and test out, shapes, sizes, and functions.

Through the testing and ideation phase, the principles from the Lean Startup Methodology (Blank, 2013) have been used to reduce failure. Assumptions and hypotheses were made, then tested either by our self or with help from our user panel consisting of five mothers on maternity leave and a breastfeeding expert. Depending on the result the idea was killed or elaborated on.

Illustration 0.2 shows the process as it has progressed throughout the project. It is created to give an overview of the tests, visits, and investigations there were conducted throughout the project, and the things that were planned to do, but got canceled due to corona. These are drawn with grey in the illustration.



INTRODUCTION

In Denmark, there is a challenge in fulfilling the needs of breastfeeding. It is recommended by the Danish Health Authority to breastfeed the child fully the first six months, and breastfeed partly from six to twelve months. According to Sundhedsdatastyrelsen only 11,2 % succeed to breastfeed fully at six months, despite the fact that more than 97 % want to breastfeed fully (Sundhedsstyrelsen, 2018).

It is important to breastfeed because it is proven that it will prevent several diseases for both mother and child. For the infants, it is protecting them against diarrhea, respiratory infections, otitis, and preventing future obesity. For mothers, it gives better protection against breast cancer and ovarian cancer, and it has a preventing effect on postpartum depression (Sundhedsstyrelsen, 2018)

This is an issue to the society because a better success with breastfeeding would prevent many people in getting ill, and thereby save the health care a lot of money (Sundhedsstyrelsen, 2018)

There are many factors that could lead to failing with breastfeeding. Complications during birth, stress, or the anatomy of the nipple. But the fact that breastfeeding is very time-consuming when you have to do it every third hour for the first months, and only the mother can do the job, families often tend to supply with infant formula so the father can take part in the feeding, and give the mother a break. This challenges breastfeeding because it is much easier for the child to drink out of a bottle, so the child might lose interest in the breast because it is more difficult to get the milk (Sundhedsstyrelsen, 2018).

Fifteen years ago new parents had five days at the hospital after giving birth, where they were guided and helped to succeed with giving breast. Today they only have one or two days. To help the new parents at home, Ingrid Nilsson ph. D and chief consultant at the committee of health information created four guidelines on how to succeed with breastfeeding. These were tested in an experiment with 3451 mothers, and resulted in 36 % more mothers breastfeeding fully after six months. Here are the four guidelines translated from Danish (Sjøgren, 2018)

1. Skin-to-skin contact is important – and as much as possible for the first days. Skin-to-skin contact is especially important the first time you are trying to breastfeed.
2. Remember frequently breastfeeding. The child must be breastfed a minimum of 8 times a day right after birth, but 10 times would be preferred.
3. Sit well when you are breastfeeding. You need to sit relaxed and in a position, you can stay in for a long time without being disturbed. The child should be able to get a good grip around the breast.
4. Involve the fathers. The father needs to support the mother about breastfeeding. This is according to Ingrid Nilsson essential for the mother to continue breastfeeding.

According to guideline number three, the mother's seating position during breastfeeding is very important. When searching the market for products designed to give a good position during breastfeeding, the possibilities on the danish marked are very limited, why there is a big potential in solving that in this project.

Illustration 0.3 own picture from visit at maternity group

1 UNDERSTANDING

This phase documents the journey of exploring the topic to get the right understanding of the problem and define what specific problem that is needed to be solved. This is done as research, interviewing users and specialists, collecting data through surveys, and analyzing the functions of existing products on the market.

Illustration 1.1 own picture from visit at maternity group

DISCOVERING THE PROBLEM

To start up the master thesis project, the task was set to look for different topics where a problem could be solved by designing a product. This was done by looking into the team's common interests and searching for potential design problems in media and doing our daily life.

During maternity leave, one of the team members notices a need for a specific chair for breastfeeding because it was difficult to get the right position sitting in the bed or sofa. Looking for one to buy, it came as a surprise that there was only one available on the danish market designed for the purpose. This was too expensive and not very appealing, so the only solution was to test out armchairs in the stores, to find a match. She ended out buying an armchair from Ikea that did a better job than the sofa and bed, but during the maternity leave, it was clear that some needs were not covered in the armchair.

ISSUES DISCOVERED DURING BREASTFEEDING

Difficult for the mother to eat. It seemed like every time you were about to eat, the baby needed to be breastfed, and it could be quite challenging to balance a plate and breastfeed at the same time.

Sometimes the baby fell asleep during breastfeeding, and trying to put the baby to bed would often result in a screaming baby. It would have been nice if the mom could just take a nap in the armchair, with the baby sleeping in her arms. It could also be challenging to get up from the armchair carrying a sleeping baby because you are holding it with both arms.

The Ikea armchair was chosen because of the height of the armrests, but they were made of wood, so sometimes it would hurt when sitting there for a longer time with a baby on your arms.

When the baby regurgitate, it was difficult to clean it off the armchair.

Based on the discovered issues a problem statement was created:

How to design a nursing chair that supports the mother, and gives her the best opportunity during breastfeeding?

OUTPUT

These observations indicate potential in designing a product specifically for breastfeeding. But because the observation is only based on one person's point of view, it is necessary to confirm by other sources that there is a need. The fact that there is only one product on the market could give a big business opportunity, but it could also mean that there are too few buyers. The first step would be to investigate if there is a market potential.

- The mothers eat during breastfeeding.
- The mothers would like to nap during breastfeeding.
- The mother carries the child in both arms when getting up from the nursing chair.
- The mother needs support under the arm during breastfeeding.
- The product is exposed to a lot of regurgitate from the baby.
- There is a lack of nursing chairs available on the market.

MARKET POTENTIAL

In order to determine if there is a potential market for a nursing chair salesmen from stores that could potentially sell the product was interviewed, because of their experience with selling products for our target group. It turned out that one of the stores had the only nursing chair on the market in the shop, why it was ideal to analyze the use of it.

MARKET ANALYSIS

A visit was conducted in five different shops (appendix 1), with experience in selling products to new parents, where the idea of a nursing chair was discussed. In general, they saw a big potential in the idea, because it could help many mothers, and the competition would be minimal on the market. The major issue was that it was very rare they had a request for a nursing chair.
In Babysam Aalborg City Syd they had the nursing chair from ammestolen.dk in their nursing room for the customers to use. They did not sell the product but they had some flyers to advertise for the company. Their experience from the customers was that it was quite amazing to sit in, but it was too ugly for their home and too expensive with the price of 7000-10.000 DKK depending on the model.

Illu. 1.2 own picture from visit at maternity group

Analysis of Ammestolen

With permission from the salesmen, the user scenarios were acted out with the nursing chair using a testing doll, to analyze the nursing chair. To see the full analysis look at appendix 2.

The comfort was very great and you had a good sitting position because of the height of the nursing chair and the arm support. The nursing chair could be locked in three positions in order to lean back in the nursing chair, but the seat was following the back support so you would always be seated in a 90 degrees position, which did not seem ideal if you wanted to take a nap. Sitting with a baby in the arms it was quite difficult to lock the nursing chair in the positions, and when you unlocked the nursing chair you were almost pushed forward, which could be dangerous with an infant in your arms.

The pillow had a soft surface that was very dirty, and it did not seem easy to wipe off, and it was not possible to take off the cover to wash it in a machine.

There was a matching footstool, and when you sat in the nursing chair it all would rock because both the nursing chair and the footstool had a rocking function. Testing the rock function it seemed a little over the top because you almost got dizzy.

The appearance of the nursing chair was not very appealing. It was almost screaming baby-function-product, instead of a nice nursing chair for your home.

OUTPUT

The analysis gave a good indication of where to be better if designing a competing product, but there were also some things that needed to be investigated further. Before going further with the design process, it is necessary to investigate if there is a need for the nursing chair when there is no request for it in the shops. This is done by reaching out to potential buyers and collecting data with the use of surveys and interviews. While waiting for enough answers to the surveys, it was decided to look for other possible design problems in the market for new parents.

- The nursing chair has an on/off rocking function.
- It is difficult to get up from the nursing chair holding the child in both arms.
- The users prioritize the aesthetics.

- The product is exposed to a lot of regurgitate from the baby









Illu 1.3 is showing pictures of the nursing chair from ammestolen.dk

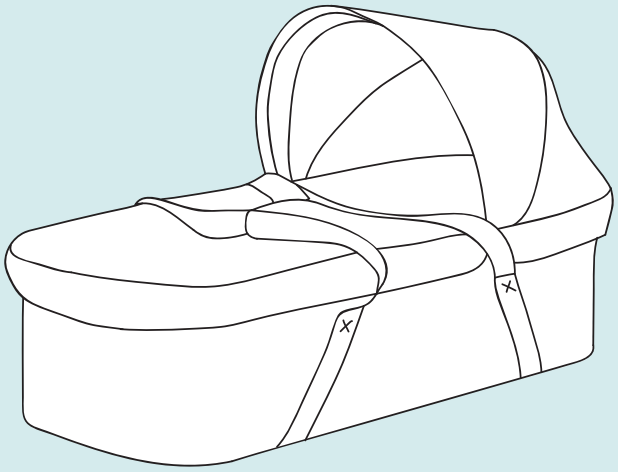
EXPANDING MARKET VIEW

Due to the uncertainty about the market potential for a nursing chair, a research was conducted in BabySam, by a semi-structured interview with an employee and by investigating the product types in the store. This research was made to get an overview of other existing solutions new parents need when the infant arrives, to see if it was possible to identify a new problem or find a new market potential within the newborn categories.

On average 60.000 children are born in Denmark every year (dst.dk, 2019). When becoming a parent, there is a long list of products the new parents need. Based on Magasinet Penge an ordinary family spends in an average of 16.000 DKK on equipment before the child is born, and in total, they spend 63.000 DKK on their child the first year (dr.dk, 2014). This indicates that it is an area where people are willing to spend a lot of money, why there could be a big potential in looking at other products on the market.
Going through some of the product types in the store, the market potential, and what problem they are solving was discussed. Below the key points of the discussion, about five potential product types are described, based on the interview in BabySam. To see the full interview look at appendix 3.

CARRYCOT

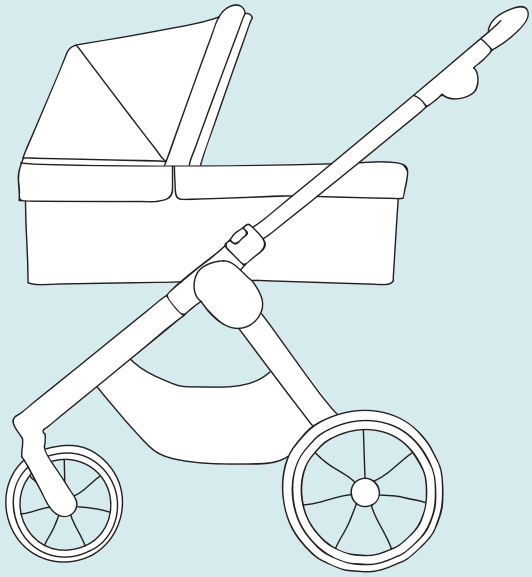
There could be some potential in combining a carrycot with other functions because it is only being used for the first 6 months from birth. The carrycot could be designed so it also could be used as a bedside crib or a cradle, meaning that the parents would have one less product to buy, which also would benefit the environment. Based on the information from the salesman, it would be challenging to convince the customers to buy the product, because they typically prefer the carrycot that is designed for the specific stroller, and often it comes with a good price when they buy it together.



Illu. 1.4 carrycot

STROLLER

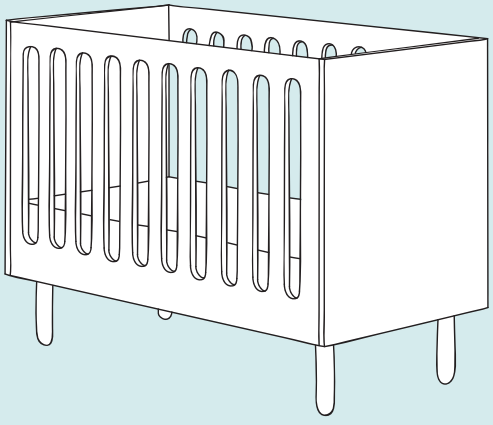
It could be interesting to design a stroller because of the many user interactions and different functions. There is a big market for strollers and combi strollers in Denmark, where 15.000 are sold every year. The issue with the big ordinary stroller is that there only is a market in Denmark, because people in other countries do not let their children nap outside in a stroller, and the market is dominated by the two very big players Odder and Emmaljunga with many years of experience. During the last couple of years, the request for the stroller has fallen compared to the combi stroller, because more people get kids when they live in apartments and here the combi stroller is more convenient with the smaller size and multiple functions. Designing a combi stroller seems more complex, and it would be a big challenge to get into the market competing with many big companies worldwide with decades of experience and their own developed technologies.



Illu. 1.5 stroller

COT

A cot has a big potential because it is one of the products that all families need. A child typically sleeps in it from 0-3 years. The existing products on the market are designed to be adjusted for the different stages of the child's development, and some are extending the lifetime of the product, by making it possible to transform the cot into a junior bed. One of the cots from STOKKE has extended the lifetime further by making a cradle that transforms into a cot, and later into a junior bed.



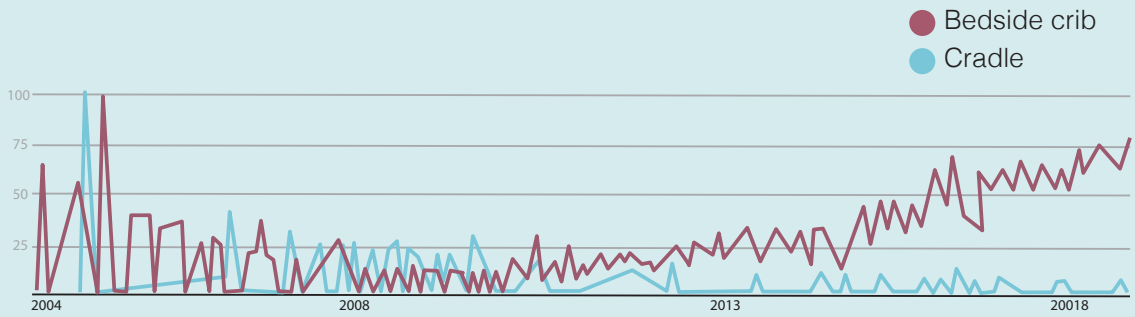
Illu. 1.6 cot

BEDSIDE CRIB VS. CRADLE

A bedside crib is a relatively new product on the market, due to the new focus on co-sleeping with the kids. Because of the risk of SIDS (sudden infant death syndrome) it can be too dangerous to have an infant in the bed, why a bedside crib is an ultimate solution. Usually, infants were put in a cradle, but they are disappearing from the market. This is confirmed by looking at the Google Trend statistics of how often people search for bedside cribs versus cradles.

OUTPUT

Identifying the bedside crib as a new player in the market, and with inspiration from STOKKE's transforming bed, there could be a potential in designing a bedside crib that could transform into a cot, and later a junior bed. This could be a potential direction for the project, in case there is no market for a nursing chair.



Illu 1.7 google trend analysis about how often people are searching on cradles or bedside cribs

- Many existing cots are able to grow with the child
- The combination of a bedside crib and cot is not existing on the market.

MARKET POTENTIAL FOR A NURSING CHAIR

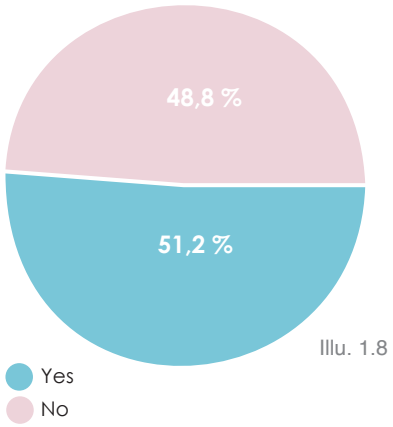
Earlier a survey was created to determine if there was a potential market for a nursing chair. The aim of the survey was also to get an understanding of mothers' nursing habits and needs, and potentially find a group of mothers that would help with feedback doing the project. The survey was shared through Facebook and visits around Aalborg where it could be possible to approach a lot of mothers and ask them to answer and share the survey.

The survey resulted in 84 answers from mothers in the age of 21-45 years old, where 43 were first-time mothers. To see the full survey look at appendix 4.

Doing small conversations with mothers met in public it was clear that the opinion about furniture for breastfeeding was very divided. Either they saw no need for it at all and would never waste money on it, or they were very excited about the product and what big difference it could do for the mothers. Because it is based on their experience the division could be caused by the fact that some found it challenging to breastfeed and some did not. This division is confirmed when looking at the results from the survey, where 51 % of the 84 were interested in buying furniture for the feeding situation if it would give them the right seating support, and have a simple design that would fit into their living room (illu. 1.8).

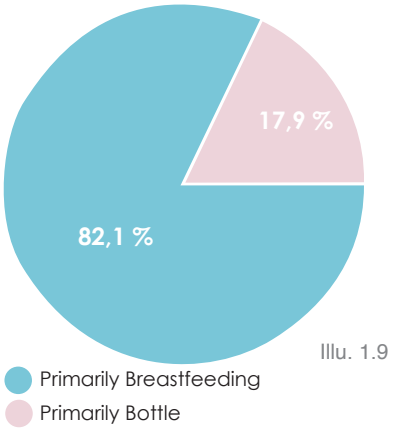
The results from the survey show that 82 % of the mothers used breastfeeding as the primary feeding source for the first couple of months of the child's life (illu 1.9). The last 18 % used bottles because they could not get the breastfeeding to work, or they did not have enough milk to saturate the child. Some mentioned that the child had difficulty sucking the milk out so they needed to use a bottle instead. Only two explained that it was their own decision not to breastfeed their child.

Would you like to buy a furniture that guaranteed you a good sitting position during breast- or bottlefeeding but also has a simple design?



Illu. 1.8

How did your child get food during the first few months?

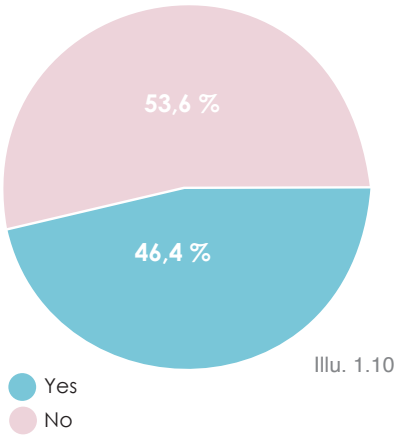


Illu. 1.9

Due to the feeding situation, 46 % of the mothers felt discomfort, where around 35 % experienced pain in the neck, lower back, and/or shoulder (illu.1.10). Some mentioned that it was not only caused by the feeding but also when they had to sit a long time with the child in their arms to let them fall asleep.
When asking what the most important parameters for a good nursing chair would be, the mothers answered the arm support. The arm support should be adjustable to give the best support. The back support also had a high priority where they would need good support to the lower and upper back, and the back support should be tall so they can rest the head and shoulders. It was confirmed that it had to be easy to get up from the nursing chair with a child in the arms and that it should be easy to clean.

Some pointed out that they would prefer if the nursing chair could be used for other purposes when they stop breastfeeding, and that it would be ideal if the appearance fitted into the living room.

Did you have any pain in your body due to breastfeeding or bottle feeding?



Illu. 1.10

OUTPUT

The survey confirms that the majority of mothers want to breastfeed but some find it quite challenging. Around 51 % (illu. 1.10) of the target group have an interest in buying the product if it gives the desired support and has the right aesthetics. This indicates that there is a potential market for a nursing chair.

- The mother needs lower back support during breastfeeding.
- The back support needs to be tall enough to support the shoulder, back and head

- The mother needs support under the arm during breastfeeding.
- The mothers need head support to nap during breastfeeding
- It is difficult to get up from the chair holding the child in both arms.
- The users prioritize the aesthetics

CHOOSING DIRECTION

Based on the gathered information there are two potential directions for this project. One is to design a nursing chair, the other is to design a bed that transforms from a bedside crib to a cot, and then a junior bed. To choose the direction the pros and cons are compared. First, a quick visit to Aalborg Library's children's apartment was conducted, to talk to mothers about the bed direction. This was done as a semi-structured interview, using a survey to type in the answers (appendix 5).

DESIGNING A TRANSFORMING BED

Based on the results from the interviews at the library, the pros and cons of the concept are listed beneath:

PROS

• Around 75 % preferred a bed that was able to grow with the child. This would ease the process of moving the child to a bigger bed, because they would already be familiar with the bed, and feel safe and secure in it.

• It would extend the lifetime of the product. A bedside crib is only used until the child is 4-6 months. A cot is used until the child is about 3 years.

• 53 % saw a big potential in the concept of a bedside crib combined with a cot because the bed could be used from newborn and follow the child into their own room.

• There are no products on the market that combines a bedside crib and a cot.

CONS

• They would not be able to reuse the bed for the next child unless they are born about seven years apart.

DESIGNING A NURSING CHAIR

Based on the survey used to investigate the market potential for a nursing chair, the pros and cons are listed beneath:

PROS

• At this moment there is only one competitor on the Danish market

• Based on the survey, more than 50 % see the potential in the product and would like to buy one.

• The product would improve the nursing situations for many parents

CONS

• The lifetime of the product is very short because you only breastfeed in about 6 months.

• To extend the lifetime, by continuing using the nursing chair, it would have to compete with all armchairs on the market.

• A bed able to grow with the child is preferred.
• Potential in combining a bedside crib and a nursing chair that transforms into a cot.

OUTPUT

When comparing the directions, two issues were weighing the most:
• The proved need for a nursing chair, and how big a difference it would make.
• New parents having to buy so many things, with a short lifetime, when expecting a baby.
This lead to an idea of combining both directions. A bedside crib and a nursing chair would only be used for the first six months, so why not make them transform into a cot when you no longer need them? The next step would be to investigate the functions and needs of the three product types, to see if it is possible to combine the three products.

USER PANEL

To discuss and confirm the user needs for the different products and the final concept, a user panel was created. The user panel consists of a midwife with expert knowledge in breastfeeding and five mothers who all have at least two children. This means they have more experience and are more aware of how different children can be. This user panel will be used through the process to test out different prototypes and give feedback on ideas through visits.

Louise Marie Holm Nørby
Midtwife, Reflexologist &
Breastfeeding expert

Stine, 32 years old
3 children: Liva, 6 months, August,
6 years, and Elias, 9 years

Camilla, 38 years old
2 children: Felix, 5 months, and
Max, 4 years.

Christina, 35 years
2 children: Magnus, 6 months, and
Andrea, 4 years

Anne, 40 years old
2 children: Asger, 5 months and
Alba, 3 years

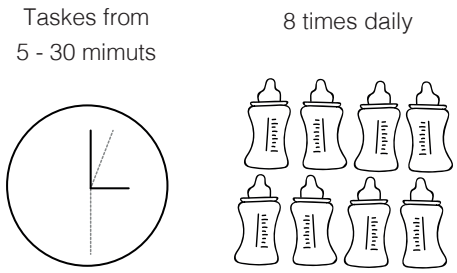
Mia, 33 years old
2 children: Selma 6, months, and
Svend, 3 years

BREASTFEEDING OVERVIEW

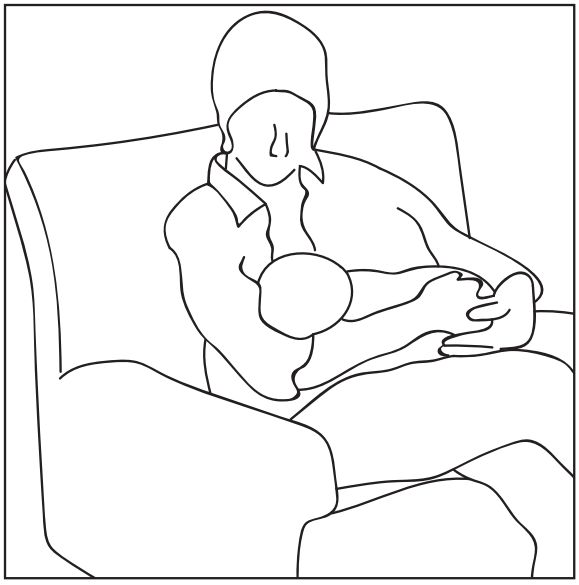
In order to get a better understanding of the user scenario, context, and needs, an overview was made based on an interview with breastfeeding expert Louise Marie Holm Nørby (appendix 6), interviews with the maternity group (appendix 7) and available information from the healthcare system.

In the first couple of months, it is recommended to breastfeed at least 8 times a day, and breastfeeding typically lasts between 5 to 30 minutes. In some cases, the mother is breastfeeding 12 times a day with a lasting of 60 minutes. This means that the mother spends many hours in the chair, why it is important with good comfort (Sundhedsstyrelsen, 2018).

The breastfeeding would typically take place in the parent's bedroom, the child's bedroom, or in the living room. Being on maternity leave you do not want to end up living in the bedroom, so it is important to have a good place to breastfeed in the living room.



Illu. 1.11, show the recommended schedule for breastfeeding



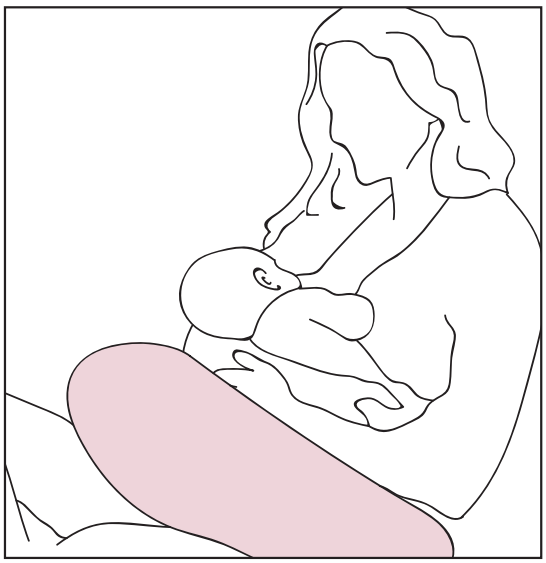
Illu. 1.12 Mother brestfeedig in armchair

Illu. 1.13 Mother brestfeedig in bed

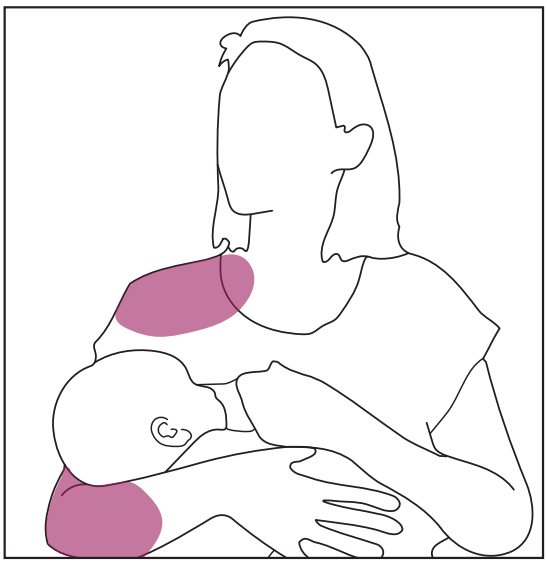
It is important for the mother to sit in the right position to be able to breastfeed. If there is tension in the arm and shoulder in the side of the breast she is using, it can be difficult to make the milk flow. By having the right support under the arm holding the baby, it is possible to relax in the arm and shoulder. To give the best support it is important that it is firm and stable to keep the child in the same position to make sure the child is not losing the grip. The right arm support depends on the height of the mother, the length of her arms, and the size of the breasts in order to make the child reach them. Today the co-pingstrategy is to use a nursing pillow and/or other pillows and stack it as needed. The issue is that it takes some time, and often the pillows slide away when breastfeeding, so the mother does not want to go through the trouble every time they have to breastfeed.

It should be possible for the mother to sit in different positions in the chair. Depending on the infant's sucking technique it is necessary to change position to empty the mammary glands all around the breast. If some of them are not emptied enough it can cause mastitis. In appendix 8 there is an overview of the differnt breastfeeding positions.

It should be easy for the mother to get up from the chair because she sometimes needs to carry the child with both of her hands.



Illu. 1.14 Mother using brestfeedig pillow for support



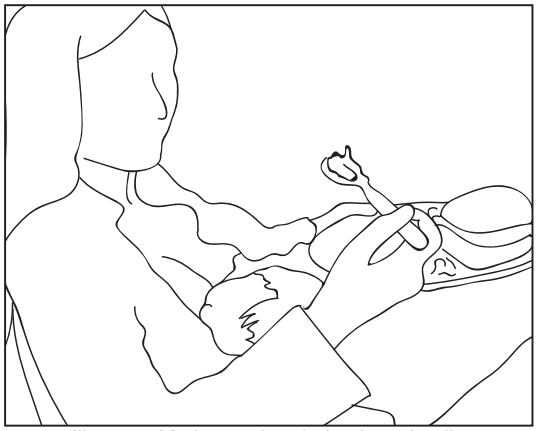
Illu. 1.15 show pain areas

Sometimes the breastfeeding takes a long time, or the baby falls asleep, so it would be preferred if there was support to the mother's head, so she could take a nap.

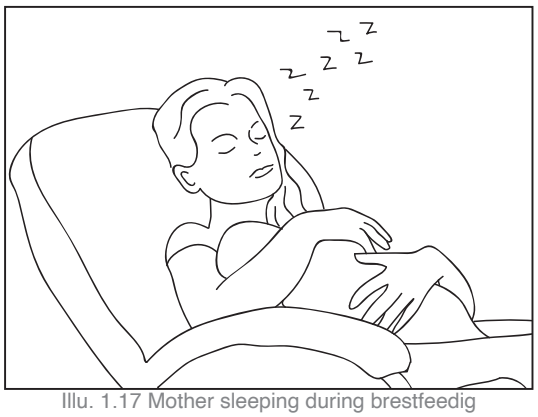
For a breastfeeding mother, there is a big need to eat and drink, so this often occurs while breastfeeding. This means that the mother should have easy access to reach for and put away food and water when she is breastfeeding.

Some mothers prefer a rocking chair, because the rocking function helps the mother and child to relax, and it can be a big help if the child suffers from colic. Others do not like it at all, because it makes them dizzy, and they do not feel safe because the chair is moving. In this case, it would make sense if the rocking function could be turned on and off.

When it comes to the fabric, all the mothers agreed that the product should be easy to clean. They did not mind if they had to change a cover and machine wash it, as long as they had an extra cover, but it would be preferred if they just could wipe it clean. They would also prefer if the fabric was organic.



Illu. 1.16 Mother eating during brestfeedig



Illu. 1.17 Mother sleeping during brestfeedig

OUTPUT

Based on the overview many of the previous needs was confirmed, and some were further detailed. The dimensions of the chair are very important in order to succeed in the physical aspects of breastfeeding. The extra functions like being able to eat or sleep just add to the experience.

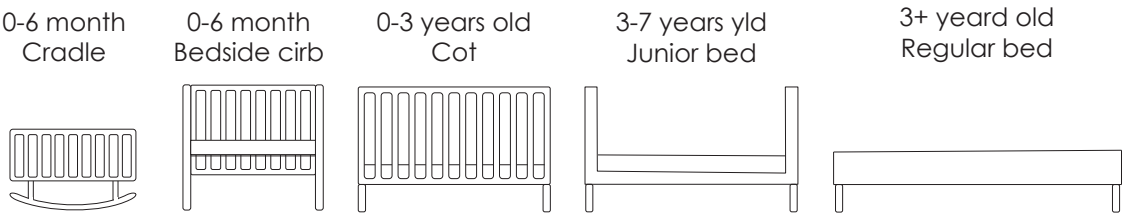
- The arm support should be adjustable, firm and stable.
- The mothers need head support to nap during breastfeeding
- The mothers eat during breastfeeding.
- It is difficult to get up from the chair holding the child in both arms.
- The mother needs lower back support during breastfeeding.
- The back support needs to be tall enough to support the shoulder, back and head.
- It should be possible to wash the cover in a washing machine or wipe it clean.
- There are conflicting opinions about the rocking function.

- Mothers use different positions when breastfeeding.

CHILDREN BEDS OVERVIEW

To get an understanding of the user scenarios for a bedside crib and a cot, an overview was made, describing the context and the functions of the products. The information was based on an interview with the maternity group and an analysis of the functions of the existing products on the market.

There are different beds for different stages of the child's life because the size of the bed and the need for functions change as the child grows. For smaller children, it is important that the bed is not too big, because they feel more secure in smaller spaces that remind them of being in the uterus. It varies what bed the infant starts with, and how often they change bed size. To get an overview of the possibilities, the different bed types and periods are illustrated beneath.



Illu. 1.18 shows an overview of the different bed categories for kids from the age of 0-7 years

BEDSIDE CRIB

A bedside crib is a small bed used during the first 4-6 months of the child's life. It is typically open on one side, or have a detachable side. The bedside crib is attached to the parent's bed, making it possible to keep the infant close during the night, and minimizing the risk of SIDS. This requires that the bedside crib can be safely mounted on the parent's bed, so the two beds do not slide apart. The bedside crib should also be able to be adjusted in height, to fit the height of the parent's bed (vildmedboern.dk, 2020).

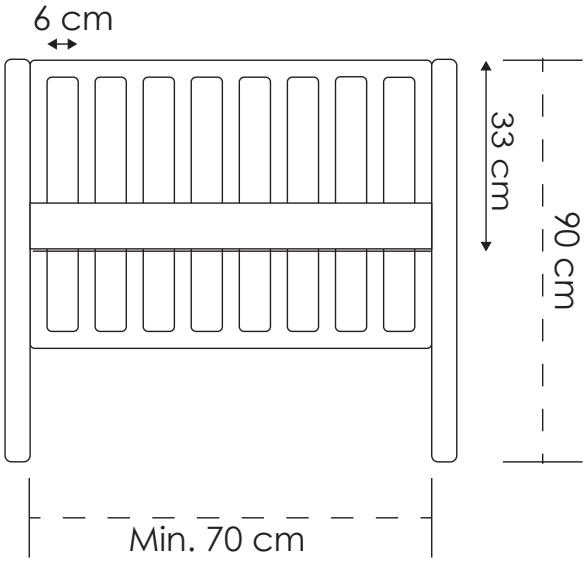
A bedside crib is mainly used in the bedroom next to the parent's bed, but those with the extra side could also be used as a cradle and placed away from the parent's bed or in other rooms.

Illu. 1.19 Linea by Leander bedside crib from BabySam

Based on an example in the standards made for a cradle (standards for a bedside crib was not available) the dimensions inside the bed is 80 x 42 cm, and the height is 90 cm (Varefakta kontrolleret, 2017,). By looking at the different bedside cribs on the marked the length variates from 80 to 112,5 cm and the width from 45 to 69 cm (vildmedboern.dk, 2020).

In the example from the standard for cradles, the height from the floor to the top of the bed is 90 cm. This is set to make it easy for the parents to reach the infant and to make it possible to adjust the height to the parent's bed. The height inside the cradle is 33 cm from the bottom plate to the top to make sure the child is not able to fall out. (Varefakta kontrolleret, 2017,) When the child is able to sit on its own, the inside height has to be bigger to make sure the child is not able to climb over the top, so at this point, you would typically move the child to a cot.

The safety standard requires the distance between the bars to be a maximum of 6 cm. There is no minimum distance required but all existing solutions have bars or a mesh of fabric, making it possible for the infant and parents to see each other, and to create an airflow. (vildmedboern.dk, 2020)



Illu. 1.20 Dimensions of bedside crib

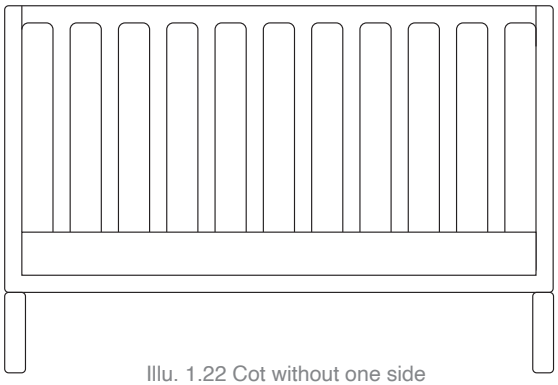
COT

It was not possible to get access to a standard for a cot, but it was recommended by the store Ønskebørn to use TÆNK where the security of cots is tested by consumers. The healthcare also bases their recommendations for cots on TÆNK's safety tests.

The cot is used from the age of 0-3 years depending on the size of the child. The cot is typically placed in the child's room or in the parent's room.

When the child is able to climb over the bars, it is possible on many existing products to remove one side, so the child safely can get out of the bed. Some beds also come with a rail, that can replace the side of bars, and make sure the child does not fall out when sleeping. (Sundhedsplejersken.dk, 2013)

Illu. 1.21 Leander cot from BabySam



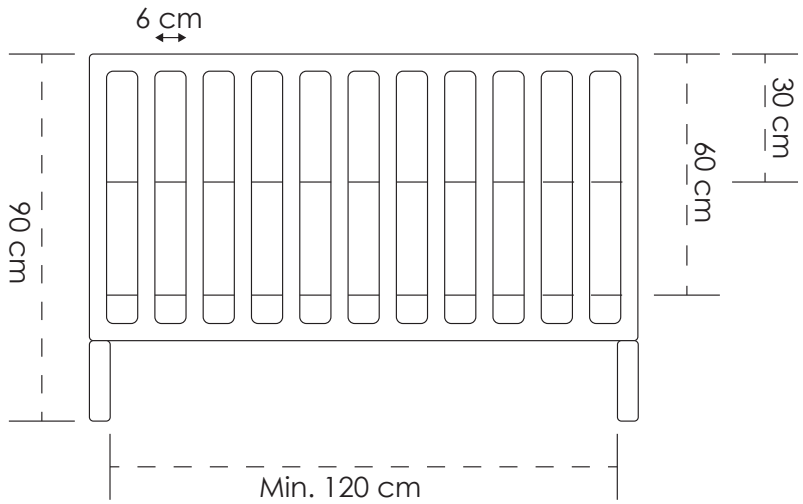
Illu. 1.22 Cot without one side

When the child is able to sit up, the bottom is moved down from a minimum of 30 cm to the top, to a minimum of 60 cm to the top. This is to avoid the risk of the child falling out. (Sundhedsplejersken.dk, 2013)

The typically lying dimensions for a cot are a width of 60 cm, a height of 90 cm, and a length of 120 cm. This is based on the existing cots on BabySam's webshop. (Babysam.dk, 2020).

The distance between the bars in a cot must not be wider than 6 cm. That is to make sure that the child is not able to push the head or upper body in between the bars and get injured. (Sundhedsplejersken.dk, 2013)

If the bottom plate is made with slats, the distance between should not be more than 2,5 cm to make sure the feed can not get stocked. And neither should the distance between the bottom plate and sides. (Sundhedsplejersken.dk, 2013)



Illu. 1.23 Dimensions of cot

OUTPUT

This overview gave an understanding of which functions to include and why. When it comes to the dimensions it is important to distinguish between rules and recommendations. It was decided to treat the recommendations based on safety as rules in this project. The other recommended dimensions would be used as guidelines to start up the idea generation.

- The bottom plate in the bedside crib should be adjustable to fit the parent's bed
- A bedside crib should be open on one side, or one side should be detachable
- It should be possible to adjust the height of the cots bottom plate from 30 cm to 60 cm
- The height inside the bedside crib can not be lower than 33 cm
- Distance between bars should maximum be 6 cm
- Distance between slats should maximum be 2,5 cm
- Distance between bottom plate and sites should maximum be 2,5 cm

- Typical lying dimensions for a cot is 120 x 60 cm
- Typical height from the floor is 90 cm for both cot and bedside crib.
- The length variates from 80 to 112,5 cm in a bedside crib
- Some cots have a detachable bar section to remove when the child is able to stand.

DESIGN BRIEF 1.0

PROJECT OVERVIEW

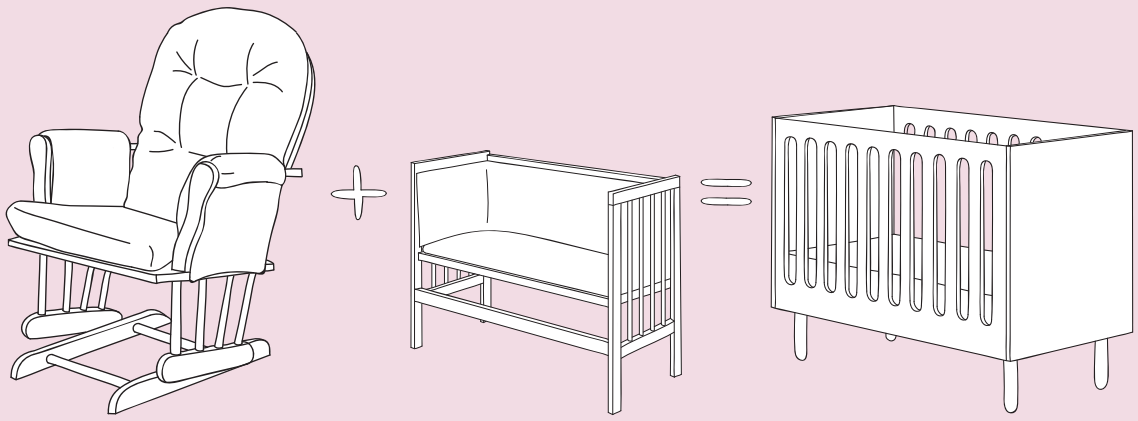
In order to succeed with breastfeeding it is important to sit in a position that gives the right support and makes the mother relax. The market for chairs designed for breastfeeding is very limited. One reason could be that a nursing chair only is needed for the first six months of the child's life.
When becoming new parents, there is a long list of products to provide for the infant. This means they have a lot of decisions to make, and it can be quite expensive. Instead of adding a new product type to the list, it would benefit the families and the environment to combine a nursing chair with a bedside crib and cot.

TARGET GROUP

The target group are the new parents who want the best opportunities for succeeding with breastfeeding, and cares about the quality and lifetime of products.

PROJECT STATEMENT

How to design a product that would provide a better support during breastfeeding, consisting of a nursing chair and bedside crib that can be transformed into a cot?



Illu. 1.24 chair + bedside crib = cot

VISION

The vision of Spire is to create family furniture for life

MISSION

The mission of Spire is to create functional products of a high quality and with a long lifetime, designed for both the child and the parents

DELIMITATION

In this project, it is decided not to focus on improving the use of a bedside crib and a cot because these product types are well established on the market.

CHALLENGE

Simple product ⟷ Vs. Multiple functions

BUSINESS STRATEGY

As a startup company, a market potential in furniture for families was found, where the idea was to create sustainable products by combining several products in one to extend the lifetime. The plan is to outsource the production to a company in Denmark that can produce the whole product. In this way the start-up company will not have to invest in machines for production, and the transportation will be reduced, when it is not produced in several companies. The goal is to sell the product in BabySam or LuksusBaby through their online web page and in their stores to the end-users.

INSIGHTS

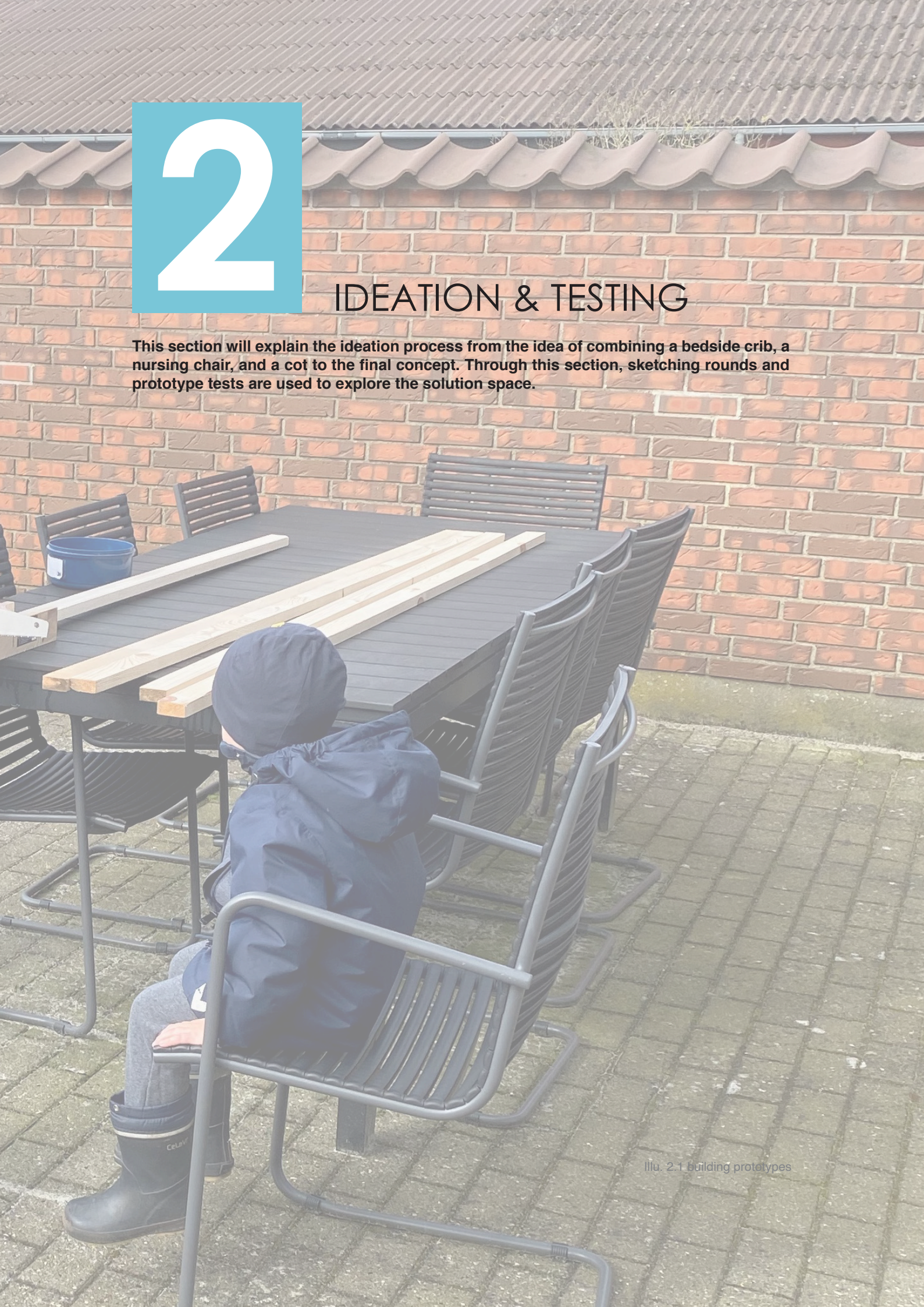
The collected insights are transformed into prioritized needs and wishes. The priority is based on what we believe the product needs to have and what would be nice to have. The insights are prioritized from 1 to 5 where 1 to 3 is seen as wishes and 4 to 5 is seen as needs which the product has to fulfill.

NO.	INSIGHT	PRIO.	PRODUCT PART	PAGE
1	It should be possible to eat when breastfeeding.	1	Chair	14, 27
2	There should be a head support to rest the head on	4	Chair	14, 22, 27
3	It should be easy to get up with a child in both arms.	3	Chair	14, 16, 22, 27
4	There should be an adjustable firm and stable arm support.	5	Chair	14, 22, 27
5	It should be possible to wash the cover in a washing machine or wipe it clean.	4	Chair	14, 16, 27
6	It should be possible to turn on and off the rocking function.	1	Chair	16, 27
7	The aesthetics of the product is important	3	Chair, Cot, Bedside Crib	16, 22
8	The product should grow with the child.	3	Cot	20, 23
9	The product should support the lower back.	4	Chair	22, 27
10	The product should have a tall back going all the way up to the head.	5	Chair	22, 27
11	It should be possible to sit in different positions.	3	Chair	27
12	The bottom plate should be adjustable to fit the parent's bed	4	Bedside crib	31
13	It should be open on one side, or one side should be detachable	5	Bedside crib	31
14	It should be possible to adjust the height of the bottom plate from 30 cm to 60 cm	4	Cot	31
15	The height inside can not be lower than 33 cm	5	Bedside crib	31
16	Distance between bars should maximum be 6 cm	5	Bedside crib, cot	31
17	Distance between slats should maximum be 2,5 cm	5	Bedside crib, cot	31
18	Distance between bottom plate and sites should maximum be 2,5 cm	5	Bedside crib, cot	31
19	Minimum lying dimensions is 120 x 60 cm	4	Cot	31
20	Height from the floor should be 90 cm	3	Bedside crib, cot	31
21	The length should be between 80 to 112,5 cm	4	Bedside crib	31
22	There should be a detachable bar section to remove when the child is able to stand.	3	Cot	31

2

IDEATION & TESTING

This section will explain the ideation process from the idea of combining a bedside crib, a nursing chair, and a cot to the final concept. Through this section, sketching rounds and prototype tests are used to explore the solution space.



Illu. 2.1 building prototypes

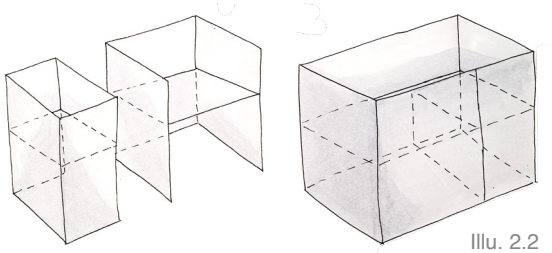
COMBINING THREE PRODUCTS

After getting a wider understanding of the user needs and functions, the goal was to test if it was possible to combine the three products in one solution. To test this the MVP method was used to quickly see if the idea could succeed.

The task was set to sketch on different ways to transform a bedside crib and a nursing chair into a cot. Out of the sketches four ideas were chosen and built as 1:5 cardboard models to test out how the dimensions would fit. The used dimensions were based on the listed insights in the design brief. The sketches and models were simplified by using a plate construction, to make it easier to see how the dimensions fitted together.

IDEA 1: TURNING 180 DEGREES

In this concept, the bedside crib and nursing chair would be put together and turned upside down to work as a cot see illu 2.2 and 2.3.

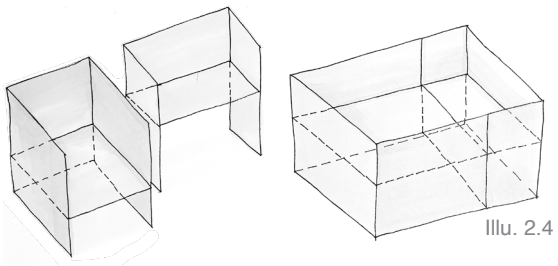


Illu. 2.2

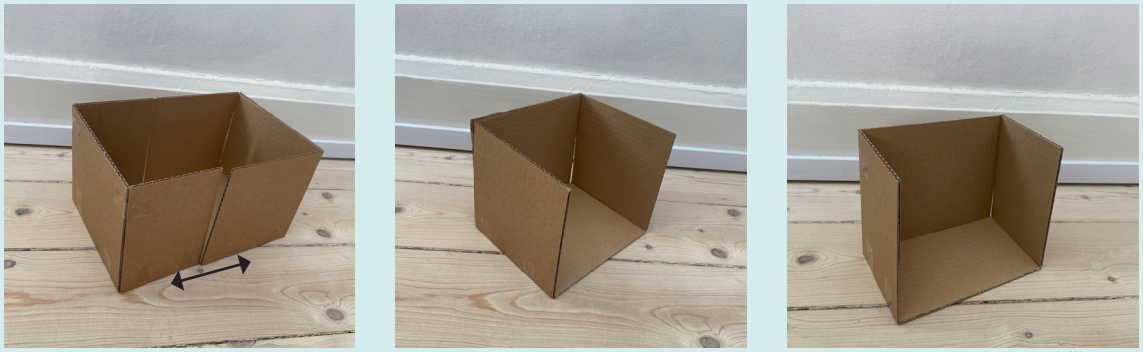
Illu. 2.3

IDEA 2: CUT THROUGH THE COT

In this concept, there was made a cut through the cot, where it would give an acceptable width of the bedside crib and depth of the nursing chair see illu. 2.4 and 2.5.



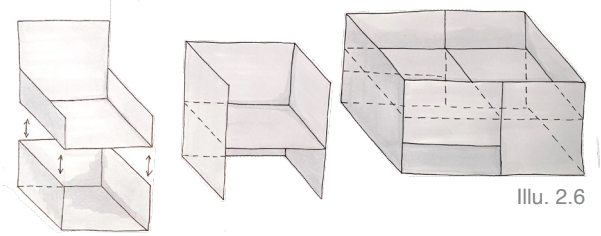
Illu. 2.4



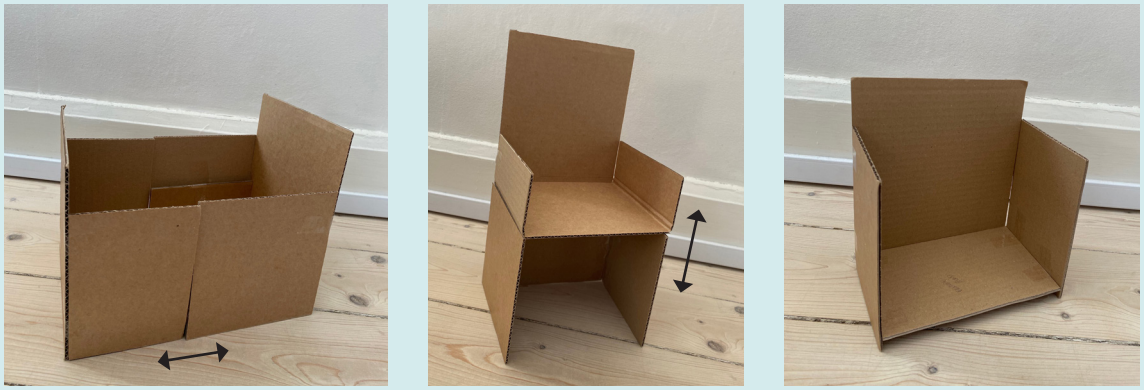
Illu. 2.5

IDEA 3: SPLIT AND STACK

This concept (illu. 2.6 and 2.7) can be split in two the same way as idea 2. The chair part is different because it consists of one big part with back and arm support and two bar sections. To transform it into a chair, the two bar sections are put beneath the big part and used as legs for the chair. When the product is used as a cot without bars, the arm support sides will work as low bars, to prevent the child from falling out.



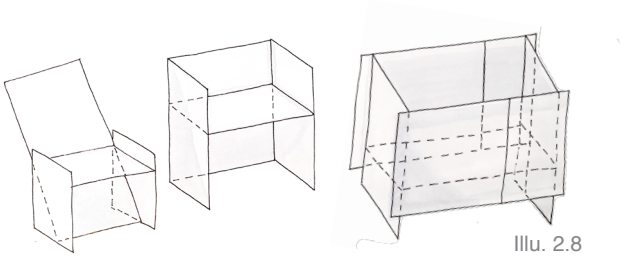
Illu. 2.6



Illu. 2.7

IDEA 4: SPLIT AND 90 DEGREES TURNING

This idea can transform into a cot bed, by removing the back support of the nursing chair, and turning the nursing chair and bedside 90 degrees and then connect them in the middle. The back support from the nursing chair is used as the bottom plate of the cot bed (illu. 2.8 and 2.9).



Illu. 2.8

Illu. 2.9

OUTPUT

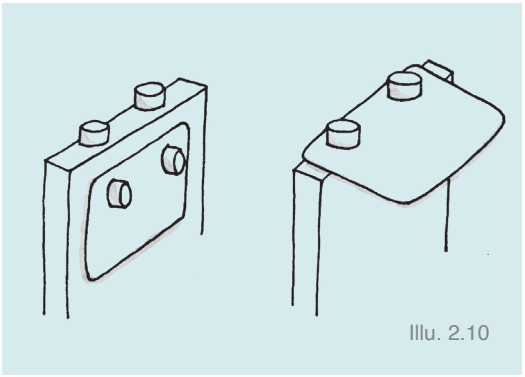
Based on the four ideas it was clear that It made the most sense to just divide the cot in two because the crib and the nursing chair would have all the needed elements for their functions. Because all four ideas were based on simple plates, it was necessary to try out different shapes and challenge the concept.

THE BEST NURSING CHAIR

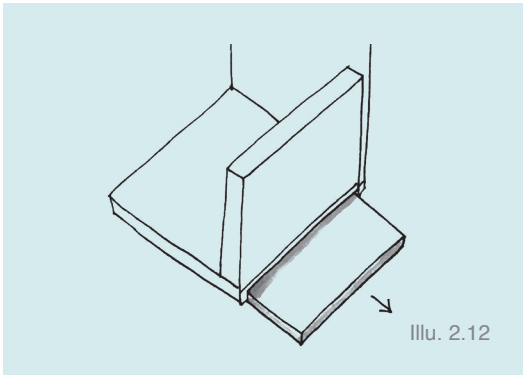
In order to challenge the ideas from the previous round, it was decided to look at the product from a different angle. Based on the gathered needs for a nursing chair, the intention was to create the best possible nursing chair. With the use of the Brainpool method, there was made a quick sketching round for each need, to figure out the best way to solve the problems.

EATING

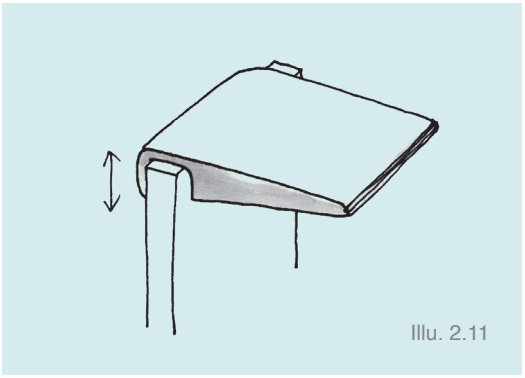
Based on experience from other mothers the need of eating or having a glass of water next by was found. The sketching round resulted in solutions where a table was attached to the chair in different ways and how it could be hidden away when not in use as in illu. 2.10 to 2.13.



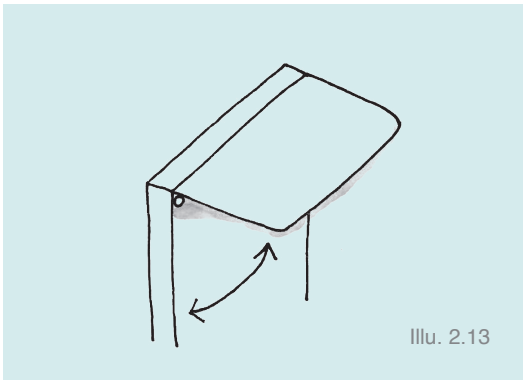
Illu. 2.10



Illu. 2.12



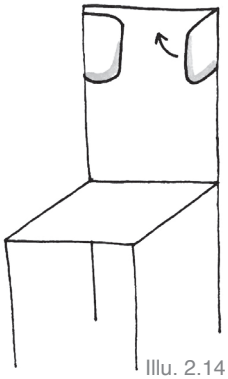
Illu. 2.11



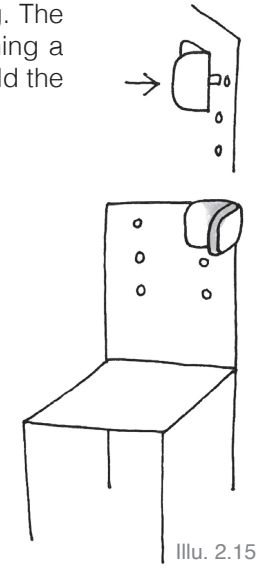
Illu. 2.13

TAKE A NAP

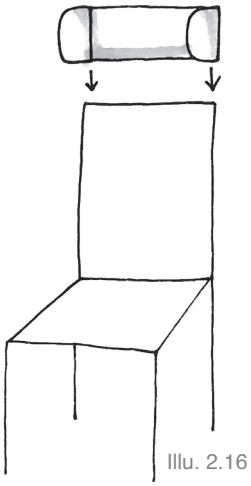
It would be very helpful if the mothers were able to take a nap when breastfeeding. The solutions were different ways of attaching a head pillow with a shape that would hold the head in place (illu. 2.14 to 2.16).



Illu. 2.14



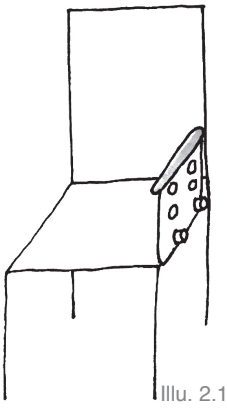
Illu. 2.15



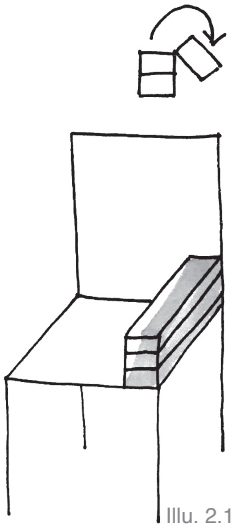
Illu. 2.16

ADJUSTABLE ARM SUPPORT

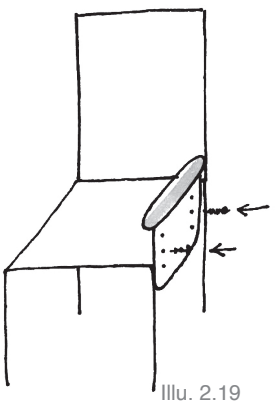
To get the right support it was necessary to make the arm support adjustable. It could be solved by flipping pillows, or arm support that could be mounted in different heights (illu. 2.17 to 2.19).



Illu. 2.17



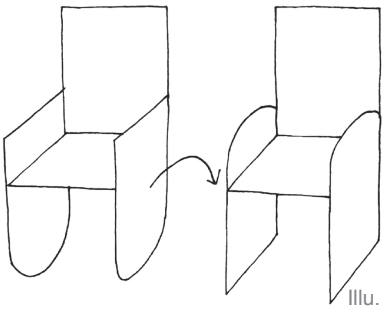
Illu. 2.18

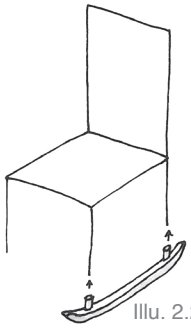


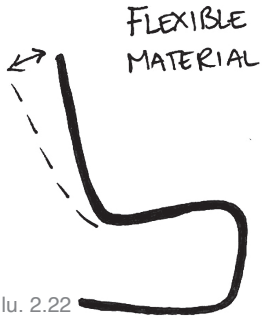
Illu. 2.19

ON/OFF ROCKING FUNCTION

Based on the different interviews it was very divided between the mothers if they needed a rocking function or not. The sketching round gave some solutions on how to meet both needs in one product (illu. 2.10 to 2.22).


Illu. 2.20


Illu. 2.21

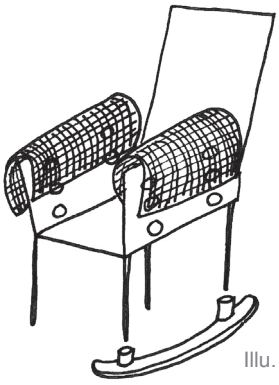


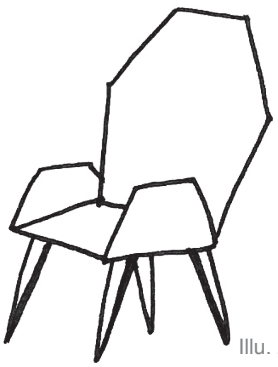
Illu. 2.22

BEST NURSING CHAIR

Based on the knowledge from previous research and the ideas from the four Brainpool rounds, it was decided to sketch on the best possible nursing chair, without concerning about the bedside crib and cot. This lead to three quite different solutions (illu. 2.23 to 2.25).


Illu. 2.23


Illu. 2.24


Illu. 2.25

OUTPUT

It turned out to be quite difficult to sketch on the best nursing chair because it seemed like all the issues could be solved by simple add-ons. So the actual challenge was to find an overall concept that would combine all the functions in a meaningful way. Both for the nursing chair functions, but also for the combination of the bedside crib, nursing chair, and cot.

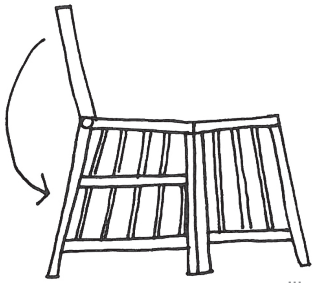
INSPIRATIONAL PRINCIPLES

Looking for a way to combine all the functions in an overall concept, it was decided to search for inspiration in existing armchairs and cots, modular concepts, and wood techniques. The images were collected on four inspiration boards (appendix 9).

Going through the inspiration boards different potentials were discussed, which lead to six principles that could be interesting to translate into a concept: Folding, Cupic idiom, Curved idiom, Few big elements, and Many small elements. A new sketching round was conducted based on the list of principles.

FOLDING

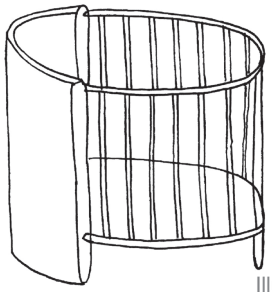
Creating concepts with folding was quite difficult. There was no need for reducing the size of the product, why folding did not make much sense for an overall concept, but maybe it could be used for some smaller details.



Illu. 2.26

CURVED IDIOM

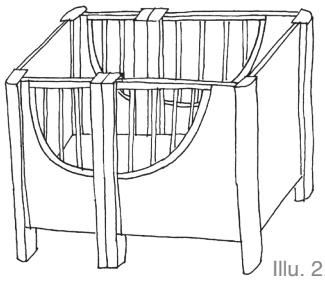
With the use of only curved elements, the production would be more complicated but the overall cot bed design would stand out compared to the competitors. The nursing chair could get a softer appearance and would fit better into a living room.



Illu. 2.27

CUBIC IDIOM

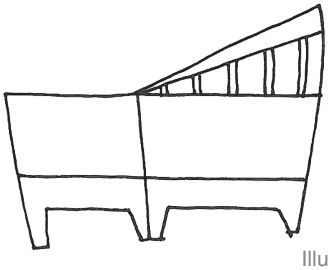
The concepts with cubic plates look a lot like the already existing cots on the market. When only using cubic elements, the nursing chair alone became very hard and squared, and was difficult to imagine in a living room.



Illu. 2.28

FEW BIG ELEMENTS

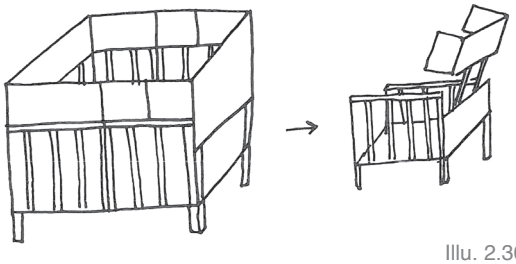
Trying to think of a concept with as few elements as possible created a very simple design, and the transformation from the cot bed to the nursing chair would be very easy.



Illu. 2.29

MANY SMALL ELEMENTS

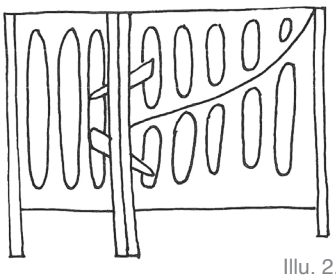
This idea was based on creating smaller elements to make it possible to fulfill all the small needs of the arm support, back support, etc. But the idea ended up having so many components that the production would be very expensive and the transforming would be difficult and time-consuming because of the small parts. Also, the cleaning would be difficult.



Illu. 2.30

ASSEMBLE

With this principle, the idea was to use different wood techniques to assemble the product and make these stand out as design details. But because all small parts need to be safely attached or big enough for children not to swallow, the assembly parts became very big and were breaking up the overall shape of the cot bed.



Illu. 2.31

OUTPUT

The output of the sketching round turned out to be very limited, but there was some potential in the use of curves and trying to make the product as simple as possible. It was clear that the task, of trying to come up with a concept with all these functions based on a principle, was too complex to solve. The intention was to come up with something that would create a meaningful unity for the product, so it was decided to try with a different approach.

EXISTING ARMCHAIRS

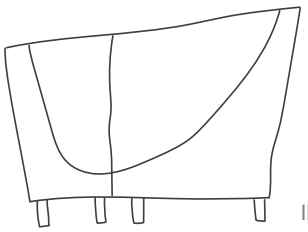
Still looking for a way to create the overall concept fitting both the design of a nursing chair and a cot, it was decided to take more direct inspiration from existing armchairs, because the nursing chair function had the highest priority. Using the inspiration boards with armchairs from appendix 9, a task was set to transform the design from an existing armchair into a cot.

Out of the armchairs on the inspiration boards, two armchairs were chosen because they were found most interesting to transform and because it was possible to imagine a transformation of the armchair into a cot. Based on the two armchairs a more detailed sketching round was conducted to explore the possibilities. The two armchairs were used as guidelines for the overall design of the solution.

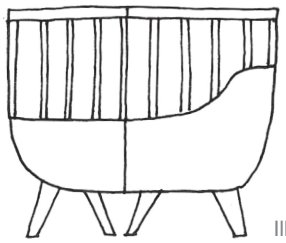
DIRECTION 1 - THE SHELL CONSTRUCTION

The Norr11 Mammoth armchair illu. 2.32 inspired to use the shell to shape the nursing chair and combine it with a bar section to create the cot. With inspiration from the Mammoth armchair, several solutions were created see illu. 2.33 to 2.36. Between the idea one was chosen (illu. 2.33) as the preferred, based on the simplicity of the design and the interesting shape, with the curved lines in the bar section on the inside against the straight angled lines on the outside.

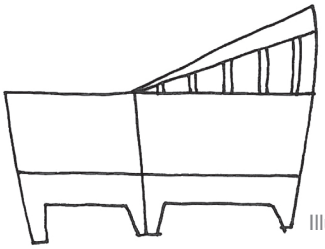
Illu. 2.32 The Borr11 Mammoth armchair



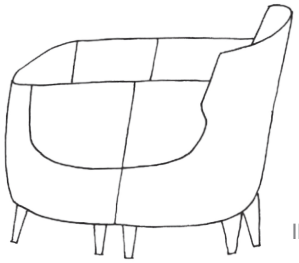
Illu. 2.33



Illu. 2.34



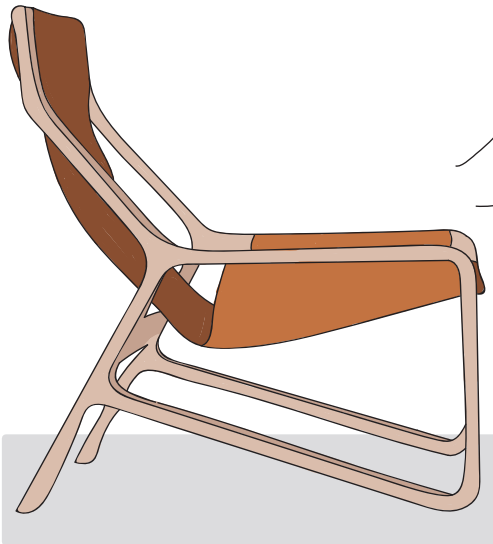
Illu. 2.35



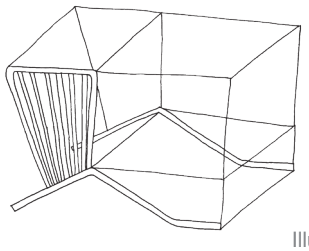
Illu. 2.36

DIRECTION 2 - TIP THE CONSTRUCTION

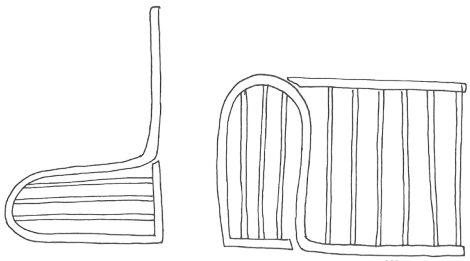
Toro lounge chair illu.2.37, inspired to design a simple construction of a chair that could be turned over and transformed into a cot. This would create simplicity in the product and at the same time make it stand out on the market. The inspiration from the chair also led to several ideas (illu. 2.38 to 2.40), but it was difficult to integrate the bedside crib in the product. One was chosen as the best because it had a way to integrate the bedside crib (illu. 2.40).



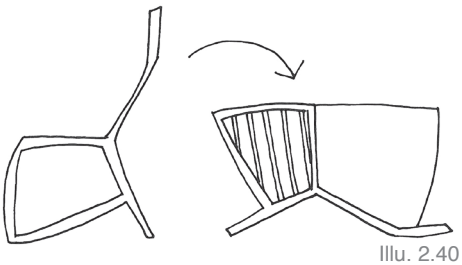
Illu. 2.37 The Toro Lounge chair



Illu. 2.38

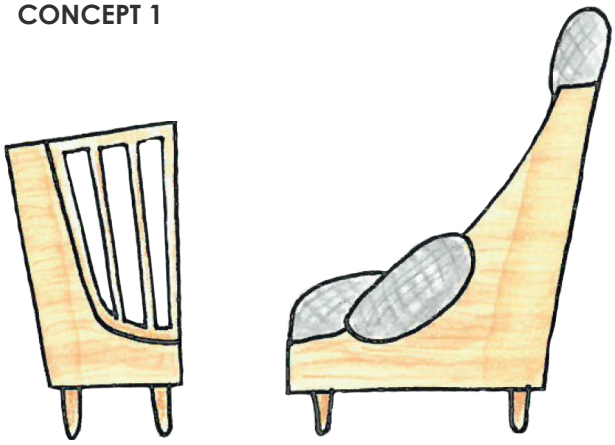


Illu. 2.39

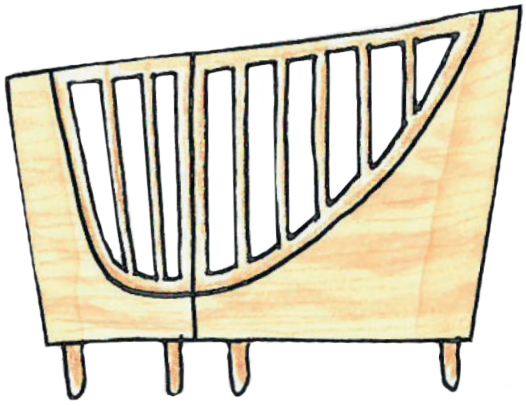


Illu. 2.40

CONCEPT 1

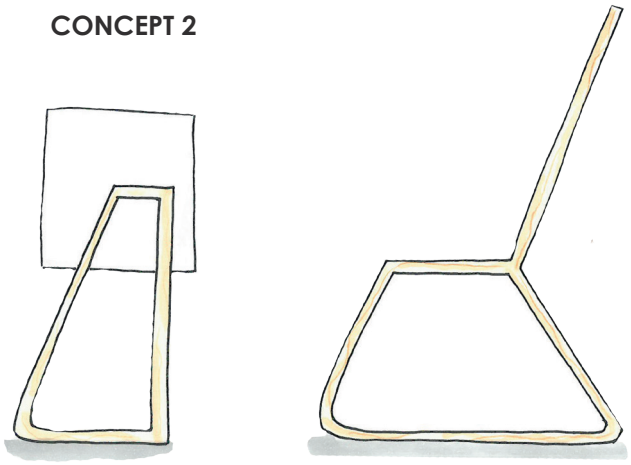


In this shell concept, the cot is split vertically into two pieces. The biggest part is going to be the nursing chair, and the smallest part is the bedside crib. The lats are removed from the chair part, to transform it into a nursing chair. The slope in the top of the cot creates the needed height for the back support, without making it difficult to reach the child in the bed. With the split in the cot, it is possible to extend the bed and turn it into a junior bed.

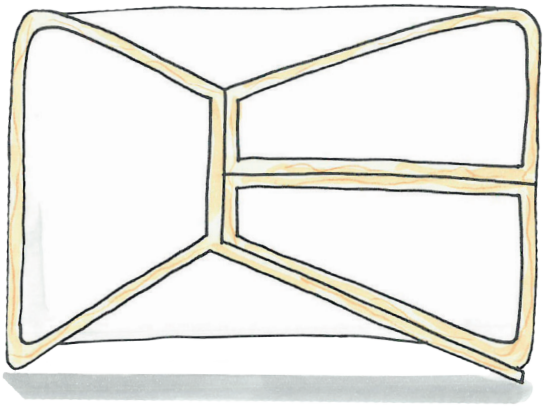


Illu. 2.41

CONCEPT 2



In this concept, the two long sides of the cot are constructed by three parts. The two biggest parts can be tipped over and used as a chair by sliding a flexible bottom plate into the two sides, creating the seat and the back support. Out of the four remaining side parts, two of them can be used as arm support for the chair, and the other two will be used as legs for the bedside crib. The box for the bedside crib is created by the endplates of the cot.



Illu. 2.42

OUTPUT

Comparing the two concepts, it was clear that concept two still had a lot of unsolved issues on how to make the dimensions match and how to make use of all components in the product. It was decided to move further with concept one, because of the simplicity and that the needed dimensions for the nursing chair and bedside crib would be easy to solve with this concept. The other concept made the transformation from chair to cot way too complex

SHELL CONCEPT

After choosing the final concept a new ideation round was conducted to test out different variations of the shape. This was done in illustrator where it was possible to draw it with the right dimensions. The ideation round resulted in many variations as seen in appendix 10. These drawings were used as a base for a discussion about how the different variations affected the product.

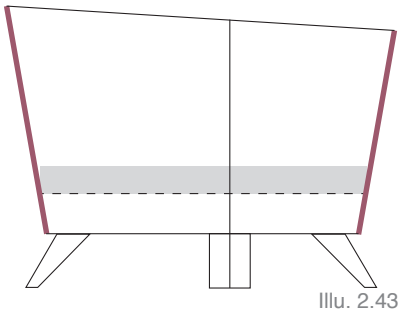
ANGLE

One of the topics was how the ends of the cot should be angled. It was important that it looked intentional, but at the same time, it should not make the product too big. Two variations were picked out for further investigation. One with an angle on 10 degrees and one with an angle on 5 degrees (illu. 2.43 and 2.44).

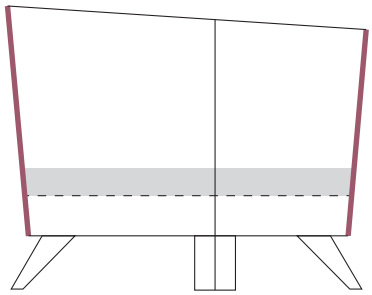
BOTTOM PLATE

Going through the shape variations of the bottom plate, three were chosen to move further with (illu. 2.25). It was important that the shape did not reduce the lying area two much, but it should also have a soft balanced shape.

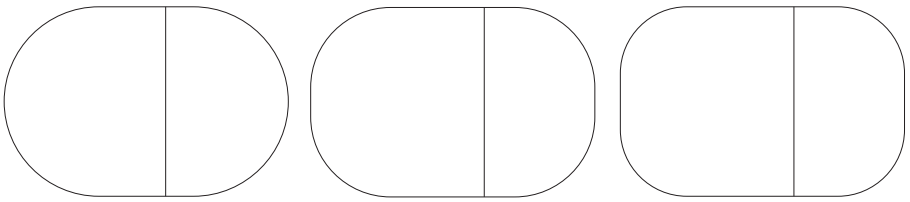
When considering the choice of bottom plate, it was clear that it was not possible to make other decisions, before the bottoms were tested out in a real model, to see how the shape would affect the rest of the product.



Illu. 2.43



Illu. 2.44



Illu. 2.45

OUTPUT

It was decided to test out the angle of the sides of the cot and the shape of the bottom plate, in 1:1 models, to see how they would appear in real size.

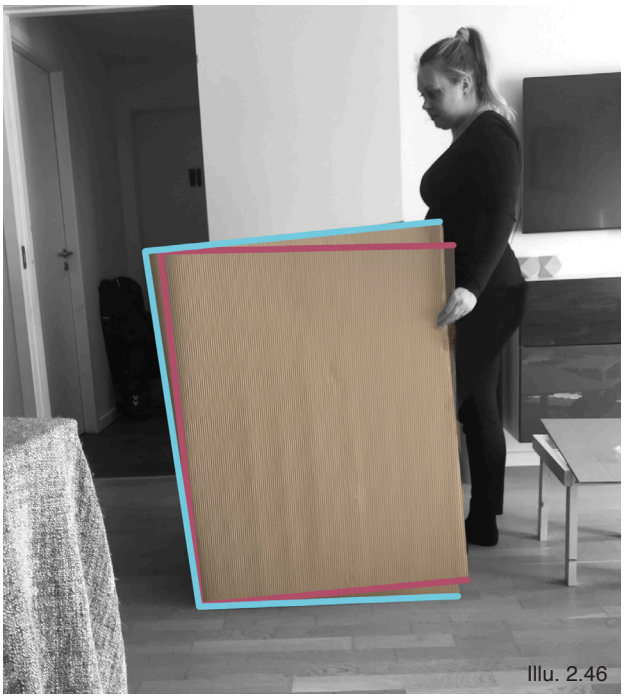
PROTOTYPING IN 1:1

From the previous phase, three bottom plates were picked out to test how the product would appear in scale 1:1. The chair part of the product was made as a prototype in cardboard to see how it would fit a person, and into the living room.

At first, a bottom construction was built, to make it possible to test the seating position in the nursing chair, and make the appearance more realistic. The seating height was made in 45 cm based on a quick test of how easy it was to get up from existing furniture.

The two different angles were tested (illu. 2.46), and it was clear that the 5 degrees were not enough, and it was very difficult to see that it was angeling. But the 10 degrees gave a good angle and a good slope for the back support.

To test out the shape and size of the product, it was decided to build two models. One with a square bottom and one with an oval bottom and compare the differences.



Illu. 2.46

5 degrees
10 degrees

1ST MODEL: SQUARE BOTTOM

Illu. 2.47

2ND MODEL: OVAL - RADIUS ON 40 CM

Illu. 2.48

When comparing the two models, the mutual issue was that both seemed enormous. The round shape from the oval bottom made the nursing chair a little smaller, but it seemed very closed because it was not possible to make the bar section very big if we wanted it to be straight. If the bar section curved, the production would be more expensive, and it would be more difficult to store. To solve this issue a third model was built using a square bottom with rounded corners.

3RD MODEL: SQUARE BOTTOM WITH ROUNDED CORNERS WITH A RADIUS OF 15 CM

Illu. 2.49

With the rounded corners, the overall design of the nursing chair became better and from the side, the nursing chair had a good balance between the open and closed area. But even though the shape was better the nursing chair still seemed very big.

Building the models it came clear that is was not necessary to be able to adjust the cot in two heights, because the minimum of 30 cm from the bottom to the top, was only needed the first 6 months. So the function of height adjustment should only be in the bedside crib. This meant that is was possible to use the same height of the bottom for the nursing chair, as for the cot in the 60 cm position.

OUTPUT

This test showed that the bigger a radius in the corners of the bottom plate, the smaller the product seemed, which was a good thing. But the bigger a curve, the smaller space there was for the bar section if it should be straight. At this point, it seemed impossible to make the nursing chair appear smaller and more open at the same time, so it was decided to look for inspiration in nursing chairs that were supposed to look big.

- The cot should only have one height adjustment, 60 cm from the bottom plate.
- The Bar section has to be straight in the vertical plane.
- The ends of the cot should have a 10 degrees angle.

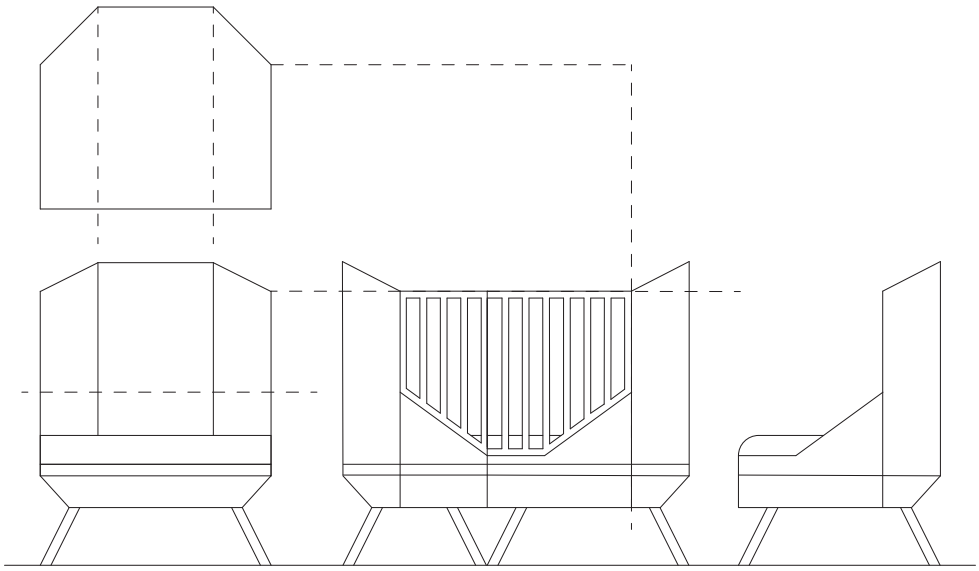
INSPIRATION FROM A BIG ARMCHAIR

To figure out how to make the size of the nursing chair look like a regular armchair, a big armchair was found as inspiration. Based on the issues from previous round and with inspiration from the big armchair, a new variation of the shell was sketched on and built as a cardboard model in scale 1:1.

THE UNKNOWN ARMCHAIR

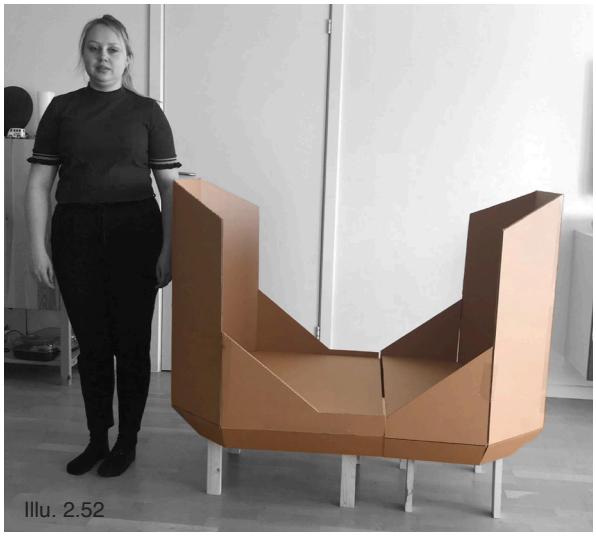
This unknown armchair was chosen for inspiration because it seemed like a cozy nursing nest with room for different seeding positions and support for arms, back, and head. The overall shapes were embracing the big size of the armchair, and it was inspiring how the shapes of the pillows softened up the diagonal lines. The chosen shape is shown in illu. 2.51. The variations can be seen in appendix 11.

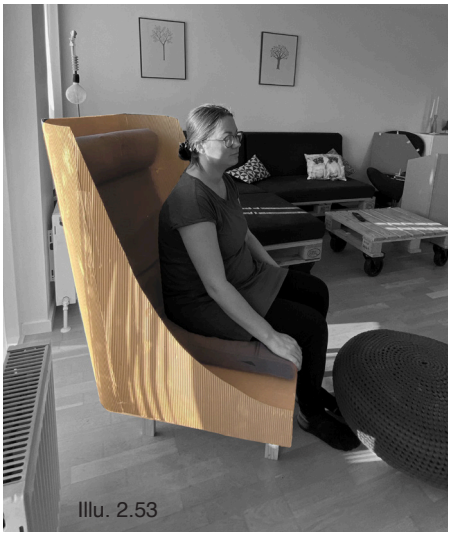
Illu. 2.50 The unknown armchair



Illu. 2.51

To compare the new shape with the previous models, it was built in cardboard in scale 1:1 and tested in context (illu. 2.52 to 2.54).
The product with the new shape seemed way more appealing, because it looked smaller and lighter, and it made it possible to make a bigger bar section. It would also be cheaper to produce because it only consists of straight plates cut in different ways.


Illu. 2.52


Illu. 2.53

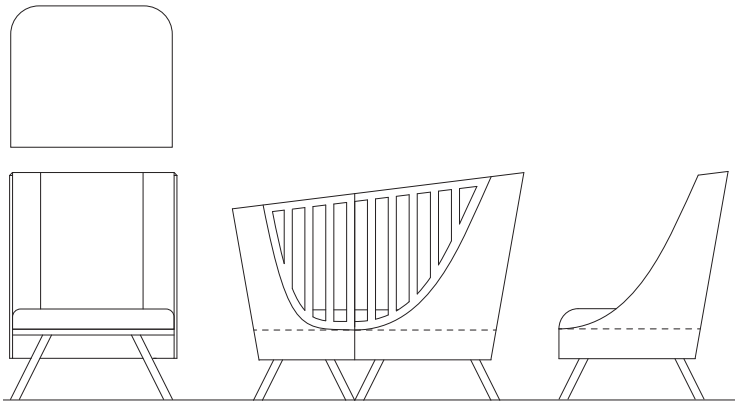

Illu. 2.54

OUTPUT
At that point, we were quite impressed by the product, but it came to our minds that it could also have something to do with the quality of the model. Because it was easier to make, the output was more precise and sharp. So it was decided to build a more precise model of the hole curved concept, to make a fair comparison.

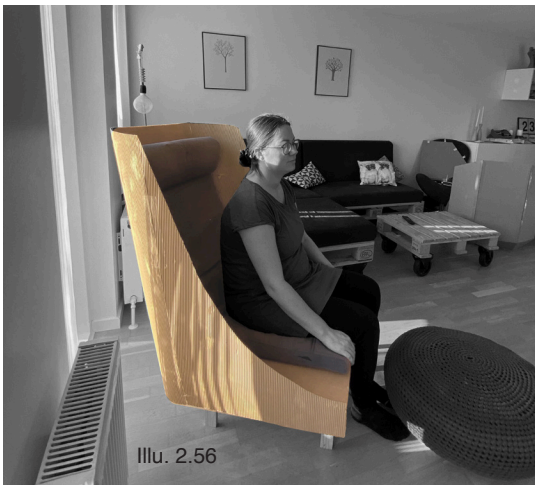
REBUILD

The purpose of this round was to make a more precise model of the first shell concept, with the right shape of the slope and back angle. This was done to be able to compare it with the concept from inspiration from a big armchair.

To be able to create a more precise curved model, a measurable sketch was made based on the first sketch of the concept (illu. 2.55.)
After the dimensions of the product were specified, the product was built in 1:1 in cardboard (illu.2.25 and 2.26). The overall shape of the product looked much better, but the nursing chair still looked very big. The model showed that the height of the product was too high for the parent to reach the child in the bed.



Illu. 2.55



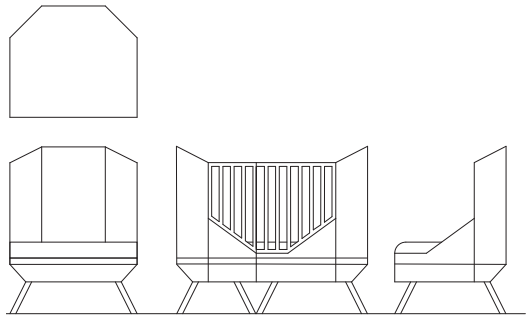
Illu. 2.56

Illu. 2.57

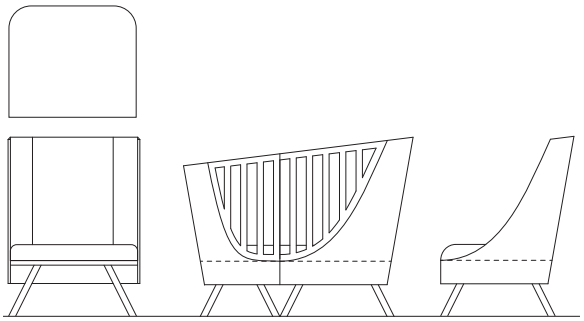
OUTPUT
The new model created some more fair conditions to compare the two products, but it was still difficult to choose between the two products. So it was decided to get the maternity groups opinions on the two shapes.

CHOICE OF CONCEPT

The shell concept and geometric concept were presented to the maternity group in a pdf with drawings and pictures of the two concepts built out of cardboard in 1:1. The intention was to get an idea of what idiom they would prefer, so they were asked to only focus on the appearance of the product.

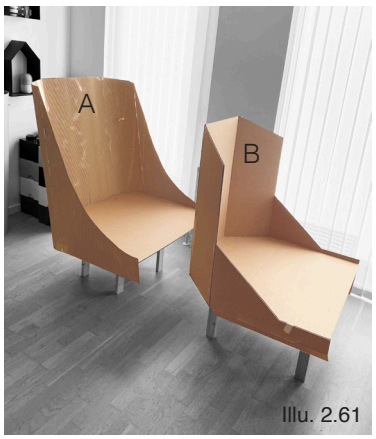


Illu. 2.58

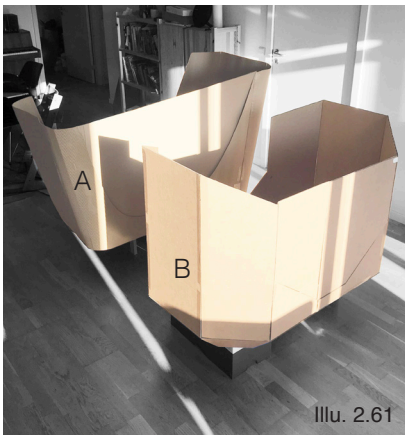


Illu. 2.59

Illu. 2.60



Illu. 2.61



Illu. 2.61

The maternity group collected their feedback in a mail, based on a mutual discussion. The message can be seen in appendix 12.
All five mothers in the maternity group preferred the curved shell concept (A). The comment on the shell concept was, that it seemed more simple, clean, and timeless. they liked the soft lines. The tall back looked like it gave good back support and the way the top slope was made they saw as a nice detail. The only bad comment was that maybe it gets too closed and dark because the section with bars was very small.
The comments for the geometric concept (B) was that it had a funny expression and a more modern look. They meant the concept has too many edges, which they did not like when the baby had to crawl around in the bed. When asked which concept they would choose, they all said the shell concept (A).

OUTPUT

Based on the maternity group's comments, it was decided to move further with the shell design, still having to solve the issue with the size. It worked fine getting feedback based on the pictures in the pdf, but it would have been ideal if the maternity group could have seen the models in real life.

DOWNSIZING THE PRODUCT

When experiencing the chosen concept in scale 1:1 it seemed way too big, so it was necessary to evaluate the chosen dimensions, to see if it was possible to downsize the product.

It would benefit the product to downsize the length of the bedside crib because it would mean a smaller width of the cot and nursing chair. The smallest length of the existing bedside cribs are 80 cm, but when looking at WHO child growth standards (appendix 13) it could be acceptable to make it shorter. Danish children are higher than average, so it is necessary to look at the 85th percentile (babyinstituttet.dk, 2020). A boy at six months on the 85 percentile is almost 70 cm. Making the length of the bedside 70 cm would be ideal because it would benefit the width of the nursing chair, and it also fits to the standard width of a junior bed that is 70 x 160 cm. It might get a little too short for the child at six months, but at that time the need for support when breastfeeding is smaller, so it would make sense to transform the product into the cot.

The total height of the product was a problem because it was challenging to reach the child lying in the bed. The initial seating height for the nursing chair was set at 45 cm because it was a typical height of a dining chair, and it was assumed that it would be easier to get up from. Doing a quick test trying to get up from furniture in different heights without using your hands, it was decided that it could be accepted to minimize the height to 38 cm.

Illu. 2.62

Illu. 2.63

Illu. 2.64

Illu. 2.65

Illu. 2.66

A model with the new dimensions was built in 1:1 to see the improvements (illu. 2.62 to 2.66). Now the size seemed more realistic as an armchair, and it fitted fine into the context. The only issue was that the slope from the back of the bedside crib to the back of the nursing chair seemed very exaggerated, so two other heights with 5 cm distance were tested out using tape. Moving it 10 cm down, it seemed like the slope was a mistake instead of intensional. Moving it 5 cm down it gave a fine indication of a slope, without being too exaggerated, so this became the final change in the dimensions.

OUTPUT

The size of the product was no longer an issue, so now it was possible to start detailing the components of the product.

- The length of the bedside crib should be 70 cm.
- The seating height of the chair should be 38 cm.






Illu. 2.67 own picture of the kids from the visit to the maternity group

DESIGN BRIEF 2.0

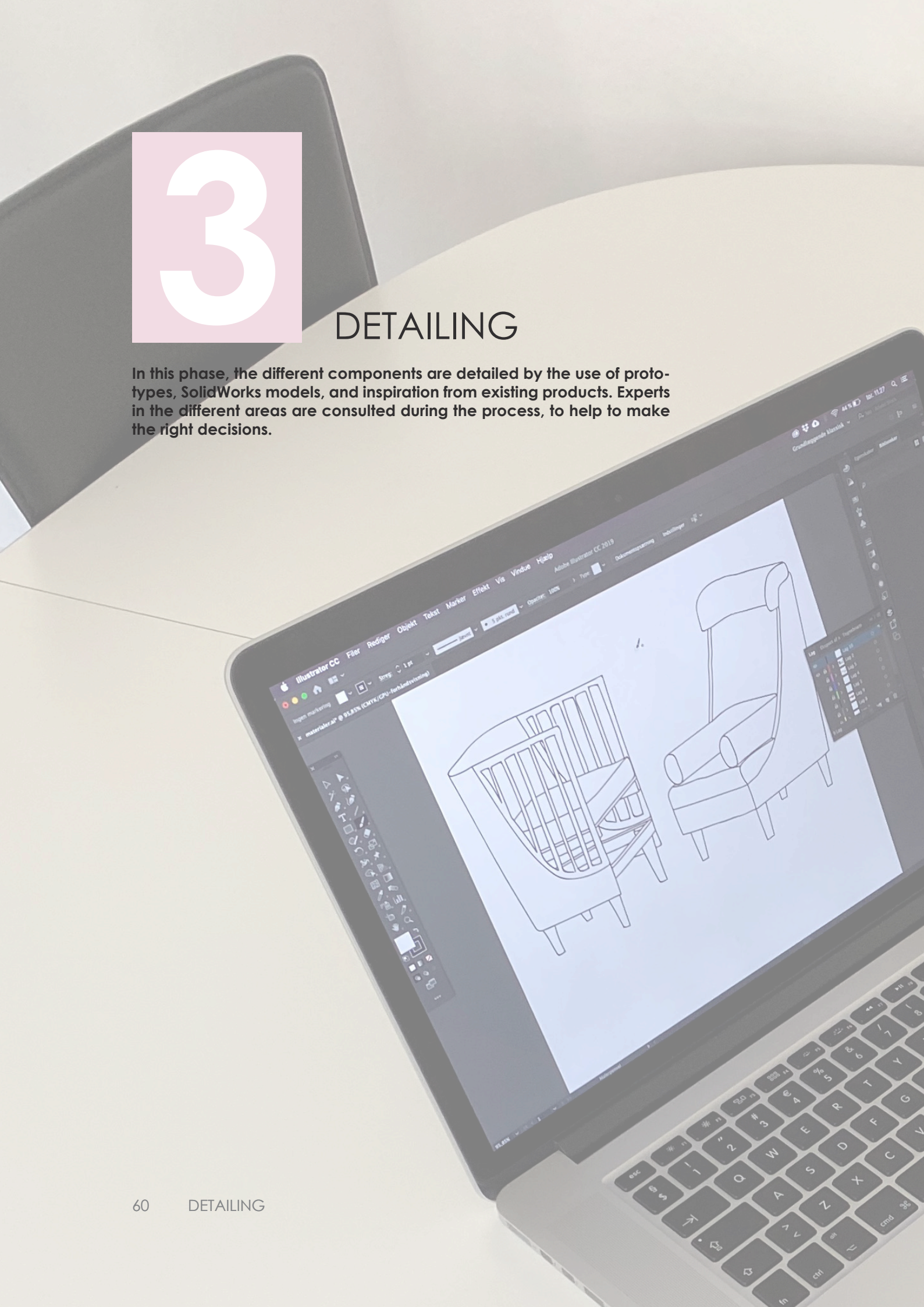
On this page, an updated version of the collected insights is made. The new and updated insights are highlighted with white in the table, and the insights that have been updated are crossed out and the new ones are added below.

NO.	INSIGHT	PRIO.	PRODUCT PART	PAGE
1	It should be possible to eat when breastfeeding.	1	Chair	14, 27
2	There should be a head support to rest the head on	4	Chair	14, 22, 27
3	It should be easy to get up with a child in both arms.	3	Chair	14, 16, 22, 27
4	There should be an adjustable firm and stable arm support.	5	Chair	14, 22, 27
5	It should be possible to wash the cover in a washing machine or wipe it clean.	4	Chair	14, 16, 27
6	It should be possible to turn on and off the rocking function.	1	Chair	16, 27
7	The aesthetics of the product is important	3	Chair, Cot, Bedside Crib	16, 22
8	The product should grow with the child.	3	Cot	20, 23
9	The product should support the lower back.	4	Chair	22, 27
10	The product should have a tall back going all the way up to the head.	5	Chair	22, 27
11	It should be possible to sit in different positions.	3	Chair	27
12	The bottom plate should be adjustable to fit the parent's bed	4	Bedside crib	31
13	It should be open on one side, or one side should be detachable	5	Bedside crib	31
~~14~~	~~It should be possible to adjust the height of the bottom plate from 30 cm to 60~~ cm	~~4~~	~~Cot~~	~~31~~
14	The height should be 60 cm from the top to the bottom plate.	4	Cot	31,51
15	The height inside can not be lower than 33 cm	5	Bedside crib	31
16	Distance between bars should maximum be 6 cm	5	Bedside crib, cot	31
17	Distance between slats should maximum be 2,5 cm	5	Bedside crib, cot	31
18	Distance between bottom plate and sites should maximum be 2,5 cm	5	Bedside crib, cot	31
~~19~~	~~Minimum lying dimensions is 120 x 60 cm~~	~~4~~	~~Cot~~	~~31~~
19	Minimum lying dimensions is 120 x 70 cm	4	Cot	31, 57
20	Height from the floor should be 90 cm	3	Bedside crib, cot	31
~~21~~	~~The length should be between 80 to 112,5 cm~~	~~4~~	~~Bedside crib~~	~~31~~
21	The length should be 70 cm.	5	Bedside crib	31, 57
22	There should be a detachable bar section to remove when the child is able to stand.	3	Cot	31
23	The Bar section has to be straight in the vertical plane.	5	Bedside crib, cot	51
24	The ends should have a 10 degrees angle.	4	Chair, bedside crib, cot	51
25	The seating height should be 38 cm.	5	Chair	37

3

DETAILING

In this phase, the different components are detailed by the use of prototypes, SolidWorks models, and inspiration from existing products. Experts in the different areas are consulted during the process, to help to make the right decisions.



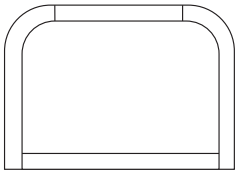
Illu. 3.1 Detaling the product

CONSTRUCTION & BOTTOM PLATE

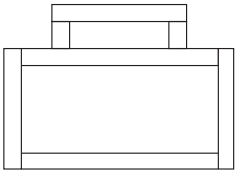
Different ways of creating the construction structure carrying the bottom plate were tested to find the best and most simple solution. On the construction, the shell, and legs of the product are attached. Below three ways of creating the bottom structure were found.

The construction structure is placed on the inside of the shell and is the carrying construction. The construction is made out of laths with a dimension on h: 48 mm w: 24 mm. Based on the feedback from the carpenter company Magnus Thomsens Efterfølgere it should be strong enough, and it might be possible to choose a smaller dimension, but this should be tested out.

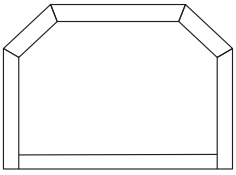
CURVED
The first version, is the most expensive to produce because of the bent lath. It is also the construction supporting the bottom plate most. This construction makes it possible to attach the legs in the corners of the product.

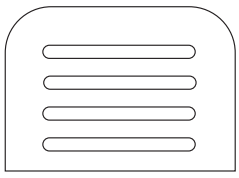

Illu. 3.2

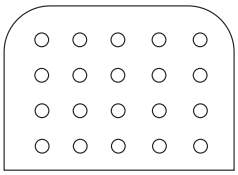
SQUARE
Instead of using the curved laths, it could be made with straight laths, which is easier and cheaper to produce, but there are more parts to assembly. The problem here was that the legs were not possible to place in the corners of the shell.


Illu. 3.3

COMBINATION
The third version became a combination of the curved and the square construction. With this idea, the construction is still simple, easy, and cheap to produce. But at the same time, the angled lats make it possible to place the legs in the corners.


Illu. 3.4


Illu. 3.5


Illu. 3.6

BOTTOM PLATE
The bottom plate is placed on top of the construction to carry the mattress. The thickness of the plate ended up being 10 mm, based on existing products. In the plates air holes are needed to create airflow to the mattress, these holes can be made in different ways as seen on illu. 3.5 - 3.6, but based on the needs the holes can not be bigger than 25 mm.

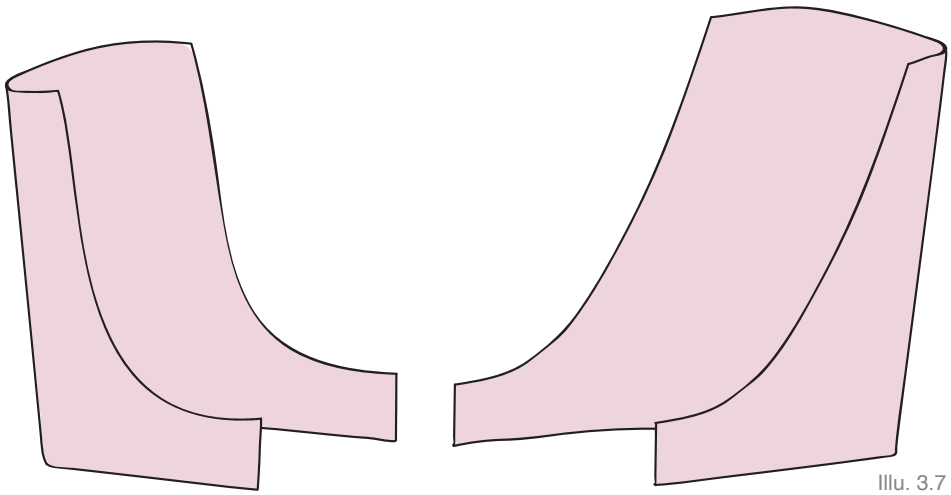
OUTPUT
With approval from Magnus Thomsens efterfølgere, the latch has a dimension on 48 x 24 mm. The construction is made as simple as possible to lower the production price, but at the same time, it is shaped to make it possible to place the legs as far out as possible.

SHELL

As the shells play an important role in the overall shape of the product, different existing solutions are looked at to find inspiration about the production and thickness.

During the ideation and the testing phase, the overall design of the shell was made. The shell has a curved back with an angel on 10 degrees. To get an idea of the thickness of the shell the carpenter company Magnus Thomsens Efterfølgere was contacted. Also, existing armchairs and existing children's beds with a curved wooden plate were investigated. The most used thickness for bent plywood for children beds was 18 mm, but because of the size of the shell, the weight would become very high, so it was decided to reduce it to 15 mm. Based on Magnus Thomsens Efterfølgere it should be strong enough, but it would be necessary to test it in a prototype.

To produce the shells Hudevad furniture was contacted, because they specialize in bent wooden shells. To produce the shells, Hudevad uses wood veneer of beech or birch, which are bonded together with glue and pressed to the desired shape in a specially designed mold. Because the two shells have the same curves and radius, it is possible to use the same mold for both. The veneer would just be cut smaller for the bedside crib. This mold would cost around 40,000 DKK. When the shells are shaped, the edges will be milled in their five shafts machine to achieve a nice finish.



Illu. 3.7

OUTPUT

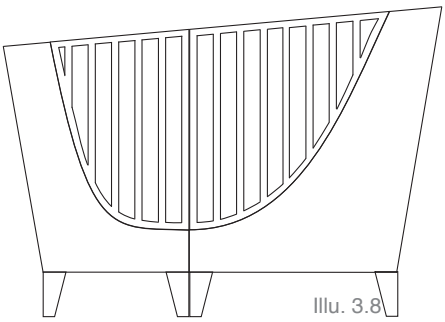
Based on the contact to both Hudevad Furnitures and Magnus Thomsens Efterfølgere, the thickness of the shell was set to 15 mm. As it is difficult to calculate the thickness of the shell, it is necessary to test it in a real prototype with the exact materials. This test will show whether the shell should be thicker or if it is possible to make it thinner.

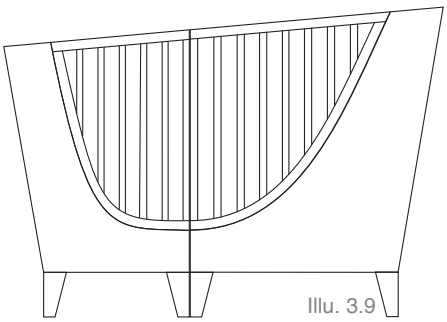
BAR SECTION

To reach an optimal appearance, different variations of angles, thickness, and spacing was drawn in illustrator (appendix 14). These variations were explored in two ways of producing the bar section. One where it was cut in a plate, and one where it was built by massive bars.
Based on the drawings, a distance between the bars of 55 mm and a bar thickness of 15 mm gave the best balance. Now it was just necessary to decide how to produce it.

PLATE WITH HOLES
Using a plate creates a simple design of the cot, because there are not that many attachments areas. Here it is possible to use plywood, which is the same material as the shell. This way it is also very simple and easy to produce. The hole and overall shape of the bar section are made with a CNC miller, which is an easy and cheap production way.

MASSIVE BARS
Creating the bar section with massive bars, adds more quality to the product, because of the transition between the bar section and the shell. The production of this bar section is very complicated because every length of the bars is different, which means that every part has to be handmade. To assemble this bar section the holes in the frame need to be made very careful because of the various angles.

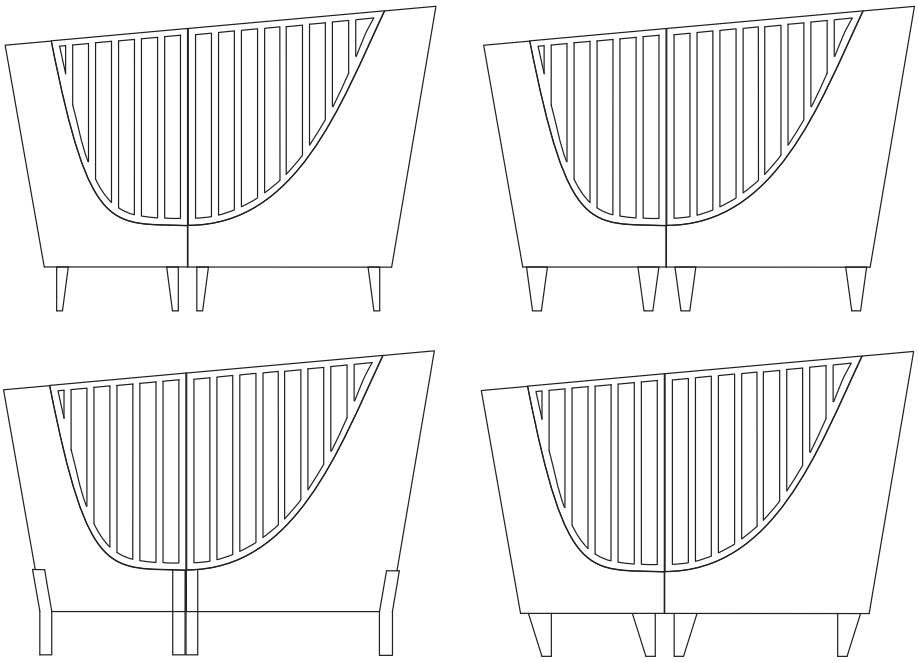

Illu. 3.8


Illu. 3.9

OUTPUT
The wish to have a visional transition between the shell and bar section was desired because it gives a feeling of quality. Based on the two different versions it was decided to use the plates with holes because of the production. It is too complicated to produce the bars because every bar is different and needs to be attached in different angles. To fulfill the wish of the transition the plate was made 19 mm which is 4 mm thicker than the shell. The bar section is following the surface on the inside, which makes it possible to create a difference on 4 mm on the outside surface, which will be highlighted by the use of fillets.

LEGS

After settling the overall appearance it was possible to design the shape of the legs. Different suggestions were drawn in illustrator to compare the aesthetics (illu. 3.10).



Illu. 3.10

Because the legs are attached to the bottom construction, the design of the construction determines where to place the legs, which was not considered during the sketching session. With inspiration from the drawings, different legs were made in SolidWorks and tested out in the real placement of the model. The final legs were chosen based on how the appearance fitted best to the idiom of the rest of the product.

When mounting the legs on the construction, a carpenter from Magnus Thomsens Efterfølgere suggested making a cut in the top of the leg (illu. 3.11).

Illu. 3.11

STABILITY TEST

Because of the 10 degree angles on the ends of the cot, there could be a risk of tipping over the product. The most critical scenario would be if a child of 18 kg was standing in the nursing chair end of the cot, leaning the entire body against the back.

To calculate if the product would tip over, the center of gravity for the cot (C1) is found in SolidWorks. The center of gravity of the child (C2) is estimated based on the child's position when standing in the bed. For the cot to tip over, the force from the child should cause a rotation in the point marked on the leg

FIRST THE FORCE IS CALCULATED:

F_{cot} = 31,5 kg × 9,82 m/s² = 309,33 N = 0,309 kN

F_{child} = 18 kg × 9,82 m/s² = 176,76 N = 0,177 kN

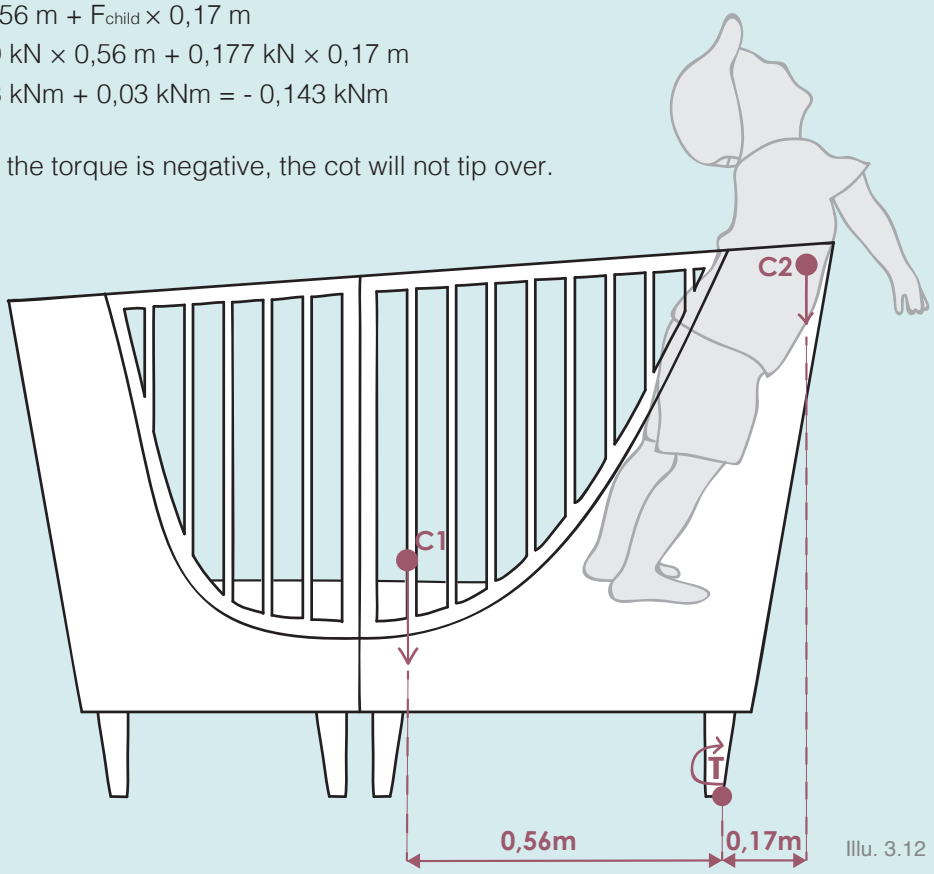
THEN THE TORQUE IN THE POINT ON THE LEG IS CALCULATED:

- F_{cot} × 0,56 m + F_{child} × 0,17 m

= - 0,309 kN × 0,56 m + 0,177 kN × 0,17 m

= - 0,173 kNm + 0,03 kNm = - 0,143 kNm

Because the torque is negative, the cot will not tip over.



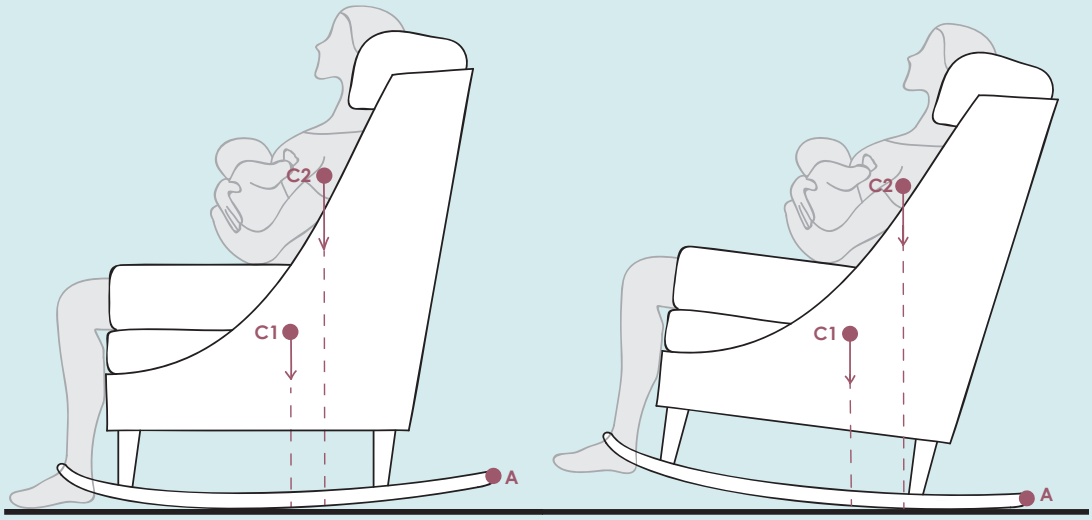
Illu. 3.12

ROCKING FUNCTION

To be able to compete against the nursing chair from ammestolen.dk it was decided to design an add-on to create a rocking function. It is very divided whether or not the mother prefers the rocking function, so it should not be a permanent part of the product. Often it is first when the mother is standing with a screaming child in her arms, especially if the child has colic, she discovers the need for the rocking function, so here she would be willing to buy the add-on. The add-ons will be attached under the legs of the nursing chair.

To achieve the best rhythm when rocking the nursing chair, it would be ideal to test out existing rocking chairs with different curves between the nursing chair and the floor. This was not possible at the moment, so instead the curve was created with inspirations from pictures of rocking chairs.

To make sure the nursing chair is not tipping over when rocking, the center of gravity of a woman breastfeeding and the nursing chair, should not move past the edge of the curve (A) when the nursing chair is rocked all the way back. The center of gravity of the nursing chair (C1) is calculated by SolidWorks. The center of gravity of the breastfeeding woman (C2) is estimated based on her shape. As seen on illu. 3.13, the centers of gravity do not move past point A, so the chair will not tip over.



Illu. 3.13

OUTPUT

To create a connection in the idiom, between the legs and the bed, the selected legs are designed with a straight side that meets an angle, similar to the bed. The legs are shaped so that they grab around the construction part to increase stability.
The rocking function is made as an add-on feature to meet both the need of a still chair and a rocking chair.

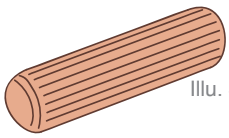
ASSEMBLING

To figure out how to assembly the product, inspiration was taken from existing cots and the overall furniture industry. With feedback from Magnus Thomsens Efterfølgere the final decisions were made.

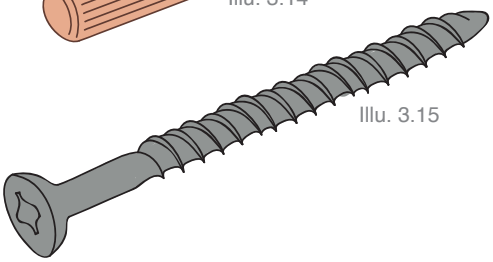
The assembling of the product can be divided into two types. The ones done by the manufacturer, and the ones done by the end-user. For the end-user, the assembling should be easy, because in some cases the mother would prefer to do it by herself because they enjoy preparing for the baby. In these cases, the mother would be pregnant, or have a baby to take care of at the same time. Because the assembling is only done once or twice per child using the bed, it was decided that it would be acceptable having to use tools for the assembling. This would also be more secure, instead of using som quick click systems, that also would be more complex and expensive. For furniture design for children, it is important that all connections are made in a safe way, so the child can not get injured or swallow small parts. In the product there are five different types of connections which will be shown below.

THE CONSTRUCTION PIECES

For connecting the angled parts of the construction it was decided to use wooden dowels with a length of 30 mm and a diameter of 8 mm (illu. 3.14). These would be glued into pre-drilled holes in the construction pieces. The middle beam in the construction is mounted with screws (illu. 3.15) because the bedside crib and the nursing chair will be connected through that beam.



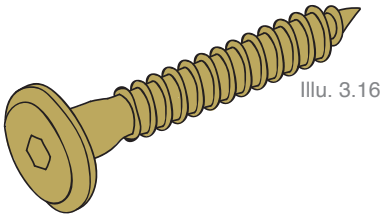
Illu. 3.14



Illu. 3.15

THE LEGS TO THE CONSTRUCTION

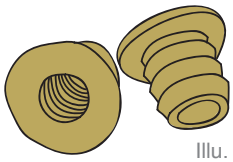
The legs are connected to the construction by a screw going through a hole in the leg and a smaller pre-drilled hole in the construction (illu. 3.16). The screw goes directly into the wood because it is not supposed to be disassembled. This assembling is done by the end-user.



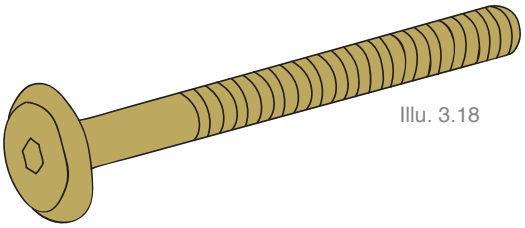
Illu. 3.16

THE CONSTRUCTION TO THE SHELL

To strengthen the connections to the shell, threaded nut inserts (illu. 3.17) are mounted in pre-drilled holes in the shell by the manufacturer. This is also done in the holes for the height adjustment of the bedside crib. Because some of the nut inserts will be visible, it was decided to use a nut that should be pounded in, because it had a more simple appearance. It would be necessary to test if the pounding would affect the shell. In that case, a nut insert with a hex drive could be used instead. The construction is mounted with an M6 furniture screw (illu. 3.18) screwed into the nut. This is done by the end-user.



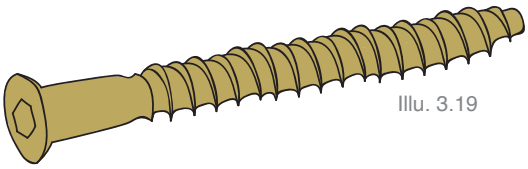
Illu. 3.17



Illu. 3.18

THE BAR SECTIONS TO THE SHELL

For connecting the bar section to the shell it was considered to use an (in danish called) excenterbolt and excenterhus, which are frequently used in furniture. With this solution, there would be no visual screws or holes from the outside. On the inside, there would be a hole with a diameter of 15 mm, which is covered with a small plastic piece. It would be too dangerous to use the plastic piece because it is not safely secured, so it would not be possible to hide the holes. Instead, it was decided to use M6 furniture screws (illu. 3.19) as they do in Leander's baby junior bed. This is done by the end-user.



Illu. 3.19

Illu. 3.20

THE BEDSIDE CRIB PART TO THE NURSING CHAIR PART (AND JUNIOR EXTENSION)

When transforming the bedside crib and nursing chair into the cot M6 furniture screws (illu. 3.18) and furniture bolts (illu.3.20) are used two places on the construction and four places on the bar sections. This is done by the end-user.

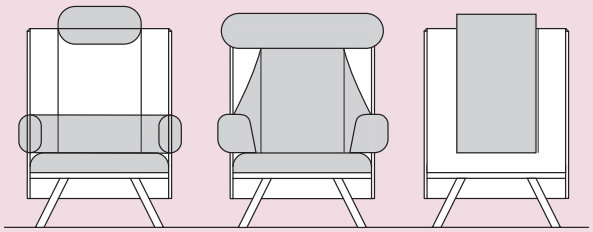
OUTPUT

The product is going to be simple to assemble by the end-user because they only have to use screws. There might be some changes in the choice of size of the screws because it is necessary to test out the thickness of the shell and how it reacts in the connection joints.

CHAIR UPHOLSTERY

To make the nursing chair more comfortable for the user, and to fulfill the needs for support and adjustments, an ideation round was made in illustrator (illu.3.21). Based on the drawings, some of the ideas were tested out in mock-ups.

Based on the insigths from the maternity group, it was decided that it should be possible to remove the covers and wash them. This meant that it would make the most sense to make the head, back, and arm support in three different parts. The mattress part from the cot is put in a cover and used as the bottom in the nursing chair.



Illu. 3.21

BACK AND HEAD SUPPORT

For convenience, it was tested out if it was possible to use the mattress piece (40 cm x 70 cm) for the junior bed extension, as the back support. See illu. 3.22 and illu. 3.23. But it did not fit very well into the shell, and it did not provide good support. To create the best support it was decided to use the shape of the shell to form the backrest and cut it in an angle that would make it possible to lean back and give good support to the back.

To support the head a cushion at the top of the nursing chair was needed, see illu 3.24. To provide the best head support, the pillow needed to go over the top edge of the nursing chair to be high enough. It should also go a little beyond the side edges, to make it possible to rest the head.

Illu. 3.22

Illu. 3.23

Illu. 3.24

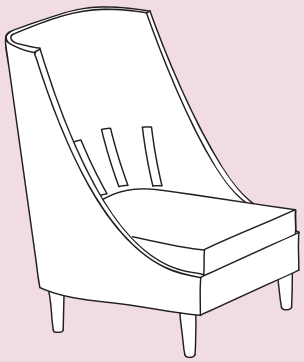
To create the best comfort for the mother during the feeding situation a pillow supporting the back and head was made. The pillows are made out of foam covered with fabric, and the two pillows are connected with a zipper. To make the back cushion stay in place different solutions was looked at:

VELCRO

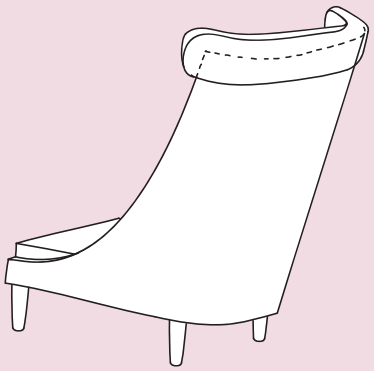
If the velcro is used it would have to be attached to the inside of the shell, which would be visible when the product is used as a cot. Beside that, the velcro has a short lifetime because it is susceptible to dust and dirt. Velcro also creates a risk of sticking to the clothing and thereby making damages.

FABRIC POCKET

By creating a small pocket in the fabric of the head cushion, it is possible to keep the head and back support in place. But this would change the overall appearance of the nursing chair because a part of the shell would be hidden behind the fabric.



Illu. 3.25

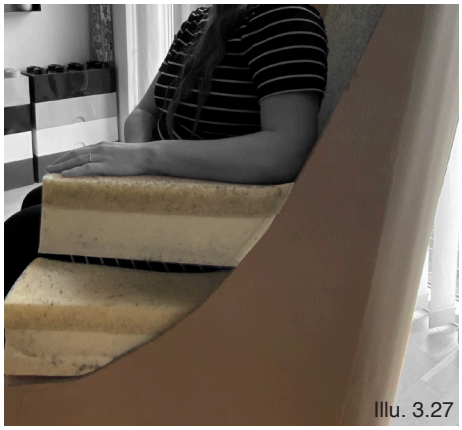


Illu. 3.26

To create the most simple design for the nursing chair, it is decided not to fasten the back support. This decision is made because the back support is made out of cold foam with a density of 32 kg, which makes it very firm and heavy. The shape of the shell and the angled back is assumed to keep the back support in place. This would need to be tested on a prototype in the right materials. The back support pillow is standing on top of the seating pillow. The seating pillow is as the back support made in cold foam which is covered with fabric, but on the bottom surface a non-slippery material is added, to make sure the pillow is not able to move.

ARM SUPPORT

The result from all the user research and surveys showed that adjustable arm support was important to make it possible for the mother to gain the best support for her specific needs.



Illu. 3.27

Illu. 3.28

The first idea for the armrest was as see on illu 3.27 and 3.28. to stable a armrest witch is attached to the shell and possible to adjust in height. The challenge with this armrest was that the adjustments were complicated and challenging to do while having a child in your arms.

With inspiration from a nursing pillow, it was decided to test out a concept with a more flexible armrest (illu. 3.29 to 3.32). By using a long pillow placed around the mother, it was possible to fold and positioning the armrest after the individual needs. In the ends, there would be two velcro straps, making it possible to attach the pillow around the mother, so it would stay in place. The arm support pillow has different functions because the user is able to modify it during use. The pillow can be used as a regular armrest, or it can be folded in front of you.

The shape of the arm support is made to give the user lower back support, which also keeps the arm support in place. By not clamping the arm support to the nursing chair it is possible for the user to move it easily around.
The pillow used for the tests was a u-shaped pregnancy pillow, so it was a little oversized compared to how the final armrest should be. The pillow was made with a filling of Foss Flakes, which is also used in many nursing pillows, so it would be fine to use it in the armrests too.

To evaluate the idea, pictures of the test were shown and explained to the breastfeeding expert Louise Marie Holm Nørby. She liked all the thought behind our idea, and she recommended using Foss flakes, because it is firm and easy to shape and keep in one position, and at the same time it is good to keep the heat away (see the full interview in ppendix 15).

Illu. 3.29

Illu. 3.30

Illu. 3.31

Illu. 3.32

FABRIC

The fabric used for the seating, back and head support is Neotex Lido, which is recommended by Ap Polstring. This textile is used for furniture and has a high Martindale. The fabric for the armrest is 100% organic cotton. This is chosen because it is often used for nursing pillows. It all can handle to be washed at 60 degrees.

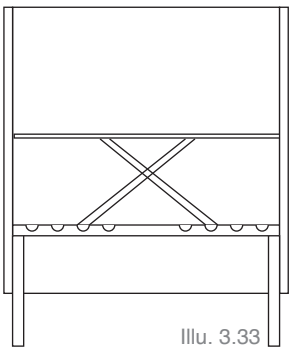
OUTPUT

The tests gave a good indication of the needed dimensions and placements of the cushions. It was not possible to test for the best support, because the cardboard model was not strong enough to lean on. It was decided to finish up the shapes in SolidWorks and focus on the desired aesthetic. When it is built in the real materials it will be possible to improve the comfort of the nursing chair.

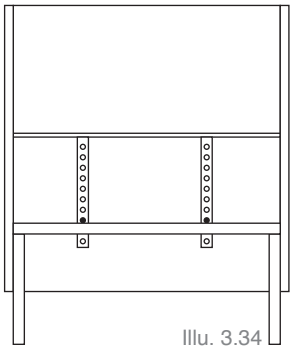
HEIGHT ADJUSTMENT FOR BEDSIDE CRIB

The bedside crib is placed next to the parent's bed. The height of beds for adults variates a lot, so the height of the bedside crib needs to be adjustable. It was preferred not to have holes all over the shell, so different solutions were tested out.

Illu. 3.33 and 3.34, show two examples on how to adjust the height. Both solutions make it possible to extend the height without making holes in the shell. One extends the height by lifting the bottom and mount it on the construction in the holes that gives the needed height. The other changes height depending on what grooves the legs are placed in.



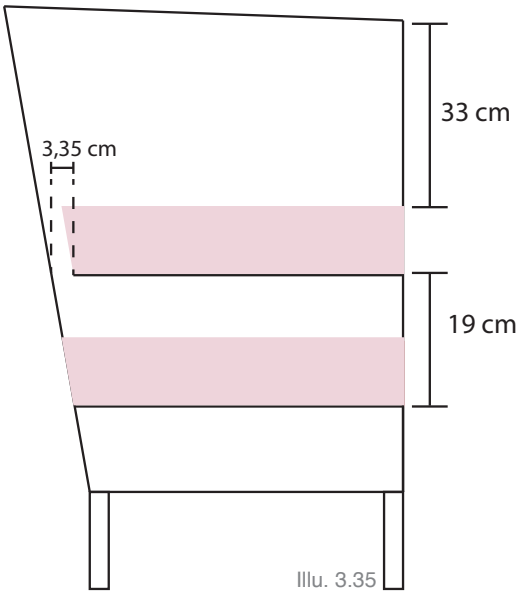
Illu. 3.33



Illu. 3.34

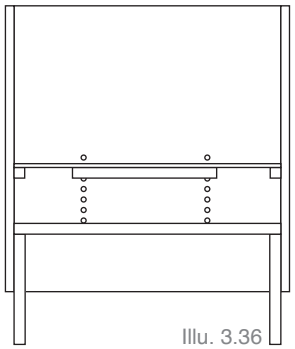
Investigating the two solutions another issue was discovered. When the height is raised, a gap would appear in the side of the bed, because of the angle of the shell. To figure out if it would be an issue, it was necessary to calculate the size of the gap. Because the bed should be raised to a height with a minimum of 33 cm from the mattress to the top, the bottom should be able to move 19 cm. This meant that the gap in the highest position would be 3,35 cm (illu. 3.35).

This could be solved by making an extendable bottom, but combining this with one of the height adjustment solutions, it seemed way to complex, compared to the fact that the adjustment only would be done once or twice.
Discovering that the bottom only should be adjusted 19 cm, it was decided to compromise and make holes in the shell, and because the mattress would cover 10 cm of the holes. It was decided to make a detail out of the holes, instead of trying to hide them.



Illu. 3.35

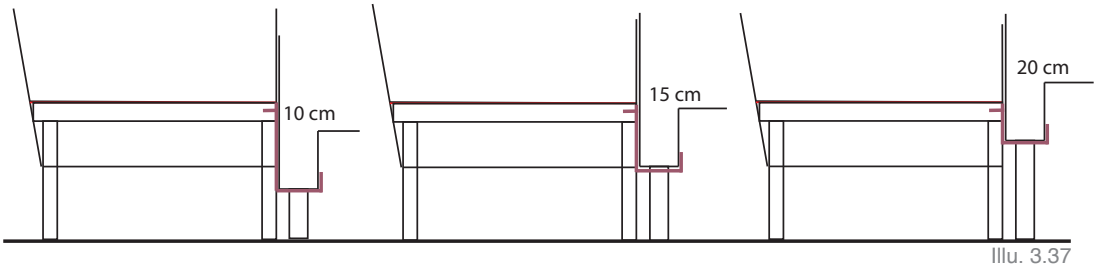
To carry the bottom it was decided to make a smaller support structure, that should just be mounted in the holes with the desired height (illu. 3.36). To solve the issue with the gap, the beam mounted on the side of the shell with the angle should have a debt of a minimum of 5 cm to cover the gap. The bottom would be fixed in the to structures on the sides, to make sure the bottom does not slide, and to create some extra stability.



Illu. 3.36

LOCKING SYSTEM OF BEDSIDE CRIB

To make sure the bedside crib stays beside the parent's bed the height of the legs on regular beds is found. 10, 15, 20 cm is the standard measurements used for legs to regular beds. Therefor a way to attach the bedside crib could be by gripping underneath the parent's bed. Illu. 3.37 show how an angle bracket is attached to the bedside and gripping underneath the bed.



Illu. 3.37

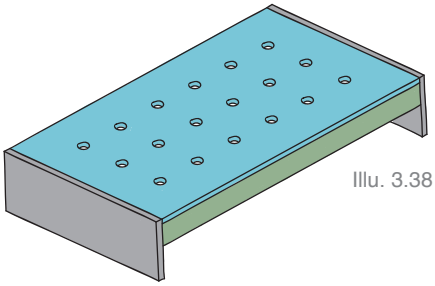
OUTPUT

The bedside crib can simply be adjusted in five different heights and attached to the parent's bed by using one of the angle brackets that come with the bed.

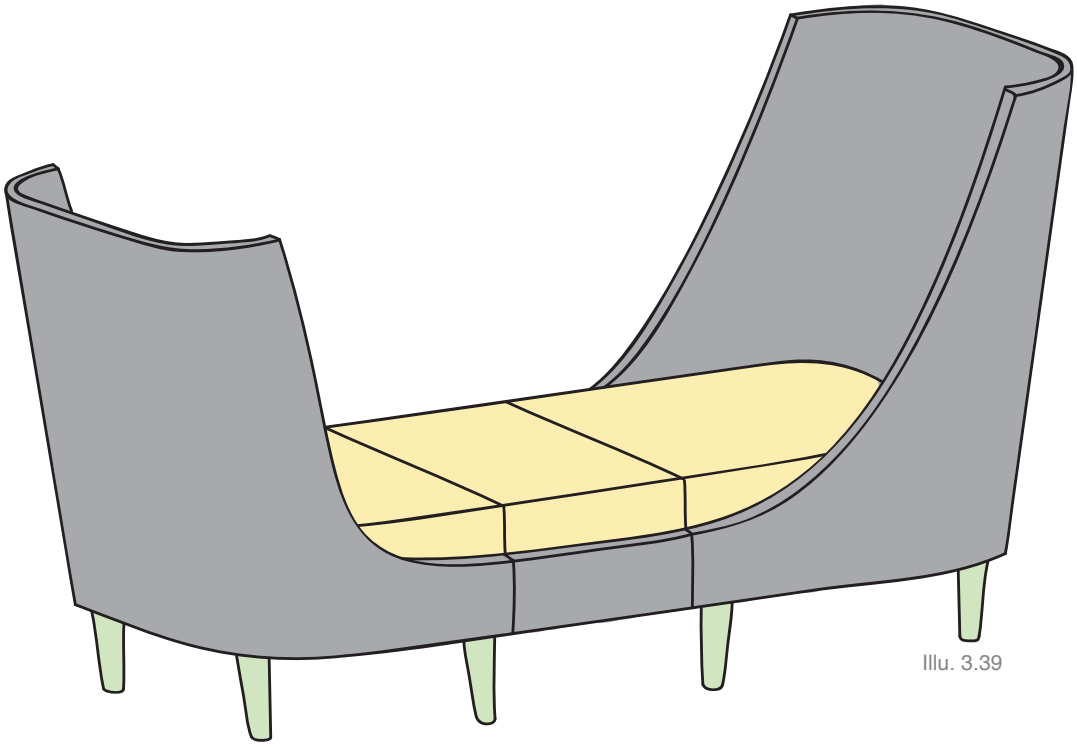
EXTENSION TO JUNIOR BED

To make the lifetime of the product even longer the bed is able to extent to a junior bed by adding an extension part. This section will explain the extension from the cot to the junior bed.

To be able to compete against the existing cots on the market the bed needs to be able to extend to a junior bed. By looking at the existing beds the length of a junior bed is either 140 cm or 160 cm long. To extend the life of the bed as much as possible the bed can extend to 160 cm (illu. 3.39). This means that the extension piece for the bed must be 40 cm long. The extension part (illu. 3.38), including the extra piece of the mattress, is purchased as an accessory for the bed, and will typically first be needed when the child is 3 to 4 years old.



Illu. 3.38



Illu. 3.39

SPECIFICATION

In this table, the final specifications are listed. The specifications are based on the gained insights. It is divided into the three product types; Nursing chair, Bedside crib, and Cot, to create a better overview. The source refers to the number of the insight that lead to the specification.

SPECIFICATION	UNIT	VALUE	SOURCE
NURSING CHAIR			
Detachable head support	Binary	Yes	2
Arm support pillow filled with foss flakes	Binary	Yes	4
Minimum washing temperature for covers	°C	60	5
Lower back support pillow	Binary	Yes	9
Maximum height	mm	980	20
Minimum seating height	mm	380	25
On/off rocking function	Binary	Yes	6
BEDSIDE CRIB			
Minimum number of height adjustments	Steps	5	12
Minimum height from floor to bottom plate	mm	280	12
Maximum height from floor to bottom plate	mm	470	12
Open on one side	Binary	Yes	13
Minimum height from bottom plate to top	mm	330	15
Minimum lying dimension	mm	700 x 500	21
COT			
Minimum height from bottom plate to top	mm	600	14
Maximum distance between bars	mm	60	16
Maximum diameter of holes in bottom plate	mm	25	17
Maximum distance between bottom plate and sides	mm	25	18
Minimum lying dimensions	mm	1200 x 700	19
The bar section has to be straight in the vertical plane	Binary	Yes	23
Angle on the ends	°	10	24
Extendable	Binary	Yes	8
Length of extension	mm	400	8
Detachable bar sections	Binary	Yes	22

4

IMPLEMENTATION

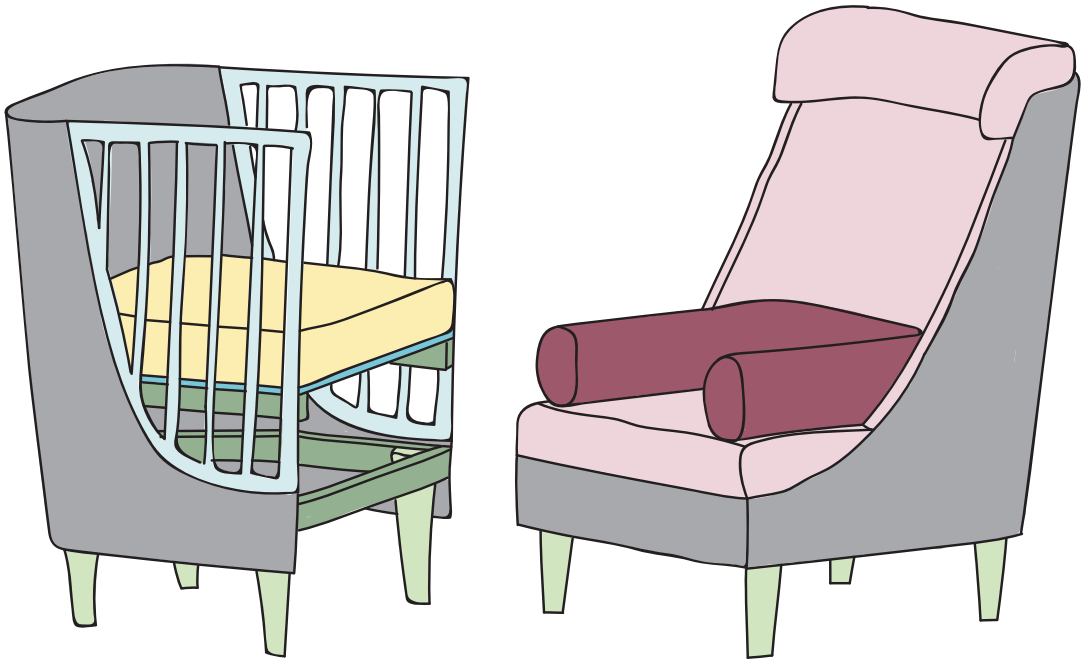
In this phase, the business strategy, business oppertunies, market potential, and economy for Spire will be presented. There are different aspects and considerations to have in mind when starting a new company.

Illu. 4.1

MANUFACTURING

Spire is a small start-up company creating family furniture. The company consists of two industrial designers. Because Spire is a design consultancy it is important to find another company to produce the product. For Spire it is a high priority to make the product and production as sustainably as possible, and therefore it is important to find the right match of a production company.

Spire has decided to use Hudevad Furnitiures as the main manufacturing company because they have over 50 years of experience in furniture production. They focus on sustainability and have a lot of the needed competences. Hudevad Furniture is located on Funen and is one of Denmark's leading companies in the production of designer furniture and furniture components. Hudevad has expert knowledge within; molding workshop, pressing technique, machining, surface treatment, upholstery, assembly, packaging, and shipping. In their production and choice of material, Hudevad Furnitures is focusing on creating sustainable and environment friendly products.



Illu. 4.2 show a quick overview of the parts in the product

CONSTRUCTION BASE

LEGS

SHELL

BOTTOM PLATE

BAR SECTION

MATTRESS

BACK AND HEAD SUPPORT

ARM SUPPORT

CONSTRUCTION BASE
The product contains two constructions types. One is the supporting construction of the entire product and the other is the height adjustment for the bedside crib. The construction is made out of 48 x 24 cm laths of pine tree, which is cut in the wanted length and angle with a cutting miter saw.

LEGS
The legs are made out of solid wood. The legs are made in two variations; soap-treated oak or painted beechwood witch comes in all different colors. The shape of the legs is made using a three-axis CNC milling machine.

SHELL
The shell is made in two variations depending if the surface should be in wood or painted. The painted version is made out of 10 pieces of 1,5 mm beechwood veneer and coated with paint. The other is made out of 8 pieces of 1,5 mm beechwood veneer, and 2 pieces of oak veneer which is placed as the first and last layer. Beechwood is used because it is growing fast and is very strong. The shells are form-pressed in a specially designed mold. The shell for the bedside crib and the shell for the nursing chair have different sizes, but because they have the same radius in the bends, it is possible to use the same mold for both. The veneer would just be cut in different sizes. Before pressing the shells, glue is added to every second layer of veneer on both sides. During the pressing, the heat activates the glue. After the shapes are pressed the surfaces are milled and sanded into the wanted shape.

BOTTOM PLATE
The bottom plate is made out of 10 mm plywood, which is cut using a 2D CNC miller. In the bottom plate, 2,5 cm holes are drilled to create airflow to the mattress.

BAR SECTION
The bar section is made the same way as the bottom plate but in 19 mm plywood. The Bars have a dimension of 1,5 cm and the holes between the bars are 5,5 cm. The edges are milled to create a fillet.

MATTRESS
The mattress is made of 8 cm cold foam with a strength on 80N and on top 2 cm memory foam. It is covered with a washable bamboo cover in strong quilted quality with 3D mesh on the side, which dissipates moisture and heat from the mattress. The mattress provides good suspension and soft comfort. All materials used in the mattress are Eco-Tex standard 100 certified. The mattress is cut using a 2D CNC cutter.

BACK AND HEAD SUPPORT
The back and head support are made out of cold foam with a strength on 125N. The foam is covered with a washable cover made in Neotex Lido fabric that has a high Martindale. The foam is shaped and cut using a 3D CNC cutter, and the cover is sewn.

ARM SUPPORT
The arm support is sewn and has a washable cover made in 100% organic cotton, which is filled with Foss flakes.

MARKET POTENTIAL

This section explains how big the market is, and which area Spire is targeting. The idea is for Spire to target the Danish market, where there are servals ways to do it. The section will also show other possible ways for Spire to expand the market.

DENMARK

In Denmark, around 61.000 children are born every year, where 50 % is the firstborn. (dst.dk, 2020) This indicates a big potential for Spire on the Danish marked because all children need a bed. Of course, some families will reuse the beds if they get more than one child, and some will also inherit beds from other family members.

SCANDINAVIA

The Danish culture and interior design are not that far away from the other Scandinavian countries. Therefore a big potential could be to extend the marked to both Norway and Sweden.

In Norway, around 63.000 are born every year (leksikon.ord, 2015(1)), and in Sweden around 72.200 are born every year (Leksikon.org, 2015 (2)). In Sweden and Norway, a woman has on average around two children, which is the same in Denmark. This makes it possible to estimate that about 50 % of the children born every year are potential buyers.

Illu. 4.3 map of scandinavia

MARKET OPPORTUNITIES

To make sure Spire is using the right strategy for marketing and selling the product, different marked opportunities are investigated. The opportunities are to sell on a webshop created by Spire, through social media, or to sell through existing companies.

Webshop

One of the ways to sell the product could be through our own webshop, where all the sales are handled by our self. By doing that, we need to use a lot of money on marketing to become known on the market. A way to go public could be through the existing nursing rooms in stores and malls. By displaying our product in their rooms, it would create awareness of the product and make it possible for the users to try it out.

BabySam

BabySam is one of the biggest store chains within the sale of children's furniture, clothing, toys, stroller, etc. in Denmark. BabySam has a large selection and a lot of different brands. BabySam already has a corporation with big brands like Odder Barnevogn, where they are the only dealer of the stroller beside Odder themself. There is a big potential in selling our products through BabySam because they are well known on the market.

LuksusBABY.dk

LuksusBaby is like BabySam a danish store chain. LuksusBaby is selling children furniture and clothing for children in the age of 0-16 years. Luksusbaby has a smaller assortment because they handpick all the products in their stores. Luksusbaby is very focused on high-quality brands and furniture design. LuksusBaby has also a big potential because they are known for the high-quality design product, which is the product we aim to compete against.

Instagram

Today many companies use Instagram as a marketing place. There are two ways of doing that, or the two ways can be combined. The first is by contacting some famous danish influencers, and make an agreement with them, that if they get our product for free or cheaper, they have to create serval post when using the bed in their daily life on Instagram, for their followers to see. That is a good and easy way because the followers trust the influencer.
The other way is by making our own Instagram channel, and market the product that way. It can be harder, because then it is a new company making the commercials, and then the followers do not find it as trustworthy.

BUSINESS STRATEGY

To create a business strategy for Spire as a company the Business Model Canvas (Osterwalder and Pigneur, 2010) is used. This method is built up by nine building blocks. These will help create an understanding of the company value, customers, and partners. In this chapter, some building blocks from the BMC are used to explain the business strategy for Spire.

VALUE FOR THE CUSTOMERS

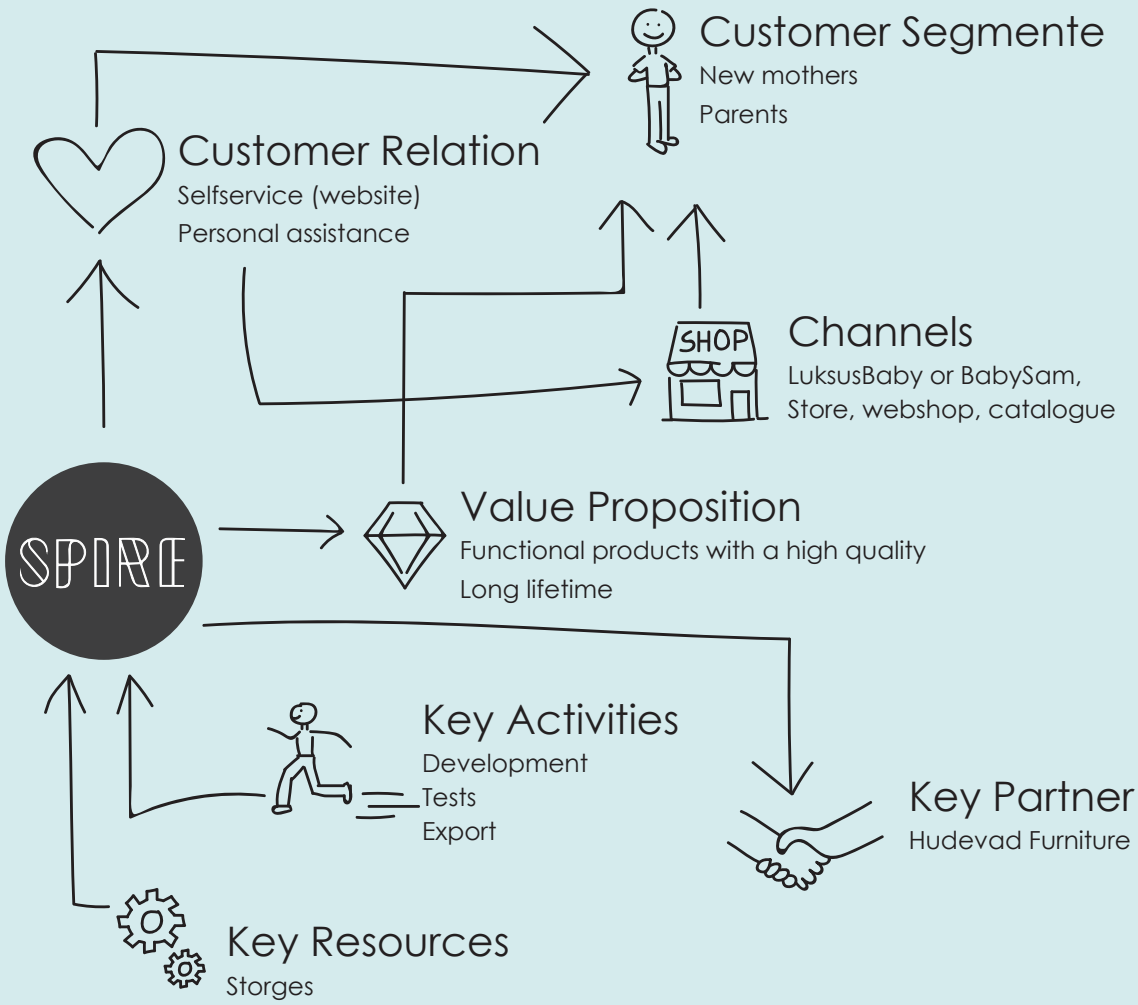
The customer segment is as mentioned earlier, mothers who want to create the best opportunities for succeeding with breastfeeding her child. The product is also for new parents who want to give their children the best start in life. It is parents who want to create a safe environment for their child by making it possible for the child to grow with the product, instead of having to adjust to a new thing.
The Value proposition for Spire is to create sustainable solutions for new mothers to give them the best options during breastfeeding. It is important for Spire that the lifetime of the product is as long as possible to utilize the resources of the materials the best way, but also to limit the large consumption for the parents.

CHANNEL & CUSTOMER RELATIONSHIP

The relationship between Spire and the end-users will differ based on the channel. At this moment the biggest potential is by using BabySam or Luksusbaby as our distributor because they already have an established customer group. In this case, Spire will not have any direct contact with the end-user. All contact will go through the distributor.
Marketing will also go through BabySam or luksusBaby's catalog, online web page, and showroom in the stores.

There are several activities in product development. The activities included the production of the product, both carpenter work and the upholstery, quality check and packaging, will be done by Hudevad Furniture, which will be Spire's biggest key partner. Hudevad Furniture will also have contact with the sub-suppliers of the textiles, foam, wood, and coating or paint.
Spire wants to be as sustainably as possible and therefore it is important to use a Danish company to minimize transport. Hudevad Furniture is chosen because it is located in Denmark, and they are able to do the entire production of the product.

Revenue is created when the product is sold through BabySam or LuksusBaby, stores, or webshop, at a fixed price. The price of the product is found based on the prices of competing products on the market.



Illu. 4.4 Shows Spiers business strategy

SCALABILITY

As a start-up company, it is important to have an idea of how to scale the company. In this section different ways of scaling Spire will be presented.

NURSING CHAIR
Depending on the market's reaction to the nursing chair the next step could be to develop a separate nursing chair with a bigger focus of the individual user needs, instead of having to fit into a cot.

ARM SUPPORT PILLOW
At this moment the idea is that the arm support pillow is sold together with the cot, nursing chair, and bedside crib as a packet solution. It could be an idea to sell it separately because the pillow can be used as a body pillow many pregnant women use during sleep. The pillow can also replace the existing nursing pillow on the market as it is designed in the same material and has the same properties, however, our pillow is equipped with velcro at the ends which allow the user to adjust it in different ways and thereby adapt it to the saturation.
It could also be an idea to sell the cover separately to make it possible for the user to have serval covers in different colors or patterns.

SELLING ALL PARTS SEPARATELY
At this moment it is decided that the nursing chair, bedside and cot is a packet together because we want the people to use all three products. There could be potential in selling the bedside crib, nursing chair, and cot separately if some only want one of the products. By selling it separately it is also possible to show people that they will get the best offer if they buy the full packet.
There could also be potential in making mattresses in different materials to cover a larger user group. Some people are very focused on the use of materials where others are more price sensitive.

VERSION 2.0
At this moment the basic use of the bedside crib and cot have not been questioned. For the next version of the product, it could be interesting to look more into the use of the bedside crib and the cot to see if there are any unsolved problems or user needs with the existing product types.

ADD-ON ITEMS FOR THE PRODUCT

As already explained, it is possible to buy accessories to the product to personalize it after the user's individual needs. At this stage the product only has two accessories; the rocking chair leg and the junior bed extension. Besides that, there could be potential in creating a table fitting the nursing chair to be able to fulfill the need of the mother being able to eat while nursing. Also, some of the existing products come with a side rail for the junior bed that would make sense to add as an accessory.

FURNITURE IN SAME STYLE

An idea would also be to design a changing table, dresser and other furniture to buy when getting a child, in the same style as the bed because many people buy the whole product family so the products are matching each other.

PROBLEMS

For Spire it would be interesting to investigate if there are unsolved problems for the use of furniture for pregnant women, and the entire process of having a child.

ECONOMY

SALES PRICE

The Sales price of the product is found by looking at existing solutions on the market. Sebra, Leander, and Stokke have created the three best-known cots on the Danish market. These beds are all able to extend to a junior bed. The way the bed is sold is in parts, where you buy the cot, the mattress, and the extensions separately. This makes it possible for the end-users to split up the payment of the bed. The prices of their cots are between 5.500 DKK and 6.000 DKK without mattress and extension parts.
Our product is also split up. The main product is the cot, bedside, and nursing chair, where the back, arm and head support pillow are integrated. Besides that it is possible to buy the mattress for the bedside and the nursing chair in one. As additional accessories it is possible to buy the rocking legs to the nursing chair and the extension part to the bed.

Based on that, the sales price for the cot is set to 6.000 DKK because you get 3 products in one, and the price for the mattress is 1.200 DKK. The unit price used is 7.200 DKK because it is assumed that the user buy the mattress fitting the product. The contributions for Spire is calculated based on estimations on the cost of materials and the hours spent on production given from Hudevad Furniture. When our product is sold through BabySam or LuksusBaby, they also need to earn something, and we have calculated with a contribution margin of 39%.

INVESTMENT

Inspired by lean startup methodology (Blank, 2013) and based on the market potential Spire will start with a production of 200 products. These are expected to be sold within the first year. Starting with a small amount makes the risk of failing smaller. It also makes it possible to make changes based on feedback from the end-users to the product before starting the second production.
The production of the product is outsourced and done by Hudevad Furniture. Through the process Spire keeps a close collaboration with Hudevad Furniture. Further development, and tests, CE certifications, and website, are needed before the product is ready to launch. To be able to realize this product Spire needs an investment of 154.000 DKK.

UNIT PRICE		
Retail price incl. VAT	7.200	DKK
Retail price excl. VAT	5.760	DKK
Contribution (distributor)	1.616	DKK
Sales price	4.144	DKK
Contribution (Spire)	1.746	DKK
Product cost	2.398	DKK

INVESTMET		
Development	100.000	DKK
Website	6.000	DKK
CE mark	5.000	DKK
Bending mold	40.000	DKK
Cutting Drawing - Pillows	2.000	DKK
Cutting drawing - Mattress	1000	DKK
Total	**154.000**	**DKK**

BUDGET

This budget is made based on the size of our investment, the variable and fixed cost as well as the sales price. The sale prices used for the budget is 7.200 incl VAT, because we assume that the customer always buy the mattress fitting the product. As seen in the table, Spire will shortly after the firth year break even. See the full budget calculation in appendix 16.

BUDGET OF SALE	**YEAR 1**		**YEAR 2**		**YEAR 3**	
Number of units sold	200	Pc.	1.500	Pc.	5000	Pc.
Sales price	4.144	DKK	4.144	DKK	4.144	DKK
Product cost	2.310	DKK	2.310	DKK	2.310	DKK
Fixed cost (monthly cost x12)	214.800	DKK	214.800	DKK	214.800	DKK
Sales revenue (turnover)	1.151.921	DKK	8.639.406	DKK	28.798.020	DKK
Variable cost	828.720	DKK	6.215.400	DKK	20.718.000	DKK
Contribution margin	349.200	DKK	2.619.000	DKK	8.730.000	DKK
Investmenst	-154.000	DKK	-19.600	DKK	2.384.600	DKK
Contribution	134.400	DKK	2.404.200	DKK	8.515.200	DKK
Remaining	**-19.600**	DKK	**2.384.600**	DKK	**10.899.800**	**DKK**

5 EPILOG

REFLECTION

PRODUCT

The final product fulfills all the identified needs, and has a big potential on the market.
Through the process the wish for eating in the chair has been left out, because the final shape of the chair made it easy to reach for a plate, if the chair was placed near a table. Going through the solution some products still needs further development. The need for a rocking function was very divided, so it was decided very late in the process to create the add-on, but it was not possible to test out in real life. Finally it could benefit the product if the parts could be stored inside the product when not in use.

PROCESS

The development process of the product has been very smooth and chronological. There have only been minor discussions because the consensus on what goals were wanted for the process and the product was decided and well-formulated at the beginning, which made it easy to make decisions.
This semester has been the first one with a group of only two team members. This was challenging because we were forced to work on multiple tasks at once, where it usually is possible to divide it more. At the same time, it also confirmed to us the skills we have gained throughout the study.

If we could change something in the process, we should have been more critical about the collected dimensions from the bed overview and challenged them earlier in the process. We spend a lot of time trying to make it work, instead of downsizing it earlier. But again, it might have been more difficult to compromise on the lying dimension of the bedside crib, if we had not been through the process with the oversized chair.

One and a half months into the project, the society was locked down due to corona. This forced the team to rethink how to work on a project. In general, the milestones were used as guidelines, but it was necessary to focus on one week at a time because we did not know what would happen. For each week morning meetings were scheduled and to-do lists were made, which kept the process going.

The main challenge cause by the lockdown, was the ability to test the ideas on our users. We did the tests on our own, and tried to be critical, but we might have got some extra point of views if the users had tested them. The prototypes were limited because of the denied access to the schools work facilities, so it was difficult to test out a realistic support in the nursing chair.

In general, it was challenging to approach experts on the different topics, because they were hard to reach at home, or too busy at work because of the lockdown.

CONCLUSION

This master thesis project aimed to create a product that would support mothers doing breastfeeding. Breastfeeding is a demanding task that takes a lot of time, and the mother has to be relaxed in order to make the milk flow. The right seating position and support under the arms would be a big help to the mother, but the market of products that provides this support is very limited. A child is mainly breastfed the first six months, and it can be a big investment to provide a nursing chair, considering the short time it is used, and all the other products new parents have to buy for an infant. This issue led to the idea of combining a nursing chair with other products for infants. As a result of a market research, a potential was discovered in designing a nursing chair that combined with a bedside crib could transform into a cot.

This resulted in the product Groa, a product with the three main functions; nursing chair, bedside crib, and cot. The nursing chair is designed with a nursing pillow that can be attached around the mother in the desired position, so it gives a good support under the arms, and in the lower back. The head pillow is shaped so it is possible to rest the head and take a little nap while breastfeeding. The nursing chair has a height that makes it possible to get up holding a child with both arms. If it is needed it is possible to buy an add-on, that can transform the nursing chair into a rocking chair.

The bedside crib can be attached to the parents' bed, and have five height adjustments to make it possible the align the mattress with the mattress of the parents' bed. When the child grows out of the bedside crib, or the nursing chair no longer is needed, they can be combined into a cot, which extends the lifetime of the product. When the child gets older it is possible to extend the cot into a junior bed by buying the extension part.

Groa is, with its simple design and functions, and the way it supports mothers during breastfeeding, a great family furniture for life.

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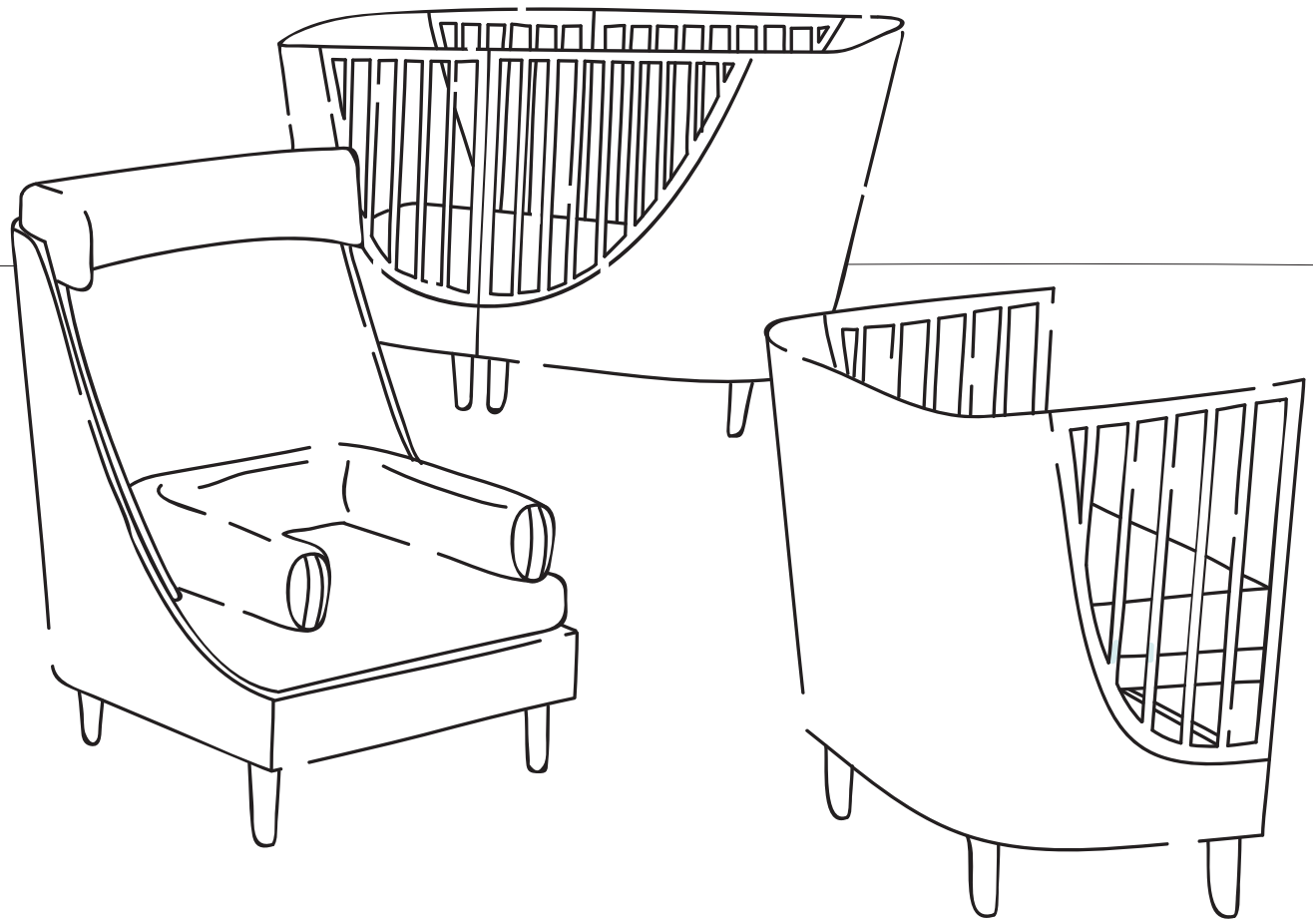
Illustrations

All illustrations and images used throughout the reporters are own creations


SPIRE

Appendix

MSc04-ID17 / June 2020 / Industrial Design / Aalborg University
Emilie Rysgaard / Trine Nyeng Møller Christiansen



GROA
BY SPIRE

TITLE PAGE

Project title:	Groa by Spire
Team:	Msc 04 - ID 17
Project theme:	Master Thesis
Report type:	Process report
Project period:	03.02.2020 - 03.06.2020
Supervisor:	Thomas Arvid Jaeger
Technical supervisor:	Michael Skipper Andersen
Number of pages:	24
Team members:	Emilie Rysgaard
	Trine Nyeng Møller Christiansen

READING GUIDE

This project consists of two reports; a product report and a process report with an appendix and a technical folder. It is recommended first to read the product report together with the technical drawings to see the final result. Then, the process report with the appendix, where a more detailed understanding of the development process will be documented.

TABLE OF CONTENT

APPENDIX 1- INTERVIEW AT BABY SHOPS

To get an understanding of all the different baby product there is sold in baby stores in Denmark a fieldwork study was made. Through the field study an unstructured approach was used during the interview with the employees from the shops. The goal was to get an understanding of the need for a nursing chair, but also to get another view from a more professionals eyes on the idea.

4/2/20 MEDARBEJDER HOS BABYSAM:

Ammepuder fås med 2 forskellige slags fyld, vi anbefaler "foss flakes" da det ikke falder sammen og samtidig er det ikke varmt at have op mod kroppen i længere tid.

Ammestolen.dk har babysam tidligere samarbejdet med, ved at stolen har stået i deres butik, og de så har henvist folk videre til hjemmesiden hvor stolen kan købes.
Kunder og medarbejderes mening om stolen er at den er grim og dyr (8000-9000 kr)
Der findes ikke andre produkter der kan sammenlignes med ammestolen fra ammestolen.dk på markedet, og det er ikke noget folk typisk efterspørger i butikken, men efter de prøver ammestolen vil de gerne have stolen, men prisen er alt for høj i forhold til at det en stol man ikke ønsker efter amningen er afsluttet.

Det vigtigste ved at skabe en stol til amning er fokus på:
- Hvor skal armene hvile
- Noget kunderne gerne vil have stående i deres hjem
- Noget man kan bruge i en længere periode end kun til amningen

Kunne i se potentiale i en afskærmet ammestol så det muligt at tilbyde amme faciliteter men ikke nødvendigvis bruge et helt rum til formålet? Ja, Ammerum er noget vi oplever er meget vigtigt, men fordi butikken ikke er så stor er det begrænset med plads vi kan afsætte til det.

5/2/20 BØRNE LOPPEN

Er en butik hvor forældre kan sælge deres børnetøj videre ved at man har en stand man selv ordner og så kan andre købe tøjet. Butikken have et stort ammerum. Der var mange mødre i butikken. Potentiale for at fange mødre senere i processen.

4/2/20 MEDARBEJDER HOS LUKSUSBABY:

Vi forhandler kun en slags ammepude i butikkerne, men der kan fås en anden model online på vores webshop.
Kunderne efterspørger et amme/pusle rum hvor de kan sidde lidt afskærmet og opfylde barnets behov. Tidligere henviste luksusbaby til Sallings pusleområde, men da de flyttede i større lokaler har de nu mulighed for at tilbyde kunderne dette selv.

5/2/20 BABYSAM - CITY SYD

I butikken havde de et ammerum hvor der var både almindelige stole men også ammestolen. Derudover sælger butikken ammepuden.

5/2/20 ØNSKEBØRN

Sælger ingen former for møbler til afhjælpning under amning udover ammepuden. De oplever i butikken at der er nogle, men få der spørger ind til ammestole. Butikken havde intet ammerum til rådighed.

7/2/20 BØRNENES KARTEL

Butikken gav friis ideen til at lave et ammerum til mødre. Synes det at have en ammestol ville være en god ide og de kan se stort potentiale. Ville klar thave ammestolen i deres ammerum eller butik hvis den passede ind i det almindelig hjem.

EVALUATION

Ud fra de forskellige undersøgelser er det tydeligt, at alle butiksindehaverne ser et stort potentiale i at designe en ammestol, da de ser et behov på marked. Derudover var det tydeligt at de fleste butikker har et ammerum til rådighed, men at møblerne i disse rum er billige ikea møbler fordi deres budget ikke rækker til at købe de bedre stole. Ud fra dette er det blevet klar at det største potentiale ved ammestolen ligger i hjemmet.

APPENDIX 2 - AMMESTOLS ANALYSE

- Rengøring: Der ingen muligheder for rengøring af betræk, det kan ikke aftages og vaskes i maskine og det anvendte stof er ikke nemt at aftørre.

- Den primære funktion er gynge funktioner i både stol og skammel. Funktionen er lavet meget avanceret da den er løftet over jorden. Dette gør produktet meget besværligt at rengøre.

- Det er muligt at låse stolen i forskellige stillinger. Ryglænet er i sig selv ikke justerbar det hele sidde området der hælder, så det ikke muligt at ligge ned i stolen.

- Når stolen aflåse falder den ned i 0 positionen og giver derfor et voldsomt sving.

- Armlæne på stolen giver en god støtte til at holde barnet og til aflastningen af skuldrene.

APPENDIX 3 - EXPANDING MARKET VIEW

Due to the uncertainty about the market potential of the nursing chair on the Danish market. A marked research was made in BabySam, through an semi structured interview with an employee and by test off different products. This research was made to get an overview of other existing solutions new parents need when a small new one arrives, to see if it was possible to identify a new problem or find a new market potential within the newborn categories. But also to test out different hypotheses

DATE: 13/02

BARNEVOGN:

Hvor stort er barnevogns markedet?
Det er kun i DK der sælger barnevogne da vi er det eneste land der lader deres børn stå ude at sove.

Hvor mange tremmesenge sælges der årligt?
Der bliver solgt ca. 15.000 barnevogne i DK, og det er hovedsageligt babysam og ønskebørn der forhandler dem. De to største producenter er Odder barnevogne som er dansk mærke og Emmajunga der er et svensk brand.

Har du fundet nogle problematikke med de vogne der på marked i dag?
BabySam har et samarbejde med Odder barnevogne og der derfor udover Odder selv de eneste på det danske marked der sælger deres vogne.
Man kan se en ændring i folks vaner ovr dk da det i københavn er blevet ca. 50/50 med salg af barnevogne / kombivogne fordi folk bor tættere så der mindre plads. I Aalborg sælger de cirka 10% kombivogn og resten barnevogne.
I en barnevogn det muligt at have barnet sovende ude i cirka 2år hvor man ved en kombivogn grundet størrelse er nødt til at skifte til klapvognsdelen efter cirka 6 måneder grundet størrelsen på barnevogns kassen.

LIFT

Køber folk en lift?
I sommerperioderne anskaffer folk sig en lift til barnet og i vinterperioderne køber folk en voksi. Liften/ voksi'ens formål er at gøre rummet i barnevognen mindre, for barnet så de føler sig mere trygge.
Hoveddelen af de solgte lifte er modellerne der passer til barnevognen. Hovedsageligt anbefaler vi man bruger liften til barnet ikke kan være der mere eller til barnet er omkring 6 måneder eller vejr 8-9 kg.

BEDSIDE + VUGGE

Vi kan se i ikke har så mange vugger hvad er grunden?
Det er en stigende trend at folk køber en side by side seng nu i stedet for en vugge da mange forældre gerne vil sove tæt på deres børn.
Man bruger i snit en vugge eller bedside crib indtil barnet er 4-6 måneder

TREMMESENG

Hvor længe bruges den?
Omkring fra 0-3 år, men mange bruger en vugge eller bedside de første 6 måneder.
tremmesengen er også den seng vi sælger flest af, fordi sengen har en lang levetid.
Sælger i mange af de senge der kan vokse med barnet?
Det er meget 50/50 havd vi sælger men der en del der foretrækker sengene der følger barnet for kun at skulle købe en seng som så kan bruges i cirka 6 år. Der dog også nogle der køber dem for at skabe en base for barnet så de ikke skal tilvænnes til en anden seng flere gange end højst nødvendigt.

EVALUATION:

Based in the new knowledge from the test and interview in BabySam the group saw a big potential in creating a product comping the cot bed and bedside crib into one.
This idea was based on the new tendency that parent want to sleep close to their newborn child, but also on the fact that the bedside crib is a growing marked. Because of the short lifetime of a bedside crib it could be interesting to look at ways to integrate the cot bed and bedside crib in one product.

APPENDIX 4 - SURVEY AMMESTOL

The aim of the survey was also to get an understanding of mothers' nursing habits and needs, and potential find a group of mothers that would help with feedback doing the project. The survey was shared through facebook, and visits around in Aalborg where it could be possible to approach a lot of mothers, to ask them to answer the survey and share it.

DATE: 6/2 - 18/2

BARNEVOGN:

84 svar:
Hvor mange børn har du?
1 barn: 43 (51,2%)
2 børn: 36 (42,8)
3 børn: 5 (6%)

Hvor gammel er du?
21-25: 15 (17,9%)
26-30: 34 (40,5%)
31-35: 27 (32,1%)
36-40: 7 (8,3 %)
40-45:1 (1,2%)

Hvordan fik dit barn mad de første måneder?
Primært amning: 69 (82,1%)
Primært plaske: 15 (17,9%)

Hvad var grunden til at du brugte denne metode?
Naturligt og nemt (32 svar)
Kan ikke amme (7 svar)
Det var lettest, rart og gratis
Fordi jeg kunne. Det er nemt, praktisk og sundt for barnet
Halv halv: barn have noget med nakken gik over i kun flaske
Det er det bedste for barnet, og min amning fungerede rigtig fint, så jeg kunne ikke se nogen grund til ikke at amme.
Havde ikke selv mælk
Praktisk hygiejnisk, god sværeste for moren at stoppe end for barnet ammet til 2 år
Han fik min modermælk på flaske, da han ikke kunne suge mælken ud pga for kort tungebånd
Det er det mest naturlige! Det var nemt! Og jeg vidste han fik lige det han havde brug for
Fordi ernæringsmæssigt er der så mange vigtige og gode ting i modermælk, som man ikke kan bidrage med. Og så er det klart det nemmeste og det mest naturlige valg for os.
Kæmpede en frygtelig kamp i 8 uger for at få amningen til at køre uden held. Gav derefter op og gik over på ren flaske.
Det var det mest naturlige valg for mig, og jeg nyder nærværet med min søn.
Kunne ikke mætte ham nok selv, så måtte derfor gå over på flaske.
Amning er første prioritet og det bedste man kan gøre for sit barn hvis muligheden er der.
Nemhed og ernæring samt tilknytning
Sundhedsmæssige årsager og fordi det var det mest naturlige
Det var min førsteprioritet at amme og var så heldig at det lykkedes.
Barnet skulle have de gode antistoffer til at booste immunforsvaret. (6 svar)
Det lykkedes "nogenlunde" med amning (lidt vanskeligheder engang imellem)
Flere grunde. Både den måde du connecter med dit barn men naturligvis også fordi, at jeg tror på, at det kan forebygge forskellige sygdomme såsom astma o.lign. Derudover grundet de gode vitaminer, som man overfører gennem modermælken.
Den første flaske, da amning ikke var muligt. Den anden amning fordi jeg kunne
Det virkede bare som den naturlige måde og samtidig er det også den metode de anbefale
Det er det nemmeste for mig, og godt for barnets immunforsvar og virker generelt beroligende med hud-til-hud
Kunne ikke få amningen til at virke, kæmpede i 6 uger
Kunne ikke amme grundet blodtab
For at få en nær tilknytning til min søn
Efter anbefaling fra læge og jordemoder

Hvilken type møbel opholdte du dig primært i derhjemme når barnet blev ammet eller fik flaske?

Sofa: 56 (66,7%)
Lænestol 8 (9,5%)
Seng: 4 (4,8%)
Gyngestol: 9 (10,7%)
Ikke noget specifikt sted: 7 (8,3%)
I hvilken forbindelse blev dette møbel anskaffet?
Havde i forvejen: 72 (85,7%)
Arvestykke: 3 (3,6%)
Anskaffet pga. barnet: 9 (10,7%)

Har du haft nogle gener i kroppen der er opstået i forbindelse med amning eller flaskegivning?
Ja: 39 (46,4%)
Nej: 45 (53,6%)

Hvis ja, Hvilke genere havde du? (39 svar)
Smerte i ryg (9 svar) 23%
Smerte i ryg, nakke og skuldre (5) 12,8%
Smerte i nakke og skuldre (10 svar) 25,6%

smerte i lænd/ bækken (4 svar) 10,3%
Brystbetændelse (5 svar) 12,8%
Brystsmerter (3 svar) 7,7%
Låsning af de thorakale hvirvler grundet ensartet stilling. Dette skyldes dog ikke kun amning men også stillinger man er i, med en lille baby. 2,6%
Hårtab 2,6%
Hovedpine 2,6%

Hvis du skulle købe et møbel til amning eller flaskegivning, hvilke parametre er så vigtige for dig?
Komfort (20)
Passe ind i hjemmet og kan bruges efter amning, må ikke være baby stil (10)
Støtte til både mor og barn (8)
Høj ryg (7)
Hovedstøtte (5)
God plads til skiftende positioner (5)
Rengøringsvenligt (2)
Armlæn, armstøtte (14)
Pris (3)
fødderne skal have god kontakt til gulvet (3)
Baby må ikke glider væk eller at puden glider væk under baby (1)
Gynge/ vugge funktion (2)
ingen interesse (4)

Kunne du finde på at købe et møbel der garanterer dig den bedste siddeposition under amning eller flaskegivning som samtidig har et enkelt design der passer ind i dit hjem?

Ja 43 (51,2 %)
Nej 41 (48,8 %)

Hvis ja, hvad må sådan et møbel koste? (41 svar)
500- 1000 kr (8)
1500 kr (10)
2000-2500 kr (9)
3000 kr (6)
5000-6000 kr (2)
Prisen er ligegyldig så længe det god komfort (6)

EVALUATION:

The survey confirms that the majority of mothers want to breastfeed but some find it quite challenging. Around 51 % of the target group have an interest in buying the product if it gives the desired support and have the right aesthetics. This indicates that there is a fine potential market for a nursing chair.

APPENDIX 5 - SURVEY BEDS

This interview is made as a short semi structured interviews to ask people at the library and in Aalborg City about here thoughts when choosing bed for their child. 20 people was interview

DATE: 18/02

Hvor sov din baby (0-6 måneder) om natten?
• Vugge (2, 10%)
• Bedside crib (8, 40%)
• I forældrenes seng (7, 35%)
• Tremmeseng (3 15%)

Her du hørt om de forskellige senge der kan ombygges så de vokser med barnet ofte fra: tremmeseng til juniorseng?
• Ja, jeg har selv en (8, 40%)
• Ja, men har ikke en (11, 55%)
• Nej, aldrig hørt om (1, 5%)

Ser du det som fordel at en seng kan vokse med barnet så sengen har en længere levetid ?
• Ja (15, 75%)
• Nej (5, 25%)

Hvorfor, eller hvorfor ikke vil du vælge en seng der kan vokse med barnet?
• Jeg syntes det vigtigt at mit barn føler sig tryg og ikke skal tilvænnes nye ting hele tiden, så derfor har vi en seng barnet kan have i en længere peiode
• Mine børn arver fra hinanden, så derfor har en alm tremmeseng været mest nyttig
• Jeg ville vælge disse fordi de er Æstetisk smukke og så det praktisk at den han holde indtil barnet er 6-7 år
• Syntes det smart, men man skal købes nye stykke madras så ved ikke hvor stor fordel det er
• Vi har sebra sengen og den er vi glade for.
• Har ikke råd til så dyr en seng, selv om det da helt klar ville være dejligt at have.
• Ville gerne have en men pga. budget blev det en alm tremmeseng som han kan bruge til han er omkring 3/4 år, valgte de sådan en.
• Mit barns tryghed er vigtig derfor valgte vi en justerbar seng, så han kunne have en fast base
• Vi købte en til 1. barn så ved 2. Barn er sengen genbrugt
• Pris er vigtigt vi har arvet alle senge

Kunne du have interesse i at købe en seng der kan ombygges fra bedside crib til tremmeseng til juniorseng så levetiden forlænges?
• Ja (13, 65%)
• Nej (7, 45%)

Hvorfor?
• Tænker de bliver for dyrt
• Vi stod selv og overveje om en bedside var det rigtige fordi levetiden er så kort syntes vi det var mange penge at investere. Men fordi der har været alt det oppe med vuggedød turde vi ikke lade hende sove i sengen med os, så vi endte med en bedside, så ser da klart en fordel i at den er en del af tremmesengen.
• Mine børn er født med under 1,5 års mellemrum så de arver sengen efter hinanden.
• Synes ethvert skift barnet skal vænne sig på ny er unødvendigt så det genkendeligt fylder hos os og klar at fortrække.
• Synes klart det kunne være interessant da vi syntes det vigtigt med sammen sovning i starten, men også dejligt at have sin seng for sig selv og muligheden for nemt at flytte barnet i sengen uden de våger, hvilke vi ikke kan nu da han sover i vores seng og vågner ved vi flytter ham.
• Smart med kombi løsning
• Skal være nemt at bruge, skal ikke være en stor investering

EVALUATION

Based on the result form the interview it is very imported for the parent to create a safe environment for their children around bedtime and therefore around 75% preferred a bed able to grow along with the child. Recognizability is important and therefore it is a good thing that the child do not have to get use to a new bed.
Some also mention that they want their kids to inherit from each other and therefor a regular cot bed is preferred because it only last from the age of 0-3 years and then the next child can inherit the bed.

When presenting the idea of a bedside crib combined with the cot bed, 65% saw a big potential because then the bed can be used from newborn and easily moved into the child room.
The negative things about the idea was that people was price sanative and thought that bed like that will be very expensive.

APPENDIX 6 - INTERVIEW AMME EKSPERT

DATE: 20/02

Amme ekspert - Louise Marie Holm Nørby

Hvordan kommer mødre i kontakt til dig.

• Man henvises ikke – barsels jordemødrene (kun hvis det går galt første gang)
• Det er mødrene selv der opsøger mig
• 75% henvendelser grundet smerte

Under amning, hvilke møbel anbefaler du så mødrene at bruge?

• Der er som udgangspunkt intet møbel der er bedre end andre.
• Der intet der understøtter den gode siddestilling under amning.
• Må ikke pålægge møderne nogle specielle produkter de skal købe
• Ammepude er hvad hun anbefaler (helst "BB hop me" modellen, da den er muligt at regulere i fasthed)
• Kan også være en sofapude, det støtten under armene og under barnet skal være så fast som muligt.
• Fast underlag der er tryk aflaste af moren sidder behageligt.
• Ændre position under amning skifte balle
• Tilbagelænet + ret

Hvad hældning er bedst for ryggen under amning?

• Det at kunne skifte siddeposition, er vigtigere ned hældningen.
• Tilbagelænet (barnet ligger med egen krop på maven og mærker egen tyngde)

Er der andre ting vi skal have fokus på når vi designer en stol til amning?

• Det er vigtigt med en høj ryg så der støtte hele vejen
• Hovedstøtte er også vigtigt, for at give moren mulighed for at længe hoved tilbage og slappe af.
• Støtte under barn eller arme er altafgørende for at moren kan opretholde samme position under amningen i længere tid af gangen. Fordi folk er forskellige kan det være meget forskelligt hvilken støtte de behøver.

Hvad er den bedste amme position?

• Muligheden for at flytte på sig, sidde i forskellige stillinger

APPENDIX 7 - INTERVIEW MØDREGRUPPE

The goal of this interview is to get a better understand of the need the mother have during breastfeeding and when choosing a cot or a bedside crib. The interview is made during a mother group with 3 mothers and is structured as a semi structured interview.

DATE: 4/03/20

Brugerpanel billede af jer + navn, aldre og antal børn, aldre og køn
Vi ønsker at mødes med jer måske 2-3 gange mere frem til juni
Test prototyper og give feedback
Test af endelige produkt
Vi ønsker i står til rådighed hvis vi skulle have spørgsmål

Bruger 1: Stine på 32 år, har 3 børn, Liva på 6 måneder, August på 6 år og Elias på 9 år

Bruger 2: Camilla på 38 år, har 2 børn, Felix på 5 måneder og max på 4 år

Bruger 3: Christina på 35 år, har 2 børn, magnus på 6 måneder og Andrea på 4 år

3 in1 løsning

Bedside + Tremmeseng + Ammestol
Hvem i hjemmet ville transformere sengen
Det kan både væres os eller vores mænd der ikke sådan en som har rollen til sådan en opgave.

Senge:

Har du en bedside crib? Hvor bruger i jeres bedside crib
2 ud af 3 bruge en bedside crib, og det vigtigst var at den kunne justeres til sengen. De bruge den få gange som en vugge hvor den side side var nødvendig. Den side have en vugge i soveværelset men barnet sov mest i forældres seng. 1 bruger en babynest i bedside den første tid fordi det giver barnet stor tryghed at føle sig omsluttet.

Bruger i den nogle gange inden i stuen som vugge? Hvad er vigtigt for jer når i skal vælge en bedside crib?
Barnets trivsel den første del af livet er det vigtigste for de nybagte mødre. Dette medføre at tæt kontakt til barnet er vigtigt og sikkerheden i de forskellige produkter.

Hvor står jeres tremmeseng?
Tremmesengene er placeret inde på barnet eget værelse, men ingen af dem har brugt den endnu da de små stadig sover hos forældrene. De små sover stadig ved forældre da de stadig ammes 1-2 gange om natten og derfor er det nemmest at have dem i soveværelser fortæller mødrene.
Kan den justeres i forhold til barnet?
1 ud af 3 have en forlæng bar tremmeseng

Amning:

Bruger i en form for gyngefunktion/ vuggefunktion? og hvad er grunden?

Gyngestol fra sinnerup. Gyngen funktionen har mest været brugt til at få barnet til at falde i søvn. prisen er ikke så vigtig hvis funktionen og levetiden på produktet er god. (bæredygtighed og genkendelighed)
Det vigtigste under køb af produkter ergonomien. Vigtigt at der god støtte til ryggen når man sidder ned, for man skal bære rundt på en baby næsten hele dagen så derfor er det rart at man får lidt aflastning når man sidder.
Det også vigtigt at tage forbehold for barnet størrelse når de er 6 måneder da de jo så fylder en del mere i stolen, og derfor er det vigtigt at stolen er bred nok.

Hvor lang tid har du ammet/ og hvor lang tid tager hver amning?
Det svinger meget, men i starten går der flere timer med det man føler sig lidt som en malkeko.
Ammede indtil barnet begyndt at se en interesse i mad så omkring til han var 4 måneder.

Hvilke produkter bruger i nu til støtte?
Ammepude eller ingenting
Prøvet at stable forskellige pude, men de glider bare væk under en, så det fungerer ikke.

Hvor i hjemmet ammer i?
Stuen eller soveværelset.

Hvor ville i placere jeres ammestol?
Ville placere den i stuen

Hvis i skulle investere i en ammestol, hvad er jeres ønske angående rengøring?
Vaskbar, aftørring
Betræk skiftesæt til når det til vask, skal passe ind i en standard kogevaske. At producere mælk giver hedeture så hellere en åndbar stol med vaskbart betræk.
Imprægneret overfalder, hvis det muligt at imprægnere en overflade så det åndbart ville det klart være nemmest at kunne tørre produkter af. Produktet må ikke se sterilt ud, da det skal passe ind i hjemmet.

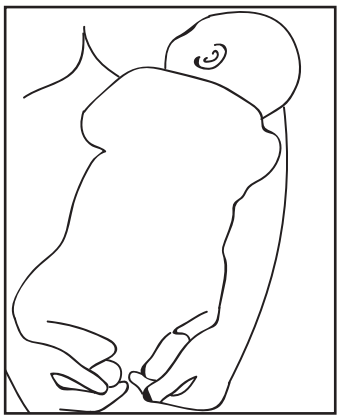
Har i oplevet et behov for at kunne spise under amningen?
Ja, og man bliver også vildt tørstig, så man skal altid have vand med, for når først man er startet så man fanget og kan ikke lige hente noget. En brugte et hay bord til at have mad og vand på under amning, og det kunne nemt flyttes til begge sider af stolen sidde alt efter hvilket brugt der blev ammet ved.

Har i oplevet et behov for at kunne sove under amningen?
Ja det dejligt lige at kunne blunde så en form for støtte til hoved er klar tát foretrække.

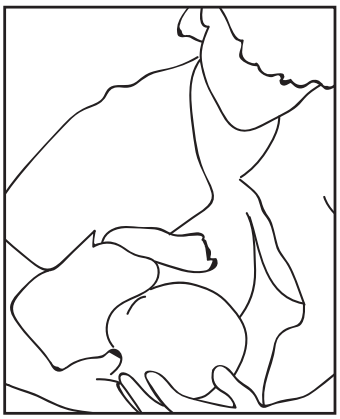
Evaluation
Ud fra interviewet var de klar hvilke behov mødrene havde, både under amningen, men også når det skulle ud og købe seng til deres børn.

APPENDIX 8 - BREASTFEEDING POSITIONS

DATE: 4/08

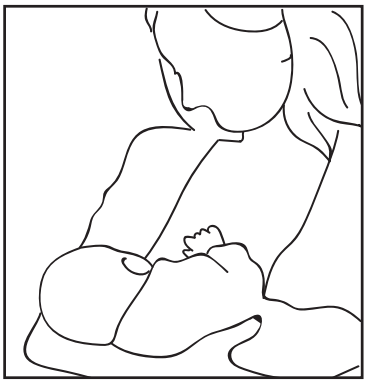


Laid back breastfeeding
Mor ligger tilbagelænet i 16 til 59°, barnets fodsåler har fast underlag, hvorved de neonatale reflekser understøttes.

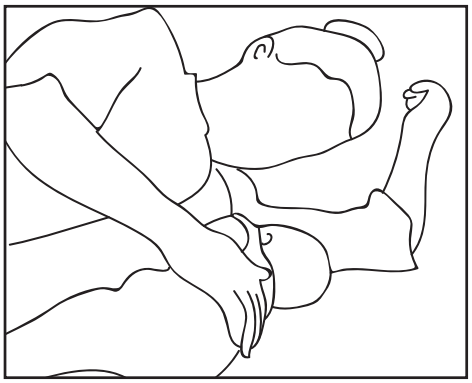


Tvillingestillingen
Barnets krop og ben ligger bagud under moderens arm. Hovedet støttes af moderens hånd.

Krydsstilling
Barnet ligger på tværs hen over moderens mave med hovedet hvilende i hendes hånd.



Den klassiske ammestilling
Barnet ligger på tværs hen over moderens mave med hovedet hvilende på hendes underarm.

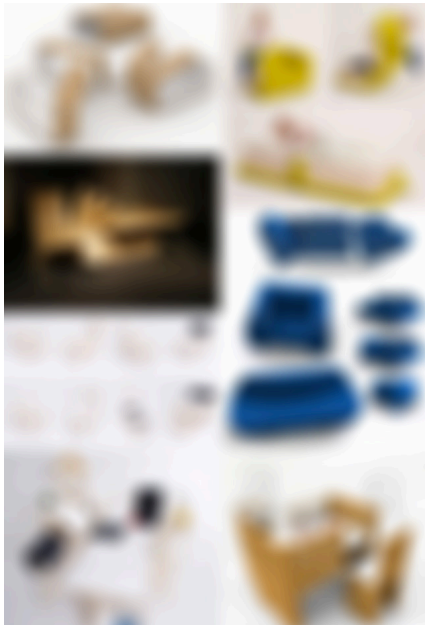


Liggende amning
Når moderen ligger og ammer, er det vigtigt, at hun er afslappet. Barnet kan støttes med den øverste arm.

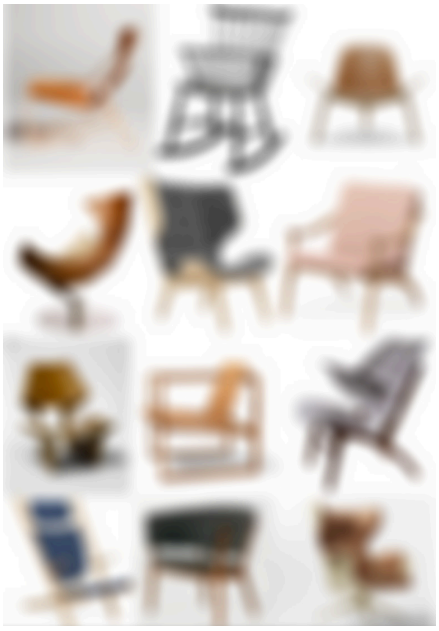
APPENDIX 9 - INSPIRATIONS BOARDS

Der er lavet fire forskellige inspirations boards, et med billeder af interessante tremmesenge, samlings principper i træ, møbler der er modulopbygget og den side er over forskellige lænestole. Fordi denne rapport skal offentliggøres, kan vi ikke vedlægge boardsene i appendix da vi ikke har rettighederne til alle de bruge billeder. Vi har derfor sløret de fire boards, men til vi vil medbringe dem til eksamen.

MODULAR FURNITURES



CHAIRS

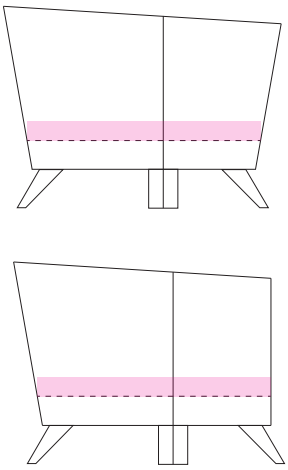


INTERESTING COTS

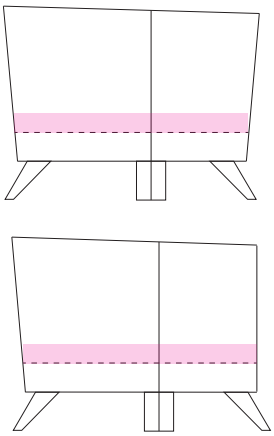
WOOD TECHNIQUES

APPENDIX 10 - SHELL CONCEPTS DRAWINGS

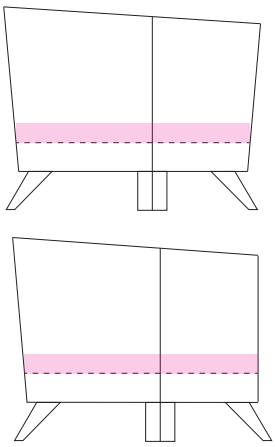
10 graders side hældning
9 cm top hældning
70 cm ryglæn



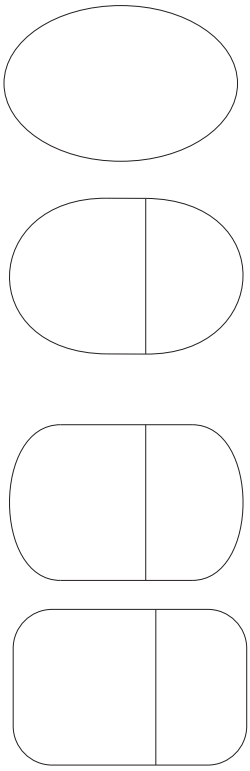
5 graders side hældning
4 cm top hældning
65 cm ryglæn



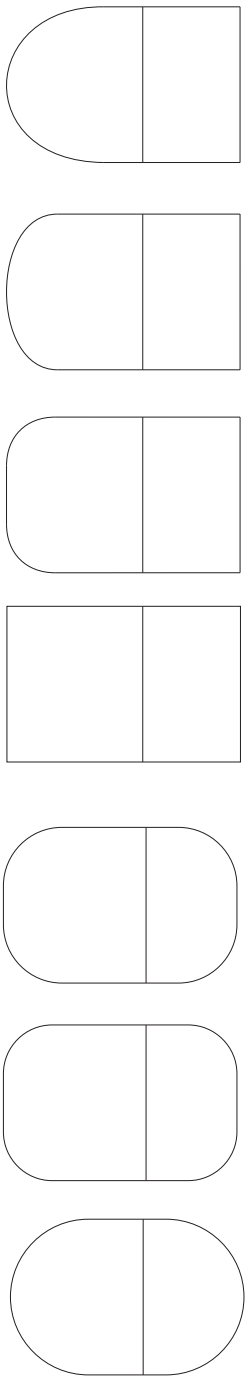
5 graders side hældning
8-9 cm top hældning
70 cm ryglæn



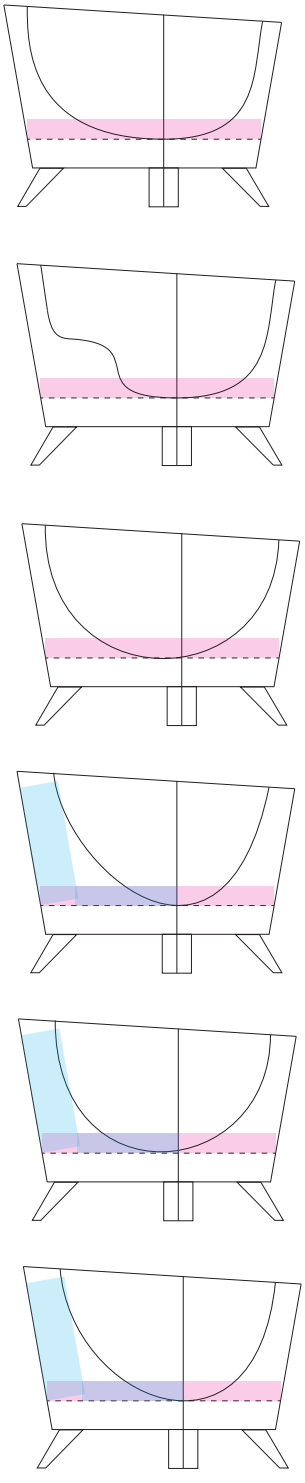
Bliver meget æggeformet
mister meget plads i liggemålet
Formen er for run til at få en god ryg støtte



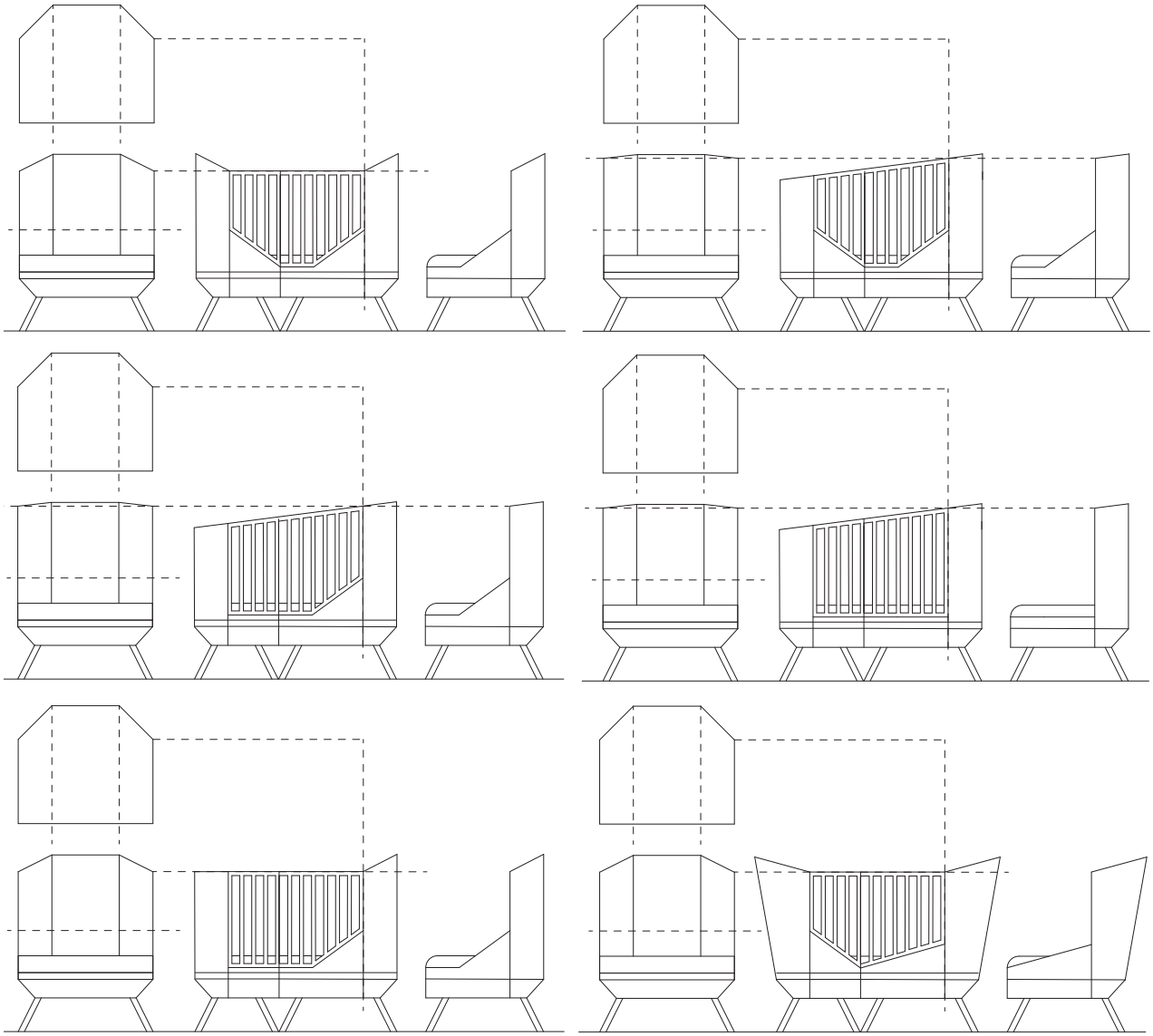
Skaber ikke den samme helhed i produktet
Produktet virker meget todelt



Giver mest mening hvis trammedelen bliver helt lige, derfor er det vigtigt hvordan bundformen runder
- LIge tremmer
- Støtte til armlæn
- plads til albuer



APPENDIX 11 - GEOMETRIC SHAPES



APPENDIX 12 - FEEDBACK MØDREGRUPPE

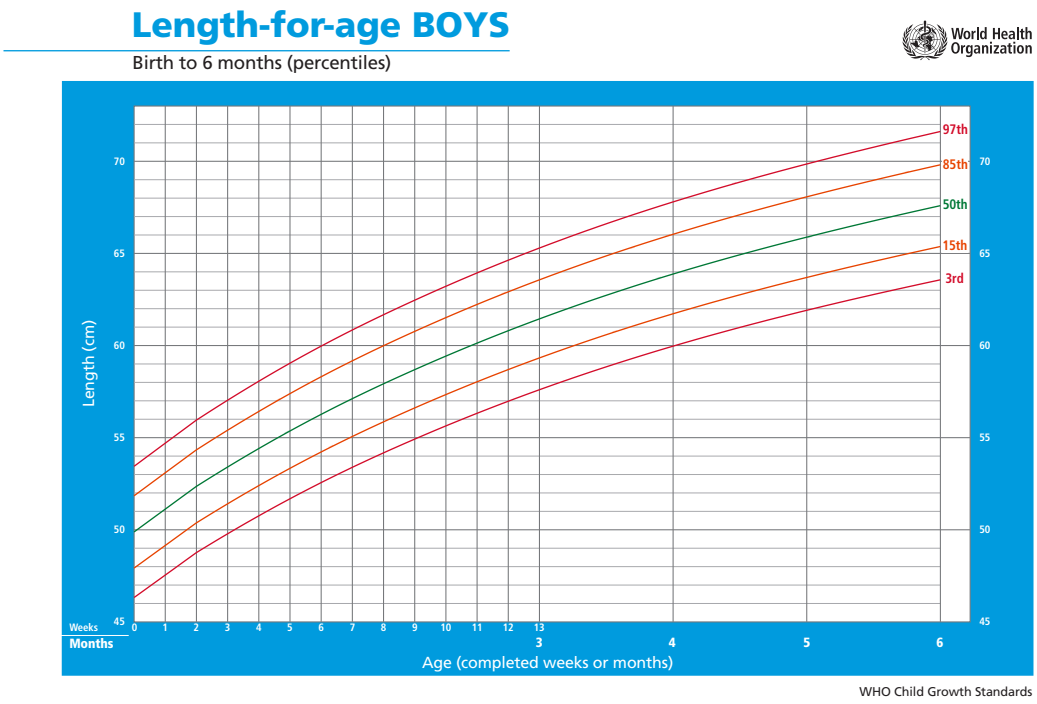
En PDF fil blev sendt afsted til mødregruppen. De diskuterede så sammen alle 5 de 2 forskellige koncepter og sendte dette svar tilbage til os:

Synes koncept A er mest rent og tidsløst, med bløde behagelige linjer. Den høje ryg ser ud til at kunne give en god støtte. A Sengen er også ret fin med en skæv linje ned. Kan blive i tvivl om den bliver for lukket og mørk inden i, nu der kun er tremmer på et så begrænset stykke. B stolen har et moderne udtryk som også er ret sjovt. Kan tænke at sengen måske bliver for kantet ift at have en baby der bevæger sig rundt i alle hjørner og kanter.

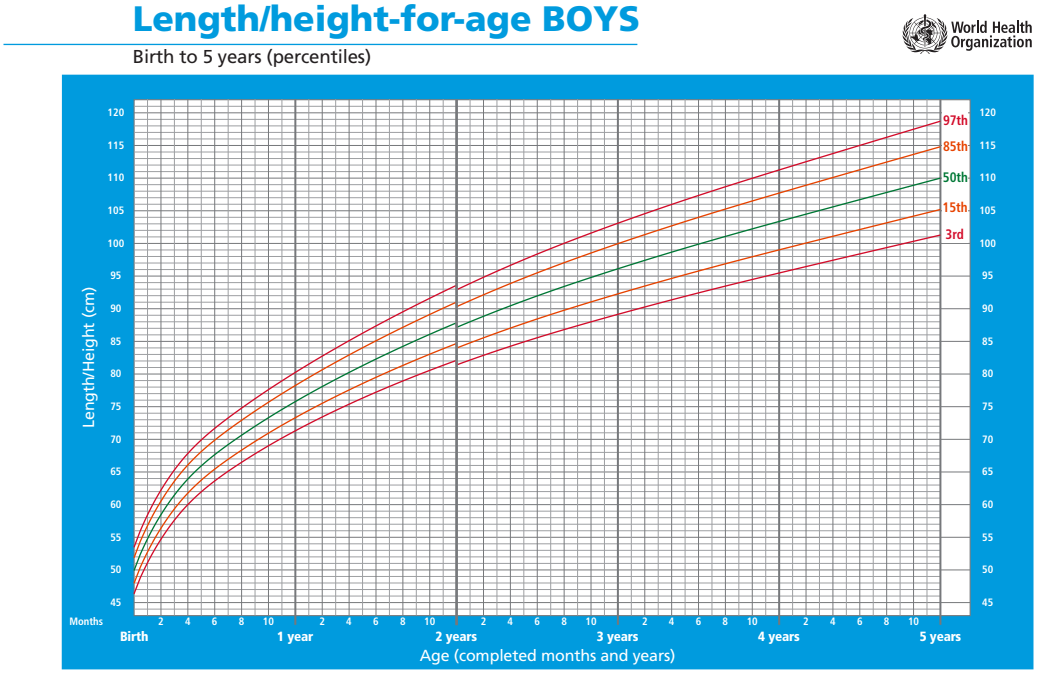
APPENDIX 13 - WHO CHILD GROWTH STANDARDS

HØJDEKURVER

FRA HJEMMESIDEN:
HTTPS://BABYINSTITUTTET.DK/LAENGDEKURVE-HOJDEKURVE



WHO Child Growth Standards

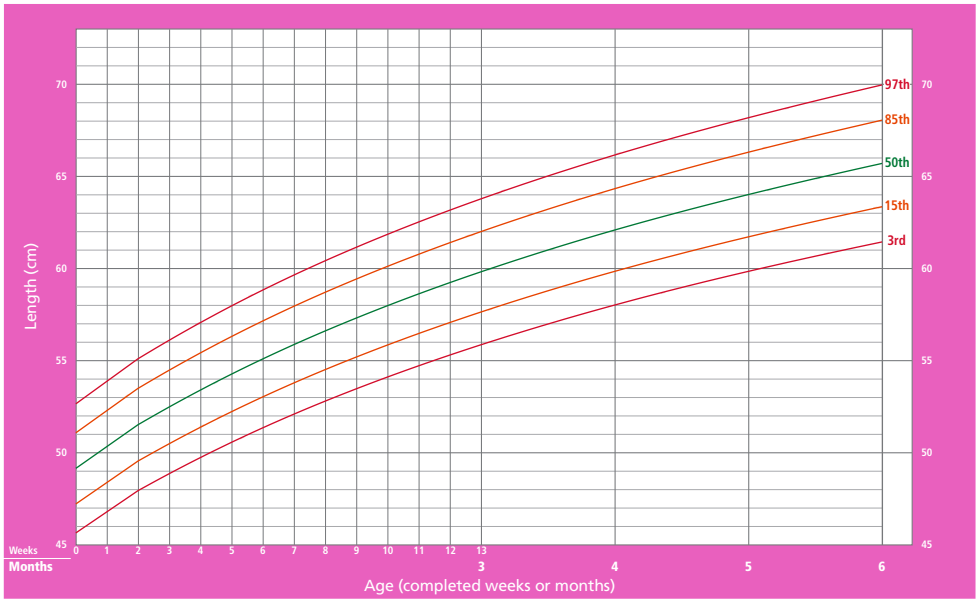


WHO Child Growth Standards

Length-for-age GIRLS

Birth to 6 months (percentiles)

World Health Organization

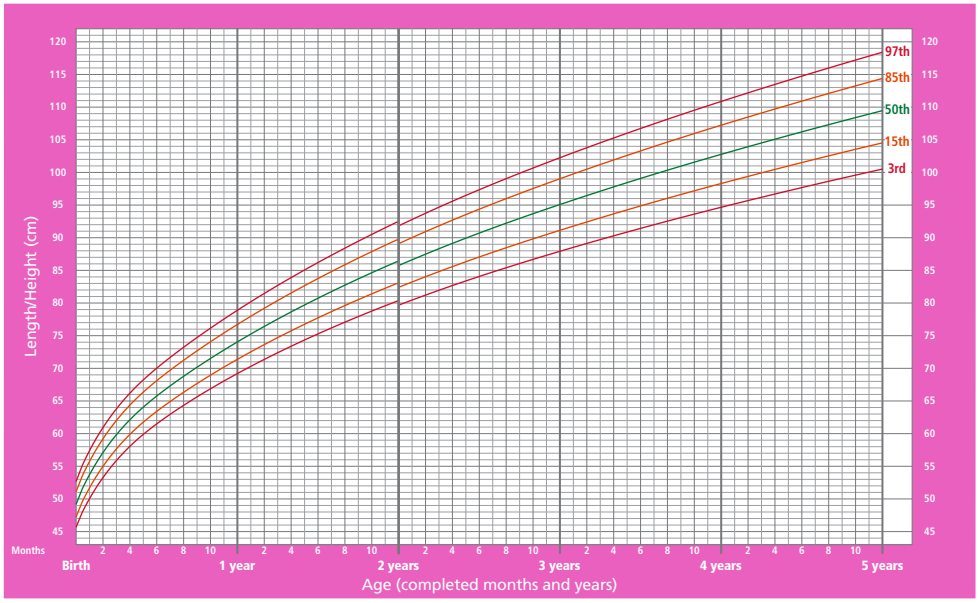


WHO Child Growth Standards

Length/height-for-age GIRLS

Birth to 5 years (percentiles)

World Health Organization

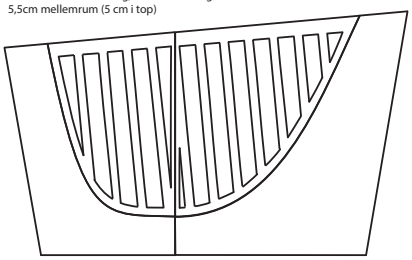


WHO Child Growth Standards

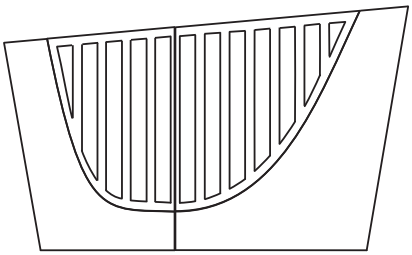
APPENDIX 14 - BAR SECTION

PLATE

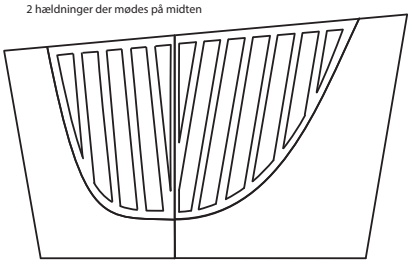
Tremmer med hældning, 3cm tremme og
5,5cm mellemrum (5 cm i top)



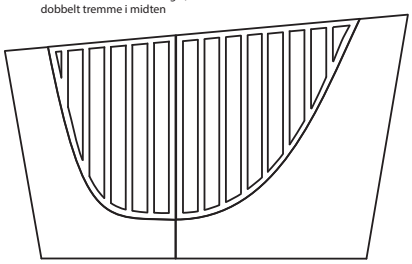
Tremmer uden hældning, 3cm tremme og
5,5cm mellemrum (3 cm i top)



2 hældninger der mødes på midten

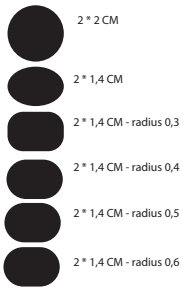


2 centimenters tremmer og 5,3cm mellemrum
dobbelt tremme i midten



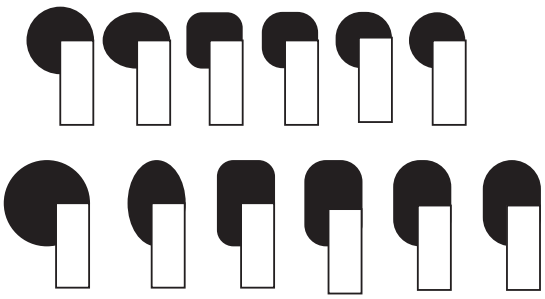
BARS

Forskellige former på tremmer

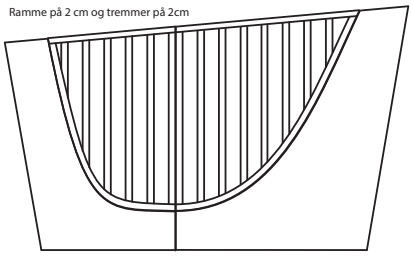


Måder på hvordan den kurvede tremmer, griber fast om skallen

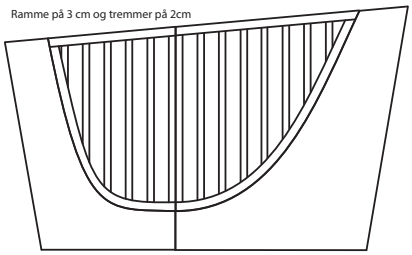
L samling



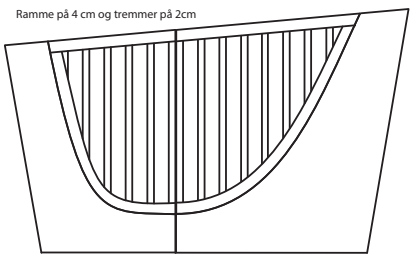
Ramme på 2 cm og tremmer på 2cm



Ramme på 3 cm og tremmer på 2cm



Ramme på 4 cm og tremmer på 2cm



APPENDIX 15 - INTERVIEW AMME EKSPERT

The goal of this interview is to get a better understand of the need the mother have during breastfeeding and when choosing a cot or a bedside crib. The interview is made during a mother group with 3 mothers and is structured as a semi structured interview.

DATE: 19/05

Amme ekspert - Louise Marie Holm Nørby

Har gyngefunktionen nogen betydning for amning, eller er det mest bare for at berolige barnet?

• Gyngefunktion, kan både forstyrrende men også styre amning, det afhænger meget af moren, men også barnet.

• Gyngefunktionen bruges som sanse motorik og kan være en god måde at berolige moren, hvilke giver de bedte amme forhold.

Hvilken form for støtte er bedst under barnet og armene under amning?

• Behøver ikke nødvendigvis være et armlæn
• Fast støtte

Viste/ forklarede vores ide amme pølse pude/ armlæn.

• Den ide i
har er god, men husk at de materialer i bruges skal være meget fast for at sikre at barnet ikke kan flytte eller synke ned i materialet.

• Kunne være godt at kunne tage med – fordi den kan virker beroligende for moren fordi hun ved den virker

• Nem at holde i en hånd, eller flyttes med en hånd, da man har baby i den anden.

Vigtige ting at tage med:

• Mor sidder korrekt og behageligt – må ikke flytte sig da det river i bryst vævet og barnet så kan mister grebet

• Hvis baby kan synke ned i pude, så ændres greb på brystet og så kan det være svart for banet at finde det gode greb igen.

• Baby bliver i position som er i starten, må ikke ændres undervej, stabile holdning under amning.
• Gør morens arme fri så hun kan tænde tv'et, tage vand etc., uden at det flytter på barnet.
• BB hop me, (bedste ammepude på arbejdet ifølge hende, da den kan justeres i fasthed)

APPENDIX 16 - BUDGET CALCULATIONS

Materials cot		DKK excl. vat	DKK incl. vat (25%)	unit	amoutn needed	unit	DKK per unit excl.	
Fabric Nefotex Lido	Upholstrer	56,0	70,0	m2	4,4	m2	246	DKK
Zipper	Upholstrer	1,9	2,4	piece	8,0	pieces	15	DKK
100% organic cotton	Upholstrer	44,0	55,0	m2	1,2	m2	53	DKK
Økotex standard 100 certificeret koldskum med styrke på ca. 80N. Cutted	Upholstrer	224,0	280,0	piece	1,0	pieces	224	DKK
Foss flakes	Upholstrer	72,0	90,0	kg	2,8	kg	202	DKK
Finer plader 1,5 mm	Hudevad	60,0	75,0	m2	10,0	m2	600	DKK
Krydsfiner 10 mm	Hudevad	56,0	70,0	m2	0,8	m2	47	DKK
Krydsfiner 19 mm	Hudevad	52,8	66,0	m2	3,5	m2	185	DKK
Bundkonstruktion 48x24 mm	Hudevad	6,4	8,0	m	4,0	m	26	DKK
Total							**1.598**	**DKK**

Materials Juniorbed								
Økotex standard 100 certificeret koldskum med styrke på ca. 125N.Cutted	Uphoster	52,0	62,4	piece	1,0	pieces	52	DKK
Krydsfiner 10 mm	Hudevad	58,3	70,0	m2	0,3	m2	18	DKK
Krydsfiner 15 mm	Hudevad	61,0	73,2	m2	0,2	m2	12	DKK
Bundkonstruktion 48x24 mm	Hudevad	6,7	8,0	m	2,1	m	14	DKK
Total:							**96**	**DKK**

Materials mattress								
Økotex standard 100 certificeret koldskum med Newton på ca. 125N.Cutted	Upholster	190,00	228,00	piece	1,00	pieces	190	DKK
Total							**190**	**DKK**

Manufacturing		Salery per hour			Time per part in min	amount of parts	DKK per unit	
Building wood + lakering	Hudevad	170			145	1	411	DKK
Sewing (upholstrer)	Upholster	170			25	1	71	DKK
Assembly (us)	Hudevad	100			30	1	50	DKK
Packaging (us)	Hudevad	100			35	1	58	DKK
Shipment							20	DKK
Total manufacturing costs per unit							**610**	**DKK**

Investmet	One off cost	Monthly cost year 1	
Development	100.000		DKK
Website	6.000	100	DKK
CE mark	5.000		DKK
Rent		1.300	DKK
Bending mold	40.000		DKK
Cutting drawing - Backrest	2.000		DKK
Cutting drawing - Mattress	1.000		DKK
Insurance (product, business and accident)		2.000	DKK
Computer equipment / software		2.000	DKK
Accountant, Attorney, Other Counseling		1500	DKK
Telefon, mobil, internet		1000	DKK
Uforudsete omkostninger		10000	DKK
Investment	**154.000**		**DKK**
Monthly cost		**17.900**	**DKK**

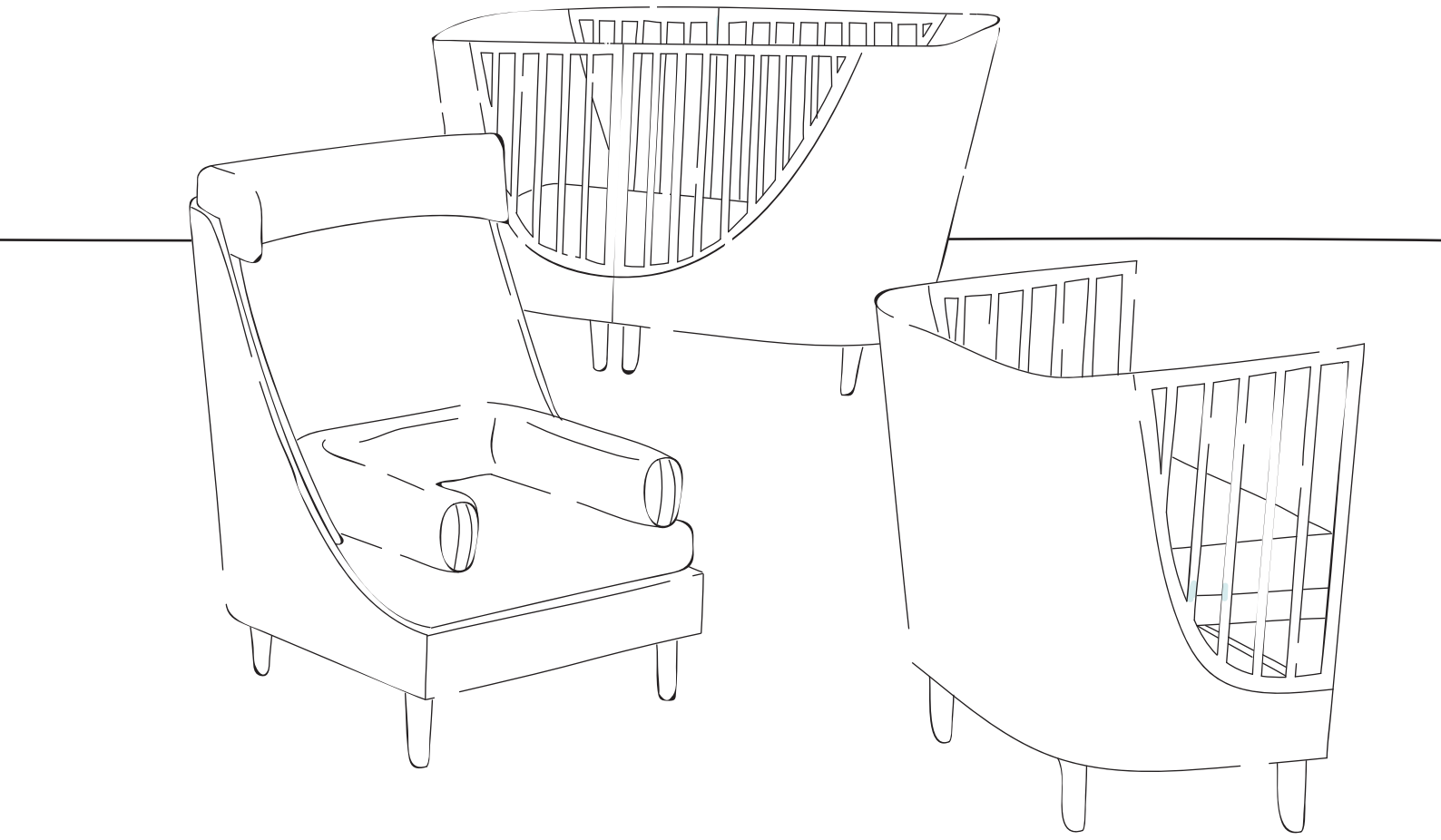
Unit price for cot + mattres		
Retail price incl. VAT	7.200	DKK
Retail price excl. VAT	5.760	Dkk
Contribution (distributor)	1.616	DKK
Sales price	4.144	DKK
Contribution margin Spire	1.746	DKK
Product cost	2.398	DKK

Breakeven analysis Cot	**1 year**	**2 year**	**3 year**	
Number of units sold	200	1.500	5.000	DKK
Sales price	4.144	4.144	4.144	DKK
Product cost	2.398	2.398	2.398	DKK
Fixed cost (monthly cost x12)	214.800	214.800	214.800	DKK
Sales revenue (turnover)	1.151.921	8.639.406	28.798.020	DKK
Variable cost	828.720	6.215.400	20.718.000	DKK
Contribution margin	349.200	2.619.000	8.730.000	DKK
Investment	-154.000	-19.600	2.384.600	DKK
Contribution	134.400	2.404.200	8.515.200	DKK
Remaining	**-19.600**	**2.384.600**	**10.899.800**	**DKK**


SPIRE

Technical Drawings

MSc04-ID17 / June 2020 / Industrial Design / Aalborg University
Emilie Rysgaard / Trine Nyeng Møller Christiansen



GROA
BY SPIRE

TITELPAGE

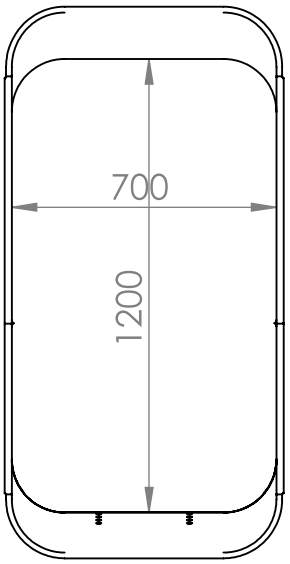
Project title:	Groa by Spire
Team:	Msc04 - ID17
Project theme:	Master Thesis
Report type:	Process report
Project period:	03.02.2020 - 03.06.2020
Supervisor:	Thomas Arvid Jaeger
Technical supervisor:	Michael Skipper Andersen
Number of pages:	40

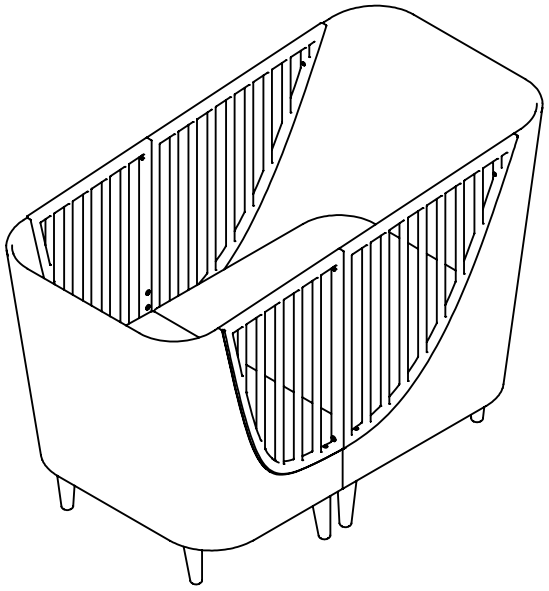
Team members:	Emilie Rysgaard
	Trine Nyeng Møller Christiansen

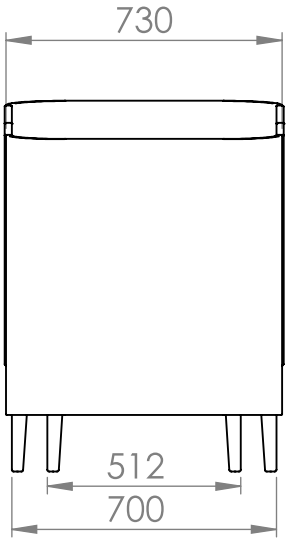
READING GUIDE

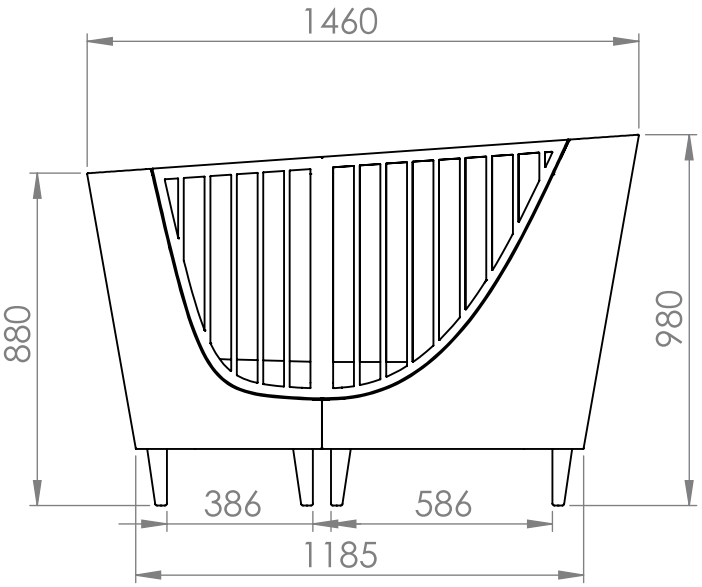
This project consists of two reports; a product report and a process report with an appendix and a technical folder. It is recommended first to read the product report together with the technical drawings to see the final result. Then, the process report with the appendix, where a more detailed understanding of the development process will be documented. Since many of the parts in the product are a mirrored of each other, only one parts is cohosen to make as a detail drawing.

TABLE OF CONTENT









TITEL: Cot	**MATERIAL :**	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 1 of 35
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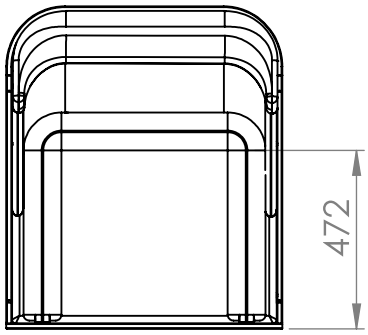
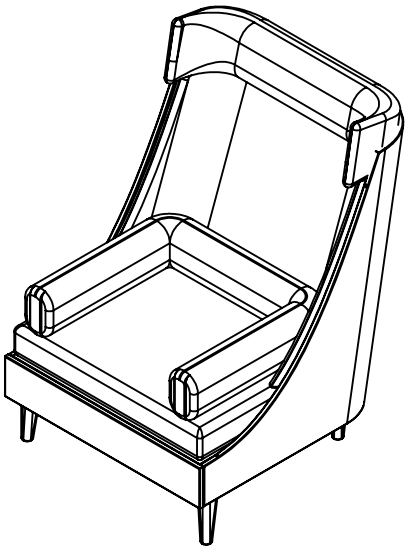
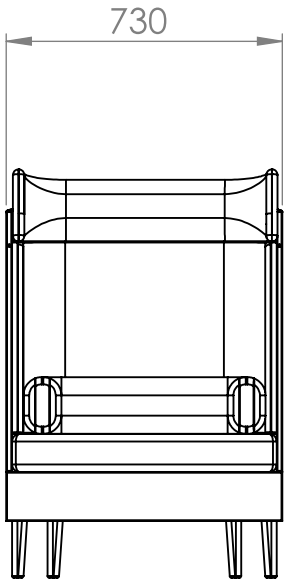
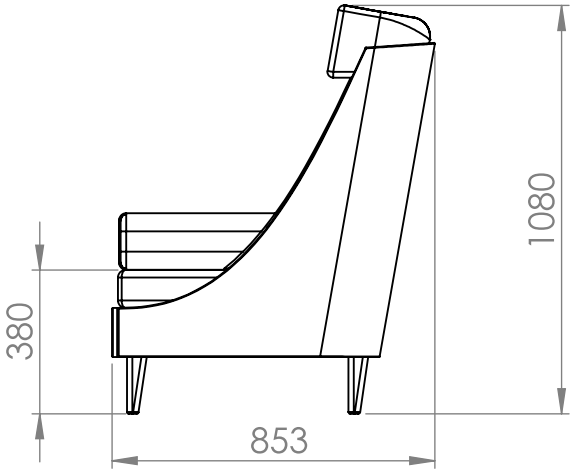
PRODUCTION METHOD:		**DRAWING TYPE:** Orthographic view









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DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:**
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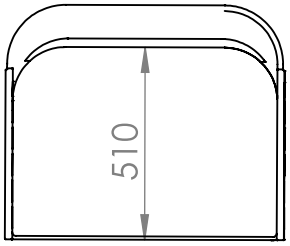

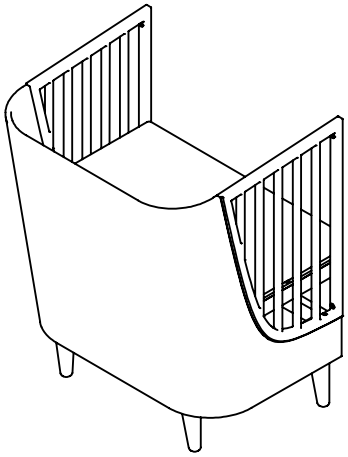

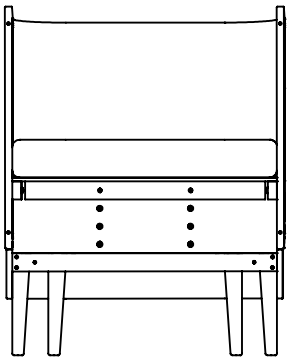

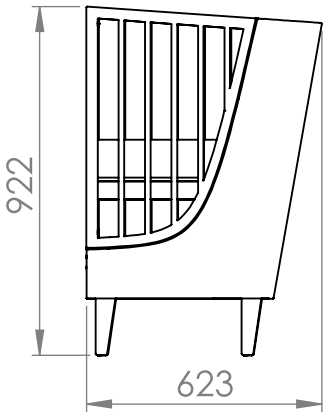

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DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:**
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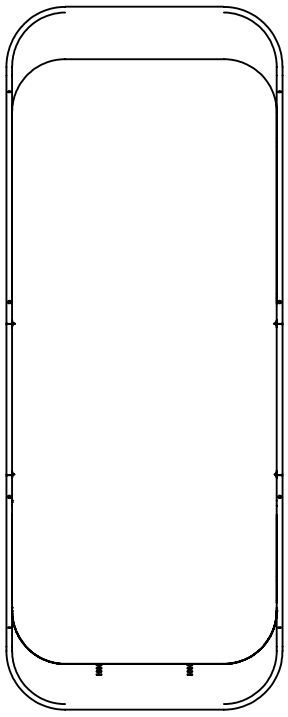

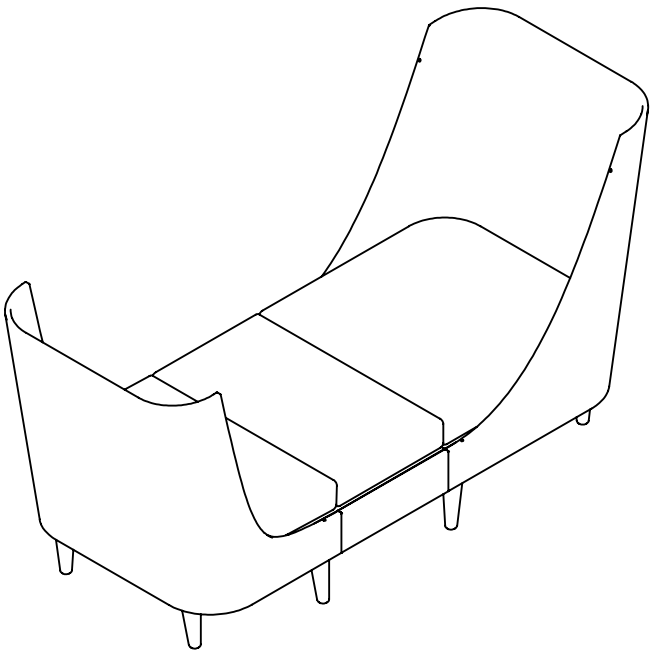

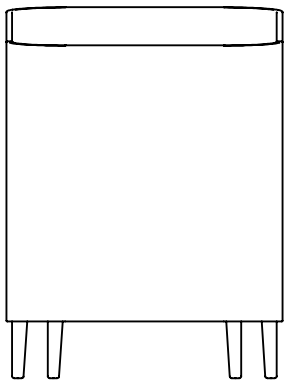

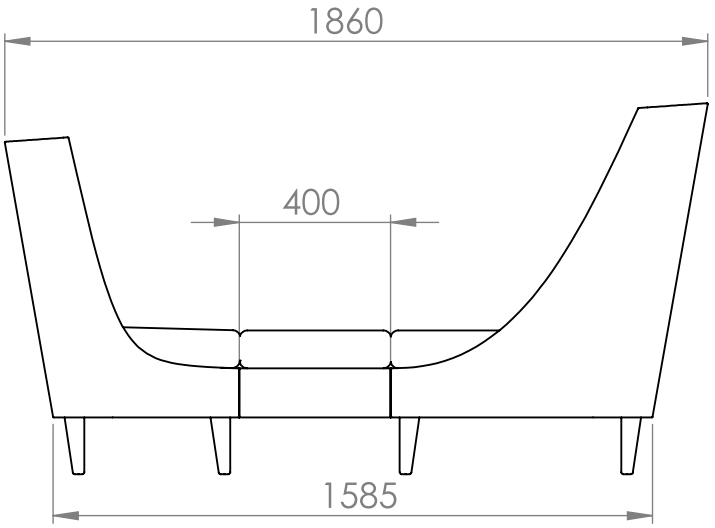

TITEL: Junior extention	**MATERIAL :**	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 4 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:**
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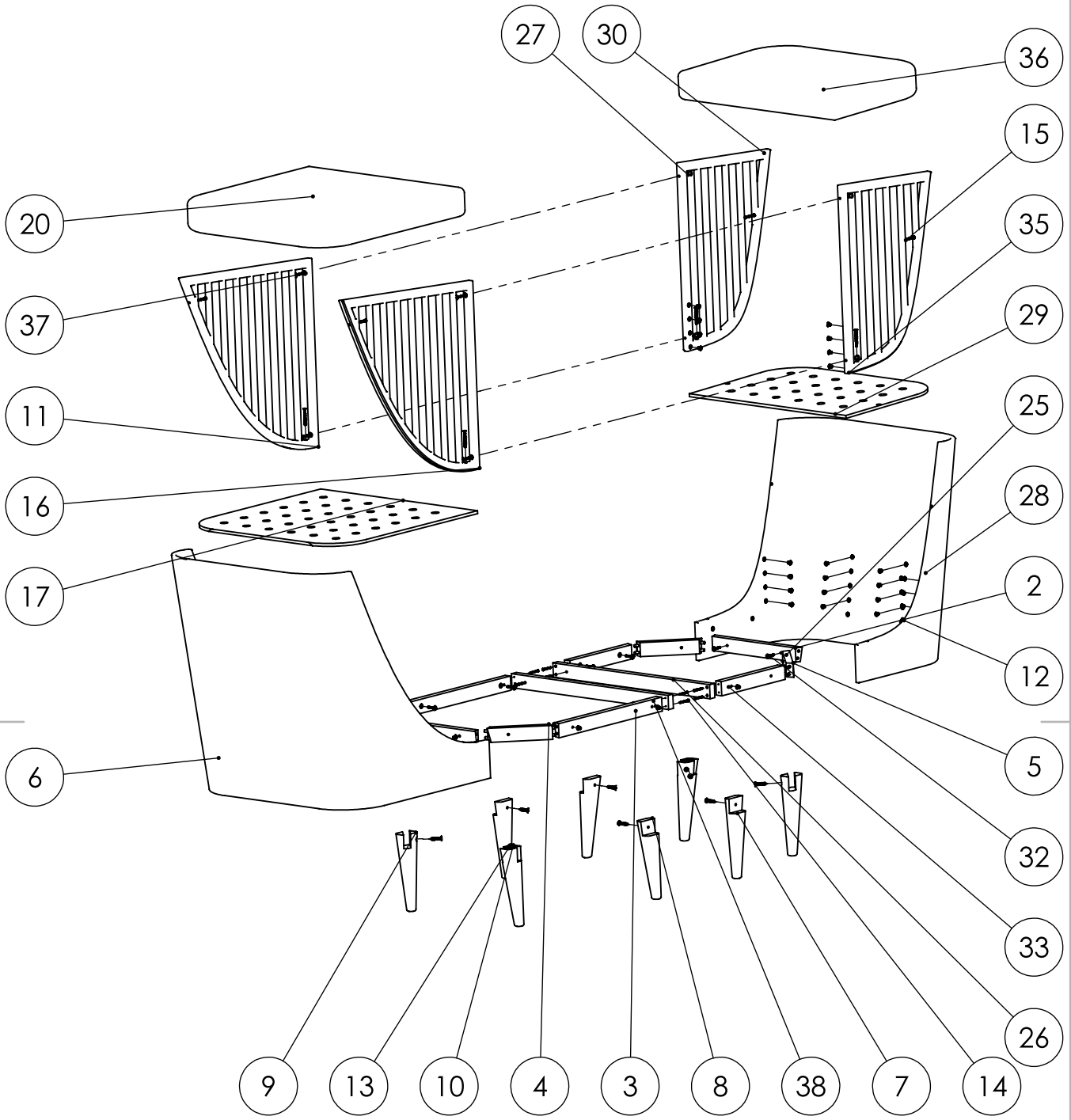

TITEL: Cot	**MATERIAL :**	**DATE:** 01.06.20
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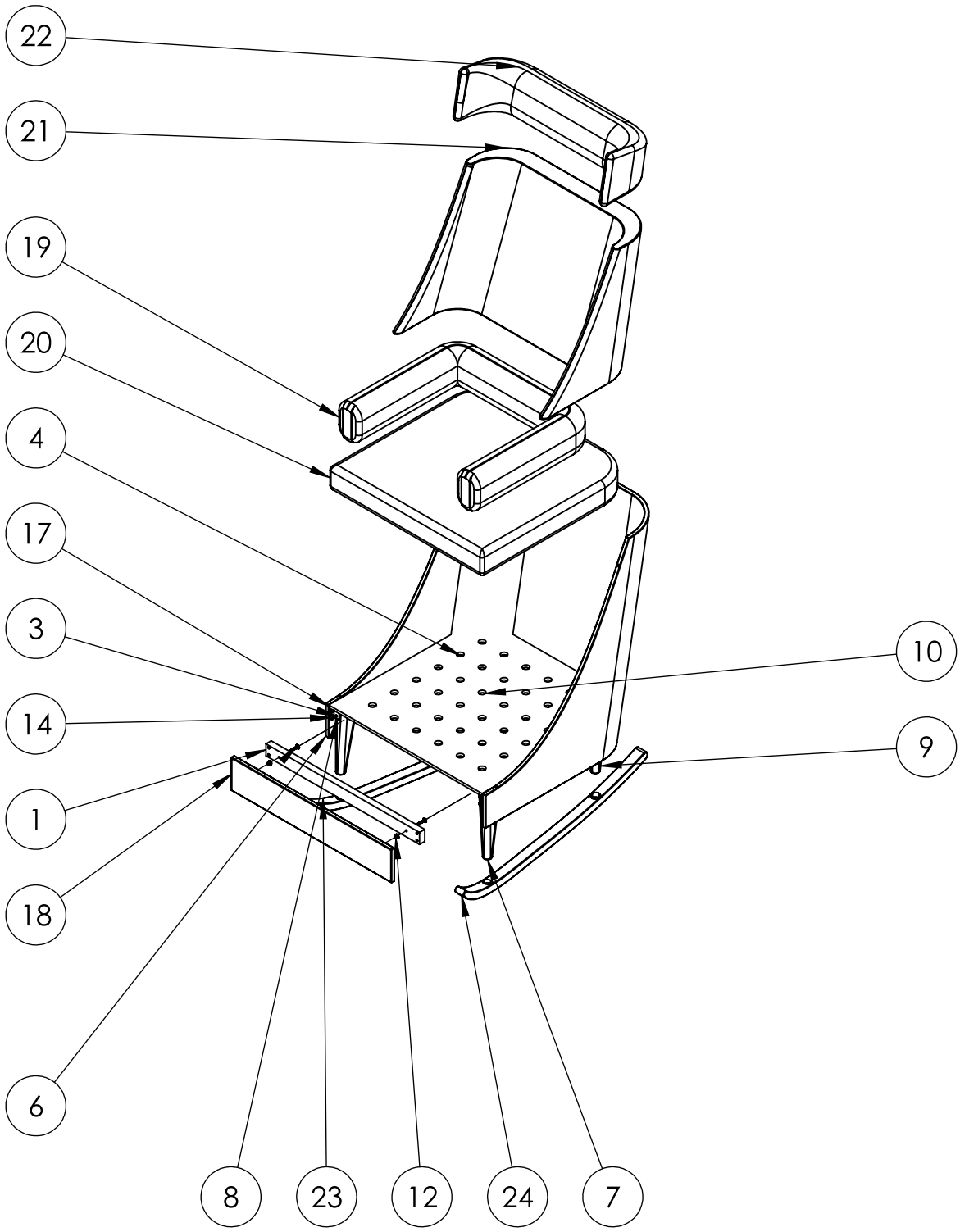
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:**
PRODUCTION METHOD:		**DRAWING TYPE:** Exploded view



TITEL: Nursing chair	**MATERIAL :**	**DATE:** 01.06.20
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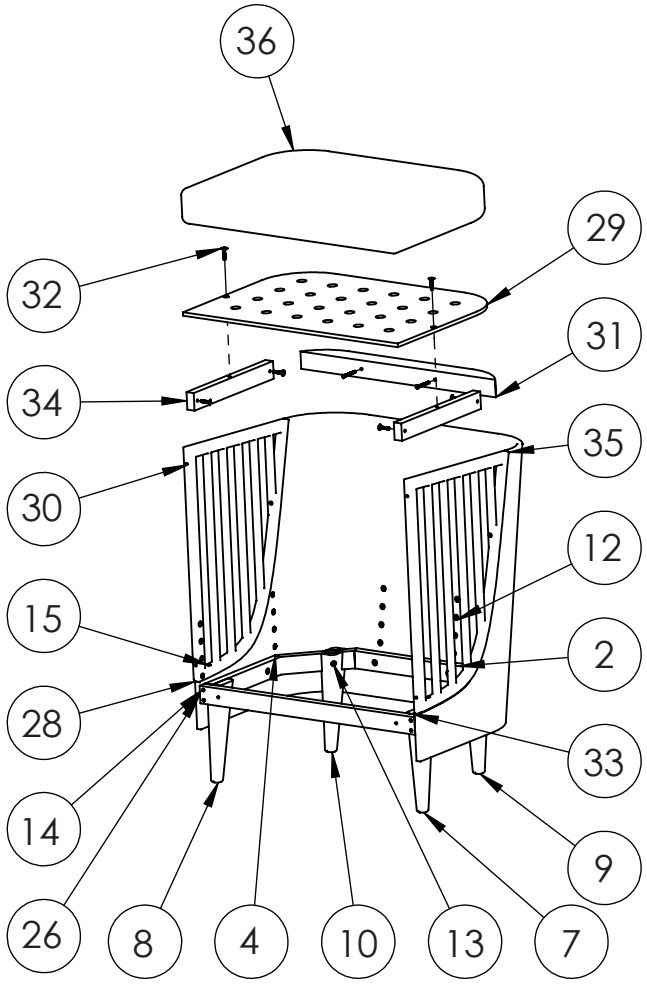
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:**
PRODUCTION METHOD:		**DRAWING TYPE:** Exploded view



TITEL: Bedside crib	**MATERIAL :**	**DATE:** 01.06.20
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DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:**
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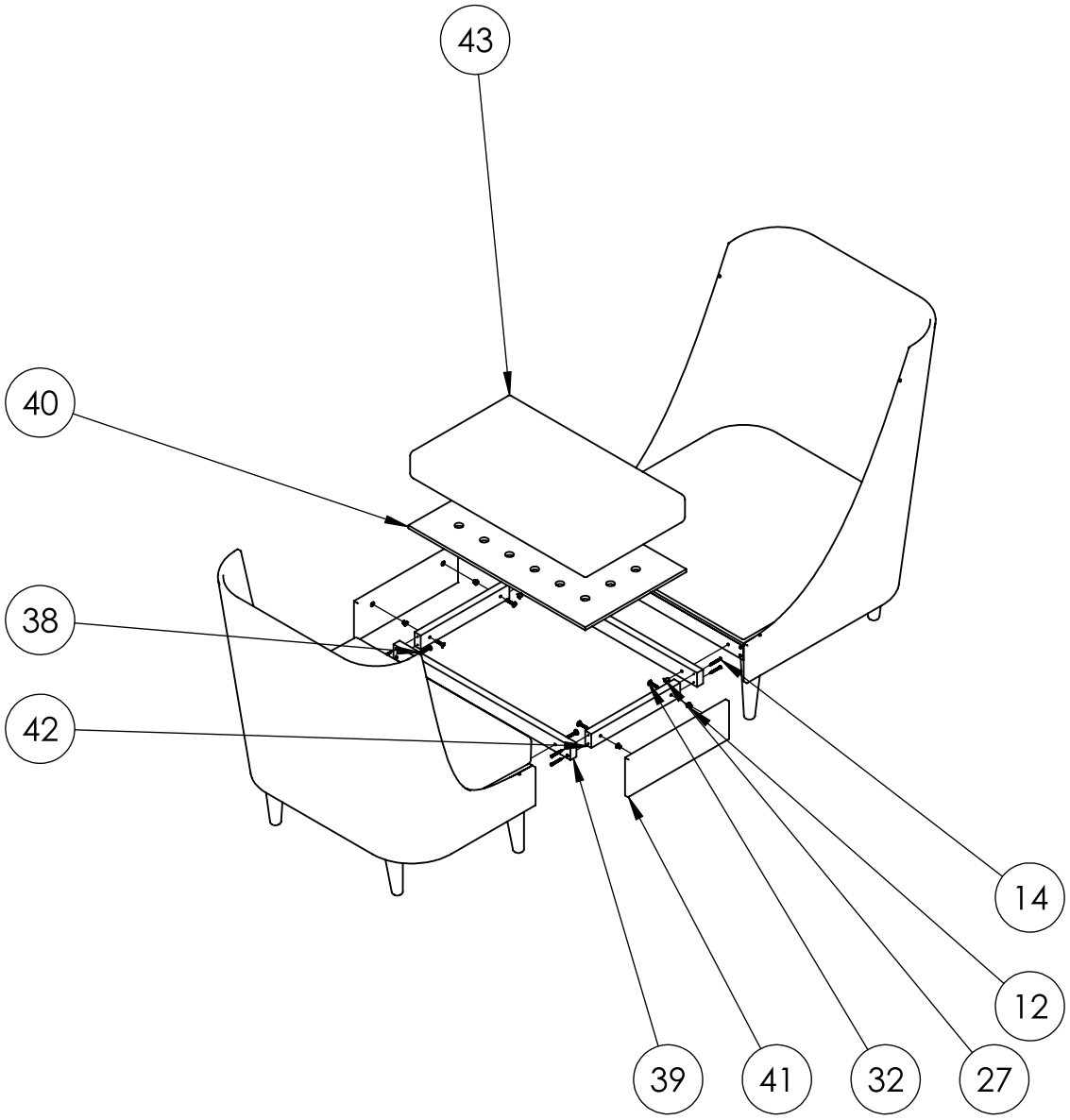
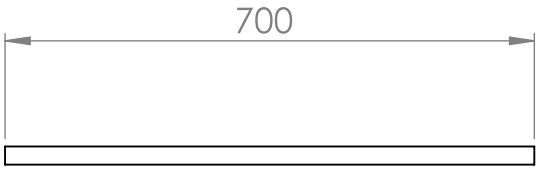
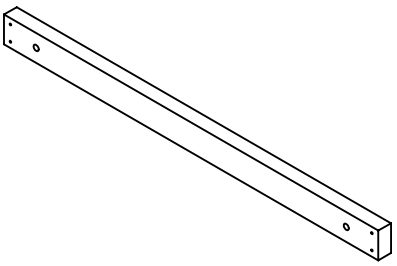


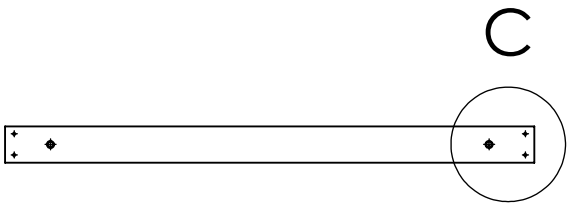
TITEL: Junior extention	**MATERIAL :**	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 8 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:**
PRODUCTION METHOD:		**DRAWING TYPE:** Exploded view

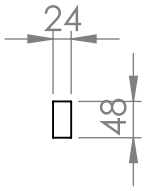
BILL OF MATERIALS

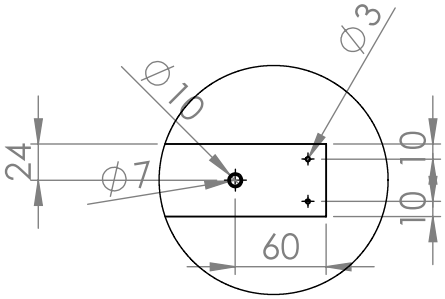
NO.	PART	MATERIAL	Note	Qty.
1	Construction - Middle lath	Pine wood		1
2	Construction -Back lath	Pine wood		2
3	Construction - Chair length lath	Pine wood		2
4	Construction - Slant lath	Pine wood		2
5	Construction - Slant lath mirror	Pine wood	No. 4 mirrored	2
6	Nursing chair - Shell	15 mm Beechwood veneer		1
7	Leg	Beechwood		2
8	Leg mirror	Beechwood	No. 7 mirrored	2
9	Leg angled	Beechwood		2
10	Leg angled mirror	Beechwood	No. 9 mirrored	2
11	Nursing chair - Bar section	19 mm Plywood		1
12	Threaded nut inserts			40
13	Furniture screw for legs			8
14	Screw			16
15	M6 furniture screw (55)			10
16	Nursing chair - Bar section mirror	19 mm Plywood	no. 11 mirrored	1
17	Nursing chair - Bottom plate	10 mm Plywood		1
18	Nursing chair - Front plate	15 mm Plywood		1
19	Nursing chair - Arm support pillow	100% organic cotton		1
20	Nursing chair - Mattress	Cold foam		1
21	Nursing chair - Back support pillow	Cold foam		1
22	Nursing chair - Head support pillow	Cold foam		1
23	Nursing chair - Rocking leg	Beechwood		1
24	Nursing chair - Rocking leg mirror	Beechwood	No. 23 mirrored	1
25	Wooden dowels (8 x 30 mm)			16
26	Construction -Middle lath big holes	Pine wood		1
27	Furniture bolts			8
28	Bedside crib - Shell	15 mm beechwood veneer		1
29	Bedside crib - Bottom plate	10 mm Plywood		2
30	Bedside crib - Bar section	19 mm Plywood		1
31	Bedside crib - Height adjustment back	Pine wood	Same as no. 1	1
32	M6 furniture screws			18
33	Bedside crib - Lenght lath	Pine wood		2
34	Bedside - Height adjustment side	Pine wood		2
35	Bedside crib - Bar section mirror	19 mm Plywood	No. 30 mirrored	1
36	Bedside crib - Mattress	Cold foam		2
37	M6 furniture screw (55) big head			4
38	M6 furniture screw (40)			4
39	Junior extention - Construction side	Pine wood		2
40	Junior extention - Bottom plate	10 mm Plywood		1
41	Junior extention - Construction length	Pine wood		2
42	Junior extention - Front plate	15 mm Plywood		2
43	Junior extention - Mattress	Cold foam		1







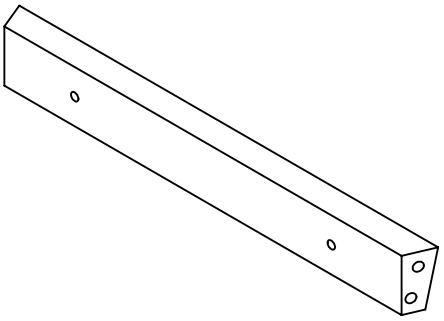


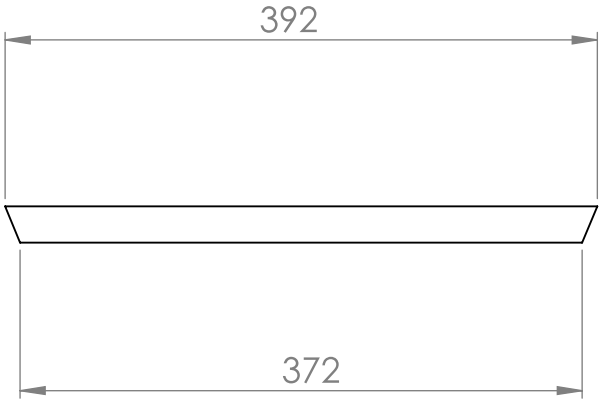


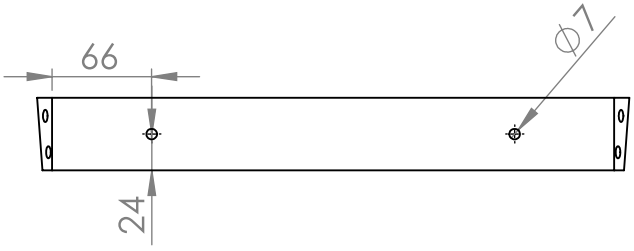
DETAIL C

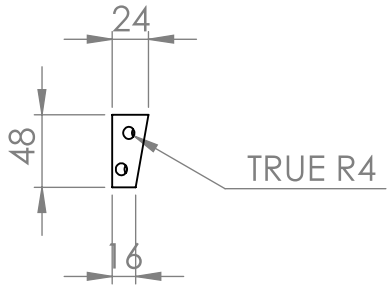
SCALE 1 : 5

TITEL: Construction - Middle lath	**MATERIAL:** Pine wood	**DATE:** 01.06.20
SCALE: 1:10	**DRAWN BY:** MSc04-ID17	**SHEET:** 9 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 1
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

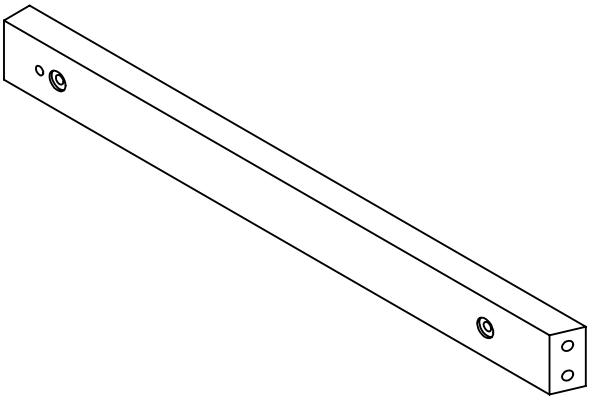


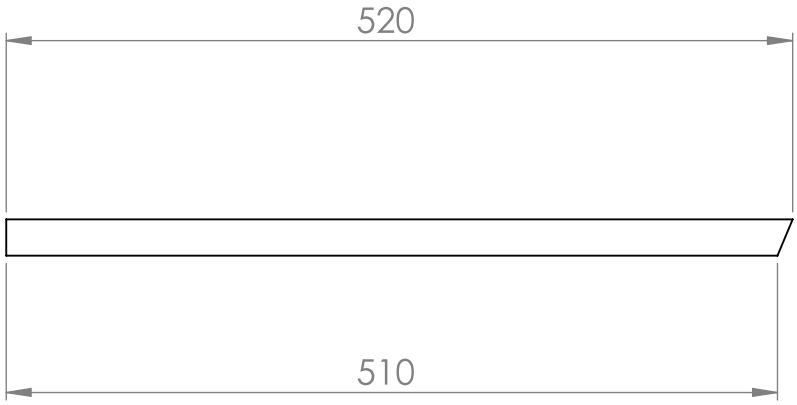


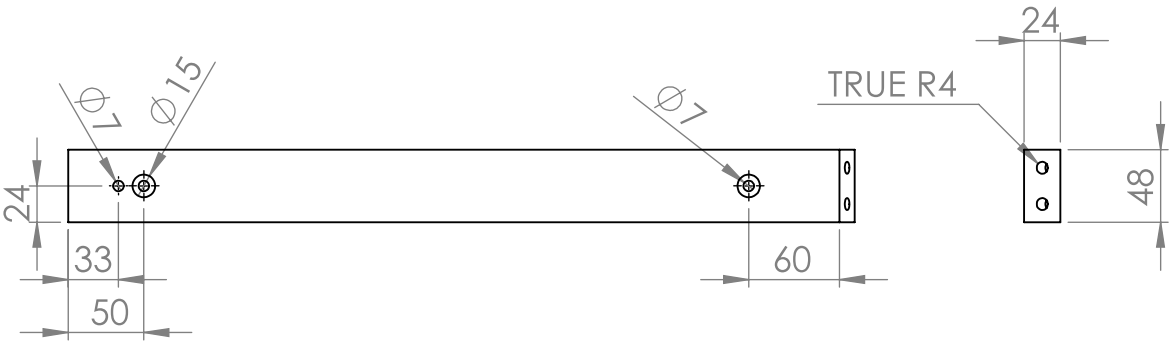




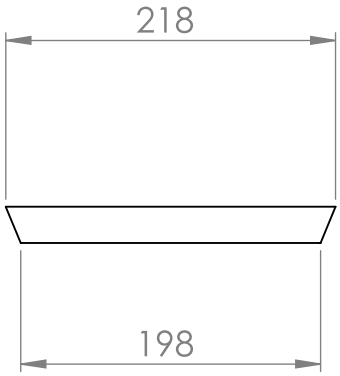
TITEL: Construction - Back lath	**MATERIAL:** Pine wood	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 10 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 2
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

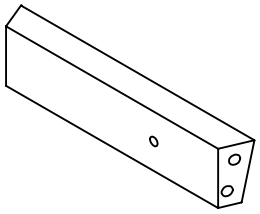


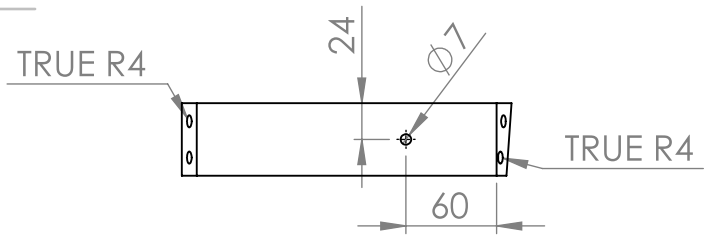


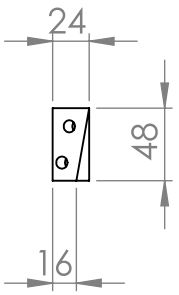


TITEL: Construction - Chair length lath	**MATERIAL:** Pine wood	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 11 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 3
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

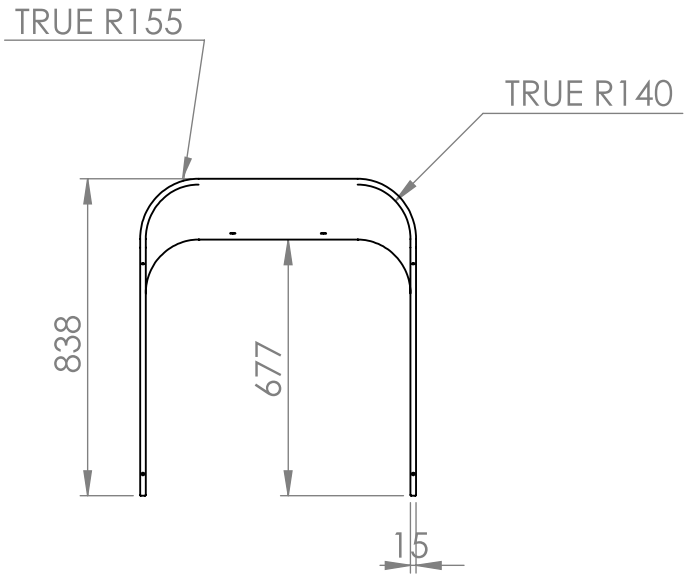


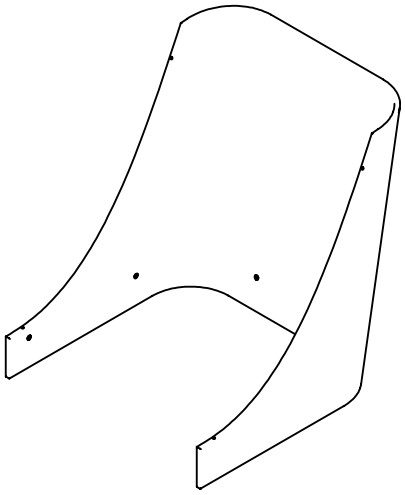


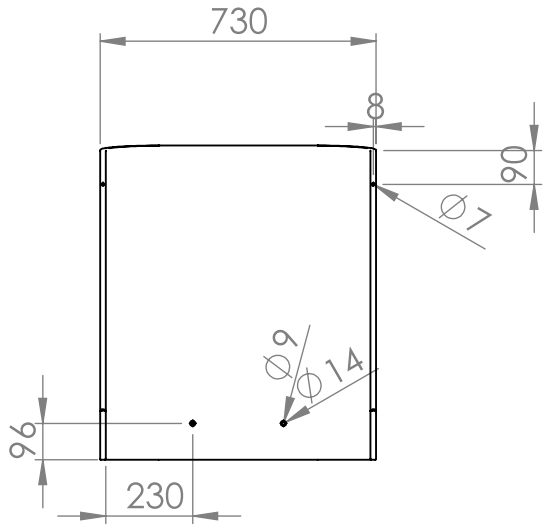


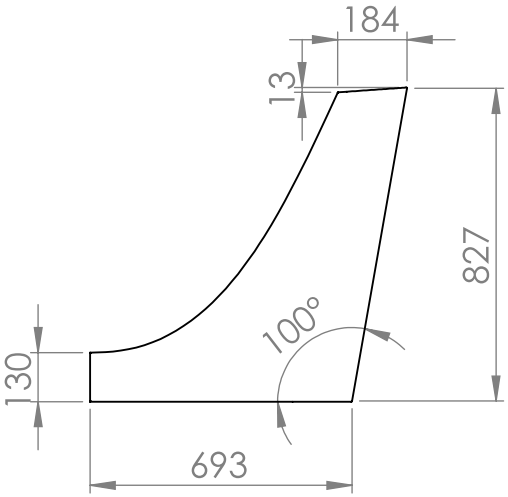


TITEL: Construction - Slant lath	**MATERIAL:** Pine wood	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 12 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 4
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

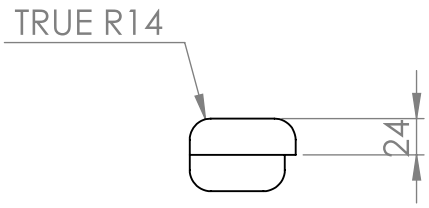


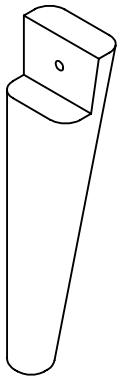


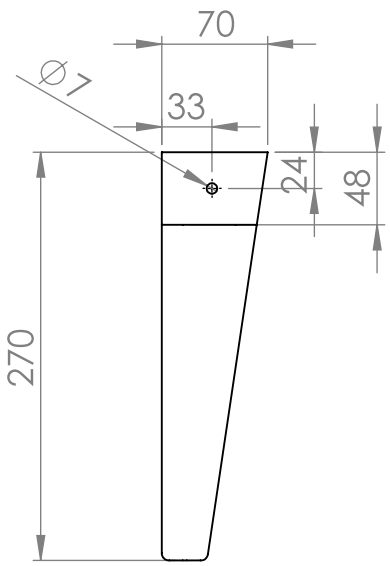


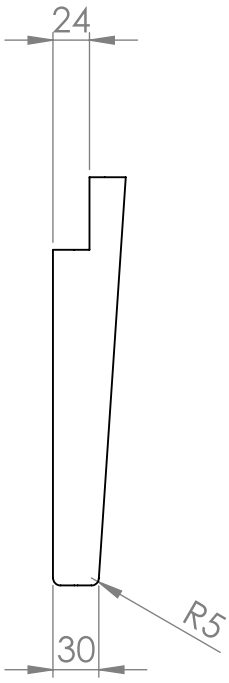


TITEL: Nursing chair - Shell	**MATERIAL:** Beechwood veneer	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 13 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 6
PRODUCTION METHOD: Press molds, Pressing technology, Milled, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing

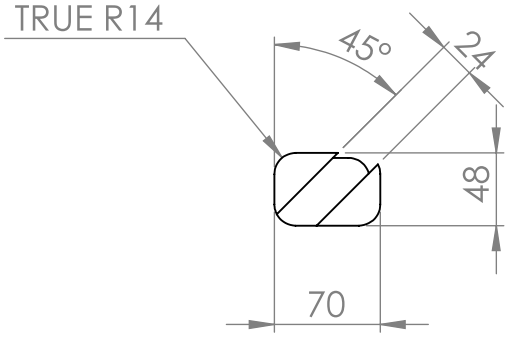


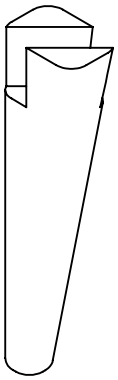


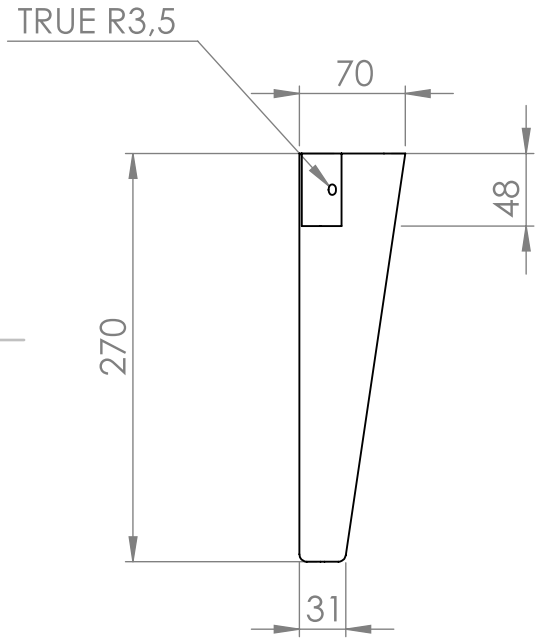


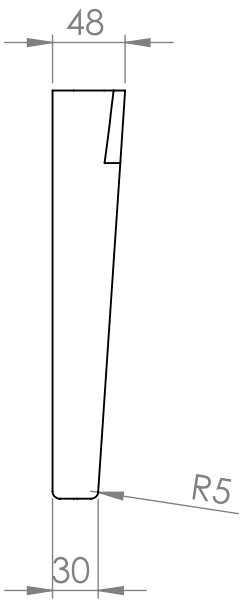


TITEL: Leg	**MATERIAL:** soap-treated oak or painted beechwood	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 14 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 7
PRODUCTION METHOD: Milled, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing

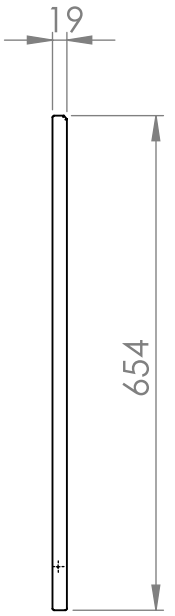


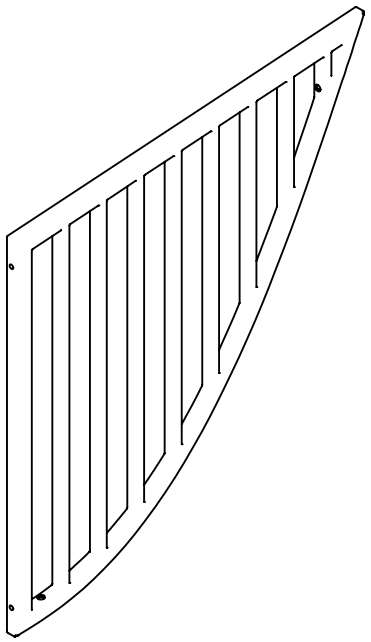


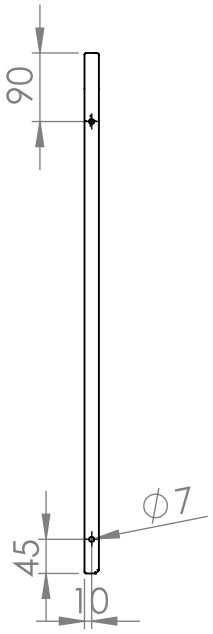


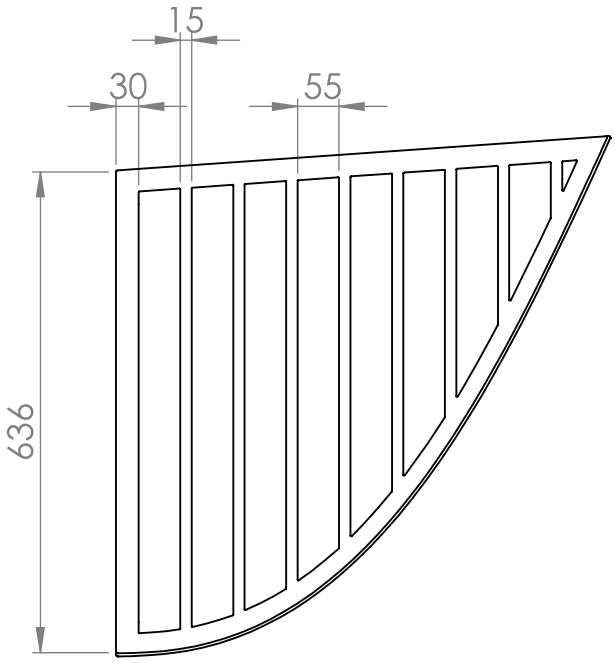


TITEL: Leg angled	**MATERIAL:** soap-treated oak or painted beechwood	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 15 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 9
PRODUCTION METHOD: Milled, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing

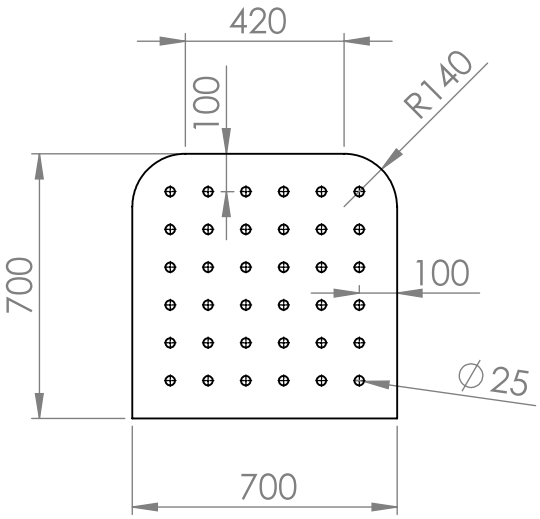


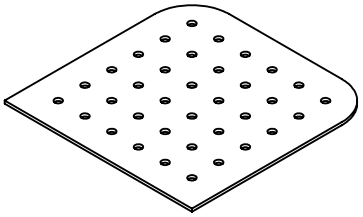


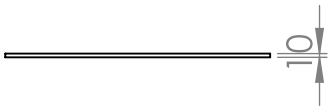


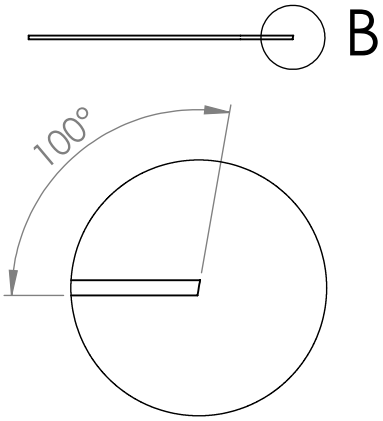


TITEL: Nursing chair - Bar section	**MATERIAL:** Plywood	**DATE:** 01.06.20
SCALE: 1:10	**DRAWN BY:** MSc04-ID17	**SHEET:** 16 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 11
PRODUCTION METHOD: Milled, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing





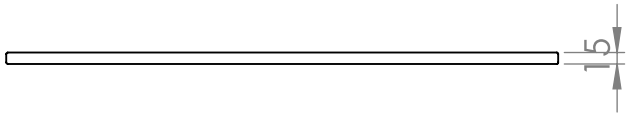


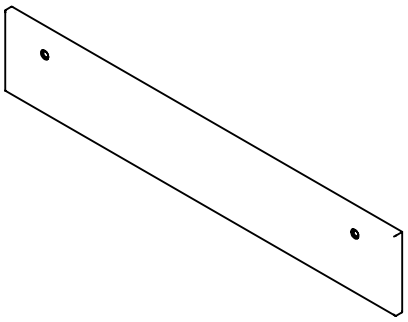


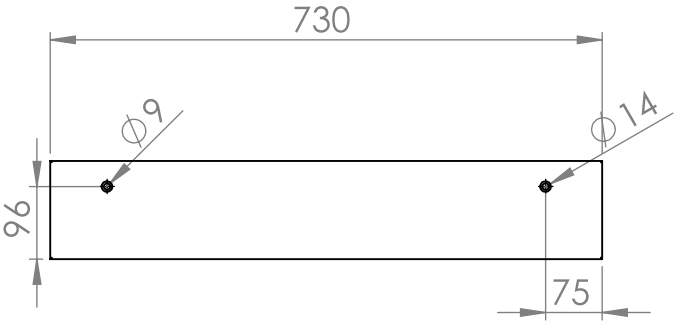
DETAIL B

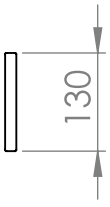
SCALE 1 : 5

TITEL: Nursing chair - Bottom plate	**MATERIAL:** Plywood	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 17 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 17
PRODUCTION METHOD: Milled, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing

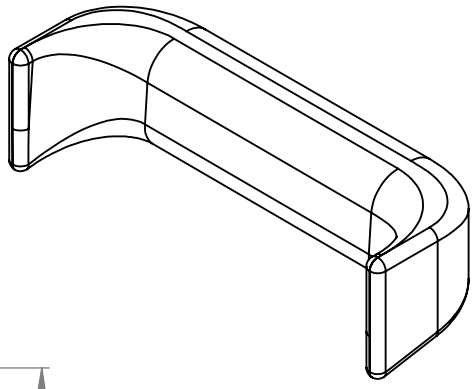


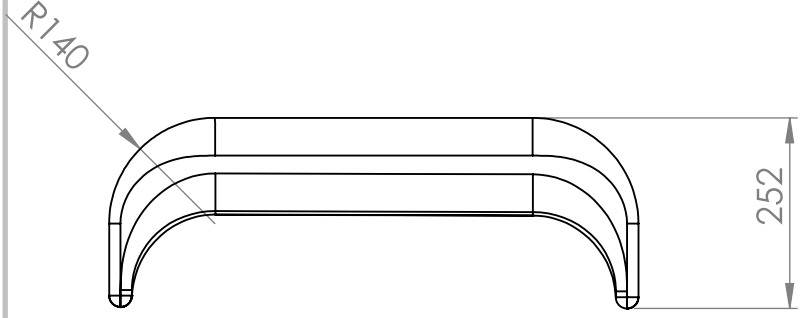


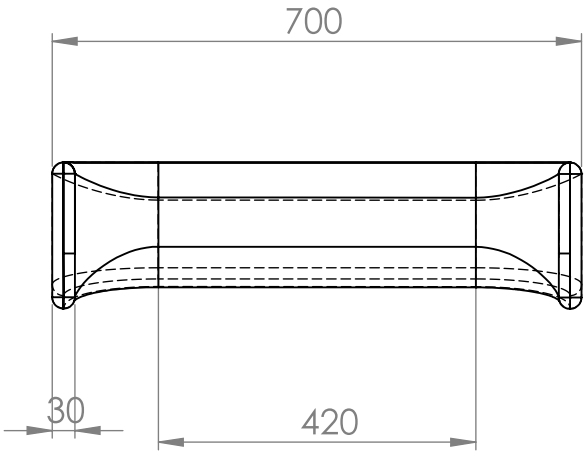


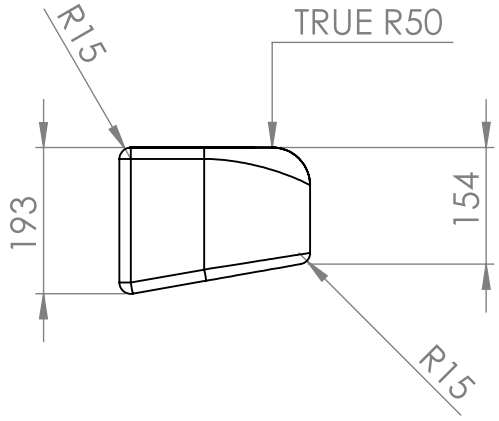


TITEL: Nursing chair - Front plate	**MATERIAL:** Plywood	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 18 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 18
PRODUCTION METHOD: Cut, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing

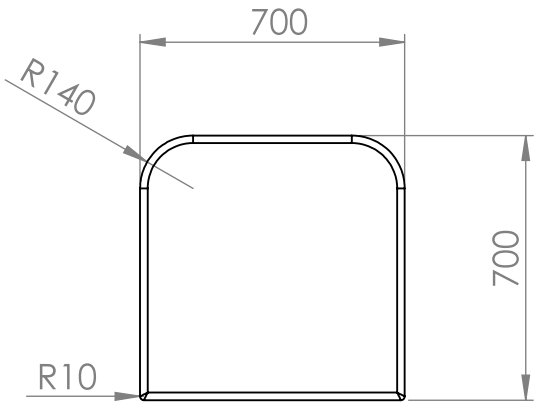


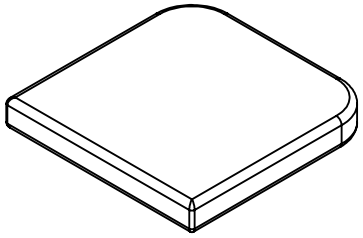


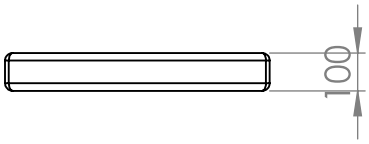


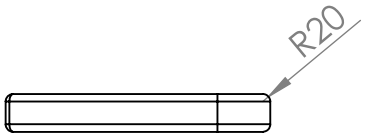


TITEL: Nursing chair - Arm support pillow	**MATERIAL:** 100% organic cotton	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 19 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 19
PRODUCTION METHOD: Sewen		**DRAWING TYPE:** Detail drawing

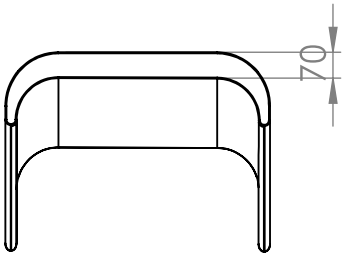


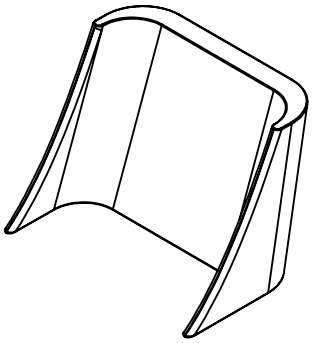


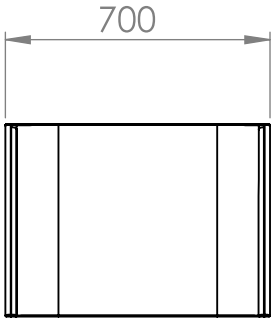


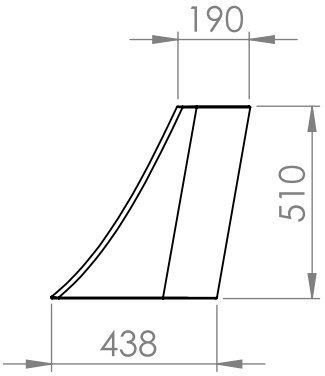


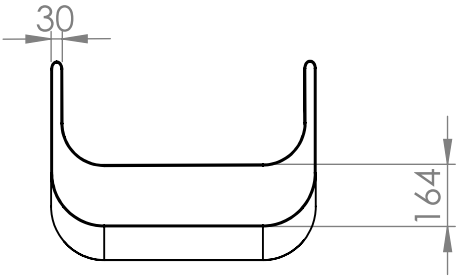
TITEL: Nursing chair - Mattress	**MATERIAL:** Cold foam	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 20 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 20
PRODUCTION METHOD: 2D CNC cut		**DRAWING TYPE:** Detail drawing



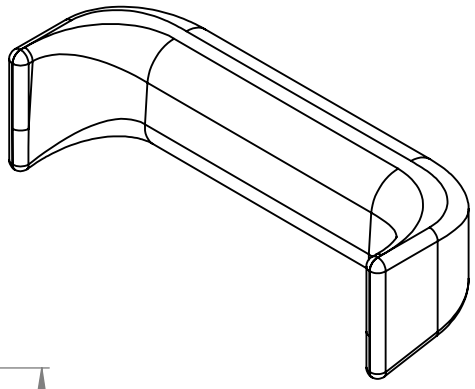


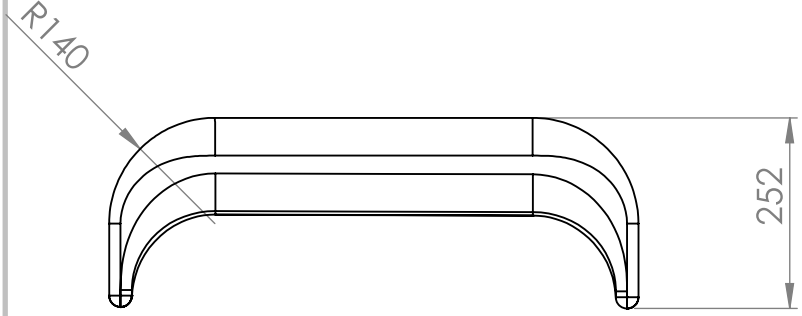


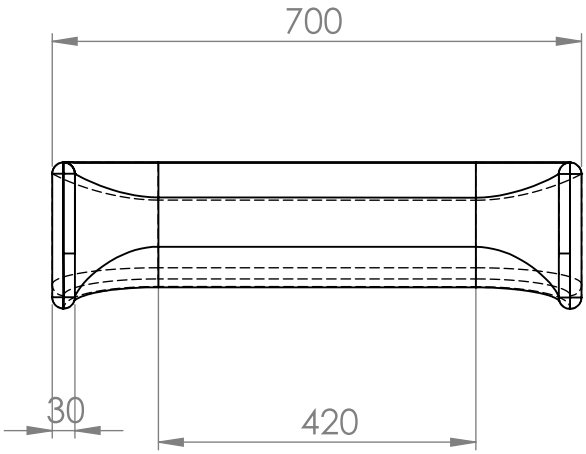


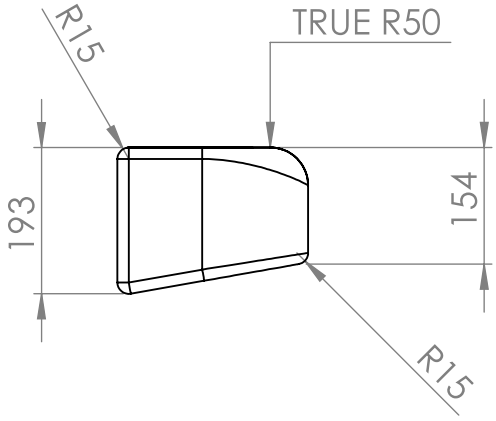


TITEL: Nursing chair - Back pillow support	**MATERIAL:** Cold foam	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 21 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 21
PRODUCTION METHOD: 3D CNC cut		**DRAWING TYPE:** Detail drawing

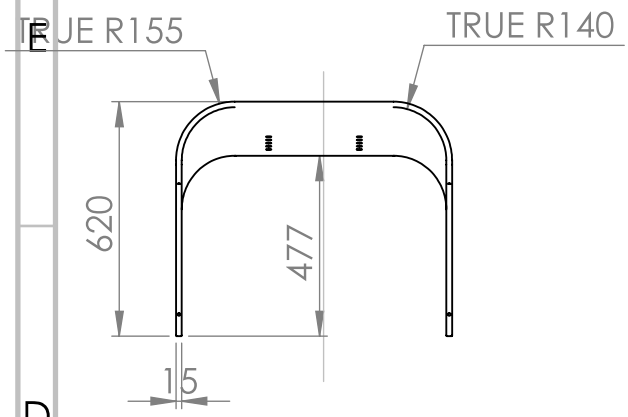


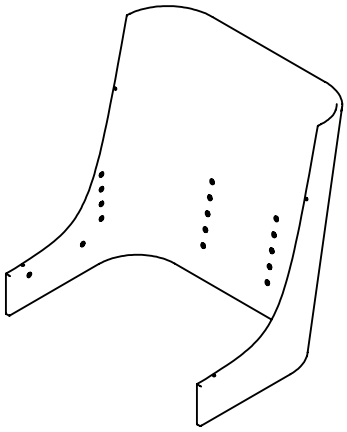


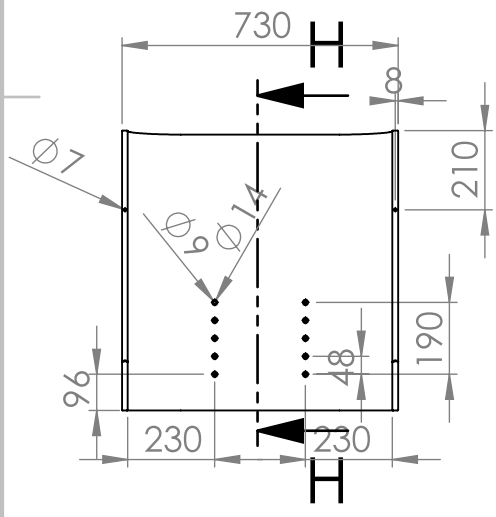


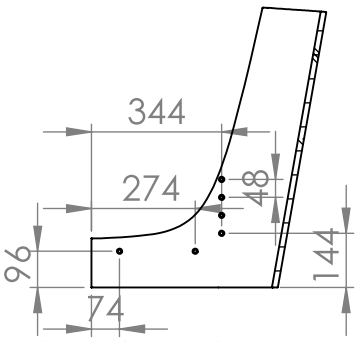


TITEL: Nursing chair - Head pillow support	**MATERIAL:** Cold foam	**DATE:** 01.06.20
SCALE: 1:10	**DRAWN BY:** MSc04-ID17	**SHEET:** 22 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 22
PRODUCTION METHOD: 3D CNC cut		**DRAWING TYPE:** Detail drawing

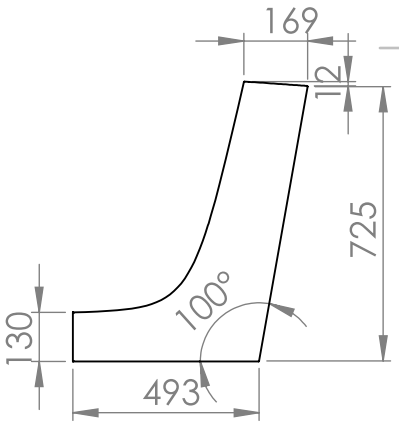




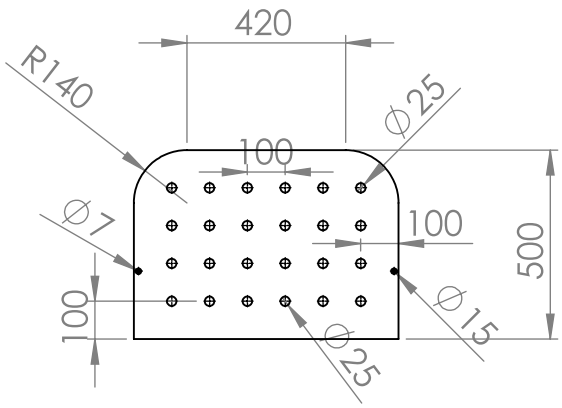


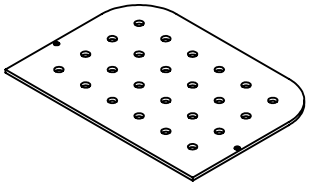


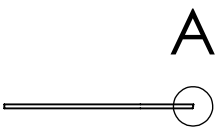
SECTION H-H



TITEL: Bedside crib- Shell	**MATERIAL:** Beechwood veneer	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 23 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 28
PRODUCTION METHOD: Press molds, Pressing technology, Milled, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing

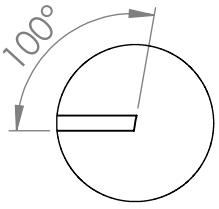




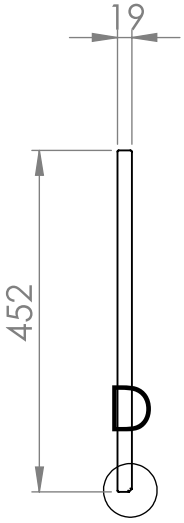


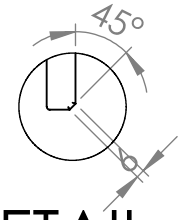
DETAIL A

SCALE 1 : 5



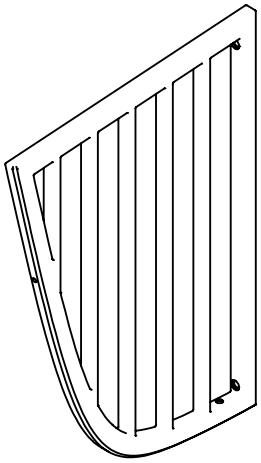
TITEL: Bedside crib - Height adjustment back	**MATERIAL:** Plywood	**DATE:** 01.06.20
SCALE: 1:10	**DRAWN BY:** MSc04-ID17	**SHEET:** 24 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 29
PRODUCTION METHOD: Milled, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing

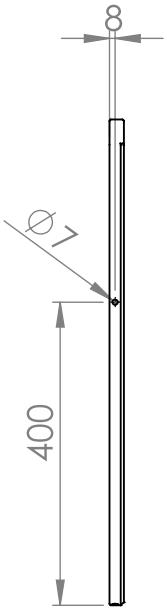


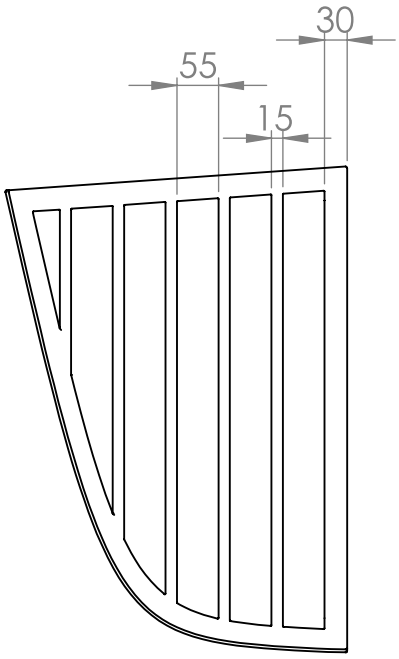


DETAIL D

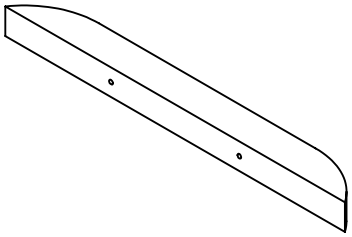
SCALE 1 : 5

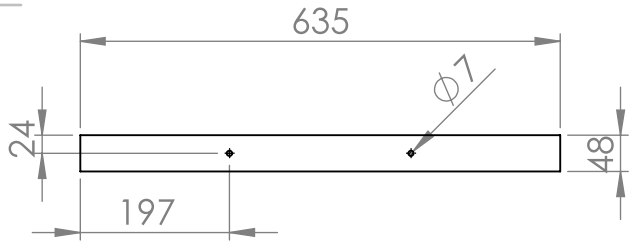


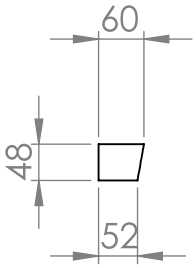




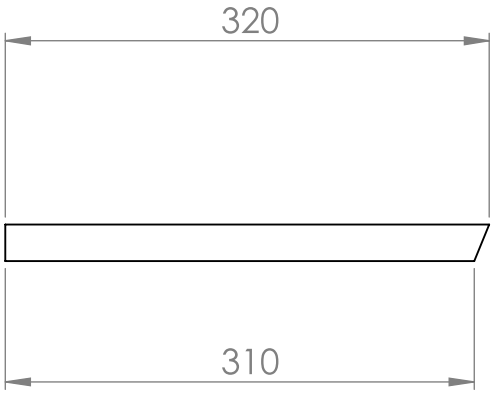
TITEL: Bedside crib - Bar section	**MATERIAL:** Plywood	**DATE:** 01.06.20
SCALE: 1:10	**DRAWN BY:** MSc04-ID17	**SHEET:** 25 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 30
PRODUCTION METHOD: Milled, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing

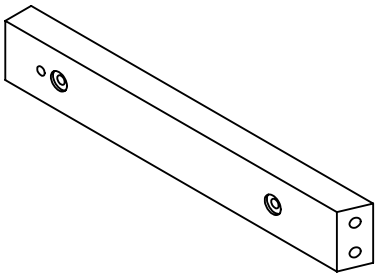


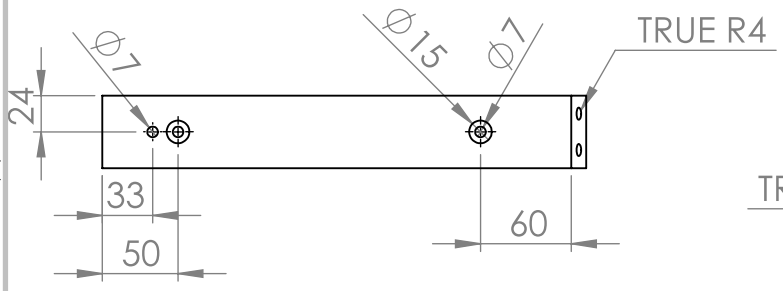


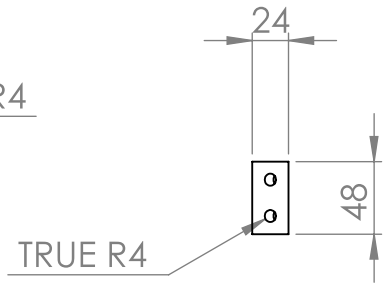


TITEL: Bedside crib - Height adjustment back	**MATERIAL:** Pine wood	**DATE:** 01.06.20
SCALE: 1:10	**DRAWN BY:** MSc04-ID17	**SHEET:** 26 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 31
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

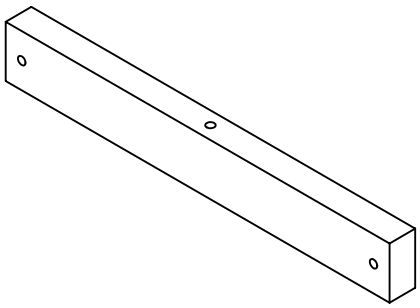


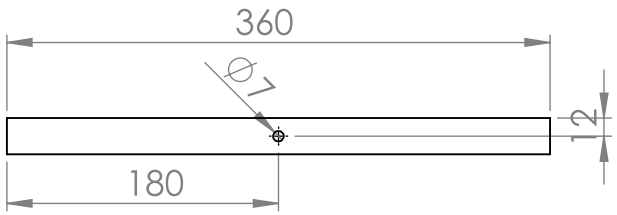


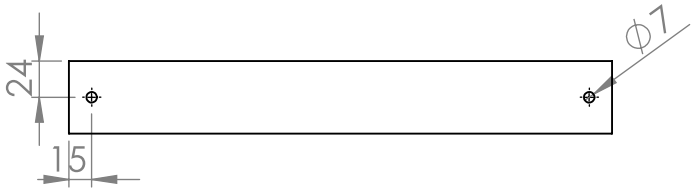


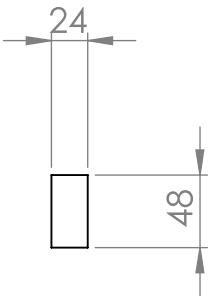


TITEL: Bedside crib - Length lath	**MATERIAL:** Pine wood	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 27 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 33
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

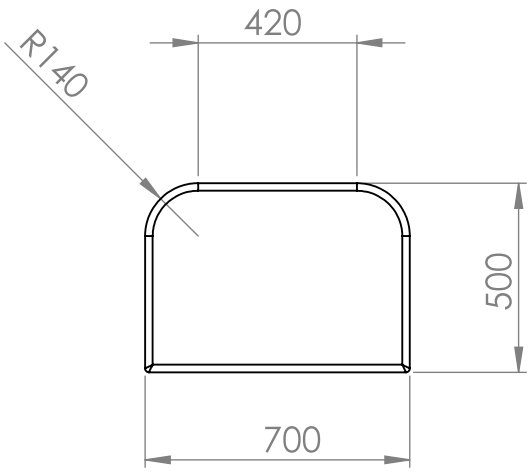


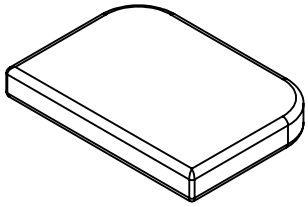


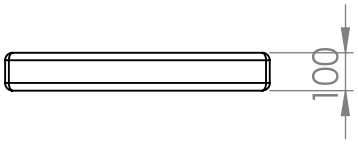


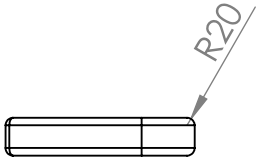


TITEL: Bedside crib - Height adjustment side	**MATERIAL:** Pine wood	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 28 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 34
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

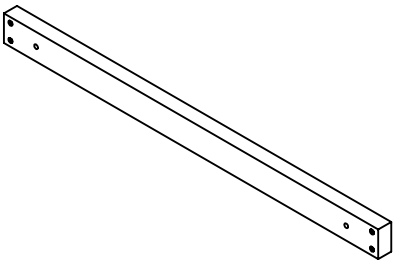


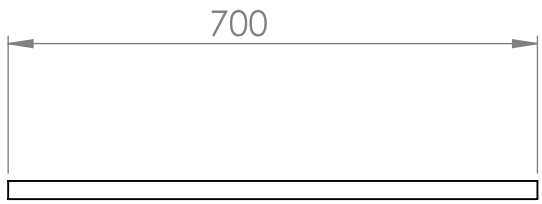


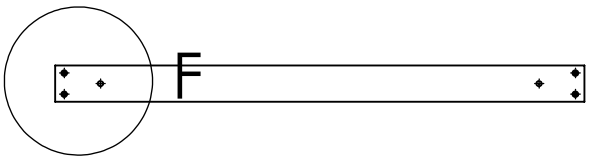


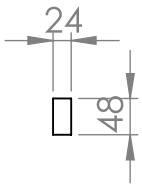


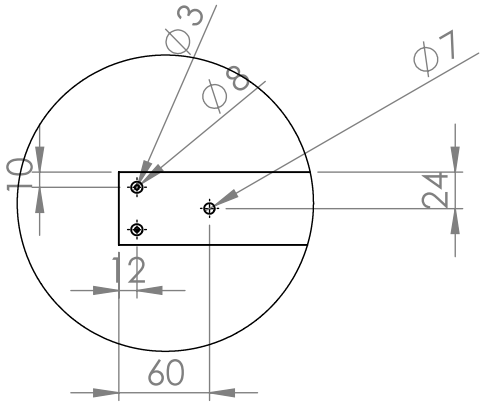
TITEL: Bedside crib - Mattress	**MATERIAL:** Cold foam	**DATE:** 01.06.20
SCALE: 1:20	**DRAWN BY:** MSc04-ID17	**SHEET:** 29 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 36
PRODUCTION METHOD: 2D CNC cut		**DRAWING TYPE:** Detail drawing







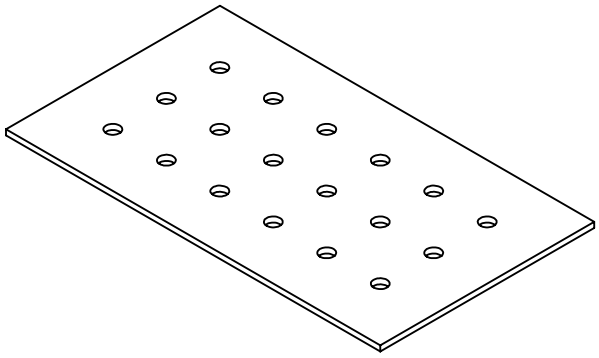


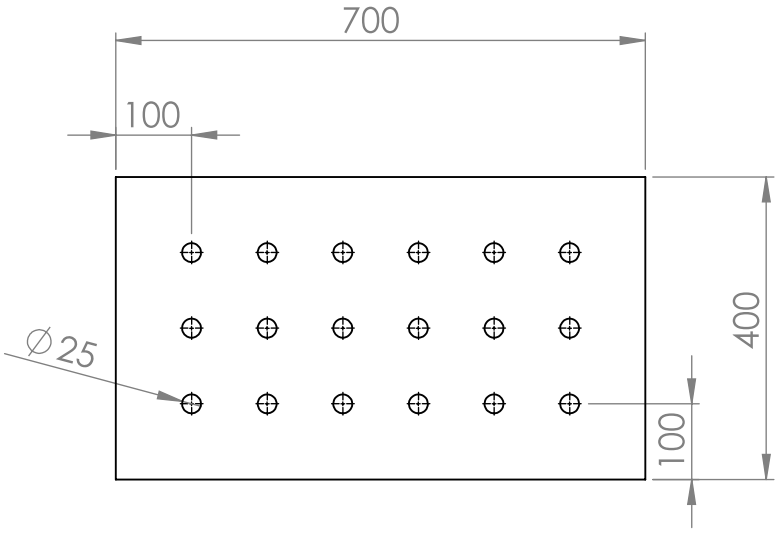


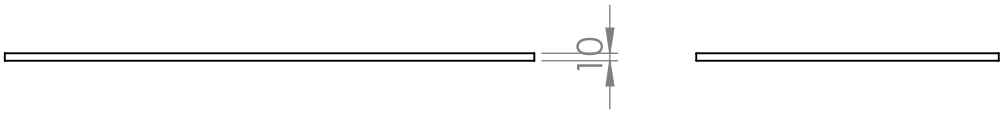
DETAIL F

SCALE 1 : 5

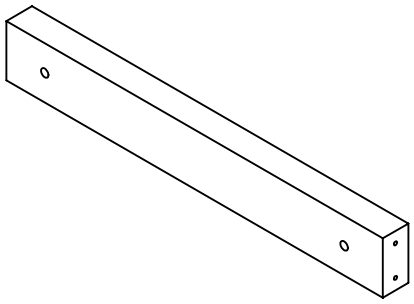
TITEL: Junior extention - Construction side	**MATERIAL:** Pine wood	**DATE:** 01.06.20
SCALE: 1:10	**DRAWN BY:** MSc04-ID17	**SHEET:** 30 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 39
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

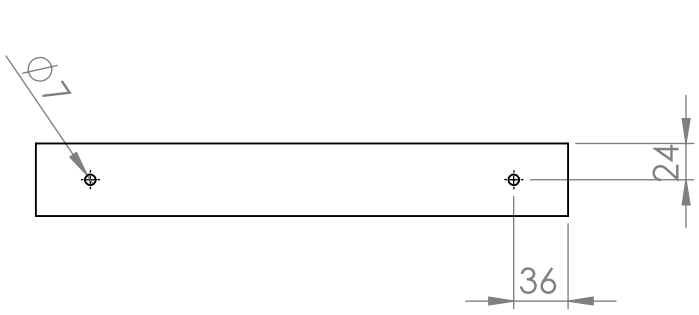


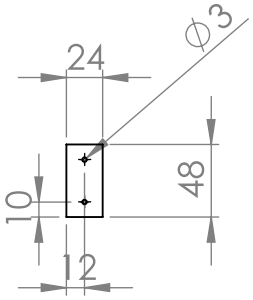




TITEL: Junior extention - Bottom plate	**MATERIAL:** Plywood	**DATE:** 01.06.20
SCALE: 1:10	**DRAWN BY:** MSc04-ID17	**SHEET:** 31 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 40
PRODUCTION METHOD: Milled, Sanded and Surface treatment		**DRAWING TYPE:** Detail drawing

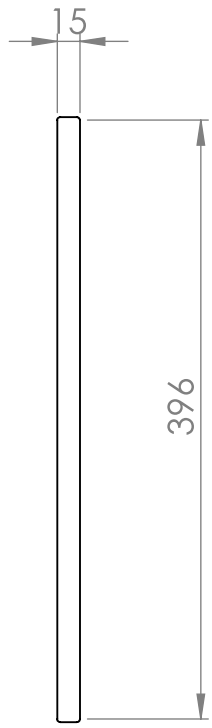


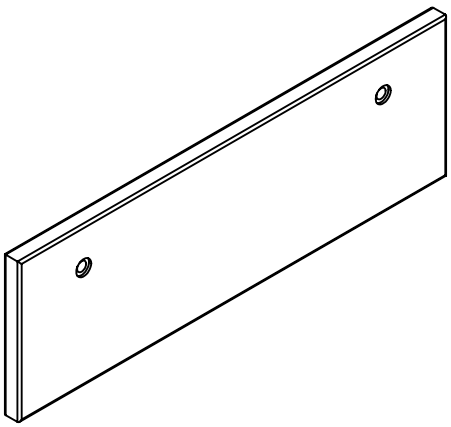


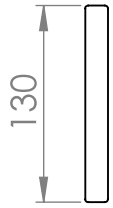


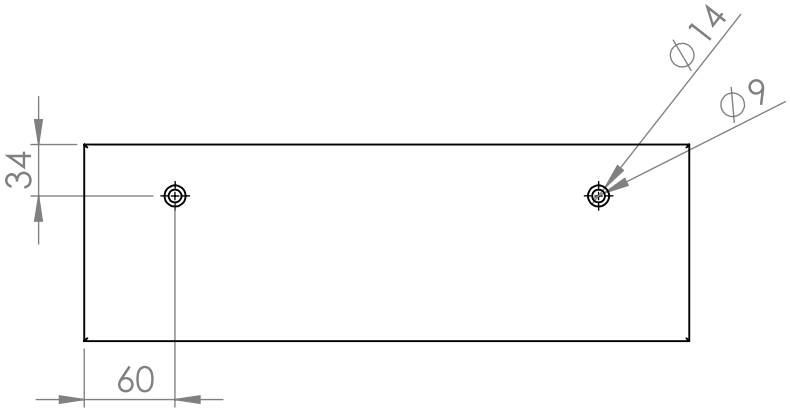
TITEL: Junior extention - Construction length	**MATERIAL:** Pine wood	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 32 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 41
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

36

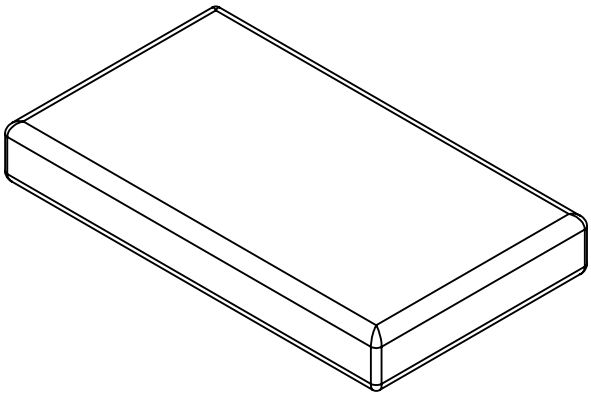


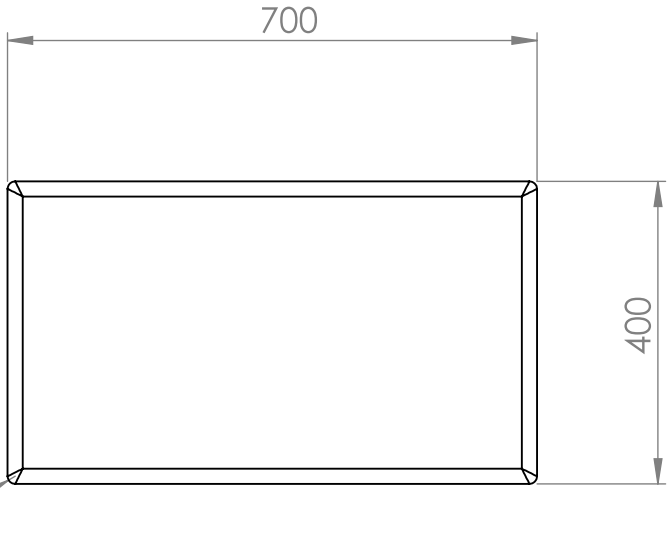


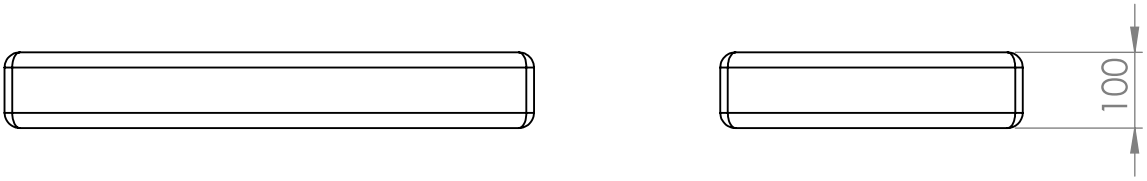




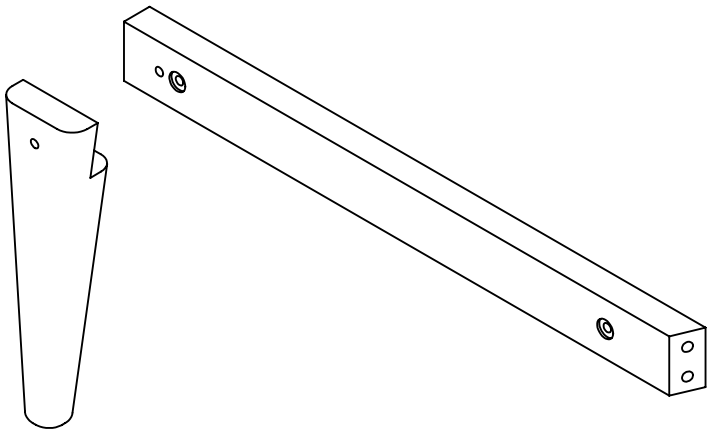
TITEL: Constroction - Middle lath	**MATERIAL:** Plywood	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 33 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 42
PRODUCTION METHOD: Cut		**DRAWING TYPE:** Detail drawing

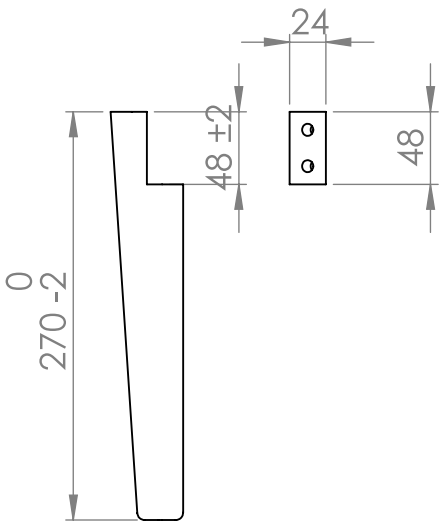






TITEL: Junior extention-Mattress	**MATERIAL:** Cold foam	**DATE:** 01.06.20
SCALE: 1:10	**DRAWN BY:** MSc04-ID17	**SHEET:** 34 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 43
PRODUCTION METHOD: 2D CNC cut		**DRAWING TYPE:** Detail drawing





TITEL: Leg mirror & Construction - Chair length lath	**MATERIAL:**	**DATE:** 01.06.20
SCALE: 1:5	**DRAWN BY:** MSc04-ID17	**SHEET:** 35 of 35
DIMENTIONS: mm	**FIRST ANGLE PROJECTION**	**PART NO.:** 3 & 8
PRODUCTION METHOD:		**DRAWING TYPE:** Tolerances


SPIRE