Thesis | Jennifer Backlund | 2017

MULTIFUNCTIONAL PACKAGING

ABSTRACT

For my final thesis I am designing multifunctional cardboard transportation boxes for the finnish childrens furniture company LumoKids. The goal of the project is to create a new type of cardboard boxes that have a second life after arrival as play objects for kids. The main target group are children aged two to six years old.

My main working method is learning by doing and my information and knowledge strategy is based on information gathering, interviews and workshops. Based on this I have designed new boxes for four different LumoKids products.

KEYWORDS

Design for children, cardboard design, multifunctional design, LumoKids

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Multifunctional Packaging

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TIIVISTELMÄ

Opinnäytetyössäni suunnittelen monikäyttöisiä pahvilaatikoita suomalaiselle lasten huonekaluyritykselle, nimeltä LumoKids. Projektin tavoite on luoda huonekaluille pakkaukset, joita voi käyttää kuljetuksen jälkeen lasten leikkikaluina. Kohderyhmä on 2-6 vuotiaat lapset.

Työskentelymenetelmäni ovat tekemisen kautta oppiminen ja tiedonhankinta strategiani perustuu tiedonkeruuseen, haastatteluihin ja workshoppiin. Tämän pohjalta olen suunnitellut uusia pakkauksia neljälle LumoKids tuotteelle.

AVAINSANAT

Suunnittelu lapsille, pahvi, pakkaussuunnittelu, monitoiminen suunnittelu, LumoKids

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1.

The client and brief

1.1 Introduction

In my thesis I set out to create new and playful furniture packaging for the Finnish childrens furniture company LumoKids.

I have worked with Lumokids as a freelance Graphic designer since the summer of 2016. The idea of the project already began last autumn when we discussed the possibility of multifunctional packaging for some of the LumoKids products. At the time there was not enough time to explore the idea in full. Wanting to have more time to take this idea further I suggested that I could work on this project as my thesis.

The goal of the project is to give the company shipping boxes a second life after arrival. To find out how to turn the plain cardboard boxes that their furniture is being shipped in into something imaginative and fun that kids can play with after the furniture has been unpacked. Most of the products I´m working with are targeted at children between two to six years old.

My main working method is learning by doing and my information and knowledge strategy is based on information gathering, interviews and workshops.

I focus on things to take into consideration when designing for children, working with cardboard and economical design methods for industrial production.

For this project I have interviewed Juha Andresson designer at Stora Enso, Jouni Tainio sales manager at Flexolahti printing company, Sohrab Kazemahvasi Director of Innovations at Division Packaging Solutions and Emmi Rautiainen, kindergarten teacher.

I will also conduct a workshop with a group of children between two to seven years old.

In this thesis I set out to find answer to questions such as:

- **How to make a dull cardboard box into something perceived as playful, fun and valuable by both young kids and their parents?**
- **How to at the same time create cost efficient designs that can be produced industrially and without compromising the boxes structure and original functions of protecting and safely transporting the products?**
- **How to create something inspiring, that adds value to the customers unwrapping experience?**
- **How to tie this product to the company brand and make it a seamless part of their story?**

Picture 1. LumoKids table and stools. LumoKids archive 2017.

1.2 LumoKids brand

LumoKids is a Finnish children's furniture design company founded in 2014. The founders and owners are entrepreneur couple Sanna and Tuomo Puhakainen. Tuomo Puhakainen is the company CEO and Sanna Puhakainen his co-founder. They will henceforth be referred to as Sanna and Tuomo.

The company specializes in modern childrens furniture with a playful twist. Sanna and Tuomo´s story began when they were remodeling their home and were looking for suitable furniture for their childrens bedroom. They couldn't find anything on the market that would both match their interior style, be imaginative and fun for the kids and made out of all natural materials. This gave them the idea to start their own furniture company.

Sanna and Tuomo wanted to focus on manufacturing sustainable and stylish furniture. Also taking into account the limited space in a kids bedroom and a child's wants and needs. To ensure that the products are as well suited for children as possible their own three kids have been included in the ideation process from the start. (LumoKids 2016)

They also wanted to work with young Finnish designers, and the current collection is produced in collaboration with two young industrial designers Juuso Andersin and Otso Leppänen. It also features work by graphical designer Kaisa Mallinen and me, packaging and brand designer Jennifer Backlund.

All the LumoKids textile products are manufactured in Finland and the furniture in Estonia.

1.3 The brief

The brief for the thesis is to design a new type of packaging for four of the LumoKids products using corrugated cardboard. The boxes will function as transportation boxes for the heavy furniture pieces so their foremost function will still be to protect the contained products during transportation to their destination.

LumoKids have recently opened a showroom at Telakkaranta in Helsinki but most of their sales still happen online. This means that the visual look and unwrapping experience of the transportation boxes is very important because for many customers it will be the first physical contact with the brand.

Studies show that food is perceived as tasting better when eaten with a real knife and fork compared to eating with plastic utensils (Maria Godoy. 2013). In the same way the packaging and unwrapping experience can play an important part in adding immaterial value to the product inside.

The main goal of the project is for the new shipping boxes to, besides their original function, have a second life as play objects for the children upon arrival. To create something that inspires play and creative joy for children and also give the customers of the brand, in other words the parents, a more meaningful unwrapping experience and connection to the brand.

Picture 2. Lumokids logo. Backlund 2017.

1.4 LumoKids products

The LumoKids product range currently consists of a stool, a table, and three different bed designs with different size, colour options and including some textile accessories. Several of the products have modular features and all of them are designed to be functional and space saving. The product range is light coloured with pops of pastel shades and black. LumoKids has a clean Scandinavian design language with a whimsical and imaginative touch.

All of the furniture is made using natural materials such as birch plywood. leather and hand woven cotton.

The targeted age group of the products are mostly two to six years olds, besides the multifunctional Ketara bed series which can be used by all the way from two to fifteen years olds.

Picture 3. Ketara bed. LumoKids archive 2017

2.

Designing for children

2. Designing for children

The main target group for the project is children of ages two to six years old. Since I didn't have any previous experience designing for kids I needed to do some background research about things to take into consideration when designing for such younger users.

Already at two years old a child´s creativity is starting to develop. The child is just learning to speak but already starts to become interested in roleplay, can walk a bit, build a block tower from blocks and enjoys for example painting and baking. A six year old on the other hand can already speak quite clearly. Has a lot more control over the body and enjoys running, playing, sports and spending time with friends. At this age the child is already quite handy and enjoys hobbies such as crafting, drawing, making bead strings, baking and cooking. (Mannerheimin lastensuojeluliitto 2017)

A two year old is around 85 cm and a six year old can be around 120 cm tall. These are averages and there can be a lot of individual variations (Puhakainen 2017)

PIcture 4. LumoKids Kaarna table and Korento bed. LumoKids archieve 2017.

Question based interviewing with children can be quite difficult since children are easily susceptible to their environment and perceived expectations of the interviewing adult. Luckily some of the barriers between adults and children can be overcome when interviewing in a natural setting or within the context of another task such as playing with toys or drawing (Kvale, Steinar, 2009, 146).

For this reason instead of conducting interviews with children in the beginning of the process I decided to first research shapes that children like, make a set of mockups and present them to a child test group to play with. While the children are playing I will then observe them playing with the mockups and ask questions about their experience and based on this see how the mockups might be improved.

I also talked with a friend who has worked as a kindergarten teacher for several years about the topic. Something very interesting that came up was the need young kids have for their own little playspace or huts. This is part of the child´s first small steps towards an independent individuality. To have a little space that is theirs that they can decorate themselves and use their own imagination to turn into whatever they want. (Rautiainen 2017)

Another very interesting and noteworthy thing that came up through several discussions and material I read through was the importance of not creating something too "ready made". (Nylander 2017, Vesanto, E. 2013) As a designer it is quite natural to want to polish a product to perfection in every detail. And this is in a lot of cases very appreciated by the adult end users. Children on the other hand can actually prefer to be left with some possibilities to morph the toy or product to their own liking.

When designing for young children it can be extremely important to leave enough space for their own imagination and creativity. The possibility for modularity, changeability and exploring by doing and touching can be immensely important for the young users experience of the product, learning process and even character development.

This is especially true in today's society where the children´s toy market is booming bigger than ever before and many modern kids are drowning in ready made toys. When in fact for the child´s imagination and learning abilities to be able to blossom it can be much more important to have toys that are not so ready made and that challenge their own imagination. (Vesanto, E. 2013)

> "It is in playing and only in playing that the individual child or adult is able to be creative and to use the whole personality, and it is only being creative that the individual discovers the self"
>
> (Winniecott 2005, 73)

3.

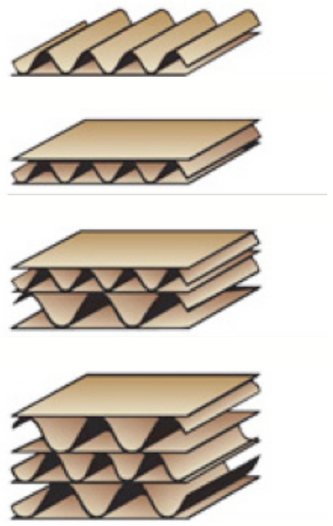
Working with cardboard

3. Working with cardboard

Cardboard is a 100% recyclable material so it is very well suitable for children's play objects. Its cheap, can be painted on and played with, and after use it is easy to discard for recycling. In Finland the amount of cardboard that is recycled is high. Already in 2001 it was counted that 85% of the country's cardboard was recycled (Laakso & Rintamäki 2003, 21).

There are several types and thicknesses of cardboard but all of them consists of one or several curled layers of fluting medium and one or several layers of flat carton that is attached to the flute.

The most common cardboard construction types are single wall corrugated cardboard (one layer of flute and one layer of carton), basic corrugated cardboard (one layer of flute and two layers of carton), double wall corrugated cardboard (two layers of flute and three flat layers of karton) and triple wall corrugated cardboard (three layers of flute and four layers of flat carton).



picture 5. Cardboard structures www.packsize.com

Within the industry cardboard types are divided into letters A to O according to thickness and construction. A being the most heavy material and O the most thin. (Laakso & Rintamäki 2003)

3.1 Designing with cardboard

Designing with cardboard and producing cardboard boxes is quite niche knowledge so one of the best way to find more in depth information has been to interview professionals who work within the cardboard packaging and printing industry. For this purpose I interviewed Juha Andersson, designer at Stora Enso and Jouni Tainio head of customer care at Flexolahti printing company. I also had several discussions with my head teacher Noora Nylander who has a lot of experience from working with cardboard.

For the interviews I used a semi-structured approach. This means that some elements of the interviews were fixed but not all. In this case the questions for the interviews were pre-designed but there was no ready made answers to choose from and the person being interviewed was free to answer in his or her own words. (Hirsjärvi & Hurme, 2009, 47)

Through the interviews and discussions I found out important information about things to take into consideration when working with cardboard. The project also had a limited budget so from the start one of my goals was to find out more about the industrial production process of cardboard and what can present pain points that significantly increase the price of manufacturing.

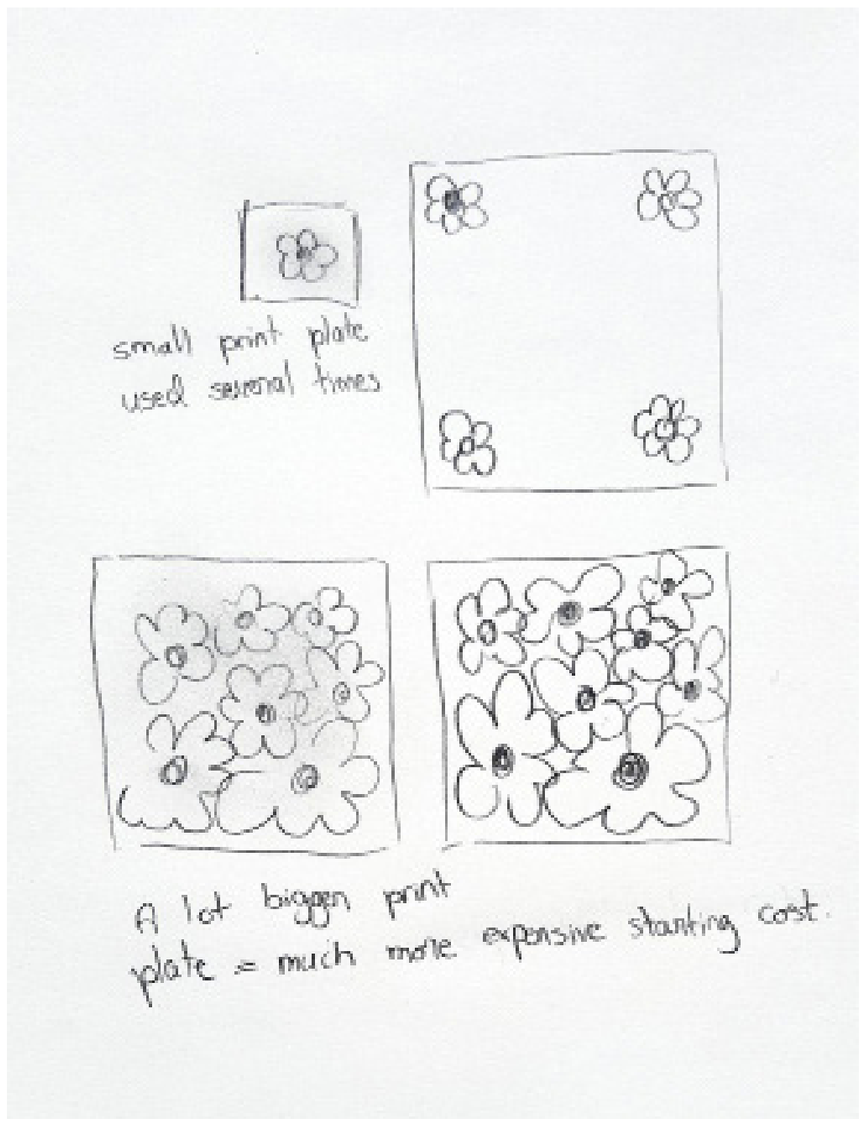
Furniture can be quite heavy and requires more supporting packaging material than smaller, lighter objects would. For furniture the most commonly used cardboard thicknesses are 4mm and 7mm. Especially for larger and heavier pieces of furniture such as beds or sofas its advisable to use 7mm material thickness and also a heavier construction like double wall corrugated cardboard (Juha Andersson 2016)

When calculating nets for cardboard the materials thickness must be taken into consideration as well. When any flat material is folded the fold will take half of the material thickness more space. This isn't noticeable when folding normal paper but must be taken into consideration when working with thicker materials. This makes calculating the nets for thicker cardboard more demanding and requiring more calculating and testing. (Nylander 2016)

Some of the most important things that came up during the interviews were regarding how to design the printed areas of the work. Cardboard in itself is a quite cheap material so even if the net is a bit more unusually shaped or uses a bit more material than a regular box that doesn't add to the cost of the project significantly.

On the other hand what can create a larger expense is how the printed areas of the products have been designed. Cardboard is nowadays almost exclusively printed using a method called Flexography. This printing method uses a flexible relief plate that is attached to a cylinder like printing tool. The protruding parts of the cylinder are covered in ink and printed onto the chosen surface. (picture)

Picture 6. Here the flexo print relief plate is attached to the cylider. When it´s rolled in ink only the protruding parts with the desired design on them will get coloured. anderson-vreeland.ca.



Picture 7. Flexo plate pricing logic scetch. Backlund 2017.

The production cost of these relief print plates is quite expensive. Of course if someone is printing a very large series of products at a time this might not matter. But since especially in the beginning the production series for this project would be quite small the starting cost couldn´t be too high. The plates price goes according to size, so if there is a lot of print on a large area this will be more expensive than the producing of a smaller plate that is used several times. (Jouni Tainio 2016)

Printing several colours is more expensive as well so we decided to work with only black colour. This actually also went well with my thoughts of creating something that kids can decorate by themselves. By using natural brown cardboard and simple, not too overpowering graphics for the products this leaves more space for a child to decorate and colour the boxes however they like. Printing two sided would also add to the cost so all of the print would preferably be placed on one side of the flat net.

Also to be taken into consideration is the possibility of flat packing with a glue tab. This means that the box nets are made so that they are possible to preglue on one side and transported flat before packing. This is important since the LumoKids furniture is produced in a different factory than the cardboard boxes.

4.

Benchmarking

4. Benchmarking

Before I started working on the designs for the project I did some benchmarking of other similar projects that have been made so far. It turned out that this is a quite new topic and I only found a handful of projects focusing on something similar. Most of the existing projects I managed to find were all through the help and tips from professionals within the field.

On the other hand what I did find a great deal of was DIY tutorials and photos of homemade cardboard projects for children made out of old boxes. Clearly the cardboard box and cardboard as a material already has a strong appeal among kids and their parents for further fun and usage. There is also a growing market of companies who produce furniture, lamps and toys for children using cardboard.

More and more companies are seeing the benefits of the cardboards morphable surface, cheap price and possibility to recycle. These toys and play objects don´t need to last forever but can instead be used creatively and freely and then easily discarded after use and recycled. In a world where the amount of plastic garbage is increasing threateningly and junkyards are overflowing with trash I found a lot of merit in this.

4.1 Current similar projects

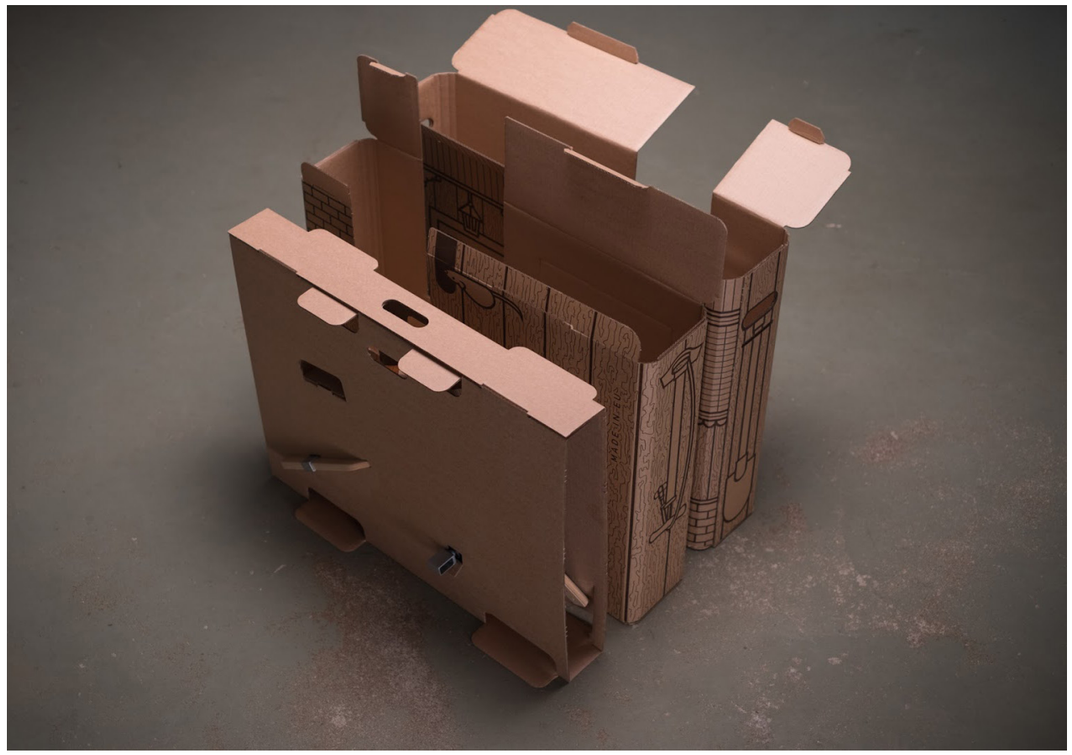
Here I have gathered the most interesting, inspiring and relevant similar projects that I found:

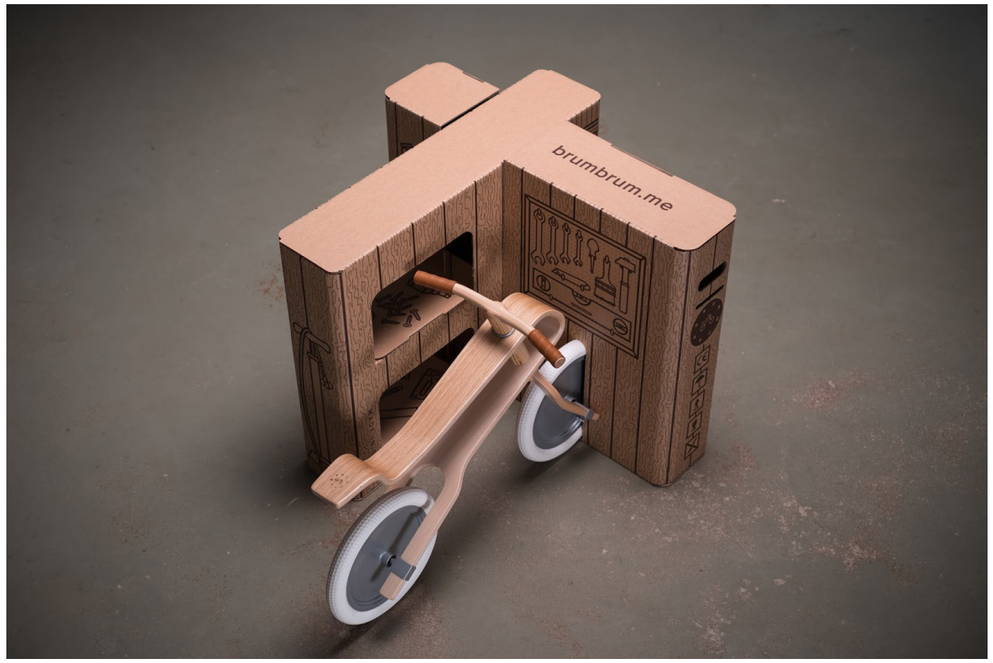
More and more companies are seeing the benefits of the cardboards morphable surface, cheap price and possibility to recycle.

Picture 8. Kids playing with Gigi blocks, BabyNord

Gigi blocks

Gigi blocks are a series of life size cardboard building blocks produced by Swedish owned company Baby Nord. A bit like Lego but much larger and made from cardboard. The idea is to be able to build large, life sized projects that can also be drawn on and that are easy to recycle after use. (BabyNord 2016)





Picture 9-11. The brum bike with its transport box that doubles as a bike garage. The Dieline.

Brum bike box

The brum bike is a pedal less bike aimed at small children of two to six years old produced by the german design company Brumbrum. The packaging the bike arrives in can be turned into a toolshed and stand for the bike after opening. The box construction is a simple box inside box structure that opens into a bike shed with shelves and a storing spot for the bike.(The Dieline 2016) This I found to be a very inspiring project that focuses on similar questions that I am addressing in this thesis. The fact that the box function is directly linked to the product is also really nice. During my process I have returned to this project several times as a guideline for the level of work and thoughtfulness I want to put into my own project.

PIcture 12-13. The canyon bike box. Pletonmagazine.com

Picture 14. Finnish mothers box. Kaksplus.fi

Canyon bike

Here an example by the Canyon bike company on how a simple box is turned into something special using simple one coloured printing. The customer is greeted with a nice message from the company that immediately makes the buyer feel more connected to the brand and pleased with their purchase. (Nylander 2016)

Mothers box

An excellent Finnish example of a cardboard box with a second life. The box is full of baby clothes and equipment and is sent out to each new mother in Finland for free by the Finnish government. The box can be used as the baby's first bed after arrival and unpacking.

5.

Project overview

5. Project overview

In this chapter I present the different products that require packaging, their designs, functions and the criteria and wishes of the company for each packaging.

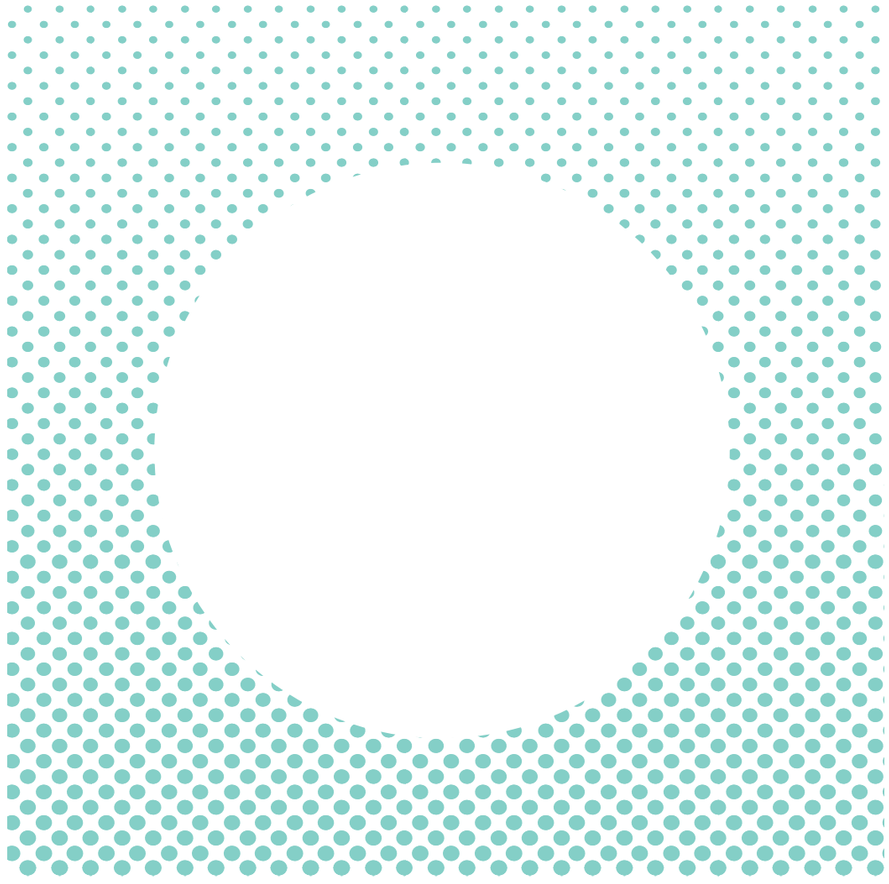
To keep shipping costs affordable the LumoKids furniture parts are when needed divided into several boxes for transport. To keep the production prices reasonable for each product that is divided into several boxes there will be one "main" box with a special design and the other boxes for the same product will have some smaller detail that links them to it.

5.1 Products to pack

The project consists of designing packaging for 4 different LumoKids products:

- **Sieni stool**
- **Kaarna table**
- **Korento bed**
- **Ketara bunk bed/ Canopy bed**

The boxes will function as the LumoKids products transport boxes. Most of the items are ordered online so for many customers these boxes will be the first physical contact with the brand. LumoKids are aiming towards an international market so the boxes need to withstand overseas shipping as well.



5.2 Sieni stool

Sieni is a playful storage solution which also works as a stool for the Kaarna table.The Sieni stool is a small pallet for kids aged around 2-6 years old. It features a hollow inside for convenient storage and a cap in either white leather or red and white woven cotton. The cap is removable to make it easy to wash and change. Sieni is made of birch plywood. (LumoKids catalogue 2016)

Of all the products to pack the Sieni stool had the smallest budget for packaging so for this product Sanna and Tuomo wished for as simple and cost efficient solution as possible.

The Sieni stool is shaped like a mushroom and brings to mind Finnish nature and forests presented in a playful way.

- **Product dimensions: 340 x 350 x 280mm**
- **Proposed cardboard thickness: 4mm**
- **Shipped in one box**
- **Retail price: 340e**

Picture 15. Sieni stool with white leather cover. LumoKids archive. 2017

5.3 Kaarna table

Kaarna is a table for two to six years olds, the cover of its press moulded legs easily making a hut or hiding place. The table top has plenty of room for games and school work.

Sieni makes a fitting stool for Kaarna. Four little Sienis fit handily under the table. The space under the table is 54cm high. " (LumoKids katalogi)

- **Product dimensions: 800 x 116,29mm**
- **Material: Birch plywood**
- **Proposed cardboard thickness: 7mm**
- **Shipped in one box**
- **Retail price: 490e**

Picture 16. Kaarna table. LumoKids archive. 2017

5.4 Korento bed

Korento is a bed for young children ages around 2-6 yrs. The bed has an additional sidebar that can be attached to the side for more security.

Different colours can be chosen for the horizontal beam and the length of the bed can be adjusted by changing the horizontal beam and extending/reducing the lattice piece.

If needed, the bed can be combined with the Ketara loft bed, to make a bunk bed for children. In this way, siblings can sleep in the same room during early childhood but later, the beds can be split in two again, perhaps as each child gets their own room." (LumoKids katalogi)

- **Main box measurements: 820 x 640 x 330 mm**
- **Proposed cardboard thickness: 7mm**
- **The Korento bed is transported in two different boxes. The end pieces which is the main box and the sides which come in either 160cm or 200cm.**
- **Retail price: 870-890e**

Picture 17. Korento bed. LumoKids archive. 2017

5.5 Ketara beds

The Ketara bed is LumoKids best selling product. It changes according to the needs of the child from preschooler to teenager. The bed comes in a canopy bed or a loft bed version. Either can be changed into the other by buying the needed extra parts. It's also possible to change the length of the bed between 160cm to 200cm with additional parts.

The Ketara bed has an alternative canopy with a star design. (LumoKids catalogue)

- **Main box measurements: 1550 x 860 x 200 mm**
- **Proposed cardboard thickness: 7mm**
- **Packed in three or five boxes. The canopy bed is packed in three and the bunk bed in 5 boxes. Both sets include two of the large end pieces which would be the main decorated boxes.**
- **Retail price: 1420-1460e**

This is the most challenging of the four products to pack since the targeted age group is so large. This means that the design needs to be a lot more neutral. What pleases a child of two to six years is something very different that what a twelve year old will want and be impressed by.

Another challenge is that the boxes are so big. Most people won't want to store the boxes in their full size due to lack of space. So whatever the design it can´t use the material in full.

The end pieces are transported in two very large boxes, around 160 cm long that will be the main boxes for this product. That means that there will be two large boxes with the same design. Whatever is made for them needs to be something where it doesn´t matter that there is two.

Picture 18 and 19. Ketara canopy and bunkbed. LumoKids archive. 2017

Project overview 5

I also need to think about how to link the boxes together in the case of Ketara and Korento where the products arrive in several boxes. This needs to be something economical and easy. Like for example a LumoKids logo on the boxes and/or a small greeting to the buyer.

The project is fairly large sized and contains a lot of different parts to keep track of. Which means that a systematic working method and thorough testing is required.

To make things clearer for myself I made a set of mini models of all the current LumoKids shipping boxes and paired them up according to wich product they belonged. This helped both in seeing the dimensions for the different boxes and especially to get a feel of the products packed in multiple boxes.

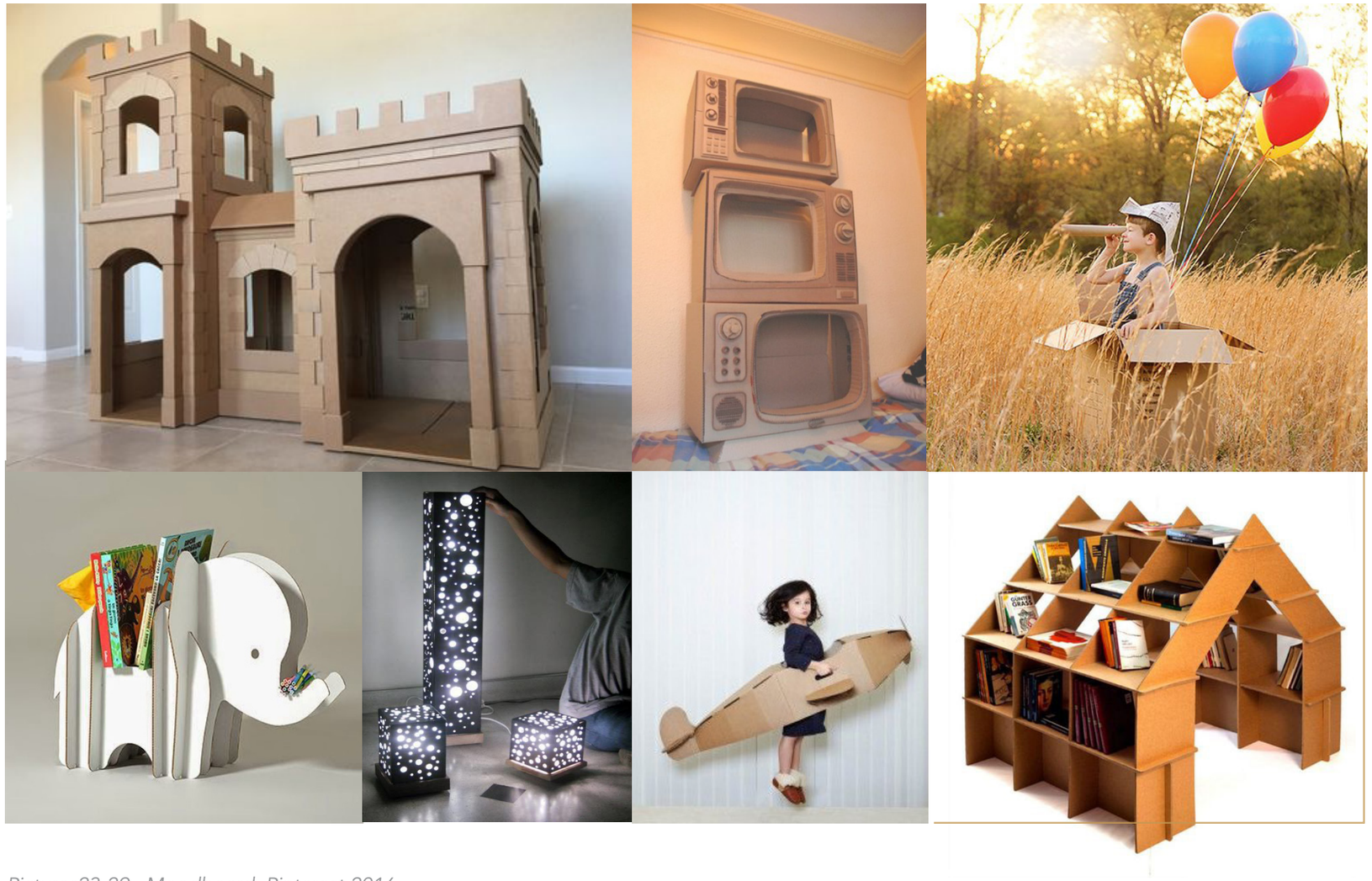
Picture 20. model of the Korento beds transport boxes. Backlund 2017.

Here are models of the Korentos shipping boxes. The Korento bed is transported in two different boxes. The end pieces which is the main box and the sides which come in either 160cm or 200cm.

Lower left and right Picture 21 and 22. Ketara bunk bed and canopy bed transport boxes. Backlund 2017. Packed in three or five boxes. The canopy bed is packed in three and the bunk bed in five boxes. Both sets include two of the large end pieces which would be the main decorated boxes.

6.

Ideating



Pictures23-29. Moodboard. Pinterest 2016.

Here is the moodboard that I made from ideas and pictures that I gathered for the project. A lot of the most interesting projects made from cardboard that I found were through the american online picture bank Pinterest.

6. Ideating

I did a lot of sketching in the beginning to get a feel of Sanna and Tuomo´s wishes for the project and what would work well with the kids. A few ideas and topics that came up right from the start were animals, forests, airplanes, racecars and castles.

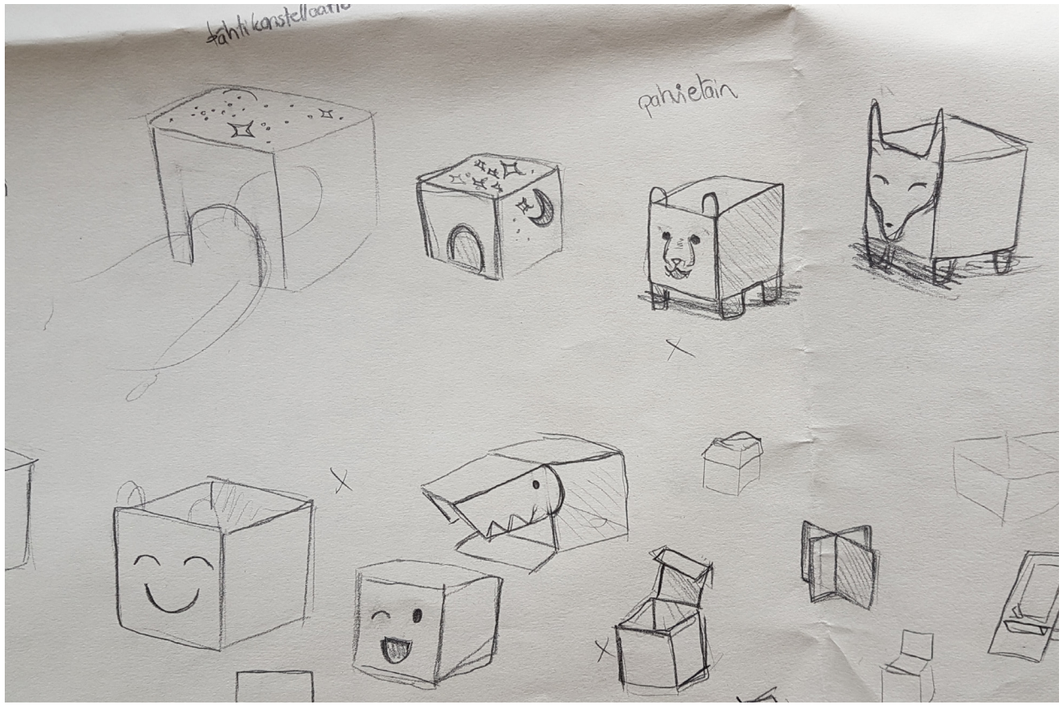
LumoKids slogan is Play. Joy. Adventure. and the feel of their collection is a kind of playful scandinavian style. They also use birch forests in some of their promotion material since most of the products are made of birch plywood, connecting the designs to forest and nature. We wanted the boxes to reflect this playfulness and northern magic.

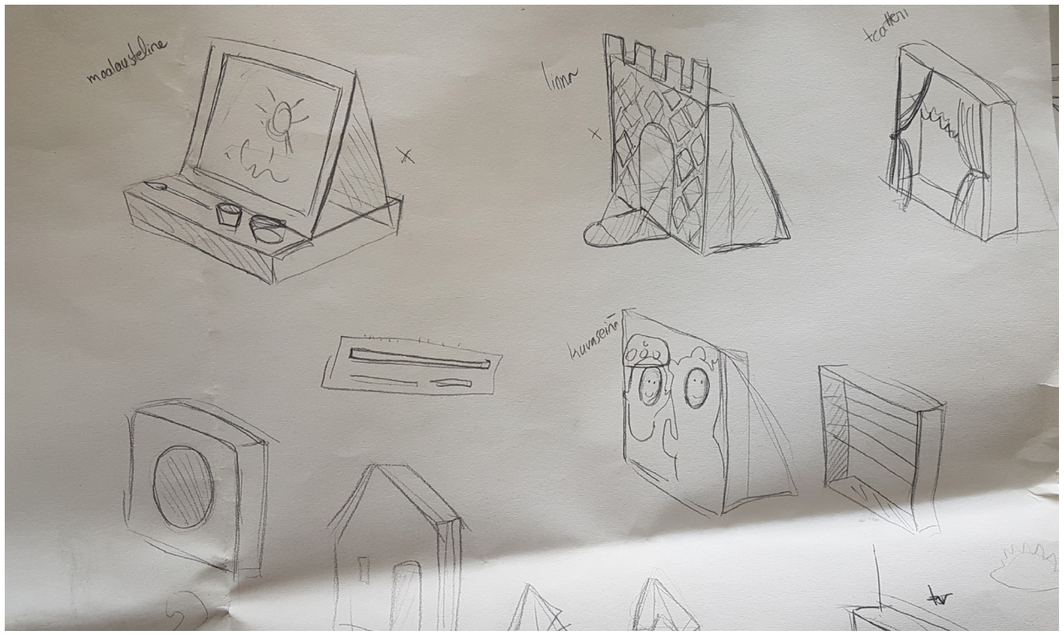
Since the products where all furniture it was hard to come up with boxes that would be exactly themed with the products. Like for example the brum bike and its storage shed. Instead we wanted the designs to be imaginative and playful objects that would go with the overall feel and theme of the brand and bring fun play moments for the kids.

The shapes of each product would also definitely play a big part in what kind of end shape would be possible to create for that box. Already for the project overview I created a mini model of what a normal box for each of the products to pack would look like. This gave me something to refer to when figuring out what shape would be best suitable for each of the boxes dimensions.

Since all of the products were so different in size and shape it would be necessary to make a separate design and construction for each one.

From my gathered information I also really liked the thought of creating a personal little playhut or area that leaves the child space for imagination and decorating to his or her own liking.





Pictures 30 and 31. First sketches. Backlund 2017.

Play. Joy. Adventure.

Pictures 32. LumoKids slogan + slogan font. LumoKids archive.

7.

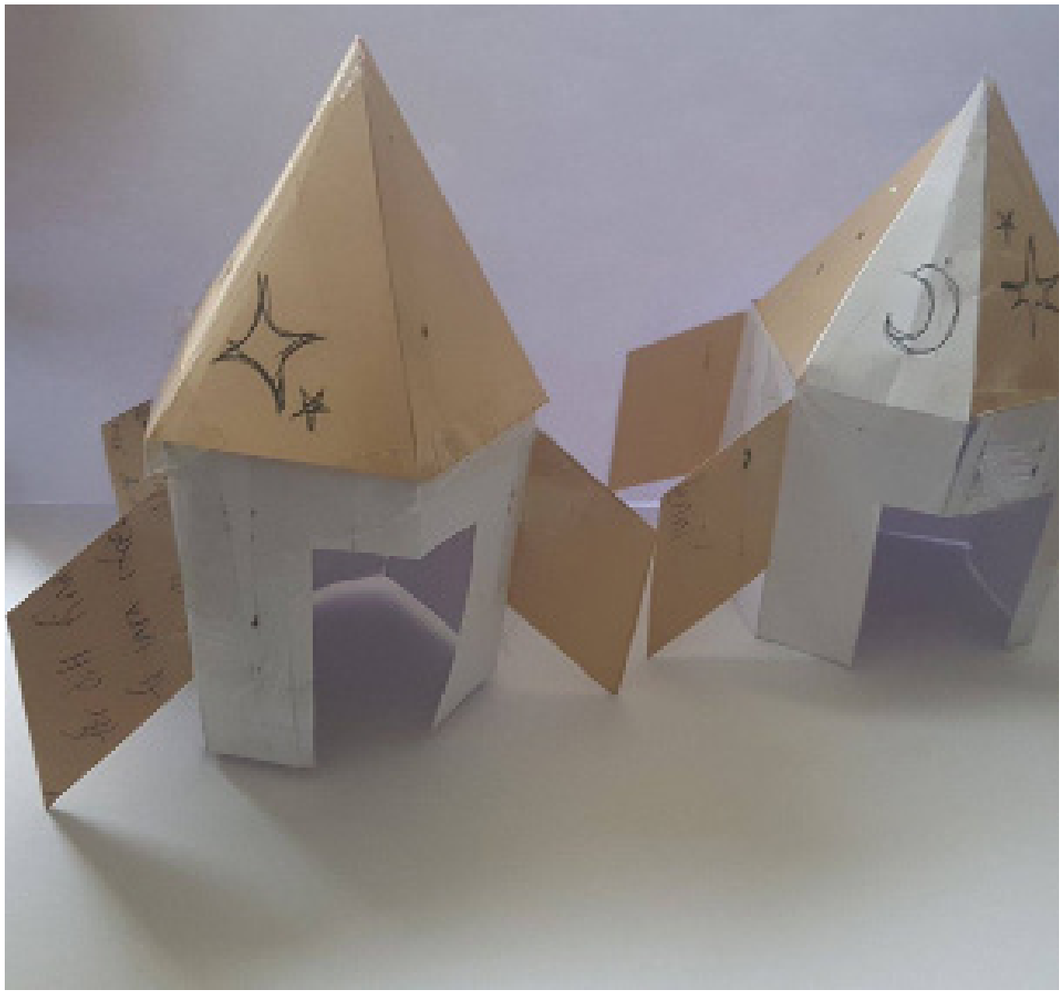
Protoyping

7. Prototyping

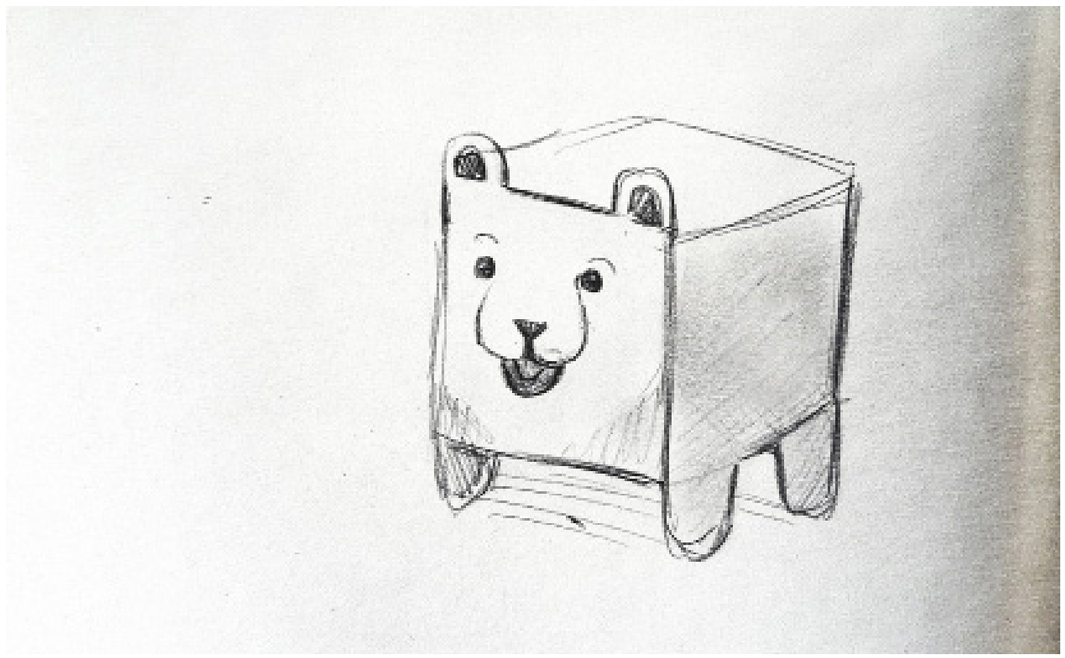
Before starting the project I discussed with Noora what would be a smart working method. Since several of the products I was working with were very large it would be quite inconvenient to make full size mockups from the very beginning. The smallest box I was working with was the sieni stool box which was only around 35cm x 35 cm. But since the largest box I was working with was around 80cm x 160 x 30 cm I had to come up with a working method where I wouldn´t need to start out with full scale models.

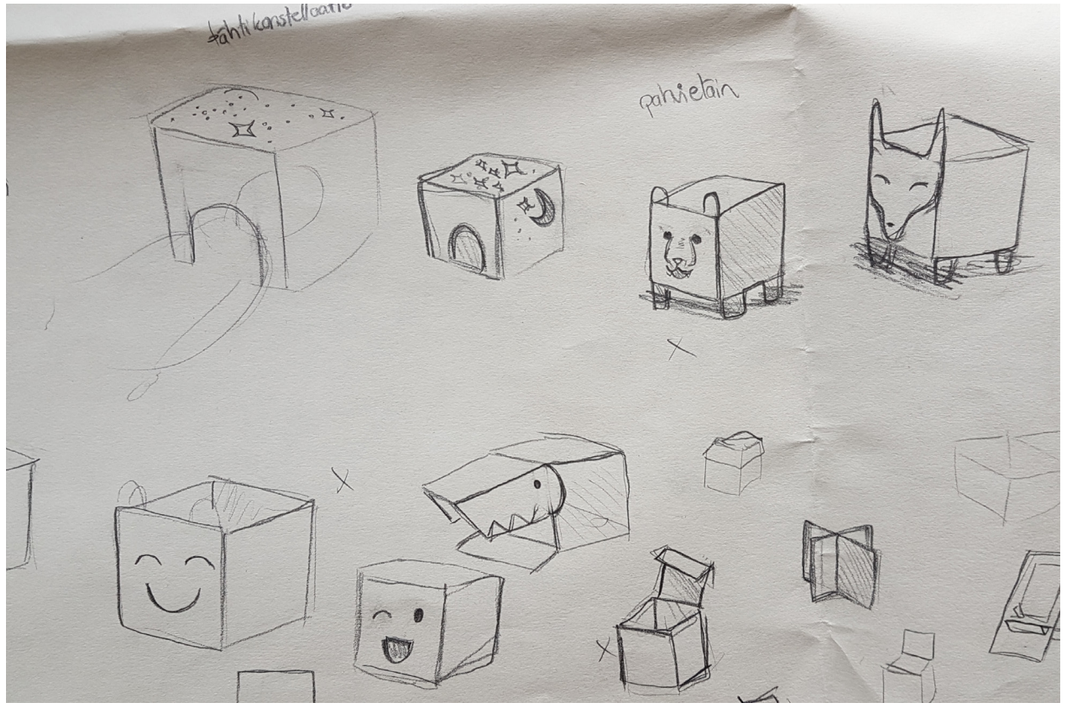
On Nooras suggestion I started working with minimodels. After a bit of testing I decided on using a scale of 1/10 to the original size. This allowed for easy measurement conversion since a box that would normally be 80cm x 80cm x 16 cm was now 8 x 8 x 1,6 cm. For the first set of mockups I used thick 240 g brown paper. I felt it was important to play around with the shape in the beginning without having to worry about calculating measurements for thicker material. (Nylander 2016)

Among cardboard there is a series of n- and e- thicknesses that look the same as their thicker counterparts but are a lot thinner. Using this type of cardboard I would be able to make mini models that essentially looked like shrunken versions of what the final prototypes would look like. This was also a good plan B to have in-case I wouldn’t be able to finish the final fullsize products by the time I needed to photograph them.



Picture 33. Early mini models. Backlund 2017.





Picture 34 and 35. Sketches for sieni. Backlund 2017

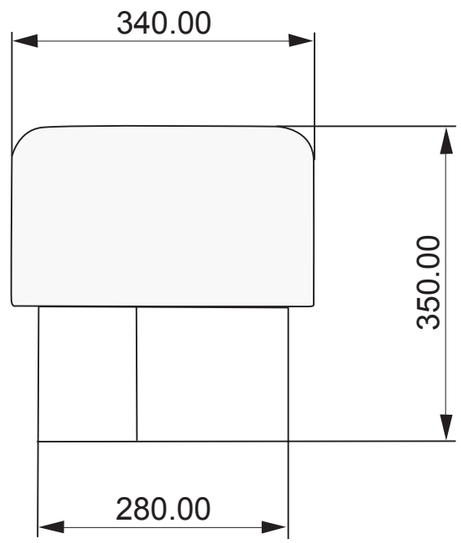
7.1 Sieni

Sanna and Tuomo really liked the sketches I made of a simple box with a face on it. I also wanted to try out different Finnish animals since the Sieni design so strongly brought to mind Finnish forests and nature.

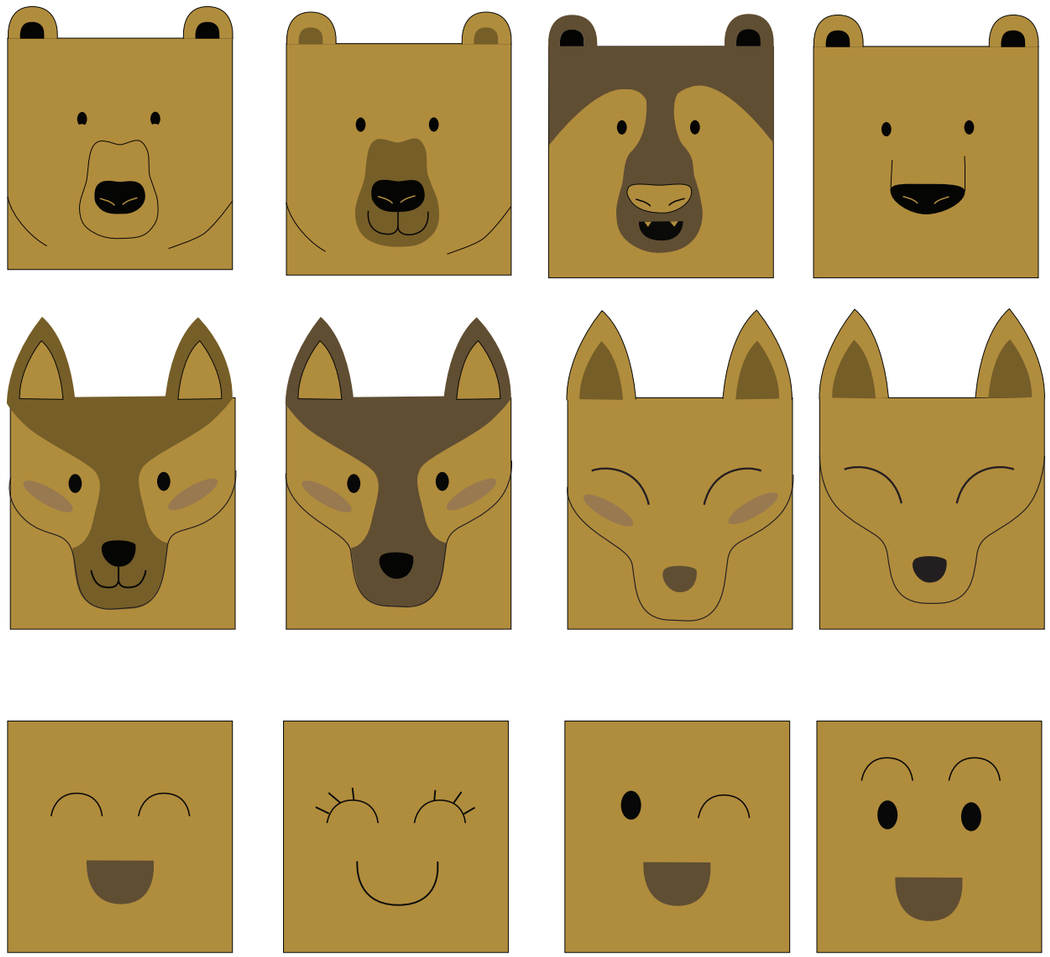
Sieni was also the product with the smallest box budget so it was important that the solution would be as cost efficient and simple as possible.

I did several sketches for the box face, a simple face, a fox and a bear. Sanna and Tuomo liked the bear best and thought that the most simple and graphical one of my ideas would suit the brand best.

We decided to discard the legs from the original idea since there would be the risk that they would fail if a small child suddenly decided to sit on the box. After seeing the first test model I made we needed to do some small technical adjustments. We decided to put in a small tongue lock on the box front to stop it from bulging out and also to make the hatch lid part a bit longer so the lid would stay more firmly shut during transportation. On the tongue lock I also added a small curve to make opening it easier.

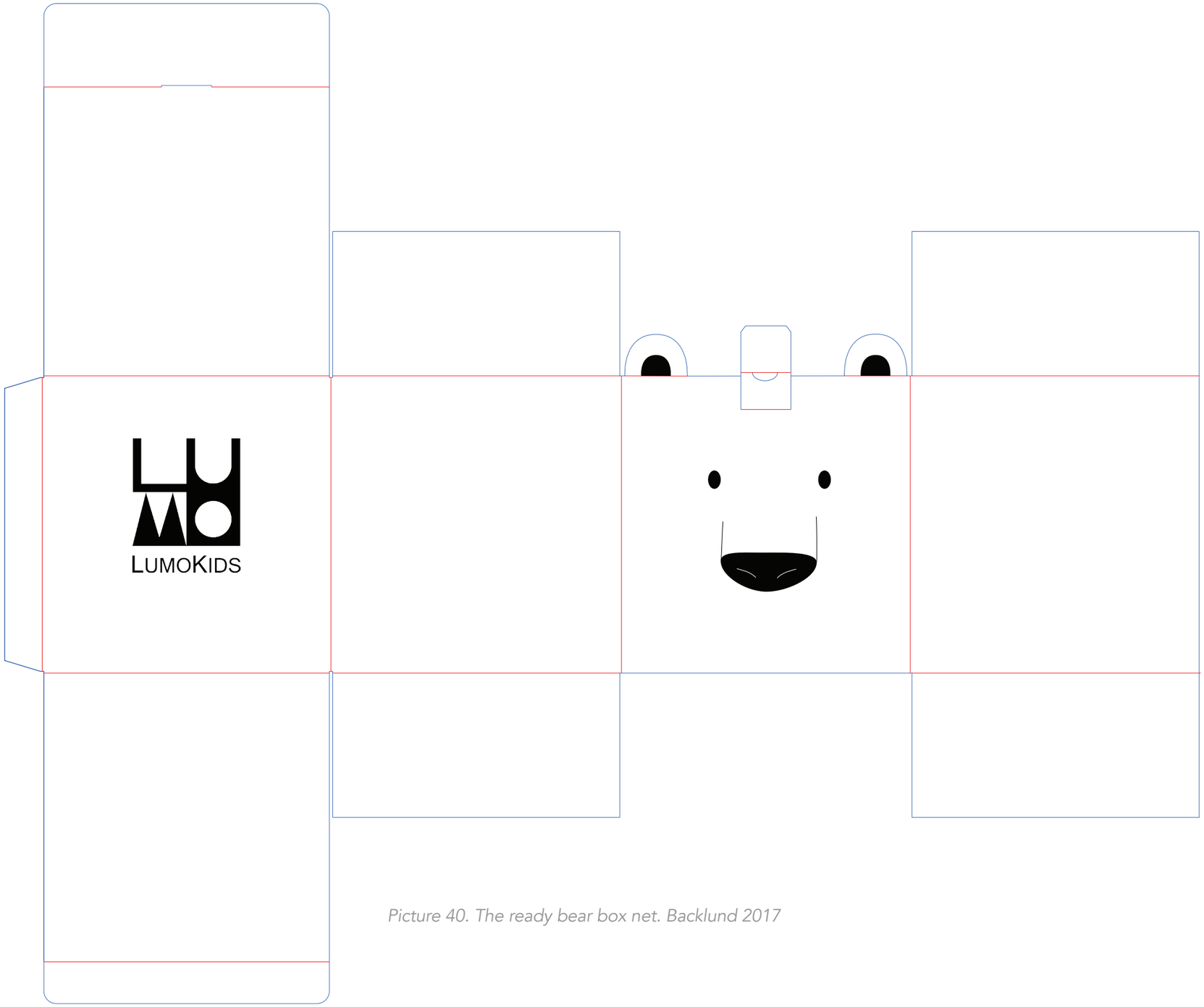


Picture 36. Sieni stool measurements. LumoKids archive 2017



Picture 37. Here are some of the box face ideas I made and showed Sanna and Tuomo. They liked the bears best and chose the most graphical one on the right. Backlund 2017

Pictures 38 and 39. The more finalised mini model for the bear box. The little curve on the tongue lock for easier opening is still missing. Backlund 2017.



Picture 40. The ready bear box net. Backlund 2017

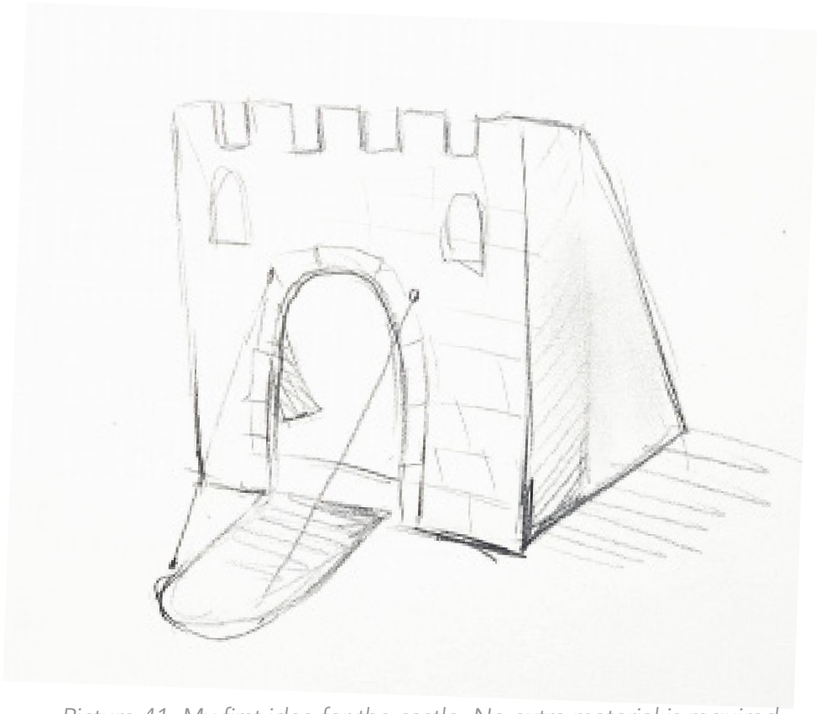
7.2 Kaarna

After looking through my sketches we decided that a castle design would be best for this box. The large square shape of the table surface supported this thought nicely.

Once I started the prototyping I first came up with a new idea that would save as much material as possible whereby the box would be cut open into a stage kind of castle. This first model did not turn out very well.

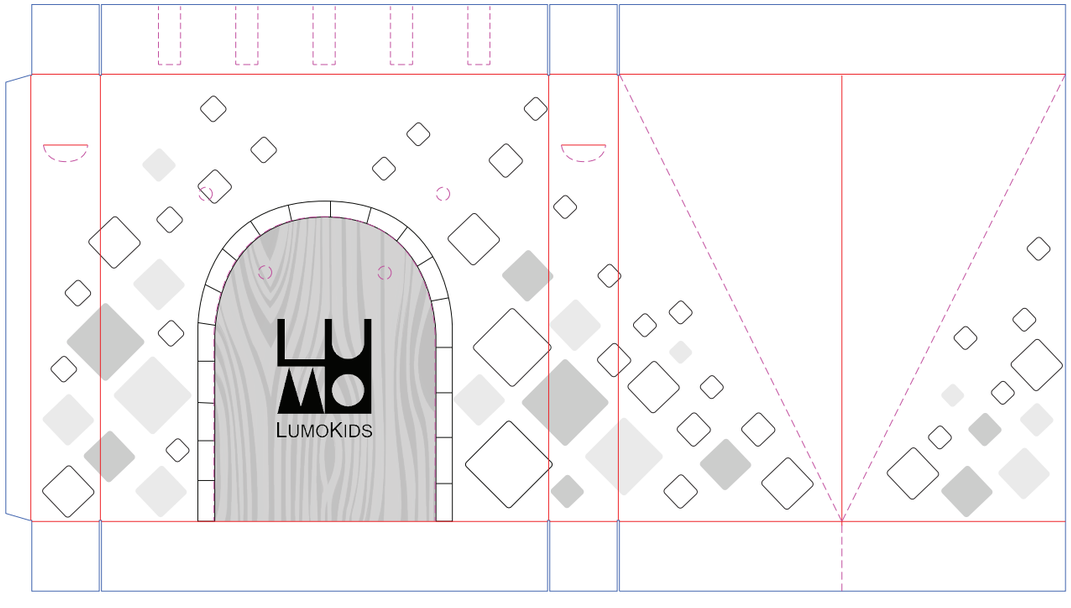
This box was quickly put into a small batch production. Due to an error that we didn't realise until too late the parts that should have been lightly perforated keeping the structure intact were instead cut wide open.

The product wasn't protected properly and at the same time we realised that the measurements of the product had been measured incorrectly for me.



Picture 41. My first idea for the castle. No extra material is required. Backlund 2017.

Picture 42. The perforation cut wide open by the factory. Backlund 2017.

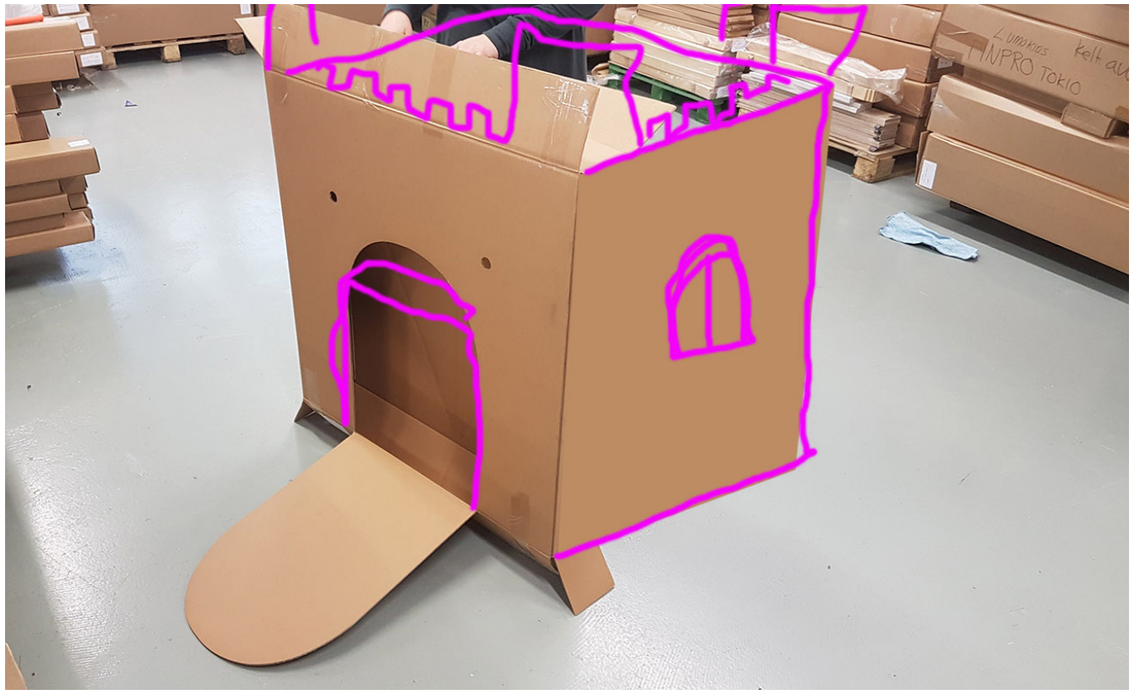


Picture 43. The net for the first idea for the castle. Backlund 2017.

I also realised that just to be on the safe side there couldn't be any perforation on the surface of the box that would interfere with its purpose of protecting the product well.

At this point I started thinking that if economically possible it would be nicer to make a fullsize castle with three or four walls instead of two. Also returning to look at some other design projects with a similar design goal as mine I realized that I would have to come to terms with the fact that this type of design would most likely take up a bit more cardboard than a completely "normal" box. I had to accept that, of course trying to minimize the amount of extra material that would be needed.

Another problem that had appeared in the first box was the fact that the table legs which were loose in the box were not fixed in place well enough and would need some extra support.



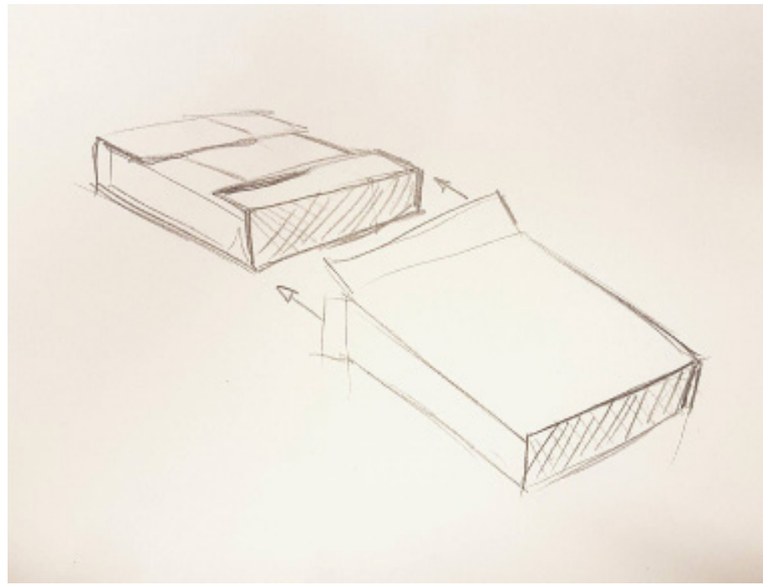
Picture 44. New castle idea. Backlund 2017

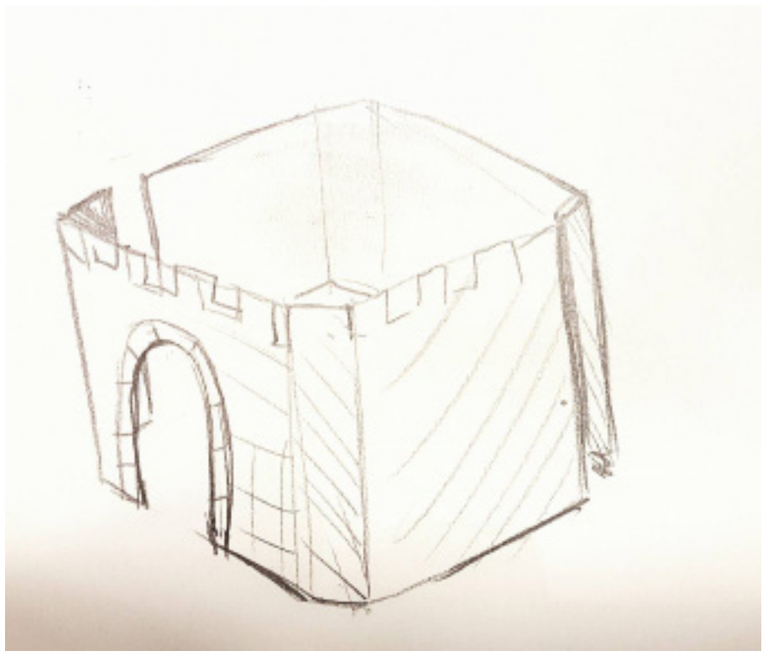
Picture 45. There was 27mm too much space at the top of the box, and the table legs are not steady. Backlund

Combining all of these thoughts I had the new idea that there would be an extra sleeve inside the box for the table legs. If the outer box could then be opened and the inner sleeve attached to the outer box I would be able to create a castle with four walls.

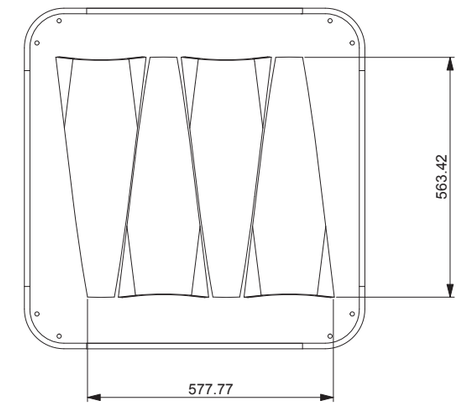
Then I needed to focus on making the opening of the box and transforming it into a castle as smooth as possible. I also wanted to avoid the use of duct tape if possible and instead make all the connections mechanical.

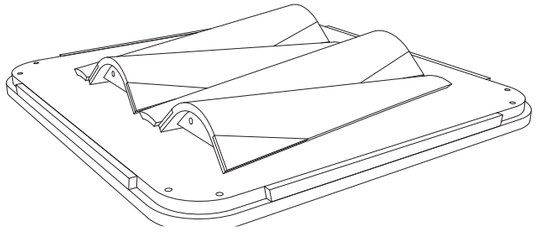
Picture 46. Rough castle model. Backlund 2017





Picture 47 and 48. Top most. I decided to focus on a sleeve inside the box to keep the table legs in place and be able to construct a four wall castle. Backlund 2017.





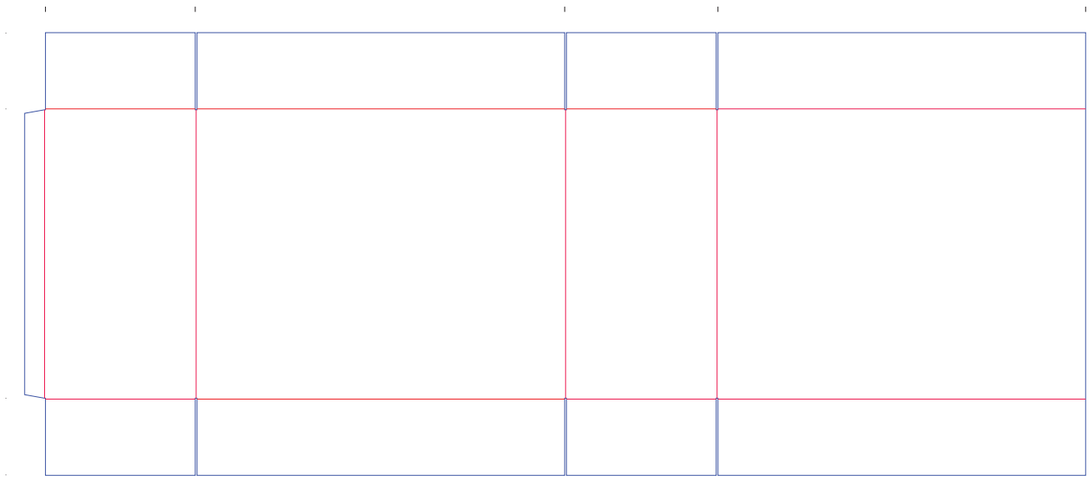
Picture 49. Table sketch. LumoKids archive 2017.

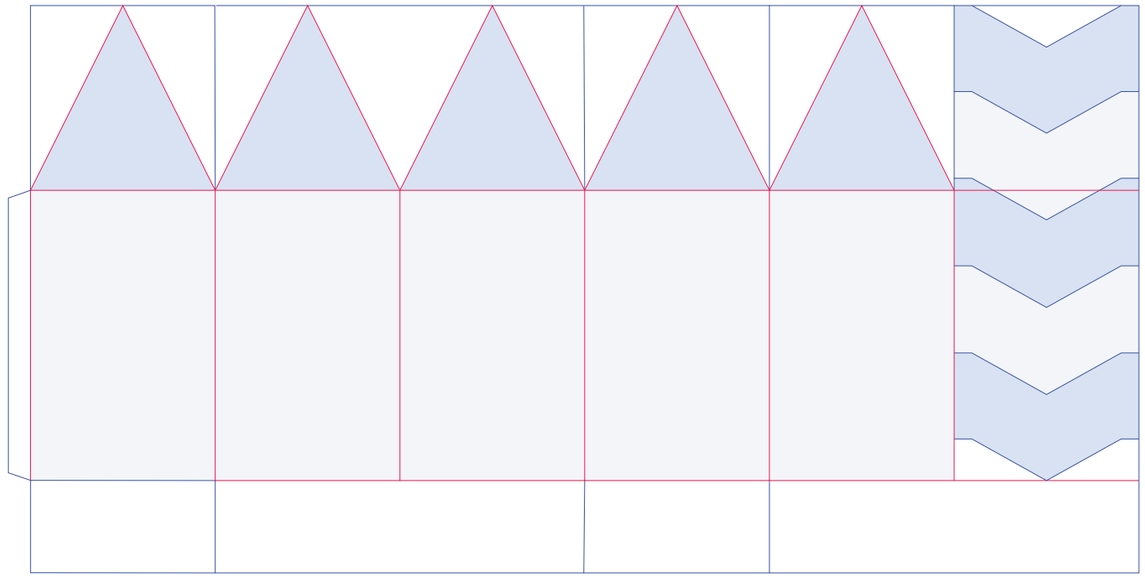
7.3 Korento

For the Korento box I tried a different approach and actually started with playing with the pattern and seeing what shapes I could make. I tested morphing different parts of the net and realised I could quite easily make symmetrical walls by lengthening the sides of the box a bit and creasing the center of the two longer sides of the box. This gave me a pentagonal shape with a pointy roof that started to remind of a space shuttle.

Sanna and Tuomo were pleased with this thought as the current LumoKids collection already has a space theme with both a star patterned canopy and cushion.

For me I liked the thought that this like the castle would also be a type of personal space for the child that can be decorated to their likes and where imagination can run free.





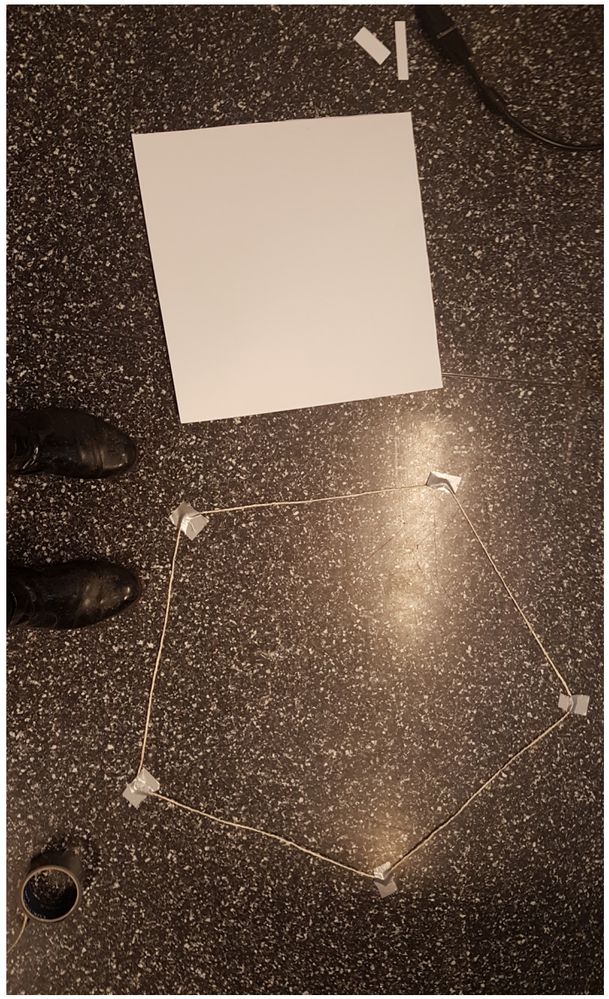
PIcture 50. The above picture is the normal boxpattern for Korento and below my first sketch of the new patter. Backlund 2017.

Picture 51. Inspiration picture from pinterest.

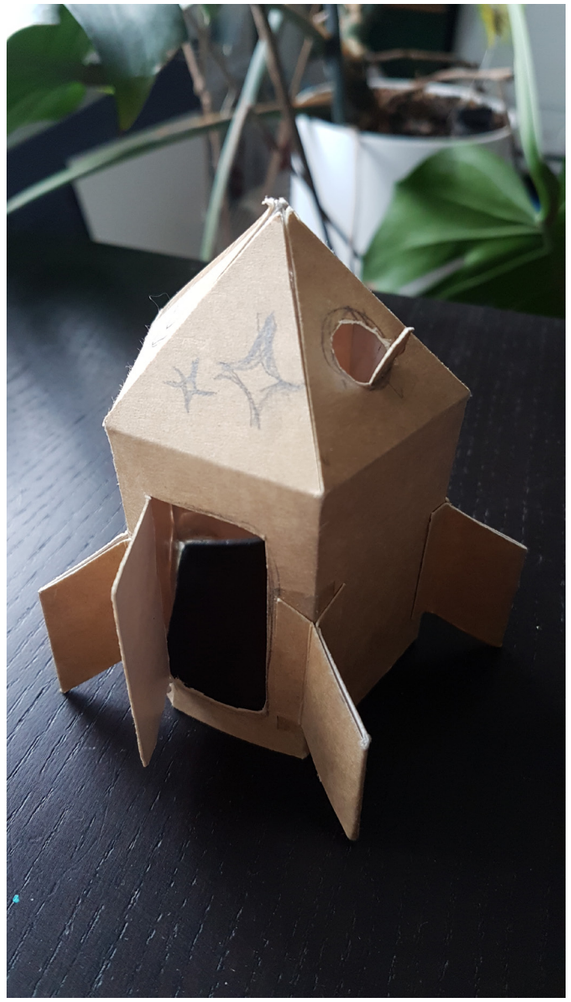
I wanted to use half of the longer side not to make the end box too large. Half of the side is 41.6 cm wide. For the size to make sense and a kid to be able to move inside a pentagon is most likely the smallest shape I can use.

I tested how big the rocket would become first with a square, then a pentagon and hexagon. Although the hexagon would be more nicely symmetric than the pentagon I wanted to use the pentagon if possible since it would use less material.

The door will have to have approximately this width to work. I also realised that I would need to test the space shuttles door. I needed to test how wide it would have to be to fit a 2-6 year old child neatly through it. Design wise I wanted the door to be as small and neat part of the rocket as possible.

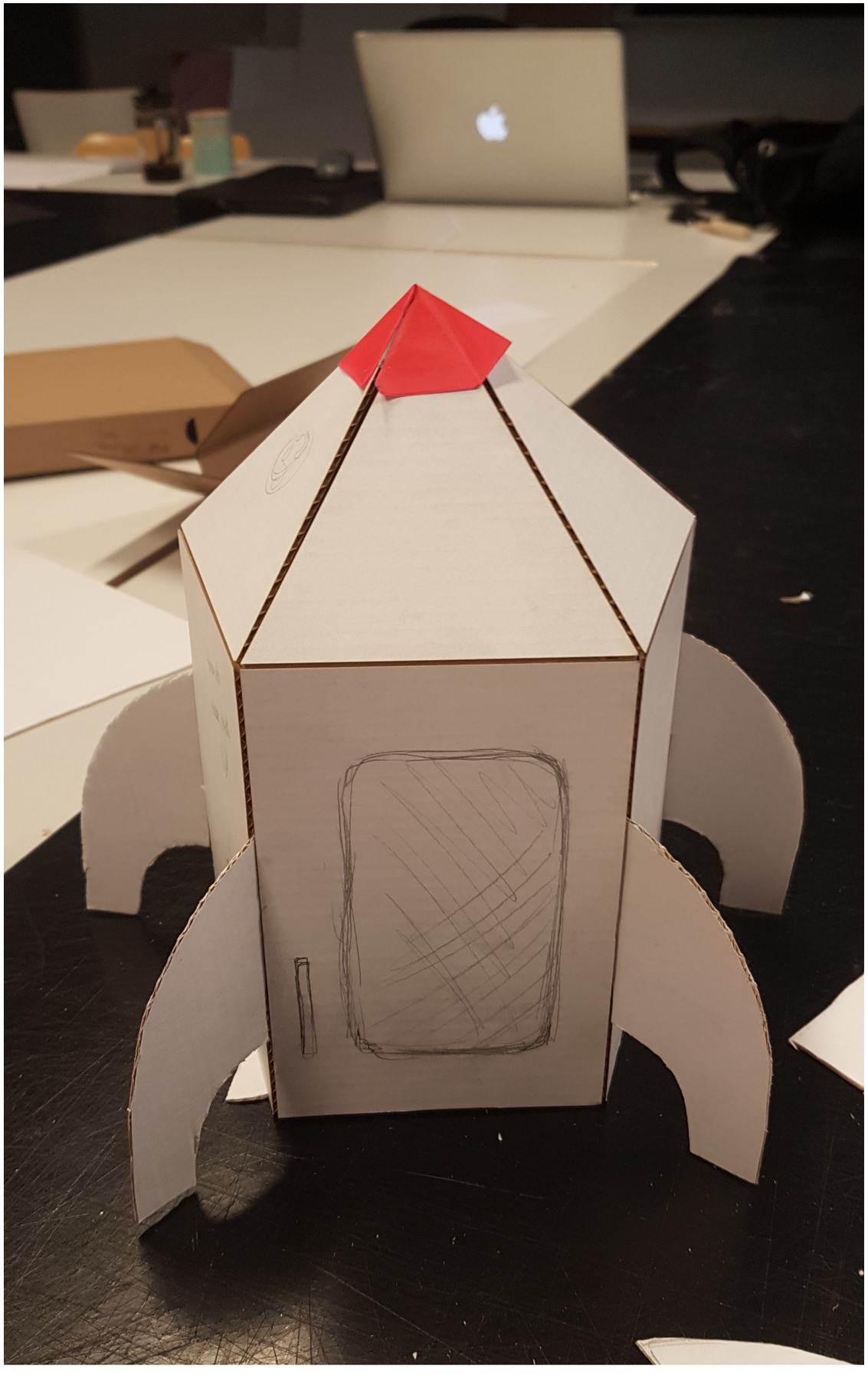


Picture 52. Testing how big the area inside the rocket would be using these measurements. Backlund 2017.



Picture 53 Here is my first mini model for the rocket. Backlund 2017.

In this idea the top is connected using a small coloured sticker. This makes the assembling easier. And there could be added a little set of galaxy themed stickers with stars and planets to decorate the rocket with.



Picture 54. Second a bit larger prototype. I realised that the rocket wings would only need to be single thickness since the 7mm material the final rocket will be made of is so much thicker. Backlund 2017.

7.4 Ketara

Ketara is in a way the most challenging of the four products since the age range of the bed series is basically two to fifteen years old. For this reason we decided that whatever building possibilities or print there would be on this box it would have to be both unisex and be neutral enough to appeal to a very wide range of ages. I came up with several thoughts and Sanna and Tuomo could choose which idea they liked the most.

Since the ketara boxes are by far the biggest, whatever shape we decided on it needed to be something that would utilise only a part of the box volume since most people wouldn´t have enough space to store something made from that much material. Of course it would have been brilliant to create a pattern for a huge pirate boat or something else extravagant but we needed to be rational with this product and try to create something that would please as large a range of the users as possible. This was the rationale that we started to work with.

My thought was that from one of the sides inside the box it would be possible to cut out pieces to create some kind of modular shelf. Ideally it would be constructed only out of flat shapes so that the cutting out and assembly would be as easy as possible. Creasing isn't really possible to do easily at home so it would be better if the design consisted only out of flat shapes.

Unfortunately due to lack of time I wasn´t able to follow through on this idea during the Thesis time. I will continue with this part of the project outside of the thesis.

Picture 55. Inspirational picture for this idea. Pinterest 2017.

Full-sized prototypes

8. Full-sized prototypes

The most complicated part of this process has been designing the nets for the products. There is a lot to be taken into account and a lot of problem solving to do for this part of the process. While working on the structures for the boxes I started preparing everything I would need for making the full scale prototypes.

I also realised that making the true to life size mockups will be a lot more time consuming than for any project I've done before due to the large size of the final boxes. For these nets it won't be possible to use the school laser cutter. Everything needs to be cut and shaped by hand which will take time.

For this reason I decided to test a lot of the elements of the designs in full scale and with the real 7mm material before making the final prototypes. This way I could use the laser cutter for several of the tests which would speed up my process a lot. Also some of the constructions and ideas I tested worked in small size but did not translate well to the full size and 7mm thick material.

I talked to Juha Andersson from Stora Enso and he kindly agreed to supply me with material for the full sized prototypes. Stora Enso´s largest cardboard pieces that they had in stock were 1750 X 2250 mm, so this is what I´ll be using as material size. The cardboard thicknesses that I´m working with are 4mm and 7mm.

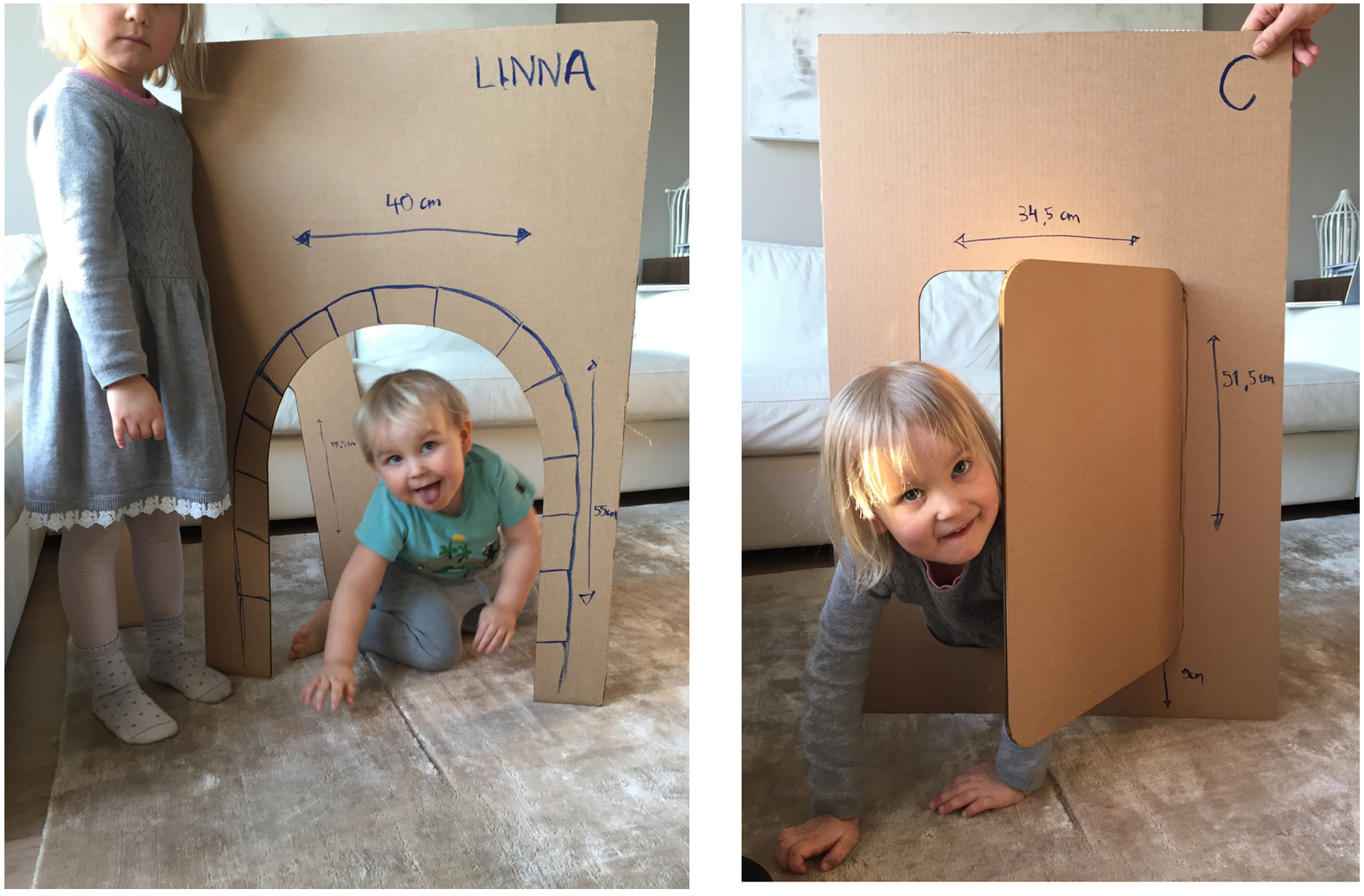
Picture 56. The material waiting at school to be turned into full-sized prototypes. Backlund 2017.

Full-sized prototypes 8

Among the things I tested in preparation were the door sizes I had planned for the castle and rocket. I needed to make sure that kids were able to fit smoothly through the openings and that they weren´t too small. This would otherwise present an inconvenient problem when testing the more finalised mockups.

Sanna and Tuomo kindly tested the protos for me with their three children. The kids reportedly had a lot of fun testing out the doors and immediately started planning how they should be decorated and turn into a pretty hut.

This was brilliant to hear as it supported the evidence I had found so far for that young kids enjoy most when they can be part of the design processe.



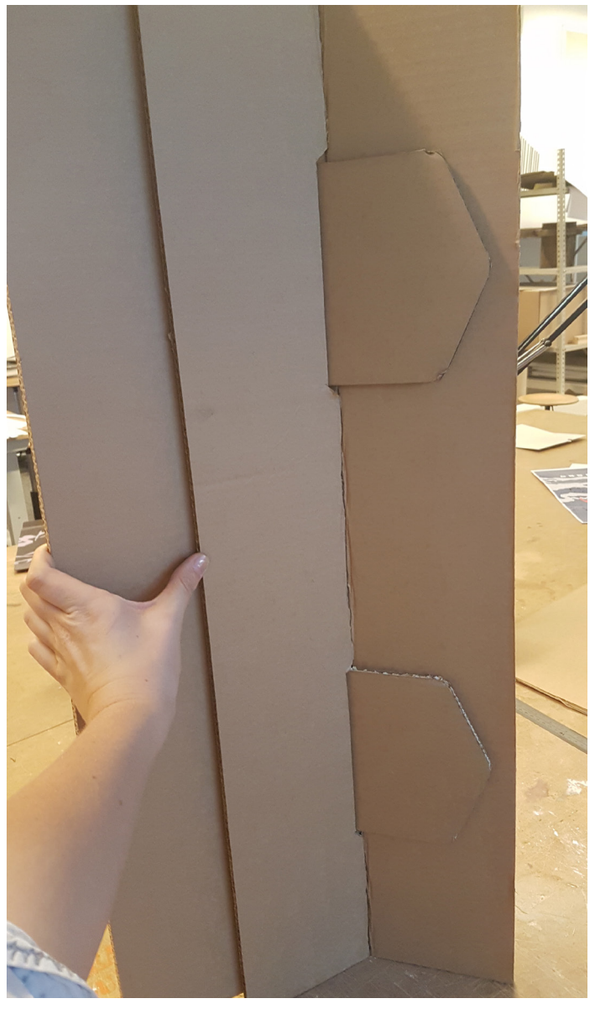
Picture 57, 58. Sanna and Tuomos kids playing with the test doors. Sanna Puhakainen 2017.

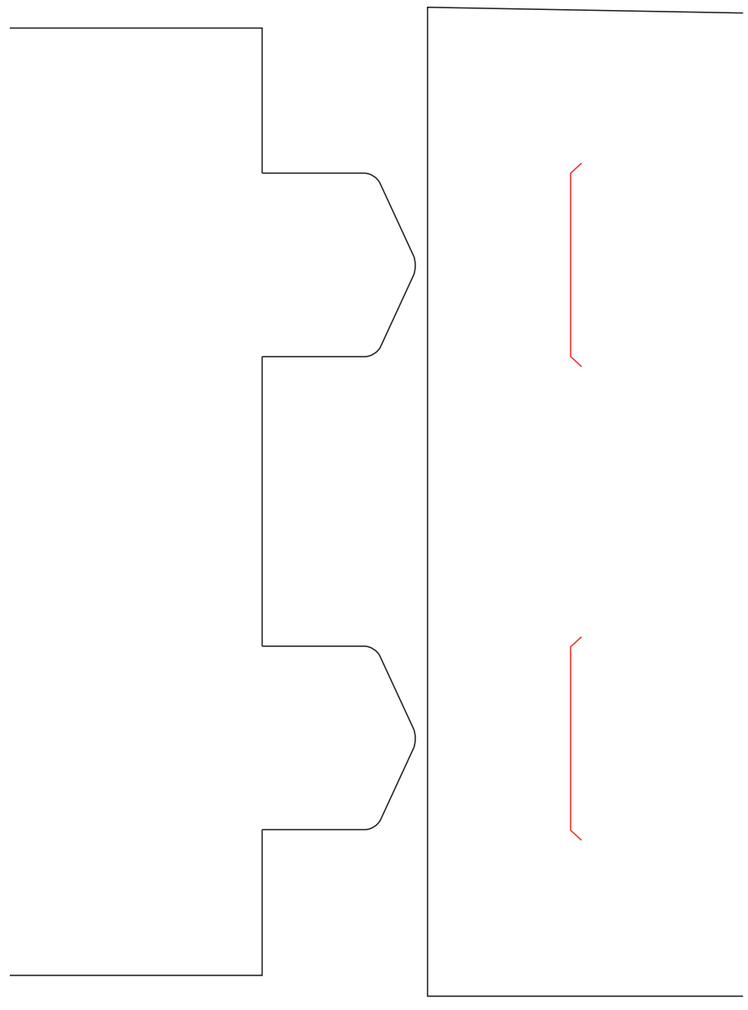
Another thing I wanted to test was different mechanical locking mechanisms. For both the castle and the rocket I wanted to avoid any taping being required for the assembly of the products. Not everyone has duct tape at home so it would be more convenient if the locking mechanism would be mechanical.

For this I soon realised that what worked in a small size didn´t necessarily translate to also working with the double corrugated 7mm material. I did several tests to find a mechanical locking structure that would function with the thick cardboard material.

Picture 59 and 60 The left hand picture testing hugging tabs to connect the pieces. The right picture: a different locking mechanism.Backlund 2017.

Full-sized prototypes

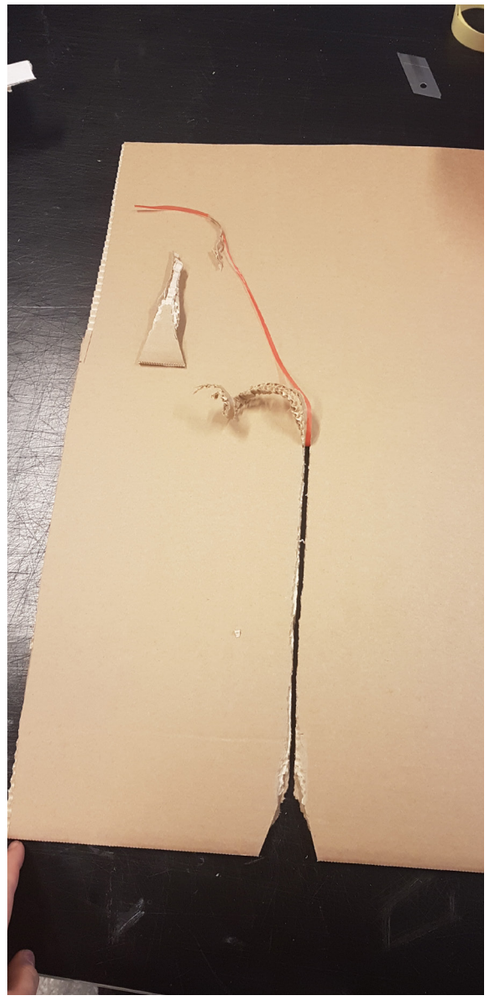


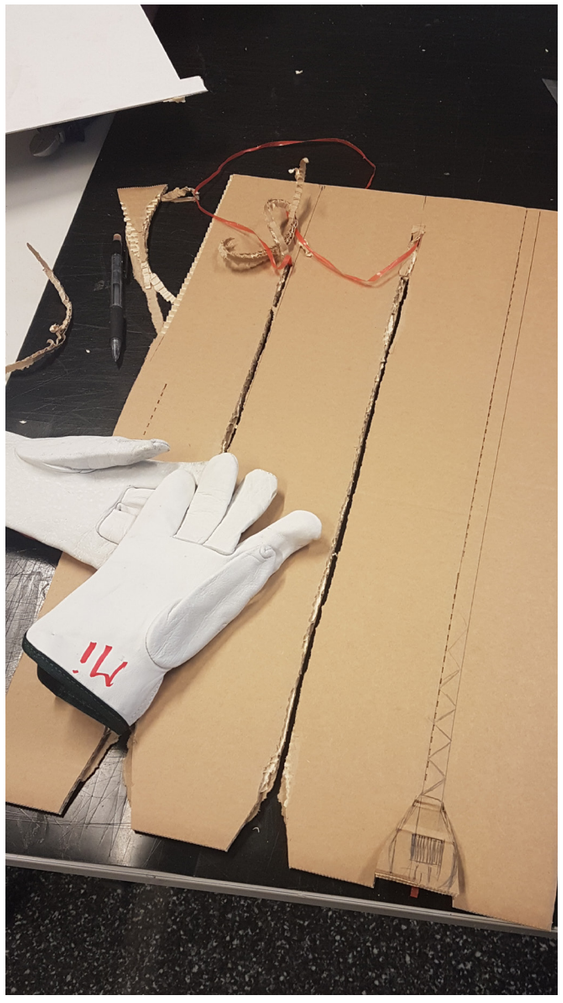


Picturex, 61, 62, 63 The most sucessful test so far of a mechanical locking mechanism. The tabs are connected through strategically placed slits that keep the pieces thightly connected. Backlund 2017

Noora also introduced me to a special type of tape that can be used even on very heavy cardboard to create an easy, rip open mechanism. The most common usage for this type of rip open tape is for example the boxes that potatoes and leek are shipped into the stores with. The idea is that according to the pace the boxes are emptied in the store a clerk can remove a bit more of the box to reach the lower levels of vegetables. (Nylander 2016)

Using this method the opening mechanism of the LumoKids boxes as well could be made a lot more simple. Since the customers are parents with young kids I wanted to make the opening of the boxes and assembly of them as simple and easy as possible.





Picture 64 and 65. Testing the rip open mechanism. Backlund 2017.

Once everything is fine tuned for the nets I will start by drawing up the full scale patterns on silk paper and then tape them to the cardboard with masking tape. Using a method that designer Paul Jackson refers to as the pricking method. I will make a pin prick through the silk paper net into the material beneath at each corner of the net to create an accurate copy. Then I will connect the pricked dots on the cardboard to recreate the pattern. This allows me to use the same template multiple times and saves time since the full scale patterns will take a lot more time to make than small, laser printable packaging. (Jackson 2012)

Childrens workshop

Since all of the LumoKids furniture are designed in collaboration with children it seemed only fitting that I would do some hands on testing with a child workshop group for this project.

Unfortunately due to lack of time it will not be part of this Thesis.

I have already discussed with Sanna and Tuomo that during the coming weeks, once the full-scale prototypes are ready, we will arrange a workshop with the Puhakainen family´s own three kids and some of their friends families.

This will be to test the first full scale prototypes once they are finished. Both the appeal and ease of assembly for the parents as well as observing how the children will react to them. In this workshop I will also supply the kids with markers, fabric and old recycled items so that they can decorate the boxes as they see fit.

I´m sure that this workshop will bring valuable insights to further this work. Afterwards I will use the gathered information and knowledge to further polish and develop the models.

Picture 66. Kid playing. dailymail.co.uk

9.

Conclusion

Conclusion

This has been a very interesting project to work with and continues to be so as I will not be able to finish the design process within the given timeframe.

Instead I will continue the project in the coming weeks. After finishing the first full sized prototypes I will test them with the upcoming workshop paricipants. After that I will make final alterations and send the designs to a printing company to get one more round of opinioins on wether any alterations need to be made for a smooth inustrial production. After that the first batch of new boxes will be ready for production.

It has been demanding and a good learning experience to be completely in charge of a project from start to finish without any exterior timetable and working mostly by myself.

The other challenge that proved tougher than I anticipated was creating the nets for this project. The amount of time required to test and polish the constructions took a lot longer than I had thought. Especially since I´m working with a thick material that requires extra testing and worked with several models alongside eachother.

I have learned a lot during this process and feel that through all the knowledge and know-how I have now gathered I can confidently steer this project to the finish line.

I know that there will still be a lot of testing and retrying to do to achieve a set of fully working designs. But I´m positive that the end result will be well worth the extra time and effort.

Picture 67. Motivational quote. lovethispic.com

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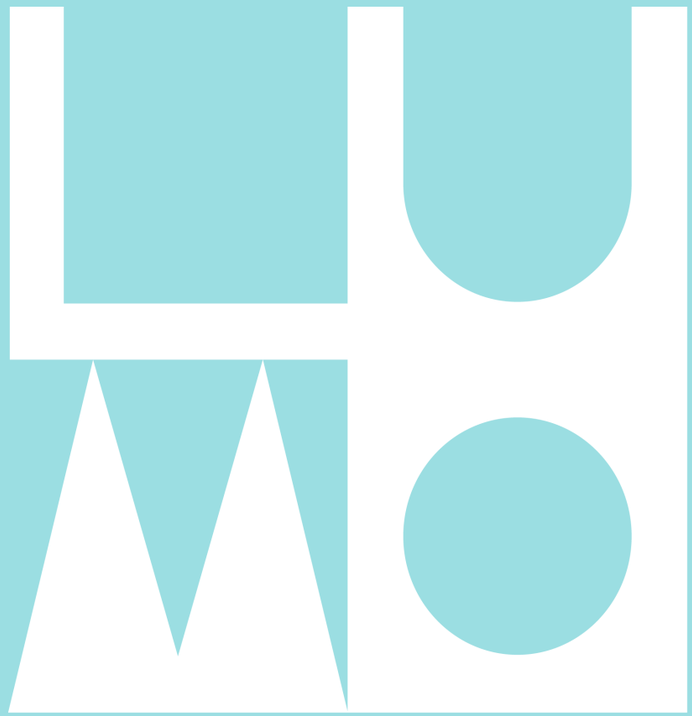
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