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University of Applied Sciences

Degree program in Design

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FROM IDEA TO PRODUCT

Making priority products out of cross-laminated timber

Bachelor's Thesis 2014

SUMMARY

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Design

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From idea to product

Making priority products out of
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Bachelor's thesis

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The designer's job in this particular thesis work is to suggest, plan, research, test, develop, create and draw an idea that is implemented to work that what producing company will do with subcontractors. The outcome is product with the package.

The objective of this thesis is to design affordable and suitable products to the Natural Heritage Services project, The Finnish Nature Centre Haltia's Shop using material cross-laminated timber (CLT). The starting point of the project is that Haltia shop products are made out of CLT wood. Connection between Haltia and CLT is that Haltia is built out of CLT and CLT is something Bravoo and Haltia had earlier thought of using in products. Customer for this thesis is Finnish Nature Centre Haltia. Muototalo Bravoo is maker of the products that I as a designer will design. Subcontractors work closely with Bravoo and that work is controlled by them. the Design work in this thesis is going through changes starting from the material CLT and ending up to the plastic product.

Approach for this work is productive. Action research is used as a research method in this thesis. the Designer will work closely with the customer and the product producing company. Work will start from briefing and will be followed by research and testing. Fifty product ideas are developed and after iteration few products are chosen by the customer. Production will follow and one product will be made. the Outcome is that CLT is not the best material for small items to be produced.

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1. INTRODUCTION

The first contact with Finnish Nature Centre Haltia took place when they contacted Kymenlaakso University of Applied Sciences in 2011. The students from the group DE10 were chosen to design products to Haltia's gift shop. Product concepts were made and my proposal was chosen. There were animal figure models which were used in a tea light set. These products serve as the basis range of products for this thesis and present further developed variations of a tea light set. In figure 1 you can see tea light candle tray. All in all, the first project took almost two years. At the



Figure 1. Tea light candle tray

same time as the project proceeded, I made the internship in Haltia. Internship lasted for five months, during which time the first products for Haltia gift shop



Figure 2. Finnish Nature Centre Haltia (Lehtonen 2013).

was completed. The products were on display in Haltia shop and got Muototalo Bravoo's Risto Granlund's and Tuula Meriluoto's attention. They mentioned that to Haltia's people, and I contacted Bravoo to ask whether it would be possible to do my thesis to them or through them to customer, in this case, to Haltia. We met up with Bravoo shortly after this and they suggested me a project which material would be cross-laminated timber, CLT wood, something Bravoo and Haltia had earlier thought of using in products. In figure 2 you can see Haltia building that is made of CLT.

My own requirements to the project are that my thesis work will meet requirements needed in a syllabus. Secondary needs are that it is possible to create a project which outcome is a new product. Third thing is that this new product will be produced. Fourth need is to get along with manufacturing company Muototalo Bravoo that is also responsible for getting right sub-contractors to work and keep good contact to customer for the future. Team goals are that the design work and workflow between Muototalo Bravoo and me is working; I deliver designs and talk with them about if changes are

needed in design. After that Bravoo orders products from subcontractor. Project requirements and goals are to produce new product or product family based on a brief given to designer. Brief is to make product or product family out of wood, cross laminated timber. In Appendix 1 and 2 there is my timetable for this production.

2. PARTNERS IN MAKING

2.1 The Finnish Nature Centre Haltia

The Finnish Nature Centre Haltia is the first public building in Finland to be constructed using CLT elements. June 6, 2013 building was inaugurated. Haltia is located in the national park Noux some 30km from Helsinki city center. Haltia has a big role in showing Finnish culture and nature in its exhibitions. 3500 square meter space offers two exhibition space and restaurant facilities.

Haltia building is designed by the architect Rainer Mahlamäki, who was inspired by the tales of Kalevala, the Finnish national epic. This Kalevala connection in Haltia building made me think of products that could relate to Kalevala as well. The design enables man and nature to come together peacefully and harmoniously. Haltia wants to be example in wood construction, inspire and increase use of wood in public and apartment buildings.(Haltia 2014)

The Haltia has been designed and built in accordance with the principles of sustainable construction, with the aim to minimize the carbon footprint. Environmental aspects are taken into account Haltia operational. Facade of the building materials, wood, copper, natural stone, grass cover and spruce will test of time. Even the brief for doing products to Haltia is bound to wood and specially cross-laminated wood, CLT, materials that are used in Haltia building could also be starting points when developing a wider range of products to Haltia shop.

Haltia is made out of prefabricated CLT panels. Panels are produced by Stora Enso Ltd. CLT can be used in structures in ceilings, walls and floors. Load-bearing columns and beams are not needed. Prefabricated elements helped builders to start indoor work quickly and it helped to complete the building in 18 months.

Haltia is a part of Metsähallitus Natural Heritage Services project. Haltia's activities and operations are run by Natural Heritage Services.(Suomalaista puuarkkitehtuuria ja -rakentamista 2013)

2.2 Muototalo Bravoo Oy

Helsinki based Muototalo Bravoo Oy is the object of communication and the implementation of specialized design and service agency. Priority is domestic products. Object is the message. Object of communication is to the customer's brand development and strengthening. Traditional means of business and promotional gifts and promotional products and corporate image - the means to Bravoo 'expertise is in control.(Muototalo Bravoo 2014)

2.3 Stora Enso

Stora Enso Oyj is a Swedish-Finnish forest industry company that was born in the Swedish STORA AB (formerly Copper Mountain Bergslags AB) and the Finnish Enso Oyj merged in 1998. Stora Enso in 2007 was Europe's largest and the world's third-largest forest products company, as well as the world's largest paper and board manufacturer. (Stora Enso 2014)

Stora Enso uses and develops expertise in renewable materials to meet the needs of its customers and many of today's global raw material challenges. Products provide a climate-friendly alternative to many products made from competing non-renewable materials, and have a smaller carbon footprint. Solutions based on wood therefore have wide-reaching benefits for business, for people and for the planet. (Stora Enso 2014)

2.4 Cross-laminated timber (CLT)

CLT is a solid wood construction product made of single-layer panels which are at right angles to one another, and can measure up to 2.95 m in width and 16.00 m in length. CLT solid wood panels are made up of



Figure 3. Three layer 60mm CLT. (Stora Enso 2012)

several layers and can be produced in different sizes.(Stora Enso, 2012) The layers are bonded using adhesives which is environmentally-friendly. In figure 3 you can see typical layered CLT wood. CLT is an approved and tested product by Stora Enso. Tests ensure safe construction and high-quality CLT. Conscientious planning ensures that raw materials of CLT are used in most efficient way. Planning, construction and protection against weather conditions and damp will assure that CLT buildings last for a long time. CLT is PEFC-certified which means that is guaranteed that wood is derived from sustainably managed forests. Difference between CLT and glulam wood can be found at figure 4.

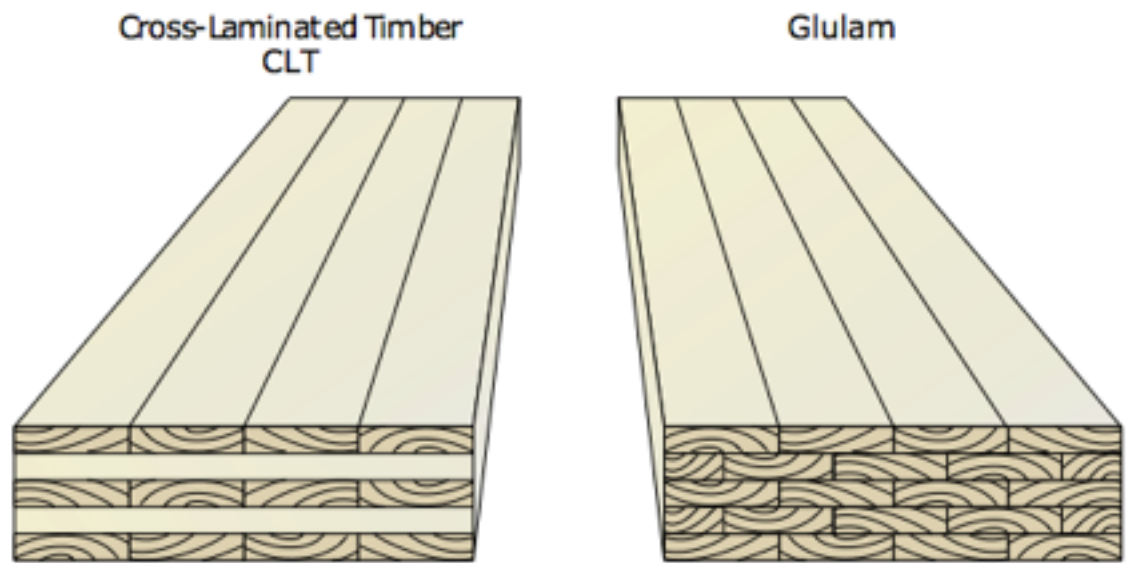


Figure 4. CLT versus traditional glue laminated wood (CLT Handbook, FPInnovations, Pointe-Claire, QC Special Publication SP-529E 2013, 5)

3. GOALS AND OUTLINES

3.1 Haltia gift shop products and task brief

Project brief was to design affordable and suitable products to Natural Heritage Services project, Finnish Nature Centre Haltia's Shop using material cross-laminated timber (CLT). Manufacturer for work and mentor is Muototalo Bravoo and the Designer is Pasi Pietari Hornamo. First concept product ideas are created as the project goes on and they need to match for Haltia Shop products. At the moment Haltia has Scandinavian high profile ceramic works and vases made of wood on sale at shop, as well as what every nature centre around the world has: t-shirts and stuffed animals/cuddly toys.

Products made of CLT will connect Haltia building and Scandinavian clean style together. The Haltia is Finland's first public building that has been implemented CLT material. Project starting point is that Haltia shop products are made priority out of CLT wood. This material will be a contact point for the tasks products. To the customer, a main thought is that you take a piece of Haltia with you when you buy a product that is made out of CLT.

Product concept's starting point is to search how to create right size products out of CLT wood that lines up Nature Centre Haltia's gifts shop artifacts and style. Haltia has variety of products sold at their shop. Materials differ from wood to ceramics and paper to stone. There are works by ceramic artist Maarit Mattanen: a product family of clay vases. Products from paper, maps that cover for the whole Finland and its nature parks as well as paper artist Sirpa Kivilompolo's paper urns and lanterns. Other artifacts are jewelry made of stone, cuddly toys in animal forms like Saimaa ringed seal, fishes and birds. T-shirts, bandanas, Suunto-watches and compasses, ceramic artifacts like plates and animals, postcards, tea lights, animal shape soaps and posters related to nature are also sold in Haltia shop.

CLT material design project purpose was to create new functional and right price range products to Finnish Natural Centre Haltia's shop. Search for right products was aiming to please demand of international shopping customer needs. Big size items were banded and focus was in smaller, cheaper price range products, which are sold the most. This focus lowered the investment risk. Product line was to be economical, small in size, easy to sell and would need minimum storage space in shop. Product line main target group would also need to cover larger customer group. Low producing cost, good sell margin, small in size, customer friendly price and innovative product. Products should also be in line with other Haltia Shop artifacts; nature strongly in present, would support Haltia's clean designs and other Finnish design brands, e.g. Martini, Suunto. In the beginning of thinking the designs, there were no restrictions or boundaries-those came along the way when ideas were presented to Design House Bravoo and Haltia. Material was CLT and it was the only starting point for this project. As project went further it came obvious that CLT would not be the best material in economical or production point of view when thinking of producing finally selected small items. Because of this, search for alternative material was made.

3.2 The Project flow

The first step was my 5 month internship at Haltia. After that I was able to understand Haltia's product range and the products that sell. Product range was from knives to individual ceramic pieces and from arm watches to paper urns and postcards. Typically items were some technological products, long tradition products like knives and items you sell in a nature shop around the world: t-shirts, cuddly toys and posters. When understanding about products that were sold in shop was reached I was able to think of what kind of concept products could be offered and what one could need in Haltia gift shop. One criterion was that product are designed and manufactured in Finland.

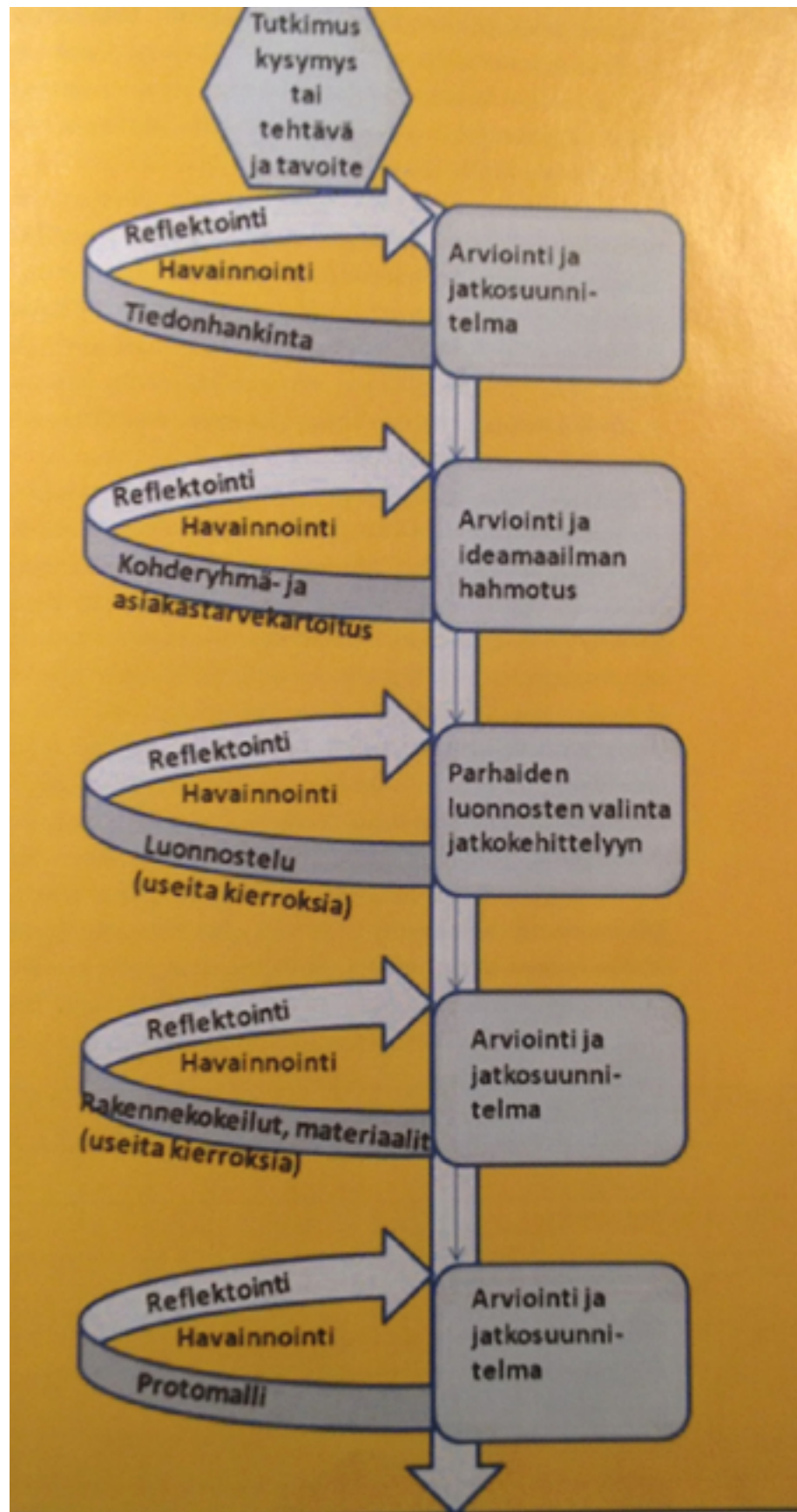


Figure 5. Example of an action research process, the progress of design work in the field. (Ruohonen 2009, 13)

In a brief, Muototalo Bravoo, who was going to produce the products, instructed me to design products from CLT (Cross laminated timber). This was a starting point; design concepts out of CLT wood. I began to search subject and made a mood board where I was looking for interesting products that could be modifiable to my own project and I studied the shape of products. In figure 5 you can see action research process.

4. RESEARCH

4.1 Action research and methods

I collected information about CLT material and how to use the material. That knowledge helps when considering the shape and style. I use literature sources and the skills I have learned when making product family to Haltia.

The research method of this project is action research, which is more or less iterative process. (Pentti Routio 2006) In design process planning, research and development are together. Designer affects around and is actively involved in what you are doing. Typically, the design work will be productive. Outcome is aimed to corporate customer and target audience. When the designer is a maker, the subscriber defines the objective and comment on the work. (Ruohonen 2009, 9) Iteration cycle is an important part of the production process. Each step of the disparity needs to take into account and make changes to the product. The thesis is productive with the task and objective. Action research is not really research method, but an approach or framework around which intertwines a number of methods and operators (Ruohonen 2009, 10). In action research, the designer is typically co- operating with sub-contractors and with the client. With this kind of symbiosis, problems and challenges are found and fixed. the Designer works on the process of relaying information and modify activities in the customer and subcontractors according to the feedback received from the work progresses. This process style was used in this thesis. The study must take into account what methods are right for this research and what methods will give a realistic outcome. The emphasis is on concepts in this work. Process of this particular concept is explained in this thesis work.

4.2 Research data: CLT

I began to study CLT to know the material and contact material producer Stora Enso. I asked them about left over materials for demo use. I agreed with company representative that I could pick up test



Figure 6. CLT boards.

material from Store Enso's factory at Hartola, Finland. Got pieces of three layered 60mm solid CLT wood boards, with size of 70-90cm x 120cm. CLT blocks were very massive and it made me think how it would be possible to use this type of raw material in demo products / mock ups. I knew that products would be small in size and would need to be elegant at the same time, so raw material was not the best choice for that. I picked up material in winter time when it was minus celsius degrees and air humidity was low. I stored one CLT board indoor's in my flat and rest of the material in a colder plus ten degree temperature room where the humidity was higher than the indoors in Finland winter time. The surplus material turned out to be a little problematic in use. This caused problems for making a demo of products from CLT raw material because it had deep cracks throughout the board in less than a few days. In figure 8 you can see the cracks in CLT wood. This same situation happened to boards that wore in more humidity cold storage. In figure 6 boards are protected against the weather with liquid thaw because one product idea, geocache was supposed to be used in outside condition



Figure 7. Painted 60mm three layered CLT



Figure 8. Deep cracks in 60mm three layered CLT



Figure 9. CLT 100 s5 VI

Material that was left over from windows and doors was really most basic. In figure 7 I am testing how paint will work in a damp condition. In figure 8 shows deep cracks in CLT wood. Figure 9 shows the most suitable CLT material for small products because of its thickness and five layer structure.

4.3 Testing materials

I was wondering how to get the wood to be more than a wood product? How to make a product that is not intended to be made of wood? How to treat wood that it will last? How thin cross-laminated timber can be cut, that it still holds up? How well the material is able to varnish or staining, to color? How to work with CLT with CNC machinery? What would be the upside of using CLT? These thoughts I wondered at the same when I read more about CLT through. I got lucky enough to contact Stora Enso. This gave me access to the manuals they and from CLT. Very quickly it became clear that the product is sensitive to cracking and moisture. Moisture in a CLT panel could be

controlled by treating it with liquid. That would create CLT a shield that makes water-repellent membrane surface to the material.

When talking about the CLT thickness I came to the conclusion that about 10mm CLT piece is very resistant to cracking. 10mm is too thick block if one ones to do small items out of CLT. I would need to think some other materials. Plywood 4-5mm thickness of the product is not a problem to produce. I also made another user test, which continues today. I tested the CLT panel and exposed that to the weather. I used thaw bath below the painting. With this method the product can withstand weather fluctuations in small numbers. I got CLT panels from Stora Enso Hartola unit. The plates were to be used for making a demo products. The material was to be CNC machined aircraft. I talked about the material and my goals with Stora Enso's people. With that result, research and development I realized the limitations of the material. This raw 60-millimeter CLT material was not suitable for making small objects. This assumption was confirmed by the Stora Enso as well. This was not the best material to use in key rings and refrigerator magnets. Material should be much thinner, such as plywood. We did a demo with 4mm plywood and product was milled with the CNC machine. When we used CNC machine, we found that we did not succeed and the plywood cover dispersed. We rotated our products to be milled 90 degrees on the operating table, and we got decent demo products out. I also contacted Adam Rowe in Laser Cut Studio, a company that would laser cut what needed out of many materials and I gave the task of cutting the same pattern with a laser. It was a success and soon came to realize that the CNC should not be used in this type of work because of cost and technical difficulties. Also, a little thicker pieces of CLT 100 s5-VI material could be cut with a laser as well. In figure 10 you can find laser marked CLT. CLT is not used in this project because it is not suitable for producing small, thin items but it will be on Haltia's goal to use it in some other occasion and project. If our project small items are developed or made, material is going to be plywood and cutting technology laser cutting.

4.4 Comparing analyses



Figure 10. Laser marked test piece of CLT 100 s5-VI

Comparison with performing (comparative method) identify and review the material to individuals which have similarities but differ in some way from each other. Comparison of differences by examining the perceived find systematic data structure that allows divergence cases between. (Pentti Routio 2006a)

I studied the different nature centers product offerings for the first time more than two years ago. Task was to design products Haltia future gift shop. Quite quickly it became clear that the products are in every place the same. Products could be roughly divided into four groups: under 25, over 25, over 50 and more than 100 dollars / euros. Haltia was offered as part of this thesis work of twenty-two product ideas that had been pre-selected from 50. Pre

qualification work was made by me and Muototalo Bravoo. Around five-six work reached its final stage and they were very similar to what is offered in other visitor centers around the world. The most expensive products were obtained in more than € 1000 class and size suitable for outdoor use.

I appreciate nature centers which have a little bolder approach in products. T-shirts and birdhouses is to be found in every nature center but there are exceptions. In New York's Museum of Modern Art models of the city's iconic buildings made of wood are sold in their gift shop. For example, in the case of Haltia architecture of the house and the shape of the architecture could be utilized, as well as iconic buildings of Helsinki, because Haltia is a showcase for the whole Finland. Wooden children's toys are also timeless and they are found in every culture. Finnish bird species could be utilized even more effectively too.

5. PRODUCT DEVELOPMENT

5.1 Developing steps

The style is a clear line of Scandinavian design, which takes into account Haltia visual appearance, as well as sale ability. The products are clean, pure line small objects. Those can be manufactured cost-effectively and sold out with good margin to the customer. The fifty ideas of the products had a lot of ideas that would be better to use in interior design than Haltia shop products. Many of the pillows, chairs and utensils were left out of this concept because they were more interior products than gift shop products.

The development has been made on the basis of mood board where I studied the shape, material, color and style that would fit the Haltia and the Haltia shop. The form would be rounded and streamlined. The material should be wood and the colors repeat the Haltia colors of red, blue and green shades.



Figure 11. Haltia brand colors (Haltia 2014b)

Figure 11 shows Haltia brand colors. I was wondering the target group and internationalism, and how it would affect the product. In idea stage there were no other rules than that the product was supposed to be dimension of the size that the customer would be able to take it home easily. Also affect the size of the storage, and a sample of the layout, the smaller the better. If the product would be a small, would



Figure 12. 3D Illustration of an owl

probably be the production structure also lightweight. Very cheap and expensive

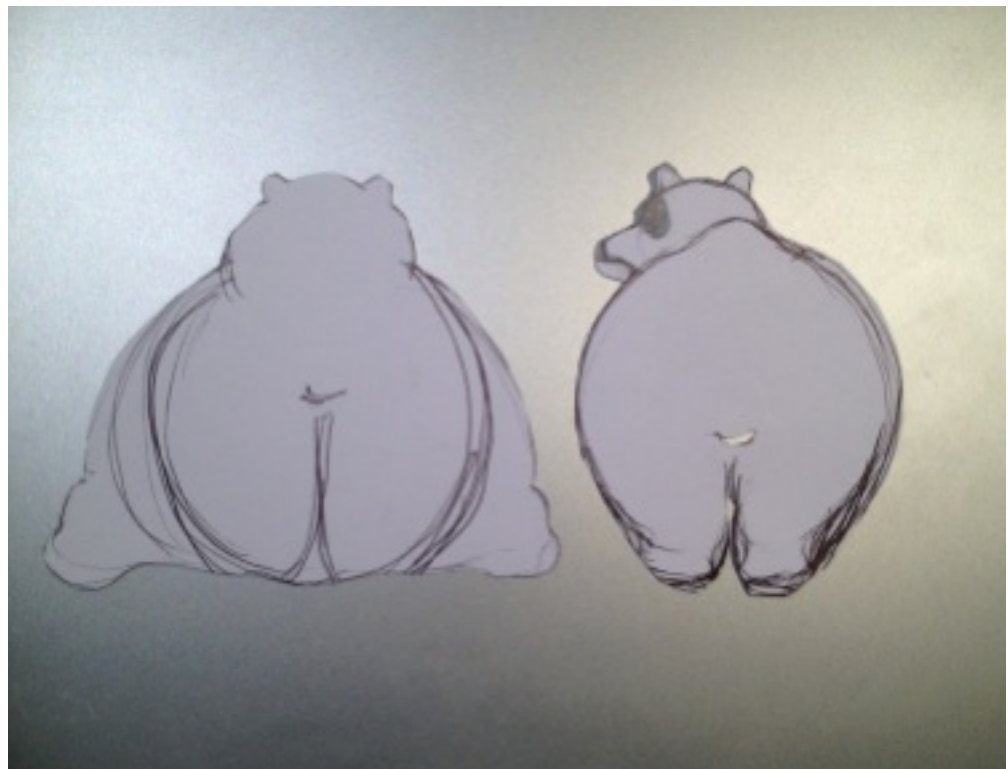


Figure 13. final sketch of bear figures

product, according to Haltia representatives were of those who sell the most. The information was somewhat surprising, especially expensive products. In figure 12 there is 3D Illustration of an owl with three different eye options. The bear figure needed 20 different illustration to get the final shape that is seen in figure 13.

Product models were drawn on paper. Sketching was applied for the overall look of the product, and then moved to details. Flying squirrel format was modified immediately for 3D modeling without hand drawing. The products bear saw its biggest transformation. Bear's shape was drawn twenty times to the paper before moving on to the 3D drawing. The most difficult thing was to find a universal format, which the animal could be identified. Did a flying squirrel, after all, look like a bat, or a road kill? Had to draw the shape as animal as simple as possible. It would need to have a hint of sympathetic and humor. I think the flying squirrel managed to form for this purpose. While studying the proportions of the products I noticed that the owl character eyes were very important. They would define the character. The Owl's character was made in three different versions, each of which had different kind of eyes. I tried to get every version of its most possible solution.

The first meeting explored Bravoo's activities, as well as determined the order, the brief. The assignment was to make cross-laminated timber products that could be sold in Haltia Shop. In fact, the customer, Nature Centre Haltia did not set criteria to products that were produced, except that the products should reflect the value of the Haltia to the world and would need to be as international as possible. The product would be suitable in size so that the customer gets exported it home. Product should also be small because Haltia shop is small in size, only a few dozen square meters.

5.2 Product ideas

I had fifty ideas to start with and I made the raw selection what to offer to Bravoo and customer by myself. I made the decision but made sure that

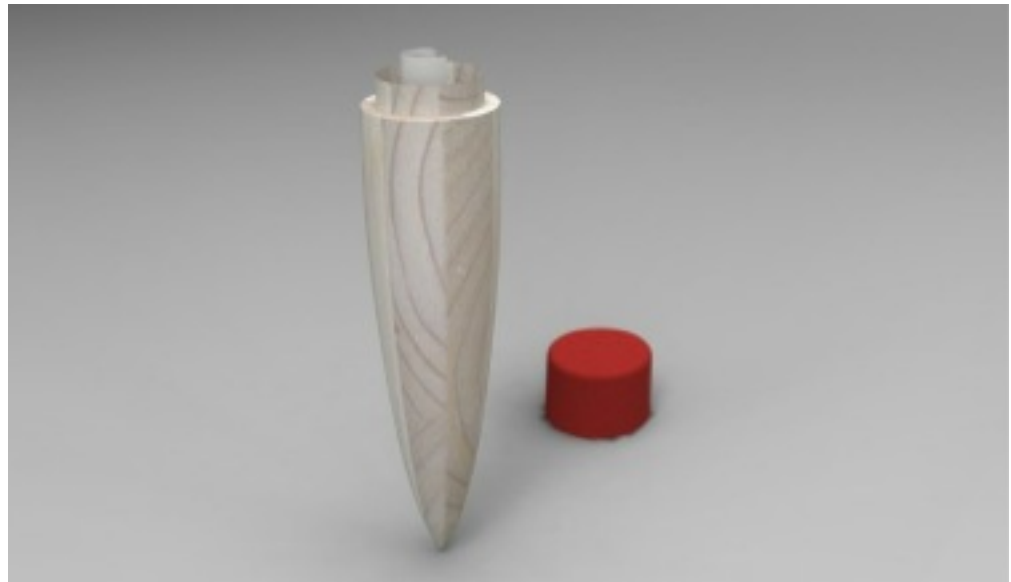


Figure 14. 3D picture of geocache



Figure 15. 3D picture of a lamp and candle holder

Bravoo people saw what those other ideas were. In the fifty ideas board there was products that were left out. Those were: tie tack, all kind of cases and boxes (product families), rack for keys, products that involve letters (Haltia



Figure 16. 3D picture of bean chair that is filled with wood chip

word), see figure 15, light fixtures, rack for knives, easy chair, sauna shoes, children's toys and many more similar ideas. In appendix number 3 it is possible to see picture of one idea. In figure 14 it is possible to see 3D picture of geocache. Figure 16 shows bean chair concept.

For the next iteration round I chose by myself twenty-two ideas that were: test-tube shape geocache for outdoor use, earring and necklace with graphic surface. In the surface there is modern Karelian influence pattern with laser marked to the surface of the earring and necklace, laser marked mobile phone covers, coffee table, iPad cover case, light and candle rack made of Haltia letters, mobile jewelry, wallet mobile phone cover, bean chair filled with wood chips, refrigerator magnet, Haltia building shape bird nest etc. In appendix number 4 it is possible to see pictures of these ideas. the Jury for the ideas were Design House Bravoo in a co-operation with designer. Many of the twenty plus product ideas were more like products that could had been sold in the interior shop rather than in Haltia shop. We were looking more global products that would interest foreign tourists as well as Finnish audience.

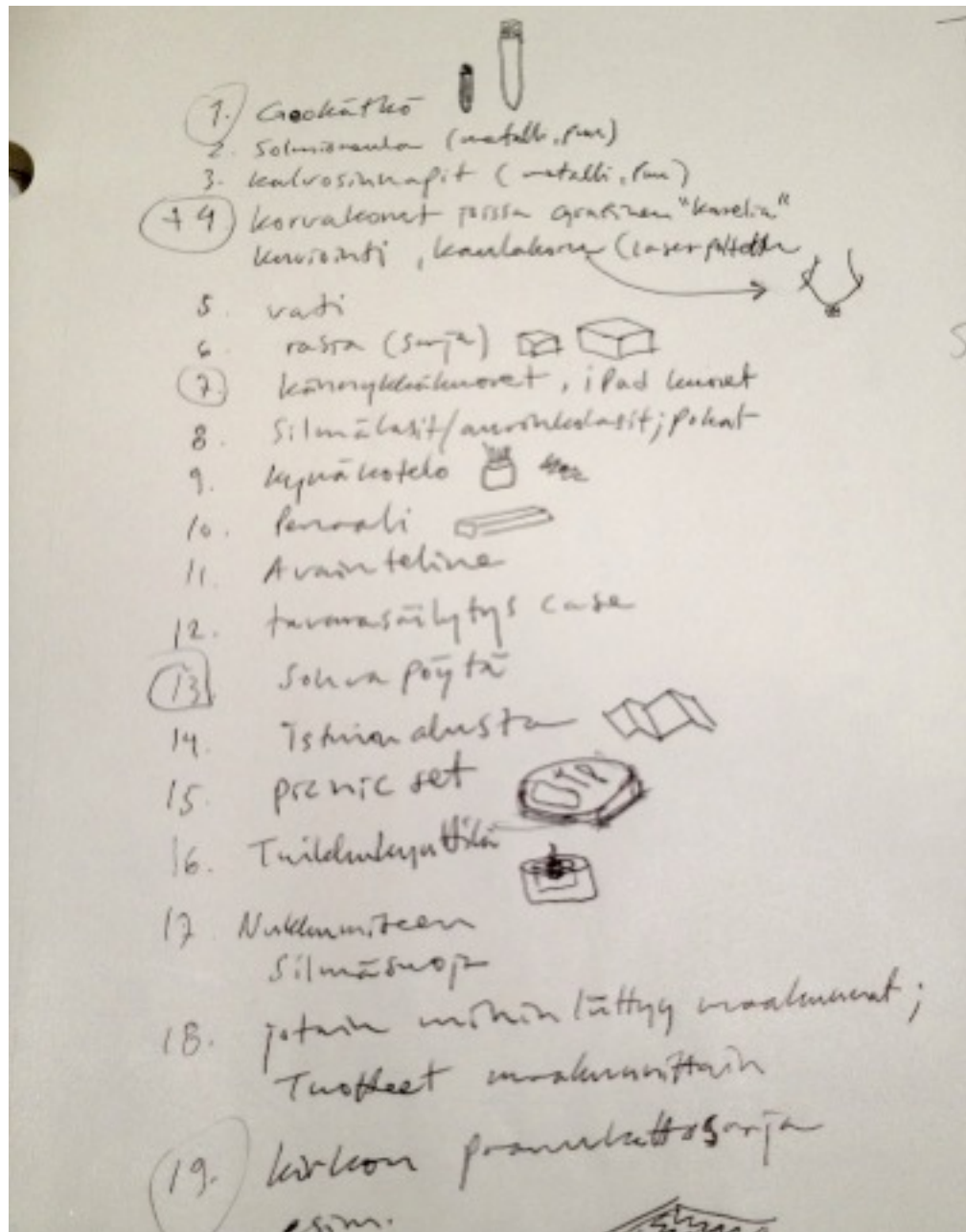


Figure 17. Part of the fifty product ideas

5.3 Fifty to twenty ideas

At the beginning there were fifty-product ideas or proposals and those were narrowed down to twenty-two. In figure 17 you can find some of the fifty ideas. The development were made on the basis of mood board where I studied the shape, material, color and style that would fit under the Haltia brand and Haltia shop. In figures 18 and 19 you can find research that was

made about shape, material and style for Haltia. Plastic and metal objects were left outside of the mood boards because of the thesis focused on organic

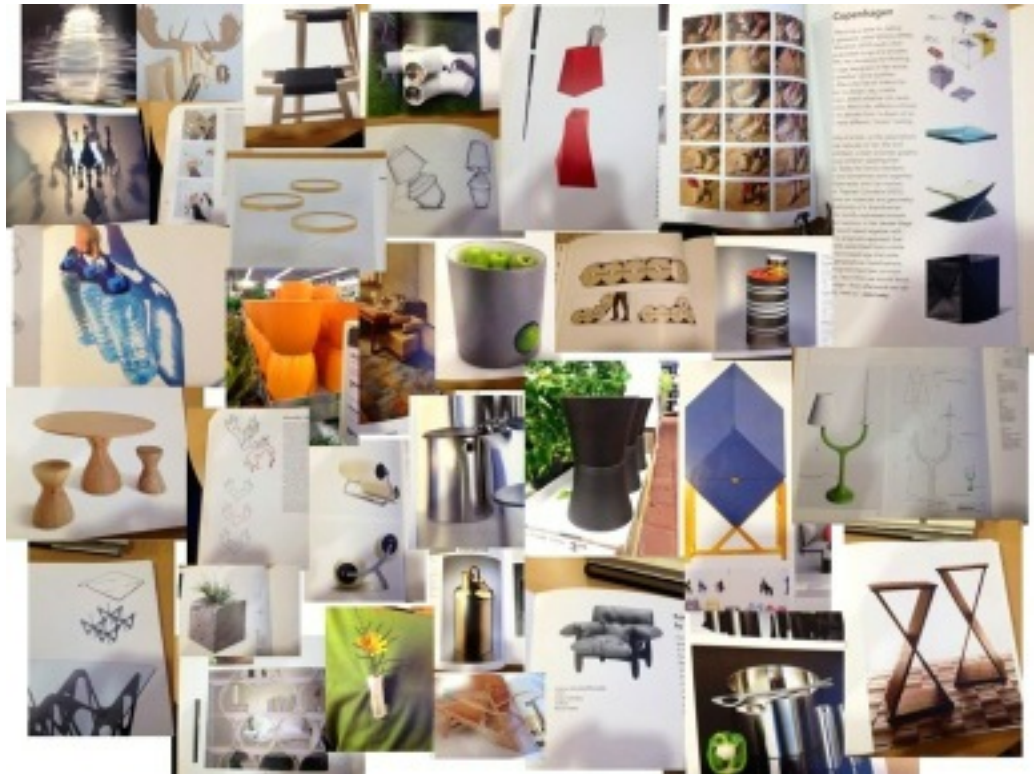


Figure 18. Mood board 1

shapes and soft wood. Haltia style is modern, so the mood boards helped to perceive a clear Scandinavian visual style.

People have an average of 11 times more goods than 40 years ago. I was wondering what is a sustainable design? What is the carbon footprint of the product remains? Have I taken into account all the aspects that influence the decision design?

Nowadays, simple is not simple any more. It is computer calculations of the energy, mass and optimal design. The number of materials and increased knowledge of them, together with the development of technology increases the complexity of the issues. In appendix number 5 it is possible to see picture of energy and strength in different materials.



Figure 20. Laser marked shingle roof necklace made out of CLT



Figure 21. Laser marked Kareljan necklace made out of CLT

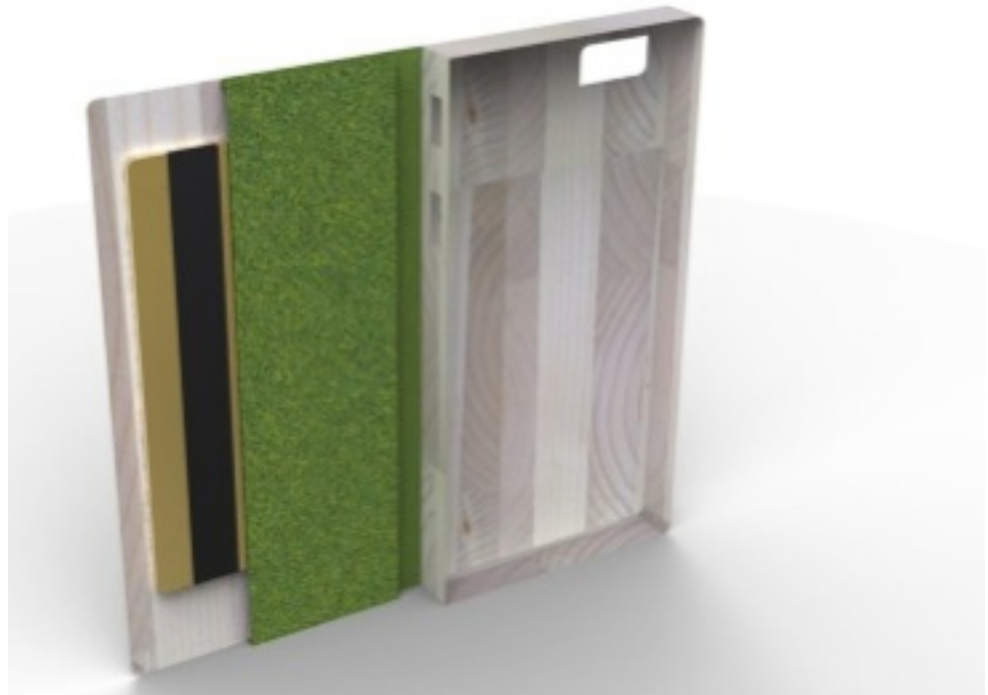


Figure 22. Laser marked mobile phone cover with modern Karelian pattern

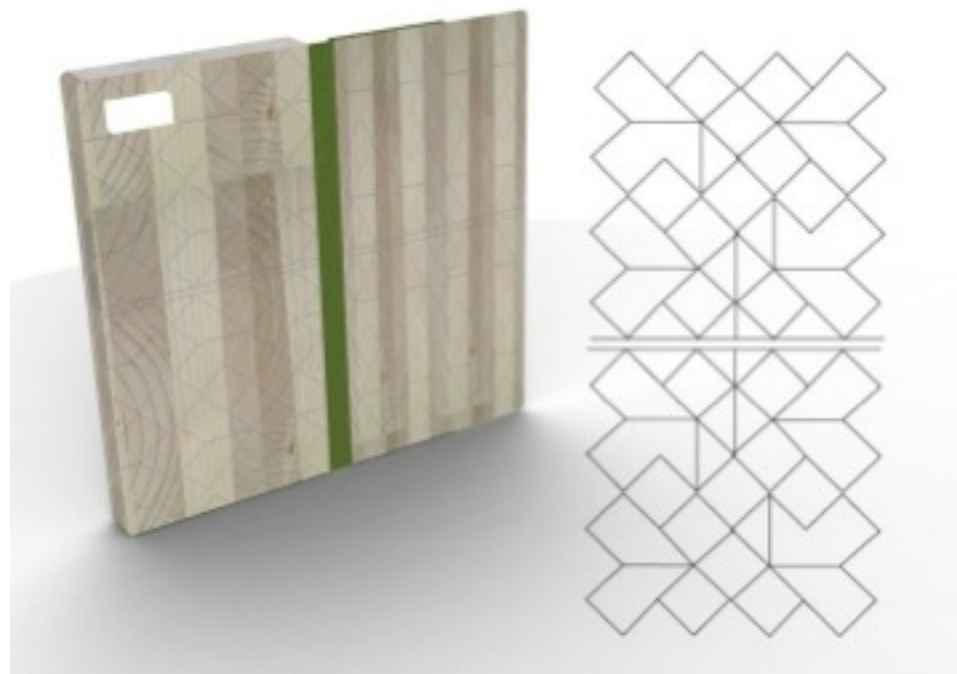


Figure 23. Inside of mobile covers: the wallet

5.4 Six were chosen out of twenty

I presented how I ended up from fifty product ideas to twenty-two. Some of the products turned out to be, according to Bravo representatives, more interior products, and hence not of Haltia spirit. In figures from 20 to 26 you can find ideas that were presented to Haltia. I began to study CLT to know the material and contacted CLT producer Stora Enso.



Figure 24. Mobile version 2



Figure 25. Mobile version 1



Figure 26. Children's wall measure 80-160 cm

In next step I presented about 20 product ideas in the first meeting with Muototalo Bravoo representatives. The meeting made clear which products could be exported to forward. Those were refrigerator magnet series, mobile decoration made of CLT wood so that it would hold photo frames, wooden reflector and etc. In 2nd round there were 6-7 products in discussion. After

that I got to know which products could be fine tune. In appendix number 6-7 it is possible to see pictures of this face.



Figure 27. CNC machined reflector

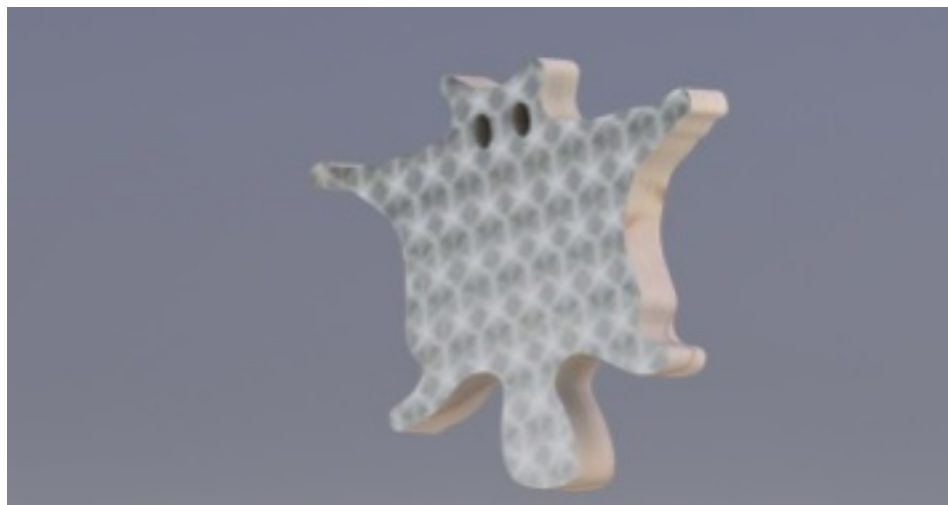


Figure 28. 3D Illustration of wooden jewel with reflective tape

6. PRODUCT

6.1 From six ideas further: development of flying squirrel

3rd round was with the customer. Six product concepts were developed further. This meeting was the last before the concepts were presented to the customer. The fourth presentation to the customer followed and we went through the products that could be worth developing and would fit to Haltia. The key factor why customer chose those products were price and need. They needed small items, that could be easily sold and were small enough for people to carry home. CLT was noticed to be too raw material and could not be used in reflector because of CE-requirements. 3D image and plywood test piece of wooden reflector can be found in figures 27 and 28. From there It was agreed to developed the soft reflector and a flying squirrel-shaped wooden jewel with a reflective properties.

6.2 4th product round

The flying squirrel was further processed product of Haltia product family. Wooden flying squirrel's reflective properties was achieved with reflector sticker that was attached to the article, front and back. Wooden material, due to the product could not be called officially the reflector because it did not meet the CE marking of set requirements. (europa.eu 2014) Three product demos were inspected, shapes and fine adjustments and a decision was made on production. In appendix number 8 it is possible to see different options of wooden reflector.



Figure 29. Flying squirrel reflector made out of plastic with recurrent Haltia brand colors

6.3 5th product round and production

In the fifth meeting with representatives of Bravoo I re-drew the shape of flying squirrel. Earlier version of squirrel was little too big for the reflector. I squeezed the size and made adjustments to tail and eyes. 2D image was completed and send to sub-contractor who was going to do metal tool for the reflector. After metal tool or mold was completed it was possible to cast reflector out of plastic. Reflectors were made in five colors that are repeated in Haltia brand. In figure 29 you can find a ready reflector product. Bravoo designed



Figure 30. Evolution of squirrel reflector

presentation package. Bravoo worked with sub-contractors and took care of competitive bidding. In figure 30 you can see development of a squirrel. Material, color accuracy and production volumes were decided by Bravo representatives as well. I asked for information on everything related to the project steps in the production, but I did not get any information on which to share in thesis. My job was to modify the shape of

the product and everything else took care of Bravoo. Haltia took care of marketing presentation. When thinking of following project, I would learn much more, if I could be involved at every stage of the project. This hope was not realized in this project. However, I received the product cost information from Haltia. Plastic reflector factor settled in a couple of euros and out sales price is naturally higher. In the first production wave it is decided by customer that plastic reflector is gonna be produced. Other products are on hold and production will or will not follow (fall 2014). In figure 30 there is the final shape of squirrel made with computer, laser-cut piece of plywood and finally finished product, the soft plastic reflector.

CONCLUSION

What I learned about working in the project where the Finnish Nature Centre Haltia needed a new product at their gift shop is discussed in this conclusion. Haltia was the customer, I was a designer and Muototalo Bravoo helped me to make product ready for production. Project starting point was to create a new product for the customer to sell. New material that was not earlier used in gift products and was mainly a house building material, was used. This material was cross-laminated timber (CLT). Outcome of testing and analyzing project materials gave conclusion that CLT is possible to use in designs that were presented to the Finnish Nature Centre Haltia. Products that were presented in the project were divided to different categories by price, size and style. It came obvious that small items, designs that were created to customer, were not best type of products to be produced from CLT. Productization showed what kind of material was most suitable for the task. More flexible material was plywood, from material wise and by price. Designs gave birth to new kind of product. Product material was wood but need of reflector created a new product. Wood could not fulfill requirements needed in CE-proved reflector, so one more item was created out of plastic. I hope in the near future that development of CLT products continues and suitable ideas to produce a product out of CLT are found.

All in all working with Muototalo Bravoo in creating new products was time consuming but fruitful collaboration. Process outcome was more thoughtful and product was better because of group work. Project showed me that few months was way too short time for me to do everything from scratch to ready product. There were four individual rounds where I presented product concepts and it was time consuming to get results and decision from customer. As a result of material research it was clear that selected material, CLT, did not work in small product category. Material was too rough, stiff, heavy and thick that it would not be able to be used in a customer chosen products. Research results lay base to the future productions. The starting brief was too vast to operate effectively and in time frame. On May 2014

project is still going on and we have only one product in productization. There should be at least two product under way and maximum four. Last project with this customer before this project took two years to finish. Conclusion for this project is that six month is not enough to finish project from start to ready product. In a future I see that I can work with a customer Haltia in new projects, because they need new products for their gift shop all the time.

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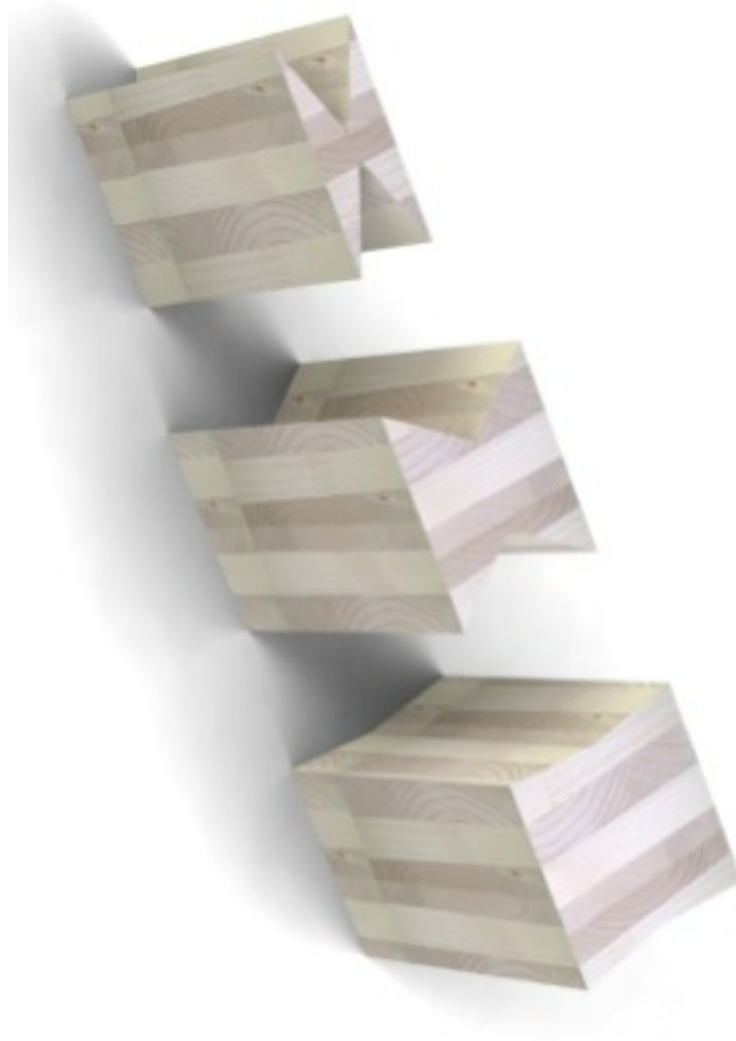
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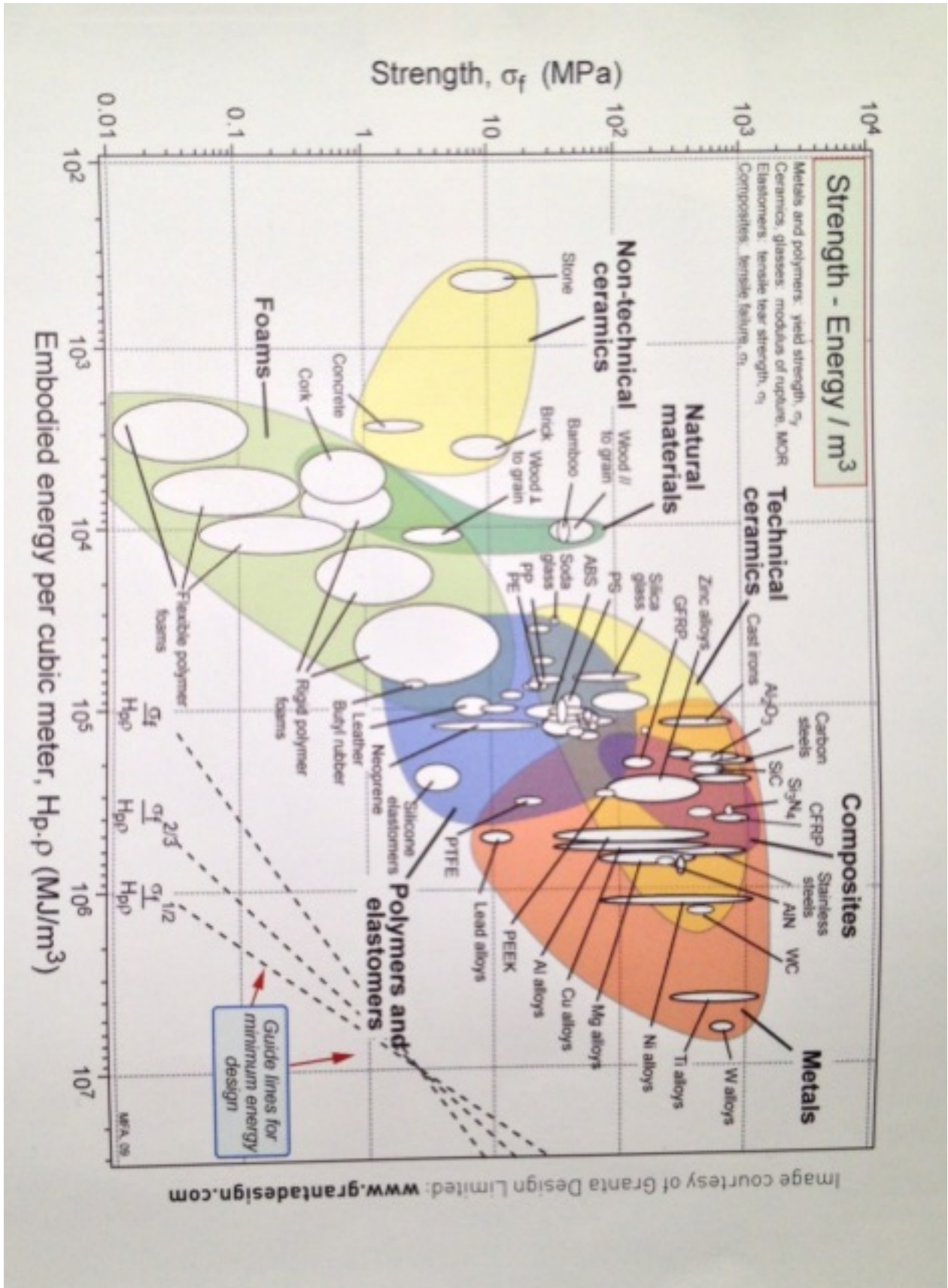
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CONTEMPORARY CHAIR

Appendix 3











WOODEN REFLECTOR WITH REFLECTIVE TAPE

Appendix 8

