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industriDESIGN

DESIGN OF A SUSTAINABLE BED for IO Kids Design

Natalia Blanco Sierra

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EXCHANGE PROGRAMME



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This degree project is performed at the School of Engineering in Jönköping in the subject field Industrial Design. The project is a result of the Industrial Design and Product Development Engineering degree in Zaragoza University (Spain) and the Industrial Design Master programme in Jönköping University with the exchange programme. The writer is responsible of the result, conclusions and reflections.

Tutor: Lars Eriksson

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Abstract

This report is the result of the bachelor thesis that includes the skills acquired during the bachelor degree in Industrial Design and Product Development Engineering in Zaragoza, Spain; and the master programme in Industrial Design with the exchange program in Jönköping, Sweden.

In the report is described the industrial design methodology, from both theoretical and practical point of view, used to achieve the final design. It includes a theoretical background, the design process, and the consequent results and conclusions.

The project consists of the design of a sustainable bed for the company IO Kids Design. The concept follows the outlines of sustainable design principles, and the simplicity and contemporary lines of the design of the company.

Summary

This report consists of the design process and result of a sustainable bed for the company IO Kids Design.

In the report is described the industrial design methodology, from both theoretical and practical point of view, used to achieve the final design. It includes a theoretical background, the design process and their consequent results and conclusions.

The main goal of this project is to design a versatile, ergonomic and innovative bed for children, adapted to every stage of their growth; the idea of sustainable design.

Sammanfattning

Denna rapport består av designprocessen samt resultatet gällande en hållbar säng som vi tillverkade åt bolaget IO Kids design.

Vad som beskrivs i rapporten är den industriella designmetodik, från både teoretisk och praktisk synvinkel, som används för att uppnå den ultimata designen. Den innehåller en teoretisk bakgrund, designprocessen och efterföljande resultat och slutsatser.

Det huvudsakliga målet med detta projektet är att utforma en mångsidig, ergonomisk och innovativ säng för barn, Anpassad till varje skede av deras tillväxt; begreppet hållbar design.

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1 Introduction

1.1 Background

The project is made in collaboration with the company IO Kids Design. This collaboration began in the Stockholm Furniture and Light Fair.

IO Kids Design is a British design company based in London. They create contemporary, innovative and high-quality design.

Their products are designed with the idea of multi-functionality; to ensure a long lasting of the furniture, reducing the need to replace it. They believe in functional, adaptable, well-engineered and, above all, fun furniture that can grow with a child.

Regarding the environment, they make their products in Europe in the most sustainable way possible. The products are tested by FIRA (Furniture Industry Research Association) and fulfil with all UK and European safety regulations. In the production stage, they combine traditional methods with modern technology, and with special attention to detail and precision.

1.2 Objectives

The life cycle of children products is very limited because of the fast growing of the children. Since children are born till they finally grow up, a lot of different furniture is needed in order to adapt it to his new height or weight.

The goal of this project is to design a versatile, ergonomic and innovative bed for children, adapted to every stage of their growth.

The objective is to design a product adapted to the children, since they are born till they finally grow up; the idea of sustainable design. The product should follow ergonomic rules and should be innovative for the rest of the product in the market. Also, the aesthetics lines of the company should be translated in the final product.

All the skills and knowledge acquired within the courses during the whole degree has to be shown in the project.

1.3 Delimitations

The company uses Scandinavian birch plywood in their designs because of its strength, warmth and durability. They also add a laminate layer for providing an extra protection. This makes the pieces longer lasting, what achieves the aim to create products that will be enjoyed for many years. Therefore, no material analysis will be done in the report. A production analysis won't be done either, as the company has their own processes.

Since the short time of the project, economic aspects and manufacturing processes won't be studied; however, it will be taken into account in the design.

1.4 Disposition

The **introduction** part resumes the main goals of the project and gives a general view of the report. It includes the stage of the problem, objectives, delimitations and the structure of the report.

The **theoretical background** includes the description of some concepts used in the report that will help the reader to understand them.

About the **method**, is the theoretical explanation of the design methods applied within the project.

In the **approach and implementation** part, all the steps made in the project are shown. This is the result of the followed method.

The **result** is the final outcome of the project shown by rendering and modelling. It is the consequence of all the steps made before and the solution to the problem.

To end, in the **conclusion and discussion** part, the project and the result are analysed. It reflects personal thoughts about the project and the company's and professor's feedback.

2 Theoretical Background

This chapter includes the theoretical definition of relevant concepts within design in order to introduce the reader to the project.

2.1 Design

Design is a creative activity whose aim is to establish the multiple qualities of objects, processes, services and systems throughout their life cycle. Design is a factor for innovation, introduction of technologies and the crucial nexus of cultural and economic exchange. (Fornies I., 2009, p.4)

It is a discipline that uses the creativity in an ordered way in order to achieve new ideas and product concepts. It is related to the processes of development and product planning and corporate strategy. (Manchado E., 2010, p.4)

2.2 Industrial Design and Product Development

Activities within product development field, generally intended for use by multiple users, based on research and analysis and structured and planned to ensure the achievement of predetermined goals. (Manchado E., 2010, p.1)

Set of activities carried out to cover the various stages of product development, from identifying a need, through the generation of ideas, its evolution, and its technical definition for production, the definition of a strategy of communication market, and the coordination and management tasks necessary for the success of all other. (Manchado E., 2010, p.2)

2.3 Design method

The method is the way to achieve an end or goal proposed in advance, so that does not happen by luck or chance but by a clear order in a set of rules.

The method is defined when theoretically raises a number of actions, processes, use of tools, etc. that are intended to achieve a number of previously established objectives, this approach is tested and validated empirically.

There are alternative methods applied to the design process and product development, but all are essentially based on three basic actions: Planning, Development and realization. This sequence is repeated both globally within the project and to resolve details. (Fornies I., 2009, p.10)



Figure 1. Basic structure of the design process

2.4 Creativity

Creativity is the capacity of generate ideas to solve problems.

Creativity means creative and flexible application of an objective and structured methodology.

One of the main creativity methods is 'brainstorming'. 'Brainstorming combines a relaxed, informal approach to problem solving with lateral thinking. It encourages people to come up with thoughts and ideas that can, at first, seem a bit crazy. Some of these ideas can be crafted into original, creative solutions to a problem, while others can spark even more ideas. This helps to get people unstuck by "jolting" them out of their normal ways of thinking.' (Michael Diehl and Wolfgang Strpebe)

2.5 Design specifications

The design specifications are an essential document for the correct development of the product. Every project should begin with a need, detected or generated, within an existing or a potential market. (Fornies I., 2009, p.15)

The specifications allow the design team to know what kind of product they are designing, for whom, what features are most appropriate, etc.

The specifications can be critical or desirables.

2.6 Design Thinking

Design Thinking is a methodology for generating innovative ideas that focuses in understanding and finding solutions to the real needs of the users.

The theory began its development at the University of Stanford in California (USA) from the 70s, and it was applied first as "Design Thinking" by the design consultancy IDEO, today's main precursor.

According to Tim Brown, current CEO of IDEO, Design Thinking 'is a discipline that uses the methods of sensitivity and designers to match the needs of people with what is technologically feasible and what a viable business strategy can convert in customer value as well as a great opportunity for the market'

2.7 Ergonomics

Ergonomics is a multidisciplinary study of human work aim to discover laws to formulate better development standards.

It includes the set of scientific knowledge relating to man and needed to develop machines and devices that can be used with maximum comfort, safety and efficacy. (Fornies I., 2009, p.4)

Ergonomics are not only the dimensions of the product and the way it is used by the user; ergonomics also concern factors as the amount of illumination required, the effect of colours, the presence of noises, the way it can be perceived and interpreted an interface, etc. It affects the texture definition, angles, surfaces, colours, sizes, dimensions, motion sequences, visibility elements, work environment, and how the product can affect other people.

Science that deals with the study of human body measurements with objectives anthropological, medical, sport or the design of systems with which man interacts. (Rebollar R., 2014, p.3)

2.8 Graphic design

Graphic design is the process of programming, projecting, coordinating, selection and organization of elements in order to produce visual objects destined to communicate specific messages for determinate groups. (Biedermann A., 2012, p.12)

Graphic design adds value to the messages that a product or a company wants to transmit.

Within graphic design; naming is the technique of design a name for a product or process making it conceivable, communicable, recognizable, identifiable and memorisable. (Biedermann A., 2012, p.78)

2.9 Sustainable design

‘Sustainable design (also called environmental design) is the philosophy of designing physical objects, the built environment, and services to comply with the principles of social, economic, and ecological sustainability.’ (McLennan, J. F., 2004)

Some of the sustainable design principles are:

- Low-impact materials (non-toxic, sustainably produced or recycled materials which require little energy to process)
- Energy efficiency in the product and its processes
- Emotionally durable design
- Design for reuse and recycling

Environmental design involves introducing environmental criteria in the design of a product, trying to minimize the key environmental impacts along the entire product life cycle.

An eco-friendly product is a product which development has been taken into account the complete sequence of its life cycle and its implications and the various parameters related to it in terms of sustainable development, economic, social aspects and, of course, environmental, adopting each time the more relevant decisions. (Manchado E., 2013, p.7)

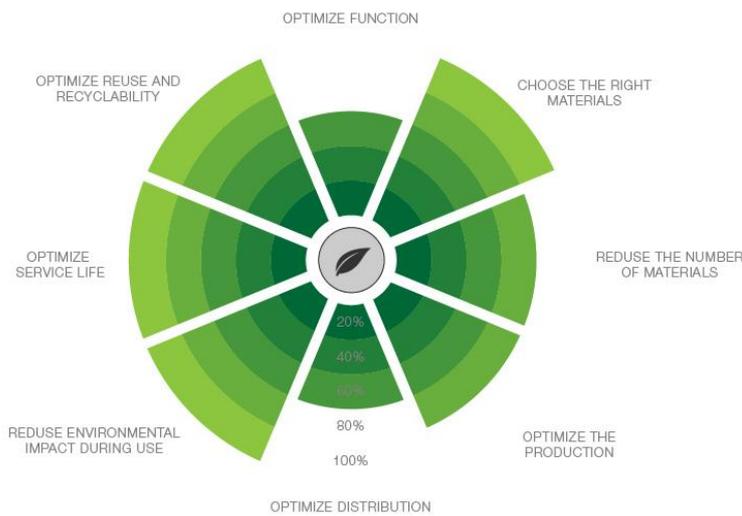


Figure 2. Eco Design Strategy (Green Furniture Concept)

3 Method

The method followed in the project is the method 'Design Thinking'. This methodology is defined and explained in the 'Theoretical Background' part (page 9)

Design Thinking process consists of five stages: empathize, define, ideate, prototype and test. The process is not linear; you can go backward or forward or even jump stages if you consider.

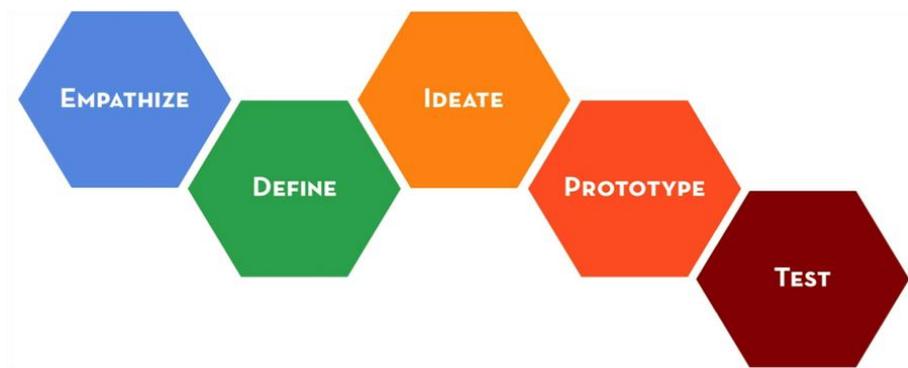


Figure 3. Design Thinking (Stanford University Institute of Design)

3.1 Empathize

Empathize is the understanding of the experience of the users involved in the solution we are developing, and their environment.

By empathizing, the observation and interaction with the user's experiences are studied.

3.1.1 Research

The research is the study of all the context of the topic we are designing for. The main task is to get information for the following analyse.

The research is useful for finding new opportunities that can be covered with a new design.

3.1.1.1 Market analysis

The market is studied in order to know how this problem is already solved and what needs are not covered.

The market research is very important in order to know what is already designed and to design a product that satisfy the needs in a better way than the rest of the products that are already in the market.

The market analysis includes a research of the products and the concepts that are related with the project, and their segmentation.

3.1.1.2 User analysis

The user is the group of people that are related, in any way, with the product. Their demands and needs define the main characteristics that the product should have.

In the user analysis is studied all the stakeholders about the product and their needs. According to Cambridge University, the stakeholder is “any group or individual who can affect or is affected by the achievement of the firm’s objectives.”

3.1.1.3 Ergonomic analysis

Ergonomics and design are much related. Both aims are to create a satisfied relation between the product and the user, by the detailed analysis of the situation and all the aspects related with it.

It defines the anthropometrics measures of the target group of the project and the ergonomic aspects that we have to take into account in the design of the product.

3.1.2 Mood board

Mood board is a visual tool that involves the selection of images, photographs, materials, etc., which can express concepts related to the possible solution and are difficult to express in words. They can help the most accurate perception of environments, styles, values, etc.

3.2 Define

The define stage is the process and synthesize of the results of the previous stage in order to identify the aspects that are interesting and can help to reach new interesting perspectives.

The goal of the Define stage is to create a meaningful and actionable problem statement and to identify those needs whose solutions will be the key to obtain an innovative result.

3.2.1 Statement of the problem and objective

Description of the problem founded and the goals that are wanted to achieve with the project.

3.2.2 Problems and needs

After the analysis of the information gathered in the empathize chapter we can easily find out what the user needs, what is already solved and what is needed to be designed.

3.2.3 Design specifications

The design specifications define the requirements that the design should cover and the important aspects that the product should have.

3.3 Ideate

The ideate stage is the exploration of a wide variety of possible solutions about a problem. The ideation step is the transition from identifying problems to the creation of the solutions for the users we are designing for.

3.3.1 Ideation

The ideation includes the generation of different and endless solutions and ideas. It includes also the analysis and development of the ideas into more specific concepts.

The ideation is the combination of the rational thoughts with the imagination with the result of innovative solutions for a problem founded.

3.3.1.1 Mind map

Mind map is a tool that helps the development of a thought and its possible connections with others. A main subject is placed in the centre of the map, and different concepts will emerge from it.

3.3.1.2 Brainstorming

Brainstorming is a creative technique that drives to a large amount of different ideas concerning one topic.

‘Brainstorming combines a relaxed, informal approach to problem solving with lateral thinking. It encourages people to come up with thoughts and ideas that can, at first, seem a bit crazy. Some of these ideas can be crafted into original, creative solutions to a problem, while others can spark even more ideas. This helps to get people unstuck by "jolting" them out of their normal ways of thinking.’ (Generating Many Radical, Creative Ideas; James Manktelow & Amy Carlson)

3.3.1.3 Morphologic analysis

The morphologic analysis is a creative technique that consists on decomposes a concept or problem in its essential elements and basic structures.

The goal of this technique is to find the best solution to achieve a determined problem.

3.3.1.4 Sketching

Sketching is a technique used to translate an idea or various ideas into rough or unfinished drawings.

It includes different styles and manners, and also different tools (markers, digital, colour pencils...)

3.3.2 Conceptualization

With the different ideas it's possible to create concepts with different solutions.

In this stage the ideas and concepts are reflected through sketches and renderings.

3.3.2.1 Rendering

Rendering is the translation of an idea or concept into a three-dimensional representation by a computer 3D program.

This technique allows the designer to have a more realistic view of the concept, referring to size, colours, materials and even details.

3.4 Prototype

The prototype stage is the transformation of the ideas into physical form in order to experience and interact with them.

By making the ideas in a physical way it's easier to gain empathy and see what it's needed to improve or refine, what works and what doesn't work.

Prototypes are an important step in the development of a concept, since the designer can test how the solution will work.

3.5 Test

Test is to try out high-resolution prototypes with users involved in the solution we are developing.

By testing, you learn more about the user and refine your original point of view.

With the testing step is possible to find new problems, make changes and test new solutions before the final design.

4 Approach and Implementation

4.1 Empathize

In the empathize stage I do a research about what it is important to know for the development of the product and what will help to achieve the best solution. Also mood boards with inspiration about colours, materials, aesthetics, shapes and manners that inspire the design of the product.

The information in this step is collected in order to know how the product should be designed regarding shapes, colours, dimensions and functionally.

4.1.1 Research

4.1.1.1 Market analysis

The market analysis collects information about the products in the market that are related with the product that it is been designed and also about the products of the same typology (sustainable cribs).

With the reseach of the market I get information about what kind of products exist in the market, how are they design, how they solve the problems and what needs are not covered by them. With this study, the main features that the product should have are exposed as well.

INFORMATION ABOUT CHILDREN ROOMS:

We can tell two types of rooms: colourful rooms and neutral coloured rooms. What they have in common is the use of white or grey for the main parts of the product, and colourful or wood colours for the rest of elements. There are also colourful products, but usually the colour is given from accessories or other products in the room, maintaining a neutral coloured product.



Figure 4. Collection of images about children rooms

INFORMATION ABOUT CRIBS:

Regarding actual cribs, the main features are: easy assembly and neutral colours. But few of them are designed for more than 2 or 3 years of use.



Figure 5. Collection of images about cribs

INFORMATION ABOUT CHILDREN BEDS:

Most of the actual children beds are designed in a minimalistic style and neutral colours. The problem is the same than in the cribs, all of them are designed for a few years of use.



Figure 6. Collection of images about children beds

INFORMATION ABOUT ADAPTABLE CRIBS:

The phenomenon of sustainable cribs is increasing regarding the concerning of sustainable design nowadays. And, although the products are designed for a higher lasting, most of them just offer a few more years of use.



Figure 7. Collection of images about adaptable cribs

4.1.1.2 User analysis

In this project there are two main group targets: the user and the customer. The user includes babies, children and teenagers between 0 and 18 years old. The customer includes the parents or adults in charge of the user.

The most important one is the user, because is the one that is going to be in touch with the product; however, the customer also have an important role in the experience with the product because they are the ones that choose and buy the product.

ABOUT THE USER:

Children of 0 – 2 years old: CRIB

– WHAT DO THEY DO?

Sleep, Play

– WHAT DO THEY NEED?

Comfortable and secure space to rest

Bars/surface to prevent for falling down or going out of the crib

When the baby can't stand up the bed needs to be higher in order to be easy to take the baby

When the baby can stand up the bed needs to be lower in order to not make easy for the baby to go out of the crib

Children of 2 – 5 years old: TODDLER BED

– WHAT DO THEY DO?

Sleep, Play, Read

– WHAT DO THEY NEED?

Bars/surface that prevent to fall down while sleeping, but that allows to go out of the bed without problem

Comfortable space to rest

Suitable place to do other activities

Children of 5 – 18 years old: NORMAL SIZE BED

– WHAT DO THEY DO?

Sleep, Play, Read, Study

– WHAT DO THEY NEED?

Comfortable and relaxed space to rest

Suitable place to do other activities

ABOUT THE CUSTOMER:

The main features that the customer wants in the product are:

- Safety
- Aesthetics
- Sustainable
- Easy assembly

4.1.1.3 Ergonomic analysis

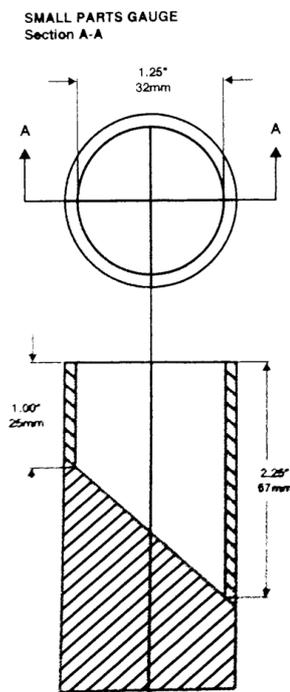
In the ergonomic analysis are taken into account different aspects. The first, and most important, is the anthropometrics; because these measures will lead the size and design of the product. And then the security is studied because, when designing for children, security is especially important.

Regarding the **anthropometrics**; measures of the body from children aged 0 to 18 are studied from the book '*The measure of man and woman*' from Henry Dreyfuss Associates. With this, the measures of the total height and total weight are studied in order to adapt the interior of the crib and bed to that measures and design a suitable product.

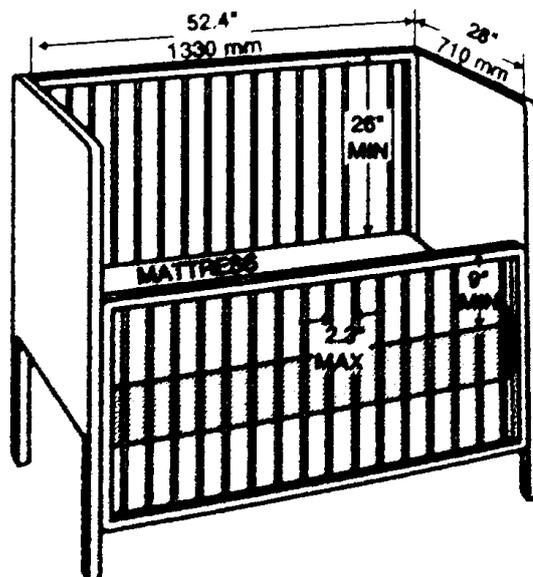
Regarding **security**; the norm 'UNE EN 716, Cunas y cunas plegables para niños', these are the specifications to follow when designing crib and foldable cribs for children:

- Size: The Cradle must be at least 20 cm greater in length than the height of the baby, while for the width is 60cm space required.
- Bars: The distance between them should be between 4.5 cm and 6.6 cm and its structure should note that the baby can't find points of support to help you climb.
- Height: according to this standard internal height of the crib mattress from the base to the end of the bars should be 60 cm or more.
- Springing: The blade gap can't exceed 6 cm while the distance between it and the frame can't be more than 2.5 cm. on both sides.
- Decorations: Avoid stickers to decorate the crib, as your baby could suck and is not recommended considering that you know nothing of their origin.
- Mattress: You must fit the space perfectly with a maximum hole in the side of 2cm per side. Moreover, the mattress should be at least 10 cm thick.
- Wheels: If your crib has wheels must ensure that at least two are lockable.

And regarding the book 'The measure of man and woman' by Henry Dreyfuss, these are the specifications when designing objects for children:

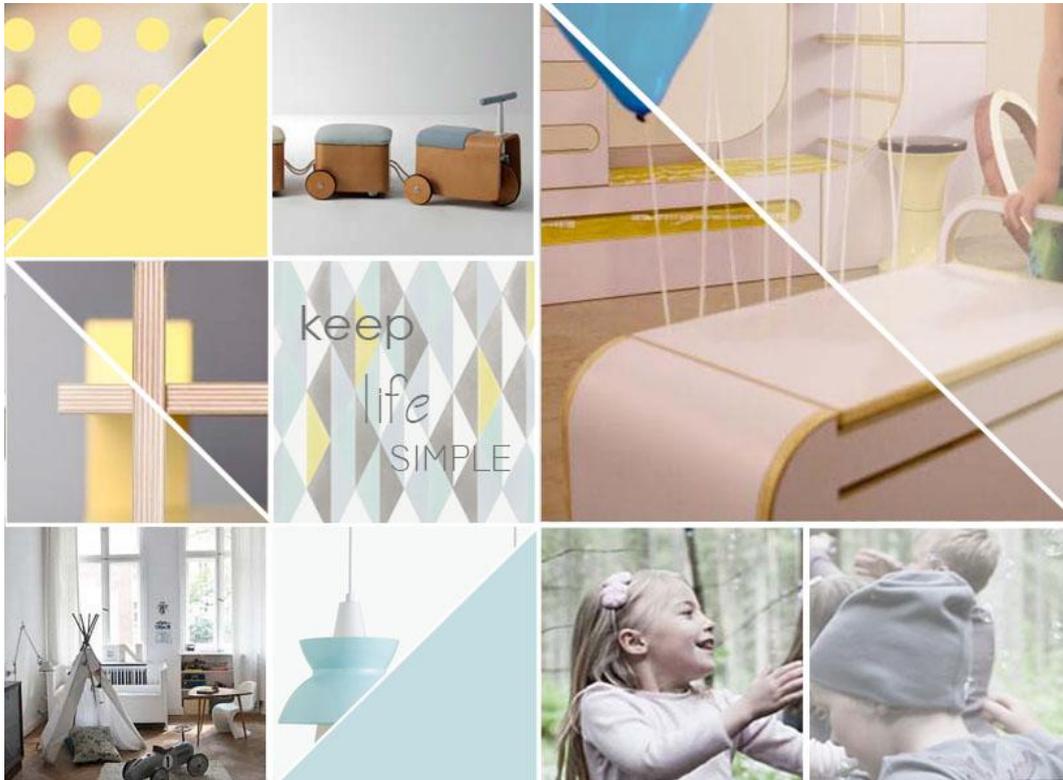


**RECOMMENDED FULL SIZE
CRIB DIMENSIONS**



4.1.2 Mood boards

The first mood board I include the aesthetics, colours, textures, materials, target group and design that inspire the product.



The second mood board I include the products, values and design of the company.



4.2 Define

4.2.1 Statement of the problem and objective

The life cycle of children products is very limited because of their fast growing. Since children are born till they finally grow up, a lot of different furniture is needed in order to adapt it to his new height or weight. This is a problem, not only for the economy of the family, but also for the huge amount of different furniture produced.

The objective of this project is to design a bed that can be adapted since a kid is born until he become an adult; the idea of sustainable design. The product should be innovative over the rest of the products in the market. Its design should be thought to be ergonomic and functional; and the aesthetics should follow the manners of the company.

4.2.2 Problems and needs

- Similar shapes and aesthetics in cribs and beds in the market | Need of innovation and differentiation
- Low lasting products and very few products that can be reused | Need of products that can be used for a long time
- A lot of pieces and tools needed to assemble the products | Need of easier assembly methods and tools

4.2.3 Design specifications

- The bed must be a comfortable place to sleep and rest for the user
- The product should be secure for the user and under regulations
- The bed should support an adult weight when it use as a bed
- The bed must be adapted to the height and weight of the children since they are born till they finally grow up (0–18)
- The design should be attractive for the user in all the stages, and also for the customer
- The bed must follow ergonomic rules and adapt to anthropometric measures
- The bed should be innovative from the rest of products in the market
- The design and values of the company must be translated in the design
- The aesthetic should follow the Scandinavian design values

- The product should be easy to assembly and with simple design
- Storage should be taken into account in the design, providing it or making it easy to do it
- The product should be able to be produced in wood and in series
- The product has to be designed thinking about a convenient transportation
- The product should be designed with the idea of sustainable design

4.3 Ideate

4.3.1 Ideation

In the ideation process the techniques brainstorming and mind map are combined in order to find ideas and innovate thoughts about the idea of a bed.

The result is a mind map that links not only thoughts related with the idea of a bed, but also other concepts that could have relation and could inspire the design.

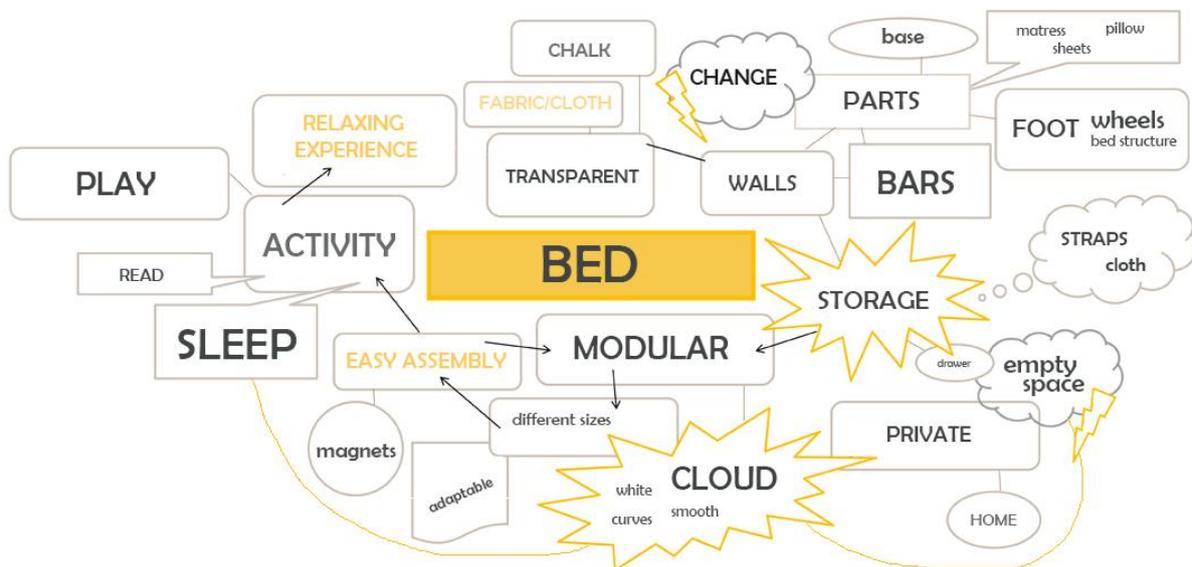
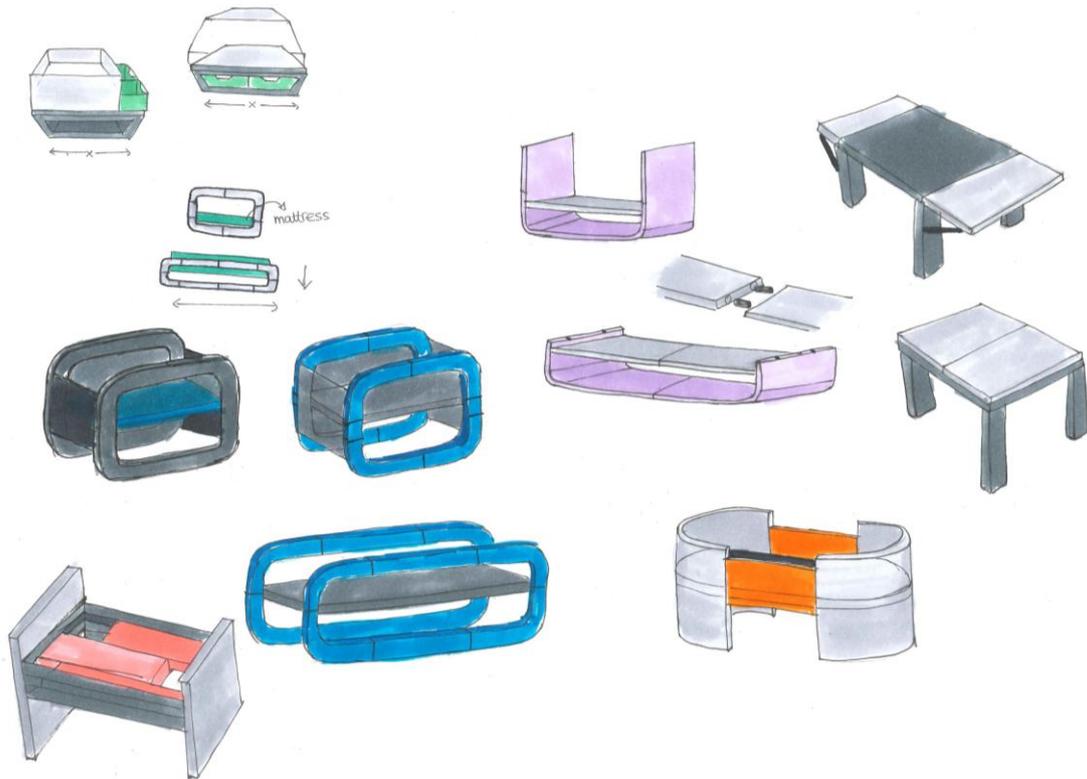


Figure 8. Design brainstorming



4.3.2 Conceptualization

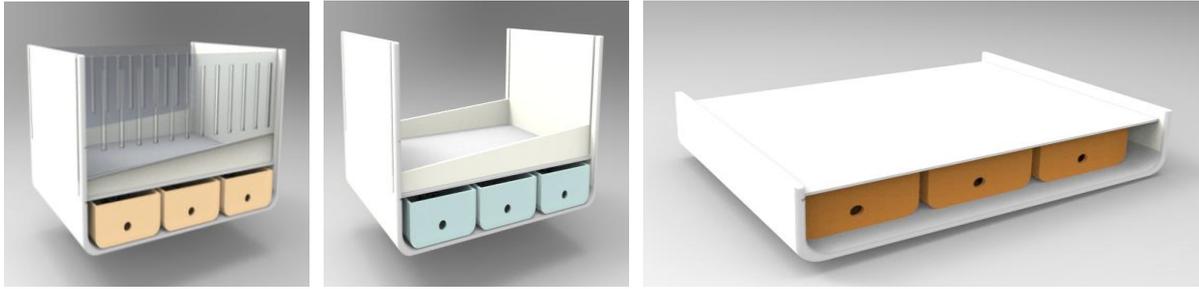
– First concept –

The first concept consists of a design of a crib that, by adding pieces, can be changed from a crib to a normal size bed.

The concept is based on the idea of easy assembly and flat packaging.

The storage is incorporated in the design by modular pieces.



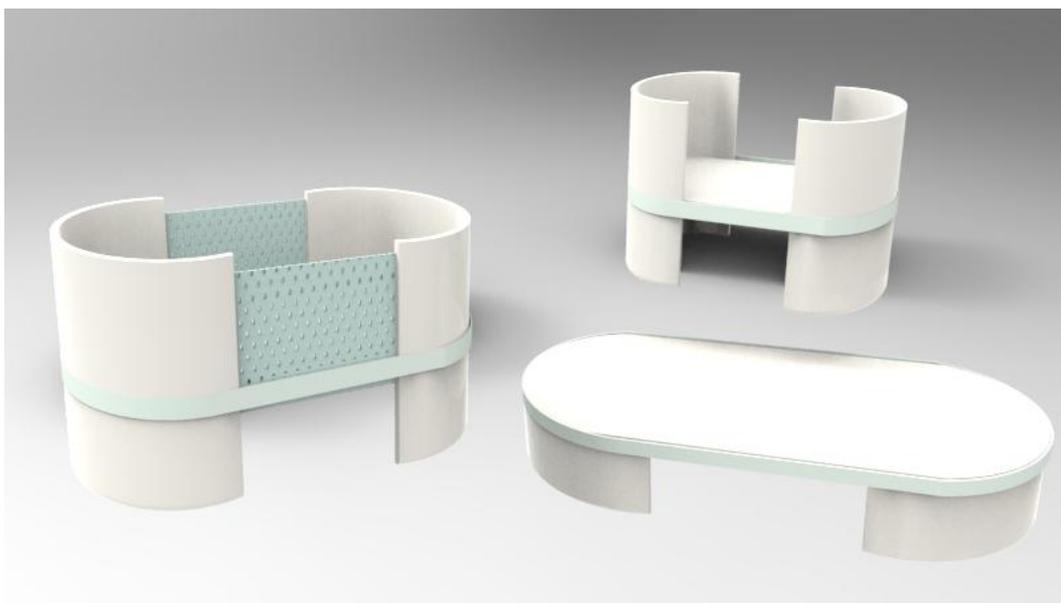


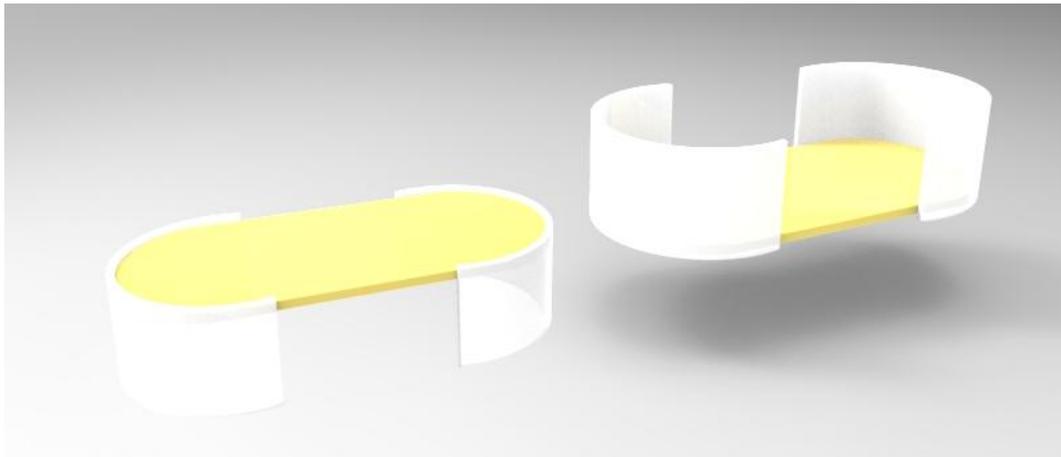
– Second concept –

The second concept consists of the design of a crib that can be turned into a bed by adding and changing pieces.

The concept is based on the idea of innovative shape and aesthetics and easy assembly.

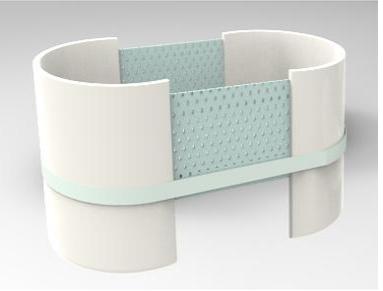
The shape makes easy the storage task.





4.3.3 Concept election

For the election of the most suitable concept I take into account the most relevant characteristics that I pursue for the design of the product.

	 CONCEPT I	 CONCEPT II
SUSTAINABILITY	3 	 3
INNOVATION	1	 3
EASY ASSEMBLY	2 	 2
VERSATILITY	2	 3
AESTHETICS	2	 3
ERGONOMICS	3 	 3

The most suitable solution for the design is the concept number two since it is more innovative, more versatile and with better aesthetics.

4.3.4 Concept development

For the development of the concept different issues have to be taken into account. In order to achieve the best solution for the design, different problems concerning the design of the product are exposed with different possible solutions. For exploring the highest amount of solutions, the brainstorming technique is used again.

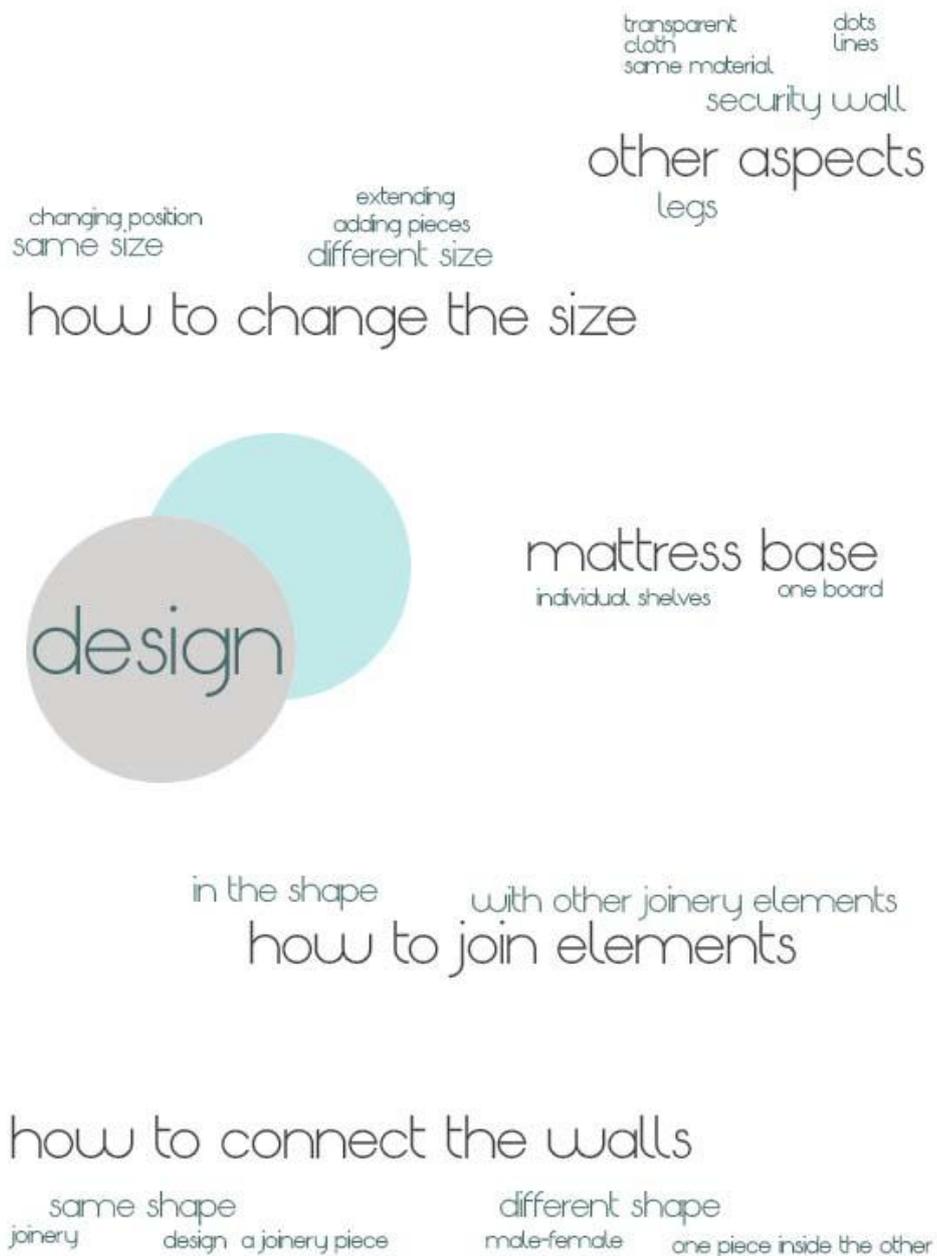
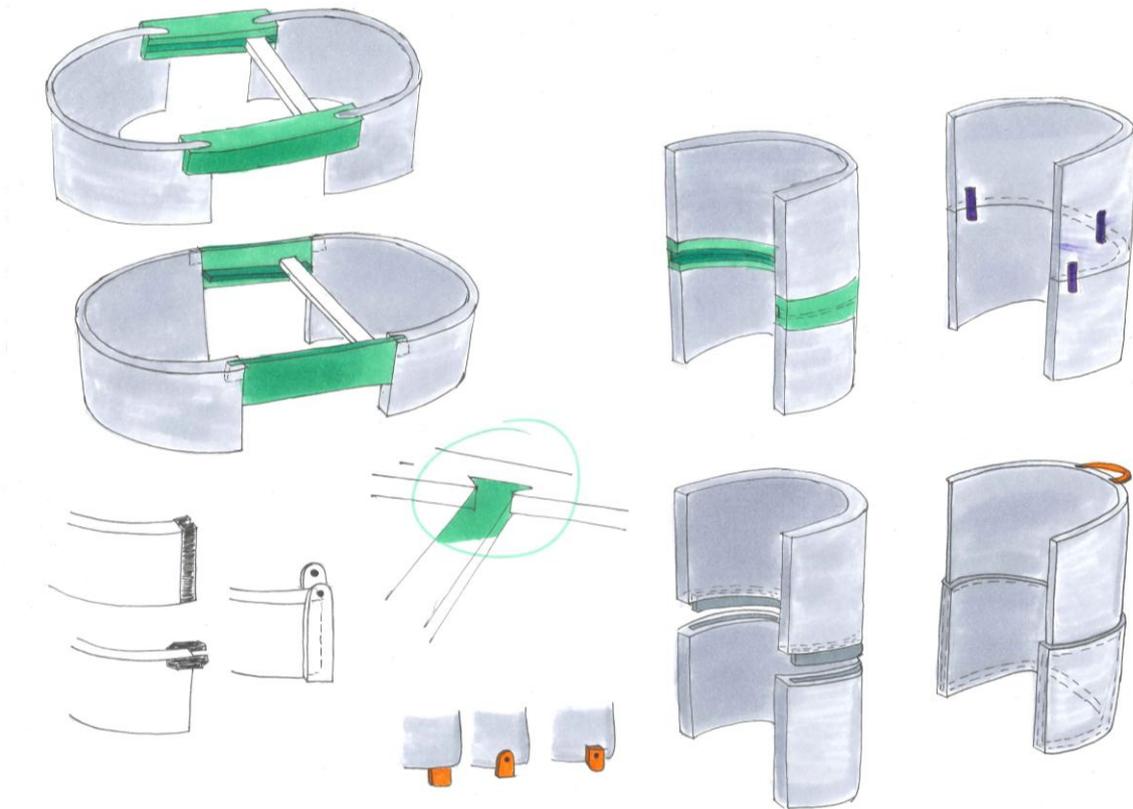


Figure 9. Development brainstorming



Regarding the graphic design part, a name for the product is designed. The name will be designed as a logo with the more convenient style.

For creation of the name of the product I use the brainstorming technique; with concepts related with the product and what it transmit, such as things, colours, shapes,... Also different colours and typographies are studied.



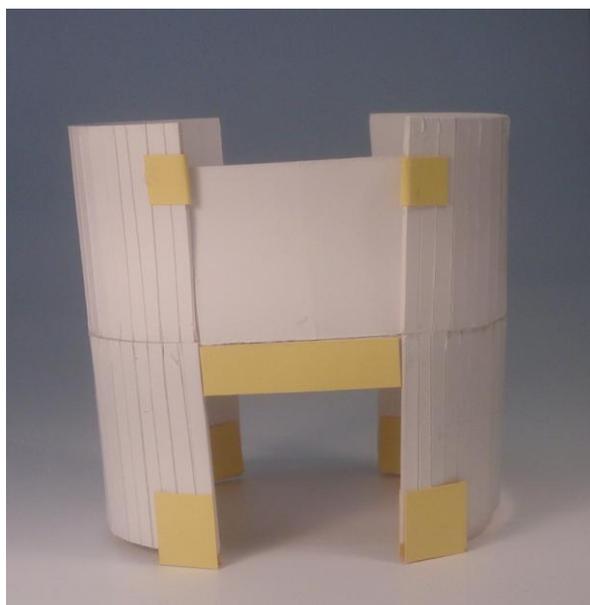
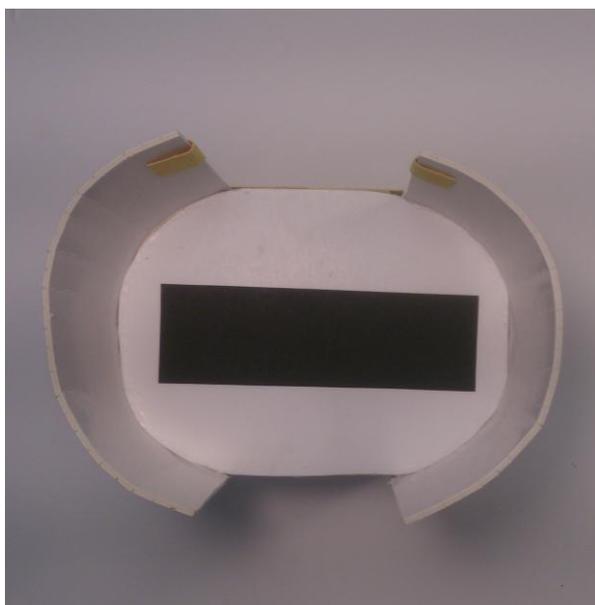
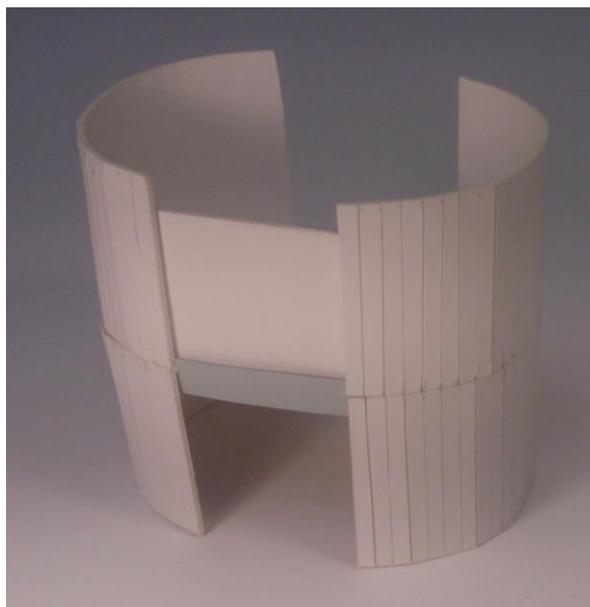
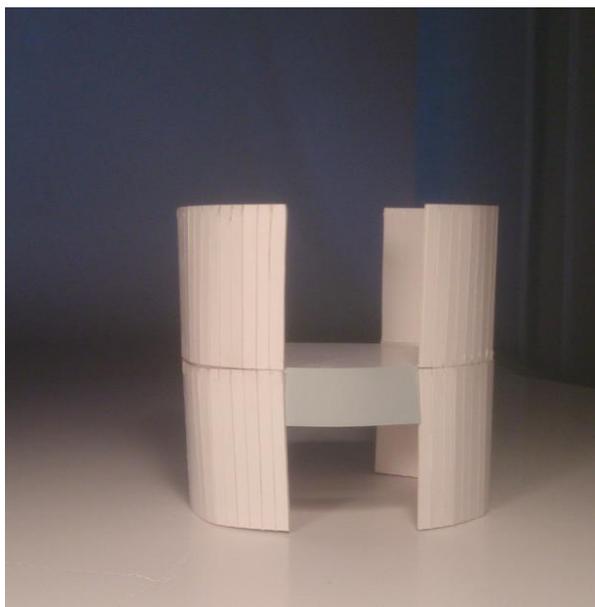
Figure 10. Graphic design brainstorming

4.4 Prototype

In the prototype stage different forms and aesthetics of the concept are tested.

The first mock-up is the size of a half circle. Different types of unions are tested and also the adding of legs.

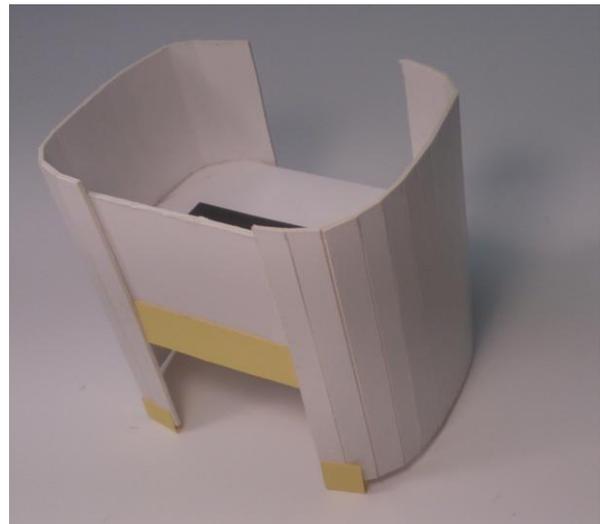
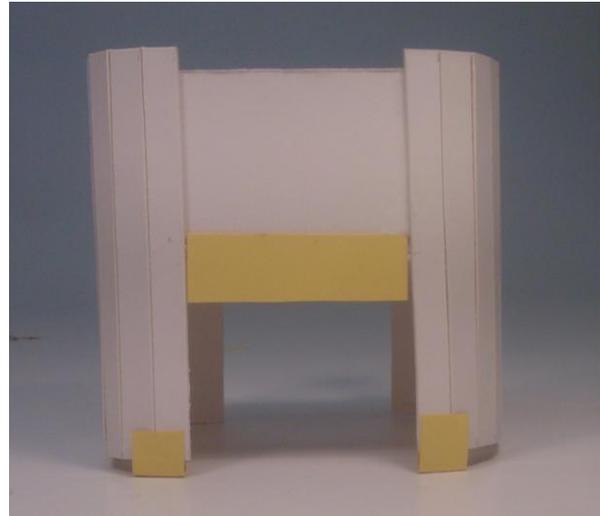
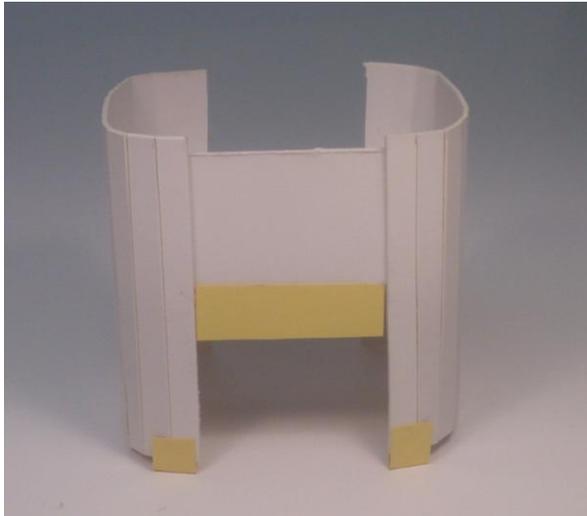
The size of a 5 year-old child (maximum height for toddler beds) is tested, proving that the size is also convenient.



In the second mock-up is the size of a rounded rectangle. In this one less accessories are added.

Also the size of a 5 year-old child is tested and proved.

This form suits better the company's design. Also with less accessories makes the product more clean, as the 'keep life simple' principle.



4.5 Test

This step is not possible to implement within the project due to the nature of the assignment. However, it is a step that can be made if the company decides to invest in the product.

5 Result

5.1 Description of the product

The product consists of the design of a crib that, by changing and adding elements, can be adapted to every step of the growth of children, since they are born till they finally grow up. This concept makes the product a sustainable design, allowing adapting the product to the user and avoiding the fact of buying a lot of products for the same function.

The product has 3 'modes': the crib mode, the toddler bed mode and the normal size bed mode. The crib mode is for a baby between 0 and 2 years old, the toddler bed is for a child between 2 and 5 years old, and the normal size bed is for a child between 5 and 18 years old. The ages are relative, since there are children that grow with different timing than the rest. Also the bed is define for a child since they are born till they grow up (teenager), but the measures are like a normal size bed, so the bed could be use for any age from 5 years old.

The materials and aesthetics follow the Scandinavian design style. The combination of white and the natural wood colour create a peaceful space that allows the children to grow in harmony. This, with the transparent walls, reduces the sensation of tightness.

The aesthetics match the style of the company: simple, innovative and contemporary design.

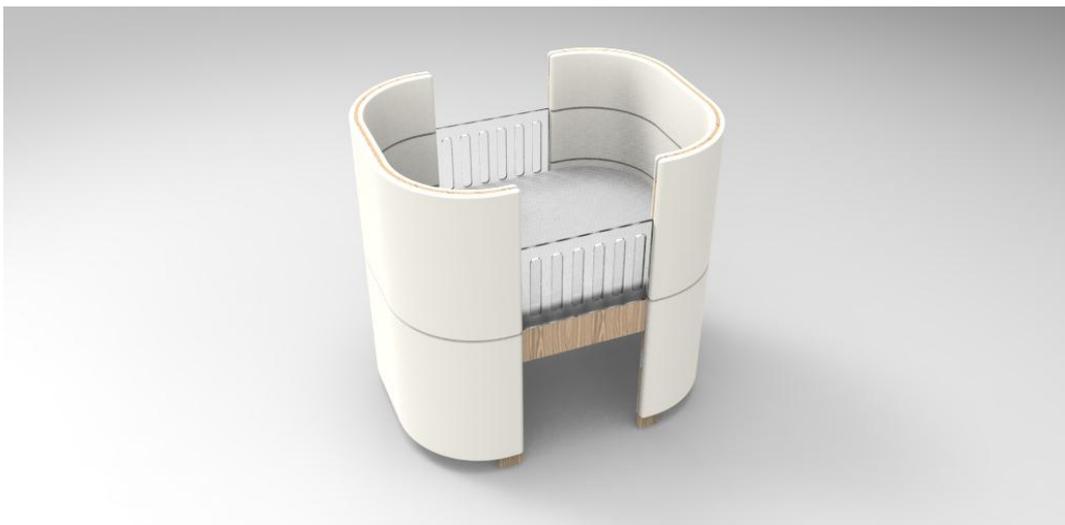
Regarding ergonomics aspects; all the measures are settled regarding anthropometric studies, the shape makes the product not only innovative but also secure when is a toddler bed without the need of a security element, and the transparent element have two sizes in order to adapt it to the size of the baby and the parents needs.

5.2 Visualization of the product

5.2.1 Rendering



CRIB MODE



TODDLER MODE

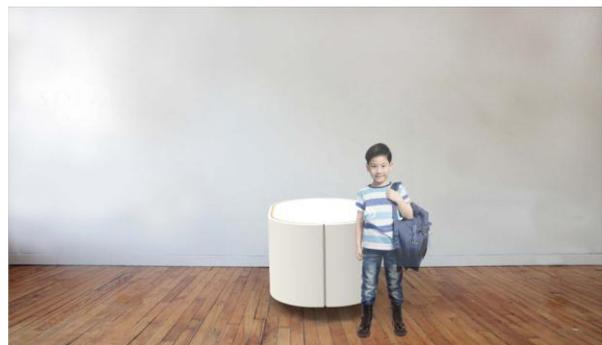
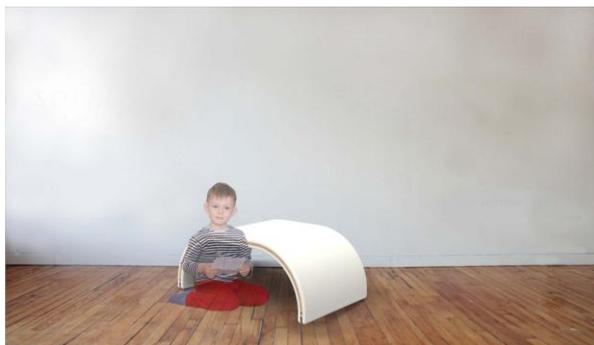


NORMAL BED MODE

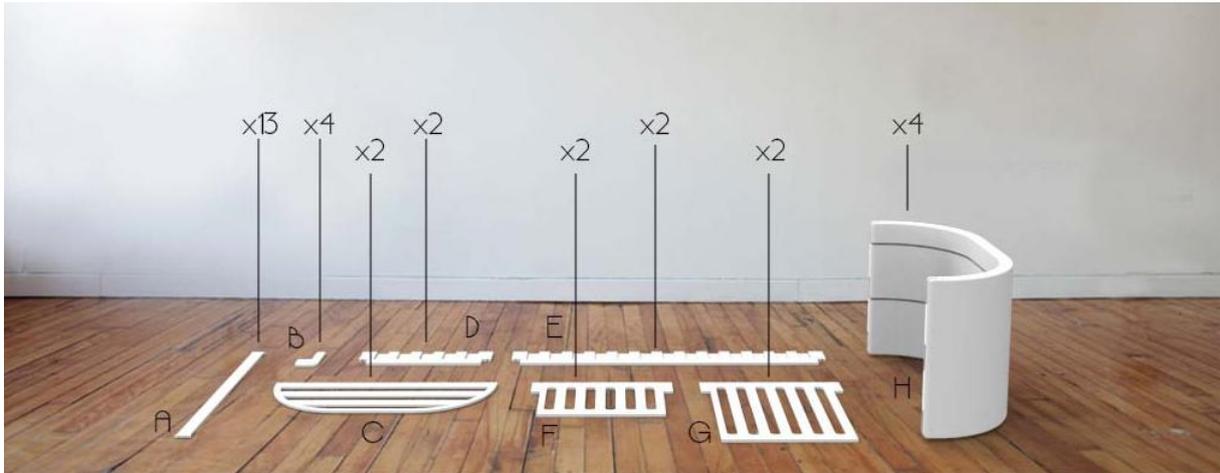




SECONDARY USE: TABLE



5.2.2 Elements



The description of the elements needed for every mode is:

CRIB: Ax5 – Bx4 – Cx2 – Dx2 – F/Gx2 – Hx4

TODDLER: Ax5 – Bx4 – Cx2 – Dx2 – Hx2

NORMAL SIZE: Ax13 – Bx4 – Cx2 – Ex2 – Hx2

5.2.3 Material - Colour range

In order to adapt the product to more users, the product can be offered in more colours and materials.

The main colours are white with the union elements and the feet in the natural birch plywood colour. Other option would be changing the natural colour of the wood for colourful colours.

The main materials are birch plywood with the safety elements in transparent PMMA. Other option would be all the elements made with birch plywood.



5.3 Technical aspects

5.3.1 General dimensions

– Measures that influence the design:

Crib size: 60 x 120 cm

Minimum height required for the crib: 60 cm / 20 cm more than baby's height

Minimum width required for the crib: 60 cm

Minimum distance between crib bars: 4 – 6 cm

Normal size bed: 90 x 200 cm

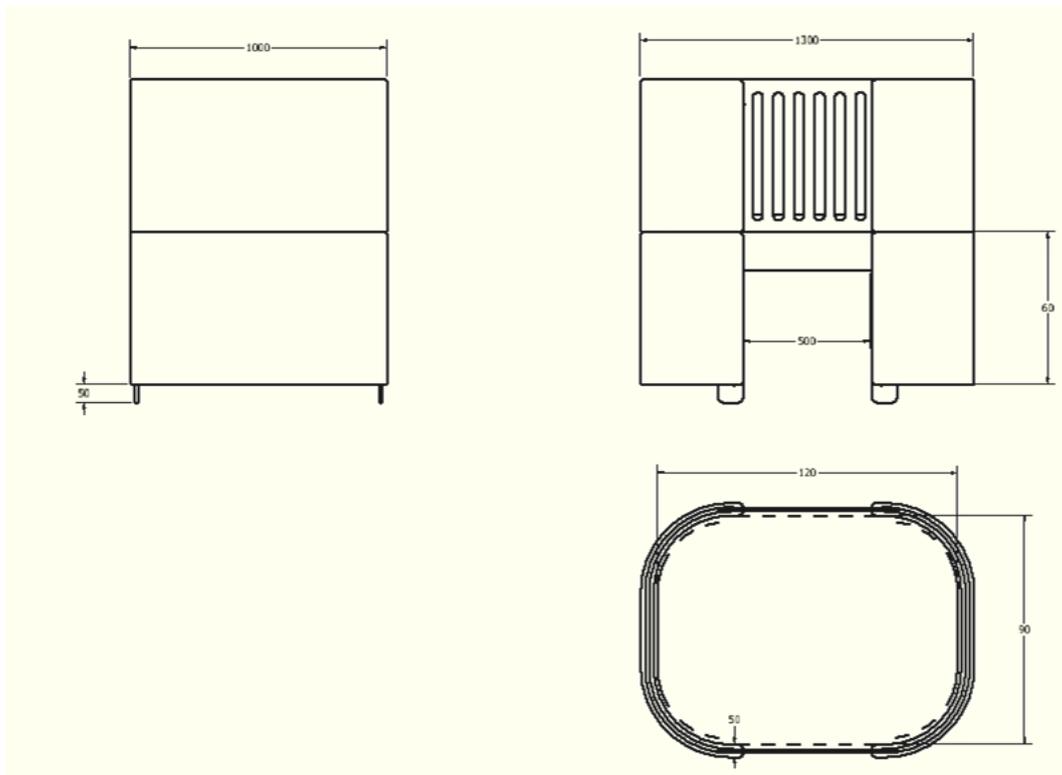
Convenient distance between the floor and the top of the bed: 30 cm for the toddler bed and 60 cm for the normal size bed

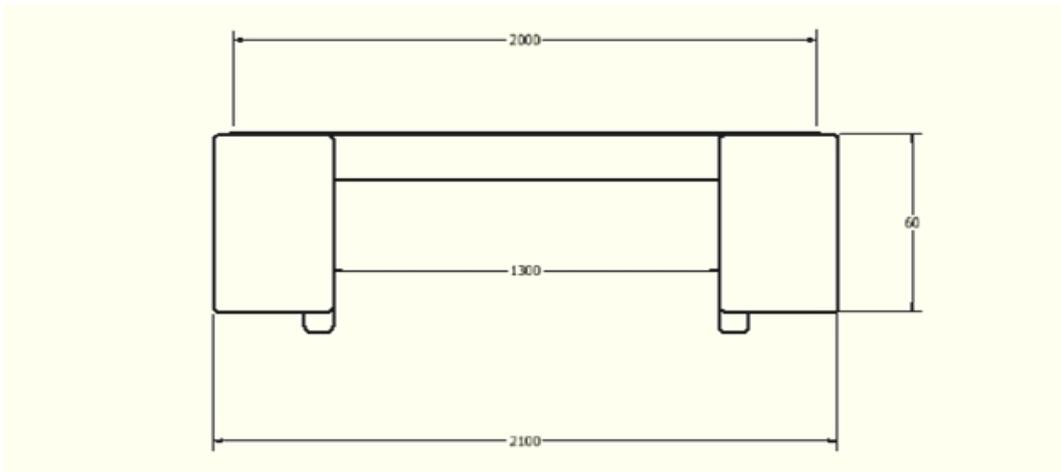
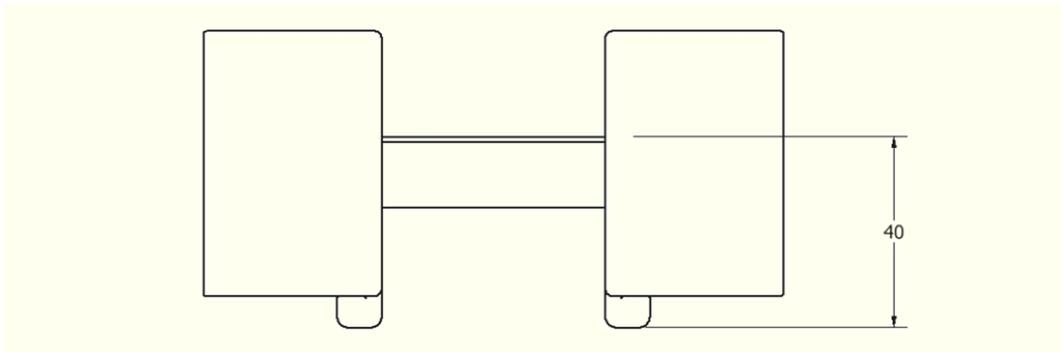
– Final dimensions:

GENERAL WIDTH: 900 mm

HEIGHT: 1250 mm (crib) – 650 mm (toddler and normal size bed)

LENGTH: 1300 (crib and toddler bed) – 2100 mm (normal size bed)





5.3.2 Material

The company uses Scandinavian birch plywood with a laminate layer in their designs.

The main properties of this material are strength, warmth and durability. These properties, together with the extra protection of the laminate layer, make the product longer lasting, achieving to create products that will be used for many years. All the pieces of the design will be produced with this material, except for the transparent piece with the bars; that will be produced in the thermoplastic material PMMA.

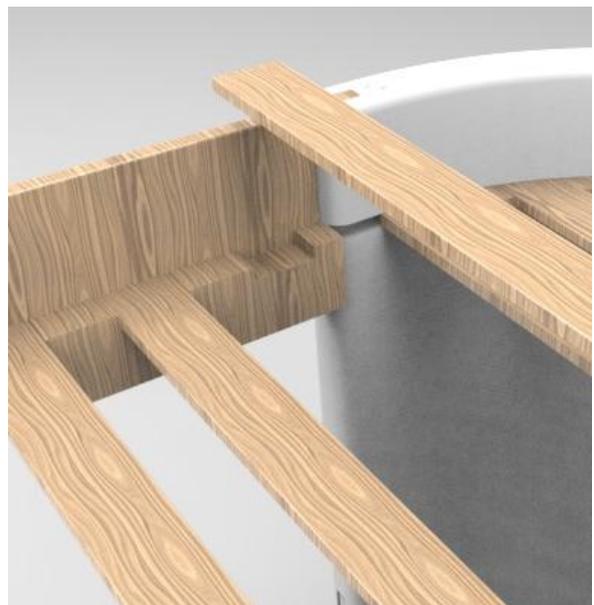


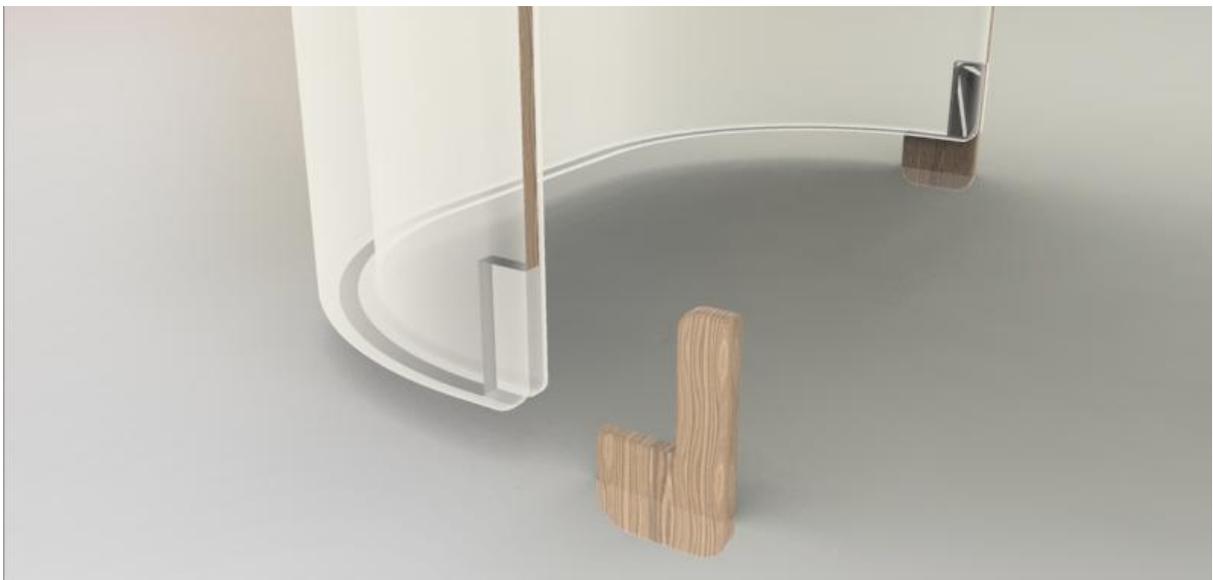
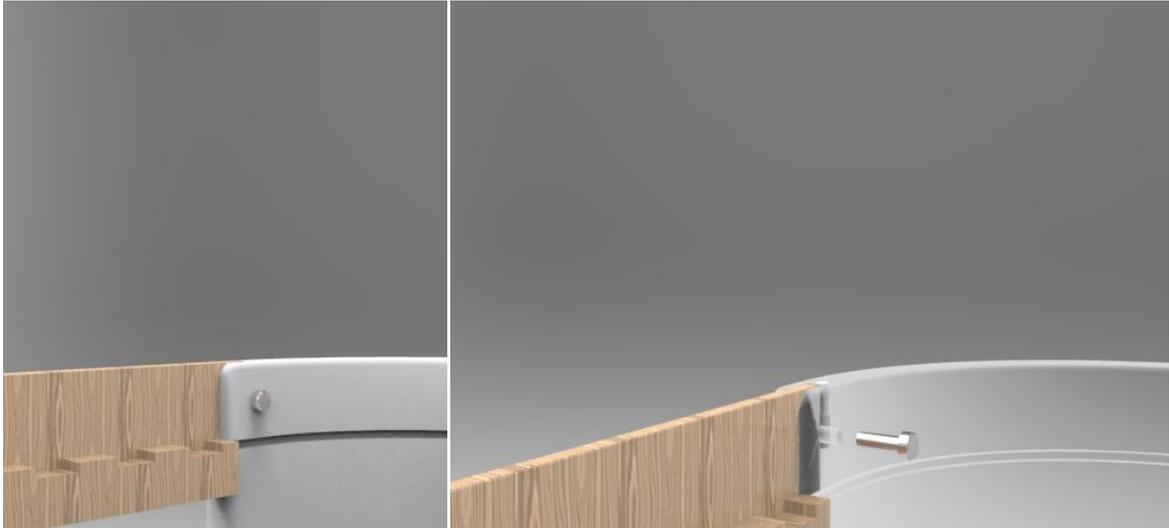
Figure 11. Birch plywood



Figure 12. PMMA

5.3.3 Assembly of the product





5.4 Graphic design

The name chosen is 'nube', cloud in Spanish. I select this name because cloud is a concept that is much related with the product, since clouds are white, with round and smooth shapes and they remind of sleeping and dreaming. Also, this name follows the characteristics of good naming: brevity, simplicity, ease of reading, memorization, euphony, association and evocation, originality and distinction.

The colour selected is blue because is very related with children and nursery products. Regarding the physiological aspects, blue means trust, tranquillity and security, It reduces stress, creating a sense of calmness and relaxation. These aspects match what the product should transmit.

The typography applied is 'origin', because it is simple and peaceful, but with a childish style.



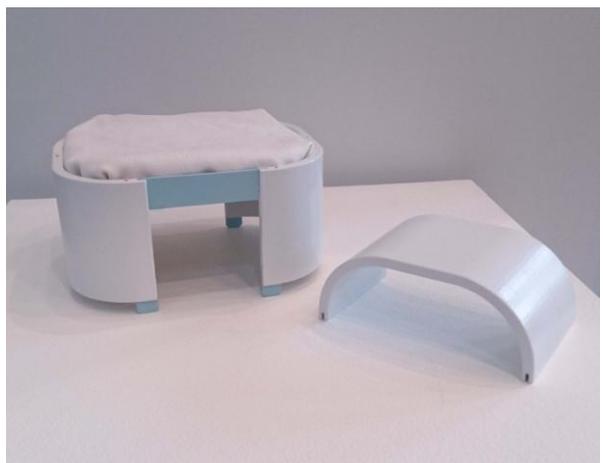
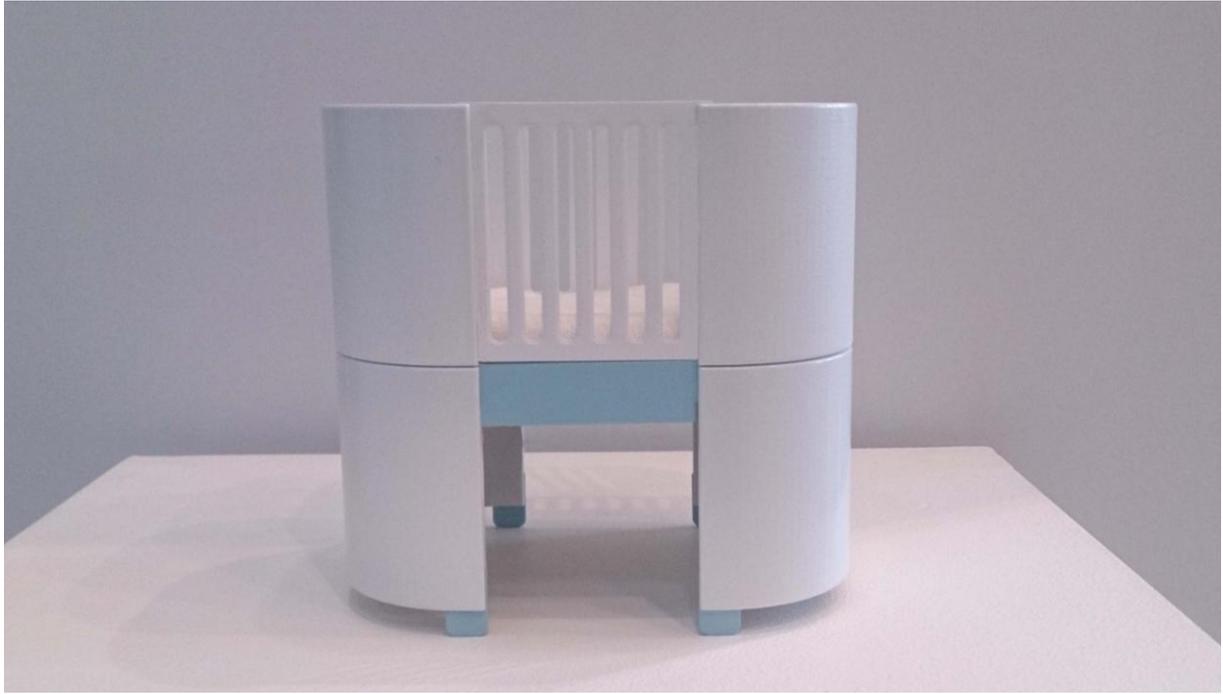
Figure12. Final logo

5.5 Model of the product

The model of the product has been built with plastic in a 1/8 scale. It represents just the crib mode; since the shapes, details and assembly are the same in all the modes.

The shape has been printed with the 3D printer and then it has been painted and assembled.

It has been painted in white and blue to show the different materials and colours that can be applied to the product; since in the poster is shown in wood and transparent plastic.



6 Conclusion and discussion

Regarding the design methodology; I have learnt that, although all the methods have the same base, there are a lot of different ways to apply them and a great range of different processes. Depending on the character and goals of the project, various paths can be followed. However, every designer has their own methodology and manners in the design process.

The method of the project has been based in the Design Thinking method and in the processes learnt in the four years of education.

With this project I have developed my design skills in areas such as sketching, designing solutions and making decisions. Apart from that, I have learnt how to deal with a big project individually, since most of the projects I have made have been group projects.

The goal of the project was to design a versatile, ergonomic and innovative bed for children, adapted to every stage of their growth. The idea of sustainable design was the base of the product. As a conclusion I would say that, although it was a challenging project, I achieve to fulfill the objectives and come up with a promising product.

About the product, every detail has been thought; however, some parts of the product could be reconsidered, taking into account the manufacturing processes and the mechanical properties. If the product is going to be produced, a real scale and a functional model for the real users are needed, in order to see how it works and if there are solutions that must be reconsidered.

To finish, I want to highlight the fact of collaborating with a real company, giving more severity to the project. With this experience I have learnt how to work with real problems and real solutions.

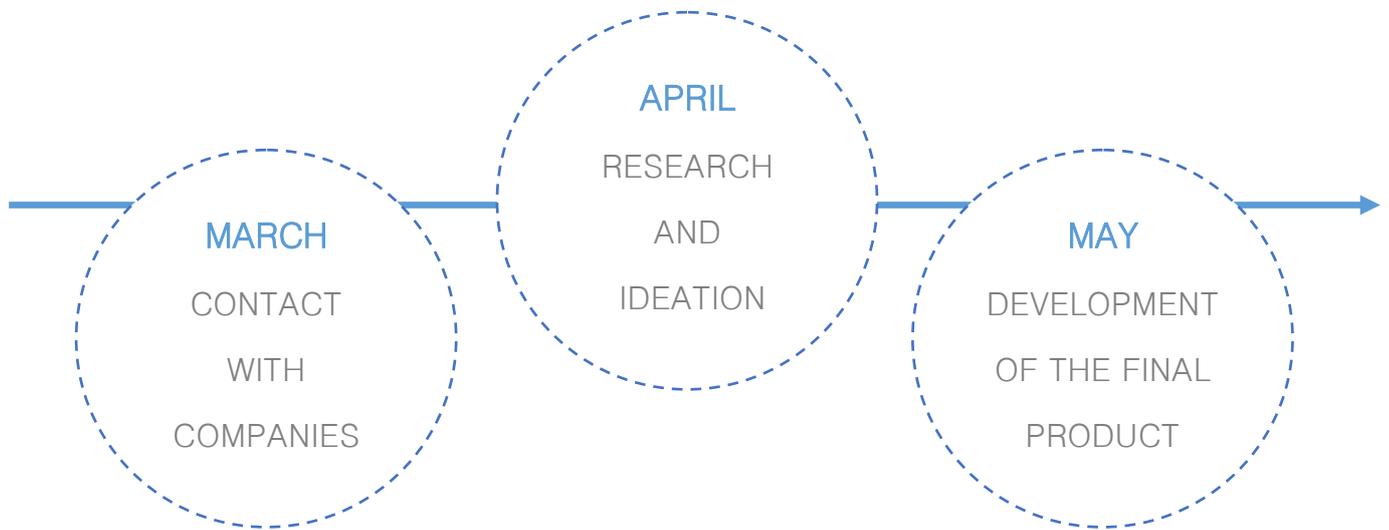
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- Figure 11: <http://design-milk.com/brickbox/>
- Figure 12: <http://www.archiproducts.com/en/products/61443/les-contemporains-pmma-chair-pli-roche-bobois.html>

8 Attachments

Attachment 1	Planning
Attachment 2	Posters

ATTACHMENT I: PLANNING



WEEK	1 23march	2	3	4	5	6	7	8	9 18may
INTRODUCTION									
THEORETICAL BACKGROUND									
METHOD									
APPROACH AND IMPLEMENTATION									
RESULT									
POSTER									
PRESENTATION									
MODEL									

ATTACHMENT II: POSTERS



nube

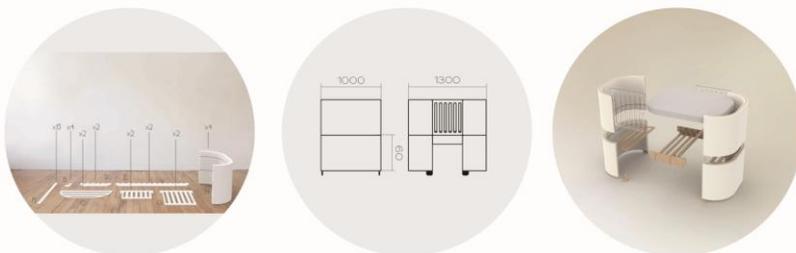


SUSTAINABLE DESIGN - ADAPTABILITY



KEEP
LIFE
SIMPLE

SECONDARY USES - MULTIFUNCTIONALITY



EASY ASSEMBLY - SIMPLICITY