Universidad de Valladolid

ESCUELA DE INGENIERÍAS INDUSTRIALES

UNIVERSIDAD DE VALLADOLID

ESCUELA DE INGENIERÍAS INDUSTRIALES

Grado en Ingeniería de Diseño Industrial y Desarrollo de Producto

BERMUDA: Mesa de salón con altura y profundidad ajustable

Autor:
Nieto Domínguez, Ana Belén

Responsable:
María Isabel Sánchez Bascones

Universidad de Destino:
Høgskolen i Oslo og Akershus

Valladolid, Febrero 2016

TFG REALIZADO EN PROGRAMA DE INTERCAMBIO

TÍTULO: **BERMUDA:Sofa table with height and depth adjustment**
ALUMNO: **Ana Belén Nieto Domínguez**
FECHA: **28 Octubre 2015**
CENTRO: **Høgskolen i Oslo og Akershus**
TUTOR: **Nils Seiersten**

RESUMEN:

El propósito de este proyecto es el de crear una mesa para el salón con una superficie ajustable, tanto en altura como en profundidad. La solución final es capaz de proporcionar una posición correcta al usuario en cualquier actividad realizada con la mesa, como puede ser comer o trabajar en la misma. Además de su estética atractiva, este mueble se ha desarrollado teniendo muy presente una posible futura producción industrial, con todo lo que ello conlleva. Para ello se ha tenido mucho en cuenta el usuario final y el área geográfica en el que se ha desarrollado. Para proporcionar una mayor fiabilidad, se han ido validando diversas maquetas, así como un prototipo final a escala real.

PALABRAS CLAVE:

Mobiliario, Mesa, Interiores, Funcionalidad, Escandinavia

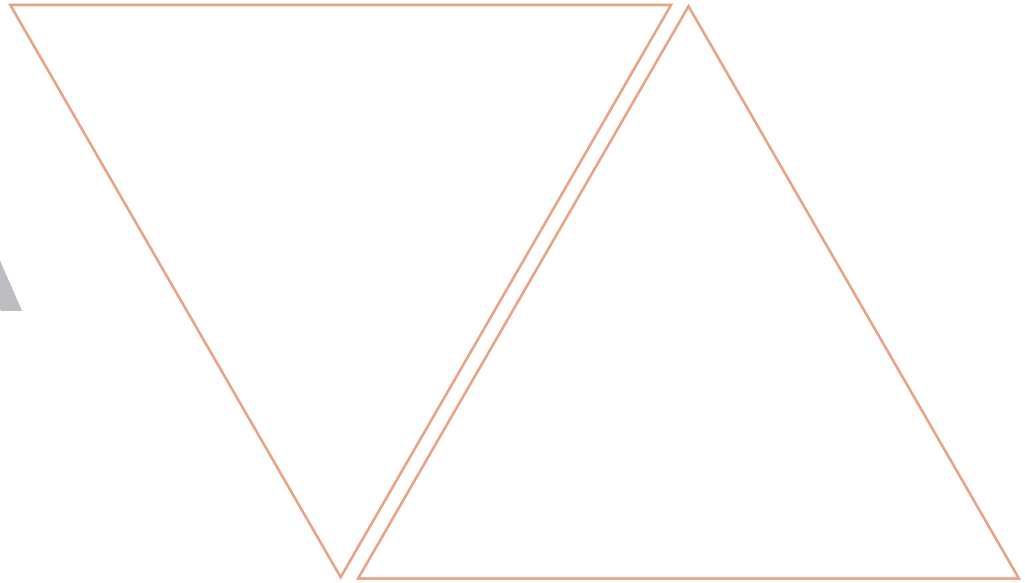
SUMMARY:

The purpose of this project is to create a sofa table with an adjustable surface, both in height and depth. The final solution is able to provide a correct position for the user in any activity undertaken with the table, such as eating or working on it. In addition to its attractive aesthetic appearance, this furniture has been developed bearing in mind a possible future industrial production, with all that entails. For this we have had much in mind the end user and the geographic area in which it has developed. To provide greater reliability, they have been validated several models, and a final real-scale prototype.

KEY WORDS:

Furniture, Sofatable, Interior Design, Funcionality, Scandinavia

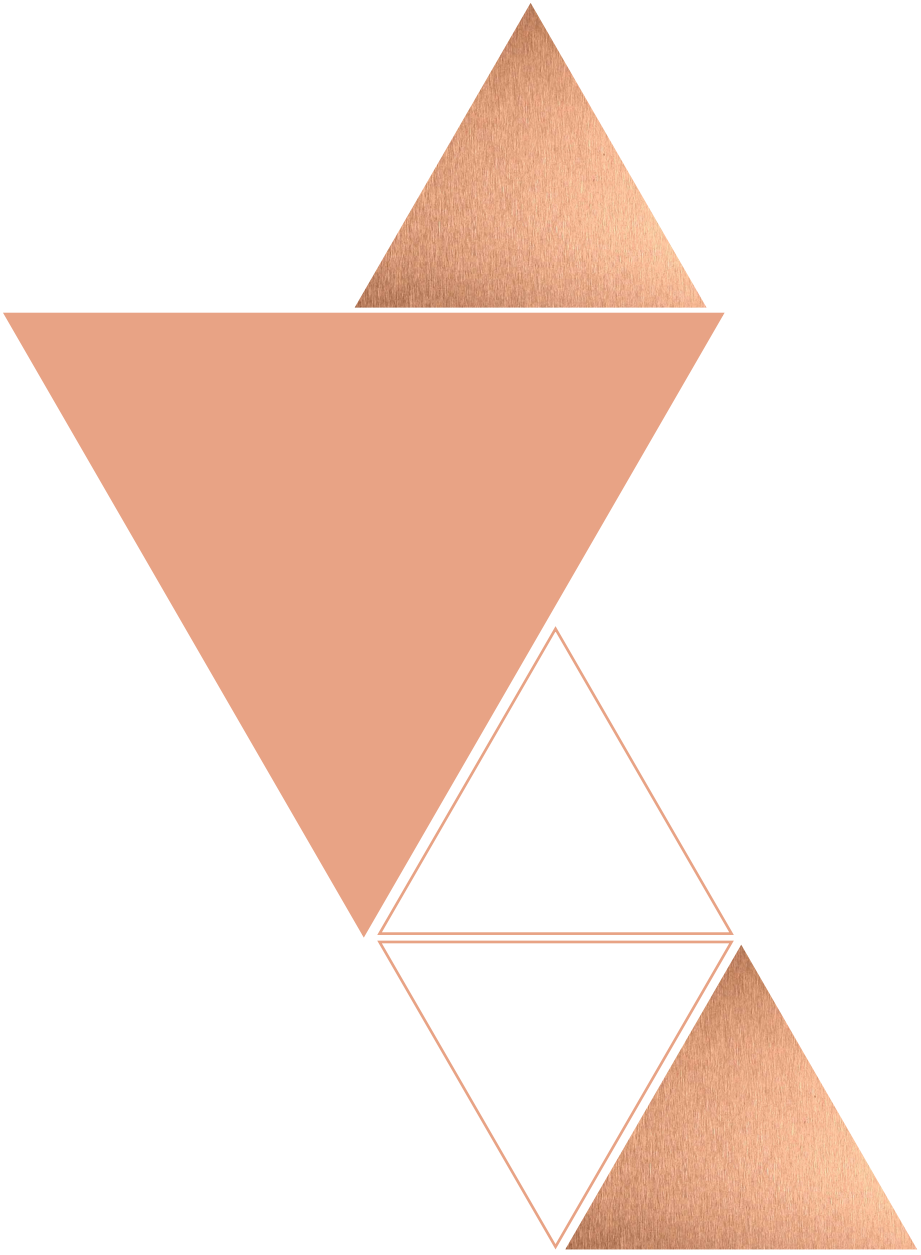
WORK REPORT
BERMUDA

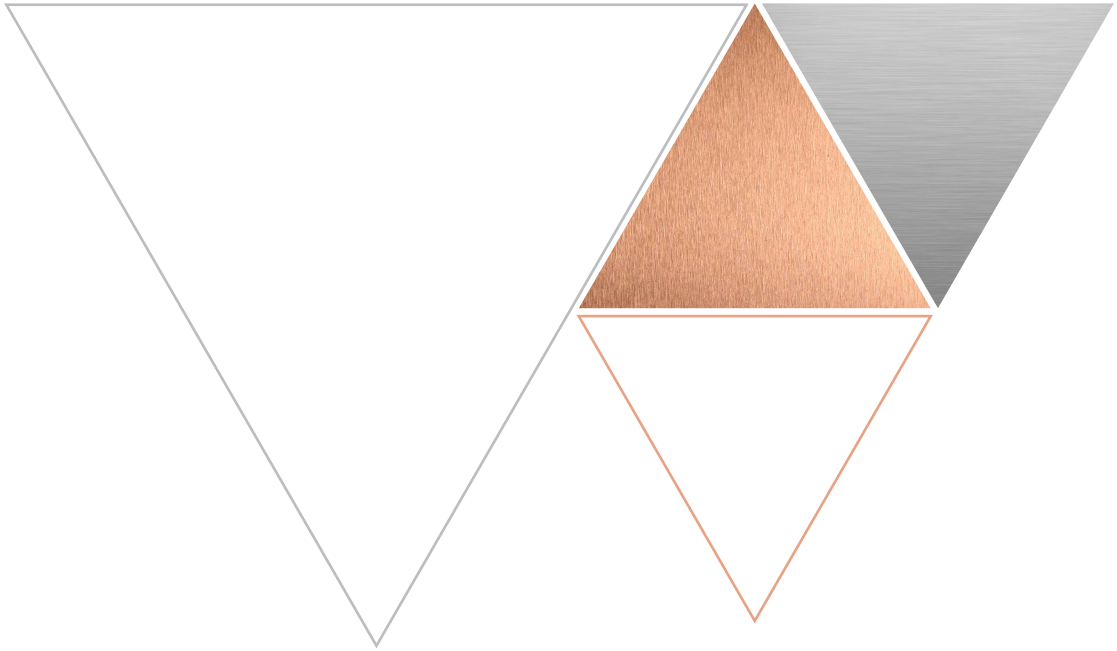


By
Ana Nieto, Amelie Keil,
Maria Løland & Sofie Marie Blattmann

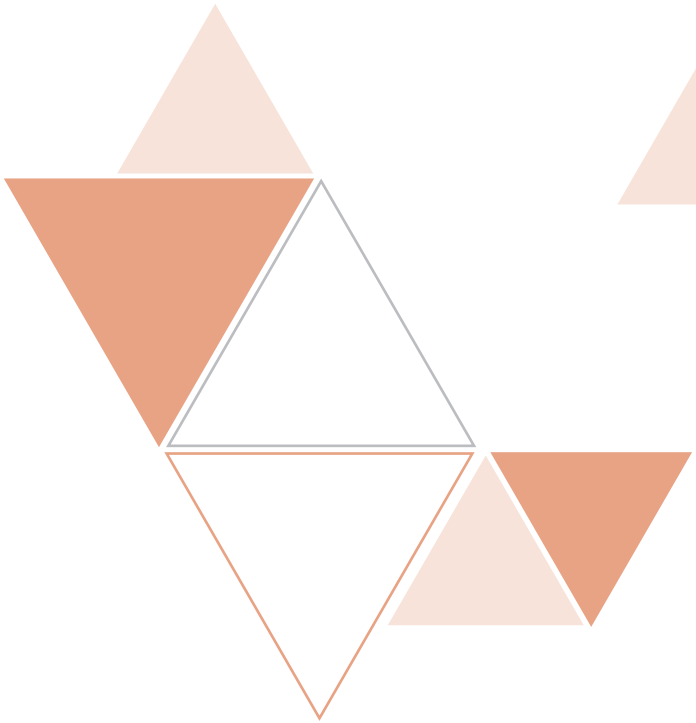
ABSTRACT

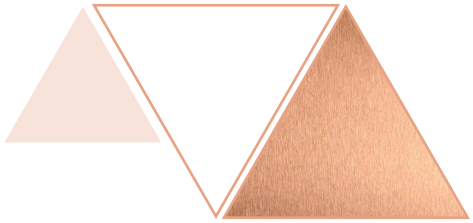
This report is divided into three parts, describing all the different aspects of the process designing the sofatable Bermuda. The first part is the introduction to the process. This part contains the issue, first chosen target group, first estimated selling price and key points. The second part describes the development process, how the Bermuda table came to be and what has been changed from the first prototype. The final part of this report is about the final prototype, where bullet points and arguments of choices are presented.

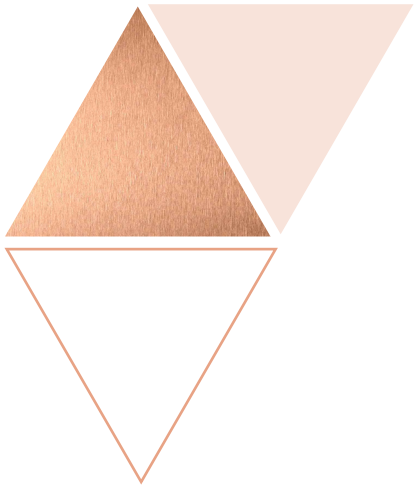




INDEX







By doing multiple analysis and research we have come to the conclusion to design a sofa table developed within the scandinavian design principles. Therefore the design is going to be simple, functional, intuitive, of high quality, and a mixture of different and functional materials. Minimalism and simplicity are key factors. Environmental issues will be an important part of the development process.

Our first chosen target group were people aged 18-25 living alone in small spaces. We changed this to people living alone with a stable economy.This is because the estimated selling price was changed, and we think most of these people are students who cannot afford to buy the table. The new target group are people who have a steady job and the opportunity and interest in buying high quality design furniture. We think that the target group is of the age of 25 and up.

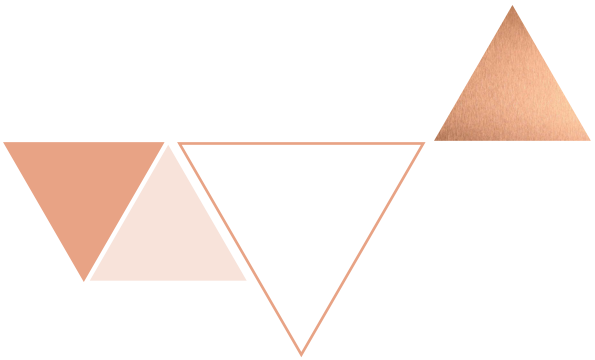
We got information from a survey that was created by several sofa table project groups joining in on one big survey. 309 people answered in total about the use and needs of a sofa table. Through this survey we got the opinions of different target groups and existing sofa tables. This is the reason it is important to think of factors like packaging and assembly, materials and production to make the product good both in quality and conscience.

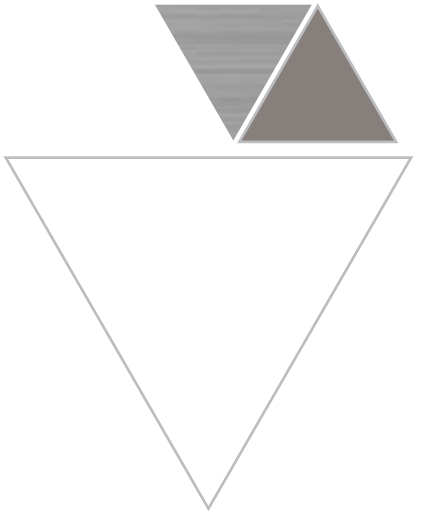
We contacted Naprapat Fredrik Hebnes Pedersen at Naprapatlandslaget in Lillestrøm. He helped us finding different ergonomic seating positions during the user test.

Concerning the market assessment of the planned product, the customer can be placed in the early majority section of consumers.The product will be in this section because the early majority section of users will be more interested in new and modern designs. After the innovators, the early majority is the first section that wants new and exciting products.

We have decided that it will be sold in different stores in Scandinavia for the first crucial period. We want to sell our product in shops like Skeidar (BoConcept) or Bolia since the early majority is buying a lot of products there, and they are already selling adjustable furniture. Here they also have a skilled staff that can explain the functions for the customer.
After an analysis of existing products and pricing, our first conclusion was that our final product should be sold between 5000-10000 kr. This was to ensure that we could meet our target groups price range and make room for quality design. Since the target group was changed during the product development, the selling price also changed. Final price and estimates are described further in part.3 of this report. (page.13)

For more details of the distribution, suppliers, analysis of existing products, market assessment, price estimates, product map, swot analysis, project aim and general constraints please look at the 1.edition of the project description.





CONCEPTS MP2

As we mentioned the target group that we started with was not suitable for the estimate price of the table or the design principles that we had made. So we had to change it so that all of the points on the supplier's and distribution part would be correct. In part.3 you can find the list over the following for the prototype (see previous estimates on the 1.edition of the project description):

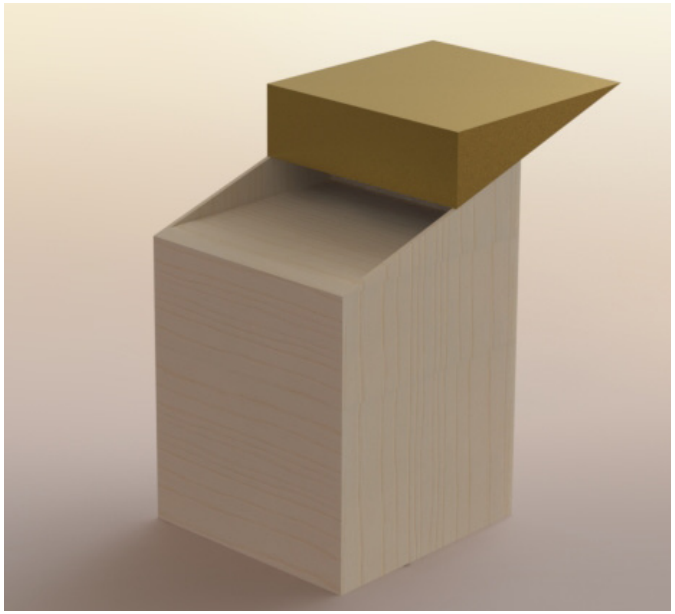
- Production costs
- Digital drawings
- Production methods
- Development costs
- Tooling costs
- Selling costs

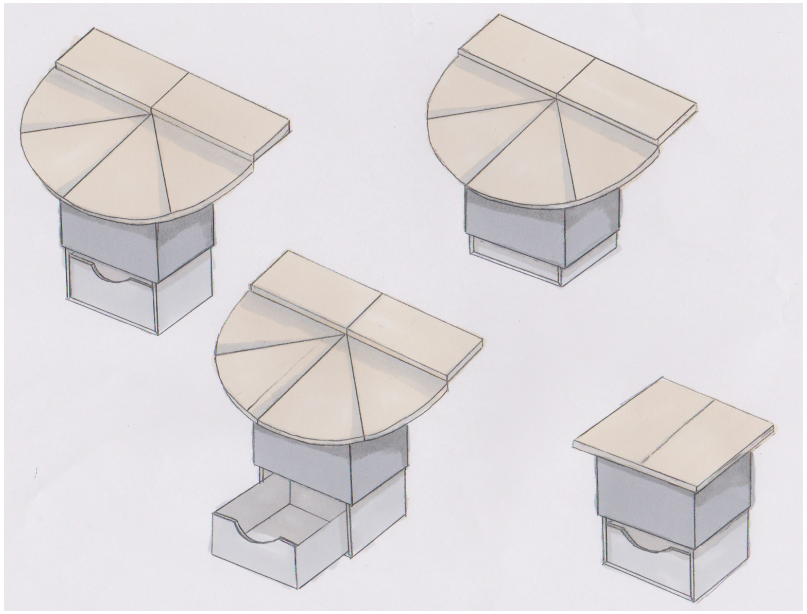
THE SHAPE OF BERMUDA SOFA TABLE

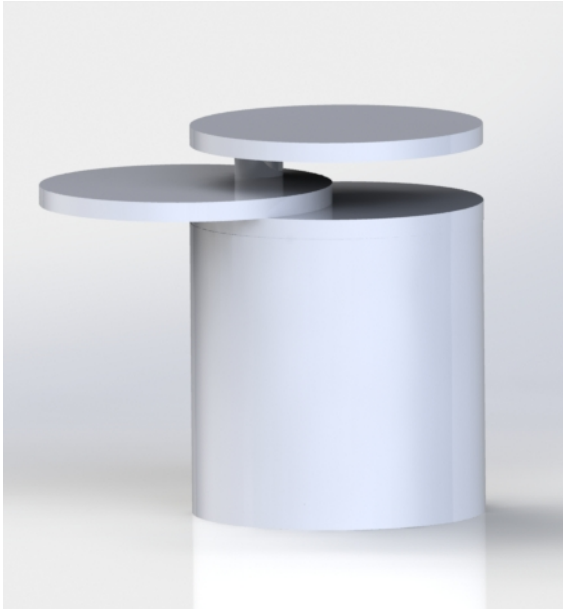
The shape of the Bermuda sofa table was designed based on previous sketches, drawings, ideas and concepts made throughout the design process. Through the design process we often ended up agreeing on sketches and drawings that had geometrical shapes. We made a mood board that shows where most of our inspiration came from.

We all liked the ability of a height and depth adjustment that were easy to understand and use. Also that the table had either a geometric or organic shape. The three concepts underneath were shown at MP2. We took our favorite parts from the three concepts and come up with one concept shown in the mid-term report and at MP3. From the concept 1(see attachment.) we took the shape of the top and the sliding function as an inspiration, and from concept 1 and 2 the bottom.

From the sketches (See attachment) you can see our development from this to the final concept shown at MP3. This was as our chosen concept that we developed the final prototype from. The name Bermuda was chosen for this concept because of the triangles.







1.Edition Bermuda table / summary

The choice of the height and depth was made as a result of the shape of the two triangles. The triangles are easily lift /flipped up in an angle, and are therefore creating a new height.
The height of the triangles and the legs, make the height both workspace and sofa table friendly.The regulation of the depth is also made easily by the same move. When the table is on its highest part you can flip out two additional plates, creating a new depth as well as a new aesthetic feature.The results are a clear and functional table created by simple geometry.

It's build up by two triangles, which give us the angled legs and a big surface when the two triangles are resting down on the legs. When the triangles are lifted up, a third triangle appears and creates a petit storage place for your daily stuff. The material chosen is whole wood for the triangles, plates and hooks. This will make the table look and feel more stable, as well as to give it an organic and soft finish. The legs will be in stainless steel, as well as additional hinges and screws to make the table more intuitively. Between the legs there will be created a web of thread, that creates random patterns. This creates a contrast between the legs and the straight and geometry shaped tabletop.

2.Edition Bermuda sofa table

After the presentation we got a lot of feedback and did the following changes. The legs were changed in order to make the shape of the table look more stable and fit better aesthetically. We changed the material to solid wood, previous choices were not giving the table a scandinavian look.

We also changed the way you use the depth adjustment by taking away the additional plates, because of the lack of stability. We decided that the triangles now should be fixed, because the need for additional space was more important when the table was used as a sofa table and not when used as a working space.

Therefore, we changed the way of height and depth adjustment by now folding one of the triangles over the middle plate and the second one up in a 90 degree angle. This makes it much easier for the end user to lock the table than in the previous edition. This is now the solution for the sofa table in the worktable position.

When folding down the triangles they still lean on the legs as before. And the legs still have the same angle. The angle has to be the same so that when the triangles rest on the legs, the surface would be completely straight and horizontal.

Although some comments were to remove the swivel base (the ability to turn the table in a circle) we decided to keep it. Then the end user could customize the position of the sofa table further to the preferred sitting position. We also changed the way of locking the table in its working table position. Instead of the previous lock, we made two clamps that fit on each side holding and pinching the plates of the tabletop together.

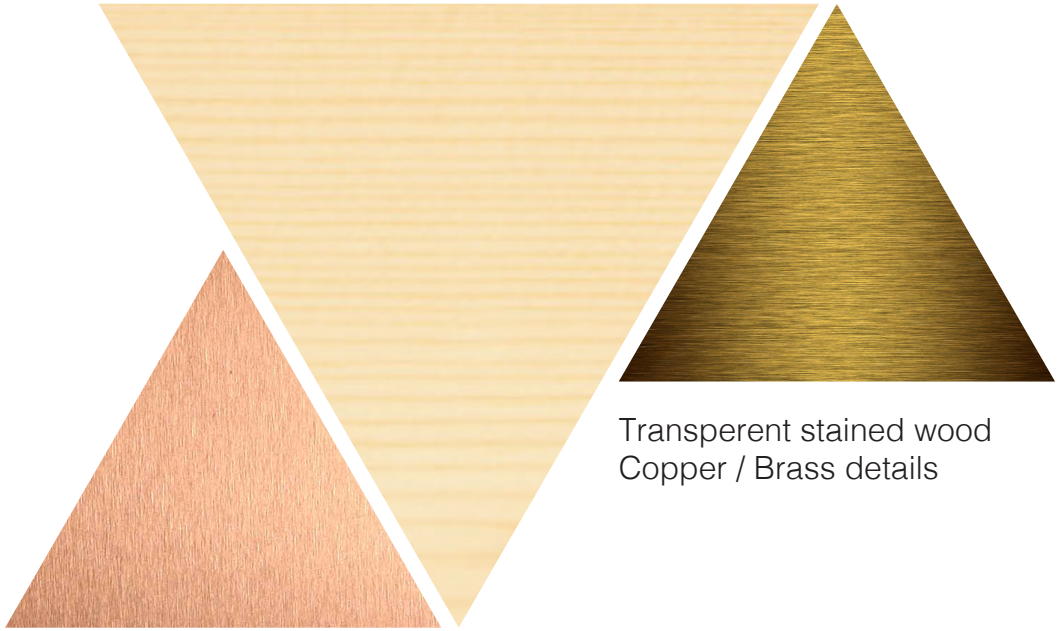
BERMUDA

The Bermuda table is a functional and smart sofa table developed within the scandinavian design principles. With geometric shapes, white stained birch and copper details Bermuda has clear and minimalistic aesthetics. The table is easily transformed from a sofa table into a practical working space in two simple steps.

Bermuda comes in various colors
The prototype has white stained wood with copper details.

White stained wood
Brass /copper details

Grey stained wood
Brass / Silver details



Transperent stained wood
Copper / Brass details

ENVIORMENT FOR END USER

We presented the final prototype for two of the end users. The presentation went well and the end user found the table intuitiv, functional. The woman like the material combinations but the mann prefered another color of the staind and details

PROTOTYPE IMPROVMENTS

Although the main concept of the prototype is now fixed there are still some improvements to make before the table can be produced. To make the table look more stable in production cavities could be made in the plates to sink in the hinges. This will make the gaps less visible and make the table look more compact. Although it is a possible solution we chose not to have the hinges sunk in. Thats because the function of lifting the triangles up is more visible for the user and one more step of production can be avoided. Since the clamps are loose parts we fixed them with magnets. To make it more userfriendly additional clamps could be delivered with the table in case they get lost.

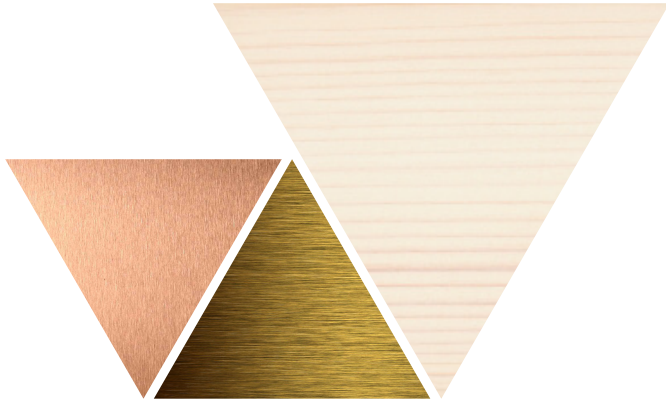
BULLETPOINTS

FUNCTIONAL
•Height and depth adjustment
•Adjustment leads to a more ergonomic seating position
•Can be used as a working space and meals
•Additional functions: Storage for magazines, books, remote etc
•Possibility to turn tabletop to your choice of position
•Magnets makes it easy and functional to store the locks/clamps when not in use
•Easy for the end user to assembly at home with few tools
•Can be easily carried by one person

INTUITIVE
•Easy to understand that the table has different functions
•The hinges indicates that the triangles can be moved
•The pockets show you the room for storage
•Easy to assemble

HIGH QUALITY
•Solid wood (Birch)
•Plywood (Birch)
•Hinges in stainless steel
•The table is protected with one layer of stain and a satin oil top coat
•The stain and topcoat is environment friendly from OSMO (OSMO,outdated)
•Functional design
•Table top and legs are assembled by the manufacturer

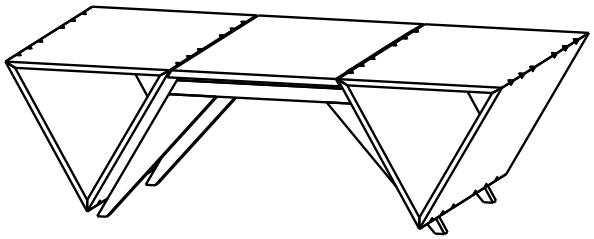
MIX OF DIFFERENT FUNCTIONAL MATERIALS
•Hinges and locks/clamps in stainless steel with a copper finish
•Mix of plywood and solid wood in birch
Storage pockets in white synthetic leather
•The table has been stained white with one layer
•Magnets to hold locks/clamps have a copper finish



USER MANUAL
For the end user we made a simple manuel, showing the user how to but the table together at home.

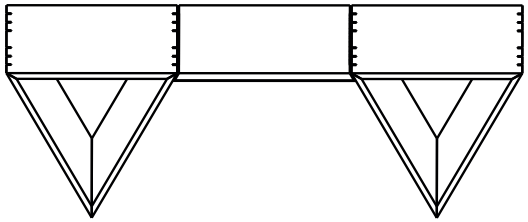
The manual are also representet at the exhibition in its orginal format.

BERMUDA TABLE

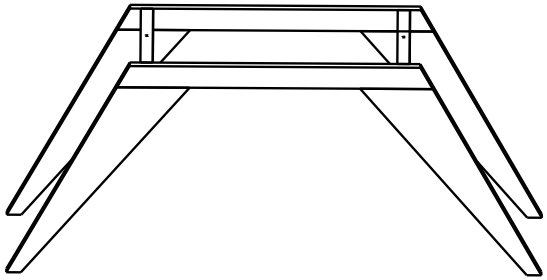


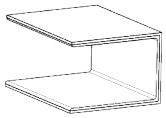
CONTENT

Tabletop



Leg frame



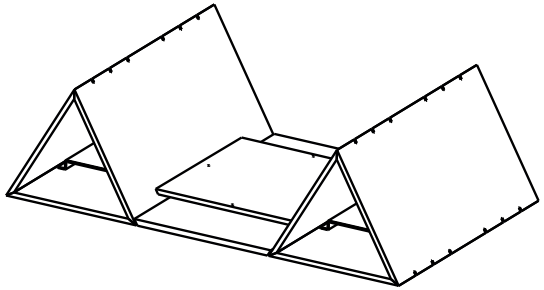


X 2

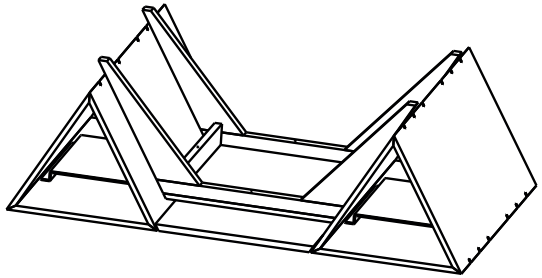
X 4

STEPS

1 Place the tabletop face down.



2 Flip over the legs frame and place it on the tabletop.



ARGUMENT FOR AESTHETICH CHOICES SOLID BIRCH / BIRCH PLYWOOD

As described in the project description we wanted the sofa table to be designed within the scandinavian design principles. A natural choice to get a scandinavian aesthetic is choosing wood as the main material. The different considerations were oak, maple, ash, pine and birch. The choice of using birch as the main material came natural since it is one of the most common wood types in Norway. Birch is a strong and medium heavy tree type that is suitable for furniture. Birch is also allergy friendly, suitable for construction and much more stronger than pine. Naturally the solid birch was our choice of the legs and the lower part of the table. Birch is also one of the cheapest wooden materials in production.

For the the tabletop we chose plywood of birch. This choice was made because of the moveable parts of the tabletop. We wanted the tabletop to be easy to move and have a clear contrast to the bottom part of the table. Plywood as a material is also very strong. By having this material on the tabletop we also accentuate the shape of the triangles because of the way the plywood is build up by layers of wood.The choice of using plywood for the top instead of solid wood is based on the construction of the tabletop.This is because of the weight of the movable parts. The tabletop needs to be light so it is more user friendly.

STAIN AND TOPCOAT

We wanted the wood to be a bit lighter than the original birch color. So our choices were between grey or white stain so the wooden structure is still visible. We ended up on the white matte stain because it looked more natural. The matte satin finish topcoat gives the table a natural look and protects it against water spill, food, drinks etc. Having the environment in mind our choice is OSMO (OSMO, outdated) for both stain and topcoat since it is environmental friendly.

HINGES

The table is built up around the two triangles. By moving the triangles you can easily adjust the height and depth. To be able to do this, the two triangles are connected by hinges on each side of the middle plate. Our choice of making the hinges visible both in color and structure was to make it more intuitive for the end user. By adding the copper finish and putting them against the birch plywood with a white stain finish, the expression gives a soft and clean transition between the two materials. This is what scandinavian design is all about. For the prototype we could not get hinges with delay. But in the production friction hinges will be used, since they have a delay to prevent the triangles to slam down and cause damage to the legs.

DETAILS (Pockets,locks/clamps and magnets)

To complete the look of the table we added some small details to the storage and clamps to make them visible and functional. The storage is hidden inside of the two triangles. We want the storage pockets to be visible but not too much so they do not take the attention away from the shape of the whole table. By making them in white synthetic leather they will create a shadow that indicates a room for magazines, books remote etc. The material also implies to the end user that it has a function.

The locks (clamps that will hold the tabletop together when adjusting the height up) are given a copper finish like the hinges. This indicates for the user that these have an important function but also give the table the same color transition as the hinges. The clamps are easily stored inside the triangles underneath the pocket by locking them to a magnet. This prevents them to fall down, and you will not have any loose parts. The magnets have the same copper finish to make the connection between locks (clamps) and magnets.

DETAIL OF HINGES

DETAIL OF POCKET AND CLAMPS

Friction hinges from Torp Fasteners (torp-fasteners, 2010)

Cutting the wood
Relevant production methods for our product would be limited to the usual methods used throughout Norway, since this is where we want our table to be produced. Though both laser and manual cutting are a possibility, CNC machining is the fastest method. This is a frequently used carving method for a variety of materials, but especially wood, metal and plastics. In our case, both a three and ve - axis CNC milling machine can be used for cutting out all the pieces with correct angles in wood. CNC machining is a very rapid and eective way of cutting with a general low tooling cost. It produces high quality cuts with close tolerances.

This machine can be used for both mass and low volume production. Since the most machines are nearly fully automatic, the labor costs are minimal. Some machines even change the tools themselves. The operation is rapid and as long as the machine is set up, it can carve out the shapes in seconds. In our product, we have dierent shapes, so we have to include time for changing the settings for all the new pieces made. One positive aspect is that with only three parts that need dierent settings, making all the wooden parts ready for assembly is done rapidly. Many CNC machines can also drill holes for screws, so this can also be included in this operation (Thompson, 2007, p.183-186).

Labor costs can be calculated on the basis that in this part of the process, an educated CNC operator is needed. According to utdanning.no (utdanning.no ,2015) an educated operator makes around 422 – 466 000kr. a year. If we round this down to around 450000 a year, it comes down to about 230 kr. per hour. We imagine that the rest time the parts are made, it would take some time to ready the les for the machine. As soon as the les are ready, it would only take minutes for each part made, depending on the number of parts per le. We could approximately calculate that it takes an hour or two to make the les ready, then only 10 minutes to make the parts with the machine. Therefore, the cost of programming is only a one – time cost (investment), while the 10 minutes of labor will be the standard calculation in a total cost overview.
According to “3D Maskinutleie” by daily manager Morten Sandnes, (M.Sandnes personal communication 12th october 2015) they take 1000kr per order, and a price per minute when the machine is in use. This price is 25kr per minute for 2D milling, and 30kr for 3D miling.

Our product will only need the 2D milling, since it is a at surface. We might need a jig though, depending on the programming needed. The 1000kr is a standard price, and this includes the programming and preparation of the machine. Of course, this company is based on cutting, not assembling and other operations. So the investment would be the 1000kr for preparations, and then 250kr for cutting the shapes.

Staining the wood
We want all parts of our table to be nished with a white stain. This is most likely done manually, with a spray – gun. It is also possible to do the nish before and after assembly. According to our product, the fastest and easiest way is to stain the pieces after the CNC machine process, before assembling. This process might take roughly one hour to do, depending on the skill of the operator. In the smaller factories in Norway, it is often the same people doing the paintjob as well as the assembling. Of course, the stain has to dry before assembling. This can be done in a special dryer-oven, so the parts are ready in a few hours. According to SSB (Statistisk sentralbyrå, 2014) the average monthly pay for carpenters is 33 300. This comes down to about 222 kr. per hour.

Assembly
The assembling will not take too long, as long as all the parts are pre drilled, and properly cut out. The triangles need to be glued together with plugs, and then connected to the middle plate with hinges. Then the swivel base has to be attached. The other part is to assemble the legs with glue and screws. This will make the table ready for packaging, so the consumer can assemble the legs with included screws. This operation should not take more than 30 minutes, not including the time it takes for the glue to dry

Summary
If these processes were to be used at the same location (factory), the total time of active labor would be around 1 hour and 45 minutes. If we include the time it would take for the stain and glue to dry, it would take roughly one - two days to get the product ready for shipping. All these processes are calculated as a one-man job. If more people are involved, the time will be decreased, but the labor cost will increase. Costs of active labor: 390kr. Tooling costs: CNC machining: (1000kr) 250kr. Jigs: 10kr (?) Total production cost: (1650kr) 650kr.

TOOLING COST / MATERIAL OPTIMIZATION

As we reflect on the project description our product will be distributed in the main cities of Scandinavia. To calculate the cost of transport the price is calculated by volume or weight, volume per cubic meter and weight per kilo. For these prices we have contacted with a transport and logistics company in the Scandinavian countries called Freja (Freja, 2015) The sales manager has provided us the following prices assuming that shipments are made from Oslo for 50 kg/ 0,2 m3:

-Sandefjord: 494 kr.
-Tr. Heim: 587 kr.
-Tromsø: 1387 kr.
-Gøteborg: 1650 kr.
-Stockholm: 1750 kr.
-København: 1650 kr.
-Helsinki: 1900 kr

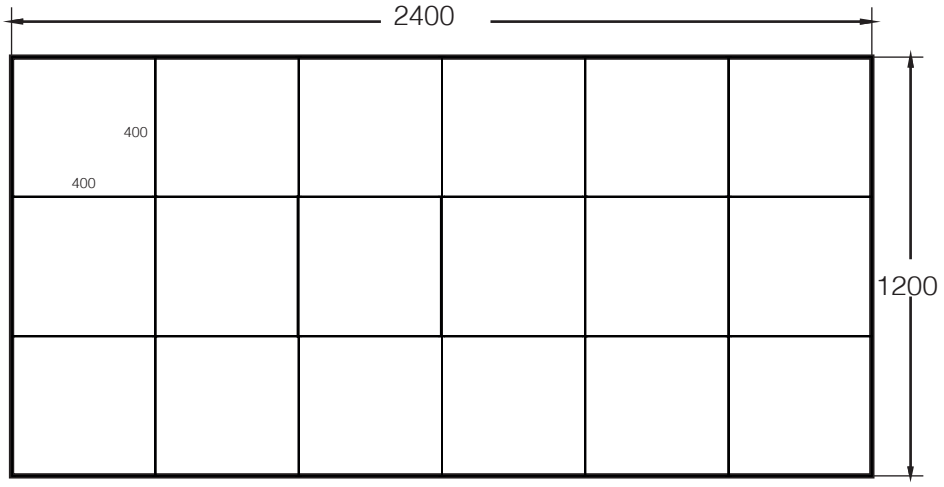
A freight price within Norway must add 25% of the amount in taxes. In other countries an agreed amount is fixed.

So knowing that the total volume occupied by the table during transport is 0.0196 m , the final price of shipments is:

-Sandefjord: 60,515 kr.
-Tr. Heim: 71, 908 kr.
-Tromsø: 169,908 kr.
-Gøteborg: 161,7 kr.
-Stockholm: 171,5 kr.
-København: 161,7 kr.
-Helsinki: 186, 2 kr

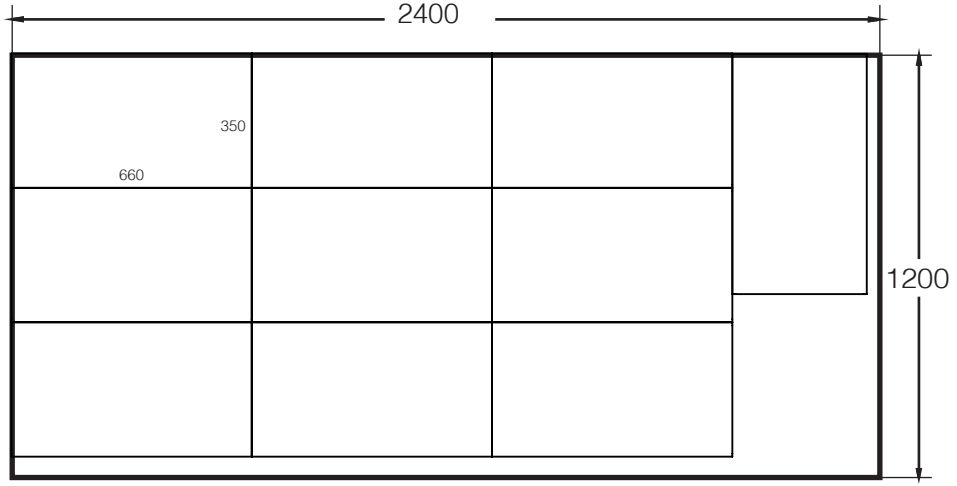
MATERIAL OPTIMIZATION

12 mm. birch plywood (Base Plates)



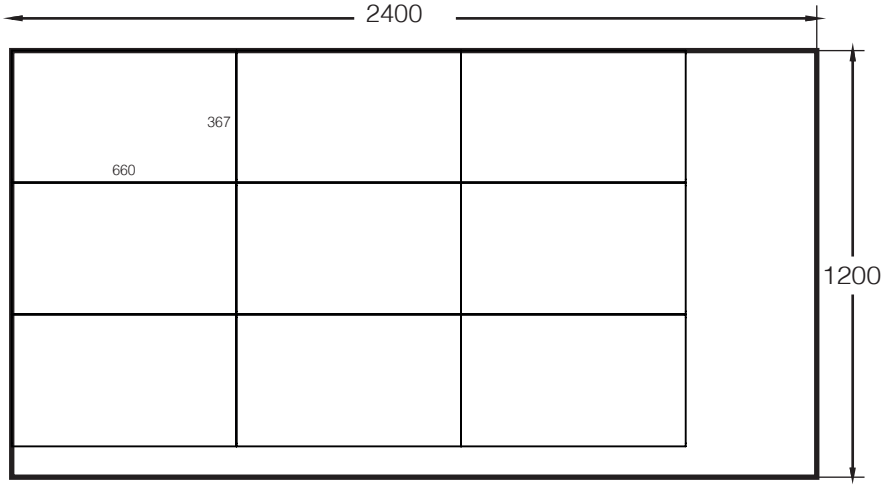
With 1 big plate we get 18 base plates to build 18 tables.

12 mm. birch plywood (Triangle Plates)



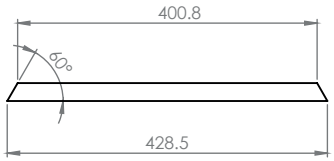
1 big plate --> 10 triangle plates; each table needs only 6 triangle plates.

15 mm. birch plywood (Upper Base Plate)

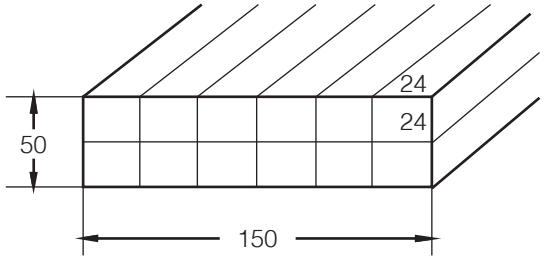


1 big plate --> 9 upper base plates

50 X 150 mm. Solid Birch (Leg Base)

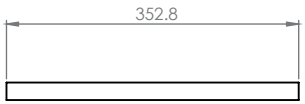


24 mm. thickness

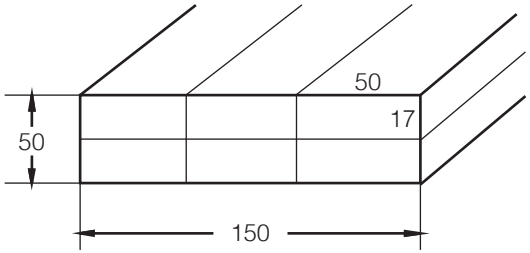


With 430 mm length we get 12 leg bases. Each table needs 2 leg bases, so we get leg bases to build 6 tables.

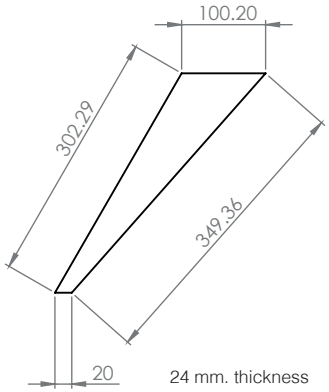
50 X 150 mm. Solid Birch (Leg Support)



24 mm. thickness

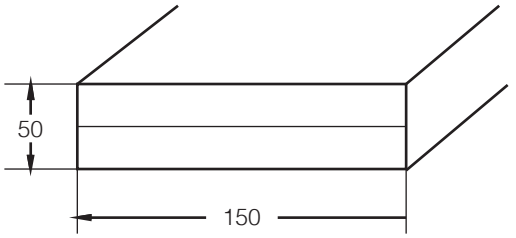


With 353 mm length we get 6 leg supports. Each table needs 2 leg supports, so we get leg bases to build 3 tables

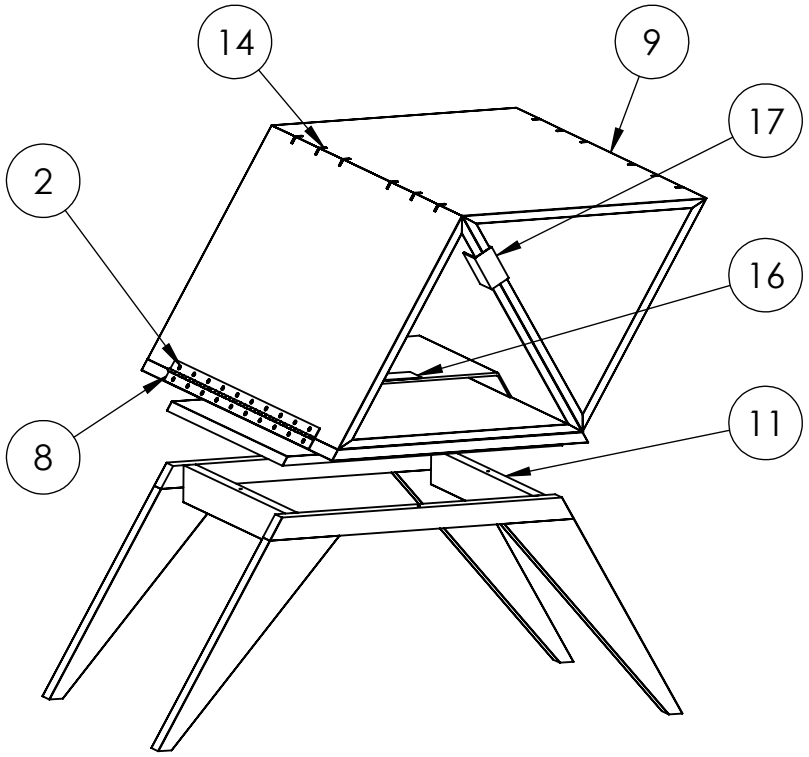


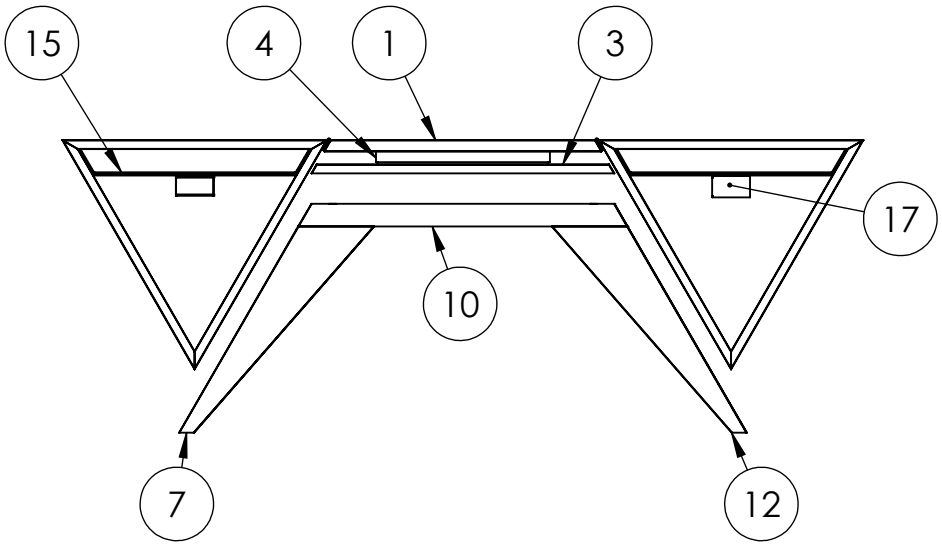
24 mm. thickness

50 X 150 mm. Solid Birch (Legs)



With 350 mm length we get 2 legs. Each table needs 4 legs, so we need **700 mm length.**

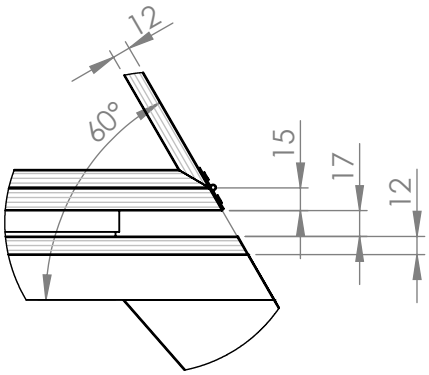


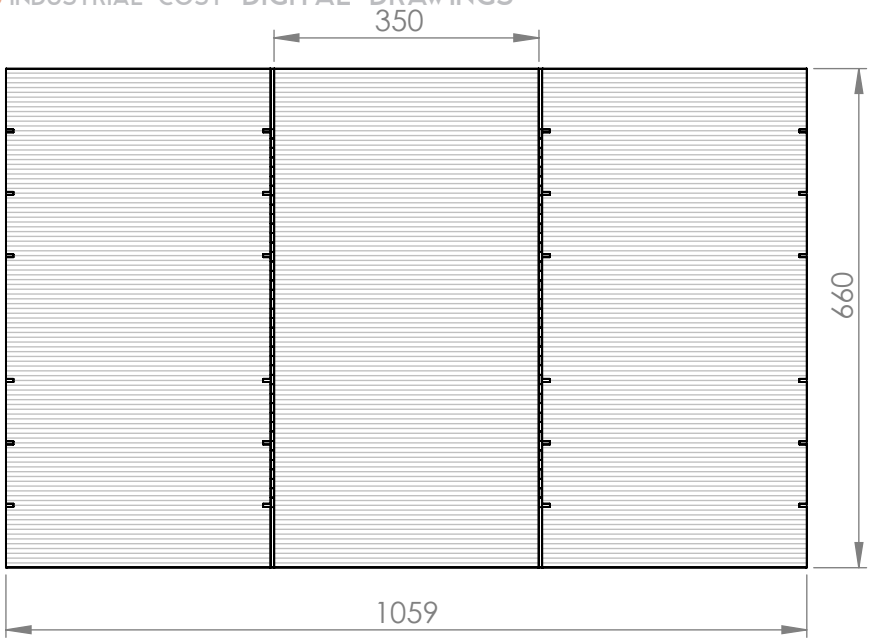


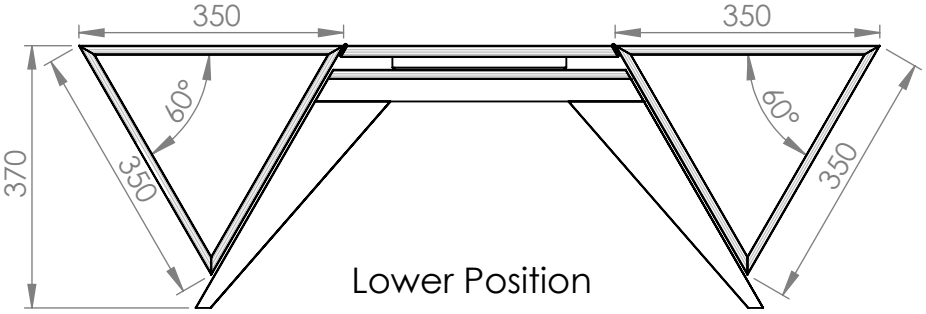
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: +2 ANGULAR: ± 1°	FINISH: OSMO white 1 layer, Osmo Oil finish matt		DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION
				Prototype	
	NAME	SIGNATURE	DATE	TITLE:	
DRAWN	Sofie Marie Blattmann Amelie Keil, Maria Løland, Ana Belén Nieto Domínguez		26/10/15	Bermuda Assembly Parts	
CHK'D					
APPV'D				DWG NO.	A4
MFG				3/3	
Q.A					
	Main MATERIAL: Whole Wood Birch Plywood of Birch		Group 8	SCALE:1:20	SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	upper-Base-plate	Plywood 15mm	1
2	Screw	Ø 3.5mm, lenght 16mm	20
3	2. base plate	Plywood, 12mm	1
4	Swivel Base	height 17mm, Ø 230mm	1
5	Swivel base Screw 1	Ø2.5mm, lenght 11mm	5
6	Swivel base Screw 2	Ø2.5mm, length 17mm	4
7	Leg Type1	Whole Wood	2
8	Hinge	Clas Ohlson, Art. No. 40-7102, copper finish	2
9	Triangleplate	Plywood Birch	6
10	Leg Base	Whole Wood	2
11	Leg Support	Whole Wood	2
12	Leg Type 2	Whole Wood	2
13	Wooden Plugs	for legs frame assembly, Ø8, lenght 30mm	16
14	Cookie	Birch, for Triangle Assembly	36
15	Magazine Bag	White synthetic leather	2
16	Magnet	copper finish	2
17	Clamp	copper finish,synthetic leather detail, steel	1
18	EXTRA: Screws	to be added to packaging, lenght 36mm, Ø 3.5mm	4

DETAIL C
SCALE 1 : 5

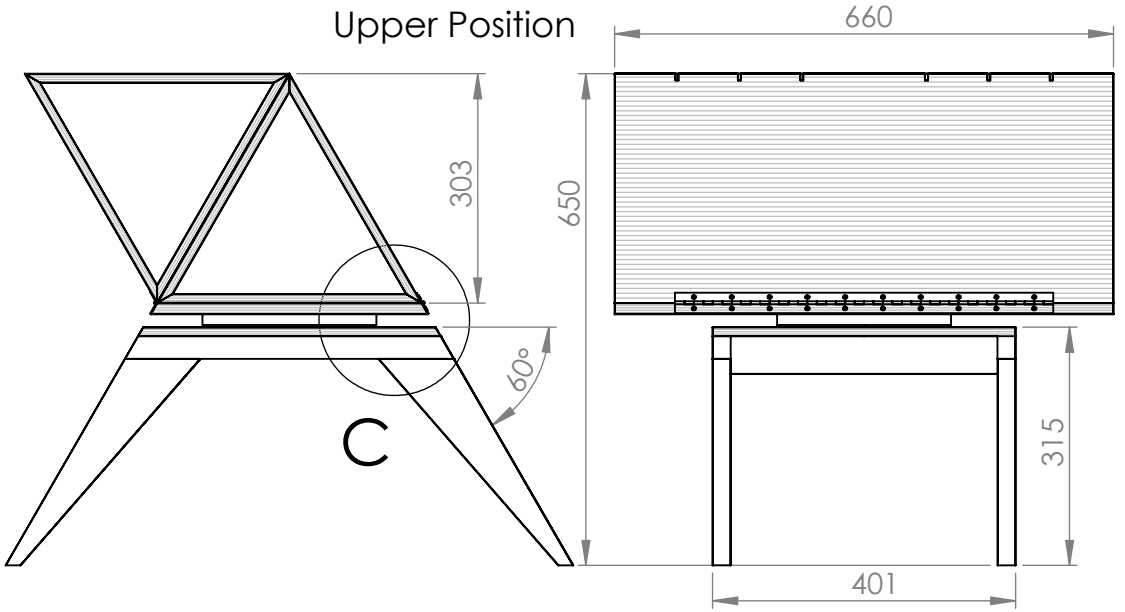






Lower Position

Upper Position



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: +2 ANGULAR: ± 1°	FINISH: OSMO white 1 layer, Osmo Oil finish matt	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING / REVISION B
	NAME	SIGNATURE	DATE
DRAWN	Sofie Marie Blattmann, Amelie Keil, Maria Løland, Ana Belén Nieto Domínguez		26/10/15
CHK'D			
APPV'D			
MFG			
Q.A			
MATERIAL: Plywood of birch (parallel lines), whole birch		Group 8	

Prototype

TITLE: Bermuda Table Overview Main Measurements

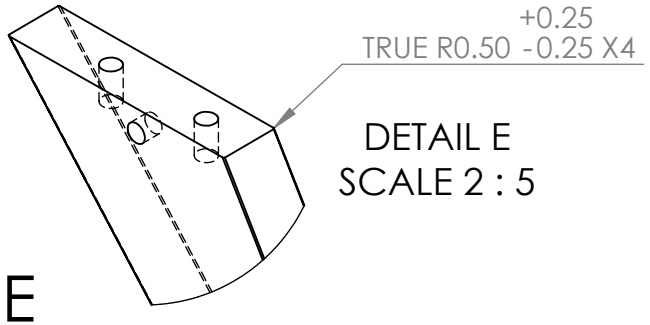
DWG NO. 1/3 — A4

SCALE:1:20 — SHEET 1 OF 1

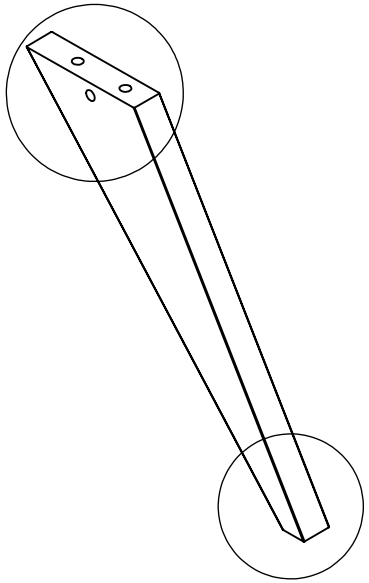
SOLIDWORKS Student Edition.
For Academic Use Only.

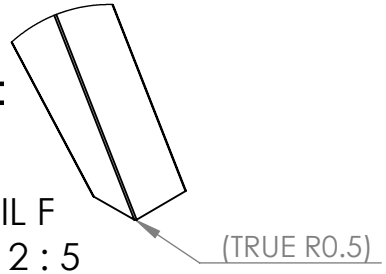
REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
D2	A	hole diameter changed	23/10/2015	
D3	B	holes position changed	26/10/2015	

PART3 INDUSTRIAL COST PRODUCTION DRAWINGS

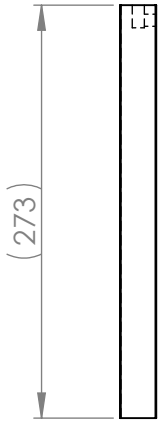


DETAIL E
SCALE 2 : 5



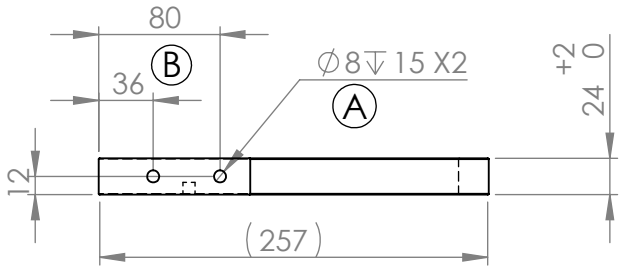


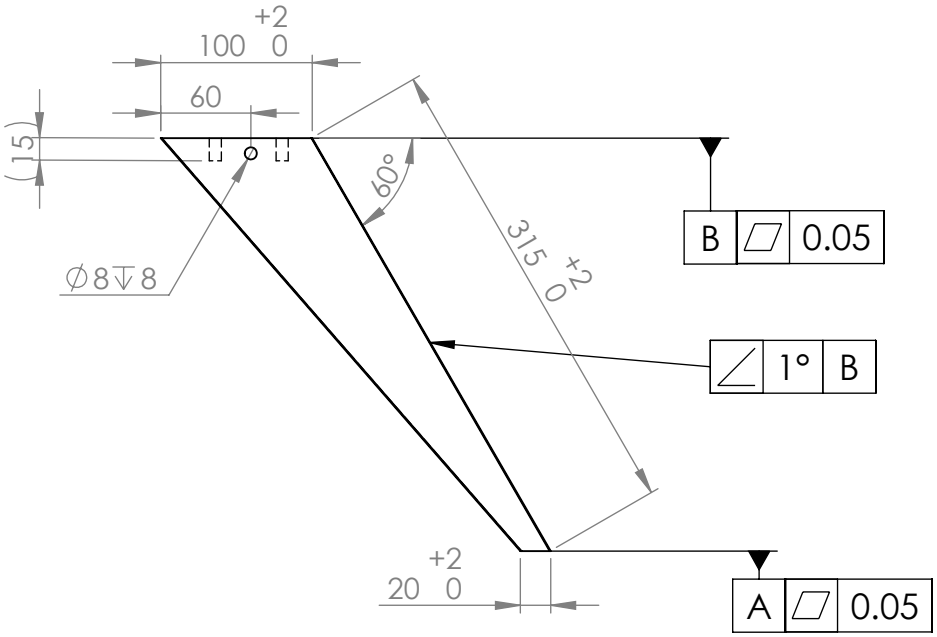
DETAIL F
SCALE 2 : 5



Side View

Top View





SOLIDWORKS Student Edition.
For Academic Use Only.

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: +2 ANGULAR: ± 1°	FINISH: OSMO white 1 layer, Osmo Oil finish matt	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING / REVISION B
			Prototype
	NAME / SIGNATURE / DATE		TITLE: Bermuda Table Leg Item No. 4
DRAWN	Sofie Marie Blattmann, Amelie Keil, Maria Løland, Ana Belén Nieto Domínguez		26/10/15
CHK'D			
APPV'D			
MFG			
Q.A			
Weight: 235 grams	MATERIAL: Whole Wood Birch		Group 8
			DWG NO. 2/3 / A4
			SCALE:1:5 / SHEET 1 OF 1

WOOD

Birch plywood12 mm. thickness	
Triangle Plates	302, 4 kr
Base Plates	28 kr
Birch plywood 15 mm. thickness	70,4 kr
Solid birch	
Legs	86,1 kr
Leg Base	8,815 kr
Leg Supports	14,514 kr
Total wood	**510, 229 kr**

HINGES

2 hinges 50 mm length	**50 kr**

SWIVE BASE

1 swivel base	**296,25 kr**

FABRIC

1 square meter of synthetic leather fabric	**100 kr**

COOPER SPRAY

1 can of cooper spray (400 ml.)	**69 kr**

STAIN

1 can of white stain (375 ml.)	**269 kr**

SCREWS

Wooden screw flat head	**33,90 kr**

PLUGS

200 pieces of wooden plugs 8 x 30 mm	**39,90 kr**

GLUE

Polyurethane glue (300 ml.)	**129 kr**

TOP COVER

1 can of trnsparent top cover (500 ml.)	**299 kr**

Total	**1796,279 kr**
Applying 20% off buying in industrial quantities: Total material cost	**1437,023 kr**

ACTIVE LABOR

15 minutes cutting with CNC machine	38,34 kr
30 minutes assembling	115 kr
1 hour staining	230 kr
Total active labor	**383,34 kr**

TOOLING COSTS

CNC machine	
1000kr / order	1000 kr
25 kr / minute	250 kr
Total tooling cost	**1250 kr**

Total production costs	**1633,34 kr**

MATERIALS COSTS

Wood	510,229 kr
Hinges	50 kr
Swivel base	296,25 kr
Fabric	100 kr
Cooper spray	69 kr
Stain	269 kr
Screws	33,90 kr
Plugs	39,90 kr
Glue	129 kr
Top Cover	299 kr
Total material costs (20% off)	**1437, 023 kr**

PRODUCTION COSTS

Active labor	383,34 kr
Tooling costs	1250 kr
Total production costs	**1633,34 kr**

Total manufacturing costs **3070,364 kr**

TOTAL COSTS

Doing a little research on the calculation of the final product price we found the following scheme:

Manufacturing costs + 20 % mva → X2 → Designer → Transport → X2 Store → Final price

So knowing that the manufacturing costs are 3070,364 kr:

3684,437 kr x2 = 7368,873 kr → Designer

At this price we must add the cost of transport to the point of sale, which depend on the destination city. For example, suppose that the tables will be sold in Tr. Heim:

7368, 873 kr + 71,9075 = 7440,780 kr

To calculate the final price just we have to add the amount which earn the store for selling our product, which is usually the double price.

7440,780 x2 = 14881,56 kr.

BIBLIOGRAPHY

Freja .(outdated). *Frontpage.* Obtained 27.oktober 2015 from http://www.freja.com/no/

OSMO .(outdated). *Frontpage*. Obtained 27.oktober 2015 from http://www.osmo.de/opencms/de/index.html

Statistisk sentralbyrå. (2014). *Solgt produksjon av varer for store foretak i industri, etter prodcomkode, tid og statistikkvariabel* , 2014. Obtained 28. August 2015 from https://www.ssb.no/statistikkbanken/selectout/ShowTable.asp?FileformatId=2&Queryfile=201582811254445341158SalgProdIndVare&PLanguage=0&Main Table=SalgProdIndVare&potsize=1

Statistisk Sentralbyrå. (2014). *Lønn for ansatte i bygg- og anleggsvirksomhet,* 2014. Obtained 11. oktober 2015 from https://www.ssb.no/statistikkbanken/selectvarval/saveselections.asp

Thompson, R. (2007). Manufacturing processes for design professionals London: Thames & Hudson ltd.

Torp Fasteners (2010). *FRIKSJONS- OG POSISJONSHENGSLER.* Obtained 27.oktober 2015 from http://www.torp-fasteners.no/Produkt/Hengseltyper/FRIKSJONS--OG-PO SISJONSHENGSLER.aspx

Utdanning.no. (2015). *CNC operatør*, 2015. Obtained 10.oktober 2015 from http://utdanning.no/yrker/beskrivelse/cnc-operator

ATTACHMENT

MP2 PRESENTATION
PART.2 DEVELOPMENT
WORKPLAN 2.0

HOW CAN A SOFA TABLE IMPROVE BOTH THE AESTHETIC AND FUNCTIONAL VALUE OF A COMPACT LIVING SPACE?

GROUP 8
Ana, Maria, Amelie, Sofie

KEY POINTS

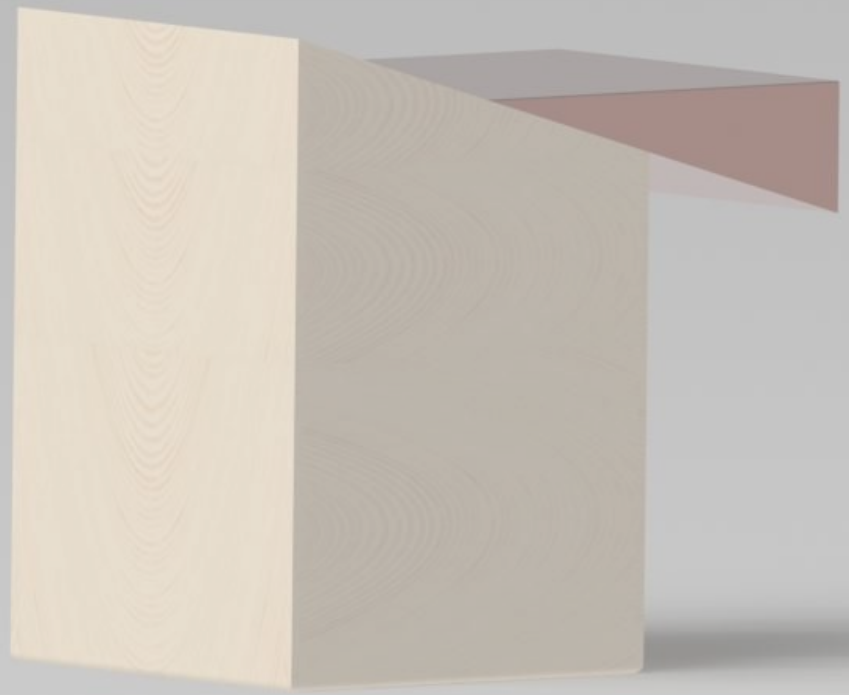
Height and depth adjustable

Scandinavian Design

Hidden wheels

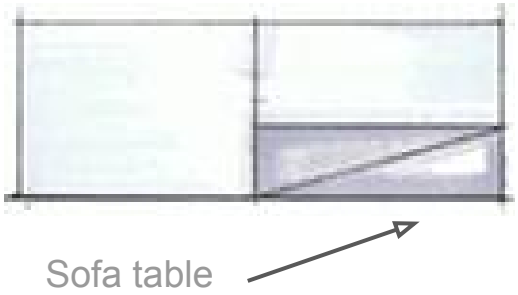
Hidden storage

CONCEPT 1

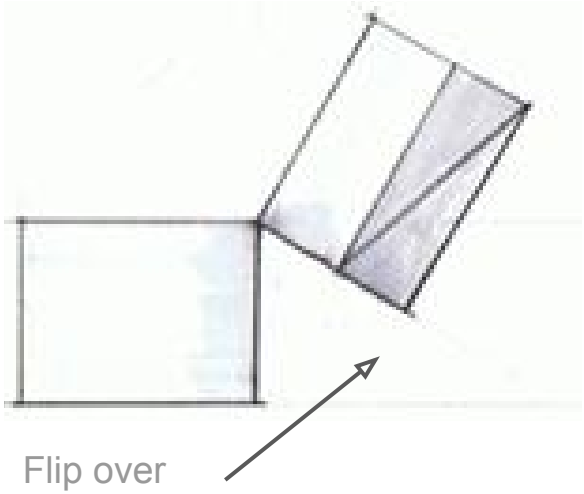


By Maria Løland, Sofie Marie Blattmann, Ana Nieto & Amelie Keil

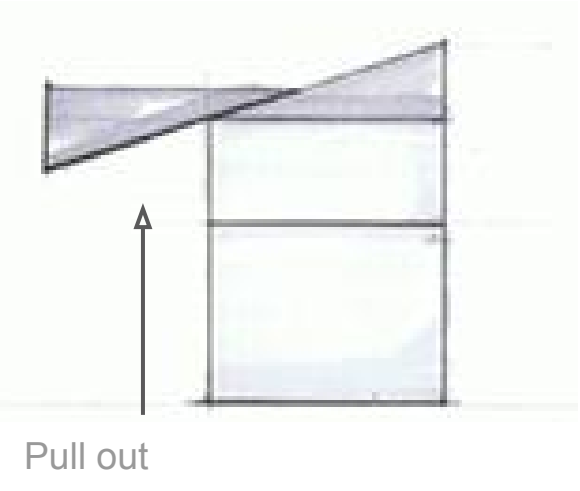
CONCEPT 1



Sofa table



Flip over

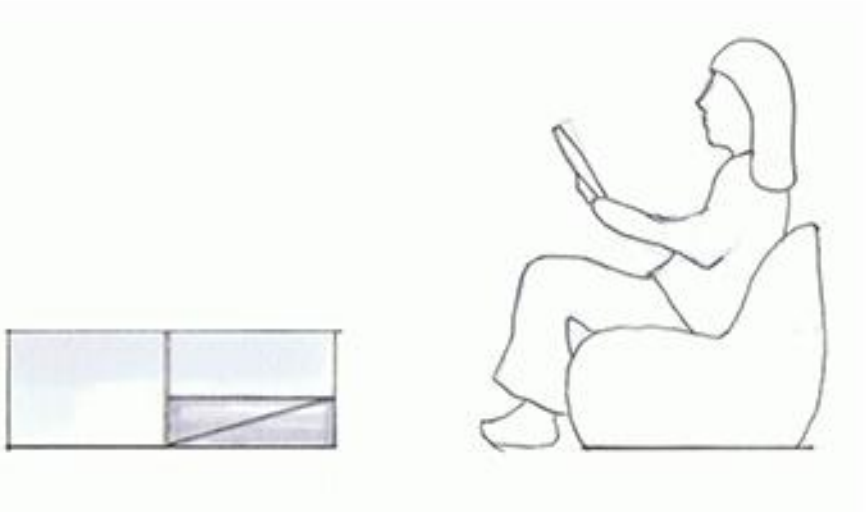


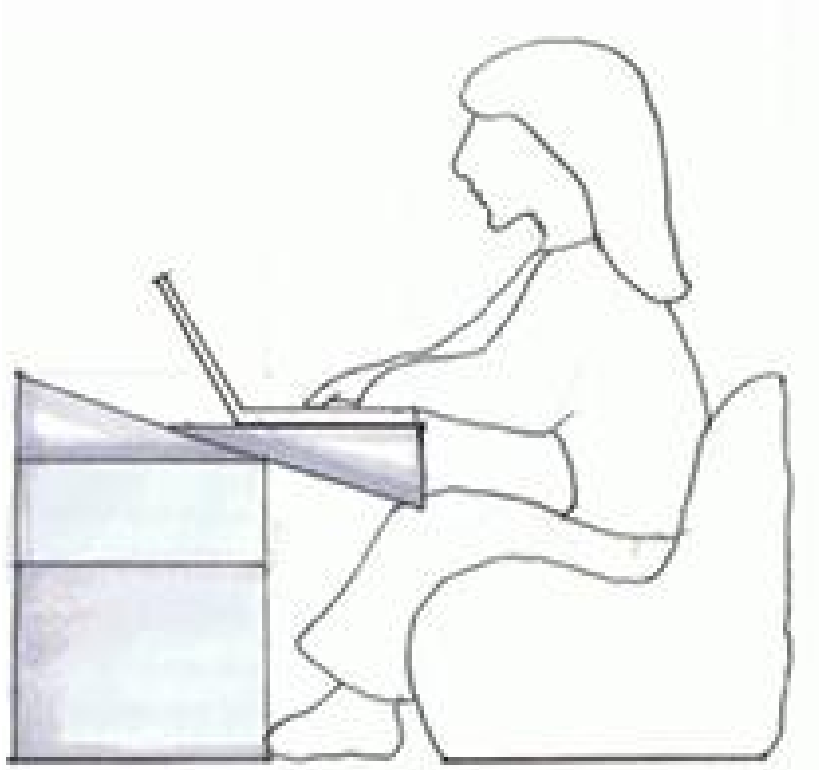
Pull out

Dimensions (mm)

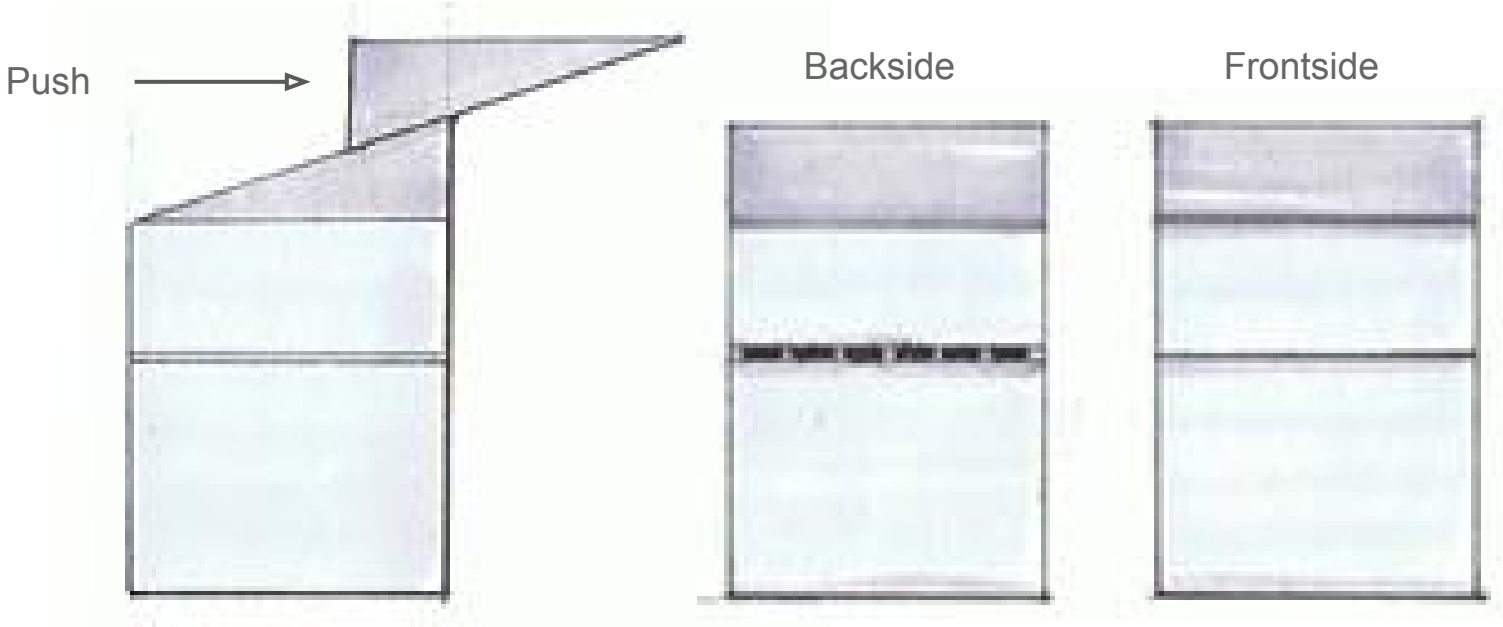
L 500 x 500 (each box)
H 370
H 740

CONCEPT 1





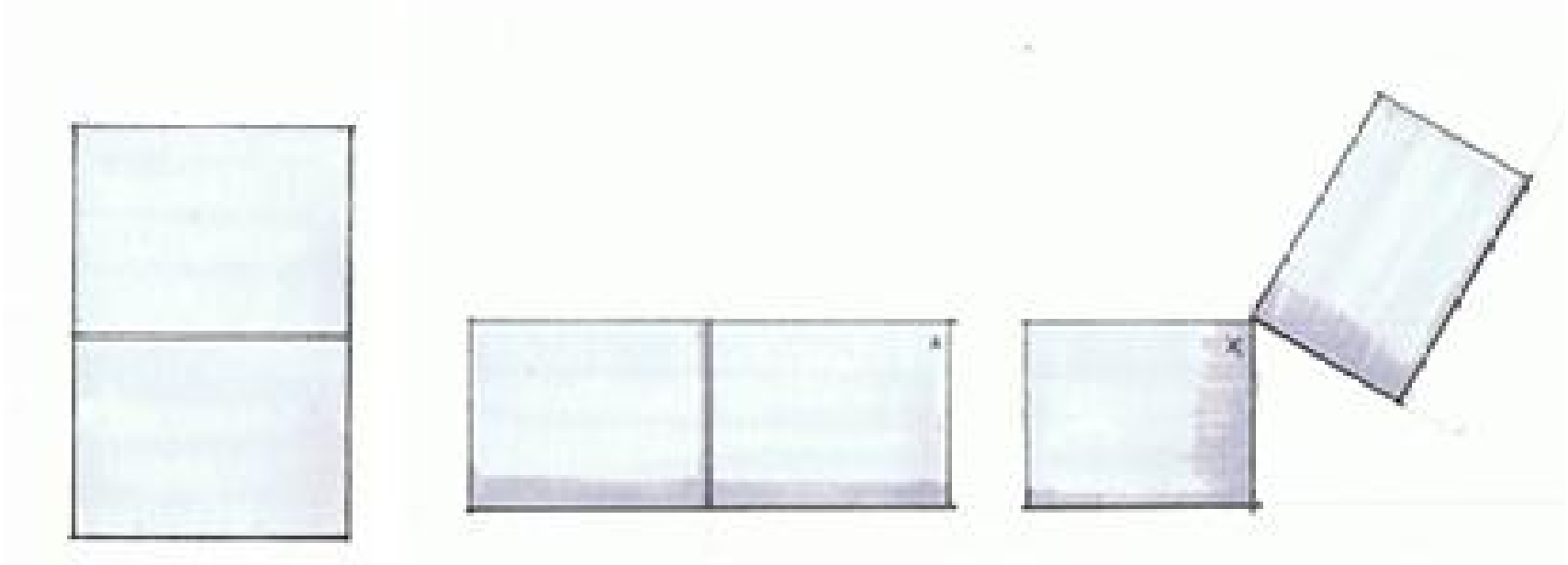
CONCEPT 1



A second solution. The table on top get pushed to the opposite direction.

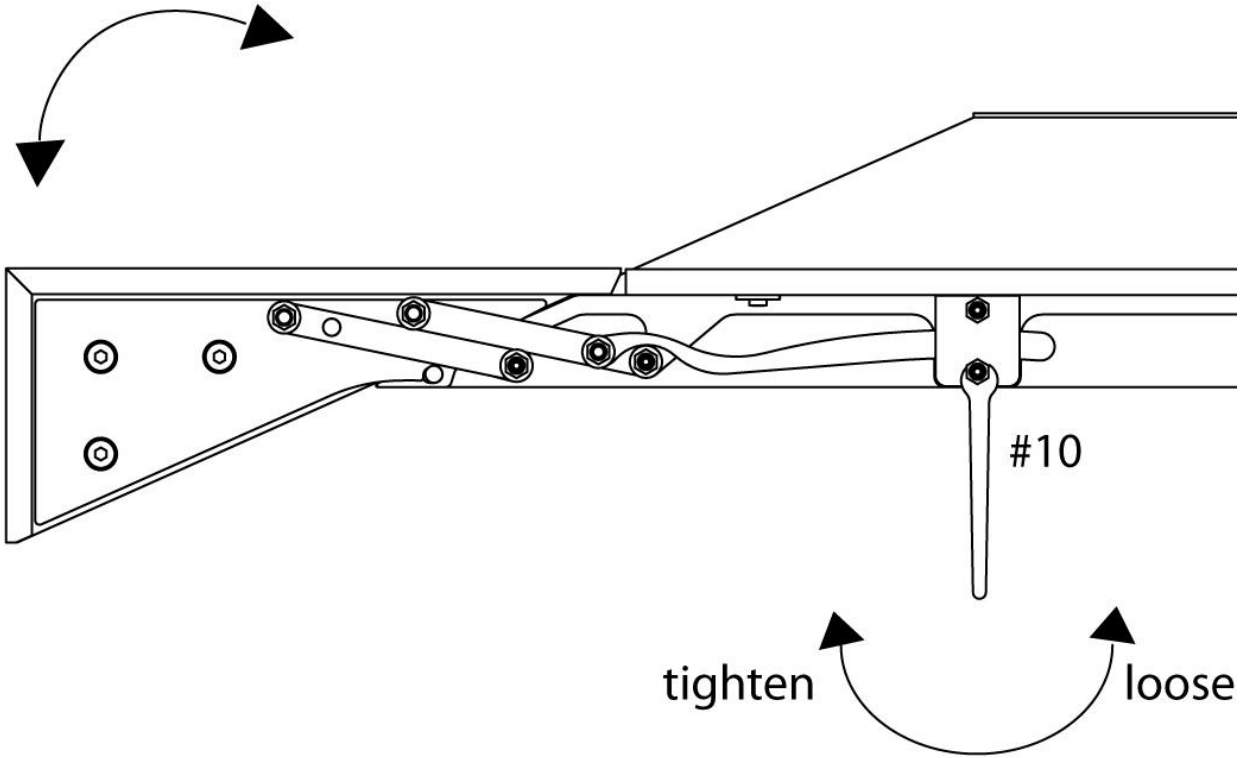
By Maria Løland, Sofie Marie Blattmann, Ana Nieto & Amelie Keil

CONCEPT 1



A third solution. Plane boxes with hidden storage.

CONCEPT 1 // Construction method

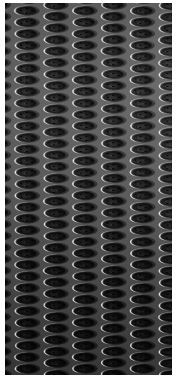


CONCEPT 1 // Material solutions



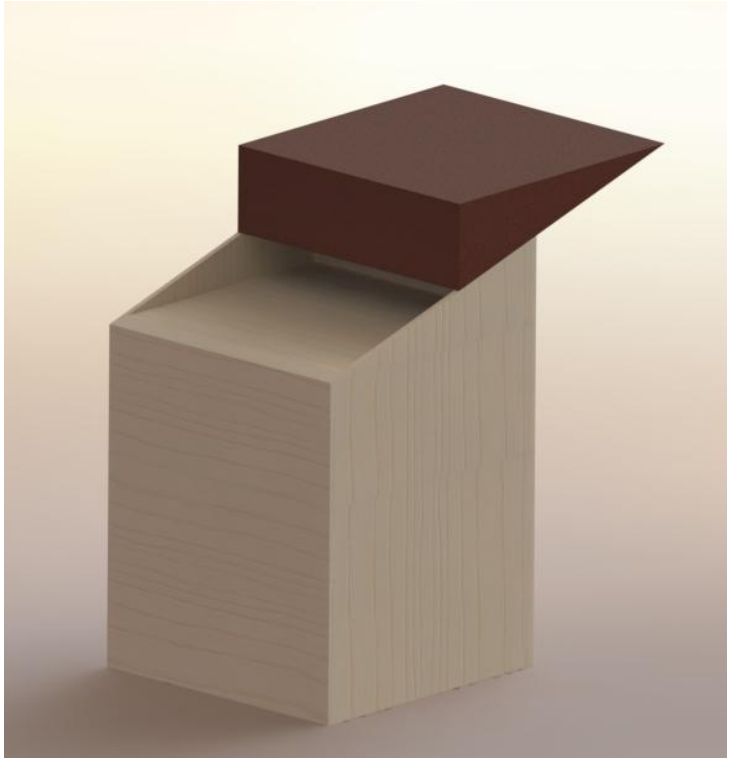




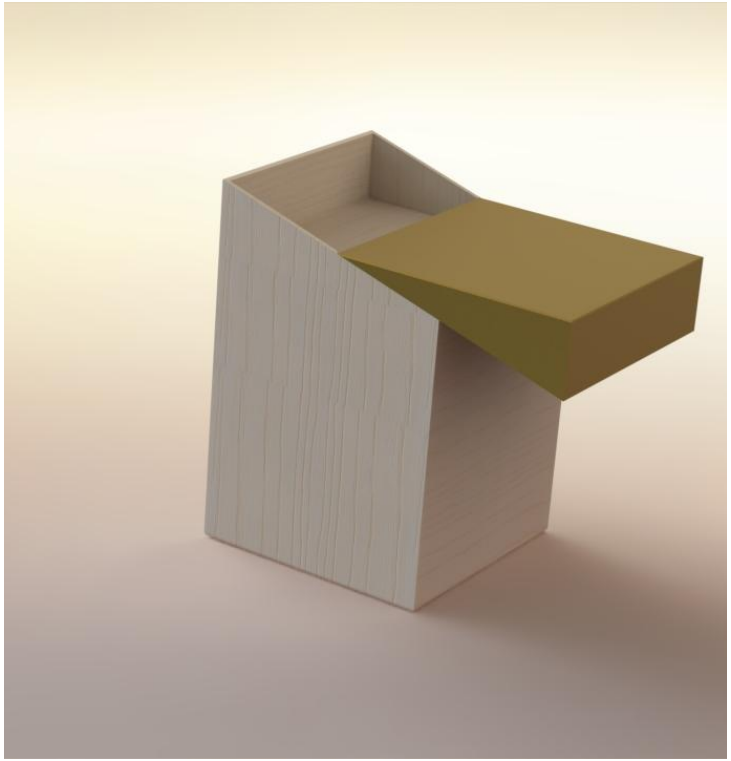



By Maria Løland, Sofie Marie Blattmann, Ana Nieto & Amelie Keil

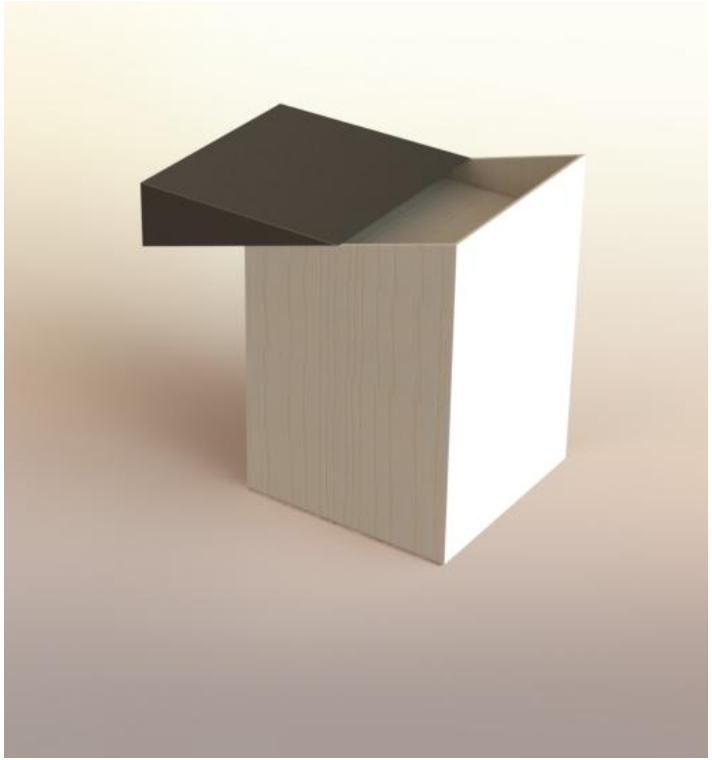
CONCEPT 1 // Material solutions

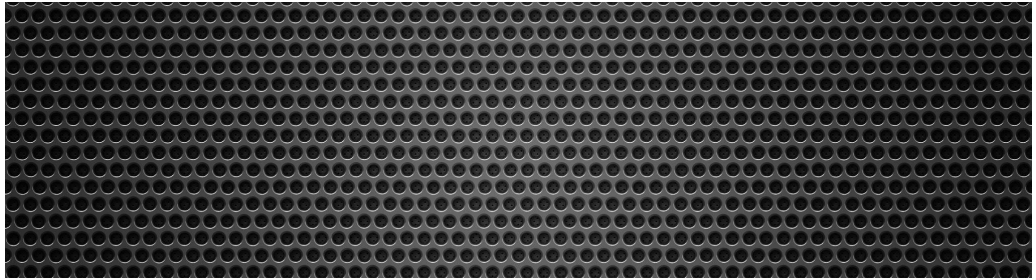


CONCEPT 1 // Material Solutions

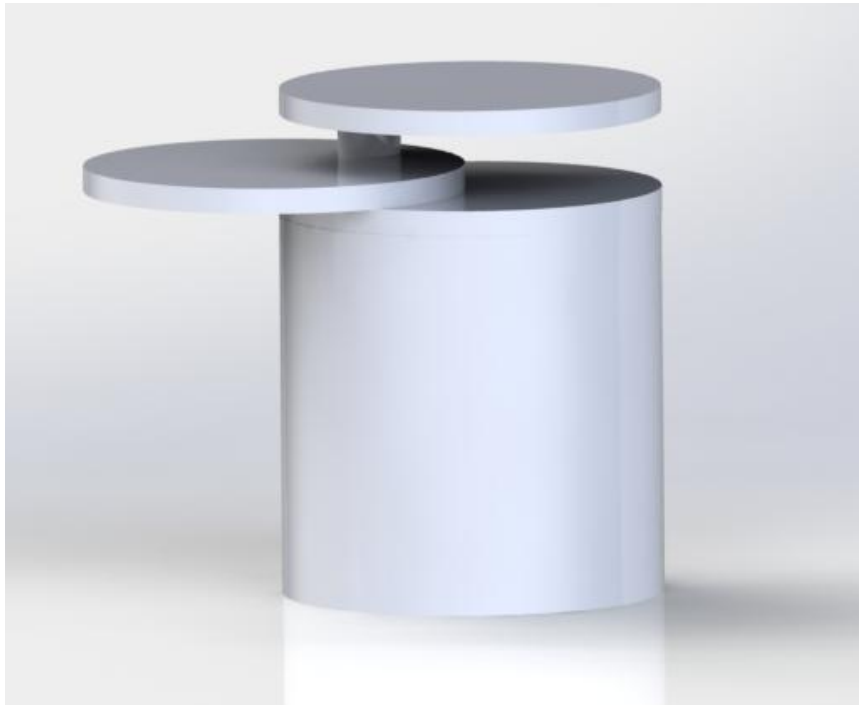


CONCEPT 1 // Material Solutions



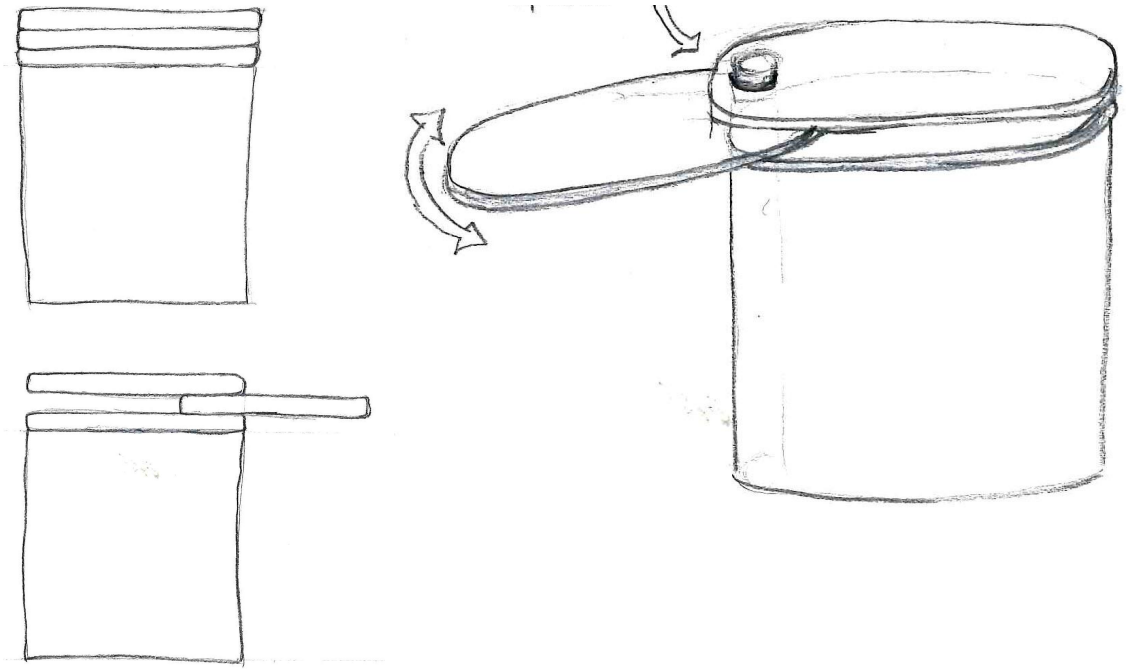


CONCEPT 2



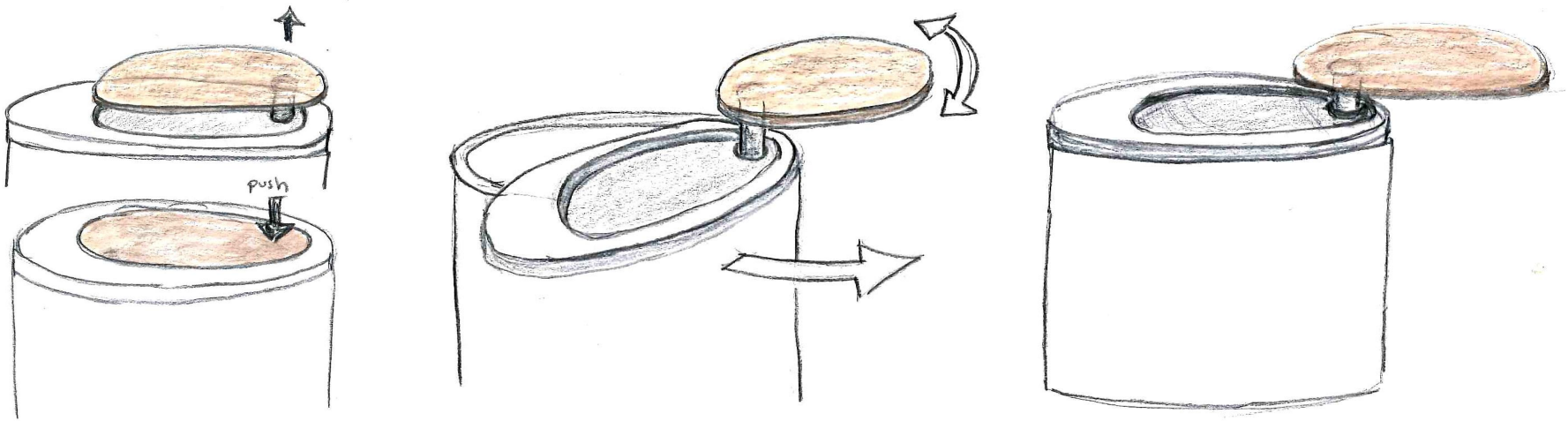
CONCEPT 2

First solution



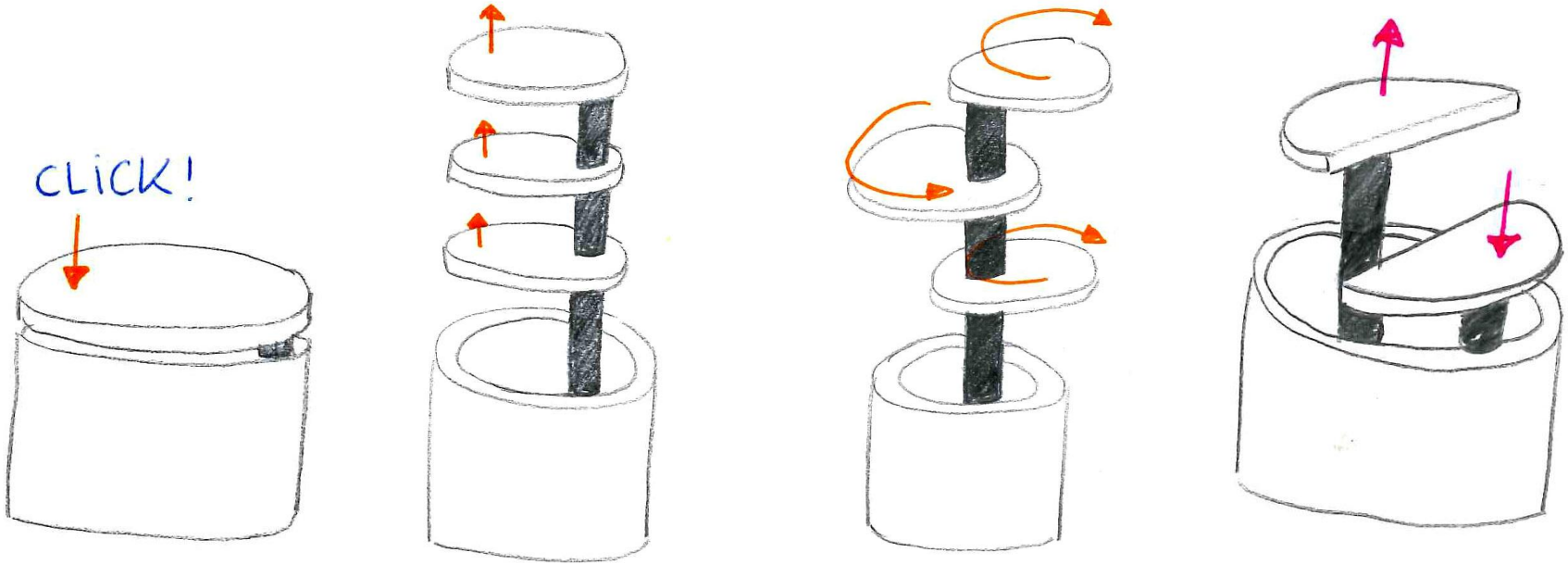
CONCEPT 2

Second solution



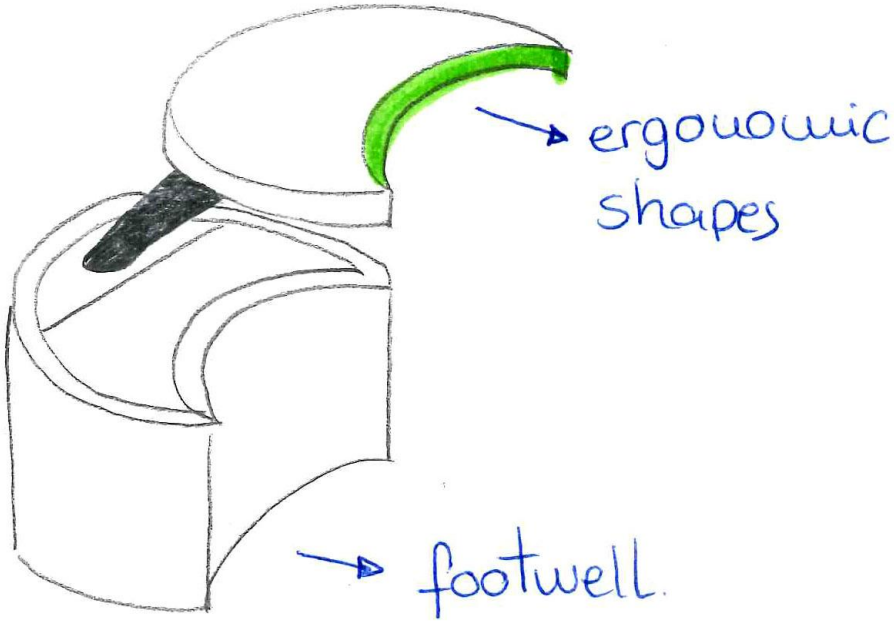
CONCEPT 2

Third solution



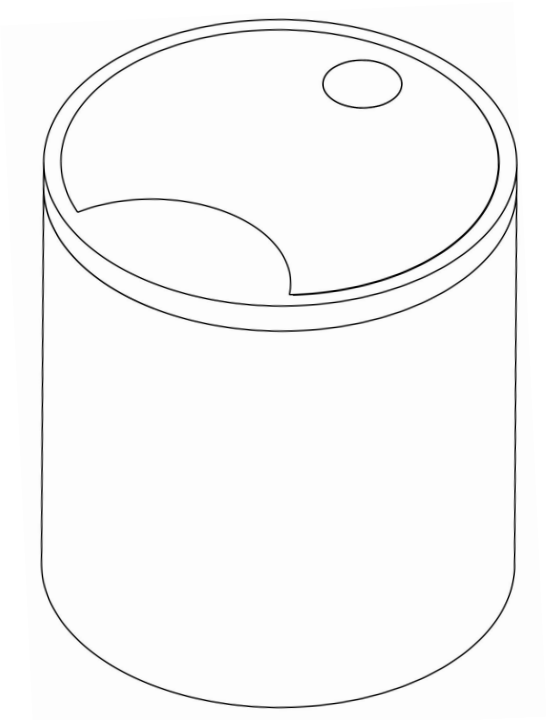
CONCEPT 2

Fourth solution

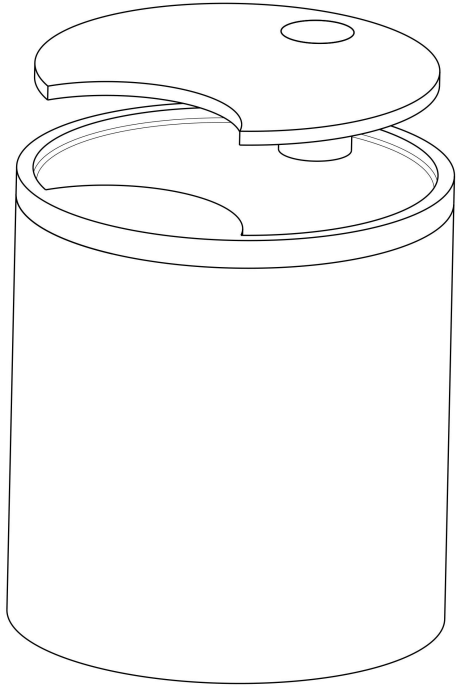


By Maria Løland, Sofie Marie Blattmann, Ana Nieto & Amelie Keil

CONCEPT 2 // Estimated measures



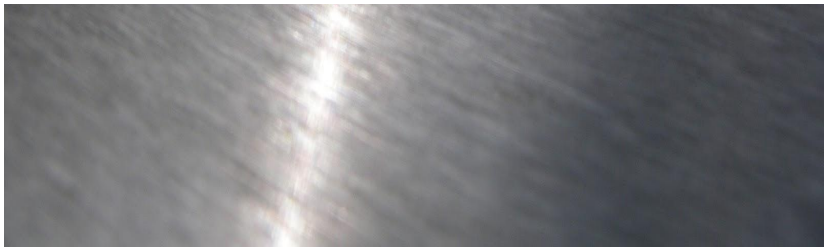
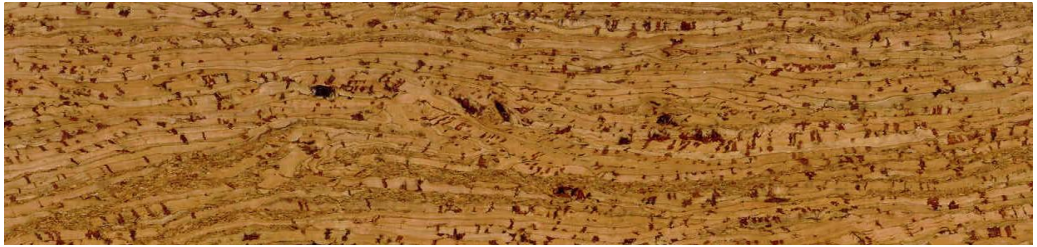
CLOSED: 500 mm height

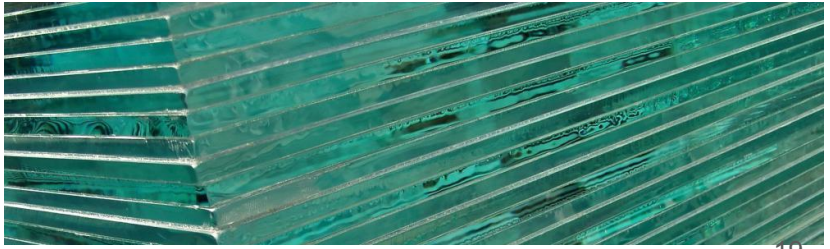


OPENED: 740 mm height

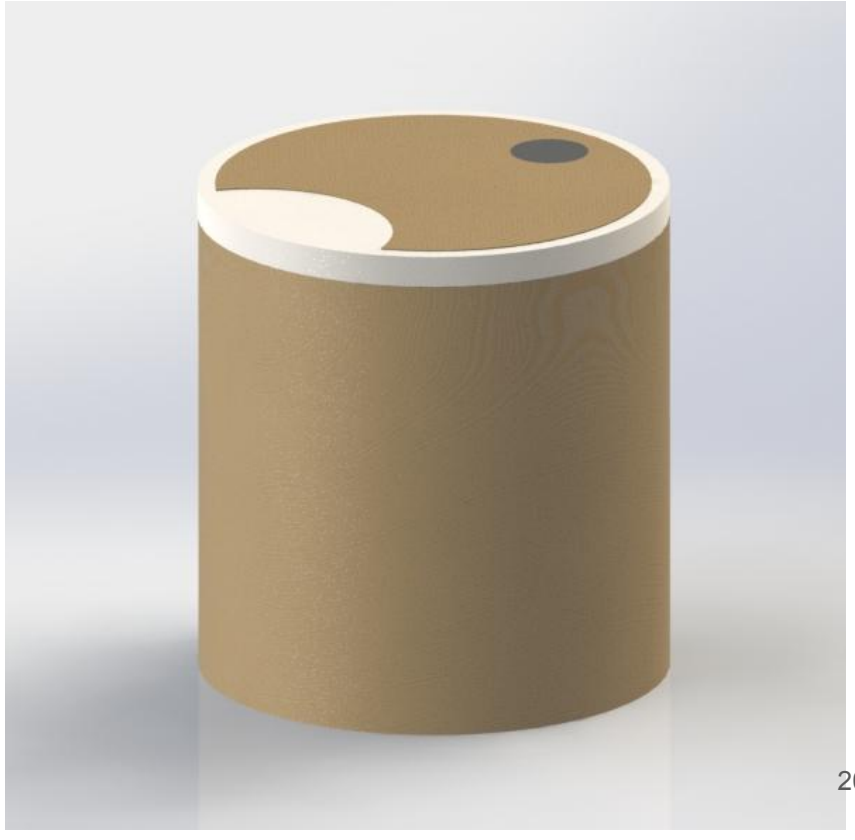
By Maria Løland, Sofie Marie Blattmann, Ana Nieto & Amelie Keil

CONCEPT 2 // Material solutions

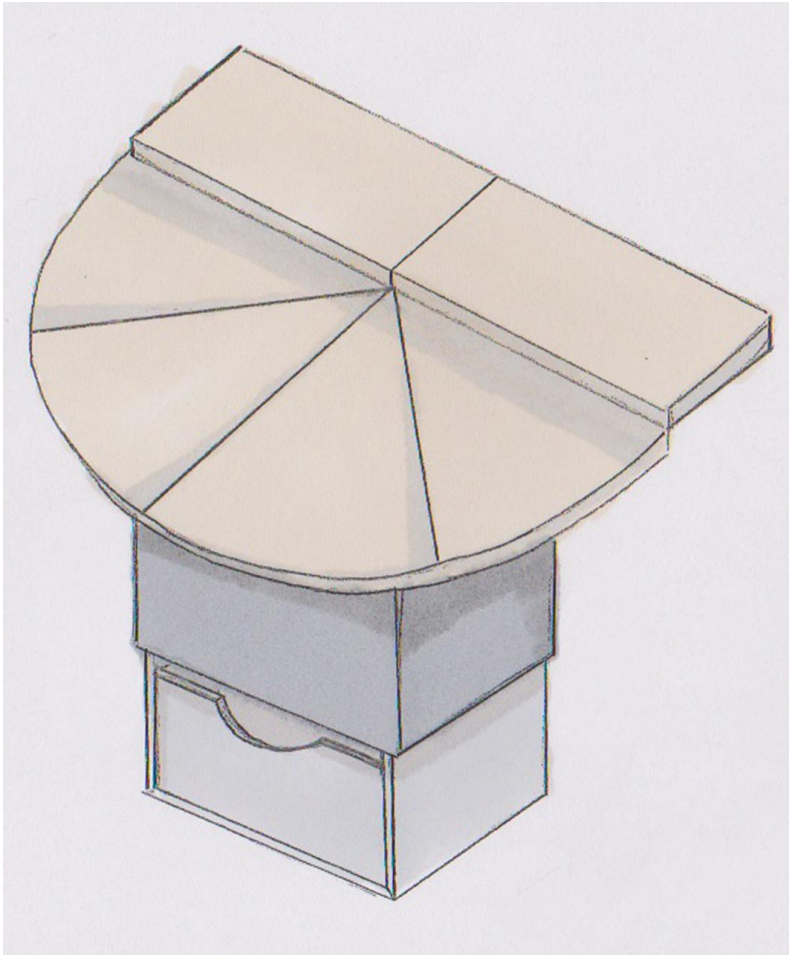




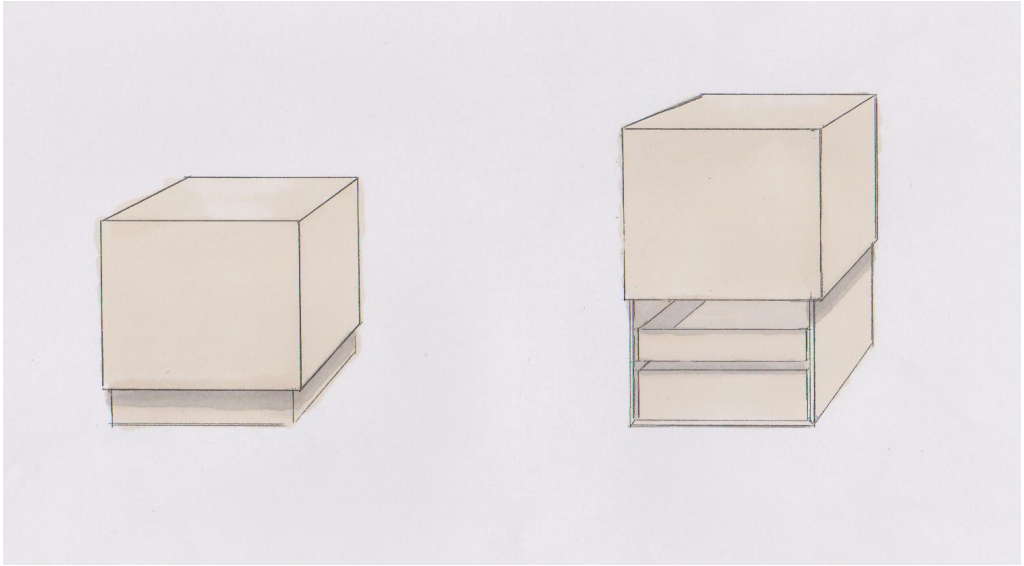
CONCEPT 2 // Material solutions

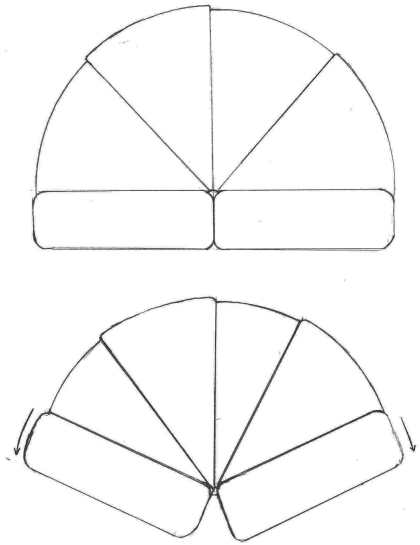


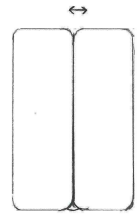
CONCEPT 3



CONCEPT 3 // Table top and base



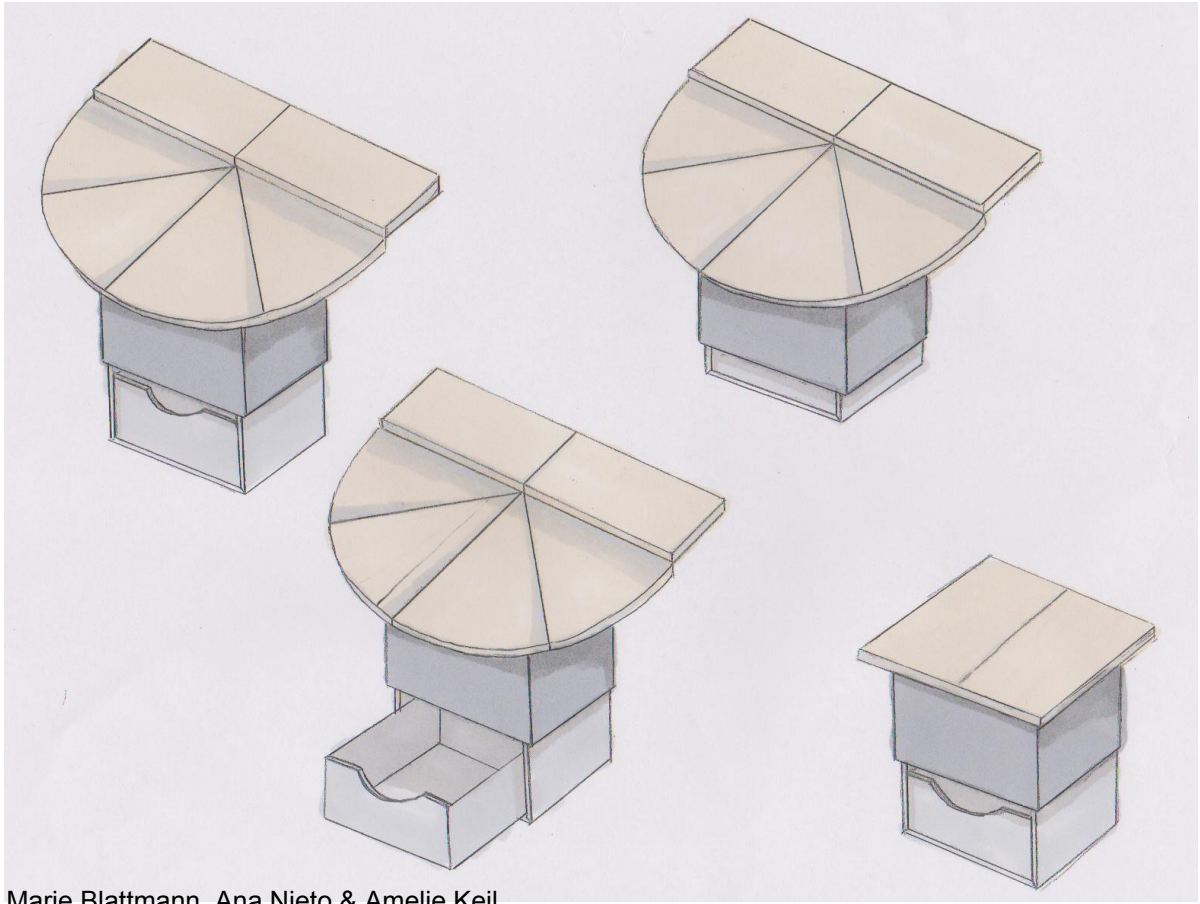




Estimated dimensions of table base:
Lowest: 40cm
Highest: 70cm
Width: 30 x 30 cm

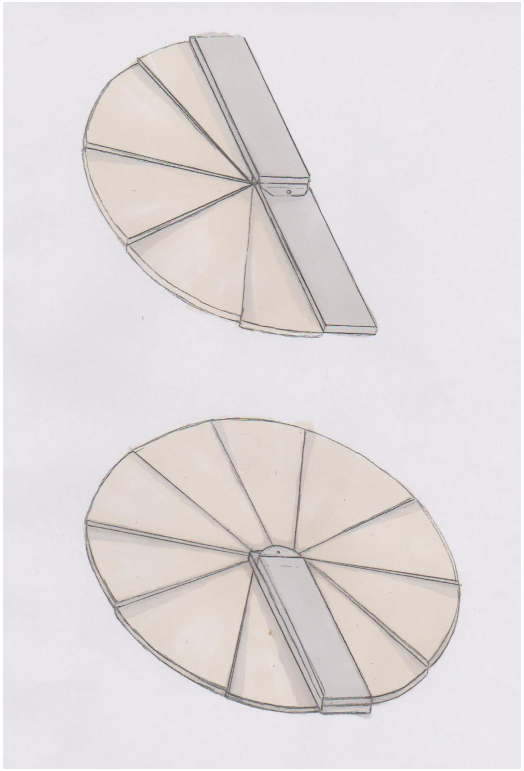
By Maria Løland, Sofie Marie Blattmann, Ana Nieto & Amelie Keil

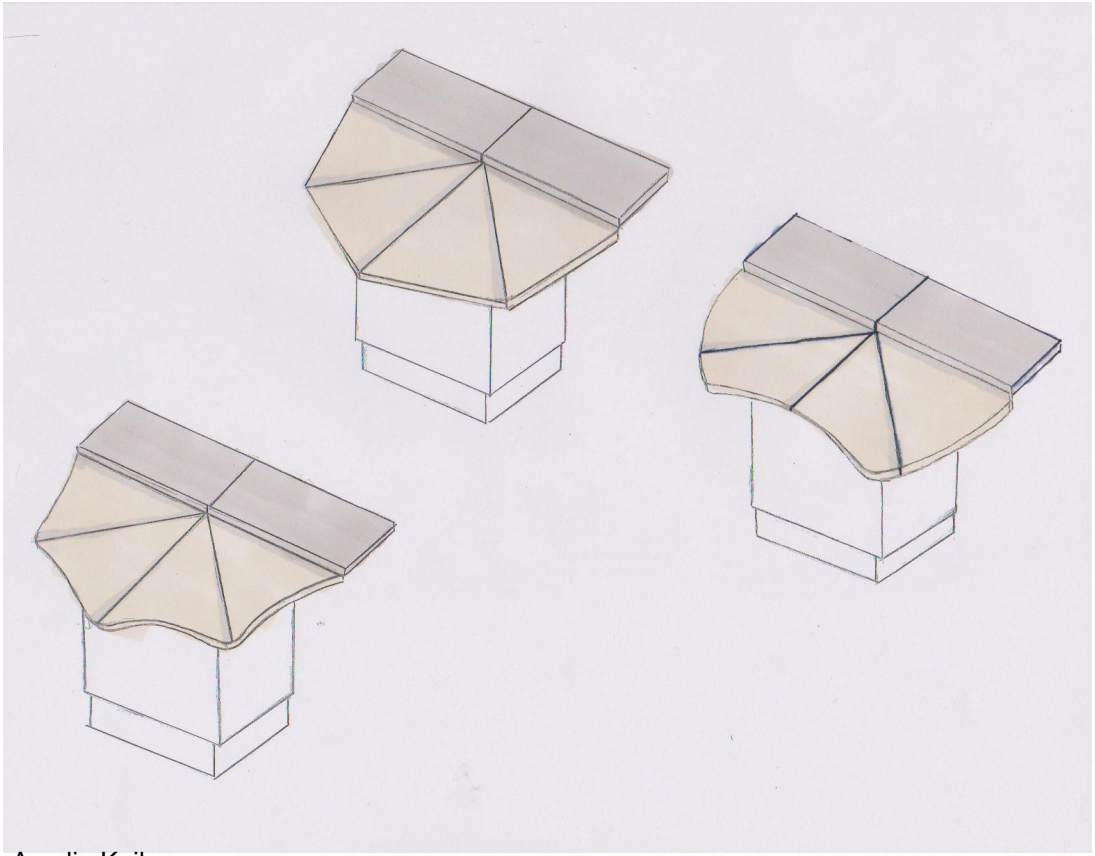
CONCEPT 3 // Functions



By Maria Løland, Sofie Marie Blattmann, Ana Nieto & Amelie Keil

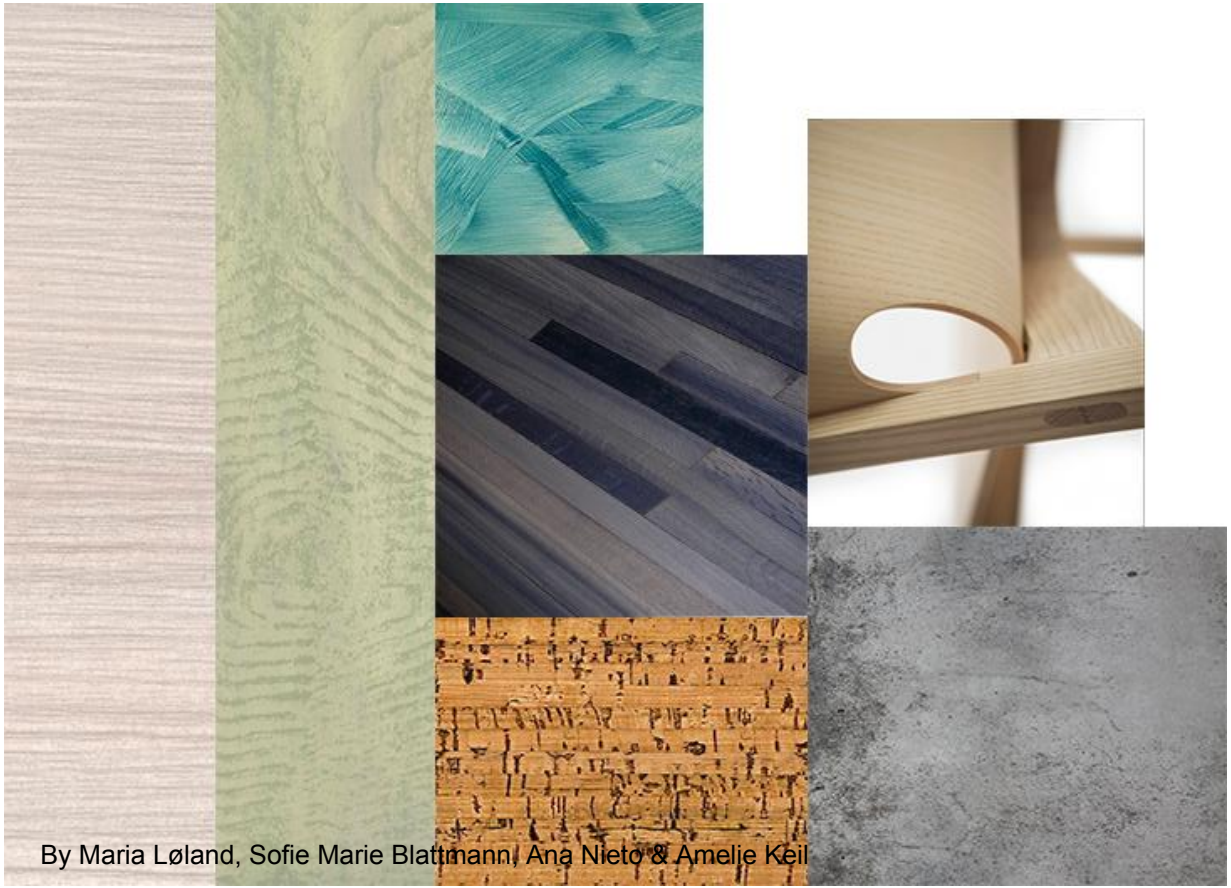
CONCEPT 3 // Variety

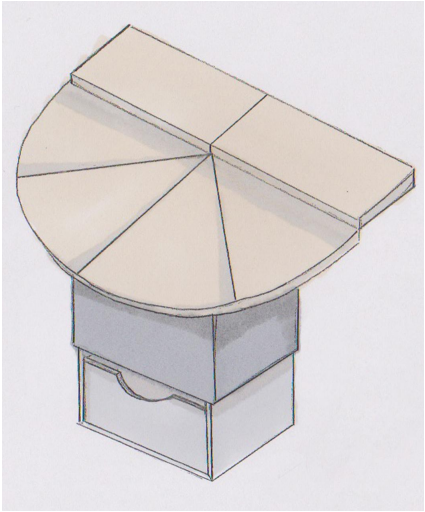


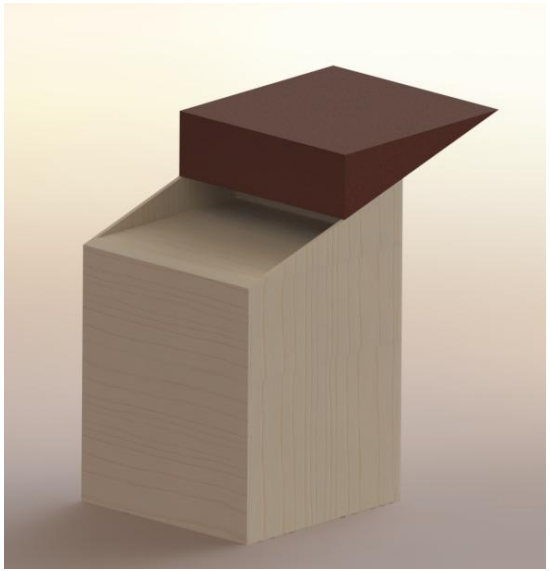


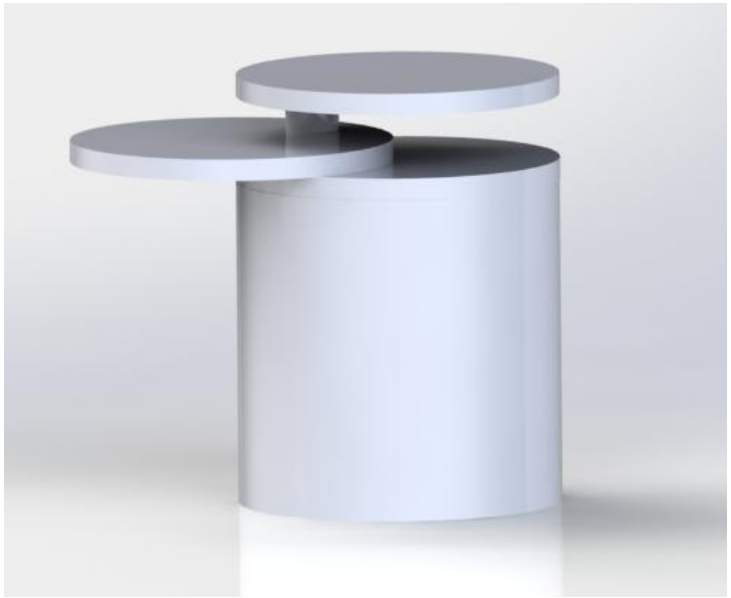
By Maria Løland, Sofie Marie Blattmann, Ana Nieto & Amelie Keil

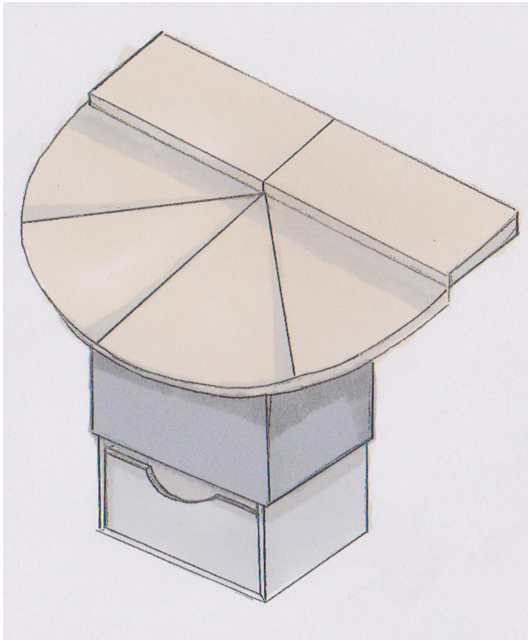
CONCEPT 3 // Colors and Materials







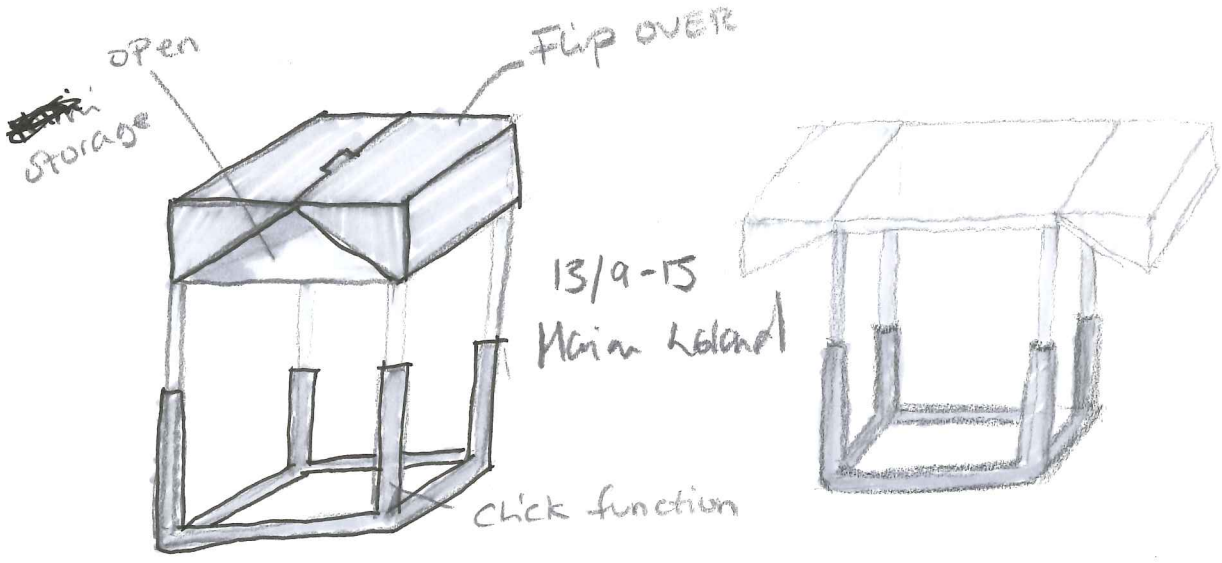


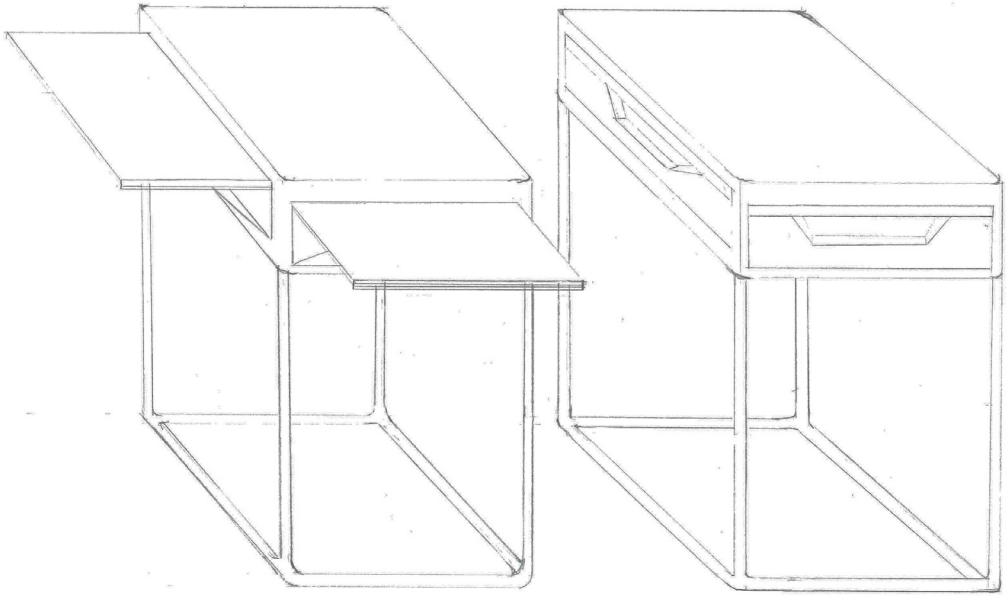


PART2 DEVELOPMENT

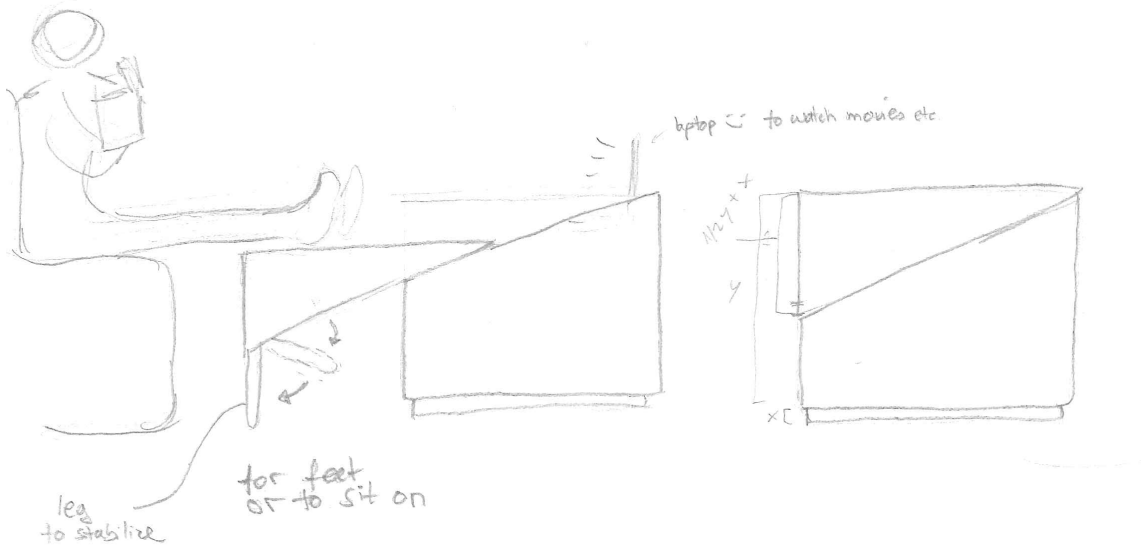
From the sketches you can see our development from this to the final concept shown at MP3. This was as our chosen concept that we developed the final prototype from. The name Bermuda was chosen for this concept because of the triangles.

Bermuda concept (MP3)





10/9-15
STB


laptop ⌣ to watch movies etc
leg to stabilize
for feet or to sit on


small storage possibility
→ could go with this idea
A.Keil 10/9/15


A.Keil
10/9/15
A.Keil

WORKPLAN

Prosjectname.:	Fordypning i produktdesign / Product design specialisation																																	Start date:				13.aug.					
Done by:	Maria Løland, Sofie Blattmann, Amelie Kell & Ana Nieto																																	End date:				28.okt.					
Date.	Uke 33			Uke 34			Uke 35		Uke 36			Uke 37			Uke 38			Uke 39			Uke 40			Uke 41			Uke 42			Uke 43			Uke 44			Uke 45			TOTAL	CURRENT	DEVIATIONS
Insight																																										
Assignment brief	8																																					8	8	0
Analysis	3			15			10																															28		-28
Userprofil (target gropup)							6																															6	6	0
Project terms							8																															8	3	-5
Market assesment							10																															10	1	-9
Project terms(identity,symbol,enviroment value, functionalty). Sale price and product map of product							12																															12	1	-11
Project description				12			3																															15	1	-14
Sketching / mock-ups									25																													25	34	9
Tutoring																																						1	1	1	0
Development																																										
Concept development										52		69			38			37			16																	212	35	117
Bullet Points																		2																					2	1	-1
User tests																		13																					13	8	-5
Mid-term rapport																		12			36																	48	11	-37
Digtital drawing																											20											20	40	20
Estiment development cost																											3											3		-3
Final modell																					94	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	112	206	94
Work report with supplementary material																																						115	148	33
Preperation of presentation																					9																	12		0	0
Tutoring																					1											4	1					6		-6
Reflection notes																												1										1		-1
Summery / extra work																																									
Correction																																						0		0
Extrawork /mistakes I																																						12	0		0
Course evaloution																																						1	0		0
																																						645	504	141