

Bord(en)

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LUNDS UNIVERSITET

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From Lund University School of Industrial Design, Department of
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Lastly I want to thank my fellow students and family with whom I have discussed my project with for many hours.

Abstract

The main goal of this project was to create a table which could be used in different heights and for different purposes. Height adjustments would allow the users to be seated in different ergonomic positions. The affordance of being able to use the table for different purposes is valuable for a compact living situation.

Reports regarding our constantly changing living situations and the benefits of eating together as a family became the backbone for my project. A personal interest in Japanese culture and objects was my creative inspiration.

The table was built in scale 1:1 in Ash wood which is ideal for furniture because of its mechanical properties. The framework for the table can be adjusted so that the legs can extend upwards together with the table surface.

Summary

Project Aim

For my final project within the Bachelor I was determined to explore more about a certain place in our homes, the kitchen table. Growing up in a family where everyone had lots of different activities everyday meant that we did not see each other in the morning rush. Instead we gathered at the end of the day around the dinner table to enjoy a meal together and to sum up the experiences of the day. With this valuable lesson from home along with an IKEA report¹ I read that detailed how the people of today feel less at home in their own physical space made me think. The same IKEA report also referred that location is the new currency of our constantly growing cities. Our living space is simultaneously getting smaller and smaller. As I continued my research I found other reports that detailed how children who eat together with the rest of their family actually have a decreased risk of getting eating disorders.

After the research phase it became clear to me that my objective should be to design a dinner table for families who need versatile furniture that can adapt to the situation. In order for them to be able to eat dinner together or invite guests over.

Inspiration

On a trip to Japan in 2015 I came in contact with how the Japanese people live their life. The country itself is about the same size as Sweden but with a population of over 126 million people².

In order to make life manageable in Japan everything needs to be optimised and thought true. It is encoded in the DNA of their culture and they have mastered how to design multipurpose furniture that take up little to no space. Traditional Japanese furniture typically feature well thought joinery and honest materials such as raw and untreated wood. These joinery techniques are almost like a piece of art and when you look at them you can not help to think how they actually fit together.

In a traditional Japanese home you can often find a Chabudai³. A 30 cm high table that features as the dinner table. The user is often seated on a small stool or directly on a soft mattress. This piece of furniture intrigued me and proved to be a major inspiration for my project.

Result

The finished prototype is a combined dinner and couch table crafted in ash and steel. A wood that is hard but relatively light, the wood grains are fine and the colour palette is encompasses white and yellow tones. The table consists of of a frame made entirely in wood, steel legs that can slide into the frame to allow the user to adjust the height and of course the table table top. The table could be used as a standard dinner table, a desk, a couch table or as a traditional Japanese dinner table. I designed all the parts so that end consumer could mount it together themselves.

Hopefully this piece of furniture would encourage people to gather around and ultimately create a sphere that the user would be proud to call home.

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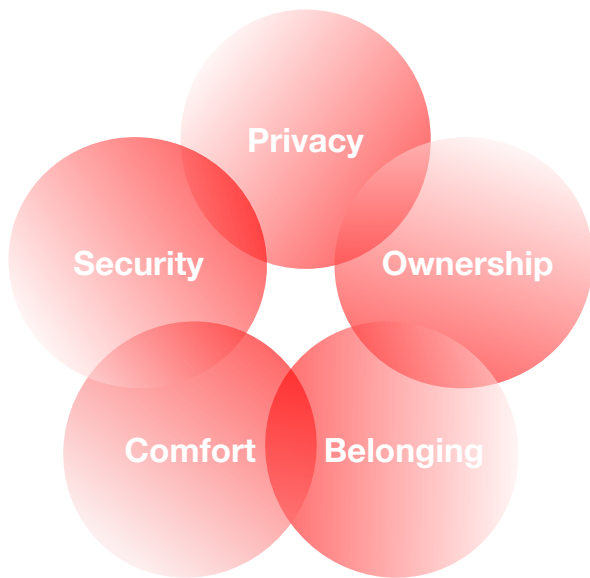
Research

Do you feel at home?

Every year IKEA conducts a report they call "Living at home". The goal of the report is to make it easier for them to overview how the behavior of their customers has changed over the year.

This year's annual report was conducted over 22 markets and over 22000 people participated. One of the things they found out was that 35% of all the participants felt at home in other places than the actual space where they live. The same parameter was 20% in 2016 and increased dramatically in 2017 to 29%. You could say that this is now a tendency and that our idea of home is changing. One of the most important aspects in choosing a space to live in is of course location. The last 120 years have seen a rapid of industrialization. As more people move into cities, spaces become smaller and location becomes the new currency of living status.

According to IKEA's survey would 64% prefer to live in a small space if the location was great versus a big home with a less ideal location. This is astonishing and really proves that we as designers must design furniture that's adaptable to our needs, saves space and of course are environmental friendly. In the report conducted by IKEA they have identified five pillars that defines why people feel at home in a space.



Privacy: A feeling of being in control of the environment and of course being sheltered both visually and acoustically.

Ownership: A feeling of responsibility and being in control of the environment. Connected with pride and freedom.

Belonging: A feeling of being accepted and free in order to be yourself. Also connected to everything you are not.

Comfort: A feeling of ease and relaxation. Of course it is also closely connected to physical well being.

Security: A feeling of safety and trust that you can let down your guard.

The conclusion I draw from this report is that our very definition of home is ever changing. Our physical spaces are decreasing in size and therefor our products needs to be better designed. We need to use the materials in each product wisely and constantly question if our products can have multiple use cases.

The report also declares that 1/3 of us feel at home at other places than our actual physical home. This fact in combination with the desire that over 2/3 of us want to create a different home than the one we were brought up in makes room for some new ideas.

My focus in this project will be on the heart of the house, the dinner table. I want to explore how we can combine different cultures and create multi use furniture with good ergonomics.



Around the kitchen table

In a household the kitchen table is often the heart of the home, or at least it used to be that. The significance of a place to gather around to enjoy a meal together, play board games, repair things, do the homework or just have a conversation with friends and family. The scale of the kitchen table makes it ideal for conversation since you sit comfortably close to each other. Compared to a living room where some spots are of course more comfortable than others and distance and direction might make it hard to include everyone in a conversation. Around the kitchen table everyone is equal and included.

At our household, and probably many more, the kitchen table was a no-tech zone while eating meals together as a family. Often the dinner at the end of the day was the only time we spent together. This gave us time valuable time to talk about our day, about what's on the schedule for tomorrow and after the dinner some time for playing board games. I could easily say that some of the best moments I have shared with my family and friends have happened around the kitchen table, the heart of the home.

To eat together is not only an activity that's good for the family dynamic, it has also been proven to benefit children's health. In a study published in 2011 by a research team from University of Illinois⁴ they found that there was a clear correlation between shared family meals and better health. The study was made with the help of 182,000 kids and young adults between the age 2.8 and 17.3 years. In other words, eating together around the kitchen table can influence your life positively in many ways.

History

To really examine how and where we eat today we must take a look at history and different cultures. Like many other things, the Egyptian civilization have provided the oldest proof of tables being used⁵. These basic table structures were often just a pedestal on which you could place a tray on top to serve food and drinks. Of course this was only for the really rich people of society. The ancient Greeks and Romans developed the concept further and constructed tables resembling the ones we have today. Main materials were marble, wood and metal alloys like silver or bronze. The word itself is derived from the Latin word "tabula" meaning board, plank, flat top-piece. There are plenty of different designs and specialized use cases for tables.

Chabudai

In a traditional Japanese home you would find a special table called a Chabudai with a table height of approximately 15 to 30 cm above the floor. These tables would often have a collapsible structure that would enable the table to be stored elsewhere when not in use. The tables would be used for all types of purposes, dinners, tea ceremonies, repairs and among other things. In the winter time when the climate change and the temperatures get lower you could replace the Chabudai with a Kotatsu. A similar table with a sort of a blanket wrapped around it.



Re-defining my brief

Initially I wanted to design a full experience, a table that could be converted with accompanying chairs that would allow the same adjustment in height. As I continued the research and looked into solutions that already exist on the market I found that it would be enough of a challenge to design the table itself. So quite early on I decided to drop the vision of designing the chairs. At first I felt a bit disappointed but as time went by I was happy with the decision. Designing a chair is a serious challenge and then to add the option to somehow remove the legs without losing any stability is definitely an engineering challenge.

So my brief was reformulated to: "Design a couch table that easily can be converted to a standard dinner table for at least four people."

Final brief

”Design a couch table that easily can be converted to a standard dinner table for at least four people.”

Competition

Unsurprisingly there are a lot of tables on the market and at first I thought that there would be an excess of tables that would tick all the boxes of my brief. Fortunately for my project there was not that many tables that would allow this functionality. Of those I found it was easy to divide them into three different categories, Functionalism, DIY and Japanese/Western. The tables that I looked further into was the one's whose main function was to be a couch table.

The first category of tables I called Functionalism after the architecture style from the sixties. These tables are often built in teak and the form language also follows the time. The fact that you can extend the table in height is often hidden and clever. These tables are typically only constructed in wood. A typical one that I found was "Sesam" designed by Folke Ohlsson.



The second category was DIY-tables (Do It Yourself). This category is extremely diverse since the tables are often designed and built by one person. Therefore they are as individual as the people who designed them. This freedom allows the designer to use as many building methods and material choices as they seem fit and therefore they are often very artisan and not applicable to industrial replication. Popular building methods include woodworking, steel welding and epoxy resin casting.



The third category I examined was the Japanese/Western combination. These tables are often designed for industrial replication for an audience that would need a traditional Japanese table with the possibility to transform it into a standard western table. The mechanics of these tables are often very simple. Often they drew inspiration from Japanese wood joinery and relied on a few simple steps to extend the legs.



Producibility

After my brief research I found out that I wanted something rather finished as the final product. This would not be a DIY-kit with different building options, instead a finished product where some machined parts would be put together by the user. Ideally I wanted the product to be as cheap to produce as possible. Ash is not the cheapest wooden material around but it offers great machinability and mechanical properties. For further development it would be reasonable to build the table top from somekind of MDF covered in veneer.

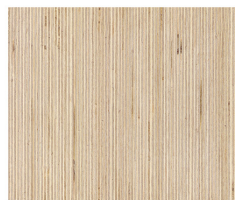
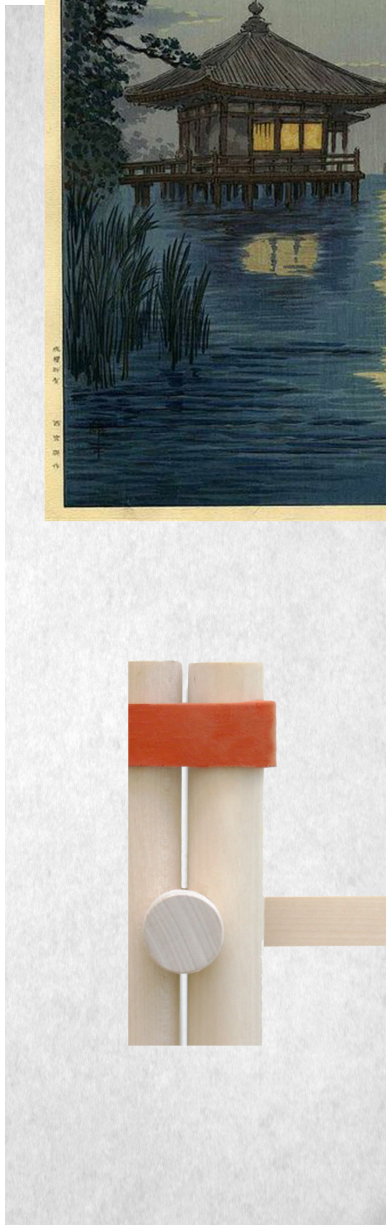
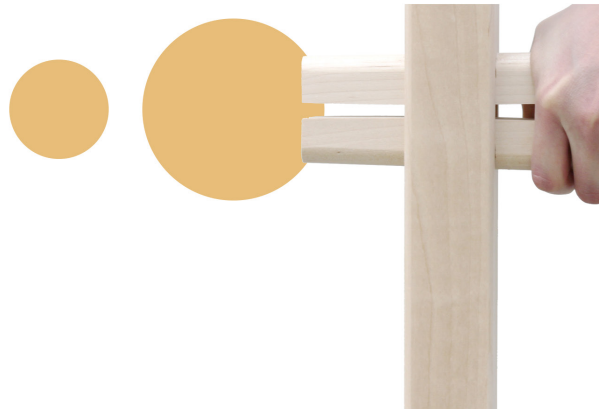
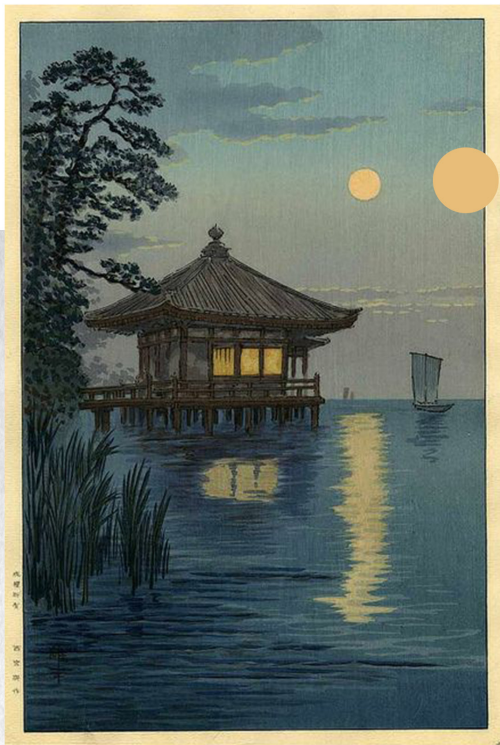
Conclusion

After my initial research regarding the competition I could conclude that there was lessons to be learned from all of them. I really liked the way the way the Functionalists table's were built almost entirely in wood and the fact that you could not tell from the first look at the table that it had multiple purposes. The DIY-category offered simple mechanical solutions with the help of steel bars and rods. The Japanse/Western table's featured a lot of finesse and simplicity which I would like to achieve.

Inspiration

After I had defined my brief, done some initial research and looked into the competition, I started building a moodboard. A combination of Japanese and Swedish artworks together with raw materials helped me set the path of how I wanted my product to feel. I deliberately excluded any finished products in my moodboard since they communicate a lot more than what's needed. Although, one product that influenced me was the classic Eiermann table⁶, designed by Egon Eiermann in 1953.





Function analysis

Main function:

Provide a table surface that could be adjusted in height to allow different activities and scenarios for up to 4 people.

Functions:

Allow two people to easily adjust the table height without much effort.

Offer a table surface that's sufficiently big for a dinner for four people as well to be used as a couch table.

Personas

In order to define the needs of my target users I created personas to represent the different users that could use my product. This was a very helpful exercise that gave me a lot of knowledge. For example I found out that some of the users might use the table to save sacred apartment space while others might use the table because of ergonomic reasons. Here follows an excerpt from some of the personas.



Lucy and James, both in their late twenties, are the urban couple who were dedicated to try their luck in London. When they moved together they decided that location and community was key and the Barbican Estate was their preferred choice.

Although they love cooking together and having friends over, fitting everyone is always a problem. Right now the only table they have is a coffee table in front of the TV-set.



The only space for a kitchen table

"Our apartment is great but we had to do some trade-offs. Not having a kitchen table is one of them.

It kinda sucks since we like having friends over. Instead we go out to eat..."



Pictures7

“I’m trying the best I can to make sure that I exercise my knees every day. Sitting in cross-legged really helps to relieve the pain in my knees.”



Janne's favorite spot in the house



Janne is 65 years old, retired and now living along the coast in the archipelago just outside of Gothenburg. As a former sailor he has travelled around the world and brought home small things from almost every single place in the world.

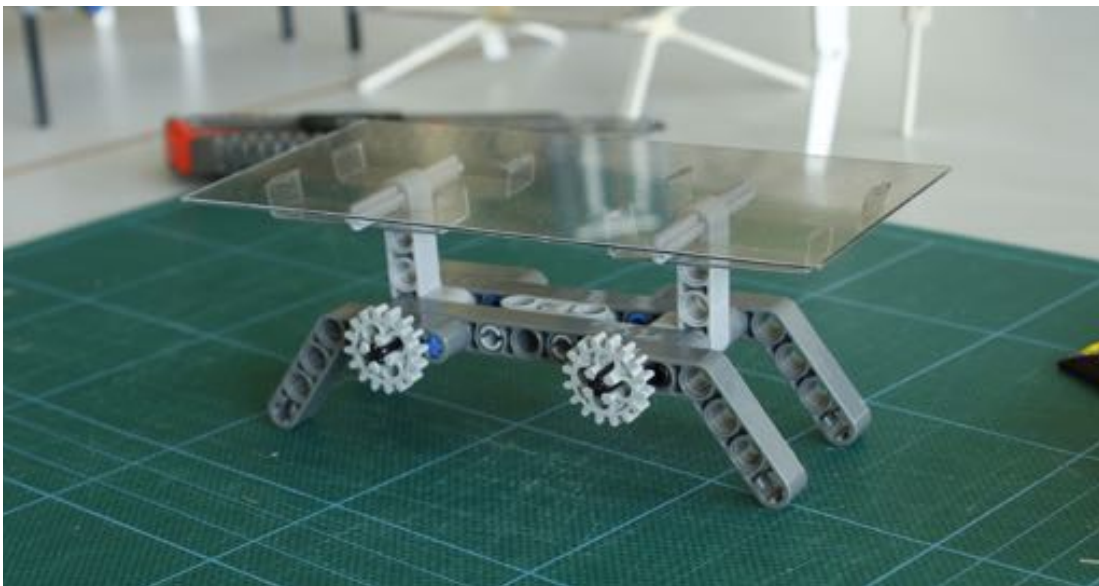
In recent times his knees have been holding him back exponentially. The doctors advice is that he should try to variate his ergonomic positions as often as possible.



Prototyping

Early stages

My preferred way of working with a design task is to start building models as quick as possible. In my opinion the fastest and most iterative way of getting further in the design phase is to build models. I started out by exploring how to solve the mechanical problems with the help of a LEGO Technics set. Quite fast it became apparent to me that I wanted the table always to be standing in the same direction. To clarify, I did not want the user to have to turn the whole table around to extend the legs. This would force the user to have a certain muscle capacity and space to transform the table. The LEGO models gave me a lot but it's hard to go into detail since the pieces have certain constraints. Therefore I worked in parallel with paper models to explore further. This would prove to be a fun and easy way to gain ideas. In total I built about 10 models in both paper and LEGO.





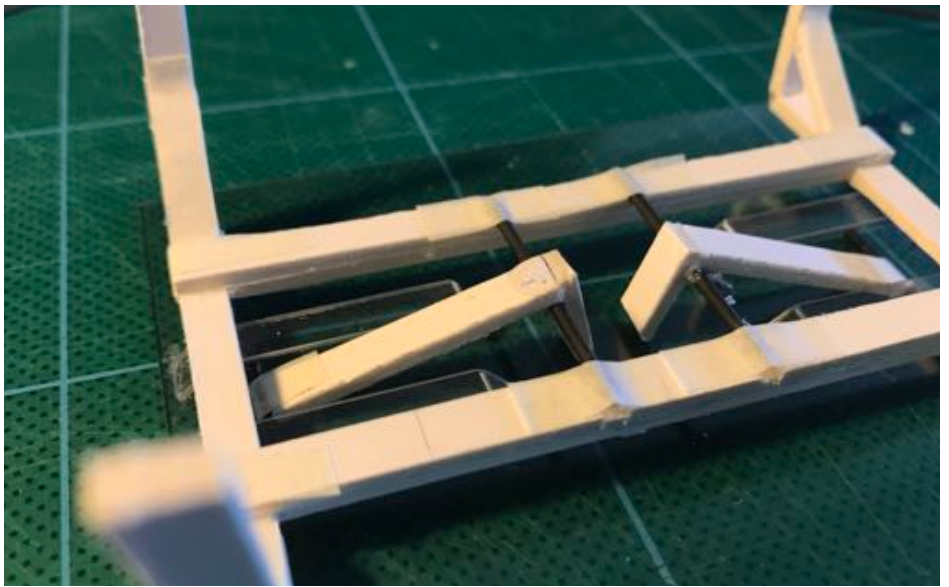
A concept which I liked a lot but that would be very hard to realize because of the mechanics. On the right you can see the table from underneath.



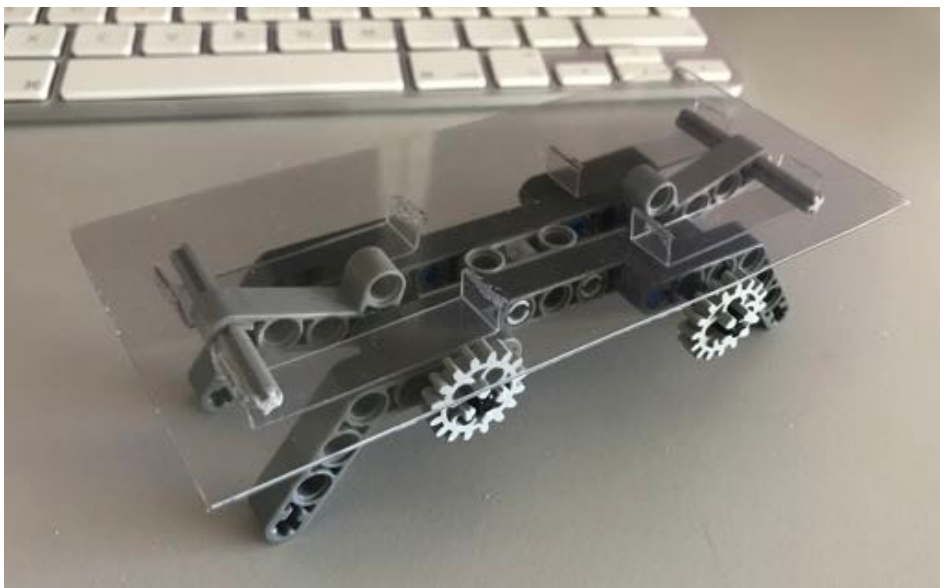
This concept would be built around a hinged system that would allow the table surface to be heightend or lowered. In order for this to work there would be a lot of fixtures which would add a lot of weight.



Inspired by traditional ropes found on old boats gave me this idea. In my concept the ropes could be tightened in order for the table surface to be heightend. This idea was hard to build with cardboard and would of course be even more unrealistic to pursue.



This concept was built with Lego which gave it a very technical look. In reality that was never the goal.



Sizing & proportions

In order for me to find the right size, dimension and proportions I knew that I had to go full scale. In previous projects this have often never been a problem but I soon realized that furniture is different. You can design all the details and features perfectly in a CAD-software but one thing that's hard to get right is how the object relates to the human body and the rest of the surroundings. Therefore it was necessary to build a full scale mockup. At first this mockup was built painstakingly in cardboard but I was quickly reminded that it's better to build in wood directly. The cardboard could not take any pressure or weight and therefor I could not test it in real world scenarios. I also cut my finger quite badly while building the frame.

Eventually I decided to build a functional mockup out of wood and steel, without any aesthetic consideration at all. A beat up table that had been in use at the clay shop gave me something to work on. My focus quite early on was to build a traditional Japanese dinner table and therefor I wanted to test how far from the floor I could have the table surface. I also wanted to test how many people that could be seated and at what distance from each other since this would decide the dimensions of the table surface.



The rough cardboard model that almost cost me my finger.



Fabian trying out the appropriate height for the table surface.

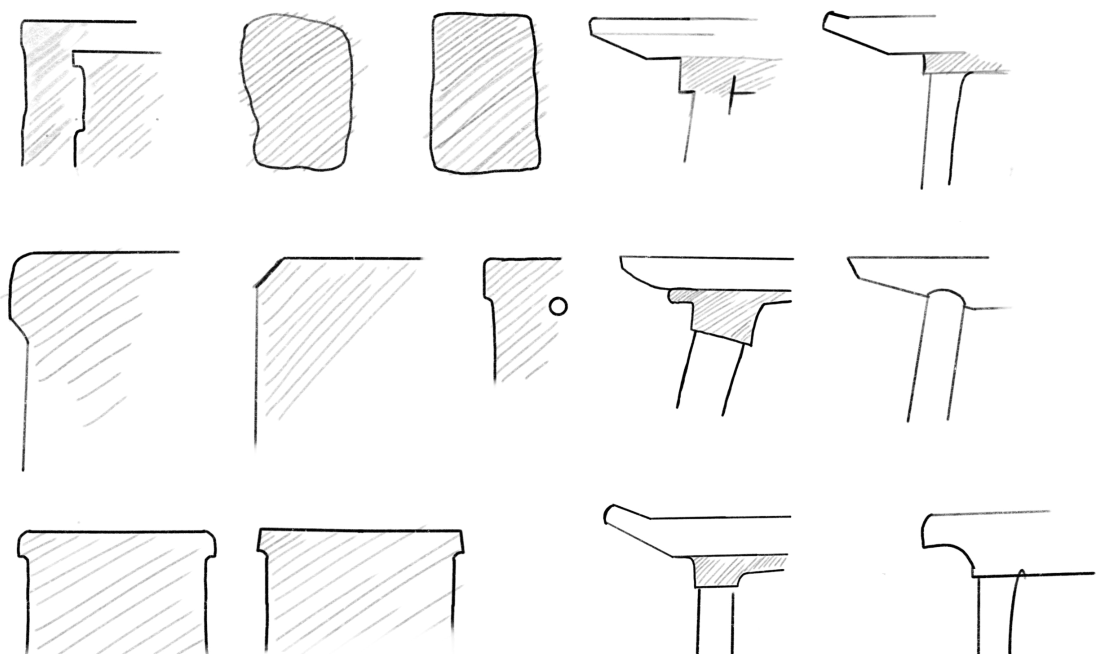
To do this I went down to the workshop and cut the legs to 40 cm (including the table surface). This would prove to be enough height to have your legs under the table while at the same time proving to be a good height for a lower couch table. With this crude prototype I also tested how much space was needed when you were sitting down for a dinner on the floor like a traditional Japanese dinner. For a few lunches did my fellow classmates from different study years help me find the appropriate size of the table surface. IKEA's wide variety of couch table's in different sizes guided me in the right direction.



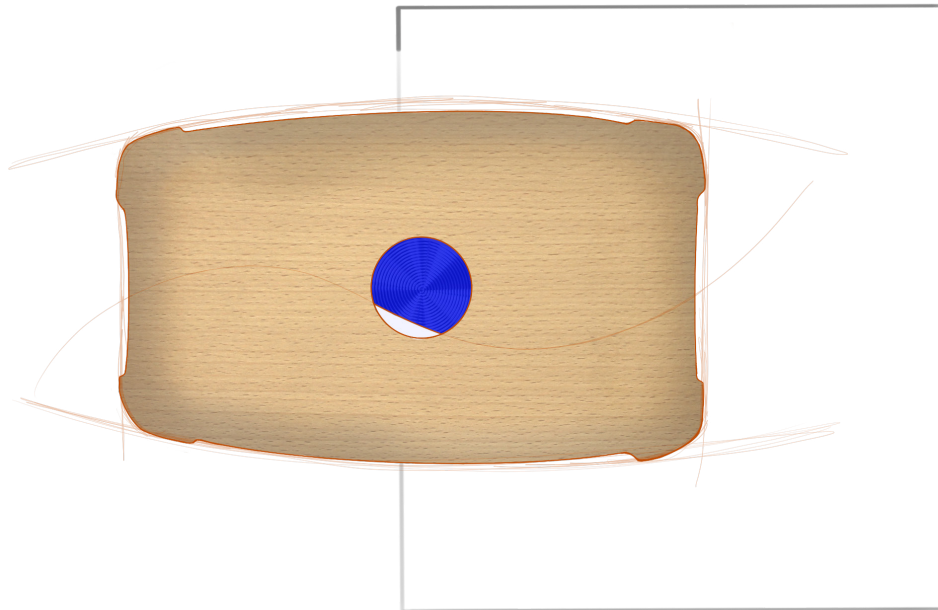


Sketch phase

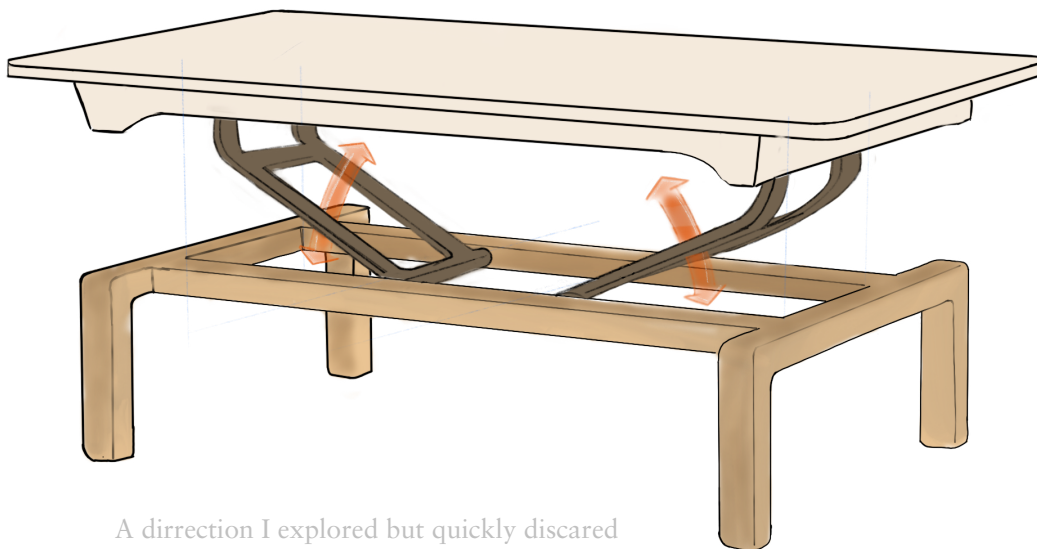
Generally my workflow is often quite hands on and therfor I do not sketch that much. But since sketching is much faster than building models I decided to buy an iPad Pro to improve my sketching skills. This was the first project where I tried the iPad in the workflow and it helped me to improve in the design phase although I have a lot more to learn.



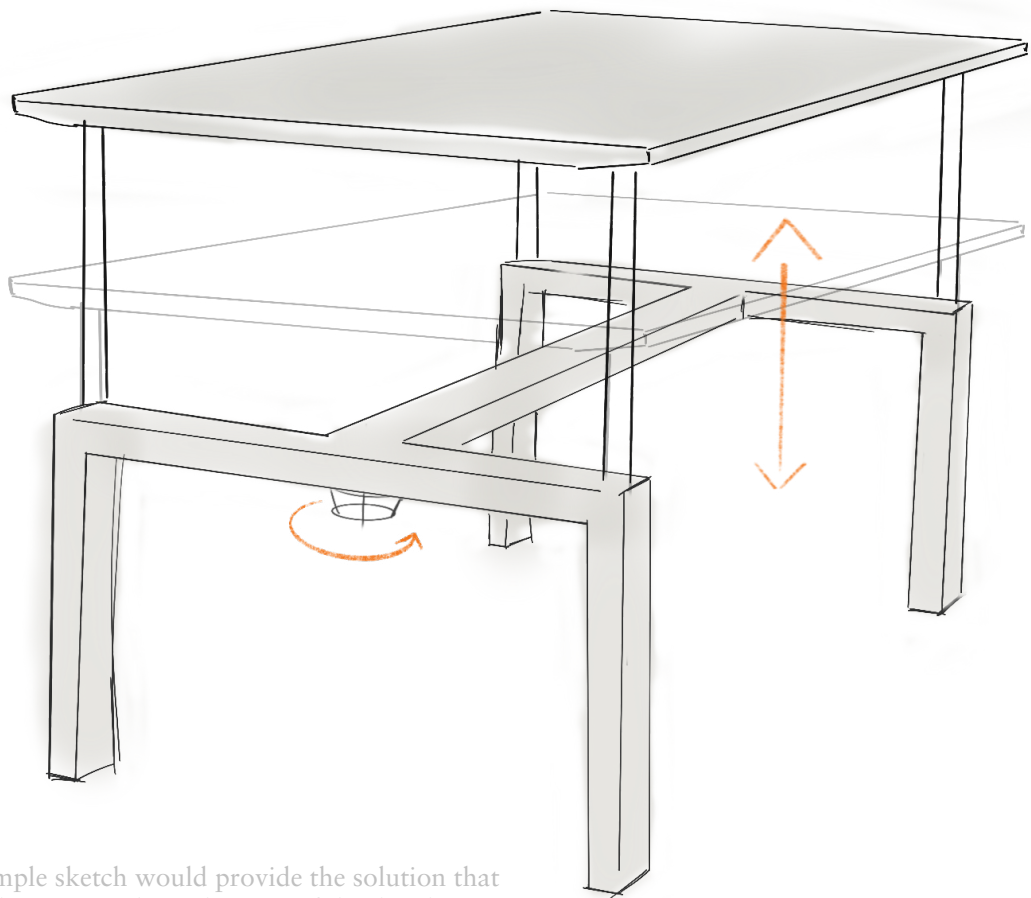
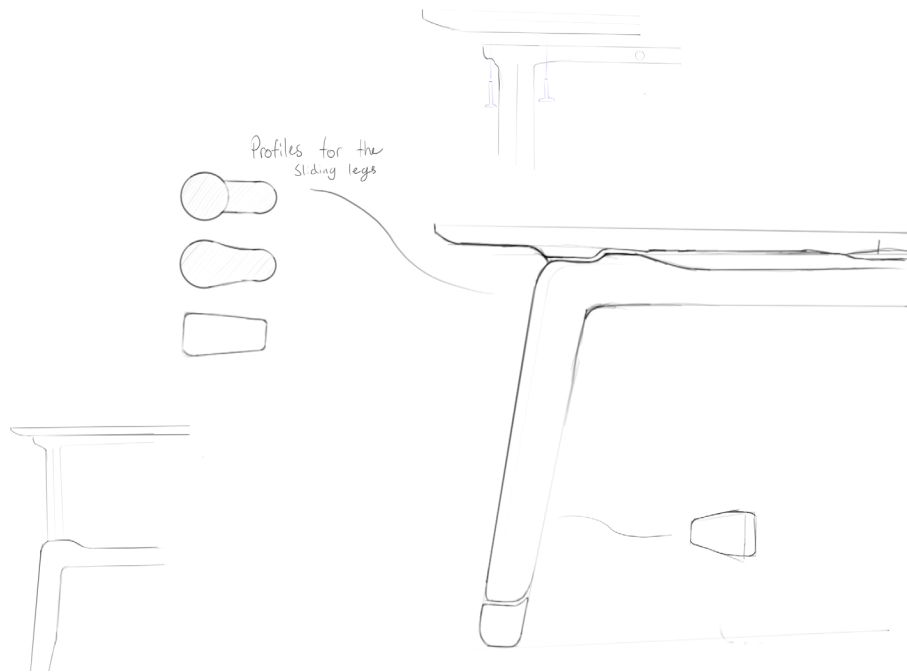
Some of table tops to the left with different profiles.
To the right, some connections that could have been used.



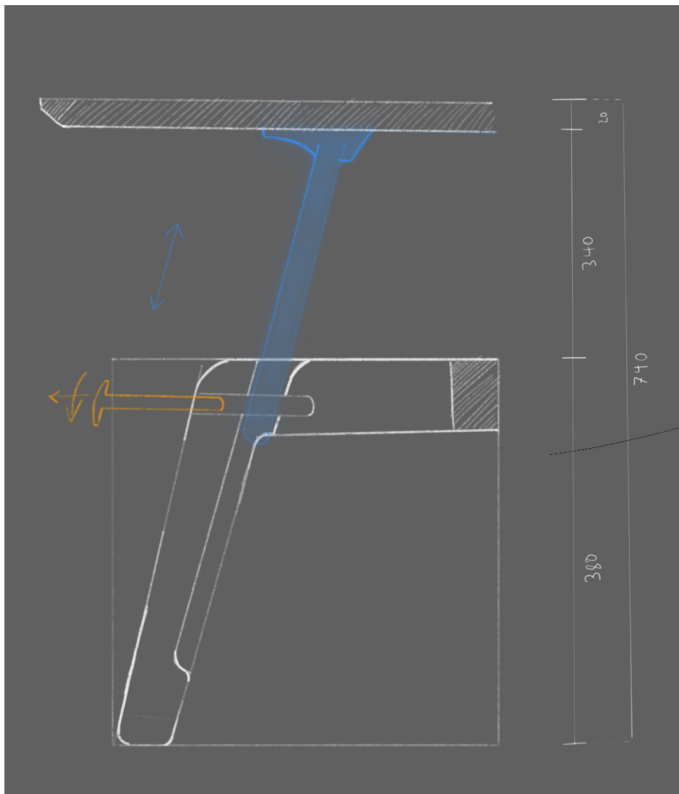
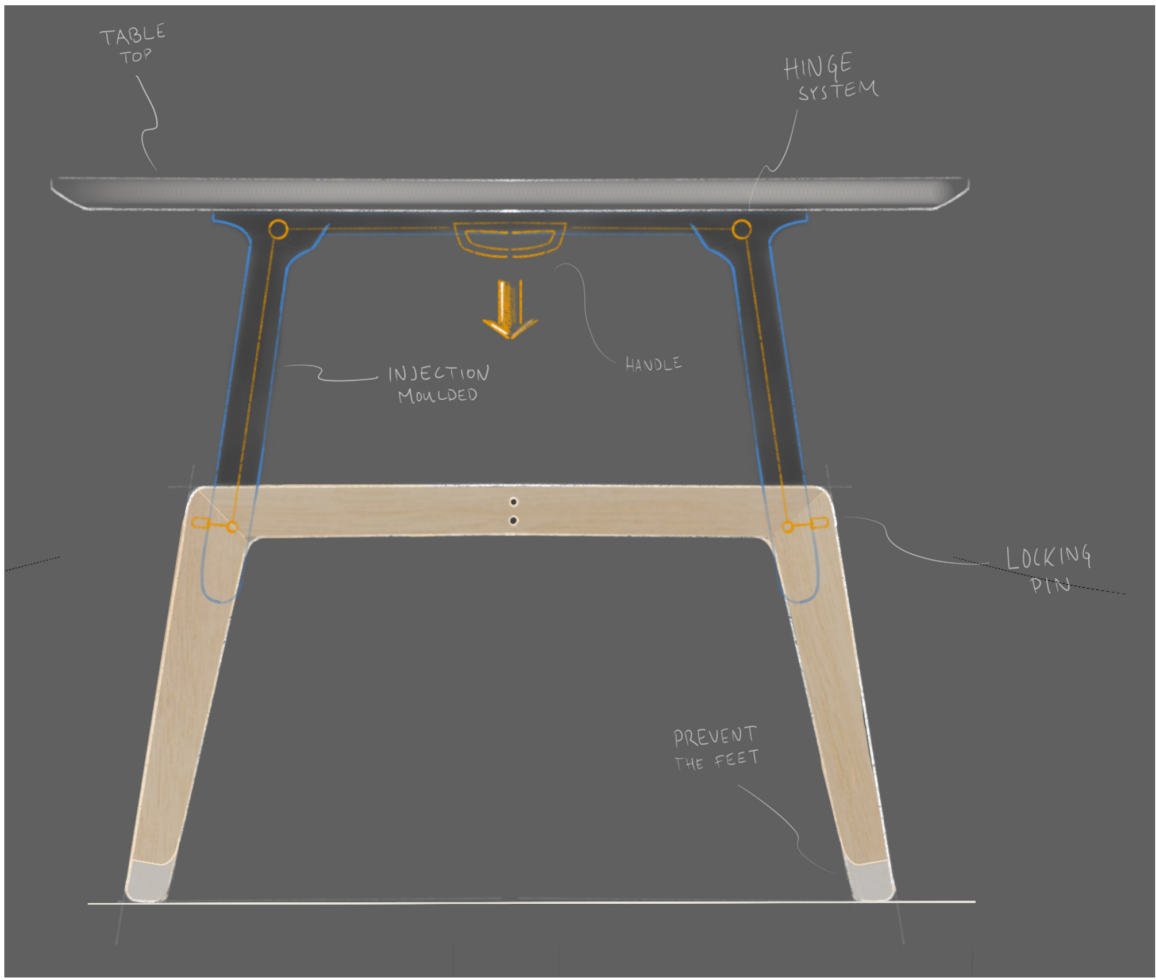
More of a crazy and free sketch of a table top seen from above.



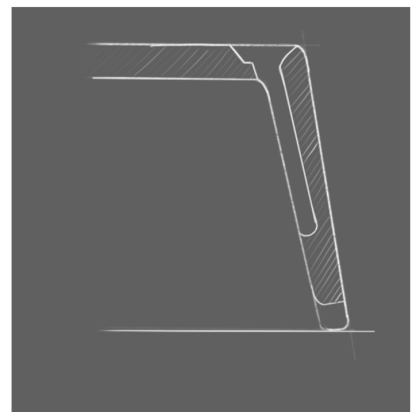
A direction I explored but quickly discarded because of the mechanical difficulties.



This simple sketch would provide the solution that I would pursue in the end. None of the detailing was in place of course.

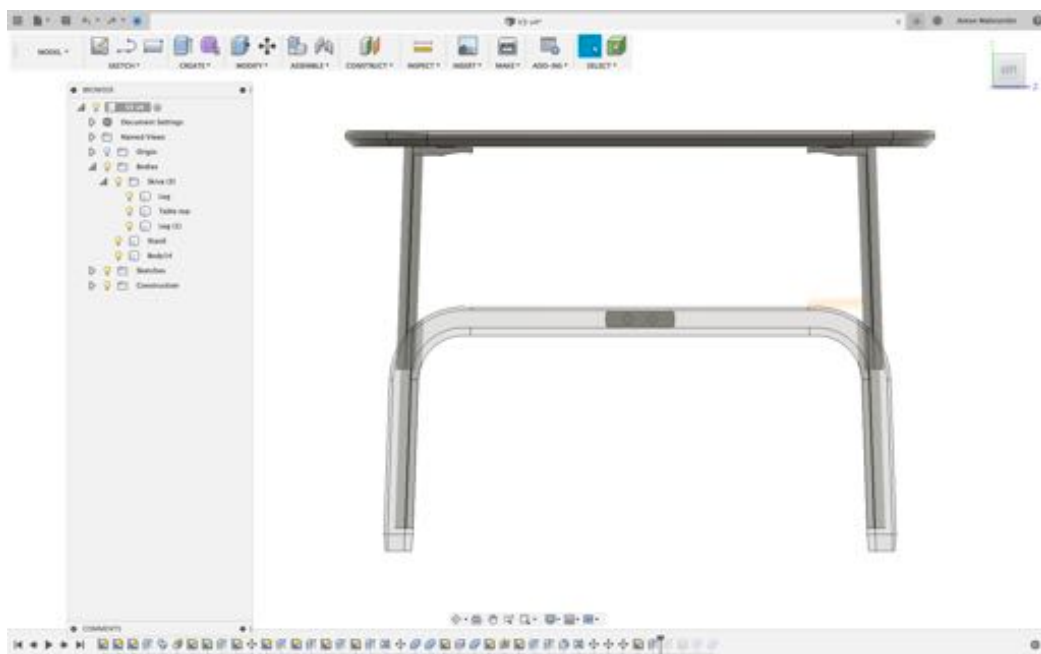


The same principle that I would later pursue but a different locking system.



3D exploration

After the sketch phase I moved over to 3D-software Fusion 360 for some more exploration on the structure of the table's legs. In these brief sessions I rendered out a short animation video. These short sequences were very helpful when I discussed my next steps with the workshop staff.



The editor window in Fusion 360.



A short video sequence made in Keyshot shows how the table can move in the y-led.

Mechanics

So far in the project I knew I wanted to build a table out of wood combined with steel. I also knew that I wanted the table to have dual functions as a couch table and a dinner table. Therefore I needed a mechanism that would enable the user to easily convert between the two modes. The mechanism needed to be safe, simple, reliable and preferably hidden within the frame of the table. I strongly believe that these kind of functions should not dominate the products, instead they should be designed to in a way magically appear when the user needs them.

Initially I envisioned that the user would be able to convert between the two modes themselves but as I looked into the mechanics it would prove to be a hard one to solve for me. I was stuck in this phase for a long while until I decided to just go down in the workshop. With the help of the brilliant workshop technician, David, we found a suitable technical solution based on Polhems Mekaniska Alfabet. This would enable two persons at the opposite end of the table to release a spring loaded pin-system and thereafter move the table surface to the correct height by just raising it from the frame. In hindsight this could be solved with greater finesse and much quicker but my mechanical knowledge could only lead me this far.



Picture⁸: The pins that would allow the table to be adjusted in height.



In the milled out groove a spring loaded hinge would allow the pins to lock and release.

Design & aesthetics

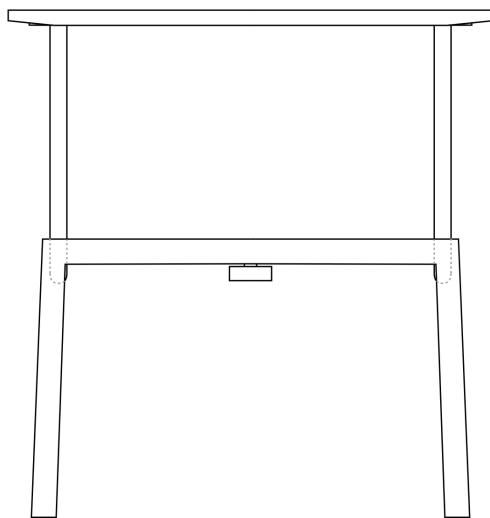
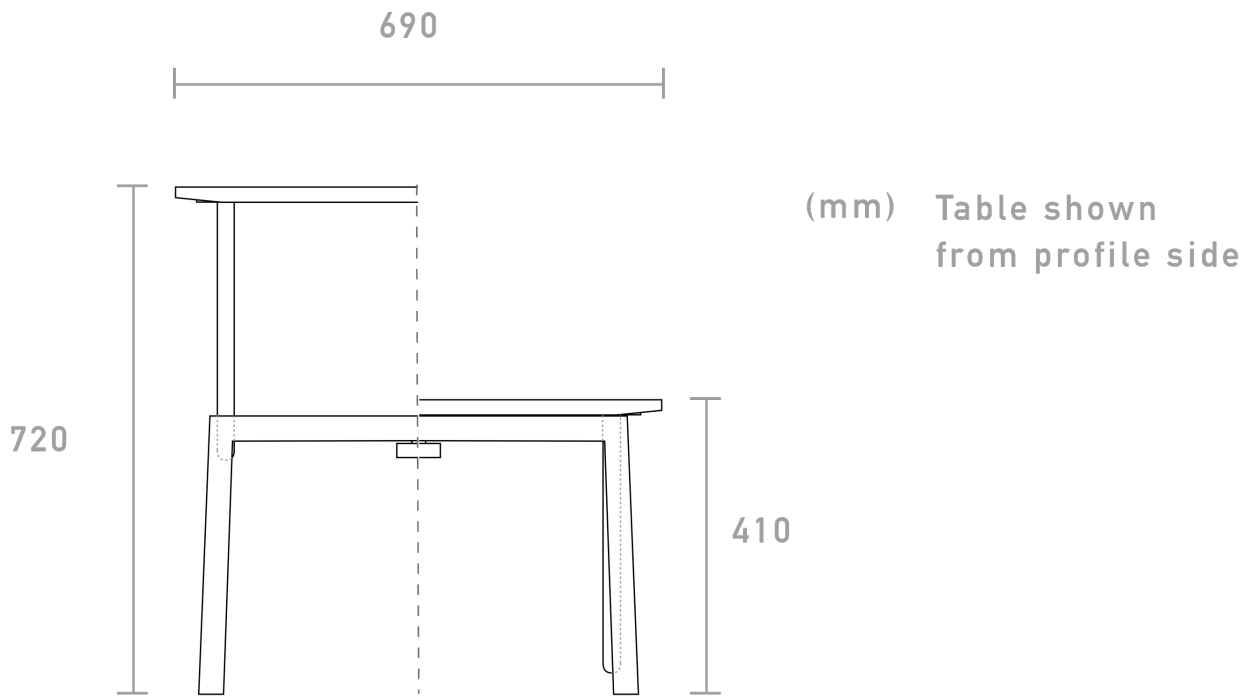
As I discussed previously I had an inspiration regarding aesthetics found within the Japanese culture. The raw untreated but finely crafted wood with straight lines and subtle details was what I had in mind when I designed this table. In Japan the traditional furniture designers often put great care behind the wood joinery. Often allowing them to only use the inherent strength of the wood to hold the piece together.

One of the details I put great care in when building this table is the angle of the legs. In order for the table to not look too static I decided to angle the legs two degrees from the upper joining piece of the framework. In order for this to work with the rest of the construction I had to drill a 30cm hole with a diameter of 25mm. This proved to be a tedious task but after a few test and some minor modification on the tooling it eventually worked.

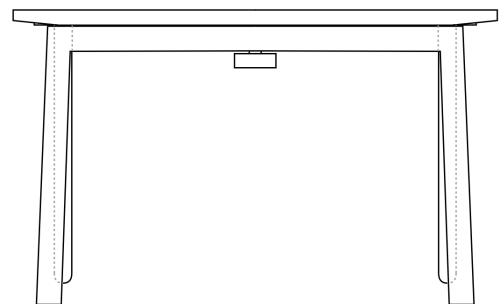
Another small but important detail is the chamfer on the underside of the table surface. This quite long but not that sharp chamfer makes the whole surface look thinner from the side and is something tactile to feel with your fingers.



Technical drawing



Dinner table



Couch table

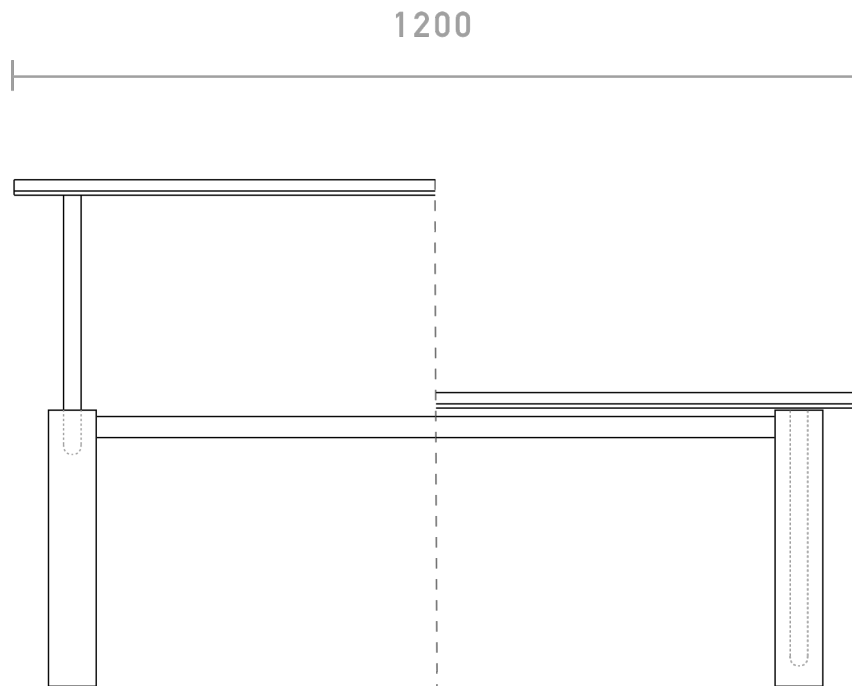
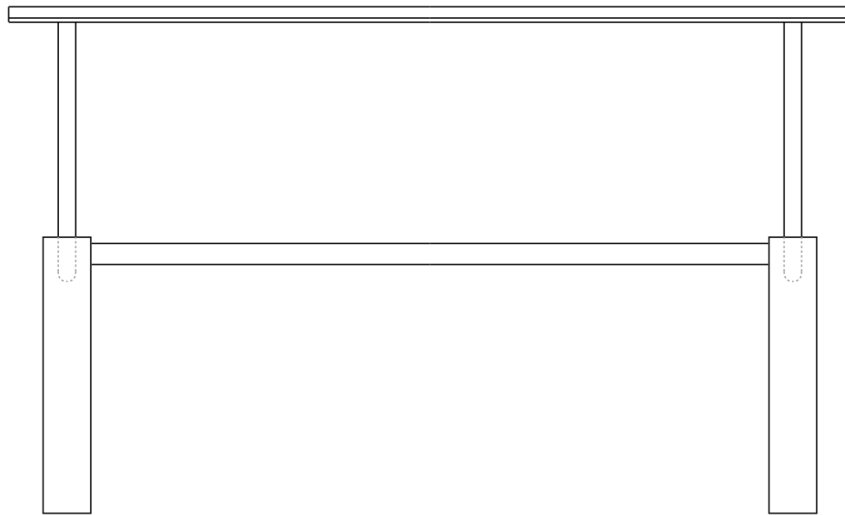
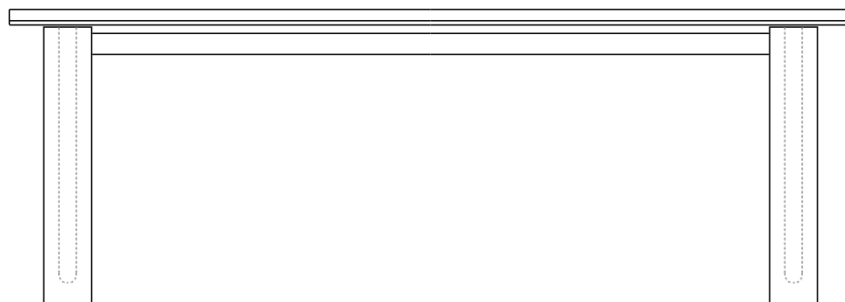


Table shown
from side view



Dinner table



Couch table

Result

















Conclusion

In this project I have researched how space is something that's getting more and more sacred in our cities and that we need multifunctional and durable furniture to live our lives. I chose to combine the couch table with a dinner table. I sketched, carried out user testing and built models to try my concepts out. The result is a prototype scale 1:1 table designed and built by me which relates back to my brief.

Personal reflection

Looking back at this project I feel proud that I actually made it cross the finish line. There were plenty of sharp turns and challenging tasks to overcome in this project. One of the things I did not anticipate was how different it is to work at a larger scale. As I often build scale models at an early stage this would prove to be hard when you're building a table. Although this made practice sketching instead.

There are plenty of things I wish I did differently when I look back. Time management, more user testing, going down to workshop earlier and better development of the hinge system are just some of them. I will really try to improve on these subjects in the next coming projects.

The things that I'm proud of is the use case of the product, I do believe that this product deserve to exist on the market. The quality of the model is also something that I worked hard at. Three full weeks in the workshop was the time I had to spend and the reward was worth it. Lastly but not least, the photos of the product are something that I am very proud of and have gotten a lot of praise for.

To conclude my bachelor project and what I have learnt during the past years is that a designer needs to be skilled in many areas and always strive to know more about the things we do not know yet.

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