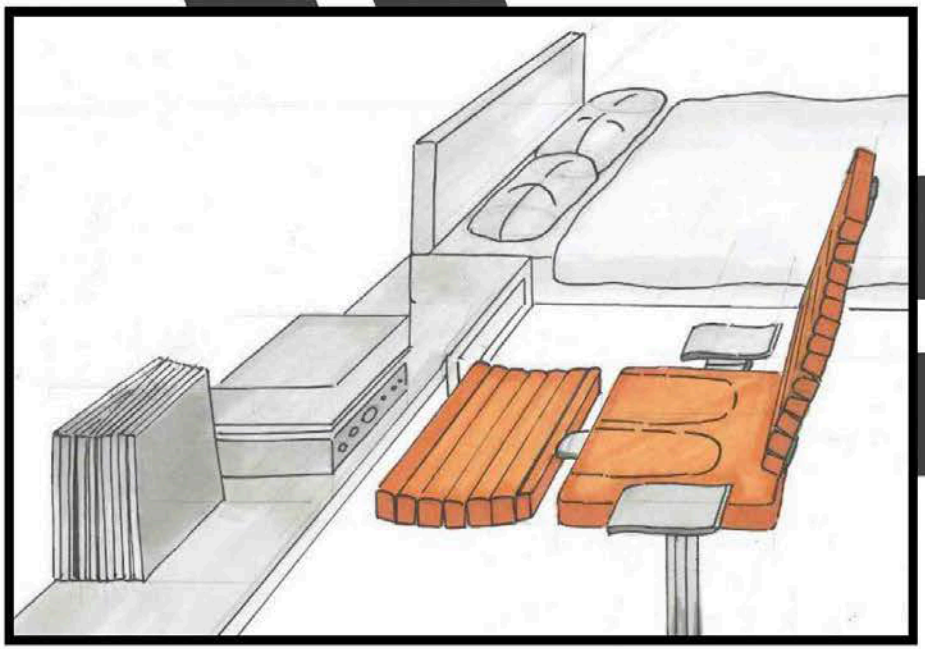
Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 3 Design and Visual Communication 2026

91627 Initiate design ideas through exploration

SAMPLE EXEMPLAR – ACHIEVEMENT



Product Design

Design brief

StakeholderS:

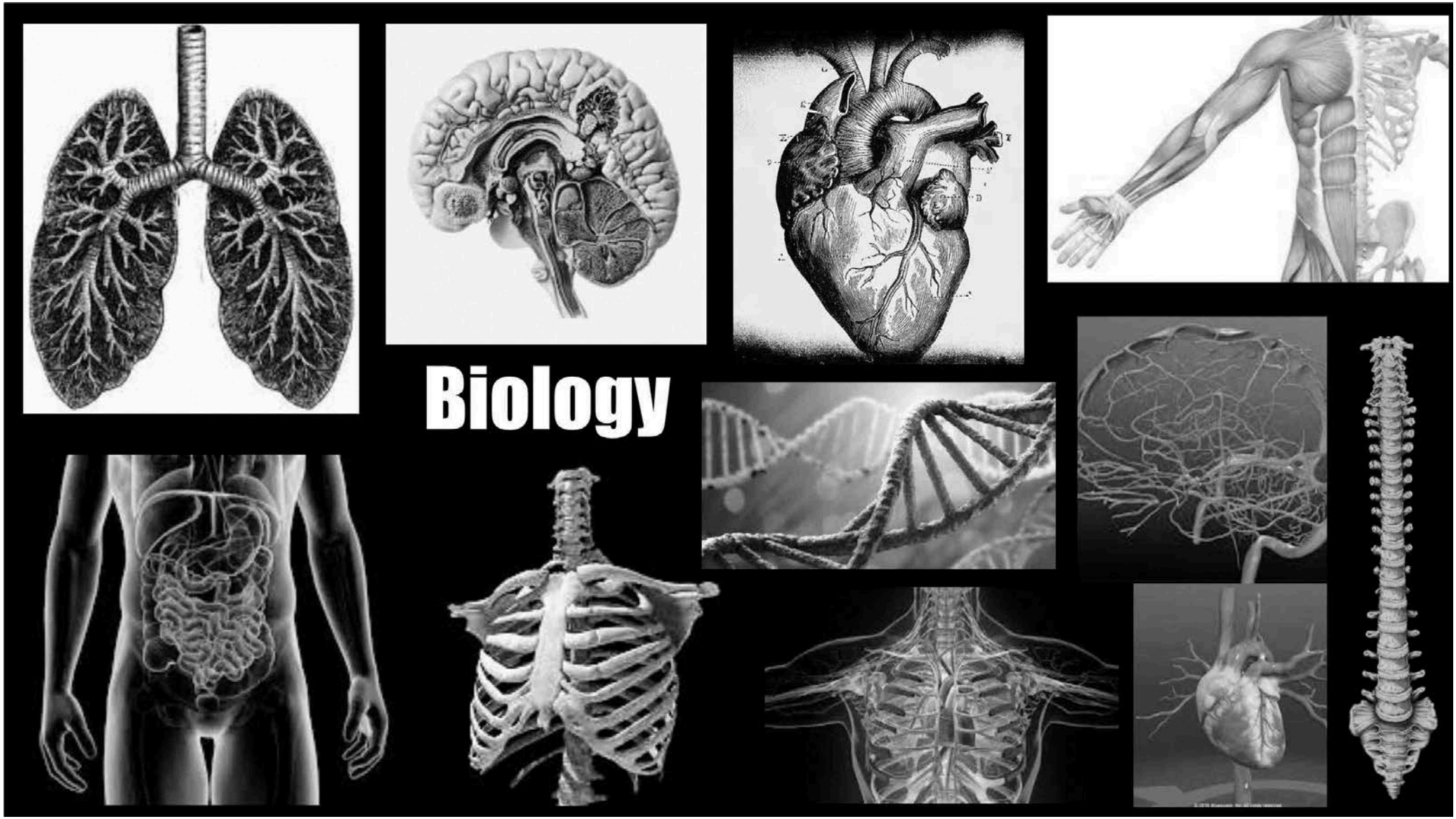
- Primary: Me
- secondary : my parents (mum,dad)

Context: when I am watching tv or listening to music in my room I generally don't have anywhere apart from my bed to sit. Resulting in a messy bed and bad posture. My current desk chair is also very uncomfortable.

Brief: design a hybrid desk and lounging chair to be used in both settings.

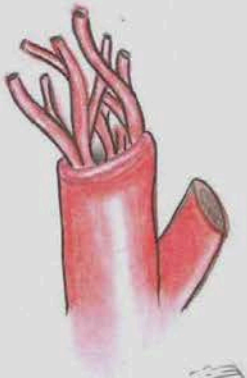
Specifications:

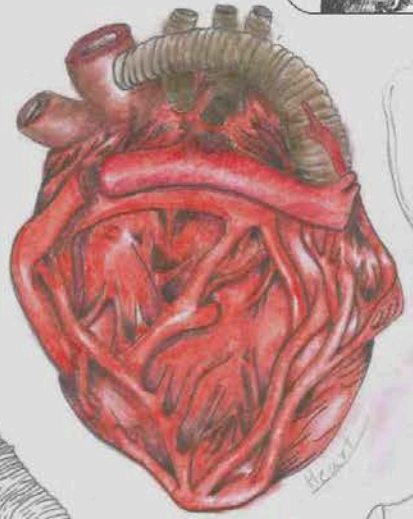
- The chair will need to tie in with the rest of my room and not stick out to much.
- The product will have to be visually appealing and look good even when out of use.
- It will need be able to convert from a lounge style chair with a footrest to a desk chair without.
- The chair shouldn't be to big as to take up all of my available floor space and should fit under my desk
- Ergonomic and comfortable in both states
- The design will tie in with my ideations
- I would like the item to be environmentally friendly made from ethically sourced materials
- The design should be able to withstand time and built to last
- I would like the chair to be able to hold various items such as phone and drink on its arm eliminating the need for a side table

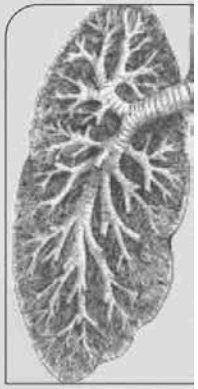

Biology

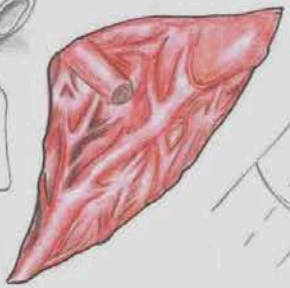

Architecture

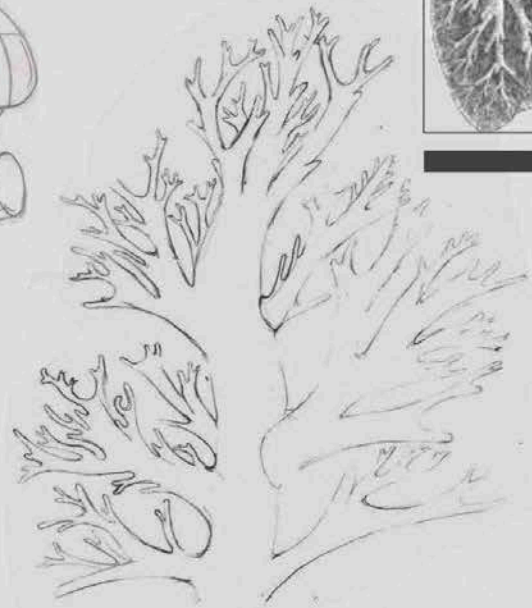
Biology Ideations



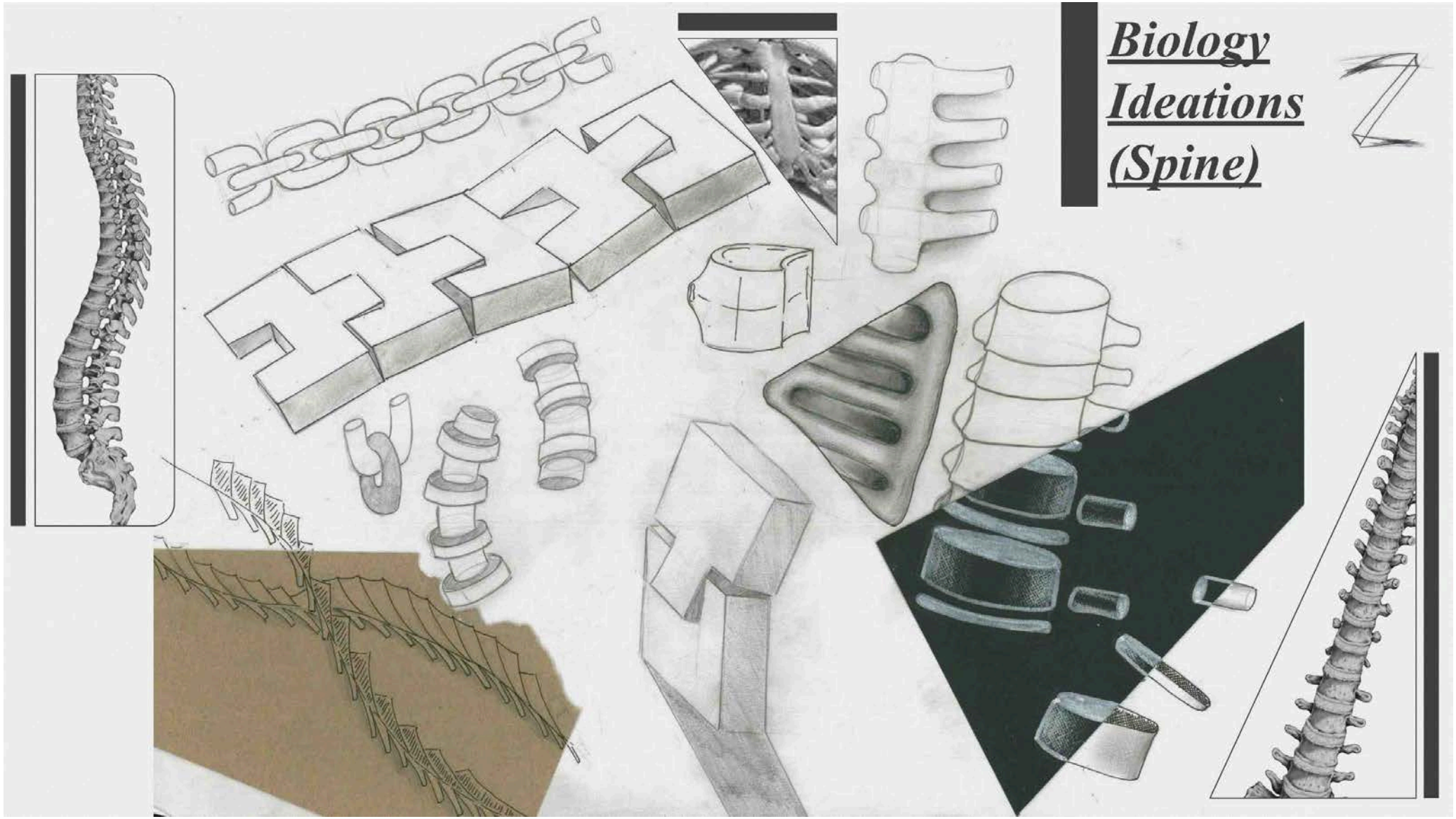




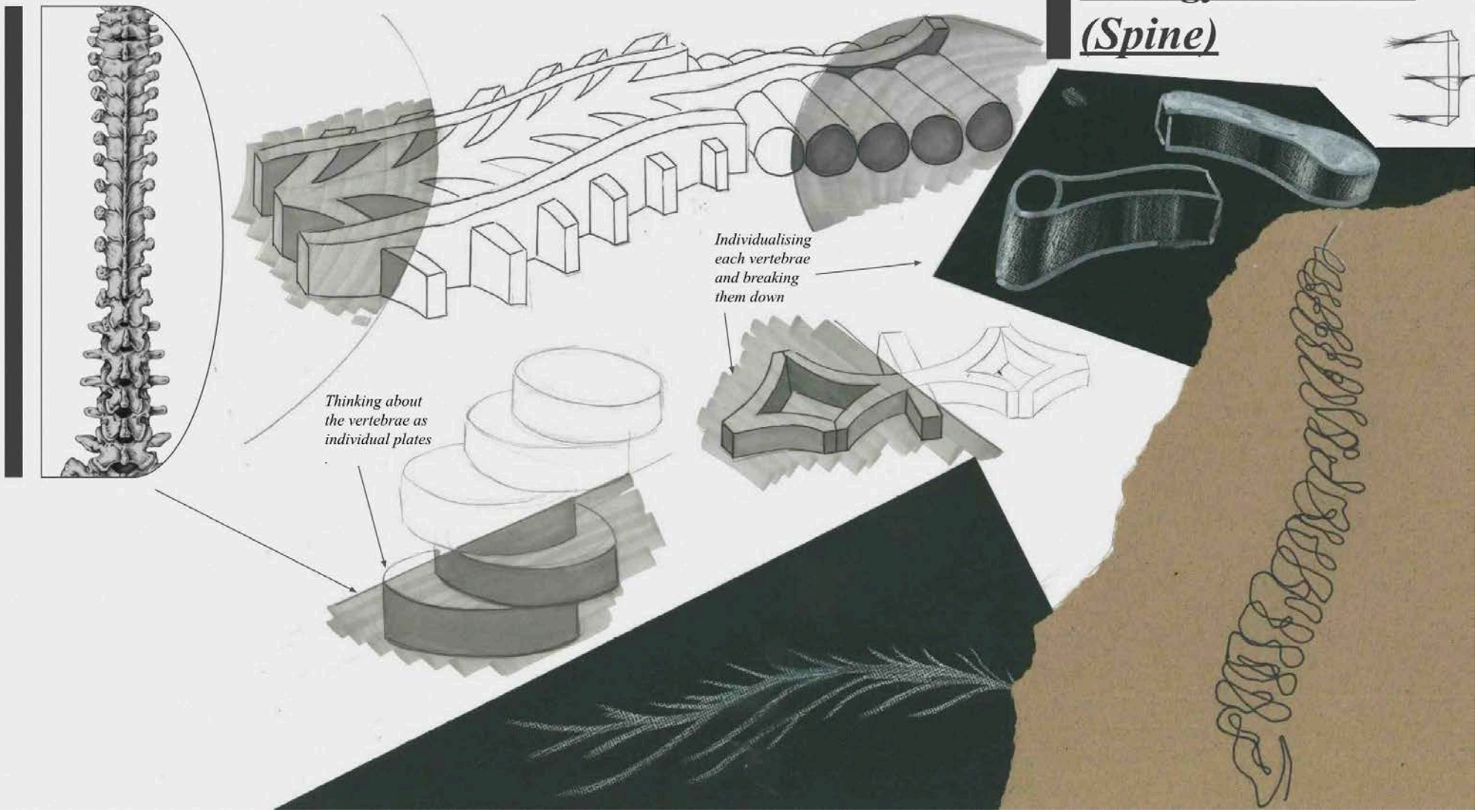




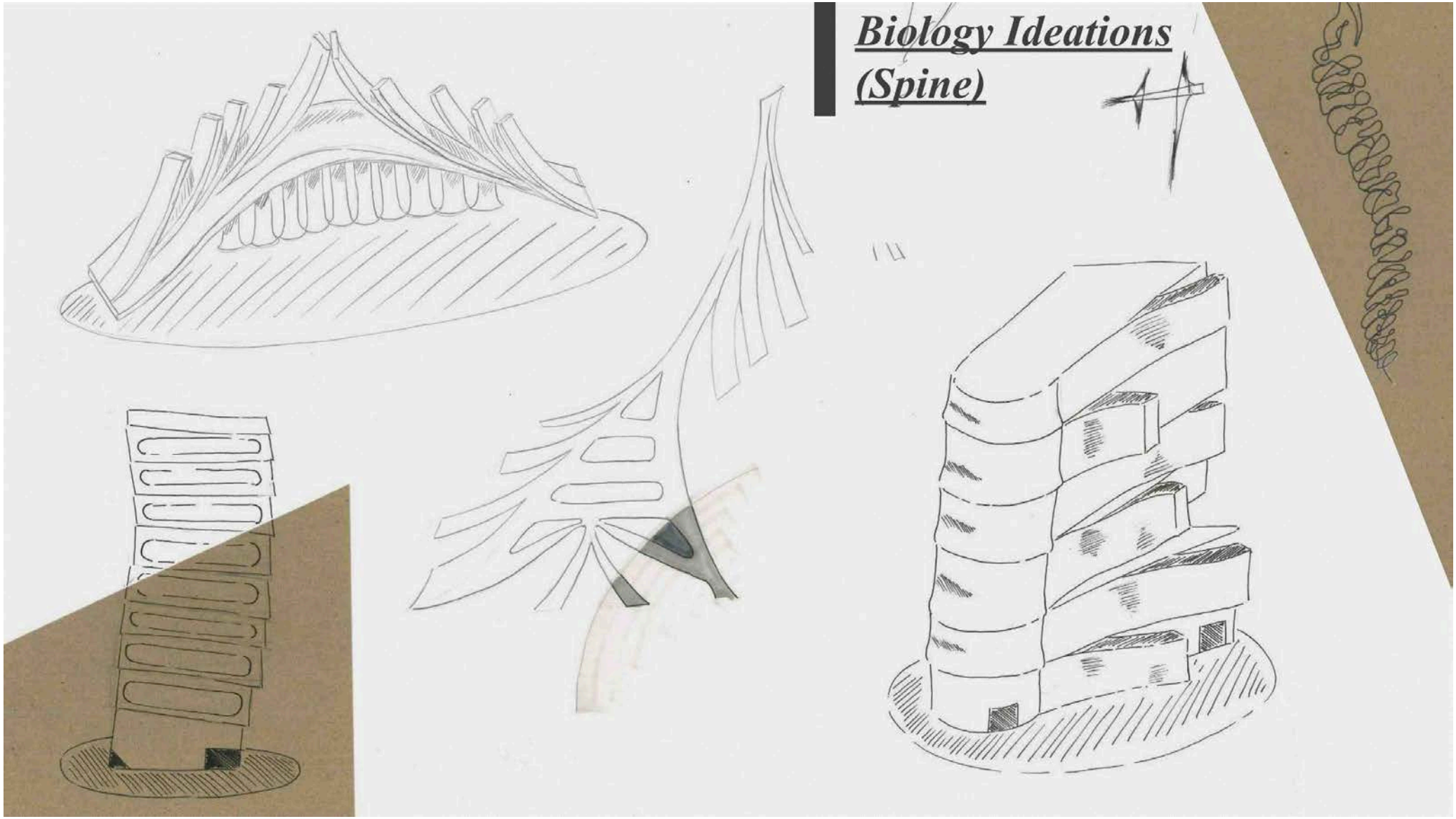
Biology Ideations (Spine)



Biology Ideations (Spine)

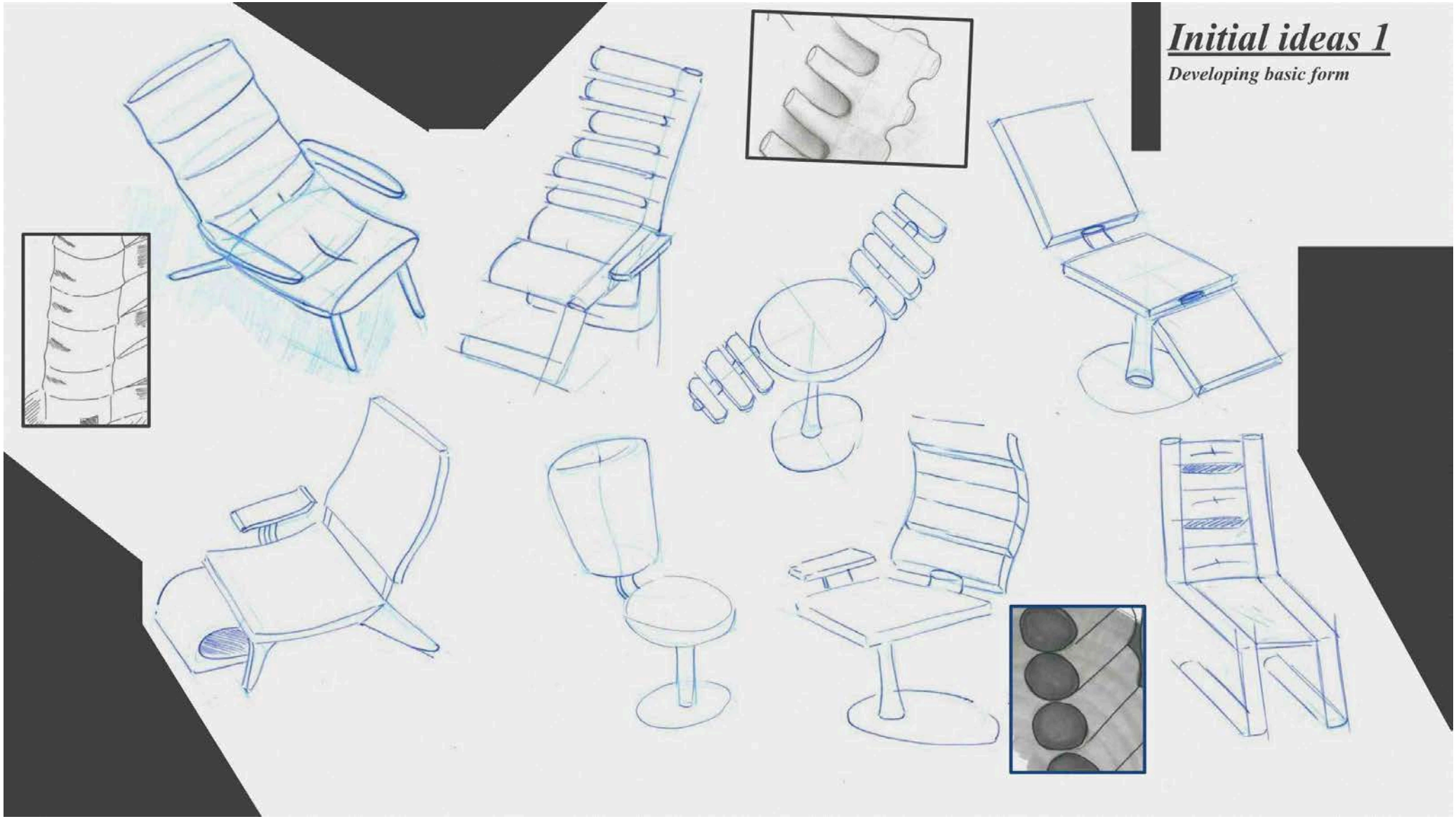


Biology Ideations (Spine)



Initial ideas 1

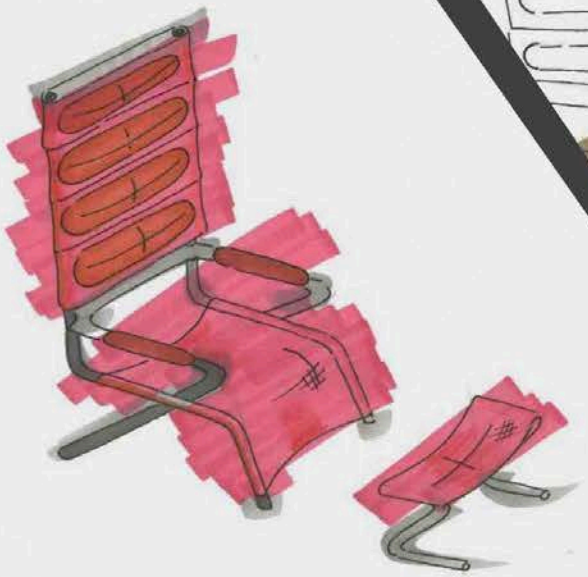
Developing basic form



Initial ideas 2

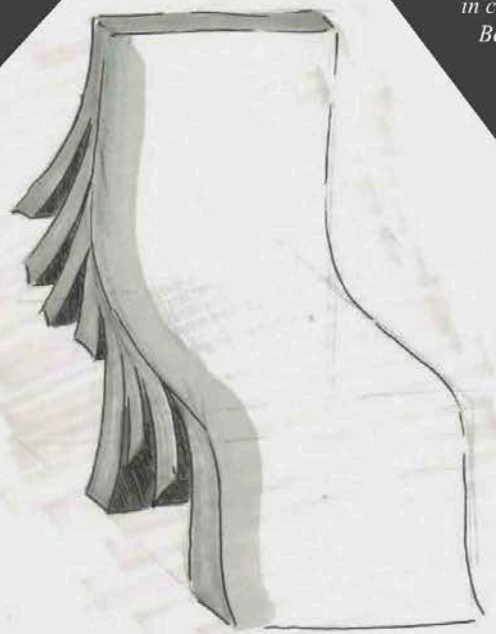
Developing basic form

Initial ideas 3



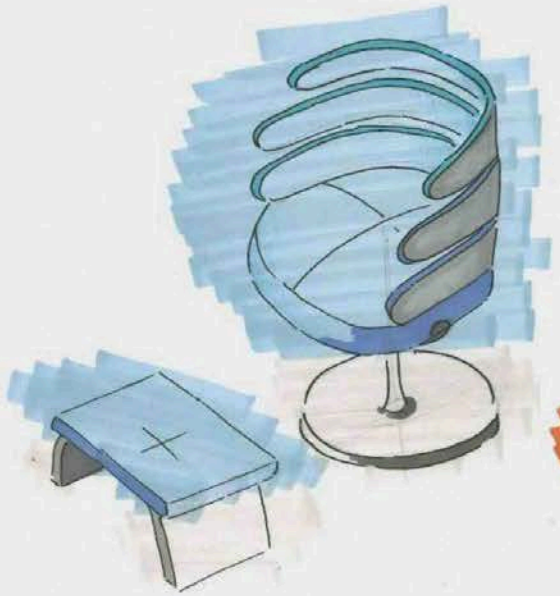
This design is admittedly very similar to the Knoll Wassily Chair with a wire frame being the majority of the chairs structure and design. With the addition of a more sculpted backrest tying in with my ideations. Incorporating a foot stool/ottoman, instead of a footrest I think that this chair could take up more room then necessary or even available.

This chair takes a different approach solving my issue of a footrest by having a removable stool that can tuck under the chair. All in all I really like this idea and think that a stool/ottoman could be more convenient and versatile then a footrest. Despite this I think the design is a bit to gothic and wouldn't fit in with the rest of my room.

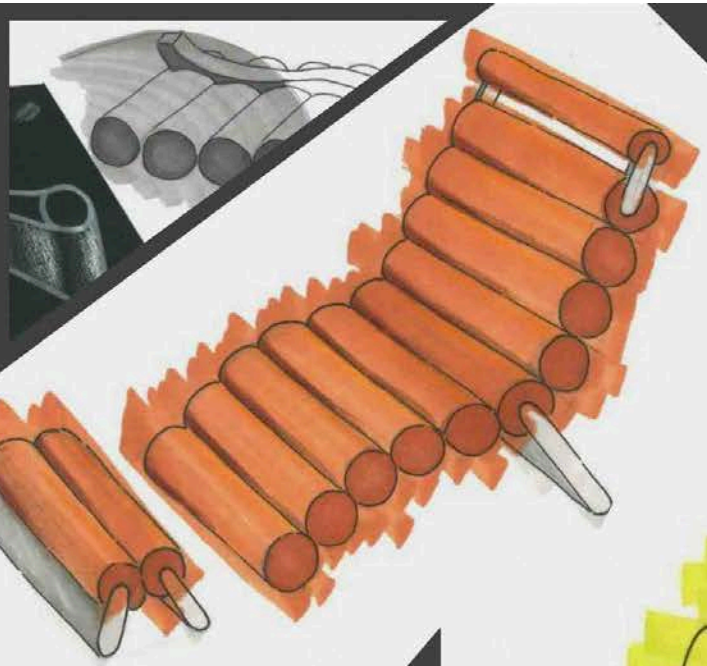


This chair is more open and has a more upright seating position than typically seen in casual lounge chairs. Because of this I don't think it could be suitable or even developed into a product fit for my brief.

Initial ideas 4

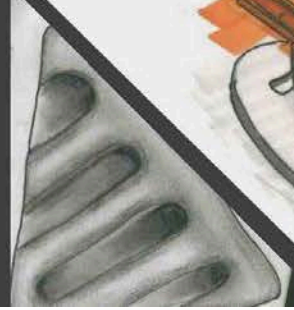


Although I like the look of this chair looking more like a log chair i don't think that it fits in with my brief or design parameters.



I like the way that th chair is very op taking a differe approach to t blue cha

I like the way that this chair wraps around the user, much like the Papa Bear chair. Incorporating the repetitious horizontals seen within a ribcage.



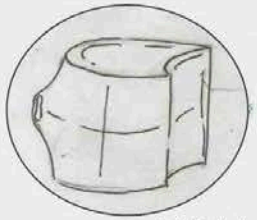
I think that the idea of a segmented backrest like this one could be interesting to develop.

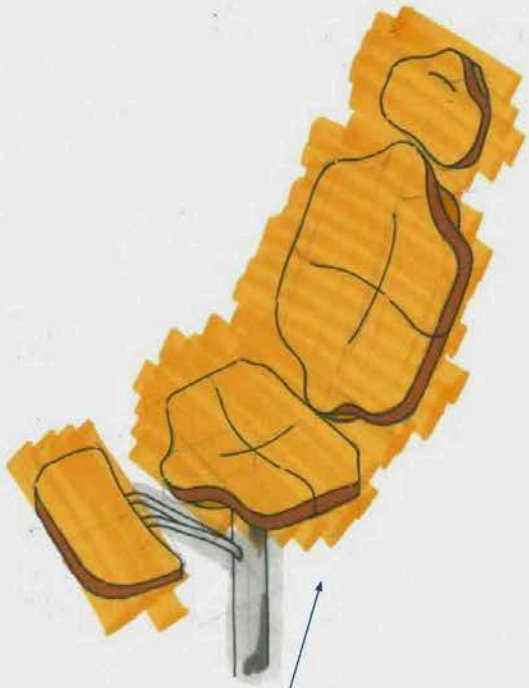
Overall I think that the basic form of the chair is good with a solid base to work off of however significant changes will need to be made through design development. Such as the footrest and armrests which are both ugly and unfit for purpose.

concept 1

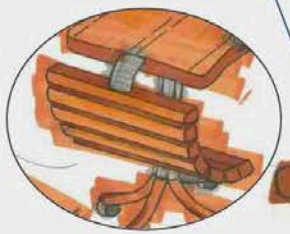
This concept is focused more on the aesthetic quality of the spine and the vertebrae, with each cushioned section mimicking the shape. Overall I think that at this point it is a weaker design over concept 2 but I think that it could be interesting to develop the shape and overall form factor as I think it looks to cold and institutional as it is.

The headrest is nice but some articulation would be needed between the headrest and the backrest and a hinge design would need to be developed.

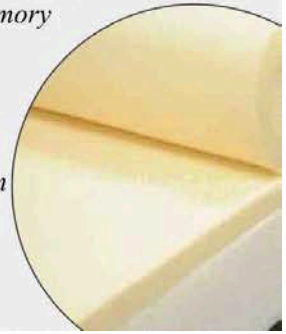




I think that the footrest would be inconvenient especially when going under a desk., as it would get in the way. Maybe something like concept 2 could work better folding under the chair.



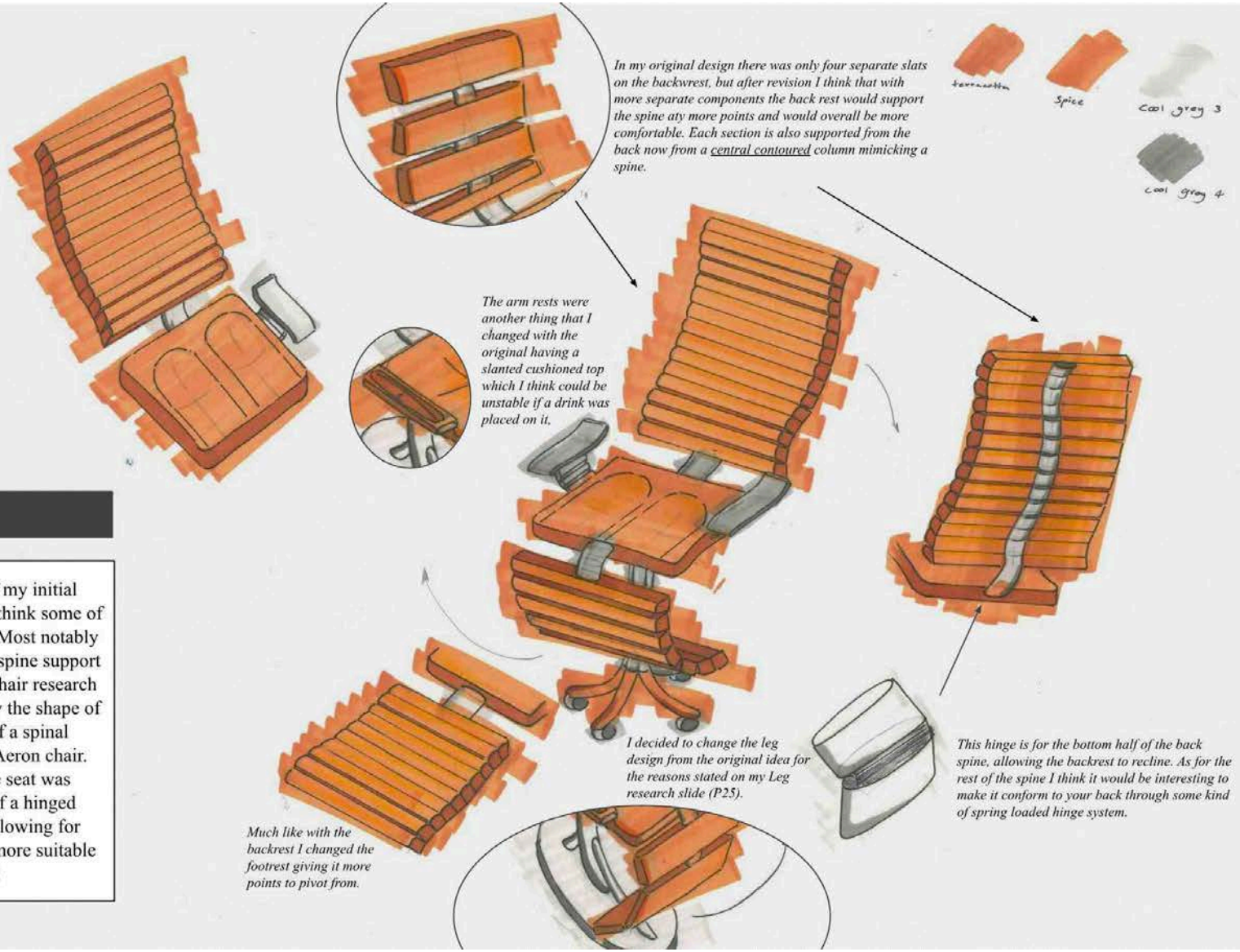
Given the amount of cushioning on this chair I think a good quality memory foam would be suitable supplying a more comfortable seating experience over generic foam commonly found in chairs.



This design is focused more on everyday practical use in both the desk and lounging environment. It incorporates more modular features such as the foot rest, which will be able to tuck under the seat as shown. The backrest part (in grey) mimics a spine and I would really like to develop the idea of a hinge system allowing each cushion to move freely contouring to the back shape of the user

concept 2

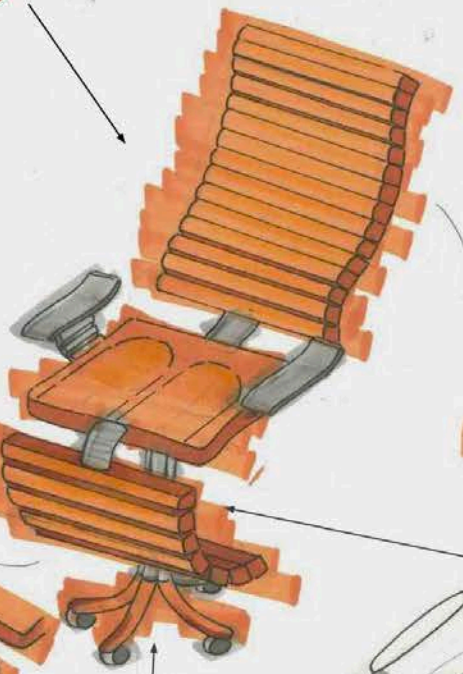
Happy with the overall design of my initial drawing I thought to revise it and rethink some of the parts that could use improving. Most notably the backrest and the addition of the spine support on the back. Thinking back to my chair research in the beginning I thought to modify the shape of the backrest, mimicking more of a spinal curvature like what is seen in the Aeron chair. Also thinking ergonomically the seat was changed a bit with the addition of a hinged portion of the spine at the back allowing for multiple seating angles, making it more suitable for my needs and brief.



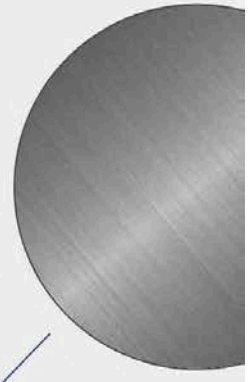
concept 2 development

With one of my design specification being that the chair should stand the test of time the materials used should all be very hard wearing. For the seat backrest I plan to have the internals built from a high grade MDF. I chose this for many reasons, one being that it is both lightweight and easily worked, which is important given the intricate shapes. For the hinges both on the back of the chair connecting the backrest to the seat and along the underneath of the foot rest I plan to use a harder material than the legs, which will be aluminium,. Being that they are going to experience a lot of pressure and use I think titanium would be sensible, being both lighter and stronger than a mild steel, with the added benefit of better corrosion resistance. Titanium is also able to stretch far better than steel before fracturing. This is important especially on a hinge like this one, bearing a lot of weight.

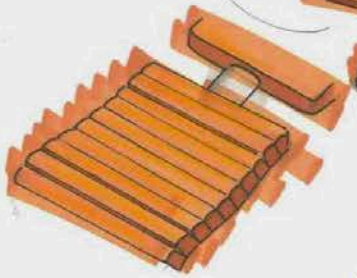
When thinking about fabrics for my chair I want something that's going to be breathable and of a reasonably loose weave. With this in mind I think a light grade recycled cotton would be the best option. Being breathable and hardwearing with the added benefit of it being a recycled material.

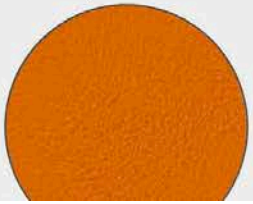


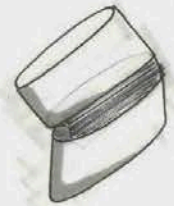
For the finish on the armrests I think a brushed aluminium would look good and tie in nicely with the overall aesthetic of the chair.



From research of the best material I think that aluminium tubing would be well suited for the legs. With its high compression strength and lightweight nature combined with the four individual columns seen on the design I think that there would be no better option.

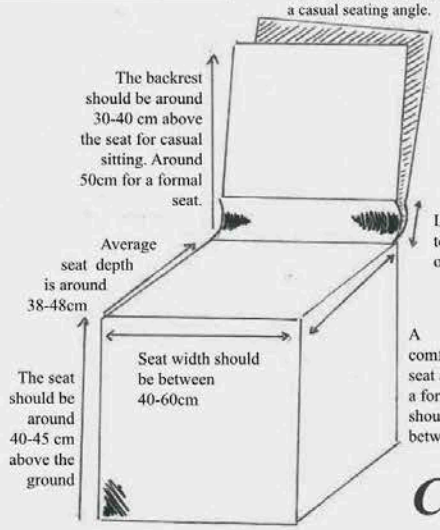


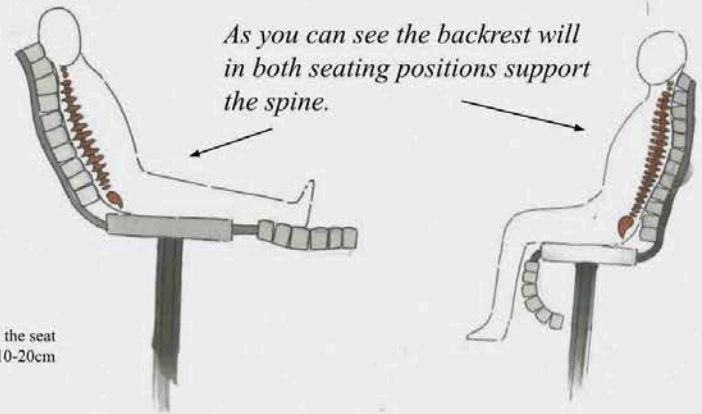


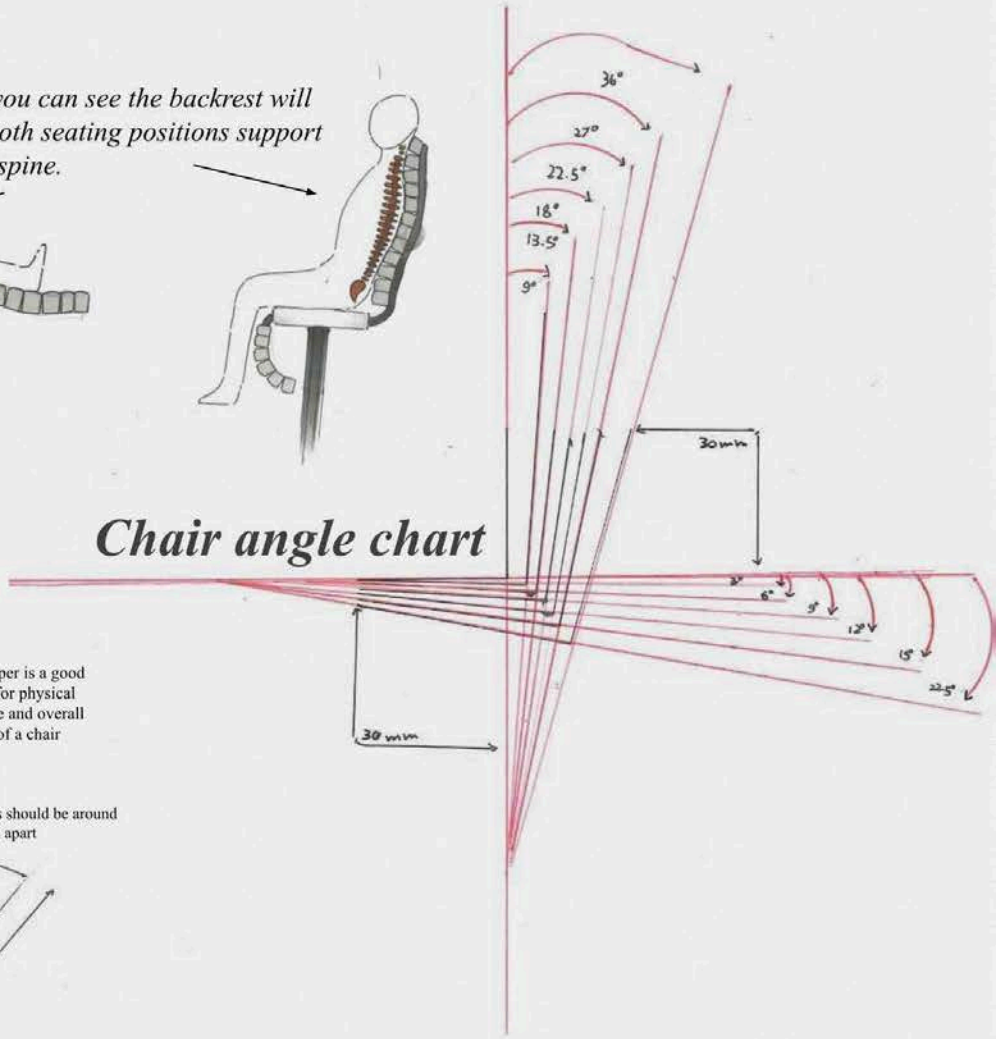


for the coloured ends of the legs I think that powder coating would be a great choice. Holding up better than paints especially on a point as susceptible to wear as the legs.

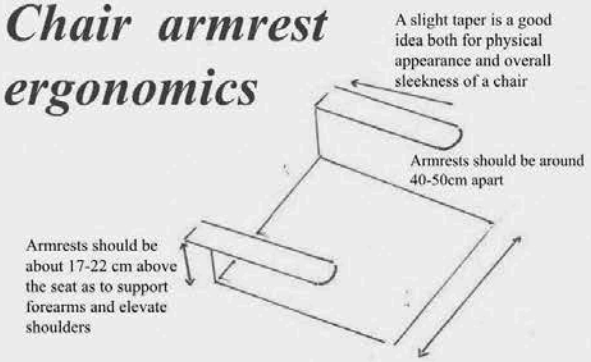
Concept 2 ongoing research:Chair ergonomics







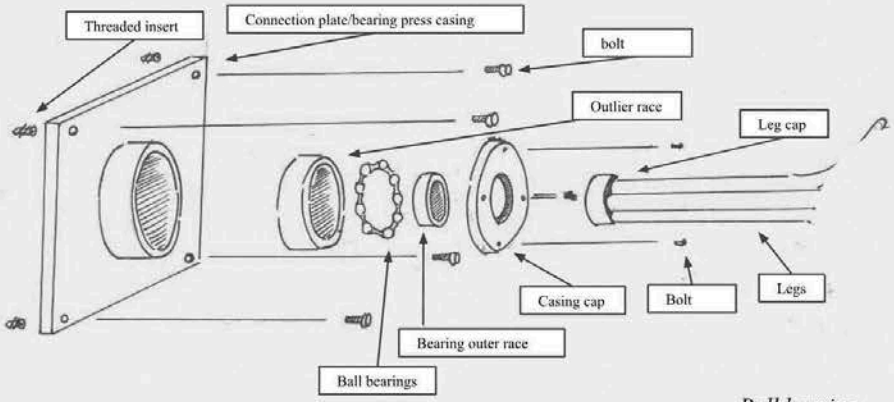
Chair armrest ergonomics

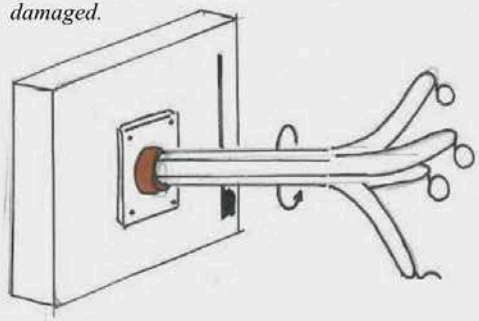


Concept 2 ongoing research: swivel system

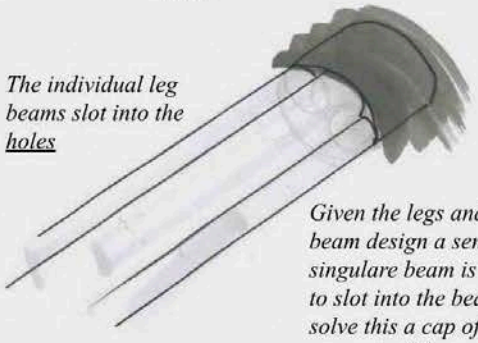
From this diagram I can see that the swivel action comes from a bearing encased in the base. Knowing this I think that something of the same concept could work for my chair.

The bearing and its casing are made up of many parts being the bearing casing (in orange) which is directly attached to the fixing plate. Cut to the exact size of the bearing it allows the bearing, to be press fit into the casing and move freely. Another benefit of encasing the bearing like this is that it makes it a lot easier when it comes to repairing and reinstalling a new bearing if and when this one gets worn or damaged.



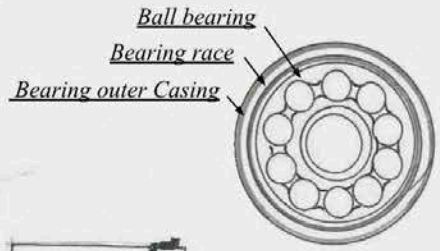


The individual leg beams slot into the <u>holes</u>

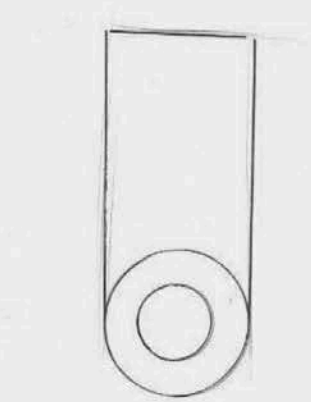


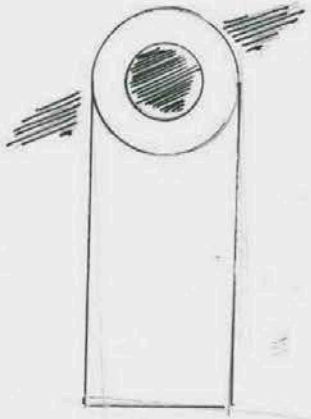
Given the legs and there four beam design a sentral singulare beam is necessary to slot into the bearing. To solve this a cap of sorts will connect all four parts at the end creating a solid sturdy connection to the bearing.

The plate and bearing part will attach to the chairs underside from four simple bolts. These will thread into pre threaded inserts which will be installed in the mdf frame. These are spaced out and are clear of the bolt system which sits higher inside the seat.

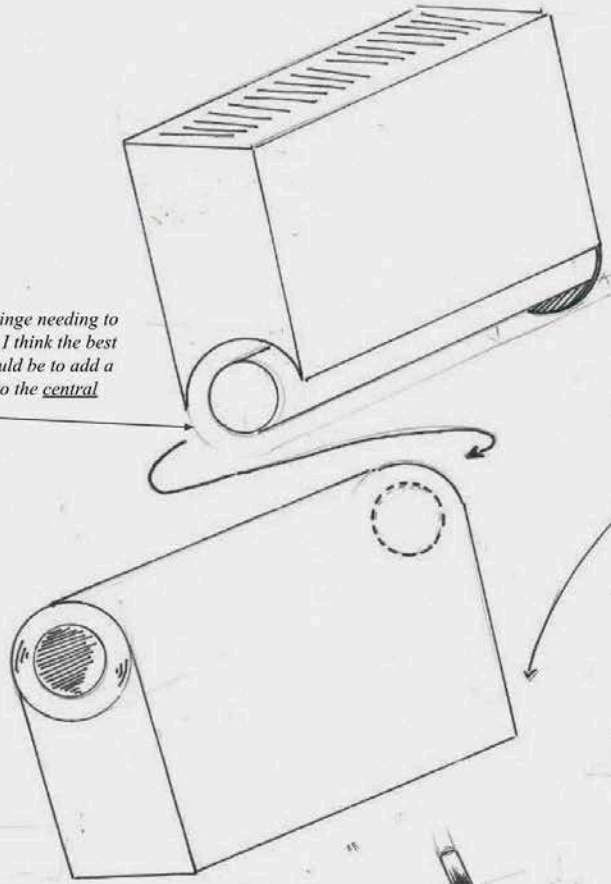


Concepts 2 development Hinge concept

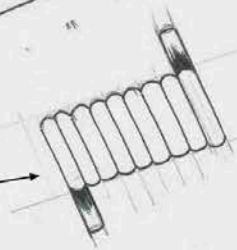


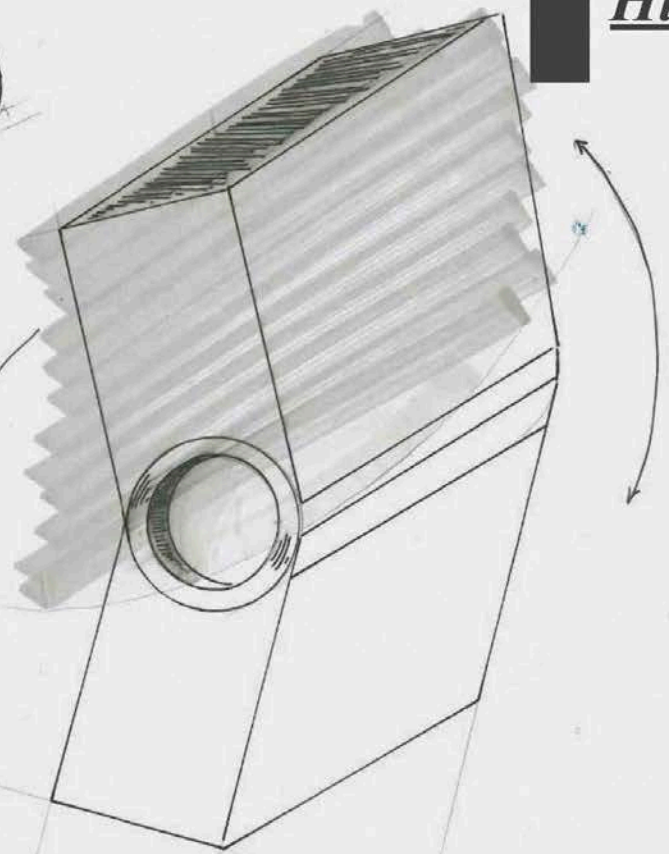


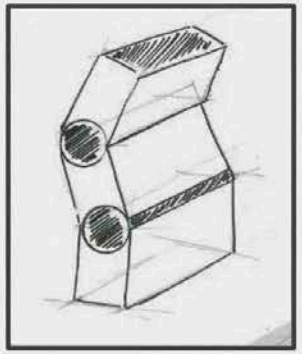
With the hinge needing to be sprung I think the best option would be to add a spring onto the central pin.



The spring would through to both p and held at tension from the extra mater at both ends

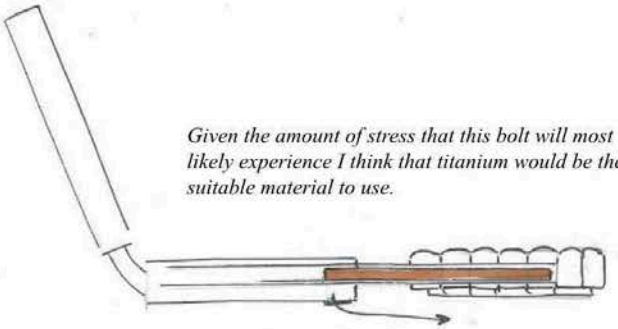






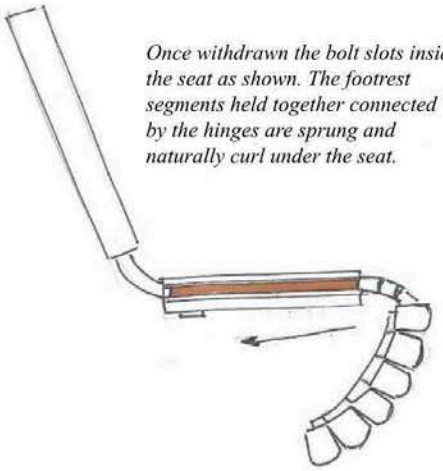
The idea is to connect multiple of these hinges together giving more points of articulation. Being used on the back part of the backrest connecting the spine to the seat having more movement and adjustments would be a good way to make the chair more accessible and comfortable for more people

Concept 2 development Revised footrest design



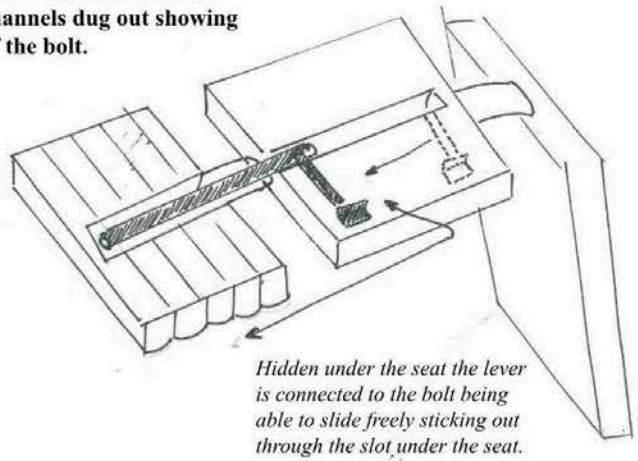
Given the amount of stress that this bolt will most likely experience I think that titanium would be the suitable material to use.

Moved forward by the lever under the chair the bolt slots through each segment of the footrest. Adding support to the rest, the bolt (in orange) connects both parts by a structural join.



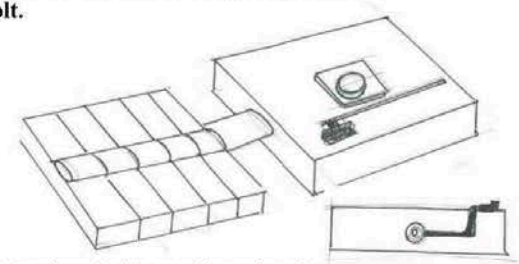
Once withdrawn the bolt slots inside the seat as shown. The footrest segments held together connected by the hinges are sprung and naturally curl under the seat.

This shows the inside of the chair with the channels dug out showing the path of the bolt.



Hidden under the seat the lever is connected to the bolt being able to slide freely sticking out through the slot under the seat.

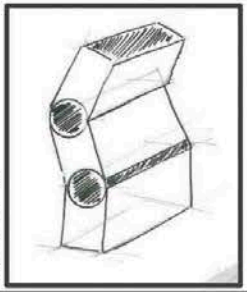
This shows the outside of the chair with the channels dug out showing the path of the bolt.



This is where the hinge will attach to the footrest. Connecting each individual cushion to one another. This part is separate from the other hinge connecting the footrest to the seat.

This black slot will be seen on my final design and allows the lever to attach to the bolt whilst still allowing movement. Going underneath the seat and emerging on the surface further to the edge as seen.

The hinges will be connected in a chain like shown on slide 24



This bolt system is how I will allow the footrest to be both collapsable and sturdy when in use. By using a titanium rod that will span the majority of the way through each individual cushion section, save for two at the end, I will be able to create a stable surface with no visible support like what is seen on a lazy boy style chair. Moved with a hidden lever underneath the seat, the cushions, supported and sprung by their hinges, will need to be lifted and the bolt will be sent through connecting the seat and rest. The bolt will have a rounded end cap as to make the action easier and less difficult.

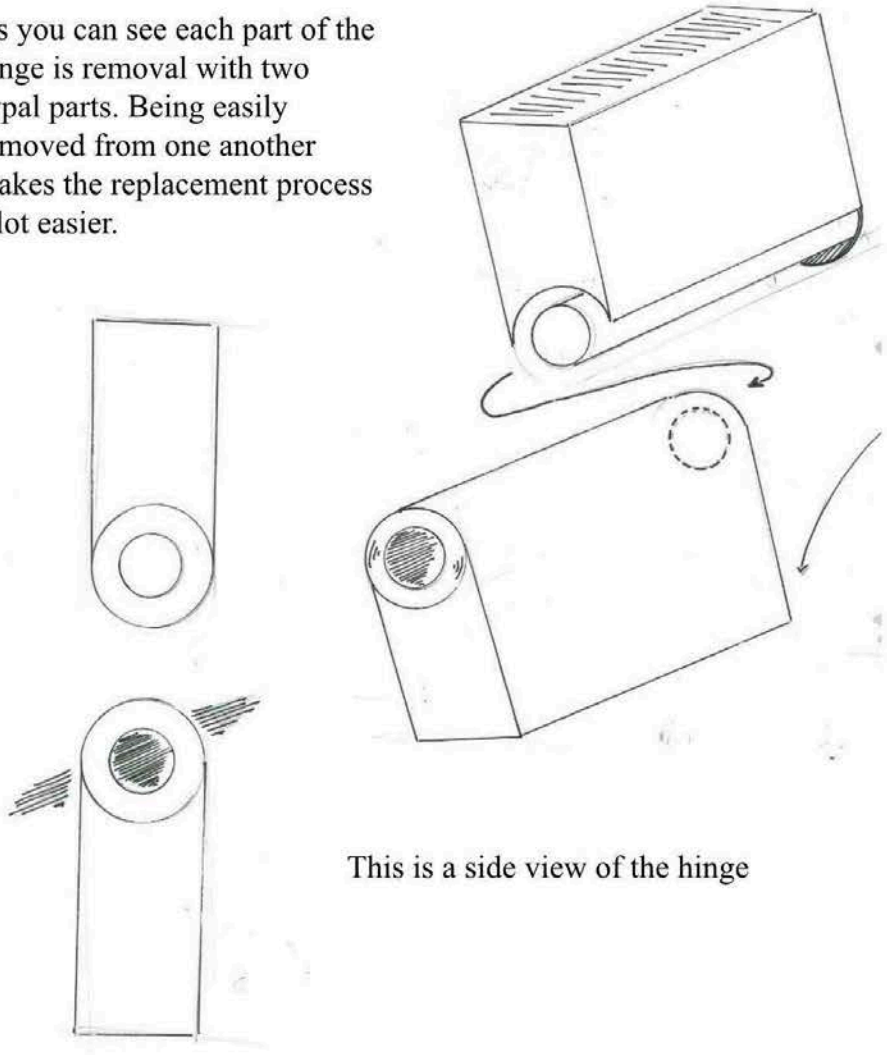
Broadest sense

Maintenance

Maintaining the product given the materials chosen would be fairly simple and unnecessary. Starting with the hinges and mechanical components which are all machined from titanium. These parts, which would experience the most wear wouldn't, aside from oiling on occasion, need any maintenance. However if a part were to break there could be an issue. Given titanium's difficulty when machining and overall cost a replacement would be expensive, however that is still not to take away from why I chose it. Titanium is extremely strong which is the main reason that it is as expensive as it is. The installment of a replacement of a piece wouldn't be an issue, with each piece being removable and easily reachable as shown on the hinge slides. As for the upholstery, general cleaning is all that is necessary and should last an extremely long time.

Titanium strength research

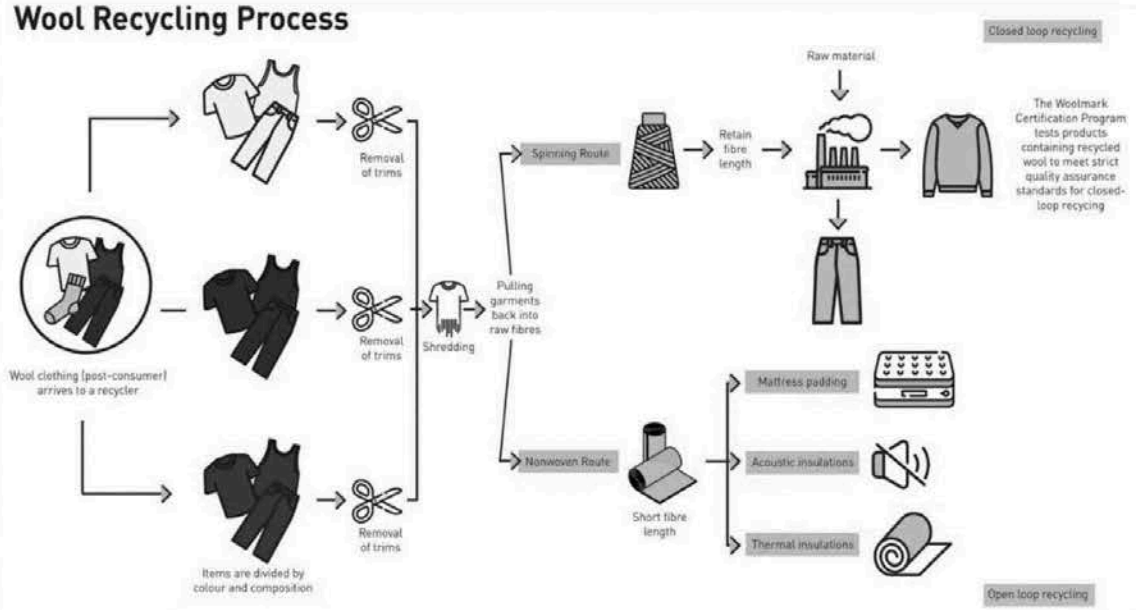
As you can see each part of the hinge is removal with two sypal parts. Being easily removed from one another makes the replacement process a lot easier.



This is a side view of the hinge

Sustainability of resources.

In order to keep my chair as environmentally friendly as possible a great way would be to use recycled materials. Most notably through the fabric chosen which could be made from Recycled wools.
The process of recycling wool and other various fibres is roughly the same and is a simple and sustainable way to make textiles.
The process starts with the wool scraps either through old clothing or scrap pieces of fibre. This raw material is shredded and pulled apart rendering the material back down to its original fiberouse state, this part of the process is essentially “down cycling” bringing the material back to its natural state. After this the shredded material is mixed in with small amounts of alternative materials such as carpets and other various upholstery that has also been recycled. Once shredded the raw material can be spun into thread and woven into fabrics much the same as normal, however in the industry recycled material isn't made equal, with two different processes “Open” and “Closed” loop” weaving, producing varying qualities of material. With closed loop recycling their is the added process of sorting through different wool types and keeping all the material that is to be reused all the same, preserving the value of the original weave. Despite producing a higher quality product closed weave fabrics are less beneficial to the environment and are sustainably less viable. Leaving all of the unwanted materials to go to waste in landfills.



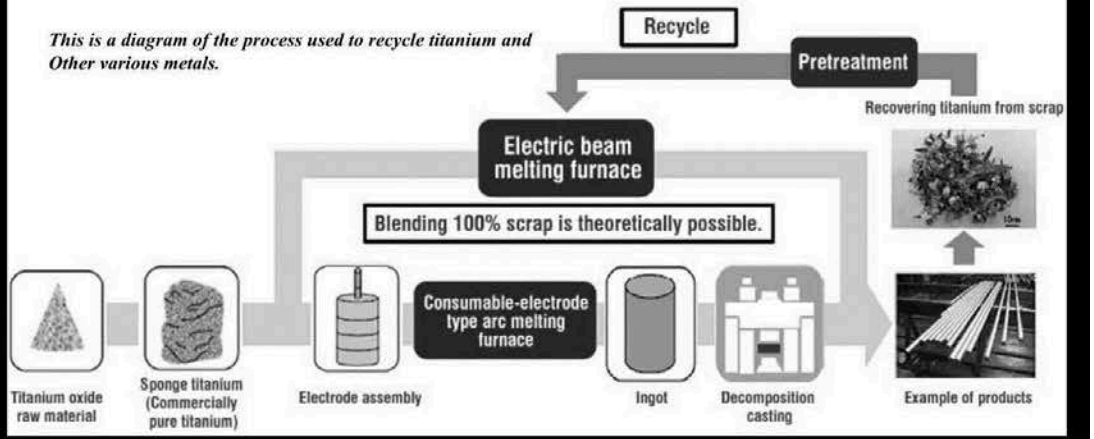
[Wool recycling research]

Ultimate disposal

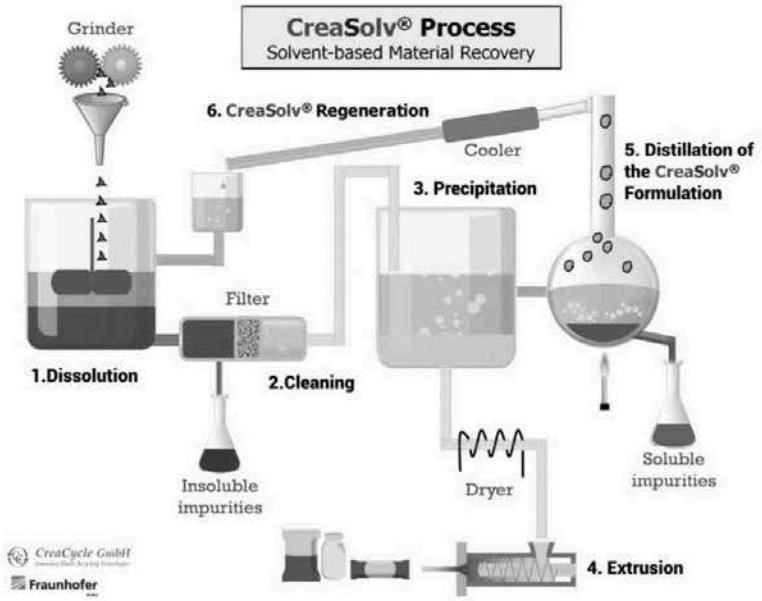
In the eventuality that my product were not to be used several steps could be taken to reduce the overall waste from disposal. All materials and metals such as the aluminum and titanium could both be recycled and ultimately reused. Being melted down in specialized high vacuum furnaces after cleaning the raw material could be cast into industrial quality materials. As for the fabrics used the recycled cotton fabric would again be able to be reused and recycled through the same processes that it had already gone through. Unlike the other materials used the mdf wouldn't be able to be recycled in anyway, with glues used to form the material posing health risk through any recycling process. However reusing the material is likely and could be repurposed. If this wasn't to be the case the material would most likely end up as landfill. Memory foam used as the chairs padding and cushioning can be recycled and used one of two ways. Chemically the material could be rendered down into nothing resulting in zero waste. The second option is through recycling the, shredding the foam down where it can then be used in other materials such as carpeting underlay and insulation to name a few.

foam recycling research

This is a diagram of the process used to recycle titanium and Other various metals.

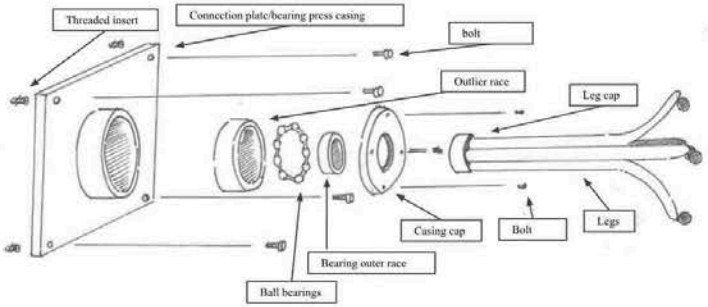


This is a diagram of the chemical process used to dissolve foam

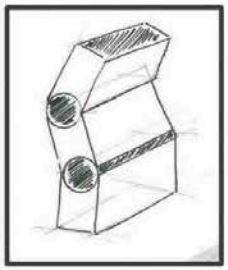


Final design: functional

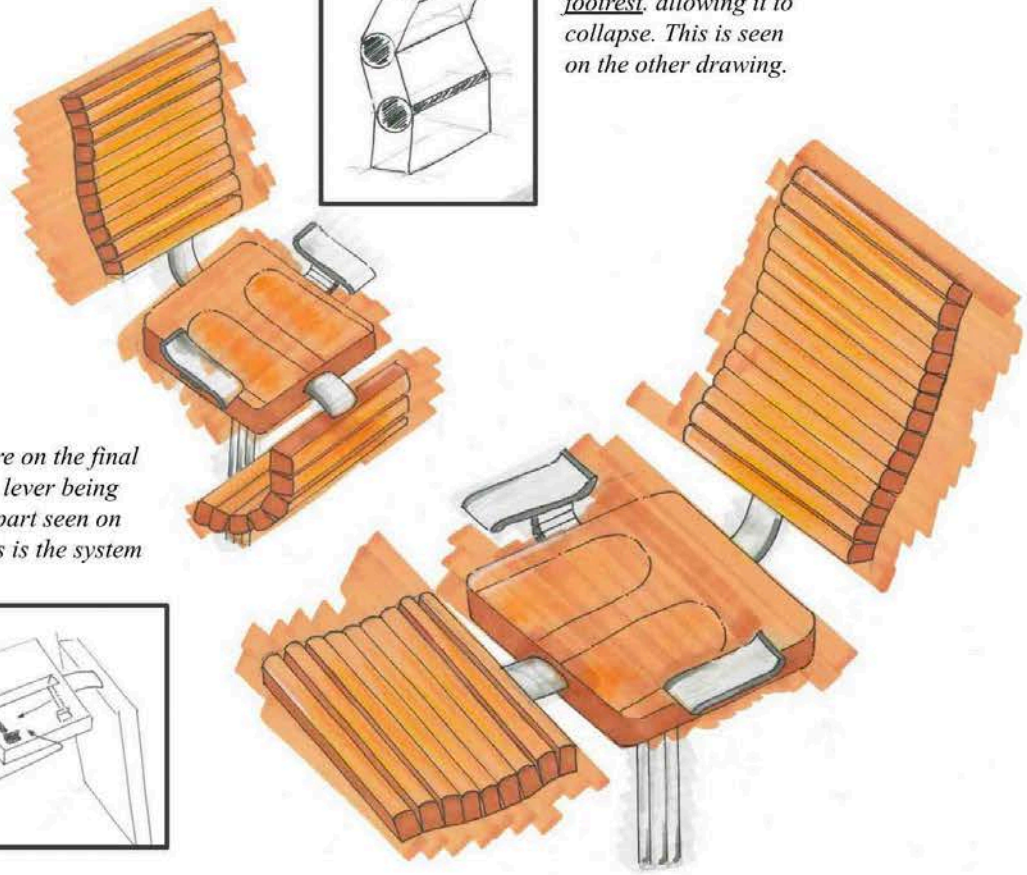
To scale

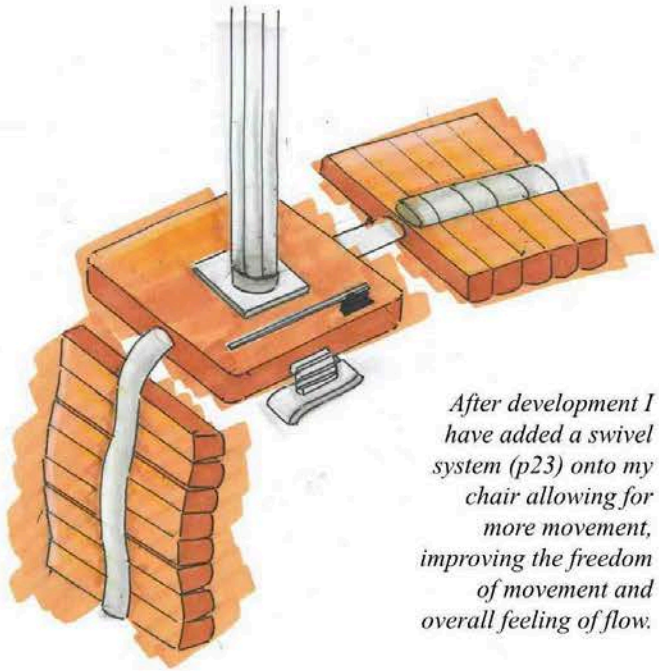


With the development of the hinge (p24) it has been implemented in three different spots. The part connecting the footrest, the lower parts of the back spine



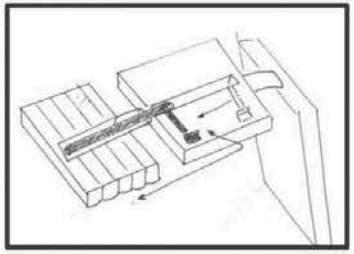
And also the underpart of the footrest. allowing it to collapse. This is seen on the other drawing.



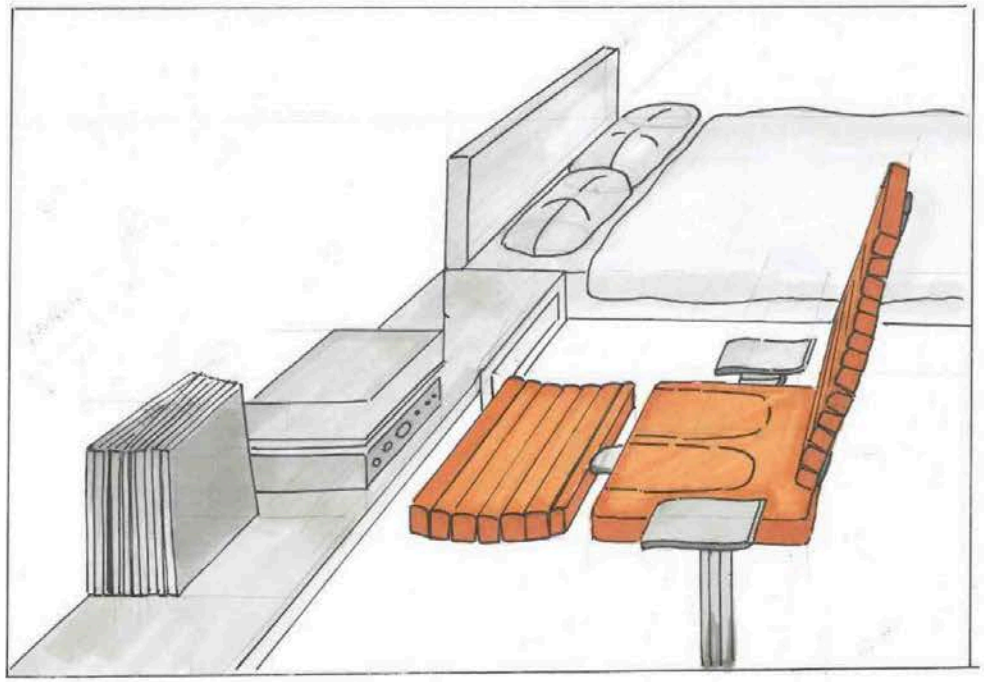


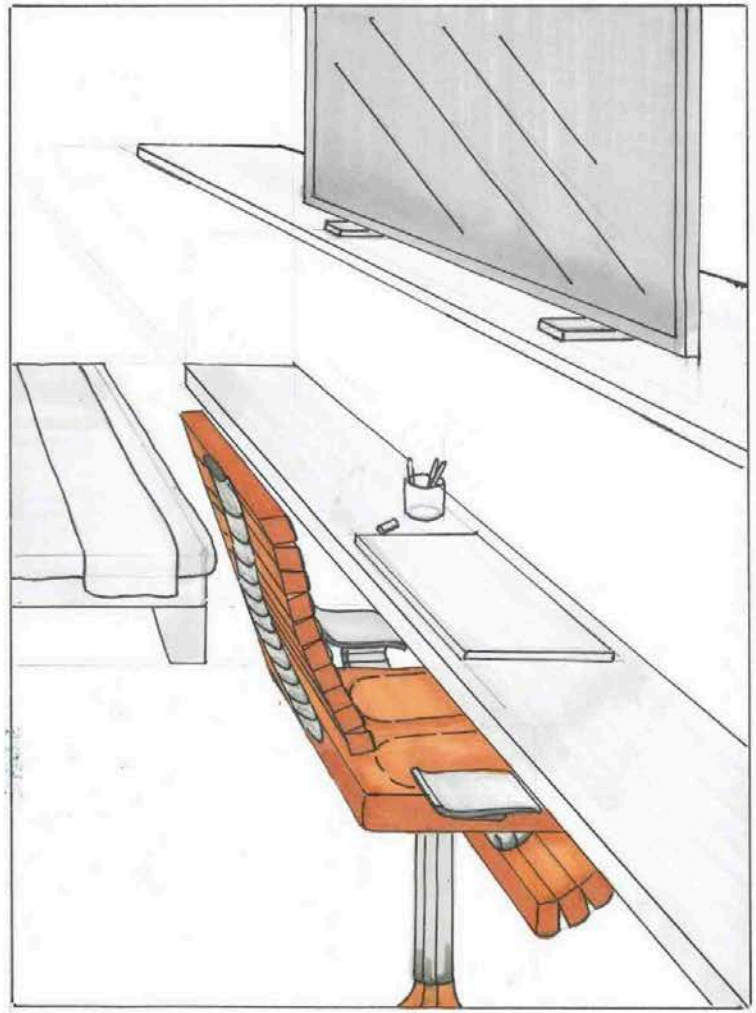
The bolt system (p25) is seen here on the final design. With the lever being the only visible part seen on the exterior. This is the system internally

After development I have added a swivel system (p23) onto my chair allowing for more movement, improving the freedom of movement and overall feeling of flow.



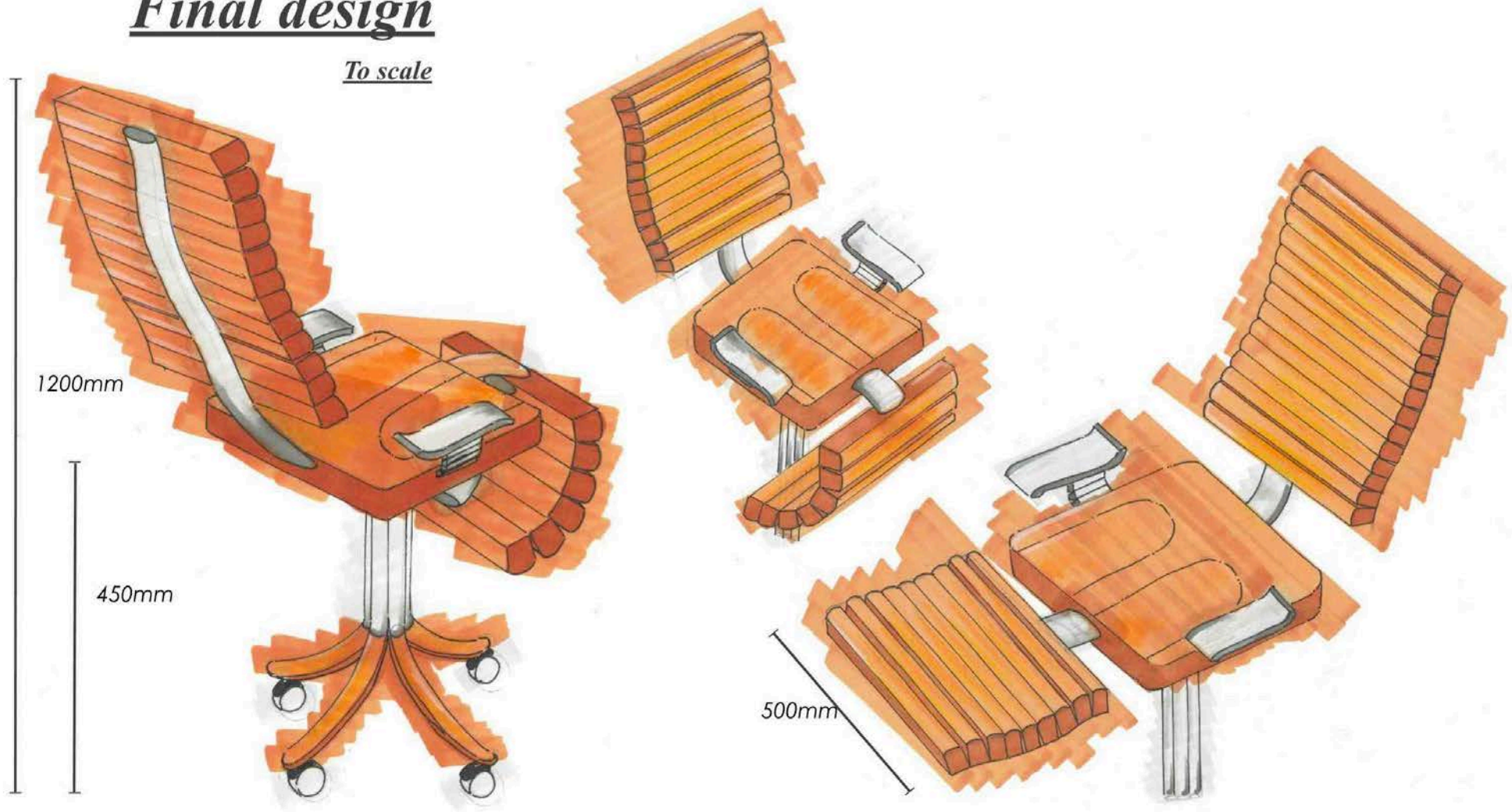
Product in context





Final design

To scale



Sample Achievement exemplar

Subject: Design and Visual Communication

Standard: 91627

Total score: A4

Grade score	Commentary
A4	Inspiration is primarily from the biology aspect rather than the architecture collage and is explored as a series of sketched starting ideas. This leads to different initial chair designs with identifiable function shown through its structural details and parts. There is a clear link back to the biology starting point and starting ideas, but once the design is established, all the design consideration of the construction details and materials do not show any further exploration. The candidate would need to demonstrate this to move up to M5.