

IBDP Design Technology Higher Level

Portable chair/table for trekkers.

Page count- 35.

Candidate code - 003566 0008

Criteria A - 1120

Criteria B - 236

Criteria C - 420

Criteria D - 1127

Criteria E - - N/A

Criteria F - 898

A-1- Situation Problem

Trekking is an activity loved by many, if not as a sporting activity it is yet a leisure one for many. While talking to a friend he and I have often faced the problems of trekking up a mountain to the perfect spot but having no place to rest or sit as it is a very exhausting activity. Although there are solutions such as a foldable chair which is easy to carry, but while trekking alone it is not possible to carry a bag for necessities as well as engaging one hand with the sole activity of carrying a chair. Currently there is no solution for carrying so many materials inside which poses concerns for the trekkers. It is inconvenient for a trekker to carry essentials as well as a chair while climbing up a mountain. Furthermore, In case of a fall, it is important that the trekker has both their hands free to protect themselves, by having to carry a chair. One potential solution for this problem is creating a all in one backpack that has accommodations for all of the necessities that one would need, it can also be used as a table or elevated seating for trekker, away from the insects infested and dirt filled areas.



The client complained that the chair was pretty heavy since its skeletal structure was made of metal. Through observation of how the client acted while holding the chair and bag, it would be observed that he changed his arm position in order to rest it on his back, this shows that it is uncomfortable and too heavy to carry normally, placing it on his back reduced the weight lightly and the strain on his muscles.

Brief

The backpack will be flat enough to allow for ease of convenience and lightweight to add less stress on the client.

The backpack will have an ergonomic design which is comfortable for the trekker to carry - One of the major physiological factors is comfort. The backpack should not be an inconvenience for the client. It should be easy for them to carry and comfortable so that they can trek efficiently while keeping the product intact and their hands free. The primary purpose of the solution is to make trekkers lives around the world easier. By considering comfort as a factor, I will be able to design a backpack which helps them in the best way possible.

The backpack will be made out of strong materials so that when it is carried close to or hit against rocks or tree trunks, the materials and functionality of it remains intact.

The backpack will transition by detaching and re-attaching 3 flat panels thus changing form from a backpack to a chair/table for the client to sit on or food to be laid out on easily

Design goal:-

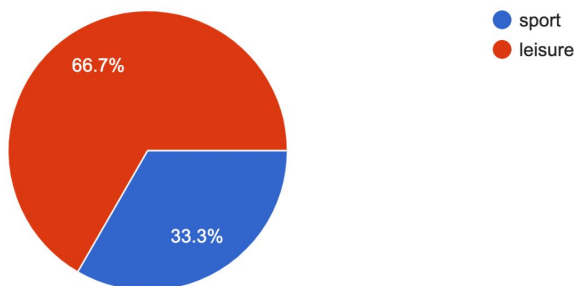
- The design should be comfortable
- The design should be portable and compact
- The design should offer ease of transportation
- Design should be lightweight

Target audience:

The product aims to solve the problem faced by occasional trekkers(primary audience) that trek for the view more than the sport and trek for short period of times as the bag would not be able to hold enough.

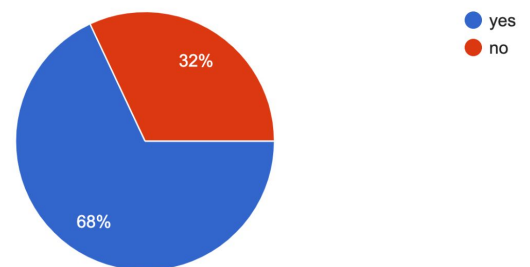
Do you trek for sport or leisure

21 responses



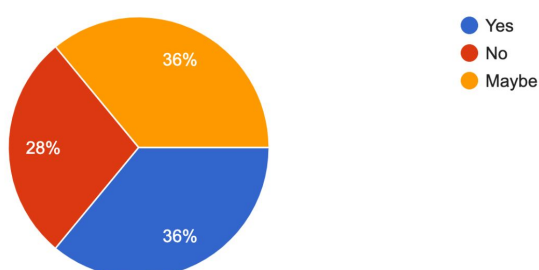
Do you trek often?

25 responses



Would you like to have a product that would combine the function of a bag and chair in one product?

25 responses



Using the primary method of collecting data using a survey, I sent it to my friends as well as on a WhatsApp trekking group chat, consisting of 32 participants that are around the age of 30. Though this it can be observed that most people have short treks. And majority said maybe for the product that shows that there is a design potential.

Design specification based on analysis

Design specification:

	Requirement	Justification	Prioritization 1-5
Aesthetics	<ul style="list-style-type: none">- Since the product is made for trekker the colour pallet for this product is bright orange, black and white.	The use of bright orange is not only for aesthetic purposes but also helps the trekker to be spotted from a distance.	3
Performance	<ul style="list-style-type: none">- Quick and easy to transition	The product should not add stress to the client during the transition and assembly process.	
Cost	<p>Costs to consider:</p> <ul style="list-style-type: none">• Material• Manufacturing cost	All these costs have to be considered because they are components of the product.	4
Target audience	<ul style="list-style-type: none">- Trekkers	The product is being made for the trekkers to carry for treks.	
Safety	<ul style="list-style-type: none">- Light weight- Correctly sized(compact)	<p>Trekking itself is a strenuous activity so the product should not add more load on them, otherwise it may cause discomfort and inefficiency.</p> <p>The product should be compact as the trekkers have to move around and thought small areas, the bag should also be able to fit through narrow spaces.</p> <p>As the location will most likely be surround with trees and water bodies it is important that the product does not get damaged because of rain, or the goods inside could get damaged as well as the product, this would make it inefficient.</p> <p>The product should include a safety lock so that it should not open during swift or rapid movements.</p>	5
Target market	<ul style="list-style-type: none">- Trekkers	The trekkers hygienic place to sit	5

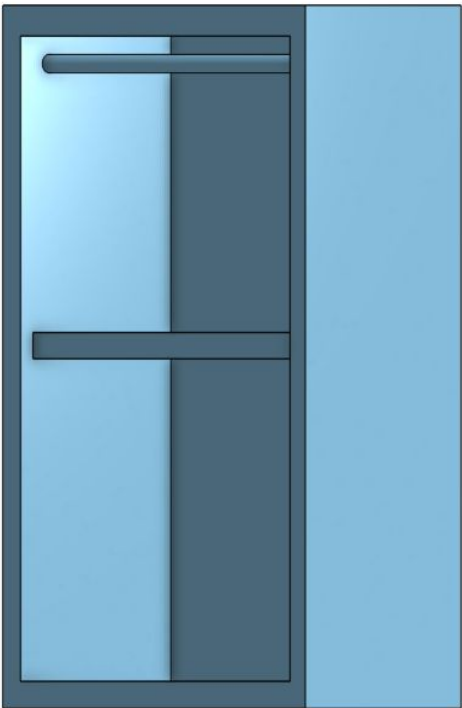
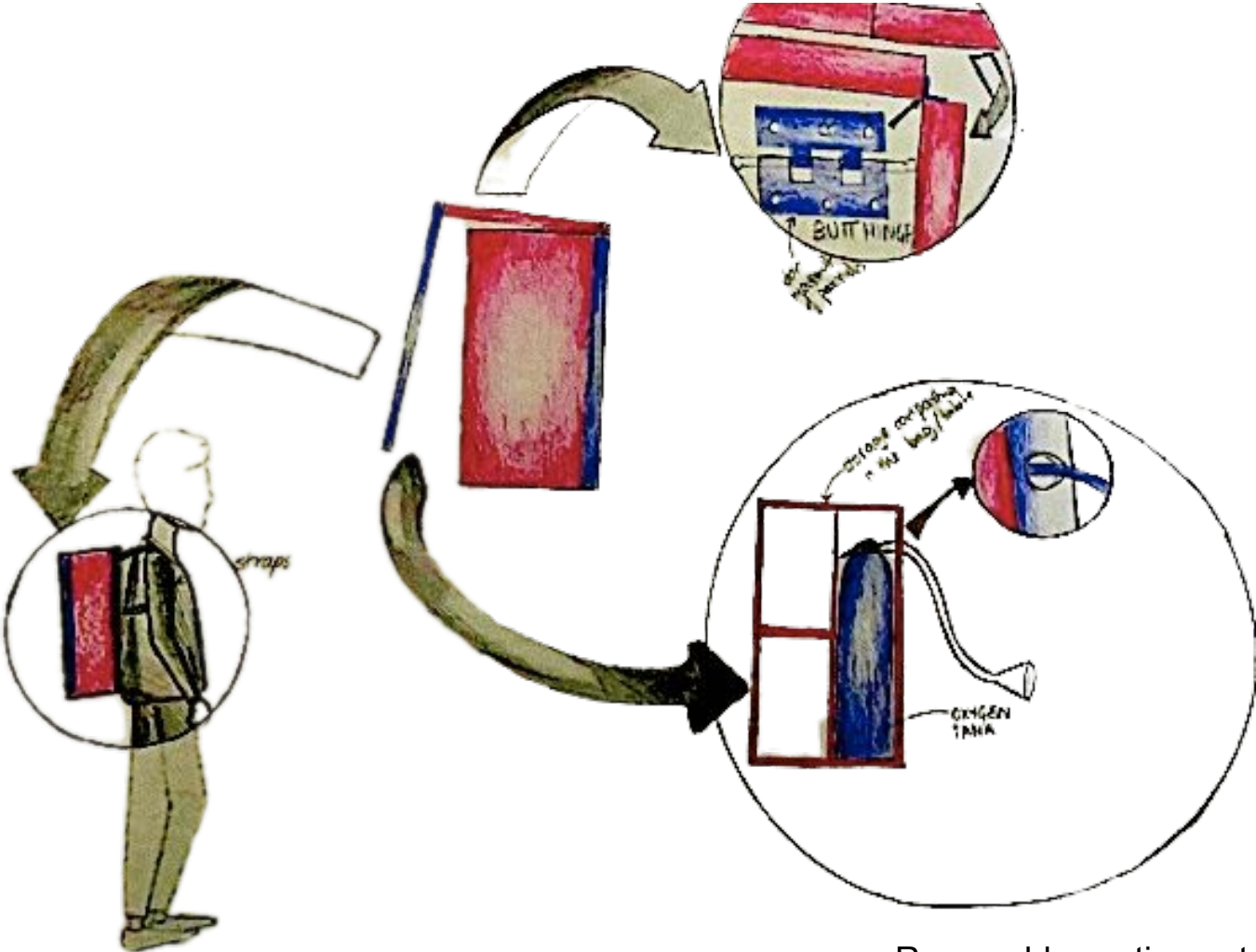
Design specification based on analysis

	Requirement	Justification	Prioritization 1-5
Function	<ul style="list-style-type: none">- The function is to convert efficiently from a backpack to a chair	The inside compartment should be quickly accessible, in case of an accident the first aid kit would have to be accessed quickly.	3
Comfort	<ul style="list-style-type: none">- Comfortable for client to carry and use	Trekking is a very strenuous activity and can take the client hours, it is important to equip the client with the appropriate product that allows them to perform the activity as effectively as possible.	5
Portability	<ul style="list-style-type: none">- Ease of traveling, not a burden for client.	The product has to be portable, as trekking is a strenuous activity and the product should not be a burden for the customer.	4
Size	<ul style="list-style-type: none">- 50 cm x 35 cm	To fit accommodations for everything that is the minimum size needed.	3
Material selection	<ul style="list-style-type: none">- Addition foam sheet	A foam sheet is important to give the client more comfort after they have experienced fatigue.	2
Disassembly	<ul style="list-style-type: none">- Ease of assembly and disassembly	Disassembly helps to retain product value. The parts saved can be sold, reused, reassembled or recycled.	4

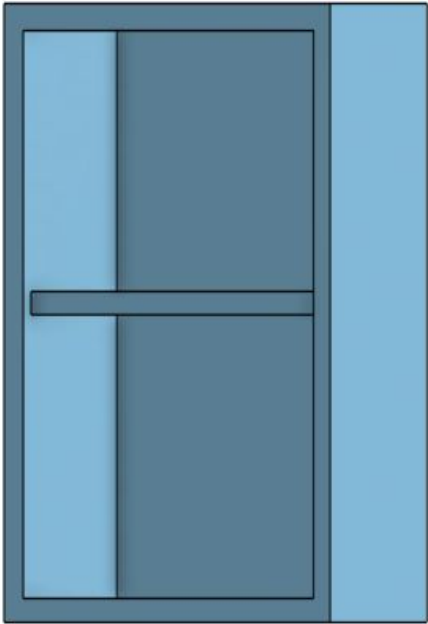
Feasible ideas:sketches and annotations

Initial concept sketch
This helped me quickly
put my ideas to paper.

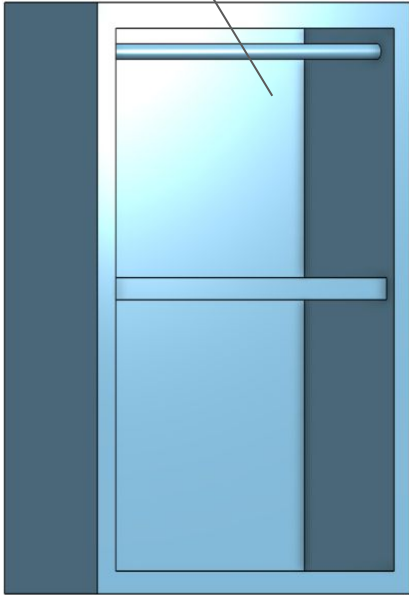
Sketch 1



Objects go
inside

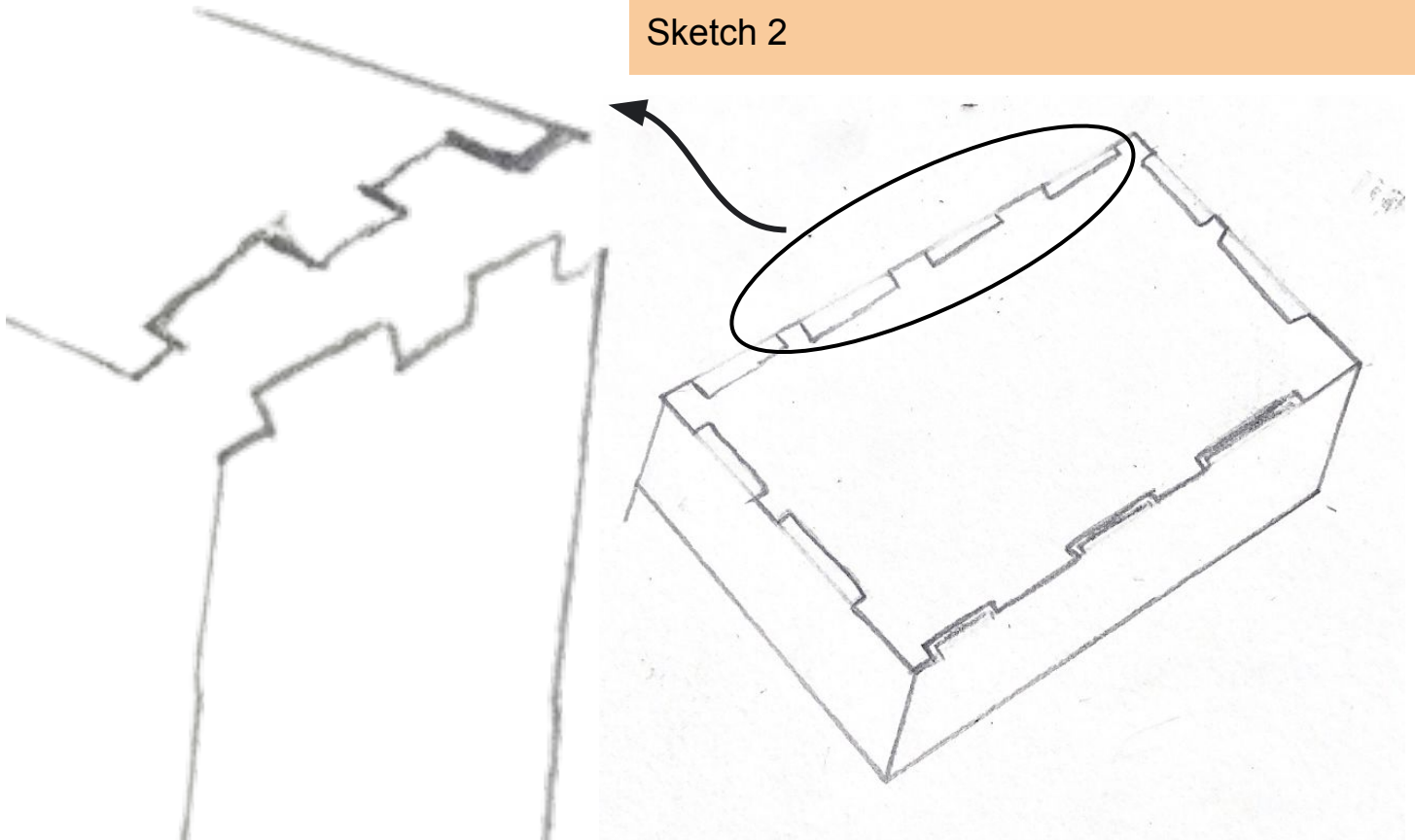


Removable section gets
reattached

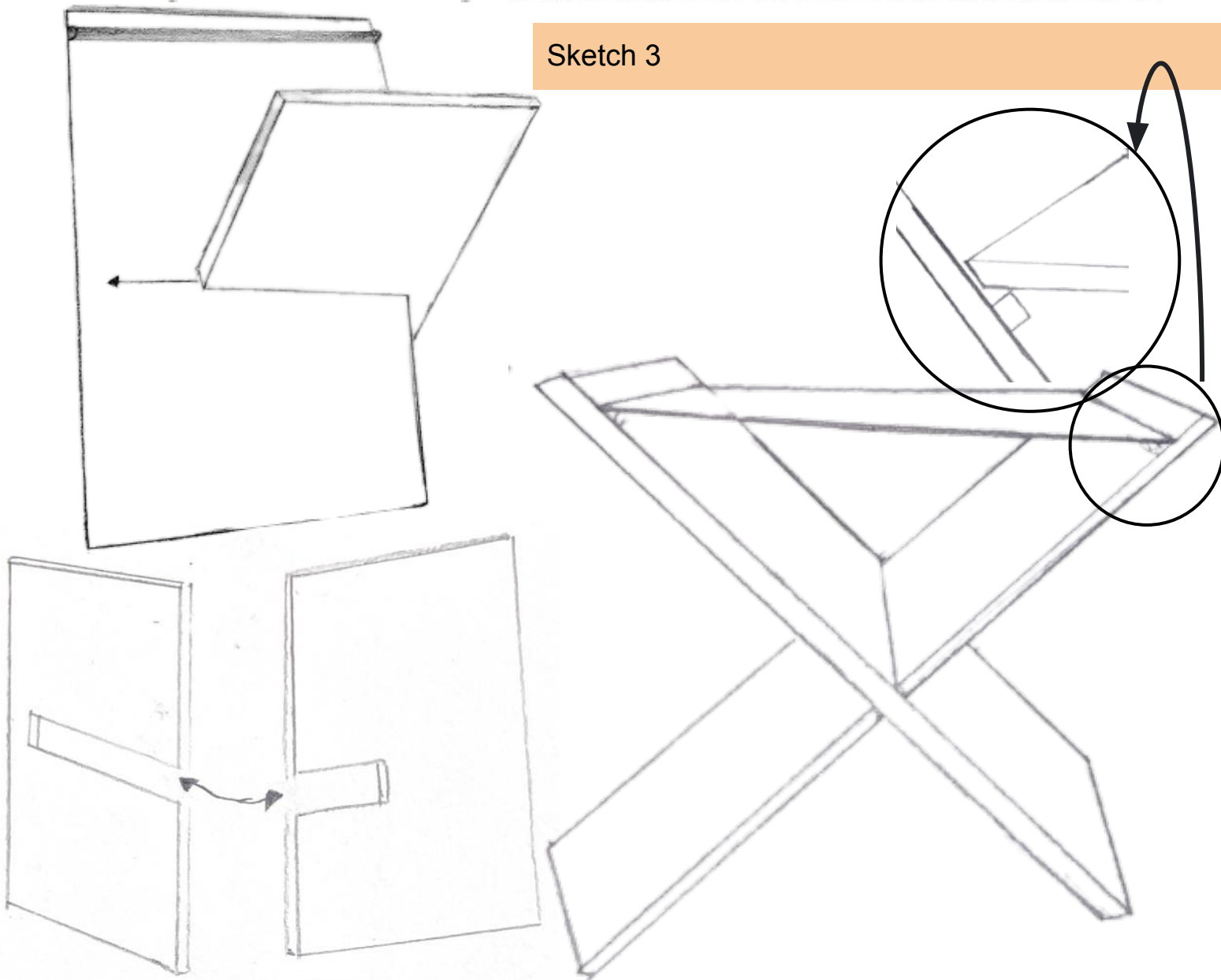


Feasible ideas: sketches and annotations

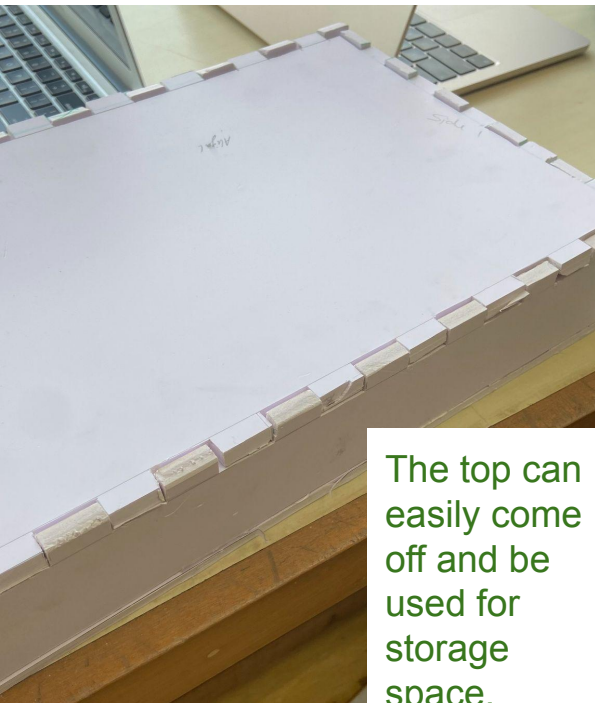
Sketch 2



Sketch 3



Concept modelling: test ideas, user feedback



Hand cut common dovetail joint

But the height is too short

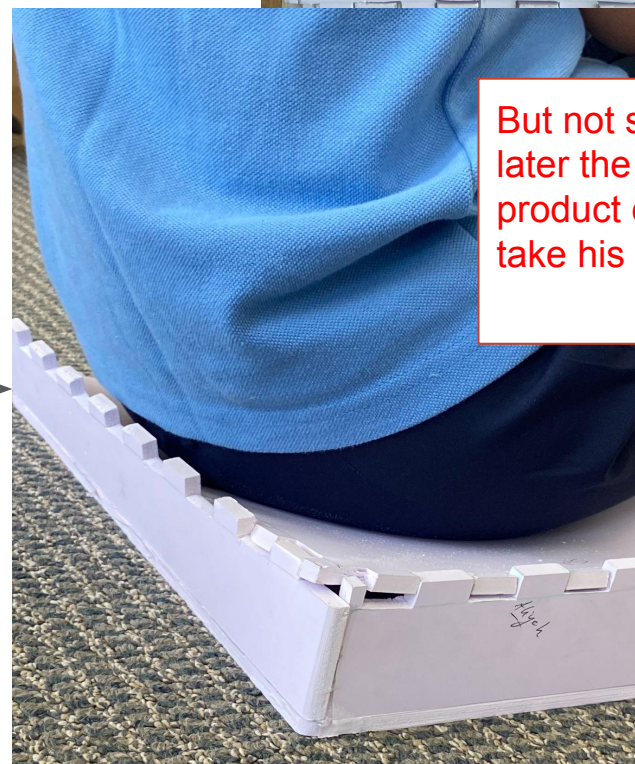
This joint allows the client the ease of removal and attachment

The top can easily come off and be used for storage space.

Client compiled about it being too short to sit on, but if it was bigger it would be inconvenient to carry.



The product was able to hold my clients weight for some time.



But not soon later the product couldn't take his weight

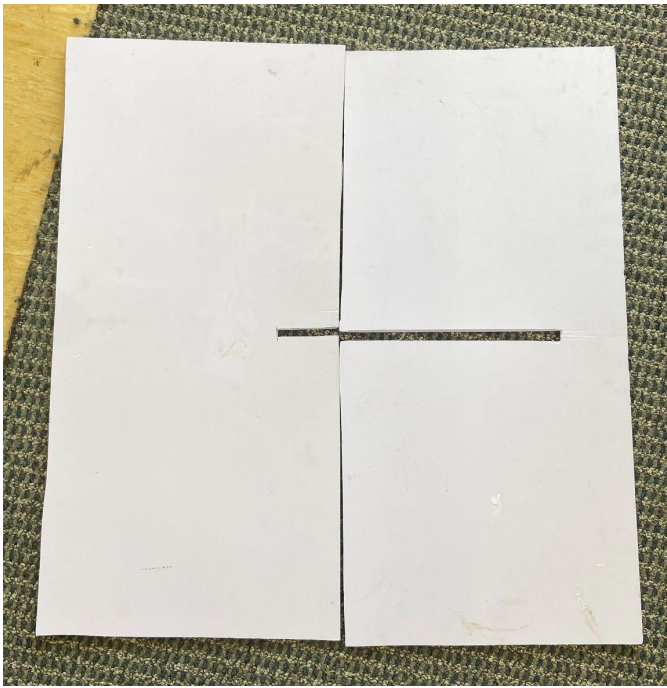
Advantages

- The client's body was able to fit onto the product.
- The joints made it convenient for storage
- The client said that if it had straps he would have been able to carry it as it was compact and portable.
- The board didn't actually break, it only bent inwards

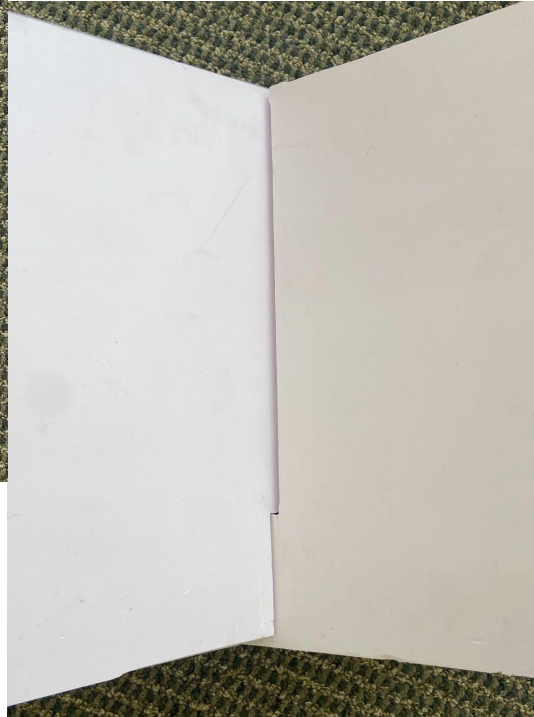
Disadvantages

- The product couldn't hold his weight for more than 30 seconds.
- The joint got unattached with when pressure was applied. Could be hazardous.
- The products inside could have been damaged with the pressure.

Concept modelling: test ideas, user feedback



Top angle of how the product looks when it is assembled together.

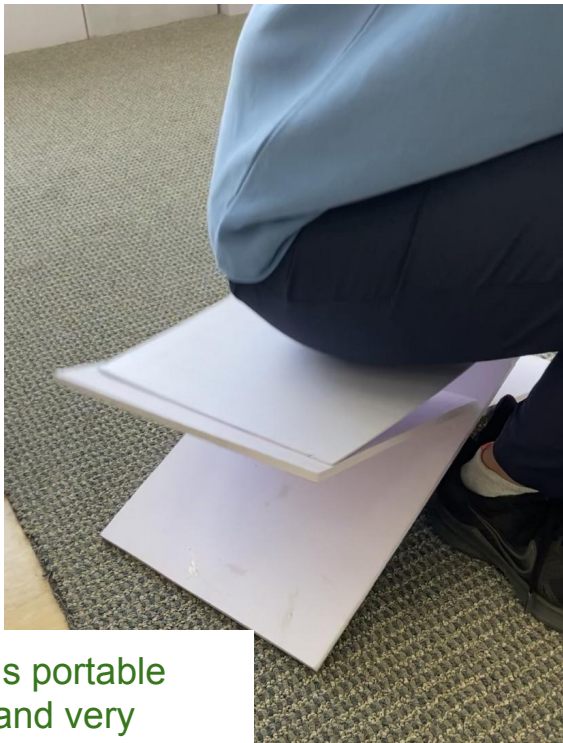


The 2 separate panels that can very conveniently be attached and unattached.

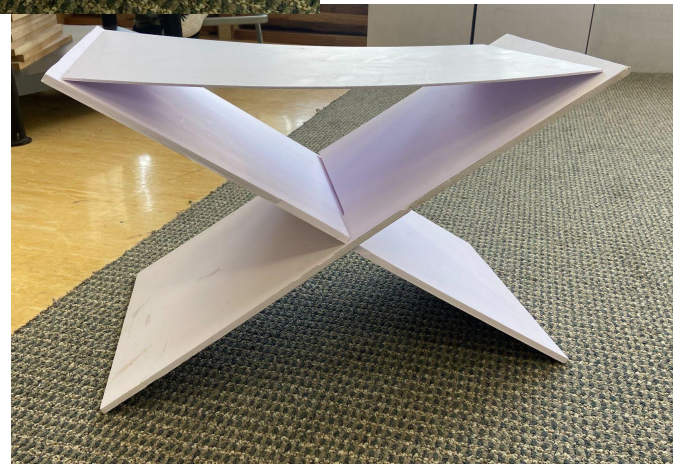
Product comprising of only 3 flat panels

Can be used as a table and as a chair.

Made for ease of disassembly



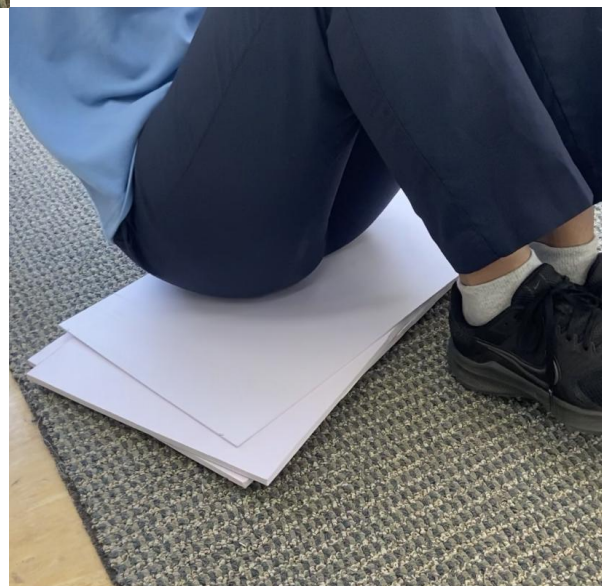
The product couldn't take a lot of pressure.



Is portable and very compact.

User feedback received:

- Product was easy to assemble.
- Convince of traveling with it.
- Top board could be unstable and would need some way of keeping it stable.
- Too fragile.



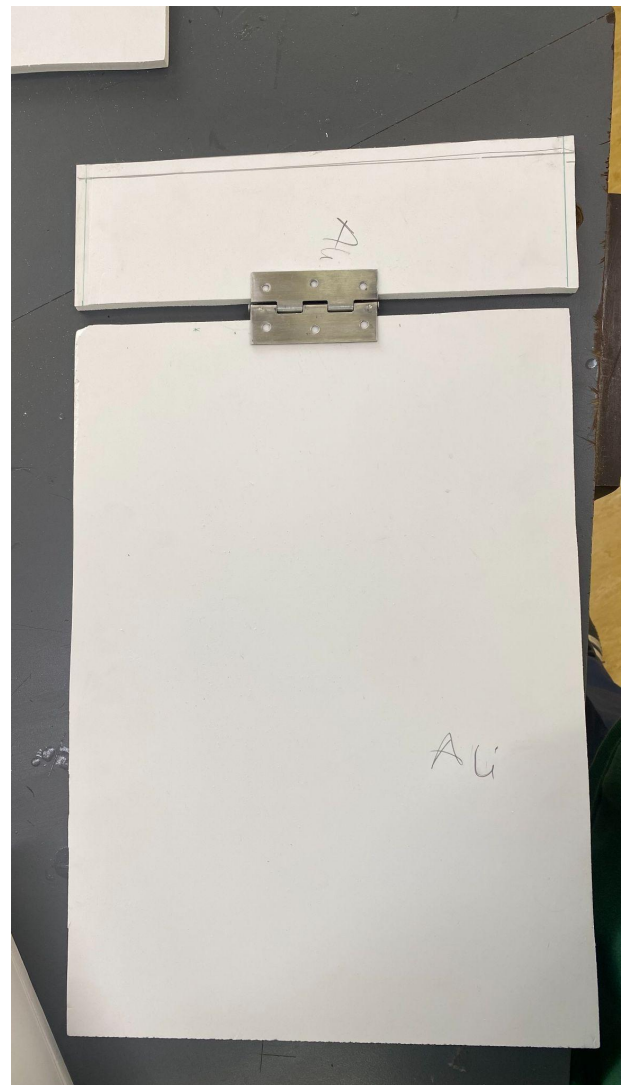
The product can be used as table for lightweight objects but not a chair as it can't take human weight.

Concept modelling: test ideas, user feedback



Spacious to carry equipment and other objects

Bulky, client will have to be careful not to hit the product while trekking making it inconvenient



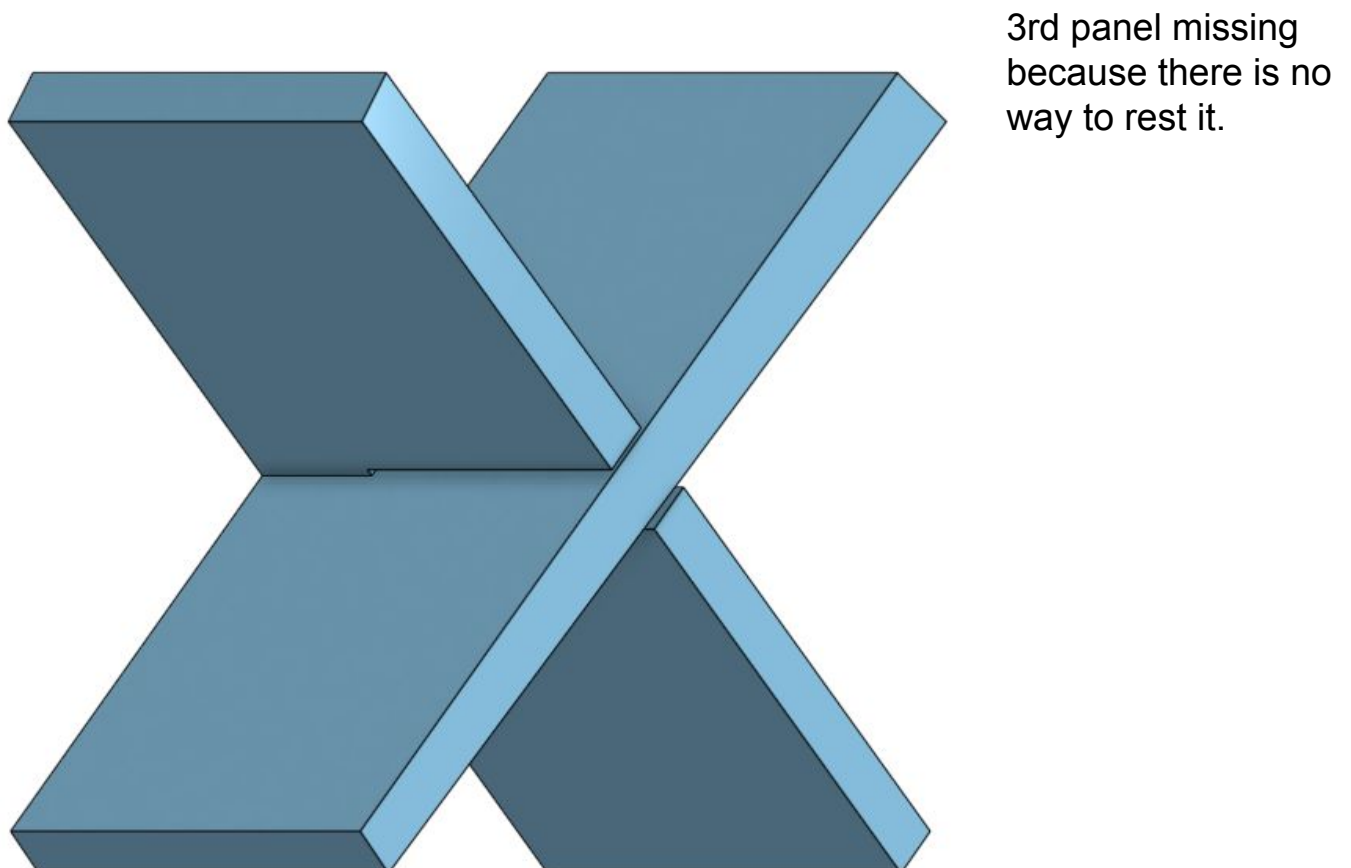
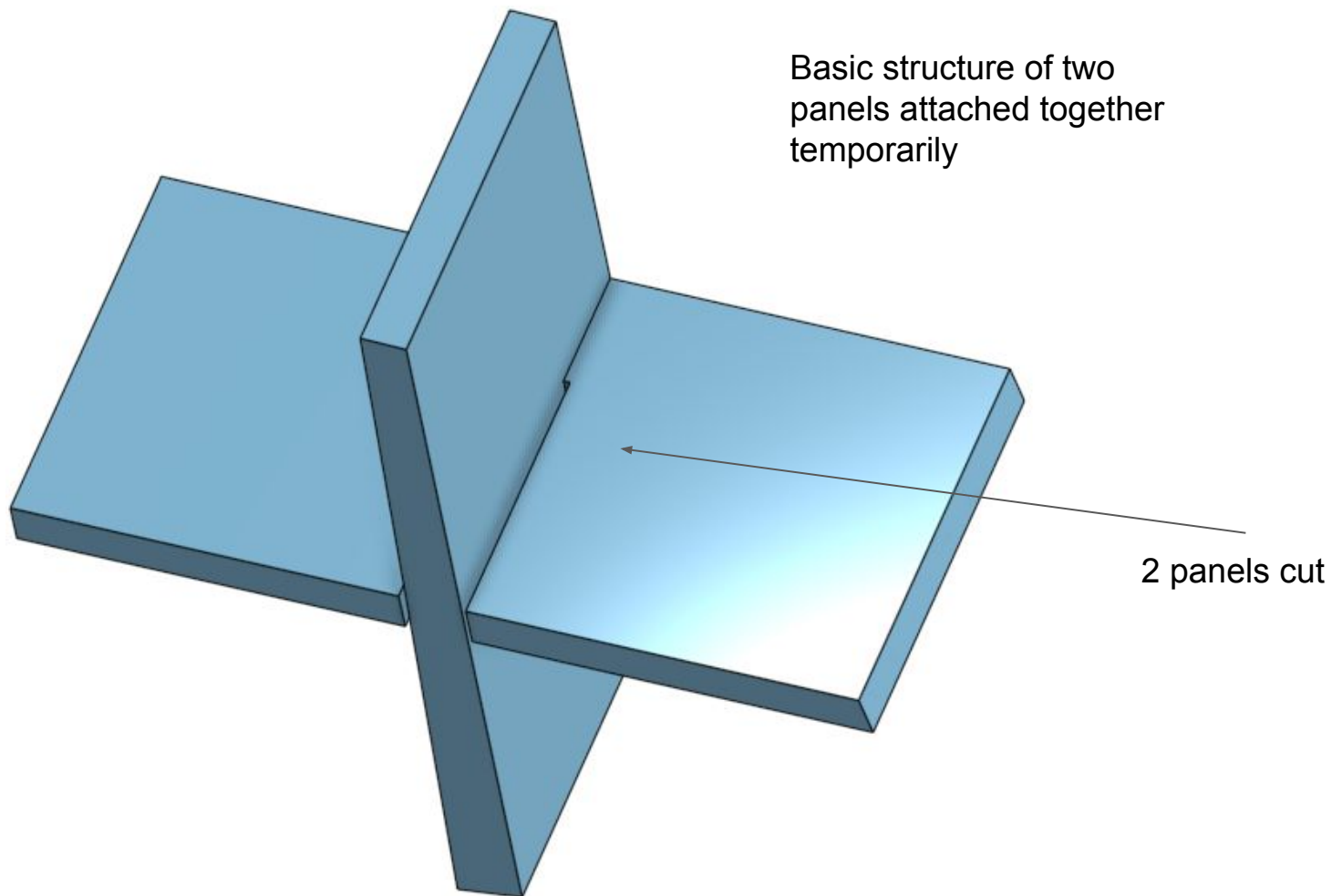
Hinges can get rusty if in contact with water

User feedback received:

- Panels were very inconvenient to slide and open
- Box was bulky to carry

Panels attached with hinges for ease of opening and closing

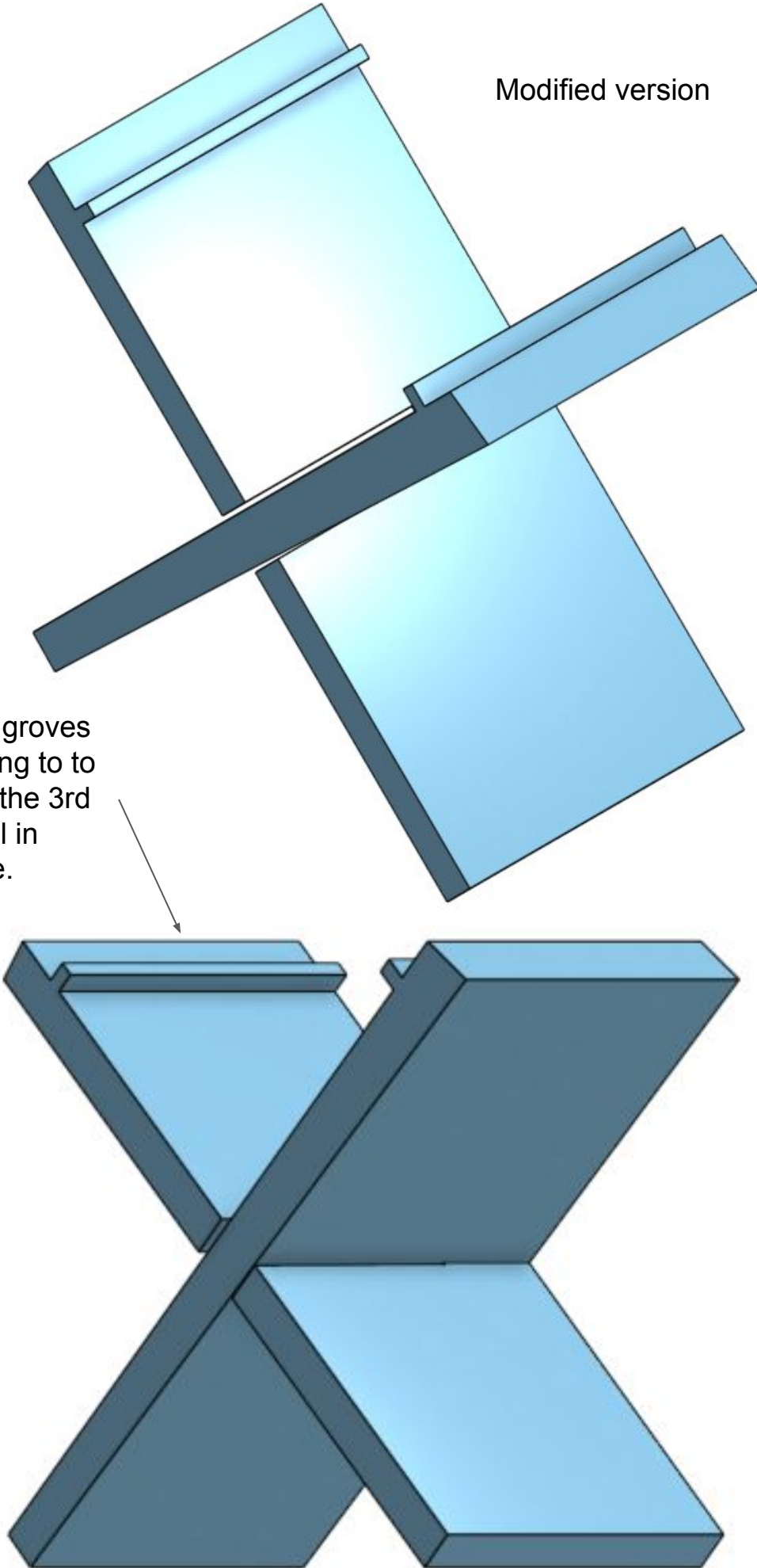
Presentation drawing with annotation, justification related to spec



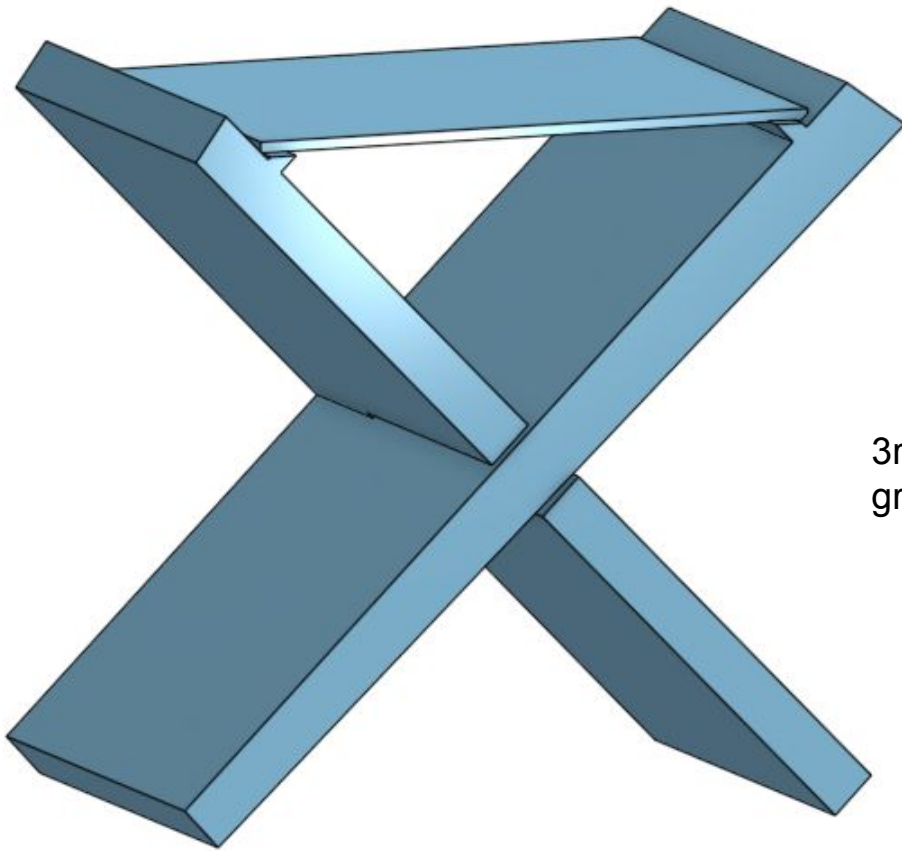
Presentation drawing with annotation, justification related to spec

Modified version

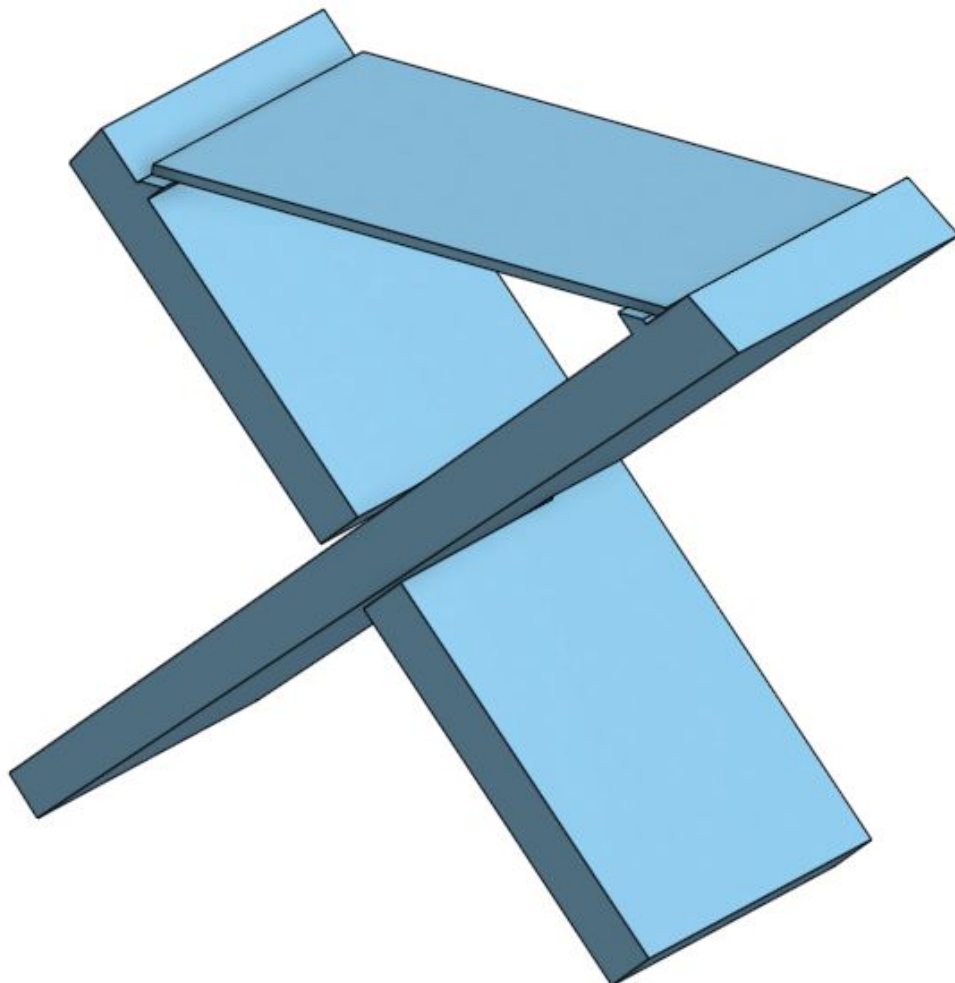
With grooves coming to to hold the 3rd panel in place.



Presentation drawing with annotation, justification related to spec



3rd panel added with
grooves for stability.






CRITERION - C

Identify and justify choice of materials, components and manufacturing techniques for final prototype

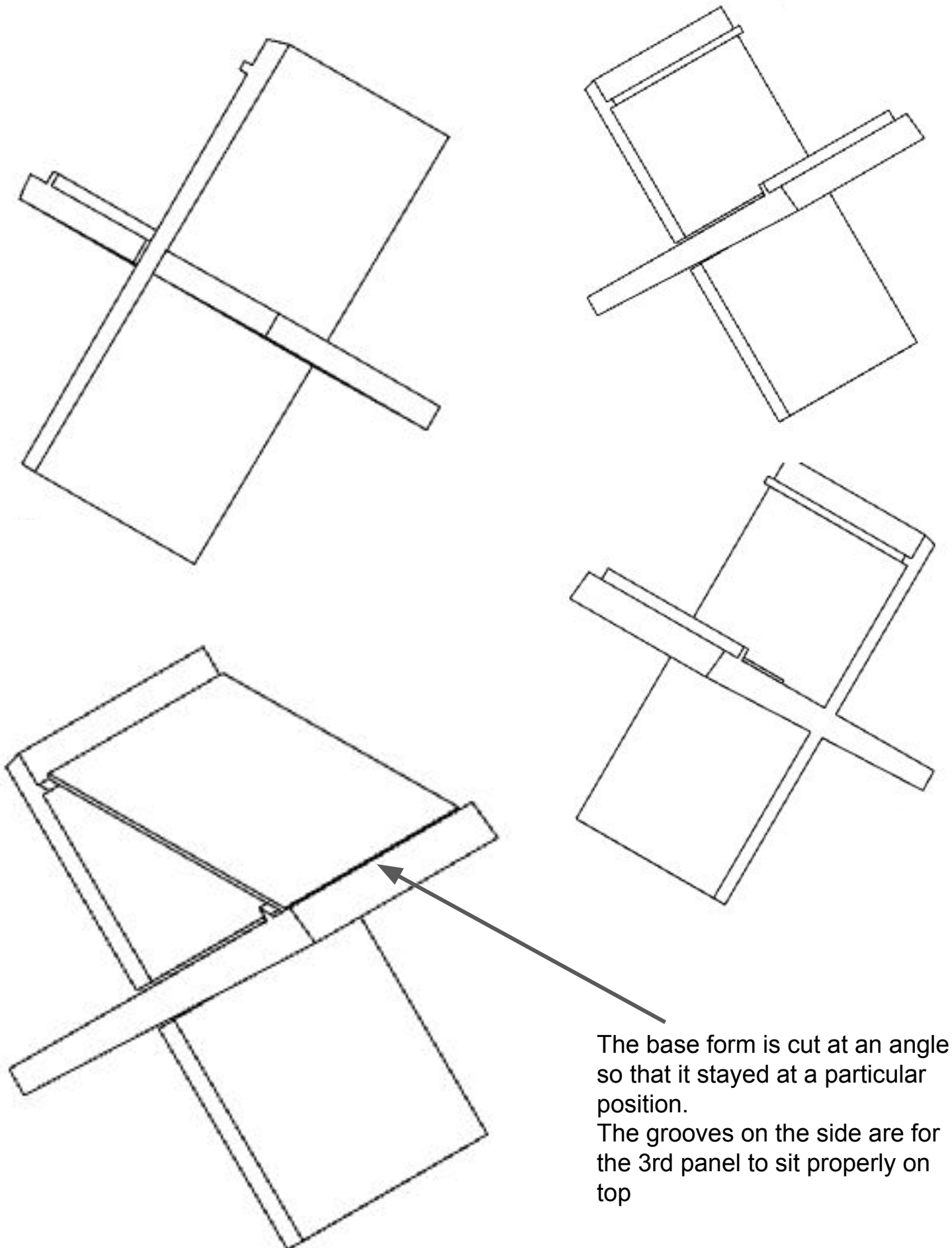
Material	Need	Material option 1	Material option 2	Material option 3
Board	A hard material is required to create the basic structure of the product.	<p>Fiberboard: Fiberboard is made from wood fibers. It is used in furniture, flooring, and insulation.</p> <ul style="list-style-type: none"> - stronger than MDF 	<p>MDF (Medium-density fiberboard): MDF is a type of engineered wood made from wood fibers and glue.</p> <ul style="list-style-type: none"> - weaker than plywood and fiberboard. 	<p>Plywood: Plywood is made from thin layers of wood veneer that are glued together.</p> <ul style="list-style-type: none"> - stronger than MDF and fiberboard. 
Cushioning	This is needed so that the customer feels more comfortable	<p>Lux foam is a high-quality foam used for furniture seating and mattresses which makes it heavier than EPE.</p> 	<p>EPE foam sheet is lightweight, semi-rigid, flexible and shock absorbent.</p> <ul style="list-style-type: none"> - Lighter than memory foam 	<p>Memory foam is sensitive to temperature and pressure.</p> <ul style="list-style-type: none"> - heavier than vinyl and closed cell foam. 
Cloth(bag straps)	For easy of convince the product should be easily portable.	<p>Yogya mat bag strap, using a similar method of packing.</p> <ul style="list-style-type: none"> - highest ease, as it is not attached. 	<p>Common bag straps, will be inconvenient to carry as the straps can not be removable, attaching will cause inconvenience to function.</p> 	

Identify and justify choice of materials, components and manufacturing techniques

Material	Justification	Components	Price
plywood board	Since the chair needs to be able to take the pressure to be functional the material used inside must be strong yet light.It is denser and stronger than regular fiberboard or MDF and is often used in furniture, cabinetry.		Ranges from 900 to 4500 rupees(per sheet).
Thin sheet of foam	The EPE thin sheet of foam will be used to cover the interior and exterior of the product do the sharp edges of the plywood board do no hurt the client and also are there for aesthetic and comfort purposes.		280 rupees
Cloth(bag straps)	The cloth will be needed for the bag straps. The concept of a yoga bag is convenient as the product and the bag can be separated from each other, and it is lightweight.		304 rupees

Material	Manufacturing techniques	Time spent
Plywood board	Using laser cutting works with high accuracy and precision, but	1 hour 30 minutes
EPE thin foam sheet	Cutting and sticking of sheet with araldite as it is a stronger adhesive.	1 hour 15 minutes
Carrier straps	The straps will first be purchased and then adjusted to the correct measurements of the product.	2 hours.

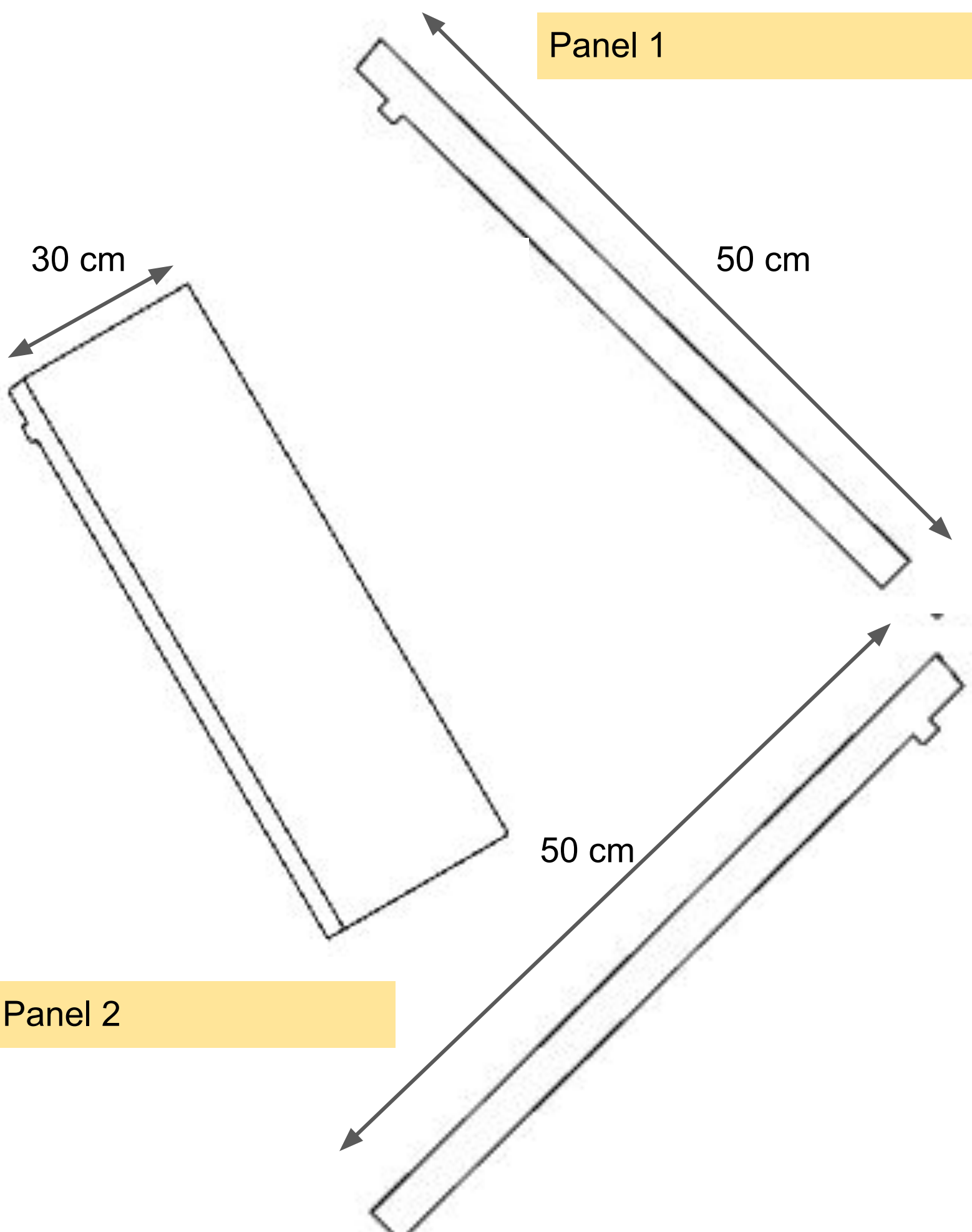
Detailed technical drawing, bill of material
for third party to manufacture prototype



Detailed technical drawing, bill of material for third party to manufacture prototype

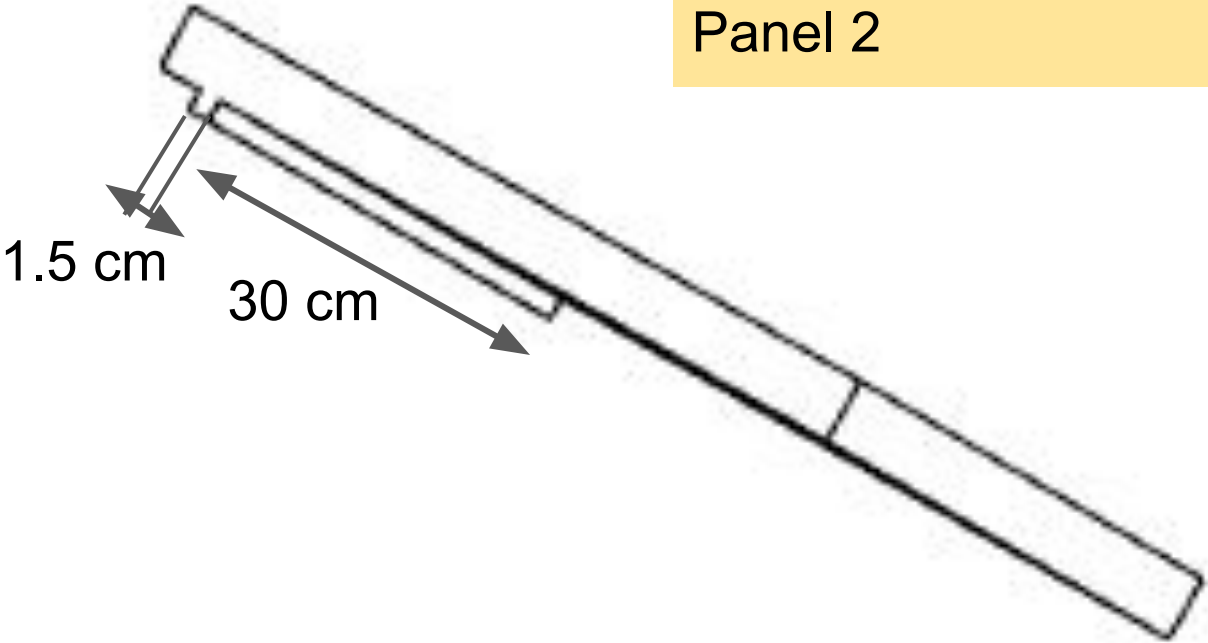
Part no.	Material	Quality	Length	breath	Process
1	Plywood panel 1	1	50 cm	30 cm	Laser cutting
2	Plywood panel 2	1	50 cm	30 cm	Laser cutting
3	Plywood panel 3	1	50 cm	30 cm	Laser cutting
4	Dovel for grooves	2	30 cm	1.5 cm	Rip cutting.
5	EPE sheet	3	50 cm	30 cm	Cutting with scissor and sticking
6	Bag strap	1	N/A (adjustable)	N/A (adjustable)	Outsourced / stitching to adjust

Detailed technical drawing, bill of material for third party to manufacture prototype

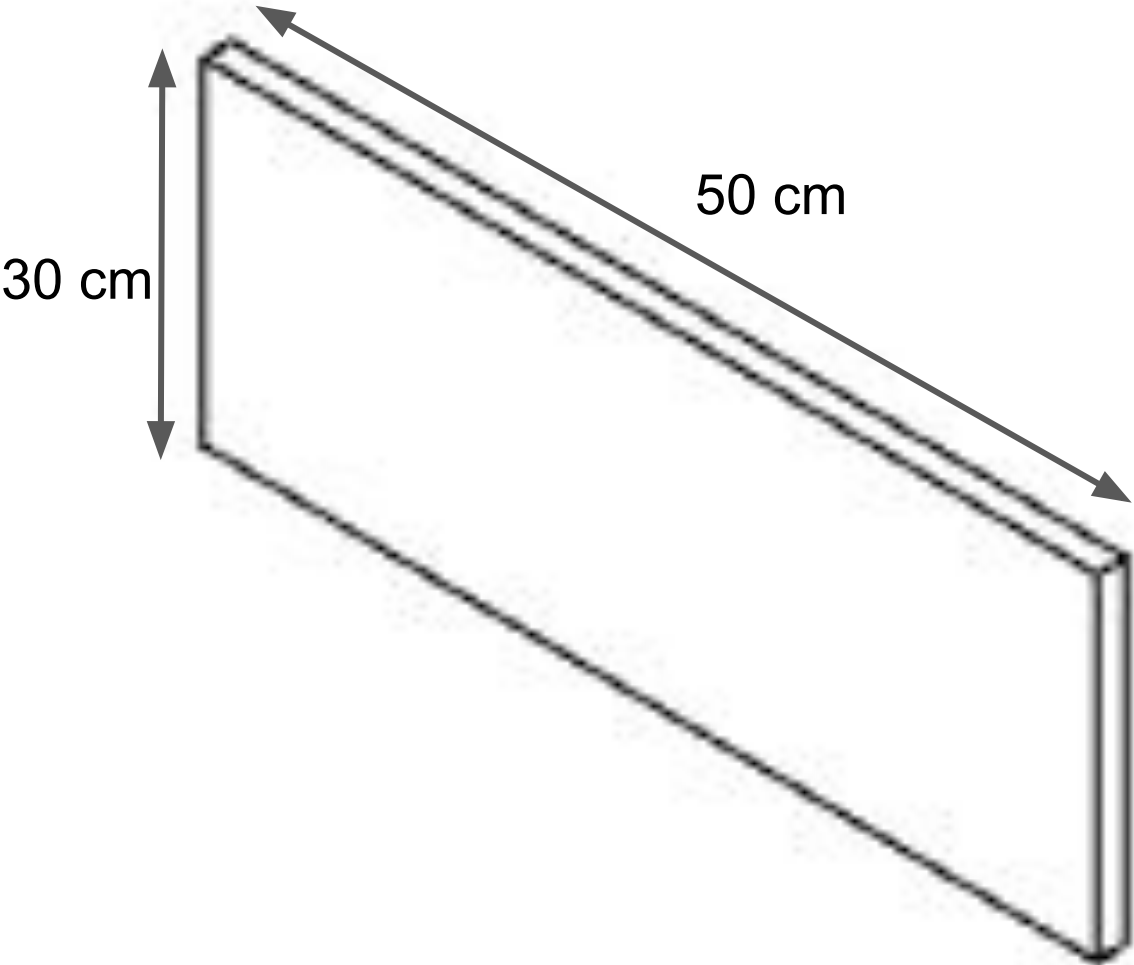


Detailed technical drawing, bill of material
for third party to manufacture prototype

Panel 2



Panel 3



Construction plan

Process	Task	Equipment	Quality control	Risk assessment	Time
Material prep	Order plywood	10 minutes
	Order EPE sheet	5 minutes
Processing	Cutting panel 1	Laser cutter	Ensure wood piece is properly aligned. Check for movement	Turn on the particle extractor, wait before removing any fragments.	30 minutes
	Cutting panel 2	Laser cutter	Ensure wood piece is properly aligned. Check for movement	Turn on the particle extractor, wait before removing any fragments.	30 minutes
	Cutting panel 3	Handsaw, scale, set square and pencil	Ensure set square is used of accurate rectangle shape	Measurements could go wrong.	20 minutes
	Cutting thin strip dor hold	Handsaw, scale, and pencil	Ensure measurements are accurate	Measurements could go wrong	10 minutes
Assembly	Attaching thin strip	Hammer and nails	Ensure it has equal spacing on both panels	Make sure fingers are out of the way of the hammer.	20 minutes
	Cutting and sticking EPE sheet	Aerldite	Make sure gule is spread evenly	Ensure there are no places missed	30 minutes

Justify testing strategies

Performance testing – Data collection

Ref no.	Success parameters	Tested with	Justification
PT1	Measure durability	Primary user	Product should have ease of use to decrease burden on client.
PT2	Observe if they are affected by any sharp edges or feeling discomfort.	Primary user	One of the main purposes of the product is to provide the client with comfort after they have experience fatigue by trekking.
PT3	Observe if assembly is causing the client more stress.	Primary user	The product should relive the clients stress not add to it.
PT4	Observe if the client is easily able to understand the assembly and disassembly of the product.	Primary user	Product should have ease of use to decrease burden on client.
PT5	The product should not break after a fall.	Primary user	The first test is the drop test, the customer will undoubtedly drop the product at some point this will make sure the product is not weak.
PT6	Ensure that all panel pieces fit well together and with ease	Primary user	Through this, we see whether or not the product fits effectively. and if the product will be compatible with the environment and client.
PT7	Product should be compact and portable.	Primary user	In this case, since a trek could be through small spaces the product should be portable and compact.
PT8	Product should be comfortable for the client .	Primary user	The product should not cause stress to the client as they will already be tired.

Test results, strengths and weaknesses, used to evaluate spec

Evaluation of testing strategies against specification

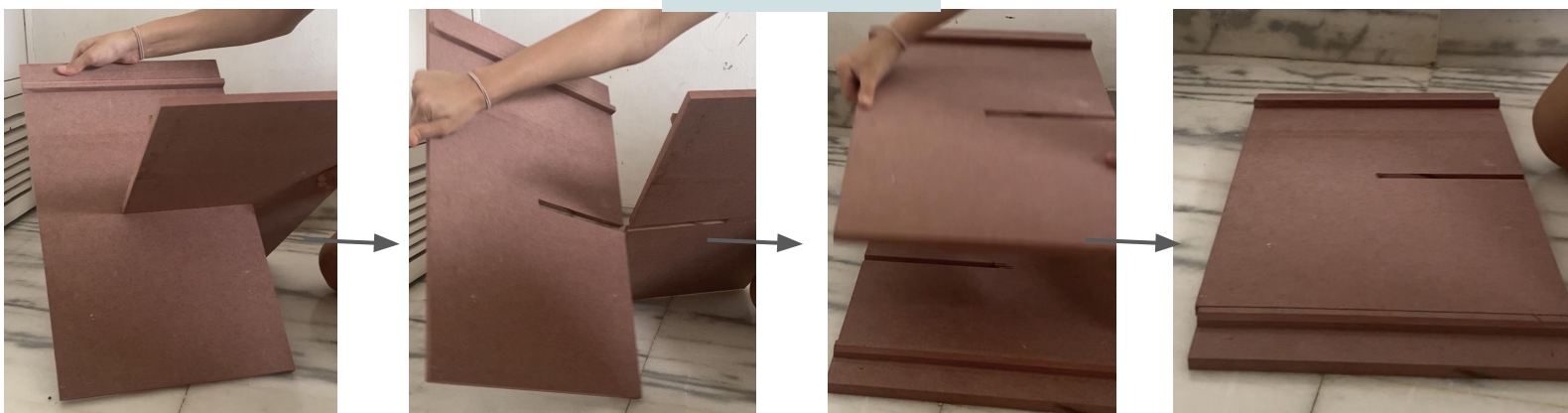
Specification	Test ref no.	Rating	Comment
Quick and easy to transition	PT3	4/5	Since the product is not automated it will add slight stress to the client, but level of stress is as minimal as possible.
The function is to convert efficiently from a backpack to a chair	PT4	5/5	The product is a very simple design which helps the client understand it easily thus not causing a lot of burden to the client.
Comfortable for client to carry and use	PT8	4/5	As the product is flat and light it is comfortable for the client to carry and with the foam sheet over it the product is comfortable during use also.
Ease of traveling, not a burden for client.	PT7	3/5	The flat design of the product is very easy for the client to carry or fit anywhere but since it is made out of wood it can add slightly more weight than necessary.
Ease of assembly and disassembly	PT6	3/5	The precise cut and easy design of the product allows client to easily assemble and disassemble it. But if there was any damage to the center cut of the product the position can be compromise and this change in position could cause the client discomfort.

Strengths	Weaknesses
<ul style="list-style-type: none">• The flat design• Convienince of carrying due to compact design.• Posseses porporties of stiffness and toughness.	<ul style="list-style-type: none">• Wood is a slightly heavy material• Incase of any damage - change in position of the product

Test results, strengths and weaknesses, used to evaluate spec

Testing evidence

PT3 & PT4



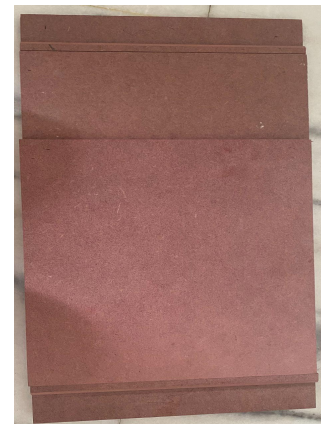
It can clearly be observed that the transition of the product is not time consuming or difficult. It is slightly tough to align the 2 panel slots correctly and quickly but once done the rest of the assembly and disassembly process is very simple.

PT2 & PT2



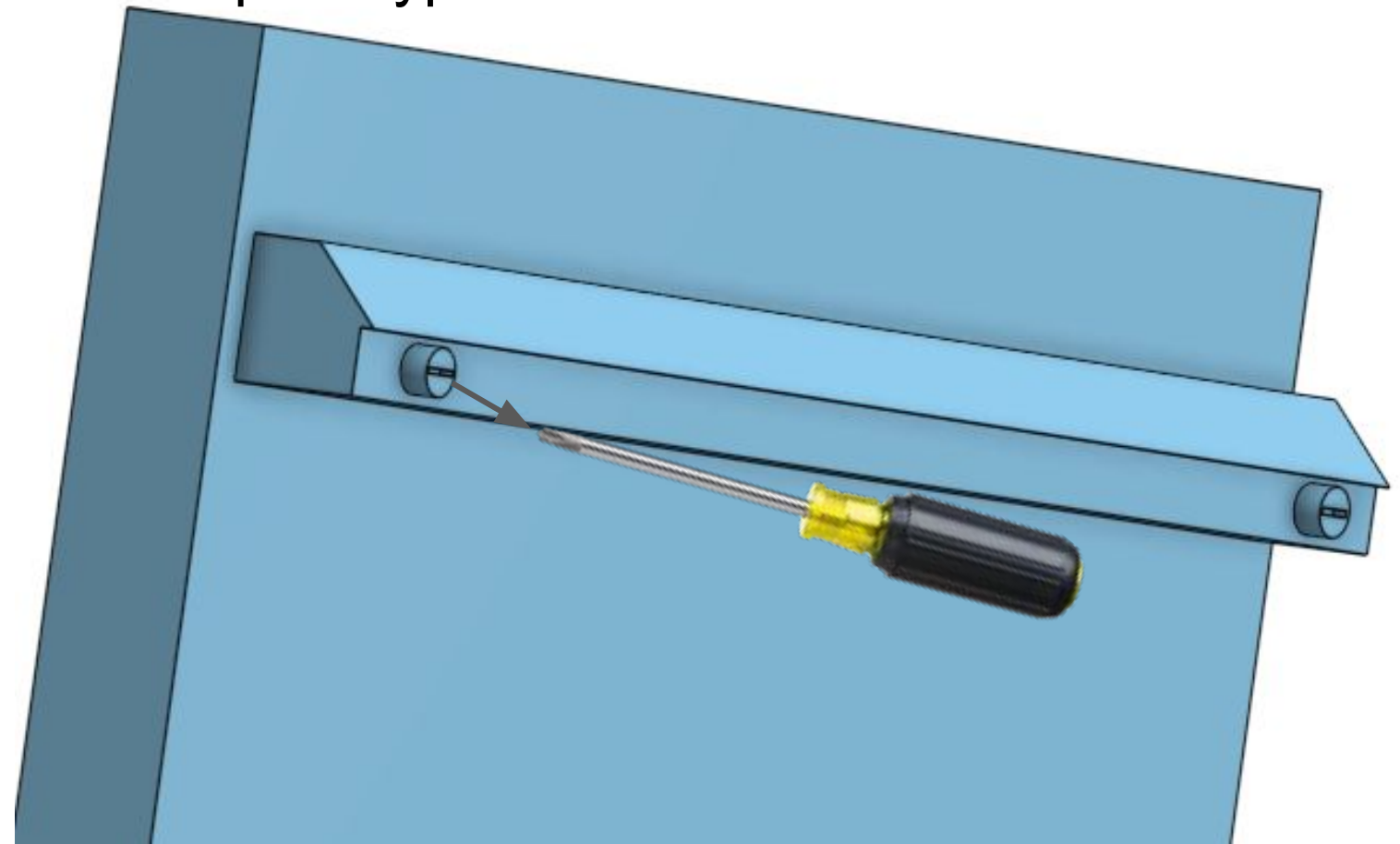
Each panel itself has been cut in a way there no sharp edge can come into contact with the client. After testing the feedback from the client was that the product was comfortable in itself as the material was smooth and there was no need for additional foam.

PT6 & PT7

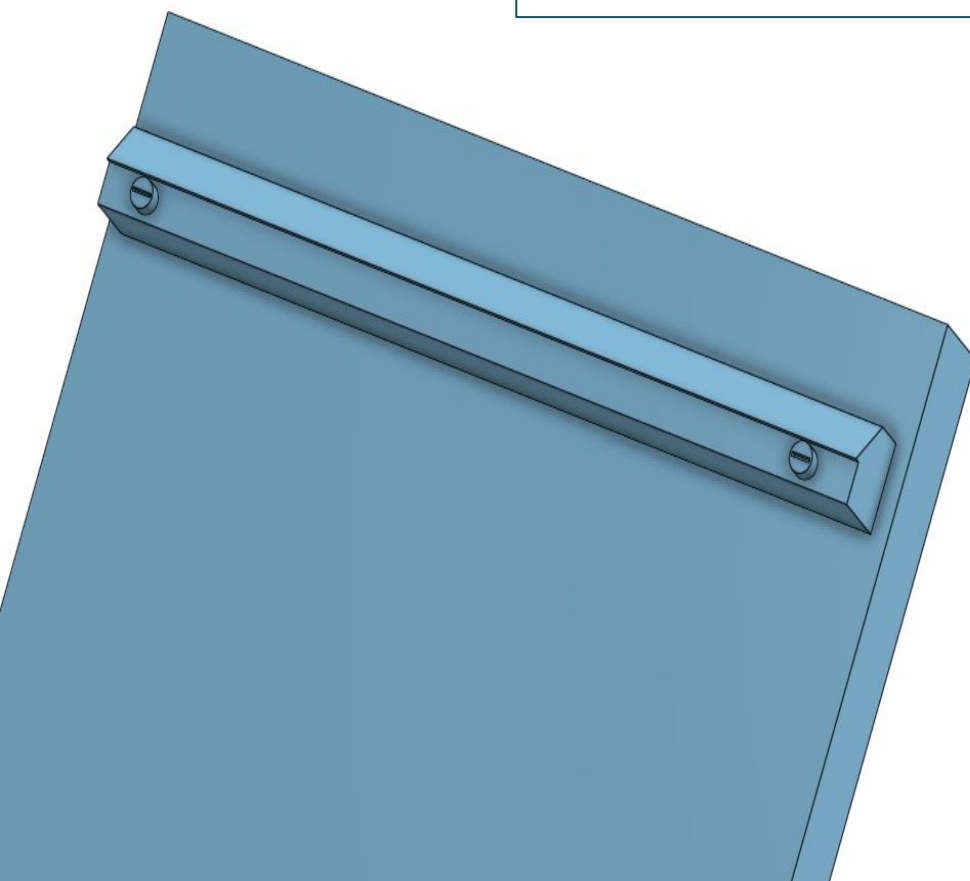
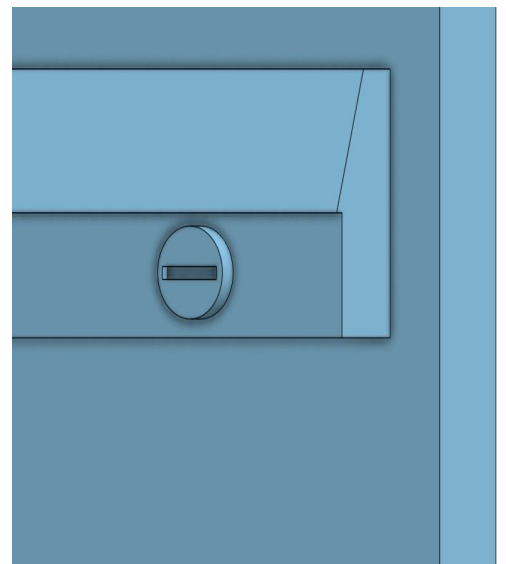


Panels fit together perfectly and make a sleek and flat product that is compact and portable

Graphic models and text to explain how to improve the prototype(linked to weakness) and revised prototype

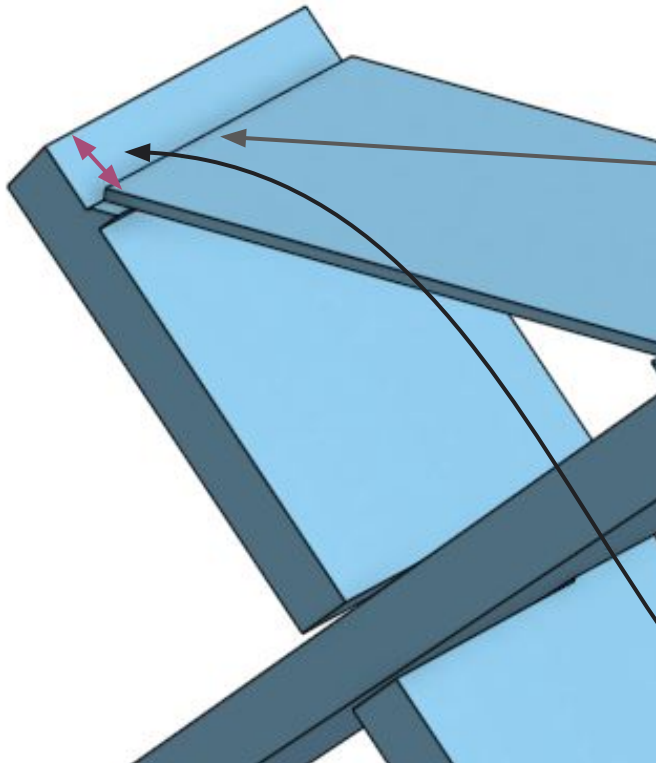


Adding screw that can be easily removed with the help of a screw driver



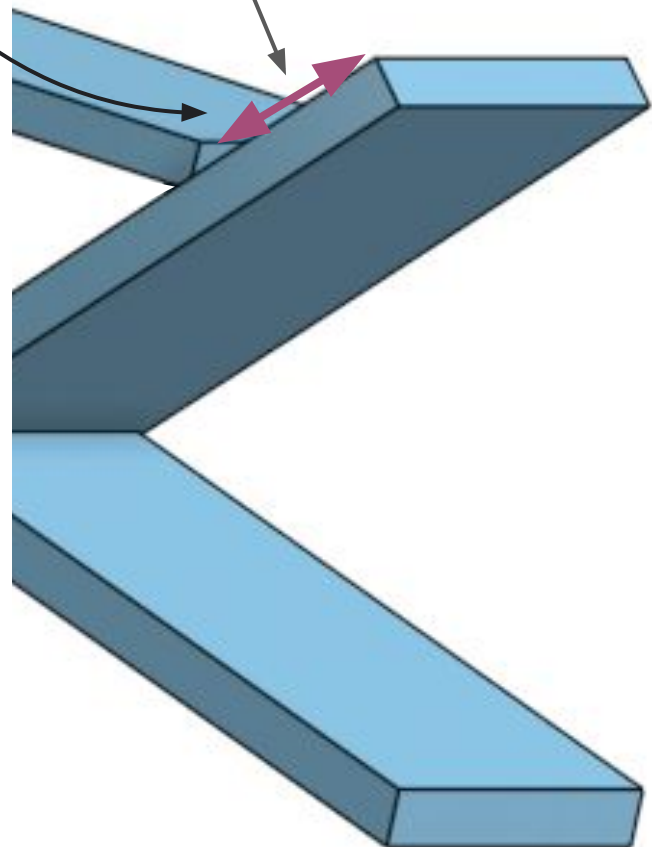
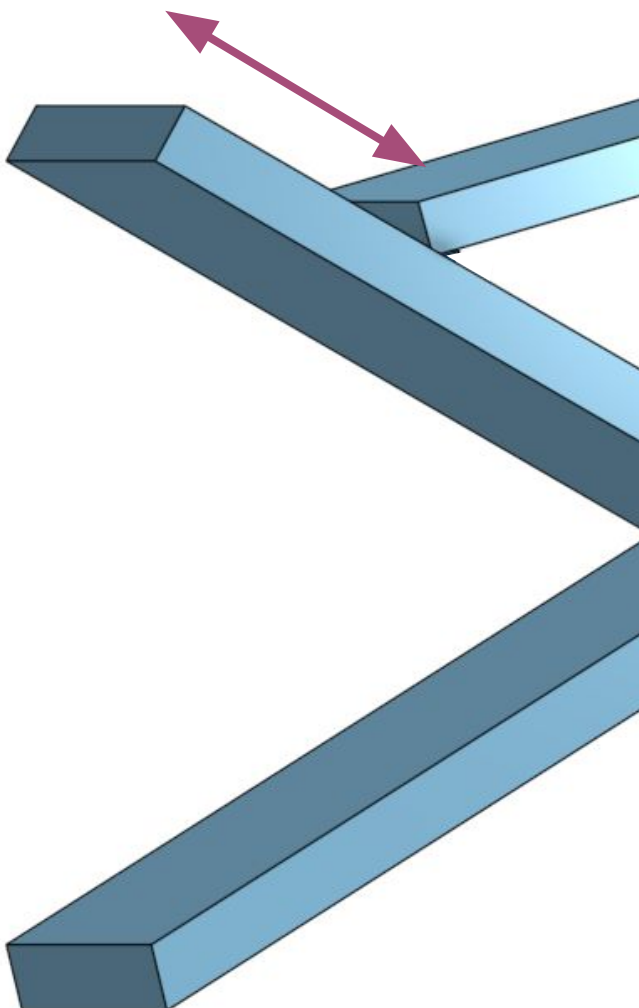
By adding screw driver it makes the strip easily attachable and detachable, thus in case of any cahnge in position or damage the sprip can be removed allowing the toppmost panel to be adjusted to an appropriate height.

Graphic models and text to explain how to improve the prototype(linked to weakness) and revised prototype



The distance between the toppmost panel and the top of the side panel in the first diagram is how the product is actually supposed to be.

The distance between the toppmost panel and the top of the side panel in the second diagram is the adjustment made to accommodate the toppmost panel in case of any damage or change.



The toppmost panel will rest on the 2 side panels instead of the strips for as low as the position changed

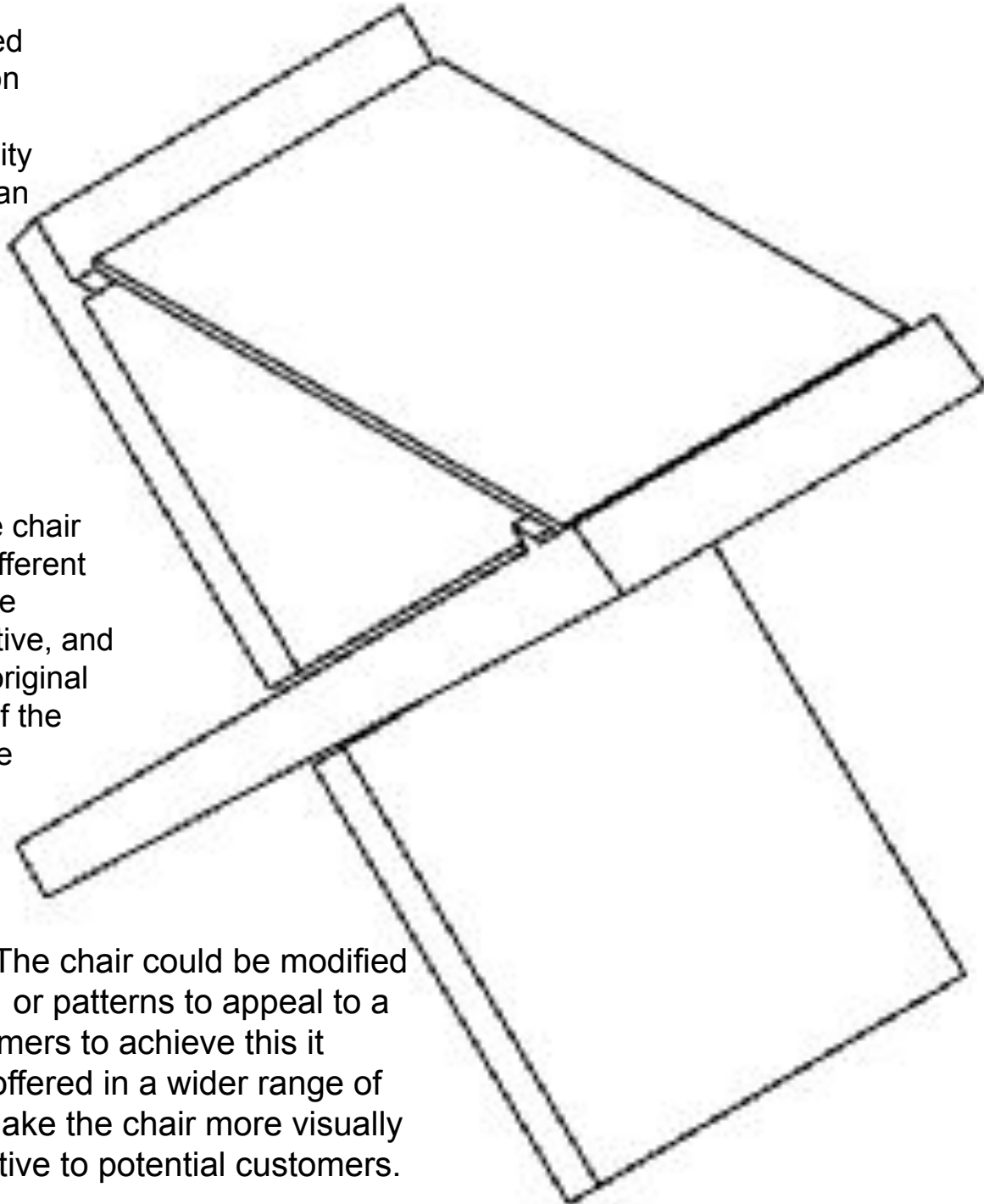
Drawings and models showing modifications needed for commercial production

Modification for commercial production

Cost reduction: The chair would be modified to reduce its production costs without compromising on quality or functionality. This can be done by using recyclable plastic which is a more affordable material.

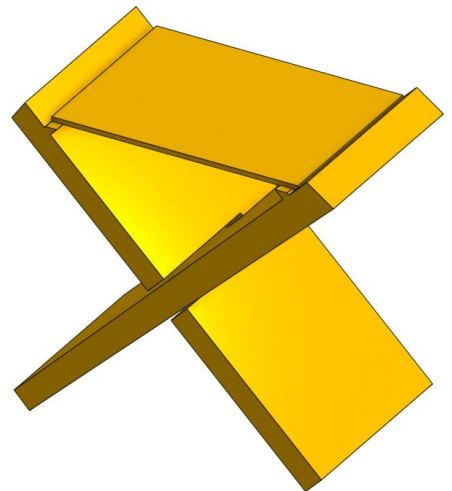
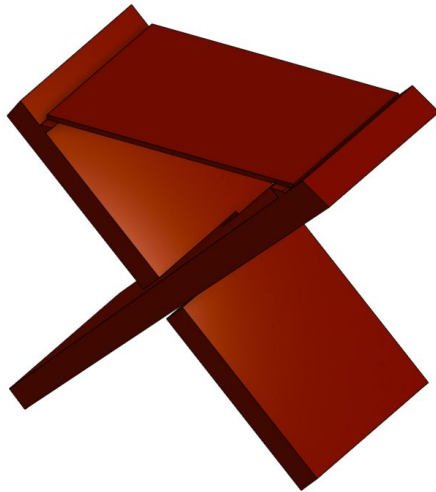
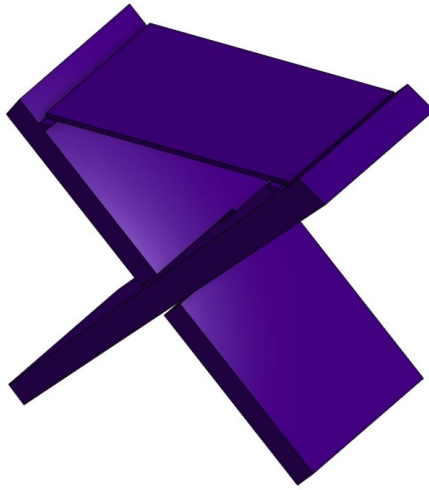
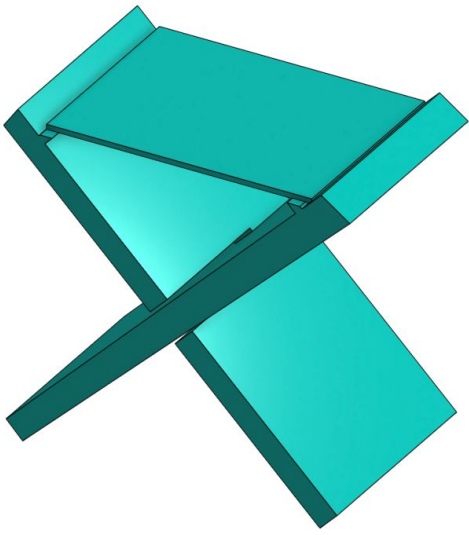
Material changes: The chair could be made with different materials that are more lightweight, cost-effective, and eco-friendly than the original design. For instance, if the product could be made recycled plastic.

Style modifications: The chair could be modified in terms of its colour or patterns to appeal to a wider range of customers to achieve this it could be made and offered in a wider range of colours. This could make the chair more visually appealing and attractive to potential customers.



Commercial prototype presentation drawing and annotations.

Style modifications:



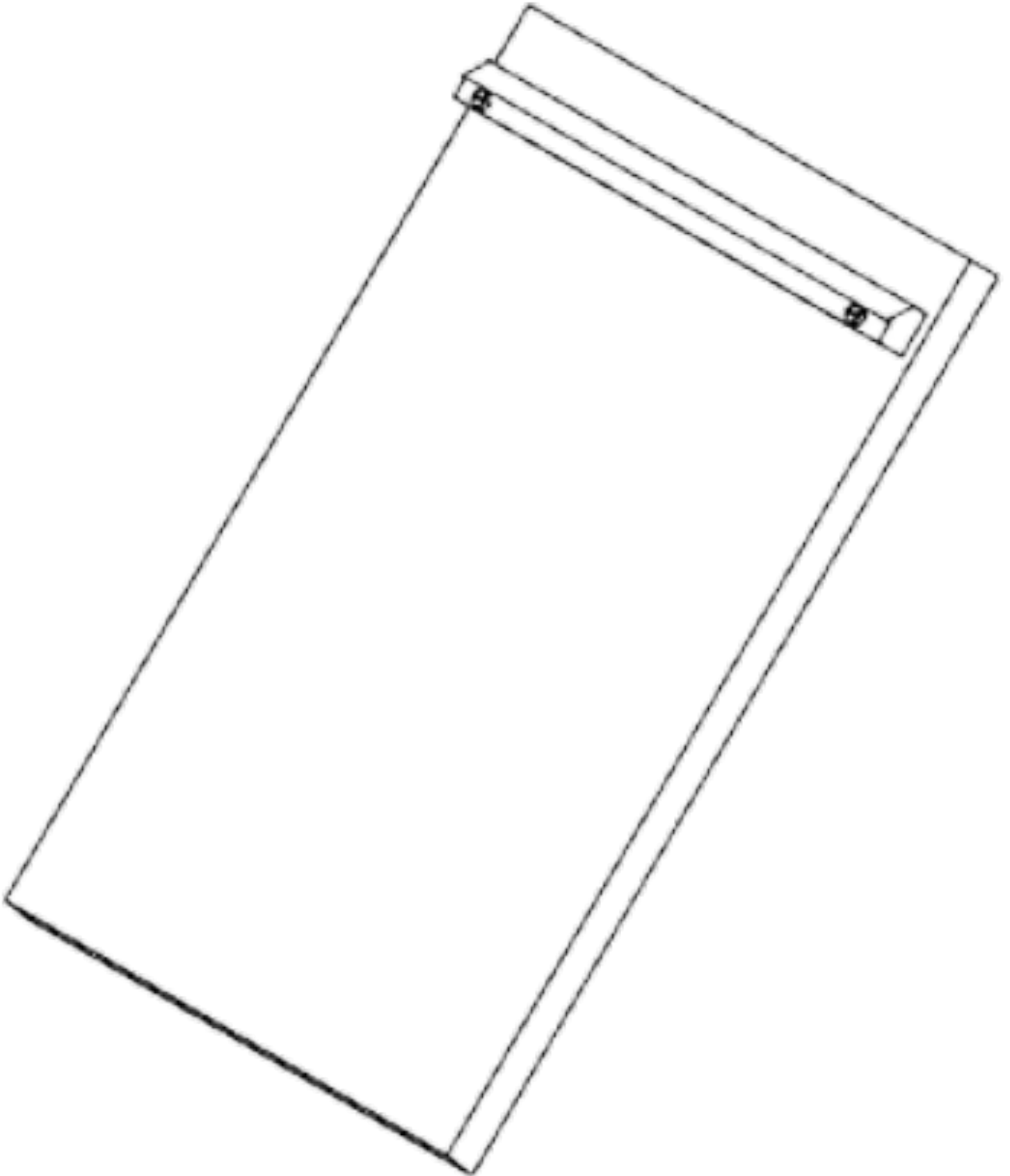
Material changes and cost reduction:



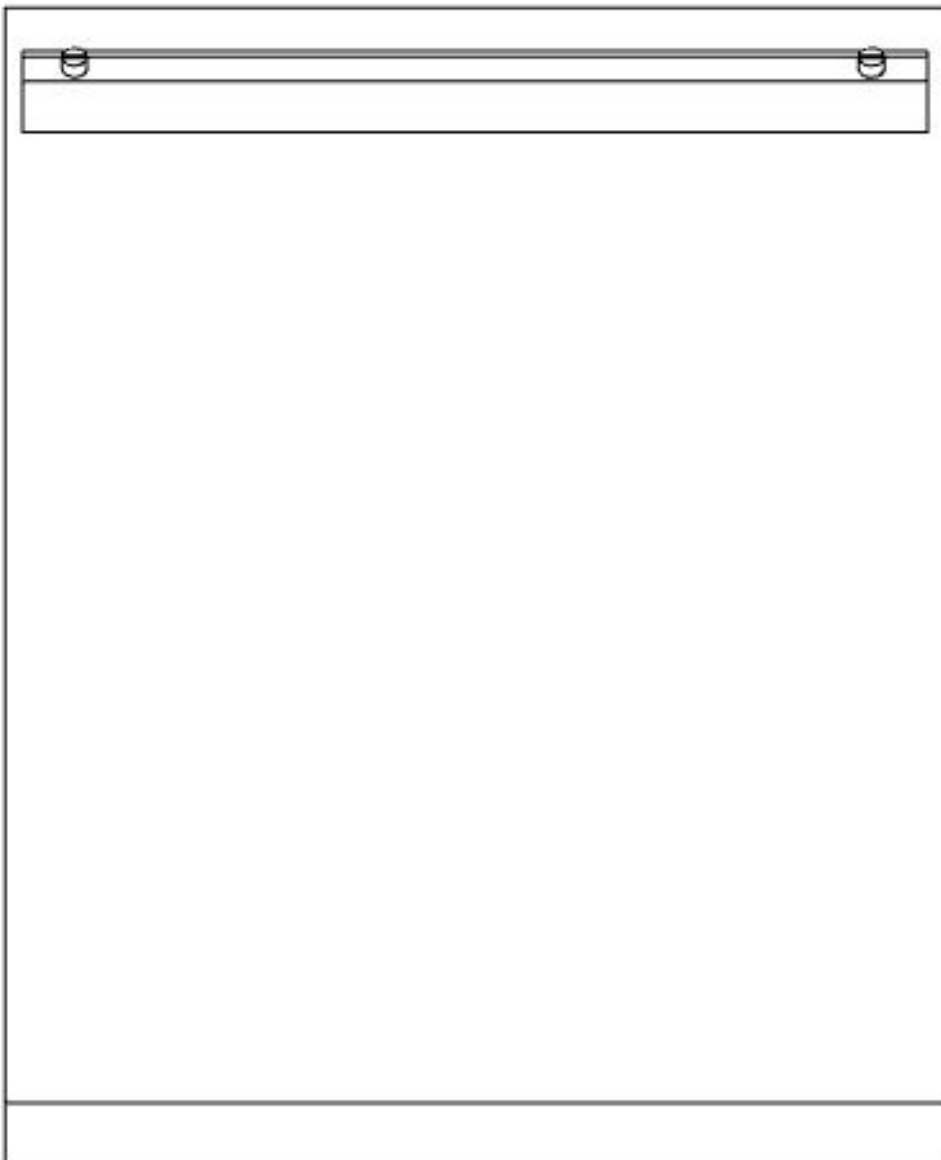
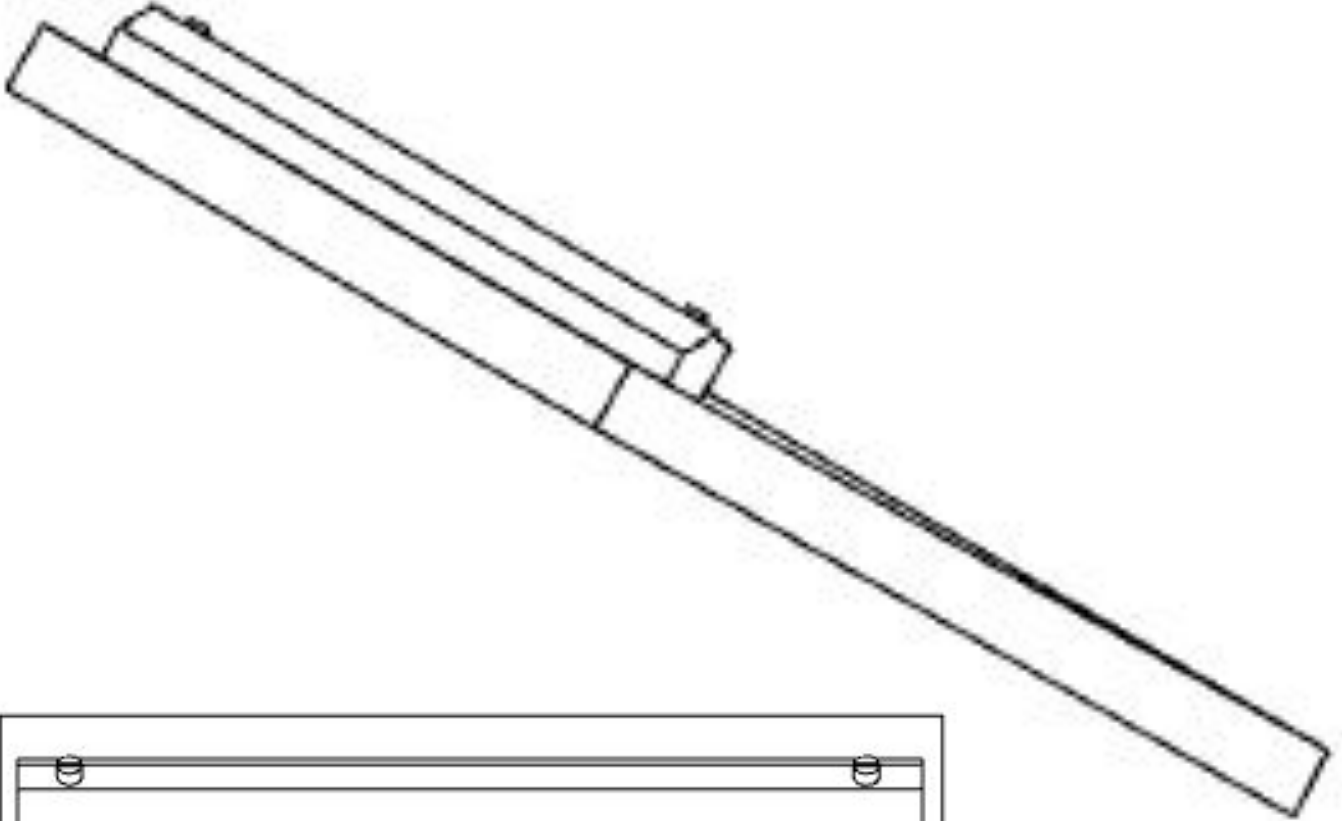
Commercial prototype :Technical drawing, bill of material, assembly of drawing

Part no.	Material	Quality	Length	breath	Process
1	Plywood panel 1	1	50 cm	30 cm	Laser cutting
2	Plywood panel 2	1	50 cm	30 cm	Laser cutting
3	Plywood panel 3	1	50 cm	30 cm	Laser cutting
4	plywwod for grooves	2	30 cm	1.5 cm	Rip cutting.

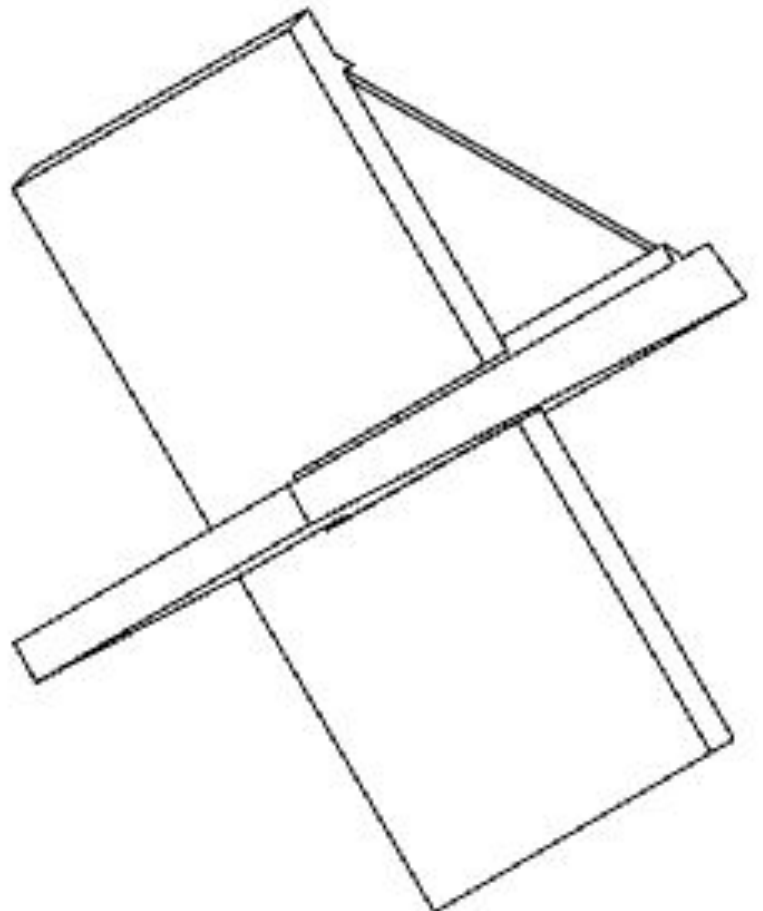
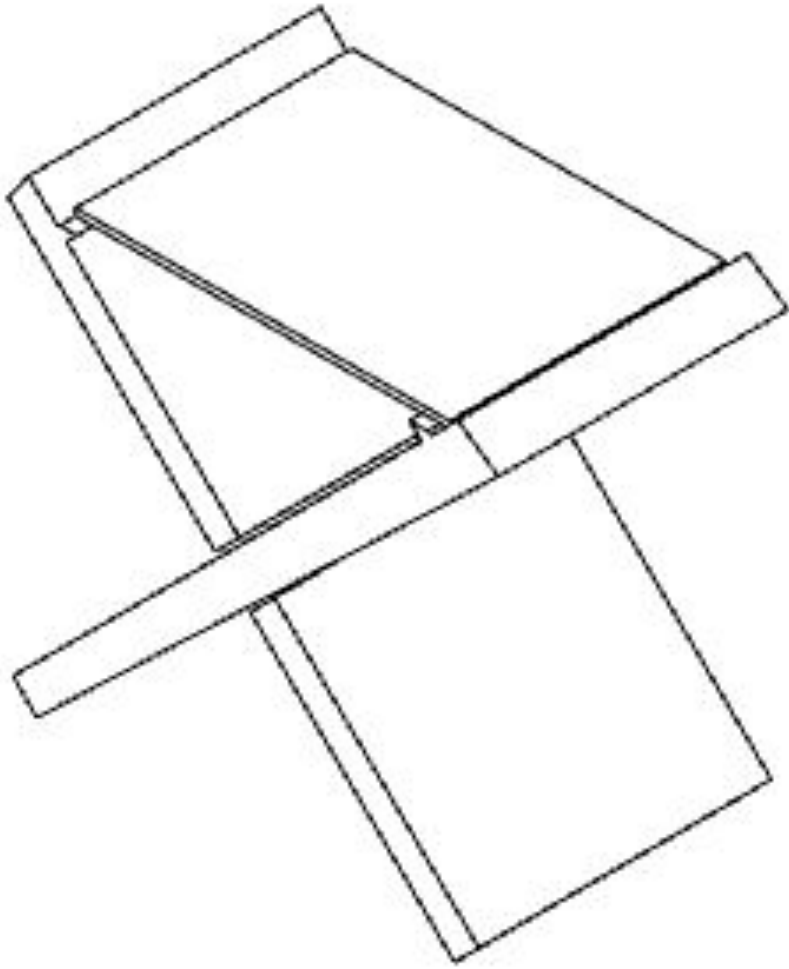
Commercial prototype :Technical drawing,
bill of material, assembly of drawing



Commercial prototype :Technical drawing,
bill of material, assembly of drawing



Commercial prototype :Technical drawing,
bill of material, assembly of drawing



Identify and justify materials and components

Justification of materials:

For commercial production i think it would be more beneficial to use recyclable plastic as it reduces the amount of plastic waste that ends up in landfills and oceans, helping to mitigate the negative impact of plastic on the environment. It can be less expensive than traditional plastic materials, which can make the production of the chairs more cost-effective. It can be molded into a wide variety of shapes and sizes, making it possible to create innovative and unique chair designs that are both functional and aesthetically pleasing. Recyclable plastic is often more durable than other materials, which means that chairs made from this material can last longer and be less prone to damage or wear and tear. Recyclable plastic is easy to clean and maintain, making it a practical choice for outdoor spaces making it better for trekkers.

Many consumers are becoming more environmentally conscious and prefer products made from sustainable materials. Using recyclable plastic in chair design can appeal to these consumers and enhance the brand image of the product.



First used plastic is collected

Then converted to small grains that can be molded



Using heat these grains are molded into sheets of plastic that are durable, malleable and lightweight.

Identify and justify manufacturing techniques

Justification of adjustability component:

The easy adding and removing for the strip hinges is for ergonomics. Adjustable chairs allow users to customize the chair's height, seat depth, and armrest height to their body type and preferred posture. This reduces the risk of musculoskeletal disorders, and increases overall comfort. An adjustable chair can accommodate a wide range of users, making it a versatile choice for spaces that are used by multiple people with different body types and preferences. Comfortable chairs that promote good posture can improve productivity by reducing discomfort and fatigue, allowing users to work for longer periods without needing to take breaks.

Removing and attaching a strip with a nail and screwdriver is a relatively simple process that does not require specialized tools or expertise. Nails and screwdrivers are widely available and can be found in most hardware stores, making it easy to obtain the necessary materials. They are relatively inexpensive, making this method of attachment cost-effective compared to other options. However there are some drawbacks such as depending on the application, nails and screws may not provide a secure enough attachment, which could result in the strip becoming loose or falling off. Using nails and screws can cause damage to the surface being attached to, such as leaving holes or scratches. Removing and attaching the strip can be a time-consuming process.

Justify appropriate scale of production

As trekkers and trekking equipment is a niche market Small-scale production allows for greater flexibility in responding to changes in market demand, allowing businesses to quickly adjust production to meet changing customer needs. Small-scale production can be less expensive than large-scale production because it requires less capital investment in equipment and infrastructure. The product can be only distributed to sports stores. Small-scale production allows for greater customization and personalization of products, which can be a competitive advantage in niche markets. Small-scale production can result in higher-quality products because there is greater attention to detail and quality control throughout the manufacturing process. Small-scale production can be more environmentally sustainable than large-scale production because it often uses fewer resources and generates less waste. It can promote local sourcing of materials and support local economies, which can have social and economic benefits for the community.

- Abhishek Waghmare, IndiaSpend.com. "900 Million Indians Live in Two Rooms or Less." *Scroll.in*, Scroll.in, 5 July 2016,
scroll.in/article/811205/900-million-indians-live-in-two-rooms-or-less#:~:text=Like%20Vijay%2C%20about%20900%20million,the%20government%20in%20June%202016. Accessed 29 Apr. 2022.
- . "900 Million Indians Live in Two Rooms or Less." *Scroll.in*, Scroll.in, 5 July 2016,
scroll.in/article/811205/900-million-indians-live-in-two-rooms-or-less. Accessed 6 May 2022.
- "Buy Supreme Mall Outdoor Folding Camp Chair (Green, Medium) at Amazon.in." *Amazon.in*, 2022,
www.amazon.in/Supreme-Outdoor-Folding-Camp-Chair/dp/B07J6MQSD3. Accessed 22 Nov. 2022.
- Erin. "This Minimalist Modern Cat Bed Doubles as a Functional Side Table." *CONTEMPORIST*, 2 May 2017,
www.contemporist.com/minimalist-modern-cat-bed-doubles-as-a-functional-side-table/. Accessed 29 Apr. 2022.
- "Fiber Board - Google Search." *Google.com*, 2013,
www.google.com/search?q=fiber+board&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiMt-Knm9j9AhWZJbcAHcc3A0YQ_AUoAXoECAEQAw&biw=1440&bih=821&dpr=1#imgsrc=Z9CxMfFXt2yR2M. Accessed 13 Mar. 2023.
- helpguidewp. "The Joys of Owning a Cat." *HelpGuide.org*, 8 Sept. 2020,
www.helpguide.org/articles/healthy-living/joys-of-owning-a-cat.htm#:~:text=The%20health%20benefits%20of%20cats&text=They%20can%3A,and%20lower%20your%20blood%20pressure. Accessed 6 May 2022.
- PTI. "India Has 80 Million Homeless Dogs, Cats, Has Highest Levels of Abandonment: Mars Petcare Report." *The Economic Times*, Economic Times, 25 Nov. 2021,
economictimes.indiatimes.com/news/india/india-has-80-million-homeless-dogs-cats-has-highest-levels-of-abandonment-mars-petcare-report/articleshow/87916334.cms. Accessed 29 Apr. 2022.
- "Recycled Plastic - Google Search." *Google.com*, 2013,
www.google.com/search?q=recycled+plastic&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiFjbOn4uf9AhUQR2wGHXxCBqEQ_AUoAXoECAEQAw&biw=1440&bih=821&dpr=1#imgsrc=Z_JtxK5z0dd0kM&imgdii=uFBrfH9zpbsI5M. Accessed 19 Mar. 2023.

“Recycled Plastic - Google Search.” *Google.com*, 2013,

www.google.com/search?q=recycled+plastic&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiFjbOn4uf9AhUQR2wGHXxCBqEQ_AUoAXoECAEQAw&biw=1440&bih=821&dpr=1#imgrc=Q7URmiKq5o6XCM&imgdii=cmki8u_4n2whDM. Accessed 19 Mar. 2023.

“Recycled Plastic - Google Search.” *Google.com*, 2013,

www.google.com/search?q=recycled+plastic&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiFjbOn4uf9AhUQR2wGHXxCBqEQ_AUoAXoECAEQAw&biw=1440&bih=821&dpr=1#imgrc=D7637-IpUOALmM&imgdii=PgyCTxTcpXYM6M. Accessed 19 Mar. 2023.

“Wide Color Palette That Appeal to Wide Audiences - Google Search.” *Google.com*, 2013,

www.google.com/search?q=wide+color+palette+that+appeal+to+wide+audiences&source=lnms&tbm=isch&sa=X&ved=2ahUKEwik2KC12uD9AhXSJLcAHZbBAOcQ_AUoAXoECAEQAw&biw=1440&bih=821&dpr=1#imgrc=EJKliiKdr5Y5EM&imgdii=_1iqlf9ryAhjrM. Accessed 16 Mar. 2023.