

TRAVEL PR



TRAVEL BUDDY

— COMPACT MODERN —



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A-Level Product Design
Centre code: 62451
Personal code: 3183

This would be for my stakeholder feedback

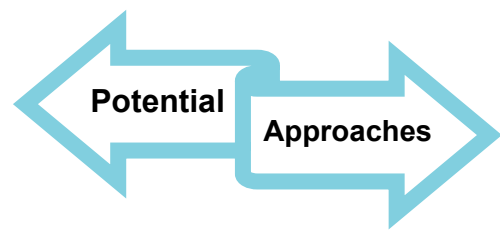
- Positive feedback
- Negative feedback

This would be for my own personal comments (often to end user feedback)

My own pictures

Online pictures

(All Videos Are My Own)
Please view videos separately as they don't seem to work



Feasibility study of potential approaches

Exploring possibilities to help improve travel by organising in different situations.

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Food and Drink

Travel with kids

Travelling with kids they require many items. Some of these include food bottles, dummies, nappies, toys and more. Easily overwhelming and easy to forget makes it difficult for parents trying to travel. I can make an item to keep these things in the same place.

Some of the possibilities:

- A product for smaller items including dummies, smaller toys and bottles. The issue with this is that when travelling only necessary items are taken meaning kids toys are not a priority.
- A organiser for larger items such as diapers and food. This is often just placed in a suitcase and into baggage or just brought at the location travelled to.

I think overall the idea is useful and can be very convenient but for this the demographic is quite niche and does not reach a large audience like some of the other ideas.

Product opportunities

Product: A mini toy bag that can be packed and given to kids to keep them entertained in public.

Issue: the market is filled with many toy boxes and other travel containers.

Product: A organiser for parents on the move with only necessities nappies, feed bottles etc.

Issue: There are so many items that a bag does the same job and market is saturated.

Product opportunities

Product: A container for snack organisation

Issue: Market has lots of options

Product: Something to fit whole meals in for a whole family

Issue: Any opportunity has already been considered and a product exists

Feeding a whole family in an airport, service station or train station can be extremely expensive so often families can decide to bring food especially when travelling with children. The food taken can become an inconvenience to pack so maybe a certain container or separate bag can be created.

This however is already a feature in the form of a lunch box and the food transportation market is already saturated with many containers and such for almost every type of food. I however can incorporate the aspects of a snack tray or cup holder into my product.

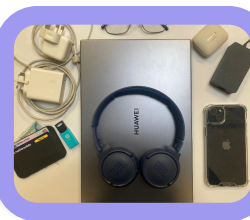
Product opportunities

Product: Larger item organiser for laptops mouses and cables

Issue: Often already created or don't need to be accessed while on the move

Product: A organiser for smaller items

Issue: Variety of products and sizes could be difficult to fit all.



Electronic devices

Many people of all ages and genders travel with extra electronic items. From power banks to recharge phones to usb sticks to ipads. I have many options for different types of product. I previously talked about and looked at items i could take and include. Most of these items are used while on the mode of transport for example the ipad, laptop and smaller items such as power bank and cables. This means the product needs to be easily accessible and able to be used while on the mode of transport. I can incorporate features to help improve the product as a functional travel accessory.

Documentation

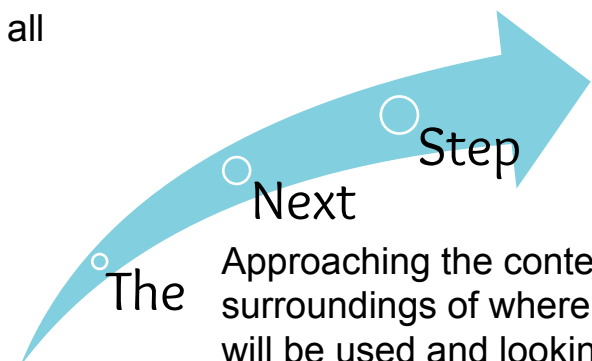
When travelling documentation is critical to ensure an easy passage. It can often be easily misplaced which could ruin a holiday. If i could place the documents in one place that allows for multiple people to travel safely happily without a thought.

The only two items however are boarding passes and passports. Boarding passes are now mostly always digital and therefore paper copies are not needed. This leaves just the passport. This is simple to store and doesn't really require an extra item which might even be an inconvenience.

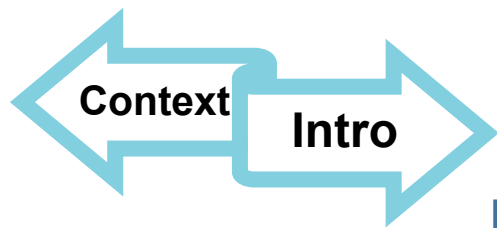
Product opportunities

Product: Seperate item to store all the documents

Issue: Only think really needed nowadays is a passport and a phone for a boarding pass so a whole item is not needed



Approaching the context of the surroundings of where the product will be used and looking at the space I have to work with



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Investigation of context

The overall issue

When travelling the number of items that are often taken when travelling can easily become overwhelming and can lead to things being misplaced, lost and forgotten about. Current products don't combine the ease of transporting the items along with accessibility and usage of the products.

With the limited space and rushed manor of travel, carrying many separate products for different purposes can be heavy and irritating.

Exploring by looking into general items taken with you



I gathered together all the electrical items I would typically take on a holiday trip. This included multiple devices as well as chargers for them. Some other items not included could be sd cards/ memory sticks, glasses case etc. Miniature items such as sd cards and sim cards are often lost and forgotten about. To ensure they are well kept and accounted for i could add a pocket/ place for them when designing my product.

Understanding the space available in a car



With a much more private mode of transport, such as a car, there are more possibilities of use of space is available. However, a key issue is that most common cars do not have tray tables included in their seats. This means that i need to consider whether the product I make can include features specifically for use in cars e.g. using the headrest as a mount. By doing further research into modes of transport later, i can determine priority of different functionalities.

Looking first hand at the train and plane exploring features and space available



By going on a plane I realised the shared limited space restricts the possibilities of using many items. The exposure of a plane with its cramped spacing limits the availability of comfort and use of many bulky large products.

The benefit of a plane and the train plane is the tray table. Although little this could be used to maximise its capabilities. As researched without organisation products overlap. They are also easily misplaced/ dropped leading to loss of items.

When I was on a train the space was more flexible with more availability.

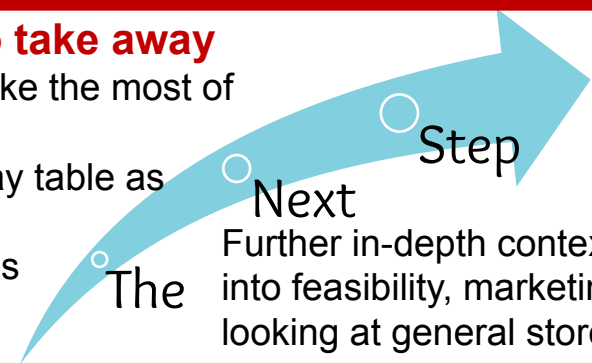
the train is more rushed with people moving about all the time. This means less people get many devices out in the worry of forgetting something or even somebody stealing items. Passengers can be seen keeping items close to them



After laying all my items out I quickly filled the table. Putting items in my pocket was uncomfortable and the amount didn't allow it. Placing it into a bag would cause difficulty to access when needed

Conclusion - Things to take away

- Limited Space- need to make the most of what is available.
- Possibilities of using the tray table as a part of the product.
- incorporating as many items as possible to not forget or loose anything.



Further in-depth context research into feasibility, marketing and looking at general stores



Investigations of the context and feasibility study of potential approaches

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SWOT analysis for feasibility:

Strengths - the versatility of the product with its ease of use would create a possible advantage against competitors. Current products are often fit for one purpose whereas this holding up a phone or tablet or having a separate wireless charger. These items can quickly add up to create lots of extra weight and take up already limited space. By combining multiple purposes into one product, a gap in the market could potentially be filled.

Weaknesses - Depending on the complexity of the product, the manufacturing process may be tricky and therefore time consuming. On features such as a wireless charger intricate detailing may be required for things such as wires.

Opportunities - By keeping it as a general multipurpose travel accessory that can be used in many different scenarios, it can be marketed to a large demographic. With the possibility of having stakeholders in convenient locations, it could become a useful tool to many individuals in their day to day lives.

Threats - People may not see the product as a useful tool but instead as a nuisance/inconvenience. Similarly they may not need many features that are included and only individual features. This is where competitors products already on the market excel.

Recap of the scenario and thinking about next step

Now that I have decided for the product to be tech related I needed to **narrow down** on what I can improve and problem I can solve. I can do this by doing some **primary research** into tech stores and getting **employees help** to find a items similar and looking at their feature

Looking into Marketing possibilities to appeal to a variety of users

If the product is **versatile** it can be used in **multiple scenarios**. This makes marketing a great **diverse opportunity** that can be taken into further consideration when designing and making the product. When creating a product, the idea of creating **multiple versions of the same product** can be explored. For example, a simpler variation of the product that is given away by an aviation company to high value customers as a "freebie". This could be a **simpler version with less features** compared to a **better more premium version** which may have more features such as a built-in wireless charger. This would lead to more stakeholders and therefore **more possibility for sales**. **Different designs and colours** could be used to **appeal to different ages** as well as **sexes**.

Trip to Apple to look at similar items and their features

After popping into the apple store in Reading I looked at some **more luxurious, higher end products**. I found this laptop case that incorporated the main idea of my product with **individual storage pockets** for items including power banks and cables. I also spoke to an employee asking if they have similar products, he mentioned I am better off looking online at their website which has a larger variety.



Trip to Currys to look at similar items and their features

A quick trip to currys in Didcot. I spoke to the store manager and explained my project. He said that he did not seem to have products to do with travel. He directed me into the section for protected cases for specific items.

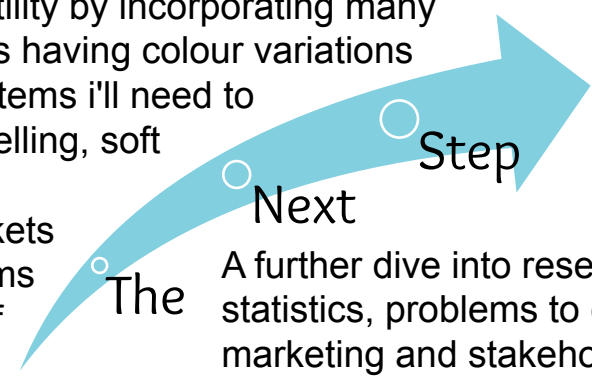
There were only travel cases for specific items. Although not very useful to compare to, it gave me some incentives on what to include in the product:

- Hard shelling
- Soft padding to protect the fragile items
- Compartments for individual items with specific spacing



Conclusion - Things to take away

- Achieve versatility by incorporating many items as well as having colour variations
- to protect the items I'll need to look at hard shelling, soft padding.
- individual pockets for different items to keep track of each item.



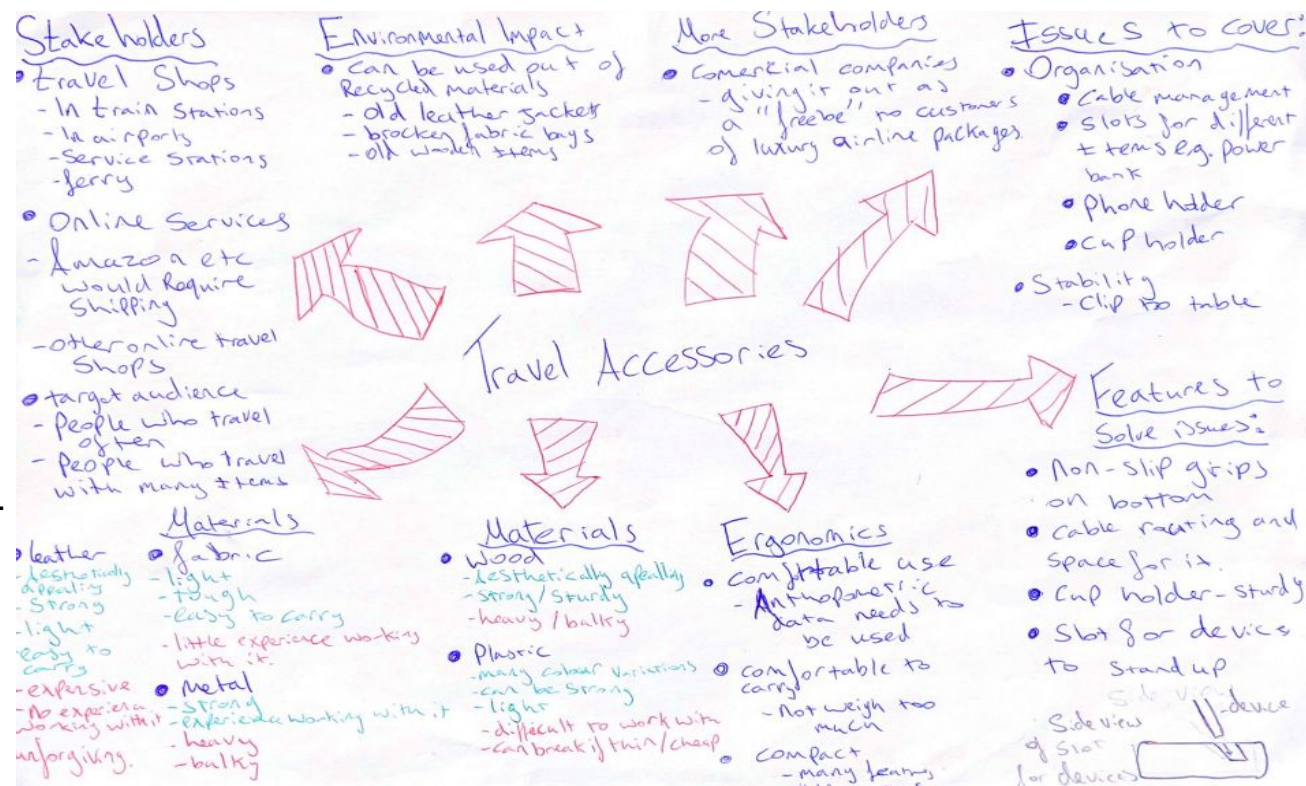
A further dive into research about statistics, problems to cover, marketing and stakeholders and a brief view on materials.



Investigations of the context and feasibility study of potential approaches

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Mind map- looking into different context about different aspects of the design process



My initial thoughts on problems to cover (key things to keep in mind):

Functionality – the item needs to incorporate many pockets for easy functionality and use. This will help with organisation of the items and ease of use of the product. The more convenient the product the more likely someone will be to see and buy the product.

Weight – the item needs to be lightweight. When transporting it not in use it needs to be relatively light to act as an aid, not a nuisance. Needs to also withstand being randomly placed in a bag and be durable enough not to break.

Organisation - needs to be easy to use giving the end user quick access to their items. To achieve this, it can be created with ergonomics in mind to make it as comfortable as possible.

Potential features – can include built in features such as a wireless charger where the power bank can be plugged into it to power it.

Marketing, Stakeholders and possible end users that could be a part of my design process:

Target market – Large demographic audience with varying limitless ages. For anyone who requires an ease-of-use product that can be taken and used in a travel environment.

Aviation companies – An idea for aviation companies to give their products to more expensive tickets like first class as a “freebie” for customers who pay a large price. This can be done by creating multiple versions of the same product e.g one cheaper model to hand out and one more expensive model to sell.

Travel shops – in general travel locations like train stations, airports, ferry shops and service stations. it can be sold in shops as an individual product. The convenience and contextual location for such a product can help increase sales.

Online shops – Online retailers such as Amazon, Ebay, specific shops like Go Travel. This would require consideration in other stakeholders such as shipping companies, packaging companies etc.

Daily UK Flight Data

Date	Number of flights	Seven-day average
23 Apr 2024	5,417	5,509
24 Apr 2024	5,541	5,511
25 Apr 2024	5,545	5,477
26 Apr 2024	5,807	5,478
27 Apr 2024	4,991	5,476
28 Apr 2024	5,348	5,475

Rail – With over 1.8 billion people travel by rail every year in the UK the demographic is extremely large.

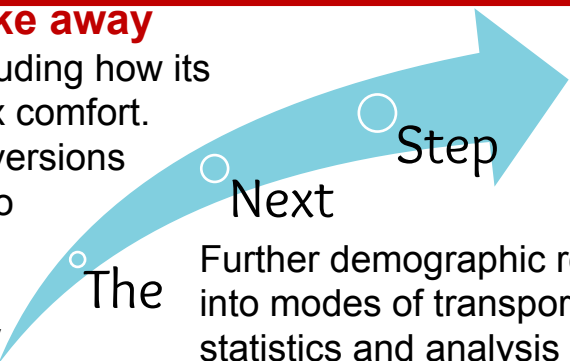
Conclusion – with only these two values it shows the product can become necessary and be used by many people on a daily basis.

Context research:

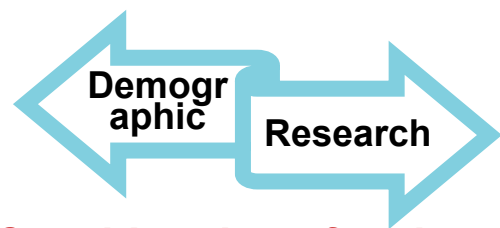
Aviation - With research from a government statistic website, it is shown that in the past month (of this research taking place) there was roughly 5000 flights going to, from and within the UK with an average of 4122 flights a day from dates 2nd Jan 19 -28th Apr 24.

Conclusion - Things to take away

- Ergonomics of the product including how its carried, weight and size for max comfort.
- possibility of creating multiple versions of the same product to appeal to many and selling it in multiple locations.
- The consideration of where my product will be most useful.



Further demographic research into modes of transport including statistics and analysis of priority. Research into baggage and space

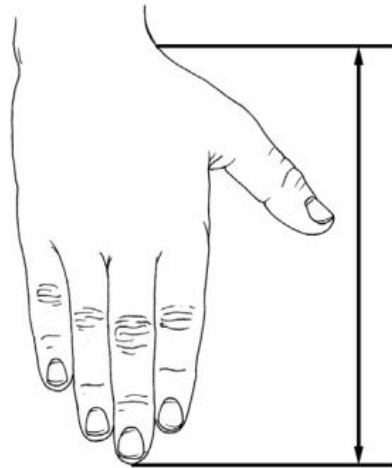


Investigations of the context and feasibility study of potential approaches

Looking into travel statistics to judge which mode of transport i should mostly base my product to (continuing from previous page)

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Consideration of anthropometric data to roughly judge the size of my product



FEMALE N = 2208			MALE N = 1774		
Centimeters		Inches	Centimeters		Inches
18.05	Mean	7.10	19.38	Mean	7.63
.97	Std Dev	.38	.98	Std Dev	.39
21.50	Maximum	8.46	23.30	Maximum	9.17
14.90	Minimum	5.87	16.00	Minimum	6.30

With the use of anthropometric data i can look at the **mean measurements** to determine the size of my product as well as features such as depth of pockets to ensure that items can **easily be reached**.

To create a **comfortable** product that suits **all ages and genders**, i need to think about the **95th percentile** when designing the size of the product. Mostly my product would appeal to **adults** who travel more often but younger ages may also want to use the product.

Bag investigation



easyJet

CARRY-ON

22 x 14 x 10 Inch

56 x 35 x 25 cm

Economy - 33 lbs / 15 kg

By looking at requirements for carry on sizes i determined that i have to make my product **lightweight and mostly compact**. This would require using mostly **artificial and synthetic materials** such as polymers and various textiles. A beneficial factor of polymers is that often they are made in **easier manufacturing** processes that involve less human intervention to produce making it **efficient** and often **cheaper to mass produce**. With the weight of baggage often being checked, the user would not want to carry a large heavy bulky item. This means **density of the material** needs to be monitored.

With an **increase in the use of busses**, the product could be considered to incorporate and use the features of a bus. However bus **journeys are often short** and therefore setting up a large product for a few minutes may not be worth it. The mode of transport being on a rise shows that numbers are slowly increasing to that of before covid meaning it is **worth considering** an increase in all public modes of transport

Annual Bus Statistics 2023

The number of local bus passenger journeys in England saw an increase of 0.5 billion (19.3%) to 3.4 billion in the year ending March 2023.

This was lower than before the coronavirus (COVID-19) pandemic when passenger journeys in the year ending March 2020 for England were 4.1 billion.

car traffic increased by 3.0% from 2022 levels to 251.3 billion vehicle miles. 2023 car traffic estimates remain lower than those for before the pandemic (-4.4% when compared to 2019)

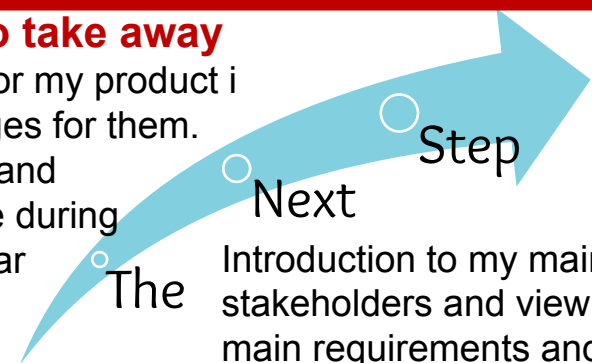
With over **251 billion** vehicle miles, car transport is a **main factor** to be considered. With the privacy of a personal vehicle size and weight is much **more flexible**. However often the person commuting in a car is the driver of the vehicle meaning the product cannot be used while on the move but instead to be used as **storage**. This therefore means i should look at considering making products that are **less functional as a entertainment system** and more functional as a **storage device**.

British people make an estimated 500 million passenger journeys by coach in the UK each year.

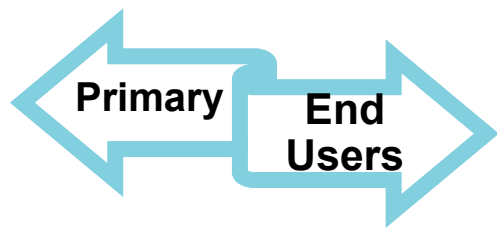
Coaches are similar to that of a train and plane. However, coach journeys are often **longer in time** as it is a slower mode of transport. With around **500 million** users the mode of transport is less important. Nonetheless it needs to be considered when designing the product. This could be done by **prioritising usability over storage** to **maximise comfort** while using.

Conclusion - Things to take away

- Due to mostly adult uses for my product i should look at using averages for them.
- increased use of coaches and busses i could look into use during transport over storage as car has lots of miles but mostly from people driving
- should be light and compact



Introduction to my main stakeholders and viewing their main requirements and the design brief



Victoria Hytrovska:

Age: 51

Occupation: Benefits and payroll manager responsible for overseeing the entire payroll process, ensuring employees are paid accurately and on time. Manages benefits administration, including health insurance, retirement plans, and other employee perks, ensuring compliance with legal and company policies. Travels to conferences abroad and to the office once every week.

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Investigations of user needs and wants and the design brief

Design Brief:

I am going to develop and design a travel accessory that will assist in the transportation and accessibility of items including but not limited electrical items such as power banks and cables, as well as key small items such as keys memory cards and headphones. It will need to be ergonomically comfortable, easy to use and useful as a product.

I want to incorporate features to be able to use the product while in transport allowing for the user to combine storage



List of end user needs and wants for Vicky:

- Comfortable to use - ergonomically
- Compact - able to store a variety of items in one place
- Place for smaller items (USB, SD card, mouse)
- Place for cables and other charges
- Place for power bank for a longer journeys

List of end user needs and wants for Stas:

End user:



Summary of key needs and wants:

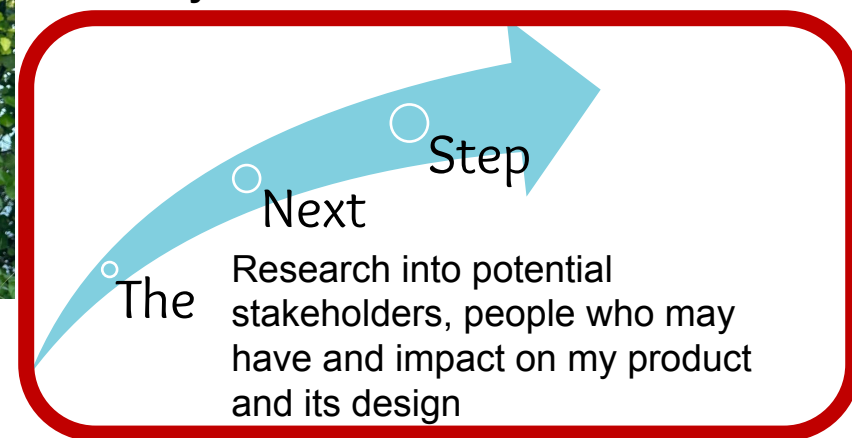
1. Store items such as phone, wallet, keys, power bank, chargers etc
2. Organisation possibilities to be able to use the product in cramped spaces such as plane and train.
3. Not to worry about forgetting items
4. Be able to use items while on the go



Stanislav Vitruk:

Age: 27

Occupation: Stas is a busy senior planning consultant, delivering large infrastructure projects around the country. His nature of work requires him to communicate with a lot of clients, this means he needs to be present in many offices around the country so that he can deliver programmes efficiently and on time.



Secondary stakeholder potential requirements

Aviation companies

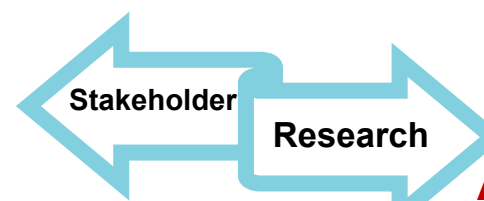
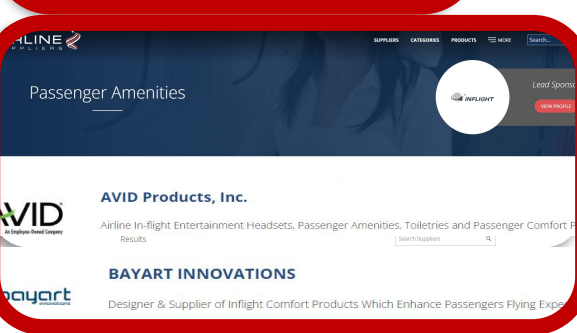
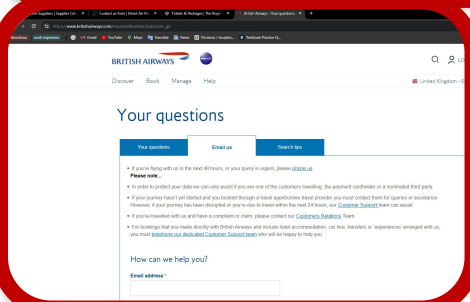
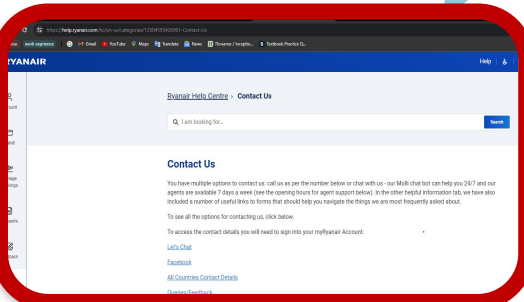
Research and trying to get a hold of them as stakeholders:

When trying to email large corporations such as BA, Emirates, Ryanair etc I kept facing the same **issue**. I would try to find an email I could message and as a result would **just find customer service to feedback on a flight**. I therefore had to find an alternative.

After further research I found a website named airline supplies. This had email links to **companies involved in various items used during inflight operation**. This would be an **ideal area for sales**.

Emailing **nine** companies on this website resulted in **no companies acknowledging** the email and receiving **no replies**. Although extremely underwhelming it made me realise the **difficulty** of involving a large corporation in small business work.

A result of this is not having a stakeholder that is an industry specialist as I think a similar approach would result in the same verdict



Investigations of stakeholder needs and wants and requirements

Manufacturing companies

Potential companies that i could involve in the manufacturing process at an industrial level:

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Hollinbrow are a **CNC** precision manufacturing location that specify in metals. This could be extremely useful if I would like to **create a mould** for my product to make out of plastic or another material. Based in Telford



Redwood offer technical **textiles** and specialist manufacturing of products having **specialist equipment** to create any textiles product. This would be extremely useful to use if creating a **fabric product**. Based in Lancashire.



Plastic Injection Mold & Injection Molding are offered by zetar. This could be useful to make the product into reality out of plastics at a **large-scale level**.

Zetar Mold

Delivery companies:

Fulfilment Costs

To give you a true end-to-end fulfilment cost, our standard carrier prices are inclusive of:
 ✓ Inbound receiving of the goods to our warehouse*
 ✓ First Pick
 ✓ Shipping with a leading courier (Evri, Royal Mail, Fedex)
 If you ship multiple items in a single package, there will be a charge of £0.79 per additional item.
 Discover our full list of couriers.

	Standard	Fully Tracked	
Size and Weight	Huboo 48 Hour	Huboo 24 Hour	
Small Letter to 20g	£1.56	-	
Large Letter to 100g	£1.69	£1.97	
Large Letter to 250g	£2.40	£2.82	
Large Letter to 500g	£2.82	£3.29	
Large Letter to 750g	£3.69	£4.21	



Huboo offer a **cheap storage**, fulfilment (including **packaging**) and delivery per item using **48 hr delivery**.

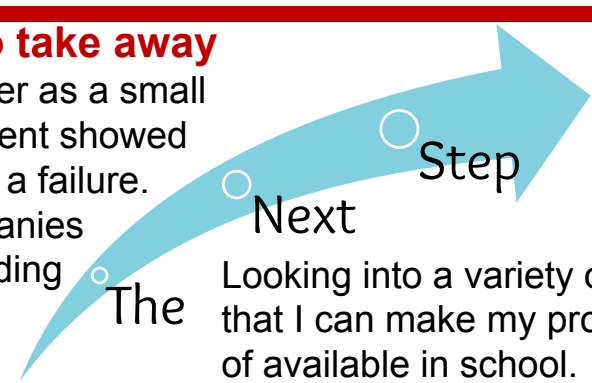
Store to Store	Store to Door
£2.25 exc VAT £2.70 inc VAT	£2.25 exc VAT £2.70 inc VAT
Drop your parcel off at your local store for collection at another.	Drop your parcel off at your local store to be delivered to any postcode in mainland UK.
Buy this service	Buy this service



Yodel direct also offers a delivery service offering options for both **store to store and store to door**. This availability however does **not offer storage or packaging** meaning **more manual labour** would be required.

Conclusion - Things to take away

- involving a large stakeholder as a small business/ independent student showed to be extremely difficult and a failure.
- many manufacturing companies offer various options depending on the route i decide to go down.
- delivery companies offer various options



Looking into a variety of materials that I can make my prototype out of available in school.

Primary User Needs (Stakeholder requirements)

Manufacturing companies:

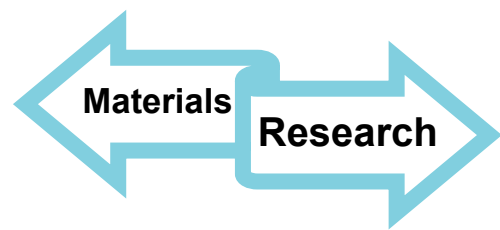
- One material makes it cheaper and easier to manufacture.
- Use of standardised components
- Large scale prototype

Aviation companies:

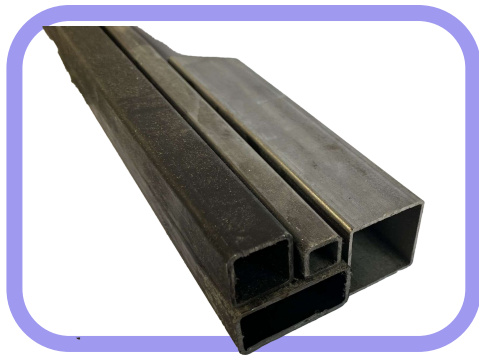
- Customisation for their own brand identity.
- Relatively cheap cost per product to create profits and appeal to more customers
- portable and light weight. If its sold on a plane, extra weight and storage taken can be an inconvenience.
- The size of the product needs to ensure that it fits onto a tray table and into peoples bags so that they will want to purchase it.

Delivery companies:

- Light weight - ensures easy transportation and no strain on delivery drivers.
- Durable - needs to be packaged well and the actual product needs to be durable as during transportation movement of the product can cause damage
- The size of the product needs to be kept minimal as the smaller it is, the more products can be stored and transported for less money.



Some materials available to me for prototypes and manufacturing exploring properties and suitability:



Mild steel is **high strength good ductility and easy to work with** a magnetic metal due to its ferrite content. However mild steel is relatively **expensive** for a meter of mild steel tube of 20mm by 20mm with a thickness of 2mm is around £5-£10 for 4m however due to its characteristics it is worth the money. For the project at hand however, metal is **too heavy, bulky and uncomfortable** for a small lightweight product



Flexi-ply is **extremely flexible** and can be easily bent twisted or curved without breaking. in Flexi ply all the grains run in the same direction giving the plywood flexibility without losing its durability.

it has a high degree of **durability** meaning it can withstand everyday use. It is relatively affordable for £21 you can get a (L)1.22m (W)0.61m (T)6mm sheet from B&Q. Flexi ply is made of plywood which can be **sustainable** depending on the wood the plywood is made from.



Acrylic comes in many various **colours, shapes and sizes.** Although aesthetically appealing, it can often be **difficult to work with** as it is a **brittle** material. However, a property of acrylic is that when heated it becomes **extremely malleable** and can be moulded and shaped using **vacuum forming** providing **intricate details**



Textiles are a key material that could be incorporated in the design. It could be used as a main material for the products structure. Although **not having much structural integrity,** the **tensile strength of the material can be extremely high** depending on the fabric used. Although not much tension will be applied, the ability to **withstand rips and tears** can be useful with constant use.

Materials such as polyester and nylon provide possibilities of adding **colour** as well as having **high strength** due to its man made properties.



Exploration of materials

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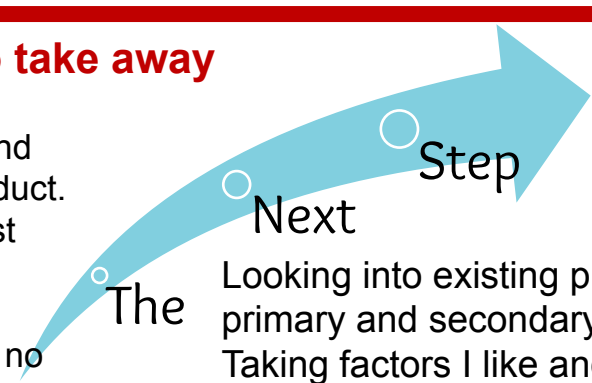
With a wide variety of timbers as well as **sizes, shapes, colours, durability** and more there is an endless possibility with the types of wood we can use. The wide range of sizes makes almost any size of product possible to make. Wood is a **kinder and more forgiving** material to work with as there are **multiple ways to finish, shape, style** the woods.

In some industrial processing with more advanced machines CNC machines are available that can cut almost any pattern possible with **extreme precision.**

Arguably the **most aesthetically appealing** material comes at a cost and due to its density, a product using wooden materials can become **very heavy and uncomfortable** to use and move very quickly. Over time, coats of finishes can begin to come off due to constant use meaning the raw material may become exposed to surroundings causing **damage, stains.**

Conclusion - Things to take away

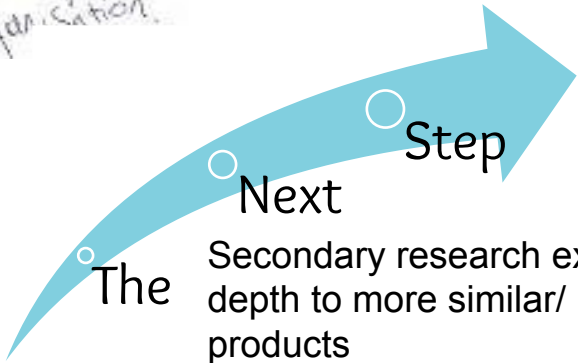
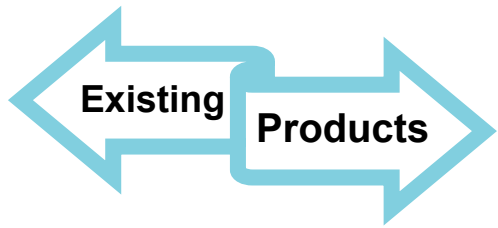
Mild steel is quite heavy and expensive although durable and secure is not great for my product. Wood is the material i am most experienced with working Making it easiest for me. Textiles are lightest but i have no experience.



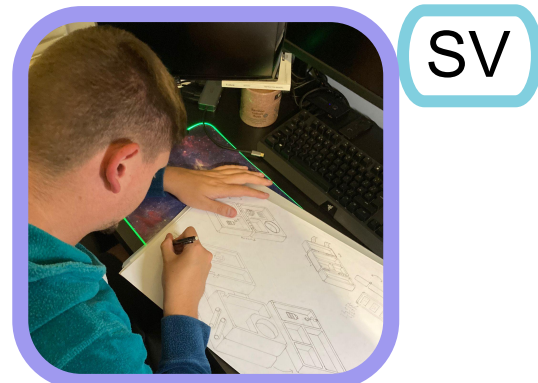
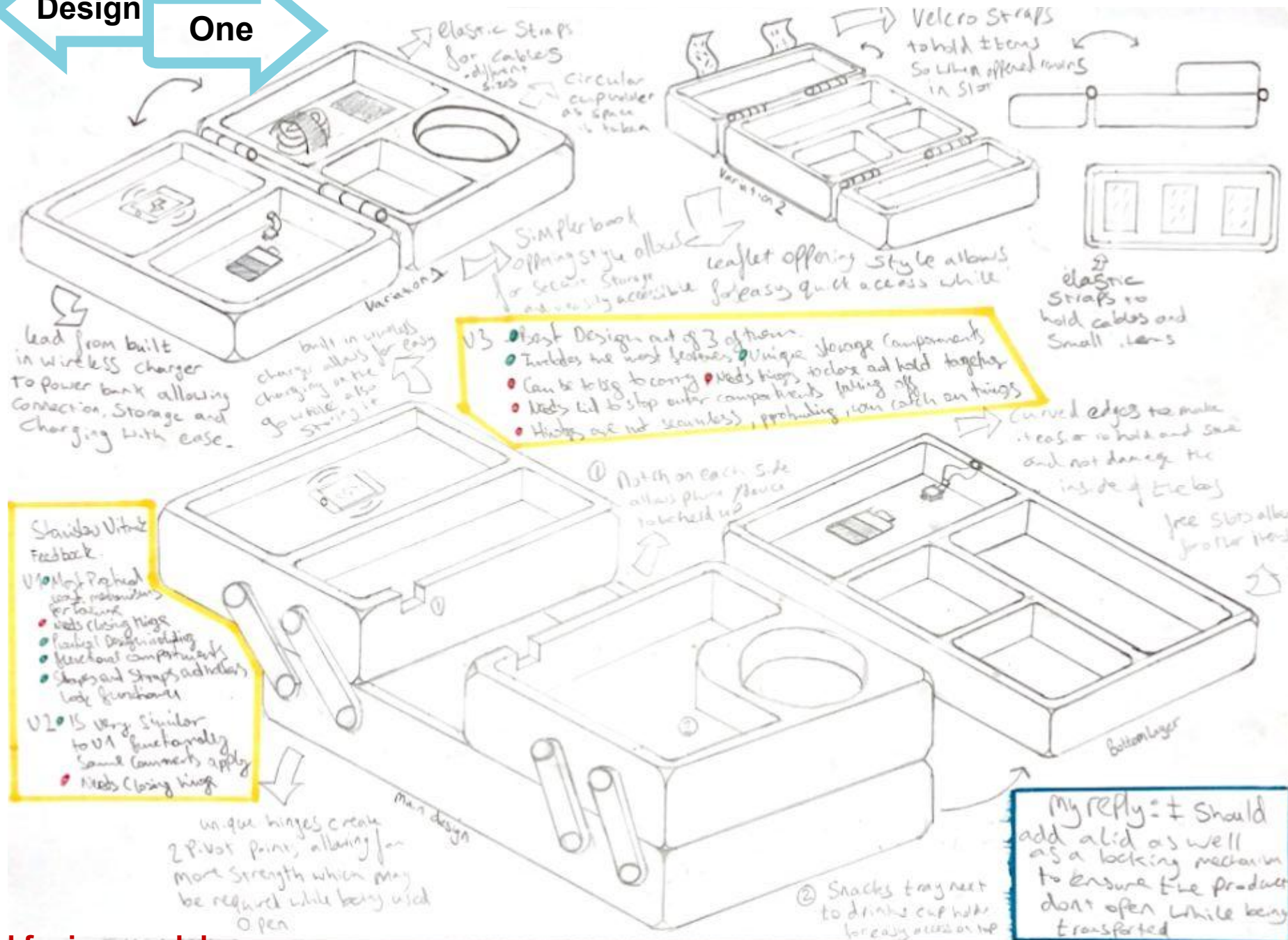
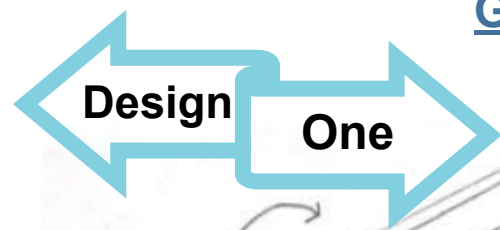
Looking into existing products primary and secondary research. Taking factors I like and dislike

Investigations of existing products and practices

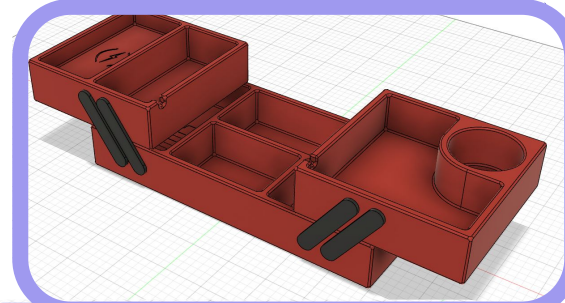
SV



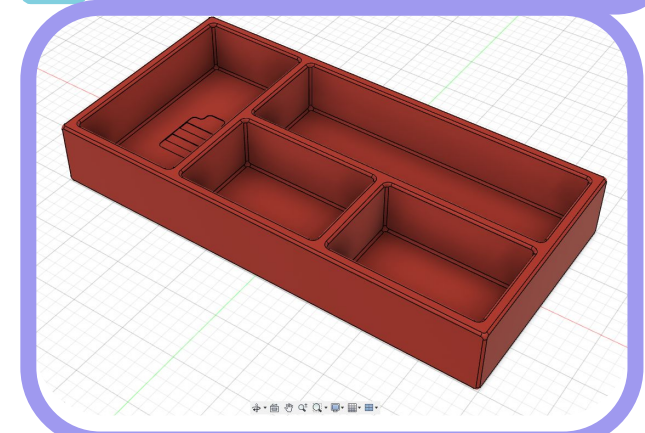
Generation of initial ideas and design development



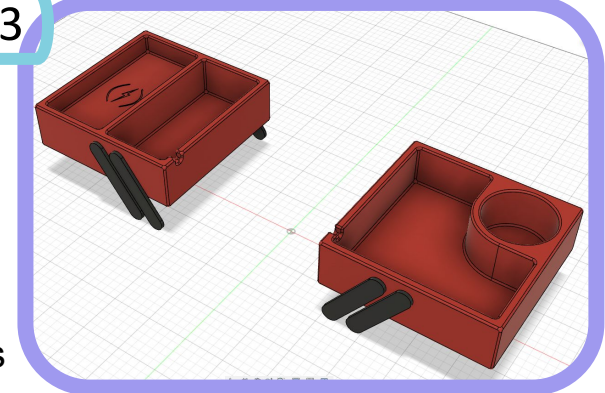
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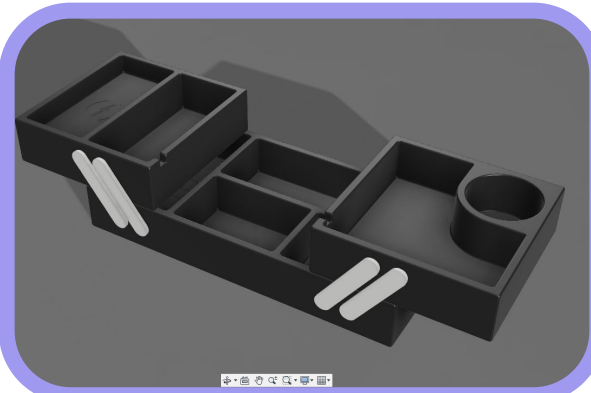
2



3

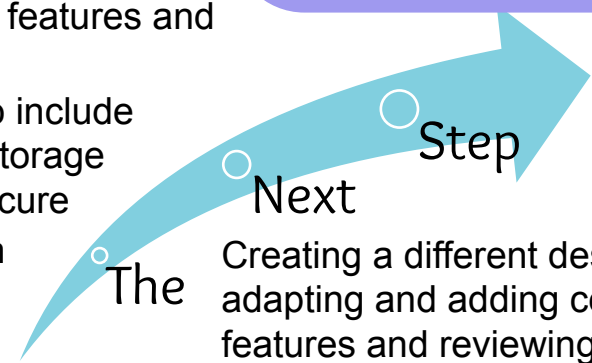


3d fusion model



Using fusion 360 i managed to create a 3d model of the product to be able to fully understand the workings of the prototype. By rendering it, i was able to visualise and adapt the colour scheme as well as the material to look at how it could be created.

- 1 By creating a red version, it shows the variations in colour as well as highlighting the features and lines to make it clearer to view
- 2 The base is created with pockets to include power bank slots as well as other storage compartments that are shut and secure
- 3 The tops can be adaptable and can be altered to have various different compartments. The left hand side has an inbuilt wireless charger.



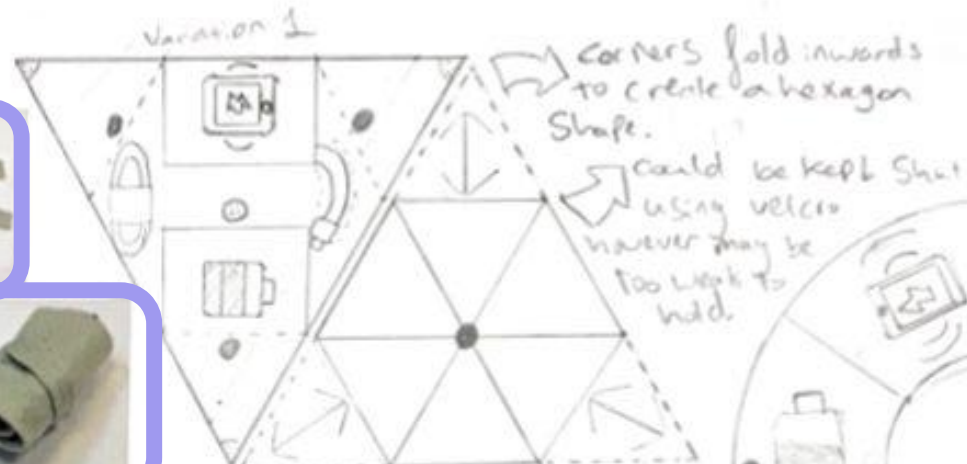
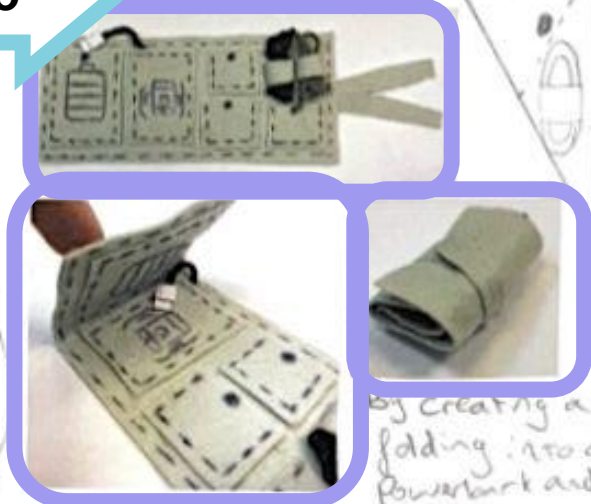
Creating a different design adapting and adding certain features and reviewing end user feedback.

Generation of initial ideas and design development

SV

Design Two

Quick model i made



variations

Talking to the textiles technician i was able to get an insight into fabrics needed. She recommended using performance fabrics which are man made fabrics made for high wear and tear. An example of this could be ballistic nylon which is thick and tough with no stretch. It also is easier to work with as fraying is little to none when cut. A sheet of 150cm by 1m is £19.95 from UK Fabric Online.

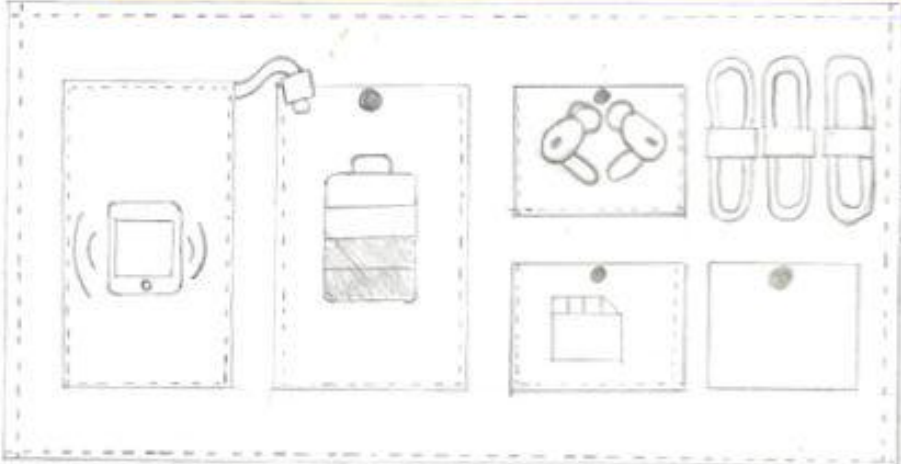


This design is made of fabric and can roll up into a compact roll that is lightweight and quick and easy to open

Stitched in wireless charger allows for ease of use when charging phone however phone will not be seen if trying to use on the move.

Main Design • Looks very functional and sleek
 • Great to collectively carry main travel gadgets, portables and compact
 • Easy to fold and put away • Can be labeled and used for holding all your belongings
 • Disadvantages - Can rip and disintegrate • Things may fall out

My reply: I will make out of tough textile and add buttons to pockets



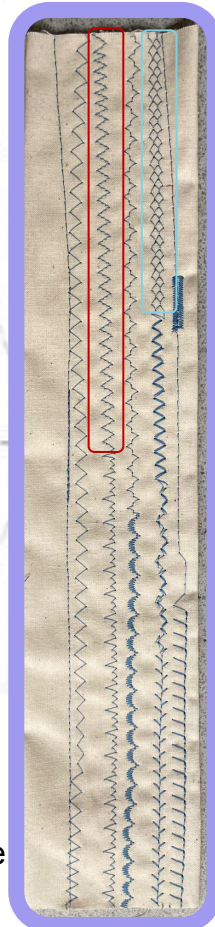
Strings help to keep the roll shut being it tens secure

Possibility to make it out of leather instead of textile fabric for a weather proof product

Stitching variations (A picture to right) can create different aesthetic with the possibility of contrast colour stitching



Labelled Pockets different items allows user to keep track of all different items



The technician also mentioned the importance of stitching and the strength of the thread. Polyester thread is required along with the strong material to keep it secure. There are a variety of stitching all with different purposes. The stitching surrounded in red is more flexible allowing it to give way a little without breaking making it ideal for pockets to stretch. Other stitching variations can be used for decoration. Contrast stitching can be used to create an aesthetically appealing "finish".

For the straps/ connection method to tie the holder together a stronger stitch is required. As it is constantly being pulled and stretched to tie the strings, the stronger stitch like the one in the blue box.

For a more premium material, leather could be used. The issue however is that specialised tools are required. This along with high prices for leather (£25 for a sheet of A3) can become problematic for mass production. This can be factored into the price of the product but would decrease the target market.



The technician helped by giving me advice to use wadding. This would be necessary as the items intended to store are fragile and due to its use during transport. An added layer of protection would improve the quality increasing the value of the product. Fabrics can already be brought with wadding in place. This however more expensive will save time



Step Next
 Thinking of new ideas different from the last adapting and changing them to solve other problems

My model made from laser

A example of a mould i had

Generation of initial ideas and design development

SV



Example of a cnc'd piece



I can create a mould out of laser cut plywood for a mould for vacuum forming



a professional nylon mould can be made when manufacturing at a mass scale

End User Feedback:

Vicky
- cup holder to store drinks
- phone holder that acts like a stand, can watch films on long journeys
- don't like round shape not ergonomic
- hexagon shape is too big
- it cannot store items while on the move

Precise machine cuts for intricate miniature details

any shape can be easily cut including curves corners etc

this model helped me to visualise spacing and design of the product

I can create a mould for vacuum forming I will need to create a drafting angle to take plastic off

Pocket Variation



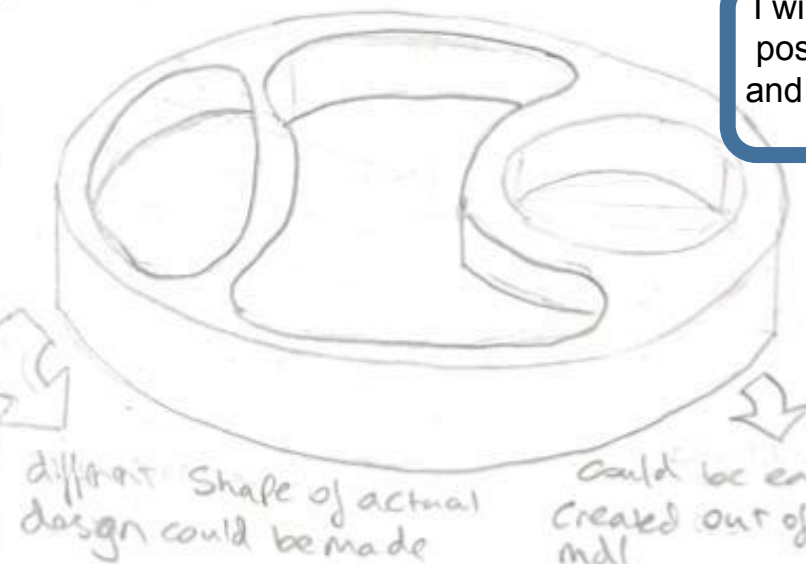
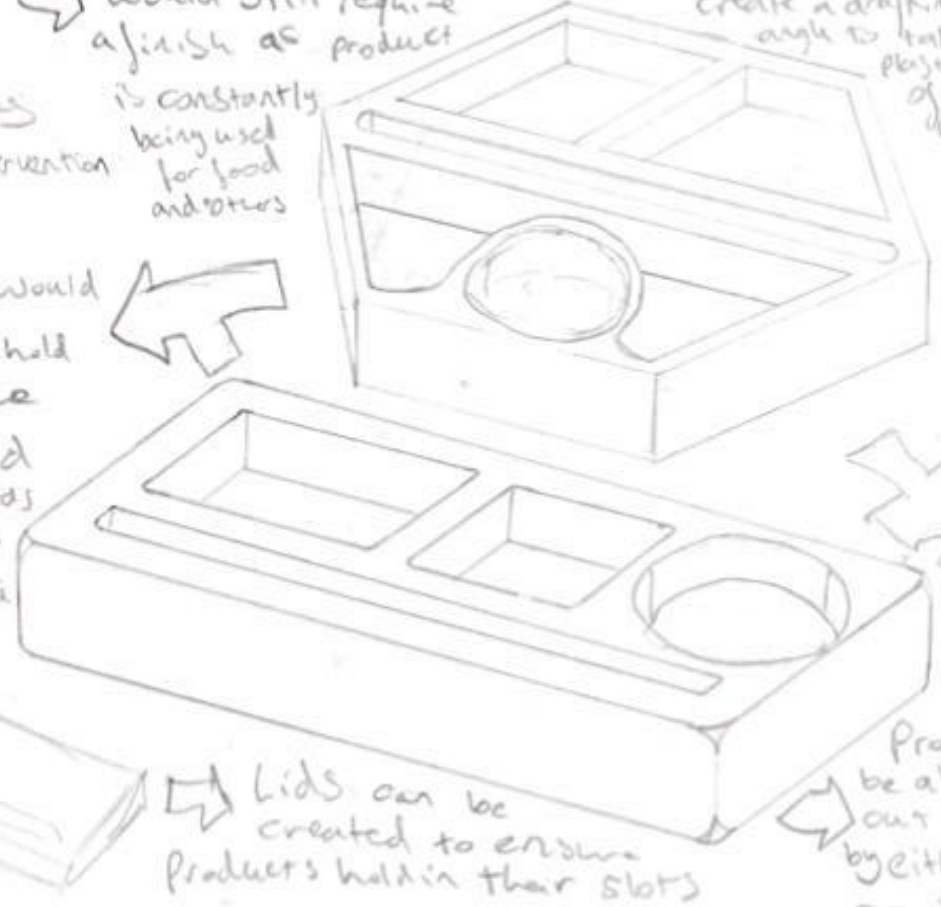
variations

Cheap to create as little human intervention is required

would still require a finish as product is constantly being used for food and others

different features would be required to hold products in place

velcro and elastic bands can be added to hold items in place



different shape of actual design could be made

could be easily created out of wood mdf

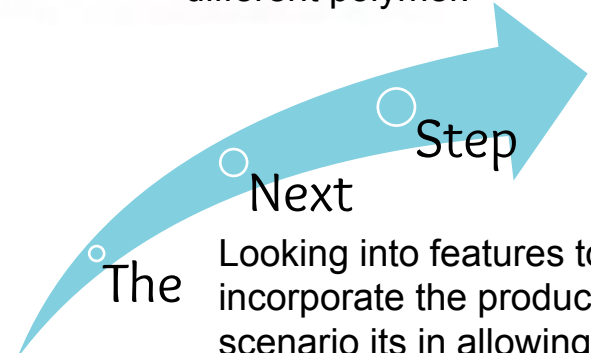
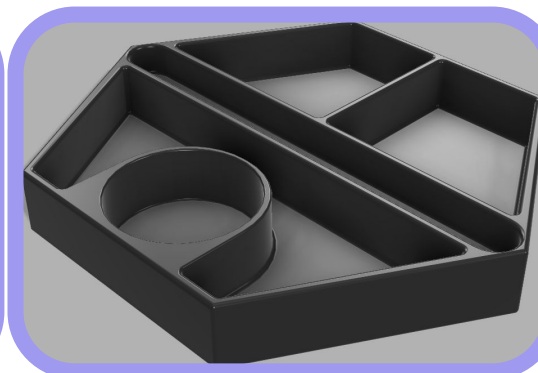
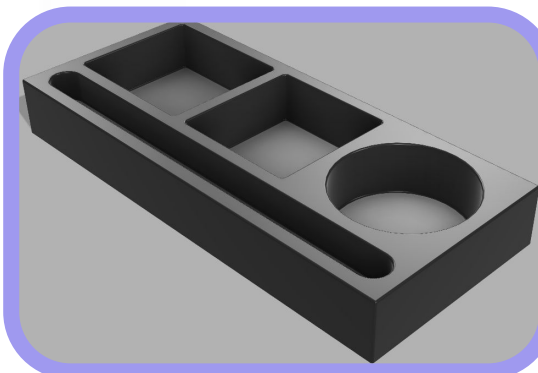


Lids can be created to ensure products hold in their slots

Products could be also manufactured out of Polypropylene by either vacuum forming or injection moulding

could be too heavy

By modelling my designs i was able to visualise the different options for pockets and slots. Unlike my other designs, this design is made more for the use of the product on the mode of transport opposed to the storage aspect. This could be changed by adding a lid to the product to allow for the items to stay in place. This would require a different polymer.



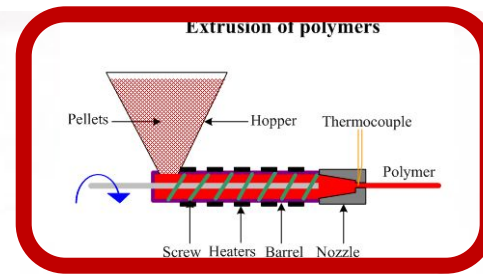
Looking into features to incorporate the product to the scenario its in allowing it to be used on tray tables

Generation of initial ideas and design development

Design Four

End user feedback

I will take into account to consider both aspects of transport. Make sure any mechanisms involved are simpler and won't be as complex



Due to the shape of the product a mass manufacturing process that could be used is extrusion. By creating a die of the shape of the main curve mass production could be easy. The division panels can be created separately through injection moulding for example or even extrusion again then be cut by machines into exact shape.

Extendable clip



PLAY ME

by using an extendable clip ± an able to clip the product to many tray tables

A lid can be added by using the extendable clips to secure it in place

close to table to not take much leg room

Made out of metal for durability and strength for supports. extendable spring loaded clip allows versatile attachment to tray tables and table lid

My model of the design



By creating a model ± realised it would require a back support due to the weight of ± legs. It will hold

metal clipped to hold product to tray table

Model shows the product will not take much space on table making it functional

Can however be bent so would require a wireless charging area could be included but would require a thicker base

Multiple variations of the same base model can be created

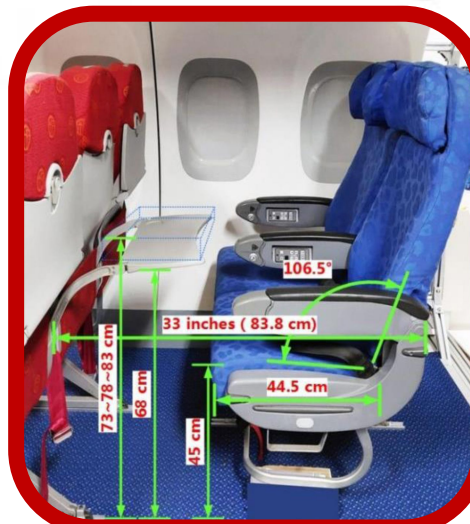
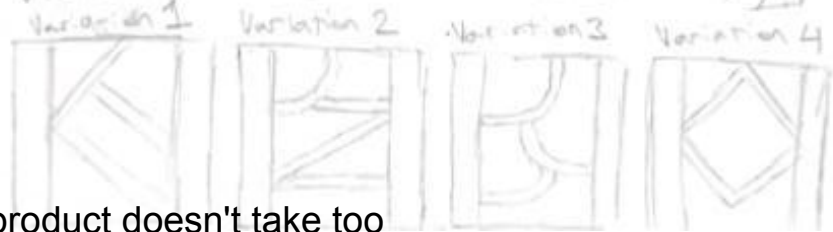
Travel experience on a plane.



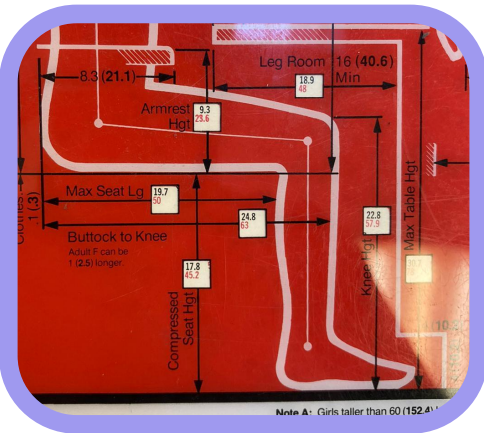
When travelling ± had ± items on the table making me unable to use it for homework

± bent cluttered and disorganised makes it easy to forget or lose something

Packet Variations:



To ensure that the product doesn't take too much legroom, i need to consider anthropometric data along with measurements for tray table heights. For a tall individual of a height of 183cm the average knee height is 57.9cm. This is on the taller side so measurements are in the higher percentile. The measurements of tray table height are 68 cm. This allows for roughly 10cm wiggle room allowing for my product to be <=8cm.



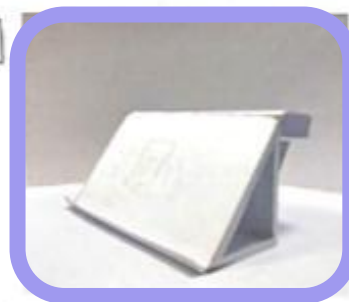
Stas
Great idea but only practical in one use case scenario where table is available. Practical features, for most common gadgets. Complex mechanisms would make the manufacture process more difficult. Its susceptible to brake whilst transporting

The Next Step
Looking at another perspective of how you can attach the product and use it during travel

My model

End User Feedback:

SV



Product is also not compact so would take up quite a bit of space

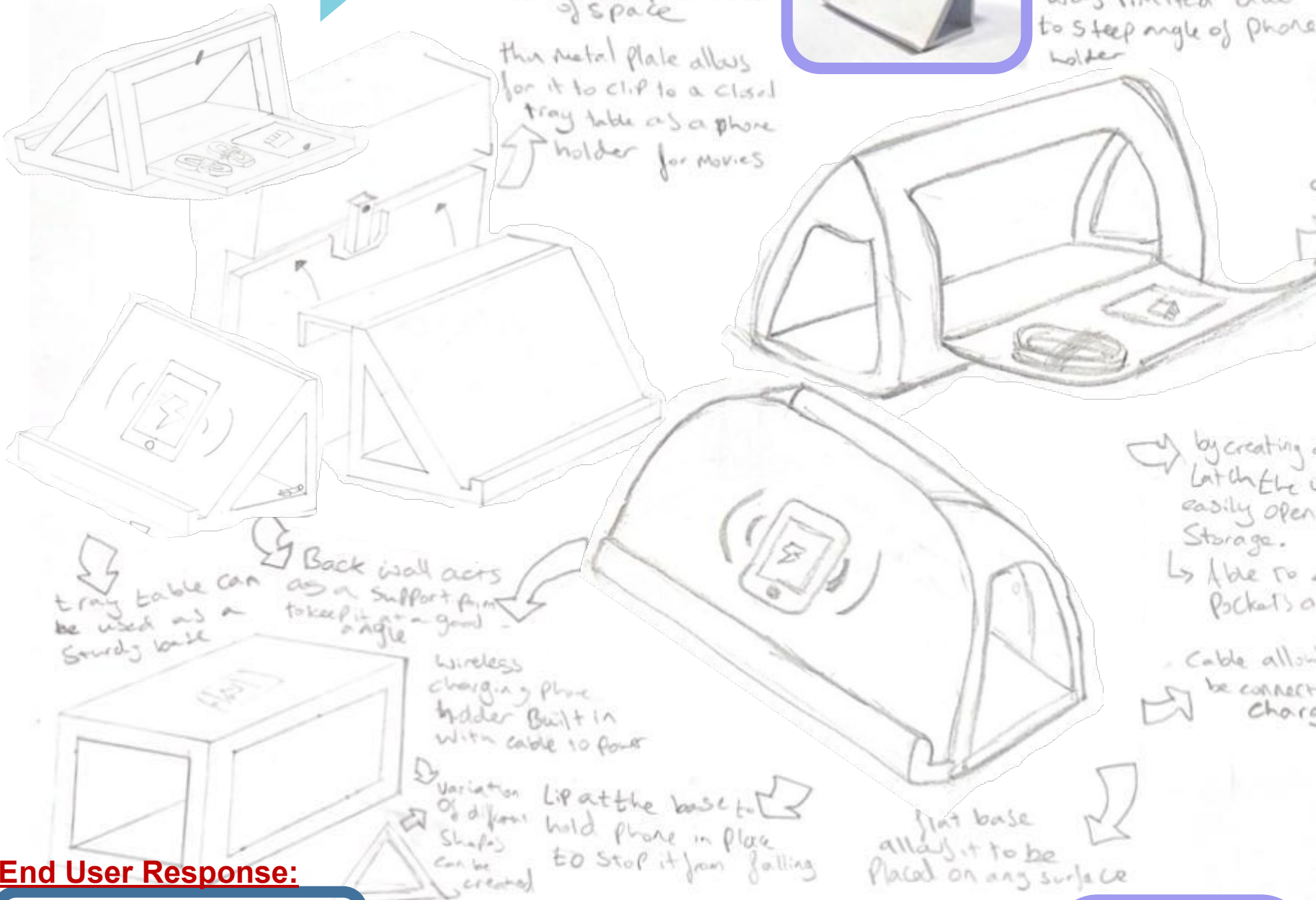
Creating a model made me realise space in back compartment was limited due to steep angle of phone holder

this metal plate allows for it to clip to a closed tray table as a phone holder for movies

open sides allow for easy access however the tray may fall out - may need a cap

Vicky

- like that it is creating more space on a tray.
- has elastic bands to secure things.
- has compartments for small items
- bulky, not suitable for compact storage



tray table can be used as a sturdy base

Back wall acts as a support from the tray table to keep it at an angle

wireless charging phone holder built in with cable to power

lip at the base to hold phone in place so stop it from falling

variation of different shapes can be created

flat base allows it to be placed on any surface

by creating a door with a latch the user is able to easily open and access the storage.

↳ Able to add extra storage pockets and cable holders

↳ Cable allows power bank to be connected to wireless charger



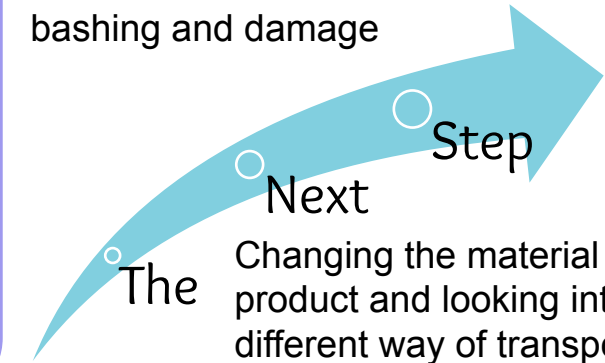
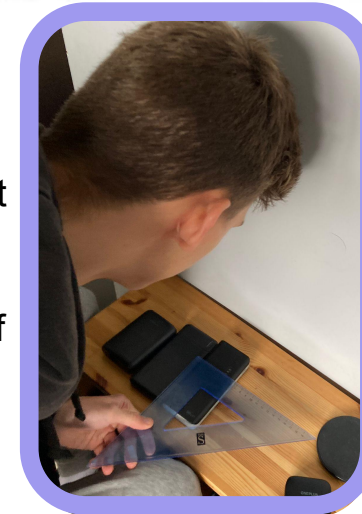
Polypropylene is a suitable material that can be used. This is due to its resilience and its variety of manufacturing processes. It has an extremely low density making it ideal for travel to save weight. It comes in lots of colours meaning multiple version appealing to a larger demographic. For example it is used in bins which can withstand a lot of bashing and damage

End User Response:

I will take forward the elastic bands idea and small compartment items and i will try incorporate in another design.

Power Bank Research:

By looking at different power bank sizes i can estimate the sizing of the product. As i need it to at least be able to fit a power bank in the back i will need to make sure it is as versatile as possible. By going onto amazon along with looking at a variety of different power bank sizes in person, i was able to determine a mean for the height of 14.68cm and a mean width of 7.39cm. This therefore means my products opening needs to be at least 8 cm by 16 cm to fit most power banks.



Changing the material of the product and looking into a different way of transportation.

Design Six

Generation of initial ideas and design development

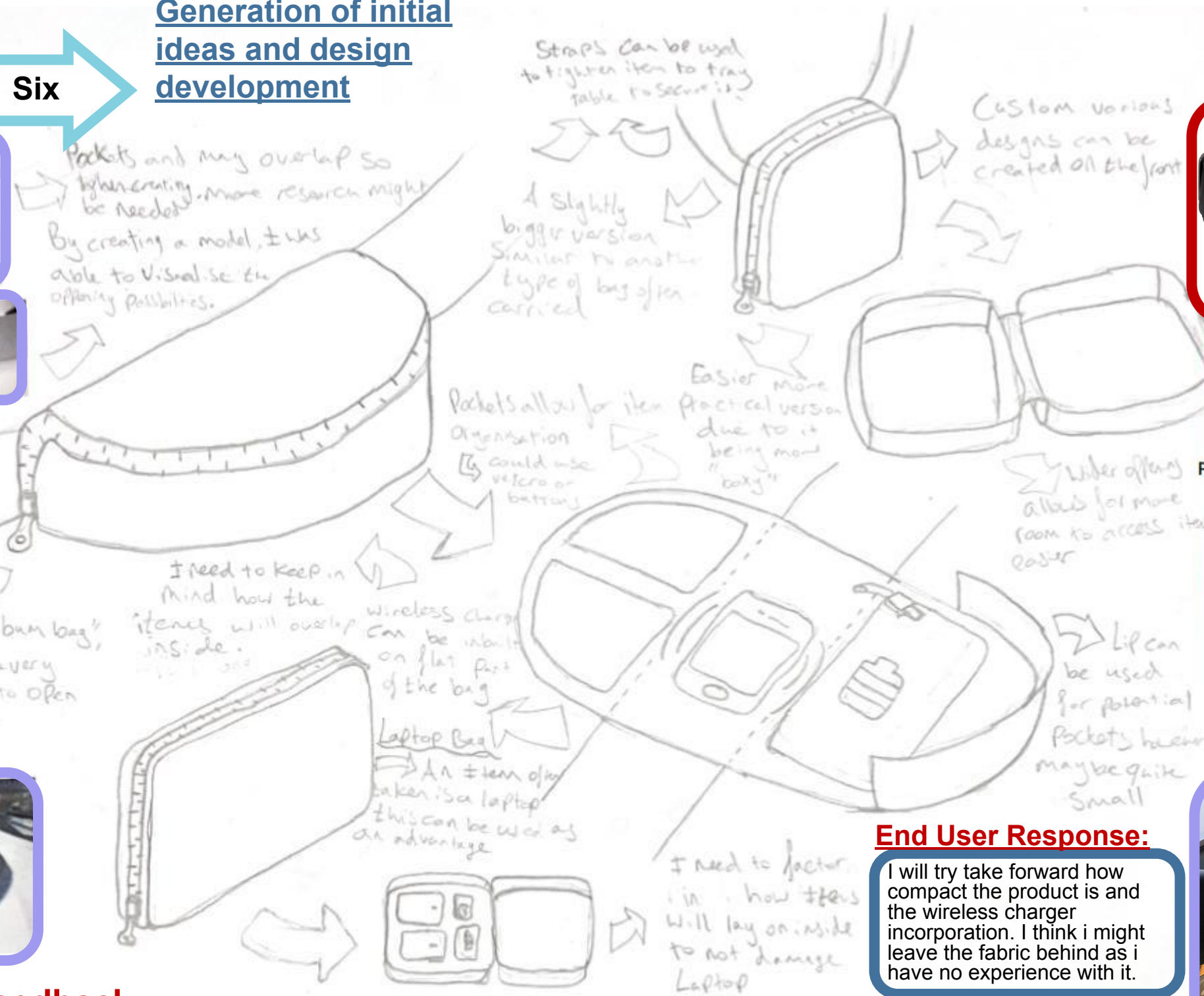


My model of my product



End User Feedback:

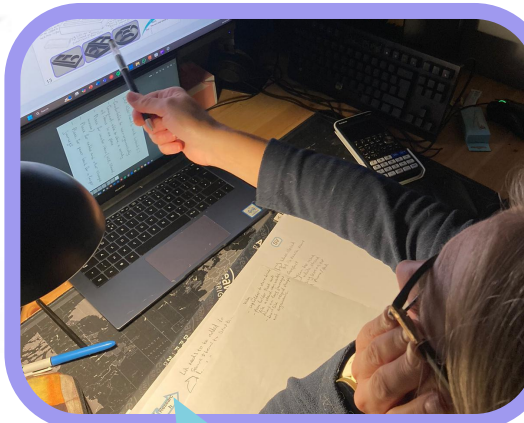
Stas
The use of fabrics can be difficult to manufacture, it does not offer as much protection as the other designs. Items may be disorganised and are likely to move around and fall out. The benefits of this design are that it would be lightweight and easy to transport. This design would be difficult to repair however the materials may be durable but will offer less protection. This design can be used as a wearable and can be carried independently.



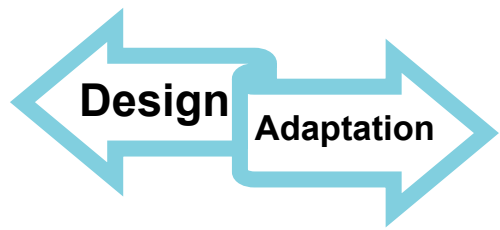
By researching dimensions of standard bum bags I can determine whether a product similar can be created.
Product Dimensions : 19.3 x 8.9 x 14.9 cm;
As a phone is typically 150cm by 70cm it will comfortably fit inside the bag. I could add a wireless charger built in to be able to charge the phone and connect a power bank.

End User Response:
I will try take forward how compact the product is and the wireless charger incorporation. I think I might leave the fabric behind as I have no experience with it.

Vicky
Features I like:
- compact
- light weight
- space for wireless charger
Don't like:
- have to store separately
- no cup holder



Step Next
The Looking into design features reviewing and researching different factors to keep in mind



SV

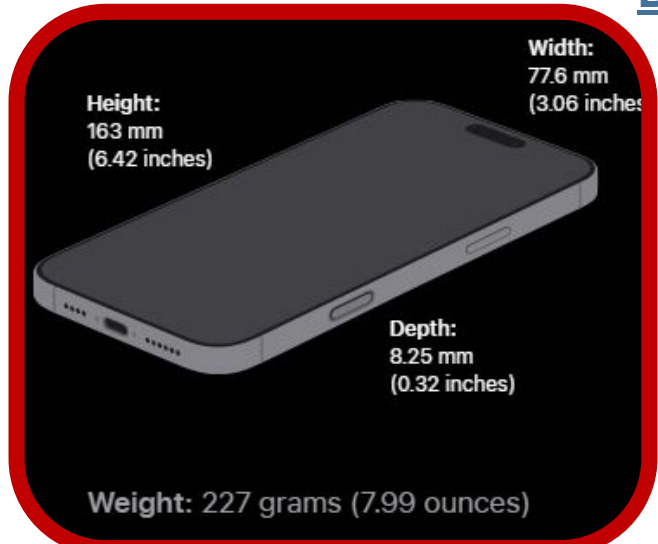
Research into tech features of the product including wireless chargers, cables and magsafe



5/10/15w Fast Wireless Charge. £3.37

Sizing Of The Product:

To factor in having a wireless charger and a power bank, i need to be able to comfortably space each item to be able to use them in the product.



By looking into the newest iphone 16 pros dimensions i determined that fitting this phone would comfortably make any other phone fit as it is the largest iphone. This therefore meant that i needed a width of around 80mm and height of around 170 mm. I also need to consider that the size of the wireless charger on the right has a diameter of 100 mm. Although hidden it still needs the space to be factored in when making.

Wireless Charger Research:

With the prices of wireless chargers being quite cheap, The possibility to incorporate it into my design would add function into the product. The idea is that i am able to use the power bank that will be stored and have a cable routed into a built in wireless charger that is completely hidden. However an issue could be that the coil could heat up and phone could also heat up due to poor conduction if the coil is poor.



As i want it to be hidden, the product needs cables that are small and tight to save space. Cables similar to the ones on the left are ideal due to their minimalist space taking. This can be used to create a connection between devices

A factor to consider is the wireless charging range. As i am planning to build it potentially below timber i need to factor in how far a wireless charger can function. By using a high quality wireless charger i own (one above) i tested its range using a 5mm thick piece of flexi ply. The results (green light glowing) shows that the wireless charging had no issues working. As a conclusion i have decided that using a complete wireless charger is a quicker more reliable process however it is more expensive.

Using the research from design five on the power bank, i need to ensure that the power bank also fits as many as possible. Using the means of the research taken i need it to be at least 150 mm height along with 80 mm width. This is similar to the

Research into magsafe and how i could use it to my advantage:



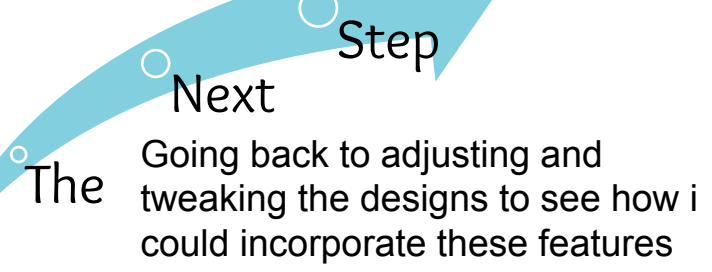
A new apple feature is the magsafe. These are small magnets embedded inside the phone itself under the rear glass. This creates a suitable connection to attach devices such as cases, wallets and most importantly wireless chargers. The magnets are secure and strong able to hold the phone up. They are however not overly strong to make it uncomfortable to remove,

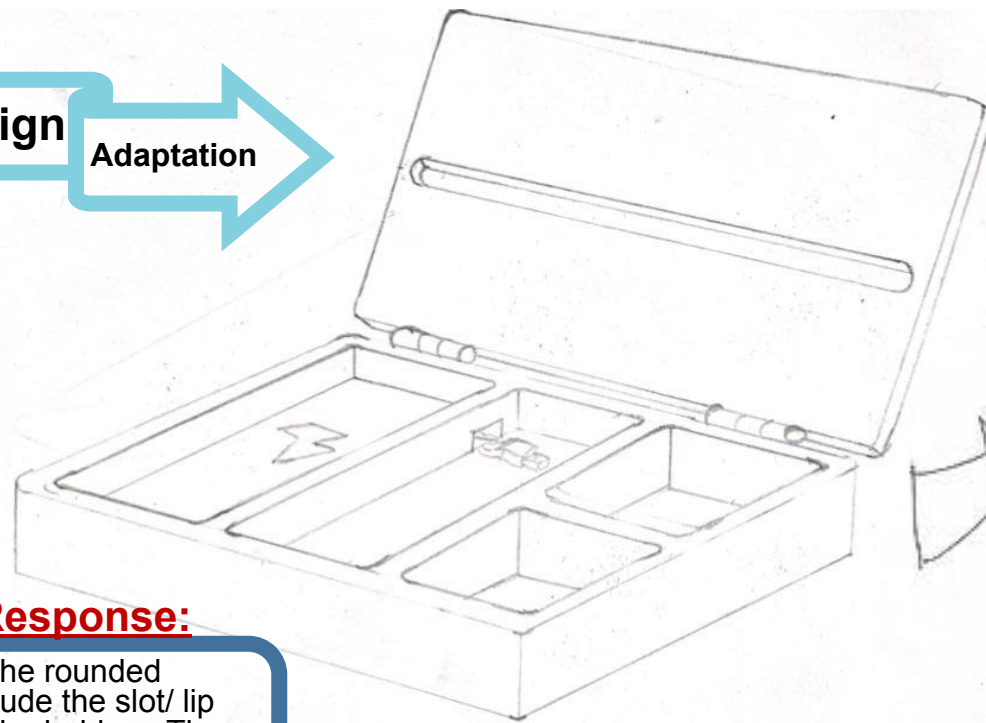
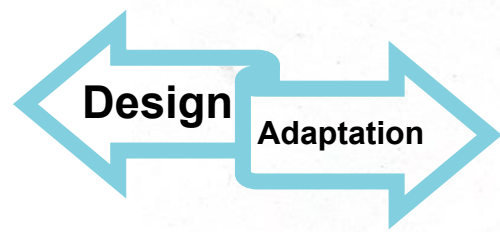


Using this to my advantage, i could implement it without covering it which would allow for a solid attachment which would not only keep the phone in place but would also charge it. This wireless charger is small but also the cable that attaches it is already embedded solving a worry i would have



-31% £8.99 RRP: £12.99





a clear acrylic lid can be useful to look inside to be able to quickly and easily check if all items are stored and not forgotten about.

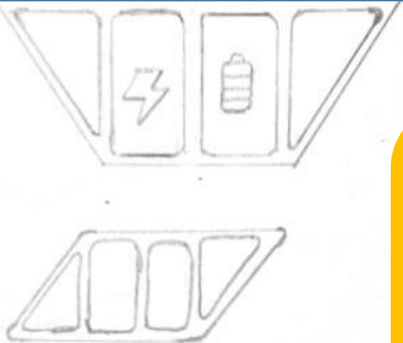
Slots for other items to be stored. I can add things such as elastic bands and clips to keep items secure

Lid has a slot taken out to be able to place phone into it to hold it up

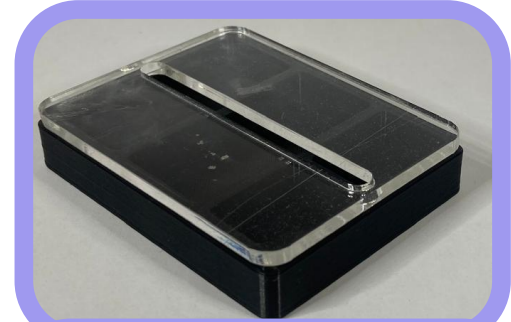
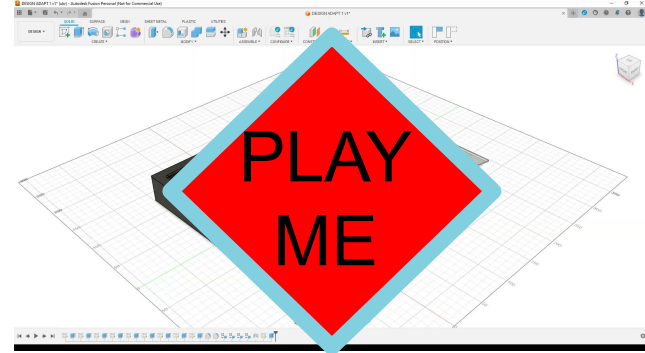
Shape variations can be altered for a more unique design

End User Response:

It can include the rounded edges and include the slot/lip for a phone to be held up. The organisation pockets are a good feature to use



My 3D Printed model for rapid prototyping



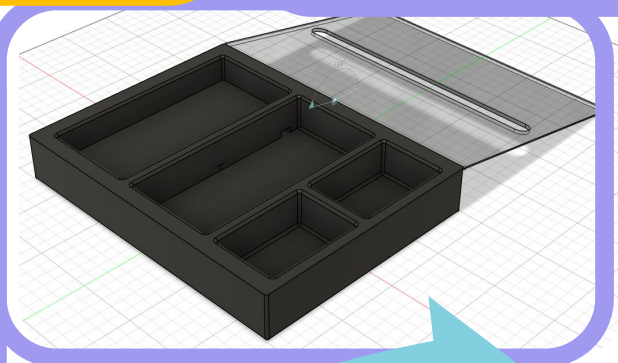
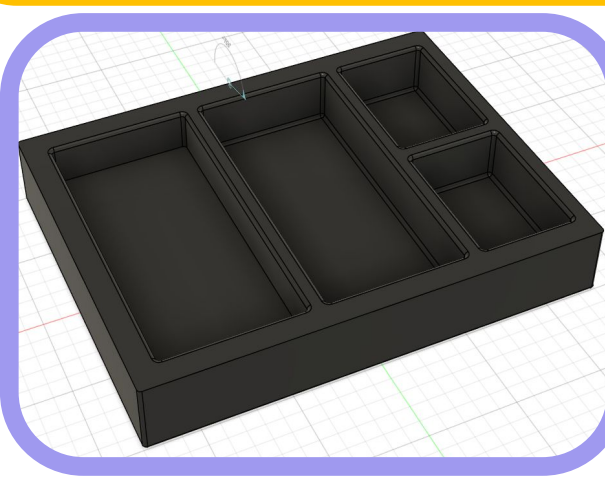
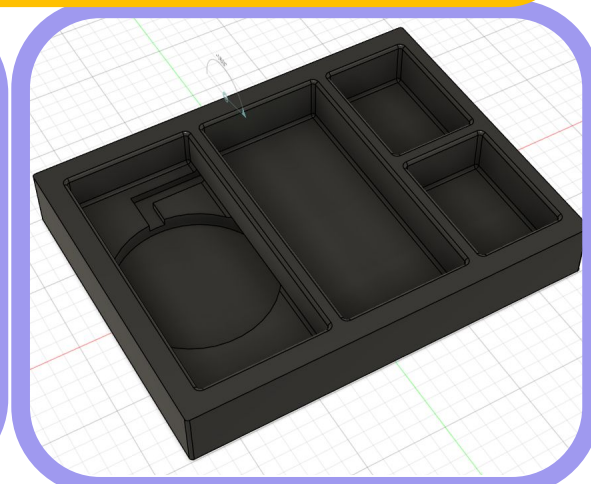
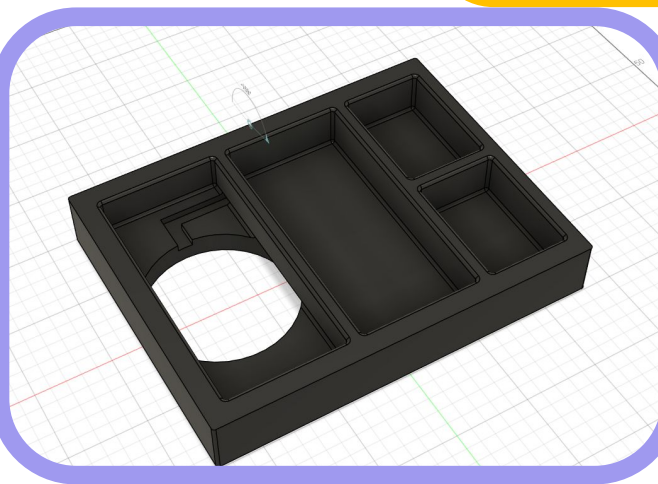
Stas

- Practical design, easy to fold transport and put away
- Round edges are great for ergonomics
- Clear lid great for easy checking and organisation
- Incorporation of common travel gadgets and compartments is very practical
- Utilisation of the lid as holder and stand is unique.

Vicky

- Nicely organised
- clear lid, easy to see whats inside
- nicely measured compartments to fit travel accessories

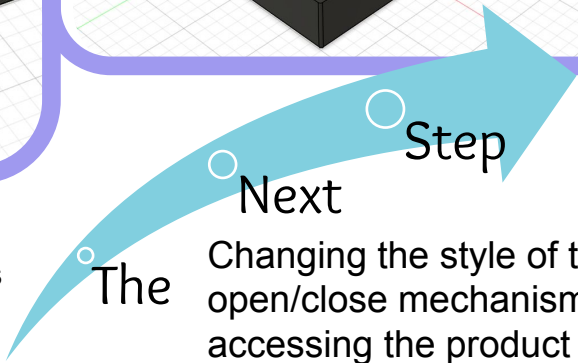
Design Breakdown:



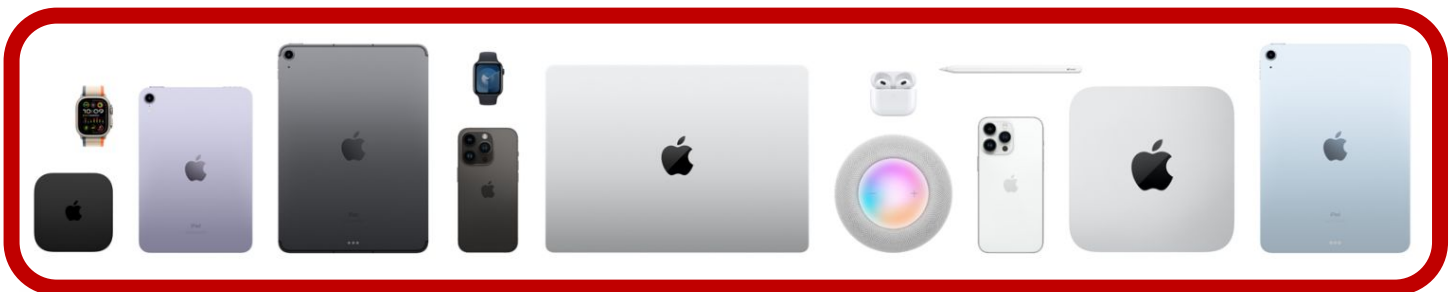
First the hole for the wireless charger will be cut including the slot for the cable. This would be cut from the bottom as the 20 diameter of the charger is larger than the width of the phone slot.

The hole is then filled by placing a disk of the same size as the hole. The wire is connected and routed through the slot to be able to connect to the power bank.

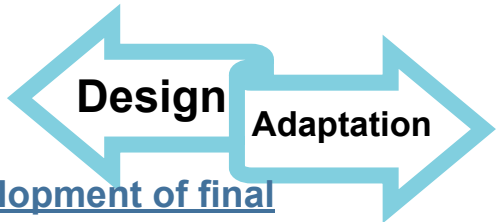
Finally a panel is placed on top of the wireless charger and kept in place. This completes the product allowing for an inbuilt charger to be in place and used as created.



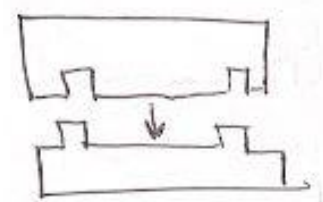
Step Next
Changing the style of the open/close mechanism when accessing the product itself



SV



Development of final design solution and critical thinking



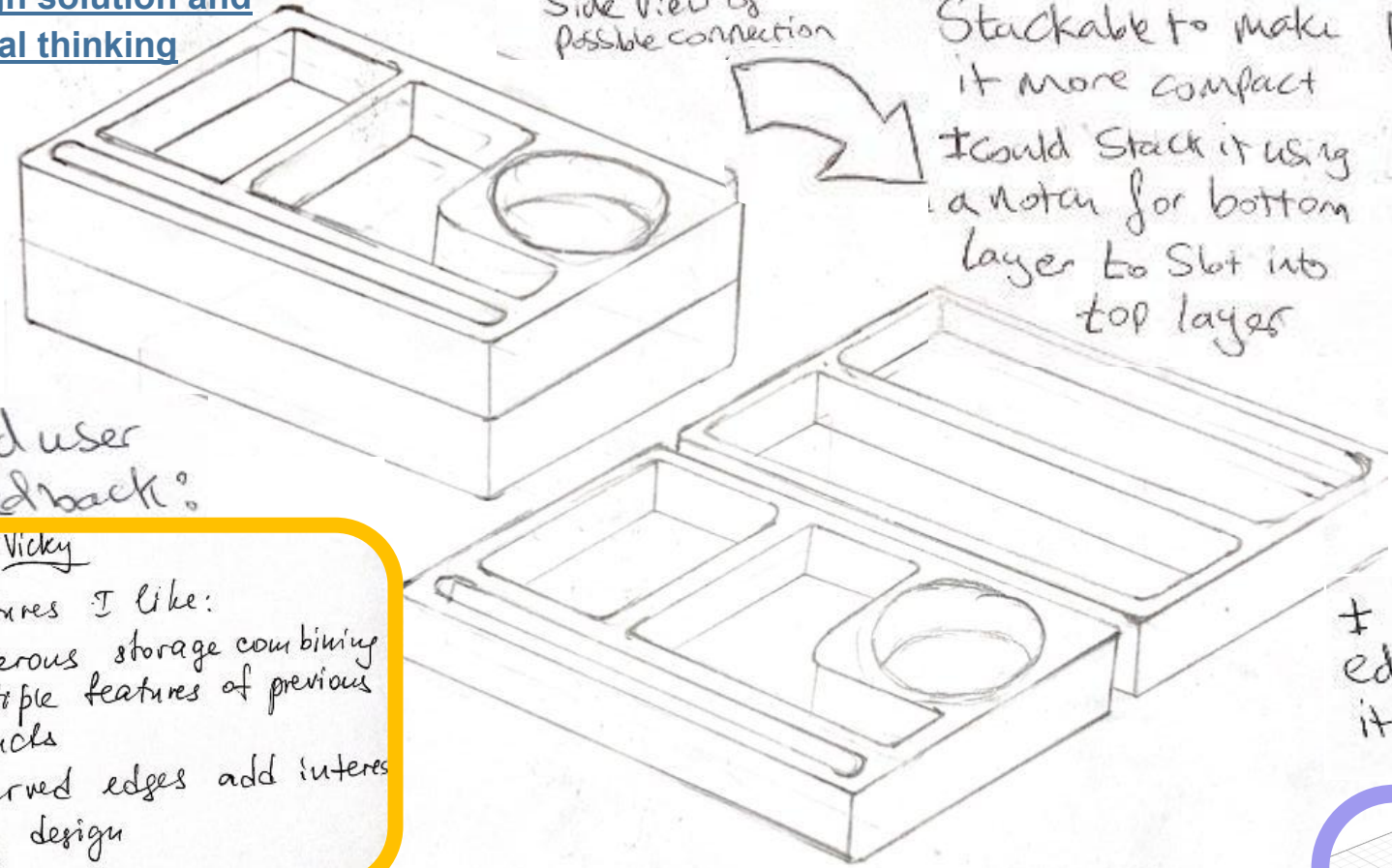
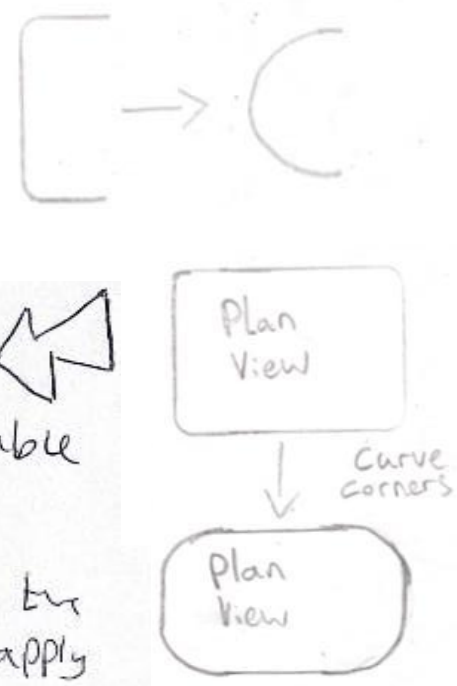
Side view of possible connection

Stackable to make it more compact
I could stack it using a notch for bottom layer to slot into top layer

By looking at Apple products, I observed they are aesthetically appealing due to their curved edges.

By creating rounded edges, it makes it ergonomically more comfortable to hold and use.

I like the possibility of curving the edges of my final design so can apply it to any future designs.

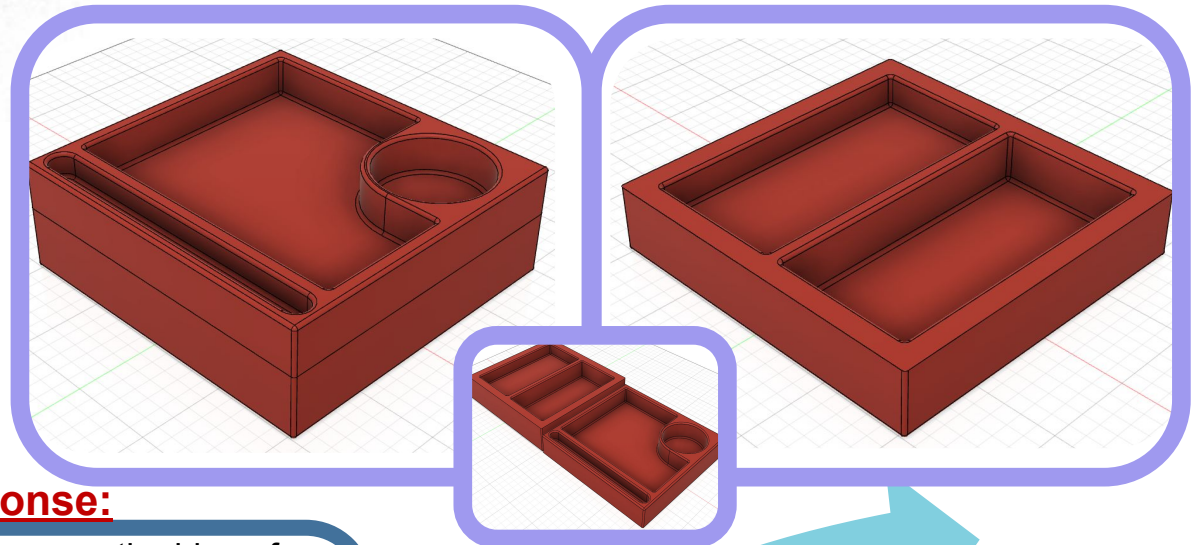


End user feedback:

Vicky
Features I like:
- generous storage combining multiple features of previous products
- curved edges add interesting design

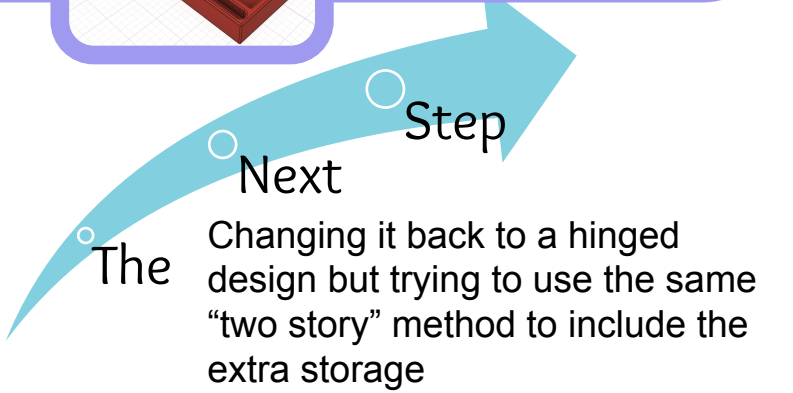
Stas
Advantage of having many compartments
Disadvantage is size bulky size
Would require many restraints to keep items organised and in desired location
Rounded edges are ergonomically beneficial
Phone/tablet holder is great utilisation of space

Modelling it helped me visualise the size and realise it is overly boxy



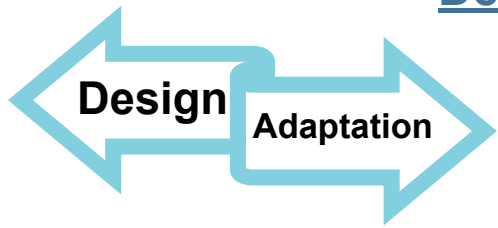
End User Response:

I definitely want to pursue the idea of having compartments, rounded edges and a holder for a phone however I think I will need to work on the connection of the two sections as it is impractical and can easily disconnect and become a nuisance. The product will need to be able to shut to ensure items are not going to fall out and get lost



Development of final design solution and critical thinking

SV



Lid needs to be added to secure items to stop them from falling out when opening and closing

Similarly to the lid, elastic bands and clips can be added to secure items.

Pocket style can be changed to include larger and smaller pockets

with cup holder with place for snacks and/or extra storage

When closed it is much more compact

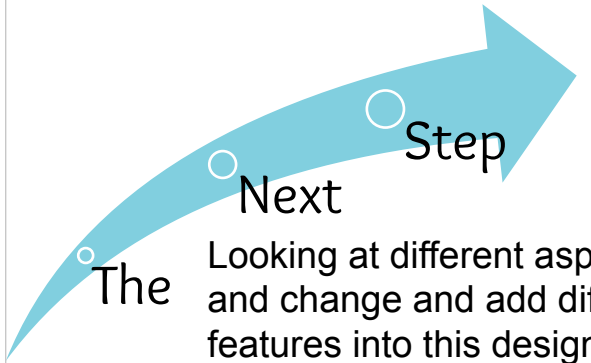
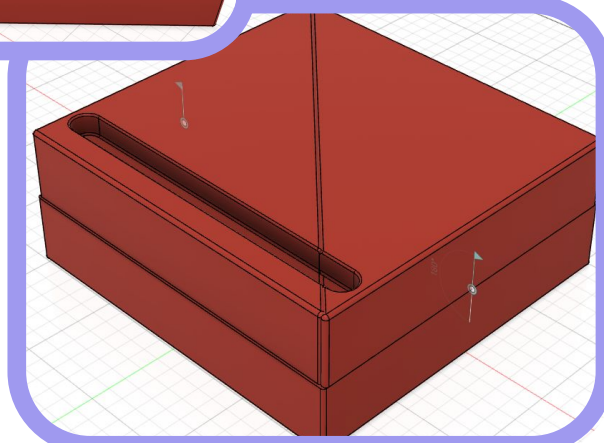
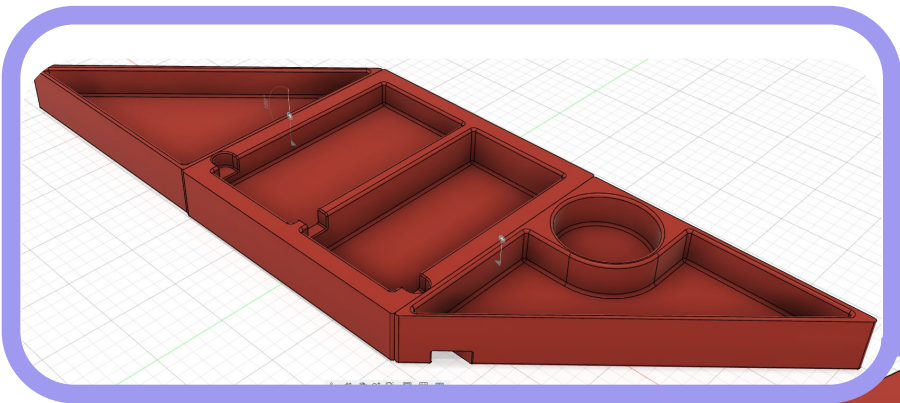
can be used while closed by using slot on top to hold phone/ipad

clip should be added to hold the item closed

End User Response:
I will pursue this idea and tweak aspects of it as end users and i are all happy with the look and design of all the features

Vichy "A box ^{outside} out of a box"
- The best design comparing to the previous products. A box that can be transformed into different shapes depending on your mood.
- has all compartments to fit travel accessories giving space for snacks and drinks!

Stas
Unique quirky design with many practical compartments, I like the utilisation of dividing the square using hinges. Easy to manufacture maintain and replace. The phone/tablet stand is a great addition to the top section using utilising all the space given.

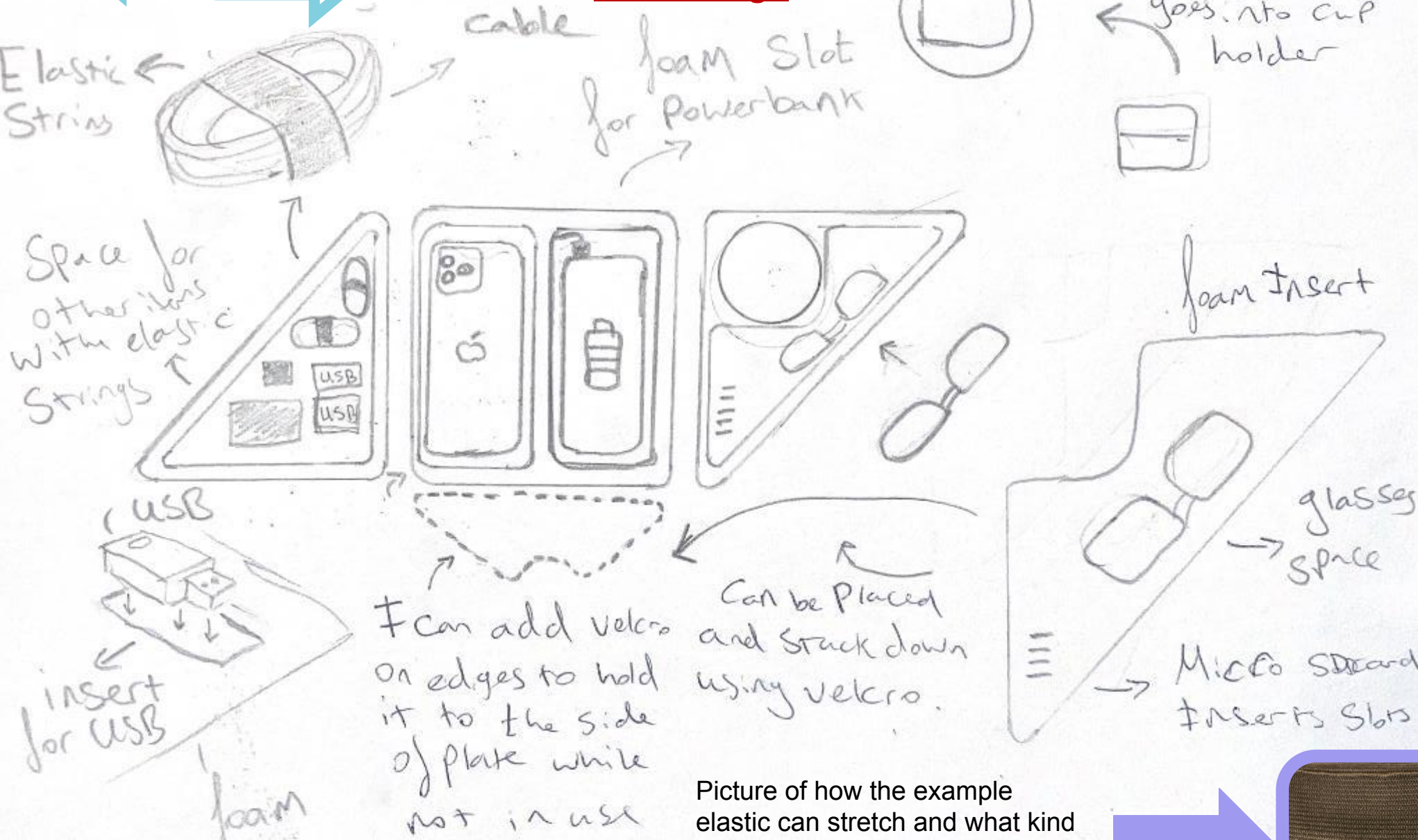
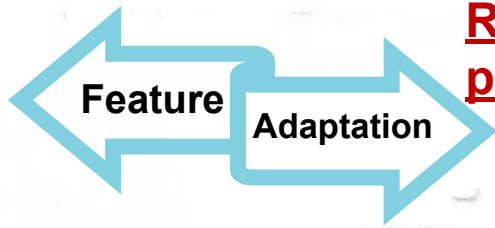


Looking at different aspects to try and change and add different features into this design

The unique opening style allows for easy access to all compartments. It provides a usable inside and outside with its phone holder on either side. The large shape created allows for a large entertainment centre. The compartments can be modified into a variety of configurations.

Research into the use of foam in my product and how it can be incorporated

Research into bands and how it can be applied



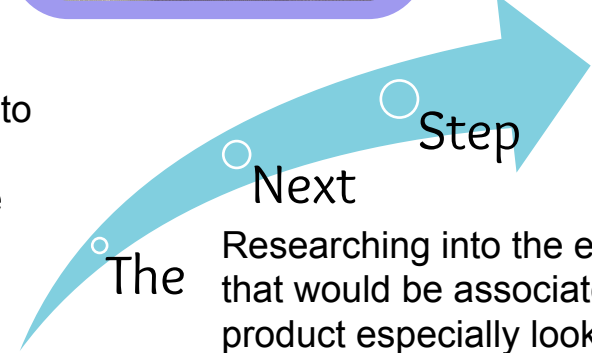
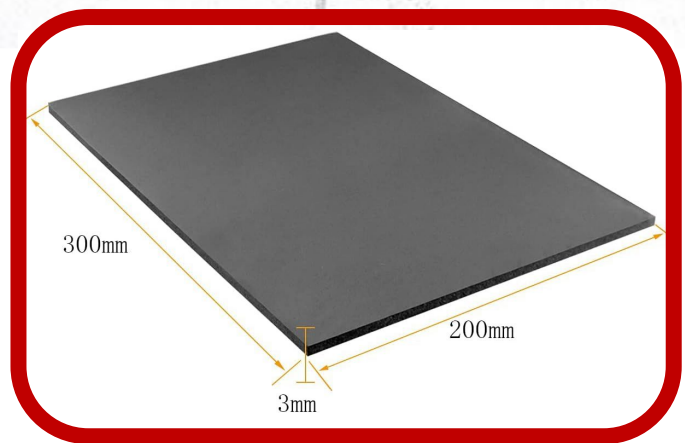
- The elastic comes in many styles, sizes and different stretch variations.
- To apply these i can use different methods such as stitching it into the foam pieces with different threads.(i can explore the possibility of using contrast stitching.)
- I can also just glue the bands in.
- This can then be used to hold any loose items for example cables specifically.

Picture of how the example elastic can stretch and what kind of material i mean to include



Research into foam and how it can be applied

- 5 PCS for £10.99 that can be cut to shape using a simple craft knife. This can achieve the desired slots for specific items to hold them in place. It can be glued into the product
- Although only 3mm thin, multiple layers can be added and stacked to create thicker pieces.
- Instead of placing the top layer over the phone charger of the same material the box is made of (last point of the design breakdown on page 18) i can place a thin layer of foam instead creating a soft placemat that is also light and thin so charger can still function as required.

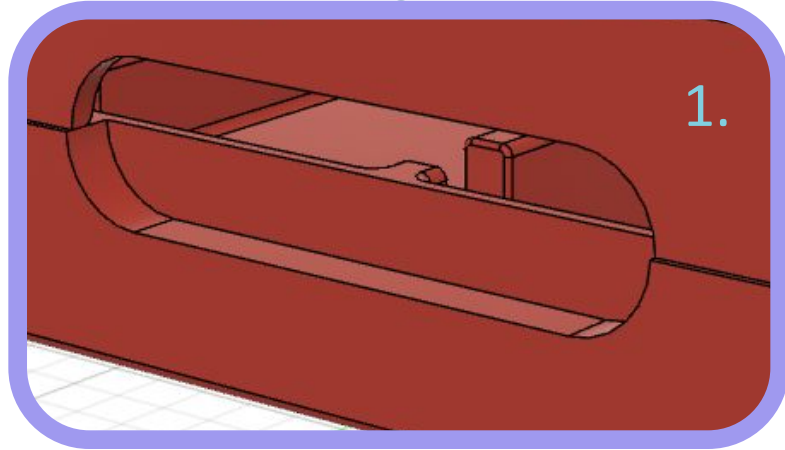


The

Next

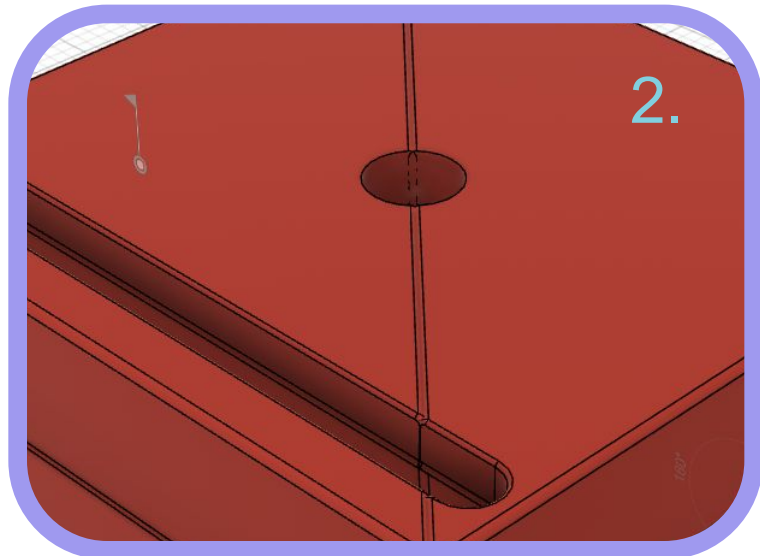
Researching into the ergonomics that would be associated with my product especially looking at handles and anthropometrics

Development of final design solution and critical thinking



1. When creating the handle i realised it created a really awkward gap the items could fall out off.

I will instead try to explore the possibility of creating a circular opening slot in the top by using the same anthropometric data. With the biggest size of finger being 22 i will round up the circle diameter to 25



2. The circle design can be difficult to use as it does not provide much room for grip. This however aesthetically appealing is not very functional. It does not provide for the ability to lift the object like the other designs. I can still use this design alongside another to create multiple opening possibilities if i want to.

Creating a model for the foam and how items can be used in it



Modelling the foam by using a laser cutter i was able to explore how things and items could slot in. This showed that i could use the same slots for multiple items. However the issue i found was that some items were snug while others were loose. Due to this i decided to add elastics to every item slot allowing the items to be secure no matter their size also meaning i could make the holes bigger to hold all kinds of different model procuts



Exploring handle variations using anthropometrics in the process to adjust to the correct sizings.

8 = breadth of first joint of digit

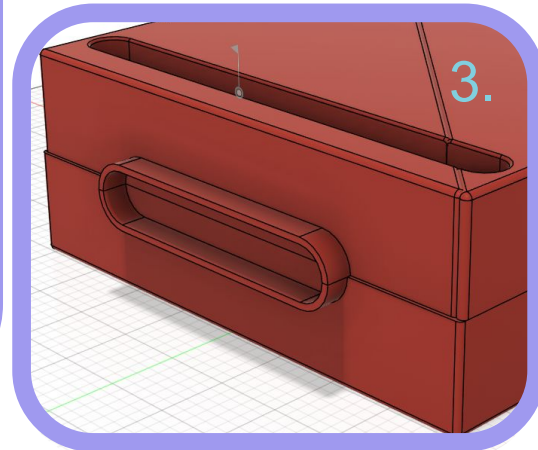
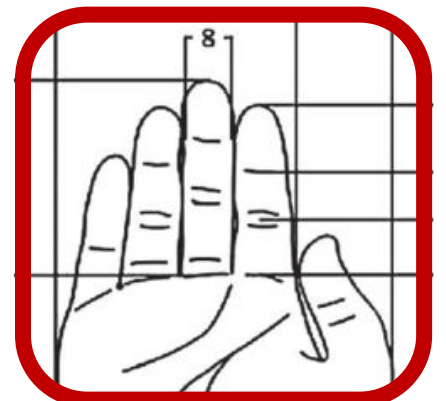
	Right hand		Left hand	
	M	SD	M	SD
Breadth of first joint of digit 1	21.96	2.63	21.62	2.64
Breadth of first joint of digit 2	20.06	2.27	19.73	1.78
Breadth of first joint of digit 3	19.92	1.86	19.56	1.85
Breadth of first joint of digit 4	22.24	81.23	18.48	3.53
Breadth of first joint of digit 5	16.83	1.82	16.66	4.05

I only need rough measurements so i will use rounded values and add them together to give a minimum width for the slot on the handles/ opening slot (excluding the thumb (first digit))

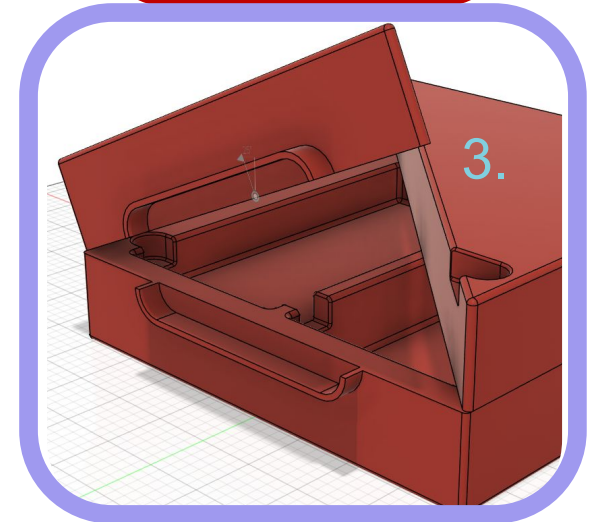
-Right hand: 20+20+22+17= 79mm

-Left hand: 20+20+19+17 = 76mm

Therefore the size must be at least 87mm allowing for 2mm on each finger so i will round up to 90 mm



3. After applying the second adaptation i determined that the overall it would be more beneficial to have two handles in one. This allows for the ability to open the box by grabbing between the edges and to pick it up by grabbing by the bottom of the two handles.

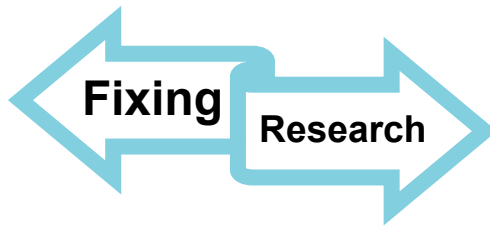


The Next Step

Research into closing mechanisms picking and choosing which one would suit my product best

Development of final design solution and critical thinking Exploring the ability to add velcro to hold thin piece of material in place to hold items

SV



Research into different options for a Fixing to keep the lid shut

Neodymium Magnets can be used as a **latching mechanism**. By using **multiple magnets** placed around the edges built in (like in the picture of the box) it can **latch and snap together** to hold it like in the example video. This provides a **"luxury" or "premium"** feel to the box. I will need to explore the **strength of the magnets** to determine how many to place to get the perfect **balance between latching capability and the ability to open the box itself**.

Many **tech items** use a magnet as a connection. My product using magnets would **add to the theme**. The mechanisms work well as they keep the items **shut while also easy to open**. They are also **aesthetically appealing** as they have a satisfying "snap" when the magnets begin to pull inwards

Pre-manufactured methods

Various latch types already exist at a **cheap price**. They can **easily be added** to my product. The different types of latches give a **variety of options for aesthetics**.

More modern options like the metal latch on the bottom right

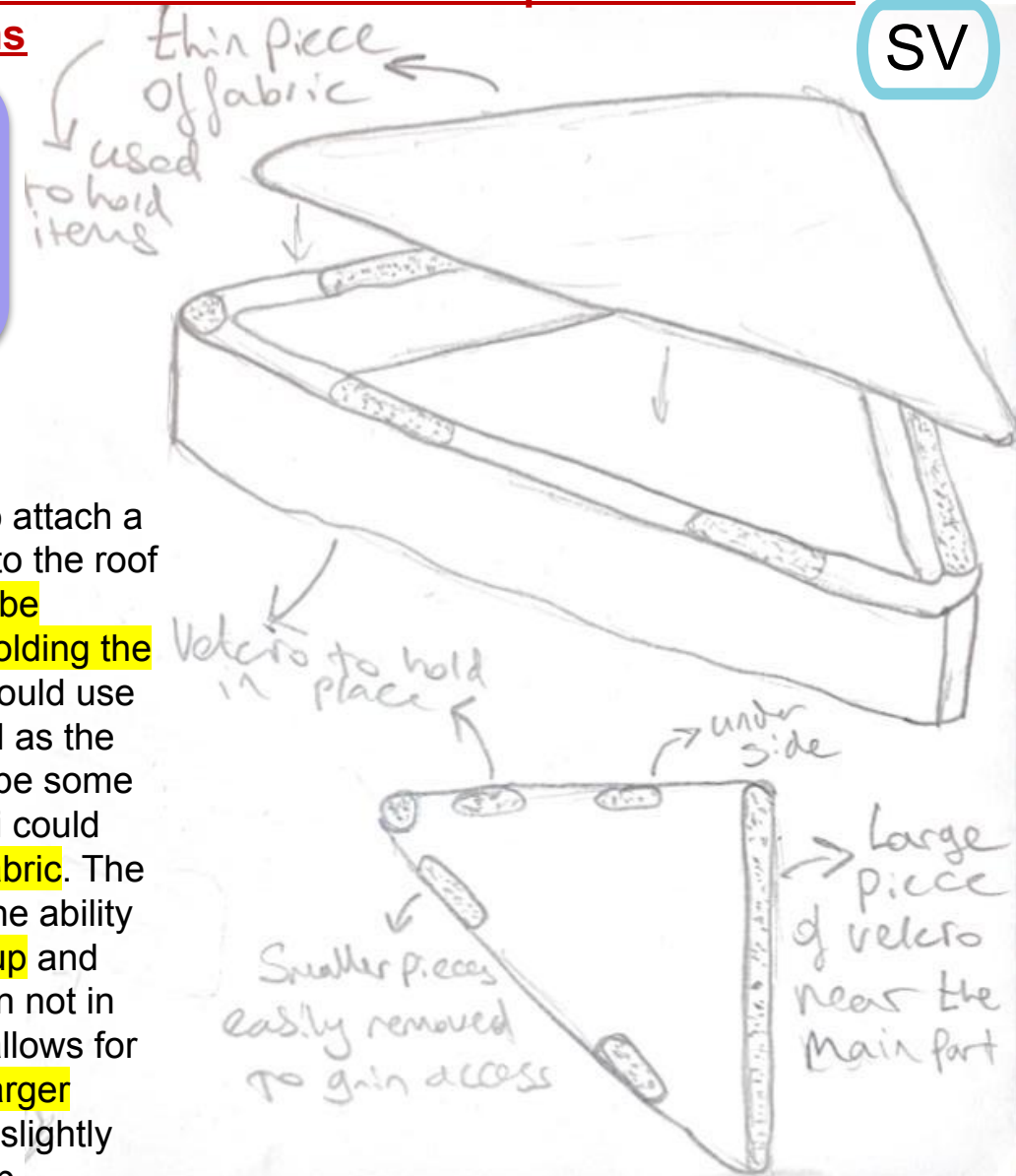


4 Pack Silver
£5.99
(£1.50 / count)



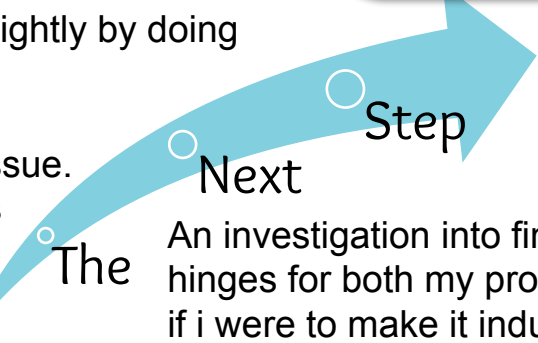
20 mm x 8 m
£6.99

By using **velcro** to attach a piece of material to the roof i allow it to **easily be accessed while holding the items in place**. I could use the same material as the box which would be some form of plastic or i could use a **thin bit of fabric**. The fabric allows for the ability for it to be **rolled up** and placed away when not in use. Fabric also allows for **stretch** allowing **larger items** to fit in and slightly move the fabric up.



Explaining the effect of the velcro and the thickness it will add.

The issue i face is the **added thickness of the velcro** when it is shut. This is an issue as when it comes to it **not being flush**. An additional gap makes the product **unstable and not easy to close**. To counteract this i could **imbed** the velcro slightly by doing something similar to the magnets. This would completely remove the issue. Another way to solve it is to **discard it completely and use elastics** all around to secure the product.



An investigation into finishes and hinges for both my prototype and if i were to make it industrially



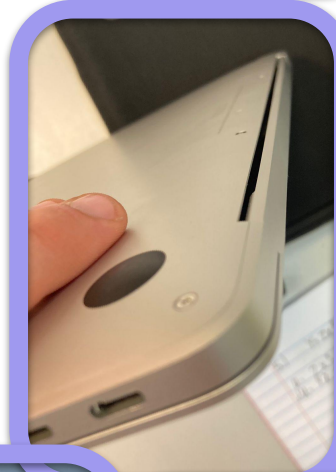
Industrial level finishes as well as hinges investigations



When making the final version of my product i would potentially try and create it in the style of an apple macbook. The clean aesthetic and smooth matte finish adds a premium look to the product. A slightly curved top edges and rounded corners provides a circular finish to a boxy initial design. I could potentially try and incorporate that into my product. However due to my item having to use its opening lid as a base when opened, the curved edge may cause it to have all of its weight on the peak of the curve of the lid. This would provide instability to the overall balance and can cause damage if padding is not added which would ruin the aesthetic.



At an industrial level i could create hinges similar to this in many laptops. Tucked away in the inside they can hide out of the way and make the product more aesthetically appealing. The design makes it look sleek and professional. They are much smoother and stronger however unfortunately, i do not have the facilities, equipment or understanding to incorporate this in my prototype.



Exploring the use of fabric hinges in my prototype.

I want to make a premium hinge for the actual product similar to that of a laptop one. However i do not have the material, experience or time to manufacture a hinge of this sort so instead decided to use a fabric hinge.

By gluing together two bits of wood to be held together by fabric i am able to test the thickness of the material required and which works best..

I coated both the fabric and wood in glue allowing them to both set for 24hrs. I was looking at the functions of:

- Revolution of the hinge (how well it functions as a hinge and can open and close.)
- the strength of the hinge moving in the unintended direction (opposite to the direction it moves.)
- Gap created when the hinge is shut



Thicker fabric Hinge.

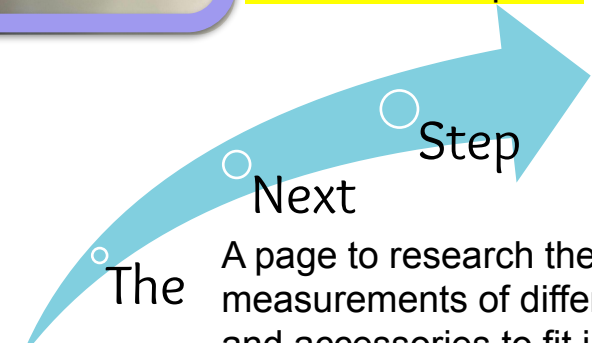
The thicker fabric worked well and even slightly better. It managed to withstand more pressure before breaking. It however did create a slightly bigger gap. This could potentially be used to my advantage with the velcro thickness in the previous page. Revolution of the hinge was exactly identical and just as smooth. This might be the overall better option.

Thinner fabric Hinge.

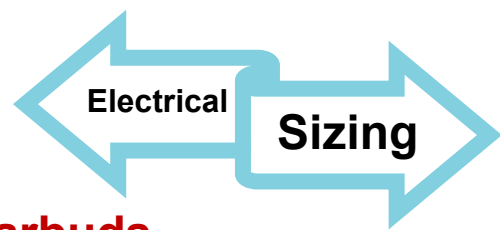
The thinner fabric was strong and worked well overall. The revolution was smooth and easy with little play in the side to side movement. It was extremely functional and smooth.

The ability to withstand strength for the unintended direction is very high. I tested this by applying pressure in the opposite direction which required much more pressure than any typical use of the item.

The gap created was quite slim in comparison to the thicker fabric it was mostly invisible which worked well for the product.



A page to research the measurements of different devices and accessories to fit into my product



Development of final design solution and critical thinking

SV

Samsung s25 Ultra



Dimension
162.8 x 77.6 x 8.2mm

Google Pixel 9 Pro XL



162.8 mm (height)
x 76.6 mm (width)
x 8.5 mm (depth)

Oneplus 13



Dimensions
Height: 162.9 mm
Width: 76.5 mm
Thickness: 8.5 mm (Arctic Dawn/Black Eclipse)

Earbuds

Similar to phones, there are **main brands of headphones**. However due to the **saturated market** with many good headphones, people tend to **stick to their brand of phone**. This is due to the **interconnectivity** of the headphones and phones creating an ecosystem

The largest length was 60mm and the width was 50mm. I should consider these when creating the pocket sizes to ensure that **most headphones will fit**

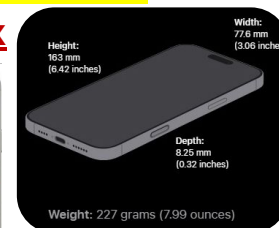


Phones

Newer phone models tend to keep getting **bigger with newer models**. By looking at multiple brands and their **newest flagship phone** models I can determine an average size that the phone will be by looking at the biggest phone sizes I can use this and consider a reasonable size that will **fit multiple phones**.

The size for the height is around 162mm and a width of 78mm so **anything smaller is fine**

iPhone 16 pro max



Electrical sizing averages of items



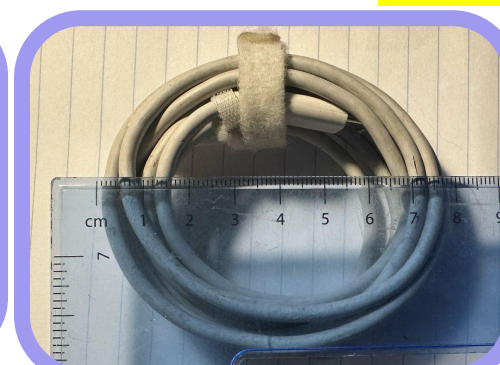
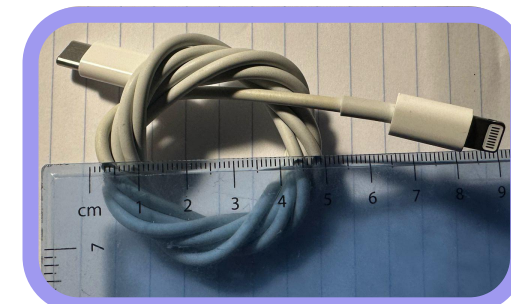
Usb sticks

Usb sticks, similar to cables, have a **large variation in sizes**. Although most are not larger than a thumb, they still have a variety of widths, lengths and heights. The largest one I found is 60 mm in length. I believe that the best option for the usb stick is a **general foam slot** that can **use friction** to hold a **variety** of usb stick sizes. The ability for the foam to **return** and **wrap around** the usb stick would allow for a **large variety of different brands and sizes**.



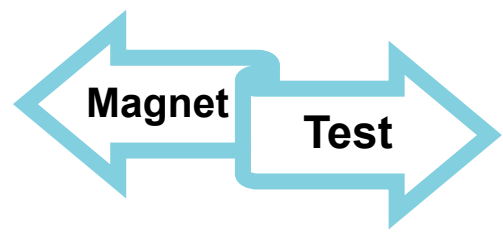
Cables

Many **sizes and lengths**, these factors are so varied it is **extremely difficult to appeal to all sizes**. The plan is to **fit my laptop charger cable** (one at the bottom). The other main cable is the **phone charger** which is **much smaller** and will easily fit in the **same spaces** as the laptop cable. The diameter is around 80mm but the cable **can be squished**.



The Next Step

Testing magnets to use as a latching mechanism. Working with 3 types of magnets, testing their strength and size.



Development of final design solution and critical thinking

Using a digital balance to test the pull of each magnet pair

To test the magnets i used **sellotape** to temporarily attach one **magnet to the scale** and the other to a pen. I used a pen and a scale that does not contain much ferrous metal to ensure that no external factors affect the test. I zero'd the scale and attached the pen magnet to the scale magnet and pulled the pen upwards until the magnet released and looked at the **maximum number** before the magnet detached to give me a **rough estimate of magnet pull**. I need to keep in mind that in the actual product the magnets will be face to face. This means that the force will be **larger** as their would **not be a barrier of sellotape**.



5mm Magnet:

With around **260g** of pull being read at the most for the 5mm magnet not many would be required. According to the research on the right side only around 3 or 4 pairs is required.

4mm Magnet:

With around **170g** of pull being read at the most for the 4mm magnet a fair few more would be required as it is roughly half of the pull force of the 5mm magnets. According to the research on the right side only around y at most is required. I have 25 available to me therefore 10 on each side would be great



3mm Magnet:

With around **95g** of pull being read at the most for the 3mm magnet a lot more would be required as it is roughly 1/4 of the pull force of the 5mm magnets. According to the research on the right side only around y at most is required. I have 50 available to me.



Conclusion:

I need a balance of **strength** to keep the items secure and product to remain closed but also the ease and **comfort** for the ability to open the product without issue. Therefore after testing the magnets and comparing the data to the researched pull force i think that the ideal would be 10 amount of 4mm magnets. These should be **embedded roughly** all over products edge to **distribute the force equally** throughout.

Researching data to determine the pull force required to open my product to ensure it isnt too strong.

The maximum pull force of magnets suitable for opening a product with your fingers while seated should be manageable without causing discomfort or requiring excessive strength. Here's a breakdown:

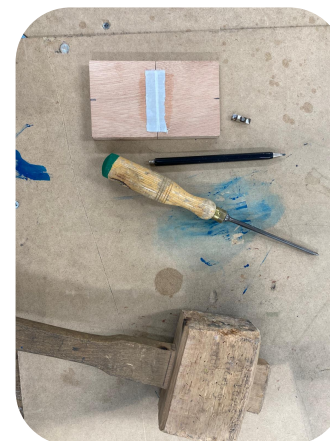
Safe Pull Force Range:

- **Light to Moderate Effort:** Magnets with a pull force of 2–5 pounds (1–2.3 kg) can typically be separated with fingers. This range works well for products requiring some resistance but still easily opened by most adults.
- **Moderate to Strong Effort:** Magnets with a pull force of 5–10 pounds (2.3–4.5 kg) may be manageable for some but could require more effort and strain.

According to my research i found that at most for my small product i should use a "light effort" model with a pull force of about **1-1.5kg**. I have done magnet testing of all three size magnets i have and can use this data to determine the **perfect amount of magnets** and the ideal size.

Embedding magnets process for initial testing.

Using a fine chisel i managed to carve out a small fine area for the test magnet. I **embedded the magnet** and decided to see whether i should **cover the magnet** over with another material.

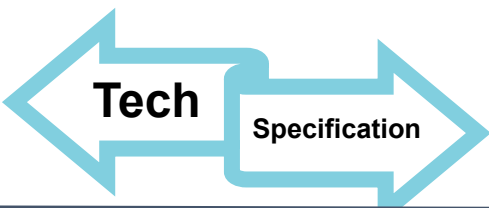


The

Next

Step

Finishing off the magnet testing and looking into the features for the technical drawing



Final magnet test



Using a **pillar drill**, i drilled a 4mm diameter hole. I inserted a magnet and using a **two part wood filler** covered the magnet to hold it in place. This could then be **painted over** causing it to blend in/ completely hide the wood.



It was able to hold the wooden block to **stop it from falling**. As a result i concluded that the **strength had decreased**. To overcome this i could use **more magnets**. I however **don't have enough** 4mm magnets to counteract the strength

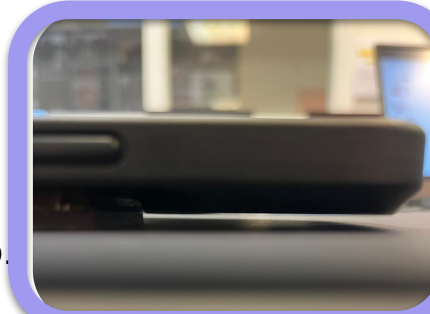
Looking into things that will affect my technical drawing and how to adapt my model to support it.

Planning for making the final prototype

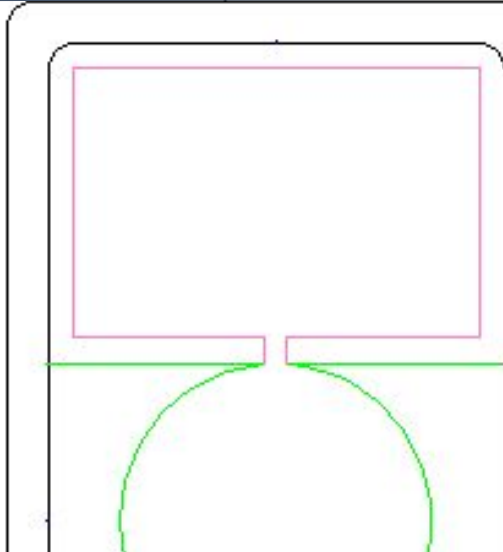
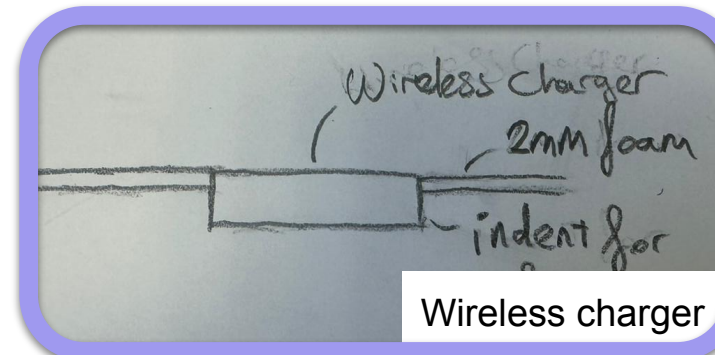
SV



The camera is **too large and protrudes**. The phone case has a bigger area for the camera as a result. If i want the magsafe charger to connect i need the phone to **sit flat** with the products surface. I can create an **indent** above the wireless charger point where the camera can rest to make it **sit flush**. Working it out i needed around 5mm for a clear gap. This will **account for all the different phone models** i took a looked at.



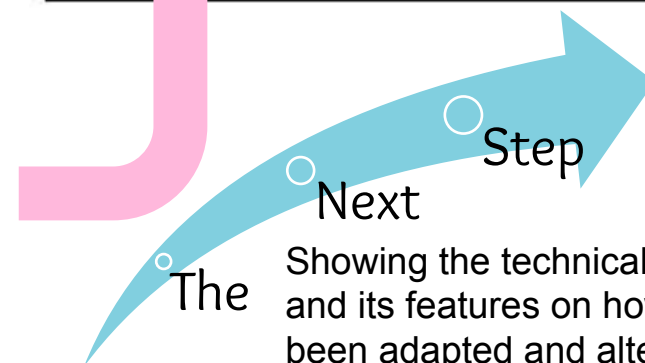
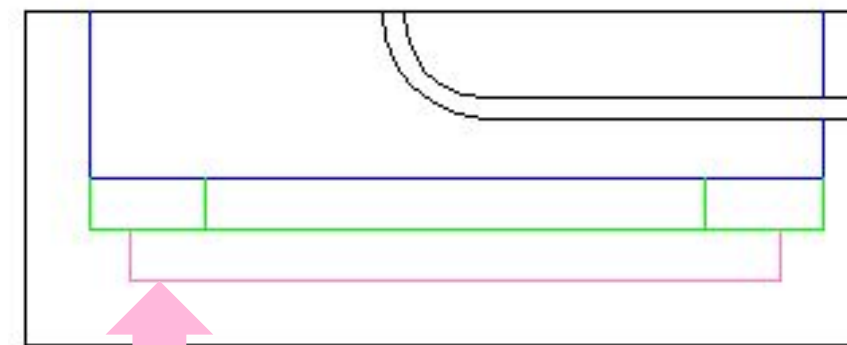
Due to me adding a foam layer to line the inside of the pockets where the wireless charger is it will **add an extra 2mm**. This means that the depth for the wireless charger needs to be **offset** by 2mm. As it has a depth of 6.2mm it means that a perfect 6mm will fit it.



Unfortunately the cable is built into the wireless charger and is **1m long**. The port **cannot lose connection** as it is **built in**. But this means that i **cannot exchange the wire** for a shorter one. To counteract this, i created a pocket where the wire can be **bunched up and stored**. The pocket will be covered along with the routing for the cable to hide both of them.

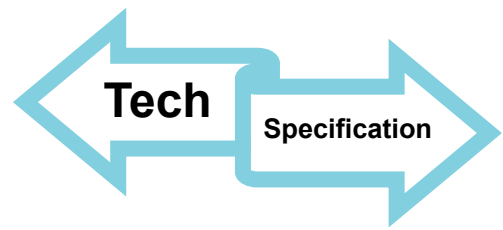
-The green layer is used to **indent** the wireless charger to **sit flush** against the bottom plane. The layer extends beyond each side this **fits for the camera** to be able to sit there comfortably.

-The pink is the **deeper layer**. This is for the cable to be **routed and stored**. A piece of foam can be used to cover the wire to hide it.



Showing the technical drawing and its features on how they have been adapted and altered.

Planning for making the final prototype

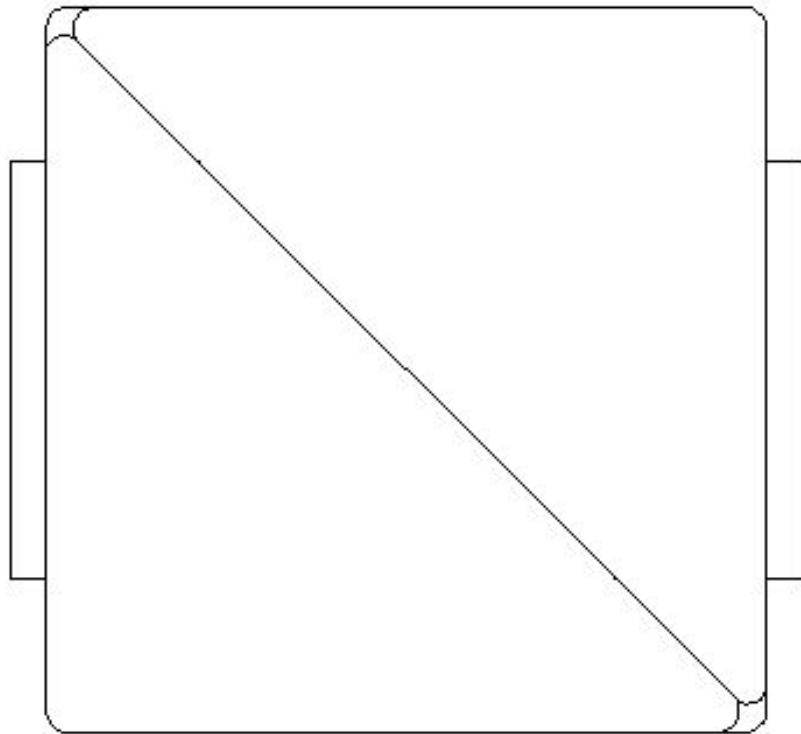
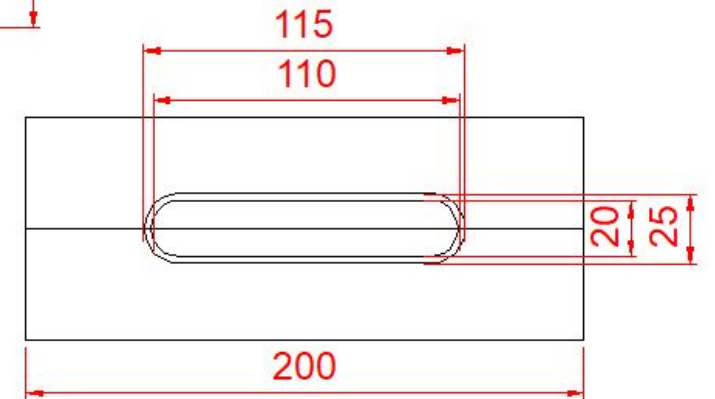
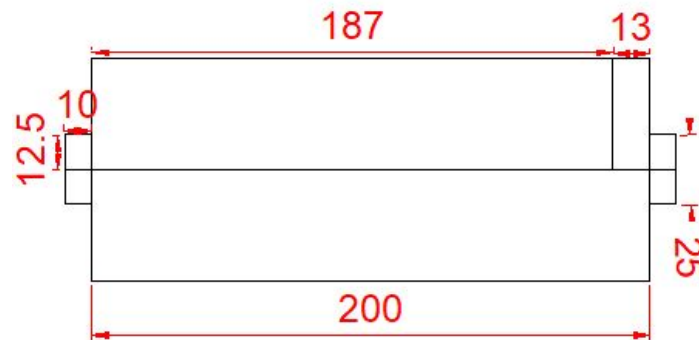
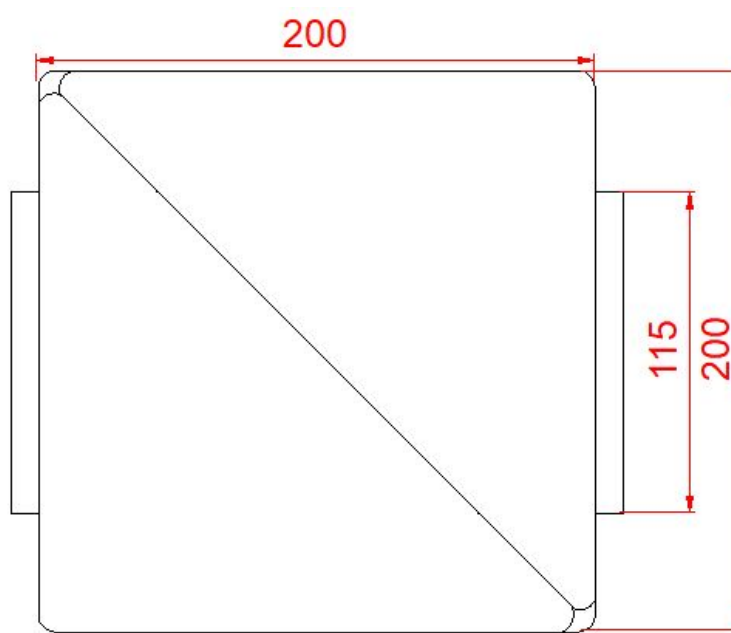


Closed drawing

SV

My technical drawing is made up of various sections an open one and a shut one. The drawings are of the product shut and open.

The first slide is to show how the product would look closed. The open one also shows inside diameters as well as depths all highlighted in different colours to ensure its the most visible



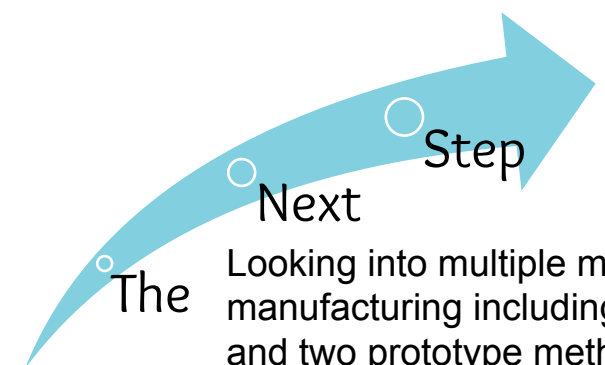
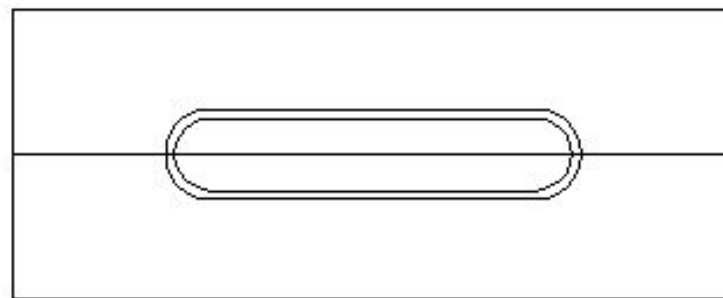
-Red lines are all for dimensions and any dotted red lines are to show what dimensions lead to.



-Green is the deeper depth cut out for the wireless charger and its cable routing (Which is

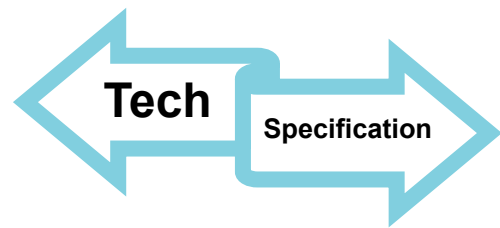


-Blue lines are to represent the depth of the pocket cuts (the main cuts)

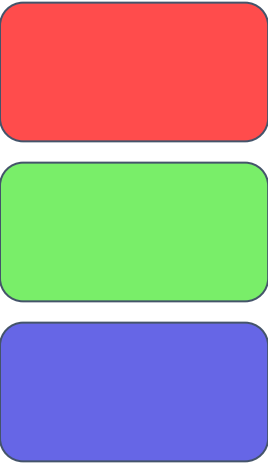


Looking into multiple methods of manufacturing including industrial and two prototype methods.

Planning for making the final prototype

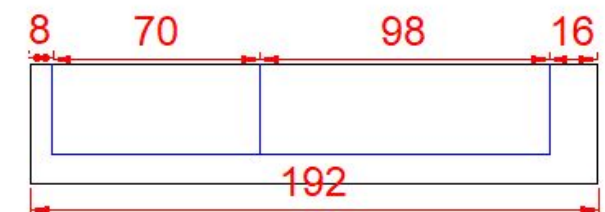
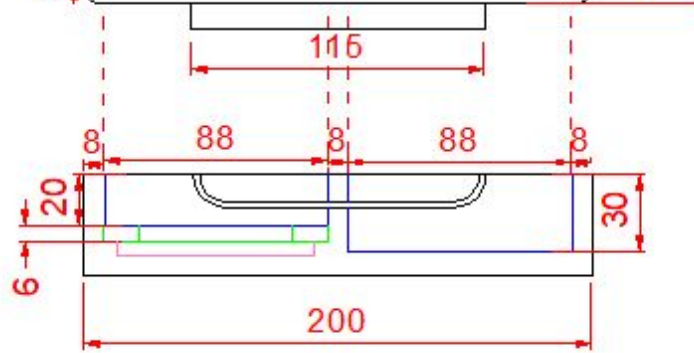
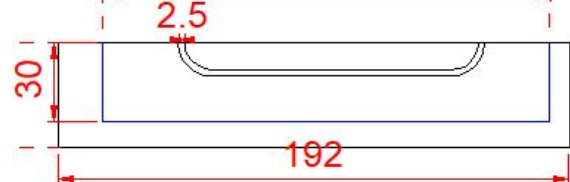
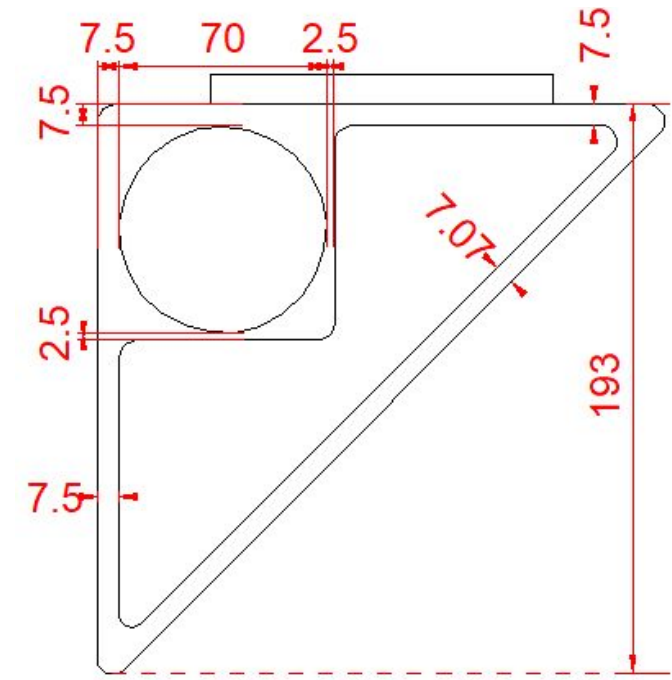
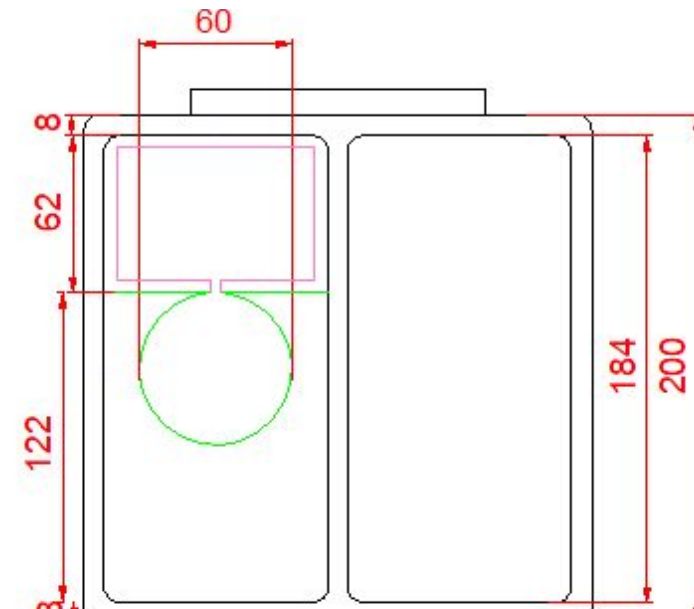
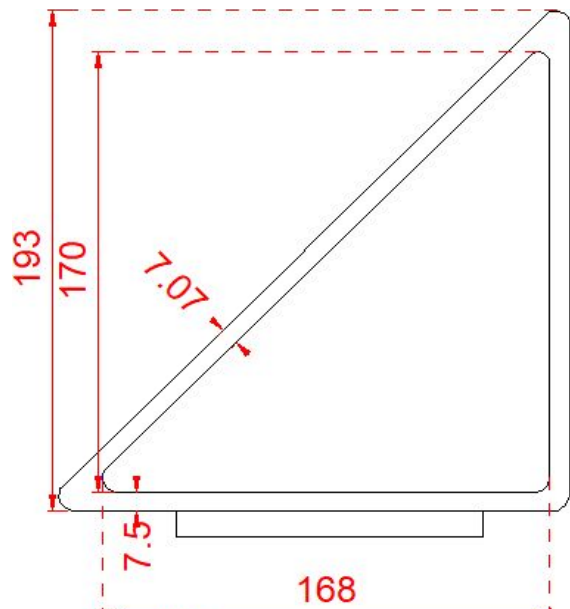
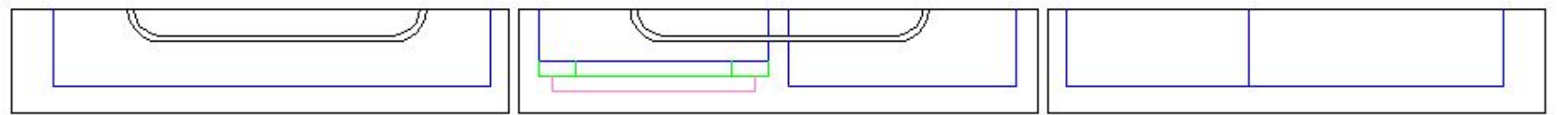
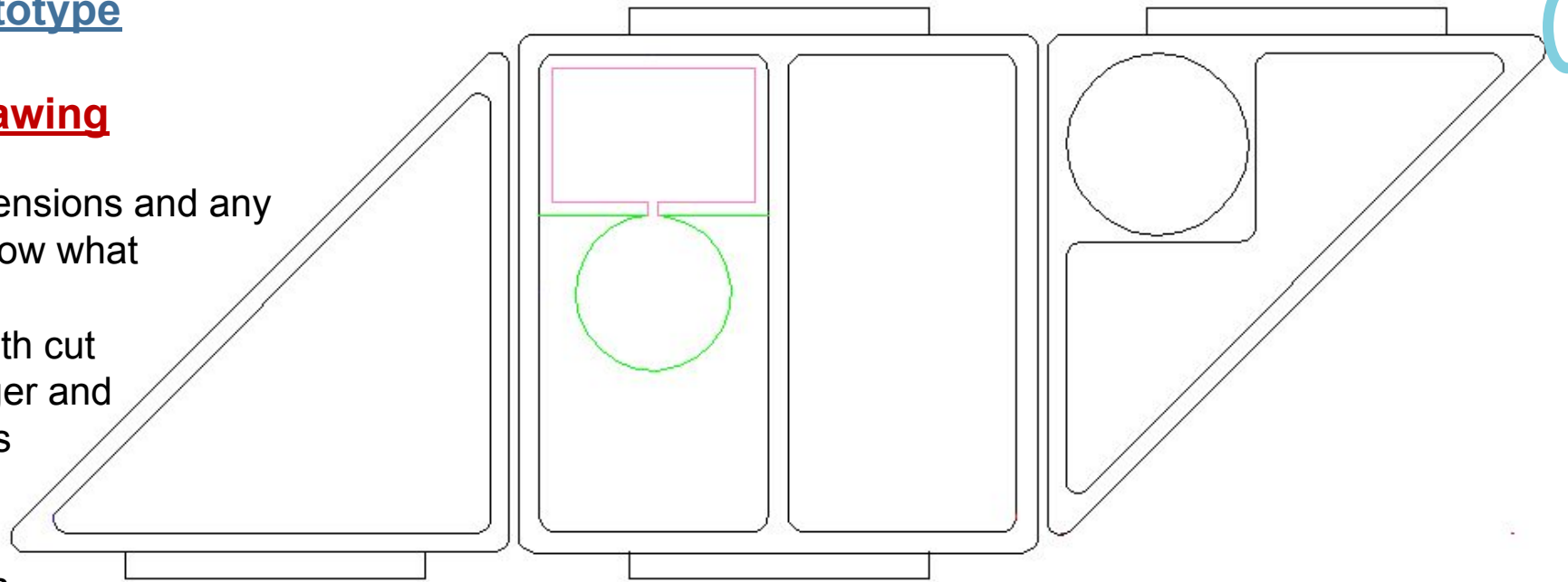


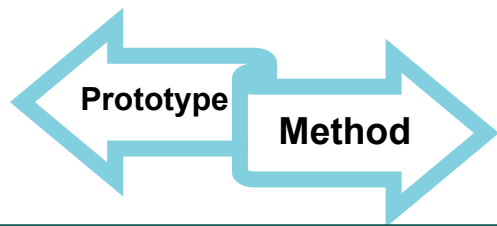
Open drawing



- Red lines are all for dimensions and any dotted red lines are to show what dimensions lead to.
- Green is the deeper depth cut out for the wireless charger and its cable routing (Which is
- Blue lines are to represent the depth of the pocket cuts (the main cuts)

SV





Plan one

Planning for making the final prototype

SV

Looking into a method of how to manufacture a single prototype using equipment and resources available to me at school.

Step 1

Make the final design on 2D Design. Using the technical drawing with already made scale drawings. Make sure to take out any unnecessary parts. Tweak if necessary

Step 2

Using a laser cutter, make a prototype out of card to ensure the dimensions are as required and i am happy with it.
Am i content with the dimensions?

If not

Step 3

Using an external software, called Boxford import the file and fill the areas that should be cut then select options to pick the desired depth of the cut. Ensure to cut out an area for the wireless charger and route path for the cable to exit out by the power bank.

Step 4

Preview the animation to ensure that all the settings selected are as expected and press to cut on the 3d router. Are the depths and colours for the cutting correct?

If not

Step 5

Insert wireless charger and cable routing it to the power bank slot. place a thin layer of mdf over the the wireless charger and ensure it charges. Glue the mdf in place using pva glue and leave to dry.

Step 6

using a 4mm drill bit on a pillar drill, slightly drill shallow holes for the magnets to be inserted. Glue them in to secure them. Ensure to align them so that they line up when shutting. Before gluing the magnets ensure polarities match

so that the box shuts fully use araldite to glue them. set.

Step 7

To create my fabric hinges i needed to ensure everything was straight and well aligned so that when sitting everything was smooth and fit well. Do this by using a tri square to ensure a precisely flat surface Apply pva glue to the cut strips of fabric and leave to set.

Step 8

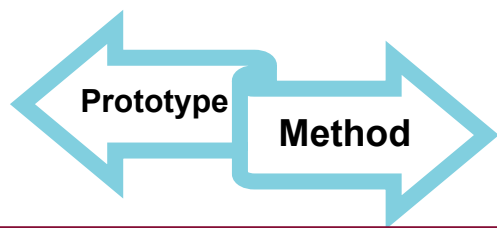
Using the laser, cut plywood handles from my technical drawing and pva glue them together section by section gluing only two layers at a time to create a strong straight bond using weights to ensure all of the area is in contact.

Step 9

Drill small holes to imbed the magnets in the product securing them with

Step 10

spray paint the whole box with primer initially then with the actual paint letting it dry for a said time (over 24 hrs) between sprays.



Plan Two (Revised plan)

Planning for making the final prototype

SV

Looking into an alternative method of how to manufacture a single prototype using equipment and resources available to me at school.

Step 1

Make the final design on 2D Design. Using the technical drawing with already made scale drawings. Make sure to take out any unnecessary parts. Duplicate sections to stack to required height. Tweak if necessary

Using a laser cutter, make a prototype out of card to ensure the dimensions are as required and i am happy with it. Am i content with the dimensions?

If not

Step 3

Compress all the files onto one sheet of 600x600mm laser ply (maximum size for the laser cutter at school) to minimise wastage.

Step 4

Cut out the files and remove any unwanted pieces and align and stack the layers to the wanted height to visually check if it all aligns, there are no missing pieces and everything is accounted for

If not

Step 5

Using a acrylic sheet and pva glue and a roller, roll some glue onto the sheet. Rub the layer over the glue to coat and cover it. Stick it to the first layer. Ensure all INNER edges are aligned. Repeat the process till all sections are glued putting it under a weight between

Step 6

After all sections are dry, sand the edges to ensure they are mostly flat and smooth. Re-round the edges by using sandpaper to ensure they are curved. Using a hand router and while wearing glasses apron and a mask to protect yourself, route a curve into the outside bottom of each of the pieces to create a smooth rounded edge.

Step 7

Using wood filler and scraper, cover all the sides in wood filler to fill any holes and gaps. Sand the edges to ensure they are all smooth.

Am i happy all holes are filled?

If not

Step 8

Glue fabric hinges by aligning surfaces using flat edges to ensure the sides will sit flat when shut. Cut the fabric hinges to size using fabric scissors and coat them in pva glue. Pillar drill holes for magnets using a 4mm drill bit. Ensure to align the holes and polarities of the magnet

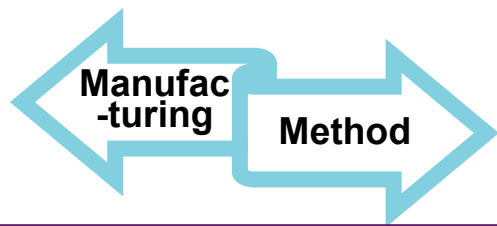
Step 9

Using the same wood filler as before ensure to cover the magnets to hide them. Cover inside bottom surface with masking tape and spray paint the box.

Am i pleased with the amount of paint and how it looks? If not

Step 10

Remove the masking tape and using hot glue stick wireless charger. Route the cable round and through to the wireless charger, glue it in place then stick foam over it to hide it completely.



Industrial Plan

Planning for making the final prototype

SV

Looking into a method of how to manufacture multiple products using manufacturing and industrial processes and machinery.

Step 1

Only needed to be done once:
Using another manufacturing company, create a mould for the product that is suitable for injection moulding out of steel. This can be done in three sections for the two triangles and the main square.

Step 2

Using polypropylene and an injection moulder heat the granules and inject them into the mould. The square mould should be created to have a space for the wireless charger.

Step 3

Using a standard premade wireless charger and a cable, place the wireless charger in its place and route the cable to the power bank slot. Using a flat thin piece of acrylic, stick the acrylic over the wireless charger to hold it in place using acrylic glue.

Step 4

Using a premade hinge similar to a laptop one, place the hinge in a premade slot on both pieces and use premade small screws to fix the hinges in place. This would create a flush hinge that would function smoothly

Step 5

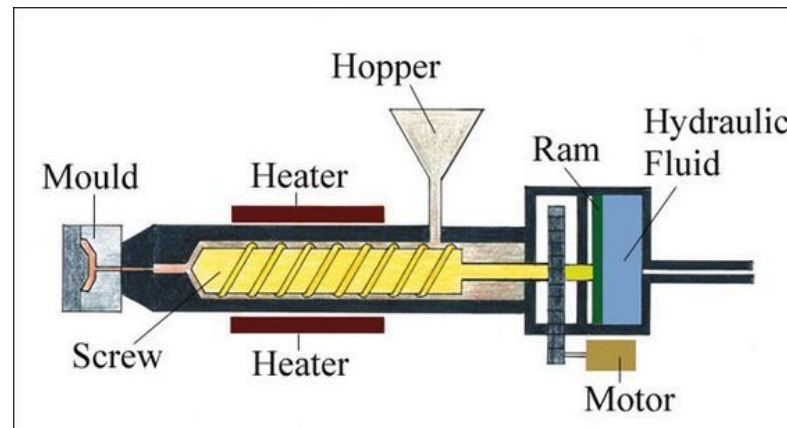
Embed the magnets into the moulded pieces using acrylic glue to keep them in place. Glue the rubber feet in place in the embedded slots using the same acrylic glue.

Step 6

Using fabric cut to size, stitch the velcro to the fabric on designated sections. Attach the other side of the velcro to the base using the acrylic glue.

Step 7

Using a precision laser cutter, cut foam pieces to precisely fit inside the product. Stitch elastic pieces to connect to the foam for attaching items to keep them secure. Add



The Next Step

Doing a risk assessment and looking into multiple safety precautions to be taken into account while manufacturing



Assessing all the risks and health and safety to do with the making of the prototype and industrial product as well as looking at user considerations

Prototype:

-**Extraction** when using the laser cutter to ensure any fumes from the card are extracted out of the room and to **not affect the user**. Ensure to **not look directly at the laser beam** as it is extremely bright and can **damage eyes**.

-**Extraction** of the **sawdust** from the 3d router ensuring there is not much sawdust in the air as that could **affect the lungs and eyes**.

-Being in a **well ventilated** room when working with any **glue** to ensure not many **fumes are inhaled**. Wear an **apron to protect clothes**.

-When using a **pillar drill** to create the little embedding for magnets, ensure to wear an apron for **no clothes to catch** into the drill and use **safety goggles** to **protect the eyes** from any sawdust and things that may fly out.

-Use a **face mask** (ideally a respirated one) and a **well ventilated room/area** to ensure i am fully protected from the fumes.



Industrial:

-**injection moulding** produces many **toxic fumes** which will need to be **extracted** out to ensure that there it is **not inhaled**.

-when using any **glue** including acrylic glue ensure **good ventilation** to protect from any **toxic fumes**.

-when using **scissors**, careful cutting as they can be very **sharp and harmful** if used incorrectly

-when using a **sewing machine** to sew the velcro, ensure that **fingers are kept away** from the needle to ensure no accidents occur.

-To help protect from all **hazards and injuries**, employees working on the product should be **trained** to use equipment and resources and any **dangers surrounding them**. This would help reduce injuries. Also simple **first aid** training could be used which would reduce significant injuries.

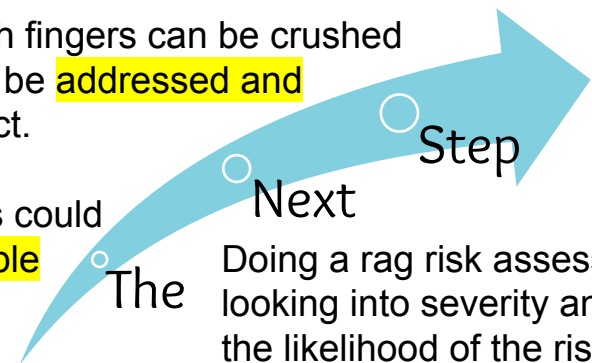
Users:

-When used by or around young children, **small parts** can be an issue. I need to ensure any pieces are **stuck on well** and will not come off easily

- Any **sharp corners or edges** need to be sanded/removed to ensure all pieces are **smooth and harmless** adding to the ergonomics of the product.

-**Crush points**- considering points at which fingers can be crushed when closing the product. These need to be **addressed and warned** about in the release of the product.

-**Stability** of the product when in use. This could be an issue if the product tips or is **unstable** as items could fall out.



Doing a rag risk assessment looking into severity and scale for the likelihood of the risk actually taking place and the severity.



Ranking and rating the risks on a Red Amber Green (RAG) scale for the likelihood of the risk actually taking place and the severity of the damage the risk will induce if it were to occur.

<u>Risk</u>	<u>Likelihood of it happening</u>	<u>Severity of the risk if it does occur</u>
Fumes from laser not well ventilated	Low	Medium
Sawdust in the air	Low	Medium
Glue fumes	Medium	Medium
Pillar drill injury	Low	High
Spray paint fumes	Medium	Medium
Injection moulding fumes	Low	Medium
scissors	Low	Low
Sewing machine	Low	Low
Small parts	Medium	High
Crush points	High	Low



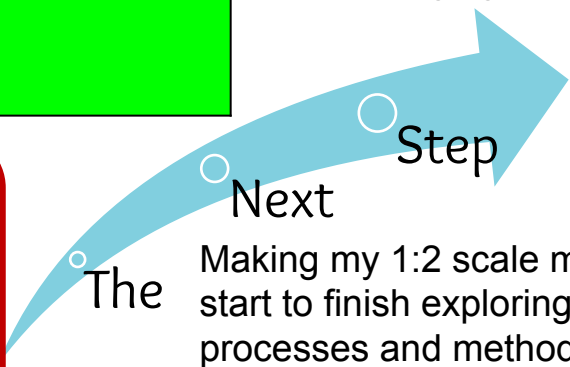
Low - unlikely to happen as long as correct precautions are taken. Injuries would be minor.

Medium - more likely to happen however not often. Injuries could be more significant.

High - extremely likely to happen. Injuries would be significantly damaging and life changing

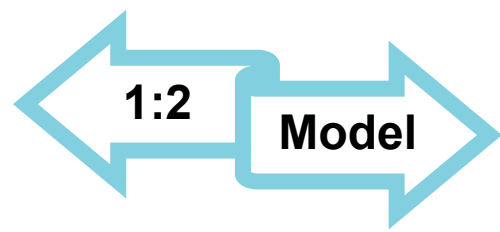
Conclusion - Things to take away

- most are unlikely to happen as long as correct precautions are taken to prevent them
- Those with high severity are key ones to focus on as they are most damaging
- small parts need to be made secure and a warning is required for choking hazard for young kids
- pillar drill has a low likelihood however high severity as long as correct precautions are taken risk can be minimised

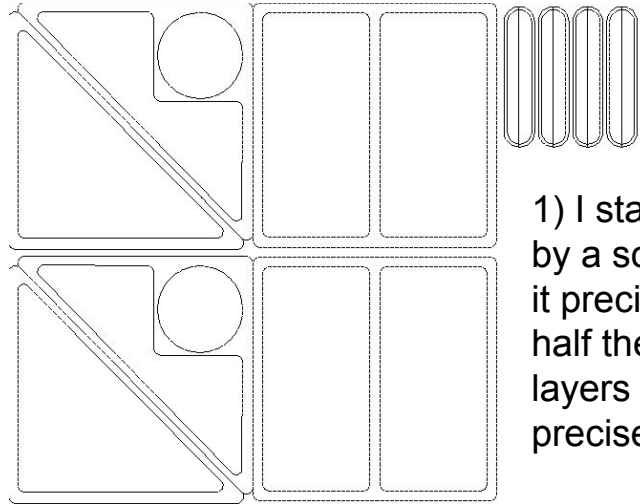


Next

Making my 1:2 scale model from start to finish exploring different processes and methods used.

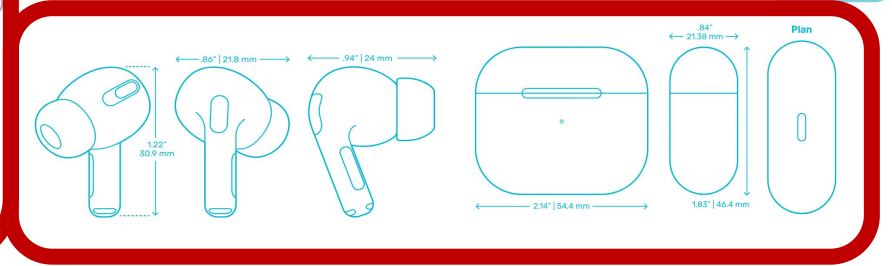
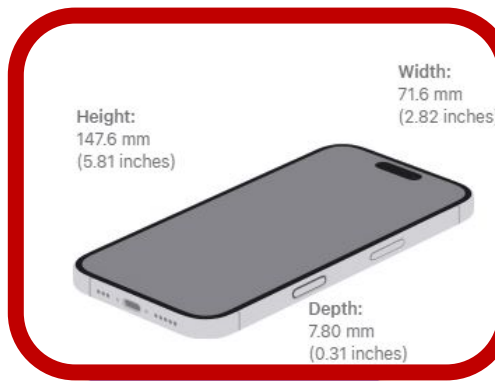


Planning for making the final prototype

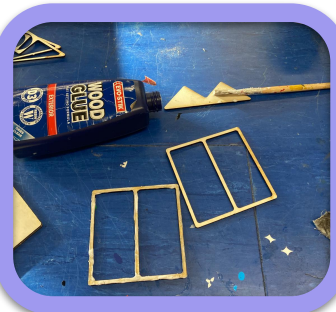


My process of making for my mini 1:2 scale model

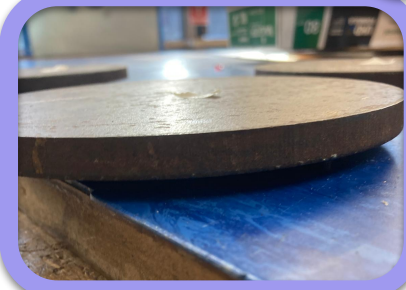
1) I started by scaling my technical drawing by a scale of two. This allowed me to have it precisely as i was going to make it but half the size. I duplicated parts to make it in layers and used a laser cutter to cut precisely all the pieces.



5) To demonstrate test my model i decided to create 1:2 scale items of a phone, airpods and a power bank. I did this by looking up measurements of an iphone 16 and airpods and scaling the products down. I used the laser cutter to etch and cut out the shapes. I used actual products to measure things such as curve diameters.



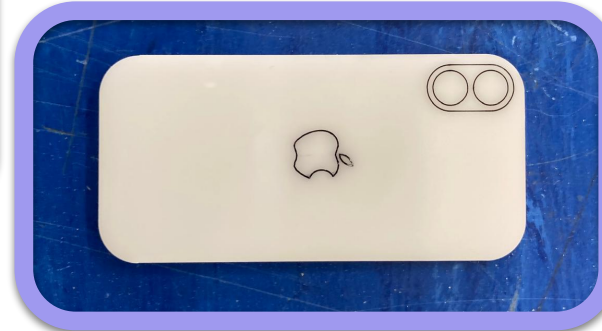
2) I used pva glue to combine layer one by one to one another and letting them set under a weight for around 20 minutes. I repeated this process multiple times to combine all the necessary layers.



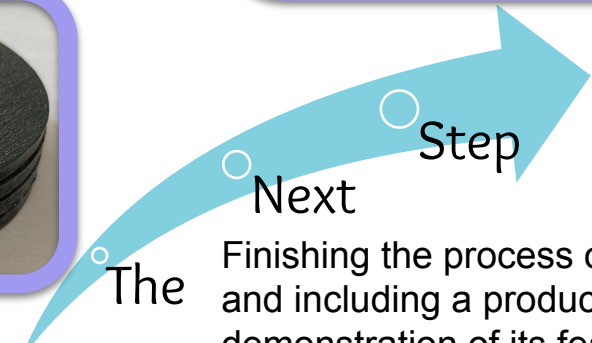
6) As it was etched onto white acrylic, the details were not clearly visible. To solve this i used a permanent marker to scribble over the engraved area. This highlighted the whole area. I used a polisher wheel to polish off the area to remove the marker from everywhere and due to the marker getting into the cracks, It wasn't affected by the polisher wheel leaving just the engraved parts permanently marked.



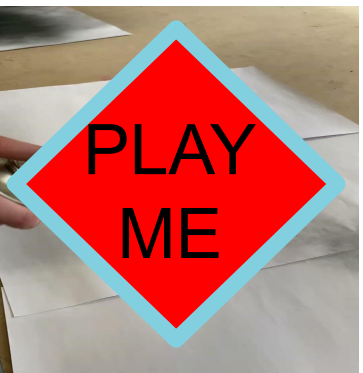
3) By cutting thin bits of fabric for the hinges, i was able to glue and let set for over 24 hrs the same pva glue. This allowed me to apply the hinge on the inside of the product to hide them when closed.



4) Because i have never used spray paint, i practiced using it on one of my older plywood models. This gave me a sense of how the paint would look as well as how long it would take to dry and look complete. After the tests i began to spray paint my actual model in with the same process and paint. I applied a few layers of the paint to my product waiting for the whole product to fully dry before reapplying. I ensured all edges in and out were covered by an even coat.



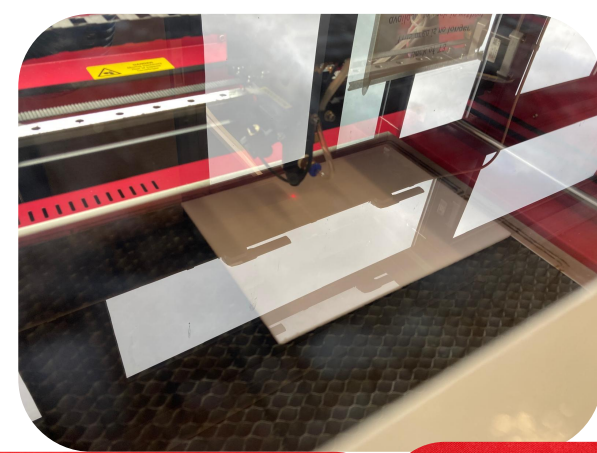
Finishing the process of making and including a product demonstration of its features.



Planning for making the final prototype



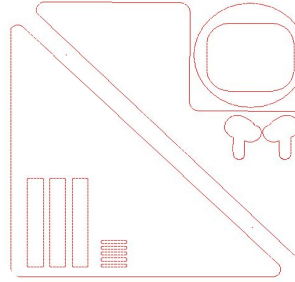
Finishing my process of making for my mini 1:2 scale model and display



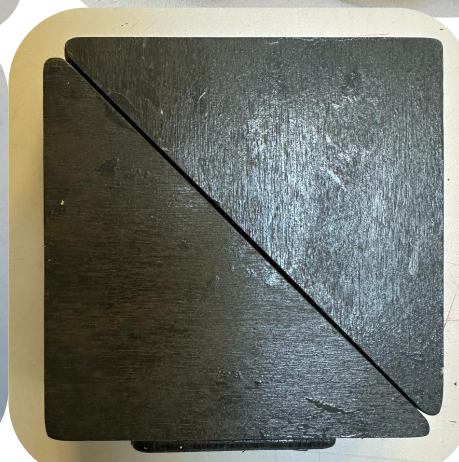
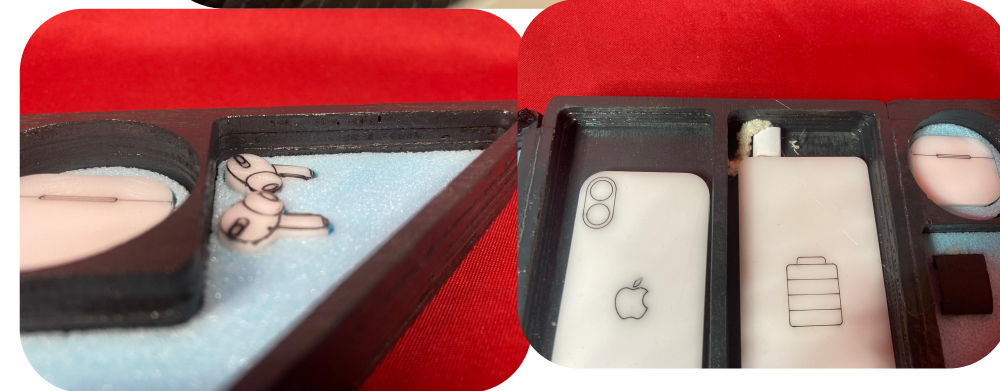
SV

7) I tried out by creating and sticking with velcro a piece of fabric on top of one of the triangle. The issue i had is that the fabric ruined the sleek aesthetic of the product. It functions well and would work even better with more velcro however i did not like the material it was made of. This can be changed in the actual product

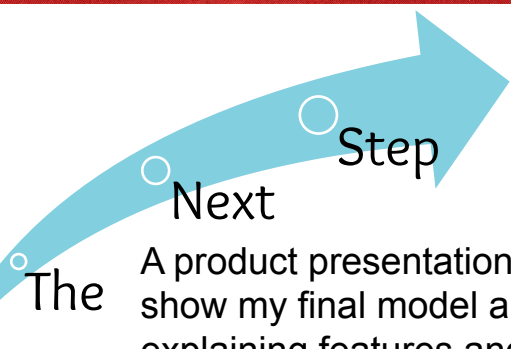
8) Using the same 1:2 cad, i combined it with the already existing cad from the device cutouts. This created identical size pieces that would perfectly slot in. This would create a flush tight finish for the items to stay in place when shut. I added different pieces as a placeholder for items such as usb devices and cables.



1:2 scale model presentation

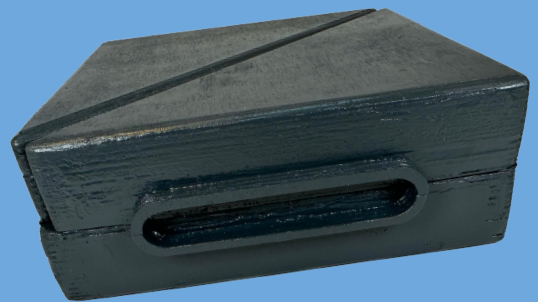


-All photos and diagrams are now mine unless otherwise indicated with a red ring as done previously

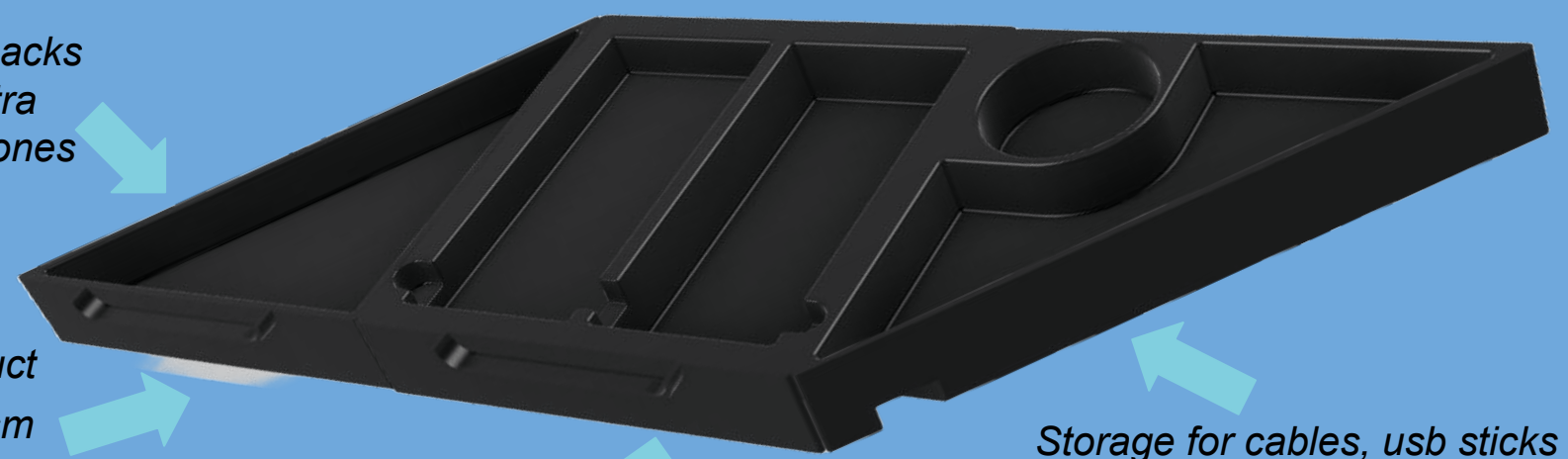


Travel Buddy

Travel buddy is a sleek new product to help maximise comfort while travelling putting user minds at ease while on the go



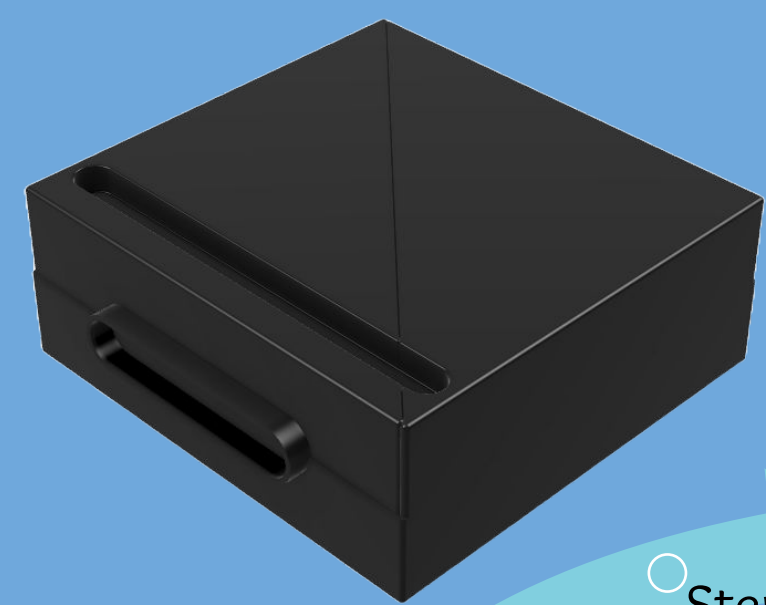
Slot for cups and snacks also acting as extra storage for headphones and more



Handles to pick up and open the product with a sleek magnetic closing mechanism

Storage for cables, usb sticks and any other items.

Wireless charger and power bank slot with an inbuilt cable to connect it



The Next Step
Jumping into my process of making for my actual prototype using and developing methods from making the model

Making Process

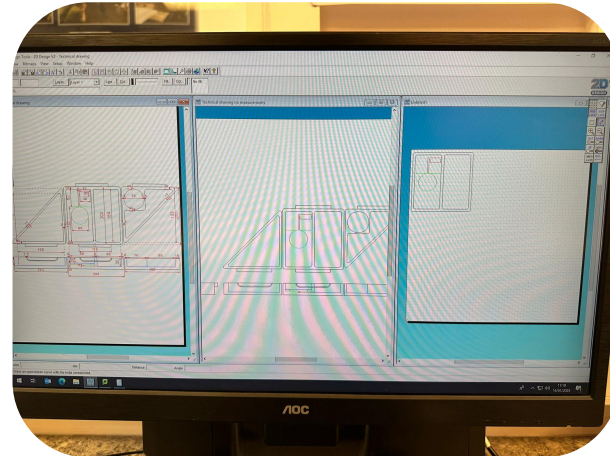
Due to unforeseen circumstances i had issue getting my frame 3d routed and was not sure if this was going to be a possibility so began making with my alternative method



Problem One

The cable length is the first problem. The box that i created was unfortunately way too small.

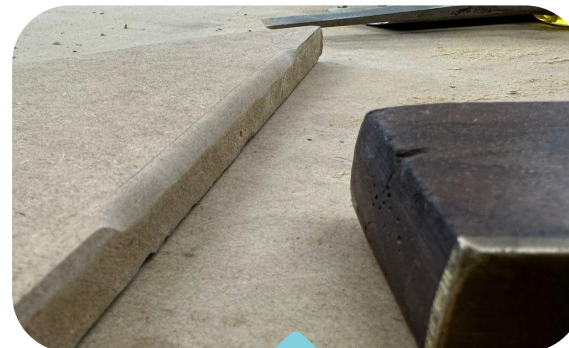
4) To solve this i cut the box wider and created another layer underneath with the same box so now instead of one layer it is now two layers deep



1) I started by doing a quick test on the laser cutter. As my piece would require many 3mm layers stacked i tried short cut it by testing if 6mm would work but unfortunately it didn't cut through

2) Using my cad model from the technical drawing i used it and placed it onto 600x600 plywood sheet which is the maximum size for the laser cutter.

3) After creating all the files ready to be laser cut, I got the laser ply cut and placed it in the cutter after 75 mins all the layers where ready.



5) By applying pva glue to an acrylic sheet and rolling it out with a paint roller i was able to place the cut out sheets into the glue and move it around. This was a quick easy way to evenly spread the glue. I then put the weight on top before repeating.

6) I got my teacher to use the table saw to straighten the edges. This was necessary due to the inconsistent edges as it is not as precise as the 3d routing that would have happened.

7) Before gluing on the hinges i decided to router the edges to create a curve. Before doing it on the actual product i tested it on a test piece to ensure i was happy with the curve diameter. I then successfully routed the edges while wearing full ppe.

8) A flat piece of wood is what i aligned with the edges of the product to ensure a flat edge was aligned. I doused the fabric in glue and added glue to the product. I then placed the fabric and lft it to dry.

9) Using wood filler mixed with a hardener i scraped it along the edges with a flat scraper to fill any grooves and inconsistencies.

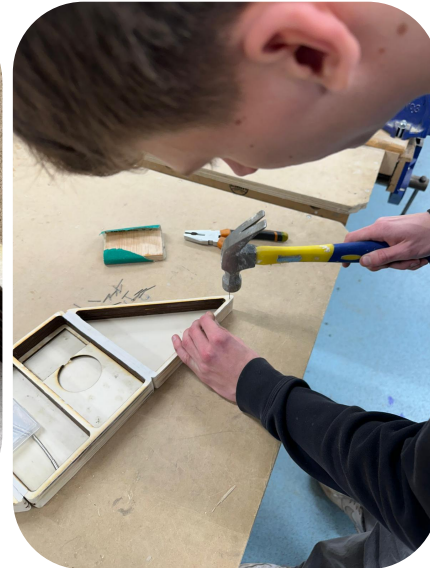
The Next Step

Continuing with the process of making adapting to any problems that may occur and getting feedback on features when needed

Due to unforeseen circumstances i had issue getting my frame 3d routed and was not sure if this was going to be a possibility so began making with my alternative method

! Problem Two

I started sanding the edges to try and smooth the newly added wood filler. I quickly got worried about the hinge as it ever so slightly protruded and after checking i noticed it created a slit in the hinge.



11) Using a hammer and some veneer pins, i nailed the pins and clipped them using pliers. I then shut the edge and pressed them to create an indent aligned with the other side. I now knew where to drill holes

10) I had to fix this by using a chisel to remove the hinge and repeating the same process as before to glue a new one on

Small group test to determine if magnet strength is good

12) I found the 4mm drill bit and attached it to the pillar drill which i used to drill a indent for the magnet.

13) After completion i used a polariser to align the polarity of the magnet and inserted one of the magnets in one side and the opposite in the other.

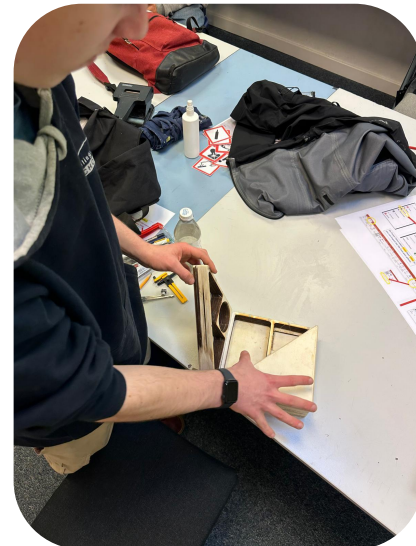


Dylan: "Good strength. Comfortable to open."

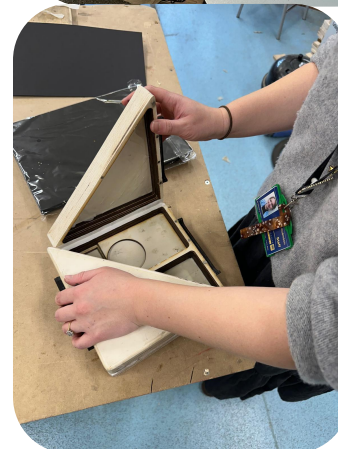


Lucas: "Nice, perfect to open. Easy to use."

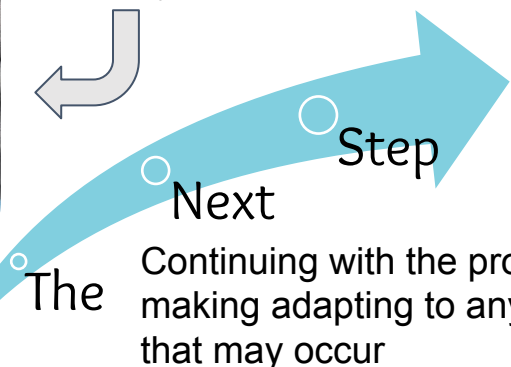
Ben: "ergonomically comfortable, ideal."



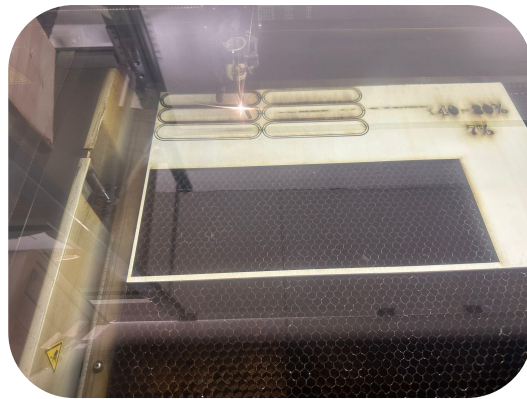
Elliot: "Not too difficult to open and makes it secure. Sleek closing mechanism which is hidden."



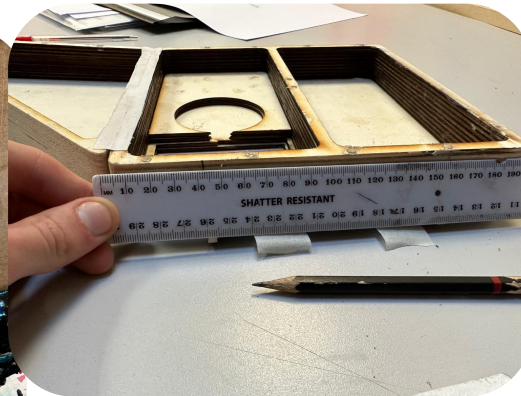
Miss Robinson: "smooth, clasps well and easy to open."



Due to unforeseen circumstances i had issue getting my frame 3d routed and was not sure if this was going to be a possibility so began making with my alternative method



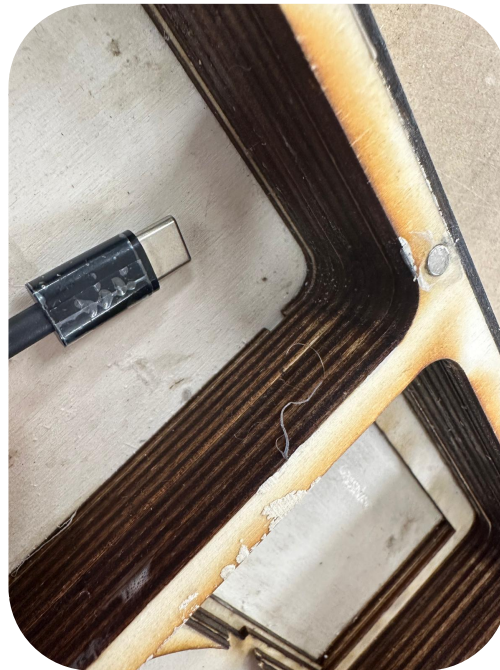
Problem Three
When laser cutting the handles out, i realised they were far too thin and would be difficult to glue and easily snap.



14) To solve this i simply made the inner diameter of the loop smaller. This increased the surface area and therefore it had more strength and was easier to glue together

15) i glued the pieces together and taped them to keep them together.

16) i marked out using a pencil and ruler the lengths to centre the handles i shut the product and extended the marks to the other side to ensure handles would align when shut



Problem Four
As i didn't intend to have this as my final product, i did not execute the idea of putting the cable from the wireless charger in while gluing this meant i couldn't get the wire through and needed to make it wider



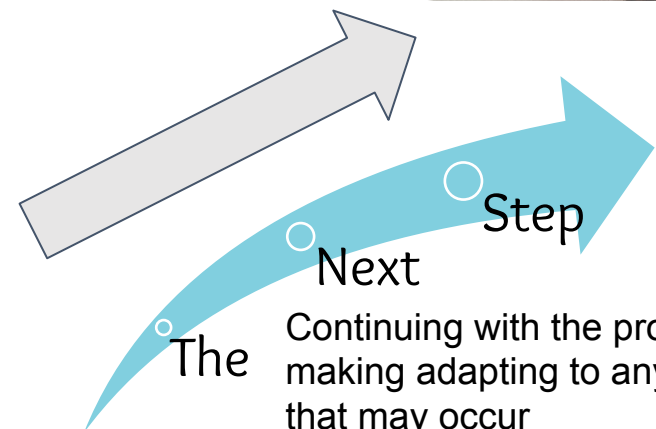
17) i applied the glue to the handles and placed the tape over to secure them and let them dry. At the same time i glued the hinge back in place.

18) Counteracting problem four: i used the blade of a coping saw and two pliers to hold the blade. I unfortunately ran into another problem.

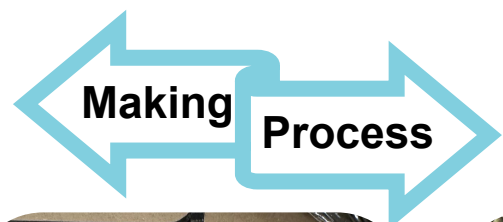
Problem Five
The blade had two prongs on either end and was too tight to wiggle through the hole



19) i used a drill to start the hole for the wire off. This made the very fiddly process a little easier. I eventually managed to wiggle enough space for the wire to pass through.



Continuing with the process of making adapting to any problems that may occur



Due to unforeseen circumstances i had issue getting my frame 3d routed and was not sure if this was going to be a possibility so began making with my alternative method



20) using the same files i used to cut out the layers i cut out foam for all the sections and a plastic layer to cover the wire

21) i used a rough estimate of usb sticks to create a general size that would hopefully fit most usb sticks.

22) i cut out holders for the usb using the scrap left overs from the other layers. I cut out for and did a mini test to see what holds the usb most secure while still being easy to access

23) i taped up the inside layers and also put blue tack on the magnets to protect them from the paint



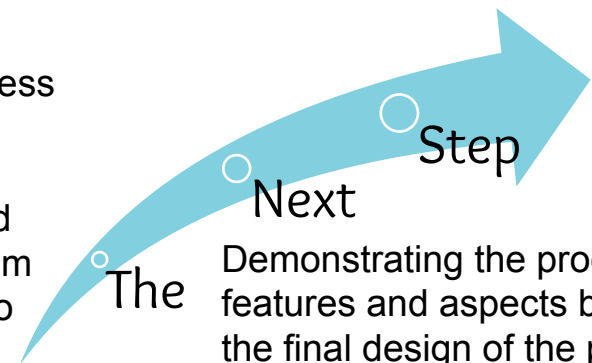
24) I began to spray paint the product applying layers, waiting for them to dry then sanding them with wet paper (p400). I then applied another coat and again waited for it to dry before repositioning the product and repeating the process.



Problem Six

The glue wouldn't stick to the rear surface of the wireless charger.

25) I started trying to glue the wireless charger but ran into problem six. I used a different glue to secure it. I used hot glue to wind the cable and secure it. I then glued the other foam pieces together and stuck them into the product.

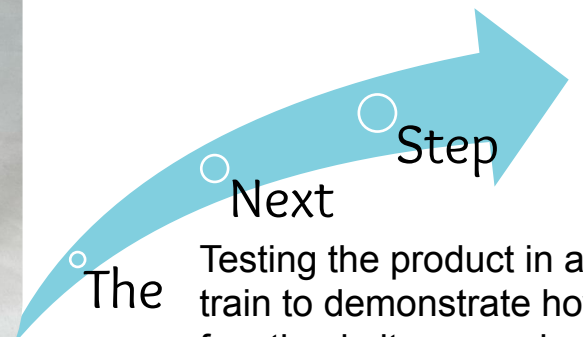
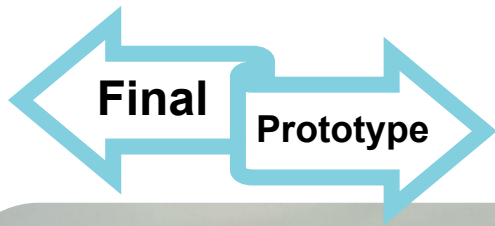


Demonstrating the products features and aspects by showing the final design of the product

Final prototype presentation page in different scenarios

Analysis and evaluation of primary sources

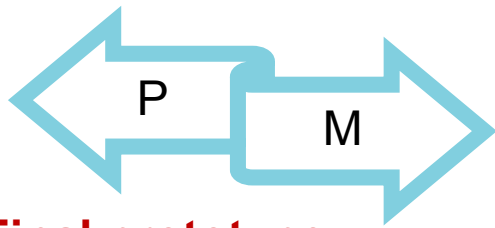
SV



Testing the product in a car and a train to demonstrate how it would function in its scenario.

Analysis and evaluation of primary sources

Car

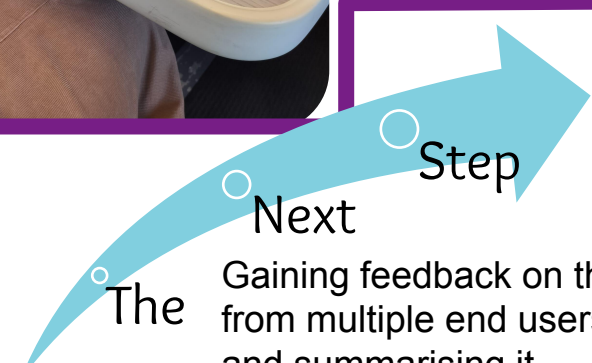


Final prototype presentation page in a car and on a train



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The Next Step
Gaining feedback on the product from multiple end users reviewing and summarising it.

Analysis and evaluation of primary sources

SV



Collecting end user feedback including likes and dislikes and things i could improve.

Stanislav's feedback (video summary)

Likes:

- Consistently delivered, nice shape, rounded edges and overall ergonomic and practical look.
- Well packed into small practical solution for things needed when travelling. Covers everything he would need on the go
- Sturdy handles and elastic allowing items to stay secure
- Size of the product being able to incorporate everything he travels with.
- Really likes wireless charger and its magsafe feature keeping the phone secure and doesn't fall out

- Size is practical
- Can put in bag with no issues
- Perfect size for aeroplane table with no worry of the items falling out or sliding off

Dislikes:

- Finish of the prototype
- Height of the product but understands its necessary for the chargers
- Length of the product (how much it spans out)

Things I could improve:

- Make out of plastic for an overall improved finish
- Slimming down the size of the product by using a plastic mould
- Have grip material at the bottom so the actual product doesn't slide around

My response to the feedback:

- The finish for the prototype is going to change when i create the actual product. This would solve most of issues with the prototype finish.
- There are possibilities of reducing the size of the products that i can explore in the next few slides. I could try place the powerbank under the wireless for example to reduce the size.

Vicky's Feedback

If it is a real pleasure to see the result of your hard work. Though it is just a prototype it is a very impressive travel item to have.

I am not a frequent traveller but whenever I go abroad I always feel nervous to take everything I need. Your phone nowadays seems to be a very important thing to have while you are travelling.

The product that you designed comes very handy here: you just fit in all the compartments and enjoy the flight or train travel.

I like the ergonomic design, safe magnetic compartment, which will hold the phone in place during turbulence. No need to stay close to the charging station, as you have your power bank packed in case your battery is running low. Things do slide on the plane or train table but they stay in place in the Travel Body.

The size seems too big at first sight but you have all you need in one place and don't need to worry to remember which pocket you put it in.

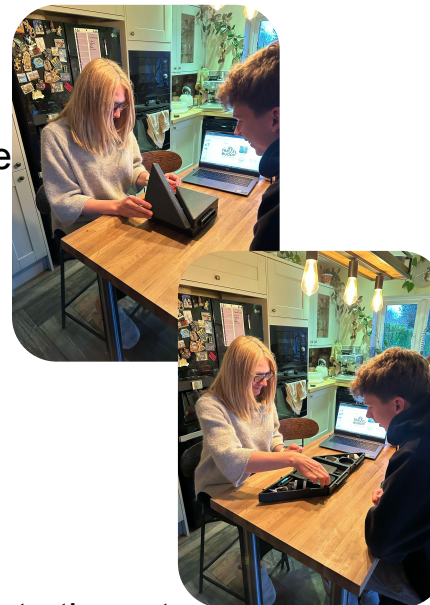
I understand that this is a prototype but I would prefer to have something smoother to hold. Think about a different finish and brighter colours inside.

I like the way it opens and the handles but would prefer the smoother edges and possibly covered with velvet.

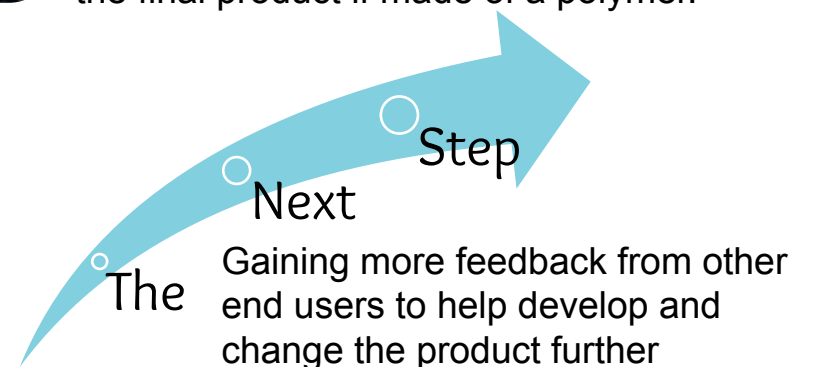
An idea to pursue: get in touch with budget airlines and offer it as their merchandise item approved to be taken on board in addition to allowed small holdall.

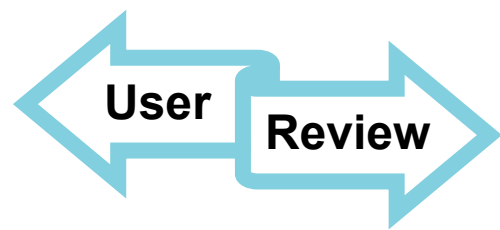
My response to the feedback:

- I love the idea of pitching the product to airlines however think it would be difficult to persuade them.
- the velvet soft inside idea is a great way to improve the aesthetic and appeal of the product. Definitely a feature to add
- By having a separate inside colour scheme it would be great for aesthetic appeal to many customers. Another great feature to add.
- A different finish would not be an issue as it would be much smoother feel and look on the final product if made of a polymer.



- I could use something like rubber feet for example that would help the product to stop slipping, By embedding them i will have the ability to make them sleek and professional like a laptop.
- By using a plastic mould it will not only solve all the other problems but also allow the product to be more sleek and space compact.





Looking at another point of view from people who have not seen the process behind it to get an external viewpoint.

Analysis and evaluation of secondary sources

SV

Louis' feedback (video summary)

Likes:

Magnetism and its strength is a nice feature with the fact that it cannot be broken making it long lasting and that they are embedded meaning they are out the way and won't fall out.
Likes the overall spacing with the elastic bands
The items are secure and won't move around anywhere and get lost
Material inside soft velvet which is much more appealing

Dislikes:

Size of the product
Too bulky

Claire's feedback (video summary)

Likes:

- Triangles shape and how they fold over
- Padding of the product

Dislikes:

- Depth of the product
- How much padding there is

My response to the feedback:

- Something to cover over the phone like a microfiber glasses cleaner to protect it from being scratched and damaged
- Less deep for the triangles so the overall height is less for making it easier for transportation
- Decrease the thickness of the padding

My response to the feedback:

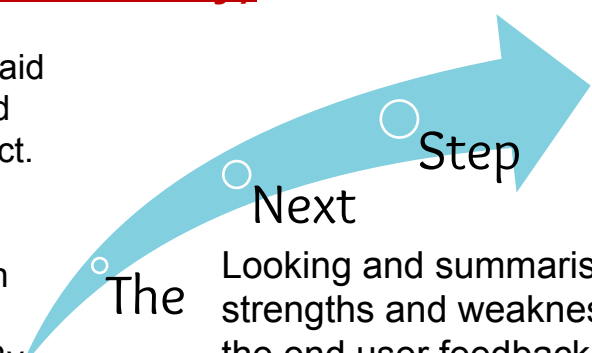
- The features mentioned will be kept especially the magnetism.
- I will address features to do with the size in a later slide coming up with a solution to be able to solve the issue. The size would take some work and design adaptation including modelling to test how well the product will work. I would have to however speed up the process to model the products.
- The elastic bands are definitely a great feature and addition but I would do more research into products sizing to try and maximise the usage and versatility if the feature

My response to the feedback:

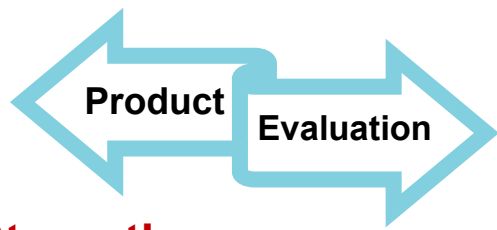
- The microfiber cloth is definitely a good idea to help protect the product. I could easily add the feature in a sleek aesthetic way. I will explore this later.
- I can decrease the padding which would either increase the space or maybe it could be an opportunity to decrease the size.
- I unfortunately am unlikely to decrease only the size of the triangles that open up. This is due to the fact that when opened they need to touch the surface it's on as otherwise it would not be stable and adding weight could damage the product.

Currys employee feedback (an external opinion in the tech industry)

I decided to get the opinion of a tech expert. Sami (a Currys employee who is familiar with many different brands and tech companies and their devices and accessories) said it was "impressive" and thought the product was well thought out. He particularly liked the opening mechanism saying it was "innovative" and a "fun" way to open the product. He was a fan of the magnet latch saying it was "modern" and "liked the snap" the product made when closing. He also brought up the fact that I primarily focused on Apple products and suggested that some items such as the Galaxy buds may not fit in the same area. **My reply:** to improve the product I would do similar research to the phone and powerbank research but look at all items such as USB sticks and cables. By using lengths and measurements I could improve the versatility of the product



Looking and summarising my strengths and weaknesses from the end user feedback and adding in my opinion.



Product reflection considering previous points including swat annalysis and needs of stakeholders from start of the project

Strengths

-Travel buddy is very versatile. It can be used to transport various items. From technology to cabling to stationary the possibilities are not limited. This allows for a variety of users with different needs to be intrigued with the product. Changes to appearance can be made easily. This means different colours and patterns allowing for a range of customers of various ages and genders.

-The product has possibilities to be used while on the go. The drinks holder and compartment next to it can both be used as storage and as snack and drinks holders.

-I managed to use a lot of the space for both storage and usable space meaning it mostly maximises the usage of the product making it mostly compact. I made it easy to take with you and have it in one place.

-Ergonomically easy and intuitive to use.

-Possibilities for customisation with brands and even my own brand could be created. Due to its large surface area marketing and branding can be incorporated on many surfaces. Colour ways and paint works could be changed for different brands.

-The incorporated wireless charger is consumer friendly being used with a variety of different models of different brands.

Weakness

-Manufacturing process of the prototype was very tedious with lots of time invested. This would differ from the industrial process which should be easier to mass produce. Processes such as sticking down the wireless charger and foam would however still need to be done by hand. This can account for human error as it probably won't be stuck perfectly which could leave gaps making it not pass an internal quality control.

-Quite large. It takes a decent bit of space in someone's bag. This is mostly an issue for those travelling with restricted luggage mostly in a plane. The space although useful might not be necessary for those travelling light.

-the power bank takes up half of the square which is a quarter of the total amount of space. This is necessary however due to its size but can be manufactured in a different place.

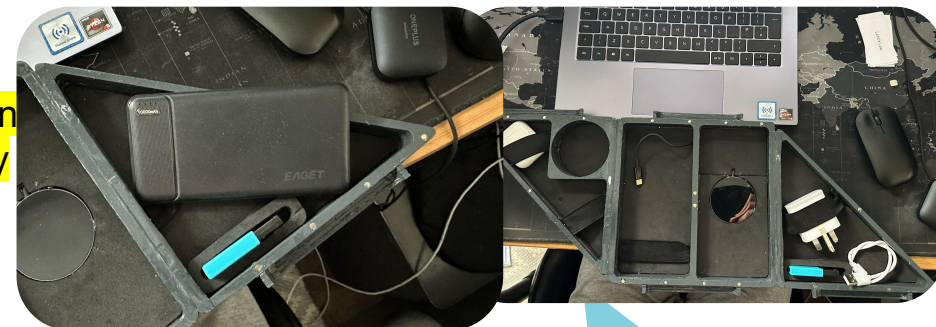
-the triangles although aesthetically appealing are not the most efficient use of space. Larger items such as power bricks that plug into the wall are too large and only fit in one place.

My thoughts and reviews on the prototype

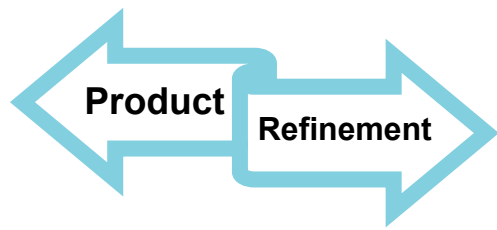
Travel buddies main goal was a balance between suitability of use while in a mode of transport and storage while on the move. The product mostly succeeded in both aspects. It functions well as a component to travel with however quite bulky making it inconvenient for those packing compact. It manages to store a variety of items quite efficiently keeping them safe and secure all together with easy access.

The triangles although aesthetically appealing aren't very space efficient. Most items are rectangular leaving little room to put them in. This is only however an issue for larger items which the main items (power bank and phone) are already accounted for. Other items such as power bricks are not necessarily needed in the compartment as they are often not needed while on the move and can be stored elsewhere in the luggage.

I think that i would keep the main idea of the item with the two triangles. The main way i would change the product is reduce its width and change the material. I have gone into depth on another page where i suggest some features to add and change weighing up their positives and negatives.



Looking for opportunities that i can improve and alter. Comparing its functionality and advantages as well as disadvantages

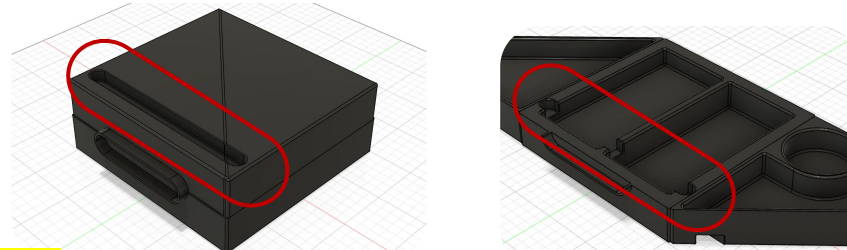


Evaluation to manage design progression

Opportunities for improvement and its adaptations for that, including responses and solving issues that end users suggested could be changed.

-I considered making **indents to hold the phone upright** for example however did not implement them. Adding more of these features could **improve the functionality** of the product during the usage aspect.

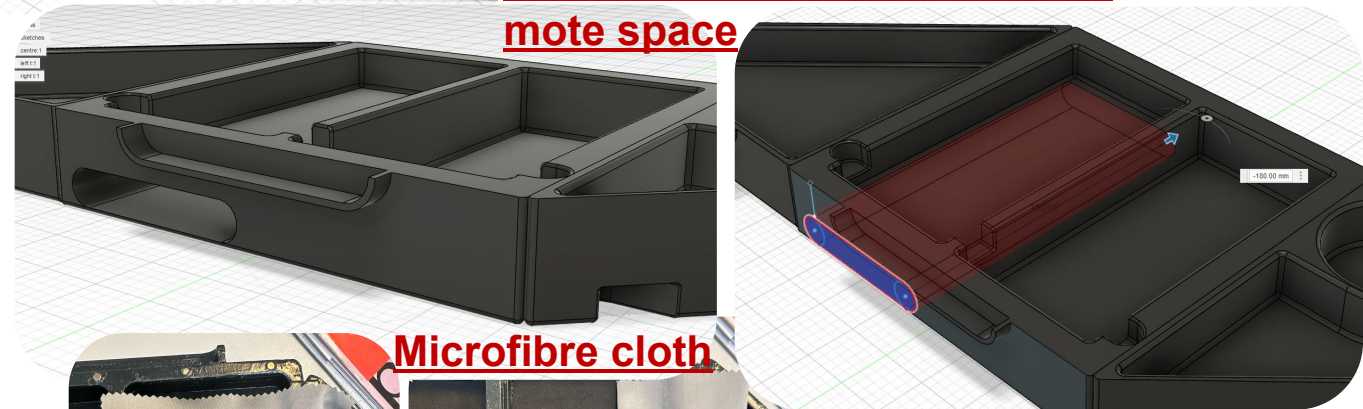
Phone slot holder on my 3d cad model



This might **slightly decrease aesthetic** but **increase extremely the practicality** of the product during inflight use. This was something i should definitely add as it will **only improve the product** and has **no down side to it**.

-I could make the **shape slightly different or remove aspects** such as the cup holder for more storage. This would however **counteract the purpose of the product** so instead rearrangements can be made. What i could do is place the **power bank below the wireless charger** and have **external access to the power bank slot** as it does not need all the open space as it **doesn't need to be seen** so can be hidden away instead. The issue i now face is that the product needs to be **even taller** to fit the power bank under it. I could however **slim down the width as a result**.

Powerbank alternative slot for mote space



-A end user suggested the possibility to add a **thin piece of microfibre cloth** on top of the phone to **protect it** from items opposite scratching the phone screen when shut. This would be easily done by having a cloth that **attaches to the other side** to protect the phone from any damage. It can connect to the other side by either **velcro or thin bar magnets** that i have previously explored.

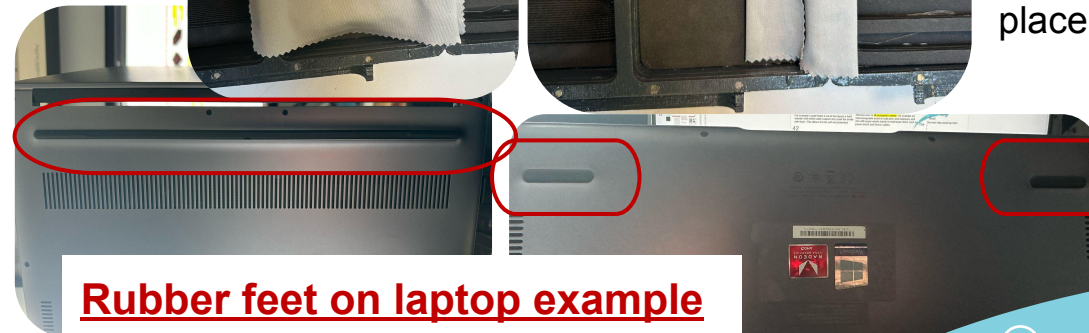
Microfibre cloth



-Things such as **jigs** can be used for the **alignment** of foam and the wireless charger which would make it **easier and quicker** to place in and glue the items.

-Another thing one of my end users suggested was some sort of **grip** on the bottom of the item, that would **stop it from sliding**. This could be done by using **rubber feet** very similar to a laptop which could be **embedded in the bottom** of the product.

Rubber feet on laptop example



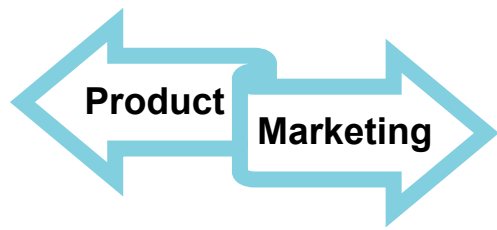
-**Different options** including a long one and short ones.

-Making it out of a **different material** similar to the **pp**. For example i could make it out of two layers a **hard outside shell** which adds **support and cover** the inside with foam. This allows it to be **soft and protected**. Alternatively, i could make the whole product out of **foam and fabric**. This would make it **softer** giving it **more protection, lighter** and **easier to fit into a bag**.

-I could create **interchangeable foam inserts** with various different uses to **fill everyone's needs**. For example an interchangeable insert to hold pens and stationary and one with larger elastic bands to hold larger items such as power bricks and thicker cables.

The **Next Step** Looking at marketing and how to sell, advertise and promote my product.





Diving into marketing and looking into how to price, package and promote the product.

Evaluation to manage design progression

Unique selling points

The unique aspect of my product is that it allows the user to use the item while travelling in many various different ways. Unlike other products which are mostly solely used for storage or entertainment while in a certain mode of transport. My product allows for most methods of transport and is relatively compact, easy to take on the go. It is customisable for various companies allowing them to attach/embed their logo into the surface.

The four p's of marketing

Product: The product allows for both storage and transport. The innovation of the opening makes it unique and aesthetically appealing. Intended to look aesthetically appealing, the product would be sleek and professional with variants for different aesthetics for different companies.

Price: To ensure that its is made professionally the price needs to reflect the labour costs along with the materials and components for manufacture.

According to my research price of polypropylene is £1 per 1kg. My product is about 400g at most therefore 40p. Taking into account a laptop hinge which is around £20 and the £9 wireless charger and the foam sheets which are around 50 pence (may be less if bought in a large quantity) excluding glue comes to a total of around £30.

Based on the UK price of £1,000 per metric ton:

1 metric ton = 1,000 kg, so:

$£1,000 \div 1,000 \text{ kg} = £1.00 \text{ per kg}$

Place: From airport terminal shops to inflight sales on the trolley service the item can really be sold in most place. Normal shops such as tesco and waitrose could also sell the item. The most profitable locations will most likely be those related to travel. E.g train stations, airports, service stations, ferries and their ports. Online services such as amazon will always be convenient and efficient so i think the product will be popular there.

Promotion: Any travel locations (airports etc) would be prime advertising locations as people may have issues at the time with disorganisation. Inflight booklets and other leaflets on transport for food and other things often catch people's attention while travelling as they often have time to spare to browse and read. Social media has become a large source of advertising recently due to its popularity with all ages and genders. This could be used to reach target audiences with the need for the item. Social media can provide a link to a private website or a large website such as amazon.

Product Packaging

The durability of the product means the product doesn't require much protection meaning it can be shipped in a packaging that's relatively slim and similar to the products size.

Similar to apples products, the goal for the packaging is to be simple, and look professional and sleek. The product can be displayed on the top allowing for the user to see what they are buying. There could be space for detachable and interchangeable inserts of foam as stated in the potential opportunities.

I managed to quickly edit the image on the top of my product to be able to display the idea i wanted to portray. The look mirrors apples professional sleek aesthetically appealing look.



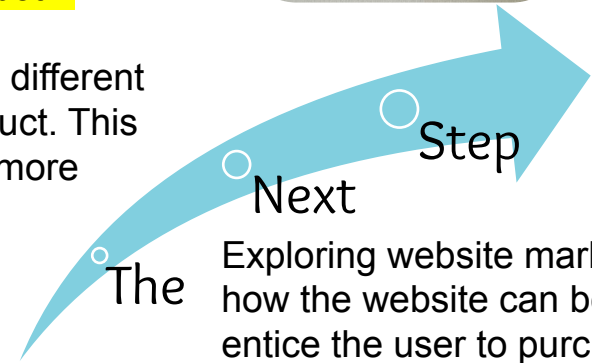
Logo and personalisation

I thought of two possibilities to personalise and add a logo to the product:

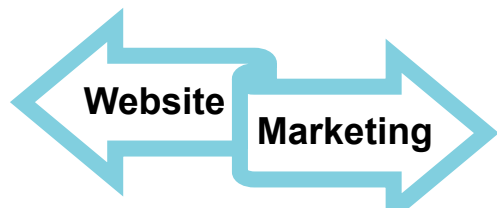
One: Engraving the surface of the box. This can be done using the same laser cutter on a smaller power setting. This would create a logo that is permanently there and sleek. It won't stand out but will still be visible. This could be a companies logo or my own or even both.



Two: Painting a logo in a different colour on top of the product. This would highlight the logo more which would be greatly beneficial for company collaboration logos with potential clients such as British airlines and other airlines



The Exploring website marketing of how the website can be created to entice the user to purchase the product.



Evaluation to manage design progression

SV

Website creation, analysis and possibilities for improvements.

Instead of just pictures, i would actually use **my 3d model** to create an **animation** similar to that off apple. This would create a great interesting **360 look** at the product as the client would be **presented with it initially**. The professional look is **difficult to generate** for someone with no experience as i found out.

Marketing and magazine example of possibilities

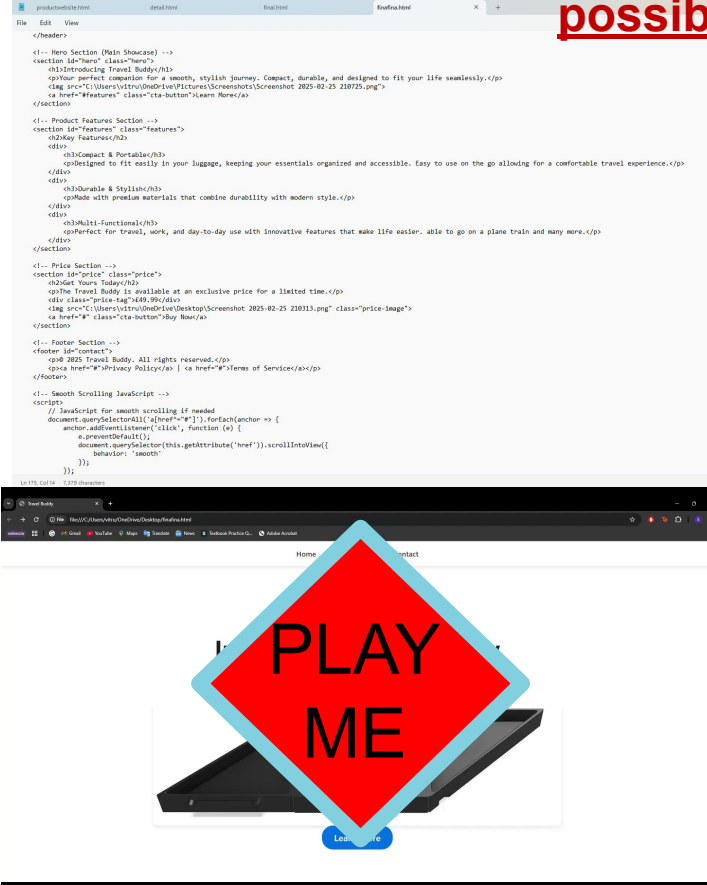


I made a really quick mock up of a **flight magazine example**. This could be made much better with a **proper presentation page** and offered in flight to customers. The same page could be **used as a poster** as well as in **other magazines** near and **related to transport**. This will bring **attention** towards the **new product** in the field.



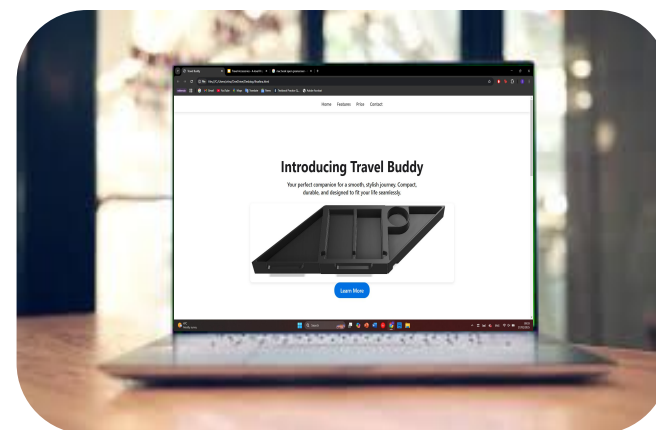
The user **will be able to do something similar** to that however **on the actual website** meaning they can **interact and see all the angles** of the product

Using **chat gpt 3.0** i managed to **create a website** that i could run locally to put my ideas into action easily. After a lot of tweaking and adjusting i was able to change the code to suit the idea i had in mind. The idea was a **minimalistic luxury style website very similar to apple**. The plan was for the product to **speak for itself** in a sense that it has its **own reputation** and has little description to start. I went into more detail in the Psychology of my website page layout to attract the user



Psychology of my website page layout to attract the user

Initial presentation page to show off the products **sleek professional aesthetic** allowing for the user to see the product **without being bombarded** with information all at once. This gives the user time to **appreciate and form an opinion** on the product before seeing any other aspects such as **price**.

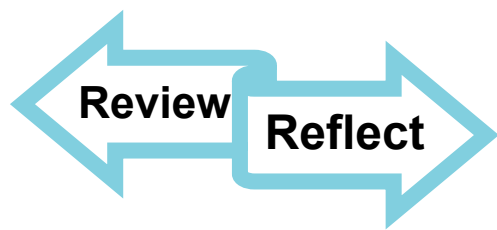


The view of the webpage only shows **one aspect at a time** allowing the user to **review the product** step by step almost as **an unboxing**.

Product description used to **inform** the customer of the main aspects of the product allowing them to **learn more** and **have more interest** in the product.

Finally the user is presented again with the image of the product and **offered a price** with a limited price for an set time. This could affect the user into the feeling of **exclusivity** and **getting a good deal** which could **entice them to purchase** the product. The information on the page is kept to a **minimal** to allow the product and **brand to speak for itself** as a **exclusive luxury brand**.





Evaluation to manage design progression

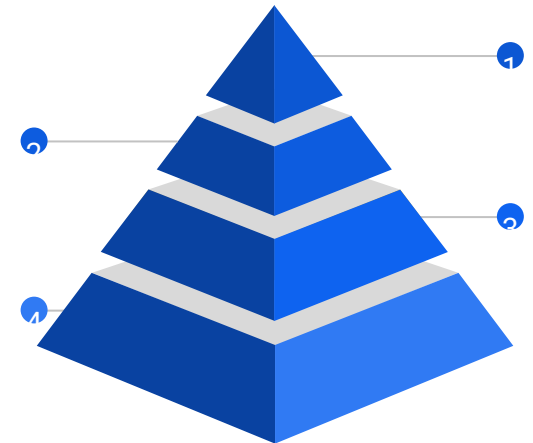
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Design and manufacturing process

For the process of manufacturing my prototype i had a lot of issues during the making. This was primarily due to me not being prepared to create it using the second manufacturing method. I however worked around the issues to the best of my abilities solving them efficiently with limited time. I researched and explored various factors including anthropometrics (hand sizes), ergonomics (magnet strength testing and research into pull force ranges) and other sizings of related products (power banks, wireless charger and phone sizes). Using previous designs to develop and improve my designs for the prototype became a key skill in improving the overall product.

Learn from what went wrong.

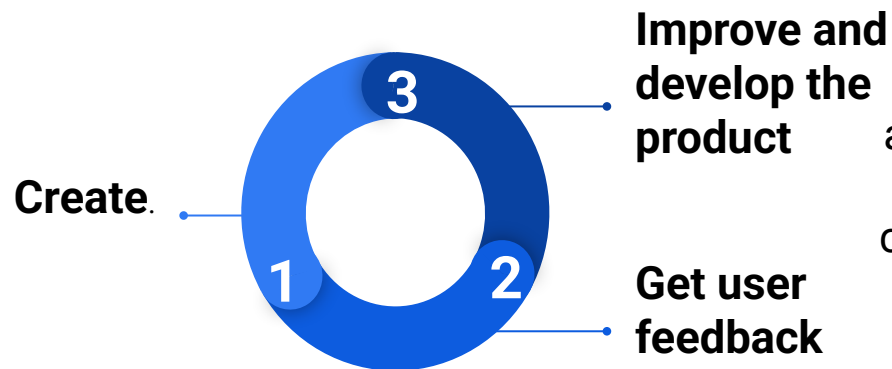
Improve the product and myself as a designer



Make the mistake

Fix the mistake

What i have learnt and things to take away.



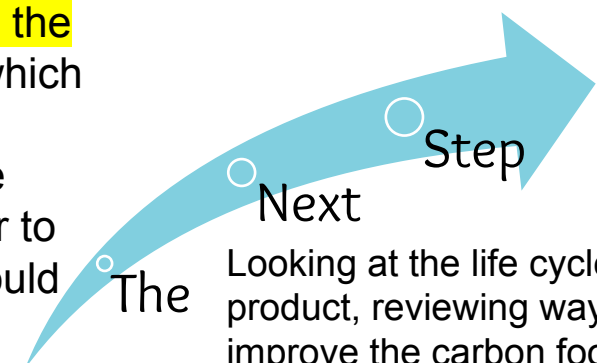
Improve and develop the product

Get user feedback

One of the key things i have learnt from the many points is to take, consider and use any feedback. This taught me to consider other point of views which helped me further develop and improve my product. I often oversaw issues or improvements due to being so focused on an idea. To solve this i often went and asked for multiple peoples opinions who would often come up with new approaches that i would not think of. Developing existing skills like cad and sketching taking them to another level to improve the quality of my work. Researching and exploring aspects associated with my product helped ensure it was fit for its intended reason but maximise capability in its field. Another key point is to use mistakes as a learning and space for improvement. Instead of getting worked up and focusing on my mistakes i learnt to use them to improve my product and myself as a product designer and student.

Likely hood of success of the product in the present and future

The benefit of my product is that it can develop as technology develops. It is very versatile meaning any future products can be placed and used. The market will always be available for such products as people will always need to store stuff while travelling. The advertising campaign with the website, leaflet, poster and social media will hopefully grab people's interest in the product and reach its target audience. The goal would be to create an audience who not only enjoy the product but also love the brand. This would create a loyal customer base similar to companies such as apple and anker which create high quality products that people trust will be professionally made. Other products and accessories that could be made in the future can be compatible making a mini ecosystem where another new product would connect/link well and make everyone's lives easier and the customer to want new products. Collaborations and connections can be used with other companies which could reach new customers and help give the brand a name.

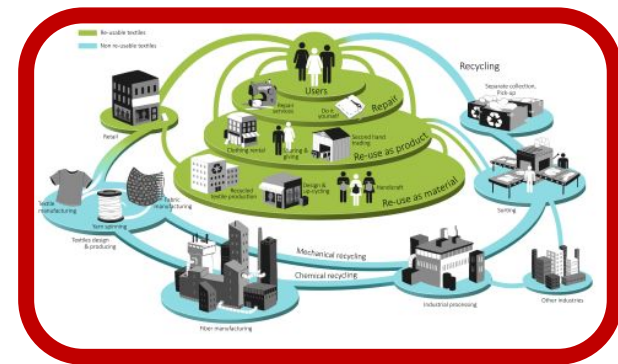


Looking at the life cycle of the product, reviewing ways that i can improve the carbon footprint of the product.



Evaluation to manage design progression

Exploring the life cycle of the product from start (raw materials) to end of life (disposal) including aspects of the six R's.



SV

Raw materials

Polypropylene is made from crude oil and natural gas, both non-renewable fossil fuels.

Extracting and refining crude oil requires high energy and water use which both contribute to carbon emissions. It mostly harms the environment through oil drilling and refining which causes air pollution, water contamination, and habitat destruction.

Transportation can become very damaging due to lots of emissions from transportation of aircraft ships and trucks leaving a large carbon footprint before manufacturing even begins. Oil spills are unlikely but are extremely damaging if they do occur as they harm and damage habitat and wildlife as a result.

Manufacturing and production

injection molding uses lots of energy as it uses temperatures around 200-250 degrees celsius which as a result requires lots of electricity to get to those temperatures and also water to cool machinery during manufacturing.

Luckily there is not much waste produced as pp can be recycled in the factory and reused however the large amounts of electricity produce co2 emissions.

Distribution and transportation

Product is made to last as pp is durable and can withstand wear and tear hopefully lasting for years to come.

Plastic is difficult to fix and repair so any severe damage means the product is wasted and cannot be reused.

Take back programs can be used to give a discount for example to try and reduce waste. The damaged product can be melted and materials recycled decreasing carbon footprint of material, saving it from landfill and saving money for the company as it would be cheaper than sourcing fresh materials and would also entice the customer to buy another product from our company.

End of life (Disposal)

It can be recycled and remelted into a new product saving money and improving carbon footprint

It can be thrown away ending up in landfill leaving it damage the environment if not disposed of correctly

According to research it takes around 20-30 years to break down in landfill. There are possibilities of using biodegradable plastics which can reduce the impact.

Ways to make it more environmentally friendly

- ✓ Use recycled polypropylene instead of newly sourced plastic.
- ✓ Make the design easy to disassemble and recycle.
- ✓ Reduce material thickness to use less plastic.
- ✓ Use minimal, eco-friendly packaging (e.g. cardboard instead of plastic wrap).
- ✓ Encourage take back programs for recycling.

Six R's

Rethink: Change the design of the product to remove amount of material, change type of material (more environmentally friendly) and to ensure it lasts a long time

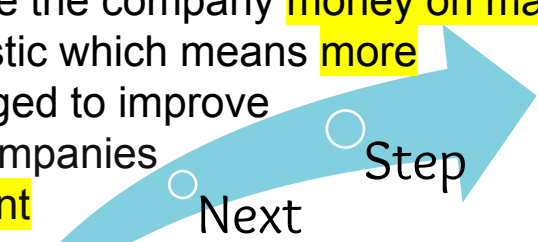
Reduce: Using less material in places would make it thinner as well as lighter. This makes it more portable and cheaper overall

Reuse: By doing a take back scheme for a discount will not only allow for less waste but save the company money on materials.

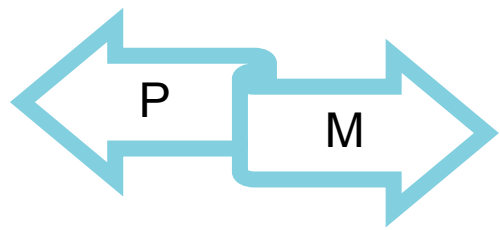
Repair: Tricky to repair plastic which means more waste. Design can be changed to improve

Refuse: Refusing to use companies that damage the environment when extracting raw resources

Recycle: Takeback scheme to reduce waste and improve the environment and save money



Adjusting the final designs by including most tips from end users and proceeding with focus group tests to get closer to a final product.



SV

