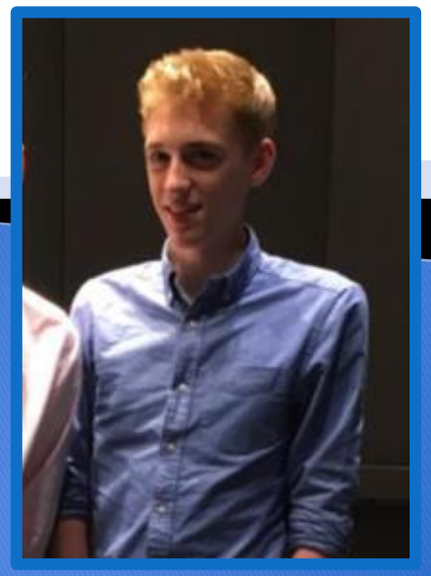
Seb Sirrell

F523



Problem 1

As the product will be for children, it has to be exciting and appealing to the children, not just plain and boring like any other shelf.

Problem 2

The second problem, linked to organisation and general tidiness, is the willingness of younger children. Children need an incentive to tidy their toys up and their rooms. This incentive could be a range of fun ideas, such as music or movement.

Problem 3

Another problem I have come across is the amount of room for furniture in a child's bedroom

Video

The Client:

Name: Sheryl Lawrence
Occupation: Pre-school teacher
Age: 42

Likes/wants:

- An interesting and fun shelf that would encourage her child to put her own toys away
- Different sized compartments/shelves for different objects and toys
- Out of the way, makes the whole room look more tidy.

Design Brief / Solution

Create a shelving unit based around the generic likes of the gender the product is bought for, this will be liked by the parents as they are appropriate for the children. An example for this is the theme of cars for boys and flowers for girls. These gender appropriate designs will be perfect as they are simple, which allows for more focus on the function. These shelving units have to provide an incentive to the children for them to want to clean up their toys, the incentive could be movement as this will make the chore seem fun to the children rather than a tedious task. As there isn't much room in a child's bedroom, the shelf should not only incorporate storage but other wall hanging products, such as mirrors and clocks.

Target market:

The shelving unit will be made for children aged 4-10, therefore the aesthetics have to appeal to the children of both genders. However, the designs have to appeal to the parents too as they will be the ones buying the products. The parents wont buy a product that isn't suitable for their child. The function of the product will mainly be for the parents as the product will provide incentive for the child to clean up their toys. Although, the product may have different methods of accessing the toys within, this will appeal to the children as they will act as secret compartments that the children will enjoy.

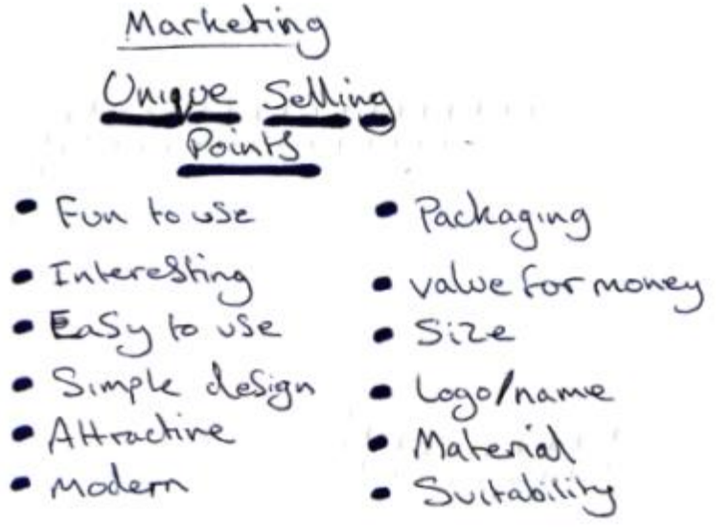
The Situation:

This is the bedroom of my clients child's bedroom. There are toys all over the floor and on the bed as they have no incentive to clean up their mess. There is also a blank wall by the bed, this would be prefect for a shelf that would liven up the room more and keep it tidy at the same time.

This brain storm shows what should be included into my designs and what can be integrated later on in the designing of the product. It also references other similar products and the features that are included in them.

Background Information / Design Brief

The unique selling points are what make the product marketable and commercially viable. These are the reasons that people would buy the product to be designed over other existing products.



Primary inspiration

This very different method of accessing, and storing products has inspired me to change up the storage aspect to make it more innovative, not just like a drawer.

I like the ying and yang storage unit as the whole product is storage and it only takes moving one half to reveal all of the storage

Multiple compartments make everything more organised. Organisation is important in my product as it is meant to help children clean up

As my product will be used by untidy children, it might be sensible to use two lines of security for keeping the toys in place, like this table

I liked the idea of this gearing box design. The chain reaction of turning one gear to turn the next seemed fun and, therefore, inspired me to try to use chain reactions in my designs

All of these photos were taken by myself when visiting the new designers exhibition in London.

This shelf is very innovative as it incorperates a clock into the design and includes a mirror in the same design

However, this shelf is quite boring due to colouring and the static nature

I like this shelf as it is different to general shelves that are flat lines which products rest on. Whereas this shelf is hexagonal and more closed off, making it similar to a drawer

These two different products have the same function of expanding. The products seem to have limited space, until they expand. The expanding is almost like a secret compartment that children have in toys. A secret compartment would make the product more fun for a child as they can keep their valuables safe.

Secondary Inspiration

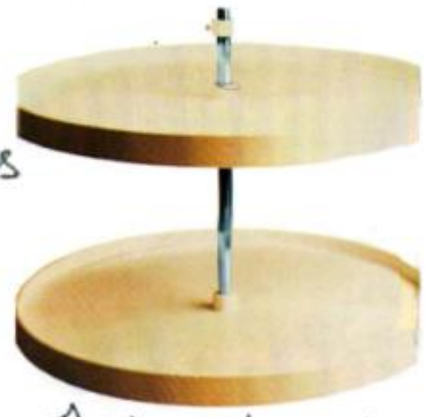
Incorperating magnets into a childs storage unit is a clever idea as it allows for smaller, metalic toys to be easily stored and put on show.

The design of this shelf is bad as it has nothing keeping it's contents safe. There is also alot of room wasted as items cannot be placed on top of others, due to the risk of them falling out.

Having a shelf with multiple compartments makes it easier to organise the contents. The different sizes also allow for objects of all sizes to be stored

This design is similar to the second photo. However, this design is better as its compartments vary in size, much like children's toys.

All of these images were found on the internet



This cake stand has inspired me to make a moving shelf. Rotating cake stands make it easier for the user to get to the cakes they want, this would be an interesting feature to use in a shelf. The moving shelf would also be good for children to use as they would find it fun.

One thing I have discovered while searching the internet for children's shelving units is that they are generally placed above the child's bed. This placement makes it easy for both the child and the parents to use the shelving.

The cog wall art has inspired me to include this sort of mechanism into my design in order to make the shelf move/rotate.

Materials

Used for real Product — Properties — manufacturing techniques — Used for Prototype

Poly Propylene

- light weight
- Best manufacturing technique to use is injection moulding
- good chemical resistance
- good electrical insulator
- good for kitchen ware

Acrylonitrile Butadiene Styrene

- used to make alot of helmets

- high impact strength
- light weight
- Scratch resistant
- good for 3D printing

High Density Poly Ethylene

- used to make pipes
- Strong
- light weight
- Injection moulding

Un Plasticized Polyvinyl Chloride

- good chemical resistance
- used to make bowls
- Strong
- easily coloured
- vacuum formed

Solid
CNC router
Stable
furniture
kitchen units
Easily damaged by moisture

Medium Density Fibreboard

Plywood

- Stable
- constant Strength
- laser cutter
- used for furniture
- kids toys

- ~~Jigsaw~~ Laser cutter
- flexible
- Splits if bent too far
- Strong when glued
- used in alot of furniture

Flexi Ply

- tough
- brittle
- Shop Signs
- Laser cutter
- car parts
- only Small parts could be made from acrylic

Acrylic

easy to clean

The children's shelves in Ikea seem to be Plastic rather than wood

Simple one piece design

I visited Ikea and took these photos

Injection moulded

less parts

vacuum formed or injection moulded

Both good for batch production

used in childrens toys

recyclable

durable Strong

Impact resistant

Scratch resistant

light weight easily coloured

used for window borders

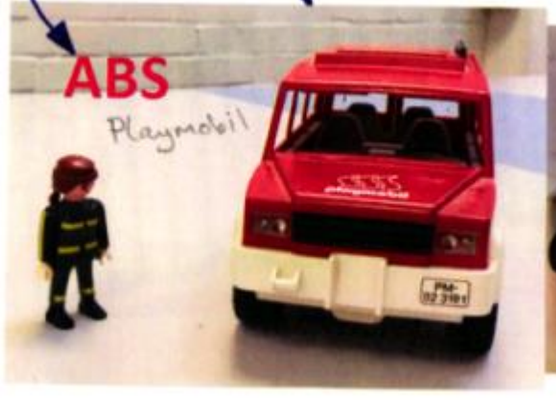
isn't as good as ABS

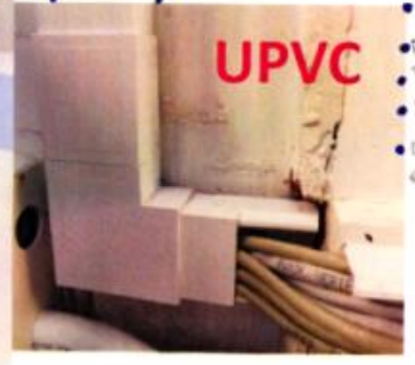
easily coloured

light weight

Strong

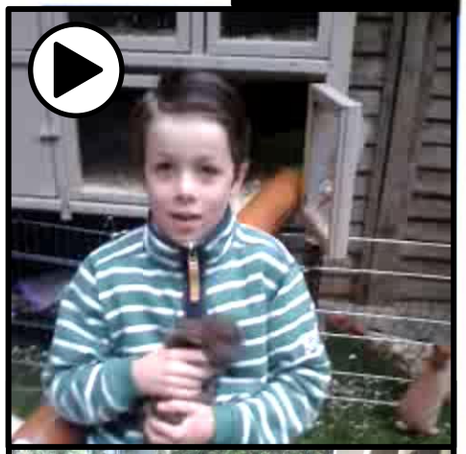
Stiff





Information

Videos



Videos of two children aged 8 and 6

I asked general questions

Such as:

- Favourite colours
- Favourite shapes
- Best toys / Possessions
- Hobbies
- what they enjoy doing

having a smaller storage area allows for a back and front to be added.

177cm

adult

the height at which the shelf is placed depends on the base height of the user.

The shelf will likely go above the bed so that both the child and the parents can access the contents

118cm

6-7 yo

having to climb on to a bed will be fun for the child

270mm

200mm

Specification

A — Aesthetics

- **The aesthetic of the product should align with the general likes of both male and female children** . For example a boys likes might be football, therefore the products aesthetics should be related to football in some way.
- Like the Ikea shelving for children**, the colours and the shapes of the product should be quite simple**. A simple look will make it look modern and wont bring too much attention to the storage unit.

S — Safety

- **As the shelf will be used by children, it needs to be very secure** when fixed to a wall to stop it from possibly falling on the user.
- Making the product light will also help it to be more secure when on the wall as there wont be as much strain.
- **Any mechanisms that are included in the designs should be covered up** so the children cant access them as they can be dangerous.

C — Customers

- The product will be aimed towards children aged 4- 10, therefore the aesthetics have to appeal to that age group
- **However it will be the parents that buy the product so it will have to appeal to them too**. It will most likely be the function that appeals to them rather than the aesthetics.
- There will be two different designs of the products that will appeal to both genders.
- **Organisation is a big deal for parents**, therefore the product should help organise the contents

Si — Size

- **The width of the compartments need to be about 20-30cm** so that big toys can fit in there easily.
- **There will also be different sized compartments** for organisational purposes and storage for toys of all sizes.
- **The length of the shelf should be big**, for a lot of storage space. The length of the shelf should be around 850mm.
- The height of the shelf should be around the same size of the length to make the shelf even.

Co — Cost

- When estimating the cost, the size and the function of the product have to be taken into account. The better the function, the higher the price can be raised as people will be more willing to spend a lot of money on it.
- **The size also needs to be accounted for as the bigger the product is, the more money will be spent on making and materials,** which means the price will have to be raised.
- However, from my research the price of generic shelving for children ranges from about £125- £249. Therefore, £249 should be the maximum price of the product.

F — Function

- **The main function is to get children to learn to put their toys away** and have fun when doing so, this could be done in a number of ways, but the easiest way to do this is to have some aspects of the shelf move.
- The shelf will store toys of many different sizes and shapes.
- Using some sort of mechanism for the movement of the **shelf will be interesting to the children who use** the shelf.

E — Environment

- **The best height for a children's shelf is around 1000mm to 1200mm** as the average height of a child aged 6-9 is 1180mm. However, to let both the children and the adults have easy access to the shelf, the best place for the shelf to be is above the child's bed
- **The damage the product does to the environment should be kept as low as possible**, this means using materials that can be recycled or that are renewable
- Another way too keep damage to a minimal is to produce the product in as few parts as possible, to keep manufacturing down.

M — Materials

The Product will either be made from these two materials:

- **ABS**- this plastic is impact resistant, strong, durable, light weight, scratch resistant and easily coloured. This material has all of the right properties needed for when making a product for children.
- **PVC**- This isn't as good but is still a good candidate. PVC is tough, stiff, easily coloured and light weight.
- **However**, using MDF could be a good idea as this can be more easily decorated.

Er — Ergonomics

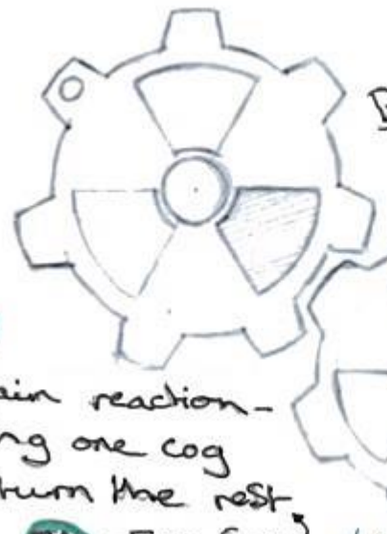
- **The shelving needs to be the right size so it can be placed at the right height but still be used by both adults and children**, this means the product will have to be quite big
- **The opening to the shelf needs to be designed around the potential contents of the shelf** This is to make sure that typical products can fit in the product
- **Any handles on the shelf need to be grippy** to make the shelf easy to use.

Mn — Manufacture

- The two shelves that I found at Ikea were vacuum formed, therefore this method of manufacturing might be a good one to consider. However, the cost of making a mould for a shelf would be quite high.
- Blow moulding might also be a good method of making the product as this will allow the parts to be hollow, making the product lighter and easier to secure onto a wall.

Design 1

Bird's eye view



Hole to reveal compartments

engraved

F3

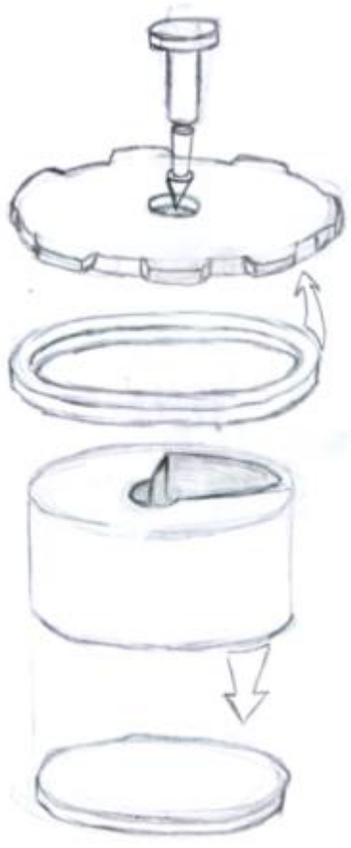
Chain reaction - turning one cog will turn the rest.

F1 - Fun for kids

Multiple compartments that are revealed when the cog is turned

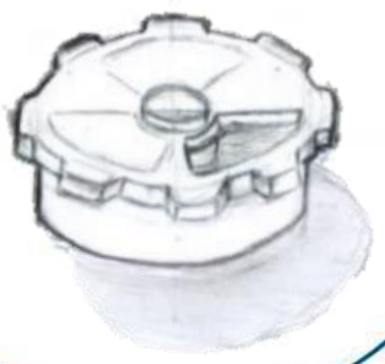
S3 As the shelf is a mechanism it can't be covered up, which is a safety issue for kids

Exploded view



This drawing shows all of the product parts to the design in more detail

Isometric



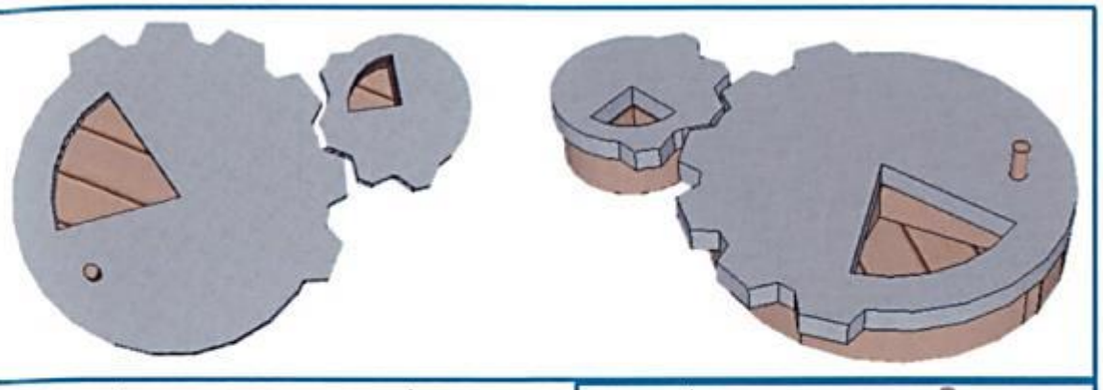
The cog parts on the shelf can be used as a handle to turn the product

Er3

This is done using a dowel that keeps the shelf top in place but allows for movement

F1

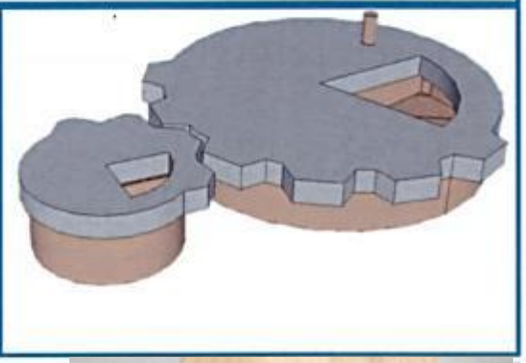
I needed to make the model for this design on 2D design as the top part of it had to move while the bottom part is secured



The real product would have 2-3 compartments in each cog part

F2 S1, 2

→ Made from ABS and blow moulded to make the product M1 lighter M1,2

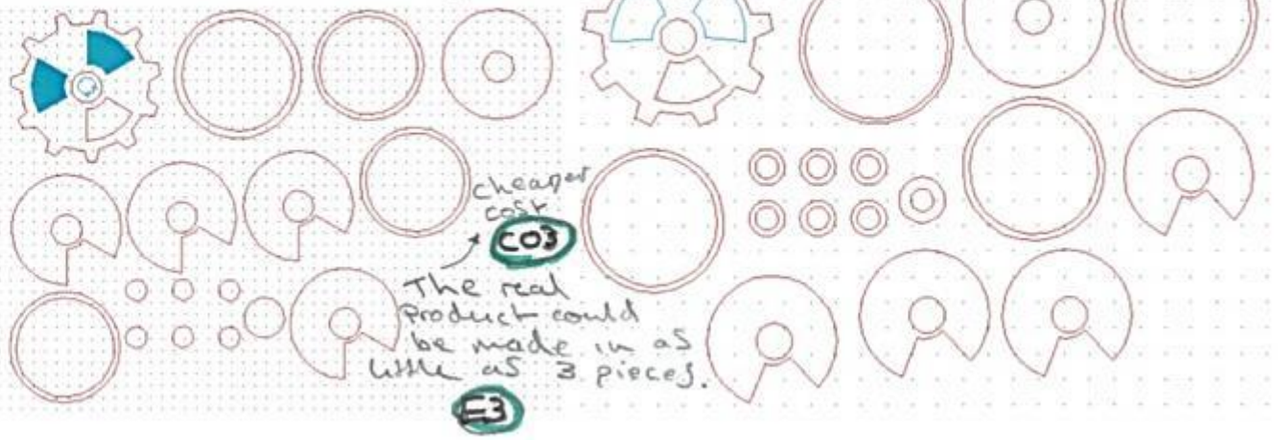


Mechanisms such as cogs aren't gender specific as C3 it's the movement that will appeal to children

In order for the model to work, both parts needed to be secured to something.

Two different sizes of the shelf.

Comments:
Likes the moving aspect
Improvements:
Making the product multifunctional through the addition of a clock.

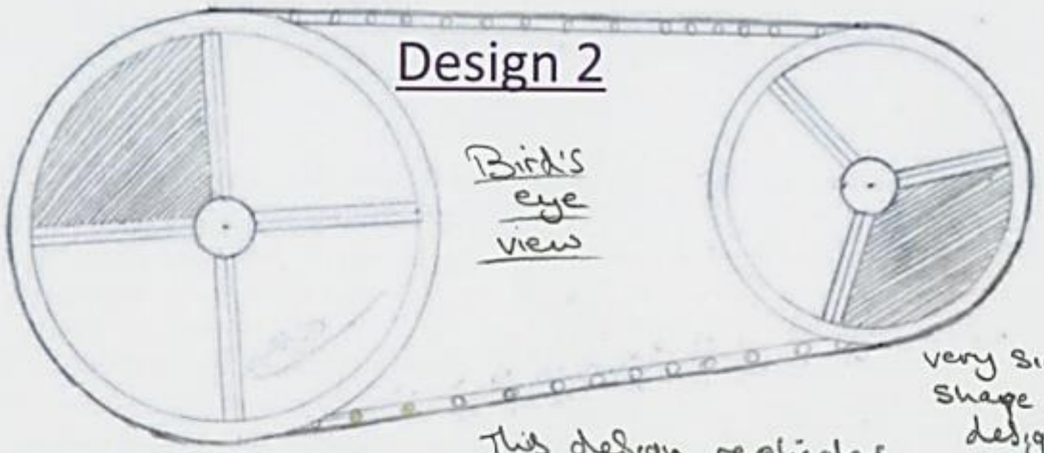


cheaper cost C03

The real product could be made in as little as 3 pieces.

E3

Design 2



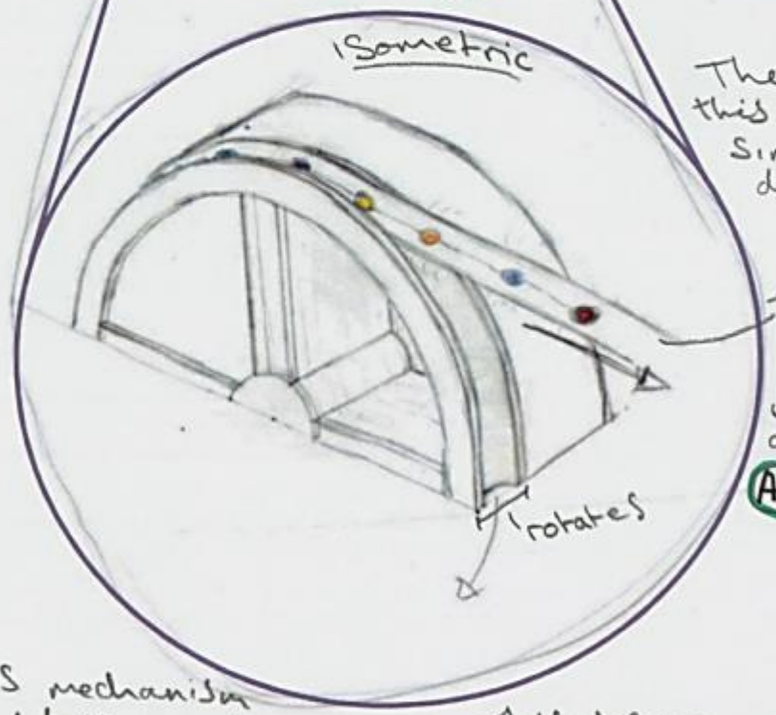
Bird's eye view

very simple shape and design A2

This design replicates a bike chain

This was designed because the 6year old girl said she liked cycling A1

The rotation will be fun for kids to use F1 F3



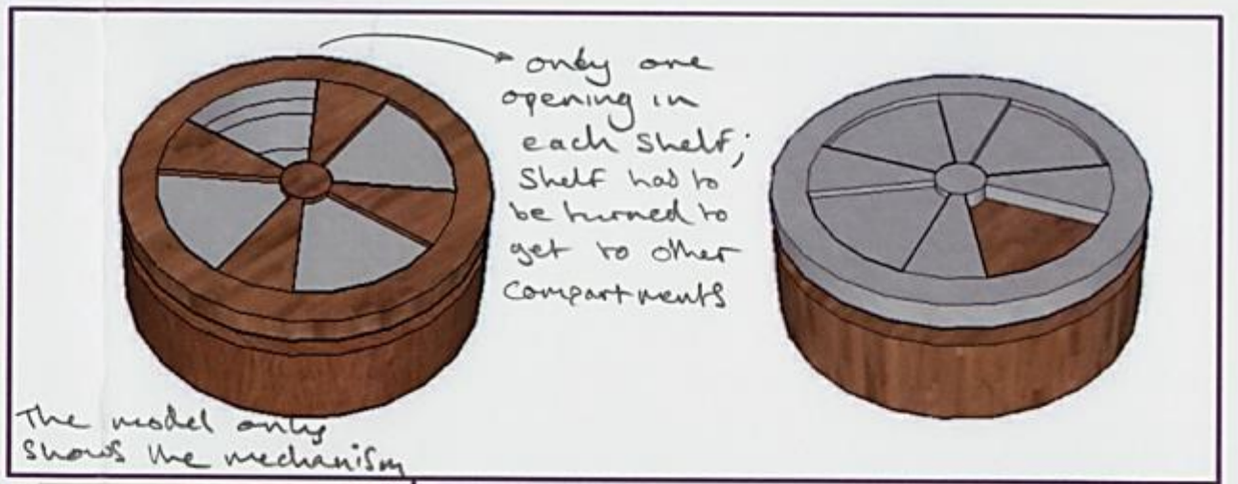
The design for this product is similar to design 1

The rope in the real product would be elastic and colourful A2

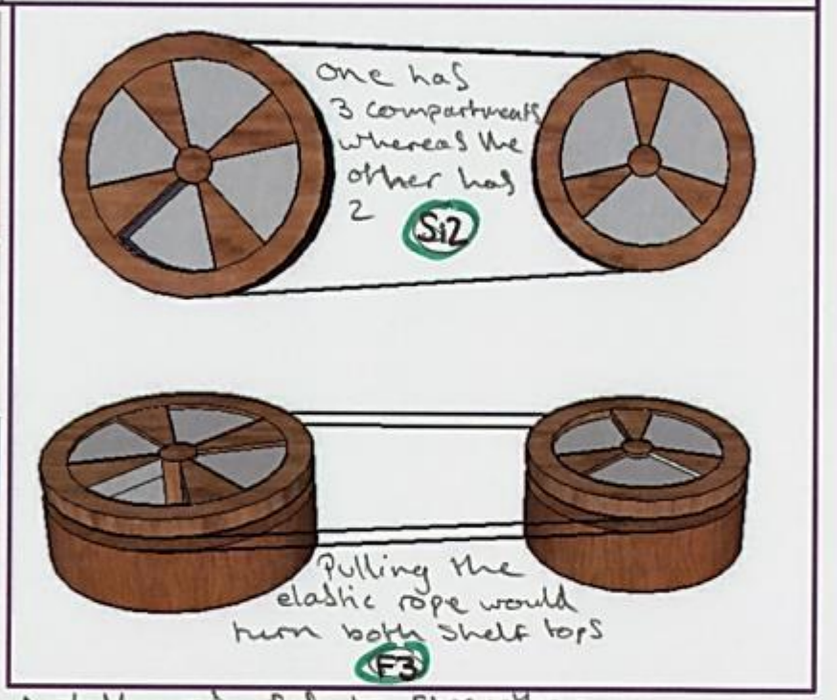
This mechanism wouldn't be dangerous for young children S3

This design would take up a lot of room as the two parts to the shelf are spread apart

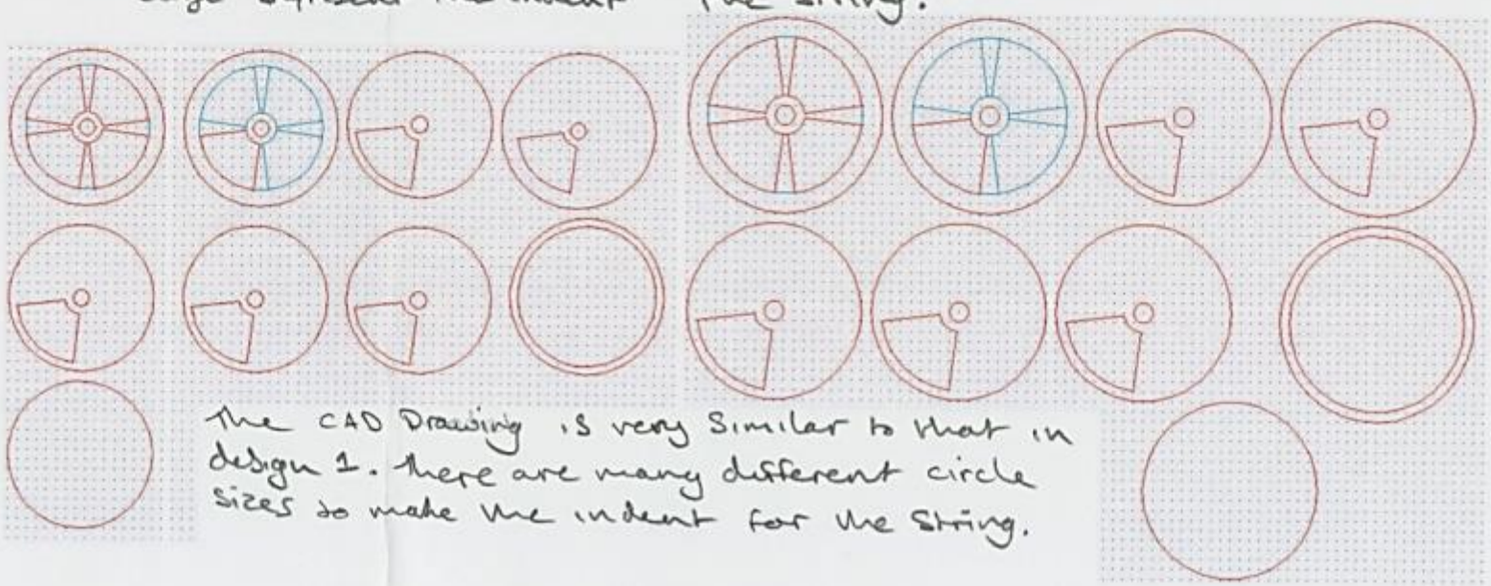
As the shape is more simplistic, this design would be easier and cheaper to make than design 1 C03 C02



The String around the edge represent the indent



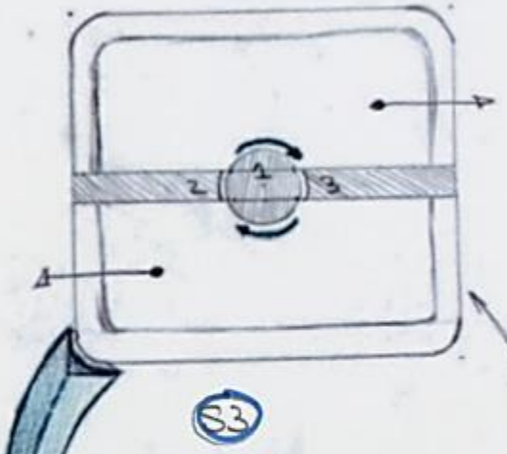
A platt was used to strengthen the string.



The CAD Drawing is very similar to that in design 1. there are many different circle sizes to make the indent for the string.

Design 3

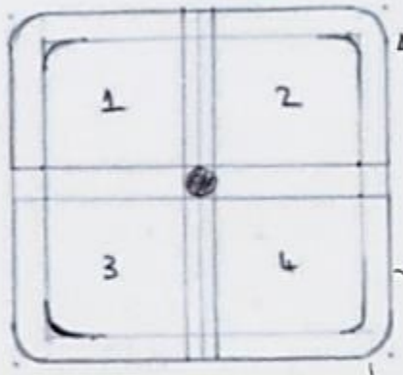
Front



S3

Take away Pieces 1, 2 & 3
↳ Cover the mechanism

Behind the Front



4 Sections
↳ Easier to store toys
F2 S1 2

very hollow as there are a lot of compartments
S2

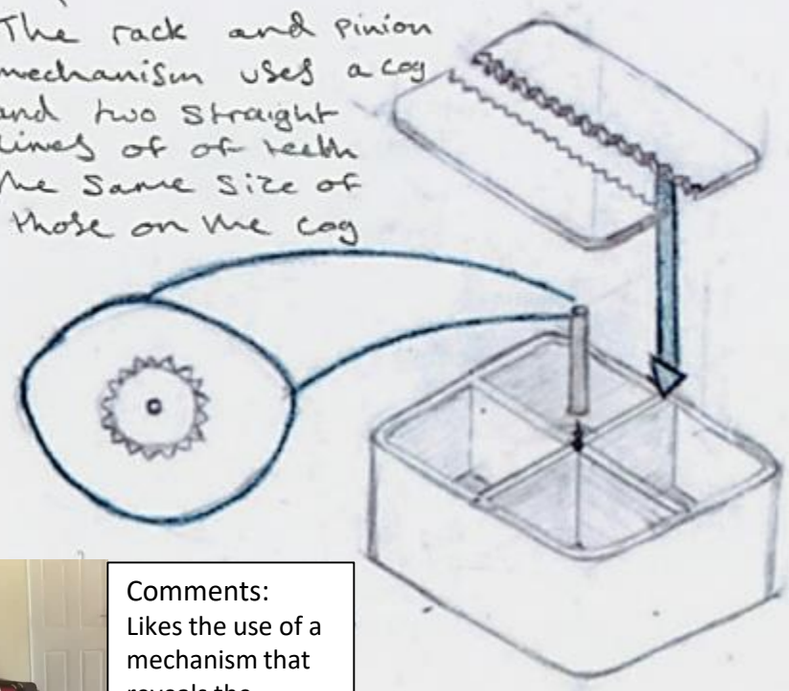
Doesn't appeal to a specific gender A1

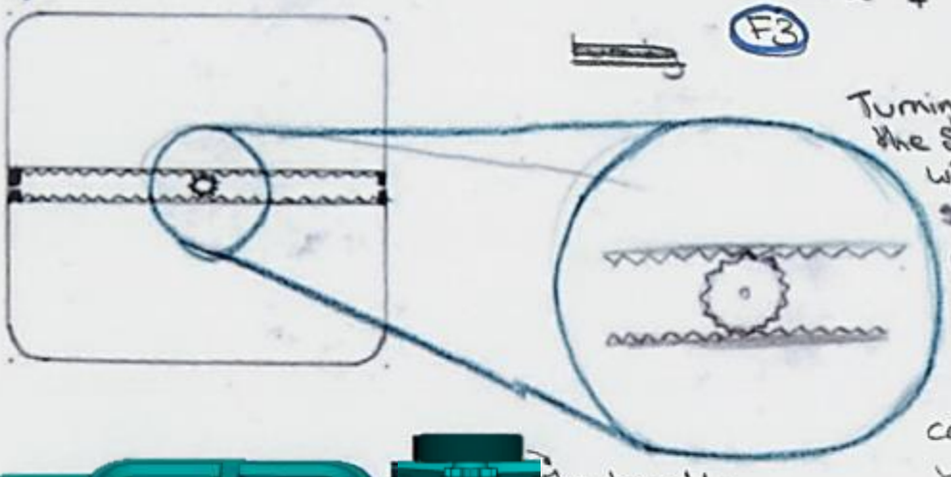
turning clockwise will move the top pannel right and the bottom left, revealing Sections 1 and 4
F3

A lot of parts to it E3

The rack and pinion mechanism uses a cog and two straight lines of of teeth the same size of those on the cog

Exploded view





Turning the Shaft wheel will turn the cogs, which will then move the Pannels

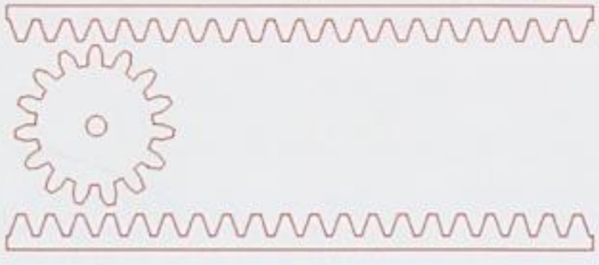
The Shelf is complex, but easy to work as you only have to turn a handle

Play me

Comments:
Likes the use of a mechanism that reveals the hidden storage.
Likes the amount of storage in the design.

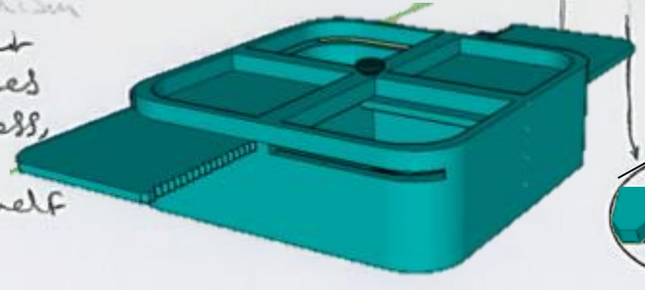
Only shows mechanism

with previous designs, I had struggled with getting the teeth on cogs working together. Therefore, I traced an image from the internet

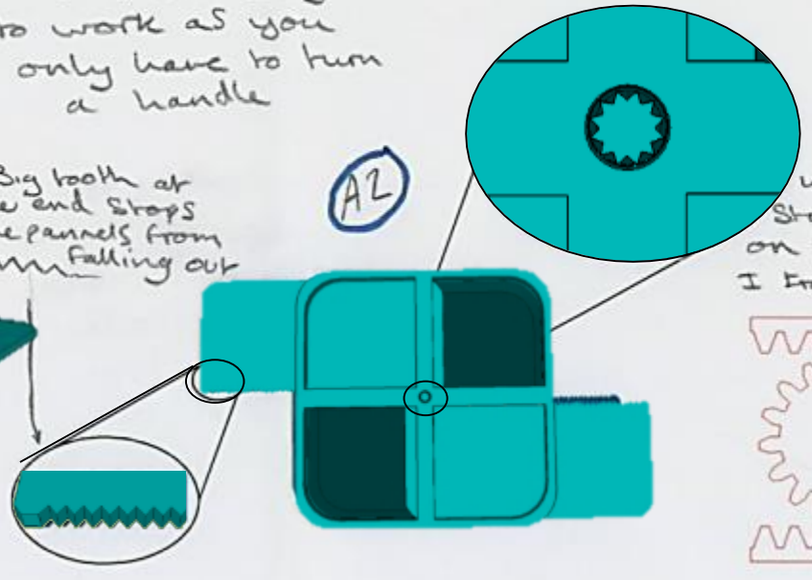


The handle goes on top of the cog so the user can easily turn the cog and move the Pannels
F3

The whole Shelf is almost like a Secret compartment as it uses a unique method of access, making it hard for others to enter the Shelf
F1

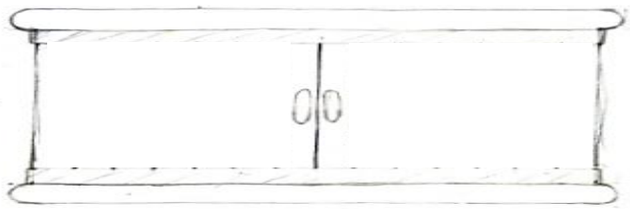


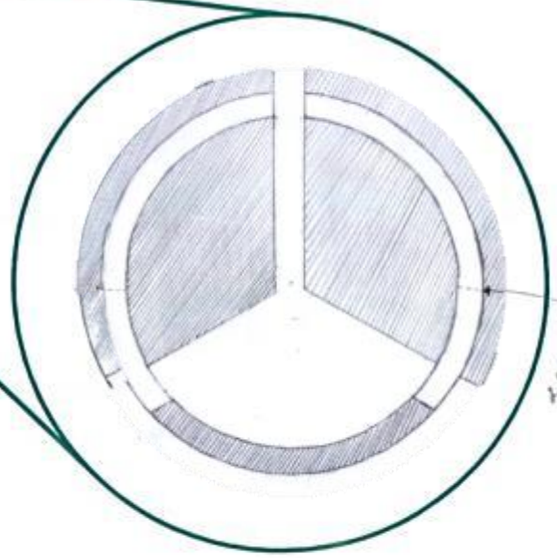
Big tooth at the end stops the pannels from falling out



A2

Bird's eye view

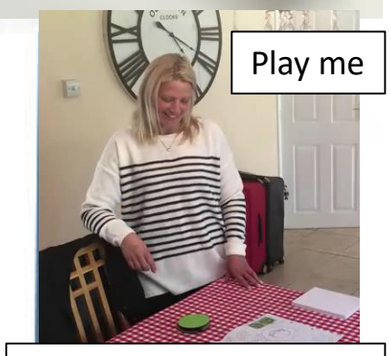




Where the door goes down to.

The aesthetics of the shelf are simple to hide that it is a shelf. A2

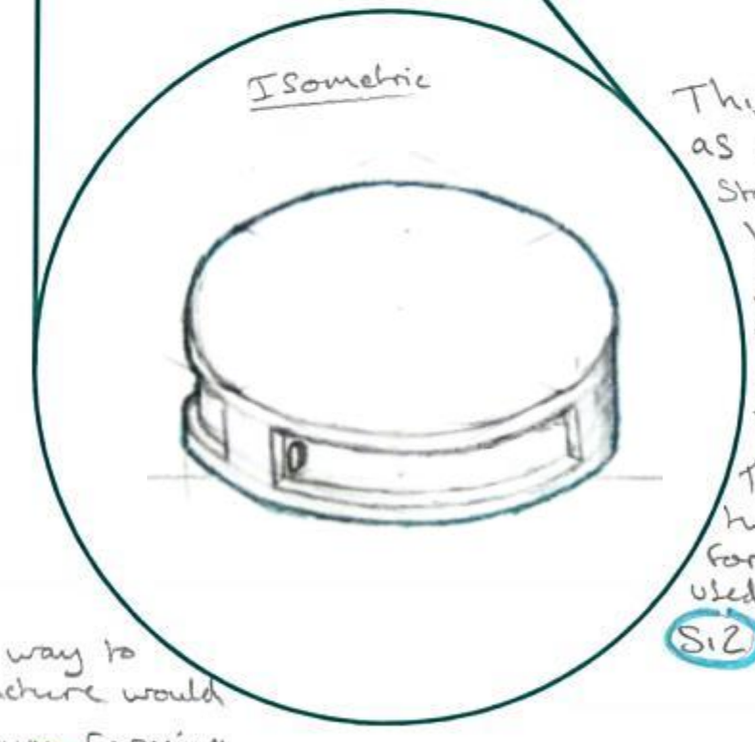
Children get bored of toys easily. Therefore, this shelf would be useful for the parents that don't want to throw away toys C2



Play me

Comments:
Likes the simplistic ness of the design when up on a wall and the amount of storage the design provides

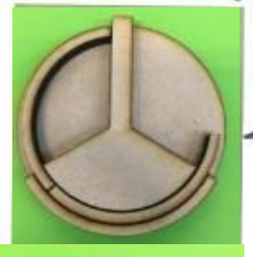
Isometric



This was designed as a child's mass storage unit

Not easily accessible. Toys that aren't used often are put in here

This shelf has two compartments for unwanted/unused toys to be put S2



Doesn't open all the way to keep the toys in and stop them from falling out.

F2

Because of the curve, the doors won't fall out, meaning there is no need for any railings.

Would be made in about 6 parts E3 which would be bad for the environment.

F2

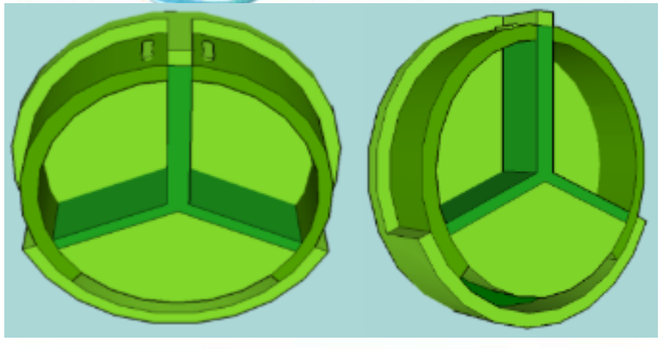
Still allows for a lot of toys to be stored

The depth of this design doesn't have to be too big as the height and width would be quite big.

When on a wall, the shelf will look simply like a design on the wall Er3 A2

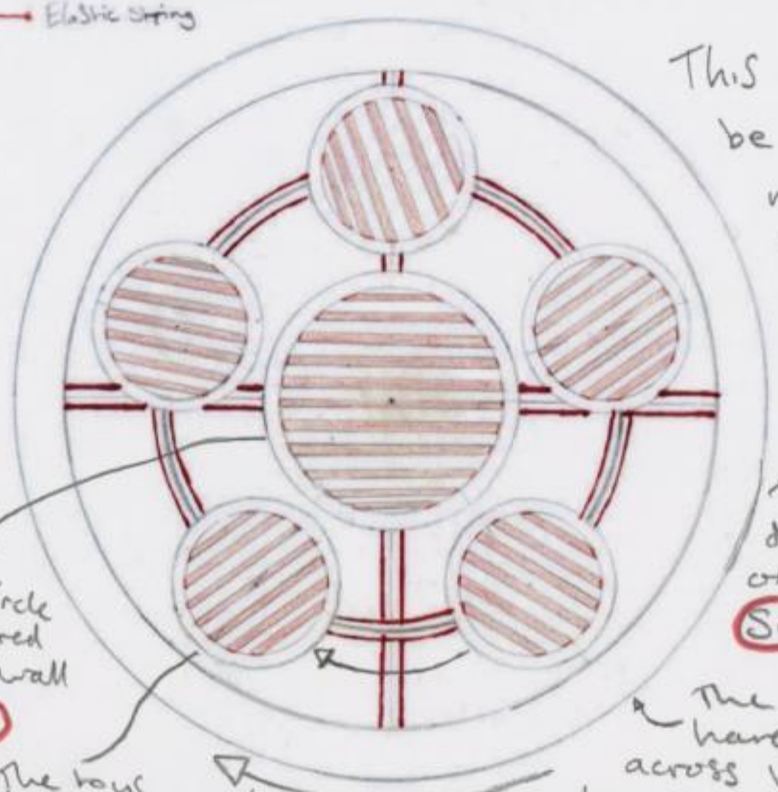
The handles are ergonomically designed so they are easy to use

Easiest way to manufacture would be vacuum forming. Mn1



Railings/

Elastic String



This design would be really big when made to make sure each circular storage is big enough to be useful

There are two different sizes of shelf units

S2

The centre circle is secured to the wall

S1

The toys would be rolled around and damaged.

F1

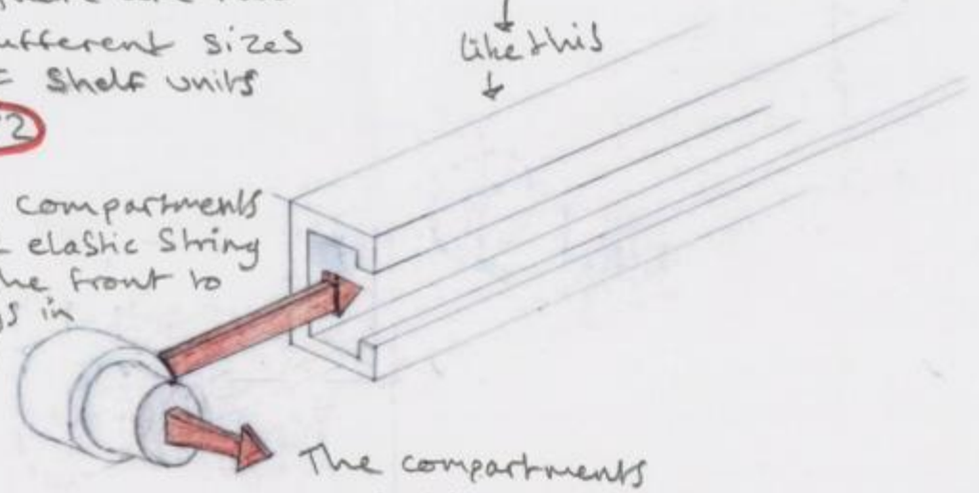
When turning the outer ring/cog, the inner shelves will turn

F3

In order for the shelf to move but still be secure, railings are needed

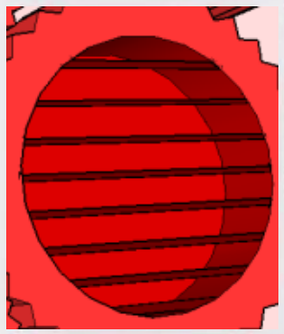
S1

Like this



The compartments have elastic string across the front to keep the toys in the shelf

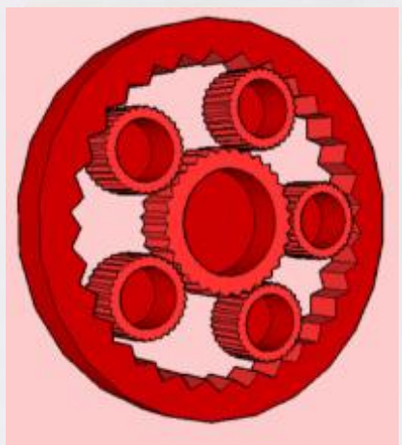
The compartments are held onto this



The whole shelf is a big cog mechanism, therefore it can't be covered up which can be dangerous

S3

There are too many parts to the product, making it hard to manufacture

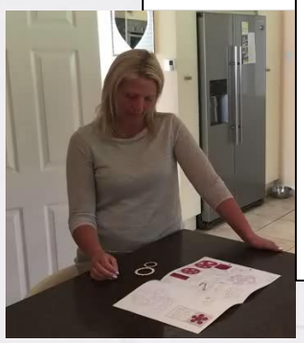


The width doesn't have to be too big as there are a lot of storage options/ compartments

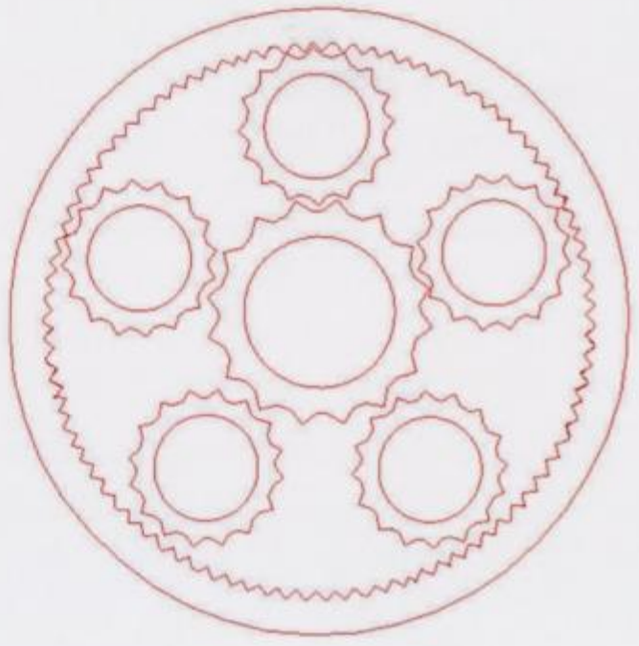
It is too hard to make a model for this design, therefore I just made one that shows the middle stays still while the rest move.

All parts of the shelf require the same size teeth, which would make manufacturing difficult

Play me



Comments:
Likes the workings of the design but thinks the open teeth would be a safety risk for young kids. Also likes the many compartments the design includes.



Memory Sketch

This design also means the user doesn't have to reposition their hand to keep turning the handle.

Adding a smaller handle on the original gives the user something they can wrap their whole hand around

ergonomic finger holes

like an old telephone

Turning from the outside of the handle gives the user leverage

Adding finger holes to the handle would improve the ease of use as their fingers won't be able to slip out

Finger sized-Arched grooves would make the handle more ergonomic

expand on ergonomics

Similar to most bottle lids

makes it easier to turn

adding grip to the handle will create more friction

The handle will be hard to grip and use in its current state

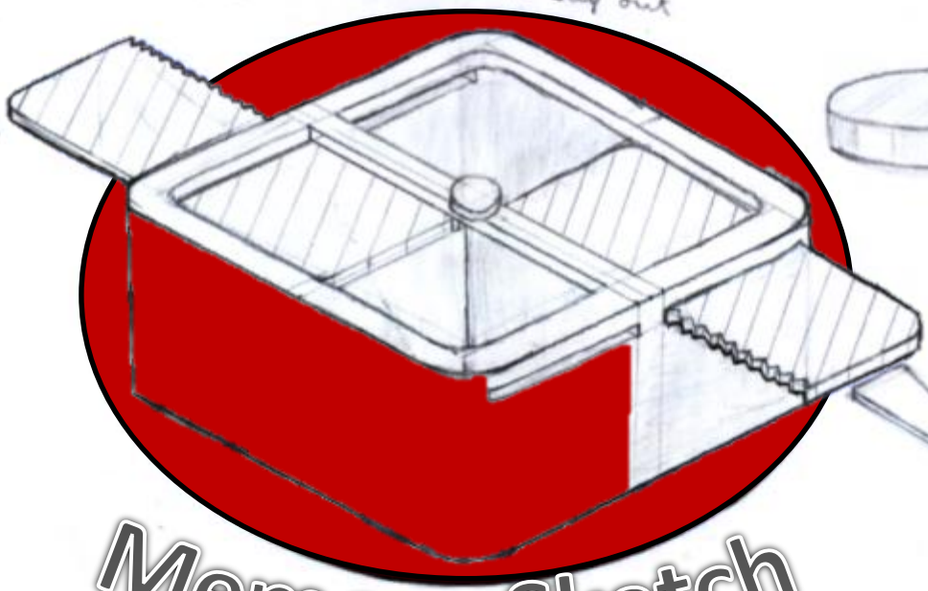
magnet

metal cars

Allows for metal objects to be held on the shelf wall

For extra storage and more filling of the shelf

Magnet board



The current panels are solid

Having a See through panel will allow the user to view the contents before use

Different views

different levels of transparency

This will also make the mechanics visible to the user

having shelving separators would help with storage

4 different types of Compartments

A Birds eye view of the inside of the shelf

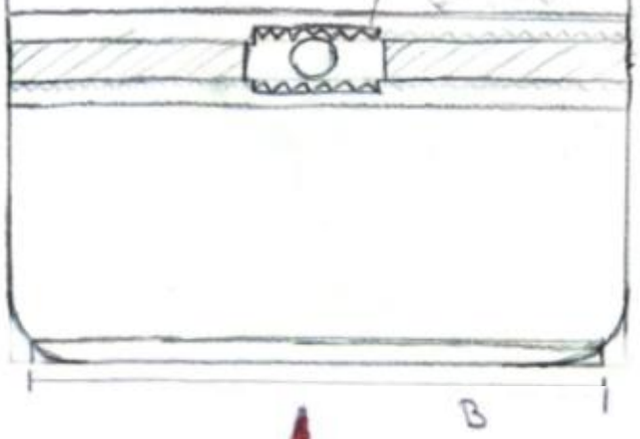
means the contents would have to be stacked

only has 4 compartments

Ideas following on from feedback:

- A better handle for the doors
- Transparent doors so the contents can be seen
- More segments within the storage for organisation

Gap in guide channel allows for connection between the cog and the pannels



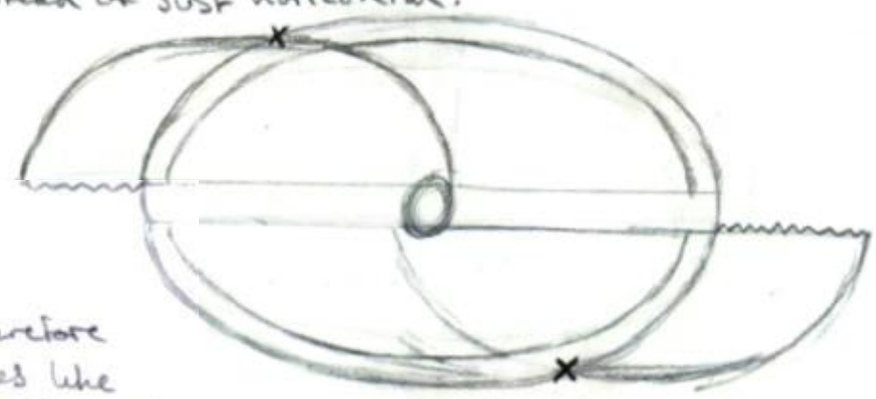
If no guide channels were used, the pannels wouldn't slide of stay in the shelf.

Guide "B" is needed at the end of each pannel too

The channels will only work with pannels that are flat

Therefore shapes like an ellipse wont work

when using this shape, the guide will be bent. This means the pannel would move both vertide and horizontal, instead of just horizontal.

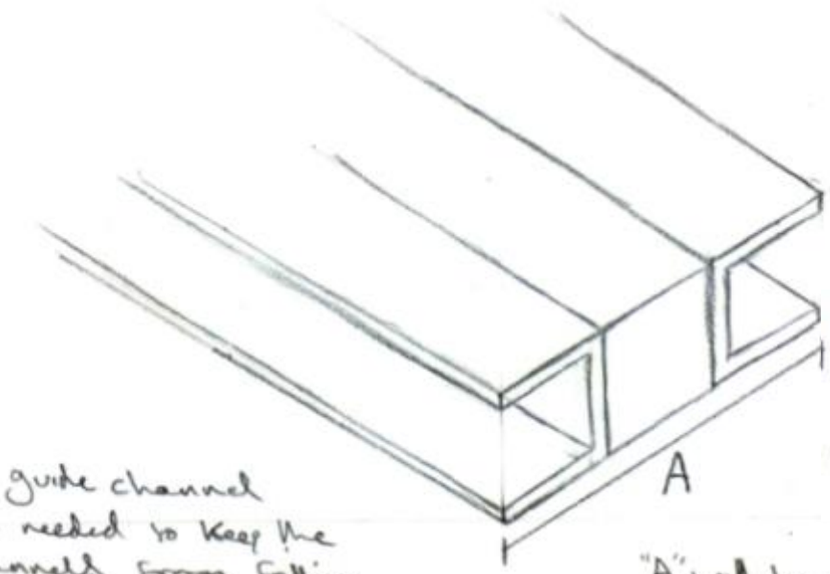


The shape needs to be almost rectangular

This is how the guide channels will look on the pannels

Manufacturing Theory

This page is to show how some aspects of the product will work.



Guide channel

A guide channel is needed to keep the pannels from falling out

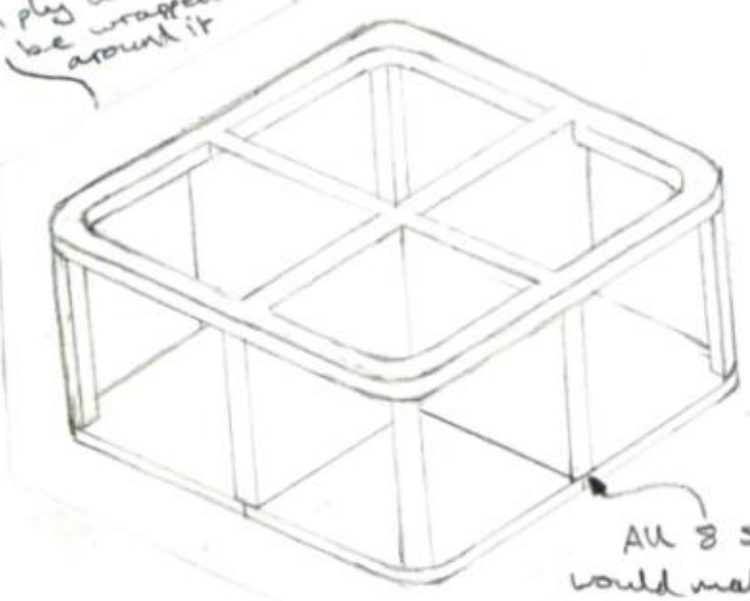
Allows them to move smoothly

"A" will be in the middle of the shelf, to hold both pannels

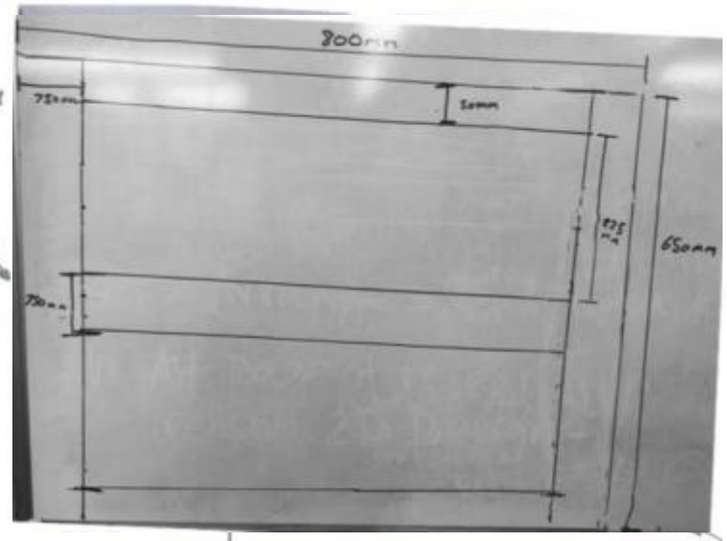
This would be the frame of the shelf

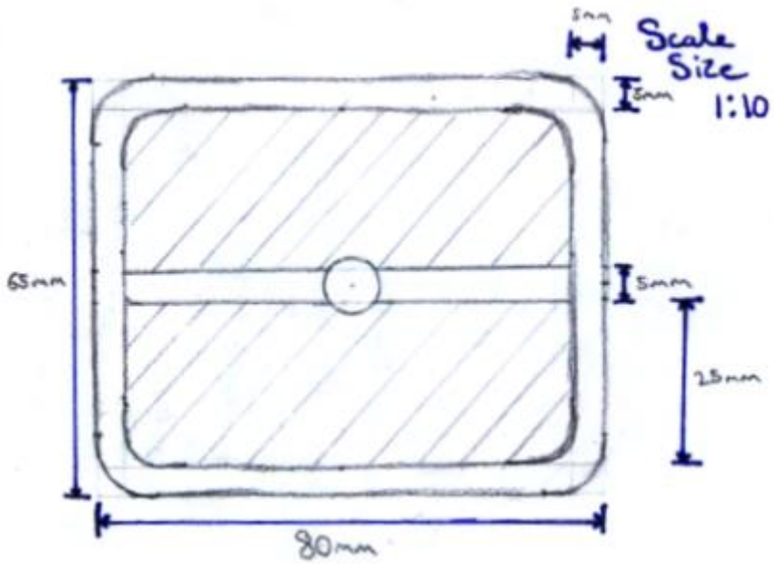
Flex. ply would be wrapped around it

gives the product a smooth shape finish



All 8 supports would make the product sturdy





This is a Scaled down drawing to better show the Shape of the product

O = overall
P = panel

O height = 650mm

O Length = 800 mm

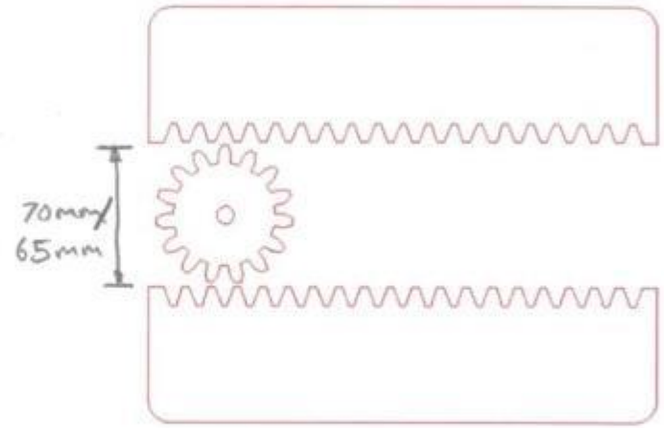
P height = 225mm / 250mm

P Length = 800 mm

This is because the teeth of the panel need to be taken into account

The overall cog size is smaller than the mechanism cover, which is 75mm.

Scaled drawing



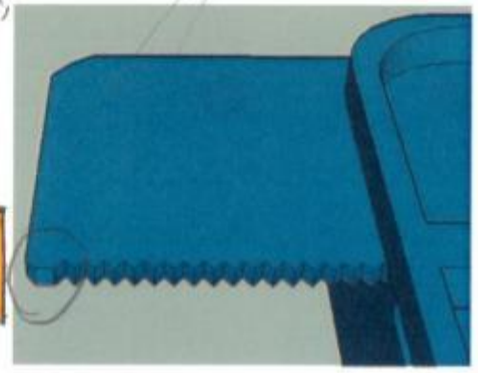
The mechanism in the hole Punch is used for paper guides So the user can punch the holes central

The teeth on the rack and pinion have to be perfect and made Specifically for each other

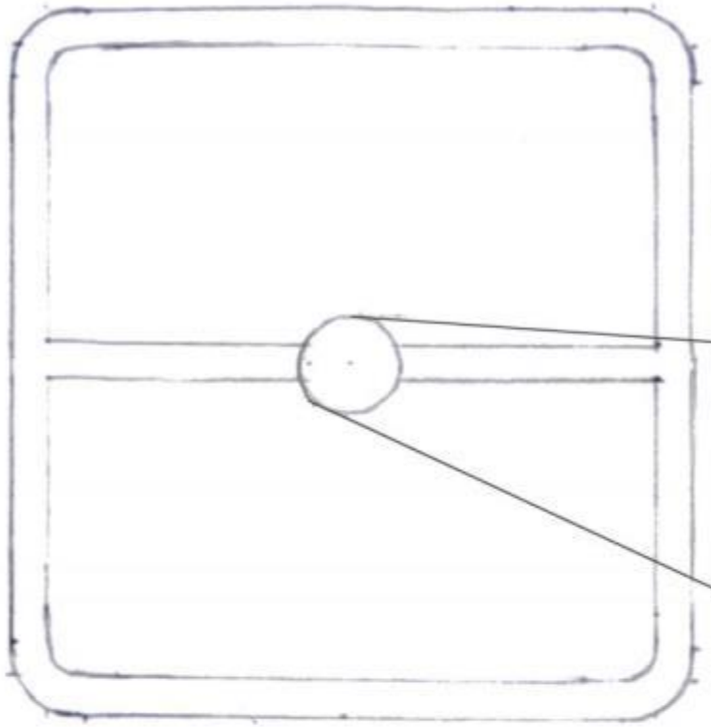
The whole idea for my shelf came from using this hole Punch

When devising the mechanism, I looked at the hole punch for inspiration

The cog won't be able to get past this point



Development 1



A smooth handle would be difficult as your hand might slip when turning it

E3

Tiny grooved would provide grip to the user as there would be more friction

Each indent would fit and secure the finger of the user, this would improve the ease of use as the fingers wouldn't be able to slip

Putting handles on the panels is another possible method for opening the shelf.

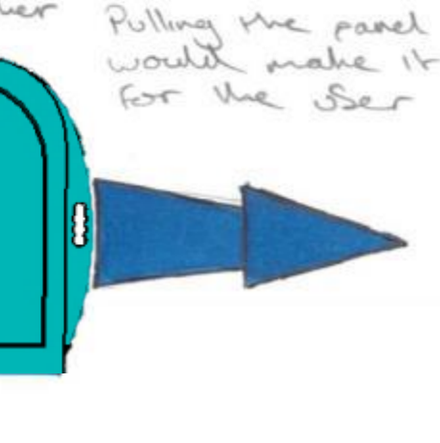
This gets rid of the need for a handle

(reduces manufacturing

E3

F3

AlSo makes the mechanism seem more magical as pulling a panel one way makes the other move the other way



An ingroved pattern would not only improve the friction, but also make the product look nicer

A2

F3

The inspiration for this development came from the retro telephones that had finger holes to turn the mechanism

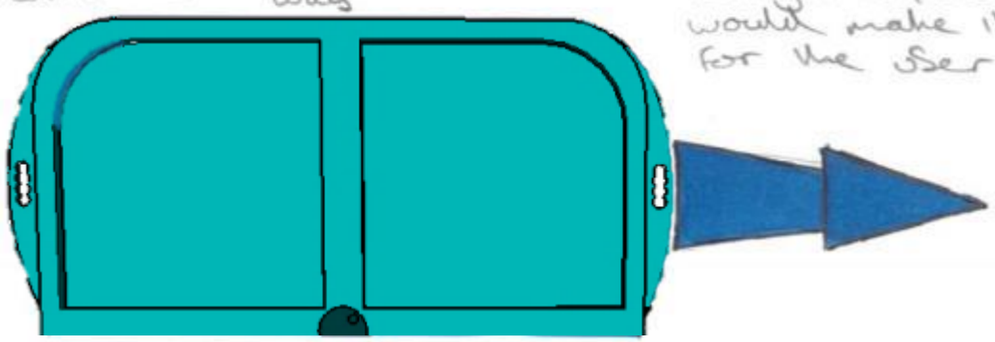
children like to put their fingers in holes

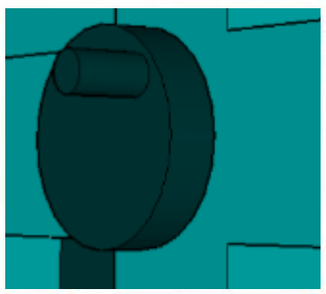
F1

Smoothing the handle into the panel makes it blend in with the product more

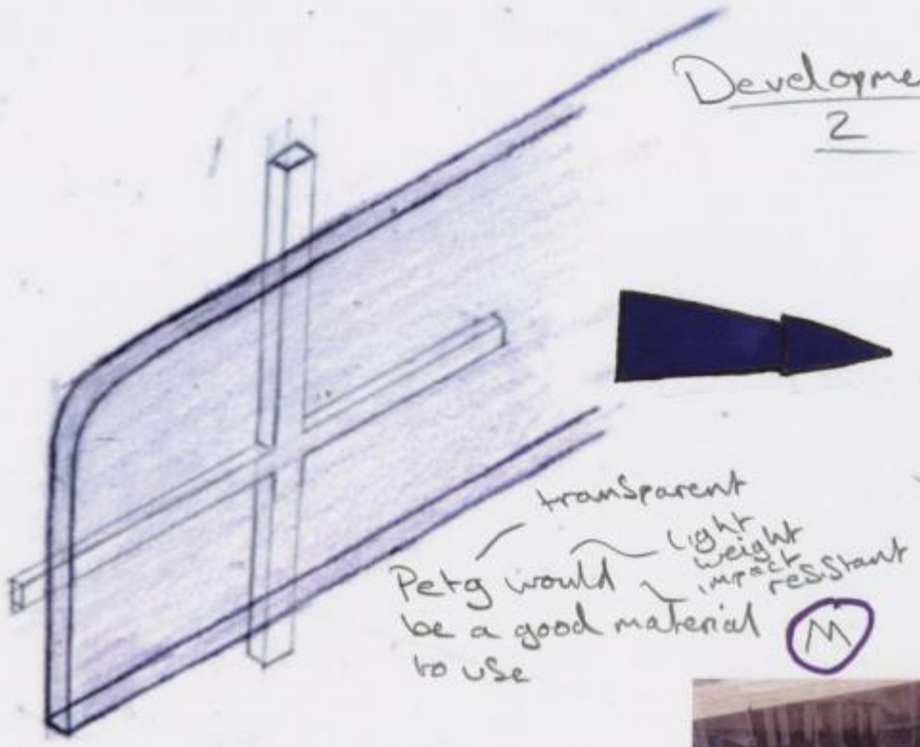
A2

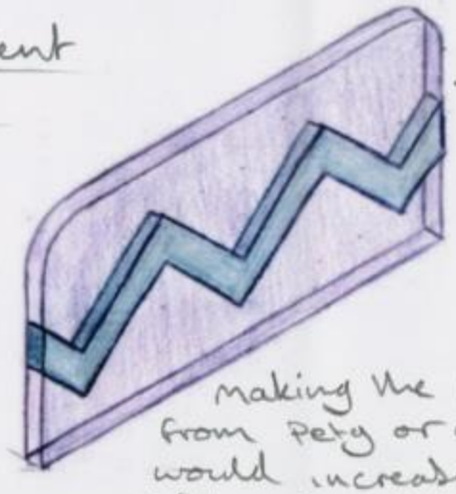
Pulling the panel would make it easier for the user





Development 2





a range of different panel designs

C3

Making the panels from Petg or acrylic would increase the cost quite a bit

C03

transparent

Petg would be a good material to use

light weight

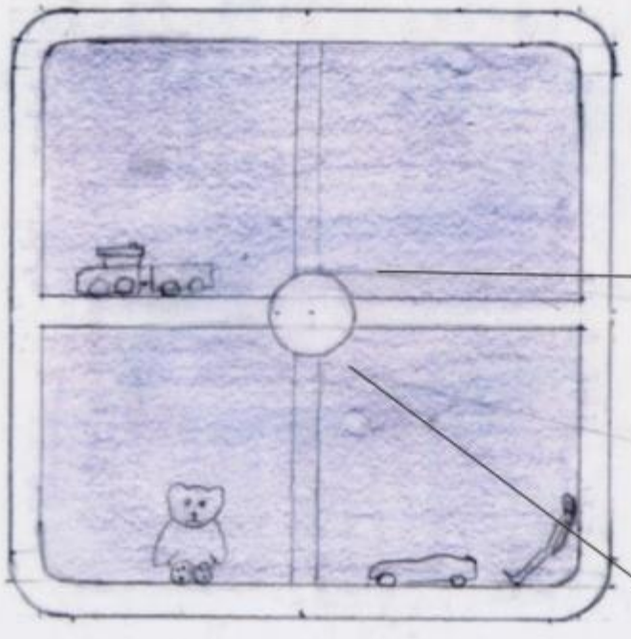
impact resistant

M

Semi-Transparent panels allow the user to see what's inside each segment

clear Acrylic

This shows that the contents are protected but can be seen at all times



Being able to see which toys are where would save the user the hassle of looking through each compartment.

C2

The mechanism is still covered up for safety

S3

F3

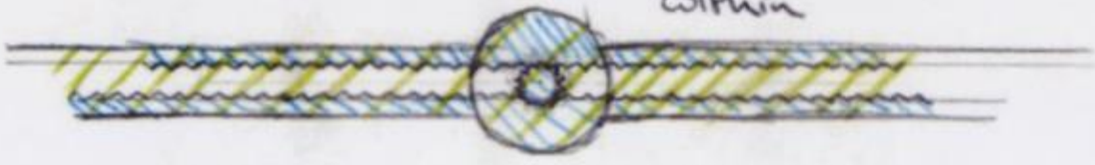
C2

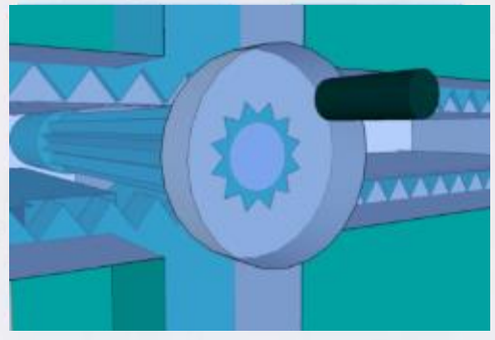
Seeing the mechanism inside would be interesting to the user as they can see and learn how it works

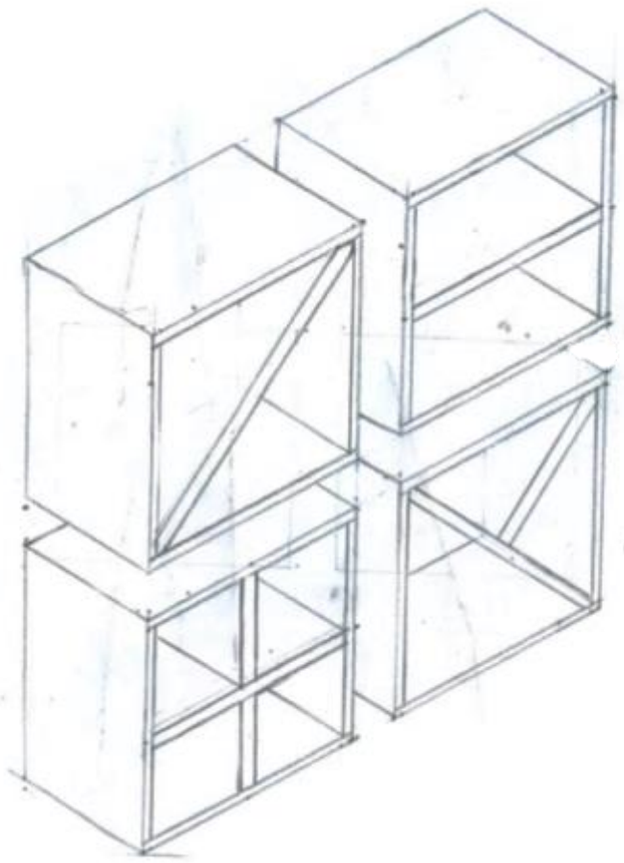
= Protective cover

= Mechanism

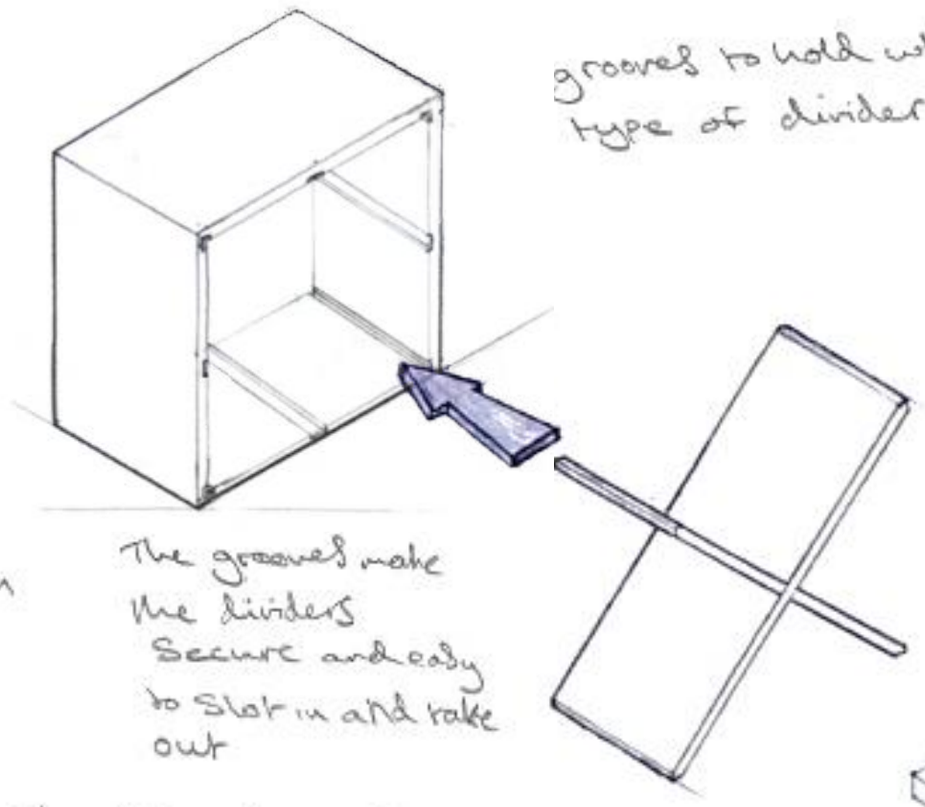
transparent so the user can see the mechanism within







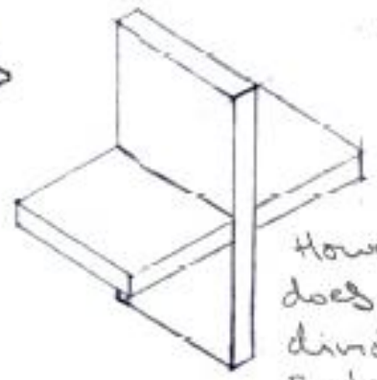
grooves to hold which ever type of divider is chosen



The dividers would be premade, which means there would still be limited options

The grooves make the dividers secure and easy to slot in and take out

ion

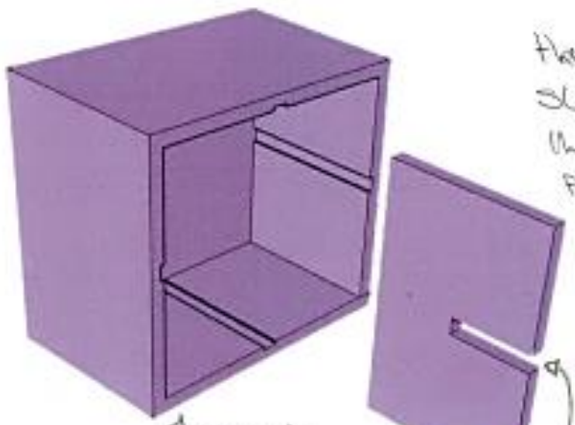


However, this does allow the dividers to be switched to the best combination for the user (C2)

was to have 4 different set dividers that would not be changeable

that the customer can use (S2)

The different variations means the storage can be altered to fit with the contents (F2)

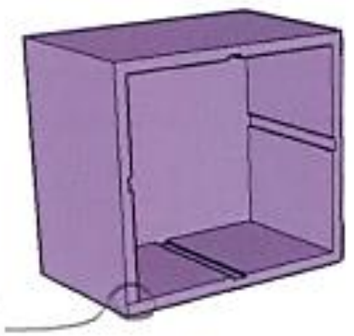


Having pieces that slot together means there are many more possible variations that the user can put together themselves

The only problem is that if only one divider is used, it will have a hole in it

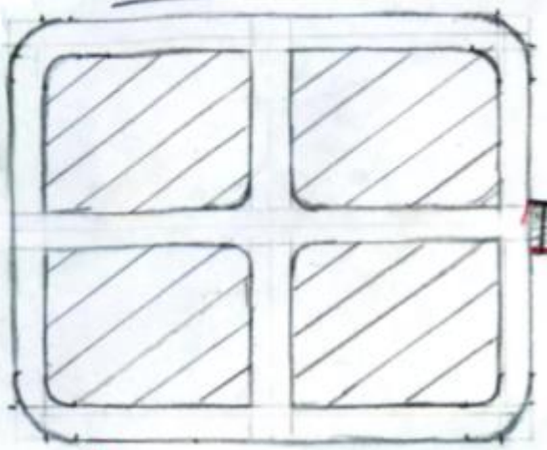
Slotting together pieces reduce the number of parts when having a large number of variations

The corner grooves were deleted as the diagonal dividers would be secure when the slot into the corners anyway (E3)

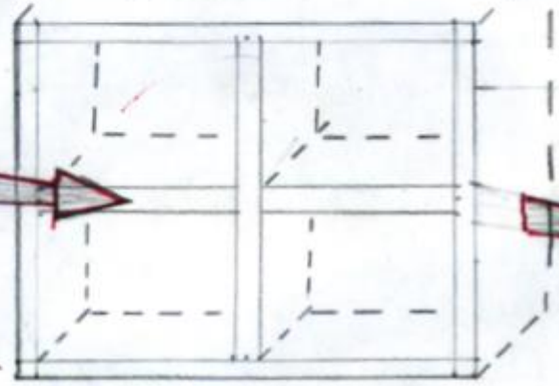


Manufacturing Theory

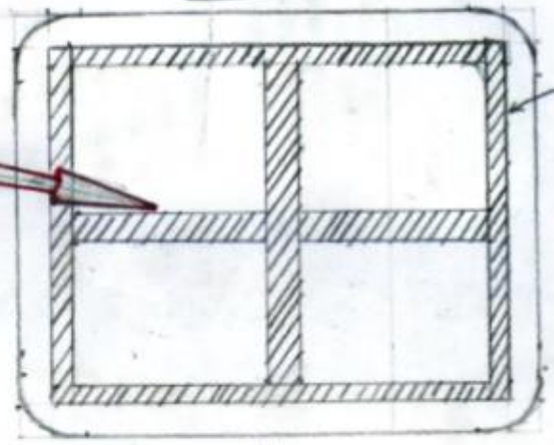
Front



Middle



Back

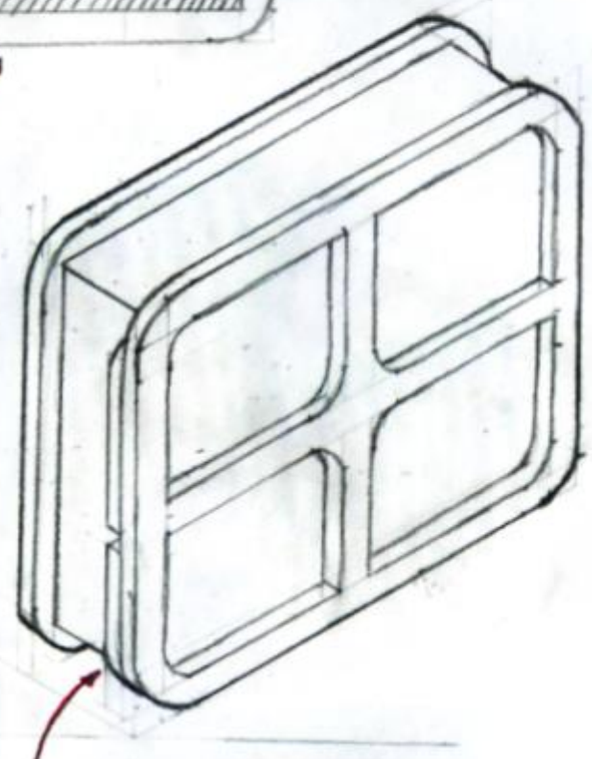


There is a groove for the middle piece so it would fit in perfectly to the right place

There middle piece is not Square to help with the fitting of the compartment dividers

This Square middle will also make manufacturing a lot easier

The front piece will also have grooves on the back, to aid the alignment when putting the product together



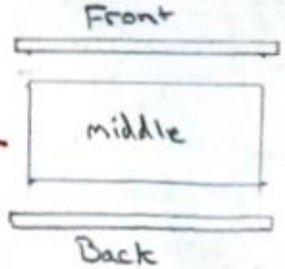
The front of the Product has also changed but for aesthetic reasons

After manufacture has finished, the edges can be Smoothed off

Old design

When my class was asked, which front they prefered, they chose the new design over the old one

The new design shows that the Storage is Split into four segments.



Held together using PVA glue

The middle fits into the groove on both the front and back piece

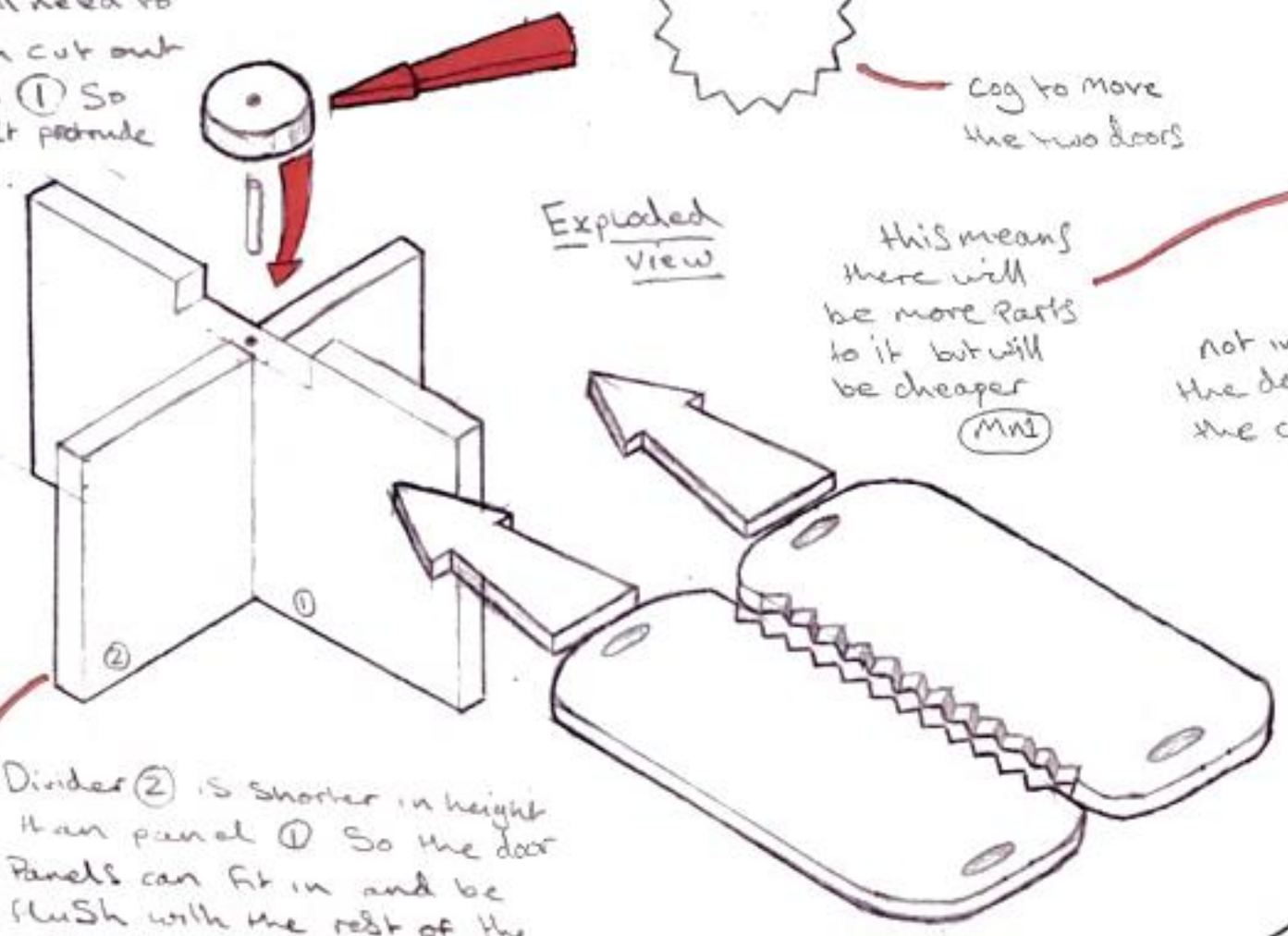
This makes them hidden, yet easy to get hold of

The Panels extrude to the edge of the Product front

There will need to be a Section cut out from panel ① So the cog doesn't protrude the dividers.

Cog to move the two doors

Exploded view



this means there will be more parts to it but will be cheaper (M1)

Due to not having access to big manufacturing systems, such as blow moulding, everything will be made from MDF using a 3D router (M2)

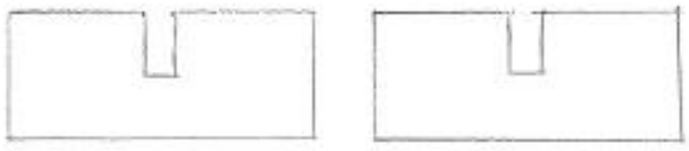
not including the doors and the cog

made of 6 pieces

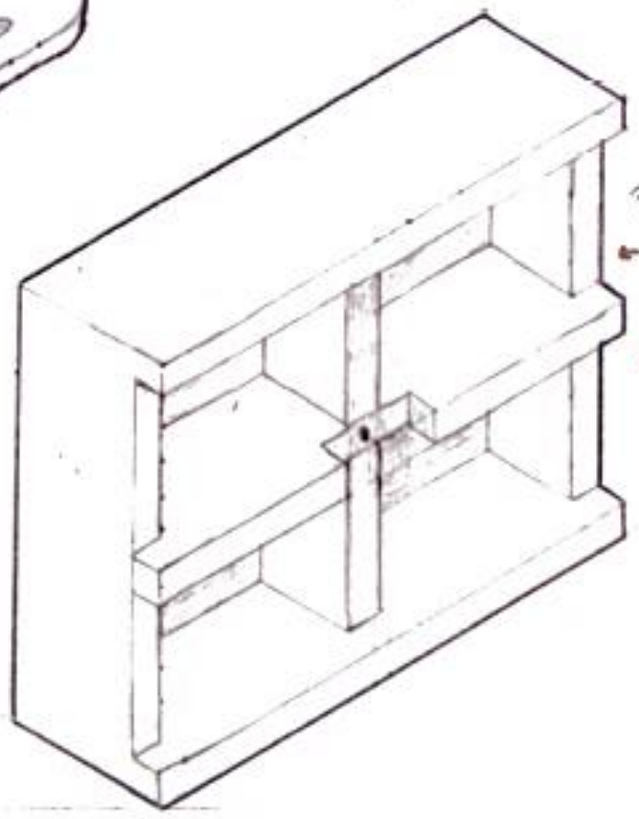
This is the middle section of the product

Divider ② is shorter in height than panel ① So the door panels can fit in and be flush with the rest of the casing.

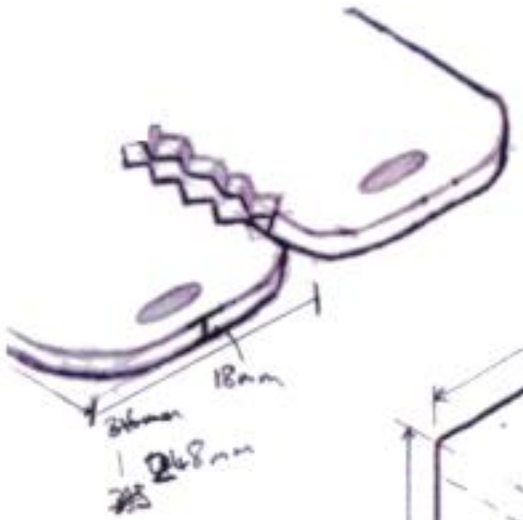
made using two pieces that slot together



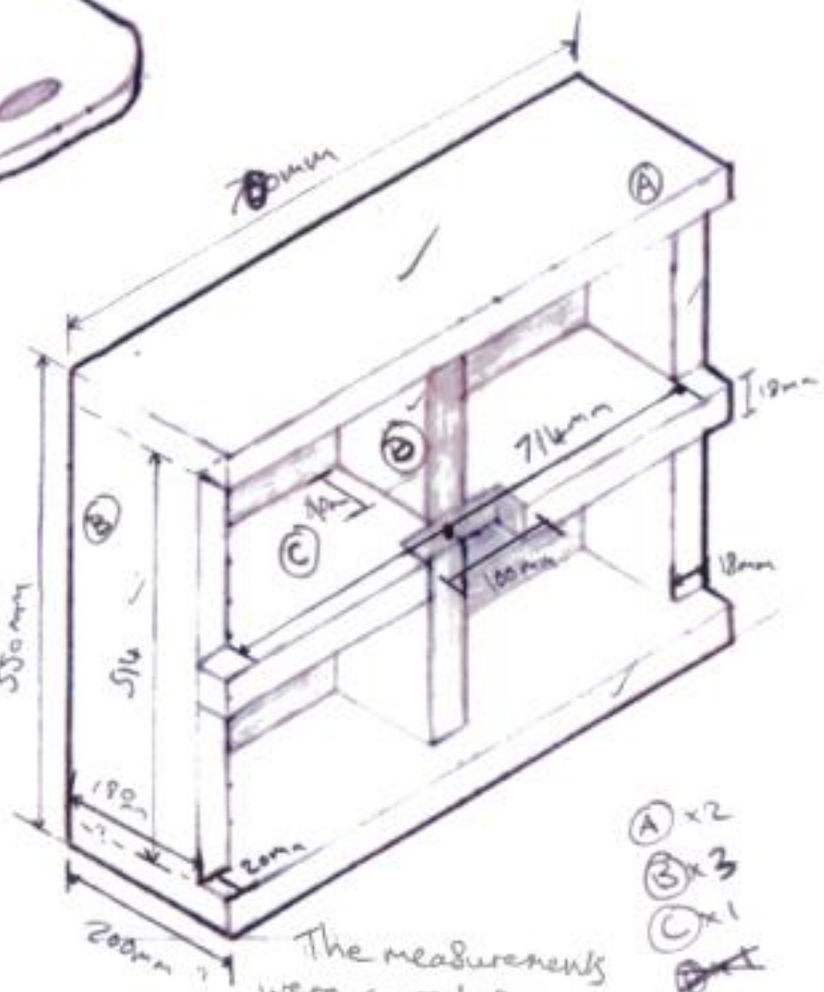
When all pieces are put together, the middle section will look like this



Doors will go in here



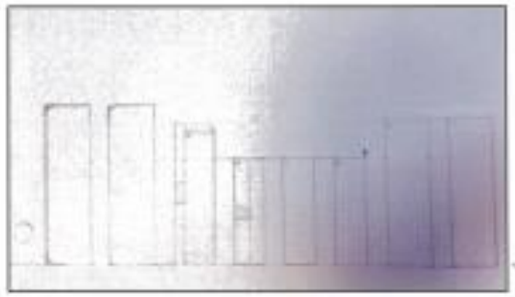
Before I made the model, I decided I had the measurements for everything



A x2
B x3
C x1
~~D x1~~

The model was made to a tenth of the size of the real product

The measurements were correct for the prototype but didn't work when making the 2D CAD for the final product.



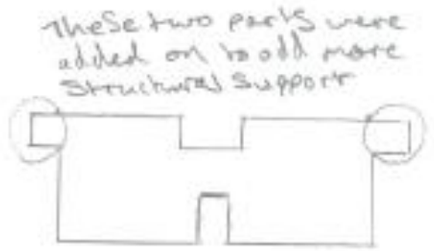
Each piece was drawn to the right size

- referencing the drawing with measurements

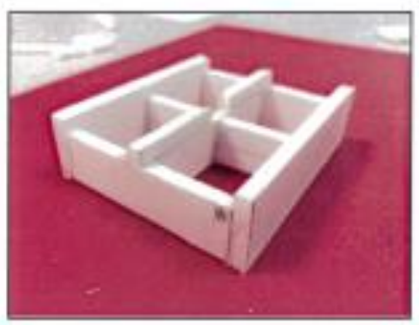
- made from foam board

The first part to be put together was the casing of the middle section, then the dividers

- everything was held together using hot glue



These two parts were added on to add more structural support



Each piece was labled to make construction easier

All of the parts for the middle section were cut out and sanded to make sure it all fits together perfectly →

When the doors were moved, the circle representing the cog also turned like the cog would

- The cog may need to be the same width as the material to let the doors fit in

(This might become a problem as the material is 18mm thick

This could be fixed by making the doors a bit shorter so the cog can extrude

When the front is put on, there will be too much friction between the doors for them to move easily.

When the doors were closed everything was flush which would be a problem for the moving doors

To fix this, I added two bit of Semi-thin card, which would give the doors a bit more room to move freely

The next part I glued on was the bottom. This part had to be lined up with the doors so when they are closed the front, back and doors will be flush

The cog was taken out as it kept coming out of place and could stop the model from moving

Finally, the front was put on. I was glued on to be flush with the the bottom and the doors

the border needed to be thicker to cover up the card used

The front was difficult to cut out, this is why some parts are a bit rough

Everything was hard to line up, therefore in the real product marks will be made to help with alignment

The doors will open as far as the images show

(this is to stop them from coming out of the Product

To get our products manufactured professionally, we are sending accurate CAD to 'Contrax Furniture', which is a company that hires out their CNC router

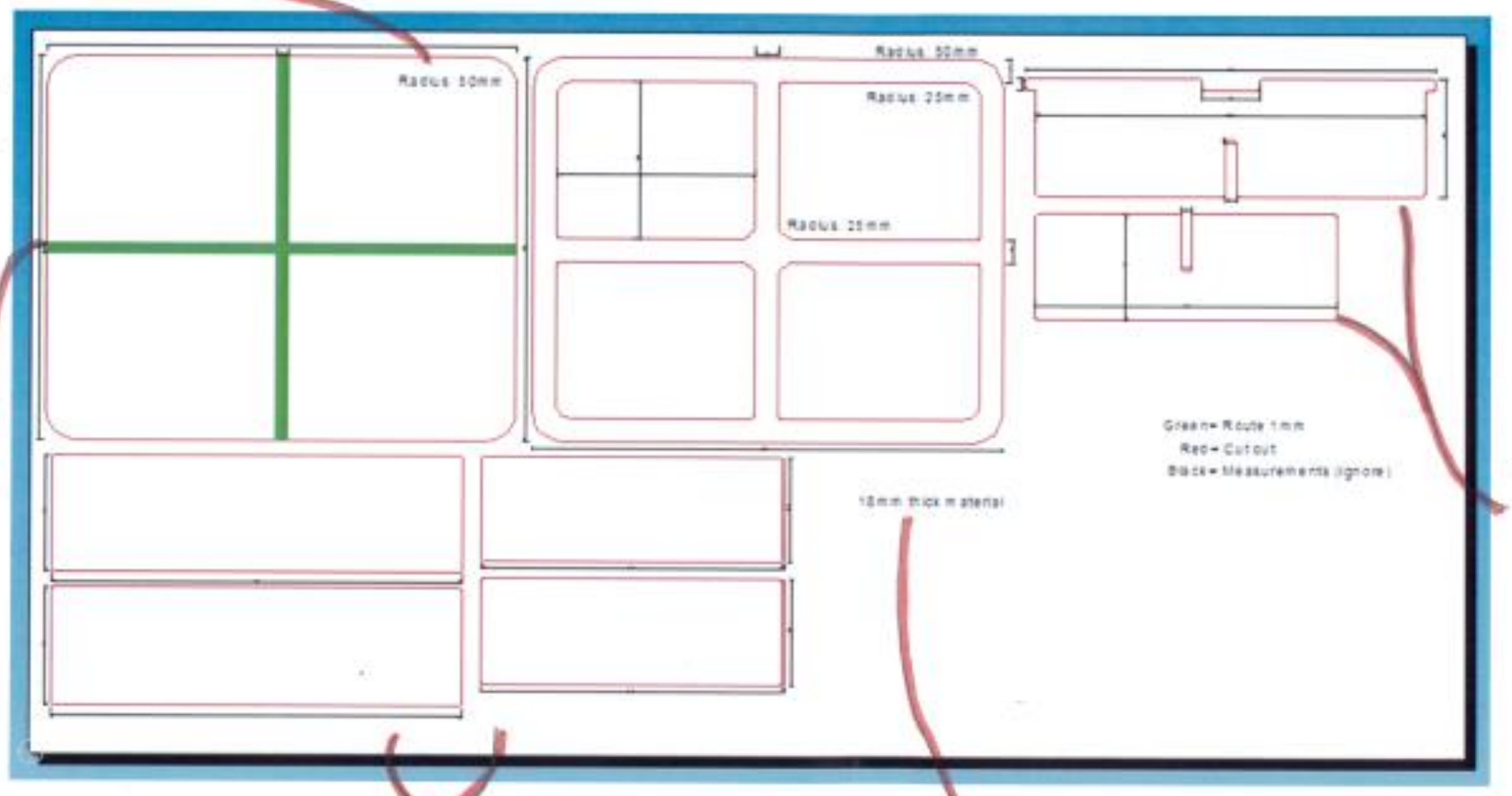
The first drafts of our CAD drawings were sent off to the company so they could check the designs and make any changes needed

The CAD was sent off with detailed, working drawings so the company would understand our design.

the 4 corners of the back and front have a radius of 50mm

When making the CAD, I referred to the sizes worked out on a different page

These were presumed to be correct at the time



The green is engraved so the cross section in the centre piece can be accurately placed on the back

These two will slot together when cut out to make the cross section in the centre of the middle section

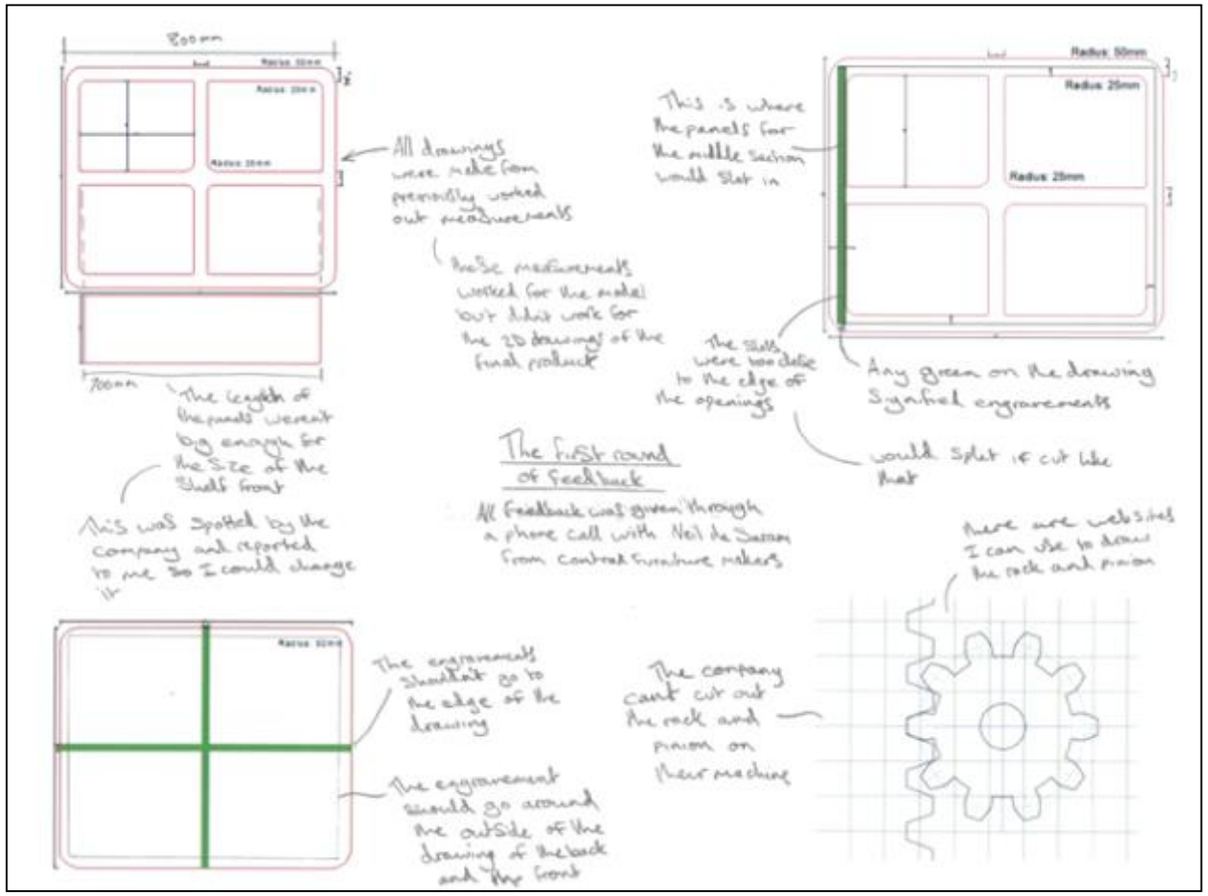
These four rectangles are what would form the middle section to my design

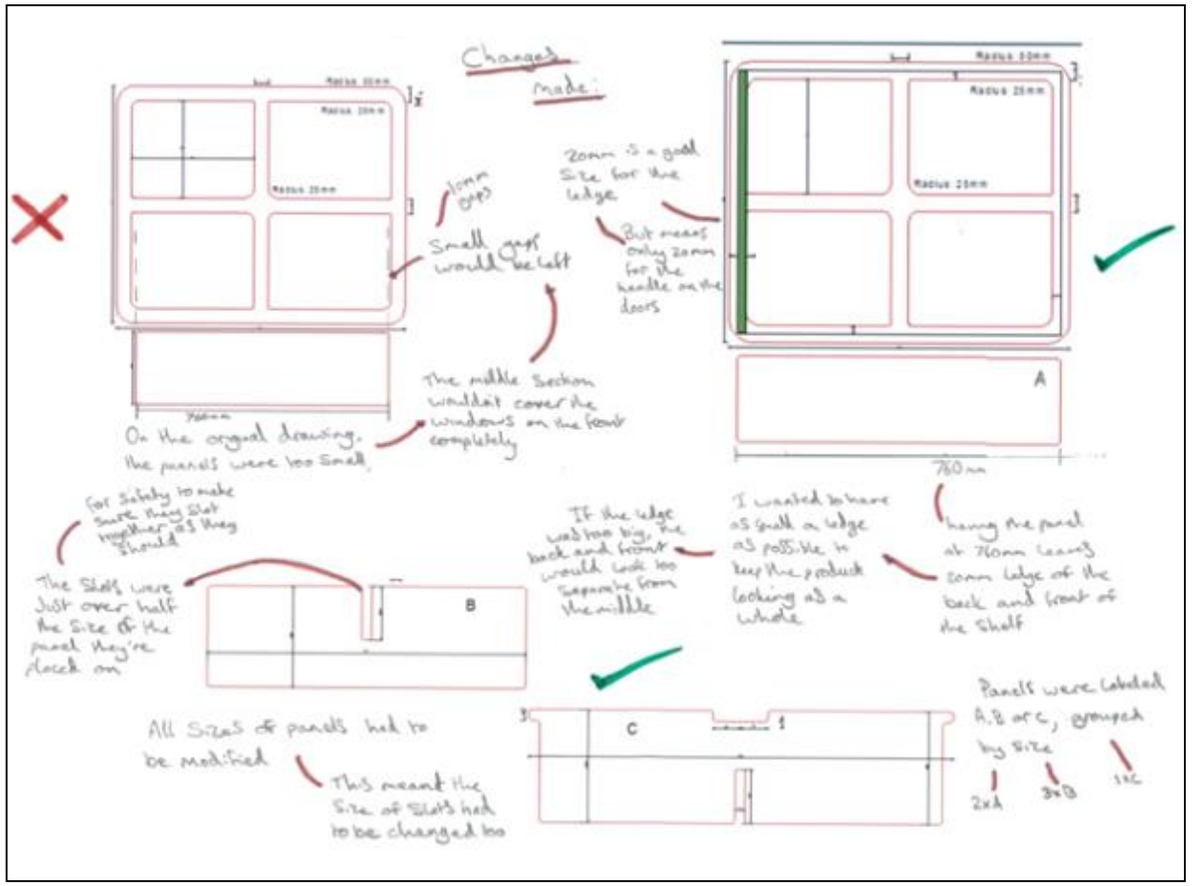
All material used is 18mm thick

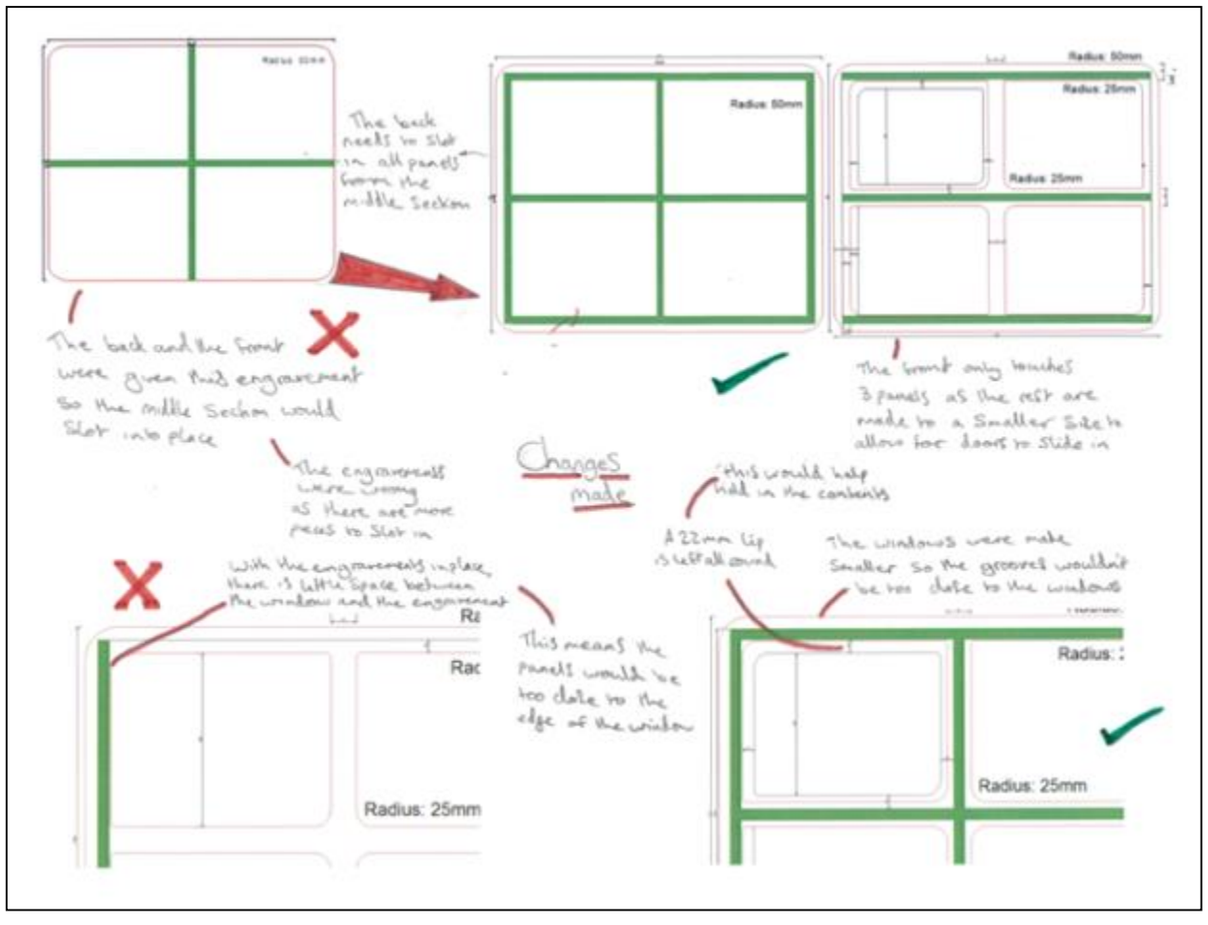
This has to be accounted for

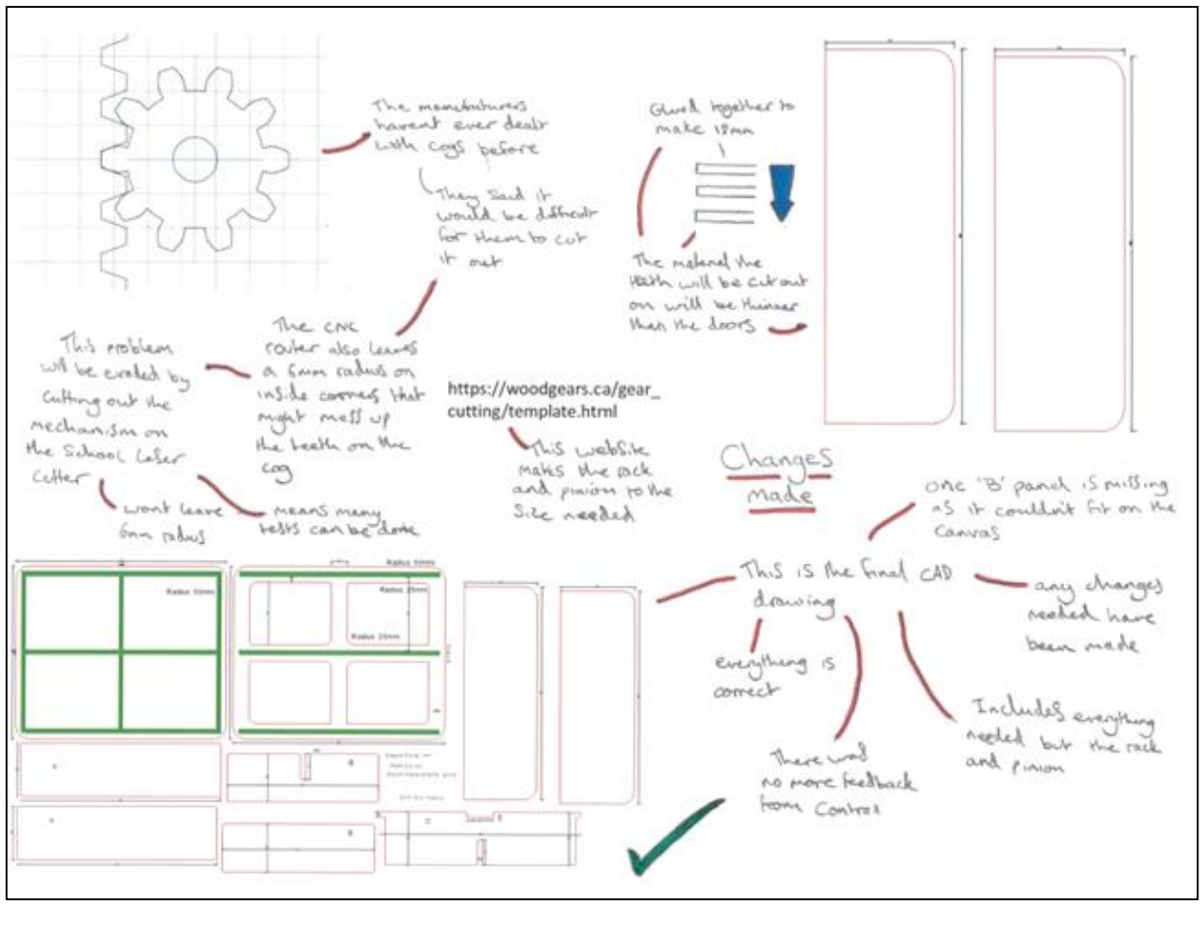
At this stage I hadn't added in the doors or the cog as I needed to ask them if their company was capable of cutting out the teeth

All changes made to the CAD drawing





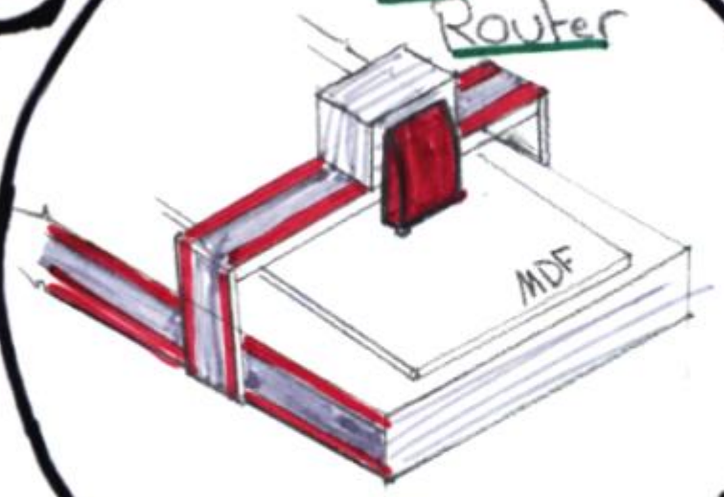




Stages of Making

1

CNC Router



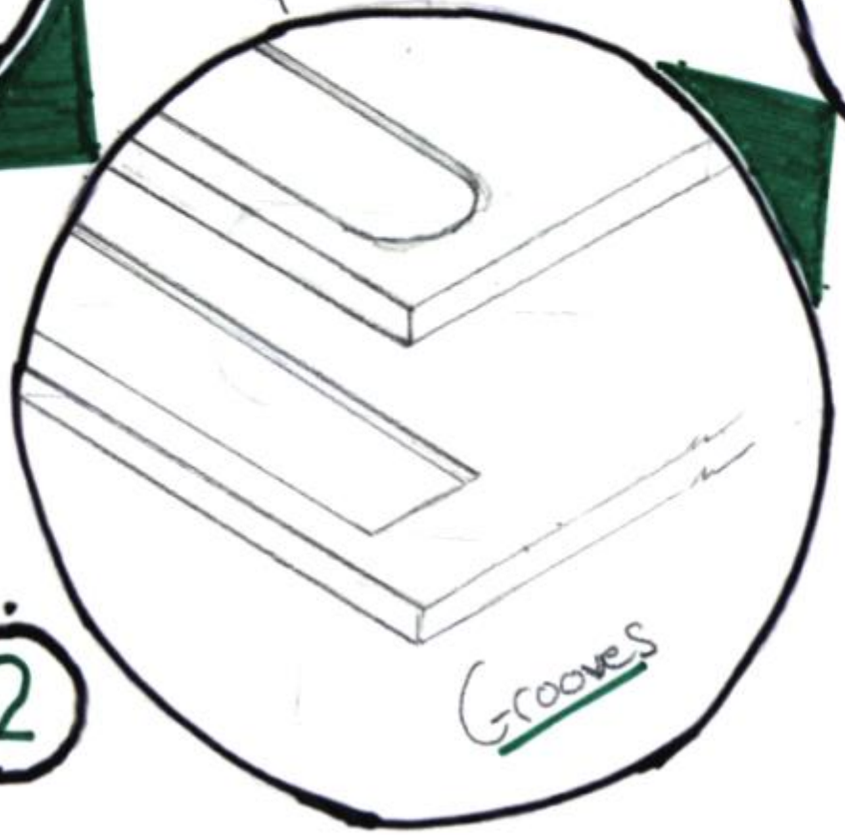
All 2D drawings are cut out on a CNC router provided by a local company

Contrax furniture

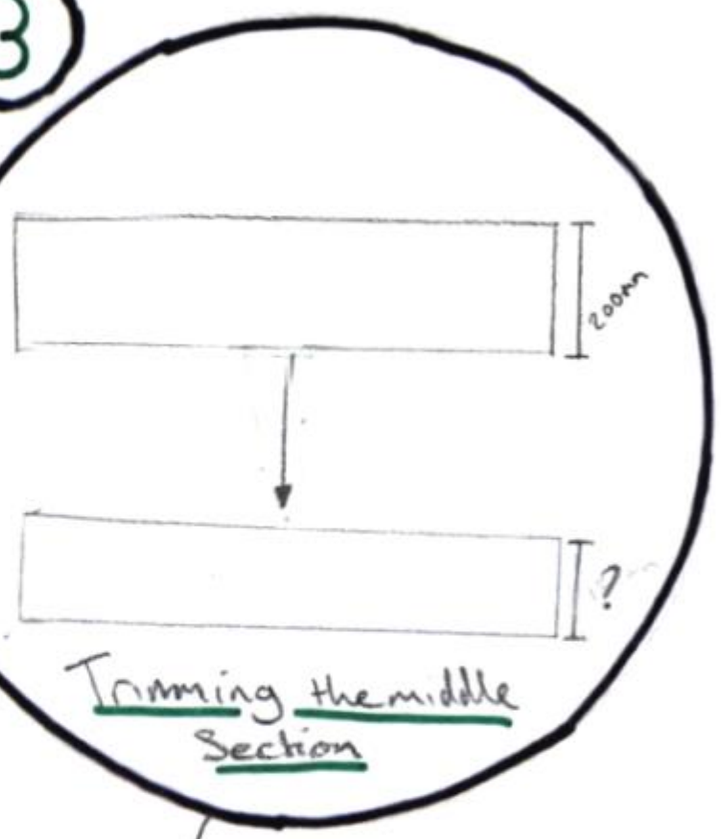
Allows for any panels to be slotted in

The CNC Router leaves a 6mm radius on any inside corners, which will have to be squared off

2



3



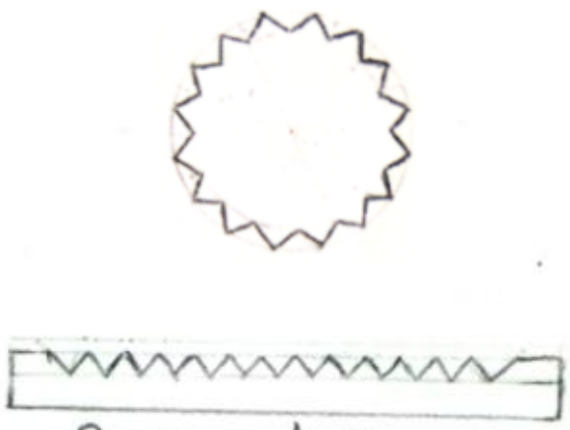
Trimming the middle Section

The middle panels will be taken down to a suitable height so the overall product isn't too thick

Current size might look chunky

Stages of Making

4

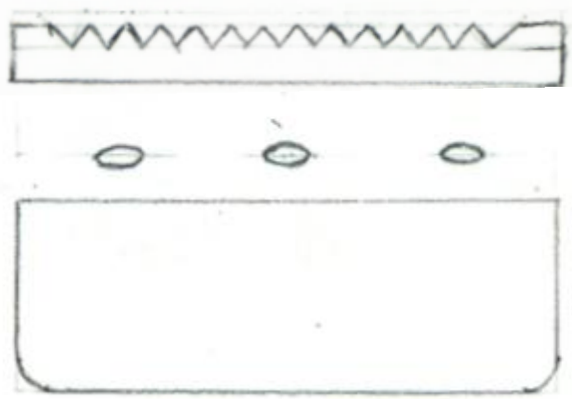


Rack and Pinion

The CNC router at Contrax can't cut out the teeth for the mechanism

Instead, the rack and pinion will be cut out at School on the Laser cutter

5



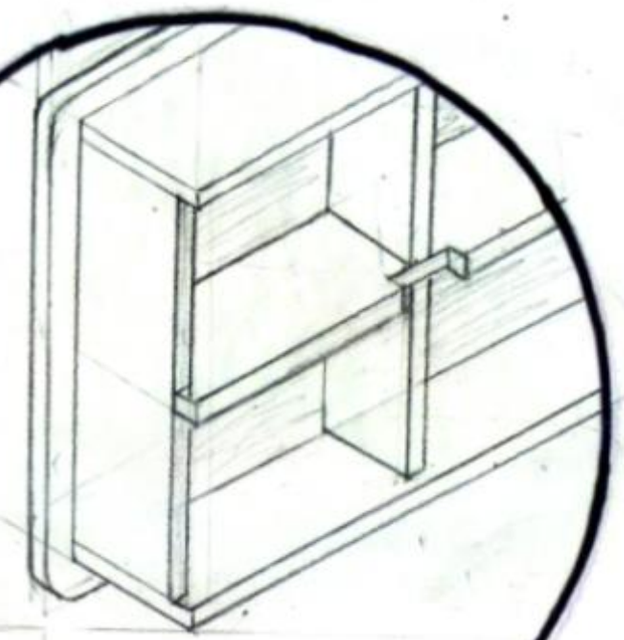
Doors

When the rack and pinion have been cut out, the teeth have to be stuck onto the doors

Biscuits will provide more support

using PVA glue and biscuits

6



Back and middle

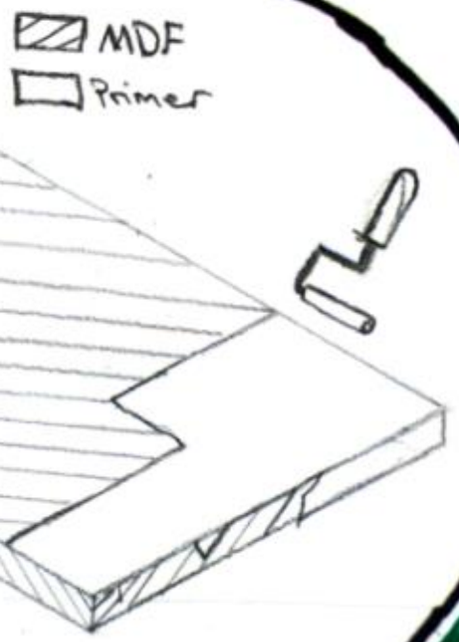
The next step is to fix and glue together the back and the middle section

Using PVA will slot into grooves

This will allow me to put in the pinion before the front gets put on

Stages of Making

7

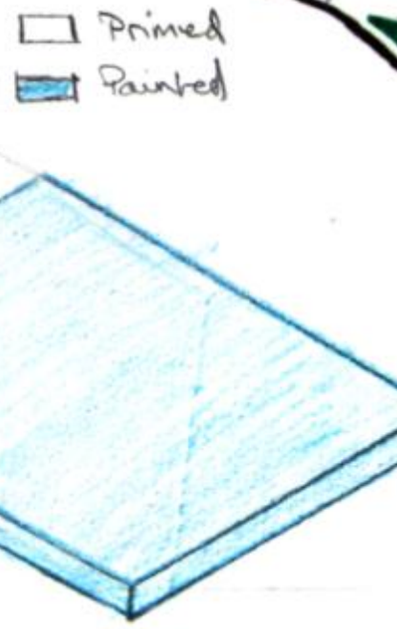


Priming

All pieces to be painted need to be primed first to allow the paint to be put on

Needs to be smooth before painting

8

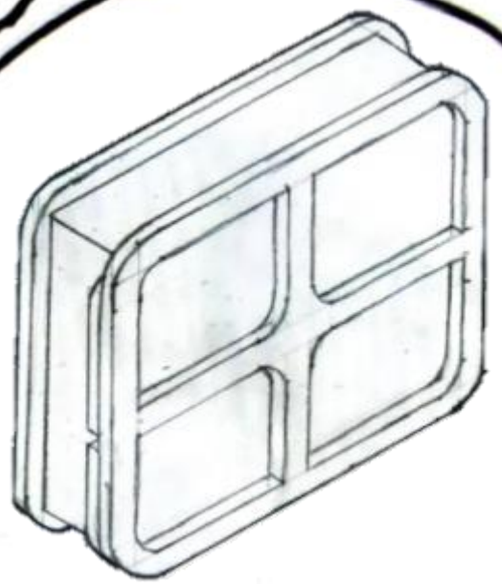


Painting

At least 2 coats of paint put on

Painted in two different colours, which colour goes where needs to be figured out

9



Putting it all together

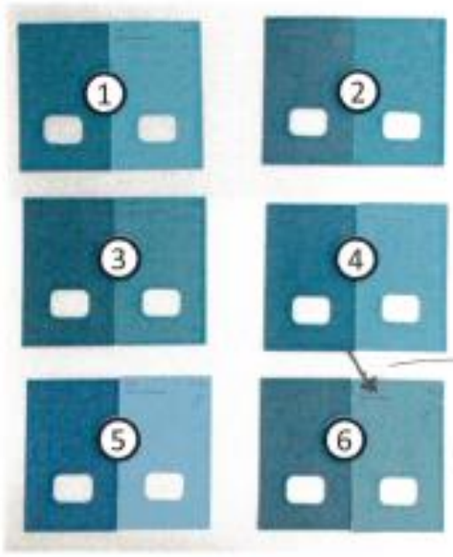
Most pieces will slot together but will still be glued for security

Screws may be used some places to hold together parts

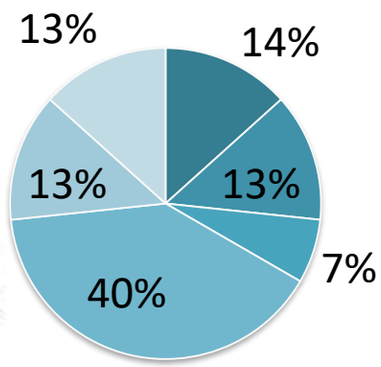
I went to B&Q to pick out some paints

They had a huge range of choices to which I chose my favourites so I could ask different people which I should use

I asked 15 people to choose their favourite combination of colours. The favourite pair was number 4, therefore I had these paints specially made.



2 people suggested mixing pair 4 with pair 6



Primer had to be used on the MDF first

make sure the paint works it's best

2 layers of primer

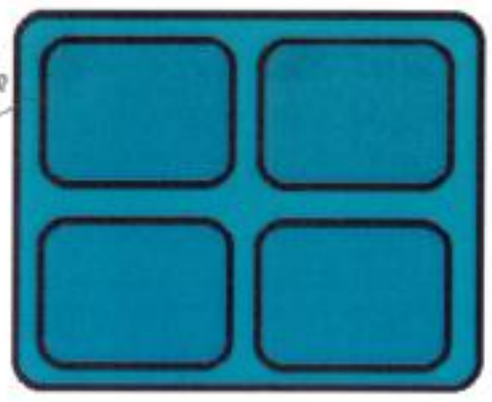
Satinwood, water based, quick drying

The paint was specially made so I could get these colours, along with the correct properties

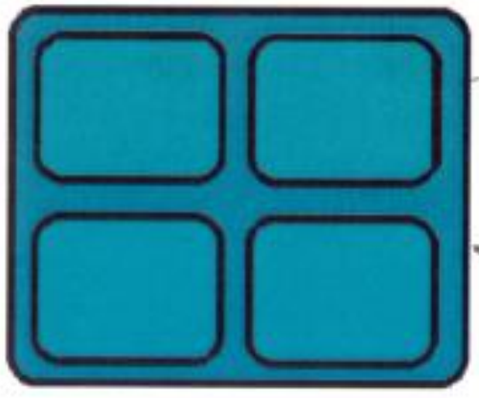
Combination 4 got 6 votes in total, therefore this is the paint I went with

3 layers of each

These two images were made on paint so I could see whether the product would look better with dark paint on the inside or outside



dark on the inside



dark on the outside

I eventually chose this one as the contrast is clearer

A roller was used to put on the paint

a roller with small hairs was suggested as it gives the best finish

Making Stages 1, 2 and 3

① 

Sheet of MDF on a CNC router

① 

All parts of the product cut out apart from the mechanism

① 

A deeper incison was made so the two pieces could slot together more easily

① 

This was the product when all slotted together

② 

The CNC router left a 6mm radius on corners - these had to be cornered off

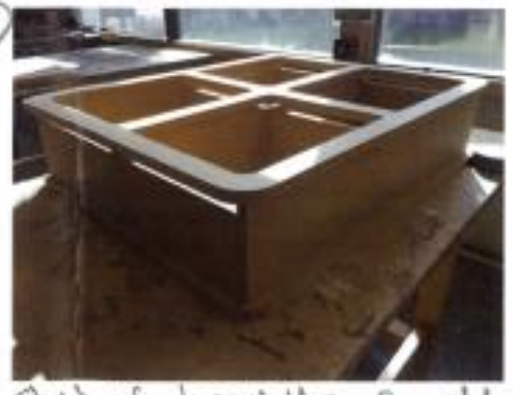
② 

③ 

The product was too thick, therefore 5mm was taken off of the middle section

③ 

The circular saw cut the 5mm off all pieces used in the middle section

③ 

This is how the smaller version looked

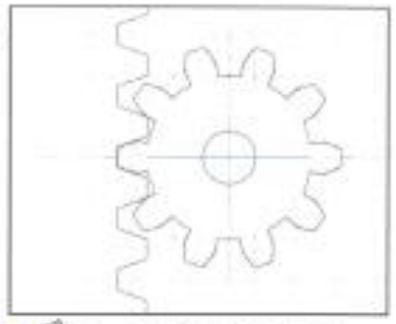
1. Contrax cut out my 2D drawings on a CNC router. The total cost of this was €165. The CNC router left a 6mm radius on inside corners, this lead to Stage 2.

2. The 2D drawings were designed for all parts to be slotted together. However, the 6mm radius stopped this from happening. Therefore, I used a chisel to straighten the corners so the whole product would fit together without glue or nails.

3. When the whole product was together, it was too thick to be put onto a wall. I asked others if they thought the size should be reduced, to which they agreed. Therefore, I used children's toys to see how much I could reduce the size by.

Making Stages 4, 5 and 6

④

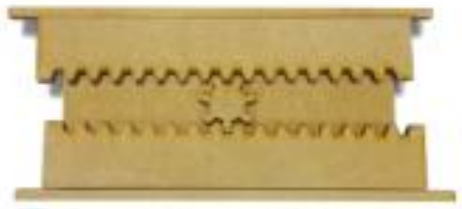


The cog system couldn't be cut out on the cnc router

④

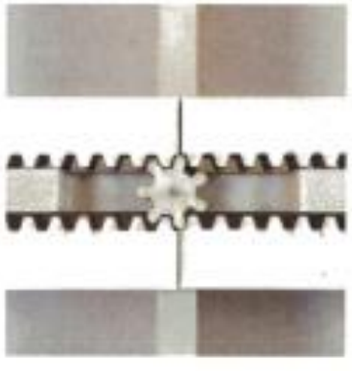
I tested 3 different sizes of the mechanism. The middle size fit best in the product

④



I put the prototype mechanism together with stoppers to mimic the final product

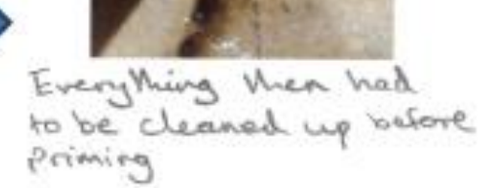
⑤



The teeth were layered 6 times to match the size of the doors (18mm)

Everything then had to be cleaned up before priming

⑥



The middle was then glued to the back piece

⑤

The layered teeth were then glued to the doors using Pva and Sash clamps

⑥

Some Slots Still wouldn't fit together

⑥

All corners and slots were filed and Sanded so the slots would work

⑥

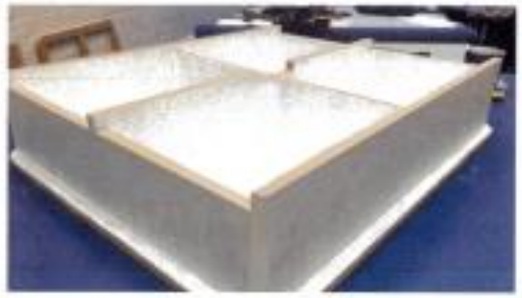
4. Stage 4 of making was based around the figuring out of and cutting out the mechanism. I found a website that matched the rack and pinion teeth together. The mechanism was cut out on the Laser cutter 6 times each to get to 18mm thick

5. When the mechanism was cut out, they were all glued together and then glued to the doors using Pva glue and Sash clamps. After being glued the doors needed to be sanded to make the teeth flush with the Runners

6. The 6th stage of making consisted of gluing the middle part of the product to the back. Some cleaning up then needed to be done before priming started, such as corners being sanded.

Making Stages 7, 8 and 9

7



I Started the priming with the middle and bottom Section

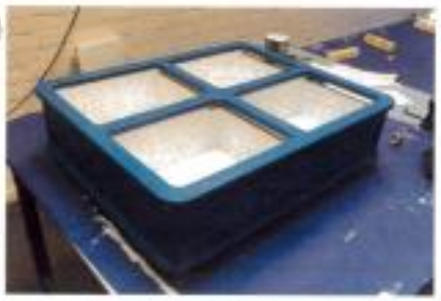
7

All pieces primed had to be sanded lightly then primed a second time to get a Smooth finish

7

The whole products had been Primed, apart for bits that wont be Seen

8

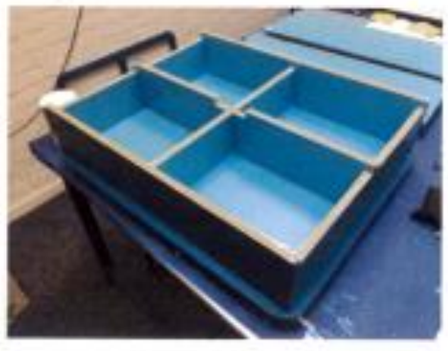


The outside was first to be painted, in dark Cyan. All surfaces were Given 3 coats for a Solid finish

8

Paint was chiselled from the under side as it left marks on the doors.

8



The inside and the doors were then painted light blue

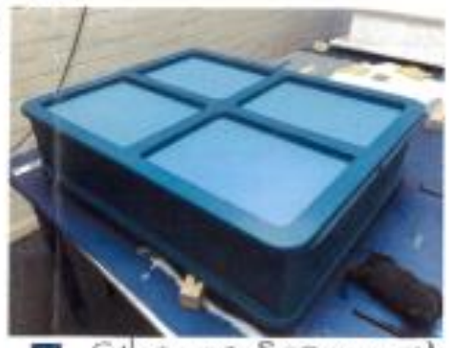
8

Some paint leaked between the teeth, therefore I used a chisel to remove it

9

All had finished being painted. Then was put together.

9



Silicone Spray was used to reduce friction between the doors.

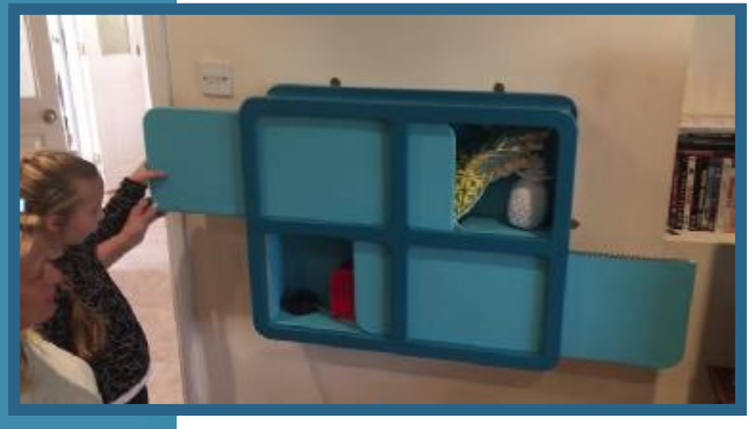
9

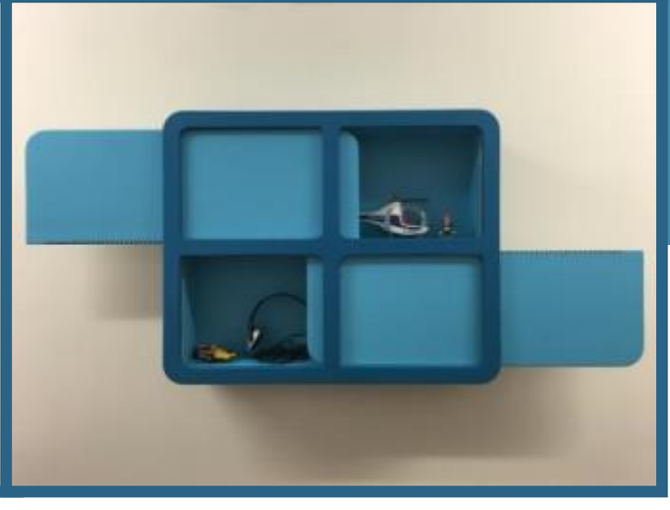
7. Before Priming could Start, all edges had to be Sanded and rounded off so they would be Smooth. After the first layer of primer had gone on, edges were Sanded for a Second time to get rid of any roughness. The Second layer of primer would then go on.

8. The outside was painted first as it is all the same colour. 3 coats were given for a Solid finish. The inside was painted next, along with the doors. Both were only given 2 coats as the finish was already as wanted.

9. Stage nine was the last Stage of making where everything was put together. The paint on the doors caused too much friction, therefore I tried to use wax to reduce friction. This didn't work so I used 3 in 1 Silicone Spray, which did work.

Final Product





Marketing and Presentation

Selling Point:

Every product needs a selling point that will stand out and appeal to its target market. Without having something that will make it different to other products, it wont sell. The aspect that makes my product different is the **mechanism** inside it. The mechanism makes it different to any product I could find on the market. The method of accessing the contents of the product is very original as you pull one door out and the other does the same but on the other side. What makes this product even more unique is the **mystery** of it. The mechanism is unknown to the children that use it and is therefore seen as **magic**. One thing a lot of children like is **a place to hide their favourite items** so that no one else can get to them, this product offers that as the handles are hidden so anyone who hasn't used it before will struggle to figure it out. All of these aspects make the product appeal to the children that would use it, however the function of the product would also be a selling point to the parents who would buy the designed product. The function will act as **an incentive for kids to tidy up their toys** as they get to have **fun** while doing it, the different segments would also offer **organisation** which would also appeal to the parents.

4P's of Marketing:

Product: The product might not be clear as to what it is at first glance to the user, therefore it has to be made very clear as to what the product is, what it does and why it is different. Stating all of these will make it more sellable to the user as they will understand what it is and why they should buy it.

Price: The price of a product is a big deal to the customers, is the price is too big they wont buy it and will be scared off, therefore the price has to be just right. The price of the final product has to take into consideration three things, the target market, the cost to make the product and the amount of profit wanted/needed. The target needs to be thought about to know what sort of price they would be able to afford. The cost to make the individual product needs to be thought through too as the price needs to be somewhat higher than the cost so that profit can be made. This leads to the thinking through of the profit, a decent profit needs to be made so more can be continued to be made with spare money left over.

Promotion: People need to know about the product, therefore it needs to be promoted so people will know that its for sale. Promoting the product will get more people to know about it and in turn get more sales for the product. The more sales made, the lower the price can come.

Place: The place at which the product is sold and where the product will be marketed. The product is a very suitable design for IKEA and Aspace, so placing the product to be sold at either would be good. Advertising the product on billboards might not be the best idea as its not a product you would generally see on a billboard, the best place for it to be advertised would be on TV on a kids show. Social media sites are also a great place for free advertising which loads of people would see.

Packaging:

Due to the parts the product comes in (how they were cut out by Contrax), the product can be flat packed for easy transportation and minimal packaging. Flat packing the product will make it ideal for commerce in IKEA as one of the things they look for is the ability to reduce packaging and size in transportation.

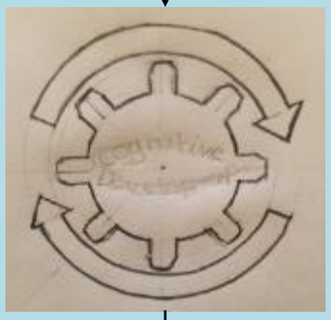
Final Pricing:

The final price of the product takes into consideration the cost to make the item and the general price of products closely related to this one. The amount it cost to make the product came to around £208. This estimate includes the price to CNC route all the parts (£165), paints (£23 each- half used), silicone spray (£10) and any other costs (£10). Looking at prices of similar sized products with the same storage space, the most expensive seems to be £249. This would be good price for my product as it covers the cost to make and leaves £40 profit, however this might not be enough, costs will be raised accordingly.

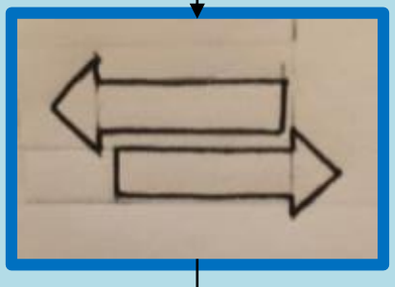
Marketing and Presentation

Logo design

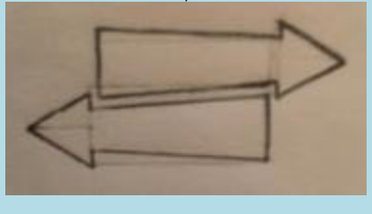
The first idea for the products logo was a cog shape with the company name on the inside of it “Cognitive Development”. The cog shape was chosen as the product designed contains a cog mechanism.



The second design is a development on the first idea. This logo just adds on two arrows that go around the cog, highlighting the movement of the cog when in action.



The logo was then developed again but this time by taking something away from the design, which was the cog. The two arrows were left to mimic the design of the product which has moving doors that work much like the logo. This is the chosen logo as it is the cleanest, simplest and relevant to the product.



Although the logo had been finalised, I tried to improve on the design by adding more shape to the arrows. However, this took away from the tidiness of the logo, which wasn’t good as the logo should resemble the product meaning the logo should be clean and tidy

Name development

First thoughts:

The first idea was to link the name to the mechanism that makes the product what it is, a cog system. The first word that sprang to mind when adding onto the word cog, was cognitive. After discovering that this wasn’t the most relative word the product, I stumbled upon “**Cognitive Development**”. This is a field of study in neuroscience that looks at a child's development is information processing, conceptual resources, perceptual skill and more. This sounded to be more relevant as the product is used to help the users learn to tidy up after themselves. However, this name sounded a bit too sophisticated and long for a storage unit for kids. This name was more suited to a company that would make this sort of product, therefore this has been chosen to be the name of my company to which would make the product.

Product name:

As I was struggling with getting a name for the product, I decided to collect a few words that could describe the product or words that are linked to what the product is.

What is the product in a single word?

- Helpful
- Fun
- Original
- Interactive

What does the product do?

- Move
- Helps tidy up
- Stores toys

Words used to describe the product:

- “Magic”
- “fun”
- “cool”
- “awesome”

Here are some of the names I came up with that incorporate or link to the words above:

- KeepTidy
- MagicStorage
- FunClean
- **PlayTidy**

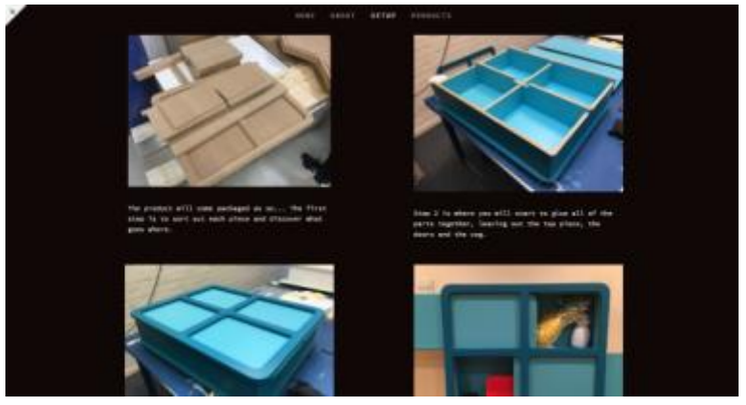
The name chosen was PlayTidy as it best describes the product as it helps keep tidy the toy that kids play with while also being fun to play with.

Marketing and Presentation

I created a website to showcase my product, offer a place to buy the storage unit and give information about it. There are four pages to this website, including the home page, about, setup and products page.

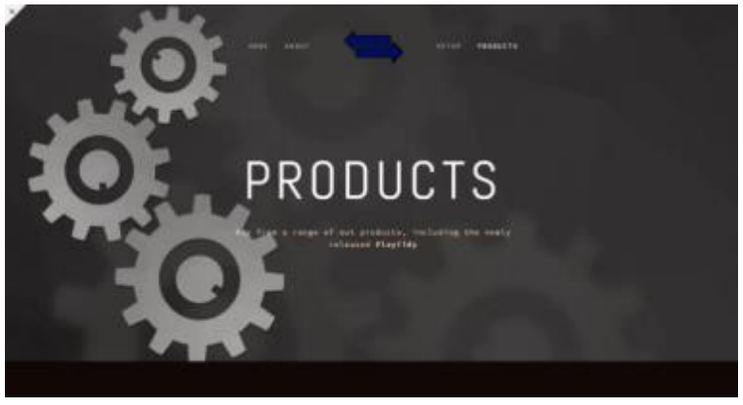
The home page includes the companies name, which is Cognitive Development, three tabs for the user to click on and a button directly under the company's name. The three tabs will take the user to any of the three other pages, depending on which one they click. The button at the centre of the home page will also take the user to the page where they can buy the product, this is placed at the centre as this is the whole reason for the website to exist.

The about page gives a brief description on the company and the product that has been produced. This page is a typical section you would see on any commercial website, explaining what they do as a company and more.

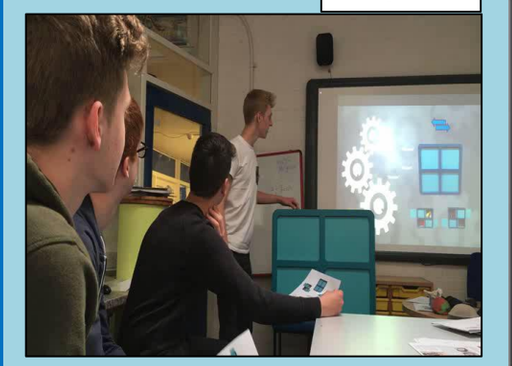


The next section of the website is the setup page, this teaches the buyer of the product how to put together the storage unit when it arrives in flat pack form. There are four simple stages to it that are explained using both images and text so the user get a full understanding of how they should setup the product.

The last page is the most needed one as it is the products page. Section has room for the showcase of multiple products that the company might make. At the moment it only has the PlayTidy product for sale. Once this product is clicked on, I will take the user to a description of the product, explaining what it is and does, show a couple of images of it and give the price at which it is sold.



Play me



I presented a slide to my class, showing photos of the finished product surrounded by words used by the target market to describe the product. When talking about the slide, I explained the selling points of the product and why it is suitable for the target market it is intended for. After this, I spoke about pricings such as the cost to make the product and the amount it could be sold for

Spec met

Spec not met

Testing and Independent evaluation

A2- Like the Ikea shelving for children, the colours and the shapes of the product should be quite simple.

The Final product was very simple in design but complex in function.

C2- It will be the parents that buy the product so it will have to appeal to them too. It will most likely be the function that appeals to them rather than the aesthetics.

The moving doors will appeal to the parents as it will be fun for their kids to use while also helping to keep places tidy.

C4- Organisation is a big deal for parents, therefore the product should help organise the contents

The four segments will help keep some form of organisation for the user.

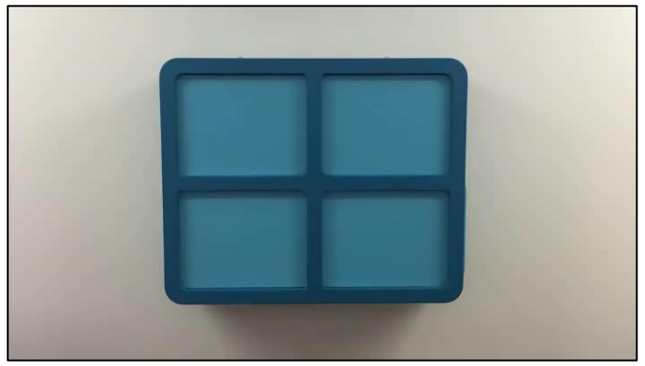
Co1- When estimating the cost, the size and the function of the product have to be taken into account. The better the function, the higher the price can be raised as people will be more willing to spend a lot of money on it.

The function of the product is innovative and liked by the target market I have interviewed, meaning people will be more willing to spend a lot of money

S3- Any mechanisms that are included in the designs should be covered up so the children cant access them as they can be dangerous.

The main bit of the mechanism is hidden, but the teeth on the doors show when opened.

Play me



E3-Another way too keep damage to a minimal is to produce the product in as few parts as possible, to keep manufacturing down.

The product could be made in fewer parts

Er2-The opening to the shelf needs to be designed around the potential contents of the shelf

The thickness of the product was reduced so it would just have enough storage space to fit larger toys in

Si2- There will also be different sized compartments for organisational purposes and storage for toys of all sizes.

Originally, dividers were going to be used for this but there wasn't enough time to make them. This would be a development for the real product

Si2- The length of the shelf should be big, for a lot of storage space. The length of the shelf should be around 850mm.

The final product was 800mm x 650mm

F1- Using some sort of mechanism for the movement of the shelf will be interesting to the children who use the shelf.

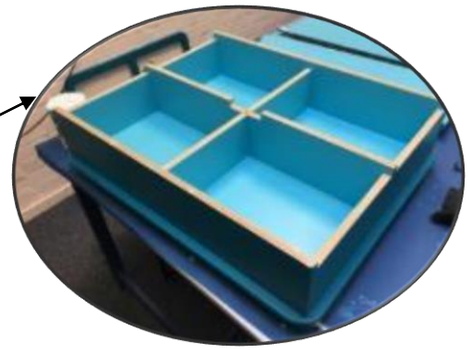
The moving doors are almost like "magic" to the children that use it

M3- Using MDF could be a good idea as it is cheaper and easier to manufacture.

I used MDF for this model of the product, however if it was to be sold some parts, such as the doors and mechanism, would be made from ABS.

Strengths

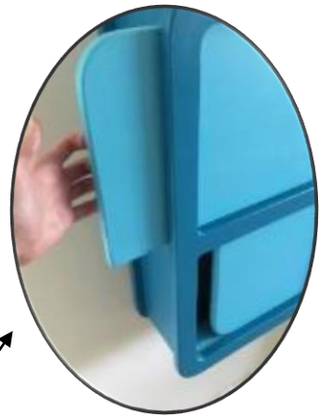
The storage unit has multiple storage sections that can provide some form of organisation for the user. These sections also have the potential to be divided up even further for more personalisation and better organisation.



The mechanism came out better than expected, meaning the unit seemed even more magical to the kids that used it. The smoothness of the working cog system also made it more fun for the kids to use and acted as an incentive for them to tidy up their toys

The style of the unit was described as very “contemporary” and “simplistic”, making the product not stand out too much, while also standing out when it comes to functionality.

The functionality of the moving parts make the product stand out from other units for kids on the market, this will make advertising and marketing a lot easier.

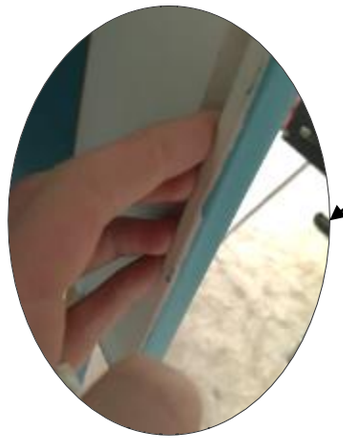


Children tend to like having hidden features or secret compartments to hide their possessions, this is why the handles are put on the back of the doors, making it more difficult to access for those who aren’t the owner of the product.

The Product is able to be flat packed, this will make it easy to transport and means less packaging will be needed.

A bigger lip on the inside of the compartments would be a good addition to further prevent the contents of the product from falling out.

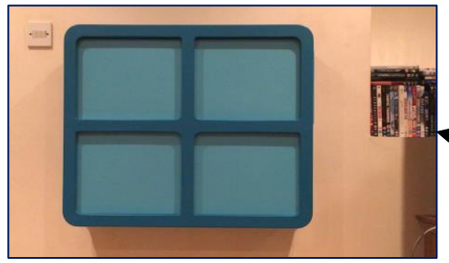
The colours used in this model might not suit everyone or every room, therefore in production the product will come in a variety of colours, such as green, pink, purple and more.



The handles on the back of the doors are possibly a bit too small for the everyone to use. A better idea could be to use some form of grip that is flush with the doors so it doesn’t restrict anyone from using it.

The paint on the product sometimes makes the doors sticky and difficult to open, therefore a better finish should be applied so this wouldn’t happen.

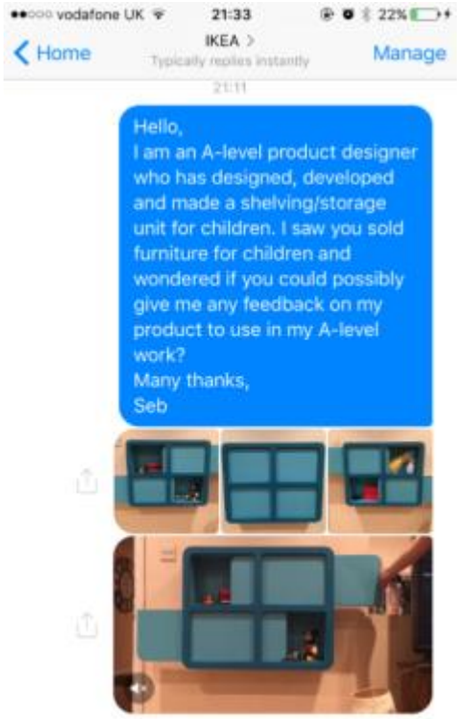
Play me



One big weakness of the product is the noise that is created when the doors are being opened. This noise would have to be toned down in production, possibly by using another material.

Weaknesses

Testing and Evaluation

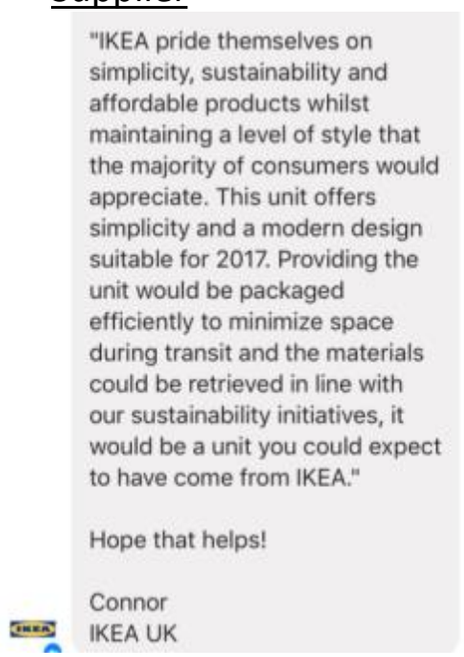


I sent videos and photos of my product to companies that specialise in furniture to get their feedback on my product. I messaged 4 different companies including IKEA, Mother care, Aspace and The Children's furniture company. Out of these four, only two of them got back to me and gave me feedback. IKEA sent back two lots of feedback from two different people, one from customer support and one from a supplier of IKEA. The other company to give feedback was Aspace, the company's director gave me a few points to consider and a few aspects he liked.

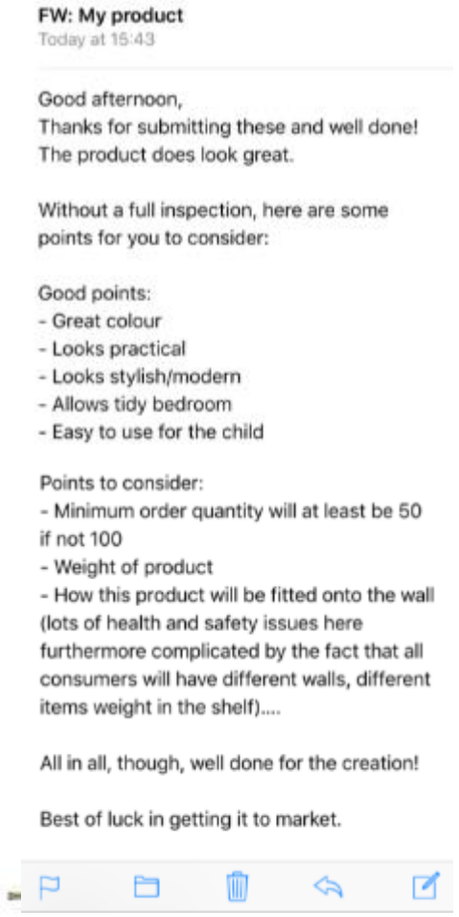
The customer support at IKEA described the product as "amazing", complimenting the contemporary design and the simplicity of the operation. The supplier, on the other hand, said that it is "a unit you could expect to have come from IKEA", along with commenting on the modern design and, again the simplicity of the aesthetics

Customer Support

Supplier

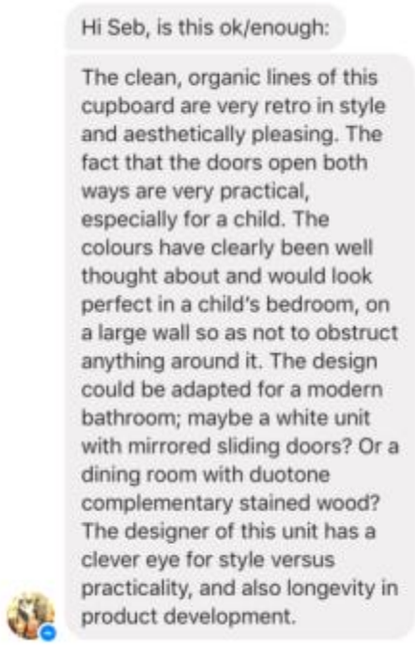


ASPACE
REAL FURNITURE - FOR KIDS



Contacting and showing my product to Aspace was more tricky as it had to be done through email, meaning the video couldn't be sent to them. However, the Director still gave some great feedback. The first thing they commented on was the look of the product and its functionality of helping keep a bedroom tidy. The aesthetics were said to be "Great" and "stylish/modern". Then the replier gave me some points to consider if the product went into full production. The minimum order that Aspace would place is around 50-100 units, therefore a good method of batch production would have to be found. The weight of the product was also a point to consider as it is quite heavy and will be difficult to put on walls and be held there securely.

For the last part of evaluation, I decided to get the views of a graphic designer to see if there isn't anything aesthetically that they would change or anything they particularly like. Fortunately, I managed to get in touch with a graphic designer at a publishing company due to having connections to them. I asked the designer if they could review my product and make any comments on it, anything they would change, any future improvements and anything they enjoy about the product. The first thing to notice is the very first word used to describe the product "clean" This a great response to the aesthetics of the product as it should look clean to resemble what the product helps do, which is clean. The PlayTidy is described as "retro", which is the opposite to what both IKEA and Apace said. The colours chosen were also commented on and said to be "well thought out" and would look "perfect in a child's bedroom". As for changing the look of the product, nothing was mentioned apart from the possible adaptation for different environments. Such adaptations mentioned were putting mirrors on the doors and changing the colours to white to suit a bathroom or changing the product to look more sophisticated so it could fit in a "dining room" as such, by simple changing the colours or material to seem as though it is made from stained wood.



Testing and Evaluation

First Impressions:

This is a video of the target audience I have used throughout my designing and developing and their first impressions of the product. I wanted to get the first impression to see what they thought of the general look of the product rather than just focusing on the mechanism and the functionality of the product. The first word used to describe the aesthetics of the product was “cool” and “awesome”. They both commented on how they like the colours used in the product.

Reviewing the Mechanism:

When testing out the mechanism and the functionality of the product, the child was asked to find the handle, to which is hidden round the back of the doors. The child found the handle with ease as they had been testing it out for a few minutes before the video. However, the “secret handle” would be difficult to find for those who haven’t used it before, such as the child's friends; keeping the contents hidden from them.

Likes/Dislikes:

The aim of the Product was to be fascinating to the users and almost seem magical to the children that wont know how the mechanism works. When the product was being reviewed by my target market, this is exactly how it came across, as “Magical”. One improvement stated by the parent is that the product makes a little bit too much noise. This is a big flaw in the design that could put users off of buying, therefore it would be a primary problem that would be the first thing to be fixed if going into production.

Storage Space:

The amount of storage the product provides is liked by the user as it allows them to store a range of different sized toys. A feature that could be improved on in the future is the ability to stack the toys inside the product without them falling out.

Everyone that gave feedback on this page is in the age range of my target market.

More Feedback:

I also got 2 more lots of feedback from 2 similar aged children. Therefore, I could have feedback from both genders to see if their likes/dislikes would be any different. In this lot of feedback, the favourite aspect of the product was the fact that the whole product was like a secret storage unit for them as the handles to open the doors are hidden and cant be found too easily. This is a big feature of my product and I aimed for the contents to be hidden away and not easily accessible to anyone but the owner. This was done because, after looking at a lot of other storage units for kids, a lot of them contained secret compartments for their favourite belongings.

Improvements:

I asked if there were any improvements that the children would make to the product, both functionality wise and aesthetically. Nothing was mentioned about the mechanism. However, a few comments were made about the aesthetics being too plain and possibly needing some “patterns on the outside” and changing up the colours a bit. One idea given to me by a friend is that the doors could ng blackboard paint so the children can draw on the doors themselves, using chalk.

Product Size:

Choosing the size of the product was difficult as it needed to be just right, having it too small would mean there wouldn’t be a lot of storage space and having it too big would mean it would be tricky to put onto a wall. In this video the child said that the size was “just right” and wouldn’t change it. He also claimed he would have this product placed in his room if it was for sale.

From this photo you can see that the front of the product fell off during testing, this was later fixed using corner brackets and screws to hold the front to the middle section of the product. Glue was not used as this would stop any future fixings from being possible as you would be able to access the mechanism if anything went wrong or broke.

Review and Reflection

Brief

Create a shelving unit based around the generic likes of the gender the product is bought for, this will be liked by the parents as they are appropriate for the children. An example for this is the theme of cars for boys and flowers for girls. These gender appropriate designs will be perfect as they are simple, which allows for more focus on the function. These shelving units have to provide an incentive to the children for them to want to clean up their toys, the incentive could be movement as this will make the chore seem fun to the children rather than a tedious task. As there isn't much room in a child's bedroom, the shelf should not only incorporate storage but other wall hanging products, such as mirrors and clocks.

Was the brief met?

Instead of having two themes for the product that would be gender specific, the product will come in a selection of colours so the user can choose their preference and not have to settle with the chosen theme. This opens up the target market a bit more as the product isn't set to two themes that would limit the range of people that would buy the product. Although the product has strayed from the brief aesthetically, the function of the product has been kept the same throughout design and development. The product developed has a mechanism hidden within itself to provide a form of movement. This movement is seen as "magic" and fun for the kids, acting as an incentive for them to use it and tidy up their toys. Instead of incorporating mirrors and clocks, the product just ha a lot of storage space. However, in further development plans would be made to make the doors more interactive by making them able to be written on or such.

Although the design has gone off route from the brief, it was for the good of the product to make it better for the user and open to a wider range of kids.

Target Market:

The shelving unit will be made for children aged 4-10, therefore the aesthetics have to appeal to the children of both genders. However, the designs have to appeal to the parents too as they will be the ones buying the products. The parents wont buy a product that isn't suitable for their child. The function of the product will mainly be for the parents as the product will provide incentive for the child to clean up their toys. Although, the product may have different methods of accessing the toys within, this will appeal to the children as they will act as secret compartments that the children will enjoy.

So far testing has shown that PlayTidy does appeal to the target market it is directed at. Parents that have been shown the product always mention the mechanism, which is good as this part of the product is means to appal to them as well as the kids.

Product Success:

In my opinion, the product turned out to be a great success, based on the views of my peers and the target market that reviewed it. The making of the product worked out a lot better than many people thought it would as many said to me that they didn't think that I would be able to get the mechanism working however, the mechanism worked incredibly well, better than I had ever expected. The part of my product that came out best was size of the product I think as it is able to store many items and doesn't take up too much room on the wall when the doors aren't extended. The testers stated that they thought the best part of the product was the mechanism as it worked so well.

The innovation of the product was also a great success as no one I asked has ever seen a self that has doors working in this way.

Future Changes:

Future models of the product will include more interactivity and possibly different styles to the product, such as ones with patterns added to them. The extra interactivity would come from making it possible for the user to draw on the doors through using blackboard paint and chalk. Some of the developments that were though of earlier on in the project were not able to be carried through, such as the section dividers and the transparent doors. The section dividers could be made easily and would give some form of customisability. The doors on the other hand would only be viable if the product was going into manufacture.

Sustainability:

Sustainability of a product is a big need for some companies, such as IKEA who say that it is one of the things they look for when making new products. Therefore I would have to make sure that my product is as sustainable as possible if it was to be produced and marketed. Here are the 6Rs that I would need to consider to make the product sustainable:

Recycle: Using recyclable materials in the product is the first thing people think of when trying to make a product sustainable. Materials such as MDF cannot be recycled but are a good material to use as it is cheap. Using some form of plastic would be good too though as it could be recyclable, if a thermoplastic, and will be more light weight than MDF, as well as stronger. As the doors were planned to be transparent, ABS should be used for them as it is able to be recycled, an incredibly good material for kids and can be transparent.

Reduce: Reducing the amount of material used makes the product more sustainable too as it will require less manufacturing and less of the material will be used. The amount of material could be reduced through using a different material, such as a plastic. Plastics are stronger than MDF, meaning the material wouldn't have to be as thick to be as strong.

Reuse: Reusing recycled materials that have come from other products is a good idea as it will save money and will increase the sustainability of the product massively.

Rethink: Quite often a product will be rethought to come up with ways of reducing the cost or reducing the materials used in it. The design may have o be changed completely in order to do so.

Refuse: Refusing to use something in the product that might not be needed would increase sustainability too, such as how I refused the idea to have a handle on the front of the product as this would just use up more time and materials that isn't necessary.

Repair: As the product is produced in flat pack form, certain parts of the product will be able to be purchased for repair, for example the doors and the cog as these are the two pieces that are most likely to break.