SKI EQUIPMENT STORAGE UNIT.

'ALPINE STORAGE - INNOVATION MADE SIMPLE..'

Hamish Sherry.

Candidate number: 1152

Centre number: 62451

BRIEF/ BACKGROUND INFORMATION.

Problem 1:

During market research, I have found that most skiers experience problems when trying to find a product which they can easily use to store their accessories at their hotel or chalet.

Problem 2:

A secondary problem identified to me was that often accessories are damaged or lost when left lying around. A product would be required to tidy up and prevent damage to this equipment.

Design brief:

When skiers come off the Pisté at the end of a day skiing, they usually deposit their equipment around the chalet as they come home. The problem occurs in the following morning when the equipment is forgotten or misplaced, because they are not easily found. A product is needed to address these problems, filling the void in the market.

TARGET AUDIENCE:

I intend to market my product to a wide range of audience, incorporating a diverse range of end users. The product would be targeted towards those who ski; specifically incorporating features for skiing equipment. For a larger range of audience I would also aim to address those in the chalet business, who own apartments, private chalets, hotel complexes or restaurants in ski resort's towns and up in the mountains. For a larger success at the marketing and retail stages I could add diversity to my design idea. Through manufacturing of multiple sized units, for different numbers of people; the intended product becomes more appealing. This gives more potential manufacturing methods. I would also strongly consider targeting large companies that I would be able to market to. (John Lewis, amazon, Argos etc.).

KEY DESIGN ISSUES TO CONSIDER:

- **WATER RESISTANCE-** Because the snow will melt off the equipment, commonly onto the floor and surrounding objects, the product has to be water resistant to maintain it's integrity.
- **WEIGHT -** A product which may often be transported to different locations, must be light enough to be carried by a range of end users, whilst being heavy enough to support the weight of all accessories when is in use.
- **DIMENSIONS/TRANSPORT CAPABILITES -** to maximise transport capabilities, the disassembled product must fit in a small suitcase (67x 45x 28cm).
- **AESTHETICS –** The style of the product must suite the aesthetics of the chalets in which the product would feature.
- **ABILITY TO HOLD/ SUPPORT SIGNIFICANT WEIGHT-**
- **MATERIAL-**

MARKETING:

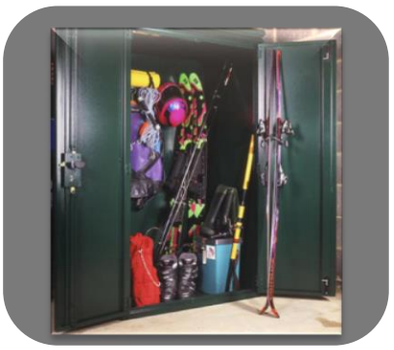
In order to market my product effectively I will target pitches and negotiations to multiple large distribution companies such as; Amazon or Argos perhaps, whilst using telecommunications to advertise my product directly to the target market.

MY SOLUTION:

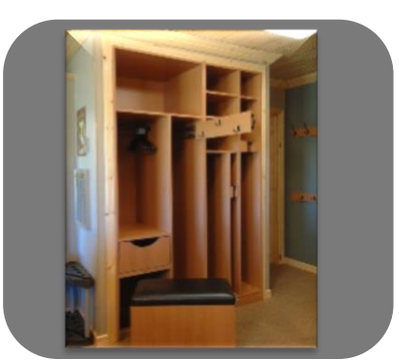
In response I intend to design and produce an innovative storage unit, which provides a simple yet creative solution to the managing of skiing accessories when the user returns home from the slopes.

REVIEW OF INSPIRATION AND INFLUENCES.

- This is the environment in which my product would be expected to be placed.
- At present the vast majority of smaller items have been scattered in multiple areas of the boot room or even in the other levels of the house. The unit would enable the items to be maintained in one place.
- The storage unit would most likely be placed by the door- this will allow the efficient use the product on immediate return to the home.
- These boot rooms often have a few items of furniture in them; whilst not being significantly large rooms. As a result my product's shape would be very important . Its interaction within the room will need to be strongly considered.



- This unit's main purpose is intended for long term storage; when the end market isn't using the equipment.
- Here, the equipment has been compacted into one area. Although managing to contain a high quantity of items, smaller more crucial items maybe obscured or lost within the unit. Divisions would be needed to separate the larger items from the smaller objects, such as sunglasses sun cream and ski passes.
- The idea of keeping all the necessary equipment in one place is ideal for accessibility.
- The cheap aluminium sheets provide a level of security although this would be unnecessary in the interior of a chalet.



- This unit incorporates the different storage methods that would be required for varying products. For my design I would need to create a product which uses an innovative design to incorporate these storage method.
- However, this cabinet is large and takes up a significant amount of space. In a ski chalet, preserving space and limiting the number of items in a boot room can be an issue. A future product would have to take this into account.
- If a British family were to own a chalet abroad; they would need to add furniture or want to add their own. In this regard my product must have simple transportation capabilities and a construction method for the end user.

- I favour the design product because it is suitable for a range of end user group sizes; be it a couple or a family and friends group. Larger Chalets often cater for groups 6 or more. Having the rack and shelf is a desirable feature that is beneficial if my product would be intended for use by a group of people.
- The green hook is also a versatile implement to the design that can be adapted to a variety of storage concepts. This is an easy method which can hold multiple different objects.

- Although very useful for larger ski equipment, these hooks could be scaled down to hold gloves, hats, items which use straps or even ski poles.
- At the current size the hooks would be too large for the intended product's location. In this respect- I would most likely not forward this design but include an adaption and combination to save space and weight.

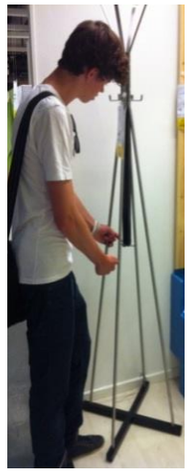
REVIEW OF INSPIRATION AND INFLUENCES.

By looking at similar existing products in the retail environment I was able to identify the stronger qualities of successful products. On the other hand I could also identify the weaknesses of products or characteristics that would not be suitable for my intended design. These could then be addressed in the design stage. It also gave me an understanding of the dimensions of a suitable unit, whilst indicating the retail costs which a single unit could be marketed at.

A trip to the large Ikea outlet in Wembley, London allowed me to personally examine similar existing products in the current market. I could explore current design influences and design schemes, whilst looking at potential aesthetics and colour schemes. How other companies had constructed a product identity and branding also helped forward my design planning. By looking at hand stands- the closest existing product, shows what clients favour in their purchased products. It is also indicates that this design idea is unique.

I decide to analyse hat stand , because they are the most similar existing product to my intended design.

1.



TJUSIG
Hat and coat stand, black
£50
The price reflects selected options
Article Number : 701.596.66
Size
191 cm

This features a simple design whilst providing varied height hooks for different end users. The height of the product may cause issue if more products were to be placed further up. The most comfortable height to hang items would be at a similar height to the shoulder. The most expensive of the three products. Wide and stable base to prevent falling, if knocked**. (weight, materials and specific dimensions).**

2.

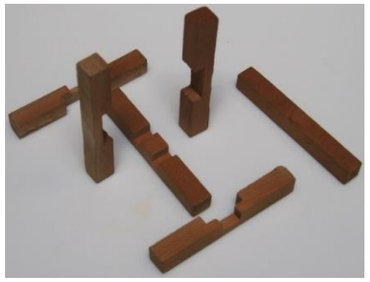
KNIPPE
Hat and coat stand
£25
Article Number : 802.020.23
Read more
Size
170 cm

Although very simple, the design does not provide sufficient storage for the expected quantity of items that a skier would require. The height of the product is more attractive than the previous product, although the base width that the tripod encompasses, would have to be reduced. A tripod design could be knocked over if there was an imbalance of weight or if accidentally pushed. A more ideal price range to suite a more diverse target market. **(weight, materials and specific dimensions).**

3.

PORTIS
Hat and coat stand, black
£25
Article Number : 000.997.89
Size
191 cm

A similar price to the second product. The narrow design is more ideal for a smaller are or chalet, to save space, whilst maximising storage capacity. Perhaps not enough storage provided. Similar to the previous two, this product cannot be collapsed or stored in a reduced form. Complex design would not be favourable. **(weight,** polyester powdered coated steel **and specific dimensions).**



These wooden puzzles feature inter-locking wooden components which are very secure once together. This design could be incorporated into my base or stand to construct a collapsible design- very appealing for storage purposes. The design could take advantage of sustainable and economically viable materials whilst making the product a light weight.

The appeal and influence of these furniture units stems from the aesthetics and simplistic forms. Varied sized shelving and colours would make my concept more individualistic and so more attractive in the retail environment.

REVIEW OF INFORMATION.

From looking at similar products, I have found that an upright stand gives the most beneficial storage solution for many small items of clothing or equipment. However, if items were to be removed, they could be forgotten in the morning. A system which reminds the user or helps them to remember which equipment to bring would be necessary.

A Manikin style design featuring pegs on multiple body parts, would provide a simple storage solution. This concept would attract younger users; turning a chore of putting their equipment away into a fun activity. Meanwhile the unit would make the product appealing to parents because it would aid them to teach their children to take care for and take responsibility for their possessions.

The diagram above indicates where on the manikin design, the items would be held. Because the items are stored in positions, relative to where the user would wear them whilst skiing, it is a creative, visual aid to remember all key items.

Products intended for storage:

- Hat
- Goggles
- Sunglasses
- Rucksack
- Pisté map
- Hard hat/ woolly hat
- Sun cream
- (Socks)
- Scarf
- ‘Snood’
- Gloves/mittens
- (Keys)
- (money)
- (Wallet)
- (Ski pass)

End user	Shoulder height (cm)	Eye height. (cm)	Hand dimensions. (cm)	
Harry	154	168	9	19
Anysia	145	160	7.5	18
Tessa	135	147	7.5	17
Joe	146	168	8.5	18
Sam	157	172	8	18
Charles	150	165	7.5	17.5
Alice	147	162	7	17
Kate	143	167	7	16.5
Tom	163	179	8	19
Anna	139	158	7	18
Bethany	146	164	7.5	18
Hamish	162	178	9	20
Average dimension	149±5	166 ±5	7.8 ±0.5	19.5 ±0.5

Through collection of anthropometric data concerning observation height of the average human person and the comfortable height of a raised arm (shoulder height)- I can construct a product which will be the most suitable size. In addition, the information of the average hand’s width and length gives me appropriate dimensions for the different storage components.

I need to produce a design concept which is not just an attractive hat stand. The product must incorporate innovative features; being capable of holding all relevant specialised ski equipment perhaps be the main marketing point.

SPECIFICATION.

1. Function:

- The unit is required to **provide a space efficient, storage solution in chalets for alpine sport equipment.** Because the existing market contains products which hold skis, poles and boots, my unit will focus on the storage of the remaining equipment.
- The intended stand must **the essential accessories** necessary to a skier or snowboarder, or any participant of an alpine sport.
- The unit would be ideally placed very close to the chalet/ room door to provide an easy to reach storage space for those exiting or entering the environment.
- The unit must be assembled with ease using the supplied components.

2. Manufacturing:

- Must be **efficiently reproduced to reduce the manufacturing time period and therefore manufacturing cost**.
- Manufacturing process must allow for a flat pack design; an appealing design feature which would allow ease of transport.

3. Materials:

- Must **not be of significant weight**, allowing ease of transportation by any end user.
- However, must possess a mass which will be load bearing of weight up to 6kg.
- Durable, able to withstand every day knocks and potential damage due to accidents.

4. Cost:

- Through research , most similar products cost in the range of £20- £70. However my product is a unique and innovative new design so would not necessarily be in direct competition with these products. This would allow a more higher end **price bracket of around £50-£100**. Affordability is not a main concern, because those who would purchase my product would come as a representative of a company or would be a skier/snowboarder themselves. Because winter alpine sports are expensive, the participant would have the money required to purchase a product which is higher up the market.
- Must be **cheap to produce/manufacture- this allows for a reduced retail price** and maximise profit margins. A competitive price of the product at market would allow for successful sales of the unit.

5. Ergonomics:

- Materials and form are required to be ergonomically suitable for frequent client use.
- The product must be comfortable to use by a range of age and sizes of end users.
- These ergonomic proportions would be based upon anthropometric data and research collected

6. Aesthetics

- colour neutral or a wide range of colour selection would be provided enabling the stand to suit a large variety of room designs and client preferences.
- The product needs to have a professional appearance; target market should not be deterred by a low quality finish to the product.

7. Anthropometrics:

- Anthropometric data and research of a range of client's shoulder and eye height would give a suitable height for the product.

8. Safety Precautions:

- Has to be **pose no danger to the client during their interaction with the product**.
- Must be of appropriate weight so that the user may transport the unit without damage to their person. **If the product is of a larger weight, the packaging must clearly label the product's weight** to identify the hazard with the user or anybody transporting the product by hand.
- **Any small parts** must which may be swallowed **must be identified** for the safety of small children.
- User friendly materials and shape which doesn't cause harm when the product is used appropriately.

9. Compactness:

- The stand must utilise minimal space within the room, so as not to interfere with the client's interaction with the remaining space of the room the unit is in.

10. Marketability:

- This product must be suitable for a mixed-gender market, tending toward a more adult market.
- The manufacturing process must feature recyclable or sustainable materials which have a long product life and achieve highly in the Life Cycle Assessment.
- The Product must be a unique design featuring an innovative concept or design components which would make the product more appealing to the intended target market.

11. Size:

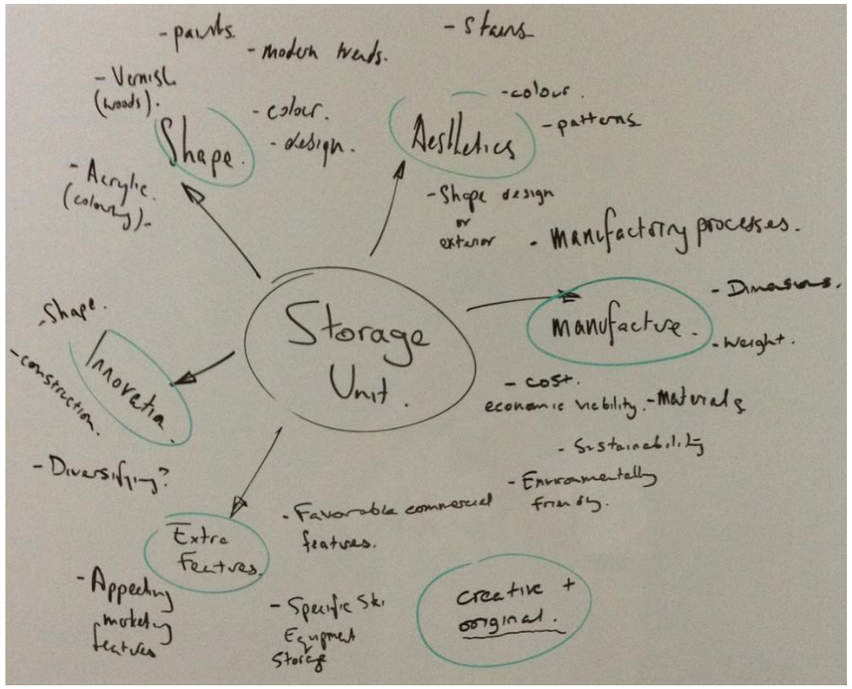
- The overall **height must be of a comfortable measurement to provide an easy to reach storage space for the client**, having the storage component of the product in an optimised position. (not too high /low).
- The product's base must not extend too far, so that floor area taken up is reduced to a minimum.
- After purchase, the product must be able to be transported in an averaged size car. This would therefore put limits onto packaging dimensions .

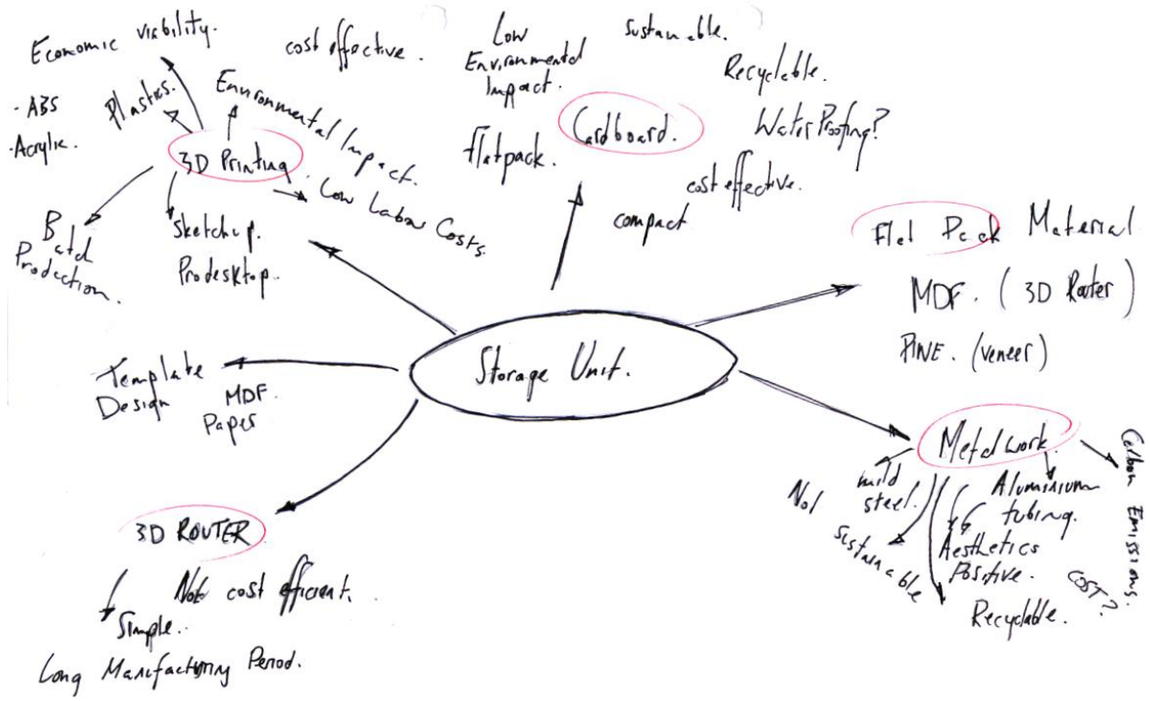
12. Moral and environmental implications:

- The manufacturer must not exploit the workers, whilst providing a safe working environment in the factories.
- To have a minimised environmental impact, the product should use recycled/ recyclable and/or sustainably sourced materials.

DESIGN AND DEVELOPMENT.

I decided to begin my investigation into the development, through the process of brainstorming my initial ideas about the design in mind. In addition, I began the process concerning the sub-categories of the design/manufacturing process and their features.

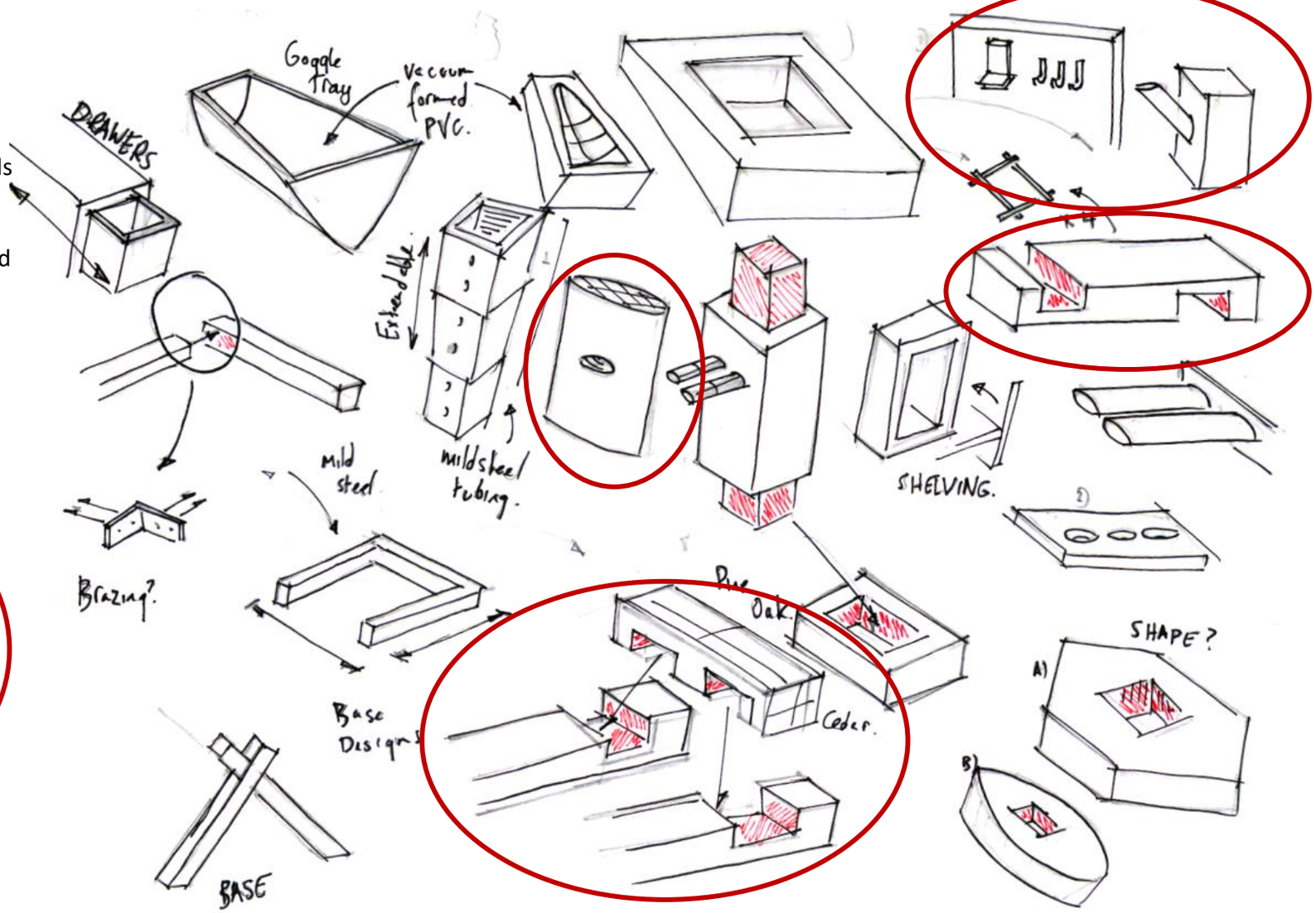




I favour these concepts as they best incorporate storage facilities specific toward smaller accessories .

Combined, the designs could create a product which would meet the design brief. I would have to use standardised parts in a modular cell/ production system.

Sketching components and methods of construction helped me to explore possible variants, whilst dismissing those which aren't suited to the specification.

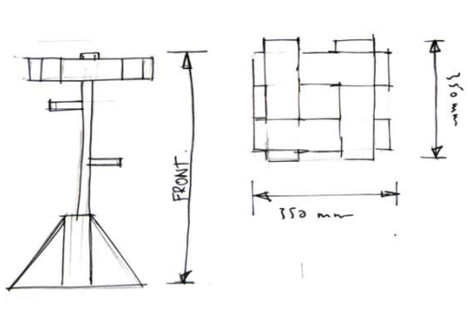


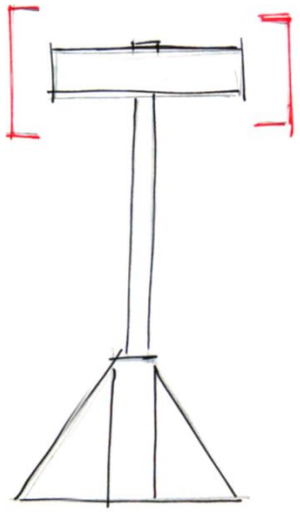
Not all of these designs would be commercially viable. I have therefore decided to continue with a limited number of concepts.

I intend to further explore the puzzle block inspiration to incorporate into my design concept. Although the basic concept is not original, the application and integration would be a strong 'unique selling point for the marketing proposition.

DESIGN AND DEVELOPMENT.

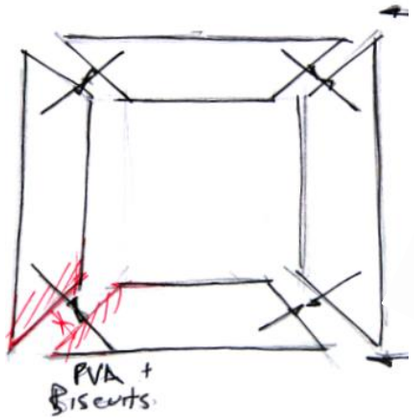
-The following designs, develop the top area, if examining a hat stand; the main storage/ holding component of the product.

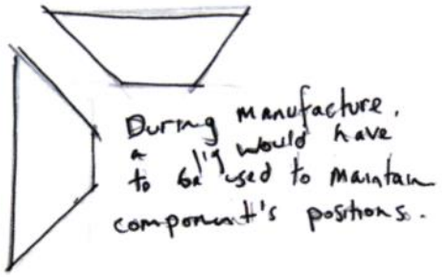




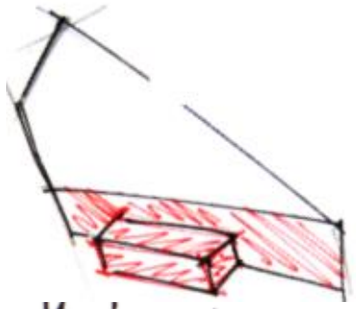
After my initial design maps, I decided on a product which would be free standing, with an upright design . This came about from my investigation of hat stands in the existing product market. I favoured an upright structure due to the often limited floor space in chalets, Also, hat stands are light weight and able to carry many objects. As a result I wanted to investigate the different design concepts for the top of my storage unit.

Design 1.

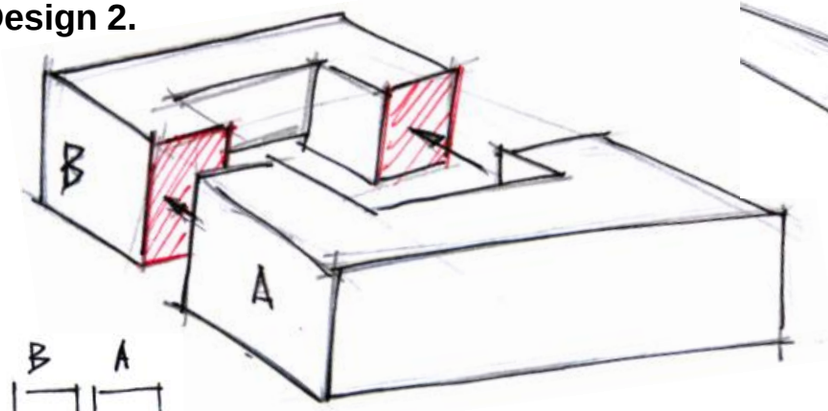


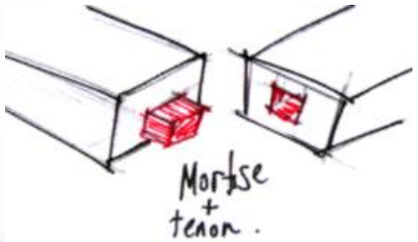


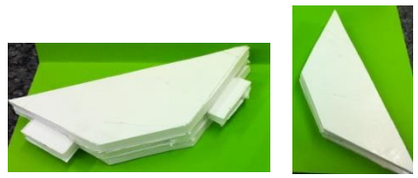
Double layered biscuit joint.

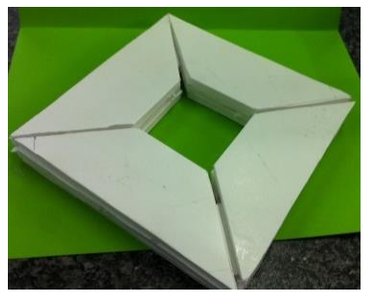


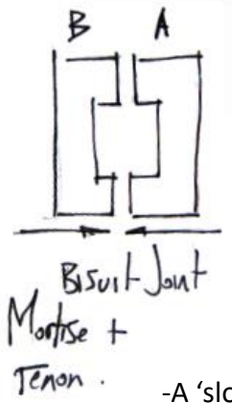
Design 2.





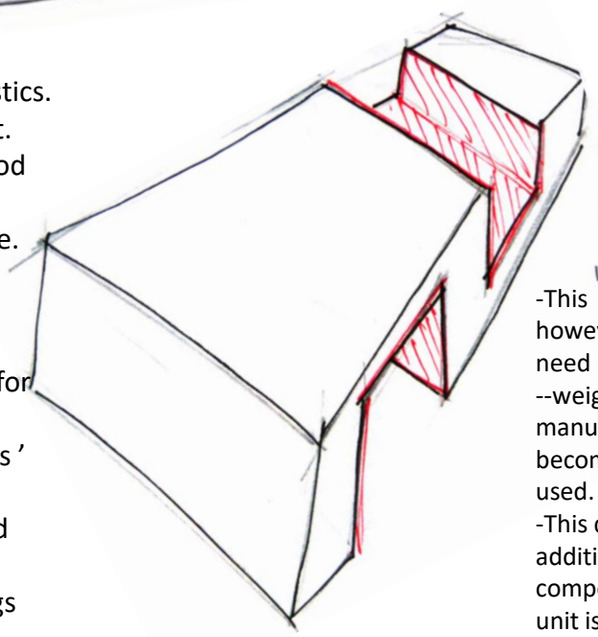






Materials:
- wood, metals, plastics.
- Mild steel… weight.
- hardwood/softwood
- veneer? Integrity.
- ABS, polypropylene.
-Cost.

-A 'slot together' design would be an ideal choice for manufacture; best suiting the 'Transport capabilities ' key design points.
Perhaps the product could be marketed as a flat packed product. KD fittings may have to be investigated.

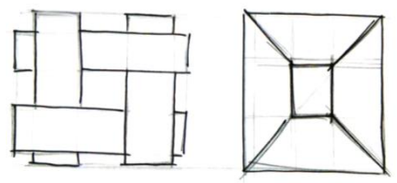


-Aesthetics and economical viability must be considered within the design. Square design although simple and effective, may not be the most aesthetically pleasing solution to the design brief.

-With a pre- fabricated model of the top of the storage unit, simplicity of the design is increased; allowing efficient batched produced components. This would also make the product more economically viable.

-This would be a very simple design solution, however there are some problems which would need be addressed.
--weight concern. Dependant on the manufacturing material, the product could become very heavy, if solid pieces of material were used.
-This design wouldn't remain together without an additional method that would hold the components temporarily together. (as long as the unit is in use and being stood in a room).
-A more effective a light weight solution, to hold the pieces together is needed. Preferably a non permanent method which is easy to construct.

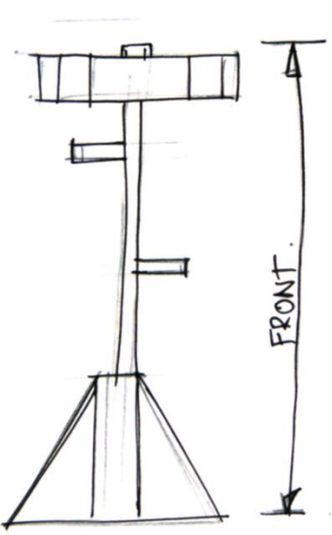
-During modelling I decided to use multiple layers of foam core to produce the desired mortise and tenon joint; in a scaled down model. This picture frame style design would easily be flat packed, with required transport and storage space being minimal.
-A method of holding these components together, whilst the product is in use, would have to be designed.

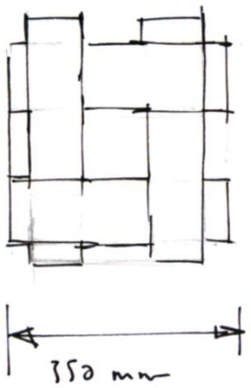


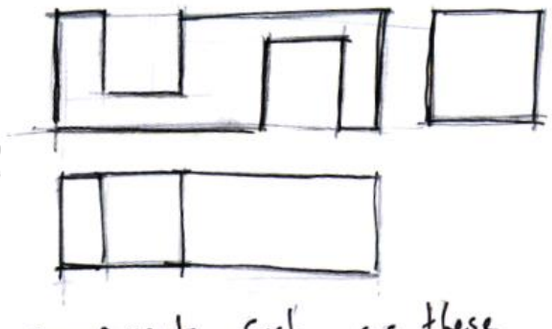
Design 1. **Design 2.**

DESIGN AND DEVELOPMENT.

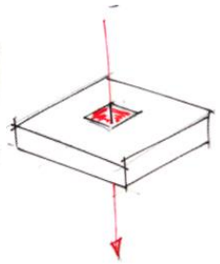
1. I favoured the flat packed, puzzle piece design. I needed a creative design which would be original and appeal to the target audience, which would be competitively marketed against existing hat stands.

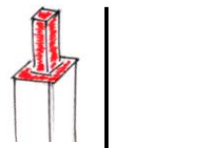


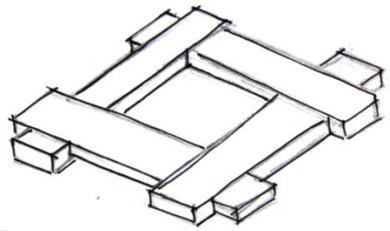


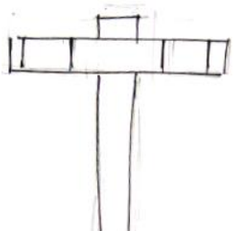


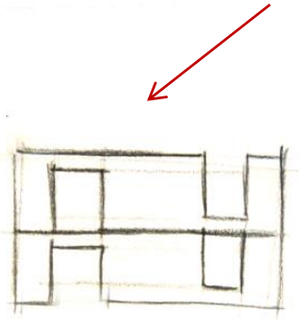
Components such as these would be able to be batch produced.



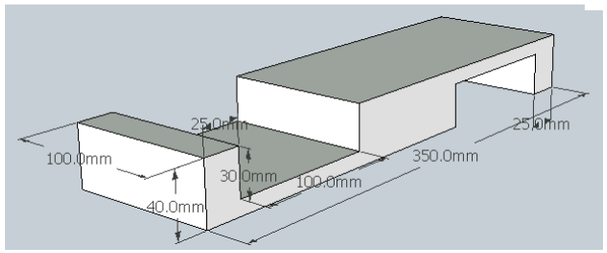


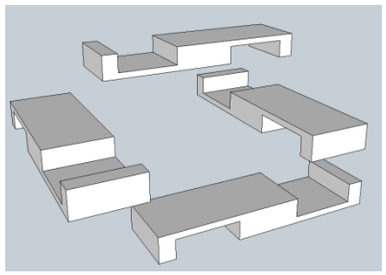


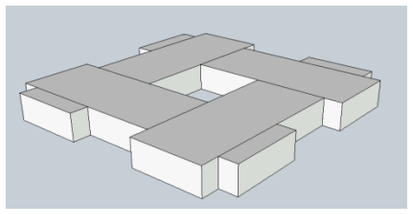




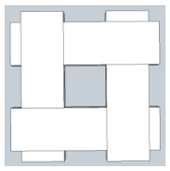
2.



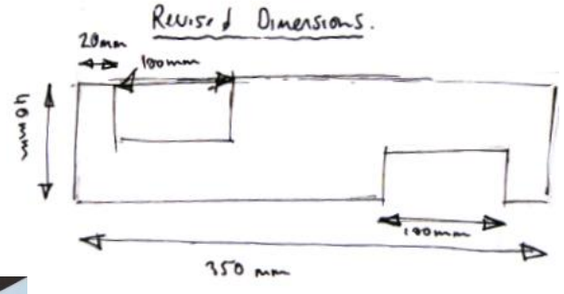


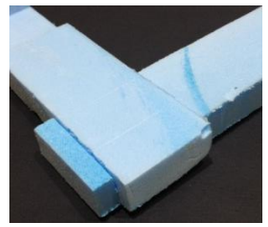


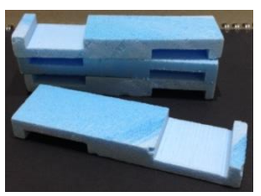
The idea behind this design is a ‘flat packed’ design which would hold together without adhesives, whilst having a short construction time for the end user. The multiple components of a repeated design would slot together. Rails , hooks and shelving could then be incorporate off the edges or underneath; holding the equipment.

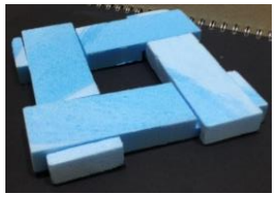


3. Through production of the CAD designs, I realised that after combining two components I made, the intended construction method would not work with the primary dimensions I decided. Changes to the current dimensions would be needed to produce working prototypes/models.



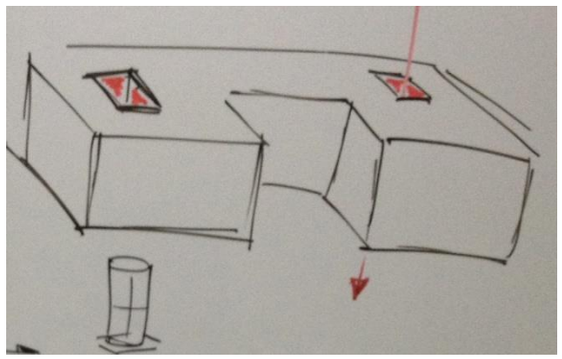


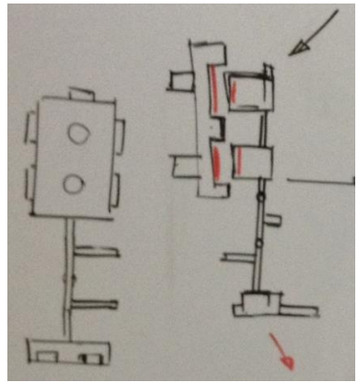


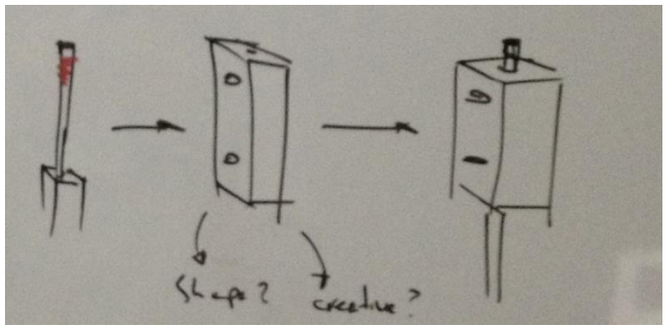


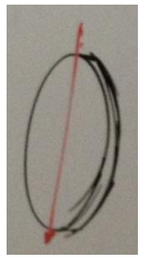
The developed design incorporates more rails on the lower sections- with the ability to hold heavy items such as rucksacks or helmets. By looking at the sketch of the human form the new design is able to hold all the listed items.

4.

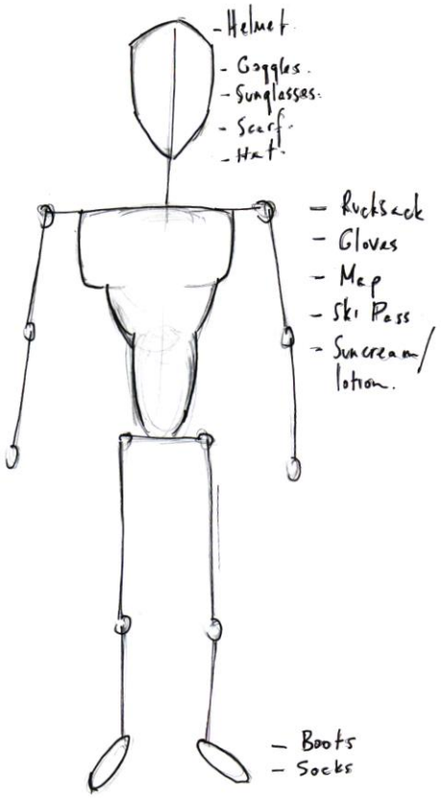




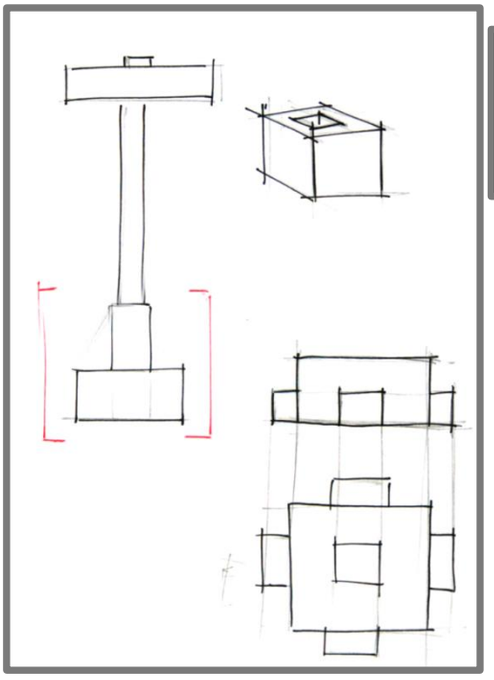




After discussion with the end user, I have produced a more vertical setup to the design, whilst incorporating the favourable puzzle piece design- minimising area covered- a key area of development. To increase stability, rigidity and storage capacity, a second support shaft could be added.



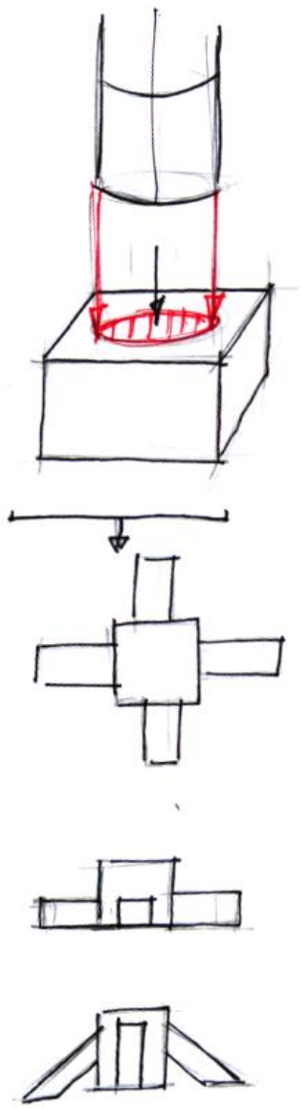
DESIGN AND DEVELOPMENT.



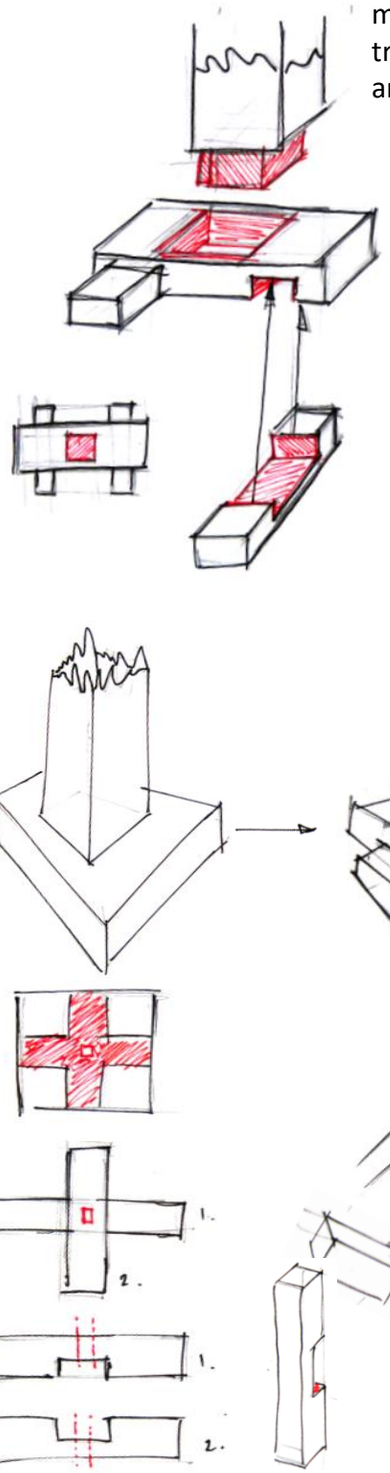
Through the next developments I intend to explore the variety of base concepts that would meet the required specification.

A) In order to manufacture a product which is stable, capable of holding a potentially significant amount of weight, I needed to explore base designs. The base also had to have the ability to be assembled and disassembled by the user, for minimal transport space.

I began with a simple cube base, later decided that this would still not provide sufficient stability.

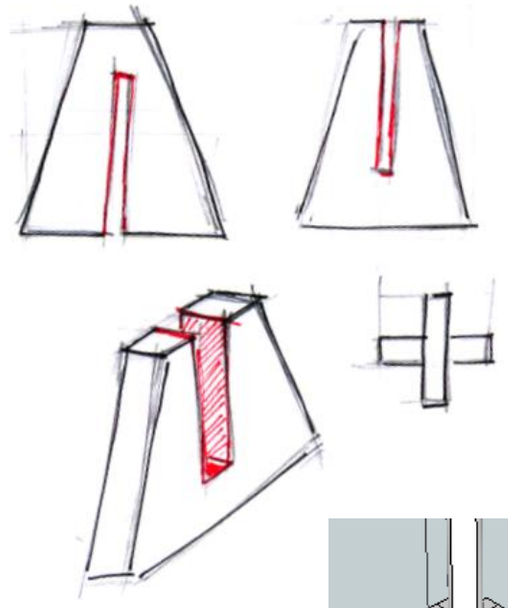


As I favoured the puzzle piece design, I continued the theme (aesthetically pleasing design theme and shape is commonly very popular), using the method to design 'legs' protruding off each face to further develop the stability.

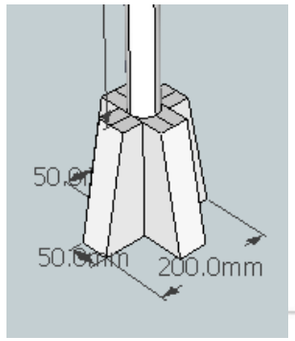


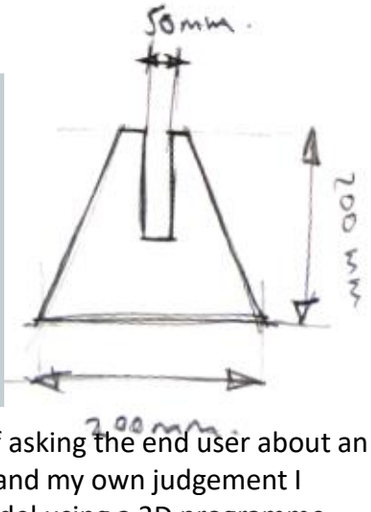
B) I explored the design with a change of shaft shape- deciding a cuboid mortis and tenon joint would be simpler to batch produce, whilst being a more efficient shape to transport to the supplier and during customer use.

Similar to the intended top, these legs would be removed during use and fitted together when the product is erected in the chalets. Although not being moved from the position , perhaps the use of dowel rods or an alternate KD fitting would be necessary to increase the rigidity of the structure.

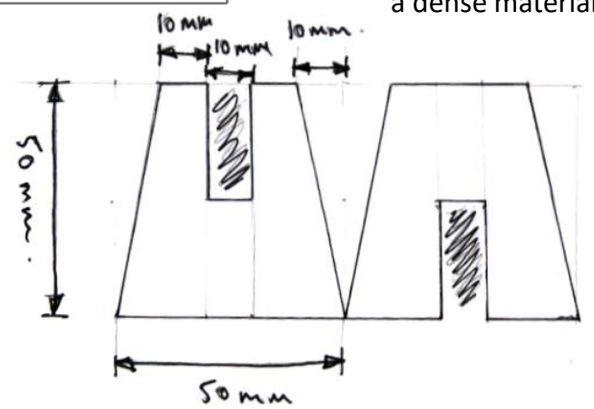


C) Because the previous design concepts had been more lateral bases they used a larger surface area. Floor area can be limited in the boot rooms of chalets, especially those which accommodate for 2-3 people. I needed to produce a design which would need minimal floor area. This upright slot-together design still enables a firm base whilst using a significantly less surface area.





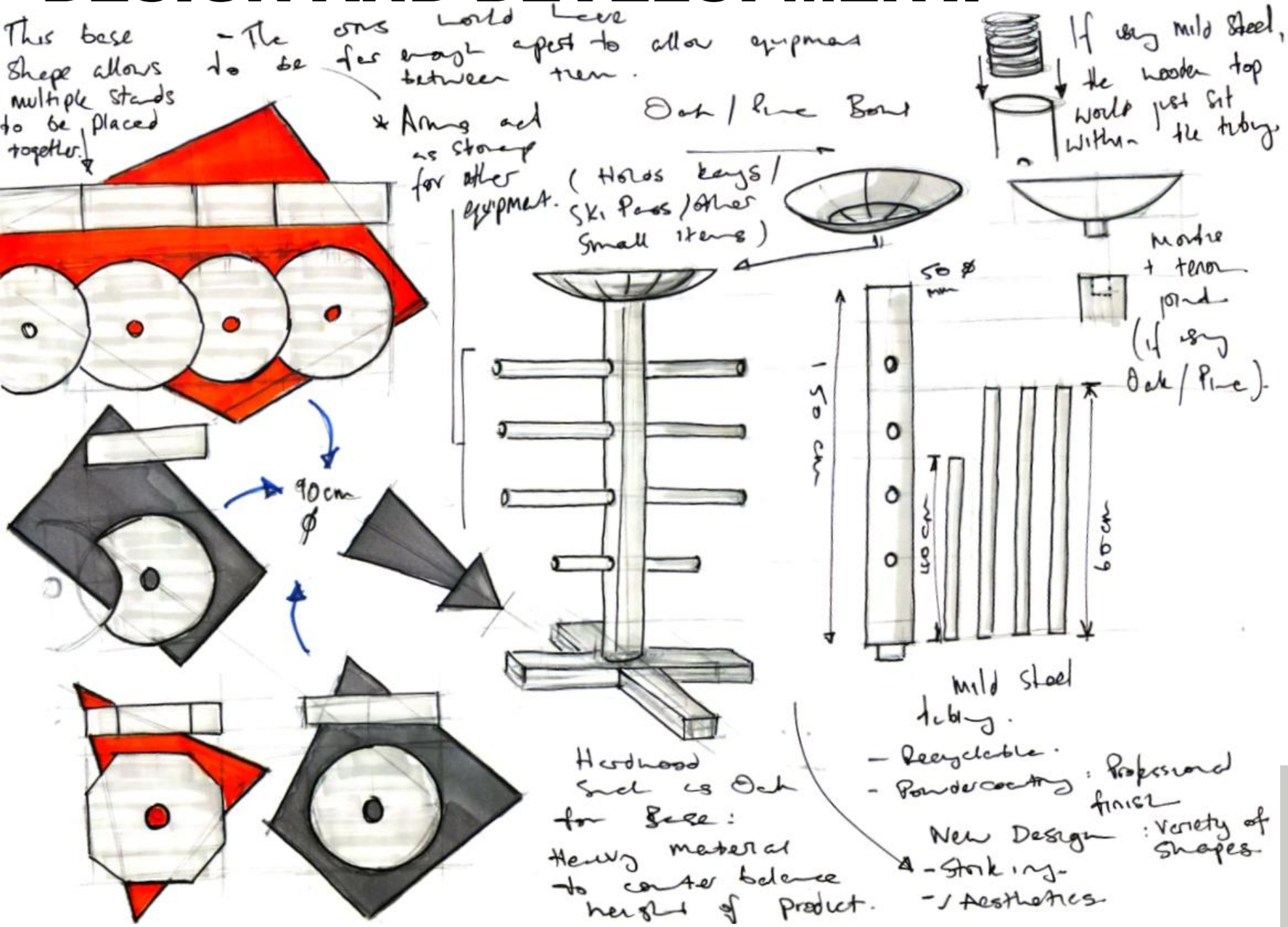
Through a process of asking the end user about an adequate size piece and my own judgement I produced a scale model using a 3D programme. This size is large enough to forma stable support base whilst not being to heavy if manufactured in a dense material at a 1:1 scale.



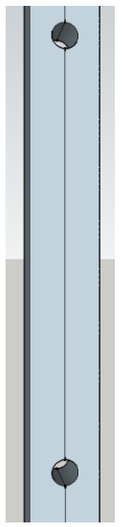
I then proceeded to sketch a 1:2 design for the following modelling session. From previous realisations I ensured that the joint's depth would correctly produce my intended design.

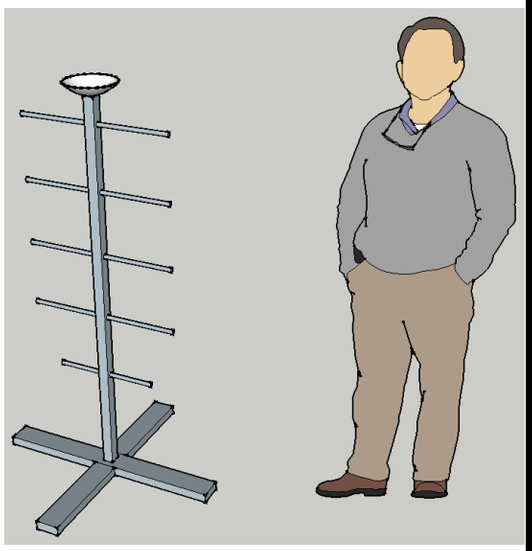
I think the modelling session worked effectively to represent the intended concept. This product would be efficiently manufactured on a large scale. I decided to make a trapezium profile , to save material and therefore weight, whilst maintaining the strength. The change of shape is also contrast to the block forms to the previous designs.

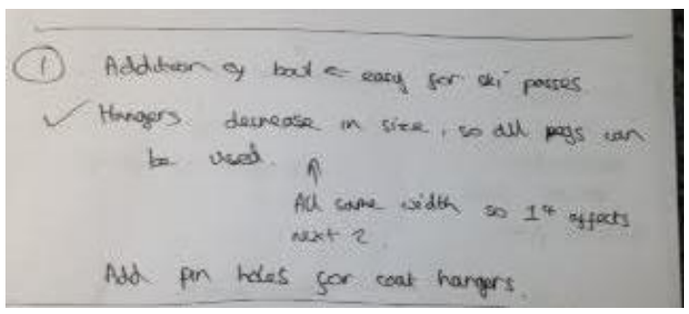
DESIGN AND DEVELOPMENT.



My Inspiration for this design was originally sourced from these child development toys. The aesthetic design which features rings as opposed to blocks and bright colours may work well within my design. Associations between items and their relevant storage arm would help the user place all of their items onto the storage unit, whilst reminding them if equipment was missing from its layer on the product.

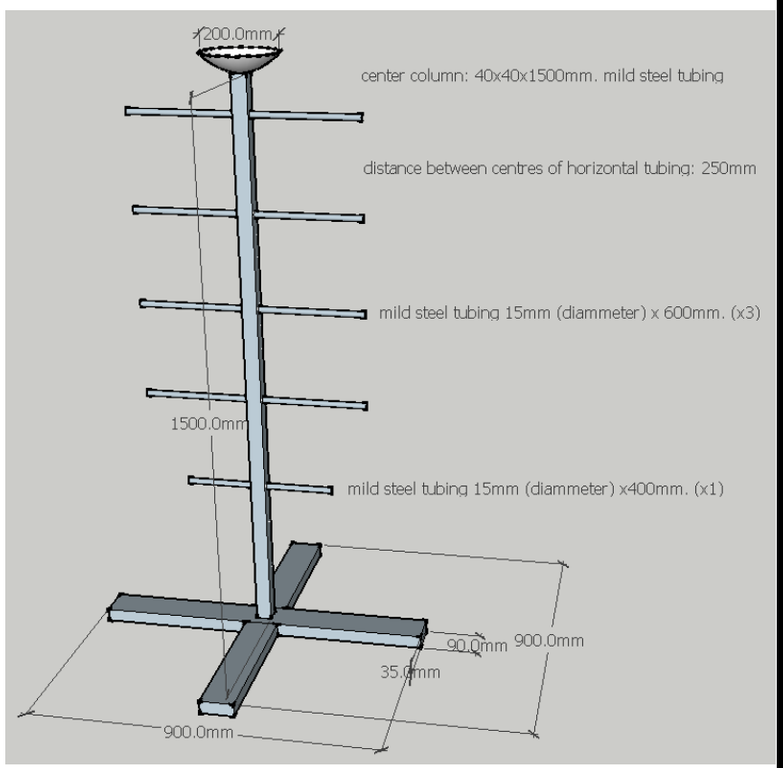




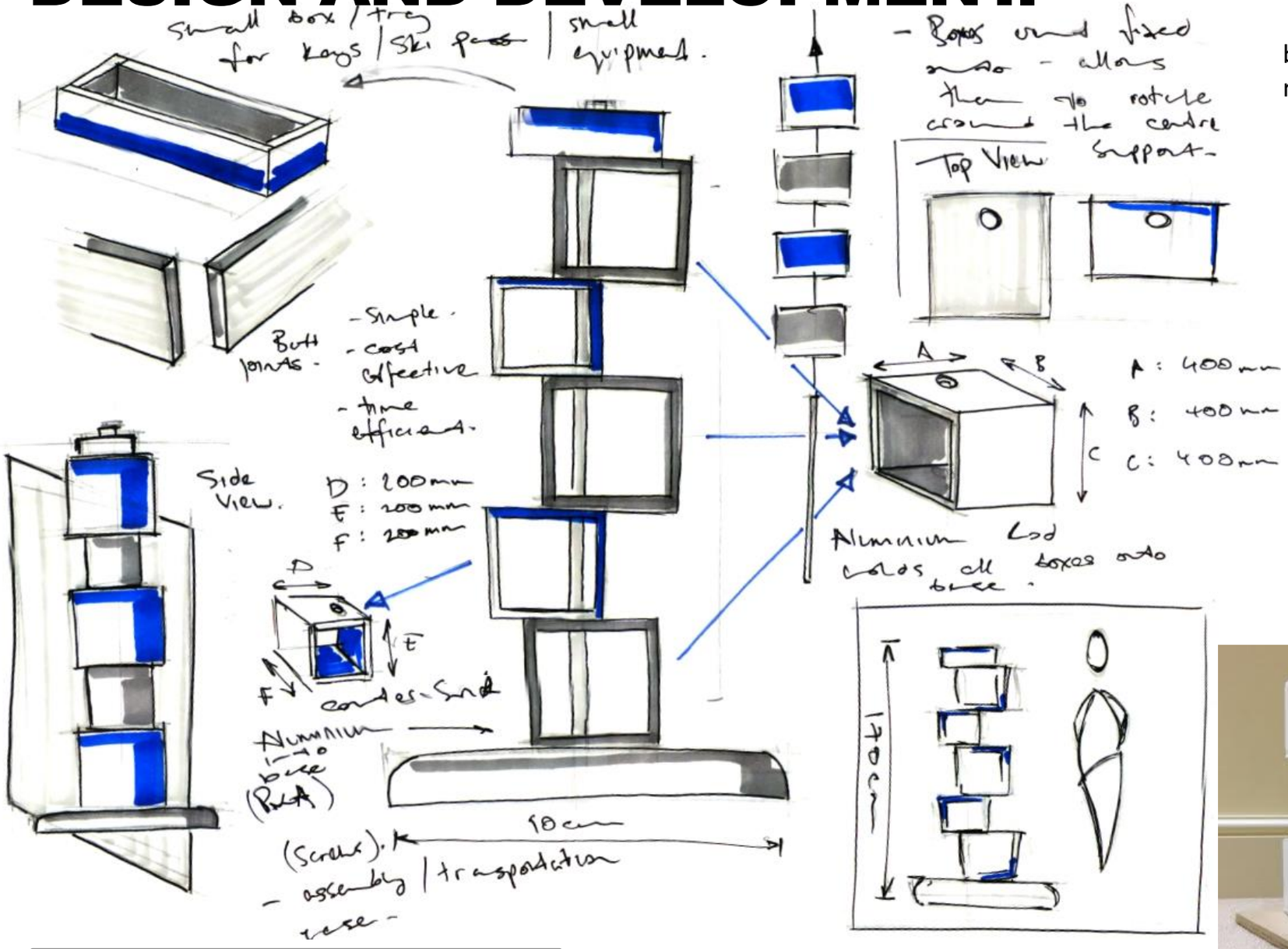


CAD Session :

To allow a more simple and therefore more cost effective design, I have changed the central upright tubing's shape. from a cylindrical tube to a cuboid. This allows a more efficient manufacturing time period.



DESIGN AND DEVELOPMENT.

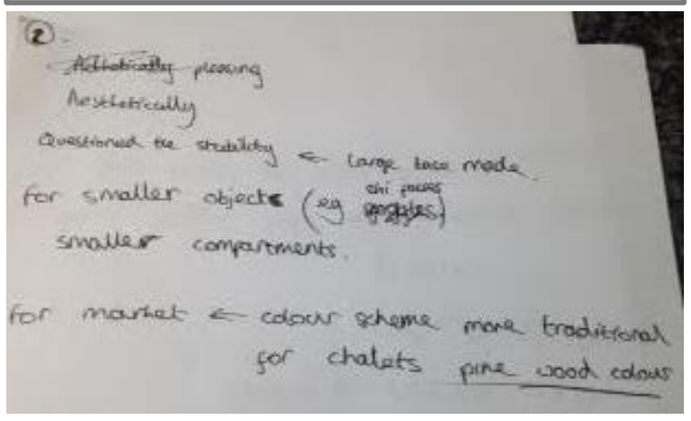


Modelling Session:

I simplified the design during the modelling . This was because I only intended for the model to give a physical representation of the concept and its function.

The pictures below show the innovative function of the unit. The central support column allows the separate compartments to rotate around, giving shape versatility and allows for the client's preference.

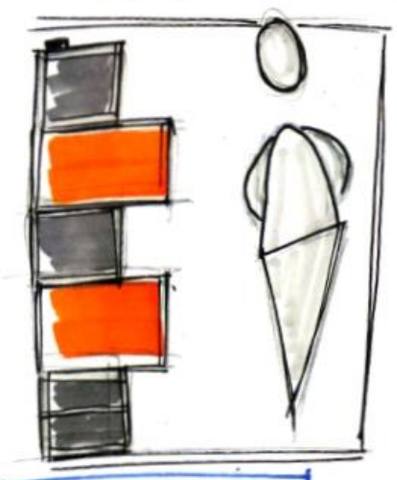
Review and conversation with end user discussing favourable features and areas of the design to develop upon.

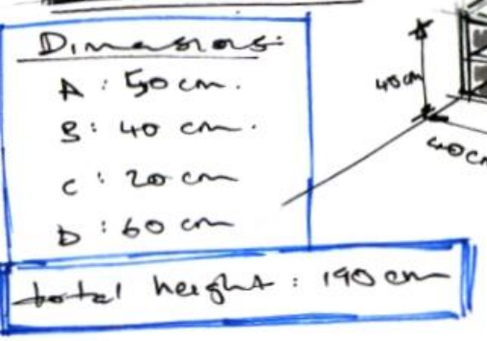


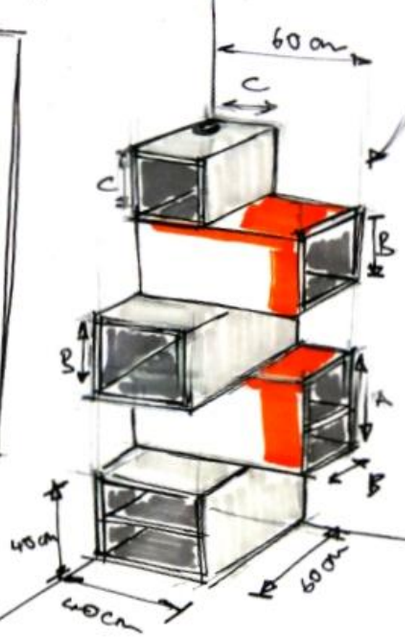
Please play videos (left) of end user comments.

Review and conversation with end user discussing favourable features and areas of model to develop upon.

DESIGN AND DEVELOPMENT.





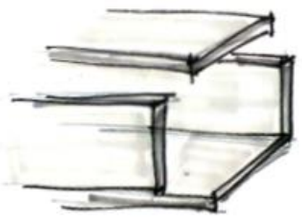


This unit could be stood in the room corner - minimises impact on room.
→ minimal space used.
→ maximises potential room use.

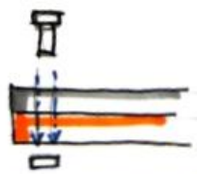
Veneered Pine Boxes.
→ cheap : . not as sustainable as pine board.
. is recyclable though

This could allow for batch / mass production using standardised parts.

Biscuit Joint.



PVA.



→ If knock-Down fittings were used, the product could be distributed to existing furniture shops such as IKEA.

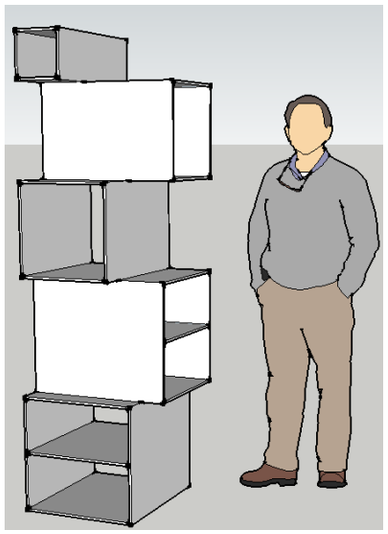
Aluminium machined bolts, threaded to screw each box together.

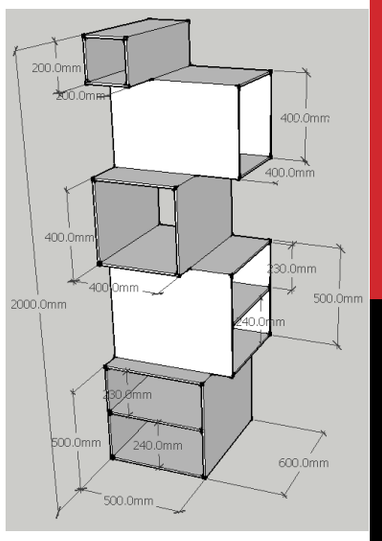
this allows for quick assembly and disassembly when transporting the product.

• Box shapes are very space efficient. Yet can't as creative as a different shape.

→ The innovation of the product lies within the product's use of space / Aesthetics / and new design.

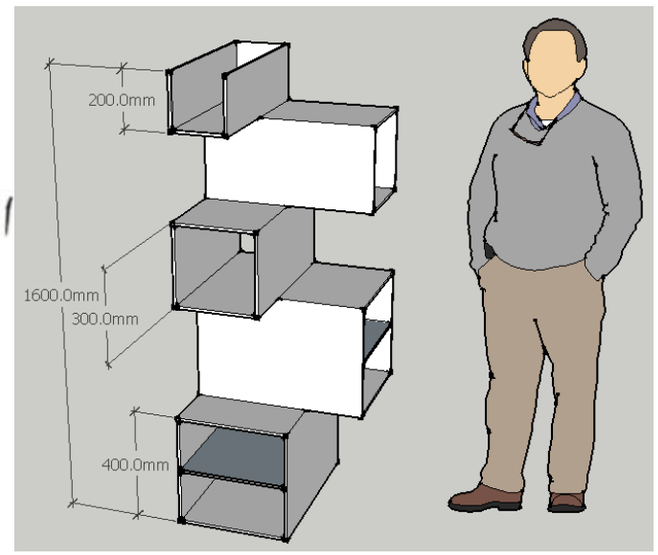
CAD Session 1:





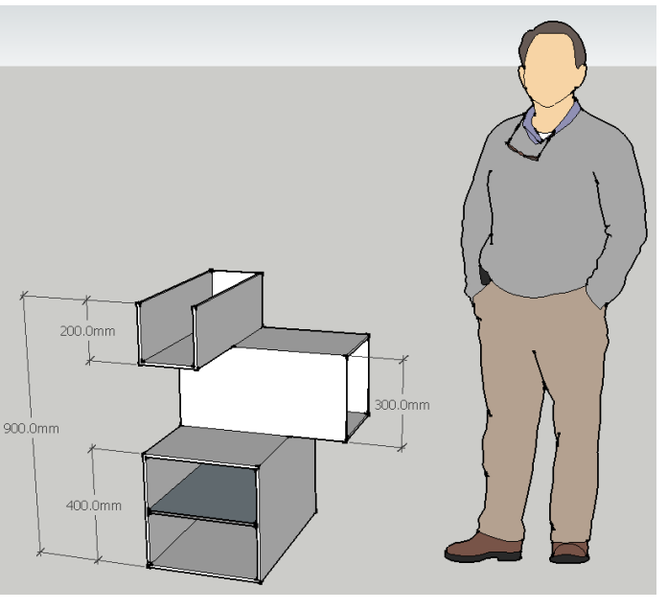
CAD Session 2:

Because the unit is only intended to hold accessories and no significantly large items, I thought that the first CAD drawing was too large. As a result I made a developed design in which the scale was decreased.

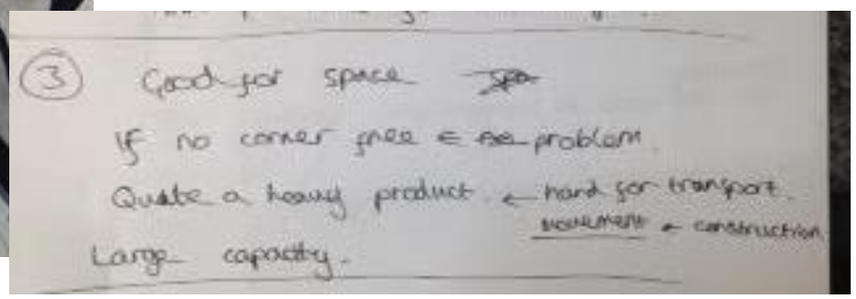


• The new design is much shorter in height, which allows easier interaction with the top compartment of the unit.
• Furthermore, I made the top compartment open topped to increase the ergonomics of the unit. (when revising the anthropometric data gathered, end users with larger hand sizes would have had trouble accessing the enclosed narrow front).

CAD Session 3:

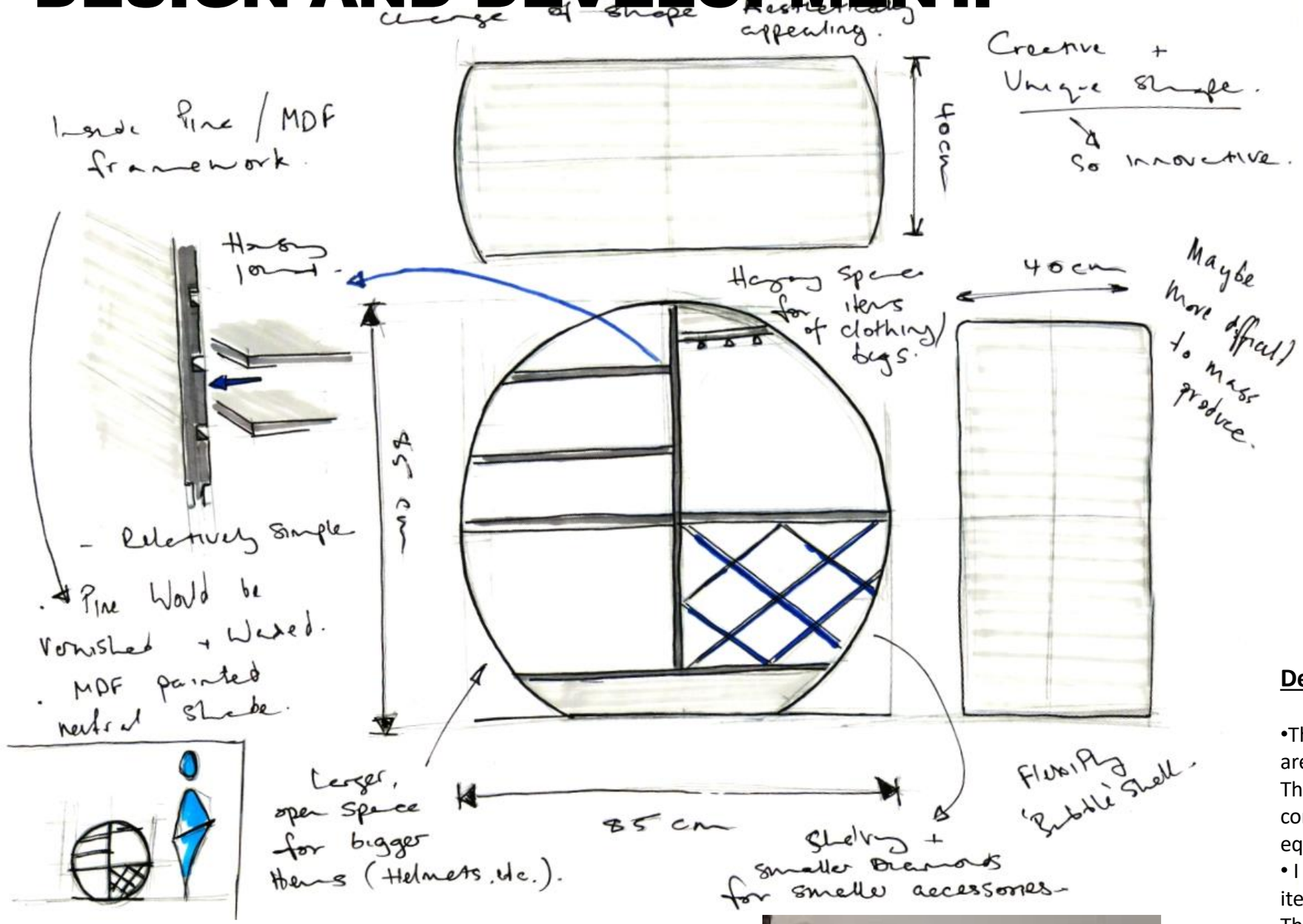


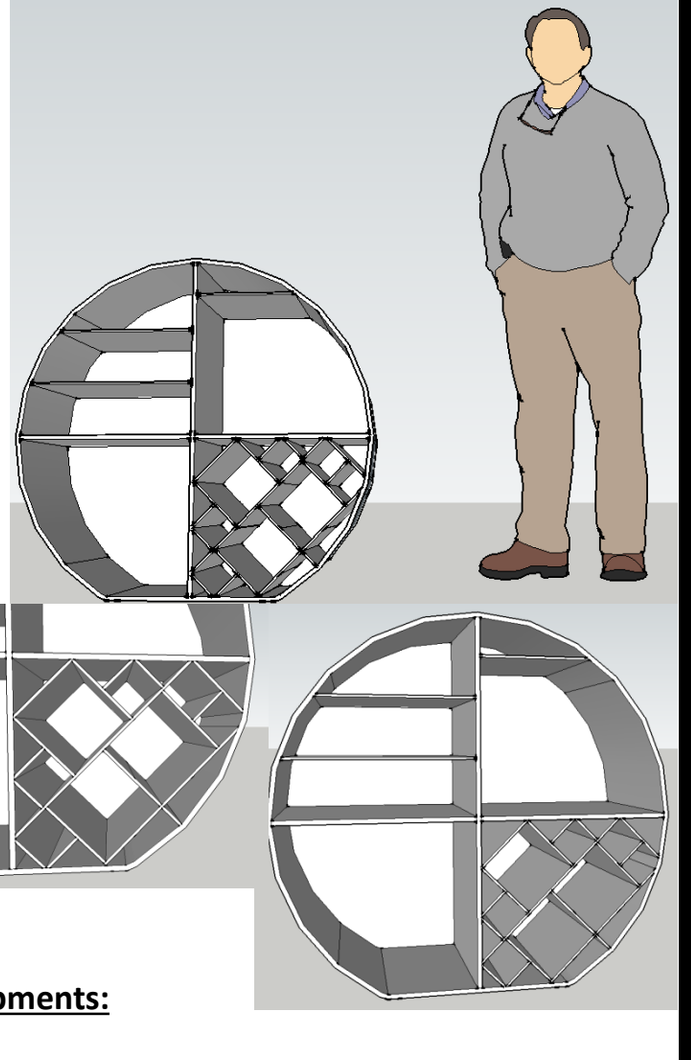
•In response to client feedback, I have made a much smaller product of the same design. **To diversify the design**, this product could be marketed as a branched off new product- intended toward chalets and homes which have a small number of residents , or chalets and homes which are very limited on space.

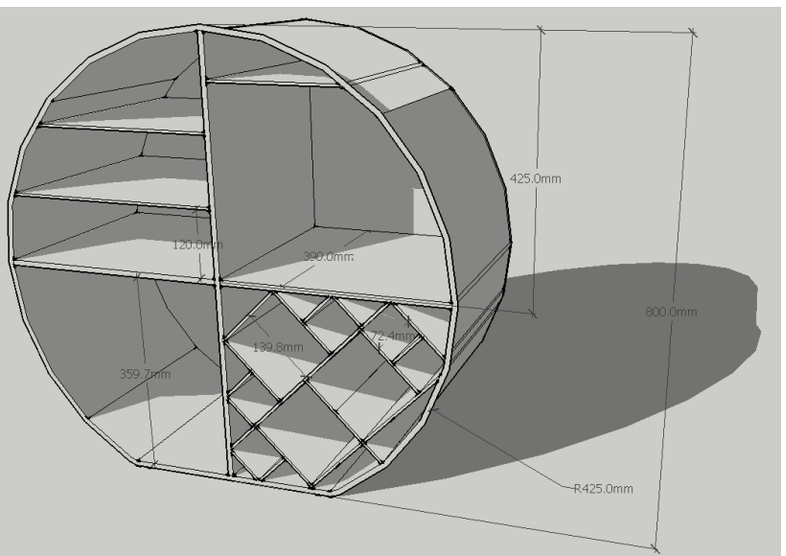


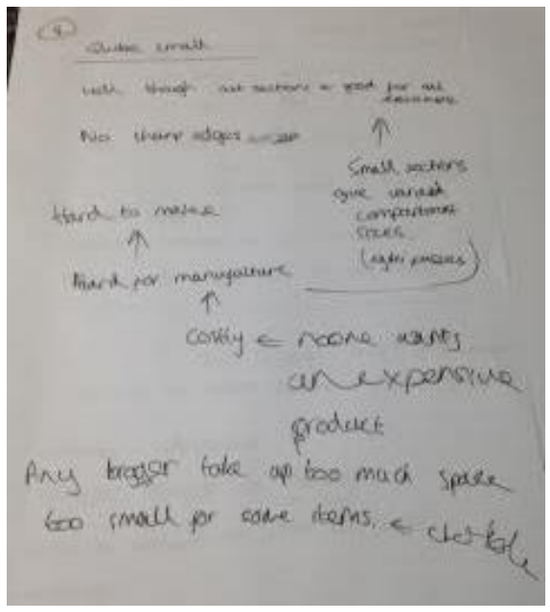
Review and conversation with end user discussing favourable features and areas of the design to develop upon.

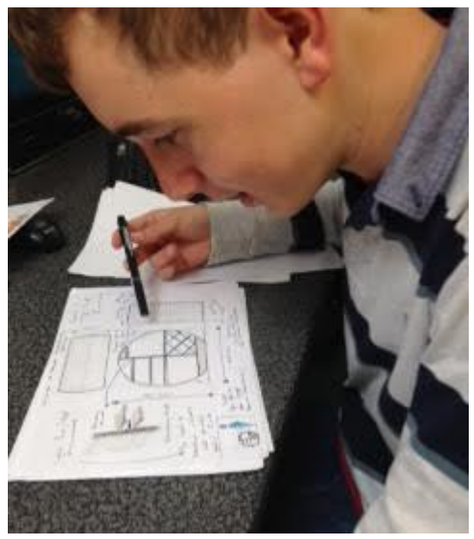
DESIGN AND DEVELOPMENT.











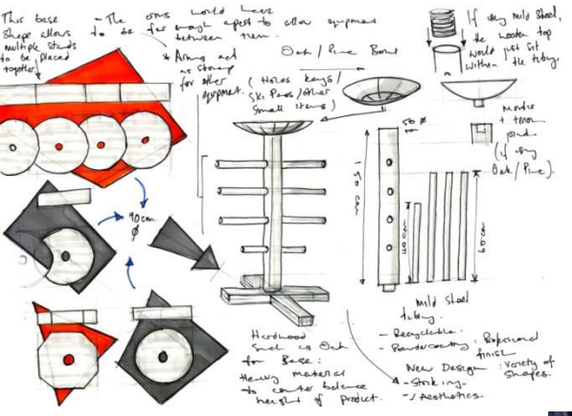
Developments:

•Through CAD design, I manipulated the diagonal storage area to incorporate varied sized storage compartments. This was partly due to original drawing inaccuracies of the concept and also to allow for different sized pieces of ski equipment.

• I also incorporated a backing into the design to prevent items being pushed all the way through the storage unit. The original 400mm depth includes the 10mm MDF backing.

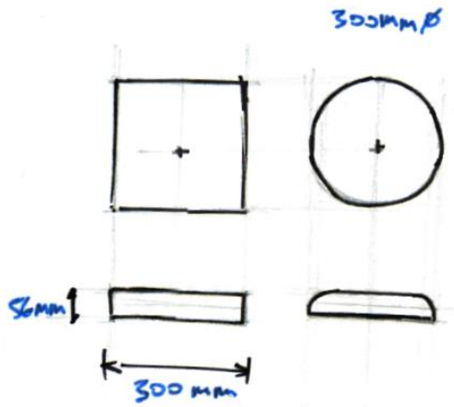
Review and conversation with end user discussing favourable features and areas of the design to develop upon.

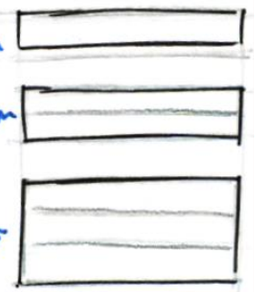
FINAL DEVELOPMENT.



I decided to further develop this design, as I preferred the application of the 'arms' to hold accessory items.

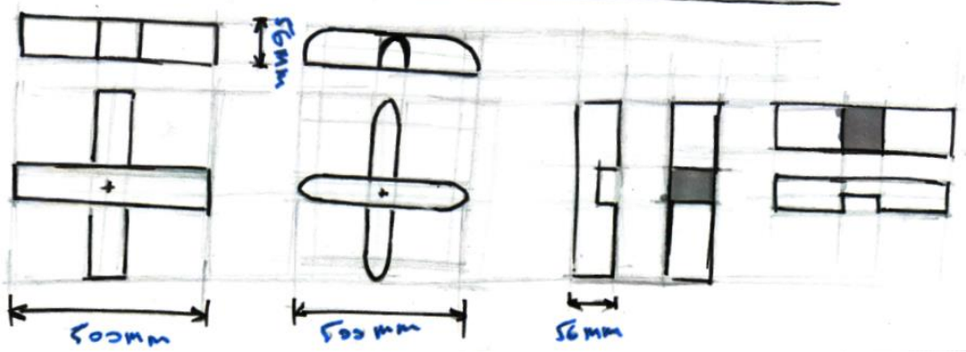
This page develops the possibility of making a unit which incorporates these 'arms' in a vertical setup around a central column, as opposed the previous horizontal setup.





Too large - one single piece of material → Gives a good base of support. Impractical for a transportable feature

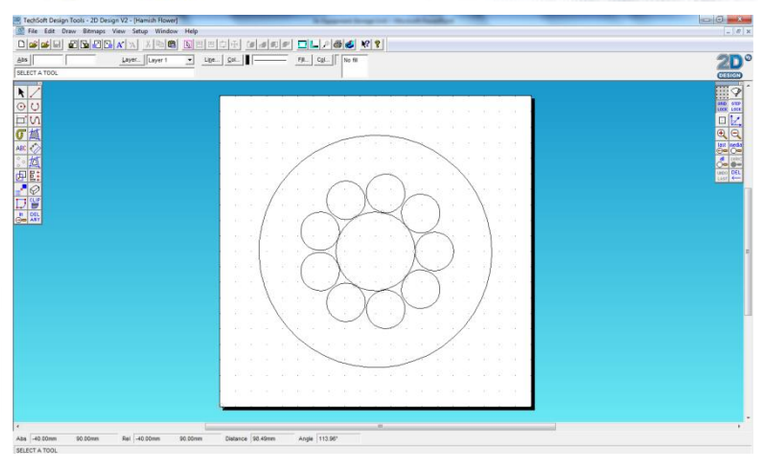
Gives a wider base of support without adding excess weight



The drawings explore the unit's base design- developing an effective base, which securely supports the upright design, whilst minimising the weight.

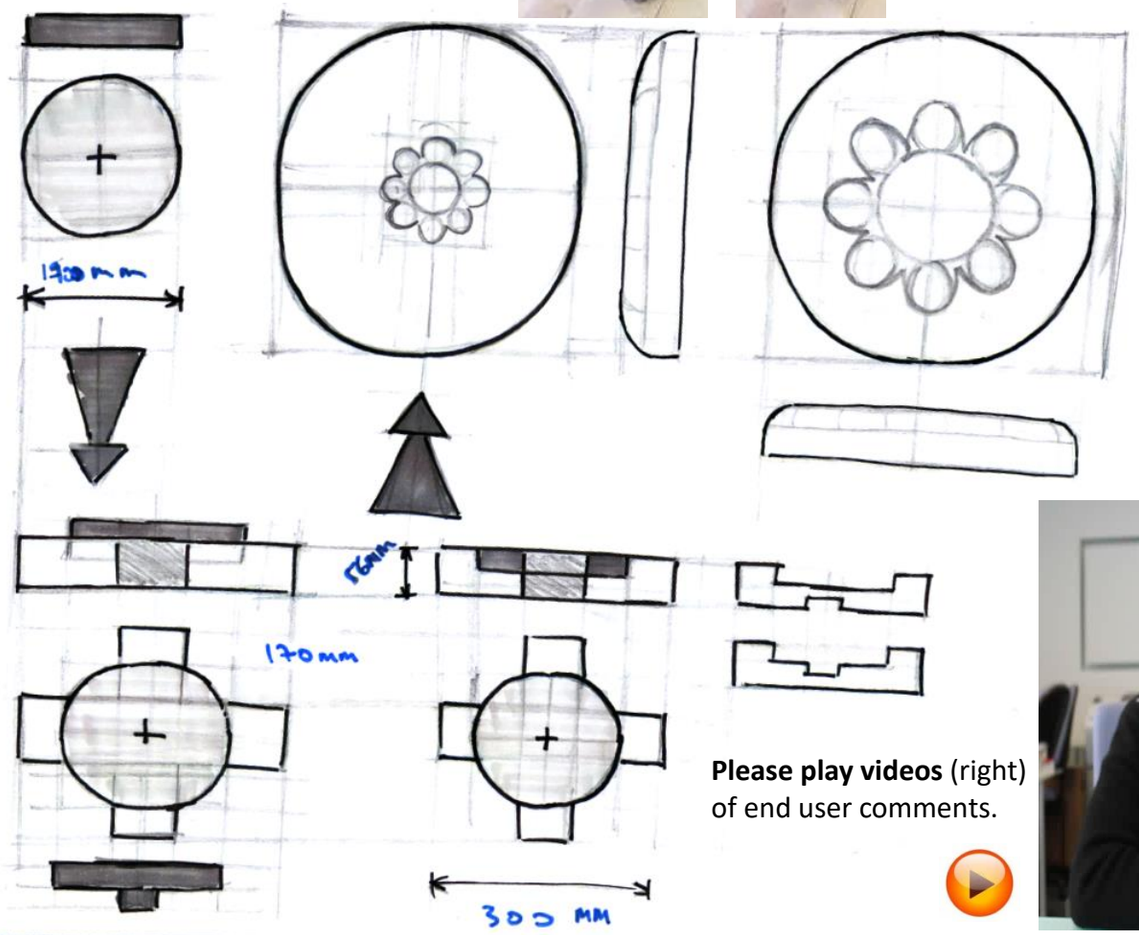
Different perspectives of the tubing's configuration.

This upright arms would stand in this flower petal design, with the central column being of a larger diameter. Two perpendicular pieces of material enables the stand to be securely supported, whilst making the design weight efficient.

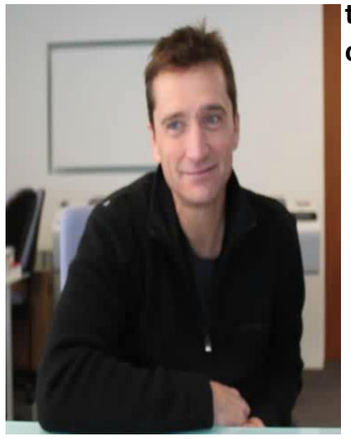


These Mild steel tubes would then stand upright in the holes of the flower petal base.

I then proceeded to use CAD to construct and consequently cut out, using CAM, the flower petal base using two MDF boards glued together with PVA:



Please play videos (right) of end user comments.



Review from expert:
I took my design to Graham Bell, for an expert opinion on the design. Graham Bell is a former Olympic skier, who now currently is a BBC presenter of the BBC show, 'Ski Sunday'.

ACTION PLAN.

Quality control and quality assurance:

Quality control:
Quality control is set up to ensure that the product meets the standards of the customer. It would involve inspections during and after the manufacturing process to ensure that the equipment stand is not of a poor quality. Quality Control would be either carried out on all or a sample of my product. Inspection checks can be carried out by:
- Simple visual checks
- Detailed data comparisons
- Accuracy of dimension control
- Flammability tests
- Weight verifications
- Electric circuit examination
- Safety inspections

One my main aims from a business point of view is to produce a product which has been tested using quality control and having zero faults. This means that the base size and arm lengths must be a uniform size, with the angle of bend at the top of each arm being the same for all units that are manufactured.

Quality assurance:
I would carry out this procedure to ensure that my product is of a high standard. The product is checked before, during and after the manufacturing process. Each component would be checked for damage, that the powder coating has been successful and that no mistakes have been made during the manufacturing process . The aim of these checks is to ensure that the product is of a high quality first and every time.

Risk assessment:

When manufacturing my prototype e design I have to ensure that I take certain safety precautions in the workplace.

- I have to wear an apron and appropriate footwear to prevent damage to my feet and clothing.
- I must ensure that when using machinery and tools that I'm wearing safety goggles.
- I have to maintain a clear working environment to prevent avoidable hazards. This will protect both myself and others who are using the workshop.

To complete my risk assessment I must review these points throughout the manufacturing process to maintain the required level of safety.

Health and safety regulations:

During the manufacture of my product I must ensure that I abide by certain regulations and laws to ensure the safety of all employees.

- Health and safety at work act 1974- ensures that employers make work for their employees and other visitors as safe as possible. Other visitors include self-employed, sub-contractors or members of the general public. The Act gives guidance as to what the employers need to do in order to reduce risk in a commercial environment.
- Personal Protective Equipment At Work 1992- concerns protective clothing and equipment within the workplace, ensuring all necessary protective items are provided.
- Workplaces Regulations Act 1992 - covers ventilation, heating, lighting, workstations and welfare facilities.
- Provision and Use of Work Equipment 1998- concerning the safe use of machinery and other equipment.
- Reporting of Injuries, Diseases and Dangerous Occurrences - employers must notify the Health and Safety Executive concerning any injuries, diseases or dangerous occurrences with their business.

Trade Descriptions Act 1968:

This is an Act of the Parliament in the UK which prevents manufacturers, retailers or service industry providers from misleading consumers as to what they are spending their money on. This law empowers the judiciary to punish companies or individuals who make false claims about the products or services that they sell.
Applying a false trade description to goods is a strict liability offence. As a result I must provide the correct **Product Labelling** on my packaging.

Intended process of manufacture:

Stage 1:
Repeat CAM to construct a second MDF base. Using PVA glue both together.

Stage 2:
Mark all mild steel tubing in preparation for cutting. Cut mild steel tubing using metal chop saw.

Stage 3:
Set up pipe bender. Use pipe bender to bend angle on each of the 'arm' tubes, leaving the centre one untouched.

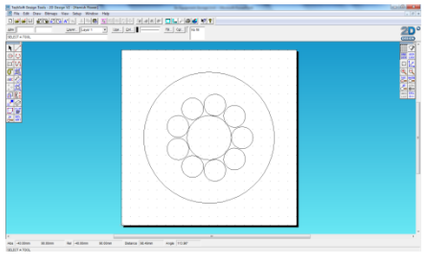
Stage 4:
Use metal chop saw again to cut down eight of the nine arms to staggered heights, leaving the 9th one at the original height.

Stage 5:
Using half round, and full round files , remove burrs from every end of mild steel tubing. Dry run of product to ensure all components fit together as intended. Repeat filing if necessary

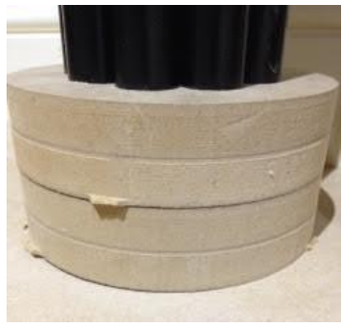
Stage 6:
Using 3mm drill bit, drill holes into bottom of each component, in preparation for powder coating.

Stage 7:
Take components to powder coater. Return 1 week later and collect.

PROCESS OF MANUFACTURE – FINAL DESIGN



1. Following the previous design step, I repeated the CAM process to give me a second MDF base. These, I glued together using PVA to give me a more supportive base.



2. secondly, I bent the top of the outside poles using the pipe bender- these would act as the 'arms' which would be where the items are stored.

5. Final Product showcase:

3. Third, I used the metal chop saw to cut down the mild steel tubing to varying lengths; developing height variance in the design. This allows a variety of end users (both adults and children) to interact with the product.

4. The mild steel was sent off to an exterior powder coating company to be 'finished'. During the manufacturing process when my unit is mass produced, this would occur in factory. If it were to be more economically viable to have the mild steel powder coated by a second party, this would be done.

- As depicted, my unit uses minimal floor area , which is perfect when being so close to a room entrance. Meanwhile, the 9 poles at varied heights, allows a fairly large quantity of equipment to be held, without interfering with each other. The different heights allow the items stored, to be accessed from different angles and heights.

EVALUATION.

SPECIFICATION.

1. Function:

- The unit is required to **provide a space efficient, storage solution in chalets for alpine sport equipment.** Because the existing market contains products which hold skis, poles and boots, my unit will focus on the storage of the remaining equipment.
- The intended stand must **the essential accessories** necessary to a skier or snowboarder, or any participant of an alpine sport.
- The unit would be ideally placed very close to the chalet/ room door to provide an easy to reach storage space for those exiting or entering the environment.
- The unit must be assembled with ease using the supplied components.

2. Manufacturing:

- Must be **efficiently reproduced to reduce the manufacturing time period and therefore manufacturing cost.**
- Manufacturing process must allow for a flat pack design; an appealing design feature which would allow ease of transport.

3. Materials:

- Must **not be of significant weight**, allowing ease of transportation by any end user.
- However, must possess a mass which will be load bearing of weight up to 6kg.
- Durable, able to withstand every day knocks and potential damage due to accidents.

4. Cost:

- Through research , most similar products cost in the range of £20- £70. However my product is a unique and innovative new design so would not necessarily be in direct competition with these products. This would allow a more higher end **price bracket of around £50-£100**. Affordability is not a main concern, because those who would purchase my product would come as a representative of a company or would be a skier/snowboarder themselves. Because winter alpine sports are expensive, the participant would have the money required to purchase a product which is higher up the market.
- Must be **cheap to produce/manufacture- this allows for a reduced retail price** and maximise profit margins. A competitive price of the product at market would allow for successful sales of the unit.

5. Ergonomics:

- Materials and form are required to be ergonomically suitable for frequent client use.
- The product must be comfortable to use by a range of age and sizes of end users.
- These ergonomic proportions would be based upon anthropometric data and research collected

6. Aesthetics

- colour neutral or a wide range of colour selection would be provided enabling the stand to suit a large variety of room designs and client preferences.
- The product needs to have a professional appearance; target market should not be deterred by a low quality finish to the product.

7. Anthropometrics:

- Anthropometric data and research of a range of client's shoulder and eye height would give a suitable height for the product.

8. Safety Precautions:

- Has to be **pose no danger to the client during their interaction with the product.**
- Must be of appropriate weight so that the user may transport the unit without damage to their person. **If the product is of a larger weight, the packaging must clearly label the product's weight** to identify the hazard with the user or anybody transporting the product by hand.
- **Any small parts** must which may be swallowed **must be identified** for the safety of small children.
- User friendly materials and shape which doesn't cause harm when the product is used appropriately.

9. Compactness:

- The stand must utilise minimal space within the room, so as not to interfere with the client's interaction with the remaining space of the room the unit is in.

10. Marketability:

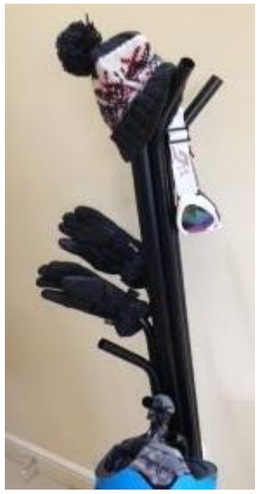
- This product must be suitable for a mixed-gender market, tending toward a more adult market.
- The manufacturing process must feature recyclable or sustainable materials which have a long product life and achieve highly in the Life Cycle Assessment.
- The Product must be a unique design featuring an innovative concept or design components which would make the product more appealing to the intended target market.

11. Size:

- The overall **height must be of a comfortable measurement to provide an easy to reach storage space for the client**, having the storage component of the product in an optimised position. (not too high /low).
- The product's base must not extend too far, so that floor area taken up is reduced to a minimum.
- After purchase, the product must be able to be transported in an averaged size car. This would therefore put limits onto packaging dimensions .

12. Moral and environmental implications:

- The manufacturer must not exploit the workers, whilst providing a safe working environment in the factories.
- To have a minimised environmental impact, the product should use recycled/ recyclable and/or sustainably sourced materials.



Please play videos (right) of end user comments.

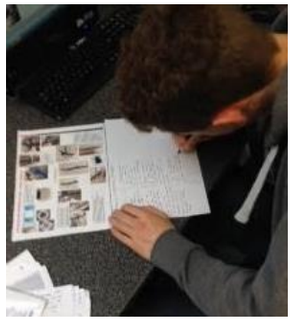
Evaluation against specification:

1. The unit takes up minimal floor area so does provide a space efficient storage solution. **This meets spec. point 1.**
2. Because the unit has no permanent fixings and uses components which can be massed produced, **the storage unit fulfils the requirements of spec. point 2.**
3. Due to materials used, the cumulative weight of the product would be too excessive for most end users to transport with ease. **This would mean that the product does not fully meet spec. 3. However when in separate components, the unit is easily moved around and the product adequately can support a load of up to 6kg.**
4. The price of the materials and powder coating, significantly increased the manufacturing price of my product. With the final material cost reaching £97 and the powder coating costing £35, **I would have to market the unit at a considerably high retail price to make the product economically viable. However when the materials are bought in larger orders; the manufacturing cost would decrease; enabling the retail price to fall** or my profit margin to increase. Because of this, my product is commercially viable.
5. The product integrates the anthropometric data into its design very successfully, so **making the unit ergonomically friendly. (meeting spec. 5.).**
6. The **black powder coating finish gives the unit a sophisticated and professional aesthetic selling point**, making it appealing to the end user. The shape made as a result of the **'arms' branching off at staggered heights is a aesthetically appealing** feature.
7. Appropriate dimensions have been made as a result to the research and collection of anthropometric data, which will allow the most efficient and comfortable interaction between end user and product.
8. With the addition of rubber bungs, which fit in the end of each tube, the product's safety is increased. These small parts cannot be removed easily, so no safety hazard is posed to small children during use. During manufacture and distribution , the rubber bungs will be packaged in a separate bag, within the box.
9. The **stand utilises minimal space within the room**, so would not interfere with the client's interaction with the remaining space of the room which the unit is in.
10. The **neutral colour shade makes the product gender neutral. The materials used are not sustainable but can be recycled or reused. The shape of the design and manipulation of the poles is very innovative.**
11. According to client feedback, the dimensions of the product provide an easy reach storage solution. The base has a small diameter, which means that the unit does not intrude into the room too far. Individual components pose no weight issue to the end client. However, **when packaged the unit's large weight would have to be labelled on the box. The end user would face no particular difficulty with size of the actual packaging when transporting the unit in an averaged sized car.**
12. The materials list features recyclable and reusable materials. **However because the unit is manufactured using mainly mild steel; my product is not very sustainable.**

I was able to meet much of the specification, through constant review during the design and throughout manufacture of the product.

Please play videos (left) of end user comments.

EVALUATION.



End User 1:

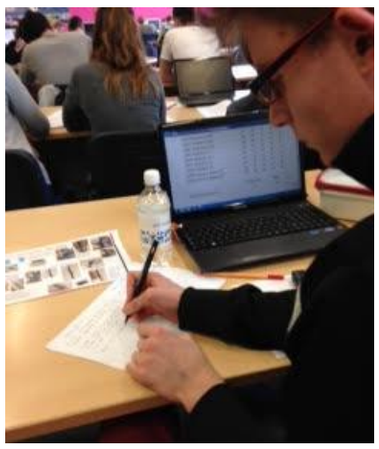
Testing + Independent Evaluation.

Strengths	Weaknesses.
- Sophisticated aesthetics which would appeal to the end user.	- Gap between poles allows items to fall down, if not placed on the unit correctly.
- Maximal use of floor space; very appealing for users of smaller chalets.	- Angle of bend is not large enough. A more perpendicular bend would prevent the items from moving whilst on the product.
- The ease that some of the components are permanently fixed together make it extremely easy to transport: versatile design.	- The manufacturing cost makes the retail price very high maybe too expensive.

End User 3:

Strengths	Weaknesses.
- Lots of arms means families can use it and large groups of skiers	- environmental concerns as it is made from a finite resource
- a range and variety of equipment can be held so for both skiers and snowboarders can use it	- worries about wet ski items dripping as no heating currently installed
- dual purpose as can act as clothing stand in summer	- demand would fluctuate from summer to winter
-elegant design, black goes with many room designs which hotels would like.	

End User 2:



Strengths	Weaknesses.
The arms are moveable so they can be adjusted depending on the space.	The poles sticking out could intersere if there's a small corridoor.
Chalets usually are heated very well, so it needs to be heat resistant - mild steel is a good material to use.	It could be nice to see different colours of finish.
Although high, the cost is aimed at the target market.	The cost is very high.

My response to independent evaluation:

In response to the weaknesses of the product, I will either discuss their comments or facilitate the following changes to the design, marketing or manufacturing process to make the product meet more of the end user requirements.

End User 1 comments:

•A method to bind the arms to the central column and one another would pull each arm toward the centre of the product. This would prevent the arms separating and a gap forming- hence solving the issue raised. This binding could be made from treated leather thonging. Using the leather thonging would provide an impermanent solution to the material problem. However the material cost would be increased, further increasing the retail price.

•During manufacture, when the mild steel is placed into the pipe bender to construct each arm, the angle of bend would simply have to be increased, making the requested more horizontal end. To the piping.

End User 2 comments:

•Although the demand may heighten during winter, sales would still be made during summer, because hotel companies and private chalet owners would want to stock their properties with the product during summer, in preparation for winter.

•A method of warming the product to remove moisture from the equipment would have to be developed. As discussed with this particular end user, if the product was heated too excessively, a safety issue would be caused.

•Eventhough not sustainable, the environmental impact is reduced due to the mild steel being able to be recycled at the end of the product's life cycle.

End User 3 comments:

- During manufacture, the powder coating will be available in a more varied range of colours. Further research therefore will have to be made into this.
- Furthermore, in the advertisements and brochure- in shop- will feature comments stating that the product is available in a variety of finishes.
- As the client states; eventhough the retail cost would be high, the target market are those who participate in alpine sport, so are able to purchase a more expensive product. This is a valid to bring light to; as some may not wish to invest in an expensive product. It would be wise therefore to review the intended retail costs.
- The interference of the arms in a narrow does not concern me from a design point of view. This is because the poles are able to me rotated in their base, so that they can be positioned in such a way that they would not obstruct anybody who moves past the product in a small space.

EVALUATION.

After manufacturing my unit, I then reviewed what I changed during my manufacturing process. Although the plan was followed on the whole, some adaptations had to made. The time period for each stage was also skewed by unprepared minor stages which were necessary for the progression of manufacture.

What I have learned during the process.

Intended process of manufacture:

Stage 1:
Repeat CAM to construct a second MDF base. Using PVA glue both together.

Stage 2:
Mark all mild steel tubing in preparation for cutting. Cut mild steel tubing using metal chop saw.

Stage 3:
Set up pipe bender. Use pipe bender to bend angle on each of the 'arm' tubes, leaving the centre one untouched.

Stage 4:
Use metal chop saw again to cut down eight of the nine arms to staggered heights, leaving the 9th one at the original height.

Stage 5:
Using half round, and full round files , remove burrs from every end of mild steel tubing. Dry run of product to ensure all components fit together as intended. Repeat filing if necessary

Stage 6:
Using 3mm drill bit, drill holes into bottom of each component, in preparation for powder coating.

Stage 7:
Take components to powder coater. Return 1 week later and collect.

① Because tabs were left to hold the base in the remaining MDF; I had to remove them. → This proved difficult because of the delicate design of the base.

② As I previously did not know the exact angle I wanted, I had to spend time experimenting with different angles. This significantly increased the manufacturing period.

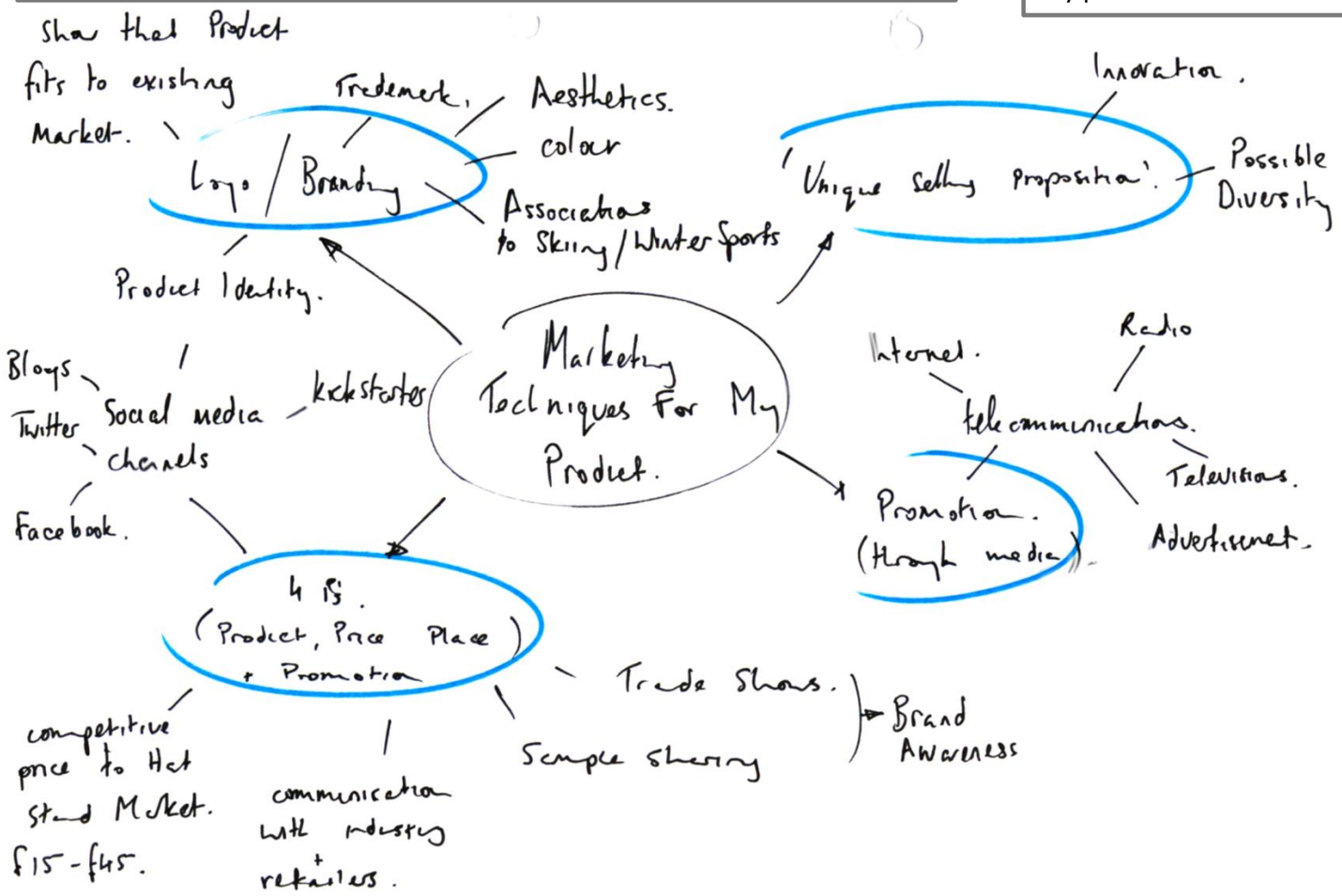
③ Again the exact difference of height between the poles meant I spent more time measuring, and experimenting.

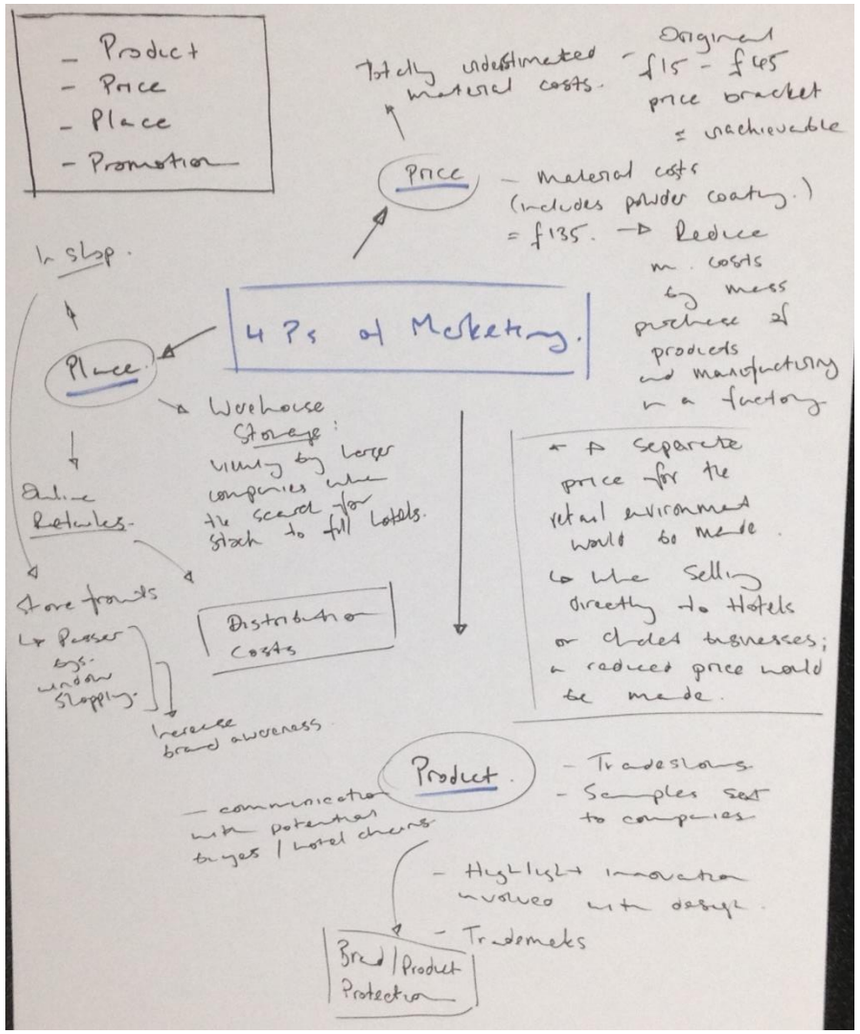
④ If I was using different powder coats - time would be used switching/cleaning the machinery → I would therefore have to powder coat units in large batches.

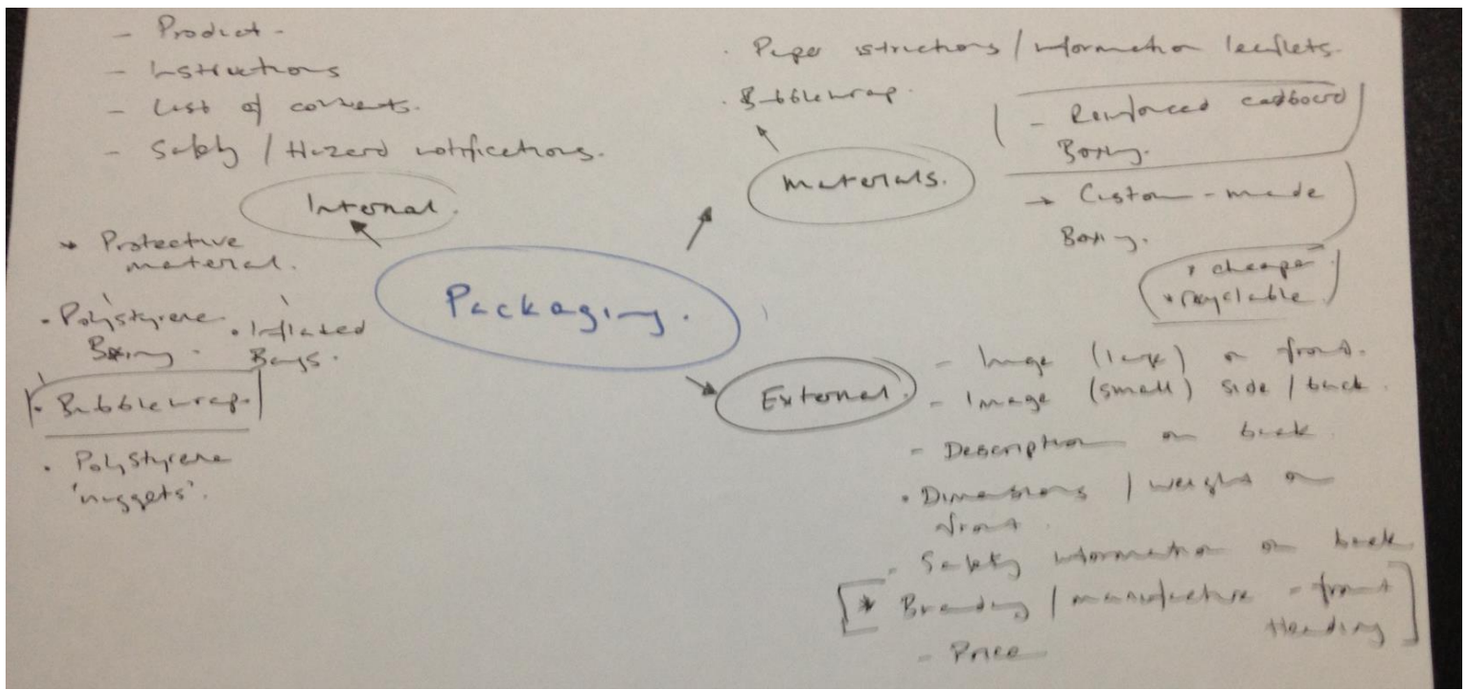
MARKETING.

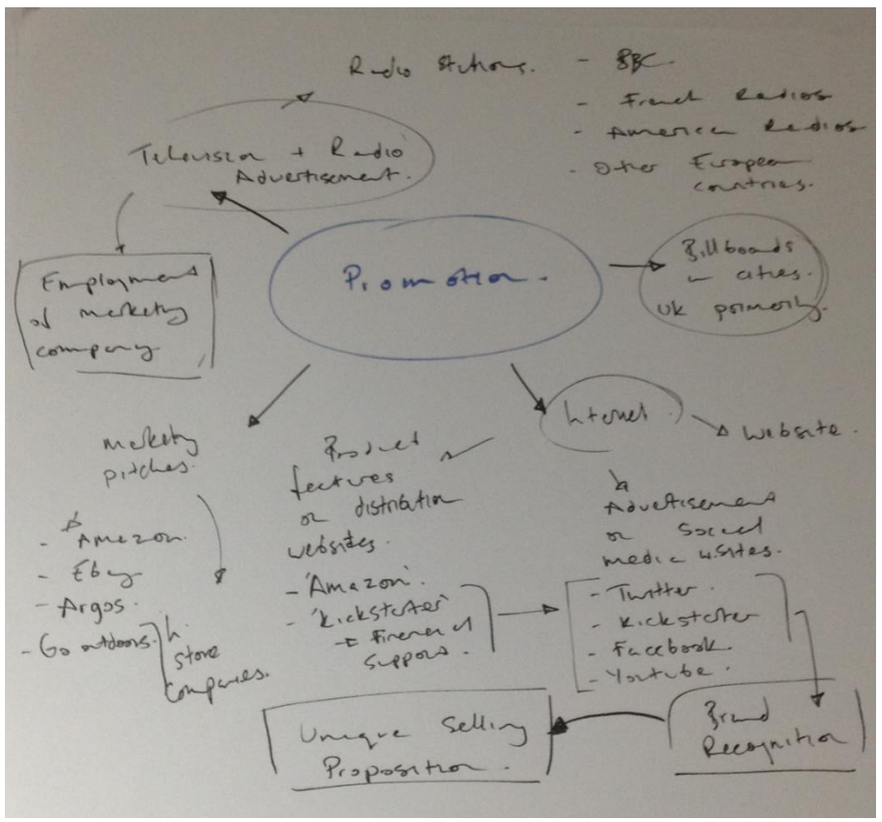
Marketing Strategy A:
I made a mind map of initial thoughts of how I could begin to market my product and raise product awareness .

Marketing Strategy B:
With each of the separate sections of my strategy I made a further mind map of how I would market my product.









MARKETING.

Unique selling proposition:

For my product to catch the initial attention of the target market, retain their attention and ensure that the end user remembers my product, I need an effective **Unique Selling Proposition.**

For a unique selling proposition to be effective, I need it to indentify my product as an individual, away from existing similar products.

I must consider what influences/affects the customer within the market place. This would include; what type of advertisement processes would positively and negatively affect their decisions to purchase a product.

As a result I have conceived the following unique selling proposition:

'Alpine storage- Innovation made simple.'

I think that my statement creates interest through it's simplicity. A short USP is more easily remembered, so ideal. The proposition highlights the innovation behind the design; making it stand out from existing products.

Logo/ Branding:

Through the creation of a product name, brand and logo, I have to consider longevity and differentiation.

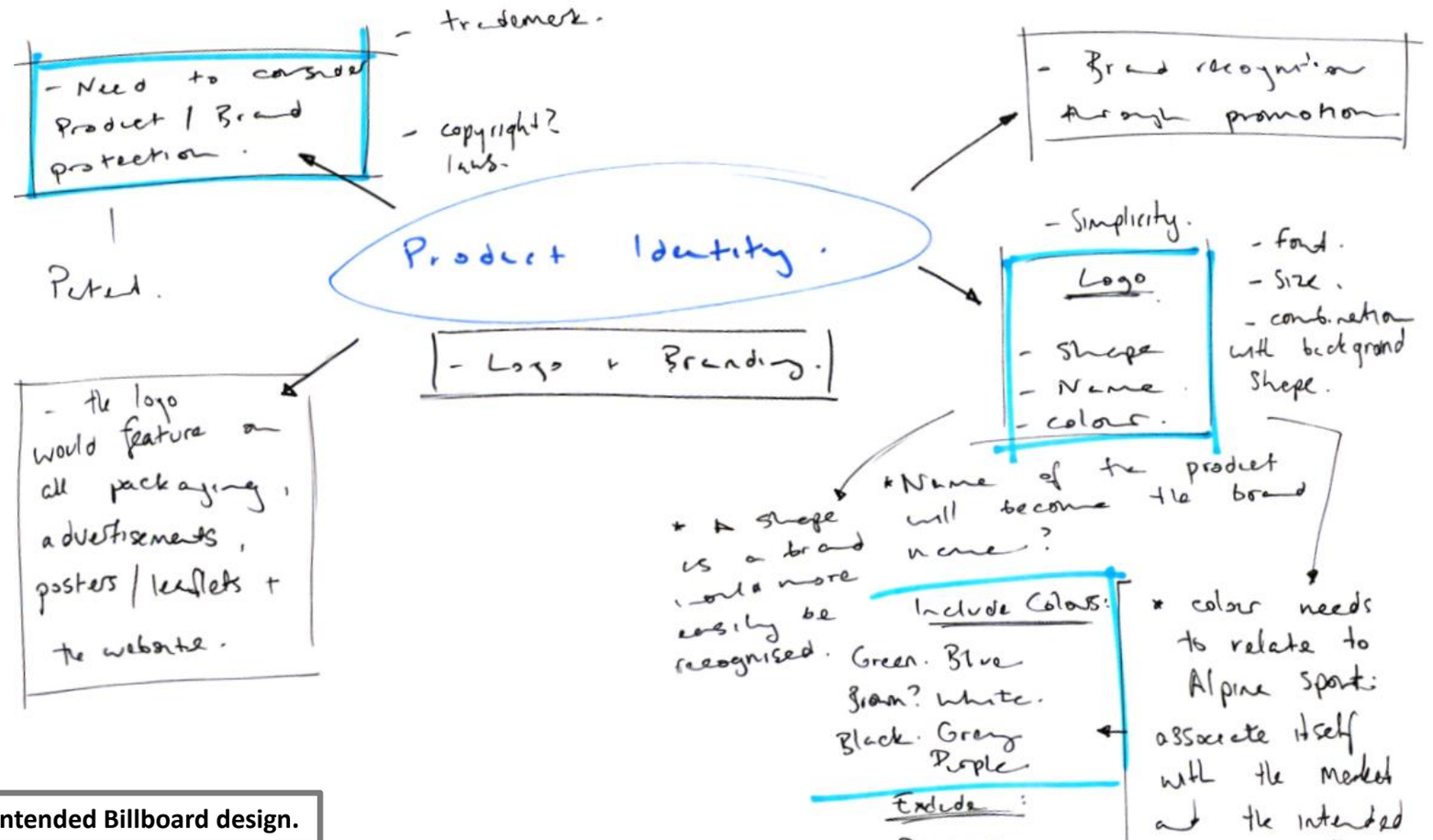
-I cannot create a product which shares a trending theme or name. If I do, as soon as the trending theme declines in popularity, so too will my product's name.

-To differentiate my product, the name must stand out against the competing market, whilst conveying information about the product and company, to interest the target market.

-I have also got to create a name which is easily pronounceable and pleasant when heard. Phonetics are also very importance.

The name of my product is 'SESU'; an acronym for 'Ski equipment storage unit'.

The name itself will act as the logo for my product. An image without words , I do not think, would portray clearly my product to the end user.



Intended Billboard design.

SESU

Above is my product logo and name. The use of a royal purple helps gives the appearance of quality and wealth to the product. An end user would prefer to have an item of sophistication within their chalets. Meanwhile, the 'Arial rounded MT bold' text gives a softer appeal to the name. this is complimented by the soft sound created by the pair of 'S's'. [se-soo].

A video (left) showing a section of my presentation of my product.

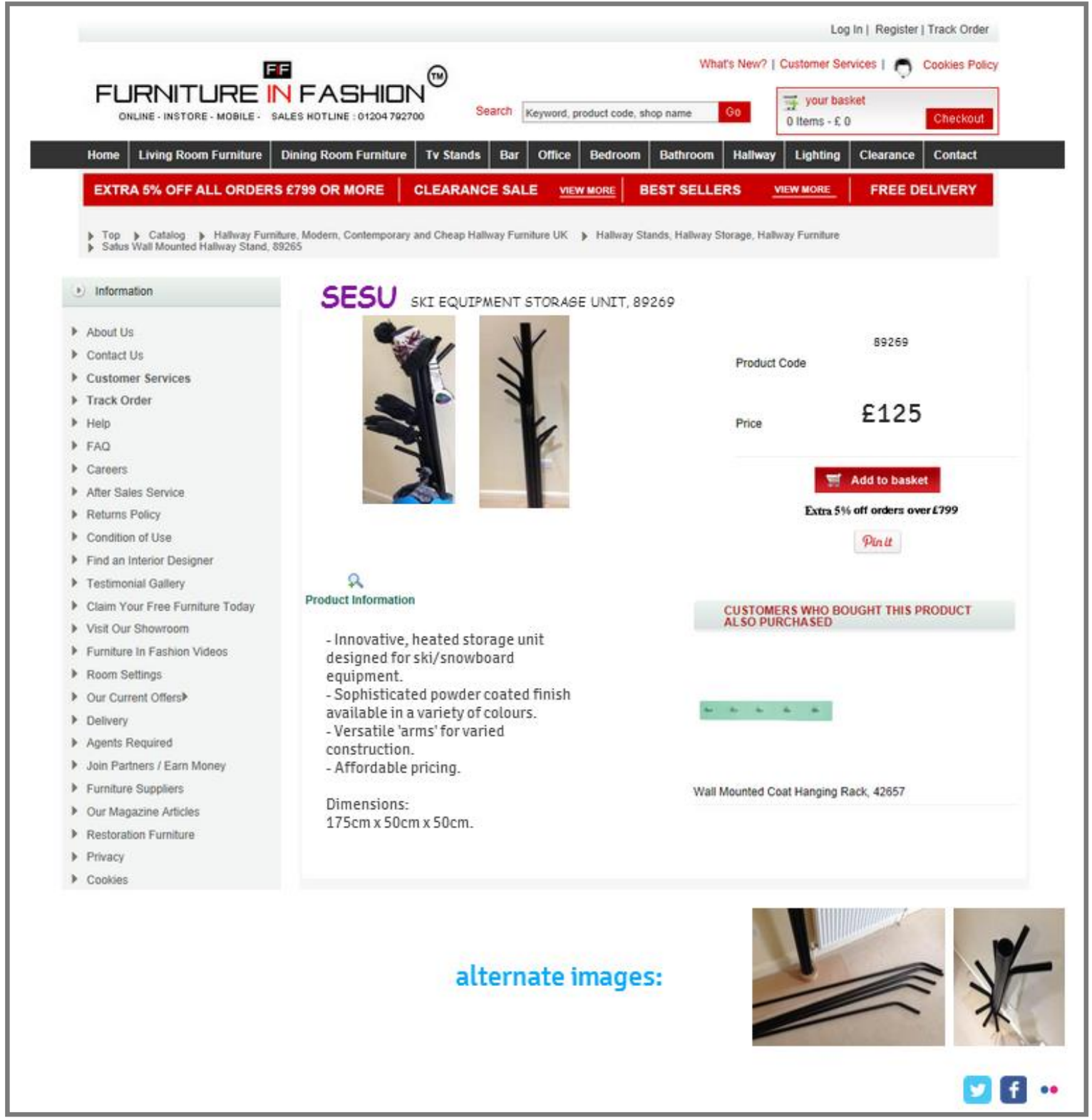
MARKETING.

I then proceeded to create an online presence for my product through the use of a website. I decided that selling my product through an existing furniture company such as 'Furniture in Fashion' would provide my company with a commercially viable starting point.

My website can be found at: http://hamishsherry18.wix.com/sesu.

Using 'wix.com', I created a design for what my product page would look like and its content for the website 'furniture in fashion'.
I inserted 'furniture in fashion's' website template into wix.com , to then create my own version of the product page. I then proceeded to import and build up the page myself

My advertising poster:



I would reproduce copies of this poster in large copies for small posters on the sides of bus stops. I would also make A4 copies of the page to distribute as hand-outs at pitches to client companies and on the streets.

REVIEW AND REFLECTION.

It is very important to consider the moral implications during the design process of any new product. This ensures that both the environment and the preservation of human rights is maintained, whilst ensuring the highest economic benefits for all parties involved in bringing the product to market.

Environmental/sustainable implications:

The environmental responsibility of a product's user, ensures that our actions and lifestyle have the smallest possible environmental impact as possible . This includes the incorporation of raw materials to the disposal and/or recycling of the product's materials. Throughout a product's life, we use life cycle assessment- to help us understand and reduce the pollution and energy used.

• To extract the necessary iron ore for the manufacture of the mild steel, mining processes and mechanical equipment are required. Harmful gases, from the use of the machine's fuel is released into the atmosphere. Mining causes damage, to the local environment. Mining (especially surface mining); destroys huge areas of land- which were previously habitats for local populace of animals, plants and people.
• Because some of the packaging isn't often recycled, the use and distribution has an indirect impact on the environment through CO_2 emissions, which are also contributing factors to global warming.
• Incorrect disposal, or recycling of my ski pole after the product's life will cause a negative impact on the environment. The mild steel of the centre column and arms has the ability to be widely recycled; therefore it's environmental impact is reduced.

Social/Ethical implications:

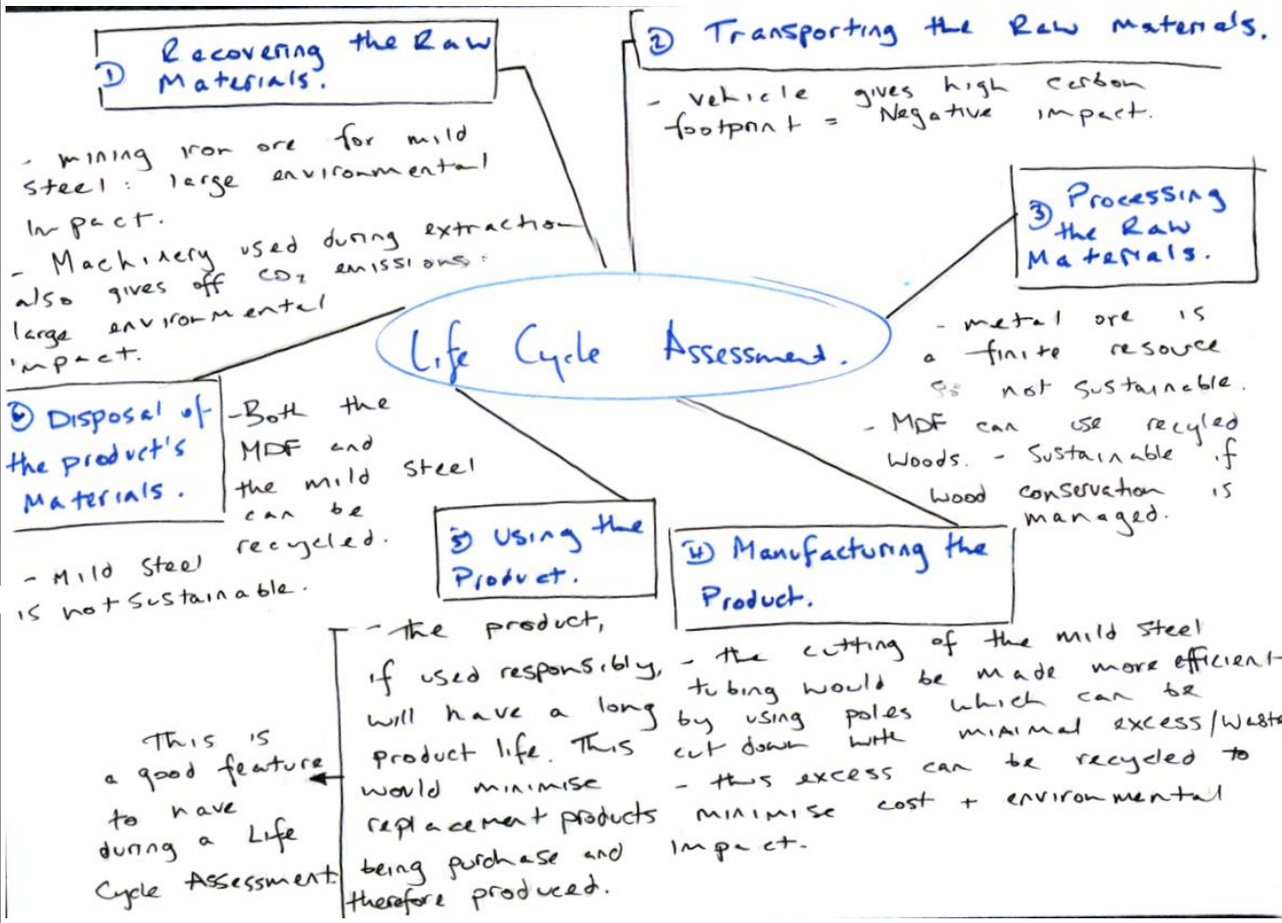
The social interest concerns the preservation of human rights and people's quality of life (especially employees). The product must promise to deliver exactly what is advertised and promised, whilst fulfilling our expectations.

•Everybody has basic rights of freedom. This incorporates the rights to safety, food and water, care and also a place to live. The declaration of human rights encompasses all basic rights. These issues have a minimal impact on my product, because the market it features in does not especially promote or restrict human rights/freedoms.

Success of product in market place:

From a business perspective, I do see the potential success of my product if put to market.

•My stand is aesthetically pleasing and would definitely appeal to the target market.
•The unique design fills a new gap in the market, so has no current competition.
•The product's design and function successfully captures the required target market.
•The design does have the possibility to be diversified into a new range of storage products.



Economic implications:

The economic implications of a product- are generated through the assurance that both parties 'behind' the product, benefit economically. The most influential party; the company itself- must ensure that they achieve their profit margin, whilst the employees aim to acquire a fair income, appropriate working environment and have safety measures put in place to protect their rights that they're allowed.

•Incorporating the product into the society creates employment. The manufacturing period, needs employees to oversee the automated production of the components. Further employment is generated for the transportation of the product to the retailer and customer. Within the retail environment, sales assistants are needed to handle, advertise and sell the product.
•To make the product's manufacturing process more economically viable, improvements can be made. The machinery used in the factory or in the mine, could be powered by a more renewable energy resource; such as solar or wind power. The use of recycled materials, would dramatically decrease the raw material requirements.
•If this product were to be manufactured in China, low labour costs would be more beneficial economically, but are not morally favourable . Although Chinese workers are paid low wages- their position is not exploited. A Chinese factory worker may average about $1 and hour. However the company removes a percentage from their pay check- for food and housing rent, leaving them on around £0.47.This prevents poor conditions- such as sweatshops- and that they have reasonable working hours. On the other hand, this does not guarantee that my product is entirely a fair trade item.

REVIEW AND REFLECTION.

Further Improvements

Aesthetics.

- I would like to develop the product so that it is available in a range of colours + finishes.

More Sustainable

- I would prefer to use products / components which are more economically friendly (in response to client feedback).

- During manufacture I would implement jigs to ensure that all 'arms' are cut and bent to the same, uniform size and angle.
(This would improve quality control).

I would also add a small compartment to hold the very small accessories. (keys/ski pass)

Function

- In Response to expert advice, I would definitely install a heating system, which would gently warm the product and also any item.

- After the prototype, I would strongly consider substituting the MDF for a more sustainable Softwood (Pine).

Materials used.

- An alternative to mild steel would be appealing; this would further decrease/help environmental impact. → it would also decrease the total weight - saving on distribution costs.

Diversify

- The Development of a range of similar products would really benefit Product and brand identity.

CARBON FOOTPRINT

The carbon footprint of a product, defines the quantity of carbon, emitted in relation to the consumption of fossil fuels . A low carbon footprint is ideal. The higher the carbon footprint of a product, the higher the environmental impact. The carbon footprint measure is made up of two parts- **primary** + **secondary**.

- **primary**; the direct emissions of CO2. includes domestic energy consumption and transportation of the product. For international distribution, the primary emission would be fairly high. This would have to be integrated with the financial plan of my company.

Secondary; indirect emissions from the usage of the product. My secondary carbon emission is zero, because no carbon is used during the client's interaction with the unit. This would offset the higher primary emission, so reducing the total footprint.

Intellectual property (IP) refers to creations of the mind for which exclusive rights are recognized in law. Under intellectual property law, owners are granted certain exclusive rights to a variety of intangible assets, such as musical, literary, and artistic works; discoveries and inventions; and words, phrases, symbols, and designs.
Common types of intellectual property rights include copyright, trademarks, patents, industrial design rights and in some jurisdictions trade secrets. For the name, logo and design of my product to be protected I would have to register the design to gain a patent.

Electric tube heater : (development)
I would integrate this pre- existing product into the central column of my product. The outer casing may have to be removed and an internal bracket be fixed into my product. The extra cost would have to also be integrated into the financial scheme of my business plan. By bulk buying the product, I could perhaps be able to achieve a discount on the single unit price.

My business needs to confirm a guarantee that the product is of a high quality. In order to gain customer satisfaction I could setup a **Total Quality Management scheme**. This emphasises the importance of manufacturing good products, and makes sure that every employee working under the business is responsible for their own high quality standard work. If any faults are found these need to be corrected immediately. If this is done at an early stage then the fault can be rectified quickly and easily without a large delay.

Developments to aid commercial viability

1. I would have to invest in a manufacturing method which is more economically viable.

2. In a very 'environment friendly' market, I would have to make my product more sustainable.
- The Carbon footprint would also have to be reduced.

3. Because I made my prototype myself, considerations for labour costs would have to be included into manufacturing to make my product more commercially viable.

4. It would be necessary to extrapolate production in to batch production methods. Once I have larger demand, I can develop a mass production scheme.

5. As of larger scale production, the manufacturing costs and time period needs to be reduced, to maximise profit margins.

6. Regulations checks are necessary to ensure that my product and company meet laws + Regulations for Legal requirements.

7. I would also explore possible alternative production materials. This would help costs and increase sustainability.

8. Considerations for manufacturing locations is also important. I would have to think about using cheaper labour costs (moral/ethical issues) or produce my product in the UK. I could also construct production programmes in the countries its sold in. This would generate local employment. A great marketing point.