

design and technology

Thomas Alleyne's High School

oblo



why study D & T at A level?

- design and practical based
- diversity of outcomes
- excellent results for all abilities
- CAD/CAM facilities – new suite
- develop an understanding of contemporary design and technological practices and consider the uses and effects of new technologies and modern materials.



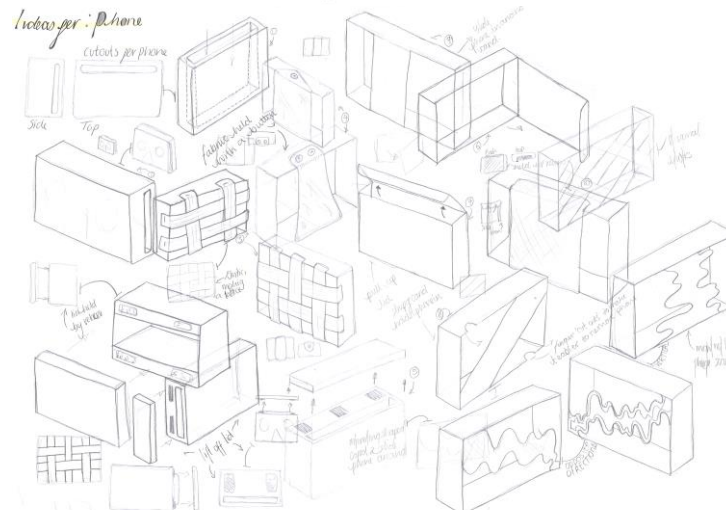
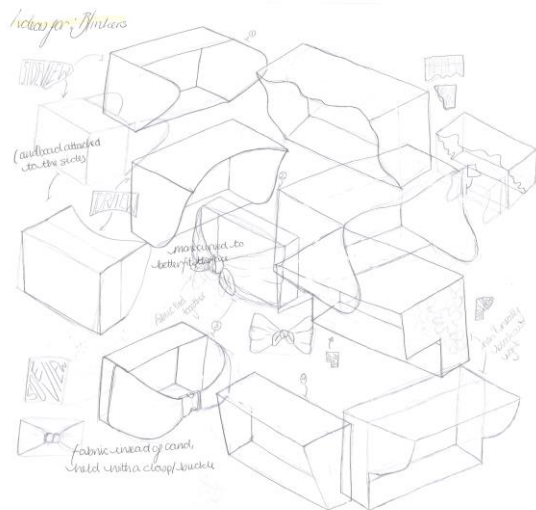
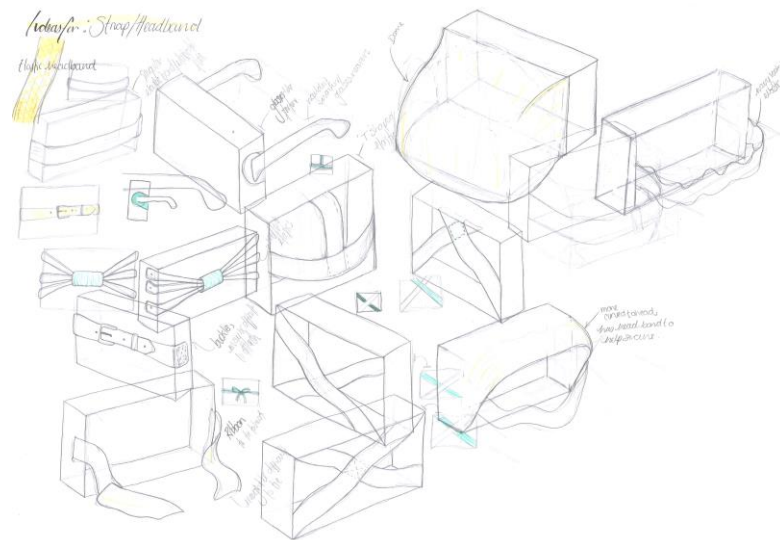
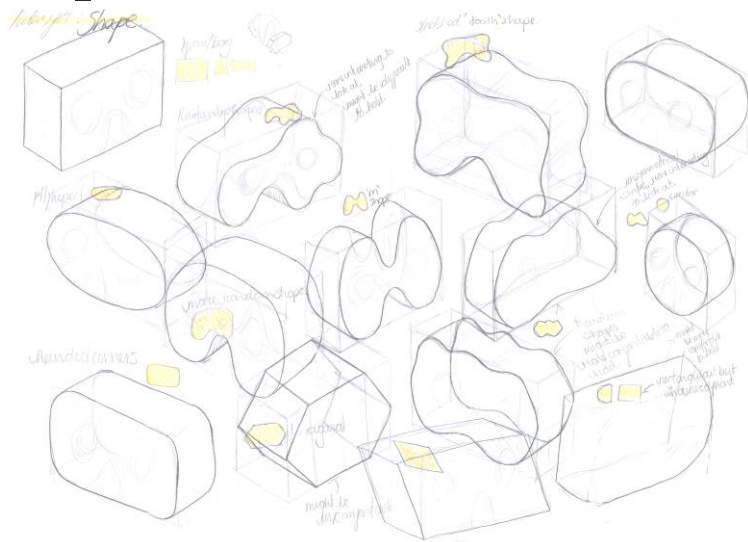
what does the course cover?

- Product Design (Resistant Materials)
 - Graphic Design
 - We currently do not offer Food + Nutrition at A Level
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- designing
 - thinking
 - being creative
 - design issues
 - communication skills, sketching, modeling and CAD
 - initiate design solutions, develop, test and trial working models and prototypes;
 - develop thinking skills, financial capability, enterprise and entrepreneurial skills.

[what does the course cover?]

- 50% Component 1: **Design and Technology in the 21st Century**: theory taught across the 2 years for use in coursework annotation and the **final exam**
- 50% Component 2: **Design and Make Project** – a coursework project similar to GCSE where you design, develop, make and test a product of your choice.
- First half of Y12: We do one minor project which does not count towards your coursework mark, but will teach you all the design and making skills needed. This is to further develop your skills and confidence using a wider range of tools, materials and equipment not previously used in lower school including the bandsaw, laser cutter, 3D printer, plasma cutter etc...

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Moodboard

A good point about this Easel is that it is adjustable, so people of different heights are able to use it. There are not any ergonomic components of this design to make it comfortable to use, as it is very minimal, simple to use and easy to store. I like how it is a table-top easel, as this will be a lot easier for students at Thomas Alleyne's High school to use in a busy classroom.

This easel has a flat level towards the bottom which can be used to hold materials/tools or used as a foot rest, making it more comfortable for the user to use. However, the design doesn't look very appealing as it looks very flimsy, due to less material being used.

This easel is a slightly more modern style, due to the colour combination of grey and the natural wood. This easel is also very minimalist, as there aren't any other functions apart from being able to hold a canvas, therefore it is simple to use and easy to store. This easel also has a very easy and simple way of adjusting the angle of the canvas holder, as there are slits cut into the grey plank underneath where the canvas holder can slot in. Another property is the handles so it is portable and easy to carry around.

This Easel has a storage compartment for materials and tools. It also has a component that allows you to adjust the clamp to hold different sized easels, therefore this easel has good functional properties. The lid of the storage also works as the easel stand, meaning this easel is multi-functional.

I like how this easel has wheels so you can move it around the art department very easy so different classes are able to use it. However, this product is too big to easily manoeuvre it around the art department.

I like the different storage components on this product, as it extends out to be more accessible and collapses to be stored. However, this product would be too big to use in a classroom environment.

This easel is very easy to use and store which are positive points for an easel which will be used in an art department because it will be easy for the students to use, access and store. This easel features very dull colours, which may not appeal to high school students. Another problem is that you have to reach around the easel to retrieve any items from the storage box, meaning that the storage point is not easily accessed when in use.

This product is small, so the art department can purchase many of these. It can also collapse, so it can be very easy to store in a box. However, you are not able to use large canvases on this easel.

The legs are adjustable to suit different heights, which is an important property to an easel that is free-standing. I also like that it has a hook, so you can hang your apron or a towel, making this product multi-functional. I also like how this easel is collapsible and easy to store, which may be an important factor for an easel that will be in an art department, as the department can become cluttered, therefore having an easel that can be stored easily will mean the department can stay organised.

This easel is very minimal and looks very fragile which isn't suitable for an art department where many people will be using it.

Due to the natural wood grain and colour, against the black components, it gives the easel a very sophisticated aesthetic. The thickness of the wood also gives it a durable look and this aesthetic gives the easel a high quality appearance, which would appeal to my client as the easel needs to be durable, as it will be used frequently in the department.

This easel is very small so the cost of materials are less expensive, so the selling price will be less expensive. This means the art department could buy enough of these easels to supply every student in a class with one.

This easel has wheels so it can be moved around easily, which can be very useful in a school environment as different classes in the art department may want to use it. However, this product is made from aluminium which doesn't biodegrade, therefore the product is not made out of sustainable materials.

This easel is aimed at young children as it is appropriate for the average height, but I like how the paint is stored as there is holes cut into the acrylic sheet where paint brushes and paint pots slot into it.

I like how this easel has a platform for you to put your feet on, this shows the designers have thought about comfort for the user, showing it is a good quality product. Furthermore, you could also use that platform to store your tools and equipment, making it easier for the user to access the tools they need.

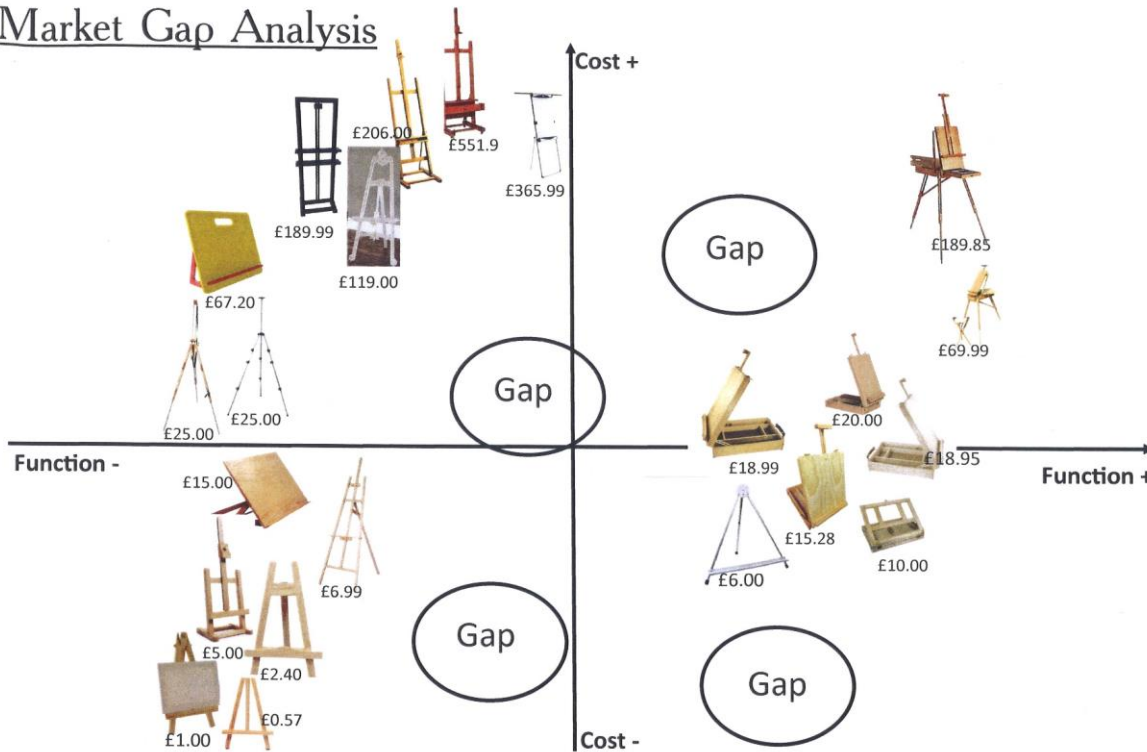
This easel features a stool which also is a storage property. However, the stool is not very ergonomic because it is flat and does not fit the curves of the user, causing it to be uncomfortable. It is also difficult to access the storage whilst painting as you would have to get off the stool to retrieve supplies. There is also nowhere to put your supplies in front of you whilst you work.

Although this product is easy to use, only two people are able to use it at once. It also takes up a lot of room which may not be available in the art department. This product is multi-functional, as it can be used as an easel and a desk. It also has a lot of storage, which is useful to keep supplies organised. Moreover, this product does not come with chairs to use at the desk, so you would have to use chairs that do not match the style of the desk or buy chairs that do.

This is a very well designed easel, as you can use it on a table but it also has extendable legs so you also have the option to use it free-standing. Another positive point to this easel is that there is a good amount of storage and there is also a wooden plate that revolves and you can pull it out to put your tools on it whilst you are working.



Market Gap Analysis



Justification of Possible Design Brief

The initial contact with my client has highlighted a need. I have investigated these key points on my brainstorm, developing the points and coming up with ideas that would work well for my client. I then created a moodboard to see what is already available, analysing good and bad points which would help me to design a successful easel. I inferred that there is not a product that is currently available for my client. I did more research and did a market gap analysis, which highlighted where there are gaps in the market for a new easel, so I am able to design a product for a target audience and this audience includes my client and art teachers across the country.

Interim Design Brief

I intend to design, develop, prototype and test an easy to store, multi-use easel for use by unisex art students, aged between 13-18, at high school. The market gap analysis shows me the current gaps in the market for an easel and at this stage I intend it to be a table top easel, with storage that features a light box. I will develop these ideas.

I will make a singular prototype that can be developed to suit different markets and scale of production. Once I have produced further research, I will then refine the design brief.

Gap Analysis Conclusion

From looking at my market gap analysis, I can see that there are gaps in an area of a high function easel that is multi-functional, including storage, adjustability and is in a price range between £15-£50. Furthermore, there is another gap in the centre, where there is average functionality and costs between £15-£30. There is also another gap where the functionality includes extra storage, including a drawer and lift up compartment in the price range of £40-£100. Finally, there is also a gap in the cheaper and more simple easels that are table-top and can be adjustable, in a price range of £5-£15. However, there are also some non-viable gaps, such as a very high functioning easel with a very low cost; this would not be possible as no profit would be made or there would not be enough money to possibly make a high functioning easel.

This research has made it more clear on where there is a gap in the market, however I will do more research to see which gap would be best to design within, whilst also satisfying my client or whether I could design a product to satisfy multiple gaps.

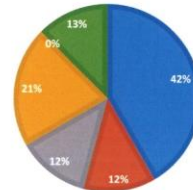
Survey Results

These are the results from the survey that I created. I asked the public questions which will help me to design an easel, then I have put the results for each question in a pie chart, so I can easily see which are the most popular answers from the questions. I asked 24 people of different age ranges and genders, as I believe this makes the survey results fair, as I am getting answers from different points of view. Below you can see a screenshot of the first page of my survey

1. What age range are you in?	12-21	22-31	32-41	42-51	52-61	72+
2. How much would you be willing to spend on an easel?	£1-£20	£20.01-£40	£40.01-£60	£60.01-£80	£80.01-£100	£100.01+
3. What gender are you?	Male	Female	Other	Prefer not to say		
4. What should the easel be made of?	Wood	Metals	Plastics	Other		
5. What age range should the easel be aimed at?	0-5	6-10	11-20	21-30	31-50	51+
6. What colour should the easel be?	Natural wood	Black	White	Grey	Blue	Red
7. What material would you prefer to use on the easel?	Acrylic/plastic	Wood	Metals	Plastics	Other	Other
8. What should the easel be used for?	Canvas	Metals	Plastics	Other		

WHAT AGE RANGE ARE YOU?

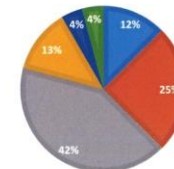
■ Dec-21 ■ 22-31 ■ 32-41 ■ 42-51 ■ 52-61 ■ 72+



The survey results from this question inform me that 42%, which is the majority of the people who answered my survey are aged between 12 and 21. This shows me that the most of the answers I will receive throughout the survey will be mostly the opinion of this age range.

HOW MUCH WOULD YOU BE WILLING TO SPEND ON AN EASEL?

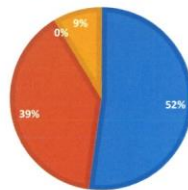
■ £1-£20 ■ £20.01-£40 ■ £40.01-£60 ■ £60.01-£80 ■ £80.01-£100 ■ £100.01+



This pie chart shows me that 42%, which is the majority of the public would want to spend between £40.01 and £60 on an easel. However, 25% also said they would be willing to spend between £60.01-£80, so my selling price may range between £40 and £70, as this seems to be the most popular price for the public who answered the question.

WHAT GENDER ARE YOU?

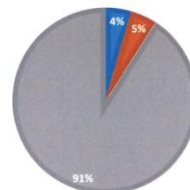
■ Male ■ Female ■ Other ■ Prefer not to say



As you can see from the pie chart as shown above, 52% of the people who answered the survey were male and 39% were female. These survey results show that the majority of people who answered my survey are male, which means the results throughout the survey may be more catered to males.

WHO SHOULD THE EASEL BE AIMED AT?

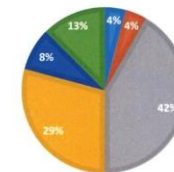
■ Males ■ Females ■ Unisex



91% of the people who answered my survey believe that my easel should be unisex. This will affect the aesthetics of the easel, as it would need to suit all genders. This also means that my target audience is a lot bigger, as I am not narrowing my target audience down to just one gender.

WHICH AGE RANGE SHOULD THE EASEL BE AIMED AT?

■ 05-Oct ■ Nov-15 ■ 16-20 ■ 21-30 ■ 31-50 ■ 51+



The survey results from this question inform me that the majority, 42%, believe my easel should be aimed at people aged between 16 and 20. However, 29% believe it should be aimed at people aged between 21 and 30. These results show that I should aim my easel at people aged between 16 and 30.

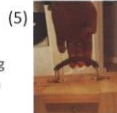
Product Analysis - Easel



This is a table-top easel, which includes paint, artist's palette and paint brushes. This easel is from the brand "crelando", which I bought in Lidl. This easel cost £19.99.

Function-

- ✓ There is an adjustable stand, which you are able to adjust to fit different canvases. This is a good point, as you have an option to choose between different canvas sizes. As you can see in the photo (1), there is an adjustable component, which is easy to use. You have to twist it to tighten or to loosen; allowing you to put the canvas in, and then you tighten it so the canvas is secure.
- ✓ Another positive is that you are able to adjust the angle of the easel. The component that you use to adjust the angle is the same component as the component that you use to adjust the canvas holder, which you can see in the photo (2). This is very simple and easy to use as the product features the same components.
- ✓ This product holds a canvas well as there is a lip at the bottom of the easel, as you can see in the photo (3), which the canvas can sit in. The product also features an adjustable component at the top of the easel, which the user can tighten, so the canvas is secure. These features help the product work well because when you are painting, the canvas is still and secure.
- ✓ This product features brass clasps that you are able to open and close very easily, as you just lift up the metal clasps, as you can see in the photo (4). This is a positive point, as you are able to seal the easel shut to transport and store easily.
- ✗ A negative to the handle is that it is very thin and the weight of the easel, whilst being full of tools and equipment, may easily break because the handle is very flimsy. Whilst carrying the easel by the handle, the handle curves as it is under a lot of pressure, as you can see in photo (5).
- ✓ There are compartments in the bottom half of the easel where you can put brushes and paint, which you are able to see in photo (6); then there is also a storage system in the lid of the easel where you are able to put your artist's palette, which you can see in photo (7). These storage compartments make it easier for the user to keep all the tools and equipment needed to paint in the same place. It also makes packing away a lot easier and faster for the user, as each product has different storage spaces inside the easel, which they can put the tools in.
- ✗ The user is unable to use this easel standing up, as the easel has no legs to be able to have freestanding. This may be a problem for some people that like to paint standing up and find it more comfortable painting this way.

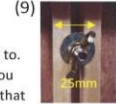


Ergonomics-

- ✗ The handle of the easel is faux leather⁽¹⁾ which is usually PVC, does not feature any ergonomic properties as you can see comfortable for the user to carry, for example finger grips.
- ✓ A positive ergonomic property is that you are able to adjust the angle of the easel to suit your height, comfortable for the user to sit and
- ✓ This product is a suitable size, as it can adjust up to approximately 700mm, however when it has not been adjusted it is 300mm. This is a positive point, as when un-adjusted it can be stored easily, however if you need to adjust the easel to be bigger then you have the option to.
- ✗ The brass components used to adjust the angle and size of the easel are very small, which you can see in photo (9), and can be uncomfortable to tighten and loosen, especially for people that may have bigger hands. The threaded bolt, wing nut, washer and screws have been bought in bulk, so the designers of the easel did not design the adjustable components, which shows the designer did not consider comfort for the user.

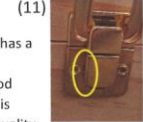


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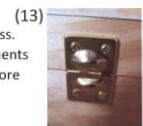
Quality-

- ✗ You are able to see that excess PVA glue in photo (10) that has seeped out the side of the joint. This shows the designer has not made sure that glue is not visible. The excess glue can detract from the aesthetic and give you the impression that the designer has not carefully thought about the design.
- ✗ The brass components are thin pressed sheets of brass, as you can see in photo 4, the brass is very thin. The thin brass can be dented, split and damaged very easily, as brass has a high malleability. As you can see in photo (11), the brass is scratched.
- ✗ As you can see in photo (6), the top and bottom panel of the easel is made from plywood with a pinewood veneer on the top. This makes it appear as if its solid pine, however it is made more inexpensively. This also means that the wood is not as durable or as good quality



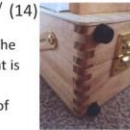
Aesthetics-

- ✓ The natural wood looks visually appealing because it gives it a more organic appearance. You are able to see the grain of the wood in photo (12), creating a natural pattern on the easel, without having to design a manufactured material to have a similar effect.
- ✓ I like how the wood used is a very pale cream shade, which you can see in photo (12), as it is bright and not dull. As there is not a dye put onto the wood and the wood is in its natural state, this will appeal to many people, as there is not a specific style to suit a particular style of room.
- ✓ I like the brass components against the pale coloured pine, as the colour of the brass complements the colour of the pine, due to the cool tones within the wood and the brass.
- ✓ Another positive about the aesthetic properties of this easel is that the brass components have a shiny finish to them, as you can see in photo (13). This finish gives the easel a more



sophisticated look, due to the contrast against the matte pine. The shine also keeps the product from looking dull and boring, as the shine catches the user's eye.

- ✓ The faux leather handle is a dark red/brown colour, as you can see in photo (8). I like how the dark leather contrasts against the pale coloured pine. I also like how the more traditional appearance of the handle, contrasts against the more modern style of easel. The mix of these two styles gives the effect that the designers wanted to create a product that is new, whilst still incorporating components that look traditional.
- ✓ This easel features finger joints, which look aesthetically pleasing, as it gives the corners of the easel a pattern, which looks very sophisticated, as you can see in photo (14).
- ✓ The corners of the easel are rounded and these rounded edges gives the product a more modern appearance, which you are to see in photo (14).



User-

- ✓ This product consists of no aesthetical features that suit any particular target audience. Therefore, people from all age groups and genders would want to buy this product.
- ✓ This is a very affordable product for the user, as you can see in photo (15), as younger people are able to save enough pocket money, summing to £19.99 and older people would be able to buy this product without spending too much, as all the tools are also included.
- ✗ Some people may be looking for an easel with a particular design to suit their age range and this easel does not feature any properties to suit an age range, so some people may not be interested in this product.



Cost-

- ✓ This product is very good value for money as it is only £19.99, however paint, brushes, canvases, a spatula and an artist's palette is included inside the easel. Buying this product allows the user to have everything they need to paint rather than buying tools and equipment separately.
- ✗ This product may create a very low profit, due to the cost of materials, making costs; there are 51 pieces inside such as canvases, and paint inside that has been purchased to put in the easel. The total cost of all these factors would be very close to £19.99; therefore, a small profit is made from each product that is bought.
- ✗ The designers could be underselling this product, which may also cause the user to think this product is not as good quality, as some people may expect to pay around £30.00 for a good quality easel.

Environment-

Design-

- ✓ As you can see on the packaging in photo (16), there is an FSC logo printed on the front, meaning the wood featured in the easel is made from sustainable materials.
- ✓ The metal components are recyclable, as they are made from brass, which is a recyclable metal. This is better for the environment because the metal will not go to landfill to create pollution; instead, it will be made into a new product.
- ✓ Around 60% of the easel is biodegradable, as it features pinewood, which is able to biodegrade. If the easel went into landfill, the wood would be able to break down naturally, creating less visual pollution.
- ✓ The designer has reduced the amount of pine used in this easel, as you can see in photo (17), they have used thinner pine but it is still thick enough to



be durable. Therefore, fewer materials were used, so the designer would be able to produce more easels rather than wasting materials unnecessarily.

Making-

- ✗ This product would have been made using machinery that uses electricity that comes from fossil fuels. Therefore, pollution was produced whilst making this product and more of the finite fossil fuels would have been used up.
- ✓ The pine and ply wood would both have been tessellated using computer controlled tessellating to reduce the amount of waste material.
- ✗ This wood is attached together using PVA glue, as you can see in photo (10), which is a form of plastic and can pollute.
- ✓ The metal components have been screwed and drilled into the wood rather than using an adhesive that would pollute.
- ✗ This product was not flat packed and could not be flat packed, as it is adhered together. However, flat packing this product would mean you would be able to transport more of the product to the shop after being made. This means less fossil fuels are used transporting the products multiple times because you are able to fit more products in one delivery.
- ✗ This product has been packaged, meaning materials have been used that will be thrown away once bought by the user; this is wasted materials for a component that has a short life cycle.
- ✓ The packaging has been made from cardboard, as you can see in photo (18). Cardboard is a sustainable and biodegradable material, as it made from wood that comes from trees, which can be planted and grown.
- ✓ The cardboard packaging has a high gloss varnish finish, which adds expense to manufacture, but it makes it look higher quality.
- ✓ The packaging can be recycled, however the cost to recycle would be high due to the printing techniques used and the plastic laminate applied would have to be removed, but this cardboard can be used to produce biomass.
- ✓ The cardboard packaging has been created using a net template, as you can see in photo (19). This means the packaging can be easily recycled, as it is one piece of cardboard.



Use-

- ✗ This product does not cause any pollution when in use, as it does not feature any batteries or electrics.

Disposal-

- ✗ This product would not be very easy to recycle, as it needs to be dismantled first, due to the different components and materials.
- ✗ This product is not very easy to dismantle for recycling, as you would have to unscrew all the brass components and handle. You are also unable to recycle plywood, as it has PVA binding each layer together, so the user would have to break apart the plywood from the solid pinewood then recycle the pine. Some people would not bother trying to dismantle this easel; therefore, it would be put into landfill.

Conclusion-

In conclusion, there are many positive points about this easel that I could incorporate into the product I produce, including the adjustability and storage. However, there are some negative points about this product that I would like to test and develop to improve, and possibly feature on the easel I create. I would improve the handle on the easel by testing different materials that would be comfortable and test different structures

Contextual



Colour

As you can see from the photos of the art rooms, they are colourful due to being decorated with the artwork of the students. However, if you don't look at the bright and colourful artwork, the rooms are very muted as you can see from the green and cream coloured floors and walls. As the artwork is what decorates the room, there isn't a colour scheme, so all the colours may clash.

Shape

The dominant shapes in the room are rectangles, as you can see from the shape of the tables, windows, stools, lights and shelving, which I have highlighted in the photo of one of the art rooms. A way I could contrast this with the easel design is by designing it to feature more curved shapes, however if I wanted the easel to compliment the shapes of the art rooms then I will design it to be more man-made angular shapes.



Style

The art rooms do not have a particular style as the art that is decorating the rooms all have different styles, featuring different shapes and colours. However, at first glance the room appears to be a more traditional style due to the stained plywood tables and shelving. As you can see when comparing the photos of the school art rooms to examples of other art rooms, the art room I am analysing is a lot more traditional and less modern.

Materials

I noticed that the tables are made from plywood with a white laminate veneer. The counter tops are made from laminated chipboard and the cupboards are also made from laminated plywood. The overall materials used in the room are man-made with a laminate to appear as if they are solid wood. The frame for the stools are made from powder-coated steel with rubber grips on the bottom to stop the stools from sliding on the floor whilst applying force to them. The powder-coat stops the steel from rusting, therefore keeping the steel durable to be able to withstand weight.

Surface Finishes

The tables have a shiny finish on the laminate which contrasts against the matte finish of the paint that is painted on the walls. The stools have a glossy varnish painted on them, however the finish is wearing off of them.



Conclusion

In conclusion, I will create an easel that will be a utilitarian product as the function is the most important feature in the creative environment, whilst aesthetics is not as important due to the art work that is hung around

Measurements	Height (mm)	Width (mm)	Depth (mm)
School Desk	740	460	555
Acrylic Paint	160	50	12
Scissors	160	70	20
Paint Brush	190	10	10
Pencil Sharpener	15	25	14
Pencil	170	7	7
Eraser	15	40	25
Sellotape	55	20	24
Ruler	320	40	4

the room being the main aesthetical property. However, I will still design the easel to have elegant design solutions, for example I could combine a glossy/shiny finish with a matte finish as this could look visually appealing, whilst complementing the different types of surface finishes around the art rooms.

Sizes:



These are examples of other art rooms around the world, which I would also need to take into consideration whilst designing, as the easel I produce must suit all of these, if different schools would want to purchase the product I produce.



Ergonomics & Anthropometrics

Ergonomics is the comfort of the interaction a human has with a certain product. For example, ergonomics has been considered in a product that features finger grips, as this may make the product more comfortable for the user to hold and grip. When ergonomics have been considered when designing a particular product, the product is of higher quality as the user's comfort has been taken into consideration. If a product is not comfortable for the user to use, then the product is not ergonomic, therefore the product is not of a good quality.

When designing a product that is ergonomic, anthropometric data must be used. The anthropometric data featured in this research consists of a range of measurements of both the male and female body, such as height, grip diameter and seated height.

After working out the results from my survey, 91% of the people who answered my survey believe the easel I design and make should be unisex. This means I should consider both men and women's anthropometric data when using measurements and ergonomic features for my product.

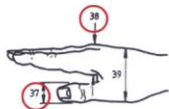
This page features anthropometric data, which I may need to use when designing the easel, making it comfortable to use for both males and females. I have selected the anthropometric data that may apply to my product to make it ergonomic and higher quality.



(j)

40- This measurement is the maximum grip diameter of the human hand. I need these measurements to understand the best size to create a handle for the easel, so it can be comfortably carried. I may also need these measurements to work out sizes of handles for a drawer and other storage features. The average grip diameter for a male is 52mm, but for females, the average grip diameter is 48mm. These are the 50th percentile measurements to work out the average of the lowest and highest measurements of both males and females. The average of both of the males and females average grip diameter is 50mm, so this measurement would work well for both males and females.

	Male				Female			
40 Maximum grip diameter	45	52	59	4	43	48	53	3



(i)

37- This measurement is the thumb breadth of the human hand. I need these measurements to understand the average thumb size, as I may feature thumb grips on my easel so you are able to pull out a small table to put tools and equipment on. The average thumb breadth for a male is 23mm, but for females, the average thumb breadth is 19mm. These are the 50th percentile measurements to work out the average of the lowest and highest measurements of both males and females. The average of both of the males and females average thumb breadth is 21mm, so this measurement would work well and suit both males and females.

	Male				Female			
37 Thumb breadth	20	23	26	2	16	19	22	2

38- This measurement is the hand thickness at the palm of the human hand. I may need this measurement to understand how much of a gap may be needed between the drawer and the easel, as the table-top may also be stored in this gap. This measurement is important as I don't want the gap to be too narrow, as it may make

it more difficult to pull the table-top and drawer out. I do not want to feature handles on the drawer and table-top as this would be a waste of materials and it would make the easel more difficult to store, therefore I need to leave a gap big enough to be able to put your hand in to pull the table-top and drawer out. The average hand thickness at the palm for a male is 33mm, and the average hand thickness at the palm for females is 28mm. These are the 50th percentile measurements to work out the average of the lowest and highest measurements of both males and females. The average measurement of both of the males and females average hand thickness from the palm is 30.5mm, so this measurement would work well for all genders.

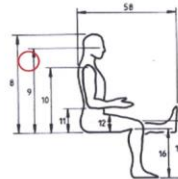
	Male				Female			
38 Hand thickness at palm	28	33	38	3	23	28	33	3



(h)

36- This measurement is the index finger breadth of the human hand. I may need this measurement to understand the best size to create finger grips, which may be used on a handle to make the easel comfortable to carry and be better portable. I may also feature finger grips on the table-top, so you are able to add pressure and pull it out, rather than featuring a handle on it. The average index finger breadth for a male is 21mm and the average for a female is 18mm. These are the 50th percentile measurements to work out the average of the lowest and highest measurements of both males and females. The average measurement of both of the males and females average index finger breadth is 19.5mm, so this measurement would work well for all genders.

	Male				Female			
36 Index finger breadth	18	21	24	2	15	18	21	2



9- This measurement is the sitting eye height of the human body. I need this measurement to understand how high the easel needs to adjust, whilst set up on a table, to suit all genders. The average seated eye height for a male is 790mm and the average for females is 740mm. These are the 50th percentile measurements to work out the average of the lowest and highest measurements of both males and females. The average measurement of both of the males and females average seated eye height is 657.5mm, so this measurement would work well for both males and females.

	Male				Female			
9 Sitting eye height	730	790	850	35	685	740	795	33

Below is a table summarising all the anthropometric data that I have spoken about in this research.

Measurements	Male (mm)			Female (mm)			Unisex (mm)
	Lowest	Average	Highest	Lowest	Average	Highest	Average
Hand grip diameter	45	52	59	43	48	53	50
Thumb Breadth	20	23	26	16	19	22	21
Hand thickness at palm	28	33	38	23	28	33	30.5
Index finger breadth	18	21	24	15	18	21	19.5
Sitting eye height	730	790	850	685	740	795	657.5

Development of Modelling — Overall Storage



WHAT — I am developing the aesthetics and ergonomics of this design.

HOW — I cut pieces of Styrofoam using the hot wire cutter and assembled them using the hot glue gun.



WHAT — Firstly, I focussed on the aesthetics as the first model looks very visually unappealing as its very bulky and doesn't look as if it has been designed thoughtfully.

HOW — I used graded sandpaper to sand the sharper edges of the storage.

WHY — I did this so the storage appears more sophisticated, due to the curved edges. The curved edges also feel better for the user, as the user is unable to harm themselves on sharp edges. The design has negative specification points that involve how bulky the design is and reducing materials, so sanding the edges help to reduce bulkiness and material.



WHAT — Next, I developed the ergonomics of the design.

HOW — To improve the ergonomics of the design, I used the bobbing sander to sand grooves into the sides of each layer of the storage, using a 15mm bobbing sander so the sanded groove would be an average finger grip size.

WHY — The design had a negative point on the specification check which involved making it easier for the user to access and I noticed that this design is not easy to grip onto each layer, so adding the finger grips on the layers would make it easier for the user to grip onto and separate each layer.

2 compartments are useful but not practical when stacked too difficult to access bottom layer



WHAT — Finally, I developed the aesthetics, as well as the ergonomics.

HOW — I used the belt sander to sand the edges to be more curved.

WHY — I have developed this as it makes the design less bulky and appear more sophisticated, as I mentioned one of the negative specification points was that it was too bulky and didn't reduce materials.

✓ Like the pivot action here.



WHAT — I made the design that I said I would take through to development.

HOW — I cut pieces of MDF using a Tenon saw; then drilled the holes and grooves into the pieces. I also used a chisel to chisel a groove into the pieces. Then, I attached the pieces together using the hot glue gun. I problem I encountered was that I accidentally drilled all the way through the bottom part, so the pencil will just fall straight through, so if I make this design, I will need to be careful when drilling in the grooves to not drill all the way through.

✓ Like the idea



WHAT — I developed by making the design larger and a full circle rather than a quarter of a circle.

HOW — I cut pieces of MDF using the band saw and sanded them circular using the belt sander. I then drilled holes using a hand drill and attached all the pieces together using a hot glue gun.

WHY — I did this because in my specification it says it needs to be easily accessible to the user and I believe developing it to be a full circle means the storage can be spun 360° making it easier to use and access.

Simple but easy to use - how can this fit in box?



WHAT — I made a simple drawer that I designed on my design ideas for the storage.

HOW — I cut pieces of MDF using the band saw and attached the pieces together using the hot glue gun.

WHY — I decided to develop this as it is too simple and looks very visually unappealing



WHAT — I developed the ergonomics of the drawer.

HOW — I used a hand drill to drill three holes into the front of the drawer.

WHY — The holes allow the user to grip onto the drawer, so it makes it easier for the user to pull out of the easel.

I decided not to develop this design any further as I couldn't develop the function as it may not work, however if I use this mechanism then I would add finger grips.

Combining My Developments



WHAT - I further developed and refined the storage feature by combining the paint brush holder within the box storage.

HOW - I did this by attaching the paint brush holder inside the box, it allows the paint brush holder to be more compact so it is not as easy to knock the paint brushes out of the holder, and this resolves my client's issue, however I wanted to develop this form of storage further and combine aspects from other designs to optimise the storage use of this design; this also meets point 4 on specification.

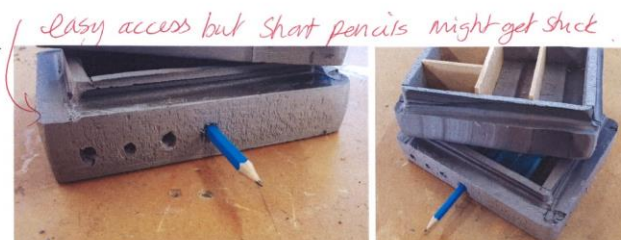
WHY - I did this as my client commented on my initial ideas that design 21 wouldn't be too useful as the paint brushes would stick out the sides, so I decided to take this into consideration and further develop and combine my ideas to please the client's needs. By applying the paint brush holder inside the box, it allows the paint brush holder to be more compact so it is not as easy to knock the paint brushes out of the holder, and this resolves my client's issue, however I wanted to develop this form of storage further and combine aspects from other designs to optimise the storage use of this design; this also meets point 4 on specification.



WHAT - I developed this design by adding more compartmental sections, as this allows the user to easily organise their different types of stationery.

HOW - I did this by measuring the inside of the top storage box and creating panels using Medium Density Fibreboard to create the divides in the storage. In industry, this would be made by batch production, as the easel itself would be batch production, however the panels would be laser cut in industry.

WHY - I did this as my client liked the compartments in the original design as it allows for sectioning of stationery.



WHAT - I made use of the storage and added pencil/paint brush holders to maximise the amount that the user could store.

HOW - I did this by using a hand drill to drill into the side. In industry, these pencil/paint brush holders would be produced by batch production using a drill.

WHY - My client mentioned that she liked the range of equipment that can be stored in the boxes, she also mentioned how she likes pencils and paint brushes to be easily accessed as this makes it easier for the user when creating their artwork, so having the pencil holders on the side allows the user to place their pencil and paintbrushes there for easy access whilst using the easel, however the pencil and paintbrushes can be transferred into the storage box once the user has finished using the easel.



WHAT - I combined two of the storage components together, which I created in the first stage of modelling.

HOW - I created the extra storage feature using Medium Density Fibreboard and glued it into the larger storage component. In industry, this would be made out of plywood by batch production using a laser cutter, and then it would be assembled by hand.

WHY - By combining these two components, it allows maximum use of space for storing equipment and this meets point 9 on my specification to hold a particular number of items, however this design holds more items than that, therefore I have maximised the amount of storage.

prefer to maximise storage space, so compact this down in scale.

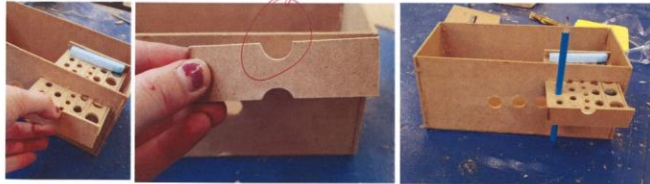


WHAT - I added an artist's palette to the pole, so it is able to pivot with the storage and be removed.

HOW - I created this by using the band saw to cut out the palette using 6mm MDF, then I used the bench drill to drill the holes around the edge of the palette. To create the dishes for the paint, I blow moulded polypropylene using the palette as a template. Finally, I used a hot glue gun to attach the blow moulded component to the MDF. In industry, this component will be made by blow-moulding polypropylene in batch production.

WHY - By being able to remove the palette, it makes it easier to use whilst painting and it makes it easier to clean, which my client mentioned when commenting on the artist palette design which is design 16 on my initial ideas.

this is good compared to a knob easy to use!



WHAT – I combined design 17 to a simple drawer design, which I thought of when thinking of a way to make design 24 easier to access. Design 24 shows two boxes that are stacked on top of each other; however the drawer is easier to access as it would just pull out of the easel, rather than having to lift off the top layer to access the bottom layer.

HOW – I made this by cutting pieces of MDF using a tennon saw, and I used a hand drill to drill the different sized holes. I also drilled into the drawer and using a coping saw to cut the slit where the pencil/brush holder would pull out of, then I used the bobbing sander to create the grooves where the user would grab the front panel to pull the holder out. Finally, I glued all the pieces together using a hot glue gun. In industry, this would be batch produced using a laser cutter and assembled by hand.

WHY – I added the pencil/brush holder to the drawer as my client said that the drawer model is very boring from my first stage of modelling, so adding the pencil/brush holder makes the drawer more visually interesting, whilst making pencils easily accessible, however the user is able to put the pencils/paint brushes in the drawer once they are finished.



WHAT – I sanded the edges of the handle of the pencil/brush holder.

HOW – I did this by using graded sand paper. In industry this would be sanded using a belt sander.

WHY – I did this as it is more comfortable for the user, as there aren't any sharper edges. I did this to meet specification point 12 on my specification where it says any handles will be comfortable for the user.

like the wave in and out function



WHAT – I combined the pivoting artist's palette concept to the drawer.

HOW – I created this by cutting a piece of dowel and MDF using a tennon saw. I also used the hot wire cutter to cut a piece of Styrofoam to go around the dowel for support. I used a drill to drill into the side of the drawer, and then used a coping saw to cut a slit where the palette would pivot out. I glued it in the drawer using a hot glue gun. In industry, this would be batch produced and laser cut, then assembled by hand.

WHY – Doing this further improves the overall look of the drawer. The small artist's palette also allows for easy access to paint whilst in use, which my client mentioned when commenting on my initial models.



WHAT – I created small grooves in the palette to hold the paint when it is put onto the palette.

HOW – I did this by using a hand drill to carefully create the grooves in the MDF. In industry, this would be done by engraving into the MDF.

WHY – I did this as it stops paint from spreading off the palette when in use.



WHAT – I added a handle onto the small artist's palette component.

HOW – I cut a piece of MDF using a tennon saw and attached it to the palette using a hot glue gun.

WHY – I did this as it makes it easier for the user to pull the palette out of the drawer. However, I do not like how the handle looks and it sticks out of the easel too far, meaning it could easily break off so I needed to focus on the handle and develop it.



NO! handle sticks out



WHAT – I removed the previous handle and created a different handle.

HOW – I cut a piece of MDF using a tenon saw and sanded the edges to be smooth using graded sand paper. In industry, this would be laser cut.

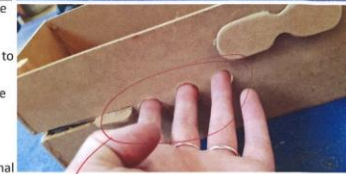
WHY – I created the new handle, as the previous handle stood out too far and didn't look very visually appealing. This handle looks a lot more visually appealing and is less likely to break off as it is more compact, which meets specification point 39 on my specification. I also sanded the handle to have smooth edges, meeting specification point 12.

Better than previous handle but I would prefer it if it was internal instead.

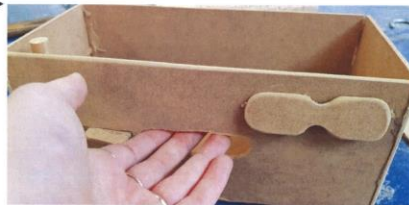
WHAT – I created a handle on the drawer.

HOW – I did this by drilling holes into the panel, using a hand drill. In industry this would be laser cut.

WHY – I did this as it makes it easier for the user to remove the drawer from the easel, meeting specification point 19 and 30. However, the three holes don't look very sophisticated, which is a point that I mentioned in specification point 30 about the handle being internal, so I needed to develop this further by keeping the handle internal but making it look more sophisticated.



** might get fingers caught!*



WHAT – I changed the design of the handle on the drawer.

HOW – I did this by using a coping saw to cut away the excess MDF, I then used graded sandpaper to smooth out the edges. In industry, this would be laser cut.

WHY – I did this as I mentioned in the previous development that it met specification point 30, however it didn't look very sophisticated, so I focussed on the design of the handle. I kept the handle internal, however this handle design is better than the previous design as it matches the overall shape of the features on the easel such as the handle on the pencil/brush holder, and therefore this design is more well-balanced, making it more aesthetically pleasing.



To big paper as simple pull out

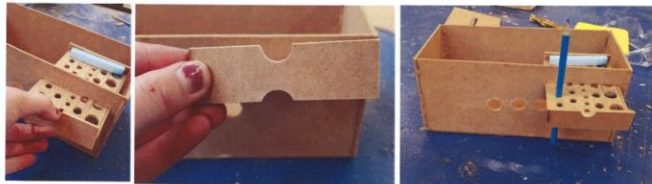


WHAT – I sanded the edges of the drawer.

HOW – I did this using the belt sander. In industry, this would be sanded in a CNC machine that would sand the edges.

WHY – I did this as the smooth aesthetic matches the smooth aesthetic of the other components on the drawer such as the smoothed handles of the palette and pencil/brush holder. Sanding the edges of the box also meet specification points 12 and 15.

not overly important as long as not splinters!



WHAT – I combined design 17 to a simple drawer design, which I thought of when thinking of a way to make design 24 easier to access. Design 24 shows two boxes that are stacked on top of each other; however the drawer is easier to access as it would just pull out of the easel, rather than having to lift off the top layer to access the bottom layer.

HOW – I made this by cutting pieces of MDF using a tenon saw, and I used a hand drill to drill the different sized holes. I also drilled into the drawer and using a coping saw to cut the slit where the pencil/brush holder would pull out of, then I used the bobbing sander to create the grooves where the user would grab the front panel to pull the holder out. Finally, I glued all the pieces together using a hot glue gun. In industry, this would be batch produced using a laser cutter and assembled by hand.

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WHAT – I sanded the edges of the handle of the pencil/brush holder.

HOW – I did this by using graded sand paper. In industry this would be sanded using a belt sander.

WHY – I did this as it is more comfortable for the user, as there aren't any sharper edges. I did this to meet specification point 12 on my specification where it says any handles will be comfortable for the user.



WHAT – I combined the pivoting artist's palette concept to the drawer.

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WHY – Doing this further improves the overall look of the drawer. The small artist's palette also allows for easy access to paint whilst in use, which my client mentioned when commenting on my initial models.



WHAT – I created small grooves in the palette to hold the paint when it is put onto the palette.

HOW – I did this by using a hand drill to carefully create the grooves in the MDF. In industry, this would be done by engraving into the MDF.

WHY – I did this as it stops paint from spreading off the palette when in use.



WHAT – I added a handle onto the small artist's palette component.

HOW – I cut a piece of MDF using a tenon saw and attached it to the palette using a hot glue gun.



WHY – I did this as it makes it easier for the user to pull the palette out of the drawer. However, I do not like how the handle looks and it sticks out of the easel too far, meaning it could easily break off so I needed to focus on the handle and develop it.

Development of Modelling – Paint Brush Holder



WHAT – I created the first model for the paint brush holder.

HOW – I designed it on CorelDraw then laser cut it onto MDF. I started to assemble it using PVA glue and realised the rings obstructed the paint brush holes so paint brushes would not be able to sit in the holes.



WHAT – I moved the holes to sit on the outside so the rings wouldn't obstruct it. I also incorporated a platform for the paint brushes to rest on.

HOW – I designed the platform on Corel and edited what needed to be edited, then laser cut it onto MDF.

WHY – I need to develop it again as you can see when I put the paint brushes in, the brushes stick out very far and don't sit very well in the paint brush holder, so I need to develop how tall the paint brush holder is.



WHAT – I made the design taller, but I realised it is not able to fit on multiple sized cups.

HOW – I edited the Corel design to have more rings so the design would be taller, then attached them onto the model.

WHY – I added the extra rings which made the brush holder taller, meaning the paint brushes would sit better in the holder. However, as you can see in the photo the holder does not fit into a bigger cup, so I needed to develop it to fit into multiple cups.



WHAT – I made the rings gradually get smaller, so it would sit on the inside of a cup rather than the outside.

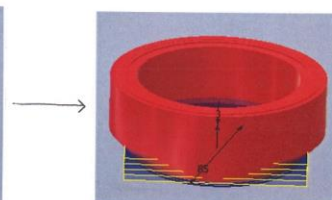


HOW – I used Corel to make multiple rings that gradually get smaller, I then laser cut it onto MDF then used PVA glue to attach the rings. Finally, I clamped it and left it to dry.

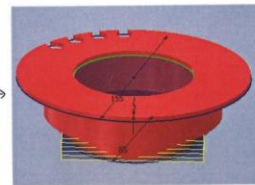
WHY – The paint brush holder sits internally so it can sit in multiple sized cups, which is useful as the user can use any cup they like.



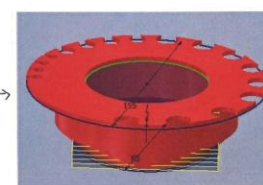
I started off by designing the base layer and frame, which I need to add onto. I used ProDesktop to create these developments of the water pot component, which will then be 3D printed.



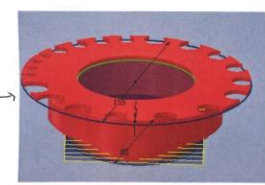
I then worked out the thickness and added the adjustable rings onto the bottom as my client said she liked how it is able to fit many different sized jars.



Next, I added the top layer where the user will insert their paint brushes. I began adding the holes.



Ring sized holes were added to the circumference of the top layer. The ring sized holes will allow the user to insert different sized brushes; this is very useful for an artist.



I continued to add the holes.



The final product was produced and now can be 3D printed.

456

the idea and it can fit lots of jars/cups etc

facilities

- Newly refurbished multi media workshop facility and seminar room
- specialist equipment: 3D Printer / rapid prototyping (Plus CAD/CAM, Lazer Cutter, plasma cutter, sublimation printing.....)
- open access to computers
- an 'adult' working environment



career opportunities

- Mike Cane – Higher Technical Apprenticeship at Rolls Royce
- Product design – Kieran Pierce – New range of furniture currently in production, going to UK market in coming months.
- Ian Thomas (Bespoke furniture for Peter Crouch)
- Engineering – Will Turner (EES and JCB work placement)
- Fashion design – Grace Kemp secured a job with her final project client working on wedding dresses
- Industrial design – Liz Smith, Katie Wilson – wind turbine design
- Marketing – Kim Taylor – Disney in America and currently in Australia.
- Sustainable Design – Emma Gerard, Exeter. Now chief engineer on the UK's biggest windfarm
- transport design
- Architecture
- packaging
- interior design
- graphic design
- Advertising
- to name but a few!

results and numbers

- At A level we have a long record of excellent exam results.
- Entry requirements:
Level 6 or above is preferable due to the academic nature of the course and the independent study skills required.

