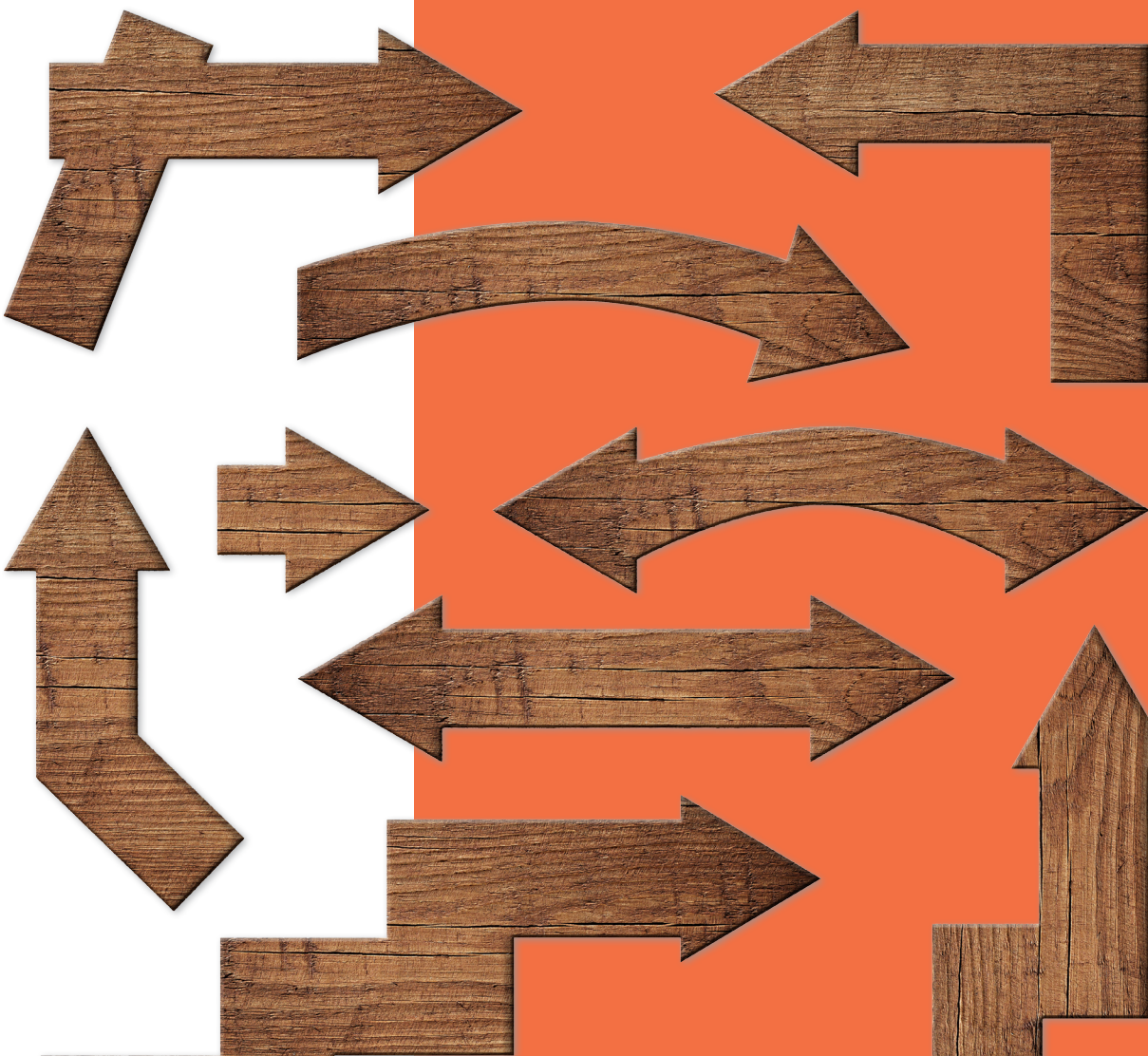
AQA
Realising potential

GCSE
DESIGN AND TECHNOLOGY
(8552)

NEA EXAMPLE RESPONSE

NEA Example response 1 with commentary
Contemporary Home

Version 1.0 May 2018

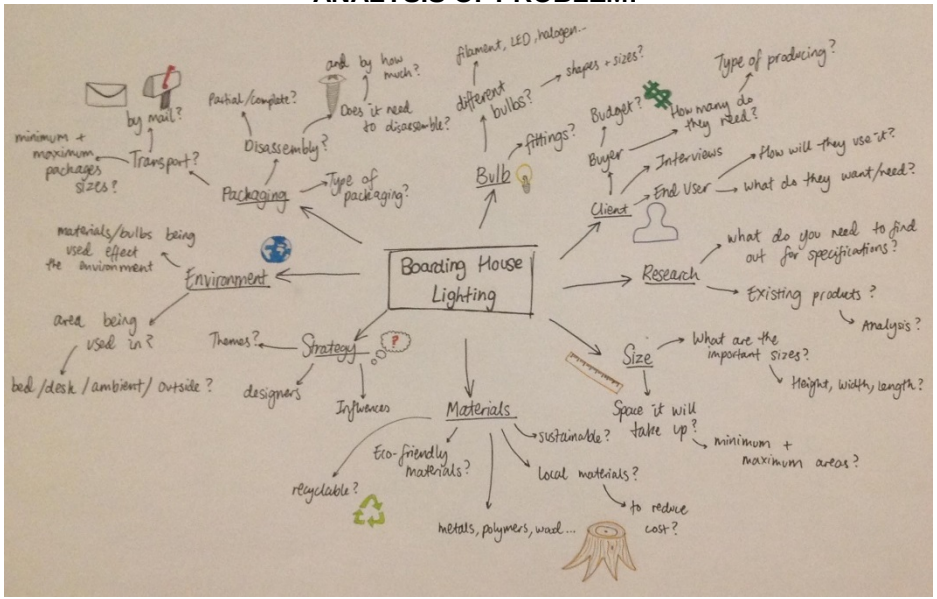


Contextual Challenge: The Contemporary Home

PROBLEM

Our school boarding house has many boarding students attending each year. Quite often these students are international. The rooms are very well designed, however the desk space can be dark and sometimes cramped. I will conduct some initial research in order to determine what approach I taken when designing this Product.

ANALYSIS OF PROBLEM:



EXAMPLES OF PRODUCTS:

Pictured here is a designer table lamp from Heal's, a British furniture store chain. It has a very attractive sleek, modern design and has been designed/made with expertise resulting in its expensive price.

This is ambient ceiling lamp also from IKEA. The product's price is from the solar panels used as they can be expensive but appeal to customers as they last for longer.

LOCATION:

The product will be used in [redacted] School Boarding House which is located in Brunei. It will be used on, either, a bedside table or the study desk as task lighting.

Also in the Houses, there's communal areas that need some ambient lighting to be designed for socialising/relaxing. There is also the lighting for outside and around the Boarding House for when it's dark.

RESEARCH TASKS:

CLIENT INTERVIEWS: To interview the buyer and end user - a teacher and student from the Boarding House - to establish their needs such as budget and practicality. This is important as it will develop my design to help satisfy both customers. Also the investigation of the environment used by the student for the lighting will aid the design.

EXISTING PRODUCTS: To evaluate/analyze existing products being manufactured and sold to the public. This will help to provide important features needed or elements that need to be considered.

DESIGN MOVEMENTS: To examine designers/movements to help begin a design strategy for the subsequent planning of my lamp. This will help when choosing the style and aesthetics for the lamp.

IMPORTANT SIZES: To attain the critical sizes of specific components that are necessary for the lamp. Also the minimum and maximum dimensions of the actual lamp and the space it could take up are significant.

SUMMARY:

I need to research the Boarding House including customer, environment and requirements as my product will be place in the Boarding House. As well analysing existing products, packaging and bulbs/fixtures, I will plan a design strategy using inspiration from movements/designers. The design will result in needing to decide if it's task or ambient and where it will be located in the Boarding House.

Product Evaluation

CUSTOMER:

The customers that this product is aimed at is for boarders room in the school's Boarding Houses. Their age range is from teens to young adults - years 7 to 13. They would all have different tastes and styles but a general "opinion" would want an attractive product that gives good lighting suitable for their needs with a modern style. It would be used for a bedside lamp that gives light to their bed and a little for the room.

FUNCTION:

The product will be for a boarding house room as a bedside light where it will use it's light to illuminate the room/bed. The bright LED light is for lighting the room or for lighting the bed for reading etc. It plugs into the wall and switches from there to turn on meaning it's connected directly to the mains. It is very simple to use as there are only two settings: on and off. If there was a switch on the cable and maybe some different light intensities it would improve the product.

AESTHETICS:

This product has a very straight edged, right angled, linear shape which gives it the look of a modern building/skyscraper. It has a modern style containing several colours; red, white, dark blue and light wood brown. I like it because of its modern look with its clean finish, straight lines/edges and attractive joints.

MATERIALS:

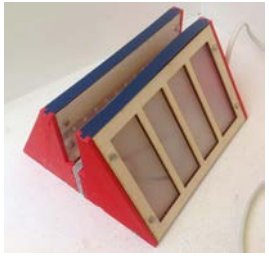
The materials that make this product are plywood, polypropylene and 3D printed plastic. They are appropriate for its function as they make it light, allow it to be hollow and have interesting colour choice. They consist all in different components with two symmetrical pieces which are made up of around 8 components. It is handmade mainly except for the machine printed plastic and the polypropylene. Also made well as there are few errors and good accuracy.

ENVIRONMENT:

There are no harmful chemicals used in or come from this product. However, the plywood would have been cut down from trees and the plastic creates carbon dioxide from the process of making. The light plugs into the mains with a 13A plug and uses electrical energy. This energy flows into the LED lighting producing a bright white light. LED lighting actually has environmental benefits as they consume less power per unit of light emitted. This reduces greenhouse and carbon dioxide emissions.

SAFETY:

The product has several sharp edges and corners though some have been flattened to blunt them. It has no loose components but some materials and areas seem slightly flimsy. It wouldn't be suitable for a child as they could close it and trap it on their fingers. Also some areas, like the clear polypropylene, appear fragile and liable to fall off.



SIZE:

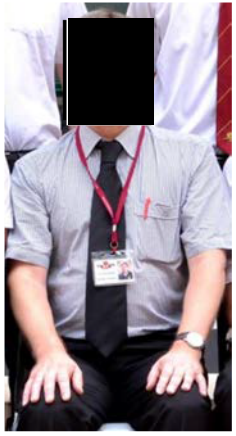
It is a suitable size for a bedside table as it is not to big and won't take up too much space. Also it is lightweight for its size which makes it easily moved. It has a good height but the width could get in the way when adjusting the light. The size of the product also means that it gives sufficient lighting.

COST:

The product cost between 40 to 60 Brunei dollars which is good value as it's an appealing product that gives good lighting and also considering the many different materials and processes used to make it.. It looks more expensive as it has several components and is rather intricate.

SUMMARY: This product is very attractive and designed well to be a bedside light. It is made to be able to change the light direction which is an interesting feature that I may include into my own designs. The use of LEDs are environmentally friendly which appeal to many customers and is something to think about for my own product. However this lamp doesn't disassemble for packaging which could have improved its design.

Mr [redacted] - Head of [redacted] Boarding House



Client interview

Q: What would be your budget/price range for the lamps?
A: It would be between $25 - $30 for about 70 lamps seeing as I'm buying in batch for the Boarding House. But if they were for the communal area I'd pay around $50 - $60 because I'd be buying less, maybe 3 or 4.

Q: Any design movements you would like to be incorporated in the product?
A: I personally enjoy the style of Art Deco or semi Art Deco. I like minimal design that is not overly complicated but looks attractive and does its job.

Q: Any specific type of materials would you like the lamp to have?
A: I prefer the use of wood as it can be attractive when lacquered or oiled and I don't mind steel or iron. Wood works well because it fits in with the existing furniture in the Boarding house.

Q: Is there any other functions you'd like the lamp to have?
A: If it was a bedside lamp a lamp that had several uses, like a book stand, would be very useful as the space is quite small. Even for a desk having more uses for a lamps footprint would be very useful.

Q: Is there any specific colours or themes you like to be involved in the lamp?
A: [redacted] house colours are gold/yellow and black which would be nice if involved in the design.

Q: Are there any specific safety features you need/want for the lamp?
A: Not being able to touch the bulb (if it emits heat) or the electrics and it needs to not be able to break easily if were to be knocked or dropped.

Mr [redacted] also spoke about how in a bedside lamp the ability to direct where the ligh[redacted]e going for just one bed because there are several people in a room who don't want to be disturbed at night.
He mentioned about the shared communal area that doesn't have lighting that suits the room as it's just bright, harsh lights. Soft, warm light would be best because it is where the students go before sleep.

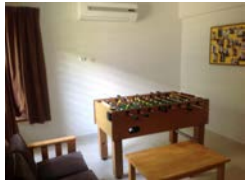
Location visit

[redacted] [redacted] School has 4 Boarding houses one of which is [redacted] House that has around 70 students. In the rooms there's a beside table and small study desk but neither are provided with lighting. Also they all share a communal area that does not have appropriate lighting.

This is an example of a bedside table that is located next to each bed. Students can bring in their own lights but nothing is provided. There isn't much space on it meaning the lamp needs to take up as less space as possible so other objects can be placed there as well.

Students also have their own study desk in their rooms with no provided light. This table is also quite small and needs as much possible room for books and work. A lamp that is able to direct its light would be useful for when studying.

This is the common room used by all the students to relax before bed or sometimes house meetings. There aren't any appropriate ambient lighting in this area, just bright, hospital-like overhead lights. There is enough space for a standing floor lamp to create a nice atmosphere.



When we visited the Boarding House, we took measurements of various areas/tables. We measured the width of the headboard, 4cm, so if you were to designed a 'clip on' light, you would have the dimensions. We also measured the bedside table and study desk which were 46x46cm and 50x100cm.

SUMMARY: From the location visit and interview, I've found out that space is an important issue in the Boarding House meaning that a task light will need to have a small footprint. Ambient lights however have more freedom and space for their design but need a soft glow. I now also know how much the client will pay and what he is looking for in an lamp for the Boarding house.

Research Findings Chart

RESEARCH	FINDINGS	REFERENCES
Product Analysis	• Lamp needs a sturdy base. • Also needs to take up minimum space in environment. • Mobility of lamps head/light is effective. • Ability to disassemble for packaging • Attractive aesthetics	Previous Yr 11 product
Client	• Has budget of $25 to $30 for 70 units. • Prefers use of wood, Art Deco style and possible use of certain colours. • Wants task light to provide light for only one person and not disturb. • Wants ambient light to emit soft, warm glow.	Mr [redacted] - Head of [redacted] Boarding House
Location Visit	• There is limited space inside a room on a table or desk. • The common room has more space for an ambient light. • Bedside and desk measurements: 46 x 46 cm and 50x100cm.	[redacted] Boarding House

DESIGN BRIEF:

To design and create lighting for [redacted] [redacted] Schools Boarding House to be used by students living in the Boarding House. It can be for a bedside table, personal study desk, communal ambient lighting or for outdoor lighting. It is important that the product does its specific purpose for the lighting option chosen such as enough lighting for reading if a bedside light and it is able to be disassembled to a smaller size for cheaper and easier packaging. Also the design needs to viable for possible industrial and batch production using industrial techniques/processes.

Design Specifications

AESTHETICS: My product must follow a design strategy from one of my researched design influences. Also it must appeal to the clients preferences who enjoys the use of wood and likes colours related to [redacted] House. Packaging does not need lots of special design/features so can be simple.

COST: The light must be priced between $25 - $30 or $50 - $60 depending if it's a task or ambient lamp because this is what the client will be willing to pay. From analysis of existing products, it showed that their prices were similar at $24 for a moderate ambient lamp. Also the lamps price should display the design and quality.

CUSTOMER: The heads of Boarding House will be the clients who are buying the product but Boarding students will be the end users. From request of the client, the product must be durable, robust and safe from any possible hazards.

ENVIRONMENT: These products will be placed in the Boarding House in either the user's room or the shared common room. Both myself and the client want the lamp to be as environmentally friendly as possible. This can be done by using an energy efficient bulb or LED as well as using simple Eco-friendly material for the packaging.

SIZE: The Boarding House rooms don't have much space therefore the space on desks and tables are minimal, 46x46cm and 50x100cm. The lamp will have to have a small footprint as a bedside or study light as the tables are also used for other functions. If it is going to be used as an ambient light in the communal area, there is more freedom in its size as there is more space.

SAFETY: The product must not have open bulb or wires so that there is no possibility of the user harming themselves by electrocution or burn. Making the light durable so that it doesn't break easily and cause harmful pieces to be broken off is an feature requested by the client.

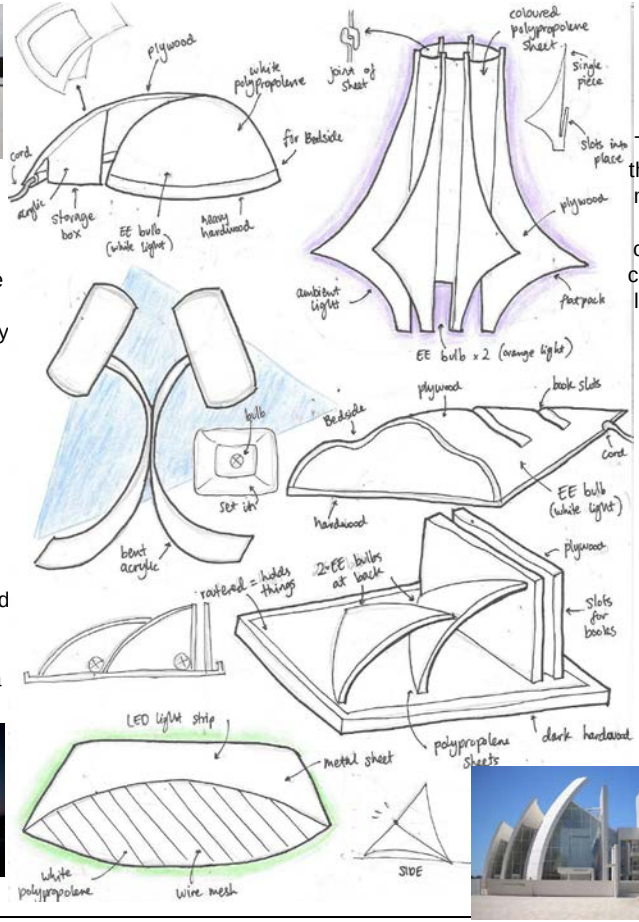
FUNCTION: The product could be either a task (bedside and study) or ambient (communal areas) light. For a task light, the client required it to be able to direct its light for only one person. It could also have the possibility of several functions to make up for the space it's using. For an ambient light, it should have a soft and warm glow to not disturb anyone in the area and create a nice atmosphere.

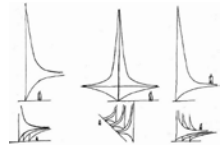
MATERIALS/MANUFACTURING: The product will be batch produced meaning it must be able to be made using industrial processes. This means using different machines such as a 3D printer. The client preferred the use of wood as a material but also likes steel or iron. Theses materials should be long lasting and the wood could possibly be locally sourced.

DESIGN IDEAS: Oscar Niemeyer - Architect

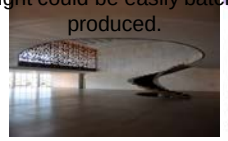
The curved dome and entrance of the Oscar Niemeyer Foundation building influenced this light. This light would be able to give light to a specific area as asked by the client.

This Oscar Niemeyer Museum lamp would need to be developed further with another function to make it appropriate for a table light.

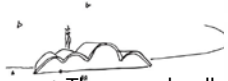




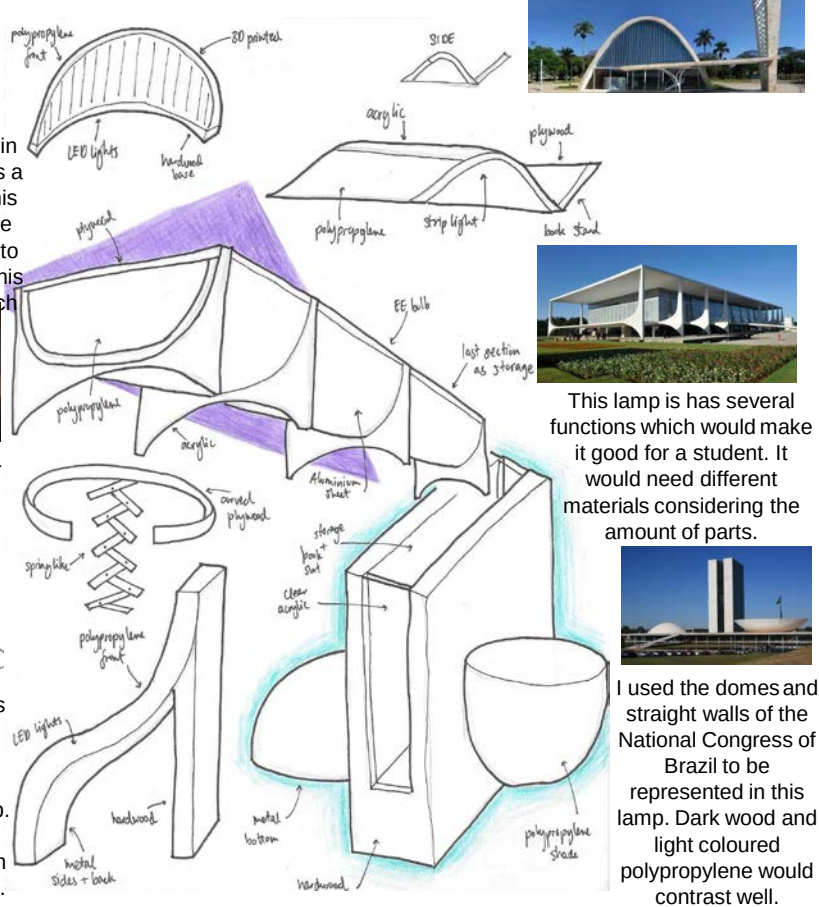
The shape represented in this drawing was used as a main repeating part in this lamp. The polypropylene could be yellow relating to customers preference. This light could be easily batch produced.



The curves Niemeyer used so much are conveyed both in this drawing and within my lamp design.



The curved walls of this building opposing the straight wall inspired this lamp. However it may take up too much space on a table.



This lamp is has several functions which would make it good for a student. It would need different materials considering the amount of parts.

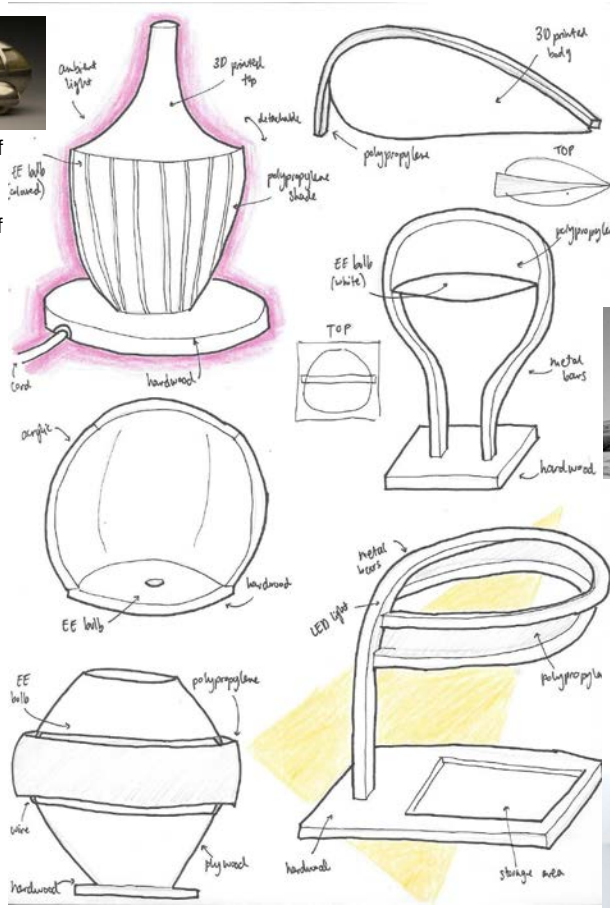
I used the domes and straight walls of the National Congress of Brazil to be represented in this lamp. Dark wood and light coloured polypropylene would contrast well.

SUMMARY: The majority of my designs for architecture I believe could be developed further to fulfill the design brief assigned. Oscar Niemeyer's style of curves and abstract forms have greatly inspired my designs; it has led to me creating attractive ambient and task lights.

DESIGN IDEAS: Streamlined design - Movement

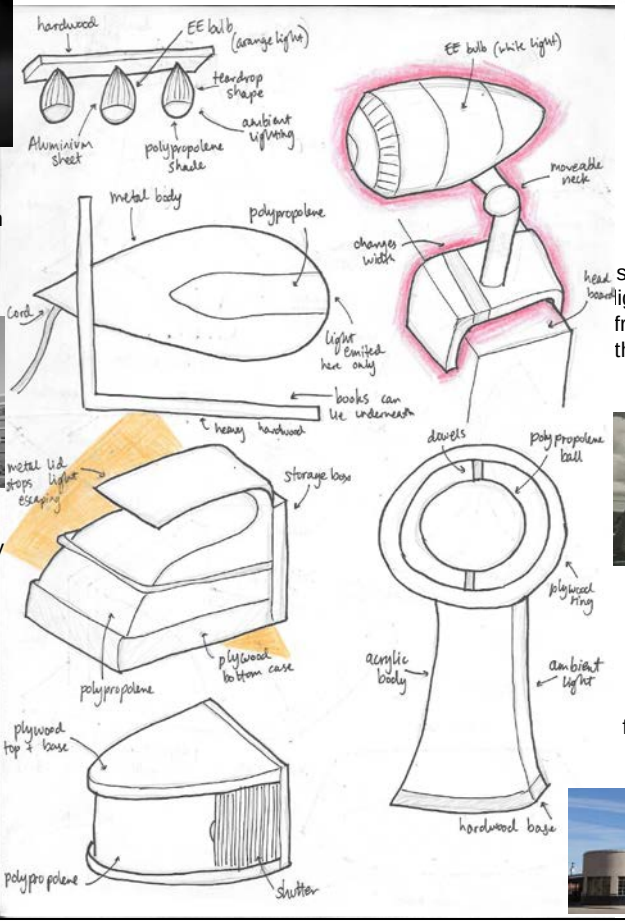
This is a good example of the prominent teardrop shape which I have incorporated in several of my designs.

This chair's smooth soft look was used in several areas of my designs.



I used the soft streamlined design from this motorbike in my designs for a simplistic, calm look.

I used the interesting shape of the chairs back and used it in my design to make a creative shade. The bulb will need to be hidden for safety.



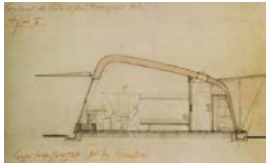
Inspired by the teardrop shape being used as the main body in this sharpener, I used that in a light that clamps onto a be frame. This design reflects the price produced from th client.

Incorporating a shutter into this light may be difficult. Also another feature could be added like a box for storage.

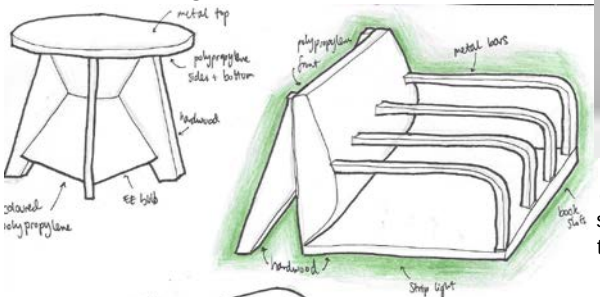
SUMMARY: The teardrop shape is a big part of streamline design and if I were to choose a light from this strategy to develop further it would need to incorporate this to fully represent this movement. It was difficult to add extra features when coming up with streamline influenced lights.

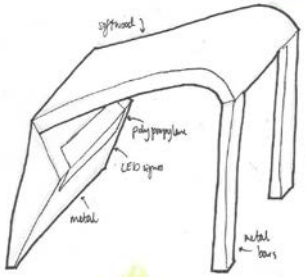
DESIGN IDEAS: Jean Prouvé - Designer

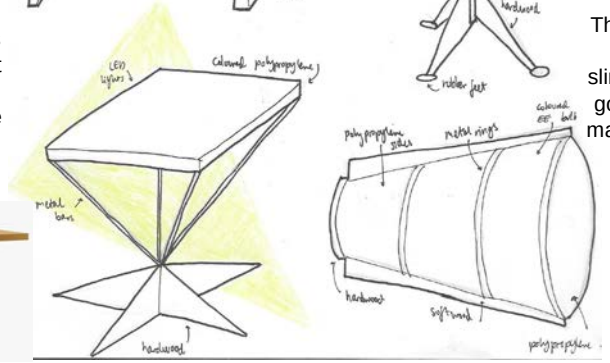
This stool inspired this similar light with its triangular looking legs. I also kept the flat top to help project the light.



I used this buildings cross section and represented it in my design while also adding Prouvé's signature shape.

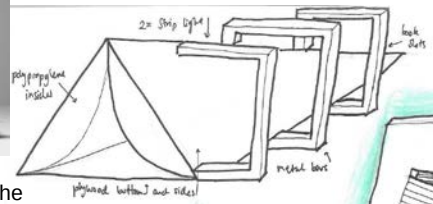


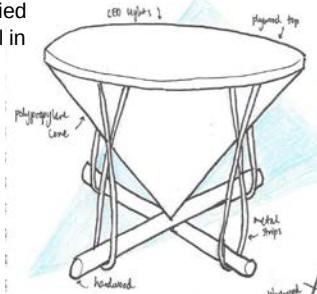


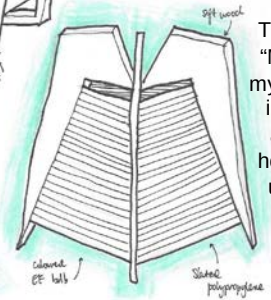


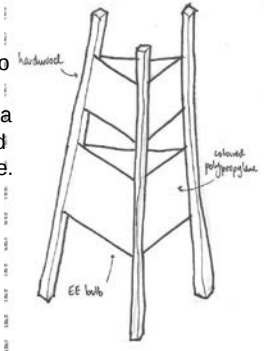
I like the chairs fat cushion contrast with the sleek metal bars and tried to convey a similar feel in my design.

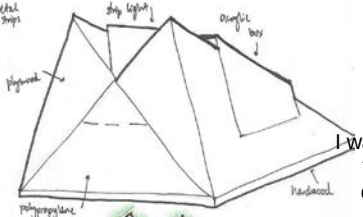
This design is different to the rest as it has a slimmer feel. It could be a good desk light if I could make the head moveable.

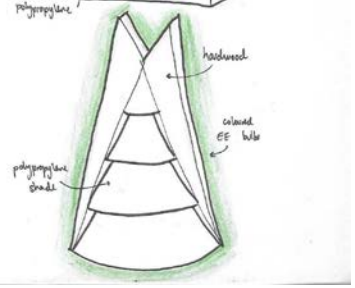










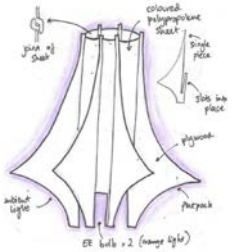


The durable frame used in "Maison Demontable" and my design gives this light an impression of sturdyness and resistance. Also the houses wooden walls were used in this lights shade.

I wanted to use the "Buvet tables" most interesting component in a design make an attractive task light.

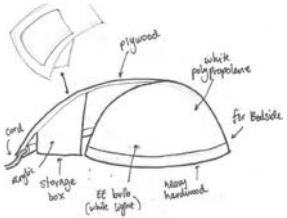
SUMMARY: I like the outcome of these Jean Prouvé inspired designs and the interesting shapes and styles that have been drawn. There are several designs here that I think would be appropriate for an ambient or task light indicated in the design brief.

Sketch Model with Peer Evaluation



Model 1

EVALUATION:
This sketch model was quite simple to make as it only consists originally of two components but I added a base to help hold up the thin supports. This would make it easy to manufacture and it could be possible to flatpack. Where a bulb bracket would go on this light would need to be developed further, as well as the base; this was discussed in our peer evaluation. It is an ambient light most suitable for standing in the common room and creating a atmosphere.



Model 2

EVALUATION:
This was the most difficult sketch model to make meaning if I were to make this light it would be more problematic. In the peer evaluation they all liked the aesthetics of the light but agreed about the manufacture difficulty. Some other issues arose about how the bulb will be replaced when needed. This light has really nice aesthetics and several other functions but because amount of materials it will increase the cost. Also packaging could pose as a problem as it could be complicated to get it compact down, therefore rebuilding it will be as well.

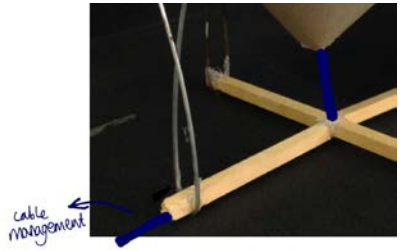
Model 3

EVALUATION:
Personally this is my favourite sketch model out of the three and my peers liked the aesthetics of it as well. They came up with some further development such as having the cord run along the leg and having a removable lid. I improved the lid by adding indentation to hold objects without them rolling/falling off. Also this light will easily be able to sit on top of some books or support them on the lid. This light would have a range of materials but most can be cheap or locally sourced.

SUMMARY: I'm going to choose my third model to develop further as I believe this is the best out of the three models and my peer group agreed. It will be used as a task light on a bedside table in Boarder's bedroom. It will use a energy efficient bulb as this is the most appropriate and energy efficient. The main materials used in the light will be polypropylene, metal wires and wood. There is still improvements to be made to make it completely suitable for the Boarding House and meet the specifications outlined.

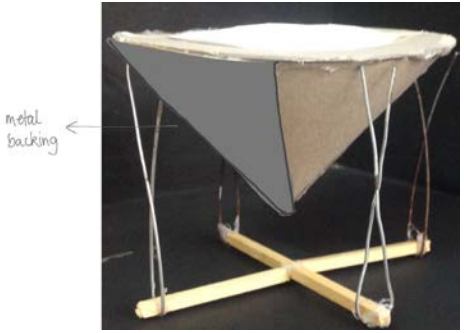
Model Development

Model 1

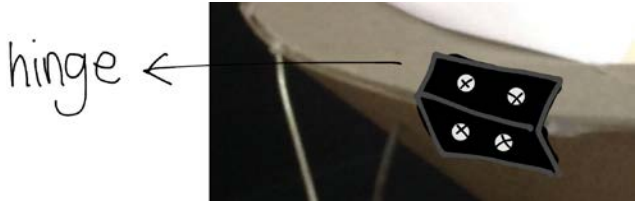


From the peer evaluation they commented on how the cable would be managed. To fix this I would have it coming out the cone's tip then going through the bottom of a wooden base at the back. This means the cable will be out of the way and not getting tangled up.

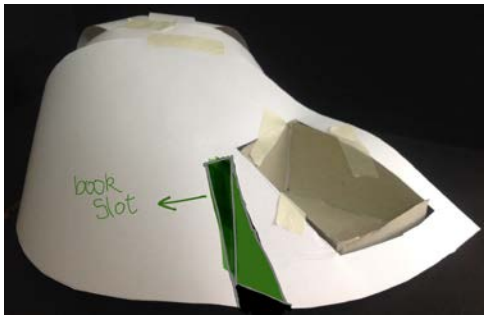
I would put a thin metal sheet at the back of the light so that the projected light is directed just towards one area of the room. The sheet would need to be more than halfway round the light to do this. This was an issue brought up by the client if they were going to buy lights for a Boarding House room.



The light would need a way of being able to replace the lightbulb inside when it needs changing. The easiest way would to have the lid able to come off and on, however it will need to stay attached to the light so it isn't lost or damaged. I would add a hinge so the lid can flip open for the user to change the bulb. The hinge might look better on the inside of the life so as to not affect the aesthetics of the light.

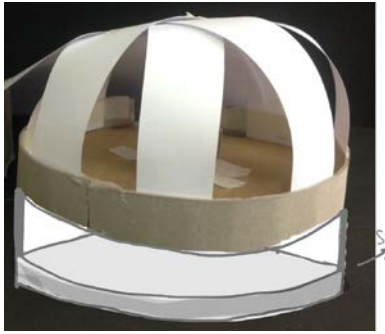


Model 2



I would add one or more book slots in the back side of the light as an additional feature. This would give the back additional use aside from just directed light only at the user. There could be several slots for more books but they might need more support. The client brought up having a book stand when asked about other functions.

This development was an idea from the peer evaluation group and they suggested raising the dome higher and having a storage box underneath. This would provide more storage space which is useful as the light takes up quite some space on a table. The storage space would be useful to slide in a book or a phone to hold or protect.



SUMMARY: Following the model development of two of my models, I have decided to choose Model 1 to develop as my final product. I came to this decision after looking at several ways both models could be developed and the first model will be most appropriate as a light for my client. This model also is refers closely to my design specification and can be developed even further to make it completely suitable.

DESIGN ANALYSIS: Full size card model

AESTHETICS: The lamp has an interesting shape and modern appearance. This card model doesn't have the colours of the real product; the final product will have simple muted colours from the wood, metal and polypropylene. However the 3D printed components could be coloured to suit the client's preference in the specification. Also the client like the use of wood in products and this lamp has wood for bothe the base and three sides of the shade.

COST: The lamp doesn't have many materials or components so won't be very expensive. I think it will be within the customer's price range but more near the higher amount of $30. This price will be good value for money as it's an appealing product and has good functionality.

ENVIRONMENT: This lamp is best suited to be placed on the bedside table in the user's room. It will use a energy efficient bulb to make it more environmentally friendly as stated in the specification.

FUNCTION: This lamp will be a task light for in a bedside table in a Boarders bedroom. It is able to direct its light to only one person/bed which was stated in the specification by the client. The bulb has a nice strong yellow light which will be softened slightly by the polypropylene therefore giving enough light for reading but not too harsh lighting. For the final product I would like it to have an added feature in the lid that holds objects allowing more functionality. Also having a switch or a dimmer switch would improve the lamps function.

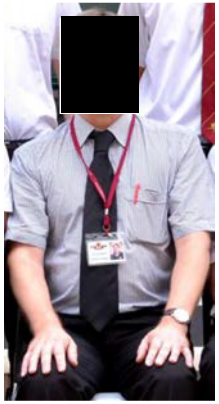
SAFETY: The lamps bulb and wires are all enclosed so there's no danger of harm to anyone. There is some sharp corners which can be rounded on the final product. Also the metal wires need securely attached to the lamp otherwise they could be harmful. There are no loose components except for the lid which wouldn't do much damage. The lamp is fairly durable, a request made by the client.

MATERIALS/MANUFACTURING: The materials that will be used for final lamp product are hardwood, plywood, polypropylene, metal wires and 3D printed plastic. These are suitable as they make it stable, robust and attractive. The client likes wood being used in the product as stated in the specification and doesn't mind metal - steel or iron - which the lamp will use.

SIZE: The lamp is suitable for the bedside table because the base is only takes up a tenth of the tables area; the base is 216 cm^2 and the table is 2,116 cm^2. This is because of the bases shape meaning there's still space. The lamps height is 30 cm which inputs it at a good height to distribute light well.

SUMMARY: I've linked my analysis back to the specification which will allow me to make the necessary improvements such as adding the extra function on the lid. The lamp follows most of what was stated in the specification meaning it will make it a successful product after a few developments. The client mainly likes the lamp and would include some little developments.

CLIENT FEEDBACK



I got some feedback from my client from an interview about my model. Mr [redacted] said he liked the stability of the lamp and the control of light being emitted which he thinks are important features. For the final product he would like there to be a switch on the cable and for the polypropylene to be frosted so the light isn't very bright. He also thought the lamp looked quite adaptable and creative.

Packaging

Packaging is essential for a product as it provides information about the product, promotes the product/company and instructs on how to use. It also contains the product, transports easily, protects from when being moved about and displays the product. Good packaging should be cheap but still attractive and do its job well. Also using the least amount of material or environmentally friendly materials are a good feature to appeal to a wider audience.

Net packaging is used often to make a package as it is simple and the complexity of the design can be increased. The net is usually cut from one sheet of material that will be batch produced and is easily assembled with different seals to keep it together. Also with a net it means that it can be transported efficiently to the company who will use it while using least amount of space. The more costly nets, used by companies who can afford to do so, are sealed shut by either glue or another adhesive and the cheaper ones are able to be reduced back to a net again as they are only fitted together. (Shown in the right picture is a simple packaging net that was easily taken apart.)

Inside packaging it must be able to protect the product from when it is being transported around. This can be by air packets/bubble wrap that hold the product still while protecting it from hitting the sides and being damaged. Also sometimes, sections are made to hold components in the packaging to stop them from rattling about; these can be made be cardboard or another lightweight material. (In the photo to the left is a cardboard net made to hold a perfume bottle in place.)

Packaging uses different locking devices to secure the openings of the package around the product. One way - the locking method - is having tabs that are pushed into slits and lock; these have to be done by a computer to get them accurate and have it as strong as possible. (A simple sample of this in the left photo.) Another way is the blister packaging locking device where there is circle protruding and an indented square to secure the circle pops into the square and is locked. (An example of this fixture to the right.)

The different materials used in packaging varies in expense, treatment and complexity. The common grey cardboard material is cheaper as it is not bleached and only the outside is laminated so as to add on the products information with colour. (As shown in the picture of a bulbs packaging to the left.) The smooth, white and more expensive cardboard is used by companies, such as Apple, who can afford more grandeur. To get the cardboard white it has to bleached which is harmful to the environment. However, this material appeals to customers because of its soft feel and clean, luxurious look.

The information - all provided for the customer - displayed on packaging will include either all or most these features: details about the product, instructions on how to use/maintain/assemble and business contacts. Also symbols are a big part of the information provided such as the “CE” and “Kitemark” signs to indicate that it's made accordingly with a tested guarantee. Other symbols give important details to the customer such as how to handle the product, whether recyclable and hazard warnings. Barcodes and QR codes are used to be scanned and then reveal relevant details such as the price and to be directed to a online page perhaps about the company.

IKEA create great packaging as it is made out of recycled corrugated cardboard that is screen printed on a side with one colour. IKEA also mainly flat pack their products to save material and space. it's

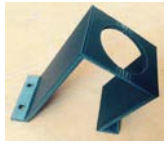
Bulbs and fittings

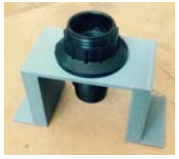
Filament bulbs need lots of wattage to power them but don't last for a long amount of time. Their light is only a byproduct of the heat created; this makes them a fire hazard. They have to be replaced fairly regularly but are cheap to purchase. They also can come in different colours/shapes which are good for ambient lighting. However, they have a negative impact on the environment as they emit carbon dioxide.

LED bulbs are expensive as they need a transformer to work but last much longer than filament bulbs. They also emit a bright light that come in different colours that can flash in patterns. Also they are good for the environment as they use less energy and do not produce harmful gases.

Energy efficient bulbs are expensive but use less wattage than filament bulbs and last for a longer time. However, they emit dangerous gases when thrown away and in a rubbish heap.

There are two different types of fittings: screw fittings and bayonet fittings. For a screw fitting, the bulb just screws into it and is held in place. And for a bayonet fitting the bulb is pushed in and twisted for it to be held in place. For each of these fittings you need to know the measurements of its widest diameter, the length (and length with bulb) and screw thread. The fitting will be fixed onto a mount that can be made with different materials such as acrylic, 3D print or plywood. Although 3D printing shrinks when it cools which would need to be accounted for in the measurements. The mount can be made into many different shapes and sizes suitable for the lamp it needs to fit in. The mount also needs its dimensions to be measured as the bottom of the fitting and wire need to be able to fit underneath it. The mount’s hole diameter also needs to be accurate to be able to fit the fitting so for the ones we’re using it needs to be between 33.2 mm and 27.8mm as these are the widest diameter and screw thread dimensions. A mount we measured was 30.37mm which seems appropriate as it's a good distance between the dimensions.

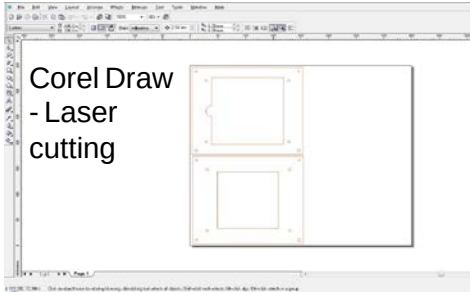




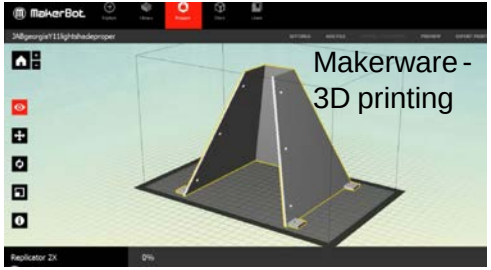
SUMMARY: The best bulb to use would be one that is environmentally friendly and emits light not heat. The mount and fitting needs to be measured accurately for each other and to fit inside the lamp. Good packaging would be made from a simple net with few tabs to lock it together. It will also need the correct symbols and information on/inside the packaging and packaging that doesn't affect the environment is the best. Flat pack or partially disassembled products mean that smaller packaging can be made meaning a lower cost.

CAD Drawings - Rendered

These are my rendered examples CAD drawings of my light. I've experimented with different materials and colour finishes to try and work out what could look good for the final product. I tried two colour schemes that represent two of the different Boarding Houses that the light would be being used in. I like the blue colour scheme because of soft, calm colours which would be suitable for a bedside night light. Also the red colour scheme for Eagle Boarding House is attractive but maybe too bright/intensive a colour for night.

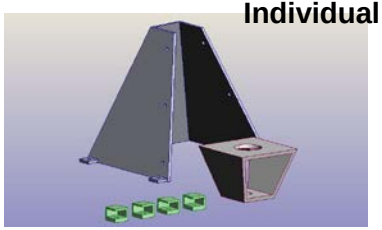


Corel Draw - Laser cutting



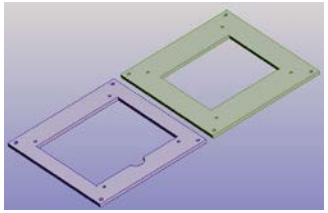
Makerware - 3D printing

Individual Component Parts

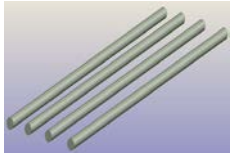


I have several different components that make up my light but most are CAM. They will use a variety of techniques to be made including 3D printing and laser cutting.

The main top components are the two laser cut plywood pieces. They both have holes for the supports and for the lamp shade to screw into. They also have a square opening for access to the bulb: one is smaller so as to support the lid and the other has a small semicircle cut out for taking out the lid.



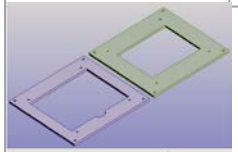
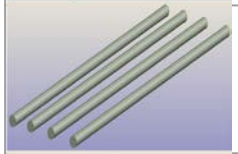
The design for my light shade had to be changed and developed several times. It's now going to be 3D printed as it's easier due to the complex angles. First I tried halving it to keep the original sizes but this didn't work when it tried to be printed so I ended up making the proportions smaller for it to fit/work.



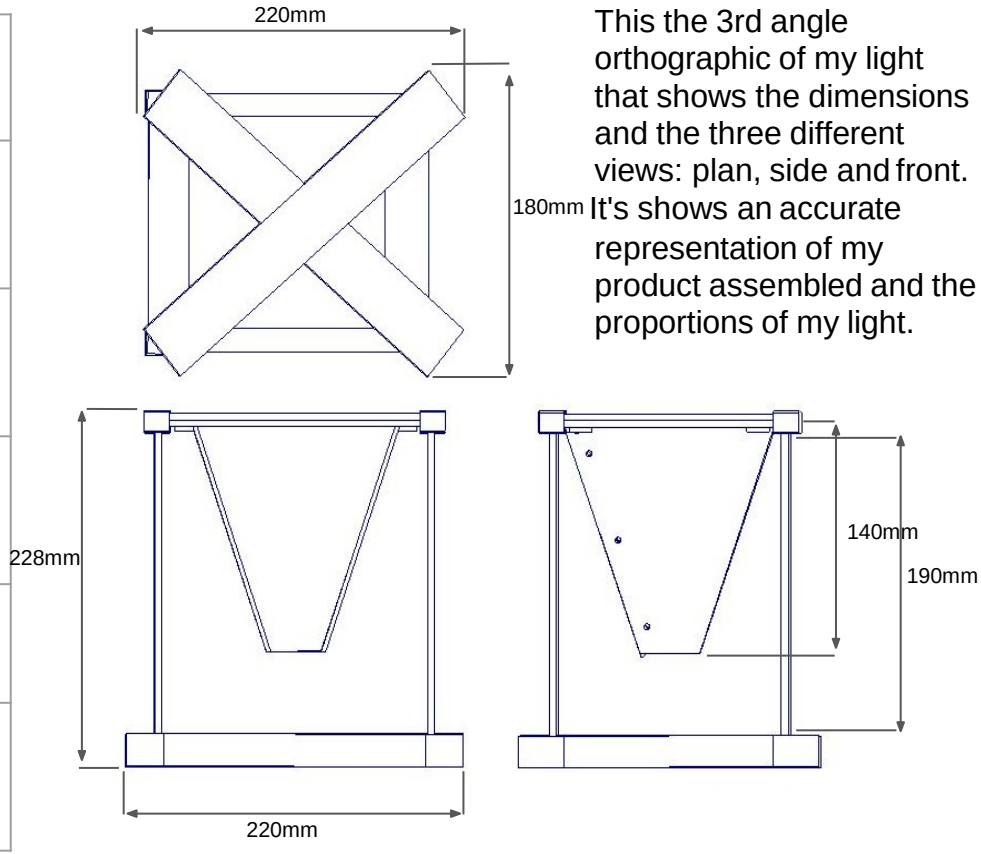
Another design development during the CAD was the change of the supports. I've changed them to straight rods that will connect the top and the base. These are more suitable for making the light stable as well as being simpler when making it.

SUMMARY: Through the CAD process several of the light's components went through development due to the several issues that appeared once I started to 'make' it on the computer. A main development as a result of the CAD work was changing the supports to straight rods, instead of the bent wire, which made it more stable and secure. Also, the light's proportions changed during the CAD process and has made the whole product smaller.

Material and Cutting list

	MATERIAL	MANUFACTURING PROCESS	SIZE
	Plywood (2 components)	Laser cut	400x350 mm
	Acrylic rods (4 components)	Hand cut: coping saw	5mm (diameter)
	PLA (6 components)	3D printed	
	Polypropylene	Laser cut and engraved to be folded	600x400 mm
	Hardwood (2 components)	Hand cut:	40x20x265 mm

3rd Angle Orthographic



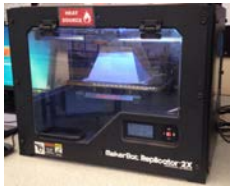
This the 3rd angle orthographic of my light that shows the dimensions and the three different views: plan, side and front. It's shows an accurate representation of my product assembled and the proportions of my light.

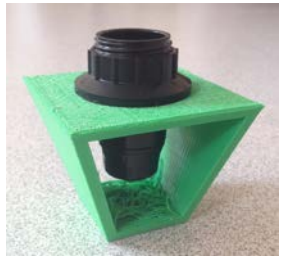
SUMMARY: Through the use of my 3rd angle orthographic I am able to see my assembled light's proportions which will help me in the manufacture of the product. From the the 3rd angle orthographic there's quite a bit of space between the shade and the base which may need to be reduced later. The material and cutting list will help with the manufacturing as it tells me the size of the components and how they will be manufactured.

Materials Investigation

3D PRINTED SHADE

The shade had to go through many developments and size changes before it was able to be printed in the 3D printer. It was either too big or wouldn't lie on it's side but I changed the size proportions which didn't affect the other components and it printed with no problems.





3D PRINTED CORNER

I had to reprint the corner component a second time because there was too much material and the edges should've been 'rounded' to make them safer. (The green coloured one is the improved corner.)

3D PRINTED BRACKET

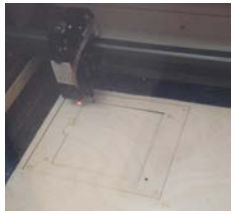
I printed the bracket and the measurements were all correct and it fitted well in the light. However, a side of the bracket didn't print well because there was no support to hold it in position so I will reprint it on it's side to avoid this.

BASE

I knew I wanted a hardwood for the base so I looked into the different types. I chose the meranti wood because of its dark colour and it's locally sourced.

LASER CUT PLYWOOD

I laser cut the two top components and the measurements were all correct and all the holes lined up. However, these will need to re-cut as the holes for the supports need to be changed to all the same diameter for acrylic rods.

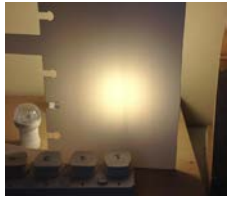


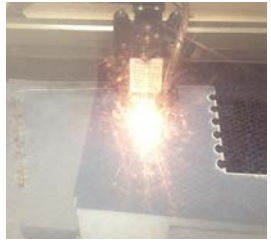
SUPPORTS

There was four different choices for the supports: acrylic tube, acrylic rod, wire and wood dowel. I laser cut the plywood components with four different sized holes so I could experiment with the choices. After testing them all, I choosing to use the acrylic rods because they provide sturdy support, a suitable thickness and are available in several different colours.

LASER CUT POLYPROPYLENE

I had to laser cut my polypropylene several times as measurements weren't correct. Also, the settings on the laser cutter needed to be adjusted because it left backflashes on the polypropylene which left unattractive 'burn' marks.





I tried two different types of polypropylene: a frosted clear one and a white-coloured one. I prefer the white polypropylene because of the more attractive lighting effect as the clear polypropylene you're able to see everything inside and produces a bright, harsh lighting.

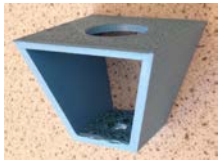
SUMMARY: My material investigation allowed me to look at different colours, materials and sizes enabling me to make choices such as adjusting the corner sizes, using white polypropylene and meranti wood. It also allowed me to try processes several times so as to get it correct and let it be suitable for the final product. Also, I need to make sure that the end colour scheme is appropriate and suits the light.

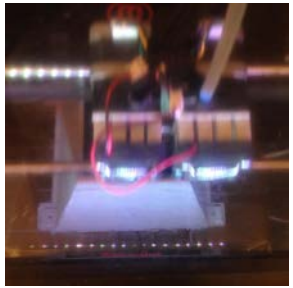
Manufacturing Diary

TOP

1.For all the 3D printed components I exported my CAD drawings as .stl files then opened them on makerware to be printed. I have a total of ten 3D printed components.

2.I spray painted two of 3D printed components; I chose two different blues that suited my colour scheme.





3.Three components needed to be laser cut so I exported my CAD drawings as .dxf files and opened them on coreldraw to be transferred to the laser cutter.

4.The plywood components were sanded together on the belt sander then had to be oiled with Danish Oil and the polypropylene had to be folded on the indents.

BASE

1. I cut two 40x20x200mm meranti blocks using a tenon saw then I drilled the holes for the dowels and acrylic supports. After this, I sanded both pieces with sandpaper till it was smooth enough for use.

2. The dowels were cut to length of 235mm with a coping saw then glued with PVA glue into the holes in the wood blocks.

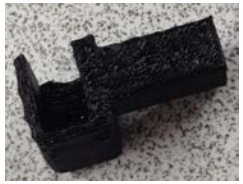
3. I sanded the sides of the sides of the base so the dowels were flush into the wood. Then it was oiled with Danish Oil and left. When it was dry, I added four feet to the meranti blocks and screwed the four support brackets.

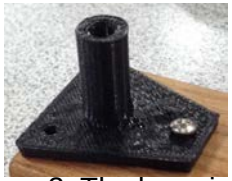
4. I cut four acrylic rods with a coping saw and sanded the edges with the disc sander so they were smooth.

ASSEMBLY

1.The polypropylene diffuser is attached to the shade with four nuts and bolts. These are then attached to the plywood components with four nuts and bolts.

2.The four corner clips slide onto each corner and fit above the corner holes. The light bracket just sits inside the shade.





3. The base is already assembled and just needed to fit the four acrylic rods into the support brackets and fix them to the top support clips.

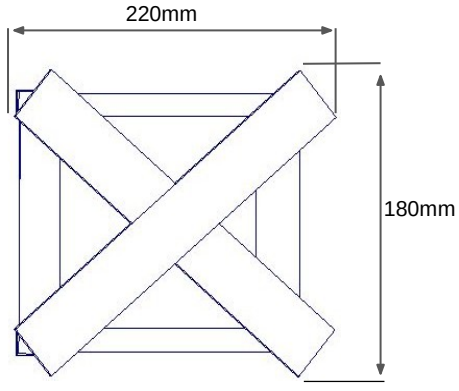
SUMMARY: My manufacturing diary records the processes to make my light including the different programmes, tools and equipment needed. It shows how it was made and also how it was finally assembled to complete the light.

BASE

Manufacture Development

LEGS

My original design for the base met several problems during the process of manufacturing the light. If the top plywood components had been square then to make the base would have been much simpler as the wood components would have needed to just have been at right angles to each other. However my design changed during the CAD process making the top components rectangular and this made the angles needed very complicated.



The design for the light's legs didn't need to be altered dramatically as the original design still worked. However there was some racking as the acrylic rods weren't quite sturdy enough as they are flexible and there wasn't enough depth in the wood and plywood to support them. As seen in the CAD most of the acrylic rods were exposed and only little of the ends were in either the meranti or plywood.

The angles were too complex to get the exact overlay of the wood components so the light's legs would accurately line up. Due to this I changed the base design to a much simpler design but made sure that it didn't take up any more space than the previous design. I also thought about how the cable would be managed with the new design so it could be tidied away easily and not in the way.

To fix this problem I had to design four extra brackets to be attached to the meranti blocks that created extra support. As well as this I developed the four corner clips to include some extra support for the acrylic rods. I designed some CADs then exported them to be 3D printed.

The new design is simpler than my previous idea but continues similar image created by the acrylic rods. There is two dowel pieces to hold the wood blocks together and they also hold the cable in place.

The bottom brackets incorporated the lights main shape - pyramid - in them and were attached by three screws into the meranti. The corner clips fitted the same as before but just with extra length.

SUMMARY: I learnt about manufacture development and how it won't also be what you've designed so you have to adjust but you can still achieve a similar product.

Product evaluation against specification

AESTHETICS: My product must follow a design strategy from one of my researched design influences. Also it must appeal to the clients preferences who enjoys the use of wood and likes colours related to [redacted] House. Packaging does not need lots of special design/features so can be simple.

EVALUATION: My light has developed from the original design but has still stayed to my design strategy. Wood is quite prevalent which suits my clients preferences but the colour scheme works better for [redacted] Boarding House.

COST: The light must be priced between $25 - $30 or $50 - $60 depending if it's a task or ambient lamp because this is what the client will be willing to pay. From analysis of existing products, it showed that their prices were similar at $24 for a moderate ambient lamp. Also the lamps price should display the design and quality.

EVALUATION: My product would be a task light and be in the higher ends of the clients willing price due to the several components and processes. However the price of the light will display its design and quality.

CUSTOMER: The heads of Boarding House will be the clients who are buying the product but Boarding students will be the end users. From request of the client, the product must be durable, robust and safe from any possible hazards.

EVALUATION: As my colour scheme is blue and white it will appeal most to [redacted] House and the students will enjoy the design. The light is durable and safe from any possible hazards but not as robust as it could be. The client and end user both like the final product.

ENVIRONMENT: These products will be placed in the Boarding House in either the user's room or the shared common room. Both myself and the client want the lamp to be as environmentally friendly as possible. This can be done by using an energy efficient bulb or LED as well as using simple Eco-friendly material for the packaging.

EVALUATION: My product is best suited to be placed on the bedside in the user's room due to it's size and lighting ability. I've tried to make it as environmentally friendly as possible by using locally sourced wood and corrugated cardboard for the packaging.

SIZE: The Boarding House rooms don't have much space therefore the space on desks and tables are minimal, 46x46cm and 50x100cm. The lamp will have to have a small footprint as a bedside or study light as the tables are also used for other functions. If it is going to be used as an ambient light in the communal area, there is more freedom in its size as there is more space.

EVALUATION: My light will be in a Boarding House room on a bedside table and it takes up less than a quarter of the space available meaning there is more than enough space for other functions.

SAFETY: The product must not have open bulb or wires so that there is no possibility of the user harming themselves by electrocution or burn. Making the light durable so that it doesn't break easily and cause harmful pieces to be broken off is an feature requested by the client.

EVALUATION: There are no open wires or bulb except when changing the bulb as the user has to take off the lid and come in contact with it. The light is durable and doesn't break easily to create harmful pieces however some components can be removed.

FUNCTION: The product could be either a task (bedside and study) or ambient (communal areas) light. For a task light, the client required it to be able to direct its light for only one person. It could also have the possibility of several functions to make up for the space it's using. For an ambient light, it should have a soft and warm glow to not disturb anyone in the area and create a nice atmosphere.

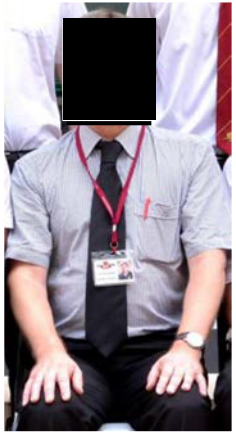
EVALUATION: As my light is a task light, it directs light out of only one face to be used for only one user and not disturb anyone else in the shared room. However I wasn't able to add other functions to the light as I had planning during my designing.

MATERIALS/MANUFACTURING: The product will be batch produced meaning it must be able to be made using industrial processes. This means using different machines such as a 3D printer. The client preferred the use of wood as a material but also likes steel or iron. Theses materials should be long lasting and the wood could possibly be locally sourced.

EVALUATION: I used two different types of wood: meranti - which was locally sourced - and plywood as per the clients preferences. My light can be made using industrial processes and several of my components were made with a 3D printer.

Final Client Interview

I had my client - Mr [redacted] Head of [redacted] Boarding House - review my end product. This allows my final light to be assessed by the client to see its appealability and whether it fits the client's criteria.

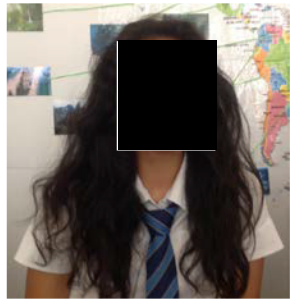


Mr [redacted] said that overall he “really liked” the light and thinks it “turned out well”. He enjoyed the good control of the amount of light being emitted as he thinks this is an important factor for a task light, especially as it is a bedside light. An important aspect of the light was changing the bulb and Mr [redacted] liked the ease involved in the process and its straightforwardness. He liked the stability of the light and believes you could rest light objects on the top and he gave an example that he would place his glasses if he was using the light.

Mr [redacted] appreciated the design of the light and thought that even though he likes minimalistic design, the light wasn’t overly complicated and had an attractive design. As stated in the first interview, Mr [redacted] commented on his preference of use of wood in the light so enjoyed the amount and different woods used in my product. He also thought that there was a good use and combination of the materials overall. A main improvement he would want would be a switch closer to the light for easy access of turning it on/off.

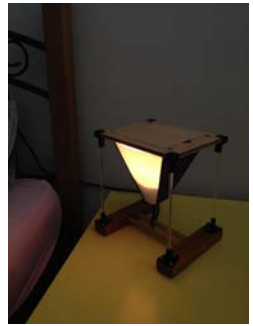
End User Interview

I also had an end user review my end product. [redacted] Benson is a Boarding House student who stays at [redacted] Boarding House during the weekdays and would be using the product frequently.



[redacted] thought that the amount of light being emitted was low enough to not be disturbing other students in the room. She also really enjoys the creative design of the light and thinks it would fit well on a bedside of a Boarding House room. The size appealed to her as she thought it’s not too big but also not too small; it leaves more than enough space on the bedside table. Some developments she mentioned to enhance the product and to make it more suitable for use by the students were covering the gap at the top where the polypropylene allows direct light from the bulb to come out. Also [redacted] commented on having a storage box/place would increase the functionality.

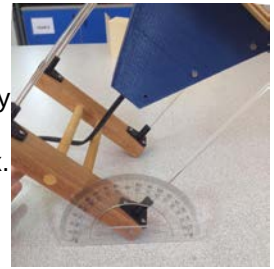
We also went to the Boarding House and placed our lights in the appropriate environment to review how well they work in the room.



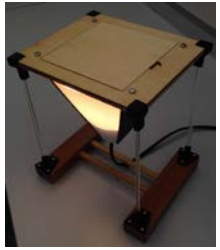
SUMMARY: These interviews show me how the client and end user enjoy the product but can see some slight improvements to better suit their needs. Both had similar improvement ideas for the light such as having extra functions incorporated in the light's design and they both liked the control of light emission.

Testing

TILT TEST: I tested the tilt angle for both the side and front faces and they both had large angles before they would begin to fall. The side face reached approx. 135 degrees and the front face reached about approx. 140 degrees. This is good as it means the light won't be knocked over easily.



WATER RESISTANCE: To test the lights water resistance I applied some water droplets to several surfaces. None of the water was absorbed as the wood had a water resistant finish and the other materials were all waterproof. This is good as it means no damage would occur if someone were to spill a liquid on the light.



RUN TIME TEST: I left the light on for six hours to test it's durability. Afterwards I checked if anything had heated up; the surrounding polypropylene and ABS were cool to touch but the bulb was warm. This is alright has the bulb isn't open and is protected. Also because nothing was hot to touch it means that no one will harm themselves by burning their skin.

FITNESS FOR PURPOSE: My light fits its role as a task light on a bedside table as it directs light at only the person using it. It produces enough light to be able to read by but not disturb the user or others before bed. Also it takes up very little space on the table so there's space available for other uses or functions. However, it could be multi-functional and provide other uses as this would be useful as boarders have limited space. Also the bulb can be changed easily after constant use by the user.

SUMMARY: The tests that I carried out on my light allowed me to prove its durability and suitability to be a Boarding House bedside light. Also it will allow my client and users know it is reliable.

Lamp Improvements

A good improvement to the light would be to add either a on/off switch or a dimmer. Having a switch directly on the light would make it easier for the user to turn it on or of. A dimmer would allow the user to choose their preferred lighting depending on the activity. They would probably prefer to have softer, low lighting right before going to bed so it doesn't disturb them but brighter lighting for when they're reading in bed.

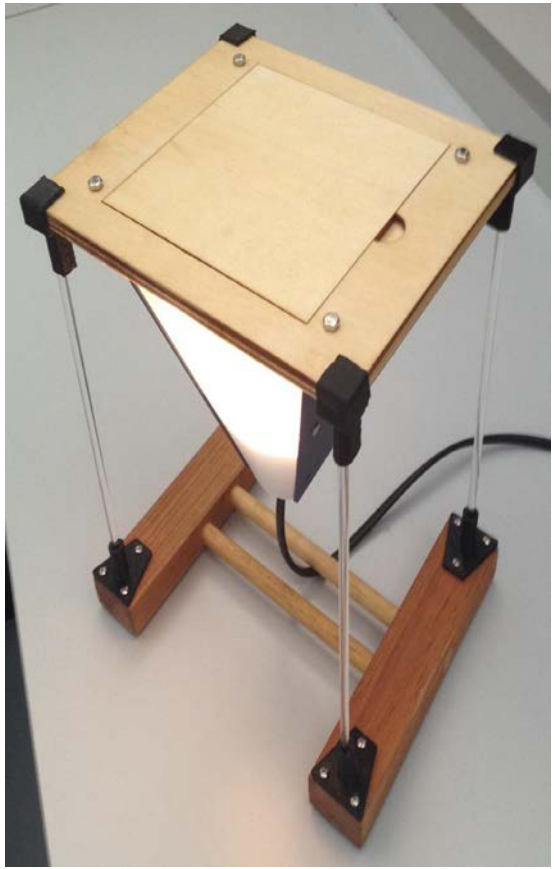
I would like to develop the light's diffuser and shade so that there's a larger area for the diffuser and having smaller area on the sides. This would change the light's shape a bit but not drastically and it wouldn't affect many of the other components. The larger diffuser area would mean that more light will be produced for the user to utilise.

Another feature I would improve is the legs and I would make them stronger so that they completely supported the light. To make them stronger would mean making them thicker and going deeper into the plywood and meranti. Having the stronger legs would mean there would be no need for the brackets so less components to manufacture.

Having the stronger legs and longer top could mean that another function could be involved with the lamp. Such as being able to support a book or other objects. This means that the light would make use of the space it is taking up.

SUMMARY: These developments would improve the light for usage by the user and would produce a more attractive product. They would also improve the lights functionality.

Final Product



2019 candidate record form

GCSE Design and Technology
Unit 2 – Non-Exam Assessment

Please attach the form to your candidate's work and keep it at the centre or send it to the moderator as required. The declarations should be completed by the candidate and teacher as indicated.

Centre number

1111

Centre name

AQA Centre

Candidate number

1234

Candidate's full name

AQA Candidate – Example 1

Work submitted for assessment **must** be the candidate's own. If candidates copy work, allow candidates to copy from them, or cheat in any other way, they may be disqualified.

Candidate declaration

Have you received help/information from anyone **other than** subject teacher(s) to produce this work?

☒ No ☐ Yes *(give details below or on a separate sheet if necessary).*

Please list below any books, leaflets or other materials (eg DVDs, software packages, internet information) used to complete this work **not** acknowledged in the work itself. Presenting materials copied from other sources **without acknowledgement** is regarded as deliberate deception.

Microsoft Office, Google images, AutoCAd, 2D design

From time to time, we use anonymous examples of candidates' work (in paper form and electronically) within our guidance materials to illustrate particular points. If your work appears in AQA materials in this context and you object to this, please contact us and we will remove it on reasonable notice.

I have read and understood the above. I confirm I produced the attached work without assistance other than that which is acceptable under the scheme of assessment.

AQA Candidate – Example 5

Date 01 May 2019

Teacher declaration

I confirm the candidate's work was conducted under the conditions laid out by the specification. I have authenticated the candidate's work and am satisfied (to the best of my knowledge) that the work produced is solely that of the candidate.

AQA Teacher

Date 01 May 2019

Candidate number	Candidate's full name

To be completed by the teacher
Marks must be awarded in accordance with the instructions and criteria in the specification.

Assessment criteria	Maximum mark	Mark awarded	Teacher/assessor's supporting statement
1 Identifying and investigating design possibilities	10	8	The Contextual Challenge has been identified and possible solutions have been explored through a task analysis in the form of a mind map and a table. **Evidence slide 1** A client has been identified and investigated in the form of a questionnaire. The site has also been explored. **Evidence slide 3** An in depth product analysis has taken using ACCESSFM **Evidence slide 2** Some investigation work into bulbs and packaging has taken place. **Evidence Slide 11** Investigation work has been completed throughout in particular within the development stages to ensure the correct decisions have been made when working towards a final prototype. **Evidence slides 5- 13**
2 Producing a design brief and specification	10	7	A basic research findings chart helps to inform the brief an specification. A good design brief has been produced outlining the key points. **Evidence slide 4** A range of detailed design specification points have been created and justified. **Evidence Slide 4**
3 Generating design ideas	20	20	A range of initial dress designs have been created and annotated. Clear links to inspiration. **Evidence slides 5-7** A range of approaches and techniques have been made. **Evidence Slides 5-7** Designs have been well presented and communicated.
4 Developing design ideas	20	17	Development has taken place taking into account investigation work and all decisions have been explained throughout through drawings and written annotation. **Evidence slides 8-13** Practical investigations have taken place through modelling. **Evidence slide 8-10** A final design has been produced and explained in detail. **Evidence slide 12** A detailed manufacture specification and orthographic drawing. **Evidence slides 13** A Final physical model has been produced and all decisions have been explained and justified throughout. **Evidence slide 10**

5 Realising design ideas	20	20	The student has used the correct tools and equipment to produce a high level prototype. The Lamp base had been dowelled together and finished to a very high standard **Evidence slides 14,15,16,21** The shade has been 3D printed and attached to laser cut plywood. **Evidence slides 14,15,16,21** The brackets have been 3D printed and allow the bars to be located. **Evidence slides 14,15,16,21** Evidence of manufacture can be found on **Evidence slides 14,15,16,21**
6 Analysing and evaluating	20	19	Good testing of the prototype has taken place against the design brief and specification. Each point has been clearly justified and explained. **Evidence slide 17** Users have tested the prototype and feedback has been analysed. **Evidence slide 18-19** Manufacture has been analysed and future modifications have been discussed. **Evidence Slides 19-20** A wide range of analysis throughout the portfolio including; Design brief & specifications **Evidence slide 4** Conclusions throughout **Evidence All slides** Research analysis **Evidence slide 4** Evaluation against the specification **throughout the design section**
Total mark	100	91	

☒ Photographic evidence of the prototype **must be included** in the work submitted. This must clearly support the marks awarded. The quality and quantity of photographs provided must be sufficient to judge the quality and detail of the work undertaken. Failure to provide such evidence may result in moderators being unable to confirm the marks you have awarded. Please tick/select the box to confirm this has been included.

Details of additional assistance given

Record here details of any assistance given to this candidate who is beyond that given to the class as a whole and beyond that described in the specification (*continue on a separate sheet if necessary*).

N/A

Concluding comments

NEA Example Response 1 Commentary

Criteria	Positive Features	Further development
1 Identifying and investigating design possibilities	The student has analysed the design problem. A product analysis is a good way to look at the work of others and allows the student to start looking at product strengths and weaknesses. It is also clear this is primary research. An important focus throughout is on the client. The client has been identified along with the user and its environment. The student has then conducted some primary investigation work through a questionnaire. This has been conducted with their client. The investigation work has been concluded throughout and directly informs the brief and specification. A basic research analysis table also helps to consolidate findings. Investigation work happens throughout the portfolio and is clearly evidenced this helps understand the students thought process and show the iterative process.	An analysis of the contextual challenge and possible opportunities would significantly improve this section. A wider range of research techniques would help improve some of the development research within the development section.
2 Producing a design brief and specification	The design brief is clear and identifies all the key points listed in the marking criteria. The design specification directly links to any investigation work that has taken place. Most points are measurable and have all been justified to a good standard.	The points in the specification are more an analysis of research rather than measurable specification points.

Criteria	Positive Features	Further development
3 Generating design ideas	The initial ideas for the show a range of ideas that have been informed by investigation work. It is also clear where inspiration has come from. A range of techniques have been used to communicate ideas. It is good practice to see the students analyse their designs throughout. It is clear that investigation work informs design ideas and further investigations have been discussed. Ideas are clear and well communicated.	
4 Developing design ideas	The student has used many techniques to develop their final prototype. They have also explained decisions throughout. The student has analysed all decisions throughout this portfolio. A range of basic models of the lamp has been produced to plan the manufacture of the prototype and also help make decisions. Investigations continue to happen throughout this section. A detailed manufacturing specification has been produced in the form of a cutting list and orthographic drawing. A final model has been produced supported by a final design.	The manufacturing specification is lacking detail for third party manufacture.

Criteria	Positive Features	Further development
5 Realising design ideas	A final prototype has been produced using a range of appropriate tools and processes. The student has evidenced quality control throughout their manufacture plan. Evidence of the stages of making is evident. Clear prototype pictures are evident.	Evidence of CAD files would support the manufacture section.
6 Analysing and evaluating	Clear testing against the specification has happened at the end of the portfolio. The student has conducted a range of appropriate physical tests of the product. The client and customer have provided feedback and have tested the product. Some good discussion has been made into how this product could be further developed. Analysis and evaluation has happened throughout the portfolio and has been clearly evidence usually in a summary box.	The student may wish to redevelop possible solutions for future developments to support their written responses.

Get help and support

Visit our website for information, guidance, support and resources at aqa.org.uk/8552

You can talk directly to the design and technology subject team

E: dandt@aqa.org.uk

T: 0161 957 3334

aqa.org.uk

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