edexcel

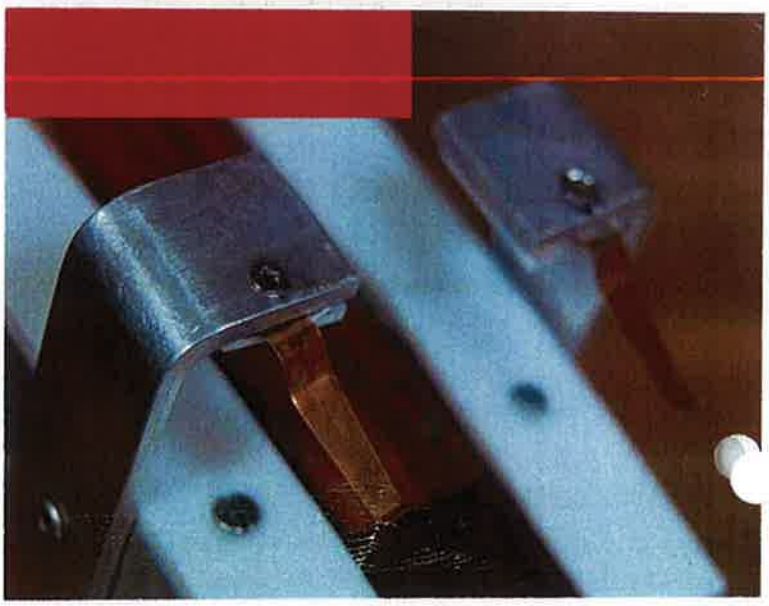
Website Exemplar

GCE D&T Resistant Materials.

Unit: 6RM04.

Topic: Lamp.

ADVANCED (A2) GCE DESIGN AND TECHNOLOGY: PRODUCT DESIGN

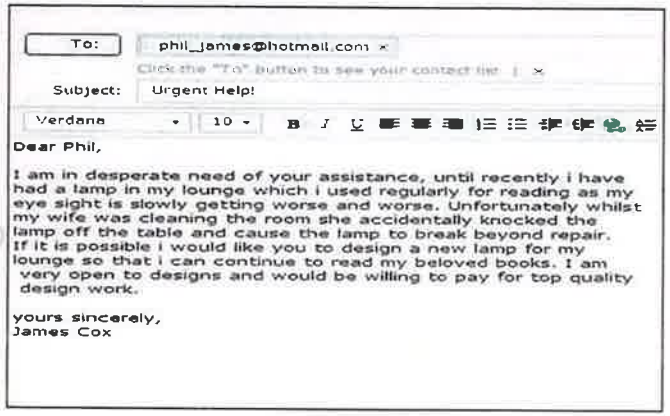


1.

Design Brief

The Problem and Client

After receiving an email from a relative and following subsequent phone calls with my relative I have been asked to produce a complete range of design possibilities for a new table lamp. Following the design process I will be producing a table lamp which will be commissioned to my client as a one off piece of manufacture


To: phil_james@hotmail.com

Subject: Urgent Help!

Verdana 10

Dear Phil,

I am in desperate need of your assistance, until recently i have had a lamp in my lounge which i used regularly for reading as my eye sight is slowly getting worse and worse. Unfortunately whilst my wife was cleaning the room she accidentally knocked the lamp off the table and cause the lamp to break beyond repair. If it is possible i would like you to design a new lamp for my lounge so that i can continue to read my beloved books. I am very open to designs and would be willing to pay for top quality design work.

yours sincerely,
James Cox

After talks with my client I have been able to establish his design needs and situation. My client briefly described his design needs to me:

- The design should not be too large, fit comfortably on the table with sufficient space around the lamp so that the table can be used for other purposes.
- The lamp should be adjustable so that you can move the light around.
- The light should be bright enough so that I can read my books with ease.
- The design should be aesthetically pleasing and suit the surrounding area.
- Quality design, finish and materials should be included at an affordable price.
- Should be tough and durable enough to withstand knocks and falls.

I will produce a specification after relevant research so that my design will fulfill my clients design needs. I plan to be designing my product with not only my client in mind but also a wider market so that I can leave open the possibility of wider production and distribution.

Identifying the wider Potential Market

The client which I will be primarily designing for is aged 46 so the market which I will be designing my product for will be the professional age group (25-50 years of age). To suit this age range my design will have to be sleek and attractive to suit their needs. I feel that this is a very competitive market to enter however this age group controls the main consumer spending of this type of product and will offer the highest possible profit margins. I have decided upon the target market through 3rd party evaluation by stating what I intend to produce and asking different age groups whether this is something that they need and would potentially purchase. Deciding upon the target market will allow me to be more specialised in my questionnaires further along so that my product truly suits my target market.

Research Plan

To begin my research I will be mind-mapping aspects which I feel would need to be researched for the manufacture of my product and then will be producing a detailed research plan which will describe where the information will be found from and why I need the information and how I will use it. The research plan will provide me with a structure so that I can avoid any unnecessary research and avoid time wasting.

Research	Where I will find the information and why I need the information?
Site Survey	I will be looking at the site where the lamp will be situated so that I can produce specification points which will be specific to the area and ensure that the lamp will be appropriate to the site. Spec points could include; length of wiring from plug, size of base dependant of the size of the table. I will find this information out by primary research. I will be visiting the house and measuring the area as well as photographing the area for future reference. I will use the information to influence my purchasing of cables.
Existing Products	I will be looking at a variety of existing products so that I can evaluate their positives but also their negatives. This will be crucial in the success of my product as I will be able to avoid the mistakes which other designs have made by applying aspects of their positives in my own design. Client feedback is vital to this research as I will be able to get to know my client further and understand my clients specific likes and dislikes so that I can produce designs appropriate to his needs. I will look at existing products so that I can also get an understanding of the cost of similar products to that which I wish to produce so that I will be able to price my product competitively within the market. I will find information of existing products from internet research but also primary research. I will evaluate some of the products by hand so that I can gain a better idea of the overall quality of the product and workmanship put into the products.
Market Research	I will be producing a questionnaire which I will pose to both my target market and to my client in the hope that I will be able to understand the needs and likes of the market. The responses which I will receive will heavily influence the designing process. Each question will have specific relevance to my project and will be used in my specification. I will find this information by producing the questionnaire and asking my target market and recording their responses. I will be showing the information using graphical techniques such as pie charts.
Materials and manufacturing techniques	I will be evaluating material choices and using client feedback so that I can decide upon the materials which I wish to use. I will be using client feedback on the materials so that the design specifically appeals to my client. Once I have decided upon suitable materials to use I will look at possible manufacturing techniques which could be used to enable me to evaluate what designs I could achieve. I will find this information from the internet but also from primary research on the materials which I can gain access to.
Quality Control and Environmental issues	I will be finding relevant safety standards which lamps must meet so that I can ensure that my product is safe for use and could be sold on a wider market. I will evaluate the environmental impacts which my product will cause and attempt to minimise the impacts to make it as sustainable as possible. I will find this information mainly from the internet but also using books.

Design Brief

In this project I will be designing a table top lamp for my client, James Cox. My client is looking for a lamp which is very adjustable, bright enough to allow ease of reading in areas of low light. The design must be aesthetically pleasing and should be tough and durable enough to withstand knocks and falls. The design must not be too large as the table space is limited. The design must be produced as cheap as possible while maintaining quality. The design must consider sustainability and the environment through its manufacture and materials. The product must be safe to use and conform to relevant safety standards. The lamp design will be determined by continual discussion with my client to ensure the maximum of customer satisfaction and greatest possibility for the product to be sold on the open market.

Client Feedback: I am very pleased with the research plan and the design brief is accurate to my needs. I am very excited to progress through the research section along side you.

Conclusion

This page has clarified to me what I will be designing and who my client is. I will now begin my research using my research plan and will be using client feedback throughout the research and design sections.

PDS points:

- The lamp must be adjustable.
- The light must be bright enough to ensure ease of reading
- The design should be aesthetically pleasing
- The lamp must be durable enough to withstand knocks.

RESEARCH

Site Survey

In this page I will be producing an analysis of the site where the lamp will be located so that I can decide upon appropriate specification points so that the lamp is best suited for the location. I will be taking measurements and photographs on the area for future reference and to help me decide upon proportion once I begin the designing stage.

After measuring the dimensions of the table I have concluded that the table is 580mm high, 600mm long and 400 mm wide. The plug is located 300mm from the table and 200mm up the wall. Using this information I have found from the site survey I have been able to generate the following PDS points:

•Withstand a fall from 580mm. As my clients last lamp was damaged beyond repair from the fall my client wants the design to withstand the fall so that it will have a long lifespan.

•The lamps cable must be at least 980mm long so that it can reach from the far side of the table to the mains plug situated on the wall. This will allow the lamp to be moved around the table with ease as the cable will not restrict its movements.

•The design must suit the surroundings, to do this I could incorporate wood into my design as the table is made of wood and the seating is upholstered with brown colours.

Client Feedback: I do not want the light base to exceed a size of 250mm x 250mm. This is so it does not take up too much space on the table so it can be used for other things also.

Existing Products

Now in my research I will be focusing on existing products which relate to my target market. I will show a variety of designs which contain different materials and methods of manufacture. By evaluating the products strengths and weaknesses I will be able to incorporate the good aspects into my own design work. I will be using client feedback when evaluating these products so that I can further understand my clients specific likes and dislikes so that my designs are appropriate. I will look at the costs of products so I know what my product should cost in a competitive market. I will also evaluate the products; aesthetics, functionality, environmental impacts and materials.

	Specification Criteria	Mark scheme	Mark
1.	Functionality	High level of light produced, flexibility and durability. The light offers a long lifespan due to the use of materials, joints and processes.	9-7
		A reasonable level of light produced from the light, fairly flexible with a fairly long lifespan due to the use of materials, joints and processes.	6-4
		A low level of light produced with little/no flexibility and durability which means the light has a low lifespan.	3-0
2.	Materials	The materials used are environmentally sustainable, either from sustainable sources or are recycled. The materials can be produced to a high finish improving their aesthetics and finally the materials produced are not so expensive that the product isn't commercially viable.	9-7
		Some of the materials used a sustainable and can be recycled. Some of the materials allow a high quality finish and the price and availability of the materials is not commercially viable.	6-4
		The materials have not been considered sustainably and a high quality finish is difficult to achieve. The price and availability of the materials is not commercially viable.	3-0
3.	Manufacturing Methods	The light has been produced using a range of advanced manufacturing methods without the costs becoming too inflated. The choice of method is appropriate for the product and can produce the design with a high quality finish.	9-7
		The light uses some different manufacturing methods which are reasonably simply but costs for the production are quite high.	6-4
		The light does not use many manufacturing methods however the cost of production for the light is high in comparison with the level of manufacture.	3-0
4.	Cost	The product has been produced to a very affordable price when considering the level of manufacture and choice of materials.	9-7
		The product has a reasonable price with a fairly high level of manufacture and choice of materials.	6-4
		The products price does not match the level of manufacture and materials used.	3-0

Marks	Existing Product 1: Dimensions:
6/9	Reach- 300mm
5/9	Size of Base- 120mm
5/9	
7/9	
23/36	

The overall product rating from my mark scheme was 23/36. The product did not really excel in any area of my mark scheme but did reasonably across the board. I feel this product is the most simplistic however I do not feel it has a higher quality than any of the others.

Functionality: The lamp uses energy saving light-bulbs, one downside to these are that the bulb takes a couple of minutes to warm up to their full power which means that in those minutes the light is limited and is very hard to read from. However once the light has warmed up it produces sufficient light for comfortable reading. The lamp has a reasonable level of flexibility as the top 5 inches of the neck of the lamp is flexible. The lamp connects to mains power and has an on/off switch on the lead going to the mains power.

Materials: The majority of the lamp is made from aluminium which produces a very sleek and attractive matte silver finish. The wires for the lamp are hidden within the tubing of the light. The head of the lamp is also constructed from aluminium and contains the compact fluorescent bulb. Within the base of the lamp there is a low density polyethylene box which contains the relevant wiring which the lamp needs.

Aesthetics: The lamp has not been constructed with aesthetics at the forefront however ergonomic and anthropometric data has been used to construct the head of the lamp as the size of the head is extremely well sized and allows for the light to be moved with ease which increases the lamps desirability. The matte silver is silver and quite plain which works with the design used however on more complex designs I feel that only limited use of the colour should be incorporated.

Environmental Impact: The majority of the lamp is made from aluminium and this can be recycled which is positive as the materials will not end up in landfill sites. The bulbs used in the lamp are compact fluorescent which are low energy which is good for the environment however they contain mercury which is not.

Cost: The cost of the lamp is £34.95 which is very reasonable when considering the cost of materials and the level of manufacture which must have been involved in its manufacture.

Client Feedback: The light design is very simplistic but it does fulfill the purpose. The size of the base is roughly correct for my liking. The shape of the head could work with some extra designing. I also feel that the silver is very attractive as it looks sleek and modern.

Marks	Existing Product 2: Dimensions:
8/9	Reach- 600mm
5/9	Size of Base- 140mm diameter
6/9	
8/9	
27/36	

The overall product rating according to my mark scheme is 27/36. The areas of strength for the product were in the functionality and cost sections where it excelled. However the material and manufacturing process choice marks were low which brought the overall mark down.

Functionality: The lamp offers a bright light which would be sufficient for reading in low light areas. The lamp is very adjustable coming from the extremely flexible middle section. The lamp connects to mains power and has a switch to turn the lamp on and off.

Materials: There are a few different materials which are used in the design. Steel is used for the head of the lamp with a compact fluorescent bulb. The middle section is made from a steel inner core with a plastic cover and finally the base is made out of plastic to hold the electrical components. Other materials such as glass could have been incorporated which would have improved the aesthetics however would have increased the price of the lamp considerably, the glass could come from recycled sources which would reduce the products impact on the environment. However, the production of new glass for the product would not be sustainable.

Aesthetics: The lamp is more functional rather than aesthetically pleasing. The lamp head and base have been covered with a blue protective coating for decoration but otherwise very little effort has gone into the aesthetics. By using more classical materials such as woods possible the aesthetics of the lamp could be improved.

Environmental Impact: The plastic which has been used cannot be recycled which makes its impact quite high as the plastic will end up in landfill sites. The bulbs used in the lamp are compact fluorescent which are low energy which is good for the environment however they contain mercury which is not.

Cost: The cost of the lamp is £29.99 which is very reasonable when considering the cost of materials and the level of manufacture which must have been involved in its manufacture.

Client Feedback: I do not like the shape of the light bulb and how prominent it is in the lamps head. The overall design is fairly simplistic however the design is not unique enough, too boring. I di[illegible]e level of flexibility which the lamp offers.

PDS points:

•The lights base must not exceed 250mm x 250mm so that it does not use up to much space on the table.

3.

RESEARCH

In this page I will be continue focussing on existing products which relate to my target market. I will evaluate their strengths and weaknesses and use client feedback when evaluating these products so I can understands the likes and dislikes of my client. I will look at the cost, aesthetics, functionality, environmental impacts/considerations and finally materials. From this page I hope to produce a range of PDS points which will have been generated from the product research.

Existing Products

	Specification Criteria	Mark scheme	Mark
1.	Functionality	High level of light produced, flexibility and durability. The light offers a long lifespan due to the use of materials, joints and processes.	9-7
		A reasonable level of light produced from the light, fairly flexible with a fairly long lifespan due to the use of materials, joints and processes.	6-4
		A low level of light produced with little/no flexibility and durability which means the light has a low lifespan.	3-0
2.	Materials	The materials used are environmentally sustainable, either from sustainable sources or are recycled. The materials can be produced to a high finish improving their aesthetics and finally the materials produced are not so expensive that the product isn't commercially viable.	9-7
		Some of the materials used a sustainable and can be recycled. Some of the materials allow a high quality finish and the price and availability of the materials is not commercially viable.	6-4
		The materials have not been considered sustainably and a high quality finish is difficult to achieve. The price and availability of the materials is not commercially viable.	3-0
3.	Manufacturing Methods	The light has been produced using a range of advanced manufacturing methods without the costs becoming too inflated. The choice of method is appropriate for the product and can produce the design with a high quality finish.	9-7
		The light uses some different manufacturing methods which are reasonably simply but costs for the production are quite high.	6-4
		The light does not use many manufacturing methods however the cost of production for the light is high in comparison with the level of manufacture.	3-0
4	Cost	The product has been produced to a very affordable price when considering the level of manufacture and choice of materials.	9-7
		The product has a reasonable price with a fairly high level of manufacture and choice of materials.	6-4
		The products price does not match the level of manufacture and materials used.	3-0

Marks
9/9
6/9
7/9
4/9
27/36

Existing Product 4

Dimensions: Reach: 660mm

Size of Base- 120mm x 120mm.

The overall product rating from my mark scheme is 27/36. The product excelled in the functionality section due to its high level of flexibility. The product also did well in terms of its materials and manufacturing processes however the cost of the product is far too high which dropped the products marks.

Functionality: The lamp uses an energy saving light bulb however it provides sufficient light for reading. The lamp is extremely flexible with two hinges in the design. The lamp connects to mains power and the on/off switch is located on the cable going to the mains.

Materials: The lamp consists of aluminium arms with steel joints between the arms. The head is also made from aluminium and the whole design has been coated for protection and aesthetics. The base has been weighted so that it provides extra stability.

Aesthetics: The design looks quite modern however the hinges do seem to detract from its aesthetics. The finish can come in a range of colours which allows a lot of flexibility to peoples tastes.

Environmental Impact: The aluminium and steel components can be recycled which is good for the environment. The low energy bulb is good for the environment as it doesn't use a lot of energy.

Cost: The lamp costs £127 which is extremely expensive however the level of workmanship is very high and the components have been very delicately finished.

Client Feedback: The design has been finished extremely well which makes the design quite attractive. The design is simple but definitely effective. The flexibility of the design is a definite advantage and would allow me to read easily. I would only be willing to pay up to £80.00 however the lamp would have to be extremely well made.

7/9
9/9
8/9
8/9
32/36

Existing Product 3:

Dimensions:

Reach- 550mm

Size of Base- 120mm x 140mm.

The overall product rating from my mark scheme is 32/36. The product did very well in all areas of my criteria. I thought the use of materials within the product was its best attribute. The lowest mark was the products functionality and I feel that if the products flexibility were improved then this would considerably increase this mark.

Functionality: The lamp offers a bright light which is more than sufficient in providing enough light for reading. The upper part o the neck is flexible which allows the lamp head to be moved and adjusted. The lamp connects to mains power and the switch for the lamp is on the base of the lamp which is very helpful.

Materials: The majority of the lamp is made from steel. For the flexible part of the neck there is a thin steel inner core wrapped by thin circles of plastic. The steel has been coated in most of the parts of the lamp to give it a black finish which works extremely well and protects the material from damage. The light head contains a compact fluorescent bulb and the inner side of the head is plated with polished mirror so that it can reflect the light and increase the brightness of the light.

Aesthetics: The design looks very modern and attractive. This is done by the combination of black and silver steel in the lamp design. The design is very simplistic however the head has been made more intricately which gives a more professional feel to it. The aesthetics could be improved by incorporating materials such as glass to further increase the stylish feel of the design.

Environmental Impact: The lamp is made from steel which can be recycled which is positive for the environment. The compact fluorescent bulbs are low energy however they contain mercury which is not good for the environment.

Cost: The cost of the lamp is £50.00 which is quite expensive for a table lamp however the lamp has been designed very well and looks very professional which increases the price.

Client Feedback: I like the way that colour has been used to improve the aesthetics of the design without making it look tacky or cheap. The overall design is simplistic but looks very professional.

Client Feedback: My favourite lamp is the 3rd one as it is the most professional and stylish out of the lamp designs. They all offer high levels of flexibility which I would like used in my lamp. I would like a switch on the lamp or on the cable so that I do not have to reach for the mains switch.

PDS points generated from product research:

- The design should be original, stylish and professional looking.
- The design should use either energy saving or low energy bulbs or LEDS to reduce the impact on the environment.
- Variation in colour and materials should be incorporated into the design, for example black and silver, metal and wood.
- The design should have an on/off switch on either the mains cable or on the lamp itself so that it can be turned on/off without having to reach to the mains plug. The product could also be made into a touch lamp possibly.

RESEARCH

Existing Product Complete Disassembly

As I have researched various existing products looking at their strengths and weaknesses, costs and aesthetics, functionality and environmental impacts. I have now chosen the product which my client rated highest and will conduct a full disassembly of the product so that I can further my knowledge on the manufacturing processes and materials involved in the construction of the light.

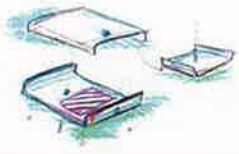
Here I will be describing the ways in which the separate sections will have been manufactured, the quality checks which will have been used and finally the total cost of each stage.

Here I will be looking at the materials which have been used for the lamp. I will look at the positives, negatives and finally the environmental impacts of using the material so that I can understand the decision making process which was used to choose the material. I will also be offering an alternative material and comparing it with the chosen material.

The majority of the lamp is made from mild steel sheet and tubing. The advantages to using mild steel include; the strength of the material allows the lamp to have a long life and will have little damage, the mild steel can be manufacturing in a wide range of ways which gives the designer flexibility. However the problems with mild steel include; the cost of mild steel (roughly 4000$ per tonne) which comparatively is very expensive.

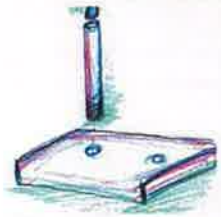
- The steel must be manufactured from materials which must be extracted from the ground. Steel is a valuable and limited resource. The extraction of the steel uses up energy and can release gases into the atmosphere which will contribute to global warming. The environmental impacts include:
- The steel must be transported from the extraction site, to the manufacturer and finally to the consumer. This transporting releases gases into the atmosphere which can also contribute to climate change.
- The manufacture of the steel to produce the design will use up valuable resources and can release toxic gases.
- The design must be packed when they are transported and sold which uses up valuable resources and increases the amount of waste.
- The steel is recyclable so the waste products in the manufacture can be reused and after the designs are thrown away they can be recycled although separating the steel from other materials may be difficult.

An alternative material which could have been used is aluminium. The advantages to using aluminium include; the aluminium is much cheaper than steel (2700$ per tonne), the aluminium is much more lightweight than the steel. This will reduce the overall weight and possibly desirability of the design. It will also reduce the cost of transportation as it will not create as much weight. The aluminium can also be finished to a very high standard and can be left with a range of finishes such as polished, satin etc. Aluminium has very similar environmental impacts as steel so the change in material would have very little effect in that respect.



The base is made from thin mild steel sheets. Both the top and bottom pieces are line bent on an industrial scale to increase production rate and reduce costs. Jigs are used to cut the holes in both pieces of mild steel, the jig is used so that workers can work accurately and quickly. A small piece of threaded mild steel tube which has been previously cut to size is brazed to the inside of the top piece of the base. The threaded tubing will house a bolt which is inserted from the bottom of the base, this is how the pieces are held together. The base houses the electronics for the light. A small piece of mild steel block is welded to the inside of the base to add weight to ensure the light does not become unstable and fall over. There are many quality control checks which are used throughout the manufacture of the base. The base is checked that the line bender has bent all of the pieces to the correct angle. The holes have all been positioned correctly and to the correct diameter, this is checked by a human. Once all of the components have been manufactured and checked then the pieces will be finished either by dip coating or given a satin finish. The overall cost of manufacture per unit is £6.00 per unit, large companies can get their materials cheaper and as the manufacturing is on a very large scale the manufacturing costs are reduced.

The button is made from two small pieces of acrylic. The bottom piece is made from a circle piece of black acrylic which is drilled and then chamfered to give the correct shape. The button is also made from a thin circular piece of black acrylic. The quality control of the pieces include the button fitting inside the lower piece, the pieces sufficiently cover the designated holes and finally that the pieces have been finished to a high standard and there are no major scratches or marks. The total cost of production of this piece is 30 pence per unit.



Mild steel tubing is used for the lower half of the stand for the light. The tubing is used to house the wires for the electronics which enable the light to work. The tubing is brought in long sections and then machines cut the individual pieces, this process is very quick and accurate. An external thread is applied to the outside of the tubing and using a mild steel tube with an internal thread the leg is screwed into the base. The tubing is inserted into the base before the pieces are closed and is brazed to the bottom. A hole is cut in the threaded tubing to allow for the wires to fit through. At the top of the tubing an internal thread is added which will hold the machined mild steel connector piece. The quality control involved in this section are to check the wires can fit through the holes drilled in the tubing within the base, the legs thread is not damaged and can screw into the base, the connector piece screws into the leg, the pieces have all not been damaged and have a reasonable finish, the leg has been cut to the correct height. The overall cost of this section of manufacturing is £4.00 per unit.

The light section is made relatively simply. The top section of the light is made of one piece of thin mild steel sheet which is line bent to produce the pentagonal shape. Two thin tubes of steel are then welded to this at the bottom ends of the pentagonal shape. These tubes are then threaded. Two end plates are cut using CNC machines, these are drilled and then screwed into the threaded tubes. The head will house the lighting fixture and bulb. To increase the level of light given off mirrors are glued using epoxy resin to the inside edges of the mild steel. The quality control ensures that the pieces all fit together and are strong enough so that it would not break easily, the housing can house the light fitting and finally that the pieces have all been produced to a high standard and none of the pieces have been damaged. Once all of the pieces have been made some of the pieces will be dip coated to protect from erosion/corrosion. Once this has been done the pieces can be assembled and then sold. The overall cost of this section of manufacture is £8.00. The complete cost of manufacture of the lamp is £23.30, the company prices the lamp at £50.00 so that they can achieve a sufficient profit from the designs because as trends change so rapidly the design may become unwanted and out of date relatively quickly.

The flexible region of the lamps leg has been made using both plastic and mild steel. The inner core is made from mild steel circular strips which are positioned close to each-other, these will have been cut using a lathe. The outer core is made using ABS which has been extrusion moulded and then later cut to the correct length, the plastic holds the pieces of mild steel together however there is sufficient room for the light head to move around. At the top of the leg there is another connector region which is screwed into a piece of mild steel making up the flexible region. This piece will have been machined on a lathe and connects the lamp to the light. The quality control involved in this section include; the mild steel sections are all cut to the same length and diameter, the ABS has been extruded to the correct diameter, the ABS covering the mild steel allows for sufficient movement, the connector piece fits into the flexible region. All of the pieces have been finished to a high standard and have not been damaged. The overall cost of this section of manufacturing is £5.00 per unit.

Quality Control:

Batch inspection is carried out by sub-dividing each batch, if it is necessary, it will be divided into sub batches of no larger than 10,000 pieces. A random sample is take of 200 pieces. Each of the 200 pieces are examined for the possible faults that lamps can exhibit. These faults can be classified into critical, major and minor categories. Generally a critical fault is one that renders the product useless to the purchaser. If one of the 200 piece sample shows a critical fault then the 10,000 piece batch will have to be 100% inspected. All products produced in the UK have to meet strict British standards. This standard is a short hand for showing that the standards have been met as each product has different standards.

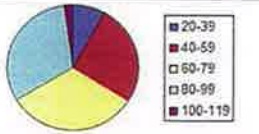
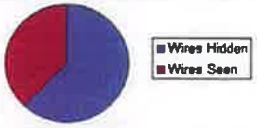
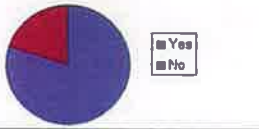
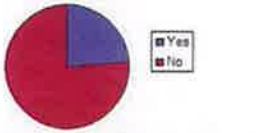
From this page I have learnt more on ways to manufacture lamps and will use this in the design process, I also know roughly how much the processes and materials should cost, although I must take into consideration that materials will cost more as I will not buy in bulk like large companies will do.

RESEARCH

Questionnaire

In this page I will carry out a questionnaire which contains a variety of questions relating to my product. I will be surveying 50 people of a range of ages but whom are all within my target market (25-50 years of age). I will also be surveying my client so that his feedback is included. From this page I hope to generate PDS points which I will include in my specification and these will help me in the designing process. Unless my client has any specific design needs I will be attempting to design my product with the open market in mind which is why I am surveying 50 people.

I have designed this questionnaire so that I can generate PDS points which will aid me in the design process. The method I have chosen to gather this information is by talking with the person in question. This method is fast, cheap and I can receive a high amount of replies. If I used a post return system such as email there may be a low rate of reply as people will be less willing to reply. I have chosen 50 people as this is a relatively high number of people to ask which means that the results which I obtain will be more accurate to the whole population.

Question	Justification	Results	Conclusion
1. Would you prefer a more free form design (rounded/organic shapes), a more straight edged design or a mixture between the two?	This question will help sway my designing emphasis so that I can produce designs which my target market will like and would be willing to purchase.		From my survey of 50 people, I have found that 70% of my target market would prefer a design which has a mixture between straight edges and organic/free form shapes. I will take this information into consideration when designing. Client Feedback: I would also prefer the design to have a mixture between the straight edged design and organic design. I feel that a mixture will create a far better overall design.
2. How much would you be willing to pay for the lamp?	This question will help me decide what price I should aim to design and produce the lamp for so that in the open market it would be commercially viable.		From surveying 50 people I have found that 64% would be willing to pay between £60-£99 for a high quality lamp. I will therefore attempt to produce my lamp within that range so that it could be sold well in the wider market. However I will attempt to keep the cost as low as possible so that higher profits can be achieved. Client Feedback: I would be willing to pay up to £80 for the lamp providing it was made and finished to a high quality.
3. There will be wiring which will be needed for the lighting element, would you prefer the wiring to be hidden within a structure or do you not mind the wiring to be seen?	This question will help me in the designing process so I know whether the design the lamp with the wiring hidden or not so that it will be commercially viable.		From my survey of 50 people, I have found that 62% would prefer the lamps wiring to be predominantly hidden however on discussion with the market the consensus was that they would prefer the wires to be hidden however as long as the lamp was made with quality then it would not be such an issue and then would still purchase the lamp. Client Feedback: I agree with the statement above. I would prefer the wires to be hidden if that's possible but I will still purchase the design if they cannot be hidden.
4. Do you feel that you need more table lamps?	This question will help me to identify the demand for the lamp and roughly how large the market is.		From my survey of 50 people, I found that 80% said that they do need more lamps. This tells me that there is a large demand and market for table lamps within my target market.
5. Would you be willing to pay more for an 'environmentally friendly' lamp?	This question will help me in the designing process as if an 'environmentally friendly' lamp can be sold for more then I will do so as it will be far better for the environment without having damaging effects on possible profits from the lamp.		From surveying 50 people I have found out that 70% would be willing to spend more for an 'environmentally friendly' lamp. With this in mind I will attempt to make my lamp environmentally friendly with the knowledge that it will still be commercially viable. I will still try and keep the price as low as possible to increase profits. Client Feedback: I would definitely spend more for an environmentally friendly lamp as I always want to do my part for the environment.
6. Would you prefer the lamp to be capable of being folded down and made portable?	This question will help me in the designing process so I can design the lamp to suit the markets needs.		From the survey of 50 people, I found that 76% said that they do not need the lamp to be capable of being folded down and become portable. However in discussion they said that if I were to make it possible to fold down then they would still purchase the design but its not an necessity. Client Feedback: I agree with the statement above. I do not need the lamp to be portable but it wouldn't be a bad thing if it was able to.

PDS points:

- The design should consist of a mixture between straight edges and organic shapes.
- The lamp should not cost more than £80.
- The lamp should be made to be environmentally friendly.

RESEARCH

Materials

In this section I will be evaluating different materials so that I can hopefully make informed choices on which materials to use. I will be looking at the materials properties, machinability, the cost and finally the aesthetics. By assessing all of the materials variables I can choose the most appropriate material. I will be looking at metals, plastics and timbers, I have decided not to include glass as safety glass which would have to be used is extremely expensive and would be difficult to work with. Also on discussion with my client he has told me that he does not wish to include glass in the lamps design either.

Metals	Durability	Mechanical Properties	Machinability	Environmental Impact
Mild Steel	Very High	Tough, Ductile and Malleable, good tensile strength, easily joined by welding or brazing.	Very Hard	Mild steel can be recycled however each year there are 11mt of steel scrap arisings. About 70% of this scrap is recovered and recycled however of the remainder, 2/3 is land-filled. There are many recycling companies which will take the steel however.
Iron	Very High	Tough, ductile, malleable.	Hard	Iron has the same environmental impact as Mild steel. Both Iron and Mild steel are mined from an ore and then converted into the various types, this uses a lot of energy to do so.
Stainless steel	Very High	Hard, strong, durable and tough, lightweight.	Very Hard	All stainless steel products are 100% recyclable, the typical re-melt rates for stainless steel is between 60-85%.
Aluminium	High	High strength/weight ratio, lightweight, malleable and ductile.	Medium	The conversion of Bauxite into aluminium uses large quantities of energy. Recycling aluminium however uses only 5% of the energy and 5% of the CO2 emissions as compared with primary production and reduces waste going to landfill.
Copper	High	Malleable and ductile, easily joined, expensive.	Medium	The ore in which the copper comes from is a limited source although we have only mined between 12-13% but it makes sense to conserve the remaining ore. Recycling a tonne of copper uses 15% of the energy it takes to mine and extract the same copper which helps conserve the worlds supply of fossil fuels and reduce carbon dioxide emissions.

Aluminium would be the most suitable material which I would use in my product. The aluminium is lightweight and malleable but most importantly is extremely durable. The aluminium can be polished to a very high standard which will improve the overall aesthetics of the lamp. The aluminium is also comparatively cheap. 2.5 metre square aluminium tube costs £13.57 where as 2.5 metres of stainless steel costs £18.05. Aluminium is sustainable as it can be nearly 100% recycled which will mean that the material will not go to waste.

Client Feedback: I agree that aluminium should be picked from the possible materials. Aluminium can be finished to a high standard which is very important.

Plastics	Ability to be laser cut	Properties	Environmental Impact
ABS	No	Durable, high impact strength, lightweight, tough and scratch resistant, high quality of surface finish.	ABS can be recycled however it uses large quantities of energy to be produced. Plastics are produced from oil which we should try and preserve for future generations.
Acrylic	Yes	Rigid, hard, durable with uniform strengths, available in many colours, easily scratched, non-toxic, good electrical insulator.	Acrylic as a plastic is recyclable. Its manufacturing process however involves many toxic chemicals and requires a lot of energy. If its not recycled, the plastic isn't biodegradable so doesn't break down well over time and will sit in landfill for a long time.
Polypropylene	No	Rigid, hard, good impact resistance, smooth, shiny, good chemical resistance.	Polypropylene can also be recycled however the plastic does take large quantities to produce and uses essential crude oil.
Nylon	No	Tough, fairly hard and resists wear.	Nylon can be recycled but if it is not recycled then it will end up on landfill sites for many years to come.
Epoxy Resin	No	Very strong, good resistance to wear and chemicals. Brittle unless reinforced.	Epoxy resin takes a lot of energy to be produced but also takes a lot of energy to be recycled however this is far better for the environment than it ending up in a landfill site.

I have decided that Acrylic would be most suitable if I were to use plastic within my product. The acrylic comes in a range of colours and can be laser cut. The material is rigid, hard and durable. Another important factor is that the acrylic is a good electrical insulator which is important as electricity will be involved within the lamp design. The acrylic is recyclable which means that the material will not be wasted and is sustainable.

Client Feedback: I feel that acrylic would be most appropriate and comes in a range of colours.

Timber	Colour	Durability	Workability	Environmental Impact
Ash	Light Creamy Brown	High	Hard	Whilst wood is a sustainable source, wood recycling ensures that wood does not unnecessarily end up in landfill sites, the wood does biodegrade which produces green house gases. Ash comes from Ash Trees which are widespread and easily available.
Beech	White/pinkish brown	High	Hard	Whilst wood is a sustainable source, wood recycling ensures that wood does not unnecessarily end up in landfill sites, the wood does biodegrade which produces green house gases.
Pine	Light Brown	High	Easy	Whilst wood is a sustainable source, wood recycling ensures that wood does not unnecessarily end up in landfill sites, the wood does biodegrade which produces green house gases. Pine trees grow very densely packed which means there are large amounts of pine available across the globe.
Mahogany	Reddish Brown	Very High	Hard	Whilst wood is a sustainable source, wood recycling ensures that wood does not unnecessarily end up in landfill sites, the wood does biodegrade which produces green house gases. Mahogany is quite a rare wood which means that its use should be quite small as there is only a very limited supply of mahogany. Mahogany veneers could be used instead of solid mahogany.
Oak	Light Brown	Very High	Very Hard	Whilst wood is a sustainable source, wood recycling ensures that wood does not unnecessarily end up in landfill sites, the wood does biodegrade which produces green house gases.

I have decided that I will be using Beech for any wood aspects of my product. Beech is very aesthetically pleasing and can be stained to make the wood either dark or light. The beech has high durability which is extremely important. Beech is also comparatively cheap. 22mm x 220mm is £18.50 however 22mm x 220mm of mahogany is £34.70. Wood is easily recycled which means that the material is sustainable and can be purchased from sustainable sites.

Client Feedback: Beech is one of my particular favourite woods and feel that the wood would suit the surrounding area extremely well.

RESEARCH

Relevant Information & methods of Batch Production

Batch production is used by manufacturers so that they can produce identical goods in a shortened time whilst keeping up with changing trends. In this page I will be looking at different methods of batch production to increase my knowledge of the different methods to influence my various designs of the lamp. Batch production will help me produce my design faster and would make it possible for the lamp to go into the wider market and be produced on a larger scale which could make it potentially successful. I will also look at corrosion prevention techniques in-case I decide that I wish to use ferrous metals in my product.

Moulds: Moulds can be used to shape a number of materials into shapes and can create identical copies each time. The material can be moulded very quickly and the moulds are relatively cheap to make. Moulds can be used to bend metal, set the shape for laminated wood and finally to mould heated plastic. The material moulds are made from depend heavily on what they are being used for moulding, plastic would not be suitable for bending metal as it is not strong enough and too brittle.

Advantages: The time taken to make the mould varies massively with the complexity of the mould.

Disadvantages: If the moulds are made incorrectly the moulds could damage the materials.

Vacuum forming: This is a method of forming plastics into different shapes according to their moulds. The plastics are heated up using a specialised oven which makes the plastic become flexible and easily moulded. Once the plastic has been inserted into the mould and the cooled the plastic will set in the desired shape. With thermoplastics they can be reheated and remoulded again and again however with thermo-set plastics you only have one try before the material becomes useless.

Advantages: The moulding process is extremely quick and thermoplastics can always be remoulded if the first attempt fails.

Disadvantages: The moulds can take some time to make as you need two and sometimes three part moulds.

Casting: Like polymers, metals can be heated to known melting temperatures. When molten, the liquid metal can be poured into moulds. Moulds can be created from sand, alloy steel or ceramics, depending on the metals being cast.

Sand Casting: The sand is specially prepared, to contain oils that act as binders to help it hold its shape while the hot metal is being cast into it.

Advantages: Complex three dimensional shapes can be produced

•Cores can be used to produce hollow sections

Disadvantages: Due to poor surface finish, some machining is necessary.

•Its not as accurate as die or investment casting.

•Low rate of output and is therefore suitable only for small production runs.

Investment Casting: This uses wax and then clay to produce the moulds which the molten metal is then poured in to.

Advantages: Good finishes can be obtained along with a fair degree of accuracy.

•Complicated shapes can be produced

•There is no split line showing on the product.

Disadvantages: The cost is very high.

•Size of components is limited by weight.

Laser Cutters: These are machines which use extremely high temperatures in order to cut through metals, woods and plastics. Laser cutters are controlled using a computer and designs can be easily transferred from the computer to the machine for it to make. This is extremely useful in long distance communication manufacture, for example if the products designed in the UK it could easily be manufactured in the US or any other country easily via email.

Advantages: Laser cutters can create identical copies of the same product every time to extremely precise measurements.

Disadvantages: The cost per unit is very cheap however the initial costs of the machine, computer and software is very high.

Corrosion Prevention

The major problem with using ferrous metals is that they are corroded by oxygen, creating rust. To combat the corrosion you must coat the surface of the metals with a substance so that the oxygen cannot come in contact with the metal. There are a few different methods of doing this, they include; painting, galvanising, plastic dip coating and finally oil bluing.

Oil bluing:

Oil bluing is where you cover the metal with a very thick layer of oxide which will prevent the metal from rusting. The metal is heated up and then dipped into oil then its removed and allowed to cool. Once the metal has cooled it will have a blue/black colour to it and is protected from corrosion.

Plastic Dip Coating:

Plastic dip coating gives a physical barrier between the metal and oxygen. This barrier prevents corrosion and can also be used decoratively. The plastic comes in a range of colours however bold and bright colours can sometimes look fairly tacky and cheap.

The process is done by heating the metal up to a cherry red and then dipping it into Polyethylene granules. The granules melt and stick to the metal. Good plastic dip coating leaves a smooth even layer of plastic however if it is done incorrectly it can leave a terrible finish.

PDS points:

•The product should include one method of batch production so that if it were to go into the wider market the product would be able to be made in large volumes quicker.

RESEARCH

In this page I will be looking at quality control methods and also environmental aspects which would need considering. I will be looking at the Kitemark and CE mark and the standards which would have to be achieved to gain these marks. I will be producing end product features which I will include into my specification and finally I will include some production safety points which I will use to ensure not only my safety, but the people working around me. I will be looking at environmental considerations as I wish to make my product as sustainable as possible.

Quality Control

The Kitemark and CE mark

When a product shows the Kitemark this means BSI has independently tested and confirmed the product conforms to the relevant safety standards. The manufacturer will pay for the licence and their product and manufacturing process is evaluated and tested by BSI. Manufacturers will do this as the symbol is widely know symbol which gives customers assurance that the product conforms to British Standards and will be safe to use. Manufacturers are not legally required to apply for a Kitemark. Products which will be sold across Europe must carry the CE marking. The CE marking is applied for like the Kitemarking and shows that it meets the requirements of the European legislation. Below are a few examples of Standards which I would have to conform to if I wished to achieved the Kitemark.

- **BS EN 61347-1:2008 BS EN 61347-1:2008**. Lamp control gear. General and safety requirements
- **BS EN 61347-1:2001, IEC 61347-1:2000 BS EN 61347-1:2001, IEC 61347-1:2000**. Lamp control gear. General and safety requirements
- **97/210440DC 97/210440DC. IEC 60926.** Auxiliaries for lamps. Starting devices (other than glow starters). General and safety requirements (IEC Document 34C/418/CD)
- **BS EN 15363:2006 Lighting**: Strength durability and safety.

Even though I will not be applying for the Kitemark or CE marking I have produced the following PDS points from guidelines which I have researched on the BSI website. I will include these guidelines in the design and manufacturing process so that I can ensure that the product will be safe to use for my client.

End Product Safety features:

- No sharp corners or edges which could potentially harm people.
- The light must have a stable base to ensure the lamp does not become unbalanced and falls over which could potentially harm people and damage the lamp or the customers property.
- There should be no loose parts or parts easily broken which could be ingested by children or animals alike.
- The lamp should not be so tall it could topple easily and be a danger to people and property.
- The electrics must be safe and insulated to ensure that the user cannot be shocked by the electricity.
- The lamp must be strong and durable enough to withstand knocks and falls to ensure a long life.

Also to ensure the high quality finished product I will be including a range of production safety points. I will refer to these throughout the manufacturing process to ensure quality and safety.

- Do not rush during the manufacturing process, work efficiently and always consider quality.
- Use the correct tools and processes for the job in hand. High quality joints and finishes should be used.
- Goggles and aprons should be worn while in the workshop area. For some machinery specialised clothing must also be worn to ensure safe use.
- When using unknown machinery, you should practice safe use for yourself and others around you.

Conclusion- This section shows to what standard the product must be produced so that it could be sold in the wider market. Quality is extremely important when selling products as costumers will pay more for higher quality goods. Although the product is a 'one off production' I will be using some of the guidelines from the standards agency while producing my product so that I can achieve a very high standard.

Client Feedback- I am very pleased with the quality section and feel comfortable that if they are followed then the product will be made extremely well.

Environmental Considerations

Another important area for my product is its environmental footprint and sustainability. In this section I will be outlining the different areas I should consider which I must follow in the material section and production methods of my product.

Sustainability of Materials/Recyclability:

- A proportion of the materials used in the product must be sustainable or consider sustainability. This could be achieved either by purchasing the materials from sustainable outlets or using rare wood veneers over more available wood such as plywood. If the materials are sourced from sustainable outlets they would be more expensive however from feedback from my client and questionnaire I have found out that the market would be willing to pay more for sustainable products.
- A proportion of the materials used in the product must be able to be recycled. The material must be capable of being reformed, remade or finally reused for another product or use. This will ensure the material does not end up at landfill sites.
- The materials should be used carefully to ensure little waste is left. This can be done by purchasing the correct amounts of materials and checking measurements before cutting.

Sustainability of Production Process:

- Less energy consuming methods of production must be used where possible. An example includes sawing by hand rather than using a band-saw. Energy can also be saved by working efficiently while on the machines, I must be careful though that I do not rush and either compromise quality or hurt myself.
- An alternative to using less energy consuming processes would be to source the energy from clean, renewable energy such as solar panels. Solar panels have been installed at our school and produce power which goes towards powering machinery in the workshops. This would make the manufacturing process more environmentally friendly.

Client Feedback: I am very pleased with this section, it outlines the ways in which the product will be made sustainable which is very important to me.

9.

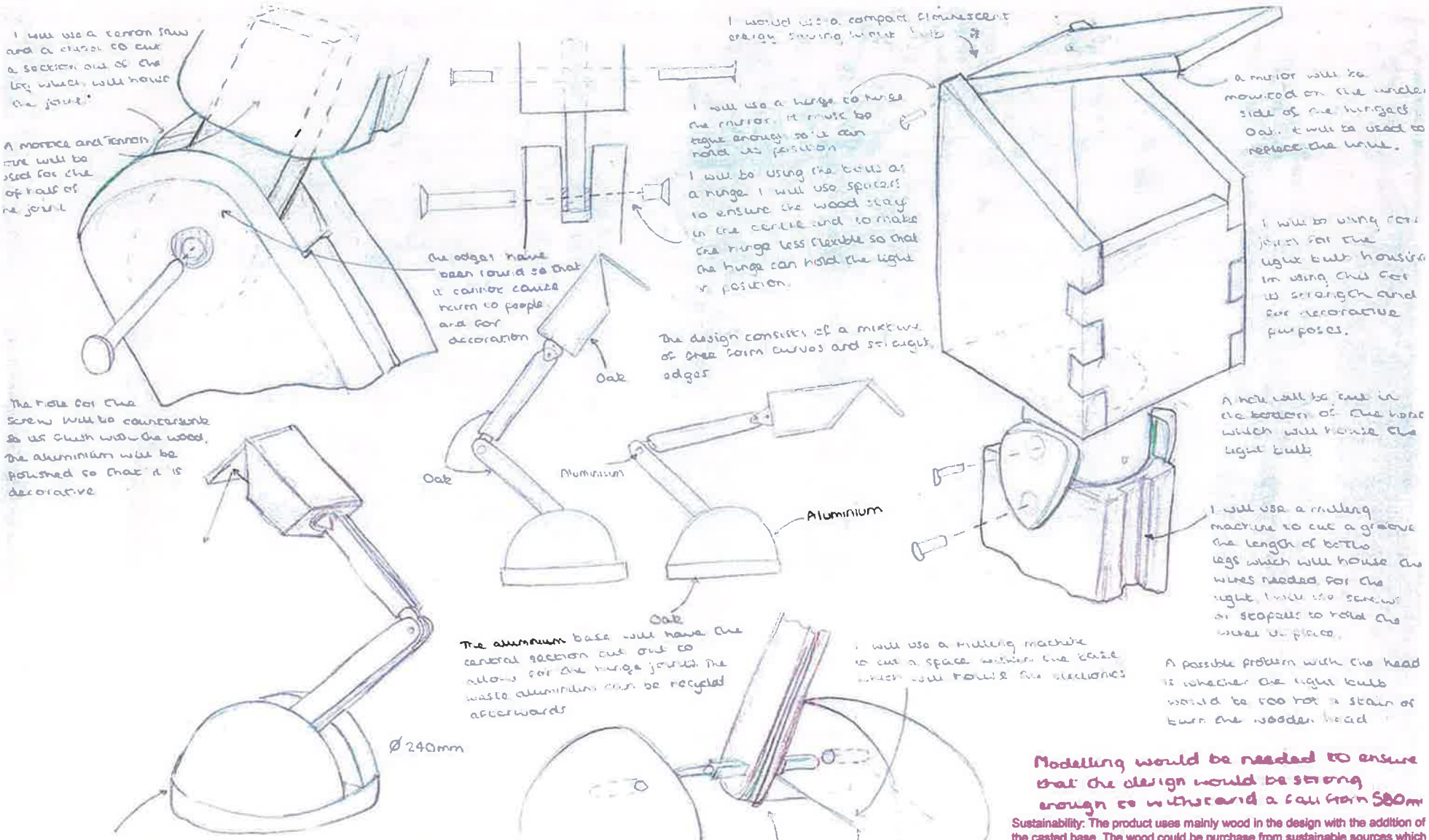
Product Specification

After consultation with my client, target market and from the research which I have undertaken, we have been able to agree with the specification points which I will include in a table format. It will be used all throughout the designing process to reference ideas and their development and to check that the design requirements and the client/user group needs are being matched. In the table I will be justifying the specification points with reference to which piece of research the point came from and finally I will also include ways to test the specification points. This will be used at the end of the project to asses and evaluate my final product. It will allow me to see its successes, failures and improvements which could be made.

	Specification Points	Justification	Testing
Purpose/Function	1. The lamp should be environmentally friendly.	1. This spec point has come from my questionnaire. Both my client and target market said that they would be willing to pay more for a sustainable lamp.	
Form	2. The design should consist of a mixture between straight edges and organic shapes.	2. This spec point has come from my questionnaire. It was an opinion from my target market and also my client and would make the design appeal more to them.	
User Requirements	3. The design should be original, stylish and professional looking. 4. The design should be aesthetically pleasing and suit the surrounding area. 5. Variation in colour and materials should be incorporated into the design (black/silver, wood/metal) this will improve aesthetics.	3. This spec point has come from my product research section. My client expressed his like of the more professional looking lamps which I researched. 4. This spec point has come from the discussion with my client and has been included so that the design suits my clients needs. 5. This has come from the product research and discussion with my client and will improve the designs aesthetics.	3. I will use a questionnaire to test this spec point. 4. I will be using a questionnaire to test this point.
Performance Requirements	6. The lamp should be bright enough to ensure ease of reading. 7. The lamp must be adjustable. 8. The lamp must be durable enough to withstand knocks and have a long lifespan. 9. The lamp must be able to withstand a fall from 580mm. 10. The design should use either energy saving, low energy bulbs or LEDS to reduce the impact on the environment.	6. This spec point has come from my original discussion with my client and is included so that the lamp suits his needs. 7. This spec point has come from my original discussion with my client and has been included so that the design suits my clients needs. 8. This information has come from the discussion with my client. He asked for this so that his lamp will have a long life. 9. This information has come from my site survey. It has been included as my clients previous lamp fell and broke and he wants the design to withstand any fall from the table and have a long lifespan. 10. This spec point has come from my product research and has been included so that the design will be more environmentally friendly.	6. I will use a questionnaire to test this spec point. 9. I will be performing a drop test from 580mm to ensure that the lamp can survive the fall.
Materials and Components	11. The design should have an on/off switch on either the mains cable or on the lamp itself. Another alternative includes the lamp being made into a touch lamp to operate the switch. 12. A proportion of the materials used in the product must be sustainable or consider sustainability. A proportion of the materials used in the product must be able to be recycled. The materials should be used carefully to ensure that little waste is left. 13. The lamps cable must be al least 980mm long. 14. The design must suit the surroundings. To do this I will incorporate wood into my design.	11. This spec point has originated from my product research section. It has been included so that you do not have to reach for the mains plug. This is vital as my client begins to age. 12. These spec points has come from the environmental research and have all been included to ensure that the final design is environmentally friendly and sustainable. 13. This spec point has come from the site survey and has been included so that the lamp can reach from the far side of the table to the mains plug situated on the wall. This will allow the lamp to be moved around the table with ease as the cable will not restrict its movements. 14. This spec point has come from my site survey. It has been included so that the design will suite the brown colours surrounding the lamp.	13. I will measure the cable to ensure it meets the minimum dimensions. 14. I will be using a questionnaire to test this specification point.
Size	15. The lights base must not exceed 250mm x 250mm.	15. This spec point has come from the site survey and from my client. He doesn't want the base too large so that it doesn't take up too much space on the table. The reduced base size will also limit the amount of material being used for my product.	15. The size of the base will be measured and must conform to the size regulations.
Safety and Quality	16. There should be no sharp edges which could potentially harm people. 17. The light must have a stable base to ensure the lamp does not become unbalanced and falls over which could potentially harm people and damage the lamp or the customers property. 18. There should be no loose parts or parts easily broken which could be ingested by children or animals alike. 19. The lamp should not be so tall it could topple easily and be a danger to people and property. 20. The electrics must be safe and insulated to ensure that the user cannot be shocked by the electricity.	16. This information has come from my safety research and has been included to ensure safe use. 17. This spec point has come from my safety research and has been included to ensure safe use. 18. This spec point has come from my safety research and has been included to ensure safe use. 19. This spec point has come from my safety research and has been included to ensure safe use. 20. This spec point has come from my safety research and has been included to ensure safe use.	16. I will be using a questionnaire to test this spec point 17. I will be using knock tests to discover the overall stability of the product to assess its safeness. 18. I will use a questionnaire to test this spec point. 19. I will be performing a 'knock' test to ensure the lamp is not too tall. 20. I will be performing safety inspections and have a trained electrician to also inspect my work to ensure that the lamp is safe after manufacture.
Scale of production	21. Less energy consuming methods of production must be used where possible. 22. The product should include at least one method of batch production.	21. This spec point has originated from my environmental research and has been included so that I attempt to use less energy consuming methods of production so save electricity. 22. This spec point has come from my batch production research page and has been included so that if the product were to go into the wider market it would be possible for the product to be produced quicker.	
Cost	23. The lamp should cost no more than 80 pounds.	23. This spec point has come from my questionnaire. It was expressed by both my target market and client that 80 pounds would be the maximum they would be willing to pay.	23. I will be adding up all of the costs of my product once completed.

Client Feedback: I fully agree with the spec points proposed and feel that these are very detailed guidelines to produce a lamp which will suit my needs.

Initial Ideas



Modelling would be needed to ensure that the design would be strong enough to withstand a fall from 580mm

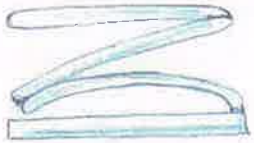
Sustainability: The product uses mainly wood in the design with the addition of the casted base. The wood could be purchase from sustainable sources which would reduce its impact on the environment however the casting takes a lot of energy to melt the aluminium which is not very sustainable. Lots of the processes used for the design could be done using less energy consuming methods which is positive.

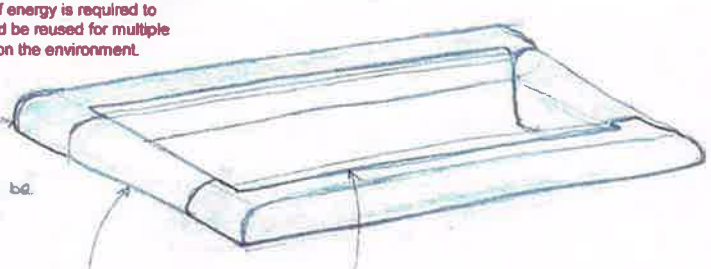
Client Feedback: I like the level of flexibility that the design offers however I do not find the lamp head at all attractive and feel its extremely box like. I feel slight changes in design or materials could sort this. I also have fears that the design made be too fragile if knocked over however the size of the base would make this quite unlikely.

Initial Ideas

Client Feedback: I love the mixture between the curved edges and the straight sleek lines. I feel the design would be very usable and realistic however I am concerned on the size of the base, from the design it looks quite large which is not ideal as the table is only small and table space is limited.

Sustainability: The legs of the design are made from steel which is not sustainable as it is removing resources from the ground and a lot of energy is required to produce the steel. The design uses formers which could be reused for multiple designs which would reduce the impact of the product on the environment.





A row of LED lights will be housed in the head of the light and be bright enough together

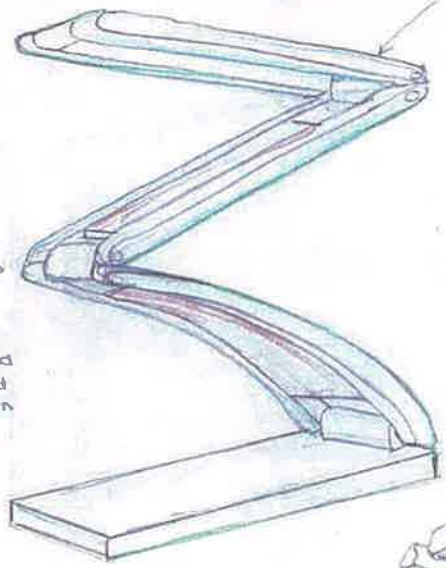
A hole will house the wiring

Veneered plywood inserted using dowel joints

Rods would be inserted through the pieces to act as the hinge.

The hinge would be rigid enough to hold itself in position

The steel hinge would be dip coated for aesthetics



The cylindrical steel has been included in the light head so that it matches the rest of the design- the hinge.

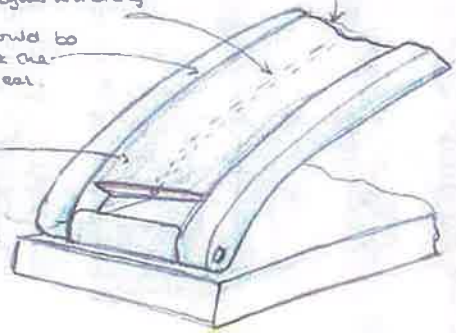
I would use a milling machine to cut a groove in the steel. I would then insert veneered plywood into the steel for aesthetics. I will secure it using araldite.

The plywood would be veneered as solid wood resources

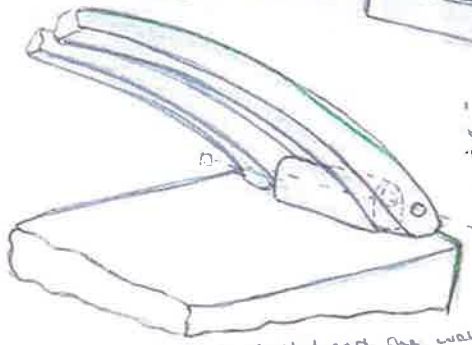
Before the oak is bent a hole will be drilled the entire length, this will house the LED wiring

dowel joints would be used to connect the oak to the steel.

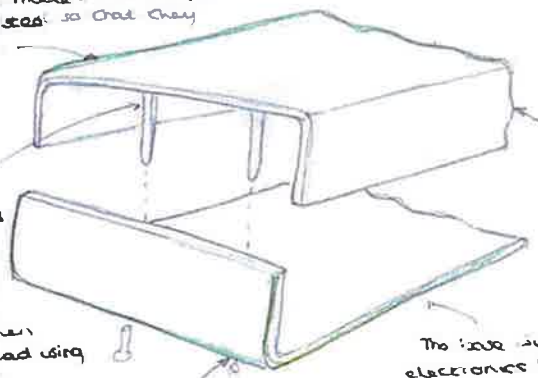
The plywood insert sits between the steel and is bent to the same angle using a former



I will be using hollow steel squared tubes for the legs of the light. They will be bent using a former into the specific angle.



The base will be made from two pieces of thin ply bent steel so that they fit in together



Two steel cylinders will be welded to each end of the top piece of mild steel. The cylinders will then be given a thread using a tap and die

Holes will be drilled in the bottom piece so that threaded bolts which will make can be screwed into the cylinders and hold the base together

I would get the top base of the base professionally dip coated to give it a professional finish. The bottom piece will be polished and does not need protection as its stainless steel

The hole will hold the electronics for the light and the semi permanent fixture allows for access to the electronics for any maintenance. Sand bags could be inserted into the base to increase weight.

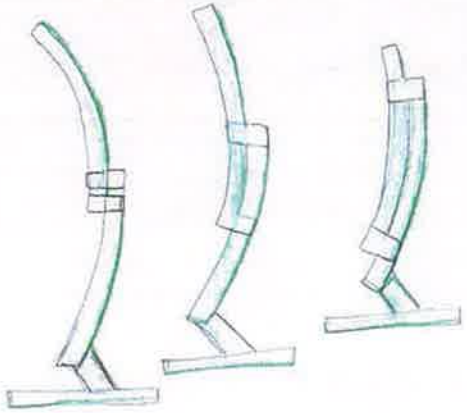
A small block of steel will be drilled and the welded onto the base, this piece will also be dip coated. The two legs will be placed either side of this block and have a rod inserted through both these pieces to act as a hinge. The ends of the rod will be threaded so bolts can be screwed in at each end to hold it in place. The right sizing rod will mean the hinge can move but will be able to hold the light in position.

- Client Feedback

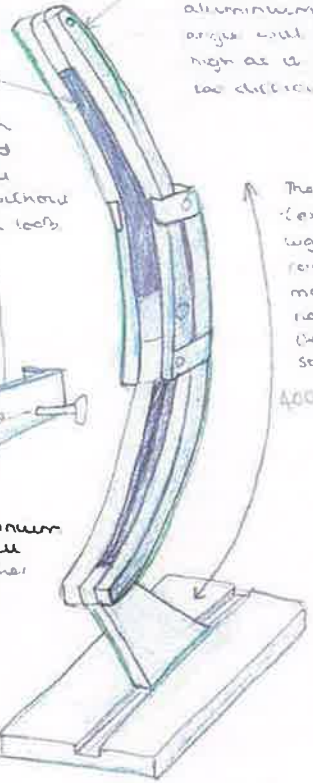
Initial Ideas

Client Feedback: I feel this design is the most aesthetically pleasing. I love the curved nature of the design and the simple uniqueness of the design. I do not however like the shape of the base and feel that would need to be developed. I feel this design is very unique but there is also lots of scope to develop and improve the lamp.

Sustainability: The design would use LEDS which have an extremely long lifespan which would mean there would be no need to replace the bulbs over its lifetime. The design would use a jig which could be used for multiple products which would reduce the impact on the environment.



THE DESIGN EFFECTIVELY INCORPORATES ORGANIC AND STRAIGHT SHAPES

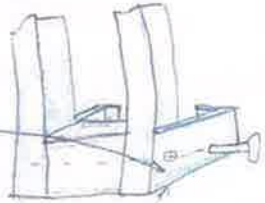


The light will be based around 4 3cm square aluminium rods. The angle will not be too high as it would become too difficult to make

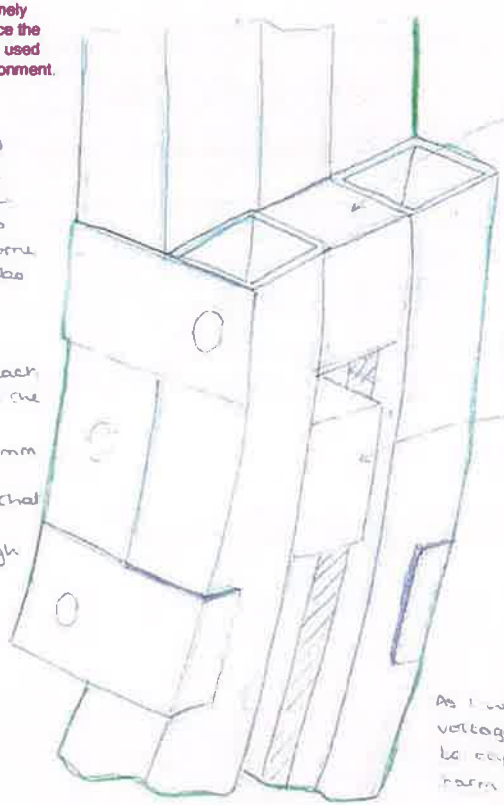
Instead of the LEDs I will be using a vacuum formed piece of frosted acrylic. This acrylic will allow enough light without being too bright and will look attractive

The overall reach (extension) of the light will be roughly 300mm modelling is need to test that the base is stable enough

400mm



The two necks will be attached by using bolts with the beech spacers between

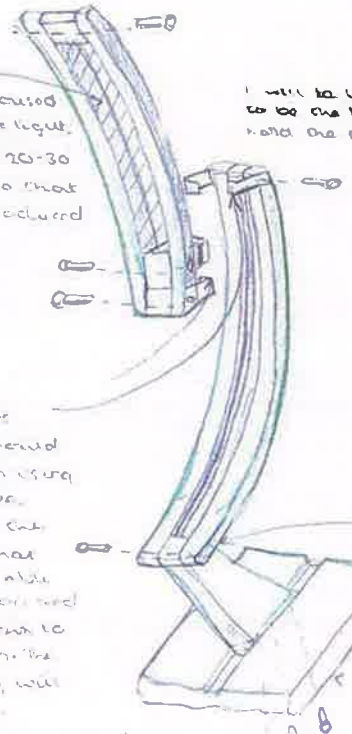


small square blocks of beech will be used as spacers between the aluminium. This would also be aesthetically pleasing

This would be a small piece of aluminium which will be between the thick piece

I will be using copper strips which run the length of the back and on the edges of the aluminium piece. This will act as the contact point for the LEDs so that it is not necessary to disguise or show the wires

As I will be using low voltage the lamp will not be capable of causing harm to the user



The LEDs will be housed in the top part of the light. I will use between 20-30 ultra bright LEDS so that sufficient light is produced

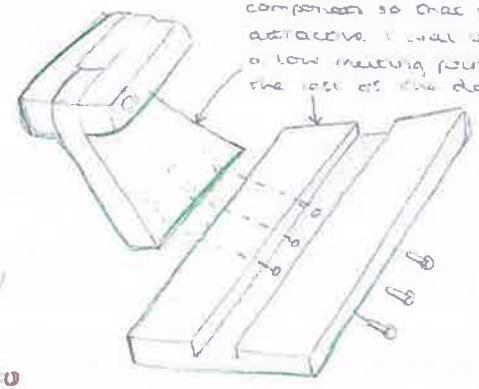
I will be wire bending aluminium to be the hooks which will hold the two sides together

On the inside edges of all of the hooks I would stick rubber to them using a contact adhesive. The rubber will give that bit of friction so that the light will be able to hold its position and not slide back down to its folded position. The hinge fastening will also add to this.

Aluminium will be used for the majority of the design as it is very lightweight but strong which is very important.

All of the joints that I use will be simple to ensure that the need to [illegible] finish with [illegible] other material

This is for safety but also to maintain the design aesthetic



For the base I will be casting both of the components so that the finish looks quite attractive. I will use aluminium as it has a low melting point and will suit within the cost of the design

I will use a machine machine to cut the groove in the lower piece of the base. This groove will house the leg on the light. I will drill through the two pieces and using a tap and die thread the holes. I have decided instead of using bolts which I would have to screw

Initial Ideas

Client Feedback: On the whole I do quite like the design however I do feel that the level of flexibility that the design offers is not as much as I'd anticipated. I feel the design is quite attractive and unique, especially the formed head however the issue of flexibility would need to be resolved were we to proceed with this design.

The design is mainly made using straight edges, curves are still need to be incorporated to achieve the spec point

HEAT

for the light bulb cover I will be using a piece of acrylic, possibly frosted acrylic so that it looks aesthetically pleasing

I will cut out the basic shape however I could use a CNC machine if my product was to be put into batch production

The vacuum form the acrylic I will be using a former which I will make using timber. I will heat the acrylic until it becomes floppy and then hold the acrylic down while it cools

I will be using a counter weight to overcome the weight of the bulb and light fitting.

The acrylic light housing is very brittle and could break from a fall.

The cables cannot be hidden but this could be changed in development

The mould will be made from two parts cut from one larger piece of wood This is also a form of batch production speeding up the manufacturing process

The hinge will be able to be undone and moved and then secured in its new position I would make the bolt head.

I will make mild steel bolts and weld small pieces to the end to make it easy to turn the bolt using your hands

I will use a contact adhesive to attach the light bulb cover to the light bulb fitting

ACRYLIC

light bulb

I will use a small piece of circular aluminium and mill out a groove into the circle

I will use a piece of rubber the increase the friction in the joint and to protect the materials

The base may have a problem with weight but using modelling this could be tested and metal could be added to increase the weight

The aluminium will flex enough so that when the top is tightened the legs will trap the light in position

The circular aluminium will house the holder for the light bulb

A small strip of rubber will be inserted between the joints of acrylic here to increase the friction on the hinge

Holes will be drilled through the hinge and bolts used secure the hinge joint

grooves will be made to house the aluminium using a chisel and the head of the screw will be sunk enough that so could the aluminium

I would use brass aluminium to the base stand. The aluminium will be cut and the bend using a gemlo bending machine

Sustainability: The design on the whole is quite sustainable as fairly few materials and processes have been used for the produce. The majority of the materials would be able to be recycled after use which would mean that the materials were not simply wasted after its lifespan.

- Spec Points (not fulfilled)
- Client Feedback

Evaluation of Initial Ideas

The design has not fur-filled This spec point.

The design has achieved The spec point.

In this page I will be comparing my initial ideas to see which idea fur-fills the most of the design criteria and will help me once I have chosen which design to precede with as I will know which aspects of the design need changing. Many of the spec points will only be able to be tested after the construction however some can be used for the design process. I will be using a questionnaire which I will pose to my target market to test some specification points, these are specified in the spec table.

Specification Point	Initial Idea 1	Initial Idea 2	Initial Idea 3	Initial Idea 4
2. The design should incorporate a mixture of straight edges and free form curves.	The design does incorporate a mixture of straight edges and curves, this is achieved by the free form base and the straight edged head and legs.	The design sufficiently incorporates straight edges and free form curves.	The design does incorporate both the curves and straight edges very well.	The majority of the design is made using straight edges. More curves would need to be incorporated to achieve this spec point.
5. Variation in colour and materials should be included in the design.	I have used a mixture of metals, the wooden light and the cast base give the mixture in materials.	There is a lot of variation in colour and materials by the use of wood and metals.	There is not as large a variation in materials as the majority is metal however there are small amounts of wood and plastic being used.	There is variation in the colours and materials used by the use of aluminium, beech and acrylic.
7. The lamp must be adjustable.	The lamp is adjustable by the joint which has been made in the base and the middle of the light.	The lamp is fully adjustable with 3 hinge joints.	The design is very adjustable and can be easily adjusted.	The lamp is adjustable but not to the level of adjustability which the other designs offer.
8. The lamp must be durable enough to withstand falls.	Modelling would be needed to ensure that the wood is not too brittle and would break from a fall.	The lamp would be durable enough to withstand a fall. The majority of the design is made from metal which is very strong.	The lamp would be mainly made from aluminium which is very strong and would be able to withstand a fall from the table.	The acrylic light housing would be very brittle and could potentially break from a fall.
10. The lamp should use environmentally friendly bulbs	The design would use environmentally friendly energy saving bulbs.	The design would use LEDS which are low energy making them eco friendly.	The design would use LEDS which are low energy making them eco friendly.	The lamp would use environmentally friendly energy saving bulbs.
12. A proportion of the materials used must sustainable or be capable of being recycled.	The wood used in the material would be capable of being recycled. The aluminium cast base could also be re-melted and re-used.	The materials could all be recycled and re-used making the design sustainable.	The materials would be able to be recycled after use which will mean the product will not end up at landfill after use.	The materials could be recycled after use and only small amounts of materials are used which would reduce the impact on the environment.
13. The design must suit the surroundings.	The design would be finished to a high standard and the design would suite the surroundings by the use of wood and aluminium.	The design would suit the surroundings by the use of metal and wood. The sleek design would also suit the surroundings.	The design would suit the surroundings but the original and stylish design.	The design incorporates wood and metal well which would suit the surroundings in the lounge.
15. The lamps base must not exceed 250mm x 250 mm.	The lamps base does not exceed 250mm x 250mm.	The base would not exceed the 250mm x 250mm limit.	The base would not exceed 250mm x 250mm.	The lamp base would not exceed 250mm x 250mm.
19. The lamp should not be so tall that it could topple over easily.	The base would weigh enough and be stable enough so that it would not topple over even if the light was fully extended.	The base is the correct shape and large enough that even with the light fully extended it would not topple over.	The base is large and heavy enough so that it could hold the lamp full extended.	The lamp is not very tall which means that it is very unlikely that the design would topple over.
21. Less energy consuming methods of manufacture should be used where possible.	Less energy consuming methods would be using for example the use of saws for the wooden joints and casting rather than die casting.	I would be using less energy consuming methods such as bolt joints rather than welding.	Less energy consuming methods include casting rather than die casting but also the use of bolt joints compared to welding.	Less energy consuming methods such as hand routing would be used instead of using milling machines.
22. The product should include at least one method of batch production.	The design does include casting which is a method of batch production.	The design includes moulding which is a method of batch production.	The design would use moulds for the aluminium curves which are a method of batch production.	The product would use a mould to shape the acrylic and this is a method of batch production.

Design 1	Design 2	Design 3	Design 4
6/9	8/9	8/9	5/9
5/9	8/9	7/9	7/9
7/9	8/9	8/9	6/9
7/9	7/9	8/9	6/9
25/36	31/36	31/36	24/36

From using my evaluative criteria which I used previously for my existing products which evaluates the functionality, materials choice, manufacturing processes choice and finally the cost. I have been able to conclude that designs 2 and 3 both scored 31/36. Both designs scored highly in all areas but there is still areas for improvement for both designs. I will now be using a questionnaire to decide between design 2 and design 3.

I have decided that I will be putting forward Design Idea 2 and 3 forward to questionnaire because both of the designs fur-filled all of the specification points and scored the highest marks in my mark scheme which I used to evaluate the existing products. I will be conducting a small survey of students and family to ascertain which design is preferred on the whole so that it would be commercially viable.

1. Between designs 2 and 3, which would appeals to you more considering not only aesthetics and functionality, but also the environmental aspect.		From surveying my friends, family and my client I found that 88% thought Design 3 was the most appealing. This means that were the design to be put into mass production there would be a large market for the design to make a profit. Client Feedback: I prefer Design 3 due to its aesthetics.
2. Would you be willing to pay up to £80 pounds for Design 3 providing it was produced to a high standard?		From my questionnaire of my friends, family and my client I found that 94% said that they would be willing to pay up to £80 pounds for Design 3 providing that it were produced to a high standard. This means the product would sell in large numbers were the design to be produced commercially. Client Feedback: I would be willing to pay up to £80.

From the evaluation of my design against the spec and evaluation using my mark scheme I narrowed the designs down to two, I used a small questionnaire of my friends, family and my client and have decided that I will be proceeding with de[illegible]. I will now begin to develop the design further, in conjunction with my client and aim to i[illegible] the design considerably.

Testing and Modelling

In this page I will be testing/ trailing various aspects of the design which I feel may be an issue when I begin manufacture. Modelling is undertaken to reduce mistakes once manufacturing begins, modelling will ensure that mistakes are not made with the materials which may have been ordered specifically for the purpose which will ultimately reduce the amount of waste and effect on the environment. Modelling allows me to test whether aspects of my design are feasible or whether more development is needed.

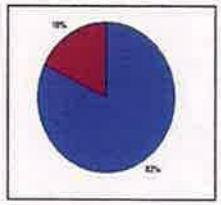
Client Feedback: I feel that the shape of the designs base should be check to ensure that the light does not become unstable and fall over easily.

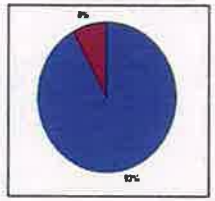
Modelling 1:

I will be testing the proportions of the design so that I can ensure that my products dimensions will suit the needs of my client and the wider market. To test this I will be producing a 1:1 scale side and front elevation of the product. I will then be conducting market research by asking 50 people in my target market, including my client, and recording whether the dimensions are suitable. For the research I will only be accepting a 80% agree level, if the agree level is lower than that I will be completely redoing my dimensions as too large a proportion of the target market would not like the sizes and would possibly not purchase the design, limiting its potential profits.

Results:

After conducting the market research I found that from a sample of 50 people, 82 % were happy with the dimensions of the design however 18 % were not completely satisfied with the proportions. The 82 % is slightly above the acceptable level however I after discussion with the people who did not agree with the sizes I found that the majority said that they did not like the thickness of the base. Now I will ask the 50 people whether they think if the base was made thicker the design would become more attractive and more likely for them to purchase the lamp.





Results:

After conducting the market research I found that from a sample of 50 people, 92 % agreed that if the base was made thicker it would improve the aesthetics of the overall design. In this light I will be making the base thicker in my development section to improve the quality of my design and match the likes of my target market

The solution:
From my modeling I found that a rectangular base was too unstable for three of the four sides/directions. To tackle this I will modeled a circular base to test whether this works better than the previous base. The results were positive, the base gave good support to the light in every direction due to it being circular. I will be making the base circular in my development to ensure the lamp has a long life which will be beneficial for my client.

Modeling 2:

I will now be testing the feasibility of the base shape/design as my client has raised concerns over the bases design. I am testing to ensure that the base would be able to hold the light securely and decrease the possibility of the lamp being knocked over which could damage the light. To carry out this test I will be making small models of the base and a light. For this I will use two pieces of wood which I have nailed together which will form a basic modeling test.

The results:

I found from my model of a lamp design with a square base, where the light is off-center, as in my design. That the lamp could be easily knocked over in three of the four direction, the only direction where it was hard to knock the lamp over was pushing it forward (center). This test has shown me that the shape of the base is not appropriate for a light which is fairly fragile.

Modeling 3:

I will now be testing the feasibility of using the copper strips to conduct the electricity which will be used to power the LEDS. I wish to test that the copper strip will be able to conduct the electricity, will not heat up and become dangerous and finally that you will not be shocked by touching the copper strip. To test this I will be creating a simple circuit. I will connect crocodile clips to the copper strip which I will soldered to a resistor and then to a LED and then connect that to another crocodile clip and complete the circuit.

The results:
I was able to conclude that:
- The copper strip conducted the electricity, I found this out using the volt meter and LED.
- The copper strip did not heat up due to the electricity, I tested this using a laser thermometer.
- The copper strip did not shock you when you touched the strip due to the low voltage.

After testing the feasibility of the copper strip I have been able to ensure that I do not need to develop this section of my design

Client feedback: I am very pleased that you tested using the copper strip as I have children who could touch the lamp and I would not want them to get harmed.

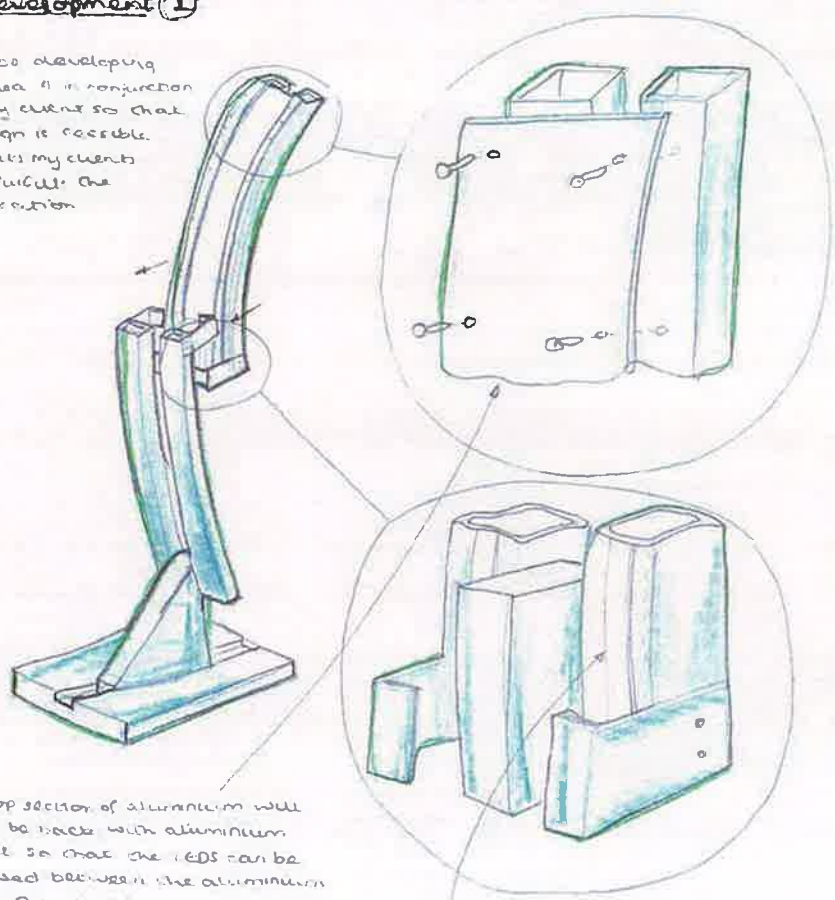
Conclusion: Now that I have successfully modelled various aspects of my design I can be sure that the product will work and will be successful. I will now move onto my manufacturing plan and then begin my manufacture.

Development

Client Feedback: Currently I do not like the base at all, especially the shape or the way the design has been made. I feel that a circular base may be more attractive and possibly the use of a higher quality wood.

Development ①

I will be developing initial idea 4 in conjunction with my client so that the design is feasible and suits my clients needs/fulfills the specification



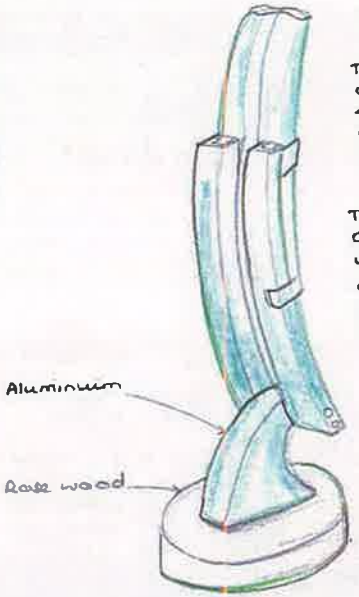
The top section of aluminium will now be made with aluminium sheet so that the LEDS can be housed between the aluminium and the plastic. The aluminium will be pop riveted into the square tube. The rivet heads will be filed flush with the sheet metal so that it can slide smoothly

The aluminium sheet however will create an addition problem there will be a lot of friction between the sheet aluminium and the tube. To overcome this I will be gluing thin strips of PTFE to both pieces using a contact adhesive. The PTFE will allow the two pieces to slide smoothly

Client Feedback: I agree with the use of PTFE, as I am ageing I was worried about having to slide the design but with the PTFE it will be able to slide easily. I do not mind that the use of PTFE will raise the price because I feel it will look very attractive as well as being practical.

Development ②

Due to my clients comments I will now be developing the base so that the aesthetics are improved

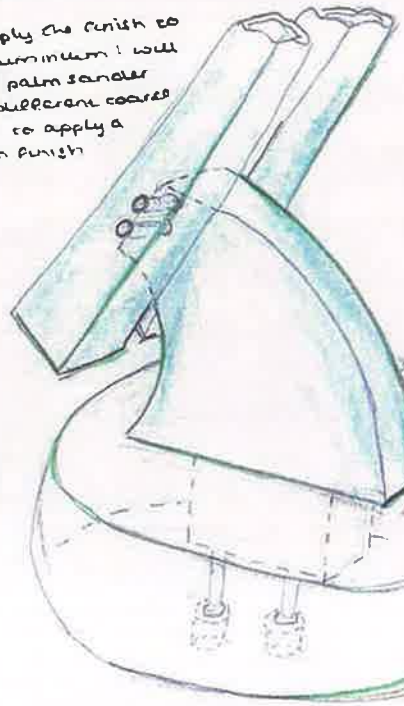


The base will still be made from two components however the shape of both has been changed

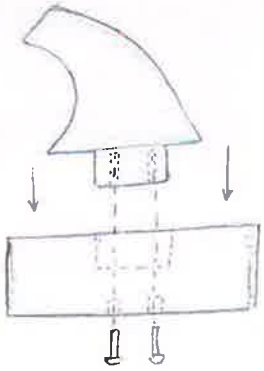
For the base I will be using a very attractive Rosewood which I found scrap in the workshop

To make the aluminium section I will be using cavity chuck aluminium. To cut the shape I will use a pillar drill to cut the aluminium making sure the holes overlap I will use a bar-saw and files to remove the rough edges from the aluminium

To apply the finish to the aluminium I will use a palm sander and different coarse paper to apply a satin finish



I will use a milling machine to cut the square bottom and ensure the material is square. I will drill 2 holes in the base making sure they drill vertically and then I will tap the holes to thread them



I have changed the shape and thickness of the base due to my modelling.

To create the base I will be using the wood lathe to round the rosewood and make both faces flat I will use different grade sandpaper to apply an attractive finish to the wood. I will then mark out the shape of the aluminium and using the marking cutter will cut a groove in the rosewood which will house the aluminium. I will use the pillar drill to drill two holes, I will also drill 2 clearance holes which will hold the heads of the screws which will hold the aluminium counter bore

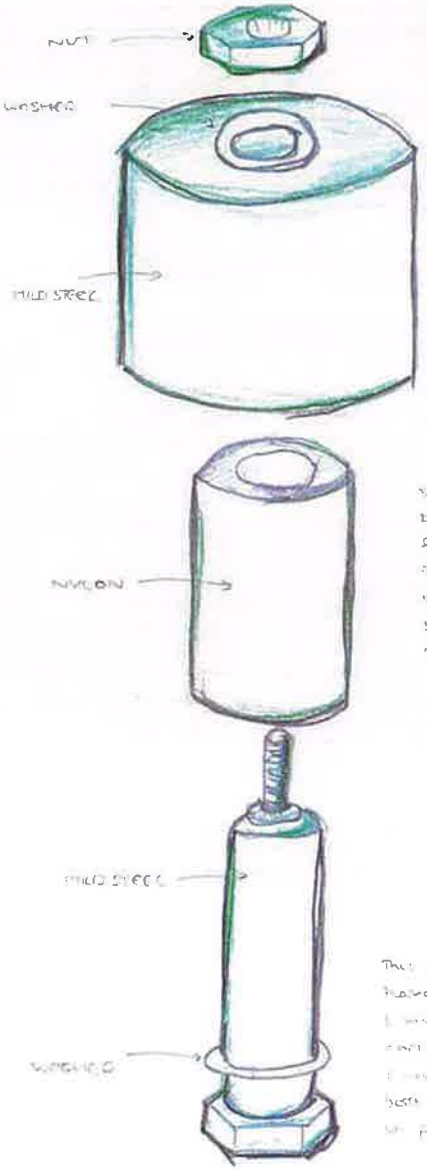
■ - Spec Points (can be filled) ■ - Client Feedback

Batch Production

My spec states that the product must include at least one method of batch production. I will be using a jig to produce the curved aluminium sections of my design. Jigs are a form of batch production as they can produce the same product each time.

After making and using the jig it will be donated to my school to be used for other projects meaning the material I used will not simply go to waste.

The jig is essentially a swinging arm with a roller attached to the end. However it is made from multiple components.

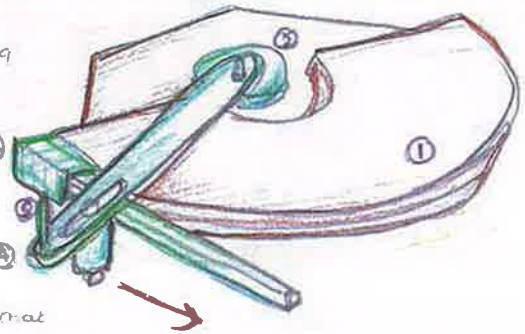


I will be bending roughly one metre long pieces of aluminium at a time so that I can gain enough leverage to achieve the curve.

The roller will be a piece of mild steel that I will lathe circular and then drill a central hole.

The nylon cylinder will be machined so that the friction is reduced once the roller is able to roll freely. I will be using a lathe to create the nylon insert.

This piece will be made from hexagonal mild steel which I will be lathing to form a shaft. I will thread it at each end to hold both the roller and nylon in place.



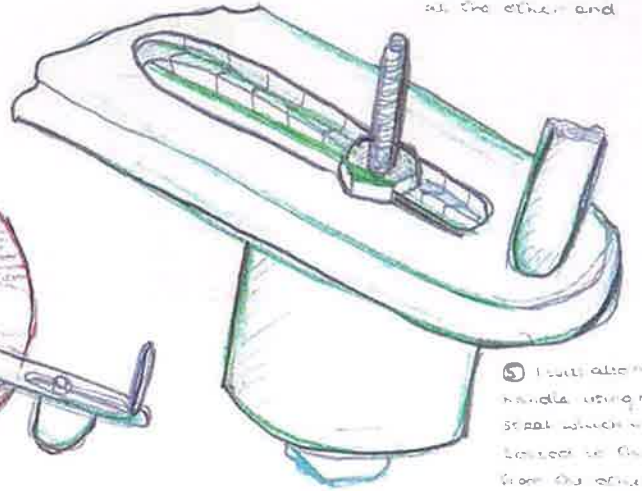
2. A base plate will be bolted to the plywood, not screwed to increase strength. The base plate will be in the form of the plywood circle. The base plate will be made from scrap mild steel.

The insert will also be made from mild steel. I will lathe the steel so that it can be inserted into the base plate. The steel will also be threaded to secure the arm piece.

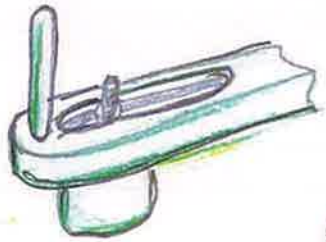
4. The majority of the jig will be made from plywood which I will use using (1) a bandsaw for the curved sections, (2) a saw for the back parts. I will be nailing the pieces together.

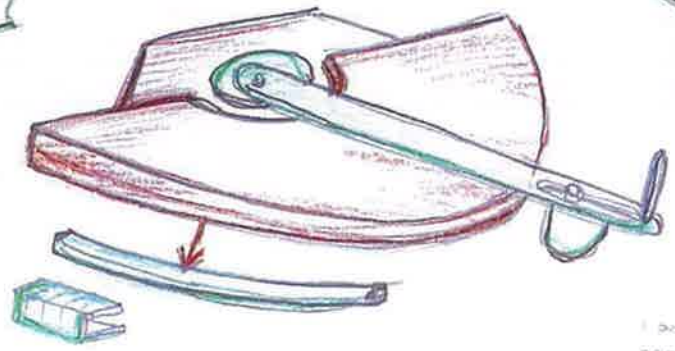
3. I will be using a bent piece of mild steel which will be drilled and screwed to the jig. This will hold the work and allow for bending to occur.

5. This arm piece will be made from a large piece of mild steel. I will drill a hole to attach it to the base plate and mill a groove as the other end.



5. I will also make a handle using mild steel which will be bolted to the arm from the other side.





I will ensure the jig rollers have no play bearing to ensure the jig does not move.

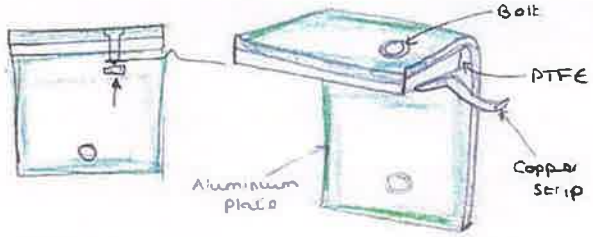
I am making a groove so that the roller can be moved/adjusted so that the bending can be achieved practically.

Development

Development ③

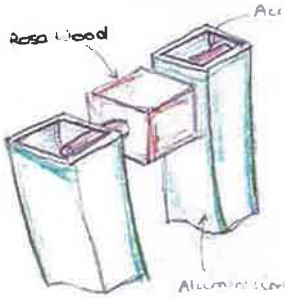
After much consideration I have decided that I will be running the low voltage electric current through the two different sides of the lamp I will be using the brackets that hold the crane and base together as the contacts. This leaves the central connection is now obsolete.

The bracket will be made from thin alum plate which I will cold bend using a hammer and vice. Then I will use a pillar drill to cut and hole in the aluminium and the PTFE

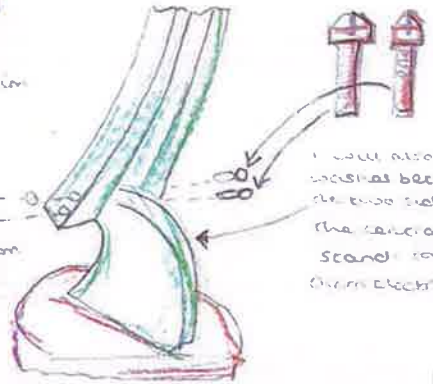


The PTFE is there to reduce friction and prevent the brackets damaging the light. I will then use a small bent to attach a thin piece of bent copper to the bracket. The bracket will conduct the electricity between the two sides as the PTFE between them insulates them

Now I must separate the two sides electrically



I will use small pieces of rose wood to act as the spacers and will drill and insert acrylic rods which will be glued into place



I will be using 4 nylon bolts which will hold the two sides to the base insulating

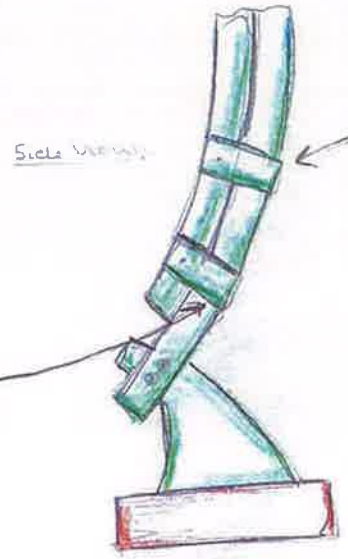
I will also use washers between the two sides and the central base stand to insulate them electrically

Development ④

Client Feedback: After considering your proposal for several days I have an issue with the way the brackets will be made. In the current position the curves would not be able to slide together as the brackets would be in the way as they are positioned at both ends. I feel you should be develop the bracket design so that they can slide onto each-other.

After my clients comments I realised that it would not be possible to slide the top and bottom section together once I had pop rivetted the clips to the sides

For the solution I decided against attaching the two pieces and then pop rivetting the clips to them as it would not be possible to assemble the top and bottom halves

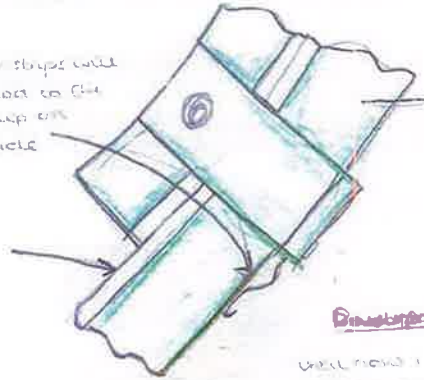


Solution:-

I will be attaching the two bent clips to the top section of the light. This will allow the top half to slide onto the bottom

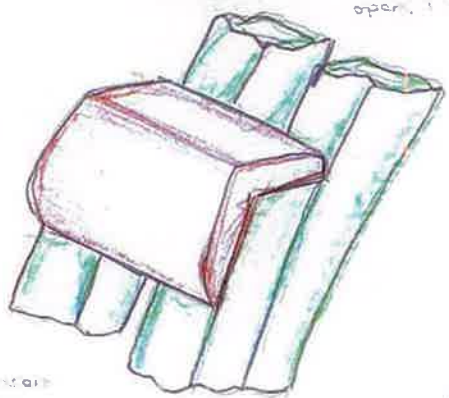
I will only use 1 pop rivet per clip. This will allow slight movement which is needed as the curves may not be bent identically.

The copper strips will be attached to the bottom clip on either side

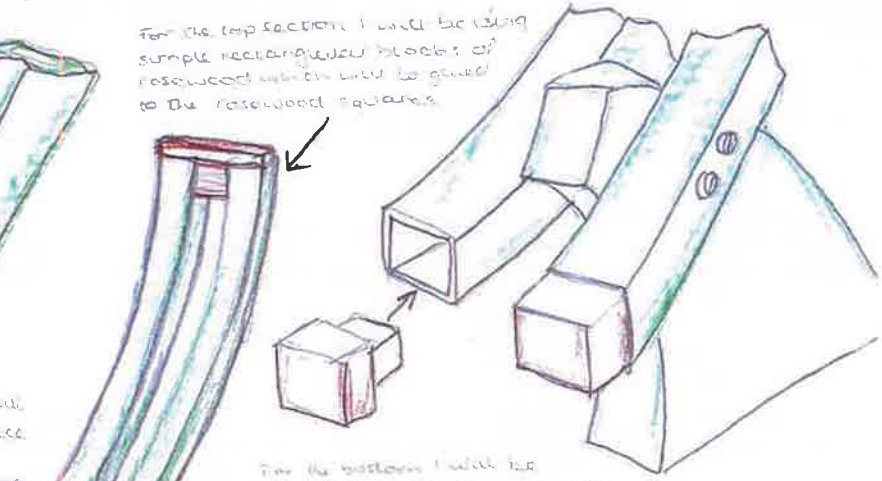


Development ⑤

Until now I have had the ends of the illuminators wires completely open. I do not like this so I will be designing caps for them



For the top section I will be using simple rectangular blocks of rosewood which will be glued to the rosewood squares



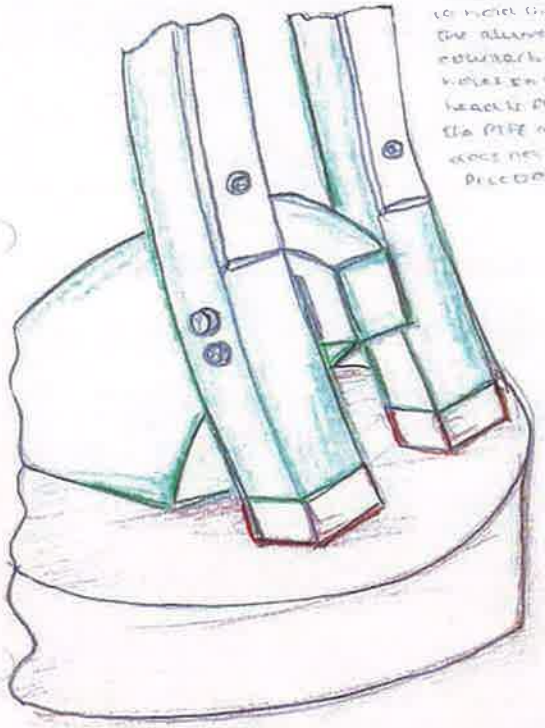
For the accessible top I will use a right angled piece which will act as a stopper for the sliding piece. I will cut this using a hacksaw

For the bottom I will use three pieces of rosewood which will be glued to several pieces of plywood which will be sandwiched into the aluminium which then glued

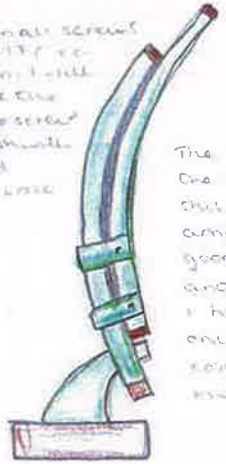
Development

Development ⑥

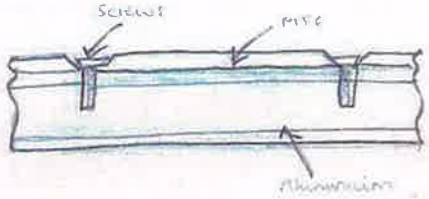
With reference to development ①, I will be changing the material which I stated so that the design is more feasible and aesthetically pleasing



I will use small screws to hold the PTFE to the aluminium. I will countersink the holes on the screws heads flush with the PTFE and does not create friction

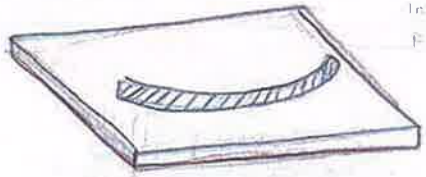


The ... areas shown where the PTFE will be placed this is to reduce the amount used which is good for the environment and will reduce costs. I have placed the PTFE only where they will be rubbed between the two pieces

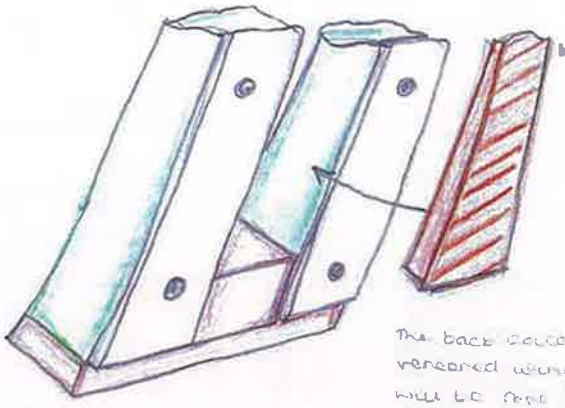


Development ⑦

I have decided to remove the sheet aluminium which I had introduced in development ①. This is for both aesthetics and to reduce the amount of resources which I'm using in my work



Instead I will be cutting the profile of the curve out of plywood. I will then cut the plywood thickness so that it sits into the gap between aluminium in the extrusion



The insert will be fabricated further in that the PTFE but the thickness of the insert will only be half the thickness of the aluminium this will allow for the LEDs to be housed

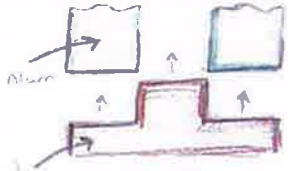
The back face of the insert will be veneered using a rosewood veneer this will be more aesthetics and will increase the number of processes.

Veneering also reduces the amount of plywood (rosewood) which I am using which overall will be more sustainable

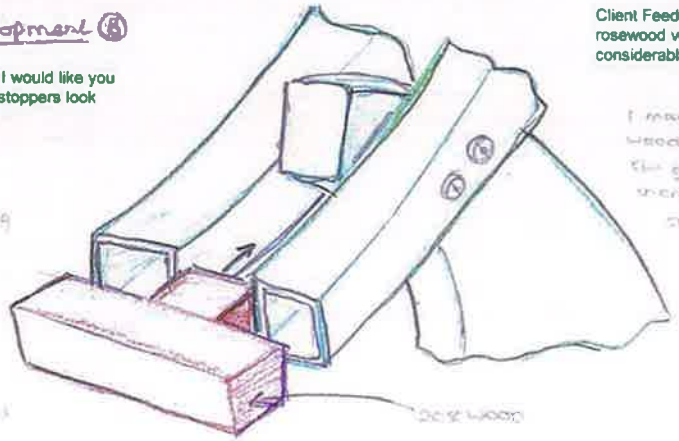
Client Feedback: I feel that the introduction of the rosewood veneer insert will increase the quality of the lamp considerably.

Development ⑧

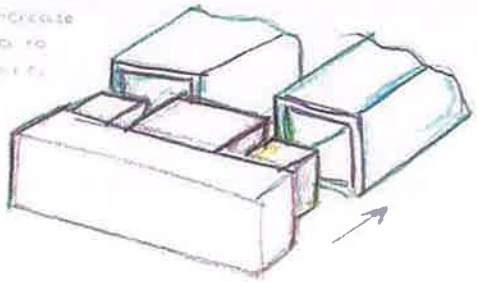
Client Feedback: I do not like the bottom wooden stopper, I would like you to redevelop this so that it is more attractive and all of the stoppers look the same or at least similar.



I will cut the plug with a saw then I will be gluing the piece into place with wood glue



I may have to use small wood insert to increase the gluing area to increase the grip strength



Development

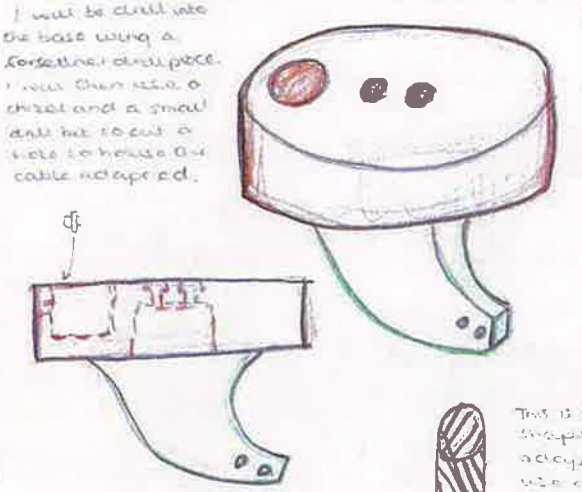
Development (1)

In conjunction with my specification and my clients specified preferences I will now be developing how my light fixture will house the wires so that they are as discrete as possible.

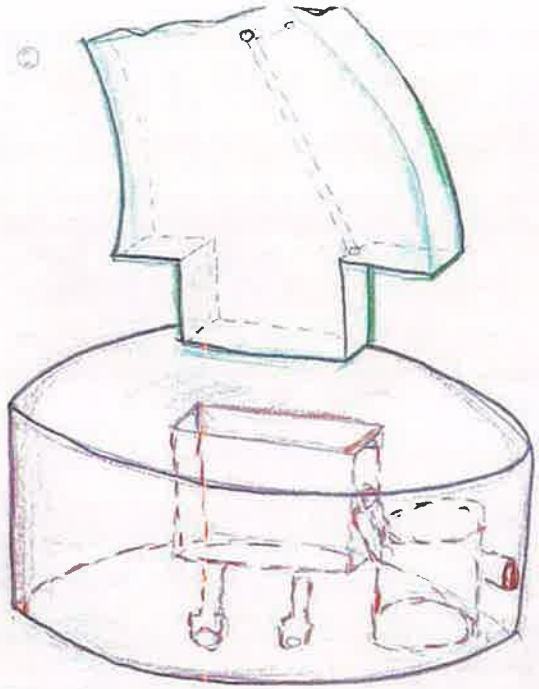
(1) My wall fixture uses DC current and I will use an adaptor to connect the cable to the wires for the LEDS

I will be drilling slowly so that I do not burn the rosewood

I will be drill into the base using a forstner drill piece. I will then use a chisel and a small drill bit to cut a hole to house the cable adapted.



The base adapted will be drilled into placed once I have soldered the electrical cables which will connect to the curve aluminium



I will be using the pillar drill to drill diagonally through the aluminium stand. I will be drill through the centre of the stand. I will drill slowly so that the wood doesn't overheat

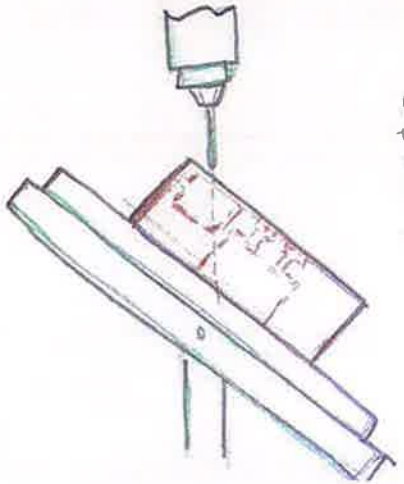
The wires will feed from the adapter through the base and stand and will come out close to the curved section where will be connected

Once I have drilled through the stand to the correct depth I will drill across the wood to intersect the diagonal hole

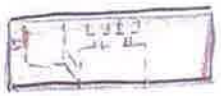
This is the shape of the adapted I will use a drill bit for the top and chisel for the bottom

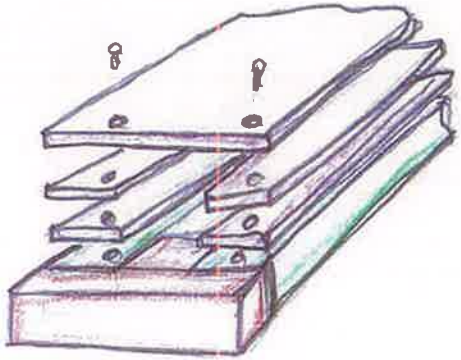
Development (2)

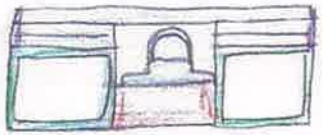
I will now be finalising how the LEDS will be covered. I will be using frosted clear acrylic which will be screwed into the aluminium using self tapping screws



I will be using the pillar drill tilted so that I can drill at an angle. This is so the wires will be able to pass through the base and into the aluminium stand without the wires needing to be shown on the outside



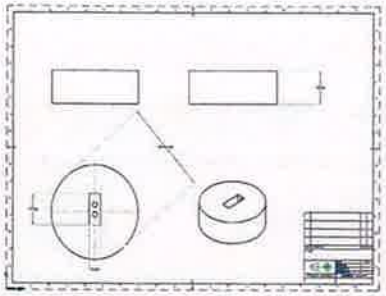




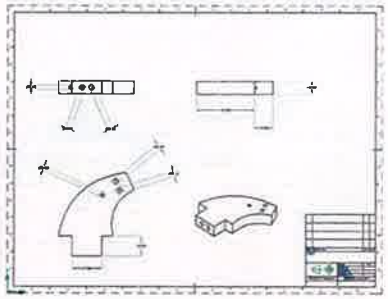
I will be using a straight piece of acrylic so that there is sufficient clearance for the LEDS which will be housed

Chosen Design

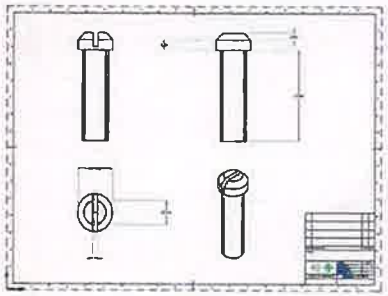
In this page I will show all of the components which I will use in my product,. I will show an engineering drawing of the components which has the dimensions and I will briefly describe how the component will be manufactured.

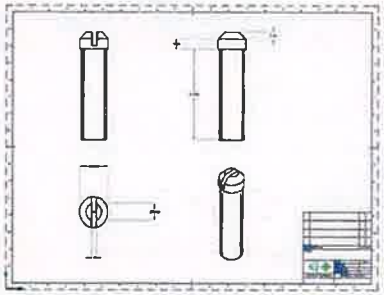


Rosewood Base
To construct the rosewood base I will be using the wood lathe to face off and round the wood so that its circular and flat. I will use sandpaper to finish the base. I will use the mortice cutter to cut the groove in the base which will house the stand. I will use the pillar drill to drill the holes for the stand and to house the cable adaptor. I will use a chisel to cut the hole in the side of the wood which will house the cable adaptor. Modelling has shown the circular base is the best at providing 360 degrees stability.

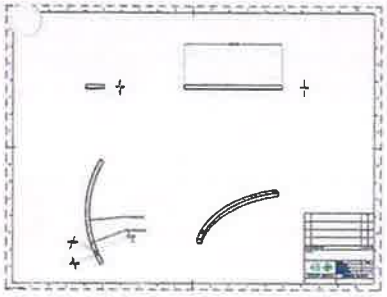


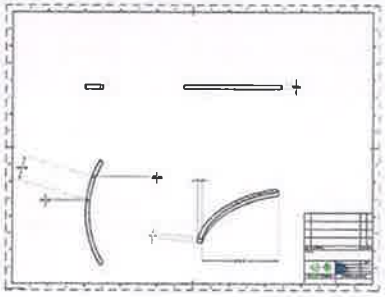
Aluminium Stand
For the stand I will use aluminium plate. I will use the pillar drill to roughly cut out the shape and then I will use the band-saw and a pile to smooth the curved shape. I will use the milling machine to cut the bottom half which will be housed in the rosewood base. I will use the pillar drill to cut the holes in the stand which will; hold the stand to the base, hold the aluminium curves to the stand and finally to house the wiring so it cannot be seen.



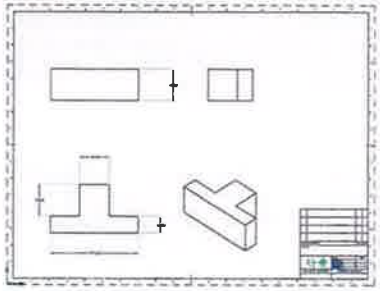


Nylon
I will be producing four nylon bolts which will connect the aluminium stand to the aluminium curves. They will be made from nylon so that the two different sides will be insulated electrically. I will use a lathe to cut the shape of the screws, then I will use a tap to give the screws the thread. I will use a tennon saw to cut the groove in the screw so that they can be screwed using a screw driver.

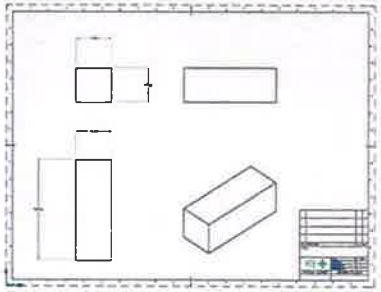




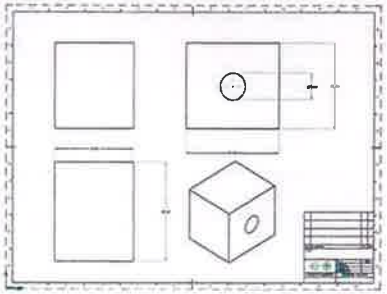
Aluminium Curves
I will be using the lathe to face off the ends of the aluminium tubing and then use the jig to bend the aluminium into the curves. I will use the pillar drill to cut the holes for the stand and then apply the holes with a thread. I will also drill and thread the holes for the PTFE and the wooden insert.



Rosewood End
This piece of rosewood will be placed at the bottom of the aluminium curves. I will use a tennon saw to cut the shape and will use sandpaper to cut the shape accurately. I will use ascending grades of sandpaper to give the wood a high quality finish.

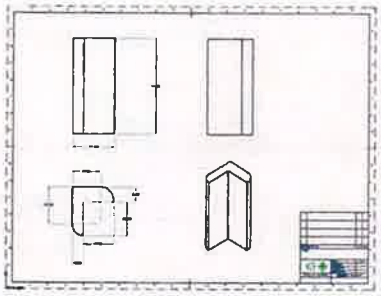


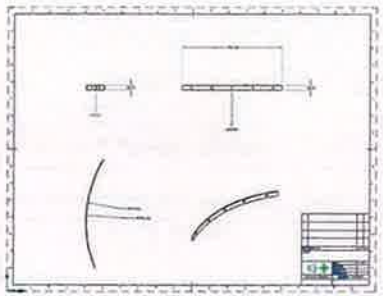
Rosewood Middle Insert
For this rosewood insert I will be using a tennon saw to cut the shape. I will be using ascending grades of sandpaper to give the wood a high quality finish.



Rosewood Insert
I will cut out the shape using a tennon saw and then will use a pillar drill to cut the hole for the acrylic rod to fit through.

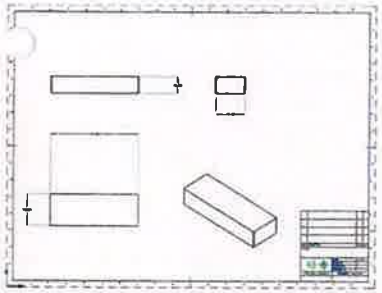
Chosen Design

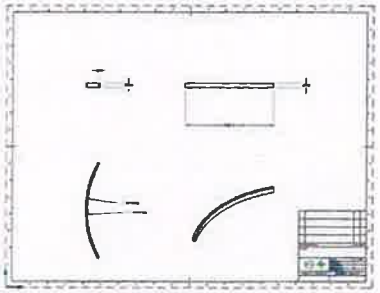




Rosewood Top Stopper
I will use a tennon saw to cut the stopper which will be placed on top of the bottom two aluminium curves. I will use the disk sander to round two of the edges so that the component is less harsh and is a more organic shape.

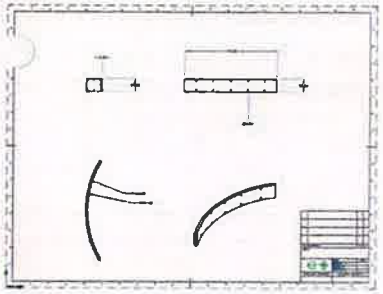
The PTFE
I will use a drill to drill the holes to attach the PTFE to the aluminium. I will countersink the holes so the screws are flush with the surface. I will use a tap to apply a thread to the holes.



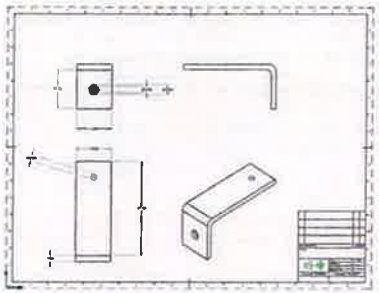


Rosewood Ends
I will be using a tennon saw to cut the rosewood into the correct shape. I will use sandpaper to apply the finish and it will be glued using araldite to the rosewood inserts at each ends.

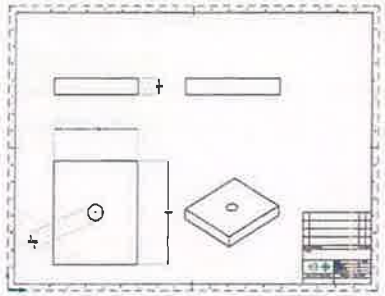
Veneered Plywood Curve
I will use the band-saw to cut the plywood. I will then veneer the outside edge using a rosewood veneer. I will use sandpaper to apply a finish and glue the insert to the aluminium curves.



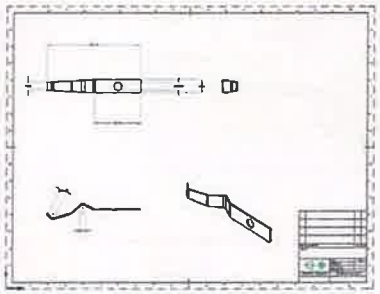
Frosted Acrylic
I will be cutting the frosted acrylic using the band-saw and then use the drill to cut the holes through the acrylic and aluminium. I will then screw the self tapping screws through both materials which will hold them in place.



Aluminium Bracket
I will use a hack-saw and a file to cut the shape of the aluminium plate. I will then use a hammer to bend the aluminium into the right angle shape. I will then use the pillar drill to drill the holes and countersink the hole.



The PTFE
I will be using a tennon saw to cut the PTFE into shape. I will then use the pillar drill to cut the hole in the PTFE. I will use araldite to attach it to the aluminium bracket.



Copper Strip
I will use scissors to cut the shape of the copper strip and then I will bend the copper by hand. I will finally drill the hole while will be where the screw is inserted.

Pre fabricated parts to be purchased:

- **Two bolts which will hold the base to the stand.**
- **Twenty screws which will hold the four PTFE strips to the aluminium curves.**
- **Ten self tapping screws which will hold the frosted acrylic to the top aluminium curve.**
- **Twelve ultra bright LEDS with Circuit Board.**
- **Two screws and nuts which will hold the Copper strip to the Aluminium bracket.**
- **Four wires to conduct the electricity to the LEDS.**
- **A cable adaptor which will connect the wires to the cable which goes to the wall plug.**

Chosen Material

This sections explains and shows what materials I will use to construct my final design. I have chosen them in accordance with my specification, questionnaire and research. The client and I feel these are the best materials suited for the job. I have decided to annotate the 3 dimensional model to show precisely where all of the materials are located.

Copper Strip
For the conductor between the two curved pieces I will be using copper strip. I am using this because of its electrical conductivity, easy workability and machinability. For any machine work the majority of the energy will be supplied for by the solar panels installed on the school roof. I will be using any non energy consuming methods of manufacture where I can.

LEDS
I have decided to use LEDS for the light. This is because of their size which will enable them to be housed in the head of the curved section. LEDS use much less energy than other light bulbs. They also have an extremely long life which will mean that they will not need to be replaced in a very long time. This makes the use of LEDS much more sustainable.

Acrylic Rod
For the connection between the two pieces of curved aluminium, I decided to use acrylic, I chosen this because of its insulating quality which was essential. The acrylic is also strong enough to hold the two sides together, although the acrylic is brittle it will not be put under enough strain for this to be an issue. I will not be using any energy consuming methods to construct this material. I will be using as little acrylic as possible to reduce the environmental impact.

Frosted Acrylic
I have chosen frosted clear acrylic for the LED cover which will be placed on the top half of the lamp. I have chosen frosted clear acrylic as it allows the light from the LEDS to pass through but slightly dims the light which is needed as the LEDS by themselves are quite bright and harsh. There is very little machine work required for the acrylic, only drilling, which will be powered mainly by the energy obtained from the solar panels on the school roof. I will be using self taping screws which will hold the plastic to the aluminium. This is very good as I can insert these using a hand screwdriver which further reduces the impact on the environment.

Aluminium Plate
I decided to use aluminium plate for the stand piece which will connect the base to the curved section, it will also be used for the brackets which will hold the two curves together. I decided to use this so that it matched the curved aluminium section and because it can machine well and can be given a high standard finish. I found the aluminium plate in a scrap pile which means that no extra aluminium will be made for my usage, which reduces the environmental impact. The scrap material also reduces the costs to my client. For any machine work the majority of the energy will be supplied for by the solar panels installed on the school roof. I will, where ever possible, be using non energy consuming methods of manufacture to reduce the environmental impact.

Aluminium Square Tube
I have chosen aluminium for the curves which make up the central concept of the design. Aluminium machines well, can be bent into the curve, gives a good finish, resists corrosion and can resist wear and tear. For any machine work the energy will be mainly supplied for by the solar panels installed on the school roof. This eliminates the use of fossil fuels. This is a much cleaner and environmentally friendly source of energy which reduces the impact of me, using the material, on the environment. I will, where ever possible, be using non energy consuming methods of manufacture such as sawing and filing.

PTFE
I have decided to use the PTFE to reduce the friction between the four aluminium curved section. I decided to use PTFE because of its low friction surface and it being lightweight. The machining which I used for the PTFE is powered mainly by the solar panels on the school roof. This offsets the deficit caused by the manufacture of the PTFE.

Plywood
For the separating section between the two curves I will be using plywood. I will be veneering the back with a rosewood veneer. For any machining the majority of the energy is from the solar panels on the school roof. By using the veneer it reduces the amount of rarer slower growing wood as the plywood underneath is made from faster growing timber. This makes it more sustainable as less of the slower growing wood is used, the method also makes it cheaper for the manufacturer and the client.

Nylon
I decided to use nylon for the screws which will connect the stand to the curved section. I decided upon nylon because of its easy machinability, aesthetics and comparative cheap price. For any machine work the majority of the energy will be supplied for by the solar panels installed on the roof.

Rosewood
I decided to use to use rosewood for the base and the separating pieces between the curves. I decided to use rosewood because of its aesthetics and as we found a scrap piece of rosewood which was left over from a previous project. This will reduce the cost to my client. As I am simply recycling the rosewood which would have otherwise been wasted and caused me to purchase more rosewood (and therefore cut down another tree) the overall outcome is that it is beneficial for me to use the scrap piece. The machining which I will do to the wood will be powered mostly by solar panels on the school roof therefore further reducing its environmental impact. I will, where ever possible , be using non energy consuming methods of manufacture such as sawing.

Conclusion: The materials I have chosen work well together and are thoroughly suitable for my product. They are all strong, durable and can give a good finish. They fur fill my specification and they include metal, wood and plastic which have been incorporated to suit my clients needs. They have also been considered sustainable to reduce the impact on the environment.,

RESEARCH

LEDS

For my product I will be using LEDS. I will need to purchase these so I will be sourcing the LEDS from various companies to search for the best price. On a larger scale manufacture reductions in price could occur from buying in bulk which would reduce the cost of LEDS in the production of my product.

LED 1:
This range of high brightness star LEDs offers up to 75 lumens at 700mA. The device consists of an LED mounted on a hexagonal aluminium base that functions as a heatsink and is electrically isolated so that the device may be mounted directly onto a metal chassis, etc. The distinctive design of this device enables the mounting of a number of LEDs in a tight configuration, giving an opportunity to create a high light level output in a small area. The positives of the LED include:

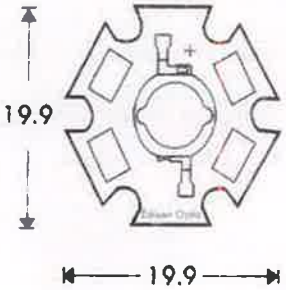
- The High flux output means more energy efficiency than incandescent and most halogen lamps.
- Solid state technology offers robust and durable technology with a life expectancy of more than 100,000 hours.
- Long life spans offer savings in reduced maintenance costs.
- Lambertian radiation pattern for ready-focussed beam with a wide viewing angle of 120° to 140° .
- Wide range of vivid colours – white and warm white versions available.
- Applications include reading lights, portable lighting, interior lighting, security and garden lighting, architectural lighting, LCD backlights.
- Instant light – less than 100ns.
- Package diameter 19mm, lens diameter 6mm, overall height 6mm. Low voltage DC operation, fully dimmable — for suitable drivers see **LED drivers** in **Integrated Circuits** section.

The price of the white LEDs, which I would be using cost £2.95 each. However if the product were to be produced on a large and commercial scale there would be reductions in price due to purchasing in bulk.
The shape and the brightness of the LEDS would suit my design and provide adequate light for reading.

Order Here (Exc. Vat / Inc. Vat)

Unit of Sale: EACH (1)

Description	Order Code	1+	25+	100+	250+	Qty	
LED STAR 3W WHITE 90LM (RC)	55-1988	£2.95	£2.75	£2.65	£2.55	1	Buy
LED STAR 3W WARM WHITE 70LM (RC)	55-1876	£2.95	£2.75	£2.65	£2.55	1	Buy
LED STAR 3W RED 70LM (RC)	55-1878	£3.63	£3.38	£3.25	£3.13	1	Buy
LED STAR 3W AMBER 90LM (RC)	55-1880	£3.63	£3.38	£3.25	£3.13	1	Buy
LED STAR 3W GREEN 100LM (RC)	55-1882	£3.69	£3.44	£3.31	£3.19	1	Buy
LED STAR 3W BLUE (RC)	55-1884	£3.63	£3.38	£3.25		1	Buy



LED 2:
These star type LEDs from **TruOpto** are high flux modules that are mounted on an alumina PCB substrate. They are more energy efficient than incandescent and most halogen lamps. Available in a range of colours, including white and warm white, the range of applications for these LEDs include lighting and signalling functions for reading lights, small and large portable lighting, indoor and outdoor architectural lighting, general lighting and beacons. The features include:

- Reflow soldering process compatible
- High luminous flux
- Low voltage operation
- Long operational life
- Low thermal resistance 12°C/W
- Lambertian radiation pattern for wide viewing angle
- Wide operating temperature range from –30°C to +110°C
- Dimensions 19.9mm AF, overall height 6.1mm

The White LED would cost £2.63 which is slightly slower than the previous LED. However this LED is 1W rather than the previous 3W which means that less light would be produced therefore more LEDs would need to be purchased. For this reason I will not be purchasing this LED.

Order Here (Exc. Vat / Inc. Vat)

Unit of Sale: EACH (1)

Description	Order Code	1+	25+	100+	250+	Qty	
LED STAR 1W WHITE (RC)	55-2248	£2.63	£2.44	£2.31	£2.19	1	Buy
LED STAR 1W WARM WHITE (RC)	55-2250	£2.63	£2.44	£2.31	£2.19	1	Buy
LED STAR 1W RED (RC) 55-2252 back Order	55-2252	£2.63	£2.44	£2.31	£2.19	1	Back Order
LED STAR 1W AMBER (RC)	55-2254	£2.63	£2.44	£2.31	£2.19	1	Buy
LED STAR 1W BLUE (RC) 55-2258 back Order	55-2258	£2.63	£2.44	£2.31	£2.13	1	Back Order

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LED 3:
This consists of a range of high power surface mount LEDs capable of producing up to 25cd of luminous flux at 350mA. The features include:

- High luminance
- Up to 120° viewing angle (see technical specification)
- Water clear lens
- PLCC-4 package
- Suitable for surface mount, assembly and solder processes
- Applications include traffic signals, back lighting, automotive lighting, indoor and outdoor commercial and architectural lighting

This LED costs £4.32 per LED which is almost double For that reason I will not be purchasing this LED.

Order Here (Exc. Vat / Inc. Vat)

Unit of Sale: EACH (1)

Description	Order Code	Price	Qty	
KA-1010PWC9 XPOWER LED WHITE (RC) 56-0214 back Order	56-0214	£4.32	1	Back Order
KA-1010SEC28 XPOWER LED RED-ORANGE (RC) 72-8005 stock due in < 1 week	72-8005	£0.94	1	Back Order
KA-1010SYC28 XPOWER LED YELLOW (RC)	72-8000	£0.30	1	Buy
KA-1011UYC28 XPOWER LED YELLOW 100LM RC	72-8020	£0.25	1	Buy
KA-1010ZG10ZC LED PLCC-4 GREEN WIDE (RC) 72-8010 back Order	72-8010	£1.46	1	Back Order
KA-1010QB9ZC XPOWER LED BLUE WIDE (RC) 72-8015 back Order	72-8015	Was £0.30 NOW £2.50	1	Back Order

Conclusion: I will be purchasing the 3W star LEDS from Rapid. I will purchase them online with next day delivery so I will purchase them as I need them. To produce sufficient light for reading I will be purchasing 12 LEDS which will be connected using PCB boards. I have also added in the dimming effect the frosted acrylic will cause so enough light is produced.

Final Design & Its Evaluation

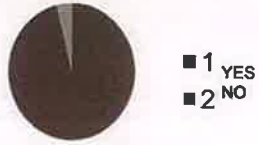
After developing my initial idea I came to my final design proposal. I used idea 3 because it matched all of the requirements, compared to all of the other designs, 1, 2 and 4. Both my client and I felt that idea 3 had the greatest potential to be developed into a design which would suit my clients need and become a viable product. The design allows for relatively easy manufacture as jigs are used. Although the design is fairly complex and there are numerous parts I feel that I will be able to complete the product, to a high standard, in a fairly short space of time. I have sourced the materials and will be reducing the costs of my product where ever possible to reduce the overall cost to my client and make the product more viable as a business opportunity. Now that I have fully developed my idea I will be evaluating it against my specification to ensure that all spec points have been addressed. Through fur-filling all of the design criteria I can ensure that the design will suit the needs of my target market.

	Specification Points	Design 3
Purpose/Function	1. The lamp should be environmentally friendly.	1. Through the choice of materials, the production techniques employed and the energy used from the solar panels it is possible to say that the design will be environmentally friendly and will have minimal impacts of the environment.,
Form	2. The design should consist of a mixture between straight edges and organic shapes.	2. The lamp consists of a mixture between curved section and straight. The curved sections are present in the curved aluminium and in the aluminium stand. The straight section is found in the base and on the curved section ends and between the aluminium.
User Requirements	3. The design should be original, stylish and professional looking. 4. The design should be aesthetically pleasing and suit the surrounding area. 5. Variation in colour and materials should be incorporated into the design (black/silver, wood/metal) this will improve aesthetics.	3. From the questionnaire I discovered that 92% of my target market said that the design looked original, stylish and professional looking. 4. From the questionnaire I found out that 96% of my target market said that the design look aesthetically pleasing and suited the surrounding area. 5. There is clear evidence of variation in materials and colour in my product, the most prominent being the contrast between the aluminium stand and curves and the use of the rosewood. My client and I feel that the mixture is highly desirable and suits his taste.
Performance Requirements	6. The lamp should be bright enough to ensure ease of reading. 7. The lamp must be adjustable. 8. The lamp must be durable enough to withstand knocks and have a long lifespan. 9. The lamp must be able to withstand a fall from 580mm. 10. The design should use either energy saving, low energy bulbs or LEDS to reduce the impact on the environment.	6. I will use a questionnaire to test this spec point. This will be conducted after manufacture of the light. 7. The design is very adjustable with the sliding curved aluminium allowing the focus of the light to be moved to achieve maximum lighting where it is needed. 9. I will be performing a drop test from 580mm after manufacture to ensure that the lamp can survive the fall. I feel that the materials and joints used this will be easily achievable. 10. The design uses LEDs which will reduce the impact on the environment.
Materials and Components	11. The design should have an on/off switch on either the mains cable or on the lamp itself. Another alternative includes the lamp being made into a touch lamp to operate the switch. 12. A proportion of the materials used in the product must be sustainable or consider sustainability. A proportion of the materials used in the product must be able to be recycled. The materials should be used carefully to ensure that little waste is left. 13. The lamps cable must be at least 980mm long. 14. The design must suit the surroundings. To do this I will incorporate wood into my design.	11.The design has the on/;off switch located on the mains cable which allows ease of use. 12. All of my materials have been chosen with sustainability in mind. The aluminium plate and rosewood were both scrap which has no additional effect on the environment. I used veneered plywood instead of solid rosewood to reduce the usage of the rarer slower growing wood. I used LEDS which have an extremely long lifespan which will mean that they use less energy overall. 13. I will measure the cable to ensure it meets the minimum dimensions. 14. The design does use wood however I will be using a questionnaire to test whether the design suits the surroundings after manufacture.
Size	15. The lights base must not exceed 250mm x 250mm.	15. The base is circular and has a diameter of 140mm.
Safety and Quality	16. There should be no sharp edges which could potentially harm people. 17. The light must have a stable base to ensure the lamp does not become unbalanced and falls over which could potentially harm people and damage the lamp or the customers property. 18. There should be no loose parts or parts easily broken which could be ingested by children or animals alike. 19. The lamp should not be so tall it could topple easily and be a danger to people and property. 20. The electrics must be safe and insulated to ensure that the user cannot be shocked by the electricity.	16. I will be using a questionnaire to test this spec point. This will be carried out concluding manufacture. 17. I will be using some quality tests to check this point which will include attempting to measure how easy or hard it is to knock the light over. My modelling showed the circular base was the most stable. 18. I will use a questionnaire to test this spec point, this will be done after manufacture. 19. I will be performing a 'knock' test to ensure the lamp is not too tall, this will be done after manufacture. 20. I will be performing safety inspections and have a trained electrician to also inspect my work to ensure that the lamp is safe after manufacture.
Scale of production	21. Less energy consuming methods of production must be used where possible. 22. The product should include at least one method of batch production.	21. I have chosen less energy consuming methods in my product where ever I was able to do so. I was able to use more machines in the production due to the energy produced from the solar panels on the schools roof. 22. The main aspect of the design includes the curved aluminum section. This was produced after constructing a jig which can be used to produce identical replicas of the same curve which allows fast and accurate manufacture. The jig will be recycled within the school to help produce other students work and therefore the materials I used will not simply be wasted.
Cost	23. The lamp should cost no more than 80 pounds.	23. The total cost of manufacture is £79.70

Questionnaire

I will be using a questionnaire to evaluate certain aspects of my specification. I will be surveying 50 people who are in my target market, this will include my client.

3. Does the design look original, stylish and professional looking?



4. After showing a picture of the area which the light will be placed I asked; does the design look aesthetically pleasing and suit the surrounding area?

Manufacturing Schedule

In this page I will be constructing my manufacturing schedule which will assist me during my manufacture. I will including the time taken, materials and tools used, the costs, quality control checks and finally the health and safety considerations.

Process	Sub-Process	Time (minutes)	Materials and tools used	Cost (GBP £)	Quality Control Checks	Health and Safety Considerations
Making the Base	Planning and Wood turning	60 minutes	Materials: Rosewood, plywood, PVA Tools: wood plainer, wood turning machine, cutting tools	Plywood- £1.50 PVA- £0.20	■I will use a spirit level to ensure that the base is horizontal before wood turning. ■I will ensure that the wood is circular using a compass. ■I will ensure that the top of the wood is horizontal using a spirit level.	I will ensure that students are not in close proximity to me while working which could cause harm to them or me. I will use the correct equipment for both processes. I will remove my tie while wood turning and wear goggles and a mask so I do not breathe in too much dust.
	Finishing the Base	30 minutes	Materials: Rosewood Tools: wood turning machine, sand paper	N/A	■I will ensure that all edges and faces are smooth, there are no splinters or cracks in the surface of any side. I will do this by inspecting the work and also getting another student to check the quality of the base.	I will be wearing goggles and a mask to ensure I don't breathe in too much dust from sanding the wood.
	Mortice cutter	30 minutes	Materials: Rosewood, plywood, PVA Tools: Mortice cutter, clamps	Plywood- £1.50 PVA- £0.20	■I will check that the measurements are correct, during and after cutting to ensure that the hole is cut to the correct dimensions ■I will check that the cutter has not created splinters in and around the hole.	I will be wearing goggles and an apron while using the machine. I will be assisted by trained staff to ensure I do not get hurt. There will not be students in close proximity which could lead to accidents. I will locate all of the emergency stop switches prior to using the machine in-case of emergency.
	Drilling	30 minutes	Materials: Rosewood Tools: Pillar drill, drill bit, spirit level, tri-square, clamps	N/A	■I will ensure that the hole has been cut in the correct position and the wood has not been damaged by the drilling.	I will be wearing goggles and an apron while using the machine, I will locate all emergency stop switches prior to using the machine in case of emergency.
	Counter-boring	30 minutes	Materials: Rosewood Tools: Pillar drill, drill bit, spirit level, tri-square, clamps	N/A	■I will ensure that the hole has been cut to the correct depth ■I will check that the bolt head is hidden in the counter-bore.	I will be wearing goggles and an apron while using the machine, I will locate all emergency stop switches prior to using the machine in case of emergency. I will cut the wood slowly to ensure the wood does not overheat and burn.
	Chiselling	15 minutes	Materials: Rosewood Tools: Chisel	N/A	■I will ensure the hole is large enough to house the cable adaptor. ■I will ensure the wood does not chip or crack.	I will be very careful when using the chisel ensuring that I am always working away from my body and that my hands are always behind the direction the chisel is moving. I will make sure that no one is around me that could cause harm to myself or to them.
Making the Stand	Cutting out shape	90 minutes	Materials: Aluminium Tools: Pillar drill, drill bit, clamps	N/A	■I will ensure that all of the holes overlap so the shape is cut out. ■I will cut as close to the line as I can to speed up the cutting which will follow.	I will be wearing goggles and an apron while using the machine, I will locate all emergency stop switches prior to using the machine in case of emergency. I will use a lubricating fluid to ensure the aluminium does not overheat.
	Smoothing edges using band-saw	30 minutes	Materials: Aluminium Tools: band-saw	N/A	■I will ensure that the shape is being cut out to the correct shape using a template.	I will be wearing goggles and a mask while using the machine, I will locate all emergency stop buttons prior to using the machine in case of emergency, I will be taught on using the machine and supervised while doing so to reduce the risks of an accident.
	Milling the stand	60 minutes	Materials: Aluminium Tools: Milling machine	N/A	■I will ensure that I am cutting the aluminium to the correct shape, using templates. ■I will check the insert fits into the base.	I will be wearing goggles and a mask while using the machine, I will locate all emergency stop buttons prior to using the machine in case of emergency, I will be taught on using the machine and supervised while doing so to reduce the risks of an accident.
	Filing the stand	30 minutes	Materials: Aluminium Tools: Bastard and smooth cut files	N/A	■I will check that I am cutting the correct shape using a template. ■I will continually clean the file to make sure aluminium files do not get lodged and scratch the work to pieces.	I will make sure that no students are in close proximity and will work slowly and carefully making sure that I do not hurt myself on any sharp edges which there may be.
	Drilling and threading	30 minutes	Materials: Aluminium Tools: Pillar drill, drill bit, spirit level, tri-square, clamps.	N/A	■I will ensure that I am cutting to the correct depth. ■I will check that the drill bit is positioned correctly.	I will be wearing goggles and an apron while using the machine, I will locate all emergency stop switches prior to using the machine in case of emergency. I will make sure that I do not get the cutting compound into my eyes or into other students eyes.
	Sanding to Finish	30 minutes	Materials: Aluminium Tools: Palm sander	N/A	■I will make sure that there are no major scratches on the surface of the aluminium.	I will wear goggles and a mask to ensure I do not breathe have any breathing problems.
Making the Light	Lathe- facing off	30 minutes	Materials: Aluminium Tube Tools: Lathe	N/A	■I will check that the aluminium is cut to the correct length.	I will be wearing goggles and a mask while using the machine, I will locate all emergency stop buttons prior to using the machine in case of emergency, I will be taught on using the machine and supervised while doing so to reduce the risks of an accident.
	Making the Jig	270 minutes	Materials: Mild steel Tools: Lathe, milling machine, pillar drill, tap and die, hand saw.	Mild steel- £25.00	■I will ensure the rollers diameter and central hole diameter are both correct ■I will ensure the arms groove is to the correct width and length ■I will ensure the roller corrector piece and nylon fits within the roller. ■I will ensure the face plate can house the rotating piece.	I will be wearing goggles while using any machines. I will locate all of the emergency stop buttons before beginning manufacture. I will be supervised while using any of the machines which will reduce the risk of an accident. I will ensure no other students are in close proximity to me while I am working.

Manufacturing Schedule

Process	Sub-Process	Time	Tools and Materials	Cost	Quality Control	Health and Safety
	Drilling and threading the holes to connect the curved aluminium and the base.	60 minutes	Materials: Aluminium Tube and Aluminium block Tools: Pillar drill, tap and die	N/A	■ I will ensure that the holes all line up through the three pieces.	I will be wearing goggles while using the machine, I will locate all emergency stop buttons prior to using the machine in case of emergency, I will be taught on using the machine and supervised while doing so to reduce the risks of an accident.
	Making the nylon bolts	90 minutes	Materials: Nylon Tools: Lathe, tap and die	£2.40	■ I will ensure the bolts are the correct diameter so will fit into the threaded holes in the base. ■ I will check that the bolts are all the same size.	I will be wearing goggles while using the machine, I will locate all emergency stop buttons prior to using the machine in case of emergency, I will be taught on using the machine and supervised while doing so to reduce the risks of an accident.
	Attaching the PTFE to the Aluminium	60 minutes	Materials: PTFE Tools: Drill, tap and die	£10.00	■ I will ensure that I cut the PTFE to the correct length. ■ I will ensure I use enough screws to hold the PTFE securely.	I will make sure that no other students are near me while I am using the drill. I will make sure I use goggles and have my tie tucked into my shirt.
	Making and attaching the brackets	150 minutes	Materials: aluminium plate, PTFE, copper strip Tools: Hammer, pillar drill, hack saw, pop rivet gun	N/A	■ I will make sure that the brackets line up correctly. ■ I will make sure the bracket is bent to 90 degrees. ■ I will make sure the bracket, PTFE and copper strip are all attached strongly.	I will make sure no one is around me while I am bending the aluminium plate. I will wear goggles while I am using the pillar drill. I will locate all the emergency buttons prior to using the machine in case of emergency.
	Making the square inserts	30 minutes	Materials: Rosewood and Acrylic rod Tools: Tennon saw, pillar drill	£3.00	■ I will make sure the square inserts are cut to the correct size. ■ I will make sure the holes line up to the inserts are positioned in the correct place. ■ I will make sure that the inserts are glued strongly in position.	I will make sure that I work slowly while using the Tennon saw with no one in close proximity to me. I will make sure that I use goggles while using the pillar drill and will be supervised while using the machine.
	Cutting the curve insert and veneering it.	30 minutes 60 minutes drying time	Materials: Plywood, rosewood veneer Tools: band saw, Tennon saw, veneer hammer, glue spreader.	£3.00	■ I will make sure the curve is identical to that of the aluminium. ■ I will make sure its the correct thickness. ■ I will make sure the veneer has been properly glued to the plywood. ■ I will make sure the insert has been glued strongly into place.	I will be supervised while using the band saw and will locate the emergency buttons prior to use. While using the contact adhesive I will make sure that the room is well ventilated and while make sure not to ingest any of the glue or allow any other student to accidentally ingest the glue or get it in their eyes.
	Cutting the plugs for the ends of the aluminium curves	60 minutes	Materials: Rosewood Tools: Tennon saw, disk sander	N/A	■ I will make sure the rosewood covers the ends of the aluminium curves. ■ I will make sure the plywood inserts are snug against the aluminium curves. ■ I will make sure the end covers are glued strongly to the curves.	I will make sure that I work slowly while using the Tennon saw with no one in close proximity to me. I will make sure that I use goggles while using the pillar drill and will be supervised while using the machine. While using the Araldite I will make sure that the room is well ventilated and while make sure not to ingest any of the glue or allow any other student to accidentally ingest the glue or get it in their eyes.
Assembling	Drilling the base	30 minutes	Materials: Rosewood Tools: Pillar drill	N/A	■ I will ensure the hole is the correct diameter, distance from the edge and correct depth.	I will make sure that I work very slowly so that the wood does not burn. I will make sure I locate all emergency stop buttons prior to using the machine. I will wear goggles while using the machine so I do not get any material in my eyes.
	Chiselling the Base	30 minutes	Materials: Rosewood Tools: Chisel	N/A	■ I will ensure the hole is the correct size and shape to house the cable adaptor. ■ I will make sure that the wood does not become chipped or damaged.	I will make sure that I keep my hands behind the chisel at all times in I slip while working. I will make sure that I have no distractions and that there are no other students around me.
	Drilling the Aluminium	30 minutes	Materials: Aluminium Tools: Pillar drill	N/A	■ I will make sure that the hole is cut along the correct line. ■ I will cut the hole to the correct depth and I will make sure that I intersect the diagonal hole.	I will be wearing goggles while using the machine, I will locate all emergency stop buttons prior to using the machine in case of emergency, I will be taught on using the machine and supervised while doing so to reduce the risks of an accident.
	Cutting the Acrylic	30 minutes	Materials: Acrylic Tools: band-saw		■ I will make sure that the plastic is cut to the correct length and width.	I will be wearing goggles while using the machine, I will locate all emergency stop buttons prior to using the machine in case of emergency, I will be taught on using the machine and supervised while doing so to reduce the risks of an accident. I will wear an apron to avoid clothing being caught in the machine.
	Attaching the Acrylic	30 minutes	Materials: Acrylic, Aluminium Curves Tools: Hand drill	N/A	■ I will make sure none of the self tapping screws become obstructed by other screws in the work. I will also make sure that the acrylic is attached securely.	I will be wearing goggles while using the drill, I will wear an apron to avoid clothing being caught in the machine.. While using the hand drill I will ensure no one is near me who could cause an accident.
	Drilling and attaching the acrylic	30 minutes	Materials: Acrylic, Aluminium Tools: Hand drill, Screw Driver	50p for the self tapping bolts	■ I will make sure that all of the holes line up so that the self tapping screws can be inserted through the acrylic and into the aluminium. ■ I will make sure that the acrylic is screwed tightly against the aluminium.	I will be wearing goggles when using the drill, I will wear an apron to ensure that my clothing does not get caught in the drill which could damage my clothes or cause me harm.
	Finishing off the Product	120 minutes	Materials: All Tools: Sandpaper, Emery Paper	N/A	■ I will make sure that all of the edges are not sharp which could cause harm. ■ I will make sure that I remove all scratches so that the designs quality is improved.	I will make sure that I am careful while sanding by hand to ensure I do not cut myself on any parts of my product. I will also take regular breaks so that I do not cause excessive stress on my muscles.

Over time taken to complete production: 26 and a half hours (including drying time)

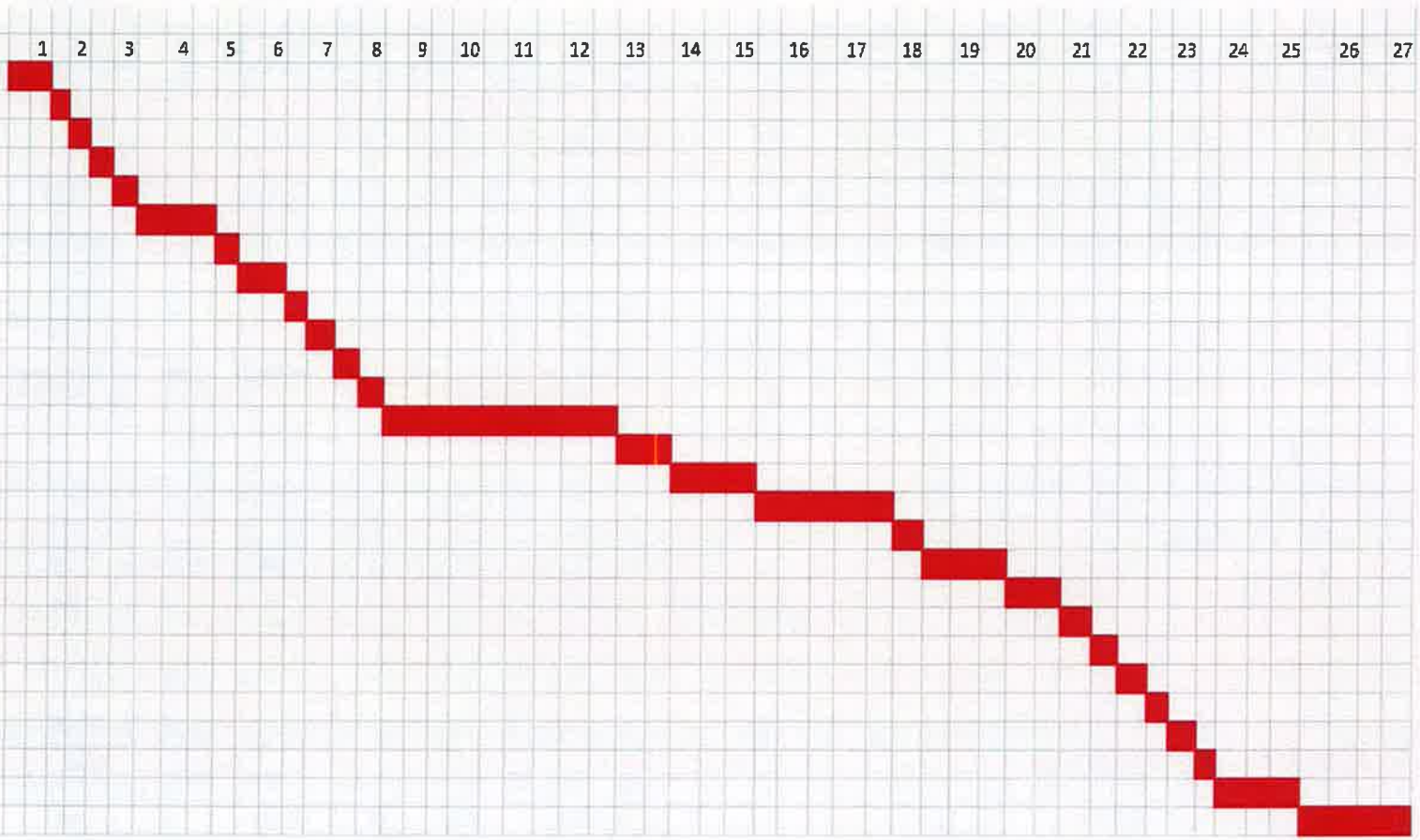
The ultra bright LEDS which I will be using for the light cost £2.70 each, I will have 12 LEDS which means the LEDS will cost £32.40. The total estimated cost of production: £79.70, this comes just under the £80.00 budget which is very positive.

Conclusion:
The manufacturing schedule shows each of the processes used in the product, its time allocated to complete, the materials, the cost of materials, what quality control checks need to be in place and the health and safety considerations. It will ensure that the costs are reduced as much as possible due to the pre-costed and chosen materials. This will increase the profit margins and reduce the cost to my client. A better visual representation is a flow chart. I will use flow charts to guide me through my manufacture.

Gantt Chart

I will be using a gantt chart to show the amount of time it will take me to complete each stage of manufacture. This is extremely useful as I can determine which aspects of my design are time consuming and find possible ways for me to reduce the time which will therefore save money. I will be predicting how long the processes will take, it will vary due to my level of experience in the process, the workability of the materials being used and the speed in which the tools, machines and materials could work. During manufacture I will be filling in my gantt chart using actual times, I will use this in my evaluation to evaluate how efficient I was during the manufacture.

Process	Time taken in Hours
Making the Base	Planeing and Wood Turning
	Finishing the Base
	Mortice Cutter
	Drilling
	Counter-boring
Making the Stand	Cutting the shape
	Smoothing edges (ban-saw)
	Milling the stand
	Filing the stand
	Drilling and threading
	Sanding to finish
Making the Light	Lathe - facing off
	Making the Jig
	Drilling and threading
	Making the Nylon bolts
	Making and attaching brackets
	Making the square inserts
	Cutting/veneering curve insert
	Cutting the plugs
Assembling	Drilling the base
	Chiselling the base
	Drilling the aluminium
	Cutting the acrylic
	Attaching the acrylic
	Drilling and attaching acrylic
	Finishing of the Lamp
	Drying Time

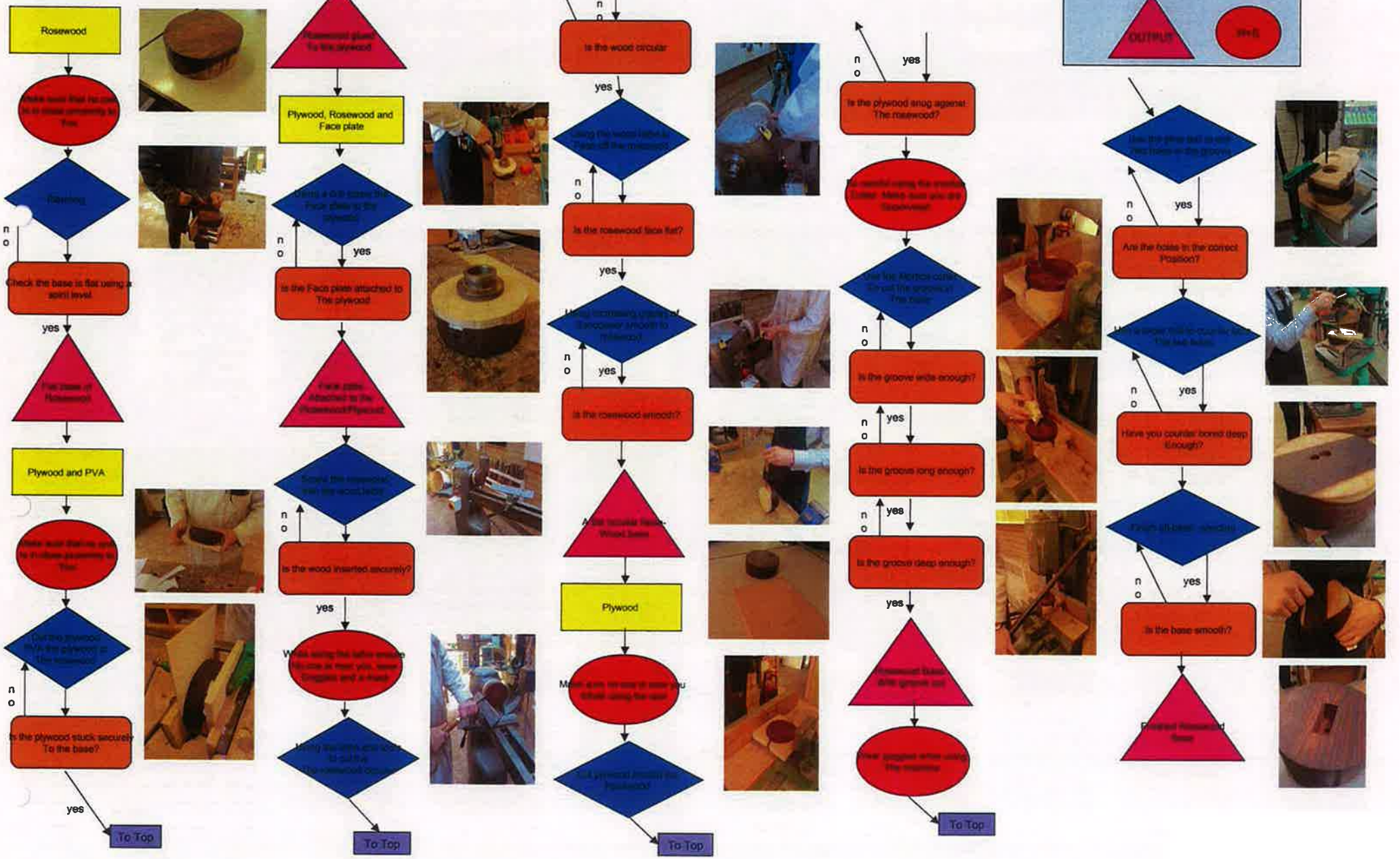


Conclusion:
The Gantt chart shows that the longer processes are; making the jig (4 and a half hours), making and attaching the brackets (2 and a half hours), Cutting and veneering the curve (1 hour and a half). Making the jig will take considerably longer due to the amount of lathe work that is required. The precision that I will need to make the individual parts will mean that the process will take me considerably longer. The brackets will take me quite long due to the technique nature of attaching the copper strips to ensure that they will stay in constant contact with the aluminium. Veneering will also take longer due to the high level of accuracy needed to achieve a high finish, I am very inexperienced in terms of veneering so I will be taking it slowly to ensure I achieve good results. A lot of the processes are relatively easy which will mean I can produce them much quicker.

Flow Chart

As my design is relatively complex I will be producing a flow diagram for one of the main aspects of my design. I will be able to work through the flow chart during my manufacture so that I know which processes I will be doing next and can be prepared. Flow charts are useful as they are very visual and an easy way to track your stage of manufacture so you can attempt to keep to deadlines. The section of manufacture which I will be producing a flow chart for will be the construction of the base. I will be using similar flow charts throughout my manufacture to ensure my product is produced correctly and to a high quality.

Making the Base









Firstly I gathered the materials for the base, I found a roughly circular piece of rose wood. I chose the wood because of its variation in colour, also the wood was scrap and if I had not chosen it then it would have gone to waste which is not environmentally friendly. To begin I had to plain the bottom of the base using a hand plainer.

Once the base was flat I was then able to attach the face plate. To do this I cut a piece of plywood so that it was larger than the circle and then glued the plywood to the rosewood with a piece of paper in between. This will allow me to separate the two later on easier. I used PVA glue to join the pieces. I put all three components into a vice and used clamps also to hold the pieces together so that the glue joint was strong. Once the glue had dried I used the band saw to cut around the rosewood so that the plywood base was flush with the edge of the circular rosewood. Using mathematical chords and a compass I was able to find the centre of the circular wood. I then marked the centre using a pencil.








Now I had to attach the chuck insert to the base. To do this I aligned the insert so that it was in the centre of the plywood and then screwed nails through holes in the insert which attached it to the plywood. Then base was then ready for the wood lathe.

I used a spirit level to ensure that the base was horizontal before wood turning. I used a range of wood turning tools to gradually carve the wood so that it was circular. I then repositioned myself and started to face the front of the wood off so that it was flat. I screwed my work into the wood lathe and then turned the machine on. I used a range of wood turning tools to gradually carve the wood so that it was circular.








I then repositioned myself and started to face the front of the wood off so that it was flat. Once the wood was circular, tested by using a compass and the face was roughly flat, tested using a spirit level, I used sandpaper to apply a nice finish to the wood. I began with coarse sandpaper and gradually used finer paper. I made sure to keep the paper moving so that it did not burn and mark the wood. As you use your hands to face off the wood it was not completely flat so I had to use a lathe to face it off properly. To do this I screwed the work into the lathe and then used the cross slide to cut across the face and slowly made the face completely flat, make sure not to burn or mark the work. Once the rosewood was circular and faced off I could now separate the rosewood from the plywood, to do this I used a chisel and pushed it between the two and then easily separated, I was careful not to damage the wood. There was some paper still stuck to the rosewood which I sanded off using a palm sander, I was especially careful not to damage or scratch any of the other surfaces as they were highly finished and I would have to repeat the sanding process again if I damaged it. I ensured that all edges and faces are smooth, there are no splinters or cracks in the surface of any side. I will do this by inspecting the work and also getting another student to check the quality of the base.

I gathered the aluminium which I wished to use for the stand. I found a piece of scrap aluminium which someone had left after using as much as they needed, this helps to reduce the impact of my product on the environment as it would have previously gone to waste. Using the to scale drawing that I drew in my modelling stage, I cut out the stand shape and used it as a template. I used engineers oil blue to mark the aluminium, I applied a thin layer of the oil blue to the aluminium and then once it had dried used a scribe to draw the outline of the stand.







the aluminium was very thick and the shape was fairly complex, it would not be time effective for me to attempt to cut the shape out using a saw. Instead I used a pillar drill to drill holes around the complete circumference of the shape. I work slowly and used an 8mm ...l bit so that I was not cutting too much material at once. I used lubricant so that the work and drill did not overheat and it would allow for smooth drilling. I made sure that all of the holes overlapped so that the work was being cut away from the rest of the aluminium. Once the drilling was completed I was left with the shape of the stand however there was sharp ridges around the work. The cut away the majority of the ridges I used the band saw which had a multi material blade on it which meant that it was able to cut the aluminium. I slowly moved the work around so that the blade cut off the ridges. I did not cut them completely off as I may have ruined the shape. As the bottom of the stand was going to be inserted into the wooden base, it had to be parallel so that it would fit flush with the base. To do this I used a milling machine. I clamped the work into the table so that it was parallel with the drill bit. I also changed t... bit so that I was using a long drill bit so it could cut through the thick aluminium. I slowly m... ...red the work so that I cut the bottom of the stand. The edges were parallel with each other and were straight which is important. Now I had to file the aluminium to get ... e which I wanted. I used a bastard cut file to begin with the remove the majority of the ma... ...d then used flier files to achieve a smoother finish. I used a square file to add the square edge to the part of the stand which is undercut and where it will be insert... the rosewood. I checked that all of the holes overlapped so the shape was cut out, I check... . I had cut as close to the line as possible. I used a template to help me cut the aluminium to the correct shape.

Manufacturing Diary


I then wrapped the aluminium in masking tape so that it did not get damaged after I had sanded it using the palm sander, this is only a rough finish and I will be finishing the aluminium properly towards the end of manufacture.





I then drilled two 8mm holes in the base of the aluminium. To do this I set up the aluminium so that it was horizontal using a spirit level but also a tri-square. I cut very slowly to ensure the material did not move within the clamp. I used a lubricant so that the aluminium did not overheat. Once I had drilled the holes I threaded them using a tap and die. I worked slowly ensuring the thread was properly cut and used a cutting compound to assist with the cutting.



Once I had cut the aluminium stand I began the process of cutting the hole to house the stand. Firstly I marked out the shape of the base on a piece of plywood and cut it out using a saw to reduce my energy consumption. I used the plywood so tightening the clamp in the machine did not damage the work.



I cut the hole using the mortice cutter, I worked very slowly checking the sizes of the aluminium stand so that I could achieve a very snug fit. I checked that the measurements are correct, during and after cutting to ensure that the hole is cut to the correct dimensions. I also checked that the cutter has not created splinters in and around the hole.




Once I had cut the hole large enough for the aluminium stand to fit in I began drilling the holes to attach the components together. I marked out where the holes needed to be and used a pillar drill to cut two 8mm holes. I placed a piece of wood on top of the wood so that the clamps did not damage the work. Once I had successfully drilled the holes I used a 12mm drill to counter bore the holes from the bottom, I worked progressively to cut the holes to the correct depth. I checked to ensure that the hole has been cut in the correct position and the wood has not been damaged by the drilling, the holes have been cut to the correct depth and the bolt head is disguised.



I then began construction of the aluminium curves. Firstly I cut them to the correct size and then I used a lathe to face off the ends of the aluminium so they were ready for the next stage of manufacture. I checked twice that I was cutting the aluminium to the correct length, both while I was using the saw and made sure not to face off too much material. I ensured the faces were left smooth.









Here I used to lathe to face off and round the mild steel which will be used for the roller. I ensured that the insider hole was the correct dimensions and that the outside edge was smooth, using emery cloth so that it does not damage my work.

I used the milling machine to cut the groove in the moving arm where the roller attachment will be placed, this allows me to adjust the position of the roller and achieve a more accurate curve. I also drilled the hole in both ends of the arm which will house the handle and the attachment to the base. I ensure that I milled the groove to the correct width and length so that the roller attachment will slot into it. I ensure the holes at either end are to the correct diameter.

I used the milling machine to cut the slot in the mild steel that will hold the aluminium which will be bent. I also drill the holes in the sides which will be used to attach the grip to the plywood. I ensured the slot is wide enough to house the aluminium.

Here I cut the curve out two pieces of plywood and then screwed them together to increase the thickness. The second photo shows the base plate which will be screwed to the plywood and the piece where the arm will be attached and able to rotate on. I ensure all of the pieces were cut to the correct dimensions.








This piece will hold the roller. I used the lathe to round a hexagonal piece of mild steel. I used a tap to create a thread on the top which will hold the roller to the arm. I used a piece of nylon to decrease the friction between the two pieces of mild steel. I will ensure that the diameter of the piece will be the same size as the insider hole of the roller.

This piece is made from mild steel and I used the lathe to create the shape. This piece is inserted into the face plate. The arm will slot onto this piece and will be the moving aspect of the arm. I threaded the end so that a bolt could be used to hold the arm to this piece. I ensured the piece slotted into the face plate and that the diameter was the same as that of the arm pieces hole.

Here shows me using my jig to bend the aluminium into curves. I ensured the curves were bent properly and that they held their shape so that all 4 pieces were identical copies of each other.

Manufacturing Diary










Here I used a pillar drill to cut the holes in the bent aluminium which will be attached to the aluminium base. I used masking tap to hold the two pieces together so that the holes were in the same position. I then used the bent aluminium holes to guide the drilling of the aluminium stand. I then threaded the holes using a tap.

I used the lathe to create four nylon bolts, this is so that either side of the curves are separated electrically. I used a venire gauge to ensure the bolts were to the correct diameter and that the bolt heads were also the correct size.

This is the PTFE which I will use to reduce the friction between the curved aluminium.





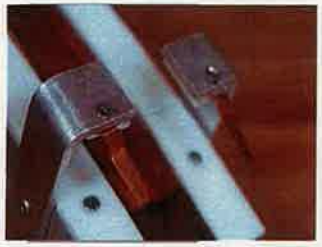



I used the band saw to cut two long strips of PTFE. I then marked out the length of strip which I wanted to used and cut it with a tennon saw. I used as little PTFE as I could due to its cost and to reduce the amount of resources which I use in my product. I checked and double checked that I had measured the lengths correctly before I cut them to ensure I did not waste any of the material.

I used the hand drill to drill holes through the PTFE and aluminium. I then counter sunk the holes so that the screws would be flush with the PTFE. I used a tap to thread the holes in the aluminium and then inserted the screws which held the pieces together. I ensured I was using the correct sized drill before drilling to avoid mistakes

Now I began making the brackets for the curved aluminium. I cut them to size using a hack saw and then used a hammer to cold bend the brackets into right angles. I checked they were right angles using a tri square.









I used the pillar drill to cut the holes in both the bracket and then the curved aluminium. I am only using one pop rivet so that they can move slightly as the aluminium is not a perfect curve. I made sure the holes lined up correctly so the bracket is in the right place.

I then constructed the electrical contacts. Firstly I bent a piece of copper, then I drilled a hole through the bracket, PTFE and copper. I then used a bolt and nut to attach all three pieces together. I made sure that the copper was bent in a way that the copper stays in contact with the aluminium.

I then used pop rivets to attach the brackets to the aluminium curves. I attached two on either side which will hold the curves together. I ensured that the pop rivets were inserted correctly and were not going to break.

I then manufactured the spacers between the aluminium curves. To do this I selected small pieces of rosewood and used a tennon saw to cut the squares. I them used a pillar drill to drill through the rosewood and on either side of the rosewood. I then inserted an acrylic rod through the three pieces and glued using araldite.







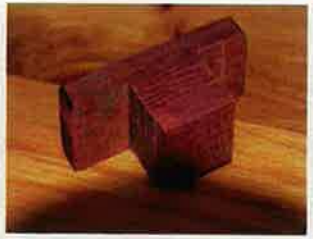
I then used MDF for the insert between the two curves. To do this I used the band saw to cut the profile of the curve. I then cut the thickness of the curve which is roughly half the thickness of the aluminium curves. Once the curve was cut I marked out the length which I needed an used a tennon saw to cut the length. I ensured the curve was cut to the correct diameter and that the length was correct so it slots into the gap perfectly.

I then veneered the back side of the plywood insert as that side will be seen from the outside. It also means that I have reduced the amount of rosewood which I am using by veneering which is positive for the environment. I ensured that the veneer was stuck strongly to the plywood using a contact adhesive. I also made sure the edges were not sharp which could potentially cause harm.

I used araldite to glue the plywood insert between the two aluminium curves. I used G clamps to hold the pieces together while it was gluing. Once it had dried I sanded and then polished the rosewood veneer insert.

Manufacturing Diary



Here I have been producing the stoppers which will cover the ends of the aluminium curves. I used a Tennon saw to cut the shapes and sanded the shapes to achieve an accurate finish. I used the Tennon saw to reduce the amount of energy I am using for my product. I worked slowly to ensure that the stoppers are cut to the correct dimensions to reduce waste. I will continually compare the stoppers to where they will be placed so they are accurate.





Here I have drilled into the base of the Rosewood using a forsettner drill. This will be using to house the cables and the mains cable connector. Once I drilled the hole to the correct depth I drill a hole intersecting into the hole from the side. I then used the chisel to cut the shape of the cable adaptor so it could be slotted into position. I used the pillar drill to drill diagonally to connect the hole for the stand and the hole which I have just drilled so that cables do not need to go out of the base. I ensured that I cut to the correct depth and that the hole tightly housed the cable adaptor.







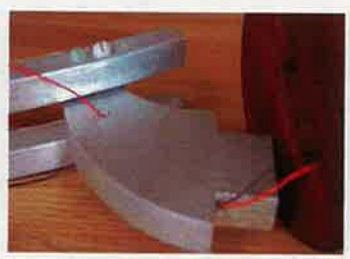

Here I have drilled into the aluminium, I drilled diagonally so that when I drilled across the work the holes intersected and it would enable me to run the cables through the base through this hole and come out near the aluminium curves so that the cables are as discrete as possible. I ensured that the hole was drilled at the correct angle and to the correct depth. I took great care in ensuring that the hole intersected the diagonal hole.

Now I begun to construct the plastic sheet which will cover the LEDS and be mounted onto the aluminium curves. Firstly I used the band-saw to cut the acrylic to size. I used masking tape to hold the acrylic to the curve and then drilled the holes through the plastic into the aluminium tubing. I then used self tapping screws to hold the plastic in place. I then dissembled this so that I could mount the LEDS in place. I will ensure the plastic is cut to the correct length and width, the screws do not interfere with any other screws which are present in the curve and finally ensure the screws hold the acrylic tight to the curve.








I then connected up the wires and mounted the LEDS. I used a soldering iron to solder the exposed wires to the aluminium tubing and to the plug adaptor. I ensured that the wires were soldered directly to the material so that the electricity could pass through the materials.

I then began to sand and finish off the product. I sanded the work by hand to reduce the amount of electricity I was using for the product. I used ascending grades of sandpaper followed by wet and dry paper to give the aluminium a satin finish. While I was assembling the work I worked very slowly so that I did not scratch or damage the work. While I was gluing pieces together I made sure not to sure too much which would make the work look unattractive.



Now that I have completed my manufacture I will begin the evaluation of my product..

Product Testing

Now that I have completed the manufacture of my product I will be completing the final tests and questionnaires and questionnaires to ensure that my product has fur filled all of the specification points. I will also be conducting safety tests to ensure the products safe to use before handing the product over to my client. I will take this opportunity to ask what improvements my target market and client feel could be made to my product to increase its desirability and potential to be successful in the wider market.

6. The lamp should be bright enough to ensure ease of reading.

To test this I asked 10 members of my target market to test the product out to pass this test. The test was simply to read 3 different sized font books to make sure that sufficient light is produced to ensure ease of reading which is the aim of the product.

After conducting the test I can conclude that the design does provide enough light for easy reading. This was evident even when reading the smaller font books. This is needed as the purpose of my lamp is for reading.

Client Feedback: I have to wear glasses while reading however I found the light produced adequate light to ensure easy reading.

13. The lamps cable must be at least 980mm long.

The cable is roughly 11ft 8 inches. I tested this simply by measuring the length of the cable. The long cable ensures that the design will be able to be placed where it is desired and will move about with ease.

9. The lamp must be able to withstand a fall from 580mm.

To test this I will be using a simple 'knock test' which will create the fall from 580mm. After performing multiple drop tests and inspecting the product I can ensure that the design can withstand a fall from a height of 580mm. This was needed as my client wanted to ensure the product had a long lifespan.

Client Feedback: I am very pleased the lamp can withstand a fall from that height simply because my last lamp broke because of such a fall and I do not wish to have to purchase a new light.

14. The design must suit the surroundings. To do this I will incorporate wood into my design.

To test this I am using a questionnaire. The question which is posed to 50 members of my target market is: does the design suit the surroundings? I will show the target market a photograph of the area which the lamp will be situated so they can assess whether it suits its surroundings.

Client Feedback: I feel the design suits the surroundings and am thoroughly pleased with the design and its aesthetics.

18. There should be no loose parts or parts easily broken which could be ingested by children or animals alike.

To test this I will be using a questionnaire which will be posed to 50 members of my target market. 'Are there any loose parts or parts which could be easily broken on the design?.

From testing my product I have found that 100% of my target market found no loose parts or parts which could be easily broken. This is very important to ensure that no parts could be ingested by children and animals.

Client Feedback: I am very pleased that the product passed this test as I often have young nieces and nephews that I would not want them to be harmed by the light.

16. There should be no sharp edges which could potentially harm people.

To test this I will be using two methods. Firstly I will use tissue paper and run the paper over all of the corners and edges as an initial test that there is no sharp edges. Then I will be running my hands over all of the edges. I will be doing this extremely slowly to ensure that I do not cause injury to myself.

After testing the edges which firstly tissue paper and then using my hands I have successfully ensured that the edges are not sharp and will not harm anyone should they come into contact with the product.

Client Feedback: I am very pleased that the product passed this test as I often have young nieces and nephews that I would not want them to be harmed by the light.

20. The electrics must be safe and insulated to ensure that the user cannot be shocked by the electricity.

I used an electrician and myself to test the electrics to ensure that the are safe to use. I ensured that there were no exposed wires which could harm people. The electricity passing through the lamp is such a low voltage that it could not harm anyone.

19. The lamp should not be so tall it could topple easily and be a danger to people and property.

To test this I will be using knock tests from various positions to ensure the height is not too tall so the product is knocked over easily. After performing the knock tests I can ensure that the lamp is not too tall which means it is not toppled easily which could cause potential harm and damage. The lamp can be pushed over forwards when its extended with a reasonable level of force. I would consider slightly altering the shape or the weight of the base so that this was not possible.

Client Feedback: I am very pleased that the product passed this test as I often have young nieces and nephews that I would not want them to be harmed by the light.

17. The light must have a stable base to ensure the lamp does not become unbalanced and falls over which could potentially harm people and damage the lamp or the customers property.

To test this I will be using knock tests to assess how stable the design is in various positions. From my modelling I found that the circular base was the most stable however a larger design may have altered this. After performing the knock tests I can now ensure that the size and shape of the base is large enough that the product is not easily unbalanced which would cause it to fall over and potentially harm someone or damage their property.

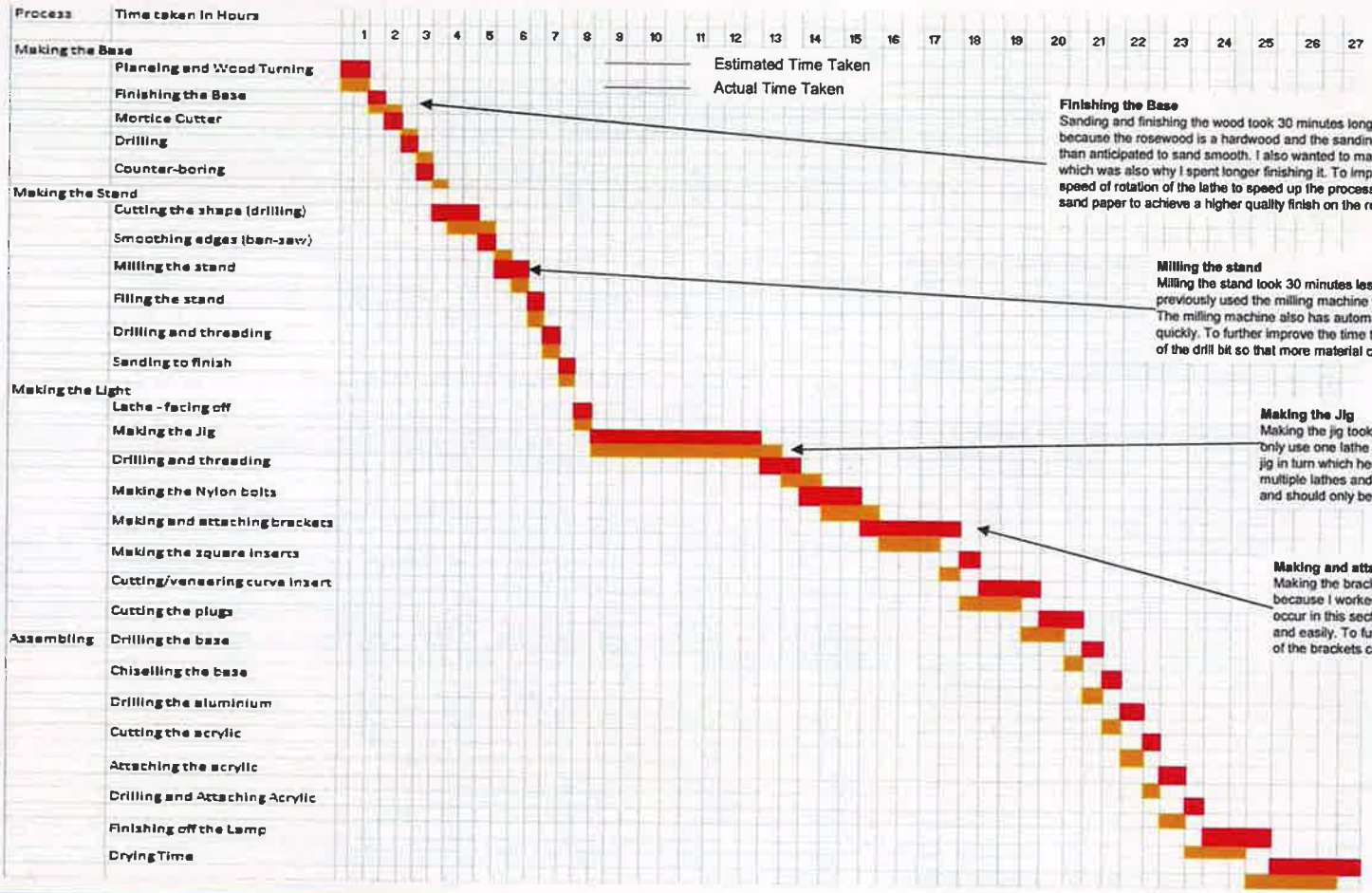
Client Feedback: I am very pleased that the product passed this test as I often have young nieces and nephews that I would not want them to be harmed by the light.

From my final evaluation of my product and this page of product testing I can [illegible]ure that my product fur fills all of the specification points which were stated. The points were tested in a range of w[illegible]ng different techniques.

Evaluation

In this section I will be evaluating my time management. In order to evaluate this I filled in the actual times taken into my Gantt chart and will compare to my predicted times. I have added annotations to the chart to highlight the anomalous areas where the manufacture took either longer or shorter than anticipated. I will explain the possible reason for the anomalies and state any possible improvements which could be made to decrease the time of manufacture.

Evaluation of Time management



Finishing the Base
Sanding and finishing the wood took 30 minutes longer than expected. This was because the rosewood is a hardwood and the sanding process took much longer than anticipated to sand smooth. I also wanted to make the base especially nice which was also why I spent longer finishing it. To improve this I would increase the speed of rotation of the lathe to speed up the process. I would also use even finer sand paper to achieve a higher quality finish on the rosewood.

Milling the stand
Milling the stand took 30 minutes less time than expected. This was because I had previously used the milling machine which enabled me to work fast and efficiently. The milling machine also has automated levers which makes it easy to operate quickly. To further improve the time taken I would increase the size and sharpness of the drill bit so that more material can be removed at a time.

Making the Jig
Making the jig took 30 minutes longer than expected. This was because I could only use one lathe at a time which meant that I had to produce each part of the jig in turn which heavily slowed down my progress. To improve this I would use multiple lathes and cut multiple pieces at once, however this may be tricky to do and should only be undertaken if you are experienced.

Making and attaching the Brackets
Making the brackets took 60 minutes less time than I had expected. This was because I worked very efficiently, previously I had foreseen possible mistakes to occur in this section but they did not arise. Bending the brackets was very quickly and easily. To further improve the process I would possible make a jig so that all of the brackets could be bent and cut at once.

Apart from the occasions which have been stated I manufactured my product on schedule with my estimated times. However, if the manufacturing were to be commercialised the time could be further decreased by the following ways.

- Experience gained on the machines would enable you to work considerably faster without compromising quality or safety.
- Jigs could be used for the manufacture of the wood inserts and stoppers which would mean that they could be cut at once to the correct dimensions.
- With the angled drilling towards the end of the manufacture you could produce a wedge which could be placed under the base which would create the desired angle each time.

Evaluation of my Product: Questionnaire

I will be using a small questionnaire which I will pose to my target market so that I can evaluate the my product in terms of the desirability to my target market.

1. Do you feel the Lamp has been produced with a high quality finish?

From surveying 50 people, 45 people said that they felt the finish given to the lamp was to a high quality. The 5 people who did not agree did not like the standard of finish given to the brackets. This part was very hard to finish as I had cold bent the aluminium plate with a hammer which had severely scratched and dented the aluminium which was hard to remove. I could use other methods to bend the aluminium such as line bending however a thinner aluminium plate would need to be used to do this.

Client Feedback: I am very pleased with the finish. I like the satin finish which has been given to the aluminium and my favourite part is the rosewood base which has been finished extremely well.

2. Do you feel the materials chosen work well together?

Out of my 50 target market, 48 people said that they felt all of the materials of the design worked well. The two which did not agree said they would have liked more wood to be included as they felt the wood is by far more attractive than metal so I should have used more wood. Although they felt this they both still said that they would not hesitate in purchasing the product however if I were to remake the product it is something I should consider.

Client Feedback: I feel that the materials work perfectly together and all complement each-other. I feel the use of the metal contrasts the wood and that if anything improves the quality of the wood.

3. Do you feel that the product is sustainable enough for you to purchase the design for a higher price?

From my survey I found that 37 people said they would pay more for the product. The majority of the people who criticised its sustainability said they would have liked the materials to have been sourced from sustainable manufacturers to reduce the products impact on the environment. In particular the use of the slow growing rose-wood.

Client Feedback: I feel that the product has been considered with a high level of sustainability in mind. It has been produced considering environmental friendly processes and materials.

From this small questionnaire I have found that my product has a high quality finish, the materials work well and that I would be able to price my product higher due to its sustainability and would have a large market in which to aimed my product at. The views of my target market will be taken into account when I propose future modifications to my product if it were to be produced on a large commercial scale.

Evaluation

In this section I will evaluate different parts of the manufacture and the product. I will look at the successes, failures and difficulties and possible areas I could improve the product.

General Evaluation of my Product

Manufacturing Processes that went well

In the manufacture I found that the most successful area was the production of the rosewood base. The whole manufacture of the base took around 4 to 5 hours which was extremely quick considering the amount of processes which were involved. I found that all of the processes worked as I had planned and they all worked perfectly well and I was extremely pleased with the outcome of the base. I found the wood lathing quite difficult to begin with as I was new to it however after some practice and advice I was able to use the wood lathe very comfortably.

Difficulties during the Manufacture

During the manufacture I found a few processes difficult which increased the time taken to complete them, they include:

- I found sawing difficult, I tried to work quicker than I maybe should have which meant that I was not always cutting straight and at right angles which lead to mistakes being made and increased time sanding to get the wood into the correct shape. To improve this I could simple work slower so that the simple mistakes were not made. Experience and practice will also improve my skills of sawing.
- I found using the lathe was relatively hard to begin with however after a lot of practice I was able to improve my speed on the lathe. I was able to increase the speed by using the automated controls which meant that I could continue with other processes while the lathe was performing cuttings. I found cutting the nylon screws the most difficult on the lathe due to the size of the bolts, it made me do the processes in specific order, however this took me a few attempts which wasted materials.

Cost Evaluation

The overall final cost of my manufacture came to £82.30, instead of the £79.70, which I had estimated to have paid. I had to purchase more nylon as I made a mistake during the manufacture which rendered the material useless so more was needed. I made I planned the process the second time round so that the mistake was not made again. The cost of the extra nylon was £1.20. The plywood used to back the rosewood also cost more than I had anticipated, £1.40 more. These two material costs have caused me to run slightly over-budget. However I only ran over by £2.30. If the product were to be produced on a large scale the costs would be further reduced which would make the product a viable commercial opportunity. As this is a one off production I had the product to cost which meant that I used the highest quality materials as I was not aiming to make any profit from my product as my client was a relative and the product was made as part of my A level Course. In the larger manufacture the costs would be reduced and the price raised so that there was a large enough profit margin. I sourced the materials very locally which meant that I did not necessarily get the best price as I was more looking for convenience so this is also an area which could be improved to reduce the cost of the product. As I used recycled the rosewood and aluminium plate this would raise the costs of the product., however, the cost of the jig would compensate for this as one jig could be produced to make many products.

Manufacturing Areas I could Improve

I could have saved so much time in the lathing process, particularly when making the jig . I could decrease the time taken by using multiple lathes and switching between the lathes so that multiple pieces could be cut at a time. Also planning the manufacture of the nylon bolts could have decreased the time of manufacture due to not making mistakes. I could have also improved the finishing process of the base which ran over the estimated time by increasing the speed of the wood lathe so that less time will be needed sanding.

Product Features that were Successful

Overall I was extremely pleased with the product however my favourite aspect of the product is the base and stand aspect. I particularly love these parts due to the quality of manufacture and finish which was used to make these pieces. I found the rosewood looked stunning when it was given an extremely high quality finish. I was also very pleased with the base as the rosewood was initially scrap and it was very hard to see it looking attractive however the transformation of the rosewood was simply unbelievable and has lead to me liking the base so much.

Areas of the Product I could Improve

Overall I feel that I could have improved the brackets of the design which hold the aluminium sides together. Since finishing the aluminium tubes using sandpaper and emery cloth I found that the brackets were scratching the aluminium which was not very pleasing as over time the design will look very scratched. I also have fears that the design may become unstable if knocked with a reasonable force due to the size of the base, if I were to produce the product again I would redesign the base however I would keep the base's overall design principle the same. I also feel that the design is not as movable as I would have liked. To improve this I could have possible a swivelling joint between the aluminium curves and the stand, this would increase the reach of the light however the base would certainly need to be redesigned so that it would stay balanced and not simply fall over.

Standard of Finish given to the Product:

Overall I was very pleased with the standard of finish which was given to the product. The highest standard of finish was given to the base and stand which made these parts look very aesthetically pleasing. I did not give the curved aluminium as high a standard finish as I would have wished because I only tried to finish the material off after I had attached all of the other components, in particular the brackets. This made it very difficult to apply a finish around the brackets. I also found it very difficult to give a high finish to the brackets due to the damage caused by the hammering. To improve these I would apply a finish to the components prior to assembly.

The Environmental Impact of my Design:

Areas of success: Overall I found that my design had a very small impact on the environment by careful consideration on the materials and processes which were employed to produce my product. All of my materials were either recycled from scrap or had the potential to be recycled after use which significantly reduce the impact of my usage of the materials on the environment. To reduce the impact on the environment in manufacture I also tried to use hand processes such as sawing rather than the use of band-saws. Obviously this was not possible for many areas of my product however many areas were produced by hand. The electricity which was used to power the machines was from a clean renewable source which is also very positive for the environment (solar panels on the school roof). However the solar panels only produced energy when the sun was out which was not practical in manufacture, i.e. having to wait for the sun to do any manufacture. For that reason I did use some non renewable electricity so that I could produce my product in the allocated time. The majority of the electricity I used however was from the solar panels as some of the energy can be stored within the school for use.

Areas for Improvement: The main area which I could improve would simply be my planning prior to manufacture. Lack of planning in the production of the nylon bolts in particular lead to waste being created by simple mistakes which could have been easily avoided. Also the materials which I had to buy were not from certified sustainable sources which could also reduce the impact of the environment. If the product were to be introduced into the larger market it would be possible to produce goods on a mass production scale which would also reduce the impact on the environment by decreasing the amount of waste products and materials.

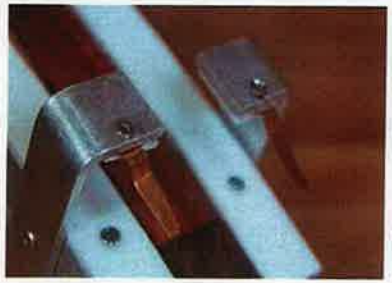
Conclusion: Overall I feel that the product was an overwhelming success. The processes ran relatively smoothly even though some parts did not run so smoothly but there are simple solutions which could be put into place to improve the processes. I will now evaluate the health and safety, quality control, time management and product usage to fully understand the pros and cons of my design in order to improve the manufacture. I will also be producing a Life Cycle Assessment to further assess the products impact on the environment.

Evaluation- Product Use

I will now evaluate the product being used. I will include photographic evidence of the product in use and will highlight areas of successes and possible areas of improvement. Even with areas which are not necessarily problematic I will be offering possible improvements. The problems and improvements have come from my opinions and from the views of target market which I obtained while interviewing them in regards to the product evaluation.

1. One area which I could improve upon would be the size, shape or weight of the base which would make the lamp much more stable. The lamp itself is not fragile however a fall from a height could cause damage to the materials, such as scratching or denting. Reducing the risk of the lamp becoming unstable and falling will not only increase the lifespan of the lamp but will decrease the risk of injury or damage being caused to the user. A lengthened lifespan will also be positive for the environment as the user will not have to get rid of the lamp and purchase a new one which will cause the consumption of more materials.

2. Another area which could be improved is the brackets which holds the two aluminium curves together. I was forced to place the brackets fairly close together otherwise the curves would not slide past each-other due to the amount of friction which would be caused. This meant that when the light was in its resting position the top of the front curve was able to move slightly to each side which is not ideal. To improve this I would use a T bracket which would be placed in-between the aluminium curves however the T bracket would need to be electrically insulated so that the light system would still function. The brackets also caused slight scratching to the aluminium which could simply be resolved by introducing softer materials to the inside of the bracket.



3. My client stated that he wanted the product to have a high level of adjustability. Although the curves did offer a high level of adjustability I feel that the design would be improved considerably by the increased movement. To improve the design I would like to create a hinge joint between the aluminium curves and the stand. This would allow the curve to be moved which would increase the movement considerably. The only issue with the hinge joint would be that the base would need to be radically changed so that the lamp did not become unbalanced and fall over.

4. The design could also be improved considerably by decreasing the height of the lamp. But this would need to be accompanied by decreasing the radius of the curves. The improvement would make the lamp much more portable and attractive in the wider market. If this were to happen then I would need to include more LEDS so that the light was dispersed more even though the lamp had a smaller reach.

Evaluation

In this section I will evaluate different parts of the manufacture and the product. I will look at the successes, failures and difficulties and possible areas I could improve the product.

General Evaluation of my Product

Manufacturing Processes that went well

In the manufacture I found that the most successful area was the production of the rosewood base. The whole manufacture of the base took around 4 to 5 hours which was extremely quick considering the amount of processes which were involved. I found that all of the processes worked as I had planned and they all worked perfectly well and I was extremely pleased with the outcome of the base. I found the wood lathing quite difficult to begin with as I was new to it however after some practice and advice I was able to use the wood lathe very comfortably.

Difficulties during the Manufacture

During the manufacture I found a few processes difficult which increased the time taken to complete them, they include:

- I found sawing difficult, I tried to work quicker than I maybe should have which meant that I was not always cutting straight and at right angles which lead to mistakes being made and increased time sanding to get the wood into the correct shape. To improve this I could simple work slower so that the simple mistakes were not made. Experience and practice will also improve my skills of sawing.
- I found using the lathe was relatively hard to begin with however after a lot of practice I was able to improve my speed on the lathe. I was able to increase the speed by using the automated controls which meant that I could continue with other processes while the lathe was performing cuttings. I found cutting the nylon screws the most difficult on the lathe due to the size of the bolts, it made me do the processes in specific order, however this took me a few attempts which wasted materials.

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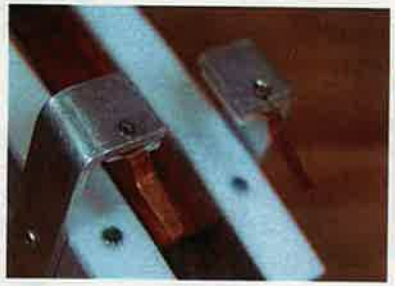

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Evaluation

Evaluation of Processes

Here I will focus on the varies manufacturing processes which I have used for my product. To evaluate this I looked at each of the processes individually and outlined what went well when using the processes, what were the problems which the process or tools and finally how they could be improved.

Process	Evaluation	Photo
Planeing	Planeing can be done using a machine however to reduce energy consumption I used a hand planer. I succeeded in using the planer to flatten the base of the rosewood however the planer was very difficult to use. The problem I found was adjusting the blade so that it did not protrude too far and take off large chunks of the material. To improve the process I could use a planer that electronically protrudes the blade.	
Wood Turning	I used the wood turning lathe to round and face off the rosewood. I did manage to make the rosewood circular with right angles however this took very long as you were doing it by hand. To improve the process you could using tools similar to that of a normal lathe which would make the wood turning much more efficient.	
Mortice Cutter	I used the mortice cutter under supervision from my teacher. I worked very slowly and cut the groove very accurately as I only cut small pieces of wood at a time. The problem with the mortice cutter was that the cutter slightly damaged the edge of the wood by the groove however this was simply rectified by simple sanding. To improve the process you could sharpen the blade so that the cut is much smoother.	
Drilling (pillar drill)	I have used the pillar drill before so was fairly experienced with the process. I used the pillar drill quickly and efficiently and successfully drilled the holes in all of the material that I needed to. The problem I found using the machine was that I was attempting to drill too quickly and this would cause the chuck to come out of the pillar drill. To improve this I would either increase the speed of the pillar drill or simply drill slower so that the drill bit can cut effectively.	
band-saw	I used the band saw to cut the slight grooves from the aluminium stand. The machine was very fast and I was able to remove the waste very quickly. I found it difficult cutting the smaller grooves however to improve this I could simply have left larger grooves around the work so that it was not as fiddly to remove the grooves with the band-saw.	
Milling	I used the milling machine to cut the stand's bottom into right angles. It worked very well and I was able to produce the work 30 minutes under estimation. I found it was hard to see the work through the guard however simply cleaning of the guard could vastly improve its visibility.	
Lathing	I used the lathe for many different aspects of my product. I found the lathe very easy to use even though I had previously very little experience using the machine. I used the automated cross slides and saddles to cut the work which produced a very clean cut. The only difficulties I found using the lathe was cutting blade became blunt fairly quickly after long and continued cutting, to improve this I would look at purchasing high quality and strength cutting tools so that a clean cut is achieved for longer periods.	
Threading and Tapping	Threading and tapping worked very well in lots of areas of my product. The process was very quick to do however the quality of cut was lower than I had desired. Due to the nature of the tap it was very easy to thread the hole at an angle which would ruin the thread. To improve this I would use a spirit level to ensure that I was cutting at right angles to the work.	
Sawing	I used sawing instead of band-saws where ever it was possible. The positives of sawing are the environmental benefits which are associated with it. However, I did encounter numerous problems while sawing, I found it was very hard to saw both vertically and horizontally but meant I had to spend more time sanding the wood so that the cuts were clean and at right angles. This could be improved simply by practicing and gaining experience, I felt that I was rushing which lead to me making errors.	
Veneering	Veneering was very cost effective because I brought the cheap plywood and then veneered one side using a thin rosewood veneer. The finish was to a very high standard however the process is time consuming which is a problem. To speed this process up you could use faster drying contact adhesives.	
Chiselling	Chiselling was a very fast and effective method to cutting a rose in the side of my rosewood. It was very quick and relatively easy to do. The only difficulty I found was that it was very easy to chip and damage the hard rosewood however sanding disguised this. You could improve this by sharpening the blade of the chisel which would allow for a sharper cut.	
Sanding	Sanding using increasing grades of glass paper quickly removed all of the scratches on the product. It was quite hard to remove deep scratches. To quicken the process I used a palm sander which allowed for better sanding.	
Varnishing	Vanishing is a very quick and simple process. The only problem which I found was the drying times were very long which slowed down my manufacture, this could be improved by using a faster drying varnish or using a fan to speed up the drying process.	

Evaluation of Control Systems

Here I will be evaluating my control system/batch production method. This will show me the areas which went well and possible areas to be improved so that I can increase the efficiency of the process which would allow for higher profit margins.




In my product I decided to include one method of batch production so that if it were to be introduced into the wider market it would be able to be produced at a much faster rate. I researched the various different methods of batch production and I decided to make a jig which would be used to produce the curved sections of my piece. The jig is a method of batch production because once made it can produce the same curve each time.

The jig was successful as I was able to produce four curves which were able to slide past each-other. The jig took me five hours to make which was half an hour longer than I had previously anticipated. In a large scale production the time which would be regained from using the jig would far outweigh the time which was taken making the jig.

I found that the jig did not produce perfectly identical curves which has effected the sliding motion of the aluminium, this is because we were cold bending the metal which meant the metal is very springy so it had a tendency to flex back into its original position once the roller was removed. To overcome this I would anneal the metal to make it less springy which would mean that it would hold its shape in the jig far better. A possible problem with this could be burning the plywood however you could substitute the plywood for another material or apply burn resistant covers to the plywood.

Evaluation of Health and Safety

Here I will be focus on the health and safety aspects of all parts of the manufacture. It displays what techniques were adopted and any possible ways of improving them so that the level of health and safety is increased.

Health and Safety	Evaluation
Goggles	Goggles were used when using any machinery. The goggles which I used during the manufacture were made from plastic and on the whole were satisfactory but the plastic did have a tendency to mist up and become scratched which meant that in the later stages of the manufacture scratches had accumulated and your vision was reduced which is not practical when using machinery. To solve this problem I would consider purchasing higher quality goggles and simply take more care not to scratch them and possibly cleaning the goggles so that scratches did not accumulate.
Mask	Masks were using to prevent the inhalation of any dust particles or fumes which may be created in the manufacture. This is very important so that respiratory problems do not occur. The only problem with using the mask was that it was quite poorly made which meant that I was forced to replace the mask half way through the manufacture. On a larger scale production higher quality masks would be needed otherwise costs could increase dramatically through replacing masks.
Apron	I wore an apron whenever I was in the workshop. The apron was used to protect your clothing but also to stop any loose clothing becoming caught in machines which in the worst case scenario could lead to serious injury. The apron does not need improvement.
Guards	Guards are present on the majority of the machines in the workshop. They are in place to protect from material flicking from the machine and injuring myself or others. The guards worked perfectly when they were in place however they were not present on all machines, such as the band saw which made using the machine quite dangerous to use. Another problem was the guards were very scratched and the visibility was quite poor which made it hard to see the work, which is vital when you are cutting precisely.
Wiring	While using hand tools such as palm sanders they all have wires and cables. To overcome the risk of people tripping over the cables and causing harm to them or others I work as closely to the plug as I could to reduce the risk.
Noise	While using any loud machines I made sure that I wore ear protectors however I also made sure that there were not many other students in come vicinity which could possibly damage their hearing. The machines which made the most noise were the disk sander, band-saw and palm sander.

Evaluation

e Cycle Assessment:

To check the sustainability of my final product I will be carrying out a life cycle assessment (LCA). The most important areas to consider in the LCA are the raw materials, manufacture, distribution, use and finally end of life. The LCA evaluates all areas of sustainability of my product.

Raw Materials: The rosewood which was used for the product has been recycled which means that it did not specifically have an impact on resources however on a commercial scale rosewood would need to be cut and brought on a large scale which would have dramatic effects on the forests if it did not come from sustainable sources. The rosewood is a hardwood which is extremely slow growing so new trees would take a very long time to re-grow. The aluminium used the product was not brought from a sustainable supplier as I bought the ..aterial locally. The aluminium takes considerable energy being extracted from the ground and then processes into its present usable form. A full analysis of all of the materials chosen for the design is shown on page 25.

Manufacture: For the product I attempted to use less energy consuming methods of manufacture where-ever possible. For the product I used a jig which is sustainable as although materials are used for the jig, only few need to be made to produce multiple products. The waste could be minimised by in depth planning to ensure that all of the materials were being used so that there is as little waste as possible. A full analysis of the manufacturing processes is on page 25 also.

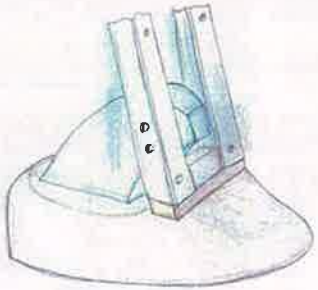
Distribution: The product could be produced so that it could be fully disabled and flat packed which would reduce the space needed to transport the product so more products could be transported at once. Locating near manufacturers which produce the aluminium would reduce the mileage of transporting the material to be processes however if this was further away from where it would be sold this would be counterproductive.

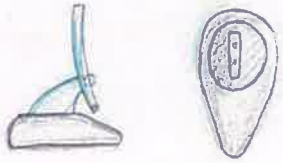
Use: Throughout the designing and manufacture I have been making the product with a very high level of quality so that it will last long. I have used high end materials and the joints are all very strong. Testing showed that the product would be able to survive multiple falls without damage. The light uses LEDS which have a very long life so they will not need to be replaced which is sustainable. The LEDS are also less energy consuming than other light bulbs which will over the ...ts lifespan significantly reduce the amount of energy used.

End of life: With the exception of the LEDS, all of the materials of the product can be recycled or reused after it has been used. Making the design able to be fully dissembled will mean that all of the different materials will be able to be separated and recycled.

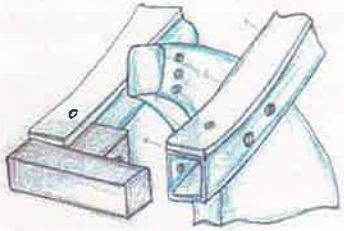
Evaluation: Future Improvements

In this page I will be showing potential areas of improvement to my design which I would make were I to reproduce the product or if it were to be produced on a commercial scale. The improvements have originated from suggestions from my client and target market which were obtained during my testing section.





1. I would begin by altering the shape of the base to not only increase the stability of the light but also to improve the aesthetics of the base. Improving the lights stability would mean that there is less risk of the light becoming unbalanced and being damaged which would increase the lifespan of the product. I have changed the shape of the base into a tear drop shape. This will improve the stability of the light to the front. The tear drop shape will also complement the shape of the curves used for the light which will make the product as a whole seem like one continuous product. If it were to be made from wood I would be forced to shape it by hand or by using disc senders however this would be very slow and not commercially viable. An alternative to this would be to cast the base which would be very quick and simple to produce. The aluminium would also match the aluminium used for the curves so this may improve the aesthetics however I feel wood would need to be incorporated elsewhere so a range of colours still existed.

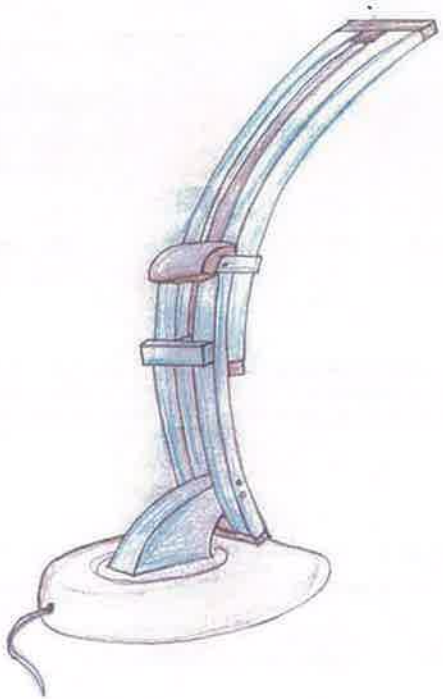


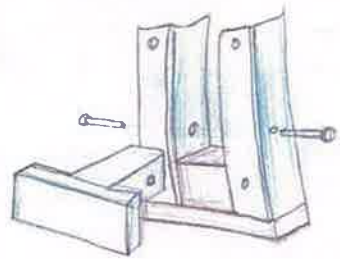
2. I would also like to completely hide the wires used for the light. To do this I would drill a hole that is within the space of the aluminium tubing. The wires would run through the stand directly into the aluminium tubing where it would be soldered so the electricity could pass through.

3. I would not use ultra bright LEDS to produce the light for my product. The LEDS which I used cost £2.95 each. The amount of light produced by the LEDS is not as much as I would have anticipated from the price. Instead I would use normal LEDS which cost between 20-50 pence, to compensate for the decrease light given off by the LEDS I would increase the number of LEDS however it would still be cheaper than the ultra bright while offering the same level of light.

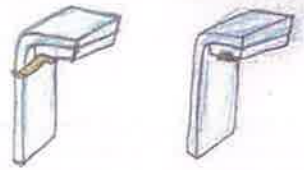
4. I would also spread the LEDS out more across the curve so that the light is more dispersed. This will mean that more area will be illuminated from the same amount of LEDS so that the product can not only be used for reading but also to illuminate whole desks for working. This will mean that there will be a larger market for my product increasing its commercial viability.

5. I would also consider using parabolic reflectors so that the LED light is directed in the desired direction as without direction the light is dispersed in all directions and a lot of the light is absorbed and wasted. Using the reflectors will mean that fewer LEDS need to be used as more light will be produced from each LED. This will reduce the overall cost of manufacturing meaning larger profit margins can be gained.





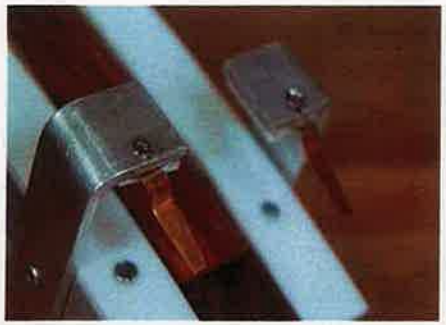
6. Another problem I found while testing was that as the brackets could only be positioned at one end of the aluminium curve the top had a tendency to move from side to side. To improve this I would use a T bracket at the bottom and the use normal brackets at the top. The T bracket would be inserted and secured after the curves haven been positioned. The T bracket would be milled so that it is very accurate and I would use nylon screws to hold it in position. I would secure PTFE to the inside surface of the bracket to insulate it electrically and so that it does not damage the surface of the aluminium curve.



7. As the brackets with the copper conductors will now be place on the front of the aluminium curve I did not want the copper strip to be seen. Therefore I will be placing the copper within the PTFE so that it will still perform the contact point without the copper being seen.

Finished Product

Client Feedback: I am extremely pleased with the lamp which you have produced. It perfectly suits what I wanted even though I lacked the creative ability to produce it myself. The lamp will last me a long time and I will be grateful for years to come.












Conclusion: Overall I am extremely happy with my product which I have produced. I have fur filled the design brief and the specification and have produced a product which I can be very proud of. I am most proud of the originality of the design and feel it is very aesthetically pleasing as well as being relatively complex to produce. Most of all my client is thoroughly happy with the product which is also very important.