

Aspects of this report have been edited to remove identifying information and extraneous material

Scholarship Technology Assessment Schedule 2011

The student has presented a reflective report with supporting evidence and:		
1	2	3
Demonstrated some synthesis and integration of technological experiences in bringing together knowledge skills, ideas and methods to allow their technological outcome(s) to be realised. (2 marks)	Explained how some of the complexities of the situation(s) have been identified and explored Explained why the outcome(s) address the problem(s). (2 marks)	Some reflection on information or understandings or practice(s) that were used to inform the development of their technological outcome. (1 marks)
Demonstrated synthesis and integration of technological experiences in bringing together knowledge skills, ideas and methods to allow their technological outcome(s) to be realised. (4 marks)	Explained how the complexities of the situation(s) have been identified and explored. Justified why the outcome(s) address the problem(s) or justified the technological practice undertaken. (4 marks)	Some reflection on information, understandings and practice(s) of others that were used to inform the development of their technological outcome. (2 marks)
Demonstrated synthesis and integration of technological experiences in bringing together knowledge skills, ideas and methods to allow their technological outcome(s) to be realised. Demonstrated: - elegance in terms of ingenuity, simplicity, optimisation and polish of their technological practice and its resulting outcome(s) or - originality in terms of inventiveness, innovation and elements of unconventionality in the technological practice they undertake and its resulting outcome(s). (6 marks)	Explained how the complexities of the situation(s) have been identified and explored Justified the technological practice undertaken and why the outcome(s) address the problem(s). (6 marks)	Reflected on information, understandings and practice(s) of others that were used to inform the development of their technological outcome. (4 marks)
Demonstrated synthesis and integration of technological experiences in bringing together knowledge skills, ideas and methods to allow their technological outcome(s) to be realised. Demonstrated: elegance in terms of ingenuity, simplicity, optimisation and polish of their technological practice and its resulting outcome(s) - originality in terms of inventiveness, innovation and elements of unconventionality in the technological practice they undertake and its resulting outcome(s). (8 marks)	Explained how the complexities of the situation(s) have been identified and explored. Justified comprehensively the technological practice undertaken and why the outcome(s) address the problem(s). (8 marks)	Critically reflected on information, understandings and practice(s) of others, that were used to inform the development of their technological outcome. (6 marks)
Sub Total 6	Sub Total 6	Sub Total 2

Overall Level of Performance

14

Technology Scholarship Project



Scholarship Report

Intro

My client (and Dad) is [REDACTED] who works at and owns [REDACTED] Architects. There he is faced with day to day tasks which revolve around the designing of houses. At his desk which is where he spends most of his working day he has an issue with adequate lighting for his desk. This is a problem when he has to carry out tasks such as sketching, reading and managing the business etc. and cannot see his work clearly without having to strain his eyes. Therefore my technology project is to solve this issue, considering the complexities of the situation and delivering elegance and originality in the design to produce a unique and quality product that meets the clients needs and is also suitable for manufacture and a wide range of consumers with similar problems. I started my technology project at the beginning of the school year by looking at various issues to solve and choosing the one which I thought was the most important to solve. This was a valuable exercise as I considered what I would be able to do and what would be the most rewarding for me and my client. I got a more in depth look at the clients issue on the clients issue page and refined what my clients key factors were through the stakeholder requirements consultation. This was very important in laying the foundations for my project and was invaluable in future steps where I faced many issues and decisions that had to be made. In all these decisions I kept all my key factors in mind which gave me guidance and steered me in the direction that would achieve the best possible outcome for the client. This is reflected in the success of my project meeting all the key factors and consequently having a very pleased client. Evidence of the key factors having a heavy influence on my technological outcome can be found throughout my portfolio in all my decision making and design development stages.

Existing Technologists/Designs

I then moved on to looking at not only existing designs 1 and 2 but also at other technologists practice in order to help me in my project by learning from other experiences when making a technological solution to issues. My technologists included my dad – an architect, Furnware – Classroom Furniture Company, Dyson – Innovative Electrical Appliances as well as taking a brief look at [REDACTED] on the Shipping My Lamp page and Construction Method impacting Material Selection page. All these case studies brought unique ways of producing a high quality technological solution which meets its clients needs, whilst my look at existing designs allowed me to analyse how technologist have gone about solving similar problems to mine previously. This gave me an idea of what worked and heavily influenced the way in which I went about my whole entire project from Pre-Production to Production to Post production. From the analysis I did of the existing technologists I gathered vital information which helped in developing a solution.

From the Furnware case study I learnt to continually consult my client at all the design stages as well as pre design stage to know what they want and then to check that I am delivering what they want. Many steps I took were consequently similar to those taken by a Furnware as bullet pointed in my case study. Firstly the stakeholder requirements page, this gave me an idea of what the clients priorities were for the solution so I knew what they wanted at an early stage, allowing me to set about fulfilling the clients needs. As I planned on expanding my stakeholders from my single client to the lamp being for a wide range of desk lamp consumers, I also had to include the wants of the market if my lamp were to be mass produced as these were clients and I had to find out what they want as they did in the Furnware case study. In the case study Furnware went looked in schools at the students needs to find out what the students wanted. That's why I interviewed a lighting direct employee as they deal with the people my lamp would appeal to on a day to day basis and they know what a wide range of consumers want out of a desk lamp, therefore I knew the wants of a wider market vital for the success of my solution as a mass produced product. This lead to my understanding of what the market wanted expanding and I used this knowledge when making decisions on what light to use. For example, in my Light Comparison I selected the my bulb as it had a focussed beam of light which Jarif (the light direct employee) said was key to many lamp customers. I also selected the 3W bulb after I found out that the customers want a lamp that produces good light, the sales representative at LEDstuff.co.nz recommended that wattage and therefore the lamp was selected. I also looked at optimizing my lamps design for manufacture to further make my design suitable to be mass produced. With the initial key factors for all my stakeholders identified and explored I developed a final brief to inform my design and ensure I delivered what the client wanted. With this in mind I started the design stage where I came up with some concepts (see sketches), I consulted with my client and we ruled out certain arm shapes together and decided to take the remaining concepts and show them in situ, I did this in my aesthetics investigation 1 and 2 and consulted my client in this aspect again and we finally chose a basic arm shape to develop further. With the design fully developed I made my test arm where I got feedback from my client again which added complexities therefore I had to make some changes to arrive at my final lamp arm (I will look at the changes made later in the report). I mirrored the client consultation which Furnware used but I did not completely replicate their process as I chose the materials and construction method before the design so that the materials and construction influenced the design rather than the design influencing the materials, I understand this is not the usual process but I used a unique approach where I designed to suit the materials and construction method, this may restrict some but I did not find that this restriction was negative, rather, it gave me guidance and ensured _____ that my design was made within the boundaries of what I was capable of producing.

Scholarship Report

I also used the case study I did on my Dad to influence my design process as I knew that he would know, after years of designing successful homes for unique clients, what was an effective method in the design stages of the product to produce a design that the client wanted and would fulfil their needs. Therefore I used his professional technologists practice to influence my method even though it was from a different context. The process I undertook was similar to his as a result of my case study into his practice. First of all I looked at what my client wanted and determined the functional and aesthetic requirements of the solution by looking at my briefs and the research I had done up until the final brief. I also defined the key factors which went on to heavily influence the research I did, and consequently I put these requirements brought forth by the research (which were necessary to ensure that all the key factors where met and that the client would be given what they wanted) into specifications, this ensured that going into the design stage I knew the requirements of the lamp which were needed to please all my stakeholders. I also looked at the constraints on the location in a similar way to how Dad looks at a site for a proposed house in my constraints on the Location page. With the stakeholders requirements sorted out and the requirements of the location identified and explored I was able to work on some concepts. These were shown to the client and narrowed down to a single concept which I developed with the client into a suitable lamp arm design during page 1 and 2 of my design investigation, this mirrors the client consultation Dad uses for developing his designs. With the concepts refined for the Base and Lamp head as well through design sketches I was able to translate my designs onto SketchUp where they would eventually be converted to DXF (DXF is a specially formatted file that accurately holds the dimensions of a component, they work on CAD programs and also the Laser Cutter Program where the exact dimensions are very important) and taken to the laser cutter. Doing the concepts and design development on paper by sketching was quick and easy as opposed to doing it all on SketchUp which would have taken a long time and I would not have been able to communicate ideas to the client as quickly, therefore in this way the process saved me time which was helpful as I was under time restrictions. It also produced the same high quality final design as I was able to easily translate the developed concepts onto SketchUp where they were made into final technical drawings, as are Dads sketches when they are translated to be accurate technical drawings on a CAD program. Then the designs were shown as accurate 3D models where the proportion of the design could be assessed and tweaked. I then showed the designs to my technology teacher to get a second opinion on the practicality of producing the design. With both my client pleased that the design aesthetically appealing and my technology teacher, agreeing with its practicality to be built I moved on to produce the Desk Lamp.

The Dyson Case study was more focussed on developing the function of a product (like I did on my Functioning model page) rather than the design like my case studies of both Architects and Furnware were more focused on. In this way it was good to look at a process that produces very functional designs on top of the more aesthetic and fit for purpose aimed processes of the previous technologists. I hoped that this would expand the success of my lamp to its functionality, enriching the function of my final product. I had a small idea about methods for making the lamps adjustable from looking at the existing design but I had not really looked at these ideas in practice or experienced first hand the suitability of different balancing mechanisms. Dyson make models to test the functionality of their products in order to develop their function to a market leading standard which simply cant be matched by other electrical appliance companies. One of my complexities was that the Lamp would have to be adjustable and I would be taking a huge risk if I just tried balancing methods on the final design, therefore I decided to use the same principle and make MDF models of the balancing systems to test their functionality. These models were purely aimed at the function of the Desk Lamp and no design work had taken place yet so they consisted of simple rectangles for arms. The balancing system was based on desk lamps that I had seen on the internet and the models were cut out on the laser cutter. The models were successful in helping me to choose the parallelogram balancing method and also made me confident that it would work when I used it on my finished product. I also used their testing method to develop my arm and base designs. I made a test arm to test the functionality of the arm, luckily I did this as the arm was not strong enough and needed to have an additional layer added. The Base also needed to be developed once it was built and issues were identified, as were the thousands of prototypes Dyson made for testing. I was unable to run extensive tests like Dyson but I did develop my design significantly due to the creation of test components which was inspired by Dyson's testing. I did not however run reliability tests like Dyson on my lamp once it was finished as it would be damaged by such testing and I had to deliver my client a quality outcome. This is not the case with Dyson as they can easily reproduce a product after they have damaged another in testing. I did not have the time or resources to make another lamp, therefore it was impossible for me to put the lamp through vigorous testing.

Scholarship Report

I also looked at [redacted] practice as he also uses a laser cutter to make his various lights. I felt that his products were the most similar to mine out of all the products produced by the case studies due to the fact that he, like me had designed to suit a laser cutter construction method rather than sorting out the construction method and material after the design has been finalised like Furnware did. I believe that the technique I used (like I [redacted]) is more practical as I can go through the design process knowing what's possible and designing my lamp to suit. This leaves me with a design specially made for the laser cutter, utilising all the advantages of using a laser cutter (the advantages of using the laser cutter were looked at on the Construction Method page). This is opposed to design without knowing the construction method, you may not know what the different construction methods possible are capable of and therefore you don't use these capabilities to their max potential like I was able to do with my design. The kitset design aspect of [redacted] practice was also very helpful in informing my practice to make my solution more suited to the modern consumer. I used a similar technique but in the context of a desk lamp to make my design a kitset so that it could be shipped for less off online websites or to retailers as a result of it taking up less room. The kitset also adds an activity for the consumer to assemble it which can make them feel more proud of the desk lamp as they know that they helped put that together. It's a bit like the bread you can buy from the shop and you have to bake it in the oven before you eat it, there may be extra effort required but the bread will always taste better as you can say that you made it yourself.

The existing designs 1 and 2 were also key in getting my project started and also developing various aspects of my lamp. Looking at the existing designs I was able to get ideas for balancing systems to be used and consequently tested one of these systems on my Functioning Model page. I saw on the existing designs how they could function and decided to use a similar system on my lamp. The existing designs also helped me decide what type of light would solve my clients issue. They also provided examples of using different types of light bulbs in various situations and also materials. These led me on to look closer into the various aspects of the existing designed desk lamps and how they could be applied to my own desk lamp. This resulted in a better informed research stage and consequently I have used a parallelogram balancing method in my final design. The existing design also influenced me to select the laser cutter as my construction method as I saw what the method was capable of producing and was inspired to use it in my own lamp, I did not use the method of printing of the paper, sticking it on the material and then cutting the shape as I would not be able to cut it out as accurately as the laser cutter was capable of. The existing designs also helped me to identify the factors involved with a desk lamp and how they interact, I was able to look at the existing technological practices and gather the key factors which were involved in making the product, I was able to apply and reject these key factors which allowed me to identify my key factors and also gather how they interact by studying the existing desk lamp designs. The existing designs were important in getting the basic framework of my lamp designed, they also help me with getting the lamp head designed as they gave me a rough idea of the dimensions for the balancing system along with the basic points of the holes for the connecting corners of my desk lamp. On my final outcome I used loops to guide the wire down the lamp arm. This was the same method used in the fourth existing design, the look of the existing design was tidy and aesthetically appealing whilst it required minimal effort to make. Therefore I decided that it was an easy method and produced a good outcome therefore I used it in my own product.

Overall my case studies and existing designs I looked at combined to heavily inform my technological practice at all stages of my project this year. Doing them at the beginning of my project was important as I was able to use their knowledge for the remainder of my project and ultimately produce a functional and aesthetically appealing desk lamp that meets all the needs of the client and is suitable for mass production. I was also able to modernize the desk lamp experience by making it suited for online customers with the addition of the kitset design. In the end these case studies combined, allowing me to produce a very successful product and without using their knowledge I would not have been able to produce such a successful lamp. I also would not have been as successful if I hadn't decided to be different from my case studies for stages of my project, that is were the individual (myself) becomes the most key to the success of the project. Being able to choose what to follow and what not to follow and in some cases making up my own methods is what made me effective in producing a successful solution.

Scholarship Report

Complexities/ Decision Making

I had to make sure that my projects outcome was successful and in order to do this I had first identify what the key factors of my project were in the [Factor Identification](#) page and [Stakeholders Requirements](#) page. This allowed me to identify what the client wanted and added complexities to the situation as I needed to come up with a design that pleased all these key factors. I looked at how these factors interact in order to see how meeting one key factor would affect many other key factors at the same time in the [Key Factor Interaction](#) page. This allowed me to explore the various complexities and how they all relate to each other. This down the track was vital in my decision making as I knew for example when I selected the material that the selected material would affect the strength, design, possible colour and finishes and aesthetics of the overall lamp. Therefore I had to make a decision that would not only be a good material but it would also have to be strong, aesthetically appealing, come in a range of colours or able to be finished in a range of ways and the design would have to cater for what was possible with the selected material.

When making the decisions throughout my project I had to consider all my key factors which would be affected by certain choices made. The first decision I made once I had decided on what issue I will solve was what light bulb to pick. I narrowed down the selection to CFL and LED as these were both energy efficient. CFL was cheaper but contained mercury which my client didn't like and would also last only 10000-20000 hours compared to LED's life of 50000 hours, selecting LED would mean that the longevity (an important key factor) would increase, however LED's are more expensive than CFL but cost was not a key factor therefore the LED would produce the best outcome for me. I was able to prioritise the key factors on the [Stakeholders Requirements](#) page, this allowed me to know what was more important to the client when it came to making decisions, I also used the briefs as these contained the information about what the clients wanted so that I could try and deliver this in making a certain choice. I also sort out expert advice when making certain decisions to inform me on specific issues that I may not be familiar with. In my LED selection, I didn't know what type of wattage LED would deliver the right amount of light for my client. This was an important issue as the correct brightness would be vital to the user friendliness of the lamp, therefore I emailed the LEDstuff.co.nz sales representative who looked at my brief and what I needed the light for and made a recommendation on a light wattage which I followed as I trusted his judgement. Evidence of this can be found throughout the light selection process, [Light Comparison/ Light Research](#), [Final Selection](#). Examples of this process being followed are in all my decision making stages. When choosing my material I also had to consider the construction method which it would suit best and further still which combination of material and construction method would suit my project best.

This decision making process which considers not only the obvious key factor which is associated with the choice but also the key factors which are affected by that key factor allowed me to make decisions which pleased all the key factors and ultimately helped produce an outcome that met all these key factors and specifications which were derived from the key factors.

Integration and Synthesis

On top of the knowledge from the existing technologists, I have had to use all my previous technology experience whilst bringing in new skills and techniques to complete my project to a high standard. In 2010 I made a Paper Mache chair for my level 1 technology project the skills learnt for making the chair were not applicable to this years project, instead I consulted with teachers and also learnt off the internet using Youtube and various websites to gain the skill required to produce my project to a high standard. I looked at how I learnt these skills on the [Expert Help](#) page. The skills I learnt were also largely aimed at designing my lamp on SketchUp and using the program to export the designs in DXF format so that they could be cut by the laser cutter. This was due to the time I spent on the construction of my lamp shift to the design stage, getting everything perfect and developing a functioning design for the client that meets all the specifications. I had to produce this design accurately and then translate the individual pieces which needed to be cut into DXF format before they could be cut by the laser cutter. I would not have been able to achieve such a good design (and therefore fulfil one of the clients most important key factors, aesthetics) in the time frame set by the school year if I did not cut out a lot of production time by grasping the use of a new technology, which I believe is the way of the future. I would not have been able to produce my design to the same quality and accuracy in the same time frame if I were to cut the pieces myself, if I could complete it at all, but if I did not have the laser cutter available I would not have designed such a complex lamp, I talk about the opportunities created by the laser cutter on the [Construction method](#) page, and I also talk about the material selection in relation to the construction method on my [Construction Method Impacting Materials Selection Page](#).

Scholarship Report

In the end I was criticised by my peers for using the laser cutter as they believed it was cheating in a way as I wasn't cutting the pieces out, but they had not seen the extra tens of hours I did refining the design and making suitable files to be cut by the laser cutter which would have well outweighed the time spent doing simple designs on paper. As a result I now have the ability to have my lamp mass produced as I have all the computer files available to make exact replicas of the pieces I had to cut out and in turn I could go to any large laser cutting company and have the design mass produced, this fits in with my specification for the lamp to be able to be mass produced. This prioritization of time is looked at later in the report in the Planning Section. The extra design work paid off though as I had very good feedback on my [Facebook Survey](#) regarding the aesthetics of the lamp (the other factors could obviously not be commented on by simply looking at a picture) so I felt that I had shown those criticising using the laser cutter what can be achieved when the focus is shifted to the design stage. In the end how many products are entirely hand made in today's world? My case studies involving Dyson, [Furniture](#) and Furnware used machines for a large portion of their build process and it is very common for almost any mass produced product to be made mostly by machines. In this way, I believe I have used a universally accepted construction method only making myself more involved than large companies by programming the laser cutter myself and doing all the assembling myself.

Constraints on the Location

The environment of the desk lamp played a role in some of the key factors such as aesthetics as found out on my [Social Factors](#) page. Therefore I had to pay extra attention to this area to make sure that the lamp would not detract from his business at all and promote it instead by reflecting his good taste in design. I ensured that it did suit the clients taste by involving him in the design process as much as I could, but when consulting with him he said that he trusted me to design something good so he let me design everything on my own and I checked in with him at various stages to ensure that I was on the right track. This in the end allowed me to have freedom in the design whilst delivering a outcome that suited the clients taste. The fact that the lamp was going in the clients office also put pressure on me to not only deliver a good design but also produce a high quality product. If the light were poorly finished it would reflect poorly on my client and also it would reflect poorly on me as the person who made it. Therefore I had to strive to produce a quality product with a quality design.

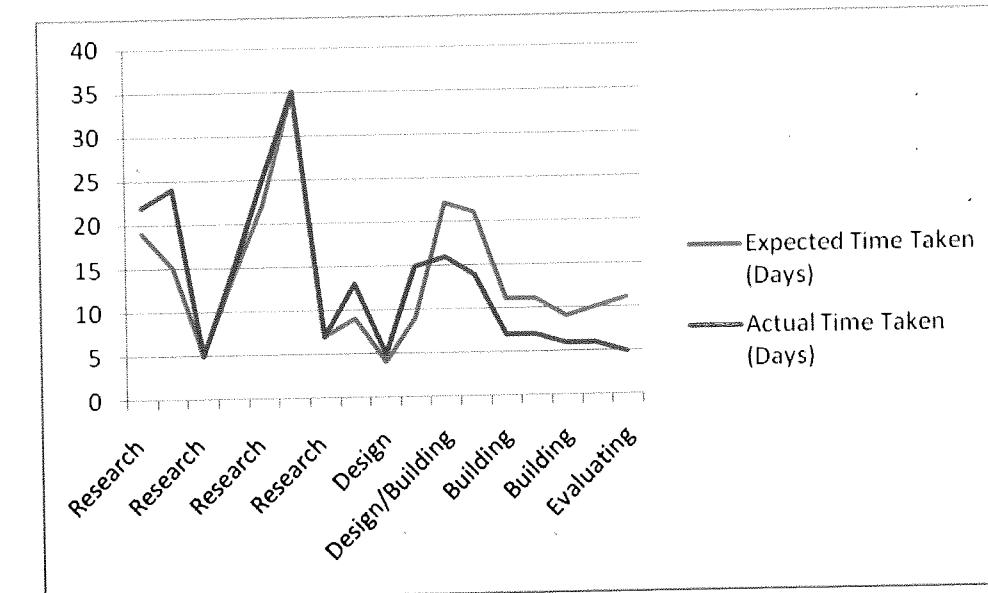
Technologists Obligation to a Wider Community

I also looked at the [technologists obligation to the wider community](#) and how supporting movement like fair trade and also using eco-friendly technology people will recognise the good intentions of the company and also that they can support the companies cause by purchasing their products, this leads to an increase in the companies sales. I factored this in to my decisions on what light to use and also with the kitset design as they both are environmentally friendly movements. I do this to promote saving on power and transport as well as using it to increase my lamps likely sales. All the decisions though have not been hard as the right decision morally in my case has brought many other positives with it such as savings in money with the energy efficient bulb and in shipping with the kitset along with the environmental positives. However the fact that I had added more complexities to the design process in the form of specifications (i.e. the design had to be kitset etc) did mean that I had to include these requirements into my design which was not too difficult or restricting. But one compromise I had to make in the decision process was the use of Perspex which is a plastic. This generally means that it is very hard to dispose of and is a large proportion of the waste we as a human race are producing. But this is only a prototype and though the material was not sourced from a sustainable source (yes there are sustainable Perspex sources, check out this website which is one of them <http://www.perspex.co.uk/documents/environment/Environmental-Policy.pdf>) for this particular lamp I would use Perspex from a sustainable source if I were to mass produce the product. I also learnt that Perspex can be recycled to produce a high quality material, so it affects which at first were thought to be very negative, turned out to be minor and on top of that, the durability of the material means that the lamp will last very long and will not be thrown out after a short time like other desk lamps that have components likely to need replacing, this saves excess production which will inevitably have a bad impact on the environment.

Scholarship Report

Planning

I did have an overall plan for the Project 1 and 2 which I believe was actually quite accurate due to the fact that I tried to stick to this plan as best I could. As you can see in the graph below the various steps did take about the same time in relation to the time that I had set out on the plan areas that exceeded the time allowed was getting the project started and the design stage. There is also a large overtime section between design and design/building which is due to the heavy development which the base undertook. Also the design stage took longer than first expected due to the fact that I decided to spend extra time on the design, making it a priority, but as you can see I caught back up a good share of the time during the building stage also as expected due to the fact that I had decided to use the laser cutter and knew that it would speed up the build time. Overall I felt that I stuck to my plan despite falling behind at a stage I caught back up as I expected to. This is pleasing that I was able to make a decision to spend more time on the design and still be able to finish due to the shortened build time as a result of using the laser cutter. If I had not made this prediction early on in my project I would have spent less time on the design, resulting in a poorer design and slower build process as a result of the design not being optimized for assembly and cutting. Therefore I believe that this prediction was key in the success of my final design as it allowed me to use my time more effectively and consequently I produced a much better design than what could have been produced had I not made a time prioritization and also a much easier design to produce, as the extra design time was spent on developing the design to improve the aesthetics and optimization for manufacture. I also had planning boxes on the side of my slides, these allowed me to take a brief look at the slide and refresh my mind on what it was about, these boxes also supply a great basic outline of what I am doing in certain slides in relation to the project as a whole, allowing me to stay in touch with where I am in the project. The use of the Pre Production Planning page allowed me to predict issues that I could face in the production process and combat them before they arise, allowing my production process to go a lot more streamlined.



Improvements to my Practice

My production process time and wastage could have been significantly reduced had I put in place a more efficient planning system. If I had made a list like a cutting list of what components I needed cut from what materials and how many are required I would have been able to avoid the mistakes I made (cutting out six of the same arm when I only needed two and forgetting to get the unique middle arms cut) which cost me materials and time. I would also have put an assembly of arms plan into place which would allow me to know what different components needed to be assembled together. This would have saved me even more wastage as I glued the white layer on the wrong side of two arms making them useless. This added up to be a significant amount of wastage and time which would outweigh the time it would have taken to make a simple list of assembled components needed and what pieces would need to be cut to make them, this would also have reduced my Lamp constructions environmental impact. At first I did not consult my client enough and this ended up costing me a decent amount of time which was spent considering using aluminium tubing for the arms which would have produced a very common looking lamp. When I found my client wanted something unique it was apparent that this material choice was not practical and a change in material selection had to be made which consumed time.

Scholarship Report

Design Development

The Arm design had to be developed after the construction of a test piece revealed an issue with the strength and rigidity of the arm. Consequently, I decided to add another layer of white 4.5mm Perspex. The layer would create an I Beam effect and would stop the arm from flexing as much as well as increasing the strength. I had to design the additional layer so that the clear green Perspex was still visible and would remain a feature as the client wished. I achieved this with a specially shaped additional layer which perfectly solved the issue, however it created a new issue in itself. The extra layer would have to be positioned perfectly and be consistent throughout the arms to produce a quality outcome. It also had to be done with ease in order to produce the lamp on time, as I was under time constraints and also as it needed to be a suitable design for mass production. Therefore my lamp would not have been successful in the time allowed if it weren't for the gluing jig that I designed and made to assemble the arms. It was simple and required less than a period to get cut and put together with a scrap piece of dowel which was cut to size. The dowel was a very good joining method as it was not permanent which meant that the template could easily be adjusted by changing the layers around so that the white layer of the arm could be glued on other sides to get the arms for both sides of the lamp. The layers were then joined again effortlessly with the dowel. Further still the gluing jig produced a very cleanly assembled arm which was one of my main worries entering the arm assembly as the glue that I used would leave marks that would not come off if the glue got onto a surface that wasn't supposed to be glued. This would ruin the aesthetics of the arms, but the jig allowed me to put the glue exactly where it was to go and the layers would not move around which would smudge the glue on to unwanted surfaces and also the layers were held in perfect relation to each other. This was simple and efficient, without it the arms would have been poorly put together and the aesthetics, which were very important to the success of the project, would have been ruined. The Assembly of Arms page includes an animation of how the gluing jig works and also deals with the issue of assembling the arms.

The base design is also very simple and time saving despite its complex looking aesthetics. (the Base Construction show the Bases development) The way which the ribs slot into the base makes the base impossible to have the ribs out of line, whilst they are held in place and glued cleanly. This is much more effective than say a base with no slots where the ribs are stuck on like a butt joint. This is better in every way than a base without slots as shown in the table heavily reducing the time taken to assemble and the quality of the finished product.

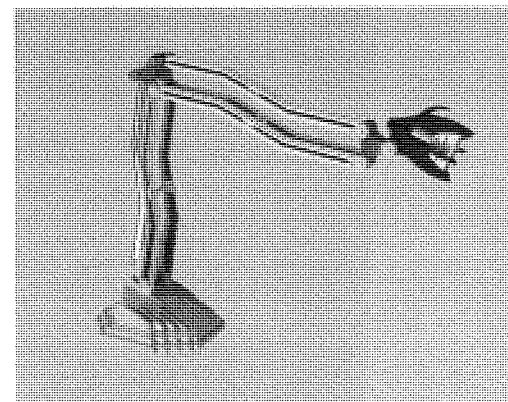
	How are the pieces held in place	How are all the pieces put in their exact location	How do the ribs stick up at a right angle to the rest of the base	How effective is the gluing process
Normal Unslotted Base	They are held in place by hand it will be hard to keep a steady hand and the rib may move around	I need to measure and mark the positions by hand	I will need to use a right angle block	Not very as the area exposed to be glued is quite small and will be quite easily broken as there isn't much support for the glued area
Slotted Base	They do not need to be held as the slot holds them steady	The places are already cut out and the ribs will always be put in their exact location	The two layers make sure that the ribs are held at a right angle to the base when they are put in the slot	Very there is more area which is exposed to the glue and there is strong support for all directions of movement ensuring a strong bond

To save materials on the base, the ribs are designed so that they slot into each other when they are being cut so that minimal material around the odd shapes is wasted. This fits into my environmental obligation to save on useless material wastage and also reduces cutting time, a simple solution that helps me save on materials and time whilst not compromising the quality of the finished product.

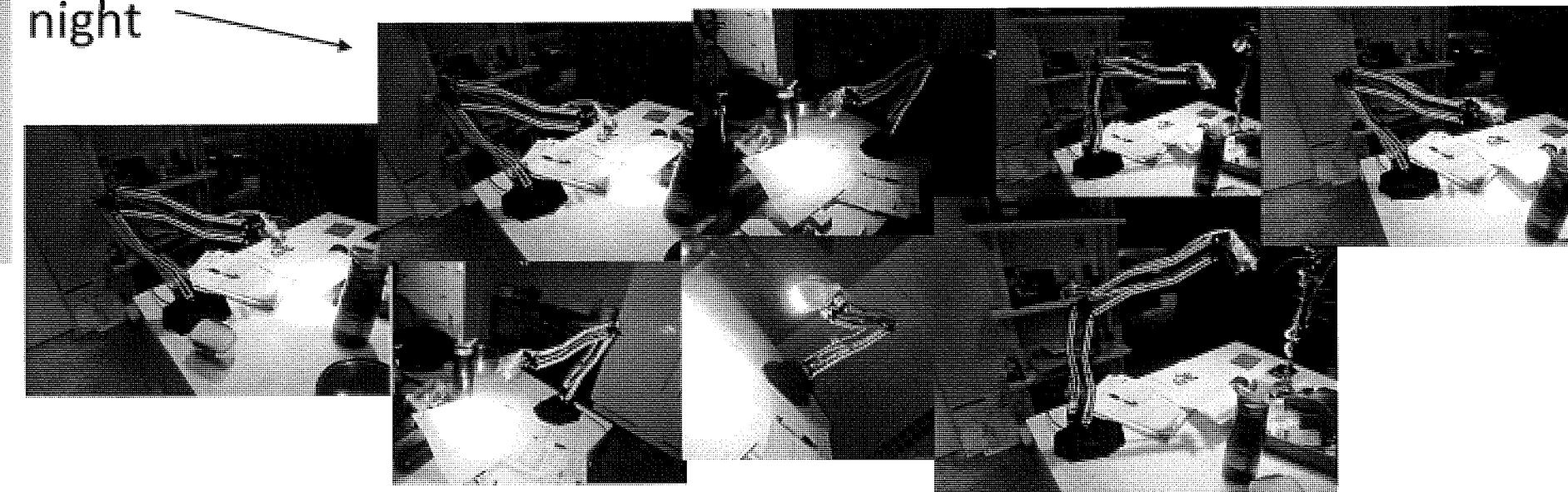
Scholarship Report

Final Product

The final product which the customer gets is a package described on the Final Product page. This is a modern and innovative package that will further promote the LED technology used and the Desk Lamp itself due to its unique take on the whole package which is received with a desk lamp. I have brought the product into the modern day where people are buying almost everything online rather than going to a shop and buying it. I have done this by making my Lamp a kitset (an issue which I brought forth early in the project in the Shipping My Lamp page) this will reduce the size of the package and consequently the shipping cost making it more affordable to the consumer. I believe this final product is both elegant and original as it uses simple methods, such as making the lamp kitset and digitalising the assembly method to make the Lamp appeal to the new age consumer. I could have done what others have done in the past by making a preassembled lamp that takes up lots of space during travel or an unassembled lamp that arrives with masses of confusing exploded drawings on how it goes together that few can follow. Rather I have made an animation that by simply putting on your computer and pressing play (no special programs are required due to its AVI format which can be played on any standard media player) you have an instant virtual construction of the lamp before your eyes that makes the assembly even more straight forward than it already is by showing what goes where and the finished product so that they know it is assembled correctly. On top of this the lamp itself uses uniquely shaped and designed components which give it a modern look that is appealing to many. There is evidence that my lamp's aesthetics are great as I found on my Facebook Survey which is another original method for getting feedback on a product, I posted a photo of my Lamp and asked people to comment on the aesthetics, these people were not prompted to make certain comments as I would only be cheating myself if I did so and the comments were very rewarding, making me confident that my lamps design is very good. This adds to its suitability for mass production as it appeals to a wide range of consumers. One issue did pick up on was that a girl commented that it was not so suitable for a female audience, this statement did have merit to it as the lamp was designed with a male client primarily in mind. However I find this comment very valuable as the design could be adapted to suit a female audience by changing the colours of Perspex used to more feminine colours. Below is a concept for the same lamp with different coloured Perspex used. It is only a concept and the idea would be further developed and test arms made before I produced a lamp in that colour scheme to ensure it had good aesthetics. I would also like to develop the lamp head to include the other colours of Perspex as this would make it harmonize more with the rest of the lamps design as well as making the lamp more aesthetically appealing. I have also evaluated the lamps environmental impact as this was a key factor to keep the impact to a minimum so I have reflected on how my lamp impacts the environment.



Additional photos of Lamp at night



Client and their Issue

[Go Back \(1\)](#)

Initial Client Consultation

Q. Where do you require an additional light source?

A. On my desk mainly, but the light could be used in the meeting room where a lot of reading also takes place.

Q. Why do you require an additional light on your desk?

A. Because currently the amount of light supplied by the lights on the roof is not enough to see detailed work or small font sized reading material clearly. I think that having some extra light on my desk will make viewing my work more clear and easy.

Q. What do you want out of the lighting aspect of the solution?

A. I would like an energy efficient bulb that does not contain any harmful materials like mercury but still saves on power and money. I would like the light to be bright enough to see my work clearly, but not so bright that it hurts my eyes when I'm using it.

Q. Is being environmentally friendly important to you?

A. I do what I can such as recycling the paper the office uses and using power saver (CFL) bulbs throughout the office. I am not over the top about this issue but where possible I try to keep my impact to a minimum.

Q. How much do you think you would use an additional light source?

A. I would say about 15% of the time I am at work, this time would vary though on a day to day basis. But the majority of my time is spent on the computer or visiting sites with clients.

From my initial consultation I was able to formulate a statement that describes the clients initial issue: My primary stakeholder is _____, the owner of Architects. He owns an office with multiple workstations where his employees design houses both on the computer and by hand. Allan being the owner has to pay for all the businesses overheads and naturally would like to keep these costs to a minimum in order for his business to be productive. Allan tries to keep his impact on the environment to a minimum and actively recycles the paper his office uses. He is also currently using energy saving bulbs in his office (CFL's) but is aware that they contain mercury and would like to use lighting that does not contain these harmful materials. For the majority of his time Allan uses a computer or is on site visits/meetings but for the remainder of his time (about 15%) he is off the computer (viewing designs, sketching, managing the business, reading about rules and regulations and other relevant material) and requires adequate lighting to do so. This work is vital to Allan earning a living and he works 10 hours a day 5 days a week. So the time that he requires adequate lighting adds up to about 7.5 hours a week at the very minimum as he may use the lighting for other purposes. Though the office is lit with lights on the roof these take time to warm up when first turned on and even after a while they still don't supply enough light for my client. My client has asked me to create him a lighting solution to be located on his desk or possibly in his meeting room that will supply him with adequate light. The light must supply adequate light from the moment it is turned on and not take time to warm up as time is money when it comes to business.

Planning:

What: I am taking a look at my clients life and indentifying where the issue that needs to be solved comes in.

Why: So that I can identify the issue and set about solving it so that the client is left with a product that meets their needs.

Resources Required:

Client, Clients Workspace.

Date: 20th February – 1st March

Shanahan Architects

[Go Back \(1\)](#)[Go Back \(2\)](#)

owns and runs Shanahan Architects, he manages a varying number of staff but usually there are about 4 other people working for him. It is important that he plans out his work to be completed on time and to a standard that it can be submitted for consent. He finds that when he is not too busy planning is not that important but when he is busy planning is key to making sure that he gets the designs finished for a client on time. If he does not finish on time he holds up the client from building their house and he will establish a bad name for his company. In some cases the client may give a date and if the drawings are not finished by then the job is lost and all the time spent on it is wasted, therefore the stakes are high and meeting a deadline is crucial for practicing technologists. Allan says he sets up time blocks of a working week and plans to work on one project and get so much achieved in that week. If he is falling behind he will either allocate more time to a particular project or if he is ahead he will spend time on other projects that he is behind on. He says that his planning is not as good as it should be and that on the more time focused projects he set milestones of what he should have done by a certain date.

To design a house Allan follows the following process:

- Look at the site and brief, functional and aesthetic requirements.
- Look at what constraints are on the location, height restrictions, boundaries, site coverage, town planning
- Design and develop a design that meets these requirements
- Refine this design through consultations with the client, on average 2 or 3 consultations, the number depends on the client
- Finalize the design with the client
- Start and complete detailed technical drawings
- Submit drawings to council for approval
- Get builders to quote make adjustments if necessary
- Begin construction
- Minor details may be changed during construction if client requires them to be.

Alternatively on some occasions the client will show Allan houses from magazines or previous houses he or others have designed that they like. They then ask him to design certain aspects similarly, for example if someone saw a kitchen layout in a magazine, a certain cladding or an overall style that an existing house has which the client liked he will then use those to influence his designs. It is all about giving the client what they want and if they like an existing design or layout you can adapt it to go with your designs and style. This is very worthwhile to achieve what the client wants and this is why magazines like 'Prodesign' and 'House and Garden' sell as they are often bought by people looking for inspiration and ideas.

This process is one that could be applied to the design of my desk lamp. I will design a lamp that meets the specifications and stays within the constraints and then refine this design with the client to get a final design that will meet the clients criteria.

Planning:

What: I am taking a look at an Architects design process

Why: To inform my own design practice based on what this existing technologist has done and achieved success as a result

Resources Required:

Date: 1st-3rd March

Dyson Case Study

[Go Back \(1\)](#)

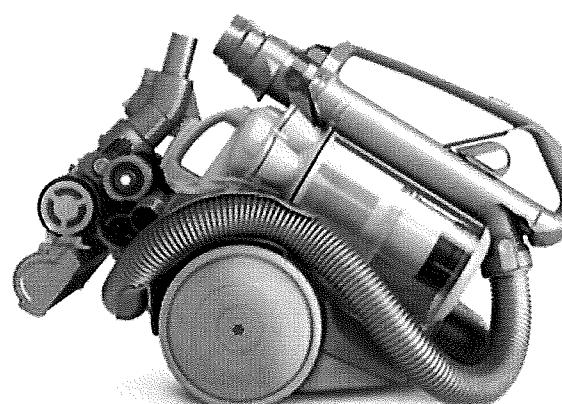
[Go Back \(2\)](#)

Dyson are widely known for their innovative products that are the leaders in their classes. They make vacuum cleaners, desk fans etc. and I consider them to be the top brand for both functionality, originality and aesthetics in all their products. Therefore I am looking at their construction process in order to inform my practice so that the best possible outcome can be achieved for my client. Dyson run extensive tests to ensure that its products will more than achieve what they are designed for in order to produce a top quality product that is durable and functional. **Development testing**

Dyson work towards one idea: that everyday objects can be made to work better. This mind set drives them to keep aiming higher and consequently they are always developing their products to make them the best they can be. This method of always developing the product is not possible for me as I only have a school year to complete a technological solution, but I should, as much as I can, try to develop my product in the design stages as much as possible in order to get the best results for the client.

From idea to prototype

The results from development testing are used to improve the design of the next generation of Dyson machines. At the end of my project, I may find that I have ideas for the development of a next generation version of my lamp, I will be unable to produce that product this year, however it will be a worthwhile practice at looking at ways to improve my product once I have finished, so that this can be done in the future. This will be vital to the success of my lamp, should I choose to go ahead and look at mass production. Thousands of prototypes are built to refine the improvements one at a time, starting with hand-made cardboard models. Later, complex selective laser sintering tools build fully functional prototypes for testing in Dyson laboratories. By developing in many steps, Dyson are able to produce relatively cheap ideas which can then be developed and finally produced more expensively and accurately by their complex laser sintering tools. This is a cost effective way that allows many options to be explored in a commercial environment where research and development money may be restricted.



Reliability testing

Finally, every cleaner is subjected to a battery of endurance tests to ensure that its durable. The longevity of a product is very pleasing to a customer and is vital for repeat business though it may be a long time coming due to the longevity of the product. A consumer relates longevity, which is produced through the durability of the product, to the quality of the product this can make the experience a lot more pleasant for the customer. Talking to a Toyota salesman I learnt that Toyota gets a lot of repeat business due to the longevity and low maintenance cost of their vehicles, this method of gaining repeat business applies to a wide range of products and should be considered when producing my solution. Hence I have added longevity and durability to my key factors as I believe they are vital to success in business. Dyson has a test facility at which their vacuum cleaners are pushed, pulled, dropped, frozen, baked and shaken. They also have five vacuum cleaner assault courses where the most demanding test of all human use puts machines through their paces, with 28,000 hours of punishment doled out every month. This is effective in testing the longevity and durability of the product. These tests are usually performed on the completed product and bring forth issues which need to be solved, this means that the final design is continually developed and resulting in a more successful product. Similar tests could be applied to my solution prior and post construction so that I know certain parts of my project will work before, however as I am making only a single outcome, I will be restricted to the tests I can do as I will not deliver my lamp in pieces to my client after vigorous testing. My solution can however be tested on its functionality and adjustability in the same way which Dyson tested their products to see if they were fit for purpose. I can then evaluate the solutions performance and recommend changes necessary, however I will not have time to heavily develop my solution after it is built, due to time restraints, so the issues will have to be spotted to the best of my capability during or before the design stage in order to have a successful product finished on time.

Planning:

What: I am reviewing Dyson's product development process

Why: So that I can inform my own practice by learning from existing technologists successful practice.

Resources Required:

<http://www.dyson.co.uk/testing>,
<http://www.dyson.co.nz/about/technology/testingdev.asp?searchType=technology>

Date: 4th-8th March

[Go Back \(1\)](#)

Furnware

The process to get an idea from your head to a real life product varies in method, efficiency, effectiveness, and quality. Therefore I will look at other peoples processes in order to achieve a high quality product at the end of my project. This is the design process of a Hawke's Bay classroom furniture manufacturer Furnware. They introduced a new Bodyfurn range which included a new student desk and the dynamic chair in a range of sizes. The increased size of the desktop opened the opportunity to later develop a clip-on side storage unit for the desk. The new range was developed through extensive initial market and end-user research and ongoing stakeholder consultation and testing and trialling. Because of this direct relationship with their customer base, marketing of new products began at the early development stage.

The Process

- Extensive consumer testing and feedback for the concept.
- The ideas were put to design group included a range of expertise from across the company, to provide a mix of different ways of thinking.
- The team looked at the concept, discussing its viability and asking what could be done differently to improve it.
- An MDF model of the design up to that stage was made and shown to the students (clients). Their feed back was positive so company knew their project was meeting its requirements.
- The designs were continually shown to students and their feed back dictated what ideas were kept and focussed on and what were moved to the side.
- With the design pretty well finalized to be the best it can be for its clients the materials were researched. The materials were selected and the function of the materials became more important than the aesthetics
- A rough physical model of the storage units was approved by the design group as a concept that Furnware could commit to. (final design phase)
- The whole process from concept to the final prototype for manufacture took about four months.

From this process I have found that it is vital to continually consult my client on every decision that will effect the final outcome. I will apply this to my own project, consulting my client on what materials, type of bulb, mechanism and design. I will also make sure that I find out what the client wants and with their input deliver this to the best of my ability. In this project function was obviously important in the material selection, I will consult with my client to see what is more important when selecting materials.

Planning:

What: I am looking at Furnwares design process

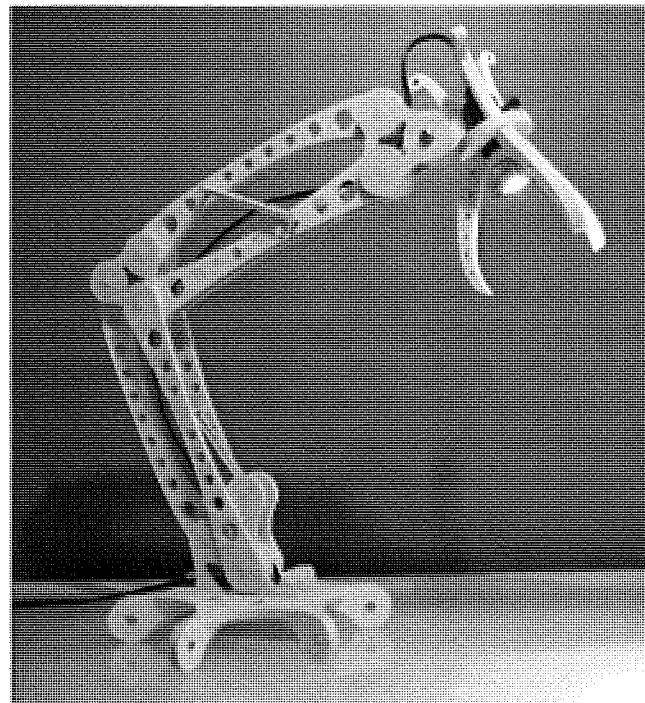
Why: So I can apply the process to my own project in order to achieve a higher quality product.

Resources Required:

<http://www.techlink.org.nz/Case-studies/Technological-practice/Materials/Side-Storage-Unit/index.htm>

Date: 9th-15th March

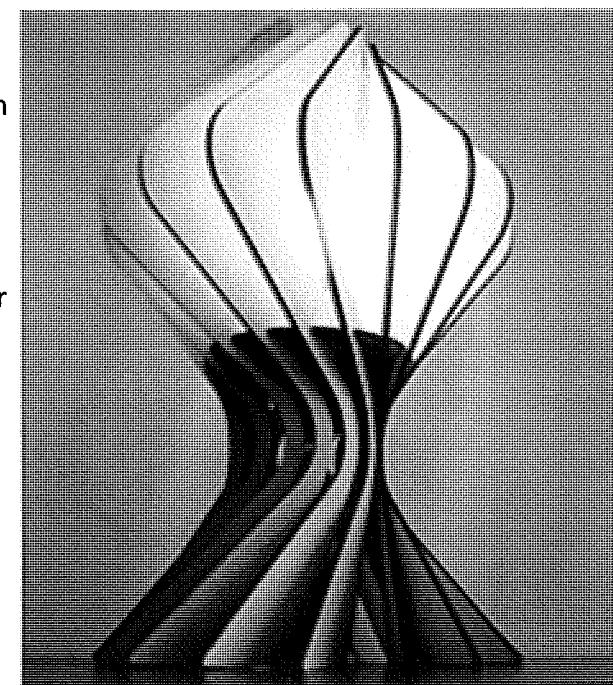
Existing Design



The client/creator of this lamp wanted a cool and unique desk lamp that is adjustable, so their main needs were functionality and aesthetics. When making this design or any design that involves a light it is important that the parts to be handled will not be heated by the light. The designer of this light has kept the parts to be handled away from the heat and/or made of insulator. Wood is an insulating material therefore will not become hot easily making it a suitable material for a lighting solution. He has also used an LED which will not heat up as much as other bulbs. I will need to use materials that can withstand the heat that the bulb emits or else my solution may become damaged.

This lamp is made up of components that were cut using a scroll saw. Shapes drawn on the computer were printed off and glued on to wood which was then cut out using the printed lines as a guide. This is a quick and easy way to get computer drawings translated to a hard copy. This lamp is made from 1/4" and 1/2" Baltic Birch plywood, it is used as it is strong, stable, easy to cut and in this case it comes from a renewable source. This design is also very functional, it uses springs and pivot points to allow it to move the light source both up and across allowing the light to be adjustable, complying with the clients need for adjustability and functionality. Personally I don't like the look of this lamp but its functionality is excellent, the client was pleased with the aesthetics therefore it meets their need for aesthetics. The light used is a 3-watt LED, this provides effective white light, a suitable option for my lighting purposes. The light puts out 180 lumens of light which the creator said is enough for a small desk space. It also has a reflective casing on it narrowing the beam of light to 30-40 degrees. This is important as the light will go everywhere if not directed and adds to the desired functionality. This design is quite cool and has a lot of attitude to it, its base looks like feet.

The clients for this lamp is the lamp buying consumer. This lamp is not designed to be adjustable like the previous lamp, instead it is more of an art piece that is located in a hallway or on a desk. As a result this design does not have near the same functionality and flexibility of the previous design I evaluated. The design is also made using wood which as stated previously is a good insulating product to prevent the heating of components. This lamp is constructed from Eurolite plywood, hardboard with a soft acrylic finish. Eurolite plywood is suitable for use in more weight critical applications rather than structural areas, since a lighting solution does not require much strength this is a suitable material for my project and this design. The components are cut out using a laser cutter as well as a water jet. I have access to a laser cutter therefore this would be a possible construction method for my lighting solution. The design of this lamp allows light to be emitted over 360 degrees brightening a room rather than a desk which my project aims to achieve. The lamp is shaped in such a way that the . The light used is a 40W spiral energy efficient light bulb, takes about 10 – 15 minutes to assemble and requires no glue to construct. This design is a completely different design to the previous. I prefer the functionality of the previous but the aesthetics of this design. I hope to achieve a design that is both aesthetically appealing and functional taking the best from both of these designs. This is not the type of lamp that will solve my lighting issue but it looks good. And I like the contrast of colours and flow of shapes that make them appear 3D



[Go Back \(1\)](#)

[Go Back \(3\)](#)

Planning:

What: I am researching existing designs

Why: To explore what current solutions there are for my clients issue and to get some ideas for the design and functionality of my lighting solution, it will also let me see what types of lights others use for their lighting solutions.

Resources Required:

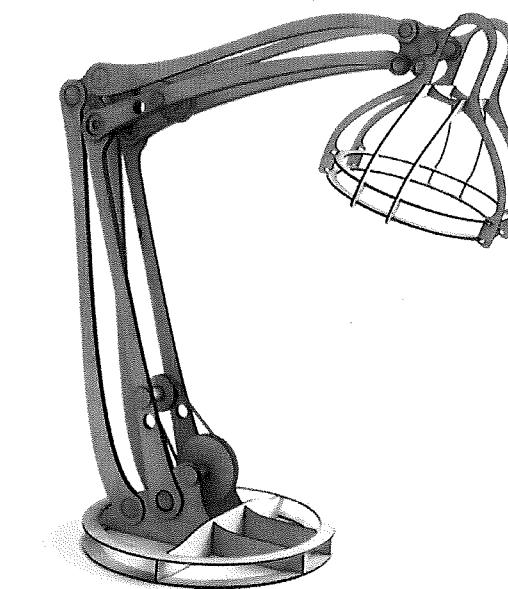
<http://www.instructables.com/id/Woodpunk-LED-Desk-Lamp/> ,
<http://www.industrialdesignserve.com/gallery/Alienology-Lighting-Bloom-Lamps/275681>
PowerPoint

Date: 16th-23rd March

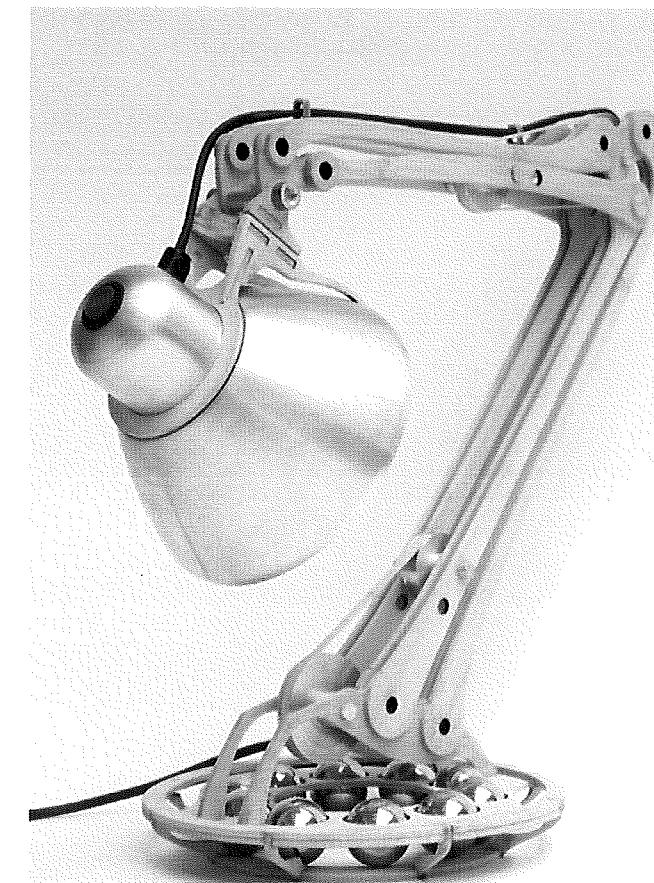
Existing Design

[Go Back \(1\)](#)
[Go Back \(3\)](#)

This lamp is made out of thin plywood. Wood is an insulating material therefore will not become hot easily making it a suitable material for a lighting solution. This lamp is not actually pictured with a light but it has a place allocated for a light and casing so it could be easily made into a desk lamp. This lamp is made entirely of components that were cut using a laser cutter. The lamp comes un assembled and the pieces are assembled like a 3 dimensional jigsaw puzzle. The desk lamps arms are different from each other unlike the previous design which had similar arms. This could create problems when extending the arms as the arms may come together unevenly when the arms are fully extended or retracted. This design looks to be functional and uses a similar balancing mechanism as the previous design except it uses a wheel and rubber band to provide tension, I am unsure as to how effective this is in keeping the arms of the lamp poised. All of the balancing system allows the light source to be moved about a range of angles, heights and depths. I like the look of this lamp over the previous design as it has a flow about it. The base provides a stable platform for the lamp which means that it won't tip over. I think it looks cool and that the arms look like bones, the burnt edges look alright aswell. My client likes the look of this desk lamp, he likes the simplicity and kitset nature of the design.



This design is very similar to the other design on this page. It uses a lighter colored plywood cut out with a laser cutter. Again wood is an insulator so it is a suitable material to be used around a potentially hot lamp. This lamp has a lamp shade and light which slot into a holder made from wood. The lamp shade helps supply a focused light, I am unsure what type of light bulb is used but with the lamp shade you are limited to bulbs that are able to fit into the lamp shade. There is a switch on the lamp head which is very functional as the user can turn the lamp on from the part of the lamp that is closest to them. This lamp does have some metal screws etc to piece it together unlike the previous lamp which was entirely wood. The desk lamps arms are different from each other like the previous design. This could create similar problems when extending the arms as the arms may come together unevenly when they are fully extended or retracted. This design looks to be functional and uses a similar balancing mechanism as the previous design. All of the balancing systems I have looked at allow the light source to be moved about a range of angles, heights and depths. I like the lighter timber used in this lamp and the shiny metals used also add to its aesthetics. The base looks stable but also incorporates metal balls which allow the lamp to move around, this does not seem to be a good idea as the lamp would always be moving around making it hard to work with. I like the metal lamp head and I like the way you can see the wire running down the back of its arms, I prefer the darker wood used in the previous design to the lighter wood used in this design. The base is quite cool and it looks like it would move around easily.



Planning:

What: I am researching existing designs

Why: To explore what current solutions there are for my clients issue and to get some ideas for the design and functionality of my lighting solution, it will also let me see what types of lights others use for their lighting solutions.

Resources Required:

<http://eckiller.com/2009/12/cool-cnc-friendly-desk-lamp-design.html> PowerPoint

Date: 24th-27th March

1st Brief

My client is Allan [REDACTED] who owns and works for [REDACTED] Architects. Allan needs a lighting solution that will supply adequate light for viewing designs, sketching, managing the business, reading about rules and regulations and other relevant material. The lighting solution needs to be energy efficient but the amount of light put out cannot be compromised as that would go against the lighting solutions primary function which is to supply adequate light to his work area. He would like the materials used to have a minimal impact on the environment and be durable so that they do not corrode or break down over time. The light used must give adequate light from the moment it is turned on and cannot take time to warm up. The space on Allan's desk is limited therefore the area of the lamp in contact with the desk will be limited in size to prevent the desk from becoming cluttered. The light will be on show to his clients and he will see it everyday at work so the lamp must be aesthetically appealing and not offensive to anyone. The lighting solution must be adjustable so that the light source can be moved or angled to suit. Allan does not have a budget but all spending has to be within reason and be necessary for the success of the project. The lighting solution must be strong enough so that it doesn't break or become flimsy. With my existing design research I have identified the basic concept for the solution to be a desk lamp which is balanced allowing it to be adjustable.

Key Factors:

- Adequate, Energy Efficient light source
- Aesthetics
- Adjustability/Functionality
- Environmentally Friendly production process
- Durability
- Strength

Planning:

What: From the research I have done so far I have developed a first brief

Why: This will guide me in what I research next as I now know roughly what my client wants so I can set about doing it.

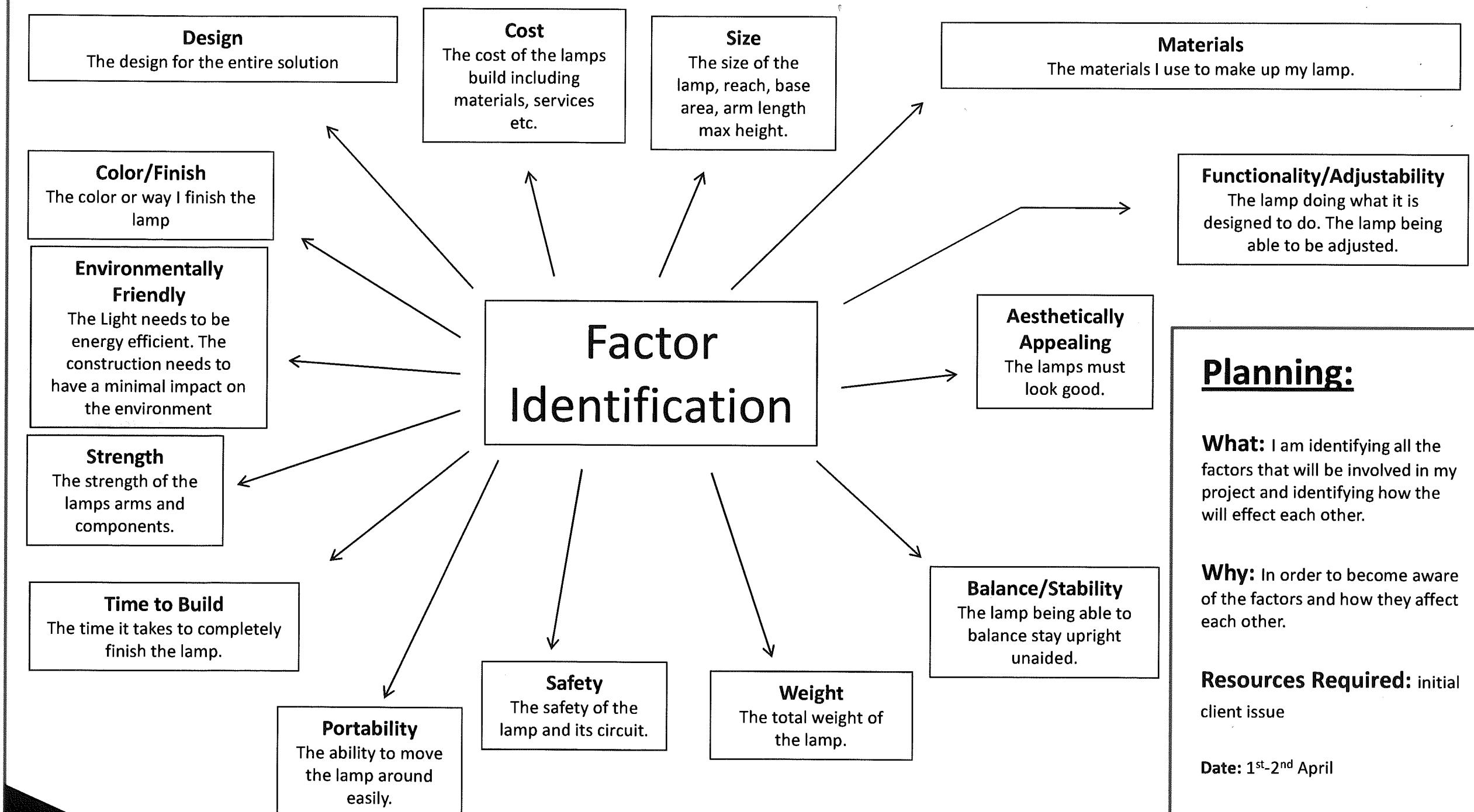
Resources Required:

Previous Pages

Date: 28th March – 1st April

Go Back (4)

Factor Identification



Key Factor Consultation

[Go Back \(1\)](#)

[Go Back \(4\)](#)

Factor Consultation

I listed the factors that I identified in my key factor identification to the client and asked them if they where important and why? This will give me an idea of what the client wishes to get out of my project and why they want it so I can further cater my project to their needs. I have listed the factor and what the client said about it.

Aesthetics/Design: this is very important, because it's a one off piece, it needs to be an artwork. I could go and buy a whole bunch of lamps from china for the same price as this lamp so it must be unique.

Safety: this is obviously important as I don't want anyone to get injured or be in danger of getting injured.

Adjustability/Functionality: this is a given, in today's market everything must function and your outcome must be no different. I must be able to move the lamp into a position and it must hold itself there.

Strength: this is also a given, the lamp must be strong enough so that it will not break easily.

Portability: the lamp will not be moved around much if at all so this is not an important key factor.

Weight: the lamp is not going to be moved around so weight is not really an issue but I don't want a huge brick.

Cost: this is not an issue, if I wanted a cheap lamp I would go and buy a mass produced one as it would be easier and just as functional.

Energy Efficiency: this is very important as we must harness new technologies in this modern age to be competitive as a business, easy on the environment and easy on the wallet.

Balance/Stability: this is also a must have in order for the lamp to function. The lamp must be sturdy and in no danger of tipping when the arms are extended and when the lamp is in any position.

Materials: the materials are of high importance as they must stand the test of time without breaking down or losing their aesthetics. The materials used must be aesthetically appealing and strong enough so that the lamp doesn't break. Also where possible use recycled or environmentally friendly materials.

Colour/Finish: this is very important as the aesthetics of the lamp hinge on the colour and finish that is selected.

Energy Efficiency: as stated in previous consultations this is very important to me as I would like to minimize my impact on the environment and also keep the businesses running costs down.

I also asked my client to make a general comment on what he wanted out of the desk lamp? and what he thinks is important in technological outcomes Today? "I believe that design is important nowadays, we have come to the stage where function is a commodity and it is design that sets apart products. Anyone can make something that works but only a hand full can make something that is aesthetically appealing." He used an example of purchasing a car. "When you buy a car every car will get you from A to B, be functional, but every time I will buy the more aesthetically appealing car even if it costs significantly more."

Planning:

What: I am consulting my client on what his priorities in the desk lamp are.

Why: So that I can identify the issue and set about solving it so that the client is left with a product that meets their needs.

Resources Required:

Client, Clients Workspace.

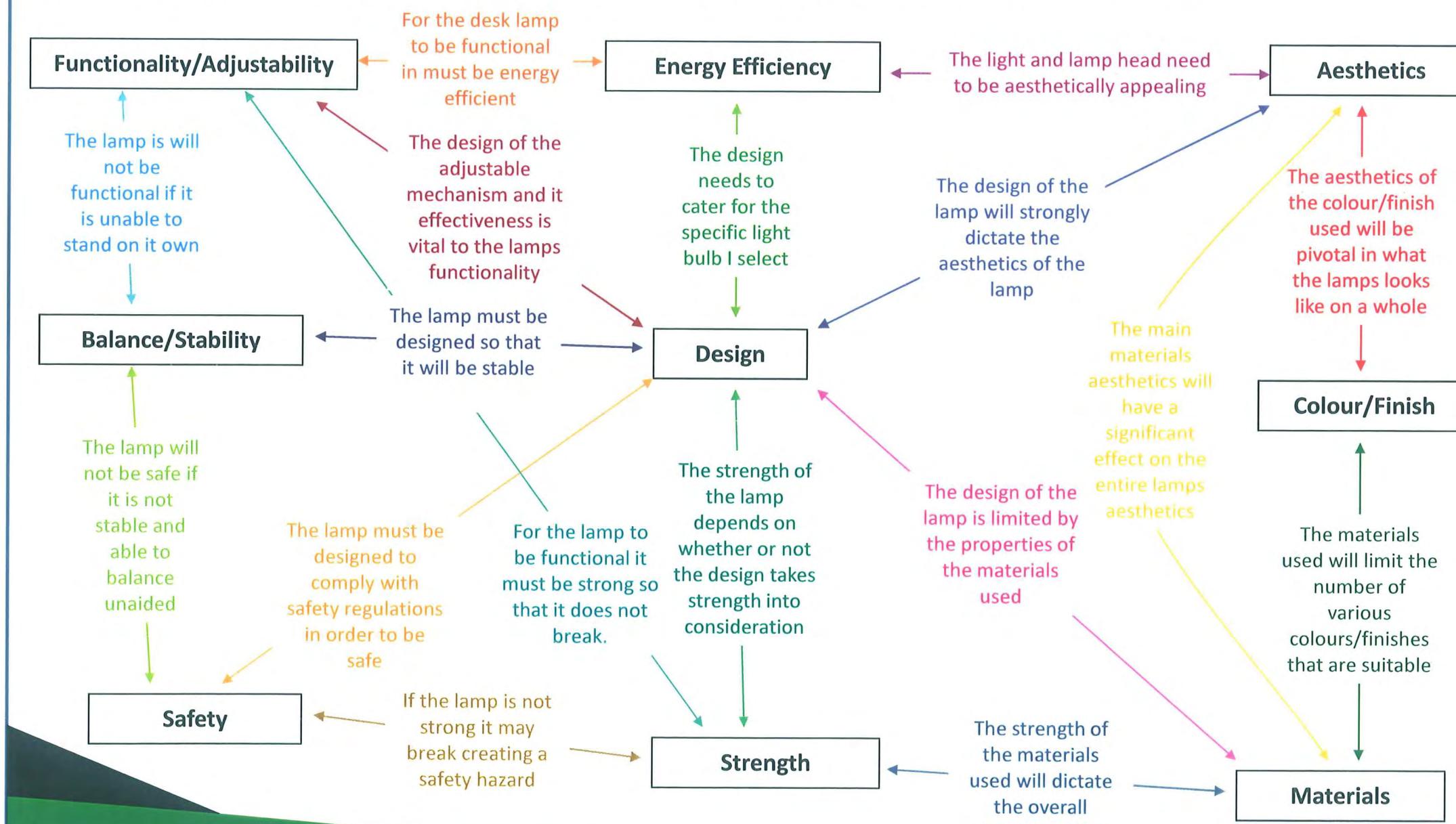
Date: 2nd-4th April

[Go Back \(4\)](#)

Factor Interaction

What did I learned from key factor consultation?

I have learnt exactly how my client feels about technological outcomes today. His input is invaluable to me as it lets me know exactly how he feels about different aspects of the lamp. The client expects functionality and adjustability but he wants aesthetics on top of this. The lamp must be functional but if it is not aesthetically appealing the lamp will be a failure in my clients eyes. Therefore I must deliver a lamp that is both functional and aesthetically appealing for this project to be a success. I will need to apply this knowledge when designing my lamp and also keep it in mind when making decisions along the way. Now I have the knowledge to derive the key factors for my desk lamp. I will also identify how the key factors interact with each other so that I am aware of what will happen as a result of changing various aspects of the lamp e.g if I change the colour the aesthetics will be affected.



Planning:

What: I am narrowing down the identified factors to key factors and exploring how they effect and interact with each other.

Why: In order to become aware of the key factors and how they affect each other.

Resources Required: Factor Identification.

Date: 5th – 9th April

2nd Brief

Talking to experts on lighting from lighting direct I have added more factors that the lighting solution must address. The light must have a direct and focused beam of light so that only the target work is illuminated this will require me to ensure that the light bulb has built in reflectors or I will have to add a casing to achieve this, I class a focused beam as being around 50 degrees or less. Also I have learnt that consumers will simply throw away the desk lamp if any component fails, therefore it is important that the desk lamp is long lasting in every aspect (Materials, Light Bulb used, balancing system etc.) Based on what I have learnt during my existing design research I think that the lighting solution will be a desk lamp as this is the best solution to fill my clients needs. The desk lamp will be powered via a plug into the wall as my client has no need for a battery or alternative power supply. Me and my client have also discovered that there are a lack of energy efficient lighting solutions such as desk lamps that incorporate new advancements in lighting, I have also found that due to a lack in aesthetics and desirability, the few solutions out in the market are not selling very well. This is wasting large amounts of electricity and in bringing forward an attractive energy efficient desk lamp which uses modern technology I believe that I can create a desirable lamp not only for my client but for a range of consumers. Therefore I am expanding the target audience and stakeholders for my technological solution. The lamp will now have to be manufactured, therefore the design must be suitable for such a thing. Based on my Stakeholder Requirements consultation I have identified what is valuable to the client and myself for this desklamp, hence I have updated the key factors.

Updated Key Factors:

- Adequate, Energy Efficient light source
- Aesthetics
- Adjustability/Functionality
- Environmentally Friendly Materials
- Durability-Long Lasting
- Strength
- Focussed Light Beam
- Mass produced

Planning:

What: I have updated my brief as my knowledge on my project has expanded.

Why: So that I can develop what my client wants and how im going to deliver that.

Resources Required:

Previous Pages

Date: 10th April

Client Consultation

[Go Back \(1\)](#)

I interviewed a lighting direct employee to get an idea of what the desk lamp market is like. This will be vital as this light store sells lamps and has experience in what people want in a desk lamp and if there are any issues with existing lamp designs. Lighting Direct is a possible place where I could sell my lamp and therefore will have a highly valued opinion and input into my final product.

Q. Do you think there is currently or will be a demand for energy efficient bulbs to be used in desk lamps?

A. Yes there is currently a small demand for energy efficient bulbs in desk lamps but the frequency of customers asking for desk lamps with energy efficient bulbs is increasing quickly as people become more aware of alternative bulbs such as LED's and CFL's. the most popular type of bulb used currently is still halogens though as they have a well directed and focused light that allows people to read etc. easily with the lamp.

Q. What do your customers look for when they are buying a desk lamp?

A. Most people look for a bulb that produces good light and are not always so concerned about aesthetics, but for others aesthetics is key in which lamp they purchase. Adjustability is also important as people want to be able to direct the light easily and without having to move the whole lamp.

Q. Do you have any preference of what type of bulb should be used in the desk lamp between CFL or LED?

A. LED's last longer and use less power which is attractive to a customer. The longevity of LED's is also important as most people will chuck the whole lamp out when the bulb blows. But there is not much of a range of LED bulbs whereas there is a large range CFL bulbs and in general CFL bulbs are more developed.

Q. What is the main factor/ aspect of a desk lamp that influence what the customers buy?

A. The main point of sale is a focussed light that allows people to easily read under and direct the light onto their work or reading. If the light was not focussed the customer would just buy a table lamp instead.

Q. What is the preferred choice for an adjustable lamp?

A. I usually recommend that people avoid lamps with spring arms as they often break leaving the arms flimsy and the lamp is chucked out as it is useless. Instead I recommend those without springs that use an adjustable neck which allows the light to be easily directed.

Q. What materials are commonly used for desk lamps? Why?

A. Most are made of stainless steel as it is resistant to rusting and corrosion but some are made of plastic as it also doesn't break down over time. But the most popular with customers are the lamps made of metal.

Q. Are customers happy with the lamp being plugged into the wall or should I look into a battery powered lamp?

A. Customers often choose lamps that have a switch on the lamp and are plugged into the wall so that they can turn the lamp on and off at the lamp rather than at the wall. I don't think that it is worth looking into battery powered lamps as I think the wall powered lamps are more than adequate.

From this I can gather that there is a growing demand for LED's to be incorporated into applications like desk lamps etc. I have also learnt that it is important for the lamp to be adjustable and produce good light. This shop's customers are not as focused on aesthetics as my client is, this could be due to the nature of the shop as it is a high volume lower market shop whereas my product is aimed at a more up market audience, where aesthetics are more important. I will stick with a lamp that is plugged into the wall rather than battery as there is no real need and it would be a con rather than a pro. I have also narrowed down my material selection to aluminum and stainless and plastics as well.

Planning:

What: I am interviewing a lighting direct employee

Why: To get an idea of the wants and needs of a wider desk lamp market

Resources Required:

Telephone, Notepad

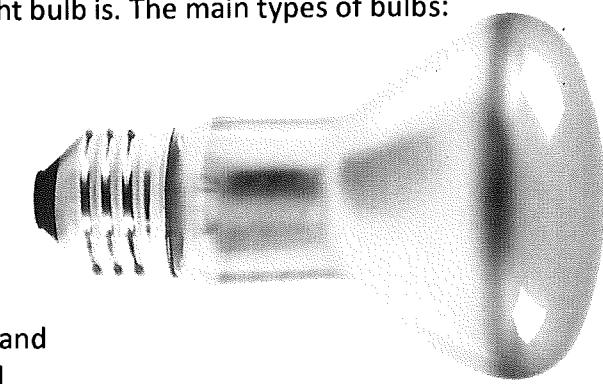
Date: 11th April

Light Comparison

Since my lighting solution requires energy efficient lighting there are multiple choices, in this research I am to compare which type of light is the most suitable for my lighting solution. I must weigh the energy efficiency, environmental impact and functionality. Aesthetics may also be a consideration depending on how visible the light bulb is. The main types of bulbs:

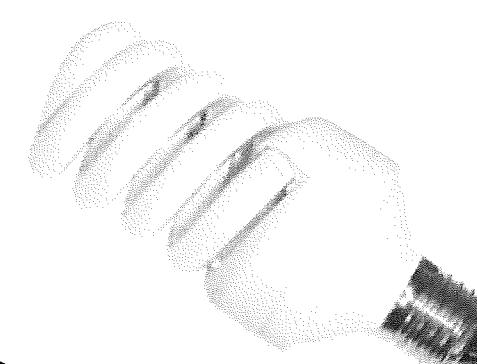
Incandescent

These are the most popular and well known bulbs, incandescent bulbs work by using electricity to heat a tungsten filament in the bulb until it glows. The filament is either in a vacuum or in a mixture of argon/nitrogen gas. Most of the energy consumed by the bulb is given off as heat, this mean that the energy efficiency is low. The filament can also become uneven and break, this breaks the circuit and the bulb no longer works, making the bulb less reliable. The life of an incandescent bulb is about 700-1000 hours.



Fluorescent

These bulbs work by passing a current through a tube filled with argon gas and mercury. This produces ultraviolet radiation that bombards the phosphorous coating causing it to emit light. Bulb life is very long - 10,000 to 20,000 hours. Fluorescent bulbs are also very efficient, producing very little heat. Fluorescent offers a cool white light which would be suitable for rendering. With the new type bulbs, and style of fixtures coming out, fluorescents can be used in most places around the home. Note that fluorescent bulbs need components called ballasts to provide the right amount of voltage. There are primarily two types - magnetic and electronic. Electronic ballasts solve some of the flickering and humming problems associated with magnetic ballast, and are more efficient, but cost more to purchase. Some ballasts need a "starter" to work along with it. Starters are sort of small mechanical timers, needed to cause a stream of electrons to flow across the tube and ionize the mercury vapour. This means that these bulbs contain mercury and are harmful to the environment in this manner. The bulbs also take time to warm up.



LED

LEDs operate at a much higher efficiency than conventional lighting, and also higher than energy saver bulbs! This means that LED lighting will save power and will therefore save you more money than any other bulb. Unlike incandescent or halogen lighting, LED lighting runs cool, so there is no risk of burning or fire hazards. LEDs have a much longer lifetime, where a typical LED bulb lasts up to 50,000 hours compared to typically 30,000 for fluorescent and only 2000 for halogen or incandescent bulbs. LED bulbs turn on instantly unlike the energy saver bulbs which take a while to "warm up". There is no glass to break in most LED bulbs, which makes them safer. LEDs are ideal for use in applications that are subject to frequent on-off cycling, unlike fluorescent lamps that burn out more quickly when cycled frequently. The manufacturer has full control over the colour of light output from LEDs. LEDs do not contain mercury, unlike fluorescent lamps, making them environmentally friendly.



Planning:

What: I am researching different types of light bulbs

Why: To aid me in deciding what type of light bulb I should use in my project.

Resources Required:

[http://www.megavolt.co.il/Tips and_info/types_of_bulbs.html](http://www.megavolt.co.il/Tips_and_info/types_of_bulbs.html),
http://ledstuff.co.nz/about_leds.php

Date: 12th April

Client Consultation 2

I am seriously considering LED to be my choice of bulb. Therefore I am consulting with my external client to see what I will have to take into consideration when using LED's and also what LED will be suitable for my purpose. I am also seeing if there is a demand or will be one for LED technology

Q. How many watts do you think an LED used in a desk lamp should be?

A. LED's differ in quality so different quality's put out different amounts of light for the same wattage. For good reading a 3W LED will be good for up to a meter away, so you wouldn't really want to go any brighter than 3W. At the moment we have a 1.3W LED which is enough for a down light on a staircase.

Q. From your experience do LED's operate at low temperatures?

A. LED's do get quite hot contrary to popular belief but I have only experienced heat that was an issue in a powerful 9W lamp. We used a heat sink to compensate for this.

Q. What is the light beam of an LED like?

A. LED's put out very direct and focussed light. Sometimes they have a lens but they do not need a casing to direct the light.

Q. Do many people request LED's specifically when they come into your store? if so why?

A. At the moment LED's are a very specialist product so not many people specifically request them but the number is growing as people become more aware of the technology. People often buy them for fittings high up or hard to reach as they are sick of halogen and incandescent bulbs blowing all the time.

From this consultation I was happy that LED's were the right choice of light bulb. They possess the features that were identified in a previous consultation to be important, focused beam of light, longevity. This has made me confident that I have made the right choice and that LED's are the best possible light bulb for my clients needs. I have also now got an idea of what wattage of bulb I should get and I will go ahead with the high power 3W bulb based on what I have learnt from Jarif's experiences with LED's.

Planning:

What: I am in the final stages of selecting what type of bulb I should use. I am consulting with Jarif from Lighting Direct to see what his experience with LEDs has been like and what I would need to consider if I were to choose LED as my type of bulb.

Why: So I can confirm that LED is the best choice of bulb for my Desk Lamp.

Resources Required:

http://en.wikipedia.org/wiki/Environmental_impact_of_electricity_generation

Date: 13th April

Light Comparison/Light Research

[Go Back \(1\)](#)
[Go Back \(4\)](#)

Evaluation

Based on my research I have decided that LED will be the best option. It is energy efficient, long lasting and environmentally friendly, ticking all the boxes for my lighting solutions. I also know that it is functional in the position of a desk lamp as it is used in one of the existing designs I studied. I am yet to decide on what exact type of LED I will use but I will be restricted by what's on offer to me from stores in Auckland or online. I have consulted with my client on this decision he believes that LED's are more modern and are the best possible option for the desk lamp, due to their efficiency, longevity and they are a good source of light. The incandescent was obviously not appropriate due to its high

What LED should I use?

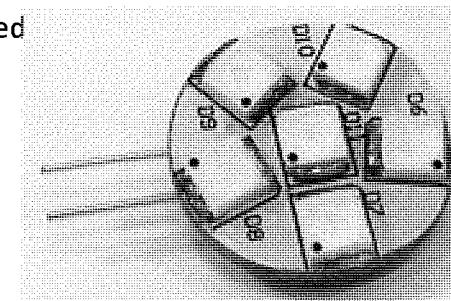
I will look at only bulbs that I can get hold of as there is no point looking at a bulb that is not available to me.

The first bulb I have found is from an online store called www.ledbulbs.co.nz. I emailed the website explaining what the LED would be used for and this is the light that they recommended. The bulb has 6 high power SMD LEDs which together put out 100 lumens of light which the company said should be enough to adequately light an A3 piece of paper. It can operate from 8-30v dc this will require a transformer. On looking at another desk lamp the bulb used is a G4 Halogen bulb that puts out enough light for carrying out detailed work underneath since this bulb is the LED equivalent to a G4 bulb this bulb should be suitable for my desk lamp. This is ideal where the bulb lies horizontal in the fitting, the bulb will be lying horizontal so it is important that the bulb functions when horizontal. This low power bulb only draws 1.3W this is a saving of around 90% compared to a Halogen bulb making it very energy efficient. It puts out about the same amount of light as a 10W halogen bulb. Its small size also means that it will fit into a light housing easily. This light beam is very wide and therefore I would need use light housing to make the beam more direct.

DESCRIPTION:

- *6 High Power SMD LEDs inserted
- *G4 base
- *Input voltage: 8vdc to 30vdc
- *Consume wattage: 1.2W
- *Light output equivalent: 10W
- *Diameter 22mm
- *Thickness 8mm
- * 100 Lumen

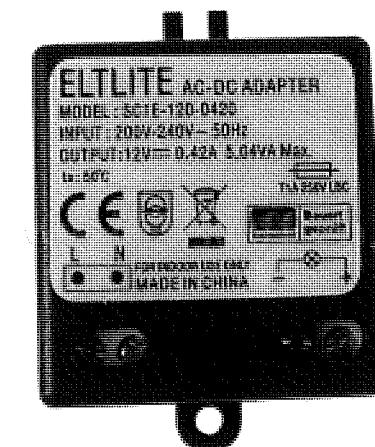
This bulb costs \$18.00



The other bulb was recommended by the sales representative at www.ledstuff.co.nz. I sent a similar email as I did with the other website and they recommended a range of bulbs to me but this is the bulb that I think will be the best value for money and most fit for my purpose of the recommended selection. This bulb uses 3 1W LED bulbs and puts out the brightest light the company has seen for a 3W bulb making it excellent for my lamp as I need a bright light but I want to keep the energy consumption to a minimum. The 3 1W LEDs give superior power savings for the same light output, and maintain low operating temperatures (under 60 degrees Celsius). The beam angle of this light is 45 degrees which is very important as I have learned from my interview with a lighting direct employee that a focused beam of light is one of the main aspects of a lamp, customers look for. The lifetime for this LED is approximately 50,000 hours. The input voltage is 11-14V DC or AC so a transformer will be needed to convert the power supply. The dimensions of this lamp are: diameter 50mm and depth 43mm.



I need to convert the power that comes out from the wall to make it suitable to run the LEDs off. This supply takes 230V mains and puts out 12V 0.42A for running a single 3.6W bulb, up to two 2.5W MR16 bulbs or up to 50 individual LEDs. It works at a temperature of under 60 degrees Celsius. The dimensions are 42x40x22mm and the component weighs 47g. This is a good size and will be able to easily fit into the base or it could be placed at the wall close to the plug.



Planning:

What: I am looking at which LED I should buy to use in my Lamp.

Why: I am buying a LED because I could not possibly make one with the skills I have and the LEDs already out there are perfectly capable of fulfilling my needs. Therefore it would be impractical and time consuming for me to make or get a bulb made so I am purchasing a bulb instead.

Resources Required:

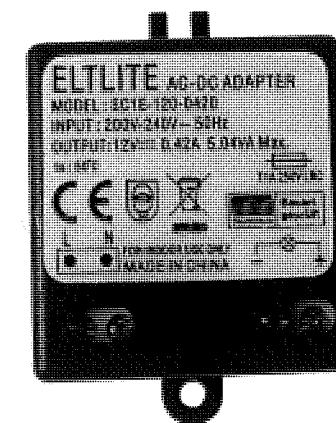
<http://ledbulbs.co.nz/g4-horizontal-led-bulb-830v-p-102.html?osCsid=c7ee7b80197d1e56c352347e369557dc>,
http://ledstuff.co.nz/product_info.php?products_id=139,
http://ledstuff.co.nz/product_info.php?cPath=25&products_id=350

Date: 14th-15th April

[Go Back \(4\)](#)

Final Bulb Selection

I chose the 3W High power LED as it comes recommended from the shop that is selling it which gives me the piece of mind that someone with experience in LED lighting thinks that this light is suitable for my purpose. This is an expertise I don't have therefore I got a recommendation from a reliable source. The bulb is also significantly brighter than the other bulb I looked at selecting which is important as the bulb needs to be bright enough to supply adequate light to my clients desk but the light cannot be too bright or else this could damage the clients eyes, I believe I have found a good balance with this bulb but it will not be until I test it in its real environment that I will know if it has a good brightness. Having an inappropriate brightness is a risk to the success of the final product but I am confident that it will be suitable due to the recommendations I have got and also the lamp used in one of the existing designs is a 3W LED so it should be suitable for my purpose. Ledstuff also said that this is the brightest 3W bulb that they have ever seen, this tells me that I am getting good brightness out of every watt this light bulb uses ensuring that this bulb is energy efficient yet emits good light. The excellent 'light per watt' is due to the configuration of the light bulb, three 1W LED's are used rather than one 3W LED this also keeps the operating temperatures down which is important as I don't want my lamp being melted or burnt by excess heat. The beam angle was very important to me as this bulbs beam angle is only 45 degrees whereas the other bulbs light beam was just under 180 degrees according to a photograph. Therefore I would have had to use a light casing to make the beam more focused this would be time consuming and expensive to design and build. The bulb was long lasting (50000 hours) which is standard in LED's and the other LED I researched had a similar lifespan but this lamp lasted slightly longer and this was a bonus as the decision did not pivot on lifespan when they both already lasted so long. The size of this is a bit more difficult to work with than the other LED but with a diameter of 50mm and depth of 43mm this bulb should be easy to accommodate in the lamp heap design. I showed my client the light comparison and they also chose the 3W bulb because of its bright focussed beam, they also thought that warm white would be a better colour of light to work with over cool white which, they thought, was too blue in colour and looked less natural. So I went ahead and purchased the warm white 3W LED, the power supply and also a bulb holder which adds about another 10mm of depth but supplies an easy and secure connection from the prongs of the light bulb to wires that are ready to be soldered into a circuit. This will save me time and also it gives a secure connection to the prongs, a better connection than I could have possibly made. The products arrived after a few days and cost \$55.70 including shipping, \$6.90 for the holder, \$29.90 for the bulb, \$12.90 for the power supply and \$6.00 for the shipping. The client is happy with the cost and the products which were shown to him on arrival seeing the size of the products also helps me to get an idea of proportions for the design. I am also happy with the products and look forward to wiring up the circuit.



Planning:

What: I am making a decision on what bulb and accessories I will buy for my project

Why: so that I am sure I have made the right choice of light for my project as the light is very important to my finished product and how it functions.

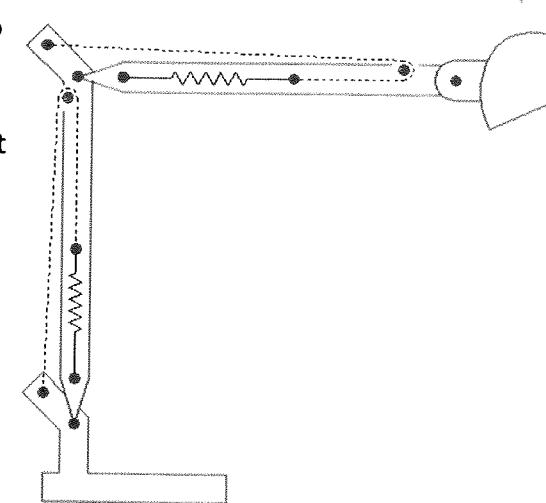
Resources Required:

Client, previous page.

Date: 16th April

Function Research

I want to make my desk lamp adjustable therefore I have decided to use a system which allows me to pivot the the arm of my lamp both the base and the joint between the two arms. Adjustability is important to the client therefore it is vital that I investigate the most suitable method of making my Desk Lamp adjustable. I am looking at existing methods of making my lamp adjustable as I am under time constraints and therefore it would be a great risk to the success of my project if I were too try and develop my own method of making the lamp adjustable as I am not sure if I have adequate skills to develop such a thing. Therefore in using a proven existing method I will be eliminating this risk factor and achieving a similar result. I will create functioning models of the systems researched and test if the systems will give me the adjustability that my client desires. I have learnt from my case study on Furnware that creating a functional model is important to test functionality and also gain client feedback



Parallelogram

This is another possible system I could use for balancing my desk lamp it uses parallelograms that are supported by springs to supply a large range of motion. This is a very popular mechanism and I assume that it will be a suitable option for making my lamp adjustable. Therefore I will make another functioning model and compare the two mechanisms in order to see what method is more suitable for my desk lamp. Using a 3D model I downloaded from the internet I was able to get the Measurements and locations of the arms. From here I will make a functional model. This is the same system used in the existing design I researched, therefore I know that it works well in practise.



Tolomeo Desk Lamp

This lamp uses Tension springs within the arms to keep the lamp balanced and the arms taught. This is aesthetically appealing as the springs cannot be seen but it also could create a problem if the spring needed to be replaced as the spring would be hard to access when replacing, this could cause the owner to simply throw the lamp away as it is useless, wasting an entire lamp for the sake of a spring. This is not environmentally friendly, therefore If I were to use this adjustable mechanism I would need to design it so that it could be easily repaired. The Tolomeo desk lamp has no parallelograms in either arm. In this modern lamp the tension springs are hidden in the arms. The lamp cap rotates the same direction as the upper arm and forearm. I am going to make a model using the pivot points of this lamp and will evaluate the function of this form of balancing system



Planning:

What: I am researching different mechanisms for making my lamp adjustable.

Why: So I can decide which mechanism will be the most effective in making my lamp adjustable.

Resources Required:

http://en.wikipedia.org/wiki/Balanced-arm_lamp,

Date: 17th – 21st April

Functioning Model

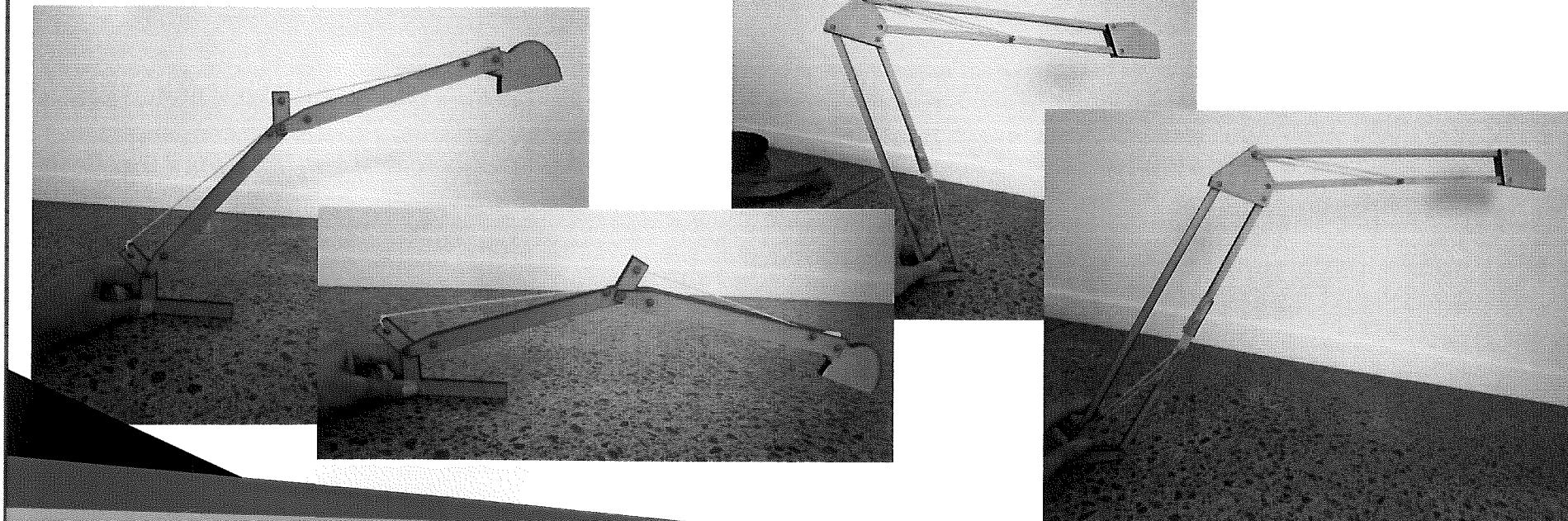
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[Go Back \(3\)](#)

In industry functioning models can be both an effective and accurate method of testing whether or not the function of a system or item is suitable and effective in fulfilling its purpose. A functioning model can be scaled down and made without worrying about aesthetics or the finish, it is a fast and easy way to make sure that something functions before investing a lot of time, money and resources on a final product that may not even work. A functioning model can identify faults and errors within the design that need to be corrected and it can supply you with the piece of mind that your product will function correctly. I have decided to make a functioning model to test the adjustability that different arm balancing methods give me. My client said that adjustability is a must have for the lamp to be effective so it is important that I investigate the range of movement different mechanisms give me. I aim to find out which balancing method holds the arms in place firmly when the arms are extended/retracted through a range of angles. I also will take note of any other relevant observations that I come across when testing these functional models. I plan to use the most functional method in my final desk lamp design, the pivot points will remain the same but the arm shapes will be changed for a unique and aesthetically appealing look that the client stressed to be important.

Functional Model Test

These pictures show how the arms of the lamp could stretch unsupported through a range of motions. My hand is only keeping the lamp from falling over side to side as this model only looks at the arm movement. When the arms were bent in further than pictured the arms became flimsy and were not effective in holding their position making this system of balancing good for a limited range of motion. The flimsiness may have been due to the elastic used not being strong enough but it held the arm firmly at other angles and if the elastic is too strong the lamp would just curl up. The model also showed me the importance of having an adjustable neck for the light to move independently from the arms giving an easily adjustable light source. I also did a test with the parallelogram which is an alternative to the Tolomeo set up, this was also cut out of MDF using the laser cutter and measurements from a picture. The arms were balanced similarly with rubber bands and I was able to extend and retract the arms through a wide range of angles similar to that of the Tolomeo system. However I felt that it supplied slightly more range and seeing it used in the existing designs leads me to believe that it is more effective than the Tolomeo system. Also due to the nature of the Tolomeo system where all the mechanisms are internal I believe that it will be harder to fix or replace parts if need be. Another point is that the lamp head stays at the same orientation when the arms are bent which will be more user friendly.



Planning:

What: I am testing out my functional models

Why: So that I can decide on what balancing method to use in my final design.

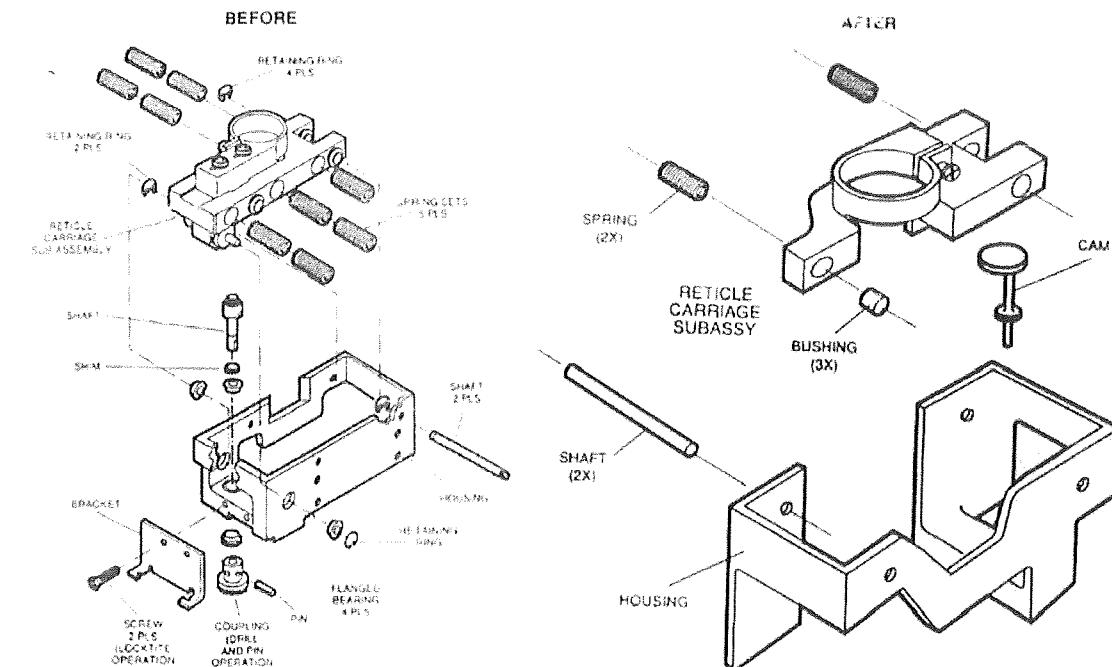
Resources Required:
MDF, rubber bands, ice cream sticks, duct tape, camera

Date: 22nd April – 11th May

[Go Back \(1\)](#)

Manufacturing my lamp

I have previously expressed my need for the lamp to be manufactured therefore it is important that I look into what factors are key for a lamp to be manufactured. Design for Manufacturability and Assembly is a very important factor that needs to be addressed in order to maximise the suitability of my design for mass production. I have looked at a powerpoint in the link below by David K. Porter works at crystal engineering corp. as the director of engineering, he has worked for many companies that deal in this field such as heavy automotive, medical, telecom and instrumentation. He has experience in what it takes to make a design suitable for manufacture. The following is the main points that I gathered from the presentation.



The two designs seen are the same part but one has been optimised for mass production. He uses this to show what the difference is between a product that is a one off and a product that is optimised for manufacture and assembly.

The main differences are:

- Less parts-more simple
- Less labour required to assemble and less energy used to make
- Higher quality

This assures that the product will be cheaper to produce which means that there is a higher profit margin and the product is competitively priced. These are two very important factors to someone who is trying to establish a business as they ensure that the product sells and that you make money of it. 75% of the cost to produce a product is determined by the design. In short complexity of design increase the cost of materials, labour and energy whilst causing more wastage which is consequently bad for the environment.

This is very important for me to consider when designing my Lamp as I would like it to be suitable for mass production, therefore this factor interacts with the design factor. I will need to ensure that my design is as simple as possible so it uses the least materials and time to manufacture and assemble. I also note that most manufacturing is done on CNC machines similar to the laser cutter I have access to at school therefore it is important that all my designs are suitable for such machines, i.e. accurate computer files of the drawings are readily available.

Planning:

What: I am looking at how my lamp being mass produced will effect other key factors and what is required to make a design suitable for manufacture

Why: so that I am aware of what the lamp being mass produced means for the lamps other key factors.

Resources Required:

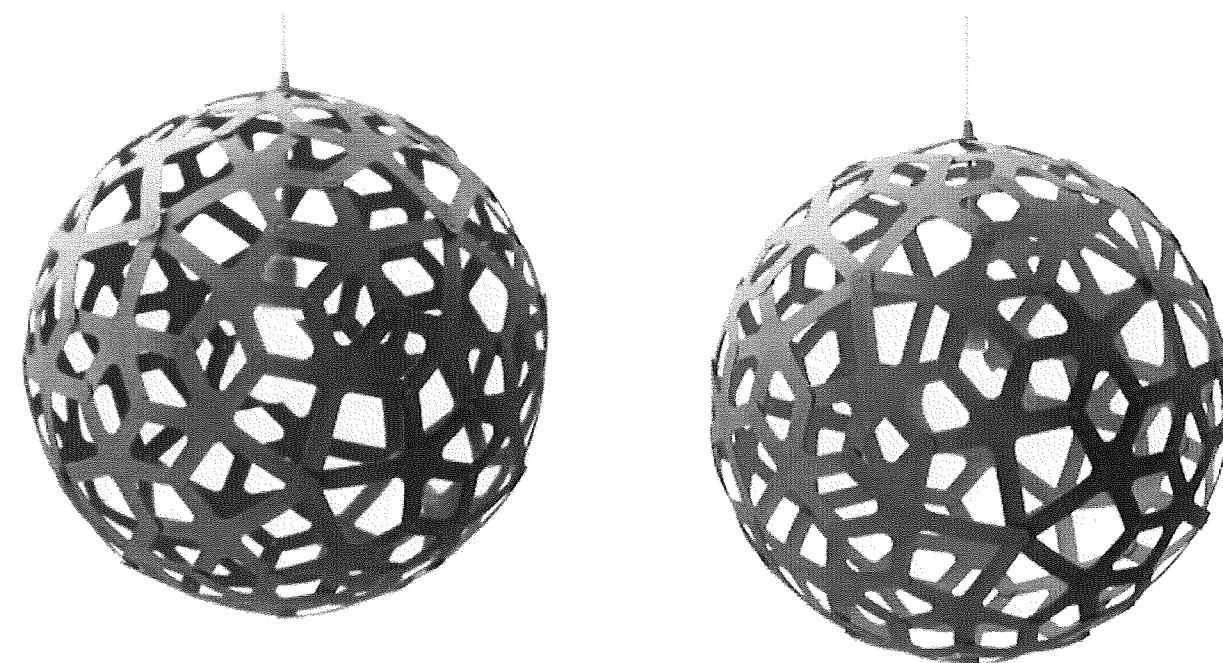
<http://www.calpoly.edu/~fowen/me428/Design%20for%20Manual%20Assembly%20Lecture%20Rev%204.pdf>

Date: 12th – 13th May

Shipping my lamp

Go Back (8) Go Back (1)
 Go Back (3)

Many items nowadays are bought online and are required to be shipped out, even items stocked in stores had to be shipped there in the first place, therefore it is vital that the item being shipped takes up the least amount of space possible. One way in which the shipping costs can be drastically reduced is through the use of a kitset, the individual components are tightly packed in a way that removes all the wasted space which is created when an unusual shape such as a lamp is made to fit in a simple shape such as a cube. One kiwi designer who has grasped the idea of a kit set is David Trubridge. He uses small 2D cut-outs which easily assemble to form large elegant shapes which would usually take up huge amounts of space but since they are transported disassembled the shipping space is drastically reduced.



The designs seen to the left are his 'coral' lamps, they are very aesthetically appealing and as you can see would require a large amount of space to ship when they are assembled. But the small star shaped cut-outs are shipped disassembled and hence very little space is required.

Important factors for kitsets are as follows:

- The components require tools that are included or common to have around the average house.
- The components include instructional material to piece components together correctly
- The nature of the assembly must be simple enough for the average person to complete
- Assembly time must be as small as possible.
- Parts that pose a possible safety hazard must be preassembled safely.

I think that making my design a kitset would be worthwhile to reduce my environmental impact caused by shipping. It will also save consumers money on shipping as the cost can be greatly reduced when smaller items are shipped. To ensure the success of my kitset design I must consider all the important factors mentioned prior. It would also be preferable to take a unique approach on some of the important factors in order to make my product unique and more exciting for the consumer.

Planning:

What: I am looking at how I can efficiently ship my lamp

Why: To bring my lamp into the modern market where shipping costs from online shopping are a big thing.

Resources Required:

<http://www.davidtrubridge.com/Designs/lighting/kitsets/coral/>

Date: 14th – 16th May

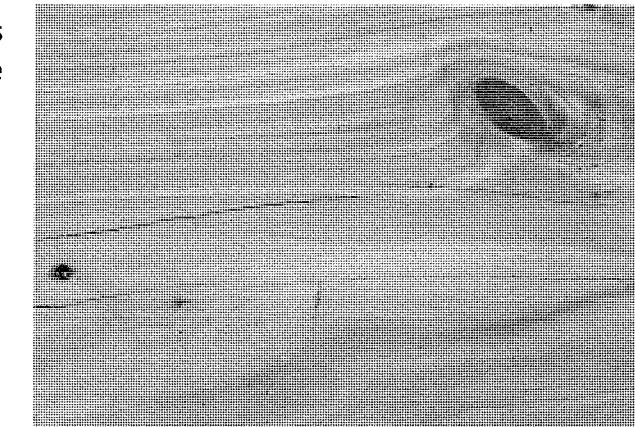
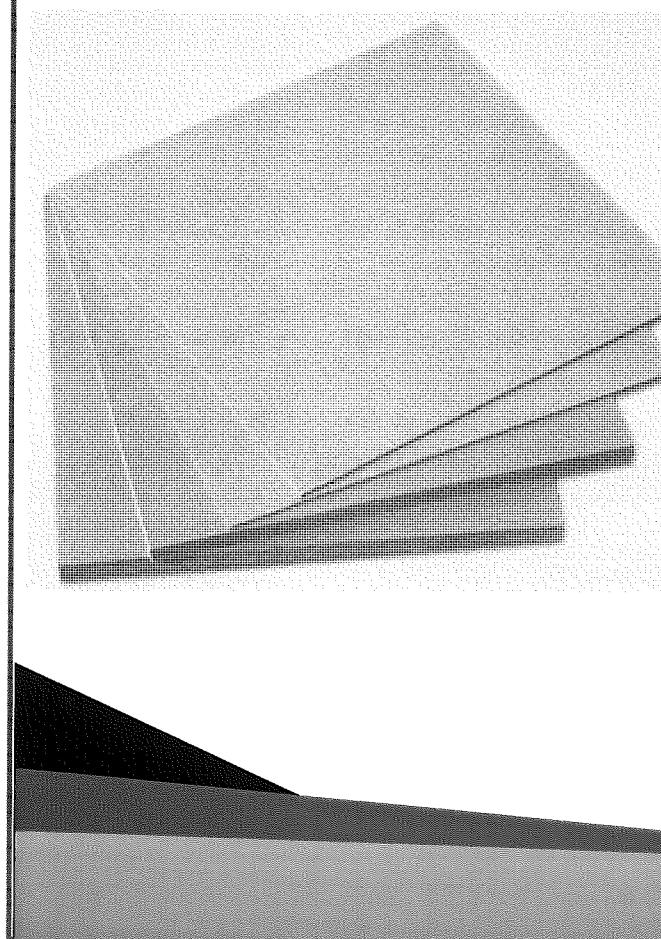
Materials Research

Macrocarpa

Macrocarpa has been well known since ancient times for it's durability and decorativeness, two features which are required in the application of a desk lamp. Macrocarpa was introduced to New Zealand in the 1860's to be used mainly for shelter belts. Macrocarpa is strong which makes it a highly sort after wood for the construction of many different things from furniture to boats, it is also aesthetically appealing allowing it to be used for decorative purposes. The strength and of Macrocarpa is a positive factor as the material I use for the arms of my desk lamp will need to be strong despite being quite thin and small in size. It is also aesthetically appealing which is a must as the client has stated that aesthetics are one of the top priorities for the desk lamp. Macrocarpa has a natural resistance to the elements and therefore does not need any artificial protection against insect or fungal attack, it can also be used outdoors (even for cladding) with no protection, this ability to resist against weathering etc is another positive factor as the material needs to be durable and not break down over time in order for the Desk Lamp to be functional. The fact that it does not need to be treated is also good for the environment. Macrocarpa is not a NZ native therefore in using it I would not be supporting the destruction of native bush which is important to both me and my client. This material can be cut in the laser cutter but due to the extreme heat involved in this process the edges cut using the laser cutter would be charred but only to a small depth leaving superficial burns that would need to be sanded off. Macrocarpa can be finished in a range of ways such painting and varnishing, a range of finishes is important in order to ensure the good aesthetics of my desk lamp. However due to the nature of wood (having a grain) the small pieces used though strong one way can be easily broken when stress is applied from certain directions, this renders this material unsuitable to be used for my project as I cannot have the components breaking easily as one of the key factors for my desk lamp is strength.

MDF

MDF is a type of hardboard, which is made from wood fibres glued under heat and pressure. MDF is an alternative to plywood and chipboard., I have positive previous experience with material as it is the material I used for my model which worked quite well in the context of a desk lamp. It is dense, flat, stiff, has no knots and is easily machined. Because it is made up of fine particles it does not have surface grain, this solves the problem which I had with Macrocarpa (previous material researched). But the absence of a surface grain also means that this material is less aesthetically appealing than Macrocarpa. MDF would be more suitable instead if I were to paint my desk lamp (which at this stage could be a possible finish) as painting MDF produces a smooth quality surface. MDF is a suitable material to be cut with the schools laser cutter as I have cut it with the laser cutter when making my model, but like Macrocarpa MDF gets charred edges when cut with the laser cutter. MDF can be dangerous to use if the correct safety precautions are not taken. MDF contains a substance called urea formaldehyde, which may be released from the material through cutting and sanding. Urea formaldehyde may cause irritation to the eyes and lungs. Proper ventilation is required when using it and facemasks are needed when sanding or cutting MDF with machinery. The dust produced when machining MDF is very dangerous. Masks and goggles should be worn at all times. If I use MDF these are some safety precautions I will have to take, this is not a negative factor just a condition of using MDF. I have also learned from my existing design research that MDF (an alternative to the plywoods used in existing designs) is a tried and tested material for similar applications to mine, this gives me piece of mind that if I use MDF it will function well as it did in the existing designs.



Planning:

What: Researching different materials that I could use for making my lamp

Why: So I can decide what material will be suitable to use in my project

Resources Required:

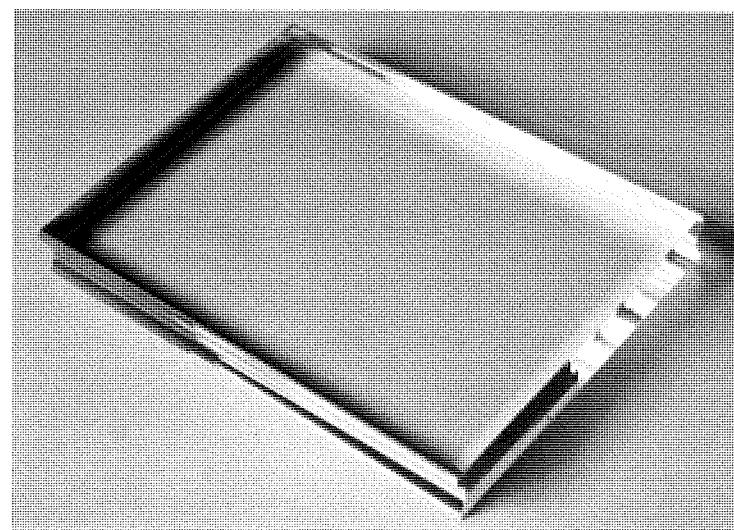
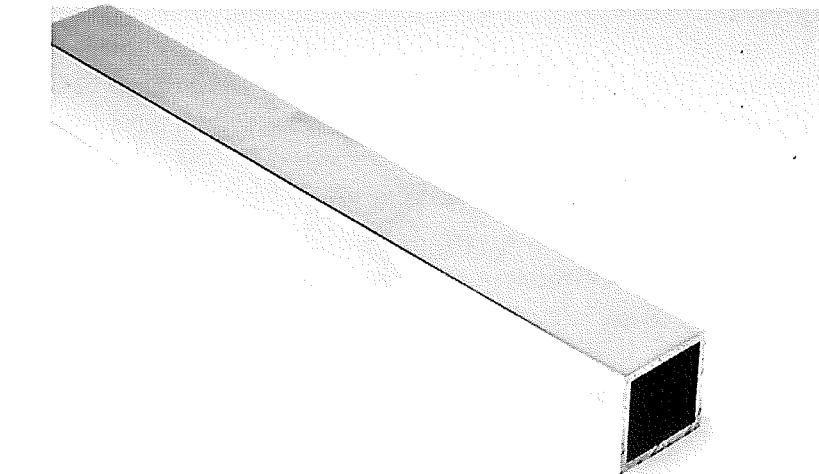
Internet, PowerPoint
<http://www.macdirect.co.nz/About+Macrocarpa+Cypress/THE+HISTORY+OF+MACROCARPA.html>,
<http://www.diyaudioandvideo.com/FAQ/MDF/>

Date: 16-17th of May

Materials Research

Aluminium Square Tubing

Aluminium is light with a density one third that of steel, 2.700 kg/m³. Aluminium is strong and is used for its excellent strength to weight ratio. This is important in the context of a desk lamp as the arm weights should be kept to a minimum whilst be stiff and strong enough to support the light. Aluminium has a good formability which means that it will be able to be shaped easily. Aluminium can also be cast, drawn and milled. Aluminium is very easy to machine. Ordinary machining equipment can be used such as saws and drills, but the laser cutter is unable to cut aluminium so an alternative cutting method would be required. Aluminium can be joined using all the normal methods available such as welding, soldering, adhesive bonding and riveting. Though I don't think that I will be joining many pieces without using nuts and bolts this is reassuring that it is easy to join if required. A thin layer of oxide is formed in contact with air, which provides very good protection against corrosion even in corrosive environments, this is very important as the lamp arms need to be durable or else the whole lamp may break and be useless. This layer can be further strengthened by surface treatments such as anodising or powder coating. The thermal and electrical conductivities are very good even when compared with copper. Furthermore, an aluminium conductor has only half the weight of an equivalent copper conductor. Aluminium is a common material like other metals to be used in the construction of a desk lamp. However its popularity and limited shaping capabilities (in the square tube format) will limit my design, I wonder if I can create something unique with this material.



Perspex

Perspex has an excellent resistance to the elements making it suitable for use outdoors, this is not relevant to my project as it will be used inside but it is definitely a pro for this material as the arms need to be durable. The material, if coloured, also maintains its colour very well which would help the lamp maintain its colour and would prevent fading which would detract from the aesthetics. Perspex becomes soft and flexible when subjected to heat in excess of 100 degrees Celsius which is good for shaping the material but the heat caused by the light may soften the material and damage my lamp structurally and aesthetically. However with the LED being selected this won't be an issue as the operating temperatures of my circuit do not exceed 60 degrees celcius. The abrasion resistance of 'Perspex' is roughly comparable with that of aluminium but because the material is indented rather than removed, the resultant visual effect is rarely noticed in service, the material should be resistant to scratching as excessive abrasions which would make the lamp look less visually appealing. Perspex is strong and lightweight and therefore would be a suitable material for the lamp as it will keep the weight down but the structure will still be strong. If this is cut using the laser cutter it will release fumes, this will have to be dealt with.

I will use perspex as I have also decided to use the laser cutter as the primary tool. I believe that the Perspex coupled with the laser cutter technology will produce the most original and effective result, therefore it is a no brainer to use a material and construction method combination that will supply me with the most freedom for my designing and highest quality for my product.

Planning:

What: Researching different materials that I could use for making my lamp

Why: So I can decide what material will be suitable to use in my project

Resources Required:
Internet, PowerPoint

Date: 18th – 19th May

Construction

Go Back (1)
Go Back (3)

Method impacting material selection

knowledgeable in this area. This would be suitable if I were to work with Macrocarpa as it is set up to handle such timbers. But I don't see it as the right facility to make a desk lamp as it is more aimed at larger furniture items where as my project is more small and complex, needing accuracy. Also Macrocarpa is really a material for large projects like chair as it has a grain and will be weak in small applications such as a desk lamp.

Mr Jones is in charge of the engineering room, he is not my teacher but he is very knowledgeable in working with metals, this makes me confident that if I were to chose to make my lamp out of metal I would be in good hands. The engineering room is possible if I want to use aluminium as a material, but aluminum is a very common desk lamp material, and for good reason as it is light strong. But I want my lamp to be original and different to any other existing desk lamp, my client also wants this as he said in my Stakeholder Requirements consultation "...it needs to be an artwork. I could go and buy a whole bunch of lamps from china for the same price as this lamp so it must be unique." This leads me too believe that aluminium is not a good choice as it is too common and I am also restricted with what I can do with it.

Finally the laser cutter, this is a small machine that is similar to those used in professional industry. It produces clean cuts and is able to work with MDF, Macrocarpa (not ideal for use with this technology) and Perspex. Being new to the school my teachers have little experience with it but their abilities with it are ample. This is probably a resource which out of the three my teachers have the least experience in, so I would have to be a bit more independent if I were to use this facility. MDF is not a very aesthetically appealing material and is used more for areas that are out of site (i.e. structural) since the material used on my lamp will be very much visible therefore this makes it an inappropriate material choice since aesthetics are so key to the success of this project. Finally the combination of Perspex and the laser cutter, this is the combination which I believe will produce the most original and successful outcome. The Perspex is an aesthetically appealing material which I have had some experience with in 2009 when making jewellery boxes, I noted it for its great aesthetics and now that I have the opportunity to work with this material again and knowing that it can be easily cut in the laser cutter, the opportunity is hard to turn down. The range of colours which the Perspex comes in will leave me with many options, giving me freedom when designing, this is a recipe for success. When the laser cuts the Perspex it vaporises it rather than burning it leaving clean edges unlike the burnt wood edges which would need to be sanded to get a good finish. This will save me time which is invaluable as I am under time constraints to get the project done. The laser cutters accuracy will mean that I will get the accuracy I need when working with a smaller item such as a desk lamp. The laser cutter requires computer drawings (dxf files to be specific) this means I will need to have accurate computer drawings of every part to be cut by the laser cutter this will add extra time but I believe that the accuracy of this will outweigh the extra time needed.

A New Zealand designer who has used the new technology available is David Trubridge. He uses many small complex shapes to combine using simple rivets to form a large simple shape. His designs come as kit sets, this heavily reduces freighting, making it a cheap and green option. His designs assemble to create functional works of art that, though simple, are visually appealing and elegant.

This year the school has purchased a laser cutter. They have invested a lot of money into the machine and in doing so would like students to be able to use this machine to enhance their technological practices. The machine uses computer drawn designs to cut out very accurate shapes etc. I would very much like to use this technology. Even though it is still early on in the project I need to make a decision now on what construction method I use. First of all the resources available to me are:

- Laser Cutter – able to work with wood under 12mm and Perspex
- Woodwork room – bandsaw, power tools, drill press, thicknesser... all the things necessary for working with wood.
- Engineering room – welding equipment, lathe, metal shaping equipment ... a good selection of tools for working with a range of metals.

Mr Breig is the teacher in charge of the workshop, he is also my technology teacher which is an important pull factor for working in the workshop. He is very knowledgeable in this area as he has worked for furniture making companies. I have had experience with wood before in my previous tech projects, and I am

Planning:

What: I am looking at the effect of various construction methods on the various materials which I have to select from

Why: So that I know what material works with what construction method in order to help me decide on a material and construction method.

Resources Required:

Previous Page, Technology Teachers

Date: 20th – 24th May

Go Back (4)

[Go Back \(2\)](#)

Constraints on the Location

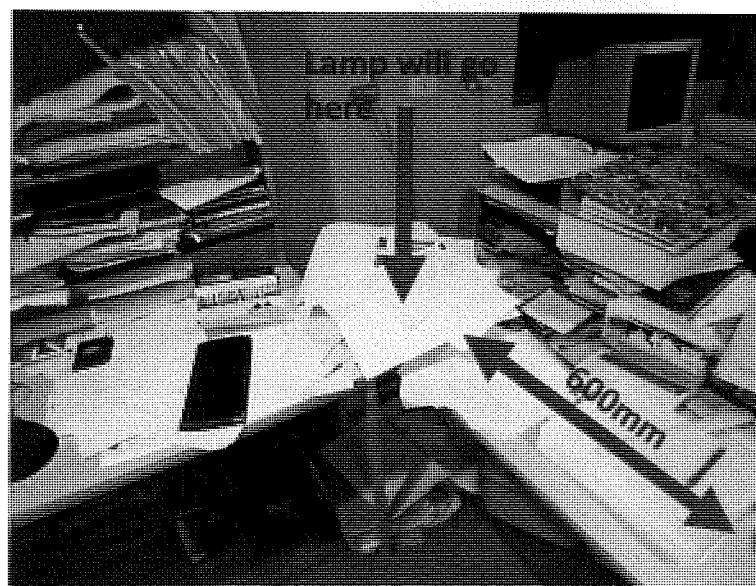
The location is the clients desk where it will be used to supply adequate light for reading and sketching. The client has also revealed to me that it may be used in the meeting room when showing clients the work he has done for them or for reading at break times. Therefore the locations will set boundaries which the lamp must stay within they also bring various social factors which need to be considered. The success of the lamp relies heavily on how it is received in its destined environment therefore it is very important that I design the lamp with the constraints of the location and social factors in mind.



This is the meeting room where my client and his employees read during breaks and also deliver presentations to their clients showing them the work they have done for them. The room is dimly lit and it can be difficult to read in the darker winter months therefore areas of about A3 size will need to be lit up. Examples of reading areas have been highlighted in red, the desk lamp would most likely be positioned around where the blue oval is so it would be able to supply reading light to both the chairs on either side of the table directly in front of it.



This is my clients desk and the area that it will be located the majority of the time. The area highlighted in blue is the work space that requires the light, therefore the client suggests that the lamp is positioned in the corner of the desk so that it can supply light to both sides, A closer look at the area it will be located is required. The power point is circled in yellow, the power cord must be long enough to reach this as it needs power to function



This is a closer look at the location, there are obviously papers on the desk from the client working, but the client has agreed to make space in the corner where the lamp is to go. The space is limited therefore the base must not be too large, the base must be able to fit into a 250mm circle. The light must be able to supply either side of the desk with light therefore it must be able to reach out about 600mm in order for it to illuminate the whole desk. The lamp will mostly be used for the side on the right of the picture, therefore the client would like the lamp to be fixed in one direction rather than having a rotating base as this may move around which would be annoying for the client.

Planning:

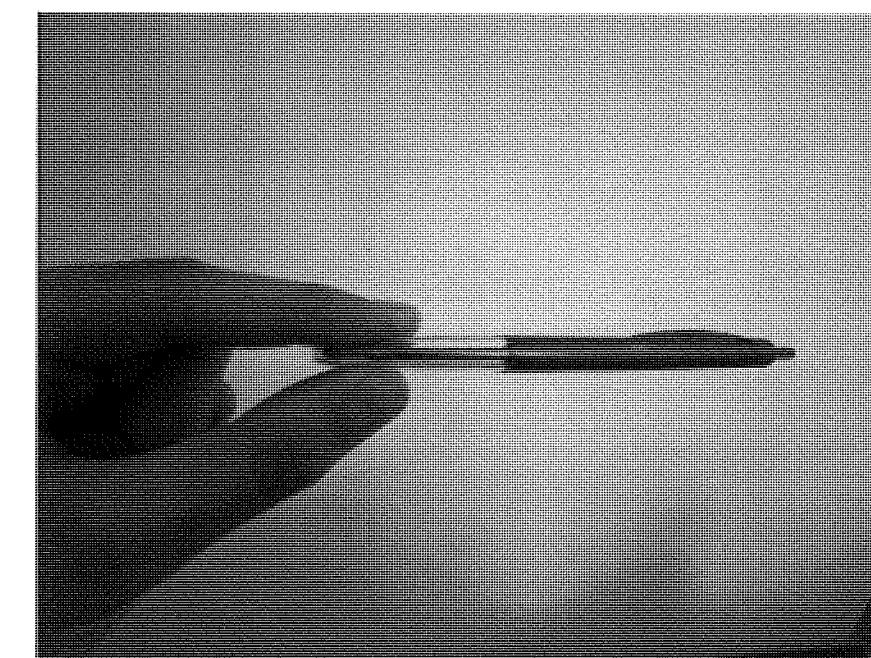
What: I am exploring the locations where the desk lamp will be situated and the considerations that come with the location

Why: So that my desk lamp is successful in its destined environment

Resources Required: Pictures of the location, Client input
Date: 25th April

Ergonomics

To make the desk lamp functional it must be user friendly. Ergonomics will play a large role in making my lamp easy to use for my client and is therefore an important factor that I will have to address in my design. First of all the lamp needs to be adjustable, this has been addressed with the function research but when adjusting the lamp this task needs to be carried out easily and comfortably for the user friendliness of the lamp. From using lamps previously I have found that the easiest way to adjust the lamp is from the lamp head, therefore I think that the lamp head should incorporate a handle that is easy to hold and consequently allows for easy adjustment of the lamps position. The handle cannot be too large so that ruins the aesthetics but it must be big enough so that it can be easily grasped. Thinking about a good size I thought, what about a ballpoint pen, everyone uses one now and then to write and they fit into fingers easily and ergonomically. Therefore I am using the basic dimensions of the bottom section of a ballpoint pen to base the size of my handle on the light, this will ensure the handle is ergonomic. The dimensions of the handle will therefore be about 6mm in height and 30mm in length, the thickness will be dictated by the material used. To reach the area required on the desk the lamp needs to be able to extend out 600mm laterally from the base. The arms won't be completely straight at this length so I will make each arm length 350mm in order to achieve this reach. The lamp head also needs to be separately adjustable to the rest of the lamp, this allows the light beam to be moved independently to the arms allowing for a large range of adjustability so that the lamp head is able to supply a focussed beam of light to any area on the desk which the client wishes. The spring balancing systems on my existing design research looks effective and ergonomic as the arms can be moved and they simply stay in place without the need to loosen or tighten the joints in order to move the lamp arms around, therefore I believe this area is to be looked further into and used as my balancing system. The base must stay put, and also not tip due to the weight of the arms and lamp head. This can be achieved by having a decent sized base that may need to be weighted down. I also think it would be a good idea to have a grip tape stuck on the bottom of the base to prevent it moving around on my clients hard surfaced desk as the traction between hard materials is not good and the base moving will cause discomfort to the user. For the longevity of the lamp I will need to ensure that the parts which may fail are removable so that they can be replaced instead of the whole lamp being thrown out.



Planning:

What: I am looking at the aspects of the lamp which will make it user friendly to the client.

Why: So that I know what will deliver a user friendly outcome, and improve the clients experience with the outcome

Resources Required:

Client, Ballpoint pen

Date: 26th April

Social Factors

[Go Back \(5\)](#)

Social

My lamp will be situated in Allan's office where his clients will pass through and talk to him about what they want in their house. The lamp will be clearly visible to these clients therefore it is important to give Allan's clients a good impression of his taste and style as if the lamp looks bad it will give his clients the impression that he has bad taste, in the architecture business you are entrusting someone to design a home for you that you will see everyday and invest a large amount of money in therefore people want to know that they are entrusting these responsibilities to someone who has talent and will deliver what they want. If they think the architect has bad taste they will not feel comfortable entrusting him with designing their house and therefore a little thing such as my lamp could cost him business. On the other hand my lamp could also promote his business by showing that Allan has good taste and style since he will have input on the design of the lamp. The lamp must not be offensive Allan said the following about the lamps social importance "if my clients are coming through my office they will see the lamp and they will need to derive some joy from it. The lamp will need to have style so that it positively reflects on me and I need to feel comfortable putting it in front of my clients." This confirms my thoughts on the social effects of the lamp.

Cultural

The lamp must not be culturally offensive as many different people from different cultures will be coming in to my dad's office and he does not wish to offend any culture. The offending of any culture may lose him business as well.

Planning:

What: I am identifying and exploring the social factors of the lamp being situated in my clients office

Why: So that I am aware of what is required for the lamp to be socially acceptable when in location

Resources Required:
Client.

Date: 27th May

Specifications

Through the research I have done between the second brief and now I have been able to develop my specifications to a stage where I feel that it is possible to move on to the design and construction stage with a wealth of knowledge which will enhance my design in a way that I will achieve the best possible outcome. If my lamp meets these specifications I know that it will meet the requirements of the brief and will therefore be successful.

- The design must be suitable for manufacture, being as simple and easy to assemble as possible.
- The lamp must have a handle on the lamp head of a similar size to that of the lower section of a ballpoint pen.
- The lamp arms must be 350mm long
- The lamp head must be separately adjustable to the arms
- The arms must be balanced by a parallelogram mechanism
- The base must include space for a transformer of dimensions 42x39x22 (LxWxH) the transformer must also be removable
- The lamp head must fit the bulb well
- The lamp head must also incorporate the lamp holder
- The lamp must be made of perspex
- The lamp will be mainly if not all cut on the laser cutter
- The lamp must have a kitset assembly which is easy enough for the average person to complete. It must also be assembled without the need for special tools. It must have instructional material on how the lamp is assembled. The parts that are too hard or possibly dangerous for the client to assemble must be preassembled.
- The lamp must reach 600mm from the base with adequate light
- The lamp must be balanced by a parallelogram spring balancing mechanism, this must supply the lamp to be held in a range of positions
- The lamp must be stable and maintain balance through all the possible positions
- The lamp arms must be stiff and strong enough so that they do not wobble and will not break
- The base must be strong so that it will not break when there are the forces involved in balancing acting on it
- The lamp must not be socially or culturally offensive and its aesthetics must reflect the clients good taste
- Parts that may fail will need to be removable so that they can be fixed or replaced
- The lamp must include a switch that is close to the lamp itself so that the client will not have to turn it on and off at the wall every time

Planning:

What: I am putting the requirements of my lamp into specifications

Why: So that I know what I need to produce in order to meet the clients needs.

Resources Required:
previous pages

Date: 12th – 18th June

Final Brief

My client is [REDACTED] who owns and works for [REDACTED] Architects, my other stakeholders are desk lamp consumers or people who will buy a desk lamp. The Lamp must be suitable for my client whilst fulfilling the needs of a desk lamp consumer. The lamp will be made as a one off solution for the client but I would like it to be able to be reproduced and sold to lighting consumers. The lamp must promote the use of new more energy efficient lighting technology and have as minimal environmental impact as possible. The desk lamp must supply adequate light to a medium sized desk area. It must have balanced arms so that it can be adjusted to further improve the functionality of the lamp. The lamp must be able to move to its desired location so it has to have an acceptable weight, though this should not be much of an issue as it is only a desk lamp. The Desk Lamp must be long lasting in all aspects and the parts which may break will need to be easily replaceable. In this way the lamp will reduce the production of desk lamp and further halt the negative environmental impact that this production is having. The light must have a direct and focused beam of light so that only the target work is illuminated this will require me to ensure that the light bulb has built in reflectors or I will have to add a casing to achieve this, I class a focused beam as being around 50 degrees or less. The client is very aesthetically orientated and wants a unique aesthetically appealing design that has a wow factor about it. The aesthetics must reflect the clients taste as it will be positioned on his desk at his office where his clients will see. The lamp design has to be optimised for manufacturing as it may be mass produced in the future it also must be a kitset to save on shipping and reduce the environmental impact that shipping causes. The light will be used in a working environment therefore it cannot produce sound and must be ergonomic to streamline the user's interaction with it. There is no budget for this project except all costs need to be justified as there cannot be wasteful spending.

Final Key Factors

- Aesthetics – the light must be unique and aesthetically appealing, the looks should promote the use of energy efficient lighting technology
- Optimised for Manufacture – the design must be suitable to be mass produced cost efficiently
- Kitset – the desk lamp should be able to be shipped in pieces and easily assemble by the customer
- Strength – the Lamp needs to be strong so that it can function and will not break
- Longevity – this will ensure that the light reduces the environmental impact of manufacturing by reducing the amount of materials and power used to make more desk lamps to replace broken ones
- Adjustable – the lamp arms need to be able to maintain their position when moved through a range of angles
- Light – the light produced needs to be enough to supply my clients desk with adequate light
- Energy Efficient – the bulb used needs to be energy efficient whilst retaining brightness
- Safe – the lamp must be safe, there must be no danger at all caused by the lamp in order for it to be mass produced as well as used in my clients office
- Stability – the light has to stay balanced when the arms are extended or retracted or else those functions are useless
- Materials – they must be durable, strong and aesthetically appealing
- Durable – the lamp must have a sound construction and not be prone to corrosion or wearing out

I have added in a few key factors as they have become important after consulting with my client and expanding the market for my desk lamp. These are the final key factors which I will have to ensure are met in my final desk lamp, how well the desk lamp meets these key factors will dictate how successful my technological solution is overall.

Planning:

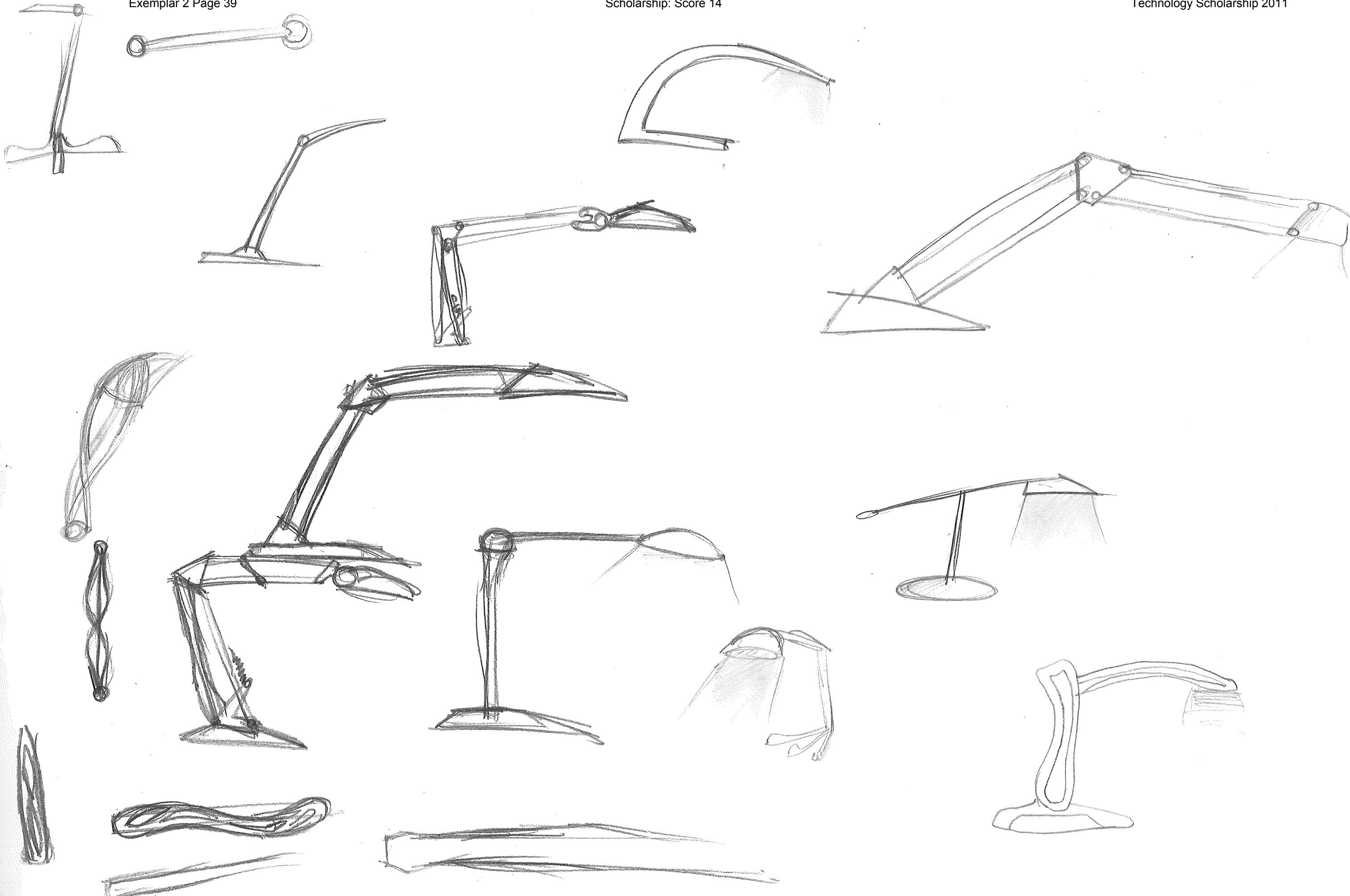
What: I have developed the brief through the research I have done and client consultation.

Why: to aid me in getting the best possible solution for my client and stakeholders.

Resources Required:

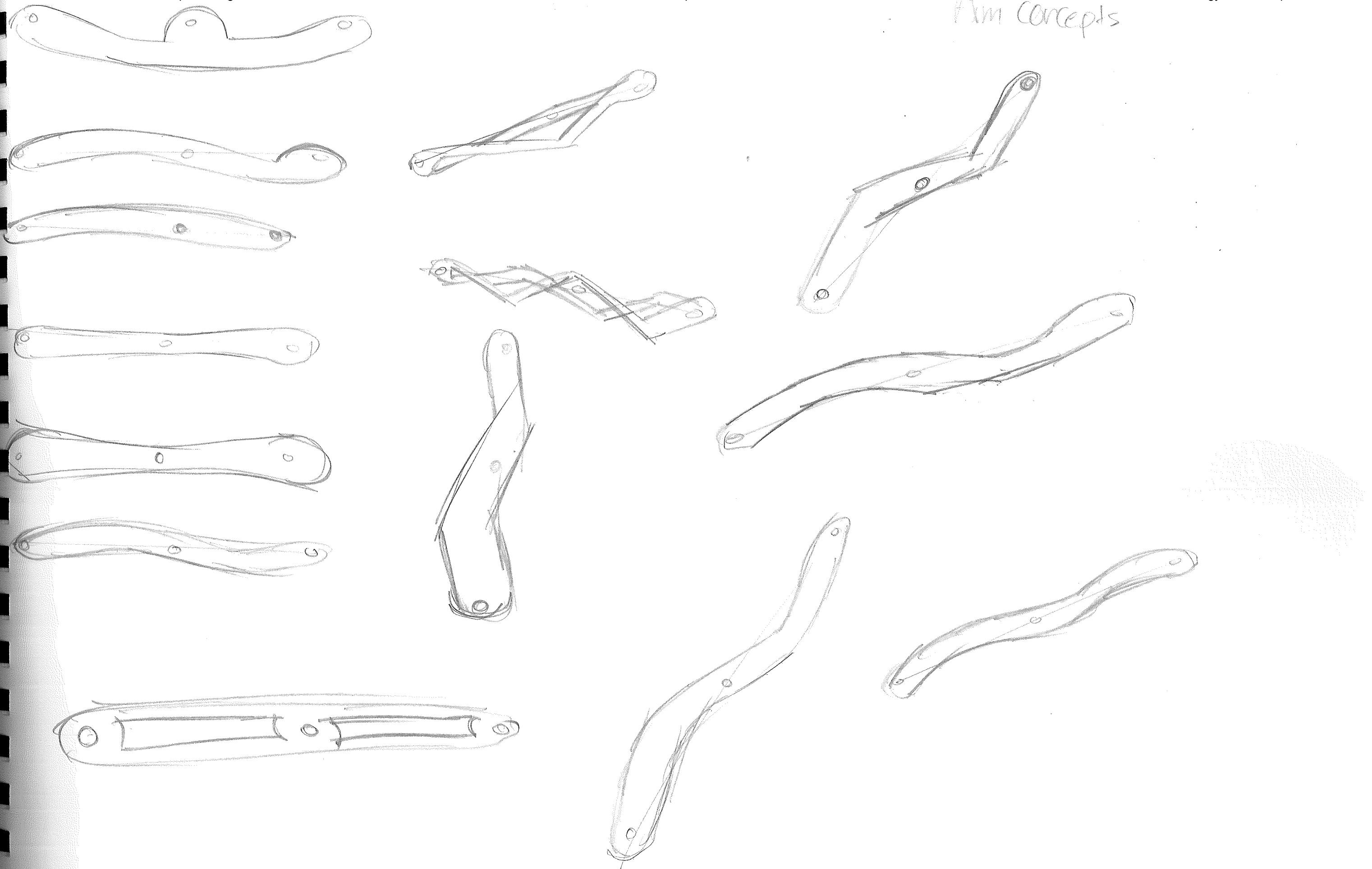
previous pages

Date: 19th – 22nd June



Initial Concepts

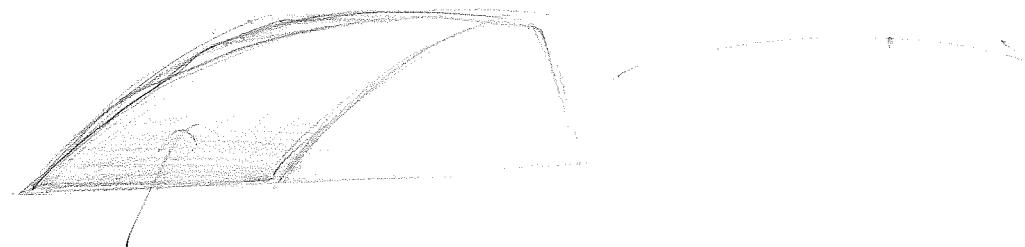
Am Concepts



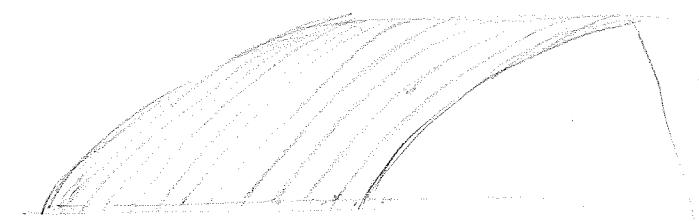
Rose Concept



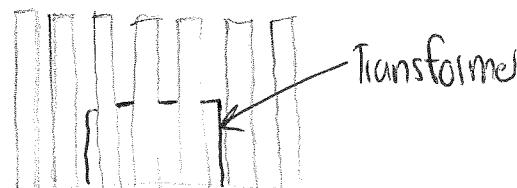
Room for transformer/Aluminium



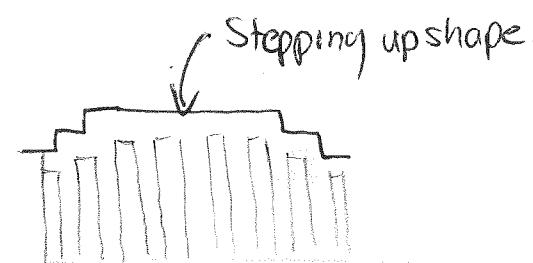
Perspex is bent into shape in line with aluminium



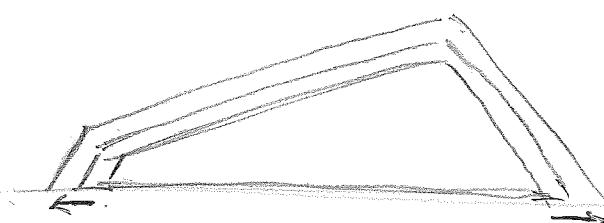
Instead of bending the perspex I could cut out individual sections and glue them together to make the same shape.



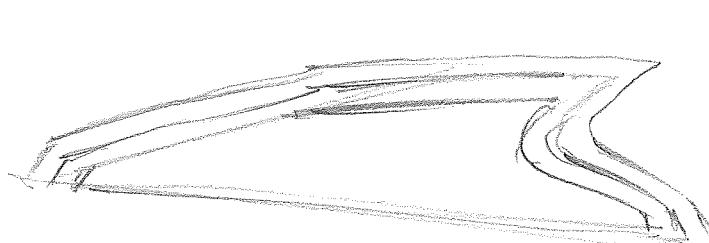
I could save on materials and achieve a unique design if the pieces had gaps between them. The transformer still has adequate room.



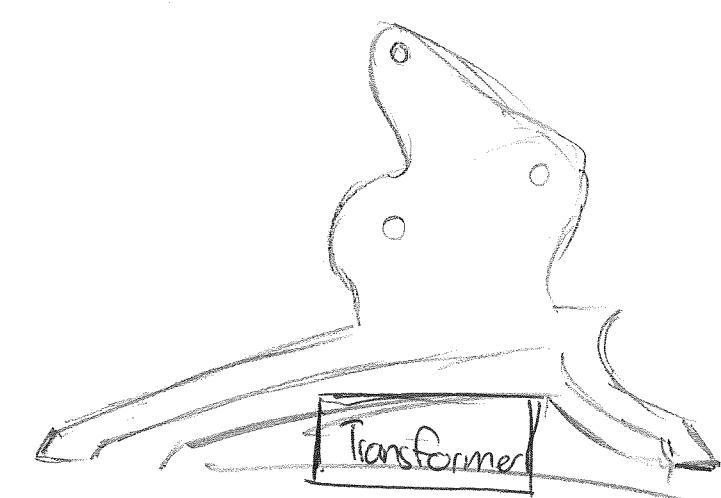
more interest could be added to the design if it was given another dimension, this is achieved by making the heights differ.



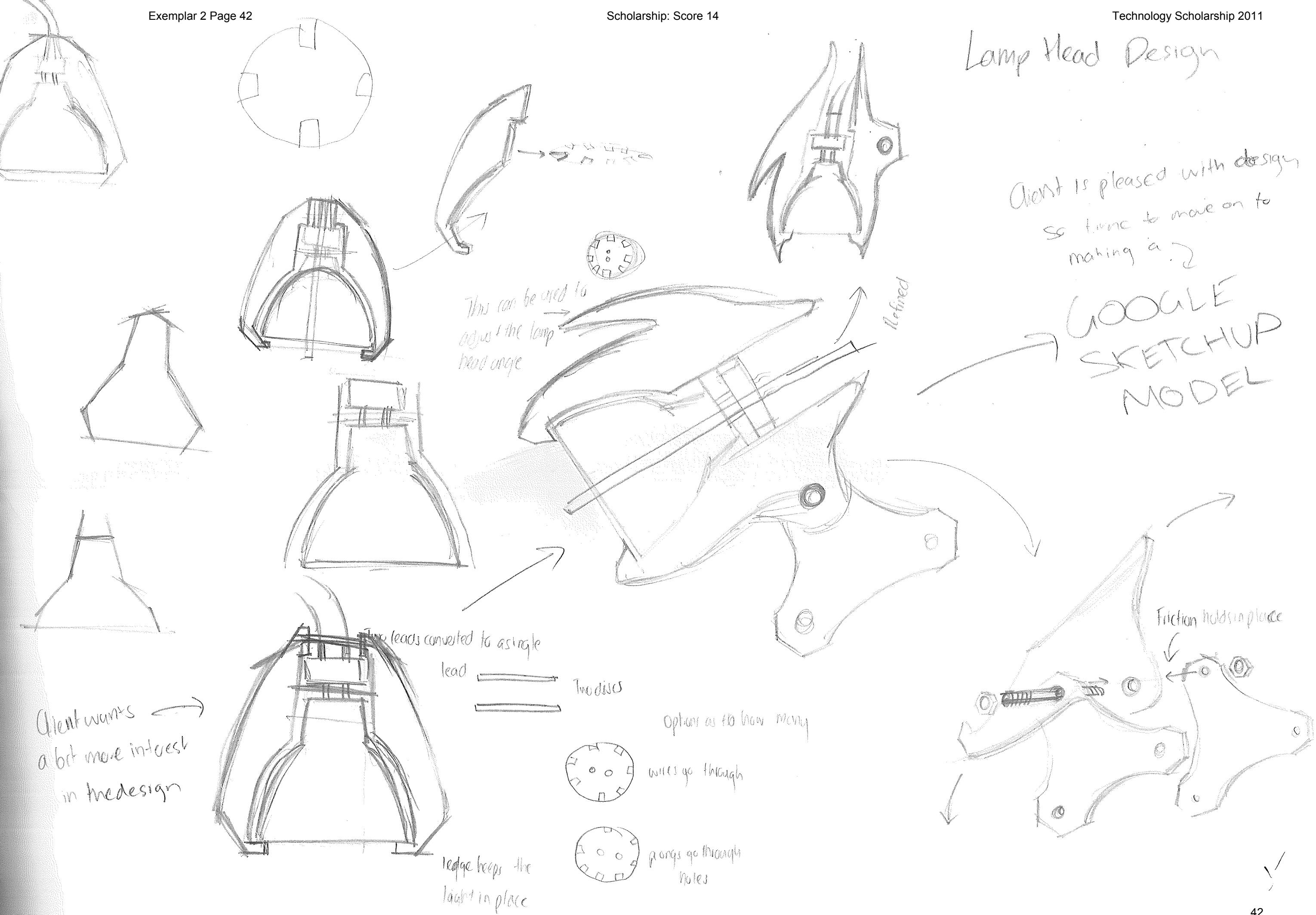
This is a side view, if the shape also extends out this supplies a material saving when they are being cut whilst supplying a hollow middle for the transformer to go into.



I have refined the section shape to make it more unique and aesthetically appealing



Client is pleased to move on to developing stage
GOOGLE SKETCHUP MODEL

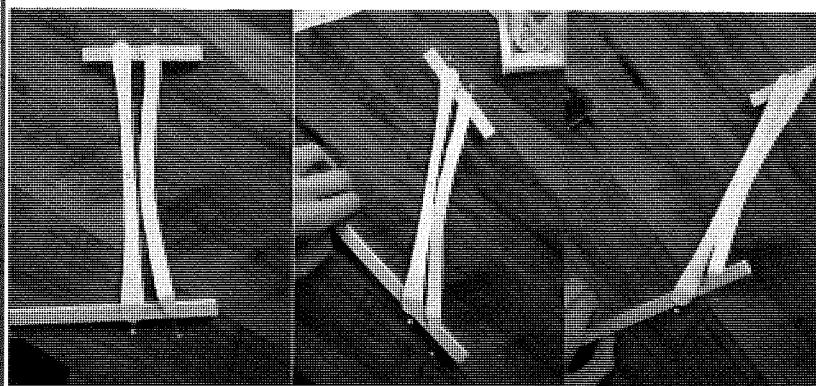


Design Investigation 1

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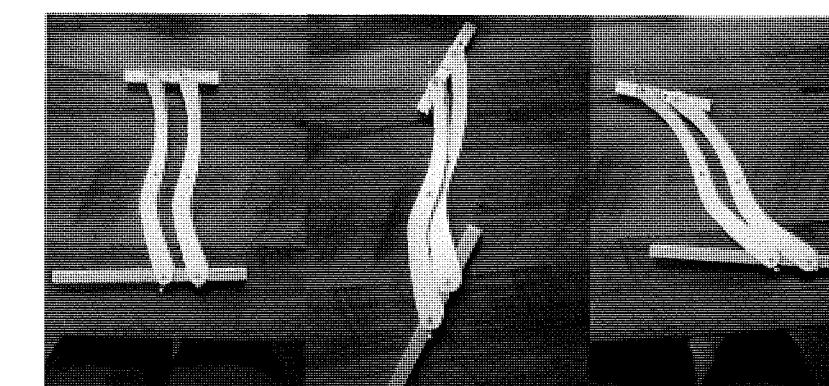
When I was designing single lamp arms, as seen on the concepts page, my client made the comment that it was hard to visualize accurately what the arms would look like when they are next to each other, as they would be in the final product, also what the lamp would look like in different stages of extension and retraction. I agreed with the client and since aesthetics is such an important key factor that needs to be addressed in the design I thought of a system that I could use to quickly and easily test what different arms looked like in context. First I would draw the arm shape including accurately plotted pivot points on a piece of A4 paper. I then proceeded to cut the shape out and trace the cutout to make another arm cutout of the exact same shape. Then I used pins from my mums sewing kit to pin these cutouts to some balsa wood which acted as the points that the lamp arms would be fixed to and move the arms so that they would be shown in various different positions. I learnt from my research into Furnware's production process that constant feedback on concepts is vital to achieving the best possible outcome therefore I will be asking my client what they think of the concepts I have designed. I will then take their feedback and refine and develop the design accordingly.



This was the first concept that I came up with. I liked how the arms had a unity about them that made them look like a single arm rather than two arms. My client liked it but said that he wanted a more interesting shape.



I then designed an arm with more straight edges in compliance with the clients wishes but I thought that did not look very good as there were too many straight lines. My client thought the same but said that I should develop this idea.



The client selected an arm shape of my concept page that he liked the best. I translated that concept on to my testing system and the pictures show the results. My client thought that this was an improvement but said that they would like to incorporate more straight edges rather than curves to make it look more aesthetically appealing.



I developed the idea to the one seen above which has much less lines used, I think this is a vast improvement and looks aesthetically appealing when extended and retracted. My client agreed saying that this design is more simple and it looks much better than the previous designs therefore I decided to take this design to the next level and make a complete lamp arm configuration.

Planning:

What: I am exploring the design of the arm in context

Why: So that I can develop the arm to look good when it is extended and retracted as it will be in its final environment.

Resources Required:

Paper, Pins, Balsa Wood, Camera

Date: 23rd – 29th June

Design Investigation 2

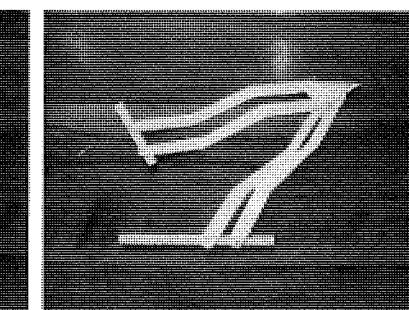
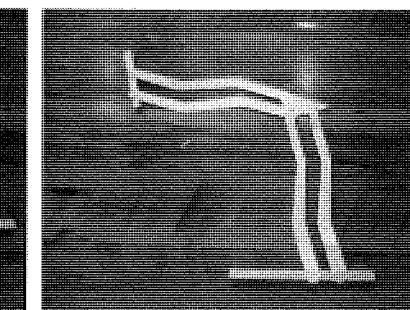
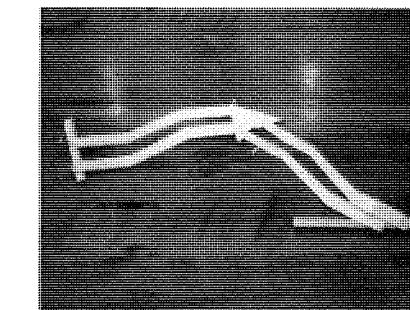
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With the preliminary aesthetics test done I decided to go one step further and translate the chosen arm design on to a full desk lamp set up. This should give me and my client and idea of what the lamp will look like. It will also help me to design the remaining components of the desk lamp such as the base, the lamp head and the 'joints'. I added to the previous setup to allow for another set of arms and the joint that holds together the two sets of arms. In my research on existing design processes I learnt that it is a worthwhile exercise to ask the client about previous designs they like which you could use to influence your own design. Therefore I asked my client what previous designs they would like to influence the design. My client said that there is a line of computers by dell called 'Alienware'. He said that they have a really cool styling and aesthetics and that the desk lamp design should be inspired and influenced by its aesthetics. Therefore I found an image of the product and evaluated it so that I could use it for inspiration when developing the design.



This is the Alienware PC my client recommended I use to influence my design. I agree that this PC looks aesthetically appealing. Its contrasting colours of red and black make the PC eye catching whilst the sharp straight edges make it look futuristic. The red plastic looks as if it is glowing and the overall computer looks as if it was taken right out of an aliens house. The materials used look to be opaque and transparent. The client wants me to use a similar style that consists of straight lines and contrasting colours.

The aesthetics of the chosen lamp arm in context looks aesthetically appealing. It complies with the 'alienware' theme that my client pointed out to be a cool style that he would like me to use as inspiration. I have used straight edges to get the modern look and this has encouraged me to come up with innovative ideas for the arms through the use of different coloured Perspex.



Planning:

What: I am looking at an existing style of design which the client likes.

Why: So that I can try and replicate the style in my lamp design.

Resources Required:
Paper, Scissors, Alienware PC

Date: 30th June- 2nd July

Construction Method

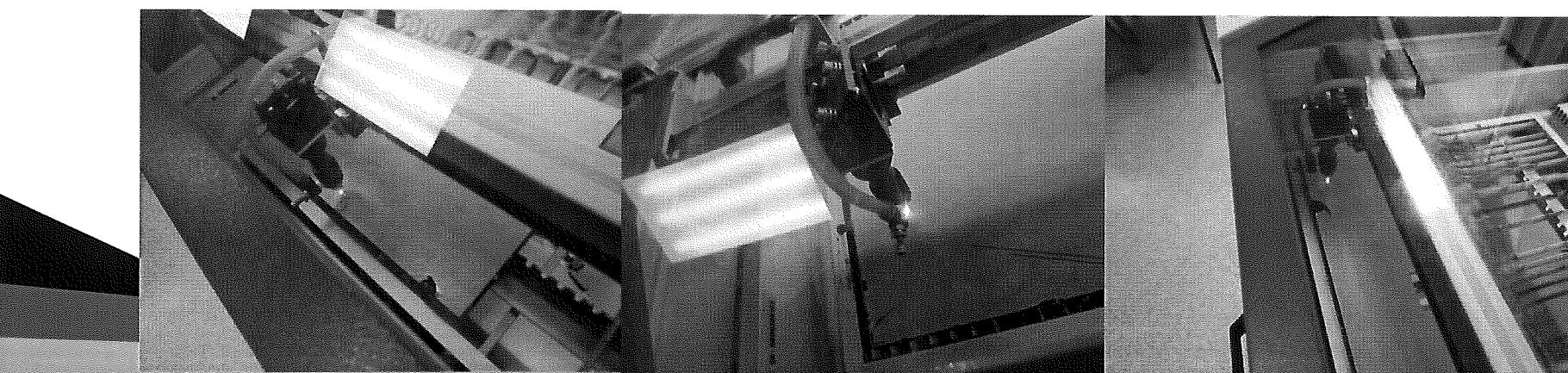
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It was always a possibility to have my desk lamp made using a laser cutter as I could get the components cut from outside of school, but this would be impractical as it would cost a lot of money (though cost is not an issue with my client they would not be happy spending excessive amounts of money just to get the lamp cut out) and I would not be able to make test pieces, which as I learned from my study on Furnware's production process is vital in order to save time and resources that would be used up down the track. I would also not be making the lamp myself if I were to outsource such a large part of the lamps construction. But the technology is available to me and therefore the easy access to such technology has influenced how I have designed my Desk Lamp and also what materials I have used (looked at in the Construction Method Impacting Material Selection page). The complex shapes and inlays involved in my design requires very accurate cutting which as a human would be nearly impossible and instead I would have to spend hours sanding to get the shapes to fit. Due to the time intensive nature of this process and the time constraints I am under, it would be impractical to design such complex shapes and therefore my design would be simpler. But due to the high degree of accuracy that the laser cutter provides I am able to design very complex shapes and be confident that the fitting and assembly of these shapes will be easy and relatively quick. The nature of my design has also changed it co-insides with an emerging design trend that involves objects being designed specifically for CNC machines, using the precise cutting and shaping applications of these machines to achieve unique designs that are seen as impractical before the technology was introduced. These designs only require assembly and are not limited by the constraints of traditional carpentry. When designing for a CNC machine you are not restricted to what is practical with a scroll saw etc, and the nature of the process where assembling is the only step after cutting (no sanding, filing, polishing etc) means that the construction time is very small. This growing design trend also fits in with the worlds growing use of computers and the internet. Designs can be posted from anywhere around the world, by simply downloading the file people are then able to make an exact replica of the product. With many products being manufactured offshore or around the country its is important that accurate computer drawings of the design are created and can be replicated in separate locations easily. In this way I will be designing my lamp at home and then sending the files over the internet to school where I will cut the components or taking the files with me on a data stick.

Using the Laser Cutter

To cut out a file with the laser cutter I had to follow the following process

- Import .dxf files off USB into the Laser Cutter program
- Move the shapes around on the program so they take up the least space in order optimize the material usage
- Check the total size of the items to be cut and ensure that they will fit onto the bit of Perspex they are being cut from (it is also easier if the protective film is removed from the perspex so that it doesn't need to be peeled off after the cutting, however to prevent the perspex scratching I left it on in for certain pieces)
- Set the Laser Heads height with a simple spacer placed between the material (whether it be 3mm or 4.5mm) and the tip of the laser head
- Send the laser to the bottom left hand corner of the shape which will be cut, put the bottom left corner of the perspex in line with the laser
- Check that all the ventilation is turned on and the lid is shut (the laser will not go with it open) and commence the cutting by pushing start on the computer or the machine itself
- When the laser is finished cutting wait a few seconds to ensure all the fumes from the cutting are removed by the ventilation and then open the lid and remove the cut pieces. Finished Cutting!



Planning:

What: I am reviewing my method of using the laser cutter and also exploring how the laser cutter affected my design

Why: To show my cutting method and also look at how others like me have been influenced by this new generation of CNC machines

Resources Required:
 Photos, Mr Jones (expert help),

Date: 3rd – 10th July

Pre Production Planning

[Go Back \(6\)](#)

Before I commence the production of my desk lamp it is vital that I address certain possible issues that need to be taken into thought in order to prevent them from occurring and consequently having an effect on the time of production or the final solution itself. Therefore identifying these possible issues and addressing them will ensure that I get my project done on time and to a high standard. It will be impossible to predict every issue as this type of construction is new to me but I can use my own and others existing knowledge to identify the majority of the issues that may occur. This will help me to get my project finished on time and to a high quality standard so that my client is pleased.

Possible Issues	Implications	Solution
My teacher said that the Perspex glue may blemish the surface of the Perspex when gluing my components together.	Blemishes on the Perspex will affect the finish and the aesthetics of my final product in a negative way. The aesthetics will be affected as it is not visually pleasing for marks and blemishes to be on the various components of the desk lamp.	I will take extra care when applying the glue and see what affects the glue will have if leaked onto the visible Perspex. This can all be addressed through the construction of a test arm.
The availability of the Perspex (specific colours and thicknesses) may not be available or obtainable	If I don't get the required thickness and colour of Perspex the aesthetics, strength and stability will be affected. The aesthetics will be affected as colour has a heavy influence on the aesthetics, also the thickness may make the components look disproportionate, thus affecting the aesthetics. The strength will be compromised if the Perspex is too thin and the stability will also be affected if a thin, flimsy Perspex is used.	I will look at the Perspex available to me and use what I deem to be appropriate based on the three key factors that will be affected by this decision.
The fit of the light in the lamp head	If the light does not fit it will simply not be held in place. This will affect the function and aesthetics. The function will be affected as the light will not be incorporated into the design and the aesthetics will be affected as the desk lamp will look odd if there is not a correctly fitted light.	I will design the lamp head to fit the light shape and construct a test lamp head to ensure that the light fits correctly.
Balancing the arms with the correct spring force	If the springs are too strong or too weak the arms of the desk lamp will not be balanced. This means that they will not be able to hold a position, therefore the adjustability and function will be affected in this way.	I will have to go to a spring shop and trial different springs to get the perfect balance.
Components of individual arms not fitting correctly	If the individual arms do not correctly assemble I will not be able to continue with the overall assembly of the desk lamp.	The fit of the components for each arm will be addressed in the test arm. From this I will know whether or not changes need to be made to the design.
The circuit and light not working once fitted to the lamp	If the light does not work the whole purpose of having a desk lamp will be defeated, as its main purpose is to supply adequate light to a work area. Therefore the functionality of the design will be affected in this way.	Before adding the circuit to the lamp I will test it on its own.
The desk lamp must be finished to a high standard	The client will not be pleased, this will ultimately mean my product is unsuccessful.	I will take the time and care necessary to achieve a high quality finish.
The Lamp needs to function, the light and the circuit component as well as the adjustability	The lamp will not function and therefore it will not meet its requirements.	I am making a test circuit to make sure that the light works, I have done functional models to ensure that the adjustability mechanism works.
The stability of the final product	The lamp cannot be functional if it is not stable, therefore it will be useless if this issue is not considered	I will test this when possible and solve the problem (if there is one) as soon as possible

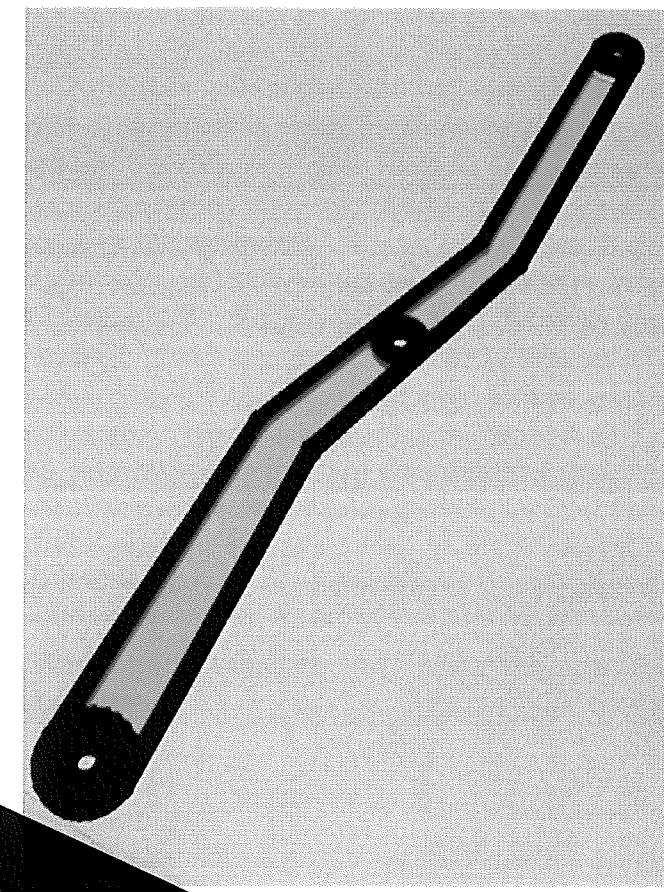
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Arm Complexities

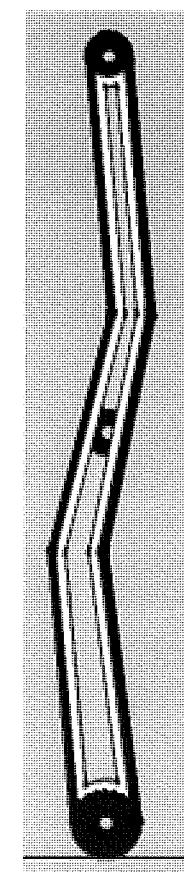
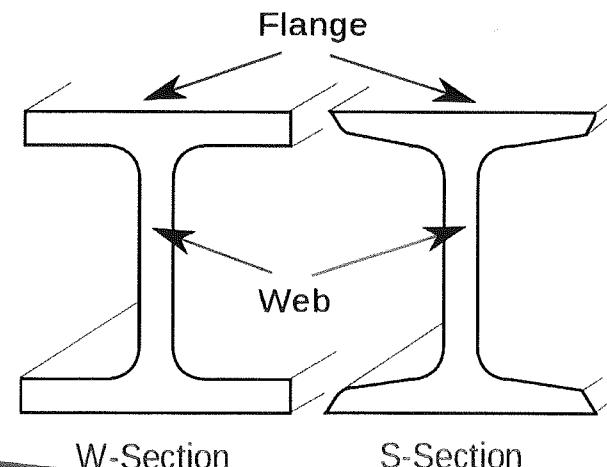
During the design process I tried to design the components which make up the desk lamp to assemble with ease in order to cut down the time it takes to construct the desk lamp. Therefore ease of assembly was added to the key factors I had to consider when I designed the components, the challenge was to develop a design that meets all the key factors in order to achieve a lamp that met my clients high expectations. Therefore I was faced with various issues when I was in the design process that needed to be addressed in the design stage to ensure the success of my lamps construction. On this page I will look at the lamp arms complexities and consequent development whilst on the following 'Lamp Head Construction' and 'Base Construction' I look at the issues that arose with those components.

The Arms

I made a test arm to see if it was strong enough and if it could be easily assembled. This test was important as I needed to ensure that the design was practical before I went ahead and cut all the arm components out, the test arm did expose a few issues that needed to be solved. The first issue with the design was the lack of strength that a single layer of 3mm thick Perspex would supply for each individual arm. The strength of the arms is vital to the functionality of the lamp and is a must have for the success of my lamp. But it was not an option to use a different thickness as the colours of Perspex I wanted were unavailable in other thicknesses. Therefore I decided to add another layer, this layer is designed in such a way that the transparent Perspex is still visible, this is a design feature that my client really likes therefore it is important that I maintain this aspect. It also harmonizes with the rest of the design for the lamp arm, making it fit in with the design and allowing for appealing aesthetics. The extra layer will be white to contrast the black colour of the layer whilst emphasising the green transparent 'feature' of the design. This extra layer will be 4.5mm thick Perspex as this thickness was available in white and this will be stronger than the 3mm thickness supplying the arm with adequate strength.



I have researched ways in which bending can be stopped and have come across I Beams. The horizontal elements of the "I" are flanges, while the vertical element is the web. The web resists shear forces while the flanges resist most of the bending moment experienced by the beam. Beam theory shows that the I-shaped section is a very efficient form for carrying both bending and shear loads in the plane of the web. On the other hand, the cross-section has a reduced capacity in the transverse direction, and is also inefficient in carrying torsion, for which hollow structural sections are often preferred. Since my lamp arm needs to resist bending the addition of an extra layer creates a beam effect similar to that of the I Beam which will make it very effective in reducing bending, creating a rigid frame for my lamp. This means that my extra layer will surely help solve the flexibility issue I had with the test piece.



Planning:

What: I am developing my arm design with the help of some ongoing research

Why: because the model showed that the arms were not strong enough and I needed to make my lamp arms more rigid and strong

Resources Required:
<http://en.wikipedia.org/wiki/I-beam>, Materials room

Date: 3rd July – 5th August

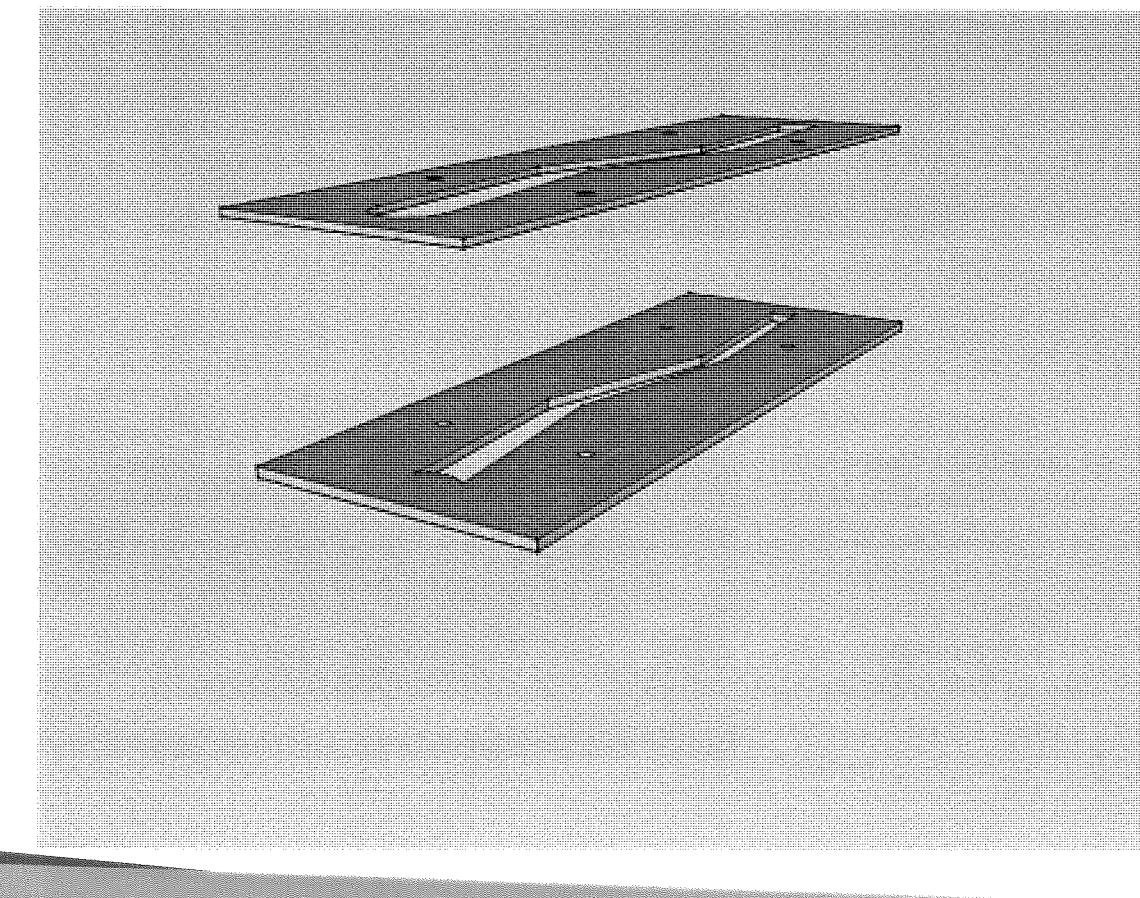
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Assembly of Arms

The added layer of Perspex needed to be positioned perfectly to create elegance in the arms aesthetics and uniformity between the separate arms as it would look bad and unprofessional if the pieces looked different. But this would be hard getting the layers aligned correctly and I could not just simply glue it by eye and get it right every time. The layers would then need to be clamped together whilst they are still being held in place as the Perspex glue requires the site of gluing to be put under pressure in order for a good bond to be formed. The glue, if leaked onto a surface can also spoil it leaving marks which are very hard if it is possible at all to remove, therefore I must not have glue leaking onto the surfaces not being glued. Also for my lamp to be suitable for mass production the assembly must be quick and easy in order to keep labour costs down. This posed a huge problem to the quality of my final product and the time of the production process. It could take a large amount of time to glue, time I did not have with the date I need to complete it by looming in the near future and the time it will take to assemble in mass production. The finish needs also to be excellent to make the lamp aesthetically appealing. I had heard of gluing jigs where two parts are held in position by clamps and in a template to be joined, but there was nothing out there that could be applied to my particular joint. I then thought of how the shape though 3D is made of components that are shaped on a single plane. Therefore I thought that if I could somehow hold the two layers on top of each other firmly and in their relevant positions I would be able to put one layer down, apply the glue and then put the other layer on top. Running with this idea I used the two outlines of the shapes in their relative positions to each other on Sketchup and added four 6mm holes (the diameter of the dowel which I would use to join them) to each. The holes were located so that when they joined up the two planes would line up perfectly. I have sourced some scrap 4.5mm MDF for the white layer template and some 3mm ply for the black layer template, the woods used are the same thickness as the material as I need to clamp the pieces once the glue has been applied. Click the video below for an animation of the arm assembly. First the 4.5mm layer of white Perspex is added and glue applied to the exposed surface. Then the black layer is added and clamped for gluing. With the black layer glued on to the white layer the clamps are removed and a ledge is created by the overlap of the white layer, supplying a slot where the clear green Perspex can be put on and easily glued to, leaving a cleanly put together arm. The simple joining of the jig with dowel means that when I need to glue the white on the other side of the Perspex which does need to happen as the white goes on different side of the black, I can simply pull one side of the template off and put it on the opposing side, ready for the opposite side arm to be glued up.

Evaluating the method

The gluing jig was a huge success and was very simple but invaluable for the way in which it effectively and consistently glued the layers together in their exact positions. This produced perfect arms for the lamp which is key in the final aesthetics of the over all lamp. It also saved me lots of time with the total assembly time taking a maximum of 5 mins per arm with the glue dry. This idea is one that I am very proud of as it is simple and very effective at solving all the issues initially posed. Without it the quality of my finished product would be much lower and achieved at a later date.



Planning:

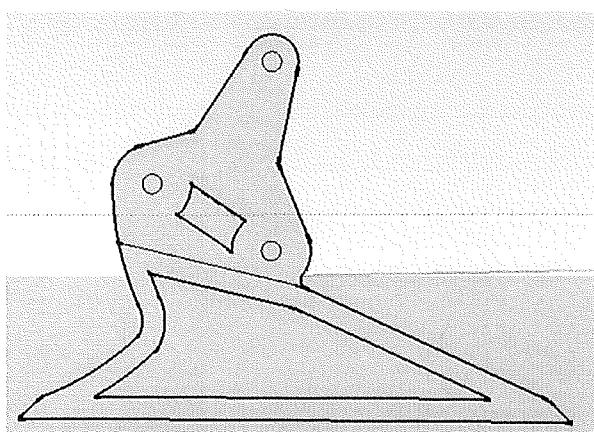
What: I am solving and issue with the assembly of the lamp arms.

Why: So that I can have a smooth and efficient production process

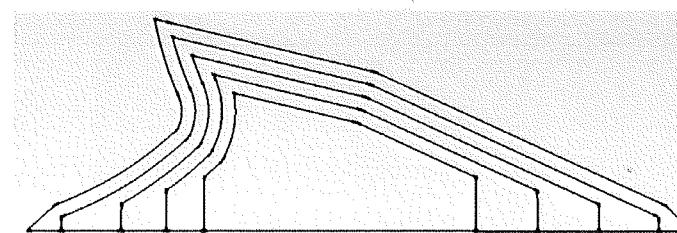
Resources Required:
Google SketchUp, MDF, Plywood

Date: 6th -10th August

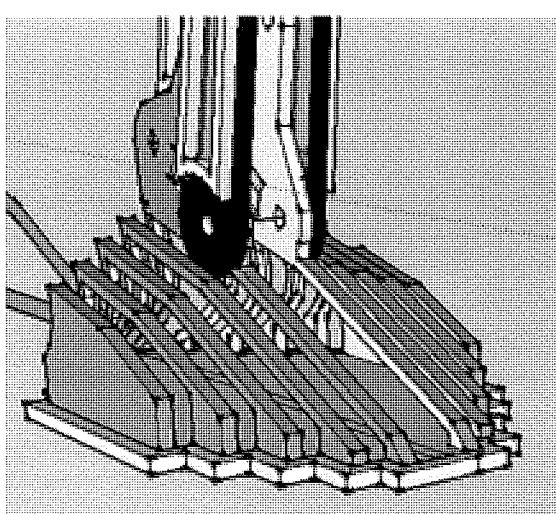
Base Design



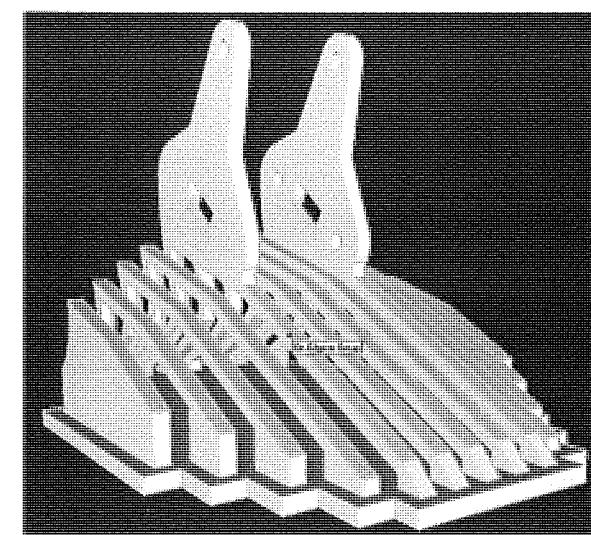
1. Translating the developed sketching design to Sketchup, the rib shape was made to harmonise with the main functioning ribs which held the arms



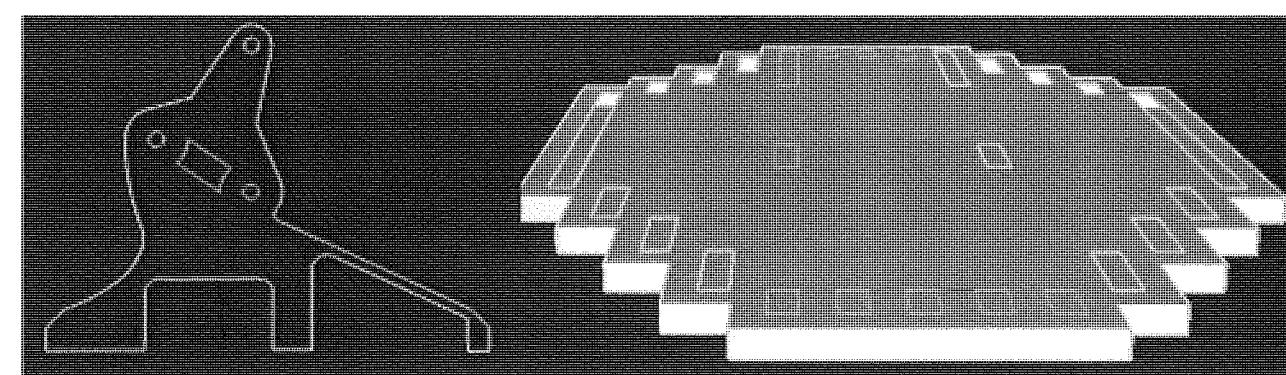
2. I moved on to develop the way in which the ribs would be cut out, this way pictured is efficient and will save materials



3. I then made the sections pictured into what the base would look like assembled, I was obvious that the arms were to close together and needed to be moved out by adding additional ribs in between the main functioning ribs.



4. So I added more ribs in between and was happy with the aesthetics. However the functioning ribs were not well supported and would most likely break under load.



5. I then developed a more supported and stronger functioning rib and also developed a slotted base to make for an easy assembly. The design was then exported to DXF ready to be cut by the laser cutter

Planning:

What: I am developing my Base design on Google SketchUp

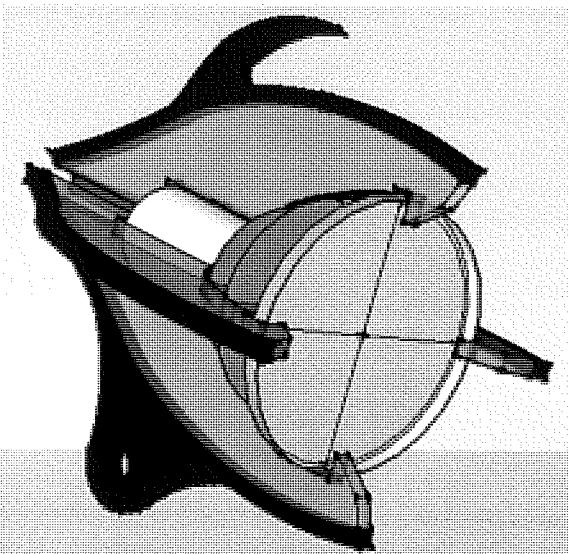
Why: So that I can improve its function, aesthetics and suitability for mass production

Resources Required:

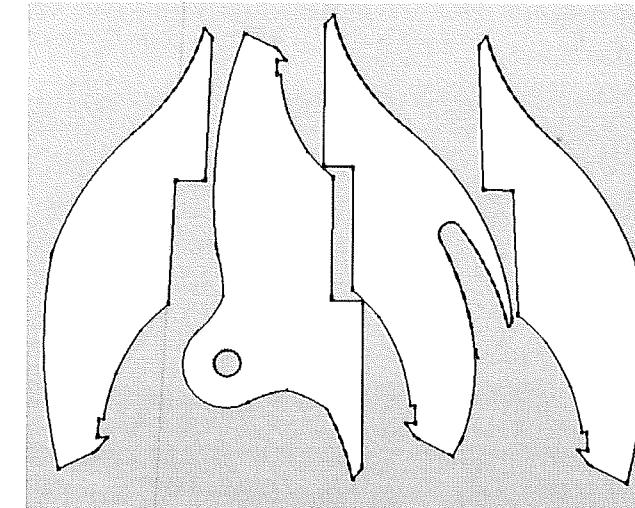
Google SketchUp

Date: 10th - 14th August

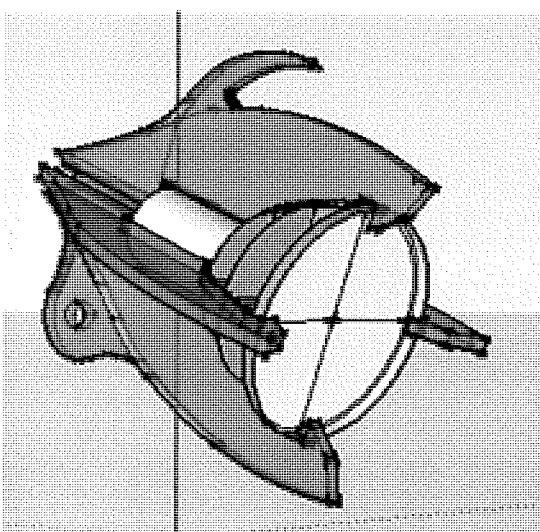
Lamp Head Design



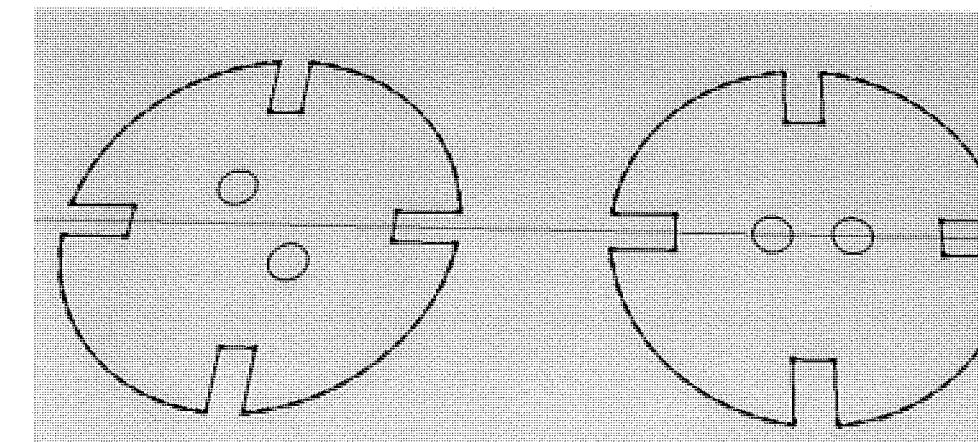
1. Translating the developed sketching design to Sketchup, I also looked at a lamp head which included black Perspex however I decided to keep the all green lamp head as I believe that it will look more aesthetically appealing and be easier to make. I measured the LED bulb and made a model of it to base my dimensions around.



2. I then prepared the lamp sections so that they could be efficiently cut out on the laser cutter. You may notice that in the previous picture the hole to attach the lamp head is in a different position on the black edged lamp. I have moved the hole to make the lamp head more adjustable and the lamp on a whole more aesthetically appealing



3. I then made the final lamp shape into a model to check that I liked the proportions. With the aesthetics confirmed I moved on to develop the rings which join the sections.



4. The rings were made so that they would position the sections in perfect relation to each other. The holes were made so that the bulb holder could be concealed in between the rings and the wires and the bulbs prongs could fit through the holes.

Planning:

What: I am developing my Lamp Head design on Google SketchUp

Why: Because the design needs to be made suitable to be cut out on the laser cutter. I also need to make it more aesthetically appealing and suitable for manufacture

Resources Required:
Google SketchUp, LED Bulb

Date: 14th – 20th August

Final Design

The Corner Connectors keep the arm shapes in parallelograms which is vital to the spring balancing method.

The arm design consists of three types of perspex, 4.5mm White Perspex, 3mm Black Perspex and 3mm clear green Perspex

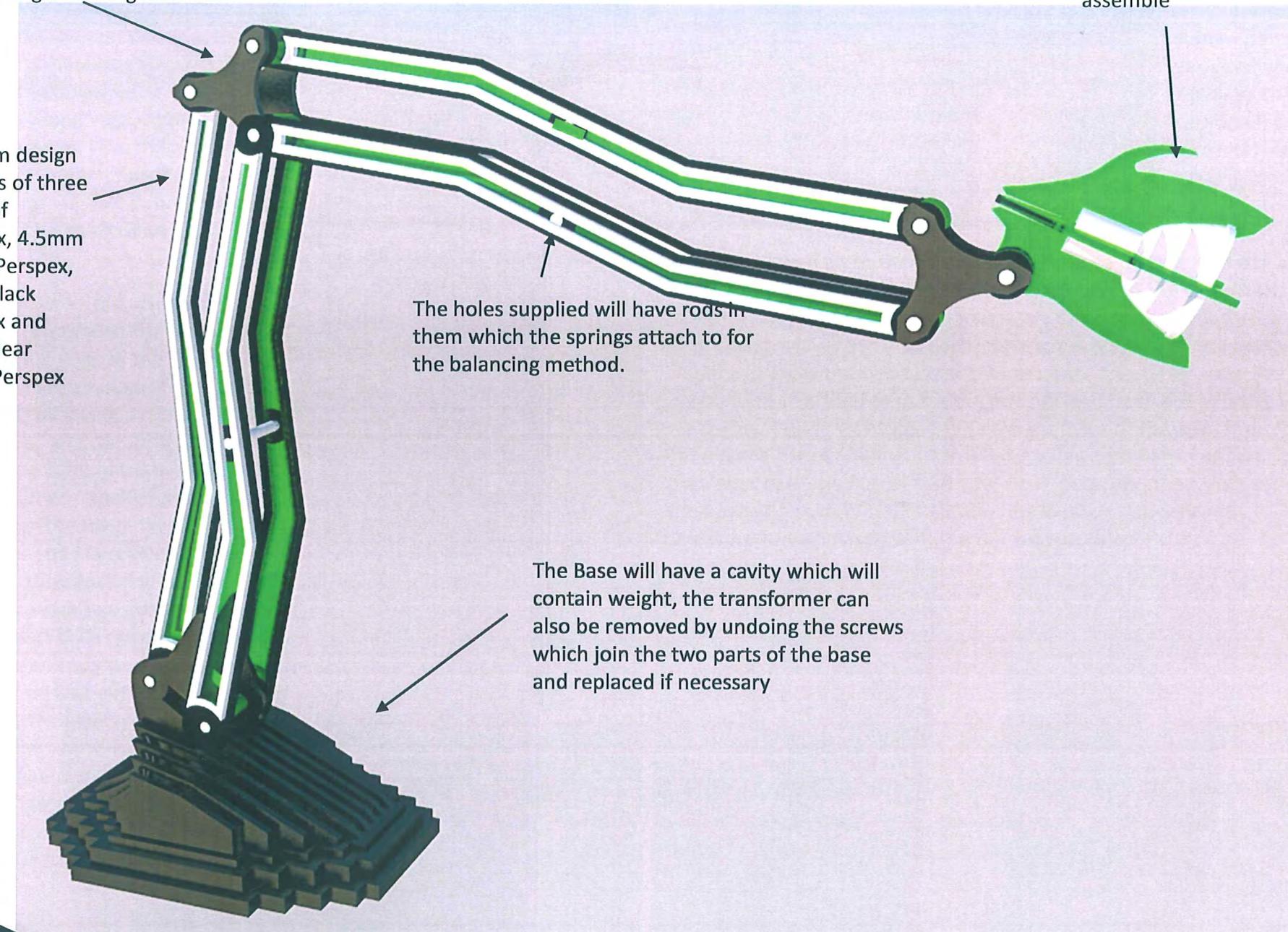
The Joining method is yet to be determined.

The holes supplied will have rods in them which the springs attach to for the balancing method.

The Base will have a cavity which will contain weight, the transformer can also be removed by undoing the screws which join the two parts of the base and replaced if necessary

The Lamp Head will consist of 6 pieces, 4 sides and two rings, this simple construction will make it easy to assemble

The lamp has a kitset design with the pack consisting of 6 various arms, the assembled base and lamp head, the corner connectors, and the joining method which is yet to be decided. The design measurements can be found in the SketchUp files also on this disc.



Planning:

What: I am looking at my final Design, so I can show the completed project

Why: So that I know what to construct in my Production Process

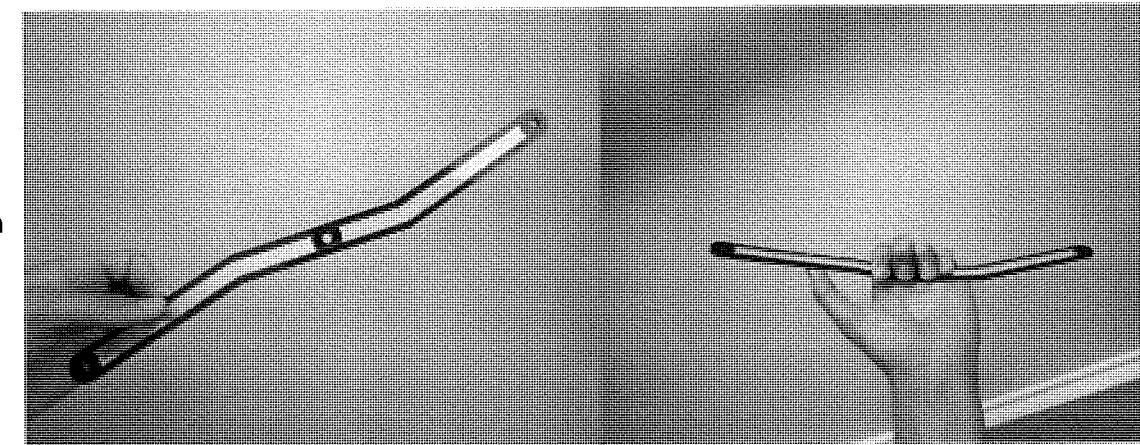
Resources Required:

Google SketchUp

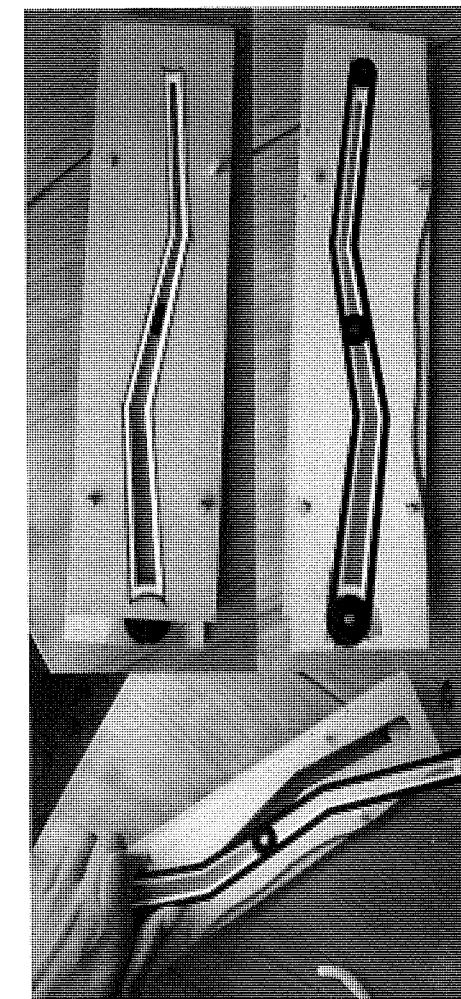
Date: 3rd July – 10th September

Production Process

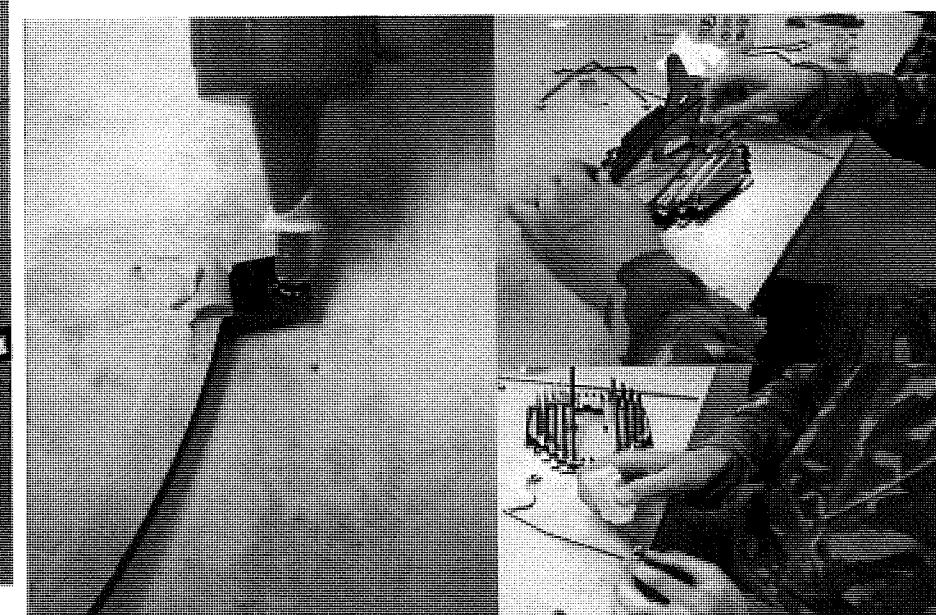
1. The production process kicked off with a test arm being built to test its functionality. I glued the edges of the transparent green Perspex before slotting it in to the black Perspex and clamping. The arm was obviously not strong enough as seen in the picture, the Perspex bent considerably when put under pressure. But I was pleased with the aesthetics of the Perspex combination. My client agreed that it was not strong enough, something had to be done.



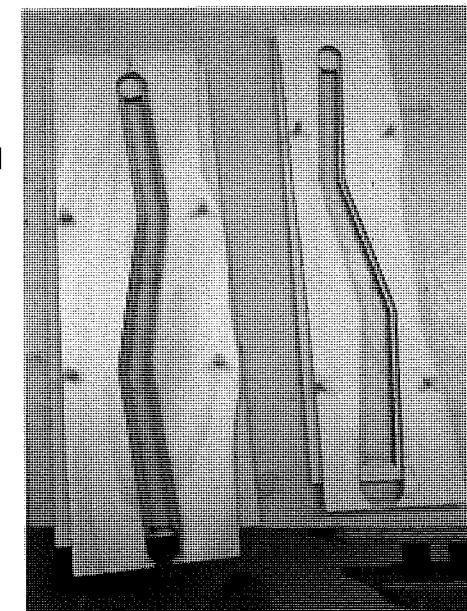
3. I then glued up the arms and the additional layers with the gluing jig. I laid the white layer in the jig and applied a small amount of glue to the surface before laying the black layer down on top and clamping the pieces to form a solid bond between them. With that glued I applied more glue in the edges of the ledge made by the white layer and black layer. I then added the transparent green layer and clamped it again to ensure a solid bond was formed. I then removed the arm cleanly from the jig and it was finished. I repeated this for every arm, simply separating the layers of the jig and reassembling them so that the white would be glued on the other side in order to make arms for both the sides of the lamp and also the double sided arms for the middle sections.



4. Then I moved on to the assembly of the base. At first I cut out a single layer base and the ribs, these were flimsy as the slots in the base did not hold them tight enough so I decided to re-cut the base with an extra layer so I also added an extra 4.5mm onto the bottom of the ribs to allow them to slot into both layers. The base was still a bit unstable so I decided to make the bottom layer step out in order to make the pivot point closer to the weight force of the arm, therefore I cut out the new base and assembled it using a similar method to the previous base. The bottom part the rib is glued and then slotted into the base, the second base held the ribs in place securely and therefore I was pleased with the finished product.



2. Therefore I designed an additional layer for the arms which is made of 4.5mm perspex, I also designed and made a gluing jig to fit the additional layer accurately to the existing layer.



Planning:

What: I am making the test piece of my lamp, then making the gluing jig and using it to assemble the newly designed arms. I am also starting the Base Construction.

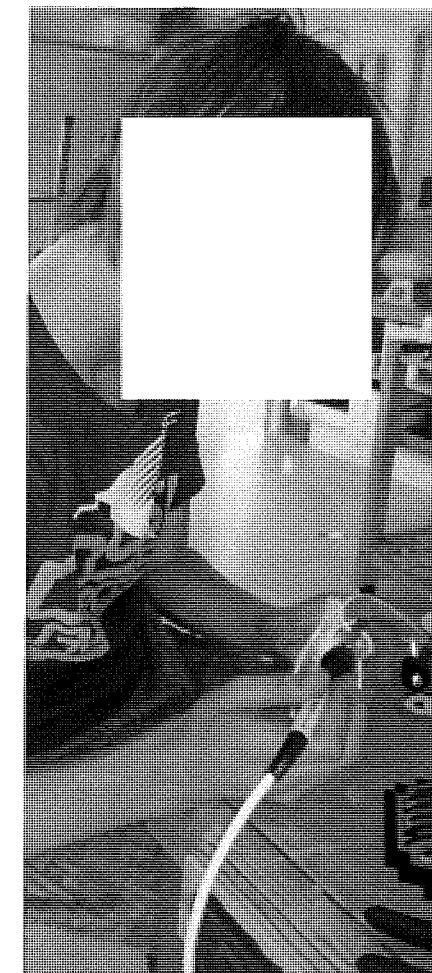
Resources Required:

Laser Cutter, Perspex, MDF, Plywood, Acrylic glue, Dowel, Camera.

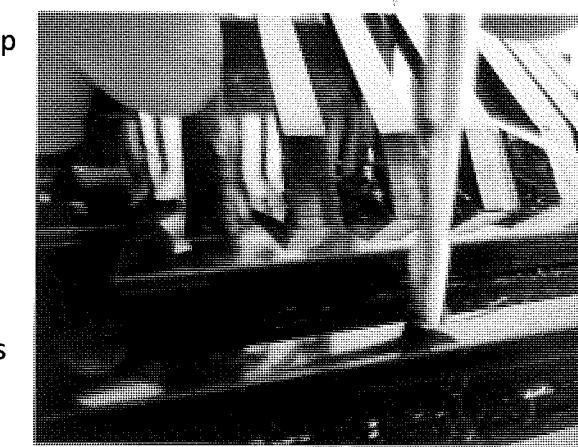
Date: 3rd July – 20th September

Production Process

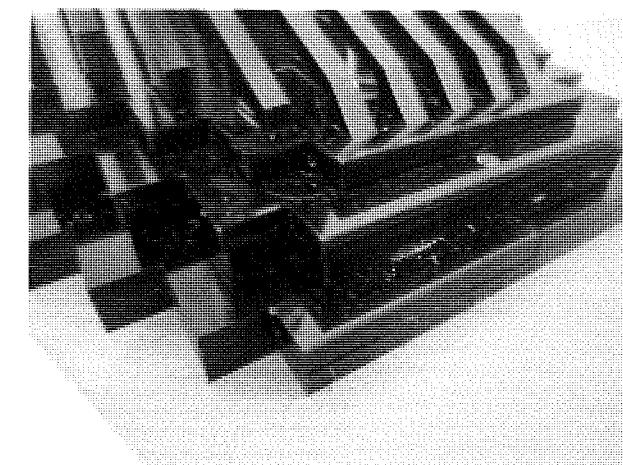
5. With the base assembled I moved onto the lamp head. This was assembled with the light in place to make sure that the sections were in the correct places and came together correctly. Once I had developed the shape it assembled very nicely. I glued the areas which are touching each other and held them together with my hand for force. This worked and I continued to finish the lamp head. It then soldered the finished product onto the wires which were attached to the transformer



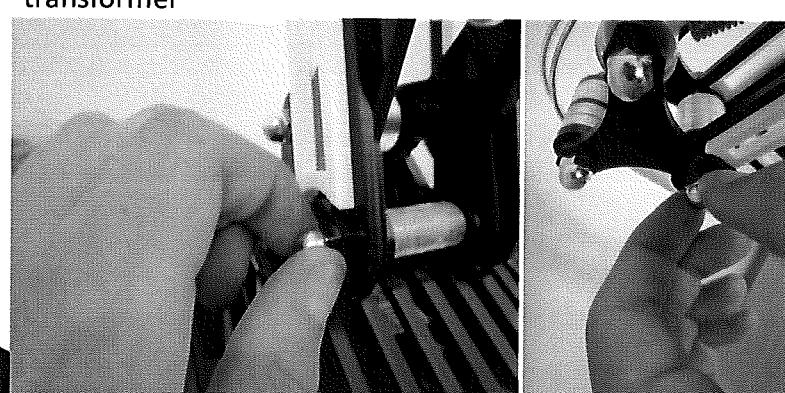
6. I then had to tap the holes on the base so that the new bottom part of the developed base design could be attached and removed with screws, this allows the transformer to be accessed.



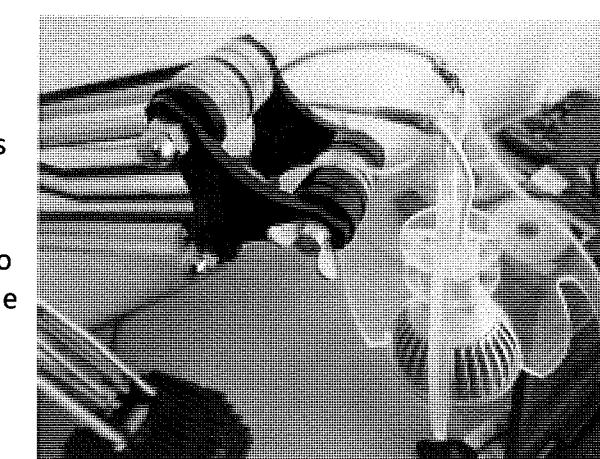
7. The base was then screwed together with the transformer inside and the wire leading out to both the mains and the lamp head.



8. The transformer can just be seen in the rib cage, but due to the black on black it disappears making it more discrete.



9. The arms were then attached with the dome nuts by hand as a spanner was not required to get them to the desired tightness.



10. However the lamp head was put on with two wing nuts to tighten as they are much easier to tighten by hand and the lamp head will need to be adjusted easily so wing nuts are suitable. With this the production process was finished.

Planning:

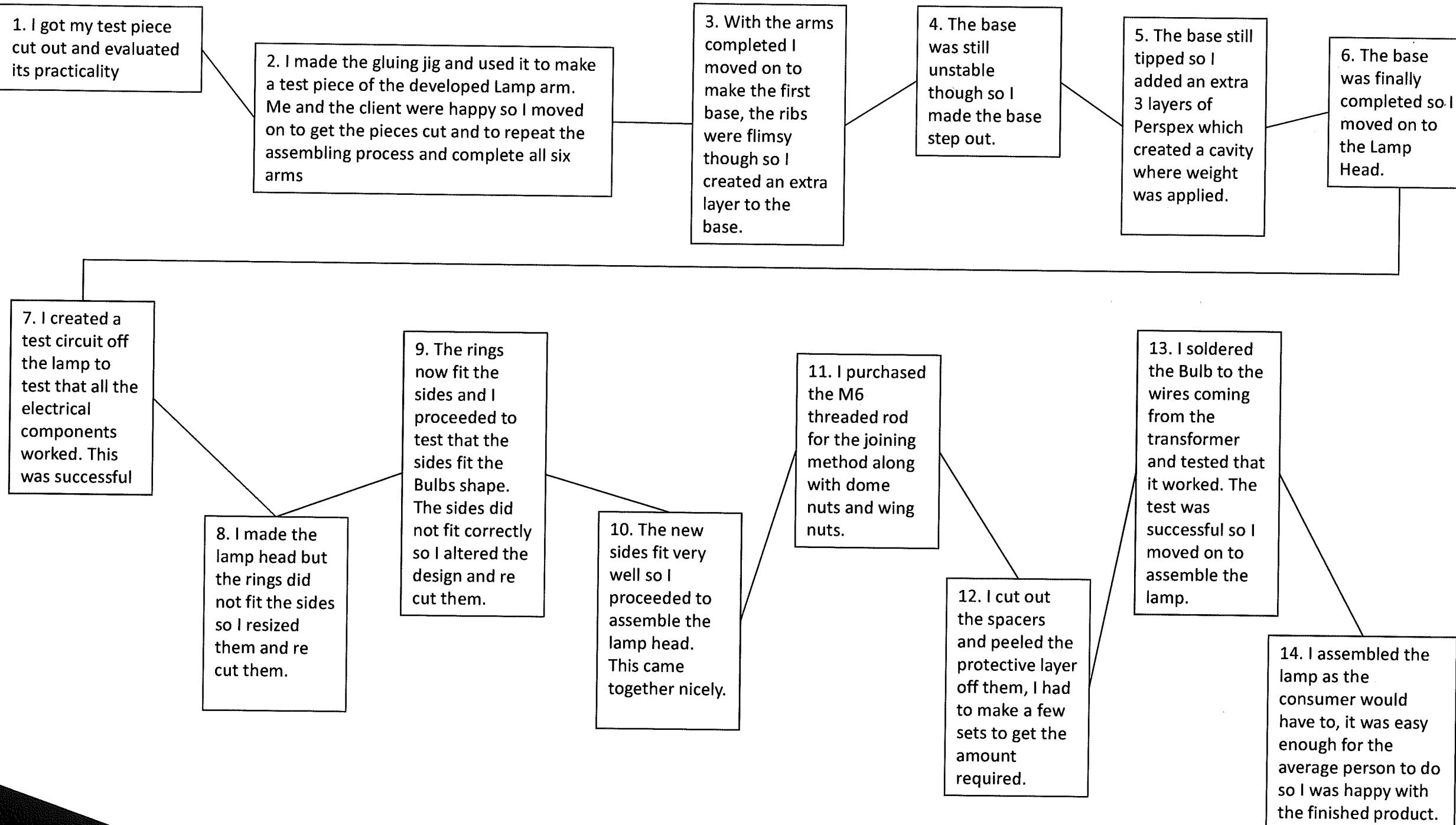
What: I am making the circuit and completing my developed base and Lamp Head design. I am also assembling the lamp.

Resources Required:

Laser Cutter, Perspex, Acrylic glue, soldering iron, solder, Camera

Date: 20th September – 8th October

Production Process Milestones



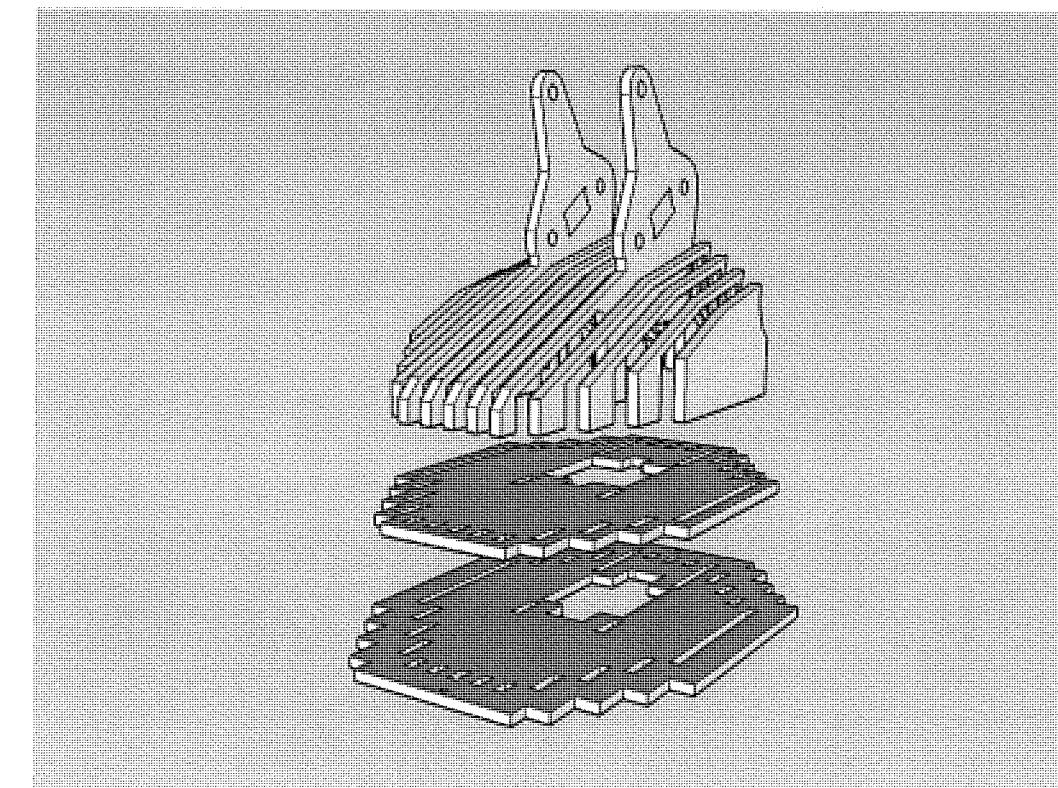
[Go Back \(7\)](#)

Base Construction

The Base

The original design of the base included holes for the 'ribs' to slot into. This is a very important and innovative design feature that allows the assembly of the base to be quick, clean and easy, which will ensure that my project will be finished on time to a high standard. The slots mean that no clamps or gluing jigs will be required and also that a minimal amount of the messy glue is used when assembling. It is also designed so that it is aesthetically appealing as it uses many 2D shapes which come together to make a 3D shape, like similar designs with "Router Aesthetics". The 'ribs' are also cut in a way that a minimal amount of material is used, which is important as the Perspex is an oil based product and I am trying to stay as eco-friendly as I can. On cutting out the base and the 'ribs' which slot into it, it became apparent that the slots were too large, this is attributed to the width of the laser cut which though small does make a large difference when the measurements I am working with are so small (tenths of a millimetre) therefore I made the slots slightly smaller so that the 'ribs' would be held into place more firmly and cut out the developed base to see if the problem was solved. I then tested this by putting the ribs in their slots without being glued, there was still a bit too much movement, therefore I decided to add another layer (exactly the same as the first) to the base so that there would be two layers glued together with twice the depth for the ribs to slot into, this should supply extra stability to the 'ribs'. The 'ribs' design also needed to be adjusted to compensate for this development so I simply added an extra 4.5mm (the thickness of the added layer) onto the bottom of each one in Sketchup and re-cut them. I then tested this without glue to see if it had solved the stability problems, it had, the 'ribs' were now held in place much more firmly and the stability problem was solved. I showed this to my client who raised the issue of what if the transformer needed to be fixed or replaced. This was a fair statement as it is a problem that may, though unlikely, happen in the future so it was important to fix, I also realised that it would be very hard with limited access to the transformer to attach the wires for the circuit. Both these reasons

meant that I needed to redesign the base so that the transformer could be removed. My technology teacher also noted that in my redesigning of the base it would be worthwhile to make the bottom layer of the base 'step out' to supply extra stability to the base. With both these factors in mind I redesigned the base and re-cut the components as I had glued the previous base and 'ribs'. This base fits all the requirements and included a 'step out' for extra stability. To allow for the transformer to be removed I added a slot which it fits into tightly, this is secured to the rest of the base by screws. I had to decide which screw to use, self tapping or one that required a thread to be made first. I consulted with my technology teachers Mr Jones and Mr Broome who have both had experience with using Perspex, Mr Jones suggested using screws which had to have a thread made whilst Mr Broome suggested using the self tapping screws as they can get more grip onto the perspex. With opposing opinions I decided that it was best for me to do a test on a scrap piece of Perspex to see which would work better for me. I found Mr Jones method good whilst the self tapping screws were hard to put in and since the screw and its thread would not be taking any load I deemed that Mr Jones method would be used I then glued up the base and my client are happy with all the the developed base.



Click the image to play an animation of the Base's assembly

Planning:

What: I am looking at the development and construction of my Base

Why: So that I can show the process which I had to go through to get the final product

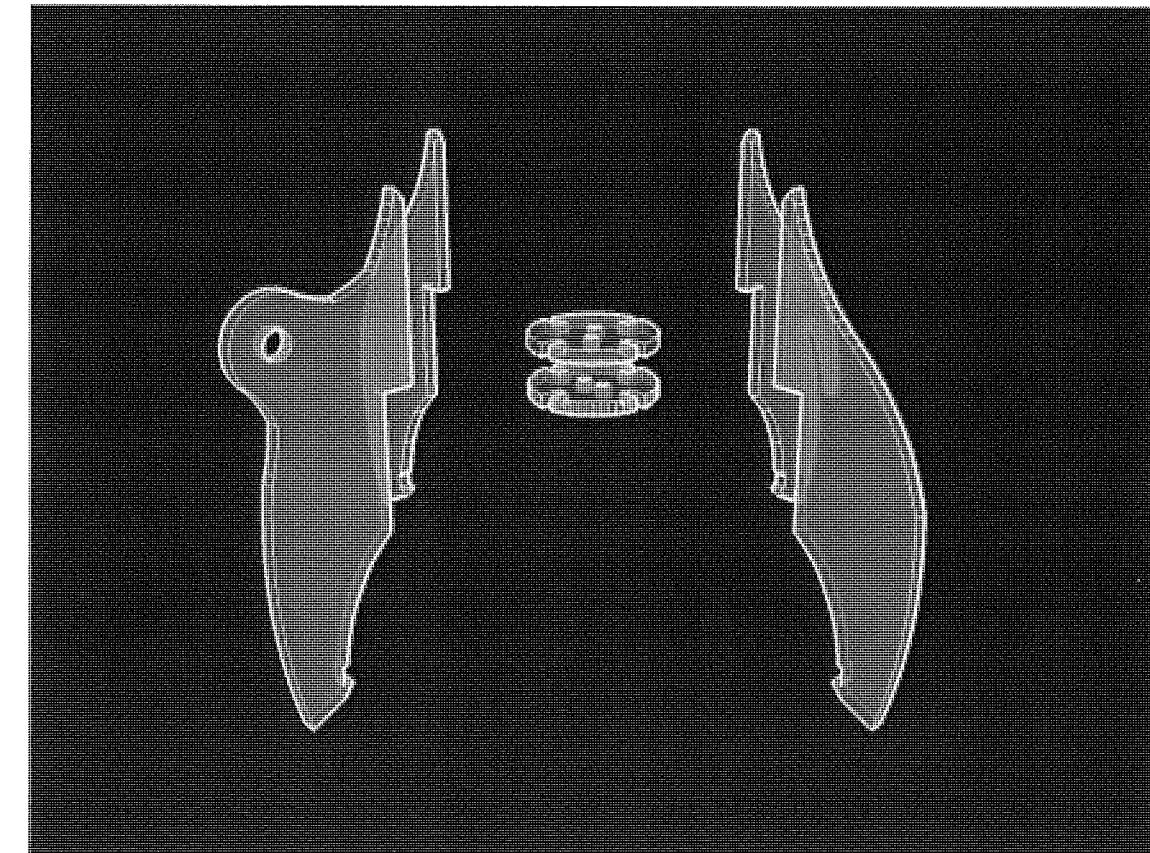
Resources Required:
Google SketchUp

Date: 24th August – 25th September

Lamp Head Construction

I designed my lamp head using Google SketchUp and then converting the files to dxf using a downloaded plugin. The files need to be converted to dxf as this is the file format supported by the laser cutter. To ensure the my lamp head sides fit with the LED's shape I cut out a practice piece along with the two circular joiners to check the shapes fit correctly. I used minimal pieces to save materials as this would be wasteful and my specifications dictate to be environmentally friendly, I also feel morally obligated to keep the use of materials down to a minimum as no matter how environmentally friendly etc. a material may be, it is always better to use less. On fitting the sides with the two circular joiners it became obvious that I had three problems that needed to be solved in order for the lamp head to fit up correctly. The lamp head is designed to fit in with the easily assembled nature of the lamp, it is also designed so that it supplies a firm and secure hold for the LED light which will be the main function of the lamp. To supply this perfect fit the sections that hug the bulb will need to fit onto it perfectly, this requires accurate measurements of the LED's shape and also incorporates the holder which cleanly links the LED to wires which can then be soldered to the rest of the circuit. The first problem was I had not accounted for the extra height that the top circular joiner would add (3mm, the thickness of the Perspex). To adjust for this issue I needed to add at least 3mm to the height of the top section. This issue was easily resolved using the move tool in SketchUp adjusting the required height whilst maintaining the aesthetics of the remainder of the side. This was a skill learnt from an expert as mentioned in a previous slide. The second issue was at the point were the curved bulb meets the straight section. The point needed to be dragged out another millimetre or so in order to fit. This was achieved through a simple design alteration where I moved the point out by another millimetre. The third problem was that the lip of the side was not low enough for the bulb to fit in, also the issue was brought up from my teacher that the bulb though long lasting may be faulty and therefore should be replaceable. I took this into consideration and determined that the shape of the head meant that the sections could be pulled apart allowing the bulb to slip out and be easily removed. The joiners (circles) also posed an issue as they came out with slots that were too big and would not supply a decent hold on the sections. This was caused by the laser's cut width as dealt with in previous slides.

Therefore I adjusted the size and recut, upon testing the recut piece I confirmed that it was a good width, fitting the section snuggly, and continued with the construction. The simplicity of the design (only made of six pieces) is done so for manufacturing and ease of assembly whilst reducing parts to be cut. Click the image to play an animation of the Lamp Head's assembly.



Planning:

What: I am looking at the development and construction of my Lamp Head

Why: So that I can show the process which I had to go through to get the final product

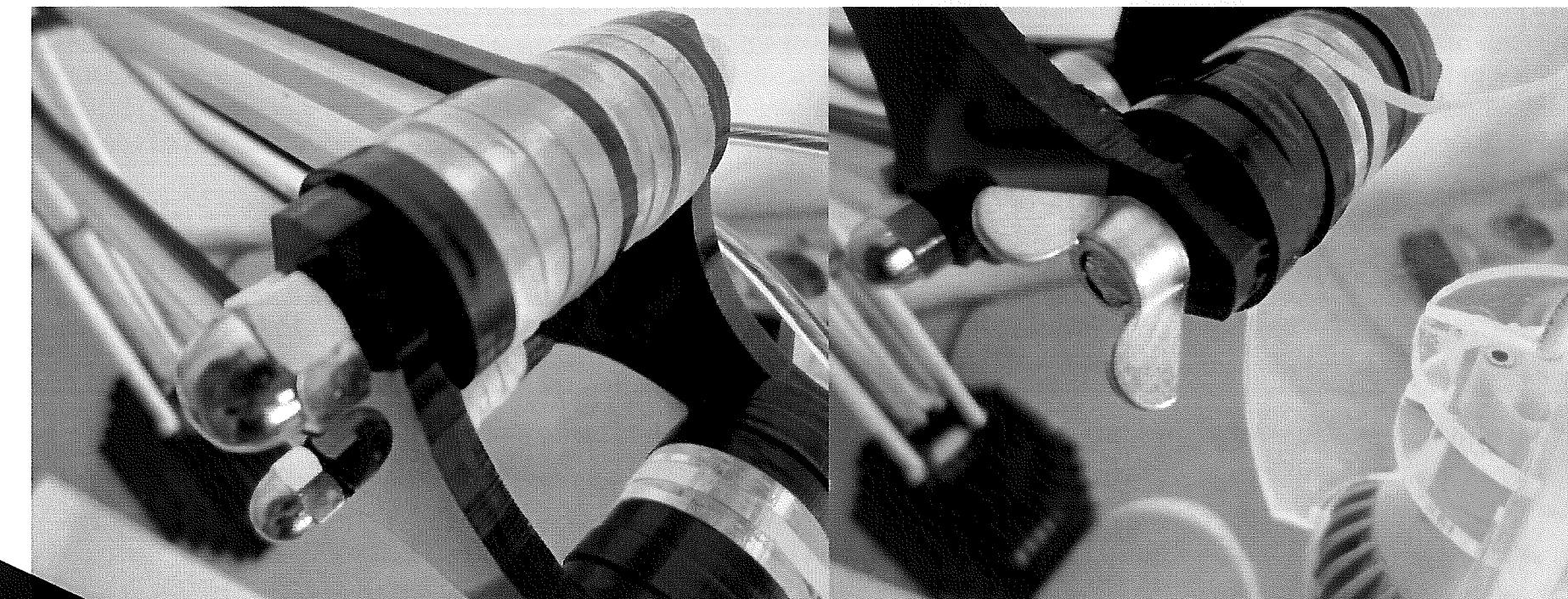
Resources Required:

Google SketchUp

Date: 24th August - 1st October

Joining Method

The arms will need to be joined to each other, the Lamp Head and the Base. I have designed holes into the components so that a nut and bolt like method could be used but I haven't decided what exact method will be used and also how the components will remain evenly spaced. This issue must be solved with something that will work but it must be aesthetically appealing at the same time. The holes I have designed are 6mm therefore some M6 threaded rod will be required to fit through the whole and some nuts to go on either side. Alternatively I could use some Perspex rod which is glued on in a way that the pieces can still be moved. This would be difficult and it would be permanent once it is glued, this means that it would not be easily assembled and disassembled which makes it unsuitable for my lamp as it needs to be easily assembled for the kitset purposes and able to be disassembled in order for an arm to be replaced etc if necessary. This makes the Perspex rod an impractical choice though I believe it would be a more aesthetically appealing choice. Going back to the idea of a threaded rod with nuts either side, I believe that this will provide the easy assembly and disassembly I am looking for however using standard nuts will not look any good. The joining method needs to be aesthetically appealing as it will detract from the rest of the lamps aesthetics if it is not. Therefore I looked at chrome dome nuts, these are compatible with the nut and bolt system whilst supplying a clean and aesthetically appealing finish to the joining method. The nuts may slip but I can just use some thread lock to make them stay in place if required. This supplies a functional and aesthetically appealing solution to my problem but I still need to solve the spacing issue. With the nuts tightening the joints the arms will push in if there is not spacers to give them support from the inside. Therefore I will need to use some kind of spacer to ensure that the components maintain the correct spacing. A metal spacer does not look very good and does not harmonise with the rest of the design so it would not be aesthetically appealing either. I needed to use something that would suit the rest of the lamp, then I thought, what if I cut perspex discs out on the laser cutter. This was perfect, I used a combination of black 4.5mm Perspex and Clear Green 3mm Perspex to get the correct distance. It worked perfectly it also looked really good, I did encounter an issue with a bit on the base however. The spacer was too big and was not fitting as it was colliding with the ribs, therefore I simply made it smaller in that instance and the problem was solved.



Planning:

What: I am solving the issue of the joining method

Why: So that I can have a successful method of assembling my lamp.

Resources Required:
Laser Cutter, Spacers, Dome and Wing nuts

Date: 24th September – 8th October

Expert Help

When I am unable to do something or do not have the skill set it is important that I gain the skills necessary to do this. Throughout this project I have gained the skills required from People, Youtube and online forums.

SketchUp

Throughout my project I have used SketchUp for the final designs for various components as well as to develop their designs. I have a small amount of skill with this program from previous use in other technology projects etc. This means that certain functions available on SketchUp are out my skill range. Therefore to speed up the design process and allow me to use functions that I previously was unable to do I have consulted with my client who happens to be knowledgeable in this area. _____ is very experienced in the use of this program as he uses the program on a day to day basis to present models of houses to his clients. Therefore his ability with this program is exceptional and he has a lot to teach me with this program. But due to the lack of time it would be improbable for him to teach me everything he knows, luckily enough I see Allan everyday as he is my father and I was able to consult with him on various issues that arose frequently and as they came up. This meant that I was able to have access to a wealth of knowledge on SketchUp very frequently and also allowed me to get the complex shapes and models I required for my project accurately and quickly. To make the animations you have seen in this presentation I needed to go online and read forums and tutorials on how to work with certain SketchUp plug-ins. This informed me on how to make the animations and export them from SketchUp so that the person does not need SketchUp to watch the videos. This was vital as the animations are great for explaining the construction and assembly of components. It also will be used as an instructional video for the person who buys the Lamp.

Laser Cutter

The laser cutter has been the main tool I have used for my project therefore it was vital that I had the ability to use this machine to cut out my Perspex. I have had no previous experience with laser cutters as the machine was new to the school this year, therefore I had to learn how to use it. Luckily Mr _____ was supervising all of my cutting sessions and he taught me how to use it in the first few sessions. I was also able to consult with him if any problems arose. This was very important as his supervision allowed me to learn basically how to use it so that I was programming it to cut, myself, rather than someone else. It also was important for my safety that I had a teacher supervising as my usual tech teacher Mr _____ had to watch the rest of the class in a different room to where the laser cutter was. Without the supervision and knowledge of my tech teachers Mr _____ and _____ who I consulted throughout the cutting stage I would not have been able to achieve a large section of my production process to a high standard.

Tapping

I have not had to tap a hole so that it has thread for screws before and I wasn't sure on how to do it either, therefore I consulted with _____ who showed me how to use the tapper and also what size of holes are needed for various screws. It was quite simple so I was able to tap the holes and have a removable transformer in the base.

Gluing Perspex

To learn how to use the Perspex glue I watched a you tube video I also looked up safety precautions for gluing Perspex online as well. The video link is http://www.youtube.com/watch?v=hT6Ow_cBTps

Planning:

What: I am looking at the help I needed to inform my practice.

Why: so that I can show how I gathered the knowledge required to complete my project

Resources Required:

Youtube, Mr Jones, Mr Breig, Mr Broome, Allan Shanahan

Date: 8th October – 13th October

Final Evaluation

Go Back (5)

Go Back (8)

I have finally finished building my lamp and have put it in its final environment. It is now time to evaluate the success of my lamp. First of all I asked the client what they thought of the lamp overall, "I think that it is stylish, looks cool and is also practical for me all aspects, good light, good adjustability. It is also a design show piece which reflects well on my design taste and will certainly impress clients who see it. You have delivered on every key factor I have identified with you and the desk lamp you have produced is perfect for me. I would like to also thank you for making this for me and involving me in the project, it has been a long road but in the end you have delivered a desk lamp that I believe is perfect for me." the client obviously sounds pleased with the result and the success which the lamp has had with the client is reflected in the way which it meets its specifications, the specifications were addressed in the design stage so all of them have been included in the design and consequently the finished product. The only specification which I have not met is having a switch, this is due to the fact that I could not find a switch to buy that would suit the lamp or attach to the wire running up the lamps arms. Therefore I decided to leave it out and I talked to my client about this who said that I would be ok as the switch he has to plug it into is not too much of an inconvenience to reach. However I will need to look into this matter in the future if I decide to mass produce the lamp as this will be a key aspect of the user friendliness of the lamp. The lamps key factors have all been met as a result of the specifications being factored into the design but the finished product is really pleasing. Firstly the aesthetics, the lamp is very aesthetically appealing and I have conducted a facebook poll which backs this up and assures me that the aesthetics are appealing to a wide market which is vital to the success of the lamp as a mass produced. I posted a photo of the lamp and asked people to comment on its aesthetics, the comments posted are as follows:

brilliant. absolutley marvalous., October 26 at 9:06pm

it reminds me of a transformer October 26 at 9:07pm

r WOW! Looks Mean, October 26 at 9:08pm

: stand looks nice. design is real cool. like how the yellow stuff comes up through the stand give it a cool as effect/look :), October 26 at 9:21pm

: nice lamp, October 26 at 9:22pm

: ok personal opinion: 1) agreed with Sungho Lee's post 2) design is flash 3) i don't have a desk lamp like that 4) really cool and EXCELLENT, October 26 at 9:23pm

: The colours and the futuristic look make it look cool, October 26 at 9:23pm

nice design and creative shape on the stand. October 26 at 9:24pm

: that is a good lamp. good design and function, October 26 at 9:24pm

: do we buy one? October 26 at 9:24pm

great work, love the design, October 26 at 9:27pm

looks aesthetically appealing with futuristic looks. I think it reflects modern interior design. October 26 at 9:29pm

I also think it looks futuristic, i like the way the base seems to slot together and looks efficient and stable. My only criticism would be the head which in my personal opinion would like to have some sort of shade so that we cant see the actual light bulb part from the side. Overall though creative and original design, October 26 at 9:36pm

Daron i like the design as it shows the more modern features, especially highlighted with fluro colours and the glass/gloss effect given by using the acrylic. Its a more complex design that gives the impression that it looks futuristic too that would most probably influence the user think in the same manner ;) October 26 at 9:38pm

Cedric I personally think that it is a very fascinating lamp model. I guess what appeals to me is the complexity of the design as well as (what seems to look like green perspex material) it complements very well with the shape, and yeah I agree with the majority that it looks like 21st century (modern) design...AWESOME WORK THERE FOSS!, October 26 at 9:45pm

Redmond it scares me! haha nah looks good foss! October 26 at 10:01pm

Marlon It looks pro as.... I like the choice of the two main colours of lime green and white which is a good combo as it helps if stand out and makes it look futuristic... The straight edged design also makes it modern as modern design nowadays is cubism... Would definitely suit a glass desk or something.... Good effort foss!! October 26 at 10:38pm

Laura nice attention to detail, quite a boyish design though, definately not for the female population Thursday at 1:40pm

Tim Very aesthetically pleasing Thursday at 4:06pm

Mike now that's a pretty funky lamp there. Can u make me one? =) Thursday at 5:00pm

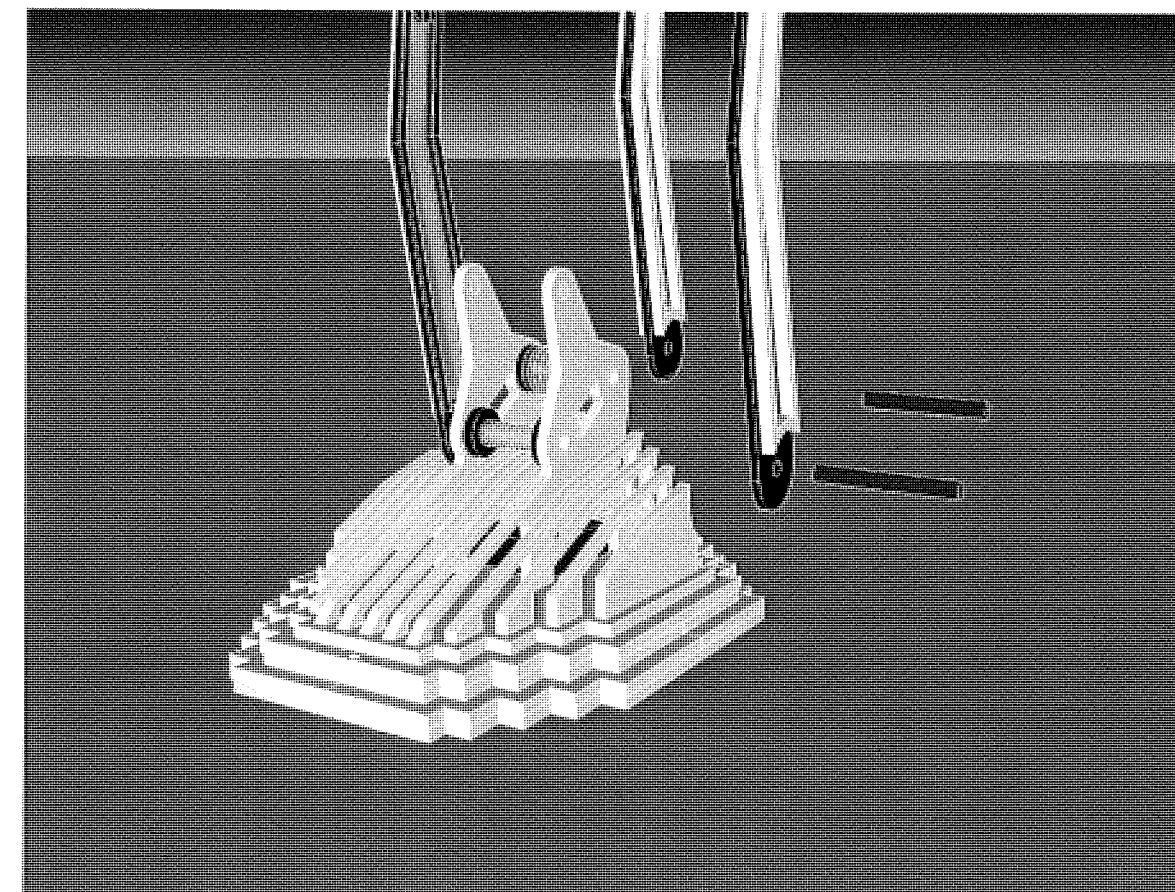
James E Looks very futuristic and robotic :D Thursday at 8:35pm

[Go Back \(8\)](#)

Final Evaluation

Those are obviously very pleasing comments with a few constructive criticisms as well which will help me to improve the design in the future. The design was very easy to make and I am confident from the production process that the lamp would be easy and cost effective to manufacture. The design is also a kitset, when assembling the components like the client would have to when they arrive, I found it a simple and easy process which the average consumer would be able to follow. I have also created an animation which will be sent on a CD with the product when purchased to explain the assembly. Click the image to play the instructional animation. This is a modern way to explain how the pieces go together. As a result of my arm development the lamp is strong and rigid, my client feels comfortable when using it that the lamp is strong and all the parts feel as they are more than strong enough to carry out their purpose. My design has catered for the electrical parts to be replaced should they break and the kitset nature of the design also means that the arms, base and lamp head can be easily replaced, should they break for any reason. My lamp is also very adjustable as seen in the Final Gallery it is capable of a range of positions, and it holds these positions unaided. This allows very comprehensive coverage of the desk with light. The light itself also has a perfect brightness that is not too bright that it hurts your eyes but light enough to easily supply an A3 sheet of paper with clear reading. This coupled with the adjustability of the lamp allows the light to cover a large desk area. It is perfect for my clients desk which is long, as it can be extended easily to supply the far end of the desk with reading light. It also is great in the meeting room where it can light up magazines etc whilst staying out of your way, by using the adjustable neck to angle the light onto your page from a distance. The lamp is also safe as I have had it looked over by an electrician to check that all the wiring I have done is safe and will not pose a hazard. The Perspex used as the main material also means that the lamp is an insulator, this will prevent electric shocks from occurring when the lamp is handles even if there is an electrical fault.

The lamps base has needed much developing in order to get it stable but finally at the end, the extra area of the developed base combined with the addition of weight is enough to prevent the lamp from tipping, I also used a grip pad on the bottom to add extra stability on hard surfaces. This is vital to the function of the lamp as it is unable to extend past a certain point without tipping if it is not weighted. The durability of the lamp is yet to be determined as it is only been made for a few weeks, however the use of the Perspex and long lasting bulb should mean that the light will need no maintenance for at least the bulb life. If I had to do this project again I would have tried to work harder earlier on in the year so that there was not a big rush at the end. I could have done this by sticking to my plan more efficiently and working harder consistently. In terms of the design I think I would change the lamp head to make it include the other types of Perspex used in the Lamp as it would harmonise better. I would also make the base longer in order to make it stable more efficiently. Apart from that, I believe the extensive design development I have done has made the final outcome very successful.



Planning:

What: I am evaluating my final outcome and also looking at what the consumer gets in the final package.

Why: To look at how I can improve the design and also what was good about the outcome.

Resources Required:

<http://en.wikipedia.org/wiki/I-beam>, Materials room

Date: 13th October – 27th October

Final Gallery

