EDEXCEL

GCE Design and Technology:
Product Design (AS)
(Graphics Products)

EXEMPLAR MATERIAL 2

Title: Anna G the Cork Screw

UNIT: 6GR01

Design Technology

Design Technology
Product Design - Graphics Products
8GR01

Portfolio of Creative Skills

2009

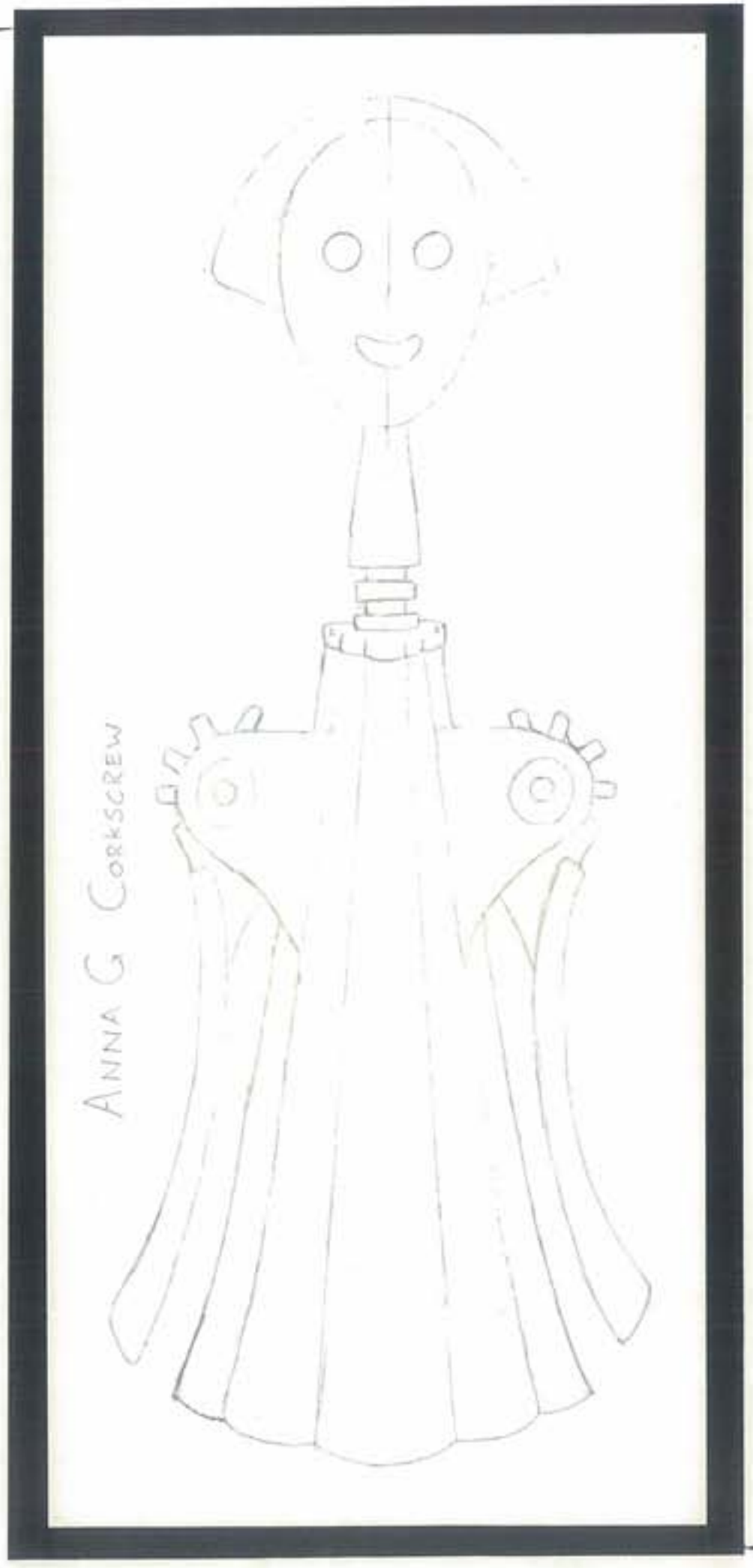
A Level

Product Investigation

- "Anna G the Corkscrew"
- "Product Analysis" — Section A - Performance Analysis
- "Product Comparison"
- "Initial Sketches" — Section B - Materials and Components
- "Materials Analysis"
- " Manufacture Analysis" — Section C - Manufacture
- "Quality Analysis" — Section D - Quality

Anna G the Corkscrew

This is Anna G, a stylishly designed corkscrew from Alessi. It has a retail price of £24.00, and described as "a valuable and stylish addition to fit in with any kitchen". This is the product I will be evaluating throughout the first part of this course



Product Investigation

Within Product Investigation I will individually address and cover the following sections on the Anna G Corkscrew, from Alessi

Section A— Product Analysis
In this section I will evaluate the specifications for Anna G. and compare its functionality with other corkscrews

Section B— Materials components
This section covers the materials chosen for the product, their properties and the advantages and disadvantages for these choices.

Section C—Manufacture
In this section I will address the methods used to manufacture the product and the advantages and disadvantages of these methods

Section D— Quality
In this final section I will investigate the quality control checks necessary check the manufacture of this product

Product Analysis

Alessi
Anna G - Corkscrew
£24.00

What did the designer set out to achieve

In the conceptual process of creating the Corkscrew Anna G, I feel the designer set out to make a efficient and practical product (in this case a corkscrew), which was also aesthetically pleasing to the customer, to stand out from other products in this market

Scale of Product and cost

How does the design allow for a particular scale of production.
What determines cost?
- Price it is selling at (Value for Money?)
- Customer/ Potiential Market
- How many parts there are to the product

The product design, does not allow for mass scale production, because of several factors. It has a high retail price for a simple kitchen utensil because of its innovative design, therefore has a relatively small market . It also has an unusual shape and many different parts to it. So understandably, the Anna G corkscrew would be best in batch production.
In terms of price, using expensive materials increases the cost of production and thus will cost more on the shelves. Also price is determined largely by the materials that are used to make it, in this case, nylon (the base), is quite cheap and the handles are coated in chrome which has more useful properties than just using solid chrome handles. The final factor is that the product has been created by a stylish designer, within a company renown for it's modern unique designs (Aleesi)

Function

Purpose of the product

The Product's purpose is simply to act as a corkscrew, to remove corks from bottles safely, with ease and consistently without loosing efficiency. From the straightforward design, this product is intended to be easy to use, no manual needed to use it. The stylish and eye-catching design could well make this piece the subject of conversation

Performance requirements

What technical considerations must be achieved
- Consistantly being able to remove corks
- Use without need for manual
- Ease for removing corks

To take into considerations the performance of the product, it must consistently be able to remove corks without the product deteriorating. The function to remove corks must also be done with ease and without need for a manual.

Form

Why is it shaped as it is?
- To attract customers
- To fit well to the hand

Anna G has been shaped to represent a woman, based on the designer's girlfriend. However it has been adapted for use as a corkscrew. It has been ergonomically designed to be practical, the base fits to the hand and made of a smooth nylon plastic (see Materials for more details). Also the handles are curved to the "dress" of the corkscrew, this can prevent catching your skin between the handle and cover, this is also done with the cogs, they are positioned on top and out of the way. The curved shape is again comfortable to hold and use.

User requirements

What qualities make the product attractive to a user
- Colour
- Shape
- Materials

User requirements are another factor that has to be taken into account when designing a product. It is an expensive designer product and will therefore attract many customers to this product over others because of this. But also the fact it is comfortable to hold and easy to use; the base, is slightly textured for grip; the handles, are sleek and has no sharp areas where the user might feel uncomfortable whilst holding the corkscrew. So this proves it is also practical as far purpose, but with a stylish appearance, making it a quality product

Material and Component requirements

How should they perform

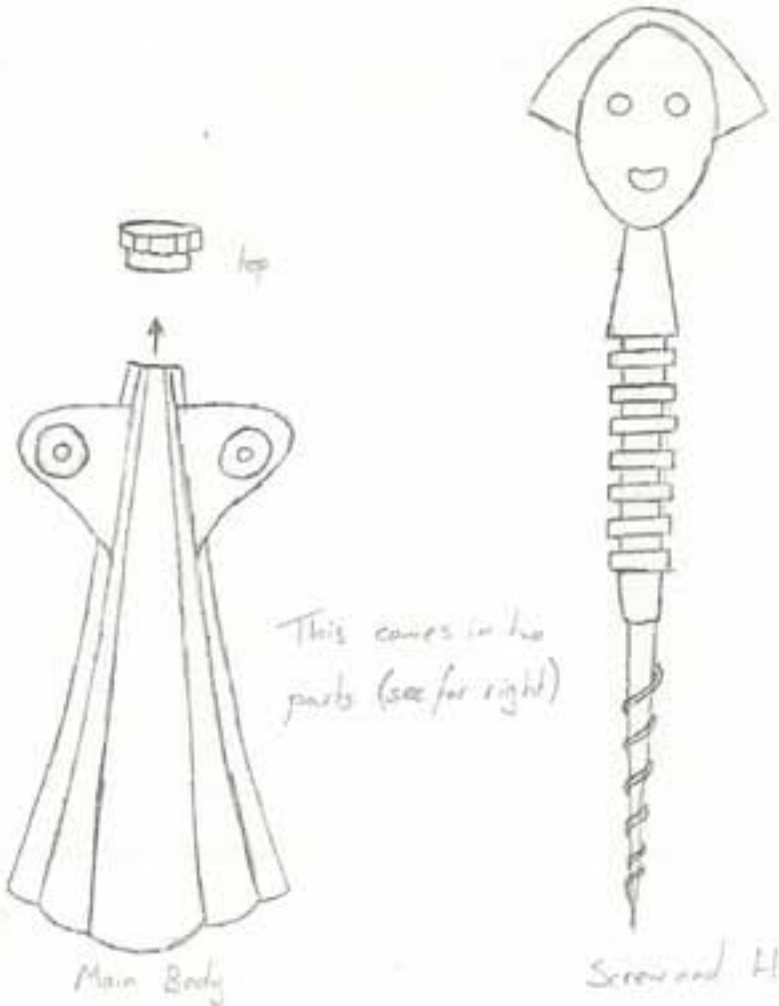
The designer has to also take into account the materials that the product will use and how this will affect its performance (mainly its ease of use). The main body of Anna, for example, is sturdy and slightly textured for grip. It is made out of a smooth nylon material, which is self-lubricating, so avoids friction with the cogs of the handles. The handles themselves are chrome plated zamak, which gives the smooth and shiny finish. The chrome plating has the additional feature of being easily cleaned, which makes the product practical to live with also. The materials not only have to be carefully chosen, but need to be aesthetically pleasing, strong and durable as the price for the Corkscrew is more than its regular counterpart

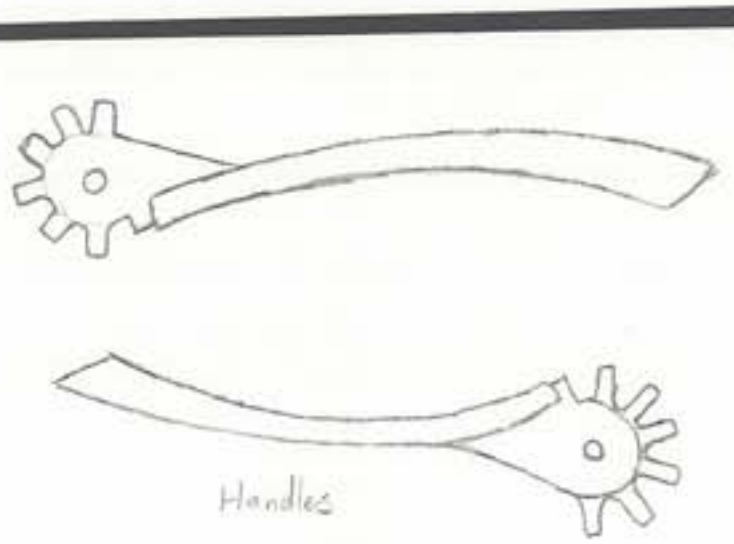
Product Comparision

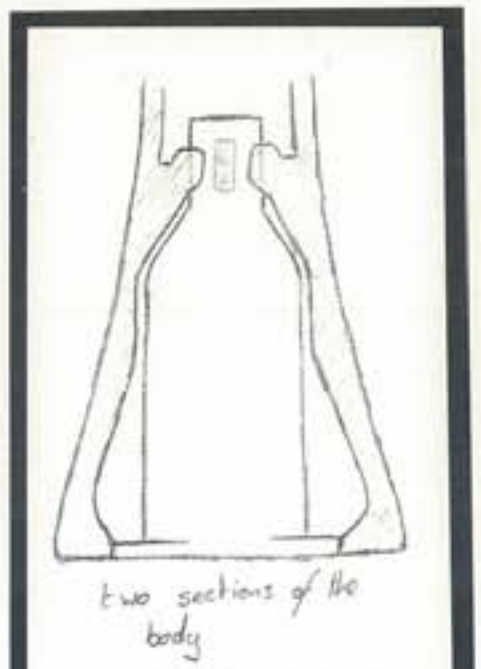
Below are 2 other examples of corkscrews which I have compared to Anna G in terms of Aesthetic properties, Materials and its features

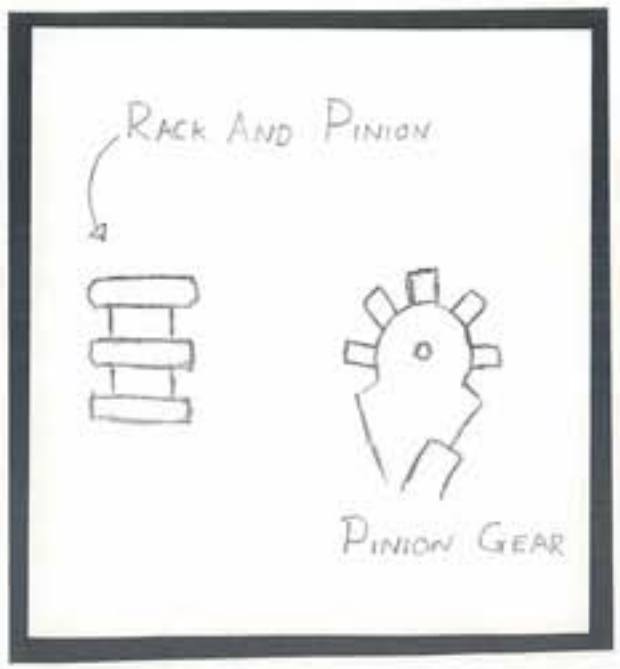
	Anna G Corkscrew (£24)	Wing type corkscrew (£6)	Lever Corkscrew (£27)
	In the conceptual process of creating the Corkscrew Anna G, the designer set out to make a efficient and practical product (in this case a corkscrew), which was also aesthetically pleasing to the customer, to stand out from other products in this market. 	This is a basic corkscrew, bought pretty much to just remove corks from bottles or the tops from bottles too. It is designed purposely for use rather than to look impressive. T his explains the low price, as the customer is not paying for a stylishly designed product. 	This corkscrew has a differing mechanism, and is designed more for holding to remove the bottle, with the handles fitting around the bottle to fix it in place.The price comes from the fact it is heavy-duty, there is a lot of parts. This is not as simple to work as the first two corkscrew. 
Aesthetic Properties - Colour - Surface texture - Surface decoration - Brightness	The main body of Anna G, is sturdy and slightly textured for grip with a bright colour to attract customers. It also has the function of covering the screw and protecting the hand. The handles themselves are chrome plated Zamack, which gives and attractive, smooth and shiny finish.	As for the aesthetic properties of the winged-type corkscrew , I find it is not as aesthetically pleasing on a whole in comparison to Anna G. It isn't as colourful, but it does have a reflective surface, which does attract customers	The design for this corkscrew is, in my opinion more aesthetically pleasing than the "winged type corkscrew". It has a textured grip , but not bright plastic that is seen with Anna G. However in similarity to the other two it does has the reflective surface.
Materials and Properties - Material - Properties - Mechanism	Anna G is made from a variety of materials. The body is made from a plastic called polyamide, more commonly known as Nylon, and this is self-lubricating, so avoids friction with the cogs of the handles. The handles themselves are chrome plated Zamack, which gives the handles shine as well as it being strong and durable	Like Anna G the metal of this product is Chromium plated which gives it the same advantages (e.g. easy to clean, resistant to a certain amount of wear) But as it fully metal there is no plastic and therefore doesn't have the advantage of a textured grip. As a product it is hard to hold as the screw is open instead of covered with Anna G corkscrew (by her dress)	This corkscrew is made from a mixture of plastic parts and metal, like Alessi's corkscrew. The metal is a stainless steel alloy, which means it doesn't need to be plated, it is also protected from rust, a useful quality in kitchen utensils. As for the mechanism, as mentioned earlier, it's design enables the user to hold the bottle as tightly as they like, as the handles fit round it, with a third to remove the cork.
Features and user requirements - unique features - Customer attractions and repulsions	The chrome plating has the additional feature of being easily cleaned, which makes the product practical to live with also. The design also enables the corkscrew to stand up for display and alike. The handles are sleek and have no sharp areas where the user might feel uncomfortable whilst holding the corkscrew	This on the other hand does not stand up But it has the added advantage of a bottle opener But the Mechanism is looser, this maybe as instead of rivets the Wing-typed corkscrew used screws. Product is harder to hold as like I said earlier there is no screw cover.	Like the Wing-typed corkscrew, it cant stand up, but many types of these corkscrew have separate stands included. This corkscrew can be considered to be easier to hold than Anna G since there are clear handles out of the way of where u remove the cork, whereas with Anna G, the handles come down beside the body, where you hold the corkscrew.

Initial Sketches

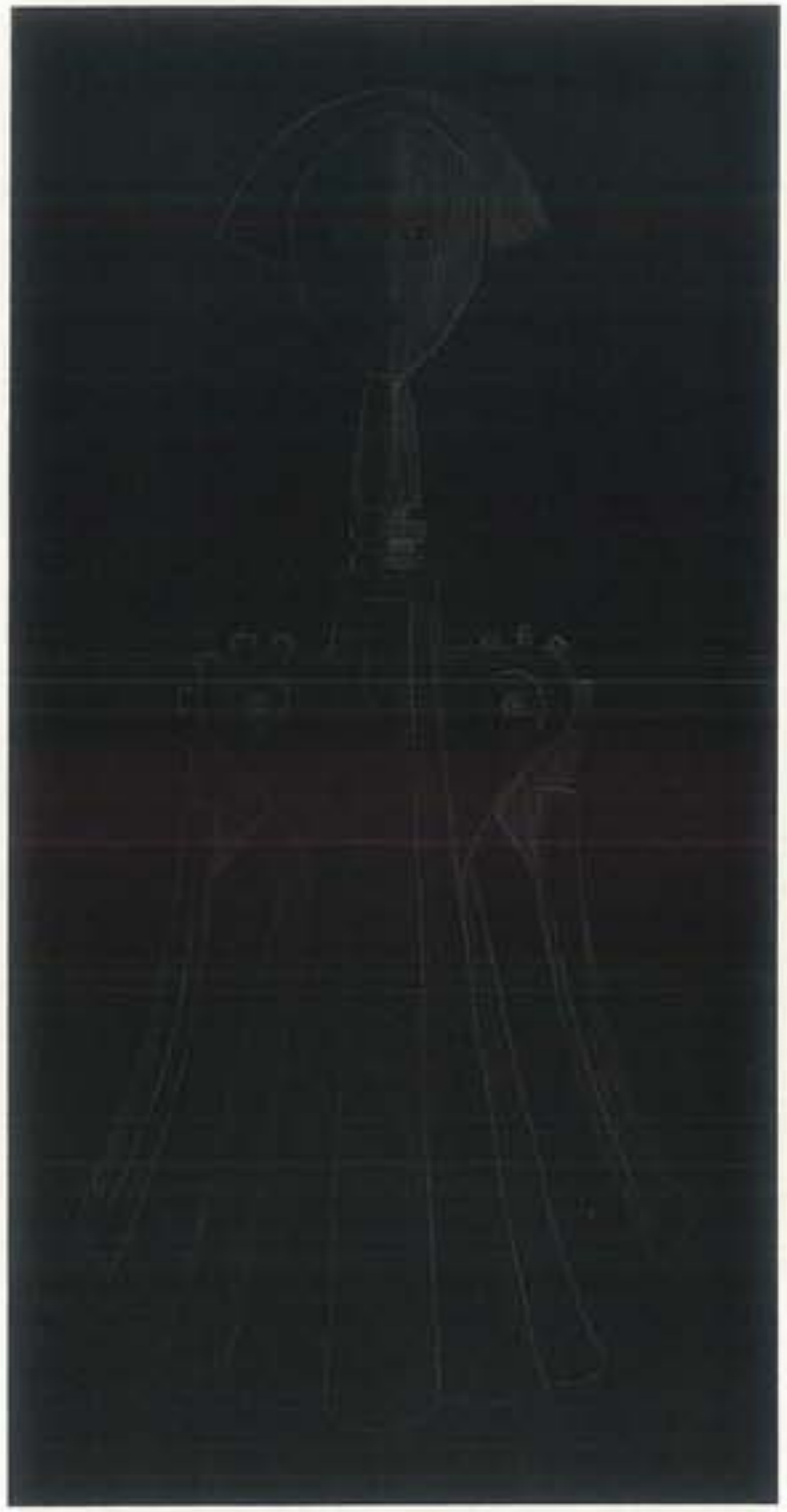






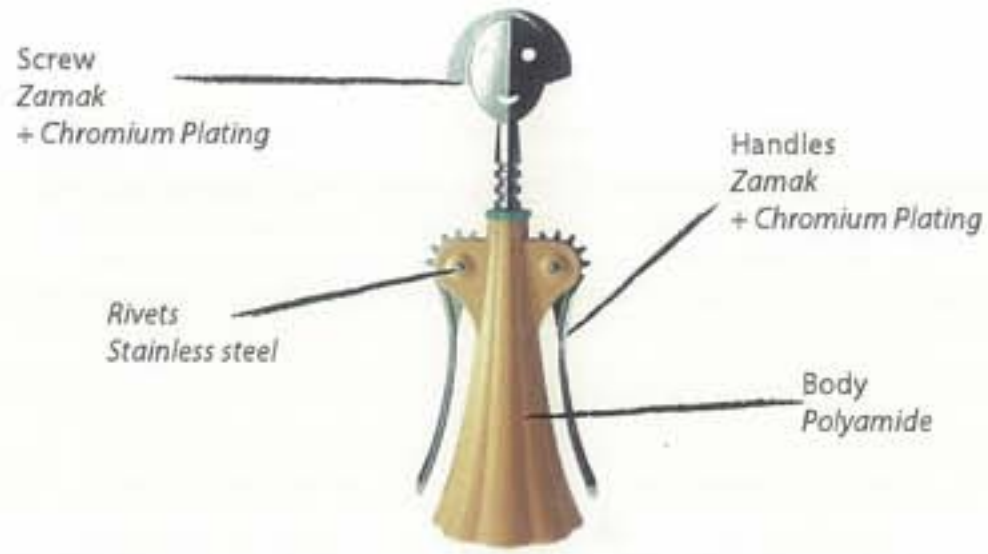


From these sketches I can see the individual components that makes up Anna G. and also the aesthetic properties mentioned in Section A, that makes Anna G. unique, stylish and modern.



Materials Analysis

The table below shows the materials used to make Anna G. Each Material has its reasons for use, be that for its aesthetic or general material properties.

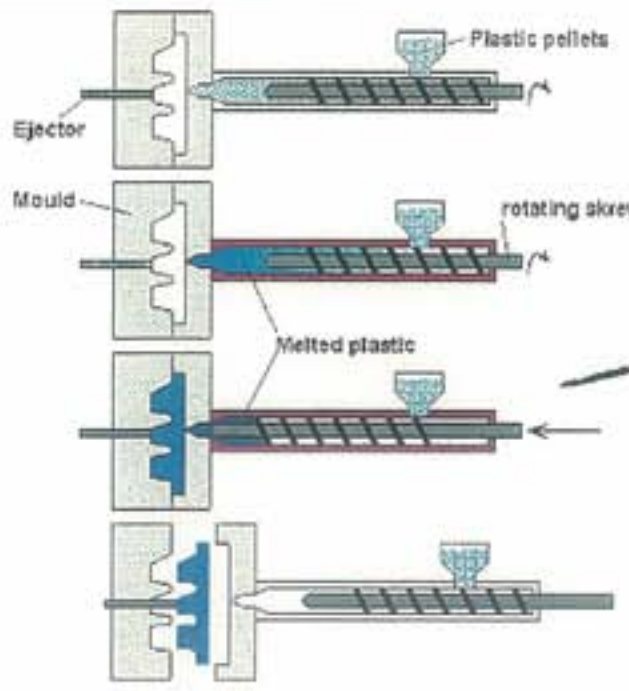


	Advantages	Disadvantages	Environmental issues	Alternative Material
Body Polyamide (Nylon)	Polyamide, or as it is more commonly known, Nylon, is tough, strong and impact resistant, which means that in the use of the corkscrew, it will be able to withstand falls to the kitchen floor without shattering (tough/impact resistant and not brittle), does not scratch easily (hard). As a plastic it is self-lubricating, which means there is less friction between the body and mechanism, and so it can be used with ease and doesn't need oiling. It is easy to clean, which is helpful in the kitchen environment and with nylon being abrasion resistant also, it means it can be cleaned without fear of damaging the product. Finally polyamide is easily formed and complies with thermoplastic methods, this means it can easily be injection moulded.	For all its advantages, nylon has a few disadvantages which apply to its use as a corkscrew. It has a high moisture absorption, which means it will take on water in a damp environment, not very useful in a kitchen. Another disadvantage is that it picks up dirt easily, however this is compensated for by the fact it can be cleaned easily too. If displayed in direct sunlight, polyamide' colour will fade, and so needs to be U.V. stabilised, which adds to the producing cost. Finally the plastic shrinks from the mould, and so the rivets and handle widths need to be taken into account with measuring the mould.	With the production of Polyamide, (injection moulding), it requires large amounts heat to melt the plastic into the mould, this uses a lot of energy. However very little waste is produced.	Metal such as stainless steel or the Zamak as used in the handles and screw. Polypropylene, another type of plastic that shares a lot of properties with Polyamide, being impact resistant and self-lubricating Polyethylene, waterproof, and resistant to chemicals
Screw and Handles Zamak (zinc Alloy) It is comprised of 95% zinc (Zn), aluminum, magnesium and copper	Zamak is a Zinc alloy, comprised of 95% zinc, aluminium, magnesium and copper. This means it has the advantages of several metals, such as high melting point, and so it's shape will not distort with a high temperature in the kitchen. It is said to cast "like water", and this suggest it is easy to cast and fits well to the mould. The metal is hard and therefore resistant to scratches and denting. It is a non-ferris material and will not corrode with acids and alike.	As for the disadvantages of Zamak, like most, for example, over time it can become brittle. Again like most materials that are cast, the initial setting up of the casting process can be expensive. Also similarly to Nylon, the metal can shrink over time, which means the mechanism would slowly become harder to use.	Environmental issues for Zamak include the fact it is made from a variety of metals and so the ore refining processes to get the metals would need a lot of energy and there could be pollution where the metals are taken from the earth and the waste of the processes used to get the metal. Also the metal needs to be heated to go into the mould, and again this requires a lot of heat and energy.	Stainless steel (wouldn't need the chromium plating) because it contains a high amount of chromium which helps prevent it from rusting. This is good as you can have different types of finish such as course abrasive finish a brushed or satin a matt finish or reflective Another type of base metal so long as it is plated with chromium
Rivets (joining handles to body) Stainless steel	Stainless steel is a metal commonly used in the production of kitchen utensils. The main reason for this is it's resistance to rust and therefore its performance won't be affected by water unlike Nylon. It has the same properties as steel, being strong, hard and durable so it wont lose strength or scratch easily. Stainless steel is also non-porous and so will not absorb water. Again like Zamak it is very corrosive resistant.	Stainless steel has some disadvantages also, overtime the rivet will become brittle and there is a possibility that it will snap. Although it doesn't corrode, it can start to corrode if the protective covering is worn away. Finally as a material it is quite expensive.	Again like Zamak there is an issue with the getting the metal from its ore, (Carbon steel and chromium) and heating it to get it into the mould. However over half of all new stainless steel is produced using old scrap metals.	Steel screws are an alternative way they are easy to get hold of and are a cheap method. And they are easy to get hold of in all different shapes and sizes.
Screw and Handles Chromium Plating	The metal parts of the corkscrew are covered with a chromium plating. This has a shiny surface (aesthetically pleasing) and holds its shine with a minimum of cleaning, keeping it bright and sparkling through use. It protects against wear and, in thick layers, corrosion also, and again like nylon, easily washable and cleanable. It also has the additional environmental factor of being recyclable.	However as it is sprayed or dipped to apply the chromium plating, and so the coating can be irregular spread if the product has sharp angles. Similarly to Zamak the initial outlay for the plating is expensive. Its last disadvantage is that over a long period the plating can get scratched and possibly brittle from this.	The Electrochemical process used to plate the Zamak with chromium uses a chemical bath, this is harmful waste and so the recycling and processing of those substances is expensive, using a lot of energy	Electrostatic coating—plastic or paint Dip-coat plastic—this is cheap and is easy to do. But this is not something that will last for as long as plating and can have an irregular spread, but can look attractive

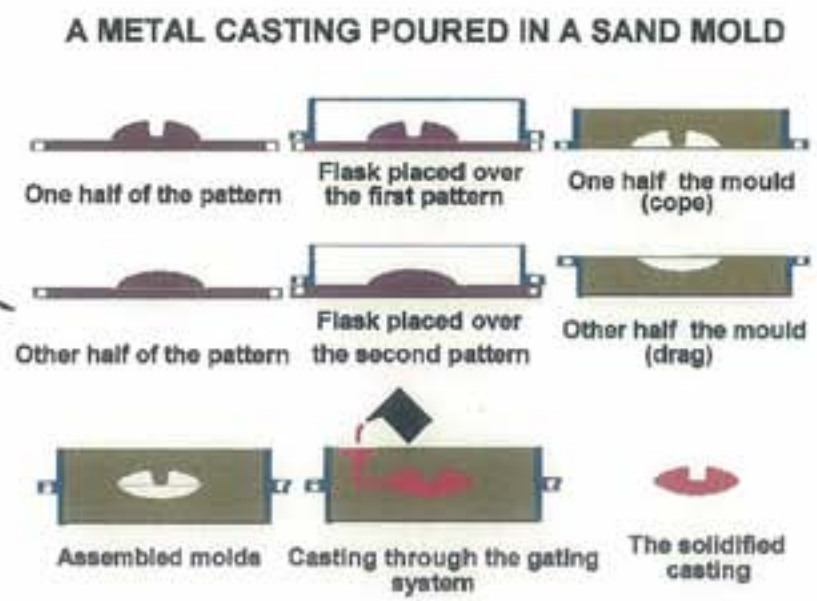
Manufacture Analysis

Below are some of the manufacture processes used to produce Anna G.

	Advantages	Disadvantages	Environmental Issue	Alternate Method of Production
Injection Moulding Used to mould the polyamide into form of the body of the corkscrew	Injection moulding is ideal for mass Production (however although the corkscrew is batched produced, it still can count as an advantage. There is a low cost when actually producing the product, and the mould can last a long time. It has the ability to produce complex geometrical products, such as the body for Anna G.	However the initial set up of the moulding system is expensive, for example the mould itself needs to be precisely cut and the machine is also very expensive. Also the product will not maintain good mechanical properties due to the limited fibres that can be used in the plastic, but on the other hand the plastic used has the mechanical advantage of being self-lubricating.	The Plastic requires heating to enable it to melt and fit into the mould and so uses lots of energy. However very little waste is produced.	
Die casting Used to produce the handles and screw from Zamak	Die Casting can have excellent accuracy (and produce a lot of detail as it involves a metal mould). It is suitable for applications when large quantities of parts are required and of high detail as it has a rapid production rate. It also has the ability to cast smooth surfaces as well as textured. The system reduces and in most cases, eliminates secondary machining operations (processes done after initial machining)	On the other hand, a large production scale is needed to compensate and make this an economical process, as the initial cost to set up the mould and machine is very expensive. Also porosity (the material being porous) is common.	Again like the plastic, the metal requires heating, but as Zamak has a higher melting point, so the metal requires more heat to melt and cast. This uses a lot of energy as well.	- Sand Casting Molten Metal is poured into a mould cavity formed out of sand (natural or synthetic). The cavity is formed by using a pattern (an approximate duplicate of the real part), which are typically made out of wood
Electro-plating Used to coat the Zamak	The process for electroplating is fairly simple on a whole, and once everything is up and running.	Although easy, before electroplating an object, it [the object] must be polished of all blemishes/ scratches. Also getting a consistent thickness can be difficult depending on the objects measurements and geometry, the plating metal is attracted to external corners but less so to the internal corners	The electroplating using an electrochemical bath will still leave the chemical waste from the bath. This can be harmful to the environment and so needs to be processed and if possible recycled. This, however, uses a lot of energy.	There are two methods of electroplating, the chromium can be applied by either electrostatic coating or electrochemical coating, the latter involves a bath of chemicals, and the first, involves a negatively charged spray which is attracted to a positively charged product.



Two Methods of production mentionned above



Quality Analysis

All products go through a series of checks to insure they provide the customer with a reasonable quality product. These checks are known as Quality Control (QC) and in achieving these checks it completes Quality Assurance (QA) as well. QA is the assurance that the end product performs to a certain standard. These standards are decided upon by external standard organisations like BSI, British Standards institute also known as the "Kitemark" and the European CE mark for quality assurance.

1 These Quality Processes start as soon as the raw material is collected. They are first checked for 2 things, that they are in the correct form, powder, sheets, granules etc, and also that there is the right amount, in the correct thickness and size.

With the production of Anna G. the main body is manufactured through injection moulding, and checks are made during this procedure also. These checks include:-

- Making sure the enough granulated plastic is being pushed through the injection mould system to fill the entire mould
- Should the mould not fill entirely, another check will detect the product is incomplete
- The temperature is monitored in 2 ways.
  - As the plastic needs to be liquid to go into the mould, this is monitored, as if it is too cold, it will not fit round the mould and the product will come out incomplete
  - The product also needs to be cooled to solidify, this is checked, as if too hot, when removing the product there is risk it will not have properly solidified

The last quality checks are made to the end product. This insures overall quality for the final product. Some of the checks are made in the following areas:-

- Checking the product has been correctly assembled
- Checking it has correct overall shape, nothing has been left out the mould, there are no rough edges or sharp corners.
- Checking the strength of the product, and to make sure it hasn't lost any properties it wanted from the raw materials
- Checking the colour pigment is consistent all round the product

External Quality standards

Below are some of the renown quality standards, there mark, where it applies and what it means in terms of the product

The BSI (British standards institute), and its mark more commonly known as the "Kitemark", and is given to products that have passed independent tests made by the BSI. Once these tests have been passed the product is issued with the licence to use the kitemark on their product and packaging. This is a nationally recognised symbol and gives the customer the assurance that the product is safe to use and reliable.

CE The CE mark is given by the European legislation and shows that this product has conformed with standards informed. Many products need to reach these standards before they can be legally sold in Europe.

Products don't need to receive the "Kitemark" and alike, but having this assures the customer that the product is to a particular standard. And if the product is changed to conform with these standards, the customer may be more inclined to purchase this product.

Initial Checks *(when materials come in)*	Material checks *(during manufacture)*	Machinery Checks *(during manufacture)*	Part Checks *(after production)*	Assembly checks *(checks the assembly of parts)*
Is there the right quantity of Material? Is the material in the correct form? Is it the right colour? Is it of a good quality? Is it the right density?	Is there the right quantity for the machine? Is the material in the correct form? Is it at the correct temperature? Is it the right colour? Has the material softened enough?	Are both the moulds/dies correct? Is the temperature of the machine right? Is the pressure needed correct?	Does the part have the correct appearance , colour and texture? Is the part in the correct form? Does the part have the correct properties (durability , strength etc)? *To check the parts properties extra tests are done using a variety of machinery.*	Does the final product perform to the quality stated? Is the product consistent with the others? Is the appearance correct? Does the product have the correct properties ? Is the product safe to use?

Quality Assurance (QA)
Is the system used by the manufacturer to monitor the quality of a product from its design and development stage, through its manufacture, to its end-use and the degree of customer satisfaction. In other words, QA is an assurance that the end product fulfils all of its requirements for quality.

Quality control (QC)
Is part of the achievement of QA. It involves the actual inspection and testing activities used by a manufacture to ensure a high-quality product is produced.

External quality Standards
Are used when testing, inspecting and verifying the overall quality of materials, components, products and systems. These formal standards are produced through standard organisations for national (BS), European (EN) or international (ISO) use.

Product Design

- "Specification and Brief"
- "Research"
- "Initial designs"

Section E - Design and Development

- "Modelling"
- "Final Proposal"
- "Final Computer render"

Section F - Communicate

Product design - Lighting

Specification and Brief

Design Brief

For Section E and F, I will have

> "to design in detail a lighting feature that will hold one or more DOT-IT "downlights" (touch light) of either 2 designs (shown below)"

Before I begin designing I have to take into account the design brief as follows:-

- The light needs to be free standing
- It needs to be relatively adjustable (Optional)
- It holds one or more of the 2 suggested DOT-IT units
- It needs to be modern/stylish
- The user must be easily able to "press" the light on and off
- The light should be original and innovative
- The materials of the light should be appropriate to the manufacture
- The Light should be made appropriate for batch/mass production

Product Design

Within Product Design I will design a free – standing Lamp, using either of the two touch lights shown to the left. The designing will have to conform and cover the areas below

Section E - design and development

In this section I will have to present ideas that are realistic and follow the design specification. It must demonstrate an idea of materials, processes and techniques that would be used to manufacture this product in mass production. The design must include technical details and a final orthographic drawing as well as some form of model

Section F - Communicate

This section covers the range of media used to communicate the design ideas. The ideas must be easy to follow and enough detail for 3rd party manufacture.

Specifications

I will be designing a desktop lamp for office use with target audience being adults who working in office environments. So with this in mind the design will need to be small enough to fit on a desk, but have a large enough impact on lighting the desk area. It also must aesthetically modern to compete with other desktop lights in that market. Bearing all of this in mind, the lamp must be designed to be manufactured through mass production and so shouldn't be too complex

Product design - Lighting

Research

Valencia satin chrome desk lamp
Diameter: 110mm
Height: 380mm
This is the typical modern desktop lamp made up of a base, "stem" and light "head". The design is simple; the stem is adjustable like most in the market, but made unique by being fitted with a rotary dimmer switch.

Fabio 81262
Height: 300mm
Another desk lighting design, this time far more adjustable as the entire stem is flexible. However this design is a lot smaller and I feel, less suitable for a desk environment as the reach of the light is limited

Anglepoise type75 adjustable lamp
Height: 700mm
The classic desk lamp, which has been in use since the 1930s, the design pivots in two places along the stem. It has a basic design, but wouldn't really fit in with on a modern desk.

Flos gibigiana table lamp
Height: 430mm
Base: Ø95mm
This light has a modern and unique design. The light is not directly projected onto the desk, it shines up through onto a mirror. To adapt this design I would need to make it more adjustable.

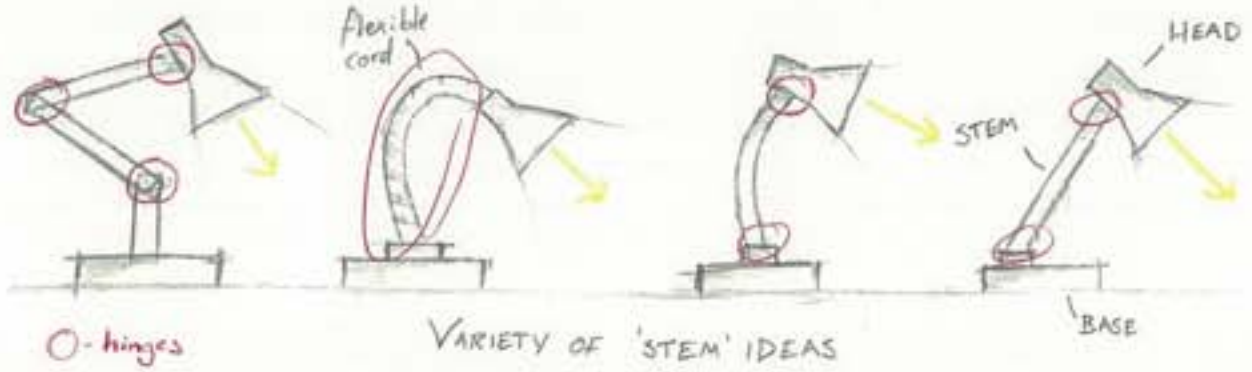
Desk Lamp Chrome and Wood
Height:390mm
A slightly different design, stylish and modern; which would use the rectangular instead of the circular downlight. Again it is adjustable at the base and head, with the stem being made from wood instead of metal or plastic which adds a nice touch

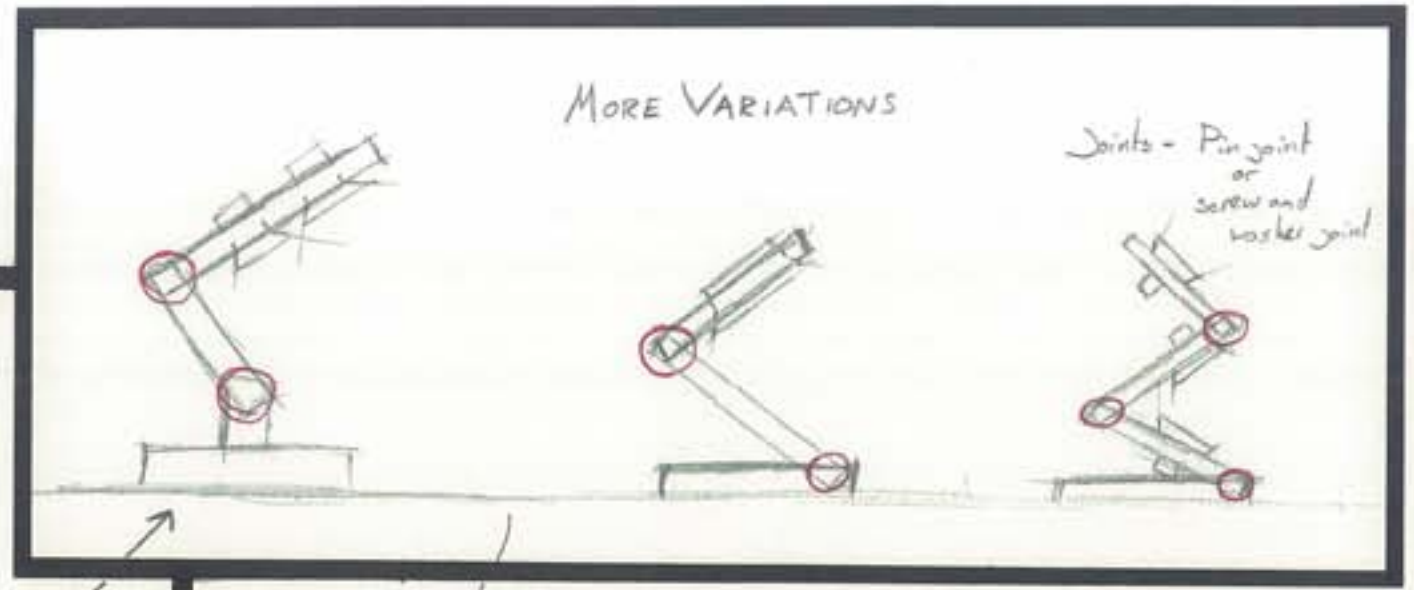
589 desk lamp-chrome
Diameter 200mm
Height 310mm
Small and interesting design; it would have to be adapted to hold the touch light. However I do like the distinctive curved back which holds the light.

flos tab table lamp
height:327mm
weight:273mm
base: Ø175mm
A simplistic but stylish design could hold several of the circular or one of the rectangular downlights. Again it would have to be made adjustable

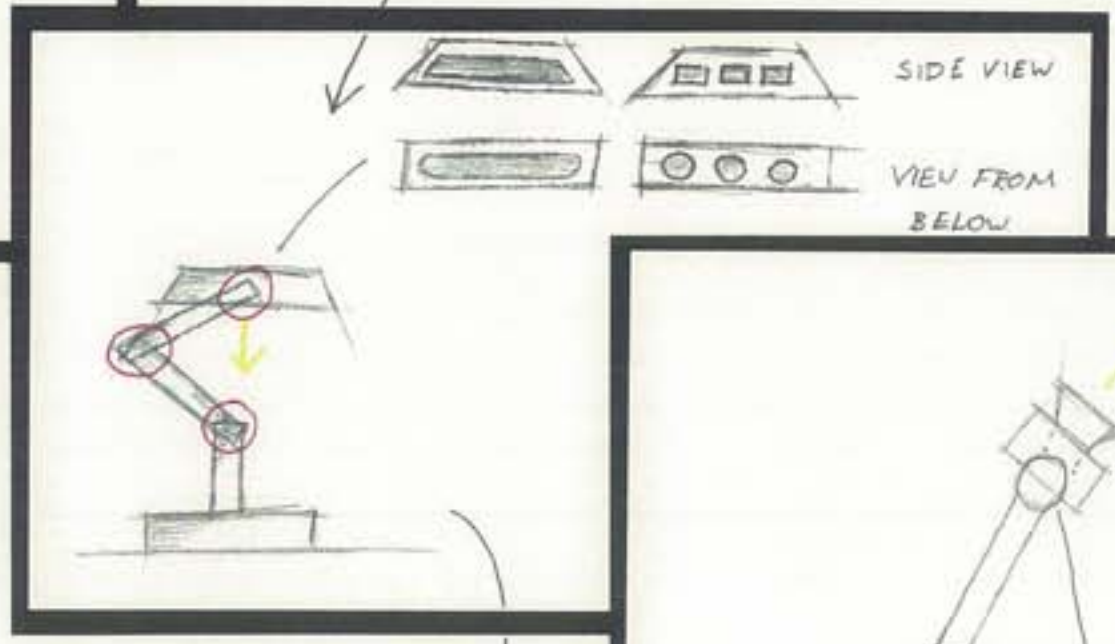
Lighting

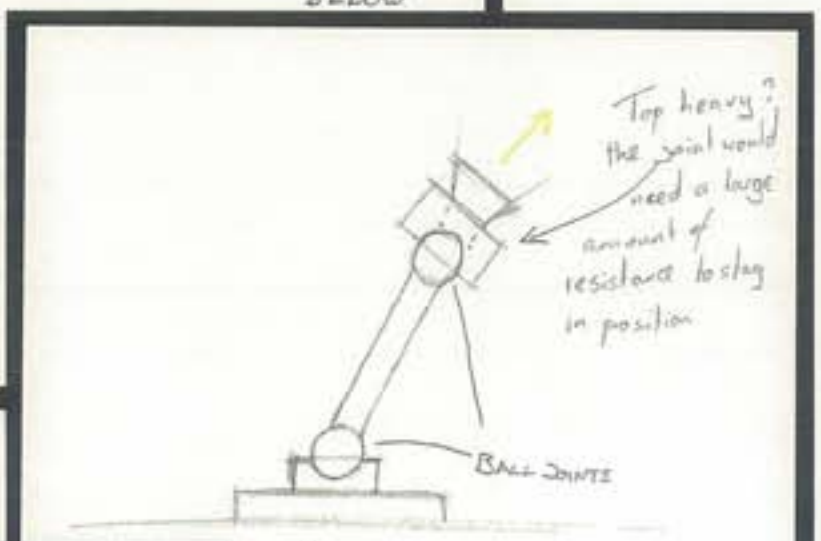
Intital Designs

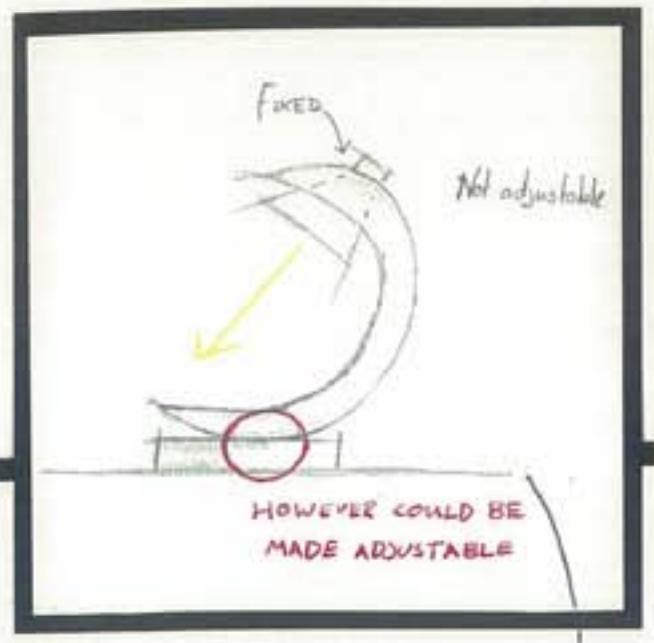




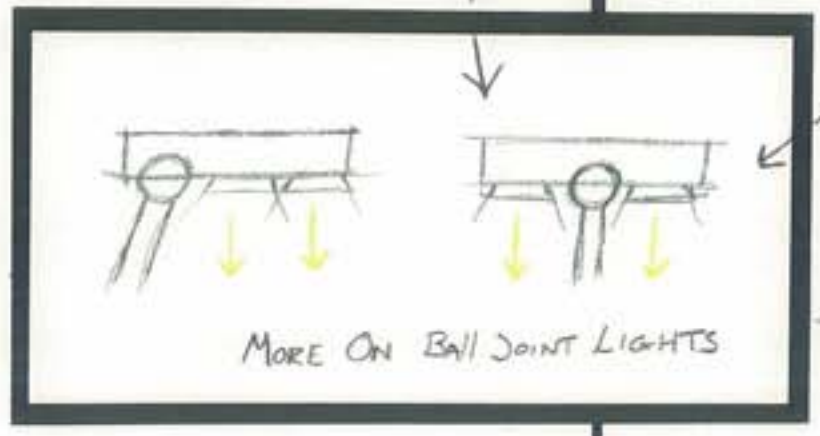
Above are a variety of designs to make the lamp adjustable. Flexible cord has the problem that it can only be made out of metal, and the base needs to be weighted so that it can extend past the base.

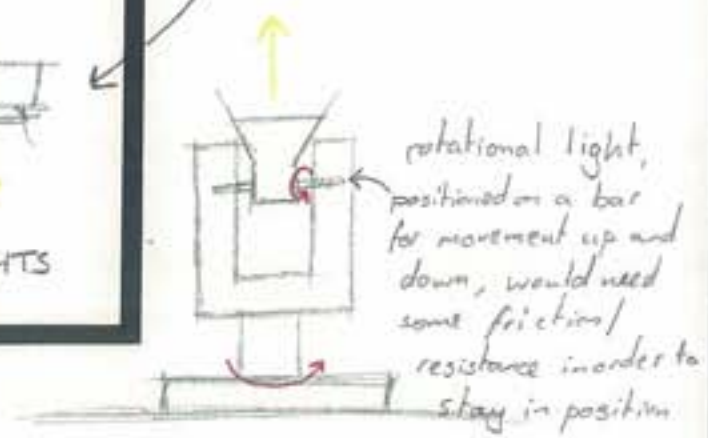


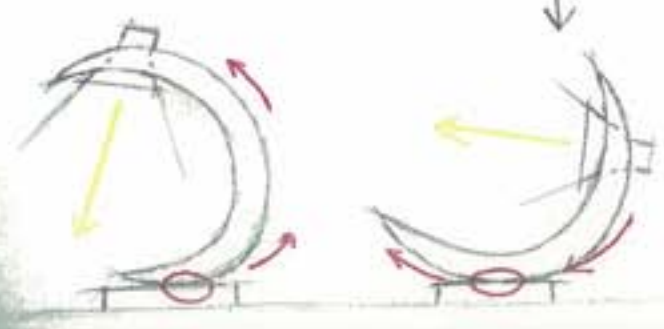




The curve design could be made adjustable by able to slide around.





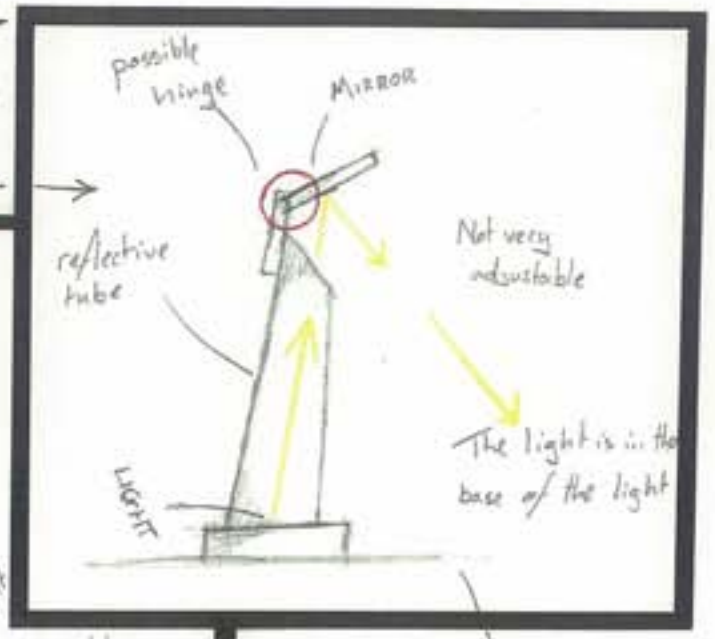


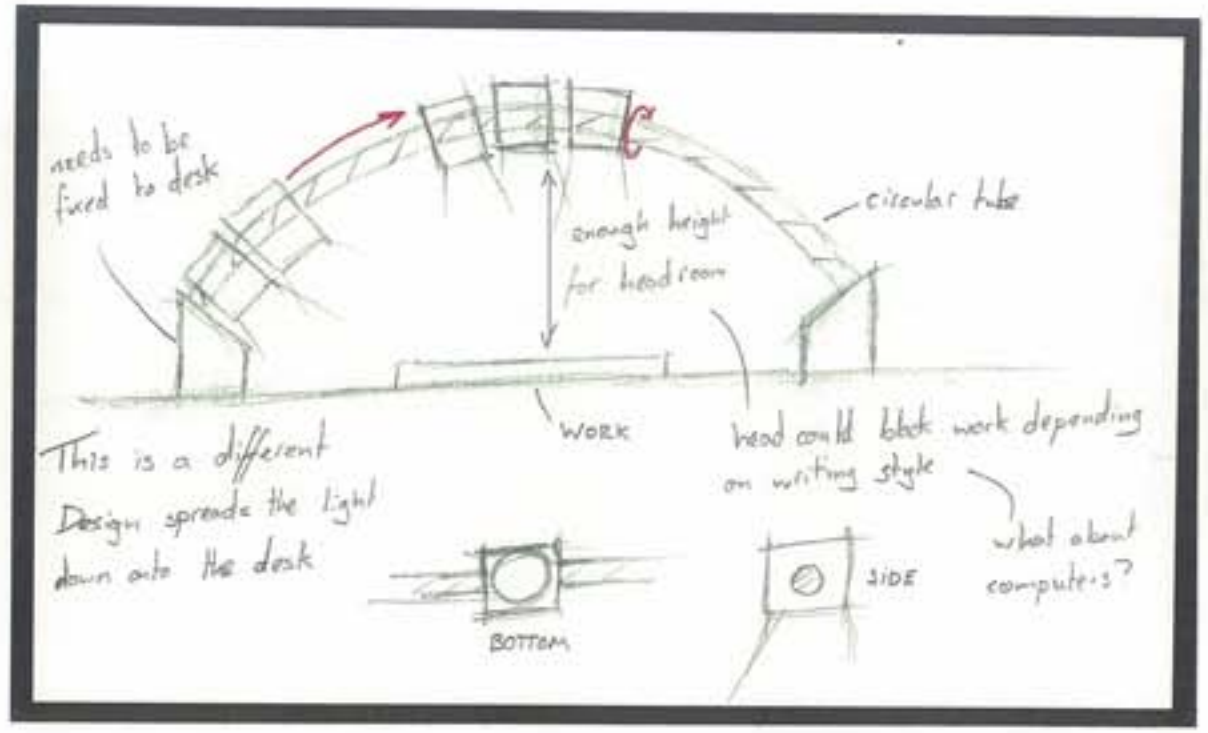
THE LIGHT IS fixed but the curve slides round which means the light can cover a large area.

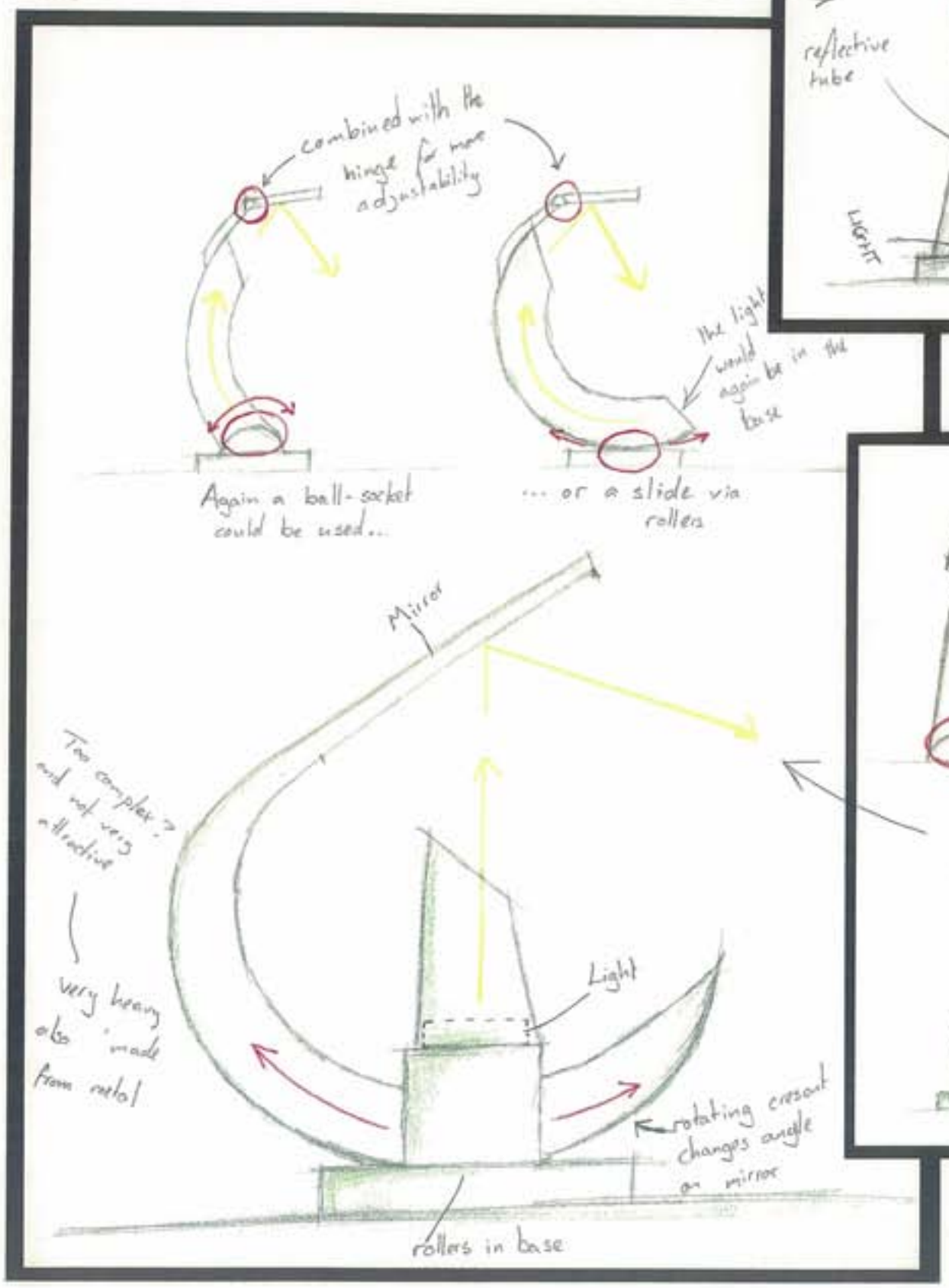
Lighting

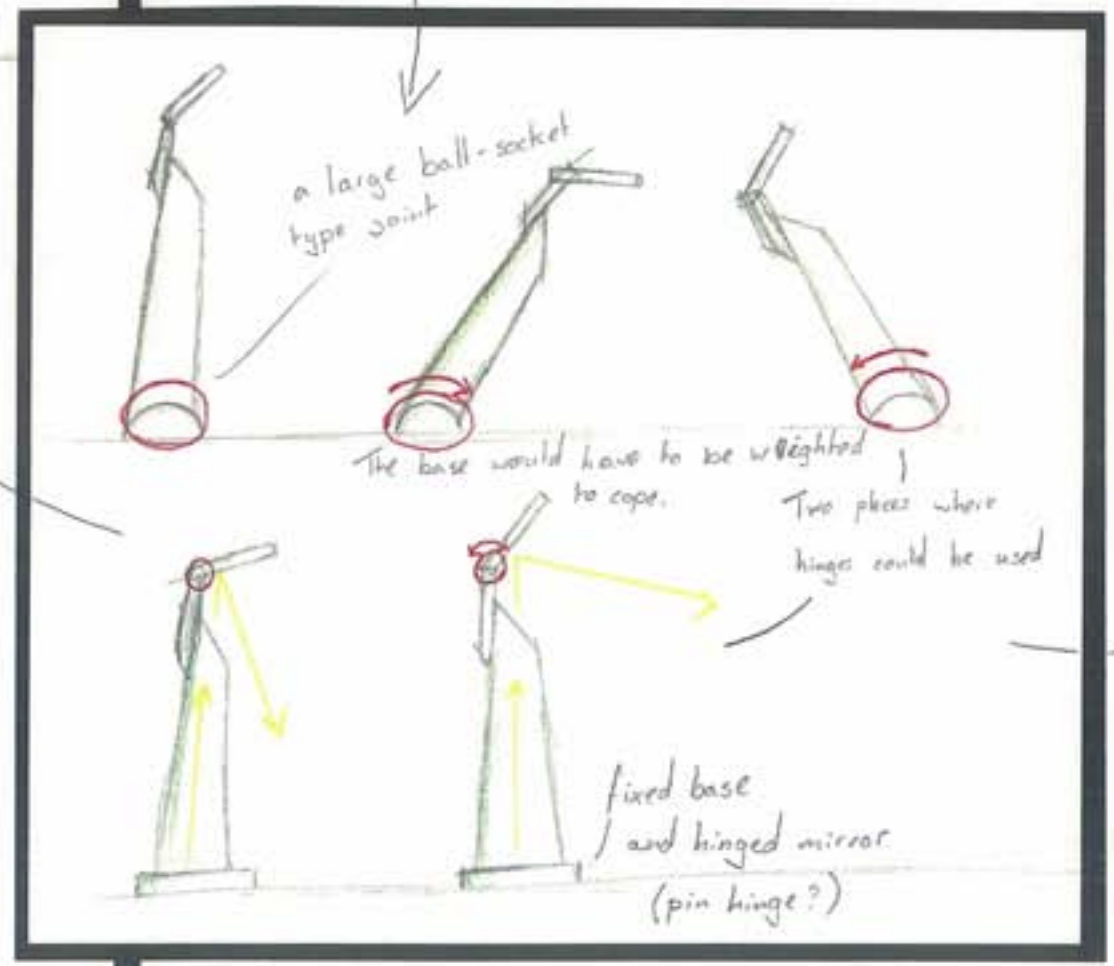
Intital Designs

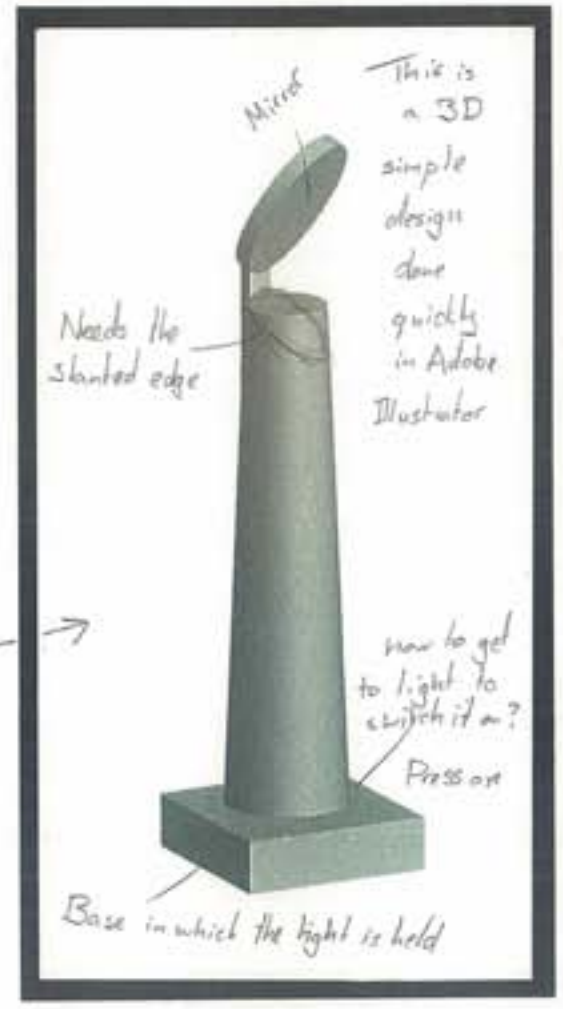
This design is based on the idea that the light is reflected via a mirror to its intended target











Lighting

Intital Designs

bottom would have to be reflective in order

Made from Acrylic where the light is embedded

not very intensity

REFLECTS OFF BOTTOM

LIGHTS UPWARDS

USEFUL? FOR A DESK ENVIRONMENT?

target of the light not very useful

unstable base

General design isn't very adjustable

STORAGE AREA

SHELVING BASED LIGHT STAND

STORAGE

STORAGE

Could be made from Plywood type wood for an attractive finish

STORAGE

"Storage" might get very hot under light

The below design was based on ~~or~~ kitchen down lighting. The light is exposed in a sloped design

cover to cut out glass of LEDs

with cover, how would it be turned on?

FRONT

COVER

LIGHT

SIDE

more suitable as down lighting not for desktop

FRONT

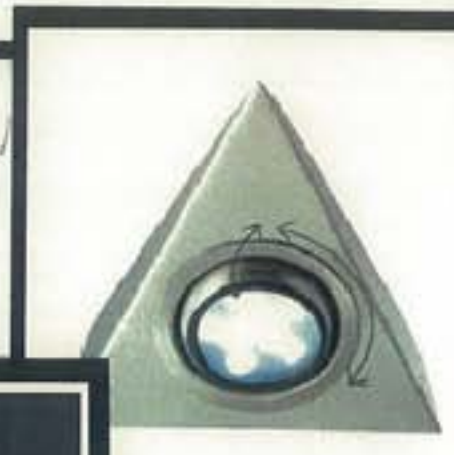
SIDE \ front heavy

RECTANGULAR LIGHT

FRONT

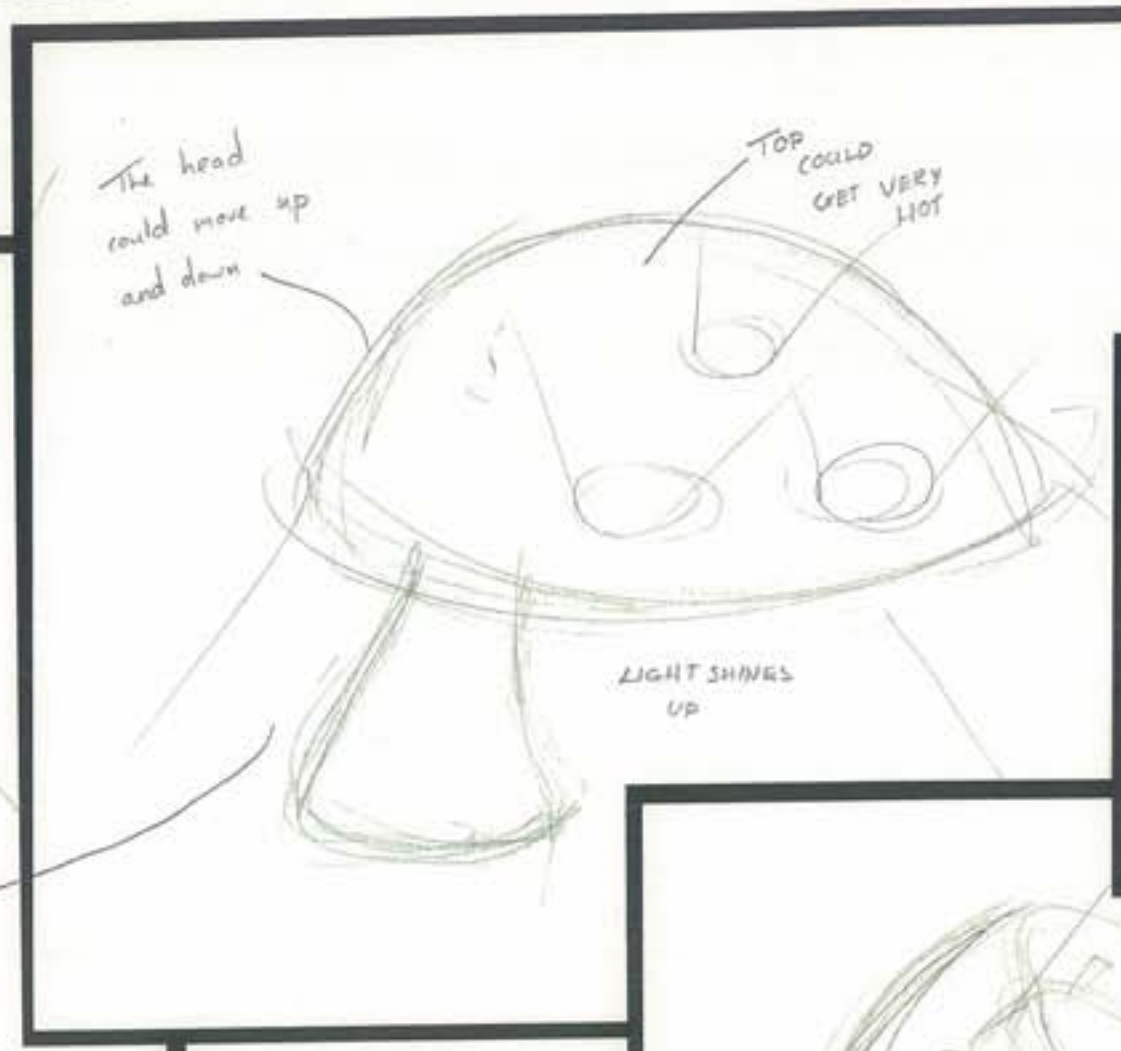
SIDE

This kitchen down lighting influenced the designs above



Lighting

Intital Designs



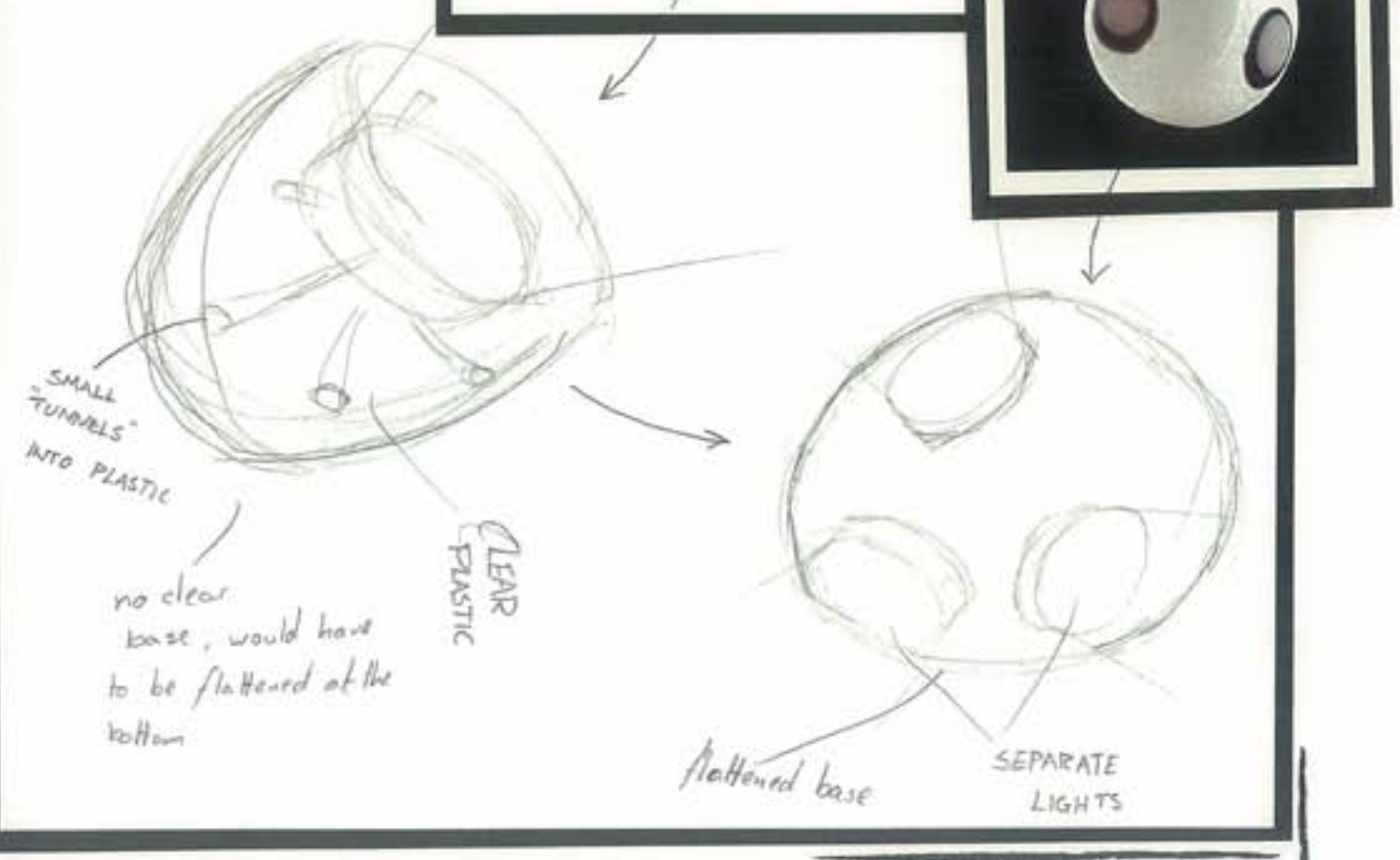
Possible materials for mushroom

- Aluminium, soled with an attractive finish, but it would conduct the heat and could get very hot
- Plastic, such as polyethylene by I feel it would have a tacky finish and there is the hazard that it could melt

Mushroom Design

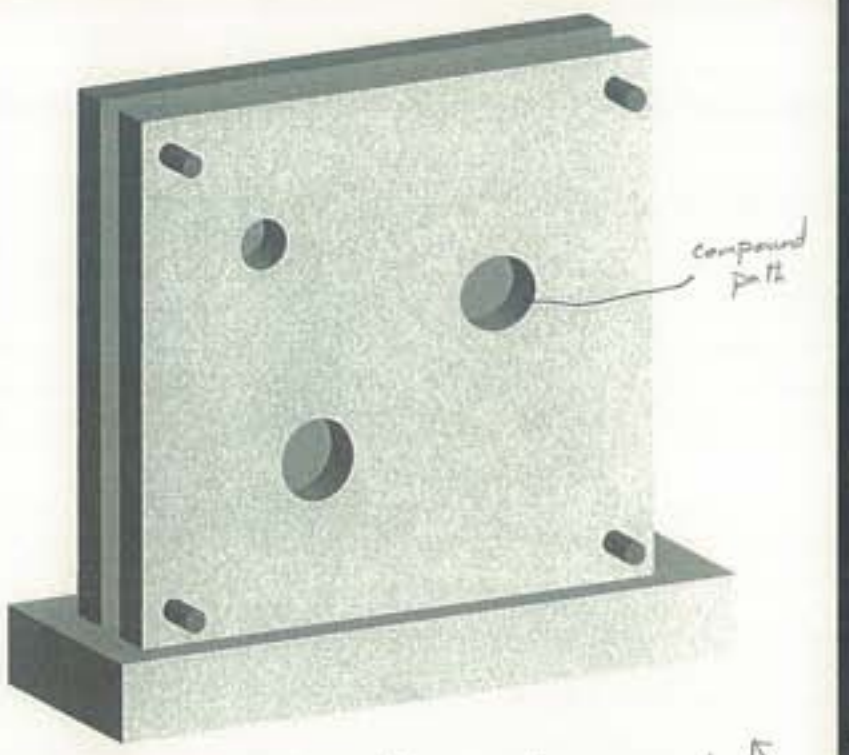
The mushroom design based around a mushroom is more of a table lamp where the touchlight is reflected off the top of the mushroom

These 2 images influn the two designes below, which are more aesthetically pleasing than my

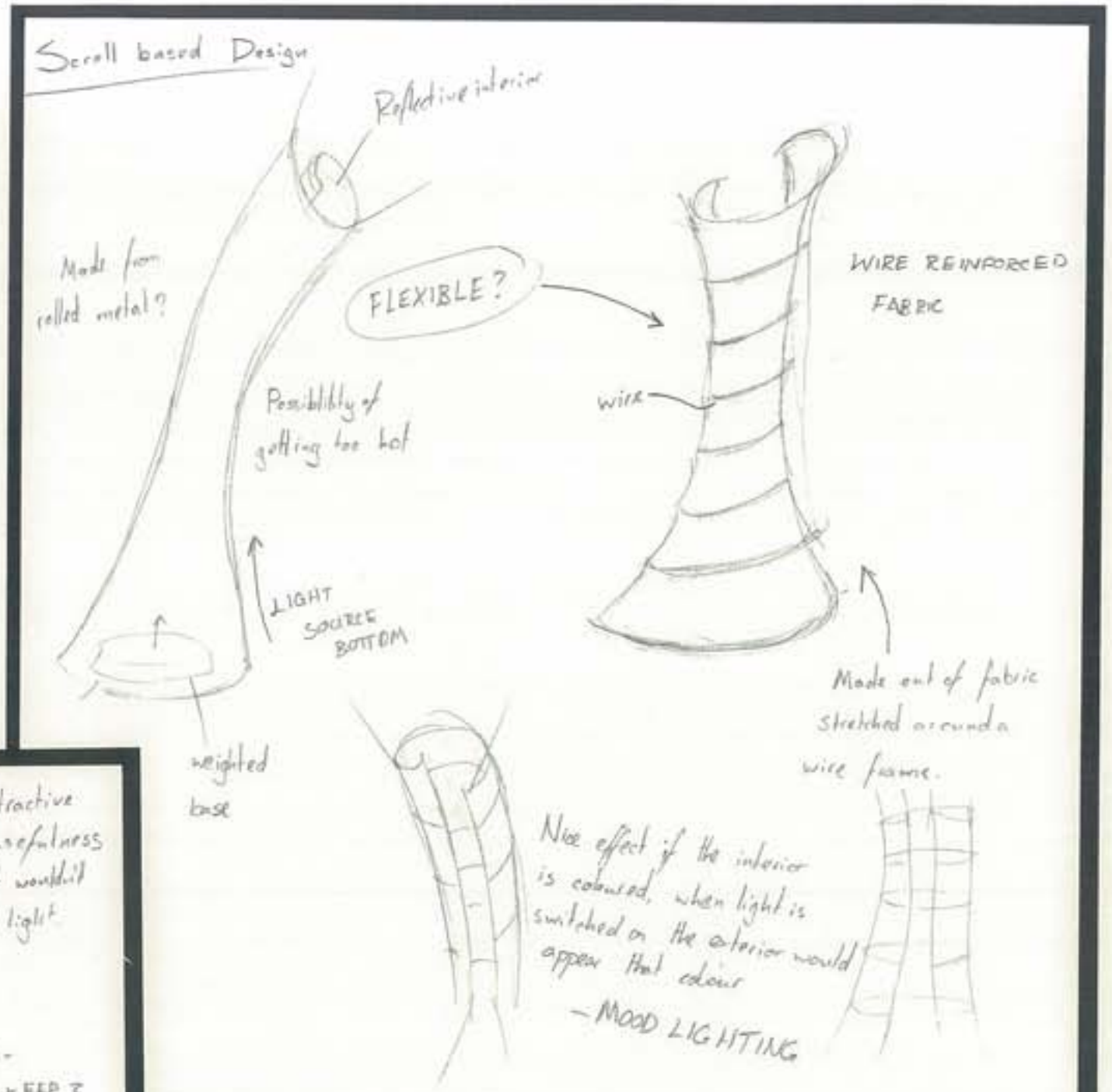


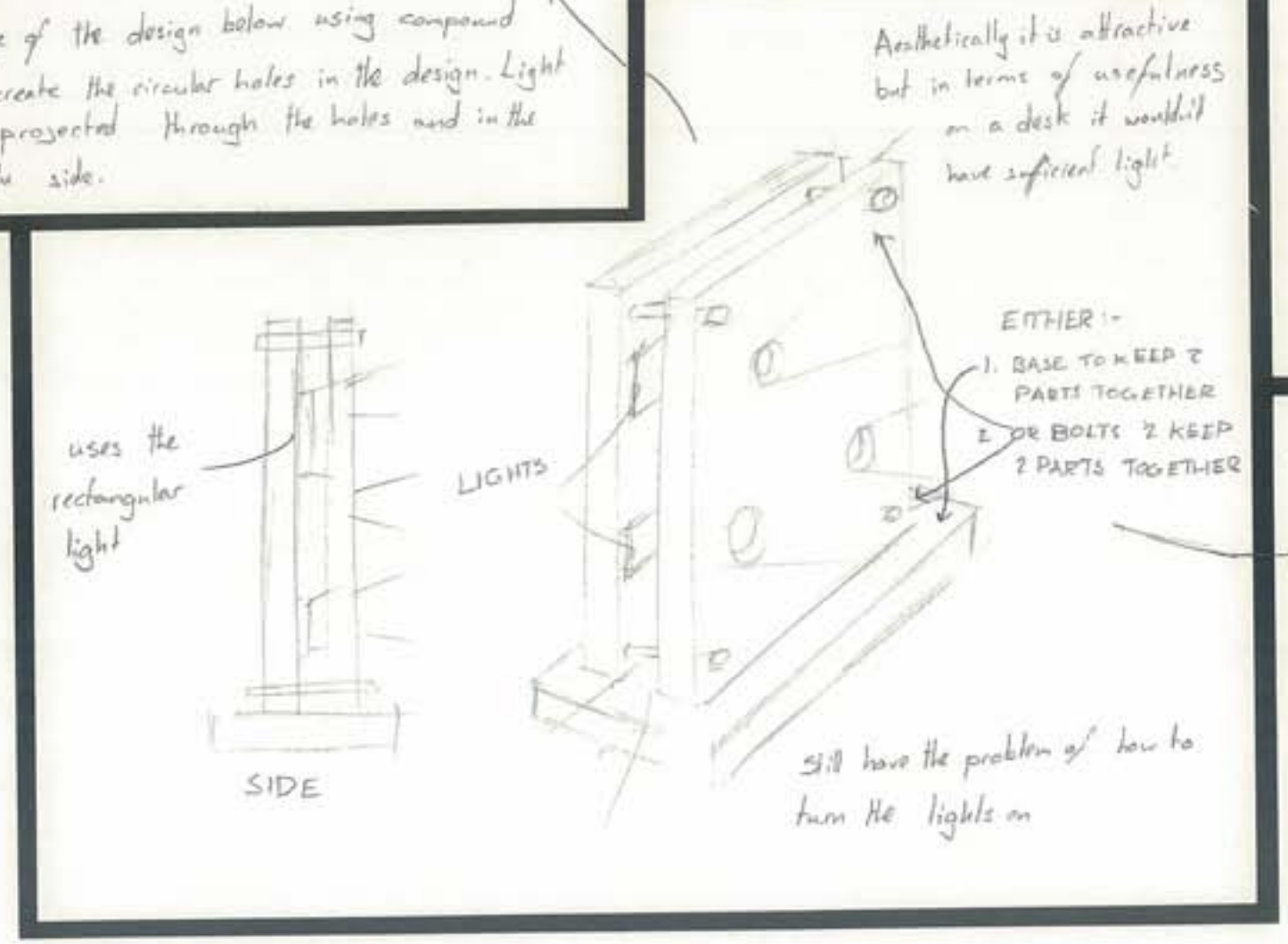
Lighting

Intital Designs



3D image of the design below using compound parts to create the circular holes in the design. Light would be projected through the holes and in the gaps in the side.





Materials

- Acrylic, the light would light up the edges of the acrylic,
- Metal would reflect the light well out the sides and holes

light target isn't useful
(where the light, lights up, is not useful)

SIMILAR TO A SCROLL

material look reinforced material?

how to turn on?

WEIGHTED BOTTOM

Light comes out both ends? Need two lights

could be made adjustable

MIRROR

gap runs the length of the product

Bent metal or injection molded plastic

How to turn light on?

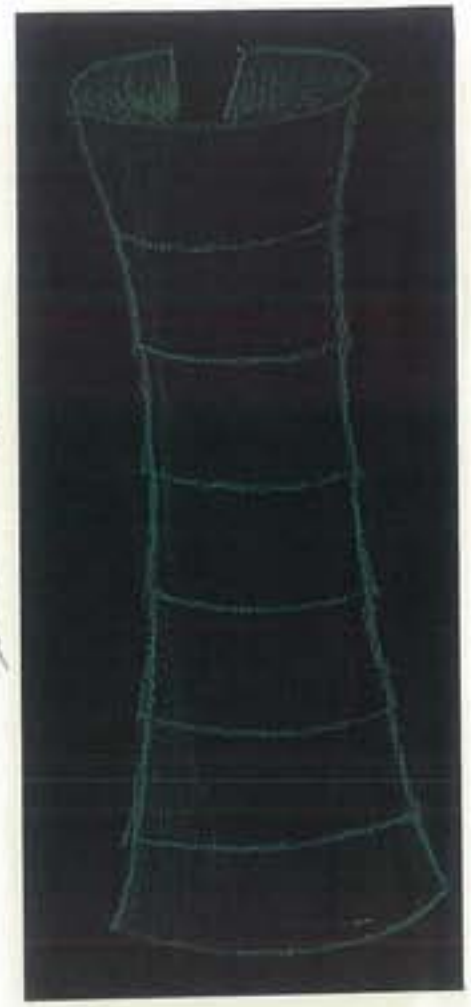
Light at the bottom

Material would let the colour of the interior shine through the exterior

ADJUSTABLE OPTION

Metal or material

Overlapping flexible material/plates of metal bend with wire supports on inside



IDEAS

BENDS CLOSE SO LIGHT IS CONCENTRATED ON COMING OUT THE TOP

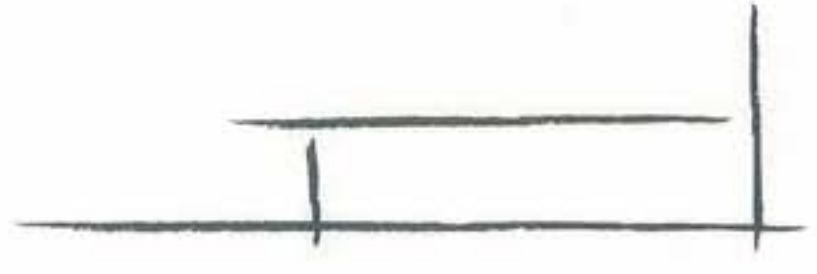
MIRROR CAN CLOSE TOP

Hinge

The alternative is to have the main body fixed and slide a plate in/out of the light. The shape could be curved to cut off the bottom first and up to the top.

If the light needs to be adjustable

However there aren't any materials that I know of that could repeatedly "bend" as I want it. So it could possibly work with a hinge at the back instead. This also raises the issue of how to turn the light on.



The mirror head would be sat on here

Body shape

This is my favourite body shape that I will use for the product

would let little light through and adds to aesthetic quality

Design off black card

different designs

TOO GRAPH LIKE

illustrator render with the mirror head in place

inner surface would be very reflective

I have kept the exterior colour neutral to fit the desktop environment the interior colour keeps the product from appearing dull

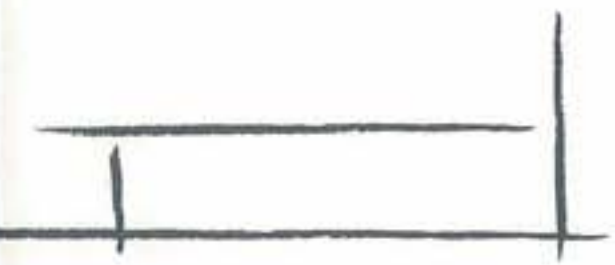
Different interior colours

Sliding back/front panel

This "sliding back plate is the design I would use in the final proposal

Platform which the light would stand fixed to the

The gap in the design was influence by this lamp shade from "Grito".



Lighting

Intital Designs

Here are some ideas for joints that would make the mirror head adjustable.

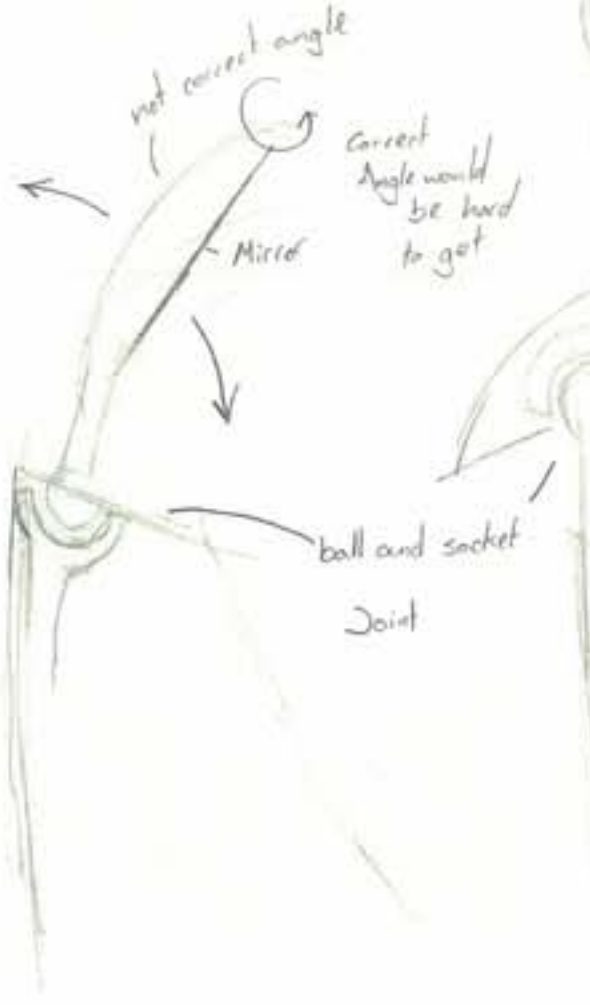
Screw and washer Joint

simple joint, but limited in movement and not very original

Pin Joint

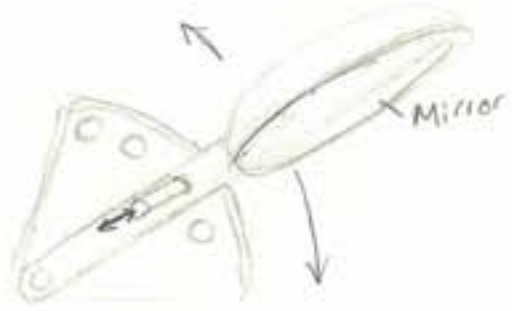
Another simple Joint with two directional movement

alot of possible movement



Alot of possible movement, but not very aesthetically pleasing

Limited movement but a unique feature that could be made a feature of the light



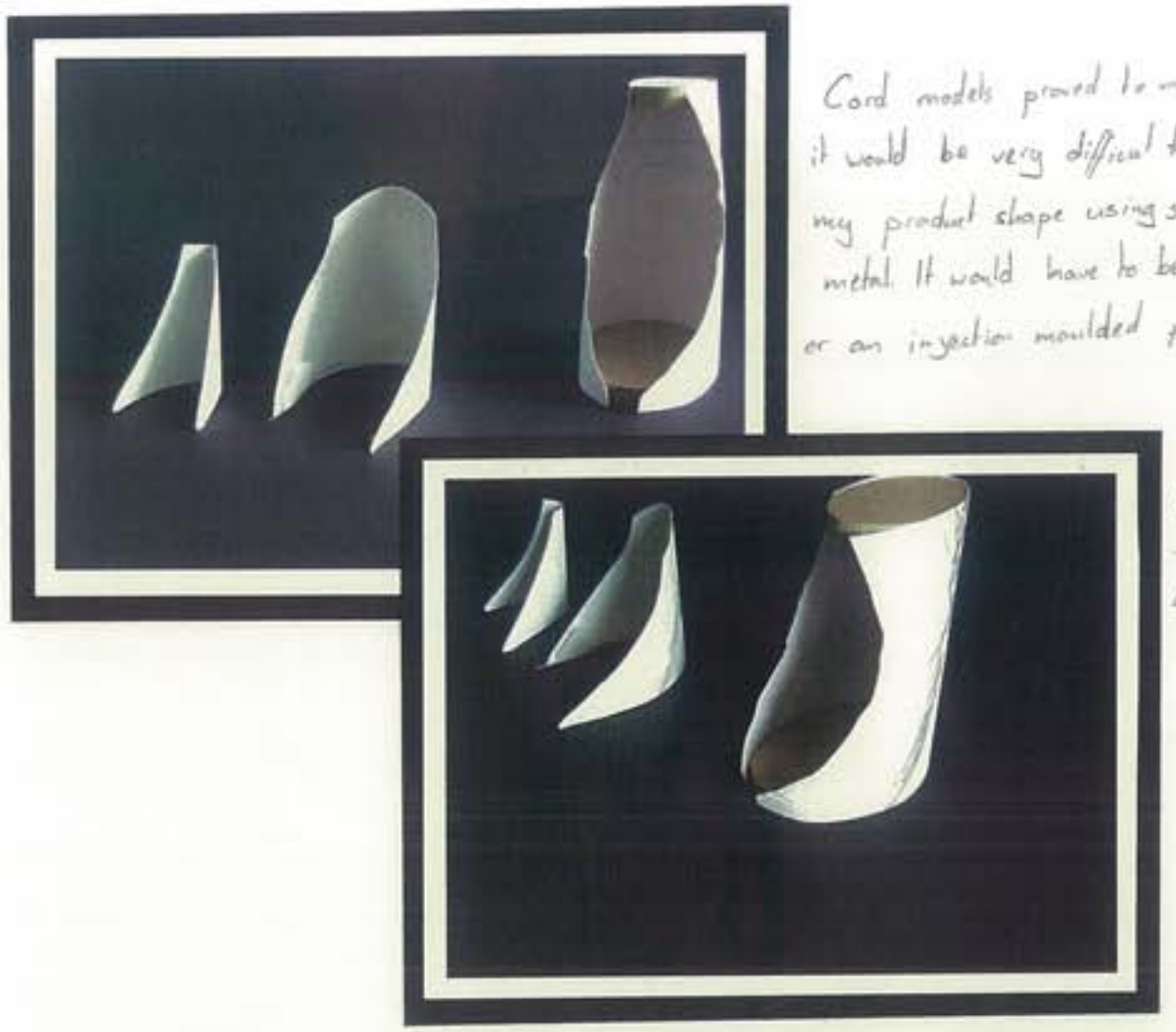
the "Pin" that holds the mirror in place could be pulled out and left, attached to the main body via chain?

Lighting

Part	Material possibilities
Main Body (fixed Shape)	Metal—such as Aluminium, titanium, stainless steel, mild sheet steel Plastic — such as polypropylene or polyethylene (UV stabilised) Wood— Birch Plywood, Flexi-ply
Back slide	Plastic— polyethylene Metal— Aluminium, mild sheet steel Mirror Acrylic— this can be bent to be fixed to the front of the slide to reflect the light
Mirror Head	Mirror— Glass Mirror Plastic—polypropylene or polyethylene Metal— Aluminium

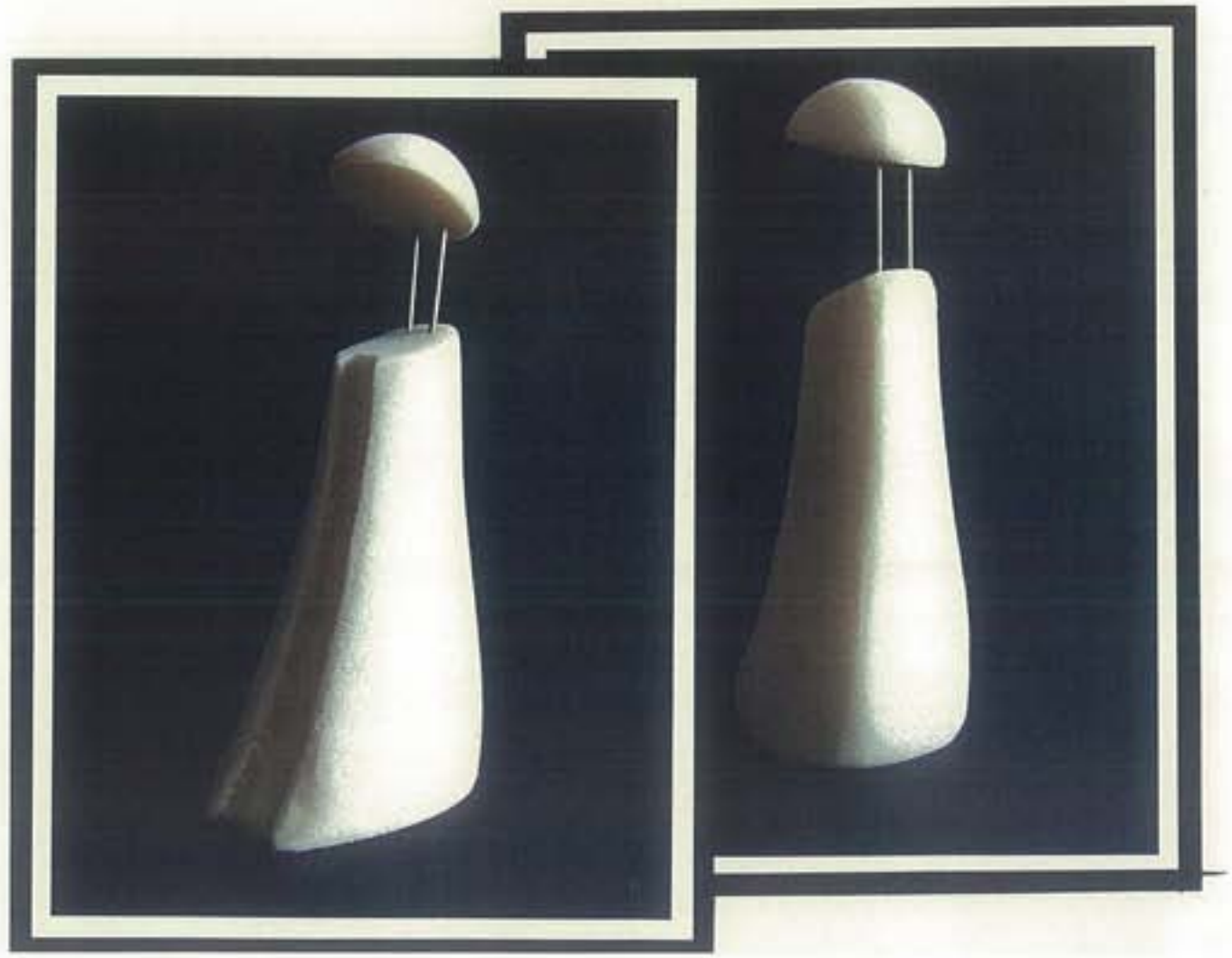
Plastic	Metal
• Variety of colour • Flexible • More mouldable • Injection moulded	• Has to be coated for colour • Strong, longer lasting • (Needs to be thicker, in order to Die cast the product) • Or it could be press cut, annealed and rolled into shape

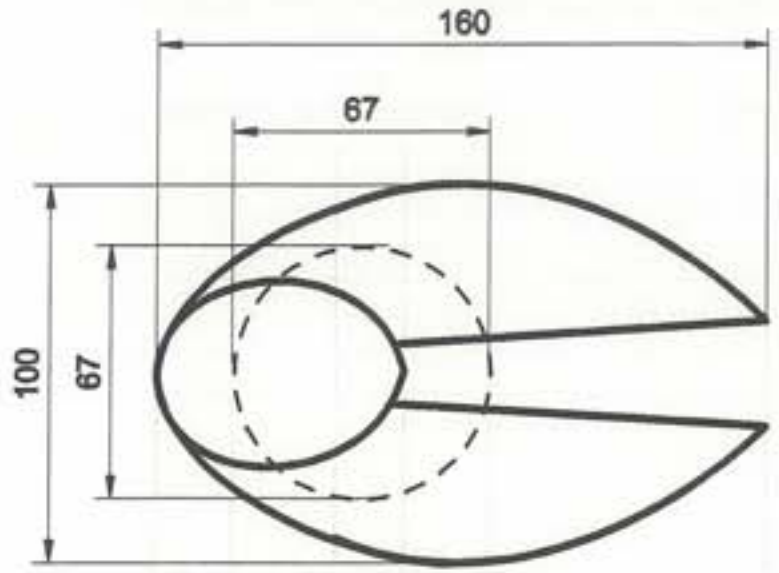
Card models proved to me that it would be very difficult to achieve my product shape using sheet metal. It would have to be die-cast or an injection moulded plastic

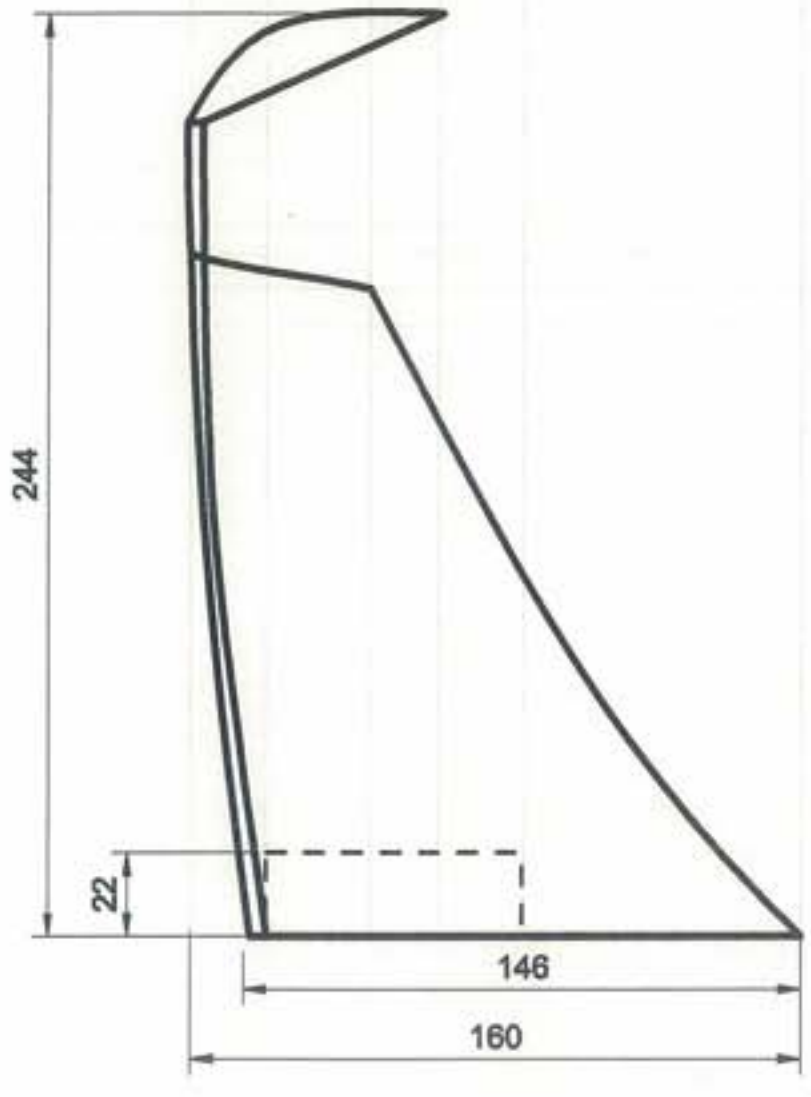


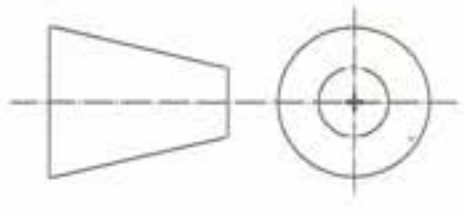
Card, like sheet metal can achieve the offset curve

I managed to form a 3D model of the basic shape using Styrofoam and 2 small brass rods to hold the mirror head up.







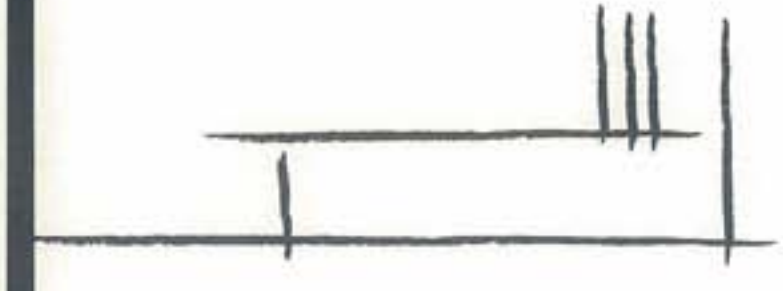


Final Materials decisions

I think the main body will be made from ~~vacuum formed~~ injection molded plastic (polyethylene), due to the fact the shape is made up of two curves. Sheet metal couldn't be bent into this shape easily and would end up being too stressed as a material. It could also be die-cast, but this limits the types of metal that can be used, and would not achieve the same "sheet" effect. Wood for the same reason cant be used as it curves in more than one direction. The plastic used would then be U.V stabilised before being coated in two differing colours inside and out.

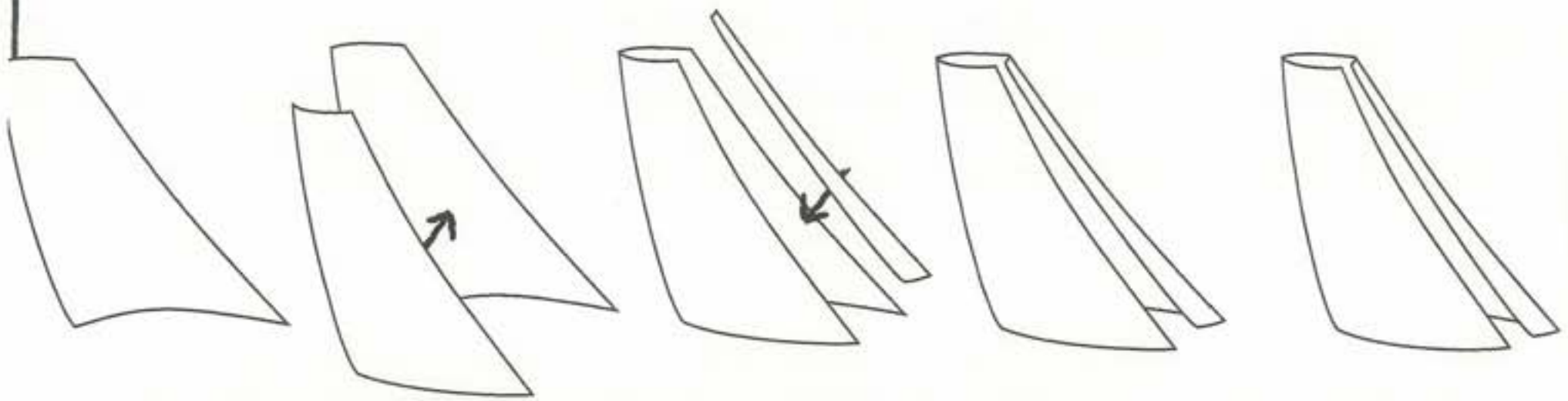
In terms of the back slide, again plastic (polyethylene) would be used as metal would off balance the product. A mirror acrylic could be bent and fixed to the front of the slide to increase the amount of light reflecting towards the Mirror head.

As for the mirror head, plastic would be used again, as again metal would upset the balance of the product. Glass mirror would be used for the actual mirror.

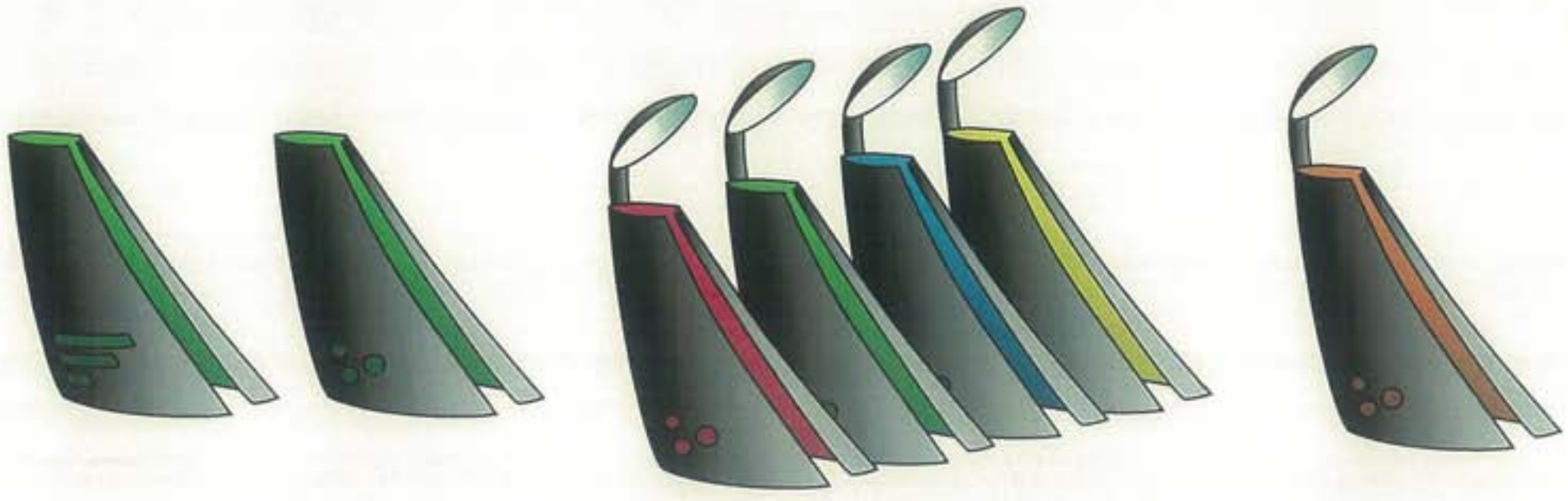


Lighting

Intital Designs



The CAD model is made up of three 2 dimensional shapes, made using the pen tool before editing the anchor points to decide on the correct curve. After positioning the shapes correctly I then refined the shape to look more 3D and to made sure the curve looked complete. Then the circles were added to the side and made a "compound path" (basicially it cuts that shape into the layer/shape behind). The Mirror below was also made using the same process. Colour was later added.



Product design - Lighting

Evaluation

Below is the evaluation of the lighting design, compared to the original specifications

Specifications

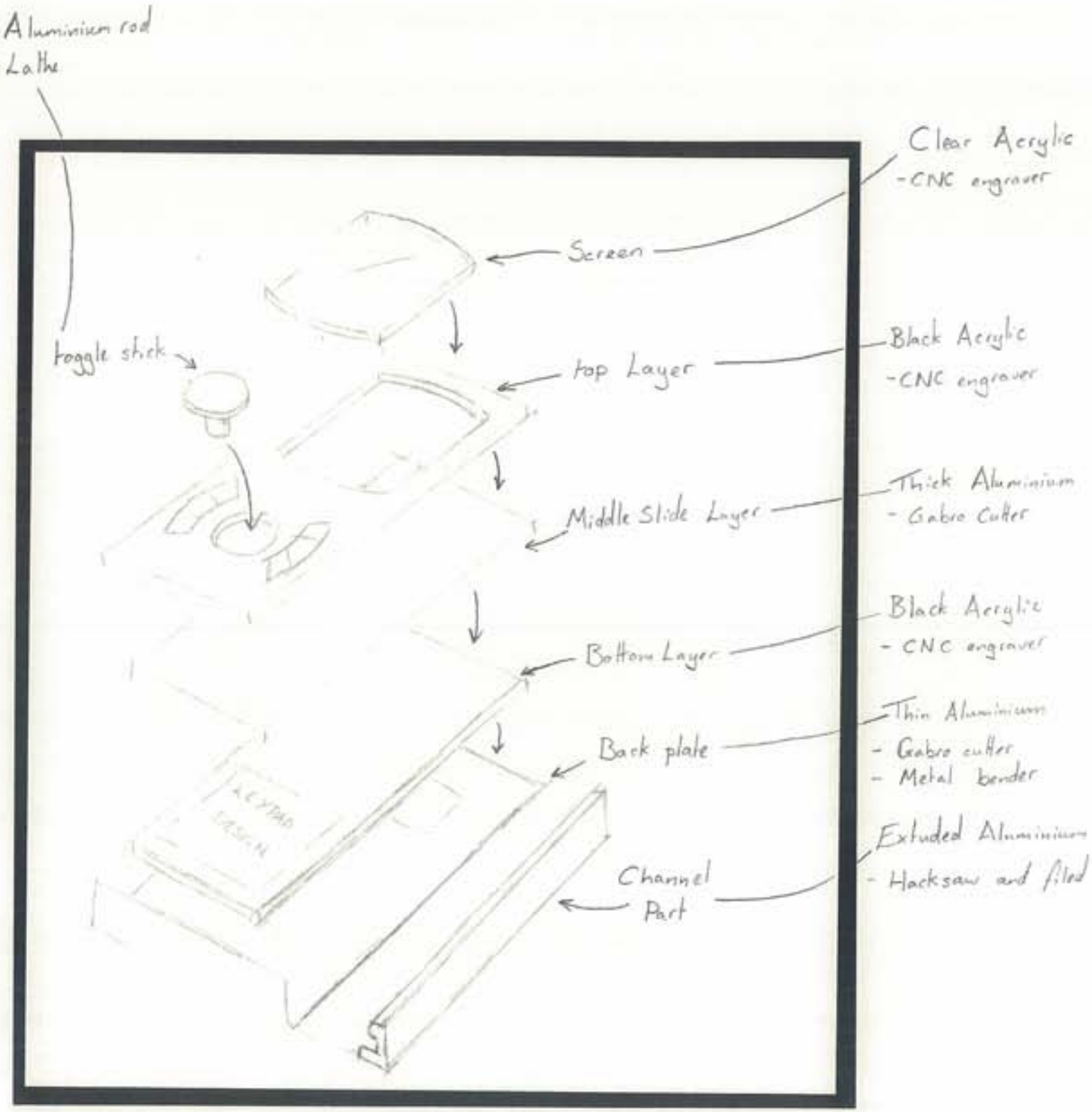
I will be designing a desktop lamp for office use with target audience being adults who working in office environments. So with this in mind the design will need to be small enough to fit on a desk, but have a large enough impact on lighting the desk area. It also must aesthetically modern to compete with other desktop lights in that market. Bearing all of this in mind, the lamp must be designed to be manufactured through mass production and so shouldn't be too complex

Specification Point	Mark out of 10	Comments/Improvements
The Light needs to be free standing	10/10	As the light is on the base of the lamp, it is completely freestanding and is unlikely to topple over (which would be a problem with the lamp shape) as the weight of the lamp is at the base. The only problem would be if the light isn't reflected enough to have an effect on lighting up the target area. In this case the light would have to be moved to the top of the design (effectively where the mirror head is) which could cause a problem in standing since the weight is now at the top.
It needs to be adjustable (optional)	7/10	There are several designs suggested in the design stages that could make the lamp adjustable, the final proposal uses a back sliding plate suggested on page 18, and the mirror head is adjustable also.
It holds one or more of the 2 suggested DOT-IT units	10/10	The product would successfully hold the circular DOT-IT unit and as the designs shows, it would hold only one of the units. The unit would be attached to a platform on the back slide of the lamp, enabling it to slide up and down the frame of the lamp. This movement would be limited though, by the fact the lamp narrows as it gets higher.
It needs to be modern/stylish	7/10	I think the design is modern and stylish to an extent. Limited by the fact it will be mass produced means that a complex design isn't economically viable, but the simplistic design seems to work, appearing both modern and stylish.
The user must be easily able to "press" the light on and off	6/10	This is one of the areas where the design is slightly flawed. The gap running the length of the design might not be wide enough for a user to press the light on. But this can be overcome as the back slide could be pulled up and the light pressed on through the top. This however could be rather tricky and should be looked at in the prototype
The light should be original and innovative	8/10	The design is original, but its features have been influenced by other products (see research). However in terms of the lamp market it is a unique design that would stand out amongst other lights in the range
The materials of the light should be appropriate to the manufacture	9/10	Although the design limits the materials that can be used (since the lamp body, for example, is made up of 2 curves) the materials in the product are commonly used in manufacture and readily available.
The Light should be made appropriate for batch/mass production	8/10	The injection moulding process that would be used to produce the main parts of the lamp is quick and cheap once set up. It is also commonly used in the industry and mass production. Also although the design seems complex, there are only 3 parts to it—the main body, the mirror head, and the back slide.

Product Manufacture

- "Mobile Model"
- "Dimensional Drawings" — Section G - Production Plan
- "Production Plan"
- "Hazard Assessment"
- "Material Analysis" — Section H - Making
- " Manufacture"
- "Box Nets"
- "Testing" — Section I - Testing
- "Final Product"

Mobile Model



Product Manufacture

In Product Manufacture I will produce a final piece, going through all the manufacture processes, some of which would be used in the mass production of the product. These processes can be sectioned into the following

Section G— Production Plan
To cover this section I will produce a detailed production plan, including time scales and deadlines

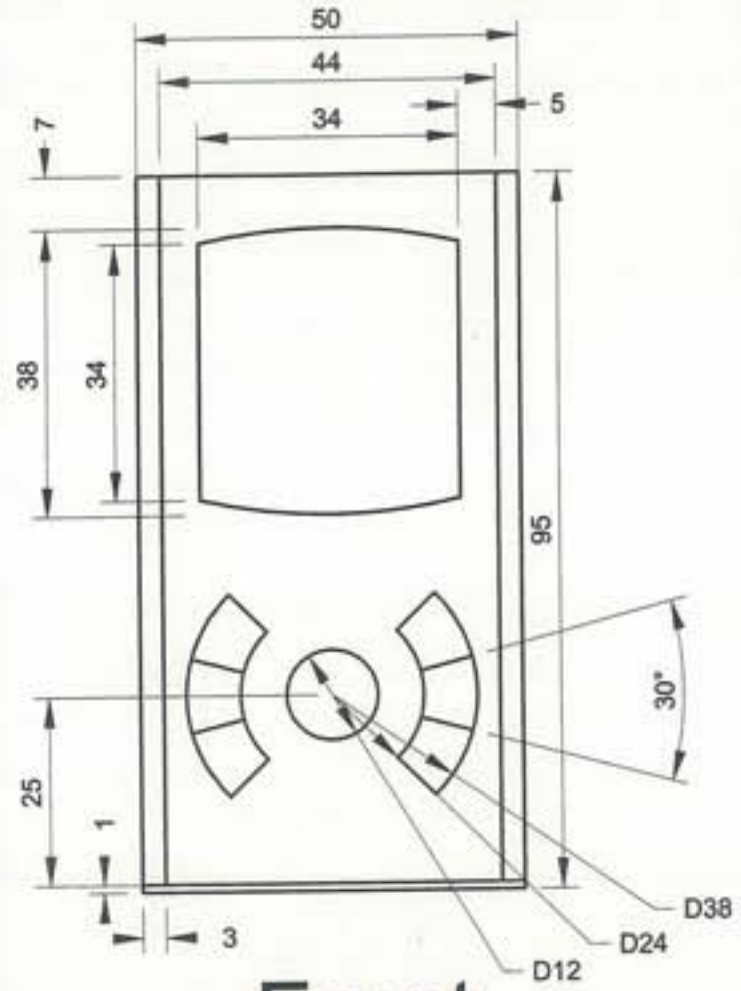
Section H— Making
I will produce a final product using a variety of manufacturing processes and methods.

Section I— Testing
This final section tests my products, using quality control checks that could have been used in the wide scale manufacture of the product

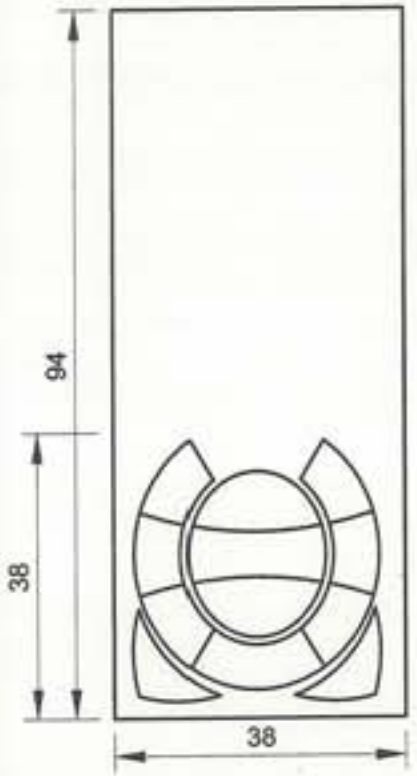
For the next part of the course I have been given a design for a model of a phone which I will have to produce using a variety of manufacturing processes with a variety of materials. I will then have to design and produce packaging for the model

Phone Model

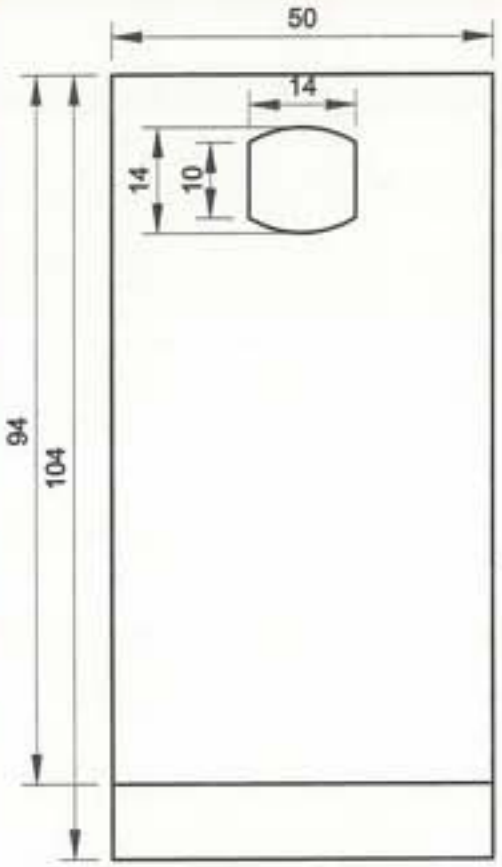
Dimensional Drawings



Front
Acrylic

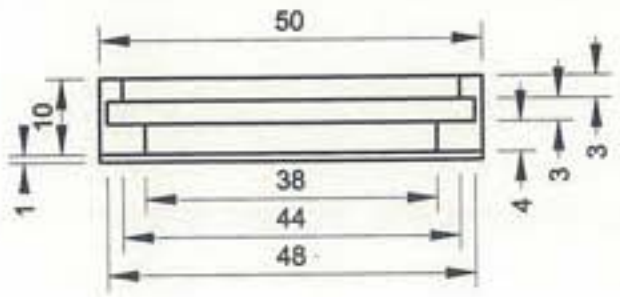


Number Pad
Acrylic



Back
Aluminium

This shows the dimensional drawings for the model phone, ideally during manufacture. I will produce the phone to these measurements. The dimensions were drawn on a program called 2D design tools which is compatible with the CNC engraver

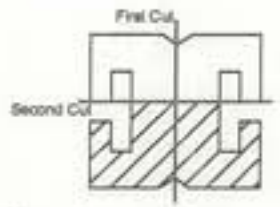


Plan view

Phone Model

Production Plan

Channel Part
Back Plate
Back Layer
Top Layer
Middle Slide Layer
Toggle Switch
Screen



The filing of the Channels took longer than expected

Channel Part *(Extruded Aluminium)*

- Measure and cut out two, 93mm of 10mm extruded Aluminium using hack saw
- Check Measurements
- File the cuts just made level using the two files
- Check Measurements
- Cut the channel horizontally into 2 equal pieces
- Then before filing, cut the channel again across the top
- Check Measurements
- Clamp the two parts of the channel together and file level all cuts made since.
- Check Measurements and for scratches
- Using wet and dry, sand the cuts level and smooth

Back Plate *(Thin Aluminium)*

- Measure and cut out 50x104mm of 1mm Aluminium using metal cutter (gabro)
- Check Measurements
- Stick a template of the camera to the metal
- Then drill 4 holes in the 4 corners of the camera
- Make sure the holes are not on the line of the camera
- Thread an abra file or piercing file through the hole and cut out the camera shape.
- Check Measurements
- To bend the back plate to 90 degrees prepare the metal by covering one side in soap.
- Quality control- We use the soap as it turns dark brown/black when the metal is fully annealed
- Then annealing it, by heating it up slowly and then quenching it and leaving it to cool
- Carefully using a metal bender, bend the metal to a near 90 degree angle.
- Make sure you don't go over 90 degrees
- Then to reach 90 degrees clamp the aluminium in folding tongs and carefully tap the metal into angle using a hide mallet
- Check the angle and continue to tap with mallet until at the correct angle

The first time the backplate was bent, it ended up with cracks along the bend

Back Layer number pad *(Acrylic)* + **Top Layer** *(Acrylic)*

- Measure and cut out a size of Acrylic large enough for both this part and the top Layer.
- Check Measurements
- Prepare CNC engraver(setting height etc), and the cut acrylic for engraving
- Check engraver height
- Using the CNC, engrave the number pad and top layer out of the Acrylic
- Check the engraving and measurements
- Make any filing changes that need to be made
- Check Measurements
- Using white acrylic paint, fill in the engraved areas, and remove the excess with a damp cloth
- Using the buffing wheel, you can add a slight curve to the buttons

This had to be engraved again as the acrylic was not fixed in place properly and spun out of the CNC

Middle Slide Layer *(Thick Aluminium)*

- Measure and cut out 50x93mm of 3mm Aluminium
- Check Measurements
- File the sides to the correct width and length in order to fit the model
- Check Measurements
- Wet and Dry the sides to smooth the filing
- Check Measurements
- Polish to finish off

Screen *(Clear Acrylic)*

- Measure and cut out a piece of clear acrylic large enough for the screen to fit
- Prepare CNC engraver(setting height etc), and the cut acrylic for engraving
- Check engraver height
- Using the CNC, engrave the screen
- Check the engraving and measurements
- Make any filing changes that need to be made
- Check Measurements

Toggle Switch *(Aluminium)*

- Measure a piece of Aluminium bar, and prepare the lathe
- Check the Lathe
- Face the piece of aluminium, so that the "top" is flat.
- Check the face is completely flat
- Change the angle on the tool post
- Continue to cut, by changing the angle and tool post until you get the shape wanted
- Make sure the aluminium doesn't get too hot, as it will snap
- When the shape wanted is achieved, use iron wool to "polish" it.

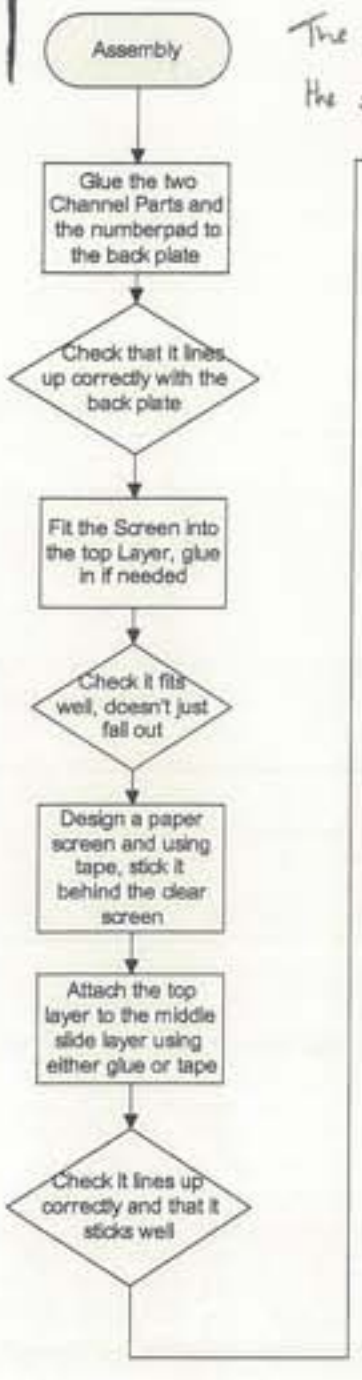
taking too much off on the lathe meant the toggle over heated and snapped

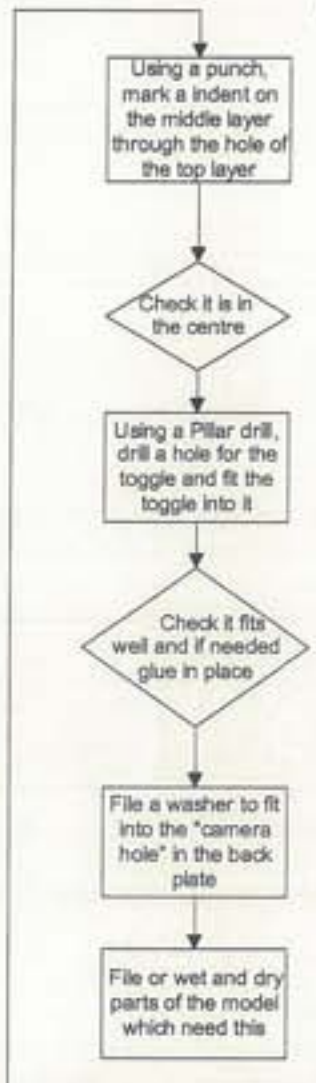
Phone Model

Production Plan | Gant Chart

Assembly

Below is the Gant chart, that forms the timeplan for the manufacture of phone model, and the Assembly plan corresponding to the manufacture plan above

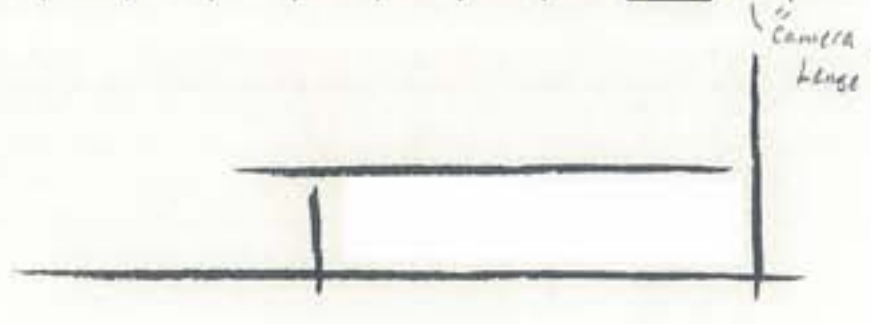




The gluing of the Channels took longer as the superglue first used was not as effective as first thought

Fitting the washer took longer as I tried using a piece of acrylic to act as a camera lense which worked well

	Time Spent on Manufacturing (in hours)																	
	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9
Extruded Channel																		
Cut out Channel																		
First Cut, filing and filing																		
Second Cut, filing and filing																		
Back Plate																		
Cut out back Plate (Gabro)																		
Drill, cut and file out camera																		
Anneal the back plate and bend it																		
Wet and Drying the back plate																		
Back Layer number pad																		
Design number pad (2D design)																		
Engrave the Number pad																		
Top Layer																		
Design Top Layer (2D design)																		
Engrave the top layer																		
Middle Slide Layer																		
Cut out slide layer (Gabro)																		
File to size and sand smooth																		
Screen																		
Design screen (2D design)																		
File to fit in top layer																		
Design paper Screen (Illustrator)																		
Toggle																		
Face off the Metal Bar using the Lathe																		
Cut out toggle design with Lathe																		
Polish and cut off Toggle																		
Assembly																		
Glue Channel parts and numberpad to Back plate																		
Fix in Screen (and paper design) to top layer																		
Attach top layer to middle slide layer																		
Mark and drill hole in middle slide																		
Fit in Toggle and glue																		
File a washer to fit as a "Camera",fit to back plate																		



Mobile Model

Hazard Assessment

In order to ensure safety during the manufacture of the model, I have assessed potential hazards and the risks possible. I have then written relevant precautionary control measures that will ensure safety while making.

Hazard	Risk	Control Measure
Buffing wheel	o If any clothing/hair/apron gets caught in the buffing wheel, it could rip it off the person/s o Extended use of the buffing wheel can cause the material to heat up, which can be very dangerous	o Tie up hair o Make sure all clothing is tied back/ out of harms way. o Wear safety goggles o Use a hand clamp, if buffing smaller objects, or if you are going to buff for a large period of time as this can heat up the material.
Belt sander	o If not held correctly the material could slip, causing the hands of the person holding in to be pulled into o Continual use of the belt sander causes material to get very hot	o Hold the material correctly (pushing forward with your thumbs and no your fingers). o Again wear safety goggles, to prevent dust going into your eyes o Refrain from using the sander constantly as this causes the material to heat up
Lathe	o If the chuck key is not removed, when turned on, this can fly out and could potentially hit another student, as well as the one using the machine o Like the buffer, there is the risk that loose clothing/hair can get caught up in the spinning part of the machine	o On the Lathe machine itself, there is a protective shield which, when up, means the lathe will not start. This measure means the shield has to be down in order to use the lathe o Make sure the metal within the chuck is secure, and also that the tool is secure as well. o Again, tie up hair and loose clothing to prevent this from getting wrapped in the lathe
Brazing torch	o The flame on the brazing torch is an obvious risk, a burn to the skin might occur through improper use of the torch or the tongs. o Likewise clothing will catch fire through careless use also	o Use the torch carefully and make sure the torch is always pointing away from yourself and other people and flammable objects. o After using, make sure the torch is hung up correctly with no chance it will fall. Using the tongs carefully quickly quench the material just heated.
Pillar drill	o If not held correctly or if not held in a vice, the drill can rip the material from your hands causing injury to them o There is also the risk of dust/small debris getting into your eyes	o Use a hand vice to prevent the material being ripped from your hands. o Make sure the drill guard is over the drill before drilling to protect your hands. o Wear safety goggles to protect your eyes
Craft Knife	o There is the risk that the craft knife could slip, and cut fingers or a hand o The segmented blade could also snap and cause injury	o Use a safety rule to protect fingers o And to make sure the safety rule has rubber strips on the bottom to prevent sliding o Make sure the knife is sharp (in a safe manner)

Regardless of what machine you are using, always make sure people are stood an appropriate distance away when using the machine, and that safety goggles are worn (exception of the craft knife).

Mobile Model

Material Analysis

In order to make the mobile model, I first need to consider the material I will make it from. The model needs to have a realistic finish, but not take a long time to make (since it is only a model, and in the industry several would need to be made before a final design is decided on).

Material	Advantages	Disadvantages
MDF	MDF, as a modelling material, is lightweight and soft. Therefore it is relatively easy to cut and shape, and so can be made quickly. It can be given a finish (this can be sprayed on) but this can be scratched away very easily also.	The problem with MDF is without a finish, it is hard to get an attractive finish, and therefore it is not a realistic end model. Also during the making, MDF gives off carcinogenic dust, which needs extraction system which is expensive to fit. As a material it is also easily torn.
Fibreboard	Fibreboard is also lightweight and very easy to shape and cut, therefore quickly made. It has the added bonus of being easily glued together, (to make 3D shapes), useful in modelling products.	But again the end result is not realistic, and it is very hard to get an attractive finish. And unlike MDF it isn't as durable.
Aluminium	Aluminium is also easy to cut and shape, just not as easy as the two above. However it already has an attractive finish which can be buffed and polished to create a realistic end model.	One of the few downsides to aluminium is the fact it is hard to achieve awkward shapes. And also is easily scratched.
Mild Steel	Mild steel is available in sheet form and readily available in large amounts. It is also inexpensive and so useful in making lots of models. Finishes can be easily applied to increase it's attractiveness .	But mild steel is not overly attractive anyway. And from a modelling perspective, is hard to cut and shape. It also needs to be coated to finish and protect from rusting
Wood	Depending on the type of wood, it can be relatively easy to shape and model. It can be hard wearing and durable. But this depends on the type of wood, as different wood have differing properties.	However it would not end with a realistic model, wood isn't commonly used in mobile phone production. There is also the disadvantage that wood can splinter, split or warp.
Acrylic	Acrylic is a easily-shaped modelling material which comes in a variety of colours, which saves on finishes that are needed for materials above. It is also lightweight, and can give a realistic model.	The only bad point about acrylic with respect to modelling is the fact it is easily scratched and very brittle.

After thinking about each material, Acrylic and Aluminium was decided on to use for the model. This is mainly as they are easily shaped with a realistic end product.

Photos of Manufacture

Aluminium Channel Part

- The photo shows the second cut made to the metal using a hacksaw
- the Channels were then filed smooth using a coarse file first followed by a cresent file

The back plate

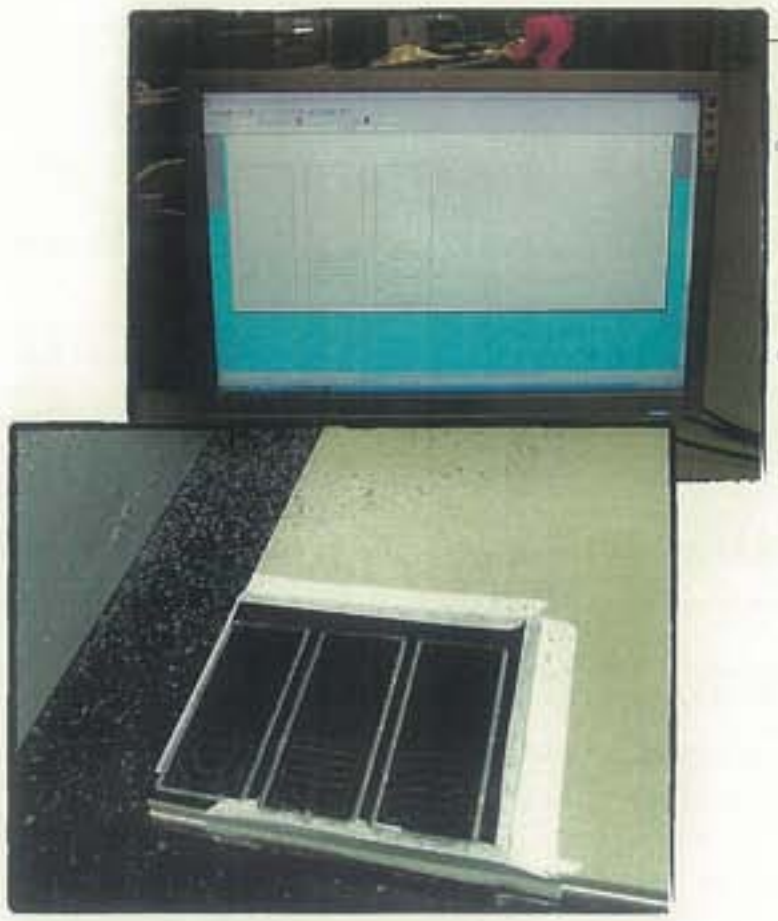
- A pillar drill is used to drill 4 holes
- An obrafile is then used to cut, joining the holes to create the basic camera shape
- The plate was cut using the Grabro cutter (shown above)
- This was also used in cutting the middle slide Layer

- small needle files are used to soften the shape of the "camera"

- A Blowtorch is then used to heat up the Aluminium before quenching it quickly, a process called annealing
- This means the metal could now be bent with more ease

Toggle Stick

- The photo above shows the Lathe, the piece of machinery used to make the toggle stick
- Slow gentle movements cause the Lathe tool to cut into the Aluminium rod which spins very fast.

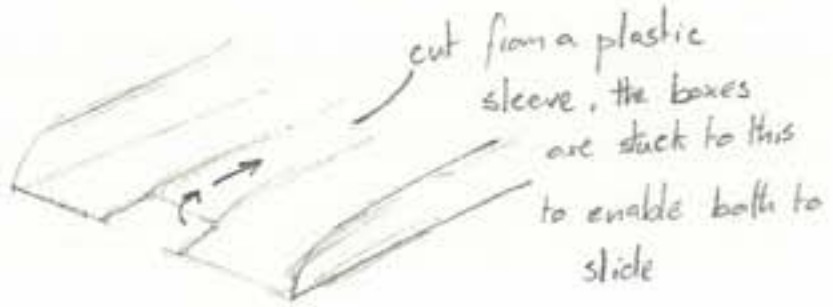


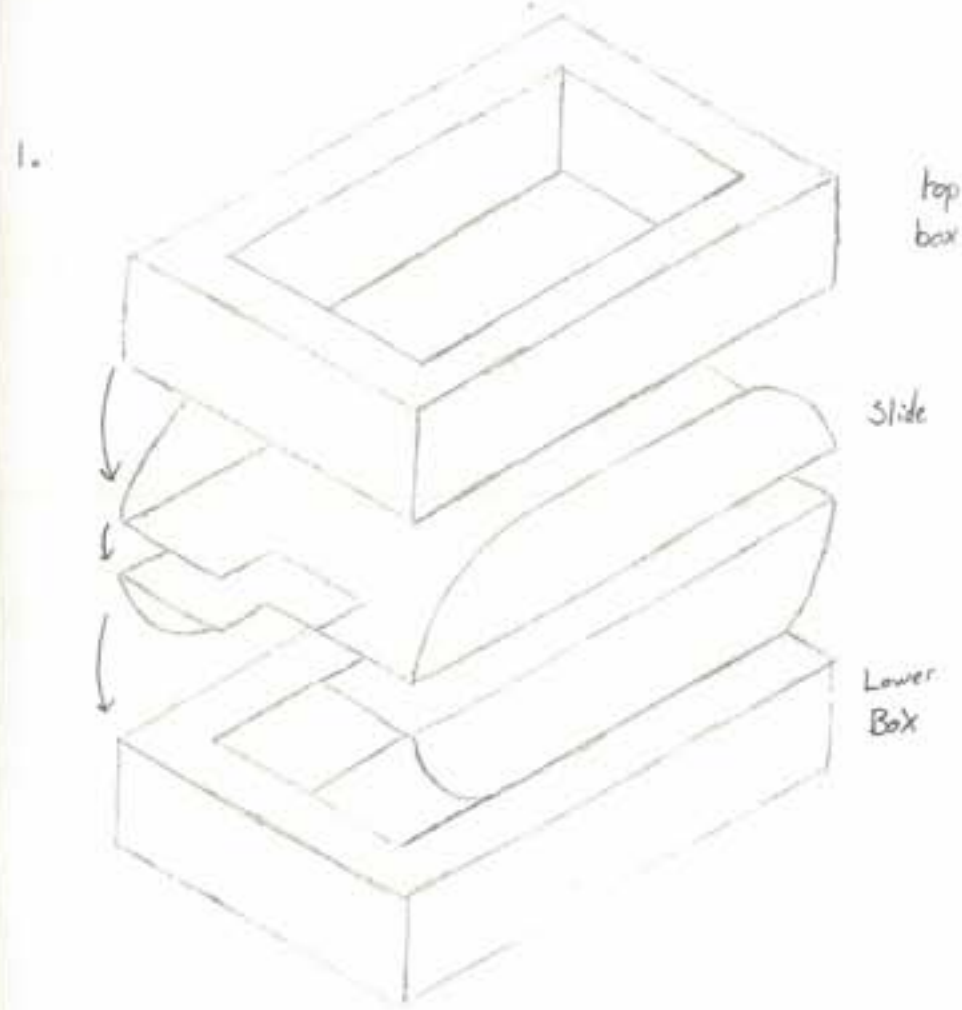
CAM

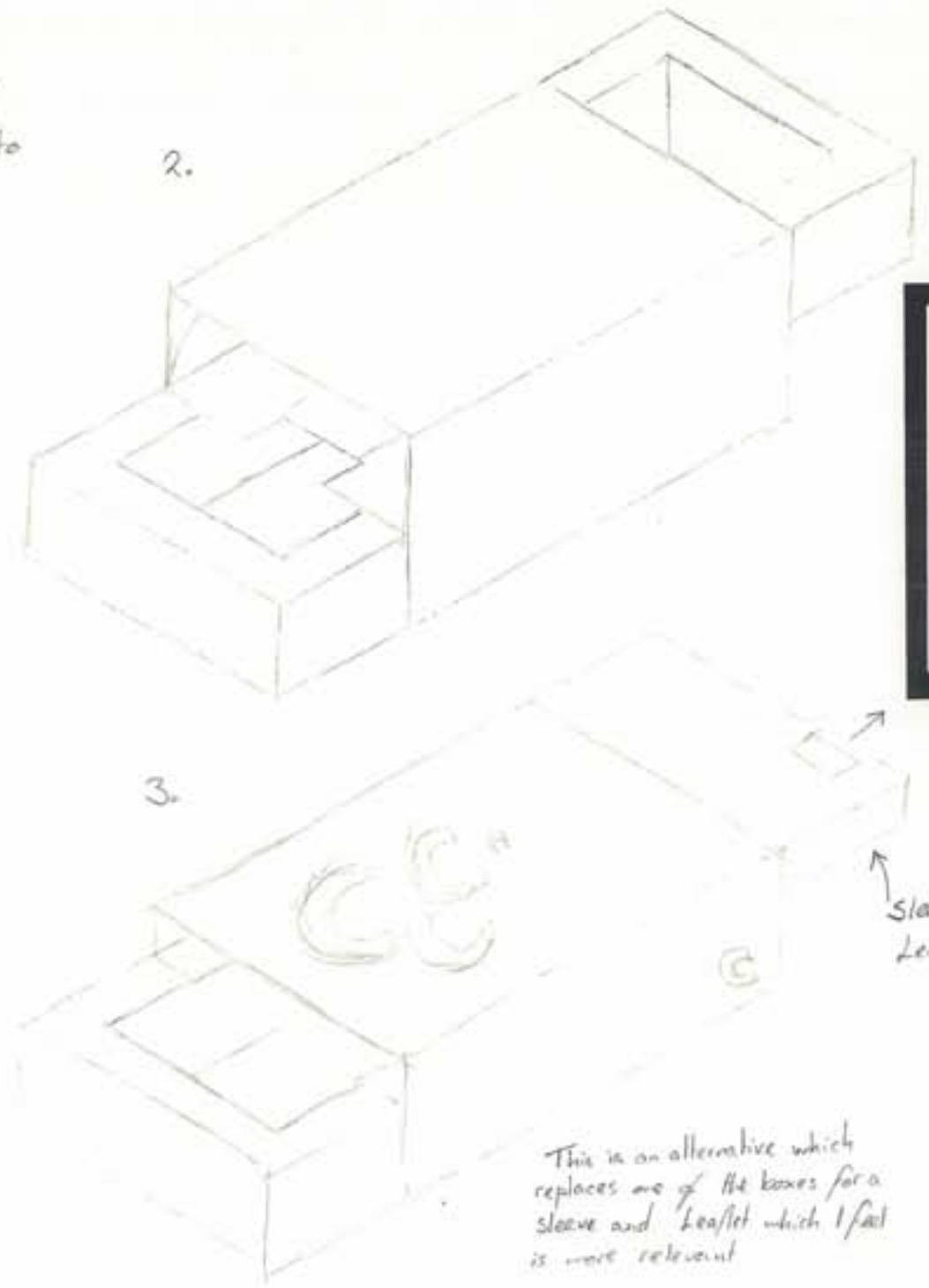
- Computer aided Manufacture
- The photo to the left shows 2D design tools, the program use to interact with the CNC engraver
- The height of the cutter and depth of cut needs to be specified before starting

- The Buffer was used to polish the acrylic and Aluminium after filing / wet and drying.
- In some cases white spirit was then used to clean the metal of dirty marks left from the buffer

Mobile Model







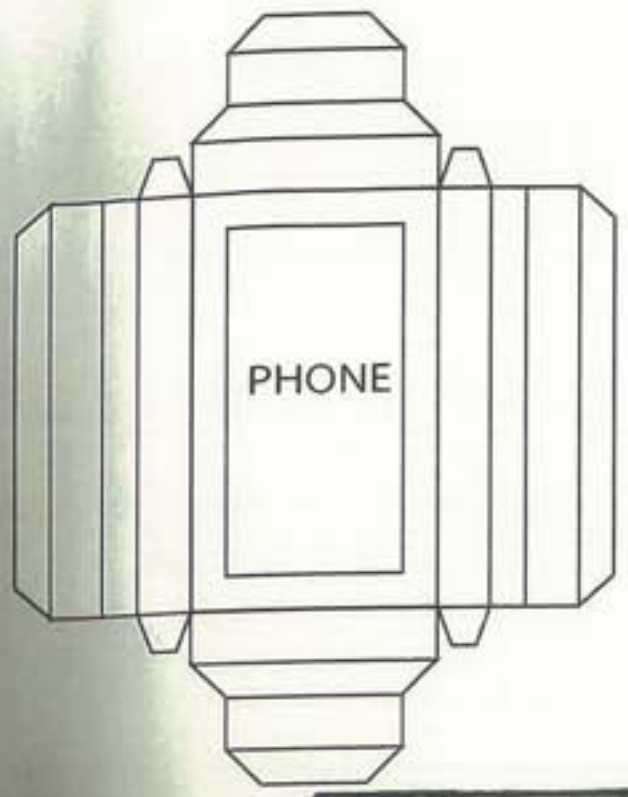
To the left are 3 isometric drawings for the model's packaging. 1. and 2. show a form of box called a Burgopak, where pulling one of the boxes out causes the other to slide out at the other end. 2. shows an exploded view of the inner workings of the packaging. 3. shows an adaptation of the Burgopak where one of the boxes has been replaced with a sleeve to hold a leaflet.

Phone Model

Box Nets

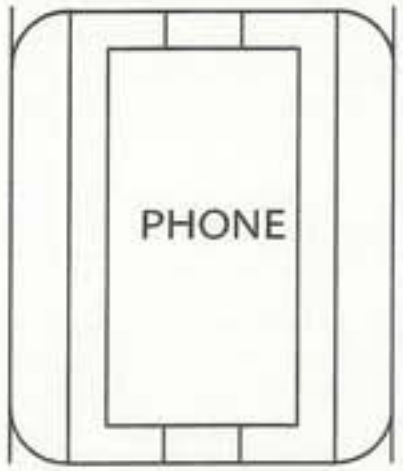
Below are the nets for the packageing (not to scale) and an example of the leaflet design used in the final packaging.

Box Net

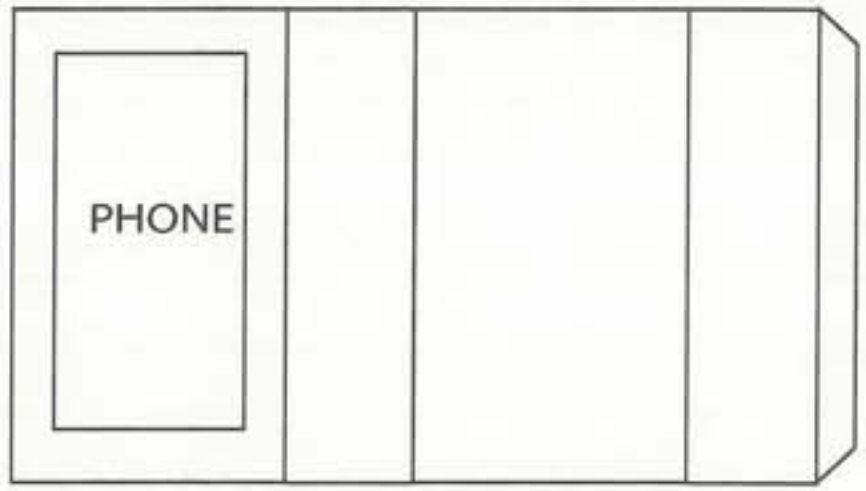


Slide Net

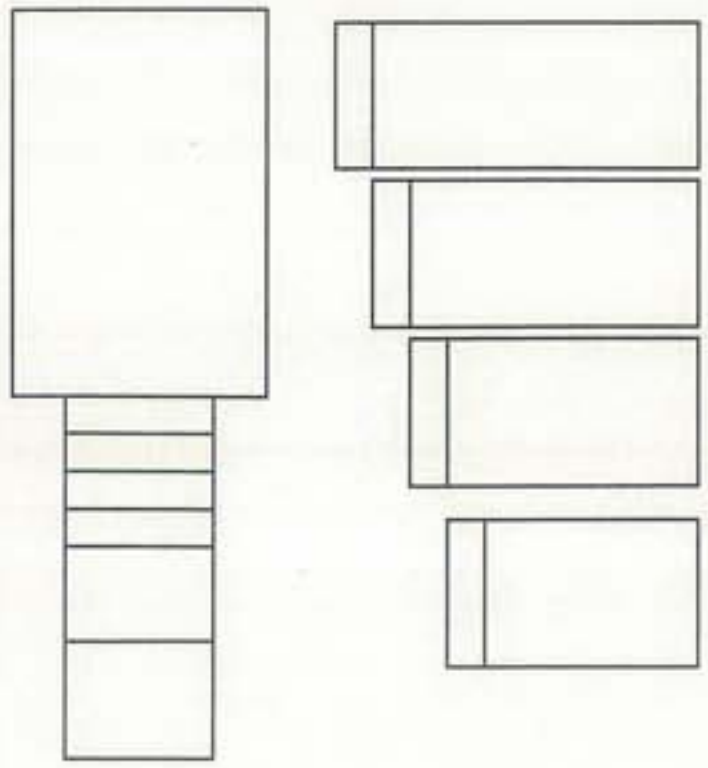
Slide Support



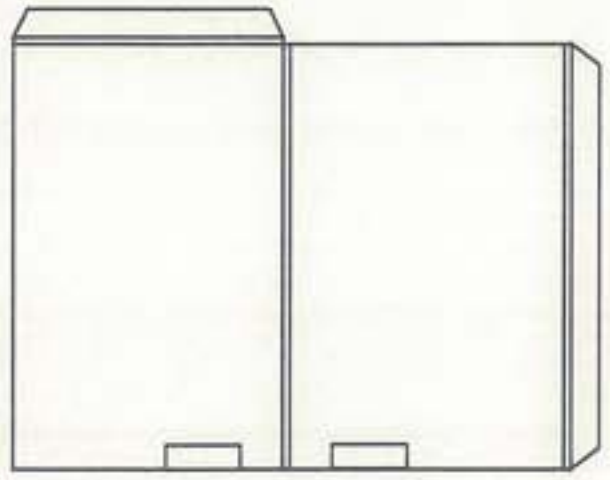
Sleeve Net



Leaflet



Leaflet Sleeve



NOTE
Vinyl was later applied to the packaging for increased aesthetic appeal

Phone Model

Testing

Testing is a process used to check a product is fit for use, and if it completes the design brief / specification. It is made up of a range of tests, much like quality control checks, to verify the performance and quality of the product. Below are the tests used with my phone model:-

Sliding mechanism

The sliding mechanism should slide cleanly without juddering . The two parts should fit snugly together without much movement side to side.

To test this, the phone will be slid open and closed, looking for any resistance or scratches caused.

Comparison with original dimensions

The product should keep close to its original dimensions, and to see how much the manufacture process effected the shape from the original product designs

To test this simply compare the dimensions of the finished product with the original product designs

Aesthetic features

The product should look stylish and modern, with unique features to catch the eye

This can be tested by a comparison to the original design and through comments made by a 3rd-party

Functionality

The product as a whole, should be clear and easy to use. Screen and toggle stick size should be appropriate.

The functionality can be tested again via 3rd – party feedback

3rd Party Testing

- **Sliding mechanism**
  1. Relatively smooth slide, could have some resistance to make the slide smoother
  2. The slide is smooth, but with little resistance it can slam back down. But there is no side to side wobble
- **Quality of finish**
  1. Clean, sheek finish, with a good shine on the camera lens
  2. Some minor marks and scratches on metal, and the plastic could be cleaned to better standard, but apart from that nothing else.
- **Ergonomic aspects**
  1. Good proportions, and pocket-sized. However sharp edges can cause some discomfort
  2. Bottom buttons are hard to reach, but the phone has correct overall proportions
- **Aesthetic features**
  1. Unique vinyl feature on back and base, and simple but effective keypad
  2. Good colour scheme, which is consistent, matched with a cool circular design. But the hard shape of the phone doesn't match the circular buttons
- **Functionality**
  1. Could be a problem with access to the 2 bottom keys, but otherwise very good
  2. The two bottom buttons could be a problem. But plenty of buttons, with a smallish screen
- **Packaging**
  1. Inventive leaflet design, accurate measurements and folding
  2. "Swish" box and leaflet design, but clear instruction needed on box to say how to open, possibly "overly complex?"

Quality of finish

The product should have a high quality finish, no sharp edges and little scratches.

This can be tested through comments made by a 3rd-party

Ergonomic aspects

The phone should fit comfortably in the hand and all buttons should be easy to press without clashing with the other buttons

To test this, the phone will be held and commented on (via a 3rd party) comfort and ease of use.

Packaging

The packaging should match the style of the phone and effectively house the product, making it safe from damage but still able to function properly

To test this the packaging will be analysed by third party and commented on by them

Phone Model

Final Product

Below are the photos of the Mobile Model and packaging

Finished Screen Design

The Booklet fits in a sleeve on the opposite side to the box where the phone goes in