ED3371 - Creative Pedagogy, CAD/CAM, Iterative Design, and Teenagers

Speaker: Rhys Evans

James Dyson Foundation Design and Technology Teacher of the Year 2012

Head of Technology, Ysgol Dinas Brân.

Class Summary

This class will focus on how students age 10 to 20 are taught to use Autodesk® digital design technologies to design and make creative products and working prototypes that address a variety of needs.

We will demonstrate methods for a creative design process and explain how metacognitive thinking skills have been applied in the classroom.

We will also discuss our methods and the results of action research carried out on a range of mixed-ability students across the age range.

Learning Objectives

At the end of this class, you will be able to:

- Describe a range of creative design strategies
- Follow a design-and-make process from concept to working prototype
- Apply a range of creativity strategies to extend student responses beyond predictable outcomes
- List the elements of a creative learning environment

“Creativity and Thinking for Success”

Common Themes

- The challenge of finding common themes in activities of the individual mind.
- We share a number of important common themes that we believe identify and help to define us as a Design & Technology Department:

  Creativity, Synthesis, Acquisition of Skill, ‘Designerly’ Thinking, AfL and Experiential Learning.
- Teaching how to take an abstract concept and make it ‘real’/concrete.

Individual Themes

- Without differences it would be a repetitive experience with everything quickly said.
- It is the differences that give the individual material areas their character.
- Personality colours preference.
- All staff and pupils are individuals and an individual mind defines it’s own routes.
- Developing the individual as a respectful and ethical citizen.

Developing learning, creativity and thinking to prepare our pupils to succeed in an accelerated age. To enable our pupils to find their passion for learning and what and who they want to be. To teach them how to be interdependent and live synergistically, to be creative, ethical and respectful of themselves and others.
To gain the necessary skills and discipline to succeed.

Rhys's Journey

Research based on the Keele database of schools showed that:

Up to 70% of secondary school pupils count the minutes to the end of lessons and 30 - 40% thought that school was boring and would rather not go to school at all.

(Barber, 1994)

"The greatest disincentives to achievement are low self-esteem and lack of motivation."

Sir Ken Robinson

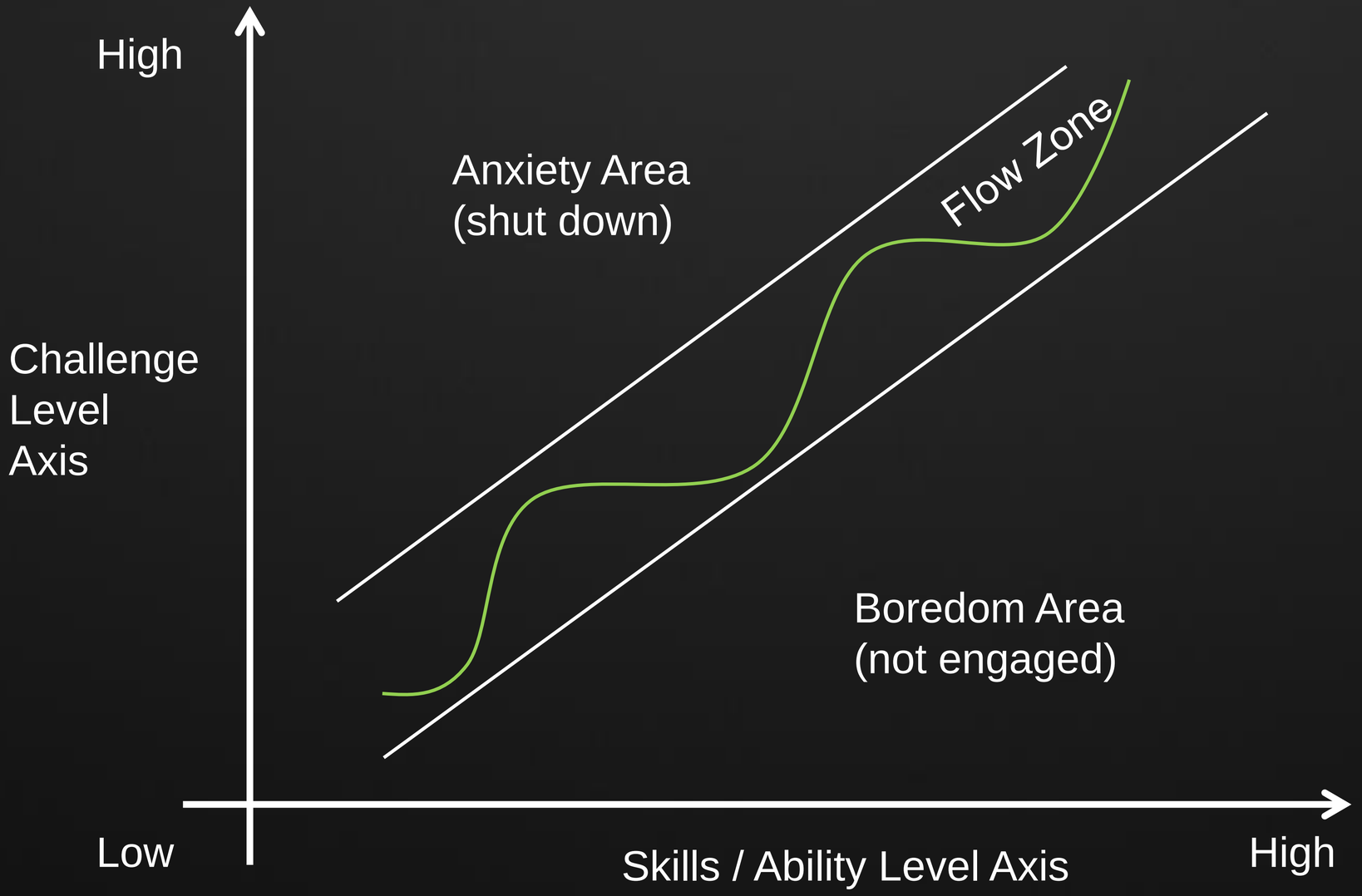
The Plan

- Why?
- What to do?
- Research
- Implementation
- Reflect

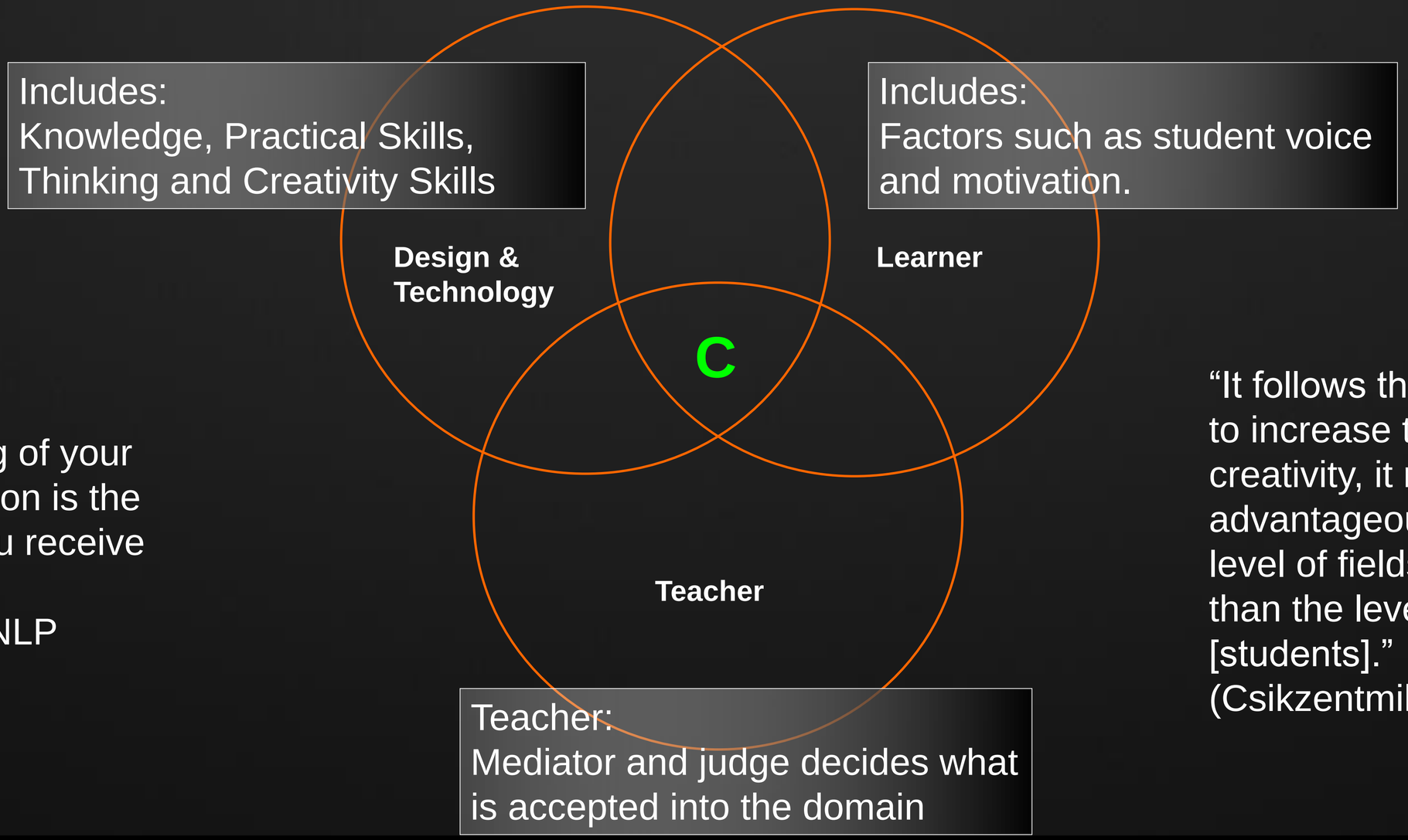
Optimal Experience

- Facing a challenge that requires a skill you possess
- Absorbing yourself in the activity
- Clear goals and feedback
- Concentration on the task in hand
- Transformation of time during the experience
- Experiencing the ‘flow’ state
- Activities that consume our attention are intrinsically rewarding.

Flow Theory (Dr. Mihly Csikszentmihalyi)



“Not a matter of what is creativity, but where is it?”
(Csikszentmihalyi)



The meaning of your communication is the response you receive

Principle of NLP

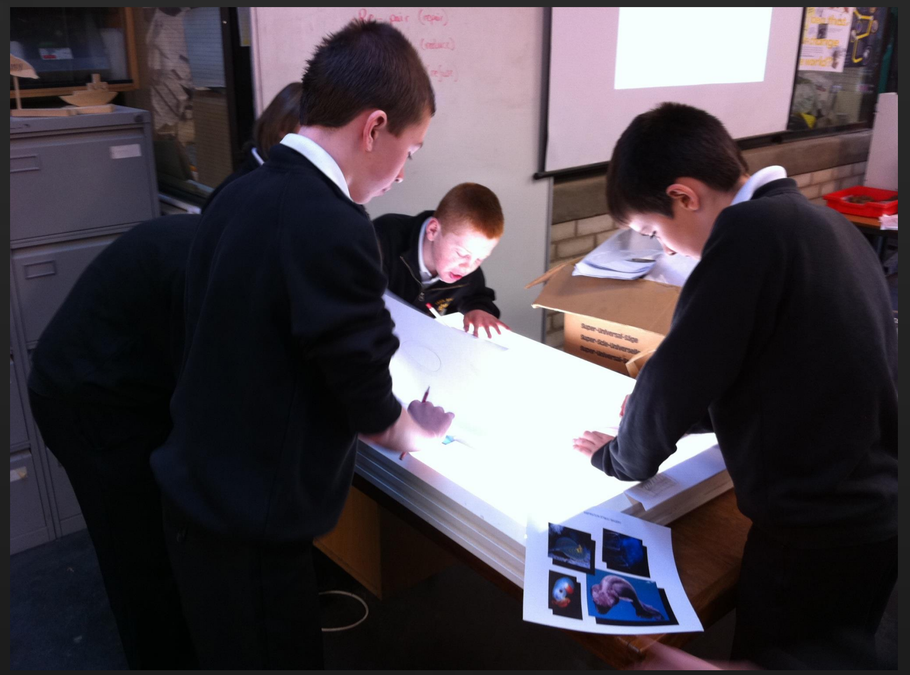
“It follows that if one wishes to increase the frequency of creativity, it may be more advantageous to work at the level of fields [teachers] than the level of individuals [students].”
(Csikzentmihalyi)

Action Research – Getting Started

- Base decisions on research principles
- Build on existing practice
- Share findings
- Don’t go it alone
- Involve students
- Keep it going

Establishing a professional learning community

Action Research – Keeping it Going



- Monitor
- Display
- Reference
- Use AfL
- Review strategies in action – consult all parties involved – especially the students (student voice)

DECIDE

Who are the members of the learning community?

What is your focus?

How and why have you chosen this focus?

What are the expected outcomes?

PLAN

What is your inquiry question?

What kind of support do you need?

IMPLIMENT

What did you do in the classroom?

What was the learners' contribution and response?

REVIEW

How did you share your research with others?

Partnership Working – Referenced to SDP.

What is your advice to other teachers?

Deciding a focus

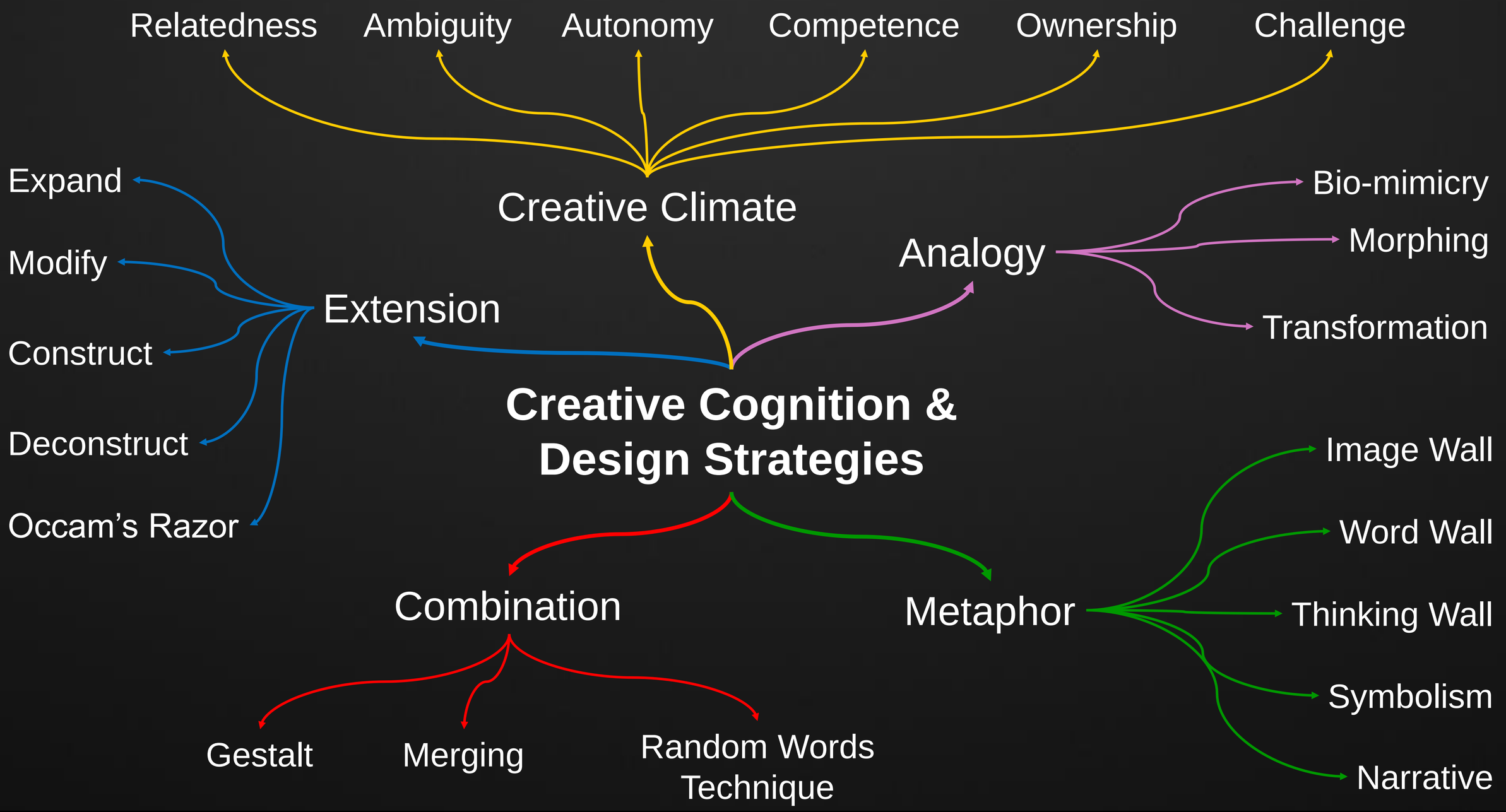
- Who are the members of the learning community?
- What is your focus?
- How and why have you chosen this focus?
- What are the expected outcomes?

Preparing and planning

- **What is your inquiry question?**
- **What kind of support do you need?**

Implementing and reviewing

- What did you do in the classroom?
- What was the learners' contribution and response?



WJEC DESIGN & TECHNOLOGY CONTROLLED ASSESSMENT TASK	CENTRE NUMBER	CANDIDATE NAME	CANDIDATE NUMBER	Date Page Started	Date Page Finished	Time Taken for Page	Total Time	PAGE
	68138	Christian Evans	05097	10/9/10	10/9/10	45 minutes	45	1

State the Initial Design Brief that you are going to solve.

ELECTRONICS/ELECTRICAL – PRODUCT DESIGN

Design / redesign a stylised electronic product that meets a particular need.
The product can be either an aesthetic prototype or a functional prototype.
The product will need some form of branding to help promote it.

Provide details of the Target Market for your product.

Young people these days all have some form of listening to music and it will be most likely they own an iPod as Apple is the dominant company for mp3 and mp4 players. What I have found is that iPod docks generally have a similar style and the consistent colours are black, white and silver. For the past few years people of all ages have bought these docks, but I would like to design and make an iPod dock especially for young people who have a keen interest in music and style.
My target market is 14 – 25 year olds who make up a significant part of the music and associated products buying public.

The Target market will be people in their teens to early twenties who have disposable income and will want to spend their money on an appealing product.

Provide details of the results of your analysis of a competitor product.

ACCESS FM

Aesthetics:
This iPod dock has a very simple appearance.
I like it's uncluttered look and think it would look good in a modern apartment building in a city. The curvaceous shape directs the eye on the central focus of the iPod. Visually I think the best feature is the way the curved front slopes down toward the base.

Function: The simple and affective design makes it is easy to use.

Technology: The technology is standard for an iPod dock and does not offer any unique points.

Cost: £129.50
I feel this is too expensive for my target market

Customer/Target Market:
It is aimed at a very diverse market because it is neutral in terms of colour and style. I think it would appeal to my target market but a significant number of people in the identified group would like something more individual.

Assembly/Construction/Sustainability:
Most of the case construction is of snap fit construction. It has advantages for the manufacturer in terms of ease and cheap cost of assembly but it make maintenance difficult and may even require the case be damaged to gain access.

Performance: In the audio review I read this IPod Dock had good volume but tended to loose quality at the high end of it's range.

Ergonomics: The position and size of the buttons is good

User Interface: It is very easy to use and access the controls

Manufacturing & Materials Processes: The main case is injection moulded ABS plastic as are the buttons

Provide details of the results of the research that you have carried out into the problem.

I have researched iPod docks by looking on various suppliers' websites such as curry's and www.apple.com. What is very common with iPod docks is that they are usually black and as you would expect the speaker is the dominant part of the dock.
You could make an iPod dock out of just about any material. However, almost all commercial products are made from ABS plastic. This is a concern to me as it is a challenging material to recycle and the percentages nationally are still relatively low at below 40% nationally even though this is a big increase on previous rates. If Wales and the rest of the UK are going to meet the proposed standards for 2020 there is going to have to be a big improvement and making products easier to maintain might help.

State the Final Design Brief that you have decided on.

The product I will be making is an iPod dock. I would like the dock to be inspired by various bands, singers or genres. The over all concept is to have an iPod dock that people will be able to buy that is inspired buy the bands/singers/genres they listen to. So whether it is **Paramore**, **Muse** or **The Pretty Reckless** it will contain a style that would be associated with them. It could also bee associated with a certain style of music. (e.g.: rock, INDIE, **Urban**, etc)
E.g: logos, album artwork, pictures, lyric inspired objects, titles, etc.

Teacher's Justification 2011

FINAL MARK

Lamp/lighting project plan (things to think about)

Appearance
- Works well with the light
- Uncluttered
- Presentable
- Simple/refined graphics
- Relates to modern design and the fashionable product market
- Eye catching
- Elegant
- Sleek
- Stylish
- The centre piece of a space
- complex
- Modern
- Sculptural
- Will it reflect contemporary design or will it be inspired by other design movements
- Appeals to target market
- Artistic
- Natural
- What will the graphics look like?
- Minimalist
- Texture and properties of materials should be taken into consideration
- Can the appearance be easily be changed

Content/client
- Will the retailer want there own company name or alternative design on the packaging?
- trendy
- Will I compose anthropometric research and use the data accordingly?
- Will they want there name on the actual product
- flashy
- Creative
- Can they clean it?
- Likes interior design
- Appreciates design
- Well educated
- A step ahead
- Who will I retail it to?
- Contemporary home
- Likes colourful surroundings
- At a dinner table
- At a house party
- Where/why will they use it?
- As a hallway feature
- In a sitting room
- For show
- In a business/office space
- Excess spending money
- Will the client want exclusivity and would this be substantial for myself, the designer?
- Works hard in career
- Extra hours
- How will they react to the product?
- How flexible will I be when it comes to retailers making changes and setting up contracts
- What data shall I collect about the market?

Function/components
- Will bulbs be included?
- Low energy
- Bulb/s
- Produce low heat and sound
- User friendly switch
- Will I include a computerised system?
- sustainable
- Long lasting
- Digital clock maybe?
- Will save time and manufacture costs
- A bought in electrical system
- Health and Safety
- Low voltage
- Safe user interface
- Interesting to use
- Will it stand freely?
- Will Batteries be included if batteries are needed?
- How will sustainability and the 6 R's effect my product?
- Will it be regulated by the BSI for safety?
- Could coating the base with rubber reduced the likelihood of the product being knocked from a surface or damaging a surface?

Marketing
- Make an interesting packaging design that is extremely engaging for the consumer
- Include free leaflets and features in the box
- How much of a 'cut' will the retailers, advertisers and manufacturers get?
- Will it have/what will be its unique selling point?
- How will I develop my brand identity?
- Design billboards to be placed around an urban area, promoting the product and where you can purchase it
- Collaborate with other companies, retailers?
- Business plan

Manufacture
- Will recycling be thought of while manufacturing? i.e. using a sheet of material to fit as many templates as possible
- Will sketch models be made?
- How many materials will be wasted and how will the excess be put to use
- Will it be costly?
- How long will it take
- Will it be flat packed?
- No waste
- How many will be made?
- I will set myself a strict plan for making
- Can it be disassembled?
- Is it actually possible to make?
- Less materials as possible
- What aspects of ICT will be involved
- How long will the manufacture process take?
- Is the correct equipment and machinery available
- Will I have to buy spare materials just in case things go wrong?
- Would it be a better option to start the making asap, when the workshop is free and so are the machines
- I should consider making a 2D flat pack/cad model suitable for a manufacturer to turn into a 3D product

Materials/sizes
- Will the design, materials or appearance of the product be up for interpretation by others (manufacturer)
- How much will they cost?
- Materials must work well with light
- Table top size
- Interesting colour
- 3 or more materials
- Sustainable materials – no wasting
- Materials must relate to theme/inspiration AND client
- Are the chosen materials commercially viable?
- Bulb must be housed properly
- Low production costs
- Local materials – reduces carbon footprint and travel/shipping costs
- The cost must be relatively cheap
- Make material samples and see which ones match

Design
- Will it reflect my style of design
- Functional properties should come before aesthetic value
- Will it relate to my previous models
- Is it sustainable?
- Will it be symmetrical?
- Designed around light, and the best way to showcase it
- Is it portable?
- One off/custom design
- Calming/subtle
- Relates to inspiration
- One off/custom design?
- If organic Includes curved, smooth, and continuous surfaces
- To what degree will complex mathematics be involved
- Colourful and bright
- How will I design the graphics?
- Will the cad model be accurate, and reflect the final design and product?
- Aesthetically pleasing
- Will it be seen on billboards?
- Will the graphics reflect the nature and look of the product
- Will it be best to use the iterative design process
- Should I stay true to what I believe about design and the processes involved or shall I look a thinking processes and philosophies by famous designers and trending ideas by the target market

Specification- Above & Below The Line.

Above: *Essential elements of my project.*

Size and Shape

- Must not exceed 450mm.
- Must represent the main characteristics as the initial design

Performance

- In terms of performance my project must be able to hold six glasses of wine successfully.
- It must be able to withstand the weight of six wine and be strong.

Aesthetics

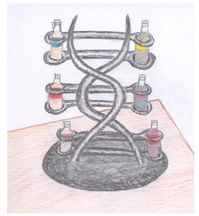
- The Aesthetics of my product have to match my initial design as much as possible.
- In my case the aesthetics of my project have to symbolise a DNA Helix spiral. The overall execution of my project must be well done and look appealing.

Ergonomics

- It must be easy to use because like stated in my target market it could be used in both the home and work place. I don't want to focus purely on it function, because I want it to be very visual.
- It must be able to have accessible features to it, or else it would fail at the prime purpose of the product.

User interface

- Being a wine rack the only real user interface you would need to consider is how you put the wine in the rack, which I've made as easy a possible with my design.



Finish

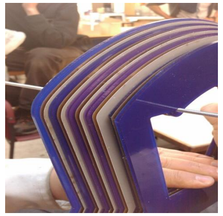
- The Finish must be done to the best possible standard.
- Hopefully by sticking to a checklist and criteria I will be able to complete the manufacturing of my product with a sufficient amount of time to apply a good quality finish.

Above: *Desirable elements of my project.*

Below: *Desirable elements of my project.*

Environmental impact/ Sustainability

- Must be as environmentally friendly as possible.
- Try to find environmentally sound materials.



Assembly/ Construction

- Make sure everything fits together exact and is in proportion.
- Consider the most efficient way of doing things.

Function

- Must do it's Primary purpose well.
- Must meet all the points individual points in the specification, in order to function up to standard.

Materials

- I've chosen the materials I think would be best for making and the best aesthetically.

Quality Control/ Assurance

- I want to make sure that there is a certain level of quality in a product or service.
- I will try to make sure that my product will meet all the specified points so it will exceed the expectations of the target market.

Below: *Essential elements of my project.*

Adventure & culture

I created this inspiration board in order to have some visual inspirations for my designs. I've focused on historic artefacts and landmarks from around the world, items associated with travel such as compasses, maps, steam trains, boats, and have also looked at animals, culture and costume in different countries.

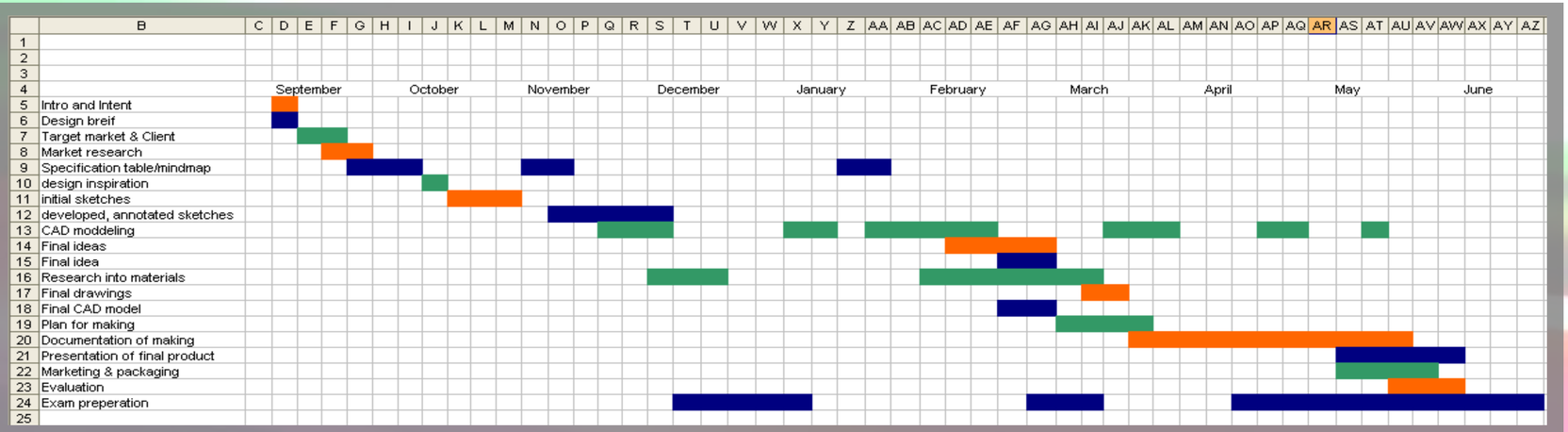
Inspiration mood board

Condensed Hierarchical specification

Level of importance	Specification notes
	The product MUST be able to function properly, The switch and light must work and be safe, there must be no loose connections or pieces of the product that are prone to breaking. It must be user friendly and function properly until it's time comes to be recycled. The mathematical/mechanical side should be completely covered, with the engineering aspect correct
	It is important that the product is structurally sound, and is at low risk of wobbling. It is important that I don't waste material in the manufacture process, or use material that is prone to breaking, or materials that are unsustainable. The product must be reviewed to see if it still fits my target market. The marketing and packaging should also be suitable for my market and client.
	It is important that, besides from functioning properly, that the product must be aesthetically pleasing and will attract the customer to buy it. I should consider making the product flat pack, and by doing so making it more appealing to the client and more competitive with the world market.
	The product's finish must be of a high standard, and there should be an option to deconstruct the product if the user wishes. Flat pack is often referred to retailers that aren't necessarily in my target market but could be a huge advantage.
	The marketing and packaging of a product is usually a very important component to it's success, although I am deciding to package and brand to product at the end of process. I think it is more important that the product is made to a good standard first

This hierarchical specification was specifically made to distinguish between key points and factors of importance within the design process. I must take this table into consideration frequently when designing and making the product to ensure I get it right. I will also use the specification table and mind map as a guide to making the product and constantly improving it. The mind map especially has questions I've asked myself which could be answered or even set out as separate hypothesis' to help me improve the product. Its very important to have a hierarchy while designing, it separates the most important points and distinguishes key points

Gantt chart



	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
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4			September					October					November					December					January					February					March					April					May					June			
5	Intro and Intent																																																		
6	Design breif																																																		
7	Target market & Client																																																		
8	Market research																																																		
9	Specification table/mindmap																																																		
10	design inspiration																																																		
11	initial sketches																																																		
12	developed, annotated sketches																																																		
13	CAD moddeling																																																		
14	Final ideas																																																		
15	Final idea																																																		
16	Research into materials																																																		
17	Final drawings																																																		
18	Final CAD model																																																		
19	Plan for making																																																		
20	Documentation of making																																																		
21	Presentation of final product																																																		
22	Marketing & packaging																																																		
23	Evaluation																																																		
24	Exam preperation																																																		
25																																																			

This is a Gantt chart, made on Microsoft excel, showing the approximate time and dates involved when completing the whole project. I will try to stick to this plan to ensure I complete the project in time. To complete this time table I will complete the majority of the CAD and computerised work in school along with the practical project

Further planning notes

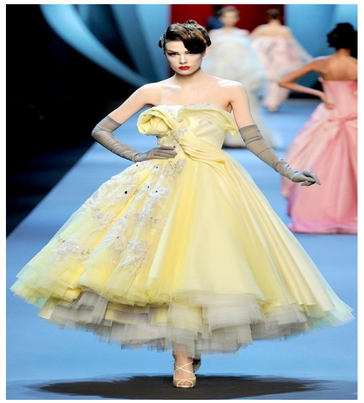
With the aid of the specification table, mind map and hierarchy I can now continue designing my product, keeping key points in mind. Above I have also set out a brief inspiration mind map to help generate ideas when sketching. In the sketching process I will start off with vague Ideas and slowly develop them into workable concepts, I will have to make sure the mathematical and engineering sides of the projects are achievable, this will mean my original sketches will be changed considerably

<u>Deduced plan:</u>

- Create rough sketches based on the imagery displayed on the mood board
- Morph, render and develop sketches to create more firmly though out ideas that reflect the previous sketches
- Continue developing, keeping target market in mind, and making some links to the chosen colours, construction methods and possible materials that could be used. Rough sketch modelling will also help when deciding weather or not a product can be manufactured.
- Develop a model on CAD and develop it in terms of what the client would expect, the target market expectations, the structural calculations, and how the materials would/wouldn't be wasted.
- After CAD development, propose a final design idea to be checked by the teachers. All aspects must be checked when creating the model such as cost, material, sizes, stresses, weights, finishes, packaging ect.
- When a design has been reviewed, and changes have been made accordingly, I will then start to make construction schedule, and develop my final design until it is a physical, fully functioning lamp

Inspiration board for features of my garment: Dior spring 2011 collection.

I have researched into the Dior spring 2011 collection in order to gain inspiration from various style elements and construction methods of Dior. This collection focuses on elements such as corseted waists to rounded hips. These style influences have appeared throughout history including the Victorian era, and even 1949-50s where elements of the Victorian style were brought back and incorporated into the fashion of the time. The collection consists of several dramatic techniques such as experimentation of light and shade. This was inspired from Dior's interest with Gruau's watercolours and Penn's couture photography. Several layers of hand painting the fabric were used in order to create the toned/ shaded effect which produced the appearance of depth. Dior also included several elements such as embroidery on one side of the fabric to create a subtle shadow, as well as using ostrich feathers. I will take inspiration from this collection focusing on elements which Dior has used a and will also experiment with the techniques from the designs and find alternative ones to compare with.



I personally like this design as it creates a tucked in waist and voluminous bottom to it. This creates well balanced proportions within the garment. The light colour scheme used is effective as it produces a harmonious feel to the design and compliments the embroidery down the side of the base.

The construction of this garment has been well thought out as it uses netting underneath the base which provides more body to the bottom of the dress. I could use this element of netting within my designs in order to produce the voluminous effect.

The long length gloves are a complimenting accessory to the garment due to the contrasting colour and difference in fabric. I could consider the materials and colours used within my designs in order to create either a bold or subtle contrast.

I like this design as it provides a full effect. I find the style of the dress interesting as draws in just below the bust line and then expands further down the dress. The light to dark colour scheme creates a shading effect within the garment, this again shows contrast which I wish to create within my own designs.

The feathers used to embellish the side of the dress work extremely well as they stand out in comparison to the material.

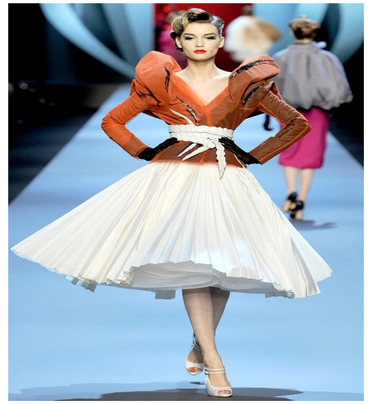
I dislike the shape of the bottom of the dress as it doesn't quite fall in place, I think that the style of the hemline is inventive and appears to take the shape of a birds wings as the feathers in the design also suggest, but wouldn't like to incorporate this aspect into my designs.

I have used this design as my initial inspiration from this particular collection. I find the colour scheme and tones created inspiring and very effective. The contrast between the various tones of rouge create a shocking look, which would definitely stand out in a crowd. I wish to create this aspect in my designs in order to attract attention from potential clients.

The construction of the garment incorporates many techniques such as gathering, pleating, layering etc. I like the use of layering in this design as it produces a full effect in the skirt. The tailored top part of this garment is also quite inventive as it creates a V-shaped neckline, long sleeves and curved hemline. The belt across the waist draws attention to the consumers waistline. This style of jacket seems similar to the Victorian era where corsets were used to create this effect. I personally like this style and would like to use several elements such as the tucked in waist and voluminous skirt within my designs.

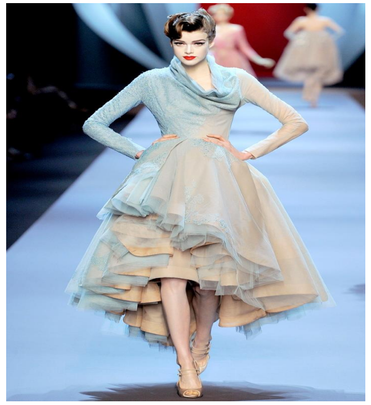
The design to the left also shows several elements of the design above. The skirt on the left however is shorter in length and appears to have more pleats/gathering incorporated to produce more volume. I dislike the colour scheme used within this design as the contrast is too over powering and doesn't blend as well as the design above. This is an aspect to consider when adding a colour scheme to my design, looking particularly which colours work best to create a contrast.

The difference in materials used is another aspect to consider. I personally dislike the variance in materials within the garment as I feel that the contrast between fabrics is too strong. I am considering using contrasting materials within my designs, however would choose subtle contrasts rather than the drastic ones within this design to the left.



I like this design as it shows strong influences from the Victorian era. The puffed shoulders and thin sleeves emphasise the top of the garment. The V-shaped neckline also draws attention to the top of the garment and has a flat edge to the top to show the difference in sections. The contrasting white belt around the waist uses the same colour scheme from the skirt.

The fullness of the skirt in this design has been created through gathering around the top of the skirt and layers of netting and fabric underneath to provide the volume. I think that the two separate sections of this garment work well as they could be worn with other garments, therefore making it an inter-changeable design.

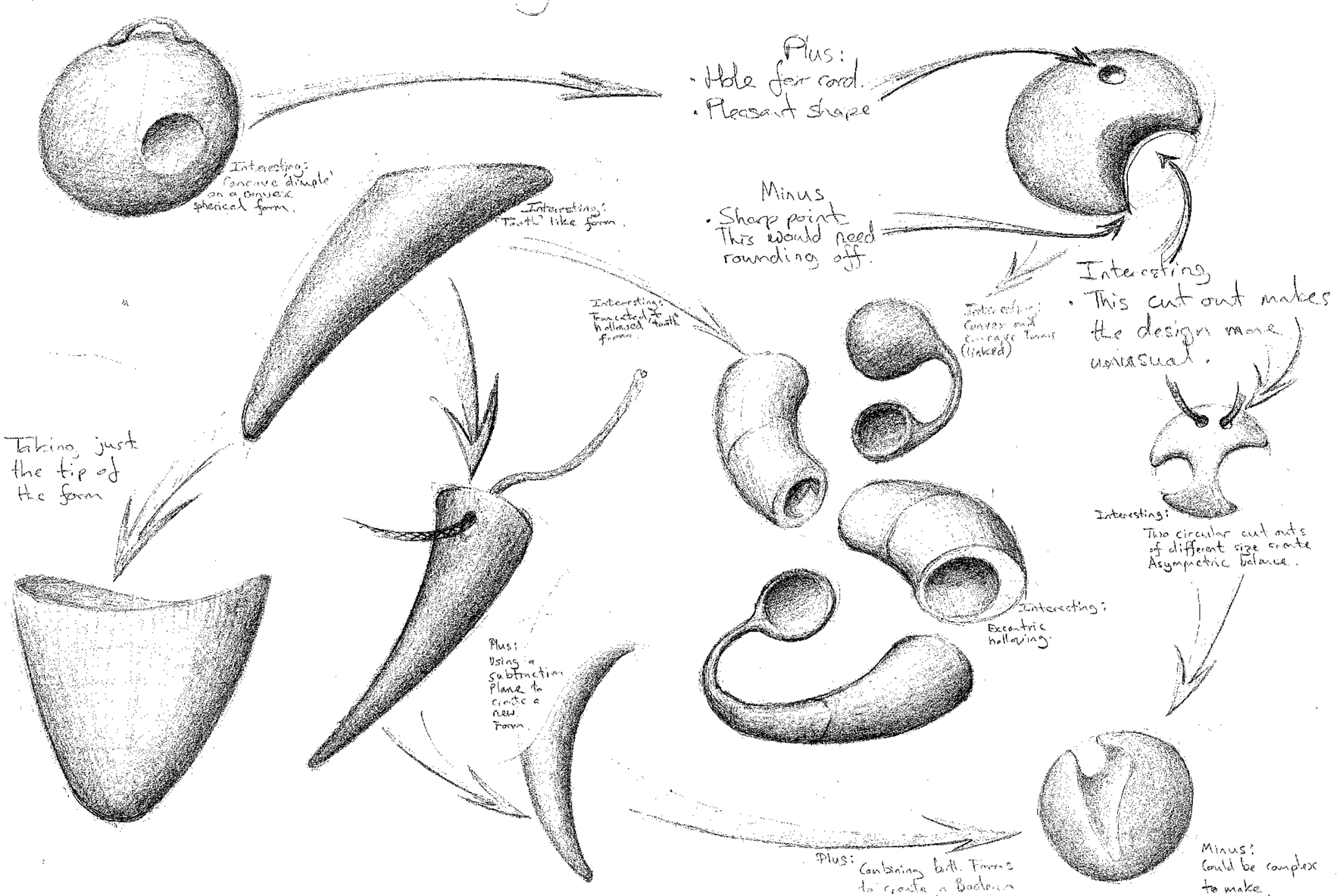


This design uses a different style of shaping on the bottom part of the garment to the others in the collection. It focuses on a scalloped edge to each section, which I feel works especially well when layered. It creates a lightweight look to the dress which could benefit the consumer if the garment was to be worn for a long period of time. I will consider this aspect of clientele comfort within my own designs and take into consideration where and when it will be worn in comparison to this.

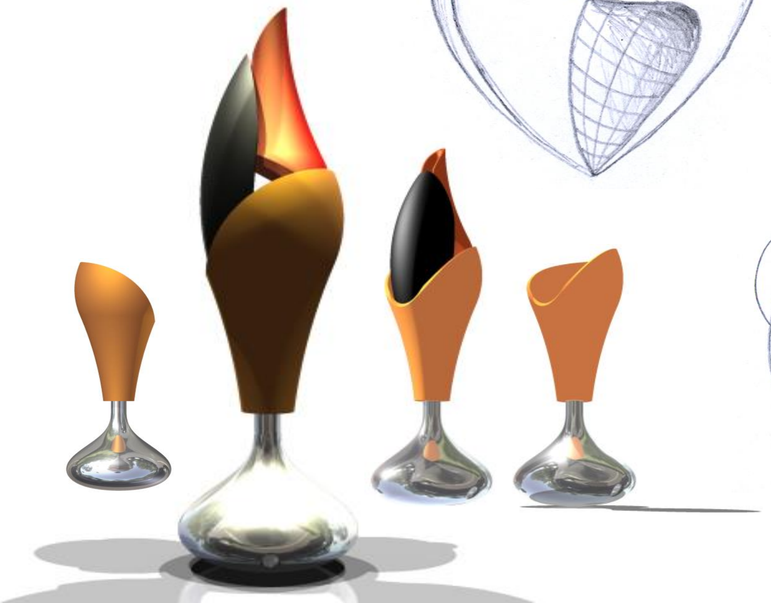
I dislike the top part of this garment as it has a sloping neckline, I personally feel that this aspect would not be suitable within my designs as it was not a common style within the Victorian era. The tucked in waist however, again is an aspect I wish to include within my designs.

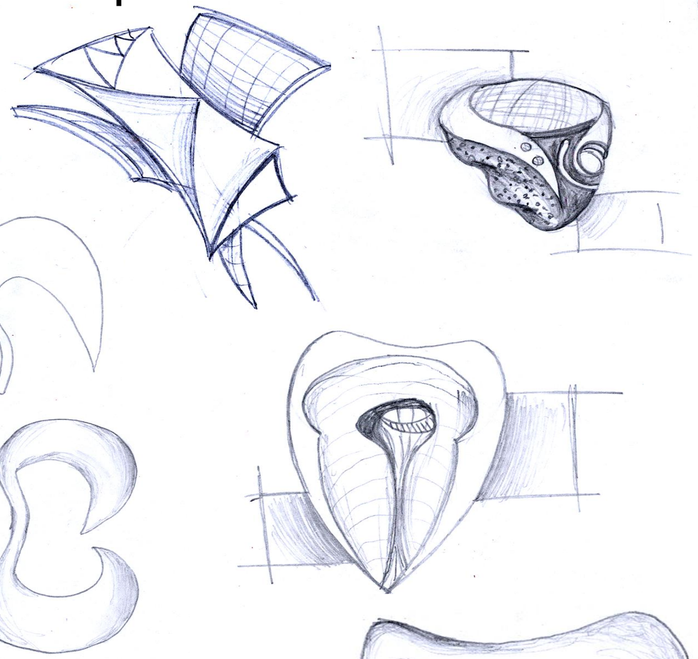
Sustainable Jewellery

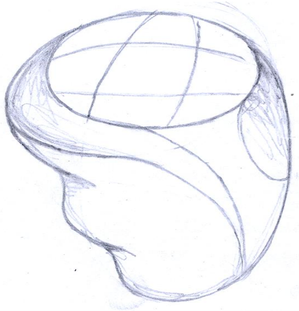
P.M.I.

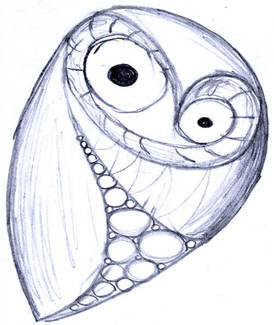


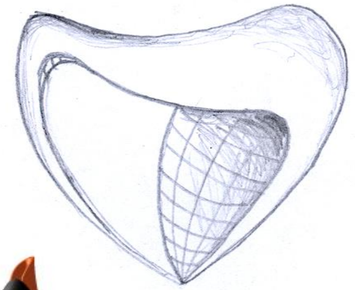
More initial ideas and development

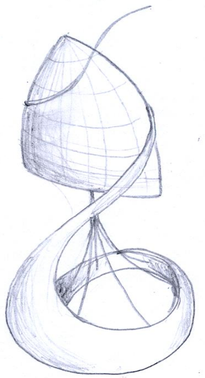


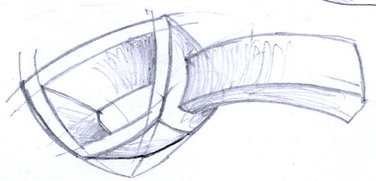


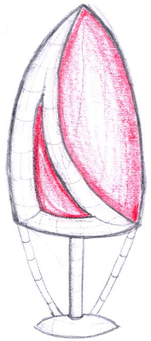


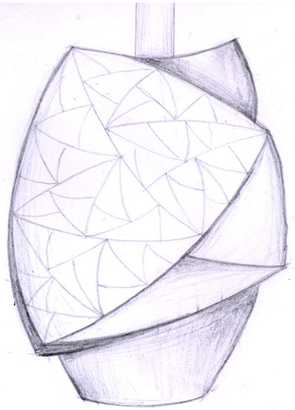


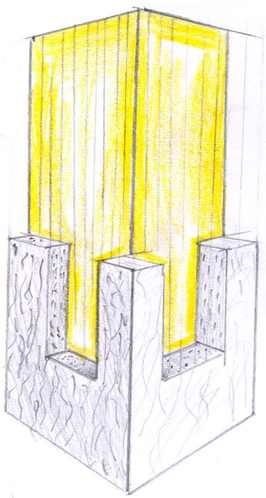


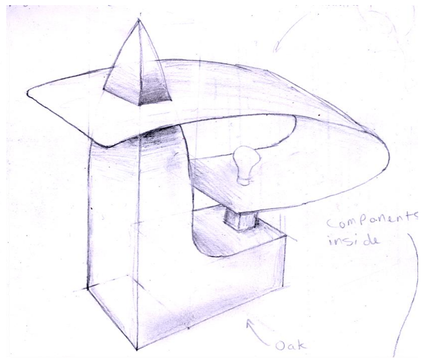


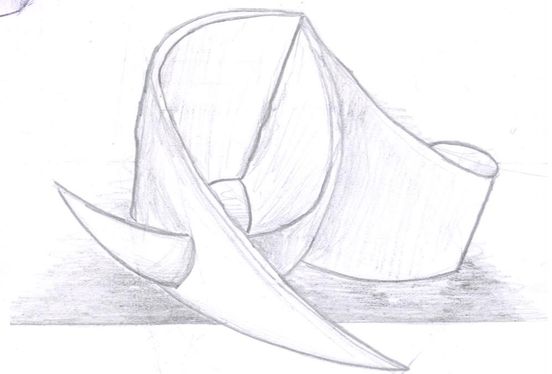


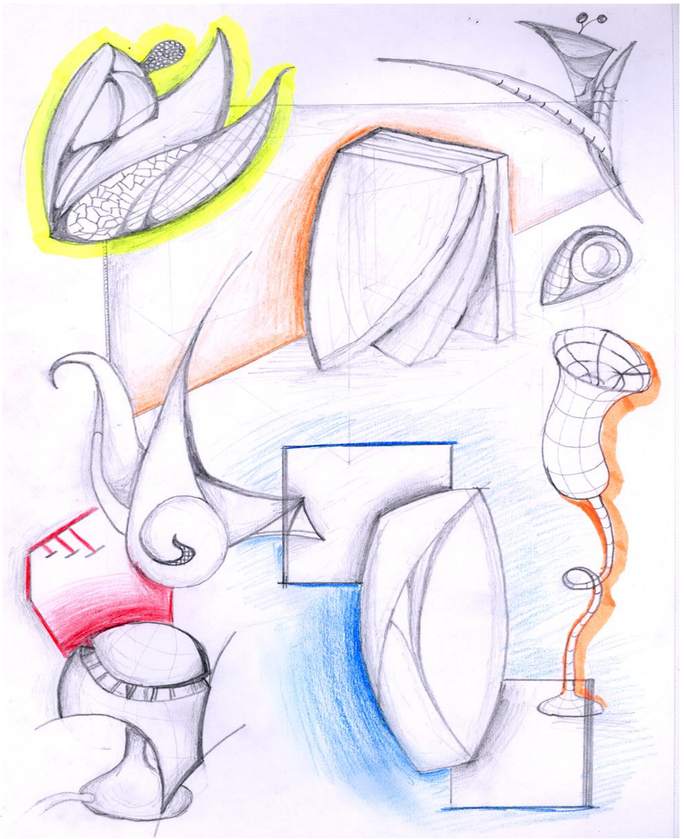


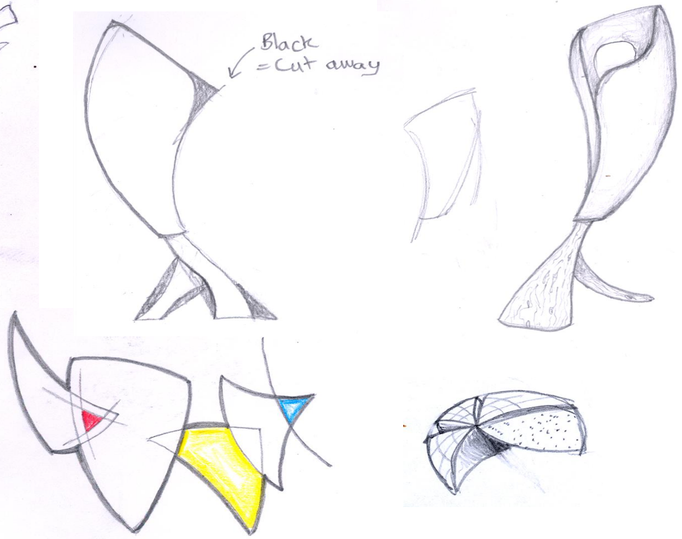












Final design idea

•Ergonomic – My garment will be easy to move around in as it will be worn at special occasions.

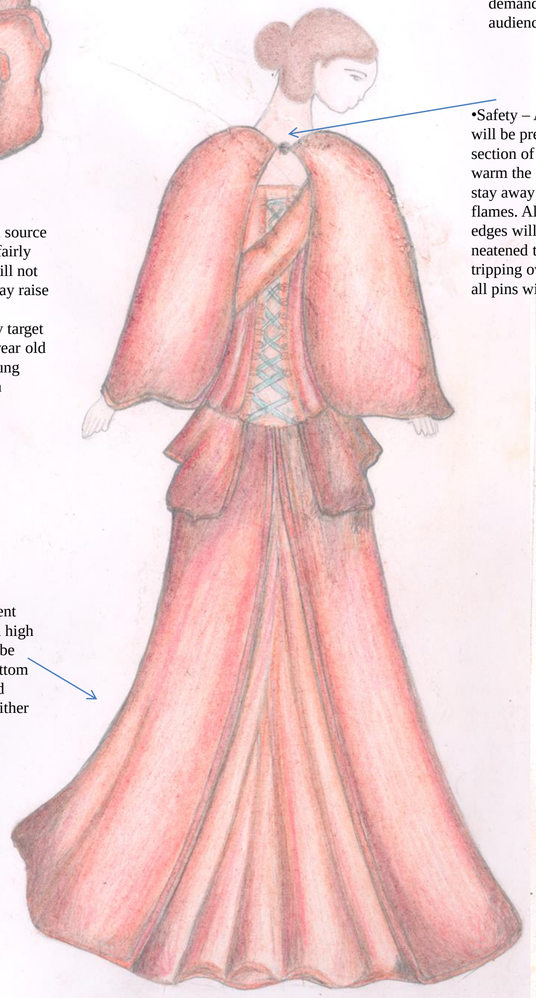
•User interface – My final garment will be made in size 8, but will also be adaptable for size 10 clients.

•Function - My final garment shows subtle design influences from the Victoria era and would be suitable to be worn at a special occasion. There meeting the demands of my target audience.

•Safety – A care label will be present in each section of my garment to warm the consumer to stay away from naked flames. All seams and edges will also be neatened to avoid tripping over them and all pins will be removed.

•Economics – I will source my materials from fairly local sources and will not buy in bulk. This may raise the cost but will be irrelevant due to my target audience of 17-25 year old women who are young professionals with a disposable income.

•Finish – The garment will be finished to a high quality. A hem will be placed along the bottom edge of the skirt and each seam will be either hidden or neatened.



Similar products – I used my product analysis as inspiration for my final design, focusing on many construction aspects of the existing garments and combining them. I also looked at my Victorian research for inspiration as well as the Victorian influenced aspects of the Dior 2011 spring collection.

•Quality control checks - will be put in place to check seam allowances and hemlines.

•Materials – I have chosen to use red Taffeta within my final design. This would make the garment stand out and therefore would create the desired effect required by the target audience. The netting and lining underneath the garment creates a voluminous effect whereas the lining creates comfort within the garment which matches another of my target markets needs as the garment will be worn for long periods of time.

•Assembly – I will use a plain seam and do not need over-locking as it would cause bulk within the garment. Seams will be neatened or hidden by lining of product. Pattern pieces will be cut out by hand and channelling and boning will be used in the corset top. Cord loops will be used to hold the ribbon in the corset top, a zip will be used as a fastening for the skirt and a button and loop will be used on my cape as a fastening. This also meets the point in my specification as all these elements will be included.

•Maintenance - Due to the specialised decorative panels, my garment will have to be dry-cleaned and therefore will not fit the washability aspect of my specification but does meet the easy repairable one.

•Aesthetics – My final garment uses toned fabric which has two different colours in the weft and warp threads of the fabric to create this two toned effect. It visually pleasing to my target market of young women aged 17-25 as well as clientele of other ages and therefore meets my specification point. It also shows references to the around the world in 80 days theme as well as the travel theme within my decorative patches on my sash.

•Build quality – I have used several modern day techniques such as CAD CAM, appliqué, laser cutting beading, machine embroidery on the CAD sewing machine, sublimination process and hand embroidery. This will be used on each of the decorative patches on the sash as shown below and matches this point in my specification.

The Applied Pedagogical Model

Research – University of Cambridge

Year 10 Set Design Project
STEAM PRINCIPLES

Year 10 Set Design Project
CREATIVITY PRINCIPLES

Technical/Procedural

Ambiguous/Risky

MATERIALS / STRUCTURES

SHAPING / FABRICATING / JOINING / WASTING

CAD MODELLING / CAM including setting up of Laser Cutter

TESTING / EVALUATION / SIMULATION (unity stage)

ANALOGY
Bio-mimicry / Transformation

EXTENSION
Expand/Modify/Construct

COMBINATION
Gestalt/Modify

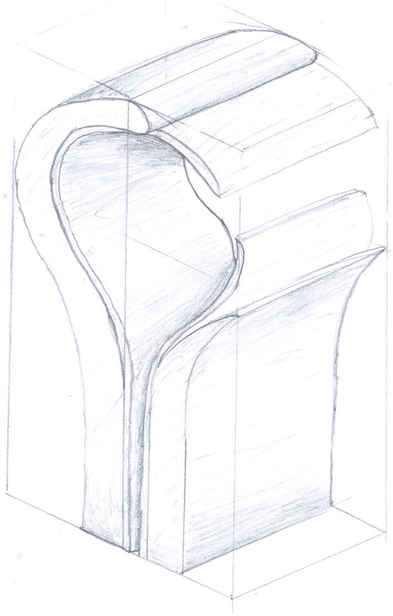
METAPHOR
Narrative

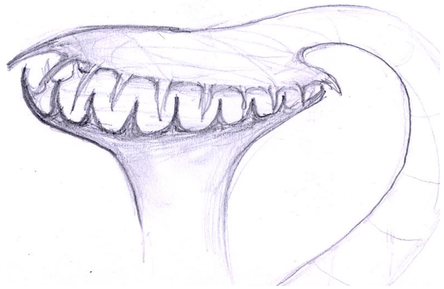
Iterative Design Cycle
‘Meta-State’

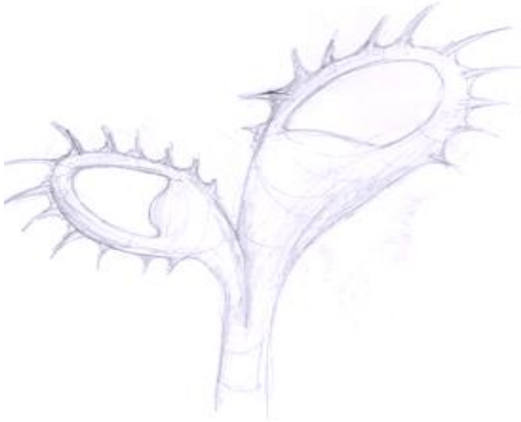
Creative Design Proposal

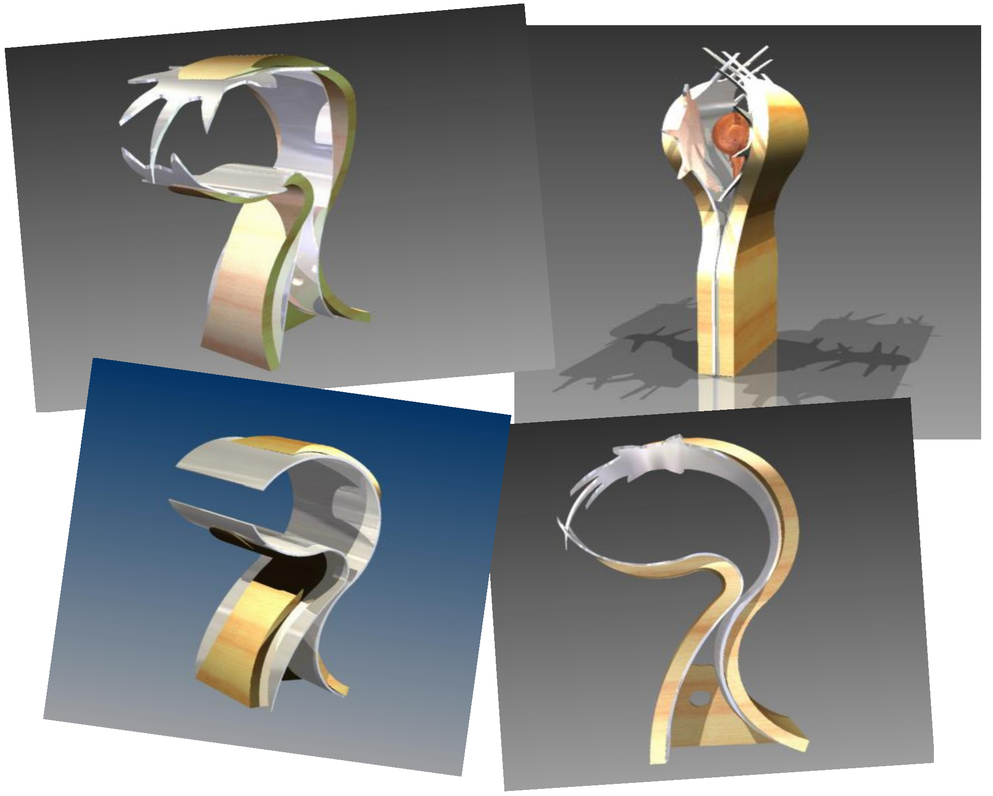
Autodesk

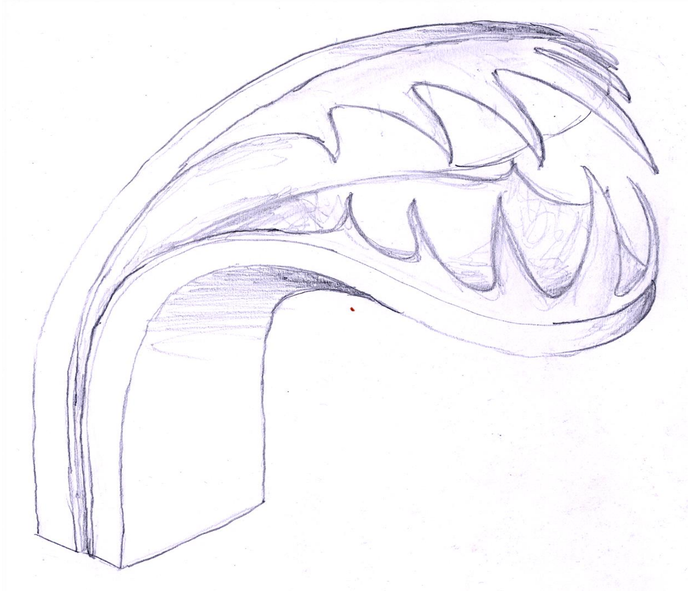
Futher Development of ideas

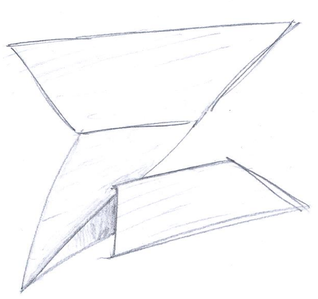


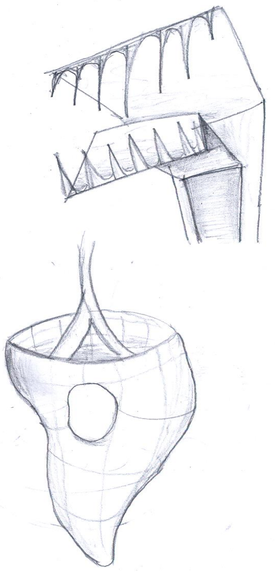


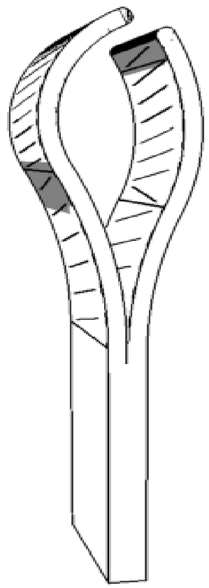




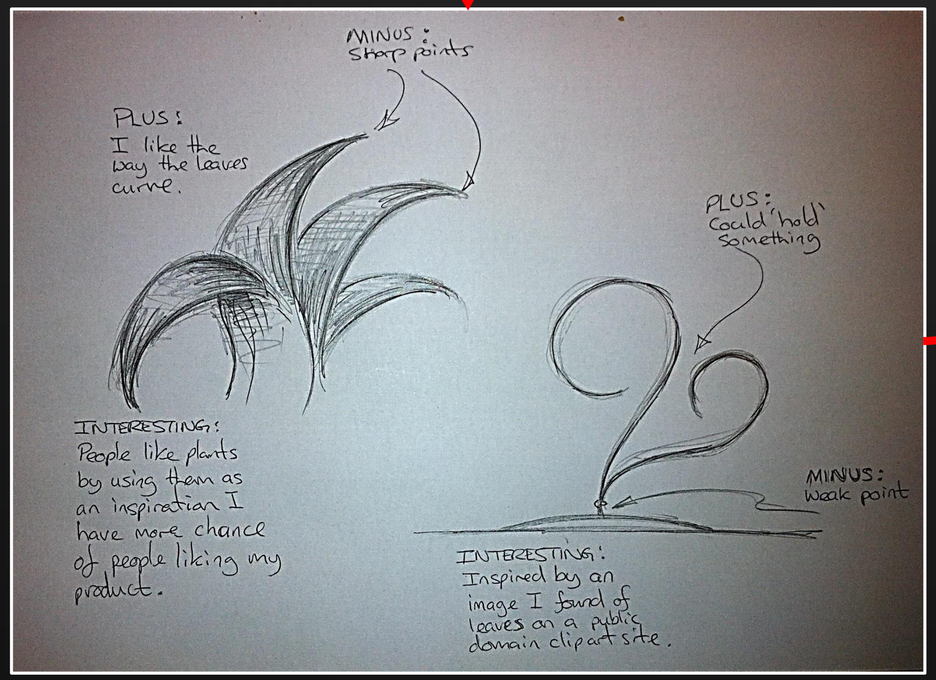


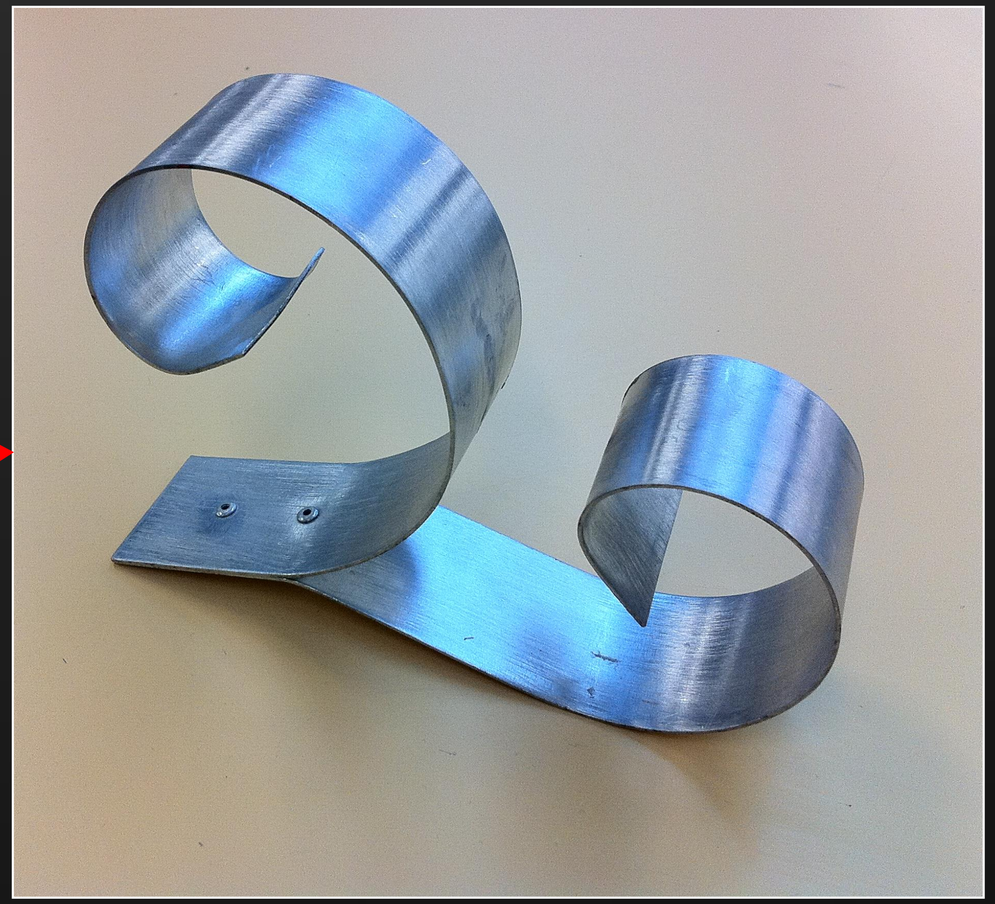






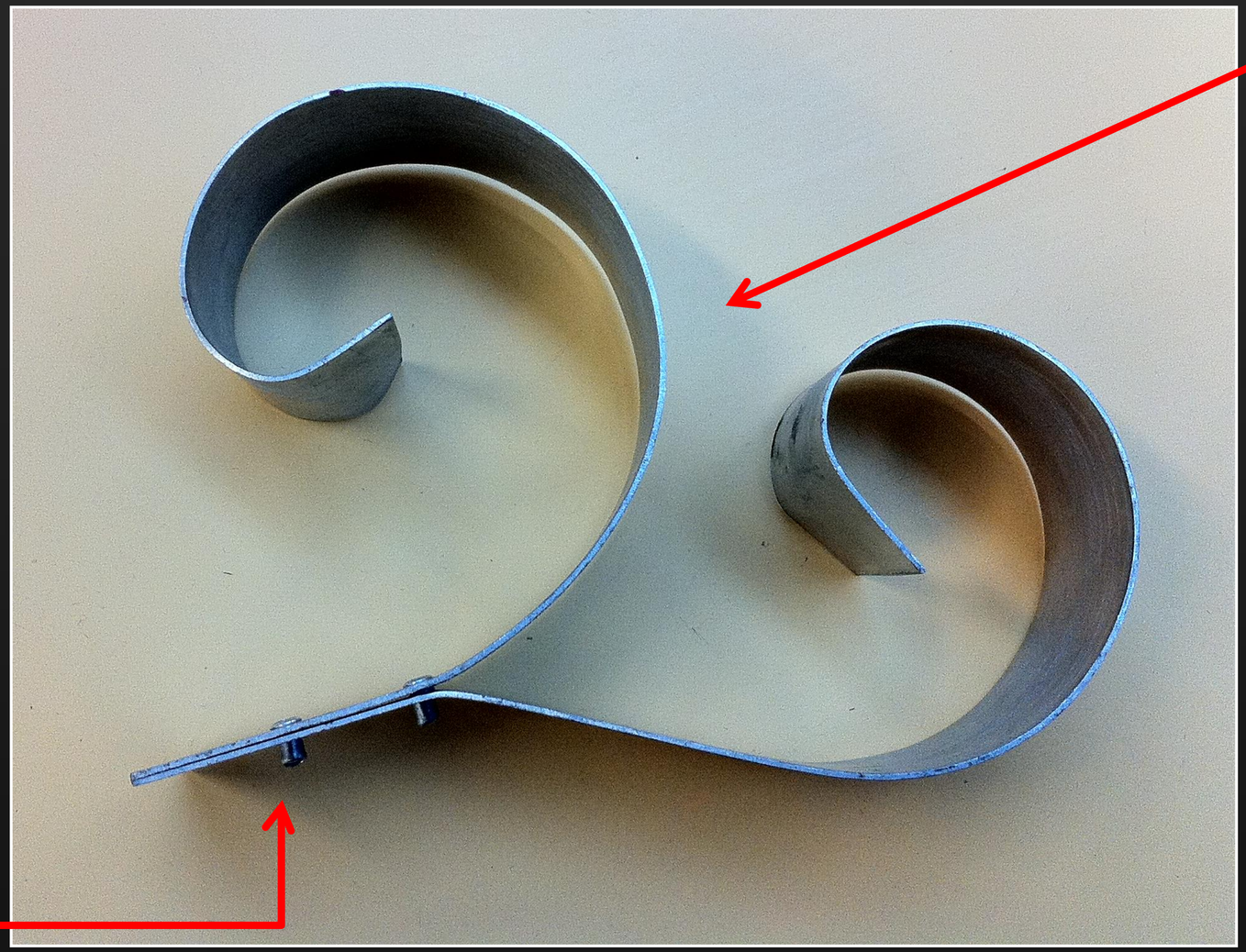
Ockham's Razor as a thinking strategy





Bio-mimicry as a design strategy

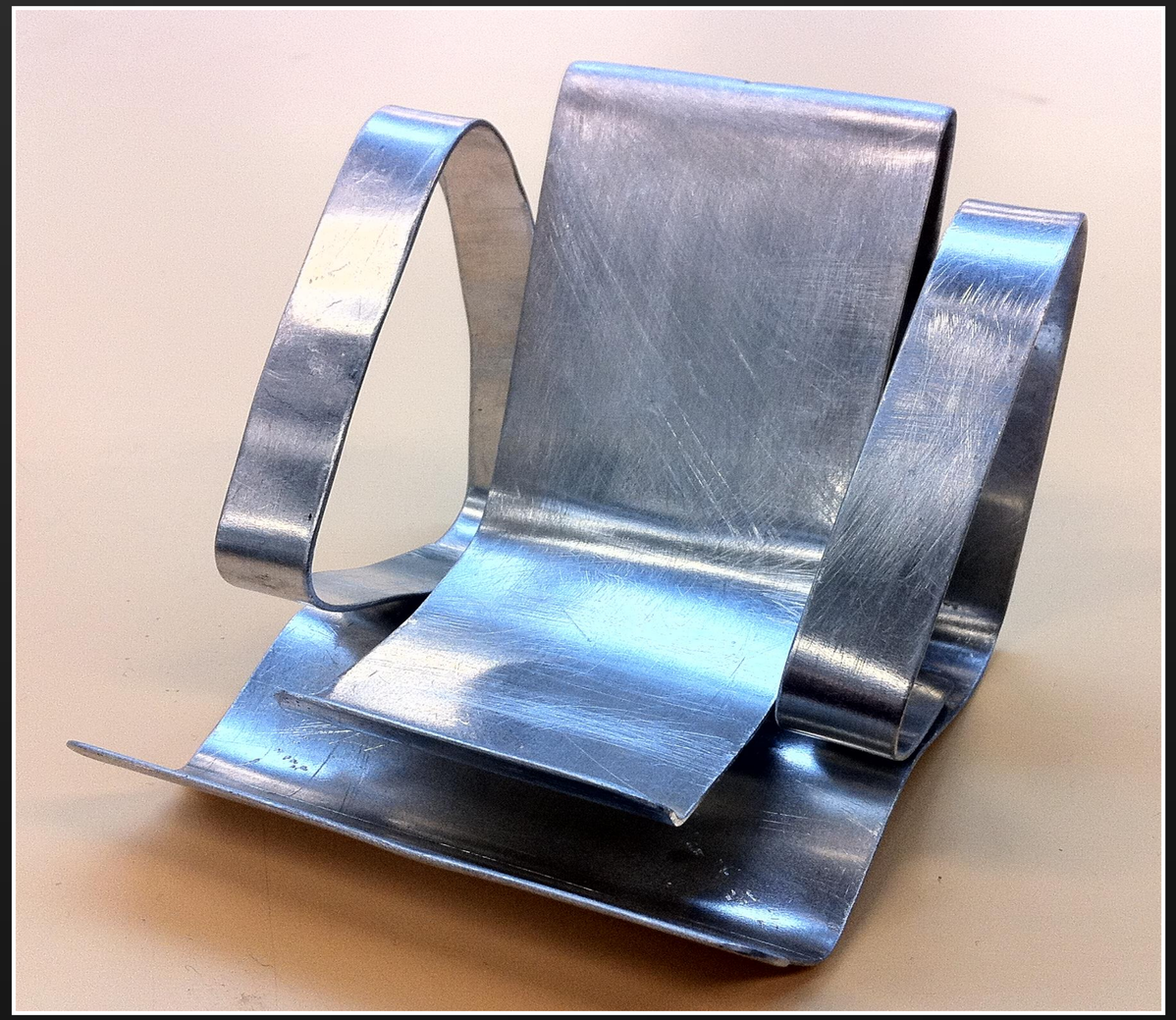
- Material Properties
- Form and structure



- Structure
- Manufacturing
- Quality

Analogy as a design strategy.

- Deceptively simple form
- Clever use of material
- Takes account of the needs of the user
- Sustainable.



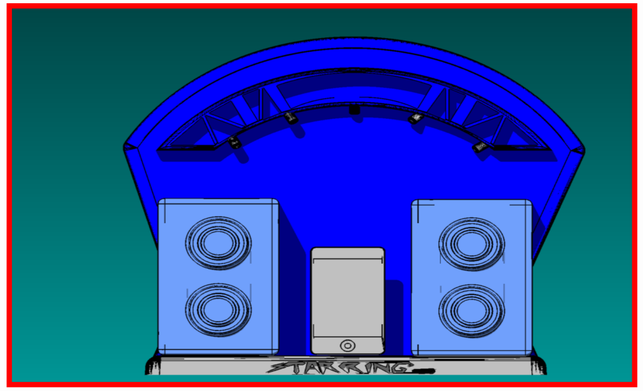
WJEC DESIGN & TECHNOLOGY CONTROLLED ASSESSMENT TASK	CENTRE NUMBER 68138	CANDIDATE NAME	CANDIDATE NUMBER 05097	Date Page Started	Date Page Finished	Time Taken for Page 60 minutes	Total Time 290	PAGE 5

Develop your chosen idea to improve its Form, Appearance, Style, Suitability and Function.

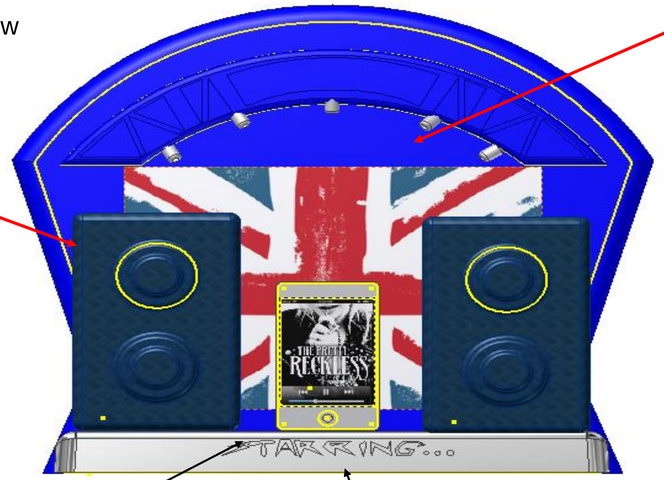
The main function of the dock is obviously to amplify music. I also have bought a component that can charge the iPod as well as playing music. The design of the amplifiers will work well with the components I've bought. The speakers I have bought have a standard amplifier and I will allow room for a trumpet component which will help make the sound better.

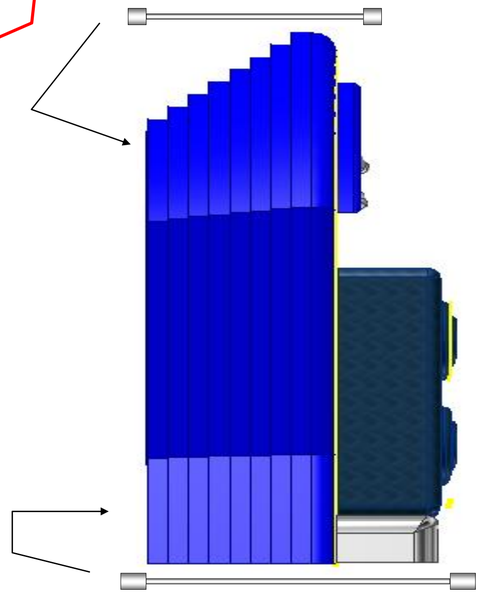
On the front base here I want to have a Union Jack flag printed here. To keep in with the feel of the dock I would like the union jack to be done in a grunge style. To make this graphic work I will have to use either white or clear acrylic plastic. I will then have to print the union jack graphic onto the plastic using the die sublimation printer.

I have improved this design by making it to the actual size of what the dock will be. I also changed some of the proportions of part of the dock such as the speakers (as shown here). I wanted to make it look as close to my original drawing as possible, but I also wanted it to be realistic and make it what it actually looked like.

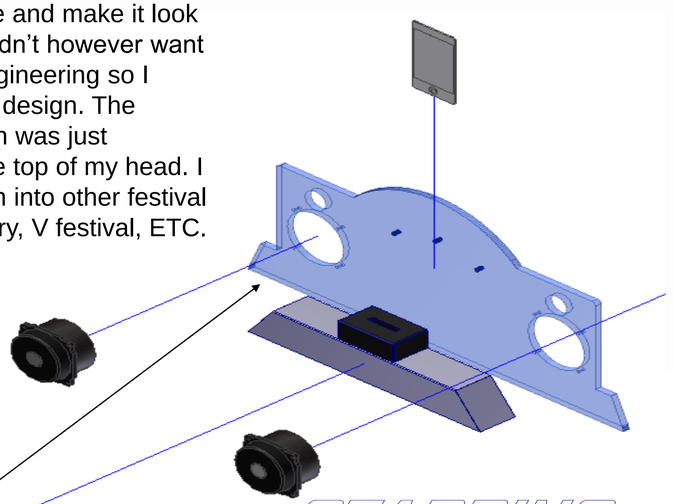


Rendered View of my design.
I chose the render tool on Autodesk inventor to make this drawing





I made this a stylised design because I wanted to look like a stage and make it look instantly recognisable. I didn't however want any of the complicated engineering so I simplified and stylised the design. The Original idea for my design was just something I thought off the top of my head. I later on did some research into other festival stages such as Glastonbury, V festival, ETC.



The iPod connector will be located here which is made to look like a stage (the picture is an example of a typical festival stage).

I would like this base to look shiny and slick and so I think that mirror plated acrylic or even steel would be ideal materials to use. I will also engrave the word "STARRING", for the significance of the iPod dock and to also keep in touch with the festival theme.

I could join the plates together using threaded bar and locking nuts.

I could move the speaker out into PA pods as this may improve the visual balance of the dock.
This may also improve the sound reproduction as t moves the speakers apart.

Teacher's Justification 2011		FINAL MARK

WJEC DESIGN & TECHNOLOGY CONTROLLED ASSESSMENT TASK	CENTRE NUMBER 68138	CANDIDATE NAME	CANDIDATE NUMBER	Date Page Started	Date Page Finished	Time Taken for Page 52 minutes	Total Time 550 minutes	PAGE 9

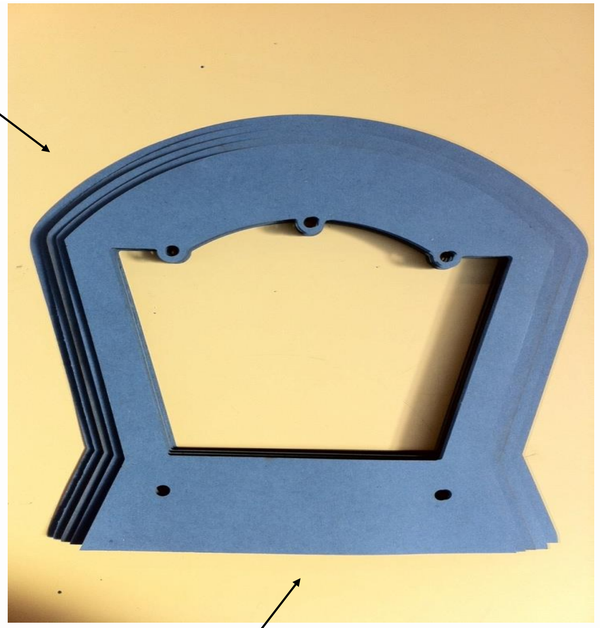
Develop your chosen idea to consider the finish and quality issues to make sure you make a good product.

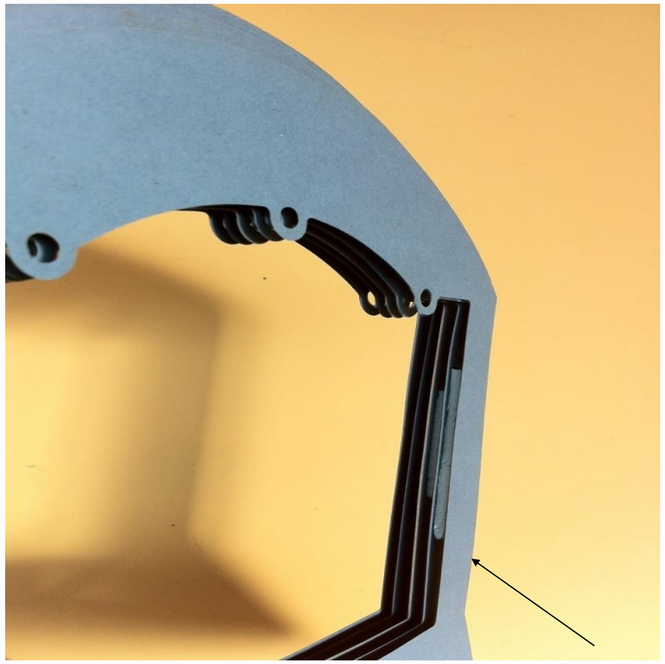
To make sure the quality of the cut outs for the dock will be of a high standard I will use computer aided design to make the drawings. I can then use the laser cutter to cut everything out.

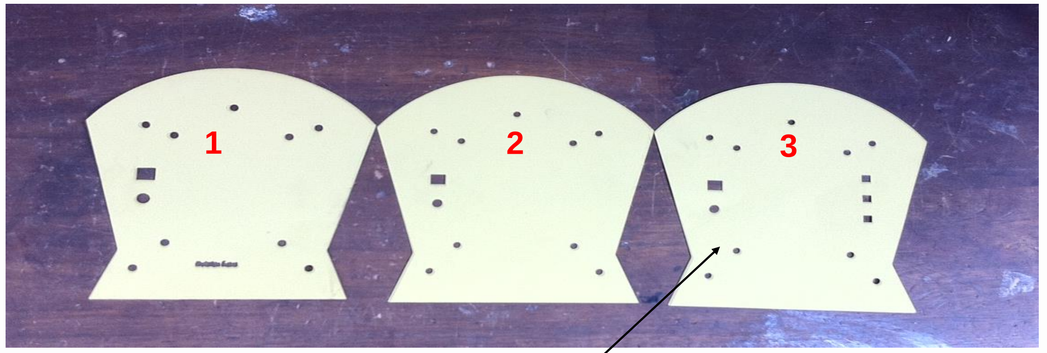
I will to use acrylic plastic when cutting out the components' for my project on the laser cutter because this will ensure I get a high quality finish quickly and is a lot easier and more accurate than doing so by hand.

I always had in mind that I wanted to use the laser cutter but before I was able to go ahead and start making the project I have had to do a number of sketch models. The models were made to see if the sizes were right, whether it looked good, how it would fit, etc.

By cutting out the back pieces separately using the laser cutter I hope to get a neat and accurate finish.







These three pieces of card are what I used to test out what the back piece of the dock would look like. As you can see from the picture it took 3 goes before I got it right and was satisfied with the out come. I started with number 1 which fitted ok but some of the holes were too big. On number to I changed the size of the holes so everything fitted well with out being too tight. The only problem with number 2 was that I had not included space for the volume buttons, which as you can see I have included on number 3.

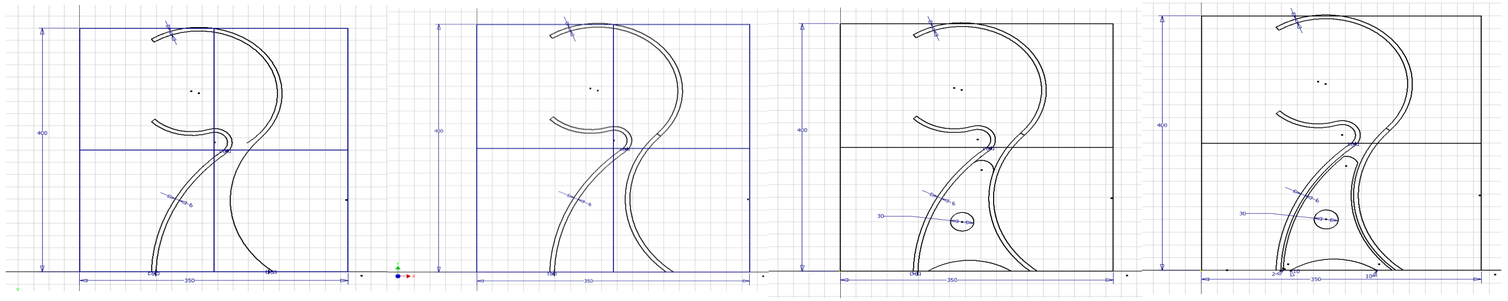
I made this sketch model before making the actual project. I used card to produce this model and spaced it out so it would give a clear and precise idea of how it would look. By making this model it helped me see what I needed to change, because when I cut it out I realised that I would need to add more holes along the bottom for the stud bar. The model was also an advantage because I was able to make the changes so I didn't waste any acrylic which I would later use to make the actual dock.

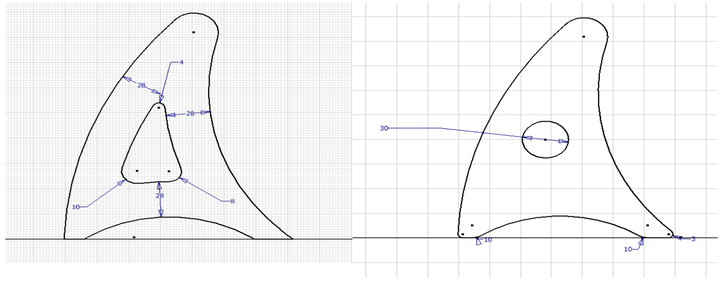
STARRING...
By Christian Evans

Teacher's Justification 2011		FINAL MARK

Further Development of ideas

After making various CAD models I decided to include actual and calculated dimensions in my design process, I knew this would help me conceptualise the product. below shows the development of ideas and how some were changed to fit the properties of materials I had chosen and some have been changed to become more aesthetically refined.

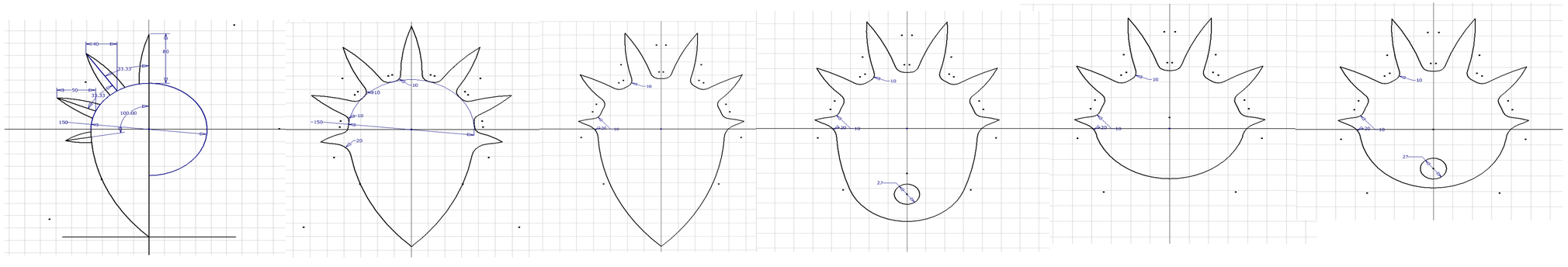


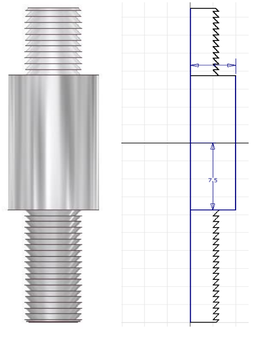


I though of different possibilities for the hole in the middle base, I saw potential for a more appealing design, and when looking back at the specification I thought it would be more sustainable to remove material. I went against this decision on the grounds that the circle gave the base the best possible structural strength apposed to the modified version

When I was designing the two lamp shades, I had to make sure that they would mesh together to create the ‘cage effect’. This required the circular pattern tool on autodesk. The first shade worked fine but the second had to be shortened because it was originally too big, and touching the first wooden stem.

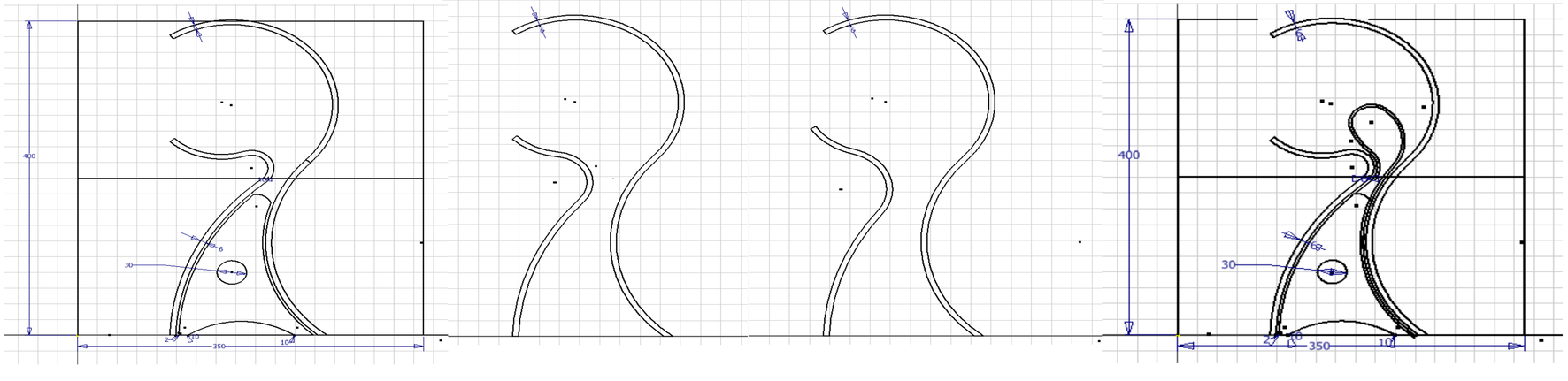
Another possibility is to use the lath to machine screws that will slightly raise the metal shades from the curved wood, this will make the product stand out more and will become more appealing.

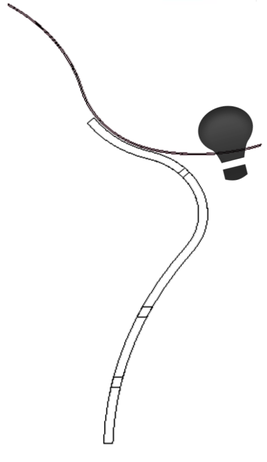




The progression below show how changes were made to the shape and radius of the curve on stem 2. As I was becoming more certain that I would use plywood over acrylic I noticed that the structural make up of the plywood would not curve around the suppose tight radius of the first drawing, therefore I made the radius bigger until I was satisfied

One problem I hadn’t particularly thought about when making CAD models, was how I was going to fit the light inside. Here is one design where curved aluminium with a hole cut into it, was inserted between the two stems to hold the bulb. I later decided not to go with this decision because it wasted a large amount of material and too many dimensions would have to be changed to fit it

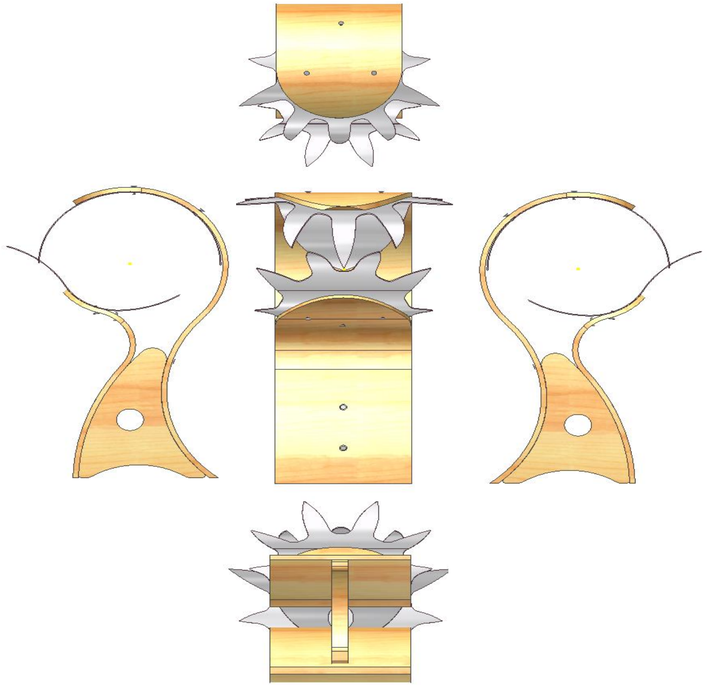


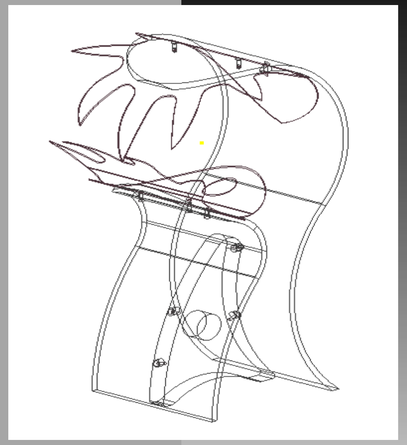


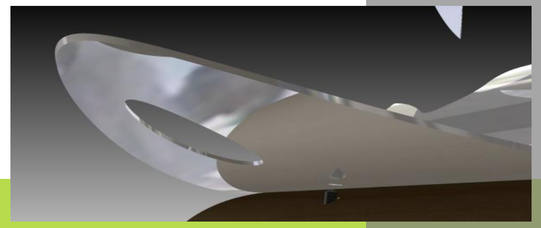
The solution to this problem was to simply extend the metal used in the shade, so that it could house a bulb, this saves a lot of material, time and energy. It also looks more refined and more aesthetically pleasing, removing the need for even more screws, and less parts if the product had the potential of being flat packed

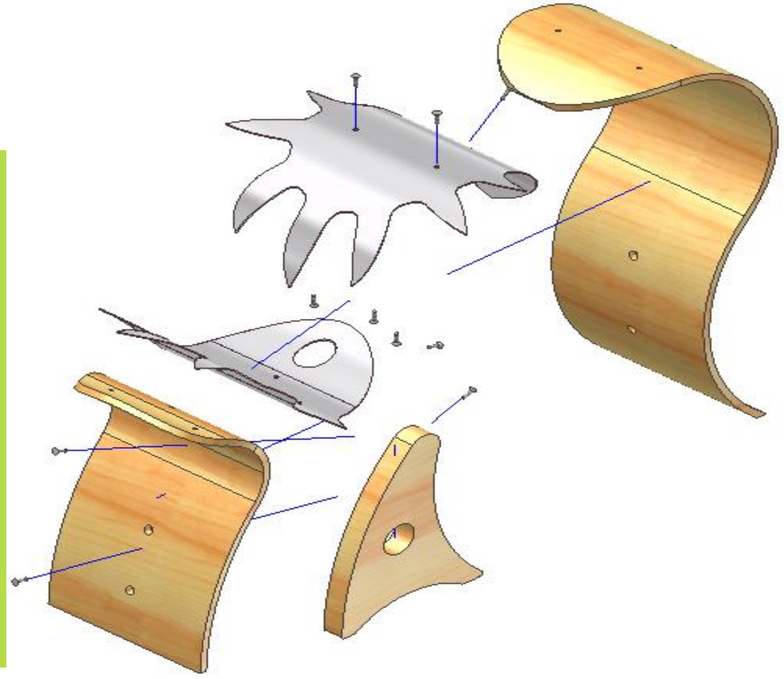
Final design, exploded view & technical drawings

To the right are the final rendered drawings of the design and the wire model showing the construction and interior of the product. On the left is a physical 3D orthographic showing the product from different views. Below is the 2D is the orthographic drawings with a parts list, there is also an exploded/construction view showing how the product will fit together. It also shows how the product is flat pack and only needs to be screwed together to be assembled. There are various rendered shots of the product showing, more closely some of the fittings and components of the product

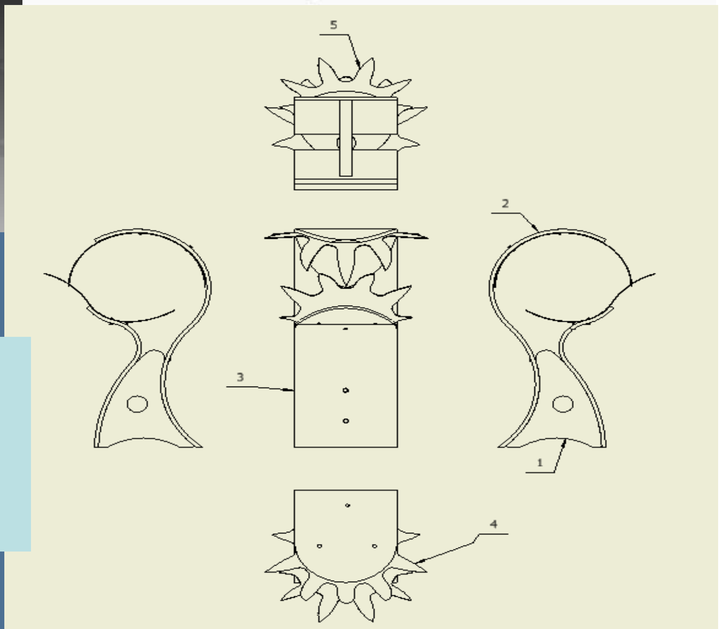








1) Middle base, made of pine
2) Stem 1 made of flexi-ply
3) Stem 2 made of flexi-ply
4) Lamp shade 1 made of aluminium
5) Lamp shade 2 made of aluminium



Outcomes

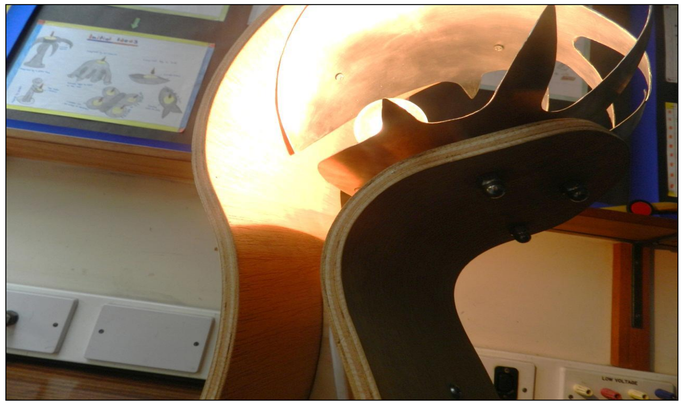
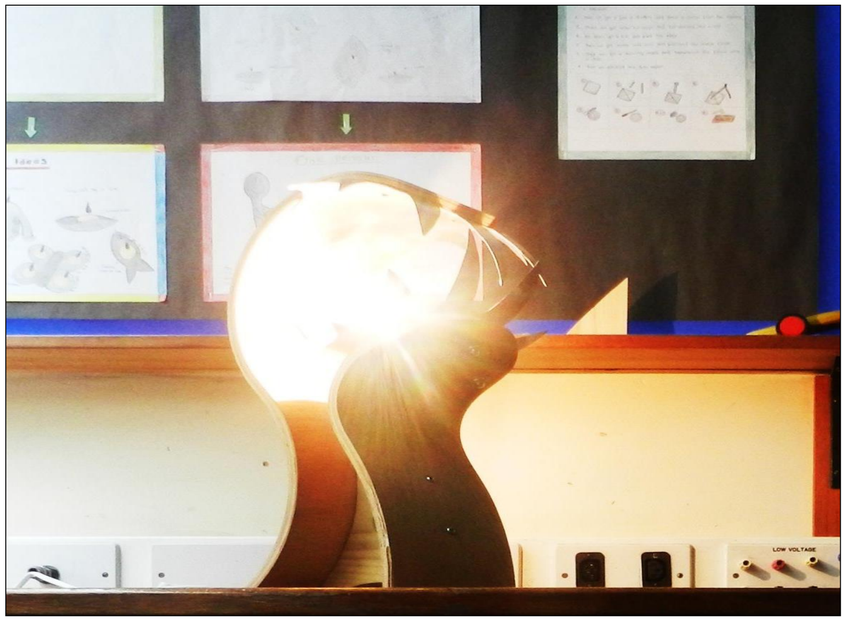


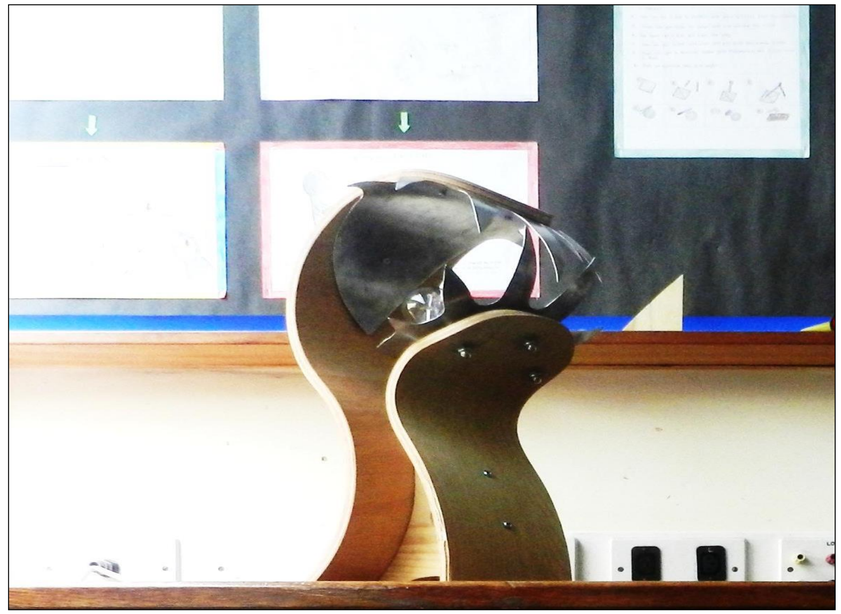






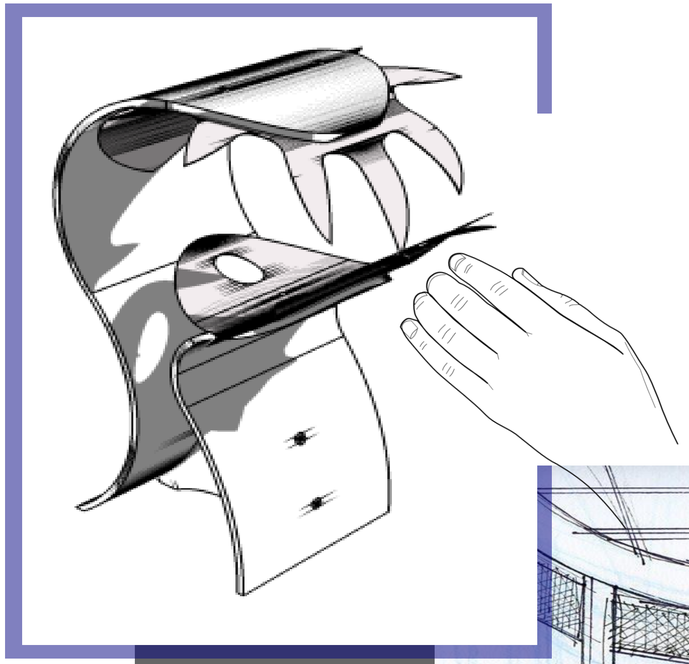


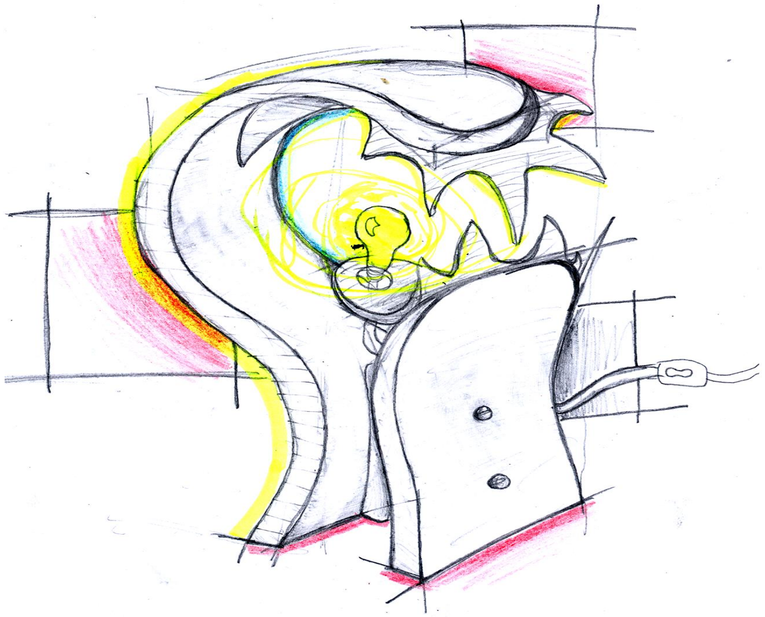




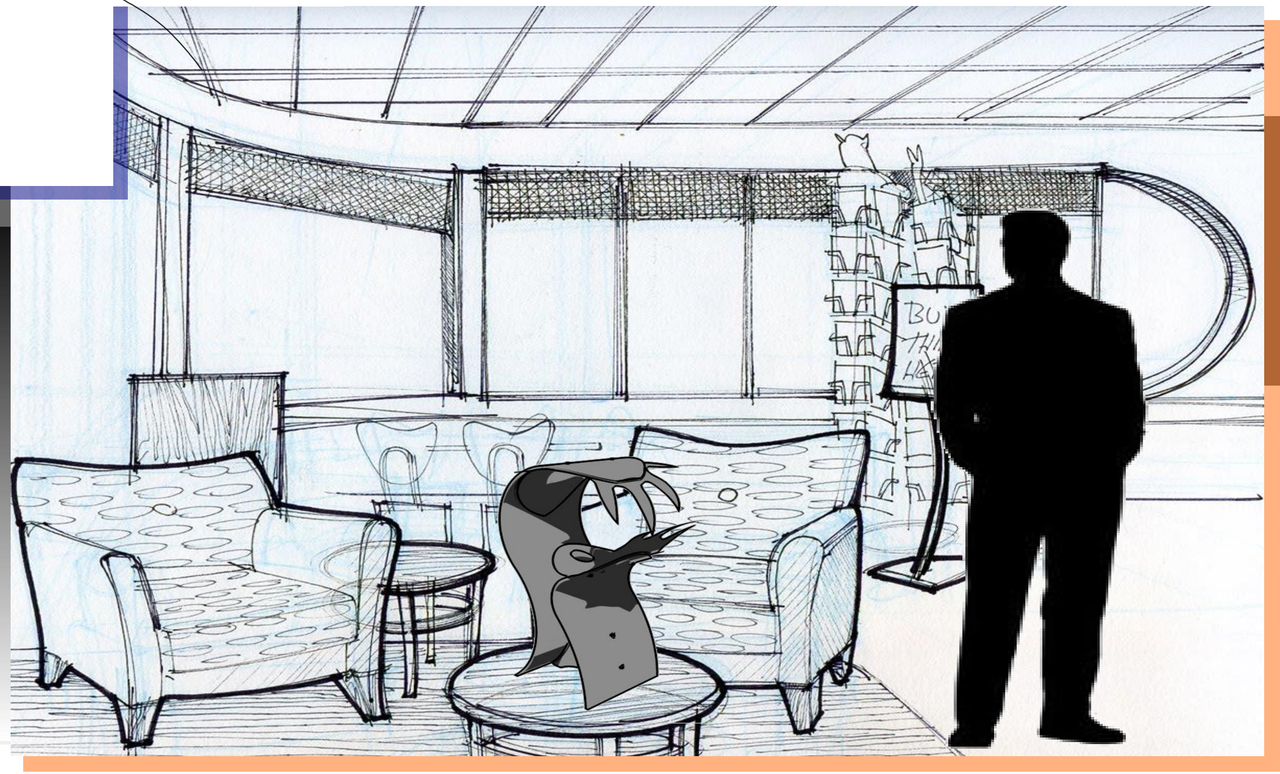


Manufacture and Testing

Allure lighting







Ysgol DinasBrân

Pupil Self-Evaluation

What have I learned about myself as a learner?

I was good at _____

_____

_____

It was difficult to _____

_____

_____

I would like to do more _____

_____

_____

I will use this skill again when I _____

_____

_____

Use this space for sketching or diagrams if they will help you show your learning.

I estimate my current level is: …….

Make a full evaluation of the final product comparing it with the initial intention. The evaluation must be a piece of continuous writing

In my specification I first stated that “my dock” must fit on a desk top. I believe I succeeded the first point because my dock wasn’t overly sized and was made to fit in the boundaries I set. The materials I specified were acrylic plastic sheet, acrylic rod and threaded steel stud bar. When I actually made the dock I decided to mainly use acrylic plastic because I didn’t want to go over the top on materials and I wanted to keep the balances in terms of colour and style. I stuck to three main colours for the dock and I stuck to these when choosing the colours of the acrylic plastic. The three colours were blue, red and purple. I initially stated that I wanted the cost of the dock to be set at a reasonable price which would make a decent profit, but I also stated I did not want to alienate the target market by pricing it to high. In making the dock I used around £25.00 in acrylic plastic and £19.00 in electrical components. My total outlay came to just over £50.00 which is a good price for a prototype product. I pushed myself to the limits of my knowledge and my practical skills. I learned a lot and had to be much more organise than I usually am to make the most of the Controlled Assessment lessons. This meant I planned carefully and practiced skills and processes so I could make the most of the time available.

Plus points:
I think my product is very attractive. I think I could use it to persuade a company to work with me to manufacture it.
The structure is very strong but it is rather heavy.
I am very pleased with the way the die sublimation printing went. I think it really adds a visual impact to the front of my dock and makes it stand out. In order to do the die sublimation printing I had to practice. All of our class had already made key rings to learn how to use it but I decided to practice some more and printed a funny picture on a mug for my dad and printed my sisters favourite band (The Wanted) on a pencil case for her. I then felt confident to do the printing in the CAT time.
The materials look really good and have a very nice finish. The mirrored acrylic was very successful on the back.

Minus Points:
The dock is quit expensive if I was going to sell it as a commercial product. I would be competing with premium brands like Bose if I wanted to make a reasonable profit.
While my product is unique it would be hard to compete against established brands.
Happily, I made it as a prototype to test my ideas and possibly use it to ‘pitch’ the idea to a manufacturer. With that in mind the cost is actually quite cheap.
There are a number of improvements I would make and I will go into detail on those on the next page.

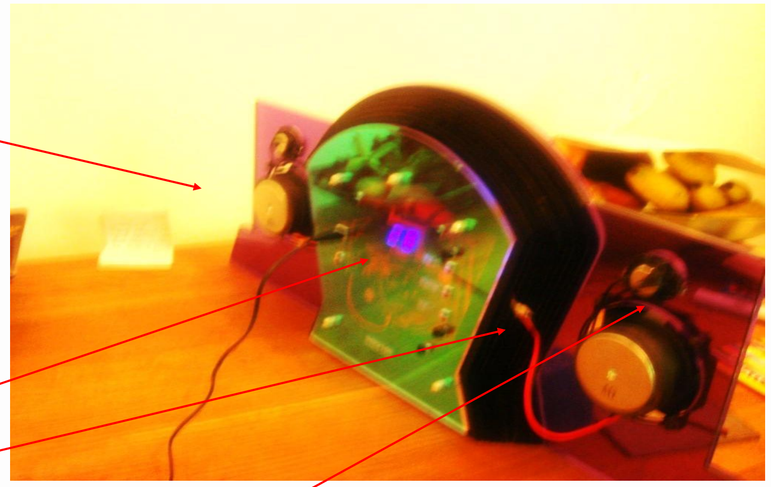
Other Peoples Views:
I have received mostly positive Reponses from the people who have seen my product. Even people who don’t say anything positive haven't said anything negative so I think that is good
A lot of my class mates like the idea and the look of my dock and that is particularly good as they are in my target market age range. Even my teachers who are definitely not in my target market age range have been positive about the look of my product.

Specification:
I feel I have addressed all the points I identified in my specification and I am very pleased with the result. It is safe and easy to use. It functions very well. It uses materials I am confident in using and the school has the equipment to shape. The cost has come out OK. The environmental impact is relatively small as it is easy to repair and disassemble at the end of it’s life.

Now that you have evaluated your final product put forward suggestions for improving the design and also suggesting any improvement of the manufacture to ensure a better quality product.

If I was likely to change anything I think I may re-design the back, in particular where the speakers are. I think if I covered the back of the speakers it may improve and amplify the sound better.

I think I made this prototype product as well as I could allowing for my skills, the available materials, the equipment that I had access to and the time available. But I would not make a commercial product in this way. An improvement I would make would be to contact an injection moulding company to have the case made out injection moulded ABS plastic.. The mould tools would be very expensive and the tooling would cost in the region of £6,000 pounds from a UK company. I could reduce this to around £2,000 if I used a Chinese company to make the moulds but it would take much longer for them to arrive from China and if there was a problem it would take a very long time to sort out by sending them back etc. All this time waiting would be lost sales so I would have to think very carefully about which manufacturer I would use.



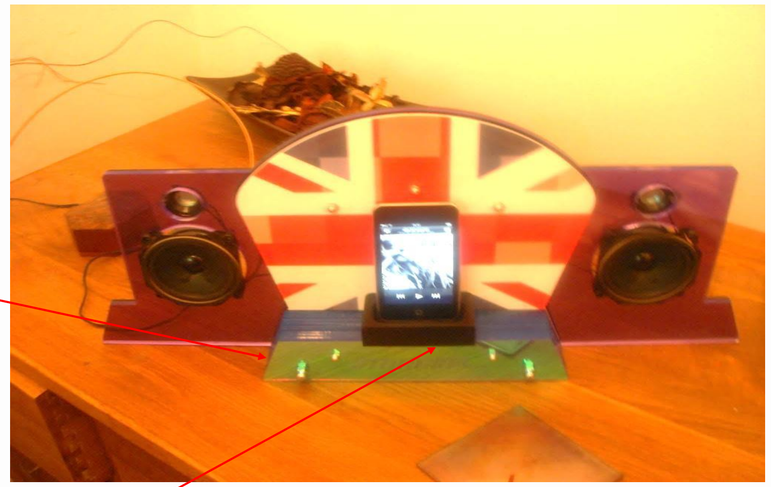
An element I would improve is the volume display. It does not sit flat to the back and I would move the circuit board mounting rods slightly so it would sit flat.

I would tidy up my wiring at the back and secure it in some way.

I would find an alternative mechanical way of fixing the tweeter' to the dock. The adhesive I used holds I fine and is the same way the manufacturer of the dock I disassembled held them in place this way but I feel it is a bit 'cheap and would look better held in place with a bracket and Allen screws – it would also be better for maintenance.

At the front I would make some custom captive lock nuts either out of stainless steel so they cold be polished or chrome plated steel.

I would try out different methods of securing the iPod connector as it works well but I am not very keen on the ABS plastic housing salvaged from the old case.



PlanForMaking

Flow Chart

Open and check CAD files on PC
connected to laser cutter
Set up laser cutter for speed and power.
focus for thickness of acrylic.

↓

Set laser cutter to go and supervise while cutting.

↓

Run until all part made and supervise while cutting.

↓

Check accuracy of cut components
and edge finish.

No → (back to: Open and check CAD files on PC connected to laser cutter)

Yes

↓

Message out the size the centre pole should be in
proportion to the number/size of the bottle holders,
then cut the unwanted amount off and
apply finish to the centre pole.

↓

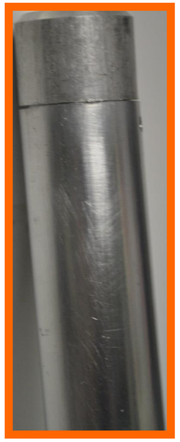
Make thread in the end caps and screw them on to the
centre piece pole.

↓

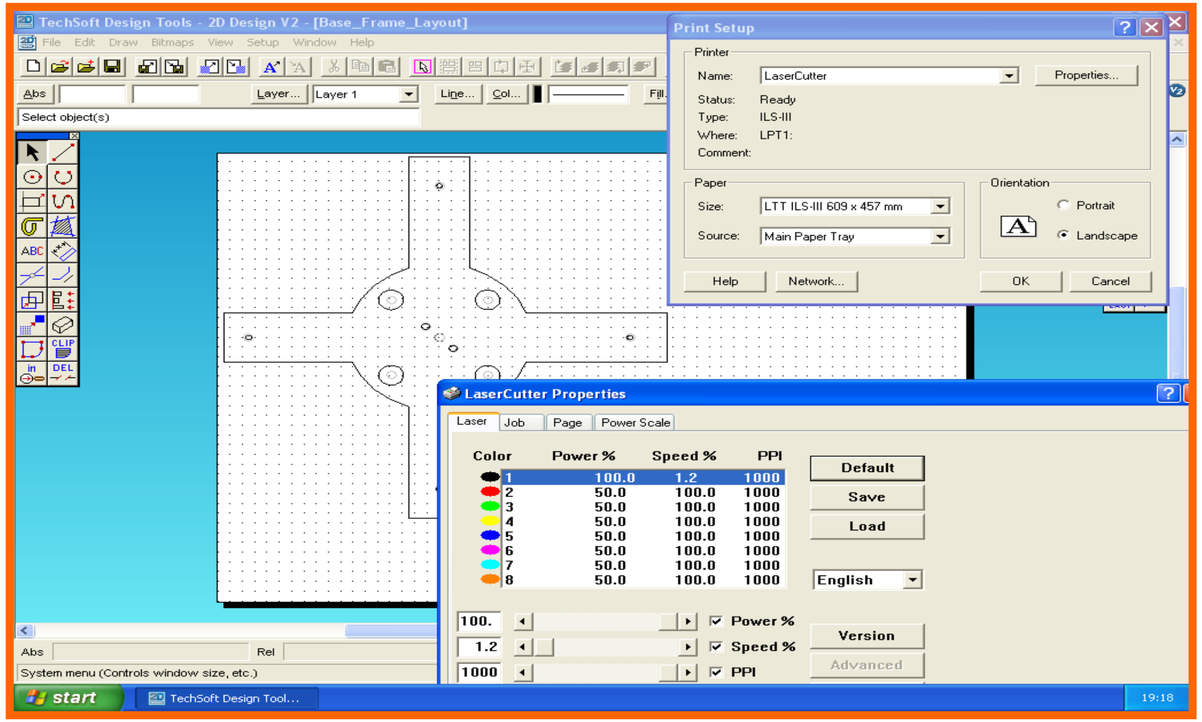
Measure out the size need for the base and cut
out the base. Afterwards assemble the pieces
together and fix the centre pole onto the base.

↓

Lastly for the proportion sail, which will be fixed to
the top end of the wine rack, I need to apply
the same rules used to cut out acrylic.



This is how I'll set up/ use the laser cutter.



Summary

How did you share your research with others?

- Within the school
- Within the Local Authority
- Across Wales
- In England
- Internationally.

Key Points

- Remember, teachers are the gate keepers
- Teachers must believe creativity can be taught
- “The key elements of creative tasks are in place e.g. ambiguous and risky, but include ‘task directed scaffolding’ (Nicholl 2008)
- The creative process may be inspired by virtually anything and supported by the ease of access, manipulation, and the possibilities of tracking the development of ideas or revisiting them in order to explore other possible routes.

What is my advice to other teachers?

- Start small
- The learning environment must be conducive to creativity
- Base your starting point on something you can measure from
- The best thinking strategies and tools are the ones that get used
- In order to be Creative you have to Do something
- Don’t be afraid to share your thoughts and resources with others
- Don’t take negative comments personally.

Acknowledgements

- Bill Nichol, (University of Cambridge Faculty of Education)
- Steve Stott, (Autodesk)
- Professor Howard Gardner (Quotes and much more)
- Sir Ken Robinson (Quotes and inspirational educator)
- Dr. Mihly Csikszentmihalyi (Quotes and creative understanding)
- Dr. Edward DeBono (PMI and other thinking tools)
- Tony Buzan (Mind mapping)
- Matthew Bell (Autodesk)

“Creativity is no longer an option.”

Howard Gardner

Thank You For Listening