GCSE RESISTANT MATERIALS

DESIGN & TECHNOLOGY
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Docking Station Example

Analysis of Design Task

Investigating the Design Context

I need to make sure that I do this so that my product fits into the specification.

The product needs to be popular so that it will sell and make money.

My product needs to be something that people that go to museums will buy.

Design Task: A major **design museum** wishes to expand its range of products on sale in the museum shop. It wishes to sell **popular** products **influenced by major design eras of the last 100 years**. Design and make a **low-voltage light**, radio, phone charging stand or **iPod docking station** in the style of a design era of the last 100 years. You can use **brought in, or recycled components for electronics.**

If I include a light it will need to be low voltage

This is what I am going to make because I think it would sell better than the other choice of products to make.

I would probably use brought in electronics as I don't have any to recycle and it will be better quality if they are new

I Will need to Research:

- Several different eras of design over the past 100 years, so that I can choose my favourite one.
- I will have to find out the iPod size so that I can design the dock around it.
- I should find out different materials that I can use to make an iPod dock.
- I should find out the cost of the materials that I want to use so I know if it would be possible to make a profit if I used them.
- I should find out if people would buy my product.
- I need to find out which one of my designs would be most popular.
- I should find out which would be better battery powered or mains powered.
- I should find out what exact target market I should be aiming the product for.
- What processes I will have to do to make the product.

Target Market/User Profile

Investigating the Design Context

My target market/users are: 12 year olds to 16 year olds

Question	Person 1	Person 2	Person 3	Person 4	Person 5
Would you want your iPod dock to do anything more than play music	Yes, I think it should have a light on it aswell	No because I would only use it for music	No I would only use it for music	It could have a clock on it aswell	No I don't think it needs anything else
Would you buy an iPod dock and for how much?	Yes, Around £35 but not too much more	Yes, £30 tops	Yes, £60-70	Yes, around £20	Yes, up to£100
What materials do you think you would like an iPod dock to be made out of?	Thermo setting plastic and/or wood	Plastic and metal	Hard plastic because its durable	Wood because I like the texture	Wood and metal
What colour would you like your iPod dock to be?	green	Plain coulers like black or silver	Blue	black	Silver and brown
How big would you want your iPod dock to be?	About 30cm long	About 20cm long	Around 20cm long	Quite small just a speaker with the plug	Medium sized about 20 – 30 cm long

Summary
Most people aren't really bothered if it can do more than play music or not, so I probably won't have my dock doing anything more as it will increase the cost.
Most people would pay around £20 –30, this means that my product must cost at the very most £20 to make because otherwise I wouldn't be able to make a profit.
From the feedback people don't really want all the same thing but wood came up quite a lot so I will probably use this as my main material.
People mainly want quite plain colours
Most people seem to want their docking station about 20-30cm long so I will make sure that my ipod dock designs will all be about this size.

IPOD SIZES

1.14 x 1.24 x 0.34 inches (29 x 31.6 x 8.7 mm) including clip

1.48 x 1.61 x 0.35 inches (37.5 x 40.9 x 8.78 mm) including clip

3.6 x 1.5 x 0.24 inches (90.7 x 38.7 x 6.2 mm)

4.1 x 2.4 x 0.41 inches (103.5 x 61.8 x 10.5 mm)

4.4 x 2.3 x 0.28 inches (111 x 58.9 x 7.2 mm)

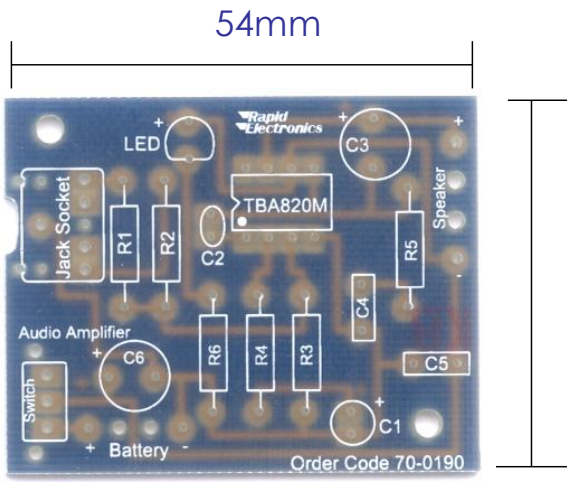
I need to make sure that my iPod dock will fit the iPods so the iPod sizes will help me to make sure that I don't make the part where the iPod goes too small otherwise my dock won't be very good and may not be able to plug the iPod in.

I will use a transistor amplifier in my iPod dock because this has two speakers, and I will need a speaker on each side of my iPod dock.

I will use an AUX port to plug my iPod into the dock.

AUX port

I have measured the size of the electronic components that I'm going to use in my docking station so that my designs take into consideration where the circuit, speakers and batteries are going to be situated.



L 48.5 mm
W 26.5 mm
D 17.5 mm

NAME:

Product Analysis

Investigating the Design Context

ACCESS FM	Analysis Information
Aesthetics Describe the look of the product	It looks quite modern and has a relatively simple design as it is basically an oval shape. It is pain black so it makes it look sophisticated. I also like the remote control which is also an oval shape and would fit in your hand well.
Customer Who is the product aimed at? Is it suitable	I think that the product is aimed at people who have an iPod and like listening to music out loud, I think it is probably for people who are older than 16 because it is quite expensive and when you are younger you don't really spend that much on speakers.
Cost Is the price reasonable	It is about £390 which is quite expensive so I probably wouldn't buy it as I think you can get just as good ones for a cheaper price.
Ergonomics Has the designer made the product easy and comfortable to use?	The remote control has been designed to fit comfortably in your hand as it is a round oval shape, this will also make it easier to use.
Safety How safe is the product to use?	It looks pretty safe although it might be a little bit unstable as it doesn't have a very big base. To use it looks quite safe though as the remote control makes it more easy to use so it makes it more safe
Size Can you transport the product or not? Where will it be used?	The product is quite big so it isn't really portable, you would probably put it on a shelf in your bedroom or somewhere like that. It also probably wouldn't be that easy to store either because it is quite big.
Function What does the product do? How well does it carry out the function?	The function of the product is to play music from your iPod it also charges it while It plays, I think it carries out its function very well as it does all the things it is supposed to do.
Materials What is the product made of and why have these materials been used?	The product is probably made out of a plastic such as ABS to make it quite strong and also because it would make it easier to mould compared to a wood or metal.

Product Pictures:

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Product Analysis

Investigating the Design Context

ACCESS FM	Analysis Information
Aesthetics Describe the look of the product	The Dragon I iPod dock has a red and black glossy colour it is basically a rectangular box with tentacle type things coming out of it that hold the 4 speakers, the wires that hold the speakers can be moved to whatever position you want so the sound comes out to the direction you want it to. It also has a little slot that the remote control fits in so you have a place to put it so you don't lose it as easily.
Customer Who is the product aimed at? Is it suitable	I think the target market for this product is music listeners of about 16+ because it is probably too expensive for more younger people.
Cost Is the price reasonable	The cost is around £215 which is quite expensive but not too bad because it is so different.
Ergonomics Has the designer made the product easy and comfortable to use?	The designer has made it quite easy to use because you just put your iPod in and then you can use the remote control to put on your music.
Safety How safe is the product to use?	The product is quite safe because it doesn't seem to have any really small or sharp parts to it that anyone could swallow or cut themselves on.
Size Can you transport the product or not? Where will it be used?	You probably cant transport it that easily as it is quite big. You would probably have it on a shelf or on your bedside table.
Function What does the product do? How well does it carry out the function?	The product plays music from your iPod out load, it carries out this function well because it does that with a good sound quality.
Materials What is the product made of and why have these materials been used?	The materials it is made of with probably mainly be made of a plastic such as ABS because this can be used to case electrics. It would also be quie good because it is reasonably hard and would be easier for the manufactures to mould compared to a metal or wood.

Product Pictures:






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Scandinavian Modern Design era

I have chosen Scandinavian modern design era to base my iPod dock design on.

Common materials are:	Common features are:	Common colours are:
Wood	Curved edges	Black
Plastic	Only one main colour	Brown
Leather	Box shapes	White

I like this design era because of its simple designs, minimalism and functionality

The parts of Scandinavian modern I will use in my iPod dock designs will probably be the curved edges, the wood and using only one main colour.

Scandinavian design started in the 1950s in Scandinavian countries the main three countries were Denmark, Norway and Sweden.This design era is well known for minimalism functionality and producing products quite cheaply. They took the basic concept of modernism and added traditional materials. An common material of Scandinavian modern is wood this is because it is an easy material to get hold of in Scandinavia for a cheap price.

The most well known Scandinavian design shop is Ikea which comes from Sweden.







TARGET MARKET/USER PERSONA
INVESTIGATING THE DESIGN CONTEXT

NAME | NIGEL SMITH

AGED 17

He is always on the go and grabs food when he has time

Loves music and the sound quality is really important to him

Love extreme sport and likes to listen to music whilst on his skateboard

He always uses is iPhone to store all his music and apps

He has loads of gadgets that can fits in his rucksack

Works as a pot washer at the local pub to earn money

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NAME:

Summary of Research

Investigating the Design Context

Source	Information Gained	Usefulness of the Information
Apple website http://www.apple.com/uk/ipod/compare-ipod-models/	Sizes of iPod and iPod images	This will show me how big I need the area where the iPod will go on my dock.
http://www.google.co.uk/products?q=ipod+docking+station&hl=en&aq=f	Existing product pictures	This shows me existing products so I can see different things that real iPod docks have and their features and materials
http://en.wikipedia.org/wiki/Transistor#Transistor_as_an_amplifier	That you can use a transistor for an amplifier	I know what amplifier will go into my iPod dock

Summary

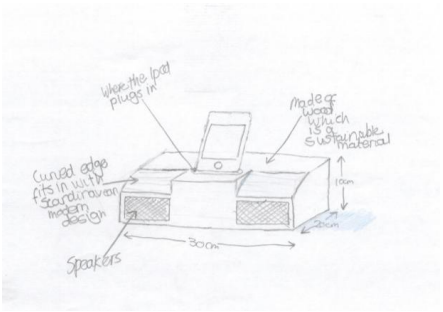
From the existing products I have learned that they all have a smooth looking finish and don't use any more than 2 or three colours, they are also quite modern looking and are made in durable materials so that it won't brake too easily. From the Scandinavian modern design era I researched I also saw that they only tend to use 1 or 2 different colours so my design ideas shouldn't involve too many different colours as this then wouldn't fit in with the design era. The Scandinavian design era also tends to use quite a lot of wood such as pine so it would be good if my design used wood as well. My target market will be 12+ because people under that age don't often have iPod's or listen to music that much.

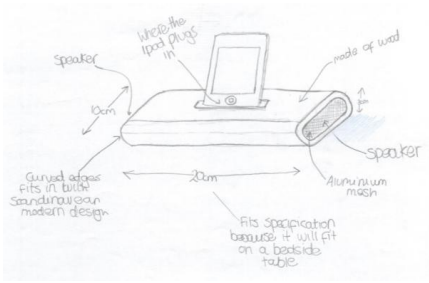
Function – My product should play music from most iPod's because this is what the design task was to do, this is the main thing that it should do so if it doesn't play music then there will be no use for my product
Performance – It will play music by using a transistor amplifier. I have chosen a transistor amplifier because I think this should be good enough quality for my iPod dock.
Area of use – My product will be used in the home on a bedside table because this is the main place where someone would use an iPod dock, so I should make sure that is not too big to fit on a bedside table.
Target Market – My target market is going to be 12+ because this is the area of people that are most likely to buy and use an iPod dock and people under this age probably won't have an iPod or listen to that much music so there would be no need for them to use an iPod dock
Aesthetics – It will have features from the Scandinavian modern design era by using curves or wood or bright colours this is because one of the things we have to do for our project is to design our product around one design era
Materials – I would like the materials that I use to be relatively cheap so that I keep under budget and materials that are easy to work with so that I can get my product to a good quality because if the materials are too expensive then I won't be able to make a big profit also if the materials I use aren't very easy to work with then the quality of the finish might not be as good as it could be.
Manufacturing – I will only be making one so I won't need any jigs or templates, however if I was making several products or making a batch then I would make a jig to mark out my wood so that it would take less time.
Cost – It shouldn't cost any more than £15 to make, other wise I wouldn't be able to make a very big profit which would mean that it wouldn't really be possible to sell it in a museum which is what part of the design task was to do.
Safety – It shouldn't have any sharp edges or small parts and all the electrical parts should be safe, if it is not safe people won't buy my product or if they do it could result in injuries.
Environmental issues – sustainable materials will be used like wood and if I use plastic it will be recyclable, this is because then my product will be more environmentally friendly and so it could make more people want to buy it.
Durability – The product should withstand regular use without breaking easily because if it breaks quickly people would want their money back. I Can do this by using durable materials that will not wear easily and by making my product as good quality as I can.

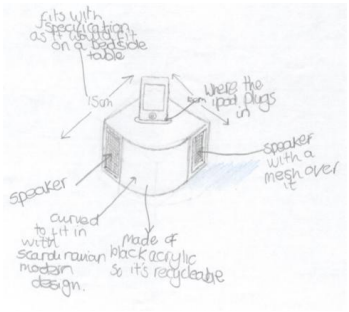
My product should be popular and should be a product that could be sold in a museum. It will have features from the Scandinavian modern design era by using either wood, curves or bright colours. Also it should use at least some sustainable or recyclable materials such as wood. It should play most iPods with good sound quality.

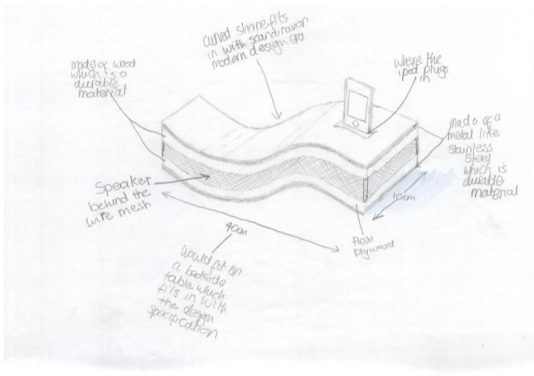
Design ideas

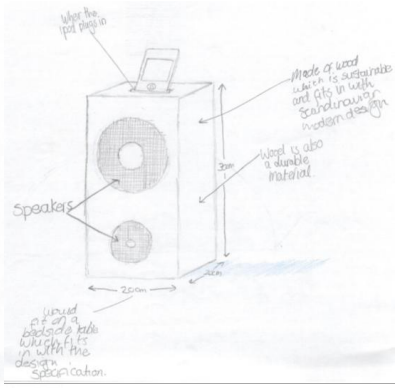
Developing a Design Proposal

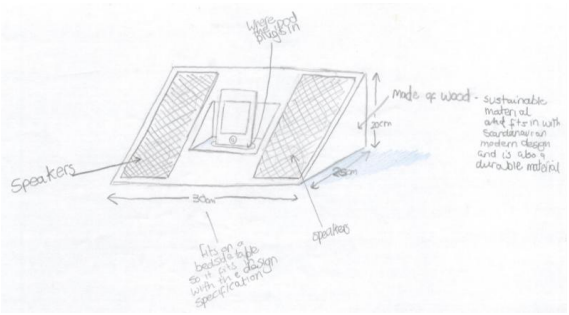






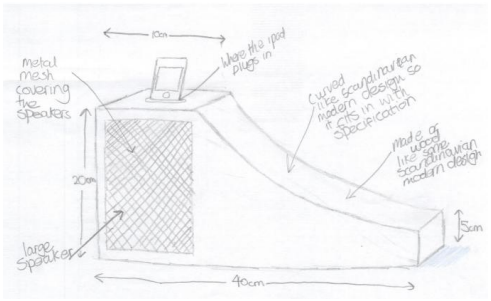


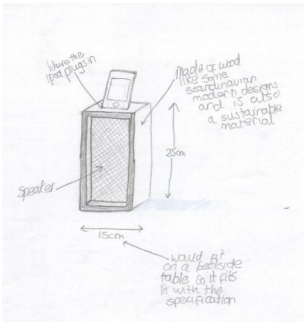


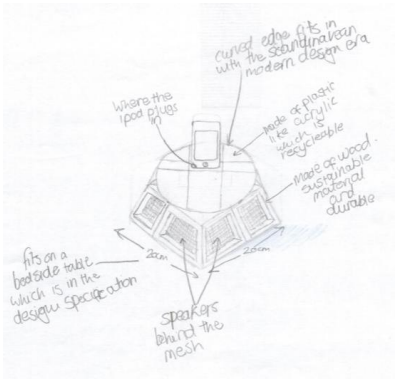


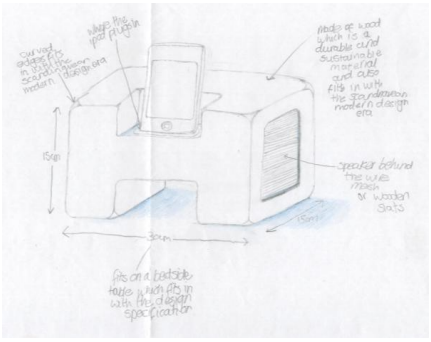
Design ideas

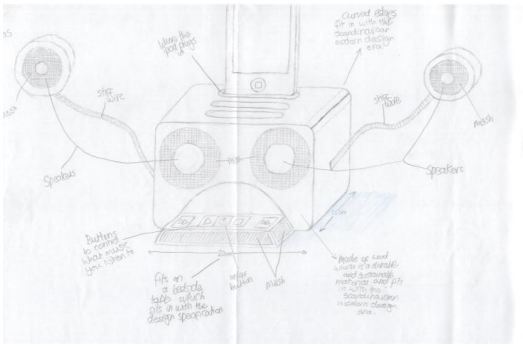
Developing a Design Proposal











Design ideas - Evaluation

Developing a Design Proposal

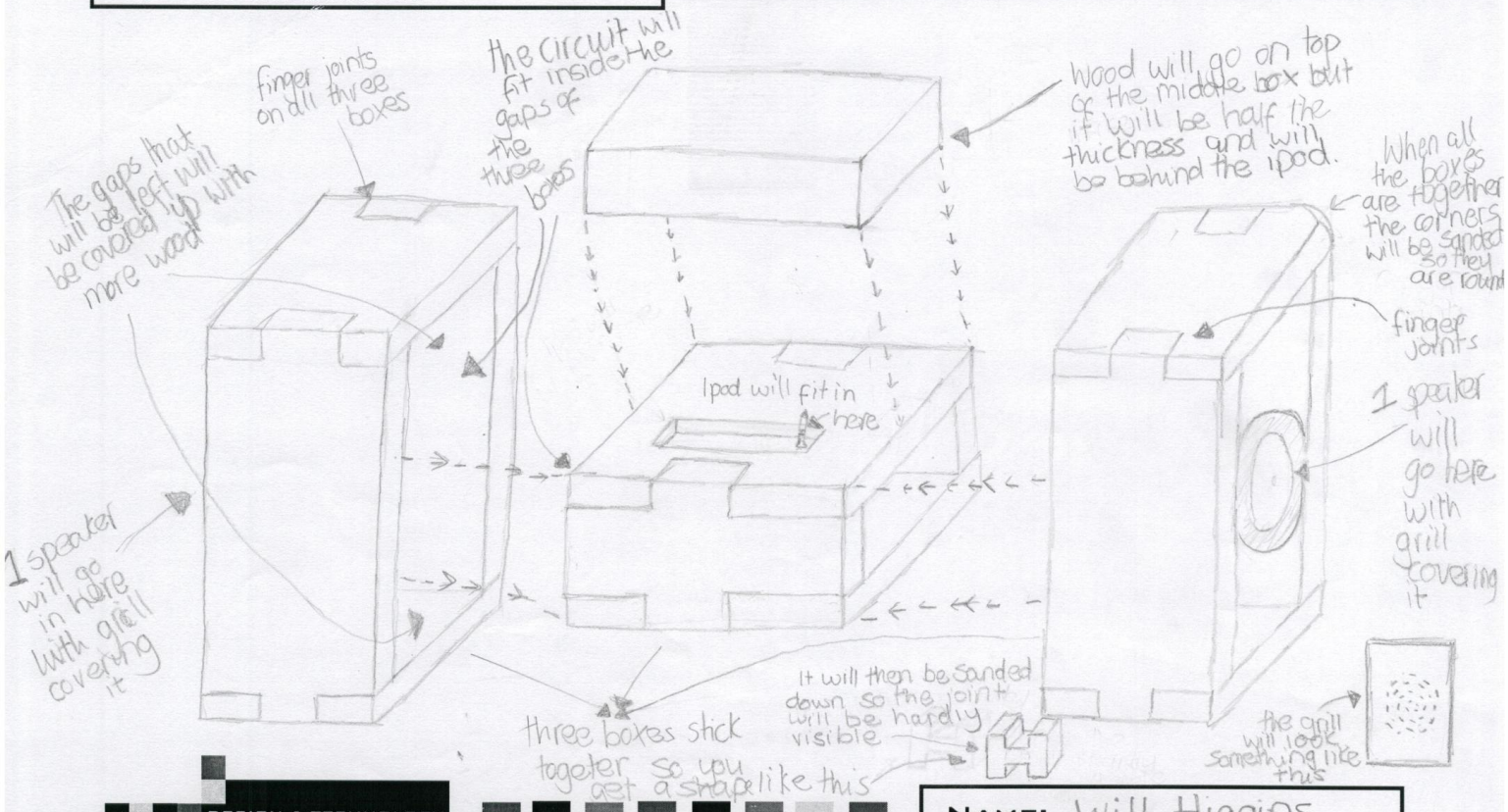
Specification Criteria	Design Ideas						
	a	b	c	d	e	f	g
Fits in with Scandinavian modern design	4	4	3	4	3	4	5
Made with durable materials	4	4	4	4	3	4	4
Made with sustainable or recyclable materials	3	4	4	4	4	4	5
Doesn't have any sharp edges or small parts	3	4	3	4	3	5	5
Easy to work with materials	3	4	4	4	4	4	4
Fits on a bedside table	3	5	4	3	5	5	4
Total points	20	25	22	23	22	26	27
Scoring	5= excellent, 4 = very good, 3 = good, 2 = average, 1= poor						

Summary:

Design G got the highest score from the design specification, this is because it fits well with Scandinavian modern design as it uses materials such as wood and it is also quite durable, it is also safe as well as it has no small parts or sharp edges. Another reason that it has won is because it uses wood and that can be recycled so it makes the product more sustainable. It is also my chosen design as the size means that it will be able to fit on a bedside table which is in my specification.

DEVELOPED IDEA

DEVELOPING A DESIGN PROPOSAL



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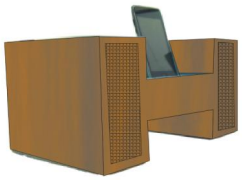
NAME: Will Higgins

Materials Used	Example	Why used?
Pine wood		To fit in with Scandinavian modern design, it is also a reasonably durable material and is easy to work with
Cast Aluminium		Because it is a durable material that I can use to make my product look good and also help to hold my iPod while it is docked. It is also a material that could be recycled.
Black Acrylic		This will be used on both sides of my iPod dock, it is a reasonably durable material and will give my product a good finish.
Rubber feet		These are used for my feet so that it doesn't mark any surface that you put the dock on

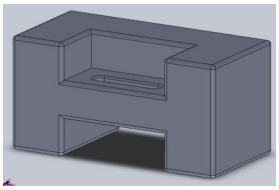
Model

Developing a Design Proposal

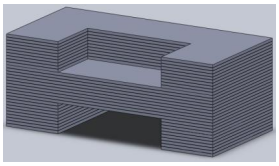
This is my model of my final design, I did the model to see what kind of size my ipod dock should be and also to give me an idea how it should be made



I have decided to make my iPod dock mainly out of wood, and this model gives me an idea of what it could look like in the end

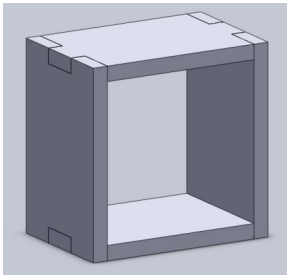


This is a modal of my design where I have used Solid Works, it shows me how it would look with curved edges instead of just straight edges like my other model



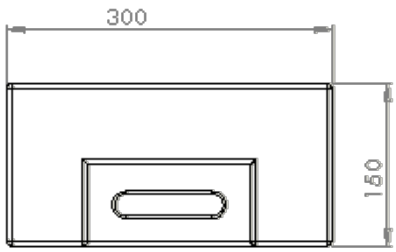
I could make my iPod dock out of layered plywood and this model gives me an idea of how it would look

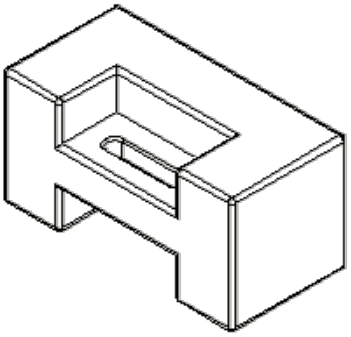
This shows my iPod dock in a bedroom on a bedside table to show where it could be used and to see how it would fit in its environment.

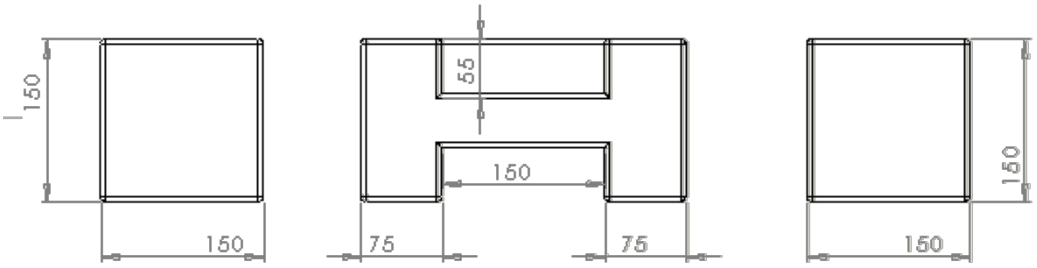


I have decided to make my iPod dock out of three boxes using finger joints this model made on solid works shows how each box will fit together

This is a working drawing of my product design, it shows the lengths of the sides on each side and also shows what the iPod dock will look like overall when it is finished.

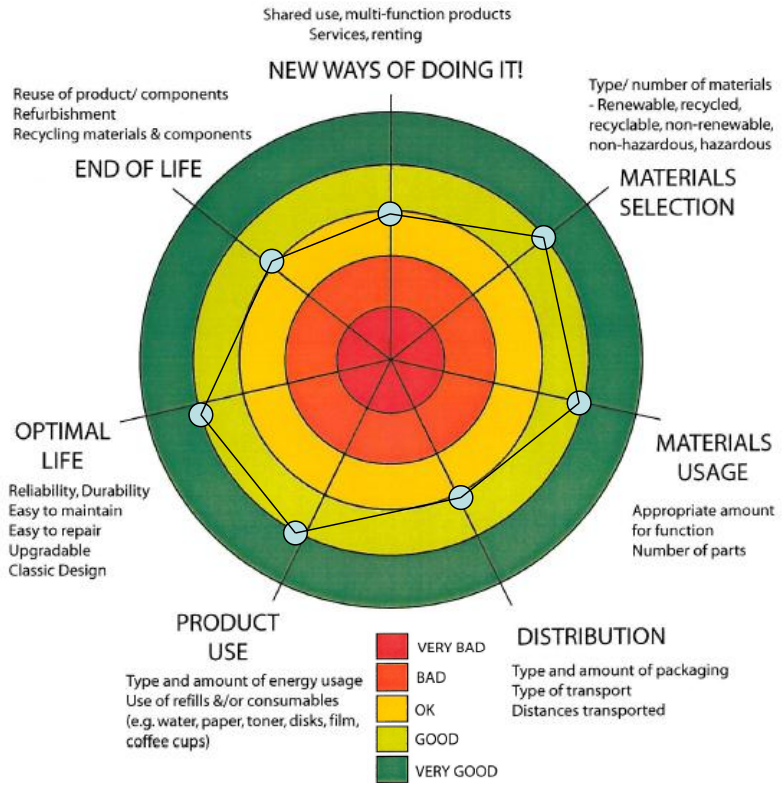






Sustainable Evaluation

Developing a Design Proposal



	Explanation
New ways of Doing it	The iPod dock I am making can be shared by people, however it isn't very multifunctional as it will only play music from different music devices such as iPods and some phones.
Material Selection	Most of the materials will be from a renewable source and should be recyclable, the materials will also be non-hazardous.
Material Usage	The material usage is good because for the function because there is not too much material used so not much is wasted.
Distribution	The distribution will be ok because the wood could be local but the speakers will probably be made in a different country
Product Use	The product will use a small amount of energy to play the music but it depends how much the dock will be used.
Optimal Life	The iPod dock I am making will be reliable and durable because it is made out of wood, and should also be easy to repair.
End of Life	At the products end of life it should be Recycled as the wood will be able to be recycled and also the speaker could probably be reused in another speaker.

Production Plan

Developing a Design Proposal

Tools Equipment:	Materials:	Processes:	Date Started: Date Finished: Quantity:

No	Task Description	Resources What you will use to carry out the task	Time	Quality Control Operational checks and tests carried out to ensure that the product performs to specification
1	Marking out the wood for my finger joints for my three boxes	Wood, ruler, pencil, square, marking gage	About 1hour	I need to make sure that I measure the marking out with a ruler accurately so that they are all the same size
2	Cut out my finger joints for the boxes	Coping saw, tennen saw, vice, the wood I am using	About 1hour	I need to make sure that I cut to the marking out lines and don't go over them otherwise they would be too big
3	Chisel out any parts of my finger joints that are too big	My wood. A chisel, wooden mallet and a vice	30 mins	I need to make sure that I don't chisel too far and should keep checking with the piece of wood it fits with
4	Glue together my pieces of wood to make three boxes and wait for it to dry	My wood, wood glue, the vice and a clamp	About 1:30	I need to make sure that my boxes are square I will do this by using a square
5	Glue on my block of wood onto the smaller box which will go in the middle and wait to dry	Middle box, my block of pine wood and wood glue	1hour	I need to make sure that the two are aligned I will use this by using a square
6	Spray the middle box with the block on top white	White spray paint and my middle section of my iPod dock	1:30	I need to make sure it is fully painted I will do this by coating it several times
7	Get my cast alluminium and mill it so it is straight and also mill the hole where the iPod will fit in	My cast aluminum and the milling machine	30 mins	I need to make sure I don't mill in too far so I will mark it out using engineers blue
8	Design the sides of my iPod dock on coral draw and cut them out on the laser cutter	A computer the laser cutter and some black acrylic	30 mins	I need to make sure they are the right size for my boxes so I will measure both sides before so it is accurate

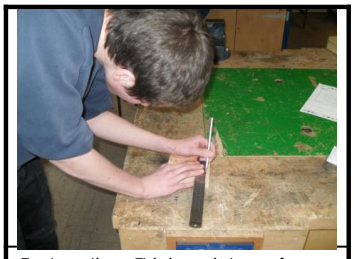
Production Plan

Developing a Design Proposal

No	Task Description	Resources What you will use to carry out the task	Time	Quality Control Operational checks and tests carried out to ensure that the product performs to specification
9	Glue together my three boxes and wait to dry	My boxes, wood glue and 4 clamps	1:30	I need to make sure that they are all square so I will use a square to do this
10	Drill a hole in my cast aluminum where the AUX part will fit in	The cast aluminum, the drill	5mins	I will measure the AUX cable to make sure that the drill is the right size so that it is accurate
11	Drill a hole in the centre of my boxes where the switch is going to go	My boxes and the drill	5mins	I will measure the switch so that I have the switch fits accurately
12	Glue on my speakers to the acrylic sides	The glue gun, my acrylic sides and the speakers	5mins	I need to make sure that the glue doesn't go through the holes so I will do this by sing only as small amount of glue
13	Solder together my speakers to the circuit board	Solder, soldering iron, circuit board and speakers	5mins	I need to make sure that I don't melt the circuit board so I will only hold the soldering iron on for a short time
14	Screw my circuit board into my boxes	Screws a hand drill my circuit board and my boxes	5mins	I need to make sure that the screws won't come through on the outside of the box so I will measure the screws and the thickness of my wood
15	Pull through the wires out of the switch hole and solder the switch to the wires and push the switch into the hole	A switch my boxes and the wires on my circuit board	5mins	I need to make sure that they are the right wires so I will test the circuit before I apply the solder
16	Attach a battery to the circuit board	The circuit board, battery	1min	I will test the battery to make sure it works first
17	Screw the sides onto my boxes	Hand drill, screws, sides and boxes	5mins	I don't want to split the acrylic so I won't screw the screw in too tight
18	Glue on my aluminum casting and pull through the AUX cable so it just poke out and wait to dry	Glue, aluminum casting, AUX cable	10mins	I need to make sure that the glue doesn't seep out so I will only use a small amount of strong glue
19	Design cut out and glue the parts of acrylic that cover the inside sides of my boxes	Computer, laser cutter, acrylic, glue and my boxes	20mins	I need to make sure that they are the right size so before I will measure the inside sides of my boxes to make sure that it is the right size

Manufacturing log

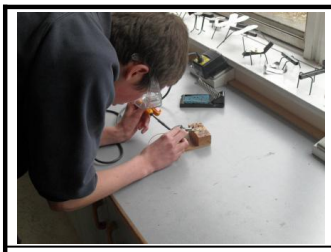
Making



Explanation: This is a picture of me marking out my wood

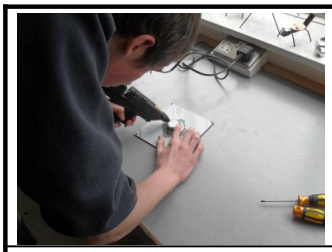
Explanation: This is a picture of me cutting out my finger joints

Explanation: This is a picture of me gluing my wood together

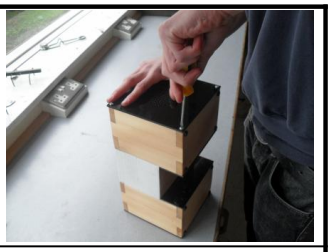


Explanation: This is a picture of me soldering the wires to my speakers

Explanation: This is a picture of me milling me aluminium cast docking part



Explanation: This is a picture of me gluing my speakers to my acrylic sides



Explanation: This picture shows me screwing on my acrylic sides

Explanation: This is a picture of me using Danish oil to stain my wood

I think my finished product looks good and I think the black acrylic has a good contrast with the light brown wood and the white painted centre box. It does everything that I designed it to do, and most importantly it plays music this is a good point as that is the main part of the design and although the sound quality isn't amazing this can't be helped as the circuit isn't the best quality.

This picture shows my iPod dock with an iPod Touch in to show that it fits

This is a picture of the front of my iPod dock showing the switch and the aluminium docking part

This is a picture of the back of my iPod dock showing the painted centre box and the Danish oil stained outer boxes

Specification Point	Specification point reached? (Yes/no)	How does the specification point improve the product?
Function-it needs to play music from different types of iPods	Yes	This improves the product as the main point is so that it plays music but it also helps as it can play music for more than one iPod as it can be more widely used with different people as not everyone has an iPod touch they might have a Nano instead so they can use it as well.
Environmental-it should have recyclable materials that can be reused to make it more environmentally friendly	Yes, because the wood that has been used could be recycled and also the cast aluminum that is used in the product can be re cast for something	This improves the product as it means that it impacts less on the environment which is good but it also might attract more people to buy the product if it is environmentally friendly.
Durability – The product should withstand regular use without breaking easily so should be made with quite durable materials	In a way because it is made out of durable materials and also the finger joints on my wood are quite strong but we haven't yet seen if it will withstand regular use	This will improve the product if it is durable because it means it will last longer so you don't need to replace it very soon and also it will improve the customer satisfaction if it lasts long.
Aesthetics – my product must fit in with Scandinavian modern design	Yes because it uses materials that are often used in this design era such as pine wood and acrylic	This improves the product because it was in the design brief for what we had to make that it should fit in with our chosen design era, I also think that it improves my product because I think it is a good design era and generally its products like good.
Area of use – my product should be about the right size to fit on a bedside table	Yes because it is 15cm by 30 cm so it should fit on a bedside table.	This improves my product because if it didn't fit on a bedside table then it would limit its use because that is probably the main place where someone would use it.
Materials- the materials should be easy to work with so that my product can be better quality	Yes because all the materials that I used were easy to work with such as pine that can be cut with a saw and acrylic that was cut with a laser cutter	This improves the product because if the materials are easy to work then their finish will probably be more neat and so will look better quality.

Modifications for making just one of my iPod docks

One of the modifications I would make to my product is that I would use better quality wood because the pine I used cracked very easily when I was chiselling out some of the finger joints to make them neater and more straight.

Another change I would make is that I would put a battery clip inside the dock so that it doesn't rattle around so much because with it at the moment it isn't clipped down so it can move around.

Another thing I would change is that I would use better quality speakers if I could because with the ones I have got at the moment the sound quality when you play music from an ipod isn't particularly good and it doesn't go very load.

Another change I would make is that I would do an insert so that my iPod will fit more close to the edge of the aluminium casting docking part.

Modifications for mass production

If I was to mass produce my product one change I would make is that I would make a jig for my pieces of wood so I didn't have to mark out every single piece of wood.

Another change I would make is that I would make sure that the materials I used were the cheapest possible because then I would keep the costs down and would be able to make a bigger profit.

I would also probably leave out the aluminium casting because it is too heavy and also too expensive so would bring down the profit I could make.

Evaluation: changes made during productions

One of the changes that I made was that I decided to add the aluminium casting docking instead of just having the iPod slotting into the wood, I also think that it improves the design of my iPod dock and I think it makes it look a lot better than it would without it. Adding the aluminium casting part also means that it has included metal, plastic and wood so it shows better quality and more parts to my design which is better as well.

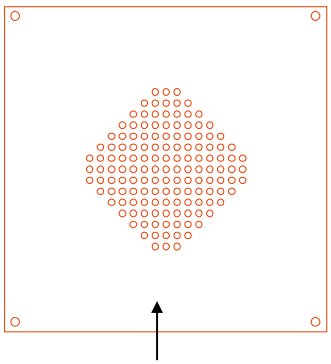
Another thing that was decided in making my iPod dock is where the switch went because I hadn't drawn that into my design idea to start with but I have put it in the centre box at the front in the middle of it.

Another thing that I have decided while making my iPod dock was that I decided to use black acrylic for my sides and to paint the middle box white, I think this was a good choice because I think it makes my product look better.

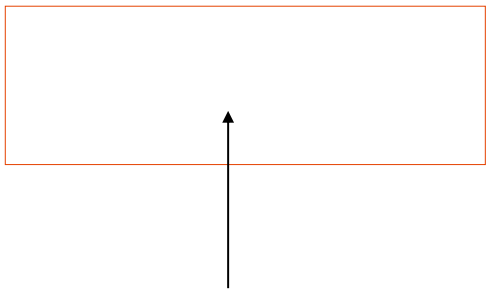
This picture shows the aluminium cast docking section that I decided to put in during production

This picture shows the black acrylic sides that I decided to use

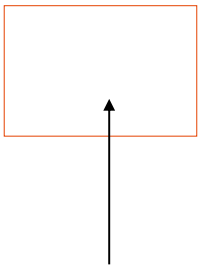
Parts that were cut out on laser cutter



This is my design for the sides of my iPod dock that I cut out on the laser cutter, I have put holes in the corners so that I don't have to drill the acrylic and risk breaking it. Before doing the design I measured the sides of my boxes so that they were the right size.



This is one of the parts that fits on the inside of the two outer boxes, before I drew it on Corel draw I measured the place it was going so that it was the right size, for this one there are no holes in the corners because I decided to glue it on instead of using screws so that it has a smoother finish



This is the other part that fits in the inside of the outer boxes, I also measured the space it was to be glued in before I made the rectangle on coral draw so I knew it was the right size