

Product Design Bridging Units

Task 1 (Technical Principles)

There are many materials that can be selected by designers to manufacture products. All materials have their own unique characteristics that make them more or less suitable for specific products. As a Product Designer or Engineer it is important that you have a wide understanding of different types of materials, what properties those materials have and how you might manufacture a product differently depending on material selection and what the product is.

Answer the following questions. It is expected that you will use **notes** as well as sketched **diagrams** that have annotations to explain them. You should use fine-line pen to make your sketches stand out and colour, where appropriate, to communicate key aspects of your diagrams.

*Tip: Look at the marks awarded for each question and try to ensure you make enough points in your answer to gain that many marks. An **annotated diagram** can be worth up to half of the total marks awarded.*

1. The photographs below show a Childs chair. The chair can be used inside or outside. It is designed for children aged 2 – 6 years old.



1 (a) The chair has been made from High Density Polyethylene (HDPE).

Explain in detail why this polymer is suitable.

[6 marks]

1 (b) The manufacturer will have taken steps to ensure the polymer does not degrade if the chair is used outside

Explain what steps the manufacturer would take to prevent polymer degradation.

[4 marks]

1(c) The chair has been rotationally moulded.

Use notes and diagrams to describe this process.

[9 marks]

2. The image below shows an armchair.

The chair arms shown in the image could be produced either from solid hardwood or from laminated veneers.

Compare the suitability of both materials for the chair arms shown. **[4 marks]**



3. **Figure 1** shows a plywood balance bike (left) and **Figure 2** shows a tubular aluminium balance bike (right).



Analyse and evaluate the two balance bikes in terms of their:

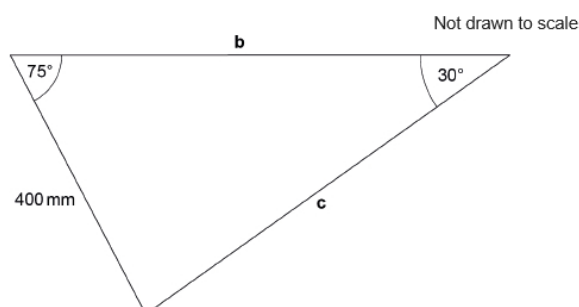
- suitability for mass production
- suitability of materials.

[12 marks]

4. The diagram below shows three tubes that make the front section of a bike frame. Work out the total length of tube required to make the front section.

Give your answer to the nearest mm. Show your working out.

[3 marks]



5 (a) Define the meaning of the term 'smart material'.

[2 Marks]

5 (b) Name a specific 'smart material' and an energy saving product that it is used in.

[2 marks]

5 (c) Describe how the properties of the smart material you have chosen enable energy to be saved.

[2 marks]

[Total 6 marks]

Task 2 (Designing and Making Principles)

Design Theory

As a Product designer or Design engineer it is crucial that you have knowledge and understanding of key design styles and movements and their principles of design. As well as, an understanding the work of influential designers and how their work represents the principles of different design movements.

I would like you to research **one** of the following Design Movements **or** Designers that inspires you and create a PowerPoint (max 3 slides) or Word doc (max 2 sides of A4) of information along with images. Nb. This must be your own work, do not copy from the internet as this is plagiarism and you will be asked to resubmit any work that is found to be copied.

Choose one of the following:

Design Movements

- Arts and craft movement
- Art Deco
- Modernism, eg Bauhaus
- Post modernism, eg Memphis

Tip: Talk about when the design movement came about, what made it famous and why? Materials and processes linked to the movement, show images of key pieces of work in that time, designers linked that movement. Add your own thoughts and opinions.

Designer/s

- Phillipe Starck
- James Dyson
- Margaret Calvert
- Dieter Rams
- Charles and Ray Eames
- Marianne Brandt

Tip: Talk about when they started their career, who they may have been inspired by, show key pieces of work, what makes them so iconic? Design principles they stick to, have they inspired others? How has industry changed because of their work? Do you like their work, your opinions.

Useful link:

designmuseum.org/

Task 3 (Upcycling Project- Design project)

Your task is for you to up-cycle/re-cycle/re-purpose a product. Take something that already exists and use it for a different purpose. Use whatever tools and equipment you have access to at home to produce another useful object. It could be something out of your re-cycling bin or something you find lying around. We want you to treat this as a mini project, you can have a little help but it needs to be your work and your own ideas. Maybe you have an expert in the family or a neighbour that can help or offer advice over the phone or at a safe 2m distance. Remember it's the idea that's important. You can use the web to help with ideas and techniques but try not to copy exactly, Pinterest is always a good starting point!



Video: [Kevin's Supersized Salvage](#)

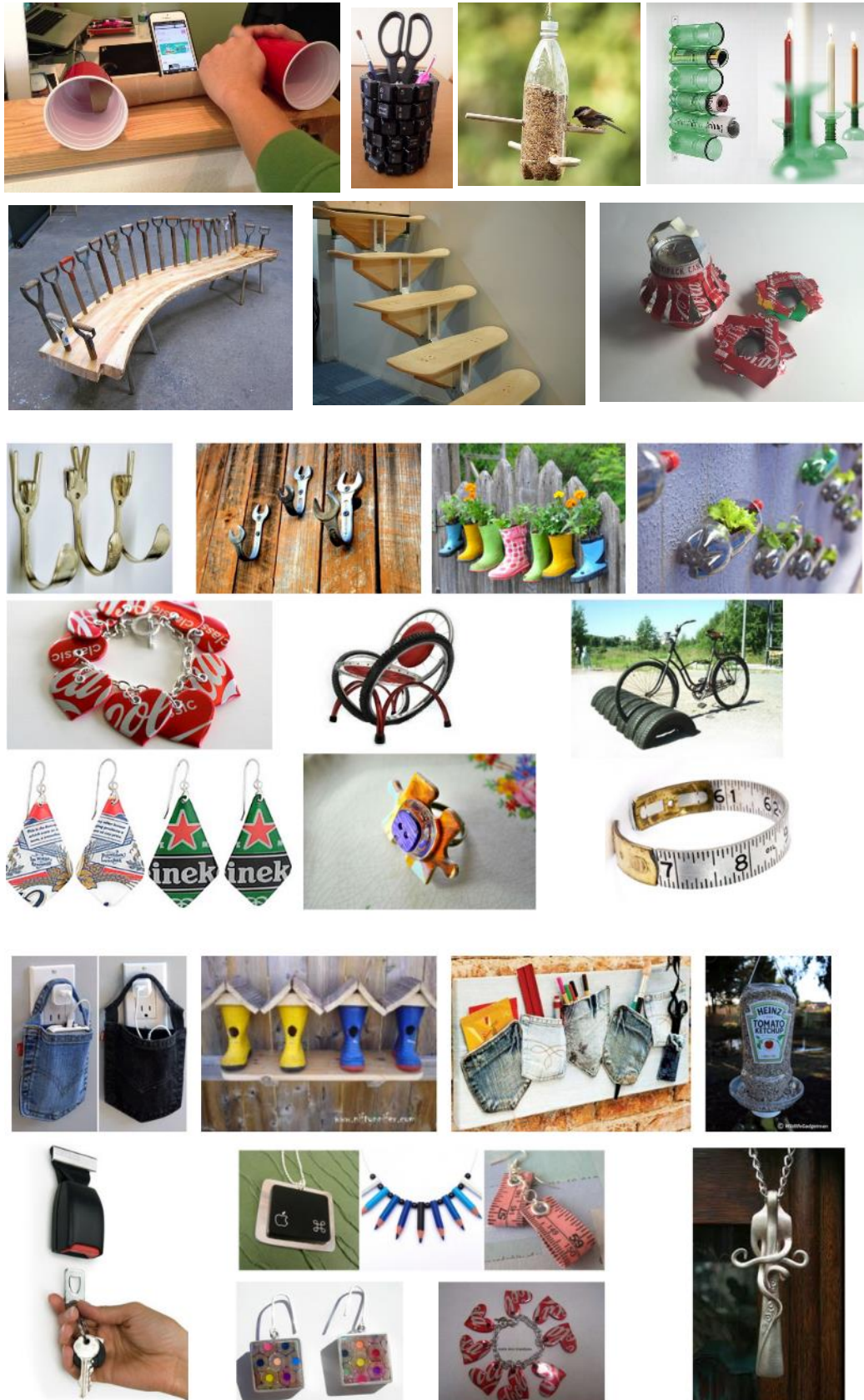
Examples:

Can you guess what they are? Can you research what part they were originally?



This page show you some of the research I have done into up-cycled products. Make sure you look in lots of places for inspiration. Talk to other family members/friends if possible see what their ideas might be. Have a look around your home for re-cycled, re-purposed, up-cycled products.

Look in your re-cycled bin, what do you have a lot of.



Set yourself up with a PowerPoint presentation. Other presentation packages are fine. Only have white backgrounds and use only 12pt text. Remember you can use your phone as a scanner (google it) or simply take pictures of your work.

Task 1

Problem (Research task 3hrs)

How much do we throw away? Research the world of rubbish. How many plastic bottles do we throw away? What happens to our old jeans? How much are the materials of an old mobile phone worth. Tell me in 250 words what you've found out. Don't copy and paste, use your own words, use diagrams to help explain your thoughts.

Task 2

6Rs (Research task 1hr)

What are the 6 Rs?

Explain, with a short paragraph, what each one is?

Task 3

Brainstorm (thinking task 2hrs)

What ideas do you have? Brainstorm/ mind map/ spider diagram as many ideas as you can, see if you can get more than 50. Talk to family member's maybe skype / facetime.

Task 4

Ideas (Design task 2hrs)

Communicate your ideas with drawing and annotations. Generate approximately 20 ideas. Make sure ideas are clearly drawn, show design detail, annotate to aid understanding. Don't forget to evaluate ideas to help work out which is best one. Again use others to help you decide.

Task 5

Development (Design 3hrs)

Choose your best idea and try to improve it (20 improvements). Remember you have to make this so your best idea might actually be your best 'you can actually make' idea. If you choose you could develop your best actual idea aswell.

Task 6

Final Idea (Design 2hrs)

Communicate your final idea. What ever way you think is your best way of communicating your best idea. Use 3D drawings (pencil crayon/ markers), technical drawings, CAD, isometric.

Task 7

Make product (Manufacture 5hrs)

Make your product with what ever you have at home. I know this will vary from scissors and sticky tape to full workshops. Please check you are allowed to use what ever you have found and you are safe to use what ever tools you choose. STAY SAFE. If in doubt don't! Photograph as you make, create a picture record of making your product. You may need a little help but try to do as much yourself as possible.

Task 8

Test and evaluate. (Written 2hrs)

How well did your product work? Are there any improvements you could make?

Problem Analysis:

As well as plastic and fabric waste, electronic waste can be a big polluter too. Each year we throw away 40 million tonnes of electronic waste away world wide. Of this only 12.5 % is recycled.



Recycle —to break down a product into its original materials and reprocess them to be reused into a different product. For example can parts be recovered from a product in order for them to be reused? Could it be made out of all one material in order for it to be recycled easier?



Repair- to fix or mend a product before throwing it away and buying a new one. For example, can the components be changed to fix the overall function? Can planned obsolescence be avoided?

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graph TD
    GI[Upcycling Ideas:] --> G[Glass]
    GI --> P[Plastics]
    GI --> M[Metals]
    GI --> F[Fabrics]

    G --> BT[bottle tops]
    G --> J[jars]
    G --> C[corks]
    G --> M1[magnets]
    G --> B[bottles]

    BT --> BTK[bottle top keyrings]
    J --> PL1[Planters]
    C --> CO[coaster]
    M1 --> CO
    B --> WB[water bottle]

    WB --> PL2[Planter]

    P --> MB[milk bottle]
    P --> CB[cardboard]

    MB --> WC[watering can]
    WC --> PL3[Planter]

    CB --> CT[toilet tubes]

    M --> BW[bike wheels]
    M --> TC[tin cans]
    M --> DC[drink cans]
    M --> L1[lights]

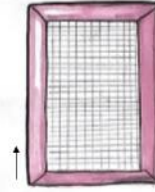
    BW --> CL[clocks]
    TC --> PL4[Planters]
    DC --> CH[candel holders]
    L1 --> L2[lanterns]

    F --> D[denim]
    F --> U[upholstery]
    F --> PS[potato sacks]
    F --> FN[fruit netting oranges]

    D --> P1[pillows]
    U --> P1
    PS --> EH[earring holder]
    FN --> PF[picture frames]
    EH --> PF
  
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Design ideas sheet 1 :

AN EARRING AND JEWELLERY HOLDER CAN BE MADE BY USING AN OLD PHOTO FRAME AND USING THE WIRING OF AN OLD SEIVE.

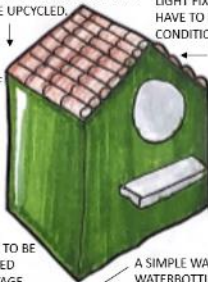


THE EARRING HOLDER WOULD BE AN EFFECTIVE PRODUCT HOWEVER MATERIALS SUCH AS THOSE FROM THE SEIVE ARE NOT IN GREAT DEMAND SO THERE ARE PROBABLY BETTER PRODUCTS THAT COULD BE PRODUCED BY USING PRODUCT THAT ARE THROWN AWAY MORE FREQUENTLY.



AN ADVANTAGE OF THIS DESIGN IS THE FACT THAT BOTTLE TOPS ARE READILY AVAILABLE AND OFTEN THROWN AWAY.

BY USING OLD GLASS BOTTLES, FOR EXAMPLE COKE BOTTLES OR WINE BOTTLES, CUTTING A HOLE IN THE BOTTOM OF THEM AND INSERTING BULB GLASS BOTTLE LIGHTS CAN BE PRODUCED.

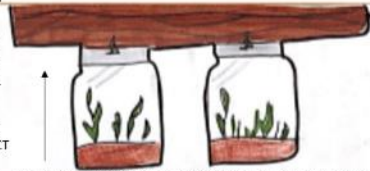


FOR THE BIRDHOUSE TO BE EFFECTIVE AND WEATER RESISTANT IT WOULD NEED TO BE SEALED WITH A WATER-BASED WOOD SEALER. AN ADVANTAGE OF THIS PRODUCT IS THAT IT IS SUITABLE FOR A LARGE RANGE OF PEOPLE.

BY ATTACHING BOTTLE TOPS TOGETHER WITH JEWELLERY WIRE A BOTTLE TOP COASTER CAN BE PRODUCED. A LAYER OF RESIN SHOULD BE ADDED UNDERNEATH THE BOTTLE TOPS FOLLOWED BY A LAYER OF FELT TO INSURE THAT THE COASTER HAS NO SHARP EDGES AND IS STURDY.



THE DISADVANTAGE OF THIS DESIGN IS THAT THE ONLY THINGS THAT COULD POSSIBLY BE UPCYCLED ARE THE BOTTLES WHEREAS THE LIGHT FIXTURES WOULD ALL HAVE TO BE IN GOOD CONDITION.



AN ADVANTAGE OF THIS PRODUCT IS THAT IT UPCYCLES A LOT OF MATERIALS INCLUDING CORKS AND WOOD FROM FURNITURE.

A DISADVANTAGE OF THIS PRODUCT IS THAT IT DOESN'T UPCYCLE A LARGE AMOUNT OF MATERIAL.

A SIMPLE WAY TO UPCYCLE AN OLD WATERBOTTLE IS BY USING IT AS A PLANTER DECORATION BY ATTACHING IT TO A PLANK OF WOOD.

AN ADVANTAGE OF THIS IS THAT IT CAN BE REUSED AS THE BOTTLE CAN JUST BE SWITCHED OUT WHEN OLD.

A COFFEE TABLE CAN BE UPCYCLED USING TWO DRAWS FROM AN UNUSED CABINET. THEY CAN BE GLUED TOGETHER OR SCREWED TOGETHER AND THE LEGS OF THE CABINETS CAN BE ATTACHED TO CREATE A FREE STANDING TABLE.

BY UPCYCLING OLD JARS AND SCREWING THE LIDS INTO A PIECE OF REPURPOSED WOOD PLANTERS CAN BE MADE. THE ADVANTAGE OF THIS PRODUCT IS THAT THE JARS AND PLANTS CAN BE EASILY REPLACED BY JUST UNSCREWING THEM AND ALSO THE PRODUCT CAN BE MADE INTO A CENTREPIECE BY ADDING SO ROPE AND HANGING IT UP.

A BOTTLE TOP CAN BE UPCYCLED INTO A KEYRING. BY FILLING THE BOTTLE TOP WITH RESIN TO GET RID OF ANY SHARP EDGES AND INSERTING A KEYCHAIN.

AN ADVANTAGE OF THIS PRODUCT IS THAT IT CAN REPURPOSE A LARGE PIECE OF FURNITURE LIKE A WARDROBE AS IT CAN USE ALL OF ITS PARTS INCLUDING ITS LEGS AND HANDLES.

A TIN CAN LANTERN CAN BE MADE BY DRILLING HOLES INTO A CAN. HOWEVER A DISADVANTAGE OF THIS IS THAT IT IS A FAIRLY SIMPLE DESIGN THAT PROBABLY WON'T WITHSTAND OVER A LONG PERIOD OF TIME.

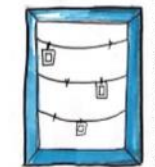


Design ideas : sheet 2

THIS IS A SIMPLE DESIGN THAT REUSES AN OLD DRAW AN MAKES IT INTO A BEDSIDE TABLE OR CABINET.



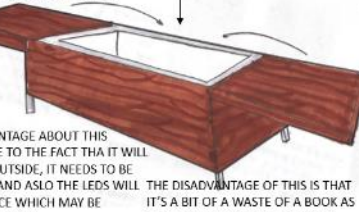
THE FRAME OF THE NOTICE BOARD COULD BE SANDED AND PAINTED TO GIVE THE PRODUCT A MORE AESTHETIC LOOK.



AN ADVANTAGE OF THIS PRODUCT IS THAT IT DOESN'T REQUIRE AND HUGE AMOUNT OF MATERIALS TO MAKE AND ALL OF THE MATERIALS NEEDED CAN BE REUSED.

HOWEVER A DISADVANTAGE ABOUT THIS PRODUCT IS THAT DUE TO THE FACT THA IT WILL SPEND ALL ITS TIME OUTSIDE, IT NEEDS TO BE WEATHER RESISTANT AND ALSO THE LEDS WILL NEED A POWER SOURCE WHICH MAY BE DIFFICULT FOR SOMEPEOPLE.

THIS OLD CABINET CAN BE UPCYCLED AND MADE INTO BOTH OUTDOOR SEATING AND A PLANTER. THE CABINET WILL BE FLIPPED ONTO ITS BACK AND LEGS WILL BE ADDED. SUPPORT WILL BE ADDED TO THE DOORS OF THE CABINET ALLOWING IT TO HOLD THE WEIGHT OF PEOPLE. WHEN OPENED UP THE CABINET ACTS AS A PLANTER WHERE PLANTS CAN GROW. EVEN WHEN THE CABINETS IS BEING USED AS A BENCH THE PLANTS COULD STILL GROW DUE TO BUILT IN LED LIGHTS THAT ALLOW PLANT TO GROW AS A REPLACEMENT FOR SUN.



THE DISADVANTAGE OF THIS IS THAT IT'S A BIT OF A WASTE OF A BOOK AS THERE ARE ALWAYS PLACES THAT BOOKS CAN BE DONATED AND USED AGAIN.



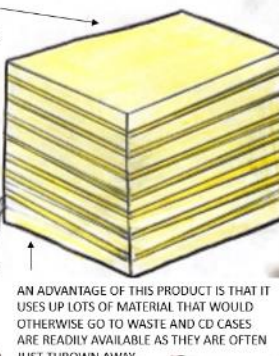
AN ADVANTAGE OF THIS IS THAT IT USES UP A LOT OF WASTE MATERIAL.

THIS LAMP IS MADE OUT OF OLD CD CASES. THE PACKAGING WILL BE REMOVED FROM THE CASES ALLOWING THE LIGHT TO FLOW THROUGH EFFECTIVELY. HOWEVER WHEN LOOKING AT THIS LAMP THERE IS NOT MUCH SPACE AVAILABLE FOR THE COMPONENTS AND ANOTHER THING TO CONSIDER IS IF IT WILL BE LIT UP BY LEDS OR A BULB.

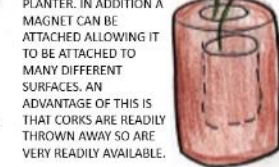


BY DRILLING A HOLE INTO THE COVER OF A BOOK AND ADDING CLOCK HANDS, CLOCK CAN BE PRODUCED.

LEFT OVER CORKS CAN BE MADE INTO COASTERS BY GLUING THEM TOGETHER AND POSSIBLY COVERING THE BOTTOM IN FELT TO GIVE IT A MORE AESTHETIC LOOK.



AN ADVANTAGE OF THIS PRODUCT IS THAT IT USES UP LOTS OF MATERIAL THAT WOULD OTHERWISE GO TO WASTE AND CD CASES ARE READILY AVAILABLE AS THEY ARE OFTEN JUST THROWN AWAY.



THE INSIDE OF A CORK CAN BE REMOVED TO CREATED A LITTLE PLANTER. IN ADDITION A MAGNET CAN BE ATTACHED ALLOWING IT TO BE ATTACHED TO MANY DIFFERENT SURFACES. AN ADVANTAGE OF THIS IS THAT CORKS ARE READILY THROWN AWAY SO ARE VERY READILY AVAILABLE.



ADDING A WOODEN BASE TO THE CD LAMP ALLOWS ANY COMPONENTS TO BE STORED AWAY WHERE THEY CAN NOT BE SEEN THIS ALLOWS FOR A MORE DESIRABLE LOOK AND IT MEANS THAT IF SOMETHING NEEDS TO BE REPLACED THE BASE CAN BE TAKEN OFF AND THE COMPONENTS REPLACED MEANING THAT THE PRODUCT WILL LAST LONGER.

THIS PRODUCT COULD BE MARKETING TOWARDS ANYON AND WOULD COST AROUND £30.

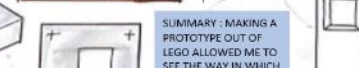
MANY FIXTURES COULD BE USED TO CHANGE THE WAY THE LAMP IS USED. ONE FIXTURE COULD BE FIXED ONTO THE WALL WHEREAS IT COULD JUST BE LEFT AS A NIGHT LIGHT.



ONE WAY TO RE USE OLD AND BROKEN CDS MAY BE TO STICK THEM ONTO THE BASE OF THE LAMP. THEY WOULD BE COVERED IN RESIN SO THEY ARE NOT A HAZARD.



ANOTHER FIXTURE THAT COULD BE ADDED IS ONE THAT ALLOWS THE PRODUCT TO BE PUT ONTO A STAND AND USED AS A FREE STANDING LAMP.



THE FIXTURE TO CONNECT THE LAMP TO THE STAND.

SUMMARY : MAKING A PROTOTYPE OUT OF LEGO ALLOWED ME TO SEE THE WAY IN WHICH I COULD IMPROVE THE PRODUCT AND MAKE IT MORE DESIRABLE.

ONE THING I HAVE TO CONSIDER WHEN DESIGNING THE LAMP IS IF I NEED TO USE A BULB OR LEDS TO LIGHT THE PRODUCT UP. LEDS ARE MORE ENVIROMENTALLY FRIENDLY THAN AN NORMAL LIGHTBULB (INCANDESCENT BULB) AS THE LAMP IS ONLY 142MM IN DIAMETRE A INCANDESCENT BULB WOULD TAKE UP A LOT OF ROOM WITHIN THE LAMP AND WOULD HAVE TO BE HELD IN PLACE MEANING THAT IT WOULD PROVE TO BE FAIRLY DIFFICULT TO REPLACE. THE BULB. ON THE OTHERHAND LEDS WOULD BE ABLE TO SIT ON THE BASSE OF THE LAMP AND NOT TAKE UP ROOM ALLOWING IT TO BE REMOVED AND REPLACED EASIER.

ALTHOUGH THIS DESIGN IS VERY EFFECTIVE AND COULD BE PRODUCED WITH A HOT WIRE CUTTER, IT WOULD POTENTIALLY NOT BE STRUCTURALLY STABLE AS THE BORDER OF THE CD CASES HOLD THE LAMP TOGETHER.

ONE WAY TO RE USE OLD AND BROKEN CDS MAY BE TO STICK THEM ONTO THE BASE OF THE LAMP. THEY WOULD BE COVERED IN RESIN SO THEY ARE NOT A HAZARD.

ANOTHER FIXTURE THAT COULD BE ADDED IS ONE THAT ALLOWS THE PRODUCT TO BE PUT ONTO A STAND AND USED AS A FREE STANDING LAMP.

THE FIXTURE TO CONNECT THE LAMP TO THE STAND.

SUMMARY : MAKING A PROTOTYPE OUT OF LEGO ALLOWED ME TO SEE THE WAY IN WHICH I COULD IMPROVE THE PRODUCT AND MAKE IT MORE DESIRABLE.

I MODELLED A FIRST PROTOTYPE FOR MY PRODUCT USING LEGO WHICH ALLOWED MY TO SEE WHERE I COULD DEVELOP IT FURTHER.

THE FIXTURE TO CONNECT THE LAMP TO THE STAND.

Development sheet 1 :

Development sheet 2:

SUMMARY: LOOKING AT THE DIFFERENT OPTIONS FOR THE COMPONENTS HAS ALLOWED ME TO EVALUATE WHICH THE BEST OPTION IS FOR MY PRODUCT.

THE DIGITAL CLOCK ASPECT OF THE LAMP COULD HAVE THE POTENTIAL TO ACT AS AN ALARM CLOCK. POSSIBLY WHEN A SET TIME IS ADDED TO THE PRODUCT IT THE LIGHT WILL LIGHT UP AT THE SAME TIME EVERY MORNING ALLOWING IT TO WAKE THE CUSTOMER UP SLOWLY WHICH COULD ALSO BE ACCOMPANIED WITH AN ALARM.

ADDING A ROCKER SWITCH TO THE BASE WILL ALLOW THE LIGHT TO RETURNED ON AND OFF EASILY WITHOUT HAVING TO BE TURNED OFF AT THE SOCKET.

A DIMMER SWITCH WILL ALLOW THE BRIGHTNESS TO BE ADJUSTED DEPENDON ON THE SITUATION.

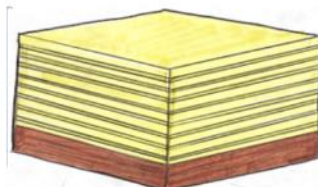
THE BASE WILL HAVE SPACE TO HOLD ALL OF THE COMPONENTS. THIS ALLOWS FOR ALL OF THE COMPONENTS TO BE REMOVED AND REPLACED EASILY, INCREASING THE LIFESPAN OF THE PRODUCT. THE PRODUCT WILL BE LIT USING LEDS DUE TO THE FACT THAT IT WONT TAKE UP SPACE INSIDE THE LAMP AND CAN JUST SIT IN BASE AND IT IS MORE SUSTAINABLE THAN AN INCANDESCENT BULB.

THE CONTROLS FOR THE LAMP CAN BE PLACED ON A PANEL ONTO THE SIDE OF THE PRODUCTS BASE.

A SPEAKER COULD BE INCLUDED INTO THE LAMP AND COULD TAKE UP ONE OF THE SIDES OF THE BASE. A SPEAKER WOULD BE INSERTED INSIDE THE LAMP AND SPEAKER MESH WOULD BE INSERTED INTO THE BASE. THE SPEAKER COULD POTENTIALLY BE BLUETOOTH MEANING THAT IT CAN BE CONTROLLED FROM A DEVICE MEANING THAT A PHONE DOESN'T HAVE TO BE PLUGED IN TO WORK.

ALTERNATIVELY A DIGITAL CLOCK COULD BE INSERTED INTO THE BASE. THIS WOULD ALLOW THE PRODUCT TO ACT MORE LIKE A BEDSIDE LAMP AND CLOCK.

Final design

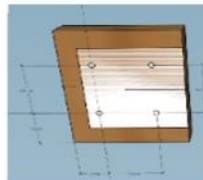


TO MODEL MY PRODUCT AGAIN I USED GOOGLE SKETCHUP. THIS ALLOWED ME TO FIGURE OUT AND LOOK IN DETAIL AT WHAT MEASUREMENT I NEEDED AND HOW THE BASE WOULD FIT ONTO MY PRODUCT.



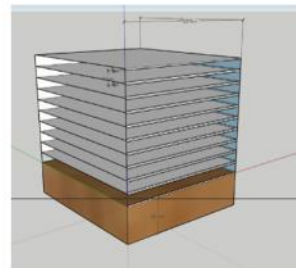
THE LAMP WILL BE LIT WITH A LED LIGHT. THE COMPONENTS FOR THE LEDS WILL BE HELD IN PLACE IN THE BASE. IF I HAS ACCESS TO MORE MATERIAL AND COMPONENTS I WOULD HAVE ADDED A DIMMER SWITCH AND A ROCKER SWITCH AS THIS WOULD HAVE ADDED AN EASIER ACCESS TO THE LIGHT. ALSO, ADDING A DIMMER SWITCH WOULD HAVE ALLOWED THE USER TO ADJUST THE BRIGHTNESS OF THE LAMP ACCORDING TO THEIR PREFERENCE AND THE TIME OF DAY.

I THEN REMOVED SOME OF THE MATERIAL IN MY BASE IN ORDER FOR THE COMPONENTS TO SIT IN AND ALSO DESIGNED HOLES FOR WHERE THE BASE WILL BE SCREWED TO THE CDS.



I DESIGNED THE BASE OF THE LAMP SO THAT IT WOULD BE ABLE TO HAVE A FIXTURE ADDED TO IT IN ORDER FOR IT TO BE ABLE TO FIT ONTO THIS LIKE A WALL OR EVEN A LAMP STAND. THIS INVOLVED ENSURING THAT THERE WERE HOLES TO SCREW THE LAMP'S BASE INTO THESE FIXTURES AND MAKING SURE THAT THE SREWA WOULD NOT BE SCREWED TOO FAR INTO THE BASE.

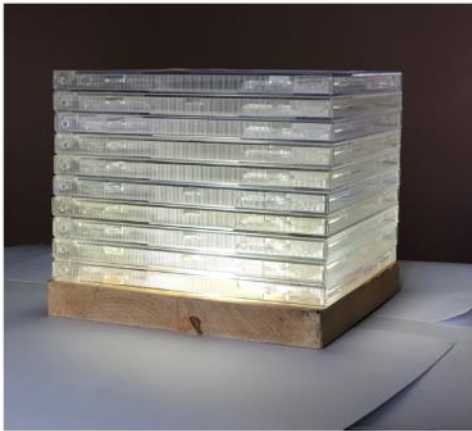
BY MEASURING THE WIDTH AND DEPTH OF ONE CD CASE I WAS ABLE TO REPEAT THIS UNTIL I WAS HAPPY WITH HOW TALL I WANTED THE PRODUCT TO BE. OVERALL THE CD STACK WILL BE 100MM TALL AND THE BASE WILL BE AROUND 20MM TALL.



Diary of Manufacture :



Final product :



Evaluation:

When manufacturing my product, I was faced with a few problems . Firstly I had to slightly adapt my product to be able to make it with the supplies I had. When designing the product as though it would be marketed, I decided I would light my product using an led and a battery pack to save both space and energy compared to a light bulb . However I didn't have access to either a led or a bulb so instead I decided that I would be able to use a torch to light up my product until I could receive something more substantial . Firstly I had to cut a hole out of the middle of all the cd cases in order for the product to be lit by a bulb if necessary . However this proved to be very difficult . I used a scalpel and a scalpel mat to make scores into the cd case and eventually this worked although it took a long time to do . I tried alternative ways to do this including heating up the scalpel to melt the plastic and even heating up the cd case it self yet this did not work as the cd cases kept cracking so it took a long time for me to cut a hole in the CDs using a scalpel to score them . When it came to gluing my cd cases together, I was unsure what glue to use so I started of using superglue however when dry, this became cloudy so instead I used PVA glue and this worked well. I measured, cut and sanded the base in order for it to be able to fit on the bottom of the product . Due to the fact that I was using a torch to light up the product I had to make a few changes to the manufacture of the product. Firstly I had to drill a hole into the base of the lamp in order for the torch to fit through. This worked well as other than the hole in the base , there was no other changes to the product itself that could be seen. However as the torch was now lighting the product , the lamp had to be elevated in order for the torch to fit underneath the product so I temporarily elevated the product by placing a stack of books on either side of the torch and placing the product on top.

Looking forward to seeing you all in September, if you have any issues or questions don't hesitate to contact me via email or Firefly.

Mr S Martindale