EDEXCEL

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

EXEMPLAR MATERIAL 1

Title: Coke Bottle

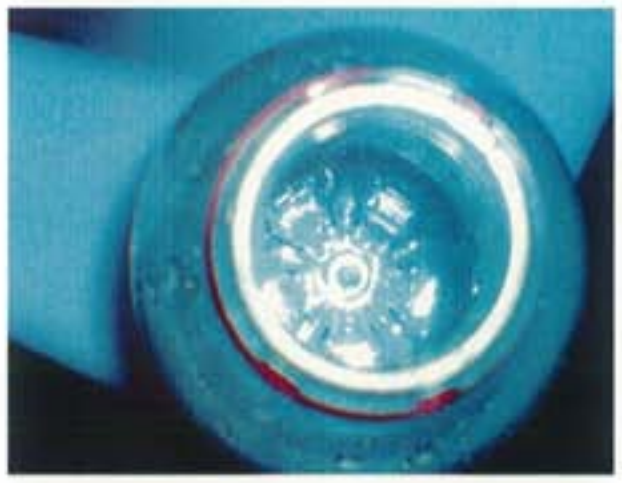
UNIT: 6GR01

PRODUCT ANALYSIS

COKE BOTTLE

Pictures - Main Product

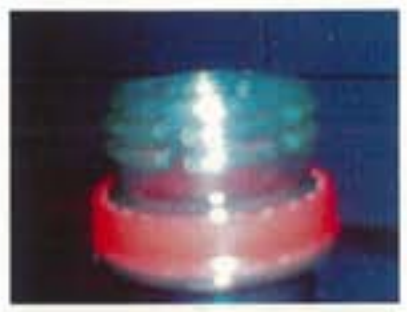
Here are pictures of the main product that I am going to analyse. I have also taken pictures of the individual components close up so that the detail on them is much clearer and more visible.



Pictures - Second Product

Here are pictures of the second product that I am going to analyse and compare with my main product. I have also taken pictures of the individual components close up so that the detail on them is much clearer and more visible.

Section A - Performance Analysis

	Main Product		Second Product	
				
	The bottle is shaped so that it is easy for the user to hold, it has ridges on the sides for easy grip when consuming the contents. It is wider at the base of the bottle so that it can stand up firmly without falling over. It is also more practical during the manufacturing process and can move along a conveyer belt smoothly. The shape is also often associated with the female form/body, which makes the product as a whole more appealing. The label is wrapped around the bottle and makes the bottle more appealing to consumers. The logo is also distinctive which also appeals to consumers to buy the product.	**Form**	The can is cylindrical and the bottom of the can is indented, which enables it to stand upright firmly. It has no ridges of indents around the sides of the can which means it lacks grip when the user is consuming the contents, however, the shape is small and compact which makes it easy to carry around or store in smaller places. The printing of the logo on the can also makes it a distinctive product and people are therefore more likely to buy the product.	
	The function of this product is to hold 500ml of liquid (coke) without the contents being damaged or the bottle itself. It also lets people consume the liquid easily and as they like because it has a lid which can be screwed on or unscrewed. This is achieved by ridges on the top of the bottle, which hold the cap in place.	**Function**	The function of the can is to hold 330ml of coke inside without it spilling out or the can itself being damaged. It has a ring pull to open it, which makes it easy to open, however, once open, the can cannot be sealed back up. The can protects the contents and so it is made of strong aluminium to ensure there is little damage done to it at any point in time. The thickness of the walls holds the pressure of the gases inside the container. Once it is opened, gases are released and they can therefore not be sealed in again.	
	The shape of the bottle means that it is easy to hold in the users hand and the cap is designed so that it is removable whenever the user wishes to do so. The bottle is fairly light and so can be carried around compactly in a bag or pocket. The transparent PET means that the contents can be clearly seen by the user, and the red label makes it appealing as it goes well with the colour of the liquid inside and is a bold and bright colour which eye catching and attention grabbing.	**User Requirements**	The shape of the can is easy to hold, however, has less grip than the bottle meaning it is less secure in the users hand. The ring pull is a permanent opening which means that once open it cannot be sealed back up and so the contents has to be consumed all at once. The contents inside cannot be seen clearly unlike the bottle. The can is appealing to users as the red is distinctive and bold and also looks attractive persuading people to buy the product in the first place.	

Section A - Performance Analysis

	Main Product		Second Product	
				
	The liquid inside must be easily consumable when the cap is unscrewed and removed and the bottle is tipped up slightly by the user. The PET bottle must protect the liquid inside and make sure none of it escapes when it is being stored or not being consumed. The bottle itself must stand freely on it's own and cannot fall over easily.	**Performance Analysis**	The can must protect the coke inside and be durable so that it is not easily dinted and the product as a whole is not damaged. The ring pull seals the can so that no liquid can escape and it should be easily and safely opened so that the contents can be consumed successfully. It must stand securely and stable on it's own and upright.	
	The plastic bottle is made of PET (polyethylene terephthalate); this is a thermoplastic, which means the effective shape of the bottle can be achieved, and easily formed using blow moulding techniques. The liquid does not react with the PET, which makes this an ideal material; it is also a durable material and is not very malleable so the bottle cannot be easily damaged. HDPE (High Density Polyethylene) are used to make the bottle cap, which is a thermosetting plastic that means the cap cannot be damaged and keeps the liquid inside the bottle safely and securely. It can also be injection moulded and formed into any shape once heated straight from a sheet. The label is made from an extremely think type of PVC put onto a sheet. This is more effective than using paper labels as there is a liquid inside and will not be damaged or make the inks run when the product is stored in a cold damp place (freezer/fridge). It is also an extremely flexible material, which can be easily wrapped around the bottle and printed onto.	**Materials and Components Requirement**	Aluminium is used on the whole can as this is an inexpensive way to produce cans, and is a non ferrous metal that can be easily printed on when in sheets. The ring pull is also made of aluminium, which can be easily bent into shape. It is a strong yet flexible material, which means that the can will not be easily damaged and although it is quite malleable, it is still tough enough to protect the liquid inside. It can be easily made into a cylindrical shape, as it is thin and flexible.	
	This product is manufactured using Continuous Mass Production, as lots are required to be made everyday 24/7. The bottle is Blow moulded, which has a low cost when produced in mass quantities which means they are reasonable inexpensive manufacture. The cap is made by an injection moulding process; this is also inexpensive when produced in mass quantities. The label is printed using flexography as it can print onto other materials such as PVC.	**Scale of Production and Cost**	The can is manufactured from long sheets of aluminium and a cold forming and ironing process is used to form the cans. They are manufactured along a continuous flow production line, which runs 24/7. This is inexpensive because they are being produced in mass quantities, however they have a high cost to change the production set up and this method of production is not flexible at all. The cans are also printed using flexography whilst in sheets of aluminium before being formed into a cylinder.	

Section A - Performance Analysis

	Similarities	Differences	
Form	Both the bottle and the can have wide bases so that they are able to stand stable and upright. They both have a compact shape, which allows them to be carried around with the user or put into a bag or pocket.	The shapes are both extremely different. The bottle has ridges in the sides to allow for more grip when the user is consuming the product, however, the can does not have this and so lacks grip. The bottles shape is more creative and more appealing to the consumer.	
Function	Both the bottle and the can hold the coke liquid successfully and securely.	The bottle has a lid and can be screwed or unscrewed whenever the user wishes to do so, whereas, the can only has a ring pull, which means the product has to be consumed as soon as it is opened. The bottle can hold more liquid than the can.	
User Requirements	The red label on the bottle and the distinctive red print on the can catch the users attention and is bold and eye catching, which draws people in to buy the product in the first place.	Both the bottle and the can are easy to hold in the users hand. The bottle has an easily screwable and unscrewable cap, this means the contents can be more repeatedly consumed as opposed to a ring pull mechanism where the liquid has to be consumed once opened. The bottle is also made of transparent PET, which allows the consumer to see the liquid inside the bottle, whereas, the aluminium can does not allow for this.	
Performance Requirements	Both products allow for easy consumption and protect the contents of the liquid inside successfully. They also both stand freely on their own or when stacked on a shelf in a shop.	The can is more likely to damage than the bottle.	
Materials and Components Requirements	Both the materials used to make the products are made from fairly flexible materials, this means the complex and the cylindrical shape are both achieved successfully. Neither of the materials used damaged the product inside.	The bottle is made of PET, which achieves a more flexible shape than aluminium. PET is less malleable than aluminium, which means it is less likely to damage. The aluminium can has less components to consider. The bottle has a PVC label, however, the can has details and logo printed straight onto the aluminium.	
Scale of Production and Cost	Both are produced on a continuous flow production scale. Both are inexpensive to produce when in mass quantities. Both the bottle and the can are printed using flexography because this allows for printing on materials other than paper or card.	The bottle uses blow and injection moulding to achieve the desired shape of the product and the cap. The can is made using a cold forming and ironing process.	

Section B - Materials

Component	Material	Alternative	Environmental Impact
Bottle	The bottle itself is made from PET (Polyethyleneterephthalate). PET is used to make plastic drinks bottles because it is extremely durable. It is a lightweight material, which makes this helpful for the user when carrying the drink around. It is an effective material when used for packaging as it prevents gas escaping from the liquid inside and does not flavour the contents. It has good presentation as it looks professional due to a sparkling clear appearance and the liquid can also be seen clearly inside due to it being transparent. PET is also inert and is an excellent barrier against atmospheric gases, which is important when considering that there is a fizzy liquid inside and also that it cannot be easily damaged or react with any gases outside of the bottle.	An alternative material to use for the bottle would be glass. This would be a good material to use to make the bottle, as it is transparent, allowing the consumer to see the liquid inside. It is also a durable material and will not break unless dropped or a high amount of force is applied to it. This could be a more expensive material to manufacture though, and is not really very lightweight. If broken, it is a dangerous material to consumers. It has a good resistance to atmospheric gases and chemicals, which is useful when considering the liquid inside the bottle.	PET is a plastic, which comes from a raw material called oil. To extract the chemicals from the oil, which will later on make plastic, requires energy in factories/plants. This then pollutes the atmosphere as it gives off CO_2 during this process. Electricity is also used when manufacturing the bottle, which means that we are then using up energy. This electricity is used to power machines which then have errors sometimes during the manufacturing process or produce bottles that are not up to scratch, in which case, materials are wasted. Plastic bottles are transported to shops and supermarkets all over the country via vehicles, which add to the pollution in the atmosphere. When consumers have purchased the product, many irresponsible people do not use bins and litter instead, this harms the environment around it an also may be harmful to any animals etc that come across it.
Cap	The cap is made of HDPE (High Density Polyethylene) which is highly resistant to chemicals, this is important as if the polymer reacts with the liquid then both the component and the product will be destroyed. It has a good barrier to water and gas, this is important as it need to be waterproof from both the inside and the outside to prevent the contents being damaged or leaking out and any gases contained in the liquid do not leak out. It is also an extremely durable material which means that it cannot be broken or damaged easily, this is useful in order to keep the liquid inside the bottle and so that when being carried around, it doesn't break easily. It can also be decorative when coloured, this is beneficial when appealing to the consumer as it can be made in bright colours and also be made to match the label. It is also distinctive if it is made the same colour as the label/brand. HDPE is a lightweight material and can float of water, it is vital that it is a lightweight material as the consumer needs to be able to carry the product around and the cap needs to be as light as possible to add to the lightness of the overall bottle.	An alternative material to use for the bottle cap would be polypropylene. This is because it still holds a lot of properties that are useful when considering a material for a bottle cap. It is a lightweight material and is also very versatile and can be manufactured either rigid or flexible, in this case, it would be rigid so that it keeps its shape well. It has excellent chemical resistance which also extremely useful when considering that there is going to be a chemical/liquid product inside the bottle so it is important that this does not damage the cap. It has good impact resistance, which means it will not easily be damaged and therefore the product will remain inside the bottle safely. Low moisture absorption is also a key issue in this material as it is vital that the moisture of the liquid is not taken up into the material. It has a wax type feel, which could be soft and friendly to touch and also is not going to be harmful to consumers.	HDPE is also a plastic, which comes from a raw material called oil. To extract the chemicals from the oil, which will later on make plastic, requires energy in factories/plants. This again then pollutes the atmosphere as it gives off CO_2 during this process. Electricity is also used when manufacturing the cap, which means that we are then using up energy. Electricity is used to power machines to make the cap, which then have sometimes produce caps that are not up to scratch, in which case, materials are wasted. Plastic bottles that contain the caps are transported to shops and supermarkets all over the country via vehicles, which add to the pollution in the atmosphere. When consumers have purchased the product, many irresponsible people do not use bins and litter instead, this harms the environment around it as it erodes and disintegrates an also may be harmful to any animals etc that come across it.
Label	This is made of very thin PVC and is produced on a continuous mass line. It is weather resistant which is important as it is being put on the outside of the bottle and so will not be damaged easily, it is also chemical resistant which is also useful in the same respect. It has a durable and tough abrasive resistance which is useful because it cannot be scratched and easily ruined. It is a versatile material in the respect that it can be manufactured rigid or flexible, in this case flexible. This is needed so that it fits around the shape of the bottle easily.	An alternative material for the label would be paper or card. Paper is more flexible and can be easily printed upon, however, it is not very durable and has an extremely bad resistance to chemicals and weather, this is bad as it is needed when making a product such as a soft drink. It would be an average material to use, however, it is not durable at all and would spoilt the look of the product and give a dull finish. Card ultimately has all of the same properties as paper though it is slightly stronger and more rigid making it harder to fit around the bottle.	Finally PVC is also a plastic, which comes from a raw material; oil. To extract the chemicals from the oil, which will later on make plastic, requires energy in factories/plants. This again then pollutes the atmosphere as it gives off CO_2 during this process. Electricity is also used when manufacturing the label, which means that we are then using up energy again. Electricity is used to power machines to make the label, which then sometimes produce caps that are not up to scratch, in which case, materials are wasted,. However lay planning is an efficient way of making sure this doesn't happen. Plastic bottles that contain the caps and labels are transported to shops and supermarkets all over the country via vehicles, which increase the pollution in the atmosphere. The consumers then purchase the product and many irresponsible people do not use bins and litter instead, harming the environment around it as it erodes and disintegrates. This may also may be harmful to any animals that may come across it too.

Section C - Manufacture

Component	Manufacturing Process	Alternative	Environmental Impact
Bottle	The bottle is manufactured using a blow moulding process. This is done using a mould and an extruder. Two hollow lengths of plastic (a parison) are extruded down between both halves of the mould and the mould is the closed tightly. Air is blown inside the parison which then allows it to become inflated and pushes the soft plastic against the cold surfaces of the mould causing it to form a bottle shape. The coldness of the mould allows the plastic to harden, and after this process has taken place, the mould is opened and the waste is trimmed off. The bottle is usually made of PET (Polyethyleneterephthalate). Blow moulding is used because there are a number of different plastics that can be used and is also costs less to manufacture bottled using blow moulding rather than injection moulding. Blow moulding is also a very quick method of producing a coke bottle and therefore allows bottles to be easily produced in mass quantities.	An alternative process to produce the bottle could be vacuum forming. This would mean, however, that the bottle would have to be produced in two halves and glued together afterwards, which is slightly less effective than blow moulding. A mould is first attached to a support plate which is known as a platen, the mould is lowered slightly and a thermoplastic sheet is clamped and heated from above. Once the thermoplastic sheet is softened enough, air is blow upwards so that the sheet raises into a slight bubble. The platen is then raised and any excess air is removed by a vacuum. Pressure acts on the top surface and pushes the thermoplastic sheet down onto the mould. Once the sheet has cooled, the mould is taken away and you are left with one half of a bottle. This is then repeated and both halves are glued together to form a whole bottle. Vacuum forming is remarkably more inexpensive than injection moulding and other moulding methods. Bottles could be easily produced in mass quantities in a very little space of time.	The amount of plastic used is a major factor as it is important that waste materials are reused, when the flash is cut off the bottle, this means that there is waste material produced in the blow moulding process. The factory that manufactures the bottles also produces a large amount of harmful gases during the process and also uses up a lot of energy when making the bottles. Fossil fuels are used to power the machines used to produce the bottles which creates harmful fuels when they are burnt. Transportation of the overall finished bottle is a vital factor contributing towards the environmental impact, as these vehicles (vans and lorries) also produce fumes which are harmful to the environment. Plastic is not a biodegradable material and therefore some types of plastic will be harmful to the environment and hard to use once they are finished with.
Cap	The cap on the bottle is made using an injection moulding process. The hopper (a funnel) is filled with plastic powder or granules which are fed through into the barrel of the machine. The barrel is surrounded by a heater which heats up and melts the plastic granules as they are carried along via the screw. The screw is then pulled back and the melted plastic is allowed to collect at the end of the barrel. Once there is enough melted plastic in the end of the barrel, the screw is pushed forward down the barrel, forcing the plastic into the mould at the end, in this case (the mould is in the shape of a bottle cap). Once the plastic in the mould has cooled and hardened, it is opened and the moulding/bottle cap is taken out. The cap is usually made from HDPE (High Density Polyethylene). Injection moulding is an effective form of manufacture for a bottle cap as it can be used to create objects in large quantities and are also identical. Injection moulding has an extremely high production rate and low labour costs. It also has little waste or excess materials once the component has been made. A wide range of materials can also be used in this manufacturing process.	To form the cap, an alternative method of moulding is rotational moulding. A heated mould causes the materials inside it to melt which then forms a puddle at the bottom of the mould. This is then rotated and this then means that the melted material inside sticks to the walls of the mould. The mould continues to rotate in order to maintain an even thickness, this happens even during the stage in which it is allowed to cool. This is an extremely slow process of moulding and is not commonly used for plastics as much anymore, and is also limited to a small number of plastics. Moulds are relatively inexpensive when using rotational moulding. There is also little material wastage once the cap has been made, it also takes a very short amount of time to manufacture a component.	The same environmental impacts apply to the manufacture of the bottle cap. The production of the cap uses the same fossil fuels to power the machines and produce the same harmful gases during the production. Waste materials are thrown away when the flash is cut away from the cap and are not reused. The same transportation factors apply to the cap. The environment would benefit massively if companies found alternative methods of production in order to save energy and costs of fuel.
Label	The label is made using an extremely thin sheet of PVC. It is made along a long line of PVC and lots of copies of the label are put on this in order to save materials (lay planning). It is printed using a process called flexography, which enables printing to be done on plastics as well as other materials. This printing process consists of a machine and inside there are 4 rollers. The first roller is rotated and dipped in ink, this is then passed along onto the second roller. This ink then rubs off onto the third roller which is called the plate cylinder, attached to this roller is a mould of the image needed to print. The fourth roller moves the paper, or in this case, the thin sheet of PVC upwards and this then rolls against the mould leaving an imprinted image on the material. Flexography has a high production rate and is a very fast method of production. It can print on both papers and plastics and is a very high quality of printing, meaning that the final product is of good quality.	An alternative process for printing the label could be Offset Lithography. This also works through a process of rollers, however, there are only 3 rollers used. Ink and dampening solution are released from the top of the machine and allowed to enter onto the first roller which is the plate cylinder. The blanket cylinder is the next roller down and this has a rubber image imprinted onto it which then rolls the image onto the material. Below this is the impression cylinder which feeds the paper or PVC from a pile through the printer. Throughout the printer there are 4 of these sets of rollers, each applying a different colour as the material passes through the printer; cyan, magenta, yellow and black.	Plastic is not biodegrable and therefore this means it makes the bottle hard to recycle. When the bottle is finished with, it is sometimes not disposed of correctly and therefore causes damage to the environment. Waste materials also apply to the label as it is important that when they are printed, they are lay planned so that more labels can fit onto one sheet of PVC.

Section D - Quality Control and Quality Assurance

Quality Control

Bottle (Blow Moulding).	Preparation - Make sure the PET/plastic is clean before hand, so that there is no dirt on the plastic and therefore nothing that there shouldn't be on the bottle once it is formed. - Make sure that the PET is the correct colour (transparent) so that the liquid inside the final product will be visible. - The mould size needs to be correct and accurate, this is so that the bottle is the correct shape and size when finally formed and holds the right amount of liquid successfully afterwards. - The machine needs to be set up correctly so that the bottle is created perfectly and accurately without any problems during the process. - Make sure the PET can hold the pressure inside the bottle because the liquid is carbonated.
	Process - Make sure the mould and the plastic is correctly aligned, this means that the final product will be accurate and will be to the right shape and measurements. - The mould must be fully connected to the machine, in order for the bottle to be produced correctly and the final result to be of a high quality.
	Finish - The final bottle must be cleaned, this means that there will be no foreign materials on the PET. - Flash is produced by the machine, it is important that this is removed and cut off, and there are no excess materials on the bottle when it is removed from the mould. - The bottle must be the correct size when it is removed from the mould so that it holds the right amount of liquid.
Cap (Injection Moulding).	Preparation - The colour of the plastic must be correct so that materials are not wasted if the moulding process starts on the wrong colour plastic. It is important that the cap is made of red HDPE, this is so that it resembles the distinctive coca cola brand. - The temperature of the machine needs to be correct, this is so that the plastic granules melt and form the cap in the mould properly. - The size of the mould must be correct, this is so that the cap fits correctly onto the finished bottle. The mould must also have ridges in it, so that the cap can be screwed onto the bottle when finished.
	Process - The machine needs be checked that it is at a constant temperature, this is so that the HDPE does not melt if it is too hot and forms properly into the mould and creates a perfect cap. - The mould must be fully connected to and positioned correctly onto the machine so that the plastic can be injected properly and it all fills the mould rather than having materials being wasted due to correct procedures not being followed, resulting in a wrong shaped/formed cap.
	Finish - The cap needs to be checked that it is the correct size to fit the bottle, this can be checked by screwing it onto the bottle and seeing if it fits correctly without letting liquid escape and so that it can be unscrewed again. The lid also needs to have ridges on the inside of it, this will enable it to be screwed onto the bottle. - Any flash or excess materials still left on the cap from the machine need to be removed and trimmed off so that only the cap is left. - No foreign objects must be on the cap and it needs to be checked to make sure no foreign objects have become involved in the moulding process therefore affecting the final product. The cap needs to be cleaned after all excess materials have been removed so that any foreign substances/objects or dust are on it at any time.

Section D - Quality Control and Quality Assurance

Label (Flexography)	Preparation - The type of plastic needs to be correctly selected so that it matches the product correctly. In the case of the coke bottle, this is a very thin sheet of PVC. - The correct size of plastic needs to be inserted into the printer so that the contents and details of the label fit onto it perfectly. It also helps if lay planning is used so that as little material is wasted/used as possible.
	Process - Sheets of plastic need to be controlled and watched so that there are no jams with the printer due to the plastic not being inserted correctly or the printer is not running correctly. - Ink levels need to be high and constant in order for the label to be printed successfully. This is also a check that takes place once printed. - Ink leakages need to be controlled as this wastes ink and also wastes time replacing a cartridge once one leaks.
	Finish - The label needs to be cut down to size using guiding from the crop marks printed around the edges, this is so that it is a perfectly and accurately shaped and sized. - The colour bar and grey scale need to be checked. These monitor the thickness or the density of the inks and ensure that the ink is of a consistent quality. - The label needs to be correctly aligned, this is checked using registration marks which monitor whether the plates in the printer are correctly aligned. If this is not the case then the image will appear blurry and the 4 layers of ink (cyan, magenta, yellow and black) will all be out of line and blurred.

Quality Assurance

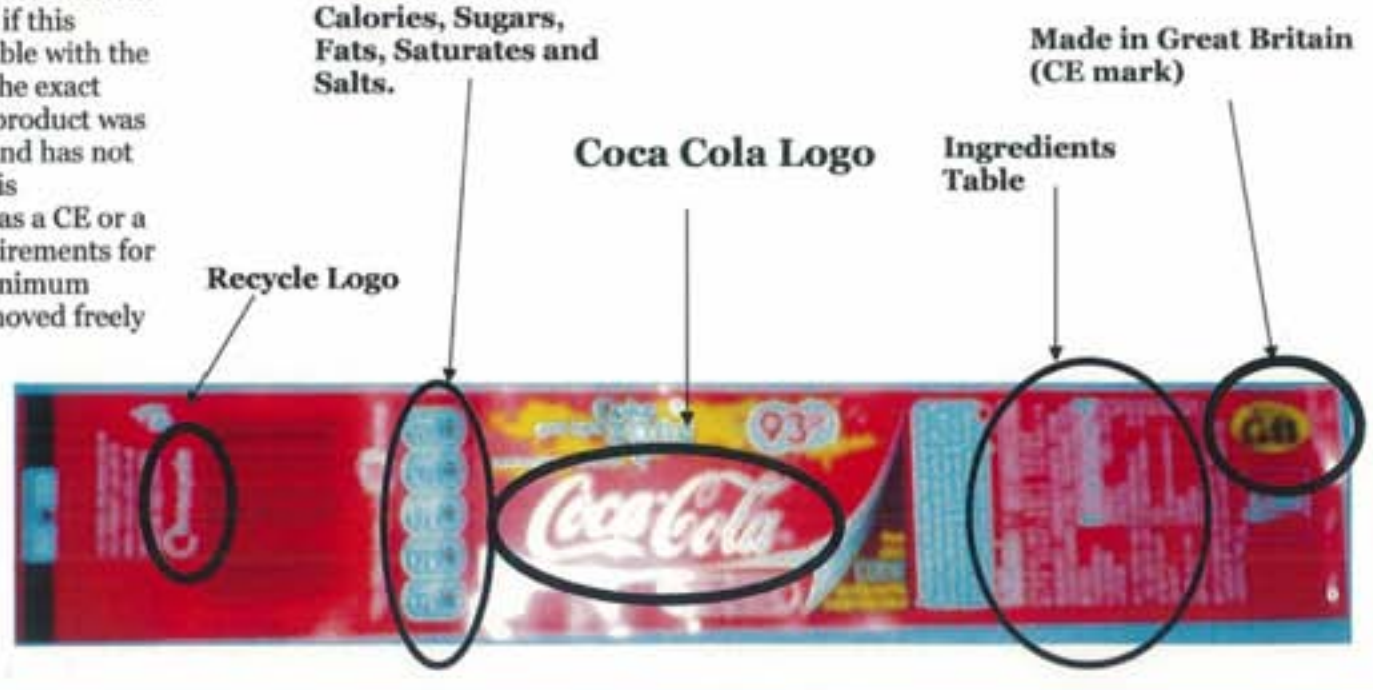
Preparation	- Check that there is enough raw material available to manufacture bottles in mass amounts. - Keep checking the batch orders frequently to make sure you have the correct amount of material to manufacture the number of bottles.
Processing	- Quality control checks on the blow moulding to make sure that it is manufactured correctly and meets regulations. - Quality control checks on the printing for the graphics on the label. - Testing to make sure materials used have the correct functions and tolerances.
Assembly	- Sampling and testing of materials to see that they perform correctly. - Testing the bottle to make sure it holds all liquids inside and do not allow any to escape. - Testing the lid to make sure it fits the bottle correctly and that it doesn't allow any liquids to escape once in place. - Test one batch only to make sure that all are correctly manufactured and meet all regulations and tolerances.

Section D - Quality Control and Quality Assurance

Finishing	- Box up all bottles ready to be sent off for sale, this allows for all quantities to be checked for dispatch. - Make sure the packaging is of a high standard so that the products can be dispatched safely and not damaged during being sent for sale.
After Sales	- Make sure the bottle is printed with a quality standards mark, this assures the consumer that the product is of a high quality and standard. This also guarantees that the product will function exactly as it appears and says it will.

The label holds all of the details of the product, this assures the consumer that it is a quality product and also informs them of all of the ingredients that have gone into the product.

The coca cola logo is the main thing that draws attention to the product in the first place and if this is printed onto the product then the consumer is assured that it is official. The label holds all the information containing the ingredients to make the coke and this ensures that the consumer that all ingredients gone into the product are safe. The recycling logo on the label informs the consumer that it is a environmentally friendly product and has been produced in conditions that are efficient to the environment, this is printed on the label to tell the consumer that it is preferred if this environmentally friendly recycling is carried on after the bottle is finished with. The table with the number of calories, sugars, fats, saturates and salts in the product tells the consumer the exact amount that has gone into the coke. The label also holds a mark which states that the product was manufactured in Great Britain. This assures the consumer that it is a British product and has not been imported from anywhere else (e.g. Europe), this is often preferred if the product is manufactured and sold in Britain. This mark is printed onto the label and acts exactly as a CE or a kite mark would. It is the manufacturers claim that the product has met all of the requirements for all of the European Directives and also reassures the consumer that it meets all the minimum requirements in order for it to be a quality product. This also allows it to be sold and moved freely throughout the European market.



PRODUCT DESIGN

TOOTHBRUSH

Product Design

Design Brief and Specification

I have decided to design a toothbrush suitable for children in the age range of 3 - 5 years old and suitable for both boys and girls. I have chosen to design this product because I feel that, although there are fun toothbrushes available to children of this age at the moment, there are limited ranges.

Design a toothbrush that appeals to children and makes them want to brush their teeth. This is sometimes a problem when parents come to trying to persuade their children to brush their teeth. Give a name to the toothbrush as well; it will need to be relevant to the theme or type of design of the toothbrush. Decide on a theme for this based on different designs that are thought of and use the most effective design.

Form

- The toothbrush must be made of flexible materials so that it is effective when cleaning teeth.
- It must have a small enough head to fit into a child's mouth.
- It must have grooves on the handle to make sure it is easy to hold and has maximum amount of grip.
- It must be of a modern style so that it appeals to a young age group and looks stylish and sleek.
- It must provide a general theme and appeal to children of between 3 – 5 years old.

Function

- It must be small and manageable enough for a small child to use.
- It must have bristles that are safe and small enough to clean teeth of young children.
- It must be made of efficient and appealing materials so that it is attractive to young children.
- It must be durable and not very malleable so that it is not easily damaged should it ever be dropped or force applied to it.

User Requirements

- The toothbrush must use bright, vivid colours as it will need to appeal to both parents and young children.
- It must be easy to use for young children because it is going to persuade them to want to brush their teeth.
- It must be safe for young children as this is a vital factor in making sure that no harm is caused when brushing their teeth.
- It must be made of light materials so that it is easy to handle for small children.
- It must be of high quality so that it is appealing to a parent/consumer.

Cost

- The product must be of a reasonable cost to manufacture and materials used must be of sound cost too.
- It must use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.

Product Design
Research and Pictures











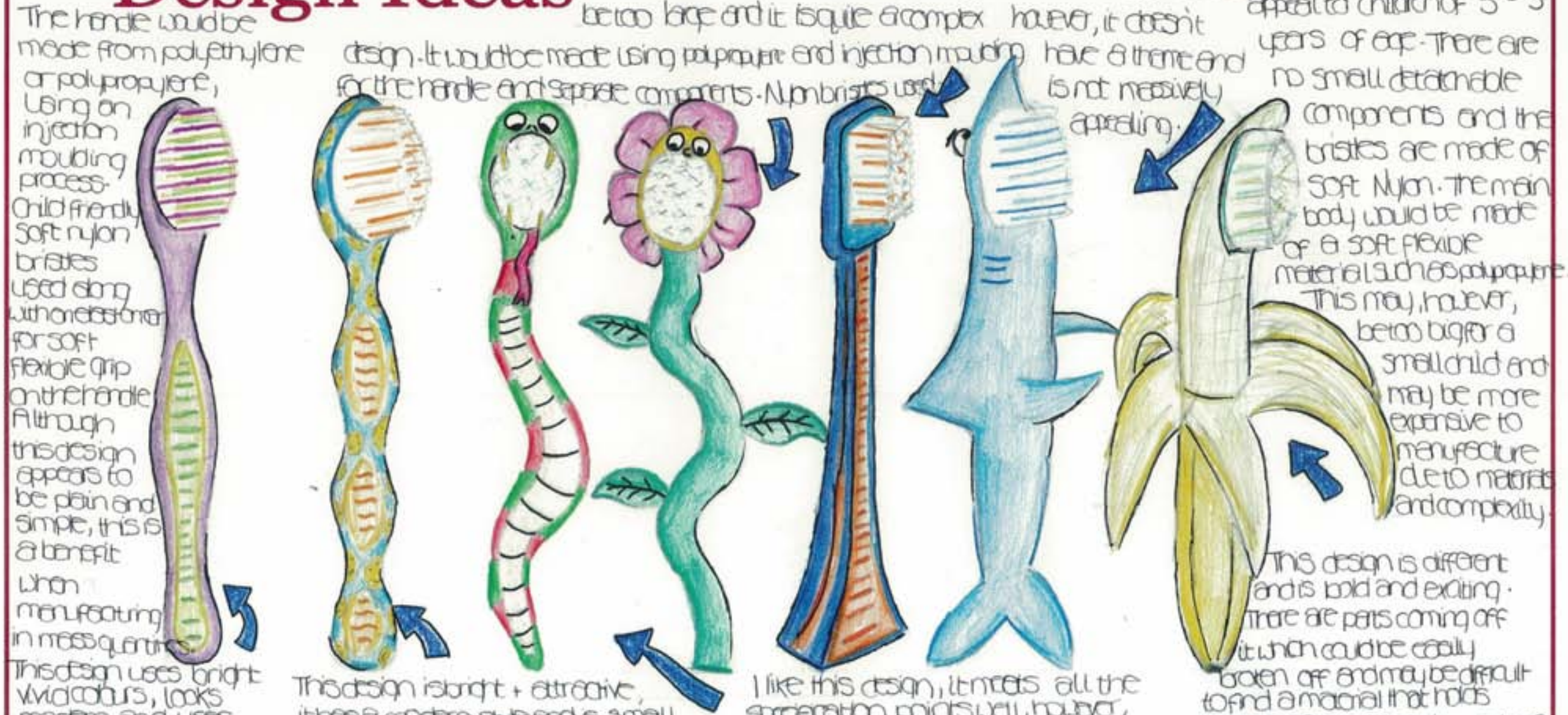






Product Design

Design Ideas



The handle would be made from polyethylene or polypropylene, using an injection moulding process. Child friendly soft nylon bristles used along with rubber for soft flexible grip on the handle. Although this design appears to be plain and simple, this is a benefit when manufacturing in mass quantities.

This design uses bright vivid colours, looks modern and uses high quality and light materials. It is also safe and small enough and manageable for young children. However, it looks as though it would only appeal to girls.

design. It would be made using polypropylene and injection moulding for the handle and separate components. Nylon bristles used

This design is bright + attractive, it has a modern style and is small and manageable for children of 3-5 years. It also includes an type of cleaning on the handle for easy grip, however, would possible only appeal to boys. The main handle made from polypropelene which is durable with SOFT NYLON bristles.

I really like this design, though it would only appeal to girls. It is vivid, modern and fun, however, the head may be too large and it is quite a complex design.

I like this design, it meets all the specification points well, however, the 'fangs' made of soft rubber may be less safe + get in the way when brushing teeth. It is also quite a complicated design although, it would easily appeal to boys + girls. The whole brush handle would be made of TPE with soft nylon bristles.

I'm not sure about this design. I would make it from polypropelene + TPE and nylon bristles however, it doesn't have a theme and is not massively appealing.

I think this toothbrush design fits a lot of the specification criteria. It is bold, creative and would appeal to children of 3 - 5 years of age. There are no small detachable components and the bristles are made of soft Nylon. The main body would be made of a soft flexible material such as polypropylene. This may, however, be too big for a small child and may be more expensive to manufacture due to materials and complexity.

This design is different and is bold and exciting. There are parts coming off it which could be easily broken off and may be difficult to find a material that holds hanging parts effectively, perhaps a flexible, soft touch material such as polypropylene. It may also be made small enough to fit a child's hand and mouth so that it can function effectively.

Product Design

Initial Ideas - Evaluation

Design	Does it meet the specification points?	Comments
1. 	- *The toothbrush meets the specification point of being made from flexible materials. It has a small enough head to fit into a child's mouth and have grooves on the handle for maximum grip.* - *It is small and manageable for a child to use, it has safe bristles for young children. It is also made of appealing and efficient materials.* - *It is bright and easy to use for young children and is made of light materials to make it easy to handle. The toothbrush is of a high quality which makes it more appealing to the consumer.* - *This toothbrush uses materials efficiently, which helps to keep the production cost down and make sure no materials are wasted.*	This design is simple and too plain, I also think this would better suited to a girl. It has all the safety factors and the size points covered, however, it is not appealing to a small child. **11/16**
2. 	- *The toothbrush is made from flexible materials and the head is small enough to fit into a child's mouth. There are grooves on the handle which means it is easy to hold and looks modern.* - *It is quite small and manageable for a small child to use and has safe soft bristles. It is made of an appealing material and is durable and cannot be easily damaged.* - *The toothbrush uses bright, vivid colours and would appeal to parents as well as children. It is easy for a child to use and it made of light materials. It is also safe to use for a child.* - *It would cost a reasonable amount of money to manufacture and materials can be used efficiently to ensure that none are wasted, adding to the cost.*	This toothbrush is flexible and fits all of the important specification points. I feel that this design is less creative or imaginative as some of the other designs. I feel that this brush is less appealing to children as it is adults. **13/16**
3. 	- *Flexible materials are used to make the toothbrush and there is a soft material on the handle which provides grip. It is of a modern style and provides an animal theme.* - *It has safe bristles and is made of efficient and appealing materials. It is durable and cannot be damaged if force is applied to it. It is small and manageable for a child to use.* - *It uses bright colours and is safe to use on a small child's teeth, it is also easy to use as it can be easily held due to grip on the handle. It is of a high quality and would appeal to a consumer. Light materials will also be used so that it can be held effectively by a child.* - *Materials can be used efficiently to make sure the cost to manufacture the overall product is kept down. The product will also be of a reasonable cost to manufacture and materials used will be of sound cost too.*	I really like this design, it looks as though it would appeal to the required age group. It uses bright colours and light materials which are suited to the age group too and make the toothbrush easy to manage. **15/16**
4. 	- *The toothbrush is made of flexible materials so that it is effective when cleaning teeth, it is of a modern style so that it appeals to a young age group and looks stylish and sleek.* - *It has bristles that are safe and small enough to clean teeth of young children. It is made of efficient and appealing materials so that it is attractive to young children. It be durable so that it is not easily damaged should it ever be dropped or force applied to it.* - *The toothbrush uses bright, vivid colours, is easy to use for young children and is safe for young children to use. It is made of light materials so that it is easy to handle for small children. It is also made of high quality so that it is appealing to a parent/consumer.* - *It uses materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	This flower toothbrush design is more suited to a girl. It meets all of the requirements of using bright, vivid colours and also uses materials efficiently, however, the head on the brush is too big and would therefore not fit in a childs mouth. **11/16**

Product Design

Initial Ideas - Evaluation

Design	Does it meet the specification points?	Comments
5. 	- *The toothbrush will be made of flexible materials, has a small enough head to fit into a child's mouth. It also has grooves on the handle so that it is easy for a child to hold.* - *It will be small and manageable, have bristles that are safe and small enough to clean teeth of young children and be made of efficient and appealing materials. It will be durable and not very malleable.* - *It will be safe for young children and will be easy to use for young children. It will also be made of light materials and easy to handle for young children.* - *The product will be of a reasonable cost to manufacture and materials used will be of sound cost too. It will also use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	Although this design scored 13 out of 16, I do not like it very much. It meets all of the main requirements, it is safe and small enough to be held and used by a 3-5 year old, however, it appears to be boring. **13/16**
6. 	- *It will be of a modern style and look stylish and sleek. It will provide a general theme and appeal to children of between 3 – 5 years old. The toothbrush will be made of flexible materials and will have a small enough head to fit into a child's mouth.* - *It will be small and manageable enough for a small child to use, will have bristles that are safe and small enough to clean teeth of young children and be made of efficient and appealing materials. It will also be durable and not very malleable so that it is not easily damaged.* - *The toothbrush will use bright, vivid colours as it will need to appeal to both parents and young children, It will be easy to use for young children. It will be safe for young children, be made of light materials and be of high quality so that it is appealing to a parent/consumer.* - *The product will be of a reasonable cost to manufacture and materials used must be of sound cost too. It will use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	I really like this toothbrush. It meets all of the requirements visually and is bright, colourful and would appeal to small children as well as adults, however it may not be practical and may be hard to hold when brushing teeth. **15/16**
7. 	- *It will be of a modern style and look stylish and sleek. It will provide a general theme and appeal to children of between 3 – 5 years old. The toothbrush will be made of flexible materials and will have a small enough head to fit into a child's mouth.* - *It will be small and manageable enough for a small child to use, will have bristles that are safe and small enough to clean teeth of young children and be made of efficient and appealing materials. It will also be durable and not very malleable so that it is not easily damaged.* - *The toothbrush will use bright, vivid colours as it will need to appeal to both parents and young children, It will be easy to use for young children. It will be safe for young children, be made of light materials and be of high quality so that it is appealing to a parent/consumer.* - *The product will be of a reasonable cost to manufacture and materials used must be of sound cost too. It will use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	This is a really imaginative design and looks attractive and fun. It would definitely appeal to a small child. The head and bristles would be small enough for a childs mouth, however, the end of the brush may be too big. **15/16**

Product Design

Initial Ideas - Evaluation

Design	Does it meet the specification points?	Comments
8. 	- *The toothbrush will be made of flexible materials, will have grooves on the handle to make sure it is easy to hold and has maximum amount of grip and will be of a modern style so that it appeals to a young age group and looks stylish and sleek. It will also provide a general theme and appeal to children of between 3 – 5 years old.* - *It will be small and manageable enough for a small child to use, will have bristles that are safe and small enough to clean teeth of young children and be made of efficient and appealing materials. It will be durable and not very malleable so that it is not easily damaged.* - *The toothbrush will use bright, vivid colours as it will need to appeal to both parents and young children, will be easy to use for young children, be safe for young children and be made of light materials so that it is easy to handle for small children. It will also be of high quality so that it is appealing to a parent/consumer.* - *The product will be of a reasonable cost to manufacture and materials used must be of sound cost too. It will use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	This is a very appealing design for children of all ages and especially 3-5 year olds. It grabs your attention and is very unique for a toothbrush. This is a successful idea as it could be made as part of an animal theme, leaving room for lots more ideas/designs **15/16**
9. 	- *The toothbrush will be made of flexible materials so that it is effective when cleaning teeth, will have a small enough head to fit into a child's mouth and have grooves on the handle to make sure it is easy to hold.* - *It will be small and manageable enough for a small child to use, have bristles that are safe and small enough to clean teeth of young children and will be made of efficient and appealing materials. It will be durable and not very malleable so that it is not easily damaged.* - *It will be easy to use for young children, be safe for young children and be made of light materials. It will be of high quality so that it is appealing to a parent/consumer.* - *The product will be of a reasonable cost to manufacture and materials used must be of sound cost too. It will use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	I don't much like this idea, however, it meets most of the practical points in the specification criteria. It seems slightly dull and looks as though it would appeal more to adults than small children. **13/16**
10. 	- *The product will be made of flexible materials, will have a small enough head to fit into a child's mouth and will have grooves on the handle to make sure it is easy to hold. It will be of a modern style so that it appeals to a young age group and looks stylish and sleek.* - *It will be small and manageable enough for a small child to use, have bristles that are safe and small enough to clean teeth of young children, be made of efficient and appealing materials and be durable and not very malleable so that it is not easily damaged.* - *It will be easy to use for young children, be safe for young children, be made of light materials so that it is easy to handle for small children and be of high quality so that it is appealing to a parent/consumer.* - *The product will be of a reasonable cost to manufacture and materials used must be of sound cost too. It will also use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	I like this design because it is simple and modern. The shape makes it easy to hold for small children which is a very important factor when considering practical issues with a toothbrush. **14/16**

Product Design

Initial Ideas - Evaluation

Design	Does it meet the specification points?	Comments
11. 	- *The toothbrush will be made of flexible materials, have grooves on the handle to make sure it is easy to hold and has maximum amount of grip, be of a modern style so that it appeals to a young age group and looks stylish and sleek and will provide a general theme and appeal to children of between 3 – 5 years old.* - *It must be small and manageable enough for a small child to use, have bristles that are safe and small enough to clean teeth of young children, be made of efficient and appealing materials and be durable and not very malleable so that it is not easily damaged.* - *The toothbrush must use bright, vivid colours as it will need to appeal to both parents and young children, be easy to use for young children, be safe for young children and also be made of light materials so that it is easy to handle for small children. It will also be of high quality so that it is appealing to a parent/consumer.* - *The product must be of a reasonable cost to manufacture and materials used must be of sound cost too. It will also use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	This brush would suit a small child, preferably a girl, I think it is quite a quirky design, however, the head of the brush appears to be far too big, and the size would need to be changed significantly for this to work. **15/16**
12. 	- *The toothbrush will be made of flexible materials, have grooves on the handle to make sure it is easy to hold and has maximum amount of grip, be of a modern style so that it appeals to a young age group and looks stylish and sleek and will provide a general theme and appeal to children of between 3 – 5 years old.* - *It must be small and manageable enough for a small child to use, have bristles that are safe and small enough to clean teeth of young children, be made of efficient and appealing materials and be durable and not very malleable so that it is not easily damaged.* - *The toothbrush must use bright, vivid colours as it will need to appeal to both parents and young children, be easy to use for young children, be safe for young children and also be made of light materials so that it is easy to handle for small children. It will also be of high quality so that it is appealing to a parent/consumer.* - *The product must be of a reasonable cost to manufacture and materials used must be of sound cost too. It will also use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	This design is similar to the previous one and meets all of the same criteria. The head of the brush is less of an issue with this design, although, it could be made smaller to suit a child **15/16**
13. 	- *The toothbrush will be made of flexible materials.* - *It must be small and manageable enough for a small child to use, have bristles that are safe and small enough to clean teeth of young children, be made of efficient and appealing materials and be durable and not very malleable so that it is not easily damaged.* - *The toothbrush will be easy to use for young children, be safe for young children and also be made of light materials so that it is easy to handle for small children. It will also be of high quality so that it is appealing to a parent/consumer.* - *The product must be of a reasonable cost to manufacture and materials used must be of sound cost too. It will also use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	I think this is a clever idea, however, it meets only one point in the form section of the specification. This means that it has little grip on the handle, does not provide a central theme and is not modern. **11/16**

Product Design

Initial Ideas - Evaluation

Design	Does it meet the specification points?	Comments
14. 	- *The toothbrush will be made of flexible materials, will have grooves on the handle to make sure it is easy to hold and has maximum amount of grip and will be of a modern style so that it appeals to a young age group and looks stylish and sleek. It will also provide a general theme and appeal to children of between 3 – 5 years old.* - *It will be small and manageable enough for a small child to use, will have bristles that are safe and small enough to clean teeth of young children and be made of efficient and appealing materials. It will be durable and not very malleable so that it is not easily damaged.* - *The toothbrush will use bright, vivid colours as it will need to appeal to both parents and young children, will be easy to use for young children, be safe for young children and be made of light materials so that it is easy to handle for small children. It will also be of high quality so that it is appealing to a parent/consumer.* - *The product will be of a reasonable cost to manufacture and materials used must be of sound cost too. It will use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	I really like this design. It has everything that a small child could want in a toothbrush. It uses bright, appealing colours, provides grip on the handle for easy hold and goes with a general theme i.e. animals **15/16**
15. 	- *The toothbrush will be made of flexible materials, will have grooves on the handle to make sure it is easy to hold and has maximum amount of grip and will be of a modern style so that it appeals to a young age group and looks stylish and sleek. It will also provide a general theme and appeal to children of between 3 – 5 years old.* - *It will be small and manageable enough for a small child to use, will have bristles that are safe and small enough to clean teeth of young children and be made of efficient and appealing materials. It will be durable and not very malleable so that it is not easily damaged.* - *The toothbrush will use bright, vivid colours as it will need to appeal to both parents and young children, will be easy to use for young children, be safe for young children and be made of light materials so that it is easy to handle for small children. It will also be of high quality so that it is appealing to a parent/consumer.* - *The product will be of a reasonable cost to manufacture and materials used must be of sound cost too. It will use materials efficiently to make sure that cost is kept low and no materials are wasted meaning that money is wasted.*	This design is much like the previous one. It meets almost all of the criteria in the specification, however, the one point that it fails to meet is the size of the head. This would need to be adjusted in order for this design to work. **15/16**

Product Design

Idea Development

Toothbrush Head

I have decided to develop this snake toothbrush design, having it score highly in the evaluation against my specification points. It is a fun design for children and also allows for lots of experimental changes to be made to it, in order to improve the design overall.

This is a side view of the tooth brush design and focuses mainly on the head and bristles on the brush.

This is a regular brush with a snake image on the back. It looks good and the colours are complimentary, however, less effective and eye catching.

I like this design, hou roundness of the he perhaps too big for a c mouth. The colours are effective too and would suit both a boy or girl. I prefer the eye detail on the back of the head.

This is a close-up of the bristles and shows a yellow bristle to act as a sort of 'fang'.

Can be made from nylon bristles. Yellow bristles can be ma alternately from a flexible, soft materia such as an elastromer.

This head shows that eye detail is on the back of the head and this leaves room for Nylon bristles and tongue detail on the inside.

Soft Nylon bristles

TPE, flexible head

Polypropylene handle (flexible + soft material)

Less safe, if small parts break off

These head designs are simple and show boy and girl designs, However, the tongue is not suitable as it could break off.

The heads not suitable f snake design c a childs m

This h cobra lik too bic a child mouth.

Manufacturing Techniques

Manufacturing a tooth-brush handle requires an injection moulding process using a polymer, usually polypropylene.

This process works through granules of polypropylene being

In the toothbrush head, there are holes left for the Nylon bristles to be added. These are carefully inserted using a machine and shaped into the more long tiny shapes. The brush then

Product Design
Idea Development

Toothbrush Handle

This design is effective and looks like it would appeal to a child. It has loop holes for a childs fingers.

Polypropylene or polyamide

Flexible + Soft Nylon

This design is a slightly pear shaped handle, however, the colours work well together and the underside of the handle has an elastomer type material for extra grip. The wapped design looks as though it would appeal to a small child.

better grip

elastomer

loop holes - easier to hold

This is the front of the brush, made from polypropylene which is a flexible material + adds for a bit of movement in the brush.

Polypropylene

rubber

raised - increases grip on handle.

This is a close up of the back of the handle. It is made of a type of soft, flexible material called an elastomer.

elastomer - rubbery underside.

grip!

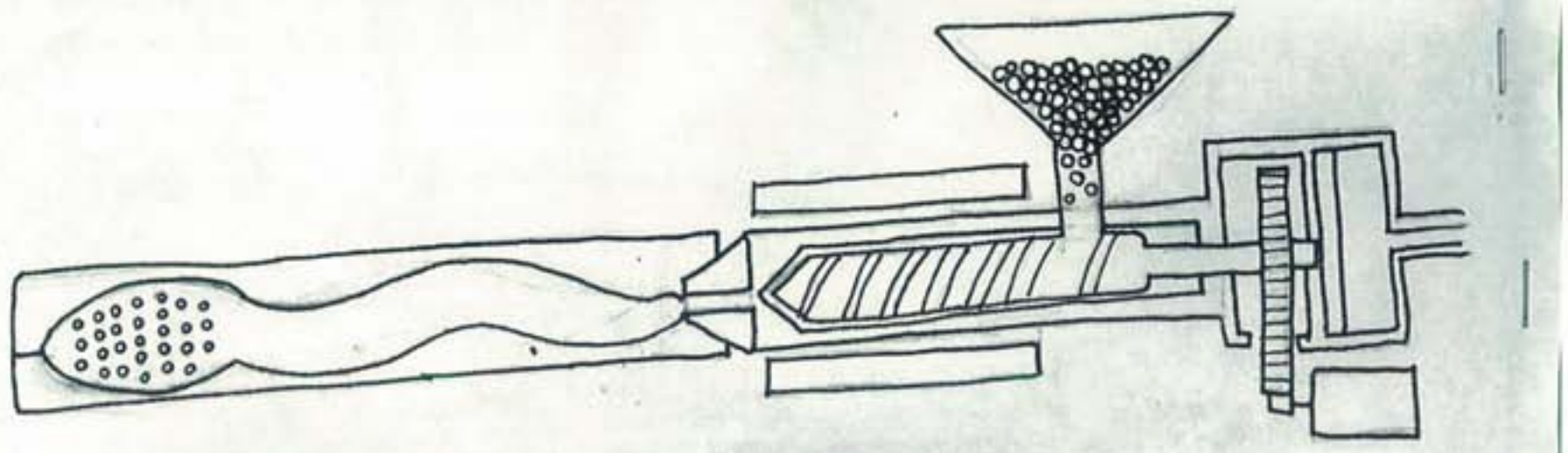
This handle looks as though it would be uncomfortable to hold. The colours are complimentary and I would perhaps make this from a more rigid material such

This handle looks effective and is a suitable shape to hold. The underside has a strip of flexible rubber which adds for a softer, more gripped hold. The tongue could also be made from this material too.

rubber

This shows all of the back of the handle and shows a soft flexible material for grip and and mouth material

This is a very good hold for a child and made from Injection mould

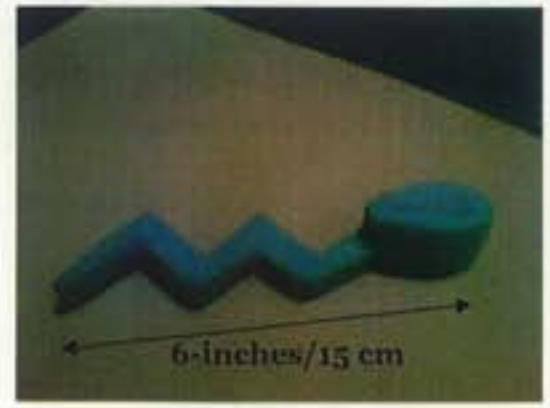


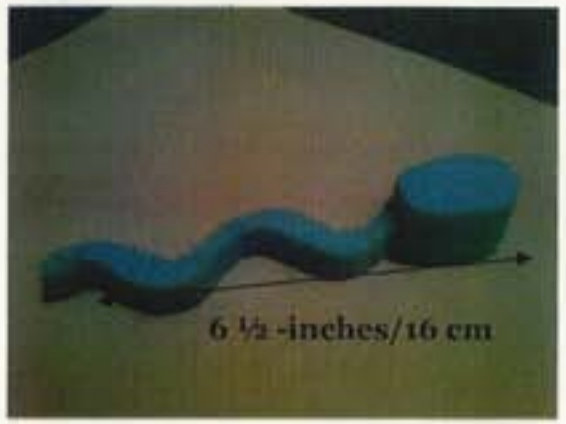
Injection Moulding Process
- Toothbrush handle.

Product Design Modelling

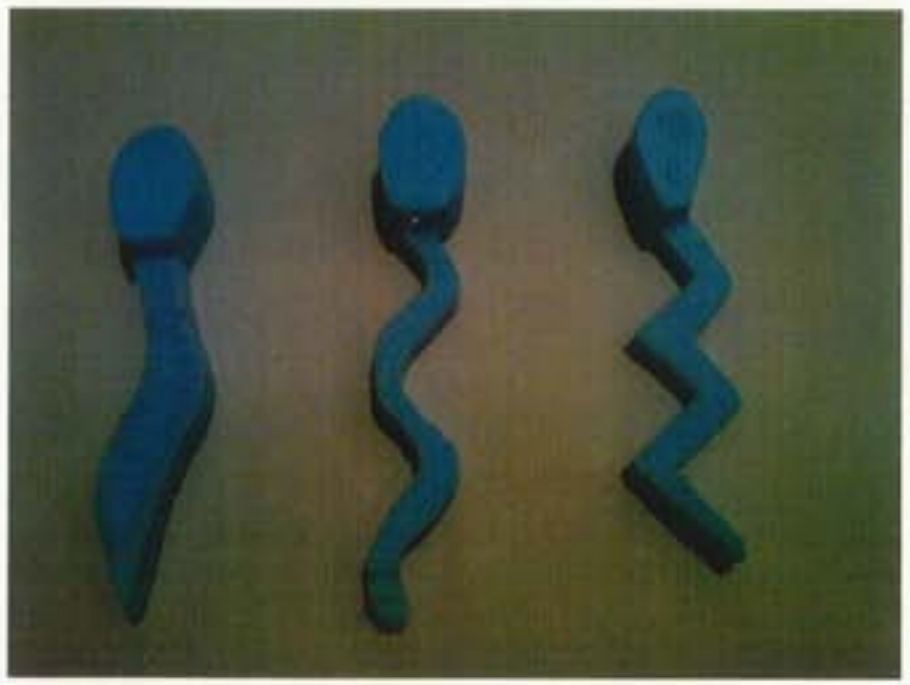
In order for me to get an idea of whether my toothbrushes would be an acceptable size for a child of between 3 and 5 years of age, I need to find measurements of the average hand size for this age range and also test out the comfort once a child is holding the toothbrushes.
I have made models of the brushes in different shapes to get an idea of which handle would be the most effective and comfortable for a child to use.
Having done some research, I have found out that the average length of an adult male hand is around 189 mm/18.9cm/7 ½ inches, while the average length of an adult female hand is 172 mm/17.2cm/just under 7 inches. The average hand breadth for adult males and females is just under 3 ½ inches/8.4cm and 7.4 cm/just under 3 inches.
After doing further research, I found that the average size of a childs hand between 3 and 5 years old age is 3 inches/7 ½ cm from the bottom of the hand to the tip of the middle finger and 2 ½inches/6.4 cm across.

Having tested out the toothbrush handles myself, I found that they were all slightly small for my hand, however, these would be very suitable for a child of between 3 – 5 years as their hand length and width is much smaller than mine. This brush appears to be slightly uncomfortable to hold due to the zig-zag handle and allows for no flexible hold of the shape. Although it looks effective, it is not practical.



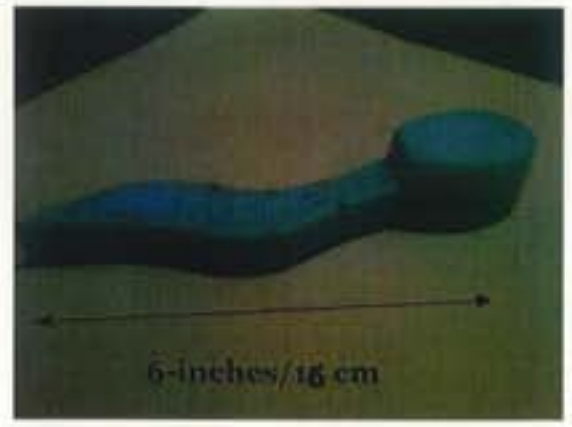


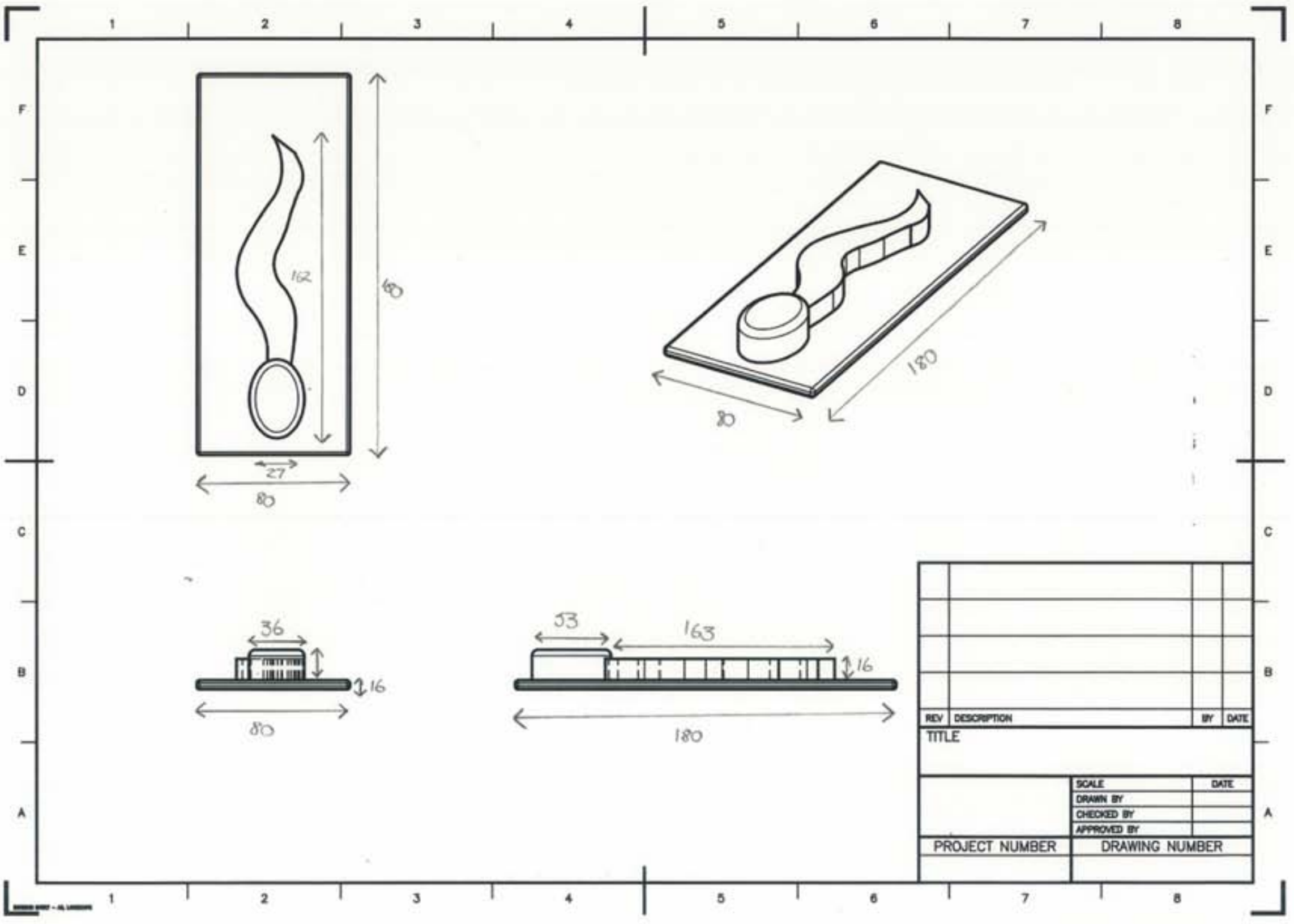
This toothbrush is the perfect size for a small child, and the shape is more suited to a snake. It is also slightly more comfortable to hold and also has room for fingers either size of the handle due to a more flexible shape. Although the shape is still slightly too waved for a toothbrush handle, it could still be used effectively and to suit the size of a child's hand.



I have modelled 3 toothbrushes out of Styrofoam. This material allows for shapes to be easily made and allow me to make different shaped toothbrush handles.

I liked this shaped handle the best out of the three. It was the least extreme, however, was the most comfortable to hold and was most snake like. The shape allowed for more effective grip and hold around the handle and was a more effective size to suit a child of 3-5 years old. It uses a slightly chunkier handle which gives a child more control over the handle and makes it easier to grip when cleaning teeth. This handle also allows for the head size to be relatively small in proportion to it which is useful when taking the size of a child's mouth into consideration.

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Product Design

Final Design - Toothbrush

This is my final design for a children's toothbrush. It meets practically all of the specification points after having developed the original idea.

After modelling the toothbrush and looking for different shaped handles that would be suitable for use of a 3-5 year old child, I eventually decided the slightly angled snake shape was most suitable and concluded that it was the safest and easiest to hold. It is a chunky handle which helps make it easy to hold and also has an elastomer on the handle which allows for grip when holding. The whole handle itself is made from polypropylene which makes it flexible. It also have very high tensile strength which is an extremely useful point when taking into consideration the user of the brush. It is a light material too which is an advantage as this makes it easy for a small child to lift and use when brushing their teeth. An injection moulding process is the most effective form of manufacturing this brush as it uses a wide range of plastics and can be altered to produce using the same mould/shape for all brushes.

On the head of the brush, I decided to put the rubber grips on the outside of the head rather than embedded in the bristles. This makes it less irritating and adds to the softness of the head.

The colours used on this brush were experimented with in this development stage of the design, and having come up with several different colour combinations that could suit the snake theme, I decided against using these.

In the end I decided to go with the original red and green colour scheme. I chose these colours because they appeal to be very bold and stand out. I also struggled to find a combination of colours that would suit both boys and girls of a young age. Red can be deemed a girls colour and elastomer green a boys colour and so in this case, it went together perfectly, as well as them being complimentary colours.

Polypropylene

Rubber

Elastomer

Cost:
- Product is of reasonable cost to manufacture and materials are low.
- Uses materials efficiently to keep cost low.

This brush successfully meets all 16 specification requirements.

I chose to move the cups and nose of the brush to the back of the head of the brush as this proved to be more visible and improved the look of the brush as a whole.

The bristles of the brush are made of a very soft Nylon which is incredibly child friendly and enables children to clean their teeth safely and efficiently.

Nylon bristles

Rubber

The bristles are fitted and shaped to the head very tightly so that no bristles are able to come loose and harm children. There are also a few coloured bristles inserted to make it appear more exciting.

Final Design meets...

Form:
- Toothbrush is made of flexible materials
- Has a small enough head for a childs mouth.
- Has grooves on the handle (easy to hold/maximum grip.
- Modern style, appeals to a young age group.
- Provides a general theme and appeals to 3-5 year olds.

Function:
- Small + manageable for a child
- Has bristles that are safe and small enough for small children.
- Made of efficient + appealing materials.
- Durable and not easily damaged should force be applied to it.

User Requirements:
- Uses bright, vivid colours to appeal to both parents and children.
- Easy to use for young children and persuades them to brush their teeth.
- Safe for young children to use when brushing their teeth.
- Made of light materials and is of extremely high quality

Product Design

Specification - Packaging

Form

- The packaging must be the correct size for the toothbrush and the brush must fit into the packet in order for it to be protected securely and not damaged.
- It must look bright and colourful and compliment the toothbrush inside to make the product look of a high quality.
- The packaging must be safe and have no sharp edges or loose parts as this is for a child's toothbrush and no harm must come to children.

Function

- The packaging must protect the toothbrush inside in order to stop it becoming damaged.
- It must advertise the product and look attractive and appealing so that it persuades parents to buy the toothbrush in the first place.
- There must be a notice on the packaging exclaiming that the toothbrush is for 3-5 year old children.

User Requirements

- The packaging must show the toothbrush inside and therefore must be transparent in some way.
- The packaging must be easy to open so that the user can get the toothbrush out.
- The packaging must have all of the details and materials used on the back so that the user is informed of everything involved in the making of the toothbrush.

Cost

- The packaging must use materials as efficiently as possible in order for there to be minimum waste and keeping manufacturing costs low.
- The materials used must be of little cost as possible so that it is inexpensive to produce packaging in mass quantities.

Product Design

Packaging - Research and Pictures

Product Design

Packaging - Idea Development

1.

I like this packaging design because I'd make the whole box from transparent PVC or PET so that the toothbrush can be easily seen. It can be cut out/ produced in the form of a net and card with details on it inserted in the base. A bed of foam would be put in the bottom of the box to hold the toothbrush in place.

This design is simple. The colour is attractive, and can be produced in mass quantities easily and reduce cost.

I would make this by printing out onto card - in the form of a net. This can be easily printed and put together easily.

Once the net is cut it, a sheet of transparent be made a view of tooth-brush inside easily.

to open the

2.

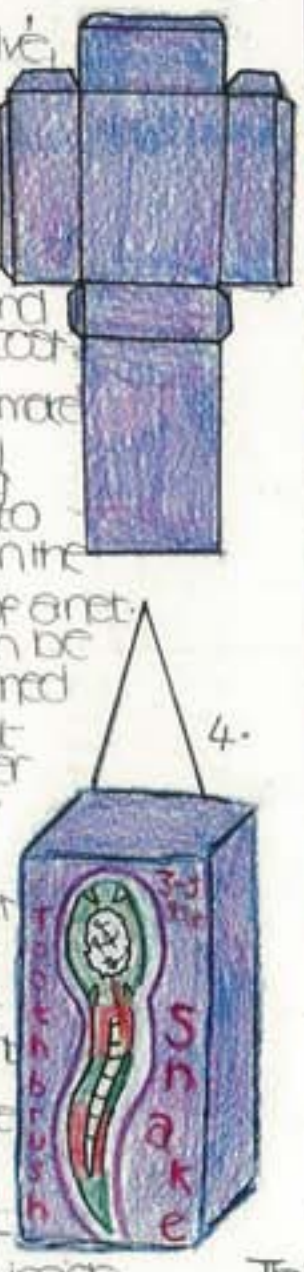
I really like the idea of this box, it appears too complicated just for

3.

It is appealing but could be time consuming to produce. The toothbrush may also be hard to fit into the box as the opening is small and has little room.

I like this idea best. It looks like it would appeal to 3-5 year olds and parents. I would make this from PET so that the brush is well protected and the plastic can be easily moulded into a snake shape. The backing could be made from card and the details printed onto it.

4.



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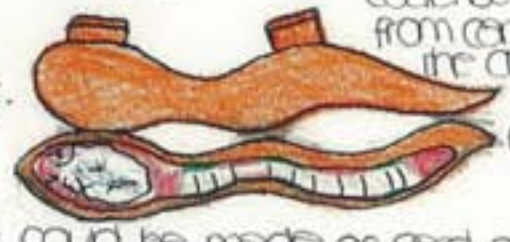
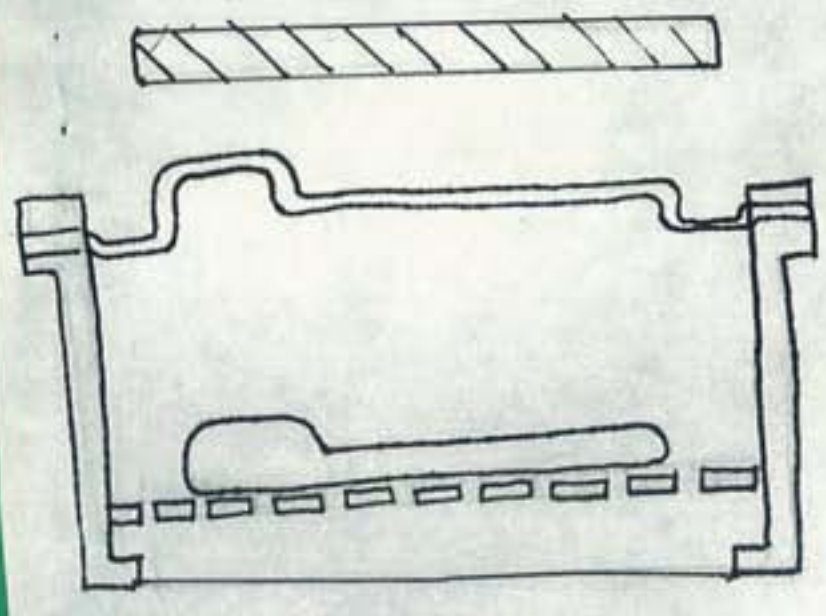


This box could be made of card or from a plastic, possibly acrylic, this acts as a case for the brush, however, could be expensive to manufacture.

This foam had the b tightly mach

This is a good idea for packagi but is more of a permen packagi idea. make from

6.



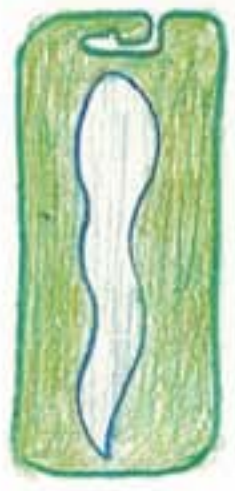
Vacuum Forming Process
-Toothbrush Packaging.

Manufacturing Techniques

For the packaging of the toothbrush, a vacuum forming technique could be used for the plastic casing, this is usually made of PET. A sheet of PET is

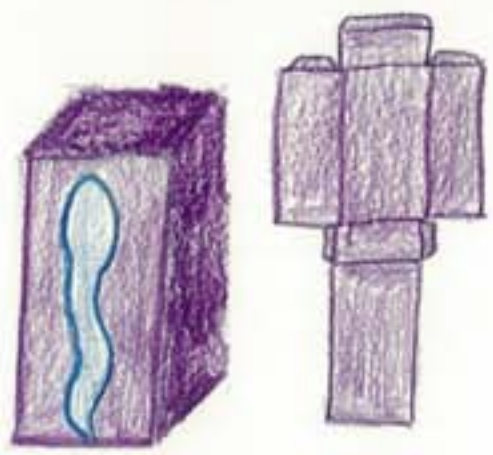
Product Design

Packaging - Initial Ideas Evaluation

Design	Does it meet the specification points?	Comments
1 	- The packaging is the correct size for the toothbrush and the brush fits into the packet in order for it to be protected securely and not damaged. The packaging is safe and has no sharp edges or loose parts as this is for a child's toothbrush and no harm must come to children. - The packaging must protect the toothbrush inside in order to stop it becoming damaged. - The packaging shows the toothbrush inside and is transparent in some way. The packaging is easy to open so that the user can get the toothbrush out. The packaging has all of the details and materials used on the back so that the user is informed of everything involved in the making of the toothbrush. - The packaging uses materials as efficiently as possible in order for there to be minimum waste and keeping manufacturing costs low. Materials used are of little cost as possible so that it is inexpensive to produce packaging in mass quantities.	I really like the packaging idea, it meets the majority of the specification points. It keeps the toothbrush safe and stops it from being damaged. It is also transparent which is a key factor. **8/11**
2 	- The packaging is the correct size for the toothbrush and the brush fits into the packet in order for it to be protected securely and not damaged. It looks bright and colourful and compliments the toothbrush inside to make the product look of a high quality. The packaging is safe and has no sharp edges or loose parts as this is for a child's toothbrush and no harm must come to children. - The packaging protects the toothbrush inside in order to stop it becoming damaged. It advertises the product and looks attractive and appealing so that it persuades parents to buy the toothbrush in the first place. There is a notice on the packaging exclaiming that the toothbrush is for 3-5 year old children. - The packaging shows the toothbrush inside and is transparent. It is easy to open so that the user can get the toothbrush out. The packaging has all of the details and materials used on the back so that the user is informed of everything involved in the making of the toothbrush. - The packaging uses materials as efficiently as possible in order for there to be minimum waste and keeping manufacturing costs low. Materials used are of little cost as possible so that it is inexpensive to produce packaging in mass quantities.	This is a really good packaging idea, it looks presentable and meets all the specification points and importantly transparents union allows people to see the toothbrush inside. It also looks attractive and displays the age range for which the brush is designed for. **11/11**
3 	- The packaging is safe and has no sharp edges or loose parts as this is for a child's toothbrush and no harm must come to children. - The packaging protects the toothbrush inside in order to stop it becoming damaged. There is a notice on the packaging exclaiming that the toothbrush is for 3-5 year old children. - The packaging uses materials as efficiently as possible in order for there to be minimum waste and keeping manufacturing costs low. The materials used are of little cost as possible so that it is inexpensive to produce packaging in mass quantities.	I disliked this design and also found that it met only five specification points and therefore is not suitable for children of 3-5 years old. **5/11**

Product Design

Packaging - Initial Ideas Evaluation

Design	Does it meet the specification points?	Comments
4 	- The packaging is the correct size for the toothbrush and the brush fits into the packet in order for it to be protected securely and not damaged. It looks bright and colourful and compliments the toothbrush inside to make the product look of a high quality. The packaging is safe and has no sharp edges or loose parts as this is for a child's toothbrush and no harm must come to children. - The packaging protects the toothbrush inside in order to stop it becoming damaged. It advertises the product and looks attractive and appealing so that it persuades parents to buy the toothbrush in the first place. There is a notice on the packaging exclaiming that the toothbrush is for 3-5 year old children - The packaging shows the toothbrush inside and is transparent in some way. The packaging is easy to open so that the user can get the toothbrush out. The packaging has all of the details and materials used on the back so that the user is informed of everything involved in the making of the toothbrush. - The packaging uses materials as efficiently as possible in order for there to be minimum waste and keeping manufacturing costs low. Materials used are of little cost as possible so that it is inexpensive to produce packaging in mass quantities.	This box uses all the requirements mentioned in the specification. It is sturdy and has a transparent window so that the toothbrush can be viewed from the outside. It is safe for children, and has no sharp edges. This makes it a very successful design and it also looks quite good. **11/11**
5 	- The packaging is the correct size for the toothbrush and the brush fits into the packet in order for it to be protected securely and not damaged. The packaging is safe and has no sharp edges or loose parts as this is for a child's toothbrush and no harm must come to children. - The packaging protects the toothbrush inside in order to stop it becoming damaged. - The packaging is easy to open so that the user can get the toothbrush out. - The packaging uses materials as efficiently as possible in order for there to be minimum waste and keeping manufacturing costs low. Materials used are of little cost as possible so that it is inexpensive to produce packaging in mass quantities.	This packaging idea is not very good as it meets only six points of the specification. It meets the safety points of the specification, however it fails to meet the attractive and appealing points. **6/11**
6 	- The packaging is the correct size for the toothbrush and the brush fits into the packet in order for it to be protected securely and not damaged. The packaging is safe and has no sharp edges or loose parts as this is for a child's toothbrush and no harm must come to children. - The packaging protects the toothbrush inside in order to stop it becoming damaged. There is a notice on the packaging exclaiming that the toothbrush is for 3-5 year old children. - The packaging shows the toothbrush inside and is transparent in some way. The packaging is easy to open so that the user can get the toothbrush out. The packaging has all of the details and materials used on the back so that the user is informed of everything involved in the making of the toothbrush. - The packaging uses materials as efficiently as possible in order for there to be minimum waste and keeping manufacturing costs low.	This is a successful packaging method, however, it is a more permanent packaging method and acts more as a display case. It meets safety measurements and is the correct size for the toothbrush. **8/11**

Product Design

Packaging - Initial Ideas Evaluation

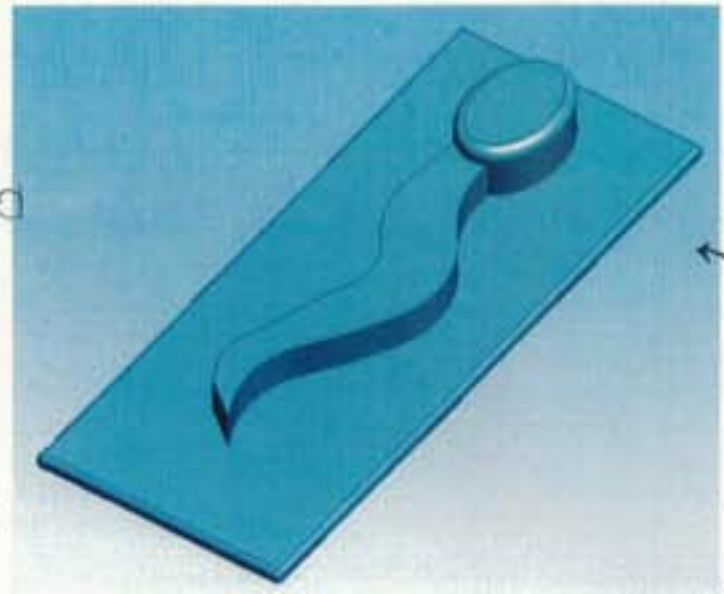
Design	Does it meet the specification points?	Comments
7. 	- The packaging is the correct size for the toothbrush and the brush fits into the packet in order for it to be protected securely and not damaged. The packaging is safe and has no sharp edges or loose parts as this is for a child's toothbrush and no harm must come to children. - The packaging protects the toothbrush inside in order to stop it becoming damaged. There is a notice on the packaging exclaiming that the toothbrush is for 3-5 year old children. - The packaging shows the toothbrush inside and therefore must be transparent in some way. The packaging is easy to open so that the user can get the toothbrush out. - The packaging uses materials as efficiently as possible in order for there to be minimum waste and keeping manufacturing costs low. Materials used are of little cost as possible so that it is inexpensive to produce packaging in mass quantities.	I don't like this idea, I think it looks unattractive and is not a very appealing or persuasive form of packaging. It does, however, meet all safety points. **8/11**

Product Design

Packaging - Modelling

Here I have modelled the packaging for the toothbrush using CAD to get an idea of what each design looks like in 3D.

This is a poor example of packaging as the raised PET that will hold the toothbrush is the wrong shape and the handle is not raised as much as the head, this will also cause problems regarding how well the toothbrush fits. This also does not box as good as the other packaging ideas, therefore I shall not be using this one.



I really like this and think it looks really well for a packaging idea. It isn't too big to be put on a shelf in a shop, should it be sold. It also clearly displays that the toothbrush can be viewed from outside the packaging. The back made from card is thin and means that the overall weight of the packaging will be kept to a minimum when the toothbrush is inside.

This is very original and looks like a very interesting idea for toothbrush packaging. It would score highly on appealing and attractiveness and would certainly appeal to both parents and young children in persuading them to buy a toothbrush. However, this is too big for packaging a small toothbrush and all the material used (Styrofoam) is not needed. The shape for the actual brush is perfect, but the surrounding material is useless and may be deemed a waste. It could also be quite heavy for packaging and the aim is to reduce the weight of both the brush and packaging overall.

This packaging design is made of a mould to hold the brush in place and then wrapped in PVC. The Styrofoam/polystyrene mould is effective in the respect that it holds the brush securely and leaves little room for it to move about. The toothbrush can be clearly viewed from the front, and the packaging is child friendly because it's soft. This packaging would be successful, however, it is less appealing and eye catching compared with other designs. It also appears quite heavy which is a factor I want to avoid.

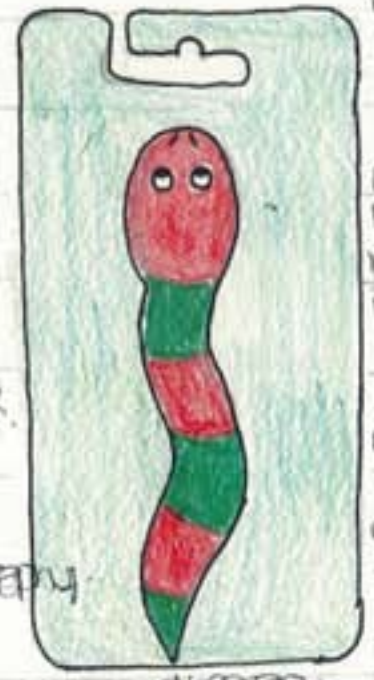
Product Design

Final Design - Packaging

This is the final design for the packaging of the toothbrush.

I have modelled the different types of packaging that could have potentially have been used. I have ruled out other ideas that were unsuitable and concluded with this one.

The colours used are fairly bright and stand out. I decided against using dark colours for packaging as this would not make the brush inside stand out as much and also does not appear as appealing as brighter colours do.



The back of the packaging contains all details such as price, materials used, health instructions, bar code etc. This is all printed onto the card using flexography. Flexography can be used to print on various different materials effectively, is quick and is of a high quality.

I gave the toothbrush a simple name 'Snake' which means there is no confusion and it is clear and original.

I think if I were to design packaging again though, I would experiment with different colours and perhaps try out a more complex shape but still suits cost the shape of the brush.

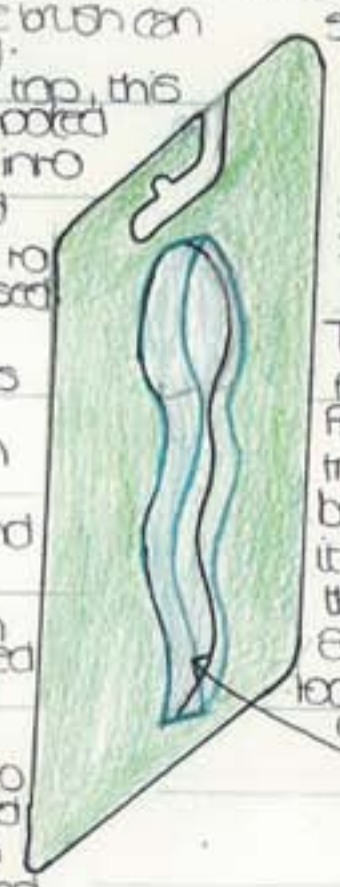
- The packaging uses materials efficiently reduce waste and cost.
- Materials used are of little cost as possible so inexpensive to produce.

Card - Strong, stiff and durable.

User Requirements
- The packaging is transparent and clearly displays the toothbrush inside.
- It is easy to open.
- Has all details displayed on the back.

On the corner, there is a piece of the PET which has not been glued to the back. This allows for the PET to be easily pulled back and the brush can be removed from the packaging.

The packaging has a hook at the top, this allows for toothbrushes to be hooked onto rails and stands when put into retail and are ready to be purchased. The hook also means that the toothbrush can be displayed and takes up little room when hooked on a rail. This is an alternative to being stacked which takes up room and doesn't allow for the brush to viewed very easily.



The packaging will be made of efficient materials in order to reduce the amount of waste and they should also be as safe and child friendly as the actual toothbrush. There should be no sharp edges or loose parts so that small children cannot come to harm.

The raised plastic casing for the brush is made from PET, because this is transparent, it allows for the brush to be viewed easily, it is durable which means that should any force be applied, it will protect the toothbrush and it will not be damaged.

PET - transparent and stiff. Cannot be easily damaged when force is applied.

Final Design MEETS...

Form
- The packaging must be the correct size for the toothbrush.
- Looks bright and colourful and compliments the brush inside.
- It is safe and has no sharp edges which means it is not harmful to children.

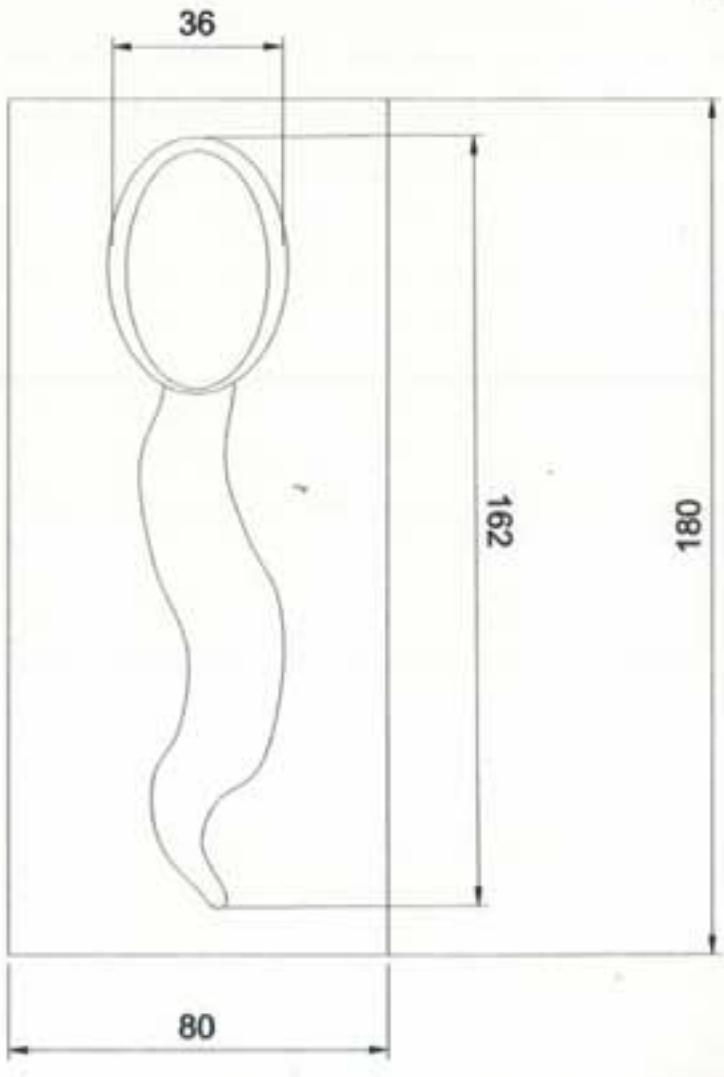
Function
- Packaging protects the toothbrush inside.
- It advertises the product and looks attractive, appealing and persuasive.
- There is a clear note on the packaging informing parents that the toothbrush is for children of 3-5 years old.

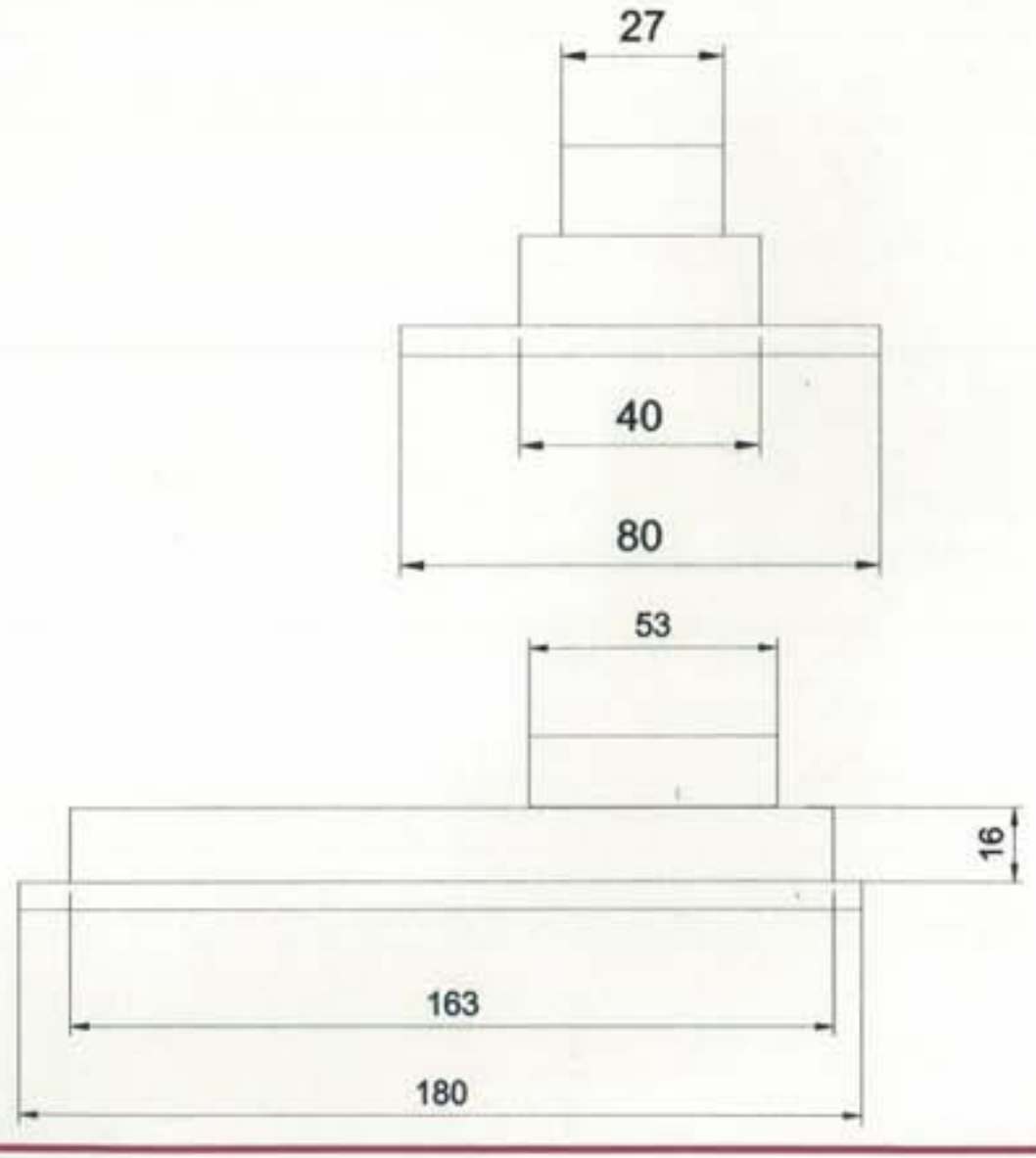
Product Design

Working Drawings and Cutting List

These are the measurements that would need to be followed if a model of the toothbrush and the packaging was made. I have also written out a cutting list with the measurements of all the materials needed to make it successfully without running out of or wasting any materials.

Material	Length	Width
Card	180mm	80mm
PET	170mm (rounded up)	30mm (rounded up)
Polypropylene	160 mm	35mm
Rubber	50mm	50mm
Elastomer	100mm	50mm





PRODUCT MANUFACTURE BEACH HUT

PRODUCT MANUFACTURE - BEACH HUT
Specification and Pictures

I have to produce a model of a beach hut. It will replicate one that could be placed on a beach for people who potentially want a creative and unique hut. I am going to make it in the shape of a sinking ship to make it look different and attractive on a bland beach setting. I will make it out of plywood 'beams' which will provide the skeleton for my beach hut. I will then either use thin strips of card for the panelling around the side of the hut, or alternately, use PVC, which is flexible and can come in a range of different colours.

This is what the shape of the front of my beach hut will look like. I have taken different ideas and shapes to create my own version of a sunken ship beach hut.

Form

- It must be eye catching and attractive, this will make it look professional and well made.
- It must be bright and stand out to catch the attention of people looking at the model.
- It must look exactly like my design and be of similar measurements, which will make sure it is as like the design as possible.
- It must be made of both flexible and durable materials to make the curved shape and ensure that it stays together and does not fall apart.

Function

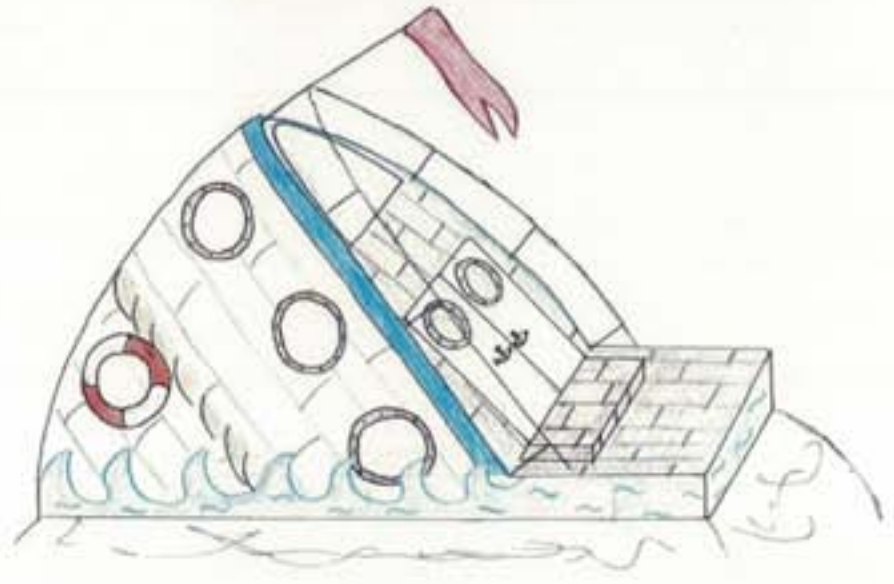
- The model will be made of natural resources because realistically it needs to fit in with a natural environment on a beach like the original actual beach hut.
- It must have enough room outside to fit in model chairs and tables.
- It must have model chairs and tables outside, because the real version of the beach hut would seat people outside and on the beach.
- It must be able to represent the design exactly to show what the beach hut would look like realistically.

User Requirement

- It must have a window so that the user can look inside.
- It must be made from light materials so that it can be moved easily.
- It must be aesthetically pleasing so that whoever is looking at the model is happy with it.
- It must have a door so that the user can also take a look inside the model.

Cost

- It must cost as little as possible to get the materials and make the beach hut.
- It must use materials efficiently and ensure than none are wasted in the making process, this will make sure money is saved on materials.



This is what the beach hut model will look like from the side view and put onto an MDF base.

PRODUCT MANUFACTURE - BEACH HUT

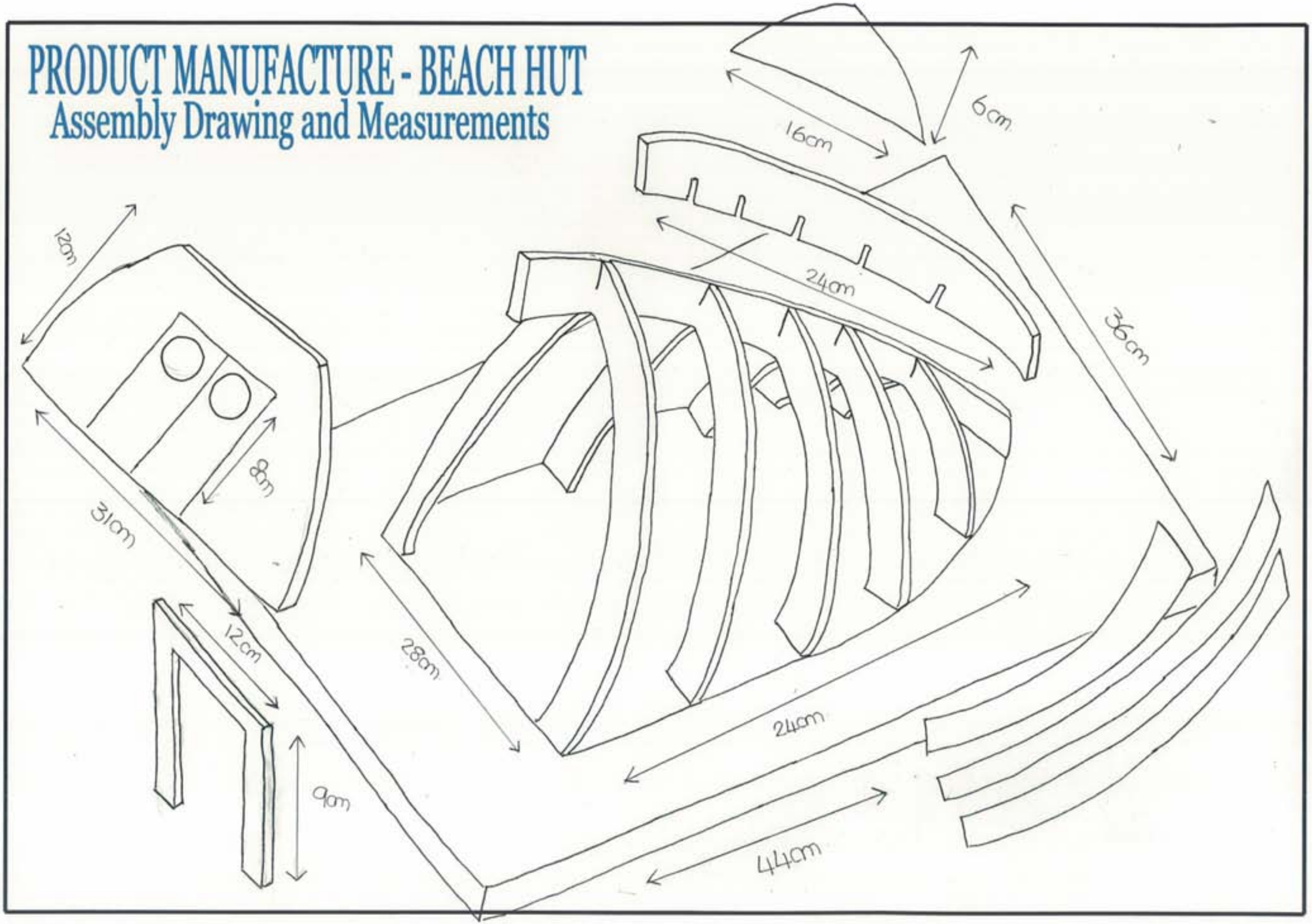
Materials

Here, I have displayed all of the materials I have used for all of the components to produce my beach hut model. I have produced a table so that the materials used and the reasons for use can be clearly recognised and read.

Component	Material	Why Used/Advantages?
Base of beach hut	MDF	I used MDF for the base of my beach hut because it is a dense material; it is also flat which is ideal for building a model onto it. It can also be cut easily without being easily damaged and allows for things to be easily glued and painted onto it.
Interior beams/structure	Plywood (laser ply)	Plywood is a very strong wood; this is useful when making a structure. It is also a flexible type of wood and can be made into curved shapes easily without breaking; this is ideal for my curved beams.
Exterior panelling	Card	This is a perfect material to use for the panels on the exterior of my beach hut. Card is easily cut into various shapes, it is very flexible but still maintains a reasonable amount of stiffness for it to be a fairly dense material. It can also be painted over easily and be glued down extremely easily.
Front of beach hut	Plywood	Plywood is very dense and sturdy which makes it a good material to use for the front of the beach hut. It is also an alternate material to using card for the front as well as the sides, which means there are varied materials used on my hut and makes it look more appealing. The panelled effect can be easily achieved by using the laser cutter and also creates a curved front.
Windows	Clear Acrylic	Acrylic is a useful material to use for the windows because it comes in various colours and is available in a transparent state, which will allow people to look inside the model. It is also a shatter resistant material and can be easily cut into various shapes. It is a fairly dense material and is very lightweight. This means that no extra weight will be added to the model.
Flooring/Step	Balsa Wood	Balsa wood is dense; this is useful so the flooring cannot be easily damaged. It is also extremely lightweight which is useful when considering the weight of the overall beach hut model. Balsa is also easy to cut and a number of different shapes can be cut out easily and effectively without the damaging the wood itself.
Railings	Wire	This is flexible and not too thick so that it can bend around the shape of the beach hut. It is light so this does not add too much weight to the beach hut. It is easy to cut and shape and does not need to be painted or adjusted in any way because it is silver, the exact colour I need to produce my railings.
Chairs and Table	MDF	MDF can be cut into smaller shapes, which I need when making small-scale chairs and tables. It is a dense material and cannot be easily damaged when force is applied to it. Fabrics and paints can be easily applied to MDF, which is useful when making bright and attractive furniture.
Additional details and objects (umbrella, towels, plants).	Fabric, Dowling, MDF, Card and Paper	All of these materials can be used to add details to smaller scale objects of the model and to add detail to the model itself. MDF and Card are both dense materials and so cannot be easily damaged; these can also be formed into various shapes and sizes. Dowling will be useful when making an umbrella as the rounded shape can be used to make the pole for it and it comes in different thicknesses. Paper comes in many different colours, which will be a benefit to using other materials such as various plastics that often are only available in specific colours. Fabric is especially useful when considering furniture or small effects and details such as the umbrella etc.

PRODUCT MANUFACTURE - BEACH HUT

Assembly Drawing and Measurements



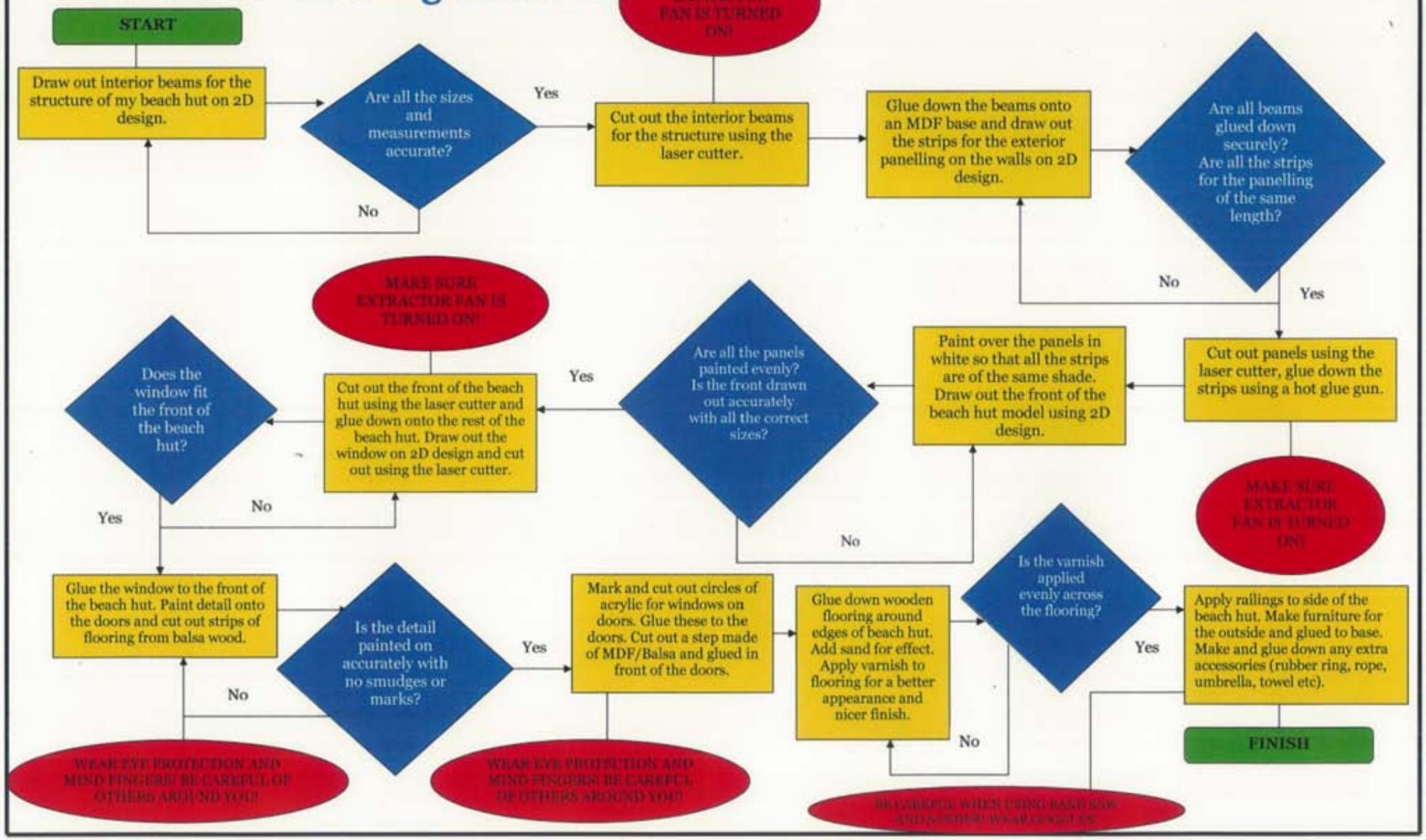
Product Manufacture - Schedule

Time	*1 Hour*	*30 minutes*	*2 hours*	*2 hours*	*30 minutes*	*30 minutes*	*30 minutes*	*1 ½ hours*	*30 minutes*
Activity	Draw out beams for interior structure of my beach hut on 2D design and cut out on the laser cutter in laser ply.	Glue down structure onto MDF base.	Draw out and cut out strips for the exterior walls of beach hut on the laser cutter.	Glue down strips for exterior walls	Paint over the walls in white; this means that all the strips will be of the same shade.	Draw out on 2D design and then cut out the front of the beach hut on the laser cutter, and glue down onto the rest of the structure.	Draw out on 2D design and then cut out clear acrylic window for front of the beach hut, glue this to the rest of the front of the beach hut.	Paint detail onto the door and cut out strips of flooring from Balsa wood.	Mark and cut out two small circles of transparent acrylic – these will make up the porthole windows on the door. Glue these to the door.
Tools	Laser Cutter, Computer.	Hot Glue Gun.	Laser Cutter, Computer.	Hot Glue Gun.	Paint, Paintbrush.	Computer, Laser Cutter, Hot Glue Gun.	Computer, Laser Cutter, Hot Glue Gun.	Paintbrush Band Saw	Band Saw Belt Sander/Sand Paper Hot Glue Gun
Health and Safety	Make sure the laser cutter is switched on whilst using the laser cutter, as it creates harmful fumes.	Make sure you are careful when using the glue gun as it is hot!	Make sure you turn on the extractor so that any harmful fumes are extracted.	Be careful of using the glue gun as it is hot!	None.	Make sure that the extractor is turned on when using the laser cutter as it creates harmful fumes. Also be careful when using the hot glue gun!	Make sure that the extractor is turned on when using the laser cutter as it creates harmful fumes. Also be careful when using the hot glue gun!	Make sure that you wear goggles at all times when using the band saw and mind fingers when cutting. Make sure there are no people behind you or around the machine.	Make sure that you wear goggles when using the band saw and the sander to protect your eyes from dust etc. Make sure there are no people around the machine when using. Be careful of the glue gun, as it is hot.
Quality Control	Make sure that all sizes are correct and accurate on 2D design before cutting out on the laser cutting. This will ensure that no materials or time are wasted.	Make sure all beams are glued down securely and that there are no loose strands of glue on the structure.	Make sure all strips are the same size and are glued on well.	Make sure there is no excess glue from the glue gun still left on the beach hut and make sure all strips are glued down properly.	Be careful that no excess paint has run down the side of the beach hut, as this makes the overall appearance messy.	Make sure that all sizes are accurate on 2D design and that the right size materials are used; this makes sure that no materials are wasted in the process.	Make sure that all sizes are accurate on 2D design and that the right size materials are used; this makes sure that no materials are wasted in the process.	Make sure all strips of Balsa for the flooring is the same size. Be sure that the detail on the doors is not smudged or messy.	Both the circles must be the same size and glued in correctly once cut out. Make sure the edges on these are smooth and sanded down.

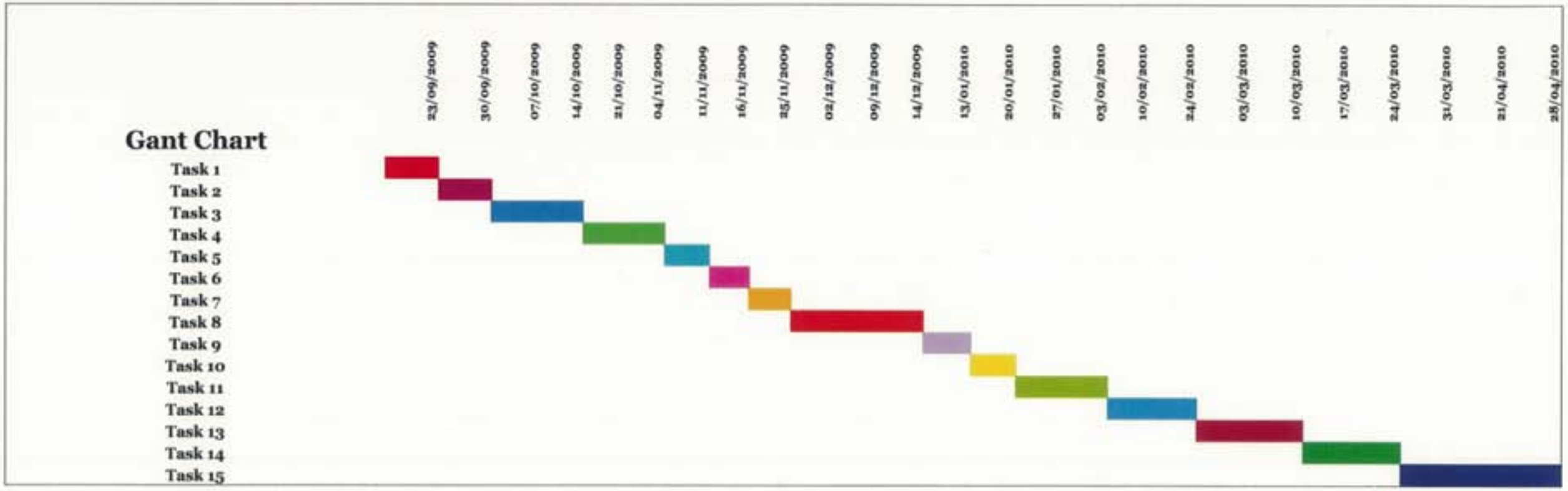
Time	*30 minutes*	*2 hours*	*2 hours*	*2 hours*	*30 minutes*	*45 minutes*			
Activity	Cut out a step made of balsa and glue down in front of the door.	Glue down wood flooring around the edges of the beach hut and apply sand to add effect. Apply a coat of varnish to the flooring for a better appearance.	Apply railings around the edge of the beach hut to make it appear more boat – like. Also add windows and rubber ring to the side of the hut.	Make chairs and table for the outside of the hut, perhaps an umbrella and a towel too for effect.	Glue down the furniture onto the base of the hut. Add a piece of rope to the side of the beach hut using string.	Complete any minor details on the beach hut such as touching up paint and adding final accessories.			
Tools	Band Saw Hot Glue Gun Sand Paper	Hot Glue Gun PVA Glue Varnish	Hot Glue Gun Band Saw Belt Sander	Band Saw Scissors Belt Sander	Hot Glue Gun	Paint Brush Hot Glue Gun PVA Glue			
Health and Safety	Be careful of hands and fingers when using the band saw. Make sure you wear goggles at all times to protect your eyes and make sure there is nobody around the machine when in use so that nobody harms themselves of gets in the way. Mind the glue gun, as it is hot!	Mind the hot glue gun, as it is hot. Be careful of the varnish, as it is sticky.	Mind hands and fingers when using the belt sander and the band saw. Wear goggles at all times to protect your eyes. Make sure there is nobody near or around the machine. Mind the hot glue gun, as it is very hot.	Wear goggles at all times when using the sander and the saw, make sure people stay clear of them and mind hands and fingers as both as sharp and potentially dangerous.	Be careful when using the glue gun, as it is hot!	Be careful when using the glue gun, as it is hot!			
Quality Control	Make sure that the step fits to the right height of the doors and it is glued in the correct position on the base. Sand down any rough edges of the wood.	Make sure all the strips of flooring are glued down properly and evenly spaced apart. Be sure that the varnish is brushed on evenly.	Make sure all of the railings are the correct height and rough edges are sanded down. Make sure all small details are glued in the correct position.	Make sure the furniture is made in proportion to the beach hut and are all sanded down and painted/covered.	The furniture must be glued in the correct position on the base of the hut; any loose glue from the glue gun must be removed. Make sure the rope is glued down firmly.	Make sure the entire beach hut is complete and meets specification points.			

PRODUCT MANUFACTURE - BEACH HUT
Flow Chart - Making Process

I have produced a flow chart showing every process of making my model beach hut. I have included all of the safety checks and precautions taken and measured it all against my schedule.



PRODUCT MANUFACTURE - BEACH HUT
Flow Chart - Making Process



Task	
Task 1	Draw out beams for interior structure of my beach hut on 2D design and cut out on the laser cutter in laser ply.
Task 2	Glue down structure onto MDF base.
Task 3	Draw out and cut out strips for the exterior walls of beach hut on the laser cutter.
Task 4	Glue down strips for exterior walls
Task 5	Paint over the walls in white; this means that all the strips will be of the same shade.
Task 6	Draw out on 2D design and then cut out the front of the beach hut on the laser cutter, and glue down onto the rest of the structure.
Task 7	Draw out on 2D design and then cut out clear acrylic window for front of the beach hut, glue this to the rest of the front of the beach hut.
Task 8	Paint detail onto the door and cut out strips of flooring from Balsa wood.
Task 9	Mark and cut out two small circles of transparent acrylic – these will make up the porthole windows on the door. Glue these to the door.
Task 10	Cut out a step made of balsa and glue down in front of the door.
Task 11	Glue down wood flooring around the edges of the beach hut and apply sand to add effect. Apply a coat of varnish to the flooring for a better appearance.
Task 12	Apply railings around the edge of the beach hut to make it appear more boat – like. Also add windows and rubber ring to the side of the hut.
Task 13	Make chairs and table for the outside of the hut, perhaps an umbrella and a towel too for effect.
Task 14	Glue down the furniture onto the base of the hut. Add a piece of rope to the side of the beach hut using string.
Task 15	Complete any minor details on the beach hut such as touching up paint and adding final accessories.

PRODUCT MANUFACTURE - BEACH HUT
Testing

Specification Point	The Test	Result	Evidence
It must be eye catching and attractive, this will make it look professional and well made.	To test whether the beach hut is attractive and eye catching and also looks like it is built to a high standard, I will ask my brother for his opinion.	After having asked my brother for his opinion on the beach hut, he said "The beach hut looks very smart and definitely catches my eye, it looks like a lot of time and effort has gone into building this model".	
It must be bright and stand out to catch the attention of people looking at the model.	To see whether the model is bright and stands out enough I will get my mum to look at it and ask for her opinion on it.	My mum stood back and looked at the model beach hut from a distance, she said "I definitely looks bold and stands out from a distance, it looks very good both up close and from a distance".	
It must look exactly like my design and be of similar measurements, which will make sure it is as like the design as possible.	I will compare the final model to the original picture of the hut and see whether it is similar and looks the same.	After comparing both the original picture of the hut and a photograph of the final model, there are a lot of similarities, however, it is not exactly the same, there are a few details that are different.	 
It must be made of both flexible and durable materials to make the curved shape and ensure that it stays together and does not fall apart.	To test whether the model is made of flexible materials I will check all the materials used on the hut and consider their properties.	All the materials used on the beach hut are flexible and durable to some extent. Some materials are more flexible than others, for example, the laser ply and the card used for the structure and the outer walls of the model are very flexible because they have to fit the curved shape.	

PRODUCT MANUFACTURE - BEACH HUT

Testing

Specification Point	The Test	Result	Evidence
The model will be made of natural resources because realistically it needs to fit in with a natural environment on a beach like the original actual beach hut.	I will test whether the materials used on the model would fit in with a beach environment and make sure that some subtle colours have been used in order for it to fit into the beach.	The colours and materials used on the beach hut are all materials that would not look out of place in a beach setting. There are some quite bold colours used on the model, however, none that stop it from potentially fitting into a beach environment.	
It must have enough room outside to fit in model chairs and tables.	To test whether there is enough room to fit model chairs and tables outside, I will look and see how much room there is from the doorway and out the front of the model. I will also measure how much room is available to place tables and chairs.	After having looked to see whether there is enough room to put a table and chairs outside, I measured that it is 15cm from the door to the edge of the wooden flooring and 36cm wide. This means there is plenty of room.	
It must have model chairs and tables outside, because the real version of the beach hut would seat people outside and on the beach.	I will look whether there are model chairs and a table outside the beach hut to seat people outside and on the beach.	I have viewed the outside of the model and there are 2 chairs and a table outside the hut, as well as a towel and umbrella for sunbathing.	
It must be able to represent the design exactly to show what the beach hut would look like realistically.	Another comparison with the original drawing of what the beach hut should look like will be made so that it can be shown realistically.	After comparing the model and the original design, there are a few minor differences such as tiny details, however, overall the hut looks similar to the original design and portrays the design realistically.	 

PRODUCT MANUFACTURE - BEACH HUT
Testing

Specification Point	The Test	Result	Evidence
It must have a window so that the user can look inside.	I will look to see whether there are any windows so that the inside of the hut can be viewed easily.	I have looked at the model and there are 3 windows in which you are able to view the inside of the hut. There is a large window above the doors and 2 small windows on the doors.	
It must be made from light materials so that it can be moved easily.	To test to see whether the model is light and can be easily moved I will pick it up and feel for lightness and easy movement.	After picking up the model, I myself consider it to be extremely light overall due to the use of light materials. It is easy to carry around and place in different areas without any hassle.	
It must be aesthetically pleasing so that whoever is looking at the model is happy with it.	I will test whether the hut is aesthetically pleasing by asking for the opinion of my friend.	My friend Dave looked at the model beach hut and said "It looks well presented, I really like this model and I would be very happy with it if this were a portrayal of my beach hut".	
It must have a door so that the user can also take a look inside the model.	By looking at the front of the beach hut, I can test whether there is a door and whether it allows people to look inside the model.	After viewing the front of the model, I have found that there is a door and it has 2 windows, which allow people to look inside the hut.	

PRODUCT MANUFACTURE - BEACH HUT

Testing

Specification Point	The Test	Result	Evidence
It must cost as little as possible to get the materials and make the beach hut.	I will see whether the materials I used were inexpensive and did not equal an expensive total.	The materials I used on my beach hut model were all recycled materials, or spare pieces of materials that were not needed for anything else, therefore the costs to make my model were kept low by reusing materials.	
It must use materials efficiently and ensure than none are wasted in the making process, this will make sure money is saved on materials.	To find out whether materials were used efficiently and that none were wasted during the making process of the model I will see whether materials were reused and that there were no usable materials thrown away.	Looking at my beach hut, I have made the most of the materials that were made available to me and therefore have no wasted any. If there were any spare materials left at the end of completing a section, I put them back in an area where someone else could use them.	

PRODUCT MANUFACTURE - BEACH HUT

Photos

PRODUCT MANUFACTURE - BEACH HUT

Photos

I used the hot glue gun as the main tool to glue my beach hut together and glue on all the small parts. I thought this was the strongest and quickest form of gluing available to me and so used this to make sure that all my components were stuck down in the right places and stuck down correctly.

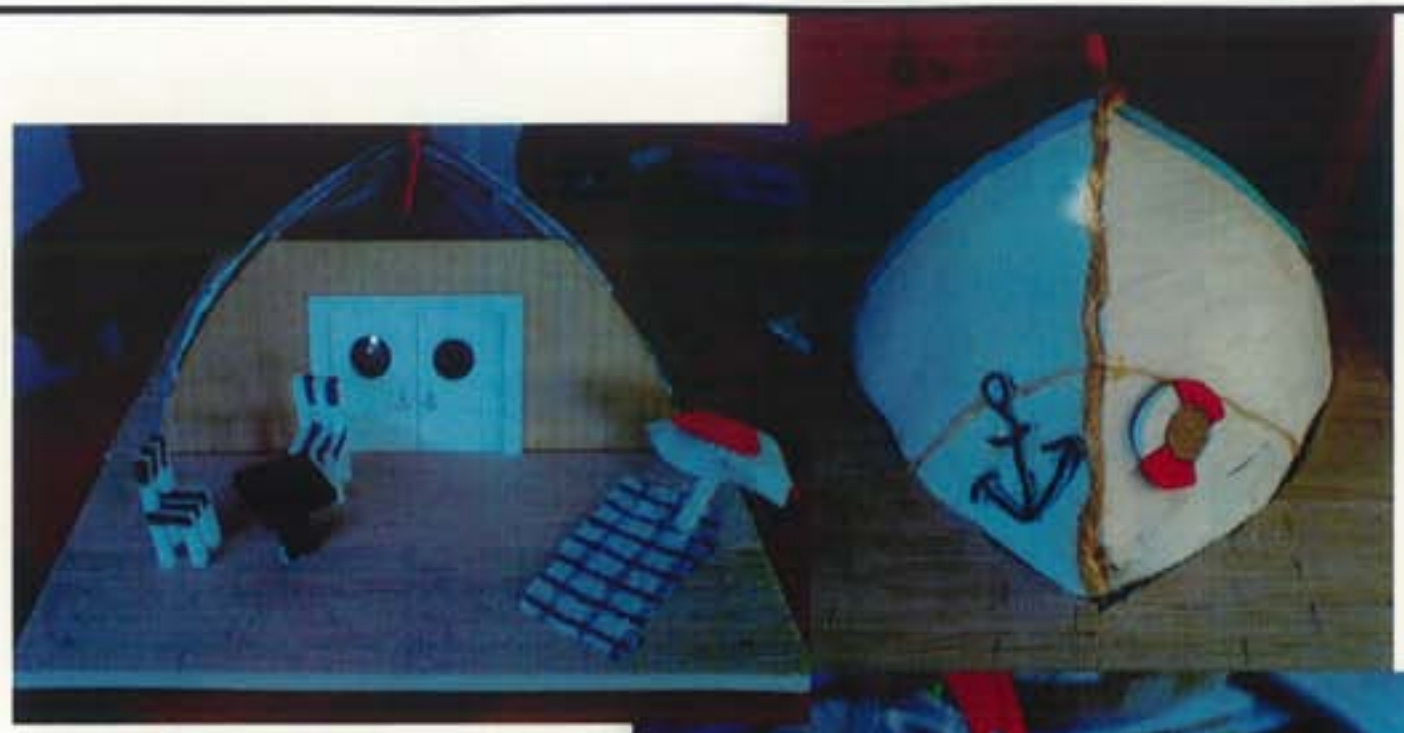
To produce the main frame/structure for my model, I used 2D design to draw out the beams and then used the laser cutter to cut these out in order for them to be cut accurately. These would not have been cut as accurately if I had cut them out myself.
I also used the laser cutter the create the front panel of my beach hut. This enabled me to cut out the curved edge more precisely and also meant that I could engrave the wooden flooring onto the front already.

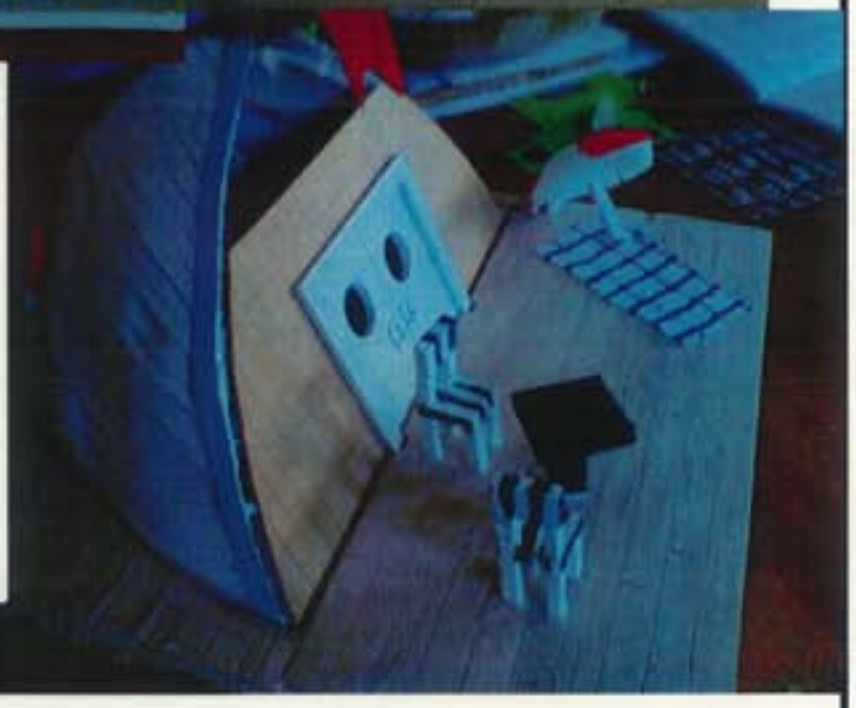
The strips of card that run along the sides of my beach hut to create the exterior walls were also cut out on the laser cutter to ensure that they were the correct size.

For the flooring of the model, I engraved the lines of the balsa wood with a chisel so that the markings would be deep and clear and would also create a nice decking finish.

I cut out the strips of the balsa wood for the flooring using a hack saw. This was time consuming but I wanted to make sure I cut the wood out properly without mistakes. I did not have access to a band saw or laser cutter at this time.

PRODUCT MANUFACTURE - BEACH HUT
Evaluation





This is the final model of my beach hut. It looks similar to the original design; however, there are a few noticeable differences.

I chose not to include the windows along the side of the hut as I concluded that this would be quite time consuming and also quite difficult to cut into the side of the hut without damaging or knowing whereabouts the beams for the inside structure were. I also decided against painting the wave effect onto the side of the hut and around the base as I felt this was inappropriate and didn't look as good as I first imagined. Another minor difference on the exterior walls of the model is the direction that the card is going. This had to be altered from the original design because it did not flow well with the interior structure and there was nothing to support the lengths of card, I decided to lay them across the beams instead of down them. On the back of the hut, I has originally planned to put two rubber rings on either side, but after putting the first one on one side, I decided that it'd look more effective if I made an anchor and used that on the other side instead. Another thing that I decided the change was the step in front of the door. I made this and glued it down to the flooring, however, I found that once it was glued down, it reduced the length of the door and made it look quite small and out of proportion to the rest of the model. I therefore decided to get rid of this and leave the door and the flooring as it was. I wasted time producing this step, but it improved the overall look of the model finding out that it looked better without it.

I found that in the end and through the testing process, the beach hut met the majority of my specification points, if not all. However, I feel that it didn't quite meet the points about it matching the original design exactly, obviously through my decisions to make adjustments and slight changes to the model in the end. I am overall very pleased with the final outcome and think it looks more detailed than the original proposal. I decided to add small details like the towel and umbrella, which I am pleased with and the rope effect on the back of the model turned out better than I thought. I managed to stick to the main characteristics of the original design and did my best to replicate them. I included the distinctive red flag and the blue stripe across the top, which I am happy about and think looks good and makes the hut bolder and stand out.

PRODUCT MANUFACTURE - BEACH HUT
Modifications

I like the doors of the model, however, I think if I were to do this again, I would change them and have them in a different shape and style. I'd perhaps make them brighter and stand out more as opposed to just using white. I think I'd make them so that they weren't as one too and so that they opened up individually. I was unable to do this because I ran out of time and felt it was more practical to make them like this. I think I'd make the door handles more 3D as well because I like the anchor shape and think it'd look really effective in 3D.

I'd change the windows too. I feel that there are a lack out windows and given more time and if it were less difficult, I think I'd stick to the original design and put windows along the sides of the hut rather than just at the front because it makes the inside darker and the hut as a whole feels more enclosed. I like the big window at the front on the top, but I'd make this more of a statement next time around.

I would change the flooring around the back and use paper mache to create a mound type effect; I would then cover this in sand. This would give a good beach effect and would help give an idea of what the hut would look like in beach surroundings. I would keep the flooring at the front the same because I quite like the decking idea. I could perhaps experiment with different types of wood to get a different decking effect and a different shade of wood.

I think the model would benefit from more furniture and accessories around the edges and on the flooring. I think I'd add little things such as bucket and spade and more chairs and tables outside. I was unable to do this because I did not have enough time but I think it'd look more effective if there was more going on outside of the hut, without making it look cluttered.

I could experiment with the colours of the furniture if I were to do this again and perhaps try out different patterns as well as stripes. I used stripes because I felt it gave the hut a seaside type feel. I'd probably use more materials and fabrics on the furniture if I were to do it again too, mainly on the chairs.

If I were to do this again, with the doors being fully functioning and being able to open and close successfully, I would put furniture on the inside of the model too. I think I'd put sofas and tables inside and make it look unique. I wanted to focus on the outside of the beach hut this time around and wanted the make the exterior look good, this is why I chose to put furniture on the outside too. I also took into account that it is a beach hut and people are most likely to be sat outside when at a beach hut.

I would like to experiment with different shapes of beach hut. I think I'd probably like to consider all the different types of beach type objects that I could turn into a hut. I could do a shell, bucket and spade, crab, ice cream etc. It'd be exciting to see how effective and unique other shapes and types of object would make a good beach hut. I feel that the sinking ship idea was a good shape to do, even if it was a little difficult to work with at times.

Product Manufacture
Packaging - Photos

Here I am mixing the plaster mix to create my mould for the tray to go inside my packaging.

This mixture had to be mixed into a paste, it was important that it was of the right consistency, otherwise it would not set properly.

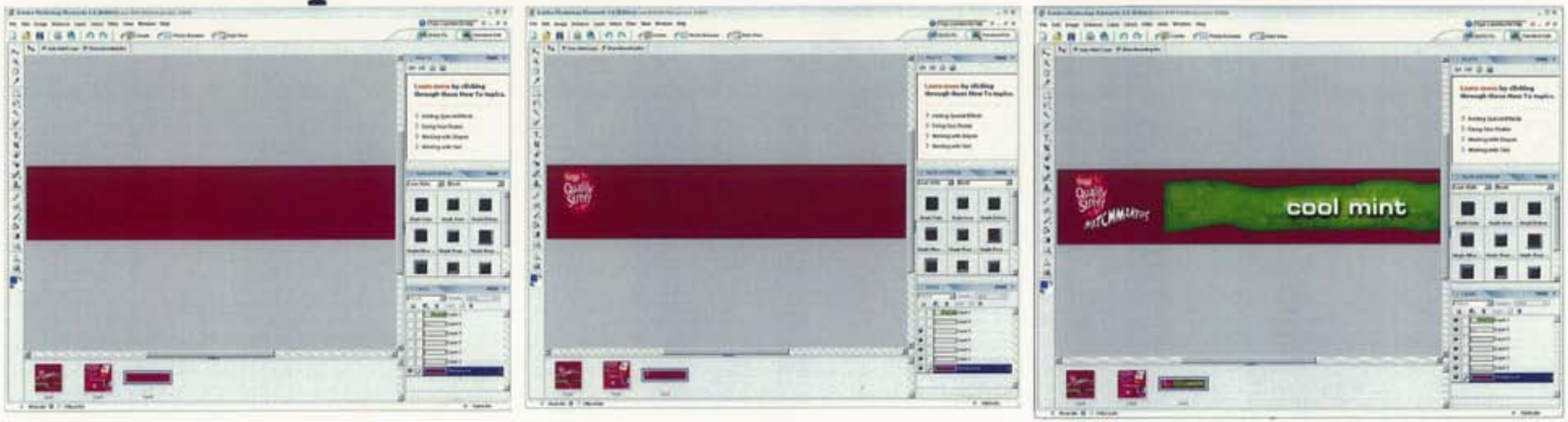
Here is my mould taken out of the plastic casing and put onto an MDF base ready to be put into the vacuum former.

This is a picture of the sheet of HIPS (high impact polystyrene) being placed into the vacuum former ready to make my tray.

Here you can see my tray is being formed in the vacuum former.

I had to wait for the plastic to cool before I could remove it from the vacuum former.

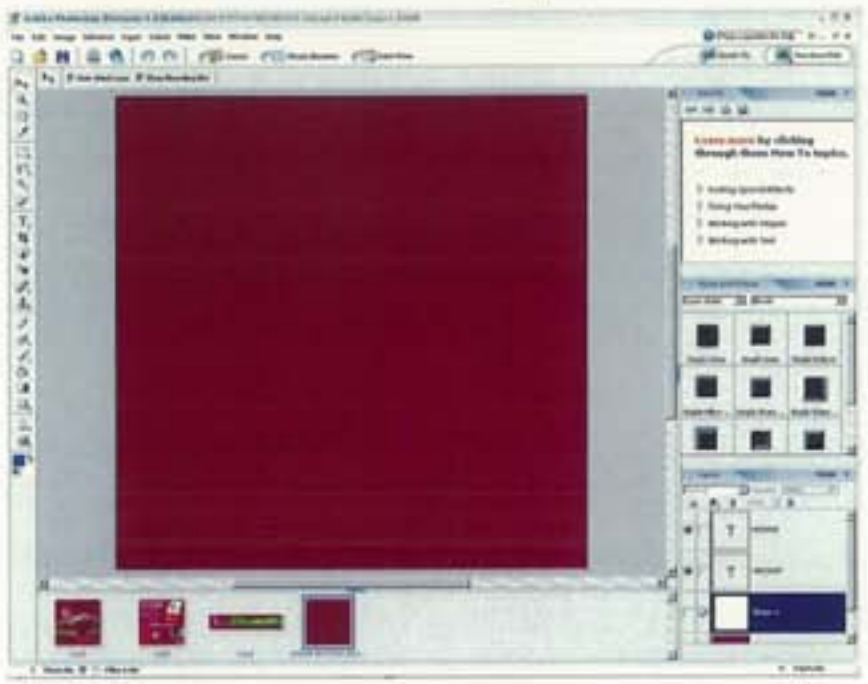
Photoshop - Evidence



Outside - Side Panel

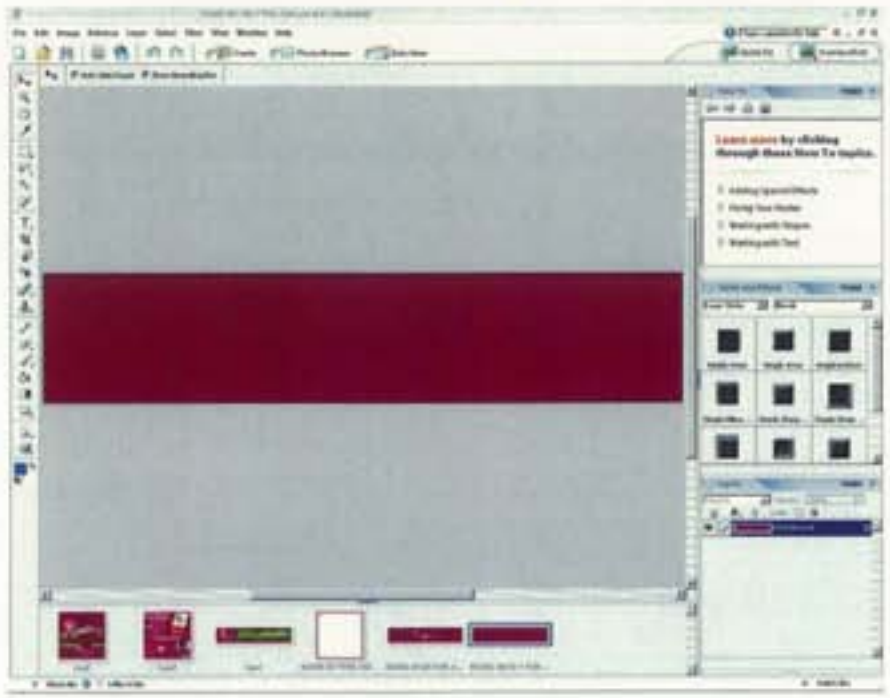
Outside - Front Panel

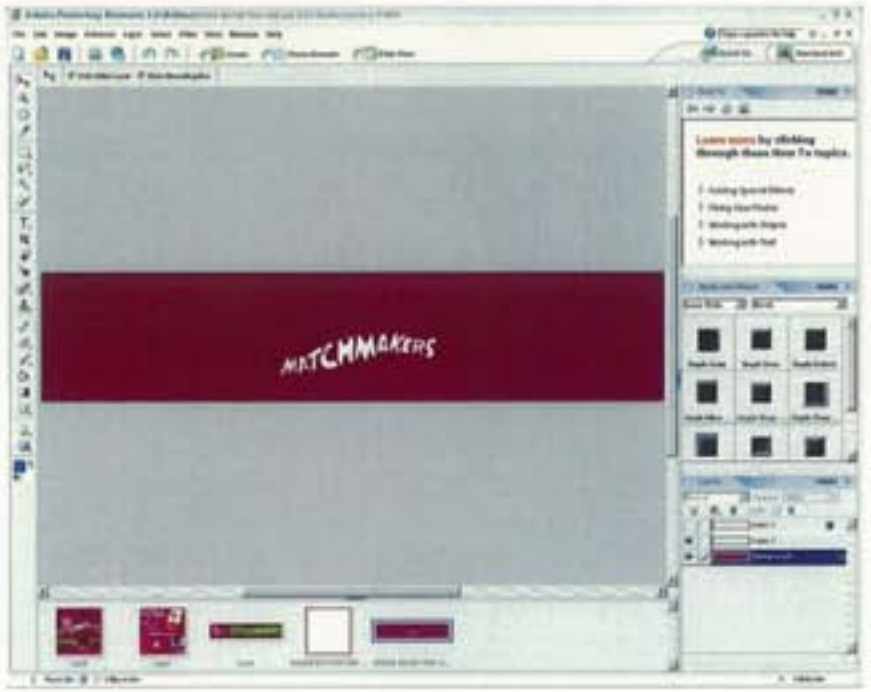
Photoshop - Evidence

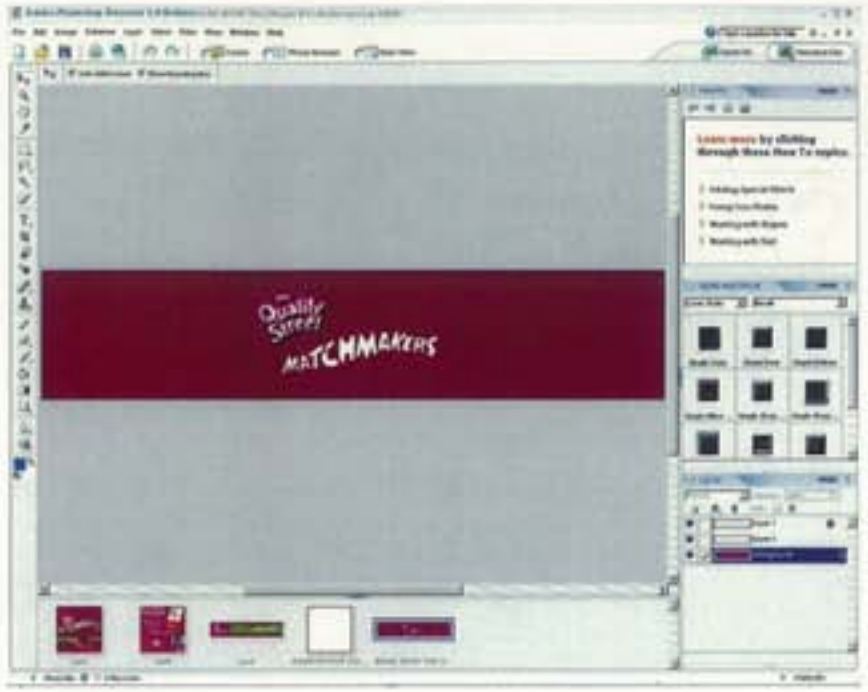


Outside - Back Panel

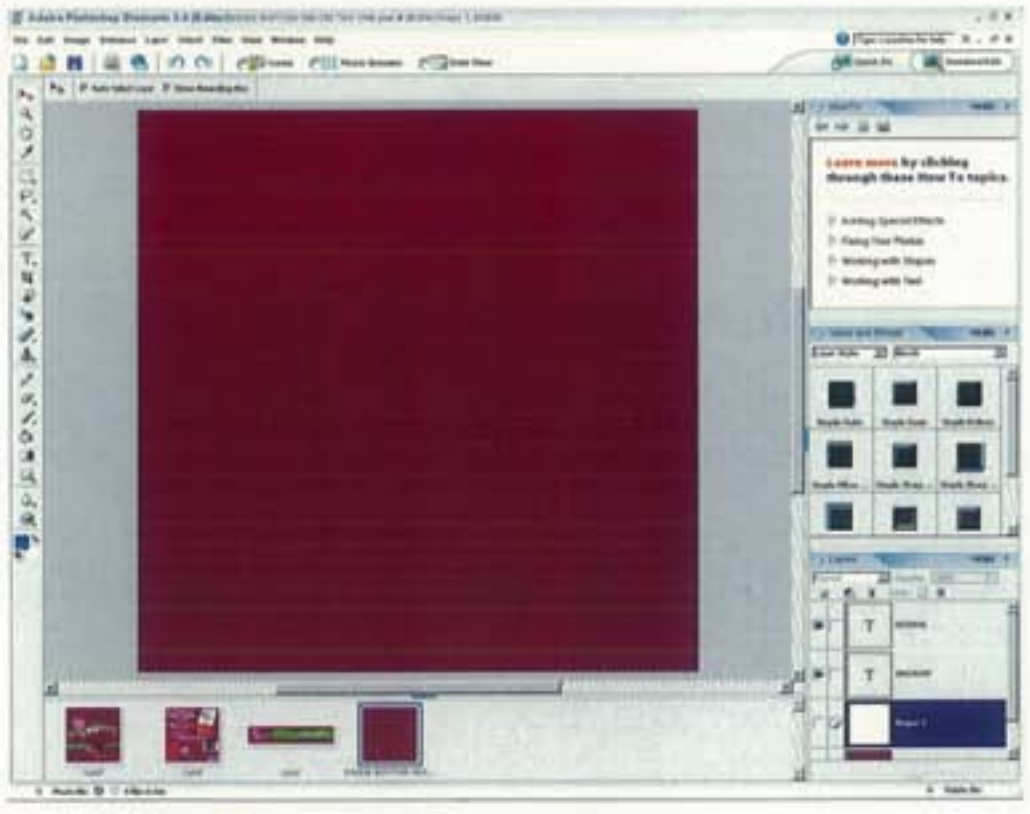
Photoshop - Evidence

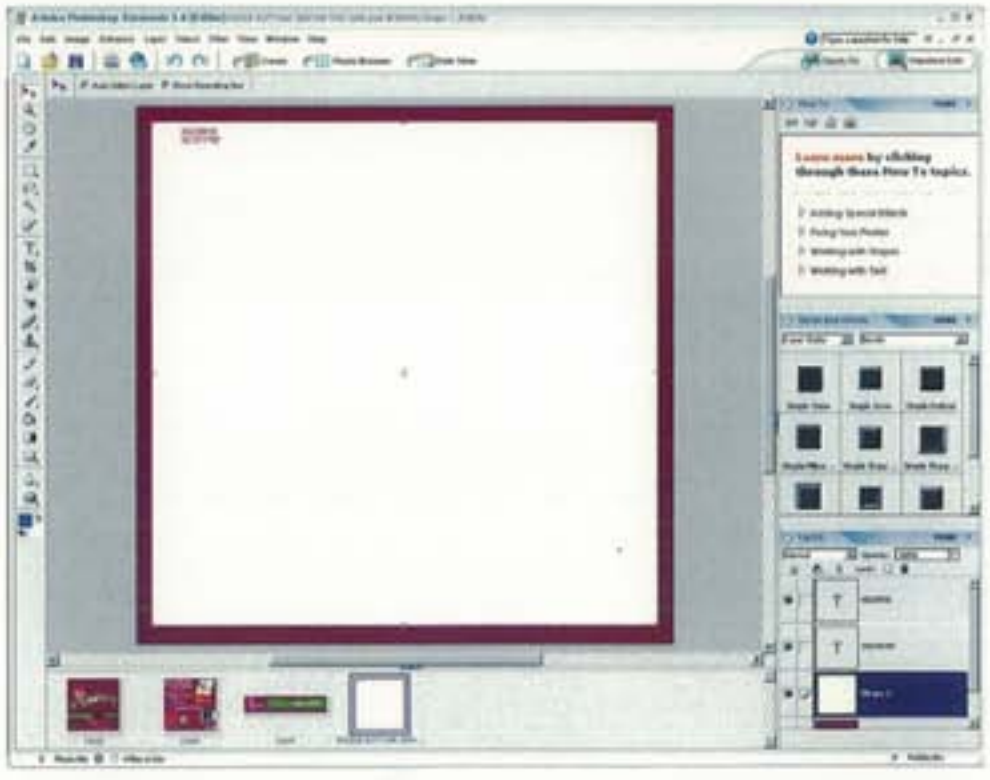






Inside - Side Panel





Inside - Bottom Panel


MATCHMAKERS