

Process Sampling

During the practical you completed at the start of the year, you used the following processes:

- Line Bender – *forming phone holder*
- Convection Oven – *forming acrylic wavy shelf*
- Pillar Drill – *create indent on base for styrofoam cylinder*
- File Forming – *Manufacture tyrofoam cylinder*
- Laser Cutter – *manufacture the finger joint box and phone holder. Living hinge for letter D.*

Used to:

- Understand how your design could be manufactured.
- Consider joining methods
- Testing of material suitability.
- Making design evaluations
- Gain 3rd party feedback
- Make design developments

	File forming	Mortise and Tenon joint	Line bending	Convection Oven	Pillar Drilling	Laser Cutting
Equipment / tools	Square file Flat file Needle files Craft knife Styrofoam Sand paper	Steel rule Try square Scroll Saw Flat file G-cramp Chisel Mallet	Line bender MDF Former Heat proof gloves / Gauntlets Acrylic	Convection oven Styrofoam former Heat proof gloves / Gauntlets Vice Acrylic	Drill bits Scrap wood Masking tape Guard Goggles Pillar Drill Acrylic Plywood	Computer 2D Design software Laser Cutter
Key vocabulary	Smooth Forming Shaping Sculpting Carving	Mortise Tenon Remove Accurate Secure	Soften Malleable Former Angle Harden Manipulate	Soften Malleable Former Angle Harden Manipulate Insulator	Depth Engraving Variation Translucent Frosted Brittle Pattern	Draw Grid lock Accurate Material thickness Cutting Engraving Acrylic Laser plywood Living hinge

Material and Product Testing

This page is important because it allows me to test different materials that I could use for my architectural model. It is important that I do this because it will allow me to test different properties of the materials. I will show a material can be used and adapted to fit into my final design. It is important that I consider how the materials fit into the design because it will look different when it is used in a design. For example, I have tested how different materials against each other as if they can be used together in the final design. Also, I needed to test the different effects that different thicknesses of materials give. This is because some thicknesses don't work in designs because they don't provide the aesthetics needed for the design. Also, it could be hard to cut the material and it could decrease the accuracy of the cut, and the aesthetics of the final design. It is important that I am able to test the different ways I can cut a material to ensure that it is accurate. This is because I will then know the best way to ensure my final design is accurate.

Acrylic

Acrylic is a material which is available in many different colours. It is a good material to use in an architectural model because it can be used for many different things due to the processes that can be used to change the aesthetics of the material. It is important that I test the different processes because they will all provide a different aesthetic and only certain processes will be suitable for my design.

The first process that I tested was using the convection oven to heat up a piece of acrylic. This allowed the acrylic to become malleable and it meant that it could be shaped easily. I put the acrylic into a mould and held it in the mould using the vice. The mould is made out of Styrofoam and it was a former for a soft, wavy curve. This is important because I want to use this acrylic as part of the external shaping of the building. It will be used to show how the environment and the building interlink with one another. Once the acrylic had been held in place for a while, the acrylic cooled and set into the former shape. This type of acrylic is known as thermo-plastic because it reacts with heat to change its properties. The colour of the acrylic is green but it was also transparent. This meant that I could link with the colour of the environment but people could still look out and into the building. This would be a good feature to include in my design because it would show a unique design, and it would also help the environment to link and flow into the building easily. However, the strips of plastic that were cut were quite large and thick. This meant that it was hard to form the acrylic into the shape that I wanted. This means that if I use this for my final design, then I will change the thickness and the length of the acrylic to ensure that it fits my design better. Also, while using the convection oven, I overheated the plastic and this caused the surface of the plastic to bubble and crackle. Despite the fact that I had made a mistake during the manufacture, it created a nice aesthetic onto the surface of the acrylic. I would like to try and include this in my design because it is unique and it provides intricate detail which is needed in the building design.

Another process that I used for acrylic testing was laser cutting and engraving. This is a very useful technique because it is to a high degree of accuracy as the files are made on CAD software. This means that many different designs can be drawn and saved which saves time when manufacturing. Also, the laser cutter is easy to use and it can change its properties. I had to do this in order for the laser cutter to cut my designs accurately and without scorching the surface of the material. I was also able to engrave into the surface of the acrylic. So I decided to test whether I could engrave the WYLAN logo into the surface of the acrylic. I found out that it was useful and I was able to engrave the logo with a high level of accuracy. However, when the final design was engraved the quality of the engraving wasn't high and it was hard to read the writing included in the logo. This means that I need to ensure that I find a high quality image that is legible because it will help the quality and the aesthetics of the design.

Metal

Metal is going to be an important part of my design. This is because my client's existing design theme is based around steam-punk. This is a theme which features a lot of metals in the design. It is important that I consider this when design my final model because metal will help to show that I value their existing theme and branding of WYLAN. I tested 3 types of metal but I focused on copper because I know that I could consider the surface of the copper. This would mean that it turns a green colour, therefore blending in with the natural environment of the park.

The first manufacturing process I used was cutting the metal. It was important that I kept the strips thin because it looks better as they can build up to create a cover for the ground floor of the design. It was hard to get large and thick strips of copper to look intricate and detailed. At first when I was testing cutting out the thin strips, I used tin snips. It was hard to ensure that I got all strip to be accurate and straight without kinks because the copper was hard to cut through. This is because the copper was 1mm thick, so for my final design I'm going to use copper which is 0.7mm thick because it is easier to cut through. Also, it is a cheap material. Another way that metal can be cut is with a guillotine. This is better at cutting the metal as it ensures that the cut will be straight. I used brass to test whether this would be worth considering for the make, and I have decided that I will use the guillotine because it is quicker than the tin snips and it's easier to use.

Once I had cut the strips of copper and brass out, I added details to the surface to make the strip more intricate. It is important that I add these details because it will help to improve the aesthetics of the final design as well as testing the manufacturing methods which can be used. Firstly, I bent and twisted the metal strip to form an irregular shape. This is because it will represent the irregular way plants and living things grow. On the next strip I used a hammer and nail to create little indentations into the surface of the metal. This will allow me to add details to my design which are intricate and by adding the indentations it will help to add a texture to the strips. This texture will show the irregular surface of the ground. The final test that I did on one of the strips was that I oxidised the surface. To do this I used vinegar and salt and caustic. This allowed me to oxidise and change the colour of the surface of the copper.



What you need in this page to show...

- One design which has been developed so that you have fully considered how you could manufacture the final prototype.
- Use of creativity in developing a design.
- An understanding of your product and how it will be manufactured and how it meets your brief.

- **Introduction** – Explain why you are completing this page.
- **Annotations to explain each process**– briefly explain how you did each process (using the information and the key vocabulary from the previous slide e.g. acrylic, convection oven, former etc.)
- **Evaluate the suitability of each process to manufacture the product you making in this project**– Evaluate the positive and negative aspects of using the process in your final prototype (the design you made a model of).
- **Development sketches** – add sketches that show where each process could be included in your final design. You could either print your model photo again and sketch over it. Or sketch images of parts of your final design.
- **Developments** – sketch or explain any developments you will make as a result of this development work.
- **Client feedback**
- **Brief Review against specification** – possible scoring against spec or written response for the aspects that are relevant to this page.
- **Review against your context and brief**
- **A summary to explain what you intend or need to do next...** (this is to complete any other relevant additional research and then to create a final design.)

SUCCESS CRITERIA

Process Development

Page – Have you....

Added an introduction and summary. You have considered what you need to do next.

Included multiple images of the relevant processes (completed and during manufacture)

Development sketches – show where this process could be used in your chosen design (sketch over the model photo or complete small sketches of sections)

Evaluate the positive and negative aspects of using each process in your final prototype.

Add annotations to explain each process using key vocabulary.

Sketch or explain any developments you will make as a result of this page of research.

Completed additional research. For example **material/** alternative process research.

Gained client feedback' - you have then considered how this information can further develop your design.

Completed a brief review against your brief and/or specification.

Material and Product Testing

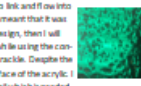
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The first process that I tested was using the convection oven to heat up a piece of acrylic. This allowed the acrylic to become malleable and it meant that it could be shaped easily. I put the acrylic into a mould and he lit it with the mould using the vice. The mould I made out of Styrofoam and it was a former for a sort, wavy curve. This is important because I want to use this acrylic as part of the external cladding of the building. It will be used to show how the environment and the building interlink with one another. Once the acrylic had been held in place for a while, the acrylic cooled and set into the former shape. This type of acrylic is known as thermo-plastic because it reacts with heat to change its properties. The colour of the acrylic is green but it was also transparent. This meant that I could see with the colour of the environment but people could still look out and into the building. This would be a good feature to include in my design because it would show a unique design, and it would also help the environment to link and flow into the building easily. However, the strips of plastic that were cut were quite large and thick. This meant that it was hard to form the acrylic into the shape that I wanted. This means that if I use this for my final design, then I will change the thickness and length of the acrylic to ensure that it fits my design better. Also while using the convection oven, I overheated the plastic and this caused the surface of the plastic to bubble and crackle. Despite the fact that I had made a mistake during the manufacturing, it created a nice aesthetic onto the surface of the acrylic, would like to try and include it in my design because it is unique and provides intricate detail which is needed in the building design.

Another process that I used for acrylic testing was laser cutting and engraving. This is a very useful technique because it is to a high degree of accuracy as the files are made on CAD software. This means that many different designs can be drawn and saved which saves time when manufacturing. Also, the laser cutter is easy to use and it can change its properties. I had to do this in order for the laser cutter to cut my designs accurately and without scorching the surface of the material. I was also able to engrave into the surface of the acrylic. So I decided to test whether I could engrave the WYLAN logo into the surface of the acrylic. I found out that it was useful as I was able to engrave the logo with a high level of accuracy. However, when the final design was engraved the quality of the engraving wasn't high and it was hard to read the string included in the logo. This means that I need to ensure that I find a high quality image that is legible because it will help the quality and the aesthetics of the design.

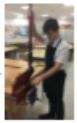


Metal

Metal is going to be an important part of my design. This is because my client's aesthetic design theme is based around steampunk. This is a theme which features a lot of metals in the design. It is important that I consider this when design my final model because metal will help to show that I value the existing theme and branding of WYLAN. I tested 3 types of metal but I focused on copper because I know that I could oxidise the surface of the copper. This would mean that it turns a green colour, therefore blending in with the natural environment of the park.

The first manufacturing process I used was cutting the metal. It was important that I kept the strips thin because it looks better as they can build up to create a cover for the ground floor of the design. It was hard to get large and thick strips of copper to look intricate and detailed. At first I wasn't testing cutting out the thin strips. It was hard to ensure that I got all strips to be accurate and straight without kinks because the copper was hard to cut through. This is because the copper was 1mm thick, so for my final design I'm going to use copper which is 0.7mm thick because it is easier to cut through. Also it is a cheap material. Another way that metal can be cut is with a guillotine. This is better at cutting the metal but ensure that the cut will be straight. I used brass to test whether this would be worth considering for the metal, and I have decided that I will use the guillotine because it is quicker than the tin strip and it is easier to use.

Once I had cut the strips of copper and brass out, I added details to the surface to make the strips more intricate. It is important that I add these details because it will help to improve the aesthetics of the final design as well as testing the manufacturing methods which can be used. Firstly, I bent and twisted the metal strip to form an irregular shape. This is because it will represent the irregular wall plants and things things grow. On the next strip I used a hammer and nail to create little indentations into the surface of the metal. This will allow me to add details to my design which are intricate and by adding the indent it will help to add a texture to the strip. This texture will show the irregular surface of the ground. The final test that I did on one of the strips was that I oxidised the surface. To do this I used vinegar and salt and sawdust. This allowed me to avoid being changed the colour of the surface of the copper.



Material and Product Testing

Timber

It was important that I tested the properties of the timber because it means that I was able to use a material which is natural. Timber will flow more naturally into the environment of the park. Timber is widely available and there are many different types of timber and manufacturers do boards made out of timber. There are many different techniques and manufacturing methods that can be used when designing. It is important that I test a many techniques so I can see which will allow my design to have the best aesthetic possible.

The first manufacturing method that I used was I used the laser cutter to cut out little strips of timber. I cut 1.5mm strips into little strips and then attached the back. This was so that I could create what I mean by cladding to the outside of the building. This cladding is natural and it will help the building to blend with the natural environment of the park. The laser cutter ensured that the panels were all the same size and this would ensure that the cladding would be uniform and accurate. The laser cutter is good to use because it is quick and easy to use and it can save the time so that it will be quick to make more if I need to. I needed to ensure that I set the laser cutter to the right speed because this would ensure that the surfaces of the wood didn't get scorched.

Once I had glued up the cladding together I decided that I was going to stain the wood to get different textures. I decided to use four different types of wood stain/paint and this would then allow me to dye and change the surface colour of the wood. By changing the colour of the wood it will add different aesthetics and I will help to create a design which shows originality. There were two that were the same in colour and then one that was really dark in colour. By having two different colours it will allow me to use both in the design and it will show a contrast. However, the dark stain was hard to apply to the wood because I had to use masking tape to prevent it from spreading onto an area that I didn't want the wood stain. The wood stain leaked through a net on the part of the frame that I didn't want stained.

Another technique that I used was using the scroll saw and sander to cut plywood. I used the scroll saw because it is quick to use but it is hard to ensure that it is cut in an accurate straight line. This means that I had to straighten the edges of the wood with a straight edge and then I used the disc sander to straighten the edges. It is easy to use and it is applicable to smooth finish to the edge of the wood. This is useful because it means that I will know that the edges of the plywood are accurate and that my design will be accurate. The smooth finish on the wood will help to show that this model has been made to a high level and degree of accuracy.

Overall timber saw good materials to use as I can use them to match into the natural look of the park that I want to create through my design. Timber is widely available so it means that I won't struggle to find it and I'll need more of it. Also, since it is widely available it means that it is cheap and this will help to keep the cost of the model down. Many different finishes can be applied to the surface of wood and this helps to change the aesthetics of design. The timber can be stained, painted, varnished or sanded to a natural finish. Also, timber saw dense and heavy but manufacturers do boards such as plywood can be bought as a cheaper option to the timber.

Conclusion

Overall this page has been useful because it has allowed me to test many different ways in which materials can be used for my design. I have been able to test both methods that might not be used in my design. It was important that I test a many different ways so that I could see which will show how I have considered more than one technique for the design and it shows that my design is adaptable and changeable. Also, by completing this material testing, I have been able to complete different techniques that I have done before. This means that I have been able to expand on my knowledge and I could then use these techniques in future designs. I need to test which technique would provide the best quality finish of my design and this is important to ensure that my final design is accurate.



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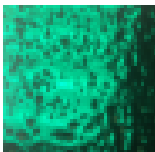
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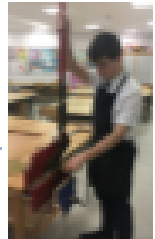


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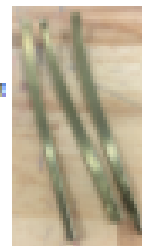


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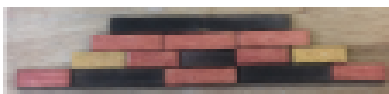
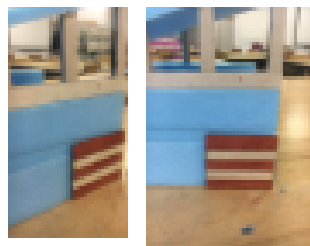
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