

Project: Outdoor shower.

Who is the client? My Dad is my client.

Stakeholders: My technology teacher Mr Breig, family friend (A plumber), my dad and I.

What is the issue? The kids trample through the house to the shower after going in the pool or beach so my dad wants an outdoor shower to stop that problem.

What are some factors?

- The shower must be under cover.
- Could need a permit.
- Drainage.
- Stability of shower.
- Durability of materials.

The clients needs:

- Needs it to be durable.
- Made out of wood.
- Modern looking.

The location of the outcome: The shower will be out the back of the house near the pool and it will be exposed to external elements, and will constantly have water running over it so it will need to be made with materials that will prevent it from rotting etc.

The resources required:

- Wood (weather resistant)
- Mixer tap and piping.
- Shower rose.
- Glue
- Screws.
- Bolts

Explain any constraints that may affect your outcome.

- Time: It is quite a large and complex item to build.
- Cost of materials: The materials needed are quite expensive. Things such as water resistant wood, shower rose, screws and bolts.

shower, instead they can go outside.

<b>Background/Context:</b>	<i>The reason why we want the shower is that the kids keep trampling through the house after going in the pool or beach and my dad had enough of the mess that they leave behind them. By having a shower outside it will solve this problem.</i>
<b>Output(s):</b>	<i>The shower will provide less fuss and mess in the house after a swim. It will be stand-alone; have its own drainage and water.</i>
<b>How will the success of the project be measured:</b>	<i>The success of the outdoor shower will be measured by having the following things: it must be sturdy and safe; runs hot and cold water, must have a good drainage system, made of weather resistant materials and isn't slippery when wet.</i>
<b>Budget:</b>	<i>Our allocated budget given by the school is \$60. Anything over that we must pay.</i>
<b>Resources:</b>	<i>13<sup>th</sup> October is when the project is due. I will need cutting equipment such as a band saw, scroll saw handsaw. Router to round edges. The thicknesser to get the wood down to size. Going too need treated pine.</i>
<b>Reporting Requirements:</b>	<i>I will be in constant contact with my client about the project over the phone or when I am at home.</i>
<b>Stakeholders &amp; Communication Strategy:</b>	<ul style="list-style-type: none"> <li>• <i>Mr Breig my technology teacher. I will be speaking to him most days of the week asking any questions.</i></li> <li>• <i>Family friend / plumber: Ask our family friend if he would like to help me with the plumbing part of the project.</i></li> <li>• <i>Family: They are a stakeholder because they will be using it.</i></li> <li>• <i>Friends: They will be a stakeholder because if they come over they may use it.</i></li> <li>• <i>Me: I will be making it.</i></li> </ul>
<b>Assumptions and Constraints:</b>	<i>The things that I am not sure about yet is whether I need a permit or not to have a shower in my backyard, whether I will be able to have our family friend to help us as he is a plumber and one constraint would be the cost of the project all together as it will be quite expensive.</i>
<b>Major Risks &amp; Minimisation Strategies:</b>	<i>A major risk to do with the project is that I could accidentally ruin the wood or do something wrong for example when I'm drilling or cutting. This could cost more and waste a lot of time getting more materials and getting back to that stage. To minimise this risk I am going to plan each stage carefully.</i>

**Risk Management:**

*Before I start to work on something I can create a problem that may occur and find a solution to solve it or to prevent it from happening.*

**Planning:**

*I will be using a planner or a timetable to sort out my time and resources.*

**Guidelines/Standards:**

*The shower has to be built safely so I don't harm myself or anyone else around me. The project must be built to the best standard I can produce.*

**Quality Assurance:**

*Keep in touch with my client constantly and keep asking him if I am working up to standard and compare it to other outdoor showers.*

**Capturing the Lessons Learnt:**

*Constantly write down notes and keep asking the teacher things about my project.*

## Specifications of the Outdoor Shower

My client wants and needs an outdoor shower because he saw it in a shop and liked the idea of having one and needs it because he has had enough of people wanting to use the shower inside after being in the pool and trampling around the house. With an outdoor shower they can come back say from the beach and wash off before coming inside. The specifications for the shower are:

- It has to be resistant to the weather, as it will be constantly used outside.
- It has to be suitable for everyone in the family to use. E.g. Tall enough so people don't have to bend down and short enough for people to use (handle height). 2.2metres tall. Base Diameter: 1metre.
- It must have a base to stand on.
- It must have running water.
- It must be safe to use. E.g. it won't topple over.

## Feasibility Sheet



By having an outdoor chair it will provide a new feature in the garden and extra seating. But a chair is not what my client wants as we already have enough seating.



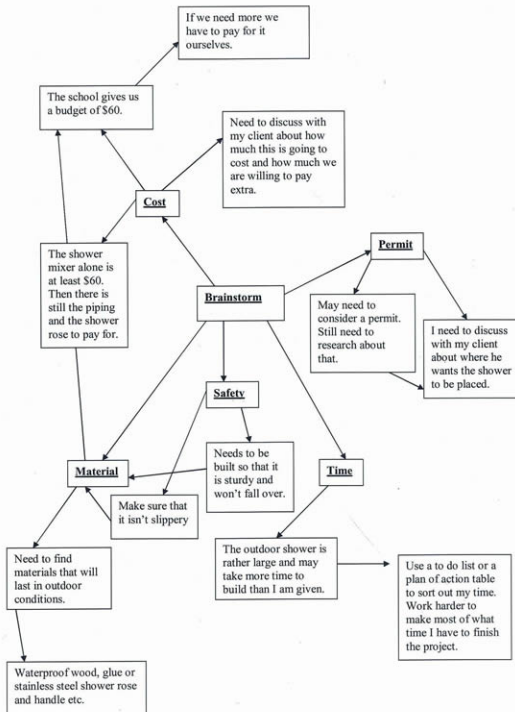
A bench would provide a nice garden feature and extra seating but it isn't what my client is looking for as he doesn't like the idea of a bench.



My client likes the idea of having an outdoor shower because it would look good in the garden and would solve the problem with the children going through the house after the beach or the pool to get to the shower inside.



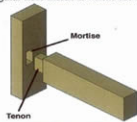
An outdoor table isn't what my client is looking for as we already have one. My client is looking for something with a more modern and complex design that will achieve his needs.



## Joints evaluation



**Mortise and tenon:** This wood joint is quite easy to make and can be used to make a chair, table or anything that needs to be made with 90degree joint. The mortise and tenon joint consists of two pieces of wood, one with a tenon on the end, which is usually longer than it is wide, the second has a rectangular hole inside it where the tenon joins it.



**Dove-tail joint:** This joint can be used in almost anything. This joint consists of two pieces of wood. One of the pieces of wood has a tail or a tenon. The tail is cut into angles to create a tight fit. The piece of wood is the interlocking end. The one that I did was a bit rough and had to chisel it down a bit to make it fit because I did the cutting by hand so

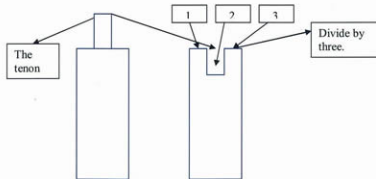
they were a bit rough. The dove-tail joint requires a tight fit so that there is no movement. Make sure when cutting the wood that you cut on the waste side of the line.



**Bridle joint:** This joint was my favourite as it was quite quick and straightforward to build. I also think that it looks the best, as it was my neatest one. This joint can also be used for pretty much anything. It can be used in a picture frame.



To create a tight fit, make sure there are no gaps. There are other ways of making it stay together, such as putting dowel rods through each side or simply just glue it. In my joint there were a couple gaps as I used a handsaw but in the end it fitted perfectly with no issues. The two pieces of wood are divided into three. One of the pieces of wood is cut to make a slat or gap. The other has a tenon that slides into that gap. Always remember to cut on the waste side of the line.



## Key Factors to do with Client

My Client: My Dad.

Size: My Dad is 6ft 4inches and is between 80-90 kilograms.

Gender: Male

Age: 47

Clients needs: My client needs my project to solve the problem of having to go through the house to the shower after coming back from the beach or getting out of the pool.

Clients Expectations: My client wants the shower to be clean and tidy. Made to an excellent standard. For it to be durable and fit in well with the surroundings as in, look good. It must be safe as our family and guests will be using it.

### Factors:

- Colour: Colour isn't really too much of a worry at the moment but I need to make sure that it's a colour that my client likes and that it suites the rest of the house.
- Machinery: Need to make sure that I have machinery that is necessary to build my project.
- Position: I need to talk to my client about where he wants the outdoor shower to be placed as we may have some problems with neighbors or the drainage.

### Key factors:

- Time: the outdoor shower is rather large and may take some time to build.
- Materials: Need to research on what materials would be suitable for an outdoor shower as it needs to be durable reliable. I also need to research on what materials I need to use to make the shower safe, because when it gets wet there could be a possibility that it becomes slippery.
- Cost: The budget given to us by the school is \$60. If we need more than that we have to pay for it ourselves. So I need to talk to my client about how much he is willing to pay and how much the materials are likely to be.
- Permit: I need to research on whether I need to have a permit.
- Height: Need to make sure that it is the right height as we have a large variation of heights in my family so it needs to suite everybody's height.
- Durability: It needs to be durable as it will be constantly used.

### Key Factors Prioritised

1. Time: Time is the most important key factor because I have limited time to finish the project in and as the shower is large and complex I will need all the time I can get to make the most of it.
2. Safety: The safety of my client and other people while using my product is a priority because I am the one that built it and if someone gets hurt from something that I may have done wrong or built unsafely I will be responsible.
3. Materials: Materials are second most important, as I have to choose materials that will be durable in the weather and be reliable so that it doesn't break.
4. Height: The height of the shower is a priority because it affects the ergonomics, which is very important. The shower needs to have suitable heights for everybody.

## Key Factors, Anything that might make the Project Difficult.

The Curve: As it is one of my specifications I have to have a curve in my design. The process of gluing another piece of wood on to the upright and cutting out the curve may take up time and could prove difficult when cutting it out on the bandsaw, as it is very long.

Cutting the circle shape out the base: This could also prove difficult to cut out on the bandsaw as the base is very heavy and can be awkward to move on the bandsaw.

Time available and available machinery: As it is a large and complex project it will take a long time to build. With short 45 minute periods it makes it difficult to make a large amount of progress so I have to result to going in during weekends and working for 3 hours. With other people in the class using the same machinery as you it makes it difficult to make progress as you often have to wait for some one to finish with a machine.

## Key Factors of the Location of the Project

Materials: As the shower will be located outside it needs to be weather resistant. That is why I have chosen tanalised pine, galvanised steel brackets and stainless steel bolts. These materials will neither rust nor rot in the exposure to the weather.

Location: The location of the shower is an important factor because where it is located it must have easy access to drainage and water supply. The location must be private from the neighbours as they won't want a view of someone taking a shower visa versa. The shower must be located on a flat surface so that it is safe and functions properly.

Accessible: The shower must be located somewhere that it is easily accessed coming from the pool. It wouldn't be practical if it was on the other side of the house.

## Key Factors to do with where it's being made.

**Safety:** As it is being made at school in a class of nearly twenty people I have to consider the safety of myself and other people that are working around me. For example when working on machinery use safety gear such as safety glasses, earmuffs, dust mask to protect you from harmful objects and machinery. When using machinery be aware of people around you and how you are using the machinery whether you are using it safely.

**Time:** Availability of materials and equipment can have a constraint on time. Plan your time that you have wisely. Materials or equipment that aren't available at school may have to be sourced.

**Access to clients and stakeholders:** My client may not always be available to me to talk to about the project and often have to make decisions on my own or get help from my teacher.

## Key Factors of Actual Production

At the beginning of the year I decided on making something a little bit more complex and interesting then a bench or table so I decided to make an out-door shower. These are factors that I have come across during the production process.

**Time:** With a height of over two metres and multiple components the out-door shower project was always going to be complex and challenging. The time impacts can be broken down by the following:

- **Design-** The design was complex and had to be altered as the construction progressed dealing with solutions to problems as they presented themselves. For example attaching the upright brackets required a design alteration ensuring that the slats remained flush and ensuring that the uprights were centred to the base. The way in which the slats are connected to the uprights had to also be altered.
- **School hours-** The forty five minute periods were limiting as much time was often used preparing or discussing solutions and actual machine time was limited. Arrangements had to be made for weekend access to provide three hour sessions to complete the project.
- **Machinery access-** The sharing of workshop equipment often meant waiting for other students to complete their tasks to give access to the necessary equipment which resulted in down-time.
- **Materials-** Materials availability often impacted on time efficiency as often new materials such as bolts and brackets had to be sourced to continue with construction.

**Skills:** Undertaking this project I had to learn new skills that I had not previously been exposed to.

These were:

- **New machinery-** To get certain finishes I had to use certain machines that were new to me. I used the router to the round the edges on the shower. Sand belt was used to get the smooth finish on the wood.
- **Carpentry-** Simple carpentry skills were needed during the production of the shower such as gluing; using a rasp, drilling, bolting and sanding.
- **Plumbing-** simple plumbing skills are needed to fit the tap mixer, shower rose and piping to the shower.
- **Design alteration-** When it came to the alteration I used design skills to create options of what could be done.



**Materials:** The materials used on the outdoor shower were new and varied and required an understanding which I gained through the process.

- Wood- Through the production and the research of my project I have learnt that tanalised pine is harmful to the body inhaled so when for example I am sanding I have learnt to wear a face mask.
- Metal- I have used stainless steel and galvanised steel because they are strong and weather resistant.
- Plumbing- As I made progress on my shower I sourced plumbing materials. I had to make sure they would last in the outdoor weather.

**Project Name:** Outdoor shower  
**Project Manager:** Luca Godinich

**Objective:** *The aim is to build an outdoor shower so that the kids don't have to trample through the house to get to the shower, instead they can go outside.*

**Background/Context:** *The reason why we want the shower is that the kids keep trampling through the house after going in the pool or beach and my dad had enough of the mess that they leave behind them. By having a shower outside it will solve this problem.*

**Output(s):** *The shower will provide less fuss and mess in the house after a swim. It will be stand-alone; have its own base and good looking.*

**How will the success of the project be measured:** *The success of the outdoor shower will be measured by having the following things: it must be sturdy and safe; runs hot and cold water, must have a good drainage system, made of weather resistant materials and isn't slippery when wet. For the final product my client and I have decided to make the shower only run cold water for time and cost restraint reasons. This will only be temporary until we find the time and money to do it.*

**Budget:** *Our allocated budget given by the school is \$60. Anything over that we must pay. My client hasn't given me a budget so there are no real constraints at the moment.*

**Resources:** *13<sup>th</sup> October is when the project is due. I will need cutting equipment such as a hand saw, scroll saw handsaw. Router to round edges. The thicknesser to get the wood down to size. Going too need treated pine.*

**Reporting Requirements:** *I will be in constant contact with my client about the project over the phone or when I am at home. Constantly show him photos of progress and ask questions.*

**Stakeholders & Communication Strategy:**

- *Mr Breig my technology teacher. I will be speaking to him most days of the week asking any questions. He will be helping me with the construction of the project in class.*
- *Family friend / plumber: Ask our family friend if he would like to help me with the plumbing part of the project. Would be able to contact over the phone.*
- *Family: They are a stakeholder because they will be using it. I have to take in to account of my family using it i.e. safety precautions.*
- *Friends: They will be a stakeholder because if they come over they may use it. I have to take in to account of my friends using it i.e. safety precautions.*
- *Me: I will be making it.*

**Assumptions and Constraints:**

*The things that I am not sure about yet is whether I need a permit or not to have a shower in my backyard, whether I will be able to have our family friend to help us as he is a plumber and one constraint would be the cost of the project all together as it will be quite expensive.*

**Major Risks & Minimisation Strategies:**

*A major risk to do with the project is that I could accidentally ruin the wood or do something wrong for example when I'm drilling or cutting. This could cost more and waste a lot of time getting more materials and getting back to that stage. To minimise this risk I am going to plan each stage carefully.*

**Risk Management:**

*Before I start to work on something I can create a problem that may occur and find a solution to solve it or to prevent it from happening.*

**Planning:**

*I am using a plan of action to sort out my time for the year on what stages I am up to and what needs to be done.*

**Guidelines/Standards:**

*The shower has to be built safely so I don't harm myself or anyone else around me. The project must be built to the best standard I can produce.*

**Quality Assurance:**

*Keep in touch with my client constantly and keep asking him if I am working up to standard and compare it to other outdoor showers. Ask my client questions to do with the design of the shower. Concept drawings.*

**Capturing the Lessons Learnt:**

*Constantly write down notes and keep asking the teacher things about my project.*

## Final Specifications

Time:

- The project is due on the 13<sup>th</sup> October.
- The time I have available to do this project is five 45minute periods a week in the workshop and sometimes on weekend for 3hours.
- To manage time I am using a plan of action.

Cost:

- I do not know the total cost of the product. As cost isn't really an issue.

Product performance:

- It must be easy to use. Suitable for children to use as well as adults.
- The shower must be durable in weather conditions.
- It must be reliable. It can't break when somebody uses it.
- Ergonomics. It must suite the capability of different ages and their capabilities. It must be tall enough so you don't to bend underneath it and te handle must be short enough to reach.
- The shower must be safe and not topple over on somebody when they use it.
- To maintain the look it can be re-stained.

The client would like it to:

- Be modern looking and fit in with its surroundings.
- Must have some sort of stainless steel features e.g. Silver bolts, stainless steel tap and shower head.
- Have a curve incorporated in the design.
- Must be 2.2 metres
- The base must be 1 metre in diameter
- Width of the upright s to be 20cm wide.
- Be made out of weather resistant materials.
- Have running water. Doesn't need to have hot water at this moment in time.
- Must have a clean-cut finish e.g. rounded edges, be stained.
- Be made with slats.

## Existing Outdoor Shower Research



This outdoor shower is quite a simple design but yet still modern looking. It has a square base with slats that run across it for the water to fall through. The neck of the shower is thin and long and at the top there is a lot of pipe showing. For my shower I would prefer to have the upright a bit wider to take up more space on the base as I feel that there is too much free space and looks odd. As you can see the shower is connected to the hose so that means it runs off cold water.



This outdoor shower is similar to the one above except it has the upright on the corner of the base making it a diamond shape. To make it more interesting I would incorporate a curve into the upright to make it more modern looking and interesting. The wood is stained a red and orange colour. The same as the one above it has a small shelf below the tap for soap and other things.



This shower is a lot more modern looking as it has an extreme curve to it. All the plumbing is hidden most likely at the back to obtain a tidier look. It has wheels so it is easily moved around. The shower rose is wide giving a larger spray of water and by the looks of it runs off the garden hose. It has a nice modern dark brown colour. Unlike the other outdoor showers this one doesn't have a base to stand on.



This outdoor shower has a nice clean modern look to it. I like the look of the slats going up the uprights and definitely incorporate slats in my shower. Like the shower above this one doesn't have a base to stand on so instead it would have to be anchored down or bolted to a wall or fence. It has an orangey brown colour to it that may be a quila stain.

## Mock-up Evaluation



This is a mock-up of my outdoor shower. It is made out of bolsa wood and is stuck together with a hot glue gun. I have made this model to scale so that I can see what it would look like and whether I need to make any changes to the design. My shower is going to have slats of wood for the base and then it will have an upright where there will be either slats or large dowels going up the front. Looking at the design of the base I have decided to change the size of the two outside slats to make room for more in the middle and also have two large slats on the sides instead. Other concepts have helped me visualise this.



This is the side view my shower. Looking at it now and designing other concepts I have decided that I don't like the bottom half the upright, as it is too fat compared to the rest of it and will make it thinner. The side profile shows estimation to how far I want the showerhead to hang over the base. Obviously I want it to over hang enough for people to get wet but not too much that it sprays right off the base.

This is the front view of my shower. The square on the upright is for the shower handle and at the back where the pipe runs up and down it is connected. The square may have to be raised because it looks a bit low. At the top it has a similar square for the showerhead. The effect of the slats going up the shower looks good but I may have to use flat slats rather than dowels as I have problems finding large sized dowels.



## Maintaining the look of the Shower

**Stain:** By staining the shower it will protect the wood from the elements and bring out the wood grain and a nice colour. Depending on what brand of stain I use it could last for years with out it being stained again. So to maintain its look I may have to stain it every few years.

**Bolts:** The coach bolts on the base may have to be checked to make sure they are holding up well and the tightness of the may have to be checked every now and then as the wood may have expanded or the bolts simply could have just come loose.

**Splinters:** Removing any splinters that I see maintains the look and prevents the possibility of somebody getting a splinter in their foot.

## Glue Information

Glue Type	Primary Use/Features
Polyvinyl Acetate (PVA) or White Glue	<ul style="list-style-type: none"><li>• For wood, engineered wood, paper, crafts and simple projects.</li><li>• Most commonly available in plastic squeeze bottles.</li><li>• Begins to set within one hour, dries clear.</li><li>• Easy clean up, doesn't stain, nontoxic, nonflammable.</li><li>• Not waterproof.</li><li>• Work needs to be clamped for best results.</li></ul>
Aliphatic Resin or Yellow Carpenter's Glue	<ul style="list-style-type: none"><li>• For woodworking.</li><li>• "Refined" version of PVA.</li><li>• Packaged in squeeze bottles.</li><li>• Varieties may be white, yellow or brown.</li><li>• Begins to set within 15 minutes.</li><li>• Water-resistant nontoxic, nonflammable.</li><li>• More resistant to temperature and water than white glue.</li><li>• Work needs to be clamped for best results.</li><li>• Used for indoor and outdoor applications.</li></ul>
Urea Formaldehyde or Plastic Resin	<ul style="list-style-type: none"><li>• For furniture-making.</li><li>• Begins to set in 4 hours.</li><li>• Powder is mixed with water to form adhesive</li><li>• Water-resistant.</li></ul>
Resorcinol	<ul style="list-style-type: none"><li>• For wood construction.</li><li>• Used for waterproof bond of veneers or laminates to wood.</li><li>• For exterior applications.</li><li>• Powder is mixed with water to form adhesive.</li><li>• Use caution, resorcinol can stain.</li></ul>
Epoxy	<ul style="list-style-type: none"><li>• For general repair or bonding of tile, metal, glass, hard plastics and non-porous materials.</li><li>• Begins to set within 5 minutes.</li><li>• Extremely strong.</li><li>• Two parts (resin and catalyst) are combined to create a chemical reaction. This reaction quickly forms a bond.</li><li>• Use caution, epoxy is toxic and flammable.</li><li>• Resists almost anything, from water to solvents.</li></ul>
Cyanoacrylates Instant or Super Glue	<ul style="list-style-type: none"><li>• For general repair or bonding of most surfaces</li><li>• 1-2 drops is all that's needed for instant adhesion.</li><li>• Used to reconnect same materials (like a broken plate) or bond different materials.</li><li>• They expand as they cure, filling any gaps in joints.</li></ul>
Cellulose	<ul style="list-style-type: none"><li>• For wood, china, glass and most fabrics.</li><li>• More than one coat may be recommended.</li><li>• Waterproof.</li></ul>

### Safety Precautions

Always read the label for specific safety information. In general:

- Use adhesives in a well-ventilated area.
- Avoid contact with the skin.
- Keep the product away from children.
- Check to see if the adhesive is flammable or toxic while in use or after drying.
- Remember that when using solvent-based products, odor may remain for some time.
- Wear gloves and a respirator if recommended on the label.

### Tips for Good Gluing

It's wise to have an all-purpose glue on hand at home at all times. Sometimes you'll need a more specialized adhesive. Read the product label carefully before you purchase for instructions on use. Here are some general tips:

- Know your requirements - moisture, temperatures, movement, visibility, before you go shopping.
- Read the label carefully to see product recommendations for interior and/or exterior use.
- If the adhesive will be used for woodworking, determine whether the product is sandable or stainable.
- Don't use too much - a thin coat usually works best.
- Try bonding a test piece to see if the adhesive stains.
- Keep the container closed - exposure to air will harden most adhesives.
- Unless you're using an adhesive that bonds immediately, clamp your work for a stronger bond.
- Clean away excess as soon as possible.
- Prepare the materials to be joined. In general, surfaces must be sound, clean and dry. Some adhesives recommend "roughing" the surface to promote a better bond.
- Setting and curing times will vary based on the temperature. Adhesives can also expand or contract due to temperature or humidity fluctuations.
- Mix any glue components carefully.
- Know the open time for your adhesive. The open time is the time after the

adhesive is applied and before it starts to set. This is the time that allows you to reposition material if necessary.

- Combine adhesives with another fastening system such as dowels, nails or screws for maximum holding.

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#### Construction Adhesives

In addition to the standard products for the weekend do-it-yourselfer, a more specialized group of products exists. Known as **construction adhesives**, they include several types of products used in building and remodeling. Their main purpose is to reduce the need for nails, screws and other fastening devices. Considered "heavy-duty," these products have specific qualities, uses and methods of application. In general, they are:

- Flexible, waterproof and weatherproof for outdoor use.
- Formulated to join wood, plastic, concrete, masonry and metal in building applications.
- Used in roofing, drywall, flooring, subflooring, plumbing, paneling, cove base, tile and wood.
- Solvent- or water-based.
- Applied in beads from a tube and caulk gun or in layers with a trowel.

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## I have Considered the Environmental Impact of my Project.

The outdoor shower will most likely always be used as it won't be thrown away. But if circumstances occur I could use the wood and recycle it to make something else as a lot of the wood used in the shower are good-sized pieces and nothing really bitty. If I decide not to reuse the wood I could always bury it or put it in a skip and get it properly disposed of. It is recommended not to burn it, as the toxic poisons released could be harmful and also not to use it for mulch, animal bedding, beehives' as well as food chopping boards and boxes used to store or transport food.

## Research on Treated Pine

This timber is treated with compounds of copper, chromium and arsenic, termed CCA.

When using this material:

- Wear gloves and dust masks when sawing.
- Any cut or sawn surface of this material will need resealing to ensure its effectiveness in resisting attack.
- Dispose of any off cuts by burying them. Don't burn them as the smoke and ash are toxic.

Galvanised bolts, washers and screws should be used when building with treated pine.

The chemicals used in the treatment of the timber eat off zinc and gold coloured coatings causing the bolts and screws to rust, especially if the timber is to be permanently in the weather.

Bolts should be as long as the total thickness of the materials being joined, plus 20mm.

Screws should be long enough so that two-thirds of their length goes into the members you are fastening.

This was becoming the Arsenic Free substitute for CCA products, however it is generally more expensive and far less effective. Most LOSP treated pine must be painted to maintain its warranty (which is half as long as CCA). Without painting LOSP treated timbers may only last a few years) A report by the Australian Government highlights the possible failure problems associated with the some types of LOSP treated pine.

Again, the LOSP chemical is popular and widely available as a treatment solution. Due to the fact the New Zealand government recognized its failures early on, there have been some changes (albeit confusing).

Osmose LOSP is called *Protim* and must be over painted. Its ingredients are Kerosene, Tributyltin naphthenate, Dichlofluamide and Permethrin. Koppers LOSP is now called *Azure* and may not require over painting, please contact Koppers for clarification. It is a newer chemical treatment and ingredients include tebuconazole, propiconazole, Permethrin, and white spirit (more refined than kero). The Koppers older LOSP treatment type is called Vascol, which is similar to the Protim product of Osmose.

NB: The exact type of LOSP treatment will determine its lifespan, and if it has to be over painted. Always request from your supplier written details of painting requirements for any LOSP products. Additionally, due to the solvents in LOSP products they are generally more flammable.



### Primed H3 LOSP Treated Pine

42 x 18
42 x 42
57 x 32 W/BStop
66 x 18
138 x 18
185 x 42
230 x 42
280 x 42

## Materials Research And Why I Chose Them.



This is a coach bolt. It is designed to bolt a piece of wood together with the smooth rounded surface on the top. It gives a nice finish to the wood and is practical for something like the shower base as people will be standing on it and it won't hurt their feet or feel uncomfortable. They come in galvanised and stainless steel. The galvanised steel ones are practical because they are cheaper and are resistant to rust from weather and treated pine chemicals.



I chose to use treated pine as my main material because I like the finished look it has when it is sanded up and it is rather cheap compared to other wood I was looking at such as quila. It will be **flame and resistant to the weather** as it is already treated.



These are stainless steel screws. I have used them to screw on all my slats. These screws are **slimline** because they are **slim** and won't rust from weather conditions, as they are stainless steel.



This is the piping I am using. I chose plastic piping because it is cheap and it will be a temporary until I chose to swap to copper piping.



Norsk Resorcinol Glue is what I used to glue together parts of my upright of the shower. I chose this glue because it is the most **durable** exterior glue. It is a two-part formula.

The following is a general description of major adhesive groups, but there are variations within each group:

Adhesive	Moisture	Temperature	Flexibility	Colour durability
Urea	Moderate	Low	Low	Colourless
Melamine	High	Low	Low	Colourless
Phenol	High	Low	Low	Red
Resorcinol	High	Low	Low	Red
PVA	Low	Moderate	High	Colourless
PVA - cross link (Titebond II, etc.)	High	Moderate	High	Colourless
Hot melts	High	High	High	Colourless



## Materials List

Item	No. Off	Length	Width	Thickness	Material
Upright	2	2200	220	45	Pine
Base side slats	2	1000	200	45	Pine
Slats underneath	2	1000	200	30	Pine
Base slats	11	1000	45	45	Pine
Glue					Resorcinol glue
Coach bolt	32	90	8		Galvanised steel
Small slats	33	200	25	30	Pine
Tap base	1	200	180	30	Pine
Shower head base	1	200	180	30	Pine
Bracket	4				Galvanised steel

## Action Plan

Name: Luca Godinich

Your role: Project manager

School: Rosmini College

Date: 14/3/08

### 1. Goal of your Action Plan

I will use the plan of action to help me keep up with what I have done and what I have still got to do. It shows my resources, my important dates and any constraints that I may have.

### 2. What are the constraints, and how could they impact on your project?

Cost would be a major constraint as the project looks like it is going to be expensive, this may slow down the process of it or may even have to take out some materials to suite my clients budget.

Whether I need a permit or not may be a constraint. I need to find out if I need to have a permit. If I do, it may take a lot of time and cost a lot.

### 3. What resources will you need to accomplish your goal?

- Wood.
- Bolts and screws.
- Piping.
- Shower rose.
- Tap mixer.

Project Key stakeholders			
Stakeholders	Contact Info	Link to Project	Consultations
Teacher	See him every day	He will see me and the project every day and help me make decisions.	I can talk to him about any problems that I have. Help me make good decisions.
Client	I am able to contact him by phone and I see him most weekends.	I will be making the shower to his needs and wants.	I can inform him of how the project is going and whether there are any problems.
Family	I see them mostly every day.	They will be using the finished project.	Won't really need to consult them about the project but I will be able to tell them how it is going and when it will be finished.
Friends		When friends come over they may use it.	
Friend (plumber)	I am able to contact him by phone.	He may be able to help me with the plumbing part of the project.	

Resources Needed to Achieve the Goal	Where to get them	When are they needed
Materials	Get the materials from my technology teacher	I will need materials for my model then I will need other materials for the actual project.
Tools	The tools that I will need will be provided in the technology room.	They will be need probably term 2 mostly. When I start my actual project.
Machinery	In class	I will need machinery during the production process of my project.

Action	Skill or knowledge needed	How to develop this skill or knowledge
Use a thicknesser.	Learn how to use a thicknesser.	Ask Mr. Breig to teach me and practise.
Screw the piping to the shower.	Not too much skill involved, just need to know where I want to put it.	Ask my dad or teacher for advice.
Screw the tap mixer on.	Knowledge of connecting the pipe to the mixer.	Ask for help or advice from my teacher, dad or plumber.
Connect the pipe to a water supply	Need to know how to connect the pipe to a water supply without any leaks etc. Knowledge of what materials to use for that.	Ask for help from my teacher or a plumber.
Drainage.	Knowledge of whether I need a permit or not if I am going to use the drain. What materials I am going to need for this part.	Ask my dad how he wants the drainage and then ask for advice from my teacher.

Important Dates throughout the year	What is happening	What needs to be done and why? (consider constraints)	What happened and what will you do next?
Term One Starts			
February			
15 February	Senior athletics	No school work	Nothing happened
Milestone	Start of project. Consultation with client about what he wants.	Make a proposal and a brief for project.	Nothing happened
16 <sup>th</sup> February	Research: materials and of other showers. Started creating a design of the shower.	Research	Chose some possible materials
March			
21 March	Good Friday	No school	Draw up concepts of the shower. Roughs.
24 March	Easter Monday	No school	
25 March	School Holiday	No school	
26 <sup>th</sup> March	Consultation with client about materials. Decision on what materials to use. Research on materials.	Write down specifications.	Wrote down options of materials that could be used and decided on pine. Wrote down specifications.
31 <sup>st</sup> March-4 <sup>th</sup> April.	Year 12 retreats	No school work	Nothing happened.
Milestone	Choose and order what materials I need. Research.	Research about the different type of materials.	I decided to use tannalised pine for my entire shower and reasons for his are in materials research.
Term Two Starts			
May			
5-20 <sup>th</sup> May	Started and completed mock-up of shower.	Take photos	Taken photo for evaluation.
21 <sup>st</sup> May	Evaluation for mock up.	Write evaluation.	Wrote up evaluation on computer for my mock up.
23-30 <sup>th</sup> May	Exams	No school work	During free time I wrote up different types of factors for the shower.
10 <sup>th</sup> June	Materials for my project came in.	Sort out materials.	Nothing happened.
11 <sup>th</sup> June	Consultation with client about what to do next.	Draw different concept drawings.	Drew up concept drawings..

13 <sup>th</sup> June	Consultation with client	Decide on design.	I showed my client the final drawings and made a decision on what the shower is going to look like.
14-19 <sup>th</sup> June	Drawing up shower.	Draw design for a template.	Drew up a template on a scrap piece of wood of the actual size of the project.
20 <sup>th</sup> June	Measured out on real wood the length of the uprights.	Needs to be cut down to size and in to shape.	

Term Three Starts			
July			
21 <sup>st</sup> July	Started on the uprights of the shower.	Draw curve to be cut out.	I drew the curved shape on the piece of wood. Had to glue an extra piece of wood at the top to compensate for the curve.
25 <sup>th</sup> July	Cut out the curve of the upright on hand saw.	Cut out curve.	Using one side as a template for the other. - A constraint occurred when cutting the upright. The blade on the hand saw was blunt and had to be replaced. This took a few days to get a new one.
30-31 <sup>st</sup> July	Used a hand plane to get rid of high spots on the uprights.	Take photos of progress.	Taken photos for the progress of my project.
3 <sup>rd</sup> August	Went to Bunning's and bought materials. Sourced materials.	Bolts need to be bought.	I bought coach bolts for the base of the shower and brackets to bolt the uprights to the base.
Decided to start on the base and leave the uprights for now because the base will take longer and I will be able to make progress on the uprights with the base done. Prioritising.			
5 <sup>th</sup> August	Started on base.	Base.	Cut out wood to size and placed it on to the base template to see if it fitted.
6-31 <sup>st</sup> August	Continued construction of the base.	Base needs to be done before end of term.	Bolting the slats together to make the base using the coach bolts I sourced from bunnings warehouse.
1-12 <sup>th</sup> September	Revision for exams.	Stop work for that period.	I stopped work for that period of time to study for exam.
5-12 <sup>th</sup> September	Exams	No school work.	
15-20 <sup>th</sup> September	Continued construction of base.	Brackets.	Brackets got bolted on. Had to cut into the slats to allow room for the brackets.
Finishing up of the base. I sanded up the base and finished it before the holidays.			
26 <sup>th</sup> September - 12 <sup>th</sup> October.	Holiday	Finish shower altogether	Over the holidays I screwed all the slats on to the uprights. Put the plugs over the screws. Sanded up stained it and took photos. Finished all paper work including evaluations etc.

Term Four Starts			
October			
13 <sup>th</sup> October	Project is due	Hand in project.	Check everything is in the folder and sort the folder in order.

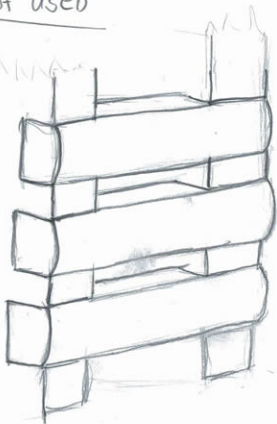
Milestones=



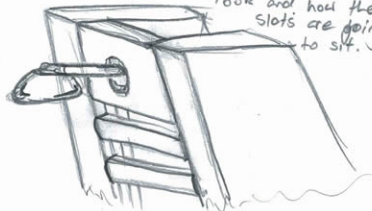
# ROUGHS

Not used

Original thought of how the slots were going to sit but time constraint effected that option as it involved cutting into the uprights.



My Client and I decided that this is how we want the top to look and how the slots are going to sit.



Couch bolt

I am going to be using these bolts for my base.



Sketch of shower handle





This was the original shape of what my upright was going to be. But my Client and I decided not to use this one as the curve was too extreme and didn't like the shape at the top.

CHOSEN SHAPE



My Client and I chose this shape of the upright because the curve is less extreme and is a bit more simple.



My Client and I decided that we didn't like this shape because bit at the bottom was a bit odd looking.

# Base concepts

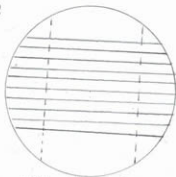


The client prefers  
the circle base.

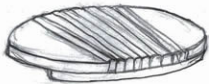


I like the  
look of the  
circle base  
better than  
the square.

Circular base



The circle base  
adds a degree  
of difficulty to  
the project.



square base

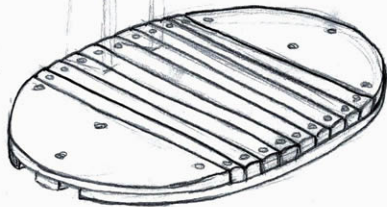


This is rather large  
and with the upright  
it will look odd and  
it's not what the client  
is looking for.



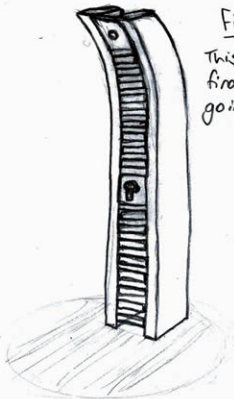
Final design

This is what the final product of the base is going to look like.



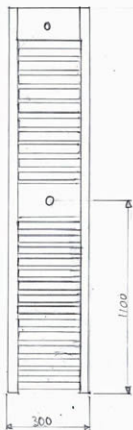
Final design

This is what the final product is going to look like.





ORTHOGRAPHIC OF UPRIGHT



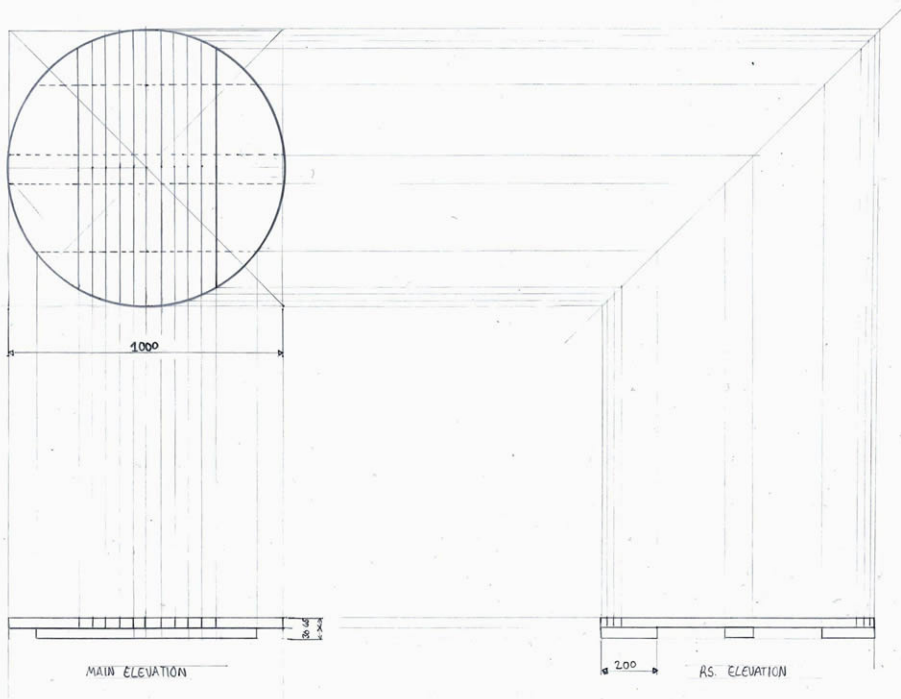
MAIN ELEVATION



SIDE ELEVATION

PLAN

ORTHOGRAPHIC OF BASE



MAIN ELEVATION

R.S. ELEVATION

## Production Process

### Base Construction

#### Planning:

The production process started with a plan drawing of the shower base. I did this with a large sheet of MDF and got a piece of string and a nail and set it to a diameter of 1 metre and drew a circle. I then accurately drew on where the slats were going to sit leaving a 5-millimetre gap between each one.

#### Actual Construction:

I then got out all wood needed for the base and started to write on the measurements to cut out with the hand saw as they were too long to put on the band saw or scroll saw. Once they were all cut to size I put them through the thicknesser to get them down to size.

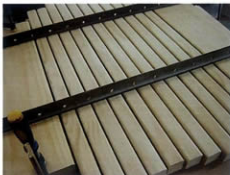


Then with a Bench Router, I rounded off all the edges on the slats facing up. As you can see I am wearing safety glasses, earmuffs and a dust mask for safety.

The next stage was to put all the slats into place on the large template that I accurately drew. I then used Brackets to keep them all tight together so they



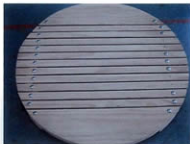
wouldn't move out of place as I drew the same size circle of the top of the slats so that I could cut it out on the band saw. Before I cut out the circle shape I bolted all the slats in so it would make the cutting process easier.



Using coach bolts to bolt the slats in.



The image to the right shows what it looks like with the coach bolts in and the shape of the base cut out on the band saw.



I decided once I had cut it out that it needed a support beam underneath of the slats so that they don't snap or bend when someone stands on it.

The support beam running along underneath.



The next stage was to use the hand router and round the edges of the outside of the circle.



Picture showing the underneath of the router and the router bit used.



Close up photo of what it looks like with the edge rounded. I like the look of the base with the coach bolts. That's the end of the construction of the base.

## Upright Construction

### Planning:

The production process started with a plan of the uprights. I did this with a long piece of MDF and started to draw on the shape that I wanted for the upright. I put on measurements for how high it was and how high the shower handle was going to sit. I used a long flexi piece of wood to draw the curve. I only drew one side so I could copy that and flip it to make the other side.

### Actual Construction:

The first stage of the construction started out with taken out the large planks of treated pine I had and drawing on the measurements and cutting it to length. I put it through the thicknesser to get it down to thickness.



This image here is one of the uprights gluing. To get the curve I wanted I had to add a piece of wood at the top using Resorcinol Glue. I then drew on the curve and cut it out on the band saw using the help of my teacher. Using that one as a template I cut out the other upright.

I then clamped them both together and put them in a vice and using hand planes and sand paper I evened out the bumps and shape of the uprights.



Ignoring all the rest of it for now apart from where the arrow is the next stage I screwed long pieces of wood running up the inside of the uprights so that I could screw the slats in and they would be flush.



You can see in this photo where the inside part is screwed in and how the slats sit flush. The slats were measured to size on a plank of wood and cut in mass production.



Using the drill press I drilled the holes in for the screws. Using a block of wood that I made to be clamped on so that I could drill each hole the same on each slat quicker then you would doing it manually.



Marking out each slat on the upright accurately I drilled them in with stainless steel screws. The square pieces for the handle and shower head were cut out and had a hole cut into the middle for the plumbing to fit through.

The upright was then drilled into at the sides and bolted up onto the base with brackets.



The tap was fitted in through the hole and all the piping was to be done in the next stage.

## Staining my Shower

To get a nice finish I decided to use kwela coloured stain. I chose this colour because it is a modern colour; it stands out well but not too much and fits in well with the house. Before I started to paint not the stain I sanded down the whole shower making sure there were no marks or rough spots. I then lay a large tarpaulin down so that I didn't get any of the stain on the concrete. I used gloves to protect my hands from it, as I am not sure what the chemicals could do to my skin. Before applying the stain I gave it a brush down to get the dust off of it. Dipping the brush in the stain I apply it evenly across the wood.



Cabot's Garden Furniture Oil is a naturally pigmented, enriching oil for outdoor timber furniture such as garden settings, BBQ trolleys and benches. Garden Furniture Oil will highlight and enrich the natural colour and characteristics of the timber. It will not crack, peel or blister and is easy to apply. It will improve water repellence, freshen the timber's appearance and rejuvenate previously applied wood stains. I chose this stain because I like the colour it would bring out in the pine and it goes well with its surrounding colours outside.



## Plumbing of the Shower

When I had finished the staining of upright of the shower I moved on to the plumbing. As my client and I decided to have the shower run cold water temporarily I had to come up with a design of how the plumbing was going to be installed. We bought a mixer tap originally thinking it was going to run hot and cold water. So the design was to make the mixer connect to one pipe so it could run off the outside tap.



This photo is showing the back of the shower where I installed the plumbing. As you can see there are two pipes that run from the tap mixer. In order for the shower to run off the outside water tap I had to connect it to make one pipe.



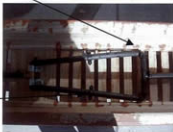
## Plumbing Materials



This is the pipe that is used for the plumbing of my shower. It is a black PVC pipe. It isn't very durable and can bend and rupture easily. The reason why I have it is because my client and I decided that it would be temporary until we decided it was time to change to copper piping.



This is a picture of what I used to connect the pipe to the fittings at the back. They are small clamps that fit around the end of the pipe and the fitting, which is tightly secured to stop leaking and stop the pipe from coming apart.



This is a brace that I used to secure the pipe to the shower. It fits over the pipe and is screwed down on either side.



## Brackets



Originally my client and I sourced these galvanised steel brackets from Bunnings Warehouse. At the time we thought that they would be long and strong enough to hold the uprights on the base. But when I went to install them they were a bit short and got advice from my teacher that they would not be suitable to hold the weight. So I went back to bunnings and got different ones.



I bought these galvanised steel brackets because they were thicker and would durable outside. These ones are much taller which will add stability to the uprights. I also bought four of them so I could have two on each side of the uprights for extra strength. The system that I have in the photo is that the brackets are bolted sitting underneath a slat.

## How to use a Router and Power Drill

### Router



In my project I used the router to round off the edges of the base, the uprights and all the slats. The router helped me to fulfil one of the specifications that the out door shower must have a smooth clean cut finish e.g. rounded edges. The router bit shown on the left is a rounder. That is the one I used to round the edges of my shower. To use the router you must wear safety gear such as safety glasses to protect



your eyes from any objects that may fly off, earmuffs to protect your ears from hearing damage and a dust mask to prevent dust inhalation. Placing the bit in to the slot and tightening with spanners. Place the black platform underneath on to the piece of wood and push down revealing the router bit to the side of the wood and locking in to place. Switch on the machine with the platform still resting on the wood but away from it until the machine starts up. When started slide into the edge of the wood and slide along the surface keeping even pressure and making sure you go with the machine but still keeping in control as the power of it could rip it out of your hands.

### Power Drill



I used the drill in my project to drill the holes for all the bolts in the slats and for the brackets. The power drill has helped me to fulfil the specification that my shower must have slats. It has done this because without using the drill to make the holes it would have made it a lot harder to have the slats. With the holes I have been able to use coach bolts, which also fulfils



the specification that it must have some stainless steel features. The power drill used in the photos to drill the holes is powered by electricity and is a lot more powerful than a battery powered cordless drill. To use the drill you must place the drill bit in the slot and tighten using a chuck key. Marking out the spot before drilling. I then place the drill bit on the mark and slowly pull on the trigger giving it more power and pushing down making sure it is straight. When the drill is all the way through pull out while still pressing the trigger. Wearing safety glasses could protect your eyes from any material that may fly off.

## My Safety during the production processes.



The safety glasses are used when I am working with machinery to protect my eyes from any materials that might fly off. The dust mask is used when I am sanding something to protect my lungs from the dust, as it can be harmful especially treated pine. Earmuffs are used when I am working with loud machinery such as the router or thicknesser to protect my ears from hearing damage.



When using the belt sander I use a dust mask, safety glasses and earmuffs. The belt sander sands quite a lot off the wood surface, which creates a lot of dust that, can be harmful to the lungs. I wear safety glasses because even though I am just sanding, something wrong might happen with the machine itself or I might hit a nail and it could hit my eyes. I use earmuffs because the machine can often be quite loud and it's just more comfortable working with them on. Before plugging in the machine I check to make sure that the lock switch isn't on as it will shag of the table and hurt me or someone else. I also check to see if there are any damages made to the actual machine that may harm me. I dust off the machine after use.



When using the thicknesser I wear safety glasses and earmuffs. I wear the safety glasses to protect my eyes from any materials that may fly out of the machine and I wear earmuffs to protect my ears because it is a loud machine. When I put a piece of wood through the machine I stand to the side then walk around the back of the machine to collect it on the other end. This prevents me from getting injured by anything that may fly out while im standing there.



When using the band saw I wear safety glasses to protect my eyes from flying materials. When cutting my materials I have to pay attention to what I am doing all the time as I could risk cutting my fingers off. The red button next to the machine is an emergency stop button.



When using the scroll saw I wear safety glasses to protect my eyes from flying materials. When I am cutting my material I pay attention to what I am doing as I may cut myself.



When I use the router I wear safety glasses, earmuffs and dust mask. As this is a powerful machine materials can fly off easily and hit me in the eyes so I wear safety glasses. It is a loud machine so I wear earmuffs and I wear a dust mask because it can give off a bit of dust. Before using the machine I check for any damages to the actual machine and the wiring that may harm me during use.



When using the power drill I wear safety glasses as a precaution because while using it I may hit a nail and it could hit me in the eyes.



When using the glue I wear latex gloves to protect them as it could harm the skin. After use I wash my hands.



When using the drill-press I wear safety glasses to protect my eyes from materials that may fly off. Before I turn on the machine I check to see that the chuck key that I used to tighten the drill bit with is taken out as it may fling it when the drill spins and hit me or someone else.



## My Clients Safety while using my Product

During the research and the production of my project I have considered my clients safety while using the outdoor shower. As the whole family will be using the shower I had to think about the different ages.

With the wood being treated pine and it being harmful because of toxic poisons in the treatment I am going to stain it. This will also make it last longer too.



The shower has slats on the base so that means there is a gap that is needed for the water to run through. So I started to consider whether someone's toes could get stuck in between the slats. So I decided on making the gaps 5 millimetres apart. To get the gaps accurate I put 5 mill spacers in between them.



As the shower's upright is over two metres tall I had to make sure that they won't topple over on to somebody and hurt them while they are using it. So to solve this problem I installed four large brackets with two on either side with large bolts holding them together. If I have to I can secure the shower to the ground so it doesn't topple over from the wind.



With having different heights of people using it I had to decide on heights that were ergonomic. I made sure that the shower handle was short enough for people to reach and that the height of the shower was tall enough for tall people.

## Possible Ideas that I didn't incorporate in to my Final Product

A shelf. While I was researching about existing out door showers I came across I few that had shelves incorporated for small items such as soap for example. I discussed this with my client and we decided not to have the shelf as it would may have looked odd with our design and that we liked the more simple look. But that was one idea that we had.



Photo of existing shower in my research that has the shelf incorporated.

## Final Evaluation

My final product of the outdoor shower I believe is a success because it meets with all the specifications and the clients wants. Such as,

- It is made out of treated pine because based on the research I have done it is weather proof and will be durable just what my client wanted.
- My client wanted it easy to be used. I have achieved this by a putting in a mixer tap connected with simple plumbing. The mixer tap is easy for children to use.
- It has been made so that it is reliable when someone is using it. The design of the base has been made to be strong so it won't break.
- The design of the product is modern and fits in well with its surroundings and has been successfully design to be ergonomic.
- As you can see in the photo the shower has achieved running water.
- It has been made with a base that has a 1-metre diameter to insure enough room to stand when using it. The height of the tap 1.1metres high so that children are able to reach it and the top of the shower has been made 2.2metres to ensure enough room for somebody to stand underneath easily.
- Has been made to be sturdy so that it won't topple over and injure somebody. Having a wide enough base has done this.
- Using the router achieved it being a clean-cut finish e.g. Rounded edges.
- It has successfully been made with slats.
- The coach bolts used and the stainless steel tap and showerhead has achieved the stainless steel features.

The modern look and the suitable finish have been achieved by the incorporated curve, the slats, stainless steel features and the kwela coloured stain. At the moment the shower only runs cold water because my client and I decided to postpone the option of having running hot water as there was a time constraint and decided that we could do it later on if it is needed. The location of the shower may also be temporary as my client hasn't decided whether he would like to make a spot in the grass for it but this will be done s a separate project. The location of the shower now is fine because it is on a flat surface so it won't topple over and injure somebody. It is

located near a drain so the water can run in to and it is located out of sight from neighbours' eyes as a privacy concern.

If I could make any changes I would make the width of the uprights to be a bit slimmer just to give it a subtler look.



## Where I have Prioritised during the production process

Size: Originally the width of the upright for the shower was going to be 400mm wide. When I drew the template of the upright on to the piece of wood I decided and spoke to my client that it the width of it should be halved down to 200mm as it looked too big and bulky. By doing this I also saved a lot of money. This is one example of prioritising.

Dowels: On the mock-up of my shower that I built there are dowel rods going up the front of the upright. When it came to the actual process of doing it my client and I could find any dowels that were big enough. So we decided to change the design to having slats instead. By doing this we saved time as it is simpler to put up the slats then it is to install the dowels and saved time. This is another example of prioritising.

## Research about Kwila and why I didn't chose it instead of Pine

### Description

The heartwood is yellowish-brown in colour when freshly sawn and weathers to dark brown. Yellow deposits in the vessels are a common feature and show out on longitudinal surfaces; sapwood is variable in width, from 25mm to 50mm and sometimes up to 100mm wide, pale yellow in colour and sharply demarcated from the heartwood; grain may be straight or slightly interlocked and sometimes wavy; texture is moderately coarse, but even. The soft tissue may produce a "zigzag" tracery on back sawn material; it is often lustrous. The timbers are non-siliceous. Freshly sawn timber has a characteristic leathery-like odour, which may persist in seasoned material. It has an astringent taste.

### Characteristics

Kwila is hard and strong. Timber kiln-and air-seasons well but rather slowly with negligible degrade and very little shrinkage or movement. Working properties variable. Cuts cleanly but may have a blunting or gumming effect on cutting edges. Cutting angle should be reduced to 20 degrees when planing quarter-sawn stock. Turns well. Timber stains and polishes well. Nails difficult to drive in but holding power good. Preboring advisable to avoid splitting. Species glues reasonable well except with casein glues; oily surface may cause problems.

One of the most important naturally durable timbers. However, extractives may leach out under very wet conditions, resulting in some fungal decay. Generally material is fairly resistant to termites and moderately resistant to marine borers. As flooring timber it shows moderate to high resistance to wear.

### Why I didn't chose kwila for the outdoor shower.

Originally my client and I thought of choosing kwila as the material. The reasons why I didn't chose kwila as the material for my outdoor shower is because for the size I needed it would have been expensive because this material is not cheap. As it is a very dense material it means that it is very heavy and would be hard to transport. Even though kwila has a nice look and feel to it my client decided to go with treated pine instead because it is cheaper and is easier to work with.



## Technological Knowledge 2.6

Charlie Moran visited us and spoke to us about the company "360 Limited" that specializes in engineering design, creative design and manufacturing design. Charlie works as a designer. The project that she helped design was a Wii Nintendo Console display centre in Australia. She explained to us what she does and the steps they had to take to complete the project.



Mr. Broom is a supervisor at the company Hayden and Rollett. He spoke to us about the check-in counters that he helped build at the International New Zealand Airport and described the steps that he and his team took to complete the project.

My project that I am designing and building is going to be an out-door shower for my dad's backyard. The reason why I am building a shower for outside is because my dad has had enough of the kids trampling through the house dirty after getting home from the beach or going through the house after swimming in the pool to get to the shower. With a shower outside it stops the problem altogether. I have a client that I consult with every now and then and update him with what's happening with the project. Whereas Charlie told us that she just got given a quick brief and never consulted with the client on what was happening with the project.

Both Mr. Broom and Charlie use a plan of action or a "Gantt" chart to deal with their time. Because they are on a time constraint to when the project needs to be done they plan each step effectively so they complete it on time with out the possibility of losing their money or contract. I have a set time to finish my out-door shower and if I am overdue I won't pass. This knowledge has influenced me to create a plan of action so that I can complete my project on time and so that through out the year I can put in important dates and factors to show me where I am and whether I am falling behind.

From Charlie and Mr. Broom I understand that a lot of other people can be involved with your project and can have important roles that can help with the processes of building or designing it. As Charlie uses people such as Bux to render in the 3D drawings I have people such as my teacher who can often help me with decisions, material ordering or help me with certain machinery that I may not know how or be able to use.

Ergonomics have to be included in all of our projects. The check-in counters for the airport had to be built so that they were comfortable and safe. When they were brought in the occupational health and safety to make sure it was safe and ergonomic and also brought in a lady to sit behind the counter on a chair to test the ergonomics. The ergonomics of the display units in the Nintendo Wii consoles were

governed by the size of the LCD screen and the display box beneath the screen. The ergonomics of the Nintendo console had to suit ages 5 to 80 and still had to take the LCD screen and the Nintendo controller. This has made me aware that ergonomics are most important for the comfortable use of an item.

To test whether my shower will be ergonomic I'm going to look at the different heights of people that may use it and choose a height for the top of the shower, the height of shower tap and also make sure when the people stand on the base of the shower especially children that their toes do not fall between the wooden slats.

The accuracy of the measurements has to be exact other wise there may be a waste of materials and money. Mr. Broom told us that they had to get the measurements of the counters exact. They had to make sure that all the counters were cut to the same size otherwise the counter on the end of the row would be a lot smaller then the first counter. When cutting materials to make sure that you are cutting efficiently because the client won't pay for extra materials, your company would and you would lose money by doing so. This has made me aware of what materials I can use and how effective I am going to have to use them because I do not have a large budget.

The materials that Charlie and Mr. Broom used for their projects would have been chosen because they need to be strong and durable to withstand constant use while still looking in good condition and to last for as long as possible. Hayden and Rollet used a material called scoria. This is used for the tops of the counters. It is a durable material. This has made me understand that choosing the right materials for your project are important if you want it to last long and look good. The wood that I am going to use is tanzanian pine. I have chosen this wood because it is weather proof which is perfect for an out-door shower and it isn't that expensive.

Another factor would be aesthetics of the project. This would relate a lot to Charlie's project because the Nintendo Wii consoles need to look good in order to attract an audience or attention between the ages of 5-80 years. This would also relate to Mr. Broom's project the Airport because it has to look good and attractive and is on show to other people from other countries. This teaches me that my outdoor shower has to be attractive looking and fits in well with its surroundings.

I built a scaled model of my shower out of wood so that I could take it to my client and discuss with him whether he wanted anything to change or for me to see whether there are any problems. It is Charlie's job to create 3D designs of the Nintendo project and then to send it off to a man called Bux who then renders and adds texture to it. It is then shown to the client. The purpose of this is to show the client what Charlie's company has designed for them. Hayden and Rollet build a prototype of the check-in counters. This helps them because they are able to copy the prototype's dimensions etc and use them to build more of the counters but at a faster speed because they do not have to make up or change things during the process of building as the prototype is there for them to experiment with before the production begins. This knowledge has influenced me that making a prototype or model is very important, as it is part of the planning process that also allows you to develop the product and overcome or prevent any problems that have or may occur.



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