My project is a cabinet with a panelled door and is made from Untreated Pinus Radiata (untreated pine). I chose untreated pine because I have experience in working with it and because it is a safe material to use. Untreated pine does not have any chemicals added to it when it is processed so I don’t have to wear any protective clothing or a special dust mask that you need when you use treated timber. Pinus radiata has a low density of around 450kgs per cubic metre compared to more than 600 kgs per cubic metre for Rimu. This means it has characteristics that we have to think about when we are working with it. It is soft so we have to be careful not to damage it when we move it around the workshop. Even objects on the bench can make deep marks that are hard to get out. It soaks up liquid very easily which can help when we put coatings on it. It has loose fibres in the grain so it can easily break away when cutting but also that makes it easy to chisel. The light colour of pinus radiata means we can choose more colours of stain and finish coating. It means we can match native timbers, or we can just leave it clear finished.

Working with Pinus Radiata in my project

Safety
The Health and Safety in Employment Act is a law that makes sure people are safe when they are working. In our workshop we have to wear covered shoes all the time in case we drop a sharp object on our foot. We tuck in our shirt and tie up any loose clothing or hair, because we use many machines that rotate and can catch loose items. If that happened we could be dragged into the machine and injured. There are safety goggles we must wear whenever we use any rotating machines and we wear earmuffs almost all the time. Hearing damage happens whenever we are exposed to loud noises and we don’t notice it happening. The HSE act makes sure we take responsibility for our own safety and minimise risks whenever we can. One of the reasons for choosing untreated pine is that it is less toxic than treated timbers, Medium Density Fibreboard and native timbers like rimu. Another reason is that it produces larger particles when we cut and sand it as they fall to the floor instead of floating in the air for us to breathe.

Marking out
Untreated Pinus radiata is an easy material to mark out because it is light coloured and is soft. But it usually has a good side and a bad side from the machining so I tried to work on the face side. I also checked for any loose knots that may make it hard to cut. I used a pencil and steel ruler for most of my marking out, but had to use a marking out knife for the marks that go across the grain. I did this so that when I cut across the grain the wood fibres didn’t chip past the knife line. I had difficulty marking out the corner mitres for the cabinet door because the rails and stiles were profiled. I had to mark out the long and short points and this has to be very accurate as a tiny mistake on a mitre means it will not fit together without gaps. Also when gluing the mitres have to be able to press up tight to put pressure on the glue. I used a gauge to mark out the rebate for the bottom shelf and also for the top rails that are used to fix down the top. Because the wood is soft it leaves a deep scratch that is easy to follow with tools and also prevents chipping past the line.

Cutting
I cut most of my cuts using the band saw which has a steel blade. I always wore safety goggles in case a piece of wood flung off the blade which can happen if you hit a loose knot when cutting. I put the blade guard down to about 10mm above my work. This is so there is less chance of accidentally touching the blade, and also means the blade is less likely to twist when it passes through different hardness’s in one piece of timber. Very hard materials like rimu or MDF can blunt a blade and this makes the blade unsafe. Keeping our hands on both sides of the blade means if the blade hits a soft part of the pine our hands don’t slip into the blade.

Even though untreated pine is not toxic I still made sure I had the dust extractor on as this keeps the dust out of the workshop and keeps the others safe as well. Dust is bad for our lungs and can also explode. Pine dust has larger particles so is a safe choice for cutting and sanding.

I had to use a small hand plane to trim off the wood down to the line. This is easy along the pine grain as it peels. But when I was going across grain I had to place another piece of wood as an end stop to prevent the wood splitting off the end. I used a router to cut a groove for the bottom shelf. I had to make sure my wood was clamped onto the bench so it couldn’t move and cause accident, or wreck my work. I used a guide timber against the left. Both hands have to be on the router so you can’t accidently injure yourself, and because the router is spinning and spitting out chips of wood I wore safety goggles, and earmuffs for the noise. I cramped another piece of wood on the far side and
let the router run into it so the grain wouldn’t split away when the cutter exits. The router bit had a carbide tipped cutter as once high speed steel loses its edge it can get very hot and burn the wood. The skirting around the base of the cabinet was cut from a length of decorative profiled timber. The profile made cutting the corner mitres more difficult as they chipped easily. The grain in pine is loose which means the ends can break away when you cut them on a mitre saw. To avoid this I cut using the manual mitre saw and cut long slow strokes with a very fine toothed blade. I used a small G clamp to hold the wood still and stop it getting dragged into the cut.

**Joining**

To widen the top sides and shelves of my cabinet I decided to dowel join the pieces together. Wide thin boards can cup because the grain is uneven across the board due to growth rings in the tree. So it is better to use narrower boards of about 150mm and join them together. The dowels have grain running along their length so they use the long ways strength when they go across a join. Using dowel joins also helps to keep the top surfaces flush so it makes sanding and finishing easier. I marked out the centres of the dowels using a ruler for length and a gauge for the width. The gauge also leaves a groove that helps keep the drill bit aligned. I set up the parallel borer with a brad point drill bit and the depth to allow for excess glue. The brad point bit has a very sharp centre and an edge cutter. I used this because it runs true even if there is a wobbly grain in the wood. Normal twist drills can go crooked in pine where there are hard and soft grain patches and that makes it harder to line up the dowels. I cramped the work piece still while I drilled and kept my hands clear of the line of the drill bit. I also made sure I had my safety goggles on. To cramp up the boards I had to lay all my work out on the sash cramps first. I used PVA glue as this penetrates deep into the porous pine when you put pressure on. Using PVA means you have to put medium pressure on to force the glue into the wood. But I had to protect the soft edges from the steel cramps with blocks of wood, as they can dig in. I laid another sash cramp across the top to stop the boards bowing up under pressure. I had to wipe off extra glue with a wet rag to prevent the glue from staining the wood. Pinus radiata soaks up the glue very quickly and any stains will stop finishing coats from penetrating. This looks untidy at the end.

**Finishing**

Sanding dust can be very dangerous for our lungs so I made sure I sanded near the dust extractor to avoid filling the workshop up with dust. I also never use compressed air to clean down benches as OSH say we should not do that as it blows fine dust into our lungs. I used a belt sander with 100 grit paper to sand the faces of all of my pieces before I assembled them. I had to be careful to move the sander in long circles to avoid cutting grooves into the soft pine timber. I never sanded any end grain with the belt sander as it can change the shape of the wood and the way it fits together. I did the rest of the sanding once I had assembled my cabinet, using 150 and then 240 grit sandpaper, using a sanding block to keep the sandpaper flat.

The Pinus Radiata is not very dense and has a loose grain that makes it soak up liquids very quickly and can go deep into the wood. I decided to stain my cabinet but I found that the stain colour soaked in very quickly to the end grain and as a result the colour was much darker than the rest. I had to put an extra coat on the faces to match the darker end grain bits. I put the stain on with a cloth rolled into a pad as a brush leaves brush marks which can hid the attractive grain. I had to make sure I kept a wet edge so I didn’t get more than one coat on at a time or this also changed the colour of the finish. The stain made the grain stand up so I sanded it with 400 grit wet and dry and then wiped the surface with a cloth to remove the dust before I put on a clear finish coat of polyurethane. The first coat I thinned down with about 10 percent mineral turpentine to allow it to get right into the porous wood. I used polyurethane to make the surface harder as pine is very soft. I made sure I put one coat on the underside of all of the pieces of work too to stop the pine soaking up moisture from the air and warping or twisting. The polyurethane also made the stain look rich in colour.