Characteristics
My project is a kitchen work table with butchers block top and is made from untreated Pinus Radiata (pine), which was merchant grade (merch) and recycled OB rimu for the table frame, and rough sawn walnut and recycled rough sawn heart rimu for the butchers block as the top. The table legs are laminated and turned on the lathe. The pine is very soft because of its low density and has a very light colour which is the same across the wood, some loose knots and even straight grain. The walnut is very dense and hard. It has swirly grain patterns and the knots are very tight. The OB rimu is about the same density as pine but a different colour which is why I chose it to laminate with pine for the turned legs. For the wedged mortise and tenon joins I used rimu wedges for their contrasting colour. The recycled heart rimu is also dense and very hard, it has a tight squeezed up grain but it’s straight, it has no knots, but it has lots of variation it its colour. The butchers block will be made with the end grain facing up.

Pine is soft as a wood because it is not as dense as the harder woods like rimu or walnut. Density is the weight per cubic metre and pine is below 400 kg/m3 whereas walnut is more than 550 kg/m3. Heart rimu is also around 600 kg/m3. The different density affects what tools we use to machine it, how dangerous the dust is, and how we join to it and put finishing coats onto it. I chose pine for the table frame because I had to make several mortise and tenon joins and wood with a straight grain allowed me to do that.

The butchers block top has the end grain facing upwards which is unusual in most furniture and meant that I couldn’t machine it the same as normal. How much liquid will soak into a wood depends on how dense it is and how tightly packed the grain is. It also depends on whether or not you are putting the liquid onto the face or the end grain. Even the changing grain in one bit of wood can change how we cut it or what techniques we use to put protective coats or finishing coats on.

Safety
Students at school are called “others” in the Health and Safety in Employment Act. That means the school has to make sure we are safe when we work and also that we work safely. We are also training for working in industry later so we have to start acting like employees. That means we have to work safely all the time, try to reduce the risks in our work, and be mindful of the other people around us when we work.

In my project I had some resistant materials that created dangerous dust when I cut or sanded them. The dense wood heart rimu is called carcinogenic because it has resins in it and very fine particles that can float around in the air and get into our lungs and cause cancer. Walnut is also dense so makes very fine particles. The way we avoid the dust is by turning the dust extractor on when we cut or sand and do it near an extraction gate. We go outside when we use the finishing orbital sander so the dust can blow away. Variations in grain creates hard and softer patches that can make cutting blades or drill bits wander off and this can be dangerous so we cramp down our work or run it against a fence to keep it straight. We should always secure work for the router anyway. I wanted to put the butchers block I had laminated through the thicknesser but was not allowed. This is because the grain was vertical up and down and the knives would have just shattered the wood and spat big chunks back out. We can only put along the grain work through the thicknesser. Chips or splinters of wood are sharp and fly around when cutting so we have safety goggles on whenever we cut or drill. Very hard woods can burn if our tools are not sharp so we always use carbide tipped blades for rimu and for walnut. We also use them for pine but we could just use high speed steel.

Because resistant materials require powerful and sharp tools we have to wear covered shoes to protect our feet, tuck in shirts and tie back hair to avoid getting caught up, walk carefully so as not to bump anyone, wait for people to finish using a machine before we talk to them, have safety goggles on near machines and earmuffs ready all the time.
Marking out

I found I could mark out all of my materials with a pencil ruler and square. The surfaces are soft enough to write on. I did find it difficult to mark on the end grain so I used a ballpoint pen. Marks are hard to get off pine so I was careful to mark softly on the pine. I also used a marking knife for the cuts I would make across the grain as this gives the wood fibres a place to chip off which is straight. It’s also easy to know when you’ve cut half the line off like the teacher says.

I was careful to avoid knots on my cutting lines or where I had a piece to rebate as the knots are very hard and dense and in pine the loose knots come out when cutting. The merch pine was very knotty. I did not want to hit a knot when I was turning on the lathe. Also you can’t nail through knots, and because the knotty wood is less porous the glue doesn’t soak in as much. The recycled heart rimu didn’t have knots but was very hard, and I tried to keep the very hard walnut around the walnut wood knots because I wanted the hardest wood for the cutting board. For turning I marked out the high and low points on my table legs and used the callipers to check the dimensions as I went.

Cutting

I cut all of the pine and OB rimu on the band saw, which is easy because they are soft and then used a sharp plane to shave accurately down to the lines. I had to chisel a sloping mortise through the table legs and a tenon onto the rails between the legs. I cut a saw cut into the tenons for a wedge which is hammered into the tenon from the other side when it’s assembled. The way the grain splits apart means that the wedge can expand the tenon and lock it in place. You couldn’t do this across the grain. I drilled through the centre of the mortise first then was able to chisel away the rest. I had to start chiselling from where the shoulder of the tenon was as I was chiselling slightly across the grain for the angle of the wedged tenon. Otherwise I would be going into the end grain and that would make it split. To cut to the shoulder on the tenon I cut across the grain with the tenon saw and again chiselled the rest which split away easily along grain.

After I had laminated the pine and OB rimu for the turned legs I had to plane the corners off with a hand plane. Because timber splits along the grain, when you are turning a square shape on the lathe the tool can split off big chunks. This is dangerous and wasteful. By planing it down first you can limit the amount that can split off. When you are turning you can tell you are shearing the fibres if you get long thin shavings. If you get chunks you are breaking the grain and the wood will be rough. I also had to cut downhill towards the centre so I didn’t dig into the grain. Sanding on the lathe is difficult as the wood is very soft and spinning fast and it’s easy to make everything round. I wanted to keep the sharp profiles on my legs so I had to get the best finish straight off the tool that I could. Once I had turned the shapes I had exposed some new end grain which will let the timber dry unevenly so I put a timber sealer coat on while it was on the lathe.

Joining

I laminated the butchers block alternating rimu and walnut in the long lengths and cramped them up tight. More tightly than if I was using pine as the wood is not as porous and requires more pressure to get the glue to penetrate. Once that had dried the teacher put it back through the bench saw across the grain into 50mm strips which I glued and cramped alternately like a chess board. This left all the grain facing upwards.

Assembling the table mortise and tenons was easier as once I had the small OB rimu wedges glued and tapped into the tenons I could remove the cramps but leave on the brace keeping it square. For all the cramping I used protective blocks to avoid damaging the wood and making more sanding work.

Finishing

Because rimu and walnut dust can be very bad for us I made sure I wore a mask when I was fine sanding. I couldn’t put the end grain block through the thicknesser so I had to sand the whole top to an even surface. I used a 60 grit belt on the sander to make it even, then I made a wide hand sanding block wrapped with 80grit, then 100, 150, and lastly 240. I did the finishing with the orbital sander outside to blow away the dust. The tight grained wood stops germs from getting in but the wood needs a protective coat as it will soak up liquids. I couldn’t use a toxic oil so I chose walnut oil which doesn’t go rancid like vegetable oil.

I used Danish oil as a finishing coat on the table. It made the colours stand out in the timbers, and highlighted the wedges and the end grain in the tenons. If the tenons were hidden you wouldn’t see the wood colours.