



Working with 3RT Wood





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CONTENTS

Introduction.....	3
Back to Basics.....	4
Common Machining Processes for 3RT Wood.....	6
- Docking to length (Radial Arm or Drop Saw).....	6
- Surface Planing.....	7
- Rip sawing.....	8
- Thicknessing.....	10
- Hand Routing.....	12
- CNC Routing.....	14
- Spindle Moulding.....	17
- Through Feed Moulding.....	18
- Turning.....	19
- Drilling.....	20
- Sanding.....	21

Introduction

The following guide is a reference document designed to give the user some advice for using our unique 3RT timber product.

Handling, machining and finishing all timber products can be a tricky process for the uninitiated, but in most instances machining 3RT wood will be like using any natural timber product.

We aim with this document to cover the most common machining processes and some basic machining techniques, along with some hints and tricks passed down through generations of wood machining experience.

Please take the time to look through this document and share it with others. Knowledge and education will not only make our industry better for everyone involved, it can also save you the end user, time, labour and ultimately money, if you get good results by learning good machining basics.

Manufactured using natural timber components and made from young, sustainably grown plantation trees, 3RT wood is the world's only true low impact, sustainable alternative to Hardwood. The look and feel of 3RT wood is similar to a natural timber and when machining it you will observe that it has fibres that run along the length of the board just as in natural timber. Therefore as with natural timber care must be taken when sawing, routing (both manually and CNC) and sanding across the "grain" or fibres in the board. As with any timber, soft or hardwood, and especially with eucalypt species, splitting along the grain can occur when incorrect methods are used.

In the following pages, we layout ways to minimise splitting while working with 3RT wood. By implementing some simple, easy to follow set up procedures for common machining practices used in Carpentry, Cabinet and Furniture Making, and Wood Machining, we can help you get the best out of your workshop with 3RT wood and in fact any timber product!

Though you may be an experienced woodworker, please be open to new tips and hints that you may have not come across before or may have forgotten, as they may give you the edge you need in completing your project successfully.

Back to Basics

The following list is a step by step guide to help you through a time tested list of machining procedures and help you achieve your goal, a finished timber project.

1. Docking: Cutting timber boards and planks across the grain to length.

This operation is generally done to cut your timber product to a size that suits your project from long lengths you have purchased. This is usually done with a Radial Arm Saw, Drop or Chop Saw or a Portable Circular saw.

2. Surface Planing: Planing of one face and one edge of a piece of timber.

Sometimes known as “Buzzing” or “Jointing”, this operation will straighten the face and edge of a board to give a flat and square reference point to work from in the subsequent machining operations.

3. Rip Sawing: Cutting your work pieces along the grain.

Using the edge of the board you have straightened as a reference by buzzing in operation number 2, a dedicated Rip Saw or a Table Saw set up with a ripping fence can be used. Again a portable saw can be used for this operation. The aim here is to cut the timber to slightly over your finished size to minimise the amount of timber that needs to be removed in the next operation.

4. Thicknessing: Using a “Thicknesser” or “Panel Planer” to machine your timber to the desired thickness for your project.

By machining the opposite face to that which you machined on the surface planer, you can accurately dress and machine the face that has the saw marks from the Rip Saw off. This will now give you dressed and parallel faces on your board.

5. Hand Routing: Routing or “moulding” the edge and/or face of your timber.

Now with a square and dressed piece of timber, you can now “mould” the edges using a hand router to achieve the shapes on the edges and faces of your timber that you need for your project. There are many ways and a huge variety of router bits available to give you the results you need and this can be done by one bit or multiple passes with several different router bits. A hand router can be used free hand or mounted inverted in a router table to make a “mini spindle moulder” which we will cover later.

6. CNC (Machine) Routing: Routing or “moulding” the edge and/or face of your timber

A computer controlled CNC router can be used to do the same job as a hand router but is programmed to follow the tool path fed into it and is used by many commercial kitchen manufacturers and furniture manufacturers. These machines have changed the industry greatly over the last 25 years and perform many operations previously done with hand routers and spindle moulders. Machining solid timber on a CNC router has specific requirements in programming, tool path planning, work piece clamping and tooling usage to give the desired results.

7. Spindle Moulding: “Moulding” the edge and/or face of your timber.

These machines are designed to cut profiles on the edges of timber boards and panels, which will give excellent results when properly set up and used. Spindle moulders have been used for generations in the furniture and timber industry for moulding components for a multitude of projects.

8. Through Feed Moulding: “Moulding” the edge and/or face of your timber all at once.

The through feed moulder, or sometimes referred to as a “four sided moulder” is effectively several spindle moulders built into one machine. It can be used to dress, size and mould your timber boards into the shapes you need for your project

9. Turning: Using a Lathe to produce 3 dimensional patterns along a length of timber.

Wood Lathes have been used for over a century to produce patterns in timber for a variety of purposes including table legs, staircase components and many other decorative items.

10. Drilling: Drilling holes for screw and bolt holes, dowell holes, and holes for hardware fittings.

A variety of machines can be used for this purpose including hand drills, electric portable drills, pedestal drills and CNC drilling stations.

11. Sanding: Finishing using abrasive papers to prepare timber for finishing

Again a variety of sanding methods can be used to prepare your timber project for the final process of coating, waxing or oiling. Many methods can be used from manual sanding, use of portable electric sanding equipment, to stroke sanders and wide belt sanders.

Common Machining Processes for 3RT Wood

1. DOCKING TO LENGTH (RADIAL ARM OR DROP SAW)

Docking is the term used for cutting dressed timber to length for componentry cutting across the grain.

Docking Saw is a general term for a saw used to cut the timber across the grain to finished lengths. A Radial Arm saw or Drop saw can be used for this operation. This operation cuts the timber to length or just slightly oversize for the components you are making with 3RT product. See example of these machines below.

Radial Arm Saw



Drop Saw



Hints and Tips!!

Support underneath the timber in the form of a false table (image A below) or replaceable saw table insert will minimise blow out and fibre tear out on the underneath side of the cut (image B). A little bit of preparation in this operation will save time, sanding and filling later!

Image A



Image B



From this point you now have square dressed lengths of timber that can be used as is for components, or can be further machined in the following processes on various machines to make shaped and profiled components for varying applications.

2. SURFACE PLANING

A Surface Planer, sometimes referred to as a “buzzer” or “jointer”, is used to:

- dress one face and
- usually one edge of timber.

This operation is to remove saw marks after cutting along the grain on your rip saw and to make sure that the face and edge are square for accurate referencing in further operations.

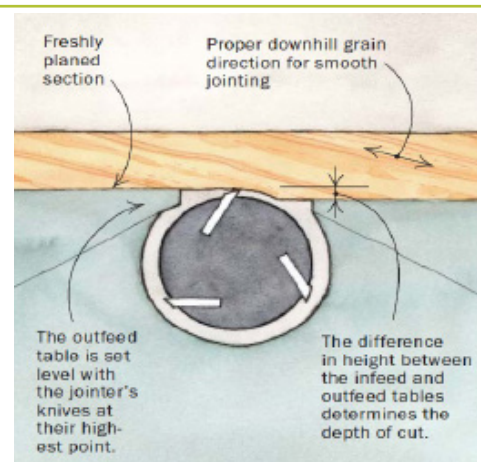


Watch the video: <https://www.youtube.com/watch?v=j-POSWZvjIQ>

Manual surface planing (or jointing) is generally the next step in a machining process using a Surface Planer or “buzzer”. The purpose here is to machine off the saw marks from the rip saw or from band saw in the previous sizing operation. Usually the timber is dressed on one face and one edge making sure the component is flat and square prior to moving on to the Thicknesser or for finished sizing.

Hints and Tips!!

See diagram to the right which shows correct set up of cutterhead and infeed/outfeed tables of a Surface planer. This will ensure a flat surface is machined on your 3RT product and make the following operations easier.



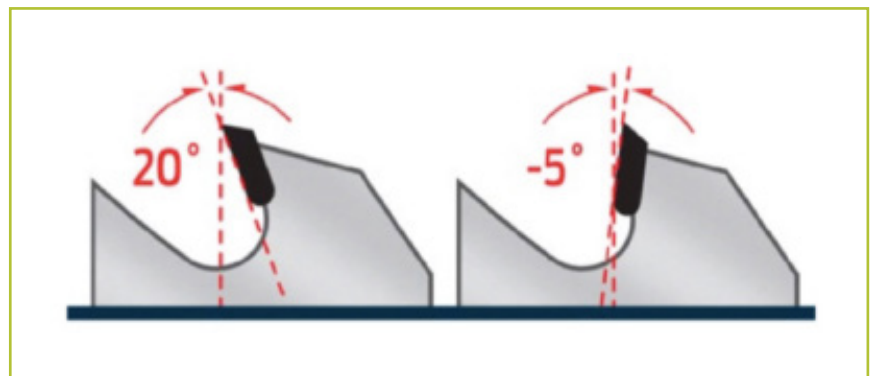
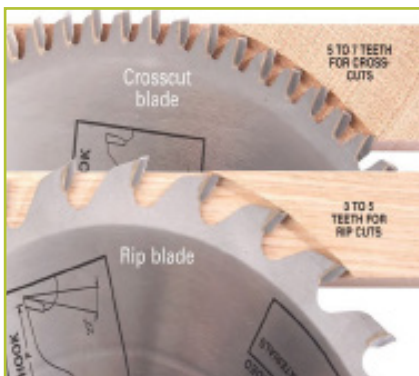
3. RIP SAWING

Cutting along the grain of the timber. This will usually be the first operation in converting your 3RT product into sizes and shapes for your projects making them ready for component manufacture.

Most 3RT Products have similar properties to Natural Australian Hardwoods and therefore have similar hardness and density properties. A rip saw is designed to cut down the blocks into sizes slightly bigger than finished components to minimise wear on other tooling.

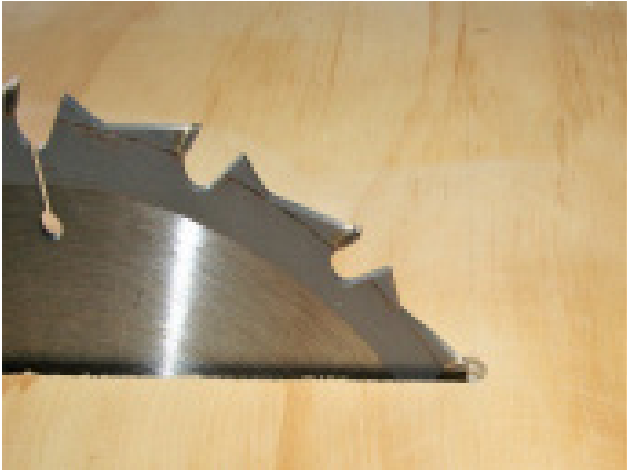
- The use of a dedicated Rip Saw Blade is recommended.
- Most table saws come equipped with a combination sawblade which is designed to be able to cut across the grain without too much break out but these usually have more teeth than a Rip Saw blade which has fewer teeth.
- Rip Saw Blades will cut along the grain more freely (lower friction) and have a lower HP requirement therefore using less power!

See Diagram below showing the difference between a classic Cross Cut blade (negative rake teeth -5 Degrees) and the positive rake, 20- 30 degrees and fewer teeth of a Rip saw blade.



Hints and Tips!!

To achieve a better result from your Rip saw and to reduce break out install a new throat piece to enclose the blade more closely or fit a false table made of plywood or mdf. This will reduce the amount of break out on the bottom side of the timber by limiting the amount the downward pressure of the saw blade makes the timber splinter. See following 2 photos.



4. THICKNESSING

A Thicknesser or Panel Planer Machine is used for machining components to finished size by dressing the opposite faces that were first dressed on the surface planer. By gradually taking surface cuts it accurately planes your panel or board to the desired thickness.



Watch the video: <https://www.youtube.com/watch?v=S0AL3GdKfxw>

- This is the finishing process for accurate sizing of square or rectangular boards and planks.
- For larger quantities it would be advisable to use a through feed moulder if available.
- A thicknesser if used correctly will prepare the timber for the following processes.
- An accurately set up thicknesser will make sure your components are “square” and dressed smoothly to hopefully require minimal sanding.



Thicknesser or Panel Planer machine

Hints and Tips!!

For the best results make sure your thicknesser knives (blades) are sharp and chip free to get a smooth result and to minimise sanding. Ensure also that your infeed and outfeed rollers are set up as per your machine manual. This will help the machine feed evenly along the whole length of the board and reduce the possibility of “sniping” (uneven finished surface on the timber caused by the timber jumping into or dropping away from the cutterhead as it passes through the thicknesser).



Note the “snipe” or ridge in the middle of the cut in the image at left caused by inaccurately set up table and feed rollers.

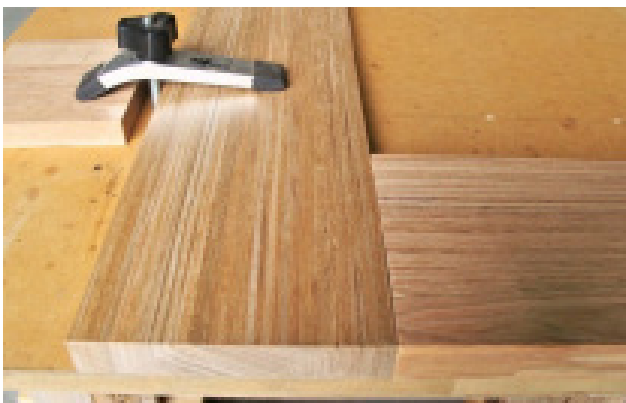
5. HAND ROUTING

The prototype maker may use a hand router to shape blocks of 3RT timber.



3RT is made mostly from Australian hardwood species and therefore tungsten carbide is the material of choice for the cutting edges of your router cutters. Cutting done in steps will mean that you can maintain a feed rate fast enough to remove an appropriate amount of timber per pass but not have to cut too slowly which will cause burning. We recommend doing several passes and doing a finish cut which will remove between 0.5mm and 1mm on the final pass.

Supporting the timber at the edge of the board with a sacrifice piece will help minimise blow out when routing across the end grain.



Set up for routing across end grain with support piece on right hand side also firmly clamped in place. Machine through the work piece into the support piece, to ensure minimal end grain blowout.

Alternatively machine halfway across end of timber cutting towards the centre line of board then simply flip the board over and repeat process.

Ready to machine end grain



End Grain Routing with support piece



Clean corner on exit side with no “blowout”!



6. CNC ROUTING

For the larger manufacturer a CNC may be used for various operations including trimming to size, grooving, rebating and profiling.

3RT will behave like natural hardwood products in most machining processes. Therefore step cutting should be implemented where possible to achieve the correct cutter feed rate in relation to RPM. i.e. using several passes at a higher feed rate rather than removing a large amount of stock in one pass at a feed rate that is too slow. We recommend pre sizing and profiling with a spiral roughing cutter and finishing with a separate finishing tool to achieve the best results. Tungsten Carbide tooling suitable for high density hardwood should be the material of choice for CNC machining of 3RT products. It is important this tooling is well maintained and kept sharp for best results.

Implementing the correct tool strategies and tool path, combined with correct tool rotations and order of operations will also improve your machining outcomes. See next page for recommendations for machining solid panels on CNC machines.

Fig 1

1st + 2nd pass using Left Hand rotation tool
climb cutting to produce chip free corners (or close to)
at point 1 and 3

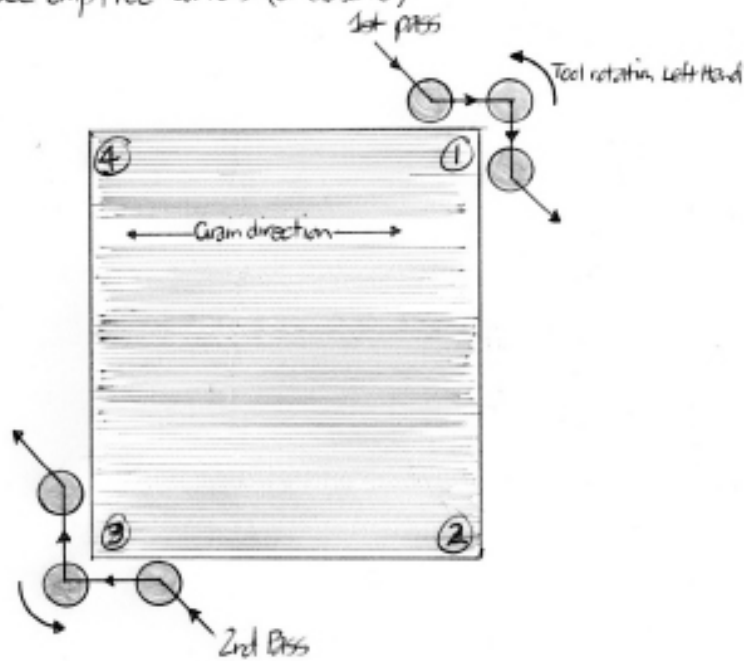
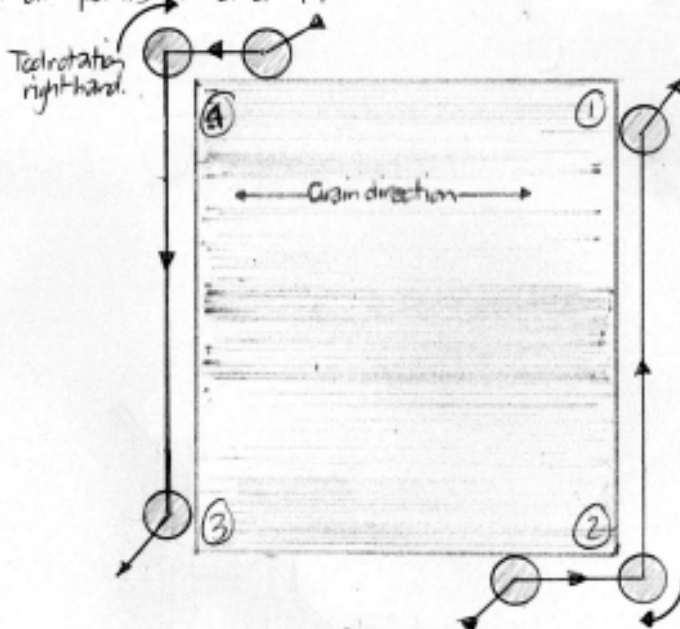


Fig 2.

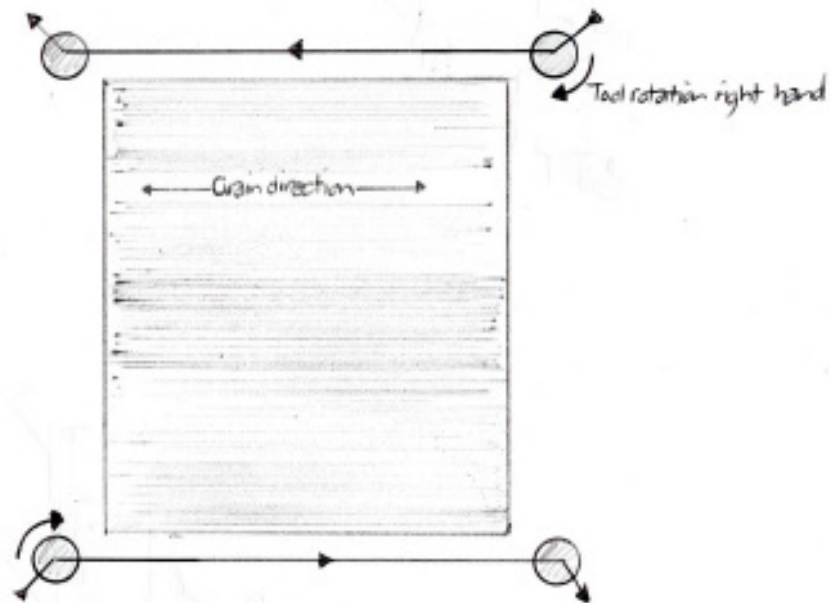
Tool change to Right hand (normal or conventional)
rotation with conventional (against the feed) tool
path at points 2 and 4.



N.B. Ensure the tool path for these cuts passes exit point of 1st + 2nd pass.
This will blend the 2 passes. At the blend point there may be some
"brushing" of the end fibres due to opposing rotation of tools which
can be removed by sanding.

Fig 3.

To take a further trim cut last with Right hand rotation tool will clean up the corners cutting along the grain for the full length of the panel.



Doing these cuts as a separate tool path means tool will not stop at corners reducing burning and extending tool life.



CNC Point to Point Machine

7. SPINDLE MOULDING

The Spindle moulder can be implemented for many operations in furniture and other timber component manufacture for both straight and curved components.

- Rebating: (along and across grain) This basic machining operation is best achieved using a replaceable tungsten carbide tip shear angle rebate cutter head.

Watch video here

- Profiling: Again Tungsten carbide tipped cutter heads or cutter heads with Tungsten carbide replaceable knives are the material of choice but for short runs of components HSS cutters can be used.

Watch video here



Watch the video: <https://www.youtube.com/watch?v=8YPg67Z06kg>



Spindle Moulder with Power Feed Unit

8. THROUGH FEED MOULDING

Sometimes called a four sided moulder, a through feed moulder has 4 or multiple cutter heads.



Watch the video: https://www.youtube.com/watch?v=oVR-Y1axm_A

These machines can be used to produce square dressed or profiled components in one pass on all 4 sides of the length of timber, completing the processes listed above on the other machines where multiple machines and processes are used. For longer production runs Tungsten carbide tooling is recommended for longevity of cutter life but for shorter runs HSS knives can be used. Replaceable knife planer cutter heads are generally used on these machines with HSS knives but replaceable tip turn blade knives in spiral configurations are sometimes used which will proved longer edge life.

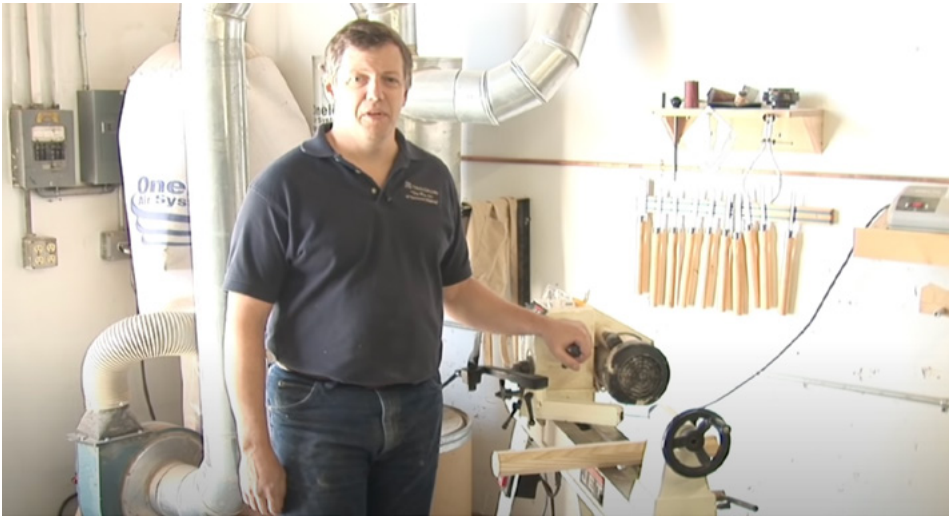
Profile shapes can be made on 4 sided moulders by utilising custom made profile knives mounted in replaceable knife heads.



Multi Head Through feed Moulder

9. TURNING

Manufacturing Furniture and Stair components on a manual or automatic lathe.



Watch the video: https://www.youtube.com/watch?v=2_P19jZjGOk

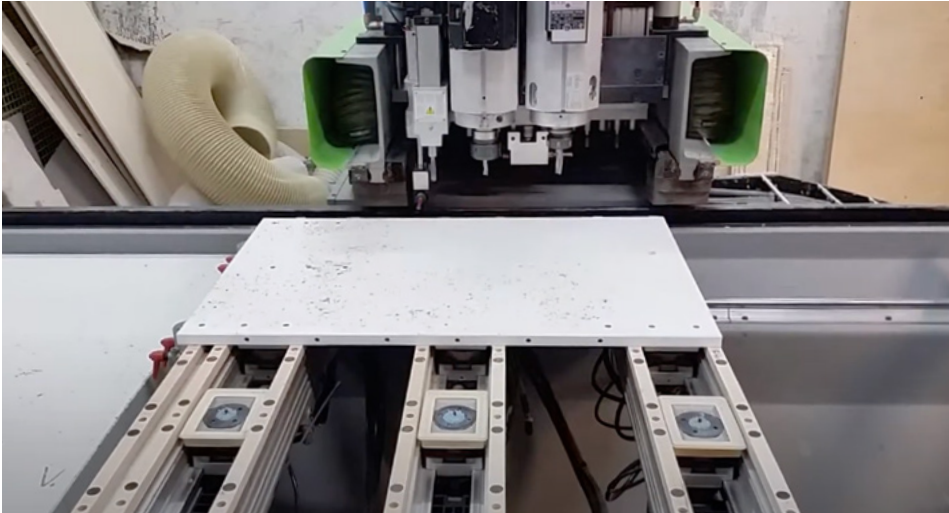


Manual Wood Lathe

Turning of components with 3RT product should follow the same procedures as other hardwoods.

10. DRILLING

Accurate drilling is best done on a stationary drill with the workpiece clamped into position on a jig or the table of the machine. Other Automatic, CNC point to point machines or CNC routers will also give excellent and accurate drilling results utilising mechanical or pneumatic clamping of the work piece. 3RT products should be drilled using sharp, good quality drills, preferably with tungsten carbide tips.



Watch the video: <https://www.youtube.com/watch?v=NRenOBGrr-M>



Pedestal Drill



CNC Drilling Centre



Dowel Drill Bit



Through Drill Bit

11. SANDING

Sanding is usually the final operation before applying finishing products such as clear varnishes of various types or oil finishes, sanding can be done in a variety of, or a combination of ways.

As with natural timber products, 3RT wood has a grain direction therefore sanding across the grain or with tools with a circular or orbital motion will scratch the surface and leave marks. These marks can be difficult to remove and may also be exacerbated by the use of finishing oils and varnishes.

Therefore where ever possible we recommend sanding with the grain. If rough sanding is to be carried out with a machine using a circular or orbital motion remember to work down through the grades starting with a coarse to medium grit and finish with finer grits sanding with the grain to achieve the required finish.



Random Orbital Sander



Wide Belt Sander



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