Tulane MakerSpace

Wood-2 Training Presentation

Wood-2 Training

- **MakerSpace Layout:**
  - **This presentation will focus on higher-hazard power tools in the "Wood Shop" Zone of the Makerspace. These tools are primarily used for cutting/milling wood and some plastics.**
  - **Training for Wood-2 access involves two parts at bare minimum:**
    - **Part One requires completing this presentation and the quiz that follows.**
    - **Part Two requires an in-person demonstration where you will use each of the tools to demonstrate safe operation and understanding.**

Because these are higher-hazard tools, you are held to a higher standard of competency to operate them. You are expected to read all manuals, review additional materials when available, then build your skills and proficiency before attempting to tackle complicated woodworking tasks.

Wood-2 Training

- **Woodworking and this presentation:**
  - **This presentation will focus on common issues which can represent serious hazards from woodworking power tools.**
  - **Experience is very important. Start with modest expectations and keep safe operation your top priority:**
    - **Because wood is a natural/organic material, do not expect the same repeatable results that metals and plastics provide. Even "fine carpentry" does not usually involve the same precision as machining metal.**
    - **Use all of your senses when operating tools. A change in sound, feel, or even smell can indicate that something is wrong as the cutting tool meets the workpiece.**

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- **MakerSpace Safety:**
  - **Anyone standing in a yellow zone must be wearing:**
    - ***safety glasses***
    - ***long pants***
    - ***closed-toe shoes***
  - **Long hair must be tied back, and no dangling clothes or jewelry are allowed. Loose clothing is dangerous around these power tools.**

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- **Tool Safety:**
  - **Take the time to familiarize yourself with all of these higher-hazard woodworking power tools.**
    - ***read the damn manuals!***
    - ***observe experienced users (watch videos as appropriate)***
    - ***avoid "the tricky stuff" until you feel confident with basics***
    - ***interact with the tool when the power is OFF***
    - ***cleanliness *is* a safety issue: keep the work area tidy***
    - ***understand how a cutting operation can go wrong***

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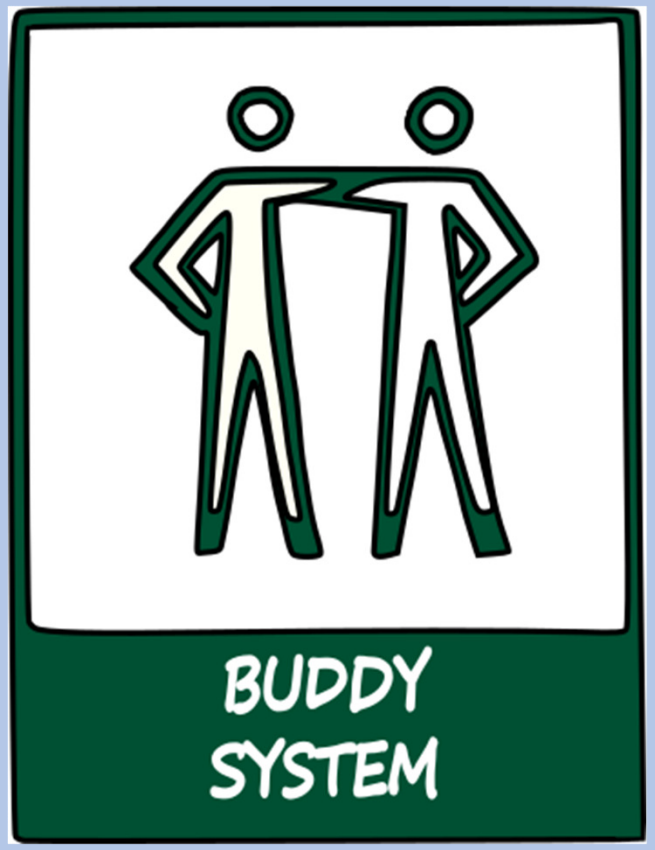
- **The "buddy system" requires - at all times - there must be someone in the same room who can both hear and readily see you, and can come to your aid.**
- **The door between the wood shop and main MakerSpace should be kept open when possible. Always make sure the Ninja on duty knows that you and your buddy are in the wood shop.**



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- **Be aware of other people in the vicinity, and what they are doing. This rule applies to tool operators, helpers, and bystanders.**
- **Maintaining control of the workpiece is the most important way to operate tools safely and effectively. We will revisit this subject for tool-specific slides.**
  - **When working with a helper, be sure that one person is in charge and in control. Two people wrestling a large board across a table saw is a recipe for disaster.**
  - **Parts/workpieces should be pressed against the table and/or fence. Even small particles or defects can push a workpiece out of alignment.**

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- **MakerSpace Safety continued:**
  - **Be aware of what to expect from a tool operation. This is where experience helps: you will develop a "feel" for the tool and know what a clean/safe cut should sound like, how much resistance it will give, and so on. Consider the motion of cutting surfaces and the forces they apply to your workpiece. When something doesn't feel "right" when cutting, you should STOP IMMEDIATELY.**
  - **Serious injury can occur in the blink of an eye. Never take a chance by making "one more cut" if something is wrong.**
    - **Understanding your tool's operation reduces the risk of an accident. A "near-miss" is just an injury that was a fraction of a second away, and needs to be prevented.**

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- **Tool: Powermatic PM2000 Table Saw**

Most table saws operate the same way, on the same principals. We will focus on the one in the MakerSpace wood shop.

The primary function of a table saw is to make straight cuts through wood. Cuts parallel with the woodgrain are called "rip" cuts. Across the grain is a "crosscut." Grooves which do not cut all the way through a board are called "dados" or "rabbets" (rabbets are on the edge).

For manufactured materials, it's common to refer to rip and crosscuts based on the proportional dimensions of the particular workpiece, as if it were representing a natural wood plank.

Wood-2 Training

- **Tool: Powermatic PM2000 Table Saw**

You should read the manual. If you had done so, you'd already know the following:

There are two handwheels on the saw. The handwheel on the front face (where the operator stands) adjusts the blade height. The knob inside of the handwheel locks the chosen setting in place.

The handwheel on the right side (underneath the extension table) has two functions. When pushed in, the handwheel adjusts the blade angle relative to the table top. When the handwheel is pulled out, the castor wheel system is engaged, making the saw easier to move. Both functions require loosening the lock knob. It is unlikely that any user will ever need to engage the castor system.

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You must read the manual. If you have done so, you should have already concluded the following:

You will always use two (one vertical, one horizontal) out of three possible surfaces to guide your workpiece (a board or plank of wood) into the blade.

The workpiece must ALWAYS be flat against the table top and a second surface– control of your workpiece is critical and this is the most important way to stay safe when working on a table saw.

The other surface will be either the miter gauge OR the fence (never both) when running the workpiece into and through the spinning saw blade.

Above, a hazardous situation has been created by using both the fence AND miter gauge to guide a board through the cut.

Wood-2 Training

➢Safety: Powermatic PM2000 Table Saw

Here are a few examples of what can go wrong, and why you need to control the workpiece during the cut:

In addition to the obvious hazard of body parts contacting the moving saw blade, misuse of a table saw can cause kickback. Kickback is the more common type of incident, caused when a workpiece is not controlled through the cut. The board (or a part of the board) can momentarily jam between the blade and the fence, then be thrown clear of the table with great force. Laceration resulting from contact with the blade often happens in this split second, but the initial cause of the incident was usually kickback.

This board was flung through an interior door when the saw blade snagged it and caused kickback. Imagine if the operator had been in the way of the projectile.

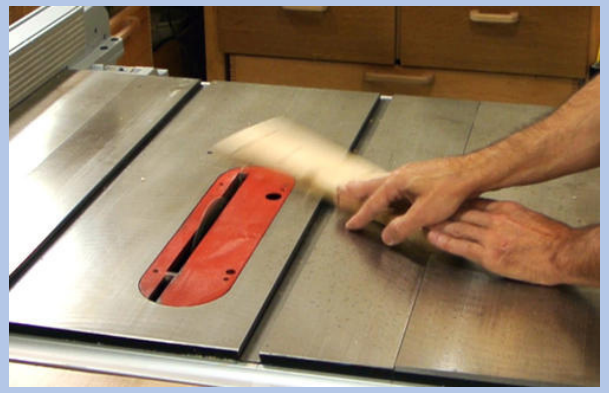
Wood-2 Training

➢Safety: Powermatic PM2000 Table Saw

Here are a few examples of what can go wrong, and why you need to control the workpiece during the cut:

It is important to start with at least one perfectly straight edge on your board. Any curve, bump, or other defect in the edge (pushing against the fence) could cause a change in feed direction, jamming the blade and causing kickback.

If you don't keep the workpiece flat against the table top and second guide, the board can bind in the blade and cause injury. If the saw flings your board, it could injure a bystander at the same time your hand slips into the blade when you lost your grip.



Wood-2 Training

➢Safety: Push Sticks on the Table Saw

Keeping fingers clear of the blade is obviously important, but don't forget that preventing kickback is equally important:

You were introduced to push-sticks in the Wood-1 training module.

A push stick/block or "hold-down" allows you to keep hands clear of the blade and can even be 'sacrificed' when working in close quarters or on small parts.

The other job of a push stick is to control the workpiece, just like your hands would do. The 'proper' size and shape of the push stick is determined by the type of cut, thickness of the board, and other variables.

This hold-down may have saved the operator's fingers, but did not prevent kickback. The board was not controlled during the cut.

Wood-2 Training

➢Powermatic PM2000 Table Saw safety accessories

Understand key safety features on the table saw:

Behind the blade is a splitting tool called a Riving Knife. This prevents the kerf (the channel made by the saw blade) from closing/binding on the board. There are two sizes of riving knife available for our saw.

An optional guard mounts on the rear slot of the large splitter. This helps control dust and chips, but makes visibility and measuring off the blade a little more difficult.

While some cutting operations will require disabling safety features, NEVER remove nor disable any accessory without understanding the risks and possible consequences.

The saw kerf (blade width) must be wider than the thickness of the splitter!

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➢Powermatic PM2000 Table Saw safety accessories

Understand key safety features on the table saw (cont'd.)

A pair of jagged-edge blades mount in the forward hole of the large splitter. These anti-kickback pawls are designed to prevent the workpiece from moving backwards (toward the operator) once the saw blade is engaged. Be sure that your workpiece clears the mounting blocks.

Because the splitters run at the blade height or above, they must be removed if you are cutting a dado groove or any slot which doesn't go all the way through a board.

While some cutting operations require disabling safety features, NEVER disable any safety feature without understanding the risks and possible consequences.

Low-profile splitter

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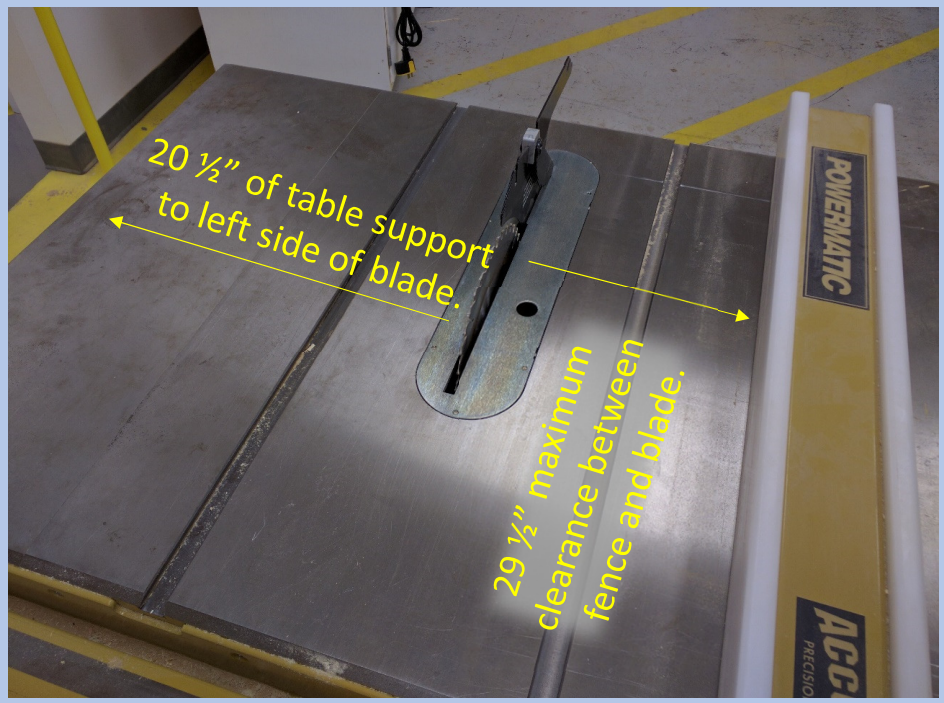
➢Safety: Powermatic PM2000 Table Saw: site-specific rules

Because of the space limitations in the MakerSpace Wood Shop, some cuts may not be safe enough to attempt and are not permissible. There is only 20-1/2″ of table support to the left of the blade, and the fence can only slide 29-1/2″ to the right side of the blade at its farthest-right position.

A particularly heavy board may need more support than the table offers. A different large (but light, thin, & flexible) board may tend to bend in such a way that it lifts off the table and creates a severe hazard.

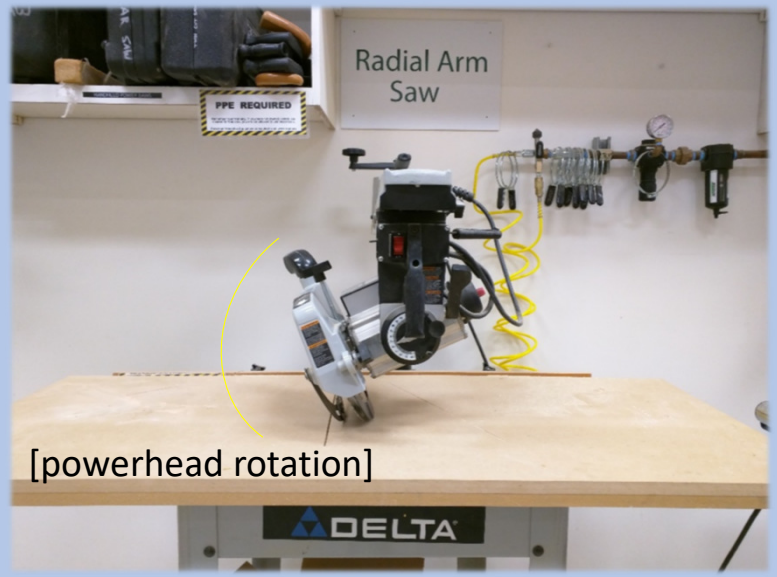
Two adjustable roller stands are available for infeed/outfeed support of long boards. Safe placement and use of these stands is always the operator's responsibility.

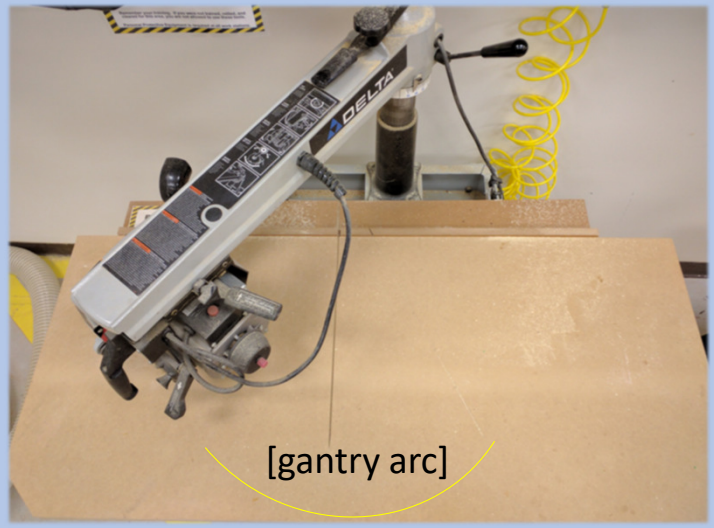


Wood-2 Training

➢Woodworking Power Tool: Delta Radial Arm Saw

Visualize the Radial Arm Saw like a handheld circular saw mounted on a sliding, radial gantry. During a cut, the spinning blade should always be moved towards the fence at the rear, away from you.





The powerhead can be raised and lowered using the arm. It can also change blade angle relative to the table, and rotate perpendicular to the gantry.

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- **Woodworking Power Tool: Delta Radial Arm Saw**
  - **REPEAT: Stop and READ THE MANUAL for this tool if you have not done so already.**

Rip cuts, or any cut where you move your workpiece into the saw blade, are NOT ALLOWED on the MakerSpace radial arm saw.

The table boards and fence board are made from MDF, and are meant to be sacrificial like the spoil board on a CNC router. Cuts through your workpiece will and should scar the MDF table boards, but do not set the blade to cut excessively deeply into the table. When the table board and/or fence are scarred enough to present a safety concern, they should be replaced with the assistance of a Ninja.

The fence board is less than an inch high, but it only needs to be high enough to keep your workpiece braced on that side.

Wood-2 Training

- **Woodworking Power Tool: Delta Radial Arm Saw**
  - **This is the most versatile, and arguably the most dangerous, tool in the MakerSpace wood shop. Stop and READ THE MANUAL if you have not done so already.**

All of these variables allow for a wide variety and combination of cuts. They also add complexity and risk.

This tool is an excellent choice for cross cuts and dado joints. The gantry allows for wider crosscutting than the chop saw.

Friction on the blade wants to 'pull' the powerhead towards the operator!

Unlike the table saw, the blade/motor of the radial arm saw is designed to move with the cut. Because of the direction the blade spins, the blade can "crawl" towards the operator if the operator is not in control of the entire cutting process.

Wood-2 Training

- **Tools: Chop/Miter Saws**
  - **Miter or "chop" saws do one task, and they do it well: drop a circular saw blade down into a board to make a crosscut. Angled crosscuts (miters) are easy and sometimes preferable on a chop saw than on the table saw.**
  - **Never attempt to hold or balance any part of your workpiece above the work surface or away from the fence. The saw will rip it from your hands and could easily yank your finger into the blade.**

Keep hands clear of the cutting area. If your stock is too small, find a bigger piece to start with.

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- **When the same job can be done on the miter saw or the radial arm saw, you should probably choose the miter saw.**
- **Never cut a piece of wood on the miter saw if you can't keep it square to the fence and table top while your fingers are clear of the plastic table insert. Find a more appropriate piece to start with.**
- **While safe cutting of round stock on the miter saw is possible, it is tricky. Supervision from a qualified Ninja is mandatory.**

Miter saws have high-pitched and LOUD motors.

Ear protection is recommended.

Wood-2 Training

- **Tools: Chop/Miter Saws**
  - **As with the table saw, you must start with a workpiece that has straight, square faces. These edges should make firm, continuous contact with BOTH the fence and table top during the cut.**
  - **If the workpiece were to move during the cut, a very dangerous situation exists that can cause serious injury before you have time to react.**
  - **The speed that you lower the blade through your cut will depend on a variety of factors.**

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➢Tools: Chop/Miter Saws

- **The saw comes with a clamping tool that will help hold your workpiece against the fence. Your workpiece should never move during a cut. Your hands should never be close to the blade.**
- **Although it is possible to make rabbet or dado-type cuts with a chop saw, this case is not allowed in the Tulane MakerSpace. Our miter saw may only be used for cross-cuts that go all the way through a workpiece.**
- **Test the depth-stop after any adjustment to the turntable or head angle. When cutting, lower the blade all the way through the cut until you reach the stop.**

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Click button to proceed to quiz