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# Dallas Makerspace Woodshop Manual

## Introduction

Welcome to the Dallas Makerspace Woodshop. Like all the other areas of the Makerspace, the Woodshop is run, maintained, and organized by volunteers. Since you are using the Woodshop and paying dues – this makes you one of the volunteers, congratulations!

As a Volunteer, it is important that you help keep the Woodshop clean and pick up after yourself [and most likely others]. Even if you only make “one small” cut, make sure you sweep up the station you just used and put away any tools that you were using. A clean woodshop is a necessity to help keep it safe.

Most tools require training before they can be used. Training classes are often posted on the calendar<sup>1</sup> and some instructors will hold group or individual classes. Arrangements for group or individual classes can be made by making a request on “Talk”<sup>2</sup>. Once training is complete, your name will be added to the active directory group and scanning your badge will enable the tool (please allow a day or two for the system to update your credentials).

All the tools are accessible at any time for any member with appropriate training – except during a scheduled class or Shop Maintenance Day. With the number of members and the heavy usage of the Woodshop, the tool you might need will be in use. We do not allow reservations (with the exception of classes), so please be patient. Unfortunately, it is also very common that the tool will need to be readjusted before use – **do not be the person that leaves things in disarray!**

Remember we are all using the same space, we are all responsible for keeping it clean, workable, and safe. Also when in doubt, please refer to the manufacture’s supplied manual – it overrides all information contained in *this* manual.

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<sup>1</sup> <https://calendar.dallasmakerspace.org/>

<sup>2</sup> <https://talk.dallasmakerspace.org/>

## Dallas Makerspace Woodshop Manual

### Rules

1. Always **clean up your mess and put our tools away.**
2. You must be at least 18 years old to operate power tools and 16 to use hand tools.
3. Safety is your responsibility. Never do anything you feel is unsafe. If you see someone doing something unsafe – talk to them and help them find a safe way to do it.
4. Never operate or use the woodshop equipment while impaired. This includes being too tired, on medication that causes drowsiness, or under the influence of drugs or alcohol.
5. Eye protection **must** be worn at all times – there are no exceptions. Regular eyeglasses are sufficient protection for the woodshop as long as they have polycarbonate lenses and cover your entire eye socket area. Spare safety glasses can be found outside the woodshop, but it is suggested to own your own pair (they can be cheaply purchased at Amazon).
6. Clothing
  - a. **Shoes** must be closed-toed and rubber-soled. **Do not wear** sandals, flip-flops, high-heels, or footwear with leather soles inside the Woodshop.
  - b. **Long sleeves** must be rolled up and any coats or jackets should be removed. Loose clothing should be restrained.
  - c. All **jewelry** should be removed from hands or wrists (including wedding rings and watches). Necklaces should be securely tucked in or removed.
  - d. Dangly items [corded earbuds, hoody strings, even long hair] should be either removed, tucked in, or restrained to prevent entanglement.
  - e. **Gloves ARE NEVER allowed while using any machine with spinning parts in the woodshop.**

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7. Hearing protection is not required in the Woodshop, but it is highly recommended. Foam earplugs can be purchased inexpensively – ones without cords are best.
8. Respirators are not required, but their use is recommended. A respirator will help alleviate allergy issues – a P100 particulate with organic vapor relief filter cartridges will protect your lungs during every step of your woodworking project.
9. Never use a broken or damaged piece of equipment. If you break or notice something broken, please report the issue on “Talk”. This will help ensure that the tool is repaired in a timely manner. With the amount of use our tools see, breakage is bound to happen.
10. All pine [including Southern Yellow Pine (SYP)] and any sappy wood is banned from use on all the free-standing tools [Jointer, Planer, Table Saws, Compound Miter Saw, Bandsaws, etc.]. Pine and Southern Yellow Pine (SYP) can be used with the hand tools [circular saws, drills, etc.]. SYP is typically found in dimensional lumber [2x4, 2x6, 2x8] – but not all dimensional lumber is SYP, so make sure to check prior to purchase. The sap adheres to the blades and tables requiring them to be changed/cleaned at a great frequency and can impact other members.
11. Cutting or working with Pressure Treated Lumber is banned inside DMS – if cuts need to be made, they must be made outside in the parking lot [make sure to return all tools to their proper locations after use].
12. Aerosol cans [rattle cans, spray paint, and spray polyurethane] are not allowed at/near Dallas Makerspace. The city of Carrollton bans aerosol cans at industrial facilities, so you must do it at **your** house.

## Safety

Accidents in the shop could result in serious bodily harm or death; you are responsible for maintaining proper shop safety.

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1. **Never do anything that you do not feel safe doing!** Do a “dry run” and visualize the action(s) you are going to perform before you turn the machine on.
2. The most important thing to know is how to turn **off** a tool. Do not turn something on that you do not how to turn off.
3. The information in this manual does not supersede any information in the company’s supplied manuals – please read and become familiar with the machine’s manual (and refer to them if you have any questions)
4. Maintaining a clear focus on what you are doing at all times is your best safety precaution. Do not rush through a job or let your mind wander from the task at hand.
5. Inspect the wood and remove any staples, nails, or other metal debris before using. The shop has a metal detector if needed.
6. Make sure the area/surface is unobstructed and clean before use.
7. Always be aware of the proximity of the moving parts and keep them at least 6 inches away from all body parts.
8. Use equipment as it is intended, use the right tool for the job. If you are unsure how to operate something – **ask** everyone had to learn at some point.
9. Maintain control of your lumber at all times. Use push blocks and feather boards when needed.
10. Never leave a running machine unattended. Make sure the tool is powered off and has stopped before leaving.
11. All safety guards must be kept in place while operating the equipment.
12. Let the tool do the work, never force the tool into the material.
13. Dull tools are dangerous. Make sure the blade on the tool is sharp.
14. When changing a blade or bit, make sure to lock out the machine. Locking out a machine is a three-step process:

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- a. Disable the machine by unplugging or enabling the safety.
  - b. Verifying the machine will **not** start before working on it.
  - c. Push the “off” button when everything is validated. Some machines can stay in an “on” position and start when they are plugged back in.
15. Beware of kickback – kickback can happen on any machine in the Woodshop. Never stand in the kickback path of any machine and warn others who are.
  16. Make sure to turn on the dust collector and open the blast gate, if it is available on the tool.
  17. Clean up the area, put any equipment away, and close the dust collection blast gate when you are done.
  18. In the event you need to call for an ambulance, dial “911”. Our address is 1825 Monetary Lane, Suite 104, Carrollton, TX 75006.

We are a “Stop” facility, if you see someone doing something that is unsafe, please approach them and help them do it in a safer manner. As a community shop, there are varying levels of expertise [you or they may be wrong in how safe it is], so use these times as opportunities of discussion.

## Allowed Material

Wood is the only materials permitted to be cut in the Woodshop. Only solid lumber is allowed on some tools (like the jointer and planer) – plywood, MDF, and particle board are not suitable for those tools. Plastics *should* be cut in the Plastics Interest Group area. If cutting plastic in the Woodshop – please make sure the dust collection blast gate **is closed**, plastic particles are not good for the Felder. Make sure to manually clean up the area after the cut.

Reclaimed lumber must be free of metal (inspected with a metal detector) and cleaned from all dirt and grime prior to cutting. If



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excessively dirty, please clean with a nonmetallic bristle brush (possibly with soap and water) prior to bringing it up to the Woodshop.

### Banned Material

All **yellow** pine, including Southern Yellow Pine [and any wood with visible sap], is banned from use on the free-standing machines [Jointer, Planer, Table Saws, Bandsaws, etc.]. The sap hardens on the cutting surfaces and tables requiring extra blade changes and cleaning [that cannot be maintained]. SYP can be cut with the hand power tools [circular saws, drills, etc.] in the work area outside the shop. When purchasing dimensional lumber, try not to purchase SYP. **NOTE white pine is permitted for use in the Woodshop – just yellow pine and SYP are banned.**

Pressure treated lumber **is not** allowed within DMS. It often is treated with harsh chemicals to prevent rot and insect or microbial damage.

Lumber from reclaimed pallets is not allowed for use on the free-standing machines. Most pallets are treated to increase their longevity [very similar to pressure treated lumber], they are often caked in dirt and grime making them unsuitable for use on the machines. Most lumber used for making pallets is poor quality and not great for use in projects.

Cutting metal is prohibited – not only does it create sparks (really dangerous around sawdust) and shrapnel, it can get imbedded in someone else's lumber. We have a metal and machine shop that have the appropriate tools for metal.

### Selecting Lumber

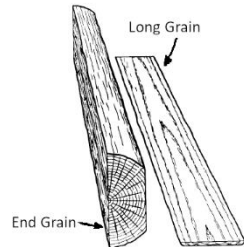
Not all lumber is the same; make sure you select what will work for your project. There are more than 60,000 species of trees in the world; selecting the species of wood really depends on what you are making, how it is going to be finished, and cost. Be aware some

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woods can be toxic or have the potential to cause an allergic reaction in sensitive individuals.

### Grain

The wood grain refers to the orientation of the wood-cell fibers. For our purposes, we will classify it in two categories: long grain and end grain. Long grain is orientated up and down the length of the tree, while end grain is the cross section of the tree showing the growth rings.



Wood will swell or shrink as its moisture content changes with humidity. Most of the movement will be in the direction of the end grain, very little change is along the long grain. Wood movement should be considered with projects that have large wood panels (tabletops, panel doors), use green or fresh cut lumber, or in environments that have varying humidity levels.

### Wood Defects

If possible, it is important to inspect the lumber you are purchasing and select pieces with minimal defects. Almost every piece of lumber will have some sort of defect – some are easier to deal with than others.

#### Warping

Warping typically occurs when the moisture content in different parts of the wood change unevenly. Warping is corrected by cutting the wood (using the joiner, planer, and table saw) into a straight board. The greater the warping, the more material must be removed.



#### Splits and Checks

Splits and checks occur when the internal stresses are too great (usually from drying too quickly) and cause a crack to form in the

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wood. You can sometimes close the gap with glue or epoxy, but usually easiest to just cut it out.

### Knots

Knots appear where old branches were once connected to the tree. They often cause variation in the grain pattern that can enhance the look – but it often weakens structural strength of the board. There is also the possibility of the knot coming loose and falling out as the board ages.

### Burls and Bird's Eye

A burl is a tree growth in which the grain has grown in a deformed manner, typically caused by injury, virus, fungus, or insects. Bird's eye is another distinctive pattern in the wood grain (it is unknown what causes the pattern) – usually found in hard maple. The uniqueness and beauty of the wood pattern in burls and the bird's eye pattern make them sought after for use in decorative pieces and can significantly raise the price of the lumber.

### Softwood Lumber

Softwood comes from coniferous trees like pine, fir, spruce, and cedar. Softwoods are very cost efficient and usually easier to work with. However, they do not handle abuse very well and can easily be dented or scratched with just your fingernail. Softwood is typically used in applications that do not see excessive wear and tear, cost is important, or ease of work is needed (like carving).

Make sure not to select Southern Yellow Pine [SYP] – it produces a lot of sap and will gum up our tools.

### Dimensional Lumber

The “advertised” dimensions of dimensional lumber, commonly used in construction/framing and sold at big box home improvement stores, is different from the actual dimensions. The actual dimensions are smaller after drying and planing, so typical 2”x4” will be closer to 1.5”x3.5”. Since the lumber is usually used

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in construction, warped boards are common – it is important to inspect each piece [also avoid Southern Yellow Pine].

### Hardwood Lumber

Hardwood comes from angiosperm trees and generally harder than softwoods (but there are some exceptions like balsa wood).

Hardwoods have a more complex structure than softwoods and typically grow much slower.

Hardwood purchased from a lumber supply company will typically be rough sawn. You will need to join, plane, and cut all sides to get a smooth, square, and parallel surfaced board. For an extra charge, some lumber supply companies will perform some surfacing. Big box home improvement stores do sell some pre-surfaced lumber but at much higher prices and less species selection.

### Rough Sawn Lumber Sizing

Rough sawn lumber is sold in random widths and lengths, generally between 4"-12" wide and 6'-14' long. When placing your order, you will typically specify a thickness and how many board feet you need. To get your desired width, you can ask for a desired width, but will typically need to cut and glue pieces together.

Thickness is usually defined in quarters – so a 4/4 (four quarters) board is roughly 1 inch thick. Typical sizes are 4/4, 5/4, 6/4, and 8/4. You can expect to lose 1/4" thickness during your joining and planing process (so 4/4 will produce at 3/4" finished board, 5/4 for 1").

Board feet are calculated by multiplying the rough thickness, width and length (in inches) together and dividing by 144. A 4/4 12"x18" cutting board will be 1.5 board feet (make sure to order 20-75% more depending on grade and project). A 4/4 5" x 4' board is 1.67 board feet, but would be difficult to make into a 12"x18" cutting board.

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### Plywood, MDF, Particle Board, OSB

These products are all engineered woods (and generically called “plywood”) – they are made in different processes, but all contain wood and glue in their construction. Because of their construction, they are not suitable for use in the joiner or planer (the wood will chip and bread apart). Engineered wood does not “move” (swell or shrink with humidity changes) as much as solid wood.

Plywood is a wood panel made of multi-layered veneer glued together. The veneer layers are typically stacked at right angles to each other. The alternating grain pattern greatly increases the strength of the board. Typical thickness range from 1/8” to 3/4” in either 5’x5’ or 4’x8’ sheets. A good plywood for “finished” work is Baltic Birch.

MDF (medium density fiberboard) is made from individual wood fibers instead of veneer sheets. It produces a flat, smooth board that is excellent for painting or vinyl finishes.

Particle Board is made from saw dust and tiny pieces of wood that are mixed with glue and pressed together in sheets. While relatively inexpensive, it is not as strong as traditional plywood.

OSB (orientated strand board) is made from wood chips and strands glued and pressed together. The sheets are inexpensive but very rough. OSB is typically used in construction (roofing or subflooring) and not really suited for most projects.

### Tree trunks/branches

Using tree trunks and branches is routinely done in the woodshop, mostly for turning bowls on the lathes. Freshly cut trees are difficult to work with, it is best if the trunk is able to slowly dry before being worked to prevent future warping or cracking.

It is important to check for metal imbedded in the wood (it is not unheard of to find nails and barbed wire) before cutting it. Because of the inherent irregularity of the trunk, you will need to properly secure and support it to cut it safely.

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### Typical Operation for Rough Cut Lumber

For rough cut lumber, you will probably go through the following process to make it usable for your project.

1. Compound Miter Saw – Cut the lumber using the compound miter saw to its rough length.
2. Jointer – Run the rough cut pieces through along one face to create a smooth flat surface. Once one face is smooth, put it against the fence and joint the edge (so when complete you will have two flat perpendicular adjacent faces).
3. Planer – Run the pieces (smooth side down), which will flatten the top surface (once complete the two faces will be flat and parallel to each other). If you have several boards that need to be the same thickness, make sure to plane each board before adjusting the table.
4. Table Saw – Rip the last edge – making sure to put the jointed edge against the fence as you push the board through the table saw.

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## Handheld Tools

### Saws

Hand Saws

Circular Saw

Track Saw

### Hand Drills

### Router

### Finish Sanders

Random Orbital Sander

Orbital Finish Sander

### Domino Tenon Joiner

### Clamps

### Chisels and Planes

### Shop Vacs, Brooms, Dustpans & Trashcans

These are the most underutilized tools in our shop; and everyone should be using them. The brooms and dustpans can be found by the door leading to the general workshop area. We own several types of brooms – from large push brooms to small hand ones.

Please use the shop vacs, brooms, and dustpans to clean up the sawdust created working on you project – even if you only made a

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cut or two. When the shop vacs or trashcans are full, please empty them by dumping the contents into the dumpster at the end of the automotive ramp.

## Stationary Power Tools

Most of the stationary power tools have (or will have) RFID readers – you must scan your card before the tool can be activated (the RFID reader has a red and green LED to display if it is enabled or disabled). When you are done working at the station, please make sure to scan out on the RFID reader (they *should* automatically time out).

It is important to clean up and put away any tools used at the machine after you are done with the station – **do not wait until your project is complete, clean up as you go!**

You should never have to manhandle a workpiece on a machine – if it does not feel right, shut the machine down and re-access what you are doing. If you are uncomfortable with a particular tool or do not remember how to use it, please ask someone for help (we all have to learn somehow).

### Dust Collector

The woodshop has a Felder RL350 Dust Collector to help keep the shop clean and minimize the dust. It is important to open the dust collection blast gate to the machine prior to using it **and** to close it after you are done (this improves the dust collection to the other machines).

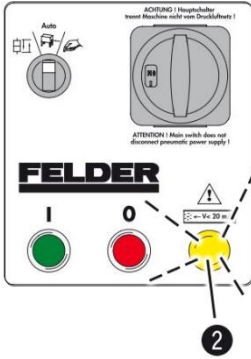
If the Felder does not start, make sure that the local disconnect is enabled and the three-position rotary switch [located left of the local disconnect above the green button] is turned to the clockwise position [toward the wall]. If the rotary switch is turned counterclockwise [toward the room], the Felder will be in a



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cleaning mode and occasionally blow air backwards to try to purge/clean the filters.

### Emptying the Unit



### The biggest problem with the dust collector is it not being emptied enough.

Please check the dust collection cart if you are not sure the last time it was emptied. Always stop and empty the machine if the yellow warning light is illuminated (item #2). If the unit get too full, the sawdust will back up and start clogging the filters – greatly affecting the collection’s performance.

### Steps to empty:

1. Turn off the dust collector (red button on the side of the machine).
2. Turn local disconnect off (large rotary switch). This will prevent a filter “cleaning” burst from happening
3. Raise the bar on the cart, which will lower the cart allowing it to pull out from under the machine.
4. Take the full bags out and put them on a roll around cart (they are not too heavy just bulky)
5. Empty the bags in the dumpster at the end of the automotive ramp. If the bag is not ripped, please save and reuse them. Also, try to be on the upwind side of the dumpster when emptying the bags.
6. Reinstall the bags into the cart – if you need new bags, they are located in the compound miter saw table.
7. Make sure the rails the cart’s bar ride along are free of saw dust and then push the cart back under the machine.
8. Lower the bar raising the cart. Getting a good fit can be a little fidgety and might require a couple attempts

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(raising/lower bar) to get a good seal between the cart and machine.

9. Turn on local disconnect (rotary switch)
10. Turn on dust collector (green button)

If the waste collection bags over filled, yellow warning light illuminated, or little/no suction at the blast gates, the filters are probably plugged. Unplugging the filters requires disassembling the machine and is a lot of work. Please post on talk so we can get it scheduled. The system *might* be able to be recovered by emptying out the machine and then putting it in a “cleaning” mode for a long while by turning the little rotary mode switch to the left most position. **If you ever clean the filters, make sure to wear a good respirator – this is not optional.**

### Jointer

The Jointer is used to flatten the surface of a board and its adjacent edge. It is typically used for rough cut lumber to flatten and square two side – it is not suitable for surfacing end-grain,



plywood, or other engineered lumber (OSB, MDF, etc.). Make sure to always check your lumber for any metal (staples, nails, etc.) and other foreign debris (dirt, grave, etc.). If your lumber is excessively dirty (typical of reclaimed lumber), please brush it off (with a non-metal bristle brush and possibly soap and water) at home prior to bringing it up to the shop. Do not joint any lumber under 7” in length. Any glued lumber must have cured for at least 24 hours.

Our jointer can handle up to 12” wide lumber; anything wider than 12” will need to be surfaced by hand planing, creating a router planing sled (you’ll need to make a jig), using the drum sander (very

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slow), or on the MultiCam CNC. It is also possible for some lumber yards to joint and plane lumber for you at an additional cost.

Before you use the jointer, please make sure the area is clear of all obstacles and that there are no trip hazards. Loose sawdust should be swept up and disposed of prior to and during operation.

The jointer works by pushing the board from the infeed table, over rotating blades, onto the outfeed table. The outfeed table should be set even to the height of the top of the blades. The infeed table should be set 1/16" - 1/8" below the outfeed table.

### Operation

To use the jointer:

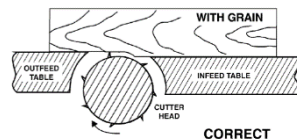
1. Verify the board has no foreign debris (staples, nails, dirt)
2. Adjust the infeed table to cut approximately 1/16" (shallower cuts allow better control over the lumber – more passes can always be made).
3. Verify the fence is set to 90° (perpendicular to the table top)
4. **If Surfacing:** Place the board down on the infeed table and check the stability of the piece by rocking it back and forth and then check the opposite side. You will want to keep the most stable side facing down (so you will have the least rocking possible).  
**If Edge Jointing:** Pick the straightest edge and place it down against the infeed table with the flat surfaced face against the fence. It is easiest to set up a feather board on the infeed table to help insure the surface faced remains firmly against the fence.
5. Open the dust collection blast gate, verify nothing is engaging the cutting head, then badge in and turn the jointer on.
6. Firmly push the board through the cutting head, pushing down on the outfeed table. Use push blocks if needed (especially if surfacing).

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7. Once the piece clears the cutting head, you can inspect the piece to see if another pass is required.
8. Once you are finished with the board, turn the jointer off, badge out, close the blast gate and clean up the area.

### TIPS:

- You should always surface the board prior to jointing the edge, this will allow the smooth surfaced side to ride more easily across the fence (also insuring a more accurate cut)
- You will only want to joint one face and one adjacent edge. Jointing opposite sides will produce two flat surfaces, but it is very unlikely they will be parallel.
- If you are not using the entire 12" cutting surface, you might want to adjust the fence occasionally to wear all the knives more evenly.
- If the surface you are jointing is already smooth, you can use a pencil to mark up the surface to verify the board is surfaced properly (the pencil marks will be removed by the cutting head – any marks remaining mean the board is not perfectly flat yet).
- You will want to cut your lumber into rough lengths prior to jointing (or planing). You will typically remove more material thickness jointing a longer board.
- Avoid feeding work into the jointer against the grain if possible. This will help minimize chipped and splintered edges.



### Hand Placement

At the start of the cut, the left hand holds the workpiece firmly against the infeed table and fence (if edge jointing), while the right hand pushes the workpiece toward the knives. After the front board is past the cutting head, the left hand should press the piece down against the outfeed table while the right hand continues to

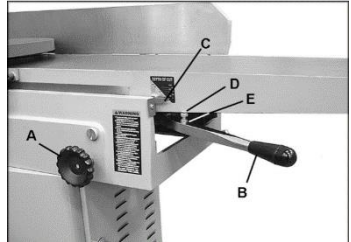
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push the board through the knives. If your hand will come within 3” of the cutting blade, you are required to always use a push block.

### Adjusting the Infeed Table Height

The cutting depth should be set to 1/16”-1/8” for all material. To adjust the height:

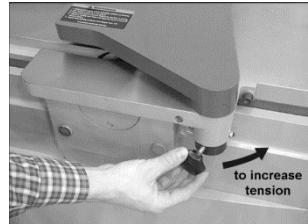
1. Loosen the hand wheel [A] by turning it counterclockwise.
2. Move the adjustment arm [B] up or down to raise or lower the infeed table height.
3. Tighten the hand wheel to secure the infeed table.



### Cutter Guard Tension

The cutter guard should always spring back to cover the cutting blade after a board has passed through. If the guard is loose, to readjust the tension:

1. Loosen the knob on the guard and push it to the right to increase the tension.
2. Tighten the knob while holding it in position.



### Kickback

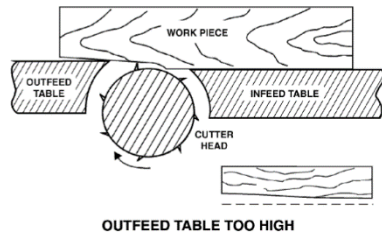
While kickback is not normally a problem, it can occur. Kickback is usually caused by the infeed table being too low (trying to cut off too much material) or hitting an imbedded foreign object (or hard knot). It is important to make sure the infeed table is set appropriately (cutting only 1/16”-1/8”) and validating that no (metal) foreign objects are in the wood.

If kickback happens it will push the wood back away from the cutter head. Make sure no one is working directly behind the infeed table and warn anyone working on the MultiCAM CNC of the risk.

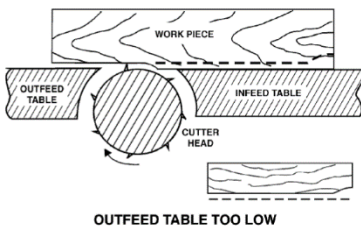
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### Problems Not Cutting Flat

For accurate work in most jointing operations, the outfeed table must be exactly level with the knives at their highest point of revolution. If the outfeed table is too high, the finished surface of the lumber will be curved.



If the outfeed table is too low, the surface will be gouged at the end of the cut. If the outfeed table height needs to be adjusted, please post a request on “Talk”.



### Excessive Sawdust / Blocked Dust Collection

Occasionally the dust collection system on the jointer gets clogged – this becomes obvious when sawdust is blown back into the workspace rather than getting pulled down into the collection system. If the dust collection blast gate *is* open, clearing the blockage is easy.

1. Verify the blast gate is open
2. Turn the machine off and unplug it
3. Verify the jointer is disabled by trying to start it (if it starts, then turn it off and find the correct plug)
4. Loosen and open the Cutter Guard
5. Lower the infeed table all the way, this helps create a gap between the rotating knives and the edge of the machine
6. Use an air gun (air hoses are against the wall next to the drill press) and blow air down the gap between the cutter head toward the dust collection hose.

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7. You should see large the sawdust moving through the dust collection hose – stop blowing once no more sawdust is seen.
8. Roll up the air hose, readjust the infeed table to the correct height, re-tension the Cutter Guard, and then plug the jointer back in.
9. If sawdust is still being blocked, you might need to remove the Dust Collection Hood and clean it out (make sure to disable the machine prior to removing the dust hood).

### Thickness Planer

The thickness planer is used to plane one side of a board and cut it to a consistent thickness. The planer works in a similar fashion as the jointer, except the cutting head is located above the table. **NEVER put your hand under the cutting cover – use a wooden push stick.**



The planer is usually the next step after jointing your lumber. Once the piece has been jointed and planed, the two faces of the board will be flat *and* parallel. Like the jointer, the planer is meant for solid lumber only – no end grain, plywood or other engineered lumber should be used. Also make sure to verify no metal or foreign objects are embedded into the lumber.

### Operation

1. Place your thickest board smooth side down on the infeed table.
2. Raise or lower the cutting head by turning the hand wheel so there is about 1/16" - 1/8" gap between the board and the plastic piece on the cover. Do not push the board

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under the cover, the anti-kickback fingers will engage the board and you will need to raise the cover to pull the board out.

3. Make sure nothing is under the cover and open the dust collection blast gate.
4. Badge in with the RFID reader.
5. Turn on the planer by pushing the green button.
6. Push the first board into the cutting head until the automatic feed mechanism starts pulling the board through.
7. The board will be ejected onto the outfeed table – if multiple boards are being feed, you can put finished boards on top of the machine on the feed rollers.
8. Run all the boards through the planer before making a height adjustment – this will insure all the boards are cut to the same thickness.
9. After making the first pass, lower the cutting head by turning the hand wheel  $\frac{1}{2}$  to 1 full turns. Then repeat the process until all the boards are planed smooth – or the desired thickness is met (measure with calipers for greater precision).
10. Never put your hand or fingers under the cutting cover. If a board does not get completely ejected (usually in the beginning when the cutting blade is not engaging the board), pull the lumber through from the outfeed table or turn off the planer and push the board out using a wooden push stick.
11. When you are finished, turn off the planer, close the blast gate, badge out, and clean up around the area.

### Compound Miter Saw

The compound miter saw is typically used to crosscut boards to their rough dimensions; allowing smaller more manageable material to be used on the other machines. While cutting an 8 foot



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(or greater) board is possible with a circular saw or on the table  
saws – it is **much** easier to use the compound miter saw.

The compound miter saw can be used to cut angled cuts on both  
the horizontal and vertical planes – if you make an angle  
adjustment please reset to 90° after you are finished. When  
cutting, the blade should pass easily through the lumber; if you are  
having to force the saw you should stop and re-verify everything is  
setup correctly and possibly change to a sharper blade.

If you are cutting several boards to the same dimension, using a  
stop block on the guide will greatly improve your accuracy and  
speed.

Changing Sawblades

**[NOTE THIS INFORMATION NEEDS TO BE UPDATED FOR THE NEW  
COMPOUND MITER SAW]**

The compound miter saw should always have a crosscut sawblade  
installed. Changing the blade should be done whenever the  
sawblade is considered dull; make sure to mark the dull blade with  
tape (and label it “dull”) so it will not be reused until it is  
resharpened.

1. Unplug the saw from the outlet. Verify the saw has  
been disabled by trying to start it.
2. Push in and rotate the FastFix arbor lock clockwise.
3. Loosen the clamping screw on  
the arbor bolt guard and  
rotate away from the arbor  
bolt.
4. Unscrew the arbor bolt by turning it clockwise. **Note:** the  
arbor bolt is a left-hand thread and turns in the opposite  
direction of a standard screw.



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5. Without pushing down on the trigger lock, pull up on the trigger to release the blade guard.
6. Raise the blade guard and remove the arbor flange and sawblade.
7. Install the new blade (verify that rotation direction is correct), replace the arbor flange, tighten the arbor bolt, and then unlock the FastFix arbor lock.
8. Verify the sawblade is securely fastened and able to freely spin. Plug the saw back into the wall plug.

### Setting the Miter Angles

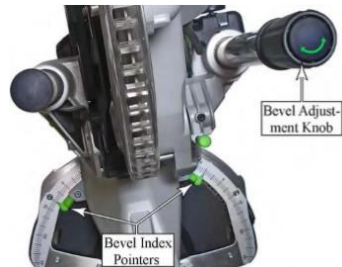
The saw is capable of mitering 50° to the left and 60° to the right, with positive stops at 0°, 22.5°, 30°, and 45°.



1. Release the miter lock by lifting the handle.
2. Press down on the miter stop release lever and rotate the miter to the desired angle.
3. When the desired angle is set, engage the miter lock by pressing down on the miter lock lever.

The bevel angle (horizontal plane) by rotating the saw head by  $\pm 47^\circ$ . To adjust the cutting head:

1. Release the bevel lock by lifting the lever.
2. Rotate the bevel adjustment knob until the bevel index pointer is at the desired angle.
3. Lower the bevel lock.

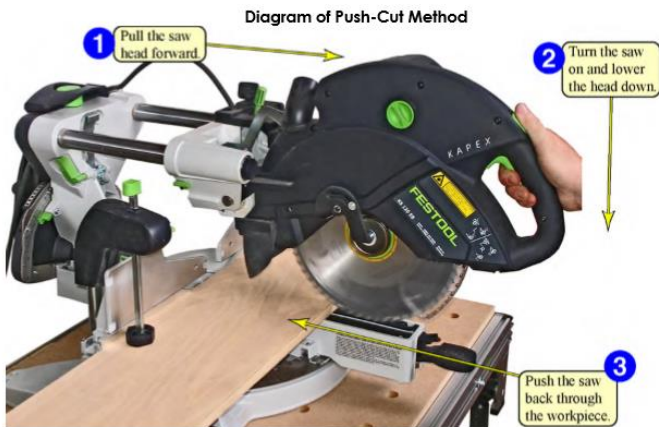


### Operation

1. Put the board against the back fence – clamping the piece if necessary.

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2. Install stop blocks and adjust miter angles if required.
3. Open dust collection blast gate.
4. Maintain a constant and firm pressure on the board holding it against the back fence with one hand while holding on the saw handle.
5. Pull the saw forward.
6. Turn the saw on by pushing both the trigger lock and power trigger at the same time.
7. Lower the sawblade and push it back toward the stop. Be prepared for kickback or blade binding toward the end of your cut – do not let go of the handle or board if it happens, just let go of the trigger.
8. After the cut is complete, release the trigger letting the saw stop and then raise the saw blade and remove your piece.



9. Once you are done, close the blast gate, clean up the area, and put away any tools that were used.

### Kickback / Blade Binding

When cutting warped boards, it is not uncommon for the sawblade to bind at the very end of the cut. The pinching the blade happens when the board shifts position as it is being cut. Do not panic if this happens – just release the trigger (allowing the blade to stop) and recut following the same line. The important part is to continue to

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maintain a firm grasp on the saw handle and the board for the entire cut.

### Table Saws

DMS has two table saws, a SawStop and a Powermatic. The main difference between the two is the SawStop has an additional safety that will stop the blade if the blade touches a person (or anything else conductive). Otherwise, both table saws have similar features and functions.

The table saws are to be used to cut wood or plastic only – no metal. If you are cutting plastic, please make sure to use the blade designated for plastic (and re-install a wood blade when you are finished).

### Common Components

#### *Saw Blades*

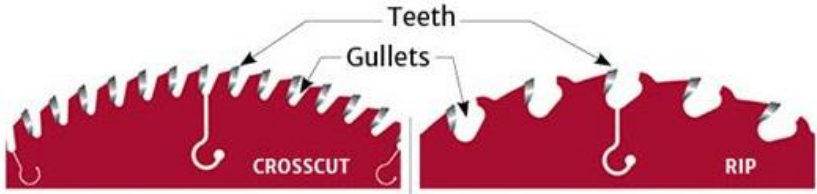
Both table saws are setup for 10” saw blades. Blades do become dull through use – and our blades see a lot of usage. If you feel you are having to excessively push the lumber through the blade, it is probably dull and needs to be replaced. Please put tape on the dull blade (write “Dull” on the tape) and put it on the shelf above the compound miter saw. Once we get a few dull blades, they will be sent out for sharpening (or replaced).

Many saw blades are designed for provide best results in a particular cutting operation. You can get specialized blades for ripping, crosscutting, cutting plywood, cutting plastic, etc. Blades can vary on number of teeth, gullet size, tooth configuration, and kerf width. DMS provides three basic blade types: ripping, crosscutting, and a general purpose (as well as one for plastics only).

Ripping blades are meant to cut lumber along the grain. They usually have fewer teeth and larger gullets. The crosscutting blade has more teeth (allowing for a smoother cut) and smaller gullets

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and used to cut across the grain. General purpose blades do well in both crosscutting and ripping, but do not excell at either.



DMS also owns a couple dado saw blades. These blades are used to cut a groove in a piece of lumber and not cut it into two pieces. For more information on how to use the dado sets, please refer to the instructions supplied with the blades (examples are also shown on YouTube).

### *Blade Adjustment*

The saw blades are raised and lowered using height adjustment wheel (in front on the SawStop and side on the Powermatic). First loosen the wheel lock then raise and lower to the desired height. The gullet of the blade should just clear the top of the piece of wood that is being cut.



To adjust the angle blade angle, use the tilt adjustment wheel. The shop does own a digital angle gauge to get a more precise angle (usually found magnetically stuck to the outside of the cabinet in the back of the room). Make sure not to use the zero clearance insert – the angled blade requires a wider gap.

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### *Riving Knife*

A riving knife is a thin piece of metal that fits behind the saw blade. It is there to prevent the wood from binding against the saw blade as the lumber is cut or drifts away from the fence. Using a table saw without a



riding knife **greatly** increases your chance of kickback – which could lead to injury or damage to your piece of work.

### *Fence*

Each table saw has a movable fence that can be set and clamped in place a fixed distance from the saw blade. The fence should always be parallel to the saw blade (if not parallel, the fence is most likely damaged and should not be used). Never use a fence and miter gauge together – this greatly increases the risk of kickback and injury.

### *Miter Gauge*

A miter gauge is used to push the wood through the blade. The miter gauge is usually set perpendicular to the saw blade, but can be set at any angle. The gauge runs in a slot in the table top (miter slot). Make sure to test the operation of the miter gauge prior to starting the table saw to insure the gauge does not come in contact with the saw blade. It is amazing the number of times this error has occurred.

### *Sleds/Jigs*

Sleds have been built for both table saws – it should be noted that the sleds are not interchangeable (the spacing of the miter slots is different on each table saw). The sleds are primarily used to cross cut lumber and are typically more accurate (stable) than using a miter gauge. DMS (may) also has several other sleds or jigs for specialized purposes like: cutting splines, tapering cuts, finger joints, etc. Sleds and jigs do see abuse and do get damaged over time, they are relatively easy to make, and so please feel free to

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make one for the shop if you do not see what you need (plans are readily available on the internet).

### *Push Sticks*

There are several different styles of push sticks available, the most common is one that DMS makes in house. Push sticks are used to help keep your hands clear from the saw blade. The push sticks can be found in the back corner of the room, hanging from the compound miter saw cabinet. Do not worry if the push stick is cut while being used – that is what they are designed to do (when we get low, we will make more).

### Safety

Table saws are designed to cut through lumber with little force; like all our power tools, they can easily cut through flesh and bone. Remember you are responsible for your safety and those around you.

Table saws are meant for cutting straight lines – if you are trying to cut a curved path, please use a band saw (or scroll saw) in that application. Always use a miter gauge or fence (never both together) when making a cut, do not attempt to do a “free-hand” cut.

Check your lumber for any foreign objects. Purchased lumber commonly comes with staples holding barcode stickers. Reclaimed lumber can contain screws or nails. Tree branches/trunks can have barbed wire, nails, and even bullets imbedded in them. Even a loose knot can become a flying projectile.

Never put your hands within six inches of the spinning blade. When the SawStop fires (stopping the blade), the operator commonly is not even aware how close to the blade they were. Always use a push stick when your hand is going to get too close to the blade. Do not worry about cutting into the push stick – that is what they are made for, and we will make more as they wear out.

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Prior to starting the table saw, make sure that the blade is able to spin freely, that the lumber isn't engaged in the blade, and the fence or miter gauge will not hit the blade during operation.

### *Kickback*

Kickback is probably the most common injury on the table saw. It is caused when the saw blade "catches" the wood and sends it flying back toward the operator. It is important to make sure no one is standing or working behind you (or is at least made aware of the risk of kickback) while you are using the table saws. When making cuts, do not stand behind the area between the saw blade and the fence (this is the direction the lumber will most likely be thrown). Kickback usually occurs when the table saw is used **without** a riving knife or if the fence and miter gauge is used together.

Lumber can release internal stresses within the lumber when it is cut, which can cause the wood to warp slightly. The riving knife helps prevent the lumber warping in a way that clamps down on the spinning blade. With the rare exception (making dado cuts for example), you should never operate the table saw without a riving knife.

Using the miter gauge and fence together greatly increases odds of kickback. As you push the wood through the blade, the wood is constrained by the miter gauge, fence, and saw blade. If anything is out of alignment or the wood twists, the wood will bind against the blade and be shot back toward you.

### SawStop

The manual can be found on the Wiki Page: **SawStop ICS73230-52**. Please read the manual to familiarize yourself with the SawStop.

### *SawStop Safety System*

The SawStop has a safety feature that is not present on the Powermatic table saw. The safety feature is engaged whenever a



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conductive material (fingers, metal, etc.) touches the blade while it is spinning. Once contact is made, the SawStop's break cartridge pushes an aluminum bar into the spinning blade and drops the blade below the level of the table – this all happens in about 3-5 milliseconds.

Because of this safety feature, anything conducting like the following materials **cannot** be used on the SawStop (and should be used on the Powermatic)

- Charred Wood – from fire, laser, etc. (the carbon is conductive)
- Laser-cut wood (see above)
- Chemically treated lumber / pressure treated wood
- Wet lumber
- Green wood
- Wet paint or wet glue
- Foil-laminated or metal leafed wood (like some picture frames)
- Metal (staples, nails, miter gauges)
- Cardboard corner guards (usually contain recycled metal fragments)
- Graphite Cloth
- Anti-static Ultra High Molecular Weight Polyethylene
- Carbon fiber
- Any metal in proximity to the blade (saw sleds, rulers, squares, miter gauges, tape measures, etc.)
- Hot dogs

A common error is not allowing the blade to come to a **complete stop** before getting near it with a ruler, other tool, or hand. Allow the blade to come to a complete stop after making a cut before touching it.

Setting the safety off for any of the above (or obvious misuse), we ask that you put \$100 dollars in the pay kiosk to cover a **portion** of

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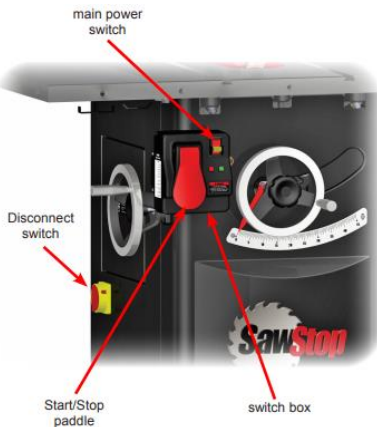
the cost to replace the blade and safety cartridge. If the safety went off because you slipped and your hand (or other body part) touched it, you are not required to donate the \$100. **DO NOT LET THE THOUGHT OF SPENDING \$100 KEEP YOU FROM USING THIS SAW – YOUR HAND IS WORTH MUCH MORE THAN THAT!** Being safe is much more important than the cost of repair.

The safety has also been known to trip when the belts are worn out and producing excessive static electricity (though this only happened after several *years* of running on the same belts – first replaced in 2019).

### Turning it On/Off

To turn on the table saw:

1. Make sure the blade is clear of any obstructions.
2. Open the dust collection blast gate.



3. Make sure the rotary disconnect switch is on
4. Badge into the RFID reader (green LED should be on)
5. Turn on the main power switch
6. Once you have a solid green light under the power switch, *gently* pull the Start/Stop paddle switch. The blade should start rotating.

To off the table saw:

1. Push the paddle switch in (should stop the blade)
2. If you are done cutting, please badge out of the RFID (red LED should be on).
3. Close dust collection blast gate.

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4. You can turn off the main power switch; but there is no reason to turn off the rotary disconnect (unless you are changing out the blade)

### *Changing the Blade*

To change the blade:

1. Disable the table saw by rotating the disconnect switch on the side of the table saw **and** then try to start the saw (blade in and turn on) to make sure it is disabled.
2. Raise the blade all the way up (makes it easier to work on) and remove the red insert
3. Loosen the arbor nut using the two wrenches located on the hook on the side of the machine next to the rotary disconnect
4. Remove the arbor nut, washer, and blade.
5. Replace the blade – make sure it is installed correctly, the blade should spin toward you.
6. Install the arbor washer (large flat side against the blade) and nut. Tighten the nut with the wrenches – do not overtighten, it only makes it harder to loosen next time.
7. Replace the red insert (insuring it is secure)
8. Put wrenches back on the hooks and turn on the rotary disconnect switch.



### *Changing the Break Cartridge*

If the safety mechanism engages, you will need to remove both the saw blade and the break cartridge. The process is not difficult – just follow the directions supplied in the replacement cartridge. Replacement cartridges are typically found in the cabinet behind the table saws.

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### Powermatic

The Powermatic does not have the safety to stop the blade if your hand (or other body part) touches the blade – it will easily cut your hand or any other body part you push into the blade.

#### *Turning it On/Off*

To turn on the table saw:

1. Make sure the blade is clear of any obstructions
2. Open the dust collection blast gate.
3. Badge in (RFID reader should have a green LED)
4. Push the **blue button** – the saw blade should start rotating.

To off the table saw:

1. Push the **STOP BUTTON** (should stop the blade)
2. If you are done cutting, please badge out of the RFID (red LED should be on).
3. Close dust collection blast gate.

#### *Changing the Blade*

To change the blade:

1. Disable the table saw by unplugging the unit **and** then try to start the saw (badge in and turn on) to make sure it is disabled.
2. Raise the blade all the way up (makes it easier to work on) and remove the table insert
3. Loosen the arbor nut using the two wrenches located on top of the fence.
4. Remove the arbor nut, washer, and blade.
5. Replace the blade – make sure it is installed correctly, the blade should spin toward you.
6. Install the arbor washer (large flat side against the blade) and nut. Tighten the nut with the wrenches – do not overtighten, it only makes it harder to loosen next time.
7. Replace the insert (insuring it is secure)
8. Put wrenches back on the hooks and plug the unit back in.

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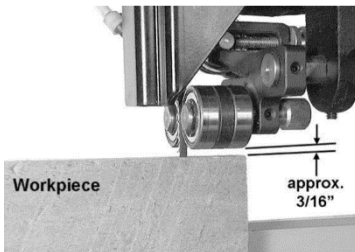
### Band Saws

Band saws can be used to cut irregular curved shapes or resawing lumber into thinner slabs. Also make sure to open the dust collector blast gates before cutting and close them when you are finished.

A band saw blade is just a hoop held in place on two rotating wheels by friction. If the blade is pinched, pulled, or torqued, there is a good possibility of the blade breaking or being pulled off the rotating wheels.



When cutting, if you need to back up the board out of the blade [pulling the board back out of the cut path] more than two blade lengths, turn the saw off and wait for it to come to a complete stop. Putting any pressure on the back of the blade [non-cutting side] could cause the blade to pull loose of the rotating wheels.



Make sure to adjust the upper guide to be just above the lumber being cut (approxamitly 3/16"). The upper guide helps keep the blade in proper alignment and minimizes any twisting while cutting.

When cutting, slowly feed the workpiece into the blade; do not force it into the blade. The thicker the workpiece the slower you will need to cut it. Pushing the piece too hard into the blade will cause the blade to drift from its cut path and lead to premature dulling of the blade. When cutting curved pieces, it is best to cut

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off several small pieces and slowly working up to your cut path. It is important to go slow and let the saw blade do the cutting.

The blade's width determines how tight of a curve it can cut. The wider the blade, the greater the minimum radius. Make sure to feed the workpiece forward into the blade as you are turning.

Blade Width	Min Radius
1"	7"
3/4"	5 1/2"
5/8"	4"
1/2"	2 1/2"
3/8"	1 1/2"
1/4"	5/8"
3/16"	5/16"
1/8"	3/16"

### *Blade Breakage/Replacement*

If you break a blade or feel the blade is overly dull, please report it on "Talk". If you feel comfortable replacing a blade, please do so – just make sure to validate the tension and tracking before using it. Also please do a few test cuts to make sure the bandsaw is ready for use for the next member (who may not be as comfortable with the machine).

### Laguna

The Laguna Bandsaw is set up for resawing lumber or cutting tree stumps for turning on the lathes. The blade does not stay sharp very long – it is dulled quickly by people feeding their workpiece into the blade too fast. Thick lumber (typically done on the Laguna) must be cut very slowly. Feeding too quickly dulls the blade and causes the blade to drift.

### *Resawing*

While it is possible to resaw on any of the bandsaws, it is very common on the Laguna (because of the wide blade installed). Resawing is the process of cutting thicker lumber into thinner

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pieces – often for “bookmatching”, producing two pieces with mirroring grain patterns.

To resaw:

1. Mark a cutline to follow (makes it easy to see if the blade is drifting)
2. Set the fence at the correct depth for the cut and add a feather board (in front of the blade) to help keep the lumber pushed firmly against the fence while cutting
3. Adjust the upper guide to be 1/8” to 3/16” above the workpiece being cut
4. Open the dust collector blast gate
5. Ensure nothing is engaging the blade and then turn the bandsaw on
6. Slowly feed the lumber into the blade; the thicker the workpiece the slower you will need to go. Think tortoise paint drying slow!
7. Watch for blade drift (movement away from the cutline). Blade drift is typically caused by a dull blade, or feeding the lumber into the blade too quickly.
8. Once the cut is complete, turn the saw off, shut the blast gate, clean up the area.

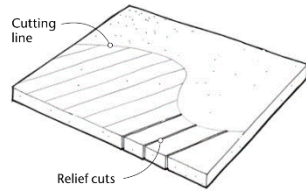
The other common use for the Laguna is to cut tree trunks and limbs (or other round stock) for turning on the lathes. It is important to **use a sled and properly brace the lumber before cutting!** If the lumber rolls while cutting, the blade will easily get pinched and break. If you ever need to stop the blade, turn the machine off and use the foot break to slow it down more quickly.

Jet

The Jet bandsaws are typically set up with thinner blades (1/4” – 3/8”) to allow for freehand cuts. When freehand cutting, make sure the lumber lays flat against the table to prevent the blade from getting pinched (if there is any rocking run the piece through the jointer to flatten one side).

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It is easiest to cut off unwanted pieces in small chunks, slowly creeping up to the desired cutline. When making curved cuts, making relief cuts helps prevent the blade from binding and is much easier to cut. The relief cut



should be made perpendicular to and stops just prior to the cutline.

**Remember to stop the machine if you are backing out lumber a length more than two times the width of the blade.**

To use the Jet Bandsaws:

1. Adjust the upper guide to 1/8" – 3/16" above the workpiece
2. Open the blast gate
3. Insure the blade is free to move and turn on the saw
4. Make cuts – being careful not to make a too tight radius of push the lumber too fast into the blade
5. Clear off any scraps that come free as you cut (put them in the trash can located near the bandsaws)
6. Once the cut is complete, turn off the machine, shut the blast gate, and clean up around the area

## Scroll Saw

## Router Table

## Drill Press

The drill press is used to drill holes in a piece of lumber. Clamping the workpiece to the table is a must; you will not be able to hold the workpiece in place (especially drilling larger holes), possibly causing injury to yourself or damage to your workpiece. The drill press is meant to be used on wood or plastic only – if you need to drill metal, please use the drill press located in the metal shop.



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DMS has several different drill bits that are available for use. The condition, size, and type of bit are not guaranteed – so you may want to bring your own.

### Types of Drill Bits

There are five general types of drill bits you will see in the Woodshop: Twist Bits, Brad Point Bits, Spade Bits, Hole Saw Bits, and Forstner Bits.

#### *Twist Bits*

Twist Bits are the “common” general purpose bits. They come in various sizes and have a pointed top that cuts into the wood. The twist bit cuts a hole from the center out, typically leaving tear out along the outer edge.



#### *Brad Point Bits*

Brad Point Bits are designed for woodworking (and a little more expensive). They come in various sizes similar to the Twist Bits, but their top has three cutting edges, one in the center and two on the outer edge. The bit cuts the hole from the outer edges toward the center, producing much less tear out and a better finished hole.

#### *Spade Bits, Hole Saw Bits, and Forstner Bits*

Spade, Hole Saw, and Forstner Bits are typically used when drilling larger holes. For the best finish, use forstner bits and avoid spade bits whenever possible.

### Operation

1. Insert the desired bit into the chuck and tighten down using the chuck key. The chuck key is held in place by a magnet on the side of the drill press – make sure to return the chuck key after you tighten the chuck.
2. Raise or lower the table as needed, make sure the drill bit is centered above the wood scrap wood (and not the metal table)

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3. Position the lumber under the bit and **clamp it securely in place**. Do not plan on holding the lumber in your hands, it just won't happen.
4. Turn on the drill – adjust the speed of the drill if needed.
5. Lower the drill bit to the desired depth. Feeding the bit too slowly may cause burning of the wood, while feeding too quickly may break the bit. For deeper holes, you may have to raise the bit to clear out the sawdust from the hole.
6. Once you are finished, turn the machine off and clean up the area around the drill press.

### Setting Rotation Speed

There are several factors which determine the best speed to use in any drill press operation, such as kind of material being drilled, size of hole, type of drill, and quality of cut desired. **Only adjust the speed of the drill while the drill is running and not cutting into anything.**

As a general rule, the smaller the drill the faster the RPM. The speed can also be faster for soft materials and should slow down for harder materials. In general, smaller bits can be over 1000RPM while larger bits can be down around 250RPM.

### Sanders

There are several stationary sanders in the Woodshop – while they help produce a smooth surface, they are primarily used to shape the wood (smoothing is better suited for the finer grit of the hand sanders). Make sure to always wait at least 24 hours after gluing before using any sanders (or other tool) – wet glue will just clog and ruin the sandpaper.

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While sanding (or after you are complete) please use a cleaning eraser stick on the sandpaper. It will help pull the sawdust out of the sandpaper, make the paper more effective and help prolong its life.

DMS does provide sandpaper for all our stationary sanders, but if you are wanting a different grit (we provide 100 grit) you will need to provide your own.

### Drum Sander

The following information for the Drum Sander was taken from a great write up done by member Micheal\_Chang on Talk (search for "PLEASE READ! Drum sander operation/information").

This machine is intended to flatten material - sanding it is a byproduct of that goal! It should not be used on plywood or material with bark (live edge). Make sure any glue ups have dried for at least 24 hours – and remove all surface glue.

### *Control Panel*

Indicators for ON/OFF, Belt speed (feed speed), measurement for current height, Feed Logic read out.

The toggle flip switch at the bottom right is to turn the machine on and off.

The push toggle on the top right is for spindle on/off.

The large red button is for emergency stop.

The rheostat on the bottom left is for feed speed.

The mm/in button will swap the read out for the height read out.



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The '0.00' button will set whatever the current height of the spindle as read by the read out to 0.000

### *Understanding feed speed & feed logic*

Before we get into how to use the drum sander and its operation it is important to know why feed speed and feed logic are crucial to your success with the machine.

Feed speed is how fast you the belt will turn anywhere from 0-12 feet/min. For smaller items (in width) you can use a higher speed as the load on the spindle will be much lower. For instance, if you were sanding a 2" wide piece of hardwood or a 1" shim you could probably start anywhere from 8-11 ft/min.

For wider material you must use a slower feed rate. For example, 19" walnut glue ups might be able to go around 5-6 ft/min. The width is the total width of material you are sending through the sander at once (don't think six 2" pieces fed at the same time equates to 2").

Finding the happy medium where feed speed is optimal means you won't burn your piece and you will save a lot of time (faster passes = faster finished project)

Feed logic works in preserving the motor of the machine, saving our sand paper, and saving your material from burning or gouging. If the machine feels your successive pass is too deep (trying to take off too much material) the LED indicator will ramp up based on the amount of load and feed logic will try to turn on. It will then try to slow the feed rate down to something it thinks is acceptable and continue to pass.

If feed logic can't fix the issue because it's just too deep of a pass the machine will shut down (recovery from a shutdown will be explained later).

This is all related to FOUR things only (the keys to success):

1. Width of material

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2. Feed rate
3. Depth of pass
4. Sandpaper grit

### *Pre-Operation Check List*

1. Unlock the cantilever cover to check that sandpaper is installed correctly (will cover this later)
2. Close the cover and lock it
3. Open the blast gate for the dust collector
4. Verify (and turn on if needed) the dust collector. **This is a MUST**

### *Operation*

To start the machine from a full power off follow these steps:

1. Flip the toggle switch (if the machine doesn't turn on rotate the emergency stop to check if it has been pressed prior to your usage).
2. Set the piece you want to sand on the belt prior to turning it on and adjust the height of the drum so that the feed rollers just kiss the top of your piece at its highest point. **DO NOT CRANK IT DOWN SO IT IMMEDIATELY STARTS TO SAND.** Back your piece off and leave it on the infeed table. If your highest point is in the middle of your material eye ball it to the best of your ability (better to err on the conservative side)
3. Turn the bottom left dial to your desired feed speed (remember: slower for wider, faster for thinner). **If the feed speed indicator is blinking 0.0 it means the dial must be reset fully (audible click) to 0.00 and then you can turn the dial again to start the belt.**
4. Turn on the spindle by pressing the green button.
5. Feed your piece through. This is where you will listen to hear if it's sanding. If it's not sanding, slowly crank the wheel so that it just kisses the piece.

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6. Once you find the top of your piece is getting sanded every so lightly **press the 0.00 button**. This is how we will track our successive passes and sand optimally.
7. Crank the wheel down so that the indicator says -.002 or -.004. Yes...that's 2/1000th or 4/1000 of an inch.
8. Watch the feed logic indicator and see how many steps you are getting.
9. Lower the wheel so the indicator is -.002 to -.004 less than the last pass.

Each pass after this will be determined by your width, feed logic indicator, experience, and so on.

### *Belt installation*

There are two retaining clips on both sides of the drum that hold the ends of sandpaper roll.

Start from the left hand side and insert roughly 1-1.25" of the roll into the clip and tightly wind it over the roll left to right. The sandpaper is tapered on both ends to allow for it to wrap properly.

There should be ZERO overlap over the sandpaper with minimal (to no) distance between the coiling (sliver of the metal drum will be seen).

The two areas that need to be looked at during your installation are the far left and far right where the paper clips in. You want this tight as possible as any bowing or overlap will cause that portion of the sander to sand deeper and result in messing up your piece (if doing something that wide or along that area of the drum) and will bog the machine down.

If it is completely tight and when you depress the paper along the clips and there's no bounce or give then you did alright.

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### *Cantilever fine adjustments*

On the left hand side below the belt is this black knob. It adjusts the tilt of the cantilever arm. I spent 2 hours TWICE in the past week adjusting this so that over a 19" span there is  $\leq 0.002$  difference from left to right.



In most cases this will not need to be touched – maybe checked and adjusted every 2-3 months

If it so happens to be needing adjustment turn the knob to lower or raise the cantilever.

### *Tips/Tricks/Suggestions*

If you are doing multiple pieces that all need to be the same thickness do them all at once. Use the dial indicator to achieve best results.

End grain cutting boards are generally pretty wide. You should NEVER be going more than  $-.006$  at MOST per pass. I'd suggest several passes at less. Yes it is a slow process, but you decided to do end grain...

You can successfully sand all the way down to fractions of an inch. I made  $3/32$ " shims the other day for a project without fail and got consistent readings from a digital caliper front to back on 2' long pieces.

Achieve your sanding goal by choosing the best grit. Want to remove more material quicker? Go with 80. Want a smoother finish with less sanding lines? Go with 150 or 180.

Use the 0.00 rest and dial indicator to help you gauge where you need to be at. Your 4/4 material that you just sent through the planer is reading  $.802$  inches on a digital caliper and you want a

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true 3/4"?  $.802 - .75 = 0.052$  inches. This is your rough target number to achieve if you started with one TRULY flat side.

Listen, listen, listen...then keep an eye on feed logic. The machine will let you know if you're doing something stupid. You can hear it. Then you will see it burn or gouge your piece. When you figure out the sound and how much to take off per pass you will be more efficient and it will just hum along.

If you for some reason took too deep of a pass that causes feed logic to turn off the sander immediately press the 0.00 button. Crank the wheel up so you can remove your piece completely. Do the reset protocol and dial your wheel back down to +0.020 and start the operations steps again. This will save you time from having to find where your starting point was.

Especially on wider pieces try to put downward pressure on the material where it is meeting the belt during the entire pass. I often do some forward pressure (not enough to change the feed speed but just on the brink so I know it will not get held up because the conveyor is too weak) and downward pressure. When the material is almost through go to the other side and help 'pull' it out (not forcefully). **The goal is to NOT let it stop during the sanding process - this causes gouges**

Every 20-30 PROPER passes take a gum block and clean the belt

### FAQ

**How much should I turn the wheel for each pass?** Read the dial indicator and aim for .002 to .008 depending on material width.

**How can I flatten my cutting board or any material?** Run passes on just ONE side until that side is completely flat. Do this by using a pencil to scribble across the entire face. When all of that pencil has been removed, scribble the entire face again and do a successive pass at the smallest possible amount to remove it all at once. This means that face is flat. Now turn the board over and run it using the same method on the other side.



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**What's the widest thing I can flatten?** 44" in theory, I'd say realistically 42 though. The 22-44 means anything from 0" – 44" wide. That's what the cantilever arm is for, your material can hang off and then you run each side through.

**Even though I didn't turn the wheel after my last pass and I sent my material through I can still hear it sanding!** This is a normal thing, the dial indicator is not an end all be all. It's a tool and a guide to help you but isn't perfect (it's pretty damn close when I do my caliper testing).

**I'm tired of the space not having sand paper and/or tired of using burnt up sand paper!** Hopefully this won't be the case if people follow this advice, but in the meantime do what I do...buy your own. On amazon it's ~\$40 for 3 rolls or go to Wood craft for \$60. Take it off each time you are done. There's a reason the space can't keep up with going through 4 rolls a day...it ain't cheap!

**How many passes will a roll last me?** If you are conservative it will last you a LONG time. If you are ramping up so that feed logic is triggering often it won't last you nearly as long. I've done 100's of passes on a single roll with it still looking new and that's not an exaggeration

**Will this speed up having to sand my project for finishing?**

Remember, the main goal based on the grits provided by the space are to flatten material. Getting snipe off the planer? The jointer blades aren't cutting perfectly flat for you? Have a slightly bowed project? This is what 80-100 grit will do. If you toss in 180...sure it may help you finish faster, but we have THREE random orbits that will take an already flat piece and sand them for finishing WAY faster.

**I have streaks/sanding lines, how do I remove them?** Once your piece is flat grab the random orbit and go at it from either the same grit or one lower and work your way up. On end grain you will find this takes a LONG time.

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**I have horizontal (parallel to the drum) dips/gouges in my material after using the drum sander.** Your pass wasn't clean and without stoppage. Read above where I talk about making sure it doesn't pause AT ALL. Put downward and forward pressure just enough to keep it moving. Don't worry, another 0.025 will take that right out.

**How many bars should I aim for on the feed logic read out?** I believe 4 is the magic number after having used this thing for so long. I think 5-6 is ok occasionally if you want to be super aggressive. Yes, everyone including me will tick the feed logic and you'll get a feel for it. You will have less desirable results on your material, so be patient and you will save time and a better end product with less frustration

**Man...I've sent my board through this thing at least 15 times and it's still not flat! Why?** Are you following my suggestions on depth per pass? Let's say you are doing 0.004 per pass. In those 15 passes you've removed 0.06 inches. That's the equivalent of less than 1/16" of an inch. This isn't a fast process, but it is the BEST tool we have for flattening besides the CNC.

**Someone told me burn marks on end grain (cutting boards) are just a fact of life with this thing.** They are wrong!

Spindle Sander

Belt/Disc Sander

Edge Sander

Lathes

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MultiCam CNC Router