Making Thin Stock

Woodworking project plans often call for stock that is thinner than the thicknesses of lumber available in hardwood stores. Surfaced 1x lumber comes out to 3/4" thick or perhaps a little more, and this is the thinnest commonly available. There are mail order companies that sell thicknesses down to 1/4" and less, but this tends to be expensive. So what can you do to get thin stock? There are numerous things you can do; find a local cabinet shop that is willing to occasionally plane down some stock for you and perhaps do some resaw, use your table saw to rip thin pieces, use your table saw and band saw in tandem, or use a jointer, band saw, and planer to do the work.

The last solution is the one of choice, if you have the machines. But many people don't and that is why one alternative is to find a shop that will help you out. If you can find such a shop it may turn out to be very easy for you to show up now and then with a few boards and quickly have them planed down, so it's worth the effort to investigate by calling around. But keep the following in mind. These shops will be busy and it is not worth their while to disturb their normal flow of materials for the sake of a small job like this. But, if you find a convenient time for them, say right at closing time or on the weekend when someone is puttering around, they may be more than willing to help. Secondly don't debate the price they ask for the work, any way you look at it they aren't going to profit from planing a few small sticks for you. If it costs too much don't come back.

One other thing you can do to make it easier for them is to prepare the stock as much as you can before you bring it in so that they have a minimum number of steps to perform on the lumber. If all they have to do is plane 5 pieces from 3/4" to 3/8", it is a lot easier for them than if you ask them to joint, rip, resaw, then plane. If your stock is thick you may need to ask them to do all those steps because it is senseless to plane thick stock way down. But the easier you make it for them the more likely they will be willing to help, so maybe you should go buy 3/4" stock and ask them only to plane it just to make the process simpler.

Whatever process you choose for getting thin stock, consider taking your result to a cabinet shop with a wide belt sander for the final thicknessing process. Wide belt sanders are industrial grade machines, technically referred to as abrasive planers. They work very fast and effectively to bring stock to a consistent thickness with an excellent surface finish. They only cost from $5-10,000 though, which is good for you in one critical respect. Cabinet shops that buy these machines must rent out time on them to other woodworkers to pay for the machine, so they welcome your business. They’ll charge about $1/minute, but in 30 minutes you can surface a lot of stock far faster and better than you will ever achieve in your shop with a hand belt sander.

RESAW ON THE TABLE SAW

Photo 1- Resaw thick stock into thinner pieces at the table saw by making a progression of cuts. First make cuts at about an inch high as shown.

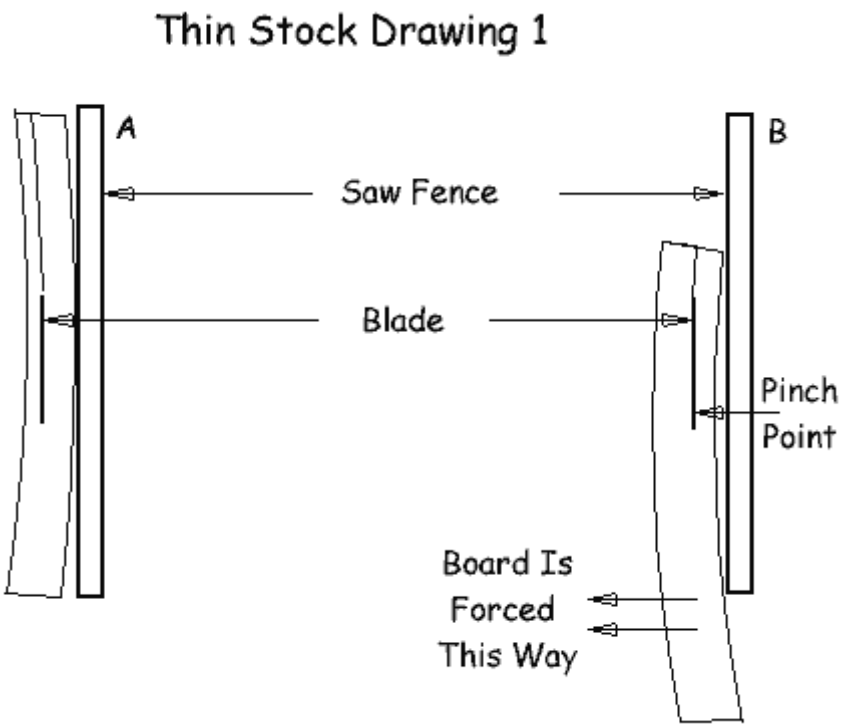
Thin stock is made on the table saw by double ripping the stock on edge, as in photos 1 and 2. The maximum width of stock you can achieve equals twice the maximum height of your blade above the table, which on most 10" saws is about 2-3/4", so 5-1/2" is about the most. This kind of ripping is very demanding of your saw blade if you try to cut the full 2-3/4" in one pass, which I don't recommend. First set the blade at 1" high and double rip the stock as in photo 1, always putting the same face against the fence, of course. Then raise the blade to 2"; rip again, and then set it at full height for the final pass (photo 2). Be sure your fingers are out of the way on all these passes and use a push stick as shown.

Photo 2- Raise the blade and make more cuts without moving the fence. When the thin part will be cut free, push it through with a push stick as shown.

The first thing you'll notice when doing this kind of cut is that if your stock is not flat, and does not ride flush against the table saw fence, the blade will tend to burn inside the cut. This is because the wood is being turned slightly against the side of the blade during the cut. You want to minimize this kind of action because it is bad for the blade to heat it this way, it is bad for the wood to burn it, but mostly because if this action is severe enough the blade can bind or worse it could grab and throw the stock. Doing the cut in three passes will help, but this is treating the symptom and not the cause, which is twisted stock. Try to pick the straightest stock you can. Cut longer pieces into shorter sections, but don't work with pieces less than 18" long. Using a jointer to flatten the face of the stock is the best solution to twisted wood. If you don't have a jointer you could flatten the stock the traditional way with hand planes- an arduous but venerable task. A belt sander with very coarse grit could be used to do

this, but this will only work well to remove severe high spots, it won't work well to make boards accurately flat.

Once you have stock that is straight to your satisfaction, look at it carefully and if the piece is still not perfectly straight place the outside of the curve against the fence, as in drawing 1A. If you place the inside against the fence, as in drawing 1B, you can cause severe binding as the tail end of the piece comes in contact with the fence. This is potentially very dangerous and should be guarded against.



Drawing 1- This drawing is greatly exaggerated for the sake of clarity, you should not cut pieces on the table saw that are as badly distorted as those shown. See text. 'A' shows how you should run slightly bowed stock in the table saw, with the outside of the curve against the fence. 'B' shows what not to do, because if the inside of the curve is to the fence severe binding against the blade can result.

How far should you set the fence from the blade? If your stock is very straight and the ripping cuts go easily, you can place it very close to the thickness you want to achieve with only a little bit extra for sanding or planing. But if the stock is not perfectly straight there will be some variation in thickness, so it is best to rip it over thickness by about 1/16" or so, and then sand or plane to thickness later.

A word of caution. We are talking here about running stock that is not perfectly straight through the table saw with a deep cut, and as I've said this is potentially dangerous. The amount of danger is a matter of degree- slightly twisted stock will not

present much problem but severely twisted stock will. If your stock is out of flat more than 1/8" over two feet of length, either find a way to flatten it or don't use it.

Using a thin kerf blade will be a big help on a job like this, for two reasons. First, because it moves less wood it is easier to push the piece through the cut, and secondly because the kerf is less wide, less wood is wasted in the cut and you can get more pieces from your stock. One disadvantage to thin kerf blades is that they can wobble a bit in the cut, making a rougher cut than with a regular blade, but the pieces will need to be sanded anyway so this is not a serious problem. It is more important with a thin blade to take the cuts in multiple passes as described above, because if you try to take a full 2-3/4" cut the blade could seriously distort under the great load. Thin blades are more likely to distort with heat build-up than thicker blades. Thin kerf blades come in many different diameters like other blades; remember that you want the largest diameter that will fit on your saw in order to get the maximum height of cut.

Whether or not you use a thin blade, it is still possible to get several thin pieces from one thick piece, depending on the dimensions. And so you may be merrily cutting along on a thick piece, gradually moving the blade up and down as you progressively peel off thin pieces, and then you find that as you start to cut the third or fourth piece that now the blade is binding where it wasn't before- and sure enough looking at the now thinner piece you see that it is no longer straight. Why is this? As wood is removed from the original piece, tensions in the wood are released causing the wood to move. On some pieces you won't see this at all, others a fair amount and on some it will be extreme. Keep an eye on the stock as you work it and straighten or eliminate those that move a lot.

Once you have your thin pieces roughed out, they need to be brought to their final thickness, and the obvious choice for this is to use a planer, if you have one, or visit your local cabinet shop and use their planer or wide belt sander. Or you can belt sand the pieces with a hand belt sander to approximate thickness, though this is not a reliable means of getting a consistent thickness. Using hand planes to thickness the stock gives you more control, as well as sore muscles, but all kidding aside if you have a penchant for planes this is where you can really make use of your skill.

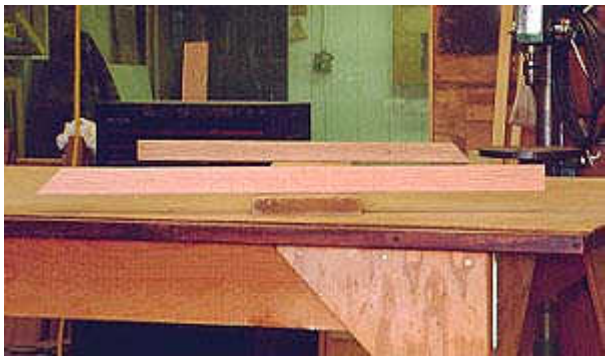


Photo 3- Winding sticks on a board that is almost flat. Note that the sticks are very close to being parallel to each other.

Here is a trick the old timers used to check for flatness when planing the face of a board. Take two straight sticks (called ‘winding sticks’), each about two feet long, and place one on each end of the board you are planing, as in photos 3+4. Then sight down the board such that both the sticks are close to your line of sight, and you will quickly see whether or not the two sticks are parallel to each other, and if not which

corners to joint, plane or belt sand down. The key with a procedure like this is to check frequently and remove only a little at a time, so you don't go beyond your intended goal.

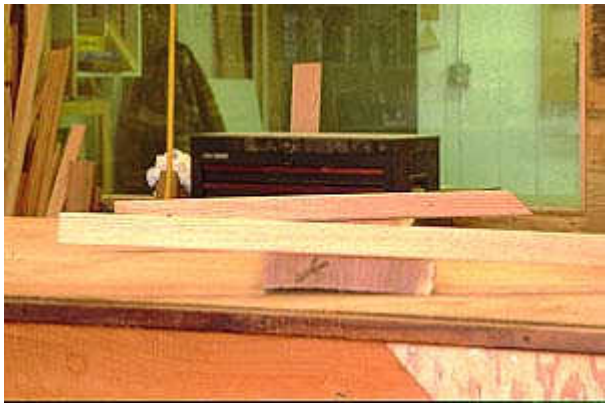


Photo 4- Winding sticks on a board that is quite twisted. This exaggerated example shows how the long winding sticks make it easy to detect twisted stock.

USING A BAND SAW AND PLANER

Making thin stock with a band saw, planer, and hopefully a jointer is easier and more precise than using the table saw procedure described above, and it allows you to work with widths that are greater than twice the height of your table saw blade. If you are lucky enough to have these machines, here is where you can really put to use the machining capabilities they have- and make you feel that the investment was worthwhile.

Note that many smaller band saws are only capable of cutting a maximum height of 6". This is not much more than twice the height of a 10" table saw blade. Many small band saws can be increased in cutting height capacity by purchasing an extension kit, which bolts on between the lower base and upper arm. Many band saws cannot be extended this way however, because the machine base is one big casting rather than an upper and lower casting bolted together. Keep this in mind when you buy a band saw.

Though the resaw process can be easy and a delight when the machines are well adjusted and your stock has consistent grain, it can be a nightmare when either aren't. Resaw on the band saw requires that the guides be adjusted carefully. If you have only cut thinner stock on your band saw (up to 2" or so) you may have never had the need to carefully adjust the guides. Here it is critical so that the blade is guided in the same direction both below the table and above the work on the descending arm.

Better quality replacement band saw guides are available to fit most saws. If you plan to do a lot of resaw with a band saw consider getting some of these.

When you are planing any stock, there is less chance of tear out if the stock has consistent grain direction and you plane with the grain, but this is even more critical with thin stock, and the thinner the more critical. If you plane against the grain on pieces less than 3/8" thick or so, there is a good chance that the stock will not only tear out but tear apart in the planer. This can send wooden shrapnel out the dust shoot, as well as back at you by the in feed roller. Using consistent, even grained stock is really the only way to go. As well, a general safety rule with planers is that you never

stand behind the in feed table where loose wood can be throw, and remove your hands from the stock you have just fed in as soon as you can.

Don't let my severe words of caution scare you away from trying this- but do pay close attention to what you are doing because this is a delicate procedure. Check and adjust the guides on the band saw, then fit a wide blade onto it, ¾" is best. A wide blade is necessary because when the blade is cutting a full six inches or more, there is a lot of pressure against the blade and it can be flexed backward. This can cause the blade to buckle slightly, and then it wanders severely to one side or the other. A wide blade resists this buckling far more than a thin blade, and is really the only choice for resaw. Also choose a blade that has no more than four or five teeth per inch, so that there is plenty of room between teeth for chip clearance as the long cut is made.

Photo 5- A point location fence used for resaw. This type of fence allows you to move the stock side to side as it is fed into the blade, adjusting the direction of cut while the cut is being made.

As you make the cut on the band saw, one face of the stock rides against a fence which is set up next to the blade and parallel to it. It is not absolutely necessary for the blade to be at 90o to the table (though it is best). But it is necessary for the blade to be parallel to the fence, so when you set up your fence you can establish its final parallel relation to the blade by adjusting the angle of the table itself, to which the fence is clamped.

Photo 6- A long, or flat fence used for resaw. This fence does not allow you to adjust the direction of cut during the process. You must use test pieces to verify that the fence face is parallel to the cutting path. Ultimately this fence produces the most consistent result, if you start with straight stock.

There are two kinds of fence you can use, one being a point location fence as in photo 5, and the other being a long fence as in photos 6 and 7. The point location fence contacts the stock being cut at only one point along its length- a vertical line perpendicular to the length of the stock and parallel to the blade. The advantage to this kind of fence is that it allows you to swivel the stock back and forth as it is fed into the blade in order to keep the direction of the cut going properly. But if you are not careful the cut can get out of hand and wander a fair bit before you get it back on course. The advantage of a long fence is that it holds the stock in one direction very steadily, and so long as the fence is angled in relation to the blade such that a straight cut results, you will get a very consistent cut. But until it is set correctly to the blade, the cut will consistently wander in one direction. Which fence is best? Try them both and decide for yourself- either will give excellent results properly used. Generally

though, I use a point location fence with stock that is less than flat, and a flat fence with consistent stock.

Photo 7- A long fence is easy to make with a few pieces of plywood screwed together. The piece that makes the fence face must be flat.

The job will come out better in either case if you can first truly flatten the face of the stock that contacts the fence. This is particularly true of the point location fence, which acts like a planer because it follows the shape of the face against the fence. A long fence has more of a jointing effect to it that is if the face touching the fence is not flat the stock still moves in a straight line at the blade so long as the fence is flat and the same points on the stock always contact the fence. But this requires that the fence be twice the length of the stock so that the same points always contact the fence from start to finish. This being impractical, the thing to do is flatten the stock face, and to do this quickly you need a jointer.

If you have a jointer it is probably a 4 or 6" wide model, or perhaps you are lucky enough to have an 8". It would seem that the width of the jointer limits the height of the resaw operation- if you want to joint first. With a 6" or even 4" jointer though, you can end up with wider stock by jointing and resawing at this lesser width and then edge gluing.

You can face joint stock that is wider than your jointer knives with this procedure. Set the jointer to take a light pass, say 1/32". Put the fence all the way to the back. Take a pass, jointing as much of the face as you can. Now, turn the part 180o and joint the other side of the same face. Turn it 180o again and take a pass. Each pass leaves a small step in the middle of the board face, but after three or four faces you will find that the two cuts on the one face are parallel. Now plane the other face till it is flat, then plane the jointed face. This procedure will only work with stock up to about 1-1/2 times the width of your jointer knives.

Once you have a flat face to work with, plane the other side of the stock just enough to clean it up and make it parallel to the jointed side. Now you have two flat sides from which to resaw on one piece. Even if you plan to get only two pieces from the stock (and thus resaw from only one face) it is a good idea to plane the other side now, because after resaw it will go through the planer better with a flat face lying on the planer table, as opposed to a rough face. Set up the band saw by setting the fence at a distance from the blade equal to the thickness you want plus extra for a fudge factor. How much extra you should set up for is a function of how confident you are about the accuracy of your resaw set-up. If you know that it will cut a very true line you can leave less than 1/16" extra, but when you are just getting started it might be best to leave 1/8" or so. Soon enough you will see just how good your set-up is, and once you have it working nicely you can minimize the extra.

But how much extra you leave can also be a function of how thick your stock is and how thick you want your results to be. If you have 1-3/4" thick stock and you want to end up with pieces at 3/8" thick, the reality is that you can only get three pieces (total

thickness 1-1/8"), and not four (total thickness of 1-1/2"). This is because if you try to get four you must make three cuts, and each cut takes over 1/16" in the kerf, which eats up all the extra between 1-3/4 and 1-1/2, leaving nothing for straightening and planing off band saw marks. Taking three out of the 1-3/4" piece means you can cut each at over a half inch, leaving plenty of extra for jointing and planing. In this case there is no sense in minimizing the thickness of cut at the resaw, you might as well shoot for making all three the same thickness.

When you begin making a cut, watch what the blade does carefully. The idea, of course, is that it follows a parallel line to the face against the fence. Push slowly, and let the blade cut at a slow, even rate. Don't force it or you can cause the blade to buckle. If the blade is sharp the cut will proceed smoothly, if it is not it won't, and there are no two ways about it. This is the most wood your band saw will handle at one time and a sharp blade is essential. After the cut has progressed a few inches, stop the forward motion of the cut, turn off the saw and wait for the blade to stop. Retract the stock and inspect the cut at the top and the bottom. If both sets of guides are pointing in the same direction, the direction of cut will be the same at top and bottom. If the cuts go different directions, it could be that one or both of the flanges that the guides are mounted on are pointing the wrong direction. Also inspect the middle of the cut by looking through the kerf. You should see light through there, and if not that means that the cut is curved inside. This could be because the blade is not wide enough, not sharp enough doesn't have enough tension, or you were pushing too hard.

Once you are satisfied that you are getting an even cut (and be prepared for a few failures at first, so use test pieces), resaw the piece all the way through. If you are trying to get more than two pieces from your stock, flip it over and resaw again referring off the other flat face. Now you are left with two pieces that are surfaced on one side and rough on the other, and one piece that is rough on both sides. Depending on the thickness you started with and the thicknesses of the two cuts you made, the middle piece will be thick enough to resaw again or perhaps it is only thick enough for one piece. Face joint it once again, and plane, and resaw if so desired.

FINISH PLANING

Finally you will have resawn until there is no more thickness to resaw, and it is time to take it all to the planer to surface the rough resawn faces. This is a simple procedure for pieces 1/4" and above in thickness. But if you want stock thinner than this a couple of problems arise that are easily solved with the simplest jig you will ever make and the greatest gift to woodworkers since duct tape- double-sided carpet tape.

All planers have a minimum thickness that they will plane- from as much as 1/4" to as little as less than 1/8". If the thickness you desire is less than the minimum for your machine, the way to plane it thinner is to put it on top of another, thicker piece of stock and run both through together (photos 8 and 9). The only requirements for this planing jig are that it be relatively flat and of a very regular thickness. Mine is made from a section of a solid core door.

Photo 8- Plane very thin pieces by putting them on top of a thicker piece, in this case a section of a solid core door.

Another problem is that when very thin stock is planed, say less than 3/16", the stock is flexible enough that the front of it can bounce up into the planer cutting head when the piece first goes in, and before it is held down by the out feed roller of the planer. It can also pop up into the cutter at the end of the cut after the rear end comes away from the in feed roller. To prevent this, use the planing jig and put double-sided carpet tape under the lead and tail ends of the piece being planed so that the ends are secured to the jig (photo 9). This will make the final thickness of the ends slightly less than in the middle where there is no tape, but by no more than 1/64th or so. If you are worried about this, put a layer of duct tape on the jig between the carpet tape, but don't use double sided here. It's hard enough getting the planed piece off with tape at two ends, without it in the middle. To get the piece off, first lift it in the middle, then run your fingers between it and the jig working your way toward the ends.

Photo 9- Double sided carpet tape is just the ticket to keep the thin stock down on the planing jig when you push it through the machine.

Because when you use this jig you add a thick piece to what will go through the planer, you must of course lower the planer table to accept the additional thickness. Begin planing by taking off only a very small amount, and take no more than 1/32nd with each pass. This makes the procedure less strenuous on the thin pieces and helps to prevent them blowing up. Be sure to always plane with the grain, or they will certainly blow up. Here is where choosing stock with consistent grain really matters- reversing grain won't blow up in the band saw but it will in the planer.

ALL I HAVE IS A BAND SAW AND TABLE SAW

Photo 10- Even if your stock is so wide that the table saw can't complete the cut; use it to do most of the work so your band saw doesn't have to.

If you have these two machines and no jointer or planer you can follow one other procedure that allows you to cut pieces of a width greater than twice the height of your blade above your table saw. Follow the procedure outlined above for double ripping on the table saw using such wide stock, and the result will look like that in photo 10. Then take this to the band saw and cut out the remaining stock between the two saw kerfs, as in photo 11. This is a far easier task at the band saw than a full resaw set-up, but it tends to use more lumber to get the same number of thin pieces because the table saw kerfs are thicker. Once again the thin kerf blades are an advantage here.

Photo 11- There is so little work for the band saw to do between the kerfs that you don't even need a fence to guide it, but using a fence will prevent wandering and leave a more consistent product, easier to deal with you are going to hand plane it smooth.

PROCEDURES FOR RESAW OUTLINED BY AVAILABLE MACHINES

Scenario A- with only a table saw available, using stock 5-1/2" wide or less.

Step 1- Pick straight stock

Step 2- Double rip at incremental blade heights

Step 3- Edge glue to attain desired width

Step 4- Visit local cabinet shop to use their wide belt sander or planer to bring stock to its final thickness.

Scenario B- With a table saw and 12" high band saw, with stock wider than 5-1/2".

Step 1- Pick straight stock

Step 2- Double rip at incremental blade heights to maximum height of table saw blade.

Step 3- Band saw remaining width of cut.

Step 4- Hand plane or belt sand boards smooth, or visit local cabinet shop for planing or wide belt sanding service.

Scenario C- With jointer, planer and band saw.

Step 1- Face joint stock flat.

Step 2- Plane other side parallel.

Step 3- Resaw at the band saw. Face joint between cuts to straighten.

Step 4- Face joint resawn pieces if there is enough thickness to do so.

Step 5- Plane pieces to final thickness.

RESOURCES FOR MAKING THIN STOCK

Band Saws, Blades, Guides
Belt Sanders
Hand Planes
Jointers
Planers
Table Saws, Blades