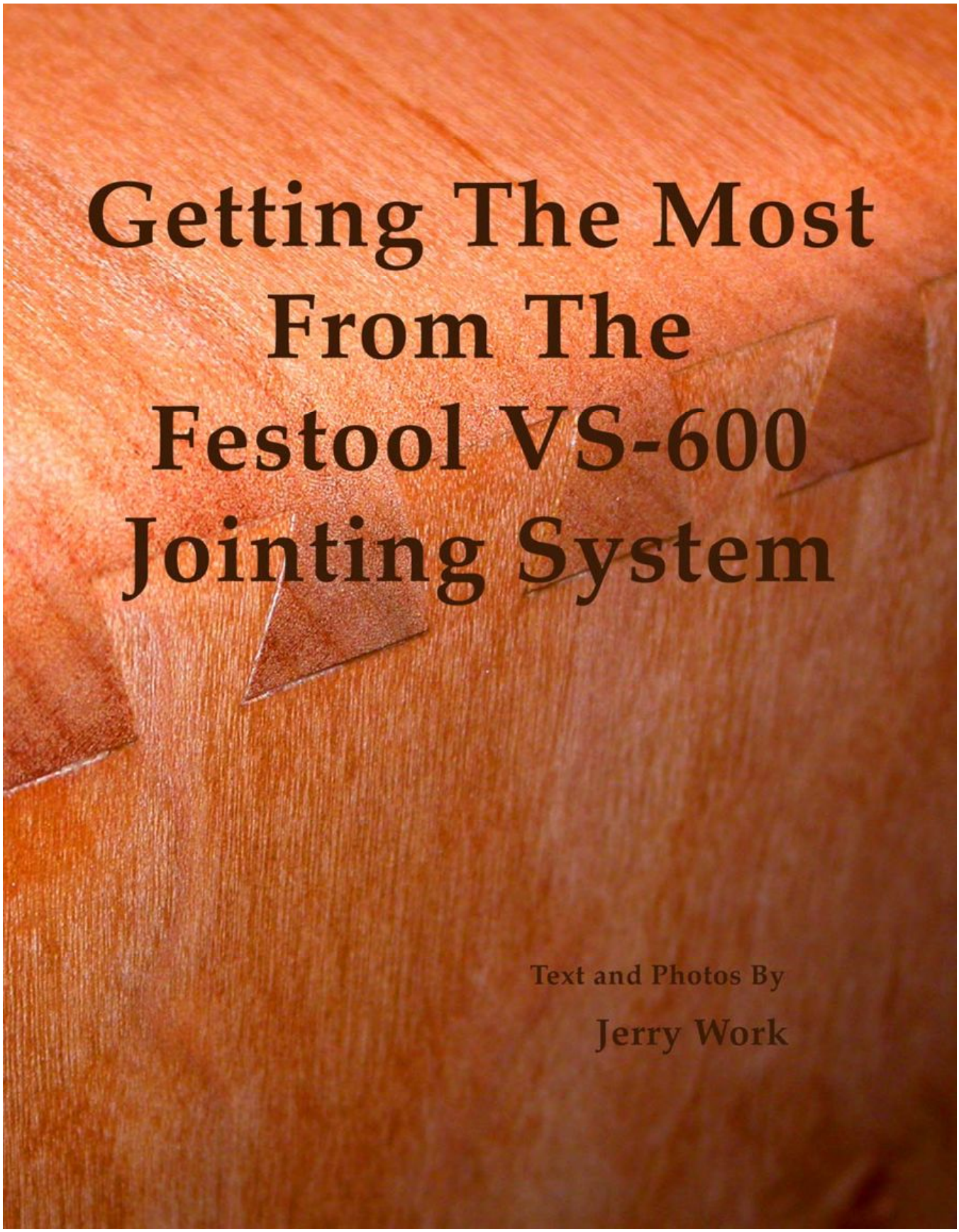
Getting The Most
From The
Festool VS-600
Jointing System
Text and Photos By
Jerry Work

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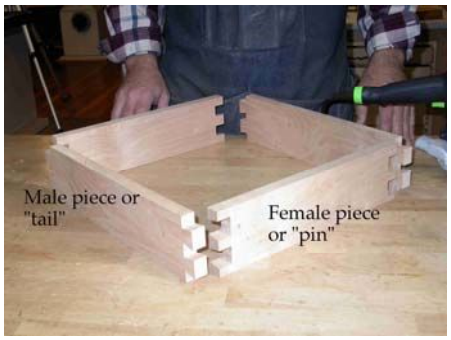
Getting The Most From The Festool VS-600 Jointing System

By: Jerry Work

Few things in woodworking invoke the image of quality more than well cut dovetails joining the sides of a drawer, box or cabinet. For thousands of years this simple, elegant joint has been employed by the finest craftsmen for its inherent strength as well as for its pleasing aesthetics. Watch a person who sees a fine piece of furniture for the first time. Their hands will invariably rub over the dovetail joints as though to confirm that this is truly a well crafted piece.

Anatomy of a Dovetail Joint

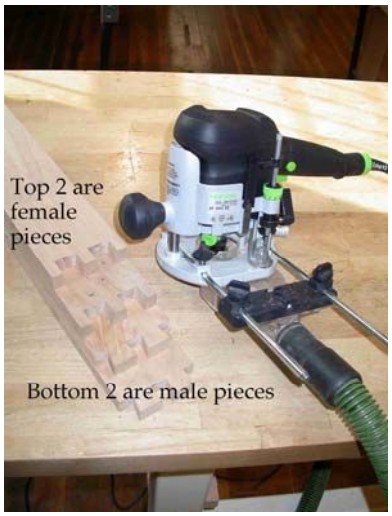
There are several different types of joints that are all called "Dovetail Joints". They get their name from a fan shaped male piece that looks a bit like the tail on a dove. That fan shaped male fits into a female recess of the same shape.



Once in place the joint cannot be pulled apart without breaking the surrounding wood.

The strength of the joint does not rely on glue, nails or screws. It comes from the interference fit of the male and female fan shapes. You simply cannot pull them apart without breaking the wood.

A dovetail joint requires at least one fan shaped male tail and at least one female fan shaped recess. It may have two, three or many more fan shaped male tails and corresponding female recesses, but it must have at least one to be a joint at all.



Before we start learning to use dovetail joints to build perfect drawers, boxes and cabinets far faster than you ever thought possible, let's spend a few moments discussing how these different joints, all called "dovetail joints," differ one from another.

All can be used to securely join two pieces of wood end to end or at right angles to one another, but that is about where the similarities end and the differences begin.

The Sliding Dovetail Joint - The simplest joint called a dovetail joint is where the male fan shape is cut laterally along an edge or an end of one work piece and the female recess is grooved into the other.

If these are both cut with exactly the same slope on the sides and to the same depth the two pieces can slide together to form a very strong, self-locking joint called a "sliding dovetail" joint.

These are most often cut with a router bit with sloped sides (called a "dovetail cutter") where the router is guided past stationary work pieces in a straight line. Sometimes this is accomplished using a guide rail (my favorite) and sometimes by holding the router stationary while the work pieces slide by in a straight line guided by a fence.

They also can be cut on jigs which hold the work piece stationary and slide the router past the work piece.

I regularly use sliding dovetails instead of dados to join the two sides of a cabinet together to form the door or drawer openings as in the picture above, or to hold shelves that tie the two sides together. I also use it for fastening drawer guides to the sides of a drawer opening, for fastening the toe kick across the bottom of a cabinet, to hold the top to the sides, and for a variety of situations when I need two pieces joined at right angles to one another in a very secure and self-squaring joint.

The pictures above and below show a side slat assembly for a large bookcase that is held together with sliding dovetails.

Once you start using sliding dovetails you will rarely revert to simple dados again.

The Half Blind Dovetail Joint - The second kind of joint that is called a "dovetail joint" is where the female recess is cut on the end of one work piece and only part way through the thickness of that work piece forming a socket into which the male fan shape cut in the other work piece is trapped.

Since the joint can only be seen from the side where the fan shape is cut, it is most commonly called a "half blind" dovetail joint. These are most often cut by a dovetail shaped router bit guided by a template where the male fan shape is cut with that work piece held vertically and the female socket cut with that work piece held horizontally.

Often, like with the VS-600, both parts of the joint can be cut simultaneously, and the joints in two sides of a drawer or box can be set up and cut at the same time. The manual for the Festool VS-600 refers to this as simply a "dovetail joint". We will talk a lot more later about how to do these joints quickly and accurately.

The Through Dovetail Joint - The third kind of "dovetail" joint is where the male and female parts of the joint are cut all the way through the thickness of each work piece. This is commonly called a "through dovetail" although the Festool VS-600 manual refers to this as an "open dovetail tenon". It is a far more complex and confusing joint to machine than either a sliding dovetail or a half blind dovetail. The male fan shaped portion of the joint is normally cut with a dovetail shaped router bit with the router guided by a template with straight sides on each finger of the template.

The female recess portion of the joint is normally cut with a straight router bit guided by a template where the sides of each finger are angled at exactly the same angle designed into the dovetail router bit.

The angle machined into the template and the angle machined on the router bit must be exactly the same or the two halves of the joint simply will not fit together.

This is one reason I always recommend using ONLY router bits manufactured by the same company that produces the through dovetail template.

Nothing can ruin your day faster than to be frustrated by the fact that the angle actually cut by an off brand router bit is slightly different from how it is marked, and that is slightly different from the angle on the fingers of the template. No matter how hard you try, you will never get a good fitting

joint out of a mismatched combination.

The through dovetail can also be a confusing joint to cut because when you look at the work piece with the female recesses you can either see the recesses, or you may instead see the uncut portion between two recesses that are called the "pins". If those uncut portions are between one side of the outboard most recess and the edge of the work piece, they are called "half pins". It is hard, especially at first, to keep straight which work piece is the male (most often called the "tail board") and which is the female (most often called the "pin" board).
I'll try to take a bit of the confusion out of this when we talk about how to cut perfect through dovetails using the Festool VS-600. The Festool manual talks about the male fan shaped portion as the "dovetail" and the female recess or pin board as the "tenons", terminology I find confusing myself.

Fortunately, it is easy to see the difference by looking at the template used for these two portions of the joint.

The male portion is cut using a template where the sides of the guide fingers are straight while the female portion is cut using a template where the sides of the guide fingers are angled.

In Festool speak, the template for cutting the male fan shape is labeled as an SZO-14-S or SZO-20-S, while the template with the angled fingers for cutting the female recesses is labeled as an SZO-14-Z or an SZO-20-Z.

It really doesn't matter what you call these two as long as you are clear that you will use the S for cutting the fan shaped male "tails," as shown in the picture above right, and the Z for cutting the female recesses separated by "pins."

Throughout this manual I will refer to the male and female parts of the joint trying to avoid the confusing tail and pin descriptions.

Other joints also called "dovetail" joints – There are a few other joints that also trap one work piece to another by a male with angled sides mating with a female recess with the same angled sides. If the male and female portions are cut in the ends of two work pieces they can be joined flat, end to end and are usually called a "flat dovetail" joint. If the female portion is cut into the ends of both work pieces and a separate male piece is machined with the fan shape at each end, that joint is usually called a "butterfly" dovetail joint. We will not be discussing these flat or butterfly dovetail joints in this manual.

Advantages - Besides the inherent strength of any of these kinds of dovetail joints, another great advantage of a well machined dovetail joint is that they are inherently self-aligning. The bottom of the fan shaped male protrusion ends in flats which are exactly the same level as the surface into which the female grove or socket is cut in the mating side of the joint. The flat on one

piece is held tight against the surface of the other thereby holding the two parts perpendicular to one another on half-blind, through and sliding dovetails, and exactly end to end on flat dovetail or butterfly joints.

If your cuts are made with precision, when you assemble your piece it will be nearly perfectly square just from the dovetail joints themselves.

So why are dovetail joints so intimidating for many?

Since these are self-aligning, self-squaring joints of extreme strength, why is it that they are not regularly used by all woodworkers as the preferred method of joining two work pieces together? And, why is it that the term "dovetail joint" also can strike such fear and intimidation in so many woodworkers?

One part of the answer is that for the joint to work well both the male and the female portions of the joint have to be cut with extreme precision. If the angles and sizes of the male fan shapes and the corresponding female recesses are not exactly the same the joint will either not go together at all or it will be so loose as to be nearly useless.

Another part of the answer lies in just how difficult it is to cut these perfectly matching fan shapes when you do more than one of each on each of the two parts to the joint. Now the requirement for precision is amplified since even if the male and female fan shapes are exactly the same size and same angle, if they are not also exactly the same distance apart, the joint simply will not go together no matter how hard you try.

Given the requirements for perfection in cutting these highly useful joints, there is little wonder why the dovetail joint is considered so difficult to cut properly and also why there have been so many techniques, jigs and fixtures offered by different manufacturers to cut them.

Each requires the user to learn a specific, different set of steps and techniques. Often the steps and techniques are far from intuitive and can involve a rather long or steep learning curve.

Maybe that is why you can go into most any woodworking shop and you are likely to find at least one and often two or more dovetail jigs stacked in the corner unused, gathering dust. The owner tried to learn the steps and techniques outlined in the manuals that accompanied the jig or fixture, and may even have done so at one time. But, the next time they tried to use the jig they got confused and felt like they had to start all over again from scratch. Frustrated, they tossed the jig into the corner and there it sits today.

In this manual I am going to try to reverse this trend by showing you how to use the exceptionally well engineered Festool VS-600 dovetail jig to make perfect drawers, boxes and cabinets every time with little or no "relearning" required.

Start with the desired outcome in mind

Most manufacturers manuals, including the Festool VS-600 manual, tell you a lot about how to set up and adjust their jig but do little to tell you how to achieve the outcome you want. Here we will start with the outcome you want – a perfect drawer, box or cabinet – and show how to use the VS-600 to achieve that outcome quickly and easily every time.

In fact, by the time you finish with this manual, I hope you will find the VS-600 is in use every day in your shop or studio just like it is in mine. When it becomes the best, fastest and easiest way to achieve your perfect drawer, box or cabinet it will be the "go-to" tool of choice for this purpose and, believe me, will gather no dust in your shop.

Making a "perfect" drawer in less than five minutes

Let's start with what constitutes a "perfect" drawer, box or cabinet. Since the side joints on all three are the same, to save my typing and your reading, from this point onward I will use the term "drawer" to mean either a drawer, a box, or a cabinet carcass. A little later on I will also cover what else you need to do besides the dovetailed side joints that differentiate one from another. And, still further on we will talk a bit about using the VS-600 to also make slotted or box joints as well as dovetail joints.

A "perfect" drawer is one that is exactly the length, width and depth you want, is absolutely square, sits flat and invokes an image of fine craftsmanship from the minute you assemble it -

No sanding to fit, no "make it a bit bigger and cut it to fit afterwards" and no "put a bit of filler into the gaps to make it look like it fits" even when it doesn't. Just perfectly made in the first place.

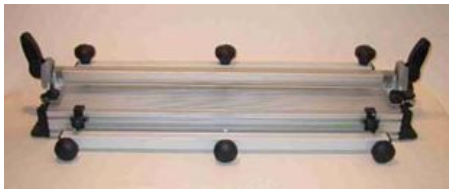
A "perfect" drawer is also one you can make day-in and day-out with beautifully cut half blind dovetail corners in less than 5 minutes. Yes, that is right, five minutes from the time you have the properly prepared stock in front of you to the time you are ready to assemble.

Stock preparation and the precise engineering of the VS-600 base unit, template, guide bushing and cutter are the keys to your perfect box in five minutes every time.

But, before we start we need to understand how the system works which we will do in the next section.

How the VS-600 system works

The VS-600 is designed around a **base unit**



which will hold your properly prepared stock in exactly the right location while you make your cuts, a set of heavy, machined metal **templates** which will guide your router to make the cuts in exactly the right places,

a **guide bushing** which you will attach to your router to exactly follow the contours of each template, and a **cutter** that is of the exact size and angles for which the template was designed.

The templates mount on the base unit. The guide bushing and router bit mount on the router.

Every part of a VS-600 system is shown in the picture below. While it may look a bit intimidating, the pieces all relate to one another quite simply and you don't need to buy them all at the same time.

One of the beauties of the Festool VS-600 system is that you only need to do your set up ***one time***. And, all that amounts to is (a) setting the template in or out to get the edges of the finished cut perfectly flush with one another and (b) setting the router bit depth to get the fit of the joint exactly as tight as you want it.

From that point on, you only need to mount the bit in your router, set the depth the same as on your test piece, and cut away so long as the component parts are within the range each template is designed to handle.

See the sidebar on "One Time Setup" on page 32.

I have found that in most cases the factory settings for in/out on the templates and the factory bit depth recommendations for each template are right on and little adjustment is required. One or at most two test cuts is all you need to make.

When you get the fit you want, keep the test pieces as your depth gauge for all the subsequent uses of that template/bit combination, perfect drawer after perfect drawer.

I strongly recommend the use of Festool guide bushings and cutters to be sure these match the templates properly. I also recommend the use of the excellent Festool routers.

They are lighter in weight than most other routers to give you ease of control. They are far more powerful than their small size would suggest. I have yet to bog one down no matter what I was cutting. And, they offer excellent chip/dust collection so you can concentrate on producing your perfect drawer in five minutes, rather than worrying about trying to work around the mess most other routers and jigs produce.

Decoding the Festool Catalog

Festool, like many tool manufacturers who service a world market, design their tools around the metric system. The numbers they use are all in millimeters which I will shorten in this manual to "mm." See "Using the Metric System" on page 36.

As that note suggests, you don't have to think in the metric system to gain all the advantages of measuring in the metric system.

But, to decode the Festool catalog you will need to at least understand that one inch is a bit over 25 mm, and one mm is a bit less than .040."

Festool offers four different combinations of templates, guide bushings and cutters for the VS-600 to allow you to cut perfect half-blind and through dovetails in stock of a range of thicknesses.

In addition they also offer two different templates, guide bushings and cutters to allow you to cut equally perfect box joints in stock of different widths, and even a doweling jig to allow you to joint two pieces of wood or man-made materials with multiple dowels if you wish.

The first time you look at their catalog or web site, the section on the "VS-600 jointing system," as they call it, will appear to be a bit intimidating. Let's decode it.

The Base Unit - The VS-600 (item number 488-876) is the base unit. You need one of these no matter which/how many templates you also buy.

The templates are all sold separately. None come with the base unit and the base unit cannot be used to cut any joint without at least one template.

The 600 refers to the maximum width of work piece that you can mount into the VS-600. 600mm is a bit less than 24" so you can work on very large drawers, boxes and cabinet carcasses.

Half Blind Dovetail Templates - There are two half-blind dovetail templates. They are given model numbers beginning with the letters SZ followed by a number which refers to the diameter of cutter expressed in millimeters that template is designed to use.

Do NOT try to use any cutter other than the one specified. If you do, your joints simply will not work. Each of these two templates is designed to cut perfect half-blind dovetail joints into stock that is within a specified range of thicknesses. Do NOT try to use stock of a thickness outside of these ranges. If you do, your joints simply will not work.

Template SZ-14 shown below left is designed to cut half-blind dovetail joints in stock **from 15 to 20mm in thickness**.

This is about 9/16" to a bit over 3/4". If you try to cut half-blind dovetail joints in stock outside this range, the female recesses (sockets as they are called) will either bottom out too close to the front or back of the drawer leaving a thin, weak area, or the male fan shaped tails will be too short to be strong enough.

You can cut half-blind dovetail joints in stock where the front and back components are more than 20mm thick so long as the sides are no more than 20mm. If you do, however, most will think the joints simply look shallow and out of scale. So, stay within a stock width of 15 to 20mm with this template.

The proper guide bushing (designed to fit only on Festool routers) comes with each template so you do not need to buy these separately. Festool calls guide bushings, "copy rings".

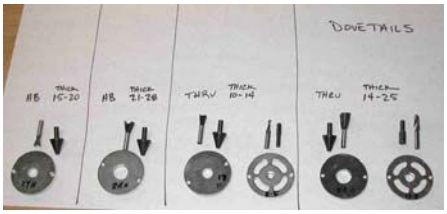
You can use other routers and guide bushings so long as the guide bushings have exactly the same outside diameter as their Festool counterparts.

You also need to buy the cutters separately. Festool calls their carbide tipped bits HW while the high speed steel bits are called HSS. I only use the HW or carbide bits. I find the Festool router bits to be among the best I own and use them every day. They are very well machined, finely polished, sharp right out of the box, and have large carbides which seem to stay sharp longer than most bits. They also are very well balanced and centered so your cuts are vibration free and "dead on" accurate in both size and angle.

The right cutter to use with template SZ-14 is 490-992. This has an overall diameter of 14.3mm with a cutting height of 13.5mm set at a 15 degree angle.

The shank diameter is 8mm which I find ideal. It is much stiffer than the ¼" shank bits you might have used before, yet small enough to produce a pleasing dovetail size and geometry. A ½" to 8mm collet adapter is available from Festool and others.

Template SZ-20 is designed to cut half-blind dovetail joints in stock from 21 to 28mm (26/32" to 1 3/32"). The same caveats on stock thickness apply. Use cutter 490-996 which is 20mm in overall diameter, has a 17mm long cutting height set at 15 degrees.



All of the cutters, guide bushings and alignment pins used for all the Festool VS-600 dovetail joints are shown above with their guide bushing centering mandrels.

The two groups on the left are for half blind dovetails and the two on the right are for through dovetails. We will cover the templates for through dovetails in that section.

All the rest of the templates and cutters are designed for either box joints or dowel joints. We will cover these later in the manual.

For now, let's concentrate on building your perfect drawer with half-blind dovetail joints in under five minutes.

These are the most commonly used dovetail joints for drawers and boxes and are also quite useful for cabinet carcasses.

Once you master half-blind dovetails and consistently produce a perfect drawer in under five minutes, then you can branch out to the other types of joints as you wish.

Don't make this mistake

Just don't make the mistake I see first time users of dovetail jigs make all the time. They pull their new purchase out of the box, do a cursory glance through the jig manufacturers manual and start butchering wood. They cut a few poor half-blind dovetail joints, then several really poor through dovetail joints and maybe an ill-fitting box joint or two. When they see the mayhem they have created, they usually give up in frustration. Stay with the half-blind dovetail joint until it becomes almost automatic for you. Then, and only then, branch out to also learn to cut the other types of joints.

A Perfect Drawer Using Half Blind Dovetail Joints

Earlier I said stock preparation, along with the precise engineering of the Festool VS-600 templates, guide bushings and cutters was the key to achieving the desired outcome of creating a perfect drawer with half blind dovetails in under five minutes.

I use primarily solid woods for all my furniture so will spend some time outlining how to get properly prepped solid wood components.

If you want to use man-made materials, stick to a good grade of multi-ply plywood like Baltic Birch. That usually comes in 5′ x 5′ sheets. The plain old softwood plywood sold in 4′ x 8′ sizes has too few plys and too many interior voids to make for anything approaching a perfect drawer.

Hardwood plywood is usually much better and can be used with some success.

Don't try to use chip board or compressed board as they generally are too weak to work well.

MDF can be used but know that the male fan shapes can be quite fragile until the piece is assembled and glued up. Once assembled with a good quality wood glue, MDF makes for a strong drawer, box or cabinet carcass. Without glue the joints in MDF are simply too weak to be useful.

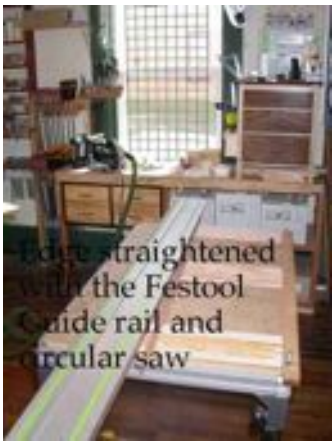
Half blind dovetail joints cut in solid wood are strong with or without glue.

To prep solid wood you almost must have a jointer and a planer.

Seldom is the wood you buy pre-surfaced really straight, flat or of equal thickness over its length. It may look that way in the store but often will have some cupping, twist, warp or curve.

You can see it if you look at the end of the board to see if it is flat side to side or whether it bows across its width somewhere along the length. That bow up or down is called "cupping." The board often also will have some twist. This is where the flat face of the board is not parallel along its entire length. Or, it may be warped enough that individual components are not flat over their length.

The only way to effectively take out cupping, twist or warp is with a jointer. If you run a warped, twisted or cupped board through a planer, the pinch rollers will temporarily flatten the board right under the planner knives. The warp, cup or twist will reappear again as it exits, leaving you with a warped, cupped or twisted board that is simply thinner.



If you joint one face flat first, you will take out the warp, cup or twist. Now, when you run it through the planer to get it the thickness you want, it will come out still flat.

Don't worry too much if a board is flat but not straight. It is easy to cut the curve out of one edge and then cut/plane the other edge to be straight and parallel to the first and of the width you want as shown in the before & after shots below.

Cutting the drawer components to the proper size

Height - Centered Dovetails Look Best – Start with the height of drawer you want.

All fixed template half blind dovetail jigs, including the Festool VS-600, are inherently designed around drawers ***of a height that is an even increment of twice the finger spacing***.

In the case of the SZ-14 template, the distance between each finger is exactly 22mm. If your dovetails are properly centered on the drawer side, when you look at the finished drawer from the side you will see an 11mm half pin at both the top and the bottom edges and all the other dovetails will be exactly 22mm apart. Hence, the set of dovetails will be ***centered*** over the height of the drawer.

This is the most pleasing arrangement to the eye and also the strongest joint.
If your drawer height is not an even increment of twice the jig finger spacing, you will still have an 11mm half pin at the top and either more or less than that at the bottom edge of the drawer. That unbalanced arrangement looks awkward to most people and the lower pin can become so small as to be weak and break off during assembly or use.

The easiest way to calculate the height of a drawer on which half blind dovetails will be properly centered is simply to multiply the template spacing (22mm for the SZ-14) times twice the number of the male fan shaped tails or female recesses showing. If your drawer will show only one male fan shaped tail when viewed from the side, the drawer will have an 11mm half pin at the top and bottom and one 22mm female recess in the middle so it will be 44mm high (about 1 ¾"). This is about as small as it is practical to make a drawer and still leave room for a bottom.

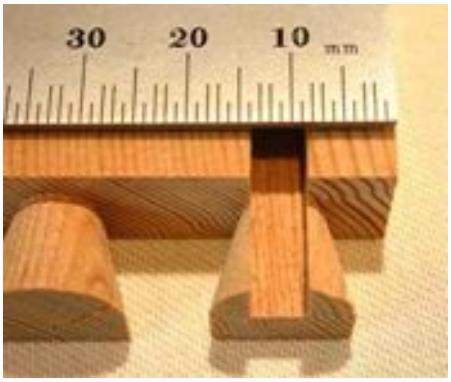
Drawer height for template SZ-14 = 44 x t

Drawer height for template SZ-20 = 64 x t

where t = the number of tails (and female recesses) showing from the side.

See the **"Table of Drawer Heights Which Will Result in Properly Centered Joints"** on page 43 for these calculations from one tail showing to the maximum size drawer which can be built on the VS-600 using these templates.

One more note on drawer height: The slot you will cut into the inside of the front, back and drawer sides to receive the drawer bottom will be centered on one half the template spacing up from the bottom of the drawer components (11mm for the 22mm spacing on the SZ-14 and 16mm for the 32mm spacing on the SZ-20).



So, the actual inside depth of your perfect drawer cut with the SZ-14 template will be 11mm plus one half of the thickness of the drawer bottom less than the overall height of your drawer. The distance from the bottom edge of the drawer sides, front and back to the underside of the drawer bottom will be 11mm less one half of the thickness of the drawer bottom -- nice and strong while still maximizing inside depth for your prefect drawer.

Cutting the slot on a center line that is 11mm from the bottom edge will put the drawer bottom slot (or dado as some might prefer to call it) exactly in the center of the male fan shaped tails and female recesses so it will not show from the outside of the drawer and will be as strong as possible.

So, pick a drawer height that is an even increment of twice the template finger spacing, 44mm (2 x 22mm) for the SZ-14 template & 64mm (2 x 32mm) for the SZ-20 template. Cut all your flat stock to that width.

Thickness - The two sides must be the same thickness, which can be of any thickness within the range of thicknesses

available for each template (15 to 20mm for the SZ-14 template). The front and back can be of a different thickness than the sides but the front and the back pieces need to each be the same thickness and within the 15-20mm range. A very pleasing drawer to the eye, and also a very common size, is one where front and back are 19mm (about ¾") and the sides are 15mm (about 9/16").

The fastest, easiest thing is to simply make all four drawer components the same thickness, but you do not have to.

Length of the Front and Back Pieces - Cut the ***front and back*** pieces to be exactly the length you want for the finished width of your drawer. If your perfect drawer would be 400mm wide (a bit under 16"), cut the front and back pieces to that length.

Length of the Side Pieces

The length of each drawer ***side piece*** will be the desired overall depth front to back of your perfect drawer less the thickness of the front piece, less the thickness of the back piece plus twice the depth setting for your router bit which is 12mm for the SZ-14 and 15mm for the SZ-20.

Side piece length = desired front to back dimension – 2 times (thickness of F or B – depth of router bit)

If you want a drawer that measures 500mm (about 20") front to back using the SZ-14 (which calls for a router bit depth setting of 12mm) and want to use front/back components that are 20mm thick, cut each side component to be 484mm long.

484 = 500 – 2(20 – 12) or 484 = 500 – 2(8) or 484 = 500 - 16

This is really easy to calculate using the metric system but can be a bit confusing if you insist on staying with the base eight "inch" system where you will have to add and subtract some fractions.

See **"Sidebar on Using the Metric System"** on page 36 of this manual for my take on this question.

Now cut the half blind dovetails at each corner

If you prepare your stock as indicated, the cutting of the half blind dovetail joints to make a perfect box in less than five minutes every time is really simple. With the Festool VS-600 you only need to mount the work pieces into the jig ***twice*** to make all eight parts of the dovetail joints on the four corners. That is because for half-blind dovetail joints made on the VS-600 you can cut two different corners at the same time. And, you only need to set up and align the template once so there is little chance for error.

Once you have done your one time set up procedure to adjust the template to the VS-600, mounting it and starting to make your perfect drawer is simple and fast.

See the sidebar note on "One Time Setup" on page 32.

Mount the SZ-14 or SZ-20 template into the VS-600 base

unit with the in/out adjusting wheels at each end against the front edge of the VS-600.

Loosen the rotary knobs on the two sides stops. Drop the template down and align the side stops to the inside of the "D" shaped hole cut in each side of the template.

Tighten the two rotary knobs to hold the side stops in place. Turn the side stop fingers so SZ-14 or SZ-20 is facing INWARD, towards the center of the VS-600. The jig is now ready to use.

So, how do you know which piece goes where and how they are oriented on the VS-600?

Start by ignoring the drawings and piece numbering text on page 21 of the Festool VS-600 manual. I will show you a much simpler method that you can far more easily remember.

Place the drawer components in front of you, standing upright just like they will be on your finished drawer with the front of the drawer facing you. Take a moment to look at grain patterns and any defects to determine the inside and outside faces for each component and which edge should be the top of your drawer. When you like the arrangement, mark the **INSIDE FACE** of each component and mark the edge that is to be the **TOP**. I do this by drawing a triangle with the point up on the inside of each component. Mark which is the **FRONT** piece and which is the **BACK** piece of your perfect drawer. I write "f" or a "b" inside the triangle to indicate that to myself.

All of the cuts will take place with the INSIDE face of each component facing out, away from the VS-600, and with the TOP edge against the side stops on the VS-600. The Front and Back will be cut horizontally clamped under the top clamp bar. The sides will be cut vertically clamped under the front clamp bar.

You can't go wrong if you always have the inside face away from the jig with the top edge aligned with a side stop. The front and back of your drawer will always be cut horizontally clamped by the top clamp bar. The sides will always be cut vertically clamped by the bar on the front of the VS-600. The order in which you make your cuts

is not important so long as the inside face is away from the VS-600 and the top edge is against a side stop.

I am in the habit of first raising the template all the way up to get it out of the way. Now I slide the front piece horizontally into the upper clamp on the left side of the VS-600 with its TOP edge against the left side stop.

I then place the back piece horizontally into the upper clamp on the right side of the VS-600 with its top edge against the right side stop. Clamp those down.

Set the template on top of these two components snugly and clamp it in place. Then I take the router bit depth gauge (the female component from the test piece we made when originally setting up the VS-600 with this template) and slide it vertically under the front clamp and clamp it lightly.

Since the template pivots even when clamped in place, it is easy to pivot it out of the way while you line up the end of the vertical piece to be exactly flush with the top of the horizontal piece that will become the front or back of your drawer.

Now I place the router on top of the template and plunge the cutter to the exact depth of the test piece. That is all the router set-up you need to do.

Remove the router bit depth test piece from the clamp bar on the front of the VS-600 and replace it with the two side components. One will clamp to the right side of the VS-600 and one will clamp to the left side. Make sure the INSIDE face is away from the VS-600 pointing towards you with the TOP edge against the side stop. Use a flat piece of scrap to make sure the ends of these vertical work pieces are flush with the top edge of the horizontal work pieces as shown in the picture to the left and clamp them down.

Recheck to make sure everything is nice and square and securely clamped in place. The horizontal work pieces that will become the front and back of your drawer should butt tightly up against the vertical pieces that will become the sides of your drawer.

The end of the vertical work pieces (the sides) should be exactly flush with the upward face of the horizontal work pieces (the front/back pieces).

All pieces should have their INSIDE face away from the VS-600 and their top edge aligned with a side stop. Pivot the template down and into place. Make the cuts.

Now simply rearrange the work pieces to cut the other two corners. As before, the top and bottom are held under

the upper clamp bar with their top edges against the side stop and the inside face is away from the VS-600 and pointing up at you. The side pieces are mounted under the front clamp bar with their top edge against the side stops and inside faces pointing away from the VS-600 and facing you with their upper edge flush with the top (inside) face of the front/back components.

Make the second set of cuts and you are done!

The reality is this all takes less time to do than to describe. Practice a few times and you will make a perfect drawer with finely machined half blind dovetail corners in less than five minutes, and you will do it every time.

The drawer sides will come out exactly the size you wanted and will be square, and the piece will be ready to receive the admiring looks from your customers, friends or family who enjoy this hallmark of fine craftsmanship.

Machine the Dado to Receive the Drawer Bottom Before Assembly

Before you assemble your drawer, take a few moments to machine the dado which will hold the drawer bottom in place. Center it up from the bottom edge of the drawer one-half of the template spacing (11mm in the case of the SZ-14 template which uses a 22mm finger spacing and 16mm for the SZ-20 which uses a 32mm finger spacing). That way the dado will not show from the outside of the drawer.

If you want the bottom to be removable, cut the bottom of the BACK piece off at the height of the top edge of the drawer bottom dado. Now the bottom can slide in from the back side and can be held in place by a screw through a slot cut into the back edge of the bottom piece.

I recommend making your bottom 2mm smaller than the inside measurement of the dado both side to side and front to back. That way the 1mm spacing all around will take up any shrinking or swelling of the drawer sides due to normal seasonal changes in humidity. If you use a solid wood drawer bottom, allow 2mm on each edge across the grain since wood moves far more across its grain than with its grain.

I nearly always use solid wood for the drawer bottom and like to keep it from rattling by putting a dollop of water-based contact adhesive or caulk in the middle of the three trapped sides (and the back if it is also trapped). Neither contact adhesive nor caulk sets up solid so the components can still move relative to one another, but they do prevent the bottom from rattling when in very dry climatic conditions.

If your drawer components are all made from man-made materials which move either not at all or far less than solid woods, you can safely glue the drawer bottom in place if you wish.

Here is a quick summary of the steps to make your perfect half blind dovetailed drawer using the Festool VS-600

One time only for each template you will do a test cut to determine the proper router bit depth setting and the template in/out setting to get the fit you want. Save the test pieces to use as a router depth gage for all subsequent uses of that template. From then on:

- Prep your stock to be flat, true and exactly the thickness you want. The front and back components must be the same thickness and within the range of the template you are using (15-20mm for the SZ-14 and 21-28mm for the SZ-20). The side components can be a different thickness so long as that is also within the range of the template you are using.

- Cut all components to a width that is an even increment of twice the half blind template spacing if you want properly centered dovetails. For the SZ-14 the template spacing is 22mm and for the SZ-20 32mm.

- Cut the front and back component to exactly the width you want the finished drawer to be. Cut the side components shorter than the depth you want your drawer to be by 2 times the thickness of the front/back components less the specified router bit depth of cut (12mm for the SZ-14 and 15mm for the SZ-20).

- Mark the top edge and inside face of each component.

- Cut the joints in any sequence, but always align the top edge against the side stop with the inside face away from the VS-600. Always clamp the front and back components horizontally under the top clamp bar and the side components vertically under the front clamp bar.

- Dado the groove for the drawer bottom centered up from the bottom edge of the drawer by one half the template spacing (11mm for the SZ-14 and 16mm for the SZ-20).

- Cut the drawer bottom 2mm to 4mm smaller than the opening from the bottom of the dados both side to side and front to back to allow for expansion and contraction of the components with normal seasonal changes in humidity. Do not rigidly glue the bottom in place. Let it float in the dados. A dollop of rubber cement or soft caulk will prevent rattling.

- Brush glue onto the long grain portions of both sides of the dovetail joints, assemble and square it up.

You're done! A perfect drawer with half blind dovetail joints in less than five minutes, time after time.

Making Your Perfect Drawer Using Through Dovetail Joints

Through dovetails are considerably more sophisticated and complicated joints to cut than are half blind dovetails. The male fan shape has to be cut by a dovetail shaped router bit guided by a template with straight fingers with the work piece held vertically.

The female recesses are cut with the work piece held vertically using a straight router bit guided by a template with angled fingers.

To fit, the angle on the dovetail bit and the angle on the pin template fingers must be exactly the same. Also, the spacing must be exactly the same.

Fortunately, the superbly engineered Festool VS-600 does most of the work for you once you prep your work pieces as described above and determine the correct sizes to cut your component parts.

As discussed earlier, I strongly recommend the use of Festool router bits and guide bushings when cutting through dovetails on this jig.

Length - Determining the correct lengths for your perfect drawer sides, front and back is easy. Just cut them to the exact length you want for the outside width of the drawer and for its depth, front to back.

Height - centered dovetails look best –

Calculating the correct height for your drawer to make sure your dovetails are properly centered is a bit more involved.

You want half pins at the upper and lower sides of your drawer.

This drawer has the dovetail shaped male pieces show from the front, normally they would show from the side. These are the outboard most sides of the female recess at the top and the bottom of the drawer no matter how many female recesses there are in the drawer side. If you get an equal sized half pin top and bottom, you will automatically have evenly spaced, centered dovetails that will look good and hold tight for generations. The trick is understanding the template spacing, the side offset and the maximum diameter of the dovetail cutter used to cut the male fan shapes.

These male fan shapes or tails are usually cut in the ***sides*** of the drawer using the template SZO-14-S or SZO-20-S. The female recesses and pins are usually cut in the front and back of the drawer using template SZO-14-Z or SZO-20-Z.

For the SZO-14 S and Z templates the spacing is 28mm and the side offset is 8mm measured from the edge of the work piece to the outboard tip of the first dovetail slot. The dovetail cutter has a maximum diameter of 14.3mm. The thickness range is 10mm to 14mm for the SZO-14 S and Z templates. For the SZO-20 S and Z template set the spacing is 40mm, offset is 15mm and the cutter diameter is 20mm. The thickness range is 14mm to 25mm.

The distance from the edge of the work piece to the center of the first tail will always be the offset plus half the maximum diameter of the dovetail bit. So, in this case it will always be 15.15mm for the SZO-14 and 25mm for the SZO-20. The distance between two tails will always be the template spacing of 28mm for the SZO-14 and 40mm for the SZO-20.

To calculate the height of drawers that will provide properly centered dovetails just add twice the offset plus the maximum diameter of the dovetail bit to one less than the number of tails times the template spacing.

SZO-14 template set drawer height = 30.3 + 28(t-1)

SZO-20 template set drawer height = 50 + 40(t-1)

where t = the number of tails showing

See the **"Table of Drawer Heights Which Will Result in Properly Centered Joints"** on page 43

The table lists centered heights from one male fan shaped tail to the maximum size drawer which can be built on the VS-600.

As you can see, these two template sets provide a number of drawer heights from which you can choose while still enjoying properly centered through dovetails.

In inches this is a range from around an inch and a half to about eighteen inches just within the range of one to ten tails showing.

Few drawers or boxes would fall outside this range, but if yours do, just use the formulas to get to the height you want by adding tails.

The maximum height you can cut on the VS-600 is 600 mm so your highest drawer, box or cabinet with centered dovetails would be 590.3mm with 21 tails showing using the SZO-14 template set and 570mm with 14 tails showing using the SZO-20 template set.

This is close to two feet high so should cover most all of your needs.

You do not have to center your dovetails if you are willing to accept the bottom dovetail being a different size than the top dovetail. The top will always be a half pin the size of the offset. For drawer heights that will not result in centered dovetails, the bottom will be whatever it turns out to be. It could be less than or more than a half pin. If it is too much narrower than the top half pin it could be weak and break off at assembly time.

Thickness - Once you know the length and width of the front, back and side work

pieces, you need to make sure they are within the thickness range of the SZO-14 (10mm to 14mm) or the SZO-20 (14mm to 25mm). Be sure the front and back pieces are the SAME thickness and the side pieces are the SAME thickness. The front/back can be a different thickness than the sides.

Make your cuts

Now you are ready to cut. For strength you want the male fan shape tails to be cut on the sides of the drawer and the female recesses to be cut in the front and back work pieces.

Once you get the hang of through dovetails don't be afraid of experimenting by reversing these to get a different look to your joints.

In the traditional trough dovetail the characteristic fan or tail shape shows only from the side of the drawer. From the front it looks like a simple box joint. If you reverse these and put the male fan shaped tails on the front and back work pieces, the characteristic dovetail shape will show from the front and back. From the sides it will look like a simple box joint.

You will always cut the male fan shaped tail pieces held vertically under the front clamp bar with the OUTSIDE face pointing out away from the VS-600.

Work pieces set to cut the male fan shapes in the "tail board"

The female recesses cut with the angled template will always be held vertically under the front clamp bar with the OUTSIDE face pointing out away from the VS-600. In all cases the top edge of the drawer components will be against the side stops as you make your cuts. The order or sequence does not matter.

Work pieces set to cut the female recesses in the "pin board".

Cut the Male Fan Shaped Tails (normally in the pieces that will be the sides of your drawer) –

I am in the habit of cutting the male fan shaped tail pieces first. To do so, mount the straight fingered template SZO-14-S or SZO-20-S on the VS-600. It is self aligning and needs no adjustment. Lower it down and align the side stops to the opening in the template just as you did before with the half blind templates. Be sure to turn the SZO-14 or SZO-20 side stop fingers inwards towards the center of the VS-600 ON BOTH SIDES of the template. Mount the correct guide bushing and the correct dovetail shaped cutter in the router.

Place scrap pieces that are at least 5mm THICKER than the pieces which will have the

female recesses cut in them (usually the front and back components) horizontally under the top clamp bar against the side stops and snug them down. Be sure they are wider than the pieces you intend to cut the male fan or tail into. These scrap pieces will hold the male work piece high enough that the bottom of the dovetail shaped router bit will not hit the base of the VS-600 and they will help prevent tear out on what will become the inside of your drawer.

Align the top edge of the pieces which will have the male fan or tail shape cut in them (usually the side pieces) with the TOP face of your scrap piece, outside face pointing out away from the VS-600 and the top edge against the side stop.

Set Router Bit Depth of Cut – With the template lowered onto the scrap pieces, place the router on the top of the template. Set your router depth of cut to be exactly the width of the pieces which will receive the female recesses. Since the scrap is at least 5mm thicker, this will allow your router bit to miss the aluminum bed of the VS-600 as you make your cuts.

Note that the proper depth of cut is the thickness of the piece into which this piece will mate.

In the picture below, the router is zeroed to the top of the work piece. Now set the proper depth, plunge and make the cuts in both pieces.

Realign the work pieces by rotating them side-to-side and cut the male fan or dovetail shapes on the other end.

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Be sure the OUTSIDE face points away from the VS-600, the top edge of your drawer is against the side stop, and the end flush with the top of the scrap piece.

You are finished with the male fan shaped tail components.

Cut the Female Recesses or Pins (normally in the front & back pieces of your drawer)–

Remove the SZO-14-S or SZO-20-S and mount the SZO-14-Z or SZO-20-Z template with the in/out adjustment wheels on each end against the bed of the VS-600.

Align the side stops with the inside of the "D"shaped hole stamped into each end of the template and lock them down.

The very first time you use either the SZO-14-Z or SZO-20-Z you will make a test cut to set the proper in/out setting on the two depth setting wheels on either end of the template. After that you only need to mount the template, align your work pieces and make the cuts.

Fit the proper guide bushing and straight router bit into the router. As you did for the male tail cuts, mount a scrap piece at least 5mm THICKER than the router bit depth of cut horizontally under the top clamp bar so you do not hit the body of the VS-600 while cutting the female recesses.

Mount the work pieces under the front clamp bar with the OUTSIDE facing away from the VS-600, the top of the drawer against the side stops, and the ends flush with the top edge of the scrap pieces.

Drop the template on top of the scrap pieces and clamp it in place. Place the router on top of the template and set the depth of cut to be exactly the thickness of the pieces into which you just cut the male fan shaped tails.

Make your cuts following the angled sides of the template fingers. Be sure to also route out the area between the angled sides of each template finger.

Note that the proper depth of cut is the thickness of the piece into which this piece will mate.

Reset the work pieces to cut the other two sides of the joint and you are done.

A perfect drawer with through dovetails in under fifteen minutes.

Because you have to use two different templates, two different guide bushings, two different router bits and do two set-ups to make through dovetail joints, it will take about fifteen minutes per drawer instead of the five minutes per drawer required for half blind dovetail joints.

In both cases your drawer will be "perfect" right out of the VS-600 joining system. It will be exactly the length, width and depth you want it to be, will be absolutely square, sit flat and invoke an image of fine craftsmanship from the minute you assemble it.

No sanding to fit, no "make it a bit bigger and cut it to fit afterwards" and no "put a bit of filler into the gaps to make it look like it fits" even when it doesn't.

Perfect Finger Joints Are Also Easy and Fast

A finger joint is simply a series of male fingers and female recesses of the same size and spacing cut all the way across the ends of the work piece. By cutting these so the male fingers on one piece fit into the female recesses on the other a strong corner joint with a relatively large gluing area can be established quite quickly. Some, including Festool, also call this a "box" joint because it is very easy to automate for rapid assembly of functional boxes.

On the VS-600, finger or box joints of two sizes can be quickly cut in work pieces from 6mm to 28mm in thickness and up to 600mm wide. The joint will look the same from either side. If you like the look of finger joints, they can be cut very quickly and accurately every time. Two corners can be cut with each set up (so long as the pieces are less than 300mm wide) and only one template, one guide bushing and one cutter are required for all the cuts.

The only set-up required is setting the depth of cut made by the straight router bit to be equal to the thickness of the work pieces.

Prep your stock just as you did for the dovetail joints. You want stock that is uniform in thickness, flat, square, of the size you want and within the thickness range of the template you are using.

Centering the Fingers - As with dovetail joints, the best looking finger joints are when the fingers are centered over the height of the box. You will have one half finger at the top of the box and one half finger at the bottom of the box. Avoid boxes with less than or more than half a finger at the bottom as these tend to be quite weak as well as awkward looking.

The proper height of the box to have centered fingers is any even increment of twice the template spacing.

Festool sells two different finger joint templates, FZ-6 and FZ-10. The numbers refer to both the size in mm of the straight router bit used to make the cuts and also to the side spacing. The template spacing is twice the diameter of the router bit so calculating the height of a box with centered fingers is quite easy. It is any even increment of twice the template spacing, ie: 12, 24, 36, etc. for the FZ-6 and 20, 40, 60, etc. for FZ-10.

Width and Length – With finger joints the fingers go all the way through each piece so simply cut the front, back, and side work pieces to exactly the lengths you want for your finished box.

Set up is similar to what you did for through dovetails. Mount scrap pieces under the top clamp bar that are at least 5mm THICKER than your work pieces to allow the router bit to pass above the bed of the VS-600 when you make your cuts.

All four work pieces will be mounted vertically under the front clamp bar. Two work

pieces will be clamped on top of each other with their OUTSIDE faces TOGETHER and what will be the TOP edge of the box against each of the two side stops. The top edge of these pieces will be flush with the top of the scrap pieces and up against the bottom of the template.

Where this gets a bit tricky is that one piece will stop against the side stop finger while the other will stop against the round portion outboard from the side stop finger.

In the pictures above I have removed the scrap piece from behind the two work pieces to make it easier to see.

Once the four work pieces are mounted under the front clamp bar and flush with the top of a scrap piece that is at least 5mm thicker than the router bit depth of cut, rotate the template down and place the router on top of the template. Set the depth of cut to be equal to the thickness of the work pieces.

Make the cuts. If the thickness of your work pieces is greater than the diameter of the router bit, make the cuts in multiple passes with each pass cutting no more than the diameter of the router bit.

Rearrange the work pieces under the front clamp bar stacked with the OUTSIDE faces together and the TOP against the side stops.

Make the cuts and you are done. A perfect box with finger joints in less than five minutes!

The concept of centering a box joint is a bit different from centering dovetail joints. A properly centered box or finger joint will show a certain number of whole fingers on one side with one fewer than that number of whole fingers plus two half fingers on the other side.

An unbalanced, yet still considered centered by some, finger joint will show the same number of whole fingers on each side. On one side there will be a half finger at the top and on the other side a half finger at the bottom.

Which you prefer is a matter of taste. I like the properly centered finger joints the best.

Conclusion

At the beginning of this manual we talked about how the dovetail joint is recognized the world over as one of the hallmarks of fine craftsmanship. We also talked a bit about how difficult many find it is to cut perfect dovetail joints or to get a dovetailed drawer, box or cabinet carcass just the size you want it in the first place. And, we touched on why so very many dovetail jigs sit gathering dust in the corner because they can be far from intuitive to set up and use properly when you only use them once in a while.

I hope that you now have far more confidence that you, too, can make a perfect drawer with half blind dovetails (or finger joints) in less than five minutes and with through dovetail joints in under fifteen minutes using the well engineered Festool VS-600 jointing system. Once this becomes your preferred means of creating perfect drawers, boxes and cabinet carcasses you will be amazed at how often you find yourself doing so. Day in, day out there simply is no better way I know of to add value and longevity to your furniture projects.

Whether you make your living doing so, as I do, or whether you build furniture for family and friends just because you love to, adding a Festool VS-600 jointing system to your shop or studio will prove to be one of the best investments you can make in working faster, better and more efficiently.

Enjoy!

Jerry

One Time Set Up

All four of the Festool VS-600 dovetail templates require a one time set-up to make sure the in/out adjustment wheels are set to cut a perfectly flush joint and to establish a router depth setting that will provide the tightness of fit you want. You only need to do this the first time you use a particular template. After that, the template will clamp in place with the correct in/out setting and, if you save the test pieces, you can quickly set the correct bit depth.

This one time set-up is fast and easy to do since you really don't care what length and width the work pieces are or how thick they are so long as they are within the range for which each template is designed. For the two half blind dovetail templates, SZ-14 and SZ-20, just mount the template with the cam shaped underside of the black in/out adjustment wheel against the front edge of the VS-600. Start with the wheel set to the zero position.

Loosen the holding screw to turn the wheel while the rotary knob that holds the template is loose enough that the template can slide in and out. When you have the in/out adjustment wheel at BOTH sides of the template set to the same zero mark, tighten the holding screws.

Now push the template towards the VS-600 so the cam shape on the under side of the black in/out adjustment wheel is against the front edge of the VS-600 and tighten the rotary knobs which fasten the template to the VS-600.

Next, move the two side stops to fit the inside of the "D" shaped opening stamped into the template. Turn the side stop so the fingers matching the template face inward, toward the center on both ends of the VS-600.

Mount one scrap piece horizontally under the top clamp bar and another vertically under the front clamp bar. Be sure each piece is within the thickness range specified for the template you are adjusting. Also, make sure each piece is against the side stop and the end of the vertically mounted piece is flush with the top of the horizontally mounted piece. The pivot action of the templates makes this easy to do if you hold a scrap piece on top of the horizontal work piece while you push the vertical work piece up against it.

Position the template on top of these two and clamp it down.

Set your router depth of cut to the factory specified 12mm for the SZ-14 and 15mm for the SZ-20. Festool routers are easy to adjust by zeroing the router bit on top of the horizontal work piece while the router is in cutting position on top of the template. Then you can simply move the depth indicator to the 12mm or 15mm mark, plunge the router and you are ready to cut.

Be careful here. ***Note that this is NOT 12mm from the base of the router, it is 12mm lower than the bit when it is positioned on top of the horizontal work piece with the router sitting in cutting position on top of the template.***

If you use some other brand of router be sure you can set the depth of cut from a bit zeroed on top of the work piece. Do not try to set the bit depth of cut with the router on the bench as it will not be correct and your joints will be way off.

Once the router bit depth is set, make the cuts. Remove the pieces and try the fit. Usually the depth setting will produce a properly tight fit, but if it is off a bit lower the bit to make it tighter and raise the bit to loosen the joint fit.

Check how flush the joint is when driven all the way home. If the vertical piece (what will normally be the side of your drawer) stands proud of the edge of the horizontal piece (which normally will be the front or back of your drawer), then loosen the two holding screws and turn each in/out adjusting wheel to the same mark in the + direction. Note that the well engineered VS-600 is calibrated so each mark represents an 0.1mm movement. If your edge stands proud by 0.2mm, move the wheels two marks and tighten them down. If the sides go in too far, move both wheels in the – direction by the proper amount.

It is a good idea to do one more test cut if you needed to adjust either the router bit depth setting or the template in/out setting. You only need to do this once and that template will forever be set to produce your prefect drawer no matter what length, width or thickness of work pieces you use (so long as the thickness is within the range specified for each template and you continue to use the same router bit).

When you have the fit you want, save the pieces to use as a router depth of cut gauge for all subsequent uses of this template.

The "right" fit is a matter of personal taste. I like the joint to go together with only a light tapping with my hand or a mallet. That will provide a good bonding surface for the glue and still show a tight, artful joint. If the joint is

overly tight and requires heavy blows to get it together then the glue will either get scraped off when you assemble, or will get trapped in the bottom of the female recesses and lock the joint open, or you will break something during assembly. While many of my colleagues will disagree with me on this point, with today's glues I think it is better to error on the side of being too loose than too tight for half blind dovetails.

The one time adjustment for the SZO-14 and SZO-20 through dovetail template sets is very much the same. You will, however, have to cut the two test pieces separately. The template with the straight fingers will cut the male fan shaped tails using the specified dovetail cutter and the template with the angled fingers will cut the female recesses and surrounding pins with the specified straight cutter.

Be sure you place a scrap piece under the top clamp bar that is at least 5mm thicker than your horizontally mounted test work piece to avoid cutting into the VS-600!

As before, once you make your test cuts put the two pieces together and observe the fit.

If the edge of what would normally be your drawer side (the piece cut with the straight fingered template) stands proud from the end of your drawer front/back (the piece you cut with the angled finger template), loosen the securing screws and turn the two in/out adjustment wheels to create a perfectly flush joint.

If the ends of one or the other of the two pieces protrude beyond the outside edge of the joint, reduce the depth of cut setting until they are both exactly flush. Since you have to adjust the depth of cut for both templates and the in/out on one, plan on doing a couple of test cuts.

Remember, you are only going to do this once for each through dovetail template set so take your time and do it right.

Once you have a correct fitting joint the template in/out setting will be correct for all further use of that template. Save BOTH test pieces to use in setting the correct router bit depth whenever you use this template set in the future.

You are done with set up and your templates are all ready to use at a moment's notice. Just mount the template making sure the cam on the bottom of the black in/out adjustment wheels is against the VS-600 when you tighten the two rotary knobs to secure the template in place. Position your work pieces under the clamps as outlined in this manual, set the router bit depth using the test pieces you saved and you are "good to go."

From this point forward you will cut perfect half blind dovetailed drawers in under five minutes and through dovetailed drawers in under fifteen minutes.

Cut the work pieces to the proper size, mount them as indicated and make perfect joints every time.

My Take On Using the Metric System

Most of the tools we use every day were designed for a world market. Most everywhere but in the US the metric system is employed for weights and measures. So, it is no surprise that many tool manufacturers design their tools around the metric system and then convert them to show inch scales for the US market.

While few of us in the USA grew up with the metric system, and certainly do not think in metric length terms, learning to measure using the metric system is far easier than using the base 8 "inch" system for building furniture. There, everything is a fraction of an even multiple of 8; one eighth, one sixteenth, one thirty second, etc. While we have learned to add and subtract odd fractions over the years, the process is still very time consuming and error prone.

On the other hand, measuring using the base 10 metric system is very straight forward. You never deal with fractions, only whole numbers. The process is much faster and far less error prone. As an example, lets say you want to build a rail, stile and panel door for a project. You want the door to be 19 3/8" wide. The rail and stile pieces are 2 5/8" wide by ¾" thick and all the groves are 3/8" deep. You want to know how long to cut the top rail piece. Lets see, it will be 19 3/8" less 5 1/4" (the width of the two stiles on either side) plus ¾" for the tenons on each end. Think you can do that one in your head every time without error?

Now try the same thing using the metric system. The door is 500mm wide. Rails and stile pieces are 50mm wide by 20mm thick with 10mm groves. Now the calculation is 500 less 100 plus 20. Easy to do that one in your head without making a mistake, isn't it?

From my experience the best thing you can do to improve the accuracy, quality and speed of building your woodworking projects is to spend the couple of weeks it takes to convert to using the metric system for your measurements. You don't need to learn to think or visualize in the metric system, just use it for your measurements.

The easiest way is to buy an inexpensive tape from a big box store that shows both, like the one in the picture.

Do your thinking in the inch system and measure using the metric system. A couple of weeks later you will find yourself thinking in the metric system more and more, and liking it far better.

I splurged and also bought a couple of rigid steel metric rules with a matt finish that I really like. They are easy to read in any light and "dead on" accurate. One is 150mm long (about 6") that lives in my apron pocket. It's great for all those shorter measurements like setting the fence to blade distance on my large band saw where you can put the end up against the fence and read in mm the exact dimension to the inside tooth on the carbide blade. The other rule is 500mm long (around 18") that is always nearby on the layout bench.
A cheap metric/inch digital caliper rounds out the

measuring tools I use every day.

The Festool VS-600 jointing system and their routers are all designed around the metric system. While you can convert back and forth, you don't need to and doing so just introduces error and frustration. In this manual I am using the metric units of measure as those are the markings on the Festool VS-600 and routers. It is not important that you can visualize the length of say, 300mm, only that you know it is twice 150mm or ten times as much as 30mm. It is all relative.

Continuous Improvement

Two of the things I like most about the products coming from companies with a strong engineering tradition is that their products reflect a systems approach where multiple components all work seamlessly together to achieve the desired outcome and they seem to have a fetish for continuous improvement. Both are evident in the Festool VS-600 and in their routers.

The VS-600 joinery system replaced the original VS-500. The OF-1010 router replaced the OF-1000. The photographs show the differences, some subtle some major. The photos also show the careful attention to systems design rather than individual tool or jig design.

Take the two jointing systems, for example. The VS-500 was about as simple and reliable as a template based dovetail jig can get. There were only three templates available: one for cutting half blind dovetail joints, one for cutting simple box joints and one for doweling. Each template would only service work pieces of a limited range of thicknesses. Every time you needed to set work pieces into the VS-500 you had to remove the template by unscrewing two wing nuts which hold the template in place. The side stops were fixed in place and were simply barrel-headed machine screws threaded into holes tapped into the top and front edges of the VS-500. The adjustment for moving the template in or out to achieve the correct joint fit was just a threaded collar on the same stud used to hold the template to the fixture. Not very elegant, not very flexible, but certainly precise and very repeatable to use once properly set up.

When Festool designed the VS-600 (on my dovetail work station above) to replace the VS-500 (on the bench to the right) they did not simply make a few cosmetic or incremental changes to the old unit, they started with a clean sheet of paper, learning well from the limitations and use frustrations inherent in the VS-500.

They designed the VS-600 to cut two sizes of half blind dovetails, two sizes of through dovetails, two sizes of box joints and three sizes of dowel joints. These multiple sizes and types cover joinery in work pieces from 6mm to 28mm thick, a range that covers the vast majority of furniture making operations. They replaced the quirky wing nut template holder of the VS-500 with an elegant pivoting template carrier to which you can quickly and accurately affix whichever template you need.

Since it pivots to clear the work pieces without removing the template, it is easy to load and square up the work pieces repeatedly, time after time with little room for error. The adjustment for joint depth is a well engineered eccentric wheel on each end of the templates requiring such adjustment capability. The two wheels have index markings to make it easy to set them to exactly the same joint depth on both ends of the template. No more rotating threaded collars by guess. You set up each template only once and it will produce joints of

exactly the right depth for all subsequent use of that template.

They designed adjustable rather than stationary side stops so each template can have a different side set back to properly match the geometry of that template. Setting the proper side stop depth is done easily each time you change templates.

The clamp bars on the VS-600 are not only 100mm longer allowing for a wider combination of work pieces, they also feature a center clamp which more securely holds the work pieces in place.

The not very elegant, not very flexible, but very precise VS-500 was replaced by a very elegant, very flexible, equally precise and faster to use VS-600. Nice generation-to-generation continuous improvement. But, they did not stop there.

Festool also looked to the routers and guide bushings which would be used with the VS-600. On the VS-500 the guide bushing had a smaller inside diameter than the dovetail router bit. So, to mount a dovetail router bit with the guide bushing in place, you had to fully plunge the router base, insert the dovetail cutter from the bottom side, and then somehow manage to fit one hand into the limited space between the bottom of the router body and the top of the plunged base to depress the spindle lock and also fit the other hand into that same limited space to tighten or loosen the collet nut. It could be done, but it was at best awkward.

For the VS-600 they redesigned the guide bushings with an inside diameter larger than the corresponding dovetail cutter so you can now easily place or remove the cutter with the base fully extended away from the router body. The router to the left in the picture above shows the new VS-600 guide bushing and cutter while the router to the right shows the old VS-500. Both of these set-ups cut exactly the same shape and size of half blind dovetail, the 14mm series.

Festool also took another important continuous improvement step. They machined a collar into the guide bushings used with dovetail router bits which fully traps the fingers on the template so it is not possible to inadvertently lift or tilt the router while moving it into

and out of the fingers while forming the male fan shaped dovetail portion of the joint, a nice touch that all template based router jig manufacturers should emulate. All of us who have cut a zillion drawers on templates without this very

important feature have ruined more than a few when a momentary lapse of concentration resulted in lifting or tilting the router.

Simply put, the VS-600 is in all ways a vastly superior joinery system than the VS-500 it replaced. This is continuous improvement at its best.

The OF-1000 and OF-1010 routers also show attention to detail and a penchant for continuous improvement. While they are in the same power range and intended for the same kinds of applications, detail changes are evident.

The power (wattage) is up a bit in the OF-1010 over the OF-1000, but the electronic speed control on both makes that hard for me to feel in every day use.

The power cord is removable on the OF-1010 and the speed control dial moved to the back where it can easily be seen and adjusted.

The base appears unchanged so all the same great attachments and fixtures fit either. The plunge, lock, and depth setting mechanisms appear to be the same so both exhibit a superior feeling of control over any other routers I use for hand held applications.

In truth, since buying my first Festool router (the OF-1000 you see pictured) I have not touched any other brand for hand held use. The light weight, ability to control and plunge with one hand, the guide rail system, built in dust collection and other features are simply superior to anything else on the market from my perspective as a one person furniture maker.

Now with the addition of the OF-1010 shown in most of the pictures in this manual, the midsized OF-1400 with .25", 8mm and .5" collets and the large OF-2000 production router Festool has covered the field. It would be hard to imagine a routing situation in which you would not naturally reach for your Festool router first.

What You Need to Know About the Festool Templates

Joint Type	*Template*	*Thickness Range*	*Template Spacing*	*Side Length*	*Router Depth of Cut*	*Orientation While Cutting*	*One Time Setup?*
Half Blind	SZ-14	15 – 20	22	DDL - 2 x (th -12)	12	Inside Out	Yes
Half Blind	SZ-20	21-28	32	DDL - 2 x (th-15)	15	Inside Out	Yes
Through DT	SZO-14	10-14	28	DDL	TMP	Outside Out	Yes
Through DT	SZO-20	14-25	40	DDL	TMP	Outside Out	Yes
Finger Joint	FZ-6	6-10	12	DDL	TMP	Outside Out	No
Finger Joint	FZ-10	10-28	20	DDL	TMP	Outside Out	No

Front and back work pieces must always be the same thickness and within the thickness range specified above. Cut them to be as long as the overall desired drawer width.

Sides must always be the same thickness and within the thickness range specified above. Sides can be a different thickness than the front and back work pieces, usually thinner.

Center the dado for the drawer bottom one half of the template spacing up from the bottom edge of the drawer. Make the dado one half as deep as the thinnest of the work pieces.

Cut the bottom 2mm less than the measurement from dado bottom to dado bottom front to back and side to side. Hold in place only by a dollop of rubber cement or caulk in dado in the center of each work piece. Do not glue firmly in place as the sides, front and back will expand and contract with normal seasonal changes in humidity.

th = thickness of work piece

DDL = Desired Drawer Length front to back.

TMP = Thickness of Mating Piece. If cutting the drawer sides, set the router depth while on top of the template and zeroed to the work piece to cut the thickness of the front/back work pieces.

How to Calculate Drawer Height for Properly Centered Joints

Joint Type	*Template*	*Height of Drawer (mm) For Centered Joints*
Half Blind Dovetail	SZ-14	44 x t
Half Blind Dovetail	SZ-20	64 x t
Through Dovetail	SZO-14	30.3 + 28(t-1)
Through Dovetail	SZO-20	50 + 40(t-1)
Finger Joint	FZ-6	12 x f
Finger Joint	FZ-10	20 x f

t = number of tails showing on the work piece in which you cut the male fan shaped tails.

f = Number of fingers showing. On one side there will be f fingers showing and on the other f-1 plus half fingers top and bottom. If you are one bit diameter wider or less wide the finger joints will be centered, but unbalanced. On both sides there will be f fingers showing plus one half finger. On one side the half finger will be at the top, on the other side it will be at the bottom.

Table of Drawer Heights Which Will Show Properly Centered Joints

No. of Tails/Fingers Showing	*SZ-14 Half Blind Dovetail*	*SZ-20 Half Blind Dovetail*	*SZO-14 Through Dovetail*	*SZO-20 Through Dovetail*	*FZ-6 Finger Joint*	*FZ-10 Finger Joint*
1	44	64	30.3	50	12	20
2	88	128	58.3	90	24	40
3	132	192	86.3	130	36	60
4	176	256	114.3	170	48	80
5	220	320	142.3	210	60	100
6	264	384	170.3	250	72	120
7	308	448	198.3	290	84	140
8	352	512	226.3	330	96	160
9	396	576 (max)	254.3	370	108	180
10	440		282.3	410	120	200
11	484		310.3	450	132	220
12	528		338.3	490	144	240
13	572 (max)		366.3	530	156	260
14			394.3	570 (max)	168	280
15			422.3		180	300
16			450.3		192	320
17			478.3		204	340
18			506.3		216	360
19			534.3		228	380
20			562.3		240	400

Metric to Approximate Inch Conversion

Milimeters (mm)	*Approximate Inches*
50	2
100	4
150	6
200	8
250	10
300	12
400	16
500	20
600	24

Meet the Author

Hi, I'm Jerry Work.

Welcome to my studio. I build fine furniture in the 1907 Masonic Temple building in historic Kerby, Oregon. Nestled along the Redwood Highway a scant 20 miles from the California border in Oregon's great southwest, Kerby was once the center of commerce for a large region of northern California and southern Oregon. When the railroads bypassed Kerby for a passable route through the mountains near what today is Grants Pass, OR, like the story of the American west, the commerce followed the railroad and Kerby faded from prominence.

During it's heyday as the county seat for Josephine County, the Masons decided to build what was for the time to be one of the grandest buildings right in the center of town, the corner of Sixth and Main. Today, Main Street is US-199, the Redwood Highway that connects the I-5 at Grants Pass with US-101 at Crescent City, CA. My wife and I would hardly call our 5,000 square foot two story building "grand," but it is a perfect setting for my studio on the first floor and our loft style living quarters on the second.

The studio reflects both my former background in technology management and my fetish for precision and standards in my furniture making. In consultation with the client, I first fully engineer a piece for function so I will know how the owner will interact with it, how the doors will hinge, latch and swing, how the drawers will slide and stop, and how all the other functional aspects of the piece will work.

Then, I design the piece for aesthetics taking design queues from many periods and styles and bring them into a modern decorating idiom. At that point a set of standards for sizing all the component parts and joints takes over.

These standards allow me to easily calculate the sizes of all the component parts by knowing only the overall dimensions of the piece. Long ago I found that using metric measurements made these calculations far easier and far less error prone.

See the sidebar on "Using the Metric System."

I work almost exclusively with solid woods so I can resaw and book match all of the panels, even those like drawer dust blocks that sit inside the drawer dividers.

Most cabinets, like the black walnut and maple burl bathroom vanity shown above, are built to what I call a 20 x 50 x 10mm or 20 x 65 x 10mm standard. That means that all the rails and stiles and the drawer, shelf and bottom divider components are 20mm thick by either 50mm or 65mm wide and the sliding dovetail joints and the slots for panels are 10mm deep. I seldom use dados, finding sliding dovetails to be vastly superior as they are self locking, self aligning and self squaring.

To cut a matched set of mirrored, stopped sliding dovetails for the dividers and drawer guides on a chest with multiple drawers can be a challenge if not done with great precision.

Thanks to Festool Multi Function Tables and rail guided routers, this previously complicated operation can be done easily and repeatably.

As you look at the pictures of my studio you will see a number of excellent Festool hand power tools and Festool Multi-Function tables which greatly simplify achieving the accuracy required for the way I build fine furniture. I purchased most of these myself and became quite impressed with the level of systems engineering, intelligent design, and precision manufacturing standards before I agreed to write manuals such as this one for Festool.

Simply put, their tools provide a high return on investment for me as they allow me to work faster, more consistently and to tighter production tolerances, all critical aspects which allow me to sell my pieces at prices far below what I would have to charge if I worked in more traditional ways.

Better value for my customer and higher margins for me, a true win-win situation.

My studio is organized around what I do the most and then I let form follow function. In my work, the things I do more than any others are to sand, finish, assemble and polish. So, the very best spot in the studio is devoted to those tasks. This work station is a large solid wood topped table with heavy welded steel square tube legs with large leveler feet. The top is perfectly flat and square.

To one side is a Festool multi-function table on which most assemblies are held, squared, and made plumb in one way or another. On the other side is the dovetailing station which houses the complete Festool VS-600 jointing system you saw in the pictures accompanying this manual, an earlier generation Festool VS-500 joining system, and two other dovetailing systems from different manufacturers.

Between these different dovetailing systems I can cut just about any kind of dovetail or other joint required for the design and aesthetics of the piece.

The one that is always mounted on top ready for immediate use is the Festool VS-600. It is simply the fastest, most accurate and easiest to use to build perfect drawers, boxes and case carcasses.

Under the sanding, polishing and assembly station is a Festool dust collector that can easily be attached to the Festool routers while dovetailing and edge routing, to the Festool sanders while sanding, to the Festool saws while cutting and to the plate jointer while cutting the slots for those joints. A pair of Festool drills and a set of excellent Festool chucks, bits, and drivers are at hand on the wall behind this work station.

Each one of these Festool products displaced other well known, high-end brands because they were simply superior tools for my use and they make more money for me day in and day out than the tools I used before. A nice bonus is that they last far longer and are more pleasing to use as well.

Down the middle of the studio are the major stock prep and cutting tools. They include a European style combination machine (300mm J/P, 300mm sliding table saw with scoring unit, spindle shaper and slot mortiser,) a 24" band saw which nearly always wears a one inch carbide blade, a scroll saw for fine work and a 16" open end wide belt sander.

Around the edges are the drills, sanders and other power and hand tools one would expect. The wood ready for use is stored on racks around the edges of the studio.

A large Festool style table (made from one standard MFT plus two additional top plates and a pair of two meter side rails) sitting on cast iron legs sits flanking the combination machine and the support table for the band saw.

This unit replaced the traditional European style workbench that I previously used. I still make and sell traditional European style workbenches for people who really want them, but, for the kind of work I do, the large Festool style work table just can't be beat. The precisely machined and accurately placed 20mm holes across the whole surface are ideal mounting points for a whole variety of clamps, jigs and fixtures, both those sold by Festool and those I make myself. Seldom a day goes by that both the Festool work surfaces are not in use.

To the front of the studio is a small gallery where a few pieces are always on display.

It is hard to keep many pieces on hand as spec built pieces tend to sell quickly.

I hope you have enjoyed this manual on how to get the most out of the excellent Festool VS-600 jointing system and this brief tour of my studio.

If you are ever in the area, please stop by for a visit. I would enjoy showing you around and answering any questions you might have about the Festool products I use every day.