

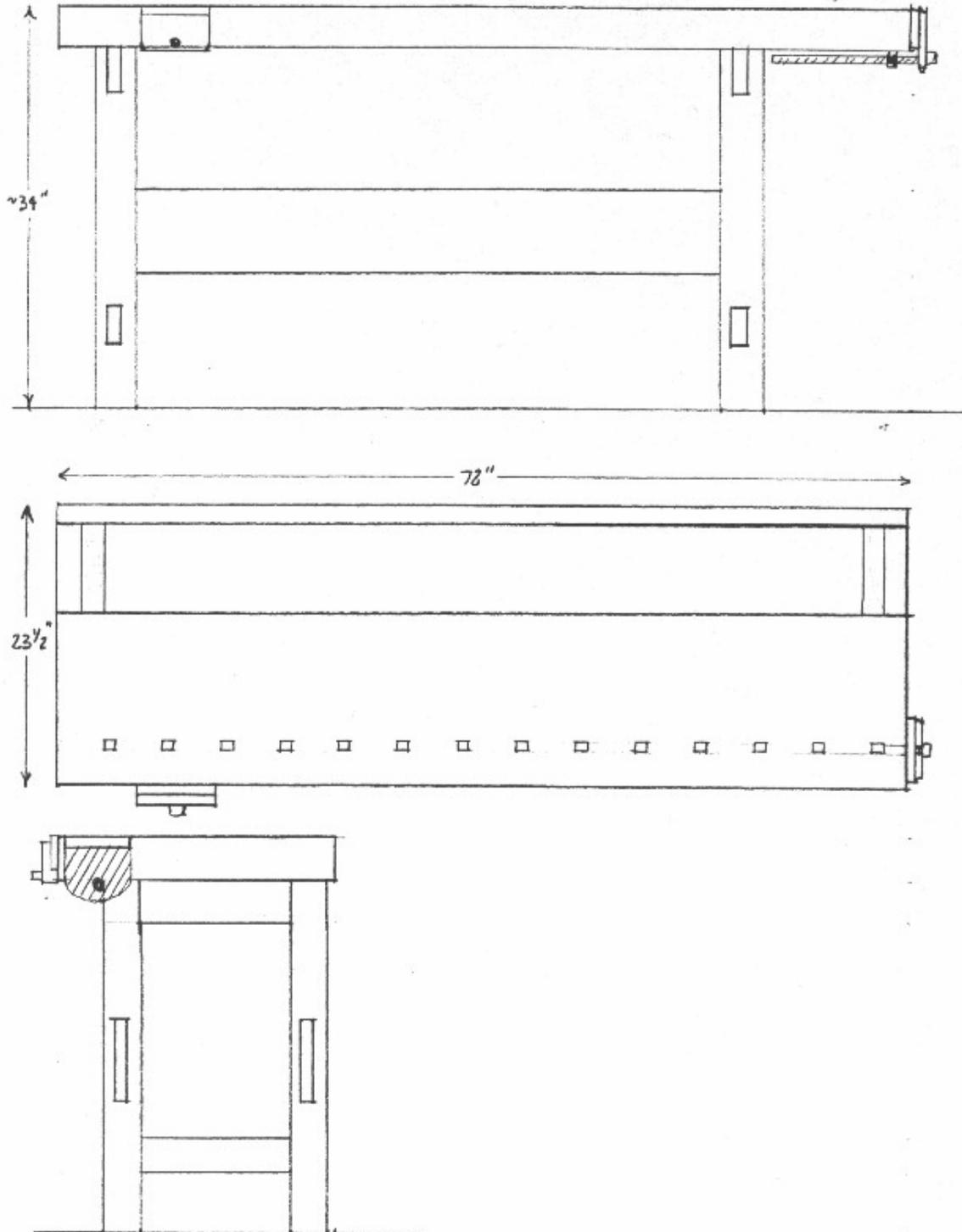
Bob and Dave's Good, Fast, and Cheap Bench

Bob and David Key

Information taken from their original website, which now appears to be defunct: <http://www.terraclavis.com/bws/beginners.htm>

***Note: The original presentation of the website was a text based page, with links to additional pages including photos. Photos have been inserted into the document where I felt they were suited (ditto to slight formatting changes). Links to other pages have been indicated in [blue](#). The page linked as 'my first bench' has been added to the end of this document in it's entirety.*

Paul Morin, Jan 1, 2006



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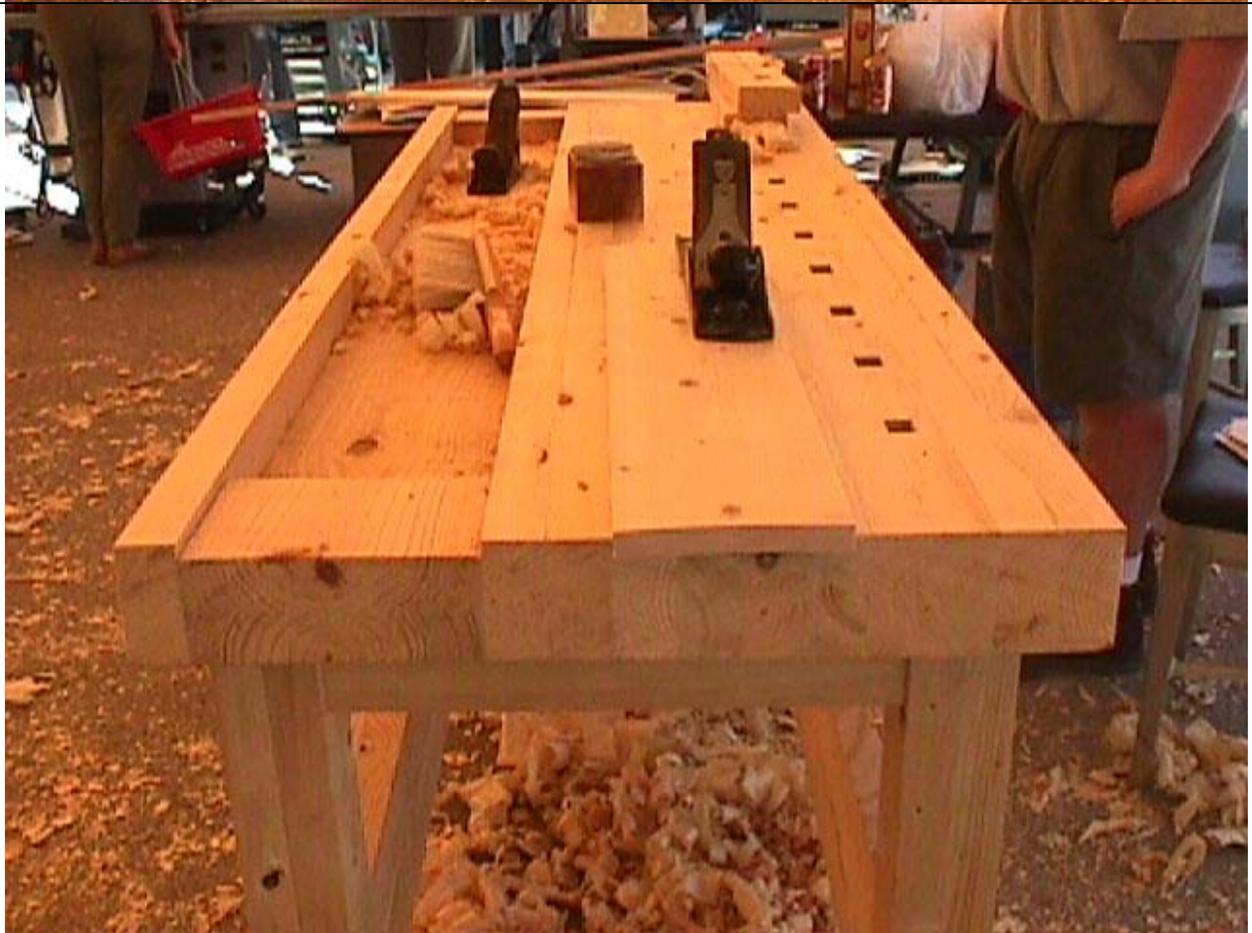
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(This section was originally linked as a separate page and has been inserted)

These are photos of the bench we made for the Highland Hardware 1999 Fall Festival - notice the shavings from planing the top earlier in the day. This was the fourth bench of this type we had made. This bench in these photos is not yet complete - the vises don't have their hardwood cheeks and the tenons are not yet planed flush with the legs.









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Why Do You Need A Bench?

I like to work wood with hand tools. My finest woodworking is done that way. Some work might go more quickly with power tools, but a power tool never leaves the kind of surface and detail that I can get with a well-tuned hand tool. Actually, there are many reasons to use hand tools – they are relatively inexpensive, safe, quiet, clean, and they don't require much space to work. Hand tools actually provide good exercise and a level of satisfaction that is hard to obtain through automation.

But hand tools are nearly useless without a proper bench. If you are interested in woodworking with hand tools, a good bench is the first thing you will need.

Webster defines a workbench as 'A table at which work is done'. That's pretty broad – by that definition, any horizontal flat surface, except maybe the ground, could be considered a workbench. Some 'workbenches' used by woodworkers I've known only qualify as a workbench because they fit this broad definition. Some have more in common with a picnic table than a cabinet-maker's workbench.

For our purposes, I will define a workbench as a table with vices for holding wood while the craftsman works it with hand tools. This excludes your picnic table, your kitchen table, your table saw, and your desk at work. But it's still pretty broad, as are the solutions to the woodworker's problem of holding wood to be worked. There are hundreds of designs for workbenches, from the WorkMate to the classic European bench with a shoulder vise, and many variations between.

Key's First Law of Bench Building

Key's First Law of Bench Building states: Any woodworker who builds a bench will want to build a second one. I suspect this is true because a woodworker can only learn what he really wants by spending a lot of time working with his first bench.

That happened to me. I didn't really know what I wanted until I used [my first bench](#) (see last 3 pages of this document) for a few years. That would have been okay except that I tried to build the ultimate bench from the start and it was too much for my skills – it took eight years to complete. I could have been doing some good work in that time and developed my skills faster - if I had built a simpler bench first.

So you can make the best of Key's Law by making your first bench as fast, as good, and as inexpensive to build as possible. That way you have something reasonable to work with while you are pondering your ultimate bench. Don't make the same mistake I did – avoid the temptation to get it perfect the first time - build this bench instead.

Bench Characteristics

It is said that for any given job you can have any two of Good and Fast and Cheap. Of course, we want all three. I have tried to design a bench that optimizes these three criteria.

This is a good bench. It's not a toy and it will not frustrate you when you work with it. It is not so nice as a full-blown hardwood cabinetmaker's bench, but you can accomplish almost all woodworking tasks with it, and with reasonable care, it should last a lifetime.

It is quick to build, but it will take you more than just one evening to complete. David built this bench in about a week, but the actual working time was less than 15 hours. That's about as fast as a beginner can build a serious bench.

This bench is also relatively inexpensive. It costs two or three times more than a WorkMate, but is still less than half the cost of a serviceable hardwood bench.

I think this bench the best workbench value that you will find. When you build your Ultimate Workbench, you can pass this first bench on to a beginning woodworker.

What You Will Need

You don't need to be a master woodworker in order to make this bench, in fact, only rudimentary skills are required. Of course, once you are finished, your skills will no longer be rudimentary. In preparing this article, I had David, my 12-year-old son, build the bench by himself. This allowed us to keep a realistic measure of the construction time required by someone who was not highly skilled. And it allowed me to accurately account for ALL the tools and materials needed for the project.

David was not allowed the use of any power-tools for this project. You could probably go faster with power tools, but most beginning woodworkers don't have fully functional shops, and I wanted the bench to be accessible to beginning woodworkers and to kids. If you are one of those woodworkers who are just now

discovering the capabilities of hand-tools, you may find it quicker to use power tools for some parts of the construction. Of course, once you get your bench done, you won't need the power tools so much...

David used the following tools:

Crosscut saw	Rip saw
Brace and bit	Chisel
Mallet	Clamps
Jack Plane	Jointer Plane
Screwdriver	Adjustable wrench
Square	Crayon
Marking knife	Pencil
Level	

This bench is made with standard two-by material available from building supply and home centers. Look for stock that is in good shape. Reject any boards that are crooked, twisted, bowed, or just plain damaged. An occasional small knot is no big deal.

The bench can be made with hardwood. I used pine because it is freely available and it's inexpensive. Maple or any other reasonably stable hardwood could certainly be used, but I advise saving the hardwood for your Ultimate Bench which you are bound to build later.

Materials:

8 12' 2x4	2 8' 2x4
2 10' 2x8	1 8' 2x8
1 Record 52ED Quick-Action Bench Vise (or equivalent)	1 Record Bench Vise (or equivalent)
Assorted bits of scrap	Glue (we use Elmer's white glue)

Our total cost for materials was about \$220.

Layout

When you get your wood home and start laying out the boards, you will probably notice some defects that weren't apparent at the store. Don't worry about it – as long as the problem is not really glaring, it shouldn't affect the integrity of the bench very much.

Start by creating your story sticks. A story stick is a length of thin scrap wood (or even paper) with sizes and distances marked out in full scale. One of the first things a woodworker learns is that measuring should be kept to a minimum. You can do this entire project without a rule or tape. Lay the project out on your sticks and transfer your marks from there onto the stock. I created three sticks for this bench: one for the length, one for the height, and one for the width.

Create your height stick first. How high should your bench be? To determine a good height for working with hand tools, stand straight with your hands at your sides and stick out your thumb. Ideally, your thumb should just graze the top of your bench. Cut your height stick the distance from the floor to your thumb. Now mark the thickness of the top at the top, then the thickness of the top stretcher just under that. Then mark the position and width of the rail and the other stretcher.

Now create your width stick. Cut the stick to the width of your bench. Then mark where your dog-holes will need to go. This is determined by where the dog is on your end vise. Adjust it in so that the holes will have one side on a joint – the dog holes will be cut out of the side of one of the 2x4s that you will be gluing into

your top. Now lay out a light line for each 2x4 and the tool tray. Then flip the stick over and lay out the width of the base. On this bench I let the top overhang from the dog-holes to the edge – that way I didn't have to worry about putting a dog hole over a part of the base.

Finally, create your length stick. Start by figuring out how much room (lengthwise) your end vise will need under the bench when it's completely closed. You don't want it to bang into the base when you are clamping something thin. This will be the amount the end overhangs the base. The other end can go right to the edge if you want it to because the face vise will be inboard of the end of the base. Once you lay out the overhang, you can mark the leg positions and the location of the face vise.

Once you've made your story sticks, you won't need any more measurements. You can build your bench from these.

Sorting, Sizing and Gluing Up

Now sort your boards according to condition. The most important part of the bench will be the upper surface of the bench-top. The bottom surface and the base are much less critical. Pick the straightest and cleanest boards and set them aside for the top. Remember that only one edge will show on the top, so it's okay if the other edge is a little messy. Just to make sure you don't have a problem with twist. This is a good time to do a loose fit. Can you put the boards together without much of a gap? You should be able to close any gap with just hand pressure. If you can't you should replace the crooked boards with straighter ones – even if they are cosmetically inferior.

This leaves the boards for the base. Before you start the base you need to make a strategy decision. Gluing, and waiting for the glue to dry, takes most of the time for building the bench. The entire base and bench top is made from laminated stock – that's the only way to get the required thickness from two-by stock. It's quicker to laminate our boards full-length, then cut them to size – rather than the other way around. But there are two good reasons to cut first, then laminate. First – if you don't have enough clamps you will do better with shorter stock. Second, if your boards are a little crooked, the gluing will go better with shorter sections. Whichever way you go, resist the temptation to glue a bunch of boards at once; your clamps will not work well this way. I never glue more than one or two joints at a time.

Building the Base

Start the base by gluing up and cutting your parts to size. Transfer your dimensions directly from your story sticks. Don't forget to allow for the length of your tenons – it's easy to forget and cut them off.

After your timber is cut to size it's time to cut your joints. These are big mortise and tenons. Tenons are usually cut with a crosscut and rip saw and planed to fit. If you have straight grained wood, you can save some time by splitting off the tenon cheeks. This is done by cutting the shoulders with a crosscut saw and splitting off the waste with a chisel. It does save a lot of time and effort but will only work with straight and clear wood, so be careful.

I make these big mortises by first boring holes to get rid of most of the waste, then squaring up with a chisel. If you are a perfectionist, you should take all the time you need to get every thing to fit exactly right. If you are not a perfectionist you can go with a fairly snug fit and it will be just as good. Don't get the fit too tight - everything will expand a little when you apply the glue. These are big joints and they are not easily forced. A little loose is better than a little tight.

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The base of the bench is held together with large mortise and tenon joints. The ones for this bench were each cut with simple hand tools. It is not necessary for the joints to be dead accurate - these were fairly rough compared to joints found in fine furniture, but they are plenty strong.



David hogs out the mortise with a brace and bit. He has marked the rectangle for the mortise on both sides and he will hog out most of the waste on one side, then turn the leg over and do the other side. Then he squares the mortise with a chisel.



Close-up view



David is getting ready to split the waste off a mortise cheek. Notice that he has already cut the shoulder of the tenon with a crosscut saw. With straight-grain wood, this is a simple process. It is more difficult with wild grain - you must be aware of the direction. If the grain is running to the center, you should start closer to the edge and pare away the overhang. If the grain runs to the edge, start at the mark and pare away the remaining waste.



Shown is the result of the first mallet blow. Notice the layout lines on the end grain. This method is much easier than using a rip saw, but not quite as neat.



The first pass at removing the waste from the mortise cheek..



The cheek after it has been cleaned up

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First glue up the leg assemblies, then add the long rails. Before you start gluing, make sure you don't have anything to do for at least an hour. Once you apply the glue you can't stop until you are done. Lots of things can go wrong here and you should be prepared. I like to have my beefiest clamps available and my big dead-blow mallet in case some persuasion is needed. Nothing is more discouraging than having a joint get stuck halfway home. Perhaps the handiest things to have at this point are another pair of hands and an even temper.

Take some time here to level up your base. Find a flat level place and plane off the legs until all four feet rest on the floor. Now work on the top stretchers. There are several things to do here. First, the stretchers themselves should be square so that the bench will sit flat on them. Next, the two stretchers should be parallel with each other. Finally, you should be able to lay a level between them. You're done with the base for now.

Gluing the Top

Before you start gluing up the top, take some time to arrange your boards. Put the best edge up and arrange the boards so that they fit together without gaps. Make it easy on yourself and replace any crooked boards now. Once you get everything just right, take a crayon and mark a big triangle across the boards. This will help keep everything in order during the glue-up. Before you go any further, mark the board that will have the dog-holes.

Some woodworkers use splines or dowels on an assembly like this. They are certainly not necessary for strength; this kind of glue-up is plenty strong without any mechanical help. The reason to use them is to keep everything in alignment during the clamping. If you are careful in your glue-up, you don't really need them – but they can make things go more smoothly. Don't worry if the boards are not perfectly aligned; it's

normal to have a bit of unevenness. Try to keep the alignment within about and eighth of an inch and you won't have much trouble planing it flat later.

Since the gluing takes so long, lets go ahead and get it started. Take a couple of boards out of the middle and glue them together. While that is drying, we can start on our dog-holes.

It's best to begin by making yourself a dog. The easiest way is to simply use a piece of dowel for a dog and drill holes in your bench-top that will fit. This is fast and easy, but it doesn't last as well as square holes. The round holes tend to elongate over time causing the dog to climb out of its hole under clamping pressure. This makes a pretty useless system – so I always use square dogs.

A good dog should be at hand when you need it, stay where you want it, and be out of the way when it's not needed. I make mine square in cross section with a wood spring on the front. It should slide easily in the dog-hole but the spring should be strong enough so that the dog will stay put where you leave it.

I like to cut the dog-holes with a saw and chisel. Define the front and back of each hole with your saw, then chisel out the waste between them. For a clean bottom (that will be the side when assembled) you can finish the cut with a router (the non-powered kind) but it's not terribly critical. Make sure you dog will fit each hole before you glue up your dog-hole board. The holes should be angled about 2 degrees off square – the dog should lean toward the vise. Be very careful laying these out that you don't angle them the wrong way. I space my holes about 5 inches apart.

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The doghole strip is prepared before it is glued to the rest of the benchtop. It is easy to get confused when preparing this part so have your wits about you when you lay it out. Notice that we clearly mark which side is up and which side the slots are cut. The piece is not reversible due to the two degree angle of the dog holes. There are two ways to mess up after you cut the slots. If you put it in upside down, the dog will tend to work itself out of the hole as you use it. If you get it turned around in the glue up, the dogs holes won't be aligned with the vise.



David chisels out the waste from the dog hole strip. Notice that he has already made the cross-cuts that define the front and back of the dogholes. Once that is done it is a simple matter to clear the waste with a chisel.



David uses a router to make the side smooth and a uniform depth.

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Now that the first boards have dried, add another one or two.

While that is drying, we can start on the tool tray. Take two 2x4s and one 2x8 and glue them together to form a long tray. While that's drying, cut your ramps from the 2x8 cutoff. Glue the ramps in at the ends of the tray after the previous glue-up has dried. I like to attach the tool tray last so that I don't put clamping pressure on the tray wall.

Now you can finish gluing up the top.

Last Steps

At this point you will notice that your bench-top is not as flat as a pool table. It doesn't need to be yet, but now is the time to make a start at it. Take your jack-plane and start knocking off the high spots and glue squeeze-out. Work it until it is moderately flat and smooth – we are not looking for perfection yet. After you complete one side, turn it over and do the other.

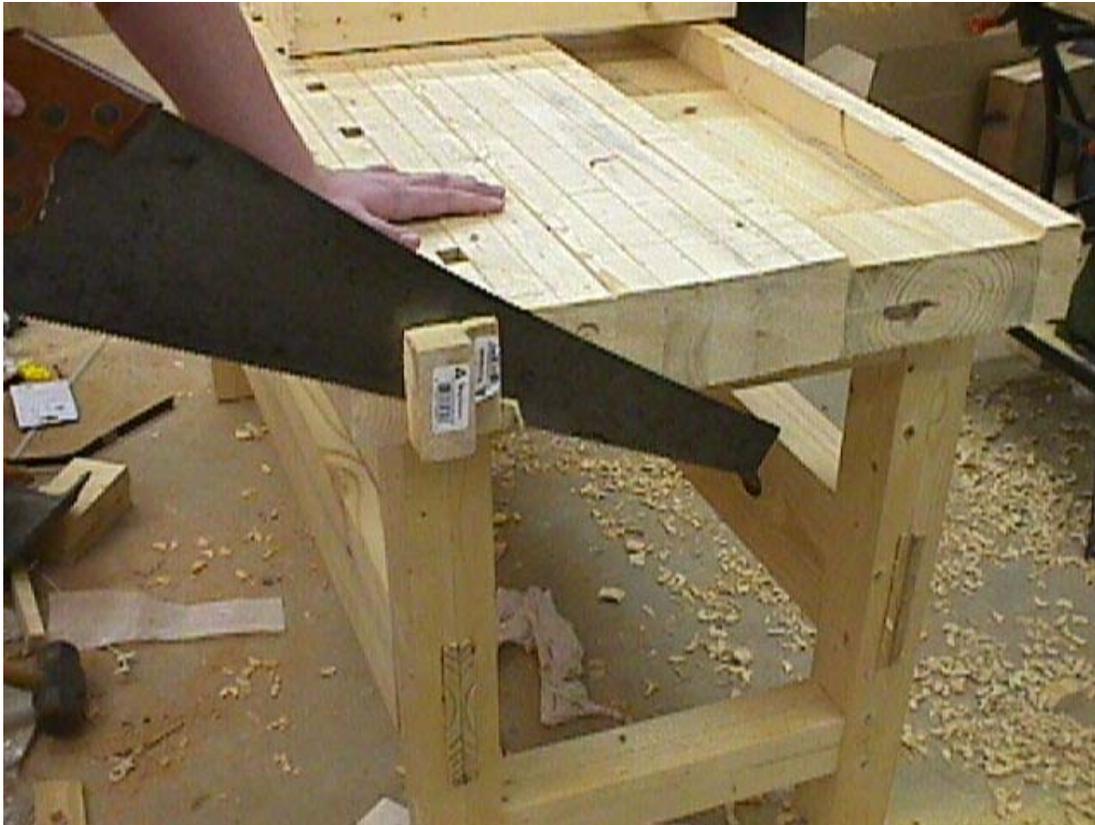
Now lay your bench-top on your new base, bottom side up. Place your vises where they go and mark any areas that will need to be let in. Mark where the bolts go, and go ahead and bore pilot holes now and temporarily attach the vises. Now, with the vises in place, turn your base over and place it where it should go and mark where the stretchers on the base should go. Unless you are very lucky, your stretchers will not lay flat. If the top rocks on the base or if you can see light between the stretchers and the top, you have more flattening to do. Work the underside of the bench top until the base stretchers lay cleanly against it.

You have several options for attaching the top to the base. The easiest way is to simply drill a hole through both from the underside and attach it with a big lag screw. On one bench, I routed out a recess for the top stretchers and simply let gravity keep everything in place. This works well but is hard to do. A similar effect can be achieved by putting cleats on the underside of the top on either side of where the stretchers go. The best solution may be to use both methods together.

The last step in construction is to attach the vises. Depending on your vises, you will probably have to cut recesses into the underside so that the vises will fit properly. Do whatever cutting is necessary and screw those rascals on. The only thing left to do after the vises are mounted is to line the cheeks with wood. Hardwood is better for this application, but pine will certainly work.

You now have a functional bench – but we aren't quite done. A proper woodworking bench needs to be pretty close to dead flat. This can be done with a #5 jack, but a #7 or #8 jointer is better. This can be a little frustrating at first. You will work and work and it will seem like you aren't getting anywhere – then suddenly everything will get flat.

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David finishes sawing the right end. The top is just resting on the base - it is heavy enough that it doesn't need to be attached for this step. Note the condition of the top after glue-up. Note also the condition of the shop after our recent move



David planing the top at the Highland Hardware Spring Festival.



David is congratulated on his completed bench by Roy Underhill.

(End inserted section)

After the top is flat, run a small chamfer all around to take off the corners. This will remove the sharp edges, which can actually cut you, and it will reduce the chance of it splintering off or chipping.

You can leave the bench naked, but I prefer to put a finish on it. I like a nice, easy, reversible finish for this job. I use a few coats of shellac and then paste wax for a good-looking surface that protects well. Don't use polyurethane unless you like to work on a plastic surface.

The Fun Part

Now, step back and admire your nice bench. You should be able to manage at least a grin at this point. Of course, you made a few mistakes along the way, and if you're like me, they stand out like lights. But that's true with most projects – I don't know any perfect woodworkers. If your errors don't compromise the utility of your bench, don't worry about it. Show the bench to somebody else and they will be impressed. They will also think you are being silly about the mistakes – and they'll be right.

The best part of building a bench is using it. The first thing you will notice is how much easier it is to use your hand tools. A good bench is one of the two great secrets of doing fine handwork. (The other is sharpening, but that's another subject).

Every so often, it's a good idea to re-surface the top. Wood has some tendency to move over time and that can pull your top out of flat; re-surfacing will restore the flatness. It will also get rid of those inevitable cuts and dents that accrue under normal usage.

Now that you're done with your bench, you can start using it. Take your time and learn its ways. Make some good stuff on it. Soon you will start having ideas of what you will want in your next bench.

Happy shavings!

Bob's Bench (*linked as My First Bench*)



I started on my bench after I read *The Workbench Book* by Scott Landis about 8 years ago. It appeared that the one by Ian Kirby would be the easiest to build, but after meeting Mr. Kirby and looking at his methods, I decided that his philosophy of woodworking was just too persnickety for me. I wanted a bench that could hold the work firmly in place whilst being plied with various hand toolery.

So I went whole hog with a bench similar to the one built by Frank Klaus. It has the old-fashioned wooden tail vise with the single screw and the old-fashioned shoulder vice that, because it has no parts to get in the way, allows easy clamping of drawer sides for sawing, etc. This style bench, of course, would be the hardest to build.

I started by acquiring the vice hardware, which for this style, is the cheapest of all vice hardware. I think that at the time it came to about \$50 altogether (it's a little more now). Having the hardware in hand, I could proceed with full-sized drawings. I ended up with a design about halfway in size between Frank's and Tage Frid's smaller version as featured in *The Small Workshop* collection of Fine Woodworking articles.

The first thing built was the base. I used 8/4 maple with through-wedged mortise and tenon joints. This was the largest thing that I had built up to then and was really more like timber frame construction. Chopping those mortises out was the work of a month's spare time, and really satisfying exercise. Doing it on the Workmate made the anticipation of completing my 'real' bench that much more intense. When the base was done I was surprised at how strong it was. Had it been carved from a block of steel it would have seemed no stronger.

Next came the top. I used various scrap and some specially purchased bits of maple, mahogany and cherry. This was my first glue-up of serious proportions and I made a complete hash of my first attempt. I was trying to do the edge jointing with a Record 07 (that was, unknown to me, seriously out of flat) and I could never get the surfaces to match. After a bunch of screwing around, I decided to rely on the strength of my clamps to force the joints together. The result was so disgusting that I put the whole project aside for 2 years.

During this hiatus, I thought about what I had done wrong and considered going right from the table saw to glue-up (which would have yielded better results) but couldn't bring myself to do it. I ended up making a contraption for my router that gave serviceable results, but not as good as I had hoped.

Now came the time to flatten the top. I started out with the Record 07 again and again ended up with a hideous mess. It looked like someone had been hacking at it with a machete. I really learned to loathe that stupid plane.

Another 3 years passed while the idea of a nice woodworking bench started to look like an expensive pipe dream.

I decided that a belt sander was the answer to my problem reasoning that a fine grit would prevent gouging. It didn't. Now I had a surface that looked like it had been hacked with a machete and dragged behind a truck down a concrete freeway.

Time for another 2 years doing the Workmate Watusi. I thought about taking the top to a cabinet shop, but I was too embarrassed. They were sure to ask what I had done to create such a unique surface, perhaps even report me for ripping off some example of the local public 'art' (it really did look bad). I thought about ripping the thing up for table legs or something that might be of use.

It should be obvious at this point that I am a self-taught woodworker. I never attended an industrial arts class. I had no skilled woodworkers around that I could learn from. I read a lot, but that is one-way learning; I needed advice and feedback.

Then I discovered the Oldtools Group. The first thing I learned was that I had never used a decent hand tool. A Stanley #8 jointer plane from MofA changed that. After the iron was scary sharp, the job of flattening the benchtop was the work of an evening. The rest of the bench went together in less than a month. Good tools and confidence gained from using them has increased my woodworking output and fun by an order of magnitude.

- In the last few months I have built:
 - A raised wooden floor for my workbench area (it's much better than concrete)
 - Two desks
 - Many dovetailed drawers (the shoulder vice and IT saw makes this easy)
 - A hanging tool cabinet
 - Another bench
- What I learned:
 - Good handtools give me better and faster results than power tools
 - Having a serious woodworking bench is even better than I thought
 - Bad handtools are worse than useless
 - Confidence is a better motivator than need
 - The Oldtools group is the most productive tool I've used

Eight years is a ridiculous amount time to take to get a bench built; but I suspect that I am not the only one (wink wink, nudge nudge). I am glad that I did finish it, and I am glad I waited for the right tools and skills and that I built the bench I wanted. My second bench (for my son) took only 2 weeks!