

Techniques for making a few simple boxes

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Intro: Techniques for making a few simple boxes

I never took a shop class after high school, and I didn't have any relatives who were handy. Most of what I learned to do I had to figure out on my own or learn from a book. I mention this because I'm sure the shop-Nazis are going to rappel out of the clouds and tell me everything I'm doing wrong, but this is what works for me. If you have a recommendation or want to correct something, please be nice. Its better if we can all just get along.

First, some **safety stuff**.



Step 1:

The safety stuff:

In some sections I'm going to be using some power tools. Big scary powerful power tools. Tools that have neither self awareness or souls. That being the case they are completely unaware of the difference between a nice clean sheet of 3/4 inch plywood and your fibula (Its a bone.. in your leg.. The bottom part of your leg...)

What I'm getting at here is that any power tool will gleefully chew or throw chunks of stuff through you much easier than a piece of wood, so please use all due caution to keep any of your soft bits out of the shiny moving parts.

When using any tool with spinning parts such as a Table Saw or Drill, you should **remove any jewellery or loose clothing that could get caught up** . The only thing more embarrassing than feeding your thumb into a table saw would be to get your heart shaped BFF bracelet caught on the blade and getting sucked in up to your toenails. Then you would wind up being the "Stumpy" friend. No one wants to get on the roller coaster with the stumpy friend.

Wear eye and (when appropriate) breathing protection. I only had to get rust in my eye once to teach me this lesson. Some material can shoot off downright dangerous dust or particles. Plexiglass and a table saw is a good way to take a melted plastic shower, MDF and a sanding wheel will give you "brown lung" and scratch your corneas. Yes, that has all happened to me.

During this instructable I have removed some safety guards on my soulless killing machines in order to better show you the processes I'm performing. **I don't recommend doing this** in any way, and it's not my ordinary method of working. The manufacturer went to a lot of trouble to mould those little bits of plastic. leave them on.

If it sounds like I'm trying to scare you, I am. I have had my table saw for around 10 years and the damn thing still scares the bejesus out of me every time I turn it on. It SHOULD scare you. I credit the fact I still have 10 fingers to the fact that I do my best to respect and fear the power of these tools and I encourage anyone doing this to develop the same caution.



Step 2: Tools and Materials

Different techniques will require different tools.. I feel just as stupid writing that as most of you think I am for even mentioning it but sometimes things just have to be said.

For that reason, I'll try to break down a specific tool list at the start of each technique. The items below are a comprehensive list of what I used during this project. Many of the techniques can use tool substitution, a hand drill for a drill press or a miter box instead of a miter saw for instance. I'll also be going over the basic explanation, operation and set-up for the tools, so don't get too freaked out over the details just yet.

Tools:

Essentials:

Hand drill and assorted bits
Hand sander
--this can either be straight sand paper and a block of wood or a power sander
speed square
saw
Clamps (few small and few large)
Strap clamp (Or a piece of rope and a stick.. I'll explain later..)
Tape Measure

Optional:

Table saw
Drill press
chisel set
screw driver
Miter box and saw

Materials

"Good" Wood (heh!)
--Most projects can be done with a single 4 foot 1x4. Project three needs a 4 foot 1x2.
Scrap wood, or a piece or two you can sacrifice.
a small 1/8th to 1/4 inch wood dowel
Screws
Wood Glue (Gorilla glue is better, if you have the option)



Image Notes

1. This is a pencil.

Step 3: Some definitions first..

This is a basic run down of some of the tools, just so we all know what we are talking about. When I first started building things it was fairly routine to use butter knives as screwdrivers and pipe wrenches as hammers. There is nothing wrong with this right up to the point your mother tells you that Christmas is ruined because all her silverware has scorch marks and twisted tips. Then your all angry and yelling about buying new silver wear for her and she's all like "the department store is closed, its CHRISTMAS" and then you cry. Sorry Mom.

The first thing I learned in health class is that you can't properly use a tool until you know what its for. Yes, that's a vaguely dirty joke. Sorry. I had to get one "tool" joke in here or I would never forgive myself.

If your already familiar with using the listed tools, you can skip this section. I will say that I actually picked up a tip or two when I was researching all this though.

There are a few essentials you should have, and I'll take this chance to explain what they are and how to use them. I'll also link to far more detailed instructions as I won't pretend I have the time to be a comprehensive resource.

What about cordless tools you say? Well let me divert for a little rant here.

If your going to be doing work outside or need to move around a lot, the cordless tools may be a good choice, but I have a thing about batteries running out on me. I hate it. I hate it with an unbridled passion the way cats hate water or the way my hamster hates cats. That's a whole lot. Its just a personal preference.

Speed Square

This is just a simple metal triangle with some markings. Where it comes in supper duper handy is that it includes a 45 and 90 degree angle. If your trying to make accurate cuts across some wood stock, this is the fastest way to make a straight line.

One edge has a lip that fits along the edge of the board, then you can use the other edges to draw either a 90 or 45 degree angle. Speedy! Even if you have a miter box, you should still have one of these.

There are also techniques for marking almost any angle with this tool. I won't go over them here, but I will link to it. [Detailed how-to](#)

Tape Measure

The venerable and time tested tape measure. The only thing more common than a tape measure is how often people use it wrong.

One thing people consistently do wrong is to measure from the end of the tape. I know this sounds like crazy talk, but using the end of tape is somewhat inaccurate if your attempting any kind of precision. Look close at that little metal tang on the end of the tape. It moves. it moves up to 1/16th of an inch on some of my tapes. There is actually a reason for this:

The tip of the tape is riveted in place and slides slightly; the length of the slide is the same as the thickness of the tip, to allow the user to make accurate measurements. With a sliding tip you get the same measurement hooking the end of the tape over a piece of lumber or butting the tip into a corner.

In day to day work, it's actually a pretty sloppy operation. If your framing a wall or anything on a larger scale, it won't matter. If your making a box 6' long with tight joints, it matters a lot.

I usually pull out some tape and start measuring from the 1" mark, then just subtract an inch from my final measurement. My projects have gotten a lot more precise since I started doing this. [Detailed how-to](#)

Saw

There are a bogging number an styles of saws. If your building a full shop you should have several types, but for the purpose of this article we just need what is commonly refered to as a Tenon saw or Back saw. These are the most commonly included versions when you purchase a miter box. The different types of saws require different techniques to use them properly. [Popular Mechanics](#) has a great article about some of the types and their use. For this project, just get the one that looks like the picture below. Often you can get these as a combo with a miter box.

hand or power drill

This is essential due to its sheer flexibility and usefulness. I highly recommend a decent quality corded drill. Choosing the right one is often a matter of personal preference. There is a great video [Here](#) . You should also get a set of bits. The more the better. I tend to chew them up like bubble gum. There are many types. I found

this handy guide . If your on a tight budget, you can just get a standard set of twist bits.

hand clamps

Not much to say about these. There are many types, but the "quick clamp" style have proven to be the most useful as they can generally be worked one-handed. the traditional screw type bar clamps are fine, but you should make sure you have something between the work and the clamp to protect it against leaving marks.

Clamped glue joints are substantially stronger than un-clamped joints. Always clamp if you possibly can.

That should do it for now.. although we make make a jig or two later on..



Image Notes

- 1. Like the sausage.



Image Notes

- 1. Not as accurate as predicted.

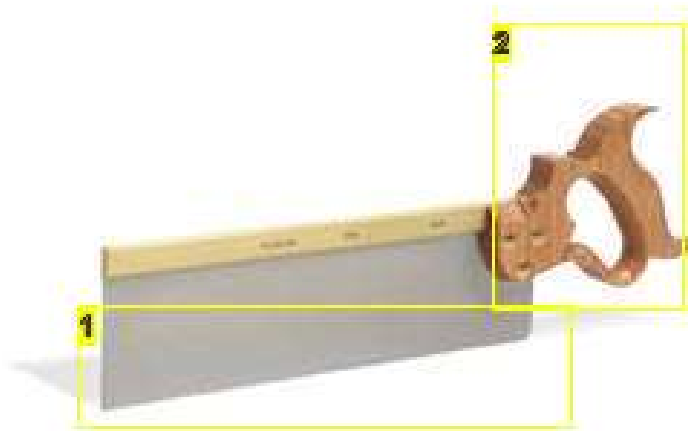


Image Notes

- 1. This is the sharp side. Do not rub on your arm.
- 2. Devil horns.. RAWWWRRRRRR



Image Notes

- 1. Looks like its running.. and has a tail..
- 2. While its tempting to put your bottom lip in here and see how hard it can grab, don't. Just don't.

How to cut pieces accurately.
How to glue up and clamp pieces.
Patience (optional, but useful..)

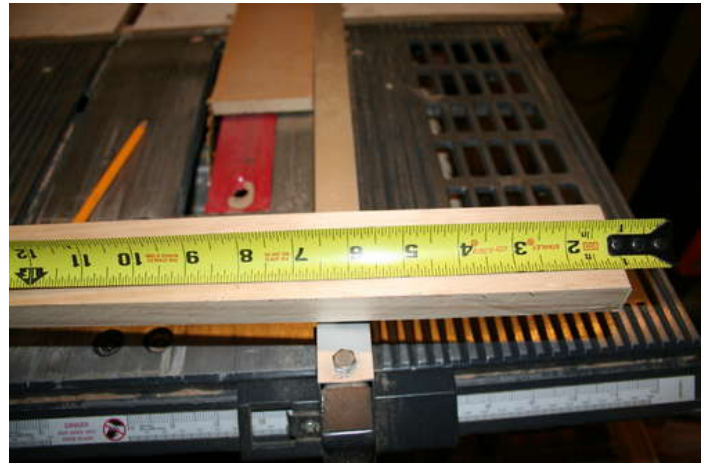


Image Notes

1. Double clamp technique.

Step 5: Basic hinged box

This is a method for making a small box with integrated wood hinges. It's not as scary as it sounds. Actually, I'm terrified, but don't tell anyone. You could do this one in the living room as well, but wait till the wife is not home. The drill tends to scare the cat, and terrified cats running about the house are not the formula for marital bliss. Especially if you have 5 of the little @\$%ers like we do.

This will not require any extensive equipment and can be done fairly quickly. The corner joints will be simple lap joints. This time, were going to throw in a small twist. Or rotation, if you want to be technical.

Tools and material:

ruler or measuring tape
Miter box and saw or table saw
Wood Glue (For this project, I recommend "gorilla glue" for the hinge parts.)
Clamps (small)
wood - one 4 foot 1x4 (or the remnants of the wood from the previous project)
One nail. about 2 inches long.
Drill, with two bits. One bit just a tiny bit larger than the screw and one just a little smaller. .
Sand paper
One spare piece of scrap lumber.

This is where we delve into the risky world of power tools. A few of the steps below will require the use of a drill on small-ish pieces of wood. You should hold the pieces against the scrap of wood and the scrap of wood should be on a floor or table. when drilling, never brace the pieces on your body for several reasons, the least of which is so you do not put the drill through your hand or leg. (in my case.. "again")

Take the board and cut it into the following pieces:

Box

3 - 6 inch pieces.
2 - 4 1/4 inch pieces
1 - 7 1/2 inch piece.

(now the tricky ones..)

Hinge

2 - 3/4 inch by 3/4 inch blocks
1 - 3 inch x 3/4 inch block. Round one end with a sander or sandpaper.

The construction on this one is a little more jigsaw-puzzle than the last one, but nothing good comes easy. Check the pictures as we go.

Basic box structure :

1. Start with two of the 6 inch pieces. Glue them together in an "L" shape, Making sure you line the edges up carefully. (Check the pictures)
2. Clamp and let fry for at least an hour.
3. Un-clamp the box and glue up the two end pieces on as you see in the pictures.
4. Clamp the ends in place, using the same two clamp technique as in the previous box build. Let dry for at least an hour.
4. Un-clamp the piece and Glue on the last 6 inch piece, making sure to glue all the edges that touch.
5. Give the whole thing a hug with your clamps again, making sure nothing moves. Let dry over night.

Hinge and top construction:

Check the pictures to make sure you understand before you start drilling willy-nilly. I would recommend using Gorilla glue on the hinge pieces if its available. Its just stronger.

1. Take one of the 3/4 inch square blocks and the 3 inch x 3/4 inch block (rounded end) and drill through the center with the larger of the two drill bits.
2. Take the last 3/4 inch square block and drill through the center with the smaller bit.
Now, you should be able pass the screw through one square block, the 3 inch block and then tighten it into the last block (with the smaller hole). Its important to pre-drill these holes in this manner. The wood will split if you don't. I guarantee it.
3. Test fit the screw by passing it through the large-hole 3/4 block, the 3 inch block and into the small-hole 3/4 block. don't over tighten anything. All pieces should still spin freely. As long as everything looks good, move on. If anything binds up, drill the holes out with a slightly larger bit.

leave the pieces assembled.

4. Place the 7 1/2 inch piece on top of the finished box so you have a level surface for the hinge assembly.
5. Find and mark the mid-point of the back vertical piece. It should be at 3 inches.
6. Glue the two square blocks in place. Glue ONLY the bottoms of the blocks. You should do your best to keep the glue off the 3 inch block and the 7 1/2 inch top.
7. Place some small clamps in place and tighten. When everything is settled, gently remove the screw, 3 inch block and top piece. This is to keep any squeezed out glue from sticking parts together that don't belong stuck together. I only wish someone had performed the same procedure (metaphorically) with Angelina Jolie and Brad Pitt.
8. After the glue has set up for a while and there are no more wet spots showing, resemble the 3 inch block and top, leaving the clamps in place.
9. Make sure the top is square on the box, and glue the 3 inch block down. Make sure you keep the glue away from the back edge. We don't want it all squeezing out and sealing the top to the back.
10. Let this all dry overnight.

Un-clamp everything and admire. The hinge should work fairly smoothly. Its not uncommon to have a little slop in the fit. It would be better to use two hinges, but .. well.. baby steps people.. baby steps..

and possibly pop it off.

Done!

What I learned:

Tetris is a fun game
Construction of a basic hinge
5 cats is too much for one house.

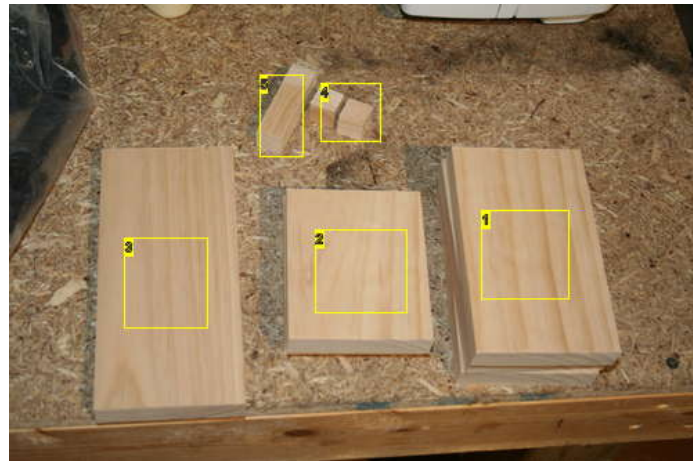


Image Notes

1. 3/4 inch by 6 inches
2. 3/4 inch by 4 1/4 inch.
3. 3/4 inch by 7 1/2 inch.
4. 3/4 inch by 3/4 inch
5. 3 inch by 3/4 inch.



Image Notes

1. Glue these as such



Image Notes

1. Double clamp method. Nice cheat if your clamps are too short to reach.
2. Last 6 inch piece in place just to make sure things line up.

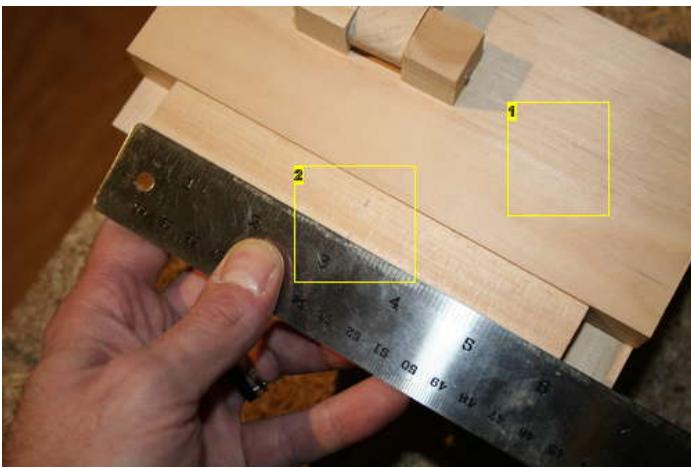


Image Notes

1. Put the 7 1/2 piece on the top
2. Find the mid-point of the back. It should be 3 inches.

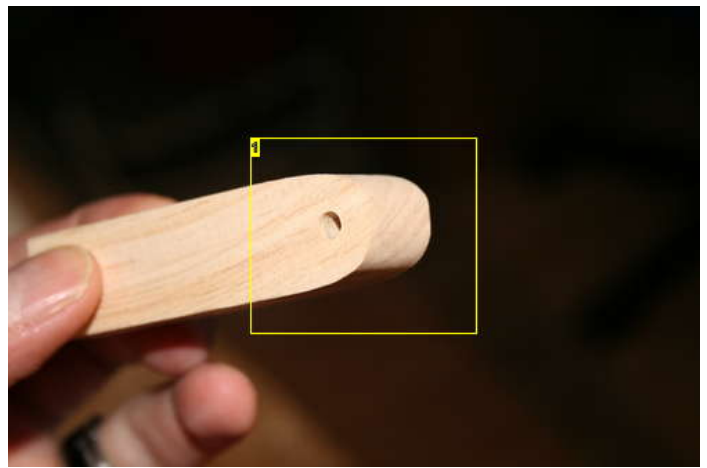


Image Notes

1. Rounded the three inch piece on the drilled end. The rounding is important as the hinge won't work right if the ends are still squared.

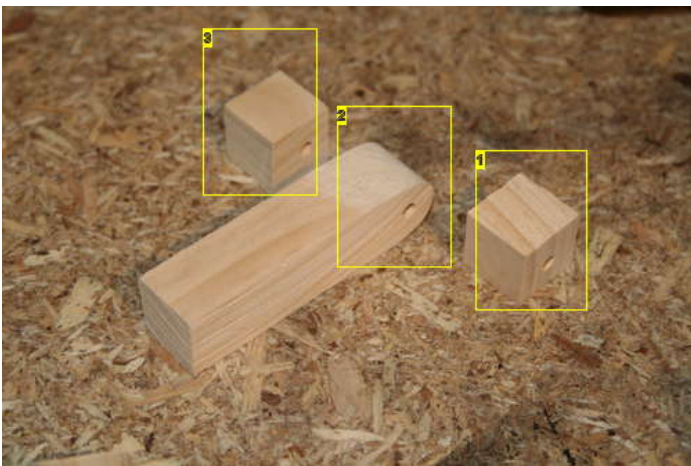


Image Notes

1. Larger bit, down the center.
2. Large bit, down the center
3. smaller bit, down the center

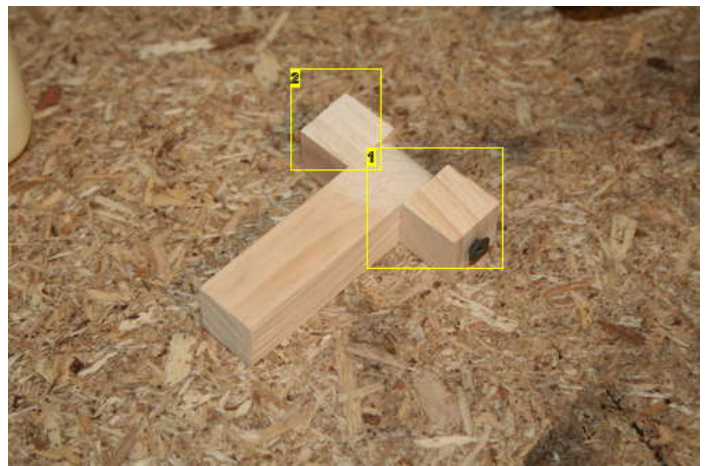


Image Notes

1. Screw is loose in these two pieces
2. Screw is snug here, but still loose enough that all parts can turn freely.

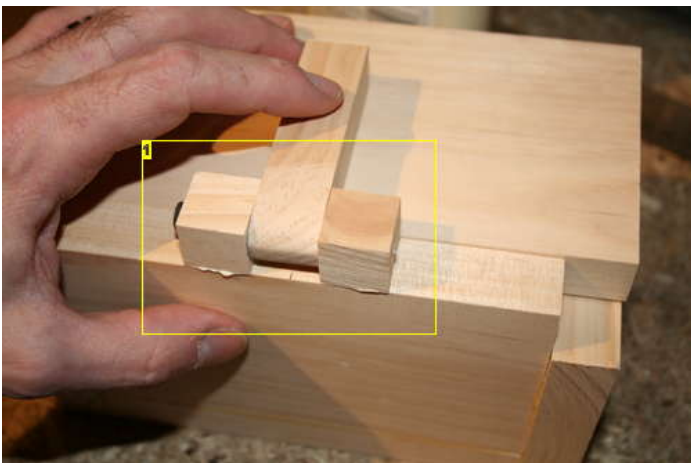


Image Notes

1. Assembled hinge set in place with the two square blocks glued.



Image Notes

1. Clamp the assembly making sure.. very sure.. that nothing moved. Slide out the 7 1/2 inch board to make sure it does not get glued in place by accident.



Image Notes

1. After the clamps are tight, remove the screw and 3 inch block. We don't want it glued in place either.

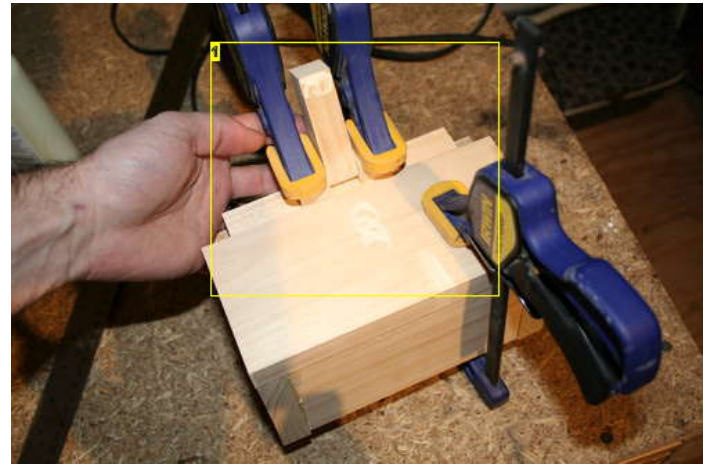


Image Notes

1. After the blocks have dried for a while, screw the 3 inch block back in place and throw some glue on there. Keep the glue away from the back edge. We don't want any to squeeze out on the 7 1/2 inch board or joint.

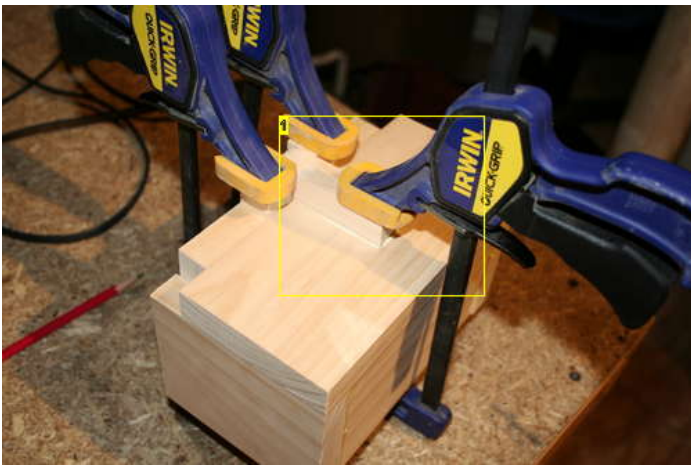


Image Notes

1. Clamp it down. Be careful nothing slides around.

Step 6: Box with mitered corners and pegged top.

Hidley-HO! Thanks for sticking around until the end!

In this section, I will show you the basic construction for a box with miterd corners and a pegged top.

In my opinion, the ability to make mitered corners is one of the core talents that distinguish your wet behind the ears newbie scrub from the polished professional. Professional "what" I won't say, as the rest of the brotherhood would drag me from the house, chain me to a pole and pants me on the interstate.

You can make clean mitres with a miter box, hence the name "Miter box", but in this case I'll be using my miter saw. Mostly out of a sense of laziness and the desire to prove that I don't do everything on my living room floor.

Tools and materials:

- ruler or measuring tape
- Miter box and saw or miter saw
- Glue
- Strap clamp or rope
- wood - one 4 foot 1x2
- thin board, 2 squares, 5 inch by 5 inch squares.
- Dowel, about 1/8th to 1/4 wide.
- Drill and a bit the same size as your dowel rod.
- Sand paper

We are going to make a thin, square box this time. The outside dimensions are going to me 5 inches, by 5 inches by 1 1/2 inches.

Construction:

1. Start by cutting your 1/2 into 4 - 5 inch (on the long edge) pieces, all mitered at 45 degrees. Check the pictures for details. If you have gaps, its better to have the gaps on the inside corners instead of the outside. The inside gaps squeeze shut under clamping a lot easier than outside gaps.
2. Lay the pieces out into a square, frame like structure.
3. Loosely lay your strap clamp or rope around the piece. Its better to have this in place before you have to tighten it. Juggling small pieces of wood with glue on them is

4. Working on the flattest surface you have, apply glue to each of the mitered edges and clamp them all together.
5. Let the whole thing dry for a good two hours.
6. Un-clamp everything. Check for any squeezed out glue and smooth down the edges
7. Glue up and clamp on one of the 5x5 squares as you see in the pictures.
8. Let dry for a few hours and un-clamp.
9. If your using a hand drill, Place and clamp (no glue) the other square piece on the top, making sure the edges are as straight as possible. If your lucky enough to have a drill press, you can get away with holding the pieces, just go slow.
10. Grab your drill and bit. Measure about a half inch up the bit from the tip and make a mark or put a piece of tape around the bit to mark the depth for drilling.
**I'm using a special wood bit that has a collar just for this sort of thing. You use the small wrench to loosen the collar and move it to the desired depth. Make sure you tighten the nut back on the bit properly.
11. Measure about halfway along one side (should be 2 1/2 inches), and about a half inch in. Drill two holes through the top piece, as straight as possible.
12. Take the dowel and place it in the hole as deep as it will go. It should be a snug, but not tight fit. If its too tight, sand the dowel lightly until it fits.
13. Mark the dowel with a pencil where it is flush with the top.
14. Remove the dowel and cut it just a hair longer than your mark. Do the other hole the same way.
15. un-clamp and remove the top piece. Turn it over and spread a little glue on the dowel.
- 16 Insert the dowels into the top piece, spinning them a little as they go in to spread the glue.
17. Let the dowels dry for an hour or so and check the fit in the box. Sand the dowels as needed to fit.
18. After its all dry, assemble the box and sand all the edges and the dowels (on the outside) flush.

Done!

What I learned:

Basic mitered corner construction
Peg construction

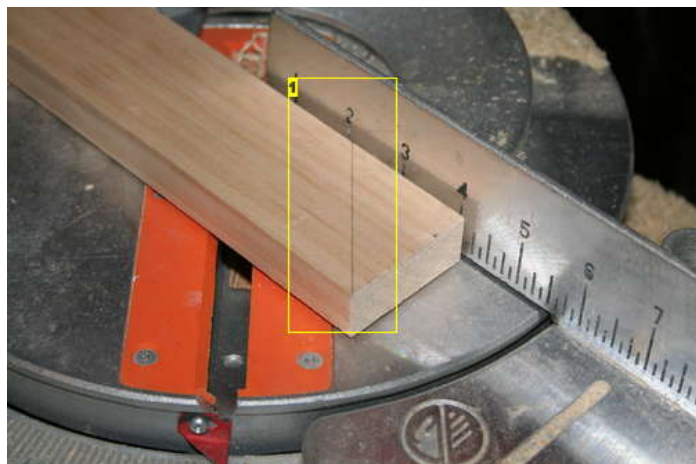


Image Notes

1. Always draw out you 45 degree lines before cutting. I almost always toss at least one board because I cut the 45 the wrong way.

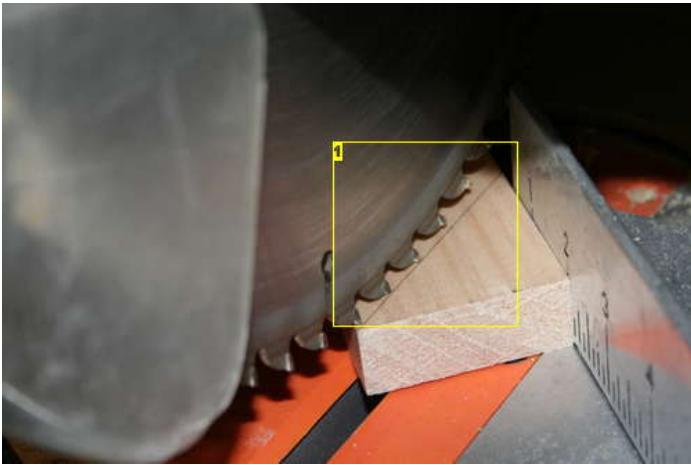


Image Notes

1. When you line up the saw, pay attention to where teeth hit the wood, and what side of the line you are cutting on.

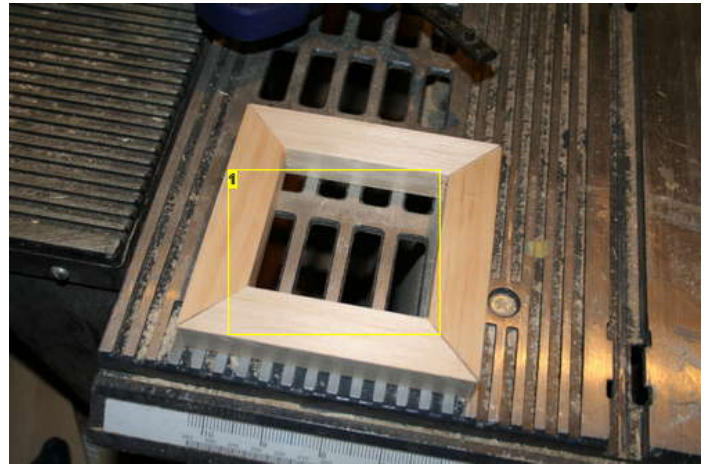


Image Notes

1. After all the boards are cut, do a test fit. The corners should be pretty close. Minor gaps will close up when you clamp it for gluing.

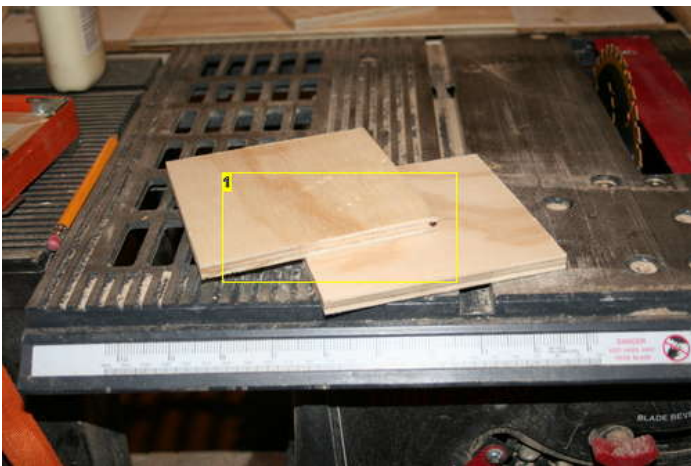


Image Notes

1. 5x5x1/4 inch.

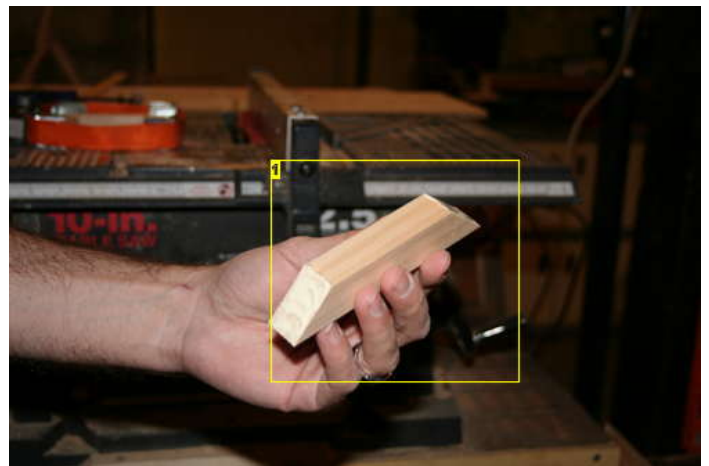


Image Notes

1. Apply glue to both sides of the pieces.

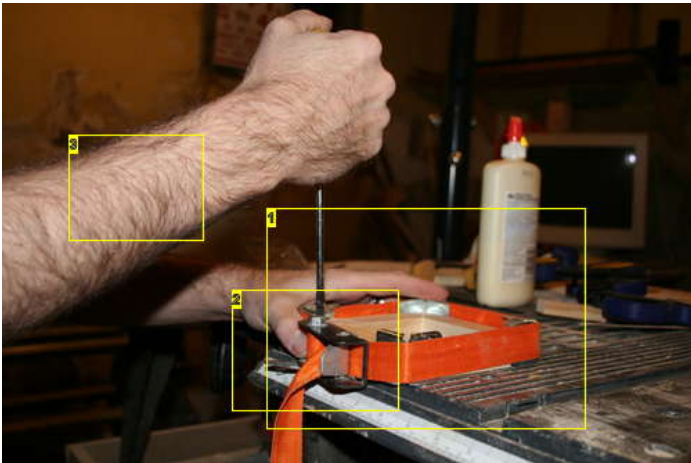


Image Notes

1. Assemble them on the flattest surface you have. The top of my table saw is about the best I can do.
 2. I'm using a strap clamp. Of all the corner clamps I have, this one works the best. You can do the same thing with a thick piece of rope and a stick. Tie the rope around and twist it like a tourniquet.
 3. Man.. I look like a gorilla here.



Image Notes

1. Leave the piece clamped up to dry for at least a few hours.

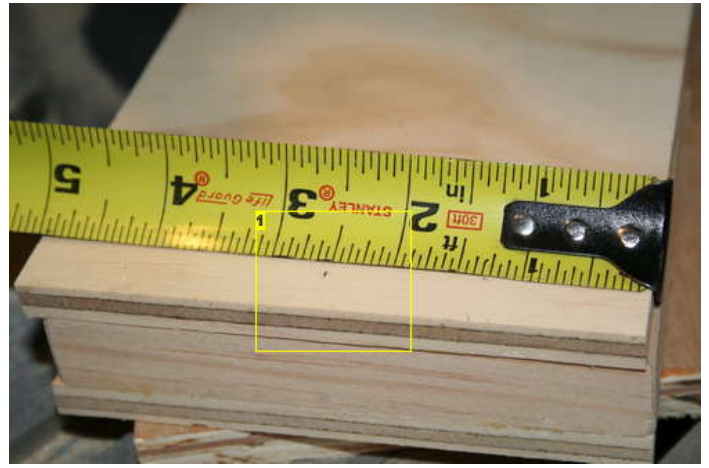


Image Notes
1. 5 inch box, half way should be about 2 1/2 inches

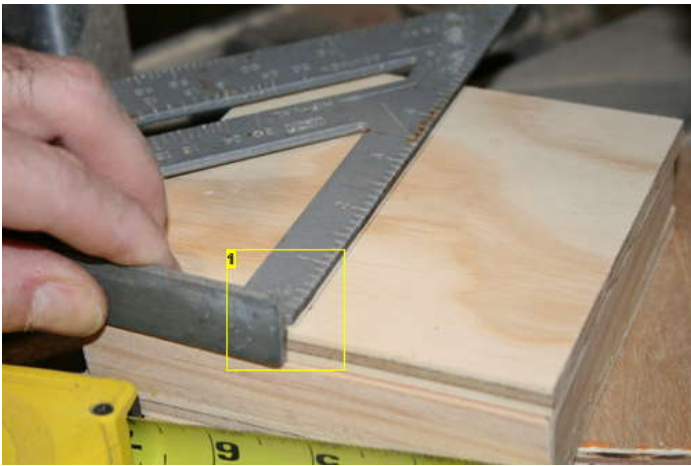


Image Notes
1. Half inch in. I'm using the speed square so I can mark both sides at once.



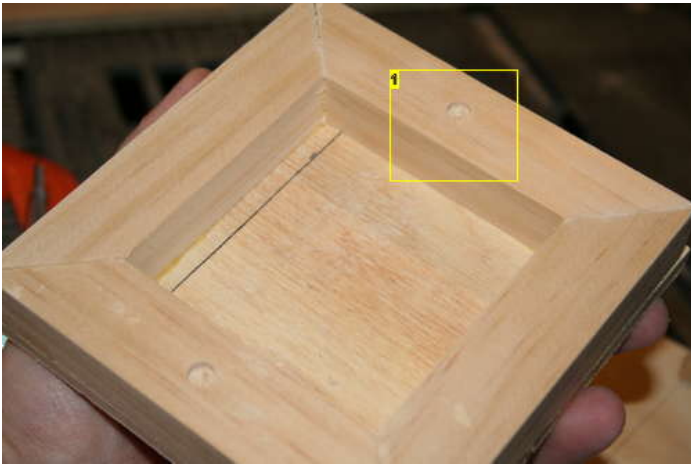


Image Notes

1. Holes.. about 1/4 to 1/2 inch deep.

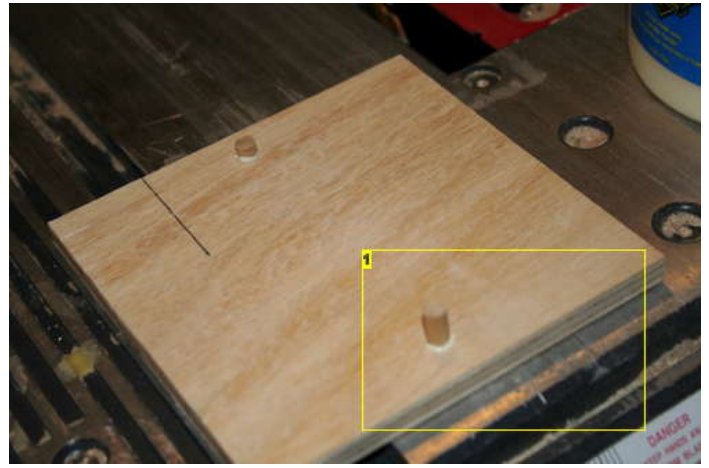


Image Notes

1. Glued dowels, cut slightly longer than needed. After the top is dry, sand them to the proper length.

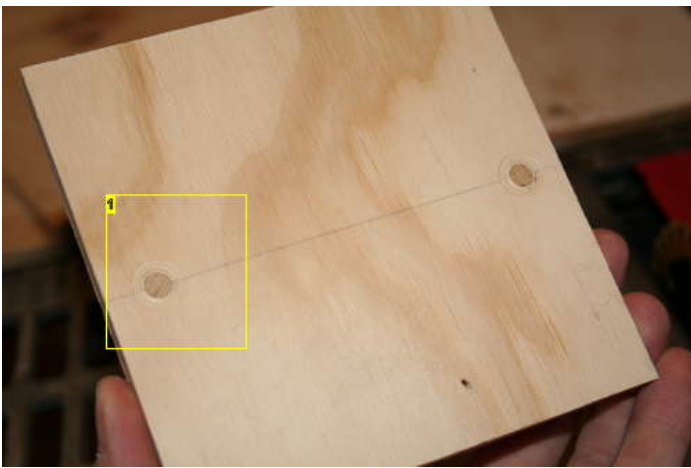


Image Notes

1. Sand the dowels flat on the outside-facing side of the top. It makes a nice detail.



Image Notes

1. This is my pencil. Speed McQueen rocks.

Step 7: Graduation

Well, there you have it.

So hopefully, combining different techniques you can now make all manner of small boxes. This talent is both useful and impressive, although its not quite something ou would see on a resume.