

Woodpunk LED Desk Lamp

by [jeff-o](#) on August 31, 2010

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Author: **PRO** jeff-o

By day, Jeff is an electronics technologist at a large aeronautics corporation. By night, a mad scientist / hacker / artist / industrial designer wannabe!

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Intro: Woodpunk LED Desk Lamp

The Woodpunk LED Desk Lamp is the result of being inspired, perhaps more than a year ago, by a [design](#) I saw on a design blog. It's a bit of a pet peeve that all these fantastic ideas are flaunted but never produced. So, I set about making my own wooden desk lamp, and I am extremely pleased with the results. The lamp that served as the inspiration for the Woodpunk actually *has* since gone into limited production, but of course it's ridiculously expensive. And besides, I still like mine better!

The majority of the lamp is made of 1/4" and 1/2" Baltic Birch plywood. I love using this stuff to make things - a quick skim of my other instructables will confirm that! It's strong and stable and easy to cut - and it's made of a renewable resource! What's not to love? Wood dowels serve as the joints. The springs and socket were stolen from two old lamps; one skillfully located at a thrift store by my wife, and the other was just taking up space in my house (and also "donated" by my wife). The LED lamp draws just 3W to produce 180 lumens, enough to illuminate a small work area. It was bought at DealExtreme, but nearly any LED bulb with an integrated reflector would work just as well.

Total cost for this project was \$25-\$30.



Now, you may be thinking, "Hey - this looks ideal for a laser cutter or CNC machine!" Well, you're right. At the moment my designs need a bit of work so they're actually compatible with an automated system - anyone willing to do the conversion? There's a 3-month pro membership for the first person who does!

So, have you got access to a scroll saw and drill press? That's pretty much all you need to make this awesome lamp!

UPDATE: [KChappers](#) generously converted my designs to .dwg, .dxf and .cdr formats for your CNC, laser cutter and 3D rendering pleasure. Thanks so much!!





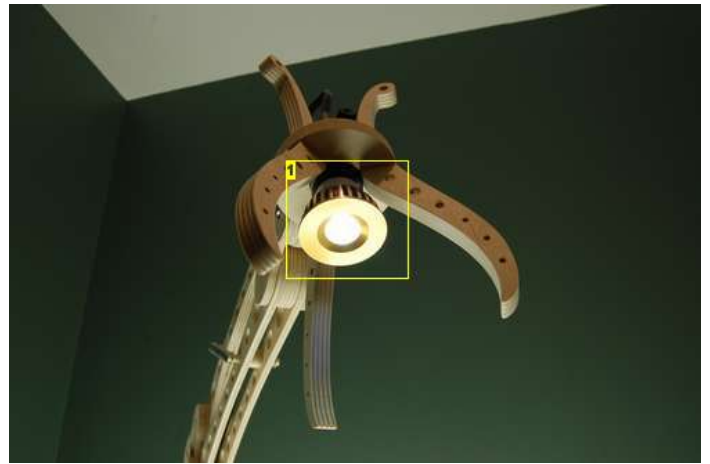


Image Notes
1. 180 lumen, 3W LED bulb

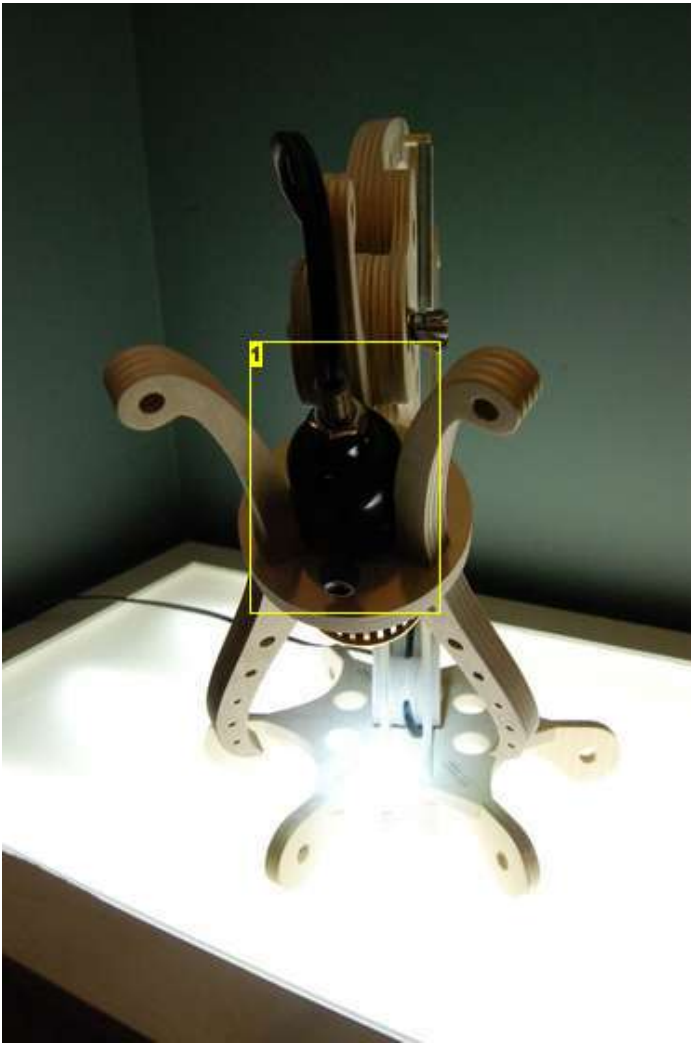


Image Notes
1. Recycled socket



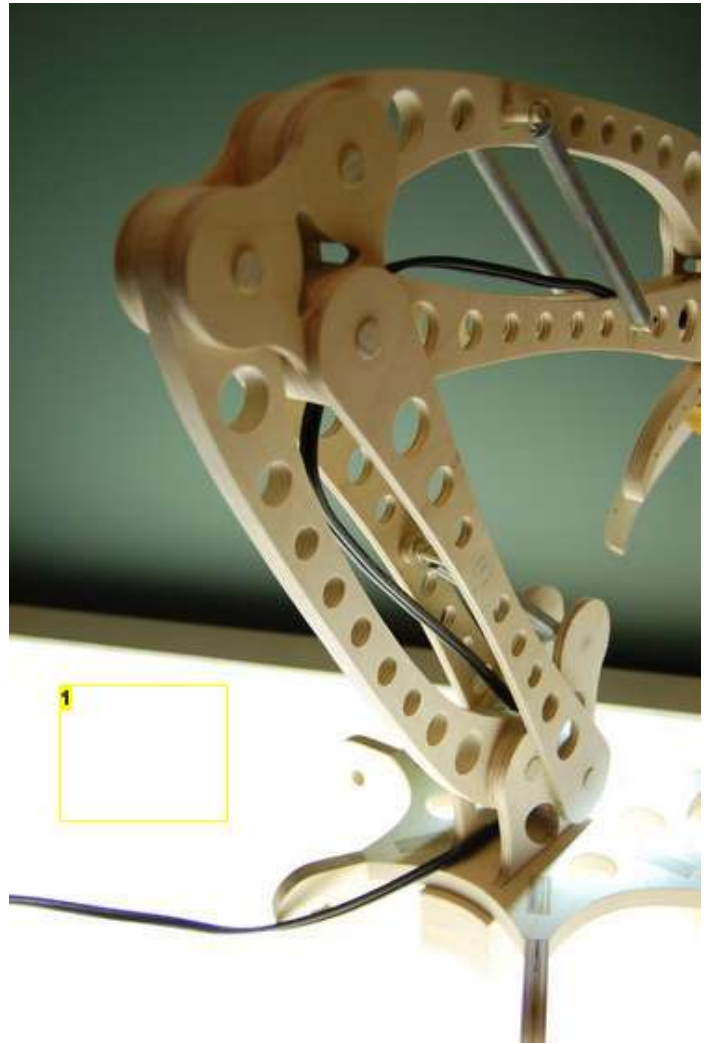


Image Notes
1. My light table



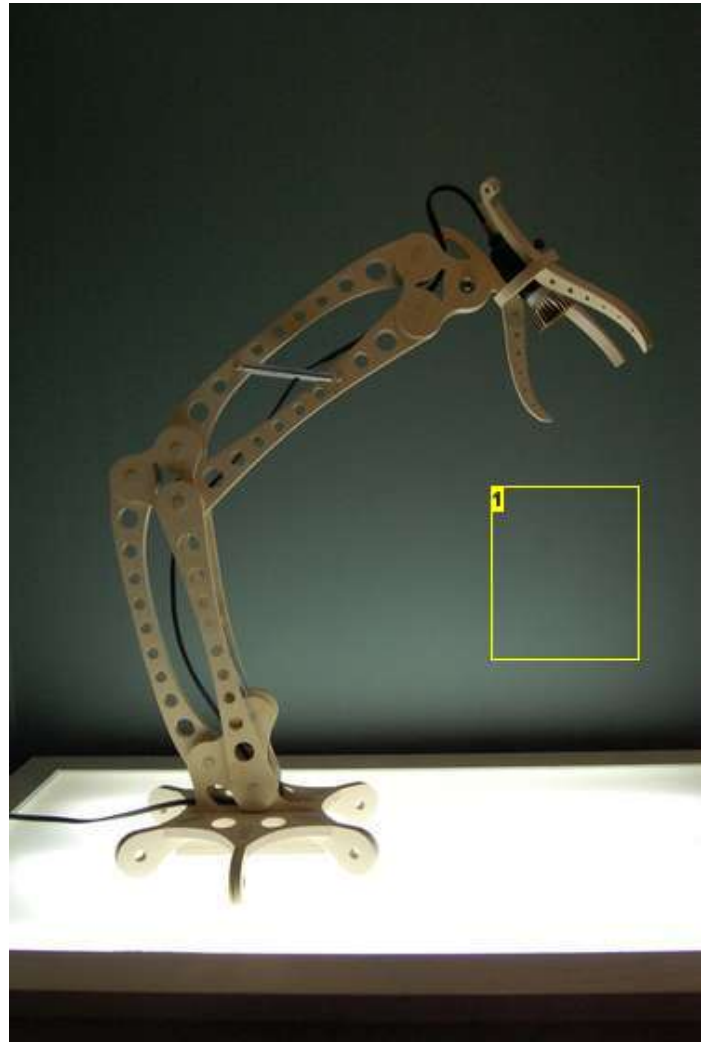
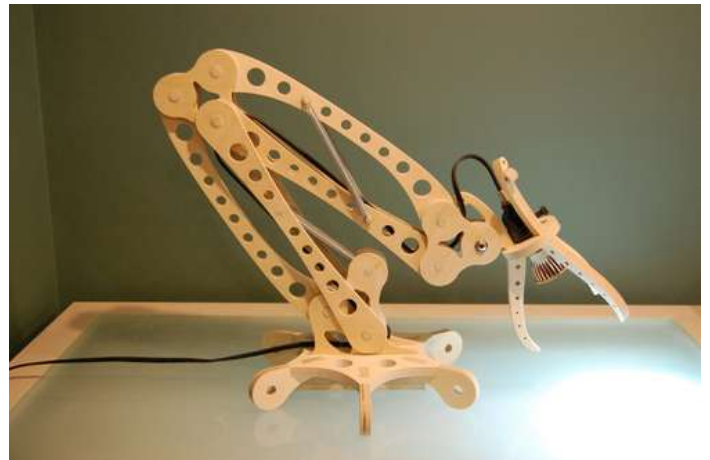


Image Notes

1. Maximum height is 27 inches. Maximum reach is 22 inches from the center of the base (without tipping over).



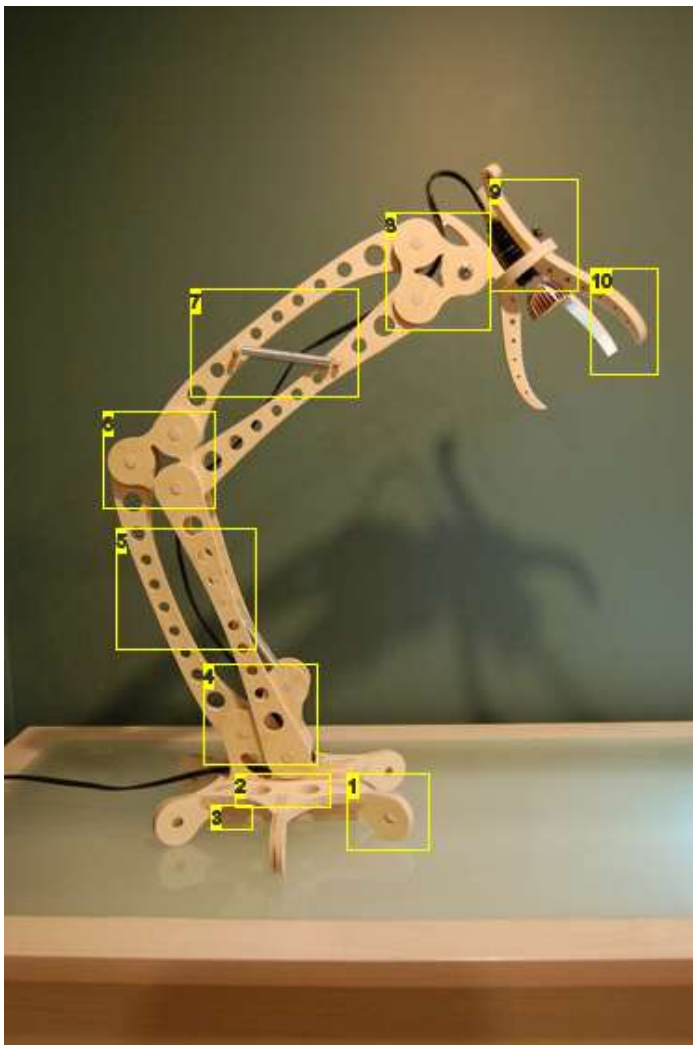


Image Notes

1. "toes"
2. Base
3. Counterweight
4. "shoulder"
5. "upper arm"
6. "elbow" joint
7. "forearm"
8. "wrist" joint
9. "reflector"
10. "fingers"

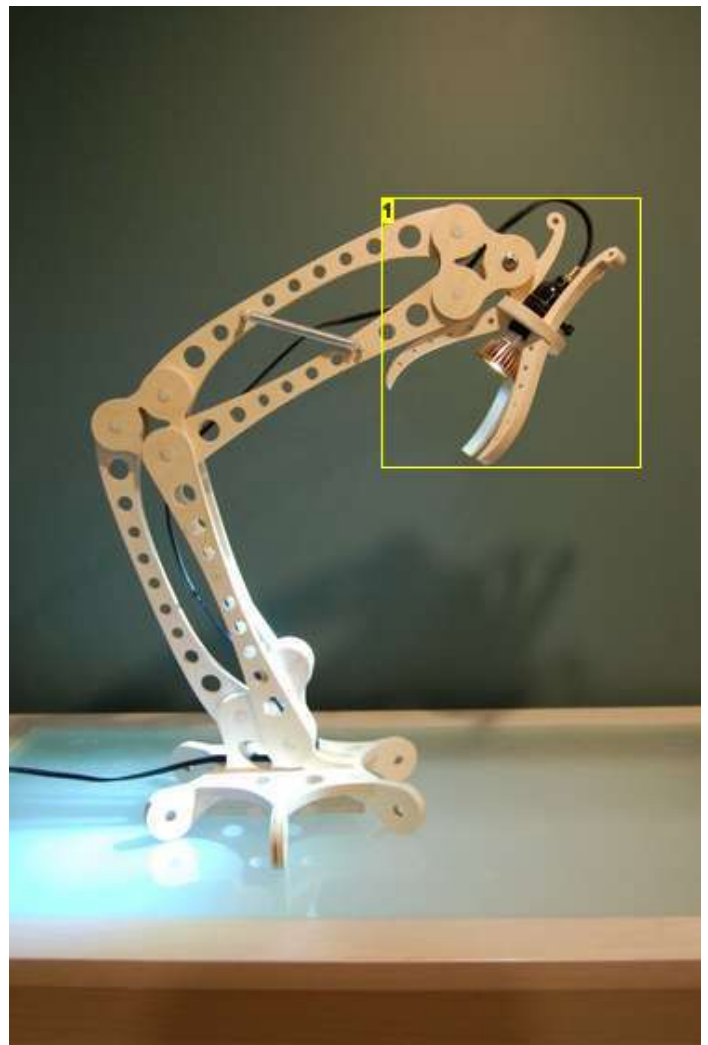


Image Notes

1. The reflector swivels up and down, but not left to right.



Image Notes

1. My cluttered workspace
2. Thanks again, Jan!

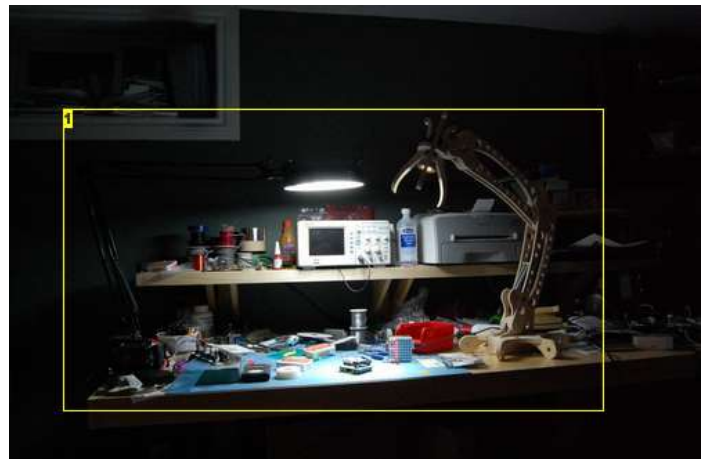


Image Notes

1. Two lamps are better than one, right?

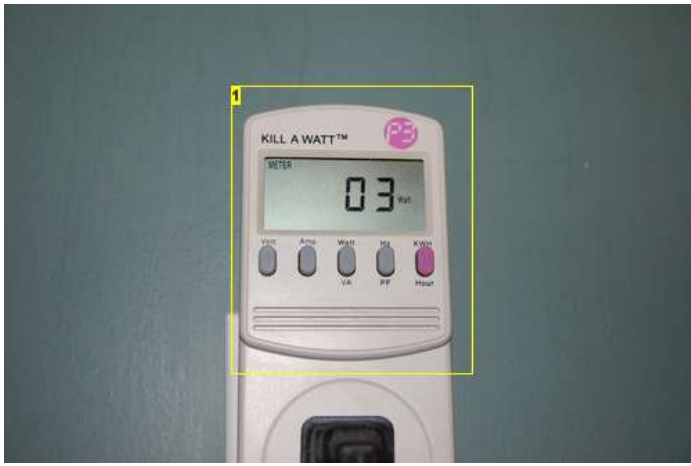


Image Notes

1. It does indeed consume just 3 Watts!

step 1: The Design

I designed "Woodpunk" in Adobe Illustrator. The patterns as attached are meant primarily for cutting by hand. If you want to use them on a CNC machine or laser cutter, they will definitely need to be modified!

When designing the lamp, I took measurements from an existing lamp I use at my workbench. I noticed that all of the "arms" are made of equal-length sections, connected by triangular "joints." This made the design relatively easy - just two parallelograms with a "shoulder" at the base, an "elbow" in between, and a "wrist" where the arm connects to the reflector. Indeed, you will notice that is exactly how I labeled the parts.

In addition, there's the base and various spacers.

Everything is designed to be cut out of either 1/4" or 1/2" plywood. Since there are many identical parts, you can stack the 1/4" wood and cut it in pairs. Not only is this faster, it also ensures that the joints are precisely aligned (this is important for the arms and joints especially).

The patterns are intended to be printed out on 11x17" paper - if you don't have this capability at home, any business supply store or print shop will be able to print the patterns for you. I printed mine at work.

Also note that you may need to modify the design of the reflector section to suit the lightbulb socket you've got - the diameter may need to be increased or decreased, for example.

Included below are the preliminary patterns - I plan to clean them up soon, to make the whole thing easier to build!

A HUGE thanks to instructables user KChappers, who cleaned up, organized and converted my designs into .dwg .dxf and .cdr for me!

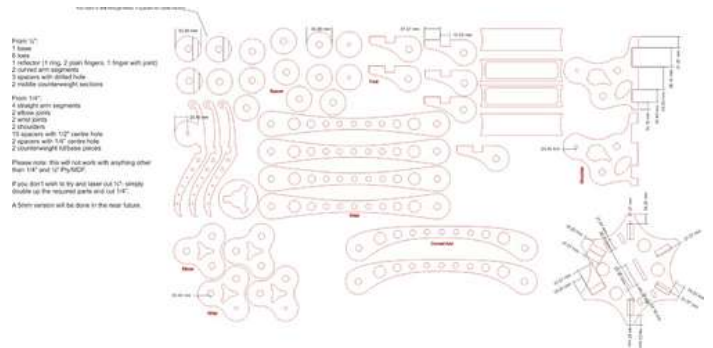
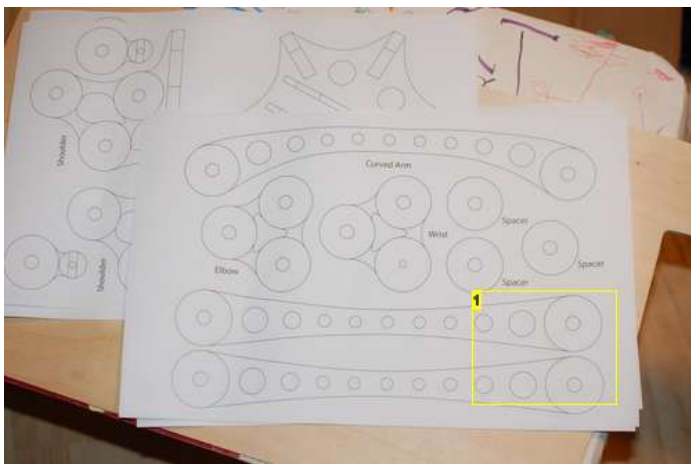


Image Notes

1. Multiple copies of the patterns printed on 11x17 sheets

File Downloads



Woodpunk Counterweight.pdf ((612x792) 164 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk Counterweight.pdf']

Woodpunk reflector.pdf ((612x792) 180 KB)

<http://www.instructables.com/id/Woodpunk-LED-Desk-Lamp/>

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk reflector.pdf']



Woodpunk Template 3.pdf ((1224x792) 179 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk Template 3.pdf']



Woodpunk Template 2.pdf ((1224x792) 175 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk Template 2.pdf']



Woodpunk Template 1.pdf ((1224x792) 191 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk Template 1.pdf']



Woodpunk Counterweight.ai ((612x792) 1 MB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk Counterweight.ai']



Woodpunk reflector.ai ((612x792) 1 MB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk reflector.ai']



Woodpunk Template 3.ai ((1224x792) 1 MB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk Template 3.ai']



Woodpunk Template 2.ai ((1224x792) 1 MB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk Template 2.ai']



Woodpunk Template 1.ai ((1224x792) 1 MB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Woodpunk Template 1.ai']



WoodPunk.dxf (3 MB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'WoodPunk.dxf']



WoodPunk.cdr (118 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'WoodPunk.cdr']



WoodPunk.dwg (957 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'WoodPunk.dwg']

step 2: Materials and Tools

Materials

1 or more discarded lamp fixtures, from which you can extract:

- 1 standard light bulb socket, with built-in switch
- 1 two-conductor cord with attached plug (likely attached to the socket)
- 4 springs (the Woodpunk is heavy, you'll need 4!)
- other assorted hardware

1 LED light bulb (I used this one but there are plenty of other choices!)

- One 1x2 foot piece of 1/2" Baltic Birch plywood
- One 1x2 foot piece of 1/4" Baltic Birch plywood
- 1/2" wood dowel (it usually comes in four foot lengths, that's more than enough)
- 1/4" wood dowel (it usually comes in four foot lengths)
- One 2" long, 1/4" diameter stainless steel screw
- Two 1/4" stainless steel washers
- One 1/4" stainless steel butterfly nut

- Carpenter's glue
- Spray glue (for affixing patterns)
- Sandpaper

Tools

- A scroll saw (I use a Dewalt DW788)
- A drill press
- 1/8", 3/6", 1/4" and 1/2" brad point drill bits
- 3/4" and 1" Forstner drill bits
- A vertical belt sander (optional)
- A screwdriver

<http://www.instructables.com/id/Woodpunk-LED-Desk-Lamp/>

A few clamps

As I mentioned before, if you've got access to a CNC machine or a laser cutter, you should be able to cut out the parts with one. The only catch is that you'll need to modify my design files so that you have usable tool paths.

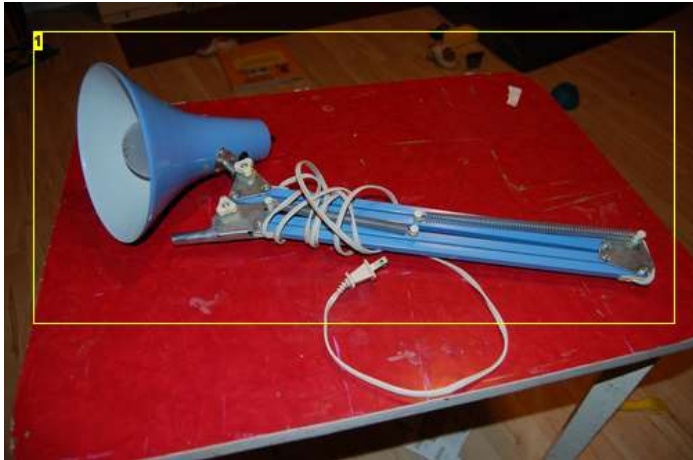


Image Notes

1. Bought at a thrift store for \$2.

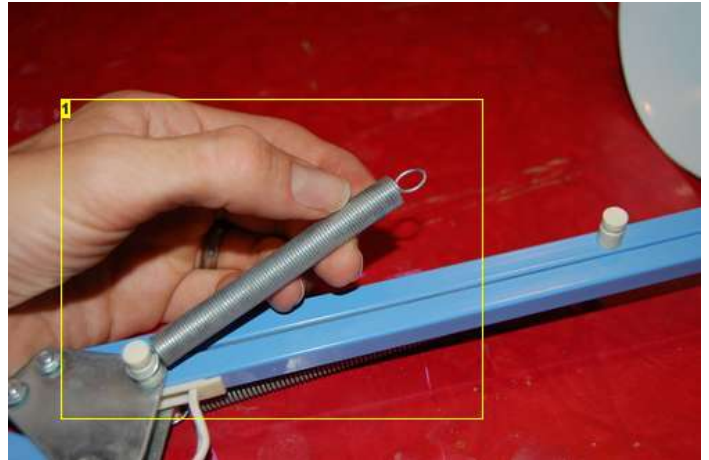


Image Notes

1. Nice springs... the only thing I could use from this lamp. The switch was broken.

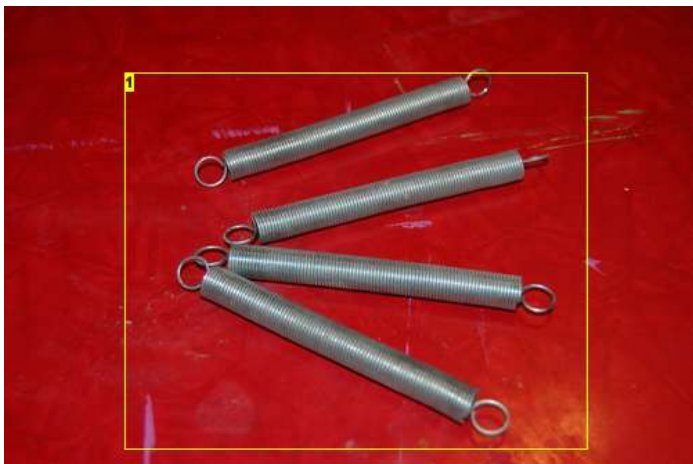


Image Notes

1. Woodpunk is heavy; you'll need four springs.



Image Notes

1. Busted reflector
2. An old luminary I had been using as a worklight

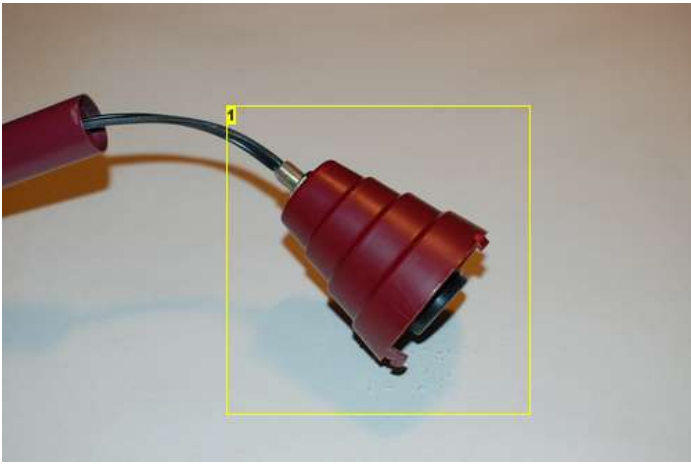


Image Notes
1. The top unscrews...



Image Notes
1. Aha, here's what we need!



Image Notes
1. Unscrew the wires from the terminals.



Image Notes
1. One extra-long cord and a switched bulb socket to match!



Image Notes
1. I bought another socket just in case the other one didn't work. I guess I'll use this for something else...

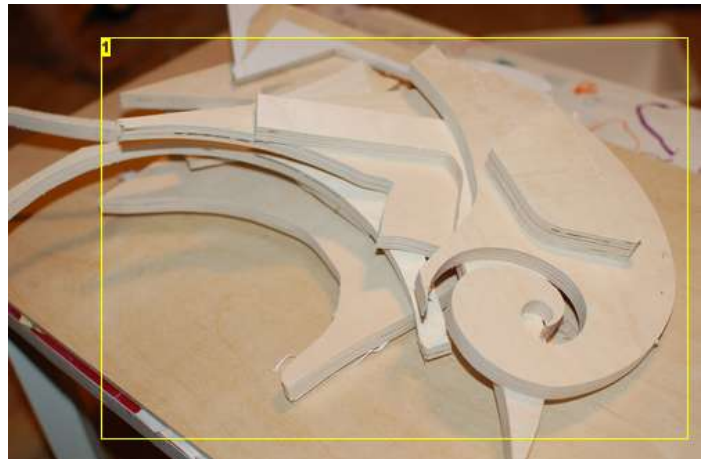


Image Notes
1. This project was a great opportunity to use up a bunch of scrap wood that was lying around collecting sawdust.

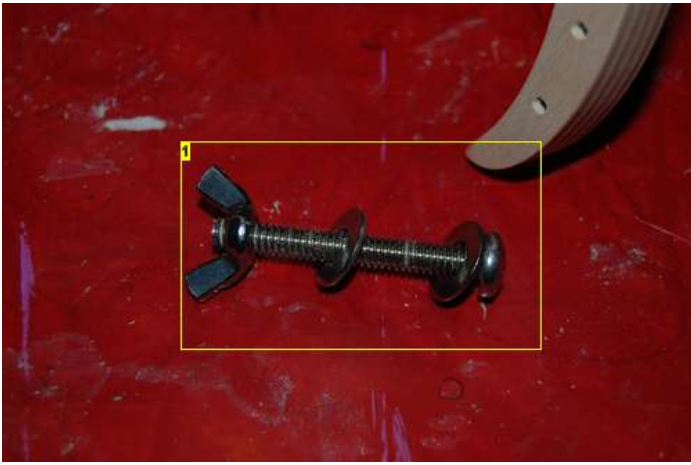


Image Notes

1. 2" long, 1/4" diameter stainless steel screw, with two washers and butterfly nut.

step 3: Print and Attach the Patterns

Once printed out, the patterns may be cut out and glued directly to the wood using spray adhesive. To make the patterns easily removable later on, let the fresh glue sit for about 30 seconds before sticking the pattern onto the wood.

I had a lot of straps lying around, so I took the opportunity to use them up where possible.

If you plan the layout of the patterns just right, you can lay down half of the required pieces, then stack one piece of wood on top of the other. Tape the layers together so they won't slide around.

Roughly cut out all the pieces on the scroll saw, and re-tape where necessary to keep the halves firmly attached together.



Image Notes

1. This stuff works well.
 2. Two patterns laid face-down on a piece of old cardboard. Spray adhesive is messy!

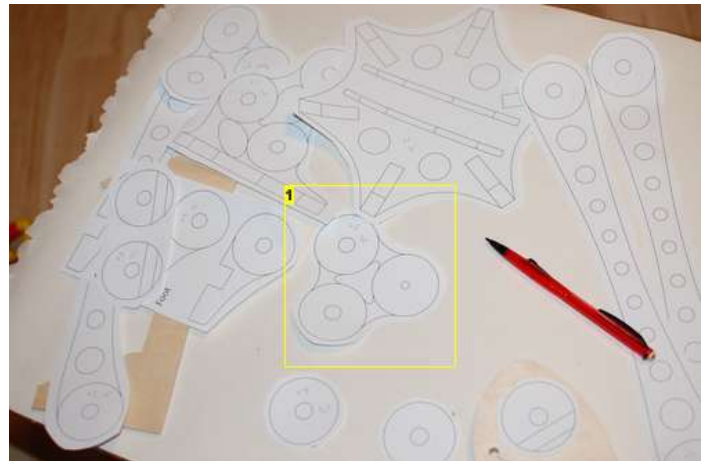


Image Notes

1. All the patterns cut out, with the size of wood they're meant for marked on with pencil.

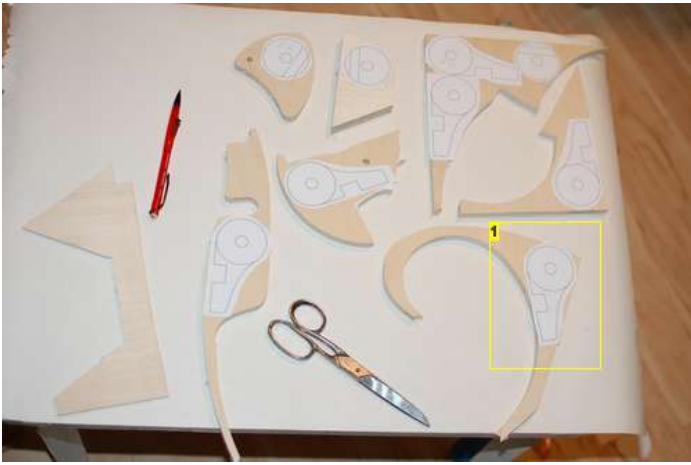


Image Notes

1. See? A great use for scraps!



Image Notes

1. Two of the 1/2" thick pieces glued to new wood

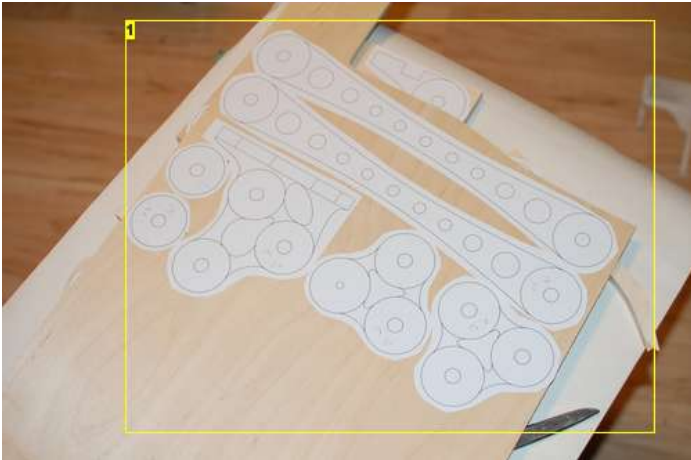


Image Notes

1. This 1/4" thick section will be cut off and taped to another one of the same size.

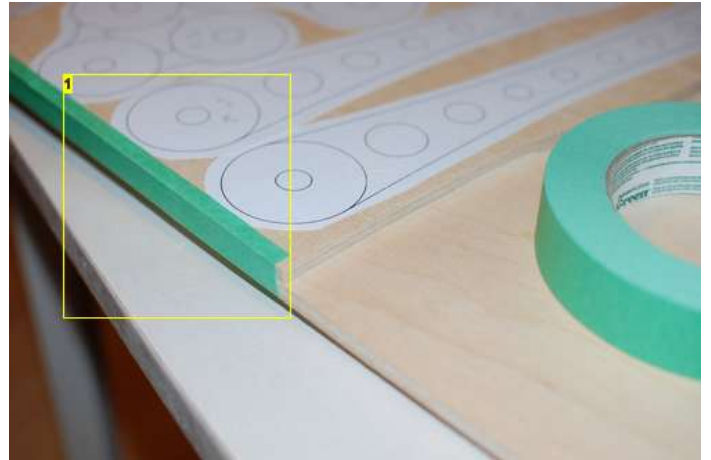


Image Notes

1. Taped along the edges for rough cutting

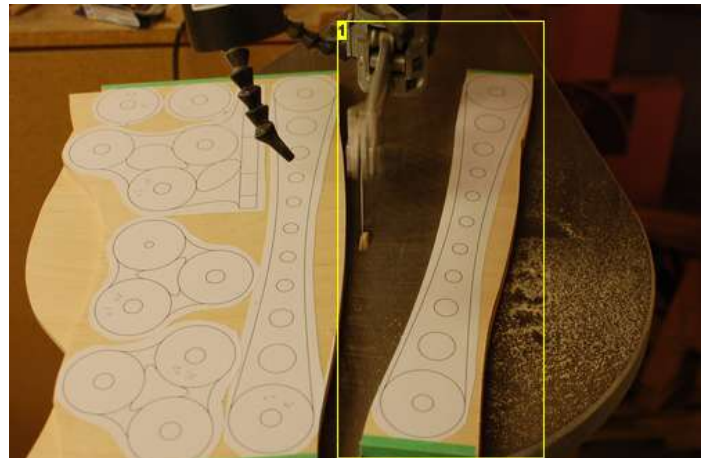
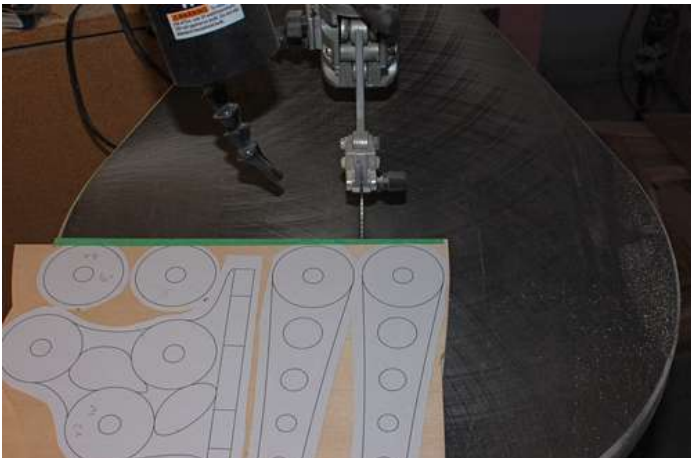


Image Notes

1. Just a rough cut is needed at this point. Finish cutting is done after the holes are drilled.

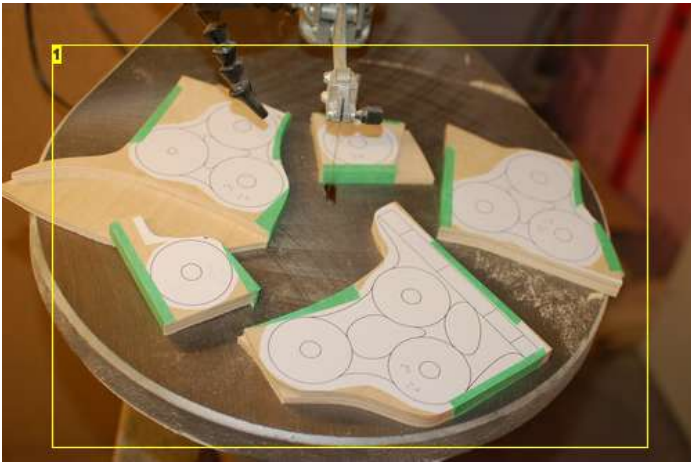


Image Notes

1. A few pieces ready for drilling.

step 4: Drill the Holes

Before cutting out the pieces properly, it's a good idea to drill the holes first. Why? Well, in the case of the stacked cuts, this will ensure that the holes are precisely lined up, making assembly easier later on. It also gives a bit more material to hold onto, when drilling those large diameter holes.

It's easiest to drill all of the same-size holes at once. I started with the 1/2" holes, since they are the most numerous. Then I did the other size holes.

Some of the pieces also have internal cuts. They'll need a pilot hole drilled, through which the scroll saw blade can be fed. I used the 1/4" drill bit for this.

When drilling, make sure you place a piece of scrap wood below the piece being cut. This will help prevent "tearout," which could ruin the look of the lamp.

Keep the matching "pairs" together until cutting is complete.

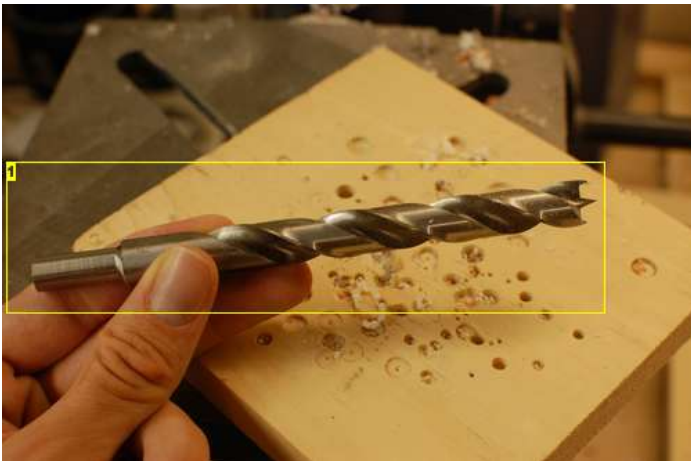


Image Notes

1. A very nice 1/2" brad point drill bit, from Lee Valley Tools. A Christmas present from me!

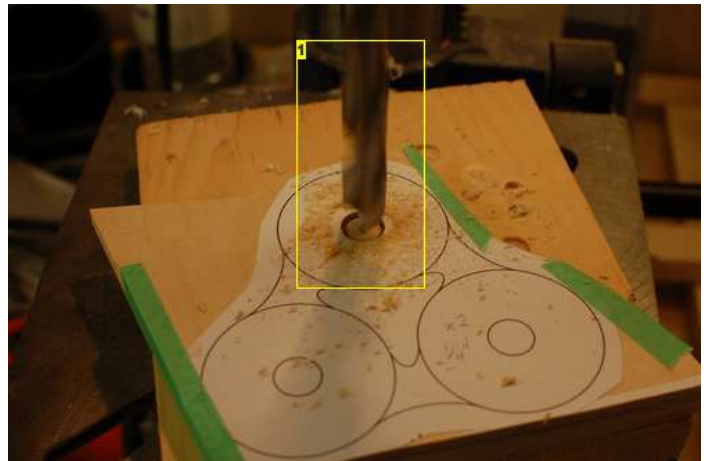


Image Notes

1. Obviously, centering the bit is very important!

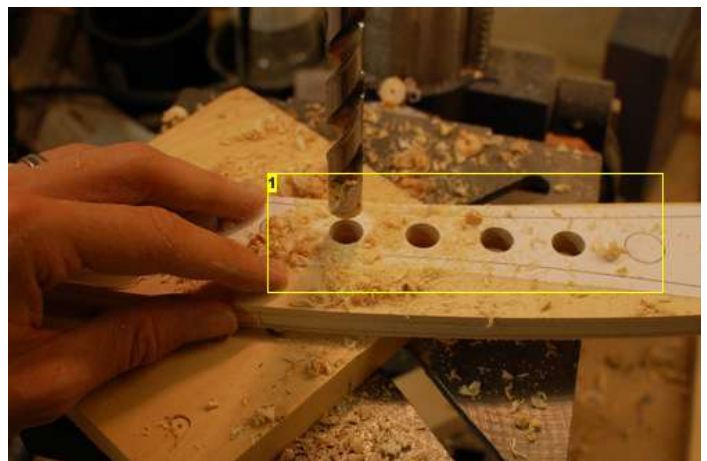
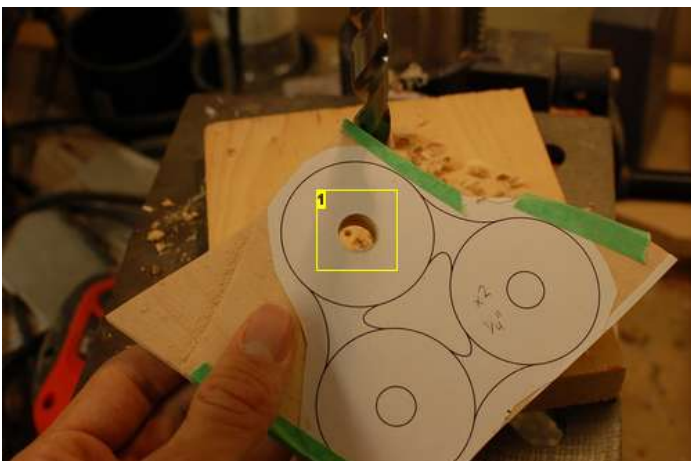


Image Notes

1. Oh, I do love the sharp, clean holes that a brad point bit produces!

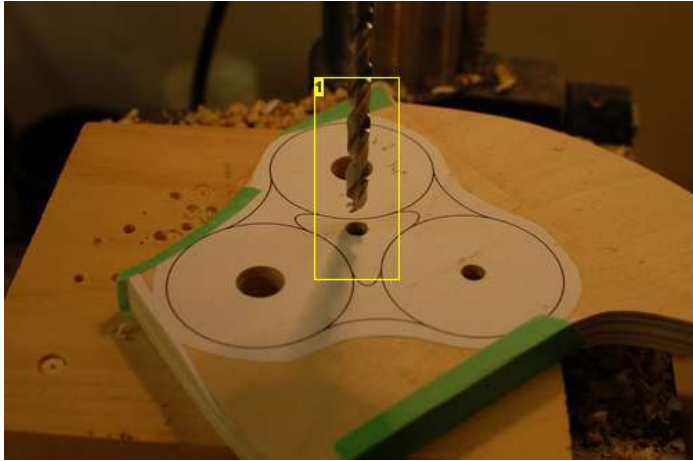


Image Notes

1. Drilling more holes...

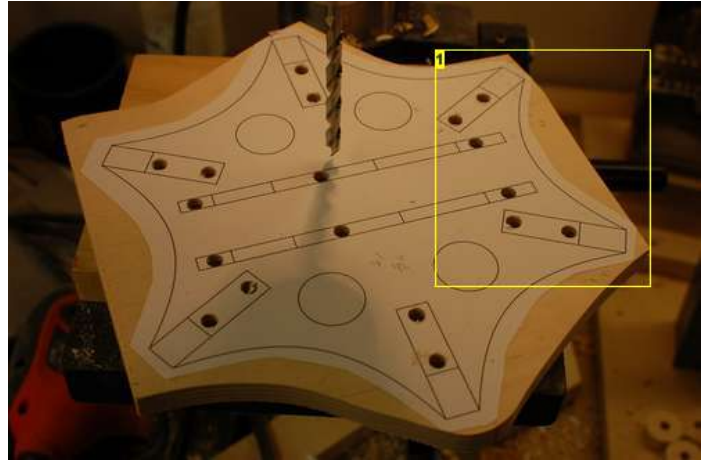


Image Notes

1. For pieces with an internal cut, make sure to drill a pilot hole.

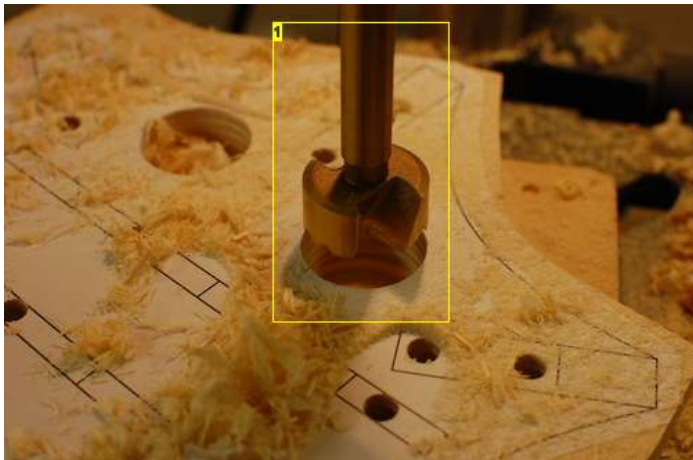


Image Notes

1. Lots of pilot holes!

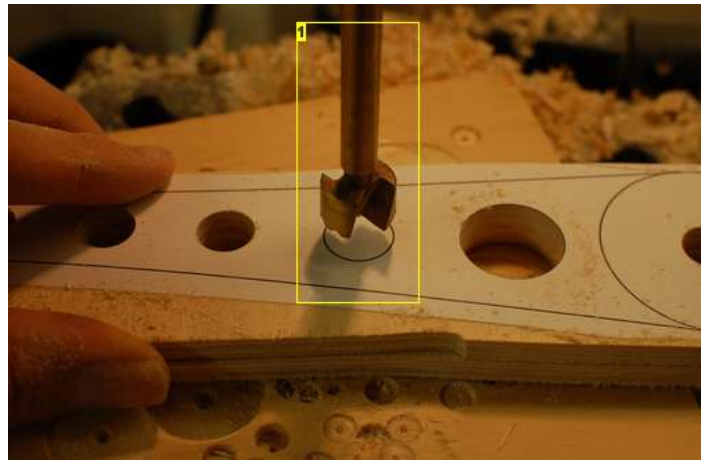


Image Notes

1. 1" diameter Forstner bit. This hole isn't critical, so if you don't have a bit like this just cut out the hole with the scroll saw.

Image Notes

1. 0.75" forstner bit. Again, non-critical hole that's just for looks. Cut out with the scroll saw if you like.

step 5: Cut out the Pieces

Now it's time to cut out all the pieces. I like to use Olson PGT blades - 7RG or even 9RG could be used here, since the patterns are not very complex.

One trick you may use for cutting out the stacked pieces is to stick a short piece of dowel in two of the holes. This will prevent the pieces from shifting far better than the tape is able to.

Cut each piece carefully, to the line. In most cases you don't have to be super-precise, though you should be careful when cutting the joints that slot together. These include the reflector, the the joint between the "shoulders" and base, and between the "feet" and base. Take your time to cut these precisely, so that the pieces fit together later with a minimum of wobble.

To do the inside cuts, disconnect the scroll saw blade on one end and feed it through the pilot hole. Reconnect the blade, re-tension it, then cut out. Disconnect the blade again to remove the workpiece.

The pieces may now be sanded to remove any rough edges and faces. You can use a belt sander for the edges if you've got one. Sand to the line using the belt sander. One the edges are sanded, remove the paper patterns. If the paper won't come off easily, heat it up a bit with a heat gun. The adhesive will release easily, but you'll need to sand the residue smooth. Lightly sand the faces of all the pieces, and sand the corners to remove any burrs.

One final step is to drill holes through the 1/2" spacer pieces. The cord will eventually pass through these holes, which are drilled perpendicular to the main 1/2" hole in the center. Using one of the scraps to support the spacer, and a clamp to hold it perpendicular, drill one or more holes large enough to accept the cord. This is a tricky operation, and a nice brad point drill bit really does wonders here.

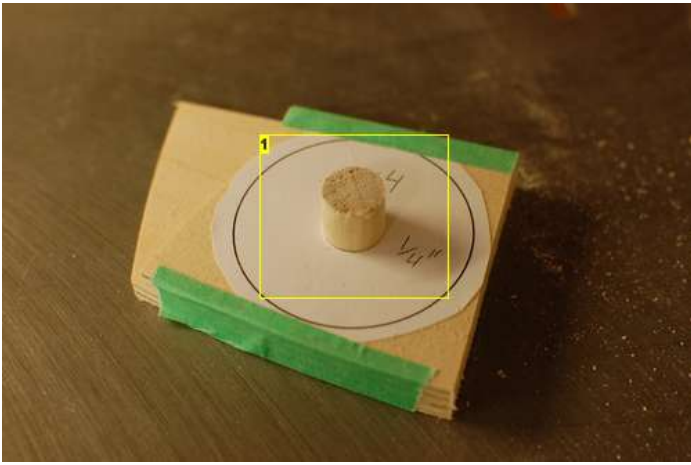


Image Notes

1. Here a 1/2" dowel is used to keep the pieces aligned during cutting and sanding.

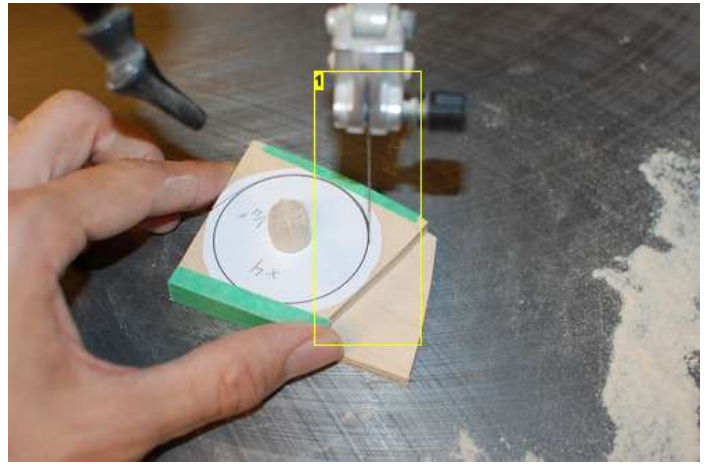


Image Notes

1. Cut close to the line...

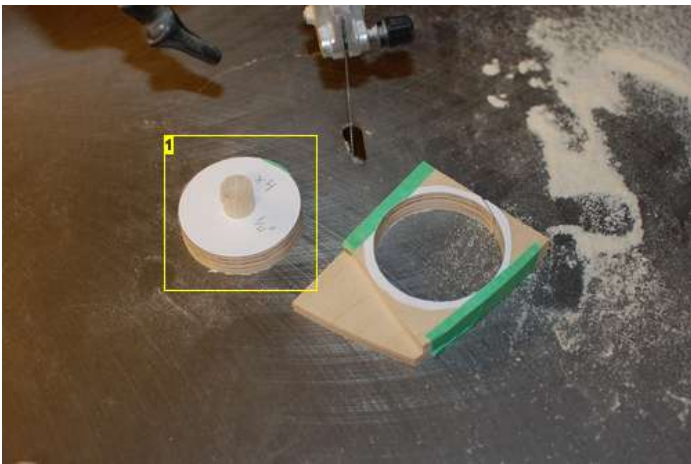


Image Notes

1. The dowel holds the pieces together in perfect alignment!

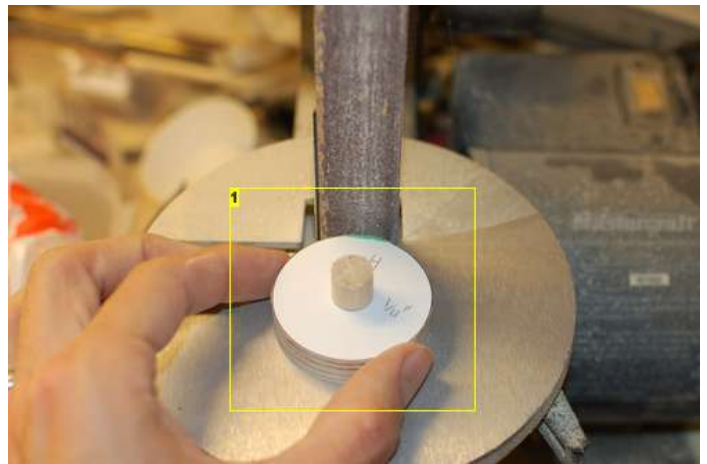


Image Notes

1. Sand to the line.

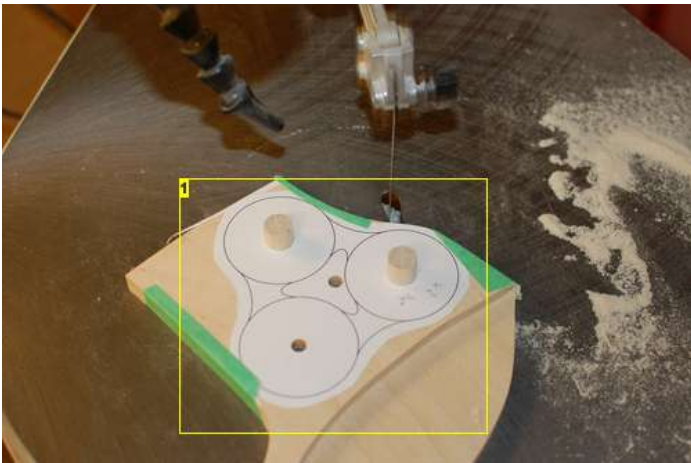


Image Notes

1. Here two dowels are used to keep this larger piece in alignment.

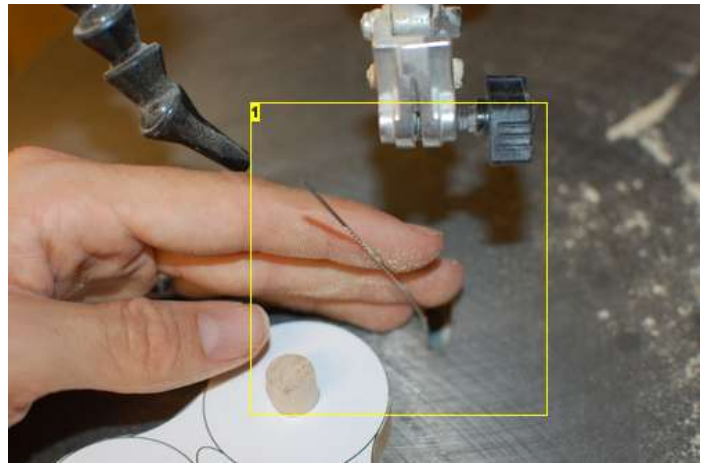


Image Notes

1. To do an interior cut, disconnect the blade on one end, and feed it through the pilot hole. Then reconnect and re-tension the blade.

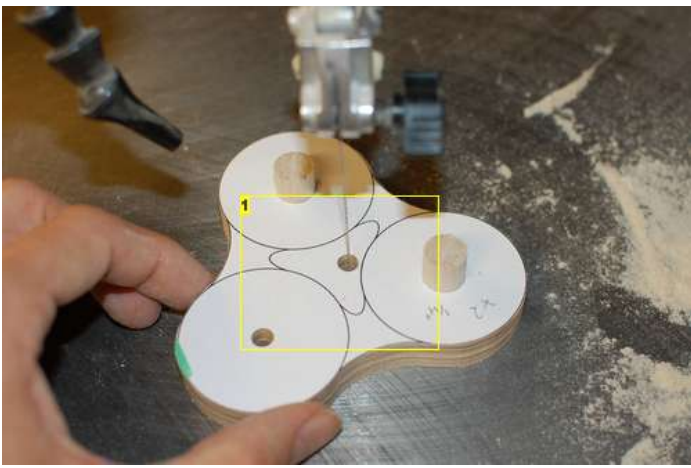


Image Notes
1. Starting an internal cut.

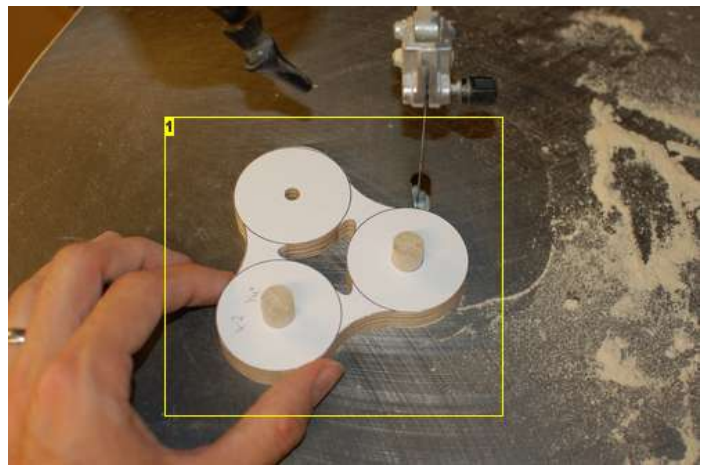


Image Notes
1. All cut out and ready for sanding.

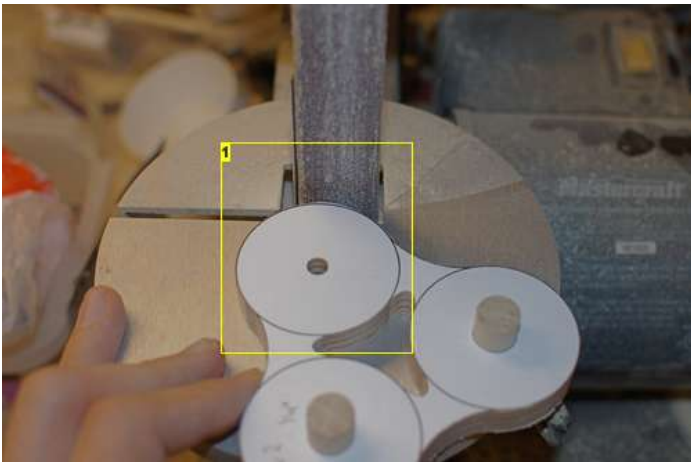


Image Notes
1. A narrow belt sander is ideal for this project.

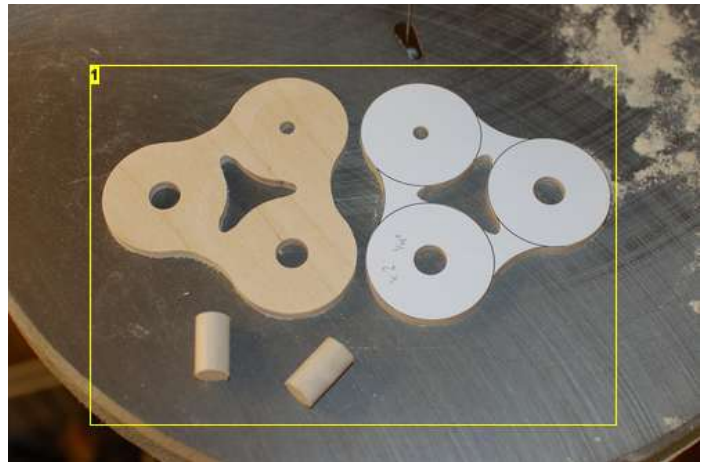


Image Notes
1. And here we go. Two pieces, exactly the same. Well, one still has the pattern attached but you know what I mean.

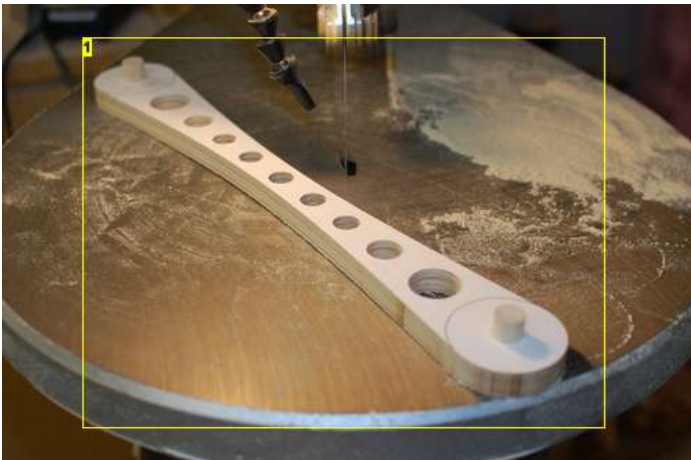


Image Notes
1. This piece will just barely fit on a 15" scroll saw. Better to have a 20" model...

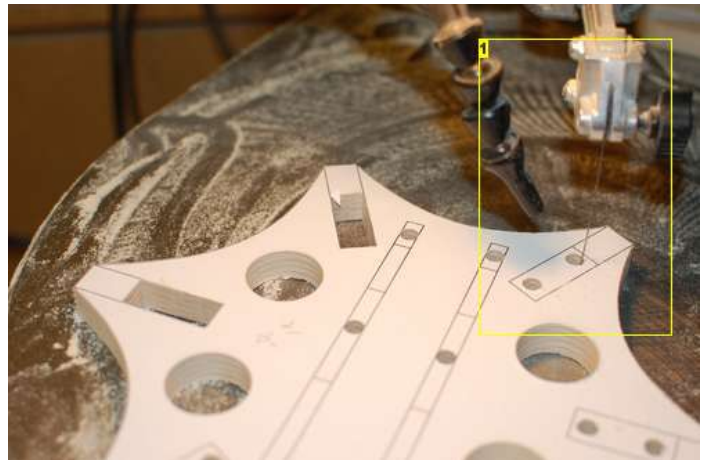


Image Notes
1. Lots of internal cuts and tight corners on this base piece. Take your time here and cut carefully, because you won't be able to sand to the line so easily here.



Image Notes

1. This is what it should look like. Pay close attention to where the slots are cut!

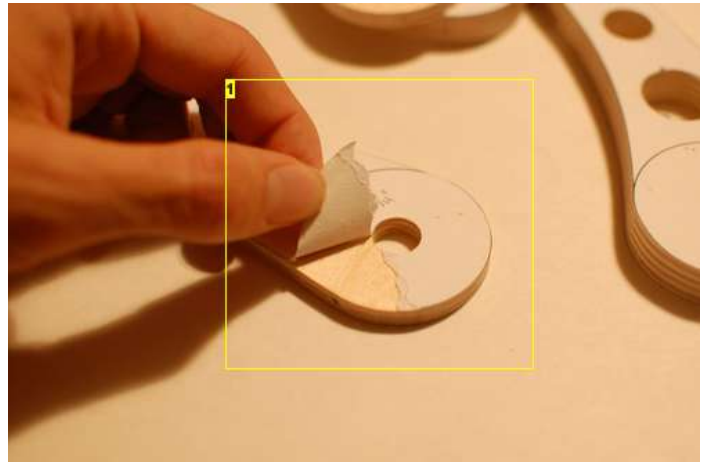


Image Notes

1. Once the edges are sanded, peel off the patterns.

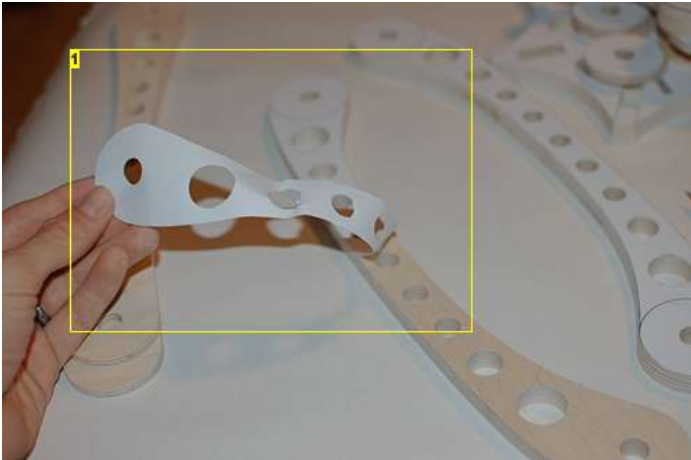


Image Notes

1. Ideally, the paper should peel off without tearing too much.

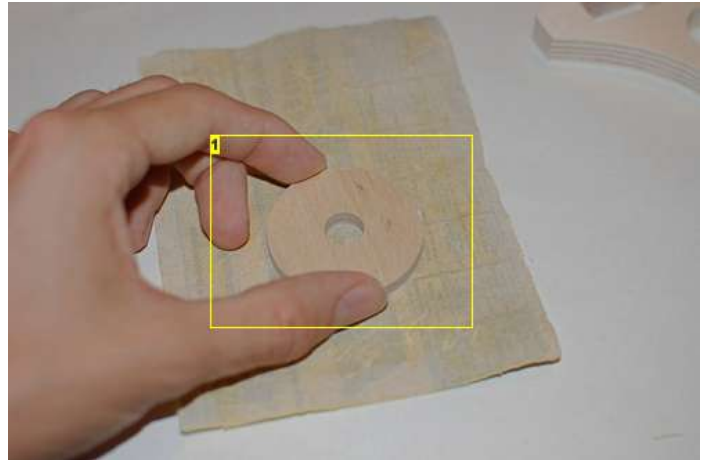


Image Notes

1. Lightly sand the faces

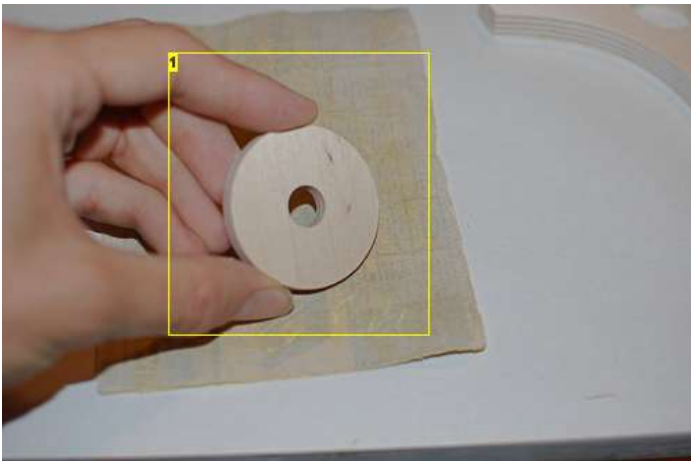
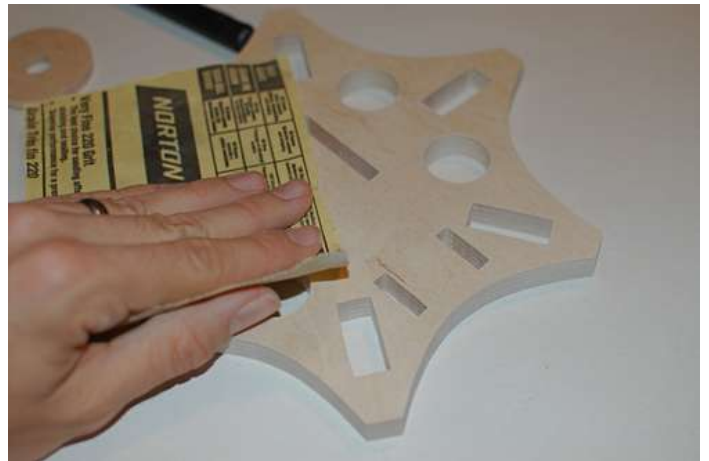


Image Notes

1. And sand off any burrs



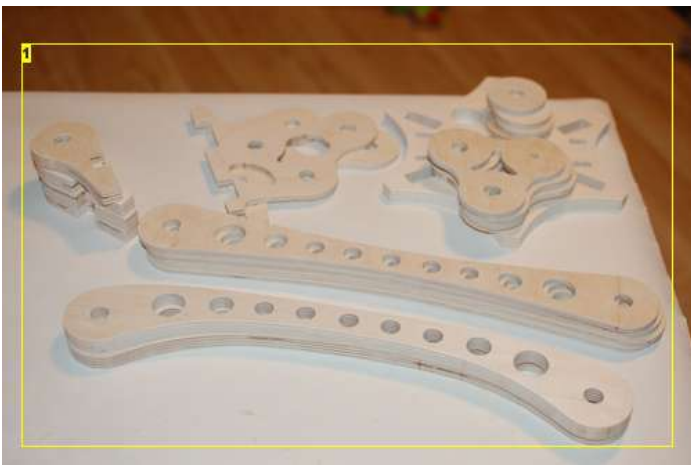


Image Notes

1. A stack of sanded parts, ready for assembly.

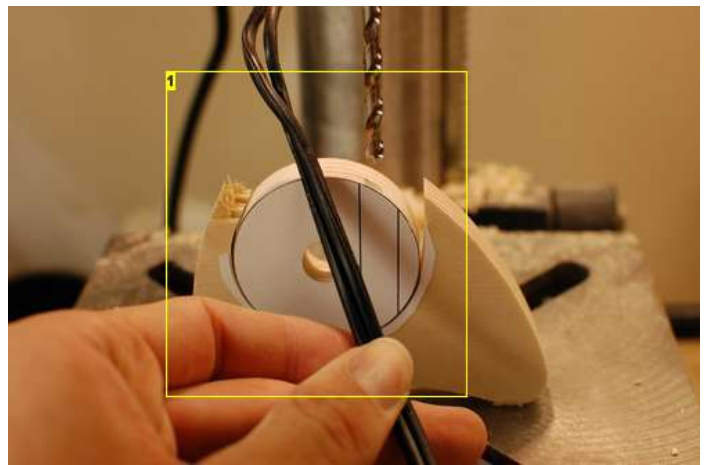


Image Notes

1. This cord needs to fit through that piece of wood, kinda where the lines are marked.

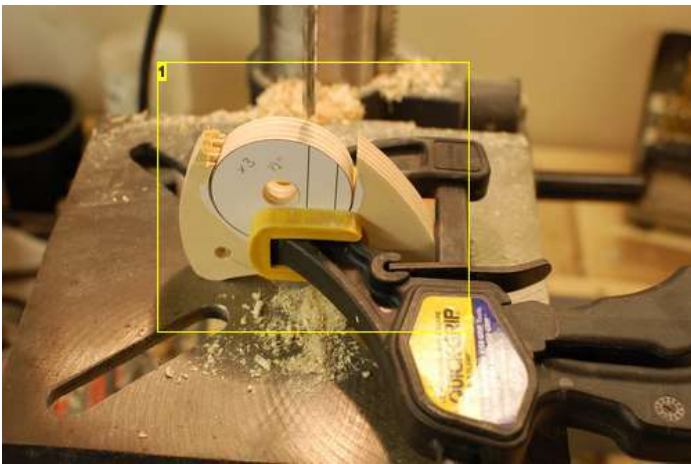


Image Notes

1. Clamped to a piece of scrap wood for support

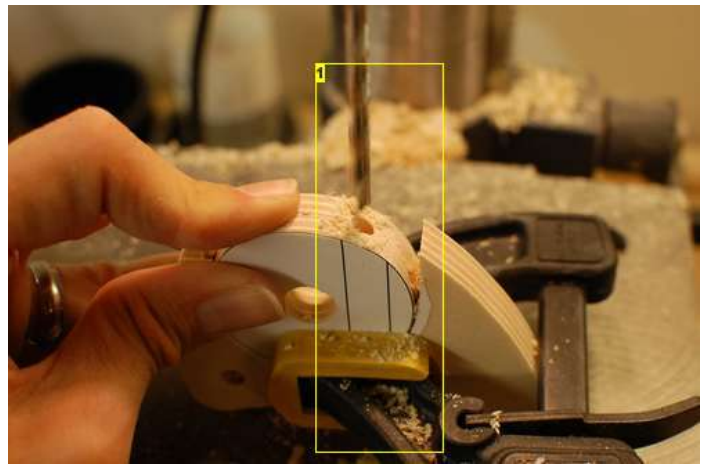


Image Notes

1. Drill one hole straight through...

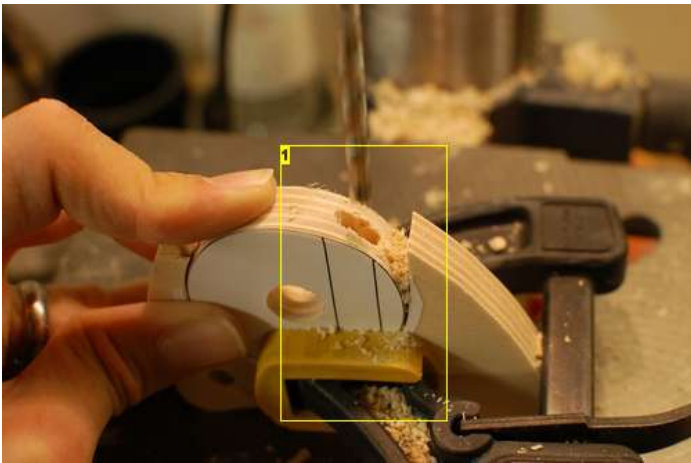


Image Notes

1. And then another, right beside it. The size of the bit will depend on the thickness of the cable. I think I used a 1/4" bit here.

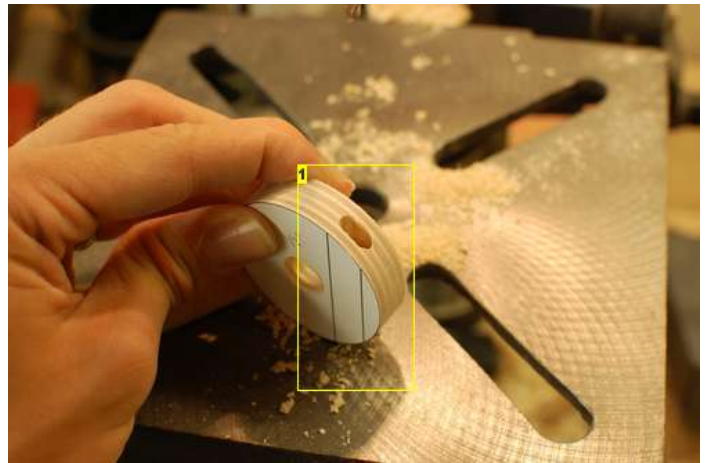


Image Notes

1. Clean it up a bit...

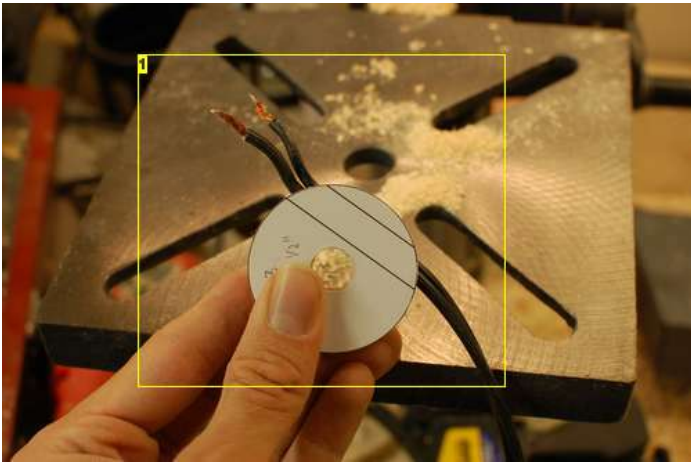


Image Notes

1. And there you go, the cord fits through. It should not be too tight, but loose is OK.

step 6: Cut the Dowels

The Woodpunk lamp requires a number of dowels of various lengths for its joints. Be careful when purchasing the dowels; though some may be advertised as 1/2", for example, but they might be slightly more or less. In my case, there were two different diameters in the bin at Home Depot - one that was exactly 1/2", and one that was slightly less! One great way of making sure you get the right size is to bring a piece of scrap wood drilled with a 1/2" hole, and try them out right in the store.

From 1/2" round dowel, cut the following:

- 6 x 1.5" long
- 2 x 2" long
- 1 x 1" long
- 3 x 0.5" long

From 1/4" round dowel, cut the following:

- 1 x 1.5"
- 1 x 2"
- 2 x 1.75"

Sand the ends of each dowel to remove any burrs and roughness. Don't sand the sides at all, or the dowels will fit too loose! Depending on the thickness of the Baltic Birch plywood, these dowels may be up to 1/16" too long - simply sand or trim flush as necessary during the Assembly stage.

Now, for a bit of a tricky step. Drill a 1/2" hole into a piece of scrap wood. Insert each of the 0.5" long, 1/2" diameter pieces in the hole, and drill a 1/4" hole straight through the center. The piece of scrap helps hold the short dowel in place, and parallel to the drill bit. Do the same for the 1" long 1/2" dowel.

Two of the 1/4" dowels will need a little notch cut in the ends to prevent the springs from slipping off. With the scroll saw or a small hand saw, cut notches on either end of the pictured dowels, about 1/4" from the end.

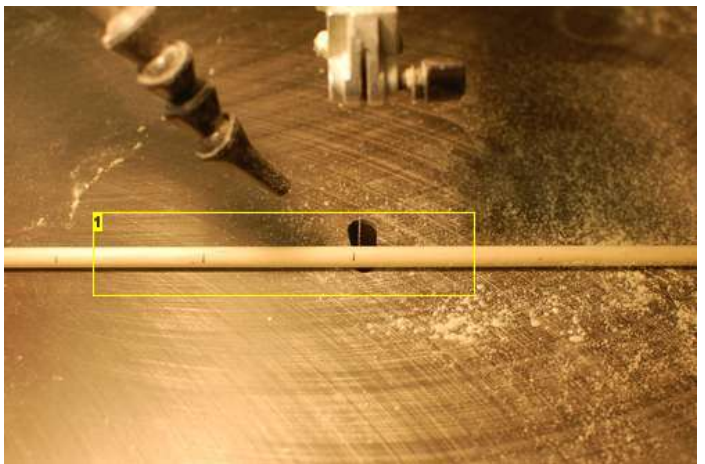


Image Notes

1. Here the 1/4" dowel is being cut.

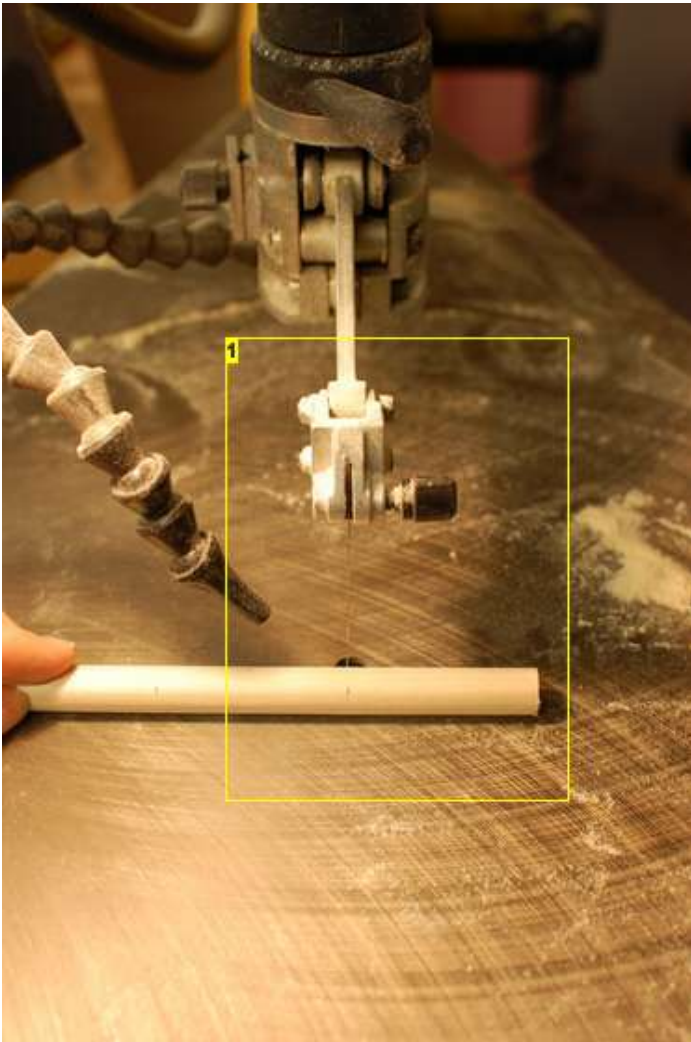


Image Notes

1. Mark off the dowel lengths and cut each on a scroll saw (or any other saw, I guess)

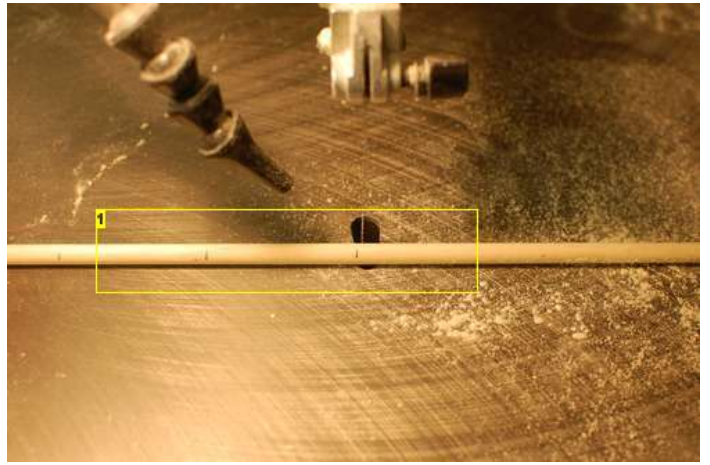


Image Notes

1. A collection of cut dowels.

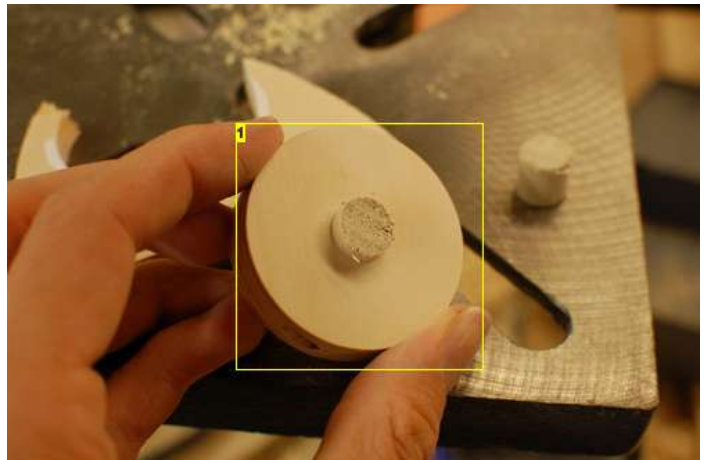


Image Notes

1. To drill a hole through the center of the 1/2" long piece, stick it in a drilled 1/2" diameter hole for support.

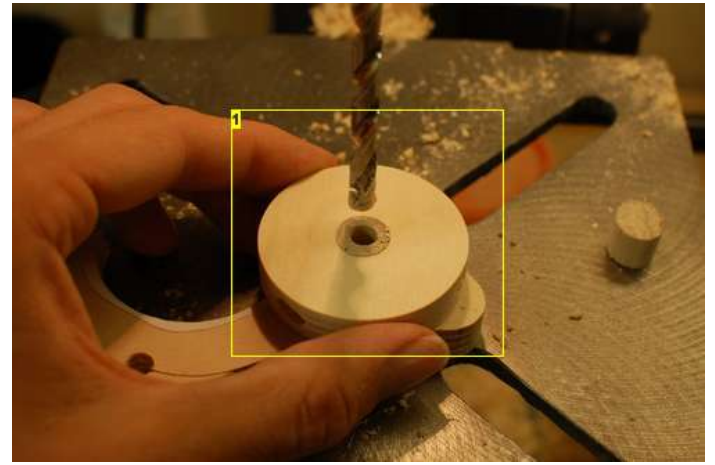


Image Notes

1. Drill in the exact center. The dowel might spin a bit, if that happens back out and drill faster.

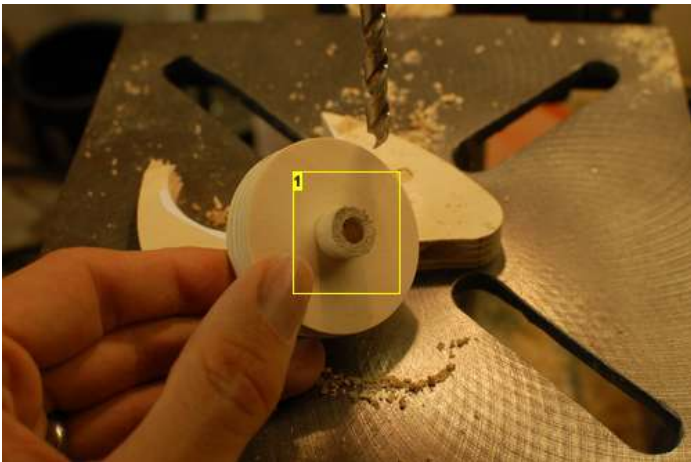


Image Notes

1. Pop the dowel back out once it's drilled.

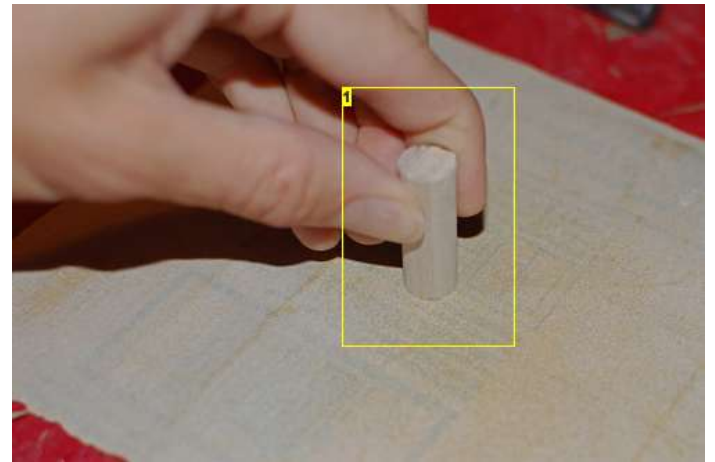


Image Notes

1. Sand only the ends of the dowels, not the sides!

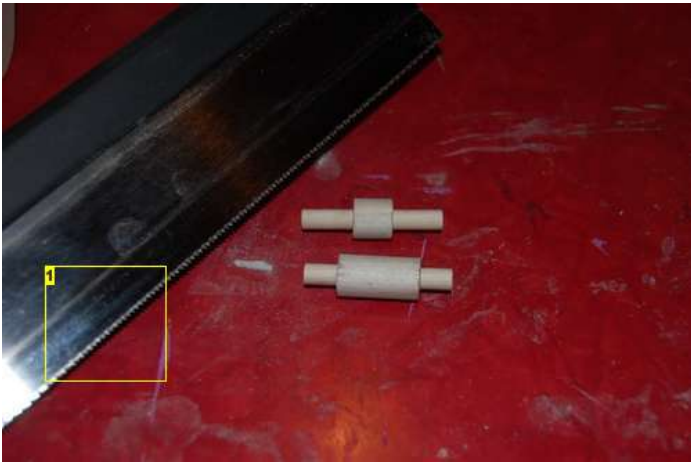


Image Notes

1. I used a handsaw to cut some notches into the ends of these dowels

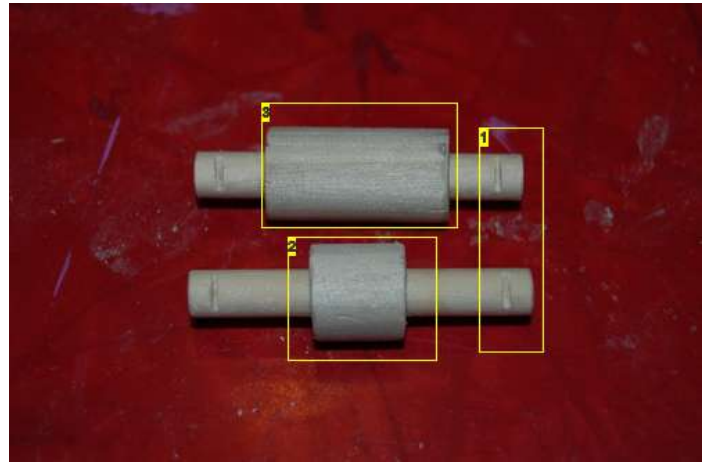


Image Notes

1. One side is notched, to prevent the springs from slipping off.
 2. This dowel goes in the upper section of the "forearm"
 3. This dowel goes in the lower section of the "forearm"

step 7: Assembly

Ah, the moment of truth! So, you've got a table littered with parts, ready to put together. I suggest dry-fitting everything to start, before adding glue and making things permanent. This way, you can determine the order in which the pieces go together, and find any mistakes (but you didn't make any, right?)

Assemble the base first, it's the easiest. Slot a foot onto each space. Some may fit better than others in certain spaces, so fit as many as you can without having to bust out the sandpaper. In some cases though, you may have to sand or cut a little bit of wood to make something fit. *If you're planning to clamp the base to a table, install the feet "upside down," so the base sits flush on a surface.* Once the base is finished, set it aside.

Do the "reflector" next. Slot in the three fingers. Hopefully they'll stay in by friction alone, otherwise you'll have to carefully hold them in place until the light bulb socket is slid in the middle. With the light fixture in place, the whole reflector should hold together. Set it aside as well.

Now it's time for the arm. Lay out the "joints" first, then slide in the 1/2" dowels. The arms and spacers will slide onto these. The assembly should go roughly like this:

- The curved 1/2" arm sections each have a 1/4" spacer on either side. 4 per arm section. These go on the outside of the arm.
- The straight 1/4" arm sections that make up the "forearm" have a 1/2" spacer between them. This pair goes on the inside of the "elbow" and "wrist" joints.
- The straight 1/4" arm sections that make up the "upper arm" go on the outside of the "elbow" and "shoulder" joints.
- A single 1/4" dowel spans the distance between the third position on the shoulder. The springs for the upper arm attach to this dowel.
- The 2" long 1/4" dowel is inserted through two of the 0.5" long dowel pieces, which in turn connect to one of the 1/2" holes on the straight sections of the upper arm. The other end of the "upper arm" springs attach here. The exact distance depend on the length of the springs.
- One of the 1.5" long 1/4" dowels is inserted through the 1" long dowel with a hole drilled through. The other is inserted through a 0.5" long dowel with a hole. These are positioned on the "forearm" at such a distance that the springs are not stretched when the arm is "raised" That is, the springs should support the weight of the arm.

The reflector assembly is attached at the "wrist" using a 2" long 1/4" diameter screw, held tight with a butterfly nut. Two washers prevent the screw and nut from cracking the wood. Place a 1/4" spacer on either side (2 total), and tighten the nut to hold the reflector at the desired angle.

Finally, slot the entire arm into the base. If the spring tensions are set properly, the arm should stay where you move it. At this point, be mindful that none of the joints pop out. Remember, they're not glued yet!

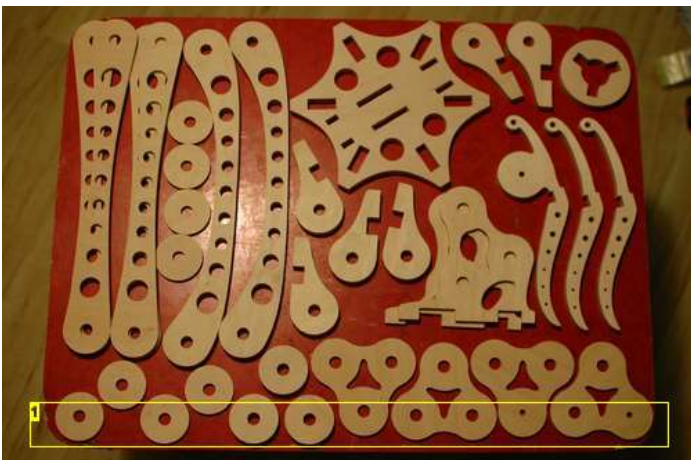


Image Notes

<http://www.instructables.com/id/Woodpunk-LED-Desk-Lamp/>

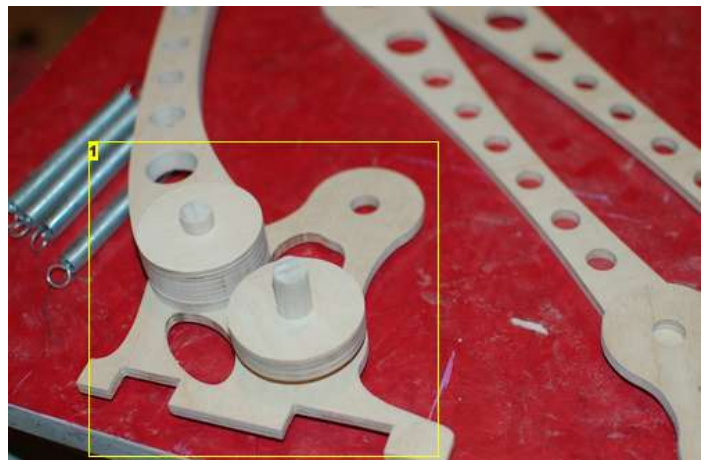


Image Notes

1. Wow, that's... a lot of parts. And this isn't even all of them!

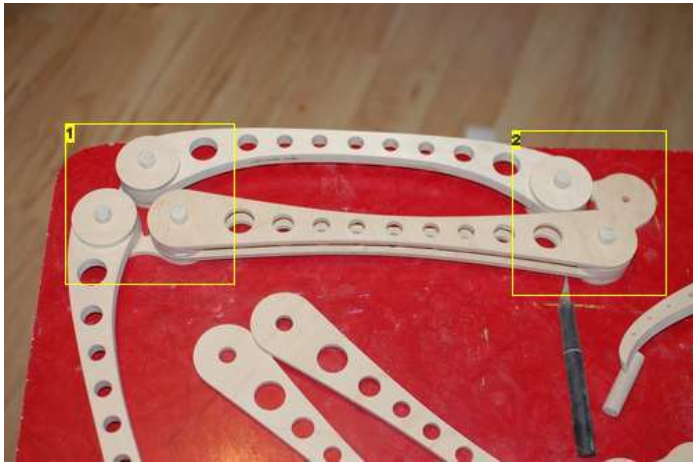


Image Notes

- 1. The 1/2" thick arm pieces have a 1/4" spacer on either side, and the 1/4" straight arm pieces have a 1/2" spacer (with hole drilled for cord) between them.
- 2. The "wrist"

1. The lamp is built by stacking segments and spacers.

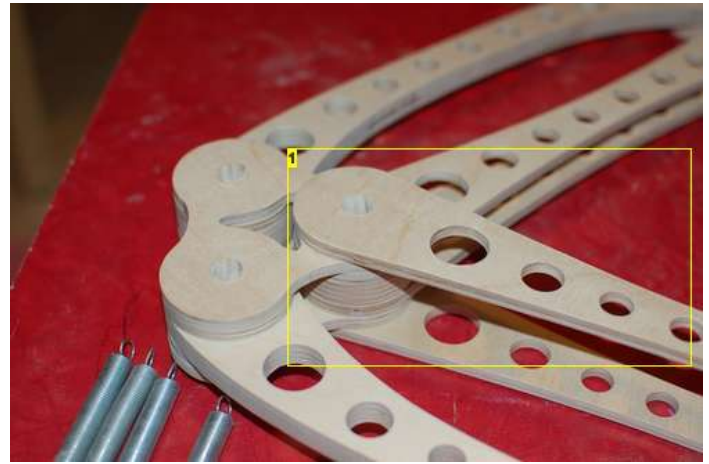


Image Notes

- 1. This is the "upper arm," it connects outside of the triangular "elbow"

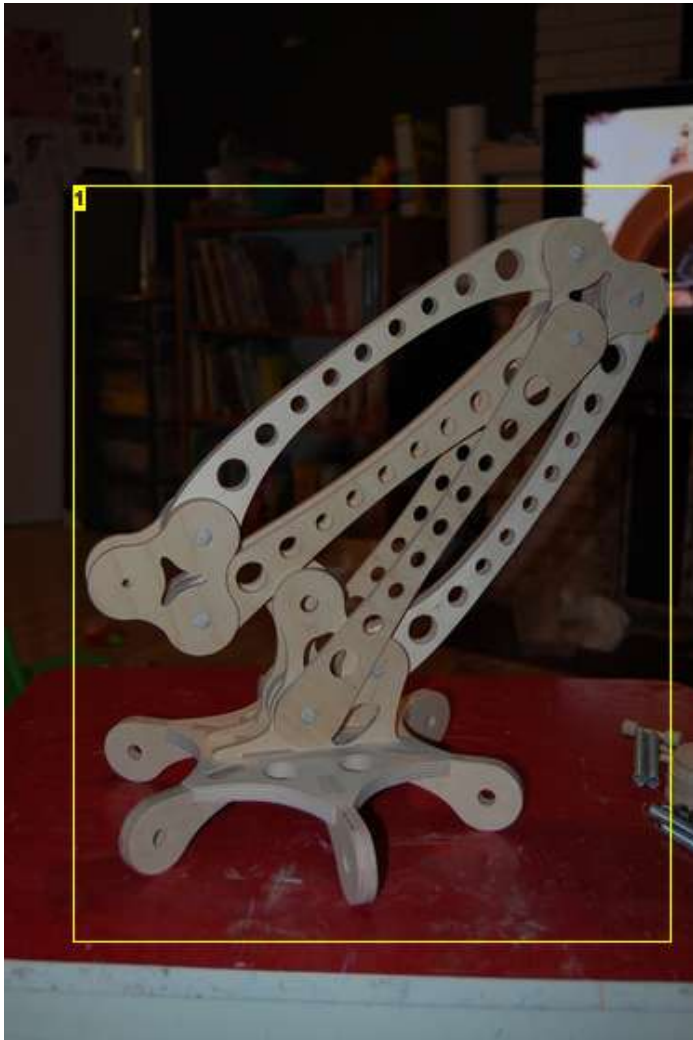


Image Notes

- 1. The mostly assembled Woodpunk lamp, holding itself together by friction alone.

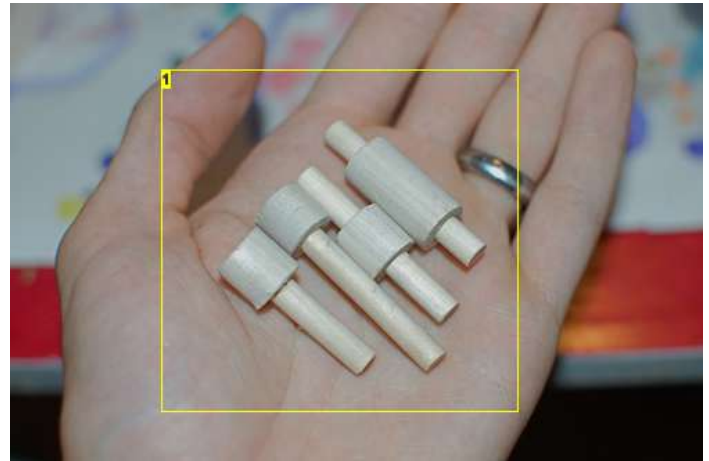


Image Notes

- 1. A few rods used for attaching the springs. The two lower pieces will have another 1/2" long piece attached to the other side, once the springs are slid on.



Image Notes

1. This straight section of the "upper arm" goes on the outside of the triangular joints.

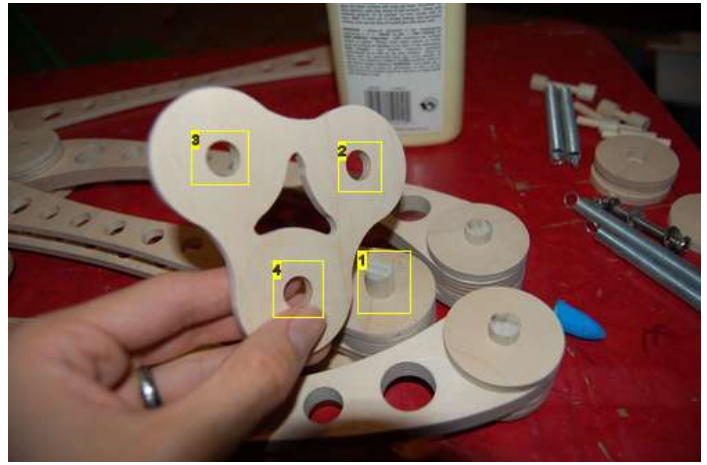


Image Notes

1. Do not apply glue here, until attaching the last arm section.
2. Apply glue here.
3. Apply glue here
4. No glue here!

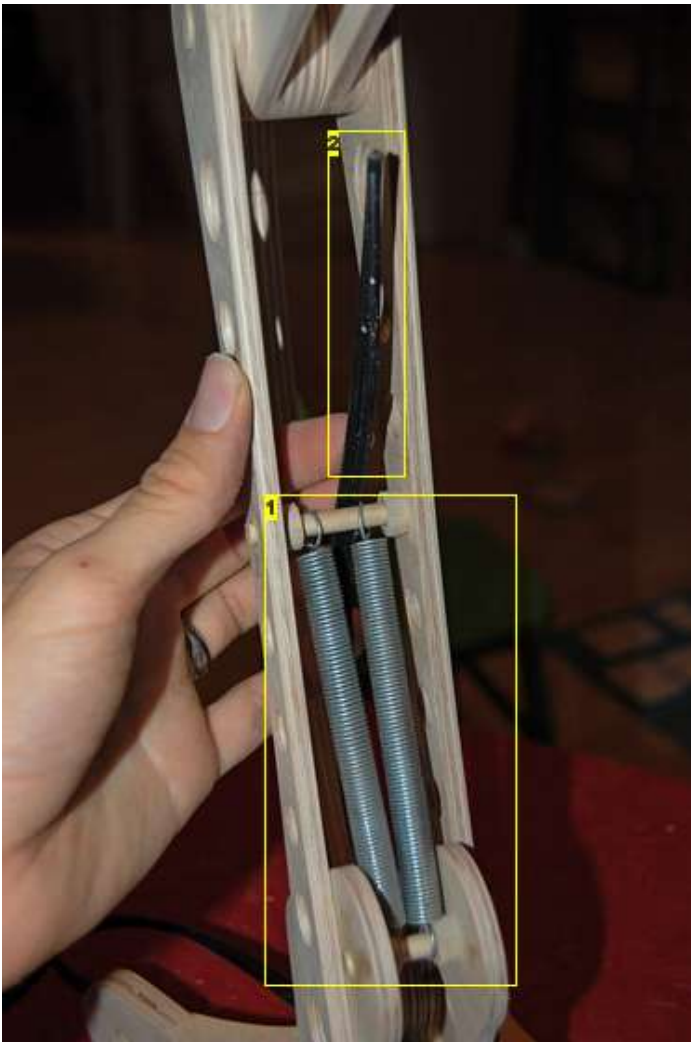


Image Notes

1. Here you can see the springs stretched between the "shoulder" and midway up the "upper arm"
2. The cable passes behind the springs

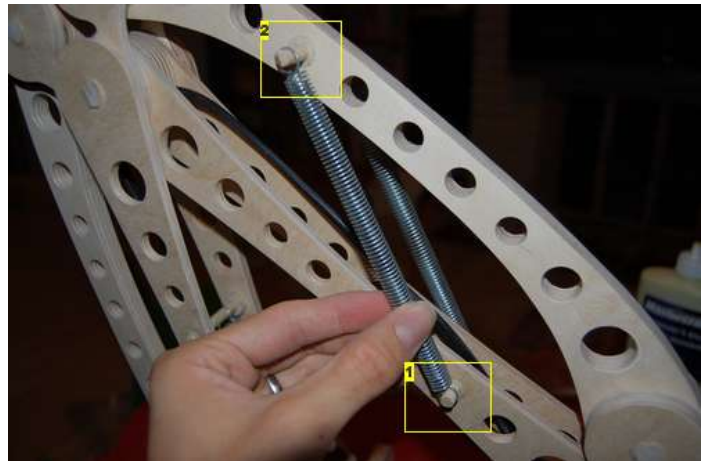


Image Notes

1. The position closest to the "wrist"
2. The position closest to the "elbow"



Image Notes

1. 2" long, 1/4" diameter stainless steel screw, with two washers and butterfly nut.

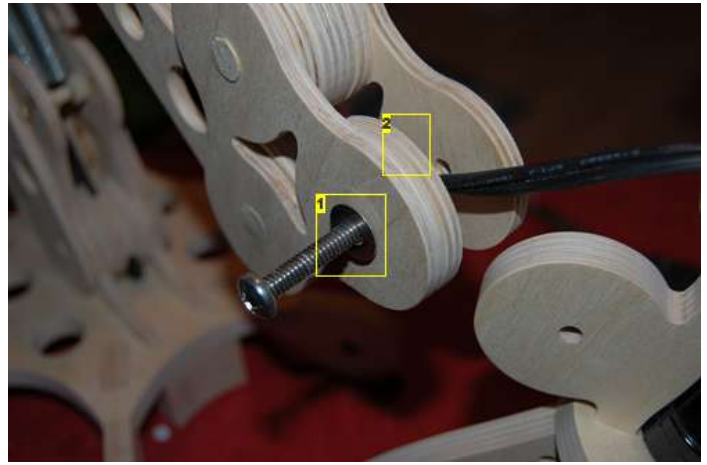


Image Notes

1. The washers go on the outside of the wrist joint to protect the wood
2. 1/4" spacer

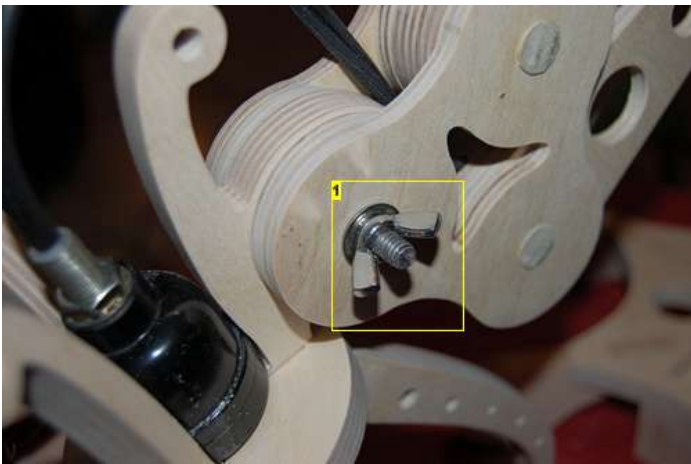


Image Notes

1. Tighten until the reflector stays where you place it.

step 8: Build a Counterweight

As you may have guessed from looking at the pictures, the Woodpunk LED lamp is big, and a little heavy. Well, not that much heavier than a metal desk lamp, but enough that the "upper arm" can't extend past vertical without the whole thing tipping over. So what to do?

Well, if you're planning to clamp the lamp to a table, there is nothing to be done. Skip this step.

But, if you'd like it to be freestanding, you'll need to add a counterweight to the base. Most desk lamps will have this of course so I shouldn't feel so bad about having to include this step. I really should have integrated the weights into the design a bit better, but oh well.

Included in the designs is a small box that can be assembled, filled with something heavy, and attached under the base to keep it weighed down. The box is made of four layers, two of 1/2" wood and two of 1/4". When stacked together, the box is a bit shorter than the "toes" on the base, and so it slips discreetly underneath. Cut out the pieces by stacking, as with the other pieces, then glue together the bottom and sides. Clamp until dry. There's no need to sand smooth just yet...

Fill the box with something heavy. I bought a bag of fine lead shot ages ago, that I use exclusively for filling counterweights like this. A far more noble cause than killing small animals, IMO. When filled the box should weigh nearly two pounds. Glue on the lid once the box is filled.

Once the glue is dry, sand the sides as a single piece to get a nice smooth finish. The counterweight is now ready to be glued to the base of the lamp.

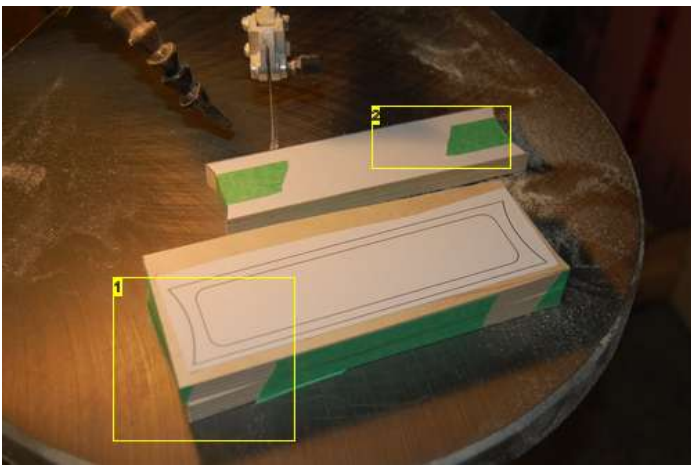


Image Notes

1. Two 1/2" pieces taped together, for cutting. This much wood is hard on a scroll saw blade, use a bigger blade if you have one.
2. Two 1/4" pieces taped together, these are the base and lid.

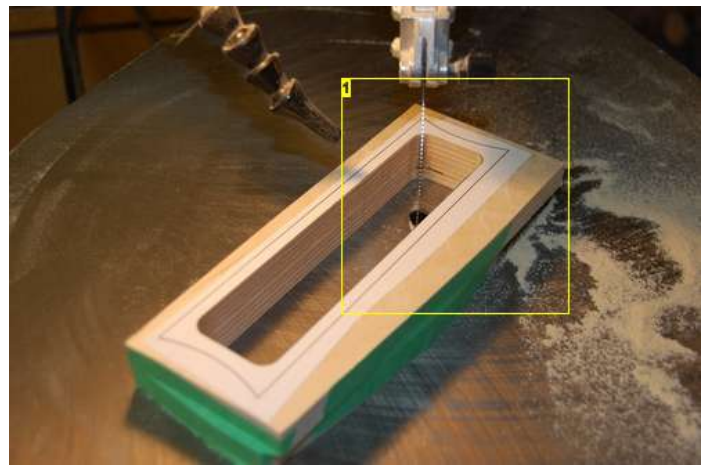


Image Notes

1. The center cavity is cut out first.

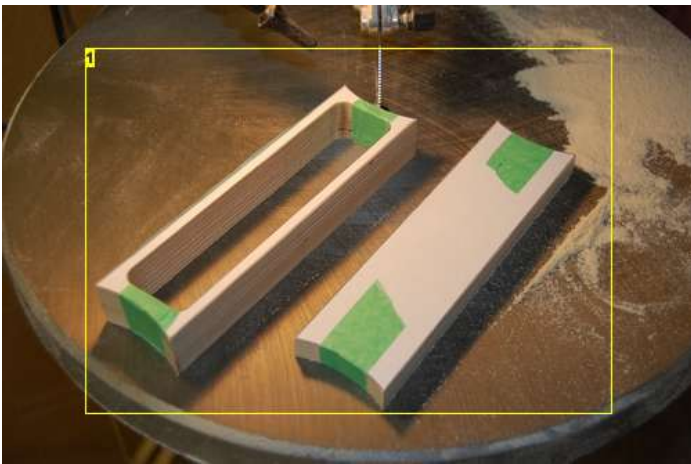


Image Notes

1. Cut, but not yet sanded. They'll be sanded flush after gluing.

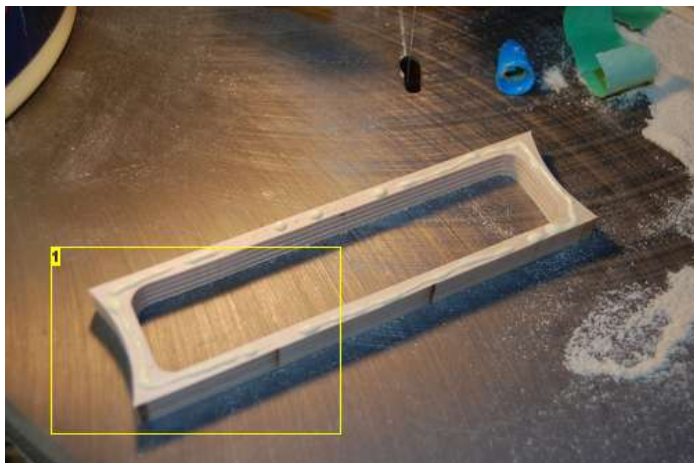


Image Notes

1. Apply a bead of glue all the way around...



Image Notes

1. The two center pieces are glued together. Now glue the lid. Or is that the base? It doesn't matter!

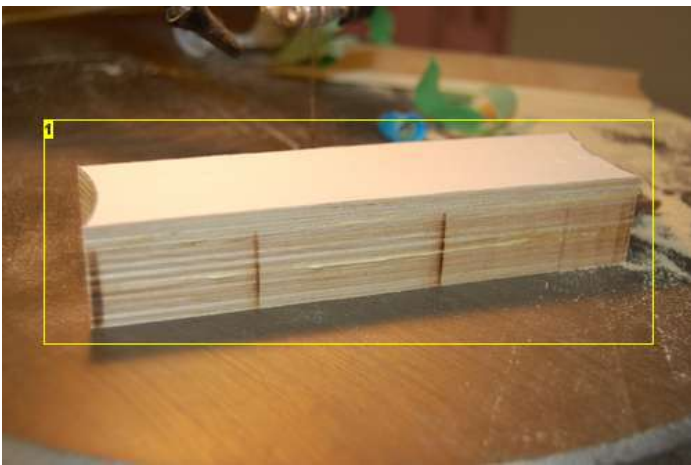


Image Notes

1. The base and center sections are glued. Note the top is not yet glued, because we haven't filled it yet...

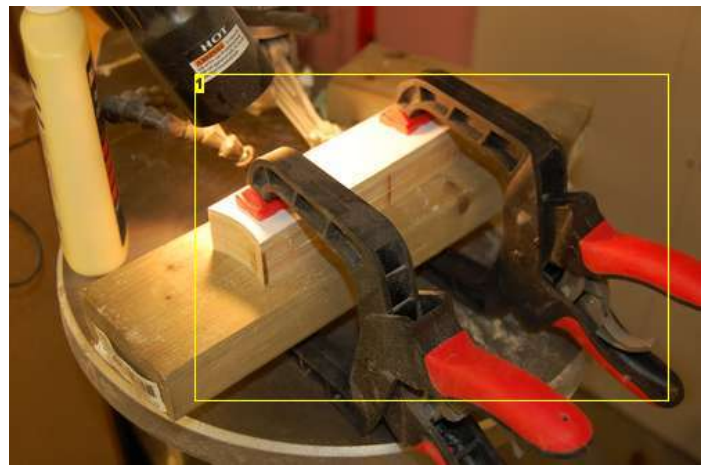


Image Notes

1. Clamp and allow to dry.



Image Notes

1. 99.8% lead. Just about the highest density/dollar you can buy. Excellent for counterweights!

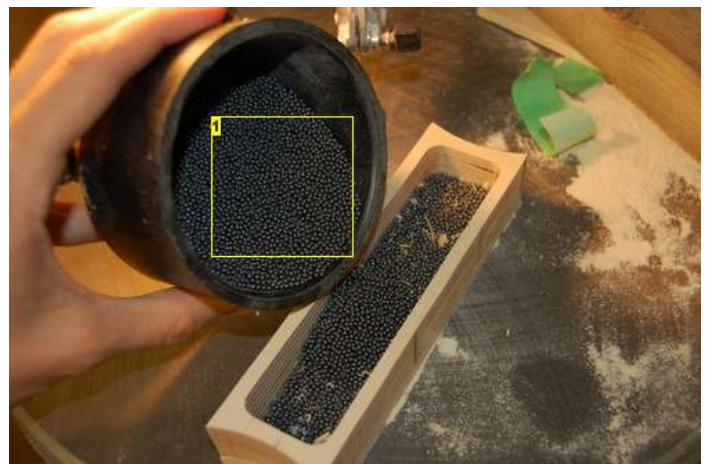


Image Notes

1. An ABS pipe cap being used for decanting...

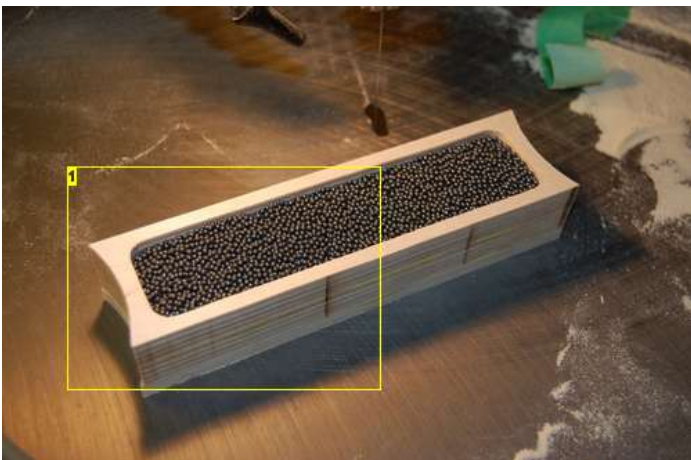


Image Notes

1. Fill to the top, but make sure the lid can still close!

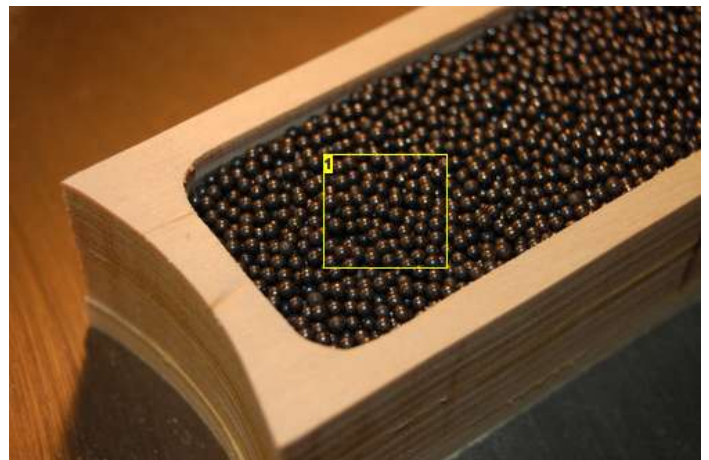


Image Notes

1. I'd hate to be shot with this stuff. Ugh.



Image Notes

1. Apply another nice thick bead of glue...

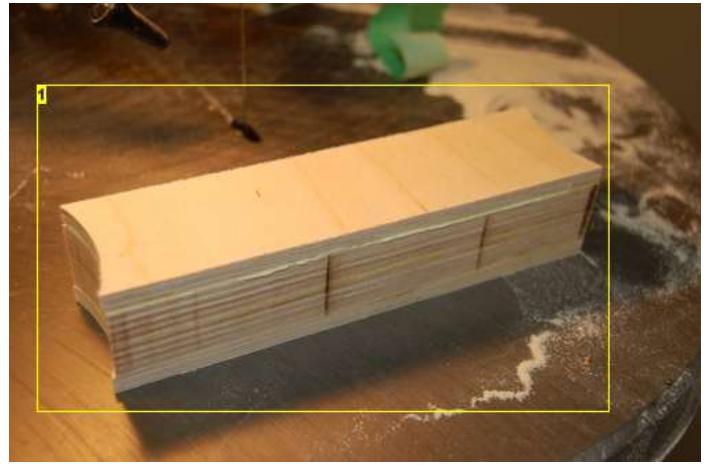


Image Notes

1. Align the top with the other three layers.

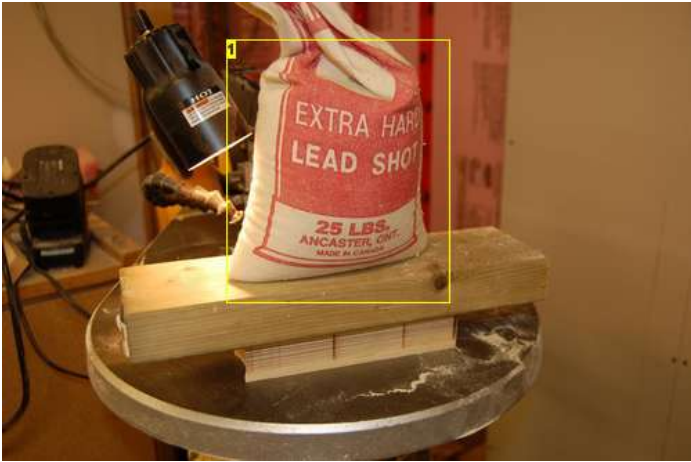


Image Notes

1. A big bag of lead shot is also great for gravity-clamping.



Image Notes

1. The block weighs 1 pound, 13 ounces.

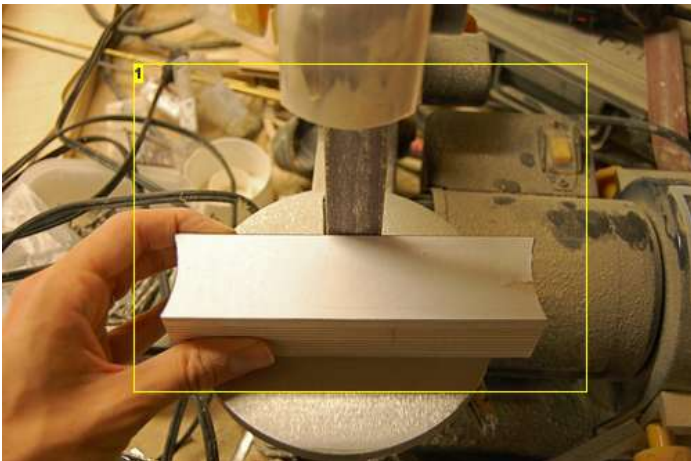


Image Notes

1. Once the glue is dry, sand the sides flush and smooth.

step 9: Gluing

It's important to know where to put glue, and where not to glue. Otherwise, the arm may never move! Assuming that everything went well at the assembly stage, partially disassemble the lamp by removing the base and the reflector.

Glue the reflector "fingers" by applying glue to all of the mating surfaces. Wipe off any excess glue. The shape of this piece makes it hard to clamp. But fear not! Grab some twist-ties (or solid core wire, in a pinch) and use one or two per finger tightly to hold the finger tightly to the ring. The light fixture will not be glued in until the wire has been run.

Next, glue in the "toes" to the base. This is pretty straightforward, remove one toe at a time, apply glue to mating surfaces, and slide together again. If the toes fit loosely, make sure they are all coplanar and the base sits level. Prop or reorient the base as it dries if necessary. Make sure to wipe up any excess glue before it dries.

When the "toes" are dry, glue the "counterweight" to the bottom of the base. Note that this isn't necessary if the base will be clamped to the table.

And now, for the arm itself. The general rule to follow is to only glue the 1/2" dowel to the outer-most arm piece. Remember, these joints must swivel! Gluing the outermost pieces only ensures that the arm won't fall apart. Set the arm on its side and remove arm sections until the tops of the dowels are exposed. Apply glue to the inside edges of the arm or joint pieces, following the rule above, the slide them on. Doing it this way will ensure that any glue squeeze-out is pushed out where it can be wiped up, rather than into the joint.

Flip the arm over and do the same thing. Check each joint to make sure the pieces are pressed together.

Now glue the arm onto the base. Again, apply glue to the mating surfaces, and slide together.

The dowels are last. Take the dowels from the upper arms, and glue the 1/4" pieces in the exact centers of the 1/2" pieces. You'll then have two dowels, one with a 1/2" long section glued to the middle, and one with a 1" section glued to the middle. The first of these is glued in place to the 1/2" thick arm, closest to the elbow. The second piece is centered and glued to the parallel straight arms, closest to the "wrist." Make sure the notches cut into these dowels face away from each other, so they are able to hold the springs.

Last are the dowels that hold the springs for the "upper arm," between the shoulder and elbow. On one half, glue in place a 1/2" long drilled out dowel. The exact position of the piece glued to the parallel arms will depend on the length of the springs. Now, apply glue to the dowels themselves, slide them halfway through the holes, and slip on the springs. Push the dowel in the rest of the way to lock the springs in place. This part is rather fiddly, and a pair of needle nose pliers might be helpful.

Once all of the glued joints are dry, sand them to remove any glue residue that might remain. If any of the dowels stick out a bit, you may sand them down or cut them flush with a fine saw, or leave them alone. But, if protruding dowels prevent the arm from moving, you'll need to trim them flush.

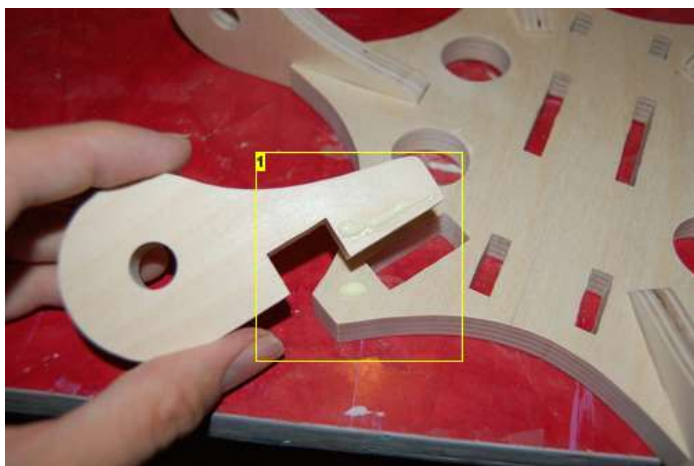


Image Notes

1. Apply glue to any mating surfaces. Carpenter's glue will work fine.

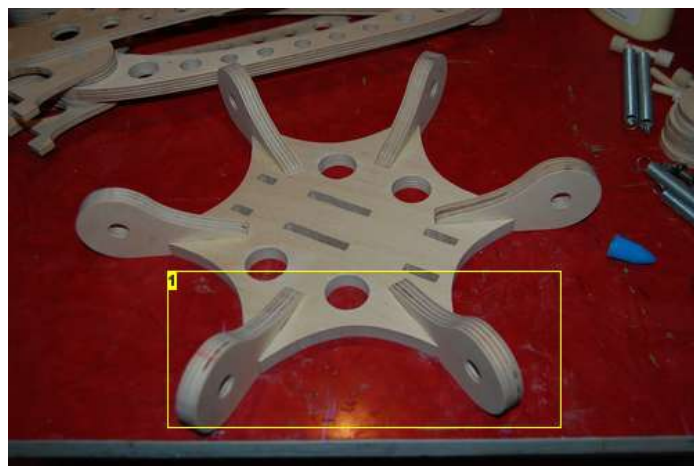


Image Notes

1. The base is upside down, pressed against a table so the feet stay flush.

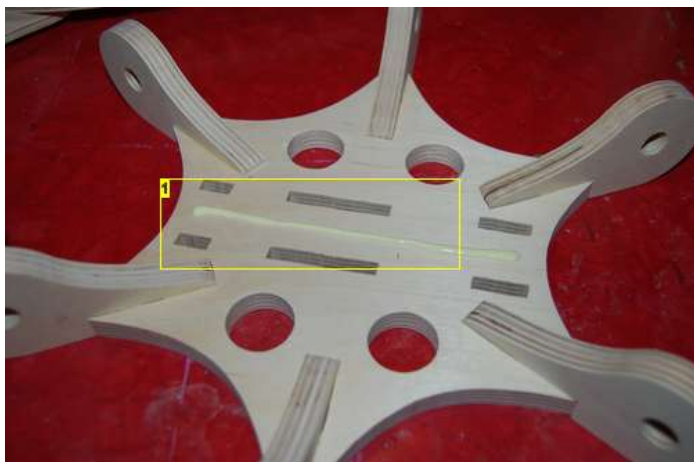


Image Notes

1. A big bead of glue for the counterweight.

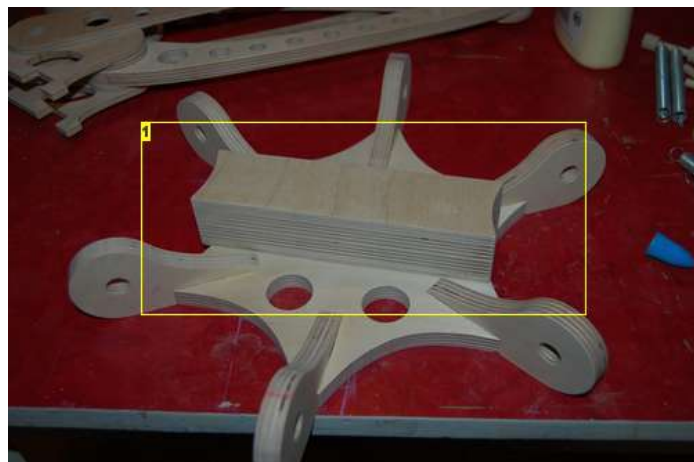


Image Notes

1. Squish and wiggle the counterweight to the underside of the base until the glue spreads out.

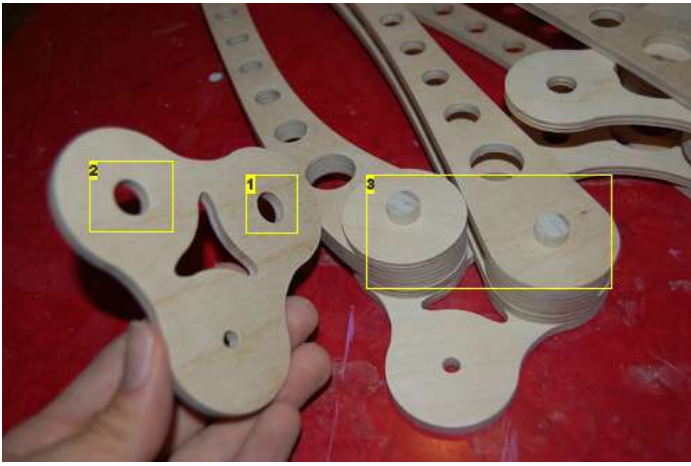


Image Notes

1. Apply glue here
2. Apply glue here
3. Don't put glue here, or the arm won't be able to move!

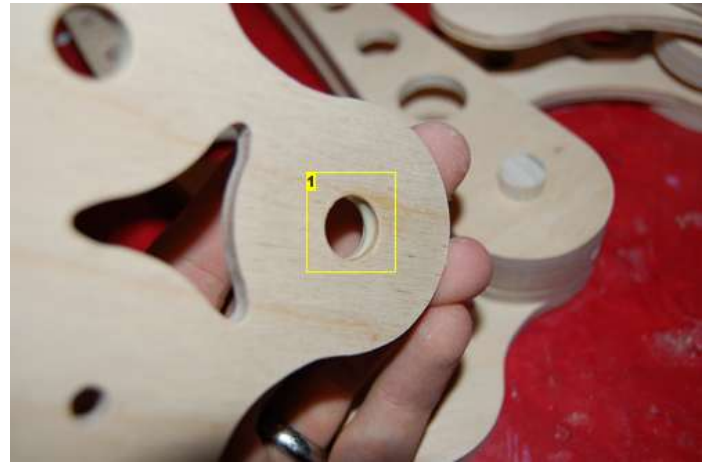


Image Notes

1. Apply a little blob and spread it all around the hole with a piece of scrap 1/4" dowel



Image Notes

1. This straight section of the "upper arm" goes on the outside of the triangular joints.

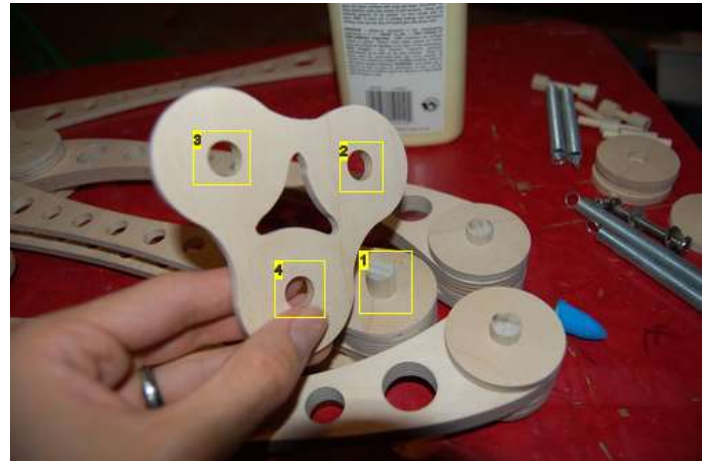


Image Notes

1. Do not apply glue here, until attaching the last arm section.
2. Apply glue here.
3. Apply glue here
4. No glue here!

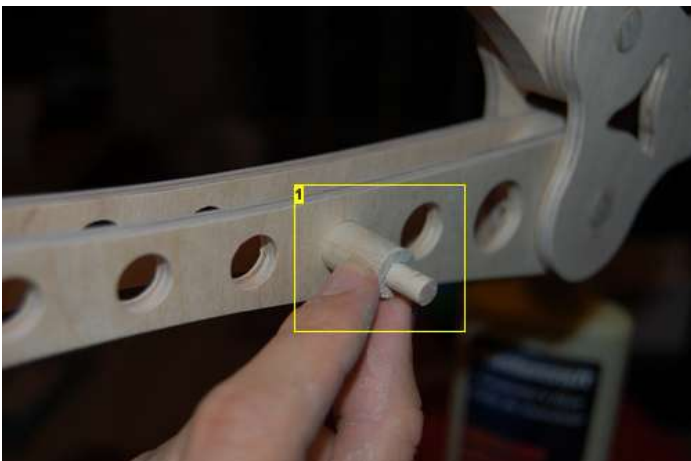


Image Notes

1. Rotate so the notch faces the "wrist"

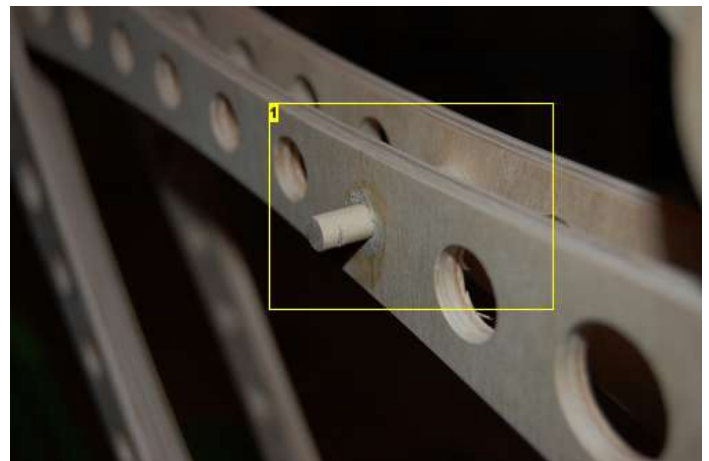


Image Notes

1. Glue in place on both sides

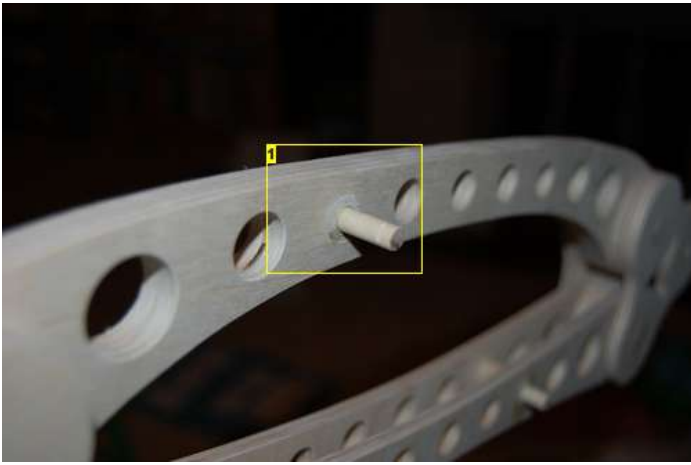


Image Notes

1. Glue in place so the notch faces the "elbow"

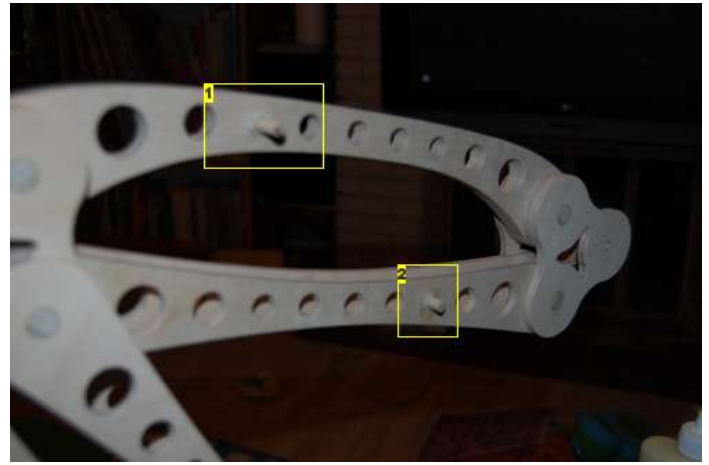


Image Notes

1. This dowel is in the 1/2" hole closest to the elbow.
2. This dowel is in the 1/2" hole closest to the wrist.

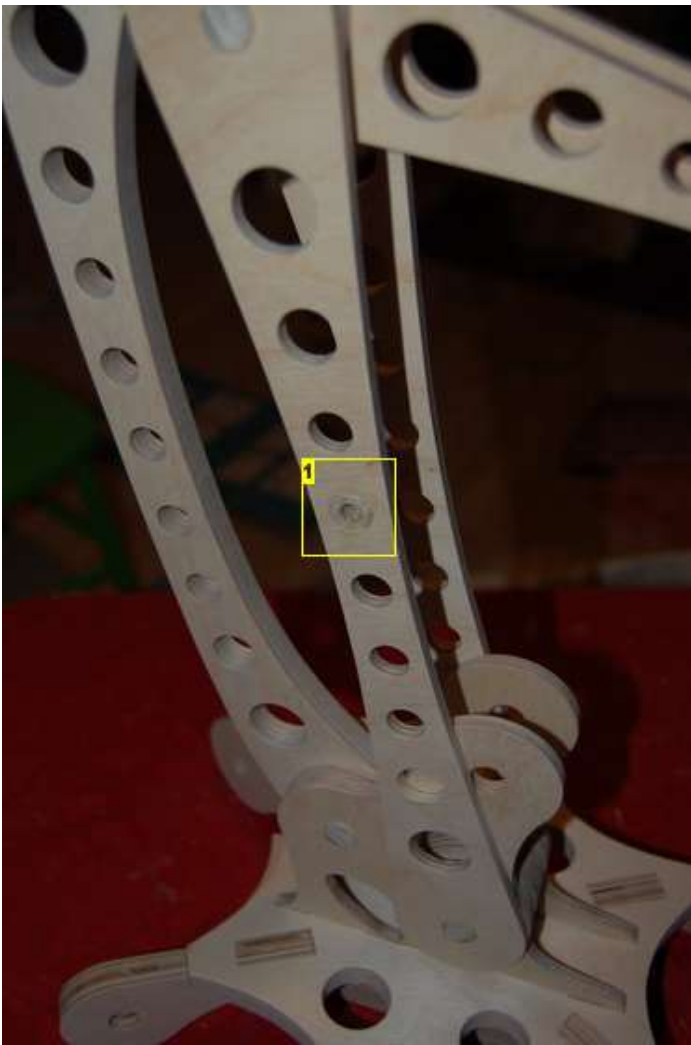


Image Notes

1. This 1/2" to 1/4" dowel is in the second-closest 1/2" hole to the elbow.

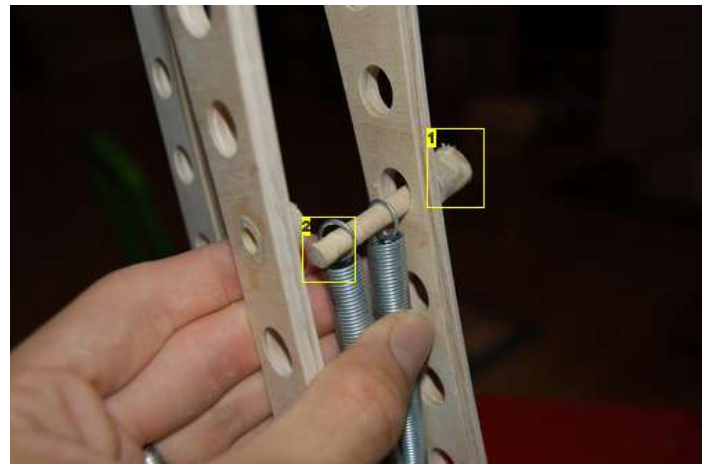


Image Notes

1. Apply glue here
2. Apply glue here

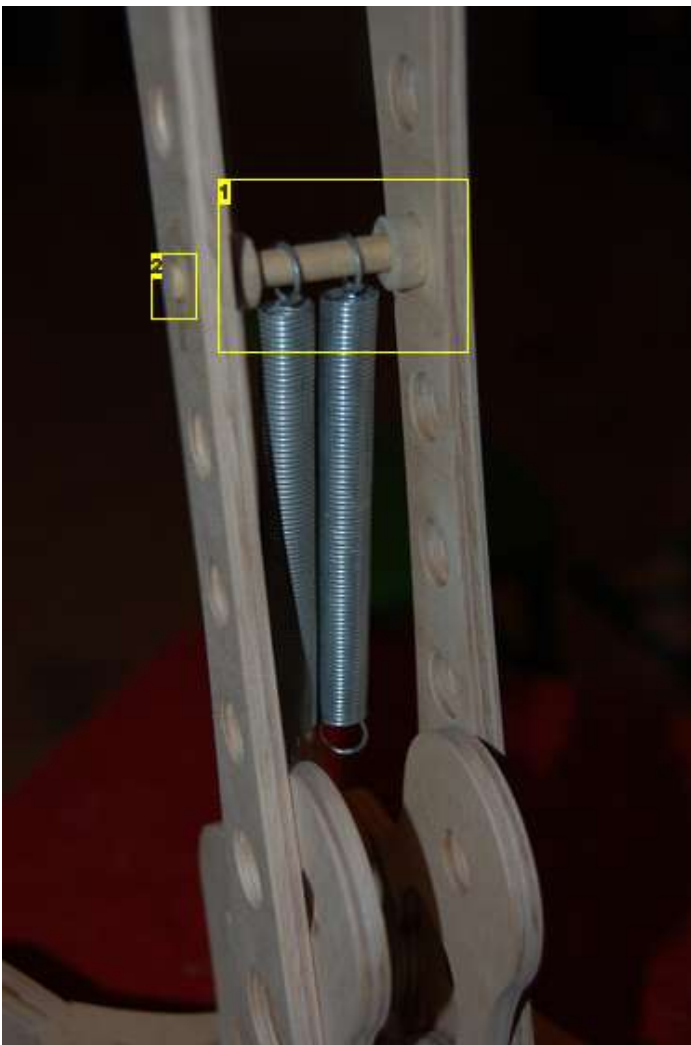


Image Notes

1. Definitely do not glue in this dowel before the springs are also attached!
2. This dowel will need a bit of a trim

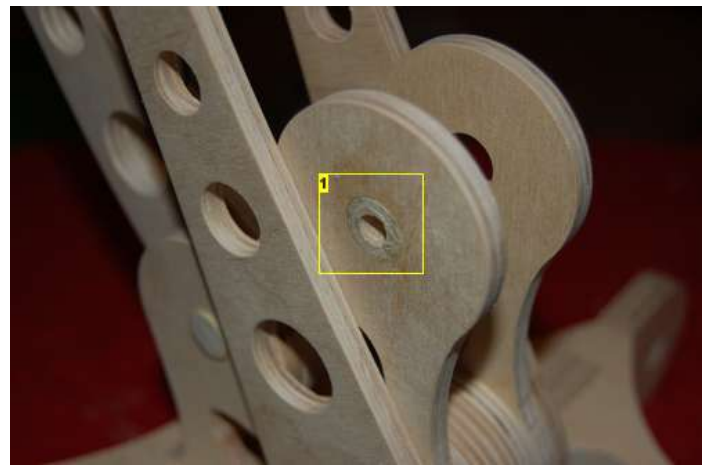


Image Notes

1. Another 1/2" to 1/4" adapter dowel. In the updated design, an adapter is not needed, just the 1/4" dowel. Ensure the dowel is flush with the edge of the wood here, or the arm won't be able to move forward all the way.

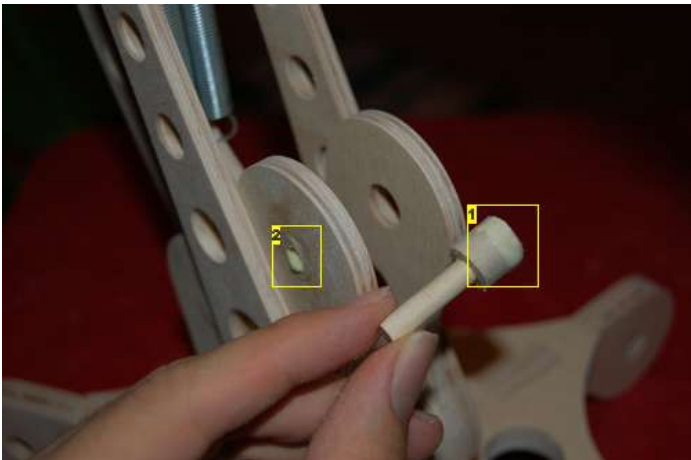


Image Notes

1. Glue here
2. Glue here

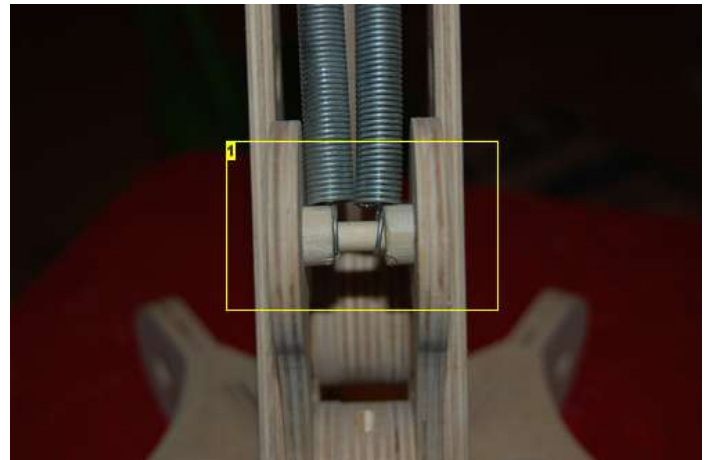


Image Notes

1. Stretch the springs so they loop around the dowel, then push it into place. Very fiddly. Have needle nose pliers handy.

step 10: Electrical

If you haven't already, snip the end off the wire. The cut end is much easier to feed through the holes in the spacers.

Starting at the base, feed the wire from the back, towards the spacer at the front of the "shoulder." Slide the wire through the hole, and pull through enough wire to reach all the way to the reflector.

Feed the wire behind the first pair of springs, towards the "elbow." Feed the wire through the spacer here, being careful not to twist the wire. A twist won't affect the performance of the lamp, but it will look unprofessional. Can't have that, right?

Continue feeding the wire towards the "wrist," over the dowel that connects the two parallel arms of the "forearm." Poke the wire through the spacer at the wrist, and draw the wire tight.

Disassemble the bulb socket, to reveal the two screw terminals. Feed the wire through the end of the socket housing, and pull through enough wire that it's easy to work with. Split the two wires apart for about 2", then strip about half an inch from the end of each. Twist the strands of wire so they don't fray.

Secure one wire onto each screw terminal; it doesn't really matter which goes where. Double check for any loose strands that might short out and fix them. Now, reassemble the socket assembly and screw in a light bulb. Plug in the other end of the cord, and turn it on. It should light up!

Unscrew the bulb again, and slide the socket into the hole at the center of the reflector. When you're satisfied with the fit, apply a dab of epoxy around the perimeter of the socket where it contacts the wood of the reflector. Before the epoxy sets, make sure the switch is centered between two "fingers" on the reflector.

Once the epoxy is cured, attach the reflector to the arm using the 1/4" bolt. A washer should go on either side of the wrist joint. Place a 1/4" spacer on either side of the reflector. Tighten the butterfly nut until the reflector stays where you placed it. Too tight, and the wood could be damaged.

Screw the light bulb back in.

Finally, pull back any slack in the cord, to neaten the appearance of the lamp.

And that's it! The Woodpunk LED Desk Lamp is ready for action!



Image Notes

1. A cut end is much easier to fit through the cable guide holes.

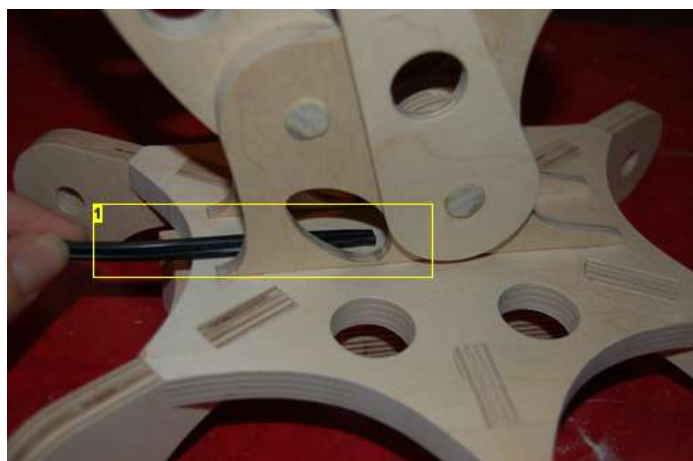


Image Notes

1. Feed from the back

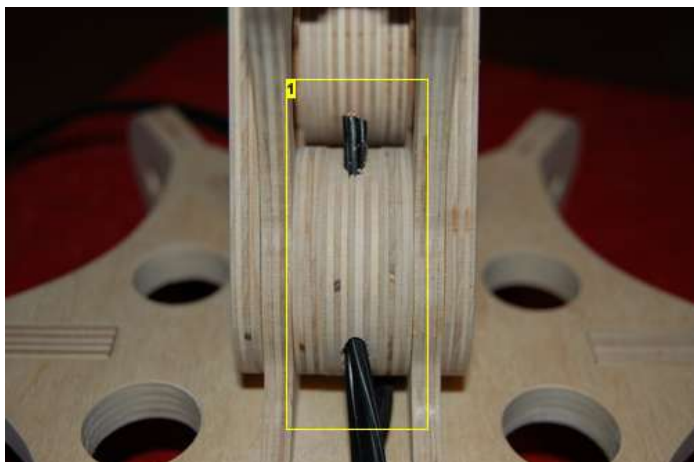


Image Notes

1. Under the 1/2" spacer, through the hole, and up.

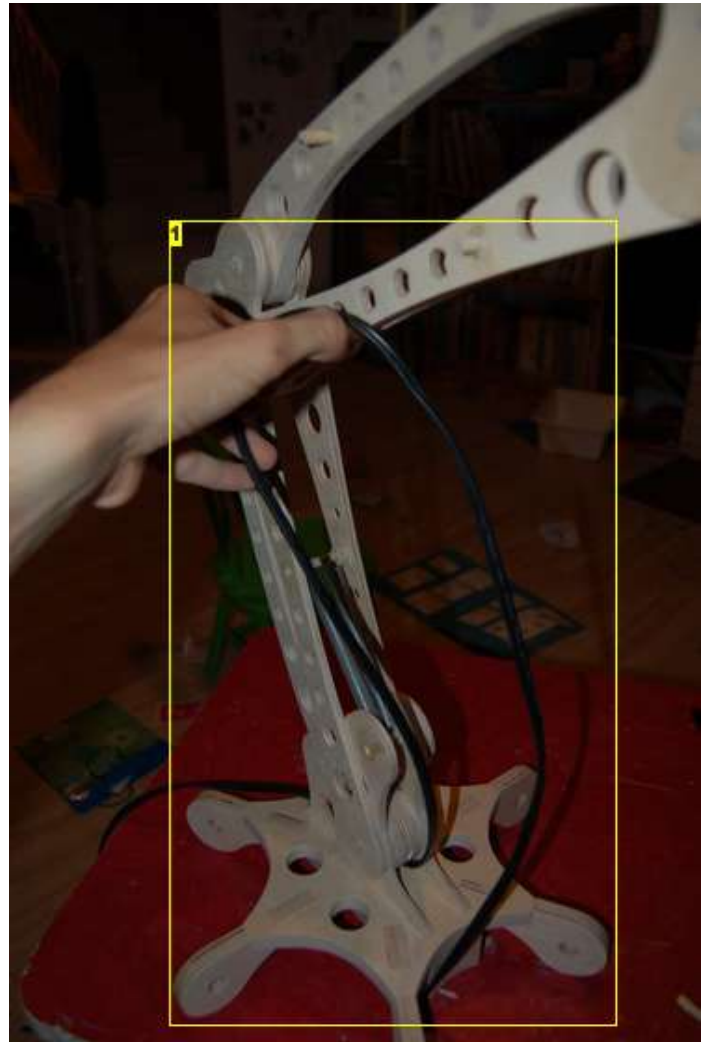
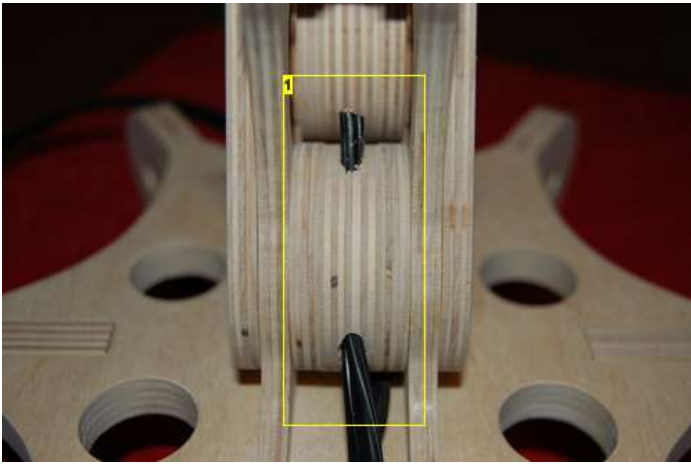


Image Notes

1. Pull through enough cable to reach the "wrist" and allow a bit extra to work with.

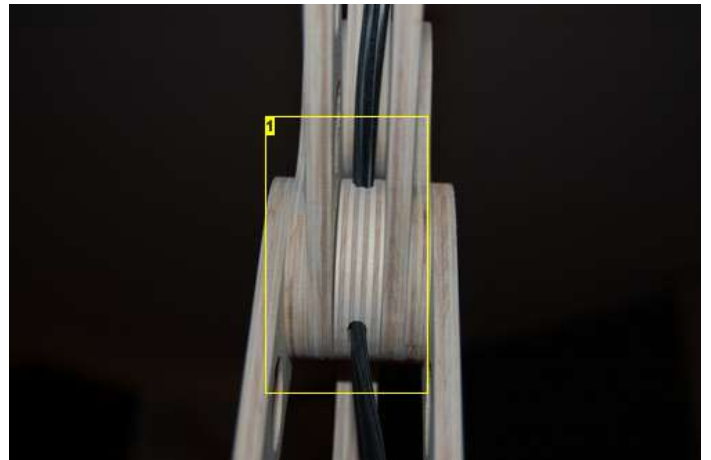


Image Notes

1. Through the hole in the spacer and up...

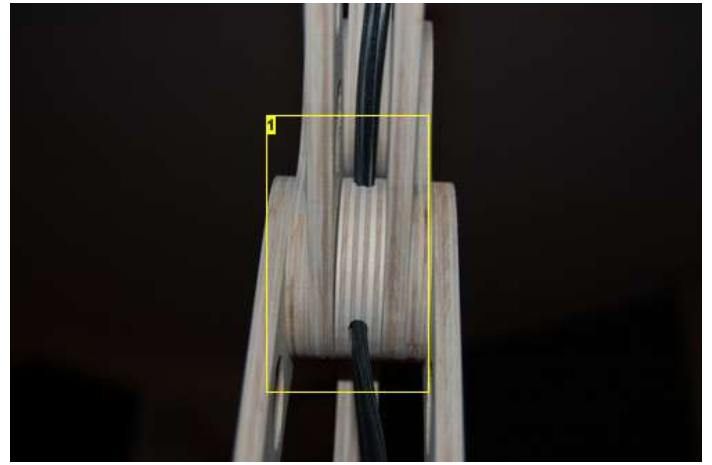
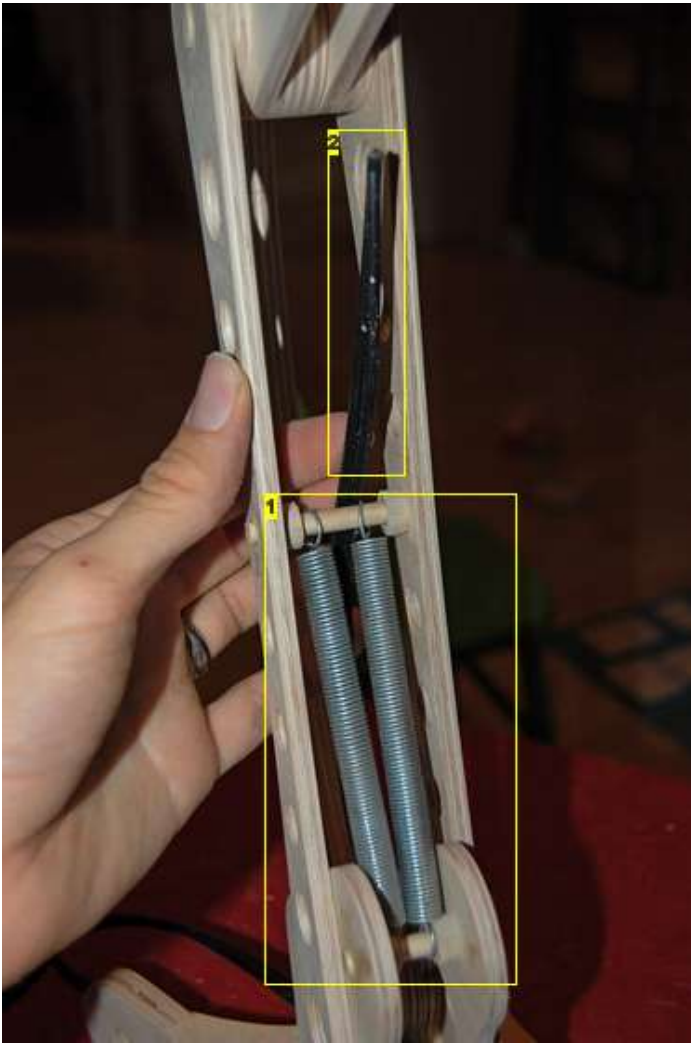


Image Notes

1. Here you can see the springs stretched between the "shoulder" and midway up the "upper arm"
2. The cable passes behind the springs

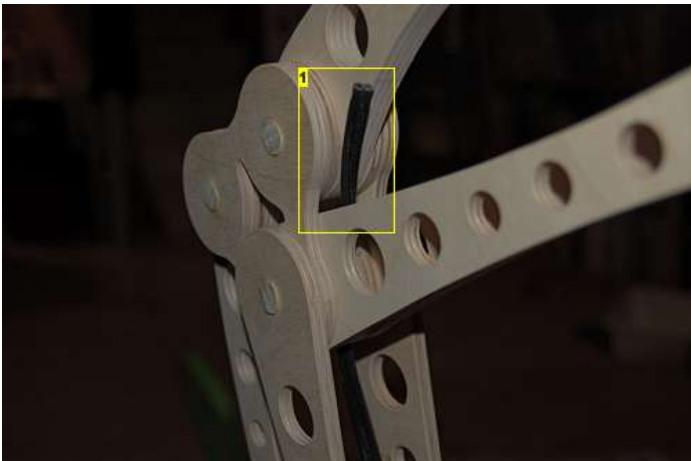


Image Notes

1. The cable goes between the upper and lower sections of the "forearm"

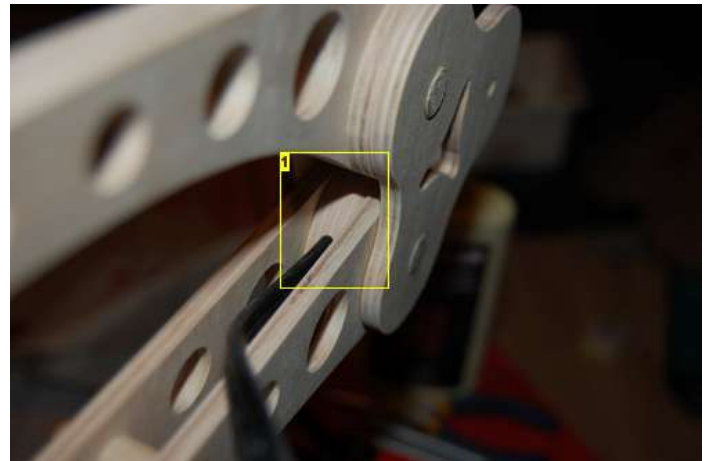


Image Notes

1. Through the hole in the spacer at the wrist joint

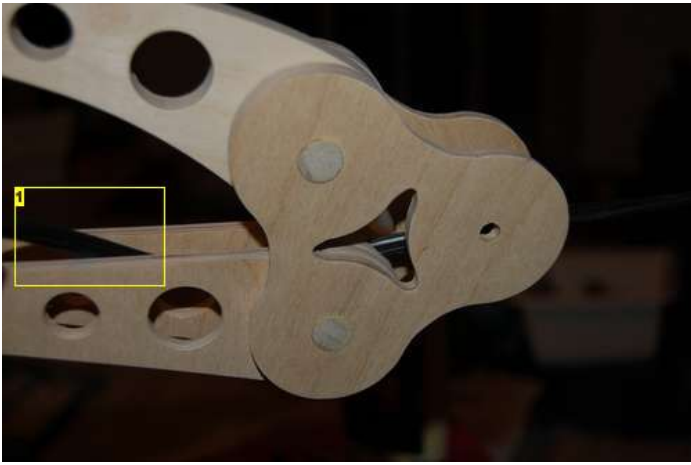


Image Notes

1. The cable goes above the dowel there the springs connect

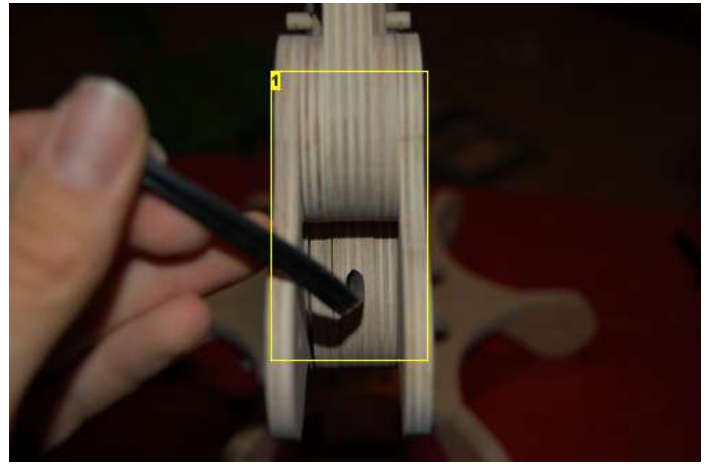


Image Notes

1. Through the hole and up, over the reflector connection point



Image Notes

1. Disassemble the light fixture



Image Notes

1. Feed the cable through the hole, and pull out enough cable to work with

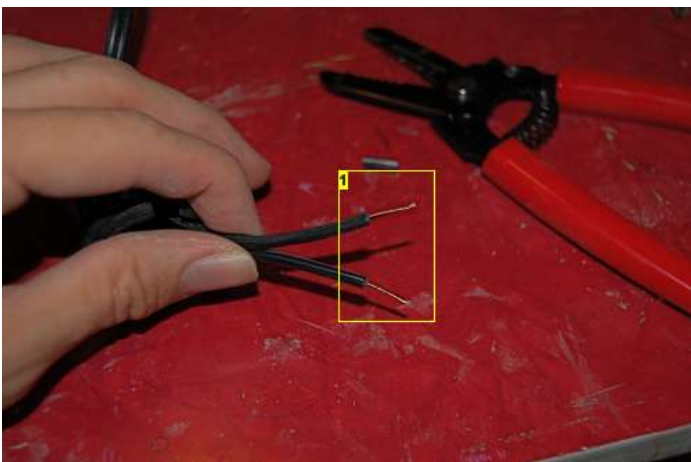


Image Notes

1. Strip off about 1/2" of insulation, and twist the wires if necessary



Image Notes

1. Wrap the wire clockwise around the screw terminal. It doesn't matter which wire goes to which terminal.

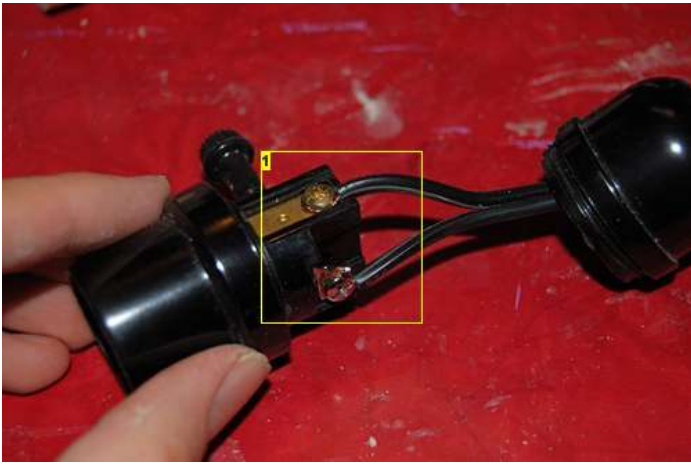


Image Notes

1. Both wires connected up.

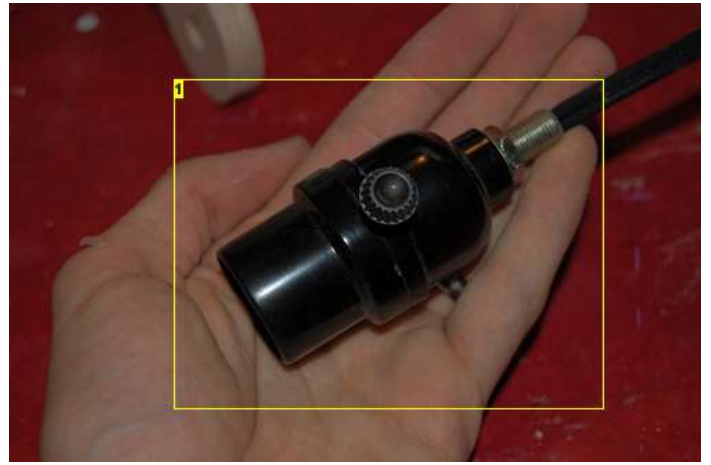


Image Notes

1. Reassemble the light fixture



Image Notes

1. Once assembled, you can plug in the light and test it to make sure it works.



Image Notes

1. Awesome LED light

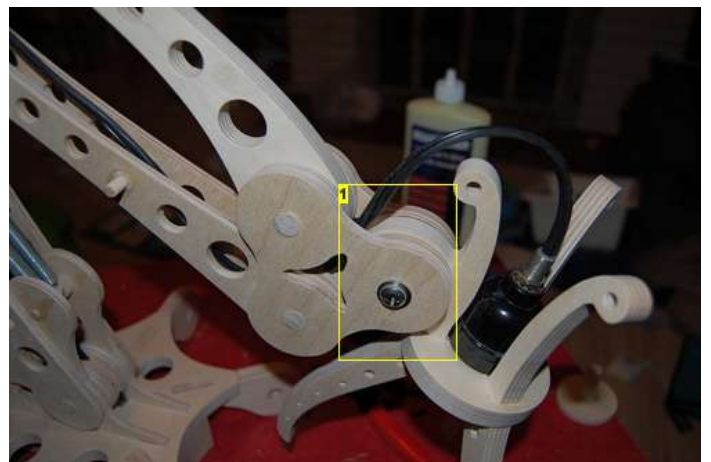


Image Notes

1. Attach the reflector assembly to the arm, using the 1/4" screw.

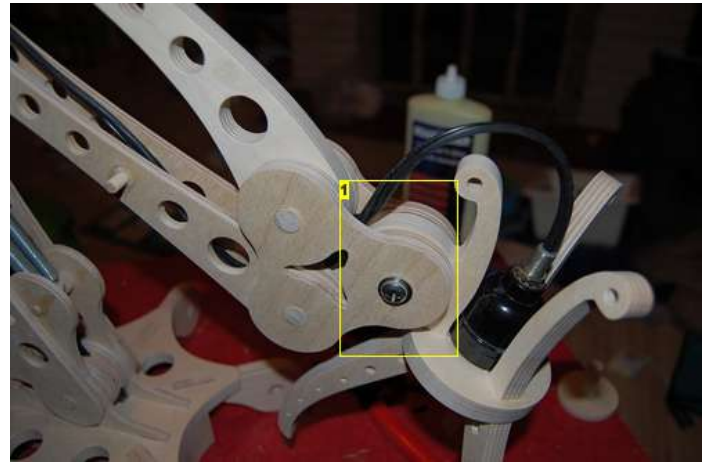
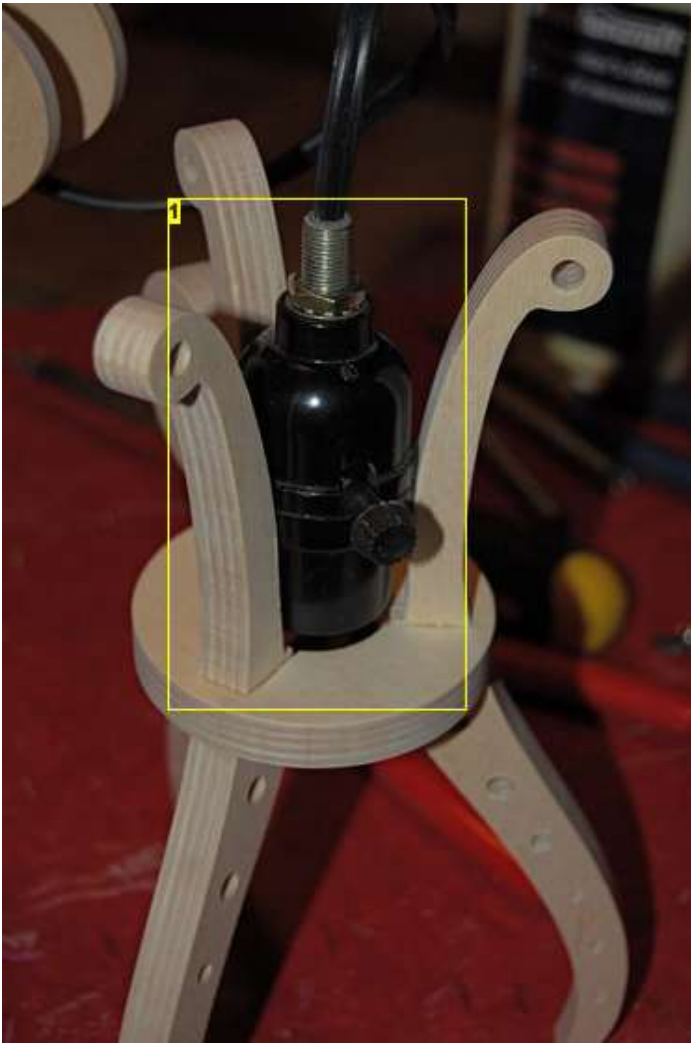


Image Notes

1. Insert the light fixture into the reflector assembly

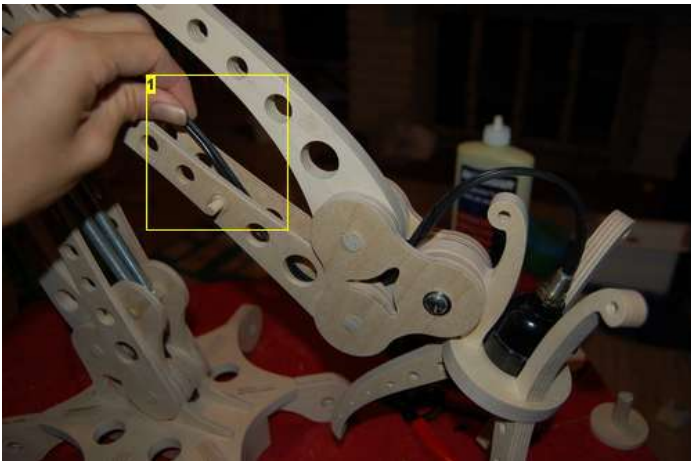


Image Notes

1. If there is an excess of wire, pull some back through the cable guides

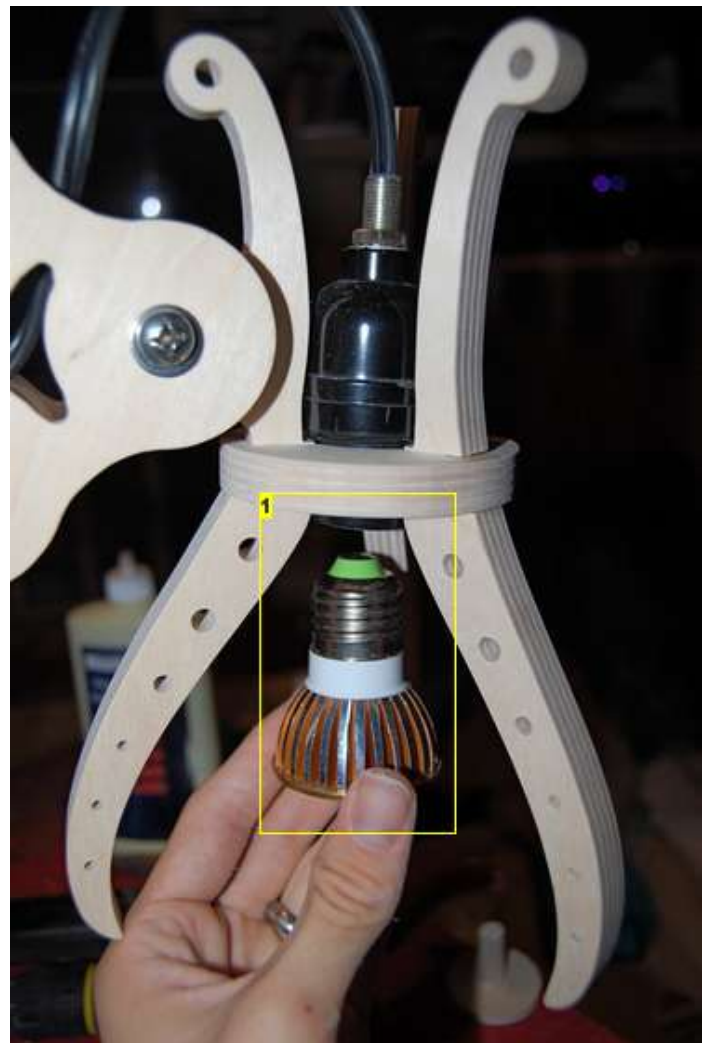
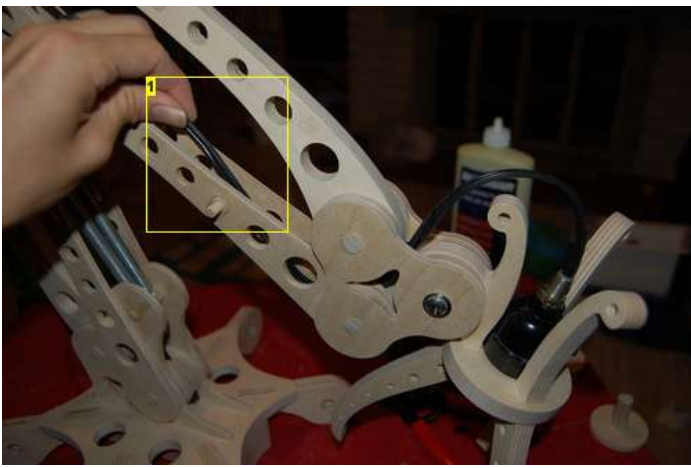


Image Notes

1. Screw in the bulb once the socket is in place



Image Notes

1. Mix up a bit of epoxy. Epoxy sticks better to the plastic socket than carpenter's glue.

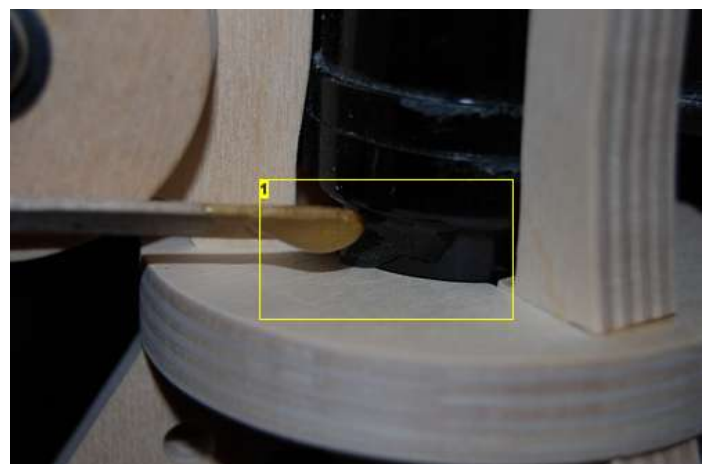


Image Notes

1. Apply epoxy around the edges of the socket, where it touches wood

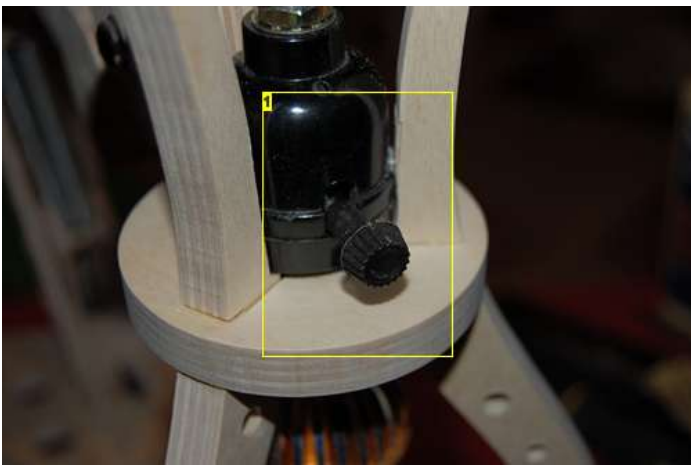


Image Notes

1. Ensure the switch is centered between two of the "fingers"

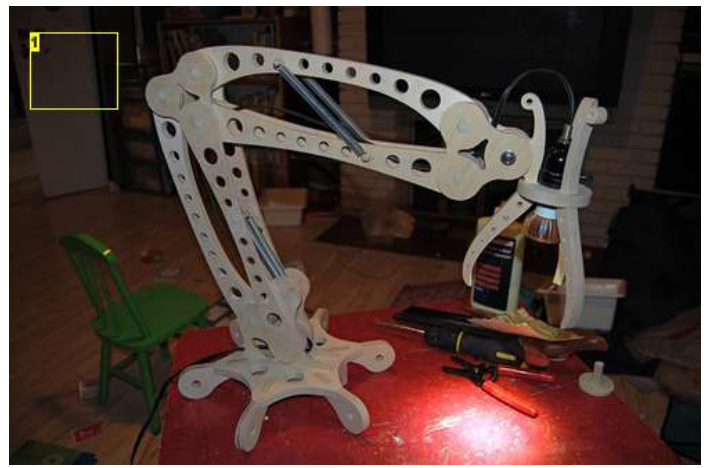


Image Notes

1. And there you go, the completed Woodpunk LED Light!



Image Notes

1. It does indeed consume just 3 Watts!



Image Notes

1. It apparently draws only 40 milliamps.

step 11: Additional Modifications

I left my lamp unpainted and unsealed. If you'd like to stain all or part of your lamp, or give it a coat of protective sealant, feel free to do so! Just be sure to use something that isn't sticky, or the lamp may not move so easily. Also, it would probably be a good idea to paint the pieces before assembling them!

I used an LED light bulb for my lamp because it looks awesome. Any LED "spotlight" you find should work fine here, because they are already focused and don't need a real reflector. However, if you're using an LED or fluorescent bulb that sends light in all directions, you're going to have to rig up a proper reflector or you'll be effectively staring into a bare bulb! One thing you could do is use the reflector from the scavenged desk lamp. It should attach to the "wrist" with a minimum of effort with the right set of wood spacers - but it won't look as cool.

Also, I would not recommend using an incandescent bulb with this lamp. They dump out a ton of heat, and I have no idea what effect that will have on the wood immediately next to the bulb. I really don't want to hear "I burnt down my house!" from any of you, ok?

You may also be tempted to extend the length of the arms. Feel free to do so, but be aware that the base will then need to be made heavier, or will need to be clamped to the desk to prevent the whole thing from tipping over.

Lastly, you may want to design an entirely different light for this lamp. You could use strips of LEDs, or LED ring lights, or anything else your imagination can conjure. Have fun with it and make it your own!

Related Instructables



Make a Fancy Blue LED Lamp (by Brad Justinen) by sensoryhouse



Cool Workshop Desk Light by rak



Simple Lamp Mount by jeff-o



Turn a Closet Into a Desk by thb43



12V LED accent floor lamp. by Torrach



AC Powered White LED Circular Magnifier Work Lamp by arcticpenguin


Comments


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 **bongodrummer** says: Sep 12, 2010. 4:06 PM [REPLY](#)
Awesome! Loving that lamp.

 **jeff-o** says: Sep 13, 2010. 4:33 AM [REPLY](#)
Thanks!


 **Crucio** says: Sep 12, 2010. 7:57 PM [REPLY](#)
Wow, that's gorgeous! Fantastic job, Jeff!
I'm going to try to build it. I have a hard time getting my scroll saw blade to cut where I want it to. My technique sucks. But this is too cool not to attempt! And I have a doner lamp, too. :p


 **jeff-o** says: Sep 13, 2010. 4:33 AM [REPLY](#)
That's too bad, with a properly set up scroll saw and a decent blade it should cut straight. It could also be that you're used to cutting wood with a lot of grain. Baltic Birch plywood has no grain, so it doesn't tend to grab your blade and pull to one side.


Would you like some help setting up your scroll saw?

 **KChappers** says: Sep 11, 2010. 8:40 AM [REPLY](#)
Fantastic lamp and instructions to go with it. I have converted the pdf's into DXF, DWG and CDR files (awaiting response from jeff-o).

Will be looking to produce a lamp (using this as inspiration) using 5mm Green edged acrylic for a glass effect..


 **ronthomp** says: Sep 12, 2010. 5:11 AM [REPLY](#)
This is great! Thanks. I was having trouble reproducing this in Solidworks.

 **jeff-o** says: Sep 11, 2010. 12:39 PM [REPLY](#)
Wow, thanks! Send them to me and I'll post them here. I've sent you a PM.

 **Bobthemonkey** says: Sep 10, 2010. 2:55 PM [REPLY](#)
Awesome project!

You mentioned in some other comments that you used Adobe Illustrator to produce the patterns. How did you keep everything to scale and aligned properly? I have tried to use AI to produce mechanical diagrams in the past but the alignment tools are fairly rudimentary (no tangent, etc).


-Bob

 **jeff-o** says: Sep 10, 2010. 7:15 PM [REPLY](#)
I have a few techniques, I guess. If I want a box or circle of certain dimensions, I click and define the dimensions rather than click-and-drag to size. I make use of the Align buttons quite a bit, as well as the rotate and reflect. Finally, I like to copy and paste bits and pieces so they remain the same.


Here's an example: when making the long arms of the lamp, I drew one 2" circle and a 1/2" circle inside it. I used the vertical and horizontal align buttons to line up their centers. I grouped these two circles together, then made a copy. I moved the second pair of circles exactly thirteen inches over, by manually typing in co-ordinates. I grouped these together again, to lock in the positions. And, made a duplicate pair.

I then drew the arcs for each type of arm, the "straight" and "curved" versions. For the straight version, I duplicated one line and flipped it horizontally, aligned them, and shifted them into place. Then I drew the circles inside, by manually specifying sizes. More horizontal alignment. Then I copied the set of internal circles to the curved arm, and shifted them around until they were centered.

So you see, in this case at least, it's done by making a few "building blocks" and working from there. It works quite well for stuff like this.

 **Bobthemonkey** says: Sep 10, 2010. 8:28 PM [REPLY](#)
Thanks!
I have been used to Inkscape and Autodesk Inventor, and recently made the switch to Illustrator. Your tips will certainly come in handy.

-Bob

 **jeff-o** says: Sep 10, 2010. 9:21 PM [REPLY](#)
How are those two programs? I was thinking of switching, myself!



Bobthemonkey says:

Sep 11, 2010. 9:44 AM [REPLY](#)

Inkscape is a good program, but I prefer Illustrator for graphics work because of a number of more powerful tools. You can produce some great things in Inkscape, but I have come to prefer Illustrator. One advantage that Inkscape has, though, are more align and distribute options for objects.

Autodesk Inventor is a great piece of software, especially the 3-D design component and assemblies. You can figure out if things will fit together in 3D space before making them (which has turned out to be quite useful in the past for me). Another extremely useful feature are the amazing array of align, distribute, fillet, chamfer, extrude, rotate, etc controls that there are. Everything is based off of measurements from one side or another, so making something symmetric is really easy. I did not switch away voluntarily, I had a 1-year license of the software through a class I was taking that expired. I may buy it again. The only problem for design that it has is that it was designed with making functional objects in mind so creating the graceful curves of a lamp that go with each other is possible, but more challenging. You can get around this by basing the parts that you are modding off of scanned drawings or other digital image files that can be produced elsewhere (but for most things it is unnecessary).

Hope this helps,

-Bob



Geekmandude says:

Sep 10, 2010. 3:00 PM [REPLY](#)

Cool!
You'll get my vote!



jeff-o says:

Sep 10, 2010. 7:05 PM [REPLY](#)

Thanks, I appreciate it!



nevdull says:

Sep 10, 2010. 4:37 PM [REPLY](#)

Once again, another awesome design from Jeff-o Labs! Very utilitarian and with a little "hammered metal" paint, you'd turn that woodpunk into steampunk!

Très forte!
-gian



jeff-o says:

Sep 10, 2010. 7:05 PM [REPLY](#)

Oooh, interesting idea. Yeah, hammered metal paint, and replace the wood dowels with brass. Yeah, that would be pretty sweet!



tofu1 says:

Sep 10, 2010. 10:20 AM [REPLY](#)

awesome design and craftsmen!



jeff-o says:

Sep 10, 2010. 2:21 PM [REPLY](#)

Thanks. :)



instruct39 says:

Sep 10, 2010. 2:13 PM [REPLY](#)

nice job with this, very cool!



CementTruck says:

Sep 10, 2010. 11:51 AM [REPLY](#)

WOODPUNK!, HA!

I love it!



Jayefuu says:

Sep 9, 2010. 9:11 AM [REPLY](#)

Awesome. And just in time since I just broke my desk lamp.

Will have to laser cut one me thinks!



Jayefuu says:

Sep 9, 2010. 9:18 AM [REPLY](#)

Could you email it to me as a set of .dxf files please? If so I'll turn it into a 3d model and cut me a nice acrylic one :D



jeff-o says:

Sep 9, 2010. 9:25 AM [REPLY](#)

Ah, that's what I don't have! I can email you .ai files though. Can you convert those to dxf, then link together all the broken line segments?

So how easy is it to cut 1/2" acrylic with a laser cutter? Man, that would be epic cool...



Jayefuu says:

Sep 9, 2010. 10:33 AM [REPLY](#)

.ai files would be fine. I'll ask Jake nicely and I'm sure he can convert them for me.

It wouldn't cope with 1/2" acrylic, I'd probably use 2 pieces of 5mm.

Or if you wanted to get REALLY (and expensive :p) cool, we could mill it from aluminium on the CNC milling machine.



jeff-o says:

Sep 10, 2010. 4:26 AM [REPLY](#)

Alright, I uploaded the .ai files as well, so download at your leisure. I figured other people would want them too!



jeff-o says:

Sep 9, 2010. 10:43 AM [REPLY](#)

OK, I wasn't sure if it could handle pieces that thick. But sure, two 1/4" pieces should be fine. You could even make come parts two-tone by using different colours!

Wow, aluminum would be crazy cool. Replace the springs with pistons and you could make your own Terminator arm!



hcgiesbertz says:

Sep 10, 2010. 12:59 AM [REPLY](#)

whoww... that is a really nice job done!

If I only had the space and tools, I would build it definately and use the 'part around the bulb' from the picture above (stefke).



jeff-o says:

Sep 10, 2010. 4:19 AM [REPLY](#)

Well, you don't need much space, but the tools are tricky. It would cost less than \$200 for a drill press and scroll saw though, so maybe someday!



valhallas_end says:

Sep 9, 2010. 9:51 PM [REPLY](#)

This is quite possibly the first project I've ever seen that I would really like to build with zero modifications to the structure...this is a very well thought out build, well documented, and the lamp itself has a delightfully eerie appeal. It looks a bit like human bones with an alien twist...

I'm impressed. Many kudos.



jeff-o says:

Sep 10, 2010. 4:18 AM [REPLY](#)

Thank you! That's sort of the look I was going for, so it's nice to hear I was successful. :)



Hisart says:

Sep 9, 2010. 3:57 PM [REPLY](#)

Beautiful! Now all I have to do is find the time to make one. LOL



stefke says:

Sep 9, 2010. 1:48 PM [REPLY](#)

I saw this lamp on the net and managed to make part around bulb. Now you have given me a good idea how to make a stand, because I think your lamp is simple to build and looks very good,



jeff-o says:

Sep 9, 2010. 2:08 PM [REPLY](#)

Wow, nice find! Yes, I'm fairly certain that my lamp would be easier to build than that one! It should be possible to adapt the shade from that lamp onto mine.



Jayefuu says:

Sep 9, 2010. 3:36 PM [REPLY](#)

Yours is prettier too :D



stefke says:

I have some plans for shade drawn by hand. I can send you but my scanner currently not here . it is realy interesting looking lamp. Here is the link http://www.wood-mechanics.net/?page_id=2 Maybe it will inspire you to make some new things.

Sep 9, 2010. 3:31 PM [REPLY](#)



jeff-o says:

Very cool. I wish I could read Russian!

Sep 9, 2010. 7:15 PM [REPLY](#)



stefke says:

I wish too thats whay I used google translate.

Sep 9, 2010. 8:10 PM [REPLY](#)



jeff-o says:

Ah, you're right. Google's new slogan should be, "no excuses."

Sep 9, 2010. 8:12 PM [REPLY](#)



seamster says:

Very nice, Jeff! This is awesome.

Sep 9, 2010. 10:21 AM [REPLY](#)

Was that an older can of Super 77, or is that the version still available in Canada? You can't get that black can version in the US anymore, and the stuff available now has a different formula. (I still use it all the time, but the new stuff tends to eat up various types of foam, where that older version did not. I'm a little jealous. It was a great product.)



jeff-o says:

Hmmm, I bought it at Home Depot a few months ago. Either it's still available here, or it was old stock.

Sep 9, 2010. 10:26 AM [REPLY](#)



seamster says:

I might have to make a trip up across the boarder... smuggle back a case of spray adhesive. Hmmm. Can I couch surf at your house? (ha ha, just kidding!)

Sep 9, 2010. 10:49 AM [REPLY](#)



jeff-o says:

Wow, you must really like this glue! I'll cherish it just a little bit more. ;)

Sep 9, 2010. 11:10 AM [REPLY](#)



Chrysn says:

That looks really amazing!

Sep 9, 2010. 10:56 AM [REPLY](#)



jeff-o says:

Thanks. It really stands out, that's for sure.

Sep 9, 2010. 11:06 AM [REPLY](#)



MichelMoermans says:

That is just awesome :D No words can describe it Jeff-o, you have done it again! :D

Sep 9, 2010. 10:29 AM [REPLY](#)



jeff-o says:

Thanks very much!

Sep 9, 2010. 10:43 AM [REPLY](#)



metalman1138 says:

Absolutely love it! Did a lot of woodworking with my grandfather, seeing this brought back memories. I'm going to enjoy making this. Thank you.

Sep 9, 2010. 10:16 AM [REPLY](#)



jeff-o says:

You're welcome! I look forward to seeing your version! Be sure to send me a picture when it's done so I can post it here.

Sep 9, 2010. 10:25 AM [REPLY](#)



Ninzerbean says:

Gorgeous!

Sep 9, 2010. 9:39 AM [REPLY](#)



jeff-o says:
Yes, it is my... preciousssss....

Sep 9, 2010. 10:01 AM [REPLY](#)

[view all 52 comments](#)