

# **Drill Press**

**For About \$20**

## Intro: Drill press for ~\$20

Anyone who works with wood knows you have to make hundreds of holes for the screws and its almost impossible to make a series of holes perfectly straight and with the same depth by hand.

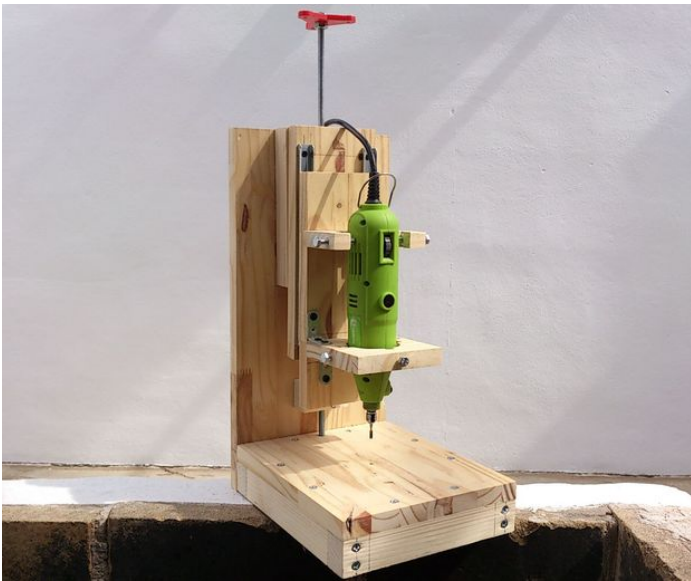
This will help you to build a tool that will save you a lot of time and effort when drilling precise holes on wood, plastic, metal, or whatever material you're working with, it can also be very useful to carve sections of materials like wood thanks to its adjustable tool height.

### You will need:

- Wooden board (I used ~2 Cm thickness)
- Wood slat (at least 2 meters, I used 25x35mm but any similar one will do the job)
- 2x Small drawer guides
- Around 30 long wood screws (and around 20 shorter ones)
- Wood glue (optional)
- High speed drill or similar tool to be attached.
- M8 threaded rod M8 threaded tube M6 screws and nuts

### Tools needed:

- Ruler and pencil
- Square and bevel
- Wood saw and jewelers saw
- Mitre
- 80 grit sandpaper
- Drill
- Wood clamp (optional, but it makes the job a lot more easier)
- Screwdriver



## Step 1: The base

To made the base, cut four pieces out of the wooden slat, the dimensions are specified at the image, to avoid problems when assembling them I used a mitre and a clamp to keep the slat attached to it, this tool keeps the blade in a vertical position, avoiding irregular cuts, a minimal amount of sanding might be made afterwards.

When you've finished cutting the slat, make the definitive rectangle shape with it, play with the position of the slats to find the optimal configuration, once aligned, hold them together by applying pressure with the clamp to the short sides of the rectangle, now they're ready to be drilled. Mark the position of the screws, I've chosen to put them 1cm away from the edge. With some measurements, find the center of the slat and mark the position, once you have found it, drill the holes, which must be slightly narrower than the screw.

Once all the holes are drilled you can remove the clamp (or not if you prefer) and place the screws, I put some wood glue at each union to reinforce them.

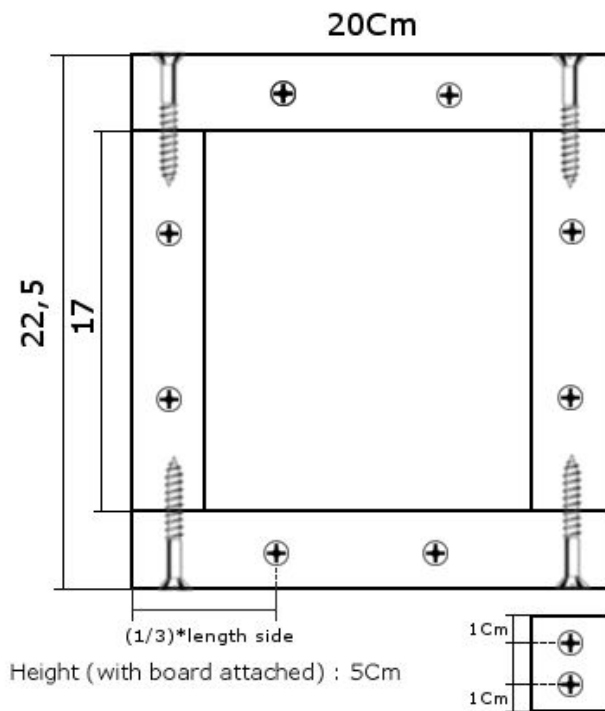
**TIP:** If you remove the clamps when the holes have been already made, make some marking where two pieces come together (like circles, triangles, lines), if you disorder them, you can always put them together like a puzzle.

**TIP:** If your wood screws have an angled head you can use a special bit or a large metal bit (8mm for example) to make a countersink so the screws don't protrude.

To attach the cover, just draw the contour over some wooden board, cut it and attach it to the slat frame with more screws, I placed 2 at each side, leaving a gap between them of about 1/3 the length of that side. If you're like me, the chances are some of the slats or parts of the board will slightly protrude from the shape we're looking for, so grab that 80 grit sandpaper or an equivalent tool and start sanding until the edges are completely flat.

**NOTE:** It's not necessary to copy the dimensions to the millimeter, just get the general idea, and use the materials you find more convenient.

**TIP:** If you want your sanding to be more accurate put some sandpaper over a wood plank and use it to sand the wood, that will ensure your pieces will come out straight.



## Step 2: The arm

The next part of the drill press will be the arm that will hold the guides to attach the drill. To make it, I cut a 40Cm tall board with the same width than the base, (Pic 1) then I sand the edges.

To install the guides we need to set a separation between the board and the drill, to achieve this I cut two pieces of wood from a slat (Pic 2), they are 17Cm tall. Once attached to the board they'll provide some separation so the drill can be more far away from the board and I can work with larger materials easily.

To attach these slats I mark the center of the large board, then I add 5Cm to each side, the space between the opposite edges of the slats must be 10Cm, with this in mind I use an square and a bevel to trace parallel lines to delineate the place where the slat will stay (Pic 4 and 5), also, I use half the width of the slat to draw another parallel, that line will be useful to know where I should put the screws.

To place the screws I divide the length of the slats by 4 (Pic 5), that will give me the space between each one of the three screws, I mark those places and proceed to drill the holes through them, then I attach the slats to their corresponding location with a clamp and using the holes I had previously made as a guide I drill the rest of the hole through the slats.

Once the holes are drilled, I make the countersinks (Pic 6) and insert the screws until the point comes out at the other side (Pic 7), that will be useful because I want to remove the slats, put some glue and then put them back in place (Pic 8). After this, I place the slats and screw them in place (Pic 9).

We don't want to attach the arm to the base now because that operation should be made when the guides are ready to be installed, that will allow us to make some corrections on the go if necessary





### Step 3: The guides

Placing the guides is the most trickiest operation, they must be completely perpendicular respect to the base, and they must be completely parallel to each other to avoid getting stuck.

First I cut two 25cm long boards (per 10mm wide) (Pic 1), notice I'm not throwing away any wood (Pic 2). After sanding the edges place my set square at one edge, and I do two marks, one at 10cm, and one at 90 (pic 3), I repeat the operation with the lower part of the board and with the other board.

**TIP:** To do the markings with the set square, use left edge of the small boards (pic 2) this edge comes perfectly straight, so errors and other problems when marking won't be a problem.

Once finished, these lines must be parallel between each other, now, with the set square I do a line 1.5 cm above the lowest edge, perpendicular to the other two, that line will help the guides to be at the same height.

With the lines that define the position of the guides I place them so the longer lines pass through the middle of the holes, then, with the pencil I mark the shape of those holes, and I drill them out of the wood (Pic 4).

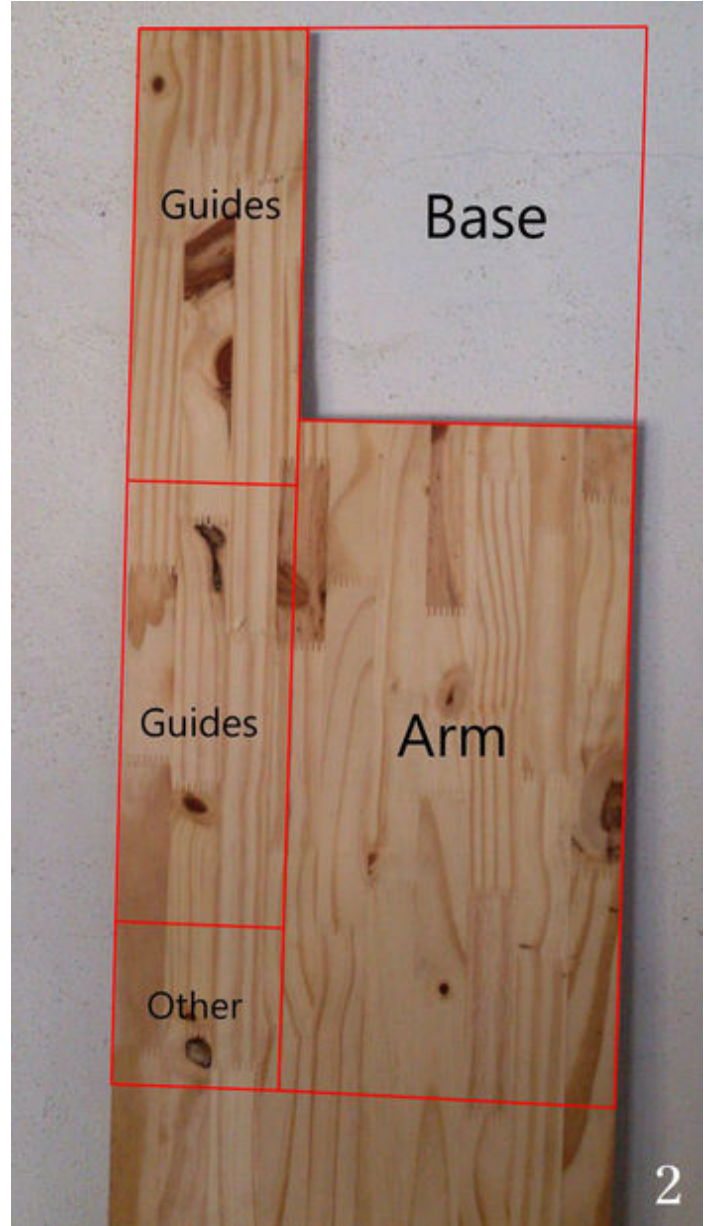
**TIP:** Maybe this is useful or maybe I'm too paranoid, but I marked the guides to know which goes where after marking the holes to drill, theoretically they're exact, but anyway, let's not risk it... After the holes are have been drilled, screw the guides to the small board (pic 5).

**Important:** Notice the my guides have different sets of holes, on one side there are lots of them, but on the other one there are just a few. The side with just a few holes will be the side attached to the arm, this is because it'll be easier to disassemble in case the guides get stuck, or to do any adjustment...

To screw the board to the spacers we need to follow a special procedure, this board must be perfectly parallel respect the big board, to do so I made a simple but effective tool to align the board (pic 6), I slide it along the flat edge of the board and check that the screw is always touching the small board, once I'm sure the board is aligned I clamp it in place, drill the holes, and without removing the clamp I insert the screws (pic 7 & 8).

After this we just have to screw the guides in place (Pic 9). I

**IMPORTANT:** While placing the screws the board can change of position to accommodate to the screws, to avoid this place the screws with the clamp attached, that way the screws will have to get accommodated to the wood, and not the other way around.









#### Step 4: The union

This is also one of the most crucial operations, the guides are now aligned, but if we goof it when joining the board with the base we'll end making holes with a certain deviation. Luckily, there are some tricks that make this process easier.

We first clamp the base to the board by eye, make sure the edges are more or less aligned, don't apply too much pressure because we want it to have a certain degree of movement (Pic 1), then, we place a carpenter's square touching the base, the board must be parallel to the side touching it, and also, when we slide down the guide, the board must remain at the same distance from the square (Pic 2), if it gets closer or further we must change the inclination of the base by tapping it gently at the bottom, the clamp will allow us to make and conserve those subtle adjustments.

Once the base is aligned with the guides we clamp it strongly, and we mark the places where the screws will be attached (Pic 3), make sure you don't get in the way of a previously placed screw. To make the lines I divided the length of the slat and board by two, that way I'm sure the screws will go through the middle of them, in my case I placed 4 long screws up (at the slat) and 4 short (at the board) (Pic 4), this is just temporary.

Now I've got a problem! and I guess some of you will have the same one. The board is misaligned with the base (Pic 5), this is not a serious problem and I kinda expected it, to solve this, I sand the upper part of the base, where the board is attached, so it forms a perfect 90° angle. It might take some tries but the hardest part is finished.





### Step 5: Adding the drill support

Now I must create a support for the drill, since I might also use a high speed drill, I opted to use have a general holder and some kind of screws to hold the tool in place regardless the diameter of it. This part is kinda general, since some measurements might change due the tool used.

I cut the last piece of wood, then I make a hole though it, I'm not very proud of how that hole came out, jeweler's saw and thick wood don't get along, but that's easy to fix with sandpaper wrapped around a tube (Pic 1 & 2). The diameter of the hole is the diameter of the high speed drill since it's the widest power tool I'll be using.

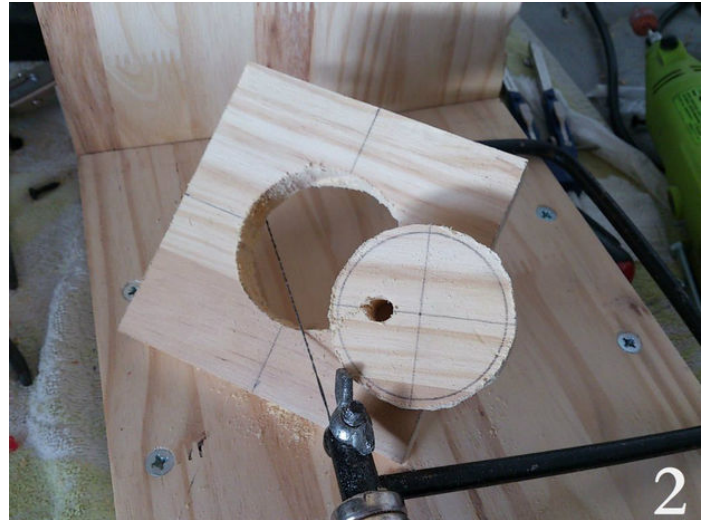
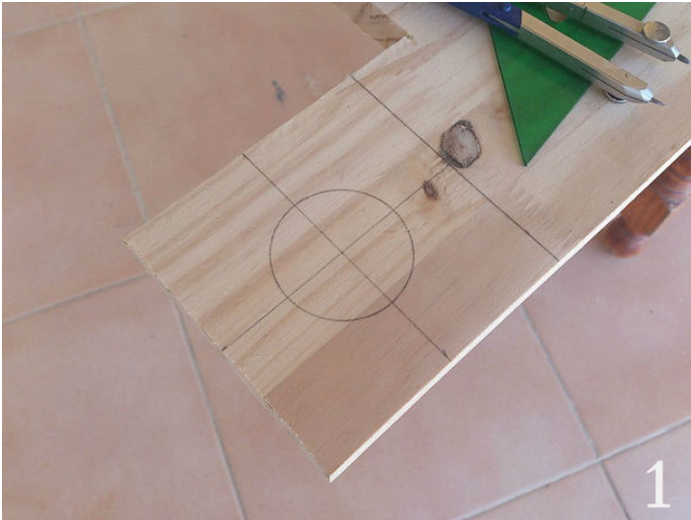
The flat side (the side that hasn't been cut) will be attached to the guide board, the other sides are sanded to remove the saw dents and I do a mark at the middle of each of them to do a hole to pass the screws through.

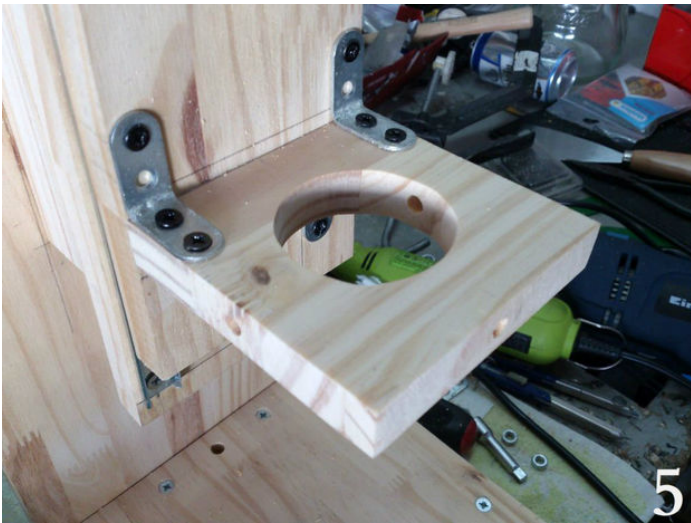
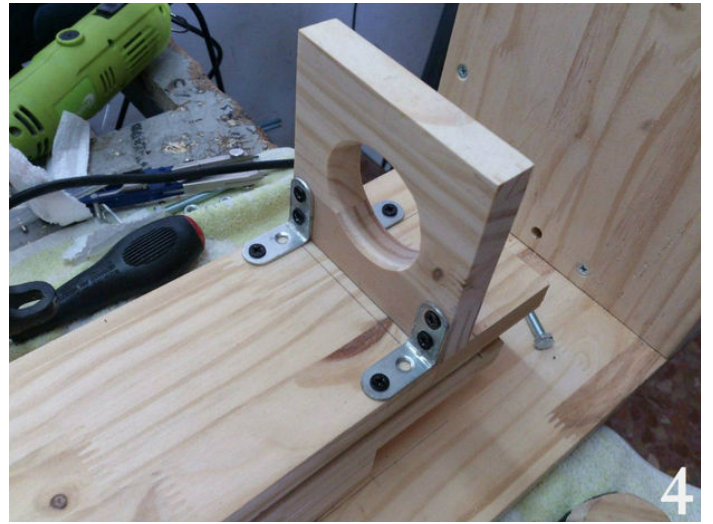
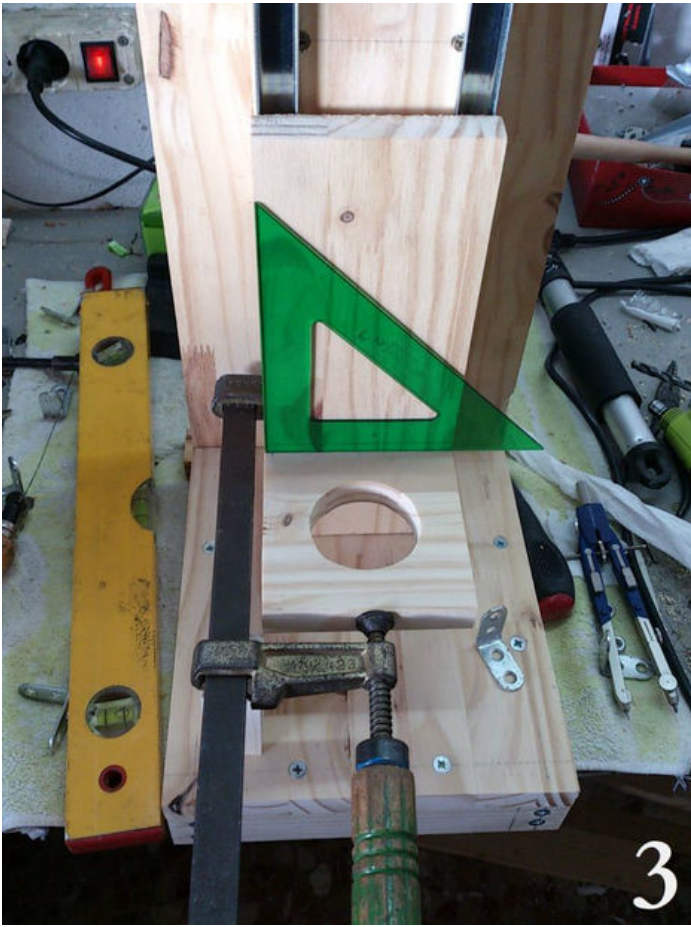
I check the support is perfectly straight and I clamp it while I drill the holes to install 90° brackets to hold the support in place (Pic 3 & 4), then I insert the screws, when all fits correctly I unscrew the thing to proceed with the next operation.

I mark a point at the middle of each side, then with a 6mm wood bit I drill holes through them, the screws to hold the tools will go in there (Pic 5).

I carefully cut away a piece of wood equivalent to the size of an M6 screw nut, that will keep the nuts in place and will allow them to be attached without protruding and touching the tool (Pic 6)

I attach another support, this time a bit higher, I also use some screws to allow some margin when holding the tool (Pic 6, 7 & 8).





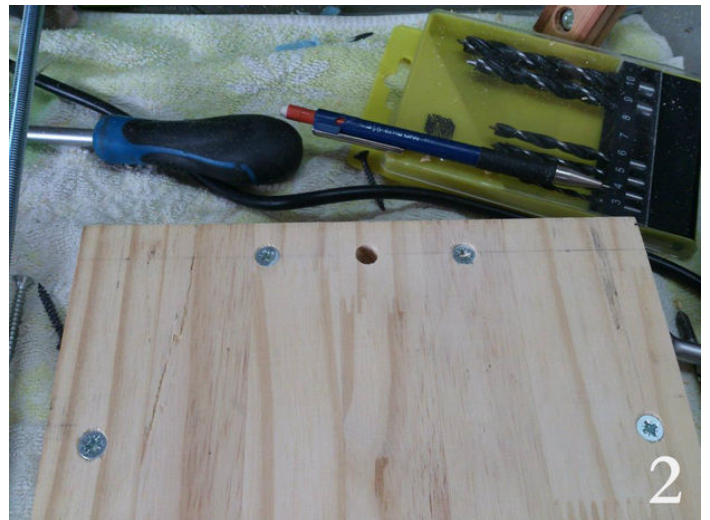


### Step 6: Final details: Hole depth adjuster

To be able to make holes at the same height we'll need some sort of adjustable stopper. I've used a 8mm (M8) threaded rod, I've cut it to a length of 50 Cm and I sanded an extreme to give it a round shape and to dull the thread a bit (Pic 1). Next I make a hole at the base (Pic 2), that hole must be big enough to let it rotate freely but not to be too loose (Pic 3).

Gluing a piece of slat to the top with a hole drilled through will keep the rod stable (Pics 4, 5 & 6)

With a small wood block a long screw/nut and a threaded tube I make a stopper (Pic 7). It will be touching the board, so when I twist the rod it goes up and down setting a limit for the tool with a lot of precision (Pic 8). I also added a small red knob to the rod to make it easier to turn.





3



4



5



6



### Step 7: Final details: Optional improvements

You can make an automatic regression mechanism by attaching some sort of spring or elastic bands to the parts depicted, but since I mostly use it for carving wood I personally haven't made it.

A handle could also be easily attached by attaching a piece of wood to the top of the guide.

Another interesting add-on would be some sort of clamps, like the ones used on CNCs, they could be easily made out of wood and could be screwed to the base with M6 screws to hold pieces tightly, although I don't find these clamps to be very practical when used on a drill press.

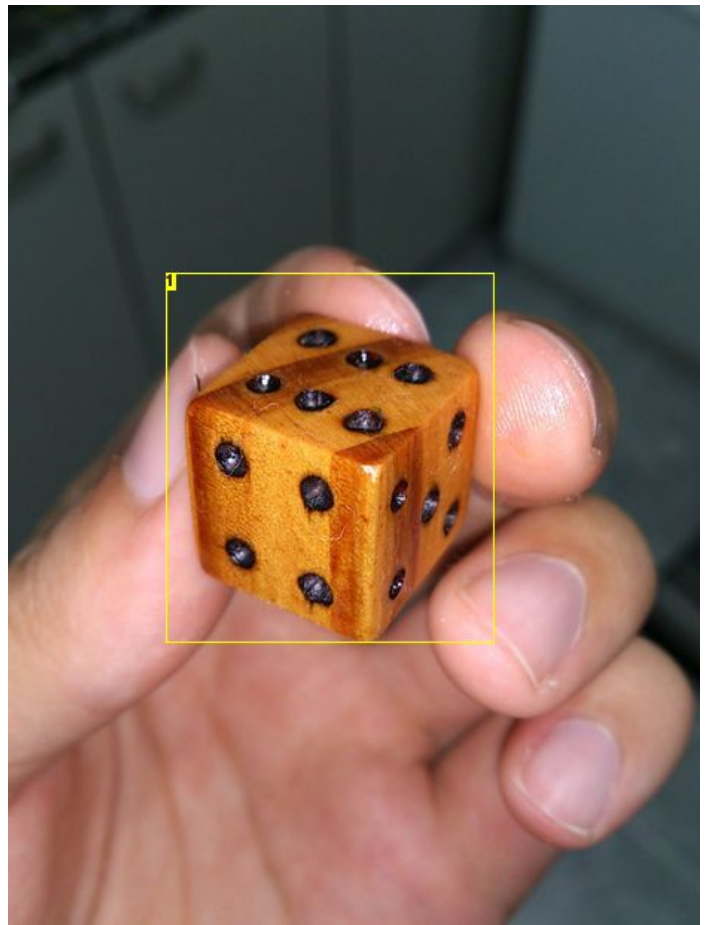
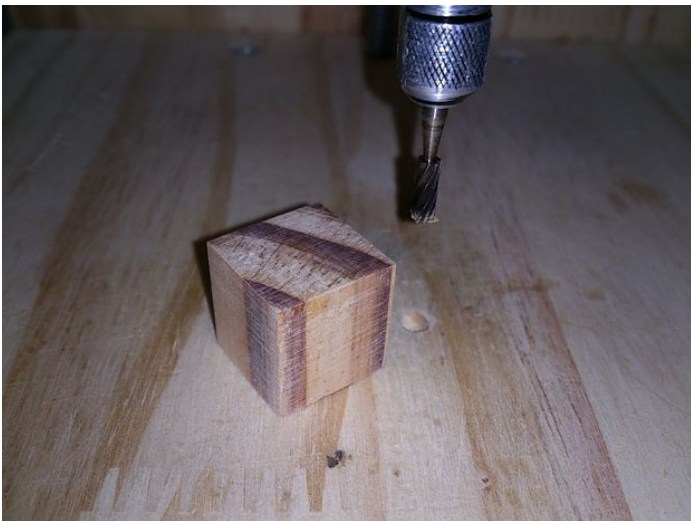
I've been also thinking about installing an LED powered by a couple of batteries to have a better illumination when drilling.



### Step 8: What can you use it for?

As I said, this tool is very useful to drill straight holes with a minimal effort, but combined with a high speed tool and a carving bit can be a great help to carve holes or to cut borders at the same height, as seen in the pictures.

Another interesting property is it can cut perfect squares out of a roughly square-shaped piece of wood for example.



#### Image Notes

1. I oiled it a bit to highlight the color of wood.



