Drilling Stone & Glass

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Adam Kelliher

It's safe, easy, and these elaborate instructions are comprised of *excess* tips and tricks to make it easier. Stone and glass are interchangeable and these instructions apply to both.

Drill Bits:

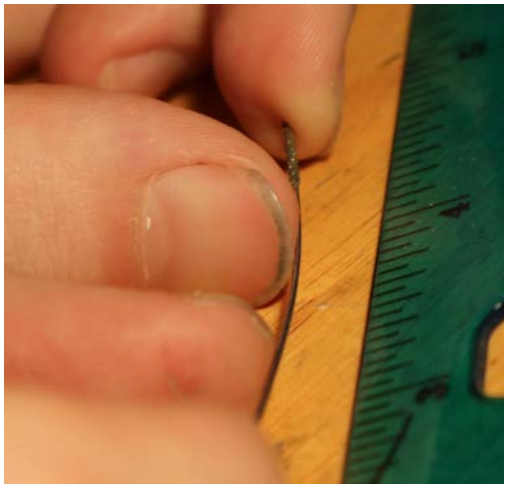
Diamond bits can be purchased from E-bay.

Small bits (.5mm to 2mm) cost less than a dollar each when purchased in bulk lots of 5, 10 or 20.

The smallest bit I have worked with and seen is .5mm. These are very flimsy. The shaft is smaller, so the bit bends easily when contacting the stone. Bits up to, but not including 1.5mm work best when the

Ultimately stationary is best achieved when the stone is laying on its flattest face. I.e. it should not "rock and wobble" and the flat face will balance it like a table.

stone is rested in an "ultimately stationary position".



Bits past, and including 1.5mm in size can drill a stones slope with added attention.

To drill the slope of a stone, start the hole carefully, using only pressure till friction is felt. A groove must be created to retain the drill bit and eliminate surface walking.

Caution: Drilling inside a natural crevice or crack can potentially split the stone as it will be broken on a fault line. If it does not break during drilling, it will be more fragile later.

Gouging a divot/ crater into a piece of wood creates a surface that will hold rounder stones. Carve it, or drill a round crater with a large wood drill bit in a scrap piece of wood by only partially chewing up the surface. It need not be pretty, and will resemble a dapping block.

Remember: Burrs and drill bits are very different. Burs grind stone with the burs vertical plane, and will do a piss poor job of cutting a hole.

Drill bit prices vary based on quality.

Drill bits, when passing 2mm in size are recognizable because they will resemble tubes. They will be hollowed out. Burs are not hollowed.

These tubular bits create cores. Cores jam in the bit, disallowing the bit to move further down into the hole. I use a sturdy piece of welding rod to clean out the cores with a jarring/ stabbing motion.

NEVER buy core bits that do not open all the way through. Some bits, poor ones to work with, have a solid shaft that links into the chuck, yet have an open tubular cutting area. When stone fills up the inside, you are, for lack of a better word up $&*% creek, because there is no way to get the stone or glass core out.

Drilling:

Stones must be drilled under water to lubricate the drill bit. Be kind to your hands, use warm water- not cold.

The water need not be crystal clear. I drill hole after hole till I cannot see anymore- then I still drill more.

You need only enough water to reach about 3mm above the stones surface. 1.5cm (excess) is fine, but too much water will cause the chuck to sink into the water pool and spray water everywhere.

Key point: When drilling, all your mechanical hand pressure on the lever is being focussed into a minute point on the stone:

The sharper your bit, the more pressure you can gamble with. If you put all your might into a dull bit, you will break the stone- because all you will be doing is squishing it in a focused area without cutting. You will be pressing, but not drilling.

When a bit gets dull, save it for soft stones low on the Mohs scale. You will know your drill bit is dull when:

- You can see only shiny metal on the bottom, because you will have worn away the diamond coating.
- Or, if you are breaking more than 1 of 5 stones.

Two types of diamond coatings exist, sintered and coated. Sintered, like lapidary grinding wheels are made with diamond fused into the metal, so that as you wear down the surface, new diamond appears.

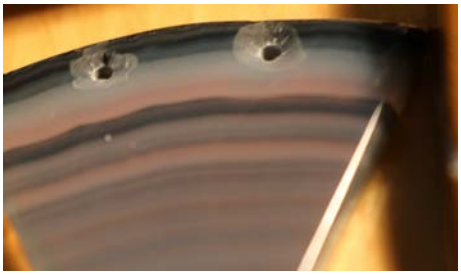
A coated bit will be ruined once the surface coating is destroyed.

SHARP

DULL

What I drill in: I use a baking sheet, like for brownies: 6x6 inches. I put a 1 inch thick wood scrap inside, then the stone on the wood. The weight of my hand holds everything in place. I also have a home-made wooden extension on the drill press platform to give more surface area for the baking sheet to rest on. I take the wood out of the water when I am don't drilling for the day to keep it from rotting.

Key point: Use less pressure on the last ¼ of the hole. Excess hand pressure will cause the back to snap out of the stone, leaving an unpolished crater- or worse, an entirely broken stone.



Cheap E-bay bits may wear out before finishing a single hole, or it may drill ten stones. On average- you should be getting five holes per cheapest bit.

Keep used bits separate from new. New bits are great for finishing that final ¼ of the hole without breaking it. Especially when the stone is financially or sentimentally valuable.

When beginning any hole, go slowly at first with the lightest amount of pressure possible, yet still contacting stone. A preliminary groove must be commenced before deep cutting can begin. If too much force is used at first, the drill bit will "walk" the surface, causing unwanted scratches.

Diamond bits (untwisted) are extremely safe. When running at full speed, you can touch the diamond without harm. Especially when in water.

When drilling, put your fingers in a secured position on the stone to hold it in place. No need to use tape or magnets. Grip it confidently knowing the bit won't hurt you. Have clear wrists, short sleeves and no rings on fingers because the chuck could grab them- though chance is minimal.

Pressure of drill bit in press will hold the stone too.

Stones *may* catch on the drill bit's diamond friction immediately upon completing a hole, and spin with the bit. Let go. Turn off the machine and carefully remove the stone by hand. Only small stones (bead size) will catch. They will not "fly away", just rotate till the machine stops.

Be clear that when you put a hole in a stone, you are removing a part of its load bearing ability. You are intrinsically weakening it. As a finished piece, a tap in the wrong way could break it. Holes cause the stone to be more vulnerable- because a vibration from a brisk contact on another hard surface (dropping, laying down too quickly) need only travel half (or less) of the original distance.

The front (the face that will look nicest after drilling) is the top part the drill begins in, because the bottoms almost always chip out. The front surface will be a clean cut.

Edges of the hole are sharp. Not to you, but to string. If a soft material is necessary for stringing, file the edges lightly by hand with a diamond file, or use a diamond bur to grind them.

Do not drill native copper with a diamond bit. It will "gum up" the bit, ruining it. Bits to drill metal work best on native copper.

If a post is needed to balance the stone against (like a third hand), drill some screws into the base piece of scrap wood to press the stone against.

When drilling, insert and remove the drill bit completely from the hole every three hippie seconds. Don't go in and out like you're playing hot potato. Relax, let the bit cut for long enough- but not too long. You will learn to hear and feel when the time to remove it is occurring, even over the sound and vibration of the press.

When a drill bit's diamond coating breaks off in the hole: DO NOT use a new drill bit to clean out the coating from inside. Use your old dull ones. Diamond on diamond will dull a bit FAST, and unnecessarily ruin your new ones.

When a bit breaks completely in two, it almost always falls into the water. Wear eye protection just in case.

If the broken bit is jammed in the hole, use pliers to carefully remove it from the stone. Only bits size 1.5mm and smaller tend to break.

Generally, drilling rock is very safe relative to other shop activities. I would allow a child to do it. Make sure hair is tied back, because the rotating chuck is the most dangerous.

Drill Press:

Table top drill presses are quiet. I use mine in an apartment, and no neighbor has ever complained.

Table top drill presses are cheap. Craigslist, and second hand websites have them listed at low cost. Vancouver, BC, has them as low as $40.00 CDN. $60.00 is average. A new drill press costs $200.00 new in stores. (2 feet tall/ bench top press).

A drill press is better than buying a dremel press stand. A dremel press stand costs the same price ($75.00 CDN new) and they are flimsy with smaller chucks. A drill press is POWERFUL.

Do not drill a stone without the stationary action of a press. It can be done with a handheld machine, but I would never challenge myself with the frustration of doing so. Final craftsmanship will suffer.

Safety:

Never wear gloves.

Never lean in too close if you have long hair.

The only safety gear **necessary** is eye protection, hair tie, and have clear wrists and fingers.

They can catch on the rotating machine.

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