

Carving Wax Zig-Zag Rings

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Goal

To familiarise the student with the basics of carving a simple ring out of hard carving wax, using a variety of carving and measuring tools. Specifically dividers and engraving tools.

Tools & Supplies Needed

- Hard carving wax ring tube (In wax drawer)
- Hacksaw and mitre box from cabinet #3
- Dividers (The good ones-see me)
- Wax files from toolkit
- Wax ring reamer from cabinet #3
- Ring sizers from cabinet #1
- Yellow ruler from toolkit
- Unimat indexing head. (see me)

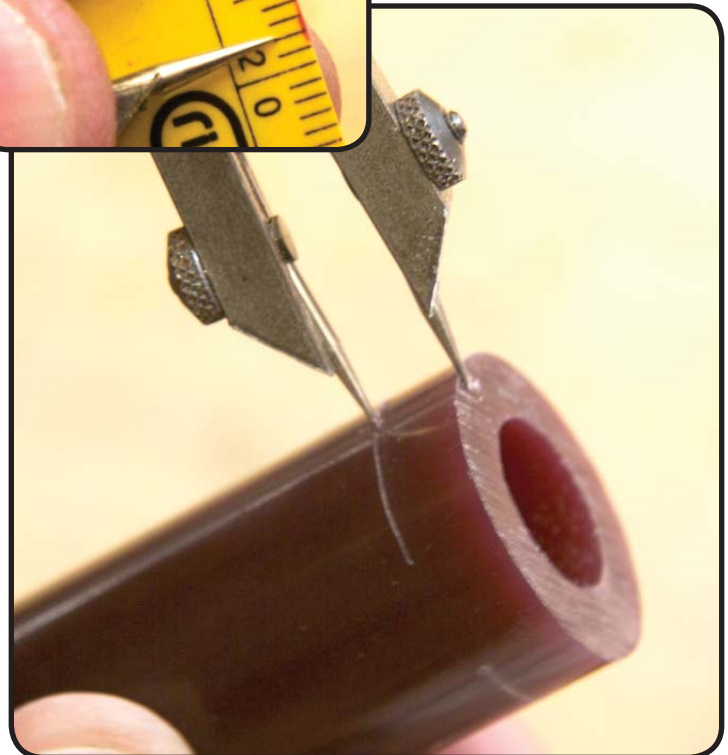
Procedure

STEP ONE:

Cut a wax blank. Find a tube of hard carving wax in the wax drawer. It can be any color, but it should be of the symmetrical, round type. There are other wax tubes in there that are asymmetrical. Don't use those. If the class is working on this, chances are good that I will have some pre-cut blanks somewhere on my desk. Check there first.

If pre-cut blanks are not to be found, set your dividers to about 8mm apart, and then mark around the end of the tube that appears to be closest to perpendicular to the tube. You do this by laying one set of the divider's points up against the end wall of the tube, and using that as a guide while you scrape the other point around the circumference of the tube. The goal is to generate a scratch that is 8mm from the end of the tube.

Once the scratch is cut, you will discover that it is nearly invisible. The cure for this is baby-powder. During class, each table has a small white 'pounce' bag. This is nothing more than a scrap of cloth filled with baby powder. Bounce this against your wax a



few times, and it will deposit a fine mist of baby-powder onto the wax. Rub it in and you will discover that the groove is now much easier to see, being filled with white powder. You should use the pounce bag any time you scribe a line. Make sure to leave it where everyone else at your table can see it. They need it just as much as you do.

Place the wax tube in the mitre box, with the scribed line even with the slot. Cut off with saw.

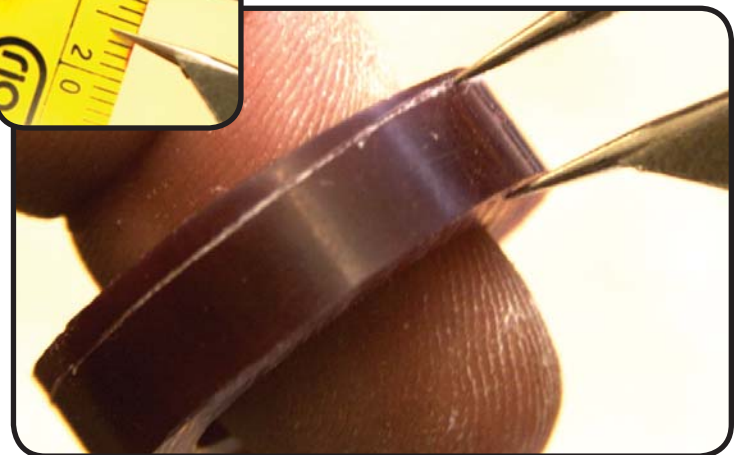
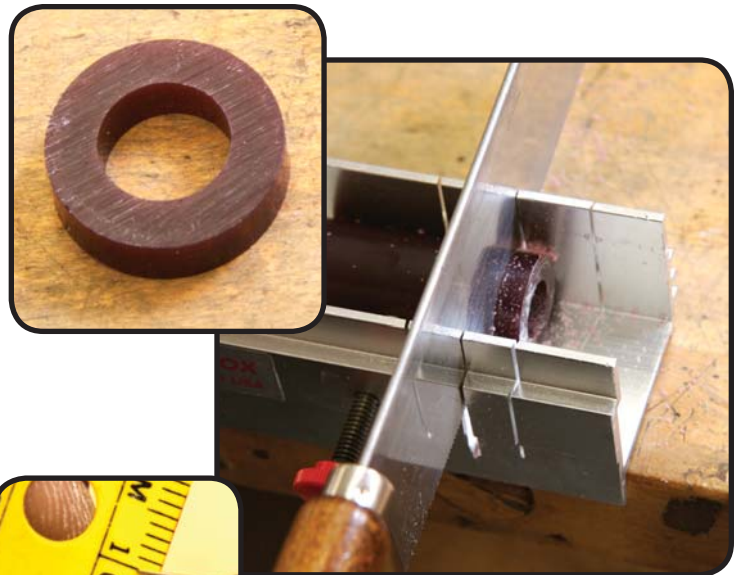
STEP TWO:

Mark and trim blank parallel. Odds are good that your tire shaped wax blank will not be of even thickness. No problem. Set your dividers for 6mm. Pick the side that looks to be the most straight. Lay one point of the dividers 'over the side' against that good face of the blank, just as you did when you marked the tube. Just like that operation, scrape the other point of the dividers around the blank, and pounce it so you can see it. This will give you a line that is 6mm from the 'good' side of the ring, and parallel to it. Use the big coarse wax file in your toolkit to file off all the wax beyond this mark.

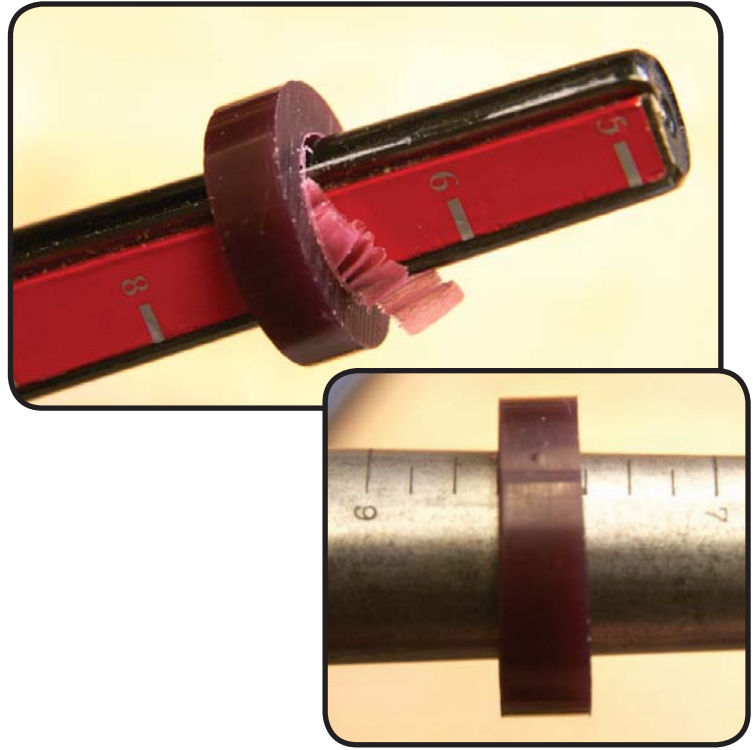
STEP THREE:

Ream for ring-size. First, use the 'fat' set of ring-sizers in cabinet #1 to determine your ring size. (You're going for a comfortable fit.) Next, grab a steel ring mandrel from just below the sizers in cabinet #1, and check to see what size the ring sizer that fits you comes to on that particular mandrel. Don't assume that because the sizer is marked size 8, that it actually *is* a size 8, or that size 8 on the mandrel in your hand has any relationship to the size 8 of the sizer. Always check, and make sure you're using a round mandrel. We have some square-ish mandrels. Don't use those. The way you tell what size a ring is on a mandrel is to check to see what size is under the center of the ring when it stops sliding up the mandrel. It's not the size that the 'uphill' end of the ring comes to, but rather the size mark that's closest to exactly in the middle of the inside of the ring shank when it stops. (Assuming that the ring is round. If it's been knocked oval, you can't get a good read on it until it's been rounded out.)

Now get one of the black wax reamer mandrels. These normally live in cabinet #3, but for class will probably be out on the front of my desk. Note two things: (A) the reamer mandrels are more tapered than the steel mandrels. This means that you must be careful to stop and turn the wax blank over every

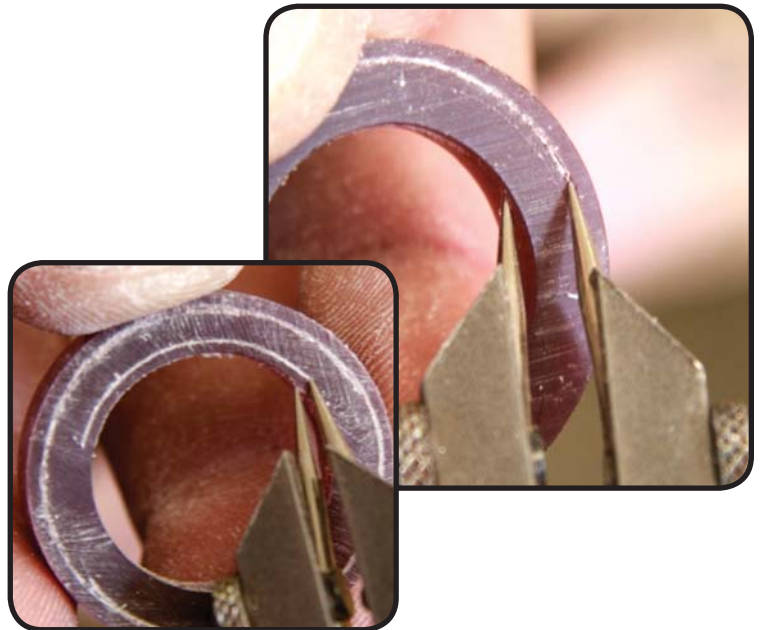


so often, or you'll carve a tapered hole, and (B) the size marks have been applied with the utmost precision...on a sticker. Those size marks are the roughest guides only. Stop and check your size frequently as you get close, and remember to ream out both sides of the hole to make sure it's even. The reamers are used by sticking them into the central hole in the wax ring, and twisting clockwise, sort of like an inside-out pencil sharpener. Do this over a trash can to avoid getting wax all over the place. Be aware that the wax reamers have no guide to make sure that the hole they're reaming ends up 'straight' through the ring. It's entirely possible to ream a hole that heads off to one side or the other. Watch the alignment of the ring on the reamer to make sure that it stays as close to straight across as possible. Twist the reamer in gently to make sure the hole stays round.



STEP FOUR:

Mark out the thickness. Set your dividers to 3 or 4 mm. Set one point of the dividers up against the inside wall of the hole you've just reamed out, and the other point against the side wall of the ring blank. Scribe a line around the entire circumference of the blank. The goal is to have a round line drawn on the side wall of the ring, an even 3-4mm out from the finger hole. Do this again on the other side of the ring, so you have two lines, one on either side face of the ring, both the same distance out from the finger hole. Reset your dividers for 1mm and scribe another set of rings, one on each face of the ring, so that you now have an outside and inside line on both faces, all of them based on the dividers riding along against the wall of the finger hole. This is how we compensate for the finger hole possibly being cockeyed: we base our measurements on that hole, and use it to define a new 'straight'.



STEP FIVE:

File the ring for thickness. The goal is to remove all the wax that is outside of the 3-4mm ring line. We do this with a file. Put the ring onto one of the forks of the benchpin. Use the big coarse wax file to file at an angle from just above the outermost ring line towards the center of outside of the ring. Work your way around the ring. The end result should look like you've taken a 45 degree bevel off the outside of the ring. Flip the ring over, and repeat. At the end of this stage, you should have a prominent central ridge running around the outside of the ring. The next step is to file straight across the outside of the ring, so



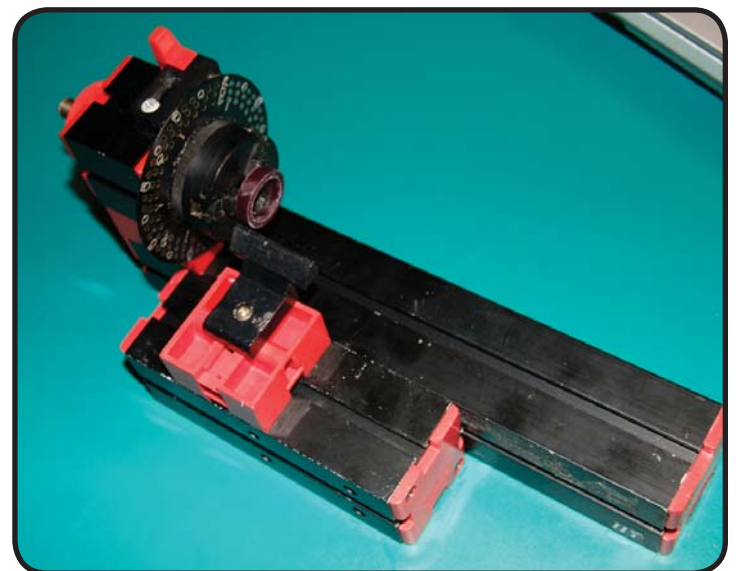
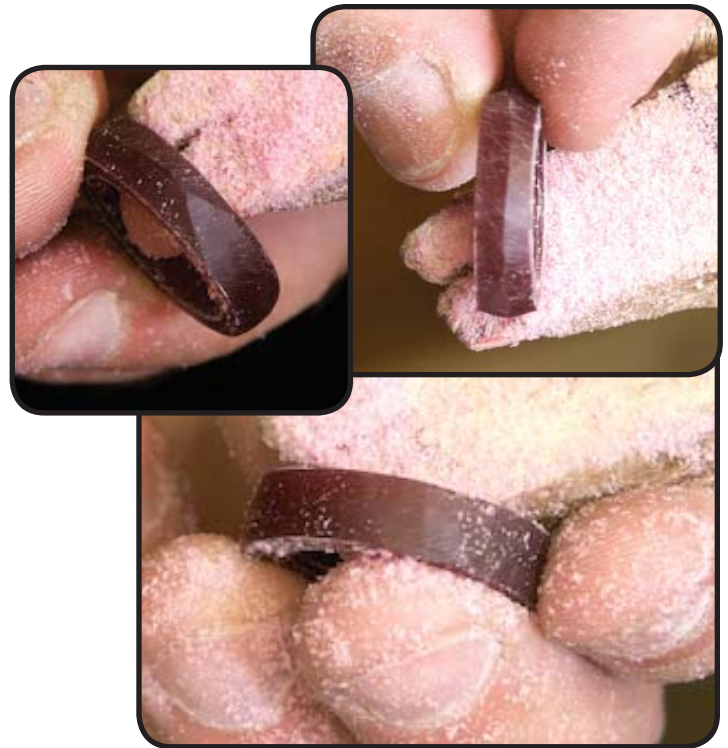
that you're filing away at that central ridge, and going straight across from one 'outside' line, over to the one on the other face. The reason for taking off the corners first is so that you can see where the line on the other side is: just file down until the bevel on the far side is gone. Once you get close, it's probably best to run the file along the face of the ring; as though you were trying to file a rotating tire. The end goal is a ring with a flat, even outer face, 3-4mm from the central hole.

STEP SIX:

Cheat. This is the step where we mark 16 evenly spaced lines around the outer face of the ring. There are various geometric formulae that we could use to do this, and outside of class, that's what you'll have to do. This class being titled 'wax casting' not 'advanced practical geometry', I have a tool that we can use to cheat: a small lathe with an indexing head. It has a chuck that can hold onto your ring, and a steel disk with evenly spaced holes already pre measured and drilled into it, thus skipping all the math and measuring.

To use it, place your ring onto the chuck. Make sure the pin that engages the ring is through a hole. Twist the outer face of the chuck clockwise to expand the jaws until they grip your ring tightly enough so that it won't slip easily, but not so tight that it breaks your ring. If the ring starts to go triangular, ease off.

Look at the indexing plate. It's the black steel ring behind the chuck body, with all the holes in it. Note that the outermost ring has many holes. 16 of them have paint around them, and one set of those holes has a stripe of silver paint that crosses all three rings of holes. That's your 'start' hole. Gently pull the stop pin back, and rotate the chuck until the pin fits into the hole with the stripe of silver paint. Let go of the pin so that it seats itself in the hole. Don't snap it in, ease it in gently. You will see a small black plastic rest bar across the side of your ring. Use the point of an Exacto knife to scribe a line along this bar. This will give you a line straight across the outside of your ring. If the rest is farther than 3mm from the face of the ring, slide it in. If it's banging into the ring, slide it out. The goal is a simple scribed line, not a deep gouge, so one quick stroke with the exacto is all that's needed. After you've scribed the line, pull the stop pin back, rotate the chuck until the pin lines up with the next painted hole, and reseat the pin. Scribe another line. Lather, rinse, and repeat until you come



around again to the striped hole. Once you get back to the striped hole, you're done, remove your ring, and give the lathe to the next person.

STEP SEVEN:

Connect the dots. The lathe will give you 16 evenly spaced lines across the outside of your ring. Use the flexible yellow ruler from your toolkit to connect the bottom of one line to the top of the line next to it. Go from that top, down to the bottom of the next space further around the ring. Continue around the ring until you come back to your starting point. The goal is a series of "V" shapes, not "X" shapes. No diagonal line should cross another. If you get lines crossing, you've skipped a space somewhere. Remember to pounce so you can see what you're doing.

STEP EIGHT:

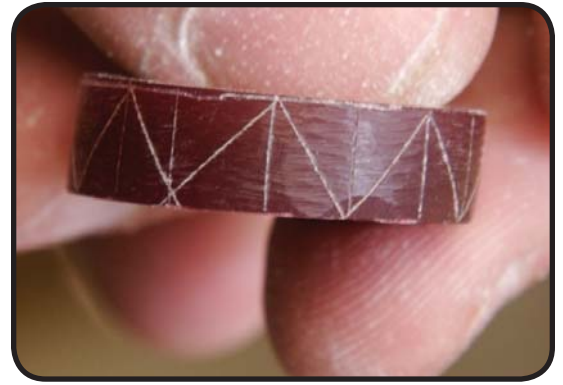
Carve the guide lines. Each table has two sets of engraving tools. In each kit, there are 2 "knife" engraving tools. They're marked with a "K" on the handle. Find one of them.

Engraving tools are held in the hand such that the mushroom shaped handle is cradled in the palm of the hand, while the blade sticks out between the thumb and first finger.

Use the knife graver to carve a straight line along the lines marked out by the lathe. Start at the end of the line where two diagonals meet. Carve away from that "V" until you run off the edge of the ring. Carve down on the outside (away from the "V") side until your groove reaches the 1mm ring you scribed on the sidewalls of your ring earlier. The goal is to have a deep trench that starts at the surface in the point of the "V", and runs diagonally down through the body of the ring until it exits the other side, at the 1mm ring. Since the "V"s alternate directions, so too will your guide trenches.

STEP NINE:

Carve the zig-zags. There are 4 flat gravers in each graver kit. They're marked F42 or F45. It doesn't matter which you use. Using one of the flat gravers, start at the point of a "V". Cut across to the other side, following the guide trench, while holding the graver at a slight angle. The idea is to have the corner of the graver that's closer to the guide trench a little lower than the outer edge. Cut more on the side away from the "V". The goal is to end up with



a flat triangular cutout. Once the first side is done, switch directions, and cut the other side of the “V”. Once both sides are done, the “V” area should look like a broad valley made of two flat triangular areas. The idea behind the guide trenches was to give you a pre-established center line to act as a guide to make sure the center line of the valley stayed centered and straight. The deepest point of the valley should just touch the scribed ring that is 1mm out from the finger hole, while the top of the valley should be at the point of the “V”, at the surface of the other side of the ring.

If you have trouble getting the triangular valley faces flat, you can use one of the flat needle files from the red wax needle file kits. Be sure to watch out for teeth on the sides of the files. Those side teeth can gouge out the opposite side of the valley if you’re not very careful. I’d recommend using your thumb as a guide to prevent the side teeth from hitting the other wall.

Once you have one valley done, repeat 7 more times around the ring. Then we sprue, cast and clean. Fortunately, that’s the quick part.

