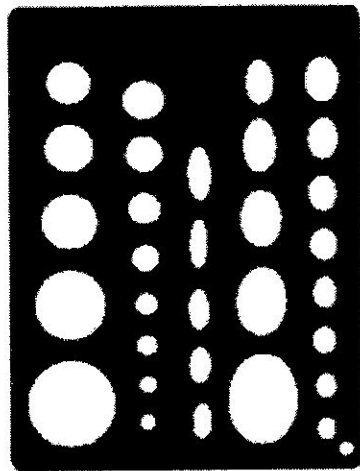


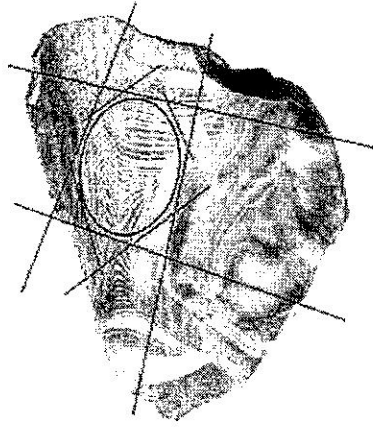
PGMC – Steps for grinding and polishing a Cabochon

1. Select your slab.
 - a. Slabs vary in thickness with thin $\frac{1}{8}$ inch or 3-4 mm, average $\frac{1}{4}$ inch or 5-6 mm and thick $\frac{1}{2}$ or 7-10 mm. The thinner or thicker your slab is will alter your approach to the cab. Thin slabs leave a potential flat middle which is sometimes difficult to polish, a thick slab can leave a high domed cab or the need to waste a lot of material.
2. Check for fissures in the slab, you might even consider palming the slab and slapping it on a table top.
 - a. Better to break it now than when you have worked on a cab for 3 hours. If you know the material is fragile this is the time to consider stabilizing it.
3. Choose your pattern and part of the slab and draw your outline
 - a. A calibrated cab is made to an exact size that can be used for purchased settings. If that is your goal try to draw your cab outline on both sides of your material. There are duplex pattern sheets available to accomplish that.



4. Trim out your outline from the slab with the 10 inch blade trim saws.
 - a. Sawing can only be done in straight lines so strategize your removal process to preserve as much of the original slab material as possible.
 - b. You will saw out the cab shape to $\frac{1}{8}$ inch or 3-4 mm of your drawn line.

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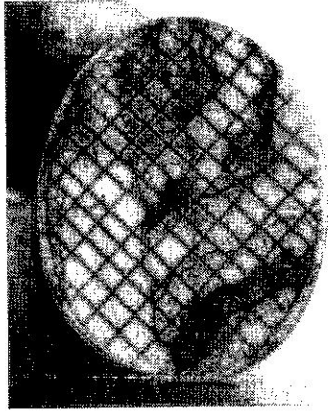
Saw Lines

5. Use the 80 grit wheel to even out the outline of the trimmed cab. Again preserve your 3-4 mm extra margin
6. Check your cab for good and not so good side and mark your cab front and back.
7. Now apply a very slight bevel with the 80/100 diamond wheel to the bottom edge of the back side of the cab to help prevent chipping.
8. Mark your girdle or beltline. Girdle or beltline is the flat area on the lower side of your cab that the setting bezel will nestle up to.
 - a. Girdle line is positioned at $\frac{1}{3}$ from the bottom of the cab.
 - b. Mark your girdle line by placing the cab on a table, bottom side down, use a ball point pen and move the cab around keeping the pen in the same position.
 - c. Depending on the depth of the slab you will have to adjust the height of the pen or the cab. An appropriate amount of playing cards helps to accomplish this



- d.
9. Mark the top of the cab with a checkered pattern with a sharpie marker – thin is best.
 - a. The checkered pattern provides a visible pattern to check for evenness as your grinding around the cab

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10. Place your dop stick on the back of your cab.

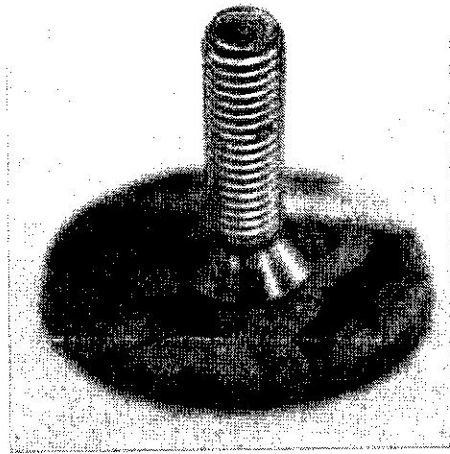
a. Wax method

1. Make sure your stone is clean and dry.
2. warm your stone by placing it on top of the wax heater.
3. When the cab is sufficiently warmed, place the dop stick into the wax and spin it around to pick up a gather of wax and then push it down on the back side of the cab. With the wax still liquid, WET your fingers and blend the wax from the dop stick down to the surface of the cab making a nice fillet. This feathering creates a supporting platform and insures a secure bond between cab and dop stick.
4. The cab and dop stick are returned to the heater for a few more minutes, giving the wax time to flow and bond. Then the assembly is removed and allowed to cool to room temperature.

b. Cyanoacrylate glue option for dopping

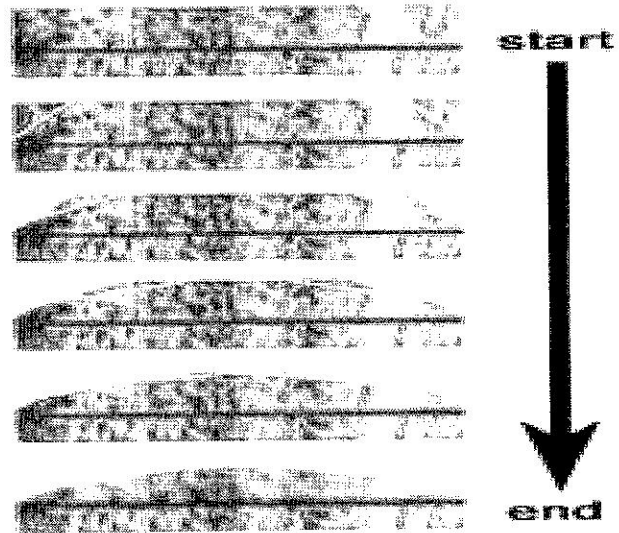
1. Clean back of cab, mark center, put a drop of Cyanoacrylate glue (crazy glue), and place a flat topped screw and then spray with acceraltor to cure the glue.
2. To remove the screw after the cab is completed your will need to heat the screw with a torch and the glue will loosen and the cab will fall off. Acetone soaking will also loosen screw.

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11. Begin with your coarsest wheel. If you are working with something soft, like opal or turquoise, or something small, begin with one of the smoother wheels. If it cuts too slowly, you can always go to a coarser one, but caution dictates that you start gently. Bring your machine up to speed and get your chosen wheel thoroughly wet before starting to cut. The water serves two important purposes. It acts as a lubricant, keeping the friction and heat down. It also carries away the swarf (the cutting debris), which prevents the wheel from clogging up. When grinding, it is important to use the lower quarter of the wheel - From 3 o'clock to 4 o'clock position only

12. Now to start your cab. With the cab back toward you hold the cab about 45° to the wheel, keep the girdle line in view at all time and grind an angle to the beltline / girdle. Move the cab from **right to left not up and down**. Make a smooth sweeping action as you move the cab around its circumference. Do not grind past the girdle line, **just to it**. **Do not grind in the middle of the cab with the coarse wheel.**

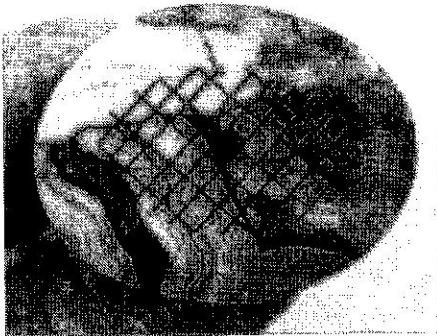
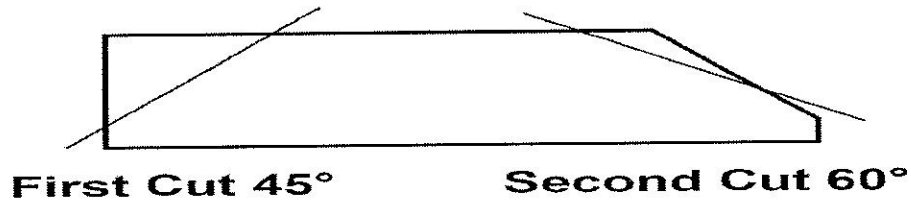


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First cut at 45 degrees

13. Now increase the angle (so that your dop stick is closer to the vertical) and repeat the process, grinding with smooth right to left motion as you move the cab around its circumference. Each of these passes will decrease your checkered pattern on the front side of your cab so check your pattern for regularity.



Cab after second cut at 60 degrees

14. Now that you have formed your bevel cuts it is time to dome your cab. First move to the 220 or 280 soft wheel. The 280 grit soft wheel is abrasive enough that it can be used to do some of the fine shaping and smoothing, especially with softer materials. The rubber drum compresses and conforms to the face of the cab as pressure is applied against it. With the cab held in only one plane move the cab in one direction - up and down to the middle and back. Go to the girdle line and then to the middle. Do not go over the middle. When one side is done, change the plane 90 degrees to the other parallel side. Again - up and down to the middle and back. Now change to the 3rd plane, same up down to the middle and back. Now the 4th plane.
15. Wash and dry your cab completely and check for uniform symmetric dome and the blending of the coarse grind lines into the smoother grind lines of the 280 wheel. Look at the stone from both ends and both sides. The curvature should be even in every direction and all the way to the

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center. You should make this inspection at every step, but especially in the first, coarsest stage. Any irregularities are easier to correct now than later with the finer grits. If there are still coarse lines present or the symmetry is not consistent then repeat the above process on the 280 grit wheels.

16. Once you are satisfied with the shape of your gem, it is time to start sanding out the coarse scratches. If you are using diamond wheels, this will be in a series of steps. Typically, you would use a combination like 280, 600, and 1200. Inspect your gem after each step. Look for proper curvature, as you did before. Also, check to make sure you have removed all the coarse scratches from the previous step. This is very important. If you don't get them all out before moving on to the next step, you will have to either back up and do it again, or settle for a low quality finish.
17. The gem needs to be clean and dry after each wheel for you to see the progress or the problems. A hair dryer can help with this step.

Polishing

Principle in Polishing – one buffing wheel to one polish. Never mix polish powder or polish stick on your wheel or buff. Marry your wheels with your polish type and keep them married.

A vertical domed rotary polisher with leather, suede, felt or sometimes wood can be used or a gauze buff wheel can be used.

For leather covered vertical domed wheel should spray the wheel with water till the polishing powder present on the wheel rises slightly on the edge of your cab as you apply it to the surface. Only use the wheel from the 8-10 o'clock position. As the pad dries out, the cab starts to get draggy on the surface and it is at this point that the best polishing action seems to occur. Heat from friction can build up quickly during polishing, and it's important to let the stone cool frequently so that so much heat is not built up that the dop wax softens and loses its bond to the cab. You should rarely need to apply more polishing powder to the leather.

Other polishing powders

Tin oxide can give a better polish on some materials than cerium oxide. Remember you must use a dedicated wheel for a second polishing compound.

Aluminum oxide on suede, soft side out is a versatile polishing method available for a high polish on more materials than any other method.

Quartz responds best to cerium oxide, which does well for opal too. You have to be very careful about heat buildup with opal. Stones get hot quickly while polishing and heat can destroy opal.

Jade, on the other hand, needs a lot of heat and friction to polish. Use chromium oxide on leather or felt.

Diamond can be used on leather, shaped hardwoods like hard rock maple or pink ivory or specially made pads (Crystallite).

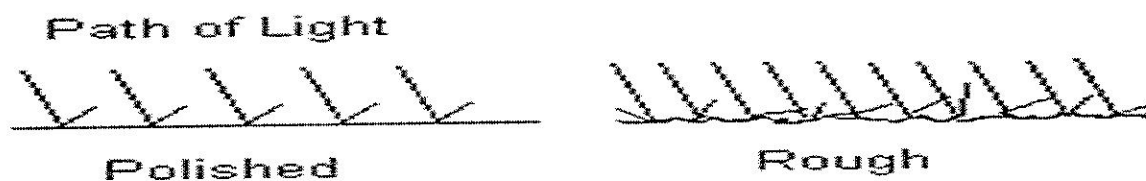
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Judging Your Work

When examining a cabochon always use a magnifier, opivisor or magnifying glasses. Begin by judging the polish. Look for any scratches or pitting that will reduce the amount of light reflected from the surface. Polish in pits can be cleaned with a toothbrush and detergent.

The next thing to look for is how even the contour is. A cabochon should have an even curvature to its surface. Look at the cab from both ends and both sides. The shape (the curvature), should be a mirror image from side to side. No area should be thicker than its opposite and there should be no bulging.

Light reflection to assess polish and curvature. The path of light will not be smooth over an improperly polished surface or an irregular shaped dome. Hold the gem so light reflects off its surface. Move the gem so the light travels across the top. If the surface is properly cut, you will see the band of reflected light glide evenly over its surface. The band of light will begin to snake if there are any irregularities.



The very top of the gem is where you are most likely to see a problem. Often a small area will be somewhat flattish. This is hard to see when viewing from the side, but obvious as light passes over it. However, if you look closely, that area probably doesn't have as good a polish either.

REFERENCES

Some wording and pictures copied from the following sites

Cabochon Making 101 - Part II Cabbing with Tucson's Old Pueblo Lapidary Club

International Gem Society - Fundamentals of Lapidary Part 4, Cabochon Cutting

California Federation of Mineralogical Societies (CFMS) Cabochon instructor Tom Burchard