Cutting Australian Boulder Opal

by Eugene McDevitt

Intermediate lapidary project.

Part 1: Selecting & preparing rough, exposing opal.

Part 2: Dopping, Cutting, & Finishing

Australian (Queensland) boulder opal is a captivating gemstone. As the popularity of boulder opal has grown, so has the interest in cutting it. It is true that some boulder opals can be quite challenging to cut, but if you are able to cut other gemstones you will be able to put your skills to good use here.

STEP 1. Selecting Rough

Buying boulder opal has its own special concerns. Like any rough, the more you know, the better. I do not make any promises, but I will make a few suggestions.

Ask dealers for suggestions for finding inexpensive rough that will be relatively easy to cut. Make sure that the ironstone around the opal is fairly sturdy. Beware of the deals that sound too good to be true. Buy fairly low grade material to start with. You might not end up with a gorgeous stone right away, but you will improve your technical skill enough that, maybe, you will be able to cut that beautiful stone in that next parcel of rough.

TOOLBOX

- **Australian boulder opal rough**
- **Dop sticks**
- **Dop wax or strong glue**
- **Trim saw with thin blade (rim thickness approx. 0.02")**
- **Diamond grinding wheels, 80-, 220-, 600-, 1200-, and 3000-grits**
- **Cutting equipment**
- **Rough leather polishing disk**
- **Tin oxide polish**
- **Lamp with 100-watt bulb**
- **Safety glasses**
- **Dust mask**
- **Old work clothes**

For information on supplies, please see the *Annual Buyers' Directory*.

STEP 2.

Look for rough with a layer of opal that is as flat and consistently shaped as possible. Look at the grain and pattern of ironstone to give you clues about the direction in which the seam will run. When opal occurs in ironstone that shows fairly flat, straight parallel lines in the matrix, there is a good chance that the opal will follow these lines. If the ironstone displays wavy lines, the opal will probably be rather wavy.

Look for cracks. Avoid rough that has been soaking in oil or glycerin, both of which hide cracks. If the rough is wet, let it dry while you are talking to the dealer, then look for flaws. Some pieces of rough may be partially faced; that is, the ironstone has been ground down to expose the opal layer. This can sometimes give you a better idea of what you are buying and save you some work, but ask yourself why the dealer is selling this and not cutting it. Avoid faced material that has deep gashes in the opal layer.

STEP 3. Preparing the rough

Put on old clothes. You'll be splashing around quite a bit of brown mud, which stains. If necessary, saw away the excess ironstone so that you can manage the remaining piece of rough with the trim saw.

Look at whatever line of opal is visible and at the pattern in the grain of the ironstone. Try to estimate the direction in which seam will run. Using a combination of the trim saw and an 80- or 220-grit wheel, expose the edges of the line of color. Try not to get too close to the line of opal. The seam of opal can make some unexpected turns, which you can ruin with the saw blade.

STEP 4.

Go back and forth between the wheels, cleaning off the stone often, and looking for signs of opal. As soon as you get one, stop and turn the rough to find other edges of the opal. Try to make sure the 80-grit wheel does not touch the opal - it can be very damaging. When you have found the edges, look carefully at the shape of the line and the nature of the ironstone on either side of the line to determine how to orient the stone.

STEP 5. Orienting the opal.

Decide which side is going to become the top. Base your decision on the shape of the seam of the opal, and the coloring, strength, and thickness of the surrounding material.

If the line of opal is curved, it will usually be easier to cut if the top of the stone is the convex (outward curving) and the bottom of the stone is the concave (inward curving) side.

Ideally, the material that is immediately below the line of opal should be as dark as possible. This dark background will make the colors of the opal stand out. Occasionally, there will be a thin layer of black potch between the line of opal and ironstone. Try to cut the stone so that this black layer will provide the background for your stone. This type of stone is called a boulder black or black boulder opal, and can be quite brilliant.

It is also important that the boulder opal has a solid base. If the ironstone on one side of opal is too thin, it will not provide the strength that is necessary to be the base of your stone.

STEP 6. Exposing the opal.

I start with the 80- or 220-grit wheel to remove the ironstone that is covering the top of the opal. I only use the 80-grit wheel if the ironstone layer is more than approximately 4mm thick. When using the 80-grit wheel, be careful and use light pressure. It can cause chipping or make deep grooves.

When removing the ironstone layer, be careful and use water. Repeatedly stop and wipe off the surface of the stone to check for exposed opal. The seam of opal can take surprising turns or bulge in unexpected areas.

STEP 7.

As you get closer to where you think the opal is, use the 220- and 280-grit wheel. Try not to come into contact with the opal when using the 220-grit wheel, as it can quicly remove quite a bit of colorful material or introduce serious gouges. Use increasingly lighter pressure with the 220-grit wheel as you get closer to the opal.

Continue to remove ironstone until you just barely expose opal in one area of the surface, or at least until you are very close to the opal layer. Sometimes, just before you reach the opal, the coloring of the ironstone will change.

STEP 8.

Switch to the 600-grit wheel to try to expose some of the opal. At this stage you are not trying to remove all of the ironstone from the surface. I usually go back and forth between the 600-grit wheel, using medium pressure, and the 280-grit wheel, using light pressure. Once you determine how the layer of opal runs, stop working on the top.

When you have a good idea of the shape of the opal, use light pressure on the 220-grit wheel or medium pressure on the 280-grit wheel to shape or remove any irregularities from the edge of the stone. This shape will not necessarily be the final shape of the stone, but it will probably make the stone easier to work once it is on a dop stick.

Next time we will dop, cut, and polish the opal.

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Part 2: Dopping, Cutting, & Finishing

At this point, your rough should be prepared and your opal exposed. I will not be discussing using a flexible-shaft machine. While some boulder opal, particularly high-grade material, requires a machine, in many cases very attractive stones can be successfully cut using diamond wheels.

STEP 1. Dopping the Opal

Using the 220-grit wheel (or gently using the 80-grit wheel) prepare the stone for dopping by flattening its back. Reduce the thickness of the back of the stone so that it is just slightly thicker than what you think would be appropriate for the finished stone. If necessary, you can remove more later. Gently place the back of the stone against the 80- or 220-grit wheel while rotating it in your fingers.

Remember, you are flattening the back -- not cabbing it. The ironstone backs of most of my stones are probably no more than 5mm thick, unless the stone is quite large or has an unusual shape. Make sure that the back is thick enough to support your opal.

STEP 2.

The stone is now ready to be dopped. The bottom of the stone should be clean and dry. I use one or two drops of glue to attach the dop sticks. Preheat the opal by resting it on the edge of the dop pot for no more than 30 seconds. After polishing, soak the opal in warm water to remove it from its dop stick. Apply light pressure to pop the opal off its dop stick after about 30 minutes. It may or may not come off -- you may need to soak it overnight.

If the back of the opal is porous, use dop wax instead of the glue, in which case you should remove the opals from their dop sticks by placing them in an open bowl, then place the bowl in the freezer for 5 to 10 minutes. Remove the bowl from the freezer and carefully place the blade of a knife along the line between the bottom of the stone and the dop wax. Apply gentle pressure, and the stone should pop off rather easily.

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STEP 3. Cutting the opal.

If you are using a machine that recirculates its water (i.e., the water is sprayed up onto the wheels, dripped down into a pan, then pumped from that pan and sprayed up onto the wheels again), change the water and clean the pans frequently. Chunks of ironstone and opal that were removed with the 80- and 220- grit wheels can splash onto the 280- grit wheel and cause scratches. The same is true with the set of finer wheels. I usually prepare several stones using the 80- and 220- grit wheels and then change the water. Also, I usually cut several stones before I move the stones on to the 1200-grit wheel.

STEP 4.

Once the glue has dried or the wax has cooled, check your opal for scratches. Think about its natural shape (which might not be the shape you want it to be). Use the 280-grit wheel with light pressure to remove serious scratches from the edges and the top, remembering to keep the stone moving to avoid flat spots and scratches. Stop frequently and wipe your stone clean to check progress. Look at the surface of the opal, not into the opal. After doing this, use the 600-grit wheel to remove the scratches caused by the 280-grit wheel and to expose more of the opal.

As I try to expose more of the opal, I often find stubborn islands of ironstone on the surface and mountains of ironstone that rise up through the opal layer to the surface. This is the nature of boulder opal. Be careful when trying to get rid of those islands -- some run deeper than you think and to remove them completely would severely distort the shape of your stone. Don't worry; these unique patterns add personality to your stone.

STEP 5.

At this point you need to make some important decisions. Look at the overall appearance of your stone, both the opal and the ironstone. Often the combination can be quite beautiful. If you are not satisfied, most of the tricky work is over. If not, or if you think that there is more treasure lurking beneath the ironstone, continue removing ironstone with the 600-grit wheel, remembering to keep the stone moving. The 600-grit wheel can still remove opal and create flat spots and scratches.

You are doing several things during this stage of cutting. You are removing scratches fromearlier stages, removing ironstone from the surface, and making the surface and shape of the stone more pleasing to the eye. Look at your stone and see what it shows you. You might need to go back to the 280-grit wheel and change the shape. Once you have removed the large scratches and are satisfied with the look, move to the 1200-grit wheel.

STEP 6.

The 1200-grit wheel will remove almost all visible scratches. It will not do much to change the shape of your stone, but it can improve its appearance. Use moderate pressure and keep the stone moving. Make sure to cover the entire stone, including the sides and areas of ironstone. Stop frequently and wipe your stone clean to check your progress and make sure that the scratches are disappearing, although the effects of the 1200-grit wheel are not immediately obvious as those of the 280- or 600-grit wheels. The 1200-wheel is also useful to round any sharp edges. Once you have removed the visible scratches, move to the 3000-grit wheel, or if you do not have a 3000-grit wheel, start to polish your stone.

If you machine has a 14,000-grit wheel, I strongly suggest that you not use it to cut boulder opal. This wheel often introduces scratches.

STEP 7. Polishing

To polish, use tin oxide on a clean foam-backed rough leather pad. Lightly wet it with water from a spray bottle. With the machine running and the pad spinning, use a brush to apply a well-stirred mixture of tin oxide and water onto the damp pad. The tin oxide and water mixture is thin enough so that it does not clump, and has the consisitency of thin gravy.

STEP 8.

Select a dopped opal to be polished and either gently touch it to the polishing pad so that it picks up some polish or just touch it with the brush used to apply the polish and water mixture.

Using light to moderate pressure, polish the opal on the pad. Keep the opal moving by rotating the dop stick between your fingers and by changing the angle between the opal and the pad. Check your progress frequently by gently wiping the surface of the opal. Remember to polish the edges of the stone as well. Keep a firm hold on your stone and do not apply too much pressure. Do not let the opal get too hot. Sometimes the rough leather pad can grab your stone and yank it out of your hands, particularly as the pad dries out or if your stone has an uneven surface or sharp edges.

STEP 9.

It takes practice to determine when you are finished polishing an opal. You want to remove all the scratches as well as make the opal as bright as possible. Keep the pad wet and reapply the polish and water mixture when needed. If the pad gets too dry, it can scratch the opal or cause it to overheat.

If your opal has much ironstone on the surface or if the surface is particularly porous, be careful. Often the leather pad will catch on the ironstone and either you will feel a tug on the stone or the pad will tear out small pieces of the ironstone that could damage or scratch your opal.

STEP 10.

If you are polishing a matrix opal, follow a similar procedure. Often the opal in such stones will polish normally, but the ironstone matrix will be dull. A useful technique is to polish the opal as described, then let the pad dry slightly. Apply more pressure while you keep the stone moving, so that you can feel the stone get warm. Remember, you are polishing the matrix, not the opal areas of your stone. Be careful -- gently heating the stone on your polishing pad can improve the finish of the matrix, but too much heat can damage the opal. This technique requires a bit of practice, but the results can be worth it.

STEP 11. Finishing the back.

Once you are finsihed polishing, remove the stone from its dop stick. Use light to medium pressure on the 220- or 280- grit wheel (or the 600-grit wheel for more precious, more fragile, or smaller stones) to remove any remnant of the dopping material. Keep the stone flat against the wheel, but rotate it slightly so that there will not be any deep scratches on the back. At this point, decide what you would like the final thickness of the back of the stone to be. I usually need to remove a little ironstone to reduce the thickness. Once you have reached the appropriate thickness, use the 220- or 280-grit (or 600) wheel to bevel the back edge of the stone, which will reduce chipping when setting.

STEP 12.

Depending on the appearance of the back and your taste, you can either consider your opal finished, or achieve a more finished appearance by working the back through the remaining series of finer wheels. I usually work the backs of my stones through the 1200- or 3000-grit wheels, sometimes going so far as to polish the backs.

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