

SPHERE MAKING

With Jimmy Peterson





Origin of the Corundum Sphere Machine



Background

- The basics of how to make spheres is from a book in the Searcher's Library: Sinkankas, John. 2014. **Gem Cutting : A Lapidary's Manual** Second ed. Place of publication not identified: Churchill & Dunn. Sphere making is just one chapter in the book.



Belt Buckles, Bolos, Slabs +



Potential Spheres: What to Look For



Spheres bring the inside to the outside, not much control of what parts make it to the surface.

- Color: The color should be throughout the sphere area.
- Size: Imagine the sphere inside the rock. There must be enough material. Rocks with acute angles are bad.
- Solidity: Dense solid rocks without cracks or defects that might break apart during grinding or polishing.

Where to Get Rocks

- Buy from Quartzite or Sales
- Buy from E-Bay
- Buy from another Rockhound
- Buy from Estates
- But it's more fun to find your own
 - Factor in the cost of gas and your time





Rock Shapes

The shape of the rock is important. It has to yield a mass that can become a sphere. In this picture is a rock that seems right at about 6-7" tall and 13" long.....

But turn it over and you can see the deep step, the acute angle, that makes it unsuitable for a sphere.

But the rock is still good for other lapidary uses!



The Rock Presents Differently Depending on Viewpoint

This rock looks nice and meaty from this view...



But turn it just a bit and the mass disappears to a point.

Dealing with Vugs (openings)



Vugs can be used in spheres as long as the polishing cup can span the opening and there's enough surface mass for the sphere.

- With proper prep the vug opening will be on the sphere's surface showing the inside to advantage.
- The polishing slurry could fill the vug during processing and must be removed or kept out by pre-filling with another medium.

Cutting & Preforming

To make the rock as round as possible before the polishing process is the goal. This process will systematically remove material by saw and afterwards, by grinder.

STEP 1: The rock is made into a cube with equal sized sides that are slightly larger than the final sphere. 6 cuts.

STEP 2: The cube is uniformly marked along each edge to outline where the corners will be removed on its way to becoming spherical.

STEP 3: Using a JIG to hold the rock, the corners are all removed with 12 more cuts.

STEP 4: Then off to the grinder.



This is the end result from sawing



Edge Flaws

Some edge flaws can spoil the sphere while others can be accommodated.

This one will NOT work...



This one WILL...



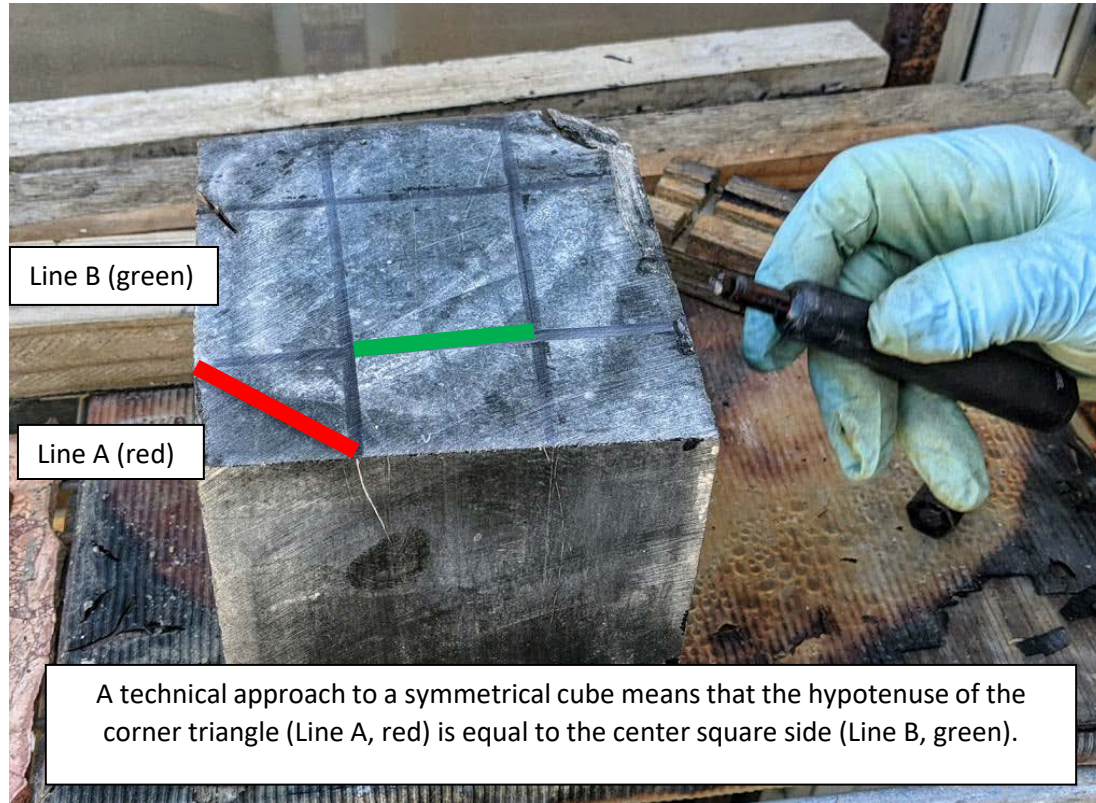
Marking the Corners

Any common marking stick will simplify the marking of all the corners.



Cuts must be straight with subsequent cuts perpendicular to the first cut.

Marked Cube Ready to Cut



This method uses a saw to remove waste. If done properly, the corners are clipped on each side and will create similar sized square faces or facets. There will be the original 6 faces from the cube plus facets on all corner areas. 18 total. Sort of a 3D octagon.

It's important to do the marking and cutting evenly to get the most spherical shape.

All Cut Lines on Cube

The grid should define a center square that is somewhat larger than the others, like the previous slide, to make similar sized facets (this sample is too evenly spaced).

The markings are just a *ROUGH* guide for saw cutting. In this case, saw to the outside of the lines.



The Magic Jig: Wood, 45° and 90°





45° Angle





Cutting a 45° angle





Using Jig Setup for Cutting Facets



Cut Off ALL the Corners



**After all the
saw-work.**

**Not done
yet!**





The Grinding Station



Steps to Grinding the Corners

Each of the sharp corners need to be manually cut off and rounded into a shape that can be managed by the Sphere Machine.



The Angle Grinder and Grinding Station





Remove High Spots

- After the rough grinding to remove the corners, it gets difficult to know what's been done and what needs doing.
- Spraying the rock black before grinding will show up the new grind marks.
- On the sphere machine, use course 46-70 combination grit; run for 1-2 minutes.
- High spots will be clear of black paint
- Circle high spots with a marker and go back to the grinding station.
- Repeat as necessary (2-3 times).





The Corundum Machine

- Homemade, 100 years old
- From a Searchers equipment sale
- This machine uses cups that rotate the sphere in random patterns.
- THERE IS NO ABRASIVE SURFACE ON THE INDIVIDUAL CUPS.





Corundum Grinding Cups

- The cups last a long time; they are made out of cast iron.
- The largest is 4 inches
- They screw into the mandrel in a way to tighten in use; on this machine they are left-handed threads, but it depends on the motors' rotation.
- Different machines may turn in different directions depending on the wiring polarity of the motor, and the cup mounting thread must match.
- The cup must also match the desired sphere size; if it is too big it will be less efficient and take longer, too small and it will wear away the edges of the cup very fast,



The Grinding Cups





Grit Slurry

- Since the cups have no abrasive surface, every 50-100 turns they get a spoonful of the slurry by holding it to the bottom of the sphere or brushing it on the top of the sphere.
- This machine also has a water drip to keep the grinding/polishing surfaces working smoothly and moving the grit evenly.
- Keep adding grit as needed.
- You must babysit the machine or else nothing happens.
- There is a rubber band pulling the grinding cups together on the sphere.
- Grits are like a Genie; there are 4-5 stages: 100, 600, 1200, then a polish such as cerium oxide or tin oxide.



Changing Grits

- Take the machine apart and wash all of the grit off.
- Change the cups every 4 to 4-1/2 hours on the corundum machine.

Polishing Cups get covered in leather



Video of the Corundum Sphere Machine

Corundum Sphere Machine in Action

<https://youtu.be/nE3EEzIac5k>

The Diamond Machine





Diamond Machine

- Covington machine from Larry Richey's estate
- Diamond is embedded in the surface of the cups, it needs no added grit.
- Cups are expensive, about \$375 for 3 cups.
- The cups are plastic and have grit: 40, 100, 200, 600, 1100.
- Grit size is shown by the color on the cups.
- If the sphere needs more polish, finish the sphere on the corundum machine.
- Cups are changed every 1 to 1-½ hours.
- Grind until the scratches disappears.
 - Sometimes you must go back a step.

Close-up of a Diamond Grinding Cup



Selection of Polishing Cups



Grit Dispenser

- This machine has a grit dispenser if you want to switch to cast iron cups.
- If the corundum cups were threaded the correct way he could move them over and use them on the diamond machine.
- The machine also has a water drip.



Random Turning

- The machine is very well balanced.
- If you're not careful, it will grind a groove in the sphere.
- A bungee cord is used to apply pressure to make the sphere turn randomly.



Bungee Cord



Video of the Diamond Machine

Diamond Sphere Making Machine in Action

https://youtu.be/E_n1zM8F4W4

When is the Sphere Done?



- No scratches = done
- Look at the sphere in the sunlight
- Johnson's Paste Wax
- Obsidian is easily scratched; don't work on obsidian on a windy day – even the dust can cause scratches.



SAMPLES









Video of *Current* Favorite Sphere

Ballarat Marble Sphere

<https://youtu.be/y5Tsv6dTduk>







Some Sphere Thoughts

- Cracks
 - To get the grit out, scrub with a toothbrush and use water under pressure.
- If a chip breaks off, you must grind the rock down, just like a cabochon.
- It is possible to epoxy a break back on, but the crack will show.
- When you get done sawing a rock, you can see the cracks.



Sphere Making as a Hobby

- Now the hobby pays for itself.
- Spheres are sold at [Walter's Shop](#), on the internet and at the show.
- eBay site: [Spheres and Stone Creations](#)
- Solar panels for electricity help.





Advice for Beginners

- Buy a diamond sphere machine.
- Cost is about \$3,000.



Helpful Links

[Covington Engineering](#)

Sphere making machines and cups, templates, angle jigs

[Johnson Brothers Grit](#)

[Barranca Diamond](#)

[Harbor Freight Angle Grinding Wheels](#)

[Makita 4" PW5001C Electronic Wet Stone Polisher](#)