

*Port Moody
Rock and Gem Club*

*Workshop Rules & Guidelines
Appendix B to the Club Bylaws*



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INTRODUCTION

To ensure safety and proper use of the equipment, all Club members using the workshop are asked to read this booklet before participating in our general lapidary workshop sessions.

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LAPIDARY WORKSHOP USAGE POLICY

A *Lapidary Workshop* shall be defined as a session in the club's space at Kyle Centre where Lapidary Equipment is being used. *Lapidary Equipment* shall include arbours, trim saws, slab saws, flat laps, and flexible shaft machines

GENERAL PROTOCOL

- **ALL MEMBERS MUST AGREE TO AND SIGN THE WORKSHOP WAIVER BEFORE USING THE Lapidary WORKSHOP. THROUGH SIGNING THE WAIVER THE MEMBER AGREES TO RELEASE, WAIVE, AND DISCHARGE PMRC, ITS AGENTS, VOLUNTEERS, AND/OR ITS EMPLOYEES, FROM ANY AND ALL LIABILITY TO THE MEMBER AND/OR THE MEMBER'S FAMILY, HEIRS, AND ASSIGNS, AS A RESULT OF ANY INJURY OR DEATH ARISING FROM WORKING IN THE LAPIDARY WORKSHOP, EVEN IF THE SAID INJURY WAS CAUSED BY THE PASSIVE OR ACTIVE NEGLIGENCE OF PMRC.** Our club has third party liability insurance through the Gem and Mineral Federation of Canada (GMFC), provided by AXA Pacific Insurance Company under Policy #1174482.
- Members in Good Standing who have signed the workshop waiver shall be permitted to participate in the Lapidary Workshops during designated hours. Members who have signed the waiver but are not in Good Standing are not permitted to access the workshop after September 30th until membership is renewed through submitting the appropriate fees to the Membership Chair. A member in Good Standing is one who has paid the appropriate membership dues.
- Non-Members (guests) shall be permitted to participate in two Lapidary Workshops during designated hours prior to being required to officially join the club and pay the applicable membership fee.
- Lapidary Workshop participants shall be required to sign the attendance book prior to using the Lapidary Equipment and pay the \$1.00 drop in fee. Honourary members are exempt from the drop in fee.
- Workshop Supervisors and Assistant Supervisors shall be in complete charge of the Lapidary Workshop and shall advise and direct the use of the Lapidary Equipment. The Supervisors shall have the right to refuse use of the Lapidary Workshop to a member as per Section 4 of the club bylaws.
- The Lapidary Equipment used during a Lapidary Workshop shall only be turned on once a Workshop Supervisor or Assistant Supervisor is present.
- All children under the age of 12 shall be required to be supervised by an adult family member at all times while using the Lapidary Equipment.
- Lapidary Workshop participants shall not excessively use the Lapidary Equipment for commercial purposes. While the club welcomes the sale of members' work at our annual show, the Lapidary Equipment is made available for personal and hobby use.
- Lapidary Equipment shall be cleaned after each Lapidary Workshop. All participants shall assist with cleaning.

- The Kyle Centre kitchen is out of bounds at all times.

GENERAL SAFETY

- Participants shall wear eye protection at all times when using the Lapidary Equipment. Safety goggles shall be made available for use.
- Participants shall tie back long hair ensuring it is kept at a safe distance from the Lapidary Equipment.
- Participants shall not wear open toed shoes or sandals in the Lapidary Workshop. Full covered shoes or runners only.
- Participants shall remove any large rings and any long necklaces before using the Lapidary Equipment.
- Participants shall not be under the influence of drugs, alcohol, or any other mind altering substance when using the Lapidary Equipment.
- Participants shall receive an orientation by a Supervisor or Assistant Supervisor on the proper and safe use of the Lapidary Equipment prior to its use. A booklet shall be made available discussing the proper usage of all Lapidary Equipment.
- The Lapidary Equipment shall not be used in conjunction with any of the following potentially toxic materials:
 - Shell
 - Bone
 - Antler
 - Malachite
 - Cinnabar
 - Any other known toxic material

AVAILABLE EQUIPMENT

Our workshop contains a variety of saws, grinders, and polishers used to create *cabochons* and other related lapidary projects. A cabochon (or “cab”) is a highly polished, convex-cut, unfaceted stone.

SLAB SAWS

Slab saws are used to cut rocks into slices or slabs. The resulting slabs can be polished as display specimens or used to create cabochons. Our workshop contains a 10 inch, 14 inch, and 18 inch slab saw. All non-honorary members are required to pay a fee of 15 cents per square inch for using the slabbing saws. Fees are payable to the workshop supervisor.

Rules

- Ensure the blade is touching the oil reserve. The oil should cover no less than 1/8” of the blade.
- Ensure the rock is not too large for the saw. A grid provided at each saw will illustrate the maximum size a rock can be to use the saw safely.
- Ensure the rock is securely fixed in the vice. The rock should not shift when moderately pulled or pushed.
- Once the rock is securely fastened in the vice, manually spin the blade. The blade should not make contact with the rock.
- Water glass can be used to glue smaller or oddly shaped stones to wooden blocks. This will help ensure a firm vice grip on the rock. Talk to a workshop supervisor for more information.
- Always obtain the permission and approval of a workshop supervisor before turning the saw on. The workshop supervisor will double-check the setup.

TRIM SAWS

Trim saws are used to cut slabs and other small rock. Most frequently, trim saws are used to cut away the excess rock around a cabochon design as marked on a slab using a template. Trim saws can also be used to manually slab up smaller stones. Our workshop contains several trim saws which use both mineral oil and water as cutting lubricant.

Rules

- Ensure sufficient lubricant is being applied to the blade. Water based trim saws need to be filled more frequently. If no water is splashing out and/or the saw is making a loud squealing noise, ask the workshop supervisor to assist with refilling it.
- Apply moderate pressure when cutting; take your time. Pushing too hard will strain the blade and cause unnecessary wear. If smoke appears the rock is being pushed too hard into the blade.
- If the rock does not fit under the blade guard it is too big for the trim saw.

GRINDING WHEELS

The workshop provides a full set of **diamond** based grinding and sanding wheels. These wheels are mounted on *arbors* and are used in sequence to shape, sand, and polish cabochons and other stones. When using the grinding wheels one works from the lowest grit to the highest, removing scratches, ridges and flat spots along the way.

Diamond Wheels

Diamond wheels are **finesse wheels** and should only be used to grind and polish cabochons and small stones.

Diamond wheels are generally always true, but they do slowly wear away with time. **Diamond wheels are costly** and should always be used carefully to maximize their lifespan. Always move the rock across the entire surface of the wheel to avoid wearing out the centre of the wheel prematurely.

An arbour utilizing silicon carbide belts is supplied for sanding larger rocks. As there is a limited supply of these silicon carbide belts you may be required to purchase your own belts for personal use.

Available Grits

Grinding

The following diamond grinding wheels (*galaxy wheels*) should be used to shape a stone. The courser (or lower) the grit, the faster the wheel will eat away at a rock. The choice of what grinding wheel to start with might depend on the hardness of the rock.

- 80 Grit
- 220 Grit

Sanding/Polishing

The following diamond sanding and polishing wheels (*nova wheels* and *sanding belts*) should be used to remove scratches and ridges and create a polish.

- 280 Grit (sanding)
- 600 Grit (sanding)
- 1,200 Grit (sanding/pre-polish)
- 3,000 Grit (polish)
- 14,000 Grit (fine polish)
- 50,000 Grit (very fine polish)

Rules

- Only members who have been authorized by the shop supervisor may use the grinding wheels. We require all members to have a one-on-one orientation with this equipment before using it. Ask the workshop supervisor for this orientation if not yet received.
- Only cabochons, small stones, and projects as approved by the supervisor may be worked on using the diamond wheels.
- Always ensure sufficient water is being provided to the wheel. Insufficient water will cause dust to form and wear the wheels more quickly. Always set up a splash pump and ensure the splash makes contact with the wheel at all times.
- Apply moderate pressure when using the 80 and 200 grit grinding wheels. Pushing too hard will wear away the wheels unnecessarily.
- Work across the entire wheel, providing equal wear to the grinding surface.

- Work no longer than **5 minutes** on the 600 grit sanding wheels. If the required result has not been reached, go back to the previous grit.
- Work no longer than **3 minutes** on the 1,200, 3,000, 14,000, or 50,000 grit sanding and polishing wheels. If the required result has not been reached, go back to the previous grit.
- Children under 12, using a grinding or sanding wheel, must be under the direct supervision of an adult family member at all times.

Buffing Wheels

Buffing wheels are flat disk wheels covered with leather or other hard material used to provide the final polish on a cabochon or stone. The workshop provides access to three buffing wheels, each making use of a different polishing compound. The buffing wheel to use depends on the rock being polished as some rocks polish better using certain compounds.

Polishing compound is applied to the wheel using a small brush, and then spread across the disk by applying water using a spray bottle. The compound only polishes when wet, so additional water must be sprayed on as the compound dries out to reactivate it. Only when the compound has been completely thrown from the wheel is more compound brushed on.

Cerium Oxide

This buffing wheel uses the cerium oxide polishing agent (brown in color) and usually provides a high polish on jaspers and agates.

Tin Oxide

This buffing wheel uses the tin oxide polishing agent (white in color) and provides a crisp polish on most stones. Obsidian tends to polish better using this wheel. Vinegar can be used in addition to water on this wheel, and is available in a separate spray bottle. Some stones will polish better using vinegar.

Rules

- Always work against the spin of the wheel in the lower left quadrant of the wheel.
- Do not use the edge of the buffing wheel to polish the insides of crosses or other angles or grooves. This will rip apart both the leather pad and the underlying rubber wheel.
- Be ***extremely careful*** when polishing rocks not fastened to a dop stick. The wheel can rip the rock out of one's hands and toss it across the room. When working on such stones, always press lightly and refrain from allowing the wheel to catch the edges of the rock.
- Be careful when polishing cabochons with corners or sharp edges. The wheel might catch and rip the rock out of one's hands, tearing it off the dipstick and potentially breaking it. Always point corners or edges downwards to avoid catching.
- Do not use vinegar on the cerium oxide wheel. This polishing compound reacts poorly to vinegar.

- Children under 12, using a buffing wheel, must be under the direct supervision of an adult family member at all times. Be aware that children often have difficulty buffing – to avoid a broken rock, consider stopping with a final polish on the 14,000 or 50,000 grit wheel until they are more experienced.

Tips

- Some rocks prefer a “dry” polish and others a “wet” polish. Try using the wheel with little water and then with lots of water. See what method works best on the stone.
- Polishing agent can become trapped in cavities or pits in your rock. This could cause unwanted brown or white blotches in your stone. If your rock does have pits or cavities, try using the diamond 14,000 or 50,000 grit as your final polish.
- Be aware that the buffing wheels will have a difficult time polishing completely flat surfaces. Usually, the middle of such surfaces will not polish properly. Try using the flat lap in such situations.
- Make sure there is sufficient polishing compound on the wheel. The compound will be “spun off” with time. However, too much compound will cause the rock to “grab” and fly off the wheel.

FLAT LAP

The 8-inch flat lap allows one to grind and polish a flat surface on a stone. The machine is equipped with several diamond disks; one moves from the coarsest disk to the finest disk to obtain a high gloss polish. While polishing, water is supplied to the disk through a *dripper*. Excess water is collected in a small *collector*. Disks are color coded to indicate the following grits:

- 80 (Steel)
- 180 (Steel)
- 220 (Steel)
- 325 (Brown)
- 600 (Red)
- 1,200 (Blue)
- 14,000 (White)

The flat lap uses a dial to control the speed at which it turns.

Rules

- Ensure an orientation on the flat lap has been provided by the workshop supervisor before using the machine.
- The 8-inch flat lap should only be used to grind and polish small stones. A surface larger than 2” x 2” is too large for this machine, and the large flat lap should be used instead. If unsure as to the suitability of a stone, ask a workshop supervisor.

- Ensure the edges of the surface being polished have been slightly rounded. This will prevent the disk from catching the stone and pulling it from your hands.
- Ensure sufficient water is being provided to the disk. If the disk becomes too dry it will wear improperly. More water is always better than too little.
- Ensure the dripper always has sufficient water and the collector does not overflow.
- Move the stone across the wheel to maximize the grinding surface. This will prevent the disk from wearing out in one area.
- As a precaution, avoid having others sit next to the flat lap while it is running.
- Wash your hands and stone off with water when moving to a finer grit. This will prevent contamination.
- When finished with a disk wash it off and allow it to dry (with exception to the 14,000 grit polishing disk).
- Ensure the disks are placed in their corresponding zip lock bags. This will help prevent grit contamination.

LARGE FLAT LAP

The 18-inch flat lap allows one to grind and polish a flat surface on a large stone. The machine is equipped with a single steel disk which is charged with a special lapping/grinding compound; one moves from the coarsest grinding compound to the finest polishing compound to obtain a high gloss polish. While grinding/polishing, water and compound are supplied to the disk by hand. Excess water is collected in a small *collector*. Tumbling compounds should not be used on the 18"-inch flat lap – lapping compounds are much finer grained than ordinary tumbling compounds and produce a scratch-free finish:

- coarse – to grind a relatively flat surface
- medium – to remove the largest scratches and true the flat surface
- fine – to pre-polish out all but the smallest of scratches
- polish – to provide a shiny, glossy surface

Rules

- Ensure an orientation on the large flat lap has been provided by the workshop supervisor before using the machine.
- The large flat lap should only be used to grind and polish stones that have been pre-ground or sawn to a roughly flat surface. The grinding process is quite slow on this machine, even when using the coarsest grit compound. If unsure as to the suitability of a stone, ask a workshop supervisor.
- Ensure sufficient water is being provided to the disk. If the disk becomes too dry the grinding or polishing action will be slowed dramatically.

- Move the stone across the wheel to maximize the grinding surface and speed up the cutting action.
- Wash your hands and stone off with water when moving to a finer compound. This will prevent contamination and the reintroduction of scratches.
- When finished with the flat lap wash off all compound and allow it to dry Lightly oil the steel disk with machine oil to prevent rusting before putting the lid on for storage.

Tips

- For large stones, an "X"-brace has been provided to hold the stone in place for hands-free grinding. Ask a workshop supervisor for instruction in using this support.

FLEXIBLE SHAFT MACHINE (FOREDOM)

The flexible shaft machine (or foredom) allows one to drill, grind, sand, carve, and buff by hand. It consists of a variable speed motor with a rheostat pedal that controls speed with foot pressure, and a flexible shaft connected to a handpiece that holds a variety of tools.

The club provides the basic flexible shaft machine and stand, but no accessories. **It is the responsibility of the user to provide accessories appropriate to the task being performed.** Always use accessories specifically designed for flexible shaft machines or Dremel machines – with shafts up to 1/8" diameter. When in doubt about the proper tool for the task and material being worked on, check with the workshop supervisor.

Rules

- Always wear safety glasses to avoid injury – regular eyeglasses do not provide sufficient protection. Avoid loose clothing or jewellery and tie back long hair to prevent entanglement with the rotating flexible shaft.
- Whenever drilling, always secure the work piece or item that you are working on in a vise or other work holding device. Holding an item in your hand while drilling can result in serious hand injury.
- Ensure sufficient water is being provided to the work being ground or carved. If the piece becomes too dry the grinding or carving action will be slowed dramatically and heat will build quickly.
- Never use or continue to use any accessory which appears to be damaged, loose, vibrating, or out of balance. Inspect each accessory for cracks or flaws before using it.
- Always insert the shank or arbour of an accessory or mandrel into the collet of the handpiece as far as possible in order to provide proper support.
- Be careful not to bend the flexible shaft too much at either the handpiece or motor shaft connections – a 4" or larger radius should be maintained. Excessive heat and wear will occur if the bend is too great.

- Always clean dirt from the machine after every use, and lubricate the flexible shaft after every 50 hours of use.

Tips

- When starting a new hole, gently cut a small notch into the rock with the edge of the drill bit where the hole is to start. The notch will act as a guide when starting the cut, preventing the drill bit from skipping along the surface of the stone.
- To ensure sufficient lubricant, try cutting the stone while it's completely submerged in water.
- When cutting, lift the bit out of the hole frequently to clear the cut of grit. Clearing the hole in this manner will not only allow the bit to cut more efficiently, but also prolong its life.
- For drilling, run the drill slowly keeping the bit at a constant angle letting the bit do the work; don't push too hard.
- Always avoid creating friction heat by lubricating as needed: beeswax for drilling, water or coolant, e.g., Bur-Life, for grinding and carving. Lubrication is very important when using diamond burs to prevent excessive bur wear.
- Do not use excessive pressure on the handpiece. Stalling the motor will result in damage to the motor or flexible shaft. Excessive side pressure will almost always bend or break the shank or arbor of an accessory. Let the speed of the accessory do the work.
- Always present the tool to the piece at a very slow rotational speed, only increase to full operating speed when the tool is in contact with the piece being worked on. Never use accessories at speeds above the manufacturer's recommended speed rating.
- In general, use high speeds only for finishing work or buffing; use medium speeds for material removal, large diameter tools, polishing, and delicate work.

DOPPING

When working on a cabochon the stone should be fastened to a *dop stick*. A dop stick is used to have more control over a project and keep hands at a safe distance from the wheels.

Dop sticks are made from either wooden or aluminum dowels and vary in thickness based on the size of cabochon being cut. Larger cabochons require a thicker dop stick. Cabochons are fastened to the dop stick through using either *dop wax* or two part epoxy glue.

The club will supply a new member with one (1) wooden dipstick. Thereafter it is up to the member to supply their own dop sticks.

DOP WAX

All workshop participants should become familiar with using dop wax to fasten a cabochon to a dop stick. This process involves using a *flame lamp* or an electric dop pot to melt a special lapidary wax (known as

dop) and use it to “glue” a cabochon to a dop stick. The workshop supervisor will guide you through this process and assist until you are comfortable.

Tips

- Dop wax is hot. Be very careful when using the molten wax, particularly when working with children. The workshop supervisor or supervising adult should dop a cabochon on behalf of children.
- Keep a container of water next to the dopping station. In case hot wax drips on your finger you can use the water to quickly cool it off and prevent burning.
- Ensure the stone being dopped is hot to the touch. Dop wax will not stick to a cold rock. Stones can be heated by placing them over the flame of the lamp, by resting them on the metal bracket with the flame lamp below, or on the top of the electric dop pot.
- When your cabochon is complete, place the dop stick in the freezer for 10 minutes. The stone can then be pulled away from the dop wax easily.
- Children under 12 are not permitted to dop. A supervisor will be able to dop their sticks for them.

TWO-PART EPOXY GLUE

An alternative to using dop wax to fasten a cabochon to a dop stick is two-part epoxy glue. This glue is not provided at the workshop; all participants are required to bring their own glue. The benefits to using glue as opposed to dop wax include:

- Simpler to apply
- Stronger (rocks do not fall off dop sticks as frequently)

Downsides include:

- Wait time (usually one must wait at least an hour for glue to harden)
- Taking the cabochon off the dop stick (more cumbersome)

Tips

- Always use aluminum dowels when working with two-part epoxy glue.
- Always ensure an equal amount of both epoxy compounds is used.
- When removing the cabochon from the dop stick, heat up the glue using the flame lamp and pull/snap the stick off the stone. A knife can be used to easily scrape the glue from the back of the cabochon.