

USING INLAND FLAT LAP MACHINES FOR

# Glass Shaping and Polishing



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# Using the SwapTop™ Flat Lap for Shaping / Polishing

## Glass Surfaces: General Guideline

Shaping and polishing glass will be either a 4 or 5 step process depending on how much material removal is required. The process is broken down into initial Roughing and Shaping, Smoothing, Pre-Polishing, and finally Polishing. Use the instruction guide included with your SwapTop™ Flat Lap Machine for product assembly and lap changing instructions. We highly recommend working through the process with practice pieces first.

- No matter which step you are on, the following precautions and guidelines apply:
- Always wear eye protection. When polishing requires you to hold delicate pieces of glass, or where glass fracturing might be possible you should wear protective gloves and long sleeves as well.
- You will adjust the lap speed and the coolant flow rate to balance the material and removal rate. A faster speed means faster material removal and will require a faster coolant drip rate to maintain proper lubrication. Coolant flow is measured in drips per minute, not gallons per minute!
- The higher the speed the less control you will have. Also, the closer you are to the outside of the disc, the faster material will be removed. It is helpful to mark the location or level of your finished surface to serve as a guide.
- Maintain the appropriate angle at all times as you move your work piece back and forth: Don't grind just in one spot, you can create deep scratches in the glass and you will wear the diamond lap unevenly. Move the piece quickly from side to side without stopping.
- If you find one side is grinding faster than the other, increase the pressure downward on the appropriate side. Do all movements and pressure changes in fine amounts so that over-grinding does not become a problem.
- Always start the coolant drip and then turn on the machine. A white powdery residue on the lap shows that you are not using enough coolant and may risk damaging the lap and your piece. Adjust the coolant flow accordingly.
- The larger the grit number, the finer the diamond. A 600 grit lap is twice as coarse as a 1200 grit lap.

### STEP 0: ROUGHING

This step is required only if you need to remove a large amount of material, e.g. flattening the bottom of a paperweight or removing glass left from the punty. Install the 170 grit lap and spin to make sure it and the master lap are centered. Remove material until you obtain the general shape, size, or depth of your finished surface. If you have less than a millimeter or so to remove you can probably skip this step and begin at Step 1.

### STEP 1: SHAPING

This step will either create your initial shape or if you started at Step 0, remove the deeper scratches left by the 170 grit lap and attain the final shape. Install the 325 grit lap, spin to make sure it and the master lap are centered. Remove material until you have a look similar to a surface having been roughly sandblasted.

### STEP 2: SMOOTHING

This step will remove the scratches left by the shaping process. Install the 600 grit lap, spin to make sure it and the master lap are centered. Proceed to grind until you have a finely frosted surface. A properly shaped surface is perfectly smooth and satiny in appearance. Rinsed and dried you should not see any scales (aka dimples, facets, flats, etc,) or scratches. Hold it up to a bright light and look for sparkles or deep lines. Scales are most easily observed by watching the piece dry. Because the "scales" will have deeper puddles of water, they will evaporate more slowly. Wet your piece and watch for this phenomenon. If you see any scratches or scales, you may not have smoothed long enough. If after additional smoothing you can still see scratches or scales, they are too deep to remove. You must return to Step 1 (325 grit) and take an additional cut off the piece to remove them and then return to this smoothing step. Your piece is ready to move to pre-polishing when you have a uniform, finely frosted surface.

### STEP 3: PRE-POLISHING

Here you remove the satin-like finish left from the previous step. Install the 1200 grit diamond lap, spin to make sure it and the master lap are centered. Your goal is a very smooth, hazy surface. There should be no visible scratches or scales at this point. If you can see scratches you need to go back to Step 1 and remove them proceeding through Step 2 and 3.

## STEP 4: POLISHING

This is where the hazy surface is polished to a high sheen. There are many different polishes, pads, and combinations of the two that can be used for a final polish. Those commonly used for glass include diamond compound (graded diamond particles mixed evenly in a water soluble carrier) or cerium oxide slurry and a felt polishing pad.

- **Setting Up with Diamond Compound:** Apply the felt pad (or your preferred substrate) to the master and install on your machine. Wet the pad and then briefly turn the machine on and off to spin off excess water. Squeeze the syringe plunger to apply the diamond compound in a series of small dots around the pad surface; about a dozen on a 6" pad, and 16 or so on an 8" pad to start. Once charged you only need to apply additional diamond compound occasionally when you notice that the pad is no longer polishing.
- **Setting up with Inland Polishing Compound (Cerium Oxide):** Apply the felt pad (or your preferred substrate) to the master and install on your machine. Wet the pad and then briefly turn the machine on and off to spin off excess water. Make a slurry of the cerium oxide according to its directions. Apply a small amount to the pad; using a brush to paint radial lines that divide the pad into thirds or quarters (like a small pizza!) should be sufficient. A new felt pad may need additional cerium oxide applied until the pad becomes "charged". Once charged you only need to apply additional cerium oxide occasionally when you notice that the pad is no longer polishing. Using excess cerium oxide can cause balls to form under the surface being polished and make scratches.

After your pad is installed and charged you can begin polishing. Do not use the water drip during step four or you will quickly rinse away your polishing medium from the pad. Turn on the machine and adjust the speed. Polishing is generally done at higher speeds than grinding steps and is something you just need to develop a feel for. You don't want to press so hard that you stall the wheel or create so much friction you cause heat fractures. On the other hand you do need to apply some pressure for the polishing process to occur. If the polish starts to cake up on your glass or dry out, add water to the glass piece by rinsing the piece under water. You will also want to periodically rinse and dry your piece to check your progress and look for scales and scratches. If you see them you must return to Step 1 (325 grit) and follow through the steps, always using the complete order of grits as they won't be polished out.

## HELPFUL TIPS

- Best results are obtained by practicing on scrap glass first.
- Spend the necessary time at each step eliminating scratches before going on to the next step.
- There is no calculated time for each step, but over time you will get a solid feel for what amount of grinding is necessary at each step of the process.
- Usually the reason for difficult polishing is that coarse grits can create fairly deep scratches that don't come out when the glass is processed at finer grits. Start with as fine a grit you can get away with. The starting grit is a balance between how fast you need or want to initially remove unwanted stock against investing time in the polishing steps. You can use a coarse grit to rapidly remove material and then spend the time required in the polishing steps or use a finer grit for material removal and polish more quickly remembering that removing large amounts of material with finer grit discs wears them out more quickly, requiring their replacement sooner.
- In some cases, you may find that your work requires alternate or additional steps to accomplish your desired results. Inland offers diamond flat laps in additional grit sizes. Our complete line includes:

Item #	Grit Size	Item #	Grit Size
438060	– 8" 60 Grit Diamond Flat Lap Disc	438325	– 8" 325 Grit Diamond Flat Lap Disc
438100	– 8" 100 Grit Diamond Flat Lap Disc	438600	– 8" 600 Grit Diamond Flat Lap Disc
438170	– 8" 170 Grit Diamond Flat Lap Disc	438120	– 8" 1200 Grit Diamond Flat Lap Disc
438275	– 8" 275 Grit Diamond Flat Lap Disc	438300	– 8" 3000 Grit Diamond Flat Lap Disc