On the Job

Polishing a Concrete Slab

by John Starr

When I built my super-insulated home in 1984, my plan was to have a walkout basement with a finished concrete slab that would absorb the sunlight from four south-facing windows and act as a thermal mass. I placed a 4-inch slab over a 3-inch layer of sand and 6 inches of XPS insulation, and used an integral red dye in the concrete. In addition, I used a wax-sealing product made by the dye manufacturer that was supposed to match the slab's color and allow the concrete surface to be buffed to a high shine.

I'm not sure what went wrong, but when we tried to buff the wax sealer, it completely lifted off the slab, exposing a soft chalky surface. Repeated scrubbing didn't solve the problem, and I ended up covering the floor with carpet and putting the kids' bedrooms down there. Over the years, laundry turned pink by the kids' clothing served as a constant reminder of this dusty yet structurally sound mess beneath the carpet.


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Twenty-five years or so later, the kids were gone, and my wife and I wanted to refurbish this lower level. Thinking once again about my original idea for a finished slab, I bought a hand-held Metabo wet polisher — a right-angle grinder that feeds water onto the surface — a diamond grinding wheel, and a series of diamond honing and polishing discs, and went to work on a 2-foot-square section of the floor. A couple of hours of work yielded a hard, smooth, brick-red finish with multicolored exposed aggregate that you could see your reflection in **(1)**. But the prospect of doing 1,200 square feet at 2 square feet per hour with a hard-to-control hand-held grinder led to one thought: Find a bigger machine.

Another wrinkle was that I was running a radiant heating loop (supplied by existing rooftop solar collectors) around the basement's perimeter. This entailed cutting 1¼-inch-deep grooves in the existing slab to accept the radiant piping, which we later grouted flush with the floor **(2)**.

Grinding, honing, polishing. I found a rental store nearby that had the equipment I needed. I rented an Edco Contrx Model 2DP dual-disc polisher **(3)** that came with a system of diamond grinding "dots" and honing


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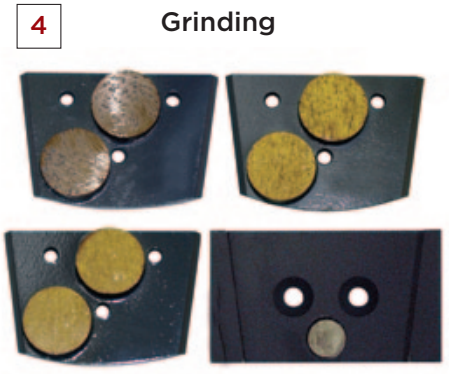

and polishing pads **(4)**, all of which were designed to work dry. I also rented an Edco TMC-7 Turbo Edge Grinder **(5)** with a similar — but larger — system of pads, and an Edco Vortex VAC-200 vacuum **(6)**.

The finishing process has three steps: grinding, honing, and polishing. Each uses progressively finer grits and creates progressively more sheen and reflectivity. Instead of first grinding with 30-grit diamond dots, I started with 70-grit dots, hoping to save time. But if I were to do it again, I would start with the beefier 30-grit grinding dots. I made a second pass with 120-grit grinding dots.

Honing came next. I began with 50-grit pads **(7)** and worked my way up to 200-grit. The final polishing step uses pads that look like they have colored jellybeans glued to them **(8)**. These include four progressively finer grits (400, 800, 1,800, and 3,500) and finally a buffing pad. After making a pass with the 400-grit, I started to see some real improvement. Also, I wasn't generating much dust anymore, so I stopped using the vacuum.

Crack filler and densifier. Older concrete usually has some hairline shrinkage

cracks, so to help mask these imperfections, I used Certishine Fusion, a liquid filler made by Vexcon. I applied it immediately after finishing with the 70-grit grinding, using a Hudson Sprayer. Then I went back over the wet floor with the 70-grit grinding dots. The Fusion combined with concrete dust to form a slurry that filled cracks and small imperfections. This process was messy and the slurry sets up pretty quickly (in about an hour), so I kept an eye on the walls and cleaned up splashes right away.

I also applied a concrete densifier called Certishine Clear, also made by Vexcon. It hardens the concrete surface, making it more resistant to staining. I applied it with a mop after honing with the 200-grit, then waited for it to be fully absorbed (about 45 minutes).

Finishing up. After I made a final polishing pass with the buff pad, the floor looked great. It had a nice reflection with no fuzzy edges — think polished granite **(9)**. Even the grouted lines blended in somewhat **(10)**.

On the advice of several people who have experience with commercial concrete floors, I've since applied a sealer and high-gloss finish that took away the crispness of the shine. I tried to buff the finish up with a standard slow-speed floor buffer, but that didn't improve its luster. Frankly, I'm unsure if sealing and waxing is needed or not, but I was afraid that if I didn't seal this floor, something might stain it and never come out. I have too much invested now to take that chance.

All told, I have about $2 per square foot in expenses for machine rental, diamond products, and chemicals. I put 111 man-hours into the floor, which comes to about 10 square feet per man-hour. If I were doing it again, I think I could increase my efficiency 10% without much trouble.

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Lessons Learned

1. Completely seal off the working area. If you've ever sanded a hardwood floor, you have some idea of what you're in for — but concrete dust is much worse.

2. Wear proper hearing and respiratory protection. This is a noisy process, exceeding 90 dB, and it's very dusty in the early stages, even with the vacuum running.

3. Lighten the load during initial grinding. When I first started, I kept tripping the 30-amp breaker. Substituting a 40-amp breaker didn't solve the problem. My assumption was that the 70-grit pads were digging into the slab surface and stalling the machine. After I took off four removable 40-pound weights that came with the polisher to provide down force, the machine worked fine.

4. Recalibrate chattering grinding pads by restarting the machine. The diamond dots have a complicated mounting arrangement, and sometimes the machine would seriously vibrate when I started it. Switching it off and on again usually solved the problem.

5. Never skip a step. Follow the manufacturer's recommended sequence for progressively finer grits. As with sanding, each step takes out the marks left by the previous step.

6. Keep the polisher moving. This is tricky early on, when you have to keep track of the power cord and vacuum hose. Your speed will pick up significantly when you no longer have to deal with the vacuum hose as you work.

7. Work the floor in two directions. Do it once east-west and once north-south. This will help flatten the floor (though not perfectly) and get rid of swirl marks.

8. Respect the edger. Keep it moving and be sure to make enough passes to get rid of the previous grits' marks. It helps if the room you're working in isn't chopped up into many little rooms that create lots of perimeter edges.

9. Rent a second vacuum if you plan to use the edger and floor machine at the same time. We used a good shop vac for the edger, with so-so results.

10. Don't wait to clean the machine. According to the directions, coating the bottom of the machine (before use) with a non-oil base form release agent makes it easier to clean off the Fusion slurry. Cleaning with a hose was pretty time-consuming when the slurry was still wet — I don't know what you'd do if it hardened up, with or without a release agent.