A Quick Guide to Polishing Concrete Floors

Concrete is fast becoming the ultimate no-wax flooring material!

Thanks to recent advances in polishing equipment and techniques, you can now grind concrete floor surfaces—whether new or old—to a high-gloss finish that never needs waxes or coatings. Factor in the superior durability and performance of concrete, and it's no wonder why more stores, warehouses, offices, and other commercial facilities are opting for polished concrete as an alternative to marble, granite, tile, or linoleum. Even homeowners are catching on to the benefits of these smooth, high-luster floors. *Continue >*

Decorative Options With Polished Concrete

You can enhance the lustrous beauty of polished concrete by using various coloring products and specialty treatments. Once you master the basic polishing steps presented in this guide, consider experimenting with these decorative techniques:

- *To add color, apply chemical stains or dyes to the concrete during the polishing process.*
- *Produce a terrazzo look by grinding through the top few millimeters of the concrete surface to expose the aggregate.*
- *For new concrete floors, seed colored aggregate, glass pieces, or bits of metal into the freshly placed concrete before it sets. The polishing process will reveal these decorative embellishments.*
- *Sawcut decorative borders or designs into the concrete.*

As with any other specialized technique, polishing is a multi-step process requiring use of the proper tools and procedures. To help get you started, this guide presents basic steps that have been used successfully by experienced polishing contractors. However, concrete is not a uniform product. Each job will present different conditions and challenges that may require you to modify these basic procedures. When in doubt, consult with your equipment and material supplier's technical representative for recommendations on how to proceed.

What Is Polishing?

Polishing concrete is very similar to sanding wood. Machines equipped with diamond-segmented abrasives (akin to sandpaper) are used to grind down concrete surfaces to the desired degree of shine and smoothness. As when sanding wood, you gradually progress from coarser-grit to finer-grit abrasives. (In this case, grit is the particle size of the diamond.) The result is a glossy, mirror-like finish.

The Benefits of Polishing

Ease of maintenance is the key reason why many warehouses and retail facilities are choosing polished concrete. Not only are polished floors easy to clean, requiring only occasional damp mopping or buffing with a neutral pH floor cleaner, they also hold up extremely well to heavy forklift and foot traffic. And they eliminate the need for messy waxes or coatings—as well as the associated labor, time, and expense to apply them.

The high light reflectivity of polished concrete is another important benefit, especially for office buildings, hotels, restaurants, and other public facilities that want to project a bright, clean, professional image. Polished concrete is also a good alternative for homeowners or businesses that can't afford marble or granite floors but want the same brilliant, mirror-like finish. It's even possible to replicate the look of stone or terrazzo by exposing the aggregate and using various coloring techniques (see "Decorative Options With Polished Concrete").

Choosing a Polishing Method: Wet vs. Dry

You can polish concrete using wet or dry methods. Although each has its advantages, many polishing contractors prefer the dry method because it's faster, more convenient, and environmentally friendly.

Wet polishing uses water to cool the diamond abrasives and eliminate grinding dust. Because the water reduces friction and acts as a lubricant, it increases the life of the polishing abrasives. Wet cutting is also more aggressive than cutting dry and may be more effective at exposing the aggregate, if a terrazzo look is desired. The chief disadvantage of this method is the cleanup. Wet polishing creates a tremendous amount of slurry (a soupy mixture of water and cement dust) that crews must collect and dispose of in an environmentally sound manner. This can dramatically slow productivity. Another downside of polishing wet: The water and slurry make it hard to see the slab surface as you're working.

Today's dust-collection equipment extracts about 99% of the dust from polishing!

Dry polishing requires no water. Instead, the floor polisher is hooked up to a dust-containment system that vacuums up virtually all of the mess. Today's dust-collection equipment extracts about 99% of the dust from polishing, keeping the worksite clean and the air quality safe. Because dry polishing is the method most commonly used in the industry today, it is the focus of this guide.

Can All Concrete Be Polished?

Almost any structurally sound concrete floor can be polished. But there are some exceptions:

- Before polishing new concrete, wait until the concrete has cured to sufficient hardness (generally 14 to 28 days after placement).
- Existing floors that need extensive patching or are extremely soft and porous may not be good candidates for polishing. You can test the floor hardness in several spots by using a screwdriver or coin to scrape or abrade the surface.
- For badly spalled surfaces, you may need to remove the surface layer of concrete using a scarifier.

STEPS IN THE POLISHING PROCESS

STEP 1: IDENTIFY THE CONDITION OF THE CONCRETE

If you plan to polish an existing concrete floor, you must first evaluate the condition of the surface you're dealing with. Here's what to look for:

- High or low spots
- Spalling at joints
- Minor cracks and blemishes
- Existing sealers, paints, or epoxy coatings
- Adhesives or mastics remaining after removal of floor coverings

Most coatings and minor surface imperfections can be removed by diamond grinding, as described in Step 2. However, if the floor exhibits major cracking and joint spalling, you may need to resort to other remedial methods (see sidebar "Can All Concrete Be Polished?").

STEP 2: PREPARE THE SURFACE

The first step in polishing concrete is to remove any existing sealers and coatings. If the floor has only minor blemishes or a very light coating, you can move on to initial rough grinding (Step 3).

For thick elastomeric membranes, mastics, epoxies, and urethanes (about 8 to 20 mils), it will be necessary to go over the surface with coarse 16- or 20-grit diamond tooling or a more aggressive grinding head specifically designed for removing heavy coatings and mastics, such as the T-Rex™ from HTC Sweden AB (www.htc-sweden.com). This tool achieves high removal rates, often completing the job after one pass.

TIP: Flat Surfaces = Better Shine
(HTC-America)

At this stage you should also fill any cracks and control joints in the floor with an epoxy or other semi-rigid joint filler, making sure to level the filler at the surface. This will enable the polishing heads to move more easily over the floor.

STEP 3: BEGIN POLISHING

Now you're ready for initial rough grinding of the concrete surface, which will prepare it for final smoothing. This is generally a three- to four-step process, depending on the condition of the concrete.

In most cases, you'll start with a coarse 40-grit diamond segment bonded in a metallic matrix (see sidebar "How to Choose the Right Abrasive"). After a few passes over the surface with the 40 grit, repeat the process with the finer 80-grit and 150-grit metal-bonded abrasives. (Some contractors like to continue up to a 300-grit grind.)

Each diamond grit step requires an average of two passes, depending on the density of the concrete. If the floor is in relatively good condition (clean, level, and blemish-free), you may be able to start the polishing process with an 80 or 150 grit.

STEP 4: DENSIFY THE CONCRETE

After performing initial coarse grinding with the metal-bonded diamond abrasives, it's often beneficial to apply a liquid chemical hardener to the concrete to help solidify and densify the surface and provide extra protection from water penetration and staining. Hard concrete also produces a better polish.

Chemical hardeners are sold under different trade names, but are usually made of sodium-, potassium-, or lithium-based silicates. These products, which can be applied to new or existing floors, work by reacting chemically with the calcium hydroxide in the concrete to form a hard, crystalline structure.

Using a stiff-bristled broom, apply the hardener liberally to the work area, being sure to keep the surface saturated. Allow the hardener to penetrate into the surface for about 30 minutes, and then remove any excess using a squeegee or floor scrubber. Before proceeding to the next step, let the hardener cure for 12 to 24 hours, or as instructed on the container. Some hardener manufacturers recommend polishing shortly after the densification process.

TIP: Don't Forget the Edges
To complete projects quicker, have a worker use a handheld polisher or small walk-behind machine to polish the edges while another worker polishes the main portion of the floor using the larger machine. When polishing edges, follow the same grinding steps used on the rest of the floor.

STEP 5: FINAL POLISHING

You're now ready to give the concrete surface a fine polish using diamond abrasives embedded in a resin matrix. Typically, this step will follow your last pass with the 150-grit metal-bonded abrasive.

Start by polishing with a 100-grit resin bond. Then switch to ever-finer grits (200, 400, 800, etc.) until the floor attains the desired sheen. For an extremely high-gloss finish, go up to a final grit of 3000.

With each successive pass, the goal is to buff out the scratch pattern from the previous pass (a process called lapping). As you gain more experience, you'll know when to switch to the next-finer grit level by observing the floor surface and the amount of material being removed.

STEP 6: PROTECTING POLISHED CONCRETE

Once you obtain the look and polish you're striving for, you may want to protect the surface by applying a commercial stain-guard product, especially if it will be exposed to grease, oil, or chemicals. Similar to Scotchgard for fabric, these solutions penetrate the surface to make the floor more resistant to stain absorption and dirt. They are usually applied by pump sprayer or wax applicator, but must be reapplied every few months or so to maintain their effectiveness.

Keep an Eye on the Shine

Not all of your customers will want a super-high-gloss floor finish. Some may prefer a more subtle satin-like sheen. As a general guide:

- At the 400-grit finish level, the floor will softly reflect side lighting.
- At the 800 level, it will clearly reflect side and overhead lighting.
- At level 3000, it will look wet and glassy, with a mirror-like finish.

SUMMARY OF THE BASIC POLISHING STEPS

Remove existing coatings (for thick coatings, use a 16- or 20-grit diamond abrasive or more aggressive tool specifically for coating removal, such as a T-Rex™).
Seal cracks and joints with an epoxy or other semi-rigid filler.
Grind with a 30- or 40-grit metal-bonded diamond.
Grind with an 80-grit metal-bonded diamond.
Grind with a 150-grit metal-bonded diamond (or finer, if desired).
Apply a chemical hardener to densify the concrete.
Polish with a 100- or 200-grit resin-bond diamond, or a combination of the two.
Polish with a 400-grit resin-bond diamond.
Polish with an 800-grit resin-bond diamond.
Finish with a 1500- or 3000-grit resin-bond diamond (depending on the desired sheen level).
Optional: Apply a stain guard to help protect the polished surface and make it easier to maintain.

TIP: Check Power and Lighting

Floor polishing machines consume a lot of juice (from 220 to 460 volts and up to 40 amps). Make sure the facility you're working in has the right electrical outlets and enough power to operate your equipment. Consider investing in a portable generator to eliminate downtime due to insufficient power. Also check the lighting: Is it bright enough to clearly illuminate the surface you're working on? If not, you'll need to bring in portable halogen lights.

How to Choose the Right Abrasive

Different types of diamond abrasives are used throughout the various stages of the floor polishing process.

Metal-bond diamond tools are best for rough grinding, heavy coatings removal, and leveling and flattening of the floor. The metal bond will wear away just fast enough to give full diamond exposure for fast and aggressive grinding action.

As you begin to hone and polish the leveled floor surface, switch to resin-bond diamond abrasives (which are bonded in a thermoplastic matrix).

The choice of polishing abrasives also depends on the condition of the surface and the hardness or softness of the material being polished. Consult with your supplier to determine the right diamond tooling to use for a particular application.

Checklist of Equipment & Supply Needs

- ✓ **Floor polisher.** Look for a machine with a planetary drive system—a large primary polishing head (from 17 to 36 inches in diameter) fitted with three or four smaller satellite heads that hold the diamond abrasives. When the machine is operating, the satellite heads rotate in the opposite direction of the primary head to eliminate linear grinding marks in the floor. Choose a machine equipped with a built-in vacuum port to collect dust.
- ✓ **Handheld polisher or walk-behind edging tool** (7 inches in diameter or smaller) to work along edges or in tight spots where a large walk-behind floor polisher can't maneuver.
- ✓ **Set of diamond-segmented abrasives** in various grit levels, ranging from about 16 to 3000 (the higher the number, the finer the abrasive level). The diamond tooling should be sized to fit the satellite heads of your polisher. You'll need two basic types of abrasives: Coarse diamond segments bonded in a metallic matrix for surface preparation and initial grinding (from 16 to 300 grit) and finer diamond segments embedded in a resin matrix for honing and final polishing (from 100 to 3000 grit). Most suppliers color-code their diamond abrasives by grit level for easy identification. A basic starter's kit should include at least three abrasives at each grit level.
- ✓ **Dust-collection equipment** to capture the dust generated from grinding of the concrete surface.
- ✓ **Penetrating chemical hardener** to densify the concrete surface.
- ✓ **Epoxy filler** for patching joints and cracks in existing floors.
- ✓ **Topical stain-guard treatment** to protect the finished floor.

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This document reached the summit (was created) on October 25, 2007 and is based on the best information available to the Sherpa at that time. To check for updates please click here http://www.ConcreteSherpa.com/polish-floors.

NAVIGATION & USER TIPS

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ABOUT THE CONCRETE SHERPA

The Concrete Sherpa is a team of people that represent the experience, teaching and learning of our team members and other industry leaders *on a mission to make life better for the concrete contractor*. We are an idea center striving to deliver thought provoking ideas based on “Concrete Advice for Business and Life” to stimulate you to reach new heights. As a user, you should remember to consider all information you receive, here at the Concrete Sherpa or elsewhere, not as a *cast in concrete* recommendation, but rather as an idea for you to consider and ponder.

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THE JOURNEY LEADING TO THE CONCRETE SHERPA PROJECT

The Concrete Sherpa Project (A Sherpa is a “guide”) was born at The Concrete Network in mid 2004. Here is how it happened:

The biggest surprise, or gift, since starting The Concrete Network in 1999 has been the concrete contractor friends from around the country we’ve made and witnessing the passion they have for what they do. These people include Dave Pettigrew, up in the San Francisco Bay Area, or the Verlennich brothers in Minnesota, or Bob Harris in Georgia, the list goes on and on. It’s quite inspiring.

We were once asked, “How are you so excited every day about concrete?” Well the answer is simple, it is impossible to not be excited about concrete when you have the job we do- interacting with hundreds of concrete contractors from every state in the country.

The thing we’ve learned about concrete contractors is that most are passionate *craftsmen*- they are often less passionate and experienced in the “office stuff”. Human nature channels us to do what we are most comfortable with; learning how to use a new saw-cutting tool is comfortable; learning and implementing a new estimating strategy, or job management tool, is not so comfortable.

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THE JOURNEY CONTINUES…

So Sherpa was born to provide FREE and easy to use information on topics many Contractors are not too comfortable with.

- Concrete Sherpa is here to provide help to contractors who are often ‘Lone Rangers’ and don’t have anyone to get solid business advice from.
- Concrete Sherpa is here to provide help for contractors who have to work too hard and too many hours in their business, and one day realize they need to work *on their business, not in their business.*
- Have fun with Concrete Sherpa and go faster towards reaching success than you might have on your own.
- To skeptics who think something free can’t be valuable, or there must be a trick- visit Concrete Sherpa and decide for yourself.

We hope you make great use of the Concrete Sherpa and it helps you to become an awesome success for yourself, your family, your church, and your community.

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