

RESTORATION & MAINTENANCE CORNER

Polishing Natural Stone

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Special Contributor

Photos courtesy Bob Murrell

MOST CONSUMERS OF NATURAL STONE PROBABLY DON'T REALIZE WHAT GOES INTO THE PROCESS OF POLISHING THOSE STONES, WHICH ARE CAPABLE OF TAKING ON A HIGHLY REFLECTIVE SURFACE.

When they see polished marble, metamorphic limestone, granite, gneiss, serpentine, basalt, gabbro, and countless others, they mostly just think of shiny marble or granite. They also may not realize that the shine is not poured onto the surface from a bottle.

Of course those of us who are in the natural stone industry know what it takes to produce that shiny piece of stone. First you must have a stone capable of taking a polish. That means it must be hard enough and dense enough. As a general rule concerning dimensional stone, metamorphic stones and igneous stones are typically the types capable of taking a true polish.

For the most part, natural stone is polished using a smoothing process. Once dimensioned, the stone surface is ground, honed, and finally polished through a gradation of abrasive grains, from coarse to fine. Simple, right? However, those of us who have polished various types of black granites (anorthosite, gabbro, basalt) or sensitive, calcium-based stones know just how difficult this can be at times.

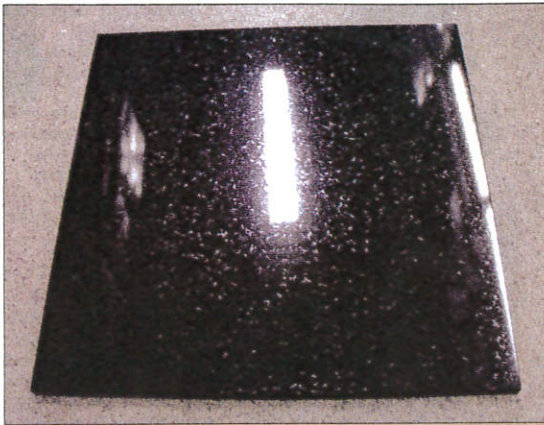
Both specular reflection gloss and color are achieved with the polishing process. Have you ever taken a 12 x 12 tile of Absolute Black granite and simply turned it from one side to the other? What is the difference? Both sides are the same stone so the only difference is the surface profile of the back side with that of the front.

As the honing process gets finer in grit/micron size, the specular reflection gloss and color start to increase. More light is reflected back to our eyes and the stone's crystals and minerals become easier to see, allowing the color to become more apparent. Some of the physical properties of light come into play here.

On the back side of the tile where the surface is rough, the light is diffused. This scatters the light and the eye can't catch very much of it. This causes the surface to look dull and lacking in color. On the polished side where the surface is very smooth and shiny, the light is reflected back to the eye and the color of the stone is now vivid.

Different stones can require more or less of the honing process. Most marbles can be polished after an 800 grit hone while many types of granite require up to a 3,000 grit level hone before polishing can be achieved.

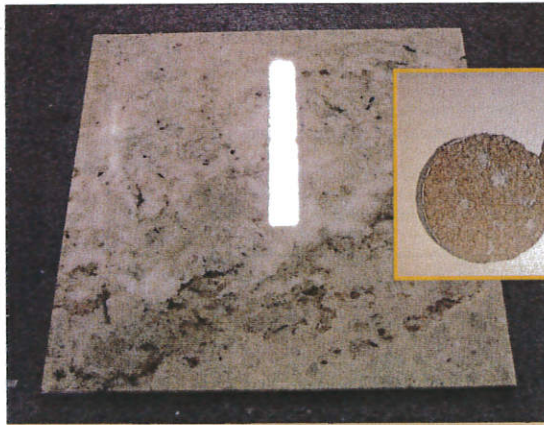
Marbles and other similar stones can be polished very effectively with the aide of special acidic compounds that basically soften the surface, allowing the fine abrasive polishing process to work much faster. Use of 5X polishing bricks comprised of potassium oxalate



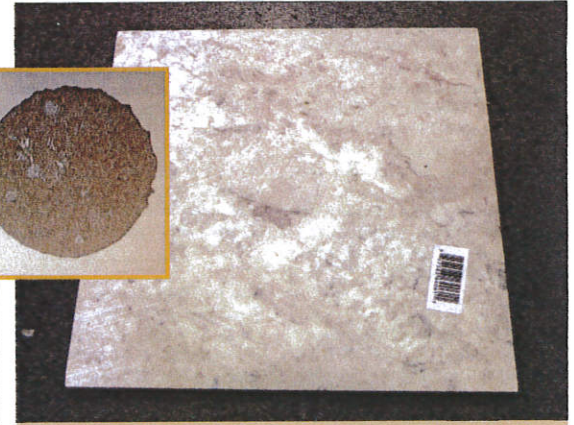
Black granite polished side; smooth surface profile results in high specular reflection gloss and deep color.



Black granite back side; rough surface profile in which light is diffused, resulting in low gloss and color.



Light marble polished; smooth surface profile with highly reflective surface and full color. Inset: Fiber head made of hemp/sisal with fiber glass inserts for polishing marble.



Back side of light marble; rough surface profile with diffused light on surface and little color.

and fine aluminum oxides are how marbles are polished at slab and tile production facilities all around the world.

There are other methods used in the field for polishing calcium-based stones. The 5X comes in both powder and compound form and can be used to somewhat duplicate the polishing results of production plants.

Crystallization is another process very commonly used to maintain the polish on marbles and terrazzo. This spray on, buffing-type process typically uses a special acid like a magnesium fluorosilicate combined with a polymer and steel wool abrasive to produce a high shine.

Granites do not react to acid the way marbles and other calcium-based stones do, so the polishing must be accomplished by mechanical means. Tin Oxide and aluminum oxide in combination with colorants and other binders is normally the preferred method. Of course there are always exceptions. The crystallization process can also be combined with the granite powders to help achieve full color on dark granites.

As a kid growing up in the 60s and 70s, I

worked on the weekends making specialty polishing buffing heads for both marbles and granites on radial arm machines. For marbles, I used to hand-roll corn shucks and stack them in a bound buffing head assembly where we would glue them in with epoxy. We eventually switched to hemp rope and even added fiberglass to aide with heat development. These buffing heads were used in combination with aluminum oxide and either 5X or oxalic acid to achieve excellent results on specific hard to polish marbles and were highly sought after at one point in time.

For granites, we used lead-wrapped felt heads in combination with tin oxide and aluminum oxide. Four inch rolls of felt belting covered in thin lead were spiraled like a cinnamon roll. The lead would help create heat and would also help fill in the surface pits on granites, making them more monolithic and thereby increasing the polish and color.

Of course eventually the use of lead was outlawed due to health and environmental regulations. The solid felt head then became common.

So, when my wife accuses me of being crazy, now she will know why!

Today, marbles are polished much the same way but with different application methods. Granites are also polished similarly. Many of the processes in the production plants are automated. New diamond discs and tools go very fine and sometimes include special buffing discs with aluminum oxides so that the edges are all done quickly and efficiently by either hand tools or CNC machines.

Restoration professionals use specific diamond tooling and polishing abrasives to get the job done in the field as well. Most all processes improve and become more efficient with time. However, the basic principles and concepts remain the same.

Bob Murrell has worked as a supplier of products and technical support to the natural stone industry for over 35 years. He has written numerous articles for various trade publications and has also trained thousands of contractors over the last 25 years.