

STRUX® 90/40

Synthetic Macro Fiber Reinforcement

Finishing and Polishing Integrally Colored Concrete Slabs Containing Grace STRUX® 90/40 Macro Fibers

By Samuel W. Davis



Overall view of polished test floor.

Richmond, Virginia

Polishing concrete is becoming increasingly popular with designers as a cost-effective means of producing attractive floors that require very low maintenance. With this, more and more questions have been asked if STRUX® 90/40 synthetic macro fiber reinforcement manufactured by Grace Construction Products as a replacement for WWF (Welded Wire Fabric) for temperature and shrinkage crack control can be used in polished concrete floors.

Polishing concrete is a mechanical grinding and polishing process similar to sanding a piece of wood. Heavy-duty polishing machines equipped with progressively finer grits of diamond-impregnated segments or discs are used to gradually grind down the surface to the desired degree of shine and smoothness. The process also utilizes hardeners and sealers to densify, polish and finally seal the surface.

To determine whether the STRUX fibers would be visible on the surface and could have any negative impact on the esthetics of a polished floor, Grace engineers finished and polished a STRUX-reinforced

concrete garage floor as a test project in Richmond, Virginia. A small portion of the floor slab was surface polished, not exposing any aggregate; the rest of the slab was polished down to a level that exposed the coarse aggregate.

The test floor consisted of a 4-inch thick slab that was 28 feet long by 30 feet wide. The concrete was integrally colored using the Grace Hydrotint® liquid coloring system. The concrete was placed in a normal manner and then finished with a finishing machine. The placement contractor used a metal pan on the finishing machine instead of standard float blades. The slab was finished without water being added to the surface during the finishing. After floating, the finishing machine was equipped with standard steel blades for troweling. The perimeter of the slab was finished by hand. The steel troweling was stopped just before the slab would be considered burned.

The polishing contractor arrived at the site to start polishing approximately 3 weeks after the concrete was placed-within the typical timeframe

for initiating the polishing process, during which the concrete would reach a minimum compressive strength of 3,000 to 3,500 psi. The floor was polished using the GranQuartz polishing system.

Step 1. The surface was polished until the coarse aggregate was exposed. This was done by making multiple passes in both directions, and then on a 45° angle to the first passes, using 18/20 grit medal disc with impregnated diamonds.

Step 2. After the slab was ground down to the desired exposure level, the polishing was continued with progressively finer pads. The 20 grit pads were followed by 50 grit metal/diamond, then 100 grit metal/diamond. After the 100 grit metal/diamond pad was used, the process was continued using resin pads with diamonds. The first resin was a 50, then 100 and 200.

Step 3. After polishing with the 200 grit resin pads, Surface Pro Densifier by GranQuartz, was added to the surface and allowed to dry. This densifies and hardens the surface.

Step 4. Next, the polishing continued with 400, 800, 1500 and 3000 grit resin and diamond pads.

Step 5. A penetrating sealer, Surface Pro Star Finish Coat, was then applied to the surface.

Step 6. Lastly, the surface was buffed using a high-speed buffer with a black stripping pad and then buffed again with a hog hair pad. The result was a dense surface with very high sheen.

The STRUX 90/40 macro fiber reinforcement caused no problems with the placement of the concrete or the steel troweled surface of the concrete. The fibers were almost invisible in the final finish (See Photo A). Fibers were mostly noticeable around the perimeter of the floor in areas finished by hand. As for the polishing, in areas where the surface was polished down to expose the coarse aggregate, the fibers were not visible at all (See photo B). In the areas that were surface polished only, the fibers were very noticeable (See photo C). It would not be advisable to specify STRUX 90/40 in decorative applications where the concrete is going to be surface polished only. I believe the reason for this is that the floating and troweling of the surface, positions the fibers in the top several millimeters in an almost perfect horizontal position. Once the concrete is polished or ground down below the first several millimeters, the fibers become less horizontal and move more on a diagonal



Photo A: Fibers were almost invisible in the final, finished floor.



Photo B: In areas where the surface was polished down to expose the coarse aggregate, the fibers were not visible at all.



Photo C: In the areas that were surface polished only, the fibers were very noticeable.

angle. This allows for the polishing process to chop the fiber off, only exposing the end of the fiber. The polishing contractor saw no evidence of the fibers interfering with the polishing process or machinery.

PROJECT CREDITS:

Location: Richmond, VA

Size: 840 sq. ft.

Color: Harvest Gold

Ready Mix Supplier:

TCS Materials, Division of Florida Rock Industries

Placing Contractor: Rick Williams

Polishing Contractor: Concreate, Richmond, VA

Mix Design: 3000 psi interior mix, #57 crushed granite with silica sand and STRUX 90/40 Macro Fibers at 4 lbs. per cubic yard.

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