

OVERVIEW OF OUR WORK AT LABYRINTH ENTERPRISES

Prior to our arraival

Those of us here at Labyrinth Enterprises are artists, specializing in installing labyrinth patterns in a variety of materials. Our specialty is concrete. We are not concrete contractors, however. In fact, we don't have contractor's licenses, as artists don't need to be licensed. We rarely hire any outside workers, other than laborers, as we prefer to do all of the installation ourselves. This makes us unique in the labyrinth world. We have likely made more hand-made labyrinths than anyone in the history of labyrinths.

When we arrive at the site, the concrete has already been completed by local contractors. We provide some helpful guidelines with regards to control joints and other details. The concrete must have cured for at least 28 days, but it can be much longer. There must be no sealants, curing compounds, or any other material covering the concrete, as it will interfere with the adhesion of our polymer concrete.

Please note that whether or not we do the work, we are available on a fee basis as consultants and designers to help with the plan for the labyrinth and its surroundings. Just a few hours can make a big difference in maximizing the use of the space for the intended purpose.

Decorative Concrete

Decorative concrete is one of the fastest growing segments of the concrete industry. We have studied the subject, attended numerous trainings provided by manufacturers, as well as accredited concrete courses. Ironically, having just said that we are artists and not contractors, we are members of the American Society of Concrete Contractors and the Decorative Concrete Council. We have received master certificates in the study of decorative concrete (classroom courses). In 2005 we went to the annual World of Concrete exhibition to learn what is new. With all of this, let us say emphatically that almost no one does anything anywhere near as complex and intricate as we do in making labyrinths. Most decorative work uses border stencils or some stains, perhaps some stamps for texture. We have had to invent our own tools because most concrete tools are too large. You can get many 14-inch diamond blades, but it's almost impossible to find a two-inch blade. What scoring we have seen has all been freehand, whereas we have developed sophisticated devices to assure accuracy and precision. We have never seen anyone apply polymer concrete by hand in the way we have developed. Polymer concrete labyrinths are our invention and available only from Labyrinth Enterprises.

Installing the pattern

Very simply stated, we draw the labyrinth onto the concrete using diamond-bladed saws ranging from circular saws to Dremel tools. We don't draw the lines first and then cut them, we draw directly with the saws. A three-inch-wide circle, for example (most labyrinths are comprised of concentric circles), would have two cuts, delineating the outside of the line, three inches apart, and parallel. Once the entire complex pattern is cut into the concrete, we mix polymer concrete in small batches and apply it to the areas inside of the scored cuts. The different color and texture, combined with the scored cuts, make the labyrinth look as if it were inlaid into the background concrete. The scored lines leave subtle shadows that outline the color, making it pop out sharply, almost in a three-dimensional way. Nothing that we use is experimental. They are products that have been around for many years and have an excellent track record. Rather, we apply them in a unique way. Hence, our proprietary polymer concrete labyrinths. We do have alternative techniques, which are a bit less in cost, which we can discuss. However, our real tour de force is the scored and hand-colored polymer labyrinth, which is low maintenance, beautiful, and durable, all at a very reasonable cost.

WHAT IS POLYMER CONCRETE?

Polymerization

Polymer-modified cementitious materials date back more than 70 years. In the 1940's they were developed for use on ships' decks and bridges (rather demanding circumstances). Polymers are made from simple organic molecules (monomers) that combine to form more complex structures through a process called polymerization (hence, polymers). The polymers are dispersed in water or redispersible powders. These are added to hydraulic cement, with or without aggregate or admixtures, depending on the desired result.

Advantages of adding polymers to concrete

In *Polymer-Modified Concrete*, a report by the American Concrete Institute (ACI 548.3R-03, August, 2003) lists these advantages to polymer concrete:

- Increased bond strength (bonding to previously existing concrete)
- Freeze/thaw resistance (suitable for northern climates)
- Abrasion resistance (for walking on)
- Flexural and tensile strengths
- Reduced permeability and elastic modulus

Be selective

Most polymers are incompatible with hydraulic concrete. In fact, only five percent are suitable. Most of these are nonionic, meaning they have no electrical charge. The type of surfactant used to disperse and stabilize the polymer is the essential consideration. Different manufacturers have different proprietary combinations. We use a pre-mixed polymer concrete produced by Elite Crete which requires only that water be added. I believe that the principle copolymer in their mix is methyl methacrylate. Acrylic latex modified concrete mixtures such as Thin Finish[®] by Elite Crete are specifically formulated for thin coatings and concrete restoration.

There are many companies now advertising decorative concrete products and polymer modified mixtures. I have trained with a number of such companies, and probably wouldn't go wrong with any of them. However, I chose Elite Crete, and have staying with them through the years, getting to know their products well (see www.elitecrete.com). I especially enjoy their interactive forum in which contractors answer questions and swap hints, with quite a bit of tongue in cheek humor.

How it works

To the normal process of cement hydration, polymer modifications add a process of coalescence. As cement hardens, there form small spaces between the aggregate particles. These spaces are what allow water to penetrate, and do damage in freezing conditions. Polymer particles coalesce to fill these voids. That's why the concrete becomes less permeable and better protected against freezing. Interestingly, polymer concrete does not produce bleed water. It makes an excellent overlay because it needs very little finishing. It is more accurate to say that it dries, than to call it curing. The polymer bonds not just to the concrete and aggregate in the mix, but also in the underlying concrete. It is for that reason that it is used to resurface concrete.

IS POLYMER CONCRETE OVERLAY DURABLE?

Labyrinth Enterprises has developed a technique to install a labyrinth pattern onto the surface of an existing concrete surface (either new or pre-existing) by using polymer concrete. We feel it is vastly superior to stains or paints, as it is much more thick, opaque, and controllable. Until we developed our proprietary technique, a decorative concrete contractor would have suggested using stain. Now there's an alternative.

Stains

Reactive stains are acid-based, reacting with the lime in the concrete to establish the color, usually derived from minerals. When sealed and properly maintained, stained surfaces can give good service. In January, 2005, I attended World of Concrete in Las Vegas. I visited a number of casinos to see their decorative concrete work. At one of the major casinos, the stained surface at the entrance to the casino had not withstood the amount of traffic. The thousands of daily visitors had worn through the sealer and then through the stain itself, exposing the raw concrete beneath. It looked very bad. It could have been avoided by cleaning and sealing the surface frequently, perhaps even weekly, but that wasn't the case.

Beneath the stain, the concrete was doing fine. The heavy foot traffic wasn't wearing grooves into the concrete. A sidewalk such as that probably had a strength of 3,000 psi. Clearly the concrete was stronger than the stain. Polymer modified concrete is even stronger, from 4,800 to 6,000 psi. Thus, if this classy casino had used polymer concrete at their doors, it would still look good.

Survives harsh conditions

For reasons such as we saw in Las Vegas, we are convinced that our all-concrete labyrinths, with polymer concrete utilized for the colored portion of the pattern, offer institutions the kind of durability and low maintenance that they desire. We have seen examples of polymer concrete in Chicago, for example, that have been through many winters and freeze/thaw cycles, and still look great. We have installed an all-concrete labyrinth in northern Wisconsin, and after two winters, it shows no signs of degradation.

But that's nothing compared to a test of an acrylic latex-modified polymer cement coating tested for 18 years (see Lavelle, J.A., 1988, "Acrylic Latex Modified Portland Cement," *ACI Materials Journal*):

This panel was oriented so as to face south at a 45-degree angle to the perpendicular (typical coating exposure condition) and was still intact after 18 years of weathering. Unmodified control specimens within the series failed in the first three months. When the surface dirt was washed off, the coating showed no color loss and no cracking or spalling.

You can't make it any clearer than this

At official publication of the American Concrete Institute (ACI) makes it very clear:

Acrylic polymers are recognized for their durability. . . . Studies have shown that thin cementitious coatings modified with acrylic latex maintain adhesion over many years of exposure to sunlight, rain, and snow, resulting in resistance to surface degradation, blistering, and cracking. . . . Acrylic polymers resist discoloration because they do not absorb ultraviolet (UV). These durability features of acrylic polymers are carried over to acrylic latex modified cement mixtures.

When talking of spray-on coatings (similar to our new technique), the same publication states:

These coatings can be relatively thin (approximately 3 mm) and still provide weather resistance and long-term performance.

PROPER INSTALLATION PROCEDURES

Proper application essential

Polymer concrete is both durable and cost effective. However, it is only as good as the surface it covers. If the underlying surface had curing compounds or oil or was dirty, then the polymer concrete may not properly adhere. Installation techniques become a very important consideration. We have used this product for years and meticulously follow the manufacturer's directions (with one exception, which will be described shortly). Nevertheless, when we first developed this technology, we applied some polymer concrete to the sidewalk in front of our studio. We didn't acid etch, or even power wash. I blew the dust away and brushed on some white polymer concrete. Now, several years later, the material shows no sign of wear. It was never sealed, so it has gotten dirty. The white color is now beige. But even with sloppy application, it is doing fine. So much more should we be assured as to the performance when properly installed.. When reading Elite Crete's specification sheets, I recently noticed that they recommend only using installers who have been trained by Elite Crete and hold an installer's certificate. I trained with them, but never received my certificate. I called and they are sending one, which will subsequently be added to this material.

Surface preparation

The key to a successful project is surface preparation. All loose material and coatings must be removed. With new concrete in which there have been no coatings applied, it is often sufficient to use a power washer to thoroughly clean the surface. In other cases, the entire surface may need to be sand blasted or shot blasted, requiring a totally new surface. Our case is a particular use, as we do not cover the entire surface, only the labyrinth pattern. In a sense, we are selectively resurfacing the concrete. Highly recommended is to acid wash the surface with a diluted mix of muriatic acid. This must then be neutralized to obtain the appropriate pH balance for the surface.

Mixing

Being one who loves concrete, I enjoy the mixing process. When mixing one bag of Thin Finish in a five gallon bucket, the mixing is completed and then a pause is taken for the false set to take place. Then the material is mixed again. During the second mix the material becomes noticeably "sticky," which certainly is the purpose, to adhere to the surface.

Application

Normally the polymer mix is applied by using a squeegee to spread an even coat over the surface. Alternatively, it can be sprayed on with a hopper gun, or applied with a trowel (a bit like what we do). In this regard our application is unique. We brush it on by hand. Since most projects cover large surfaces, hand brushing is unheard of in the decorative concrete field. In fact, we don't really paint with the brushes. They are helpful because they hold a certain amount of the mixture. We actually use them more like a spatula. It is during this process that we seem to break one of the cardinal rules for application. The product information sheet states bluntly, "One single coat of Thin-Finish is never sufficient for any application. If only one coat is applied, the adhesion and abrasion resistance of the finish will fail." We, after all, apply only a single layer. So, I have discussed this at great length with the technical team at Elite Crete. They have, in fact, approved of my application. Most overlays are applied over smooth surfaces, especially indoors. The purpose of the first coat is to adhere to the underlying surface. Then the second coat adheres to the first coat. If the first coat didn't adhere, clearly the second coat would fail along with it. We apply the polymer concrete to a rough surface that has received a broom finish. By manually pushing the polymer mixture into the rough surface area, adhesion is maximized. We have been making labyrinths with this technique for several years now. Failure typically occurs within a few months. None of our work has shown any indication of delamination. Our special method is an exception to the rule, approved by Elite Crete.

QUALIFICATIONS OF LABYRINTH ENTERPRISES

More than just concrete

Polymer concrete systems are not for do-it-yourselfers. There are too many variables that have to be considered. Elite Crete requires that its products be installed by professionals, and rightly so. Using polymer concrete to resurface only a selected part of the surface (the labyrinth pattern) represents a new application for this material. We are not concerned about competition, as this work requires a unique combination of qualities:

- Inventing tools and learning how to use them skillfully
- Knowing the technical aspects of concrete
- Training in decorative concrete techniques
- Understanding the geometry, design and symbolism of labyrinths
- Offering design capabilities for the creation of sacred space
- Operating a business that sends our craftspeople all over the country

We meet all of the criteria, giving us a unique opportunity to serve those who desire to have a labyrinth.

World-class resource

Labyrinth Enterprises is the world's foremost full-service labyrinth resource. There are others who offer some of the following services, but no one who offers all of them, except for Labyrinth Enterprises..

- Design and consultation, on site or by email and telephone
- Permanent labyrinth installation in many media, specializing in concrete
- By far the leading producer of hand drawn and painted portable canvas labyrinths
- Sharing labyrinth expertise through lectures and facilitator trainings
- Publisher of Robert Ferré's six books on labyrinths
- Extensive website with free information for the public (www.labyrinth-enterprises.com)
- Mega-links, the above website having 300 links to other labyrinth-related websites

Artistry in concrete

For insurance purposes, we are classified as artists, and that's exactly how we see ourselves. Each canvas or on-site installation is a unique work of art. Even when traditional patterns are used, the setting and the circumstances set each labyrinth apart. In Denver, Colorado, we installed a labyrinth on the site of a former amusement park, inside the restored carousel building. The client had this to say:

It was a pleasure to work with Robert Ferré on the design and layout of the Carousel Labyrinth in Denver, Colorado. He helped us find a unique design which combined the design tenets of the Amiens Cathedral Labyrinth with our 12-sided carousel structure. As a result, we have what we think is the only twelve-sided labyrinth in the world. The labyrinth has made the Carousel Pavilion a very spiritual place and members of our community are already using it in great numbers. We found Robert to have a great combination of skills for the task at hand. He educated us on the possibilities for both design and materials, was a wonderful collaborator with our concrete contractor, and demonstrated his considerable artistic and technical skills in laying out the design in the field.

Guarantee

Our work is complete when we receive the client's approval and we leave the site of construction. We guarantee that our patterns will be authentic and our work done skillfully. However, the durability of the labyrinth is dependent on many factors beyond our control, such as the quality of the underlying concrete, maintenance, vandalism or abuse, and more. For that reason we can give no specific time guarantee.