

business & technology



Product Review: Polymer Flooring

Renewing concrete with polymer flooring improves sanitation, safety and good looks.

Bill Pregler

PHOTO COURTESY OF STONHARD

CONCRETE FLOORS ARE SUBJECT to constant erosion from forklift traffic and corrosive acids (wine) in high humidity environments and suffer impact damage from barrels, barrel racks and other processing equipment. Even worse, from day one of installation, concrete is, by nature, porous. Combine this with spalling or flaking, cracking or pitting, and soon concrete becomes a wonderful environment for “bugs.”

Concrete inevitably becomes compromised. Since the vast majority of wineries are already built, restoration is key. The good news is that a concrete base already exists on which to apply polymers. Polymers then provide a revitalized and durable work surface for many years to come. Plus, they are increasingly promoted for use in new green construction and certification.

Polymer floors are one-piece, seamless, nonporous, highly durable flooring systems that eliminate what flooring industry experts call the “bug hotel.” Long standard in the food processing industry, polymer floors are finally making their way into wineries.

Chateau Montelena Winery, located at the north end of the Napa Valley, had originally surfaced its bottling room in 2005 but had problems in other areas due to a poor installation job. They decided to gut the entire winery and cover the floors with urethane from a well-respected local vendor. “Sanitation was our whole motivation, but there is also the labor perspective,” said winemaker **Cameron Parry**. “We always used a pressure washer but now save considerable amounts of time and water.”

Attributes to Consider

Commercial food processors have long considered their floors a “tool” and as much a part of daily production as any other piece of processing equipment. Sanitary floors can thus be critical to a company’s success, which makes them a priority in building design.

Unfortunately, this is not so in the wine industry even though the demands are similar. According to one sanitation expert, the mantra for wine cellars should be: “What ends up on your floor will soon end up in your barrel.” A winery can have the cleanest walls, tanks and employees; but if the floors are not clean, the product can be compromised.

Polymer floors are important for hygiene, durability and worker safety. The biggest advantage is sanitation.

Hygiene

Polymer floors provide the ultimate solution to concrete deficiencies. They are standard in food processing facilities and therefore could easily satisfy the sanitation requirements of a winery.

Randy Worobo, PhD is an associate professor at **Cornell University** whose focus is food microbiology. He specializes in microbial spoilage of beverages and pathogen transmission and conducts yearly seminars for the wine industry. Worobo recommends taking advantage of a contaminant’s weaknesses by removing places for it to hide and selecting a substrate to mitigate growth potential.

However, the cleaning process must occur long before sanitation can begin. **Samantha Kollar** from **Enartis Vinquiry**, an ISO-certified laboratory and consulting group, said, “You cannot sanitize a surface that is not clean.” Quite simply, you cannot clean a compromised slab of concrete.

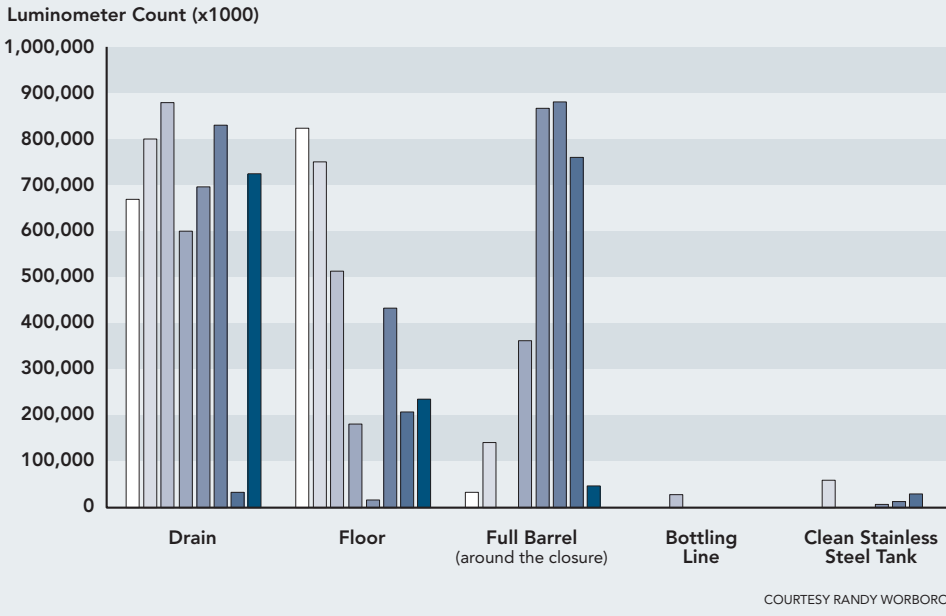
For Worobo, the key to cellar hygiene is establishing and maintaining an easy-to-follow cleaning and sanitation regime. With a tightly sealed polymer floor, the majority of pathogens can be quickly removed with a minimum of effort, using the least amount of water and energy.

Sanitation of polymer floors via steam or chemical is quick, cost-efficient and highly effective. Worobo created a chart of studies done at different wineries using bioluminescence (ATP) testing in specific processing zones in the cellars. As expected, the results show drains are the area with the most contamination, followed by floors. Interestingly, the third most highly contaminated area centers around the bung hole.

According to Worobo, in these three areas, “You will find a plethora of microorganisms, and this will include all the wine spoilage organisms such as *Dekkera*, *Acetobacter*, *Lactobacillus*, *Candida* and *Pichia*.” He continued, “Much of the issue is that molecular SO₂ is bound out once it hits the floors, drains or barrel (exterior around the bung), and the wine spoilage microorganisms can rapidly grow because there is not any free SO₂ present.”

Luminometer readings for winery environments taken at eight different wineries

Drains and floors showed the highest levels of contamination whereas the bottling line (filler head and bowl) and sanitized stainless steel tanks showed low levels of contamination. The area around the bung hole on barrels showed a range of contamination that related to sanitation practices being used specifically before or after entry of the barrel.



Durability

Durability of polymer is paramount. Wineries that have already paid for a concrete floor that now needs treatment can now think in terms of a long-term, alternative investment.

“Most people look at floors as not making money,” said **Rick Tetzel**, western regional manager for **Flowcrete North America**. “But the alternative is ineffective sanitation. While a floor may not make money, it certainly can save you money. And urethane floors in high-traffic areas can easily last 25 years.”

A polymer floor may not be bulletproof, but it is bullet-resistant. In contrast, skim coats or thin film products for concrete restoration offer a quick fix; usually the thickness of a credit card, they can be easily scratched or cracked. The impact from a heavy forklift load one time could easily damage a film product. They are generally used in residential or light commercial applications, often for decorative purposes.

Conversely, a trowled, resinous, cementitious, urethane surface, often referred to as mortar, will be 1/4- to 3/8-inch thick and can handle just about anything. Such surfaces are formulated as an aggressive solution for high impact, physical and chemical resistance.

A polymer floor will also handle thermo-shock. This is critical because the revitalized flooring system combines an underlying base (the original concrete slab) with the new resinous lamination. Radical temperature shifts (defined as 100° F in two minutes or less), such as applying hot water or steam during cleaning, can result in delaminating problems with less durable applications.

Worker Safety

Worker safety is a major concern for **OSHA** and certainly a winery’s insurance broker. One critical step in proactive risk management or assessing potential cellar liability is maintaining floors.

By nature a cellar is a wet, slippery environment. The latest statistics from the 2011 **Liberty Mutual Workplace Safety Index**, a clearinghouse of statistical data for insurance carriers, show that slips and falls are in the top three of the 10 most common causes of worker injury.

No discussion of polymer floors would be complete without mentioning the different treatments and surface preparations that are available to the winery. Various aggregates are “broadcast” during installation, prior to surface curing. They not only afford visual accents but different levels of coarseness. They provide non-skid surfaces for workers and forklifts alike.

Style

Visually, polymer floors come with a wide choice of colors and aesthetic accents that can be incorporated anywhere, from the cellar to the tasting room. Today wineries promote increasing their customer traffic via tours, special events, receptions and organized barrel tastings. Coatings can be installed in reflective colors, which illuminate normally dark areas, such as under equipment or barrels.



PHOTO COURTESY OF STONHARD

Polymer floors in tasting rooms come in a wide selection of colors.

Green Building and LEED Certification

Polymer floor manufacturers have engaged the green movement, and these companies work closely with architects and contractors that are pursuing LEED certification. Polymer floors fit these profiles in the following ways:

- **Sustainable Sites:** Polymer products rehabilitate existing floor surfaces and avoid demolition, thereby lessening the need for new facilities and construction.
- **Water efficiency:** Smooth and tightly sealed surfaces require less water to maintain cleanliness. Hygiene protocol is highly efficient.
- **Energy efficiency:** Reflectivity of floor finishes enables lower wattage lighting to be used.



PHOTO COURTESY OF STONHARD

Polymer floors can be highly reflective to lower lighting and energy usage.

- **Indoor Environmental Quality:** Polymers are solvent-free with low to zero VOC emission during installation. Polymer floors also help to dampen sound.
- **Materials and Resources:** Resinous ingredients are blended on-site from distribution locations generally within 350 miles and delivered in large, reusable containers that reduce packaging waste sent to landfills.

“Due to a constantly changing regulatory environment, a number of ‘sustainable’ programs, such as LEED, which were formerly options, are now mandatory,” said **John Guill**, a construction specifications expert with **DTR Consulting Services**.

“These standards affect all new build projects in California, and similar standards are due to take effect in 2014. Unfortunately, it is not always clear what standards apply to retrofit projects in a given jurisdiction.” He suggested performing “due diligence and definitely maintain records.”

Wineries should also remember regional water and energy monitoring. Compliance via facility improvement could become an issue, thus, check with local building departments prior to beginning any new projects.

It is worth doing your homework for other reasons. For example, there are different polymer floors to consider, and each has distinct advantages and disadvantages. First, however, choose the right company to do the installation.

Choosing a Company

Without question, wineries’ and polymer floor installers’ first recommendation is to only work with flooring companies with approved installers that provide “certified” installation. Years back, **Mike Kramer** of **International Coatings** in Franklin Park, Illinois, said, “Make sure there is a close tie-in between the applicator and the material manufacturer. We only recommend approved contractors who are familiar with our products and therefore can offer a full material warranty.”

Only a few companies provide the basic raw materials, which all polymer flooring companies use, including **DuPont**, **BASF**, **Dow**, **Huntsman** and **Shell Oil**. Thereafter, the manufacturers of flooring systems formulate their own proprietary blends.

These include companies that typically exhibit at wine industry trade shows, such as **SaniCrete**, **Stonhard**, **Flowcrete** and **IronDrive**. While these companies typically have national representation, they also work through distribution in local markets. The key is to find that local contractor who is certified with that particular manufacturer. They must have intimate knowledge of the different products available. Each manufacturer will typically have a vast collection of products for specific applications, such as the tasting room versus a loading dock.

Product manufacturers must maintain their reputations; therefore, request documentation that the installer is trained and approved, as well as letters of recommendation. It is also highly recommended that wineries work with companies that understand the specific needs and requirements of the cellar and winery environment. Polymer floors are everywhere, from car manufacturing to poultry processing. Wineries, however, present a unique list of conditions and, therefore, demands.

“Make sure to have a good working relationship with that installer,” said **Elias Fernandez** of **Shafer Vineyards** in Napa Valley. Shafer had prior installation failures dating back to the 1990s. Not only is poor workmanship a problem, but “you have to be very specific about telling them what you need,” said Fernandez. Shafer Vineyards currently has durable, non-skid floors in its caves, and the tasting room area has a highly decorative flake finish “while the bottling/production areas are so clean you can eat off the floor,” said Fernandez.

Tetzel with Flowcrete insists that all projects start with a site inspection. “We will bring in our certified contractor who will recognize and help evaluate specific flooring issues. The customer has called because they knew they had floor problems, and hygiene is usually the number one concern with smells, bacteria and even appearance. Among other things we will look at are high-traffic areas and the need for non-skid surface applications,” said Tetzel.

Site visits from **Carl Bowers** with **Tnemec Company, Inc.** mean they “walk the project to determine wear, erosion, shape, contour and drainage issues, loading areas, types of wheels on forklifts and cleaning protocol. Once we assess the situation, we ask about the customer’s expectations. Only then can we design a flooring system,” said Bowers.

“Buyers expect more today. As a result, our company now specializes in the food and beverage industry,” said **Keith Kwasny**, president of SaniCrete out of Farmington Hills, Michigan. “Our main selling feature is the knowledge of our people—from the sales team to the project engineer conducting the site survey, the installation supervisor and crew.”

SaniCrete uses no outside contractors but maintains its own internal staff and installation crews that travel throughout the United States.

Manufacturers maintain a portfolio of products to suit the needs of wineries. Loading docks suffer more abuse than bottling lines or tasting rooms. Heavy-, medium- and light-duty applications will have specific compressive, tensile and adhesion strengths. There will be issues with temperature expansion and impact resistance. These factors make material options an important part of the installation discussion.

Flooring Companies	Location	Phone	Website
BASF	Shakopee, MN	800-433-9517	www.buildingsystems.basf.com
ChemProof Polymers, Inc.	Tulsa, OK	918-584-0364	www.chemproof.com
Cornerstone Flooring	Brownsburg, IN	800-659-7699	www.cornerstoneflooring.com
Dex-O-Tex	Rancho Dominguez, CA	800-704-5571	www.dexotex.com
Dur-A-Flex	E. Hartford, CT	877-251-5418	www.dur-a-flex.com
Dynamic Coatings, Inc.	Fresno, CA	559-225-4605	www.dciflooring.com
Flowcrete North America	Conroe, TX	936-539-6700	www.flowcrete.com
General Polymer	Cincinnati, OH	800-543-7694	generalpolymers.com
International Coatings	Franklin Park, IL	800-624-8919	www.internationalcoatings.com
IronDrive	Phoenix, AZ	480-726-1891	www.irondrivecoatings.com
Phoenix Coatings, Inc.	Madera, CA	559-675-8122	www.phoenixcoatings.com
PolyMax Milamar Coatings	Oklahoma City, OK	800-459-7659	www.industrialplantfloors.com
Polytech Industrial, Inc.	Fresno, CA	800-507-2953	www.polytechindustrialcoatings.com
SaniCrete	Farmington Hills, MI	248-893-1000	www.sanicrete.com
Stonhard	Maple Shade, NJ	800-257-7953	www.stonhard.com
Tnemec Company, Inc.	Kansas City, MO	816-483-3400	www.tnemec.com

Urethanes versus Epoxies: Installation

There are only two polymers a winery should consider: urethane and epoxy.

A third polymer is available, methyl methacrylate (MMA), but its high volatile organic compounds contribute to elevated levels of ozone. Acrylates are highly reactive gases with a high odor index, probably not good around barrels, wine and employees.

Urethanes and epoxy are basically resins that are mixed with a catalyst or hardening agent and applied directly over a concrete floor that has been properly conditioned.

Urethane and epoxies both work extremely well in specific winery environments, as long as they are applied in areas that complement their characteristics. Each has something to contribute. Some of the issues for wineries to consider are:

- Cost. There is a wide range of possibilities in polymer floors, such as color, surface treatments (non-skid), strength and durability. Without question, this is when you consult with the manufacturers. Epoxy is generally less money per square foot than urethane but lacks in other areas, like strength. This is to say a winery may use less durable epoxy in tasting rooms and bottling areas and urethanes in high impact areas, such as loading docks and cellars: visual versus functional. By using a combination of both, where needed, this can save considerable money. Again, demand site visits to review your needs.
- Urethanes set within five to 12 hours while epoxies can take twice as long. This may be important when moving tanks and barrels out to clear the workspace and planning for down time. Urethanes can also be formulated and then applied in a much wider temperature range, which can be important depending on where your winery is located (seasonal temperatures) and time of year (winter versus summer).

- Vapor pressure tests (VPT) are critical. Preparation of the old floor begins with the surface scarified or shot-blasted, with cracks sealed to provide a good bonding surface. The VPT will tell the manufacturer the exact amount of moisture expiring from the concrete. Typically called moisture or vapor drive, it is the mitigation of “humidity” passing through the concrete from soils below.

Ratings are determined in pounds of vapor pressure. Epoxies will adhere to concrete that is between three and five pounds while urethanes are for anything five pounds and above, even 12 pounds. This means urethanes can just about be applied to any situation, even green concrete. “Moisture drive” has traditionally been measured by using calcium chlorate discs, positioned on the concrete for 60 hours. Today, electronic meters, such as the **Wagner Meter**, offer instantaneous measurements and are far more reliable.

- Thermo-shock has been discussed, and certainly wineries should pattern their sanitation programs with temperature as a criteria. Here urethanes are the clear winner over epoxies.
- VOCs and odors are not issues with either material.
- Acid-resistance is excellent for both; but as Kramer of International Coatings said, “Check the manufacturer’s chemical-resistance ratings to make sure the winery environment applies.”
- In terms of strength, Tetzl of Flowcrete said 85 percent of all business applications are now urethane.

Winery-specific characteristics of polymer floors

	Over H ₂ O	Vapor Pressure	Cure Time	VOCs	Odor	Hot Water	Thermo-Shock	Strength	Acid-Resistance	Cost/Sq. Ft.
Urethane	Best	5 to 10	5-12 hrs.	None	None	To 220 degrees	Best	Best	Good	\$12-\$15
Expoxy	OK	3 to 5 only	12-24 hrs.	None	None	To 140 degrees	Good	Good	Good	\$5-\$7



A sanitary work surface drains directly to stainless gutters.

BILL PREGLER

With a tightly sealed polymer floor, the majority of pathogens can be quickly removed with a minimum effort, using the least amount of water and energy.

Hygiene-Driven

As a retired general contractor from the Northwest, **Lou Kapcsándy**, proprietor of **Kapcsándy Family Winery** in Yountville, California, has installed polymer floors for three different wineries and in clean rooms for computer chip manufacturers and pharmaceutical companies. His suggestion is to “let the concrete base cure for a period of time (two to three years) to allow for settling issues and cracking. Then resurface...Polymer floors do not necessarily like to be applied over flexible surfaces, and [in] our area, we have lots of clay in the ground.”

Kapcsándy has since finished the winery project with urethanes in the production, barrel and storage rooms. The urethane on the floor, via coving, continues 3-1/2 feet up the walls as a wainscot to completely seal the work areas. Floors were contoured to promote drainage directly to the stainless gutters. “I have traveled extensively in Italy and France and am very familiar with contamination issues. We are hygiene-driven,” concluded Kapcsándy.

Floors as a Tool and a Showcase

Wineries sanitize hoses, clamps, tanks and pumps. They constantly work to keep the crush equipment clean during harvest. When bottling, they rinse bottles and sparge with nitrogen. They religiously filter wine. Winemakers look for contamination everywhere so why not maintain a sanitary floor? Science and the food industry tell you the evidence is in, and they all know where the bugs live.

Vendors we contacted will tell you polymer floors are definitely gaining in popularity, but it now goes beyond hygiene. **Kyle Tierney**, production manager for Stonhard told us, “We have seen a definite increase in the winery business and also micro-breweries. They both have the same issues with sanitation, but with more places doing tours they want their facilities to be both functional and good looking.”

Carl Bowers with Tnemec agreed and concluded, “More wineries today are taking guests into process areas and places that in the past were out of sight to the public. Increasingly, they are restoring, protecting and beautifying these areas for both cleanliness and appearance.” **WBM**