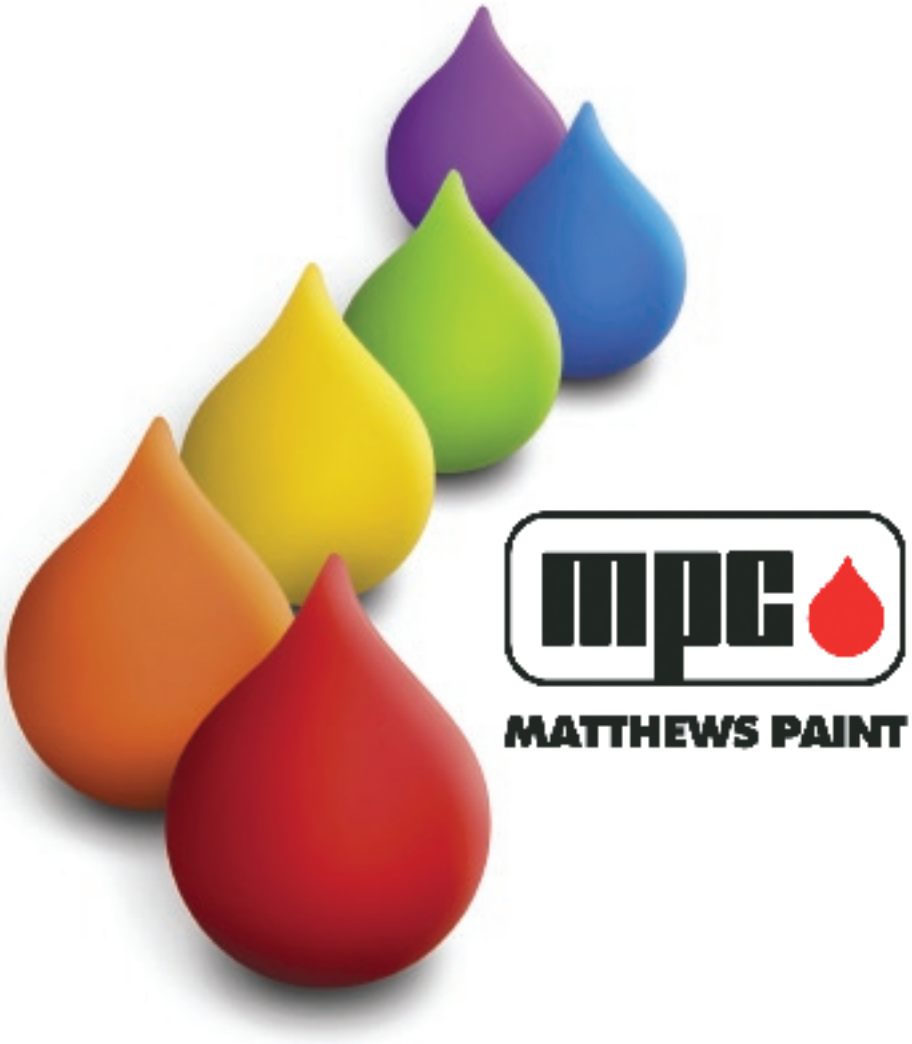

Paint Durability
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By Jeff Wooten

Paint Durability

Making sure one's paint job will last for years to come.

Sign painters have long been an integral part of the sign industry. The coatings they use provide finished signs with dynamic colors, enhanced texture, and outstanding visual appeal. With this in mind, their paint selection is an important component of the fabrication process.

Polyurethane coatings are among the highest-performing paint systems, and they're also the primary type of paint being used within the sign industry . "Polyurethanes have superior abrasion resistance, excellent chemical resistance, and are highly resistant to UV light degradation," explains Donna Schaefer, marketing manager at Matthews Paint (*www.matthewspaint.com*). "They're specified because of their excellent weathering and their color and gloss retention. Polyurethane chemistry is the industry standard—where graffiti resistance is a priority in topcoat selection. Polyurethane coatings retain their hard, durable finish and good-looking appearance for years."

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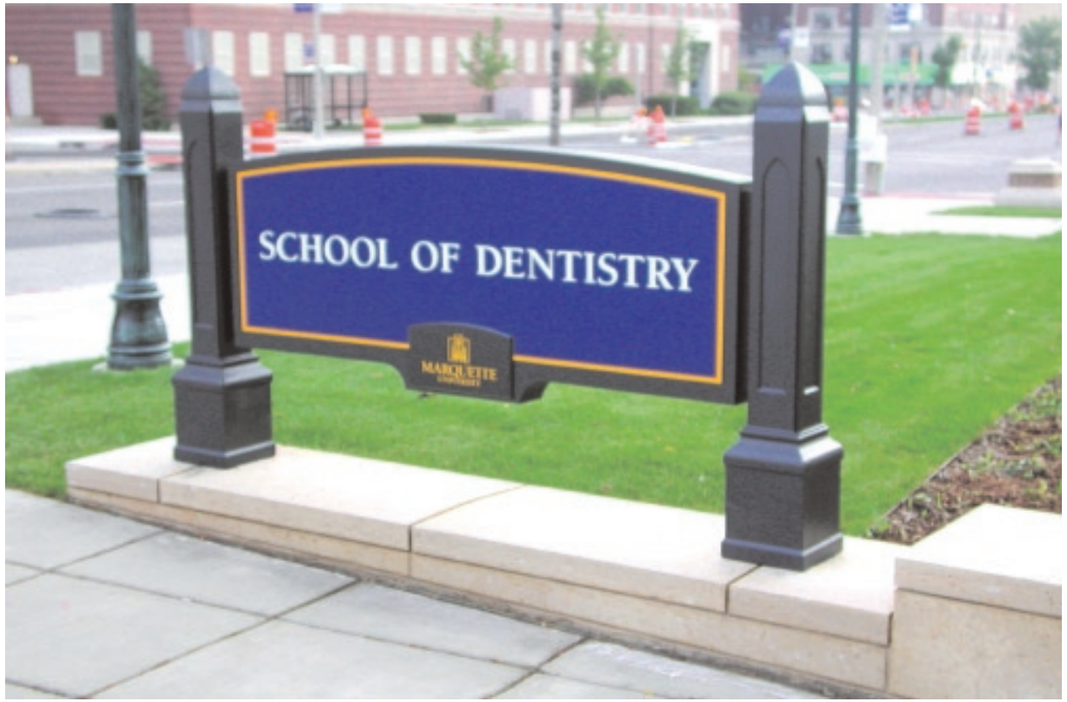

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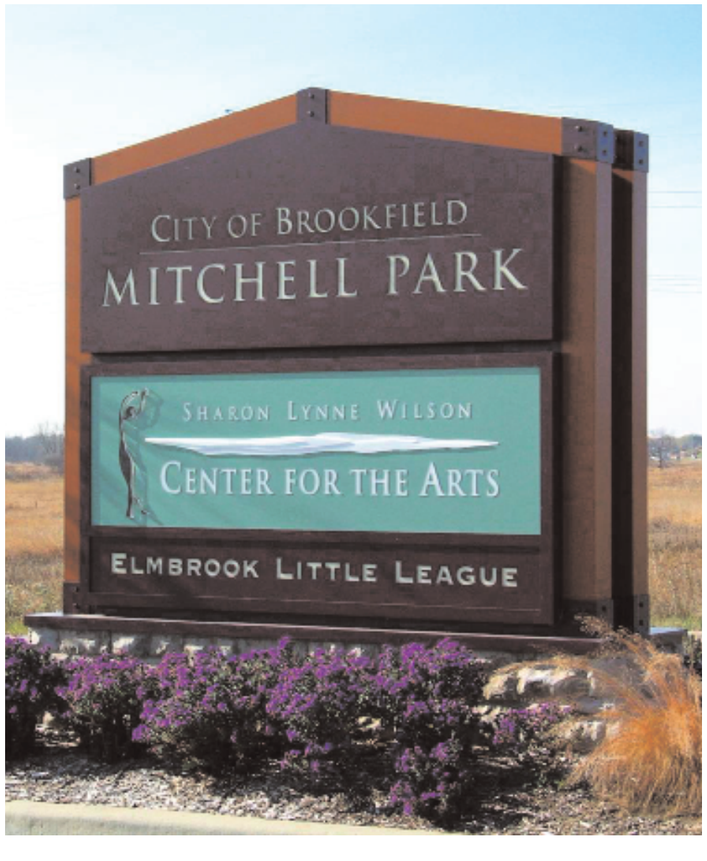


Sign painters want their finished work to be visibly appealing for as long as possible. Some frequently asked questions regarding paint durability and performance include:

☞ How long will the paint last?

☞ What happens if somebody vandalizes the finish?

☞ How does it weather?

☞ Will it stick to the primer I used?

☞ Can I afford this paint?

☞ How do you clean a painted sign?

"Ultimately sign makers *and* end-users want a long-lasting, cleanable, and durable-painted coating," says Jan Scheske, customer service/inside sales manager at Matthews Paint. "Because the sign is their advertising tool and promotes the image of a company, users want it to look as good as possible for as long as possible."

To make certain that their signage will last as long as possible, sign painters need to consider a variety of factors that can affect a paint's performance and durability: humidity, salt air, and temperature extremes, to name a few environmental examples.

It also helps to think of the future and consider if durability will be an issue down the road. If they believe this could be a potential problem, an investment today in high-quality paint will forestall headaches later on.

According to paint experts, this is an ideal opportunity where spending the extra money will prove to be worth the investment.

Jeff Damm, new product and color specialist at Matthews Paint, explains that paint durability is dependent on the strength of the coating. "The three most important factors behind the cause of surface coating breakdown are a combination of UV light, heat, and moisture," Damm explains.

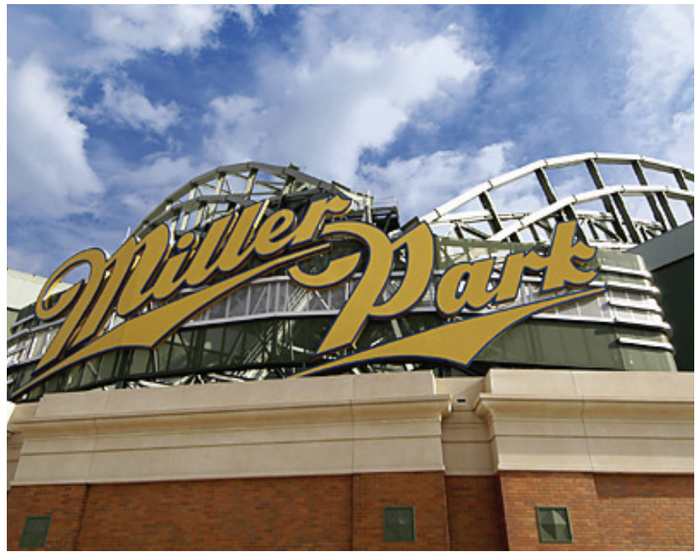
To protect against breakdown, it's important to consider the following items:

Binder. There are three basic components found in paint: the binder (the backbone of paint), the pigment (which provides the color), and the solvent (which provides fluidity). Let's discuss the binder.

There are different qualities of binders (acrylics, alkyds, lacquers, etc.), but typical binders for durable coatings are (listed in order of durability and, incidentally, cost): Polyvinyl fluorides (fluoropolymer coatings), acrylic urethanes, and pure acrylics.

Urethanes are the coating of choice in the signage industry because of their versatility, their high performance characteristics, and their ease of use. They also sport a greater range of color than polyvinyl fluorides.

As far as durability, a sign professional needs to be aware of the possibility of the paint chalking. "Chalking occurs when the binder or pigment breaks down," says Steve Sawar, technical director at Matthews Paint.



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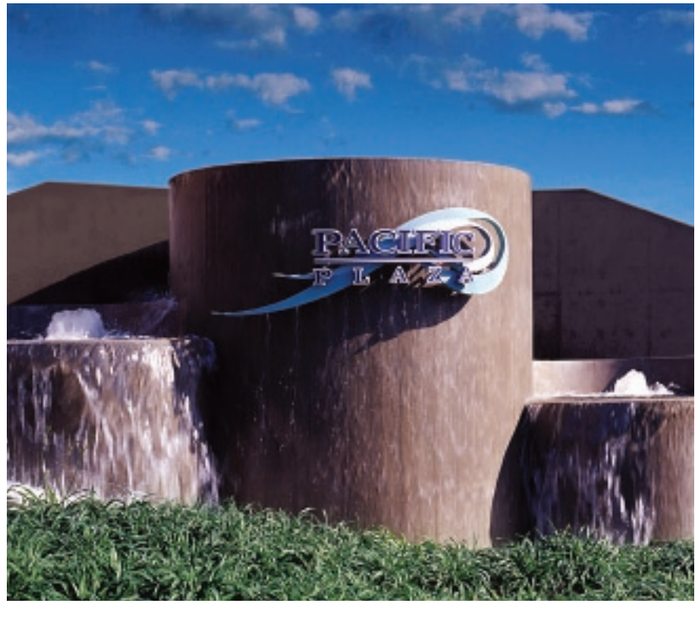

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Pigments. There are many grades of pigments, some more durable than others. High-end paint systems use only top-grade pigments that are light-fast.

"The pigments used, for example, in interior flat paint are different than what would be used in automotive-style coatings," comments Damm. "The pigments that we—and all high-end paint manufacturers—use are 'automotive-grade,' which means they possess the highest durability as that type of pigment can have."

Damm also notes that lower-end coatings use lower-end pigments, which leads to chalking and color difference much sooner than you'd experience with a high-end paint.

(*Note:* What most people describe as fading results not from the pigment itself, but instead from when the binder resin breaks down and chalks. You lose the gloss through the binder breaking down.)

Surface properties. The surface of a coating can affect durability. For example, a less permeable film will degrade faster than high-gloss coatings."Since they're not as 'tight' as a full-gloss finish, they're more easily invaded by water, moisture, etc.," comments Sawar.

Film thickness also comes into play here. "Low film thickness is often the cause of paint failures in urethanes," says Sawar, "as the proper film thickness of the primer and the topcoat is critical to paint system durability."

Proper mixing. Two-part (2K) urethanes are dependent on the proper ratio of paint and catalyst. Improper mixing causes the loss of desirable properties. Without a catalyst, a 2K urethane simply will not cross-link (i.e., the build-up of long-chain polymers that are highly resistant to sunlight and chalking). "It's more related to the proper volumes that are being mixed," explains Damm.

Surface preparation and primers. Proper substrate preparation—sanding, cleaning, etc.—is very important; so too are the primers that are being used. The primer acts to improve the substrate's surface and gives the topcoat greater adhesion capabilities. Without a proper primer, even the best surface coating won't perform well.

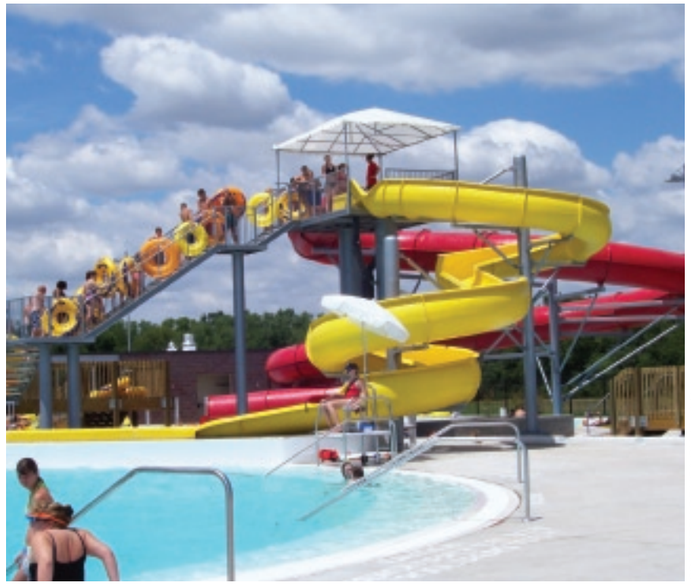
"The appropriate primer depends on what type of substrate you're painting onto," says Sawar. "When you're talking about metals, most companies have a variety of primers you can use—depending on the corrosion resistance required and the level of filling capability needed, to name a few.

"There are a variety of primers available for almost any type of substrate—including etching primers, epoxy primers, and urethane primers. It's important to ensure that you use the correct primer for the job you're doing."

Clean equipment. Cleanliness is an essential component of the successful paint job. Sawar points out that not only do sign painters need to *always* use clean tools when applying primers and coatings, they also need to make certain that the surface of the substrate is clean. "This will assist in the ultimate quality of what's being sprayed," remarks Sawar.

According to Sawar, there are cleaners available in the marketplace that are designed to prepare and clean your spray equipment and the substrate you're using.

Cure time. It's important to follow the paint manufacturer's directions in terms of cleaning, application, and the amount of time it takes to go from wet to fully cured and developed. "In our industry, turnaround time is critical," says Scheske. "Sign professionals are trying to paint and get the product shipped off quickly. However one needs to make certain that the painted sign has the appropriate amount of time for curing, so that it hardens to its fullest before being handled, packaged, and shipped."



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However there's a difference in being fully dry to the touch and being cured. "Typically urethanes can take between five to seven days to reach full cure, unless the sign is being baked or accelerated," says Sawar. "One of the reasons the industry has come up with accelerators is to speed up the polimerization process (the paint/catalyst reaction). For example, using an accelerator enables the sign builder to apply vinyl in hours rather than days."

Sawar also points out that packing-related problems can occur if the paint used on the sign isn't allowed time to fully cure. "If you wrap your sign with bubble wrap or plastic film too soon, then when it comes time to open up the package, the packing might end up stuck to the face of the paint or it might leave tracks," he says.

Temperature also plays a crucial role in a urethane's ability to cross-link. For example, painting in a cold environment (55°F or lower) will stop the coating from cross-linking, which will in turn cause irreversible damage to the film's desirable properties. Once the cross-linking process has stopped, it will never resume.

(*Note:* When curing, it's also important to store the painted signage in clean areas above 55°F and to not expose it to moisture.)

Clear coats. Clear coats are always a good idea if the ultimate in longevity is what the sign builder is looking for; a clear coat will add an additional layer of protection.

A key point with clear coats is that the higher the gloss, the better it's going to hold up due to not having inert materials that tend to compromise film integrity.

Finally Scheske advises sign painters to call their paint manufacturers with any questions they might have about the product. It's very important to know the technical requirements before starting a project. Finding out these answers upfront will help to ensure a long-lasting and high-quality paint job today and the forseeable future.

Testing Coating Durability

There are a variety of testing methods employed by manufacturers to make certain that urethane paints will be able to last in an environment or geographic location for as long as possible. These specific tests include:

1. Natural weathering test. This is a real world test of paint durability, and it's usually conducted at test farms in Arizona, Florida, and other places that experience high sunlight intensity and/or significant heat and humidity. "In this type of test, you paint the substrate and then leave it out in the sun," says Steve Sawar, technical director at Matthews Paint. "For example, in the state of Florida, a standard test would be five years."

(*Note:* This is considered to be the most reliable of paint testing methods.

2. Accelerated weathering test. This procedure exposes coatings in a QUV cabinet to a combination of UV bombardment by special fluorescent light, moisture, and heat. Cabinets can be set up for four-hour cycles (four hours of light exposure and four hours of heat and humidity or any number of even hours.) This method is good for quick head-to-head evaluation of coating variations or competitive products, but it can't be equated with "x" number of years natural exposure in the real world.

3. Carbon arc chamber exposure. Similar to the QUV cabinet but using a carbon arc light and lacking the moisture/condensation cycle. Since it doesn't contain some of the wavelengths that fluorescent bulbs do, it's a more natural accelerated weathering test.

4. Salt spray (fog chamber). This testing method is conducted in a chamber and uses salt fog. "Salt spray is an accelerated corrosive environment intended to check how corrosion-resistant the coating system is," says Sawar.

There are also a couple of tools that are used in natural and accelerated weathering tests:

Spectrophotometer. This is used to measure color shift. The unit of measure is Delta E (total color difference). Some of the mathematical models used are: CIE Lab, CIE Luv, Hunter Lab, FMCII, and CMC. "[Delta E] turns color into numbers," explains Jeff Damm, new product and color specialist at Matthews Paint. "You can assign numbers to the color shift induced. For example, if there was five delta E difference between a control panel and a weathered panel, it can be used as a basis for comparison of different formulations."

Glossmeter. This is used to measure the surface condition (gloss) of paint films, there are three types: 60-degree glossmeter (general purpose instrument), 20-degree glossmeter (used to measure high-gloss finishes), and 85-degree glossmeter (used to measure very low gloss (matte) finishes).

"You simply beam down a light at a certain angle and then a sensor reads how much of that is reflected off that same angle," explains Damm. "The more textured a surface is, the more light that's going to be scattered and the less light that's going to be received by the receptor. In exposure testing, glossmeters are used to calculate gloss loss by comparing readings of control and exposed panels."

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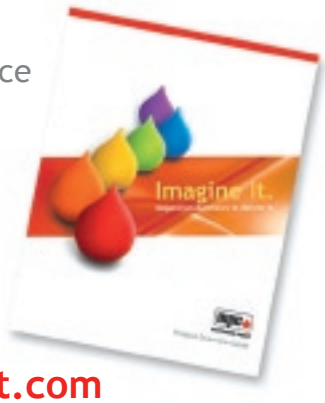

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