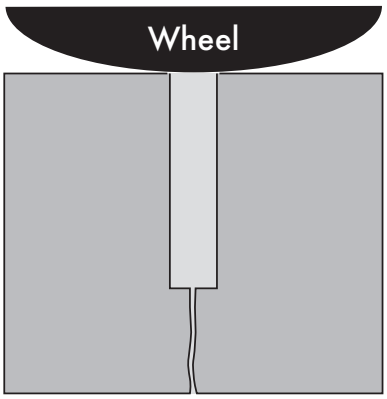
JOINT FILLER
Technical Bulletin 5

METZGER/McGUIRE

2017 LTD LESA SYSTEMS
ENGINEERED CONCRETE FLOOR SYSTEMS

FLUSH FILLER PROFILE IS CRITICAL

The primary function of the semi-rigid floor joint filler is to protect joint edges from deterioration. This damage called spalling is caused by impact from the hard wheels of material handling vehicles, and heavy load imposition or unsupported joint edges.



Semi-rigid joint fillers provide edge protection in two ways:

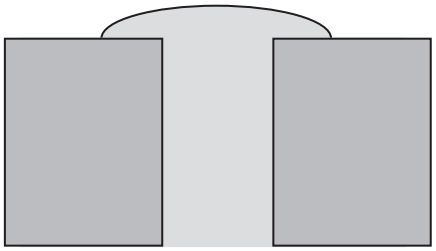
1. Semi-rigid fillers restore the floor surface continuity. As vehicles cross the joints, the filler supports the vehicle wheels, thus making the ride interruption-free.

2. Semi-rigid fillers provide edge support when they directly abut the side of the joint and the top joint edge.

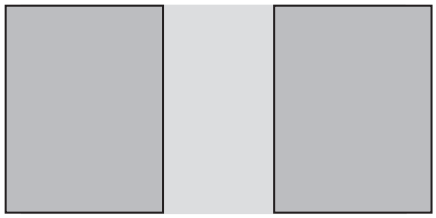
Semi-rigid filler must be flush with the floor surface to be an effective joint edge protector. While this sounds easy to achieve, in practice it is not always straightforward. The problem arises from the fact that fillers must be liquid so they can readily flow into narrow joints. All liquids tend to dish (go concave) unless you use techniques that overcome a liquids natural tendency.

HOW TO ACHIEVE A FLUSH FILLER PROFILE

The only method of preventing concave filler profiles is called the overfill-and-shave procedure. When filing, the installer dispenses enough material so that a filler crown is created. This crown is left in place until the filler cures into a solid. At this point the installer shaves off the crown, leaving the final filler profile flush with the floor surface.



FILLER CROWN



AFTER RAZORING

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VARIATION IN CROWN CREATION

Not all fillers crown in the same way. Because of their slower cure rate, epoxies may settle (dish) after the crown has been created. Additionally, epoxies may start to run through shrinkage cracks at the base of joints before they start to set, causing the crown to collapse. This is one reason why most epoxy filler instruction sheets call for a two-pass filler application, allowing any leakage to be exhibited before the crown pass is in place.

VARIATION BETWEEN EXPOXIES & POLYUREAS

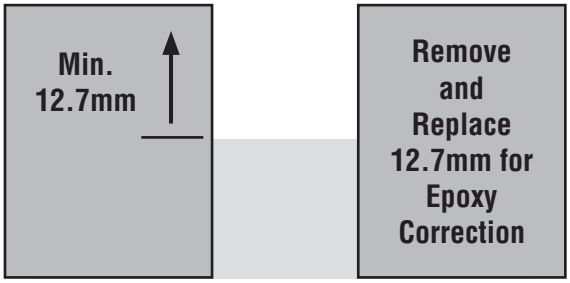
Cured epoxies tend to shave “more flush” than cured polyurea fillers. The difference has to do mostly with the chemical make-up of the respective fillers. Epoxies are often blended with inert substances (silica’s, clays, etc.) used to achieve certain viscosity and rheology characteristics. This gives epoxies a more open molecular matrix that blades can slice through cleanly.

Polyureas are typically composed of only liquid components, and when cured they have a very dense molecular structure. A polyureas rubbery texture can sometimes resist the blade and create a pulling tension, which can result in a concave profile. The potential for concave shaving varies from product to product. With both epoxies and polyureas, there are optimal timing windows when best (most flush) profiles can be obtained.

HOW FLUSH IS FLUSH?

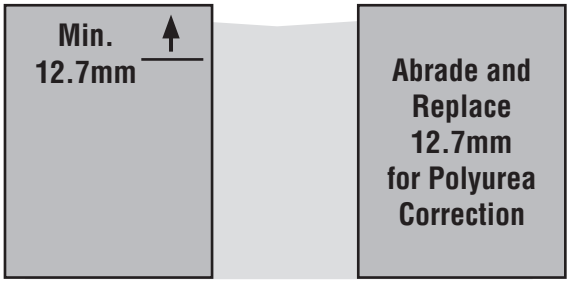
The term flush can often be subjective. Some projects require absolute flushness, while others have less stringent criteria. The most commonly used test to measure flushness on a job site is to hold a credit card edge across the joint and shine a flashlight behind it. If the light comes through under the card, dishing is indicated.

CORRECTING LESS-THAN-FLUSH FILLER PROFILES



The best, basic means of correcting dished (concave) epoxy fillers is to saw cut out the top 12.7mm of the filler and refill with the same epoxy of Spal-Pro RS 88 polyurea. Allow the filler to cure into a solid, then razor off flush. Correcting dished polyurea filler is generally done by abrading the surface to a nominal depth of 12.7mm and applying additional polyurea.

While it’s possible to saw out some polyureas using specialty blades, most polyureas are not as easily removed as epoxies.



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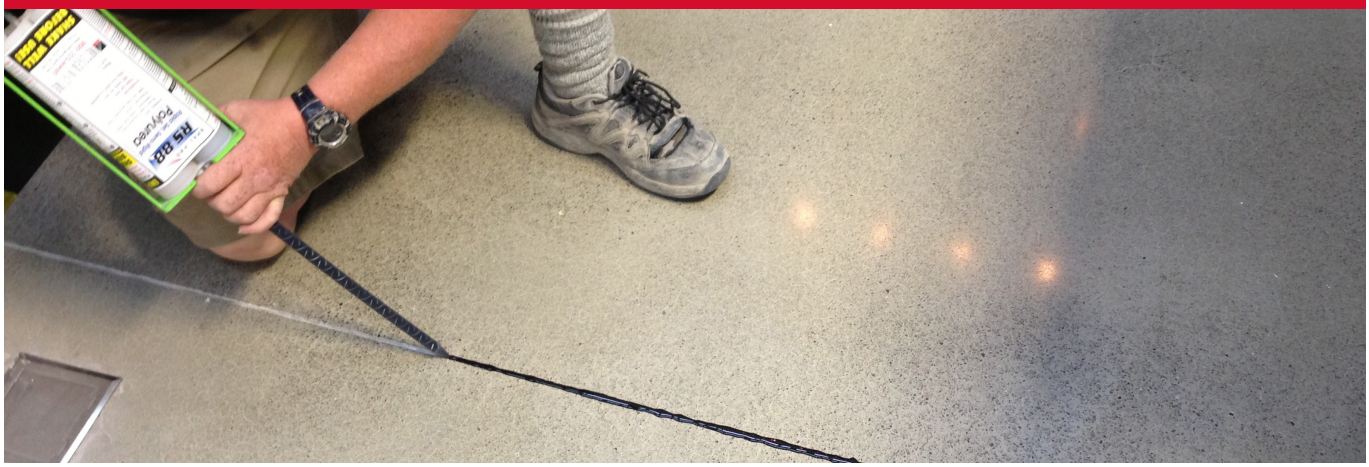

FLOOR SURFACE ISSUES FROM FILLER OVERFILL

The overfill-and-razor method of achieving a flush filler profile may have two negative side effects: surface staining and the pulling of surface fines. Both issues are related.

SURFACE STAINING

When joints are overfilled (crowned), the liquid filler will spread across the slab surface. In many cases the filler will leave a slight shadow, residue, or "stain" on the surface, even after the excess filler has been razored off. The severity of the staining will somewhat depend on the fillers properties (viscosity, cure time, ability to wet the surface, adhesive strength, etc.), in the case of polyurea fillers, the timing of the razoring process can play a role in the degree of staining or film residue. But setting all these variables aside, the predominant factor in stain severity is almost always the condition of the slab surface itself.

If a slab is composed of quality, properly proportioned concrete components, and is very densely troweled, the surface will be so tight that a drop of water will bead, rather than be absorbed. In this case, the stain left from a filler, after razoring, will generally be very slight. This can usually be eliminated over time through normal floor scrubbing, although a slightly abrasive scrub may sometimes be needed initially. The use of a liquid hardener/densifier as a integral part of the slab design/ construction will also help reduce stain severity by reducing surface porosity.

But all slabs are not created equal. Some slab surface may appear tight, but a drop of water on the slab will be absorbed rather than bead, indicating porosity. In fact, surface tightness may vary, even within a single floor. Perhaps one area dried out sooner due to weather conditions, or the start of troweling was delayed. Both can reduce surface tightness. If this is the case, a deeper stain can be expected, along with more difficult stain removal.

Recognising that slab surface tightness can vary, and that some projects have an aesthetics criteria (retail stores, etc.) that makes staining unacceptable, Metzger/McGuire developed a stain-prevention film called "SPF". "SPF" is applied as a liquid which, when dried, will leave a thin film that creates a bond breaker between the filler and the concrete. SPF works very well in the vast majority of floors, but it cannot prevent staining in a floor that has a porous surface. We've seen cases where the SPF itself penetrated into the surface and left a stain, in addition to the fillers stain. Because the SPF is now below the surface, removal can be difficult if not impossible.

When extensive overfill staining occurs, always start by examining the tightness and porosity of the slab surface.

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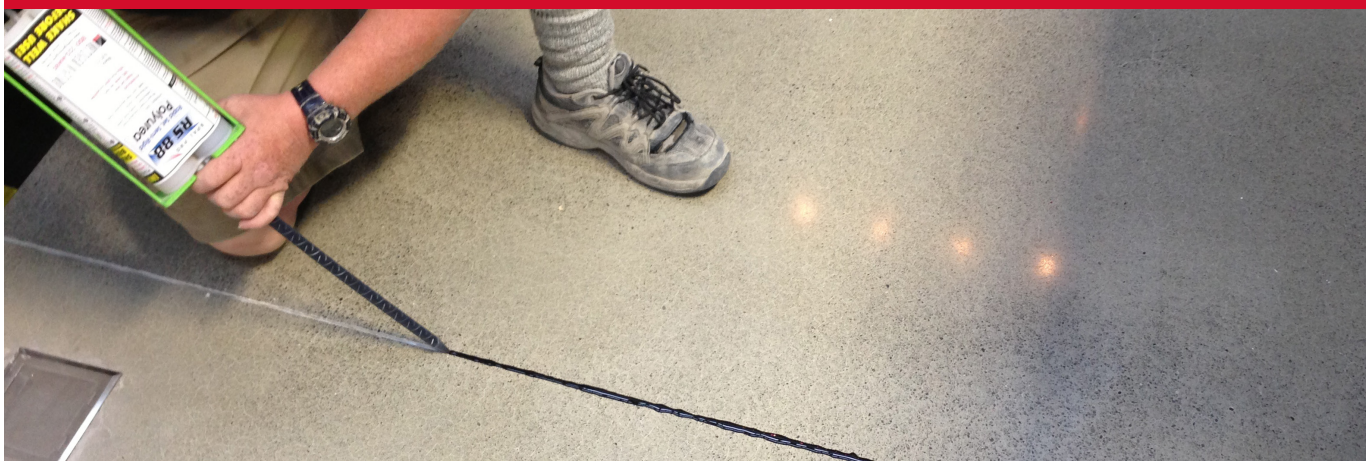

HOW TO REDUCE STAINING ISSUES

The key to dealing effectively with staining issues is always prevention. Here are some steps that should be employed on every project where staining could be contentious:

1. Establish stain tolerance criteria before filing starts
2. Apply a filler sample before the onset of the filing operation. Determine the past-razoring staining level with and without an SPF application
3. If staining is still objectionable with an SPF application, test with a thicker application, and then with two
4. If it appears that our SPF is leaving a stain, discontinue further SPF use and contact us for recommendations

SURFACE FINE PULLING

The razoring-off of the filler may also result in the removal of some of the floor surface. This phenomenon is referred to as “pulling surface fines.” As with overfill staining, the problem is almost always related to the slab surface finish.

The initial assumption on projects where this occurs is that the fillers adhesion is so high that it is pulling off the slab surface.

This assumption is incorrect for two reasons:

1. The adhesive strength of most semi-rigid filler is only 250/400psi. The integral strength of a properly finished floor slab should be impossible for the filler to tear off slab elements.
2. The only way filler can pull of fines is if it has both a chemical and a mechanical bond. As explained in the staining section of this bulletin, filler should not penetrate into a properly densified, tight slab surface.

As with staining, the first test should be to evaluate whether a bead of water is absorbed into the surface, thus indicating porosity. A second test is to apply a strip of duct tape firmly to the surface, heat slightly with a torch and allow to cool and then peel it up. If the tape pulls up fine, the conclusion is obvious. If the tests are not considered adequate evidence accepted by all, a consulting engineer can perform more conclusive forensic testing.

If it is verified that the surface density is lacking, an additional treatment of hardener/densifier should be considered.

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