



The First Year in the Life of Your New Floor

*What to expect in the First Year After Construction of Your New Industrial Floor...
What to Do When the Expected Occurs*

As the owner of a new industrial facility, you are probably still settling in, working the bugs out of your operations. Although you may not have noticed, your floor is also adjusting to its environment. How your floor settles in over the next year, and how you respond can have a significant effect on the long term durability of your floor. You need to realize that the durability of your floor will forever affect your operations and productivity.

The purpose of this article is to give you a condensed view of what is going on with your floor during its first year. Consider this an abbreviated owner's manual without technical jargon or complicated formulas. Just a simple explanation of a very complex object.

CRACKS

As much as you are displeased to hear it, all concrete cracks. There are many causes of cracking, but most of them are rooted in the fact that all concrete shrinks.

The standard concrete mix contains far more water than is needed to hydrate (harden) the cement. This excess water, used mostly to make the mix workable, will evaporate slowly over a long period of time. As the moisture leaves the slab actually shrinks in mass. This causes stress buildup, friction with the base the slab rests upon and lifting of the ends of the pour. All of these results can cause cracks. Other causes include restraint at fixed objects such as docks, improper joint spacing, late joint cutting, etc.

The question for you as the floor owner is not whether you have cracks. You definitely do. The important questions to ask are:

1. What caused the cracks?
2. How many do I have?
3. How wide are they ; how deep?
4. Have they significantly weakened the floor?
5. Will they get worse?
6. Will they affect my operations?
7. Can they be permanently corrected?
8. Should they be corrected?

JOINT DETERIORATION

In the traffic-bearing areas of your floor you have two types of joints: construction and control joints. Construction joints are those joints at the ends of pour sequences. Control (contraction) joints are joints within each pour designed to induce the anticipated cracks to crack in a straight line. Generally, you will find joints at intervals from perhaps 12 to 25' grids.

Joints are affected by shrinkage. Conventional concrete shrinks at a rate of approximately 1/8" or more in each 20'. This means that over the one-to-two year period during which concrete shrinks, your joints may open an additional 1/16 to 1/4". This can have a dramatic effect on any joint filler that is used.

Joints in traffic bearing surfaces should always be filled. The function of a filler should be to protect (support) the joint edges from damage caused by hard wheel impact. This damage is called 'spalling'. Once spalls occur they continually get wider and deeper. Spalls damage vehicle wheels, result in bumps that material handling vehicles (MHV) drivers slow down for and eventually costs \$\$\$ to repair.

To be effective, the filler should be fairly stiff, like a very hard rubber. This means it will not expand as the joint opens. There are only two ways to overcome this dilemma: (1) install the filler late in the schedule to allow for as much of the shrinkage as possible; and (2) provide for repair or replacement of the filler after the shrinkage seems to have stabilized, usually after the first full heating season.

If you are experiencing joint filler separation (adhesive or cohesive), contact the manufacturer of the filler for their recommended corrective procedures.

If you are already experiencing joint edge spalling, don't delay in reacting. Identify the cause and take appropriate action before the spalls become too severe for simple correction.

There are many causes of joint edge spalling for you to consider, including the following:

1. Joints are not filled.
2. Filler was too soft to support traffic.
3. Filler was installed too early and separated badly as joints opened wider.
4. Filler was installed too low in joint to protect edge.
5. Filler was installed too shallow to support hard wheel load (filler should be full depth in saw cut joints, 2' deep in construction joints).
6. Filler was of poor quality, deteriorated with time.
7. The concrete edge itself was weak.
8. The joint was higher on one side, leaving it vulnerable to wheel impact.

JOINT EDGE CURL

Joint condition #8 in the preceding paragraph (higher on one side) could be caused by a phenomena known as 'curl'. Concrete shrinks at a faster rate on its top surface because it is exposed to the air. As shrinkage occurs the ends of each pour curl upward. (You can see the same effect by examining dried mud). To determine if you have a curled joint, simply lay a straightedge across the joint and see if it rocks. Another is to listen for a 'thump' as vehicles cross, or visually watch for slab deflection.

Curl can leave joint edges at different elevations, leaving the high one vulnerable to wheel impact. But curl can cause even worse problems than that.

As the top edge of a slab curls upward, the bottom of the slab may actually lift up off the ground. As MHV's cross, the two adjacent slab segments may actually "rock" as they deflect under load. This means that both slabs may be the exposed high point at given times in the vehicles progress. The rocking effect also causes any joint filler used to debond and become worthless. Generally, replacing the filler will not solve the problems of rocking.

Curl is a natural phenomena that is almost impossible to avoid although, it can be minimized. The important questions for you, the owner, are:

1. How severe is the curl with regard to joint edge elevation? Will it affect my operations?
2. Do the slab ends "rock"? How much?
3. Can the rocking be eliminated easily or are more sophisticated measures necessary?
4. Is the rocking in my floor "normal" or did faulty design or construction practices contribute to the problem?

SURFACE DEFECTS

The surface is obviously the most critical part of any floor. Surface defects can also be the most difficult floor problems to repair since it is subject to constant abrasion, wear and impact. For the purposes of brevity, this article will cover only a few of the more common surface defects.

DUSTING

Dusting is a condition that usually occurs as a result of poor finishing techniques and/or poor curing. This dusting indicates that the surface is relatively soft and weak. There is no sure cure for correcting this weakness, but treating the floor with a liquid hardener will reduce dusting and improve wearability.

DELAMINATION (Scaling)

This condition is where the top 1/16' or 1/8' of the surface comes off, leaving the underlying aggregate exposed to wear. The causes are usually improper finishing, although certain aggregates can cause popouts that yield a similar appearance.

The correction of this condition requires that the entire surface be stripped away down to sound concrete, often 1/4' to 3/8'. The surface is then replaced with an epoxy or polymeric grout overlay. The cost of this procedure is high, the results seldom 100% successful and special equipment is almost always advisable.

CRAZING CRACKS

Crazing is a defect that looks like a series of cracks in the surface resembling a chicken wire pattern or a map. Crazing is seldom a serious problem, especially if the cracks remain tight and relatively shallow.

The typical cause of crazing is rapid drying of the surface caused by wind, heat, poor curing, etc. If there is concern as to the

long term durability/wearability of the surface, a treatment with a high solids sealer is usually appropriate. If the floor starts to delaminate, resurfacing may be required.

There are many additional problems that can befall a new floor besides those discussed in this abbreviated article. We hope you will contact us if you need help or even just information on any of them. There is never a charge nor any obligation for any technical assistance we provide via phone or fax. Your new floor is vital to the productivity of your operations. We hope you will consider Metzger/McGuire as your floor resource center.

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