

Why Floor Coatings Fail

Whether peeling, bubbling or delamination needs more investigation

By **Henry Hunt**, Partner, Topcoat Services USA · For owners, facility managers, contractors and specifiers



Polyurethane traffic coating on a vehicular ramp.

When a coating starts peeling or bubbling, the first instinct is to patch it. Sometimes that's the right call. Often the patch fails too, because whatever caused the first failure is still there.

1 Most failures trace to a short list

In the failed floors we've investigated, the cause has more often been one of these than a defective product. Product problems do happen, which is one reason batch records matter.

Prep. Not enough surface profile, or contamination left on the slab: oil, curing compound, old sealer, cleaning residue.

Moisture and alkalinity. Conditions in the slab that the installed system wasn't rated for.

Wrong system. A coating that was never built for the heat, chemicals or traffic in that room.

Install conditions. Wrong mix ratio, cold slab, condensation, or a second coat applied outside the recoat window.

The concrete itself. A weak top layer (laitance) that comes up with the coating.

Look at the back of the peeled piece

It's a fast clue, not a verdict. Smooth and clean suggests the coating let go at the concrete surface. Concrete stuck to it means the break happened inside the concrete at that spot. That can point to a weak surface layer, or to stresses that exceeded the concrete's strength there. Both need testing to interpret.

2 Reading the symptoms

A symptom points you toward possible causes. It doesn't confirm any of them. Use this as a starting point for what to check.

What you see	What it can suggest	What to check
Coating peeling off clean, smooth concrete	Poor bond from low profile or contamination	Original prep method, profile and any sealers or curing compounds
Coating peeling with concrete attached	Cohesive failure in the concrete: weak surface, laitance, or high stress	Pull-off testing; concrete surface strength
Blisters, sometimes with liquid inside	Moisture, alkalinity or osmotic blistering	Slab moisture and pH testing; vapor retarder; contamination
Pinholes or bubbles that formed during install	Outgassing from a porous slab as it warmed	Install timing and temperature; primer used
Cracks that follow joints or slab cracks	Slab movement telegraphing through	Joint treatment at install
Cracking and lifting in hot or washdown areas	Thermal stress beyond the system's rating	Washdown temperatures; system's rated limits
Soft, tacky or greasy surface	Improper mix, cold cure or amine blush	Batch records; temperatures during install
Coating lifting under tires	Hot-tire pickup	Topcoat type; whether it's rated for vehicles
Worn through in traffic lanes	Wear layer too thin for the traffic	System thickness and topcoat
Yellowing or color change	UV exposure or chemical staining	Sun exposure; cleaning chemicals

3 Where it broke is a clue to why

Every coating failure happens at a specific layer. Finding that layer narrows the possible causes.

Between coating and concrete. Adhesive failure at the interface. Often prep, contamination or moisture, but not always.

Inside the concrete. Cohesive failure in the substrate. The surface may have been weak, or loads and stresses may have exceeded its strength there.

Between coats. One layer didn't stick to the next. Often a missed recoat window or contamination between coats.

Inside the coating. The material itself is soft or broken. Often a mix, temperature or cure problem.



Mechanical removal and prep down to sound concrete.

A pull-off test per ASTM D7234 measures pull-off strength and records where the break happens. It's destructive and site-specific. Results are evidence, interpreted alongside concrete strength, prep records, exposure and installation history. ICRI 210.3R gives guidance on running and interpreting these tests. Acceptance values come from the project spec or the manufacturer.

4 When a patch makes sense

A patch is reasonable when the damage is isolated and the cause is understood: a forklift gouge, a dropped tool, one bad spill. Cut out the damaged area to sound edges, prep it properly and repair it with a compatible product.

It's time for a closer look when the failure is spreading, shows up in several places, appears in the first year or two, comes back after earlier repairs, or sits in a room with heat and chemicals.

When bond loss is widespread, full removal is often the most reliable answer, but testing should confirm the extent first. Sometimes sound areas can stay. We removed about 27,000 lbs of failed epoxy mortar from a food manufacturing room after repairs had been chasing the problem for a while, and replaced it with a urethane-based system.

If you don't know why it failed, you can't be confident the next floor won't fail the same way.

5 What a proper investigation looks like

1. **Map it.** Walk the floor, photograph and mark every failure area. Patterns matter: traffic lanes, drains, doorways, near ovens.
2. **Get the history.** Original spec, products, batch records, install dates and any repairs since.
3. **Ask about use.** Cleaning chemicals, washdown temperatures, equipment and traffic.
4. **Test the slab.** Moisture testing per ASTM F2170 and pull-off tests at failed and sound areas.
5. **Look underneath.** Pull samples or cores to see the failure plane and the concrete.
6. **Then recommend.** Repair, partial replacement or full removal, with a system rated for the actual conditions.

Failure diagnosis depends on site-specific conditions. Testing should follow current ASTM and ICRI documents and the manufacturer's published guidance.

About the author. Henry Hunt is a partner at Topcoat Services USA, a family-owned, veteran-owned commercial flooring contractor in Hyannis, Massachusetts, working across Cape Cod and New England. Topcoat self-performs resinous epoxy, urethane cement and polished concrete with its own crews and equipment. If you've got a floor that's letting go, we'll come look at it and tell you whether it looks like a patch or a bigger problem.

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