

IAQRadio Episode 685 Robert Higgins | William Thornton | Roland Vierra The Moisture Mob – Concrete Panel

Good Day and welcome to the Blog for IAQ Radio+ episode 685. This week we welcomed Robert Higgins, William Thornton and Roland Vierra of the Moisture Mob – Concrete Panel for a discussion of concrete and moisture related issues. The panelists were joined by fellow Moisture Mobsters: Andrew Rynhart, CEO Tramex Meters and Global Restoration Watchdog Pete Consigli in concrete and waterproofing since 1976 and has been developing products for such use since 1980.

Robert Higgins has been involved with moisture-related issues in concrete and waterproofing since 1976 and has been developing products for such use since 1980. He was a product development chemist for SINAK. He continues to work on various committees and provides expert witness services on topics related to construction, concrete and coatings.

William Thornton is North American Technical Director for Tarkett Sports and a leading floor covering industry expert. William has 4 decades of experience in all aspects of the industry from: retail sales, installation, cleaning, manufacturing, specifying, consumer complaint handling, technical training and standards writing.

Roland Vierra is the President and CEO of FLOORING FORENSICS, INC. Flooring Forensics is an independent consulting firm specializing in the science and forensic evaluation of floor covering performance failures. Mr. Vierra has been a third-party claims consultant for more than 40 years.

Nuggets mined from today's episode:

Each panelist was asked to recap the most important issues from their prior appearance(s) on IAQradio+ and to comment on improvements or worsening within the flooring industry.

Robert Higgins:

- Concrete has greatly changed since the 1950s.
- Concrete manufacturers learned that finer grinding reduced material cost while maintain similar density. The unanticipated side effect is that new cement in 500% more permeable and has much greater capillarity than its predecessor.
- These changes are not being conveyed to the flooring industry.
- EPA regulations (2002-2019) have resulted in kiln dust that is more alkaline. Adding the more alkaline kiln dust during concrete manufacturing causes cement to behave differently. Further complication is that the alkalinity of kiln dust is inconsistent nationally.
- For 2 years within Type 1 L cement, ground limestone is being used to replace Portland cement in the mix. While resulting in a lower carbon footprint, curling and microcracking of the top 1" layer is occurring globally. The resulting cement surface is self-desiccating and commonly dries to 60% moisture which is inconsistent with the 80%-90% moisture of the balance of the installation.
- This haphazard rush to green has resulted in problems for the flooring industry. False positives during in-situ testing and disastrous/catastrophic flooring failures.
- Bob opines that concrete chemistry is being ignored and that more study of cement chemistry is needed.

William Thornton:

- Changes in the flooring industry are being driven by specifications driven by the USGBC LEED Version 4 for Building Design and Construction.
- Problems are occurring at the interconnectivity of floor covering and the surface of concrete.
- Challenges posed by adhesives.
- F 710 05 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring. Floor patches and self-leveling and how they attach to concrete at the bond-line.

Asbestos Abatement:

After tearing off the asbestos containing flooring the asbestos containing adhesive needs to be removed. Cutback asphalt emulsion adhesive has similarities with roofing tar.

- High flashpoint solvents such as Odorless Mineral Spirits and D'Limonene based adhesive removers are being used to dissolve and remove the adhesives; as opposed to low flashpoint solvents such as acetone.
- Adhesive removal solvents are known to penetrate 2" downward into the cement. What goes down eventually comes back up. Solvents designed to dissolve and destroy adhesive are aggressive and are known to damage vinyl.
- Removal of adhesive with solvents 3-5 times less costly than removal by grinding.
- William advocates solvents not be used.

Roland Vierra:

- Status quo in my sector of the industry, that inertia may be because it's just the way things are, or it may be related to the lull caused by the COVID pandemic.
- Bright people in the flooring industry. Too many old-timers are stubborn and set in their ways. The floor covering industry has a legacy of having too many people not being paid enough to do professional work and yet are expected to produce very professional workmanship. Because the installation community as a whole is built around the 1099 "employee", and the industry as a whole does not pay well (selling price over quality is endemic to our industry), most in the installation community are not able to afford the necessary training. AND the days of the mentor, working for an old dude that would take the time to train you, are gone.

I had an illuminating back-and-forth with a Tech person at a large trade association. I found something lacking in their install instructions and wanted to discuss it with him, maybe he could make some notes for the next revision. He did not disagree with me but he clarified his position by noting that any installer should be capable of doing the task that I was concerned about. I thought about that and decided too many are living in a BUBBLE. Yes, the installers that belong to his trade group would certainly be skilled enough BUT, 98% of the installation community does NOT belong to this (or any) trade association AND this trade group is holding its install instructions out as a "standard", or at least a best practice, for how things should be done.

- Roland cringes every time he is present when Bob Higgins and William Thornton get together. For every hour they are together, Roland will spend 3-4 hours researching how what was discussed is related to him and flooring.
- Concrete slabs are not created equal. It comes down to the "transition zone" the top 1" of concrete. The transition zone is a sub-species of the slab. The transition zone is more porous, more alkaline...most flooring failures are concrete surface related.

DISCUSSION ON AIHA CATALYST-REGARDING MOLD GROWTH UNDER WRESTLING MATS ON CONCRETE SLAB?

Conventional wisdom is that the problem is caused by moisture wicking upward through the slab.

Roland Vierra: Mold is not only a moisture problem. Mold needs moisture, food source, and a hospitable environment. The lazy man's solution is to label the issue a moisture problem and not consider the other factors.

There is too much reliance on moisture being the cause of all failures. I looked at a job recently where the patching material was debonding from the concrete substrate – must be a moisture problem (NOT); marble tiles were discoloring, must be a moisture problem (NOT); LVP planks are buckling, must be a moisture problem (NOT); carpet is wrinkling, must be a moisture problem NOT. My point is, there are lots of things that can go wrong with an installation that does not involve moisture at all, or if moisture is a possible cause, it may be a secondary, or even a tertiary, cause.

William Thornton: Going back in history before the calcium chloride test, we would take a teaspoon of table salt and place it on the slab. We would cover the salt with a glass Mason jar and use plumber's putty to create an airtight seal between the jar and the floor. We would wait 24 hours and remove the jar, If the salt was clumpy we would not install the floor, if the salt wasn't clumpy we would install.

• It is hard for liquid moisture to move upward through concrete. Water vapor efficiently moves through concrete.

- Vapor hits the bond-line (connection between top of concrete, adhesive and bottom of flooring.
- Floor covering encapsulates the concrete and the moisture will equalize.
- Floor sealer can be a "problem child".
- The term nonporous sealer is inaccurate. Moisture hits the bond-line and will condense. Dewpoint is different than condensation. Dewpoint is temperature related.
- LEED Version 4, fly ash and the green movement.

Robert Higgins:

- Once inspected a floor that had pink and blue spots and found that the spots were caused by a sandwich that was dropped onto the floor during installation.
- Older concrete is dangerous. Salt migrates to the surface like efflorescence. Atmospheric dewpoint is caused by moisture in the air. Ionic dew point is caused when the RH exceeds 80% RH.
- The table salt, Mason jar and plumber's putty moisture testing method is valuable information. The only downside is that it cannot be quantified.
- The impetus for moisture to move is *warm to cool*.
- Water is a good transport mechanism.
- Vapor barriers don't do anything except where there are cracks. The testing used to justify the use of vapor barriers has been misinterpreted. We are still being fed things we don't need. Use of fans during cement curing and drying is the only moisture mitigation needed.
- Is an advocate of the use of capillary breaks between wet soil and concrete slabs.
- Water can only be displaced not compressed.
- Cascading water effect can dissolve and damage flooring.
- Grinding aids such as amines and glycols are added to concrete during manufacture. These grinding aids can migrate upwards though the floor and cause damage the flooring is being blamed floor.
- Fly ash is a waste product from coal production. Coal production has diminished due to green concerns. Fly ash is now in short supply.
- Adding fly ash to cement was a good idea until cement became too alkaline.
- Clinker Cement. "What is Cement Clinker? Composition, Types & Uses

- Clinker is a nodular material produced in the kilning stage during the production of cement and is used as the binder in many cement products. The lumps or nodules of clinker are usually of diameter 3-25 mm and dark grey in color. It is produced by heating limestone and clay to the point of liquefaction at about 1400°C-1500°C in the rotary kiln.
- Fly ash reacts with clinker cement in a cascading effect.
- Calcium hydroxide adding to Portland cement was thought to maintain RH at 90%. The surface will be 60% resulting in permanent damage. The air-cured surface is weaker than the balance of the slab.

ROUNDUP-

Andrew Rynhart, CEO Tramex Meters:

How moisture transports through concrete.

- Moisture is not compressible in new concrete.
- Air gaps are created as concrete dries.
- Moisture in liquid state can move through air gaps in old concrete.
- When moisture transports to the surface it is the same principle as distilling water. Thermal energy brings condensation vapor to the surface.
- Dewpoint is the condensing of airborne moisture.
- Ionic dewpoint occurs at lower RH and higher temperature.
- Evaporative cooling- surface cooler and condensation forms more readily.
- Persistent transportation of salts.
- The focus now is on in-situ testing. Some information being pushed out is confusing and misleading.
- IAQ folks understand moisture transport better than flooring folks.
- Flooring problems occur at the bond line. If moisture is eliminated to allow adhesive to cure which then reduces or eliminates flooring problems.

Pete Consigli, Global Restoration Watchdog

- Since Andrew Rynhart called in from Dublin for the Round-up, today's IAQradio+ episode went into overtime like the World Cup Games.
- Joe Lstiburek concurs with comments Bob Higgins made about the ineffective use of vapor barriers to prevent moisture migration from ground soil into concrete foundations. See Below Response #1 from Dr Joe.

- Pete says he recalls Joe in the 1990's advocating for the use of a capillary break between soil and concrete slabs when poured in a region with high water levels.
- Pete said his recollection from Joe's building science training that concrete is the most absorbent building material and if a water source was present concrete would continue to absorb moisture until it was saturated.
- One of Pete's favorite examples from Joe Lstiburek's illustration or stories to make his point was, if a cement column was built between the earth and the moon, moisture would transport from the earth to the moon as long as there was a consistent source at the bottom of the column! See Below Response #2 from Dr Joe.
- Let's keep the conversation going next week in the Moisture Mob Concrete panel's Part 2 show.
- Pete also reminded the listeners that <u>"Afterthoughts" is a great way to</u> <u>follow up on the conversation</u> from lively and informative IAQradio+ shows, like today!

Dr. Joe Lstiburek Responds to The Watchdog:

1. THREE MECHANISMS OF MOISTURE TRANSFER HAVE TO BE ADDRESSED -GROUND WATER, CAPILLARITY AND VAPOR DIFFUSION. VAPOR BARRIERS DO NOT DO A GOOD JOB OF HANDLING CAPILLARITY OR GROUND WATER. SINCE THE TIME OF THE ROMANS WE HAVE USED STONES - FREE DRAINING GRAVEL - TO ADDRESS GROUND WATER AND TO PROVIDE A CAPILLARY BREAK. ONCE YOU HAVE DRAINAGE AND A CAPILLARY BREAK YOU NO LONGER HAVE TO BE "PERFECT" WITH A VAPOR BARRIER. IT IS DIFFICULT TO DEAL WITH A CAPILLARY BREAK AT THE PERIMETER OF SLAB FOUNDATIONS. SEE THIS LINK:

https://www.buildingscience.com/documents/insights/bsi082-walking-theplank

2. NEVER SAID THIS...IT WAS SOMEONE ELSE. I DID SAY THAT A CONCRETE COLUMN WILL WICK WATER UPWARDS TO A HEIGHT OF 10 KILOMETERS OR SIX MILES IF IT WAS SEALED AROUND THE PERIMETER WITH A PERFECT VAPOR BARRIER.

Bob Higgins:

• Recounted the elegant solution he devised for waterproofing 60 miles of London England's Metro Tunnels.

- There is nothing that can't be done if you have the right precepts.
- Has found gravimetric moisture measurement to be the most accurate method. Found that Tramex aligned with the accuracy of gravimetric testing.
- Bob's poultice formula from removing spent solvent from within concrete slabs. 50% Portland cement (either Type 1 or Type 2) with 50% Tide **powdered laundry** detergent. Don't let it get wet!

Z-Man signing off

TRIVIA

In the movie Godfather 2, young Vito Andolini was trasported to NYC on a ship named Moshulu. Name the other 2 movies in which the ship Moshulu also appears?

Answer: Rocky and Blow Out

Answered by Vic Cafaro