



IAQ RADIO+

Show Number: 742 BLOG

Robert “Concrete Bob” Higgins

Surface Influences with Concrete - Connecting-the-Dots...

New Research Confirms Bob’s Theories

**With Special Guest Pete Consigli**

Good day and welcome to the IAQ Radio+ episode 742 blog. This week we welcomed back Robert “Concrete Bob” Higgins to discuss new and conclusive research that confirms his theories on surface influences with concrete. Bob’s presentation blows up the old paradigm about how and why many concrete surfaces have moisture issues and why it can be so difficult for restoration contractors to dry concrete surfaces. Bob has dealt with a lot of resistance to his ideas and now he claims the final pieces to the puzzle have been located.

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. Bob is equally involved in product and process development, having developed most of the products manufactured and marketed by his former company SINAK Corporation, as well as owning or co-owning patents for moisture testing. He has expertise in moisture-related concrete issues, having been involved with waterproofing, technical committees, professional groups, lecturing, teaching, and construction defect litigation.

Bob lives and works in Osmond Beach, FL. He has given lectures internationally and throughout the US on concrete and coatings related topics. He also continues to work on various committees and provides expert witness services on topics related to construction, concrete and coatings.

**Nuggets mined from today’s episode:**

*Welcome back Bob. On our last show with you in Feb 2023 we talked about concrete moisture inspection. One area of our conversation that got pushback was your thoughts on how and why moisture accumulates at surfaces of concrete. Your opinion shatters conventional thinking.*

*Conventional wisdom has been that moisture wicks up from below to the surface of concrete for various reasons.*

Proof of the primary source of moisture coming from above concrete slabs and floors rather than from below is conclusively demonstrated in many high-rise buildings where higher floors have higher moisture concentrations than lower floors and floors below grade.

- During flooding moisture will enter buildings through cracks and holes due to hydraulic pressure.
- Flooding also adds a new dynamic, contamination found in the flood water.

*How often do you see moisture wicked up from under concrete foundations?* Not often. A 1975 study done by the Army Corps of Engineers demonstrates that exposed concrete becomes a gradient. (“The rate at which a physical quantity, such as temperature or pressure, changes in response to changes in a given variable...” The American Heritage® Dictionary of the English Language, 5th Edition).

- Environmentally driven Sweating Slab Syndrome (SSS) is common. “SSS, results from condensation that forms from warm ambient temperatures and cooler concrete temperatures. When the warm and humid outside air comes in contact with a cool concrete surface, the air cools quickly and forms surface condensation/water droplets.”

<https://concretequestions.com/why-does-concrete-sweat/>

Let’s look at this from the restoration contractor perspective in our last show Cliff’s blog says the following:

*Bob advises that following water damage, the moisture content of wet concrete should be measured, you want a steady rate of drying and drying should be discontinued when the drying curve flattens. Stop when the curve flattens to avoid over drying. When the curve flattens maintain air movement over the concrete and discontinue dehumidification, then coat the floor. Still air is your biggest enemy.*

**What other measurements are important when drying concrete so that is water damaged?**

In an American Roofers Education Course, course instructor John T. Hull advocates establishing a dry standard on each job site. Salts move into the concrete surface during wetting and drying. F21/70 uses an RH probe. Calcium chloride test indicates lower levels of moisture than are actually present. Most concrete testing done for the last 80 years has been inaccurate due to failure to consider the presence, difference, and effect of salts. For instance: 4.5% MC reading in concrete in Florida

indicates dry concrete and a 3.5% MC in the desert indicates it's too wet. We cannot apply static numbers to tests.

### **Radio Joe Comment:**

This is also how wood moisture content should be looked at. Acceptable levels may vary by climate zone.

### **Here is another quote from Cliff's prior blog.**

*According to Bob, during "concrete hysteresis" the ingress of moisture occurs more robustly than the egress. The concrete surface can become full of salty water and can't dry. Then grind or shot blast the top layer and use a Tramex meter to check for a drop then you are likely OK. Continue air movement, maintain steady environmental/ambient conditions, ambient and coat.*

Additional options:

- Try test grinding.
- Try shallow shot blasting and apply a trowel able aggregate mixture.

### **Bob's other comments:**

- Concrete has changed the most over the last 20 years.
- Changes in concrete are driven by efforts to make concrete greener by conserving energy expended during manufacturing. During the 1950-1980s finer grinding has been used in an attempt to reduce product cost by reducing the amount of cement added.
- Grinding aids such as amine or glycol-based solvents are being used. These additives are known in Europe to affect iron-containing aggregate, resulting in rust staining.
- New concrete is more alkaline which is causing self-desiccation and cracking during curing.
- Concrete is going backwards
- We are running out of good aggregate, which is driving modification of concrete formulating and manufacturing. Aggregates are now being imported.
- Cement makers are not required to disclose their ingredients.
- Concrete makers are required to disclose their ingredients.

**TYPES of Portland cement:** (source <https://www.concretenetwork.com/cement.html> )

- **Type 1** - Normal Portland cement. Type 1 is a general use cement.

- **Type 2** - Is used for structures in water or soil containing moderate amounts of sulfate, or when heat build-up is a concern.
- **Type 3** - High early strength. Used when high strength are desired at very early periods.
- **Type 4** - Low heat Portland cement. Used where the amount and rate of heat generation must be kept to a minimum.
- **Type 5** - Sulfate resistant Portland cement. Used where the water or soil is high in alkali.

**MOISTURE BASICS AND THE EFFECT ON THE CONCRETESURFACE**

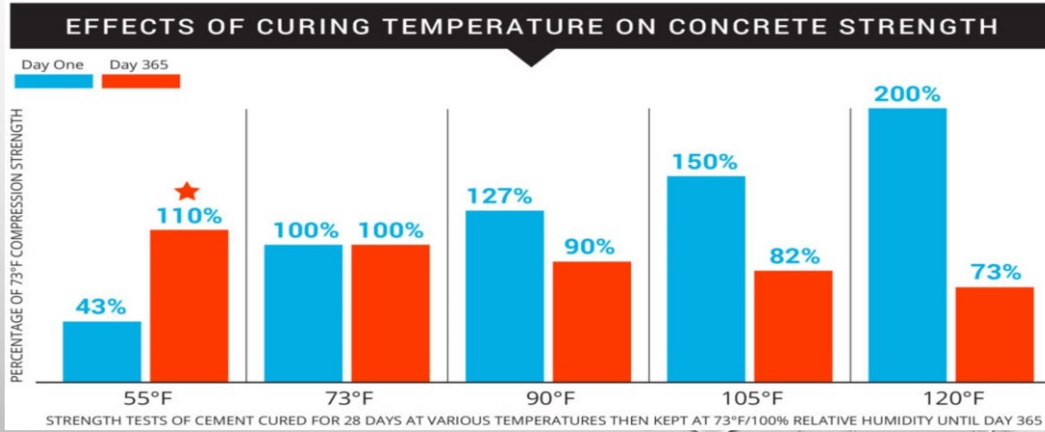
**FACT NOT FACT**

The diagram is divided into three parts. On the left, a cross-section of concrete shows moisture levels before floor covering is placed. A green vertical pipe is shown. At the top surface, the relative humidity (RH) is 74%. At a depth of 40%, the RH is 85%. At the bottom, where a 'Vapor Retarder' is located, the RH is 99%. On the right, a similar cross-section shows the state 'AFTER floor covering is placed'. The RH at the top surface is now 84%, at the 40% depth it is 85%, and at the bottom it is 86%. To the right of these diagrams is a dark box titled 'Capillary Action'. It contains two bullet points: 'Moisture \Vapor is released by way of the capillary system' and 'Moisture \Vapor can travel into and out of the concrete through the capillary system'. Below the text is a diagram of 'Capillaries' (wavy lines) with 'Vapor Emission' arrows pointing up from the concrete surface.

**FACT**

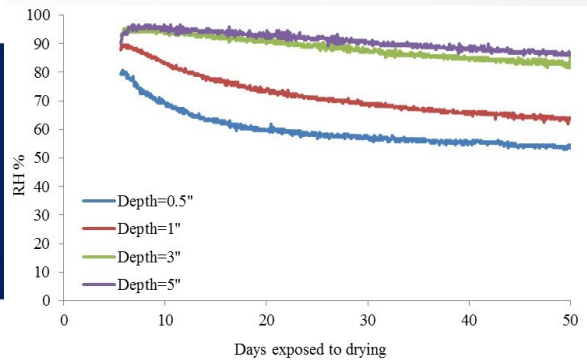
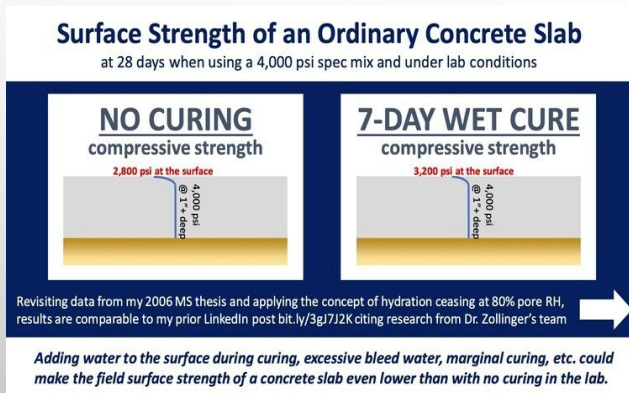
**NOT FACT** (source CTL Testing Lab)

THE WARMER CONCRETE AT TIME OF PLACEMENT AND CURE INCREASES IMMEDIATE COMPRESSIVE STRENGTH WHILE REDUCING LONG-TERM COMPRESSIVE STRENGTH



Known since the 1940s.

EVEN IN CAREFULLY CONTROLLED LABORATORY CONDITIONS, THE "EXPECTED" FULL CEMENT DEVELOPMENT HASN'T BEEN REALIZED



Texas Dept. of Transportation Test.

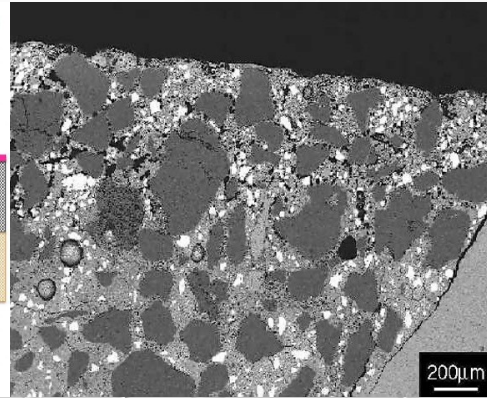
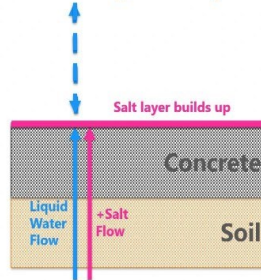
The F21-70 test is of No Value!

## SALT ACCUMULATION AND COMPROMISED CEMENT DEVELOPMENT

### The Sweating Slab Syndrome

- Liquid moisture from the concrete excess water and/or soil flows to the concrete surface.
- Dissolved salt(s) get transported to the concrete surface by the liquid water flow.
- The surface water evaporates to the ambient air
- The salt(s) stay on the surface and build up over time
- At a certain indoor air R.H. threshold the salts act as desiccant, draw water vapor out of the air and dissolve itself into it.
- After the indoor air R.H. drops below the R.H. threshold the surfaces dries again by evaporation of the surface water to the ambient air.

≈85% R.H., water gets drawn in by salt(s)



Wiss, Janney, Elstner Associates

Bob hypothesized this 30 years ago. It's not moisture migration, it's caused by moisture diffusion. 80% anionic dewpoint of cement. Development of dynamic equilibrium.

## ROUNDUP

Bob's final comment- When you remove the source of the problem; the problem goes away.

[For more information download Robert "Concrete Bob" Higgins' "Concrete Citations" document included as a supplemental resource to the Z-man's Blog!](#)

## Global Restoration Watchdog & A Moisture Mob Consigliere- Pete Consigli

### An Overview of Winter Break 2025 in Southwest Florida:

#### **Part 1:** Andrew Ask Building Science Symposium (AABSS 2025)

Two Days of Building Science with Leading Authorities and Industry Icons, Joe Lstiburek, PhD, P.Eng. and John Straube, PhD Associate Professor.

Week of President's Day, February 18-19, 2025, Naples Hilton (Naples, FL)

Includes vendor cocktail reception to meet the speakers on February 18<sup>th</sup>.

Symposium Focus: The design, construction, and operation and maintenance of buildings in Climate Zone One (hot humid climates).

WHO SHOULD ATTEND- Architects, Home Builders, HVAC contractors, remediation contractors, IAQ assessors and construction defect attorneys.

**For more information to register and reserve a room:** [ClimateZoneOne.com](https://ClimateZoneOne.com)

#### **Part 2:** A Moisture Mob Offering: Compliments AABSS Symposium!

Intimate Interactive Workshop that includes hands-on demonstrations-

February 20-21, 2025 Fairfield Inn by Marriott, Bonita Springs, Florida

Workshop Includes Networking Dinner on February 20<sup>th</sup>, 2025

#### **"Building Envelope Moisture Survey by Expert Field Practitioners"**

John T Hull - Roofing

John Lapotaire- Windows

Bob Blochinger- Flooring

Bob Higgins- Concrete

Andrew Rynhart-Timber and Wood Moisture Equivalent (WME), and How Moisture Meters Function.

Dr. Ralph Moon, PhD- Applied Research using Best Practices for Moisture Inspections and Liability Prevention.

**For More Information:**

E-mail Pete Consigli at [pccpathfinder@yahoo.com](mailto:pccpathfinder@yahoo.com) or call Pete at +1-813-758-2801.

***Z-Man signing off***

***Trivia***

Who is attributed with the invention of the first true artificial cement?

**Answer:** Joseph Aspdin, 1824

Sorry, no correct answers