



Show Number: 714

Andrew Rynhart
Kelvin Rynhart
Tramex Meters
Moisture Monitoring in the 21st Century
New Tech, Remote Monitoring & Integration with Estimating/ Documentation
Platforms

Good Day and welcome to the IAQ Radio+ episode 714 blog. This week we welcomed Andrew and Kelvin Rynhart to talk about Moisture Monitoring in the 21st Century; New Tech, Remote Monitoring & Integration with Estimating/ Documentation Platforms.

Andrew Rynhart is the Chief Technical Officer of Tramex Ltd. He was taught from a young age about moisture in buildings by his father who was the founder of Tramex meters and inventor of the first commercially successful nondestructive moisture meters for building inspection. Andrew has been fortunate over the years to have learned a great deal about moisture in the building envelope from many of the world-leading technical people in Roofing, Flooring, IAQ, Water Damage, Pest Control and other industries who use these meters, in the United States, the UK, and Europe.



Kelvin Rynhart is the Sales Director at Tramex Meters. He has been part of the TRAMEX leadership team for almost 15 years in sales and as the Managing Director. Prior to joining TRAMEX he was a General Manager at Mayfield Properties in Ireland. He is enthusiastic about continuous learning in an array of moisture related industries and has his finger on the pulse of the moisture measurement world including the disaster restoration industry.



Celebrating their Golden Anniversary in 2024; Tramex is an international leader in design and manufacturing of moisture and humidity meters. Tramex's heritage in innovation began with its founder in 1974. Today Tramex continues to innovate, design and manufacture moisture meters for building inspection with the latest range of meters currently being launched. Andrew has been involved in their development every step of the way.

Nuggets mined from today's episode:

Andrew, from the technical perspective where is Tramex rooted? Tramex is rooted in the roofing industry as an alternative to destructive testing. Where combinations of destructive testing (core sampling) and moisture mapping or external insulated where pin testing and moisture mapping was typically utilized. Tramex's sought an alternative to nuclear measuring devices. Tramex worked in conjunction with Trinity College in Dublin to develop the roof scanner. The handheld devices followed.

Kelvin, what is your role at Tramex? I learned about moisture and moisture testing working in the field. I'm responsible for sales, which means that I spin the yarn and my brother Andrew tells the truth.

Kelvin, how does Tramex determine what new products to develop? We ask our customers what they want and need.

Andrew, same question how does Tramex determine what new products to develop? We do ask our customers what they want and need. They have been asking for remote monitoring for a decade. In product development we stick to what works.

Where is Tramex's largest market? The US, where contractors are focused on getting the job done and open minded to thinking outside the box.

Andrew, moisture testing is a complicated subject. How would you explain it to a 10 year old? Moisture in buildings causes problems. Moisture is found in 3 forms: liquid, ice and vapor. With the exception of some plastics, everything contains moisture. Devices tell us how much moisture in liquid and vapor forms is present and how it interacts. Like some superheroes, moisture in vapor form flies. It needs

energy to fly, so when it takes off it leaves cold behind. Like a detective we need to find and track the moisture.

Kelvin, how would you explain moisture to an adult? Moisture measuring devices make business lives simpler and work easier. The devices help us work smarter not harder. The devices save time and reduce paperwork. The devices can help us obtain more jobs.

What are some of the advantages of TREMS? Contractors set the parameters, the system wirelessly transmits information, sets alerts, has battery backup in the event of power failure.

Some restoration contractors are concerned that remote moisture monitoring systems will be weaponized by insurance companies and their third-party administrators and used against them. Contractors establish the data points on the project. In order to weaponize the remote monitoring systems users must properly understand the data.

Andrew, what are the new trends in moisture monitoring instruments? Combining different sensor measurements to provide more and more valuable information. Combining measurements with psychrometrics.

What is the ASTM F2170 test? The ASTM F2170 test helps determine if a concrete slab meets the required 'dry enough' specifications and is recommended by many international standards including ASTM, British Standards, most Scandinavian standards, as well as being specified by floor covering, coating and adhesive manufacturers worldwide. The test measures the amount of moisture vapor in the slab and can help ascertain the moisture content of the concrete floor.

What Tramex meters can be used to perform the ASTM F2659 testing?

By testing the concrete floor or slab non-destructively per ASTM F2659, the flooring inspector can get an instant and precise evaluation of the moisture conditions within 1.0" below the surface of the slab. This is done by using a concrete moisture meter that gives a quantitative measurement of % moisture content by weight, like the Tramex Concrete Moisture Encounter 5 or Concrete Moisture Encounter X5.

Moisture problems in concrete? Andrew, moisture moves through concrete in vapor form. Concrete picks up moisture from the air which is the cause of many flooring problems. Concrete is slightly cooler than other interior surfaces due to evaporation of moisture. Where this moisture condenses problems occur. The water vapor is pure, water vapor doesn't transport alkalinity. Water in liquid form saturated with alkalinity is what causes problems.

For building material inspection other than concrete, what meter do you recommend? Kelvin, the MEX5 has the best technology and all the bells and whistles.

Moisture and Humidity meter for building and home inspection

With optional pin and relative humidity probes

The Tramex Moisture Encounter MEX5 is a digital Dual-Depth, non-destructive moisture and humidity meter, ideal for surveying moisture and humidity conditions in building structures.

The MEX5 measures moisture content in wood and drywall and provides comparative readings in various building materials such as roofing, plaster, tile and masonry. It also features a built-in hygrometer for ambient conditions and psychrometric values, an Infrared Surface Thermometer and also incorporates optional external in-situ RH probes for in-situ equilibrium RH readings, as well as Pin probes for wood, drywall, and WME readings. These individual and collective features make the MEX5 an essential and indispensable asset for professionals in the building moisture inspection and restoration industry.

Dual depth measuring range.

The MEX5 moisture meter features dual depth measuring range. Deep Depth penetration of up to 1¼" (30mm) and Shallow Depth penetration of up to ⅜" (9mm).

The dual depth readings of surface and core moisture can be compared to eliminate the influence of the substrate when testing coverings.

The pin less moisture meter measures moisture content % of wood from 0-30%. The meter can be expanded with the use of pin probes for wood, wood

by-products and drywall as well as relative humidity sensor probes for evaluating ambient conditions.

All moisture and humidity readings can be visualized and Geotagged with the Tramex Meters App and turned into moisture maps, reports and charts for sharing.

Why do Tramex meters measure Specific Gravity? Andrew, specific gravity is important in nondestructive testing because it relates to the density of materials. Wood with a specific gravity <1 floats and >1 sinks.

Can low-cost meters be used? Andrew suggests asking the manufacturer of moisture meters to explain how their instruments work. It is important that manufacturers of meters understand the technology used in their equipment so that they can provide tech support to their customers. Some manufacturers will admit to not knowing but copying technology.

Pin meters should be calibrated to a national standard. In the US pin meters are calibrated to Forestry Douglas Fir.

Pin meters are not accurate for testing concrete unless both holes are drilled to exactly the same depth. Taping clear plastic to concrete and observing after 24-48 hours is more accurate in diagnosing moisture problems than pin meters.

Why is the testing side different on the concrete meter? Andrew, when pressed down the exposed electrodes improves accuracy and overcomes issues when testing uneven concrete. When performing the F-2170 test and using the Determinator Probe the CMEX2 can test drilled holes both: top down and bottom up.

Concrete Moisture Meter for Measuring Moisture Content and Relative Humidity In Concrete Floors And Slabs, Wood & Building Materials
CREATE VISUAL MOISTURE MAPS AND REPORTS WITH TRAMEX METERS APP
The Tramex Concrete Moisture Encounter CMEX5, the updated CMEX2 concrete moisture meter, is a non-destructive digital concrete moisture meter for measuring quantitative moisture content in concrete floors and slabs. The Concrete Moisture Encounter CMEX5 also has a Relative Humidity

Meter function as it features a built-in Hygrometer that measures Ambient Relative Humidity, Temperature, Dew Point, and Humidity Ratio (or Mixing Ratio) of the environment. A bayonet plug-in port allows for optional wood pin probes or Tramex Hygro-i2 Relative Humidity Sensors for measuring relative humidity in concrete as per ASTM F2170.

The CMEX5 moisture meter for concrete determines instant and precise quantitative measurement of moisture content using Gravimetric testing as a baseline. This concrete moisture meter tests the concrete to a depth of approximately 20mm (3/4") into the slab. The CMEX5 also provides quantitative Carbide Method equivalent readings for Concrete and Anhydrite/Gypsum substrates and screeds. In addition, the CMEX5 has two reference scales for comparative readings making this moisture meter suitable to perform a concrete moisture test as per ASTM F2659.

This top quality concrete moisture meter with its Hygrometer and optional external pin and RH probe functionalities, is the ultimate tool for testing of concrete and flooring for professionals in the concrete coatings, wood flooring or water damage restoration industry to help prevent moisture problems on concrete floors.

The use of the CMEX5 can be extended with the optional Concrete Moisture Probe which measures in-situ quantitative moisture content within the concrete to an extendable depth of up to 4" (100mm). The CMEX5 is included in several concrete moisture test kits.

Moisture Mapping & Data Documentation

Concrete moisture test results can be visualized with the Tramex Meters App and turned into moisture maps, reports and charts for sharing. Bluetooth connectivity to mobile devices also helps to GeoTag test results, create, save and share photos.

Simple as needed complex as you want to get. Kelvin, describes Tramex meters as “simple as needed and complex as you want to get” and credits brother Dylan for many Tramex innovations. Dr Dylan Rynhart, PhD, Chief Operating Officer at Tramex is responsible for leading Tramex’s inhouse team of technology developers. The team incorporates the latest bells and

whistles into Tramex meters and developed the Tramex App and the Tramex Cloud which is a platform to store and report on your monitoring projects.

Monitor Temperature and Relative Humidity remotely with Secure Monitoring Software

The Tramex Remote Environmental Monitoring System has been designed and developed by Tramex for professionals who depend on the most accurate, reliable, real-time building environment temperature and relative humidity readings using state of the art technology to respond quickly to environmental changes and notify users.

The TREMS-10 comprises 10 CS-RHTA Tramex Cloud Sensors and a Tramex Cloud Station router. Multiple Sensors can be used with one Station and additional sensor Accessory Packs are also available. Registration and on-site set-up is simple using a QR code check-in procedure.

The on-site Sensors, with long-life batteries, transmit relative humidity, temperature ($^{\circ}\text{C}$ and $^{\circ}\text{F}$), dew point and grains per pound / grams per kilo readings wirelessly via the Tramex Cloud Station enabling remote monitoring of up to 200 on-site Sensors on the Tramex Cloud platform. Tramex Cloud is a secure platform to store and report your moisture, temperature and relative humidity measurements, get notified of adverse conditions and quickly monitor status from any browser.

There are no subscription fees and there is free data with the Tramex Remote Environmental Monitoring System.

Calibration? Andrew, customers are amazed by how well and how long Tramex meters remain in calibration. While most customers don't do it, Tramex suggests that devices be sent back for factory calibration annually. TREMS sensors are highly calibrated and hold calibration. Tramex has plates to check calibration. RH calibration is more sensitive. Suggests: Keep a master unit that never goes into the field to check calibration of the field units. Tramex supplies calibration salts. Tramex supplies a kit consisting of sealed canisters into which a porous material saturated with a salt solution is placed and the probe inserted. The canister is calibrated to 75% RH. Calibration tolerance is +/- 2%.

ROUNDUP

Global Restoration Watchdog Pete Consigli

- **About kids**-Jon “Dyojo” Isaacson brought his teenage son Zeke to a Winterbreak. Zeke told Pete that he was very passionate about mold!
- TREMS is another tool in the toolbox. Pete reminisced about when infrared cameras were first introduced to the industry by Lew Harriman. The devices were sold to contractors without training. “People with meters are dangerous”. There were problems with false positive readings. Important high stakes decisions were made based upon inaccurate info provided by untrained contractors unfamiliar with the technology they were using. Contractors and their tech have a responsibility to get the technology right because governments, institutions, insurance companies, facility managers, property owners have huge financial risk.
- Pete led a team of multidisciplinary volunteer team to New Orleans to consult with FEMA following a hurricane. The team convinced FEMA of the importance of using moisture testing devices.
- Who you purchase your products from is important: product training, technical support, calibration, warranty, etc. The cream of manufacturers rises to the top.
- Pete relayed a special request for Andrew to attend a highly technical upcoming conference in Australia.
- When purchasing new tools or instruments, contractors should experiment in their own home until they become comfortable and proficient.

Andrew Rynhart final thoughts:

- Training is an essential component of moisture inspection and testing. (Water Activity, Delta T, Dewpoint to Surface, Moisture Mapping, etc.)
- Credited Mickey Lee, Bob Higgins and others for adding to his knowledge.
- Water Activity measurement tip: Plug in the Surface temperature Probe and touch the surface to attain equilibrium, combine moisture

measurement with surface temperature divide by 100% = Aw (65 = .65 Aw)

Cliff "Z-Man" Zlotnik

- Reiterated Ed Light's hilarious story from the show chat: I almost shut down the Orlando Airport when I forgot to put my pin-meter in my checked bag and the TSA guy accused me of having a stun gun! This was resolved when another agent came over and said, "I used to be a mold guy, that's just a moisture meter!"

Z-Man Signing Off

Trivia

Name the electrical engineering term defined as "the measure of the opposition that a circuit presents when a voltage is applied".

Answered by: Don Weekes

Comments from our audience:

Ed Light

I really appreciate you guys' unique ability to address critical questions. In the field, I generally see cheaper/simpler meters in use. Please comment on the accuracy and reliability of lower cost meters. Are there any that give a reasonably accurate reading?

robert higgins

Hi Ed, in my experience, I would not accept the results of other meters for concrete. Other building materials such as gypsum, wood, etc. can accurately be measured with three manufacturers; Tramex, Lignomat and Delmhorst.

Ed Light

In addition to the meter's accuracy, sampling strategy is a very important factor. I try to include both typical and worst-case spots and discount tiny areas (i.e., less than a few square cm's) with a uniquely high reading, consider normal background readings from the same material in an area not affected by water damage, and

major changes in onsite relative humidity which comes into equilibrium with the surfaces.

robert higgins

The problem with most meters and most methods when measuring moisture in concrete, is that the variability in concrete is created not only by moisture, but the chemistry as well. Concrete continuously changes and meters that have NOT be evaluated in field conditions is the biggest issue. Many of them do well in a controlled environment, but become unpredictable in field conditions. Since we cannot know what is going on in the concrete, we also cannot know what the meter is actually registering

robert higgins

In a field study conducted in Finland, several methods did well in the lab conditions, but when the method were used in the field, the results were all over the map...and this difference increased with time...