Laying the Foundation

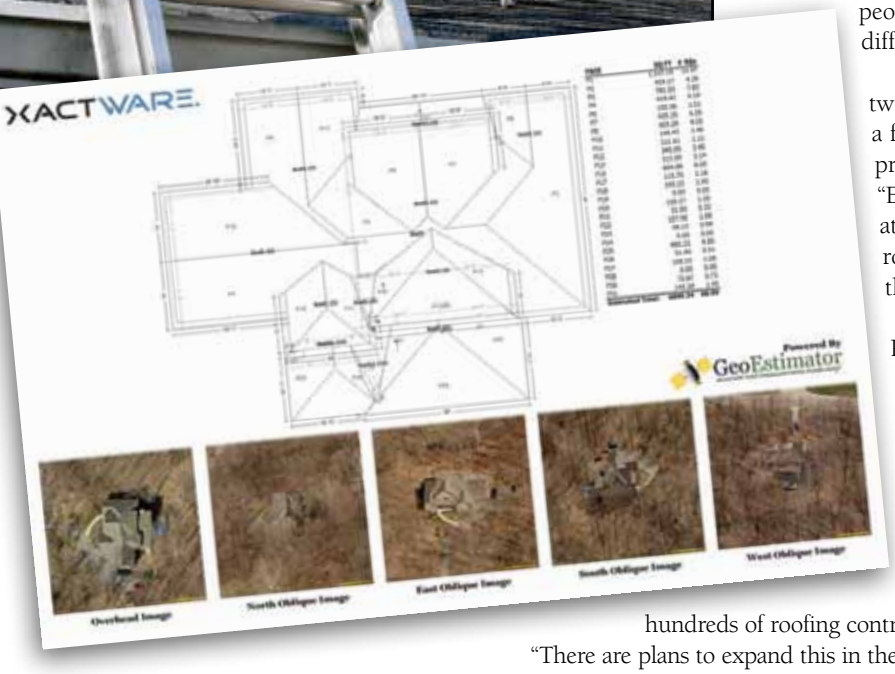
Innovation Advances Related Industries

By Symone C. Skrzycki

If there's one thing beyond our control, it's the weather. But that doesn't faze the inventor of an online roof measurement service called the GeoEstimator, which uses aerial and satellite imagery to provide calculations of roof area and lineal footage (ridge, valley, perimeter and step flashing). Regardless of weather conditions, roofing professionals can obtain measurements from the convenience of their computers – plus avoid the dangers (and potential liabilities) of climbing on steep roofs.

And in West Lafayette, researchers at the Charles Pankow Concrete Materials Laboratory (operated by Purdue University) are controlling weather conditions via environmental chambers that simulate freezing, thawing, heating, cooling, drying of materials and more. The goal: develop more durable and environmentally friendly concrete to help address the nation's aging infrastructure.

In most cases, the GeoEstimator eliminates the need for manual roof measurements. Gary Gutshall (pictured) praises the online service: "On steep roofs, I'm always concerned and if I can minimize (my employees') time up there, I'm minimizing my risk."



Goodbye tape measures

Based in Indianapolis, the GeoEstimator is geared toward roofing businesses, insurance companies and independent insurance adjusters. It was made available to the public last year.

Using the service takes only a few minutes. First, customers create a free online account. Next, they specify the address of the structure they want to measure. Within one to two business days, GeoEstimator provides a report account holders can modify (rotating pitch direction, inserting notes, etc.).

Pricing per report varies based on level of detail, but the average cost is under $30.

"It really gets down to saving money and saving time," asserts founder Dale Thornberry, president and CEO of innovative software engineering company Thornberry Consultants. "(It's about) reducing risk factors so people don't have to climb on roofs, especially steep and difficult roofs to climb.

"Time and time again, our margin of error (within two inches in most cases) is less than the margin of error of a field measurement. We've been able to double the productivity of insurance adjustors," Thornberry notes. "Even though they might have to look at the roof to look at the damage, they've been able to look at twice as many roofs per day. Roofing contractors have found the same thing with their sales groups."

For Gary Gutshall, managing partner at Pinnacle Roofing in Carmel, the safety and cost-savings aspects of the GeoEstimator appeal to him most.

"It makes it a really tough situation to get up on the roof because it's basically like climbing a mountain," he remarks, describing some of the steep roofs he encounters. "From a safety point of view, the GeoEstimator is definitely a positive. The fewer people on ladders the better."

In the year since GeoEstimator was launched, hundreds of roofing contractors across the nation have signed up to use the service.

"There are plans to expand this in the future, but they just can't be announced yet," Thornberry declares. "We're doing exciting things every day."

Putting concrete to the test

Since the Charles Pankow Concrete Materials Laboratory began operations in October, engineers have been working to reduce cracks in concrete and decrease corrosion of steel rods in reinforced concrete.

"We're looking at what the structure of concrete looks like, and by doing that we can manipulate the structure of the material to make it stronger and more durable," explains lab director Jason Weiss. "We can simulate construction environments from the Middle East to Antarctica, which starts to become very important as we start to move into a more global market."

The lab enables full-scale concrete mixing and simulations to take place in several different chamber environments. One chamber is almost 45 feet long, 15 feet tall and 15 feet wide. It has the ability to simulate multiple micro-climates at once.

"We could have an element exposed to two different temperatures – a bridge exposed to different temperatures at the top versus the bottom," Weiss offers as an example.

Coupling lab experiments with computer simulations helps researchers predict long-term performance and service life.

Current projects include exploring replacing highway cement with slag (a waste product of the iron industry) and self-curing to reduce cracking. Weiss says of the latter, "It's kind of self-policing and has big benefits for some applications.

"One of the challenges with a lot of the construction materials that are used is they tend to produce a lot of carbon dioxide as they're produced," he explains, "so right now, there's a lot of interest in finding new ways to make concrete with less cement so less carbon dioxide is used, (which is) more environmentally friendly and economical."

Among solutions is reducing the amount of clinker (formed by the heat processing of cement elements in a kiln).

"It's kind of like if you can imagine baking chocolate chip cookies with less flour or sugar and still getting the same thing," Weiss offers.

Another alternative is using waste stream materials from other industries. He notes that this method can pose obstacles because the materials "don't always react as you would expect when at different temperatures. That's one of the things the chambers allow us to look at. We can look at using other materials."

Weiss says it's difficult to estimate the cost savings new forms of concrete could yield because there are too may variables. He states that some savings will require an upfront investment.

"Everyone is typically worried about the first cost, but if you can produce a concrete that lasts for 100 years rather than 25 years, there's a huge benefit to the taxpayer and to the homeowner," he contends. "The other thing is, you might have value-added materials where they cost more initially, but dramatically reduce the probability of cracking or increase the resistance of corrosion.

"The other challenge depends upon how long you want that infrastructure element to last." With bridges and dams, for instance, he says, "Are we happy with 20-year performance or do we want 80-year performance? Which makes better economic sense?"

Purdue student Paul Imbrock (top) performs ASR (Alkali Silica Reaction) testing. ASR is a reaction that occurs with sand or rocks and causes cracks in the concrete. Below, students help prepare ring tests, which evaluate cracking resistance.

INFORMATION LINK

Resources: GeoEstimator at www.geoestimator.com

Gary Gutshall, Pinnacle Roofing, at (317) 519-4745

Jason Weiss, Charles Pankow Concrete Materials Laboratory, at (765) 494-2215