INNOVATION

Advances put construction on new footing

With its handheld device that detects 'concrete cancer,' Giatec is one of many small businesses changing the building sector

PAUL ATTFIELD

Giatec Scientific Inc. is bringing some serious innovation to the world of construction, a traditional industry that draws a lot of attention in the design and completion phases, but rarely to what happens in between.

Whether it's analyzing New York highrises or assisting the inquiry into the Elliot Lake mall collapse, the Ottawa-based start-up has revolutionized the way engineers detect corrosion, commonly regarded as concrete cancer. Giatec has developed and patented the first handheld device, known as iCOR, to allow non-invasive examination of concrete structures.

As a rapidly growing concern – Canada will reportedly be the world's fifth-largest urban construction market by 2020 – the country's annual $171-billion sector should be ripe for small-business innovation, but is Giatec the rule, or the exception?

"One of the biggest challenges in pushing the envelope is that it has to provide a reasonable value for consumers," says Morad Atif, general manager of construction for the National Research Council Canada (NRC). "In other words, at the end of the value chain there is an owner that has to accept it. It has to comply also with the minimum requirement for health and safety, which is the building code."

The NRC is doing its part to foster innovation with the launch earlier this year of research initiatives under four different categories: high-performance buildings, building regulation for market access, mid-rise wood buildings, and critical concrete infrastructure.

"What we are seeing is that innovation is a perfect storm because of the policies, the need, the growth – and many companies, even the foreign ones, are positioning themselves in the country," Dr. Atif says. "The other part we are seeing is that a lot of ICT (information and communications technology) companies or materials companies that are very large, that didn't have a business or use for buildings or infrastructure, have moved in the last five years because of the market coming up.

"You can look at home security, you can look at the ICT application for detecting sensors for fault, especially on the automation of buildings, for energy, for security and so on."

But changing the way "things have always been done" is not always received with open arms. Innovators on the conceptual side of the construction industry are developing and using new groundbreaking technologies, but those on the implementation side are not necessarily as quick to embrace change.

"Part of the issue for the builders is they aren't prepared to take on a lot of risk of a new idea if the benefit of it will go entirely to the owner or client if it works," says Don Whitmore, chairman of Vector Construction Ltd., and steering committee chairman for the research institute Canadian Construction Innovations. "If it doesn't work, as a contractor you get your head on a plate. ...

"So there's a transition period and a cultural change that has to built into every organization but it's quite a shift."

Dr. Atif says there's little doubt that change is coming down the pipeline.

"What is sure is that the ICT and material science is right now set to make the major breakthrough for the biggest challenges in the construction industry, the same way it's made major advancement and innovation benefits to other sectors. That's why you see ... a lot of industries – be it manufacturers, material science – investing heavily in those things."

As the only company offering its concrete-testing technology in North America, Giatec is certainly well-positioned to take advantage of the current climate.

The company is experiencing rapid growth. The 10-employee firm is moving to a bigger facility by November, with plans to become a 30- to 40-employee business in the next three years. The company's expertise has also attracted interest from abroad, from customers in 10 countries.

And with a change coming to Canada's building code, Giatec is poised to become an even more essential part of the construction landscape. "Right now if you want to order concrete you have to specify the strengths and you say, 'I want concrete that is 25 megapascals, 30 megapascals,'" Giatec CEO Aali Alizadeh says. "But by the end of this year you're going to have to order concrete based on two parameters: One would be the strength as usual and one would be durability, and that parameter is measured by our devices."

While it currently uses its technology in a consulting capacity, Giatec plans to commercialize iCOR by the end of the year, at a price between $15,000 and $20,000.

The company is also planning to release two more devices later this month, and by early 2015 is getting set to release its technology as a sensor that can be installed permanently on structures that don't permit a visual inspection, such as a pipeline or nuclear waste concrete bunker.

"For example, the Port Authority in New York is using our technology in really high-profile cases such as the World Trade Center and John F. Kennedy airport, and last year we used the technologies in the Elliot Lake mall collapse investigation, so Giatec was asked to go and do an inspection on site and we did laboratory analysis on the quality of concrete and the corrosion."

Aali Alizadeh, CEO of Giatec Scientific, tests concrete durability on the Bank Street bridge in Ottawa. Giatec has found customers in 10 countries who are interested in its patented device. DAVE CHAN FOR THE GLOBE AND MAIL

OTHER INNOVATORS

Ottawa-based Giatec Scientific Inc. is a leader in the field of concrete testing. Here are three other Canadian firms innovating in the construction industry:

Kinetica Dynamics Inc.

This Toronto-based company manufactures the Viscoelastic Coupling Damper (VCD), which reduces vibrations and sway caused by wind and earthquakes when incorporated into high-rise buildings. Developed at the University of Toronto by Constantin Christopoulos and Michael Montgomery, the VCD consists of multiple layers of elastic material alternating between steel plates, and it is designed to absorb energy. As Giatec CEO Aali Alizadeh says, the VCD is "one of the few examples that you see of research coming out of a university that has developed into a company that has made a change or a difference."

Equilibrium Consulting Inc.

An award-winning Vancouver firm that is pioneering the use of timber in mid- and high-rise developments as a way to provide innovative, sustainable structural solutions.

PCL Industrial Management

Canada's largest contracting organization is constantly looking for ways to push the technological envelope. In 2012, it won the Canadian Construction Association's award for its innovative method of rigging industrial modules to reduce site costs and improve safety, and this year it began exclusively using 3-D electronic blueprints and a virtually paperless process to construct a new building at its Edmonton headquarters.

Paul Attfield