BUSINESS *without* BORDERS™
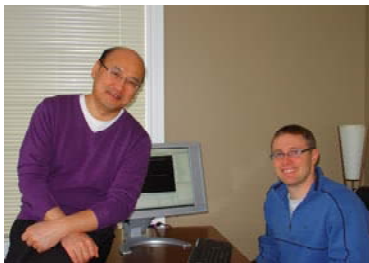## HELPING BUSINESSES GROW INTERNATIONALLY

Dam they're good: Making sure concrete doesn't move

New Brunswick-made GPS systems monitor dams, steer cranes and move robotic lawnmowers

By: Keith Norbury | From: ROB.com | Date: Tuesday November 29th, 2011

GPS technology developed by a small New Brunswick company is about to be tested on the infamous levees of New Orleans, to help guard against them breaking as they did during Hurricane Katrina in 2005.

Gemini Navsoft Technologies Inc., a four-employee company based in Fredericton, installed a version of its GPS system and proprietary software on a New Brunswick dam in January. The system, called mmVu, can detect tiny movements in large structures such as dams and levees, with to-the-millimetre precision.

Don Kim (left) and Jason Bond
of Gemini Navsoft Technologies

In New Orleans, mmVu will be one component of "a comprehensive system," according to Jason Bond, Gemini Navsoft's manager of engineering.

In the first stage, four Gemini Navsoft units will be installed on one levee, Bond says. "It's basically providing more information to know its physical condition, and hopefully allow informed decisions about whether they should be beefed up, if something's going to happen," he explains.

The global positioning system makes that possible. At New Brunswick Power's Mactaquac generating station, north of Fredericton, the Gemini Navsoft system even detected slight movements in the dam caused by routine slot cuts to relieve stresses in the dam.

"We were able to see very tiny, tiny effects in the structure," Bond says. "Whether it's a millimetre or two indicates that the structure has been disrupted somehow, and it raises an awareness that perhaps you need to pay attention to that."

The system should also help to detect slight movements cased by alkali reactions in the concrete of the dam. Concrete absorbs water, which means that periodically NB Power has to cut into the dam with a diamond saw to relieve pressure.

GPS can also detect the movements of objects that move much more quickly—such as gantry cranes. Gemini Navsoft has developed a related system that does precisely that. The company recently tested that system on a Taylor Machine Works rubber-tired gantry crane at the CSX Intermodal Terminals facility in Jacksonville, Fla.

Don Kim, president of Gemini Navsoft, says the global positioning system used to guide the crane's automatic steering was accurate to within one centimetre, with a confidence level of 99.9 per cent.

Taylor has been so impressed with the system, which completed testing in March, that the company is "working to install it on more Taylor cranes," says Ricky Patterson, group engineering leader with Taylor Machine Works. "In general terms, you can say there are approximately 70 Taylor rubber-tired gantry cranes in the field that this system could potentially be applied to," Patterson says.

While that system is tailored for the Taylor cranes, underlying it is Gemini Navsoft's trade-marked SteerVu machine control and guidance system. It's a kit that can be adapted to other models and types of cranes, as well as to other equipment.

Kim says the company is also developing technology to monitor buildings and bridges. Typically, these structures "require information warning of three-dimensional displacement," he says. GPS technology can even be used to steer automobiles. One of Kim's earlier projects was a system for robotic lawnmowers.

The SteerVu technology grew out of his work as an adjunct professor of geodesy and geomatics engineering at the University of New Brunswick, where Bond was a graduate student. The SteerVu system, for example, builds on work done from 2001 to 2003 that combined a programmable logic controller with GPS receivers. Older steering systems use digital cameras and transponders to track a crane's tires in relation to painted lines. The Gemini Navsoft system uses virtual lines and electronic mapping.

While that technology can attain centimetre-level precision for cranes, the accuracy is even greater for static objects, such as the Mactaquac dam. "Time works out to our benefit in this case and we are able to do some fancy processing algorithms to try to mitigate the error sources," Bond says. "With the crane-steering technology, the crane is moving. It's constantly dynamic, and you don't have that luxury of analyzing the data and getting rid of the error sources. Because we have that extra bit of time to play with, we can get down to millimetre level."

In time, the company hopes to export its technology to Europe, Japan, India and elsewhere. Kim is already working on a project in South Korea. "We have a business plan," Kim says. "First is government-based, concrete-based projects [such as] dams or public infrastructure. But secondary, our main focus is more private sector: buildings, even a small house."