

NEWS

Canadian robotic system passes big test on crane

Fredericton engineers prove their GPS steering system on Taylor gantry crane at Florida freight terminal

KEITH NORBURY

A robotic gantry crane steering system developed by a small New Brunswick engineering firm has passed a major test.

The system, developed by Gemini Navsoft Technologies Inc. of Fredericton, achieved better than projected accuracies on the tests, which took place at the CSX Intermodal Terminals facility in Jacksonville, Fla.

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

"The next question is if you can steer this crane within a certain accuracy. That is the control side of the story," said Kim, who is also a professor of geodesy and geomatics engineering at the University of New Brunswick. "Control accuracy we have is plus or minus two inches, which is around five centimetres. That's what we achieved on site tests."

Those tests were performed on a massive Taylor Machine Works rubber tired gantry crane, model RTGP-10072I. The crane, which is 77 feet wide between its tire centres



Above: Don Kim (left) and Jason Bond stand in front of a Taylor Machine Works rubber tired gantry crane that used a version of their SteerVu technology during a test in the spring of 2011 at the CSX Intermodal Terminals facility in Jacksonville, Fla.

Right: Gemini Navsoft Technologies president Don Kim runs his company's GPS software in the cab of a Taylor Machine Works crane at the CSX Intermodal freight terminal in Jacksonville, Fla. in 2011.



and has a capacity of 100,000 pounds, is Taylor's largest. It is designed to load and unload double-stacked containers between rail cars and transport trucks.

Gemini's proprietary SteerVu technology, which integrates a fuzzy logic controller with the GPS to enable the crane to steer itself, allows the operator to load and unload those cars more efficiently.

"It's been very helpful to the operators and the terminal personnel really have learned to use it very easily," said Ricky Patterson, group engineering leader with Taylor Machine Works, which is based in Louisville, Miss. "And it's been a good system for us thus far."

Patterson, who has tried the system himself, said the Gemini Navsoft system keeps the crane on an even straighter path than an operator can. That frees the operator to concentrate on handling the load.

"It gives them a little less cycle time between cars, so now they don't have to worry about steering and positioning as much," Patterson said. "Now they just pretty much put their foot on the accelerator and drive up to the next rail car that they're loading and unloading without worrying about maintaining a correct path."

Taylor has been so impressed with the system, which completed testing March, that the company is "working to install it on more Taylor cranes that are in different locations," Patterson said.

There are about 70 Taylor rubber-tired gantry cranes at terminals across the U.S.

Getting the Gemini Navsoft system to work flawlessly on the cranes wasn't easy, though. It involved months of "trial and error," Kim said.

One challenge with designing the system to work on the gantry cranes is that the steering doesn't automatically "come back to zero," said Dr. Jason Bond, Gemini Navsoft's manager of engineering.

"But with a crane, you turn and you have to always bring it back to zero," Bond said. "So it becomes a game of predicting your course and coming back, bringing the wheel back on time, so that you are on the correct path."

Another challenge was the response time. Because the crane has a hydraulic system, the crane responds sluggishly. "That is a very difficult part," Kim said. "So we designed this feedback controller system to control it within two inches."

Learning how the machine responded was tricky and required collecting data and tuning that information in order to design the controller. That is where the proprietary fuzzy logic software played a huge part.

Communicating the data to the machine along the entire two miles of the terminal was yet another challenge.

"It's quite a stretch and we need to have as stable communications as possible," Bond said. "With the crane moving at four metres a second or so, to have any sort of gaps, the crane could quickly go off track."

Gemini Navsoft, which has only four employees, had to design its own wi-fi system to deal with the challenges of those long-range communications. Theirs is not the wi-fi system one normally associates with a coffee shop. This one is high-powered, long-range, and outfitted for outdoor use.



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“And the nice thing about our system is with the wi-fi, basically the number of cranes that can run off of the system is essentially endless,” Bond said. Other systems, for example, use UHF radio, which basically allows only one-to-one radio mapping, he said. “So we are pretty happy to get this figured out. It gives us plenty of capacity to take this to the next level with many, many cranes.”

Kim said the system, which employs a “map and match” approach, could conceivably be designed to eliminate operators entirely. However, he doubts the unions would let that happen. That’s not the goal anyway, he said.

“We try to improve the safety in the working environment, and productivity,” Kim said. “That’s the first thing, rather than to lay off humans.”

Patterson said the system has proven it can increase productivity, even for the most experienced operators.

“You’ll see a greater increase with a less-experienced guy,” Patterson said. “But even with an experienced guy, you’re going to see some increase in productivity because he doesn’t have to bother himself or try to maintain correct paths. It’s just something he doesn’t have to worry about.”

Developing the system cost about \$300,000 Kim said. That doesn’t include licensing and service contracts should Taylor install the system on other cranes. While the Taylor system is tailored to the Taylor cranes, underlying it is Gemini Navsoft’s trade-marked Steer-Vu machine control and guidance system, a kit that can be adapted to other types of cranes and equipment. The cost of those systems would be substantially less than for the original Taylor application because most of the system has already been designed.

“If somebody else comes along and wants to use the technology then it’s a kit that would plug into their hardware,” Bond said. “Of course, there are always modifications necessary but that’s the general idea with this.”

The technology could even be applied to automobiles on freeways, although that would require more computing power because of the higher speeds, Kim said.

“Largely it’s a cost-benefit tradeoff,” Bond explained.

“For these types of applications where you’re travelling at slow speeds, there’s no real benefit to sampling it 100 times per second but there’s a huge cost associated with buying that technology. But certainly if you’re driving a vehicle out on the highway at 100 kilometres per hour you need to be able to sample very quickly to adapt to the change in the road.”

One area where the technology is being use is to detect very slow motion, such as on a dam in New Brunswick and on dikes near New Orleans.

“Basically, it’s an alarm-based system where we look at the longterm movement and if anything out of the ordinary is happening, a sudden jump, we are able to detect that and notify that something is happening,” Bond said. “It’s the same sort of engine but we are looking at things that are not moving as quickly and over longer periods of time.”

“Now they just pretty much put their foot on the accelerator and drive up to the next rail car that they’re loading and unloading without worrying about maintaining a correct path.”

— Ricky Patterson, Taylor Machine Works

Shackle kills Albertan

MICKEY DUMONT

A 23-year-old southern Alberta man died following a crane accident Nov. 17 in which he was struck in the head with a shackle.

RCMP responded to the late afternoon accident to find a young Precon Manufacturing Ltd. supervisor still breathing. But he was later pronounced dead at nearby Lethbridge General Hospital. RCMP investigating Const. Cip Ciubotariu confirmed the man died as a result of injuries to the head after being struck with a shackle attached to a broken cable.

Chris Boughton, Precon’s human resources and health and safety coordinator, said that “there was no equipment failure” and “the employee was not involved in lifting anything when the accident occurred.”

The man had been with the company for two years and was employed in a supervisory role. “He was experienced and familiar with the equipment,” Boughton said.

The crane was custom built for the concrete company three years ago. “The crane has a second hoist that can be run in tandem. He was moving it when the accident happened,” Boughton said. “He was struck with a cable.”

Police and Alberta’s Occupational Health and Safety department are investigating. Chuck Samphire, OHS manager investigations group for the southern region said, “The cause of death will come from the coroner’s office and it could be months before that is determined.”

RCMP will honour the family’s wishes and not release the name of the deceased.

The accident happened at Coalhurst, Alta., about 210 kilometres south of Calgary.

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CRANES ON A QUEST

Cranes rule Canada's underground

Cranes, hoists and even hoist-bearing helicopters play large roles in extracting the mineral riches of the hinterlands

SAUL CHERNOS

We all know big machines rule the roost in urban centres, where construction seems never-ending. But check out Canada's hinterlands, where caribou herds run wild and a hot Saturday night means a deck of cards and Shania Twain on the radio, and you'll find cranes and other lifting devices rocking the country's underground and open-pit mines.

The vast Canadian north abounds in riches, from copper and nickel to silver and gold, and cranes and hoists are essential to extracting it from the ground.

Northern Ontario is a classic example.

"There's no location (there) that's not actively pursuing some mining activity, or some mining company that's not recharging its batteries again," says Dick DeStefano, executive director of the Sudbury Area Mining Supply and Service Association.

DeStefano estimates annual revenues from mining operations last year in northern Ontario at \$10 billion, with a swath of new explorations and expansions. And, while the army of people doing actual mining is 9,000 to 10,000 strong, it's cranes and hoists doing the heavy lifting.

The machines are ubiquitous, found pretty much throughout the entire mining operation, says Roy Slack, president of Cementation Canada, a hard-rock underground mine contractor based in North Bay.

Bridge cranes are particularly common in shops and other maintenance facilities, Slack says. Depending on the mine, these machines range from 10 to 60 tonnes capacity. Bridge cranes between 20 and 30 tonnes, and sometimes higher, are often used to move hoist ropes and

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A crane lowers a galloway, a working platform that can have several working decks, into a mine shaft to continue the sinking process.

Photo courtesy of Cementation Canada Inc.

INTENSIVE INFRASTRUCTURE

Huge B.C. bridge project requires big gantry crane
full story on page 9



CONFERENCE COVERAGE

Harmonize safety across Canada Alberta crane conference concludes

Panel discussion climaxes two-day conference on crane and rigging at Edmonton's Fantasyland Hotel in October

KEITH NORBURY

The subject of harmonizing crane and hoist regulations proved to be too big for just western Canada.

While that was the topic of a panel discussion at crane and rigging conference this October in Edmonton, by the time the session was over, a consensus emerged that harmonization should extend across the country.

"What about you guys? You want this Canada wide?" said Judy Mellott, president of All Canadian Training Institute, one of

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A panel of industry experts and government representatives discuss the harmonization of crane and rigging regulations in western Canada and beyond.

Panelist members are (back row, from left) Oreste Simonetta of the Canadian Standards Association; Mike Parnell, president of ITI Field Services; Matthew Eckstine of Eckstine & Associates safety training consultants; Dan Kennedy, Alberta assistant deputy minister for its new human services ministry; Don Hurst, assistant deputy minister for Manitoba's department of labour and immigration; Fraser Cocks, executive director of the B.C. Association for Crane Safety; (front row, left to right) Al Thurston of Trans-Canada Pipeline; Daryl Harvey of Cenovus Energy; Dale Sykora of Halliburton; John Tate of Flint Energy; and Judy Mellott of All Canadian Training Institute.

Photo by Keith Norbury

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