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RVTR

Mass customization is the way to change the perception in North America that prefab and panelized structures are low in quality and lack design variety, says RVTR principal Geoffrey Thun.

Collaborative effort to create sustainable prefab buildings

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A Toronto architectural firm is breaking the traditional design mold by collaborating with university research departments and government agencies in an effort to introduce innovative sustainable buildings to the marketplace.

The architect, RVTR, is high on prefabricated modular building designs. The firm is part of a collaborative design team selected to erect an 800-square-foot modular residence called North House at the prestigious Solar Decathlon, an international competition in sustainable housing design held in Washington, DC, this fall. The goal is to make North House a net energy-producing building.

But also on RVTR's agenda is the development of a module- and panelized-based system that can be designed for a range of housing types, including multi-storey residences and commercial buildings which are tailored to fit different climates. Called the Latitude Housing System, it is made of lightweight gauge steel and incorporates steel-based structural insulated panels.

"The state of prefabricated housing in North America remains well behind what is technologically possible today," says Geoffrey Thun, one of RVTR's principals.

To better understand design issues and how to successfully bring such housing to market, architects from the firm plan to travel to Japan to study "the world's only really prefabricated high performance building industry," says Thun.

In Japan, the Canadian architects will visit prefab manufacturers and others connected to the large modular building industry. Since 1996, about 160,000 high-performance residential units have been erected in Japan.

Thun thinks the timing is right for the industry to grow in Canada.

The architect says there is a big difference between how Japan builds prefab and modular buildings and what the rest of the world does. Most countries, including Canada, simply use a group of workers to assemble buildings in a warehouse. The Japanese rely on mass customization (automated assembly lines) so they can

produce many types of "extremely high quality" housing and do it quickly.

"The use of a high-speed fabrication capacity that can produce a variety of products is critical, I believe, to the success of modular and panelized custom prefabrication," he says.

Prefabrication housing has been around since the 1930s, but the perception that prefab structures are low quality and lack design variety has kept the industry on the sidelines in Canada and the U.S.

"We believe that prefabrication can create extremely unique housing of extremely high quality," Thun says.

He says that what makes the time right for the prefabrication industry to leap forward is the push for sustainable housing and the fact that advanced robotic manufacturing technology is now readily available.

Can it be done economically? Thun says that will require the development of prefab systems on a large scale.

"One of the biggest challenges will be getting industry and government working together and getting the right set of policies in place to be able to create the capacity to build multiples and have the market for it. That is why the Japanese have been successful."

RVTR hopes to get the project rolling in 2010 in collaboration with a lightweight steel manufacturer and a prefabrication manufacturer with possible research support from the universities and government.

"It would not be difficult to imagine that with the right will and (economic) climate that such an industry could easily roll out in five years in terms of set-up time," says Thun. "I would imagine it could actually even be faster than that time, frankly."

Thun encourages builders to consider partnering with academic researchers to develop "what seems like difficult research and development projects." By "bridging the space" between academic world, designers, government and the building industry more prototypes like North House can be developed.

RVTR is using Toronto-based MCM 2001 Inc. to fabricate modules and panels and erect North house. MCM fabricated interior walls and paneling at ROM.

North House will largely consist of panels comprised of 2 by 8 wood framing covered with plywood sheets.

Inside the walls and floors and ceilings will be up to seven inches of soy-based spray-foam insulation. For MCM, the biggest challenge will be shipping the house from Toronto to Washington and having it set up with all of its "smart technology" in place in a week, says Jack Debski, MCM's project manager.

Designing and installing a leak-free flat roof that features an array of solar panels will be a challenge, says Debski. "We have to provide mounting for the solar frame so we have many points where the roof can leak."

A key objective of any new building type is to get as much exposure as possible.

Thun says RVTR hopes to get North House on display at the 2010 Olympics in Vancouver. After that, its plan is to put the house on prominent display at a major public venue in Ontario.



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