SPECIAL FEATURE

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Canada slow to join the global 'Mod Squad'

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Productivity growth within the construction industry requires more than the adoption of technological management aids. An increasing number of studies point to modular componentry as the way forward.

Among the most respected sources of research concerning construction productivity are the studies published over the past few years by the McKinsey Global organisation.

Their conclusion is fairly straightforward when it comes to construction's bottom line: "Modular construction can be as much as 50 per cent faster, which can translate into cost reductions of 20 per cent."

Where do these potential cost reductions come from?

The Modular Building Institute (MBI), is an international non-profit organisation whose representation includes 60 modular builders in Canada. They identify three key advantages, all of which lead to reduced costs: Quicker occupancy due a more streamlined construction process; more efficient use of labour, particularly in areas where key skills are in short supply; and improved predictability in terms of material procurement.

The term "modular construction" is very broad. It includes both volumetric units supplied virtually complete and ready for assembly on site, and prefabricated components manufactured remotely and then connected with other components on site to build complete systems.

Prefabricated housing has been around in one form or another for decades. Remember the Pan-Abode and Viceroy homes of the 1970s?

Despite its potential, though, McKinsey says that prefabricated housing has been in and out of favour in North America over the years. Only in Scandinavia and Japan has the concept maintained a steady foothold.

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>
> Kevin Read
> Nomodic Solutions

That's been changing, however. The United Kingdom, Europe and the Middle and Far East are experiencing a growing love affair with the concept of modular construction, and it's not restricted to housing.

In fact, size is not even an issue. It's now possible to order buildings as tall as 30 storeys or more from Chinese factories, that arrive by ship with art already mounted on the wall.

North American interest is increasing. According to another McKinsey Global report, "the permanent modular construction market share of new North American real estate construction projects has grown by 50 per cent from 2015 to 2018."

Canada Playing Catch-up

However, modular growth has been muted in Canada.

Figures from MBI indicate that Canadian modular spending declined in 2018 versus 2017 across all sectors — non-residential, education, administrative and industrial workforce —rebounding slightly to $27 billion in 2019. The 2021 MBI report indicates Canadian modular spending remained flat in 2020 and is forecast to come in at $26 billion in 2021.

"I definitely think we have a ways to go to catch up to other places like Europe." says Kevin Read, President of Nomodic Solutions in Calgary, Alta.

"They've been adopting modular for some time, particularly in the United Kingdom. And of course, there's a lot happening in Asia"

Read sees a Canadian instinct towards caution as one reason for the slower pace of modular adoption. Every project is a three-cornered discussion that involves the owner, the architect and the building fabricators, he says. And when it comes to a modular approach, education lies at the heart of the issue.

"Nine years ago, we were educating everybody. There weren't a lot of owners or architects adopting modular processes. But now, there's enough modular installed in the field, buildings that people can go touch and feel in hospitality and housing. While it's still driven by the owners, there are enough people on the design and architecture side to also promote the idea."

Going Modular, What Does It Take?

Committing to modular processes requires the close collaboration of all project parties at the earliest possible point, says Read, whether it's volumetric units or prefabricated componentry.

"Another thing is continuity. It's huge. If you invite somebody in at the beginning, they can actually help solve problems. But if you invite them in at the end, it becomes their job to find problems."

As an example, Read cites cases in the past when plans have been brought to his company almost at the building permit stage.

"They were saying, 'Hey, this project looks like it might be going over budget. What can you do?'" he says.

Some owners and designers may also hold a preconception of cookie-cutter, box-like designs resulting from modular processes.

While Read appreciates the concern, he says the reality is far from that.

Companies like Nomodic look closely at the objectives of the owner, the vision of the designer, and the specifics of the site and its community. As a design-build organisation, they can then work closely with various material and component suppliers to make their modular processes fit the design, rather than the other way around.

Logistics are another aspect requiring planning. In a country as large as Canada, distances between manufacturing facilities and the building site must be considered.

"When we get to certain stages of the design, it's important that we do a formal transport study. We need to understand what options we have to get the assembly, modules or components of various sizes to the site. It's really an exercise in analytics."

Despite an increased understanding of its overall productivity potential, Canada continues to be slow in moving to the next level of adoption, specifically the large modular projects seen elsewhere around the world.

In Read's opinion, one reason is that most current building codes in Canada themselves have been slow to adapt. That's followed by supply chain issues. The availability of innovative materials and components that support volumetric modular processes needs to improve in Canada, he says.

Canada's financial industry also has a role to play. Owners can face challenges obtaining project financing when the building is manufactured in a remote factory while site work is being undertaken concurrently. Some financial institutions are restricted by underwriting ratios regarding the storage of offsite materials that do not account for the enormity of the modular process.

Economic Snapshot

4th-wave COVID will dampen but not drown international & interprovincial migration

John Clinkard

Against the ongoing headwind of COVID-19, Canada is attracting more international migrants. Also, more Canadians are choosing to move to another province. After a gain of 34,000 individuals in the final quarter of 2020, the number of international migrants more than doubled to 76,000 in the first quarter of this year. This increase exceeded the 70,000 who arrived in Canada in Q1/2020 but it fell short of the 83,000 who entered the country in the first quarter of 2019.

The solid gain in net international migration was partly offset by a below-average increase in births and an above-average number of deaths, due to COVID-19. Consequently, Canada's total population edged up by +0.9% q/q (at an annual rate) in Q1/21 following an increase of +0.4% in Q4/2020.

Interprovincial migration shifts to higher gear in Q1

The slight reduction, from 74,400 to 72,000, in the number of Canadians who moved to another province in the first quarter of this year compared to the first quarter of 2020 suggests that persisting restrictions on travel in the wake of the second wave of COVID-19 continued to exert a drag on interprovincial migration. Looking forward, the gradual relaxation of COVID-19 travel restrictions, together with record high levels of consumer confidence, suggest that interprovincial migration will accelerate during the remainder of this year and into 2022.

Ontario attracts more than half of all international migrants

In Ontario, a net inflow of 39,000 international migrants (over half the national total), a natural increase of 1,400, and a net outflow of 5,600 residents to other provinces, caused the province's population to rise by an estimated 35,000 in the first quarter following a gain of 22,000 in the final quarter of 2020. International in-migration accelerated in the second quarter despite the onset of the third wave of COVID-19. In June, the province admitted a record 18,700 permanent residents, 14,000 of whom decided to live in Toronto. Three-quarters (75%) of the permanent residents who have moved to Ontario over the past two years have settled in Toronto.

Interprovincial migrants still stream to B.C.

Although COVID-19 briefly interrupted the flow of international migration into British Columbia during the second and third quarters of 2020, the province has remained the go-to destination for most Canadians who have wanted to relocate to another province. While it may have been the case that fewer Canadians moved to another province in this year's first quarter, that didn't stop B.C. from making a resident count pickup. Following a net gain of 4,900 in the final quarter of 2020, B.C.'s net interprovincial migration hit a 27-year high of 9,000 in the first quarter of 2021. At the same time, net international migration jumped to 13,000 from 3,400 in Q4/2020.

Due to the solid 22,000 gain in total net migration and despite a slight 300 decline in natural increase, B.C.'s population growth accelerated from +0.6% q/q at an annual rate in Q4/2000 to +1.7% in Q1/2021, second only to Prince Edward Island's +1.8%. Since it has attracted 80% of B.C.'s international migrants, Vancouver's appeal to those from outside the country appears to outweigh that of Toronto's.

Quebec's year-to-date admissions beat pre-COVID-19

After a drop of -4,200 persons in Q3/2020 due to COVID-19 travel restrictions, Quebec attracted 500 international migrants in Q4/2020 and a further 7,000 in the first quarter of this year. This increase, together with net interprovincial migration totaling 1,300 and a natural increase of 1,300, caused the province's total population to increase by +0.4% q/q annualized following no change in Q4 2020. As with Toronto in Ontario and Vancouver in B.C., Montreal within Quebec is the preferred destination of the majority of newly admitted permanent residents. Over the past six months, 81.4% of the 15,700 individuals admitted to Quebec as permanent residents chose to locate in the country's 2nd-largest city.

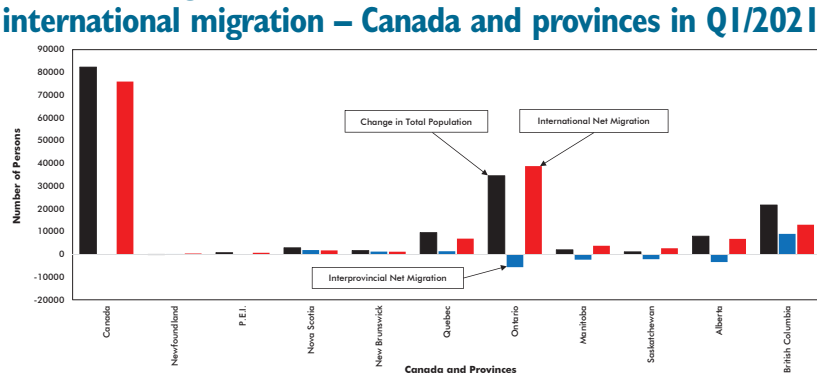
No full migration recover until mid-2023

The increasing case counts of the highly contagious COVID-19 Delta variant will probably restrict the flow of both international and interprovincial migrants through the rest of 2021, and perhaps even as far ahead as into 2023. However, the negative impact of the virus on net migration into the country should be partly offset by recently announced measures by several provinces and by the federal government to encourage everyone to become vaccinated.

Since the total number of admissions of permanent residents year to date (June) stands at 144,700 and given the lingering impediments to both international and interprovincial mobility due to the coronavirus and its variants, we expect net international migration will total in the range of 300,000 to 350,000 this year. Next year, assuming an increase in vaccine penetration and fewer restrictions on international travel, the net inflow of international migration should approach, but will not likely fully reach, the federal government's recently announced target of 411,000.

John Clinkard has over 35 years' experience as an economist in international, national and regional research and analysis with leading financial institutions and media outlets in Canada.

Net change in total population, interprovincial and international migration – Canada and provinces in Q1/2021



Data Source: Statistics Canada/Chart: ConstructConnect — CanaData.

Interlocking plastic bricks could be a 'game-changer'

DON PROCTER
CORRESPONDENT

Dustin Bowers is scouring the farms of the Atlantic Provinces for recyclable plastic waste to reuse in a line of interlocking plastic bricks and wall panels.

The 33-year-old, who has spent close to three years developing the Lego-like bricks for buildings, says when they are ready for market they will be an easy to install system that can save builders time and money "and still be environmentally responsible."

Comprised of 90 per cent recycled materials (primarily agricultural plastic waste), the large bricks will weigh 25-30 pounds each — about 20 per cent less than similar-sized concrete blocks. The only virgin additives are inhibitors and stabilizers, says Bowers, CEO and founder of PLAEX Building Systems, based in Hampstead, N.B.

"We're making a composite material akin to concrete," he points out.

So far, the product has performed well in tests in a certified-materials testing lab tied to the University of New Brunswick.

"It has some limitations but for a wide-range of applications (including residential) it is going to be a game-changer," says Bowers, whose start-up company was formed in 2020.

For now, however, the PLAEX CEO sees his mortarless interlocking plastic bricks for non-occupant applications, such as retaining walls for flood protection.

The company's goal is to press the first test bricks in the fall. Structural testing will follow in a certified lab.

A pilot project is slated for year's end or early next spring, says Bowers, adding the company is hoping to set up its first production facility over the winter.

PLAEX

Dustin Bowers of PLAEX has developed a Lego-like brick system made of recycled plastics for use in residential home construction.

Bowers, who grew up around construction tools and equipment in small-town New Brunswick, says the idea for the business came to him after working for years in construction and seeing "massive amounts of waste off every project." Confounded by the building industry's motives not to change course, he set his sights on developing a sustainable alternative.

The company has been mapping out farm waste supply across the Atlantic Provinces and is investigating the possibility of setting up mini transfer (waste) stations with farms to ensure a ready supply of recyclable plastics. Examples include greenhouse plastic sheets, plant row covers, maple syrup tubing and plastic silage waste from beef producers.

PLAEX is also looking for recyclable plastic from the marine industry.

The first wall system line under development is water-resistant to be followed by a line of waterproof wall panels that contain material from recycled tires, he says.

The impact-resistant brick will be impervious to freeze-thaw cycles which can undermine traditional masonry products.

Bowers says the start-up has taken advantage of opportunities for federal and provincial government grants for green tech products and has garnered assistance through the agricultural industry. Much of PLAEX's early development funding and mentorship has come through accelerators such as Volta, a non-profit innovation hub, and Energia Ventures based in Fredericton, N.B.

Bowers says while the company's in-house recycling process is still being fine-tuned with the assistance of partners, the process can handle "much more contaminated (plastic) waste than any other system" that he is aware of.

The start-up founder is exploring opportunities to partner with other manufacturers to produce a host of recycled materials for whole building integration. "We envision this developing into a plug-and-play building/eco system."

The opportunities for green development supported by government incentives have significantly increased recently as more people (and governments) are waking up to the reality of climate change, he points out.

Inspired by his father, a licensed insulated concrete form systems contractor, Bowers "took a dive into the business" in 2020 just as the pandemic started. Hurdles aside, he says COVID-19 has allowed for "extra focus" on product development.

Ziggy Last, Ontario operations manager, Sto Canada, has acted as an advisor to Bowers on performance criteria tests the product must pass to meet the widest possible usage under building codes.

Important testing includes for fire safety in residential and or commercial scenarios, says Last, who has 40 years of experience in construction, including materials testing to ensure Sto's products meet changing building code requirements.

"I fully support his endeavor on many levels," Last says.

Bowers is "quite certain" PLAEX bricks will achieve certification for residential applications. "Obviously there is going to be a height limit for this material but we envision it for a wide range of low-rise residential…two-, three-storey, maybe four storeys."

Panelized mod system brings speed to affordable housing project

DAN O'REILLY
CORRESPONDENT

Within a few months several London, Ont. residents will have an affordable and safe place to live thanks to a municipal fast-tracking approval process, a special federal government housing grant program, and the intense efforts of design builder EllisDon and its project partner Canam Group.

A four-storey, 61-unit affordable apartment, known as 122 Baseline Rd. W. after its street address, will be ready for occupancy by the end of December.

The building had to be designed and constructed within a 12-month window to meet the strict deadlines of Canada Mortgage and Housing Corporation's Rapid Housing Initiative. The building will have 41 one-bedroom, 16 two-bedroom and four three-bedroom units, an outdoor amenity area and 61 parking spaces.

First launched in October 2020 to address the housing needs of vulnerable Canadians, a key condition of the Rapid Housing Initiative is that approved projects have to be delivered through prefabricated modular construction.

And that is why EllisDon, which was prequalified last fall, selected Canam Group and is using its Hambro panelized modular system to meet those conditions.

Speed and cost were factors in that selection decision, says EllisDon's director of pre-construction services for Southwestern Ontario, Mike Stewart.

"Speed because the project needed to be completed by the end of this year and Canam offers a more aggressive delivery date and shorter overall schedule."

Canam is essentially a one-stop shop. So, as a single source for design-build projects, they do the design for their system as well as the foundations required and are the engineer of record. That minimizes job site issues and extras during the build, he says.

Design by locally-based Architects Tillmann Ruth Robinson Inc. started in January of this year and Canam was "working right behind them to finalize the design."

Another London-based firm, Intelligent Engineering Design Ltd. is the structural engineer of record, and also designed the foundation and the lateral design.

However, an in-house Canam team designed the building's structural system, which is comprised of loadbearing steel stud walls using Hambro composite joists and concrete slabs, says Sebastien Wagner, preconstruction coordinator for Canam Buildings.

A full set of architectural and engineering drawings was submitted to the City of London in early April. After all the building permit approvals were given, fabrication of the steel began in early May and by July 21 Canam was on site erecting the various sections with the use of a mobile crane, says Wagner.

Meeting the demands of the project meant sourcing components from three different plants. The floor Hambro joists and structural steel were produced at the company's headquarters in Saint-Gedeon-de-Beauce, Que., while the load bearing steel stud wall panels and shearwall forms assembly were fabricated at its Cornwall, Ont. plant. The roof tapered joists and steel deck was manufactured at its Mississauga, Ont. plant, he says.

In a Zoom interview conducted in early August, Wagner predicted Canam would be finished its work and be off site by the end of the month.

In reflecting on what was accomplished in such a short time, both Wagner and EllisDon's Mike Stewart say completing the design by April was the real challenge rather than the fabrication or construction phases.

"That accelerated design was achieved in about half the time a similar design project of this scope would normally take. We (EllisDon) couldn't have done it without Canam," says Stewart.

A fast tracking approval process by the City of London also expedited the project, he points out.

Construction continues at 122 Baseline Rd. W. and some of the work still left to be completed by EllisDon's own 60-member workforce includes apartment unit fit outs and the erection of the building envelope which will consist of brick veneer, says Stewart. EllisDon is also working with Housing Development Corporation London on the planning and design of similar affordable housing, he says.

Housing Development Corporation London, a non-profit agency whose mission is to provide housing for low income and vulnerable residents, was able to access just over $7.5 million in federal funding to offset the $17.5 million cost of constructing the building on municipal surplus land which the City of London had transferred to the corporation a few years ago.

SUBMITTED PHOTO

Here are Canam's exterior load-bearing steel studs with yellow, dense glass sheathing. Also, shown on the far right, is the Canam concrete shearwall.

SUBMITTED PHOTO

Setting a Canam load-bearing interior corridor wall on to slab on grade at the 122 Base Line Rd. W. project in London, Ont. Slab on grade poured June 23, 2021.