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UBC Engineering Student Centre

The University of British Columbia utilized radiant heating to update its district heating system with a modern and efficient hot water system.

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New student centre overachieves sustainability goal with help from REHAU radiant heating

When the University of British Columbia (UBC) decided to radically remake the way it heats millions of square feet of buildings on its Vancouver campus, it chose to go big. It launched a multi-year, \$80-million plan to replace its old, leaky steam-based district heating system with a modern and efficient hot water system.

"We want to be on the cutting edge of energy efficiency," said UBC Capital Projects Manager Ron Loewen.

For the older buildings, the process was daunting, as each structure some with vintage steam radiators had to be retrofitted to utilize hot water instead of high-pressure steam. But for new buildings, UBC had an opportunity to show what "cutting edge" really means.

One of those "statements" is UBC's new Engineering Student Centre. If a building was going to demonstrate state-of-the-art energy technologies, campus planners reasoned, the perfect choice was the new gathering place for more than 5,000 undergraduate engineering students. And it did make a statement.

New construction allowed innovative energy efficiency and sustainability designs, including hydronic radiant heating technology from REHAU.

The LEED® Gold certified building, designed in part by the engineering students themselves, incorporates reused materials, passive solar heating and a ventilation system combined with radiant that harnesses a "stack effect" to move air through the building naturally. The radiant system features REHAU RAUPEX crosslinked polyethylene PEXa pipe installed in floors throughout the building to provide precise heat to 20 separate zones.

After two years of use, the results are in: On a campus already committed to energy efficiency, Centre's energy use index measures 160 kilowatt-hours per square meter per year (50.7 kBtu/ft²/yr), nearly one-third less than the average campus wide, said David Woodson, managing director of UBC's energy and water services.

Radiant heating was an excellent fit with UBC's closed-loop hot-water system, he added, because the district heating loop line ran close to the building. Contractors tapped it, connected it to a heat exchanger, then hooked it up via REHAU's PRO-BALANCE manifolds to 5,791 m (19,000 ft) of flexible RAUPEX O₂ barrier pipe to efficiently heat 855 m² (9,200 ft²) of space.

"The building is performing really, really well," said Woodson, noting that the radiant design and installation appear to have been excellent as his office "has not had one single hot/cold call, which is highly unusual for a new building" let alone one with a unique design.



The REHAU system installation also “went in well,” said Matt Steele, the construction foreman at the building site and now a project manager for the contractor, Building Technologies in Vancouver. “We ran into a few issues, such as a special tool we needed to attach the lines to the heat exchanger. But REHAU was good about getting us that tool right away.”

Finally, the hot-water district system combined with radiant-heat technology is much safer and more reliable. Pressurized steam can hit temperatures of 304°C (579°F). As a result, metal piping is under enormous strain. If a line cracks or a radiator fails, it can be dangerous and “the old system was leaking a lot of steam,” Loewen noted.

The moderate hot water puts very little strain on the district system. And when this water is distributed through REHAU’s durable PEXa piping, the longevity of the heating system can exceed the useful life of the building it’s heating.

Still, the return on investment in energy efficiencies is sometimes difficult to calculate in British Columbia because the province enjoys low-cost electricity generated by hydroelectric dams, noted G.A. Willie Perez, the project engineer and a partner for MCW Consultants, the Vancouver engineering firm for the project.

The region’s future is nonetheless bright for advanced energy efficiencies including radiant heating designs and technologies, Perez said. That’s because Vancouver, and now the entire province, “have been very aggressive about insisting on reducing energy consumption in new buildings. There’s a lot going on here.” And so much more to look forward to.

Project: UBC Engineering Student Centre, Vancouver, BC

Construction type: Educational facility, opened 2015

Project scope: 5,791 m (19,000 ft) of RAUPEX pipe; 855 m² (ft²) of radiant heating; 20 zones

Architect: Urban Arts Architecture

Engineer: MCW Consultants Ltd

Mechanical contractor: Trotter and Morton Building Technologies

REHAU systems used: Radiant heating (RAUPEX[®] pipe, PRO-BALANCE[®] manifolds)