

Architectural wonder — mechanical nightmare?

Unique art college challenges mechanical designer

By Bruce Nagy



When visitors come from across Canada to visit CMX-CIPHEX Mechanical Exposition in Toronto – the country's largest mechanical trade show – they may notice some very unusual architecture if they take the time to explore the city.

If they happen to pass the Ontario College of Art and Design (OCAD) on McCaul Street, the first question that might arise for any member of the mechanical industry is: "How on earth did they get the plumbing and HVAC into that?"

An architectural wonder, designed by British avant-garde architect Will Alsop, the project was officially intended to be a renovation and expansion of the existing four-storey building. By the time Alsop was done with it, the expansion looked like a tabletop suspended in mid-air by a dozen very large coloured pencils.

The legs rise about 26 metres above ground and sink 18 metres to bedrock

below grade. The primary support for the building is actually the core shaft between the new and old sections.

Rob Pyke, manager of building projects at the college, noted that the "box floating in space" design meant that an

Engineers decided to deliver air via the steel columns supporting the structure. "We did lab testing to get holes sized and positioned just right so they blew air across the surface of the glass." Did this jeopardize the

The system

Heating, ventilating and cooling for the tabletop is provided via gas-fired rooftop units. Because of the dense urban location, they were a challenge to install, especially the replacement units on the existing building that had to be swung in under the new tabletop section. They had to be lifted with cranes. However, on one side were streetcar tracks with their accompanying overhead wires and on the other side a city park, for which crane permits are not easy to obtain. "We have recently decided that more units need replacing on the older section and will go with a series of smaller configurations transported by elevator," said Pyke.

Ventilation air for the tabletop is provided with energy recovery units using enthalpy wheels. Heating, ventilating and cooling for the recaptured space in the existing building is supplied via a split system, hot water heating and electric cooling units.

The "box floating in space" design meant that an extra surface area was exposed on the underside.

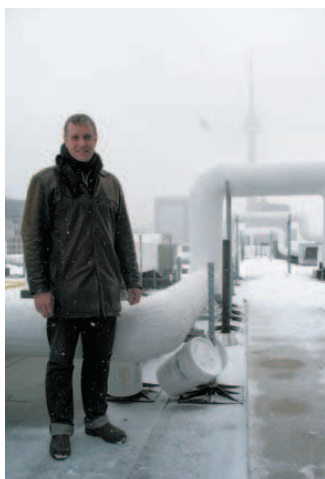
extra surface area was exposed on the underside. The "floor of the fifth level" needed special HVAC consideration. For this reason the building's forced air system included three extra heating units and a lot of extra ductwork to heat within the soffit of this exposed area.

HVAC compromise

Despite being completed only a few years ago and built to house young designers, energy conservation had to be sacrificed. "We wanted to use boilers and chillers, but the budget framework would not permit it," said Mechanical Engineer Tim Jantze of MCW Consultants Ltd., Toronto. "I guess the plan was to concentrate on the big idea with the money we had at the time," added Pyke. "We are now exploring options for more efficient systems."

"One of the unique features was to use a structural component to deliver air," said Jantze. He is talking about the four-storey entrance hall that features a full height glass facade. There were concerns about distribution and condensation in a space that large, with all that glass.

integrity of the structure? "Not at all," said Pyke. "The steel was already more than adequate to support the glass."



"Take the picture already..." Rob Pyke was gracious enough to stand on the roof in late January for a photo.



The CN Tower and historic Royal York Hotel provide a backdrop for the heating/cooling rooftop units.

The new 'tabletop' towers above the original building. (Photo by Richard Johnson)

limiting, building purge, free cooling, preventative maintenance and graphics.

Plumbing in the tabletop is conventional and limited to bathrooms and lab sinks. Storm and sanitary drainage connect to the main building through the elevator shaft and stairwell.

Winner of numerous awards, the building is primary example of striking design for its own sake which, given its purpose, is reasonable. The architect actually worked with students during the conceptual part of the design process.

Raising the building above the ground created a new outdoor public space, Butterfield Park, and also improved pedestrian circulation in the area.

Toronto-based writer Bruce Nagy covers the "green beat" exclusively for Plumbing and HVAC Product News. He can be reached at bruce.nagy@rogers.com.

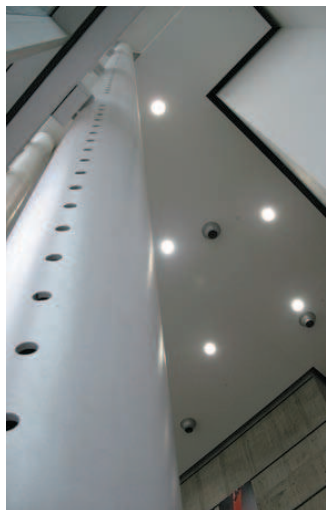


This young OCAD art student has a message for mechanical contractors and engineers working on radical projects like this.

The new building is being used to teach industrial and interior design. This required modeling labs, a painting lab, fabric dying, weaving and other lab-type workshops. Exhaust air systems are used for sanitary exhaust and special technology exhaust. Heat pipes achieve heat recovery for make-up air serving the technology exhaust systems. More fresh air is needed in these areas.

Carbon dioxide sensors are used within air systems to monitor the level of carbon dioxide and to reset the minimum outside air quantity whenever CO2 levels are below normal acceptable levels.

Fans are switched on from the space and monitored at the Energy Management Control System (EMCS). At the local switch a diode light indicates when the fan is on. During unoccupied periods, the EMCS overrides the local control switches, turns the fans off and closes the exhaust air dampers. The system's Direct Digital Control (DDC) regulates optimum start/stop, electric demand



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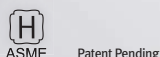
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