



Academic Report Compares Window Walls and Curtainwalls

Posted on August 29, 2017 by Jordan Scott

A recent report from University of Toronto's Building Tall Research Centre and the **Residential Construction Council of Ontario (RESCON)** provides an in-depth comparison of window walls and curtainwalls.

The report, titled "Window Wall and Curtain Wall: An Objective Review," looks at each cladding system's strengths as well as their applications. It was funded jointly by **RESCON** and the Natural Sciences and Engineering Research Council of Canada.

According to the report, construction costs vary in practice, but a typical window wall can cost nearly half as much as a typical unitized curtainwall to install. A unitized curtainwall can cost \$104.9 per square foot, whereas the report says a double glazed window wall with insulated slab bypass and interior foam insulation can cost \$54.6 per square foot.

"Reasons for the lower cost of the window wall include fewer major hoisting equipment needed during installation, simpler components for manufacturing and the lack of a requirement for it to be structurally engineered to be self-supported," says the report.

The report concludes that with new technological advances, the window wall can be a good alternative to the more expensive curtainwall.

It reads, "Curtainwalls are more expensive, take longer to install and require specialized crew and equipment to install. Window walls can also take away some useable floor space and can be aesthetically less appealing, which can cause commercial constructors to prefer the curtainwall. Both systems' performance relies heavily on appropriate design and installation. Many of the window wall's perceived faults are attributed to its older iterations, such as the lack of slab covers."

Paul De Beradis, director of building science and innovation for RESCON, says in a statement that the report shows that current window walls are more advanced.

"The false perception that window wall is a lesser form of glazed cladding should be laid to rest," he says. "This study clearly demonstrates that window wall not only has a vital place in high-rise construction, it can actually outperform a typical curtainwall system. The unique characteristics of window wall make it ideally suited for residential applications, which is why it dominates the condo cladding marketplace."

Patrick Marquis, one of the report's authors and a master's of applied science candidate at the University of Toronto's Department of Civil Engineering noted a few caveats to the report.

"More analysis is still required to fully compare the systems. A comparison should be conducted with mockups of the systems to corroborate the Morrison Hershfield modeling results. In many contexts the systems are not as interchangeable as perhaps implied from the comparison. They are not direct competitors," says Marquis. "The report is a review paper, with some added commentary. None of the modeling referenced in the report were conducted by the Building Tall Research Centre."

According to the report, a window wall sits structurally between the suspended reinforced concrete slabs, while the curtainwall hangs off the slab edges by anchors.

Marquis TELLS USGNN.com™ about why the report was commissioned.

"Motivation for the report stemmed from a larger research goal of studying cladding systems in high-rise residential buildings in Canada. When conducting the literature review, we noticed there was very little written about the window wall in the first place, and comparisons to other systems such as the curtainwall existed online, but through blog posts and forum discussions," he says. "We thought it would be a good idea to bring all the existing information together in an academic report that can objectively compare the systems through several performance indicators."

Metrics used to measure each system's overall performance were thermal performance, water penetration, air leakage and moisture control. The system's constructability, cost and maintainability were also taken into account.

The report cites thermal modeling done in the Building Envelope Thermal Bridging Guide 1.1 by engineering company Morrison Hershfield. According to the modeling, the curtainwall performs better than the window wall and has a stronger R-value at the clear wall and the slab intersection. However, improved window wall design ensures a continuous thermal barrier through spandrel bypass and thermal breaks in the balcony slabs.

In regard to water penetration and air leakage, the curtainwall has an advantage due to its less exposed parts and simpler connections to the structure. In addition, operable windows and balcony doors are rare in buildings with curtainwalls, which reduces the risk of leaks.

"However, if properly designed and installed, the window wall can outperform a typical curtainwall. In tall residential and commercial buildings, wind driven rain and strong winds will be major concerns and proper design of either curtainwall or window wall is needed to achieve strong performance," says the report.

Curtainwalls are sleeker, more expensive and installed from the outside of the building using a crane or rig. They are more often used in commercial buildings, while window walls are often used in residential buildings due to their lower cost, installation from the building interior and customization potential.

“For example, in residential construction there are usually many more enclosure penetrations needed for mechanical penetrations; here, a highly customizable window wall becomes very favorable. These penetrations are not as prevalent in commercial buildings which usually have centralized mechanical ventilation that services the entire building using vertical duct runs. Another difference that affects the façade is that commercial buildings do not typically have operable windows and balconies on every floor, thereby allowing the continuous cladding system found in curtainwalls,” says the report.

Window walls offer better compartmentalization of the building because there is no gap between the slab edge and the cladding. Noise, smoke and odor transmission between floors is reduced because window walls are installed between floors. This feature is desirable for multi-unit residential buildings.

Marquis tells USGNN.com™ how he hopes the report will affect the industry.

“We hope the effect is that people can be more informed about the systems, how they compare and perhaps change the view on window walls. Current perception is that the window wall is inferior to the curtainwall. The early window walls had many flaws that caused its poor performance, but well designed and well installed systems today can achieve great performance,” he says. “The curtainwall will always have intrinsic advantages over the window wall, but an extremely strong window wall system will still be cheaper and easier to install than a typical curtainwall.”

Click [here](#) to read the full report.