

Thermal and Energy Analysis by RDH Building Engineering Ltd.

To measure the energy efficiency that can be gained by a composite balcony system, in the summer of 2015 CCI Balconies Inc. (CCIB) engaged RDH Building Engineering Ltd.¹ (RDH) to undertake a thermal and energy efficiency analysis of the CCIB composite balcony system as designed for use in cast in place high rise residential buildings.

An executive summary follows. The complete report can be found here: www.ccibalconies.com

“The thermal and energy modelling outlined in this report illustrates the clear energy savings achieved through the use of CCIB composite balconies instead of traditional concrete balconies.”

- RDH Building Engineering Ltd. August 7, 2015

Executive Summary

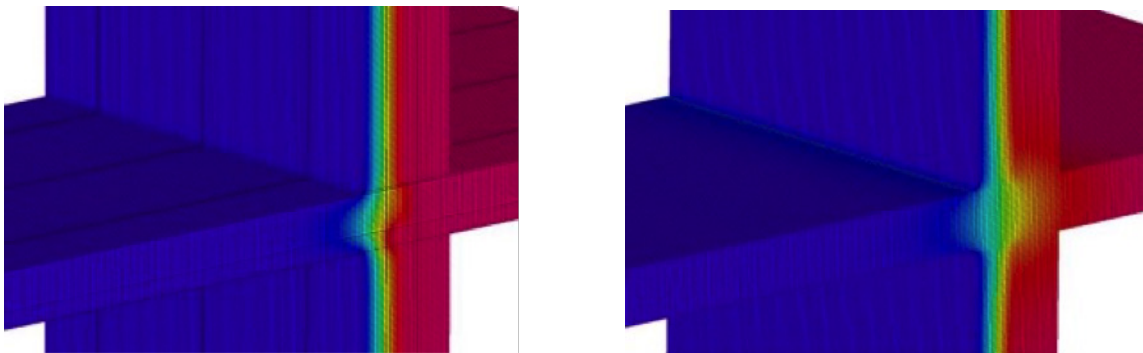
The heat flow through thermal bridges is significant and disproportionate to the overall enclosure area so that a seemingly well-insulated building can often fail to meet energy code requirements, designer intent, or occupant expectations. Windows are often seen as the largest thermal bridge in buildings, as the thermal performance is often quite low compared to the surrounding walls (i.e., an R-2 metal frame window within an R-20 insulated wall); however, exposed concrete slab edges and balconies can have almost as large of an influence having effective R-values of approximately R-1. After accounting for windows and doors, exposed concrete slab edges and balconies can account for the second greatest source of thermal bridging in a multi-storey building.

RDH Building Engineering Ltd. utilized the HEAT3 program in performing its analysis. The exercise measured the heat flow through a wall assembly with and without a balcony. For each composite balcony thermal model, a corresponding reinforced concrete balcony model was also simulated for comparison to typical market construction. Industry standard winter exterior and interior boundary conditions were used in the tests. The thermal and energy performance was measured against three wall assemblies, with thermal values of R-20; R-10 and R-4. The analysis also included various balcony lengths for the building, ranging from no balconies to balconies on 100% of the length of the building.

The highlights of RDH’s evaluation are as shown below:

- The use of composite balconies enabled consistent R-values to be maintained as the size of the balcony increased, while using concrete balconies resulted in a steady decline in R-values as the size of the balcony increased.

- Thermal modeling results indicates that CCIB composite balcony achieves better thermal performance than reinforced concrete.
- Composite balconies performed better than concrete in measuring interior surface temperatures. A warm interior surface temperature will be more comfortable for the occupants and reduce the chance of surface condensation, decreasing the likelihood of mould growth.
- Use of composite balcony system will increase percent space heat savings.
- Building with the CCIB composite balcony system will help projects qualify for LEED energy credits and development incentives.
- The CCIB composite balcony system is a cost competitive option, and immediate payback through energy savings means your project will save money.



The figure shows the partial thermal gradient through the three dimensional thermal model. The CCIB composite balcony is on the left and a typical concrete balcony in on the right in the R-20 (exterior insulated) wall assembly.

The executive summary was prepared by CCI Balconies. The complete report prepared by RDH Building Engineering is available in the resource section of www.ccibalconies.com

ⁱ On November 1, 2015 RDH Building Engineering Ltd announced the merger with Building Science Consulting Inc. and is continuing under the name of RDH Building Science Inc.



CCI Balconies is the developer of AirBalcony, a composite architectural balcony system for new high- and low-rise residential construction. The lightweight, high-performance balcony system virtually eliminates thermal bridging, providing cost savings in heating/cooling as well as long-term maintenance.