RDH BUILDING SCIENCE

Chris Schumacher | M.A.Sc.

Principal, Senior Building Science Specialist

Christopher Schumacher is recognized as an expert in the field of building monitoring, as well as enclosure and building systems testing. He has led the design, installation, and analysis of monitoring systems for a variety of research programs and demonstration projects, both in the lab and in field locations around the globe.

Expertise + Experience

Chris' formal education in architecture and engineering is balanced by two decades of experience in design, computer simulation, physical testing, and forensic investigation. He oversees much of the work done through RDH Building Science Laboratories, and regularly participates as a consultant in the development of experimental test programs for academic institutions, building product manufacturers and government agencies including DOE, EPA, CMHC, NRC/IRC, NRCan and UNDP. Examples of his research work include a multi-year investigation of thermal performance in full-scale wall assemblies (the Thermal Metric Project) and development of an apparatus and test method to measure dense-pack airflow resistance, to support development of the Building Performance Institute's test standard BPI-103 and material standard BPI-102. He has played key roles in and received awards for several major ASHRAE research projects. He has extensive experience in product testing and development and thrives on the challenge of inventing novel solutions to client and industry questions.

Before joining RDH Building Science Inc., Chris was a founding principal of Building Science Consulting Inc., and previously a founding partner of Balanced Solutions Inc., an innovative Canadian building science RD&D consultancy. His expertise has been instrumental in analyzing and remediating condensation damage in attics, mold in walls, peeling paint, failed masonry and poorly performing HVAC systems in houses, schools, office buildings and industrial facilities. Chris' combined interest in research and practice, and in the connections between the two, reflects his commitment to the continuous development of building science.

Chris is a Principal of RDH Building Science Inc. and has over 20 years' experience as a building scientist.

Education

M.A.Sc., Civil Engineering Dept., University of Waterloo, ON

B.A.Sc., Civil Engineering, University of Waterloo, ON

B.Tech., Architectural Science, Ryerson Polytechnic University, Toronto, ON

Memberships

Member, Ontario Building Envelope Council (OBEC)

Typical Projects

RESEARCH + FORENSICS

Chris was the lead building science consultant on the following projects:

- Dunning Place, Regina, SK – Provided building science testing and consulting services for this historical load-bearing masonry office building. Performed material property tests, used to calibrate a hygrothermal model. Simulations were conducted to develop options for an interior insulation retrofit to reduce energy use, and improve thermal comfort.
- Google Building Retrofit and Restoration, New York, NY – In collaboration with Building Science Corporation, building science consulting services were provided to develop a master plan for the energy retrofit and redevelopment of this 2.9 million sq. ft. historic concrete and brick masonry building. Scope included material testing, hygrothermal simulations, and construction of prototype retrofits.
- Halifax Armoury Building, Halifax Nova Scotia – Collected and analyzed data related to freeze-thaw risk assessment. As a designated Historical site, all rehabilitation of the masonry assemblies and the whole building were of utmost concern. Tasks included field review of building enclosure conditions, enclosure monitoring, analysis, and reporting.

Chris provided building science research and consulting services for the following projects:

- Thermal Metric Project – Oversaw the implementation of a multi-year research program investigating thermal performance in full-scale wall assemblies, with the goal of

Chris Schumacher | M.A.Sc.

Principal, Senior Building Science Specialist

developing alternatives to the R-value. Managed the design, construction, commissioning, and operation of the Thermal Metric Double-Guarded Hot Box.

- Vancouver Test Hut Project – Lead consultant for experimental design and setup of the Vancouver Test Hut, a field exposure facility used for a multi-year investigation of wall assembly performance in a Pacific Northwest climate.
- U.S. DOE Building America High Impact Project, Support of Standards Development: Dense-pack Airflow Resistance (final report completed Nov. 2011) – Oversaw the development of an apparatus and test method designed to act as the basis for the Building Performance Institute's test standard BPI-103 and to inform material standard BPI-102.
- Historic Masonry Building Retrofit Guidelines (United States Military Academy) – Lead consultant providing guidance on insulation retrofit strategies for a historically significant group of 86 masonry buildings.
- Frederic C. Hamilton Building, Denver Art Museum, Denver, CO – Provided expert peer review of proposed plans to remedy moisture and condensation problems for this 146K SF museum building. WUFI was used to analyze the condensation potential for existing roof and wall assemblies and several iterations of proposed repair strategies.
- Hitchcock Hall, Dartmouth College, Hanover, NH – The consulting team reviewed past reports and material property test results, prepared a hygrothermal model and used the model to predict the performance of proposed retrofit options. The architectural drawings were also reviewed and rain water management and window installation details were developed.
- OAA Whole Building Air Barrier Testing, Toronto ON – Assisted whole building airtightness testing to assess the success of retrofit activities that had been undertaken as part of a larger project to achieve net-zero performance. Testing was performed in front of a live audience as a unique educational event.

Publications + Presentations

PAPERS + OTHER PUBLICATIONS

- Schumacher, Chris J. and Robert Lepage. "Building America Building Technologies Program: Moisture Control for Dense-Packed Roof Assemblies in Cold Climates: Final Measure Guideline." *Building America Program*, U.S. Department of Energy, Oak Ridge, TN, November 2012.
- Straube, John F., K. Ueno, and Chris J. Schumacher. "Measure Guideline: Internal Insulation of Masonry Walls", July 1, 2012.
- "Building America Building Technologies Program High Impact Project: Support of Standards Development: Dense-pack Airflow Resistance." *Building America Program*, U.S. Department of Energy, Oak Ridge, TN, November 2011.
- Lstiburek, J. and Schumacher, C.J. "Research Report 1110: Hygrothermal Analysis of California Attics." Building Science Corporation, Somerville, MA, October 2011.
- Schumacher, Chris J., Straube, J., Mensinga, P. "Assessing the Freeze-Thaw Resistance of Brick Masonry Units for Retrofit Insulation Projects." Presented at Thermal Performance of the Exterior Envelopes of Whole Buildings XI International Conference, Clearwater, FL, December 2010.
- Schumacher, Chris J., et. al., "Adhered Veneers and Inward Vapor Drives: Significance, Problems and Solutions" *Journal of Building Enclosure Design* (Summer 2009).
- Straube, John F., Chris J. Schumacher, Jonathan Smegal, and M. Jablonka. "Adhered Veneers and Inward Vapor Drives: Significance, Problems, and Solutions." Presented at Canadian Conference on Building Science and Technology, Montreal, QC, 2009.
- Schumacher, Chris J., Reeves, E. "Field Performance of an Unvented Cathedral Ceiling (UCC) in Vancouver." Presented at Thermal Performance of the Exterior Envelopes of Whole Buildings X International Conference, Clearwater, December 2007.
- Ueno, K., Chris J. Schumacher, John F. Straube. "Field Monitoring and Hygrothermal Modeling of Interior Basement Insulation Systems." Thermal Performance of the Exterior Envelopes of Whole Buildings X International Conference, Clearwater, December 2007.
- Straube.J F., and Schumacher C.J., "Interior Insulation Retrofits of Load-Bearing Masonry Walls in Cold Climates." *Journal of Green Building* Vol. 2, No. 2 (Spring 2007): 42-50.
- Straube, John F., and Chris J. Schumacher. "Assessing the Durability Impacts of Energy Efficient Enclosure Upgrades using Hygrothermal Modeling." *Journal of the Intl. Assoc. for Science and Technology of Building Maintenance and Monuments Preservation* Vol 2 (2006).

RDH BUILDING SCIENCE

Chris Schumacher | M.A.Sc.

Principal, Senior Building Science Specialist

PRESENTATIONS + SPEAKING ENGAGEMENTS

- Schumacher, Chris J. and D. Ober. “Thermal Metric: the End is Near.” Presented at 17th Westford Symposium, Westford, MA, August 2013.
- Schumacher, Chris J. and Aaron Grin. “Thermal Metric Project: A Year of Progress.” Presented at 16th Westford Symposium, Westford, MA, August 2012.
- “Building Science.” Presented at Remodeling Industry Association Building Science Seminar, June 2012.
- “When Walls Work and When They Don’t.” Presented at NESEA BuildingEnergy12, Boston, MA, March 2012.
- “Thermal Metric Project.” Presented at 15th Westford Symposium, Westford, MA, August 2011.
- Schumacher, Chris J., John Straube and P. Mensinga. “Assessing the Freeze-thaw Resistance of Brick Masonry Units for Retrofit Insulation Projects.” Presented at Thermal Performance of the Exterior Envelopes of Whole Buildings XI International Conference, Clearwater, FL, December 2010.
- “Field Measurements of Moisture in Building Materials and Assemblies”, Presented at BEST2, Portland, OR, April 2010.
- “When R-Value Doesn’t Measure Up.” Presented at NESEA BuildingEnergy10, Boston, MA. March 2010. Also presented at a workshop, Wyandotte, MI, February 2011.