



## Workshop on Building Science Education in North America

### Hosts:

ASTM International

- ✓ ASTM Committee E06, Performance of Buildings
- ✓ ASTM Subcommittee E06.55, Performance of Building Enclosures
- ✓ ASTM Subcommittee E06.41, Air Leakage and Ventilation Performance
- ✓ ASTM Built Environment Advisory Council

National Institute of Building Sciences

Joint Committee on Building Science Education

### Sponsors:

DuPont

Tremco

USG Corporation

Concordia University

AIA/BETEC Building Enclosure Council (BEC) Detroit

Roxul Inc

## Program

<u>8:00-8:30 AM:</u>	<i>Welcome/Opening Remarks (D. Lemieux, Chairman, ASTM E06.55; C. Mathis, Chairman, NIBS-BETEC; P. Totten, Chairman, BETEC Education Committee)</i>
<u>8:30-10:00 AM:</u>	<i>“Overview of Building Science Education in North America – European and North American Perspectives” (G. Reichard (VT) / R. Krpan (BCIT))</i>
<u>10:00-10:15 AM:</u>	<i><u>Break</u></i>
<u>10:15-12:00 Noon:</u>	<i>“Educating the Educator” (J. Straube, University of Waterloo)</i>
<u>12:00-1:00 PM:</u>	<i>Lunch</i>
<u>1:00-2:15 PM:</u>	<i>“Science-Based Architectural Design Teaching and Learning” (J. Fernandez, MIT)</i>
<u>2:15-2:30 PM:</u>	<i><u>Break</u></i>
<u>2:30-3:45 PM:</u>	<i>“Criteria for Excellence in Building Science Education and Curriculum Development” (S. Rashkin (DOE), P. Huelman (University of Minnesota and Joint Committee))</i>
<u>3:45-5:00 PM:</u>	<i>Panel Discussion: ASTM Building Enclosure Certification Program (Moderators: C. Mathis and P. Totten, Chairman, BETEC Education Committee): Straube, Fernandez, Reichard; Krpan; Huelman; Rashkin</i>
<u>5:00-5:15 PM:</u>	<i>Closing Remarks</i>
<u>6:00-7:30 PM:</u>	<i>Reception</i>

# Workshop on Building Science Education

In order to explore in more detail the first of the four Core Competencies outlined in ASTM E2813, ASTM International (ASTM) and the National Institute of Building Sciences (NIBS) will host an **ASTM/NIBS Workshop on Building Science Education in North America** on April 6, 2014, in Toronto. The workshop will include presentations from invited speakers representing universities in Canada and the United States recognized as subject-matter experts in Building Science education, training, and curriculum development. Topics to be discussed will include an overview of building science education as it currently exists in North America, followed by a critical review of graduate-level curricula currently available in building science and how that curricula can be further developed and refined to more effectively educate architects, engineers, and construction professionals. The workshop will conclude with a critical review of the ASTM/NIBS Building Enclosure Certification and Training Program currently under development and how that curriculum can be developed to align with curricula at colleges and universities in Canada and the U.S. to satisfy the certification requirements being developed by ASTM and offer a new opportunity for professional development, certification, and career advancement in architecture and engineering.

**Daniel J. “Dan” Lemieux, AIA** (Principal, WJE, Washington, D.C.), serves as Chairperson of ASTM Subcommittee E06.55, *Performance of Building Enclosures*, and is also chairing this workshop with **R. Christopher “Chris” Mathis**, Chairman of the *Building Enclosure Technology and Environment Council* (BETEC) for NIBS and Chair of the ASTM *Built Environment Advisory Committee* (BEAC), and **Paul E. Totten, PE**, Chairman of the BETEC Education Committee. Co-hosts and sponsors of the workshop include:

- ✓ ASTM E06, Performance of Buildings
- ✓ ASTM E06.55, Performance of Building Enclosures
- ✓ ASTM Subcommittee E06.41, Air Leakage and Ventilation Performance
- ✓ ASTM Built Environment Advisory Committee
- ✓ National Institute of Building Sciences (NIBS)
- ✓ Joint Committee on Building Science Education
- ✓ AIA/BETEC Building Enclosure Council (BEC) Detroit
- ✓ Building Enclosure Technology and Environment Council (BETEC)
- ✓ USG Corporation
- ✓ DuPont
- ✓ Tremco
- ✓ Roxul
- ✓ Concordia University

Speakers and abstracts:

**Dr. John F. Straube**

University of Waterloo

***“Educating the Educator”***

This presentation will begin with a brief description of the wide range of knowledge & skill sets (outcomes) that have/are labeled as "Building Science," before proposing to outline a number of different requirements of instructors to meet those building science educational categories. The current shortage of qualified instructors at college and university level will be discussed, along with suggested paths to help meet the growing need for both educators and graduates of all types of building scientists and building engineers.

**Dr. Georg Reichard**

Graz University of Technology, Austria

Virginia Institute of Technology

Lawrence Berkeley National Lab

***“History and Evolution of Building Science”***

The presentation will focus on a comparison of Building Science Education in Europe versus North America. It will discuss the differences in climate, culture, and trades on both continents and reflect on current and historical differences in each of the aspects. A short journey in (European) building science history will be used to highlight the milestones, which created change in the way we design, build, and live in our buildings. Anecdotal observations and personal experiences will be presented to showcase past issues and identify current issues on either side of the Atlantic, explaining differences, and providing ideas for improving building science education in North America. Following this assessment, specific challenges and opportunities will be discussed as they apply to North America and the underlying social-economic context.

**Dr. John Fernandez**

Massachusetts Institute of Technology

***Curriculum Overview/U.S.: “Science-Based Architectural Design Teaching and Learning”***

Recently, the architectural community has adopted techniques of production and priorities for design that call into question the role of intuition and the primacy of authorship. Design processes have been irreversibly altered through technology and design intent has been irreversibly influenced by our augmented awareness of environmental consequences. Professor Fernandez will pose several questions, and offer several prospects for leveraging this new technical and intellectual landscape for teaching and learning design based on evidence and performance.

**Ron Krpan, PE**

British Columbia Institute of Technology (BCIT)

***Curriculum Overview/Canada***

The British Columbia Institute of Technology offers western Canada’s largest selection of courses in building science. Beginning in 1996 with the introduction of two undergraduate elective courses, the offerings have grown to include four courses at the undergraduate level, two successful part-time studies courses catering to a wide range of building professionals, and two master’s level credentials in building science. The masters’ credentials include a course-based Master of Engineering in Building Science and a thesis-based Master of Applied Science in Building Science and are intended primarily for engineers and architects interested in advanced-level study of building performance. The core courses are the same for the two credentials and include a calculus-based introduction to building science—which is intended as a leveling course—a course on building materials, and a course on building envelope. Additionally, students choose from elective courses in advanced acoustics, building energy performance, mechanical systems and control, ventilation and indoor air quality, building envelope,

modeling of heat and mass transfer in buildings, and advanced energy simulation. These courses were designed specifically to meet the goals of the building science masters' programs. The required research component of the program is supported by a range of research facilities and capabilities, including a building envelope test facility, a whole building performance laboratory, a materials testing and instrumentation laboratory, and a variety of test chambers and equipment. Research activities are also facilitated through collaboration with the local building industry. The programming is under on-going review, with a current emphasis on streamlining the path for students from the diploma level in building science through to the master's level.

**Mr. Patrick (Pat) Huelman**

University of Minnesota

**Mr. Sam Rashkin**

U.S. Department of Energy

**“Building Science: Consensus and Collaboration”**

This session is intended to share the work of several collaborative efforts focused on defining “excellence” in building science education. The Department of Energy Building Science Education Task Force is engaged in a very broad effort to identify building science educational needs across a wide range of audiences. In addition to a review of that larger effort, we will present the Joint Committee (NCHRC/ASC/AEI) work that is focused on developing criteria for building science content within selected collegiate programs. This will look at critical content expectations for programs that focus on building science as well as what building science elements should be integrated into existing design and construction disciplines. This session will also explore the depth of knowledge or proficiency levels that may be needed by various audiences relative to each of the building science competencies.