

Building Structures and Thermal Bridging

James A. D'Aloisio

Abstract:

Most structural building elements, especially steel and concrete, are good conductors of heat, compared to insulation materials. When structural elements occur within the thickness of the building envelope – especially walls, roofs, and wall/roof intersections – they can create an alternative, parallel heat path that conducts heat from inside to outside, or vice versa. This phenomenon is called thermal bridging. Losses through thermal bridging can represent a significant amount of the total energy used in a building. Thermal bridging can cause other undesirable effects as well, such as condensation within walls or finished spaces, and too-cold or too-hot interior spaces. The problems are especially pronounced in otherwise high-performing building envelopes. Fortunately, there are solutions available to minimize the problem.

This presentation will first provide an awareness of the problem by presenting a brief overview of heat movement through building envelopes, and some visual evidence of thermal bridging. It will then identify some solution concepts, and present the results of some studies that have been performed using two-dimensional energy flow analyses (THERM) on some typical building details compared to improved details. Each of the improved details represent a mitigation strategy that can be applied to other building details, including the use of stainless steel, and manufactured structural thermal break assemblies. The presentation concludes with recent North American case studies of implementation of thermal bridging reduction strategies. The goal of the presentation is to raise awareness of thermal bridging, and to make attendees aware of the fact that there are realistic, economical alternatives.

Bio:

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James A. D'Aloisio, is a Principal with Klepper, Hahn & Hyatt, a structural engineering, landscape architecture, and building envelope services firm in Syracuse, NY. Jim has over 25 years' experience as a practicing structural engineer. Lately, he has explored the relationship between building structures and energy efficiency, as well as alternative construction systems, such as Insulated Concrete Forms, Structural Insulated Panels, and Frost-Protected Shallow Foundations. In 2011 he visited Germany to learn about energy efficient European construction methods. He is currently Treasurer of the U.S. Green Building Council's New York Upstate Chapter. He has written over 20 articles on building structures and sustainability.