

conference preview

INNOVATION IN DESIGN OF STEEL STRUCTURES: RESEARCH NEEDS FOR GLOBAL COMPETITIVENESS

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IT HAS BEEN REPORTED by numerous sources that the 15-story Ark Hotel in Changsha, China was completed in just six days. The main structural components, including the steel superstructure, took less than 48 hours to erect. The structure was built of prefabricated, modular steel and concrete components, and connection detailing is uniform throughout. Considering current U.S. design practice, which may place a priority on the uniqueness of each individual design or optimization of steel weight, it is unlikely that conventional U.S. design and construction methods could create a building that could be completed in such a time frame.

Whether or not we are interested in competing with the Ark Hotel, we cannot ignore the fact that the U.S. wants to remain highly competitive in an age of expanding global markets. According to Price Waterhouse Cooper, the Chinese construction sector overtook the U.S. market as the largest worldwide and will nearly double in the next decade. Also by 2020, emerging markets are expected to account for 55% of global construction. As international development continues to grow, U.S. competitiveness will depend on the flexibility to both design with and use construction materials, including steel, in innovative ways. Whether the future includes automated construction, prefabricated or modular building components, entirely new section configurations or even completely new design approaches is unclear at this point. Design and construction approaches that consider the life cycle costs and environmental impact of the structure are also likely to continue to increase in importance.

Learn what activities are being planned to maintain and enhance U.S. competitiveness in steel construction.

Regardless, innovation will require both fundamental and applied research in order for us to both understand and develop new approaches for structural steel design.

Innovation in the Works

The good news is that a number of ideas were developed at an AISC "Innovation in Structural Steel" meeting held in Chicago in December 2010, with the emphasis being a SWOT (strengths, weaknesses, opportunities and threats) analysis of steel design and construction, including fabrication. Robust discussion at that meeting led to identification of a number of ideas with regard to steel design. A paradox also emerged: the desire for standardization versus the potential for economical designs from new or customized sections or members.

Working from the ideas generated at this meeting, the formulation of a research agenda is the focus of a new AISC and National Science Foundation supported workshop. This workshop, "Innovation in Design of Steel Structures: Research Needs for Global Competitiveness," was planned for ASCE/SEI Structures Congress in Chicago last month. The basic premise of the workshop is the belief that there is no dearth of good talent in the area of steel design research and practice. The problem is not that we cannot find the answers, but rather that we have to come to some agreement on what the questions are. Based both on discussions at the AISC Innovations meeting and input from the ASCE Metals Technical Administrative Committee, the main topics chosen for the workshop were sustainability, design for rapid constructability and design for ex-



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treme loads. Of course, the potential for innovations is limitless, and a wildcard session at the workshop was planned to be used to consider any ideas for innovation in steel design.

Within the framework of those four categories, experts from both industry and academia were invited to act as speakers and moderators in order to motivate the discussions in each topic as well as to inspire creative brainstorming. Perhaps more importantly, however, is the active recruitment of the emerging talent, the future innovators and leaders, as workshop participants. With this diversity of participants, perspectives and ideas,

the outlook is good for the development of an innovative research agenda to help the U.S. to retain global competitiveness in structural steel design.

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This article provides background for the results coming out of the March ASCE/SEI Structures Congress session, which the authors will report on as part of Session N32 at NASCC: The Steel Conference, April 18-20 in Dallas. Learn more about The Steel Conference at www.aisc.org/nascc.