ASCE INDIA SECTION

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1.0 ASCE-IS Southern Region's Activity

On December 14, 2011, three separate technical talks were organized in Bangalore by ASCE-IS Southern Region. There had been two expert lectures, one in the morning and the other in the afternoon, delivered at the Golden Jubilee Hall of Department of Civil Engineering, Indian Institute of Science. The 3rd technical talk was arranged in association with Association of Consulting Civil Engineers (ACCE), India - Bangalore Centre and Bangalore Institute of Technology, Bangalore.

The first lecture was given by Prof. Dr. Prasad Rangaraju, Department of Civil Engineering, Clemson University, USA, on "**Production and Application of Biogenic Siliceous Materials in Green Construction**". Prof. Dr. G L Sivakumar Babu, Regional Director, ASCE-IS Southern Region introduced the speaker to the audience before the talk. With increasing concerns about greenhouse gas emissions and role of construction materials in contributing towards such environmental problems, there is a need to take a fundamental look at the carbon footprint of typical construction materials and explore ways to reduce impact of construction industry on the environment. Prof. Rangaraju indicated that biogenic silica, a residue from biomass-fired power plants, is a valuable resource that can potentially be harvested on a renewable basis and help reduce the environmental impact of construction industry. He mentioned that typical biomass used in such plants include rice hulls, switch grass and other rapid growing plants that could provide a continuous and a renewable supply of fuel. His presentation focused on basic characteristics of biomass ashes and the challenges and benefits of using this as a source of supplementary cementing material for use with portland cement.

The second lecture was delivered that afternoon by Prof. Dr. Venkatesh Kodur, Department of Civil and Environmental Engineering, Michigan State University, USA. Prof. Kodur spoke about "**Innovative Strategies for Enhancing Fire Performance of High Performing Materials and Structural Systems**".

Prof. Prasad Rangaraju presenting his talk

In his introduction to the attendees, Prof. Babu mentioned that Prof. Kodur was a Fellow of the Canadian Academy of Engineering and a Foreign Fellow of Indian National Academy of Engineering. Apart from being a professionally certified engineer and associated with a number of reputed international societies, Prof. Kodur was also a Fellow of American Society of Civil Engineers. He had won many awards including AISC Faculty Fellowship Award, MSU Distinguished Faculty Award, NRCC (Government of Canada) Outstanding Achievement Award, and NATO Award for collaborative research. Dr. Kodur was part of the FEMA/ASCE Building Performance Assessment Team that studied the collapse of WTC buildings by September 11, 2001 incident.

In recent years there is growing recognition that the current prescriptive approaches have serious drawbacks and limitations and do not provide realistic assessment of fire performance. Over the last three decades, there have been significant research and development activity in improving the strength and durability properties of construction materials. This research has lead to the development of a new class of materials, often referred to as high performing materials (HPM), (e.g. high strength concrete (HSC), fibre reinforced polymers (FRP), fibre reinforce concrete (FRC), structural multilayered glued wood (engineered wood), and light gauge steel). While these HPM's have high strength and durability properties at

Prof. Dr. Kodur delivering his talk

ambient temperature, their performance under fire conditions is highly questionable. In his presentation, Prof. Kodur discussed the performance problems associated with the HPM.

Fire represents one of the most severe environmental hazards to which buildings and built infrastructure is subjected, and thus provision of appropriate fire safety measures for structural members is a major requirement in design. Currently, fire resistance is mostly evaluated through either standard tests or prescriptive based methodologies. In recent years there is growing recognition that the current prescriptive approaches have serious drawbacks and limitations and do not provide realistic assessment of fire performance. To overcome these drawbacks, performance-based fire design approach is being promoted. Undertaking such performance based design requires validated numerical models and reliable input data on many factors including realistic fire scenario, load level, boundary conditions, and high temperature material properties.

Over the last three decades, there have been significant research and development activity in improving the strength and durability properties of construction materials. This research has lead to the development of a new class of materials, often referred to as high performing materials (HPM), (e.g. high strength concrete (HSC), fibre reinforced polymers (FRP), fibre reinforce concrete (FRC), structural multilayered glued wood (engineered wood), and light gauge steel). These HPM's offer attractive alternative for realizing cost effective, durable, and high performing structures in built environment. Also, materials such as FRP and FRC are highly effective in strengthening and retrofitting of aging and deteriorating infrastructure.

While these HPM's have high strength and durability properties at ambient temperature, their performance under fire conditions is highly questionable. Many of the new materials have poor or unknown fire characteristics, and their fire performance, when integrated into structural systems, is not well understood. For instance, newer types of concrete (HSC) are found to be more susceptible to fire induced spalling. FRP's are generally combustible and lose their structural functionality through bond degradation. Engineered wood has lower fire resistance as compared to conventional wood due to the presence of adhesives, a rapidly combustible petroleum-based material. Light gauge steel is highly susceptible to local buckling under fire conditions and also adhesion of fire insulation is a major concern.

The lack of high temperature property data for these HPM was highlighted. Examples of innovative strategies for enhancing fire performance of HPM and structural systems were presented. Specific guidelines such as the use of bent ties and/or fibres to mitigate fire induced spalling in HSC and use of effective insulation schemes for enhancing fire resistance of FRP-strengthened members were discussed. Through case studies it was demonstrated that accounting for realistic parameters, such structural continuity, membrane action, end restraints, and realistic fire scenarios, can improve fire performance of structural systems.

Following these talks, good interactions took place between the speakers and the audience consisting of faculty, students and others in both the lectures and mementos were presented to both the

(Righ to Left) Prof. P Rangaraju, Prof. G L S Babu, Prof. J M Chandrakishen, Prof. A Ramaswamy, Prof.C S Manohar, Prof. Kodur, Dr. K S N Rao, Prof. M S M Kumar

Membership Advancement

If you are currently an Affiliate or Associate Member of ASCE

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speakers on behalf of ASCE IS (SR) and the Department of Civil Engineering, IISc., Bangalore, as a token of appreciation for their support.

Prof. Kodur gave another lecture on "**World Trade Center Building Disaster: Lessons for Engineering Response**" in the evening at Seminar Hall of Bangalore Institute of Technology, Vishveshwarapuram, Bangalore. At first, Mr. Raghunath, Chairman, ACCE - Bangalore centre addressed and welcomed the gathering. Later, Mr. Chandramoulee, Secretary, Bangalore Center of ACCE, talked about the program and its objectives. Mr. Pradeep, Secretary, ASCE-IS (SR) spoke briefly about ASCE - India Section. Mr. Ajit Sabnis, Secretary General, ACCE, introduced the speaker Prof. Kodur and the lecture followed. This lecture was followed by a question and answer session. There had been a turn out of about 60 delegates. The talk was well appreciated by all.

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