*** Poster Abstract ***

Fire Performance of High-Performance Construction Materials

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To assure public safety and to allow for flexibility in the use of modern high performance (HP) construction materials it is desirable to enhance current fire performance standards related to the construction industry. Also, in determining the integrity of a particular structural component design, and even in the design process itself, it will be increasingly more important for designers and building code officials to use modern methods of engineering analysis for predicting the fire performance of construction materials and systems and for minimizing the need for costly and burdensome furnace testing procedures. In this regard, acceptable and reliable methods and standards will need to be developed, advanced, and implemented.

The effort to be described responds to the above-mentioned needs. It involves a collaboration between NIST (fire modeling and co-ordination with the fire-safety community), ATLSS (structural analysis), and the University of Liège (structural analysis). The objective is to achieve performance-based methods to evaluate the fire performance of structures utilizing HP construction materials for acceptance/adoption by US and international building codes. The strategy involves the following three-stage approach:

1. Heighten awareness, especially within the North American fire safety community, of a) the need and practical potential benefit of enhanced fire performance standards and b) the diverse capabilities of the most advanced available tools for analyzing performance of fire-exposed structures. This will be done by using SAFIR, a computer model (under continuing development at the University of Liège) for analyzing the fire response of structures. SAFIR will be used to carry out computer simulations of the response of "interesting" (as identified by the design/construction industry), single-element, structural components to standard-fire exposures.
2. Develop and establish a calculation-based methodology for determining the fire resistance of arbitrary-material structural elements. This would complement and be available as an alternative to the well-recognized ASTM E119 furnace test methodology. The idea is to establish the use of advanced tools of structural analysis as an accepted alternative to furnace testing. Acceptance of such an analytic alternative would lead to substantial benefits to industry, i.e., economy and uniformity in performance evaluation and generally-improved internationally-accepted designs.
3. Develop and expand the accepted use of calculation-based methods to evaluate the fire performance of structural elements exposed to *"real" fire environments*, rather than to the *standard fire environment*; and of (portions of) *entire structures*, rather than *individual structural elements*.

KEYWORDS: ASTM E119, construction materials, fire modeling, fire performance, fire resistance, high performance materials, performance standards, structural response, structures.

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