Knowledge to Practice:

ACI Foundation

Highlighting the SDC's Role in Concrete Innovation

The ACI Foundation's Strategic Development Council (SDC) is committed to accelerating new technology acceptance within the concrete construction industry and identifying strategic and technical challenges that face the industry. This month's *Knowledge to Practice* illuminates some of SDC's recent work in helping to steer the concrete industry into a more innovative, productive, and sustainable future.

SDC has over 60 member organizations, including suppliers, contractors, architectural/engineering firms, trade associations, owners, educational institutions, and public authorities. SDC brings together leaders in the concrete marketplace to address industry challenges and provide a forum to showcase and support innovations in concrete technology. Twice per year, SDC hosts Technology Forums—1.5-day technical conferences to highlight innovative technologies and research that have the potential for positive productivity or economic impacts on the industry.

The most recent SDC Technology Forum took place this past September in Reston, VA. The forum demonstrated the significance of how new technologies can positively impact concrete construction. "My involvement in SDC has shown me that the ongoing research and full-scale product development being done right now is creating solutions to problems that only a few years ago seemed to have no clear answers at all," stated Eric Peterson, Construction Manager, Webcor Concrete. The topics discussed at the latest forum are in step with what SDC has been a part of since its formation. Some of the technologies and concepts that have been undertaken by SDC in recent years include:

Construction tools and practices

- ALICE Technologies is automating building information model (BIM) software to optimize construction schedules. This industrial solution can generate thousands of viable scheduling options at the push of a button;
- FARO Technologies, Inc., shows how high-precision three-dimensional (3-D) laser measurement and imaging in laser scanning applications change the way concrete is measured. It can document what has already been constructed, including the interior of concrete structures, and prevent construction errors through comparison with the 3-D model before elements are cast; and
- The Super Air Meter is a new field air meter test that quickly measures air-void volume and spacing in fresh concrete, critical parameters for durability of concrete, and to allow for isolating problems on a project, resulting in more reliable air-void systems.

Sustainability impact

The cement and concrete industry face a challenge in the marketplace with the heightened attention on rising global carbon dioxide (CO_2) emissions. As the demand for cement and concrete increase, the emissions from cement production rise. Also, material supplies for concrete such as quality natural aggregates and manufactured by-products (for example, fly ash or slag) are experiencing regional shortages. Many innovative concepts seek to address these issues, including:

- Blue Planet, LLC has come up with a biomimetic concept to convert CO_2 emissions from large industrial plants including coal- and gas-fired power plants, steel mills, and cement plants into limestone aggregate with properties similar to natural limestone aggregate;
- Building Product Ecosystems is striving to solve many perceived environmental and supply chain issues related to cement and concrete by using post-consumer glass waste, and currently is assessing pilot studies and working with industry standards development organizations to assure performance;
- Ongoing research headed by Gaurav Sant, University of California, Los Angeles, encompasses a unique approach to the CO_2 emission concerns by turning it into an opportunity—CO_2 as a resource, not a problem. They capture the CO_2 and use it to create a new building material, fabricated by 3-D printing technology. The material has been produced at lab scale, but the group is seeking ways to scale up the production; and
- CarbonCure Technologies uses waste CO_2 from emissions as an admixture in concrete by enhancing the reaction

SDC Technology Forum participants touring the FHWA's Turner-Fairbank Highway Research Center

products that solidify the concrete. Already scaled up, this technology has been shown to improve concrete performance through several pilot projects.

Accelerating technology acceptance

SDC Forums also address the common problem of industry resistance to implement innovative technology or methods. Innovation can positively affect the many challenges that face the concrete construction industry such as a decreasing workforce, reduced profitability, sluggish productivity gains, and increasing sustainability. But to drive adoption, there is a need to establish confidence in an innovative technology. SDC supports new technologies by first evaluating and then jumpstarting integration into the concrete design and construction community. This may be through sponsoring or managing creation of new technical documents—guidelines, specifications, and codes. SDC also organizes stakeholders for specific industry-critical issues, to help establish a foothold in standards developing organizations (such as ACI or ASTM International), perform industry surveys, develop business cases, test models, develop short courses, and support research that will provide confidence in the performance of the new technology.

"It is clear to me that the researchers and innovators need to reach out more than they are to our industry and that contractors need to reach out to them," said Peterson. "These pioneers need encouragement and feedback, and builders need to help with the guidance of our future reality."

If you are interested in learning about new technologies or sharing your knowledge of an innovative project or process, consider joining SDC at one of the future technology forums. To learn more about the ACI Foundation and SDC, contact Ann Daugherty, Director, ACI Foundation, at ann.daugherty@acifoundation.org.

Visit **www.ConcreteSDC.org** to view additional resources on the technologies and presenters listed herein.