

Slag Cement Association 2012 Project of the Year Awards

The Slag Cement Association (SCA) presented the 2012 Project of the Year Awards during the meeting of ACI Committee 233, Ground Slag in Concrete, at the ACI Spring 2013 Convention in Minneapolis, MN. The awards recognize projects for excellence and innovation in concrete using slag cement. Seven projects received awards in five categories.

Architectural Design

Natural History Museum of Utah
Salt Lake City, UT

The new Natural History Museum of Utah is an environmentally respectful building, incorporating a pervious concrete parking lot and sidewalks, a building skin made of locally harvested copper and rock products, a wind turbine, and a roof with sections seeded with native plants. Many of the interior and exterior walls of the 165,000 ft² (15,300 m²) museum are hand-formed exposed concrete with a board form finish. Project specifications called for slag cement due to its white color and recycled content value. Jack B. Parson Companies designed a self-consolidating concrete mixture that combines portland cement, slag cement, and Class F fly ash. This ternary concrete mixture supports the LEED® requirements for recycled material, using 55% recycled cementitious material content.

Project credits: Utah Division of Facilities and Construction Management, Owner; Ennead Architects, Architect; Dunn Associates, Inc., Structural Engineer; Big D Construction, Contractor; Jack B. Parson Companies, Concrete Supplier; and Holcim (US) Inc., Slag Cement Supplier.

Durability

Miami Access Tunnel
Miami, FL

The Miami Access Tunnel will provide direct access between the seaport and highways I-395 and I-95, adding another entry to the port of Miami besides the Port Bridge.



Natural History Museum of Utah, Salt Lake City, UT



Miami Access Tunnel, Miami, FL



Detroit Metro Airport Taxiway Zulu, Detroit, MI



The KONE Center, Moline, IL

Slag cement was used in soil stabilization and in the tunnel's precast concrete liners at 70% and 51% of the total cementitious materials, respectively. The design life for the concrete liners is 150 years. Given the exposure, both sulfate resistance and chloride migration were extremely important in developing the concrete mixture for the precast concrete liners. A mixture with cementitious materials proportioned at 39% portland cement, 51% slag cement, and 10% fly ash met the required design strength of 6000 psi (41 MPa). The appealing finished appearance of the concrete has led to a similar proportioned mixture being used in some of the architectural elements in the tunnel.

Project credits: Miami Access Tunnel and Florida Department of Transportation, Owners; Bouygues Civil Works, Engineer and Contractor; CEMEX, Concrete Supplier; and Lehigh Hanson, Slag Cement Supplier.

Detroit Metro Airport Taxiway Zulu Detroit, MI

The Wayne County Airport Authority needed to improve the central portion of Taxiway Zulu prior to the start of a runway reconstruction project scheduled for 2012. Portions of the taxiway required reconstruction due to deterioration of pavement and shoulders; other portions did not meet the minimum runway-taxiway separation distance required during poor weather conditions. The project specifications included FAA requirements for the evaluation of each individual aggregate for alkali-silica reactivity. Local sands exceeded the maximum 0.1% expansion at 28 days, so Ajax Paving chose a concrete mixture containing slag cement at a cement replacement of 30% to mitigate the reactivity. The slag cement concrete mixture provided reliable consistency for the nearly 50,000 yd² (42,000 m²), 16 in. (410 mm) thick paving project and facilitated completion in the required expedited manner.

Project credits: Wayne County Airport Authority, Owner; Kimley-Horn of Michigan, Inc., Architect; Ajax Paving Industries, Inc., Contractor and Concrete Supplier; and St Marys Cement Inc., Slag Cement Supplier.

Green Design The KONE Centre Moline, IL

The KONE Centre is home to the U.S. operations of Kone Inc., a global leader in the elevator and escalator industry. Designed to support KONE's mission of employee engagement and customer focus, the project included a host of sustainable design features throughout the construction and planning processes. The concrete mixture contained slag cement, Class C fly ash, and Type I portland cement. It also included a lightweight slag aggregate that is well-suited for lightweight structural and nonstructural concrete and offers excellent fire



Goodyear Innovation Way Parking Deck, Akron, OH

resistance, thermal insulation, and sound absorption. Use of slag cement in combination with the lightweight aggregate contributed to KONE's goal of LEED Gold certification by boosting the recycled content of the concrete.

Project credits: Financial District Properties, Owner; HOK, Architect and Engineer; Ryan Companies, Contractor; Builders Sand & Cement Co., Concrete Supplier; and Lafarge North America, Slag Cement Supplier.

High Performance

Goodyear Innovation Way Parking Deck Akron, OH

The Goodyear Parking Deck is a four-bay structure that has a concrete roof on top of four supported parking levels. The structural system for the garage is a long-span, cast-in-place, post-tensioned concrete structure. This design required a high-performance structural concrete mixture with low permeability and sufficient early strength gain to accommodate post-tensioning in 72 hours. Mixture designs for the post-tensioned concrete, pavements, and concrete roof all incorporated slag cement, which contributed to reduced environmental impact, met performance requirements, and provided enhanced durability.

Project credits: Goodyear Tire & Rubber Company, Owner; GPD Group, Architect; Desman Associates, Engineer; Donley's, Inc., Contractor; Mack Concrete, Concrete Supplier; and Essroc Italcementi, Slag Cement Supplier.

Wheaton Franciscan Healthcare—St. Francis Outpatient Center Milwaukee, WI

The Wheaton Franciscan Healthcare—St. Francis Outpatient Medical Facility is an 80,000 ft² (7500 m²) outpatient center that focuses on neurology services. The design was driven by the needs of the patient population, with the goal of making a world-class environment customized for those receiving care. Prairie Materials provided a slag cement concrete mixture that met desired performance requirements for the slabs-on-ground and the elevated decks. Optimum pumpability and placability enabled the contractor to place the 150 yd³ (115 m³) of concrete scheduled per day in less



Wheaton Franciscan Healthcare—St. Francis Outpatient Center, Milwaukee, WI



I-70 Mississippi River Bridge pylon, St. Louis, MO

than 3.5 hours. The concrete mixture exceeded design strength requirements and reduced the environmental footprint of the concrete. The project was finished within budget and ahead of schedule.

Project credits: Wheaton Franciscan Healthcare, Owner; Eppstein Uhen Architects, Architect; Pierce Engineers, Inc., Engineer; Riley Construction, Contractor; Prairie Materials, Concrete Supplier; and St Marys Cement Inc., Slag Cement Supplier.

Sustainability

I-70 Mississippi River Bridge Pylons St. Louis, MO

The new I-70 Mississippi River Bridge includes a 1500 ft (460 m) main cable-stayed span—the third longest in the United States—suspended between two 16,000 yd³ (12,200 m³) concrete pylons. Each pylon rises 412 ft (125 m) above water level and anchors into bedrock about 170 ft (51 m) below. The mass concrete portions of the pylons were cast with a specified mixture consisting of a 30:70 portland cement-slag cement ratio. Because the mixture achieved reliable strength, with many results over 8000 psi (55 MPa) at 56 days, it required

considerably less curing time than scheduled; had an appealing appearance, and was used extensively in other areas of the pylons. The reduced curing cycle time for each placement, from a calculated 56 days to an achieved 10 to 11 days, enabled an accelerated construction schedule.

Project credits: Missouri Department of Transportation and Illinois Department of Transportation, Owners; HNTB, Engineer; Massman-Traylor-Alberici Joint Venture, Contractor; Riley Illinois LLC, Concrete; and Holcim (US) Inc., Slag Cement Supplier.

The SCA represents companies that produce and ship over 90% of the slag cement (ground-granulated blast-furnace slag) in the United States. Through a program of continuous research, promotion, and education, SCA communicates the performance and sustainable benefits of this cementitious material to stakeholders throughout the construction industry. The association functions, through the support and participation of member companies, for the benefit of the community at large. More information is available at www.slacement.org.

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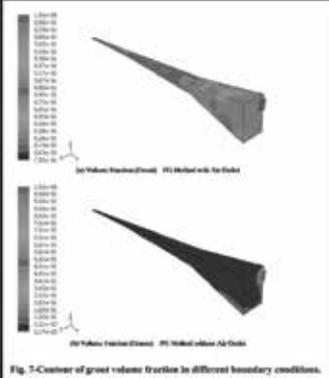


Fig. 7: Contour of grout volume fraction in different boundary conditions.

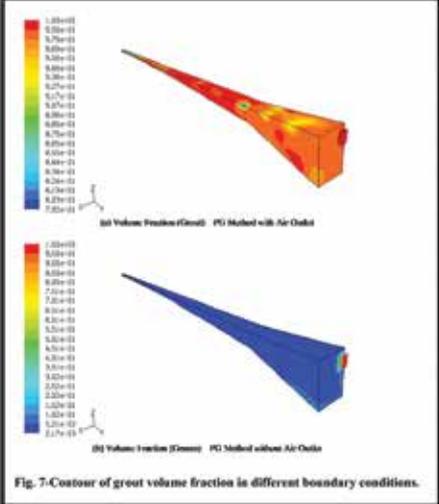


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