



System-K™ Pour at Sugar Creek (Cambridge City, IN)

SUGAR CREEK

Utilizes System-K™ For Floors
In Their New State-Of-
The-Art Facility

Project Manager:

ONEsource Facility Solutions
(Atlanta, GA)

Concrete Consultant:

CRT Concrete Consulting, LLC
(Fishers, IN)

Concrete Contractor:

TWC Concrete Services, LLC
(Cincinnati, OH)

Ready Mix Producer:

Irving Materials, Inc. (IMI)
(Cambridge City, IN)

Product:

CTS System-K™ and Type K
Shrinkage-Compensating Concrete

In 2015, Sugar Creek expanded a newly purchased existing food processing facility in Cambridge City, Indiana from 70,000 square feet to over 400,000 square feet. The food processing facility will house several state-of-the-art food preparation technologies, but the centerpiece of the facility is its Sous-Vide operations. Sous-Vide is a method of cooking that uses hot water or steam to cook meats and vegetables while they are vacuum sealed in plastic. This process technology required the removal and re-plumbing of the entire existing manufacturing floor to accommodate water lines and drains and complement the design of the new expansion. The project involves a 330,000 square foot building expansion, and the renovation of an existing adjacent 70,000 square foot meat and food processing facility.

ONEsource was the awarded general contractor on this project and TWC was subcontracted to pour all of the concrete slabs. There were two major obstacles to address in pouring these concrete floors. First, with the extensive plumbing running throughout the floors, potential for reflective cracking along the pipe placements was a concern. Second, this state-of-the-art food processing facility needed to eliminate control joints, which are common sites for cracked concrete panel edges and spalls due to slab curling, and where bacteria is prone to grow.

Given these key challenges that often lead to costly slab damage and deterioration, System-K Shrinkage-Compensating Concrete floors were recommended. A System-K mix design uses Type K shrinkage-compensating cement that is designed to counteract the drying shrinkage cracking common with ordinary portland cement. Type K is an expansive, hydraulic cement that effectively utilizes the restraints within the concrete (i.e., reinforcement, piping, etc.) and the controlled expansion of the Type K cement to offset the strains caused by drying shrinkage, keeping the concrete in compression throughout the service life of the floor. With the restraints in tension and the concrete in compression, drying shrinkage cracking is minimized or eliminated,

and curled slab edges can be prevented. Type K shrinkage-compensating cement is used in conjunction with reinforcing K-Fibers™ that permit the elimination of shrinkage steel in the floor slab design, only requiring the use of perimeter steel for each slab, and at columns or other projections in the concrete.

Floor construction started in October 2014 and was completed in April 2015. Over 270 tons of Komponent®, an expansive mineral additive used in System-K™ Fiber Reinforced Shrinkage-Compensating Concrete, were used. The System-K design allowed the contractor, TWC Concrete, to eliminate the temperature and shrinkage steel throughout the slabs and requiring only 2 - #4 bars at the perimeter of each pour and around columns or other projections. Sloping was required to each of the over 390 drains contained in the slab, accomplished by using a 3D laser screed. Approximately 6,750 cubic yards of System-K Fiber Reinforced Shrinkage-Compensating Concrete was placed.

The CTS and IMI QC/QA teams worked together to produce a mix design that required no control joints in slab pours up to 150' x 150'. The largest pour at this Sugar Creek facility measured 150' x 100'. This mix design exceeded the customer's performance requirements and the placement and finishing team's expectations and was used successfully for all of the main floors of the building. IMI worked with TWC to keep the mix workable and set times in line with project schedules without impacting the performance of the System-K Shrinkage-Compensating Concrete floors. The concrete finishing crew was pleased with the mix workability and indicated no noticeable difference between System-K finishing and conventional concrete finishing. The concrete design also allowed the batching and delivery processes to move forward unaffected. Placement was followed by a seven (7) day wet-curing process to ensure maximum long-term performance.

IMI supplied 5,000 yards of System-K Shrinkage-Compensating Concrete for this project. Another 1,000 yards were supplied for the upper decks of the facility. The mix design was engineered so that it could be delivered with a 6 inch slump. IMI used a high range water reducer to achieve a 4,000 psi strength at 28 days.

Sugar Creek was very pleased to have a high performance floor with minimal construction and control joints and no drying shrinkage cracking, ultimately giving them peace of mind for maintaining efficient facility operations and significantly reducing maintenance costs for both the floors and transfer equipment (e.g., forklifts, carts) throughout the facility. They authorized the use of System-K Shrinkage-Compensating Concrete on a second facility that began construction shortly after the Cambridge City project was complete.

Irving Materials Inc. (IMI), the Ready Mix Producer for the Sugar Creek project, is partnering with owners and contractors throughout the region to provide System-K Shrinkage-Compensating Concrete. System-K includes engineered 1/4" synthetic monofilament K-Fibers and Komponent blended with local portland cement. These short, synthetic fibers provide

Sous Vide (pronounced "sue VEED"), the food is prepped, vacuum-sealed and then slowly pre-cooked in a circulated water bath. When the food reaches its optimal internal temperature and desired texture, it is quick-chilled and then refrigerated or frozen until it is ready to be served.

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adequate restraint to allow designers to minimize or eliminate the need for temperature and shrinkage steel while improving the durability of the finished concrete.

System-K Shrinkage-Compensated Concrete provides a high-performance concrete solution with increased abrasion and impact resistance and reduced permeability that contribute to long-term protection and performance of the concrete.

CTS Cement's Type K and System-K Shrinkage-Compensating Cement Concrete solutions achieve significant savings both during installation and in-service. Construction and maintenance costs can be decreased by reducing control joint placement and treatment by more than 90%, as well as preventing costly maintenance and replacement of forklifts, pallet jacks, and other facility equipment damaged by continuous joint impact. By eliminating slab edge curling, these concrete floor solutions prevent corner breaks, and spall repairs can be avoided.

Fewer joints and larger slab placements reduce installation time and cost, while increased durability and elimination of edge curling help reduce operations and maintenance costs.

Contact CTS Cement Manufacturing today to find out how we can provide a Type K or System-K solution for your next project.