



## PROJECT PROFILE



# BOEING ACHIEVES A FLAT, DIMENSIONALLY STABLE, CRACK-FREE AND JOINT FREE FOUNDATION SLAB

**Application:**

Friction Stir Welder Foundation Slab

**Location:**

St. Louis, MO

**Owner:**

Boeing Military Aviation Works

**Engineer:**

Jacobs Engineering, Aviation Division

**Concrete Contractor:**

McCarthy Construction

**Ready Mix Producer:**

Metro Materials

**Product:**

CTS Type K Shrinkage-Compensating Concrete

Boeing production facilities in St. Louis, MO needed a super flat, dimensionally stable, crack-free and joint-free surface to operate a large, heavy precision Friction Stir Welder. Type K Shrinkage-Compensating Concrete was specified for the upper two feet of thickness of the 32' x 86' foundation slab. The slab included bearing areas, heavy I-beams cast into the concrete, and recessed areas. A monolithic placement and a super-flat surface were specified for this foundation slab in a high bay pre-engineered metal building.

After reviewing the job conditions and performance requirements with CTS Cement, McCarthy and Metro Materials determined that Komponent® technology, used to create Type K Shrinkage-Compensating Concrete, would produce the best results. Komponent® was used to replace 15% of the portland cement in the mix design. The mix was then tested according to ASTM C878 to ensure adequate expansion to achieve a net zero shrinkage using local aggregates and regional portland cement. After test results were submitted to Boeing, they agreed to use Komponent® based on the 14-day results which indicated performance met specification requirements and would produce the same successful results they had experienced at other facilities where Type K Shrinkage-Compensating Concrete had been used.

By using the concentrated Komponent® additive and blending it with regional portland cement, creating Type K cement on the job site, the design and construction teams succeeded in reducing costs while providing a high-quality concrete floor slab solution.

Komponent® was blown into a silo at the ready-mix plant and batching and mixing proceeded as usual. The resulting concrete had a .48 w/c ratio and was consistently at or near an 8" slump, which allowed for easy pumpability and installation efficiency. A concrete boom pump was used for conveyance.

Placement of this 2,752 square foot (200 cubic yard) installation started at 6:00am and was completed by 9:00am. Because Type K concrete does not produce bleed water, finishing started immediately following placement and was completed by 1:45pm. The hydration mechanism used by Komponent® technology and its more complete consumption of mix water, produces a low permeability concrete with exceptional durability. The lack of bleed water prevents dilution of the cement paste at the surface and results in 30-40% greater abrasion resistance as well as the elimination of slab curling, spalling and corner breaks.

Wet curing using pre-soaked burlene and soaker hoses commenced immediately following finishing. The burlene and soaker hoses were used to keep the Type K concrete wet for the 7-day wet cure period. Wet curing ensures full expansion of the Komponent® additive that is required to ensure net zero drying shrinkage and results in minimizing or eliminating drying shrinkage cracks. The wet cure process did not interfere with on-going construction activities and construction proceeded on schedule.

Ultimately, Boeing achieved the super flat, dimensionally stable, crack-free and joint-free floor slab they needed and Jacobs, McCarthy, CTS Cement, and Metro Materials delivered the specified performance.