

# Texas and TTI Take Rejuvenating Higher

By Sandy Lender



**Finding the right materials for statewide use is a monumental task when you have an area as big as Texas. But that's what state materials engineers for the Texas Department of Transportation (TxDOT) set out to do with recycling agent testing in four locations, culminating with U.S. 67 near San Angelo in spring 2017.**

Asphalt pavement mixtures that include high percentages of RAP replacement binder are environmentally friendly, but they have the potential to experience premature cracking. This predilection is attributed to the oxidation—or aging—of the RAP binder in the mix. To restore youth to the RAP binder, researchers test rejuvenators at varying dosages in hopes of delaying cracking while increasing the use of recycle content.

The Delta S additive from Collaborative Aggregates LLC, Wilmington, MA, is designed to do just that. It works by reversing oxidation of the asphalt cement (AC) through a carrier matrix. The plant-based carrier oil literally carries the remainder of the product into the existing asphalt binder where the other components of Delta S perform the chemistry of softening and reversing oxidation.

Jay Bianchini, Ph.D., vice president of operations at CollAgg, shared that TxDOT's Ryan Barborak, P.E., suggested he include the Delta S rejuvenator as part of the state's testing.

“Our initial conversations with TxDOT officials were in regards to approving Delta S as a WMA additive,” Bianchini said. “In the process of explaining that by simply adjusting the dose level of Delta S to the mix design it is also a very effective rejuvenator, we were made aware of the rejuvenator projects going on around the state and that the final one was coming up.”

For the U.S. 67 project, sister companies CSA Materials Inc. and Reece Albert Inc. of San Angelo produced and placed asphalt mixes to assess the performance of three rejuvenating agents under the guidance of the team at Texas A&M Transportation Institute (TTI), College Station. Fujie Zhou, P.E., Ph.D., is a research engineer at TTI and shared that the team used a balanced mix design method, originally developed by TTI, to design the rejuvenated asphalt mixes for the test sections. Their focus: rutting, riding performance and cracking performance.

CSA Materials produced the dense-graded mix with 5.3% PG64-22 binder with a CMI counterflow plant at about 300 TPH. The first 400-ton control section included 13% RAP and no rejuvenators in the mix. For the second control section, the team prepared a 400-ton section with 21% RAP and no rejuvenators. The next three sub lots of 400 tons each included 21% RAP and an additive. The sub lot incorporating the Delta S additive from CollAggs pumped the liquid at a rate of 1.64 gallons per minute through a Moyno Assembly with Compact C pump.

CSA Materials' Asphalt Production Manager William Still confirmed the production temperature of the three test mixes was 275 degrees F.

TTI's Zhou explained what the team sought from the different sections. “We increased the RAP content with rejuvenator sections, and wanted to achieve similar or better performance than the control section with lower RAP.”

Texas Department



of Transportation

One goal is to gain exposure for Delta S in the Southwest United States to compliment the formally monitored asphalt rejuvenator paving projects ongoing in the Northeast, Midwest and Southeast since the product's launch in May 2015.



*To restore youth to the RAP binder, researchers test rejuvenators at varying dosages in hopes of delaying cracking while increasing the use of recycle content.*

Zhou spoke of his pleasure with the project's success. "Based on our lab test results with the Texas Overlay Test, all three additives improved cracking resistance." In the field, "So far so good. We haven't seen any rutting or cracking."

The team has seen more than improved pavement performance. The crew felt that paving performance went well, too. For the mixes placed on U.S. 67, the Reece Albert crew had no worries to report. Still confirmed the paving crew had no problems with any of the sections, with all three performing similarly for the crew during placement and compaction.

That's good news for owner agencies. Tom Scullion, senior research engineer in the Flexible Pavements program of TTI, stated, "The bottom line is to protect the investments and to provide many more years of successful use on the thing in a safe manner."

Bianchini shared how owner agencies can protect the bottom line while protecting their commitment to environmental excellence. "The goal is to show the industry as a whole that well-designed, environmentally friendly and worker safe additives, such as Delta S, can be just as effective at rejuvenating recycled material in asphalt as the traditionally used petroleum based alternatives, all while increasing recycle content."

**Sub Lots**

**Dense-graded mix with 5.3 percent PG64-22 binder**

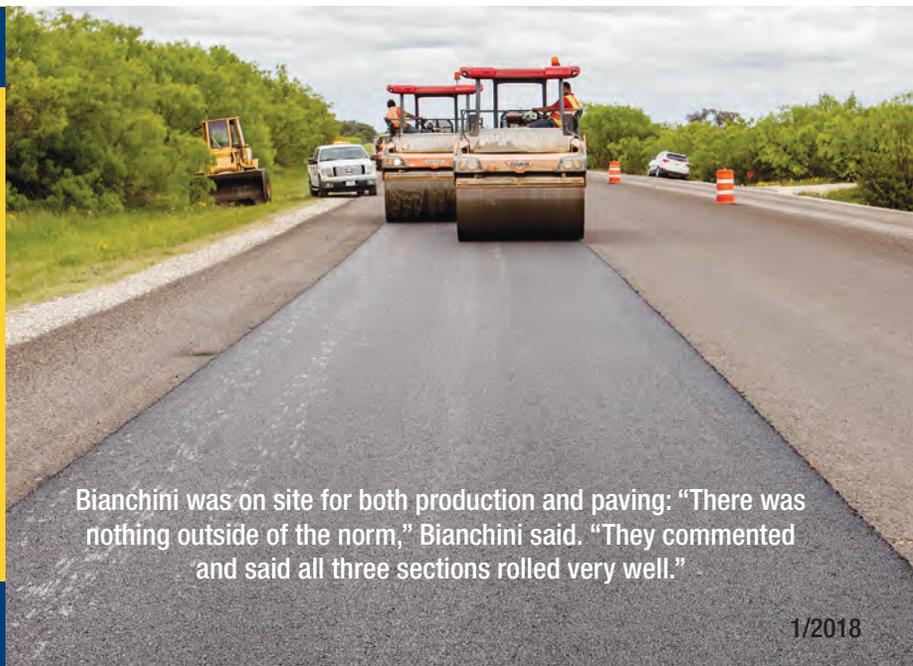
**Control section 1:** 13% RAP, no rejuvenators

**Control section 2:** 21% RAP, no rejuvenators

**Sub lot 1:** 21% RAP plus first additive

**Sub lot 2:** 21% RAP plus Delta S

**Sub lot 3:** 21% RAP plus final additive



Bianchini was on site for both production and paving: "There was nothing outside of the norm," Bianchini said. "They commented and said all three sections rolled very well."