

APPLICATION NOTES

New Software Tool Paves the Way for More Cost-Effective, Durable Roads in Kansas

Kansas Relies on LTPPBind Software to Select Superpave Binder PGs

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The Challenge

With its hot summers and long, bitterly cold winters, Kansas' climate is hard on asphalt pavements. During the winter, when pavement temperatures plunge to as low as -30°C (-22°F), the asphalt concrete becomes brittle, causing the pavement to crack. During the summer, pavement temperatures can soar to as high as 65°C (149°F), causing the asphalt concrete to become soft and malleable. Vehicles can then cause depressions in the wheelpath, known as ruts.

Seeking a cure for rutting and low-temperature cracking, several years ago the Kansas Department of Transportation (KDOT) turned to the Superpave performance grade (PG) asphalt binder specification developed under the Strategic Highway Research Program (SHRP). The Superpave binder specifications are based on the lowest and highest pavement temperatures at a site. However, SHRP specifications used the lowest air temperature as a surrogate for the lowest pavement temperature. As more information and data have become available over the past several years, the original Superpave binder specifications proved to be more restrictive than may have been needed.

The Solution

The Long Term Pavement Performance (LTPP) program recently used data from its Seasonal Monitoring Program to quantify the relationship between air and pavement temperatures. This evaluation resulted in the development of improved low and high pavement temperature models for selecting Superpave PG asphalt binders. These improved models were then incorporated into a software program called LTPPBind.

Today, the Kansas DOT relies on LTPPBind to select its Superpave binder PGs. "KDOT uses LTPPBind software as an integral part of their pavement design process," said Lon Ingram, KDOT's chief of materials and research. Based on SHRPBind, the original binder selection software, LTPPBind provides users with the ability to select PGs based on actual site temperature



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conditions and adjust the selection based on site traffic loading and speed conditions.

"KDOT pavement designers," explained Ingram, "use LTPPBind to determine the PG grades at the various depths of the pavement structure and for different traffic conditions. For instance, if traffic is greater than 3 million equivalent single-axle loads (ESALs), they bump up the PG grade one level, or if there are certain stopping/standing traffic conditions, they'll bump up the PG grade one or two levels."

KDOT is currently in the process of writing up a new policy on the use of LTPPBind for their design process. "LTPPBind is very user-friendly," says Ingram, "and we're using it for all our major paving projects in Kansas."

Working With the Software

Kansas DOT is using LTPPBind to get a better handle on its PG grades.

"The new software," explained Ingram, "changed our grade from the original SHRP specifications. Most of the State under the old software was a 58-28 PG. Now almost the entire State is a 64-28 PG, the exception being the southern part of the State where we can use a 64-22 PG."

Although it's too early to tell the effects of changing the PG grade, "we believe we're seeing improved performance with some of these binders – no question," said Ingram. One project that is being watched closely is on Interstate I-70. The project involved both partial reconstruction and a lot of new construction. "So far – and this will be the second summer since we completed the project," said Ingram, "we've seen no rutting or thermal cracking."

Another project is a recently constructed 20-mile-long roadway in the southern part of the State between Wichita and the turnpike. According to Ingram, this area carries quite a bit of traffic and it is Superpave from the bottom up. The project is about

2 years old and Ingram believes that the State will be able to get some solid historical and factual data from the project. "We're hoping this project will start to give some useful cost-benefit information," said Ingram.

The Benefits

The new Superpave binder specifications should help Kansas construct asphalt pavements that last longer, resulting in:

- Reduced thermal cracking and rutting.
- Less frequent road repairs.
- Fewer highway maintenance zones to snarl traffic.
- Reduced asphalt materials costs.

For More Information

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