

The advanced polymer that locks in the performance of modified asphalt

Project Profile



DuPont



< Montana paving project using Elvaloy® RET



This asphalt modifier promises reduced road maintenance in E Sky Country

The word "rugged" was invented to describe places like Montana, where winter temperatures may drop to minus 40 degrees F, while summer highs top 105 degrees F.

Such conditions test not only the mettle of man and machine, but the durability of the state's highway system. "With this kind of extreme temperature cycling, we have an ongoing battle trying to keep our highways driveable," says George Friez, an estimating engineer with Gilman Construction, Butte, Mont., a paving contractor for the State of Montana.

"Although asphalt can be made softer and more flexible to accommodate a road's expansion and contraction during freeze-thaw cycles," says Friez, "the softer oil makes it prone to rutting in hot weather. And if the asphalt is formulated harder to resist rutting, it's prone to cracking in cold weather. Either way, you're looking at a substantial amount of ongoing road maintenance."

One way Montana has been addressing the issue over the past several years, is by specifying the use of polymer modified asphalts (PMAs). These materials, which contain a polymer additive, have shown a marked improvement in resistance to rutting, while offering the necessary flexibility to accommodate thermal cycling.

"We first began using PMAs in 1992, and we've kept a close eye on their performance ever since," says Scott Barnes, Testing Engineer with the Montana Department of Transportation (MDOT). "In our on-site comparison tests versus unmodified asphalts, they definitely show less rutting. We're just now starting to see some very minor rutting, about an eighth inch, on the first PMAs we put down, and that's a significant improvement."

MDOT is currently repaving 17 miles of Highway 83 just north and south of Condon, Mont., with nearly 5,000 tons of PMA. "The PMA we're using contains a special DuPont polymer called Elvaloy®," says Gilman's Friez, "and we expect that it will sharply reduce maintenance in that area for a number of years."

DuPont Elvaloy® RET is a reactive elastomeric terpolymer, the first DuPont polymer specifically designed for modifying asphalt. It is compatible with most types of asphalt, and handles quite similarly to non-modified asphalt, although it is applied at somewhat higher temperatures.

"We put it down 10 to 15 degrees hotter, and have noticed that it rolls and compacts much easier than other PMAs," says Friez. "Elvaloy® also helps eliminate the problem of tender mixes, where the asphalt starts to crack even before compaction. It seems to be a superior mix in every respect."

The asphalt oil for the Condon project was supplied by Conoco Oil Company's Asphalt and Residuals Division. Conoco's Ave Forse Product Manager, Asphalt, says Elvaloy® is indeed a superior polymer for PMAs. "Unlike other polymers for modifying asphalt, Elvaloy® RET won't separate from the asphalt. It is mixed into hot asphalt originally as a solid pellet, but melts and reacts chemically with the asphalt to form a totally homogeneous material with superior performance properties," he says.

Gilman's Friez agrees: "Other manufacturers will let you know right up front that their polymer can break away creating separation, and that you can't leave the material sitting in a tank -- it must be continually agitated, and that's just an extra worry at the job site."

Because PMAs based on Elvaloy® are so stable, they help contractors get around rough spots in the weather. "We had a week-long delay at the beginning of this project," reports Friez, "but that was no problem because we knew that the Elvaloy® mix could sit in the

tank for weeks, if necessary, and still come out the same product. I think that's one of its greatest advantages. It really does give us exceptional timing and use flexibility."

Application flexibility is important, but it wouldn't mean much without long-term product performance, and here, too, Elvaloy® excels

DuPont tests show PMAs based on Elvaloy® offer better long-term creep resistance under load, superior fatigue resistance, and gr resistance to moisture and oxidation. "That's what we were promised," says Friez, "and we believe it's true based on one of our prev projects which used a PMA containing Elvaloy®, at Deer Lodge, Mont. That site still look great -- we don't see the cracking that's us apparent with unmodified asphalt even after one year.

Although PMAs are still relatively new, Friez believes this class of paving materials will save MDOT substantially on long-term road maintenance expense. "Once cracks start appearing, the maintenance teams need to be out there, because the more moisture that beneath the surface, the more damage that's done. Nothing is more devastating to the life of the road," he says.

"Rutting also collects water and creates damage," says Conoco's Forseth. Before PMAs, a state DOT could build its maintenance strategy either around fighting the rutting with a harder asphalt, or fighting the cracks with a softer asphalt. Now, with the advent of F -- and particularly with PMAs based on Elvaloy® -- both problems can be brought under control at the same time. If a PMA buys five more years of road life without major maintenance, it's a great bargain for the state no matter how you look at it."

Will PMAs become the standard paving material in the years ahead? "We're watching their performance very closely," says MDOT's Barnes. "They're not perfect by any means, but they seem to offer the best overall performance right now. We've recently reformula our aggregate to what we call 'Grade D' mixes, and most of these will definitely be polymerized. Also, with the new SHRP (Strategic Highway Research Program) specifications being phased in over the next year or so, I suspect PMA use will grow a lot. The refineri tell us they will have to add polymer to meet the new specifications."

Gilman's Friez agrees: "If the long-term economics prove as convincing as the visual evidence we're seeing today, I think PMAs will become the standard material, particularly for heavy traffic areas, and for states like Montana with broad temperature swings. From we're seeing, PMAs give the public a lot better roadway for the money."

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