



# Break is over

Iowa returns from surfacing hiatus with tougher mix

**D**urable, tough microsurfacing treatments are back, preserving Iowa interstates, but now containing a high-performance latex polymer modifier.

There, an advanced-design polymer modifier is giving Iowa's new microsurfacing mixes the toughness and adhesion they need to serve motorists and preserve pavements.

"Back in 1996 we began pavement-preservation treatments," said Francis Today, P.E., preservation programs engineer, Iowa Department of Transportation, at the National Pavement Preservation Conference in Nashville in August 2012. "But it's only been in the last three to four years that we've moved back to preventive maintenance treatments. We are working to implement an asset-management approach to assist in preserving our pavements, and preventive maintenance—including microsurfacing—is part of that."

"A short time ago we did not do any microsurfacing," said Keith Norris, P.E., Iowa DOT District 2 materials engineer. "There was a hiatus in using this surface treatment, and last year [2011] was the first for a while in which we did any microsurfacing. We're starting to use it more frequently and are increasing our applications."

For its most recent microsurfacing projects, Iowa DOT looks for those hot-mix asphalt pavements that may exhibit a high degree of surface raveling, Norris said.

"Last year, I-35 was starting to show a little wear in spots," he said. "It was in the early stages of deterioration, when we are concerned about stripping and raveling, and the pavement has an

open-textured look. We considered fog seal but had concerns about friction numbers. We settled on microsurfacing as a good application to seal the pavement, protect it from moisture and give us good friction characteristics."

Microsurfacing was applied on I-35 in 2011 and again on a second project in spring 2012. The 2012 work—near Latimer in the north-central part of the state—was placed by Sta-Bilt Construction Co. Inc., Harlan, Iowa. "Microsurfacing goes down relatively quickly and provides excellent wear characteristics," said Rick Burchett, general manager, Sta-Bilt. "It can level the pavement and extend its life."

Sta-Bilt specializes in pavement-preservation treatments, including chip seals and microsurfacing in addition to pavement base stabilization and reclamation, and serves Iowa, Nebraska and South Dakota.

## Micro's scope in Iowa

Microsurfacing is a high-performance surface treatment that combines the right proportions of polymer-modified asphalt emulsion

surface friction. Microsurfacing typically is spread in 9- to 14-ft-wide passes, in a single pass usually less than 0.5 in. thick.

"We use a continuous microsurfacing paver," said Burchett. "That machine is set up with tanks for polymer-modified emulsion, water, aggregate, cement and an additive used to control the set. The trucks that support the paver will back in front of the paver to bring additional emulsion, water and aggregate to the machine.

"Once the mix design is settled, the paver is calibrated to determine how much material is mixed through an onboard pugmill, which drops the mix into a spreader box with squeegee that places it onto the pavement," Burchett said. "The surfacing sets quickly and then can be opened to traffic."

The procedure is permitted via a supplemental spec for polymer-modified microsurfacing (download at [www.iowadot.gov/erl/current/SS/content/SS-09003.pdf](http://www.iowadot.gov/erl/current/SS/content/SS-09003.pdf)).

"We require that the mix have a latex-based polymer modifier," Norris said. "It gives the product greater elasticity and performance."

**"Use of microsurfacing in Iowa is in its infancy. But our asset-management system is helping us plan our preventive maintenance in advance, and that indicates an increase in microsurfacing and other surface treatments in the future."**

with aggregate, mineral filler, water and other additives in a dedicated paver. The material is mixed in-transit and placed on a paved surface.

The product is placed on streets, highways, airports and parking lots to extend their useful life and enhance

In addition to occasional chip seals on low-volume roads, District 2 will utilize slurry seals for transverse joint roll-down applications. "And outside of the traffic lanes we will use an emulsion fog seal on shoulders," Norris said. "We also do crack sealing and filling."

Nearly all the work is done by contractors. "In addition to pothole patching, we will strip-seal the centerlines ourselves," Norris said. "That's a traveling operation that's done with state forces."

The Iowa DOT tends to downplay the use of chip seals.

"We do a few chip seals, but they are on very low-volume roads," Norris said. "We prefer microsurfacing for roads that carry more traffic as we get the

benefits of enhanced traction without the disadvantages of loose stone.

Microsurfacing can be opened to traffic right away, which minimizes delays to the traveling public, and we can walk away from the surface without having to worry about it."

### Utility power

That microsurfacing can be used for both high-level interstate pavements as

well as residential streets is a testament to their utility. Microsurfacing mixes are engineered products that use high-performance materials.

For example, the spring 2012 application utilized Butonal NX 4190 styrene-butadiene polymer from BASF Corp., a high-performance latex that enhances durability.

It is a mechanically stable latex-polymer dispersion that is readily incorporated into cationic asphalt emulsions through addition to the soap solution (batch process) or co-milling (continuous process). It provides excellent cohesion and adhesion properties with aggregate and significantly enhances the residue properties over conventional cationic polymers.

In addition to microsurfacing, Butonal NX 4190 is used in both chip seals and slurry seals. Other formulations of Butonal can be used to modify hot-asphalt cements in order to meet Superpave Plus modified binder specs.

"Microsurfacing uses latex-modified emulsion to make a stronger, better product," Sta-Bilt's Burchett said. "It adheres to the aggregate better, as opposed to a conventional slurry seal. We've found this latex polymer to be a very good product for us."

In addition to the SB latex polymer, an emulsifier was used in this mix. Specifically developed for microsurfacing applications, it emulsifies the liquid asphalt while contributing to emulsion break control and improved adhesion.

Because enhanced friction is so important to the Iowa DOT, the state requires use of tough quartzite from New Ulm, Minn. Aggregate top size is  $\frac{3}{8}$  in.

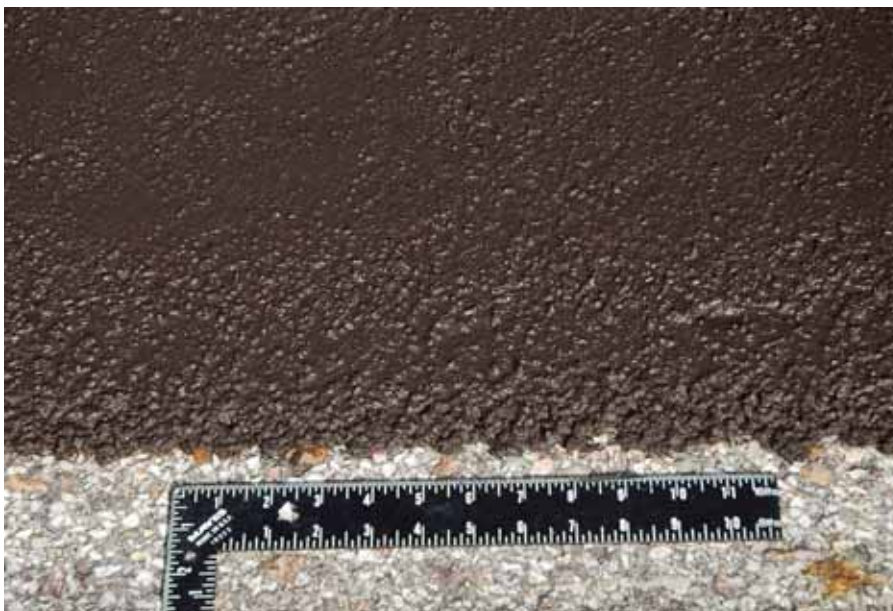
"It's a very good aggregate, with excellent skid resistance," Burchett said. "For the most part, we just don't have that quality of aggregate in Iowa. The state knows that the quartzite provides better wear, so they want to use it on high-speed highways like interstates."

The microsurfacing asphalt emulsion—supplied by Jebro Inc. of Sioux City, Iowa—includes Butonal NX 4190 polymer, an emulsifier, water and, in the largest portion, PG 64-22 liquid asphalt binder.

Cement—part of a finer portion of the mix—serves as a mixing aid and



That microsurfacing can be used for both high-level interstate pavements as well as residential streets is a testament to their utility. Microsurfacing mixes are engineered products that use high-performance materials. *Photo courtesy of BASF Corp.*



The microsurfacing asphalt emulsion—supplied by Jebro Inc. of Sioux City, Iowa—includes Butonal NX 4190 polymer, an emulsifier, water and, in the largest portion, PG 64-22 liquid asphalt binder. *Photo courtesy of BASF Corp.*

chemically contributes to a dense, strong layer.

There's a big difference between conventional slurry-seal emulsions and those used for microsurfacing, said Greg Johnson, general manager-market development, for Jebro Inc.

"This is a slurry-seal emulsion on steroids," Johnson said. "This CSS-1HM microemulsion has to break a lot faster, and it's designed not to break in the box, but to break and set quickly so you can return traffic relatively fast."

The modified asphalt outperforms conventional liquid asphalt, said Johnson. "It helps bind aggregate better than liquid asphalt alone," he said. "It improves the elastic properties of the mix itself, so when it sits on the road, it holds together better."

"Every job is different, and the mix is very aggregate-specific," he added. "The mix designs determine how the emulsion needs to be made, so we need constant feedback from the contractor in the field so we can make changes quickly if they're having issues, such as breaking too quickly or not fast enough."

## Nice topper

The spring I-35 project was 6.8 miles, all four lanes.

"It was a very good-looking finished product," Norris said. "We use microsurfacing on interstates because we get very good performance out of it. The key is applying the treatment at the right time, before the pavement begins to deteriorate."

"You want to catch the pavement before you get a lot of base deterioration, so you can extend the pavement's



Microsurfacing was applied on I-35 in 2011 and again on a second project in spring 2012. The 2012 work—near Latimer in the north-central part of the state—was placed by Sta-Bilt Construction Co. Inc., Harlan, Iowa. *Photo courtesy of BASF Corp.*

life," Sta-Bilt's Burchett said. "Microsurfacing is excellent for that purpose. If you have base corrections, those will have to be done before microsurfacing. Some agencies want crack filling done prior to microsurfacing. If the pavement is rutted we may apply a 'scratch' course to level the ruts and then come back with a surface course. But we want to catch pavements before they go down."

While not applied in the I-35 project, when microsurfacing is used to level ruts, it can eliminate the need to cold-mill a pavement.

"If you're doing rut leveling, you will have to mill it prior to an HMA

overlay," Burchett said. "But with microsurfacing, ahead of the surface course, you can put a scratch course down to correct those ruts without the milling, and you've eliminated an entire operation. Plus, microsurfacing really adheres well to pavements."

"If you understand what you are doing, you will see a better product," Iowa DOT's Todey said. "Use of microsurfacing in Iowa is in its infancy. But our asset-management system is helping us plan our preventive maintenance in advance, and that indicates an increase in microsurfacing and other surface treatments in the future." **AT**



The continuous microsurfacing paver used by the Iowa DOT is set up with tanks for polymer-modified emulsion, water, aggregate, cement and an additive used to control the set. The trucks that support the paver will back in front of the paver to bring additional emulsion, water and aggregate to the machine. *Photo courtesy of BASF Corp.*