



Kansas LTAP Fact Sheet

A Service of The University of Kansas Transportation Center for Road & Bridge Agencies

High Friction Treatments Are Gaining Traction



A high friction surface treatment was added to the outside lane of this curve on K5 highway in 2009 in Leavenworth County.



All highway safety starts with the driver's ability to control the vehicle and keep it in the appropriate lane. Annually, over 25 percent of all highway fatalities in the United States occur at or near horizontal curves.¹ In traversing a curve, an increased potential for crashes occurs because of the combination of: 1) the driving task of negotiating the curve, 2) pavement surface wear and polishing created by turning tires and 3) the higher friction demand of moving a vehicle through a curve compared to the rest of the road. Surface pavement treatments to increase friction at certain spot locations are an effective means to increase traffic safety and reduce crashes. This article will introduce readers to high friction surface treatments (HFSTs) and describe how they are being used in Kansas to date.

The treatment process

HFSTs can provide a long-lasting, higher level of pavement friction than traditional surfaces, resulting in keeping

vehicles in their lane around curves and allowing vehicles to stop in shorter distances at intersections. The treatment, targeted to a problem section of road, is a thin layer of durable, high friction aggregates topping a specially-engineered resin or a polymer binder. The binder locks the aggregates firmly in place, creating an exceptionally durable surface capable of withstanding extreme roadway friction demands, such as heavy braking, severe horizontal curves, and steep grades, particularly when the grade is in a horizontal curve. This affords long-lasting traction, while making the surface much more resistant to wear and polishing.

A HFST can be applied by machine at a similar speed to other paving surface treatments or can be applied with hand tools. The treatment can be installed on either asphalt or Portland Cement concrete surfaces; however, the pavement must be in good structural condition, with no or few cracks or correctable by remedial sealing. Typically, projects are short in length and the materials cure very quickly. The treatments can often be applied in just hours with minimal impact on traffic.

The product installation cost is not insignificant at \$20-25 per square yd, but the durability and effectiveness make the treatment an economical choice because it is only applied where needed. The life-cycle cost is excellent. The European experience and the oldest United States' projects indicate that HFST service life is approximately 10 years. HFST projects to date have produced very good benefit-cost ratios because the crash reductions continue for many years.

Benefits of high friction treatments

HFSTs have several benefits in terms of crash reduction, life-cycle cost, efficient

application, and driver comfort. See sidebar on page 2. The technology has been implemented overseas for some time, and is increasing in use in the United States. The United Kingdom experienced a 31percent reduction in crashes for over 800 intersections and other potential problem locations following spot application of HFST. A report commissioned by Transit New Zealand showed a benefit-cost ratio of 40 and a follow-up study on the before-and-after crash data showed a reduction of wet crashes by 30 percent following spot application of HFST. Closer to home, preliminary review of crash data from before and after a demonstration installation in Wisconsin shows an overall 95-percent crash reduction in the first year.

The HFST is also safer for truck drivers and bicyclists. The increased friction allows for better control at higher speeds. The surface is smoother and more consistent than some other friction treatments, like grooved pavement. If bicyclists are riding on the shoulder in a curve, there is a better chance that adjacent vehicles will stay in their lane and not stray into the shoulder, endangering the bicyclists.

Surface Enhancements At Horizontal Curves (SEAHC) national demonstration program

The Federal Highway Administration (FHWA) is conducting a national demonstration program to determine the effect of high friction surfacing on reducing accident rates on horizontal curves.² Crash data for the three years prior to and three years following the HFS installations is being collected at each demonstration site. Skid resistance, texture depth, and tire-pavement



noise (if appropriate) data is also being collected at each site.

To date, there have been 23 installations in 10 States using six different HFST vendors on five pavement types. Crash data from the projects to date indicates significant benefit for crash reduction.

Experience with HFST in Kansas

Kansas is one of the states that participated in this demonstration program. High friction surface treatments were installed on curves at four locations in the state in 2009 (see map at right). Steven Buckley, KDOT's safety engineer, has been KDOT's contact for these projects. Buckley also serves on a national committee to advance the use of HFST as part of FHWA's Every Day Counts 2 (EDC2) initiative.

Two of the Kansas demo sites were on interchange ramps and two were on two-lane highways. The installation process for the treatment used a combination of manual and automated methods. Buckley said the experience gave KDOT some lessons learned:

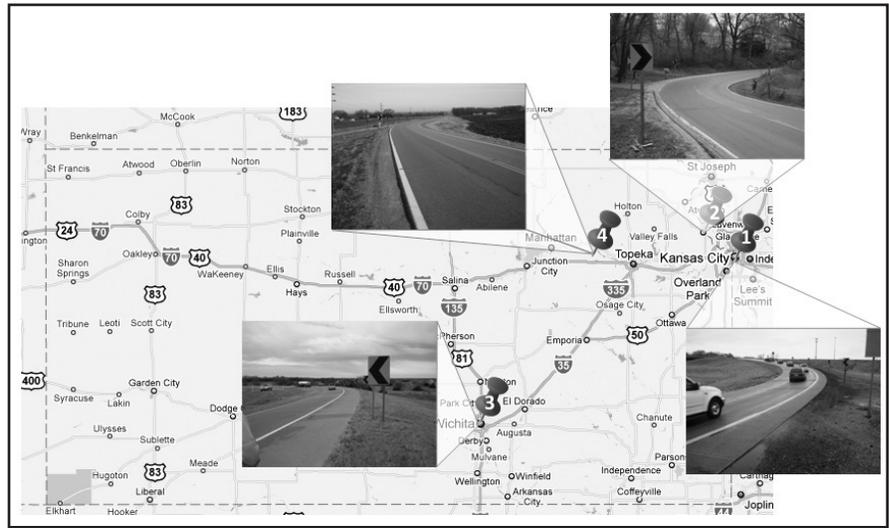
1) The existing surface condition must be in good condition and well prepped. The project at K-99 near Wamego failed because of the poor condition of the underlying pavement.

2) Target wet-weather conditions. Wet locations show the greatest reductions in crashes with the treatment.

3) Use bauxite for aggregate. KDOT used flint for aggregate on its HFST projects. They are seeing some polishing in some areas. Bauxite is much harder than flint.

KDOT will be developing a spec for installing HFST in Kansas. It will be based on a spec adopted by the American Association of State Highway and Transportation Officials (AASHTO).

To see a video of a HFST being installed in Kansas, watch a two-minute clip posted at <http://www.highfrictionroads.com/index.php?q=node/136>.



The Kansas DOT installed four demonstration projects as part of a national initiative. The above map shows the push-pin location and a photograph for each site.

Opportunities for HFST funds for local governments

Increasing the use of high friction surface treatments is a priority in Kansas, both for KDOT and the Kansas Division of FHWA. As part of the FHWA's Every Day Counts 2 initiative, KDOT has committed to spending a portion of their federal-aid Highway Safety Improvement Programs funds to apply HFST at problem horizontal curves and intersections. Based on current prices, they hope to treat 10 to 12 locations, with half on state highways and the other half on roads owned by cities or counties. If you have a location that may benefit from improved friction, please submit the location and any available accident records by April 1, 2014, to Steven Buckley, State Highway Safety Engineer, at Buckley@ksdot.org.

For more information

Visit the links in the Sources below for more information on high friction

Benefits of high friction surface treatments:

- Proven significant crash reductions
- Can be targeted to specific high risk areas, such as curves and intersections
- Safer for motorists, truck drivers and bicyclists
- Fast application and minimal disruption to traffic
- Long service life

surface treatments. Other sources:

- EDC2 webpage on high friction surface treatment. This page includes good general information on HFST and fact sheets from states that are leaders in using the surface treatment. <http://www.fhwa.dot.gov/everydaycounts/edctwo/2012/friction.cfm>.

- High Friction Surface Treatments fact sheet, EDC2, 2012. http://www.fhwa.dot.gov/everydaycounts/edctwo/2012/pdfs/edc_hfst_21.pdf

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Sources:

- 1) High Friction Surface Treatments: A Road Surface Treatment for Critical Safety Spot Locations that Helps Vehicles Stay in Their Lane. Brochure. FHWA. 2012. http://www.fhwa.dot.gov/everydaycounts/edctwo/2012/pdfs/hfst_brochure.pdf
- 2) SEAHC Demonstration Projects. Website. <http://www.highfrictionroads.com/index.php?q=node/4>
- 3) Phone interview with Steven Buckley, January 23, 2014.