High Friction Surface Treatment at Intersections

U.S. Department of Transportation
Federal Highway Administration

Pavement friction is a critical characteristic for safe driving.

Over time, the pavement surface may become polished, thereby reducing the available pavement friction and creating a higher risk of crashes.[1] Also, intersections are locations where friction demand is higher due to slowing, stopping, and turning actions that require an adequate supply of friction. High Friction Surface Treatment (HFST) consists of a layer of durable, anti-abrasion and polish-resistant aggregate (typically calcined bauxite) over a thermosetting polymer resin binder that "locks" the aggregate in place to restore or enhance friction and skid resistance.

HFST is one of the FHWA Proven Safety Countermeasures, and has been shown to significantly reduce injury and fatal crashes by roughly half at horizontal curves and nearly two-thirds at interchange ramps.[2] As a result, agencies are applying HFST at intersections as well.

Safety Benefits of Improved Friction

- Improved driver control
- Reduced stopping distances under both wet and dry conditions[3]
- Reduced skidding
- 20-percent reduction in total intersection crashes[4]
- 42-percent reduction for all rear-end crashes at signalized and unsignalized intersections[4]
- Nearly 70-percent of wet pavement crashes at intersections can be prevented by improved pavement friction on a systemic basis[5]

Advantages of HFST

- Service life at least 5 years, with some over 10 years
- Very cost effective[6]
- The targeted nature of the treatment is conducive to short installation windows resulting in brief work zones and less impact to traffic
- Provides significantly higher friction at locations where vehicle slowing and stopping is both routine and critical
- Can mitigate for limited sight-distance at intersections by reducing the total distance needed to stop[3]

[1] https://safety.fhwa.dot.gov/roadway_dept/pavement_friction/high_friction/#technology

[2] *Safety Evaluation of High-Friction Surface Treatments", Lyon, C., Persaud, B., Merritt, D. and Cheung, J., for Federal Highway Administration under contract DTFH61-13-D-0001.*

[3] *FHWA. "High Friction Surface Treatments Project Case Study." FHWA-CAI-14-016. n.d.* https://safety.fhwa.dot.gov/roadway_dept/pavement_friction/case_studies_noteworthy_prac/docs/bellevue.pdf

[4] *NCHRP 617,* https://www.trb.org/Publications/Blurbs/156844.aspx

[5] *TRB Research Record 623, 1976* https://safety.fhwa.dot.gov/roadway_dept/pavement_friction/

[6] https://www.fhwa.dot.gov/innovation/everydaycounts/edc-2/pdfs/hfst_faqs.pdf

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High Friction Surface Treatment

Applications & Installation

Intersection Applications

HFST is well-suited to intersection approaches. HFST can be applied using a systemic approach as a preventative safety strategy based on specific roadway, intersection, or pavement characteristics.

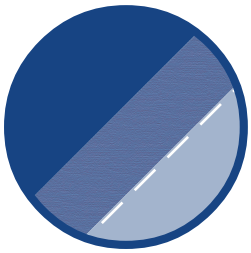
Approaches to higher-speed signalized and stop-controlled intersections

Locations with history of rear-end, failure to yield, wet-weather and/or red-light running crashes, especially with severe injuries

Intersection approaches with a downward grade

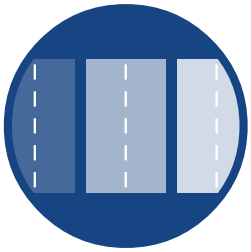
Installation Considerations

Applied by machine at a similar speed to other paving surface treatments or applied with hand tools

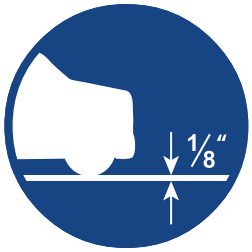


Installed over virtually all asphalt and concrete pavement types

Applied in a relatively short timeframe



Can be tinted



Results in minimal additional pavement thickness (1⁄8" to 1⁄4")

Additional Resources

- FHWA Every Day Counts, Frequently Asked Questions – High Friction Surface Treatments 2017. https://www.fhwa.dot.gov/innovation/everydaycounts/edc-2/pdfs/hfst_faqs.pdf
- FHWA Every Day Counts, A Road Surface Treatment for Critical Safety Spot Locations that Helps Vehicles Stay in Their Lane. https://www.fhwa.dot.gov/innovation/everydaycounts/edc-2/pdfs/hfst_brochure.pdf
- High Friction Surface Treatments (HFST) website - https://safety.fhwa.dot.gov/roadway_dept/pavement_friction/high_friction/