



Smoother Pavements Add Up to Savings at WesTrack

Just about everyone likes the more comfortable ride that comes from driving on smoother pavements. But as researchers at the WesTrack pavement testing facility near Reno, Nevada, have discovered, that's not the only thing to like—smoother pavements can also save you money.

From 1997 to 1999, four driverless trucks traveled an average of 15 hours a day around the 2.9-km (1.8-mi) oval track, simulating more than 10 years of Interstate-level traffic loads. Their runs were designed to evaluate how variations in hot-mix asphalt construction properties affect pavement performance and to validate the Superpave mix design and analysis procedures. During this time, the track's pavement sections developed varying amounts of roughness, rutting, and fatigue cracking, with some sections requiring major rehabilitation.

To determine the effect of pavement quality changes on fuel economy, data from two identical WesTrack vehicles were examined for periods just before and after a March 1998 track rehabilitation. Prior to the rehabilitation, the track was in rough condition, with fatigue cracking of various test sections and deterioration of areas that had been patched after core and slab sampling. The improvement resulting from the rehabilitation was evident in the international roughness index values (IRI) for the track, which showed that the average IRI had been reduced by at least 10 percent.

As part of the study of fuel economy, the fuel rate, fuel temperature, torque, and engine speed of the trucks were analyzed, as were fuel use data from daily inspections and refueling. The data showed that the average fuel mileage over an 8-week period before rehabilitation was 1.79 km/l (4.2 mi/gal). After rehabilitation, average fuel mileage over a 7-week period was 1.86 km/l (4.4 mi/gal), indicating a 4.5 percent improvement. All other factors, such as truck geometry, air temperature, and wind speed, were either identical before and after rehabilitation or compensated for within the comparison calculation. For a trucking company with a fleet operation of 1.6 million km (1 million mi), driving on smoother pavements would thus mean a savings of 46,600l (10,260 gal) of fuel.

The increased pavement roughness at WesTrack also increased the frequency of failures in truck and trailer components. For example, trailer frames began to fracture and required reinforcing welds during the weeks just before pavement rehabilitation, and steering motors and other components loosened more frequently. During the 2.5 years of traffic loading at the track, 8 of 17 trailer spring failures occurred within the 2 months prior to the March 1998 rehabilitation. Over these 2 months, 265,000 equivalent single axle loads (ESALs) were applied to the track. In contrast, the 350,000 ESALs applied in the 7 weeks after rehabilitation resulted in only one spring failure.

The final report on the WesTrack study will be issued this summer. Copies will be available from the National Technical Information Service at 703-605-6000 (fax: 703-605-6900). A limited number of copies will also be available from the FHWA Report Center at 301-577-0906 (fax: 301-577-1421).

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