

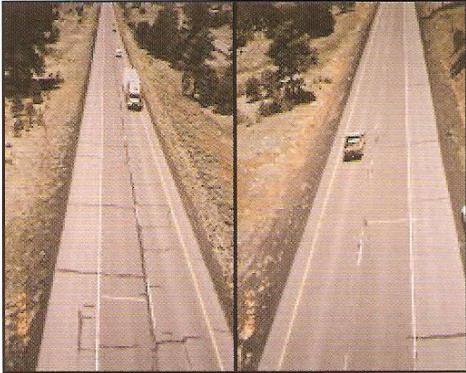


Asphalt-Rubber Long-Term Performance

The Proof is in the Pavement!

Major Advantage

One major advantage to using an asphalt-rubber binder in a pavement is the increased pavement life through better resistance to cracking and fatigue caused by heavy traffic. Case studies have proven again and again that asphalt-rubber materials, when designed properly will last much longer than conventional un-modified asphalt materials.



Conventional AC and A-R test sections placed on I-40 Flagstaff, AZ, 1990.

Asphalt-Rubber pavement materials have undergone some of the most extensive pavement testing protocols known to man and have always come out as the best. For agencies that have used asphalt-rubber, better long-term field performance is expected.

Take a look above at test sections placed on I-40 near Flagstaff, AZ in 1990. These photographs taken after 8 years of tough field performance in a climate at 7000 feet in elevation, 100 inches of snow each year and temperature ranging from -20° F below zero to 100° F. Photos taken in 1998 show a 4 inch thick conventional overlay on the left and a 2 inch thick A-R overlay on the right.

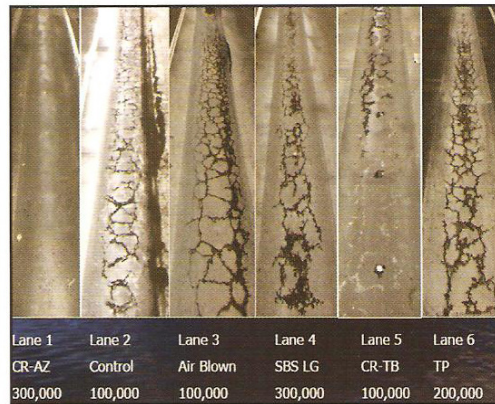
A-R CRACKS LESS

The Arizona Department of Transportation has been using the A-R material since the 1980s. A study conducted by ADOT demonstrated that after ten years of performance in the field, A-R resurfacing not only out-

performs conventional resurfacing by 3 to 1, but it beats out newly constructed pavements as well.

EXTENSIVE RESEARCH

The Federal Highway Administration's Turner Fairbank Research Center, Accelerated Loading Facility located in Northern Virginia near Washington, D.C. has been testing a variety of modified pavements since 2001.

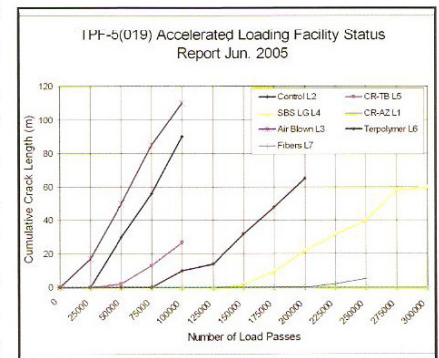


Above and below: TPF 5(019) ALF Fatigue Test Results 2005, FHWA Turner - Fairbank Highway Research Center.

This machine is affectionately called the "ALF". The machine straddles a pavement

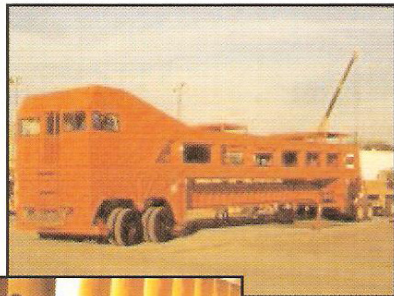
section and rolls a tire, with a specified load, repeatedly across the pavement surface. While other materials failed, the asphalt-rubber did not crack even after 300,000 passes!

The performance of the asphalt-rubber exceeds the most sophisticated chemically engineered asphalt modifiers available on the market today. Again, this performance was expected. It



reconfirms testing completed in the 1990s.

In 1992, The California Department of Transportation (Caltrans) and the South African Council for Scientific and Industrial Research (CSIR) conducted testing with the Heavy Vehicle Simulator (HVS). Similar to the ALF, the HVS moves a loaded tire repeatedly over a pavement section a specific number of times or until it is cracked. After each set of passes, the cracks are marked and measured. The Heavy Vehicle Simulator and close up of loading wheel can be seen in the photos to the left.



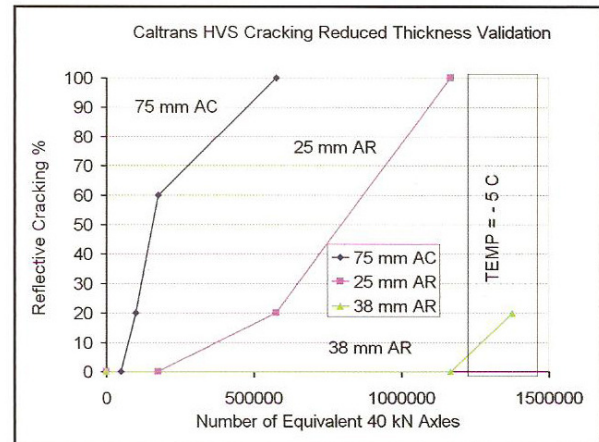
(Source: See below*)

In this testing, three resurfacing strategies were studied: A 3 inch overlay with regular asphalt, a 1.5 inch overlay with asphalt-rubber and a 1 inch overlay with asphalt-rubber. The overlays were placed on a badly cracked asphalt road.

The testing wheel was loaded to standard weights expected on U.S. Highways. After 175,000 passes, the conventional material had cracks and the asphalt-rubber sections had none. The wheel load was increased to double the standard wheel load on U.S. Highways and the testing continued. After 25,000 passes with double the weight, the conventional 3 inch section was completely cracked.

For the asphalt-rubber sections, the testing continued. The very thin, 1 inch A-R overlay lasted for another 37,000 double load passes before it was completely cracked. But for the 1.5 inch A-R section, the testing continued but with the surface temperature of the pavement reduced to 23° F to accelerate the cracking. Even in freezing temperatures with twice the load, the A-R resisted cracking. At the final pass, after 250,000 passes (75,000 passes at double the load) The asphalt-rubber was only cracked through half of the section.

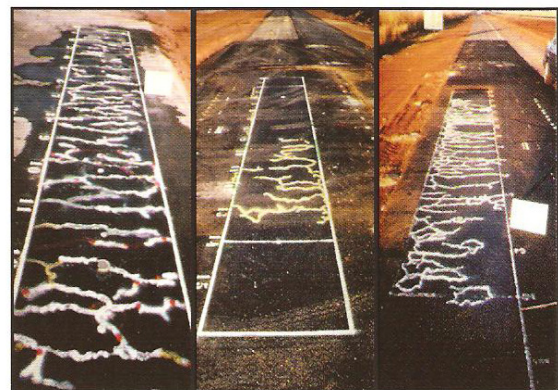
THE RESULTS



(Source: See below*)

The chart above summarizes the test results. The photo below shows the cracks in each section after the testing was completed. This performance has prompted the Caltrans Chief Engineer to state in a memo to all Caltrans District Engineers that asphalt-rubber:

"...is more durable, resistant to cracking and can achieve the same service life at half the thickness of conventional dense graded asphalt concrete for rehabilitation projects. The strategy improves pavement performance, saves valuable resources and reduces the number of tires entering landfills and stockpiles." January 31, 2005, Richard Land, Chief Engineer.



*TEST RESULTS - Heavy Vehicle Simulator Testing of Trail Sections for CALTRANS. Rust, F.C.; DuPlessis, J.L.; Verhaeghe, B.M.J.A. & Grobler, J.E., Division of Roads and Transport Technology, Council for Scientific and Industrial Research, South Africa, October, 1993

