Asphalt-Rubber User Cost Benefits

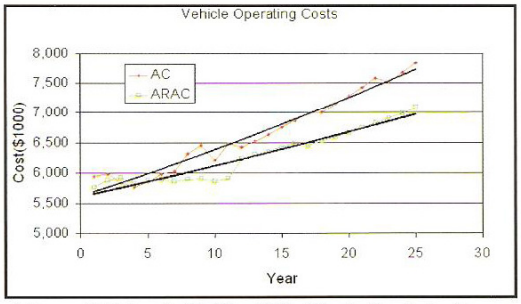
Have you heard about more fuel efficient roads?

You've heard about how the auto manufacturers' have increased the fuel efficiency in today's vehicles, but have you ever heard about fuel-efficient roads?

It's true. Several studies have demonstrated that smoother roads with less rutting, roughness and fatigue cracking help achieve greater fuel efficiency for the vehicles traveling upon them. And the roads last longer! Because asphalt-rubber pavements last longer and resist cracking better than regular asphalt roads, tremendous savings can be obtained through the project's life cycle. Let's take a look.

VEHICLE OPERATING COSTS

When Arizona State University compared two adjacent projects on I-40 near Flagstaff, AZ the differences between the conventional material and asphalt-rubber pavements were staggering. The asphalt-rubber pavement is projected to save **$9,340,000** in user's vehicle operating costs over the life of the project. **That means less wear and tear on your vehicle, saving you time and money.**



J. Jung, K. Kaloush, G. Way, "Life Cycle Analysis: A Case Study on Asphalt-Rubber Pavements in Arizona Using HDM-4 and MicroBENCOST", Nov. 2004

Fuel Efficiency - How would you like to save 4.5% in fuel costs just because your city, county or state uses asphalt-rubber? WesTrack, in a U.S. study on pavement design completed in Reno, Nevada, in 1999, showed that for identical conditions cracked pavements cost more in fuel, 4.5% more to be exact. The driverless trucks that were used to load the pavement test sections used less fuel when there were less cracks in the pavement. Less cracking means a smoother road and lower operating costs. **Some of the smoothest pavement ever measured by industry and agencies alike have asphalt-rubber on the top.** Award winning pavements on the Long Beach Freeway I-710 in Long Beach, CA, the "Two Guns" project near Winslow, AZ on I-40 and the I-35 Near San Antonio, TX all have asphalt-rubber

According to "Overdrive" magazine, in December 2004, truckers driving through Texas rated the Interstate system there as the best in the U.S. Here's one of the reasons why: An asphalt-rubber permeable friction course in Texas made an old, beat-up concrete surface into a safer, quieter, and smoother drive for the San Antonio community. The table below shows the International Roughness Index (IRI) ratings scale.

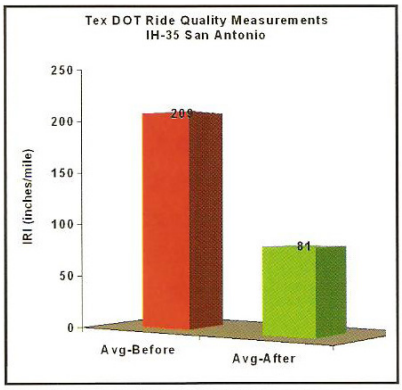
Good	Fair	Poor
IRI Below 95	IRI 95-170	IRI Above 170

Typical DOT International Roughness Index Rating System.

The index measures pavement roughness in terms of the number of inches per mile that a laser mounted in a specialized van, jumps as it is driven over the interstate. Each jump is measured in term of inches. The lower the IRI number, the smoother the ride.

The IRI in the San Antonio project went from 209 IRI (extremely poor ride) to an 81 IRI (a very good ride). **What's the IRI on your commute? Find out, ask for asphalt-rubber and you can save too.**

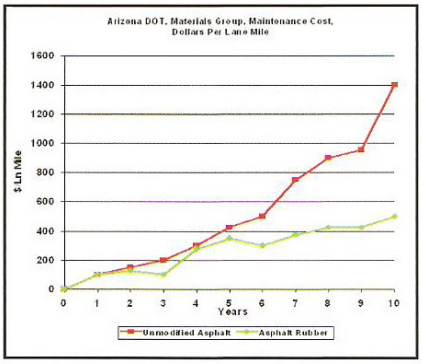
Whenever the costs are compared, asphalt-rubber strategies come out ahead of conventional materials over eighty percent of the time. Life Cycle Costs studied by Oregon State University in Arizona, California



TxDOT, "Use of PFC to Improve the Performance of CRCP", Technical Advisory, Feb. 2003.

and Texas where Asphalt-Rubber is widely used, show great savings over the life of the project, as much a $7.34 for every square yard of pavement. **That's over $50,000 for every lane mile. Imagine putting that much in your bank account every thirty years for every lane/mile of pavement in your community.**

The Arizona Department of Transportation provides a closer look at these life cycle costs. Consider how much it costs to crack fill a highway. Highways with too many cracks cost more to maintain. The chart is a comparison of unmodified asphalt pavements and asphalt-rubber pavements in the ADOT system. The charts tracks how much the pavements with and without rubber cost to maintain for every lane and every mile and every year. **After ten years, Asphalt-Rubber pavements have only one third the maintenance costs.**



G. Way, "OGFC Meets CRM: Where the Rubber Meets the Rubber 15 Years of Durable Success", AR2003, Brasilia, Brazil, Dec. 2003.

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 46,600 (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.

Article reprinted from the Federal Highway Administration's April 2000 issue of Focus, which is also available online at www.tfhrc.gov/focus/focus.htm.

You save money on fuel and less vehicle maintenance when you have smooth, crack free, efficient roads. Your local paving agency will save with less road maintenance dollars spent on repair work. Save the environment and save money with asphalt-rubber.