

# Vehicle **Fuel Economy** and the role of pavement **Smoothness**



**When it comes to America's roads,** drivers want surfaces that are safe, durable and support fuel efficiency. Pavement smoothness is critical to achieving each of these goals, and the Federal Highway Administration (FHWA) recently determined that smoothness is a key factor in ensuring satisfaction for road users.<sup>1</sup>

Thanks to advanced materials and construction techniques, asphalt provides a smooth, continuous surface that meets drivers' standards while adding to pavement longevity and requiring less maintenance than rougher roads<sup>2</sup> and lowering vehicle operating costs.<sup>9</sup>

As drivers, automakers and regulators grow increasingly concerned with fuel economy, the impact of smoothness on vehicle efficiency is receiving greater attention. Three pavement properties are commonly thought to affect fuel consumption:



**Texture**  
how rough the surface is



**Smoothness**  
how rough the road  
feels to a driver



**Pavement stiffness**  
how much the pavement  
deflects underneath  
a vehicle<sup>3</sup>

No study has grasped how all three pavement properties simultaneously impact vehicle fuel economy.<sup>4</sup> However, the current scientific consensus is that pavement smoothness typically has the greatest influence and that the effect of texture is smaller on well-maintained pavements. No real agreement has been reached as to the effect of pavement stiffness.<sup>5</sup>

All told, Americans burn nearly 170 billion gallons of fuel driving approximately 3 trillion miles a year.<sup>6</sup> If roads across the nation were built and maintained to ensure a smoother ride, drivers could see an approximately 4.5 percent decrease in fuel consumption<sup>7</sup> — the equivalent of saving about 13¢ per gallon.<sup>8</sup> Similarly, rough and poorly maintained roads increase wear and tear on vehicles — about \$377 per year for the average driver.<sup>9</sup>

Ensuring smooth, well-maintained roads would be a significant, tangible step in conserving fuel and natural resources. It would also have a direct effect on drivers' pocketbooks and overall satisfaction.

When it comes to decisions that define what sorts of roads are built, it is important to ensure that state engineers are given the latitude necessary to make the decisions that best balance economic, environmental, and social needs. This is especially important when the engineering data and science are unclear, such as the influence of some pavement properties on vehicle fuel economy.

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