PCC pavement texture that provides traction without noise

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"Noise could be reduced using longitudinal or random transverse tining without compromising friction." Chris Brakke, Iowa DOT

FOR YEARS, many people in the portland cement concrete (PCC) pavement industry have accepted that noisy roads are a necessary byproduct of pavement surface traction techniques such as transverse tining. Now, new specifications being used by the Iowa Department of Transportation (Iowa DOT) and others show that PCC pavement can provide both adequate traction and a quiet ride. Such PCC pavement surfaces may be just what motorists want.

Texture for traction

Because pavements can become slick when wet, their surfaces are often textured to provide increased friction for improved traction. On low-speed and/or low-volume roads—for example, municipal roads under 45 miles per hour, low-volume county roads, and state roads under 35 miles per hour—a roughened texture is normally created by dragging burlap or coarse carpet (artificial turf) over the surface before the concrete hardens. A broom finish may be used in lieu of or in addition to this finish.

On roads with higher speeds and/or higher traffic volumes—for example, state primary roads—the texture is made deeper to withstand more wear and tear. Tines are constructed by dragging mechanical or hand rakes over freshly laid concrete. Tining provides a longer lasting texture and reduces the water sheeting effect that causes hydroplaning. As a result, tining can help make roads safer.

Tining can be installed longitudinally or transversely. The texture created by transverse tining, however, often creates a whine when vehicles travel across the tines.

Longitudinal tining machine on PCC surface. *Photos on this page courtesy of Jim Grove, Iowa DOT.*

"Smooth," quiet roads are desired

According to a Federal Highway Administration (FHWA) National Quality Initiative survey, "Pavement smoothness is the most significant measure motorists use to judge the quality of our nation's roads."

In the pavement industry, "smoothness" is related to the condition and quality of roads, not to their surface texture. Motorists, however, judge the "smoothness" of roads not only by their rideability but also by their noise level. Noisy roads—including roads in excellent condition but with textures that cause humming or whining—are perceived negatively.

Several states are researching methods for reducing the noise of textured pavements without reducing traction. A final report on the subject is forthcoming from the Wisconsin Department of Transportation and FHWA.

Efforts in Iowa to decrease road noise

Iowa has demonstrated its commitment to satisfying motorists' desire for quiet roads. Nine test sections of PCC pavement were built in Iowa in 1993 in an attempt to reduce interior and exterior vehicle noise. The sections included uniform transverse, variable transverse, sawed transverse, diamond ground, and longitudinal textures.

"The [Iowa DOT] took a look at what Wisconsin and some other states were doing, evaluated our own test sections, and found that noise could be reduced using longitudinal or random transverse tining while achieving adequate friction," says Chris Brakke, pavement design engineer at the Iowa DOT.

As of last year, the Iowa DOT's new PCC pavements are either tined longitudinally or tined transversely with random spacing. Both methods, with respect to noise, are considered preferable to evenly spaced transverse tining.

Longitudinal tining, as opposed to random transverse tining, "allows you to get the curing compound on quicker—that's an added benefit," says Brakke. "But other than that, the choice between the two preferred methods is primarily a matter of what equipment contractors have."

And because highway users want a quiet ride, they are likely to be much more satisfied as they drive across these new PCC pavement surfaces.

For more information

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