# Smooth and Quiet Concrete

#2 in The Series by Brad Skow, PE

In the first article of this series, I started by asking the question, "Why choose concrete?" Besides the economic reasons (covered in the May 2006 issue), I'd like to explore some of the other "concrete" reasons to choose concrete over any other pavement material.

Engineers, transportation officials and government agencies face many choices when planning a roadway. Choosing a pavement type is perhaps the most critical decision they'll make. So, in this issue we'll focus on smoothness and quietness. Fortunately, concrete pavements help make their choice easier.

**Smooth Concrete**

Years ago pavements were constructed without specific requirements for surface smoothness. Today state and local transportation agencies specify smoothness with ride specifications and incentives. Many agencies have placed smoothness at the top of their ride quality goals list.

Concrete's smooth surface also translates into financial benefits. Research has shown that because of concrete's rigid structural properties and smoother pavement, it makes it easier for wheels to roll across the surface. This allows cars and larger transport vehicles a better ride and increased fuel efficiency. Research has also shown that, on average, trucks improve fuel consumption by as much as 10-20% when traveling on concrete pavements. And a smoother ride also means fewer accidents, less congestion and a more comfortable and secure environment for those on the road.

Smooth pavements are quieter pavements. The rigid nature of concrete keeps the pavement surfaces smooth long after construction; and while other materials are deteriorating, concrete is getting smoother. With an average life span of more than 30 years, concrete pavements easily outlast and outperform the competition.

Recent surveys show that the public thinks smoothness is one of the most important qualities of a good road surface. Concrete pavements can provide the longest lasting smooth surface solution. As concrete ages, the original ride can be restored by concrete pavement rehabilitation such as diamond grinding and concrete overlays.

Both existing and new concrete pavements can be diamond ground. Diamond grinding can create a surface texture that can meet and exceed the original ride specification for the roadway, or upgrade the ride specification to today's standards. It will also add another 20 years or more to the life of your pavement. But not only does diamond grinding create smoother roadways, it also makes travel quieter, both inside the car and in nearby communities.

Deteriorated pavements are easily rehabilitated with concrete overlays, which can make old roads new again in as little as 24 hours. Overlays like whitetopping provide the same durability and strength as new concrete pavement and offer an equally smooth and quiet ride.

So remember:

- Concrete's durability guarantees a smooth, long lasting pavement that outlasts the competition.
- Specify smoothness; contractors have the tools available to ensure they can meet the specifications.
- A smooth ride translates into financial benefits for the community – from fuel savings, fewer accidents, and less maintenance.
- Diamond grinding and overlays can rehabilitate old pavements, giving them a new smoothness that will last for years.

**Quiet Concrete**

Fact: Studies have shown that the majority of highway noise at low to moderate speeds (< 50 mph) comes from car, truck and bus engines, not from the contact of tires on pavement. ("Highway Traffic Noise Analysis and Abatement Policy and Guidance," FHWA, June 1995.) Still, the concrete industry is doing its part to keep the environment surrounding roadways as quiet as possible. Recent research has shown that concrete pavements are well within government and industry noise standards and when properly constructed and textured, show that concrete pavements are just as quiet as asphalt pavement.

A 2005 study sponsored by the Minnesota Department of Transportation and performed by the National Center for Asphalt Technology (Auburn University), "Evaluation of the Noise Characteristics of Minnesota Pavements," compared noise levels of MN highways and test sections at MnROAD. The summary of this report stated that Hot Mix Asphalt (HMA) pavements had an average noise level of 98.6 dBA. Mn/DOT's current specifications for Turf/Broom drag Portland Concrete Cement Pavement (PCCP) pavements provided an average noise level of 99 dBA.

A study sponsored by the Wisconsin Department of Transportation and performed by Marquette University compared noise levels of concrete and asphalt pavement. The study found that of the four lowest decibel pavements for exterior noise, three were concrete.

Another research project completed for the Michigan Department of Transportation measured noise levels on nine types of pavement and found that the widest disparity of noise level between the asphalt and concrete sections was only 3dBA, which most people would not be able to notice. In fact, some of the concrete pavements in this test were quieter than the asphalt pavements in the same test.

New techniques have been, and are being used to, deliver even quieter concrete pavements, including longitudinal tining, astro-turf drag, pervious concrete, and diamond grinding. According to recent research, the surface noise of diamond ground pavements is within 1.5 to 3dBA of the most competitive alternatives.

So remember:

- Concrete starts out quiet and gets quieter over time.
- Concrete's long lasting nature leads to less maintenance and rehabilitation, reducing the noise and congestion generated by frequent roadway maintenance and lane closures.
- Concrete can restore or improve existing pavements and make them quieter by whitetopping asphalt roadways, overlaying concrete roadways, or diamond grinding.