

asphalt diamond grinding

Road Owners increasingly see benefits grinding and grooving both new and existing asphalt pavements

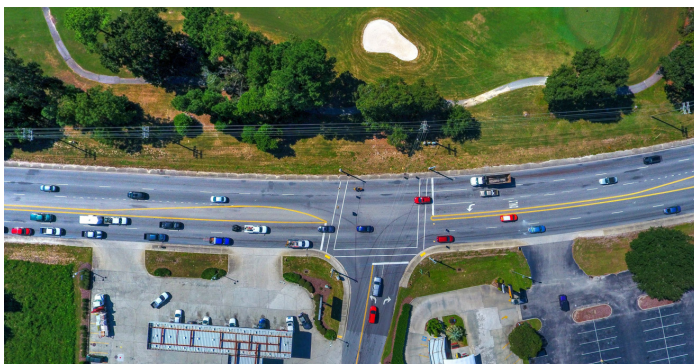
Grinding proves a cost-effective solution for achieving smoothness, safety and comfort



DIAMOND GRINDING IMPROVES PAVEMENT FRICTION CHARACTERISTICS while providing a smoother ride—and it can be used on asphalt or concrete. Unlike overlays, grinding can extend the construction season, even in low temperatures (above freezing), and it can be performed on new or existing pavement. Commonly used on concrete for over 60 years, diamond grinding is increasingly used on asphalt as well. Numerous states have used it to improve their roads' smoothness and friction characteristics, while creating a quieter ride.

SOUTH CAROLINA

SC 544 in Conway, SC is a four-lane highway serving several of the state's Grand Strand beach communities, and three separate sections were repaved in 2020. Due to the busy nature of this roadway during the vacation season, SCDOT chose to place the asphalt pavement in a single lift to expedite the project, with the final surface being diamond ground. Previous research proved that density could be obtained within a single, seven-inch lift. The issue was how to achieve smoothness. Typically, a final surface layer of asphalt is applied for this purpose, but for the SC 544 project, grinding of the single lift of asphalt pavement was used instead—a move that not only saved money and reduced traffic disruption but conserved resources. Diamond grinding also allowed contractors to achieve a smooth tie in between bridges and the surrounding pavement—another classic trouble spot in paving. A total of 106,632 square yards of pavement were diamond ground, creating an ultra-smooth, high friction and extremely quiet riding surface.



The SCDOT Office of Materials & Research conducted rideability tests, with the first test being performed after the new asphalt pavement was completed, prior to diamond grinding, and a second one performed after the diamond grinding was complete. After grinding, IRI measurements were as low as 21 inches-per-mile and the average smoothness was 35 inches-per-mile. The average reduction in roughness was 56 percent.

MISSOURI

When the asphalt surface of Missouri's U.S. 412 displayed cracking and increased roughness, diamond grinding was selected as the primary preservation treatment. Grinding had already been used successfully in the state on new asphalt pavement to mitigate flushing (bleeding) and loss of texture, as well as to meet MoDOT's smoothness specification (a maximum average IRI of 80 inches per mile). IRI data collected on interstate projects that specified grinding showed that roughness decreased an average of 40 inches per mile. The department expected the preservation treatment on U.S. 412 to extend the pavement's life by five to seven years, which is close to the life span of a thin overlay treatment—yet is achieved for significantly less money.

Prior to commencing the diamond grinding operation on U.S. 412, potholes were patched and repaired. Since the road's wheel paths were rutted, the middle hump— $\frac{1}{2}$ to $\frac{3}{4}$ inch—was removed using grinding to improve the ride and drainage characteristics. After grinding, the asphalt surface had improved friction and a smoother ride.

NEW YORK

New York state allows up to 5 percent of a pavement project's total surface area to be diamond ground for ride quality remediation. Although typically this encourages use of diamond grinding to address localized roughness, the contractor for the resurfacing of I-787 in Watervliet approached the opportunity differently. The entire allowable 5 percent surface area was allocated to diamond grinding two ramps. Diamond grinding the entire surface of the ramps achieved a 40 percent reduction in IRI. Not only did the ramps turn out to be some of the smoothest and quietest sections of the entire project, but the contractor managed to achieve ride quality pay incentive in these pavement sections.

» SAFETY GROOVING

Another diamond saw-cut surface texture being applied to asphalt pavement is safety-grooving. This process involves cutting narrow, discrete grooves into the pavement surface to reduce hydroplaning potential and is a valuable asphalt pavement preservation method. Grooving is performed in areas where the texture on an aging asphalt pavement has become worn, flushed and polished, and there is concern that water on the roadway cannot be evacuated quickly enough.

OHIO

Rain and snow can compromise road surface friction, in turn compromising safety. Even for surfaces with adequate friction measurements, limited sight distance or challenging roadway configurations can cause an above-average accident rate. The Ohio DOT has found that increasing the pavement surface macrotexture in these areas can be helpful.

In the 2010s, ODOT performed grooving and grinding of asphalt in three locations. When skid testing for a section of S.R. 126 in Hamilton County showed a lack of macrotexture, grooving and grinding resulted in a nearly 50% improvement in skid number (SN) 40-mph smooth tire values. Wet-road crashes were also

occurring on the I-90 Innerbelt Curve in Cuyahoga County. Various treatments were considered by ODOT to reduce accidents at this location, and some lanes were subsequently ground and grooved. The diamond grooved section improved the average SN 40-mph smooth tire value by more than 50%, increasing it to 1 1/2 times its previous value. On I-75 in Montgomery County, commercial trucks were experiencing a higher-than-expected crash rate while navigating a heavily traveled high-speed zone with multiple curves. Skid tests showed that macrotexture required improvement, so grinding and grooving were performed on a 2-mile stretch of the road. The diamond-grooved section improved the average SN 40 smooth tire value by more than 70%, increasing it to 1.7 times its previous value, and crash data showed a dramatic reduction in accidents.

Conserving resources, increasing safety, simplifying construction schedules and saving money are on the "wish list" of every road owner. Diamond grinding and grooving can help achieve all three, whether on concrete or asphalt pavement.



ABOUT IGGA

The International Grooving & Grinding Association (IGGA) is a non-profit trade association founded in 1972 by a group of dedicated industry professionals committed to the development of the diamond grinding and grooving process for surfaces constructed with Portland cement concrete and asphalt. In 1995, the IGGA joined in affiliation with the American Concrete Pavement Association (ACPA) to form what is now referred to as the Concrete Pavement Preservation Partnership (IGGA/ACPA CP3). The IGGA/ACPA CP3 now serves as the lead industry representative and technical resource in the development and marketing of optimized pavement surfaces, concrete pavement restoration and pavement preservation around the world.