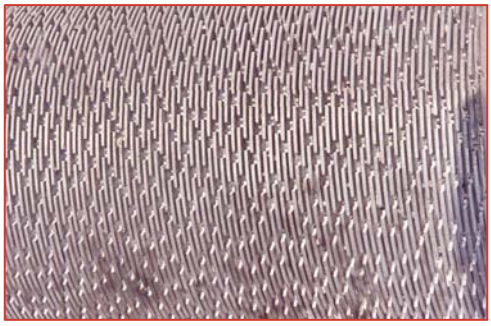
Concrete: The Strong, Silent type

By Matt Zeller, PE

Diamond grinding has long been a staple of the concrete pavement restoration toolbox. Diamond grinding has several advantages. It can: restore the ride quality to similar to new; remove any built-in roughness; and greatly reduce the noise generated by tined pavements. Minnesota abandoned tining concrete pavements in the mid 1990's, but there are still hundreds of miles of existing tined concrete pavements since concrete pavements often go well beyond their design lives.

Diamond grinding essentially planes off a thin layer of concrete to expose a new, uniform layer of the underlying pavement. The standard diamond grinding head is made up of multiple diamond tipped saw blades with narrow spacing in between each blade. The



Typical grinding head

final product after diamond grinding is a series of narrow fins of atop of the existing pavement. Over time these fins wear down to create a uniform, corduroy-type surface. This final surface has always been regarded as a one of the smoothest, quietest, and safest pavements.

A few years ago the International Grinding and Grooving Association (IGGA) and the American Concrete Pavement Association (ACPA) began researching options to standard diamond grinding to try to make the final product even quieter. The result with the most promise was developed by Purdue University in cooperation with IGGA and ACPA. This new technique has been dubbed NGCS (Next Generation Concrete Surface).

Resulting surface texture from typical diamond grind

NGCS differs from standard diamond grinding in that the pavement is essentially planed smooth (like wood), then grooved. The grooving operation can take place in a second operation, or the grinding head can be modified to include the grooving.

Close Up of NGCS Single Pass Blades

In the fall of 2007 a section of westbound I-94 at MnROAD was used to test NGCS under live traffic. Diamond Surface, Inc., a local grinding contractor and CPAM member, did the work. The test area consisted of three continuous stretches of concrete pavement. The first was the existing tined pavement, the next was conventional diamond grinding, and the last was NGCS. The results were obvious. The conventional diamond grinding was quieter, as expected. But the NGCS was noticeably quieter than the conventional grinding. The noise was measured at 104.3 dBA on the standard grind while the NGCS was 100.1 dBA, more than a 4 dBA reduction. A reduction of 3dBA is similar to cutting the traffic noise in half.

Any pavement, black or white, that can retain sound levels at or below 100 dBA is quiet. One of the keys to successful pavement management is to maintain the low sound levels. Many treatments may reduce the noise levels in the beginning, but will lose those characteristics over time. The section of NGCS was tested again this spring and the noise levels were measured in the 99 dBA range. All of the concrete sections were also tested for friction and passed with flying colors.

It can be tough to improve a pavement once it is in place, but diamond grinding can improve the noise characteristics as well as the ride characteristics. Diamond grinding also extends the service life of the pavement, ensuring our tax dollars are spent wisely.

For more information, please contact CPAM at 651.762.0402.

Resulting surface from NGCS