



Your Pavement Preservation Resource® since 1972

IGGA/ACPA CPR Division
12573 Route 9W, West Coxsackie, NY 12192
T (518) 731-7450 / F (518) 731-7490

Editorial Contact:

Kristin Dispenza, 740-249-4056, kdispenza@constructivecommunication.com
Kimberly Kayler, 614-873-6706, kkayler@constructivecommunication.com

Kentucky Uses Pavement Management Systems to Reduce Costs and Improve Pavement Smoothness

Kentucky demonstrates five years of improved IRI through diamond grinding and saves over \$1 billion using pavement management systems.

Through implementing Pavement Management Systems (PMS), Kentucky serves as an example of one state that is successfully staving off the need for extensive and expensive pavement reconstruction. By exploring the options available with concrete pavement preservation (CPP), the Kentucky Transportation Cabinet has made strides in determining data that can be used to trigger CPP.

While CPP techniques include slab stabilization, full depth repair, partial depth repair, dowel bar retrofit, cross-stitching longitudinal cracks/joints, diamond grinding, and joint and crack resealing, the most common CPP technique used in Kentucky is diamond grinding. The state has been performing diamond grinding since the mid-1990s, but at that time they were just exploring options -- not a lot of diamond grinding was being done.

That changed in 2007, when the state increased its pavement preservation activities in an effort to improve the roadway system. Between 2007 and 2012, 536 interstate lane miles were diamond ground statewide, primarily in the Louisville area. During this period, IRI measurements for Kentucky's Interstate concrete pavements improved from an average of 112.1 in/mile to an average of 74.5 in/mile – the longest sustained improvement in the state's IRI and their lowest recorded average IRI ever. The improvement was attributed to the 536 miles of diamond grinding that had taken place. The combined cost of the diamond grinding projects (including traffic control, patching, joint resealing, etc.) was \$101 million, or \$188,000 per lane mile. Reconstruction costs would have been an estimated \$1.5 - \$2.5 million per lane mile, so CPP saved the state over \$1 billion. The expected pavement life extension for ground

pavement is 10 to 15 years. The average cost of diamond grinding in Kentucky during this 5 year period was \$2.75 per square yard.

Of the state's approximately 62,000 lane miles of roadway, about 1800 are concrete; 820 of their 3800 Interstate lane miles are concrete. Therefore, finding an effective way to prolong concrete pavement life while improving performance is vital. The past year has seen an increasing range of CPP techniques being used in the state: significant partial depth rehabilitation and slab replacement has occurred, with subsequent grinding. Joint resealing is also part of Kentucky's CPP toolbox, although dowel bar retrofit, another common CPP technique, has not been extensively performed in the state.

Kentucky Achieves its Lowest Recorded Average IRI

When assessing its road network for needed repairs, the main indicator that Kentucky uses is pavement smoothness. Inertial profilometers are used to annually measure roughness on the interstate system and International Roughness Index (IRI) values greater than 130 in/mile will generally trigger CPP.

Undertaking CPP is contingent upon a situation in which there is moderate to low cracking and faulting. (Kentucky defines low faulting as $\frac{1}{4}$ - $\frac{1}{2}$ inch. Faulting greater than $\frac{1}{2}$ inch would generally necessitate full restoration rather than preservation.) Similarly, if a third or more of the slabs were in need of replacement, full restoration would typically occur. Pavements with IRI measurements lower than 130 could still trigger CPP if it appeared that cracking and faulting were about to become a major problem; conversely, if a road is expected to require major work (such as widening) within the upcoming 5-10 years, the cabinet will not recommend it for CPP.

Funding, Scheduling and Assessing

Although the budget is only approved biennially, the Transportation Cabinet has developed a six year highway plan. Project assessment is done on an annual basis for highways and on a two year basis for other roadways. Pavement management engineers measure IRI using a van-mounted inertial profiler and also perform visual 'windshield' surveys to spot cracking and faulting. Those data are used to make recommendations regarding preservation, resurfacing and reconstruction. The engineers then work with the districts on the prioritization and contracting of projects; they aim for a mix of preservation treatments across pavement types. AgileAssets® software is used to streamline planning, scheduling and recording.

The state is currently developing a process whereby the central office pavement management staff will work with district personnel to evaluate and provide direction for the entire pavement preservation program. This group will be responsible for reviewing and updating the project selection process, ensuring proper training of inspection staff, writing specifications and evaluating potential new treatments. Kentucky is modeling its changes on similar systems in other parts of the Midwest, particularly on practices shared at a meeting of the Midwestern Pavement Preservation Partnership (MPPP) by MnDOT, a leader in CPP.

Further advancements taking place in Kentucky include the adoption of a Laser Crack Management System (LCMS) for distress data collection and the development of automated predictive models for use in the PMS (part of a research program with the University of Louisville).

Ride Quality Specifications

When specifying ride quality, Kentucky measures IRI on new pavements using a Mark IV profiler with a wide-footprint laser. It was found to work better than a single point laser on concrete pavement with tining.

For preservation projects, Kentucky prefers to evaluate existing pavements using a profiler prior to advertising the contract. Time permitting, crews will conduct profile measurements for all lanes within the project limits prior to repair work. ProVAL engineering software is then used to determine where diamond grinding is most beneficial. A target IRI is established for every 10th of a mile. After all grinding has been completed, another profile analysis is conducted, and measurements are compared to those taken at the outset of the project.

Pavement Management is Key

Kentucky, having successfully balanced lessons learned from other states with the independent development of CPP solutions that fit its individual requirements, is clearly well on its way to realizing the benefits and savings resulting from the use of an effective pavement management system.