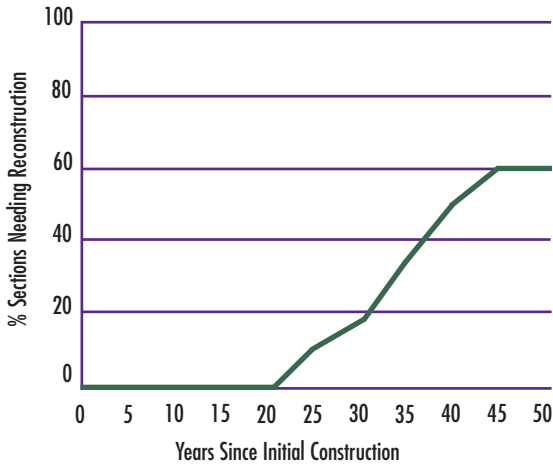
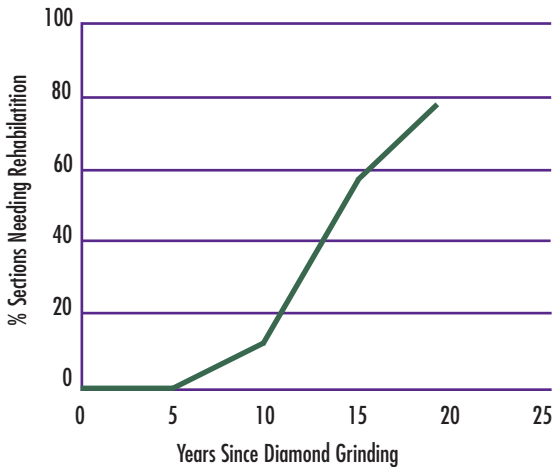


Age at which diamond ground pavements required overlay or reconstruction



Years between grinding and next rehabilitation



“Longevity of Diamond-Ground Concrete Pavements”

Concrete pavement restoration (CPR) can cost-effectively extend pavement life. Improvements such as replacing surface defects, restoring ride quality, improving skid resistance, and joint sealing are made using a “toolbox” of repair methods including patching, dowel bar retrofit, and diamond grinding. The result is an extended service life for concrete pavements. CPR is a natural part of asset management, a comprehensive approach to cost effective maintenance of public transportation assets. This approach provides a systematic means to evaluate alternatives.

The performance of one CPR technique, diamond grinding, was recently documented based on an analysis of 193 pavement sections. The results show that diamond grinding:

- immediately improves surface smoothness and ride,
- enhances surface friction,
- will significantly increase the pavement service life by reducing pavement roughness,
- can be cost-effective for highways and airports as well as streets and local roads,
- costs substantially less than an overlay, and
- does not affect or cause concrete durability problems.

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With diamond grinding, traffic can be maintained on adjacent lanes.



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Diamond grinding creates a corduroy-like texture that enhances surface friction and safety.



Resource List

- *The Longevity and Performance of Diamond-Ground Pavements*, RD118, PCA, 1999.



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Diamond grinding is a procedure used to restore a level profile and improve rideability to structurally sound pavements. Existing concrete pavements are ground using a series of diamond impregnated steel blades. The resulting corduroy-like surface texture increases traction and helps reduce hydroplaning. Concrete roads can be ground using short lane closures during off-peak traffic hours, and without affecting traffic in adjacent lanes.

The study, conducted by ERES Consultants, Inc., analyzed pavement sections in 18 states to evaluate whether diamond grinding increases the service life of the pavement and evaluate joint faulting performance, longevity of the diamond-ground texture, and the effects of diamond grinding on slab cracking. Structural analysis, and field observations demonstrated that the slight reduction in slab thickness caused by diamond grinding is inconsequential when long-term concrete strength gain was taken into account. This means the typical concrete pavement can be ground up to three times, without compromising fatigue life.

Joint faulting, which is the vertical misalignment at the pavement joints, makes the pavement rough and causes cracking, driver discomfort, and accelerated vehicle damage. Diamond grinding removes this vertical misalignment by shaving off the raised concrete. Though the initial faulting of un-doweled pavements after grinding was found to reach 0.05 inches to 0.08 inches within 1 million ESALs (0.25 inches is considered severe), its rate slowed considerably after that. Overall, diamond grinding can be expected to provide a minimum of 8 to 10 years of service with a high degree of reliability, depending on traffic and climactic conditions (dry climates fault slower). Additionally for un-doweled pavements, it was found that dowel bar retrofitting was highly effective in extending this performance even further. Dowel bar retrofitting involves placing dowels across the pavement joints to restore load transfer between adjacent slabs.

In conclusion, the ERES study found that for concrete pavements in good structural condition, diamond grinding is a highly effective and a much more economical rehabilitation alternative than an asphalt overlay. Even for pavements in poor condition, diamond grinding may be an appropriate short-term solution to restore ride quality until the pavement can be reconstructed. CPR with diamond grinding effectively extends the service life of concrete pavements.