

## North Central Superpave Center



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The North Central Superpave Center (NCSC) was established in 1995 as one of five regional centers to assist the states/provinces and industry in the North Central region with the implementation of the new Superpave mix design system for hot mix asphalt. As use of Superpave technology has become routine in the region, the role of the NCSC has evolved to include hot mix asphalt issues in general. The NCSC offers a means by which the states and industry in the region can work together to address issues of mutual interest.

The NCSC works with industry and agencies in the North Central region of the United States and Canada. The center is supported by nine states and one province; Illinois, Indiana, Iowa, Kansas, Manitoba, Michigan, Minnesota, Missouri, Nebraska and Wisconsin. The NCSC works closely with the North Central Asphalt User Producer Group, serving as the group's secretary and meeting coordinator.

The NCSC is a research and development center, with its main emphases being research and testing, training, and technology transfer. The NCSC conducts and participates in new equipment and test protocol evaluations. The center performs testing and analysis for research and pilot projects, referee testing and forensic analysis/troubleshooting. In addition, the NCSC serves as an information clearinghouse for regional and national information on Superpave-related experiences. The NCSC maintains a popular web site at <http://ce.ecn.purdue.edu/~spave>. A searchable web database of Superpave information has been implemented to better serve the region and beyond. The NCSC also serves as editor and publisher of a centralized Superpave Center National Newsletter for three Superpave Centers. Training courses are offered every year, ranging from short overviews to intensive hands-on binder and mix design classes, as well as customized training for individual companies or state transportation departments.



Current research at the NCSC is directed towards refining and expanding the applicability of the Superpave system as well as addressing general asphalt issues. There are many research projects underway on state, regional and national levels, including studies on Mitigation of Tire-Generated Pavement Noise, Optimizing Superpave HMA Surface Friction Characteristics, Simple Performance (Triaxial) Testing of North Central Mixtures, Contribution of PG Graded Binders to Low Temperature Cracking, Performance of Superpave Mixes in Indiana, Use of the Binder Ignition Oven with Dolomitic Aggregates, Evaluation of Top-Down Cracking, Field Evaluation of Porous Asphalt Mixes, and Development of Superpave Mixture Design Guidelines for Local Governments. The NCSC staff and facilities are also available to conduct, participate and assist in research and experimental or pilot projects.

The following are among the completed research projects.

- *Detailed Planning for Research on Accelerating the Renewal of America's Highways.* The NCSC led a team of Purdue researchers who collaborated with Iowa State University and TDC Partners to develop a detailed research plan for infrastructure renewal. The plan will be combined with research plans for safety, capacity and reliability to provide the framework for the national research program known as F-SHRP, the Future Strategic Highway Research Program.
- *Asphalt Additives to Control Rutting and Cracking.* This federally-funded project compared the laboratory and long-term field performance of seven different asphalt modifiers or additives. Although the test sections were placed prior to the implementation of Superpave, retained samples of the original materials were tested using Superpave protocols. The Marshall mixes were found to conform quite well to the Superpave gradation standards because of INDOT previous design approach. The results of standard PG binder tests and new MP1a tests were found to accurately correlate to observed cracking in the field. No appreciable rutting was observed on any of the test sections.
- *Incorporation of Reclaimed Asphalt Pavement (RAP) in the Superpave System (NCHRP 9-12).* This national study, conducted jointly by the NCSC and Asphalt Institute, showed that RAP is not a black rock, because significant blending occurs between the hardened RAP binder and the added virgin binder. This research also developed detailed procedures for Superpave mix design with RAP and refined the binder selection criteria for different amounts of RAP in the mix. The study produced a manual for field and laboratory technicians, guidelines for agencies and changes in three AASHTO specifications, in addition to the final report. A short video on the project was produced separately for national distribution by NCHRP.
- *Regional Reclaimed Asphalt Pavement Study.* A regional pooled fund project expanded the findings of NCHRP 9-12 to typical mid-western materials and higher RAP contents. This study demonstrated that the recommendations of NCHRP 9-12 were valid for typical regional materials. In addition, the recommendations are appropriate for mixtures with up to 50% RAP.
- *Contribution of PG Graded Binders to Low-Temperature Cracking.* The purpose of this Indiana SPR study was to evaluate the role of asphalt binders in thermal cracking resistance of AC pavements. Binders were recovered from field cores at the end of 15 years and tested using Superpave protocols. It was observed that the binder extraction and recovery process significantly influences the properties of the recovered binder. In addition, the researchers found that RTFO-PAV aging did not simulate the aging that occurred in the field during the service life of the pavement.
- *Development of Indiana's SPS-9A Site.* This Indiana SPR study began in 1997 and studied the effect of different binders in mixes with the same aggregate gradation in the field. Binder was extracted from cores obtained from the pavement at six-month intervals for a period of two years and an additional set of cores at the end of four years. Attempts are being made to correlate the observed field distress with the mixture and recovered binder properties tested.

- *Performance Evaluation of Fiber-Modified Asphalt Mixes.* This industry-funded research examined the effect of fibers in hot mix asphalt. This research provided information to the manufacturer to guide future product decisions.
- *Comparison between Various Laboratory Mixture Permanent Deformation (Rutting) Test Equipment Using Ohio Mixes.* The comparison of rutting devices was conducted in cooperation with Ohio State University (OSU). The NCSC ran a variety of Superpave shear tests on 13 Ohio mixes. This testing was able to identify the mixture that rutted in the field and could differentiate mixes with different aggregate types.
- *National Pooled Fund Study, No. 176, Validation of SHRP Asphalt Mixture Specifications using Accelerated Testing.* The NCSC co-operated with the Indiana Department of Transportation and Purdue University by providing shear testing of materials evaluated under this project which investigated the effects of various volumetric parameters (Air Voids, VMA), fine aggregate angularity and gradation (the restricted zone) on pavement performance.