A2B07: Committee on Surface Properties – Vehicle Interaction
Chairman: Thomas J. Yager

Pavement Surface Properties

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There is considerable current interest in the interactions between vehicle and pavement surfaces as they affect safety, comfort, convenience, and economics, including user costs. Focus is on the evaluation, modeling, and understanding of these interactions and the studies that identify, quantify, measure, and model the factors influencing these interactions. The establishment of limiting criteria for these factors is necessary in order to apply results toward improvement of the relationship between the vehicle and surface properties.

Activities under way are (*a*) several joint international programs to harmonize both texture and skid-resistance measurements; (*b*) evaluations of new pavement surface designs such as microsurfacing and paver blocks; (*c*) development of improved friction surface treatments such as shot peening; (*d*) preparation of new standards for the American Society for Testing and Materials, Society of Automotive Engineers, and the International Standards Organization related to friction, texture, and roughness measurements of vehicular traveled surfaces; and (*e*) annual workshops held by the National Aeronautics and Space Administration (the workshop held in May 1999 was the sixth) to evaluate new friction, texture, and roughness measurement equipment as well as techniques and test procedures.

FUTURE DIRECTIONS

New technology, such as lasers and computer processing and analysis software, have made pavement texture measurements much more accurate and less time consuming to obtain. A one-lane width one mile long can be surveyed by a laser measurement device in the same time it takes to make one volumetric, single-spot grease or sand patch texture measurement. Continuous friction-measuring equipment has been developed to monitor both fixed slip and variable slip friction values from free roll (0 percent slip) to locked wheel (100 percent slip). The earlier devices could only measure one tire slip value, 15 percent. Traffic monitoring, pavement load metrics, and comprehensive pavement management programs are accurately indicating in advance when a road section will need to be repaired or replaced.

With regard to harmonizing ground vehicle friction measurements, an ongoing joint winter runway friction program has developed an international runway friction index (IRFI), which harmonizes values measured by 13 different ground vehicles under similar runway conditions, compacted snow. Next year's testing is aimed at determining how well this IRFI can indicate aircraft braking performance and help pilots make the right decisions for takeoff. The Federal Aviation Administration has issued several advisory circulars to airports and flight crews on how to maintain high skid resistance and minimize accidents where loss of traction is a contributing cause. The American Airlines MD-82 aircraft landing overrun accident at Little Rock, Arkansas, on June 1, 1999, is a sad example in

which the aviation community did not adhere to recognizable warnings (i.e., heavy rain and high cross winds).

Long-term improvements are sought in the following areas: methods, apparatus, and procedures for measuring friction of roadway and runway surfaces during winter conditions and use of that information to determine chemicals needed to remove pavement contaminants; tire-pavement noise measurements; relationship between pavement surface elevation profile and vehicular ride quality; vehicular-pavement spatial dynamic force repeatability study; roadway surface roughness correlation; and improved methods for evaluating wet weather vehicular accident sites.

FUTURE CHALLENGES

Aviation acceptance of the IRFI and its accurate estimation of aircraft braking performance is one major challenge facing the different government and industry organizations supporting the joint winter runway friction program. The International Civil Aviation Organization and several European, Asian, and Australian civil aviation authorities have been briefed on the program results and it is hoped that recommendations in their future documents, manuals, advisory circulars, and publications will reduce the time required for aircraft and airport operators to accept the improved test procedures, runway maintenance techniques, and friction measurement and reporting. If this effort is successful, a similar friction index could be determined for roadway vehicular friction requirements. Of course, there is still room for major improvements in both tire and pavement designs to provide safer vehicular operations under all weather conditions.