Signing and Marking Materials

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As the new millennium approaches, signing and marking materials continue to evolve. Recent efforts to increase the safety of the motoring public include the use of improved delineation materials.

PERFORMANCE

If the current and future state of the art for signing and marking materials could be summarized in one word, that word would be *performance.* Quantifiable material performance requirements are relatively new to this industry, which is more than 70 years old. In the new millennium, performance of signing and marking materials will be measured day and night, and during clear and inclement weather. Improved signing and marking materials will be part of some new Intelligent Transportation Systems (ITS) initiatives; development is already under way in the ITS arena. Sign performance will be measured by its durability and utility (that is, how easily it is viewed by motorists) in real situations. New marking and signing materials to improve roadway delineation are currently under evaluation.

Improvements

The use of durable marking materials instead of standard paint and beads has increased recently. Because maintenance funds continue to be squeezed, this trend will extend into the new millennium. One new concept under development is pavement marking management systems, which allow choice of pavement-marking materials on the basis of field performance and optimal use. Some agencies have moved away from in-house striping to contractors whose materials must meet specified performance criteria. Additionally, at least 10 state departments of transportation require a minimum retroreflective performance on markings newly applied by contractors.

Some initial attempts have been made at warrantee contracts for pavement markings, which hold the contractor responsible for the long-term retroreflective performance of the installed material. The Pavement Marking Committee of the American Traffic Safety Services Association is developing a generic warrantee application specification to help agencies develop their own requirements. This generic specification should be finalized by the Pavement Marking Committee's first meeting in the new millennium.

Measurement

Recently, the U.S. Federal Highway Administration (FHWA) adopted the 30-m geometry standard for measuring pavement marking retroreflectivity; this standard also has been accepted by the European Commission on Standardization. The Highway Innovative Technology Evaluation Center is evaluating the performance of 30-m instrumentation, both handheld and mobile, in measuring the retroreflective performance of pavement

marking materials. This evaluation should be completed soon. The recently approved *Standard Specification for Minimum Retroreflectance of Newly Applied Pavement Markings Using Portable Hand-Operated Instruments* (*1*) was developed to specify retroreflective performance as measured in millicandellas per meter squared per lux. A current FHWA project is further evaluating improved retroreflectivity as related to the use of ultraviolet-emitting headlights and ultraviolet pigments in marking and signing materials.

The National Transportation Product Evaluation Program, under the aegis of the American Association of State Highway and Transportation Officials, is evaluating both sign and marking materials at regional test sites and issuing reports on material performance. More and more of the data generated are being used by agencies to choose materials for signing and markings.

Minimum Requirements

The movement toward performance was emphasized in the Intermodal Surface Transportation Efficiency Act of 1991 (*2*), which stated, "The Secretary of Transportation shall revise the Manual of Uniform Traffic Control Devices to include … a standard for a minimum level of retroreflectivity that must be maintained for pavement markings and signs, which shall apply to all roads open to public travel ...."

One result of this bill has been the development and commercialization of a mobile pavement marking retroreflectometer. Currently, 15 mobile units can continuously measure retroreflective performance of pavement markings at highway speeds in the United States. A mobile sign retroreflectometer that can measure retroreflective sign performance as the vehicle drives past the sign is still under development and testing.

In support of the effort to develop minimum standards for retroreflectivity of pavement markings, the FHWA funded two projects. Field Surveys of Pavement Marking Retroreflectivity, performed by Graham–Migletz Enterprises, presented results of surveys conducted throughout the United States. This report examined six different pavement marking materials and the economic implications of threshold values for replacing those materials. Enhancements to the CARVE (Computer-Aided Road-Marking Visibility Evaluator) Computer Model for Pavement Marking Visibility, performed by Ohio University, was aimed at determining the amount of retroreflectivity required to support adequate driver performance.

The two reports were used by the FHWA to develop *Pavement Marking Retroreflectivity: Research Overview and Recommendations* (*3*). This draft and its recommendations are being carefully examined. Additionally, the Intermodal Surface Transportation Efficiency Act of 1991 (*4*) funded a project that evaluates all-weather pavement markings; the project is being finalized and should be published as we move into the new millennium.

CURRENT RESEARCH

Several other recent research reports related to signing and marking performance should be useful to practitioners who are involved in the selection and use of such materials (*5*–*12*).

Two ongoing studies that will continue in the new millennium are

- *Enhanced Night Visibility* (Virginia Tech), a further evaluation of UV headlights, and
- *Safety Evaluation of UV-Activated Fluorescent Delineation* (FHWA).

LOOKING AHEAD

Improved quality of materials to increase safety should be considered a journey, not a destination. Comedienne Lily Tomlin once said, "The road to success is always under construction." The journey to improved materials will be apparent. In the new millennium, more fluorescent materials will be used in both signs and markings to improve driver visibility. Increasing use of wet reflective materials will improve lane markings under rainy conditions. New kinds of sign materials, including high-performance corner cube sheeting and all-plastic construction, will be used where they can be justified for improved performance. Some new materials are still being tested in laboratories, and others have been only conceptualized. As the pavement-marking community strives to provide better materials, the journey toward safer highways will continue.

One of the issues that has come forward with respect to these initiatives is finalization of a "minimum level of retroreflectivity that must be maintained for pavement markings and signs." This issue is still under consideration and should be resolved within the first year of the new millennium. Our hope is that the safety of motorists is still the most important aspect of this decision.

Another issue relates to the calibration of instruments that are used to measure the performance of signs and marking materials. Currently, no standard reference exists for the calibration of instruments that measure retroreflectivity. The Committee on Signing and Marking Materials has addressed this issue with the recent submittal of a research problem statement. The committee will continue to pursue this issue until the National Institute for Standards and Technology gains funding to finalize instrumentation requirements for calibrating and certifying performance measuring instruments.

The future of signing and marking materials in the new millennium will offer many challenges and opportunities. Enhanced and quantifiable delineation, related to drivers' needs, can only improve safety on the roadway. Improving safety by improving delineation materials will benefit all involved—especially users.

REFERENCES

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