STATUS OF ACCREDITATION OF ROADSIDE SAFETY EQUIPMENT CRASH TEST LABORATORIES IN THE UNITED STATES

Harry W. Taylor
Federal Highway Administration

INTRODUCTION

One of the duties that citizens expect of government is that it protects the health and safety of its citizens from the imposed risk of injury from products sold in the marketplace. One way a government protects its citizens is by establishing standards that must be adhered to for products. Let me list some examples — in the medical sector, pharmaceuticals and medical devices must pass certain laboratory tests and experimental trials before they are approved for use by physicians. In the power tool sector, electrical devices such as circular power saws must meet standards contained in an electrical code. Laboratories such as the Underwriter's Laboratories test to ensure that electrical devices meet this code. For highways, the traffic barriers and crash cushions that are installed in the medians and alongside the road to alleviate the harm to occupants in impacting vehicles must also meet certain standards by testing.

The method by which the traffic barriers meet standards is by being crash tested at an outdoor laboratory with a speeding vehicle under controlled conditions. The formal name for this process is "conformity assessment". Conformity assessment includes three processes. The first is the development of standards and procedures which define what a purchaser wants and what the supplier agrees to provide. The second is a quality system, and the third is laboratory accreditation. In this paper I'm only addressing the lab accreditation issue.

There are some very good reasons for the interest of the roadside safety hardware community in this subject. First, there is the increased emphasis of agencies on quality and the public on quality assurance; and second, there is the desire to interface with the international standards and procedures for increased safety and trade.

WHAT IS A LABORATORY ACCREDITATION PROCESS?

It is a system for certifying that crash test laboratories have been found competent to perform specific tests. Competence is defined as the ability of a laboratory to meet defined conditions and to conform to the defined criteria for specific calibration and test methods.

Theoretically a United States road safety hardware laboratory accreditation program is one that would

1. Provide the technical and administrative mechanisms for national and international recognition for competent laboratories based on a comprehensive procedure for promoting confidence in testing laboratories that show that they operate in accordance with the defined requirements;
2. Provide laboratory management with documentation for use in the development and implementation of their quality systems;
3. Identify competent laboratories for use by regulatory agencies and purchasing authorities;
4. Provide laboratories with guidance from technical experts to aid them in reaching a higher level of performance resulting in the generation of improved engineering and product information; and
5. Promote the acceptance of test results between countries and facilitate cooperation between laboratories and other bodies to assist in the exchange of information and experience, facilitating removal of non-tariff barriers to trade and promoting the harmonization of standards and procedures.

WHAT IS OUR STATUS?

In the United States, we are heading toward a more formalized acceptance procedure for crash test laboratories. In my opinion, the reason for this is not so much the pursuit of a carefully thought out national goal, but more the result of a need for more efficiency and effectiveness.

Mr. King Mak at our 1993 summer meeting in Newport, Oregon, in his discussion of accreditation from a testing laboratory perspective mentioned certain items of costs associated with maintaining accreditation that I suggest we use as gauges or milestones in measuring our progress.

The specific milestones are

- Periodic maintenance of accelerometers by a certified laboratory.

- Periodic calibration of electronics.
- Validation of software, e.g. digitization, calculation of occupant risk factors, etc. A standardized test data set can be used to check the validity of the software.
- Reporting requirements: documentation of activities regarding certification or re-certification requirements., e. g., date, nature and results of calibration of existing equipment, new equipment, etc.

The periodic maintenance of accelerometers milestone is required by NCHRP Report 350 as SAE J-211, "Instrumentation for Impact Test."

Most of the major credit for our progress in implementing the other three items belongs to the research and development arms of the Federal Highway Administration and the National Highway Traffic Safety Administration. They have been cooperating on harmonizing between the procedures to evaluate vehicles and to evaluate highway hardware. Messrs. Rex King and Charles McDevitt of the Design Concepts Division of FHWA along with Mrs. Randa Radwan Samaha of NHTSA are the responsible people for implementing these efforts.

Mrs. Samaha is responsible for leading the development of a method for calibration of electronics using the signal wave form generator (SWG). This is used to verify a testing agency's ability to accurately measure and record vehicular response parameters via the generated standard waveform.

NHTSA has performed or will perform the following actions to implement the SWG:

- One SWG system was adapted to output and process Class 180 precision waveforms which is allowed by NCHRP 350. Both the SWG hardware and the corresponding signal processing software were modified. The adapted system was used to evaluate the data acquisition system at the FHWA FOIL test facility for compliance to SAE J211 Class 180 requirements.
- An upgraded Class 1000 SWG system using a commercial PC based arbitrary waveform generator (ARB) and an output distribution box is under development (will be available 3/96).
  - Based on required specifications and extensive evaluation, the Keithley Metrabyte PCIP-AWFG/2 board has been selected.
  - A prototype output distribution box has been built and tested. Commercial fabrication of such a box is planned.
  - Software for turnkey operation of the ARB/SWG in the field is planned.
  - Final report will contain operator's manual for the new ARB/SWG, and the commercial specifications for both the ARB and the SWG output distribution box. The associated software will be made available for each testing site.

Mr. Rex King of FHWA has a project that prequalified crash test laboratories to perform tests. Not only did they have to qualify that they met the requirements of NCHRP 350 in addition they had to both calibrate their instrumentation using the SWG and be able to provide their test results in specified NHTSA data format. The labs were prequalified as to the largest type of vehicle they were approved to test as well as whether they were being qualified to perform compliance or research tests. Of the 7 crash test labs that perform work for the FHWA, four have been prequalified and one is pending.

Mr. Charles McDevitt is the COTR of a study being performed by the Texas Transportation Institute to develop software to calibrate crash test labs for occupant risk values. Verification of a testing agency's ability to accurately measure and record vehicular response parameters via the waveform generator is important. However, of equal importance is the agency's ability to accurately compute occupant risk measures from the recorded data. This will provide the ability to calibrate a test labs computation and provide a standard format for test results for the key factors used in evaluating impact performance of a safety feature.

CONCLUSION

In conclusion, the U.S. is moving slowly — but it is adopting procedures that will serve as the foundation for a formal roadside safety hardware laboratory accreditation process.