

GOVERNMENT STATUS REPORT - UNITED STATES

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The personal, social, and economic costs of vehicle crashes include pain and suffering, direct costs sustained by injured people and their insurers, and for many crash victims, a lower standard of living or quality of life. The taxpayer and society may be burdened by health care costs, lost productivity and associated loss of tax revenues, and public assistance for injured people. The opportunity exists to dramatically reduce vehicle–cars, buses, and trucks–collisions. During the past two decades, motor vehicle collisions accounted for about 90 percent of all transportation fatalities and an even larger percentage of transportation accidents and injuries.

The National Highway Traffic Safety Administration's (NHTSA or Agency) motor vehicle safety program considers engineering, along with its educational and assurance programs, essential to continue its goal to reduce fatalities, injuries, and crashes on the U.S. highway system. This 3-pronged process, relies on a strong educational program to inform drivers and passengers, an assurance program to determine compliance with U.S. regulations, and engineering, rooted in science and data, to develop a strong policy to continue to improve highway traffic safety. The prospect of making transportation safer, and laying the foundation for saving lives and reducing injuries through research, is a formidable one, and one that continues to challenge our best efforts in all three emphasis areas. Since the last ESV conference, NHTSA has implemented several programs to improve traffic highway safety. This report details some of the major efforts. But first, let me provide you with an overview of the crash environment in the U.S.

CRASH ENVIRONMENT

NHTSA's National Center for Statistics and Analysis (NCSA) reports that from 1992 (the lowest fatality toll for over 30 years) to 1999, deaths on US highways increased from 39,250 to 41,611. This fatality increase has been associated, in large measure, with an expanding economy and increases in vehicle usage. This is contrasted with the 50,894 people who were killed in traffic crashes in 1966. While this reflects an 18 percent decline in 33 years, the annualized rate is only about 0.6 percent.

The fatality rate per 100 million vehicle miles traveled (VMT) in 1966 was 5.5. By 1992, the rate had declined to 1.7, and remained at that level through 1996. In 1999, the fatality rate reached an all time low of 1.5 fatalities per 100 million miles traveled. U.S. interventions to reduce the fatality rate to this historically low point have resulted in about 1.7 million lives saved assuming the 1966 rate of 5.5 would have prevailed over the past 33 years. Similarly, the fatality rate per 100,000 population decreased from 25.9 in 1966 to 15.3 in 1999.

All the while, the amount of travel on U.S. roadways increased by approximately 190 percent between 1966 and 1999. This increase is comprised of two components: a dramatic increase in the number of vehicles and increased usage of each vehicle.

Passenger car occupant fatalities comprised 50 percent of the total in 1999; and, while they continue to constitute the largest proportion of U.S. traffic fatalities, they have been decreasing in recent years because of increased popularity of light trucks in the U.S. Light truck fatalities in 1999, were 27 percent of total fatalities—an upward trend from 1998, while motorcyclist fatalities in 1999 constituted 6 percent of total fatalities—another upward trend from 1998 data. Nonoccupant fatalities in 1999 were 14 percent of total fatalities. The total number of police-reported crashes in the U.S. in 1999 was estimated by the National Automotive Sampling System (NASS) General Estimates System (GES) to be 6.279 million, which is about a half million less than reported at the 16th ESV.

Further investigation of the light truck buying trend shows that light trucks (pickup trucks, vans and utility vehicles) accounted for about 18 percent of the on-road light vehicle fleet, about 17 percent of light vehicle VMT, and about 16 percent of light vehicle occupant fatalities, in 1975, when the Fatality Analysis Reporting System (FARS) began collecting fatal crash information. By 1999, the light truck portion had swelled to 37 percent of the on-road light vehicle fleet, 37 percent of light vehicle VMT, and 35 percent of light vehicle occupant fatalities. While passenger car occupant fatalities declined by 5,111, light truck occupant fatalities have increased markedly, from 4,856 in 1975 to 11,243 in 1999—an increase of 6,387.

In 1999, 475,000 large trucks (gross vehicle weight rating greater than 10,000 pounds) were involved in traffic crashes in the United States; 4,898 were involved in fatal crashes. A total of 5,362 people died (13 percent of all the traffic fatalities reported in 1999) and an additional 142,000 were injured in those crashes. Large trucks accounted for 3 percent of all registered vehicles, 7 percent of total vehicle miles traveled, 9 percent of all vehicles involved in fatal crashes, and 4 percent of all vehicles involved in injury and property-damage-only crashes in 1998 (1999 registered vehicle and vehicle miles traveled data not available). One out of eight traffic fatalities in 1999 resulted from a collision involving a large truck.

In 1999, there were 41,611 total traffic fatalities. Motor vehicle occupants accounted for 35,806 (86 percent) of these fatalities, while the remaining 5,805 (14 percent) fatalities were nonoccupants (pedestrians, pedalcyclists, etc.). Multi-vehicle crash occupant fatalities made up the largest proportion of fatalities with the majority of those occurring in vehicles with frontal initial impact. Among single vehicle crashes, occupant fatalities were nearly equally distributed between non-rollover and rollover vehicles (20 percent and 21 percent, respectively). Furthermore, passenger car single vehicle rollover occupant fatalities and light truck single vehicle rollover occupant fatalities each accounted for 10 percent of the total fatalities. See Figure 1 for a more detailed distribution of the fatalities.

DATA COLLECTION AND ANALYSIS

NHTSA conducts a motor vehicle crash data collection program through the National Center for Statistics and Analysis. It is composed of: the Fatality Analysis Reporting System (FARS), the National Automotive Sampling System, Special

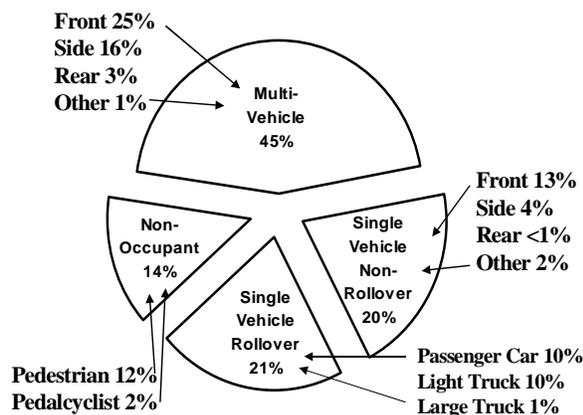


Figure 1. Distribution of Fatalities in the U.S.

Crash Investigations (SCI), and the State Data Program.

FARS is a census of all fatal crashes occurring on public roads in the United States. FARS funds State agencies to identify fatal motor vehicle crashes and collect information about them. This information is coded into a common format and transmitted to NCSA. Data from FARS have been used to assess the effectiveness of numerous programs, including those that increase seat belt use and to evaluate the performance of occupant restraint systems.

FARS will be the first DOT database to map the precise location of all crashes in the file. Beginning with the 2001 FARS data collection year, all FARS crashes will be geographically coded directly from their computer with software and maps. This feature will permit better linking of databases that use geographic coordinates.

The NASS is comprised of the General Estimates System and the Crashworthiness Data System (CDS). Using contractors for data collection, the GES provides National estimates of characteristics of all motor vehicle crashes. The CDS conducts detailed investigations into a nationally representative sample of crashes involving towed passenger vehicles to investigate injury causing mechanisms and to evaluate countermeasures.

The SCI program provides in-depth data on crashes that fall outside the scope of NASS-CDS. Generally, these are crashes in which an air bag or safety belt system appeared to operate in an unexpected manner, crashes involving alternative fuel vehicles, crashes involving children in restraints, and serious school bus crashes not investigated by other Federal agencies. SCI data are being used to track trend data related to fatal and seriously injured children and adults in air bag deployment related crashes.

NCSA data are complemented by state crash data files provided through the State Data Program. Each year, the crash data files from 17 states are obtained, documented and provided to the Agency. Also a specialized crashworthiness database is created from several of the state data files. State data files have been used in studies of driver error, antilock braking systems, center high mounted stop lamps, among others.

In another component of the State Data Program, NHTSA continues to work with states to develop Crash Outcome Data Evaluation Systems (CODES). CODES projects link statewide police-reported crash data to medical outcome data and have

been funded in 25 States. In 2000, ten of these States received additional funding to provide data and analyses requested by NHTSA as part of the CODES Data Network.

The flexibility of NCSA's data collection programs allows it to respond to special Agency needs. In the NASS-CDS, the data being collected were recently modified to include precrash environmental data and Event Data Recorder outputs. These "vehicular black boxes" are providing new insight into determining crash causation and severity. Improvements in the collection of child safety seat data are being investigated by NCSA. A greater proportion of crashes involving air bag equipped vehicles is being obtained in the NASS-CDS, because of a recent modification to the sampling plan. Special studies of Pedestrian Crashes and of Unsafe Driver Actions have been completed. During this past winter, the NASS data collection program was used to collect information about the prevalence of under inflated tires in the driving public.

CRASH AVOIDANCE RESEARCH

National Advanced Driving Simulator

In March 2001, the National Advanced Driving Simulator (NADS) development phase was completed, see Figure 2. The simulator hardware and software has been integrated and the acceptance testing has been successfully completed. The NADS has now entered into operation at the University of Iowa facility building. NHTSA research projects which have been scheduled on the NADS for year 2001 include driver distraction due to in-vehicle telematics, the effects of alcohol BAC level during demanding driving situations, and driver reaction to sudden tire failures. These efforts will continue through 2002.



Figure 2. The NADS installed in the University of Iowa facility building.

Intelligent Vehicle Initiative (IVI)

One of the greatest challenges facing the transportation system is to understand how technology can make transportation safer. The collision avoidance capabilities of motor vehicles can be significantly improved by applying advanced-technology crash countermeasure systems to improve driver's recognition of roadway hazard, decision making, and vehicle control in avoiding crashes. Preliminary estimates by NHTSA show that rear-end, lane change, and roadway departure crash countermeasure systems have the potential, collectively, to reduce motor vehicle crashes by about one sixth or about 1.145 million police-reported crash annually, if fully deployed in the vehicle fleet. NHTSA has performed significant R&D and field tests of countermeasures for major crash types.

A project to conduct a field operational test (FOT) of passenger vehicles outfitted with a rear-end collision warning system integrated with adaptive cruise control is currently underway. The goals of the project are to demonstrate the state-of-the-art of these advanced safety technologies, measure system performance and effectiveness, and estimate potential safety benefits and driver acceptance. The rear-end collision warning system to be tested will provide warnings to the driver in the form of an audible tone alert and a visual display of an icon on a head-up display when the driver needs to take action to avoid an impending rear-end collision. The adaptive cruise control system will maintain a selected headway between the driver's vehicle and the vehicle being followed by adjusting the throttle, downshifting or application of the vehicle's brakes. Data obtained from an onboard data collections system

will be used to estimate potential safety benefits and determine how well the system performed.

A field operational test will be undertaken in collaboration with industrial partners who can develop and implement an FOT of Road Departure Warning System (RDWS) that can warn a passenger car driver when they are about to drift off the road, or are traveling too fast for an upcoming curve.

A recently completed study by Carnegie Mellon University titled, "Run-Off-Road Collision Using IVHS Countermeasures," is the basis for the RDWS performance specifications. The advanced RDWS will be fully integrated into field test vehicles which are instrumented to collect data for system evaluation. Analysis of the FOT test data will be performed by the Volpe National Transportation Systems Center. The test data evaluation will have the following four principal objectives, listed in order of priority: 1) achieve a detailed understanding of RDWS safety benefits, 2) determine driver acceptance of the RDWS, 3) characterize the RDWS performance and capability, and, 4) assess RDWS deployment rates and cost. The RDWS of the future is expected to be fully integrated into future vehicles as part of a comprehensive intelligent vehicle crash avoidance package that addresses other important crash modes such as rear-end and intersection type crashes.

The initial analysis of performance specifications for lane change crash countermeasures in passenger cars was completed in FY2000 by TRW. It was estimated that the effectiveness of the countermeasure was 43 percent in lane change crash avoidance using on-road testing with a prototype situational awareness display in the rear-view mirrors. A subset of the lane change countermeasure, the so-called short range "blind spot" countermeasure, remains a concern to NHTSA because these systems are incapable of detecting a fast approaching adjacent vehicle until it is too late for the driver to react. Simulator tests to estimate the effectiveness of these systems are currently under development.

The final report for the initial analysis of the performance specifications for intersection crash countermeasures in passenger cars was completed in September 2000. Since intersection crashes involve complicated scenarios, the specifications emphasized countermeasures for the most tractable parts of this crash problem: Left turn across path, perpendicular path crashes, and premature signalized intersection entry. It was estimated that the overall crash avoidance effectiveness of prototype

countermeasures using on-road testing of situational awareness and imminent crash displays is 64 percent. The next phase of this work involves completion of the performance specifications and development of objective tests of performance.

NHTSA and the Federal Highway Administration have been negotiating with the Crash Avoidance Metrics Partnership (CAMP) to implement the first research for the Enabling Research Consortium of the Intelligent Vehicle Initiative. CAMP is a partnership between General Motors and Ford, which, for the first time ever, brings Daimler/Chrysler, Toyota, Nissan, and Navigation Technologies into a proposed research partnership with the USDOT. The proposed research agenda for CAMP and its participants includes three projects: remaining issues in forward collision warning; driver workload metrics; and enhanced digital maps for safety applications. Figure 3 presents a view of evaluation process employed during this project.



Figure 3. Evaluation of rear-end collision detection systems.

Driver/Vehicle Performance

With the introduction of high-technology systems in vehicles, drivers must continually allocate attention to the driving tasks and to the environment around the vehicle. Fundamental cognitive processes of perception and attention are at the core of the driving task demands. Driver distraction, its measurement, understanding the cognitive bases of distraction and application of the knowledge gained in these and other driver-vehicle safety topics are important aspects NHTSA is pursuing through its research activities in driver-vehicle performance, for safe driving.

Key areas of research include understanding driver-vehicle performance in naturalistic driving, driver work load management, sensing the condition of the traffic environment and assessment of threat, sensing the condition of the driver and his driving capabilities, minimization of driving risk through selective enabling of in-vehicle devices and developing suitable human-machine interface. A number of research projects related to the above are being carried

out on the NADS, conducting test track experiments and real-world operational tests.

Heavy Vehicles

The Department of Transportation has placed a great deal of emphasis on improving heavy truck safety and has set an aggressive goal of reducing the number of truck-related fatalities by 50 percent in 10 years. Meeting this goal will require a concerted, multi-disciplinary effort by many parts of the Department. In support of that goal, NHTSA is proposing several initiatives for research to improve braking performance, use of disc brakes on tractors and trailers, improved systems for side and rearward visibility, and event data recorder research to capture information prior to and during crashes which will allow us to develop a clear understanding of crash causation and in developing suitable countermeasures.

CRASHWORTHINESS RESEARCH

Vehicle Aggressivity and Compatibility

The increased popularity of light trucks and vans (LTVs)—pickups, sport utility vehicles (SUV), and minivans—presents a growing safety problem that needs to be addressed. While LTVs account for slightly more than one third of all registered vehicles, they are involved in half of all fatal crashes with passenger cars. The safety problem for occupants of passenger cars can be attributed to some inherent design differences in LTVs. Those differences are due to disparities in size (weight and height) and stiffness. Figure 4 provides an overview of fatal vehicle-to-vehicle collisions for these two vehicle classes as a function of years. Clear evidence of this trend is seen.

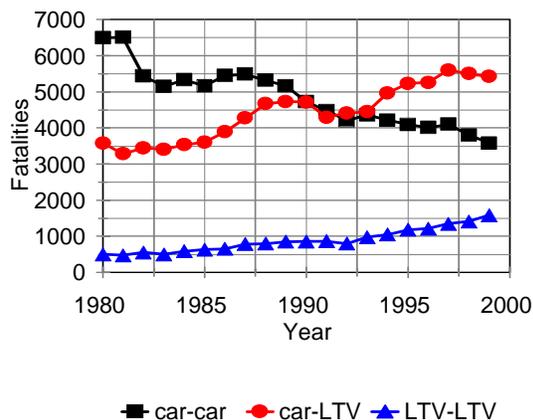


Figure 4. Fatalities in vehicle-to-vehicle collisions

Overall, these differences make LTVs more “aggressive” in their interaction with passenger cars. Based on a NHTSA analysis, weight incompatibility and impact location were determined to have a large effect on vehicle aggressivity. Furthermore, when controlling for impact location, LTVs, as compared to a passenger car of comparable weight, were determined to be twice as likely to cause a fatality in the collision partner vehicle.

Some automobile manufacturers have voluntarily introduced changes to their LTVs that will lead to improved compatibility in crashes with automobiles. The primary focus of these changes has been to improve the geometric mismatch between the frontal structures of the LTVs with those of the automobiles so as to improve the structural interaction during a crash. In addition to lowering the steel beams to minimize the geometric mismatch, Ford also has introduced “blocker beams” (i.e., transverse beams that connect the front rails) in some of their SUVs to improve further the structural interaction in frontal crashes. NHTSA is continuing research to identify vehicle features that affect compatibility and evaluate their effects in real world crash performance.

The agency is using sophisticated computer models to assess the impact of changes to vehicle size on safety performance. While the agency has identified a number of vehicle improvements to LTVs that can be readily made to improve compatibility, the research program is focused on what changes can be made to the entire fleet (i.e., both LTVs and cars). It is anticipated that the results of our research will find that changes not only to LTVs, but also to automobiles, will be required in order to improve the overall fleet safety. It is our belief that market forces alone may not fully address the compatibility issue.

Since the last ESV, considerable progress has been made in developing the systems model that is to be used for meeting the stated objective. Additionally, preliminary efforts are underway for developing test procedures that can be used to evaluate a vehicle’s compatibility. These include using the load cell data collected in the frontal crash tests of the agency’s New Car Assessment Program. Also, the use of a load cell moving deformable barrier is being investigated with the possible benefit of directly accounting for the effects of mass.

Frontal Crash Protection

Even after full implementation of driver and passenger air bags, as required by Federal motor vehicle safety standard (FMVSS) No. 208, it has been estimated that frontal impacts will account for up to

8,000 fatalities and 120,000 AIS \geq 2 (abbreviated injury scale (AIS) in the moderate to critical classifications) injuries, annually in light vehicles. This program focuses on the intrusion-type injuries and fatalities and the costly lower extremity injuries observed in crashes involving air bag-equipped vehicles. We believe a frontal offset test best represents the real world crashes that produce the intrusion-related injuries and fatalities and the severe lower extremity injuries. We have been working to develop this type of test and have been considering what new injury modes, injury criteria, and test surrogates might be necessary.

Since the last ESV, the NASS-CDS has provided more precise information regarding the principle direction of force. While the analysis is still ongoing, the preliminary results indicate that a test condition involving the use of the moving deformable barrier to simulate vehicle-to-vehicle crashes should incorporate an impact angle less than the previously cited 30 degrees that was determined when principal direction of force (PDOF) was provided in terms of clock position (i.e., 30 degree increments).

Side Impact Research

For the past few years, there has been a growing trend for manufacturers to install side air bags in vehicles. Generally, three side air bags types have evolved, those which protect the thorax, combination bags, which protect the thorax and head, and head protection side air bags, which typically deploy from the roof side rails and offer crash protection specifically for the occupant's head. In an effort to eliminate any potential dis-benefits for out-of-position occupants, the industry has developed test procedures for evaluating side air bag's risks to out-of-position occupants, especially children and small adults.

An analysis of the 1988-1999 NASS-CDS and FARS files indicates that side crashes result in over 10,200 fatalities and 40,000 serious injuries each year to occupants of passenger cars and LTVs. This corresponds to about 32 percent of the fatalities and 37 percent of the seriously injured in all tow-away crashes. Since the last ESV conference, side crash protection research has mainly focused in three areas—evaluation of the Eurosid II dummy as a potential test device for FMVSS No. 214, upgrade of FMVSS No. 214 to reflect the change in the demographics of the U.S. fleet and the resulting safety implications, and the continued development of a pole side impact test procedure to address the

single vehicle side crashes into narrow objects such as trees and utility poles.

Advanced Air Bag Technology Research

In recent years, a number of crashes have been reported where injuries and fatalities have been the result of aggressive air bag deployment; that is, the severity and crash environment did not warrant the severity of injury and/or fatality sustained by the occupant. Those most susceptible to injuries and/or fatalities from aggressive air bag deployments include out-of-position child passengers, out-of-position adult drivers (usually unbelted), and infants in rear-facing child safety seats.

Since the last ESV, the agency has published an Interim Final Rule, the latest in a series of rulemakings, to address this safety problem. Research and Development focused its activities to provide the technical basis for the rulemaking. To define potential areas of improvement with current air bag systems, various analyses of real world crash data were conducted. The NASS-CDS was utilized to analyze air bag-related issues such as effectiveness as a function of driver height and gender interaction, specific body region effectiveness estimates for various sub-populations, etc. Other analyses involved investigations of injuries and fatalities with air bags, analysis of fatalities to children under 15 with air bags, and analysis of injuries and/or fatalities to adult drivers, specifically to identify cases of air bag aggressiveness contributing to the injuries/fatalities. NHTSA's SCI program was one of the main utilities for sending quick reaction investigators to the crash site when NHTSA learns of serious air bag crashes.

With the introduction of new-generation air bag equipped vehicles into the fleet, NHTSA's SCI program also investigated the field performance of production new-design air bag equipped vehicles through crash investigations, and has implemented several early notification mechanisms to identify these crashes. NHTSA also has conducted laboratory testing to evaluate the aggressiveness of production next-generation air bag systems in new vehicles. High speed crash tests and static out-of-position tests were conducted on a sample of production vehicles, and results were compared with the pre-1998 air bag designed systems.

To experimentally assess the potential for advanced air bag technology, NHTSA has conducted testing over a wide range of conditions. Initial hardware evaluations have included advanced crash sensors, advanced air bag inflators and occupant position sensors. Research included out-of-position

tests with small female driver and child passenger test dummies, sled testing with small and large adult dummies representing moderate severity crashes of varying crash configuration and restraint application and high-speed, full-vehicle crash tests to evaluate complete system performance.

Research also was conducted to evaluate advanced air bag system performance. To minimize air bag risks to occupants in close proximity to the air bag at the time of deployment, static driver and child out-of-position test procedures have been developed; research was conducted to develop test procedures to evaluate air bag suppression systems, see Figure 5.



Figure 5. Static out-of-position test.

BIOMECHANICS RESEARCH

Our National Transportation Biomechanics Research Center (NTBRC) continues to conduct a wide variety of research projects designed to develop a better understanding of occupant crash injury mechanisms and performance levels for the automotive crash environment. Results from these efforts have provided the basis for development and improvement of safety standards, injury criteria, performance limits, anthropomorphic dummies and injury mitigating countermeasures.

CIREN

Over the last two years, several participating Crash Injury Research and Engineering Network (CIREN) centers have, in addition to their crash investigation and analysis activities, established a number of outreach and education information dissemination programs by integrating papers and presentations of their CIREN experiences into existing activities, such as annual trauma nurse and

emergency medical technician (EMT) conferences and annual conferences for surgeons and emergency room physicians. These CIREN centers have become excellent examples of the benefits of public/private partnerships that are achieving lifesaving results. The CIREN program has also achieved its near term goal of adding two new partners to the program. One of the new CIREN centers, established in April 1999, is located at the University of Alabama at Birmingham and is funded entirely by Mercedes-Benz. The other new CIREN center, located at Inova Fairfax Hospital in Falls Church, Virginia, was established in May 2000. This CIREN center is entirely funded by Ford Motor Company. The addition of these two centers brings the total number of CIREN participants to nine geographically dispersed, Level 1 Trauma Centers.

Analytical Modeling and Simulation

These efforts have concentrated on enhancing our ability to interpret the effects of crash dummy responses at the local anatomical level. The rapidly expanding capabilities and sophistication of analytical techniques used to simulate human impact response/injury coupled with the ever increasing capacities of computer hardware, make implementing this concept close to a reality. That is, rather than using empirically derived relationships linking specific features derived from measured force and acceleration time histories to injury severity, the same time histories are used as inputs to detailed finite element structural models of the human body to predict and interpret local material responses and their potential for injury. This concept, which we have dubbed SIMon (Simulated Injury Monitor), is discussed in greater detail in a subsequent paper where head impact responses from various impact situations are evaluated for the extent and severity of various types of local brain injury, i.e., diffuse axonal injury, focal lesions, and bridging vein rupture. Efforts are also underway to extend this concept to the prediction of thoracic and lower extremity injuries.

Experimental Impact Injury Research

Our quest to understand and discriminate injury types and severities from observable mechanical parameters span the broad spectrum of body structures injured and the variety of crash conditions experienced by real people in actual crashes. Skull fractures, neck injury in both children and adults resulting from either direct impacts to the head or indirect inertial loading, thoracic injury in both frontal and side impacts, pelvic and femoral fractures, as well as lower extremity and ankle injuries continue to be specifically addressed.

Anthropomorphic Dummy Development

The agency is focused on bringing the concepts of THOR (Test Device for Human Occupant Restraint), our advanced frontal test dummy, into practice. This includes efforts to improve and upgrade the existing prototype design based on our experiences derived from a world wide testing program, extending the 50th percentile male design concepts to a representation of the 5th percentile female, as well as expediting the application of this technology by adapting subcomponents of this advanced technology, specifically the THOR's lower extremity LX (see figure 6) and its neck design, to be functional units on a Hybrid III frame.

INTERNATIONAL HARMONIZATION

The harmonization of regulations has become a matter of increasing importance in the last decade. Efforts to coordinate regulatory practices on a global scale have resulted in establishment of fora and agreements to promote and guide the process of harmonization. NHTSA has been at the forefront by actively participating in many of these fora while

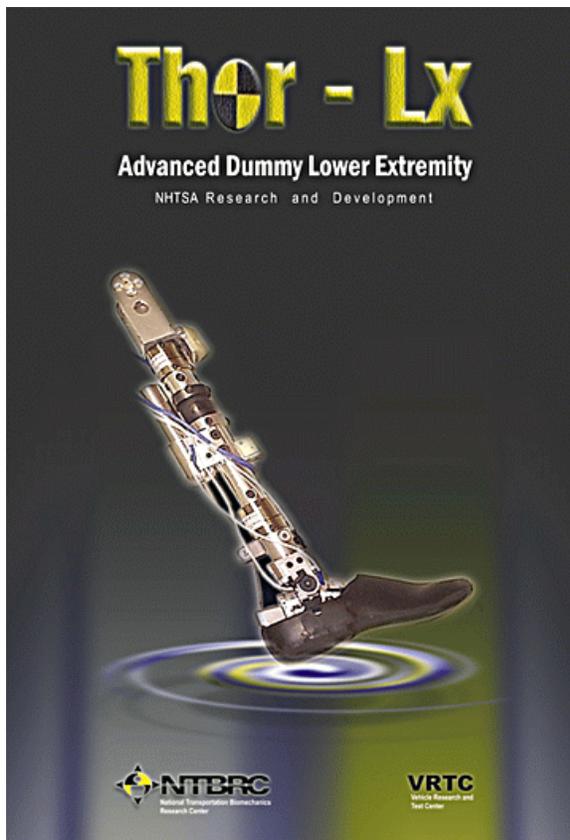


Figure 6. Thor LX.

ensuring that any harmonization activity improves the levels of safety and environmental protection.

International Harmonized Research Activities (IHRA)

NHTSA continues to work with its international partners to coordinate research, establish priorities, and to carry out the agreements reached during the 15th ESV Conference in Australia. This effort, the International Harmonized Research Activities, uses a steering committee to review recommendations and research plans, and working groups to collaborate on research in six emphasis areas: advanced offset frontal protection, side impact protection, intelligent transportation systems, vehicle compatibility, biomechanics research, and pedestrian impact protection. The 5-year term for IHRA will end with this ESV, and the participants are currently deciding the future of these coordinated efforts. At the Windsor ESV, the working groups reported on the first two years of progress. This year, they will present their 5-year report.

World Forum for the Harmonization of Vehicle Regulations (UN/ECE/WP.29)

1998 Global Agreement: On August 25, 2000, the United Nations/Economic Commission for Europe (UN/ECE) Agreement Concerning the Establishment of Global and Technical Regulations for Wheeled Vehicles, Equipment and Parts Which Can Be Fitted And/or Be Used On Wheeled Vehicles (the "1998 Global Agreement") entered into force. There are currently 11 contracting parties to this Agreement. In addition, at least three other countries have signed the Agreement subject to ratification.

The 1998 Global Agreement provides for the establishment of global technical regulations regarding the safety, emissions, energy conservation and theft prevention of wheeled vehicles, equipment and parts. The Agreement contains procedures for establishing global technical regulations by either harmonizing existing regulations or developing new regulations. The establishment of global technical regulations is expected to lead to a significant degree of convergence in motor vehicle regulations at the regional and national levels. However, while in some instances the result may be the adoption of identical or substantially identical regulations at those levels, in other instances, the result may be regulations that differ but do not conflict with each other. While the Agreement obligates the Contracting Parties, under certain circumstances, to consider adopting the global technical regulations within their own jurisdictions, it does not obligate the Parties to adopt them.

The Agreement recognizes that governments have the right to determine whether the global technical regulations established under the Agreement are suitable for their own particular safety needs. Those needs vary from country to country due to differences in the traffic environment, vehicle fleet composition, driver characteristics and seat belt usage rates.

Implementation of the 1998 Global Agreement: In August 2000, the United States (NHTSA) published a final rule which adopts a policy statement describing the agency's activities and practices for facilitating public participation concerning issues that arise in the implementation of the 1998 Global Agreement. The final rule, which took effect on September 22, 2000, sets forth the general policy goals regarding vehicle safety that the agency will pursue. A paramount goal is to continuously improve safety and seek high levels of safety in developing and adopting new global technical regulations. In addition, the final rule describes the various stages at which NHTSA will issue notices and hold public meetings for the purpose of disseminating information, seeking comments and providing opportunities for discussion.

Now that the 1998 Global Agreement has entered into force, contracting parties are submitting their recommendations for the first regulations to be considered under the agreement. In July 2000, the United States issued a notice to obtain public comments on a list of preliminary recommendations of standards or aspects of standards for consideration by the contracting parties in prioritizing the development and establishment of global technical regulations under the Agreement. The agency reviewed the comments submitted in response to its notice and, on January 18, 2001, published a list of final recommendations which will be used in deliberating with other contracting parties on a final program of work under the Agreement. The U.S. believes that the final recommendations will serve the interest of improving motor vehicle safety in the U.S. They will also help to carry out the 1998 Global Agreement's goal of continuously improving and seeking high levels of safety around the world.

Asia Pacific Economic Cooperation (APEC)

NHTSA continues to be involved in APEC harmonization projects, as a regular participant in meetings and a contributing member to the development and administration of harmonization activities. Of significance is the Road Transport Harmonization Project (RTHP), which began in

1994, and whose objective is to promote the harmonization of standards within APEC region.

Within the last few years, APEC has stepped up its efforts in promoting regional and global harmonization of vehicle standards in light of the 1998 Global Agreement's entry into force in August 2000. As of January 2001, there were six contracting parties among the APEC economies (United States, Canada, Japan, Russian Federation, People's Republic of China and Korea). In addition, in conjunction with the Transportation Working Group meetings, the RTHP has organized workshops, in which NHTSA took part, in order to encourage other APEC member economies to participate in WP.29 and to join the 1998 Global Agreement. It is anticipated that other APEC economies will become contracting parties within the next few years.

North America Free Trade Agreement (NAFTA)

NHTSA has been actively involved in NAFTA harmonization efforts through the Automotive Standards Council (ASC). The Council has been seeking for the last six years to identify incompatibilities in standards among NAFTA countries and set up a process that addresses these incompatibilities. Working groups, which comprise government and industry, have been established to facilitate the process.

In order to bring greater understanding of the various regulatory and enforcement systems within the NAFTA countries, the ASC organized a workshop in Mexico City. Since the United States and Canada have become contracting parties to the 1998 Global Agreement, the workshop also served as an opportunity to inform Mexico's key regulatory agencies, industry and other interested parties about the significance of the Agreement and Mexico's participation in the activities of WP.29.

CONSUMER AUTOMOTIVE SAFETY INFORMATION

The Consumer Automotive Safety Information program serves as the focal point responsible for NHTSA's marketing research, planning, coordination, and development of vehicle safety consumer information actions. The program conducts numerous activities promoting the New Car Assessment Program (NCAP) and informing the public on how to properly use vehicle safety features. It also develops strategies for engaging the participation of key public and private sector organizations in vehicle safety consumer information activities.

Since the 1998 ESV Conference, a notable success in the development and delivery of motor vehicle safety information to consumers has been the new brochure *Buying A Safer Car For Child Passengers*. This brochure added valuable information to that already provided by *Buying A Safer Car*, which annually publishes the NCAP test results and vehicle safety features information for new model year vehicles. Through the development and implementation of a formal marketing plan, hundreds of public and private sector groups and individuals -- National SAFEKids, credit unions, state Children's hospitals, automobile dealers, child wear retailers, child care centers, insurance companies, magazines, web-sites and others -- incorporated the *Buying A Safer Car For Child Passengers* brochure or its contents into the information they make available to the public and/or to their employees. Another new brochure, *Adapting Motor Vehicles for Persons with Disabilities*, was published in December 1999.

A major strategy for the development and delivery of motor vehicle safety information to consumers has been through outreach and partnership efforts. A number of organizations including CART (Championship Auto Racing Teams), Jiffy Lube, the National Association of Independent Insurers, the National Automobile Dealers Association, Continental Teves Corporation (on ABS brakes), and others took an active role in distributing vehicle safety information. Partnerships also were expanded as part of the agency's minority outreach efforts. The result of these activities increased the exposure of vehicle safety issues, as reflected by significant increases in NCAP web-site inquiries. Consumer research was conducted to determine consumer perspectives on how to best deliver information on rollover issues, and to test new concepts for an upgraded SUV rollover warning label and for NCAP rollover ratings. The SUV research resulted in a new rule for a simplified, colorful SUV label starting in model year 2000, and the rollover ratings research provided the basis for the 2001 NCAP rollover resistance ratings.

SAFETY PERFORMANCE STANDARDS

Since the last ESV Conference in Canada, NHTSA has published many final rules. The following is a compilation of these final rules ordered in the following three areas: Crash Avoidance, Crashworthiness, and Consumer Programs.

Crash Avoidance

- On May 28, 1998, NHTSA amended FMVSS 131, "School Bus Pedestrian Safety Devices," to permit the use of additional light sources on the surface of retroreflective stop signal arms (Light Emitting Diodes [LED]) and permit a certain amount of retroreflective surface to be obscured by mounting hardware.
- On June 17, 1998, NHTSA established FMVSS 500, "Low-Speed Vehicles," to reclassify small passenger-carrying vehicles (such as golf carts) from passenger cars to "low-speed" vehicles.
- On August 10, 1998, in response to a petition for rulemaking, NHTSA amended FMVSS 108, "Lamps, Reflective Devices and Associated Equipment," to allow upper and lower beams to be emitted by separate dedicated headlamps on either side of a motorcycle's vertical centerline or by separate off center light sources within a single headlamp that is located on the vertical centerline. This represents a further step toward harmonization with the lighting standards of other nations.
- On August 23, 1999, in response to a petition for rulemaking, NHTSA amended FMVSS 108, "Lamps, Reflective Devices and Associated Equipment," to allow manufacturers of motor vehicles with headlamp concealment devices to choose between complying with that existing provision, or with a new provision incorporating by reference the United Nations Economic Commission for Europe's standard (ECE standard) on those devices.
- On October 20, 2000, NHTSA established FMVSS 401, "Interior Trunk Release," requirements for internal trunk release that are required on all new passenger cars with trunks be equipped with a release latch inside the trunk compartment beginning September 1, 2001.

Crashworthiness

- On April 2, 1998, NHTSA published two amendments to the specifications for the side impact test dummy and the procedures in the side impact protection for positioning the dummy in a vehicle for compliance testing purposes in FMVSS 214, "Side Door Strength," and Part 572, "Anthropomorphic Test Dummy,".
- On June 12, 1998, in response to a petition for rulemaking, NHTSA amended FMVSS 210, "Seat Belt Assembly Anchorages," to require the anchorages of all lap/shoulder belt to meet a 6,000 pound strength requirement, regardless of whether a

manufacturer has the option of installing a lap belt or a lap/shoulder belt at the seating position.

- On August 4, 1998, NHTSA amended FMVSS 201, "Occupant Protection in Interior Impact," by allowing, but not requiring, the installation of dynamically deploying upper interior head protection systems currently being developed by some vehicle manufacturers to provide added head protection in lateral crashes. Compliance with these requirements is tested at specified points called "target points."
- On August 4, 1998, NHTSA amended Part 572, "Anthropomorphic Test Dummy," by establishing specifications and qualification requirements for a newly developed test dummy to be used in compliance testing for the new dynamically deploying upper interior head protection system final rule.
- On August 28, 1998, NHTSA made permanent three interim final rules related to the de-power of air bags to FMVSSs 201 "Occupant Protection in Interior Impact," 208 "Occupant Crash Protection," and Part 572, "Anthropomorphic Test Dummy:" certain exclusions or special, less stringent test requirements in related standards that applied to vehicles certified to the unbelted barrier test would also apply to vehicles certified to the alternative sled test and modifications in the test dummy be consistent with respect to the instrumentation specified in the sled test protocol for measuring neck injury criteria.
- On October 1, 1998, NHTSA adopted, as final, most of the amendments made by interim final rules on FMVSS 213, "Child Restraint Systems," to the air bag warning label requirements.
- On November 5, 1998, NHTSA amended FMVSS 221, "School Bus Body Joint Strength," to require school bus body panel joints to be capable of holding the body panel to the member to which it is joined when subjected to a force of 60 percent of the tensile strength of the weakest joined body panel; extends the applicability of the standard to school buses with a Gross Vehicle Rate Weight (GVRW) of 10,000 pounds or less; narrows an exclusion of maintenance access panels from the requirements of the standard; and revises testing requirements.
- On December 3, 1998, NHTSA amended FMVSS 304, "Compressed Natural Gas (CNG) Fuel Container Integrity," by deleting the material and manufacturing process requirements in the

standard. NHTSA believes that this amendment will facilitate technological innovation, without adversely affecting safety.

- On January 14, 1999, NHTSA amended FMVSS 208, "Occupant Crash Protection," to provide vehicle manufacturers greater flexibility regarding the location of the telltale for air bag on-off switches in new motor vehicles.
- On March 5, 1999, in response to several petitions for rulemaking, NHTSA established FMVSS 225, "Child Restraint Anchorage System," that requires motor vehicle manufacturers to provide motorists with a new way of installing child restraints. In the future, vehicles will be equipped with child restraint anchorage systems that are standardized and independent of the vehicle seat belts.
- On April 27, 1999, in response to petitions for rulemaking, NHTSA amended FMVSS 216, "Roof Crush Resistance," by revising the test procedure to make it more suitable to test vehicles with rounded roofs or vehicles with raised roofs.
- On December 14, 1999, in response to petitions for reconsideration, NHTSA amended FMVSS 201, "Occupant Protection of Interior Impact," by deleting a humidity range specification for calibration of the test device used in the car-to-pole test required.
- On January 13, 2000, NHTSA amended Part 572, "Anthropomorphic Test Dummy," by establishing a design and performance specifications for a more advanced 6-year-old Hybrid III test dummy.
- On March 1, 2000, NHTSA amended Part 572, "Anthropomorphic Test Dummy," by establishing a design and performance specifications for a new Hybrid III test dummy whose height and weight are representative of a fifth percentile female adult.
- On March 22, 2000, NHTSA amended Part 572, "Anthropomorphic Test Dummy," by establishing a design and performance specifications for a more advanced 3-year-old child Hybrid III test dummy.
- On March 31, 2000, NHTSA amended Part 572, "Anthropomorphic Test Dummy," by establishing a design and performance specifications for a more advanced 12-month-old child (CRABI) Hybrid III test dummy.
- On March 31, 2000, NHTSA amended Part 587, "Side Impact Deformable Moving Barrier," by adding specifications for an offset deformable barrier

used in offset deformable barrier test to evaluate the crashworthiness of vehicles.

- On May 12, 2000, NHTSA amended FMVSS 208, "Occupant Crash Protection," requiring manufacturers of air bags be designed to create less risk of serious air bag induced injuries than current air bags.
- On July 31, 2000, in response to petitions for reconsideration, NHTSA amended FMVSS 225 "Child Restraint Anchorage System," to address issues raised concerning installation of these new systems and how these systems are to be tested in the agency's compliance tests; and extended the temporary alternatives until September 1, 2004.
- On September 27, 2000, NHTSA established FMVSS 305, "Electric-Powered Vehicles; Electrolyte Spillage & Electric Shock Protection," requirements for all electric vehicles.
- On October 30, 2000, in response to petitions for reconsideration on our final rule published September 26, 1994, NHTSA amended FMVSS 304, "Compressed Natural Gas (CNG) Fuel Container Integrity," by addressing the bonfire test requirements.

Consumer Programs

- On April 6, 1998, NHTSA established the average fuel economy for light trucks manufactured in model year (MY) 2000 at 20.7 miles per gallon (mpg) under Part 533, "Light Truck Fuel Economy."
- On May 27, 1998, NHTSA amended Part 571, "Federal Motor Vehicle Safety Standards," to revise selected FMVSSs on tires by converting English measurements specified in those standards to metric measurements.
- On May 27, 1998, NHTSA amended Part 571, "Federal Motor Vehicle Safety Standards," to revise selected FMVSSs by converting English measurements specified in those standards to metric measurements.
- On December 1, 1998, NHTSA established a minimum driving range for dual fueled electric passenger automobiles, otherwise known as hybrid electric vehicles (HEVs) in Part 538, "Manufacturing Incentives for Alternative Fuel Vehicles."
- On March 9, 1999, NHTSA amended Part 575, "Consumer Information," by modifying rollover

warning currently required for small and mid-sized utility vehicles.

- On April 7, 1999, NHTSA established the average fuel economy for light trucks manufactured in model year (MY) 2001 at 20.7 miles per gallon (mpg) which is identical to MY 2000, under Part 533, "Light Truck Fuel Economy."
- On May 19, 1999, NHTSA amended Part 531, "Passenger Average Fuel Economy," by developing a procedure by which a vehicle manufacturer may notify NHTSA of the model year in which it elects to consider production of components and automobile assembled in Mexico as domestic value added.
- On May 24, 1999, in response to a petition for rulemaking, NHTSA amended Part 575, "Consumer Information," by rescinding the requirement that passenger car manufacturers provide general Uniform Tire Quality Grading System (UTQGS) information to purchasers and potential purchasers at the point of sale of new vehicles, requiring instead that such information be included in owners' manual.
- On July 8, 1999, in response to a petition for rulemaking, NHTSA amended Part 574, "Tire ID and Recordkeeping," to allow the date to be expressed in 4 digits instead of 3 and reduced the minimum size of the digits from 6 millimeters (mm) (3/4 inch) to 4 mm (5/32 inch).
- On August 30, 1999, in response to a petition for reconsideration, NHTSA amended Part 575 "Consumer Information," to allow manufacturers: to combine the rollover and air bag alert labels in one label; to comply with either of two options for installing both labels on the same side of the sun visor until September 1, 2000; and voluntarily install on the same side of the sun visor as the air bag label, rollover warning labels in vehicles for which they are not required.

- On April 5, 2000, NHTSA established the average fuel economy for light trucks manufactured in model year (MY) 2002 at 20.7 miles per gallon (mpg) which is identical to MY 2001, under Part 533, “Light Truck Fuel Economy.”
- On May 24, 2000, NHTSA amended Part 575, “Consumer Information,” by changing the computation of the Base Course Wear Rate (BCWR) used in calculating the treadwear grade of passenger car tires.
- On January 22, 2001, NHTSA concluded that consumer information on the rollover risk of passenger cars and light multipurpose passenger vehicles and trucks will reduce the number of rollover crashes and the number of injuries and fatalities from rollover crashes. NHTSA decided to use the Static Stability Factor to indicate rollover risk in single-vehicle crashes and to incorporate the new rating into the agency’s New Car Assessment Program (NCAP).