U.S. Department of Transportation
National Highway Traffic Safety Administration

CERTIFICATE OF AUTHENTICITY

I HEREBY CERTIFY that the annexed is a copy of NHTSA Press Release: B.01.19 "Seat Back Strength" updated: 12/98

electronically accessed by NHTSA Technical Information Services Division, *in my custody.*

Signed and dated at Washington, DC

this 24th day of July, 20 15

by

Shirlene D. Ball
Lead Technical Information Services Analyst
(Title)

I HEREBY CERTIFY that Shirlene D. Ball *signed the foregoing certificate, is now, and was, at the time of signing,* Lead TIS Analyst, [illegible]onal Highway Traffic Safety Administration [illegible]*fficial custodian of the subject record, and that full faith and credit should be given his/her certificate as such.*

IN WITNESS WHEREOF, I have hereunto subscribed my name, and caused the seal of the Department of Transportation to be affixed this 24th *day of* July *two thousand and* fifteen

For the SECRETARY OF TRANSPORTATION

Theresa L. Gordon
Certifying Officer

HS-Form [illegible](5-01) 75335-M34

B.01.19
SEAT BACK STRENGTH

updated 12/98

PROJECT OBJECTIVE

The objectives of this research program are to:

1) provide near term support to NHTSA's Office of Safety Performance Standards (SPS) for responding to the petitions received by the agency regarding seat back strength, and;

2) provide longer term support to SPS for future considerations of upgrading Federal Motor Vehicle Safety Standard No. 207, Seating Systems.

BACKGROUND

There have been several valid criticisms of the current Federal Motor Vehicle Safety Standard No. 207 which addresses seating systems. Generally it is acknowledged that the current standard requires inadequate seat strength to insure that the seat does not fail when a car is subject to a severe rear impact. Furthermore, advances in technology have made possible significant improvement in the ability of the car seat to add appreciable crash victim occupant protection, especially with the advent of integrated seat concepts.

PROBLEM DEFINITION

Motor vehicles are the dominant means of travel in the United States for both personal and business trips and provide Americans with an extraordinary degree of mobility. Traffic fatalities account for more than 90 percent of all transportation-related fatalities. The NHTSA has been charged with reducing these consequences of vehicular transportation.

National statistics for 1996 reveal that 24,456 drivers were killed and 2,234,000 were injured in crashes on our highways. The right side passenger position accounts for the second most common location of fatalities and injuries among car occupants. It is therefore appropriate to evaluate influencing factors in these statistics and to consider means for injury reduction in these two most frequently occupied seating positions.

RESEARCH APPROACH

- Determine performance of contemporary outboard seats in real world crashes and NHTSA

compliance testing. From analysis of the National Automotive Sampling System (NASS) and Fatality Analysis Reporting System (FARS) statistics and hard copy files, establish occupant protection performance of the outboard front seats. Investigate front seat performance observed in compliance tests for FMVSS 301, Fuel System Integrity, in which rigid 4,000 pound moving barrier is crashed into the rear of subject car at 30 mph.

- Develop computer modeling for front outboard seats which will provide analytic means for estimating occupant protection provided by current seating systems over the range of occupant sizes, occupant genders, and crash severities in frontal and rear crashes. Exercise these models to investigate means of improving occupant protection.

- Explore potential for advanced design of front outboard seating systems to extend occupant protection afforded by these seats to all car crash modes (frontal, rear, side, and rollover.)

POTENTIAL IMPACT/APPLICATION

From detailed information on the occupant protection functions of current front outboard seat systems, deficiencies will be identified which may be amenable to improvement by modification of current seat designs. Failures of seat back structure in the violent rear crash to verify car compliance with FMVSS No. 301 may signal inadequate seat back strength in some cars. These concerns over the adequacy of current seating systems can be addressed using the seat computer model for evaluation of the current design and potential modifications. Such work may support considerations for upgrade of FMVSS No. 207 by Safety Performance Standards.

Longer range research on improved front outboard seating systems should lead to demonstrations of a seat design concept to address improved occupant protection in all modes of car crashes. Such a seat system may add impact protection of the head from an intruding roof during rollover for the well belted occupant, may add side impact protection by structurally reacting with an intruding door and may provide lateral energy management for the seated occupant through lateral seat bolsters. The advanced seat design would also address improved belt fit and effectiveness for the occupant by employing an integrated seat design with improved accommodation of all occupant sizes. Anti-submarining seat pan design and load limiting belts equipped with pretensioners would improve air bag protection in frontal crashes.

Evaluation of contemporary front outboard seating systems through laboratory testing of a representative current seat and development of a computer model to allow analytic study of modifications to improve occupant protection is required to supplement an analysis of crash records focused on front seat occupant protection provided by current seats. To encourage industry improvement of front outboard seating design, development and demonstrated feasibility of an advanced seat concept will be accomplished.

KEY MILESTONES

- Completion of concept phase of advanced integrated seat work by EASi Engineering and Johnson Controls, April 1997.

- In-house analysis of NASS files performed to evaluate injury consequences of seat back failures during rear end crashes, December 1997. The report was published in May of 1997.

- A 14-month task order was initiated with EASi Engineering and Johnson Controls to develop a prototype advanced integrated safety seat, December 1997.
- A 6-month task order extension was initiated with EASi Engineering and Johnson Controls to test the prototype advanced integrated safety seat, August 1998.
- A final report was published on the determination of moment-deflection characteristics of automobile seat backs, November 1998.

RESOURCE REQUIREMENTS	FY98	FY99
Contract Money ($K)	300	300

PROJECT MANAGERS:

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COMPLETION DATE: August 1999

PUBLICATIONS:

1. "Summary of Safety Issues Related to FMVSS No. 207, Seating Systems," Prepared by the National Highway Traffic Safety Administration, September 1992. Search for docket number 4064, comment 1 at the DOT DMS website (http://dms.dot.gov/).
2. "Seat Damage and Occupant Injury in Passenger Car Towaway Crashes," Susan C. Partyka, Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, June 8, 1992. Search for docket number 4064, comment 1 at the DOT DMS website (http://dms.dot.gov/).
3. "Research Plan for Seating Systems," Prepared by the National Highway Traffic Safety Administration, September, 1992. Search for docket number 4064, comment 1 at the DOT DMS website (http://dms.dot.gov/).
4. "Upgrade Seating - Patents, Literature Search and Accident Analysis," Kennerly Digges and John Morris, University of Virginia, Prepared for the National Highway Traffic Safety Administration, September 1, 1992. Search for docket number 4064, comment 1 at the DOT DMS website (http://dms.dot.gov/).
5. "Analytical Modeling of Occupant Seating/Restraint Systems," University of Virginia, Contract No. DTRS-57-90-C-00092, Technical Task 5, February 1, 1994, NHTSA Docket No. 89-20, Notice 3. Search for docket number 4064, comment 24 at the DOT DMS website (http://dms.dot.gov/).
6. "Simulation of Occupant and Seat Responses in Rear Impacts," University of Virginia, Contract No.

DTRS-57-93-C-00105, Technical Task 4, November 10, 1995, NHTSA Docket No. 89-20, Notice 3. Search for docket number 4064, comment 24 at the DOT DMS website (http://dms.dot.gov/).

7. "Simulation of Occupant and Seat Responses in Rear Impacts," University of Virginia, Contract No. DTRS-57-93-C-00105, Technical Task 4B, March 18, 1996, NHTSA Docket No. 89-20, Notice 3. Search for docket number 4064, comment 24 at the DOT DMS website (http://dms.dot.gov/).

8. "Improved Occupant Protection Through Advanced Seat Design,"  Gupta, Menon, Gupta, Mani, Shanmugavelu, Kossar, 15th International Technical Conference on the Enhanced Safety of Vehicles (ESV), Melbourne, Australia, May 13-17, 1996.

9. "Preliminary Assessment of NASS CDS Data Related to Rearward Seat Collapse and Occupant Injury," Louis Molino, Office of Office Crashworthiness Standards, National Highway Traffic Safety Administration, May 1997, NHTSA Docket No. 89-20, Notice 3. Search for docket number 4064, comment 25 at the DOT DMS website (http://dms.dot.gov/).

10. "Determination of Moment-Deflection Characteristics of Automobile Seat Backs," Louis Molino, Office of Office Crashworthiness Standards, National Highway Traffic Safety Administration, November 25, 1998, NHTSA Docket No. 89-20, Notice 3. Search for docket number 4064, comment 26 at the DOT DMS website (http://dms.dot.gov/).

KEYWORDS: Seat, Seat Back, Rear Impact