The Fourteenth International Technical Conference on Enhanced Safety of Vehicles

Sponsored by:
U.S. Department of Transportation
National Highway Traffic Safety Administration

Hosted By:
Federal Republic of Germany

Held At:
Munich, Germany
May 23-26, 1994
Volume 2  Technical Sessions 6-11 Through Closing Ceremony
Contents

SECTION 4 TECHNICAL SESSIONS
(Continued)

Technical Session 6  Side Impact Occupant Protection ........................................... 905
Chairperson:  Bernd Friedel, Germany

94-S6-O-01
Side Impact Crashes in Australia ................................................................. 906
Brian Fildes, Peter Vulcan, John Lane, Jim Lenard
Monash University
Australia

94-S6-O-02
Side Impact Requirements in the USA and Europe - A Critical Comparison ............... 919
W. Albers, D. Lehmann
Volkswagen AG
Germany

94-S6-O-03
Global Trends in Side Impact Occupant Protection ............................................. 927
Sherman E. Henson, Stephanie L. Janczak
Ford Motor Company
United States

94-S6-O-04
Prospects for the Further Improvement of Side Impact Protection Based on Crash Testing ..... 938
Dainius J. Dalmotas
Transport Canada
James Newman, Tom Gibson
Biokinetics and Associates Ltd
Canada

94-S6-O-05
Injury Criteria in Real and Simulated Side Collisions ........................................... 949
E. Miltner, D. Kallieris, R. Mattern
University of Heidelberg
Germany

94-S6-O-06
Experimental Study on Absorbed Energy of Side Structure of Passenger Cars by
90-Degree Side-Impact Test ........................................................................ 957
Hideki Yonezawa, Yoshinori Toyofuku, Kouji Mizuno, Yasuhiko Irie
Ministry of Transport
Japan
Experience and Data Analysis on Side Impact Testing According to the European Procedure
Andrea M. Benedetto
FIAT AUTO
Italy

Five Years Experience of Using EUROSID-1 in Sled and Car Tests
M.C. Beusenberg, E.G. Janssen, J.J.H. Schreuder
TNO Crash-Safety Research Centre
The Netherlands

Computer Simulation Model for Side Impact Analysis
Frédéric Dieu
PSA Peugeot Citroën - CAR/EAS
Stéphane Riss
Ecole Centrale de Nantes
France

Innovative Padding Design for Side Impact Protection
Joseph N. Kanianthra, Glen C. Rains
National Highway Traffic Safety Administration
United States

Sensing Side Impacts
David S. Breed, W. Thomas Sanders, Vittorio Castelli
Automotive Technologies International, Inc.
United States

SIPSBAG - A New, Seat-Mounted Side Impact Airbag System
Stig Pilhall, Johnny Korner, Bengt Ouchterlony
Volvo Car Corporation
Sweden

New Sensor Concepts for Reliable Detection of Side-Impact Collisions
Alfons Härtl, Gerhard Mader, Lorenz Pfau
Siemens AG
Rudolf Muhr
University of Regensburg
Germany

Program of Comparison of Side Impact Testing Methods
Thierry Bourdillon
Union Technique de l'Automobile, du motocycle et du Cycle
France
Written Papers

94-S6-W-16 - Withdrawn

94-S6-W-17
Advances in Finite Element Modelling of the EUROSID-1 Dummy
Jürgen Rückert, Paul Marcault, Jutta Schlosser
Engineering System International
Germany
David Lasry, Eberhard Haug, Jean Roger
Engineering Systems International
Dominique Cesari, Francois Bermond, Robert Bouquet
INRETS LCB
France

94-S6-W-18 - Withdrawn

94-S6-W-19 - Withdrawn

94-S6-W-20 - Withdrawn

94-S6-W-21 - Withdrawn

94-S6-W-22 - Withdrawn

94-S6-W-23 - Withdrawn

94-S6-W-24
Advances in Side Impact Simulation Procedures
Detlev Maurer, Stephan Kohlhoff
Adam Opel AG
Paul A. DuBois
Hermes Engineering NV
Germany

94-S6-W-25 - Withdrawn

94-S6-W-26
Sensor for a Side Airbag: Evaluation by a New Subsystem Test Method
Yngve Håland
Electrolux Autoliv AB, Chalmers University of Technology
Mats Lindqvist
Saab Automobile AB
Sweden

94-S6-W-27
Numerical and Experimental Simulation of Different Load Cases in Side Impacts
J. Franz, R. Hoffmann, H.-J. Vasen, K. Hillenbrand
PARS Passive Restraint Systems GmbH
Germany
AAMA Side Impact Protection Research: Past, Present and Future
Robert W. Hultman, Sherman E. Henson
Ford Motor Company
United States

Technical Session 7 Pedestrian and Motorcycle Protection
Chairperson: Jac S. H. M. Wismans, The Netherlands

Evaluation of Pedestrian Protection Test Procedure in Japan - Influence of Upper Body Mass on Leg Impact Test
Minoru Sakurai, Kazushige Kobayashi, Koshiro Ono
Japan Automobile Research Institute, Inc.
Akira Sasaki
Japan Automobile Manufacturers Association, Inc., Honda R&D Company, LTD
Japan

Protection of Pedestrians Against Leg Injuries
Dominique Cesari, Robert Bouquet, Yves Caire, François Bermond
INRETS, Institut National de Recherche sur les Transports et leur Sécurité
France

The EEVC-WG 10 Head Impact Test Procedure in Practical Use
Harald Zellmer, Klaus-Peter Glaeser
Federal Highway Research Institute (BASt)
Germany

Modeling of EEVC Pedestrian Headforms and Experience with Bonnet Impact Tests
C. Constantinou
Sowerby Research Centre
A.R. Giles, J.F. Green
Rover Group Ltd
United Kingdom

Development of an ISO Standard for Motorcycle Research Impact Test Procedures
Hans Van Driessche
Honda Motor Europe
Belgium

Motorcycle Impact Performance
Greg Schmeling, Robert Archer
Harley-Davidson, Inc.
Kenneth Wiley, John Zellner
Dynamic Research, Inc.
United States
94-S7-O-07
Preliminary Research Into the Feasibility of Motorcycle Airbag Systems ................................. 1198
John W. Zellner
Dynamic Research, Inc.
United States
James A. Newman
Biokinetics and Associates, Ltd.
Canada
Nicholas M. Rogers
International Motorcycle Manufacturers Association
France

94-S7-O-08
A Review of Motorcycle Safety ................................................................. 1211
P.H. Bly (on behalf of the EEVC Ad-Hoc Group on Motorcycle Safety)
Transport Research Laboratory
United Kingdom

94-S7-O-09
Cost of Pedestrian and Bicycle Accidents Involving Car Front Ends ................................. 1221
L.T.B. van Kampen
SWOV Institute for Road Safety Research
J.J.W. Huijbers
Transport Research Centre
The Netherlands

94-S7-O-10
Computer Simulation of Motorcycle Crash Tests ............................................. 1227
A.L. Yettram, J. Smith, L.S.M. Mo, M.A. Macaulay
Brunel University
B.P. Chinn
Transport Research Laboratory
United Kingdom

94-S7-O-11
The Effect of Air Bag Inflation on the Cinematic and the Lesions of a Motorcyclist .......... 1241
Michelle Ramet, Robert Bouquet, Mounir Bouallegue, François Bermond, Dominique Cesari
INRETS, Institut National de Recherches sur les Transports et leur Sécurité
France

94-S7-O-12 - Withdrawn

Written Papers

94-S7-W-13
Analysis of the History of Pedestrian Leg Injury Severity in Road Accidents ................. 1247
Mouloud Haddak, Michelle Ramet, Michel Romieu
INRETS-LCB
France
94-S7-W-14
Concept of Hood Design for Possible Reduction in Pedestrian Head Injury ........................................ 1253
Yutaka Okamoto, Akihiko Akiyama, Kaoru Nagatomi, Takahiro Tsuruga
HONDA R&D Company, Ltd.
Japan

94-S7-W-15
Accident Risks for Two-Wheelers in France: Safety of Two-Wheelers is Largely Subject to the
Skill and Vigilance of Car Drivers .................................................. 1264
Jean-René Carré, Claude Filou
Institut National de Recherche sur les Transports et leur Sécurité
France

94-S7-W-16
Evaluation of TRL Designed Leg Protectors for a Medium Sized Sport Motorcycle ......................... 1279
Nicholas M. Rogers
International Motorcycle Manufacturers Association
France

Technical Session 8 Advanced Frontal Crash Protection: Vehicle Structure and Testing .................. 1299
Chairperson: Hermann Appel, Germany

94-S8-O-01
The Offset Crash Against a Deformable Barrier, a More Realistic Frontal Impact .......................... 1300
Ingo Kallina, Falk Zeidler, Karl-Heinz Baumann, Dieter Scheunert
Mercedes-Benz AG
Germany

94-S8-O-02
A New Approach to Quantify Passive Safety of Vehicles .......................................................... 1305
Lothar Wech, Rainer Hartmann
TÜV BAYERN SACHSEN
Germany

94-S8-O-03
Study on a Vehicle Body Structure for Passive Safety ............................................................ 1312
Toshiaki Sakurai, Michito Takagi, Tastuya Hibino, Hisashi Iihara
Mitsubishi Motors Corporation
Japan

94-S8-O-04
Mathematical Models to Evaluate Structural Forces in Frontal Crash Tests ................................ 1320
Ezio Fossat
Fiat Auto
Italy

94-S8-O-05
R.W. Lowne (on behalf of EEVC Working Group 11)
Transport Research Laboratory
United Kingdom
94-S8-O-06
The Development of the Frontal Offset Deformable Barrier Test .............................................. 1352
C. Adrian Hobbs, D. Aled Williams
Transport Research Laboratory
United Kingdom

94-S8-O-07
Simultaneous Engineering in Frontal Impact Crashworthiness Development .............................. 1359
V.M. Stephens, A.J. Piper
MIRA
United Kingdom

94-S8-O-08
A Contribution to the Analysis of Aggressivity in Frontal Collisions ........................................ 1364
Gilles Vallet, Sean Ó Riordáin, Yves Derrien
INRETS
France

94-S8-O-09
Improved Frontal Impact Crash Test Data ...................................................................................... 1372
William T. Hollowell, Ralph J. Hitchcock
National Highway Traffic Safety Administration
United States

94-S8-O-10
A Complete Frontal Crash Sensor System - II ............................................................................. 1377
David S. Breed, W. Thomas Sanders, Vittorio Castelli
Automotive Technologies International, Inc.
United States

94-S8-O-11
Correlation of Vehicle Performance in the New Car Assessment Program with Fatality Risk in Actual Head-On Collisions ................................................................. 1388
Charles J. Kahane, James R. Hackney, Alan M. Berkowitz
National Highway Traffic Safety Administration
United States

94-S8-O-12
Progress in the Development of New Frontal Dummy Components for the NHTSA
Advanced Frontal Protection Program ............................................................................................. 1405
Mark Haffner, Michael Kleinberger, Rolf Eppinger, Barbara C. Hennessey, Howard Pritz, Michael Beebe
National Highway Traffic Safety Administration
Alena V. Hagedorn, Kathleen DeSantis Klinich, Lisa Ore, C. Brian Tanner
Transportation Research Center, Inc.
Shashi Kuppa
Conrad Technologies, Inc.
United States

94-S8-O-13 - Withdrawn
94-S8-O-14
Australia's New Car Assessment Program .......................................................... 1420
Michael Griffiths
RTA NSW
Chris Coxon
DoT South Australia
Ian Pettigrew
DoT Queensland
Ron De forest, Richard Stolinski
RACV
Peter Caldwell
NRMA
Australia

94-S8-O-16
Crash Analysis of Vehicle Body Structures Using a Buckling Sensitivity Analysis .......................................................... 1427
Yuichi Kitagawa, Ichiro Hagiwara, Toshikazu Torigaki
Nissan Motor Company, Ltd.
Japan

Written Papers

94-S8-W-15
Influence of Corrosion on the Passive Safety of Passenger Cars .......................................................... 1436
Eberhard Faerber
Bundesanstalt für Straßenwesen (BASi)
Dieter Wobben
Rheinisch-Westfälischer TÜV Essen (RWTÜV)
Germany

94-S8-W-17 - Withdrawn

94-S8-W-18 - Withdrawn

94-S8-W-19
Real World Collisions and Appropriate Barrier Tests .......................................................... 1450
Pete Thomas
ICE Ergonomics, Loughborough University of Technology
United Kingdom

94-S8-W-20
Design and Testing of a Replaceable Low Speed Shock Absorber .......................................................... 1461
Frédéric Chambeau, Pascal Saint-Paul, Gilles Le Borgne
PSA Peugeot-Citroën
France

94-S8-W-21 - Withdrawn

94-S8-W-22
The Crash-Anticipating Extended Airbag Bumper System .......................................................... 1468
Carl C. Clark
Safety Systems Company
United States
94-S8-W-23 - Withdrawn

94-S8-W-24
Requirements for Optimized Crashworthiness Design of the Longitudinal Members .................................. 1481
W.J. Witteman, R.F.C. Kriens
Eindhoven University of Technology
The Netherlands

Technical Session 9       Crash Avoidance .................................................. 1489
Chairperson: Kaneo Hiramatsu, Japan

94-S9-O-01
Vision Enhancement - Concepts for the Future? .................................................. 1490
Wolfgang Hahn
BMW AG
Germany

94-S9-O-02
Safety Benefits of Fast-Rise Brake Lamps .................................................. 1497
Michael Sivak, Michael J. Flannagan, Takashi Sato, Eric C. Traube, Masami Aoki
The University of Michigan
Transportation Research Institute
United States

94-S9-O-03
Simulation on Front Glass Ghost Image .................................................. 1501
Toshiharu Goh
Isuzu Motors
Japan

94-S9-O-04
Human Factors Issues in Advanced Rear Signaling Systems .................................. 1511
Avraham Horowitz
General Motors
United States

94-S9-O-05
Car Driver Behaviour in Turning Right in Front of Oncoming Vehicle .................................. 1517
Masanori Motoki, Tsuyoshi Katayama, Masahiro Noguchi
Japan Automobile Research Institute, Inc.
Japan

94-S9-O-06
The Psychophysiological Characterisation of Driver's Behavior as a Tool For Active Safety .................................. 1524
Alain Priez, Claire Petit, Christophe Brigout, Bruno Guézard, Lionel Boulommier, Maxime Moutreuil, Claude Tarrière
Renault
Christian Collet, Evelyne Vernet-Maury, André Dittmar, Georges Delhomme
CNRS Lyon-Villeurbanne
France
94-S9-O-07
Stress in Driving Related to Vehicle Safety ................................................................. 1528
Andrea Costanzo, Gennaro Orsi
University "La Sapienza" - Rome and Automobile Club d'Italia
Italy

94-S9-O-08
Emerging Trends in Safety Design and Technology ......................................................... 1535
Wayne J. Kippola, Michael J. Stando
Ford Motor Company
United States

94-S9-O-09
Dynamic Stability Control DSC - A Wheel Slip Control System with Extended Function ........ 1549
Heinz Leffler
BMW AG
Germany

94-S9-O-10
Improvement in Vehicle Dynamics Through Electronic Control System of the Torque Split Between the Right/Left Rear Wheels .............................................................. 1560
Genpei Naito, Eiichi Yaguchi, Kiyotaka Ozaki
Nissan Motor Company, Ltd
Japan

94-S9-O-11
The Effectiveness of ABS in Real Life Accidents .......................................................... 1568
Kullgren A., Lie A., Tingvall C.
Folksam Research, Chalmers University of Technology, Karolinska Institute
Sweden

94-S9-O-12
Fuel Truck Roll-Over Simulation ................................................................................. 1574
Sven T.H. Jansen, Henk A. Lupker
TNO Road-Vehicles Research Institute
The Netherlands

Technical Session 10 Specialized Road Users and Other Topics
Child Restraints, Rear Seat Safety, Rear End Collision and Alternative Fueled Vehicles .......... 1583
Chairperson: Philip H. Bly, United Kingdom

94-S10-O-01
Biomechanical Risk Factors for Children in Cars and Aggravation by Misuse of Restraint Systems .... 1584
K. Langwieder, Th. Hummel
HUK-Verband
Germany
94-S10-O-02
The Development of a Unified Child Restraint to Car Attachment System - A Contribution
to the ISOFIX Discussions .................................................... 1598
R W Lowne (On behalf of the UNIFIX Task Force)
Transport Research Laboratory
United Kingdom
T Turbell
Swedish Road and Traffic Research Institute, VTI
Sweden

94-S10-O-03 - Withdrawn

94-S10-O-04
Interaction of Air Bags and Child Restraint Systems .......................... 1606
George E. Mouchahoir, Lisa K. Sullivan
National Highway Traffic Safety Administration
United States

94-S10-O-05
The Potential for an Improved Rear Impact Test Procedure ............... 1619
Graham Reeves
Transport Research Laboratory
Neil Bowerman
Department of Transport
United Kingdom

94-S10-O-06 - Withdrawn

94-S10-O-07
Rear End Collisions - The Effect of the Seat-Belt and the Crash Pulse on Occupant Motion .................. 1630
Gert Nilson, Mats Y. Svensson, Per Lövsund
Chalmers University of Technology
Yngve Häland
Autoliv AB
Kristina Wiklund
SAAB Automobile AB
Sweden

94-S10-O-08 - Withdrawn

94-S10-O-09 - Withdrawn

94-S10-O-10
Deborah L. Parker
National Highway Traffic Safety Administration
United States

94-S10-O-11
Rear Seat Safety of Estate Cars - New Concepts ............................ 1645
Björn Lundell, Hans Norin, Michael Persson, Stig Pilhall
Volvo Car Corporation
Sweden
94-S10-O-15
Child Restraint System Development in Australia ................................................. 1655
Michael Griffiths, Julie Brown, Paul Kelly
Road Safety Bureau, RTA NSW
Australia

Written Papers

94-S10-W-12
The Frontal Impact Performance of a Sample of Current UK Child Restraint Systems
When Mounted in Car Body Shells ................................................................. 1668
A. P. Roy
Middlesex University,
A. K. Roberts
Transport Research Laboratory
United Kingdom

94-S10-W-13 - Withdrawn

94-S10-W-14 - Manuscript not provided

94-S10-W-16 - Manuscript not provided

94-S10-W-17
Electric Vehicle Specifications for Competitive Marketing .................................. 1679
Donald Friedman
Minicars Division of MCR/LRI Inc.
United States

94-S10-W-18
Effects of Rear Seat Belts - Full Scale Collision Experiments and Field Case Studies .......................... 1683
Masaru Ueyama, Hiroshi Makishita, Kenji Hagita
National Research Institute of Police Science
Tuyoshi Harikae
Japan Automobile Research Institute
Japan

Technical Session 11 Heavy Vehicle Safety ......................................................... 1699
Chairperson: Peter Makeham, Australia

94-S11-O-01
Research on Forward Field of View of Trucks .................................................. 1700
Yukio Shiosaka
Japan Automobile Research Institute, Inc.
Naofumi Nagaike
Japan Automobile Manufacturers Association, Inc.
Japan

94-S11-O-02
Fatal Accidents Involving Heavy Goods Vehicles in Great Britain, 1988 - 1990 .................. 1704
Brian J. Robinson
Transport Research Laboratory
United Kingdom
Written Papers

94-S11-W-12
Unsafe Practices of Lorry Drivers on Long Gradients ................................................. 1785
C. Têtard, J.P. Roumégoux
Institut National de Recherche sur les Transports et leur Sécurité
France

94-S11-W-13
How to Evaluate the Performance of a Truck in the Car to Truck Frontal Crash .................. 1793
Patrick Botto
Iracba
Hervé Desfontaines, Daniel Foucher, Louis Germain
Renault V.I.
France

SECTION 5 CLOSING CEREMONY

Closing Remarks .............................................................................................................. 1797
Conference Chairperson: Klaus Weinspach, President, Federal Highway Research Institute,
Federal Republic of Germany .......................................................................................... 1797
Conference Chairperson: George L. Parker, Associate Administrator, Research and Development, National Highway
Traffic Safety Administration, United States ............................................................... 1798