

STAPP CAR CRASH CONFERENCE



Gaylord Opryland Resort
Nashville, Tennessee

November 1-3, 2004



48th



Welcome

Welcome

STAPP

The Stapp Car Crash Conference is the premier forum for the presentation of research in impact biomechanics, human injury tolerance, and related fields that advance the knowledge of land-vehicle crash injury protection. The Conference provides an opportunity to participate in open discussion regarding the causes and mechanisms of injury, experimental methods and tools for use in impact biomechanics research, and the development of new concepts for reducing injuries and fatalities in automobile crashes.

The papers that will be presented at this year's Stapp Conference cover a range of timely and important topics in impact biomechanics and occupant protection. These topics include lower extremity, upper extremity, head, and neck impact response and injury, biomechanical analysis and simulation, and ATD and occupant restraint system performance.

We would like to thank all of the authors as well as members of the Stapp Advisory Committee for the significant efforts that have been put forth in preparing and reviewing

these papers. We encourage all attendees to use the time provided following each paper presentation to offer comments and questions to the presenters. This is a valuable opportunity for further clarification of the research from which all in attendance will benefit. It is hoped that the material presented at this year's Conference will provide ideas and motivation for further research that will lead to improvements in occupant protection systems. We also encourage those who are active in impact biomechanics research to submit abstracts for papers to be included in next year's Stapp Conference, which will be held in Washington, D.C.

On behalf of the Stapp Car Crash Conference Advisory Committee, we invite you to participate in what promises to be a stimulating and enjoyable 48th Stapp Conference at the Gaylord Opryland Resort in Nashville, Tennessee.

Albert I. King, General Chair
Leda L. Ricci, Executive Director
48th Stapp Car Crash Conference



Dr. John Paul Stapp, In Memoriam, 1910-1999

A bronze bust of Dr. John Paul Stapp Col USAF MC is displayed each year at the Stapp Car Crash Conference. It was created by artist Walter Rawley of Ruidoso, New Mexico, and donated by Dr. Stapp. The bust depicts Colonel Stapp when he rode the rocket sled at Holloman Air Force Base, subjecting himself to injury-producing accelerations in order to study human tolerance to high-g environments. In his final sled ride in 1954, Dr. Stapp was accelerated to 632 miles per hour in five seconds, and was then decelerated to a stop in 1.4 seconds, experiencing a peak sled deceleration in excess of 40 gs.

STAPP

Visit our website at <http://www.stapp.org/>

STAPP

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Colonel USAF MC

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Ford Motor Company

University of Michigan Transportation
Research Institute

Ristal Engineering

TNO Automotive/Eindhoven University
of Technology

2004 CONFERENCE HOST

Wayne State University

CO-SPONSORS

University of Michigan Transportation Research Institute

University of California, San Diego

Conference Registration

Conference Registration Information

Registrations may be faxed to the Stapp registration office until October 22, 2004.

- Complete and return the registration form provided in this program with payment to the address or fax number listed at the top of the form.
- Payments may be made by major credit card or check.
- Conference badges will be available at the registration desk.
- Registration for the conference includes one copy of the Stapp Journal, technical session attendance, continental breakfasts, refreshment breaks, and evening receptions. Student registrations do not include the Stapp Journal.

ON-SITE REGISTRATION

Tennessee Registration Desk

Sunday, October 31	3:30 PM – 6:00 PM
Monday, November 1	7:30 AM – 4:00 PM
Tuesday, November 2	7:30 AM – 4:00 PM
Wednesday, November 3	7:30 AM – 10:00 AM

Stapp Car Crash Journal Pickup

Pre-registered attendees, as well as those registering on-site, may pick up their copy of the *Stapp Car Crash Journal* along with a conference badge at the Tennessee Registration Desk.

Additional copies of the *Stapp Journal* may be purchased during the conference at the SAE Bookstore for \$109.95 list. Also available this year is the updated CD collection of Stapp technical papers at a special conference rate of \$230. The cost of the Stapp CD after the conference is \$360 list. The Stapp CD is updated this year to include papers published in the 2003 and 2004 edition of the *Stapp Journal*. Also included on the Stapp CD is an index of SAE's Safety Technology Series, which includes SAE papers on Accident Reconstruction and Occupant Protection, in addition to papers published by Stapp. The *Stapp Journal* and/or CD may be ordered from SAE by mail following the conference, or by calling (724) 776-4970 [toll free U.S. and Canada (877) 606-7323], or by fax (724) 776-0790.

Publications — Cheekwood F

The SAE Bookstore will be open daily and will feature previous Stapp publications as well as new publications on safety, occupant protection, biomechanics, accident reconstruction, and related topics. All SAE publications are also available on the SAE web site at www.sae.org/BOOKSTORE. SAE paid members will receive a 20% discount.

For Stapp Conference information, call Lorraine Porter
(734) 763-3582 – E-mail: LKPPorter@umich.edu

Resort Information

Resort Information

Location — 2800 Opryland Drive

The **Gaylord Opryland Resort**, the host hotel for the Stapp Conference, is located in Nashville, 15 minutes from the Nashville International Airport.

Accommodations

Reservations at the **Gaylord Opryland Resort** may be made by calling the hotel directly at **(615) 889-1000**.

The room rate for the Stapp Conference is \$139 single/double if you register by October 15th. A limited number of rooms are available at a government rate. Be sure to identify yourself as attending the Stapp Car Crash Conference.

Please make your reservations early. A one night's deposit is required. Reservations must be cancelled 72 hours prior to date of arrival to have your deposit refunded. Reservations requested after **October 15** will be confirmed on a space-available basis.

Resort Parking

Valet parking and self parking are both available. The cost of valet parking is \$16 per day. Self parking is \$8 per day.

Resort Amenities

The Opryland Resort offers extensive guest facilities, including a fitness center, three swimming pools, nine acres of gardens and cascading waterfalls with botanical garden tours available, Delta river flatboats, the Springhouse Golf Club, and specialty store shopping. Each room is equipped with Internet access, in-room safes, coffeemakers, irons and ironing boards, and hair dryers.

Resort Dining

The Resort is known for its longstanding tradition of Southern hospitality.

A variety of dining opportunities are available in the resort, including **The Old Hickory Traditional Steakhouse**—dinner only, **The Cascades Restaurant** (seafood)—breakfast, lunch, and dinner; **Rachel's**

Travel Information

From Nashville International Airport	Leave the airport complex and go west on Interstate 40 Proceed to Exit 215 and take Briley Parkway - 155 North Go to and exit the parkway at Exit 12 Turn left at the second traffic light into the Gaylord Opryland complex
Interstate 40 West from Knoxville	Go west on Interstate 40 Proceed to Exit 215 and take Briley Parkway - 155 North Go to and exit the parkway at Exit 12 Turn left at the second traffic light into the Gaylord Opryland complex
Interstate 40 East from Memphis	Go east through Nashville on Interstate 40 Proceed to Exit 215 and take Briley Parkway - 155 North Go to and exit the parkway at Exit 12 Turn left at the second traffic light into the Gaylord Opryland complex
Interstate 65 South from Louisville / Bowling Green	Go south on Interstate 65 Proceed to Exit 90B to Briley Parkway - 155 Go south on Briley Parkway and exit at Exit 12 Turn right and go to the second light and turn left into the Gaylord Opryland complex
Interstate 65 North from Birmingham	Go north on Interstate 65 Proceed to Exit 90 to Briley Parkway - 155 Go south on Briley Parkway and exit at Exit 12 Turn right and go to the second light and turn left into the Gaylord Opryland complex
Interstate 24 West from Chattanooga	Go west on Interstate 24 Proceed to Exit 54B to Briley Parkway - 155 Go north on Briley Parkway and exit at Exit 12 Turn left at the second traffic light into the Gaylord Opryland complex
Interstate 24 East from St. Louis	Go east on Interstate 24 Proceed to Exit 43 to Briley Parkway - 155 Go east on Briley Parkway and exit at Exit 12 Turn left at the second traffic light into the Gaylord Opryland Complex

Resort Transportation from the Airport

The Resort provides a transportation desk in the lowest level of the airport. Transportation to the Resort is available between 5:00 a.m. and 11:00 p.m. The cost is \$13 one way or \$20 round trip.

Airport Cab Service

Cab fare is approximately \$20 one way.

Nashville Weather

Nashville is situated in a natural basin encompassing wooded hills, the Cumberland River, and numerous tributaries. Its elevation is 550 feet (168 m.) at the lowest point, and 1,100 feet (336 m.) at the highest point. The average precipitation per month is 4.01 inches. Fall days are warm and pleasant. Evenings require a sweater or light jacket. The average fall temperature is 60 degrees. The average high temperature is 72 degrees, and the average low temperature is 49 degrees.

(Southern-style cooking)—dinner only; **Rusty's Sports Bar**—lunch and dinner; **Finley's Pub**—lunch and dinner. In addition, **The Delta Island Food Court** is located near the Convention Center and is available for meals on the go, featuring food outlets including burgers, deli sandwiches, pizza, barbecue, and more. In addition to resort dining, there are many restaurants nearby.

Resort Lounges and Bars

Attendees can enjoy refreshments in the unique revolving **Cascades Terrace Lounge**, while the **Delta Jazz Lounge** offers after-hours live jazz entertainment and Delta water shows and river views. **The Jack Daniel's Saloon** features a friendly barrelhouse environment with a variety of appetizers, cocktails, and live entertainment.

Nashville Attractions

While the Gaylord Opryland Resort offers many on-site attractions, there are a variety of leisure activities available in Nashville, including the Grand Ole Opry, the Country Music Hall of Fame and Museum, the Music City Queen Riverboat, Opry Mills (for shopping and dining), golf courses, museums and historic mansions, Nashville sightseeing tours, and the Nashville Zoo at Grassmere.

Conference Information

Speaker Lounge — Belle Meade CD

The speaker lounge is available to all authors and co-authors of conference papers.

Stapp Conference Technical Sessions — Tennessee C Ballroom

- Please check the session schedule in this final program for starting times.
- Audio or video recording of presentations or discussions, and taking of photographs during the technical sessions, is not permitted.
- In consideration of the speakers and Conference attendees, please turn off all cell phones when entering the meeting room.

Message Center

For information on conference-related activities or to leave a message for someone attending the conference, please call the resort at (615) 889-1000 and ask for the Stapp Conference Registration Desk. All messages will be posted in the Stapp Conference registration area. Fax messages may be sent to (615) 871-7741. Faxes are received by Kinko's in the Resort.

Business/Guest Services

An on-site **Kinko's** features a full-service business center conveniently located in the convention center. In addition, **Opryland International Travel** is a full-service travel agency available to assist attendees in all their travel needs. **Opryland Transportation** can make arrangements for airport transport, off-site functions, and transport tours of the city.

HOSTED RECEPTIONS AND REFRESHMENTS

On Sunday evening, **Denton ATD** will host a reception to welcome Stapp Conference attendees in the **Tennessee AB Ballroom** at 5:00 PM.

On Monday, **TNO Automotive** will host a reception in the **Tennessee AB Ballroom** immediately following the technical sessions.

Monday's continental breakfast and refreshment breaks will be provided by the **Transportation Research Center Inc.** and **The Ohio State University Injury Biomechanics Research Laboratory**.

On Tuesday, **First Technology Safety Systems** will host a reception in the **Tennessee AB Ballroom** immediately following the technical sessions.

Preceding the Stapp Conference

PRECEDING THE STAPP CONFERENCE

Sunday, October 31 — 9:00 AM–5:00 PM — Bayou C/D

32nd Annual International Workshop on Human Subjects for Biomechanical Research

Sponsored by the National Transportation Biomechanics Research Center, National Highway Traffic Safety Administration

Nopporn Khaewpong, Chair

National Highway Traffic Safety Administration

The purpose of the workshop is to provide a forum for the exchange of ideas and the presentation of current research investigations using human volunteers or surrogates. No registration fee is required. For additional information, contact:

Nopporn Khaewpong

NHTSA/National Transportation Biomechanics

Research Center (NRD-51), Room 6221

400 Seventh Street, S.W.

Washington, DC 20590

Phone: (202) 366-4703 • Fax: (202) 366-5670 • E-mail: Nkhaewpong@NHTSA.dot.gov

**Audio and videotaping will not be permitted. Please turn off cell phones in the meeting room.
Smoking will not be permitted in the sessions.**

8:55 **WELCOME AND OPENING REMARKS**
Albert I. King, General Chair, Wayne State University

9:00 **JOHN PAUL STAPP MEMORIAL LECTURE**
Biomechanics from Research to Industry, Robert A. Denton

LOWER-EXTREMITY IMPACT RESPONSE AND INJURY

Co-Chairs: Priya Prasad, Ford Motor Company
Robert S. Levine, Wayne State University

9:30 **Injury Tolerance and Response of the Ankle Joint in Dynamic Dorsiflexion**
Rodney Rudd, Jeff Crandall, Steven Millington, and Shepard Hurwitz, University of Virginia Center for Applied Biomechanics; Niklas Höglund, Chalmers University of Technology

10:00 **Lateral and Posterior Dynamic Bending of the Mid-Shaft Femur: Fracture Risk Curves for the Adult Population**
Eric A. Kennedy, William J. Hurst, Joel D. Stitzel, Joseph M. Cormier, Gail A. Hansen, Eric P. Smith, and Stefan M. Duma, Virginia Tech - Wake Forest, Center for Injury Biomechanics

10:30-11:00 REFRESHMENT BREAK

11:00 **The Effect of Axial Load in the Tibia on the Response of the 90° Flexed Knee to Blunt Impacts with a Deformable Interface**
Eric G. Meyer, Michael T. Sinnott, and Roger C. Haut, Michigan State University; Gopal S. Jayaraman, Michigan Technological University; Walter E. Smith, Michigan State University

11:30 **Below Knee Impact Responses using Cadaveric Specimens**
Sriram Balasubramanian, Philippe Beillas, Aditya Belwadi, Warren N. Hardy, King H. Yang, and Albert I. King, Bioengineering Center, Wayne State University; Mitsutoshi Masuda, Toyota Motor Corporation

12:00-2:00 LUNCH

UPPER-EXTREMITY IMPACT RESPONSE AND INJURY

Co-Chairs: John M. Cavanaugh, Wayne State University
Farid Bendjellal, Britax Childcare Limited

2:00 **Non-Injurious and Injurious Impact Response of the Human Shoulder Three-Dimensional Analysis of Kinematics and Determination of Injury Threshold**
Sabine Compigne, Yves Caire, Thierry Quesnel, and Jean-Pierre Verriest, INRETS, France

2:30 **Mechanical Properties of the Shoulder Ligaments Under Dynamic Loading**
Sung-Woo Koh, John Cavanaugh, and James Leach, Wayne State University; Stephen Rouhana, Ford Motor Co.

3:00 **Upper Extremity Interaction with a Helicopter Side Airbag: Injury Criteria for Dynamic Hyperextension of the Female Elbow Joint**
Stefan Duma, Gail Hansen, Eric Kennedy, Amber Rath, Craig McNally, Andrew Kemper, Eric Smith, P. Gunnar Brolinson, Joel Stitzel, Virginia Tech - Wake Forest; Martin Davis and Cameron Bass, University of Virginia; Frederick Brozoski, B. Joseph McEntire, Nabih Alem, and John Crowley, U.S. Army Aeromedical Research Laboratory

3:30-4:00 REFRESHMENT BREAK

BIOMECHANICAL ANALYSIS AND SIMULATION

Co-Chairs: Rolf H. Eppinger, National Highway Traffic Safety Administration
Jac S.H.M. Wismans, TNO Automotive/Eindhoven University of Technology

4:00 **Human Neck Finite Element Model Development and Validation against Original Experimental Data**
F. Meyer, N. Bourdet, C. Deck, and R. Willinger, Strasbourg University, France; J.S. Raul, Institute for Forensic Science, Strasbourg, France

4:30 **A Novel Approach for Predicting Human Response from ATD Tests**
Zhiqing Cheng, Advanced Information Engineering Services; Joseph A. Pelletiere, Air Force Research Laboratory

5:00 ANNOUNCEMENTS

**Audio and videotaping will not be permitted. Please turn off cell phones in the meeting room.
Smoking will not be permitted in the sessions.**

HEAD IMPACT RESPONSE AND INJURY

Co-Chairs: John W. Melvin, General Motors R&D Center
David F. Meaney, University of Pennsylvania

9:00 **In Vivo Measurements of Human Brain Displacement**

Songbai Ji, Qiliang Zhu, Lawrence Dougherty, and Susan S. Margulies, University of Pennsylvania

9:30 **Shear Properties of Brain Tissue over a Frequency Range Relevant for Automotive Impact Situations: New Experimental Results**

Stéphane Nicolle, Mourad Lounis, Rémy Willinger, Louis Pasteur University, Strasbourg, France

10:00-10:30 REFRESHMENT BREAK

10:30 **The Influence of Surrogate Blood Vessels on the Impact Response of a Physical Model of the Brain**

Yednesh Parnaik, Philippe Beillas, Constantine K. Demetropoulos, Warren N. Hardy, King H. Yang, and Albert I. King, Wayne State University

11:00 **Mechanical Properties and Anthropometry of the Human Infant Head**

Michael T. Prange, Jason F. Luck, Alan Dibb, Duke University; Chris A. Van Ee, Design Research Engineering; Roger W. Nightingale and Barry S. Myers, Duke University

11:30-1:30 LUNCH

1:30 **John Paul Stapp Best Paper Award** — Presentation by John W. Melvin, 2003 General Co-Chair

The John Paul Stapp Award for the best paper of the 2003 Conference and Journal will be presented to

◆ Stephen W. Rouhana, Paul G. Bedewi, Sundeep V. Kankanala, Priya Prasad, Joseph J. Zwolinski, Alex G. Meduvsky, Jonathan D. Rupp, Thomas A. Jeffreys, and Lawrence W. Schneider for *Biomechanics of 4-Point Seat Belt Systems in Frontal Impacts*

◆ Barclay Morrison III, Heather L. Cater, Christopher C.-B. Wang, Fay C. Thomas, Clark T. Hung, Gerard A. Ateshian, and Lars E. Sundstrom for *A Tissue Level Tolerance Criterion for Living Brain Developed with an In Vitro Model of Traumatic Mechanical Loading*.

Invitation and Call for Papers — Rolf H. Eppinger, General Chair, 49th Stapp Conference, Washington, D.C.

NECK IMPACT RESPONSE AND INJURY

Co-Chairs: Barry S. Myers, Duke University
Harold J. Mertz, General Motors Corporation

1:45 **Cervical Spine Geometry in the Automotive Seated Posture: Variations with Age, Stature, and Gender**

Kathleen DeSantis Klinich, Sheila M. Ebert, Chris A. Van Ee, Carol A. Flannagan, Monica Prasad, Matthew P. Reed, and Lawrence W. Schneider, University of Michigan Transportation Research Institute

2:15 **Effect of Head-Neck Position on Cervical Facet Stretch of Post Mortem Human Subjects During Low Speed Rear-End Impacts**

Srini Sundararajan and Priya Prasad, Ford Motor Company; Constantine K. Demetropoulos, Wm. Beaumont Hospital; Scott Tashman, Henry Ford Hospital; Paul C. Begeman, King H. Yang, and Albert I. King, Wayne State University

2:45 **In Vivo Cervical Facet Capsule Distraction: Mechanical Implications for Whiplash and Neck Pain**

Kathryn E. Lee, Martin B. Davis, Roanne M. Mejilla, and Beth A. Winkelstein, University of Pennsylvania

3:15-3:45 REFRESHMENT BREAK

3:45 **Variation of Neck Muscle Strength Along the Human Cervical Spine**

Nelson Oi and Marcus G. Pandey, University of Texas at Austin; Barry S. Myers, Roger W. Nightingale, and Valeta Carol Chancey, Duke University

4:15 **Gradation of Neck Muscle Responses and Head/Neck Kinematics to Acceleration and Speed Change in Rear-End Collisions**

Gunter P. Siegmund, MacInnis Engineering Associates/University of British Columbia; David J. Sanderson and J. Timothy Inglis, University of British Columbia

4:45 ANNOUNCEMENTS

Wednesday, November 3

Technical Program

In the Tennessee C Ballroom

**Audio and videotaping will not be permitted. Please turn off cell phones in the meeting room.
Smoking will not be permitted in the sessions.**

OCCUPANT RESTRAINT SYSTEM AND ATD PERFORMANCE

- Co-Chairs: Lawrence W. Schneider, University of Michigan Transportation Research Institute
Stephen W. Rouhana, Ford Motor Company
- 9:00 **WorldSID Dummy Head-Neck Biofidelity Response**
Bernard Been, Mat Philippens, Ronald de Lange, and Michiel van Ratingen, TNO Automotive, Delft, The Netherlands
- 9:30 **A Theoretical Math Model for Projecting AIS3+ Thoracic Injury for Belted Occupants in Frontal Impacts**
Tony R. Laituri, Donald Sullivan, Kaye Sullivan, and Priya Prasad, Ford Motor Company
- 10:00-10:30 REFRESHMENT BREAK
- 10:30 **Predictors of Pediatric Abdominal Injury Risk**
Kristy B. Arbogast and Irene Chen, TraumaLink, The Children's Hospital of Philadelphia; Michael L. Nance, Dennis R. Durbin, and Flaura K. Winston, TraumaLink, The Children's Hospital of Philadelphia/University of Pennsylvania
- 11:00 **Thoracic Response to Dynamic, Non-Impact Loading from a Hub, Distributed Belt, Diagonal Belt, and Double Diagonal Belts**
Richard Kent, David Lessley, and Chris Sherwood, University of Virginia, Center for Applied Biomechanics
- 11:30 **STAPP STUDENT AWARDS**
Presentation by Albert I. King
- 11:45 **ADJOURNMENT**
Albert I. King, 2004 General Chair

CALL FOR PAPERS

49th STAPP CAR CRASH CONFERENCE®
Washington, D.C.

Rolf H. Eppinger, General Chair
National Highway Traffic Safety Administration

The Stapp Conference Advisory Committee

invites abstracts of prospective papers for consideration in planning the 49th Stapp Car Crash Conference. Papers are desired on research in impact biomechanics, human injury tolerance, and related fields that advance the knowledge of land-vehicle crash injury and occupant protection.

Paper offers should include the following information:

1. a tentative title for the paper
2. author information (name, affiliation, address, phone, fax, and e-mail)
3. an abstract of 200 to 300 words that
 - states the objective of the study
 - outlines the problem the study attempts to solve and the methodology
 - states explicitly the data to be included
 - summarizes the results and conclusions of the study

Since paper invitations are based solely on the abstract, it is important that authors provide clear, descriptive, and specific information by which the paper offer can be evaluated. Abstracts will not be reconsidered.

Abstracts should be submitted by

March 7, 2005 to: Leda L. Ricci, Executive Director, Stapp Conference Advisory Committee, University of Michigan Transportation Research Institute, 2901 Baxter Road, Ann Arbor, MI 48109-2150. Authors may also submit abstracts by fax to (734) 647-3330 or by e-mail to leda@umich.edu. If you have questions regarding abstract or paper submission, please call (734) 936-1114.

Authors whose abstracts are accepted will be invited to submit a manuscript in final form by **May 20, 2005** for extensive peer review by members of the Stapp Advisory Committee.

Acceptance of an abstract does not guarantee acceptance of a paper. Papers that are judged to meet the standards and requirements of the Stapp Journal will be accepted for publication and presentation.

Papers offered for consideration at the Stapp Conference must be written in an objective, scholarly, and scientific manner, and must be free

of commercialism, advertisement, and product identification. Papers must be prepared in clear English, and all data must be presented using SI units. Papers accepted for the Conference must be presented at the Conference.

All papers accepted for publication must be based on new data and results that will not have been published elsewhere prior to the Conference, or submitted for publication elsewhere.

Authors reporting on research directly involving human or animal subjects are required to provide appropriate acknowledgment in the paper that the research was approved by a properly constituted institutional review board or ethics committee. Paper offers that cannot provide this information will not be accepted for consideration by the Advisory Committee.

Technical Paper Awards

The **John Paul Stapp Award** is offered annually for the Stapp paper presented at the previous Conference that best meets the goals of the Stapp Car Crash Conference as judged by the Stapp Advisory Committee.

Stapp Student Awards of \$1,500, \$1,000, and \$500 are presented annually to the three students who are judged by the Stapp Student Award Committee to have made the most significant contributions to the research presented in a Stapp paper. Authors of accepted papers that include significant contributions by a student are invited to describe those contributions in a letter in order for that student to be considered. The three awards are made at the end of the conference in which the papers were presented.

STAPP REGISTRATION

48TH STAPP CAR CRASH CONFERENCE®
November 1-3, 2004

EARLY REGISTRATION DEADLINE: October 22, 2004

Mail to: Stapp Car Crash Conference
UMTRI, 2901 Baxter Road, Room 422, Ann Arbor, MI 48109-2150
Phone: (734) 975-2395 (For registration information)
Fax: (734) 647-3330 (Credit card registrations only)

Please attach a business card or complete the following:

Dr./Mr./Ms. _____

Name (for Meeting Badge) _____

Job Title _____

Division _____

Company _____

Department _____

Road/P.O. Box _____

City _____ State (Province) _____

Zip+4/Postal Code _____ Country (if not USA) _____

Work Phone _____

Fax _____

E-mail Address _____

☐ Please check here if you require special accommodations and attach a written description of your needs.



Registration is also available on the Stapp website: <http://www.Stapp.org/>



CID	CLB	CL#	OB	O#

NOTE: You must register by October 22, 2004 to be eligible for the reduced registration rate.

48th Stapp Car Crash Conference November 1-3, 2004

- ☐ Attendee*
- ☐ Presenter* (NHTSA Workshop presenters are not eligible.)
- ☐ Student** (Registration must be accompanied by a letter from student's advisor.)
- ☐ Advisory Committee Member

Children under 18 are not permitted at conference functions.

*Registration includes admission to all technical sessions, continental breakfasts, refreshment breaks, evening receptions, and a copy of the Stapp Journal.

**Student registration does not include the Stapp Journal.

CONFERENCE FEE

Prior to 10/22/04	AFTER 10/22/04	
\$ 600	\$ 650	\$ _____
\$ 500	\$ 550	\$ _____
\$ 100	\$ 100	\$ _____
\$ 350	\$ 400	\$ _____
Total		\$ _____

Payment Method*

- ☐ Check enclosed. **Make payable to "Stapp Association."**
- ☐ Please charge my: ☐ MasterCard ☐ Visa ☐ American Express

Card No. _____ Exp. Date _____

Name on credit card _____

Billing Address _____

Signature _____

*Payment must accompany registration. All cancellations must be submitted in writing. There is a \$50.00 handling charge for cancellations received before October 22, 2004. We regret we cannot process any refunds for cancellations following that date. Refunds are processed six to eight weeks after the conference. **If you have any questions, please call (734) 975-2395.**

**32nd NHTSA-sponsored International Workshop
on Human Subjects for Biomechanical Research
October 31, 2004**

- ☐ Check here to register. No registration fee is required.