



## **BRADLEY W. PROBST, M.S.B.M.E.**

### **PROFESSIONAL BIOGRAPHICAL OUTLINE**

#### **BACKGROUND**

Mr. Probst earned a B.S. in Mechanical Engineering at University of Louisiana, Lafayette, Louisiana, and an M.S. in Biomedical Engineering at Tulane University, New Orleans, Louisiana. For his Ph.D. research at Tulane, Mr. Probst developed the most advanced kinematic model of the human cervical spine known to date. This unique model will be used to make technological advances to Naval pilot ejection and recovery systems. In addition, Mr. Probst has also done advanced course work in the fields of biomaterials, materials engineering, biosolid mechanics, mechanisms of bodily functions, and advanced finite element analysis. He has also lectured extensively and shared teaching responsibilities for courses in biomedical engineering and design and analysis at Tulane University.

As a biomedical consultant for a national accident investigation firm and while a student, Brad gained valuable experience in forensic analysis while working on a university project to research soft tissue injury caused by dynamic inertial loading.

While investigating and presenting work on bone morphology, his focus was the proper use of computation modeling as it related to bone material property identification. His significant contributions led to important developments in the field of bone mechanics and response of living bone to stress and disease.

#### **SUMMARY OF EXPERIENCE**

- Developed his skills in mechanical engineering while acting as project engineer at a petrochemical facility, where he was responsible for several multimillion-dollar expansion and renovation projects
- Pursued graduate research on a federally funded project to investigate spinal trauma and human head and neck tolerances to dynamic impact loadings
- Performed finite element analysis, computer modeling, material testing and data analysis
- Used advanced numerical methods for model validation
- Operated state-of-the-art high-speed computers to develop his calibrated model and to validate biofidelity
- Created an accurate biofidelic model of the kinematic response of the human head and neck during any general 3D acceleration through the development of a finite element model. The conclusions and results of this important project will be used to make technological advances toward improving the safety of pilots during ejection and major recovery system improvements
- Uses his biomedical and mechanical engineering skills to analyze the relationship of crash injuries to crash forces, occupant kinematics, and human tolerance
- Uses forensic investigation and accident reconstruction techniques to develop injury mitigation devices

## AREAS OF SPECIALTY

- Biomechanical Consulting
- Human Injury Tolerance
- Vehicular Accident Reconstruction
- Impact and Inertial Trauma Analysis
- Injury Mechanism and Mitigation Analysis
- Slip and Fall Analysis

## ACADEMIC BACKGROUND

- Tulane University, New Orleans, LA, Ph.D. Candidate, Biomedical Engineering
- Tulane University, New Orleans, LA, M.S., Biomedical Engineering, 1996
- University of Louisiana, Lafayette, LA, B.S., Mechanical Engineering, 1988

## PROFESSIONAL EXPERIENCE

### January 2000 – Present | ARCCA, Incorporated | Senior Biomechanist

- Specializes in injury analysis, injury mechanism determination and crash kinematics
- Practices biomechanics to explore the cause, nature and severity of injuries
- Utilizes medical records, testing, computer modeling and his extensive knowledge of human injury tolerance to determine whether a claimed injury is consistent with a specific set of actions or exposure to a specific accident environment

### 1995 – 2000 | Tulane University | Research Assistant

- Pursued graduate research on a spinal trauma investigation and analysis project funded by the Office of Naval Research. His position was secured, fully funded and compensated through competitive selection
- Performed finite element analysis, computer modeling, material testing, and data analysis to develop biofidelic human cervical spine analog
- Utilized advanced numerical methods for model validation
- Proposed conclusions and research results that will be used to implement technological advancements in naval pilot ejection and recovery systems

### 1997 – 1999 | Unified Investigations & Sciences, Inc. | Biomechanical Consultant

- Performed forensic analysis of soft tissue injury from mild impact in automotive accidents
- Determined impact levels through vehicular accident reconstruction, and compared findings to determine injury causation and severity
- Presented written conclusions to clients and provided expert testimony relative to his findings

### May 1995 – 1999 | Tulane University | Teaching Assistant

- Selected by faculty mentor to assist with and share teaching responsibilities for courses such as Statics, Introduction to Biomedical Engineering and Design and Analysis
- Collaborated with mentor to plan lectures
- Prepared of course material
- Presented lectures

## 1988 – 1995 | Wink Engineering | Mechanical/Project Engineer

- Managed and was responsible for several multimillion-dollar expansion and renovation projects at a petrochemical facility
- Directed and performed environmental remediation (air and water)
- Recommended and implemented improvements to waste water treatment systems

## PROFESSIONAL AFFILIATIONS

- Association for the Advancement of Automotive Medicine
- Society of Automotive Engineers (SAE)
- American Society of Safety Engineers (ASSE)
- American Society of Mechanical Engineers (ASME)

## PUBLICATIONS

**Probst, B. R.** Anderson, G. Harris, R. Hart. (2007). *A Three-Dimensional Nonlinear Kinematic Finite Element Model of the Human Cervical Spine Under Dynamic Inertial Loading*. American Society of Biomechanics Biomechanics Symposium 2007, Stanford University: ASB.

Cantor, A., M. Markushewski, L. D'Aulerio, B. Benda, D. Eisentraut, **B. Probst**, L. Sicher. (2007). *Seat Design: A Risk Benefit Approach*. ASSE.

**Probst, B.** (Presenter). (2007). *Industrial vs. Academic Perspectives on Bioengineering Education*. ASME Summer Bioengineering Conference. Keystone, CO: ASME.

**Probst, B.,** R. Anderson, T. Hart, G. Harris, S. Guccione. (2007). *A Three-Dimensional Nonlinear Kinematic Finite Element Model of the Human Cervical Spine Under Dynamic Inertial Loading*. American Society of Biomechanics Northwest Biomechanics Symposium 2007, Eugene, Oregon: ASB.

Markushewski, M., Gushue, D., **Probst, B.**, Coward, C., (2007). *When Driver Safety Fails—Then What? Vehicular Accident Analysis: The Big Picture*. ASSE.

Gushue, D.L., Joganich, T., **Probst, B. W.**, Markushewski, M. (2007). *Biomechanics for Risk Managers—Analysis of Slip, Trip & Fall Injuries*. ASSE.

Gushue, D., **B. Probst**, et al. (2006). *Effects of Velocity and Occupant Sitting Position on the Kinematics and Kinetics of the Lumbar Spine during Simulated Low-Speed Rear Impacts*. Safety 2006, Seattle, WA, ASSE.

Benda, B. J., L. D'Aulerio, A. Cantor, M. L. Markushewski, **B. Probst**, et al. (2006). *Performance of Automotive Seat Belts During Inverted (-Gz) Rollover Drop Tests*. Icrash 2006—International Crashworthiness Conference, Athens, Greece, University of Bolton.

Coleman, J.C., **Probst, B.W.**, Roberts, M.D., and Hart, R.T. (1999). *Meshes Based On Cube-Shaped Finite Elements Do Not Converge: Quadratic Tetrahedral Elements Are An Alternative*. *Proceedings of the 1999 Summer Bioengineering Conference (ASME)* Big Sky, MT, June 1999. (pp. 329-230) New York: ASME.

Coleman, J.C., **Probst, B.W.**, Roberts, M.D., and Hart, R.T. (1998). *Investigating the Convergence Behavior of Voxel-Based Finite Element Meshes. Proceedings of the 7th Annual Symposium on Computational Methods in Orthopaedic Biomechanics*, Anaheim, CA, February 1998. Chicago: Orthopaedic Research Society (ORS).

## COURSE INSTRUCTION

- *Slip/Trip/Falls*, Rocky Mountain IASIU Chapter, Denver, CO. May 7, 2009
- *Biomechanics*, Puget Sound Special Investigators, Seattle, WA. July 30, 2009
- *Slip/Trip/Falls*, Las Vegas IASIU Chapter, Las Vegas, NV. December 7, 2009
- *Low Speed Impacts*, Oregon IASIU Chapter, Portland, OR. May 4, 2010
- *Slip/Trip/Falls*, Oregon IASIU Chapter, Portland, OR. Oct 7, 2011
- *Biomechanics*, Hawaii RIMS Chapter, Honolulu, HI. September 15, 2011
- *Determining Injury Causation*, Alaska RIMS Chapter, Anchorage, AK. October 19, 2011
- *Biomechanics*, OR RIMS Chapter, Portland, OR. June 20, 2013
- *Determining Injury Causation*, Los Angeles RIMS Chapter, September 17, 2014

## OTHER PROFESSIONAL ACTIVITIES

Judge at the Edmonds Annual Hot Autumn Nites Car Show, Edmonds, WA, September 6, 2008 sponsored by the Greater Edmonds Chamber of Commerce