Résumé of
NATHAN A. ROSE, M.S.
Principal Accident Reconstructionist

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EDUCATION: **M.S. Mechanical Engineering** (2003), University of Colorado at Denver, Colorado
B.S. Engineering (1998), Civil Specialty, Colorado School of Mines, Golden, Colorado

REGISTRATION: Mr. Rose is accredited as a Traffic Accident Reconstructionist by the Accreditation Commission for Traffic Accident Reconstruction (ACTAR #2265).

AWARDS: Mr. Rose received the **2006 Arch T. Colwell Merit Award** from the Society of Automotive Engineers (SAE) for the paper "Image Analysis of a Rollover Crash Test Using Photogrammetry." This award recognizes authors of outstanding papers published through the SAE.

EMPLOYMENT HISTORY: Mr. Rose is currently a Principal Accident Reconstructionist at Kineticorp, LLC in Denver Colorado, a firm specializing in accident reconstruction and forensic visualization. From 2005 to 2011, Mr. Rose acted as the Director of Engineering at Kineticorp. Prior to that, he held positions as an engineer (1998 to 2003) and a senior engineer (2003 to 2005) at Knott Laboratory, another Denver-based forensic engineering and accident reconstruction firm, and as a field engineer at Koechlein Consulting Engineers (1996 to 1997). In the summer of 2009, Mr. Rose received an appointment as a Lecturer in the College of Engineering and Applied Science at the University of Colorado at Denver and taught a course on impact analysis.

EXPERIENCE: Mr. Rose has been working and conducting research in the field of accident reconstruction since 1998 and has investigated and reconstructed hundreds of accidents involving passenger cars, heavy trucks, motorcycles, bicycles, pedestrians, trains and roadside barrier systems. His experience includes the following:

- During his graduate studies at the University of Colorado at Denver, Mr. Rose specialized in dynamics (the study of motion) and impact mechanics (the study of how objects respond to impacts).
- Mr. Rose has extensive experience analyzing and interpreting physical evidence related to vehicular crashes as well as modeling and analyzing crashes with physics-based computer simulation. He has an in-depth knowledge of the physical models used by the following crash analysis software packages: PC-CRASH, CRASH, SMAC, EDVSM and SIMON. Mr. Rose also has experience with railway vehicle simulation using VAMPIRE railway vehicle dynamics software. Mr. Rose has performed crash dynamics and occupant kinematics simulations for the Crash Injury Research and Engineering Network (CIREN), a research program sponsored by the National Highway Traffic Safety Administration (NHTSA). Mr. Rose also has extensive experience analyzing sensor data from crash tests and he has worked with Ford Motor Company to develop video analysis and motion tracking techniques for vehicle rollover crash test analysis.
- Mr. Rose has published numerous technical articles related to vehicular accident reconstruction. These articles have been published in the Society of Automotive Engineers *International Journal of Passenger Cars – Mechanical Systems*, in the Society of Automotive Engineers Technical Paper Series, in *Accident Investigation Quarterly*, in the Proceedings of the International Crashworthiness Conference, and in *Collision* magazine. Topics covered in these articles include rollover crash dynamics and simulation, vehicle damage analysis methods, impact restitution, tire mark characteristics, critical speed analysis, photogrammetry and video analysis. Mr. Rose's current research topics included deformation analysis for motorcycle crashes and vehicle versus pedestrian collisions.
- Mr. Rose has acted as a peer reviewer for technical papers published in the Accident Reconstruction (2007-12), Safety Test Methodology (2009, 2011), Rollover (2008-12) and Rear Impact (2009) Sessions at the annual World Congress of the Society of Automotive Engineers (SAE). In 2008 and 2009, Mr. Rose was a member of the SAE Occupant Protection Committee and an organizer for the Rollover and Rear Impact Technical Sessions held at the SAE World Congress.

AFFILIATIONS: Society of Automotive Engineers (SAE), University of Colorado at Denver Mechanical Engineering Advisory Committee (MEAC)

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Publications

1. Carter, Neal, Gray Beauchamp, **Nathan A. Rose**, "Comparison of Calculated Speeds for a Yawing and Braking Vehicle to Full-Scale Vehicle Tests," Paper Number 2012-01-0620, *forthcoming from the Society of Automotive Engineers*, April 2012.

2. **Rose, Nathan A.**, Beauchamp, Gray, "A Variable Deceleration Rate Approach to Rollover Crash Reconstruction," *Collision Magazine*, Volume 5, Issue 1, Spring 2010.

3. **Rose, Nathan A.**, Beauchamp, Gray, "Development of a Variable Deceleration Rate Approach to Rollover Crash Reconstruction," Paper Number 2009-01-0093, Society of Automotive Engineers, 2009, published in the *SAE International Journal of Passenger Cars – Mechanical Systems* **2**(1):308-332.

4. **Rose, Nathan A.**, Beauchamp, Gray, "Analysis of a Dolly Rollover with PC-Crash," Paper Number 2009-01-0822, Society of Automotive Engineers, 2009.

5. Beauchamp, Gray, Hessel, David, **Rose, Nathan A.**, Fenton, Stephen J., "Determining Steering and Braking Levels from Yaw Mark Striations," Paper Number 2009-01-0092, Society of Automotive Engineers, 2009, published in the *SAE International Journal of Passenger Cars – Mechanical Systems* **2**(1):291-307.

6. **Rose, Nathan A.**, Beauchamp, Gray, Fenton, Stephen J., "The Influence of Vehicle-to-Ground Impact Conditions on Rollover Dynamics and Severity," Paper Number 2008-01-0194, Society of Automotive Engineers, 2008.

7. **Rose, Nathan A.**, Fenton, Stephen J., Beauchamp, Gray, "Analysis of Vehicle-to-Ground Impacts during a Rollover with an Impulse-Momentum Impact Model," *SAE Int. J. Passeng. Cars – Mech. Sys.* **1**(1):105-123 (SAE Paper Number 2008-01-0178), 2008.

8. **Rose, Nathan A.**, Neale, W.T.C., Fenton, S.J., Hessel, D., McCoy, R.W., Chou, C.C., "A Method to Quantify Vehicle Dynamics and Deformation for Vehicle Rollover Tests Using Camera-Matching Video Analysis," *SAE Int. J. Passeng. Cars – Mech. Sys.* **1**(1):301-317 (SAE Paper Number 2008-01-0350), 2008.

9. Funk, J. R., Beauchamp, G., **Rose, Nathan A.**, Fenton, S. J., Pierce, J., "Occupant Ejection Trajectories in Rollover Crashes: Full-Scale Testing and Real World Cases," *SAE Int. J. Passeng. Cars – Mech. Sys.* **1**(1):43-54 (SAE Paper Number 2008-01-0166), 2008.

10. **Rose, Nathan A.**, Beauchamp, Gray, Fenton, Stephen J., "Factors Influencing Roof-to-Ground Impact Severity: Video Analysis and Analytical Modeling," 2007-01-0726, Society of Automotive Engineers, 2007.

11. **Rose, Nathan A.**, Beauchamp, Gray, Bortles, Will, "Quantifying the Uncertainty in the Coefficient of Restitution Obtained with Accelerometer Data from a Crash Test," 2007-01-0730, Society of Automotive Engineers, 2007.

12. **Rose, Nathan A.**, Fenton, Stephen J., Beauchamp, Gray, "Restitution Modeling for Crush Analysis: Theory and Validation," 2006-01-0908, Society of Automotive Engineers, 2006.

13. Chou, C., McCoy, R., Fenton, S., Neale, W., **Rose, Nathan**, "Image Analysis of Rollover Crash Test Using Photogrammetry," 2006-01-0723, Society of Automotive Engineers, 2006. This paper received the **2006 Arch T. Colwell Merit Award**, which was established by Arch Colwell to recognize authors of outstanding papers presented at SAE meetings. Papers are judged for their value as contributions to existing knowledge of mobility engineering, and primarily with respect to their value as an original contribution to the subject matter.

14. **Rose, Nathan A.**, Fenton, Stephen J., "Crush and Conservation of Energy Analysis: Toward a Consistent Methodology," 2005-01-1200, Society of Automotive Engineers, Warrendale, PA, 2005.

15. **Rose, Nathan A.**, Fenton, Stephen J., "An Examination of the CRASH3 Effective Mass Concept," 2004-01-1181, Society of Automotive Engineers, Warrendale, PA, 2004.

16. Neale, W., Fenton, S., McFadden, S., **Rose, Nathan**, "A Video Tracking Photogrammetry Technique To Survey Roadways for Accident Reconstruction," 2004-01-1221, Society of Automotive Engineers, Warrendale, PA, 2004.

17. **Rose, Nathan A.**, Hughes, Christopher M., "Optimum Chord Length for Critical Speed Analysis," *Accident Investigation Quarterly*, Summer 2002.

18. **Rose, Nathan A.**, "An Examination of the Effective Mass Concept for Eccentric Motor Vehicle Impacts in the CRASH3 Algorithm," Master's Thesis, University of Colorado – Denver, Spring, 2003.

19. **Rose, Nathan A.**, Fenton, Stephen J., Hughes, Christopher M., "Integrating Monte Carlo Simulation, Momentum-Based Impact Modeling, and Restitution Data to Analyze Crash Severity," 2001-01-3347, Society of Automotive Engineers, Warrendale, PA, 2001.

20. Fenton, Stephen, Neale, William, **Rose, Nathan A.**, Hughes, Christopher, "Determining Crash Data Using Camera-Matching Photogrammetric Technique," 2001-01-3313, Society of Automotive Engineers, Warrendale, PA, 2001.

21. Fenton, Stephen, **Rose, Nathan A.**, Johnson, Wendy, "Using Digital Photogrammetry to Determine Crash Severity," Proceedings of the International Crashworthiness Conference, September 2000.

22. Fenton, Stephen, Johnson, Wendy, LaRocque, Jaime, **Rose, Nathan A.**, "Using Digital Photogrammetry to Determine Vehicle Crush and Equivalent Barrier Speed," 1999-01-0439, Society of Automotive Engineers, Inc., Warrendale, PA, 1999.

Funded Research

1. "A Method to Quantify Vehicle Dynamics and Deformation for Vehicle Rollover Tests Using Camera-Matching Video Analysis," funded, in part, by **Ford Motor Company**, 2007.

2. "Image Analysis of Rollover Crash Test Using Photogrammetry," funded, in part, by **Ford Motor Company**, 2005-06.

Presentations

1. "Physical Evidence that Reveals Driver Error," Continuing Education Seminar for Utah State Department of Transportation Claims Department, Salt Lake City, April 4, 2010.

2. "Investigation of Claims Involving Car Crashes," Invited Presentation, Training Conference for Investigators in the Washington State Attorney General's Office, Tumwater, WA, June 15, 2010.

3. "Investigation of Claims Involving Car Crashes," Invited Presentation, Training Conference for Attorneys, Paralegals, and Legal Assistants in the Washington State Attorney General's Office, Tumwater, WA, June 15, 2010.

4. "Forensic Engineering," Invited Presentation, Introduction to Engineering Class, Chaparral High School, Parker, Colorado, March 19, 2010.

5. "Reconstruction of Crashes Involving Median or Roadside Barriers," Invited Presentation, Conference – Defense of WSDOT Torts, Office of the Attorney General, Tumwater, WA, October 21, 2009.

6. "ME4238/5238 – Impact Mechanics," an undergraduate and graduate level course taught in the College of Engineering and Applied Science at the University of Colorado Denver, Summer 2009.

7. "Determining Driver Error from Tire Marks and Quantifying the Severity of Highway Barrier Collisions," Invited Presentation, California Department of Transportation Tort Conference, San Diego Hilton, May 21, 2009.

8. "Analysis of a Dolly Rollover with PC-Crash," SAE Technical Paper Presentation, 2009 Society of Automotive Engineers World Congress, Detroit, Michigan, April 22, 2009.

9. "Investigating and Analyzing Rollover Accidents," Invited Presentation, Chrysler Tier 1 Counsel Meeting, Chrysler Headquarters, June 12, 2008.

10. "A Method to Quantify Vehicle Dynamics and Deformation for Vehicle Rollover Tests Using Camera-Matching Video Analysis," Guest Lecture, Forensic Methods Class, Wayne State University, April 15, 2008.

11. "Analysis of Vehicle-to-Ground Impacts during a Rollover with an Impulse-Momentum Impact Model," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress, Detroit, Michigan, April 15, 2008.

12. "A Method to Quantify Vehicle Dynamics and Deformation for Vehicle Rollover Tests Using Camera-Matching Video Analysis," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress, Detroit, Michigan, April 14, 2008.

13. "The Influence of Vehicle-to-Ground Impact Conditions on Rollover Dynamics and Severity," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress, Detroit, Michigan, April 14, 2008.

14. "Factors Influencing Roof-to-Ground Impact Severity: Video Analysis and Analytical Modeling," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress, Detroit, Michigan, April 17, 2007.

15. "Quantifying the Uncertainty in the Coefficient of Restitution Obtained with Accelerometer Data from a Crash Test," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress, Detroit, Michigan, April 17, 2007.

16. "Restitution Modeling for Crush Analysis," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress, Detroit, Michigan, April 5, 2006.

17. "Image Analysis of Rollover Crash Test Using Photogrammetry," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress, Detroit, Michigan, April 4, 2006.

18. "An Examination of the CRASH3 Effective Mass Concept," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress and Exhibition, Detroit, Michigan, March 11, 2004.

19. "High Speed Accident Investigation – Crashworthiness Evaluation," Training Seminar for Allstate Insurance, Knott Laboratory, Inc., Englewood, Colorado, December 5, 2002.

20. "Vehicle Accident Investigation – Evaluation of Motor Vehicle Crashworthiness," Training Seminar for Travelers Insurance, Denver, Colorado, June 7, 2002.

21. "Understanding Car Crashes," Training Seminar for State Farm Insurance, Greeley, Colorado, October 23, 2001.

22. "Computer Technologies in Crash Reconstruction," Rocky Mountain Crash/DUI Conference, Renaissance Hotel, Denver, Colorado, May 16-17, 2001.

23. "Analyzing Vehicle Dynamics & Occupant Injuries Using Computer Simulation," Knott Laboratory, Inc., Englewood, Colorado, September 12, 2000.

24. "Product Liability: Evaluation of Product Safety – Case Studies," Knott Laboratory, Inc., Englewood, Colorado, March 15, 2000.

25. "Vehicular Accident Reconstruction," Knott Laboratory, Inc., Englewood, Colorado, March 14, 2000.

26. "New Technologies in Accident Reconstruction," Society of Automotive Engineers Sectional Meeting, Knott Laboratory, Inc., Englewood, Colorado, January 19, 2000.

27. "The Role of Computers in Accident Reconstruction," Knott Laboratory, Inc., Englewood, Colorado, October 26, 1999.

28. "Courtroom Use of Photogrammetry, 3-D Computer Modeling and Animation," Knott Laboratory, Inc., Denver, Colorado, April 15, 1999.

Technical Conferences, Training and Seminars

1. Pedestrian versus Vehicle Crash Test Series (10 Tests, 3 Vehicles, Speeds between 15 and 40 mph), Hosted by the Longmont Police Department, April 20, 2011.

2. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2011. [At this conference, I attended presentations/lectures related to accident reconstruction (utility pole impacts, tire force modeling, drag sled reliability, and event data recorders). I also participated in the meetings for the SAE's Accident Investigation and Reconstruction Practices Committee and the Animation Subcommittee.]

3. "Crash Data Retrieval (CDR) Technician – Level 1," 8-hour Course Presented by William Bortles, Greenwood Village, Colorado, March 8, 2011.

4. "Vehicle Braking Performance: Braking Confidence and Pedal Feel," On-Line Short Course Presented by Tom Hall, Society of Automotive Engineers, Course Completed on July 12, 2010.

   This course covered the relationship of the applied brake pedal pressure and travel to the resulting vehicle deceleration rate. The effect of each brake system component on this relationship was described and analyzed.

5. "Vehicle Braking Performance: Stopping Distance," On-Line Short Course Presented by Tom Hall, Society of Automotive Engineers, Course Completed on May 21, 2010.

   This course covered both vehicle and human factors affecting vehicle braking performance and accident avoidance capabilities. It also covered the effects of Anti-lock Brake Systems on braking performance and the limitations of these systems.

6. "Ordinary Error – Common Behaviors that Contribute to Crash Risk," Presentation by Human Factors Consultant Tom Ayres, Ph.D., October 21, 2009.

7. VAMPIRE Railway Vehicle Dynamics Simulation Software Training, 1-Week Course Presented by Matthew Dick of Rail Sciences, Inc., July 6-10, 2009.

8. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2009.

9. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2008.

10. "Tire Mechanics & Modeling," 1-Day Course Presented by Dr. Patrick Fitzhorn, Director of the Race Vehicle Dynamics Laboratory at Colorado State University, March 20, 2008.

11. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2007.

12. "Active Safety Technology: Paving the Road to Accident-Free Driving Telephone/Webcast," March 1, 2007.

13. CarSim 7 Training Session, Presented by Thomas Gillespie of Mechanical Simulation Corporation via Teleconference, December 13, 2006.

14. Skip Barber Driving School, Mazda Raceway at Laguna Seca, Monterey, California, November 11, 2006.

This course consisted of classroom and in-vehicle instruction related to vehicle dynamics and handling, slides and recoveries, threshold braking, and racing basics. The in-vehicle instruction utilized the following vehicles: Dodge Neon, Dodge Dakota Pickup, Dodge Viper, and Porsche Boxster.

15. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2006.

16. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2004.

17. "Acceleration and VC2000PC Training," Presented by Richard Jobe of Vericom Computers, Inc., South Metro Fire Headquarters, Greenwood Village, Colorado, June 27, 2000.

18. "Adding Value to Life Through Technology and Advanced Mobility," Society of Automotive Engineers World Congress 2000, Cobo Center, Detroit, Michigan, March 6-9, 2000.