



Résumé of  
**NATHAN A. ROSE**  
Director and Principal  
Vehicular Accident Reconstruction

**KinetiCorp™**

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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).

**EMPLOYMENT HISTORY:** Mr. Rose is a Director and Principal Accident Reconstructionist at KinetiCorp, LLC, a Denver-based accident reconstruction and visualization firm that he helped found in 2005. 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. During his graduate studies, Mr. Rose specialized in dynamics (the study of motion) and impact mechanics (the study of how objects respond to impacts). He 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, HVE, 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.

**RESEARCH:** Mr. Rose has published 42 technical articles and reports 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 – The International Compendium of Crash Research*. Topics covered in these articles include rollover crash dynamics and simulation, vehicle damage analysis methods, impact restitution, tire mark characteristics, critical speed analysis, spinning vehicle deceleration rates, motorcycle crash causation, photogrammetry, and video analysis. Mr. Rose's current research topics include the use of unmanned aerial vehicles (UAVs) for accident reconstruction, low-speed collision reconstruction, video analysis of concussion-causing head impacts in professional football, rollover crash analysis using simulation, and collision simulation validation.

**TESTIMONY:** Mr. Rose's education, experience, research, and professional volunteer activities have laid the groundwork for the admission of his accident reconstruction work and testimony in courts in Colorado, California, Washington, and Georgia.

**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.

**AFFILIATIONS:** Society of Automotive Engineers (SAE) – Mr. Rose acts as a peer reviewer for technical papers published by the Society of Automotive Engineers. In the last 9 years, he has peer reviewed 51 technical papers. These reviews have been for the Accident Reconstruction (2007-18), Safety Test Methodology (2009, 2011), Rollover (2008-14) and Rear Impact (2009) Sessions for the annual Society of Automotive Engineers (SAE) World Congress and also for the International Journal of Transportation Safety. Mr. Rose is a member of the SAE Occupant Protection Committee and an organizer for the Accident Reconstruction Session at the annual SAE World Congress (Since 2013). He is a past organizer for the Rollover and Rear Impact Sessions, also held at the SAE World Congress (2008-09). Mr. Rose also developed and teaches a rollover reconstruction course for SAE. Mr. Rose has also peer-reviewed technical articles for *Collision: The International Compendium for Crash Research*.

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### Peer-Reviewed Publications and Reports

1. **Rose, Nathan A.**, Neal Carter, Connor Smith, “Further Validation of Equations for Motorcycle Lean on a Curve,” under review for publication by the Society of Automotive Engineers, 2018.
2. Neale, William T.C., McDonough, Sean, **Rose, Nathan A.**, McKelvey, Nathan, “Acceleration and Deceleration Capabilities of Three-Wheeled Motorcycles,” under review for publication by the Society of Automotive Engineers, 2018.
3. **Rose, Nathan**, “Fracture Energy Calculations for Wooden Utility Poles,” *Collision: The International Compendium of Crash Research*, Volume 12, Issue 1, 2017.
4. **Rose, Nathan**, Neal Carter, David Pentecost, Alireza Hashemian, “Video Analysis of Motorcycle and Rider Dynamics During High-Side Falls,” Society of Automotive Engineers Paper Number 2017-01-1413.
5. **Rose, Nathan A.**, Carter, Neal, Beauchamp, Gray, “The Accelerations Present during the Trip Phase of a Soil-Tripped Rollover Crash – An Update,” *Collision: The International Compendium for Crash Research*, Volume 11, Issue 2, 2016.
6. **Rose, Nathan**, Neal Carter, “The Longevity of Scene Evidence from a Rollover – A Case Study,” *Collision: The International Compendium for Crash Research*, Volume 11, Issue 2, 2016.
7. **Rose, Nathan**, Neal Carter, John Kreisher, Martin Randolph, William Neale, David Danaher, “How Accurate Are Witness Distance Estimates Given in Car Lengths?,” *Collision: The International Compendium for Crash Research*, Volume 11, Issue 1, 2016.
8. **Rose, Nathan A.**, Carter, Neal, “The Accelerations Present during the Trip Phase of a Soil-Tripped Rollover Crash,” *Collision: The International Compendium for Crash Research*, Volume 11, Issue 1, 2016.
9. **Rose, Nathan A.**, Neal Carter, Gray Beauchamp, “Post-Impact Dynamics for Vehicles with a High Yaw Velocity,” SAE Technical Paper Number 2016-01-1470, doi:10.4271/2016-10-1470.
10. Beauchamp, G., Thornton, D., Bortles, W., and **Rose, Nathan A.**, “Tire Mark Striations: Sensitivity and Uncertainty Analysis,” *SAE Int. J. Trans. Safety* 4(1):121-127, 2016, doi:10.4271/2016-01-1468.
11. Beauchamp, G., Pentecost, D., Koch, D., and **Rose, Nathan A.**, “The Relationship Between Tire Mark Striations and Tire Forces,” *SAE Int. J. Trans. Safety* 4(1):134-150, 2016, doi:10.4271/2016-01-1479.
12. Carter, N., Hashemian, A., **Rose, Nathan A.**, and Neale, W., “Evaluation of the Accuracy of Image Based Scanning as a Basis for Photogrammetric Reconstruction of Physical Evidence,” SAE Technical Paper 2016-01-1467, 2016, doi:10.4271/2016-01-1467.
13. Carter, Neal, **Nathan A. Rose**, David Pentecost, “Validation of Equations for Motorcycle and Rider Lean on a Curve,” *SAE Int. J. Trans. Safety* 3(2):2015, doi:10.4271/2015-01-1422.
14. **Rose, Nathan A.**, Neal Carter, “Further Assessment of the Uncertainty of CRASH3  $\Delta V$  and Energy Loss Calculations,” Paper Number 2014-01-0477, Society of Automotive Engineers, April 2014.
15. **Rose, Nathan A.**, Neal Carter, David Pentecost, “Vehicle Acceleration Modeling in PC-Crash,” Paper Number 2014-01-0464, Society of Automotive Engineers, April 2014.

16. **Rose, Nathan A.**, Neal Carter, David Pentecost, Tilo Voitel, William Bortles, "Using Data from a DriveCam Event Recorder to Reconstruct a Vehicle-to-Vehicle Impact," Paper Number 2013-01-0778, Society of Automotive Engineers, April 2013.
17. 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, Society of Automotive Engineers, 2012.
18. **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.
19. **Rose, Nathan A.**, Beauchamp, Gray, "Analysis of a Dolly Rollover with PC-Crash," Paper Number 2009-01-0822, Society of Automotive Engineers, 2009.
20. 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.
21. **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.
22. **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.
23. **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.
24. 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.
25. **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.
26. **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.
27. **Rose, Nathan A.**, Fenton, Stephen J., Beauchamp, Gray, "Restitution Modeling for Crush Analysis: Theory and Validation," 2006-01-0908, Society of Automotive Engineers, 2006.
28. 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.
29. **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.
30. **Rose, Nathan A.**, Fenton, Stephen J., "An Examination of the CRASH3 Effective Mass Concept," 2004-01-1181, Society of Automotive Engineers, Warrendale, PA, 2004.
31. 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.
32. **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.

33. **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.
34. 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.
35. 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.

#### **Technical Articles and Reports**

1. **Rose, Nathan A.**, “Equations for Estimating the Center of Gravity Height of a Motorcycle,” under review by *Collision: The International Compendium for Crash Research*.
2. **Rose, Nathan A.**, “Determining Motorcycle Speed from the Struck Vehicle Translation and Rotation,” under review by *Collisions: The International Compendium for Crash Research*.
3. **Rose, Nathan A.**, Carter, Neal, “An Analytical Review of Two Decades of Research Related to PC-Crash Simulation Software,” July 2017, under review by the Society of Automotive Engineers.
4. Peck, Louis, Deyerl, Eric, **Rose, Nathan**, “The Effect of Tire Pressure on the Deceleration of a Motorcycle Under Application of the Rear Brake Only,” *Accident Reconstruction Journal*, July/August 2017.
5. Carter, Neal, **Rose, Nathan**, “The Role of Vehicle Crash Data Recorders in a Motor Vehicle Safety Program,” *Electric Energy*, Summer 2015.
6. **Rose, Nathan A.**, “Reconstruction and Analysis of Rollover Crashes of Light Vehicles,” Course Notes for Society of Automotive Engineers Course C1502.
7. **Rose, Nathan A.**, Neal Carter, David Pentecost, “Analysis of Motorcycle and Rider Limits on a Curve,” *Collision: The International Compendium for Crash Research*, Volume 9, Issue 1.
8. **Rose, Nathan A.**, Neale, William T.C., Carter, Neal, “Using Data from a DriveCam Video Event Recorder to Reconstruct a Hard Braking Event,” *Collision: The International Compendium for Crash Research*, Volume 7, Issue 1, Spring 2012.
9. **Rose, Nathan A.**, Beauchamp, Gray, “A Variable Deceleration Rate Approach to Rollover Crash Reconstruction,” *Collision: The International Compendium for Crash Research*, Volume 5, Issue 1, Spring 2010.
10. **Rose, Nathan A.**, Hughes, Christopher M., “Optimum Chord Length for Critical Speed Analysis,” *Accident Investigation Quarterly*, Summer 2002.
11. Fenton, Stephen, **Rose, Nathan A.**, Johnson, Wendy, “Using Digital Photogrammetry to Determine Crash Severity,” Proceedings of the International Crashworthiness Conference, September 2000.

#### **Books**

1. **Rose, Nathan**, Beauchamp, Gray, Asay, Alan, Reconstruction and Analysis of Rollover Crashes of Light Vehicles, under review for publication by the Society of Automotive Engineers.
2. **Rose, Nathan**, Neale, William, Peck, Louis, Reconstruction and Analysis of Motorcycle Crashes, under review for publication by the Society of Automotive Engineers.

#### **Funded Research**

1. “Video Analysis of Concussion Causing Events in Professional Football,” funded by Biocore LLC, 2016-2017.’
2. “Video Analysis of Concussion Causing Events in Professional Football – A Pilot Study,” funded, in part, by the National Football League, 2015.

3. "Using Data from a DriveCam Event Recorder to Reconstruct a Vehicle-to-Vehicle Impact," funded, in part, by DriveCam - The Driver Science Company, 2012-13.
4. "Using Data from a DriveCam Video Event Recorder to Reconstruct a Hard Braking Event," funded, in part, by DriveCam - The Driver Science Company, 2011-12.
5. "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.
6. "Image Analysis of Rollover Crash Test Using Photogrammetry," funded, in part, by Ford Motor Company, 2005-06.

#### **Presentations and Courses Taught**

1. "Video Reconstruction Validation of Concussion Causing Events in Professional Football," NFL Head, Neck, and Spine Engineering Subcommittee Meeting at the NFL Scouting Combine, Indianapolis, IN, March 1, 2017.
2. "Reconstruction and Analysis of Rollover Crashes of Light Vehicles," Society of Automotive Engineers Course C1502, 8-hour course taught on December 1, 2016, Cerritos College, California.
3. "Reconstruction and Analysis of Rollover Crashes of Light Vehicles," Society of Automotive Engineers Course C1502, 8-hour course taught on September 27, 2016, Scottsdale, Arizona.
4. "Reconstruction and Analysis of Rollover Crashes of Light Vehicles," Society of Automotive Engineers Course C1502, 8-hour course taught on April 15, 2016 at the Society of Automotive Engineers World Congress, Detroit, Michigan.
5. "Post-Impact Dynamics for Vehicles with a High Yaw Velocity," SAE Technical Paper Presentation, 2016 Society of Automotive Engineers World Congress, Detroit, Michigan, April 14, 2016.
6. "Video Analysis of Concussion Causing Events in Professional Football – A Pilot Study," NFL Head, Neck, and Spine Engineering Subcommittee Meeting at the NFL Scouting Combine, Indianapolis, IN, February 24, 2016.
7. "Reconstruction and Analysis of Rollover Crashes of Light Vehicles," Society of Automotive Engineers Course C1502, 8-hour course taught on November 6, 2015.
8. "How to Develop, Use, and Effectively Present Accident Reconstruction Evidence in Trial," Summer Conference for the Colorado Defense Lawyers Association, Steamboat Springs, CO, August 1, 2015.
9. "Reconstruction and Analysis of Rollover Crashes of Light Vehicles," Society of Automotive Engineers Course C1502, 8-hour course taught on April 24, 2015.
10. "Operator Error and Liability in Motorcycle Accidents," Summer Conference for the Colorado Defense Lawyers Association, Telluride, CO, July 26, 2014.
11. "Hidden Witnesses – Technologies that Reveal Commonly Overlooked Evidence," 1 Hour, Educational Seminar Provided by Kineticorp, Denver, CO, June 25, 2014. [Topics Covered: Laser Scanning, Computer Modeling and Simulation, Full-Scale Vehicle Testing, Event Data Recorders, and Animation]
12. "Motorcycle and Trucks – Accident Reconstruction," Invited Presentation, Caltrans Torts Workshop, Oakland, CA, May 29, 2014.
13. "Vehicle Acceleration Modeling in PC-Crash," SAE Technical Paper Presentation, 2014 Society of Automotive Engineers World Congress, Detroit, Michigan, April 9, 2014.
14. "Hidden Witnesses – Technologies that Reveal Commonly Overlooked Evidence," 1 Hour, Educational Seminar Provided by Kineticorp, San Diego, CA, March 11, 2014. [Topics Covered: Vehicle Interactions with Center Median Barriers, Computer Modeling and Simulation, Event Data Recorders, Full-Scale Vehicle Testing, and Animation]
15. "Hidden Witnesses – Technologies that Reveal Commonly Overlooked Evidence," 1 Hour, Educational Seminar Provided by Kineticorp, Westminster, CO, March 4, 2014. [Topics Covered: Laser Scanning, Computer Modeling and Simulation, Low Speed Collision Analysis, Event Data Recorders, and Animation]

16. "Hidden Witnesses – Technologies that Reveal Commonly Overlooked Evidence," 1 Hour, Educational Seminar Provided by Kineticcorp, Englewood, CO, March 3, 2014. [Topics Covered: Laser Scanning, Computer Modeling and Simulation, Low Speed Collision Analysis, Event Data Recorders, and Animation]
17. "Hidden Witnesses – Technologies that Reveal Commonly Overlooked Evidence," 1 Hour, Educational Seminar Provided by Kineticcorp, Los Angeles, CA, January 15, 2014. [Topics Covered: Vehicle Interactions with Center Median Barriers, Computer Modeling and Simulation, Event Data Recorders, Full-Scale Vehicle Testing, and Animation]
18. "How In-Vehicle Video Systems Are Changing the Face of Litigation," 1 Hour, Continuing Education Webinar Offered by Kineticcorp, October 24, 2013.
19. "How In-Vehicle Video Systems Are Changing the Face of Litigation," ½ Hour, Invited, Educational Webinar Offered by DriveCam, September 19, 2013.
20. "Hidden Witnesses – Technologies that Reveal Commonly Overlooked Evidence," 1 Hour, Educational Seminar Offered by Kineticcorp, Seattle, Washington, September 5, 2013. [Topics Covered: Vehicle Acceleration Capabilities, Full-Scale Vehicle Testing, Computer Simulation, Event Data Recorders, Laser Scanning, Computer Modeling, and Animation]
21. "Hidden Witnesses – Technologies that Reveal Commonly Overlooked Evidence," 1 Hour, Continuing Education Seminar Offered by Kineticcorp, Denver, Colorado, September 6, 2013.
22. "Driver Distraction and Attention," 1 Hour, Continuing Education Webinar Offered by Kineticcorp, June 14, 2013.
23. "Accident Reconstruction for DOT Cases," Invited Presentation, Colorado Department of Law, Civil Litigation and Employment Law Section, Denver, CO, June 7, 2013. [Topics Covered: Photogrammetry, Tire Mark Types and Analysis, Computer Simulation, Full-Scale Vehicle Testing, Event Data Recorders, and Animation]
24. "Overlooked Evidence – Giving a Voice to Hidden Evidence," Invited Presentation, Washington State Attorney General's Office – Torts Division, Tumwater, WA, June 4, 2013. [Topics Covered: 3D Laser Scanning, Computer Simulation, Full-Scale Vehicle Testing, and Event Data Recorders]
25. "Recon 201 – More Concepts and Techniques in Accident Reconstruction," 1 Hour, Continuing Education Webinar Offered by Kineticcorp, May 24, 2013. [Topics Covered: Driver Perception-Response Time, 3D Laser Scanning and Computer Simulation]
26. "Recon 201 – More Concepts and Techniques in Accident Reconstruction," 1 Hour, Continuing Education Webinar Offered by Kineticcorp, April 5, 2013. [Topics Covered: Driver Perception-Response Time and Heavy Truck Event Data Recorders]
27. "Recon 101 – Concepts and Techniques in Accident Reconstruction," 1 Hour, Accredited Continuing Education Webinar Offered by Kineticcorp, March 1, 2013. [Topics Covered: Scene Documentation, Photogrammetry, Tire Mark Analysis, Simulation, Rollover Analysis, On-Board Video and Data Recorders, Conservation of Momentum and Energy, and Animation]
28. "Recon 101 – Concepts and Techniques in Accident Reconstruction," 2 Hour, Continuing Education Seminar Presented at McCranie, Sistrunk, Anzelmo, Hardy, McDaniel & Welch LLC, New Orleans, LA, February 19, 2013.
29. "Recon 101 – Concepts and Techniques in Accident Reconstruction," 1 Hour, Accredited Continuing Education Webinar Offered by Kineticcorp, January 25, 2013.
30. "Recon 101 – Concepts and Techniques in Accident Reconstruction," 1 Hour, Accredited Continuing Education Webinar Offered by Kineticcorp, January 18, 2013.
31. "Recon 101 – Concepts and Techniques in Accident Reconstruction," 1 Hour, Accredited Continuing Education Webinar Offered by Kineticcorp, January 8, 2013.
32. "Physical Evidence that Reveals Driver Error," Continuing Education Seminar for Utah State Department of Transportation Claims Department, Salt Lake City, April 4, 2010.
33. "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.

34. "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.
35. "Forensic Engineering," Invited Presentation, Introduction to Engineering Class, Chaparral High School, Parker, Colorado, March 19, 2010.
36. "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.
37. "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.
38. "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.
39. "Analysis of a Dolly Rollover with PC-Crash," SAE Technical Paper Presentation, 2009 Society of Automotive Engineers World Congress, Detroit, Michigan, April 22, 2009.
40. "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.
41. "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.
42. "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.
43. "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.
44. "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.
45. "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.
46. "Restitution Modeling for Crush Analysis," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress, Detroit, Michigan, April 5, 2006.
47. "Image Analysis of Rollover Crash Test Using Photogrammetry," SAE Technical Paper Presentation, Society of Automotive Engineers World Congress, Detroit, Michigan, April 4, 2006.
48. "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.
49. "High Speed Accident Investigation – Crashworthiness Evaluation," Training Seminar for Allstate Insurance, Knott Laboratory, Inc., Englewood, Colorado, December 5, 2002.
50. "Vehicle Accident Investigation – Evaluation of Motor Vehicle Crashworthiness," Training Seminar for Travelers Insurance, Denver, Colorado, June 7, 2002.
51. "Understanding Car Crashes," Training Seminar for State Farm Insurance, Greeley, Colorado, October 23, 2001.
52. "Computer Technologies in Crash Reconstruction," Rocky Mountain Crash/DUI Conference, Renaissance Hotel, Denver, Colorado, May 16-17, 2001.
53. "Analyzing Vehicle Dynamics & Occupant Injuries Using Computer Simulation," Knott Laboratory, Inc., Englewood, Colorado, September 12, 2000.

54. "Product Liability: Evaluation of Product Safety – Case Studies," Knott Laboratory, Inc., Englewood, Colorado, March 15, 2000.
55. "Vehicular Accident Reconstruction," Knott Laboratory, Inc., Englewood, Colorado, March 14, 2000.
56. "New Technologies in Accident Reconstruction," Society of Automotive Engineers Sectional Meeting, Knott Laboratory, Inc., Englewood, Colorado, January 19, 2000.
57. "The Role of Computers in Accident Reconstruction," Knott Laboratory, Inc., Englewood, Colorado, October 26, 1999.
58. "Courtroom Use of Photogrammetry, 3-D Computer Modeling and Animation," Knott Laboratory, Inc., Denver, Colorado, April 15, 1999.

#### **Attended Technical Conferences, Training, and Seminars**

1. "Drivers' Responses at Curves, Roadside Obstacles, and Intersections," 4-hour training webinar presented by Jeffrey Muttart, April 19, 2017.
2. NFL Head, Neck and Spine Engineering Subcommittee Meeting, 2017 NFL Scouting Combine, March 1, 2017.
3. "Drivers' Responses at Traffic Signals and Intersections," 4-hour training webinar presented by Jeffrey Muttart, November 16, 2016.
4. "Persuasive Presentations," Nancy Duarte, Online Course completed October 11, 2016.
5. "Presenting Data and Information," Edward Tufte, Denver, CO, July 22, 2016.
6. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2016. [At this conference, I attended presentations related to vehicle dynamics simulation, uncertainty analysis, and low-speed collisions.]
7. "Level 1: Photography Basics," 8-hour photography course offered by Photography Life (photographylife.com), completed January 29, 2016. (Topics Covered: Camera Gear and Lenses, Tripods, Light, Exposure, Depth of Field, Camera Settings, Autofocus, Blur, Dynamic Range and Histograms)
8. "Unleash the Power of Your Sony A6000," 2-hour photography course taught by Gary Fong (www.garyfong.com), completed December 31, 2015.
9. "Reconstruction and Analysis of Motorcycle Crashes," 8-hour Course Hosted by the Society of Automotive Engineers, November 5, 2015.
10. "Commercial Vehicle Braking Systems e-Seminar," 18-hour Course Hosted by the Society of Automotive Engineers, Completed March 13, 2015.
11. PC-Crash Training – Scenes, 3-hour Training Webinar Hosted by MEA Forensics, February 16, 2015.
12. PC-Crash Training – Trajectory Model, 3-hour Training Webinar Hosted by MEA Forensics, February 17, 2015.
13. "Aviation Fundamentals Course (AV1)," Online Course Offered by Unmanned Experts covering topics relevant to the operation of Small Unmanned Aircraft Systems (sUAS), Completed on December 29, 2014.
14. "Basic RiderCourse Segment 1: E-Course," Motorcycle Safety Foundation, Completed on November 4, 2014 (Certificate ID: 25324).
15. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2014. [At this conference, I attended presentations/lectures related to pedestrian crash analysis, crush analysis, side-swipe collisions, low-speed collisions, and bumper system testing.]
16. "Driver Distraction from Electronic Devices: Insights and Implications," 4-hour Course Presented by Jeffrey Hickman, Group Leader at the Virginia Tech Transportation Institute, 2-hour Sessions on April 3 and 5, 2013.



17. "Adobe Connect: Beyond the Basics," 1-hour Course Presented by David Walker, December 4, 2012.
18. "Getting Started with Adobe Connect," 1-hour Course Presented by David Walker, December 3, 2012.
19. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2012. [At this conference, I attended presentations/lectures related to the acceleration and braking performance of heavy trucks and motorcycles, roadway friction coefficients, vehicle deceleration, vehicle rollover motion and event data recorders.]
20. 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.
21. 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.]
22. "Crash Data Retrieval (CDR) Technician – Level 1," 8-hour Course Presented by William Bortles, Greenwood Village, Colorado, March 8, 2011.
23. "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.
24. "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.
25. "Ordinary Error – Common Behaviors that Contribute to Crash Risk," Presentation by Human Factors Consultant Tom Ayres, Ph.D., October 21, 2009.
26. VAMPIRE Railway Vehicle Dynamics Simulation Software Training, 1-Week Course Presented by Matthew Dick of Rail Sciences, Inc., July 6-10, 2009.
27. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2009.
28. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2008.
29. "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.
30. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2007.
31. "Active Safety Technology: Paving the Road to Accident-Free Driving Telephone/Webcast," March 1, 2007.
32. CarSim 7 Training Session, Presented by Thomas Gillespie of Mechanical Simulation Corporation via Teleconference, December 13, 2006.
33. 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.
34. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2006.

35. Society of Automotive Engineers World Congress, Detroit, Michigan, April 2004.
36. "Acceleration and VC2000PC Training," Presented by Richard Jobe of Vericom Computers, Inc., South Metro Fire Headquarters, Greenwood Village, Colorado, June 27, 2000.
37. "Adding Value to Life Through Technology and Advanced Mobility," Society of Automotive Engineers World Congress 2000, Cobo Center, Detroit, Michigan, March 6-9, 2000.

#### **Blog Posts and Online Articles**

1. "Sliding and Tumbling Deceleration of a Motorcycle – A Literature Review," Posted on LinkedIn on July 5, 2017.
2. "The Honest Expert Witness – A Manifesto," Posted on LinkedIn on June 29, 2017.
3. "Braking Capabilities of Motorcyclists – A Literature Review," Posted on LinkedIn on June 7, 2017.
4. "Are Physically Realistic Animations Overly Prejudicial?" posted on LinkedIn on May 15, 2017.
5. "Scene and Vehicle Documentation Checklists for Rollover Collisions," posted on LinkedIn on April 29, 2017.
6. "Producing Forensic Animations that are Credible and Admissible," posted on LinkedIn on April 19, 2017.
7. "Forensic Acquisition of Vehicle Infotainment Systems Data," posted on LinkedIn on April 7, 2017.
8. "Simulating Rollovers in PC-Crash," posted on LinkedIn on March 23, 2017.
9. "Part II – An Analytical Review of Two Decades of Research Related to PC-Crash Simulation Software," posted on LinkedIn on March 20, 2017.
10. "An Analytical Review of Two Decades of Research Related to PC-Crash Simulation Software – Part I," posted on LinkedIn on March 18, 2017.
11. "Fracture Energy Calculations for Wooden Utility Poles," posted on LinkedIn on March 1, 2017.
12. "Reconstructing the Trip Phase of a Rollover Crash," posted on LinkedIn on February 21, 2017.
13. "Use Physics and Evidence to Test what Witnesses Say About a Crash," posted on LinkedIn on February 15, 2017.
14. "Advanced Reconstruction Methods for the Roll Phase," posted on LinkedIn on February 13, 2017.
15. "Working with an Accident Reconstructionist – A Recipe for Success," posted on LinkedIn on February 7, 2017.
16. "Reconstructing the Roll Phase of a Rollover Crash – Part I," posted on LinkedIn on February 6, 2017.
17. "There's nothing new about expert witnesses disagreeing!" posted on LinkedIn on December 27, 2016.
18. "Your Credentials Matter to the Jury," posted on LinkedIn on December 20, 2016.
19. "Do the Dirty Tricks of Cross-Examination Work on Experts?" posted on LinkedIn on December 12, 2016.
20. "5 Tips for Experts Communicating with Juries," posted on LinkedIn on December 6, 2016.
21. "How YouTube is Advancing the Science of Accident Reconstruction," posted on LinkedIn on November 29, 2016.
22. "The Admissibility of Virtual Reality Animations," posted on LinkedIn on November 21, 2016.
23. "Kineticorp Adds Drone Pilots for Accident Scene Documentation," posted on LinkedIn on October 12, 2016.