



Exponent[®]
Engineering & Scientific Consulting

Robert E. Larson, P.E.

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Professional Profile

Mr. Larson addresses issues related to accident reconstruction and vehicle dynamics, including testing and analysis of vehicle handling, vehicle stability, advanced vehicle safety systems, and vehicle crash testing. Mr. Larson also has expertise in occupant vibration exposure and ride quality, and vehicle fire causation. His range of experience includes working with automobiles, light trucks/SUVs, heavy trucks, construction/industrial equipment, ATVs, motorcycles, and locomotives.

Mr. Larson has extensive experience investigating rollover crashes and analyzing various aspects from the causes of loss of control through reconstructing the rollover sequence. During his time with Exponent Mr. Larson has conducted numerous vehicle roll-over tests, both to standardized test procedures and by developing unique ways of recreating accident specific characteristics. He has extensive experience working with and analyzing the use of computer applications in vehicle dynamics and accident reconstruction.

Mr. Larson has evaluated vehicle stability, crashworthiness, and occupant protection issues on a wide variety of vehicles. The evaluations involve mechanical design analysis, biomechanics, and understanding of the use of standardized testing for evaluating occupant protection. He has conducted numerous evaluations of the vibration and impact exposure on a variety of commercial vehicles. He approaches reconstruction using traditional accident investigation and calculation techniques, but also brings extensive crash testing and computer simulation experience. He is experienced in conducting vehicle handling/characterization analyses with both on-road and off-road vehicles, and in evaluating driver response issues in vehicle handling and accident avoidance scenarios.

Mr. Larson has developed unique test methodologies and has experience conducting and developing standardized tests, as well as evaluating vehicle safety issues through database analysis. This includes Mr. Larson's experience in developing the standards for heavy truck occupant protection and his involvement on SAE committees. He has experience with test fixture design, instrumentation, data analysis, signal processing, vibration measurement, sound level monitoring, and component testing.

Additionally, he has researched and presented on issues related to ADAS and autonomous vehicles.

Academic Credentials & Professional Honors

M.S., Mechanical Engineering, University of Michigan, Ann Arbor, 1989

B.S., Mechanical Engineering, University of Michigan, Ann Arbor, 1987

Tau Beta Pi

Pi Tau Sigma

Arch T. Colwell Merit Award, Society of Automotive Engineers, 2012

Excellence in Oral Presentation, Society of Automotive Engineers, 2000

Licenses and Certifications

Licensed Professional Mechanical Engineer, Arizona, #31181

Licensed Professional Mechanical Engineer, Alabama, #28393

OSHA Certified Forklift Operator, #20082

Crash Data Retrieval (CDR) System Operator Certification

Professional Affiliations

Society of Automotive Engineers (member) Impact and Rollover Test Procedure Standards Committee

- ISO TC22/SC9 Vehicle Dynamics & Road Holding Committee
- Truck Crashworthiness Committee
- Vehicle Dynamics Standards Committee

American Society of Mechanical Engineers (member)

The Acoustical Society of America (member)

Southwest Association of Technical Accident Investigators — SATAI

Publications

Larson R, Retallack, C, Mikhailov M. Steering shaft separation with a collision involved Heavy Duty Steering Gear, SAE Technical Paper 2018-01-0524, 2018.

Fowler G, Larson R. All-Terrain Vehicle (ATV) handling and control, analysis of objective data. SAE Int. J. Veh. Dyn., Stab., and NVH 1(2):2017, doi:10.4271/2017-01-1557.

Zolock J, Senatore C, Yee R, Larson R et al. The use of stationary object radar sensor data from Advanced Driver Assistance Systems (ADAS) in accident reconstruction. SAE Technical Paper 2016-01-1465, 2016. doi:10.4271/2016-01-1465.

Senatore C, Yee R, Larson R. Future event data recorders for automated vehicles. Automated Vehicle Symposium 2016, Poster Session, AUVSI and TRB, July 2016.

Schwark J, Fowler G, Larson R, Rauschenberger R. An investigation of operator performance in All-Terrain Vehicle (ATV) handling and control. 6th International Conference on Applied Human Factors and Ergonomics, 2015.

Larson R, Croteau J, Bare C, Zolock J, Peterson D, Skiera J, Kerrigan J, Clauser M. Steering maneuver with furrow-tripped rollover of a pickup and passenger car. SAE Technical Paper Series 2015-01-1477, 2015.

Schwall M, Neal J, Retallack C, Larson R, Fowler G. Testing and analysis of autonomous emergency braking systems using the Euro NCAP vehicle target. Proceedings, ASME IMECE 2014, IMECE2014-39084.

Larson R, Cuadrado J. Heavy truck stability with a trailing axle tire blowout. SAE Technical Paper Series 2012-01-0238, SAE International Journal of Commercial Vehicles, doi:10.4271/2012-01-0238.

Brown J, Larson R, Fowler G, Kuhn R. Recreational off-highway vehicle (ROV) handling and control. SAE Technical Paper Series, 2012-01-0239.

Newberry W, Carhart M, Larson R, Bridges A, Fowler G. Biomechanics of occupant responses during recreational off-highway vehicle (ROV) riding and 90-degree tip-overs. SAE Technical Paper Series, 2012-01-0096. SAE International Journal of Passenger Cars - Mechanical Systems 2012; 5(1). doi:10.4271/2012-01-0096.

Croteau J, Zolock J, Larson R, Bare C, Peterson D, Parker D. Dynamic response of vehicle roof structure and ATD neck loading during dolly rollover tests. SAE Technical Paper Series, 2010-01-0515, 2010 and SAE International Journal of Passenger Cars - Mechanical Systems 2010; 3(1):407-449. doi:10.4271/2010-01-0515, (Arch T. Colwell Merit Award).

Larson RE, Fowler GF, Kuzel M, Stubbs A, Brown J, Donelson AC. Single-vehicle rollovers involving an initial off-roadway excursion followed by a return to roadway: A NASS study and vehicle response measurement. SAE 2008-01-0159, 2008.

Larson RE, Hansen D. Measurement and evaluation of vibration exposure a Kawasaki 80Z III Wheeled Loader. Proceedings, 2nd American Conference on Human Vibration, Chicago, IL, June 2008.

Daws JW, Larson RE, Brown JC. The Impact of plus-sized wheel/tire fitment on vehicle stability. Proceedings, Meeting of the Tire Society, September 2005.

Fowler GF, Larson RE, Wojcik L. Driver crash avoidance behavior: Analysis of experimental data collected in NHTSA's Vehicle Antilock Brake System (ABS) Research Program. SAE 2005-01-0423, 2005.

Yamaguchi GT, Richards D, Larson R, Carhart M, Cargill RS, Lai W, Corrigan CF. Development of a computational method to predict occupant motions during steering-induced rollovers. SAE 2005-01-0300, 2005.

Yamaguchi GT, Carhart MR, Larson R, Richards D, Pierce J, Raasch CC, Scher I, Corrigan CF. Electromyographic activity and posturing of the human neck during rollover tests. SAE 2005-01-0302, 2005.

Larson RE, Fries RH, Cooperrider NK. A comparison of impact and vibration loading on locomotive crew members with exposures in activities of daily living. Proceedings, ASME Rail Transportation Division Ride Quality Conference, RTD-Vol. 20, 2001.

Larson RE, Smith JW, Werner SM, Fowler GF. Vehicle rollover testing, methodologies in recreating rollover collisions. SAE Technical Paper Series, 2000-01-1641, SAE Automotive Dynamics & Stability Conference, Troy, MI, May 15-17, 2000.

Werner SM, Larson RE. Heavy truck rollover crashworthiness: Testing methods and development of recommended practices. SAE Technical Paper Series, 2000-01-0467, SAE 2000 World Congress, Detroit, MI, March 6-9, 2000.

Werner S, Larson RE, Marine M, Behrens T. Heavy truck crashworthiness Phase III — Testing and

analysis for recommended practice development. SAE CRP-13, April 1997.

Fowler GF, Fries RH, McCarthy RL, Forouhar FA, Larson RE. Steady-state and transient response of selected All-Terrain Vehicles (ATVs). SAE 940277, Society of Automotive Engineers International Congress and Exposition, February 1994.

Cooperrider NK, Fries RH, Larson RE. Locomotive and road vehicle ride quality assessments. Proceedings, ASME Rail Transportation Division Ride Quality Conference, RTD-Vol. 6, 1993.

Cooperrider NK, Fries RH, Larson RE. Ride quality assessments for a 6-axle locomotive and a heavy truck. Rail Transportation, American Society of Mechanical Engineers, RTD-Vol. 4, 1991.

Published Abstracts

Larson RE, Raasch C, Pierce J. Measurement and evaluation of vibration exposure for locomotive crew members. Proceedings, 1st American Conference on Human Vibration, Morgantown, WV, June 2006.

Richards D, Scher I, Vijayakumar V, Carhart M, Larson R, Taylor S, Ford Corrigan C. Repetitive head loading: accelerations during cyclic, everyday activities. Proceedings, Congress of the International Society of Biomechanics, Cleveland, OH, 2005.

Other Presentations

Larson RE. Ethical considerations with autonomous vehicles, driverless cars session. Fifth Annual Conference on Governance of Emerging Technologies: Law, Policy and Ethics, May 2017.

Larson, RE. Accident reconstruction in truck collision investigations and trial. Strafford webinar, 2015.

Larson RE. Driver expectations and behavior with Recreational Off-Highway Vehicles (ROVs). Applied Human Factors and Ergonomics Conference, July 2012.

Larson RE, Bosch K. Accident investigation approach to UTV incidents. Southwest Association of Traffic Accident Investigators (SATAI), Fall 2011 Conference, September 24, 2011.

Larson RE. On and off-road rollovers; a dynamic analysis of roof crush energy and deformation. ABA Emerging Issues in Motor Vehicle Product Liability Litigation, April 2008.

Larson RE. Simulation of off-road excursion. HVE Forum, February 2006.

Larson RE. Electronic stability control. Southwest Association of Traffic Accident Investigators (SATAI), Spring 2006 Conference, March 4, 2006.

Larson RE. Heavy truck testing and standardization. SAE Heavy Truck Safety, Security and Efficiency Through Technology Symposium, December 2004.

Larson RE. Proposal for a dynamic rollover test in response to the TREAD Act. Presented to NHTSA, August 2001.

Larson RE. Photogrammetry in accident reconstruction. In the Driver's Seat: Trucking, Trials and Triumph, ALFA International, May 1998.

Additional Education & Training

Reconstruction and Analysis of Motorcycle Crashes - SAE seminar, April 2018

ADAS Application: Automatic Emergency Braking - SAE seminar, April 2018

Automated Vehicle Symposium, AUVSI and TRB, July 2016

Tire Mechanics & Inspection, Forensic Tire Examination, TRGtech, September 2014

SAE Active Safety Systems Symposium, November 2013

Crash Data Retrieval (CDR) Data Analyst, Collision Safety Institute, October 2012

Crash Data Retrieval (CDR) Technician Level 1&2, Collision Safety Institute, October 2012

Applied Human Factors and Ergonomics Conference, July 2012

HVE Forum, February 2011

SAE 2009 Heavy Truck Handling, Dynamics & Control Symposium, May 2009

Traffic Accident Reconstruction, Northwestern University Traffic Institute, September 2007

Mechanics of Heavy-Duty Truck Systems, University of Michigan, June 2007

SAE Accident Reconstruction Symposium, November 2005

Enhancing Heavy Truck Safety, Security, and Efficiency through Technology Symposium, December 2004

PhotoModeler Pro 5 Training, November 2004

HVE Forum, April/May 2003

Heavy Truck Rollover and Collision Avoidance TOPTEC, April 2003

Passenger Vehicle Rollover TOPTEC: Causes, Prevention and Injury Prevalence, April 2002

Accident Reconstruction TOPTEC: Special Topics, May 2001

Commercial Vehicle Rollover Workshop, July 2000

Heavy Vehicle Rollover TOPTEC, July 2000

SAE Automotive Dynamics and Stability Conference May 2000

Passenger Car Rollover SAE TOPTEC: Cause and Prevention, 1999

Sport Utility / Light Truck Vehicle Safety SAE TOPTEC, 1997

Low Speed Collision TOPTEC, 1996

Automobile Vehicle Dynamics, SAE course, 1994

Vehicle Rollovers TOPTEC, September 1992

Peer Reviewer

Society of Automotive Engineers technical publications

American Society of Mechanical Engineers technical publications