

Jeff D. Colwell, Ph.D., P.E.
Principal Engineer

Professional Profile

Dr. Jeff Colwell is a Principal Engineer in Exponent's Thermal Sciences practice in Phoenix, Arizona. He specializes in the engineering analysis of thermal and combustion processes, especially the cause, origin, and propagation of fires and explosions. Dr. Colwell has particular expertise investigating fires associated with automobiles, recreation vehicles, motorcycles, and heavy trucks, where typical fire scenarios include post-collision fires, structure fires involving vehicles, and fires that occur while the vehicle is being operated. He analyzes how these fire scenarios, along with vehicle design, operation, maintenance, repair, and aftermarket equipment, are related to mechanisms of fire causation, growth rate, and spread. He has specialized expertise in designing and conducting both component and full-scale tests to evaluate these complex relationships.

Dr. Colwell has also investigated a wide range of fires associated with residential and commercial structures, and industrial complexes associated with the chemical, refining, and mining industries. Technical issues addressed have included cause and origin determination, ignition mechanism, smoldering and self-heating, fire spread, smoke transport, smoke detector operation, building evacuation, fire department response, carbon monoxide poisoning, and handling of hazardous waste. He also evaluates the design and performance of household appliances, heating and cooling equipment, and various other consumer products. Dr. Colwell's research has focused on forced ignition mechanisms, including spark (electrostatic) and hot-surface ignition of combustible mixtures, as well as ignition mechanisms associated with various types of electrical components in automotive electrical systems. He has also conducted research involving complex two-phase flows, liquid atomization, and droplet transport.

Prior to joining Exponent, Dr. Colwell held research positions at AlliedSignal Aerospace, the Combustion Laboratory at Arizona State University, the High Temperature Gas Dynamics Laboratory at Stanford University, and the Thermal Sciences and Propulsion Center at Purdue University.

Academic Credentials and Professional Honors

Ph.D., Mechanical Engineering, Arizona State University
M.S., Engineering, Stanford University
M.S., Mechanical Engineering, Purdue University
B.S., Mechanical Engineering, University of Wyoming

Instructor: "Fundamentals of Motor Vehicle Fire Investigation" Society of Automotive Engineers, 2009–present

Committee Chairman and Session Organizer: Fire Safety Sessions at SAE World Congress, Society of Automotive Engineers, 2008–2010

Principal Member: Technical Committee on Recreational Vehicles, NFPA 1192: *Standard on Recreational Vehicles*, NFPA 1194: *Standard for Recreational Vehicle Parks and Campgrounds*, National Fire Protection Association, 2006–present

Pi Tau Sigma; Mortar Board; Omicron Delta Kappa
SAE Excellence in Oral Presentation Award, 2009 and 2010
Outstanding Research Award, Union Carbide Corporation, 1994

Licenses and Certifications

Registered Professional Mechanical Engineer, Arizona, #31176
Registered Professional Mechanical Engineer, California, #M32027

Hazardous Waste Operations and Emergency Response (HAZWOPER); Fire Cause and Origin Investigation 1A and Techniques of Fire Investigation 1B accredited by the California State Fire Marshal; Vehicle Fire Cause and Origin Investigation Course; Fundamentals of Automotive Fuel Delivery Systems Course, Society of Automotive Engineers

Book Chapters

Long RT, Colwell JD, Ray R, Grossman HL, Thomas B, Strassburger R. Passenger vehicle fires. In: *Fire Protection Handbook*, 20th Edition. Cote AE (ed), National Fire Protection Association, Quincy, MA, 2008.

Publications

Colwell JD, Babic D. A review of oxidation on steel surfaces in the context of fire investigations. SAE Paper 12B-0004, in press, 2011.

Colwell, JD. Ignition of combustible materials by motor vehicle exhaust systems—A critical review, SAE Paper No. 2010-01-0130. Also in *SAE Int J Passeng Cars-Mech Syst* 2010; 3(1):263-281.

Colwell JD, Biswas K. Steady-state and transient motor vehicle exhaust system temperatures. SAE Paper No. 2009-01-0013, 2009. Also in *SAE Int J Passeng Cars-Mech Syst* 2009; 2(1):206–218.

Colwell JD, Mongia R, Reza A. Case study on evacuation rates within the World Trade Center Towers on September 11, 2001. Proceedings, 49th Annual Human Factors and Ergonomics Society Meeting, Orlando, FL, September 26–30, 2005.

Colwell JD, Reza A. Hot surface ignition of automotive and aviation fluids. *Fire Technology* 2005; 41(2):105–123.

Colwell JD, Reza A. Use of soot patterns to evaluate smoke detector operability. *Fire and Arson Investigator*; 2003:42–45, July.

Martin RJ, Colwell JD. De Novo VOC from regenerative thermal oxidizers. Proceedings, ASME Summer Heat Transfer Conference, Paper No. HT2003-40557, Las Vegas, NV, July 21–23, 2003.

Colwell JD, Korb TM, Peck RE. Hot surface ignition of Jet-A fuel by conductive deposits. 29th International Symposium on Combustion, pp. 297–303, Sapporo, Japan, July 2002.

Colwell JD. Hot surface ignition of Jet-A fuel by conductive deposits. Ph.D. Dissertation, Arizona State University, August 2001.

Colwell JD, Peck RE. Ignition of Jet-A fuel by silver oxide deposits. 18th International Colloquium on the Dynamics of Explosions and Reactive Systems, Seattle, WA, August 2001.

Colwell JD, Peck RE. Ignition of Jet-A fuel on silver oxide deposits. Proceedings, 2nd Joint Meeting of the U.S. Sections of the Combustion Institute, Oakland, CA, March 2001.

Cooperrider NK, Hammoud SA, Colwell JD. Characteristics of soil-tripped rollovers. SAE Paper No. 980022, 1998.

Senser DW, Colwell JD, Smith RM. An experimental study of the structure of supercritical fluid and conventional air paint sprays. Proceedings, 22nd Waterborne, High-Solids, and Powder Coatings Symposium, pp. 161–170, New Orleans, LA, February, 1995.

Senser DW, Colwell JD, Nielsen KA. An experimental study of workpiece interaction regions and impact velocities of supercritical fluid spray. Proceedings, 4th Annual ESD Advanced Coatings Technology Conference, pp. 369–379, Dearborn, MI, November 1994.

Senser DW, Colwell JD, Nielsen KA. A comparison between the structure of supercritical fluid and conventional air paint sprays. Proceedings, 7th Annual Conference on Liquid Atomization and Spray Systems, pp. 35–39, Bellevue, WA, May 1994.

Colwell JD, Senser DW, Nielsen KA. Influence of temperature on the structure of supercritical fluid coating sprays. 24th Annual Meeting of the Fine Particle Society, Chicago, IL, August 1993.

Colwell JD. Influence of pressure and temperature on the structure of supercritical fluid coating sprays. M.S. Thesis, Purdue University, August 1993.

Colwell JD, Senser DW, Nielsen KA. Influence on temperature on the structure of supercritical fluid coating sprays. Proceedings, 6th Annual Conference on Liquid Atomization and Spray Systems, pp. 39–43, Worcester, MA, May 1993.

Presentations

Melted Aluminum Patterns in Full-Scale Vehicle Burn Tests, SAE World Congress, April 13-15, 2010.

Miles P, Colwell JD. Vehicle fire litigation. Invited Lecture, Defense Research Institute, Fire and Casualty Seminar, November 20–21, 2008.

Colwell JD. Hot surface ignition—Unraveling the myths. Invited Lecture, Defense Research Institute, Strictly Automotive, September 6–7, 2007.

Colwell JD, Reza A. Hot surface ignition of flammable liquids. Invited Lecture, Defense Research Institute, Fire and Casualty Seminar, November 2–3, 2006.

Colwell JD. Role of mechanically damaged wires in the causation of automotive fires. Invited Lecture, Emerging Issues in Motor Vehicle Product Liability Litigation, American Bar Association, April 5–7, 2006.

Colwell JD. The fundamentals and nuances of cause and origin analysis of vehicle fires. Invited Lecture, Emerging Issues in Motor Vehicle Product Liability Litigation, American Bar Association, March 31, 2005.

Editorships / Editorial Review Boards

Associate Editor, SAE International Journal of Passenger Cars – Mechanical Systems, 2010-present

Peer Reviewer

- *Fire Technology*, 2006, 2008, 2010
- SAE World Congress- Fire Safety Session, 2006–2011