Charles Taylor Engineering Technical Services

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Phoenix, AZ

Timothy C. Behrens, PE, DFE, CFI, CFEI, CVFI

Principal Forensic Engineer

AREAS OF EXPERTISE:

Mr. Behrens has 40 years of experience in Mechanical Engineering, with the last 37 years primarily devoted to Failure Analysis and Forensic Engineering. Areas of expertise include Vehicle Fire Origin & Cause (including Passenger Cars, Heavy Trucks, RV's, Motorhomes, Agricultural & Construction Machinery), Vehicle Accident Reconstruction (Passenger Cars, Heavy Trucks, Motorcycles, Bicycles), Vehicle Failure Analysis (Fuel Systems, Tires, Brakes, Engine, Restraints), Low Speed Vehicle Accidents (Injury Potential & Damage Feasibility Analysis), Plumbing System & Appliance Failure Analysis (Piping Systems, Fire Sprinkler Systems, Plumbing Components, Toilets, Water Heaters, RO systems, Water Filters, Washing Machines, Dishwashers), Fire Cause & Failure Analysis of Industrial Equipment & Appliances (Generators, Compressors, Boilers, HVAC Equipment, Cooking Appliances, Dryers), Fireplace, Chimney & Wood-Burning Appliance Fire Investigations, Natural Gas & Propane System Fires & Explosions, Consumer Product Failure & Safety Analysis and Premises Safety (Slip/Trip & Fall, Stairs, Ladders, Automatic Doors, Lighting). Mr. Behrens also has extensive expert witness experience and has provided deposition and trial testimony on 40 occasions in various courts.

QUALIFICATIONS:

1983: B.S. Mechanical Engineering (with Academic Honors), University of Arizona

LICENSES & CERTIFICATIONS:

State of Arizona Professional Registered Engineer, # 31197
State of California Professional Registered Engineer, # 35500
State of Colorado Professional Registered Engineer, # PE.0034469
State of New Mexico Professional Registered Engineer, # 17085
State of Utah Professional Registered Engineer, # 372882-2202
State of Florida Professional Registered Engineer, # 95285
Board Certified Diplomate in Forensic Engineering (DFE)
IAAI-Certified Fire Investigator (CFI)
NAFI-Certified Fire & Explosion Investigator (CFEI)
NAFI-Certified Vehicle Fire Investigator (CVFI)
Certified XL Tribometrist (CXLT)
Certified Fireplace & Chimney Inspector, Fireplace Investigation Research & Education
Accredited Traffic Accident Reconstructionist (ACTAR), 1999-2014

PROFESSIONAL MEMBERSHIPS :

Senior Member of National Academy of Forensic Engineers (NAFE)
Society of Automotive Engineers (SAE)
American Society of Mechanical Engineers (ASME)
American Society for Testing and Materials (ASTM)
National Council of Examiners for Engineering & Surveying (NCEES)

Timothy C. Behrens
Principal Forensic Engineer

Southwestern Association of Technical Accident Investigators (SATAI)
American Society of Professional Engineers (SPE)
National Society of Professional Engineers (NSPE)
Arizona Insurance Claims Association (AICA)
Appointed to Enforcement Advisory Committee, AZ Board of Technical Registration

EXPERIENCE:

October 2021– Present: Principal Forensic Engineer, Charles Taylor Engineering Technical Services
Provides engineering services to the insurance, legal, and industrial sectors, among others, including consulting, projects, forensics, and expert analysis and testimony. Handle engineering projects of all sizes and complexities, including highly technical and/or unusual in the field of Mechanical Engineering, one-of-a-kind events, on a global scale.

2015 – 2021: Principal Engineer, EFI Global, Phoenix, Arizona
Provided expert forensic engineering services to investigate, analyze and determine the cause of various fires, explosions, product failure and accidents.

2006 – 2015: Owner / Forensic Mechanical Engineer, Behrens Engineering Investigations, LLC, Phoenix, Arizona
Owner / Forensic Mechanical Engineer at Behrens Engineering Investigations, a professional engineering consulting firm that provides expert forensic engineering services to investigate, analyze and determine the cause of various accidents, fires, explosions and product failures.

1999 – 2006: Senior Engineer, EFI Global, Phoenix, Arizona
Provided forensic engineering and expert witness consulting services to investigate, analyze and determine the cause of a wide variety of accidents, fires, explosions and failures.

1987 – 1999: Senior Engineer, Exponent Failure Analysis Associates
Developed, supervised and conducted hundreds of tests and experiments including full-scale vehicle crashes, rollover, handling & stability, steering, brakes, tires, restraints, fuel systems, cooling systems, fires and component level tests. Performed accident reconstruction analysis and computer simulations, vehicle fire investigations and a wide variety of product failure investigations, analyses and research.

1983 – 1987: Mechanical Component Design Engineer & Project Engineer, Garrett Turbine Engine Company (now Honeywell), Phoenix, Arizona
Conducted thermal, stress, fatigue, and vibration analysis on gas turbine engine components. Also coordinated the investigation of gas turbine engine field failures and developed solutions for field discovered problems and failures.

REPRESENTATIVE PROJECT EXPERIENCE:

Vehicle Fatal Fire, Detroit, MI
A fire erupted in a wheelchair accessible minivan that resulted in fatal injury to the driver. Mr. Behrens was retained to determine the origin and cause of the fire. The investigation included several multi-party examinations of the minivan and evidence extraction, engineering analysis of the minivan conversion process and review of extensive witness depositions. Mr. Behrens developed opinions regarding the origin and cause of the fire and that it was not related to any failure or defect by the minivan conversion company. Mr. Behrens was deposed and was preparing to testify in trial when the case settled a few days before trial.

Vehicle Fire with Injuries, Los Angeles, CA
A rental car erupted in fire as it was being driven on an LA freeway. The driver pulled over to the side of the road but one of the occupants sustained burn injuries upon exiting the vehicle. Mr. Behrens was retained to determine the origin and cause of the fire and whether any improper service by the rental car company contributed to the cause of the fire. The investigation included several multi-party vehicle examinations, an exemplar vehicle examination, review of extensive witness depositions and rental car service history. Mr. Behrens opined the cause of the fire was not related to any improper service work by the rental car company. The case was tried in Federal Court and Mr. Behrens prepared a comprehensive written report to support his opinions and rebuttal report of the opposing expert opinions. The case settled after Mr. Behrens was deposed.

Water Loss - Accidental Discharge of Fire Protection Sprinkler, Gilbert, AZ
A substantial water leak from a fire protection sprinkler head resulted in $2 million in damages to a large hotel that was under construction. Mr. Behrens conducted a comprehensive engineering investigation that included scene examinations, obtaining evidence, interviewing important witnesses and laboratory examinations of the subject sprinkler heads. He developed opinions that the cause of the discharge was due to improper installation of the sprinkler head. His findings were documented in a comprehensive report that became the framework for a successful result at trial. Mr. Behrens testified in both deposition and trial for this case.

Exercise Machine Accident, Glendale, AZ
An inversion table was being used for stretching exercise in the fully inverted position when the leg angle lock mechanism released causing the user to fall and impact his head on the floor. Mr. Behrens performed a teardown examination on the inversion table and engineering analysis of the locking mechanism. He determined the ankle lock mechanism was defective in design and subject to accidental release. He prepared a detailed report to support his opinions and the case settled.

Slip and Fall Accident in Hotel Lobby, Phoenix, AZ
A man slipped and fell on a wet tile floor as he exited the elevator. Mr. Behrens performed a scene examination that included testing to evaluate the safety of the floor surface in the wet condition. He also analyzed the placement of warning signs in the area of the fall by the hotel employees. His findings were documented in a detailed expert report, and he also testified in deposition. The case settled after his deposition.

SPECIALIZED EDUCATION:
Propane Explosions: Investigation, Failure Modes, Scene Exam & Litigation, NASP, 2022
Electrical Safety, CFITrainer.net, 2022
Motor Vehicles: Engine, Ignition, Electrical & Fuel Systems, CFITrainer.net, 2022
Motor Vehicles: Transmission, Exhaust, Brake & Accessory Systems, CFITrainer.net, 2022
Understanding Undetermined, CFITrainer.net, 2022
Practical Fractography, ASM International, 2021
Technical Topics in Forensic Engineering, National Academy of Forensic Engineers, 2021
Forensic Engineering Seminar, National Academy of Forensic Engineers, Summer 2020
Bosch CDR Tool Technician Training by IPTM – Online, 2020
How to use the Bosch CDR Tool, Crash Academy, 2020
Forensic Engineering Seminar, National Academy of Forensic Engineers, Winter 2020
CXLT Certification Program, EXCEL TRIBOMETERS, LLC, 2019
Reconstruction and Analysis of Motorcycle Crashes, SAE International, 2018
Heavy Vehicle & Kawasaki Event Data Recorders, Post-Collision Examinations, SATAI, 2018
Forensic Engineering Seminar, National Academy of Forensic Engineers, 2018
Dryer Fires: Cleaning Up on Subro, Nat'l Assoc of Subrogation Professionals, 2017
Residential Electricity for Fire Investigators, Fire Findings, 2017
Commercial Kitchen Fires, International Assoc. of Arson Investigators, 2016
International Symposium of Fire Investigation Science & Technology, 2016
Basic Electricity and Fire, International Association of Arson Investigators, 2015
Investigating Solid Fuel-Burning Appliance Fires, Fire Findings, 2014
Tire Mechanics and Forensic Tire Examination, TRGtech Tire Consulting, 2014
Understanding Fire through the Candle Experiments, CFITrainer.net, 2014

Fire Scene Safety; Personal Protective Equipment Selection and Use, IAFI, 2014
NFPA 921 Update Class, International Association of Arson Investigators, 2014
Walkway Auditor Training Course: ASTM F2948, Forcon International, 2014
Fireplace & Chimney Inspection, Fireplace Investigation Research Education, 2013
Ten Most Common Fire Scene Errors, International Assoc. of Fire Investigators, 2013
Arc Mapping Basics, CFITrainer.net, 2012
Forensic Photography Seminar, International Association of Arson Investigators, 2012
Vehicle Fire Failure Analysis Seminar, International Assoc. of Arson Investigators, 2011
Diagnosing Material Failures, American Society of Mechanical Engineers, 2011
Daubert & Expert Testimony Seminar, International Assoc. of Arson Investigators, 2011
Scene & Investigator Safety Training Seminar, Int'l Assoc. of Arson Investigators, 2010
Fire Investigation of Alternative Fuel Vehicles, Int'l Assoc. of Arson Investigators, 2010
Forensic Evidence Collection & Processing, Int'l Assoc. of Arson Investigators, 2010
Natural Gas Seminar, International Association Arson Investigators, 2010
Fundamentals of Motor Vehicle Fire Investigation, Society Automotive Engineers, 2009
Commercial Kitchen Fire Losses, Nat'l Assoc of Subrogation Professionals, 2009
Effective Investigation & Testimony Course, Int'l Assoc. of Arson Investigators, 2009
Investigation of LP Gas Fires & Explosions, Int'l Assoc. of Arson Investigators, 2008
Plastics Failure Analysis Seminar, Society of Plastics Engineers, 2007
Investigating Residential Dryer Fires, Fire Findings Laboratories, 2007
English XL Variable Incidence Tribometer Certification Program, 2006
Vehicle Fire, Arson & Explosion Investigation, Nat'l Assoc. of Fire Investigators, 2005
Boiler Operation, Maintenance & Safety, American Trainco, 2004
Tire Failure Analysis in Traffic Accidents, University of California Riverside, 2004
Toilet Assembly Failures, National Association of Subrogation Professionals, 2004
Tire & Wheel Safety Issues, Society of Automotive Engineers, 2004
Testifying Skills for Engineers, American Society of Civil Engineers, 2003
Troubleshooting Concrete Construction, The American Concrete Institute, 2002
Investigation of Gas and Electric Appliance Fires, Fire Findings Laboratories, 2002
Advanced Vehicle Fire Investigation, Steve R. Mackaig & Associates, 2001
Natural Gas Seminar, International Association of Arson Investigators, 2001
Determining Cause & Origin of Fires/Explosions, Nat'l Assoc. of Fire Investigators, 2000
Low Speed Auto Accidents, Lawyers & Judges Publishing Company, 1999
Mechanics of Vehicle Theft Seminar, Lee S. Cole & Associates, 1999
Low Speed Impact Analysis & Crash Testing, Engineering and Fire Investigations, 1999
High Speed Rear Impact TOPTEC Symposium, Society of Automotive Engineers, 1997
Investigation of Vehicle Fires, Lee S. Cole & Associates, 1994
Vehicle Accident Reconstruction Training Seminar, Failure Analysis Associates, 1994

COURSES AS AN INSTRUCTOR & GUEST LECTURER:
The Mechanics of the Collision, National Business Institute, 2012
Ford Cruise Control Failures & Fires, Pacific Rim Investigative Services, 2011
Low Speed Biomechanical Analysis, The Hartford Insurance Co., 2003
Mechanical Engineering Investigation of Fires, Arizona Risk Management Dept., 2002
Low Speed Biomechanical Analysis, Wisconsin Insurance Claims, 2001
Low Speed Biomechanical Conference, American National Property & Casualty, 2000
Accident Reconstruction, Arizona Insurance Claims Association, 1998

PUBLICATIONS & PRESENTATIONS:
"The Physics and Anatomy of Auto Collisions – The Mechanics of the Collision", National Business Institute, January 2012 (58447)

"High Speed Rear Impact Crash Test Video and Notebook"
Society of Automotive Engineers, January 1998 (with S.M. Werner).

"Heavy Truck Crashworthiness Phase III," Society of Automotive Engineers, Cooperative Research Project, Report No. CRP-013, April 1997 (with R.E. Larson, M.C. Marine and S.M. Werner). (This project resulted in the development of the SAE Recommended Practices J4218, J4219, J2420, J2421, J2422, J2423, J2424, J2425, and J2426).

"Ignition and Combustion of Automotive Carbon Canisters," Failure Analysis Associates, Inc. Report, October 1991 (with D.A. Limbert, R.C. Lange, and J.L. Wirth).

"Comparative Refueling Losses from Disconnected Evaporative Emission and Onboard Refueling Vapor Recovery Systems," Failure Analysis Associates, Inc. Report, October 1991 (with R. C. Lange and D.A. Limbert).

"Refueling Vapor Ignition Demonstration," Failure Analysis Associates, Inc. Report, October 1991 (with N.K. Cooperrider).

"Thirty MPH Side Impact Crash Test 1985 Buick Century with Mobile Oil Company Onboard Refueling Vapor Recovery System," Failure Analysis Associates, Inc. Report, February 1988 (with N.K. Cooperrider and T. Thomas).