Romualdi, Davidson & Associates
Consulting Engineers

David J. Bizzak

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Areas of Specialization

Analysis of machine and consumer product design/manufacturing defects; automotive defect investigation; analysis of electronic and hydraulic equipment malfunctions; traffic accident reconstruction; slip, trip and fall accidents; property loss investigation; vehicle fire investigation; and structural fire investigation.

Certified Fire and Explosion Investigator, National Association of Fire Investigators - 2010
Certified Vehicle Fire Investigator, National Association of Fire Investigators - 2011

Professional Registration

Registered Professional Engineer:

- Pennsylvania
- West Virginia
- South Carolina
- Mississippi

Educational Background

Carnegie Mellon University	Ph.D.	Mechanical Engineering (1993)
	M.S.	Mechanical Engineering (1989)
Texas A&M University	B.S.	Mechanical Engineering (1982)

Employment History

2020 - Present	President, Romualdi, Davidson and Associates, Inc.
1994 - Present	Romualdi, Davidson and Associates, Inc.
1988 - 1993	Independent Engineering Consultant
1987 - 1988	International Technology - Staff Consultant, Risk Control Services
1982 - 1987	Delian Corporation - Engineering Consultant

Professional Experience

Conducted engineering investigations related to a variety of litigation issues including: reconstruction of industrial accidents, machine design and machine guarding, automotive design and manufacturing defects, faulty or improper maintenance responsible for machine or automotive system failures, pedestrian slip-and-fall accidents, fire protection system failures, property loss, and consumer product design and manufacturing defects.

Investigated over 1,150 accidents associated with various industrial machines, such as mechanical and hydraulic presses, plastic injection molding machines, various special-purpose industrial machines, conveyor systems, agricultural machinery, materials handling systems, fork lifts, scissor lifts, skid-steer loaders, backhoes, excavators, dump trucks, cranes, augers, power hand tools, pneumatic chipping hammers, etc. The technical analyses performed in these accidents have included evaluation of machine design, guarding, adequacy of system or machine controls, machine maintenance, and causes of specific component failures.

Engineering investigations of golf car accidents have included performance testing and design evaluations of specific components and subsystems of electric- and gasoline-powered cars. Similar design evaluations have been performed on components and/or systems of motorcycles, all-terrain vehicles, and riding lawn mowers.

Evaluated causes of reported equipment malfunctions associated with subcomponent failures (sensors, safety switches, etc.) and/or operator error, as well as intermittent faults associated with control system faults (software or electrical).

Fire investigation experience includes the investigation of over 900 fires. These investigations have included examination of kitchen and household appliances, furnaces and boilers, industrial equipment; gasoline-powered lawn equipment; vehicles; and electrical circuitry. Investigated causes of explosions associated with flammable gases, as well as flammable dusts. Assessed damage to equipment exposed to fire conditions within retail establishments.

Evaluate causes of extensive property damage and personal injury associated with commercial coal-, oil- and gas-fired commercial power boilers. Such evaluations have included evaluation of role of control system faults, operator error, and combustion issues.

Evaluated property losses related to failures of fire protection systems, plumbing system failures, heating system component failures. These investigations have many times included material analysis of failed components to identify proximate cause of failure, such as corrosion, freeze failure, mechanical damage, design or manufacturing defect, etc.

Conversant with building construction issues. This experience includes knowledge of applicable building code and design requirements, as well as standard of care in design and construction. In addition, designed and managed construction of a residence, to including permitting and ensuring construction in compliance with building code requirements.

Working in conjunction with independent laboratories have evaluated material issues such as spontaneous brittle fracture of PVC piping systems, brittle fracture of high-tension electrical towers, failure of automotive components, plumbing system fittings, environmental stress corrosion cracking, and material specification issues.

In course of engineering investigations have developed protocols and conducted instrumented tests to aid reconstruction. Such testing has included temperature profile monitoring of heating/cooling coils of an HVAC air handler in which low-temperature freeze failures had occurred, furnace heat exchanger surface temperature testing to determine potential for smoldering ignition, breaking strength of glass to aid reconstruction of accidents, skid tests of automobiles and heavy trucks to determine braking capabilities, friction tests of footwear material/flooring surfaces, failure testing of components, long-term monitoring of performance of a malfunctioning fire protection deluge valve, measurement of force and acceleration in recreations of accidents, vehicle performance tests to assess acceleration and performance of specific vehicles, and monitoring of vehicle powertrain control module (PCM) inputs/outputs to establish nominal voltage profiles and/or detect system abnormalities.

Responsible for extensive technical analyses, laboratory testing and vehicle testing to identify the proximate cause of sudden acceleration incidents (SAIs) in a population of vehicles that exhibited an elevated reporting rate of SAI. Other vehicle defect investigations have included causes of unintended movement after shifting automatic transmission to park, analysis of alleged braking and steering system malfunctions and alleged premature tire failure.

Evaluated adequacy of the technical design of a variety of consumer products or components of a product. Examples of such investigations have included the blade retention device of a utility knife, seat retention mechanisms on exercise machines, motorcycle/ATV throttle components, adequacy of guarding and warnings on corn pickers, automotive lifts, and a chain retention mechanism on an automotive collision repair device.

Pedestrian slip-and-fall evaluations have included evaluation of friction required to support normal human gait, compliance of premises with building codes, effects of floor surface elevation changes, evaluation of stairway and handrail design, field testing of floor surfaces to determine static and dynamic coefficient of friction, testing of pedestrian footwear to determine static coefficient of friction against floor surfaces, and testing to evaluate effect of debris on static coefficient friction of walkway surfaces.

Performed reconstructions of over 880 traffic accidents involving analyses related to the following: single- and multi-vehicle accidents, daytime and night time automobile-pedestrian accidents, automobile-bicycle/motorcycle accidents, heavy truck accidents, vehicle and pedestrian speeds, low-speed collisions, computer modeling of single- and multi-vehicle collisions, automotive mechanical failures, vehicle crashworthiness, sight distance, nighttime visibility, and traffic signal operation. Analyses have also included evaluation of collision severity and potential for low-speed collisions to cause injury.

Developed and demonstrated a highly accurate laser-induced fluorescence (LIF) thermal imaging system designed to provide two-dimensional remote temperature measurement with a high degree of spatial resolution. The basic design concepts validated by this effort were to be employed in a planned turbine test research facility to be constructed at the Wright Patterson Air Force Base.

Performed and/or reviewed the human error analyses for several nuclear power plant probabilistic risk assessments (PRAs). These analyses, designed to quantify the probability of human error, consisted of a critical evaluation of the human-machine interface, time available for human action and the influence of stress and other performance shaping factors on human response.

Conducted analyses to resolve numerous engineering issues associated with nuclear power plant emergency procedure modifications at the Ginna nuclear power station. For example, assessed the adequacy of the Ginna nuclear power station emergency core cooling system to provide long-term cooling in the event of a loss-of-coolant accident.

As a lead technical analyst, supported development of Level I probabilistic risk assessments for several nuclear power stations. Responsibilities encompassed development of logic models to depict impact of component failures on complex systems, compilation of plant-specific component failure rate data, determine nuclear power plant response to anticipated transients, development of a methodology for quantifying dynamic and latent human errors that affected system operation or plant response and quantification of the probability of potential nuclear power plant accident sequences.

Served as technical expert for the International Atomic Energy Agency (IAEA). In the capacity of a nuclear risk assessment expert, assisted the Jozef Stefan Institut (Ljubljana, Slovenia) in their efforts to develop a Level I PRA for the Krsko nuclear power station.

Served as lead analyst and technical manager in an Electric Power Research Institute (EPRI) research project. Responsible for the development and demonstration of a methodology for applying probabilistic risk assessment techniques to resolve technical specification problems.

Developed a scheme to use plant-specific risk assessments to estimate the safety significance of proposed plant improvements, which served as one input for an Integrated Living Schedule Program (ILSP) used by Philadelphia Electric to prioritize projects for resource allocation.

Professional Affiliations

American Society of Mechanical Engineers
Society of Automotive Engineers
National Association of Fire Investigators

Honors

Tau Beta Pi
Sigma Xi
NASA Graduate Student Research Fellowship
U.S. Air Force Summer Research Associate

Teaching Experience

University of Pittsburgh
ME 1042 – Mechanical Measurements II (senior-level engineering laboratory)
ME 2053 – Advanced Heat Transfer (graduate-level heat transfer)

Instructor for Pennsylvania Bar Institute seminar on “Handling the Slip, Trip and Fall Case,” August 19, 2010, Pittsburgh, Pennsylvania.

Instructor for Forensic Fridays at Duquesne University, “Product Liability: An Engineer’s Perspective,” September 10, 2010, Pittsburgh, Pennsylvania.

Instructor at the Pennsylvania Association of Arson Investigation Training, Appliance Fire Investigation, January 22, 2011, State College, Pennsylvania.

Instructor for Port Authority Transit Training, “Practical Vehicle Fire Investigation,” August 14, 2019, Pittsburgh, Pennsylvania.