



## DANIEL MCDONOUGH, P.E., C.F.E.I., A.C.T.A.R. PROFESSIONAL BIOGRAPHICAL OUTLINE

### BACKGROUND

Mr. McDonough is a mechanical engineer and accident reconstructionist specializing in the safety of mechanical systems and devices including: automotive, marine, aviation, recreational, commercial and industrial equipment and systems. He consults in the design, test, evaluation and investigation of such systems. He received his B.S. in Mechanical Engineering and his M.S. in Mechanical Engineering concurrently at Drexel University. He has experience in designing, analyzing, fabricating, and investigating mechanical and electro-mechanical systems. He is a licensed Professional Engineer. He is a Certified Fire and Explosion Investigator. He is accredited as a Traffic Accident Reconstructionist by the Accreditation Commission for Traffic Accident Reconstruction, and a certified Crash Data Retrieval analyst.

He has investigated hundreds of vehicle crashes and mishaps, as well as mechanical system failures and fires. He was the on-site test engineer for sled and rollover testing to evaluate various restraint systems in military HMMWV vehicles. He has participated in sled testing to evaluate various automotive restraint systems. He has designed and conducted numerous quasi-static rollover inversion tests to evaluate kinematics and human interaction with various vehicle restraint systems in rollover situations. He has set up and participated in full-vehicle drop tests to evaluate roof strength characteristics. He has set up and participated in low-speed impact simulation and vehicle crash testing. He has also conducted numerous dynamic and static tests on various mechanical devices and components. He has set up and conducted performance testing of marine components. He has designed vehicle occupant protection systems for the United States Army, including a novel seating system for mitigating mine blast injuries. For this work two patents have been awarded by the United States Patent Office. He has consulted with the National Hockey League regarding rink design to improve player safety, leading to rink changes implemented by the League.

Mr. McDonough has expertise in the analysis and investigation of motorcycle mishaps. He has extensive experience with the theory, design, repair, and operation of motorcycles, both on and off road. He has many years of personal experience and training, including off road riding, street riding, and track riding. He applies this knowledge and experience to mechanical investigations and accident reconstruction of incidents involving motorcycles.

Mr. McDonough specializes in the investigation of all types of mechanical system failures. This includes household and commercial appliances, consumer products, recreational products, plumbing systems, and heating, ventilation, and air conditioning (HVAC) systems. He investigates residential, industrial, commercial, and construction machinery and equipment with regards to safety, code compliance, fire origin and cause, and mechanical failures. He also conducts vehicle mechanical investigations along with vehicular traffic crash reconstruction.

### AREAS OF SPECIALTY

- Mechanical Systems Analysis
- Static and Dynamic Testing
- Forensic Analysis
- Plumbing & HVAC Analysis
- Traffic Accident Reconstruction
- Motorcycle Crash Investigation/Reconstruction
- Data Acquisition and Analysis
- Machine Design and Safeguarding
- Occupant Protection
- Instrumentation Setup and Evaluation
- Safety & Codes Analyses
- Fire Origin & Cause Investigation

## FORMAL EDUCATION

- Master of Science in Mechanical Engineering and Mechanics, Drexel University, 2003
- Bachelor of Science in Mechanical Engineering and Mechanics, Drexel University, 2003

## PROFESSIONAL EXPERIENCE

### May 2004 – Present | ARCCA, Incorporated | Mechanical Expert and Accident Reconstructionist

- Conducts engineering analysis and evaluation related to human protection and safety issues
- Conducts safety, codes and failure analyses for plumbing & HVAC issues
- Conducts failure analyses of residential, commercial, and industrial appliances and equipment involving property damage and personal injury
- Designs, fabricates, investigates, and evaluates various mechanical systems
- Conducts static and dynamic tests of automobile, marine, aviation, industrial, commercial, residential and recreation equipment
- Designs mechanical and electronic data measuring systems for use in both static and dynamic tests
- Evaluates human protection systems for functionality and performance with emphasis on human interaction with the system
- Performs accident reconstruction and mechanical investigation and analyses of vehicle collisions and mishaps
- Conducts investigations and analyses of motorcycle mishaps, including mechanical failures and defects as well as accident reconstruction

### June 2003 – May 2004 | Clayton H. Landis Company, Inc. | Engineer

- Designed and fabricated mechanical and electro-mechanical systems for use in the production environment
- Focused on human interaction with the system, including design of safety guards
- Developed computer models of systems and full machining and fabrication prints
- Worked with the designs through development and into manufacture of the end item
- Interacted with machine shop, sales, project management, and customers from a wide range of industries

### June 2002 – June 2003 | Drexel University Formula SAE Team | Team Leader

- Organized and led team in design, construction, and testing of a formula racecar
- Specialized in the theory, design, and fabrication of the suspension system and components
- Conducted static and dynamic testing of components, sub-systems, and full vehicle
- Designed test apparatus and test methods
- Planned timeline, developed budget, obtained sponsorship
- Managed team, planned and led meetings and work sessions
- Worked closely with faculty advisors, corporate sponsors, and industry representatives



### March 2001 – September 2001 | Ametek Aerospace, Inc. | Engineer

- Investigated, analyzed and solved issues with equipment production
- Worked closely with manufacturing and quality control
- Created detailed database of parts and processes
- Reviewed drawings to be sent for quote. Communicated with vendors regarding prints and applications

### March 2000 – September 2000 | Boehringer Laboratories, Inc. | Project Engineer

- Designed, developed, and assembled biomedical equipment
- Analyzed current products to reduce cost
- Performed accelerated life cycle testing and conducted failure analysis
- Conducted materials testing and analysis

## PROFESSIONAL AFFILIATIONS AND CERTIFICATIONS

- Member, Society of Automotive Engineers
- Member, American Motorcycle Association
- Member, American Society of Safety Engineers
- Member, National Association of Fire Investigators

## SPECIALIZED COURSEWORK

- Traffic Crash Reconstruction, Institute of Police Technology and Management, November 2009 (80 hour course)
- Fundamentals of Motor Vehicle Fire Investigation, SAE International, March 2011
- Crash Data Retrieval System Data Analyst Course, October 2011 (40 hour course)
- Motorcycle Crash Investigation, Institute of Police Technology and Management, July 2013 (40 hour course)
- International Fire, Arson & Explosion Investigation, March 2016 (32 hour course)

## PATENTS

Co-inventor of Dual Stage Variable Load Energy Absorber for Vehicle Seating, U.S. Patent No. 8,162,374B2, April 24, 2012.

Co-inventor of Dual Stage Variable Load Energy Absorber for Vehicle Seating, U.S. Patent No. 8,439,420B2, May 14, 2013.

## PUBLICATIONS

Harrington, S., Teitelman, J., Rummel, E., Morse, B., Chen, P., Eisentraut, D., & **McDonough, D.** (2017). *Validating Google Earth Pro As a Scientific Utility for Use in Accident Reconstruction* (No. 2017-01-9750). SAE Technical Paper.

Lynch, R.T., **McDonough, D.M.**, and Keon, T. (2012) *An Update to the Dynamic Response Index (DRI) model for use in assessing seat performance in military ground vehicles*. SAFE Symposium, 2012

Benda, B., Gushue, D., Joganich, T., Markushewski, M., **McDonough, D.**, Probst, B., (2006) *Effects of Velocity and Occupant Sitting Position on the Kinematics and Kinetics of the Lumbar Spine during Simulated Low-Speed Rear Impacts*. Safety, 2006, Seattle, WA, ASSE.