



# MICHAEL A. STICHTER, Ph.D., P.E., CFEI, CVFI

## PROFESSIONAL BIOGRAPHICAL OUTLINE

### BACKGROUND

Dr. Stichter is a licensed professional mechanical engineer with extensive experience in automotive, recreational, transportation, agricultural, commercial and industrial equipment and systems.

He has more than twenty years of experience in industrial manufacturing engineering; including gas turbine blades and vanes coatings, box trucks, hot aerospace structures, and gas generation equipment. His experience also includes design of manufacturing operations and specialized equipment such as machine guarding for personnel safety.

He has extensive experience inspecting and commissioning industrial gas generation systems at customer sites around the world (EMEA, Asia, Australia); including metals processing, glass manufacturing, and electrical power plants. He has engineered PEM Fuel Cell stacks and balance of plant, and related testing equipment; sensors, valves, pumps, humidification, phase separation, electrical load, and control systems.

### AREAS OF SPECIALTY

- Failure Investigation and Analysis of:
  - Mechanical Components
  - Electrical Components
  - Hydraulic Components
  - Control Systems
- Machine Guarding, Lock out/Tag out
- Industrial and Construction Safety
- Forensic Engineering
- Oxygen Safety
- Boat Fires & Failures
  - Engines, cooling & hydraulic systems, piping, tanks, etc.
- Combustion chemistry detection, measurement, and controls
- Mechanical Engineering
- Consumer Appliance Failure
- Accident Investigation
- Battery Failure/Fire
- Codes and Standards
- Piping/Plumbing/HVAC
- Power Tools
- Fire Origin and Cause
- Laser Safety
- Hydrogen Safety
- Automobile Restoration – work quality, standards, and process

### LICENSES & CERTIFICATIONS

- Licensed Professional Engineer (PE)
  - Pennsylvania, PE # PE089115; Maryland, PE # 47945; Delaware # 22096; Massachusetts # 53988; New York # 099396; Colorado # PE.0054684, New Jersey # 24GE05471500, Texas # 134597, Alabama # 38527-E
- Certified Fire and Explosion Investigator (CFEI), NAFI# 22271-12997v
- Certified Vehicle Fire Investigator (CVFI)
- Certified Fire Investigation Instructor (CFII)
- Remote Pilot, Small Unmanned Aircraft System, FAA 4043459
- Private Pilot, ASEL, FAA 4369186
- Fork Lift Operation
- Bosch CDR Technician
- Certified Marine Investigator (CMI), #179 – IAMI #4304

## SUMMARY OF EXPERIENCE

Dr. Stichter's professional work experience includes:

- Electrochemistry including fuel cell and battery design and failure analysis.
- Hydrogen and oxygen gas generation and plant engineering, construction, and failure analysis.
- Palletized gas generation systems, water purification, fire safety sensors and response systems.
- Gas compression, transfer, and storage equipment; piping and high pressure storage.
- PLC and HMI for control and monitoring of industrial operations

Dr. Stichter has more than twenty years of experience in the design, manufacture, repair, and operation of passenger and high performance motorcycles and racing cars from model years 1910 until today.

His interest in automobiles inspired him to start his post-secondary education at McPherson College, in McPherson, KS, where he earned an Associate of Technology degree in Automotive Restoration Technology. This program included concentrated lab work in mechanical, body/paint, and trim restoration. He applied this hands-on experience to further education by going on to study mechanical engineering at Drexel University. While pursuing his BSME degree, he gained experience in aerospace development and manufacturing.

After earning his BSME, he joined Teledyne Energy Systems where he continued working on development projects for aerospace H<sub>2</sub>/O<sub>2</sub> PEM fuel cells. He developed systems for micro- and lunar-gravity passive reactant recirculation and water separation, and controls for the fuel cell system. He also engineered, commissioned, and repaired hydrogen (and oxygen) generation plants. These systems included the hydrogen generators (by electrolysis), compressors, storage tanks, deionized water, chillers, control systems, flame and gas detectors, and interconnecting piping.

Dr. Stichter's graduate research work focused on optical diagnostics of combustion chemistry and included performing ultraviolet (uv) laser induced fluorescence (LIF) experiments studying the OH radical in the afterglow of a nanosecond pulsed plasma discharge at temperatures below the auto-ignition threshold; cavity ringdown spectroscopy (CRDS), magneto-optic rotation (MOR), and cavity enhanced magneto-optic rotation (CEMOR) experiments studying OH concentrations in a lean methane-air slot burner; and development of a novel cw-CEMOR spectroscopy system to study small peroxy radicals in a flash photolysis facility. This research is applicable to engineered products such as in flame detection and chemical concentration measurement for safety and process control.

Dr. Stichter received his Doctor of Philosophy, a Master of Science in Mechanical Engineering, and a BSME from Drexel University.

## FORMAL EDUCATION

- Doctor of Philosophy in Mechanical Engineering, Drexel University
- Master of Science in Mechanical Engineering, Drexel University
- Bachelor of Science in Mechanical Engineering, Drexel University
- Associate of Technology, Automotive Restoration Technology, McPherson College

## PROFESSIONAL EXPERIENCE

### January 2017 – Present | ARCCA, Inc. | Senior Mechanical Engineer

- Failure analysis of automobile components and systems; piping; manufacturing equipment
- Failure analysis of mechanical devices including industrial equipment such as fork lifts
- Fire investigation of vehicles, structures, batteries, etc.
- Testing and development of player safety components for NHL
- Research in failure modes of lithium-ion batteries in consumer devices; i.e. e-cigarettes and hoverboards

### September 2006 – September 2010 | Teledyne Energy Systems | Hydrogen Systems Project Engineer

- Managed and engineered hydrogen generator systems projects; design, build and test
- Commissioned and engineered retrofits for field upgrades of hydrogen generation systems from 50 slpm to 1000 slpm
- Designed and tested water separation and fluid recirculation systems for micro/zero-g PEM fuel cell systems
- Developed regenerative H<sub>2</sub>/O<sub>2</sub> PEM fuel cell stack and balance of plant
- On-site investigation, repair, testing and support of fuel cell test stations
- Authored and edited Operations and Maintenance manuals for plant equipment
- Engineered control system for storage of Multi-mission Radioisotope Thermoelectric Generators (MMRTG)

### April – September 2005 | General Electric – Ceramic Composite Products | Project Engineer Intern

- Engineering support for manufacturing of carbon matrix/silicon carbide fiber parts for on-orbit plug and patch repair of wing leading edge and thermal protection tiles for Space Shuttle Orbiter, used on STS-114+

### September 2003 – March 2004 | Teledyne Energy Systems | Development Engineer Intern

- Designed and operated electrolysis separator material testing facility
- Operation and maintenance of PEM Fuel Cell life testing stations

### September 2002 – March 2003 | Pratt & Whitney – Advanced Coatings | Manufacturing Engineer Intern

- Engineering support of advanced coating technologies for thermal protection systems including Electron Beam-Physical Vapor Deposition of ceramic and Cathodic-Arc metallic coating of turbine blades and vanes

### June – September 2002 | Supreme Mid-Atlantic Corporation | Lean Manufacturing Coordinator

- Plant layout re-design for process efficiency gains through personnel safety
- Design and build machinery for truck body manufacturing
- Value Stream Mapping, 5S training

### September 2000 – February 2001 | John's Motor Service | Assistant Automotive Technician

- Automotive and light truck service and repair, shop equipment maintenance

## ACADEMIC EXPERIENCE

### Research Fellow: Combustion Chemistry & Optical Diagnostics, Drexel University, 2010 – 2016

Dissertation Title: Cavity Enhanced Magneto-Optic Rotation for Measurement of HO<sub>2</sub>

## PROFESSIONAL SOCIETIES

- Society of Automotive Engineers (SAE)
- American Society of Mechanical Engineers (ASME)
- American Motorcycle Association
- National Association of Fire Investigators (NAFI)
- American Society for Testing Materials (ASTM)
  - Committee for Flammability Hazards in Oxygen Systems
- Experimental Aircraft Association (EAA) – Lifetime member
- National Academy of Forensic Engineers (NAFE) – Member # 1162

## SPECIALIZED COURSEWORK

Fire Hazards in Oxygen Systems, ASTM, April 2008

Combustion Energy Frontier Research Center, NSF, and Combustion Institute, June 2013

Vehicle Fire, Arson, and Explosion Investigation Science and Technology Seminar, September 2017

Accessing and Interpreting Heavy Vehicle Event Data Recorders, May 2018

## PUBLICATIONS AND PRESENTATIONS

**Stichter, M.;** “Why Lithium-Ion Batteries Fail, And What to Do About It,” The 10<sup>th</sup> Annual Battery Safety Summit, Alexandria, Virginia, October 22-25, 2019. Chair of Battery Fires & Investigations session.

**Stichter, M.;** “Anatomy of Failure - Understanding the causes of lithium-ion battery fires,” CLM Magazine, The CLM, August, 2017.

**Stichter, M.A.;** Cernansky, N.P.; Miller, D.L.; “Continuous Wave CEMOR for Measurement of HO<sub>2</sub>,” 10<sup>th</sup> US National Meeting of the Combustion Institute at the University of Maryland April 23-26, 2017.

**Stichter, M.A.;** Robbins, J.R.; Cernansky, N.P.; Miller, D.L.; “Continuous Wave Cavity Enhanced Magneto-Optic Rotation Spectroscopy for Small Combustion Radicals,” Poster presented at 9th US National Meeting of the Combustion Institute at the University of Cincinnati May 17-20, 2015.

Wu, L.; Lane, J; **Stichter, M;** Cernansky, N; Miller, D; Fridman, A; “Effects of N<sub>2</sub>(v) and NO in Plasma-assisted Oxidation and Ignition Below Auto-ignition Threshold,” AIAA 51st Aerospace Sciences Meeting, Grapevine, TX, January, 2013.

Lane, J.L.; **Stichter, M.A.;** Cernansky, N.P.; Miller, D.L.; “Development of a Sensitive and Selective Laser Diagnostic Technique for Measuring Paramagnetic Species,” 8th US National Meeting of the Combustion Institute at the University of Utah May 19-22, 2013.

Lane, J.L; **Stichter, M.A.;** Cernansky, N.P.; Miller, D.L.; “A Flash Photolysis Facility for Fundamental HO<sub>2</sub> Studies,” 8th US National Meeting of the Combustion Institute at the University of Utah May 19-22, 2013.

Lane, J.L.; **Stichter, M.A.;** Cernansky, N.P.; Miller, D.L.; “Selective Observation of the Anomalous Zeeman Effect Using Magneto Optic Rotation,” Fall Technical Meeting of the Eastern States Section of the Combustion Institute at the University of Connecticut, October, 2011.

**Stichter, M.A.;** Ibrahim, S.; “Hydrogen Generation from Electrolysis,” Teledyne Energy Systems, Inc. DOE/GO/13028-001, 2008.