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FIELDS OF EXPERTISE

Electrical Fire and Mechanical Failure Analysis, Injury Prevention, Electrical Shock and Mechanical Injury Analysis, Safety, Warnings, and Hazard Analysis, Training, Research, Product and Process Design, Quality Assurance and Reliability.

PROFESSIONAL EXPERIENCE

SYNERGY TECHNOLOGIES LLC, Cedarburg, WI, 10/94 to present **President and Professional Engineer**

Successfully operate an engineering consulting firm to provide investigation services in field failure analysis for electrical, mechanical, and electrical shock and mechanical injury matters and new product, and safety and warnings development. Produced the first of its kind training video on electricity and electrical fires. Research and Development is ongoing in the areas of recreating, studying, and documenting electrical and mechanical failure modes for use in scientific forensic analysis. Has spoken about electrical fire analysis extensively in the US and abroad. Has testified over 50 times in both State and Federal Courts.

GARDNER BENDER INC. /APW TOOLS AND SUPPLIES, Milwaukee, WI 10/90 to 8/99 **Senior Project Engineer**

Started and built the engineering function at GB (\$45 million in sales-'90 and \$145 million in 1999). Justified and initiated use of AutoCAD and Pro-Engineer at GB. Managed Testing Lab along with all engineering, safety and warnings issues, lab test, tooling, fixturing, gauging, UL/CSA Listing for Wire Connector product line. Developed new products/systems for Wire connectors, justified and implemented Pro-Engineer CAD/CAM System, and Member of UL Industrial Advisory Council - 486C -Splicing Connectors.

JOHNSON CONTROLS, INC 1/98 to 12/98 **Project Design Engineer, Consultant**

Performed Project Engineering for a new and innovative Automotive Battery design. Design details are proprietary at this time. Responsibilities included product design, CAD modeling, performance testing in electrical connectivity and mechanical structural integrity, design for manufacturing, safety, and cost analysis.

MILWAUKEE AREA TECHNICAL COLLEGE, Milwaukee, WI 9/91 to 12/91 **Teacher Beginning** **Statistics Class**

**KOHLER CO., Kohler, Wisconsin 6/86 to 9/90, Plumbing and Specialty Products Division,
Senior Mechanical Project Engineer**

Developed numerous new products along with coordinating the team effort and supervising drafters and lab test technicians. Responsibilities included design, testing, drawings, warnings and manuals, and organizing these efforts with Marketing and Manufacturing. Initiated the use of Failure Mode and Effects Analysis and integration of this information into Test Procedures. Supervised staff of six including drafters, designers, and technicians.

STA-RITE INDUSTRIES, Delavan, Wisconsin 6/79 to 6/86

Project Engineer / Account Executive 7/85 to 6/86

In addition to the project engineering duties, coordinated sales, production, engineering, safety and quality efforts concerning existing and new products for the \$1 million Kohler Co. OEM spa system account.

Project Engineer 6/79 to 7/85

Designed a new product line of systems for the spa industry including directing test lab technicians to perform function, life cycle, safety, and UL tests. Wrote manuals and safety warnings. Systems consisted of pumps, heaters, blowers, filters, and controls in a pre-plumbed and pre-wired configuration. Member of IAC-UL 1563 Standard for Spas and Hot Tubs (85-86).

EDUCATION/CERTIFICATION/AWARDS

1. Bachelor of Science, Electrical Engineering, 2002, Univ. of Wisconsin-Milwaukee, 3.67/4.0, Cum Laude, Golden Key Honor Society. Includes courses in Power Systems, Power Electronics, Motor Control, and Medical Instrumentation. Senior design team won First Place in design competition.
2. Bachelor of Science, Mechanical Engineering, 1979, Marquette University, Milwaukee, WI 3.37/4.0.
3. Professional Engineer, currently licensed in Wisconsin (30414), Illinois (062-056692), Michigan (6201050939), Minnesota (43174), Iowa (16902), and Indiana (PE10403231).
4. Certified Fireplace Inspector, Fireplace Investigation Research and Educational Service (F.I.R.E. Service), September, 2007, #FP-175.
5. Hazwoper, 40 hour, Certified (Hazardous Waste Operations and Emergency Response), October 2013.
6. General Manager's Award, Certificate of Excellence, Applied Power/Gardner Bender, H1/H2 Wire connector designs and manufacturing/tooling implementations, 2006.
7. President's Award, Certificate of Excellence, Applied Power/Gardner Bender, G1/G2 Wire connector designs and manufacturing/tooling implementations, 2004.
8. Certified Quality Engineer, ASQ (American Society for Quality) – No. 30197, December 1993.
9. EMTI - Delavan Rescue Squad Inc., 1983-1986.
10. Customer Care Award, Sta-Rite Industries, Portable Spa System Design Project for Fort Wayne Pools, 1983.

TESTIMONY EXPERIENCE (68 total)

1. State court testimonies: 11
2. Federal court testimonies: 1
3. Depositions: 56

CONTINUING EDUCATION

1. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, General Fire Investigation Seminar, Topics: Residential Electrical and Gas Fires, Semi-Tractor Trailer and Heavy Equipment Fires, Utility Theft, Statewide Info. Sharing Systems. Manitowoc, WI, Sept, 2017.
2. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, General Fire Investigation Seminar, Topics: Fire Pattern Analysis, Basic Explosion Analysis, Identifying Deceptive Behavior, Dehumidifier Case Study. Stevens Point, WI, June, 2017.
3. ISFI (International Symposium on Fire Investigation Science and Technology), NAFI, Scottsdale AZ, Sept. 12-14, 2016. Topics: Lithium Ion Batteries, Receptacle Overheating, Arc Mapping, Heating Elements, Circuit Breakers, Vehicle Fires, Case Studies, CSST, Fan Coil Units, Battery Cables, ECU Fire Science Program Development, and Energized Structures.
4. Webinar (Cozen and O'Connor), Lithium Batteries & Subrogation - March 31, 2016.
5. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, General Fire Investigation Seminar, Topics: Profiling the Fire Setter, Gas Explosions, Hazardous Materials for the Fire Investigator, and Marine Fires. Green Bay, WI, Sept/Oct, 2015.
6. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, General Fire Investigation Seminar, Topics: Preparing for Daubert Challenges, Civil Litigation Issues, Case Studies, Analytical Interviewing Techniques, Materials and their Reactions to Fire, and Photography, covers NFPA 1033 – 1.3.7 (1, 8, 10, 11, and 15). Stevens Point, WI, June, 2015.
7. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, General Fire Investigation Seminar, Topics: Smoke detectors. Ignitable liquid research, evidence collection, forensic examination of fire debris. Vertical ventilation research study, and investigative programs for iPad and tablets, covers NFPA 1033 – 1.3.7 (2, 3, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16). Green Bay, WI, Sept/Oct, 2014.
8. NASP Subro College 200 Training Session, Topics Include: Investigation, expert reports, to litigation, to settlement, Marshfield, WI, Sept. 25, 2014.
9. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, General Fire Investigation Seminar, Topics: Managing Complex Scene Investigations, Fire Dynamics and Fire Protection Systems, Forensic Examination of Fire Effects on Human Remains, Building Codes for Fire Investigators, HAZMAT Scenes and Case Study on Columbus, WI Chemical Plant Explosion, Stevens Point, WI, June, 2014.

10. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, General Fire Investigation Seminar, Topics: Wildland Fire Investigation, NFPA 1033, Qualifications, Vehicle Fire Investigation, Arc Mapping, and Fuel/air Explosions, Brookfield, WI, November, 2013.
11. Hazardous Waste Operations and Emergency Response (Hazwoper), 40 hour course, including hands-on training, October 2013.
12. Dane County Arson Response Initiative (DCARI), September 21, 2013, Elevated Fires, Steve Carson.
13. Chevrolet Volt Operation Presentation: April 24, 2013, Holz Motors, Milwaukee, WI.
14. Fire and Materials Conference, Interscience Communications, San Francisco, CA, January 2013.
15. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, General Fire Investigation Seminar, Pewaukee, WI, November, 2012.
16. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, Advanced Seminar, Manitowoc, WI, November, 2011. Topics: Building Construction, CSST Fires, Arc Mapping, NFPA 921 Updates, Juvenile Fire setters, and Case Studies.
17. National Propane Gas Association, Certified Employee Training Program, 1.0 Basic Principles and Practices, Green Bay, WI: July, 2011.
18. IAAI (International Assoc. of Arson Investigators), Advanced Seminar, April 2011. Topic: Forensic Investigation of Vehicle Fires.
19. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, Advanced Seminar, Manitowoc, WI, November, 2010. Topics: Fire scene safety, Evidence spoliation, Interview and Interrogation, Legal aspects of cases.
20. Roofing Inspection Seminar, Fox Valley Technical College, Instructor: Joe Sprangers, May 10, 2010.
21. IAAI (International Assoc. of Arson Investigators), Advanced Seminar, November 2009. Topic: Heavy Equipment Vehicle Fires.
22. National Academy of Forensic Engineers, St. Louis, MO conference, May July 2009. Topics included forensic mechanical and electrical accident case studies including a Lawn mower set switch malfunction, Tractor trailer accident, Ruptured Acetylene cylinder, Bicycle-Pickup truck accident, Guardrail, Vehicle glazing, Toxic workplace exposure, and Elimination of fire causes.
23. General Fire Investigation Seminars, IAAI, WI: June, 2009. Topics included Safety at the Fire Scene and Arc Mapping.
24. IAAI (International Assoc. of Arson Investigators), Advanced Seminar, November 2008.
25. Seminar on Aluminum and its Alloys, Stork Technimet, June 10, 2008, New Berlin, WI, Topics included design, processing, and failure of aluminum parts, wrought and cast.
26. General Fire Investigation Seminars, IAAI, WI: June, 2008, Topics included: Large Loss Fires (Robert Whitemore), Kitchen fires (by Joseph Knitter and Phil Ackland), and case studies.

27. National Academy of Forensic Engineers, Puerto Rico conference, January 2008. Topics included forensic mechanical and electrical accident case studies, forensic photography, uses of medical information and legal standards for acceptability of engineering evidence.
28. Gas Systems. IAAI (International Assoc. of Arson Investigators), Advanced Seminar, November 2007. Basics of gas systems (LP and Natural gas), fires and explosions, BLEVE's, fugitive gas migration, energy theft.
29. Fireplace, Chimney, and Vent Inspection Seminar, F.I.R.E. Service, Moorpark CA, September 2007. Dale Feb, instructor. 48 hours, tested. Topics: Fireplace, chimney, and vent construction, inspection, NFPA 211, International Mechanical Building Code, failure modes, hands-on testing. Result of seminar was Certification as Fireplace Inspector.
30. National Academy of Forensic Engineers, Denver conference, July 2007. Topics included forensic mechanical and electrical accident case studies, the use of surrogates in Injury and fatality cases, and NAFE activities in forensic engineering.
31. Vehicle Fire Investigation Seminar, IAAI, Nov. 2006, Sun Prairie, WI, tested. Vehicle fires investigation seminar, hands-on investigation of one (pre-burnt) vehicle per group, verbal report for each group given to seminar attendees.
32. International Congress "Fire Safety in Tall Buildings", University of Cantabria, Santander, Spain, October 2006. Topics included building, structural, electrical safety, fire spread and suppression, and evacuation design for high-rise buildings.
33. Fire Findings Seminar, Investigation of gas and Electric Appliance Fires, Nov. 1997, May 2005.
34. Fire and Materials Conference, Interscience Communications, San Francisco, CA, January 2005.
35. Basic + General Fire Investigation Seminars (21), IAAI, WI: June/Nov. ('97 to '07), Int. (01, 06)
36. Failure Analysis Seminar, Technimet, New Berlin, WI, April, 99.
37. National Electric Code, U.W., Madison, WI, November 2000.
38. Vehicle Fire and Fraud Seminars, Anti-Vehicle Crime Association of Wisconsin, AVCAW, Wisconsin Dells, October 1998, 2000.
39. Electrical Fire Investigation Seminar, IAAI, Nashville, TN, January 1996.
40. Training the Expert Witness. U.W., Madison, WI, October 1994.
41. Plastic in Electrical and Electronics, UL Seminar, Chicago, IL, 1992.
42. Marquette University MBA classes, Statistics, Accounting, Financial Management, Milwaukee, WI, 1988-1989.
43. Quality Control Series, LTC/Kohler Co, Kohler, WI, Quality Control, Exp. Design, Adv. Exp. Design, 1987-1988.
44. Dale Carnegie, Kohler, WI, 1989.

SPEAKING ENGAGEMENTS:

1. Fire and Materials Conference, Interscience Communications, San Francisco, CA, January 2013. Spoke on Pre- and Post-Flashover Characteristics of an Electrically Heated Poor Connection between Copper and Steel.
2. National Business Institute (NBI) Webinar "Investigation and Insurance Litigation of a Fire", 12/15/2011. Discussed Forensic Electrical Engineering aspects of Fire Investigation.
3. National Association of Subrogation Professionals, West Bend, WI, June 29, 2011, "Performing Engineering Investigations for Subrogation", with Richard E. Korinek, P.E.
4. IAAI (International Assoc. of Arson Investigators), Wisconsin Chapter 25, Advanced Seminar, Steven's Point, WI, June 9, 2010. Topic: Mechanical Systems, Principles and Identification, including Heat Transfer, Venting, Fireplaces and Chimneys, and Chimney Testing.
5. Wisconsin Fire Loss Group, Fond du Lac, WI, "Advancements in Electrical Fire Investigation", 10/12/2009
6. University of Cantabria, Santander, Spain, "Improving Electrical Safety in Tall Buildings", 10/2006
7. Racine County Fire Investigation Task Force, Racine, WI, "Electrical Poor Connections, What to Look for", 3/8/2004.
8. Winnebago County Fire Investigation Task Force, Town of Algoma, WI, "Finding Evidence of Electrical Fires", 7/2002.
9. Core Engineering, Columbia SC, "Understanding Electricity and Electrical Fires", 2002.
10. Wausau, WI, Wisconsin IAAA, "Electrical Overheating", 11/2001.
11. IAAA International Meeting, Atlantic City, NJ, "Understanding Electricity and Electrical Fires", 5/2001.
12. Gateway Technical Institute, Racine, WI, "Electrical Overheating", 2000.
13. Milwaukee County Safety Academy, Milwaukee, WI, "Understanding Electricity and Electrical Fires", 2000.
14. Washington County Fire Investigation Task Force, West Bend, WI, Series of (4) Seminars on "Electrical Overheating", 1999, 2000.

PROFESSIONAL AFFILIATIONS

1. Fireplace Investigation Research and Education, F.I.R.E., 2009.
2. National Academy of Forensic Engineers, NAFE, Senior Member, 2007
3. American Society of Mechanical Engineers, ASME, 2003
4. Institute of Electrical and Electronic Engineers, IEEE, 1999

5. International Association of Arson Investigators, IAAI, International and Wisconsin Member, 1994.
6. National Society of Professional Engineers, NSPE, 2000.
7. National Fire Protection Association, NFPA, 2000 (In 2015, named member of Task Group on Heating Systems for NFPA 921).

PATENTS

1. TWIST-ON WIRE CONNECTOR..., No. 6,414,243
2. TWIST-ON WIRE CONNECTOR.., No. 6,252,170
3. TORQUE LIMITING SOCKET. No.6,198,049
4. WIRE CONNECTOR TORQUE.., No. 5,784,935.
5. ROMEX RIPPER, No. 5,732,471.
6. TWIST-ON WIRE CONN.., No. DES. 379,348
7. INSULATOR FOR CRIMP.., No. 5,373,107.
8. SHOCK ABSORBER ASSY.., No. 4,909,473.
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PUBLICATIONS

1. Initiated and wrote proposal in 2015 to add a Fireplace and Chimney section to NFPA 921 (Guide for Fire and Explosion Investigations). Proposal was accepted and will be worked on for the 2020 edition of NFPA 921.
2. "Pre- and Post-Flashover Characteristics of an Electrically Heated Poor Connection between Copper and Steel". Fire and Materials Conference Proceedings, Interscience Communications, San Francisco, CA, January 2013.
3. "The Basics of Electrical Overheating", EC&M (Electrical Construction and Maintenance), June 2009
4. "Safer Electrical Systems in Tall Buildings", International Congress "Fire Safety in Tall Buildings, Spain, '06
5. Selected photos appear in "Ignition Handbook", Vytenis Babrauskas Ph.D., Fire Science Publishers, 2003.
6. "Evaluation of Electrical Burn Injuries Using Impedance Measurements," paper for BSME, UWM, 2002.
7. Chapter rewrite for "Kirk's Fire Investigation," John D. DeHaanas^{5th}, ^{6th}, and 7th Editions, Prentice Hall, 2002, 2006, 2011.

8. "Classification of Electrical Overheating Modes," FIRE AND ARSON INVESTIGATOR, July 2001.
9. "Understanding Electricity and Electrical Fires," video, May/2001
10. "Understanding the Ground Fault Circuit Interrupter," POOL AND SPA NEWS, April 23, 1984.
11. "Shedding Light on the Purposes of the Ground Fault Circuit Interrupter," POOL/SPA NEWS, Nov. 1, 1982