THE WARREN GROUP, INC. FORENSIC ENGINEERS & CONSULTANTS
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WARREN

Thomas J. Kelly P.E., MSEE, MBA, CFEI, CESCP

Electrical Engineer

Electrical Equipment Failure Analysis

Electrocution and Electric Shock Accidents

Fire and Explosion Analysis: Origin and Cause

Industrial Electrical Accidents

Lightning Strike Analysis

Robotics & Automation/Control System Analysis

Scope of Damage – Estimate of Repair

EDUCATION

1990 **Bachelor of Science, Electrical Engineering**
Florida Atlantic University, Boca Raton, Florida

1998 **Master of Science, Electrical Engineering**
Florida Atlantic University, Boca Raton, Florida

2015 **Master of Business Administration**
Winthrop University, Rock Hill, South Carolina

EXPERIENCE

2017 to Present

The Warren Group, Inc., Irmo, South Carolina. Senior Consulting Engineer performing specialized consulting related to property damage and injuries involving electrical equipment, devices, wiring, connections, and other related electrical hardware, electrical fires and failures, arc flashes, electrocutions, shocks and other electrical injuries to people, electrical control system engineering, electrical design and safety.

Fire & Explosion Analysis
Determine the origin and cause of fires and explosions; determine the scope of damage resulting from fires and explosion.

Fire and Life Safety Standards and Codes Compliance
Evaluate compliance with building, fire protection and life safety codes and standards. National Fire Protection Association (NFPA) Codes, OSHA Regulations, International Building Codes, Uniform Building and Fire Codes, materials and product codes and standards.

Electrical Distribution Systems Analysis
Evaluate low and medium voltage electrical distribution system failures and damage in residential, commercial and industrial installations. Evaluate damage to plant and premise cabling, electrical switchgear, electrical panelboards and transformers. Evaluate damage to electrical components for electrical surge incidents such as lightning.

Control System Analysis
Electrical and mechanical control systems including relay, PLC and PC based systems and Distributed Control Systems (DCS) including Supervisory Control and Data Acquisition (SCADA) systems. AC and DC motor control and industrial process controls including flame supervision systems, automated assembly systems including robotics, and building automation systems.

EXPERIENCE, Continued

April 2017 to Present (Continued)

Property Loss Analysis
Determine the cause of the loss, establish scope of damage, estimate cost to repair, evaluate replacement cost, estimate time required to complete repair.

Safety Design Analysis (both personal injury and property damage)
Industrial accident reconstruction, machine controls, warnings, OSHA compliance, standards and codes compliance, maintenance, fire and explosion analysis, products liability, product failures, electrical failure analysis

2016 to 2017

Crump Engineering Works, Charlotte, North Carolina, Consulting Engineer. Professional consulting, design and forensic engineering services related to fire cause and origin, control system failures, buildings, industrial systems, data centers, property, safety, causation, scope of damage and value of loss, lightning damage evaluation, and compliance evaluation relating to specifications, codes and industry standards.

2013 to 2016

Radisys Corporation, Hillsboro, Oregon, Senior Field Application Engineer. Pre-sales engineering support for 3G and LTE communication protocol software stacks for defense, aerospace, public safety, and test and measurement applications. Provided support for embedded computer and network switch products. Designed, developed and implemented proof-of-concept systems to demonstrate capabilities for customer applications. Provided training and diagnostic assistance for femtocell and picocell communication systems.

2008 to 2013

General Dynamics Armament and Technical Products, Inc., Charlotte, North Carolina

Facilities Manager - Managed multi-site manufacturing and office facilities. Evaluated facility conditions for building envelope performance, energy consumption and lighting performance and compliance. Determined capital improvement projects and analyzed energy usage. Managed critical data center infrastructure including fire suppression systems and emergency power systems for multiple site locations.

Engineering Manager - Provided engineering management oversight to Advanced Programs development group. Designed, developed and implemented rapid prototypes in tactical communication systems, vehicle data integration in HWMVV, MRAP and M-ATV platforms, and deployable environmental management systems to meet customer demonstrations and project requirements. Prepared technical and management content for customer proposals to meet business needs.

EXPERIENCE, Continued

2008 to 2013 (Continued) Senior Principal Systems Engineer **-** Designed, developed and implemented rapid prototype systems to meet customer demonstrations and project requirements. Lead project engineer for containerized environmental control system for forward base deployment. Designed and developed in-vehicle network systems to enhance combat situational awareness. Designed optical and acoustic detection systems. Conducted research in high-energy laser weapon systems. Prepared technical proposal content to meet business needs.

2005 to 2008 Engineering Design & Testing Corp., Charlotte, North Carolina, Consulting Electrical Engineer. Specialized consulting in the cause and scope of damage to commercial, industrial, and residential facilities. Perform origin and cause investigations of fires and explosions. Evaluation of damage to electrical switchgear, distribution panels, transformers and components in residential, commercial, and industrial facilities. Evaluate electrical surge, lightning and arc flash incidents. Evaluate cause and scope of damage to data, voice and fiber optic cabling. Evaluate failures of commercial and industrial control systems and building automation systems. Perform analysis for compliance to building, fire protections and life safety standards. Perform evaluations for cause of damage, repair or replacement costs, and construction evaluation.

1997 to 2005 Florida Atlantic University - College of Engineering, Boca Raton, Florida, Engineer and Director of Technical Services. As the Chief Engineer of the Robotics Center, designed, prototyped, and implemented manufacturing assembly lines and fixtures. Provided technical and research support for machine vision, laser measurement, and other calibration devices. Provided computing, laboratory services, card access and CCTV security support. Coordinated space and construction needs and managed renovation projects for the college.

1990 to 1997 Florida Atlantic University - Physical Plant, Boca Raton, Florida

Interim Director and Assistant Director - Managed computing resources for division-wide Local Area Network. Oversaw day-to-day operations of work management system. Managed building maintenance, custodial and grounds service contracts for an 800-acre campus consisting of approximately two million gross square feet.

Senior Systems Programmer/Systems Programmer/Programmer - Managed computing resources for division-wide Local Area Network. Planned and implemented changes to keep pace with network growth and user needs.

EXPERIENCE, Continued

1990 to 1997 (Continued) Designed, coded, and installed new software applications and maintained existing applications to meet needs. Oversaw day-to-day operations of work management system. Performed analysis of system data to provide performance indicators as needed to department managers.

Engineering Assistant - Prepared campus floor plans, maps and master building plan drawings.

1988 to 1990 Johnson Controls, Miami Branch, Hollywood, Florida.
Engineering Intern - Performed duties of Branch Automation Technician, including maintenance of branch computing resources and design and implementation of software for HVAC systems. Installed, calibrated and maintained computer-based HVAC, fire and security systems.

SUMMARY OF SELECT TECHNICAL KNOWLEDGE

Hardware

Thorough understanding of the operations and troubleshooting of ISA, PCI, VME and S-BUS compatible systems. Proficient in the use of standard test equipment including, but not limited to, digital and analog meters, oscilloscopes, spectrum analyzers, logic analyzers, signal trace equipment, and computer simulated circuit analysis. Comprehensive knowledge in the operation, maintenance, and calibration of various types of 4-DOF and 6-DOF manufacturing robots, PLCs and CNC machine tools. Experienced in the use, installation, termination, and splicing of indoor and outdoor low voltage data cable and fiber optic cable.

Codes and Standards

Project work including design to and verification of compliance of Code and Standard elements including for the following:

- National Electric Code (NFPA 70)
- Guide for Fire and Explosion Investigations (NFPA 921)
- Electrical Standard for Industrial Machinery (NFPA 79)
- National Fire Alarm and Signaling Code (NPFA 72)
- National Life Safety Code (NFPA 101)
- Electrical Safety in the Workplace (NFPA 70E)
- ANSI/ASHRAE/IESNA Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings
- RS-232, RS-485 and RS-442 communication protocols
- IEEE 802.3, 802.5, and 802.11a/b/g/n network standards
- MIL-STD-1275D Characteristics of 28 Volt DC Electrical Systems in Military Vehicles
- MIL-STD-810G Environmental Engineering Considerations and Laboratory Tests
- MIL-STD-461F Electromagnetic Interference Characteristics

CERTIFICATIONS

Certified Electrical Safety Compliance Professional (CESCP)

Certified Mobile Elevated Work Platform Operator

Certified Fire & Explosion Investigator (CFEI)

Community Emergency Response Team (CERT) Member, Boca Raton Fire Department, FEMA Emergency Management Institute Certification May 2001

Registered FAA Remote Pilot (sUAS)

FCC Amateur Radio general license, call-sign KG4AKO

FCC General Mobile Radio Service (GMRS) license, call-sign WSBY891

Certified Level I Thermographer (FLIR) – Infrared Training Center

Certified Telecommunications Network Specialist (CTNS)

PROFESSIONAL ORGANIZATIONS AND AFFILIATIONS

National Fire Protection Association (NFPA)

NFPA Certification Advisory Group (CAG) member for the Certified Electrical Safety Technician (CEST) credentialing examination

Institute of Electrical and Electronic Engineers (IEEE)

IEEE Product Safety Engineering Society

InterNational Electrical Testing Association (NETA)

National Association of Fire Investigators (NAFI)

REGISTRATIONS

Professional Engineer in Alabama (#36129)

Professional Engineer in Florida (#00058653)

Professional Engineer in Georgia (#041275)

Professional Engineer in Louisiana (#44601)

Professional Engineer in Maryland (#49903)

Professional Engineer in Michigan (#6201309099)

Professional Engineer in Minnesota (#61417)

Professional Engineer in Mississippi (#33959)

Professional Engineer in Missouri (#PE-2025019823)

Professional Engineer in North Carolina (#031652)

Professional Engineer in Oklahoma (#35848)

Professional Engineer in South Carolina (#33722)

Professional Engineer in Tennessee (#123901)

REGISTRATIONS, Continued

Professional Engineer in Texas (#148401)

National Council of Examiners for Engineering and Surveying – Model Law Engineer (#16-878-07)

CONTINUING EDUCATION

June 22, 2026
"Utility Pole Design and Hurricane Resistance for Florida Engineers", an online course presented by CPE Solutions, LLC, Derek Finger, Boiling Springs, South Carolina

June 20, 2026
"Forensic Incident Investigation for Engineers", an online course presented by CPE Solutions, LLC, Derek Finger, Boiling Springs, South Carolina

June 15, 2026
"Wood Safety Fire", an online course presented by CPE Solutions, LLC, Derek Finger, Boiling Springs, South Carolina

June 12, 2026
"Engineering Symbology, Prints, and Drawings", an online course presented by CPE Solutions, LLC, Derek Finger, Boiling Springs, South Carolina

June 9, 2026
"Fire and Explosion Protection Engineering for Industrial Facilities", an online course presented by CPE Solutions, LLC, Derek Finger, Boiling Springs, South Carolina

June 9, 2026
"Process Hazard Analysis (PHA) for Engineers", an online course presented by CPE Solutions, LLC, Derek Finger, Boiling Springs, South Carolina

June 5, 2026
"Ground Fault Protection on Construction Sites", an online course presented by CPE Solutions, LLC, Derek Finger, Boiling Springs, South Carolina

March 29, 2026
"Electrical Safety Engineering and Arc Flash Analysis", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

March 29, 2026
"Data Centers, AI Loads, and Power Density: Electrical Engineering Challenges in the AI Era", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

March 29, 2026
"Life Safety Engineering: Advanced Electrical Fault Protection", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

CONTINUING EDUCATION, Continued

March 12, 2026
"TBPELS Professional Engineering & Surveying Practice Update Ethics", an online course presented by CPE Solutions, LLC, Boling Springs, South Carolina

February 25, 2026
"Engineering Design and Code Compliance of GFCI and AFCI Protection Systems", an online course presented by CPE Solutions, LLC, Boiling Spring, South Carolina

February 25, 2026
"Arc Fault vs Ground Fault: Protection Theory and NEC Application", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

February 23, 2026
"Predictive Fault Detection in Power & Electrical Systems", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

February 23, 2026
"Battery Electric Bus Fires: Case Studies and the MDOT MTA Experience", an online course presented by Gannett Fleming, Boiling Springs, South Carolina

December 9, 2025
"LAPELS Professional Ethics Webinar", an online course presented by Byron Trust, P.E., Boiling Springs. South Carolina

June 6, 2025
"Energy Storage Systems Q0757", an online course presented by FEMA National Fire Academy, Boiling Springs, South Carolina

May 1, 2025
"Lightning Fundamentals", an online course presented by CFITrainer.net, Boiling Springs, South Carolina

April 26, 2025
"Missouri Laws and Rules", an online course presented by APEPLSPLA, Boiling Springs, South Carolina

March 6, 2025
"Texas Engineering Practice Act and Rules", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

March 6, 2025
"Texas Ethics for PEs", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

CONTINUING EDUCATION, Continued

February 19, 2025
"Professional Ethics for The Florida Professional Engineer 2023-2025", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

February 15, 2025
"Florida Laws & Rules for Professional Engineers 2023-2025", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

December 21, 2024
"Engineering Ethics", an online course presented by PDH-Pro, Boiling Springs, South Carolina

June 19, 2024
"Damage Assessment Training (DAT)", presented by South Carolina Emergency Management Division, Office of the Adjutant General, Boiling Springs, South Carolina

June 12, 2024
"Ethics NSPE", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

March 21, 2024
"Control of Hazardous Energy", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

March 21, 2024
"Controlling Electrical Hazards", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

March 21, 2024
"NFPA 70E Navigating Workplace Electrical Safety & Essential Updates", an online course presented by NFPA.org, Boiling Springs, South Carolina

March 20, 2024
"Explosive Safety Standards", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

March 19, 2024
"OSHA: Fatalities from Improper Work Practices", an online course presented by Engineering Continuing Education PDH, Boiling Springs, South Carolina

March 18, 2024
"Electrical Safety Substations", an online course presented by Engineering Continuing Education PDH, Boiling Springs, South Carolina

CONTINUING EDUCATION, Continued

March 18, 2024
"Electrical Safety Underground", an online course presented by Engineering Continuing Education PDH, Boiling Springs, South Carolina

March 5, 2024
"Electrical Safety Aerial", an online course presented by Engineering-PDH.com, Boiling Springs, South Carolina

March 18, 2024
"Electrical Safety Underground", an online course presented by Engineering Continuing Education PDH, Boiling Springs, South Carolina

December 18, 2023
"Transformers", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

December 14, 2023
"Power Technologies Energy Data Book", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

December 14, 2023
"Engineering Ethics for the North Carolina Professional Engineer", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

August 10, 2023
"Electric & Hybrid Vehicle Fires", an online course presented by CFI Trainer.net, Boiling Springs, South Carolina

August 10, 2023
"Electric & Hybrid Vehicle Designs Basics", an online course presented by CFI Trainer.net, Boiling Springs, South Carolina

January 18, 2023
"Facilities Engineer-Electrical Exterior Facilities", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

January 9, 2023
"Florida Laws & Rules for Professional Engineers", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

January 5, 2023
"Professional Ethics for The Florida Professional Engineer", an online course presented by CPE Solutions, LLC, Boiling Springs, South Carolina

CONTINUING EDUCATION, Continued

March 8-11, 2023
NETA 2023 PowerTest Conference, Orlando, Florida

- Low Voltage Circuit Breaker Modernization
- A Review and Analysis of Current Protection Testing Practices
- Near-Misses and Your Safety Program: Are You Really a Learning Organization?
- Circuit Breaker Testing and Diagnostics – A Review
- ANSI/NETA MTS Update on Cables
- NFPA 70E: Critical Aspects and Revision Updates
- Electrical Safety Panel – Session 1
- Relays Troubleshooting – Session 1
- Understanding Transformer Protection
- How Smart Workers Use Situational Awareness to Improve Safety

March 11, 2021
"Mobile Elevated Work Platform Operator Training", presented by Sunbelt Rentals including classroom and hands-on operation, South Carolina

March 1, 2021
"ELE-117 Electrical Safety, Volume 2 of 2" an online course presented by Engineering-PDH.com, Boiling Springs, South Carolina

February 26, 2021
"ELE-116 Electrical Safety, Volume 1 of 2" an online course presented by Engineering-PDH.com, Boiling Springs, South Carolina

January 8, 2021
"Florida Laws and Rules 2021" an online course presented by PDHLibrary.com, Boiling Springs, South Carolina

January 8, 2021
"2021 Ethics for Florida Engineers" an online course presented by PDHLibrary.com, Boiling Springs, South Carolina

August 11, 2020
"Motor Vehicles: The Engine and the Ignition, Electrical and Fuel Systems" an online course presented by CFI Trainer.net, Boiling Springs, South Carolina

August 11, 2020
"Motor Vehicles: Transmission, Exhaust, Brake and Accessory Systems" an online course presented by CFI Trainer.net, Boiling Springs, South Carolina

CONTINUING EDUCATION, Continued

August 11, 2020
"Investigating Motor Vehicle Fires" an online course presented by CFI Trainer.net, Boiling Springs, South Carolina

August 11, 2020
"Fire Investigator Scene Safety" an online course presented by CFI Trainer.net, Boiling Springs, South Carolina

June 19, 2020
"SAF-118-Bonneville Power Admin 115KV Line – 2013 Accident Investigation" an online course presented by Engineeringpdh.com, Boiling Springs, South Carolina

June 17, 2020
"SAF-119-Engineering Lab, Electrical Shock – 1996 Accident" an online course presented by Engineeringpdh.com, Boiling Springs, South Carolina

May 14, 2020
"SAF-124-OSHA Controls of Hazardous Energy – Lockout/Tagout" an online course presented by Engineeringpdh.com, Boiling Springs, South Carolina

April 16, 2020
"LA Laws and Rules" an online course presented by LAPELS Online, Boiling Springs, South Carolina

April 16, 2020
"LA Professionalism and Ethics" an online course presented by LAPELS Online, Boiling Springs, South Carolina

February 12, 2020
"IEBC Essentials with Maryland Amendments" an online course presented by ICC Learning Center Online, Boiling Springs, South Carolina

February 4, 2020
"IEBC Essentials with Maryland Amendments" an online course presented by James Ryan

March 10-15, 2019
NETA 2019 PowerTest Conference, Grapevine, Texas

- Megger Best Practices," presented by Dinesh Chhajer
- Doble Laboratory Seminar
- Electrical Safety Panel
- Circuit Breakers Panel
- Offsite Tour – Medium Voltage Cable Testing and Diagnostics with a Focus on Practical Testing
- Interpretation of Power Factor and Excitation Current Test Data

CONTINUING EDUCATION, Continued

September 24-26, 2018
International Symposium on Fire Investigation Science & Technology, Itasca, Illinois

- Experts Beware: Ignoring the Scientific Method Can Be Hazardous to Your Testimony – An Update on the Law
- Thermal Activation of Molded Case Circuit Breakers By External Heat Exposure
- It That Neutral Floating?
- Torque Tightened Electromechanical Connections
- Poor Electrical Connections: Features, Material Characterization and Newly Identified Characteristic Traits, Before and After Fire Exposure
- Guidelines for Conducting a Technical Review for Fire Investigation
- Plasma Etching to Help Identify Acoustic Agglomeration Soot Patterns on Smoke Detector Piezo Disks
- Tribology and Its Applications to Electrical and Electromechanical Faults That Often Result in Fire
- Case Study with a Fire origin and Fire Cause Remotely Located From the Root Cause of the Failure in a Commercial Vehicle
- Lithium Ion Batteries and Fire Investigations
- Propane Safety: Investigation Finding and Lessons Learned in the 2014 Philadelphia Food Truck Explosion
- A Case Study of a Radiant Barrier System Roof Subject to Lightning Event: From Scene Examination to Metallurgical Analysis
- Rooftop Solar Fire Investigation

July 16-19, 2018
International Advanced Fire, Arson & Explosion Investigation Training Program, Charlotte, North Carolina

- Fire Scene Safety
- Fire Scene Documentation
- Fire Chemistry and Fire Dynamics
- Expert Testimony and Report Writing
- Appliance Failure Fires
- Origin and Cause Determination
- Explosion Dynamics
- Basic Electricity
- The NAFI National Certification Board Certified Fire & Explosion Investigator Exam (CFEI)

December 27, 2017
"Ethics for U.S. Engineers" an online course presented by William Dunn, North Carolina & Florida

CONTINUING EDUCATION, Continued

September 15-17, 2017
21 Hour PHILO Invitational Seminar 2017, Detroit, Michigan

- Tools & Sources of Liability
- Systems Safety Engineering
- Biomechanics of Injury
- 4 Conceptual Areas/Harry Philo Video
- Introduction to Vehicle Event Data Recorders
- Investigations of Injury Cases Caused by Defective Machinery, Equipment & Products
- New Standards on Fall Protection
- Class Action
- Reflections on Civil Rights Issues
- Liability Medicare Set Asides
- Anatomy of Brain Injury
- Trial is the Image of Reality/Trial Dynamics
- Trial Technologies
- Mediation/or T.R. 30 (B)(6) Deposition
- Railroad Premise Liability
- Medical Malpractice-Dental

June 5, 2017
Training in "Warren's Written Fall Protection Program & Policies," by Steve Hunt, CPCU, ARM, Fall Protection Manager, Irmo, South Carolina

June 5, 2017
"Fall Protection - 29 CFR 1926, Subpart M (1926.500- 1926.503) Training," Course designed by: Prosafe Solutions, Inc., conducted by Steve Hunt, CPCU, ARM, Fall Protection Manager, Irmo, South Carolina

- Part I – Guardrails & Personal Fall Arrest Systems
- Part II – Horizontal Lifelines, Safety Nets, Roofing Procedures & Training

December 29, 2016
ET-108 Engineering Ethics: The Kansas City Hyatt Walkway Collapse, 1 Hour

December 29, 2016
An Introduction to Heat Transfer in Structure Fires, 5 Hours

December 28, 2016
Solar Power Part I – Design for Small Structures, 4 Hours

December 27, 2016
HVAC Design – Industrial Ventilation, 1 Hour

CONTINUING EDUCATION, Continued

December 27, 2016
Corrosion Control and Tactics, 4 Hours

December 3, 2016
Nondestructive Examination (NDE), 1 Hour

PUBLICATIONS

"LOOMY: Applied Visual Cues in Autonomous Driving," 1995 Florida Conference on Recent Advances in Robotics, Orlando, Florida, April 26, 1995

"SGER: Analog Retina- A New Task-Specific Vision Device," 2000 Florida Conference on Recent Advances in Robotics, Dania Beach, Florida, May 4-5, 2000

"Pipetting Application of a Pick and Place Robot," 2005 Florida Conference on Recent Advances in Robotics, Gainesville, Florida, May 5-6, 2005

"COTS Technologies Drive Battlespace Communications," PICMG Systems and Technology, October 22, 2014