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## EDUCATION

Graduate of Carnegie Institute of Technology, 1967, (now Carnegie Mellon University) with a Bachelor of Science degree in Electrical Engineering. Minor in English.

## AREAS OF PRACTICE AND EXPERTISE

### PRIVATE CONSULTING

**Forensics - 1989 to Present** --- Experience in the field of Forensic Engineering for plaintiff and defendant representing attorneys and insurance companies.

- Investigation of electrocutions:
  - Residential, commercial and industrial facilities, wiring, equipment, panels, motor control centers, and appliances.
  - Power line contact, trucks, ladders, poles, etc.
  - Communication line shocks from carrier signals and lightning.
- Investigation of fires in determination of cause and origin, Investigations have dealt with:
  - Electrical systems, interior wiring and external power company facilities.
  - Mechanical equipment and systems, gas lines, boilers, water heaters and furnaces.
  - Auxiliary heaters, kerosene, coal and wood.
  - Automobile fires, batteries, electrical systems, fluids and materials.
- Investigation of work place injuries caused by failure or misoperation of electrical, mechanical, pneumatic or hydraulic systems; a failure or lack of safety devices; a lack of appropriate guarding or warning. Investigations include:
  - Rotating machinery
  - Conveyors
  - Presses, punches and shears
  - Door controls, busses and trains
  - Cranes
  - Tow motors and heavy equipment

- Mining equipment
- Investigation of power tool related accidents including chain saws, grinders, drills, and table saws.
- Investigation of consumer product related injuries such as from treadmills, hand tools, power tools, lighting, aquariums, and appliances.
- Investigation of vehicle related problems including:
  - Investigation of unintended accelerations of automobiles.
  - Investigation of vehicle electrical and electronic systems.
  - Investigation of pole line placements involved with automobile accidents.
  - Investigation of traffic signals operation.
  - Investigation of seat belt operation and failures
  - Evaluation of vehicle damage caused by collision, projectile, or other source.
- Slip and fall investigations.  
Resulting from surface material conditions, walkway irregularities, lighting, or other cause.
- Investigation of appliance and product failure resulting in injury, fire or death. Investigations include coffee makers, irons, deep fryers (home and commercial), TV's, VCR's and video machines, heaters, lamps, boilers, etc.
- Investigation of malfunctioning of equipment resulting in contamination of or deterioration of air quality in a building.
- Investigation of sprinkler system failures.
- Investigation of smoke detector operations and failures.
- Investigation of elevator operations including leveling, safety switches, rapid stopping, rapid door closure, and sensing equipment.
- Investigation of escalator sudden stops.
- Investigation of Electromagnetic Field effects from power lines in relation to levels effecting health, property values and equipment interference.
- Inclusion of Human Factors/Ergonomic considerations where required in investigations.
- Utilization of codes and specifications including NFPA, NEC, NESC, ANSI, ASME, OSHA, ADA, NEMA, REA, and all other applicable codes and standards.

**Engineering & Design - 1975 to Present** --- Private consulting on electrical, plumbing and mechanical systems design and operation; construction practices and techniques; overall facility evaluation for retrofit and modernization; evaluation of facilities and structures for overall integrity and operation; and, troubleshooting and problem solving in all aspects of design and construction.

- Design of new and retrofit of old electrical systems for residential, commercial, industrial, schools, hospitals and health care facilities.
- Design of new and retrofit of old mechanical systems, steam, water, forced air and ventilation, for residential, commercial, industrial, schools, hospitals and health care facilities.

- Design of new and retrofit of old plumbing systems, domestic water (hot and cold), drains and sprinklers.
- Design and installation of control systems for mechanical systems, industrial process, geothermal systems, conveyors and industrial equipment.
- Evaluation, design and retrofit of pneumatic and hydraulic controls and operations.
- Evaluation of motors in use and to be used on elevators, conveyors, escalators, manufacturing equipment, and all forms of moving and rotating equipment.
- Design of new and retrofit of existing fire, security and communications systems.
- Design of transmission lines for private industry.
- Evaluation of elevator and escalator requirements for facilities with emphasis on safe operation.
- Development of O & M manuals and procedures for clients.
- Investigation of equipment, system and material failures resulting in accidents, losses and down time. Investigations have included all forms of electrical and mechanical equipment and systems; concrete failure; surface treatment failure and created slippery conditions; equipment guarding; water problems associated with seepage, drainage, hydraulic bearing and erosion; failure of life and safety systems such as smoke detectors, alarms and communication.
- Design and installation of solar heating systems.
- Design and installation of water based geothermal systems.
- Construction management of new and retrofit projects.
- Design of new and retrofit of old facilities under the auspices of HUD, DOE, Housing Authorities, Redevelopment Authorities, County and City Agencies.
- Evaluation and design of refuse handling systems, includes determination of quantities, types of materials, types of containers, sizing of compactors, evaluation of dumping sites.
- Familiarity and use of all applicable codes and specifications including: NEC, NFPA, BOCA, OSHA, NSF, ANSI, ASME, NEMA, HUD, ADA, ACI, SMACNA, EPA, DER, and others.

## **DIRECT EMPLOYMENT**

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**Utility Company** - Twelve years with an investor owned power company

- Design of distribution and sub-transmission overhead and underground lines, including circuit protection devices and analysis of operations and outages.
- Investigation of customer problems, residential, commercial and industrial, and aiding in resolution of equipment, motor and control problems.
- Development of construction standards.

- Development of working practices and procedures.
- Development of engineering and design manuals.
- Development of computer programs for design and construction of transmission lines.
- Investigation of lightning effects on transmission lines.
- Investigation of electrostatic effects from transmission lines.
- Investigation of electromagnetic field effects.
- Evaluation and determination of conductors for use on distribution and transmission lines, including the compatibility of other utility, communication and cable, company's conductors.
- Evaluation of conductors for communications.
- Investigation of accidents and fires involving distribution and transmission lines.
- Evaluation of designs for compliance with NESC, OSHA, and FAA codes among others.
- Evaluation and standardization of materials, hardware, tools, equipment and devices for use in construction. This includes all trucks and tooling utilizing gas driven, electrical, mechanical, pneumatic and hydraulic mechanisms.
- Design of transmission lines using wood, steel and concrete.

## **CONTRACT PROJECTS**

**Nuclear Plant** - Manager of Construction Engineering, Planning and Scheduling for the construction of a new plant and the planned outages of an existing plant.

- Direct involvement in the overseeing of the installation of electrical and control facilities.
- Review of mechanical systems.
- Coordinate design and construction functions to ensure feasibility of the installation.
- Oversee the development of the planning of the work.
- Oversee the development and implementation of the scheduling.
- Evaluate compliance with NRC and CFR codes regarding construction and operation.
- Evaluate products for use in a nuclear plant.
- Evaluate the effectiveness of operations.

**Water and Air Purification Systems** - Project Manager for a major supplier of commercial, industrial and municipal air and water purification systems.

- Design and have constructed control panels and systems using relay and PLC logic and controls.
- Evaluate, specify and implement monitoring, recording and control instruments. Devices include pH & ORP sensors and microprocessor controllers; water and air flow sensors, controllers and microprocessors; level controls; temperature sensors and controls; pressure sensors and

- control; miscellaneous other chemical, ultrasonic and process controls.
- Evaluate and specify variable speed frequency controls for pumping systems.
  - Evaluate mechanical designs for correct operation and specify appropriate piping and fittings. Included are open and closed loop systems utilizing all forms of plastic and metal piping and fittings.
  - Evaluate and specify fans and blowers.
  - Evaluate duct systems for adequacy of design and operation.
  - Evaluate, supervise and coordinate component construction working directly with fabricators.
  - Determine proper electrical equipment for hazardous locations.
  - Evaluate and specify linings for vessels based on the systems intended use. Linings range from simple spray coatings to kynar and teflon.
  - Evaluate and specify paints and coatings for equipment exteriors.
  - Establish budget and schedules and coordinate all activities to meet them.
  - Establish criteria for the selection of motor control centers.
  - Oversee installations.
  - Monitor start-up and test.
  - Troubleshoot the systems.
  - Determine compliance with all applicable codes and specifications including NSF, ASME, ANSI, NEC, NFPA, AWWA, and others as needed.

### **PERSONAL PROJECTS**

- Developed and patented a steel device for anchoring and foundations. Hands on experience in the fabrication of the device, welding, bending, shearing, threading; intensive research into soil mechanics; intensive research and experience with hydraulic devices used in device installation. In conjunction with this device development extensive research in competitive anchoring, tie back and foundation systems has been conducted.
- Development of thermistor/electronics based temperature sensing and controls.
- Development of non-refrigerant based air conditioning and heat pump systems.
- Ongoing research into the incident rate and cause of unwanted accelerations.

### **INSTRUCTOR**

Seminars on building operation analysis given to Building Owner and Management groups.  
 Adult education in electricity, Westmoreland County Community College.  
 Fire causation in vehicles, PAAI, Penn State Summer Meeting  
 Lightning and its Effects, Northbrook Insurance Seminar

### **REGISTRATION**

Registered P.E. in Pennsylvania

**MEMBERSHIPS** PAAI - Pennsylvania Association of Arson Investigators  
IAAI - International Association of Arson Investigators  
NFPA - National Fire Protection Association  
IEEE - Institute of Electrical and Electronic Engineers  
SAE - Society of Automotive Engineers  
ASA - Automotive Service Association  
ASME - American Society of Mechanical Engineers  
NSPE - National Society of Professional Engineers  
PSPE - Pennsylvania Society of Professional Engineers

**BUSINESS** Owner, Renaissance Engineering

**PATENTS** One sole and three joint on soil anchoring and foundation devices with hydraulic setting tools.