
PROFESSIONAL PROFILE**Education:**

Bachelor of Electrical Engineering, Clemson University 1949. Further studies in this and other disciplines at Georgia Tech, University of North Carolina and Clemson. Also countless seminars under the aegis of a variety of sponsors.

Registration: South Carolina Reg. No. 1452 May 1953

Experience:

Over fifty years experience in the planning, design, and construction management of a wide variety of hundreds of utility, electro-mechanical, general construction and automated machinery projects for industrial, institutional, governmental, and utility clients throughout the United States, Europe, and the Middle East.

A Few Representative Task-Specific Projects Relating to Automated Machinery (and other projects):

Duke, COGEMA, Stone & Webster, Aiken SC, Team Leader of Automation Review Team, MOX Project. Evaluated COGEMA's automated process unit design in order to convert to American standards such things as apparatus, e.g., motors, pumps, etc.; codes; and special requirements of OSHA and other United States agencies.

Nuclear Metals, Inc., Boston, MA, Complete automation, electrical, mechanical, process control, tank farm, instrumentation, and design and supervision of the manufacture of a process line and its proprietary machinery for the safe, commercial processing of depleted uranium. This was a new, untried process, intended to prove to the DOE that the method was feasible and could be produced in large quantities; hence, the machinery for the process line did not exist and it was part of our commission to design and have it manufactured. It involved grinding, mixing, metering, conveying and sintering of powders and pellets. Upon completion the line produced the required annual quantity of product.

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Electrical, mechanical, fire & explosion protection, tank farm and process control engineering (including piping and instrument diagrams) and design/manufacture of special machinery for proprietary processes. This involved the grinding of a polymer whose temperature was kept below 200 deg C by the introduction of liquid nitrogen; weighing, metering, and transporting the resulting powder; mixing with other proprietary ingredients; and, ultimately, pumping through automatic valving to a tank farm for shipping, all a fully automated operation. Since this polymer exhaled a volatile gas at 243 deg C, the danger of explosion was always present; the grinding process, therefore, was required to be done within a pressure container equipped with explosion-proof gates for the introduction of materials, all of which equipment was designed and built by Pantech.

Savannah Industrial & Domestic Water Plant, City of

Savannah: Complete electrical, mechanical, automation and instrumentation design for \$15M major addition to water treatment facility. Again complete reliability of service -with automation, SCADA and other instrumentation - is the key element here. The local Savannah chemical and paper industries are so dependent upon this plant for large quantities of absolutely pure water that they pay for periodic upgrades to the plant. If the system shuts down, even for a few moments, the City is subject to large lawsuits by these customers. Constant monitoring of hundreds of analog and discrete data points, transmitted by RF and hardwire to a central point, allows complete, automated control of the various powders, pellets, and liquids that are required to maintain the strict formulation required.

Kemira Chemical Co., Savannah, GA: Electrical, electronic, mechanical, tank farm, (including P&ID) and automated process control engineering for seven story, fully computerized chemical manufacturing plant. In this case, raw material as powder and pellets enters the seventh level by means of a vertical conveyor, sent through reactor vessels and other processors, and is shipped to the customer from the first level as packaged, labeled, finished product, all under automated conditions. Total

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plant personnel: seven, including clerical; plant area, not including tank farm: 350,000 sqft.

Elan Technologies, Savannah, GA.: Electrical, mechanical, and fire protection engineering design for 85,000 sqft manufacturing facility. Involved was the automated manufacture of glass devices ranging in size from one-half to a few mm in length, processing, handling, and conveying with all the delicacy such an operation would require.

Agro-America, Georgetown, SC: Electrical, mechanical, and fire protection engineering for a 5000 horsepower manufacturing facility. In this case, in addition to the demands of a highly complex series of manufacturing operations, it was essential that continuity of electrical service be absolute because of the danger of extruders being destroyed through cooling. This was achieved through various means, including the use of two separate delivery points. This was a fully automated plant involving the handling of pelletized polymer.

ACS, United Kingdom: Design and manufacture of a fully automated, computer controlled trolley system for a textile engraving and printing company. In this case, an electrically driven, 1500-pound trolley travels on rails across the plant floor, stopping at a series of 42, 50 gallon vats for a precise injection of dye from each selected vat. From there it is shunted to a batch mixer and thence to the production line conveyor, all without human interface.

Jostens Manufacturing Company, Laurens, SC: Machine design and automation. Design of machinery to automate production after review of current manufacturing work-flow and process. Pantech proposed a concept with cost benefit analysis. Machine design required 450 "D"-sized separate drawings. The finished machine doubled the manual production, replacing five workers with one worker who, it was found, could service three of these machines. Thus, one employee is now producing the finished work of 30 operators.

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Standard Products, Winnsboro, SC: Developed design for automating part of production cycle for automobile parts manufacturer.

Wastewater Treatment Facilities: Electrical design and PLC controlled instrumentation for numerous wastewater treatment plants, pumping stations, and other sanitary systems.

Industrial Power Systems: Design and/or construction of power systems for over two hundred heavy industrial plants for such clients as **Milliken, Springs Mills, Dover Textiles, U.S. Rubber Co., Westinghouse, etc.**

Federal Law Enforcement Training Center: Electrical and mechanical design for 25-point, 100 meter, fully automated weapons range.

US Army, Fort Benning, Ga.: Electrical Design and Control for automated tank gunnery range. Range trains battle tank commanders firing live 120mm ammunition at fully automated armor and infantry targets. The Range Control Officer selects a program from the central computer; the range responds with a sequence of automated targets, e.g., an enemy tank silhouette, with its mechanism hidden and protected by a berm, that travels on rails for a distance of 1350 feet. If the trainee fails to send a round through the target within eight seconds, the trainee's tank is "painted" electronically and he is out of action.

South Carolina Army National Guard, Fort Jackson, SC: Complete design of primary and secondary electrical, communications, and gas distribution engineering for \$5M infrastructure upgrade of utilities at 550 acre site.

South Carolina Army National Guard, Fort Jackson, SC: Complete electronics, power, and lighting engineering design for a 50,000 sqft battle simulation center. The center can accommodate up to 42 general officers and their staffs from all over the country. Each group is assigned to its own computer/simulator cubicle and is given its assets, i.e., infantry, artillery and air. For four days and nights it must react to problems transmitted from the Pentagon on a minute by minute basis. It is all done electronically and includes the virtual reality firing of 105mm howitzers.

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Meyer AG, : Vibration study, complete design and construction management of isolation foundation system for an automated machine that produced a woven steel protective jacket for hydraulic hoses. This machine contained some 40 motors placed on the periphery of an eight-foot diameter, rotating structure. The resultant vibration was destroying concrete foundations in buildings the world over, e.g., Spain, Britain, and Japan. This design has been installed throughout the USA, Europe and Asia.

Utility Service: Design and manufacture of high speed automated trenching machine; design and manufacture of engine-driven tensioning device for installing large high voltage conductors on 230kV transmission lines. Design and manufacture of differential pulse circuit.

Power and Transmission Design: Design and/or construction of generation, transmission, distribution, sub-stations, aerial, underground, and submarine power projects for such clients as **Duke Power Co., South Carolina Electric and Gas Co., Carolina Power and Light, Virginia Electric & Power Co., Florida Power & Light;** dozens of cities throughout the U.S.; and foreign clients such as the governments of Iran, Saudi Arabia, and the United Arab Emirates. Included in the foreign work were the design and/or construction of generation, transmission and distribution for the cities of Bishah, Hail, and Wasiah, Saudi Arabia, and design of transmission lines and substations for Tavanir, the government-owned utility of Iran.

Telecommunication Projects: Design and/or construction of underground vaults, manholes, and duct systems for **American Telephone and Telegraph Long Lines, the Bell System,** independent telephone companies throughout Eastern United States.

Resource Discovery & Development International: Remote sensing and mapping projects in Iran, Saudi Arabia, and Pakistan.

Petroleum Industry: Design and engineering of production facilities for clients such as **Abadan Refinery** and the **National Iranian Petrochemical Company** in Iran.

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Southeast Arkansas Regional Detention Facility, Dermott, Arkansas: Electrical and security design for a six-hundred bed, medium/maximum security prison.

Electro-Optical Systems: Research, development and design of weapons detection systems.

Energy Management Systems: Developed for a variety of industries, e.g., Colite Industries, Dover Mills.