NICHOLAS A. PETRUCCI, P.E., C.S.P.

Petrucci Engineering Consultants, LLC
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Summary

Mr. Petrucci has over 35 years of engineering experience, and has been practicing Forensic Engineering for more than 25 years. His understanding of mechanical engineering principles and mathematics from undergraduate and graduate courses that he has taught (undergraduate) and taken, coupled with his industry experience, has enabled him to successfully analyze numerous failures from both theoretical and practical perspectives. Mr. Petrucci specializes in analyzing equipment and machinery failures, and machine safeguarding. He has authored and presented papers on a ladder failure and machine safeguarding, which have been published in the Journal of the National Academy of Forensic Engineers. Mr. Petrucci has provided courtroom and deposition expert witness testimony.

Education

- M.S., Mechanical Engineering, The Pennsylvania State University - 1991
- B.S., Marine Engineering Systems, United States Merchant Marine Academy, Cum Laude - 1989
- M.B.A., Finance Emphasis, Webster University - 1997
- Certificate, Forensic Science & Law, Duquesne University School of Law - 2003
- Completed/Attended several courses in the The Pennsylvania State University's Doctorate of Engineering Program and the University of Pittsburgh's Mechanical Engineering Ph.D., Program

Registrations

- Professional Engineer: Pennsylvania, Maryland, New York, Ohio, and West Virginia
- Board Certified Diplomate Forensic Engineer
- Board Certified Safety Professional
- OSHA 30 Hour General Industry Safety and Health
- Third Assistant Engineer, U.S. Coast Guard, Steam and Motor Vessels of any Horsepower (Continuity Purposes Only)

Professional Organization Memberships

- National Academy of Forensic Engineers - Peer reviewer for NAFE Journal Papers
- National and Pennsylvania Societies of Professional Engineers
- American Society of Mechanical Engineers

Additional Training

- Various National Academy of Forensic Engineers Training Seminars
- Seminars & short courses on OSHA - cranes, derricks, hoists, elevators and conveyors; OSHA - fatal accidents and prevention, OSHA - equipment safeguarding, OSHA recordkeeping, accident investigation, rigging safety, container labeling, compressed gas cylinders, aerial lift safety; finite element analysis, building codes, power plant design and operations and technical writing.

Publications

Petrucci, Nicholas, A. "Machine Safeguarding: Theory, Practice and Case Studies." Journal of the National Academy of Forensic Engineers Vol. 37 No. 1 (2020): 43-52

Petrucci, Nicholas, A. "A Forensic Engineering Investigation of a Ladder Failure." Journal of the National Academy of Forensic Engineers Vol. 26 No. 2 (2009 – published October 2012): 51-62

Petrucci, Nicholas, A. "The Design of a Flow Visualization Facility for Centrifugal Pump Impellers." The Pennsylvania State University Engineering Library May 1991

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Employment History

Petrucci Engineering Consultants, LLC (2003 – Present)
Owner of a Forensic Engineering consulting firm. Services consist of analyzing mechanical failures to determine causation (e.g., design or manufacturing defect, improper installation, excessive operating conditions, improper use, etc.) and extent of damage, provide prognosis on remaining useful life, and recommend remedial/mitigating measures; and conducting safety assessments typically related to machine safeguarding.

The Pennsylvania State University – New Kensington Campus (2003 – 2011 & 2016 - Present)
Responsibilities include teaching Mechanical and Manufacturing Engineering and related courses, student advising and recruitment, course development, and laboratory enhancement and oversight. Courses taught include:

- Introduction to Engineering Design
- Machine Design
- Mechanical Drives
- Mechanical Systems
- Thermodynamics
- Fluid Mechanics & Heat Transfer
- Engineering Mechanics – Statics, Dynamics & Strength of Materials
- Production Design & Production Design Lab
- Measurement Theory & Instrumentation
- Technical Drawing Fundamentals
- Advanced Computer Aided Drafting
- Spatial Analysis and Computer Aided Drafting
- Quality Control, Inspection & Design
- Engineering Economics

EPIC Metals Corporation (2011 – Present)
Consulting Engineer at a structural steel deck manufacturing company. Duties have included project management of larger projects; OSHA compliance initiatives for lock-out tag-out procedures, machine safeguarding, forklift safety training, hotwork, fall protection, personal protective equipment, etc. Chair of the plant safety committee.

Civil and Environmental Consultants (2000 – 2003)
Managed a multi-discipline Forensic Engineering practice area. Responsibilities included leading internal employees, sub-consultants, subcontractors, vendors, etc., to successfully complete multiple projects within budget and schedule constraints; communicating technical matters to non-technical clients; business development and reporting performance to management. Principal investigator for projects within areas of expertise.

Elliott Turbomachinery Company (1998 – 2000)

- Identified potential customers for a new product line of combustion turbine auxiliary equipment. Met with customers to understand their needs and present Elliott capabilities. Led a cross-functional team of internal personnel and external suppliers to develop proposals and detailed cost estimates to ensure competitiveness and profitability. Presented proposals to management for approval prior to submittal to customers.

- Responsible for the execution of a multi-million dollar combustion turbine power plant relocation project. Negotiated various contracts with vendors for the design and installation of the combustion turbine foundation, control system upgrade, starting diesel engine repair, and inlet guide vane modification.

- Managed the repair of numerous types of rotating equipment at a service repair shop. Coordinated reverse engineering and repairs of a variety of components (e.g., turbine diaphragms, rotor discs, shafts, gas turbine compressor blades, inter-stage seal ring assemblies, etc.) with internal, customer, and subcontractor engineers. Presented the results of engineering repair analyses (e.g., finite element analysis, Goodman stress charts, etc.) to customers. Wrote and implemented repair procedures for steam turbine diaphragms, steam turbine rotors, gas turbine rotors, electrical motor rotors and armatures, seals, etc. The types of repairs included inspections (e.g., non-destructive testing – fluorescent penetrant, magnetic particle and ultrasonic; rotor run-out;

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dimensional; etc.), welding, machining, seal strip installation, reblading, balancing, and component fabrication (e.g., thrust collars, sleeves, balance machine drive adapters, seal rings, oil slingers, etc.).

Westinghouse Electric Corporation Summer (1989 & 1991 – 1998)
-International Marketing

- Major role in developing several complex projects from initial talks to orders in excess of $130 million.
- Led cross-functional teams in preparing detailed proposals in response to customer requirements.
- Developed and implemented pricing strategies to maximize profits, while maintaining competitiveness.
- Participated in commercial contract negations. Led technical contract negotiations.

-Project Management & Engineering

- Post-commissioning site manager at a combined cycle/cogeneration power generation construction project. Managed the successful completion of over 2,000 final acceptance list items that were required for final project payment; in part by coordinating the work and interests of the customer, internal management and engineers, subcontractors, and vendors to resolve numerous technical and commercial issues. Many of these items had to be completed during scheduled plant shutdowns of minimal duration. Wrote and submitted equipment design modification procedures to customer engineers for approval.

- On-site mechanical and procurement engineer during the construction and commissioning of a combined cycle/cogeneration power plant. Recommended equipment design changes to facilitate installation and operation, and was involved with the installation and commissioning of all mechanical and some electrical systems. Worked in more detail on designing and implementing modifications to the steam turbine lube oil system, boiler feed pump instrumentation and controls, deaerator, desuperheaters, boiler relief valves, combustion turbine inlet air duct, combustion turbine fuel gas system, and combustion turbine – generator alignment.

- Lead on-site project engineer during three major outages at a large combustion turbine simple cycle power plant. Responsible for the implementation of numerous design changes. Coordinated the work of internal, customer, and subcontractor engineers to develop design modifications from conceptual design to "approved for construction." Some of these design changes included the following equipment: exhaust stack turning vanes, fuel gas throttle valve, lube oil reservoir vapor extractor, generator non-segregated electrical bus bars, fuel nozzles, bearing housings, water injection pumps, etc. Site project manager during the implementation of these design changes, which included managing the customer, internal personnel, and vendors to resolve technical and commercial issues.

- On-site start-up engineer for the installation of emergency generators at a nuclear power plant. Wrote starting air, cooling water, and fuel oil system commissioning procedures for Class 1E emergency diesel generators and ensured all components (e.g., control valves, solenoid valves, instrumentation, pumps, etc.) would be tested under various system design conditions. Recommended system design changes to customer and contractor design teams.

- Performed an engineering and economic feasibility study to increase the power output of emergency diesel generators at a nuclear power plant. Led a team of internal and subcontract design engineers to develop optimal equipment re-rate and upgrade alternatives. In addition to performance and economic impacts, each alternative was scrutinized for implications to all applicable design limitations (e.g., cooling water temperature, heat exchanger capacity, combustion temperature and pressure, lubrication effectiveness at increased oil temperatures, fuel oil system pressure and flowrate, material stress, vibration, etc.). The study resulted in a multi-million dollar equipment upgrade contract.

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Applied Research Laboratory & Dept. of Mechanical Engineering, Penn State University (1989 – 1991)

- Led a military research project that resulted in the design of a flow visualization facility for centrifugal pump impellers. The purpose of the facility was to gain a better understanding of highly three-dimensional transient and steady-state centrifugal pump performance. Wrote a computer program that accurately modeled prototype pump transient performance by incorporating fluid inertial effects, and used dimensional analysis and laws of similitude to design a low speed visualization facility that modeled prototype flow conditions. Developed preliminary design specifications for the facility components (i.e., pump motor, discharge control valve, instrumentation, visualization chamber, etc.), and designed and successfully implemented a method of manufacturing transparent highly three-dimensional impellers to be used in the facility. Authored a paper entitled *The Design of a Flow Visualization Facility for Centrifugal Pump Impellers* and presented it to members of the Mechanical Engineering Faculty and Applied Research Laboratory Staff. This paper is published at the Pennsylvania State University Engineering Library.

- Teaching Assistant for an undergraduate Thermodynamics class for one semester. Work included conducting review class lectures, tutoring students, grading examinations and homework assignments, and assisting with preparing examinations.

U.S. Merchant Marine Academy (Various Commercial Ocean-Going Ships) (1987 & 1988)

- Assisted ship's engineers in the operation, maintenance, and repair of ocean-going shipboard power plants. This work encompassed propulsion and ship's service systems for both steam and diesel power plants.

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