ROBERT DRAPER CURRICULUM VITAE

PROFESSOR, MECHANICAL ENGINEERING
COORDINATOR, MECHANICAL ENGINEERING PROGRAM

POINT PARK UNIVERSITY

INTRODUCITON

The objective of this CV is to give a clear, complete and accurate account of my life as a professional engineer and educator.

CONTACT

PHONE:
412-715-5055 (Mobile)
412-392-3875 (Point Park University)

EMAIL:
rdraper@pointpark.edu

POINT PARK ADDRESS
Room 616 Academic Hall
201 Wood St.
Pittsburgh, PA 15222

HOME ADDRESS
444 Woodland Hills Drive
Pittsburgh PA 15235

ASSOCIATIONS

- Associate Member of the Institution of Mechanical Engineers of London (PE equivalent)
- Member of ASME
- Member Engineers Society of Western Pennsylvania

EDUCATION

Masters of Science in Nuclear Engineering, *cum laude*
Victoria University of Manchester, Manchester, England, 1966

Bachelors of Science in Mechanical Engineering cum laude
Institution of Mechanical Engineers, London, England

Associate Member of the Institution of Mechanical Engineers of London
(PE equivalent)

Certificate in Design and Stress Analysis
Liverpool College of Technology, Liverpool, England

OVERALL CAREER SUMMARY

As a professional engineer, I gained very extensive experience in project management, research and development. I had a leadership role in the mentoring of junior engineers and in complex scientific and technical problem solving.

My forte as a professional engineer was in the design and analysis of sophisticated equipment for the nuclear fuel cell industries. These efforts resulted in the award of thirty U.S. patents and five corporate performance awards.

Since joining Point Park University as Coordinator of Mechanical Engineering Technology (now Mechanical Engineering), I have taught virtually every course in the Program. As Program Coordinator, I have been the leader in the transition from Engineering Technology to Engineering Science. I have prepared extensive material for four ABET accreditation visits. This work has secured continuous accreditation over the period of my employment

SELECTED US PATENTS

8,097,384
Solid oxide fuel cell with transitional cross section

8,097,381
Solid oxide fuel cell including glass seal

8,062,789
Solid oxide fuel cell with mid-stack fuel feed

7,651,801
Current bus bar and power load assembly for SFC

7,320,836
Integral air preheater and start-up heating means for solid oxide fuel cell power generators

7,157,172
Combination nickel foam expanded nickel screen electrical connection supports for solid oxide fuel cells

6,656,623
Low-cost atmospheric SOFC power generation system

6,610,434
Segregated exhaust SOFC generator with high fuel utilization capability

6,492,048
Segregated exhaust fuel cell generator

6,379,831
Expanded nickel screen electrical connection supports for solid oxide fuel cells

5,273,838
Double interconnection fuel cell array

5,258,240
Solid oxide fuel cell generator

5,200,279
Solid oxide fuel cell generator

4,827,346
Model steam generator with improved feed water heating

4,801,369
Preventing fluids in leakable enclosures from intermixing

4,749,023
Cooling system for continuous metal casting machines

INDUSTRIAL EXPERIENCE

SIEMENS ENERGY, INC., PITTSBURGH, PA
1998-2009

Advisory Engineer

Responsible for the design of solid oxide fuel cell (SOFC) generators and generator components; design of equipment used in the manufacture of SOFC; mentoring of junior engineers; engineering analysis.

Selected Accomplishments

- Designed 1200A power lead, bus bar and bundle electrical connectors for POCD8RI Solid Oxide Fuel Cell (SOFC) generator (2008-2009).
- Designed and supervised construction of the 10kw SOFC generator (POCD8RO), which was deliverable under the Department of Energy SECA coal-based fuel program. This generator is currently operating (2006-2008).
- Designed the first SOFC generator to use high-power density cells (POC3). Generator met all DOE SECA contractual requirements
- Produced conceptual designs and cost estimates for single and dual-atmosphere furnaces and support equipment for a full-scale SOFC manufacturing plant, and provided analytical support for a variety of SOFC projects (1997-2002).
- Acquired substantial intellectual property for the company, including ten (10) U.S. Patents in the field of Solid Oxide Fuel Cells (thirty (30) U.S. Patents total).

SELECTED US PATENTS (CONTINUED)

4,660,510
Model steam generator
having thermosyphon heating means

4,640,233
Model steam generator

4,637,346
Compact model steam generator
having multiple primaries

4,635,589
Model steam generator having an
improved feedwater system

4,628,870
Model steam generator having means
to facilitate inspection of sample tubes

4,622,819
Steam turbine exhaust pipe erosion
prevention

4,602,438
Method and apparatus for fluidized
steam drying of low rank coals with wet
scrubbing

4,601,115
Method and apparatus for steam drying
of low-rank coals using a rotary
cylindrical vessel

4,601,113
Method and apparatus for fluidized
steam drying of low-rank coals

4,470,271
Outdoor unit construction for an electric
heat pump

4,449,377
Thermosyphon coil arrangement for
heat pump outdoor unit

4,449,376
Indoor unit for electric heat pump

3,898,977
Liquid crystal door window shutter
arrangement for self-cleaning cooking
ovens

3,831,578
Range exterior surface cooling device

INDUSTRIAL EXPERIENCE (CONTINUED)

WESTINGHOUSE ELECTRIC CORPORATION, PITTSBURGH, PA
1966-1998

Advisory Engineer

Responsible for the design of equipment used in the manufacture of SOFCs, of equipment used for testing nuclear reactor components and of residential and industrial heat pumps.

Selected Accomplishments

- Designed and wrote specifications for all equipment required for the SOFC pre-pilot manufacturing facility in Monroeville, PA.
- Designed and wrote specifications for all major equipment required for the SOFC pilot manufacturing facility in Churchill, PA.
- Designed a water/steam separation system to prevent pipe erosion upstream of an Moisture Separator Reheater.
- Designed high-efficiency heat pumps for residential and industrial use.
- Designed and monitored construction of dual-atmosphere electrochemical vapor deposition (EVD) reactor for the formation of interconnect, electrolyte and fuel electrode upon the SOFC air-electrode substrate. The reactor was for ten years, the core element of the Siemens-Westinghouse SOFC pilot manufacturing facility (PMF).
- Designed and monitored construction of interconnection densification-fuel-electrode sintering and bundle sintering furnaces for PMF (1994-1997).
- Designed and supervised construction of equipment for the investigation of nuclear plant-steam generator corrosion problems. This equipment was highly automated and was key to corrosion testing at Forest Hills for many years.
- Designed, constructed and operated equipment to verify the effectiveness of nuclear reactor core barrel plugs. This project was completed in five (5) months so that the plug might gain approval by the NRC.
- Designed evaporator and condenser coils for high COP heat pumps and air-conditioners.
- Created software adopted by the Thermo-King and Staunton Division of Westinghouse for cost reduction and performance optimization of evaporator and condenser circuits.
- Acquired substantial intellectual property by virtue of twenty (20) U.S. Patents (thirty (30) total). (1994-1997).

COURSES TAUGHT

ME 421 Machine Design Theory & Project

ME 416 Mechanical Vibrations

ME 412 Fluid Mechanics Lab

ME 411 Fluid Mechanics

ME 406 Heat Transfer Lab

ME 405 Heat Transfer

ME 320 Kinematics of Machine Elements

ME 215 Thermodynamics

ME 213 Strength of Materials

ME 102 Dynamics

ME 101 Statistics

MATH 310 Differential Equations

MATH 300 Calculus III

MATH 230 Linear Algebra

MATH 210 Calculus II

MATH 190 Calculus I

TEACHING EXPERIENCE

POINT PARK UNIVERSITY, PITTSBURGH PA
1991-Present
Professor, Mechanical Engineering
Coordinator, Mechanical Engineering Program

Responsible for Management of (ME) Program; teaching of 200, 300 and 400 level courses; maintenance of accreditation.

Selected Accomplishments

- Introduced improved lecture delivery methodology including "Blackboard" and "Schoology"-linked to laptop computers and laser projectors.
- Constantly received excellent course evaluations in thermodynamics, heat transfer, mechanical vibrations, machine design and finite element analysis.
- Lead the effort to transition from a technology-based program to a science-based program.
- Achieved six-year (maximum possible) accreditation following each of four ABET visits.
- Acted in a consulting capacity to local industry, which brought attention to the ME program and fees to the University (~$10,000)

CARNEGIE MELLON UNIVERSITY
1987-1993

Taught thermodynamics and heat transfer as an adjunct instructor.

UNIVERSITY OF PITTSBURGH
1985-1991

Taught statistics, dynamics, advanced dynamics, and properties of materials as an adjunct instructor

PENNSYLVANIA STATE UNIVERSITY
1985-1990

Taught thermodynamics and finite element analysis as an adjunct instructor

COMMUNITY COLLEGE OF ALLEGHENY COUNTY
1970-1985

Taught calculus I, II and III and differential equations over a period of approximately fifteen years

BLACKBURN TECHNICAL COLLEGE
1957-1960

Taught algebra, trigonometry, and early calculus as a part-time instructor

HOBBIES

Formula One
Football, Manchester United
Railroads
Jazz
Drawer of Cars

Avid Collector of Pittsburgh Steel Heritage Artwork

SELECTED CONSULTING ENGAGEMENTS

- Heat transfer analysis and design relating to aluminum and galvanized steel strip coolers
- Design and analysis relating to aluminum and steel coil and slab coolers
- Produced software which optimizes the design of air jet and air/water jet strip coolers
- Persuasive technical support in sales meetings.

SELECTED PROFESSIONAL PUBLICATIONS & SPEAKING ENGAGEMENTS

- The Design and Testing of a Nucleate Boiling Water Cooled Cathode for NBL Negative Ion Source
  IEEE Conference on Engineering Problems of Fusion Research, San Francisco, CA
- Heat Transfer in Melt Spinning Cooling Belts and Drums
  Materials Research Society Symposium on Rapidly Solidified Metastable Materials, Boston, MA
- A Proposed Diagnostic Tool for Steam Generator, Side Steam Boilers
  Materials Performance, Vol. 24, No. 6
- Installation and Operational Approaches for a Nuclear Steam Generator Corrosion Monitor
  Jt. ASME/IEEE Power Generation Conference. Milwaukee, WI
- Inspection and Test Mock-Up Issues Related to a Nuclear Steam Generator Corrosion Monitor
  American Nuclear Society Topical Meeting. Salt Lake City, UT
- Fuel Cells for Stationary Applications
  Pennsylvania Society of Professional Engineers 69th Annual Conference. Erie, PA
- High Power Density Solid Oxide Fuel Cells for APU Applications
  Third ASME Fuel Cell Science Engineering & Technology Conference,Ypsilanti, MI
- Optimal Design of Current Take-Off Bus Bars for Tubular Solid Oxide Fuel Cells
  European Fuel Cell Technology and Applications International Conference, Rome, Italy
- Application of a Centrifugal Circulator for Anode Gas Recirculation in a 5kW SOFC Generator
  Fifth ASME Fuel Cell Science Engineering and Technology Conference, Brooklyn, NY