

Resume / Curriculum Vitae

CHARLES MOSLING, MSEE

pces@nc.rr.com
Raleigh, NC

Key Areas of Interest:

Consulting & Entrepreneurial Work
Alternative Energy Designs
UPS & Motor Drive Designs
High Power Battery Systems
Reliability & Failure Forensics
Patent Analysis Studies
Design Guidance

CONSULTING WORK SUMMARY: System level power electronics engineer with MSEE in power electronics, exhibiting commercial design experience in high power motor drive / inverter design up to 1MW 480VAC, control systems, and switching power supply design. Consulting work includes performing patent viability and infringement studies, root cause failure analysis, and providing design guidance as well as specification development. Have successfully implemented 6 Sigma/Lean Design projects ranging from front-end marketing to major DFM improvements, many resulting in multimillion dollar savings in manufacturing costs and warranty costs. Also worked on several low power designs for battery and energy harvesting applications, with power levels below 1mW.

POWER ELECTRONIC DESIGN SUMMARY

- High power inverter designs (1KW - 1MW) using IGBT devices, comprehensive design knowledge of inverters including gate drive design, low inductance bus design, and high power snubber design.
- Exhibit a superb background in power electronic device knowledge and design, with heavy focus on IGBT, MOSFET, and SCR technologies, including 12 pulse rectifier and static switch designs.
- Excellent magnetic design background, including line frequency and high frequency magnetics.
- Working knowledge of rotating magnetic machines, motor and generator applications, proper usage, and limitations.
- Understand the effects of PWM waveforms on motor and transformer insulation systems.
- Have a thorough understanding of high voltage systems, including impulse/hipot insulation requirements and user safety.
- Power supply design (both linear and switching), using many of the standard switching topologies.
- Have extensive unique design and use knowledge of high and low power battery systems, up to 1MW at 540VDC.
- Excellent understanding of power feed surge (input) and load side (output) fault issues and design requirements.
- Have design & usage knowledge of other devices: flywheel batteries, microturbines, EDLC's, fuel cells, etc.

ANALOG, DIGITAL, AND SYSTEM LEVEL DESIGN SUMMARY

- Very adept in defining system level specifications – defining both technology and manufacturing targets.
- Exceptional at catching user abuse scenarios and other non-intended operations.
- Strong analog and digital circuit design abilities.
- Well developed trouble-shooting skills at system, board, and component levels, including external interaction.
- Superior understanding of electronic noise, EMI, susceptibility, and mitigation tactics (PCB and system level).
- Have used PSIM, PSPICE, MathCad, EASY5, and Electronic Workbench simulation tools.
- Have strong understanding of agency standards (UL, IEC, VDE, etc.) and have designed products to meet their requirements.

TECHNICAL MANAGEMENT

- Management of engineering teams, and project leadership
- Project risk assessment, and risk mediation methods.
- Design resource administration and resource leveling / coordination.
- Development of scheduling and activity plans.

LEAN DESIGN METHODS, 6 SIGMA SKILLS

These are a collection of design methodologies that repeatedly provide optimum designs that result in maximum profit and fastest time-to-market, through clean streamlined design and proper analysis with a coordinated focus on manufacturing. A partial list includes:

- Concept engineering, team idea generation, Voice-of-Customer brainstorming for marketing
 - 6 Sigma Product Requirements and Designs
 - Tolerance Analysis (statistics)
 - DFMA – Design for Manufacturing and Assembly
 - Process Capability Studies (core 6 Sigma metrics, Cp, Cpk process metrics)
 - Gage R&R Studies
 - Design FMEA (and Manufacturing FMEA)
 - Design of Experiments
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INDUSTRIAL WORK EXPERIENCE – Reverse Chronological Order

ENGINEERING CONSULTING – PCES: 6/2004 to Present

Provided a wide variety of services, ranging from design guidance and specification development, root cause failure analysis, failure forensics, patent research, design testing, as well as other duties. Market areas of designs varied from military, commercial products, medical devices, aviation systems, industrial designs and controls, and consumer appliances.

SENIOR DESIGN ENGINEER – Powerware / Invensys: 1/2002 to 3/2003

Coordinated with newly formed team merged from the former Powerware 3-phase group and the CATV group to develop a cost reduced and feature enhanced product upgrade in the 50-160KVA power range. Had become the sole engineering Lean Design / Black Belt instructor for Powerware.

ENGINEERING MANAGER, CATV UPS GROUP – Powerware/Invensys: 1/2000 to 1/2002

Moved to a sister division of Powerware to lead in the role of engineering manager. Have been trained with the corporate Lean Design Blackbelt / 6 Sigma course, and have implemented the concepts into real life designs resulting in large savings and increased profit for the company. As manager, have turned around a failing design group with low morale, and within 18 months have developed a strong functional team with several successful projects. Have become skilled at fostering team creativity while guiding teams through objective design selection. Also have performed other management duties such as engineering project management, employment, providing budgets, team coordination, and other administration responsibilities.

HIGH POWER UPS DESIGN ENGINEER – Powerware / Invensys: 6/98 to 12/99

Worked on a product redesign/cost reduction effort for the large UPS group. My major contribution to the design was the 750KVA power inverter section and gate driver design, with the next step to increase the output capability to 1MVA, which was tested and passed the requirements. Was able to vastly increase the efficiency (~98%) over that of existing designs, helping reduce size and cost. Responsible for verifying that the 12-pulse SCR input stage and the IGBT output stage designs were thermally and electrically sound. Also part of the team responsible for product qualification testing for UL and other agency tests. On the last project for the group, provided design assistance for the smaller 20KVA UPS system with the Powerware Canada team.

INDUSTRIAL WORK EXPERIENCE – Continued

MOTOR DRIVE DESIGN ENGINEER – Eurotherm Drives, Inc.: 9/96 to 6/98

While living in England, developed and helped work into manufacturing a control board upgrade for improving drive performance and decreasing manufacturing costs, while also improving manufacturability. Also made power device tests to replace the IGBT's used in the main AC products in the 25HP - 90HP range. These duties were performed while living in England for one year to aid in releasing the product to manufacturing. After returning to the US, worked to develop the next generation AC product, which operated in the 220-240VAC and 400-500VAC range, met all required IEC/CE and UL standards.

MOTOR DRIVE DESIGN ENGINEER - Pacific Scientific/Powertec Division: 10/94 to 8/96

Designed and tested Powertec's new IGBT based drives for industrial brushless DC motors, which ranged from 20HP to 300HP and used resolver feedback from the motor. Directly engineered many subsystems within the drive design, and selected power components for the inverter stage, capacitor banks, and the control electronics for each of the different frame sizes and performed measurements and tests to verify design. In November of 1995, was promoted to the position of Engineering Manager to guide the engineering team through the remainder of the Millennium product development. The engineering team consists of power electronic engineers, software engineers, CAD designers, and various technicians. Performed a leading role in the company ISO9000 certification program, by structuring procedures and implementing R&D documentation.

SWITCHING SUPPLY & MOTOR DRIVE DESIGN - Square D Company: 9/92 to 10/94

Worked as part of a team in a joint motor drive development with Telemecanique in France. Was directly responsible for designing the power and interface board that contained control interface electronics as well as the flyback switching supplies ($V_{in} < 850VDC$) to power the control and internal housekeeping electronics for the ATV66 drives in the 100HP to 400HP range. Other duties included writing product specifications, manuals, production documents, qualification tests, and other documentation. Worked closely with the UL, NEMA, CSA, and IEC standards to develop the product. Wrote and performed qualification tests for the product in the areas of EMI radiation, voltage isolation, environmental, thermal, application specific, and user abuse endurance.

EDUCATION

MSEE: AUBURN UNIVERSITY, 1992

Researched and designed unique converter topologies to equalize battery charging and maximizing battery life and capacity. These generated several conference papers and the Master's thesis. On the Auburn solar racecar was EE project leader, and directly designed power and control electronics for peak power tracking converters while also co-designing other areas. Studied PWM, resonant, quasi-resonant converter systems and their analyses. Advanced courses taken include power electronics, digital systems, controls, and electronic design.

As part of the Auburn fellowship requirements, taught and supervised undergraduate labs in areas of computer architecture, linear analysis and circuit analysis while also assisting teaching faculty. Also performed research studies in various areas of power electronics.

BEE: AUBURN UNIVERSITY, 1989

During undergraduate studies, researched superconductor load switching using microwaves. Designed, prototyped and programmed an 8088 microprocessor system used as interface and controller for biomedical mechanical arm. Conceptually designed a laboratory power supply that utilizes properties of both switching and linear supplies.