FORCON
INTERNATIONAL

CHARLES MOSLING, MSEE

SUMMARY

Mr. Mosling is an electrical engineer with over 28 years of experience including commercial design, failure and root cause analysis, consulting services, as well as legal services for liability, forensics, and patent infringement. Charles core background is working with power levels spanning from a few watts to over 12MW and with voltages from below 12VDC to 4160VAC and includes inverters for various systems such as motor drives, UPS systems, and back-to-grid inverters. Mr. Mosling has become very proficient at uncovering latent power electronic and inverter related failures. He has successfully found design failures in several very complex projects; one having been unsolved for nearly 40 years despite being studied by many in the engineering services industry.

EDUCATION

Master of Science in Electrical Engineering - Auburn University, 1992

Bachelor of Science in Electrical Engineering - Auburn University, 1989

PROFESSIONAL ASSOCIATIONS

IEEE – member (since 1989)

CONTINUING EDUCATION

Courses and/or Certifications completed in the following:

- Mr. Mosling is a Lean Design / 6 Sigma Black Belt which is a collection of tools for finding root cause failures in difficult to solve scenarios, including utilizing methods like HALT, HASS, MEOST and other reliability tools. These 6 Sigma approaches also encompass well known quality tools such as FMEA, Design of Experiments, Statistical analyses, and Tolerance Analysis.
- Mr. Mosling has attended many power electronic related symposiums on design and failure related topics for power electronic devices (IGBTs, MOSFETS, capacitors), magnetics (motors and transformers), as well as less commonly known failure modes occurring with newer power electronic usages such as inverters, EVs, and solar energy.

CAREER HISTORY

FORCON International – Electrical Consultant
Conducting forensic engineering investigations and expert witness services as they relate to his areas of expertise.

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

Powerware/Invensys – Senior Design Engineer
Coordinated as technical lead 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.

CATV UPS GROUP – Engineering Manager
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.

Powerware / Invensys – High Power UPS Design Engineer
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.

Eurotherm Drives, Inc. – Motor Drive Design Engineer
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.

Pacific Scientific/Powertec Division – Motor Drive Design Engineer
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.

Square D Company – Switching Supply & Motor Drive Design
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 (Vin < 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.

SPEAKING ENGAGEMENTS

Presenter at the 2013 ECCE Expo on designing inverters and properly using bus bar systems.

EXPERT WITNESS SUMMARY

Date	Case Name	Client	Location	Issue
Nov 2018 to Present	Bombardier v. United Chemicon (Expert Report) **Deposition – Case Outcome Pending**	Momkus, LLC	Filed in Western District of Pennsylvania	Failures of railway high-power traction inverter capacitors.

Oct – Dec 2012	Fujitsu v. ECS (Expert Report) **Court Testimony** **Outcome Arbitration** **Completed**	Fujitsu Technology Solutions GmbH (direct)	New York, NY	Computer board failure.
Sept – Oct 2004	Vector Products v. Schumacher Electric **Patent Infringement** **Pre-trial Expert Report**	Venable LLP	Washington D.C.	Patent infringement case involving a battery charger.

PUBLICATIONS

1. D. C. Hopkins, C. R. Mosling, Presentation and Tutorial on Using Bus Bar Systems, 2013 IEEE ECCE Exposition, 2013

2. C. R. Mosling, Using DC/DC Converters To Equalize The Charging of Long Battery Strings, Master's thesis. Auburn, AL: Auburn University, 1992.

3. D. C. Hopkins, C. R. Mosling, S. T. Hung, "Dynamic Equalization During Charging of Serial Energy Storage Elements", accepted for publication in IEEE Transactions on Power Electronics, 1992

4. S. T. Hung, D. C. Hopkins, C. R. Mosling, "Optimization of Battery Life Via Charge Equalization Control", accepted for publication in IEEE Transactions on Industrial Electronics, 1992

5. D. C. Hopkins, C. R. Mosling, S. T. Hung, "The Use of Equalizing Converters for Serial Charging of Long Battery Strings", (invited paper) IEEE Applied Power Electronics Conference, Dallas, Texas, March 10-15, 1991, pp. 493-498

6. C. Wu, Y. Tzeng, J. Nelson, C. Mosling, T. A. Roppel, S. McCooey, K. Struve, M. Fernandez, "Microwave-controlled high-Tc superconductor opening switch", Journal of Applied Physics, 1989, pp. 994-996