

Exponent®
Engineering & Scientific Consulting

Jim Edmonds

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Professional Profile

Mr. Edmonds specializes in power systems for electric power generation, covering all aspects of electric rotating machinery including on-line machine condition monitoring and power plant equipment diagnostic techniques, which includes electronic processing equipment and communication technologies. In this position, Mr. Edmonds has been responsible for leading design and failure investigations in the field of power electrical systems, including the study and analysis of rotating electrical machinery (generators, motors, and motor drive systems).

Mr. Edmonds' generator expertise includes investigations of all aspects of large turbo-alternators; large, medium and small hydro generators; and wind-turbine generators: stator core, stator windings, rotor elements and excitation systems. These investigations have required a detailed knowledge of, and experience related to the generating equipment, power plant operation and maintenance procedures, interfacing equipment such as transformers, monitoring systems, unit control systems and protective relaying schemes. His motor expertise includes investigations of large, medium, and small fixed-speed and variable-speed motor drive systems of various applications and varying degrees of complexity.

Using these investigative skills, Mr. Edmonds has developed root-cause analyses for equipment design and installation defects, for relay and control misoperations, and for electrical equipment malfunctions that were responsible for cascading events and major process and system losses.

In addition to conducting investigations and testifying in matters related to power electrical systems, Mr. Edmonds has performed numerous investigations and has testified as an expert witness in matters pertaining to arc flash injuries, electrical shock incidents, electrocutions, and fire investigations that were estimated to be electrical in origin.

Prior to joining Exponent, Mr. Edmonds was Co-Founder and Executive Vice President of MCM Enterprise Limited, responsible for the introduction, marketing, and sales of the company’s prime products: rotor mounted scanners for hydro-generators and lead acid battery monitoring systems. Mr. Edmonds supported the users of the diagnostic systems by providing interpretation and analysis of the diagnostic data.

For 13 years Mr. Edmonds was a Project/Program Manager for the Electric Power Research Institute (EPRI), where he led advanced-technology research and development programs for improved power generation. This comprised technology assessments, technology development, product applications, market research, as well as commercialization aspects. It gave Mr. Edmonds an in-depth insight into the root causes leading to plant outages and performance limitations. EPRI’s management selected Mr. Edmonds to serve at the National Science Foundation for one year as an electric utility industry research advisor. Prior to joining EPRI, he held a similar management position at DOE-ERDA. While at ERDA, he was chosen to chair a Source Evaluation Board for the selection of a contractor to develop a 300-MVA superconducting generator for power plant demonstration and co-managed three Compressed Air Energy

Storage (CAES) demonstration projects.

As Staff Electrical Engineer with American Electric Power, Mr. Edmonds was responsible for all aspects of electric rotating machinery applications. This included evaluation of new equipment designs, establishing existing plant maintenance and refurbishment programs, and management of the decommissioning and disposal of retired rotating machinery systems, as well as coordination of equipment contracts for new power plant construction. Mr. Edmonds also has conducted onsite equipment testing and evaluations and instituted a unique application of a retired turbine-generator to stabilize power-line voltages in a local region.

Academic Credentials & Professional Honors

B.S., Electrical Engineering, University of Illinois, Urbana-Champaign, 1968

Life Fellow, IEEE - The Institute of Electrical and Electronic Engineers

IEEE PES Cyril Veinott, Electromechanical Energy Conversion Award, 2014

Professional Affiliations

Eta Kappa Nu (member)

Life Fellow - Institute of Electrical and Electronic Engineers

CIGRE (International Conference on Large High Voltage Electric Systems) (member Study Committee A1, Rotating Electrical Machines)

Patents

Patent 5,325,002: Trapped-Field, Superconducting, Induction-Synchronous Motor/Generator Having Improved Startup Torque, June 28, 1994 (Rabinowitz et al.).

Patent 4,722,226: Acoustic Monitor For Rotary Electrical Machinery, February 2, 1988.

Publications

Edmonds J. Using machine condition monitoring to maximize performance, minimize cost. Hydro Review XIX, 2000; 6:32-36, September (peer reviewed—received Author's Award).

Edmonds J, Richards TH. Using the network solution [hydrogenerator monitoring]. International Water Power and Dam Construction 1998; 50(10):33-34; October.

Edmonds J, Griffin GL. Advanced condition monitoring technology for hydroelectric generators. IEEE International Electric Machines and Drives Conference Record 1997; WB1/3.1-3.

Edmonds J. On-line condition monitoring for generators. International Water Power and Dam Construction 1994; 46(10):80-82, October.

Churchhill TL, Edmonds J, Feyk CT. Comprehensive noninvasive battery monitoring of lead-acid storage cells in unattended locations. INTELEC, 16th International Telecommunications Energy Conf 1994; 594-601.

Edmonds J, Rasmussen JR, Campbell T, Stone G. Failure mode testing of a hydro generator equipped with a rotor-mounted scanner. International Water Power and Dam Construction 1993; 45(1):37-43, January.

Jordan HE, Edick JD, Schiferl RF, Edmonds J, Sharma DK. Application of high temperature superconductivity to electric motor design. IEEE Transactions on Energy Conversion 1992; 7(2):322-329; June.

Churchill TL, Edmonds J, Lloyd BA, Sedding HG, Stone GC. Real-time condition monitoring of turbine generators. Proceedings, International Conf. on the Evolution and Modern Aspects of Synchronous Machines 1991; 3:727-732.

Sanchez-Gasca JJ, Bridenbaugh CJ, Bowler CEJ, Edmonds J. Trajectory sensitivity based identification of synchronous generator and excitation system parameters. IEEE Transactions on Power Systems 1988; 3(4):1814-1822, November.

Edmonds J. Coming: Large superconducting generators. Electrical World 1980; 194(9):69-72, December.

Prackouras AG, Vachon RI, Khader MS, Edmonds J. Thermal and constraint stresses in metal stacks. Journal of Engineering for Power, Transactions ASME 1975; 97A(2):301-303.

Presentations and Published Abstracts

Rakow AS, Rakow JF, Edmonds JS, Brody RD. Root cause failure analysis of a 373 megawatt steam turbine generator exhibiting both reversible and irreversible thermal sensitivity. Proceedings, ASME 2011 Power Conference, POWER2011, Denver, CO, 2011.

Klopp RW, Dugnani R, Edmonds JS. The role of brush spring kinking in a generator flash-over incident. Proceedings, 2011 North American Power Symposium (NAPS2011), Boston, MA, 2011.

Edmonds J, Daneshpooy A, Murray SJ, Sire RA. Turbogenerator stator core study. Proceedings, 6th IEEE International Symposium on Diagnostics for Electric Machines, Power Electronics and Drives, p. 441, Kraków, Poland, September 6-8, 2007.

Edmonds J, Daneshpooy A. Turbo stator core study. Presented at SDEMPED - IEEE, Kraków, Poland, September 6-8, 2007.

Edmonds J. Effects of flexible operation on turbines and generators. EPRI, Document No. 1008351, Palo Alto, CA, 2004 (contributing author).

Edmonds J, Showalter A. In-service winding failure of newly installed replacement stator. Proceedings, IEEE International Electric Machines and Drives Conference, IEMDC, pp. 797-799, 1999.

Edmonds J. Experience with rotor-mounted scanning of hydrogenerator stator windings. Proceedings, Iris Rotating Machine Technical Conference, pp. 7-16, Etobicoke, Ontario, Canada, 1998.

Churchill TL, Feyk CT, Edmonds J. Noninvasive lead-acid battery monitoring. Proceedings, 7th International Power Quality Telecomputer Infrastructure Conference, pp. 137-51, 1994.

Stone GC, Edmonds J, Campbell TH. Advanced methods for continuous insulation condition monitoring on hydrogenerators. Proceedings, Electrical Electronics Insulation Conference and Electrical Manufacturing and Coil Winding Conference, EEIC/ICWA Exposition, pp. 685-690, Chicago, IL, 1993.

Wegner CA, Bowler CEJ, Rubino JCP, Edmonds J. Turbine-generator transient monitoring: Torsional stress analysis and stability model identification. Proceedings, American Power Conference, Vol. 1, pp. 977-982, 1991.

Rasmussen JR, Edmonds J. Generator problems in cycled units. American Society of Mechanical Engineers, Power Division PW, Vol. 13, pp. 105-113, October 6-10, 1991.

Demcko JA, Farmer RG, Edmonds J, Sharma DK. A self-calibrating power angle instrument for synchronous machine control. Proceedings, American Power Conference, pp. 461-465, Chicago, IL, 1989.

Edmonds J, Emery FT. RF monitoring in rotating electrical machinery. Proceedings, American Power Conference, Illinois Institute of Technology, pp. 634-642, Chicago, IL, 1985.

Sharma DK, Edmonds J, Shugars G. Turbine-generator monitoring and surveillance. 9th International Conf. on Modern Power Stations, Vol. 1, pp. 54/1-8, AIM, Liege, Belgium, 1985.

Edmonds J, Perez AJ. A torsional vibration monitoring program for large steam turbine-generators. Proceedings, American Power Conference, Illinois Institute of Technology, Vol. 45, pp. 514-19, Chicago, IL, 1983.

Ashkin M, Baldwin MS, Eckels PW, Flick C, Schwenk HR, Edmonds J. Stability of superconducting generators-power system and cryogenic system effects. Proceedings, American Power Conference, Illinois Institute of Technology, Vol. 44, pp. 723-728, Chicago, IL, 1982.