

## Isidor “Izzy” Kerszenbaum, Ph.D., P.E.

### Principal



### Professional Summary

Dr. Kerszenbaum is the founder of Izzytech LLC, specializing in electrical power engineering with an emphasis on transformers, motors, generators and associated systems and components used in the industrial and utility sectors. His experience covers all aspects of electromagnetic apparatuses, from design of electric rotating machines and power distribution transformers, to protecting, monitoring and testing instrumentation and systems. During his career spanning over three decades, he has maintained a bond between his industrial engineering activities and lecturing on various aspects of electric power engineering.

Before becoming an independent consultant, Dr. Kerszenbaum spent a year in Exponent Failure Analysis, at the Irvine, California office as Senior Managing Engineer. Before that, Dr. Kerszenbaum was responsible for large electrical equipment in a nuclear power plant (SONGS), gaining experience in the nexus between operational effectiveness and nuclear safety in his area of responsibility. As part of this effort, he was influential in raising the awareness of the maintenance needs of the safety-related emergency diesel generators in nuclear power plants. He also was a key contributor during the development and publication of the EPRI guide for maintaining these machines, which are critical to nuclear safety. Thru the STARS Alliance and his independent consulting, Dr. Kerszenbaum has assisted other nuclear power plant engineers towards solving problems with transformer, motors, main and emergency generators, voltage regulators, protection and switchyard components.

As Director of Electrical Engineering in Edison Mission Energy, a deregulated company of Edison International, he was responsible for overseeing the electrical scope of work in the construction of new power plants, and troubleshooting large electric apparatus in operating stations. In this position, he performed due diligence reviews of electrical documentation produced by EPC contractors and owner engineers; and was responsible for hiring and managing consultants/experts and coordinating with utilities, contractors, consultants, and EME regional personal on all facets of electrical engineering, as well as new technology evaluations such as the gas-fired micro-generators.

During his work as consulting engineer in Southern California Edison, Dr. Kerszenbaum developed a set of coaxial busses that replace the flat DC busses connecting the exciter to the collector rings of large generators. This arrangement allowed the installation of Hall-effect collars for the detection and localization of grounds in the DC excitation circuit of large turbine-driven generators. He introduced and is responsible for the acceptance of the Repetitive Surge Oscillograph (RSO) technique for detecting shorted-turns in the field windings of turbo-generators in North America. Previously, the RSO technique was mainly used in Europe, and seldom in North America.

While spending six months as a Visiting Scientist at the University of Washington in Seattle, Dr. Kerszenbaum was the lead consultant on a research and demonstration project for the application of a fuzzyfied neural network algorithm for the detection of shorted turns in the rotor winding of large turbo-generators. The work was co-funded by the National Science Foundation and EPRI. Other projects which Dr. Kerszenbaum had a leading consulting roles include: the Adaptive VAR Compensator for avoiding reactive-power driven curtailments in wind parks, with a demonstration unit installed in a wind farm in Tehachapi; the High Temperature Super Conducting Current Limiter; the Santa Ana Dynamic Cable Loading; and the Smart Motor Analyzer, for the testing of the insulation of electric motors and generators in a large utility. He also developed an instrument to measure speed-torque characteristics of electric motors during starting.

As Manager of R&D with a manufacturer of large dry-type distribution transformers, Dr. Kerszenbaum developed and introduced to the industry the concept of “K-Factor” transformers for the design and application of distribution transformers carrying harmonic loads. K-factor is now a commonly used method in power quality for estimating the harmonic load for a given application.

Previous to his work in electromagnetics, Dr. Kerszenbaum worked as a protection engineer with two large utilities performing short-circuit analyses, calculating protective device settings, and analyzing faults that occurred in high voltage transmission and distribution systems.

### Degrees & Professional Honors

Ph.D., Electrical Engineering, University of Witwatersrand, South Africa, 1983

M.B.A., University of California, Irvine, 1993

Graduate Diploma, Electrical Engineering, University of Witwatersrand, South Africa, 1981

B.Sc., Electrical Engineering, Technion, Israel Institute of Technology, 1978

### Honors

IEEE-AAAS Congressional Science and Technology Fellow, US House of Representatives, 2002

The South African Council for R&D Grant, 1982, 1983

The Institute Premium Award, SAIEE, 1983

The South African Transport Services Award, SAIEE, 1986

The IEEE (IAS) Committee Prize Paper Award, 1988

The IEEE (IAS) Ralph Lee Prize Paper Award, 1990

The IEEE (IAS) Honorable Mention Paper Award, 1991

The William Gould Award for Technical Excellence by Edison International, 1999

Fulbright Specialist Roster, 2015. Grant 2016.

### Licenses

Professional Electrical Engineer, California, #12785

### Additional Languages

Spanish

Dr. Kerszenbaum is active contributor to EPRI and the IEEE. He is a regular lecturer at meetings of the EPRI's Turbine Generator Users Group, and made presentations at the Generators Users Group and Doble meetings. He is actively engaged in the IEEE's Electric Machinery Committee: recently as past chairman, and also as past chairman of the Working Group 10 (Online Monitoring of Large Synchronous Generators) and past chairman of Working Group 3 (IEEE Guide for the Rewind of Synchronous Generators). He also is an invited guest lecturer at universities and in other forums on issues related to his areas of expertise. He is also a technical manuscript reviewer for the IEEE (PES).

As visiting scholar and part-time professor, Dr. Kerszenbaum taught undergraduate and graduate courses at the University of Washington, at UCLA extension and at the California State University, Long Beach. He was electrical laboratory instructor at the University of the Witwatersrand.

#### Publications

Kerszenbaum I, Weinberger J.: *Effect of a MHO unit capacitor failure on the operation of the 'Distance Inter-phase' Relay Type GEC-CGX51*; IEC Publication, June 1979.

Kerszenbaum I, Weinberger J.: *Protection of very high voltage power lines by means of 'phase comparison protection'*; IEC Publication, 1979.

Kerszenbaum I, Landy CF.: *Investigation of the existence of significant inter-bar laminar currents in three phase squirrel cage motors with rotor-bar and/or end-ring faults*; The Transactions of the SAIEE 1983 June; 74:6.

Kerszenbaum I, Landy CF: *The detection of broken bars and/or end-rings in large squirrel cage induction motors*; The Transactions of the SAIEE, July 1984.

Kerszenbaum I, Landy CF: *The existence of large inter-bar currents in three phase squirrel cage motors with rotor-bar and/or end-ring faults*; The Transactions of the IEEE (PAS), July 1984.

Mazur A, Kerszenbaum I, Frank J: *Maximum insulation stresses under transient voltages in the windings of distribution and power transformers*; The Transactions of the IEEE (IAS), July 1988.

Kerszenbaum I, Mazur A, Mistry M, Frank J: *Specifying dry-type distribution transformers for solid state applications*; The Transactions of the IEEE(IAS) 1991 Feb; 27(1).

Kerszenbaum I, Das R: *The effect of transformer harmonic losses on the performance of large autonomous power supplies*; Proceedings, Battery Conference on Applications and Devices, CSU Long Beach, Long Beach, CA, 1989.

Batan D, Kerszenbaum I: *Effect of core-clamp pressure on the sound level emitted by the core of dry-type distribution transformers*; Proceedings, I&CPS Technical Conference of the IEEE (IAS), 1989.

Kerszenbaum I: *Shaft currents in electric machines fed by solid state drives*; Proceedings, I&CPS Technical Conference of the IEEE (IAS), pp. 71–79, 1992.

Kerszenbaum I, Rodriguez A, Pitzer J, Nguyen E: *Thermal characterization of distribution cable banks to dynamically rate circuit ampacities*; Proceedings, IEEE/PES Transmission and Distribution Conference, Chicago, IL, April 1994.

El-Sharkawi MA, Marks RJ, Oh S, Huang SJ, Kerszenbaum I, Rodriguez A: *Localization of winding shorts using fuzzified neural networks*; Proceedings, IEEE/PES Conference, New York, NY, Winter 1994.

El-Sharkawi MA, Kerszenbaum I, et al: *Transient analysis of distribution class adaptive VAR compensators: Simulation and field test results*; Presented at the IEEE/PES Conference at San Francisco, CA, Summer 1994.

Kagalwala RA, Kerszenbaum I, et al: *Transient analysis of distribution class adaptive VAR compensators: Simulation and field test results*; Presented at the summer 1994 IEEE/PES Conference in San Francisco, CA, Summer 1994.

El-Sharkawi MA, Huang SJ, Marks II, RJ, Oh S, Kerszenbaum I, Rodriguez A: *Neural network application to short turn localization using fuzzified data*; Presented at the Intelligent Systems for Power Applications (ISAP) Conference, Montpellier, France, Summer 1994.

El-Sharkawi MA, Kerszenbaum I, et al: *Field installation and modifications of a 5kV class adaptive VAR compensator*; IEEE/PES Conference, Winter 1995.

El-Sharkawi MA, Kerszenbaum I, et al: *Development and field testing of a 15-kV class adaptive VAR compensator*; IEEE/PES Conference, Winter 1995.

Marks II, RJ, Kerszenbaum I, et al: *Twin signal signature sensing: Application to shorted winding monitoring, detection, and localization*; Presented at the Workshop on Environmental and Energy Applications of Neural Networks, Richland, WA, March 1995.

Straifel RJ, Marks II, RJ, El-Sharkawi M, Kerszenbaum I: *Detection of shorted-turns in the field winding of turbine-generator rotors using novelty detectors — Development and field test*; Proceedings, Power Meeting of the IEEE, 1996 Winter.

Kerszenbaum I, Lopetrone J: *Novel hall-effect turbogenerator's rotor DC ground-fault localizer*; Presented at the 1997 IEEE International Electric Machines and Drives Conference, Milwaukee, Wisconsin, May 1997.

Guttormsson S, Marks II, RJ, El-Sharkawi MA, Kerszenbaum I: *Elliptical novelty grouping for on-line short-turn detection of excited running rotors*; IEEE/PES Transactions on Energy Conversion, 1997.

Kulkarni A, El-Sharkawi M, Marks II, R, Andexler G, Kerszenbaum I: *Development of a technique for online detection of shorts in field windings of turbo-generator rotors: Circuit design and testing*; IEEE/PES Transactions on Energy Conversion 2000 March; 15 (1).

Kerszenbaum I, Chetwynd, R: *Case study of shorted turns development*; EPRI Meeting, Charlotte, NC, July 26–27, 2004.

Kerszenbaum I, Michael P: *Experience with repairs of SONGS Unit 3 shorted-turns*; EPRI's Winter 2005 TGUG Technical Workshop and Meeting, St. Petersburg, FL, January 17–20, 2005.

Kerszenbaum I, Klempner G: *Comparison of the vibrations of 2 & 4-pole cylindrical-rotors due to shorted-turns in the field winding*; EPRI's Winter 2005 TGUG Technical Workshop and Meeting, St. Petersburg, FL, January 17–20, 2005.

Kerszenbaum I, Klempner G: *Comparison of the vibrations of 2 & 4-pole cylindrical-rotors due to shorted-turns in the field winding*; 2005 IEMDC, Denver, CO, 2005.

Kerszenbaum I, Maughan C: *Utilization of Repetitive Surge Oscillograph (RSO) in the detection of rotor shorted-turns in large turbine-driven generators*; IEEE Electrical Insulation Conference (EIC), Conference Publications, pp. 398–401, June 2011.

Relu Ilie, Kerszenbaum, I: *Issues to Consider when Substituting Large Power Transformers in Generating Stations*; IEEE, Vol. 46, August 2013.

Kerszenbaum, I: *Rigorous protection scheme, proper maintenance help prevent over-fluxing*; Combined Cycle Journal, 1Q/2015.

#### Books

Kerszenbaum I, Klempner G: *Large Turbogenerator Diagnostics Guide*; CRC Press, 2016.

Kerszenbaum I: EPRI Technical Report 3002003743: *Emergency Diesel Generator (EDG) Monitoring and Condition Assessment via Transient Methods*, December 2014.

Kerszenbaum I: EPRI Technical Report 3002001758: *Residual Magnetism*, Final Report, August 2013.

Kerszenbaum I, et al: EPRI Technical Report 1021479: *Nuclear Maintenance Applications Center: Generator Maintenance Guide for Emergency Diesel Generators*, Final Report, December 2010.

Kerszenbaum I, Klempner G: *Handbook on the Operation and Maintenance of Large Turbo-Generators*; John Wiley/IEEE Press, 2008.

Kerszenbaum I, Klempner G: *Operation and Maintenance of Large Turbo-Generators*; John Wiley/IEEE Press - July 2004.

Kerszenbaum I: *Inspection of Large Synchronous Machines*; Published by the IEEE-Press, April 1996.

Kerszenbaum I, et al: *Localization of shorted-turns in the DC-field winding of turbine-generator rotors, using fuzzified neural networks*; Chapter in: *Fuzzy System Theory in Electric Power Engineering*; El-Hawari M (editor), IEEE Press, 1998.

Kerszenbaum I: *The behavior of three phase squirrel cage induction motors with unbalance in the secondary impedance: in particular two pole motors*; Ph.D. Thesis, University of the Witwatersrand, Johannesburg, South Africa, December 1983.

#### Invited Speaker

Kerszenbaum I: *Transients in windings of dry-type distributions transformers*; LA Chapter of the IEEE, Los Angeles, CA, June 1988.

Kerszenbaum I: *K-factor calculations applied to distribution dry-type power transformers*; University of California, Irvine, CA, February 1989.

Kerszenbaum I: *Evolution of the detection of shorted turns in the field winding of turbo-generator rotors using fuzzy logic and neural networks*; Panelist on Intelligent Systems Applications to Electric Machines, at the IEEE (PES) 1996 Summer Meeting, Denver, Colorado, July 30, 1996.

Kerszenbaum I: *Computational intelligence applications in electric utilities under de(re)regulation*; Televised Lecture Series at the University of Washington, November 15, 1996.

Kerszenbaum I: *The independent power producer's experience in the changing world of electric power generation*; Seminar at the University of Washington, Department of Electrical Engineering, March 3, 2000.

Kerszenbaum I.: *Turbo-generator standards harmonization – Utility and user perspective*; CIGRE Annual Meeting, Paris, France, 2004.

Kerszenbaum I, Klempner G.: *Comparison of the vibrations of 2 and 4 Pole generators with field-winding shorted turns*; Florida IEEE/University of Florida Meeting, February 2005.

Kerszenbaum I: *Regulation of the electric power industry*; California State University – Fullerton, 2009, 2011.

Kerszenbaum I: *Life Cycle Management of large generators*; EPRI, Madrid, Spain, April, 2011.

Kerszenbaum I.: *Application of repetitive surge oscillograph (RSO) technique*; Annapolis, VA, June 2011.

Kerszenbaum I: Numerous presentations at EPRI TGUG Meetings, as well as several webinars.

Kerszenbaum I: Presentations at the GUG (Generator Users Group) and Doble meetings on issues related to rotating machinery.

#### Prior Professional Experience

- Senior Manager Engineer – Exponent Failure Analysis – Providing consulting services to clients in generators, motors and transformers, 2012-2014.

- Supervisor of the Electric Programs Engineering Group – San Onofre Nuclear Generating Station, Southern California Edison (SCE), 2012.
- Consulting Engineer – Maintenance Engineering – San Onofre Nuclear Generating Station, Southern California Edison (SCE), 2002–2011.
- Director of Electrical Engineering - Edison Mission Energy (EME), 1997–2001
- R&D Senior Scientist/Engineer – Southern California Edison, Research and Technology Application, 1991–1997
- Power Apparatus Consultant, Southern California Edison, 1989–1991
- Manager R&D, International Transformer Corporation, 1985–1989
- Design and R&D Engineer, General Electric Company, Large Machines Division, 1980–1985 (part-time during 1982–1983)
- High Voltage System Protection Engineer, Electricity Supply Commission (ESCOM), System Operations Division, 1979–1980
- Protection Engineer, The Israel Electric Corporation, System Operations Division, 1978–1979

#### Professional Affiliations

- Fellow member of the IEEE
- Fellow of the Magnetics Society of the IEEE
- Past Chair of the Electric Machines Committee of the Power Engineering Society of the IEEE (2006/7)
- Treasurer of the 2000 IEEE-International Conference on Insulation, Anaheim, California
- Technical Program Chair of the IEEE/IEMDC'99 Conference in Seattle, May 1999
- Past Chair of the Working Group 10 of the EMC (topic: Online Monitoring of Large Synchronous Generators which resulted in the new IEEE Standard 1229.
- Past Chair of the Working Group 3 of the EMC (topic: Guide for the Rewind of Synchronous Generators – IEEE Std. 1665).

#### Training Seminars

Kerszenbaum has been holding 5-day seminars on the Operation and Maintenance of Large Turbogenerators together with Geoff Klempner since 1997. Hundreds of engineers, technicians and others have participated in these seminars. He also holds 3-day seminars on larger power transformers and motors. These seminars are held at utilities, OEMs and other institutions, and once a year open to anyone in Irvine, California. Information about the seminars can be found on the [www.IzzyTech.com](http://www.IzzyTech.com) website.