

POWER ELECTRONICS TUTORIAL: Power Factor and Harmonics, Variable Frequency Motor Drives, and Solid-State Motor Starters

Description

This tutorial is designed to introduce utility engineers to the world of power electronics. The sections of the seminar will cover a Power Electronics Overview, Power Factor and Harmonics, Variable Frequency Motor Drives, and Solid-State Motor Starters. Each section will discuss the theory of operation as well as the load implications for the supplying utility. Each section will be approximately 1½ hours with question and answer periods to follow.

Power Electronics Overview - Keith H. Sueker

This section will cover feedback control systems, rectifiers and converters, phase control, switch mode systems, SCR characteristics, a number of power electronics applications, and the principles of utility applications such as VAR compensators and HVDC converters.

Variable Frequency Motor Drives - Richard H. Osman

The historical development of variable frequency drives and their present use in the low and medium voltages will be discussed. The topic will cover various types of drives, their theory of operation, and their areas of application. Present day drive applications range to 35,000 hp at 13.8 kV. Attendees will receive lecture notes by Mr. Osman.

Power Factor and Harmonics - Keith H. Sueker

These two subjects come together in their effects on the supplying utility. Power electronics may inject harmonic currents and low power factors into the supply, and resonance problems can arise. The origins of harmonics, their effects, and mitigation methods will be discussed. Attendees will receive the pamphlet "Power Factor and Harmonics" by Mr. Sueker.

Solid-State Motor Starters - Harry D. Hagerty

Solid-state motor starters offer continuous control of induction motor starting currents. They can mitigate the effects of high inrush currents on the supply and reduce mechanical stresses from across the line starting. The characteristics of these modern starters and their areas of application will be discussed. Attendees will receive lecture notes by Mr. Hagerty.

Bios

Keith H. Sueker is a graduate of the University of Minnesota and Illinois Institute of Technology. He has held various engineering management positions at Westinghouse Electric Corporation and Robicon Corporation. He is currently a consulting engineer. Mr. Sueker is a Life Senior Member of the IEEE and a member of the IAS/PES. He is the author of the book "Power Electronics Design."

Richard H. Osman is a graduate of Carnegie Institute of Technology and has been designing variable frequency motor drives for some 30 years. He has held engineering management positions in drives with Robicon Corporation, now Siemens E&A LD-A, and is currently Principal Product Engineer. Mr. Osman is a Senior Member of the IEEE and a member of IAS/PES.

Harry D. Hagerty is a graduate of the University of Pittsburgh and has been associated with Benshaw, Inc. in engineering management positions for 25 years. He has been responsible for the development of 15 kV class starters at power levels to 20,000 hp. Mr. Hagerty is a Senior Member of the IEEE and a member of the IAS/PES. He has been active in the Pittsburgh Section EXCOM.

Schedule

Introduction to Power Electronics - Mr. Sueker
Historical development, semiconductors, circuits, and applications.
Question and answer period
Break

Variable Frequency Motor Drives – Mr. Osman
Historical development, types of drives, theory of operation, applications
Question and answer period

Lunch

Power Factor and Harmonics – Mr. Sueker
Power factor correction, harmonic currents, resonances, mitigation measures
Question and answer period.
Break

Solid-State Motor Starters – Mr. Hagerty
Induction motor characteristics, inrush current mitigation, power factor correction
Question and answer period
Recap – All

Adjourn