

Power Electronics for Power Engineers: Why and How Much?

Abstract:

Why should Power Engineers know Power Electronics? The answer is obvious when one looks at the role that power electronics has to play in all aspects of power systems: Generation, Delivery and End-Use. Some of these applications can be summarized as follows:

1. Generation by Renewable Energy Sources and Storage:
 - Use of Renewable Energy Sources such as from wind energy at variable frequency, and from Photovoltaics at dc.
 - Storage in the form of Batteries such as NaS, Flywheels and SMES (Superconducting Magnetic Energy Storage)
2. Reliable Delivery
 - HVDC Transmission Systems
 - FACTS Devices such as SVC, STATCOM, TCSC etc for Voltage Stability
3. Efficient End-Use
 - Variable-speed drives to improve system efficiency like in Heat Pumps
 - Compact Fluorescent Lighting and LED-based lighting
 - Power Quality concerns due to Power Electronics based Loads

How much do Power Engineers need to know about Power Electronics? This 50-minutes top-down presentation will quickly review the applications listed above, look at the voltage and current handling capabilities of the present-day semiconductor devices, and at the converter topologies and their control that make the use of power electronics efficient, reliable and economical.

References:

1. First Course on Power Systems by Ned Mohan. Year 2006 Edition, published by MNPHERE (www.mnpere.com), ISBN: 0-9715292-7-2.
2. First Course on Power Electronics by Ned Mohan. Year 2007 Edition, published by MNPHERE (www.mnpere.com), ISBN: 978-0-9715292-9-8.