



Tutorial – II

***Testing and Condition Monitoring of Induction and Synchronous
Machines in an Industrial Environment***

Abstract:

AC electric machines are the most common and important type of electrical apparatus used in industry, and their continued operation is critical for maintaining the productivity, efficiency, reliability, and safety of the facility. The objective of this lecture is to present an overview of diagnostic techniques used in the field for off-line testing and on-line condition monitoring of medium ~ high voltage induction and synchronous machines with emphasis on electrical monitoring. The subjects covered in this lecture include failures in the stator winding / interlaminar insulation, rotor cage/damper/field winding, eccentricity, bearing, and magnetic wedges. A description of the root causes and consequences of failure are given for each component, and the benefits and limitations of commercially available technologies are presented. The target audience is practicing engineers and researchers in the area of reliability of electrical machines. This lecture can also serve as an overview of electric machine testing for attendees with undergraduate level knowledge of electric machines. For researchers in the field, it can help target future research/development on electrical testing to industrial needs.

Presenter:

Sang Bin Lee – Professor of Electrical Engineering at Korea University



Sang Bin Lee received the B.S. and M.S. degrees from Korea University, Seoul, Korea in 1995 and 1997, respectively, and his Ph.D. degree from Georgia Institute of Technology, Atlanta, GA in 2001, all in Electrical Engineering. From 2001 to 2004, he was with the Electric Machines and Drives Laboratory, General Electric Global Research Center (GE GRC), Schenectady, NY. At GE GRC, he developed an inter-laminar core fault detector for generator stator cores, and worked on insulation quality assessment for electric machines. From 2010 to 2011, he was with the Electric Drive Technologies, Austrian Institute of Technology (aka Arsenal Research Laboratory), Vienna,

Austria, as a Research Scientist, where he worked on condition monitoring of PM synchronous machines. From 2017 to 2018, he was a Consultant at Qualitrol-Iris Power Engineering, Toronto, and Visiting Researcher at University of Waterloo, Waterloo, ON, Canada, where he worked on testing of medium-high voltage machines. Since 2004, he has been a Professor of Electrical Engineering at Korea University, Seoul, Korea, and has been involved in consulting and training for field maintenance engineers in the power and utilities, petrochemical, steel, and pulp and paper industries. His current research interests are in protection, monitoring and diagnostics of electric machines and drives.

Dr. Lee was the recipient of the "Diagnostics Achievement Award" in 2017 from the IEEE Symposium on Diagnostics of Electric Machines, Power Electronics and Drives (SDEMPED), and received sixteen IEEE Prize Paper awards. He received the 2005 PES Prize Paper Award from the IEEE Power Engineering Society (PES), the 2014 IEEE Transactions on Industry Applications (IAS) Prize Paper Award (Honorable Mention) from IEEE IAS, the 2019 1st Prize, 2013 2nd Prize, 2011 1st Prize, 2008 2nd Prize, 2005 1st Prize, and 2001 2nd Prize Paper Awards from IEEE IAS Electric Machines Committee (EMC), the 2017 1st Prize Paper Award from IEEE IAS Industrial Drives Committee (IDC), the 2019, 2017, 2013, 2011, and 2009 SDEMPED Prize Paper Awards from the Technical Committee on Diagnostics of the IEEE PELS, and the 2015 1st Place, 2014 2nd Place Technical Paper Awards from the Pulp and Paper Industry Committee of IEEE IAS. He served as a Distinguished Lecturer (2014-2016) for the IEEE IAS, and as an Associate Editor for the IEEE Transactions on Industry Applications for the IEEE IAS EMC from 2007 to 2018.