

COURSE AUTHOR  
Jon Giesecke

# L2 TRANSFORMER CONDITION ASSESSMENT COURSE





**Mr. GIESECKE** is one of the world's leading experts in combining technologies used in the in-service inspection of high voltage oil-filled power transformers and substation diagnostics.

He has been training personnel worldwide in these methods for over 20 years with great success.

Prior to forming JLG Associates LLC in 2006, Giesecke was employed by EPRI Solutions as a senior project manager in the Substation Predictive Maintenance business area.

As a Senior Project Manager, some of his responsibilities included: the development and implementation of the Substation Predictive Maintenance Program (SPdM) at numerous electric utilities in the U.S. and abroad; Developing and Instructing an EPRI Solutions' SPdM course; instructed portions of the EPRI Transformer Performance Monitoring and Diagnostics course and the EPRI Substation/Switchyard Predictive Maintenance course; Providing training, services and consulting to evaluate maintenance responsibility and advanced programs applied to switchyard/substation components.

Along with vast knowledge in transformer and substation diagnostics, Mr. Giesecke is an ITC level III thermographer has instructed at the FLIR ITC training center. He also served on the board of directors of the International Society of Professional Thermographers, Inc. (ISPoT), and chaired the ethics committee. He has over 20 years of experience in transformer/substation predictive maintenance and over 25 years in substation electrical maintenance. He was also responsible for PdM template development for fossil and nuclear applications. He has been instrumental in the data acquisition and analysis of data at many nuclear facilities, aiding the nuclear power industry in creating a timely response to INPO's SOER 99-01 and 2002-03.



# TARGET AUDIENCE

## **BASIC LEVEL**


All those interested in a methodology and inspection process for oil filled power transformers.

## **INTERMEDIATE LEVEL**

Geared towards substation managers, engineering staff and substation technicians that desire to learn the latest technologies and methods/diagnostics

## **MASTER LEVEL**

Geared towards the substation technician and engineer that is doing the hands on testing and inspections. In depth learning with virtual hands on will be provided for a full understanding of partial discharge, vibration and sound level testing.



This course consists of 13 lessons on three levels, each of which is approximately 45 minutes long. The list of the levels and lessons is the following:

## BASIC LEVEL

### Lesson 1: Introduction

#### MAIN TAKEAWAYS:

1. Understand the value of benchmarking critical switchyard electrical equipment
2. Know what technologies and processes are used to determine transformer condition
3. Learn to use data from several technologies to make critical decisions
4. How often to test and when to test
5. How to apply the severity criteria
6. How to make appropriate recommendations for action
7. Why do the calculation of a cost benefit analysis (CBA)
8. Show and describe the equipment condition status report
9. Present the “history” behind this inspection method
10. Explain Level I Testing compared to Level II Testing
11. An overview of PD detection, vibration & sound level analysis for power transformers will be provided
12. A brief preview of the future sessions

## INTERMEDIATE LEVEL

### Lesson 2: Vibration and Sound Analysis

#### MAIN TAKEAWAYS:

1. Provide an understanding of vibration analysis used to determine clamping pressures (tightness) of an oil-filled power transformer
2. Vibration analysis of oil circulation pumps in the cooling system will be provided
3. Ultrasonic (acoustic emission) analysis of transformer main windings and pumps / motors
4. Sound level analysis of oil-filled power transformers

## Lesson 3: Partial Discharge Detection

### MAIN TAKEAWAYS:

1. Acoustic / ultrasonic noise explanation (airborne and contact)
2. High frequency current transducer (HFCT) used for PD / arcing detection
3. Combining HFCT and AE data using a PD-TP500A test set
4. Data analysis of PD waveforms

## Lesson 4: Infrared Thermography

### MAIN TAKEAWAYS:

1. Provide an understanding of thermography as it applies to switchyard equipment
2. Equipment-specific severity criteria will be provided
3. Equipment failure modes will be included in this lesson
4. Understanding the cooling system operation and critical issues on power transformers will be explained in detail: inlet-to-outlet delta for pumped vs natural cooling

## Lesson 5: Oil sampling, DGA, Furan, and oil quality understanding

### MAIN TAKEAWAYS:

1. Explanation of the correlation between PD/Arcing testing and DGA
2. Portable testing vs Lab testing
3. How to interpret DGA results for Main tank

## Lesson 6: Functional Testing & Visual Inspections

### MAIN TAKEAWAYS:

1. Performing functional testing of the transformer cooling system
2. Functional testing of Load Tap Changers (LTC) and analysis of data
3. Functional testing of Lightning/Surge Arresters
4. Complete visual inspection tips and tricks

## Lesson 7: Report generation and cost benefit analysis

### MAIN TAKEAWAYS:

1. Learn Level two condition assessment (L2CA) method of reporting using the Excel spread sheet matrix
2. Learn the Equipment Condition Status Report (ECSR)
3. Learn about the transformer grading tool which assigns a number and letter grade to each transformer.

## MASTER'S LEVEL

## Lesson 8: Vibration and Sound Analysis

### MAIN TAKEAWAYS:

1. Vibration and sound level analysis are used to detect changing or already damaging conditions within a transformer or cooling pumps





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