Apparatus Maintenance and Power
Management For Energy Delivery

"THE LIFE OF A TRANSFORMER" SEMINAR & EXPOSITION

Buena Vista Palace
Lake Buena Vista, Florida
Seminar: February 19-23, 2007
Industry Expo: February 19 & 20

Saturday, February 17, 2007

2:00 PM – 7:00 PM **Doble Registration Open**

Sunday, February 18, 2007

8:00 AM – 5:00 PM **Doble Registration Open**

Monday, February 19, 2007

6:00 – 7:30 AM **Breakfast**

7:45 – 8:00 AM **Welcome Introduction & Opening Remarks**

8:00 – 8:45 AM **OPENING ADDRESS** - **Insurance Industry Update**
Each year we present a status update on the "State of the Industry" from one of the industry's top experts. Come hear about trends occurring worldwide. This presentation is always one of the event highlights, and it has proven to be useful to managers of utilities and electrical equipment.
Donald Schubert
Marsh USA

8:45 – 9:30 AM **Transformer Principles & Fundamentals**
Learn about the basics of transformer action, magnetic circuits, losses, components, system configurations, generation, transmission, distribution, various types of transformers, and related material.
Richard K. Ladroga, P.E., Doble Engineering

9:30 – 9:45 AM **Break**

9:45 – 10:45 AM **Transformer Specifications Writing, Standards, Economics**
This popular presentation covers all aspects of specifying and purchasing a transformer. Key topics include standards, required information, unusual service conditions, ratings, vector relationships, loading, impedance, BIL, tap changers, operations, accessories, and much more. Additional topics include applications, operations, overloading, overexcitation, physical constraints, paralleling, short circuit capability, and shipping concerns. ANSI/IEEE, IEC, and CIGRE standards will be discussed.
David Harris, P.E., Waukesha Electric Systems

10:45 – 12:00 PM **Special Presentation – Transformer Procurement**
The process of procuring a large power transformer is a complicated procedure. This presentation discusses the various steps necessary to successfully procure a transformer, including specification development, manufacturer evaluation, bid list preparation, bid evaluation, selection, and manufacturer interfacing, warranties, schedules, penalties, and much more. Offshore purchases and associated topics will be discussed, and recent purchases will be used as sample case studies.
Wayne Vargas, Kirk Robbins, Exelon Nuclear

12:00 – 1:00 PM **Lunch (Sponsored by ABB)**

1:00 – 2:00 PM **Materials**
Materials and the manufacturing practices used to prepare and assemble them are the link between the engineer's conceptual design and the physical product that is actually built. Core steel, metal windings, insulating papers, cellulose products, insulating fluids, tank steel, shielding materials, adhesives, phenolics, rubber, and other materials will be discussed.
João Baldauf, AREVA

2:00 – 3:00 PM **Special Presentation - The Making of a Transformer**
A very in-depth, step-by-step look at the construction of a transformer, from raw materials to finished product. A large number of photos and illustrations will be used to graphically display each step in the process. Design principles and calculations will be also presented, including mechanical, electrical, and material design considerations.
Note: This presentation will be highly enhanced by an actual tour of a working transformer manufacturing facility later in the week.
H. Jin Sim, P.E., Waukesha Electric Systems

3:00 – 3:15 PM **Break**

3:15 – 5:00 PM **Special Presentation - The Making of a Transformer (Continued)**

5:00 – 5:30 PM **Question & Answer Period**
Pre-submitted and new questions from the floor will be presented and answered by a panel of experts. Also **– "ASK DOBLE" questions & answers will be presented, if time permits.**

5:30 – 8:00 PM **Manufacturer's Exposition**
Fifty (50) of the industry's top manufacturers will be on hand to provide answers to your questions, increase your knowledge with demonstrations, present you with promotional materials and product catalogs, and help you develop new contacts. Don't miss this opportunity!

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Tuesday, February 20, 2007

6:00 – 7:30 AM **Breakfast**

7:45 – 9:00 AM **Factory Testing**
Learn about the various tests specified and performed to ensure a quality product. Learn **why** you need to attend and witness factory testing, and learn **what** you should be looking for. ANSI/IEEE C57.12.00, C57.12.90 standards will be presented.
All participants will also receive a copy of the ABB Service Handbook for Power Transformers.
William J. Herron Jr., ABB

9:00 – 9:15 AM **Break**

9:15 - 11:00 AM **Special Presentation - Factory Inspections**
Learn about the need for factory visits. Different stages of manufacture will be discussed, including Core & Coil, Pre/Post Vapor Phase, Pretanking, and Factory Test. This presentation will teach you the details of each of these critical manufacturing milestones, and more importantly, what you should be looking for when you conduct an inspection, including how to assess a manufacturer's Quality Assurance program.
Phil Prout, National Grid US
Greg Anderson, Greg Anderson & Associates

11:00 - 1:30 PM **Lunch & Manufacturer's Exposition** Up to Fifty (50) of the industry's top manufacturers will be on hand to provide answers to your questions, increase your knowledge with demonstrations, present you with promotional materials and product catalogs, and help you develop new contacts. Don't miss this opportunity!

1:30 - 2:30 PM **Site Design**
Site selection, soil mechanics, grading, bearing and jacking loads, transformer foundation and containment design, SPCC guidelines, 40CFR112, deluge systems, cooling considerations. New code guidelines will be presented!
Curtis Smith P.E., Mark Juneau
Black & Veatch

2:30 – 3:30 PM **Transportation & Rigging**
Today's large units typically come from overseas or across US borders. Learn about oceanic, rail, barge, and flatbed shipment and handling. Topics also include safe rigging methods, permitting, US rail issues and restrictions, and much more.
Shaun Sipe, Barnhart Crane

3:30 - 3:45 PM **Break**

3:45 – 4:30 PM **Impact Recorders**
Learn about various impact recorders, including ball bearing & spring, strip chart, and digital. Topics include global positioning satellite (GPS) tracking; system operation; impact direction, magnitude, and frequency; redundancy, security.
Dave Baker, LAT-LON LLC

4:30 – 5:00 PM **Question & Answer Period**
Pre-submitted and new questions from the floor will be presented and answered by a panel of experts. **"ASK DOBLE" questions & answers will be presented.**

5:00 – 7:00 PM **Doble Engineered Strategies Hospitality Suite and Discussion**
By invitation only – stop by the Doble Registration Desk to sign up.

Wednesday, February 21, 2007

6:00 – 7:30 AM **Breakfast**

7:45 – 9:00 AM **Natural Ester Based Dielectric Fluids**
This presentation discusses the use of vegetable based transformer oils. Thermal operation, viscosity, dielectric strength, voltage classes, use of organic oils in new units, and also conversion of existing units from petroleum based products will be discussed.
Jerry Murphy, Reedy Creek Energy Services (Walt Disney World)
Clair Claiborne, PhD, ABB

9:00 – 9:15 AM **Break**

9:15 – 11:15 AM **Transformer Installation, Field Dressing, Oil Processing, and Commission Testing**
Shipment receipt, acceptance testing, internal inspections, field dressing – pumps/radiators/coolers/gauges/controls, equipment requirements, oil filling, hold times, energization - includes presentation of oil processing techniques, core/coil heating, vacuum requirements, moisture limits, water removal, cold traps, filtration, field processing rigs, site requirements.
Mike Horning, Doble Engineering
Derek Baronowski, Baron USA

11:15 – 12:15 PM **Lunch**

12:15 - 12:30 PM **Return to Main Auditorium**

12:30 – 1:30 PM **Keynote Address – Daniel "Rudy" Ruettiger! (Sponsored by Waukesha)**

This is one presentation you will remember forever!! Daniel "Rudy" Ruettiger, internationally acclaimed motivational speaker and celebrity, will deliver his thoughts and insights on perseverance, a positive attitude, and winning at the game of life. At only 5'7", 165 lbs, and with a learning disability, Dan was told he would never get accepted to attend college, much less play on a nationally ranked champion football team. Against all odds, he proved everyone wrong, landing a spot on the football team and earning a degree from the University of Notre Dame. His life story was immortalized in the TRISTAR blockbuster motion picture "Rudy". You will come away from this presentation completely charged and ready to reach your goals – and you will never think that "You Can't" again!!

GENERAL ELECTRIC FACTORY TOUR

1:30 PM **Group 1 Boards Buses for Departure**

3:30 PM **Group 1 Arrives at GE**

5:30 PM **Group 1 BBQ**

6:30 PM **Group 1 Departure for Hotel**

8:30 PM **Group 1 Returns to Hotel**

3:00 PM **Group 2 Board Buses for Departure**

5:00 PM **Group 2 Arrives at GE**

7:30 PM **Group 2 BBQ**

8:30 PM **Group 2 Departure for Hotel**

10:30 PM **Group 2 Returns to Hotel**

Thursday, February 22, 2006

NOTE: Hotel checkout time is 11:00 AM

6:00 – 7:30 AM **Breakfast**

7:45 – 8:45 AM **Control Cabinets & Gauges**
Today's control cabinets are highly complex components filled with a multitude of monitoring and control equipment. This presentation reviews the various monitoring systems available, along with controls, cabinet layouts, gauges, alarms, and operations.
Bill Griesacker, Pennsylvania Transformer

8:45 – 9:45 AM **On-Line Transformer Monitoring Systems**
This presentation discusses the latest systems used to monitor transformers while in operation, including gas analyzers, moisture detectors, fiber optic winding temperature measurement, tap changer monitoring, cooler control, fan operation, an alarm indication.
Mark Tostrud, Dynamic Ratings

9:45 – 10:00 AM **Break**

10:00 – 11:00 AM **Transformer Operations & Loading**
Discusses the dynamic loading of power transformers, ANSI/IEEE guidelines, thermal constraints, effects of core overexcitation, saturation, and gas generation. The presentation will take a look at system operations under unusual conditions, including overloading. Other areas of discussion include alarms and responses, operational concerns and feedback for new purchase specifications and system optimization.
Michael Lastella, Energy Initiatives Group, LLC

11:00 – 12:00 PM **Transformer Management Planning**
Chris Curtis, Lake Road Generating Company LP

12:00 – 1:00 PM **Lunch**
Outside, weather permitting

1:00 – 3:30 PM **Special Presentation - Transformer Field Diagnostics**
Including Transformer Turns Ratio, Megger, Power Factor, Capacitance, Leakage Reactance, Winding Resistance, Excitation Current, Sweep Frequency Response Analysis, Thermography. Oil and dissolved gas analysis will also be discussed. ANSI/IEEE standards will be presented.
Robert Brusetti, PE, Doble Engineering
Jon L. Giesecke, JLG Associates LLC

3:30 – 3:45 PM **Break**

3:45 – 4:45 PM **Transformer Failure Analysis**
William Bartley, Hartford Steam Boiler

4:45 – 5:30 PM **Corrosive Sulfur Update**
A number of groups are performing research and worldwide studies on the topic of corrosive sulfur in transformer oil. This presentation highlights the current status of this important industry issue.
Paul Griffin
Doble Engineering

5:30 – 6:00 PM **Question & Answer Period**
Pre-submitted and new questions from the floor will be presented and answered by a panel of experts. **"ASK DOBLE" questions & answers will be presented.**

6:00 PM **Adjournment**

Optional Fifth Day Lab Seminar:

"Electrical Apparatus Condition Assessment Using Laboratory Diagnostics"
(A separate binder will be provided)

Friday, February 23, 2007

NOTE: Hotel checkout time is 11:00 AM

6:00 – 7:15 AM **Breakfast**

7:30 – 12:00 PM **Transformer Condition Assessment Using Laboratory Diagnostics**
Presented by Paul Griffin & Lance Lewand, Doble Engineering Company

Part I – Provides a thorough understanding of how to assess the condition of electrical insulating materials and transformers. This section is divided into three topics:

Quality of new and service aged oils – Background information is provided on the properties of transformer oil. The presentation includes how to specify and evaluate new oils, what tests to perform and how to evaluate in-service oils.

Aging characteristics of insulating materials - This part of the session provides information on how to increase the life of transformers. There are a number of factors that accelerate the aging of the insulation system that can be controlled. This session provides information on when to reclaim or replace oil and gives specifications for reclaimed oil.

Dissolved gas-in-oil analysis – This is the single most important diagnostic test for transformers. This presentation reviews how the test is performed, how to distinguish between normal gassing behavior and problems, and how to evaluate trends. Practical

case studies and examples are used to illustrate theoretical concepts. Seminar participants will be quizzed (with class participation) on their understanding in diagnosing 12 cases.

Note: there will be a coffee break mid-morning.

12:00 – 1:00 PM **Lunch**

1:00 – 5:00 PM **Transformer Condition Assessment Using Laboratory Diagnostics**
Presented by Paul Griffin, Doble Engineering Company

Part II– Provides a thorough understanding of how to assess the condition of electrical insulating materials and transformers. This section is divided into seven topics:

Dissolved gas in oil analysis, continued – Dissolved combustible gases in oil do not typically cause problems but can form flammable mixtures. This session discusses how to determine the flammability of combustible gasses and precautions to take.

Load tap changer diagnostics – This presentation gives the latest information on diagnostics for LTCs, how to diagnose DGA results for LTCs and some of the pitfalls to avoid. Case studies are provided.

Oil circuit breaker diagnostics – This session is about diagnostics for bulk oil breakers which are used to take transformers out of service. Diagnostic test includes dissolved gas in oil analysis. Case study examples are included.

Metals in oil – This presentation provides an understanding of the importance of metal-in-oil tests as a diagnostic. To be able to use the information, the correct test must be specified – learn the difference between dissolved and particulate metals and when to choose each test. Case studies are given.

Condition assessment of cellulosic insulation – The analysis of the condition of the paper insulation has changed quite a bit in the past 10 years. Learn how the solid insulation ages and how to assess the condition of the paper and pressboard insulation and its remaining life. Case studies are given to illustrate the distribution of paper aging in transformers and how operation and maintenance can influence it.

Water in Transformer Oil – Assessing how dry a transformer is requires more than a water in oil test. Learn how to assess the wetness of the transformer insulation system and why you need to know the operating temperature at the time of sampling. This session discusses water migration in transformers and how water affects the ability to overload them. Examples are provided.

Sampling – The presentation discusses how to save money on your sampling program through proper training and what common pitfalls to avoid. Proper sampling preparation, practices, and equipment are given.

Note: there will be a coffee break mid-afternoon.

4:15 – 4:45 PM **Question & Answer Period**
Pre-submitted and new questions from the floor will be presented and answered by a panel of experts.

4:45 – 5:00 PM **Adjournment**