

## Announcement

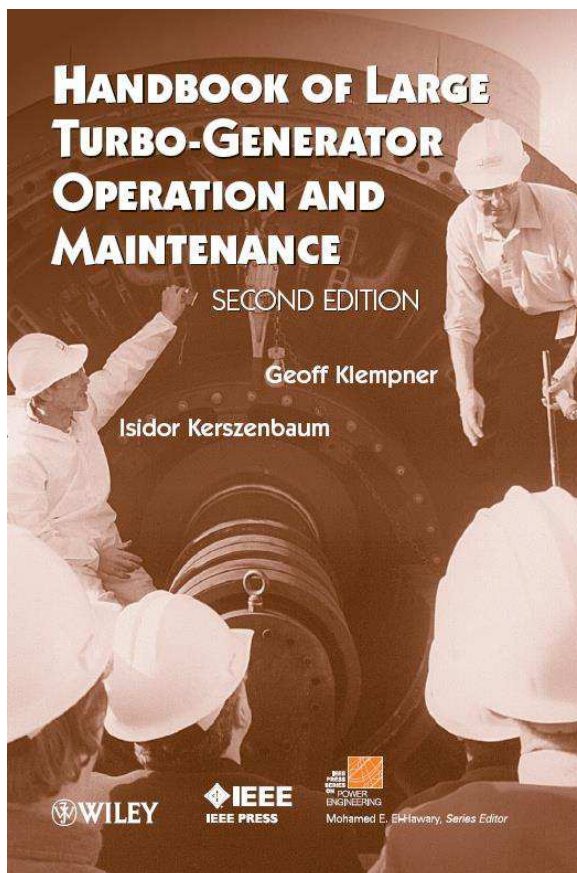
IZZYTECH and GSK GENERATOR ENGINEERING LTD. are sponsoring a 5-day technical course. It is our pleasure to invite you to participate in the seminar, **"Large Turbo-Generators – Design, Operation and Maintenance"**. The course conveys the most current information presented by generator specialists Geoff Klempner and Isidor (Izzy) Kerszenbaum. The course will be held in **Irvine, California** on **November 18–22, 2013**.

The course is based on the 880 page textbook; "Handbook of Large Turbo-Generator Operation and Maintenance", co-Authored by Geoff Klempner and Isidor Kerszenbaum.

A copy of the book will be supplied as the course material.

### Target Audience:

**This seminar is designed for power plant and repair shop engineers and managers, turbine-generator maintenance personnel, repair vendor's personnel, and personnel engaged in the selection of inspection/evaluation/repair services.**



This book is a comprehensive guide for the full range of aspects of large turbo-generators and a detailed reference on the topics of:

- Basic machine principles and theory
- Design and construction of generators and auxiliary systems
- Generator operation, including interaction with the grid
- Monitoring, diagnostics and protection of turbo-generators
- Inspection practices, including stator, rotor and auxiliary systems
- Maintenance testing, including electrical and non-destructive examination
- Ideas on maintenance strategies and life cycle management
- Upgrading and long term storage of generators

It is based on the authors' combined sixty plus years of generating station and design work experience. The information presented in the book is designed to inform the reader about actual machine operational problems and failure modes that occur in generating stations and other types of facilities.



This generator course has been presented numerous times, early on, on behalf EPRI and subsequently, directly to various utilities and other organizations around the world. It has been given in the UK, South Africa, Australia, Israel, Malaysia and numerous times and locations in Canada and the USA. It is well established over many years, with about 3,000 slides, covering the entire book content as well as additional information, presented over the five-day period. It has been presented in Irvine several times over the last decade, every time including new information from the latest operational experiences. The Irvine seminar is open to all.

The book itself is an excellent resource for operators and inspectors of large utility and industrial generating facilities who deal with multiple units of varying size, origin, and vintage. It is also an excellent learning tool for students, consulting and design engineers. It offers the complete scope of information regarding operation and maintenance of all types of turbine-driven generators built in the world, as detailed above. The book comes loaded with photos and graphs, commonly used inspection forms, and extensive references for each topic. It is an indispensable reference for anyone involved in the design, construction, operation, protection, maintenance, and troubleshooting of large generators in generating stations and industrial power facilities.

### **Course Content:**

#### **PART 1                    THEORY, CONSTRUCTION AND OPERATION**

- Chapter 1: Principles of Operation of Synchronous Machines
- Chapter 2: Generator Design and Construction
- Chapter 3: Generator Auxiliary Systems
- Chapter 4: Operation and Control
- Chapter 5: Monitoring and Diagnostics
- Chapter 6: Generator Protection

#### **PART 2                    INSPECTION, MAINTENANCE AND TESTING**

- Chapter 7: Inspection Practices and Methodologies
- Chapter 8: Stator Inspection
- Chapter 9: Rotor Inspection
- Chapter 10: Auxiliaries Inspection
- Chapter 11: Generator Maintenance Testing
- Chapter 12: Maintenance

### **Course Details:**

Date: 18–22, November 2013  
Time: 8:00am to 4:30pm daily  
Continental breakfast at 7:30am daily at the lecture room  
Location: Wyndham Irvine Hotel, Irvine, California  
Cost: \$1,795 US



**Presentation of the course will be by both authors.**

### **GEOFF KLEMPNER**

Geoff is an IEEE Fellow and a large rotating electrical machines specialist in the power industry. He is a Principal Engineer in the Engineering Services Department of a major company in Canada. His responsibilities include: large generator and motor consulting including, inspection, testing, design evaluation, failure analysis, electromagnetic FE analysis, life assessment, preparation of technical specifications and test procedures.

Previously he worked as a Senior Engineer-Specialist in Ontario Hydro (now Ontario Power Generation) for over 25 years. His responsibilities included: Engineering improvements and modifications to generating station power equipment, specifically large generators and motors. He provided advice to project engineers and generating station maintenance and operation staff. These activities covered the technical areas as above, also including financial evaluations and tender evaluation.

His consulting activities have included assistance to Southern California Edison, PG&E, ESKOM, Ameren UE, Duke Power, Delta Electricity, GE, Alstom and Ontario Power Generation, to name a few. He has also worked extensively on EPRI projects, concerning electrical machines and monitoring. Geoff has authored or co-authored numerous papers and documents, listing over 50 articles, and has an extensive background of professional activities, with IEEE, EPRI and CIGRE.

### **ISIDOR (Izzy) KERSZENBAUM**

Izzy is an IEEE Fellow, located in Irvine, CA. He is a generator specialist consulting to power plants on operation, maintenance and troubleshooting of large motors and generators.

He started his career as a high-voltage protection engineer, moving next into the world of rotating machines, first as a designer and R&D engineer, and then as a specialist on large synchronous generators. He also spent a number of years in design and R&D of power transformers. During his professional career, Izzy has consulted to power plants, both within the Edison International family of generating stations, as well as others, on generators.

Izzy has published many technical papers, and authored and co-authored two books on the operation and maintenance of large synchronous generators. He is the current Chair of the Electric Machines Committee of the IEEE's Power Engineering Society. He was the technical chair of the 1999 International Electric Machines and Drives Conference held in Seattle, and is the co-technical chair of the same conference to be held in Miami in 2009.

Izzy has been very active in EPRI and the IEEE regarding the operation and maintenance of large generators.

Together with Geoff Klemptner, he has held a number of very successful seminars like this one.

### **Day 1 - Monday**

7:30 am	Continental breakfast
8:00 am	Introduction
8:15 am	<p>PRINCIPLES OF OPERATION OF SYNCHRONOUS MACHINES</p> <ul style="list-style-type: none"><li>• Introduction to Basic Notions on Electric Power</li><li>• Electrical – Mechanical Equivalence</li><li>• Alternated Circuits (AC) / Three-Phase Circuits</li><li>• Basic Principles of Machine Operation / The Synchronous Machine</li><li>• Basic Operation of the Synchronous Machine</li></ul>
10:00 am	Break
10:30 am	<p>GENERATOR DESIGN AND CONSTRUCTION</p> <ul style="list-style-type: none"><li>• Stator Core and Frame</li><li>• Flux and Armature Reaction / Electro-magnetics</li><li>• End-Region Effects and Flux Shielding</li><li>• Stator Core and Frame Forces</li><li>• Stator Windings and Wedges</li><li>• End-Winding Support Systems</li><li>• Stator Winding Configurations</li><li>• Stator Terminal Connections</li></ul>
12:00 noon	Lunch
1:00 pm	<p>GENERATOR DESIGN AND CONSTRUCTION</p> <ul style="list-style-type: none"><li>• Rotor Forging</li><li>• Rotor Winding and Slot Wedges / Amortisseur Winding</li><li>• Retaining-Rings</li></ul>
2:30 pm	Break
3:00 pm	<p>GENERATOR DESIGN AND CONSTRUCTION</p> <ul style="list-style-type: none"><li>• Bore Copper and Terminal Connectors</li><li>• Slip/Collector Rings and Brushgear</li><li>• Rotor Shrink Coupling / Rotor Turning Gear</li><li>• Bearings</li><li>• Air and Hydrogen Cooling / Rotor Fans</li><li>• Hydrogen Containment / Hydrogen Coolers</li></ul>
4:30 pm	Adjourn

## **Day 2 - Tuesday**

7:30 am	Continental breakfast
8:00 am	GENERATOR AUXILIARIES (SYSTEM CONFIGURATIONS AND INSPECTION) <ul style="list-style-type: none"><li>• Lube Oil System</li><li>• Hydrogen Cooling System</li><li>• Seal Oil System</li><li>• Stator Cooling Water System</li><li>• Exciter Systems</li></ul>
10:00 am	Break
10:30 am	OPERATION AND CONTROL <ul style="list-style-type: none"><li>• Basic Operating Parameters</li><li>• Operating Modes</li><li>• Machine Curves</li><li>• Special Operating Conditions</li><li>• Basic Operation Concepts</li></ul>
10:30 am	OPERATION AND CONTROL
12:00 noon	Lunch
1:00 pm	OPERATION AND CONTROL <ul style="list-style-type: none"><li>• System Considerations</li><li>• Grid Induced Torsional Vibrations</li></ul>
2:30 pm	Break
3:00 pm	OPERATION AND CONTROL <ul style="list-style-type: none"><li>• Excitation and Voltage Regulation</li><li>• Performance Curves</li><li>• Sample of Generator Operating Instructions</li></ul>
4:30 pm	Adjourn

### **Day 3 - Wednesday**

7:30 am	Continental breakfast
8:00 am	<p>MONITORING AND DIAGNOSTICS</p> <ul style="list-style-type: none"><li>• Generator Monitoring Philosophies</li><li>• Simple Monitoring with Static Hi Level Alarm Limits</li><li>• Dynamic Monitoring with Load Varying Alarm Limits</li><li>• Artificial Intelligence Diagnostic Systems</li></ul>
10:00 am	Break
10:30 am	<p>MONITORING AND DIAGNOSTICS</p> <ul style="list-style-type: none"><li>• Monitored Parameters</li></ul>
12:00 noon	Lunch
1:00 pm	<p>GENERATOR PROTECTION</p> <ul style="list-style-type: none"><li>• Basic Philosophy</li><li>• Generator Protective Functions</li><li>• Brief Description of Protective Functions</li><li>• Specialized Protection Schemes</li><li>• Tripping and Alarming Methods</li></ul>
2:30 pm	Break
3:00 pm	<p>INSPECTION PRACTICES AND METHODOLOGIES</p> <ul style="list-style-type: none"><li>• Site Preparation</li><li>• Experience and Training</li><li>• Safety Procedures – Electrical Clearances</li><li>• Inspection Frequency</li><li>• Generator Accessibility</li><li>• Inspection Tools</li><li>• Inspection Forms</li></ul>
4:30 pm	Adjourn

### **Day 4 - Thursday**

- 7:30 am Continental breakfast
- 8:00 am STATOR INSPECTION
- Stator Frame and Casing
  - Stator Core
- 10:00 am Break
- 10:30 am STATOR INSPECTION
- Stator Windings
  - Phase Connectors and Terminals
  - Hydrogen Coolers
- 12:00 noon Lunch
- 1:00 pm ROTOR INSPECTION
- Rotor Removal
  - Rotor Cleanliness
  - Retaining Rings
  - Fretting/Movement at Interference-Fit Surfaces of Wedges and Rings
  - Centering (Balance) Rings / Fan Rings or Hubs / Fan Blades
  - Bearings and Journals
  - Balance Weights and Bolts
  - End Wedges and Damper Windings / Other Wedges
  - Windings General / End-Windings and Main Leads
- 2:30 pm Break
- 3:00 pm ROTOR INSPECTION
- Collector Rings / Collector Ring Insulation
  - Bore Copper and Radial (Vertical) Terminal Stud Connectors
  - Brush-Spring Pressure and General Condition / Brush Rigging
  - Shaft Voltage Discharge (Grounding) Brushes
  - Rotor Winding Main Lead Hydrogen Sealing - Inner and Outer
  - Circumferential Pole Slots (Body Flex Slots)
  - Blocked Rotor Radial Vent Holes – Shifting of Winding and/or Insulation
  - Couplings and Coupling-Bolts / Bearing Insulation / Hydrogen Seals
- 4:30 pm Adjourn

### **Day 5 - Friday**

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|------------|--|
| 7:30 am    | Continental breakfast  |
| 8:00 am    | GENERATOR MAINTENANCE TESTING <ul style="list-style-type: none"><li>• Stator Core Mechanical Tests</li><li>• Stator Core Electrical Tests</li><li>• Stator Winding Mechanical Tests</li><li>• Water Cooled Stator Winding Tests</li><li>• Stator Winding Electrical Tests</li></ul>            |
| 10:00 am   | Break  |
| 10:30 am   | GENERATOR MAINTENANCE TESTING <ul style="list-style-type: none"><li>• Rotor Mechanical Testing</li><li>• Rotor Electrical Testing</li><li>• Hydrogen Seals / Bearings</li><li>• Thermal Sensitivity Test &amp; Analysis</li><li>• Heat Run Testing</li><li>• Hydrogen Leak Detection</li></ul> |
| 12:00 noon | Lunch  |
| 1:00 pm    | MAINTENANCE <ul style="list-style-type: none"><li>• General Maintenance Philosophies</li><li>• Operational and Maintenance History</li><li>• Maintenance Intervals / Frequency</li><li>• Type of Maintenance</li><li>• Work Site Location / Work Force / Spare Parts</li></ul>                 |
| 2:30 pm    | Break  |
| 3:00 pm    | MAINTENANCE <ul style="list-style-type: none"><li>• Upgrading</li><li>• Life Cycle Management</li><li>• Single Point Vulnerability</li></ul>   |
| 4:30 pm    | Adjourn  |





### **Additional Details:**

Attendance is limited to 30 people on a first-come, first-serve basis. Please register on-line at [http://www.izzytech.com/Registration\\_2.html](http://www.izzytech.com/Registration_2.html) or return the completed registration form and your check (payable to IZZYTECH) to the address on the registration form. The fee per person is \$1,795 U.S. This fee includes continental breakfasts and refreshments at breaks, and the reference book "Handbook of Large Turbo-generator Operation and Maintenance". The classes will start at 8:00 a.m. and end at 4:30 p.m., with breaks in between and a one-hour lunch break at 12 noon. Lunch is not provided, but is readily available at the hotel and several locations next to it.

### **Recording / Photography:**

No filming, photography, or recording allowed at any point during the training.

### **Accommodations:**

Wyndham Irvine Hotel  
17941 Von Karman Ave, Irvine, CA 92614  
Phone: 949-863-1999

Attendees must make their own hotel room reservations. We have arranged a special rate of \$129.00 per night (double occupancy) at the course hotel and special rate of \$8/day for parking. [To obtain these rates you must book with the hotel before November 4, 2013 and you \*\*must state during the booking\*\* that you are coming to attend the \*IZZYTECH, LARGE TURBINE GENERATOR O&M SEMINAR\*.](#)

The hotel has many amenities. You can visit their website for a description. Also there is free Internet connection in each room.

The hotel is located just off the San Diego Freeway (Interstate 405) on Von Karman Ave and Main Street. John Wayne airport is right next-door, and Los Angeles airport (LAX) is about 50 minutes away. There are free shuttles from/to the hotel to the John Wayne airport. After collecting your baggage use the courtesy phones to ask for a shuttle.

This is one of the nicest areas in Southern California, with great weather. Disneyland and other attractions are only a short drive away.

### **Enquiries:**

Izzy Kerszenbaum      Tel: 949-733-0458  
Email: [info@izzytech.com](mailto:info@izzytech.com)

Geoff Klempner      Tel: 416-276-8901  
Email: [gskgeneng@aol.com](mailto:gskgeneng@aol.com)

IZZYTECH – Electric Power Consulting Engineering  
17 Elderwood, Irvine, CA 92614  
[www.izzytech.com](http://www.izzytech.com)



## **Registration -- "Large Turbo-Generators – Design, Operation and Maintenance" 5 day technical course**

**Registration fee is \$1,795 USD per attendee.**

Payment can be made by credit card on our website at [http://www.izzytech.com/Registration\\_2.html](http://www.izzytech.com/Registration_2.html) . This is a two-step process. Please complete (1) the online form AND (2) payment through the IZZYTECH merchant secure payment webpage.

Payment by check can be made by returning the registration form and your check (payable to IZZYTECH to:

IZZYTECH – Electric Power Consulting Engineering  
17 Eldrewood  
Irvine, CA 92614 USA

Name of Registrant \_\_\_\_\_

Title/Department \_\_\_\_\_

Organization \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

City/State/Zip/Country \_\_\_\_\_

Phone (      ) \_\_\_\_\_ Fax (      ) \_\_\_\_\_

E-mail Address \_\_\_\_\_

Signature: \_\_\_\_\_

### **Disclaimer**

IZZYTECH reserves the right to cancel the course up to one week prior to the course start date, should not enough participants be secured to hold the course. A full refund will be given should this occur.

NOTE: Please note that cameras are not allowed in the seminar and cell phones must be put on silent mode.

### **Cancellation Policy**

IZZYTECH – Electric Power Consulting Engineering  
17 Elderwood, Irvine, CA 92614  
[www.izzytech.com](http://www.izzytech.com)



Cancellation by attendees before October 11, 2013 will result in a reimbursement of 90% of the paid seminar fee. Cancellations between October 11 and October 31 will result in a reimbursement of 50% of the paid seminar fee. No refunds after October 31, 2013.