COMMISSIONING OF ELECTRICAL EQUIPMENT:
Preparation, Planning, Pre-Commissioning Checks and Tests, Commissioning Schedule, Detailed Commissioning Procedures for Transformers, Switchgear, Induction and Synchronous Motors, and Generators, Commissioning Codes, Instrumentation, Trial Run of each Equipment, Safety and Precautions, Safety Rules Clearance Certificates, Procedure for the Control and Handling of Defects, Commissioning Reports

17– 19 MAY 2017, KUALA LUMPUR

Topics Covered

Pre-Commissioning Checks and Tests
Commissioning Procedures, Documents
Commissioning Procedures for Transformers

Expert Course Faculty Leader

Philip Kiameh
Has more than 30 years of practical engineering experience with Ontario Power Generation and as a Training Manager, has conduct courses and seminars, to more than 4,000 working engineers and professionals who consistently ranked him as "Excellent" or "Very Good". Philip has also wrote 5 books for working engineers from which three have been published by McGraw-Hill, New York.
COMMISSIONING OF ELECTRICAL EQUIPMENT:
17–19 MAY 2017, KUALA LUMPUR

Course Overview
This seminar provides a comprehensive understanding of all the commissioning and start-up activities of all electrical equipment including transformers, switchgear, induction and synchronous motors, generators and auxiliaries. All commissioning activities are covered in detail in this seminar. This includes all the commissioning procedures and documents, purpose of commissioning, responsibilities, system description, documentation, testing and commissioning schedules, test reports, safety, certification, and plant completion report. The seminar provides also a thorough understanding of all the commissioning requirements for transformers, switchgear, induction and synchronous motors and, generator and auxiliaries including its switchgear equipment, switchgear, and transformers. All the stages of the commissioning procedure are covered in-depth in this seminar. This includes preparation – planning various activities, pre-commissioning checks and tests, typical commissioning schedule, detailed tests and commissioning procedures for every type of transformers, switchgear, induction and synchronous motors, and generators and auxiliary systems, instrumentation, trial run of the equipment, safety and precautions, commissioning of electrical systems, Safety Rules Clearance Certificates, procedure for the control and handling of defects, Commissioning Reports.

This seminar is a MUST for anyone who is involved in the pre-commissioning or commissioning of any electrical equipment because it provides detailed pre-commissioning checks and tests and detailed tests and commissioning procedures for every electrical equipment. In addition, the seminar provides in-depth coverage of all preparation, planning activities, commissioning schedules, trial run of each electrical equipment, safety and precautions, Safety Rules Clearance Certificates, Procedures for handling defects, and Commissioning Reports.

Course Learning Outcomes
- **Pre-Commissioning Checks and Tests**, Detailed Tests and Commissioning Procedures and Instructions for all Electrical Equipment: Gain a thorough understanding of all pre-commissioning checks and tests, and all commissioning procedures and instructions for all electrical equipment
- **Commissioning Procedures, Documents, and Certification of Electrical Equipment**: Discover the benefits of the Commissioning Management System of electrical equipment including all commissioning procedures and documents, purpose of commissioning, responsibilities, system description, documentation, testing and commissioning schedules, test reports, safety, equipment certification, and commissioning completion report
- **Commissioning Procedures for Transformers**: Learn about the commissioning procedures for transformers including functional checks, pre-commissioning tests, commissioning tests, and records.
- **Commissioning Procedures for Switchgear Assemblies**: Gain a thorough understanding of all the commissioning procedures for switchgear assemblies including substation commissioning, electrical testing, code requirements, safety rules, grounding and shorting, high power testing, NETA acceptance testing procedures, test values analysis, and commissioning forms
- **Commissioning Procedures for Generator and Auxiliaries**: Discover all the commissioning procedures for generator and auxiliaries including generator, seal oil system, hydrogen gas system, stator water system, rolling and payment of generator
- **Commissioning Procedures and Instructions for Generator Electrical Equipment**: Learn about all the commissioning procedures and instructions for generator electrical equipment including switchyard equipment, switchgear, transformers, and motors
- **Code Requirements for Commissioning Electrical Equipment and Systems**: Learn about the code requirements for commissioning transformers, switchgear, inductions and synchronous motors, and generators and auxiliaries
COMMISSIONING OF ELECTRICAL EQUIPMENT:
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Training Methodology
The instructor relies on a highly interactive training method to enhance the learning process. This method ensures that all the delegates gain a complete understanding of all the topics covered. The training environment is highly stimulating, challenging, and effective because the participants will learn by case studies which will allow them to apply the material taught to their own organization.

Who Should Attend
- Engineers of all disciplines
- Managers
- Technicians
- Maintenance personnel
- Other technical individuals

Special Feature
Each delegate will receive a copy of the following materials written by the instructor:
2. ELECTRICAL EQUIPMENT COMMISSIONING MANUAL (includes practical information about all pre-commissioning checks and tests, typical commissioning schedule, detailed tests and commissioning procedures and instructions for all electrical equipment - 400 pages)

Your Expert Faculty
Philip Kiameh, M.A.Sc., B.Eng., D.Eng., P.Eng. (Canada) has been a teacher at University of Toronto and Dalhousie University, Canada for more than 23 years. In addition, Prof Kiameh has taught courses and seminars to more than four thousand working engineers and professionals around the world, specifically Europe and North America. Prof Kiameh has been consistently ranked as "Excellent" or "Very Good" by the delegates who attended his seminars and lectures.

While working at Ontario Hydro, Prof. Kiameh acted as a Training Manager, Engineering Supervisor, System Responsible Engineer and Design Engineer. During the period of time that Prof Kiameh worked as a Field Engineer and Design Engineer, he was responsible for the operation, maintenance, diagnostics, and testing of gas turbines, steam turbines, generators, motors, transformers, inverters, valves, pumps, compressors, instrumentation and control systems. Further, his responsibilities included designing, engineering, diagnosing equipment problems and recommending solutions to repair deficiencies and improve system performance, supervising engineers, setting up preventive maintenance programs, writing Operating and Design Manuals, and commissioning new equipment.

Later, Prof Kiameh worked as the manager of a section dedicated to providing training for the staff at the power stations. The training provided by Prof Kiameh covered in detail the various equipment and systems used in power stations.

Professor Philip Kiameh was awarded his Bachelor of Engineering Degree "with distinction" from Dalhousie University, Halifax, Nova Scotia, Canada. He also received a Master of Applied Science in Engineering (M.A.Sc.) from the University of Ottawa, Canada. He is also a member of the Association of Professional Engineers in the province of Ontario, Canada.

Prof Kiameh wrote 5 books for working engineers from which three have been published by McGraw-Hill, New York. Below is a list of the books authored by Prof Kiameh:

5. Industrial Equipment (600 pages), Custom Publishing, University of Toronto, University of Toronto, University of Toronto Custom Publishing (1999).
3 Day Course Outline

**Day 1 – Commissioning Management System, Commissioning of Power Transformers, Commissioning of Switchgear Assemblies, Substation Commissioning,**

- Commissioning Procedure and Documents: Purpose of Commissioning, Responsibilities, System Description, Organization, Working Parties, Test Teams, Documentation, Safety, Plant Certification, Plant Completion Report,
- Commissioning of Power Transformers: Introduction, Recording of salient parameters, Pre-commissioning Checks, General Checks, General Arrangement, Terminations, Perfection of Connections, Earthing, Control Cable Connections, Radiator, Main Conservator and OLTC Conservator, Bushing, Breather, Cooler Units, Fans and Pumps, Winding Temperature Indicator (WTI) and Oil Temperature Indicator, Bucholtz Relays, Magnetic Oil Level Gauge, Arcing Horn Gap, Tap Changer, General Inspection
- Functional Checks
- Pre-Commissioning Tests: Insulation Resistance Test, Selection of Insulation Tester, Factors Influencing IR Value, Steps for Measuring the IR, Minimum Value of IR, Influence of Temperature on IR, Interpretation of Insulation Resistance Value, Points to Note
- Dielectric Absorption and Polarization Index Tests: Instruments/Materials Required, Procedure for Test, Interpretation of Polarization Index and Dielectric Absorption Curve
- Two Voltage Test (Step Voltage Test), Measurement of Tan Delta, Transformer Ratio Test, Short Circuit Current Measurement, Measurement of Magnetizing Current, Test for Magnetic Balance, Phasor Group Test, Test for Transformer Oil, Sampling of Oil – General Precautions, Sampling Procedure, Evaluation of Test Results, Relay Tests
- Commissioning, Records
- Commissioning Switchgear Assemblies
- AC Hipot Test, AC Hipot Test Procedure
- DC Hipot Test, DC Hipot Test Procedure
- Low Resistance Test, Low Resistance Test Procedure
- Safety Awareness and Practices
- Qualified Person, Qualifications of a Qualified Person, Recommended Practices

**Day 2 – Commissioning of Motors**

- Pre-Energization Requirements: Verification of Electrical Connections/Interlocks
- Verification of Mechanical Integrity, Lubrication System Checks
- Insulation Resistance (IR) and Polarization Index (PI) Checks: Megohmmeter, Induction Motors
- Air Gap Check
- Verification of Protective Relay Setpoints: Phase Rotation Test
- Energization Tests: No Load Run Test, Phase Current Balance, Voltage Balance, Vibration Level
- No Load Run Test: RTD Readings for Bearings and Stator Windings, Test Duration, Synchronous Motors, Phase Current Balance, Voltage Balance, Vibration Level, RTD Readings for Bearings and Stator Windings, Field Current, Power Factor and KVAR Control, Test Duration
- Load Run Test: Induction Motors, Verify Motor Alignment, Phase Current Balance, Voltage Balance, Vibration Level, RTD Readings for Bearings and Stator Windings, Voltage Dip on Start, Acceleration Time, Field Current, Power Factor and KVAR Control, Test Duration

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- Evaluating The Results of Motor Commissioning For Acceptability or Unacceptability: Motor Commissioning Form
- Evaluating The Results of Induction Motor Commissioning: Example Evaluation
- Evaluating The Results of Synchronous Motor Commissioning: Example Evaluation
- Procedure and Acceptable Values for Evaluating The Results of Motor Commissioning Compiled from NEMA, and Established Engineering Practices: Procedure
- Acceptable Values for Pre-Energization Data: Inspection/Check of Electrical Connection/Interlocks, Inspection/Check of Mechanical Integrity, Inspection/Check of Lubrication System, Insulation Resistance Readings, Work Aid 1, Polarization Index, High Potential Test, Rotating Rectifier Diode Check, Air Gap Check, Inspection/Check of Protective Relays, Phase Rotation Test
- Acceptable Values for No Load Run Test Data: Phase Current, Phase voltage, percent Voltage Unbalance, Vibration Levels, Winding Temperature, Bearing Temperature, %Ns When Excited, Exciter Field Current, Motor Field Current, Power Factor, Reactive Power
- Acceptable Values for Load Run Test Data: Inspection/Check of Motor Alignment, Phase Current, Phase Voltage, Percent Voltage Unbalance, Vibration Level, Winding Temperature, Bearing Temperature, Voltage Dip on Start (%), Acceleration Time (sec), % Ns When Excited, Exciter Field Current, Motor Field Current, Power Factor, Reactive Power (KVAR)
- Glossary

Day 3 – Generator and Auxiliaries, Generator, Commissioning of Seal Oil System, Hydrogen Gas System, Stator Water System, Rolling and Dryout of Generator, Electrical Equipment, Switchgear, Switchgear, Transformer, Commissioning Reports

- Generator: Preliminary Checks of Resistance’ Insulation Resistance, Ohmic Resistances, Generator Stator Winding, Generator Rotor Winding
- Seal Oil System: Equipment Inspection, Control Panels, AC Seal Oil Pump Motor Set, DC Seal Oil Pump Motor Set, Oil Injector, Induction Liquid Indicator, Seal Oil Coolers, Seal Oil Filters, Damper Tank, Differential Pressure Regulator, Pressure Oil Regulator, Exhaust Fan and Motor on The Drain Header, Exhaust Fan and Motor on Main Oil Tank, Commissioning of Seal Oil Starting Panel, Commissioning of Seal Oil Signaling Panel, Check with 200 V DC and AC Supplies, Trial Run of Seal Oil Pump Motors, DC Seal Oil Pump Motor, Trial Run of Exhaust Fans, Oil Flushing, Trial Run of AC Seal Oil Pump, Second Stage Flushing, Third Stage Flushing, Fourth Stage Flushing, Fifth Stage Flushing, Commissioning of The System
- Stator Water System: Equipment Inspection, Stator Water Cooling Pumps and Motors, Water Coolers, Water Filter, Magnetic Filter, Expansion Tank, Water Jet Ejector, Stator Water System Piping and Valves, Gas Trap, Instruments, Commissioning of Stator Water Starting Panel, Checks with 220 V DC and AC Supplies, Trial Run of Stator Cooling Water Pump Motor, Flushing of Stator Cooling Water System, First Stage Flushing (By pass all equipment except filters), Second Stage Flushing (Cooler B included), Third Stage Flushing (Cooling A included), Fourth Stage Flushing (Magnetic filters included), Trial Run of Stator Water Pumps (5th stage flushing), Commissioning of The System (Final run)
- Rolling and Dryout of Generator: Requirements for rolling, Requirements for Dryout, Rolling (200/210 MW Turbines) BTPS/SSTPP, Checks During Rolling, Dryout Operation, Hydrogen Filling in The Generator
- Generator Electrical Equipment: Switchyard Equipment, 400 kV Air Blast Circuit Breaker, Pantograph Isolator, Horizontal Centre-Break Isolator, Current Transformers, Capacitor Voltage Transformer, Lightning Arrestor, Earthing Switch
- Generator Switchgear: Description, Tests

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OTHER AVAILABLE COURSES

4 Pillars of Transformer Condition
Advanced Project Finance for Power
Advanced Technical Report Writing & Presentation Skills
Advanced Turnaround Shutdown & Outage Management
Ancillary Services in Competitive Electricity
Asset Management for the Power Industry
Best Practice Renewable Energy Capital & Project Management
Biomass Power Generation
CFB Combustion for Boiler Operations
Clean Development Mechanism and Carbon Markets
Coal Contracts
Combined Cycle Power Plants Operation
Combined Heat & Power (CHP) and Co-Generation Plant Operations
Competency Management System for the Power Industry
Design & Operations of Circulating Fluidized Bed Boiler
Developing & Structuring Public-Private Partnership (PPP) for Infrastructure
Effective Tender Process Management for Power & Utilities
Electrical Hazop (eHazop) Studies for the Power Industry
Electricity Demand-Side Management
Electricity Industry Design
Electricity Network Planning
Electricity Retail Contracts
Electricity Theft
Electricity Trading Essentials
Energy Efficiency
EPC Contract Management for Power & Utilities
Essentials of Coal Markets and Trading
Essentials of Power Trading
Excitation Systems
Feed-In Tariffs for PV Systems
Finance for Non-Finance Professionals in Power & Utilities
Financial Modelling for Project Finance in Power & Utilities
Fitness-For-Service AP1 579 & High Energy Piping Life Management
Fundamentals of Geothermal Energy
Fundamentals of Power Generation
Gas & LNG Contract Negotiation
Gas Turbine Generator Selection, Operation & Maintenance
Gas Turbine Hot Gas Paths, Rotors & Failure Analysis
Gas Turbine Major Inspection & Overhaul
GE Gas Turbine Operations Simulation Based
HRSG Design, Operations & Understanding, Controlling of HRSG Damage
HV Substation Design & Construction
IEC for Utilities
Integration of Distributed Generation
Introduction to Carbon Capture & Storage
Introduction to Clean Coal Technology
Introduction to Power Systems
Keeping Electrical Switchgear Safe
Leadership & Team Dynamics for Power & Utilities
LNG Fundamentals
LNG Markets & SPOT Trading
Maintenance Planning & Scheduling
Making IPP & Renewable Energy Projects Contract Frameworks Bankable
Managing Complex Projects for Power and Utilities Professionals
Medium Voltage & High Voltage Switchgear
Metallurgy for Engineers
Mechanical Engineering for Non-Mechanical Engineers
Mini Hydro Project Analysis
MKV Speedtronic Control System
MK VI Speedtronic Control System
Nuclear Energy Project Planning & Economics
Nuclear Power
Offshore Platforms Electrical Systems Design & Illustrations
Operations of Coal Fired Power Plants
Power Generation Commissioning, Operations & Maintenance
Power Generation Operation, Protection & Excitation Control
Power Plant Chemistry for Chemist & Chemical Engineers
Power Purchase Agreements
Process Control Methods
Programmatic CDM
Project Management for Power and Utilities
Relay Protection in Power Systems
Reliability Centered Maintenance Masterclass
Reliability Engineering
Renewable Energy Development & Investment
Renewable Energy Integration
Risk Based Inspection
Risk Management in Power Markets
Root Cause Analysis
Rotating Equipment Maintenance & Reliability Excellence
SCADA & Power Systems
Smart Grid
Solar Energy & Photovoltaic Power
Spare Parts Optimisation
Supercritical and Ultra-Supercritical Coal-Fired Power Plant
Technical Report Writing & Presentation Skills for Power & Utilities Professionals
Ultra Low NOx Gas Turbine Combustion
Uninterruptible Power Supply
Vibration Analysis & Condition Monitoring
Waste to Energy Plant Operations
Water Treatment and Corrosion Control for Steam Generation and Power Production
Writing Effective Standard Operating Procedures (SOP) for Power & Utilities Professionals & Engineers

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Frequently Asked Questions (FAQs)

1. Does PowerEdge have other programmes than those listed? 
We have more than 200 programmes that we are capable of running. All we need is for you to contact us and request for the preferred programme and we will able to develop it.

2. Where is PowerEdge based? 
PowerEDGE is headquartered in Singapore but we run our training programmes in different venues around Asia.

3. What does PowerEdge do? 
We are a Power & Utilities Training Specialist.

4. Can this course be done in our city? 
It absolutely can. Get in touch with us to request for a training programme to be carried out in your city.

5. Can you reduce the price of our preferred course? 
While our price has been reduced before it is even launched, we are always happy to help you with further discounts.

6. Can you change the dates of the course? 
If you have a special requested date, let us know and we will arrange another session for you.

7. Who are the companies that will be participating? 
This varies from a diversity of Power Operators, Regulators, Financiers, to Vendors in the Power & Utilities industry.

8. Where is the venue for the course? 
We usually engage a 4 to 5 star hotel meeting room to ensure the comfort of our participants.

9. How many delegates should we expect for each course? 
This varies from 15 to 20 participants. Class sizes are kept small to allow trainers to focus better on each participant.

10. What are the different payment modes? 
We accept Visa/MasterCard, cheques, bank transfers and cash on site.

11. Is accommodation included when I sign up for a course? 
Accommodation is not included in the course fee but we are always happy to advise on available accommodations.

12. Can I get a cheaper accommodation through PowerEdge? 
We will be pleased to help you negotiate a better rate with hotels.

13. Is lunch provided during the course? 
We provide lunch and 2 tea breaks every day during our training programmes.

14. Are the training materials included once I have signed up for a course? 
Yes, training and course materials are included in the course fee.

15. Will there be a certificate for the course? 
Yes, there will be a certificate of participation upon completion of a course.

16. Who are PowerEdge trainers? 
They are expert consultants and practitioners with many years of experience in the subject matter that they deliver on.

17. Are PowerEdge trainers competent? 
We have received numerous favourable feedbacks on our trainers from past participants.

18. Can PowerEdge assist with Visa travel applications? 
We can assist in advising you on the relevant procedure(s) and embassies/consulates that provide Visa for travel purposes.

19. Can we purchase training materials without attending a course? 
Unfortunately this option is not available as training materials are specially developed for courses.

20. Can course content be tweaked to cater to our needs? 
Of course! Just let us know your request and we will get the trainer to assist in carrying it out.
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<tr>
<th>Programme</th>
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<td>3 Day Programme</td>
<td>SGD 2,900 Per Participant</td>
<td>SGD 2,500 Per Participant</td>
<td>Guaranteed Minimum 40% Off Normal Price</td>
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**COMPANY DETAILS**

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- Keeping Electrical Switchgear Safe
- Introduction to Power Systems
- Excitation Systems
- Fundamentals of Power Generation

**PAYMENT METHODS**

- By Cheque/ Bank Draft: Make Payable to PowerEdge Pte Ltd.
- By Telegraphic Transfer: Please quote AE1 with the remittance advise

Company Name: PowerEdge Pte Ltd.
Bank Code: 7339 Branch code: 686 Account Number: 253386-001 SGD
Bank Address: 65 Chulia Street OCBC Centre, Singapore 049513

All bank charges and payment in Singapore dollars (SGD) to be borne by payer. Please ensure that PowerEdge Pte Ltd receive the full invoiced amount.

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