powerEDGE®
Empower your future

VIRTUAL INSTRUCTOR LED TRAINING (VILT)

COMMISSIONING OF COMBINED CYCLE POWER PLANTS

15 - 19 November 2021
5 half-day training, 4 hours per session
(total 20 hours)

GLOBAL LEADER IN POWER & UTILITIES TRAINING

TESTIMONIALS FROM PAST DELEGATES

> ***The trainer is very experienced and knowledgeable. I got a lot of knowledge which can be applied to work. Every engineer should take this training.***

Engineer, PT PJB Services

> ***The programme is useful and all discipline are covered to get overall knowledge.***

Principal Engineer, Jurong Engineering Limited

DELIVERY OF VIRTUAL INSTRUCTOR LED TRAINING (VILT)

The VILT will be delivered online in 5 sessions comprising 4 hours per day, with 2 breaks of 10 minutes per day, including time for lectures, discussion, quizzes and short classroom exercises.

Additionally, some self-study will be requested. Participants are invited but not obliged to bring a short presentation (10 mins max) on a practical problem they encountered in their work. This will then be explained and discussed during the VILT. A short test or quiz will be held at the end the course.

COURSE OVERVIEW

This course provides a comprehensive understanding of all the commissioning procedures for combined cycle power plants. The Commissioning Management System (CMS) of combined cycle power plants is covered in detail in this course. This includes all the commissioning procedures and documents, purpose of commissioning, responsibilities, system description, organization, working parties, test teams, documentation, testing and commissioning schedules, test reports, safety, plant certification, and plant completion report.

The course provides also a thorough understanding of all the commissioning requirements for gas turbines, steam turbines and auxiliaries, generator and auxiliaries, electrical equipment, switchgear equipment, switchgear and transformers.

All the stages of the commissioning procedure are covered in-depth in this course. This includes preparation - planning various activities, pre-commissioning checks and tests, typical commissioning schedule, detailed tests and commissioning procedures and instructions for every component in a combined cycle power plant, instrumentation, trial run of the equipment, safety and precautions, commissioning of combined cycle power plant systems, safety rules clearance certificates, procedure for the control and handling of defects, commissioning reports, operational testing, first fire, generator synchronization, performance testing, heat rate testing, emission testing, contract testing, CO2 concentration tests, electrical full-load rejection test, duct burner testing, partial load stability test, and reliability test.

This course is a MUST for anyone who is involved in the pre-commissioning or commissioning of any combined cycle power plant equipment because it provides detailed pre-commissioning checks and tests, and detailed tests and commissioning procedures and instructions for every component in a combined cycle power plant. In addition, the seminar provides an in-depth coverage of all preparation, planning activities, commissioning schedules, trial run of each combined cycle power plant 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 Every Equipment in Combined Cycle Power Plants:** Gain a thorough understanding of all pre-commissioning checks and tests, and all commissioning procedures and instructions for every equipment in combined cycle power plants

- **Commissioning Management System (CMS) of Combined Cycle Power Plants:** Discover the benefits of the CMS of combined cycle power plants including all commissioning procedures and documents, purpose of commissioning, responsibilities, system description, organization, working parties, test teams, documentation, testing and commissioning schedules, test reports, safety, plant certification, and plant completion report

- **Commissioning Procedures and Instructions for Heat Recovery Steam Generators, Air Blow and Steam Blow of Steam and Gas Piping in Combined Cycle Power Plants:** Learn about the commissioning procedures and instructions for heat recovery steam generators, chemical cleaning of heat recovery steam generators, air blow and gas blow of steam and gas piping in combined cycle power plants, safety valve setting and soot blowers

- **Commissioning Procedures and Instructions for Gas Turbines and Steam Turbines:** Gain a thorough understanding of all the commissioning procedures and instructions for gas and steam turbines and auxiliaries including acid cleaning of oil pipelines, lubrication and governing system (oil flushing and hydraulic testing), jacking oil system, governing system, regenerative system, barring gear, vacuum tightness test, first rolling of turbine and data logging

- **Commissioning Procedures and Instructions for Generator and Auxiliaries:** Discover all the commissioning procedures and instructions for generator and auxiliaries including generator, seal oil system, hydrogen gas system, stator water system, rolling and start-up of generators

- **Commissioning Procedures and Instructions for Electrical Equipment:** Learn about all the commissioning procedures and instructions for electrical equipment including switchyard equipment, switchgear, transformers and motors

- **Operational Testing, Performance Testing, Heat Rate Testing, Emission Testing of Combined Cycle Power Plants:** Gain a thorough understanding of operational testing, first fire, generator synchronization, performance testing, heat rate testing, emission testing, contract testing, CO2 concentration tests, electrical full-load rejection test, duct burner testing, partial load stability test, and reliability test of combined cycle power plants

WHO SHOULD ATTEND

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

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.

SPECIAL FEATURE

Each delegate will receive a copy of the following materials written by the instructor:

- *"POWER GENERATION HANDBOOK, 2nd edition" published by McGraw-Hill, New York (800 pages)*
- *Excerpt of the relevant chapters from the "POWER PLANT EQUIPMENT OPERATION AND MAINTENANCE GUIDE" published by McGraw-Hill (800 pages)*
- *COMMISSIONING OF COMBINED CYCLE POWER PLANTS MANUAL (includes practical information about all pre-commissioning checks and tests, typical commissioning schedule, detailed tests and commissioning procedures and instructions for every component and system in combined cycle power plant - 600 pages)*

5 HALF-DAY COURSE OUTLINE

Soft copy course materials & Certification of Completion will be provided to registered participants.

Session 1

Commissioning Management System, System Turnover from Construction to Commissioning, Engineering Drawings, Piping and Instrument Diagrams, Electrical Online Diagrams, Component Testing, Flushing the Systems, Chemical Cleaning of the Heat Recovery System, Air Blow and Steam Blow of the Steam and Gas Piping

- Commissioning procedure and documents: purpose of commissioning, responsibilities, system description, organization, working parties, test teams, documentation, safety, plant certification, plant completion report
- System turnover from construction to commissioning, turnover packages
- Engineering drawings, piping and instrument diagrams and electrical online diagrams
- System walkdown punch list
- Component testing, responsibilities, nameplate data, test specifications, lubrication
- Commissioning of motors, cables, switchgear and motor control centers
- Commissioning of transformers and switchyards, electrical meters and relays, instrumentation
- Loop checks, instruments, transmitters

Session 2

Commissioning of DC Power and UPS System, Commissioning of the Distributed Control Systems, Commissioning of the Instrument Air, Fire Detection and Protection Systems, Cooling Water Systems, Condensers, Cooling Towers, Feedwater and Condensate, Heat Recovery Steam Generator (HRSG), Commissioning of Gas Turbines and Steam Turbines, Commissioning of Soot Blowers

- Commissioning of DC power and UPS system
- Initial plant energization
- Commissioning of the distributed control system
- Commissioning of fire detection and protection
- Commissioning of the cooling water system, condensers
- Commissioning of cooling towers
- Commissioning of steam, feedwater and condensate systems
- Commissioning of the Heat Recovery Steam Generator
- Commissioning of Gas Turbines
- Commissioning of Steam Turbine
- Commissioning of soot blowers: readings for operation with steam (mechanical), check-up of electrical system

Session 3

Turbine and Auxiliaries, Acid Cleaning of Oil Pipelines, Lubrication and Governing System, Jacking Oil System, Governing System, Regenerative System, Boiler Feed Pump Commissioning, Barring Gear, Vacuum Tightness Test, Checklist of First Rolling of Turbine

- Turbines and auxiliaries
- Acid cleaning of oil pipelines: passivation and drying, final erection in position, safety
- Lubrication and governing system: preparation for oil filling in man oil tank, charging of oil systems, oil flushing circuit of a typical 200 / 210 MW turbine lube oil system, oil flushing, hydraulic testing of oil system, additional checks to be made on turbine oil system
- Jacking oil system: oil flushing, relief valve setting, preparation of hydraulic testing, hydraulic testing
- Governing system: checking of governing system
- Checklist for first rolling of turbine (200 / 210 MW), preparation, preliminary operation before rolling, operation to be carried out for the units with HP/IP bypass system, data to be collected during the commissioning and also after loading to full capacity in 200 / 210 MW turbine generator set

Session 4

Generator and Auxiliaries, Generator, Commissioning of Seal Oil System, Hydrogen Gas System, Stator Water System, Rolling and Dryout of Generator

- Generator general inspection and checks
- Generator: Preliminary checks of resistance insulation resistance, Ohmic resistances, generator stator winding, generator rotor winding
- Generator testing: Laboratory tests, field tests
- Laboratory diagnostic tests of stator winding insulation: Voltage endurance test, thermal cycling, dissection of coils, insulation failure analysis, partial discharge test, dissipation factor, turn-to-turn, multi-factor stress, forensic analysis
- Field tests: Insulation resistance test, DC winding resistance test, visual inspection test, digital electromagnetic core imperfection detector (EL-CID), partial discharge data interpretation and analysis, Corona probe test, dissipation factor (tan delta test), AC and DC Hi-pot test, wedge tightness test, core repair, if loose, insulation condition assessment
- Rotor testing: Recurrent surge oscillograph (RSO), air purge test, insulation resistance test, winding resistance test, impedance test, bolt and air tightness test, die-penetrant and ultrasound test of the retaining rings

5 HALF-DAY COURSE OUTLINE

Continuation of Session 4

- Rolling and dry-out of generator: Requirements for rolling, requirements for dry-out rolling (200 / 100 MW turbines), BTPS / SSTPP, checks during rolling, dry-out operation, hydrogen filling in the 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
- Switchgear: Description, tests

Session 5

Transformer Pre-commissioning Tests, Transformer Commissioning, Electrical Equipment, Commissioning of Circuit Breakers and Switchgear, Commissioning Reports, Operational Testing, Performance Testing, Heat Rate Testing, Emission Testing, Electrical Full-Load Rejection Test, Duct Burner Testing, Partial Load Test, Reliability Test

- Transformer commissioning tests: magnetic balance test, excitation current measurement, short circuit impedance measurement, frequency response analysis, winding resistance measurement, recovery voltage measurement (RVM), online moisture measurement through domino, capacitance and tan measurement, dissolved gas analysis, furan analysis in oil, measurement of voltage ratio and check of phase displacement, measurement of short-circuit impedance and load loss, measurement of no-load loss and current, dielectric tests, separate source AC voltage test. induced AC voltage test, partial discharge measurement, tests on on-load tap changer, open circuit and short circuit tests, temperature-rise test, lightning-impulse tests, switching impulse voltage test, measurement of zero sequence impedance(s), determination of sound level, measurement of harmonics of the no-load current, measurement of insulation resistance, short-circuit withstand test, condensation test, condensation and humidity penetration test, low temperature test, heat shock test at -5°C, heating shock test at -25°C
- Testing of HV bushing
- Transformer commissioning
- Circuit breakers: SF6 circuit breakers, vacuum circuit breakers, air blast circuit breaker, oil-filled circuit breaker, short-circuit current
- Commissioning of switchgear and circuit breakers: start-up and commissioning, protection, mechanical checks and visual inspection, electrical inspection, insulation resistance, contact resistance, functional operation, auxiliary equipment
- Performance testing, heat rate testing
- Emission testing, contract testing, CO_2 concentration tests
- Electrical full-load rejection test
- Duct burner testing
- Partial load stability test
- Reliability test
- System turnover from commissioning to the owner, turnover packages, system walk-downs, conclusion

EXPERT COURSE FACULTY

Your specialist course leader has more than 32 years of practical engineering experience with Ontario Power Generation (OPG), one of the largest electric utility in North America. He was previously involved in research on power generation equipment with Atomic Energy of Canada Limited at their Chalk River and Whiteshell Nuclear Research Laboratories.

While working at OPG, he acted as a Training Manager, Engineering Supervisor, System Responsible Engineer and Design Engineer. During the period of time, he 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, he worked as the manager of a section dedicated to providing training for the staff at the power stations. The training provided by him covered in detail the various equipment and systems used in power stations.

In addition, he has taught courses and seminars to more than four thousand working engineers and professionals around the world, specifically Europe and North America. He has been consistently ranked as “Excellent” or “Very Good” by the delegates who attended his seminars and lectures.

He written 5 books for working engineers from which 3 have been published by McGraw-Hill, New York. Below is a list of the books authored by him;

- Power Generation Handbook: Gas Turbines, Steam Power Plants, Co-generation, and Combined Cycles, second edition, (800 pages), McGraw-Hill, New York
- Electrical Equipment Handbook (600 pages), McGraw-Hill, New York
- Power Plant Equipment Operation and Maintenance Guide (800 pages), McGraw-Hill, New York
- Industrial Instrumentation and Modern Control Systems (400 pages), Custom Publishing, University of Toronto, University of Toronto Custom Publishing
- Industrial Equipment (600 pages), Custom Publishing, University of Toronto, University of Toronto, University of Toronto Custom Publishing

Furthermore, he has received the following awards:

- The first “Excellence in Teaching” award offered by PowerEdge, Singapore, in December 2016
- The first “Excellence in Teaching” award offered by the Professional Development Center at University of Toronto (May, 1996).
- The “Excellence in Teaching Award” in April 2007 offered by TUV Akademie (TUV Akademie is one of the largest Professional Development centre in world, it is based in Germany and the United Arab Emirates, and provides engineering training to engineers and managers across Europe and the Middle East).
- Awarded graduation “With Distinction” from Dalhousie University when completed Bachelor of Engineering degree (1983).

Lastly, he was awarded his Bachelor of Engineering Degree “with distinction” from Dalhousie University, Halifax, Nov 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.

IN-HOUSE TRAINING SOLUTIONS

Organisations today require crucial skills to improve performance, as well as a clear returns on their training investment ROI. By aligning training interventions to focus on your specific business needs and objectives, **powerEDGE** is able to deliver results way and above what can be achieved via conventional training approaches.

Our in-house training solutions offer a full spectrum of short courses and curricular that can be customized to your exact needs and be brought right to your doorstep!

Our clients have come to rely on our robust integrated learning approach as a fundamental component of their talent development and performance improvement strategy. Our unique approach comprises of the following phases:

- Detailed assessment with business issue needs analysis through pre-course evaluations and other assessment tools
- In-depth consultation development and organizational alignment
- Programme and curriculum development refinement
- Strategic evaluation process to validate learnings' achieved with ROI
- Targeted and focused re-enforcement to ensure knowledge transfer

Looking to train the whole team? Email us at ***info@poweredgeasia.com*** to know more about our in-house training or request for a quotation.

OTHER RELATED TRAINING THAT YOU CAN ATTEND:

Combined Cycle Gas Turbine Performance

Electrical Generators, Excitation Systems and Governing Systems

Steam Turbine Technology

Heat Rate Optimization of Coal Power Plants

Commissioning of Electrical Equipment

Gas Turbine and Co-Generation Plants

REGISTRATION

VIRTUAL INSTRUCTOR LED TRAINING (VILT)

Commissioning of Combined Cycle Power Plants

Early Bird Price **Full course (5 half-days) | SGD 3,099 or USD 2,262 per participant**

Normal Price **Full course (5 half-days) | SGD 3,299 or USD 2,408 per participant**

**Prices above are not inclusive of any prevailing government taxes*

REGISTRATION FORM

Name: _____ **Job Title:** _____ **Department:** _____
Telephone: _____ **Email Address:** _____
Preferred Course & Date: _____

Name: _____ **Job Title:** _____ **Department:** _____
Telephone: _____ **Email Address:** _____
Preferred Course & Date: _____

Name: _____ **Job Title:** _____ **Department:** _____
Telephone: _____ **Email Address:** _____
Preferred Course & Date: _____

Name: _____ **Job Title:** _____ **Department:** _____
Telephone: _____ **Email Address:** _____
Preferred Course & Date: _____

COMPANY DETAILS

Organization Name: _____ **Industry:** _____
Address: _____
Postcode: _____ **Country:** _____ **Contact Number:** _____

PAYMENT METHODS & POLICY

By cheque / bank draft: Only local cheque will be acceptable and cheque payable to Asia Edge Pte Ltd. Kindly ensure that your cheque is crossed 'Not Negotiable' and "Account Payee Only".

By PayNow (Available in Singapore only)
Account name: Asia Edge Pte. Ltd.
Company UEN: 200710561C

By telegraphic transfer: Please quote the invoice number on the remittance advice.
Account name: Asia Edge Pte Ltd
Bank code: 7339 **Branch code:** 508 **Account no:** 508-762903-001 **(SGD)**
Bank code: 7339 **Branch code:** 665 **Account no:** 665-000774-301 **(USD)**
Swift code: OCBCSGSG
Bank address: 65 Chulia Street OCBC Centre, Singapore 049513

All bank charges to be borne by payer. Please ensure that Asia Edge Pte Ltd receives the full invoiced amount.

By credit card: Only VISA / MASTERCARD is accepted. Payment through credit card will incur a 3.5% admin fee payable by the payer. Payment through credit card is only applicable in SGD currency.

Payment is due in full at the time of registration. Full payment is mandatory for event attendee. By submitting this registration form, you have agreed to Asia Edge Pte Ltd's payment terms payment term mentioned.

* GST - exclusive price is only applicable for overseas corporate customers, subject to qualifying conditions.

CANCELLATIONS & SUBSTITUTIONS

You may substitute delegates at any time before the event starts. Asia Edge Pte Ltd does not provide refunds for last minute cancellations. For cancellations received in writing more than 7 days or less prior to an event (including day 7), no credits will be issued.

In the event Asia Edge Pte Ltd cancels an event, delegate payments at the date of cancellation will be credited to a future Asia Edge Pte Ltd event. This credit will be available for up to 1 year from the date of issuance.

In the event that Asia Edge Pte Ltd postpones an event, delegate payments at the postponement date will be credited towards the rescheduled date. If the delegate is unable to attend the rescheduled event, the delegate will receive a 100% credit.

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