

DIESEL ENGINE POWER PLANT

Selection, Applications, Operation, Inspection, Diagnostic Testing, Troubleshooting, Maintenance, Refurbishment, Performance Monitoring, Power Augmentation, and Economics

SGD 2,645
for 2
Participants
or More

25 – 26 APRIL 2019, KUALA LUMPUR, MALAYSIA

Expert Course Faculty Leader

Our key expert has more than 32 years of practical engineering experience with Ontario Power Generation as an Engineering Supervisor and Training Manager, has conducted courses and seminars to more than 4,000 working engineers and professionals who consistently ranked him as "Excellent" or "Very Good". He has also written 5 books for working engineers from which three have been published by McGraw-Hill, New York.

TOPICS COVERED

*Diesel Engine Power Plant
Components and Systems*

*Diesel Engine Power Plant Failure
Modes, Inspection, Diagnostic
Testing*

*Diesel Engine Power Plant
Environmental Emissions*

*Diesel Engine Power Plant
Instrumentation and Control
Systems*

*Diesel Engine Power Plant
Reliability and Testing*

*Diesel Engine Power Plant
Selection and Applications*

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Introduction

Diesel engines have the highest efficiency and reliability for powering power generating plants, ships, etc. They also have low capital, operation and maintenance cost. Diesel engines have been used as prime movers for power plants of various sizes. The environmental emissions of these engines are minimal. This seminar will provide in-depth coverage of the selection, layout, operation, inspection, diagnostic testing, troubleshooting, maintenance, refurbishment, performance monitoring, power augmentation, and economics of all types of diesel engine power plants. The main focus of this seminar will be on the inspection, testing, troubleshooting, maintenance, and refurbishment of these engines. All the components, instrumentation, and control systems of diesel engine power plants will be covered in detail. The design, selection considerations, operation, maintenance, economics of diesel engine power plants as well as, emission limits, reliability, monitoring and governing systems will also be covered in detail. This seminar will also provide up-dated information in respect to all the significant improvements that have been made to diesel engine power plants during the last two decades.

Seminar Outcome

- **Diesel Engine Power Plant Components and Systems:** Learn about all components and subsystems of the various types of diesel engine power plants including plant layout, air intake system, fuel supply system, exhaust system, cooling system, lubricating system, starting system.
- **Diesel Engine Power Plant Failure Modes, Inspection, Diagnostic Testing, Troubleshooting, Maintenance, and Refurbishment:** Learn about all the failure modes of diesel engine power plants, inspection techniques, diagnostic testing, troubleshooting, maintenance and refurbishment activities required for these engines to minimize their operating cost and maximize their efficiency, reliability, and longevity.
- **Diesel Engine Power Plant Environmental Emissions:** Learn about the monitoring and control of diesel engine power plant environmental emissions.
- **Diesel Engine Power Plant Instrumentation and Control Systems:** Learn about the latest instrumentation and control systems of diesel engine power plants.
- **Diesel Engine Power Plant Reliability and Testing:** Increase your knowledge of diesel engine power plant predictive and preventive maintenance, reliability and testing.
- **Diesel Engine Power Plant Selection and Applications:** Gain a detailed understanding of the selection considerations and applications of diesel engine 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.

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About Our Expert Course Trainer

The trainer has been a teacher at University of Toronto and Dalhousie University, Canada for more than 25 years. 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.

The trainer 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 him:

1. Power Generation Handbook: Gas Turbines, Steam Power Plants, Co-generation, and Combined Cycles, second edition, (800 pages), McGraw-Hill, New York, October 2011.
2. Electrical Equipment Handbook (600 pages), McGraw-Hill, New York, March 2003.
3. Power Plant Equipment Operation and Maintenance Guide (800 pages), McGraw-Hill, New York, January 2012.
4. Industrial Instrumentation and Modern Control Systems (400 pages), Custom Publishing, University of Toronto, University of Toronto Custom Publishing (1999).
5. Industrial Equipment (600 pages), Custom Publishing, University of Toronto, University of Toronto, University of Toronto Custom Publishing (1999).

The trainer has received the following awards:

1. The first "Excellence in Teaching" award offered by Poweredge Asia Training center, Singapore, December 2016
2. The first "Excellence in Teaching" award offered by the Professional Development Center at University of Toronto (May, 1996).
3. 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).
4. Awarded graduation "With Distinction" from Dalhousie University when completed Bachelor of Engineering degree (1983).
5. Entrance Scholarship to University of Ottawa (1984).
6. Natural Science and Engineering Research Counsel (NSERC) scholarship towards graduate studies – Master of Applied Science in Engineering (1984 – 1985).

The trainer performed research on power generation equipment with Atomic Energy of Canada Limited at their Chalk River and Whiteshell Nuclear Research Laboratories. He also has more than 32 years of practical engineering experience with Ontario Power Generation (OPG - formerly, Ontario Hydro - the largest electric utility in North America). He retired from OPG in November 2016.

While working at Ontario Hydro, he acted as a Training Manager, Engineering Supervisor, System Responsible Engineer and Design Engineer. During the period of time that the trainer 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.

The trainer 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.

2 Day Course Outline

Day 1 – Diesel Engine Power Plant Design, Layout, Features, Efficiency, Components, Advantages, Fuel System, Electronic Management System, Safety, Applications, and Cost

- Diesel engine efficiency, features, operation, and fuel injection systems
- Diesel engine pistons, cylinders, strokes, diagrams, valves, air flow and fuel
- Indirect injection and direct injection of diesel engines
- Cold weather effects on diesel engines: starting and gelling
- Two-stroke diesel engine design and types
- Two-stroke diesel engine intake, crankcase compression, transfer and exhaust
- Advantages and disadvantages of two-stroke diesel engines
- Four-stroke diesel engine design, components, and types
- Diesel engine supercharging and turbocharging
- Modern high- and medium-speed engines
- Modern low-speed engines, gas generator
- Advantages and disadvantages of diesel engines versus spark-ignition engines: fuel economy, torque, power, forced induction, emissions, noise, reliability, quality and variety of fuels
- Diesel engine fuel and fluid characteristics
- Diesel engine safety: fuel flammability, and maintenance hazards
- Diesel engine applications: power generation, passenger cars, railroad rolling stock, other transport applications, military fuel standardization, marine applications
- Diesel engine speeds: high-speed engines, medium-speed engines, and low-speed engines
- Diesel engine fuel systems: air blast, jerk pump system, inline pumps, distributor pumps, Bosch VE, Injector pump service (bleeding and timing), delivery valves (service), injectors (injector service, spray pattern, nozzle opening pressure, sealing, chatter), timers, diaphragm controls, centrifugal governors (service), pneumatic governor (MZ, service), unit injection, low-pressure system (lift pumps, lift-pump service), fuel filters and water separators
- Diesel engine power plant layout, equipment, air intake system, fuel supply system, exhaust system, cooling system, starting system

- Electronic Management Systems: background, modern diesel engines, solenoid-actuated injectors, piezo-actuated injectors (service), unit injection, analog versus digital, Bosch CAN bus, on-board computer (central processing unit, memory, peripherals, sensors, actuators), tools, troubleshooting (methods for troubleshooting every component in EMS-equipped diesel engine), Caterpillar EMS, components of Caterpillar EMS, electronic unit injector, low-pressure circuit, high-pressure circuit, hydraulic/electronic unit injector (injector service, HEUI hydraulics, fuel pressure, boost pressure, throttle-position sensor, trouble codes, list of Caterpillar HEUI trouble codes, Power Stroke (slow or no-start, power stroke sensor nomenclature and functions, erratic idle, low oil pressure, air in lube oil, injector-drive module, air in fuel circuit, camshaft position sensor), Diesel (electronic unit injectors, Diesel electronic control nomenclature, no start, VGT/EGR, major DDEC flash and PID codes)

Day 2 – Diesel Engine Power Plants, Pulse System of Turbocharging, Diesel Engine Failure Modes, Inspection, Troubleshooting, Maintenance, and Refurbishment, Diesel Engine Generators, Governor, Automatic Voltage Regulator, and Excitation Systems

- Superchargers and diesel engines: applications, construction, wastegate, aftercoolers, routine maintenance, lubrication system, air inlet system, crankcase ventilation system
- Constant Pressure System Turbocharging, turbocharger arrangement in constant pressure system, advantages and disadvantages for constant pressure system
- Pulse system of turbocharging, turbocharger arrangement in pulse system, advantages and disadvantages of pulse system
- Under piston pressure supercharging, advantages
- Turbocharger surging, causes of turbocharger surging
- Exhaust tuning
- Advantages of intercooling the charged air
- Types of turbocharger lube oil system
- Types of turbocharger bearings: ball type bearing (rolling), sleeve type bearings
- Function of the labyrinth seal
- Indication of choked air filter turbocharger
- Function of nozzle ring in turbocharger

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- Function of shroud ring in turbocharger
- Function of shroud ring in turbocharger
- Purpose of inducer in turbochargers
- Function of diffuser in turbochargers
- K value in turbochargers, purpose of K value in turbochargers
- Engine operation following turbocharger failure
- Cut off damaged turbochargers for engine operation
- Engines with one turbocharger (engines without exhaust by-pass)
- Engines with two or more turbochargers
- Turbocharger faults diagnostics: symptoms, probable causes, and corrective actions
- Turbocharger exhaust system, inspection, overhaul
- Variable geometry turbine
- Common failure modes of diesel engines
- Diesel engine instrumentation and alarms
- Diesel engine inspection
- Diesel engine diagnostics
- Diesel engine maintenance activities
- Diesel engine operational activities
- Diesel engine troubleshooting: malfunctions (engine does not start, cranks slowly, trips after operating for one or two minutes, misfires, fail to develop normal power)
- Diesel engine tests: fuel quality, fuel system, bleeding, low-pressure circuit tests, high pressure circuit tests
- Diesel air inlet system: air filter, positive crankcase ventilation (PCV), exhaust gas recirculation, turbocharger, glow plugs, exhaust backpressure
- Diesel engine mechanical: fuel leaks, oil leaks, coolant leaks, excessive oil consumption, loss of compression, and oil analysis
- Maintenance of diesel engines
- Maintenance of diesel engine lubrication and cooling systems
- Diesel engine current and future developments
- Diesel engine capital cost, operation and maintenance cost, and economics
- Diesel generators, components, governor, automatic voltage regulator, and excitation systems

LEARNING OUTCOMES:

- **Gain** a thorough understanding about all components and subsystems of the various types of diesel engine power plants including layout, air intake system, fuel supply system, exhaust system, cooling system, lubricating system, starting system
- **Examine** the advantages, applications, performance and economics of diesel engine power plants
- **Learn** about various equipment including pistons, cylinders, two- and four-stroke diesel engines, fuel systems, governing systems, and electronic management systems of diesel engine power plants
- **Discover** the inspection, diagnostic testing, troubleshooting, and maintenance activities required for diesel engine power plants to minimize their operating cost and maximize their efficiency, reliability, and longevity
- **Learn** about the monitoring and control of diesel engine power plants environmental emissions
- **Discover** the latest instrumentation and control systems of diesel engine power generating plants
- **Increase** your knowledge of predictive and preventive maintenance, reliability and testing required for diesel engine power plants
- **Gain** a thorough understanding of the selection considerations and applications of diesel engine power plants



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	PER PARTICIPANT	2 PARTICIPANTS OR MORE	IN-HOUSE TRAINING
2 Day Programme	SGD 2,845 Per Participant	SGD 2,645 Per Participant	Guaranteed Minimum 40% Off Normal Price

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