



THE CHEMICAL ENGINEERING MAJOR

Operation & Maintenance of Heavy Duty Diesel Engine (HDD)

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Operation & Maintenance of Heavy Duty Diesel Engine (HDD)

Introduction:

This course will highlight the added value that Heavy Duty Diesel Engines can offer to support engineers and technicians working in power plants, petroleum industries, and fleet management and maintenance. It will show how to safely use such engines economically, safely and environment friendly. The course will emphasize the application of related recommended operation and maintenance practices advised by the most reputable manufacturers and by the relevant standards, focus on proper HD Diesel engine selection for specific jobs, retrieval and interpretation of data from HD Diesel engines manuals. This course will feature:

- The detailed description of HDD systems and characteristic performance
- Discussions on the benefits and applications of heavy duty Diesel HDD engines
- The importance of correct operation and maintenance of HDD for better reliability
- Focusing on electronic control of HDD for economy and environment friendly operation

Who Should Attend?

Mechanical Engineers, General Supervisors, Consulting Engineers, Design Engineers, Foremen, Supervisors, Technicians, Maintenance Personnel, Engineers of all disciplines, Supervisors, Team Leaders and Professionals in Maintenance, Engineering and Production Managers, Maintenance Personnel, Heads of Maintenance and Operation, Chemical Engineers, Equipment Specialists, Technical Engineers, Operation Engineers, Planning Engineers, Process Engineers, Reliability Specialists, Boiler Plant Construction Managers, Consulting Engineers, Design Engineers, Insurance Company Inspectors, Operation, Maintenance, Inspection and Repair Managers, Supervisors and Engineers, Plant Engineers, Senior Boiler Plant Operators, Repairers and Installers, Vehicles fleet maintenance engineers and technicians, Fleet Maintenance Supervisors, Automotive Maintenance Engineers, Automotive Maintenance Technicians, Diesel Power Generation Plants Engineers & Technicians

Course Objectives:

By the end of this course, delegates will be able to:

- List and explain the principle of operation of air charging systems in diesel engines
- List and explain the operation principle of various types of fuel injection systems used in HDD
- Describe the layout and components of various fuel injection systems used in HDD
- Explain how quantity and timing of injected fuel can be controlled

- Outline the principle of operation of diesel engines
- Specify the difference between Heavy Duty Diesel Engines and normal Diesel engines
- Describe how combustion occurs in diesel engines
- Explain the reason of air charging in diesel engines
- State the benefits of Diesel Electronic Control (DEC)
- List and explain the principle of operation of various HDD emission control systems
- Outline the procedure and requirements for servicing HDD
- Outline the HDD basic routine maintenance operations
- List and explain how to fix the common HDD troubles

Course Outline:

Introduction to Heavy Duty Diesel Engines (HDD)

- Meaning of HDD: Rating, Load factor, Operation duration
- HDD glossary of terms
- Standards for HDD
- Design consideration of HDD
- HDD construction features and materials
- HDD Characteristic performance
- HDD Applications

Work Cycle and Combustion in Diesel Engines

- Work cycle
- Diesel fuel (Classification, Fuel properties, Fuel tests)
- Combustion in Diesel engines
- Compression ratio
- Combustion chambers

- Direct & indirect injection
- Homogenous Charge Compression Ignition (HCCI)
- Air charging in heavy duty diesel engines
- Types (Mechanical, Turbo, Pressure wave)
- Turbocharger configuration (Combined, Two stage, Variable geometry, Sequential)
- Turbocharger control (Pressure, Fuel compensation)
- Turbocharger performance characteristics

Fuel Injection Systems in HDD

- Types and principle of operation of fuel injection systems
- Cummins systems (PT, CELECT unit injector, Accumulator, HPI, XPI)
- Caterpillar systems (HUEI/A, HUEI/B, Navistar, MEUI/A, MEUI/B)
- In-line systems
- Common rail systems
- HDD fuel injection systems layout and components
- Control of injected fuel quantity and timing (hydraulic, pneumatic, electronic)

Electronic Diesel Control (EDC)

- Advantages of EDC
- EDC basic layout and components (ECU, Sensors, Actuators, Layout for various types of fuel injection systems)
- Open & Closed loops and data processing
- Controlled quantities: Start, Drive mode, Idle speed, Maximum speed, Intermediate speeds, Cruise speed)
- Injected fuel quantity limits
- Emission control systems:
- Diesel Oxidation catalyst (DOC)
- Diesel Particulate Filter (DPF)
- Selective catalyst Reduction (SCR)
- Urea Injection (UI)
- Exhaust gas recirculation (EGR)
- Closed Crankcase Ventilation (CCV)

Operation and Maintenance of HDD

- Operation Tips for HDD
- Indicator lamps
- On-Board diagnostics
- Fuel type
- Items to be noticed
- Tips for efficient operation
- Maintenance of diesel engines
- Basics of mechanical maintenance
- Servicing of diesel fuel injection systems
- Diesel engine tune up
- Diesel engine routine maintenance operations (time-based, distance-based)
- Diesel engines trouble shooting
- Forms of diesel engine components failure
- Engines trouble shooting and fault rectification
- Testing of injection pumps, injectors, fuel feed pumps
- Tests for assessment of engine condition (compression, leakage tests)