Tel No:+97126654546 | Fax No:+97126654182 | Email: training@cmc-me.com | www.cmc-me.com

MU144:
Diesel Engine & Crane Maintenance

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Training Description:

The diesel engine produces far more useful torque per rated horsepower than spark ignition (Sl) gasoline engines or gas turbines. Diesel engines are much more efficient, durable and reliable than any other heat engine. US diesel engine manufacturers warranty their Class 7 & 8 heavy-duty truck engines for 500,000 miles! In other words, the diesel engine powered vehicles are the most economical to own and operate. Like most other construction equipment, cranes of all types are powered by diesel engines.

This intensive training course is designed to provide a good overview of the maintenance, troubleshooting and service of diesel engines and cranes. It will cover system operation, engine specifications, hydraulic system, troubleshooting, lubrication and maintenance, testing and adjusting as well as a detailed account of the causes of engine malfunctions and their solutions. In addition to the diesel engine, the course will discuss all maintenance issues related to crane components.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Carryout maintenance activities for diesel engines and cranes in a professional manner
- ✓ Recognize the different diesel engine types including in line engines, v-type engines, slant engines, opposed engines and various numbers of cylinders according to classification by title, speed, piston format and fuel used
- ✓ Discuss the basic terminology of force, torque, power, top and bottom dead center and determine the aspects of 2-stroke and 4-stroke of engine cycles
- ✓ Interpret timing mechanism construction and engine indicator diagrams as well as engine construction and maintenance
- ✓ Differentiate HP fuel pumps and maintenance including delivery valves, rack & pinion, barrel & plunger and injection pump timing and recognize the importance of fuel injectors and maintenance in actuations including hydraulic, mechanical, and electronic as well as injector faults
- ✓ Identify the various types of governors including constant and variable speed, mechanical and hydraulic governors and apply the proper procedures in maintenance
- ✓ Demonstrate the functions of starting systems and maintenance in relation to hand cranking, electric, pneumatic, hydraulic and spring tension start as well as crankshafts and its maintenance
- ✓ Specify the various cooling systems (air, water, oil) troubleshooting & maintenance in connection to overheating, overcooling, fan service & testing and recognize the different lubrications system troubleshooting & maintenance during high oil consumption, oil pressure problems and oil & filter changes
- ✓ Evaluate the features of air system service, turbo charging systems and transmission systems
- ✓ Discuss the different types of crane hydraulic pumps, crane hydraulic motors and crane hydraulic cylinders and recognize the purpose and classifications of crane control valves, crane direction control valves and crane flow control valves
- ✓ Identify crane electro-hydraulic systems, crane hydraulic accessories, hydraulic fluids and crane hydraulic circuit and employ proper troubleshooting and maintenance of crane hydraulic and other crane systems
- ✓ Acquire practical knowledge through various hands-on practical sessions in diesel engine & crane maintenance and through several group discussions on fault identity table performed during the course

Training Designed for:

This course is intended for those who are involved in the maintenance, operation or inspection of diesel engines and cranes including Engineers, Supervisors, Inspectors, Foremen and other Technical Staff.

Training Requirement:

"Hand's on practical sessions, equipment and software will be applied during the course if required and as per the client's request."

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- PRE-TEST
- Introduction
- Diesel Engine Types
  - Classification by Cycle, Speed, Piston Format, Fuel Used, In Line Engines, V-Type Engines, Slant Engines, Opposed Engines, Numbers of Cylinders
- Basic Terminology
  - Force, Work, Torque, Power, Top and Bottom Dead Center, Stroke, Compression Ratio, Efficiency and Swirl
- Engine Cycles
  - 2-Stroke, 4-Stroke
- Timing Mechanism Construction
  - Camshaft Drive, Cam Drive Ratio, Timing Gear Timing Chain and Sprocket, Chain Tensioner and Guide, Timing Belt and Cover, Vibration Damper
- Engine Indicator Diagrams
- Engine Construction and Maintenance
- HP Fuel Pumps and Maintenance
  - Delivery Valves, Rack and Pinion, Barrel and Plunger, Injection Pump Timing

DAY TWO:

- Fuel Injectors and Maintenance
  - Hydraulic Actuation, Mechanical Actuation, Electronic Actuation, Injector Faults
- Governors and Maintenance
  - Constant Speed, Variable Speed, Mechanical and Hydraulic Governors
- Starting Systems and Maintenance
  - Hand Cranking, Electric Start, Pneumatic Start, Hydraulic Start, Spring Tension Start
- Crankshafts and Maintenance
- Cooling Systems (Air, Water, Oil) Troubleshooting and Maintenance
  - Overheating, Overcooling, Fan Service and Testing, Radiator and Pressure Cap Service, Water Pump Service
- Lubrication System Troubleshooting and Maintenance

- High Oil Consumption, Oil Pressure Problems, Oil and Filter Changes

❖ Air System Service

DAY THREE:

❖ Turbocharging Systems
- Air/Fuel Ratio, Methods of Pressure Charging, Air Suction Filters and Silencers, Bearings and Lubrication, Surging, Maintenance

❖ Transmission Systems
- Clutch, Gearbox, Thrust Bearings, Shafts, Shaft Bearings, Shaft Couplings, Faults and Defects

❖ Crane Hydraulic Pumps
- Principle of Pump Operation, Classification (Positive & Non-Positive Displacement), Gear Pump, Vane Pump (Variable Volume & Pressure Compensated Variable Volume Pumps), Piston Pump (Axial/Inline, Bent Axis, Radial, Variable Volume, Pressure Compensated & Over Center Axial Pumps), Gerotor Pump, Rating of Pumps, Pressure, Flow & Efficiencies of Pumps

❖ Crane Hydraulic Motors
- Principle of Motor Operation, Classification (Rotating & Piston Type), Gear Motors, Vane Motors, Piston Motors, Difference Between Hydraulic Motors & Hydraulic Pumps, Specification of Hydraulic Motors, Efficiency of Hydraulic Motors, Motor Slippage

❖ Crane Hydraulic Cylinders
- Classification (Single & Double Acting), Construction of Cylinders, Cylinder Mounting, Seals, Cylinder Design Checklist, Common Cylinder Problems

❖ Crane Control Valves
- Purpose, Classification (Direction, Pressure & Flow Control Valves), Valve Symbols

❖ Crane Direction Control Valves
- Poppet Valve, Check Valve, Spool Valve (Rotary & Sliding Valves), Direct & Indirect Operated Valves, Valve Actuation Methods (Manual, Electrical, Pilot, Pneumatic, Electro-Hydraulic & Electro- Pneumatic), 2,3 & 4 Way Direction Control Valves, Positive & Negative Overlapping, Center Conditions (Open Center, Closed Center, Tandem Center & Float Center Valves)

DAY FOUR:

❖ Crane Flow Control Valves
- Classification (Non-Pressure Compensated & Pressure Compensated), Location of Flow Control Valve (Meter-In, Meter-Out & Bleed-Off Circuits)

❖ Crane Electro-Hydraulic Systems
- Proportional Solenoid, Proportional Valves (Direction Control, Flow Control & Pressure Control Valves), Servo Valves (Direction & Pressure Servo Valves, Single Stage & Multi-Stage Servo Valves), Use of Transducers in Hydraulic Systems

❖ Practical Sessions/Site Visit

DAY FIVE:

❖ Crane Hydraulic Accessories
- Reservoirs (Pressure & Non pressure Types), Accumulators, Heat Exchangers, Hydraulic Pipes & Hoses, Hydraulic Pipes & Hoses

- ❖ Hydraulic Fluids
  - Cavitation, Aeration, Locations of Filters & Strainers, Filter Terminology, Measurement of Contamination Levels
- ❖ Crane Hydraulic Circuit
  - Symbols of Hydraulic Components, Need for Check Valve in Hydraulic Circuits, Regenerative Circuit, Flow Equalizer, Counterbalance Circuit, Prefill & Compression Relief Circuit, Decompression Circuit, Circuits of Open Center, Closed Center, Tandem Center & Indirect Control, Hydraulic Circuits of Various Machines
- ❖ Troubleshooting & Maintenance of Crane Hydraulic Systems
  - Flow Chart Analysis of Hydraulic Circuits, Maintenance
- ❖ Maintenance of Other Crane Systems
  - Bearing Surface, Outrigger Blocking, Bearing Mats, Set-Up & Assembly, Boom Assembly, Boom Dismantling, Boom Inspection & Repair
- ❖ Group Discussions on Fault Identity Table
- ❖ Course Conclusion
- ❖ POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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