MACHINERY RELIABILITY ANALYSIS

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TRAINING TITLE

MACHINERY RELIABILITY ANALYSIS

VENUE

Dubai, UAE

DURATION

5 Days

DATES

19 - 23 December 2021

PRICE

US$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet.

TRAINING INTRODUCTION

This program shall provide the participants with the best practises in Rotating Equipment Maintenance & Reliability. Participants shall get the best practices to improve in rotating equipment repair and enhance their reliability. Rotating equipment of several types which have widely varying configurations are used extensively in the process industries. That equipment and their accessories systems represent a significant part of the capital and operating costs of most plants, so that optimizing selection has become of major economic importance. The designers as well as the operating and maintenance staff are usually confronting with major issues regarding the proper operation regimes, preventive and predictive maintenance schedules. The course presents the recent technological aspects in reliable operation, preventive and predictive maintenance of the major rotating equipments. The course crosses the boundaries from the fundamental information to top notch in the recent technological achievement in this field.

SCOPE OF WORK

The course will introduce the participants to the best practices in performing the maintenance of the rotating equipment. This involves:

- Troubleshooting (Pumps, Compressors, Diesel Engines)
- Repair Standards & procedures
- Repair Form/Reports
- Disassembling/assembling checks (pumps, compressors & diesel engines) & precautions
- Commissioning Procedure

- Monitoring systems (vibration, thermo graphic, oil sampling & analysis, alignment check)

TRAINING OBJECTIVES

The objective of this course is to provide participants with technical information on the operations and safety aspects of most of the rotating equipment that can be found in industries. Specifically, this course aims

- To lay out the main theories of reliability, failure analysis of rotating equipment.
- To enable the attendees to grasp the advanced information in preventive as well as predictive maintenance of rotating equipment
- To present different types of rotating equipment, flow characteristics through these equipment, components performance, operational and maintenance characteristics.
- To illustrate study cases for reliable operation and maintenance of different rotating equipment.

TRAINING AUDIENCE

This course is designed for mechanical and reliability technicians. This should be valuable to senior maintenance mechanics and those who are involved with rotating equipment, their operation, and their maintenance.

TRAINING OUTLINE

- Introduction to reliable rotating equipment
- Fundamentals in reliability and fault analysis
- Repair, Maintenance and Troubleshooting
- Types of compressors
- Compressor reliable operation
- Compressor surge control
- Preventive and predictive of compressor components
- Upgrading possibilities for efficient operation
- Compressors Troubleshooting
- Pump Types
- Pumps Performance and Operation
- Pump design operating conditions,
- Pumps Control and Selection
- Pump curves and piping system curves,
- Pumps Specifications and Troubleshooting

- Diesel Engines & Alignments

CENTRIFUGAL PUMP
TASKS:

1. Perform a running check on a centrifugal pump.
2. Draw a simple sketch of main parts of a centrifugal pump.
3. Draw a sketch of pump packing arrangement or mechanical seal fitted in your pump.
4. Perform a routine maintenance and write main check steps.
5. Perform replacement of a mechanical seal.
6. Perform packing replacement and adjusting gland follower.
7. Perform pump disassembly, inspect different parts and report damaged parts .
8. Perform inspection &replacement of wear rings.
9. Perform inspection of thrust &journal bearings, replace if necessary.
10. Perform the journal bearing clearance using plastic gauge method.
11. Perform the measuring of shaft thrust using dial gauge.

RECIPROCATING PUMP:

1. Mention the types of reciprocating pumps in your plant.
2. Carry out Daily running checks, monthly and 6 monthly PM.
3. Demonstrate Oil change on a reciprocating pump, check for wear particles in oil.
4. Clean oil pump suction screen and crankcase breather, refill and
5. Check for oil leaks.
6. Demonstrate main bearing clearance check using a dial indicator,
   Record results
7. Demonstrate dismantling of a reciprocating pump, identify worn or damaged parts and replace damaged parts.
8. Demonstrate crankshaft end float measurement using a dial indicator.
   Record result.
9. Demonstrate measurement of connecting rod clearance using a dial indicator. Record results.
10. Demonstrate measurement of cross- head clearance using feeler gauges
    Record results.
11. Perform inspection / replacement and test of suction and discharge valves.
12. Draw a sketch of packing arrangement of reciprocating pump in your plant
13. Demonstrate correct adjustment of packing gland follower.

ROTARY PUMPS:
TASKS :

1. Identify different types of rotary gear pumps used in the oil and gas industry. and their applications.
2. Explain why rotary gear pumps must not run dry
3. Demonstrate adjustment of internal relief valve in a gear pump.
4. Perform dismantling of a rotary pump refer to manufacturer's procedure.
5. Identify worn or damaged parts
6. Perform clearance check on all rotary elements
7. Perform condition check of thrust bearing assembly and case wear.
8. Demonstrate replacement of idler bushing, carbon graphite bushing, seal assembly, rotor and shaft
9. Re assemble pump and test run. Record performance

INSTRUMENT AIR COMPRESSOR
TASKS:

1 Draw simple sketch showing main parts of an instrument air compressors.
2 Draw sketch of lube oil system and major lubricating points.
3 Perform daily running checks on instrument air compressor and air dryers.
4 Perform routine maintenance on instrument air compressors & dryers,
5 Perform belt tension checks on air compressor.
6 Replace suction and discharge valves on instrument air compressor.
7 Draw sketch explaining the work and function of unloader .
8 Perform unloaded disassembly and assembly
9 Check operation of unloaded valve via function check.
10 Perform piston and linear wear checks records results
11 Perform clearance check and replace big and small end bearing .
12 Perform clearance check of compressor piston rings.
13 Perform head and power end piston clearance check
14 Trouble shoot typical air compressor problems.

DIESEL ENGINES Tasks:

1. Carry out a daily running checks on a diesel engine.
2. Check clutch adjustment and lubricate fittings.
3. Check oil level in woodward governor, top up if necessary.
4. Check oil level in crankcase, top up if necessary.
5. Check coolant level, add coolant if necessary.
6. Drain water and sediment from fuel day tank.
7. Demonstrate inspection and replacement of zinc rods (corrosion coupons) when necessary.
8. Demonstrate inspection, replacement or adjustment of alternator belts.
9. Demonstrate inspection, replacement or adjustment of fan belts. Lubricate fan Pulley bearing.

10. Demonstrate oil change and filter change out, clean crankcase breathers.
11. Perform change over of fuel filters, clean or replace dirty filter.
12. Perform removal, cleaning and testing of a fuel injector.
13. Demonstrate the method of bleeding the fuel system.
14. Locate the emergency shutdown devices on a diesel engine and describe their Functions.
15. Perform change out of fuel oil pump and adjust timing.
16. Perform governor change out and set up engine speed versus output requirements.
17. Perform change out and overhaul a lube oil pump.
18. Describe causes of falling lube oil pressure.
19. Perform a top end overhaul on a diesel engine.
20. Perform check and adjustments of tappets.
21. Troubleshoot typical fuel start systems.
22. Troubleshoot engine misfiring or running rough.
23. Troubleshoot engine loss of power.
24. Check turbo charger for rubbing or seal failure.

Alignment Tasks:

1. Explain methods of two-shaft alignment.
2. Explain the different types of misalignment in vertical and horizontal planes
3. Explain dial indicators types and functions
4. Perform measuring pipe strain.
5. Measure and correct soft foot
6. Check for shaft run out
7. Demonstrate how to compensate for thermal stress
8. Perform correction and locating face gap, mechanical centre and magnetic centre
9. Demonstrate measuring of bar sag
10. Perform setting of the alignment tools for face and rim method and reverse alignment method
11. Demonstrate rim and face alignment method using a graph paper in the vertical plane
12. Demonstrate face and rim alignment method using formula
13. Demonstrate reverse alignment method using a graph paper, in the vertical plane
14. Demonstrate reverse alignment method using formula

TRAINING CERTIFICATE

MAESTRO CONSULTANTS Certificate of Completion for delegates who attend and complete the training course

METHODOLOGY

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of "real life" issues in their organizations.
The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.