

Industrial Mechanic (Millwright) Level 3

Industrial Mechanic (Millwright)

Unit: C1 Shaft Alignment II

Level: Three

Duration: 10 hours

Theory: 3 hours

Practical: 7 hours

Overview:

This unit is designed to introduce knowledge of the procedures for shaft alignment using the reverse dial method. It is also designed to introduce knowledge of the procedures for shaft alignment using the cross dial method. In addition, it is designed to introduce knowledge of the procedures for shaft alignment using the laser method.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify tools and equipment used for shaft alignment and describe their applications and procedures for use.	10%
2. Perform the procedures used to align shafts using the reverse dial method.	30%
a. Pre-alignment checks	
b. Select tools and equipment	
c. Perform calculations	
d. Make adjustments	
3. Perform the procedures used to align shafts using the cross dial method.	30%
a. Pre-alignment checks	
b. Select tools and equipment	
c. Perform calculations	
d. Make adjustments	
4. Perform the procedures used to align shafts using the laser method.	30%
a. Pre-alignment checks	
b. Select tools and equipment	
c. Perform calculations	
d. Make adjustments	

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Unit: C2 Compressors I

Level: Three

Duration: 21 hours

Theory: 7 hours

Practical: 14 hours

Overview:

This unit is designed to introduce knowledge of compressors, their components and operation and the procedures used to remove, install, maintain, troubleshoot, repair and commission reciprocating compressors.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with compressors.	2%
2. Identify hazards and describe safe work practices associated with compressors.	3%
3. Identify the types of compressors, their specifications and applications. a. Dynamic/centrifugal b. Positive displacement <ul style="list-style-type: none">• Reciprocating• Radial• Screw• Vane	5%
4. Identify reciprocating compressor components and accessories and describe their purpose and operation.	4%
5. Identify tools and equipment used to remove, install, maintain, troubleshoot and repair reciprocating compressors and describe their applications and procedures for use.	6%
6. Perform the procedures used to remove and install reciprocating compressors and their components.	14%
7. Perform the procedures used to inspect and maintain reciprocating compressors and their components.	14%
8. Perform the procedures used to troubleshoot reciprocating compressors and their components.	14%

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| 9. Identify the considerations for determining if reciprocating compressor component repair or replacement is required. | 10% |
| 10. Perform the procedures used repair reciprocating compressors and their components. | 14% |
| 11. Perform the procedures used commission reciprocating compressors. | 14% |

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Unit: C3 Compressors II

Level: Three

Duration: 18 hours

Theory: 5 hours

Practical: 13 hours

Overview:

This unit is designed to introduce knowledge of vane, screw, radial and centrifugal compressors, their components and operation and the procedures used to remove, install, maintain, troubleshoot, repair and commission vane, screw, radial and centrifugal compressors.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify vane, screw, radial and centrifugal compressor components and accessories and describe their purpose and operation.	9%
2. Identify tools and equipment used to remove, install, maintain, troubleshoot and repair vane, screw, radial and centrifugal compressors and their components.	8%
3. Perform the procedures used to remove and install vane, screw, radial and centrifugal compressors and their components.	15%
4. Perform the procedures used to inspect and maintain vane, screw, radial and centrifugal compressors and their components.	15%
5. Perform the procedures used to troubleshoot vane, screw, radial and centrifugal compressors and their components.	15%
6. Identify the considerations for determining if vane, screw, radial and centrifugal compressor repair or replacement is required.	8%
7. Perform the procedures used to repair vane, screw, radial and centrifugal compressors and their components.	15%
8. Perform the procedures used to commission vane, screw, radial and centrifugal compressors.	15%

Industrial Mechanic (Millwright)

Unit: C4 Pumps

Level: Three

Duration: 36 hours

Theory: 10 hours

Practical: 26 hours

Overview:

This unit is designed to introduce knowledge of centrifugal pumps, their components and operation and the procedures used to remove, install, maintain, troubleshoot, repair and commission centrifugal pumps.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with centrifugal pumps.	2%
2. Identify hazards and describe safe work practices pertaining to with centrifugal pumps. a. Achieve zero energy state	5%
3. Identify the types of centrifugal pumps and their components and describe their applications and operation.	2%
4. Identify the types of seals and packing and describe their applications.	2%
5. Identify tools and equipment used to remove, install, maintain, troubleshoot and repair centrifugal pumps and describe their applications and procedures for use.	2%
6. Perform the procedures used to remove and install centrifugal pumps.	10%
7. Describe the procedures used to inspect and maintain centrifugal pumps.	5%
8. Perform the procedures used to troubleshoot centrifugal pumps.	5%
9. Identify the considerations for determining if centrifugal pump repair or replacement is required.	3%
10. Perform the procedures used repair centrifugal pumps.	10%
11. Perform the procedures used commission centrifugal pumps.	4%

C4.a Pumps

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with positive displacement pumps.	2%
2. Identify hazards and describe safe work practices associated with positive displacement pumps. a. Achieve zero energy state	5%
3. Identify the types of positive displacement pumps and describe their components and describe their applications and operation.	2%
4. Identify tools and equipment used to remove, install, maintain, troubleshoot and repair positive displacement pumps and describe their applications and procedures for use.	2%
5. Perform the procedures used to remove and install positive displacement pumps.	4%
6. Perform the procedures used to inspect and maintain positive displacement pumps.	10%
7. Perform the procedures used to troubleshoot positive displacement pumps.	5%
8. Identify the considerations for determining if positive displacement pump repair or replacement is required.	5%
9. Perform the procedures used to repair positive displacement pumps.	3%
10. Perform the procedures used commission positive displacement pumps.	10%
11. Identify the types of seals: mechanical, static and dynamic.	2%

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Unit: C5 Introduction to Fluid Power

Level: Three

Duration: 10 hours

Theory: 8 hours

Practical: 2 hours

Overview:

This unit is designed to introduce knowledge of the principles and applications of fluid power.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with fluid power.	10%
a. Hydraulic	
b. Pneumatic	
c. Vacuum	
2. Identify hazards and describe safe work practices pertaining to fluid power.	10%
3. Explain the principles and theories of fluid power.	25%
a. Pascal's law	
b. Boyle's law	
c. Charles' law	
d. Guy-Lusac's law	
e. Bernoulli's principle	
4. Describe units of measure as they relate to fluid power.	20%
5. Identify fluid power related formulae and describe their applications.	25%
6. Identify fluid power related symbols and abbreviations found on drawings and schematics.	10%

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Unit: C6 Hydraulic Systems I

Level: Three

Duration: 56 hours

Theory: 38 hours

Practical: 18 hours

Overview:

This unit is designed to introduce knowledge of hydraulic systems, their components and operation. Also, to introduce knowledge of schematics, their use and interpretation. In addition, it is designed to introduce knowledge of hydraulic related calculations.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify hazards and describe safe work practices pertaining to hydraulic systems.	15%
a. Achieve zero energy state	
2. Identify types of hydraulic systems and describe their applications and operation.	10%
3. Identify types of hydraulic system components and describe their purpose and operation.	30%
a. Pumps	
b. Motors.	
c. Actuators	
d. Valves	
e. Accumulators	
4. Describe schematics and their applications.	15%
5. Interpret schematics and perform the operation of a hydraulic system.	15%
6. Perform hydraulic calculations.	15%

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Unit: C7 Pneumatic Systems I

Level: Three

Duration: 50 hours

Theory: 25 hours

Practical: 25 hours

Overview:

This unit is designed to introduce knowledge of pneumatic systems, their components and operation. It is also designed to introduce knowledge of schematics, their use and interpretation. In addition, it is designed to introduce knowledge of pneumatic related calculations.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify hazards and describe safe work practices pertaining to pneumatic systems, their components and operation.	15%
a. Achieve zero energy state	
2. Identify types of pneumatic systems and describe their applications and operation.	10%
3. Identify types of pneumatic systems and describe their applications and operation.	30%
4. Describe the methods of air treatment in pneumatic systems.	15%
a. Filters	
b. Dryers	
c. After-coolers	
d. De-icers	
e. Receivers	
5. Interpret schematics and perform the operation of a pneumatic system.	15%
6. Perform pneumatic related calculations.	15%

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Unit: C8 Piping Systems and Process Tanks and Containers

Level: Three

Duration: 67 hours

Theory: 37 hours

Practical: 30 hours

Overview:

This unit is designed to introduce knowledge of piping systems, their components and operation and the procedures to remove, install, maintain, troubleshoot and repair of piping systems and their components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with piping systems.	5%
2. Identify hazards and describe safe work practices pertaining to piping systems.	5%
3. Identify and interpret codes and regulations pertaining to piping systems.	5%
4. Identify types of piping systems and describe their applications.	2%
5. Identify types of piping, tubing, and hoses and describe their compatibility, characteristics and applications.	5%
6. Identify types of fittings and describe their compatibility, characteristics and applications.	3%
7. Identify piping system accessories and describe their characteristics and applications.	2%
8. Identify types of valves used in piping systems and describe their characteristics and operation.	5%
9. Identify schematics for piping systems.	5%
10. Perform the procedures used to remove and install pipe, tubing and hoses.	3%
11. Describe the procedures used to inspect and maintain piping systems and their components.	2%
12. Perform the procedures used to troubleshoot piping systems and their components.	2%

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| 13. Identify considerations for determining if piping system component repair or replacement is required. | 2% |
| 14. Perform the procedures used to repair piping systems and components. | 2% |

C8.a Piping Systems and Process Tanks and Containers

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with process tanks and containers.	2%
2. Identify hazards and describe safe work practices associated with process tanks, containers and their contents.	31%
3. Identify and interpret codes and regulations pertaining to process tanks, containers and their contents.	4%
4. Identify process tanks and containers and describe their applications and operation.	3%
a. Bins	
b. Hoppers	
c. Receivers	
5. Identify process tanks and containers and describe their applications.	3%
6. Identify tools and equipment used to remove, install, maintain, and repair process tanks and containers and describe their applications and procedures for use.	5%
7. Perform the procedures used to remove and install process tanks and containers and their components.	5%
8. Perform the procedures used to inspect and maintain process tanks and containers and their components.	5%
9. Identify the considerations for determining if process tanks and container repair or replacement is required.	5%
10. Perform the procedures used to repair process tanks and containers and their components.	5%

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Unit: C9 Vacuum Systems

Level: Three

Duration: 12 hours

Theory: 6 hours

Practical: 6 hours

Overview:

This unit is designed to introduce knowledge of vacuum systems, their components and operation. It is also designed to introduce knowledge of the calculations and procedures used to install, maintain, troubleshoot and repair vacuum systems and components. In addition, it is designed to introduce knowledge of the procedures used to commission vacuum systems.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify hazards and describe safe work practices pertaining to vacuum systems. a. Achieve zero energy state.	5%
2. Identify types of vacuum systems and describe their applications and operation.	5%
3. Identify vacuum system components and describe their purpose and operation.	10%
4. Identify tools and equipment used to install, maintain, troubleshoot and repair vacuum systems and describe their applications and procedures for use.	10%
5. Describe the calculations and procedures used to select and install vacuum systems and components.	10%
6. Perform vacuum related calculations.	10%
7. Describe the procedures used to inspect and maintain vacuum systems and components. a. Check hoses, piping and tubing b. Check/change filters c. Determine operating parameters d. Adjust system pressure, temperature, cycling and flow	20%
8. Perform the procedures used to troubleshoot vacuum system and components.	15%
9. Identify considerations for determining if vacuum system component repair or replacement is required.	5%
10. Describe the procedures used to repair vacuum systems and components.	5%

11. Describe the procedures used to commission vacuum systems.

5%
