Industrial Pump Maintenance and Repair

Course Design
2018-2019

Course Information

Division: Industrial Technology Education
Course Number: IPT 120
Title: Industrial Pump Maintenance and Repair
Credits: 3
Developed by: M. Crockett/Revised by P. Burke
Lecture/Lab Ratio: 1 Lecture/4 Lab
Transfer Status:

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Activity Course: No
CIP Code: 47.0303
Assessment Mode: Pre/Post Test (25 Questions/50 Points)
Semester Taught: Upon Request
GE Category: None
Separate Lab: No
Awareness Course: No
Intensive Writing Course: No
Diversity and Inclusion Course: No

Prerequisites
None

Educational Value
For those interested in industrial pumps and their operation.

Description
This course covers various types of pumps and its associated piping systems as applied in industrial settings.

Supplies
None
Competencies and Performance Standards

1. Identify various pump types.
   
   Learning objectives
   
   What you will learn as you master the competency:
   
   a. Identify centrifugal pumps, including impeller, intake/discharge, and stage types.
   b. Identify positive displacement pumps.
   c. Identify rotary pumps, including gear, vane, and piston types.
   d. Identify reciprocating pumps.
   e. Identify special serviced pumps.

   Performance Standards
   
   Competence will be demonstrated:
   
   o in class discussion
   o in group and individual practice
   o on using model pumps
   o on written tests

   Criteria - Performance will be satisfactory when:
   
   o learner identifies centrifugal pumps, including impeller, intake/discharge, and stage types
   o learner identifies positive displacement pumps
   o learner identifies rotary pumps, including gear, vane, and piston types
   o learner identifies reciprocating pumps
   o learner identifies special serviced pumps

2. Explain the principles of pump operation.
   
   Learning objectives
   
   What you will learn as you master the competency:
   
   a. Demonstrate correct use of nomenclature for pump parts.
   b. Explain the types and functions of impellers.
   c. Explain the types and functions of seals.
   d. Define and explain volute case.

   Performance Standards
   
   Competence will be demonstrated:
   
   o in class discussion
   o in group and individual practice
   o on using model pumps
   o on written tests

   Criteria - Performance will be satisfactory when:
   
   o learner demonstrates correct use of nomenclature for pump parts
   o learner explains the types and functions of impellers
   o learner explains the types and functions of seals
   o learner defines and explains volute case
3. **Perform calculations required to use pumps safely and efficiently.**

   **Learning objectives**

   *What you will learn as you master the competency:*
   
   a. Calculate head, reticulation, velocity, and pressure.
   
   b. Explain NPSHR, NPSHA, and efficiency curves.

   **Performance Standards**

   *Competence will be demonstrated:*
   
   - in class discussion
   - in group and individual practice
   - on calculation problems
   - on written tests

   **Criteria - Performance will be satisfactory when:**
   
   - learner accurately calculates head, reticulation, velocity, and pressure
   - learner explains NPSHR, NPSHA, and efficiency curves

4. **Use various pump gauges.**

   **Learning objectives**

   *What you will learn as you master the competency:*
   
   a. Demonstrate connecting pressure gauge for discharge.
   
   b. Demonstrate connecting vacuum gauge for intake.
   
   c. Demonstrate accurate reading of pump gauges.
   
   d. Demonstrate operating pump with throttled intake or throttled discharge.

   **Performance Standards**

   *Competence will be demonstrated:*
   
   - in class discussion
   - in using model pump systems
   - in individual demonstrations
   - on written test

   **Criteria - Performance will be satisfactory when:**
   
   - learner demonstrates connecting pressure gauge for discharge
   - learner demonstrates connecting vacuum gauge for intake
   - learner accurately reads pump gauges
   - learner demonstrates operating pump with throttled intake or throttled discharge

5. **Use safe and efficient pump maintenance procedures.**

   **Learning objectives**

   *What you will learn as you master the competency:*
   
   a. Disassemble an end-suction centrifugal pump.
   
   b. Inspect and evaluate pump parts.
   
   c. Reassemble an end-suction centrifugal pump.
   
   d. Construct intake and discharge companion flanges
e. Use two-hole method for flange alignment on pipe.
f. Employ proper pump maintenance procedures.

**Performance Standards**

*Competence will be demonstrated:*

- in class discussion
- in using model pump systems
- in individual demonstrations
- on written test

*Criteria - Performance will be satisfactory when:*

- learner accurately disassembles an end-suction centrifugal pump
- learner inspects and evaluates pump parts
- learner reassembles an end-suction centrifugal pump
- learner construct intake and discharge companion flanges
- learner uses two-hole method for flange alignment on pipe
- learner employs proper pump maintenance procedures

6. **Develop pump troubleshooting skills.**

**Learning objectives**

*What you will learn as you master the competency:*

a. Infer and apply troubleshooting strategies.
b. Appropriately use test equipment.
c. Appropriately use safe practices for troubleshooting pumps.

**Performance Standards**

*Competence will be demonstrated:*

- in class discussion
- in group practice
- in “bugged” pump systems
- in written test

*Criteria - Performance will be satisfactory when:*

- learner infers and applies troubleshooting strategies
- learner appropriately uses test equipment
- learner appropriately uses safe practices for troubleshooting pumps

**Types of Instruction**

Lecture/modeling
Lab assignments
Group practice
Individual projects
Grading Information

Grading Rationale
50% Labs
50% Written tests

Grading Scale
A  100-90%
B  89-80%
C  79-70%
D  69-60%
F  59% and below