

**Approved by:** Christin Cech

**Last updated:** 1/14/2025

**Maintenance and HVAC Basics  
POWENG-333  
Work/Life Experience Portfolio**

Credit for Prior Learning provides students a range of options to earn college credit for what they already know. Students can demonstrate college-level knowledge and competencies from examination, portfolio, to workforce and military.

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**1. Course title, number & credit value:**

- a. Maintenance and HVAC Basics, POWENG-333, 3 Credits

**2. Course description:**

- a. A hands-on class for repairing, maintaining and troubleshooting equipment found in commercial and industrial settings. Training includes belt drives, (alignment, tension and care of belts), chain drives, fans, couplings, motor alignments, bearing removal and installation, lubrication, solenoid valves, packing, gaskets, regulating valves, piping, air compressors, pumps, and other mechanical fundamentals.

**3. Course Competencies that must be demonstrated:**

- a. This will be demonstrated on the job at their current and/or former place of employment, apprenticeship etc.

**4. Portfolio requirements that demonstrate competencies. \*Note for Resumes: Lead faculty must verify the student's work history via a letterhead mail or phone interview.**

- a. Resume and a discussion with the Department Chair/Lead Faculty

**Course Competencies**

1. Combine different types of maintenance work into one easy to read maintenance request form.

Linked Career Essentials

- Professionalism - Assess
  - Professionalism - Introduce
- Assessment Strategies

1.1. Project

Criteria

1.1. Learner determines what types of maintenance work belongs in request form

1.2. Learner achieves 80% from instructor on project

Learning Objectives

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- 1.a. Develop a plan to prioritize maintenance work intelligently
  - 1.b. Assemble PM tasks
  2. Adhere to all safety rules regarding personal protective equipment.  
Linked Career Essentials  
Professionalism - Assess  
Assessment Strategies
    - 2.1. Demonstration  
Criteria  
Your performance will be successful when:
      - 2.1. Learner will choose correct PPE 100% of the time
      - 2.2. Learner obtains 100% on safety protection equipment demonstrationLearning Objectives
    - 2.a. Adhere to safety rules related to job in progress
    - 2.b. Choose correct Personal Protective Equipment for the task at hand
  3. Calculate horsepower using proper formulas provided in text book.  
Linked Career Essentials  
Professionalism - Introduce  
Assessment Strategies
    - 3.1. Written Objective Test  
Criteria
      - 3.1. Learner obtains minimum of 80% on horsepower calculation
      - 3.2. Learner chooses correct formula 90% of the timeLearning Objectives
    - 3.a. Calculate horsepower using correct formula
    - 3.b. Verify that correct formula is being used for problem
  4. Cut correct size gaskets using different material for flanges  
Assessment Strategies
    - 4.1. Demonstration  
Criteria
      - 4.1. Learner determines what type of gasket material used for certain liquids
      - 4.2. Learner obtains 90% accuracy on cutting the size of the gasket correctly

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Learning Objectives

- 4.a. Determine correct type of material for product inside piping
- 4.b. Measure flanges and cut correct size gaskets
- 5. Replace anti friction motor bearings on 100 hp three phase motor
  - Assessment Strategies
  - 5.1. Project
  - Criteria
  - 5.1. Learner completes project in 4 hours
  - 5.2. Learner uses 100% of all parts to be assembled
  - Learning Objectives
  - 5.a. Organize tools to be used in efficient manner
  - 5.b. Arrange parts in correct order for complete assembly
- 6. Solder various sizes of copper pipe and fittings
  - Assessment Strategies
  - 6.1. Skill Demonstration
  - Criteria
  - 6.1. Learner demonstrates joining pipe together with a pro-press machine
  - 6.2. Learner achieves 80% proficiency at properly sealing a joint
  - Learning Objectives
  - 6.a. Apply solder to hot copper pipes to seal a joint
  - 6.b. Demonstrate success by pressurizing piping and holding pressure.
- 7. Use proper techniques to pack various size valves
  - Assessment Strategies
  - 7.1. On-the-job Performance
  - Criteria
  - 7.1. learner chooses correct size packing 90% of the time
  - 7.2. Learner cuts packing rings at correct angle for tight fit
  - Learning Objectives
  - 7.a. Fit correct sized packing into stuffing box of various valves
  - 7.b. Cut packing rings at correct angle to stop stem leakage
- 8. Use belt tensioning tool properly to tighten belts in an air handling unit

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Assessment Strategies

8.1. On-the-job Performance

Criteria

8.1. Learner measures tension on various sized belts

8.2. Learner adjusts tension on belt according to tensioning tool chart to within 90% accuracy

Learning Objectives

8.a. Adjust v-belts according to tensioning tool information

8.b. Install drive belts with adjusting screws for tensioning properly

9. Read different types and sizes of micrometers

Assessment Strategies

9.1. Skill Demonstration

Criteria

9.1. Learner reads micrometer with less than 1% error on measurement

9.2. Learner demonstrates proper holding technique for accurate measurement of object.

Learning Objectives

9.a. Interpret lines and numbers on micrometer to actual meaningful measurement of mechanical parts

9.b. Read micrometer in thousands of an inch

10. Operate an oxy-acetylene torch for heating and cutting in a safe manner

Assessment Strategies

10.1. Demonstration

Criteria

10.1. Learner ignites torch with proper pressure on regulators

10.2. Learner achieves minimum of 70% by using correct size tip for application of heat transfer

Learning Objectives

10.a. demonstrate safe operation of an oxy-acetylene torch

10.b. demonstrate what process you would use a oxy-acetylene for

11. Rebuild different types of steam traps



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Assessment Strategies

11.1. Skill Demonstration

Criteria

11.1. Learner chooses correct rebuild kit for specific steam trap with 80% accuracy

11.2. Learner selects proper tools for steam trap repair and replacement

Learning Objectives

11.a. list different types of steam traps

11.b. identify where different types of steam traps would be used