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# Millwright Occupational Endorsement

# Academic Assessment Plan

**Adopted by**

**The Millwright faculty: March 12, 2018**

Reviewed by the Academic Assessment Committee: 4/20/18

Reviewed by the Faculty Senate: 5/4/18

## Mission Statement

PWSC will train professional Millwrights to be skilled in precision instrumentation and ready to be employed with expertise at installing, maintaining, and repairing industrial machinery. The Millwright Occupational Endorsement prepares students at PWSC based on a curriculum certified by the National Center for Construction Education and Research (NCCER).

## Program Student Learning Outcomes

Students graduating with an Occupational Endorsement in Millwright will be able to:

1. perform job related tasks following industry-recognized safety practices and techniques;
2. analyze, set-up, and operate mechanical equipment to perform efficiently and accurately;
3. demonstrate professional behaviors and attitudes when working alone or as a member of a team; and
4. clearly communicate technical information and data verbally, in writing, mathematically, and visually when required to complete job assignments.

## Measures

| **MILLWRIGHT MEASURES** |
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| **MILLWRIGHT LEVEL 1** |
| Core Curricula: *Introductory Craft Skills* |
| Introduction to the Trade |
| Millwright Hand Tools |
| Fasteners and Anchors |
| Basic Layout |
| Gaskets and O-Rings |
| Oxyfuel Cutting |
| **MILLWRIGHT LEVEL 2** |
| Intermediate Trade Math  |
| Field Sketching |
| Intermediate Blueprint Reading |
| Specialty Tools |
| Millwright Power Tools |
| Rigging |
| Setting Baseplates and Soleplates |
| Lubrication |
| Introduction to Bearings  |
| Complex and Heaving Rigging |
| Light Lifting Devices |
| **MILLWRIGHT LEVEL 3** |
| Advanced Trade Math |
| Precision Measuring Tools |
| Installing Packing |
| Installing Seals |
| Installing Mechanical Seals |
| Removing and Installing Bearings |
| Couplings |
| Fabricating Shims |
| Alignment Fixtures and Specialty Jigs |
| Pre-alignment for Equipment Installation |
| Installing Belt and Chain Drives |
| Installing Fans and Blowers |
| **MILLWRIGHT LEVEL 4** |
| Conveyors |
| Troubleshooting and Repairing Conveyors |
| Conventional Alignment  |
| Pumps  |
| Troubleshooting and Repairing Pumps |
| Compressors and Compressor Maintenance |
| Basic Pneumatic Systems |
| Troubleshooting and Repairing Pneumatic Equipment |
| Basic Hydraulic Systems |
| Troubleshooting and Repairing Hydraulic Equipment |
| Troubleshooting and Repairing Gearboxes  |
| Vibration Analysis |
| Setting Baseplates and Soleplates |
| **MILLWRIGHT LEVEL 5** |
| Reverse Alignment |
| Laser Alignment |
| Advanced Blueprint Reading |
| Optical Alignment |
| Turbines |
| Troubleshooting and Repairing Turbine Equipment |
| Installation of Motors  |
| Preventive and Predictive Maintenance |
| Vibration Analysis |
| Troubleshooting and Repairing Pneumatic Equipment |

## Process

Students in the PWSC Millwright Occupational Endorsement program are tested based on knowledge and skill performance for the NCCER National Craft Assessment and Certification Program. All NCCER written assessments are prepared by NCCER’s and are embedded in the approved curriculum.

Questions assessing mastery of knowledge are developed and approved by subject matter experts under the direction of NCCER and ProvTM, NCCER’s testing partner. Performance evaluation of students skills are observed and recorded by the PWSC Millwright faculty. Assessment results will be maintained in NCCER’s Registry and become a portable record of the candidate’s training and assessment achievements.

Written assessments that students must master cover the following content:

* Millwright Fundamentals
* Millwright Tools
* Math & Measurement
* Bearings, Fasteners, & Gaskets
* Packing & Seals
* Couplings, Shims, Drives, & Blowers
* Construction Drawings
* Equipment Installation
* Maintenance and Troubleshooting
* Alignment

The following summarize the performance based skills students need to master to be ready for employment as a journey-level millwright:

* Identify hand tools, fasteners and equipment used in the trade and distinguish their applications
* Apply basic layout principles, blueprint reading, and master intermediate trade math
* Identify appropriate gaskets and O-rings according to their application
* Apply oxyfuel cutting techniques
* Use safe rigging practices
* Set baseplates and soleplates
* Properly use precision measuring tools
* Install packing and seals (including mechanical seals)
* Remove and install bearings and couplings
* Fabricate shims
* Pre-align and install equipment
* Install belt and chain drives, fans and blowers
* Identify conveyor parts and explain their functions
* Distinguish types of alignment (conventional, laser and reverse) and identify the steps that must be taken for each
* Identify types of pumps common to the millwright trade, and distinguish their application, troubleshooting and repairing procedures
* Identify types of compressors and their maintenance procedures
* Troubleshoot and repair gearboxes
* Identify turbine components and explain their function

| **PROGRAM OUTCOME** | **COURSE**  | **ASSESSMENT ARTIFACTS** |
| --- | --- | --- |
| **Safety Practices** | ITEC 111 (I)ITEC 112 (D)ITEC 211 (D)ITEC 212 (D)ITEC 213 (M)ITEC 101 (M)ITEC 125 (M) | Standardized tests meeting knowledge and skill performance evaluations for NCCER, hazwoper, and confined space certificationsExit Interview |
| **Analyzing and Operating Equipment** | ITEC 111 (I)ITEC 112 (D)ITEC 211 (D)ITEC 212 (M)ITEC 213 (M) | Standardized tests meeting knowledge and skill performance evaluations for NCCER certifications Exit Interview |
| **Professional Behaviors** | ITEC 111 (I)ITEC 112 (D)ITEC 211 (D)ITEC 212 (M)ITEC 213 (M) | Standardized tests meeting knowledge and skill performance evaluations for NCCER certifications Exit Interview |
| **Communicating Technical Information** | ITEC 211 (I)ITEC 212 (D)ITEC 213 (M) | Millwright Reporting RubricExit Interview |

 I = Introduced D = Developed M = Mastered

### Millwright Reporting Rubric

| CATEGORY  | 4 - EXEMPLARY  | 3 - PROFICIENT  | 1 - MARGINAL  | 0 - UNACCEPTABLE  |
| --- | --- | --- | --- | --- |
| **Structure** | Reporting is clear and accurate. Organization is logical and displays clear progression. Paragraphing and transitions are clear and appropriate.  | Reporting is adequate. Organization is logical and displays adequate progression. Paragraphing and transitions are adequate.  | Reporting is weak. Organization is not always logical and progression is frequently unclear. Paragraphing and transitions are deficient for college-level work.  | Necessary reporting elements are missing or have serious and persistent errors.  |
| **Content** | All content is covered thoroughly. Specific incidents/examples are frequently included to illustrate points. All details are placed in a logical order and the way they are presented effectively keeps the interest of the reader.  | Most suggested content is covered. More than a few specific incidents/examples are included to illustrate points. Details are placed in a logical order, but the way in which they are presented/introduced sometimes makes the writing less interesting.  | More than a few items are not addressed. Only one or two specific incidents/examples are included to illustrate points. Some details are not in a logical or expected order, and this distracts the reader.  | Much of the suggested content is not covered. No specific incidents/examples are included to illustrate points. Many details are not in a logical or expected order. There is little sense that the writing is organized.  |
| **Mechanics** | Writer makes very few to no errors in word selection and usage, sentence structure, spelling, punctuation, or capitalization. The paper is exceptionally easy to read.  | Report is relatively free of errors in word selection and usage, sentence structure, spelling, punctuation, or capitalization. The paper is easy to read.  | Report has significant errors (e.g., one or more per page) in word selection and usage, sentence structure, spelling, punctuation, or capitalization. The errors are distracting and make the paper difficult to read.  | Report has serious and persistent errors in word selection and usage, sentence structure, spelling, punctuation, or capitalization. The paper is very difficult to read.  |

### OEC – MILLWRIGHT EXIT INTERVIEW

Name: Graduation Year:

Email: Phone:

1. What were your goals/expectations coming into the program?
2. Did the program fail to meet, meet, or exceed your expectations?
3. What was the best part of the program for you?
4. What was the worst part of the program for you?
5. Following are the program learning outcomes. Please rate each one on a scale of one to four (with **one** being “I do not feel confident/I have not gained substantial knowledge in this area” and **four** being “I feel very confident /I have gained substantial knowledge in this area”):

| 1. Outcome
 | Rating |
| --- | --- |
| 1. You understand and can perform job related tasks following industry-recognized safety practices and techniques;
 |  |
| 1. You are able to analyze, set-up, and operate mechanical equipment to perform efficiently and accurately;
 |  |
| 1. You demonstrate professional behaviors and attitudes when working alone or as a member of a team; and
 |  |
| 1. You can clearly communicate technical information and data verbally, in writing, mathematically, and visually when required to complete job assignments.
 |  |

1. What are your immediate plans for the future?
2. Where do you see yourself in 1 year, 5 years, and 10 years?