

15101

Introduction to the Millwright Craft

Millwright

Overview

The millwright craft developed from the need for skilled craftworkers to build and maintain water-driven flour and grain mills. Millwrights needed to master several related crafts to construct the mills and keep them running. Since then, the size and complexity of industrial machinery has grown tremendously. The millwright craft has expanded and grown to accommodate the changing needs of today's industrial and manufacturing facilities.

Millwrights need to know how to safely move machinery and equipment, assemble and install machinery, read construction and mechanical drawings, and maintain various types of equipment. A millwright is a proud, respected problem solver who uses many different tools and skills to accomplish tasks with precision. This module provides an overview of the millwright craft, identifies the personal characteristics of successful craftworkers, and reviews the structure of craft apprenticeship programs.

Learning Objective 1

Successful completion of this module prepares trainees to:

Summarize the history of the millwright craft and the opportunities it offers.

- a. Recount the history of the millwright craft.
- b. Describe the work and responsibilities of millwrights.
- c. Identify career opportunities for millwrights.
- d. State general safety guidelines for the construction workplace.

Learning Objective 2

Successful completion of this module prepares trainees to:

Identify the traits of a successful craftworker and describe modern apprenticeship training.

- a. Identify the personal traits and characteristics of a successful craftworker.
- b. Describe modern apprenticeship training.

Performance Tasks

This is a knowledge-based module. There are no Performance Tasks.

Recommended Teaching Time: 5 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 15101
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

15102

Millwright Hand Tools

Millwright

Overview

A millwright uses specialized tools ranging from heavy-duty pullers to delicate precision measuring and leveling instruments. Millwright work involves tolerances that are often measured in tiny fractions of normal units of measure. Even a slight error in measurement or assembly can affect the operation of the equipment being serviced.

Millwrights are required to lay out equipment locations, assemble and disassemble mechanical equipment, align rotating components, and ensure the calibration of moving parts and components. Becoming familiar with the tools presented in this module and their proper use will prepare you to accomplish these challenging tasks safely and effectively.

Learning Objective 1

Successful completion of this module prepares trainees to:

Identify and describe how to use various millwright hand tools.

- a. Recognize and describe how to use various gauge standards.
- b. Identify and describe how to use pipe and tubing cutters.
- c. Identify and describe how reamers and honing tools are used.
- d. Recognize and describe how to use thread taps, dies, and extractors.
- e. Identify and describe how to use unique wrenches and pullers.
- f. Recognize types of metal snips and describe their use.
- g. Identify and describe how to use other tools important to millwrights and similar crafts.

Performance Task

1. Demonstrate the proper use and care of eight instructor-selected hand tools presented in this module.

Recommended Teaching Time: 17.5 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 15102
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

Performance Task 1

- At least eight different millwright hand tools
- Materials required for the chosen tasks, such as steel plate
- Appropriate PPE
- Performance Profile sheets

15103

Fasteners and Anchors

Millwright

Overview

Fasteners come in an almost bewildering variety of types, styles, and sizes. Some are extremely versatile, while others are highly specialized. Craftworkers handle fasteners every day, so they must understand how they work. They must choose the right ones and install them correctly. Properly handling fasteners gives reliability and safety. Improperly handling them leads to failure and unsafe conditions.

Learning Objective 1

Successful completion of this module prepares trainees to:

Describe common fastener operation and torque's role behind it.

- a. Explain how many fasteners work by producing friction through torque.
- b. List common torque-based tools and explain their proper use.

Learning Objective 2

Successful completion of this module prepares trainees to:

Identify threaded fasteners and summarize their applications.

- a. List common threaded fastener types and standards.
- b. Explain how to install threaded fasteners.
- c. List common concrete anchors and describe their installation.

Learning Objective 3

Successful completion of this module prepares trainees to:

Identify non-threaded fasteners and summarize their applications.

- a. List common retainers, pins, and keys, describing their applications.

- b. Explain how blind rivets work and how to install them.

Performance Tasks

1. Install instructor-selected threaded fasteners.
2. Tighten a group of bolts to the proper torque and in the proper sequence.
3. Install instructor-selected fasteners in hardened concrete.
4. Install instructor-selected non-threaded fasteners.
5. Install a snap ring.

Recommended Teaching Time: 12.5 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 15103
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

Performance Task 1

- Appropriate PPE
- Threaded fasteners
- Metal parts and sheets/plates with tapped and untapped holes
- Appropriate fastener tools
- Performance Profile sheets

Performance Task 2

- Appropriate PPE
- Flanged components with bolt circles
- Appropriate bolts, washers, and nuts for each flange
- Appropriate torque tools and standard wrenches

- Performance Profile sheets

Performance Task 3

- Appropriate PPE
- Hardened concrete surface
- Concrete anchors and masonry screws
- Appropriate tools for installing the anchors and screws
- Performance Profile sheets

Performance Task 4

- Appropriate PPE
- Non-threaded fasteners
- Appropriate materials and parts for installing the fasteners (sheet metal, keyed shafts, etc.)
- Appropriate tools for each fastener
- Performance Profile sheets

Performance Task 5

- Appropriate PPE
- Snap rings
- Parts held together by snap rings
- Snap ring pliers
- Performance Profile sheets

15104

Basic Layout

Millwright

Overview

Whenever new equipment arrives at a facility, millwrights and industrial mechanics help position it. Some machines connect to each other, so millwrights must align them carefully to prevent damage. To do these tasks, they interpret drawings, establishing locations based on key reference points.

Anchors attach most equipment to the floor or a foundation. Millwrights determine where to install these anchors. Positions must be precise, since even small errors can cause problems. Imagine lowering a large machine onto multiple mounting bolts, only to find one out of place.

The millwright and industrial mechanic crafts use many specialized tools for layout work. This module introduces them and explains the proper way to use them.

Learning Objective 1

Successful completion of this module prepares trainees to:

Identify basic layout tools and use them to construct layout elements.

- a. Name and describe the function of common layout tools.
- b. Construct the preliminary elements for an equipment layout.
- c. Use layout tools to perform layout tasks.

Performance Tasks

1. Determine column lines from a building drawing.
2. Use the 3-4-5 method to lay out perpendicular baselines.
3. Use the arc method to lay out perpendicular baselines.
4. Lay out equipment centerlines.
5. Use a framing square to scribe lines perpendicular to a baseline.
6. Use a combination square to scribe lines parallel to an edge.
7. Use a combination square to scribe parallel 45-degree lines.
8. Use a protractor to scribe angled lines.
9. Use dividers to scribe lines perpendicular to a baseline.

10. Use dividers and a reference point to scribe lines perpendicular to a baseline.

Recommended Teaching Time: 20 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 15104
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

Performance Task 1

- Appropriate PPE
- Building drawings with columns
- Performance Profile sheets

Performance Task 2

- Appropriate PPE
- Chalk line
- Steel tape
- Performance Profile sheets

Performance Task 3

- Appropriate PPE
- Chalk line
- Steel tape
- Performance Profile sheets

Performance Task 4

- Appropriate PPE
- Equipment drawings
- Chalk line
- Steel tape

- Performance Profile sheets

Performance Task 5

- Appropriate PPE
- Sheet metal
- Straightedge
- Framing square
- Scribe
- Clamps
- Layout dye (optional)
- Performance Profile sheets

Performance Tasks 6 and 7

- Appropriate PPE
- Sheet metal
- Combination square
- Scribe
- Performance Profile sheets

Performance Task 8

- Appropriate PPE
- Sheet metal
- Protractor
- Prick punch
- Hammer
- Straightedge
- Scribe
- Performance Profile sheets

Performance Tasks 9 and 10

- Appropriate PPE
- Sheet metal
- Dividers
- Prick punch
- Hammer
- Straightedge
- Scribe
- Performance Profile sheets

15203

Reading Mechanical Drawings

Millwright

Overview

All craftworkers read mechanical drawings at one time or another. Drawings communicate project details in a standardized way. With proper training, any craftworker can interpret and use them to perform necessary tasks. Some drawings represent mechanical parts in detail with accompanying dimensions. Others show a large system's components and overall layout. And some portray three-dimensional objects almost photo-realistically. This module introduces mechanical drawings and shows you how to understand what they communicate.

Learning Objective 1

Successful completion of this module prepares trainees to:

Read mechanical drawings, interpreting the information they contain.

- a. Describe and interpret orthographic projections.
- b. Describe and interpret schematic drawings.
- c. Describe and interpret isometric drawings.

Performance Tasks

1. Interpret an instructor-provided orthographic projection.
2. Interpret instructor-provided hydraulic and pneumatic schematic drawings.
3. Interpret an instructor-provided isometric drawing.

Recommended Teaching Time: 20 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 15203
- A variety of standard marker sizes
- Poster board

- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

Performance Task 1

- Orthographic projection drawings
- A list of information for trainees to locate and record
- Performance Profile sheets

Performance Task 2

- Hydraulic and pneumatic schematics
- A list of questions for trainees to answer
- Performance Profile sheets

Performance Task 3

- Isometric drawings (with optional BOM)
- A list of information for trainees to locate and record
- Performance Profile sheets

15202

Field Sketching

Millwright

Overview

Sometimes a millwright in the field must help an engineer or machinist understand a part or assembly's shape and dimensions. A millwright who knows how to sketch can provide this information. Field sketching does not require great artistic talent. Understanding the part or assembly, plus a few simple techniques, goes a long way toward producing a useful sketch. This module introduces sketching by breaking it down into a series of basic steps.

Learning Objective 1

Successful completion of this module prepares trainees to:

Summarize sketching techniques and object views.

- a. Describe how to sketch straight lines and angles.
- b. Describe how to sketch arcs, circles, and ellipses.
- c. Explain how to dimension sketches.
- d. Contrast the methods used for producing three-dimensional sketches.

Performance Tasks

1. Sketch straight lines and angles.
2. Sketch arcs, circles, and ellipses.
3. Dimension a sketch.
4. Produce an orthographic sketch of an object.
5. Produce an oblique sketch of an object.
6. Produce an isometric sketch of an object.

Recommended Teaching Time: 10 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper

- PowerPoint® Presentations for Module 15202
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

Performance Tasks 1, 2, and 3

- Pencil and paper
- Performance Profile sheets

Performance Tasks 4, 5, and 6

- Pencil and paper
- Simple objects or parts
- Performance Profile sheets