

L1 MILLWRIGHT

LEVEL 1



Curriculum Notes

- 162.5 Hours (includes Core)
- Revised: 2021, Fourth Edition
- Downloadable instructor resources are available.

PAPERBACK

Trainee Guide: \$74.99

ISBN

978-0-13-765382-9

DIGITAL

NCCERconnect Access Card: \$74.99

ISBN

978-0-13-821167-7

NCCERconnect +

Trainee Guide: \$104.99

978-0-13-821178-3

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Introduction to the Millwright Craft (5 Hours)

ISBN 978-0-13-765386-7

(Module ID 15101) Presents the history of the trade and discusses career paths for millwrights. Describes environments and types of work associated with the millwright trade.

Millwright Hand Tools (17.5 Hours)

ISBN 978-0-13-765387-4

(Module ID 15102) Introduces hand tools used by millwrights. Explains hand tool safety and covers the methods for selecting, inspecting, using, and maintaining these tools.

Fasteners and Anchors (12.5 Hours)

ISBN 978-0-13-765394-2

(Module ID 15103) Identifies fasteners and anchors used by millwrights, including their applications and installation procedures.

Basic Layout (20 Hours)

ISBN 978-0-13-765399-7

(Module ID 15104) Discusses the tools used in layout. Explains how to lay out baselines using the arc method and 3-4-5 method.

Reading Mechanical Drawings (20 Hours)

ISBN 978-0-13-765403-1

(Module ID 15203) Explains orthographic projection, isometric, and schematic drawings used to show piping, hydraulic, and pneumatic systems.

Field Sketching (10 Hours)

ISBN 978-0-13-765400-0

(Module ID 15202) Elective - Teaches the basic skills needed to make a good field sketch to convey information about how parts should be made or assembled.

L2 MILLWRIGHT

LEVEL 2

Curriculum Notes

- 175 Hours (required); 37.5 Hours (elective)
- Revised: 2021, Fourth Edition
- Downloadable instructor resources are available.

PAPERBACK

Trainee Guide: \$99.99

ISBN

978-0-13-765428-4

DIGITAL

NCCERconnect Access Card: \$99.99

ISBN

978-0-13-821190-5

NCCERconnect +

Trainee Guide: \$129.99

978-0-13-821203-2

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Craft-Related Mathematics (20 Hours)

ISBN 978-0-13-765434-5

(Module ID 15201) This module introduces the use of equivalents and conversion tables, figure ratios, and proportions. Explains basic use of trigonometry in calculating takeouts, volumes, and weights of objects, and performing right-angle trigonometry.

Precision Measuring Tools (20 Hours)

ISBN 978-0-13-765435-2

(Module ID 15302) Explains how to select, inspect, use, and care for measuring tools of the millwright craft. Now includes tools such as keyseat rules, telescoping gauges, ultrasonic thickness detector and hardness tester.

Millwright Power Tools (22.5 Hours)

ISBN 978-0-13-765440-6

(Module ID 15205) Introduces power tools used by millwrights and procedures for using, caring for, and maintaining these tools.

Setting Baseplates and Soleplates (20 Hours)

ISBN 978-0-13-765441-3

(Module ID 15207) Describes how to set a machine baseplate and soleplate while guaranteeing alignment with other equipment.

Rigging Practices (15 Hours)

ISBN 978-0-13-498801-6

(Module ID 38102) Describes basic rigging and safety practices related to rigging activities. Teaches use and inspection of equipment and hardware used in rigging. Explains how to apply common hitches.

Oxyfuel Cutting (17.5 Hours)

ISBN 978-0-13-418268-1

(Module ID 29102) Explains the safety requirements for oxyfuelcutting. Identifies oxyfuel cutting equipment and provides instructions for setting up, lighting, and using the equipment.

Gaskets and Packing (15 Hours)

ISBN 978-0-13-765450-5

(Module ID 15107) Describes gaskets and packing and their applications, while also providing instructions for laying out, cutting, and installing gaskets.

O-Rings and Non-Mechanical Seals (7.5 Hours)

ISBN 978-0-13-765452-9

(Module ID 15304) Enhanced coverage of dynamic and static seals, including their applications, tools used, installation procedures, and removal. Also covers lip, cup, oil, and labyrinth seals.

Introduction to Bearings (15 Hours)

ISBN 978-0-13-765463-5

(Module ID 15209) Describes the types and applications of bearings, including plain, roller, ball, thrust, and guide bearings, as well as pillow block, flanged, and takeup bearings. Also explains bearing designation systems.

Removing and Installing Bearings (22.5 Hours)

ISBN 978-0-13-765464-2

(Module ID 15306) Explains how to remove, troubleshoot, and install tapered, thrust, spherical roller, pillow block, and angular contact ball bearings.

Plasma Arc Cutting (7.5 Hours)

ISBN 978-0-13-418269-8

(Module ID 29103) Introduces plasma arc cutting equipment and safe work area preparation. Identifies correct amperage, gas pressures, and flow rates. Covers plasma-arc cutting methods for piercing, slotting, squaring, and beveling metals. Explains how to store equipment and clean the work area.

Craft-Related Algebra and Trigonometry (30 Hours)

ISBN 978-0-13-765466-6

(Module ID 15301) Explains right-triangle trigonometry and its use in the trade. Also covers interpolation, equilateral and isosceles triangles, and the laws of acute triangles.

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L3 MILLWRIGHT	
LEVEL 3	
Curriculum Notes	
<ul style="list-style-type: none"> • 175 Hours (required); 37.5 Hours (elective) • Revised: 2022, Fourth Edition • Downloadable instructor resources are available. 	
PAPERBACK	ISBN
Trainee Guide: \$99.99	978-0-13-803136-7
DIGITAL	ISBN
NCCERconnect Access Card: \$99.99	978-0-13-821218-6
NCCERconnect +	
Trainee Guide: \$129.99	978-0-13-821221-6

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Basic Pneumatic Systems (7.5 Hours)

ISBN 978-0-13-812105-1

(Module ID 15407) Explains pneumatic system components and compressed-air treatment. Introduces equipment auxiliary and special-application equipment used with compressors and with tools.

Compressors and Compressor Maintenance

(20 Hours)

ISBN 978-0-13-812110-5

(Module ID 15406) Introduces compressors and the troubleshooting and maintenance procedures associated with compressors.

Lubrication (15 Hours)

ISBN 978-0-13-812112-9

(Module ID 15208) Explains how to safely select and use lubricants. Describes types of lubricants and lubrication devices.

Introduction to Pumps (20 Hours)

ISBN 978-0-13-812114-3

(Module ID 15404) Describes common pumps and their principles of operation. Explains centrifugal, rotary, reciprocating and metering pumps. Describes net positive suction head and cavitation.

Troubleshooting and Repairing Pumps (17.5 Hours)

ISBN 978-0-13-812118-1

(Module ID 15405) Describes inspecting, troubleshooting, assembling, and disassembling pumps. Explains installing pumps, and preparing them for startup. Discusses shutdown, repair, and removal of pumps from the system.

Mechanical Seals (15 Hours)

ISBN 978-0-13-765453-6

(Module ID 15305) Covers the function and advantages of mechanical seals, identifies parts and types of seals, and includes procedures for removing, inspecting, and installing mechanical seals.

Couplings and Alignment Fundamentals (15 Hours)

ISBN 978-0-13-812122-8

(Module ID 15307) Identifies types of couplings and covers installation procedures using the press-fit method and the interference-fit method. Also covers coupling removal procedures.

Prealignment and Shim Fabrication (20 Hours)

ISBN 978-0-13-812123-5

(Module ID 15313) Covers procedures for fabricating shims. Explains how to level equipment using jack bolts, wedges and shims. Guides the checking for soft foot and other coupling stresses addressed during rough alignment.

Dial Indicator Alignment (45 Hours)

ISBN 978-0-13-812127-3

(Module ID 15314) Explains the procedures involved in aligning shafts, first with a straightedge and feeler gauges, then with dial indicators. Describes preparation for dial indicator reverse alignment, and explains the procedures for setting up reverse alignment jigs. Explains graphic and mathematical techniques for aligning equipment, based on reverse dial indicator measurements.

Troubleshooting and Repairing

Pneumatic Equipment (10 Hours)

ISBN 978-0-13-812133-4

(Module ID 15408) Explains repair and maintenance of pneumatic system components. Describes troubleshooting processes and methods, including pressure sensors and flow sensors.

Advanced Mechanical Drawings (17.5 Hours)

ISBN 978-0-13-812135-8

(Module ID 15503) Describes the use of drawing sets to obtain information about a system. Explains the process of identifying a part of a machine for repair or replacement from a set of drawings.

Vibration Analysis (10 Hours)

ISBN 978-0-13-812136-5

(Module ID 15509) Explains the causes of vibration and the procedures and types of equipment used in vibration analysis. Describes the equipment used for vibration testing and monitoring. Describes field machine balancing.

L4 MILLWRIGHT	
LEVEL 4	
Curriculum Notes	
<ul style="list-style-type: none"> • 160 Hours (required); 47.5 Hours (elective) • Revised: 2023, Fourth Edition • Downloadable instructor resources are available. 	
PAPERBACK	ISBN
Trainee Guide: \$99.99	978-0-13-817567-2
DIGITAL	ISBN
NCCERconnect Access Card: \$99.99	978-0-13821230-8
NCCERconnect +	
Trainee Guide: \$129.99	978-0-13-821234-6

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Basic Hydraulic Systems (15 Hours)

ISBN 978-0-13-817575-7

(Module ID 15409) Describes principles and types of hydraulic equipment and related safety procedures. Describes applications of hydraulic equipment.

Troubleshooting and Repairing Hydraulic Equipment (12.5 Hours)

ISBN 978-0-13-817576-4

(Module ID 15410) Explains inspecting hydraulic systems, diagnosing problems, and repairing these systems. Shows how to read hydraulic schematic symbols.

Installing Belt and Chain Drives (15 Hours)

ISBN 978-0-13-817577-1

(Module ID 15311) Covers the sizes, uses, and installation procedures of six types of drive belts and two types of chain drives.

Introduction to Conveyors (10 Hours)

ISBN 978-0-13-817582-5

(Module ID 15401) Describes conveyor systems and their principles of operation. Introduces several approaches to belt conveyor drive options. Introduces drum motors and servomotors for belt and roller conveyor systems.

Troubleshooting and Repairing Conveyors

(12.5 Hours)

ISBN 978-0-13-817584-9

(Module ID 15402) Describes maintaining and repairing belt, roller, chain, screw, and pneumatic conveyors. Covers conveyor belt tracking problems and correction methods.

Laser Alignment (25 Hours)

ISBN 978-0-13-817589-4

(Module ID 15502) Describes the operation of laser alignment instruments. Covers step-by-step vertical and horizontal alignment.

Optical Layout and Alignment (15 Hours)

ISBN 978-0-13-817590-0

(Module ID 15504) Explains how to use theodolites, optical levels, auto levels, and total stations to place and align equipment.

Gearboxes (15 Hours)

ISBN 978-0-13-817595-5

(Module ID 15412) Describes types and operation of gearboxes, and gearbox diagnostics. Covers power transmission principles.

Troubleshooting and Repairing Gearboxes (15 Hours)

ISBN 978-0-13-817596-2

(Module ID 15411) Explains how to troubleshoot, remove, and disassemble gearboxes; how to identify gear wear patterns; and how to install and maintain gearboxes.

Turbines (15 Hours)

ISBN 978-0-13-817599-3

(Module ID 15505) Describes types of turbines and their components. Describes the operation and common applications of particular types, including gas, steam, and water turbines.

Preventive and Predictive Maintenance (10 Hours)

ISBN 978-0-13-817605-1

(Module ID 15508) Explains preventive and predictive maintenance programs. Provides information on nondestructive testing, and introduces the basic techniques for nondestructive evaluation. Discusses lubricant analysis, and acoustic, infrared, and vibration testing.

Continued on following page

Millwright Level 4 (continued)

Maintaining and Repairing Turbine Components

(12.5 Elective Hours)

ISBN 978-0-13-817565-8

(Module ID 15506) Describes the process of inspecting and repairing key components of turbines. Explains the guidelines for maintaining large steam turbines.

Crane Safety and Emergency Procedures

(25 Elective Hours)

ISBN 978-0-13-498800-9

(Module ID 53101) Describes the communication process between the signal person and the crane operator. Covers electronic communications as well as the standard hand signals in 29 CFR 1926.

Crane Communications *(10 Elective Hours)*

ISBN 978-0-13-498819-1

(Module ID 21106) Covers safety standards and best safety practices relevant to the operation of cranes. Describes safety considerations related to power lines, weather conditions, and specific crane functions.