Pumps and Drivers (5 Hours)  
(Module ID 32108-07) Explains centrifugal, rotary, reciprocating, metering, and vacuum pump operation and installation methods, as well as types of drivers. Describes net positive suction head and cavitation.

Valves (5 Hours)  
(Module ID 32109-07) Identifies different types of valves and describes their installation as well as valve storage and handling.

Introduction to Test Instruments (7.5 Hours)  
(Module ID 32110-07) Introduces test equipment for industrial maintenance, including tachometers, parameters, strobe meters, voltage testers, and automated diagnostic tools.

Material Handling and Hand Rigging (15 Hours)  
(Module ID 32111-07) Introduces the equipment and techniques of material handling, and describes the procedures for rigging and communicating with riggers.

Mobile and Support Equipment (10 Hours)  
(Module ID 32112-07) Introduces the safety procedures and methods of operation for motorized support equipment, including forklifts, personal lifts, compressors, and generators.

Lubrication (12.5 Hours)  
(Module ID 32113-07) Explains lubrication safety, storage, and classifications. Also explains selecting lubricants, additives, lubrication equipment, and lubricating charts.

Hydrostatic and Pneumatic Testing (10 Hours)  
(Module ID 32206-07) Describes non-destructive and pressure testing of systems and equipment.

Introduction to Bearings (15 Hours)  
(Module ID 32207-07) Introduces plain, ball, roller, thrust, guide, flanged, pillow block, and takeup bearings. Discusses bearing materials and designations.

Low-Pressure Steam Systems (10 Hours)  
(Module ID 32208-07) Introduces the components and functions of basic steam systems, including boilers, steam traps, and blowdown recovery systems.

High-Pressure Steam Systems and Auxiliaries (20 Hours)  
(Module ID 32209-07) Explains the functioning of high-pressure steam systems used in industry.
### Industrial Maintenance Mechanic Level 2 (continued)

#### Distillation Towers and Vessels (20 Hours)
(Module ID 32210-07) Introduces the various types and functioning of distillation towers and vessels, including recovery vessels and condensate processing.

#### Heaters, Furnaces, Heat Exchangers, Cooling Towers, and Fin Fans (30 Hours)
(Module ID 32211-07) Introduces equipment used to transfer and remove heat from systems in process.

#### Introduction to Tube Work (10 Hours)
(Module ID 32212-07) Covers the basics of working with heat exchanger and furnace tubing and tube sheets.

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### L3 INDUSTRIAL MAINTENANCE MECHANIC

**LEVEL 3**

#### Curriculum Notes
- **175 Hours**
- **Revised:** 2008, Third Edition
- **Downloadable instructor resources that include module tests, PowerPoint**, and performance profile sheets are available at www.nccer.org/irc.

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

**Advanced Trade Math (30 Hours)**
(Module ID 32301-08) Explains right triangle trigonometry and its use in the trade. Also covers interpolation, equilateral and isosceles triangles and the laws of acute triangles.

**Precision Measuring Tools (20 Hours)**
(Module ID 32302-08) Explains how to select, inspect, use, and care for levels, feeler gauges, calipers, micrometers, height gauges and surface plates, dial indicators, protractors, parallels and gauge blocks, trammels, and pyrometers.

**Installing Bearings (20 Hours)**
(Module ID 32303-08) Explains how to remove, troubleshoot, and install tapered, thrust, spherical roller, pillow block, and angular contact ball bearings.

**Installing Couplings (15 Hours)**
(Module ID 32304-08) Identifies various types of couplings, and covers installation procedures using the press-fit method and the interference-fit method. Also covers coupling removal procedures.

**Setting Baseplates and Prealignment (30 Hours)**
(Module ID 32305-08) Explains how to lay out and install baseplates and soleplates. Describes how to field-verify a plate installation. Covers precision leveling procedures and performing clearance installation. Also describes basic steps for setting motors and pumps.

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### L4 INDUSTRIAL MAINTENANCE MECHANIC

**LEVEL 4**

#### Curriculum Notes
- **170 Hours**
- **Revised:** 2009, Third Edition
- **Downloadable instructor resources that include module tests, PowerPoint**, and performance profile sheets are available at www.nccer.org/irc.

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

**Preventive and Predictive Maintenance (10 Hours)**
(Module ID 32401-09) Explains preventive and predictive maintenance and non-destructive testing, and introduces the basic techniques for testing. Also describes lubricant analysis, and acoustic, infrared, and vibration testing.

**Advanced Blueprint Reading (25 Hours)**
(Module ID 32402-09) Describes the use of drawing sets to obtain system information. Explains the process of identifying a part of a machine for repair or replacement from a set of drawings.

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**Compressors and Pneumatic Systems (35 Hours)**
(Module ID 32403-09) Describes the theory and practice of compressing and transporting gases. Explains the types and principles of compressors and compressed air treatment equipment, as well as compressed air use and safety.

**Reverse Alignment (30 Hours)**
(Module ID 32404-09) 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.

**Laser Alignment (25 Hours)**
ISBN 978-0-13-610449-0
(Module ID 32405-09) Using one example system, describes the principles of using laser alignment systems to perform alignments.

**Introduction to Supervisory Skills (15 Hours)**
(Module ID 32406-09) Introduces human resource criteria, concepts, and skills for the craftsperson desiring to advance to leadership roles.

**Troubleshooting and Repairing Pumps (10 Hours)**
ISBN 978-0-13-610452-0
(Module ID 32407-09) Explains how to inspect, troubleshoot, disassemble, assemble, and install a pump. Also describes the process of preparing for startup.

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**Advanced Topics**

**Advanced Towers and Vessels (15 Hours)**
ISBN 978-0-13-610455-1
(Module ID 32501-09) Introduces the basics of reactor and refinery processes, including cat crackers, vacuum, and distillation. Also teaches the use of hydraulic torquing and tensioning equipment.

**Troubleshooting and Repairing Conveyors (12.5 Hours)**
(Module ID 32502-09) Describes maintaining and repairing belt, roller, chain, screw, and pneumatic conveyors.