Industrial Mechanic Apprenticeship Program

COURSE DESCRIPTIONS (ALPHABETICAL)

for
Inland/Desert Non-Union Unilateral Multiemployer Apprenticeship Committee
Industrial Technical Learning Center (InTech)

Employers have the option to determine what modules best align with their company goals and needs. Based on the following, please choose which modules an apprentice at your company needs to be trained in. APPRENTICES NEED TO COMPLETE A MINIMUM OF 144 HOURS PER YEAR.

If apprentice candidate has completed a DAS-Registered Industrial Electrical & Mechanical Pre-Apprenticeship, the following courses may be waived:
Safety
Fasteners & Gaskets

Total Required Hours: 324 hours
Related Courses as Necessary (not required to take all classes): 472 hours

Advanced Hydraulics (Period 3) **32 Hours**

REQUIRED COURSE

Adds to the basic and intermediate hydraulic skills teaching advanced applications. Students will learn industry relevant skills related to these new topics including operation, installation, performance analysis, maintenance, and design. These topics include heat exchangers, reservoirs, fluid conductors, fluid conditioning, filtration, motor performance, pump performance, system design, and maintenance.

Advanced Pneumatics (Period 3) **32 Hours**

REQUIRED COURSE

Adds to the basic and intermediate pneumatic skills teaching advanced pneumatic applications. Students will learn industry-relevant skills related to these new topics including operation, installation, performance analysis, maintenance, and design. These topics include advanced pneumatic principles, pneumatic cylinder loads, cylinder applications, quick exhaust valves, motor loads, air bearings, component sizing, air compressor types, air compressor operation, flow measurement, compressor performance, air filtration, lubricators, water removal, dryers, and pneumatic component maintenance.

Alignment Fixtures & Specialty Jigs (Period 4) **8 Hours**

Explains the applications and fabrication procedures for angle iron, chain, complex reverse-indicator, Christmas tree, and piano wire jigs.

Basic & Intermediate Hydraulics (Period 2) **32 Hours**

REQUIRED COURSE

Introduces hydraulic power and safety, circuits, schematics, the principles of hydraulic pressure and flow, and speed control circuits. Also builds on basic skills and includes new topics in operation, installation, performance analysis and design.

Basic & Intermediate Pneumatics (Period 2) **32 Hours**

REQUIRED COURSE

Introduces pneumatic power and safety, circuits, schematics, the principles of pneumatic pressure and flow, and pneumatic speed control circuits. Also builds on basic skills and includes operation, installation, performance analysis, maintenance, and design.

Basic Layout **(Period 3)** **24 Hours**

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

Compressors & Compressor Maintenance **(Period 4)** **16 Hours**

Describes types of compressors, their principles of maintenance, and the troubleshooting and maintenance procedures associated with compressors.

Compressors and Pneumatic Systems **(Period 4)** **16 Hours**

Describes theory and practice of compressing and transporting gases. Explains the types and principles of compressors and compressed air treatment equipment, and compressed air use and safety.

Contamination (Period 4) **4 Hours**

Contamination teaches key aspects of preventing and controlling contamination. Learners acquire skills in identifying and measuring contamination as well as prevention practices such as facility layout, cleanliness, and component handling. Provides a solid knowledge base in fluid handling and storage as well as use of clean rooms.

***Conventional Alignment* (Period 3)** **24 Hours**

Covers types of misalignment, aligning couplings using a straight edge and feeler gauge, adjusting parallel and angular alignment, using a dial indicator and eliminating coupling stress.

***Conveyors* (Period 3)** **8 Hours**

Describes the types of conveyor systems and their principles of operation.

Copper & Plastic Piping Practices (Period 1) **8 Hours**

Covers the selection, preparation, joining, and support of copper, plastic piping, and fittings.

Fabricating Shims (Period 3) **8 Hours**

Describes types of shim stock and materials and explains the procedures for fabricating shims.

Fasteners & Gaskets (Period 2) **4 Hours**

Fasteners – provides application knowledge regarding bolt types, size and grades, as well as screws, washers, locking nut devices, pins and keys. Gaskets – teaches about selecting, installing and storing the many types of gaskets available. Provides focus on integration and isolation seals, as well as T-joints. Module 2: Key Fasteners, Module 5: Gaskets and Seals.

***Field Sketching* (Period 3)** **8 Hours**

Teaches the basic skills needed to create the field sketches used to convey information about how parts should be made or assembled.

Identify, Install and Maintain Valves (Period 1) **8 Hours**

REQUIRED COURSE

Explains how to remove and install threaded and flanged valves, how to replace valve stem O-ring and bonnet gaskets, and how to repack a valve stuffing box. Also discusses the purpose of valve packing.

***Installing Bearings* (Period 2)** **24 Hours**

Explains how to remove, troubleshoot, and install tapered, thrust, spherical roller, pillow block, and angular contact ball bearings.

Installing Belt and Chain Drives (Period 2) **8 Hours**

Covers the sizes, uses, and installation procedures of six types of drive belts and two types of chain drives.

Installing Couplings (Period 2) **16 Hours**

Identifies various types of couplings, and covers installation procedures using the press-fit method and the interference-fit method. Also covers coupling removal procedures.

Installing Fans & Blowers (Period 3) **8 Hours**

Identifies and explains how to install axial-flow fans, centrifugal fans, and roots-type and screw-type blowers.

Installing Mechanical Seals (Period 2) **24 Hours**

Covers function and advantages of mechanical seals, identifies parts and types of seals, and includes procedures for removing, inspecting, and installing mechanical seals.

Installing Packing (Period 4) **8 Hours**

Explains the types of packing and packing materials found in a typical stuffing box. Covers how to remove packing and how to install compression packing and lip-type packing.

Installing Seals (Period 2) **8 Hours**

Covers the applications, removal, and installation procedures for dynamic and static seals, and lip, cup, oil, and labyrinth seals.

Intermediate & Advanced Blueprint Reading (Period 1) **24 Hours**

Describes the orthographic projection, isometric, and schematic drawings used to show piping, hydraulic, and pneumatic systems. Describes the use of drawings 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.

Intermediate & Advanced Trade Math (Period 1) **40 Hours**

Explains how to use tables of equivalents and conversion tables, figure ratios and proportions, perform right angle trigonometry, calculate take-outs using trigonometry, and calculate volumes and weights of objects. Explains right triangle trigonometry and its use in the trade. Also covers interpolation, equilateral and isosceles triangles, and the laws of acute triangles.

Introduction to Bearings (Period 1) **24 Hours**

REQUIRED COURSE

Introduces plain, ball, roller, thrust, guide, flanged, pillow block, and takeup bearings. Discusses bearing materials and designations. Module 1: Plain Bearings, Module 2: Ball Bearings, Module 3: Roller Bearings, Module 4: Antifriction Bearings Selection and Maintenance

Introduction to Ferrous Metal Piping Practices (Period 1) **8 Hours**

REQUIRED COURSE

Covers various types of iron and steel pipe and fittings and provides step-by-step instructions for cutting, threading, and joining ferrous piping.

Introduction to Piping Components (Period 1) **8 Hours**

REQUIRED COURSE

Introduces chemical, compressed air, fuel oil, steam, and water systems. Explains how to identify piping systems according to color codes.

Lubrication and Central Lubrication (Period 1) **16 Hours**

REQUIRED COURSE

The Central Lubrication Learning System teaches the technical skills needed to operate, install, tune, maintain and troubleshoot these vital systems

Mechanical Drives 1 (Period 2) **8 Hours**

REQUIRED COURSE

Mechanical Drives 1 introduces mechanical systems and develops fundamental knowledge of mechanical systems and practices. Covers basic safety, installation, key fasteners, power transmission systems, v-belt drives, chain drives, spur gear drives, and multiple shaft drives.

Mechanical Drives 2 (Period 2) **8 Hours**

REQUIRED COURSE

Mechanical Drives 2 covers heavy duty V-Belt drives including conventional, multiple, wedge, and variable speed V-Belt drives. This course describes V-Belt selection and maintenance by covering V-Belt size specification, component identification, and troubleshooting. Learners will develop fundamental knowledge of synchronous belt drives, lubrication concepts, precision shaft alignment, and coupling. Also covered is heavyduty chain drives which describes silent chain drives, multiple-strand systems, chain selection, chain lubrication, chain maintenance and troubleshooting.

Mechanical Drives 3 (Period 2) **8 Hours**

REQUIRED COURSE

Mechanical Drives 3 includes describing lubrication, selection, maintenance and trouble shooting of plain ball bearings. It introduces anti-friction bearings by describing two types of bearing and teaching the fundamental skills of how to identify, mechanically install, and thermally install, and troubleshooting those bearings. Also covered is gasket and seals.

Mechanical Drives 4 (Period 2) **8 Hours**

REQUIRED COURSE

The Mechanical Drives 4 course teaches linear axis drives, clutches, and brakes. Students will learn industry relevant skills related to these new topics including operation, installation, performance analysis, troubleshooting, and design.

Pre-Alignment for Equipment Installation (Period 3) **16 Hours**

REQUIRED COURSE

Explains how to level equipment using jack bolts, wedges, and shims. Covers precision leveling procedures and performing clearance installation. Also describes basic steps for setting motors and pumps.

Precision Measuring Tools (Period 3) **16 Hours**

REQUIRED COURSE

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.

Preventative and Predictive Maintenance (Period 4) **40 Hours**

REQUIRED COURSE

Explains preventive and descriptive maintenance and nondestructive testing, and introduces the basic techniques for testing. Also describes lubricant analysis, and acoustic, infrared, and vibration testing.

Principles of Materials – Ferrous & Non-Ferrous Materials (Period 1) **8 Hours**

Principles of materials – non-ferrous metals introduces the properties, elements, and types of non-ferrous materials commonly employed in metal manufacturing. Covers the basics of the non-ferrous material manufacturing process, the elements used to create non-ferrous materials, the main types of non-ferrous materials and their properties, and the common tests used to measure metal properties.

Principles of Plastics, Composites and Ceramics (Period 1) **8 Hours**

Introduces the properties, processes, skills, and concepts of working with plastics. Introduces the importance, properties, processes, and skills of working with composites. Introduces the importance, properties, processes, and skills of working with ceramics. Principles of materials – ferrous metals introduces the properties, elements, and types of ferrous materials commonly employed in metal manufacturing.

Pumps (Period 2) **24 Hours**

REQUIRED COURSE

Describes the common types of pumps and their principles of operation. Explains centrifugal, rotary, reciprocating and metering pumps. Also explains net positive suction head and cavitation.

Rigging (Period 1) **24 Hours**

Explains how to identify, select, and inspect rigging hardware. Also covers lifting capacity charts, load balancing, and pick points. Covers the operation, function, and maintenance of wire mesh slings and fiber ropes, load movement, and rigging knots. Proper rigging techniques are vital for efficient movement of loads and worker safety.

Safety (Period 1) **8 Hours**

Covers the importance of workplace safety, OSHA regulations, and practicing safety in the workplace. Topics include personal protective equipment, hazardous communication, confined spaces, lockout/tagout, accident response and overhead crane safety.

Setting Baseplates & Soleplates (Period 3) **16 Hours**

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.

Specialty Tools (Period 4) **8 Hours**

Explains how to select, inspect, use and maintain torque multipliers, cable cutters, nut splitters, keyseat gauges, and hardness testers.

Transition to Trainer & Mentor (Period 4) **8 Hours** Prepares a soon-to-be journeyperson in how to be a successful mentor to new apprentices and employees. They will learn about the best tools to handle conflict and how to guide others to success.

Troubleshooting & Repairing Conveyors (Period 4) **8 Hours**

Describes maintaining and repairing belt, roller, chain, screw, and pneumatic conveyors.

Troubleshooting and Repairing Gearboxes (Period 4) **24 Hours**

REQUIRED COURSE

Describes types and operation of gearboxes, and gearbox diagnostics. Explains how to troubleshoot, remove, and disassemble gearboxes, how to identify gear wear patterns, and how to install and maintain gearboxes.

Troubleshooting and Repairing Hydraulic Equipment (Period 4) **8 Hours**

REQUIRED COURSE

Explains inspecting hydraulic systems, diagnosing problems, and repairing systems. Shows how to read hydraulic schematic symbols.

Troubleshooting and Repairing Pneumatic Equipment (Period 4) **8 Hours**

REQUIRED COURSE

Explains repair and maintenance of pneumatic system components. Describes troubleshooting process and methods, including pressure sensors and flow sensors.

Troubleshooting and Repairing Pumps (Period 4) **8 Hours**

REQUIRED COURSE

Explains how to inspect, troubleshoot, disassemble, assemble, and install a pump. Also describes the process of preparing for start-up.

Industrial Mechanic Training Modules

Required	Course	Hours	Period
*	**Advanced Hydraulics**	**32**	**3**
*	**Advanced Pneumatics**	**32**	**3**
	Alignment Fixtures & Specialty Jigs	**8**	**4**
*	**Basic & Intermediate Hydraulics**	**32**	**2**
*	**Basic & Intermediate Pneumatics**	**32**	**2**
	Basic Layout	**24**	**3**
	Compressors & Compressor Maintenance	**16**	**4**
	Compressors and Pneumatic Systems	**16**	**4**
	Contamination	**8**	**4**
	Conventional Alignment	**24**	**3**
	Conveyors	**8**	**3**
	Copper & Plastic Piping Practices	**8**	**1**
	Fabricating Shims	**8**	**3**
	Fasteners & Gaskets	**16**	**2**
	Field Sketching	**8**	**3**
*	**Identify, Install and Maintain Valves**	**8**	**1**
	Installing Bearings	**24**	**2**
	Installing Belt and Chain Drives	**8**	**2**
	Installing Couplings	**16**	**2**
	Installing Fans & Blowers	**8**	**3**
	Installing Mechanical Seals	**24**	**2**
	Installing Packing	**8**	**4**
	Installing Seals	**8**	**2**
	Intermediate & Advanced Blueprint Reading	**24**	**1**
	Intermediate & Advanced Trade Math	**40**	**1**
*	**Introduction to Bearings**	**24**	**1**
*	**Introduction to Ferrous Metal Piping Practices**	**8**	**1**
*	**Introduction to Piping Components**	**8**	**1**
	Lubrication and Central Lubrication	**16**	**1**
	Mechanical Drives 1	**8**	**2**
	Mechanical Drives 2	**8**	**2**
	Mechanical Drives 3	**8**	**2**

	Mechanical Drives 4	**8**	**2**
*	**Pre-Alignment for Equipment Installation**	**16**	**3**
*	**Precision Measuring Tools**	**16**	**3**
	Preventative and Predictive Maintenance	**40**	**4**
	Principles of Materials - Ferrous & Non-Ferrous Materials	**8**	**1**
	Principles of Plastics, Composites and Ceramics	**8**	**1**
*	**Pumps**	**24**	**2**
	Rigging	**24**	**1**
	Safety	**8**	**1**
	Setting Baseplates & Soleplates	**16**	**3**
	Specialty Tools	**8**	**4**
	Transition to Trainer & Mentor	**8**	**4**
	Troubleshooting & Repairing Conveyors	**8**	**4**
*	**Troubleshooting and Repairing Gearboxes**	**24**	**4**
*	**Troubleshooting and Repairing Hydraulic Equipment**	**8**	**4**
*	**Troubleshooting and Repairing Pneumatic Equipment**	**8**	**4**
*	**Troubleshooting and Repairing Pumps**	**8**	**4**