INDUSTRIAL MAINTENANCE: TECHNICIAN FUNDAMENTALS

Levels 1-9

Learners on this pathway focus on the concepts, tools and materials involved with advanced manufacturing procedures. Level 1 employs 16 courses over seven areas of expertise to introduce knowledge of the drills, taps, dies, countersinks and cutting tools used in the manufacturing process. It will take learners 21 hours to complete this pathway.

After an introduction to the main tenets of modern manufacturing, this level of the pathway introduces the learner to techniques used to drill and cut manufacturing materials, the tools and machines needed to carry out those procedures and the lubricants used in manufacturing. The learner will gain knowledge on the specific tools appropriate for different manufacturing techniques.

Among the objectives for this pathway, learners will be able to:

- describe advanced manufacturing and identify various manufacturing roles
- describe drills and their component and their uses
- identify thread types and the taps and dies used to make them
- explain the use of oils in the cutting process
- identify common cutting tool materials

Total # of Modules: **121**

Total Hours: **132**

INDUSTRIAL MAINTENANCE TECHNICIAN FUNDAMENTALS

Level 1

Manufacturing
- 1.1 What is Advanced Manufacturing?
- 1.2 Manufacturing History and Technology
- 1.3 From Ideas to Products
- 1.4 From Design to Manufacturing

Drill Bits
- 1.5 Drill Bits

Drill Guides and Drill Stops
- 1.6 Drill Guides and Drill Stops

Countersinking Tools
- 1.7 Countersinking Tools

Threads, Taps, and Dies
- 1.8 Threads
- 1.9 Taps
- 1.10 Hand Tapping
- 1.11 Threading Dies

Lubricants and Cutting Fluids
- 1.12 Cutting Fluids

Cutting Tools for Machining
- 1.13 Cutting Tool Materials
- 1.14 Indexable Tool Holders
- 1.15 Inserts
- 1.16 Solid Cutting Tools

Level 2

Metals and Materials
- 2.1 Introduction to Metals
- 2.2 Ferrous Metals
- 2.3 Nonferrous Metals

Precision – Linear Measure
- 2.4 Introduction to Precision Instruments
- 2.5 Rules
- 2.6 Calipers
- 2.7 Micrometers
- 2.8 Small Hole Gauges
- 2.9 Dial Indicators
- 2.10 Bore Gauges
- 2.11 Height Gauges
- 2.12 Go/NoGo Gauges
- 2.13 Test Indicators

Level 3

Attribute Gauges
- 3.1 Go/NoGo Thread Gauges
- 3.2 Attribute Gauges
- 3.3 Thickness and Radius Gauges
- 3.4 Squares and Protractors
- 3.5 Surface Roughness Comparators

Precision – Reference/Observation
- 3.6 Adjustable Parallels
- 3.7 Surface Plates
- 3.8 Optical Comparators
- 3.9 Optical Center Finders
- 3.10 Grip Gauges
- 3.11 Countersink Gauges
- 3.12 Fastener Height Gauges
- 3.13 Rivet Inspection Gauges
- 3.14 Fastener Inspection Gauges
- 3.15 Gap Inspection Gauges

Weld Inspection Gauges
- 3.16 Weld Gauges

Level 4

Basic Math
- 4.1 Introduction to Basic Math
- 4.2 Arithmetic Operations
- 4.3 Numbers and the Number Line
- 4.4 Introduction to Fractions
- 4.5 Working with Fractions
- 4.6 Decimal Numbers
- 4.7 Positive and Negative Numbers
- 4.8 Cartesian Coordinates
- 4.9 The Metric System

INDUSTRIAL MAINTENANCE TECHNICIAN FUNDAMENTALS

Level 5

Fasteners

- 5.1 Temporary Fasteners
- 5.2 Bolts, Screws, and Washers
- 5.3 Threaded Inserts

Geometry

- 5.4 Introduction to Geometry
- 5.5 Basic Building Blocks of Geometry
- 5.6 Angles
- 5.7 Lines
- 5.8 Polygons
- 5.9 Triangles
- 5.10 Quadrilaterals
- 5.11 Circles
- 5.12 Three-dimensional Shapes
- 5.13 Coordinate Geometry
- 5.14 Transformation Geometry

Level 6

Hand Tools

- 6.1 Files, Hand Reamers, and Lapping Tools
- 6.2 Hammers, Punches, and Chisels
- 6.3 Pliers and Ratchets
- 6.4 Scribes, Optical Center Finders, and Drill Blocks

Industrial Controls

- 6.5 Introduction to Industrial Controls
- 6.6 Interpreting Schematics
- 6.7 Indicators
- 6.8 Pushbuttons
- 6.9 Selector Switches
- 6.10 Automatic Control Switches
- 6.11 Sensors
- 6.12 Control Relays
- 6.13 Control Relay Types
- 6.14 Control Relay Functions
- 6.15 Timing Relays
- 6.16 Contactors
- 6.17 Overcurrent Protection Devices
- 6.18 Motor Starters
- 6.19 Soft Starters
- 6.20 AC Variable Speed Drives
- 6.21 DC Variable Speed Drives

Level 7

Logistics

- 7.1 What is Logistics?
- 7.2 Logistics Technology
- 7.3 Inventory
- 7.4 Distribution and Transportation
- 7.5 Safety, Quality and the Environment of Logistics

Machining

- 7.6 Introduction to Machining
- 7.7 Introduction to Milling and Drilling
- 7.8 Introduction to Turning and Boring
- 7.9 Introduction to Grinding

Metals

- 7.10 Heat Treatment of Metals

Additive Manufacturing

- 7.11 Introduction to 3D Metal Printing
- 7.12 Introduction to Powder Bed Fusion
- 7.13 Introduction to Binder Jetting
- 7.14 Introduction to Directed Energy Deposition
- 7.15 Introduction to Bound Metal Deposition
- 7.16 3D Metal Printing Safety

Level 8

Manufacturing

- 8.1 MFG-1005 Safety, Quality and the Environment in Manufacturing
- 8.2 Measuring Success in Manufacturing
- 8.3 The Engineering Process
- 8.4 Information Sharing
- 8.5 Airplane Regulations
- 8.6 The Production Order
- 8.7 The Installation Plan

Programmable Logic Controllers

- 8.8 Introduction to Programmable Controllers
- 8.9 Introduction to Digital Electronics
- 8.10 Types and Functions of Programmable Controllers
- 8.11 General Structure of PLC
- 8.12 Physical Integration of the PLC
- 8.13 Internal Structure of the CPU
- 8.14 Basic Concepts of PLC Programming
- 8.15 Common PLC Applications

Level 9

Power Tools

- 9.1 Pistol Grip Drills
- 9.2 Drilling Techniques
- 9.3 Introduction to Stationary Power Tools
- 9.4 Disc and Belt Sanders
- 9.5 Drill Press
- 9.6 Band Saw
- 9.7 Arbor Press
- 9.8 Bench Grinder
- 9.9 Table Saw
- 9.10 Operating a Table Saw

Tool Making Skills

- 9.11 Need for Tools
- 9.12 The Process
- 9.13 Permanent Assemblies
- 9.14 Critical Features
- 9.15 Final Details