

INDUSTRIAL MAINTENANCE: ROBOTICS TECHNICIAN

Levels 1-4

Learners on this pathway study a wide variety of manufacturing disciplines to which robotic technology can be applied, as well as courses focused on robot design, elements and controls. The pathway employs four levels covering 31 areas of expertise through 102 courses. It will take learners 133 hours to complete this pathway.

Level 1 introduces learners to the design and use of blueprints, measurements, materials and fasteners used with robotic technology, the basic controls used in the manufacturing setting and the theory and use of pneumatics. Level 2 introduces the field of robotics and its component parts, adds additional material related to industrial controls, introduces the use of hydraulics in manufacturing and adds additional training with fasteners, measurements and materials. Level 3 introduces the learner to the higher-level functions of robotic automation systems, controllers and their programming. Finally, Level 4 walks learners through higher level testing of manufactured materials against their engineering drawings using the proper tools and techniques.

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

- explain the purpose of blueprints and other engineering drawings
- identify the steps in precision measurement and the tools necessary to carry it out
- define terms related to industrial controls with an emphasis on pneumatics, hydraulics and robotics
- understand the history of robotics and list common uses for robots in manufacturing
- identify the primary uses of automation in manufacturing

Total # of Modules: 102

Total Hours: 133



ROBOTICS TECHNICIAN

Level 1

Engineering Drawings

- 1.1 Introduction to Blueprints
- 1.2 Blueprint Terminology
- 1.3 Blueprint Views
- 1.4 Blueprint Lines
- 1.5 Blueprint Dimensions and Tolerances
- 1.6 Blueprint Symbols

Fasteners

- 1.7 Temporary Fasteners
- 1.8 Rivets
- 1.9 Bolts, Screws, and Washers

Hydraulics

- 1.10 Introduction to Hydraulics
- 1.11 Hydraulic Theory

Industrial Controls

- 1.12 Introduction to Industrial Controls

Metals

- 1.13 Introduction to Metals
- 1.14 Ferrous Metals
- 1.15 Nonferrous Metals

Measurement

- 1.16 Introduction to Precision Instruments
- 1.17 Rules

Pneumatics

- 1.18 Introduction to Pneumatics
- 1.19 Pneumatic Systems
- 1.20 The Properties of Gases
- 1.21 Air Compression and Distribution - Part One
- 1.22 Air Compression and Distribution - Part Two
- 1.23 Compressed Air Treatment
- 1.24 Pneumatic Actuators
- 1.25 Directional Control Valves
- 1.26 Pneumatic Applications

Level 2

Hydraulics

- 2.1 Hydraulic Fluids
- 2.2 Hydraulic Systems

Engineering Drawings

- 2.3 Assemblies and Fits

Fasteners

- 2.4 Identifying Fasteners
- 2.5 Fasteners and Fits

Metals

- 2.6 Heat Treatment of Metals

Robotics

- 2.7 Introduction to Robotics
- 2.8 Robot Safety
- 2.9 Robot Axes
- 2.10 Robot Manipulator
- 2.11 Controller and End Effectors
- 2.12 Robot Programs

Industrial Controls

- 2.13 Interpreting Schematics
- 2.14 Indicators
- 2.15 Pushbuttons
- 2.16 Selector Switches
- 2.17 Automatic Control Switches
- 2.18 Sensors
- 2.19 Control Relays
- 2.20 Control Relay Types
- 2.21 Control Relay Functions
- 2.22 Timing Relays

Engineering Drawings

- 2.23 Threads and Fasteners

Measurement

- 2.24 Calipers
- 2.25 Micrometers

Measurement

- 2.26 Vacuum Technology
- 2.27 Measuring Pneumatic Variables

Level 3

Tool Making

- 3.1 Need for Tools

Engineering Drawings

- 3.2 Runout Tolerances

Measurement

- 3.3 Dial Indicators

Introduction to Programmable Logic Controllers (PLC)

- 3.4 Introduction to Programmable Controllers
- 3.5 Introduction to Digital Electronics
- 3.6 Types and Functions of Programmable Controllers

Fasteners

- 3.7 Torque Tools

Automation

- 3.8 Introduction to Industrial Automation
- 3.9 Automated Process
- 3.10 Automated System
- 3.11 Introduction to Process Controls

Industrial Controls

- 3.12 Contactors
- 3.13 Overcurrent Protection Devices
- 3.14 Motor Starters
- 3.15 Soft Starters
- 3.16 AC Variable Speed Drives
- 3.17 DC Variable Speed Drives
- 3.18 Troubleshooting Control Circuits

Robotics

- 3.19 Controller and End Effectors
- 3.20 Robot Programs

Programmable Logic Controllers (PLC)

- 3.21 General Structure of PLC
- 3.22 Physical Integration of the PLC
- 3.23 Internal Structure of the CPU
- 3.24 Basic Concepts of PLC Programming
- 3.25 Common PLC Applications

Robotics

- 3.26 Hydraulic Actuators
- 3.27 Classification of Hydraulic Valves

Level 4

Non-Destructive Examination

- 4.1 What is NDE?
- 4.2 NDE Methods
- 4.3 Careers in NDE
- 4.4 Introduction to Visual Testing
- 4.5 Light and the Human Eye
- 4.6 Standard Inspection Techniques
- 4.7 Visual Testing Equipment
- 4.8 Manufacturing Produced Discontinuities
- 4.9 Visual Testing of Welds
- 4.6 Process Control Systems
- 4.7 Set Point/Comparator
- 4.8 Controller (PID Control)
- 4.9 Multivariate Processes

Engineering Drawings

- 4.10 Engineering Drawing Terminology
- 4.11 Engineering Drawing Views
- 4.12 Engineering Drawing Lines
- 4.13 Dimensions and Tolerances
- 4.14 Orientation Tolerances
- 4.15 Location Tolerances

Robotics

- 4.16 Industrial Robot Applications

Tool Making

- 4.17 The Process
- 4.18 Permanent Assemblies
- 4.19 Critical Features
- 4.20 Final Details

Hydraulics

- 4.21 Hydraulic Piping and Instrumentation
- 4.22 Hydroelectric Symbolology and Circuits