

# NEW ENGLAND INSTITUTE OF TECHNOLOGY

## ADVANCED MANUFACTURING INSTITUTE

### MACHINE TOOL TECHNOLOGY

**Certificate Program:** 10 week segments  
300 hours each segment

Work activities in machine shop involve applying knowledge of machine capabilities, the properties of materials, and shop practices to set-up and operate various machines. The skills needed to position work pieces, adjust machines, and verify the accuracy of machine functions and finished products are taught by classroom instructions, demonstration, and hands on experience. The machine training program will lead to employment.

#### **Classroom Modules:**

- Safety in the Work Environment
- Precision Measurement Tools & Quality Procedures
- Blueprint Reading / AutoCAD
- Technology Math
- Manufacturing Materials & Cutting Tool Geometry

#### **Machine Modules:**

- Cut-off Saw Operations
- Drill Press Operations
- Lathe Machining
- Milling Machining
- Grinding Machining
- Introduction to CNC Machining

# MACHINE TOOL TECHNOLOGY

## TEN WEEK SCHEDULE – 30 HOURS PER WEEK

### 1<sup>st</sup> PHASE - TWO WEEKS

COURSES	Hours per Week
Introduction to Manufacturing Employment	1
Safety in the Work Environment	3
Math in Machining	3
Introduction to Blueprint Reading	3
Basic Metrology	5
Manufacturing Materials & Cutting Tool Geometry	5
Benchwork – Layout Principles / Hand Tools / Power Tools	10

### 2<sup>nd</sup> PHASE - TWO WEEKS

COURSES	Hours per Week
Safety in the Work Environment	2
Math for Manufacturing	3
Blueprint Reading / AutoCAD	5
Basic Machine Technology – Cut Off Saw & Drill Press Process	20

### 3<sup>rd</sup> PHASE – SIX WEEKS

COURSES	Hours per Week
Safety in the Work Environment	1
Math for Manufacturing	1
Advanced Metrology	3
Quality Procedures and Concepts	5
Machine Technology – Turning / Milling / Grinding	18
Introduction to CNC Machining	2

## COURSE DISCRIPTIONS

### BENCHWORK:

When you complete this lesson you will be able to identify the basic hand tools required and hand work methods used to manufacture replacement or repair parts used in various types of equipment.

- Describe tools and methods for work piece layout, bluing, measuring, scribing lines, and marking hole centers.
- Describe tools and methods for hand cutting material with a hacksaw, including hacksaw parts description, blade types, cutting edge alloys, and tooth pitch.
- Describe the different types of files and methods for filing and draw filing.
- Describe the types of hand reamers and methods for precision sizing of holes, including the use of hand reamers, hand chucks, and drivers.
- Describe the different types of deburring tools and techniques for the deburring of parts with hand tools.
- Describe the various types of taps and dies and the proper hand use of hand taps and dies.

### METROLOGY:

When you complete this lesson:

You will be able to identify common micrometer types, identify their components, and correctly take readings using English, metric and Vernier micrometers.

- Identify common types of micrometers.
- List the major components of micrometers.
- Demonstrate how to take an accurate reading with an outside micrometer.
- Explain how to properly read the scale on an English scale micrometer, a metric scale micrometer, and a Vernier micrometer.
- Demonstrate how to take an accurate reading with an inside micrometer.
- Demonstrate how to take an accurate reading with a depth micrometer.

You will be able to describe the various types of fixed gauges commonly used by maintenance and machining technicians. You will also be able to explain the purpose of the various fixed gauges.

- Identify and describe the purpose of each of the following types of fixed gauges:
  - Go NoGo gauge
  - Plug gauge
  - Thickness gauge
  - Screw Pitch gauge
  - Radius gauge
  - Small hole gauge

You will be able to list the major components of dial indicators and demonstrate how to use the instrument to take an accurate reading. You will also be able to describe how to use a dial indicator to measure the run out of a rotating part, and how to align two shafts using a dial indicator.

- List the main components of a dial indicator.
- Explain how to properly read a dial indicator.

- Describe how to measure run out.
- Demonstrate how to align rotating components.
- Describe various types of indicators.

#### CUT OFF SAW:

When you complete this lesson, you will be able to describe the design and operation of a band saw. In addition, you'll be able to explain how to use a bandsaw to produce various cuts.

- List the major components of a vertical band saw.
- Describe different types of available band saw cutting blades.
- Explain how to manufacture a band saw blade using the shearing, welding, grinding, and annealing attachments.

#### DRILL PRESS:

When you complete this lesson, you will be able to describe the design, function, and safe operation of a drill press and its major components and attachments.

- Explain safety precautions taken when operating a drill press.
- Describe various drill press components and attachments.
- List various types of drill presses and describe their operations.
- Describe how cutting speeds and feed rates affect drill press operations.

#### TURNING:

When you complete this lesson, you will be able to identify engine lathe control systems and machining methods, and explain the basic methods to manufacture replacement or repair parts for various types of equipment.

- Describe basic engine lathe parts and operational controls.
- Identify types of chucks and discuss procedures for installing and removing chucks and faceplates on cam lock spindles.
- Explain the operation and use of the four jaw chuck.
- Describe tail stock parts and operations.
- Describe the following types of cutting tools and discuss their uses:
  - Carbide and alloy turning tools and drills
  - Drill bits
  - Turning tools
  - Facing tools
  - Boring bars and tools
  - Threading and specialty tools
- Identify factors that determine suitable speeds and feeds for different cutting tools, operations, and work piece materials.
- Describe the basic methods used for:
  - Turning operations
  - Shaft work
  - Thread cutting
  - Boring bars and tools
  - Threading and specialty tools

- Identify factors that determine suitable speeds and feeds for different cutting tools,

#### MILLING:

When you complete this lesson, you will be able to identify the basic control systems and machining methods used on a vertical milling machine and explain the basic operations necessary to manufacture replacement or repair parts used in various types of equipment.

- Identify the function of the vertical milling machine's operational controls.
- Explain how workpieces and cutting tools may be precision located through coordinate measuring.
- Explain how to square a work piece on a vertical milling machine.
- Describe the use of the holding and clamping tools.
  - Explain how to determine suitable speeds and feeds for various:
    - Cutting tools
    - Operations
    - Work piece materials
- Describe the use of each of the following cutting tools:
  - End mills
  - Woodruff cutters

#### GRINDING:

When you complete this lesson, you will be able to describe surface grinder control systems and explain basic machining methods used to manufacture replacement parts used to repair various types of equipment.

- Identify surface grinder components and identify their functions.
- Discuss techniques and components related to workpiece clamping.
- Identify types of grinding wheels and compare their uses.
- Explain the basic steps for dressing a grinding wheel and profile-shaping a grinding wheel.
- Describe the two basic techniques for grinding a part.
- Identify safety equipment and best practices for safe grinder operation.
- Outline the technique for grinding a workpiece parallel and to a specific size.