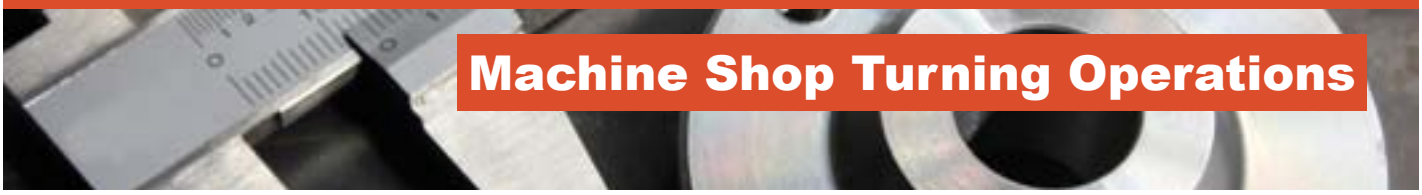

# Machine Shop Turning Operations

## Course 316: Machine Shop Turning Operations

Covers the major types of lathes and their attachments, safety, maintenance, job preparation, and basic lathe operations. Discusses all facets of drilling and boring, types of drills and drill presses, milling machines, and job bores. Explains reaming and reamer terms. Covers threads and threading.

TPC Training is accredited by IACET to offer **0.5 CEU** for this program.

### Lesson 1: Lathes and Attachments

*Topics*

Engine Lathes; Principal Parts of a Lathe; Lathe Capacity; Lathe Gearing; Lathe Drive Systems; Holding Work in a Lathe; Steady Rest; Follower Rest; Using a Lathe

*Objectives*

- Explain the function of each of the following lathe parts: lathe bed, ways, headstock, tailstock, carriage, compound rest, and spindle.
- Name the two dimensions usually used to describe lathe capacity.
- List and describe several methods of holding work in a lathe.
- Explain the function of a steady rest and follower rest.

### Lesson 2: Basic Lathe Operations

*Topics*

Setting Up a Lathe Job; Preparing the Stock; Centering the Stock; Aligning the Lathe Centers; Using the Steady and Follower Rests; Cutting Speeds; Feed Rates; Cutting Tools for Lathes; Turning Operations; Facing Operations; Boring Operations; Drilling and Reaming Operations; Milling Operations; Cutting Fluids and Coolants

*Objectives*

- Describe the factors to consider when selecting and preparing a piece of stock for a lathe job.
- Explain how to mount eccentric or irregularly shaped workpieces.
- Define the terms cutting speed and feed rate and list factors that affect each.
- Name two factors that affect the smoothness of a finishing operation.
- Explain the function of cutting fluid in lathe work.

### Lesson 3: Drilling and Boring

*Topics*

Types of Drill Press; Types of Drills; Drill Numbering and Sizing; Setting Up Work on a Drill Press; Drill Speed Variation; Drill Feed Variation; Cutting Speeds and Feeds; Drilling Compounds; Drilling Holes; Drill Press Safety; Boring; Boring on Engine and Turret Lathes; Milling Machines and Jig Borers; Boring Blocks; Clamp the Workpiece Tight

*Objectives*

- Identify the main parts of a twist drill.
- Explain the step-by-step procedure for drilling a hole.
- Demonstrate how to convert speed in surface feet per minute to inches per minute.
- Describe safety precautions to observe when working with a drill press.
- Describe the boring procedure and tell when it is used.

### Lesson 4: Reaming

*Topics*

Description of Reaming; Reamer Terms; Stock Allowances for Reaming; Machines for Reaming; Chucking or Machine Reamers; Shell Reamers; Hand Reamers; Adjustable Reamers; Expansion Reamers; Taper Reamers; High-Speed Steel Reamers; Carbide-Tipped Reamers; A Reamer for an Emergency; Selecting the Right Reamer; Reaming Speeds; Reaming Feeds; Using Reaming Fixtures; Cutting Fluids for Reaming; How to Avoid Chatter When Reaming; Reamer Troubleshooting; Counterboring; Countersinking; Spotfacing

*Objectives*

- Identify the main parts of a reamer.
- Tell what reaming method is best to use when a very accurate hole is required.
- Describe the benefits and uses of the following reamers: shell, hand, adjustable, expansion, taper, high speed steel, and carbide tipped.
- Explain how to remove burrs from the cutting edges or teeth of a reamer.
- Define counterboring, countersinking, and spotfacing.

### Lesson 5: Threads and Threading

*Topics*

Threads and Fasteners; Common Thread Series; National or Unified National Threads; Thread Identification; Square Threads; Acme Threads; Buttress Threads; Multiple Threads; Pipe Threads; Repair or Replace Damaged Threads?; The Tapping Operation; Machine Tapping vs Hand Tapping; Suggestions for Tapping; Solid Tap Sets; Special Solid Taps; Pipe Taps; Selecting the Right Tap; Drilling a Hole to be Tapped; Tapping Blind Holes; Tapping Pipe Threads; Speeds and Feeds for Tapping; Cutting Fluids for Tapping; Tips on Tapping; Threading with Dies; Measuring Threads

*Objectives*

- Describe and state the uses of the following threads: National, square, Acme, and Buttress.
- Explain how the sizing of pipe threads differs from the sizing of other threads.
- Explain when to use each of the following taps: plug, taper, bottoming, spiral-pointed, spiral-fluted, and fluteless.
- Tell why cutting fields are used in tapping operations.
- Explain how to deal with long chips when tapping.