Machine Shop Shaping Operations

Course 317: Machine Shop Shaping Operations

Covers types of milling machines and milling operations. Covers spindles, arbors, feed rates, and safety precautions. Discusses shaper and planer operations—setup, maintenance, and safety procedures. Also introduces grinding, power sawing, and gear cutting operations.

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

Lesson 1: Milling Operations

Topics

Types of Milling; Types of Milling Machines; Holding the Workpiece; Spindles; Arbors, Styles A and B; Arbors, Style C; End Mill Holders and Collets; Locating the Cutter; Determining Spindle Speed; Determining Feed Rates; Determining Direction of Feed; Cutting Fluids; Indexing; Safety Precautions for Milling Machine Operation

Objectives

- Explain the difference between peripheral milling and face milling.
- List the four types of knee-and-column milling machines.
- Explain how each of the knee-and-column machines works.
- Explain how a workpiece is held on a milling machine.
- Name and describe the three basic styles of arbor.
- Explain how the speed of a milling cutter is measured.
- Define indexing.

Lesson 2: Shaping and Planing

Topics

Introduction; Description of Shaping; Types of Shapers; Shaper Tooling; Cutting Fluids for Shaping Work; Cutting Speeds for Shapers; Setup Procedures for Shaper Operations; Typical Shaper Jobs; Angular and Internal Shaping; Description of Planing; Planer Construction; Planing Tools; Cutting Fluids for Planer Work; Planer Cutting Speeds and Feeds; Setup Procedures for Planer Operations; Safety Precautions for Shaping and Planing Operations

Objectives

- Compare and contrast shapers and planers.
- Explain the processes of shaping and planing.
- Explain how to select a shaper cutting fluid.
- Explain how shaper cutting speed is expressed.
- Explain how to check alignment of the shaper vise and ram.
- Explain how cutting fluids are applied to planer work.

Lesson 3: Grinding Operations

Topics

The Grinding Process; Types of Grinding Machines; Manual Grinding Operations; Grinding Wheels; Mounting a Grinding Wheel; Dressing and Truing a Grinding Wheel; Grinding Speeds and Feeds; Cutting Fluids and Their Use; Grinding Machine Construction and Features; Holding the Workpiece; Using the Surface Grinder; Grinding Faults; Cylindrical Grinding; Safety in Grinding

Objectives

- Define grinding.
- Name the five categories of grinding.
- Explain how to read the marking code on a grinding wheel.
- Explain how to mount a grinding wheel.
- Define the terms dressing and truing as related to grinding wheels.
- Explain how cutting fluids id grinding operations.
- List the steps involved in surface grinding.

Lesson 4: Gear Cutting

Topics

Purpose of Gears; Types of Gears; Gear Terms and Definitions; Diametral Pitch; Spur Gear Tooth Calculations; Cutting Spur Gear Teeth; Repairing a Gear by Pinning; Cutting an Involute Rack; Straight Bevel Gears; Bevel Gear Tooth Calculations; Cutting Bevel Gear Teeth; Cutting Other Gears

Objectives

- Name the most common and easiest-to-make gear.
- Name the most widely used types of gears in plant machinery.
- Define the following terms: pitch diameter, circular pitch, diametrial pitch, working depth, and face width.
- Explain how to check the first full tooth of a spur gear after cutting.
- Describe the pitch line of an involute rack.
- Explain how the teeth of straight bevel gears are cut.

Lesson 5: Power Sawing

Topics

Power Hacksaws; Power Hacksaw Blade Selection; Inspecting and Installing a Power Hacksaw Blade; Operating a Power Hacksaw; Rules for Good Hacksawing; Horizontal Band Saws; Vertical Band Saw; Band Saw Blades; Features of Band Saw Blades; Types of Blade Set; Selecting the Right Blade; Blade Installation; Operating a Band Saw; Cutting Fluids for Sawing; Straight Sawing Using a Band Saw; Contour Sawing; Friction Sawing; Other Band Saw Operations; Safety in Power Sawing; Cutting Fluids for Hacksawing and Band Sawing

Objectives

- Explain when and why cutting fluid is required when using a power hacksaw.
- Explain how to select a power hacksaw blade.
- List at least three rules for good hacksawing.
- Contrast the operation of a hacksaw and a band saw.
- List the three factors involved in selecting the right band saw blade.
- Explain the important points of power sawing safety.