Oxyfuel Operations

Course 418: Oxyfuel Operations—Joining, Cutting, and Surfacing

Covers the welding of ferrous and nonferrous metals. Describes oxygen cutting as well as brazing and soldering. Discusses surfacing techniques.

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

Lesson 1: Welding Ferrous Metals

Topics

Fusion Welding with an Oxyfuel Flame; Other Uses for the Oxyfuel Flame; Fluxes; Flame Characteristics; Temperature Control in Weldments; Welding Common Mild Steels; Welding Stainless Steel; Welding Cast Iron and Wrought Iron

Objectives

- Explain how oxyfuel welding joins metals and how it differs from arc welding.
- Explain how braze welding and torch brazing are different from oxyfuel welding and from each other.
- Discuss the purposes for using flux and characteristics that make a flux suitable for an application.
- Compare the appearance and general uses of the carburizing flame, neutral flame, and oxidizing flame.
- Explain why preheating and postheating are used.
- List important considerations in welding common mild steels, stainless steel, and cast and wrought iron.

Lesson 2: Welding Nonferrous Metals

Topics

Welding Characteristics of Aluminum; Aluminum Alloy Designations; Aluminum Joint Preparation; Aluminum Welding Procedures; Welding Characteristics of Copper and Copper Alloys; Welding Copper; Welding Brass; Welding Bronze; Welding Lead; Welding Nickel; Welding Magnesium; Making Optimum Welds

Objectives

- Discuss characteristics of aluminum that are important in welding.
- Explain how to use aluminum alloy designations.
- Describe procedures used in aluminum joint preparation and in aluminum welding.
- Discuss characteristics of copper and copper alloys that are important in welding.
- Discuss procedures for welding copper, brass, and bronze.
- Discuss procedures for welding lead, nickel, and magnesium.
- Summarize general standard procedures for making optimum welds.

Lesson 3: Oxygen Cutting

Topics

The Oxygen Cutting Process; The Cutting Torch; The Cutting Tips; Cutting Operation Safety; The Cutting Operation; Cutting Bevels; Piercing Holes and Cutting Circles; Removing Rivets; Gouging, Scarfing, and Washing; Cutting Difficult Metals; Adding Iron and Steel as Cutting Catalysts

Objectives

- Explain the similarities and differences between oxyfuel cutting and oxyfuel welding.
- Describe the equipment and safety precautions necessary for torch cutting and list standard steps in the torch cutting operation.
- Describe special equipment or methods used in cutting bevels, piercing holes, cutting circles, and cutting away rivets.
- Explain why gouging, scarfing, and washing are used.
- Explain methods used on metals that are otherwise difficult to cut.

Lesson 4: Brazing and Soldering

Topics

Brazing and Braze Welding; Brazing Filler Alloys and Fluxes; Brazing and Braze Welding Procedures; Braze Welding Cast and Malleable Iron; Brazing Stainless Steel; Safety Precautions; Soldering; Kinds of Solder; Preparing to Solder; The Soldering Tool; Soldering Procedures; Sweat Soldering

Objectives

- Compare and contrast brazing, braze welding, and oxyfuel fusion welding.
- Describe the materials and procedures used in brazing and braze welding.
- Explain important special considerations in braze welding cast and malleable iron, brazing aluminum, and brazing stainless steel.
- List the safety precautions necessary for brazing and braze welding operations.
- Explain how soldering differs from brazing and describe the materials and procedures used in soldering.

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Lesson 5: Surfacing Techniques

Topics

Surfacing Processes; Thermal Spraying; Hard Facing Welds; Torch Hard Facing Procedures; Flame Spraying; Surfacing Materials; Thermal Spraying for Shaft Repairs; Other Thermal Spraying Applications; Safety Precautions

Objectives

- Define hard face welding and thermal spraying as used for surfacing purposes and discuss general uses of each.
- Discuss advantages and disadvantages of detonation-gun, plasma, and electric arc thermal spraying and explain how each is done.
- Describe the processes of torch hard facing and flame spraying.
- Name several common surfacing materials and discuss one or more characteristics of each.
- List the steps, including those for surface preparation, in repairing a shaft by means of thermal spraying.
- Discuss the safety precautions necessary to prevent or minimize hazards from surfacing processes.