

ATPF-2450: OXY/ACETYLENE CUTTING AND BASIC WELDING I

Cuyahoga Community College

Viewing: ATPF-2450 : Oxy/Acetylene Cutting and Basic Welding I

Board of Trustees:

1/30/2025

Academic Term:

Fall 2025

Subject Code

ATPF - Applied Ind Tech - Pipefitters

Course Number:

2450

Title:

Oxy/Acetylene Cutting and Basic Welding I

Catalog Description:

Introductory course describes oxyacetylene cutting and basic shielded metal arc welding (SMAW). Included are safety practices to be followed and techniques required to cut common material in the pipefitting industry.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Pipefitter's apprenticeship program.

Outcomes

Course Outcome(s):

Discuss the respective arc welding techniques and flame cutting procedures, including safety procedures, and identify the components of the torch and oxyacetylene consumables.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. List and discuss the safety procedures as prescribed by the Occupational Safety and Health Administration (OSHA) relative to the welding industry.
2. Recognize the safety hazards with respect to welding, including arc flash, electrical shock and burns.
3. Discuss the importance of the hot work permit and explain the procedures that are to be followed.
4. List and define the terms related to basic metal cutting and welding.
5. Identify the components of the oxyacetylene torch and describe the function of each.
6. List the consumables in the torch cutting process and discuss proper handling and storage practices.

Course Outcome(s):

Demonstrate the ability to properly establish a centerline axis using wrap-around tools to layout different pipe sizes and cut to specific measurements.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Identify and explain procedures required for safe oxy-acetylene cutting operations.
2. Discuss the importance of accurate layout on various pipe types and sizes when performing cutting exercises.
3. Apply proper measuring techniques and welding tolerances for straight line pipe cutting.
4. Select correct gauge settings for flame cutting pipe.
5. Establish straight line, square layout lines on various pipes using wrap-around tools.

Course Outcome(s):

Explain the basics of Shielded Metal Arc Welding (SMAW) including the different welding machines, rod identification and safe welding techniques.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Recognize the different types of weld machines and explain the operation of each.
2. Identify the components of the welder including the cable, clamps and connector lugs.
3. Differentiate between direct current electrode positive (DCEP) and direct current Electrode negative (DCEN) to establish current flow direction.
4. Discuss rod angle and travel speed and explain how each affects weld quality.
5. Define arc length and explain its effect on weld quality.

Methods of Evaluation:

1. Quizzes
2. Tests
3. Class participation

Course Content Outline:

1. Oxyacetylene cutting/SMAW(Shielded Metal Arc Welding)
 - a. Safety
 - i. Equipment
 1. Blankets
 2. Extinguisher
 - ii. Personal Protective Equipment (PPE)
 1. Eye protection/lens
 2. Clothing
 3. Gloves
 4. Respiratory
 - b. Hot work permit
 - i. Site Specific
 - ii. Contact information
 1. Contractor
 2. Worker
 3. Scope of work
 4. Duration
 - iii. Chain of responsibility
 1. Fire department
 2. Owner
 3. Contractor
 4. Supervisor
 5. Worker
 - c. Terminology
 - i. Hot work
 - ii. Pressure settings
 - iii. Cutting speed
 - iv. Cutting angle

- v. Preheat
 - vi. Fuel gas
 - vii. SMAW
 - viii. Polarity
 - ix. Power source
 - x. Arc length
 - xi. Arc flash
 - d. Torch components
 - i. Cutting tip
 - ii. Welding tip
 - iii. Rose bud
 - iv. Regulate
 - v. Flash suppressor
 - vi. Battle cart
 - vii. Thread orientation
 - e. Torch cutting consumables
 - i. Gas
 - ii. Oxygen cylinder
 - iii. Tips
 - iv. Tip cleaning
 - v. Metals
2. Wrap around tool and applications
- a. Layout
 - i. End to end measurements
 - ii. Standard pipe fitting take off
 - iii. Bevel type
 - iv. Pipe fit
 - b. Measuring techniques and welding tolerances
 - i. Measuring technique
 - 1. Pipe quartering
 - 2. Top dead center
 - 3. Flange alignment
 - 4. Fitting alignment
 - ii. Welding tolerance
 - 1. Weld gap
 - 2. bevel angle
 - 3. Misalignment
 - 4. Inside diameter (ID) mismatch
 - c. Gage setting
 - i. Flame cutting pipe
 - ii. Fuel to oxygen ratio
 - iii. Propane
 - iv. Acetylene
 - v. Tip selection
 - d. Wrap
 - i. Purpose
 - 1. Measurement accuracy
 - 2. Industry standards
 - 3. Craftsmanship
 - ii. Common applications
 - 1. Straight cut
 - 2. Bevel cut
 - 3. Mitre
 - 4. Branch line
 - 5. Square layout
 - e. Cutting operations
 - i. Procedures
 - ii. Hand cuts
 - iii. Machine cutting

- iv. Plasma arc
- v. Torch assembly
- vi. Gage settings
- vii. Flame adjustment
- viii. Positioning
- f. Safety
 - i. Occupational Safety and Health Administration (OSHA)
 - 1. Gas cylinder
 - 2. Flash suppressor
 - 3. Fire
 - ii. Personal protective Equipment (PPE)
 - 1. Fire retardant clothing
 - 2. Eyes, gloves and respirator

Resources

National Joint Steamfitter-Pipefitter Apprenticeship Committee. *Oxy-Acetylene Cutting / Shielded Metal Arc Welding*. existing. United Association Annapolis, Md, 2005.

Lincoln Electric. *Welding*. current. Lincoln Electric Co. Cleveland, Ohio, 2011.

National Joint Steamfitter-Pipefitter Apprenticeship Committee. *Oxy-Fuel Practices*. existing. United Association Annapolis, MD, 2016.

Resources Other

Pipe Welding - How to Pass a SMAW 6G Pipe Welding Certification | GoWelding.org (<https://gowelding.org/welding-certification/smaw-6g-pipe/>). 2024.

American Welding Society. www.aws.org/ (<http://www.aws.org/>). 2024.

www.youtube.com/watch?v=w4RrDeUKcH4 (<http://www.youtube.com/watch?v=w4RrDeUKcH4>). 2010.

<https://www.millerwelds.com/resources> (<https://www.millerwelds.com/resources/>). 2024.

Safety Datasheet for Acetylene (2021) <https://www.airgas.com/msds/001001.pdf> (<https://www.airgas.com/msds/001001.pdf>)

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