

WELD 120 Basic Welding

Upon successful completion of this course, students will be able to:

1. Identify hazards involved in welding and what precautions to take
2. Identify and describe the basic theory of the OAW (Oxy Acetylene Welding) process
3. Identify and describe the basic theory of the SMAW (Shielded Metal Arc Welding) process
4. Identify and describe the use of all major components of OAW equipment
5. Identify and describe the use of all major components of SMAW equipment
6. Identify the most common filler metals used in each process
7. Identify the most common groups of metals that are readily weldable, i.e. Steel, Aluminum
8. Identify the basic joint configurations and weld types
9. Demonstrate set up and shut down of an OAW system
10. Demonstrate set up and shut down of a SMAW system
11. Demonstrate an understanding of welding parameters, i.e. heat settings, welding angles, travel speed, etc.
12. Demonstrate a basic understanding of common welding mistakes and corrective measures
13. Demonstrate basic joint construction techniques and procedures
14. Demonstrate an understanding of basic welding terminology
15. Demonstrate the proper use of the most common electrodes used in the SMAW process
16. Demonstrate the ability to consistently produce a sound weld with either process

WELD 160 Welding Orientation

Upon successful completion of this course, students will be able to:

1. Identify some common hazards in welding
2. Explain and identify proper personal protection used in welding
3. Demonstrate how to avoid welding fumes
4. Explain some of the causes of accidents
5. Identify and explain uses for material safety data sheets
6. Demonstrate safety techniques for storing and handling cylinders
7. Explain how to avoid electric shock when welding
8. Demonstrate proper material handling methods

WELD 161 Welding Preparation, Quality, and Oxyfuel Cutting

Upon successful completion of this course, students will be able to:

1. Identify and explain the use of oxyfuel cutting equipment
2. Set up oxyfuel equipment
3. Light and adjust an oxyfuel torch
4. Shut down oxyfuel cutting equipment
5. Disassemble oxyfuel equipment
6. Change empty cylinders
7. Perform oxyfuel cutting: straight line and square shapes; piercing and slot cutting; bevels; washing; gouging
8. Operate a motorized, portable oxyfuel gas cutting machine
9. Clean base metal for welding or cutting
10. Identify and explain joint design
11. Explain joint design considerations
12. Using a nibbler, cutter, or grinder, mechanically prepare the edge of a mild steel plate $\frac{1}{4}$ " to $\frac{3}{4}$ " thick at $22\frac{1}{2}^\circ$ (or 30° depending on equipment available)
13. Using a nibbler, cutter, or grinder, mechanically prepare the end of a pipe with a 30° or $37\frac{1}{2}^\circ$ bevel (depending on equipment available) and a $\frac{3}{32}$ " land. Use 6", 8", or 10" Schedule 40 or Schedule 80 mild steel pipe
14. Select the proper joint design based on a welding procedure specification (WPS) or instructor direction
15. Identify and explain codes governing welding
16. Identify and explain weld imperfections and their causes
17. Identify and explain nondestructive examination practices
18. Identify and explain welder qualification tests
19. Explain the importance of quality workmanship
20. Identify common destructive testing methods

WELD 162 Shielded Metal Arc Welding – Basics

Upon successful completion of this course, students will be able to:

1. Identify and explain shielded metal arc welding (SMAW) safety
2. Identify and explain welding electrical current
3. Identify and explain arc welding machines
4. Explain setting up arc welding equipment
5. Set up a machine for welding
6. Identify and explain tools for weld cleaning
7. Identify factors that affect electrode selection
8. Explain the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME) filler metal classification system
9. Identify different types of filler metals
10. Explain the storage and control of filler metals
11. Explain filler metal traceability requirements and how to use applicable code requirements
12. Identify and select the proper electrode for an identified welding task
13. Set up shielded metal arc welding (SMAW) equipment
14. Describe methods of striking an arc
15. Properly strike and extinguish an arc
16. Describe causes of arc blow and wander
17. Make stinger, weave, and overlapping beads
18. Make fillet welds in the: horizontal (2F) position; vertical (3F) position; overhead (4F) position

WELD 163 Shielded Metal Arc Welding – Groove Welds

Upon successful completion of this course, students will be able to:

1. Identify and explain groove welds
2. Identify and explain groove welds with backing
3. Set up shielded metal arc welding (SMAW) equipment for making V-groove welds
4. Perform SMAW for V-groove welds with backing in the: flat (1G) position; horizontal (2G) position; vertical (3G) position; overhead (4G) position
5. Identify and explain job code specifications
6. Use fit-up gauges and measuring devices to check joint fit-up
7. Identify and explain distortion and how it is controlled
8. Fit up joint using plate and pipe fit-up tools
9. Check for joint misalignment and poor fit-up before and after welding

WELD 164 Shielded Metal Arc Welding – Open V-Groove

Upon successful completion of this course, students will be able to:

1. Prepare shielded metal arc welding (SMAW) equipment for open-root V-groove welds
2. Perform open root V-groove welds in the: flat (1G) position; horizontal (2G) position; vertical (3G) position; overhead (4G) position

WELD 165 Shielded Metal Arc Welding – Open-Root Pipe

Upon successful completion of this course, students will be able to:

1. Prepare shielded metal arc welding (SMAW) equipment for open-root V-groove welds
2. Identify and explain open-root V-groove pipe welds
3. Perform open-root V-groove pipe welds in the: flat (1G-ROTATED) position; horizontal (2G) position; multiple (5G) position; multiple inclined (6G) position

WELD 175 Selected Topics in Advanced Welding

Upon successful completion of this course, students will be able to:

1. Further skills development for advanced welders in one or more processes and levels
2. Topics may include aluminum welding, sheet welding, shield metal arc welding, pipe welding, flux-core arc welding, or other

WELD 260 Introduction to Advanced Welding Techniques

Upon successful completion of this course, students will be able to:

1. Identify and explain the various parts of a welding symbol
2. Identify and explain fillet and groove weld symbols
3. Read welding symbols on drawings, specifications, and welding procedure specifications
4. Interpret welding symbols from a print
5. Draw welding symbols based on the observation of actual welds
6. Identify and explain a welding detail drawing
7. Identify and explain lines, material fills, and sections
8. Identify and explain object views
9. Identify and explain dimensioning
10. Identify and explain notes and bill of materials
11. Interpret basic elements of a welding detail drawing
12. Develop basic welding drawings
13. Identify and explain the air carbon arc cutting (CAC-A) process and equipment
14. Select and install CAC-A electrodes
15. Prepare the work area and CAC-A equipment for safe operation
16. Use CAC-A equipment for washing and gouging activities
17. Perform storage and housekeeping activities for CAC-A equipment
18. Make minor repairs to CAC-A equipment
19. Identify and understand plasma arc cutting (PAC) processes
20. Identify PAC equipment
21. Prepare and set up PAC equipment
22. Use PAC equipment to make various types of cuts
23. Properly store equipment and clean the work area after use
24. Explain gas metal arc welding (GMAW) and flux cored arc welding (FCAW) safety
25. Explain the characteristics of welding current and power sources
26. Identify and explain the use of GMAW and FCAW equipment: spray transfer; globular; short circuiting; pulse
27. Identify and explain the use of GMAW and FCAW shielding gases and filler metals
28. Set up GMAW and FCAW equipment and identify tools for weld cleaning

WELD 261 Gas Metal Arc Welding

Upon successful completion of this course, students will be able to:

1. Perform GMAW multiple-pass fillet welds on plate, using solid or composite wire and shielding gas in multiple positions
2. Perform GMAW multiple-pass open-root V-groove welds on plate, using solid or composite wire and shielding gas, in multiple positions
3. Perform GMAW spray fillet and open-root V-groove welds on plate, using solid or composite wire and shielding gas, in flat and horizontal positions

WELD 262 Flux Cored Arc Welding

Upon successful completion of this course, students will be able to:

1. Perform FCAW multiple-pass fillet welds on plate in multiple positions using flux cored wire and, if required, shielding gas
2. Perform FCAW multiple-pass open-root V-groove welds on plate in multiple positions using flux cored wire and, if required, shielding gas

WELD 263 Gas Tungsten Arc Welding

Upon successful completion of this course, students will be able to:

1. Explain gas tungsten arc welding (GTAW) safety
2. Identify and explain the use of GTAW equipment
3. Identify and explain the use of GTAW filler metals
4. Identify and explain the use of GTAW shielding gases
5. Set up GTAW equipment
6. Build a pad in the flat position with stringer beads using GTAW and carbon steel filler metal
7. Make multiple-pass open-root V-groove welds on carbon steel plate in the 1G (flat) position using GTAW and carbon steel filler metal
8. Make multiple-pass open-root V-groove welds on carbon steel plate in the 2G (horizontal) position using GTAW and carbon steel filler metal
9. Make multiple-pass open-root V-groove welds on carbon steel plate in the 3G (vertical) position using GTAW and carbon steel filler metal
10. Make multiple-pass open-root V-groove welds on carbon steel plate in the 4G (overhead) position using GTAW and carbon steel filler metal

WELD 264 Gas Tungsten Arc Welding – Aluminum

Upon successful completion of this course, students will be able to:

1. Identify and explain aluminum metallurgy
2. Explain and identify characteristics of aluminum
3. Explain GTAW and set up equipment to weld aluminum plate
4. Explain and practice GTAW techniques for plate, including padding in the flat position with stringer beads, using aluminum filler metal
5. Make fillet welds on aluminum plate in the following positions: 1F (flat); 2F (horizontal); 3F (vertical); 4F (overhead)
6. Make multiple-pass V-groove welds with backing on aluminum plate in the following positions: 1G (flat); 2G (horizontal); 3G (vertical); 4G (overhead)

WELD 265 Shielded Metal Arc Welding – Stainless Steel

Upon successful completion of this course, students will be able to:

1. Identify and explain stainless steel metallurgy
2. Identify and explain the selection of electrodes for welding stainless steel
3. Identify and explain welding variations for stainless steel
4. Prepare arc welding equipment for stainless steel welds
5. Explain stainless steel open-root V-groove welds
6. Perform shielded metal arc welding (SMAW) on stainless steel open-root V-groove joints in the following positions: flat (1G) position; horizontal (2G) position; vertical (3G) position; overhead (4G) position
7. Explain stainless steel open-root V-groove pipe welds
8. Perform shielded metal arc welding (SMAW) on stainless steel open-root V-groove pipe welds in the following positions: flat (1G-ROTATED) position; horizontal (2G) position; multiple (5G) position; inclined multiple (6G) position