Syllabus
Welding technology 3&4

School: Career and Technology Center

Instructor: Travis Leake

Course title: Welding 3 & 4

Course Description: Welding Technology 3&4 will include advanced welding processes. Advanced cutting processes include plasma arc cutting and carbon arc cutting. Advanced blue print reading leads to fabrication of projects. At the completion of this course the student should have excellent job entry level skill or should be able to enter Technical College to earn a certificate, diploma , or associates degree.

Credits: 4 units – every afternoon all year long.

Prerequisites: Welding 2

Grading scale:

- Major 60%
- Minor 40%

Course Competencies/Objectives

Unit A: Welding safety

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 materials handling methods.

Unit G: SMAW- Groove Welds with Backing

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

Unit H: Joint Fit-Up and Alignment

1. Identify and explain job code specifications
2. Use fit-up gauges and measuring devices to check joint fit-up.
3. Identify and explain distortion and how it is controlled.
4. Fit up joint using plate and pipe fit-up tools.
5. Check for joint misalignment and poor fit-up before and after welding.

Unit I: Welding Symbols

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.

Unit J: Reading Welding Detail Drawings

1. Identify and explain a welding detail drawing.
2. Identify and explain lines, material fills, and sections.
3. Identify and explain object views.
4. Identify and explain dimensioning.
5. Identify and explain notes and bill of materials.
6. Interpret basic elements of a welding detail drawing.
7. Develop basic welding drawings.

Unit K: Plasma Arc Cutting (PAC)

1. Identify and understand plasma arc cutting processes.
2. Identify plasma arc cutting equipment.
3. Prepare and set up plasma arc cutting equipment.
4. Use plasma arc cutting equipment to make various types of cuts.
5. Properly store equipment and clean the work area after use.

Unit E: GTAW- Equipment and Filler metals

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 gasses.
5. Set up GTAW equipment.

Unit F: GTAW- Plate

1. Build a pad in the flat position with stringer beads using GTAW and carbon steel filler metal.
2. Make multiple-pass open-root V-groove welds on carbon steel plate in the 1G (flat) position using GTAW and carbon steel filler metal.
3. Make multiple-pass open-root V-groove welds on carbon steel plate in the 2G (horizontal) position using GTWA and carbon steel filler metal.
4. Make multiple-pass open-root V-groove welds on carbon steel plate in the 3G (vertical) position using GTAW and carbon steel filler metal.
5. Make multiple-pass open-root V-groove welds on carbon steel plate in the 4G (overhead) position using GTAW and carbon steel filler metal.

Unit G: GTAW- Aluminum Plate

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.
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)

WELDING – ADVANCED

Unit A: Weld Quality

1. Identify and explain codes governing welding.
2. Identify and explain weld imperfections and their causes.
3. Identify and explain nondestructive examination practices.
4. Identify and explain welder qualification test.
5. Explain the importance of quality workmanship.
6. Identify common destruction methods.

Unit B: SMAW – Open V-Groove Welds

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

Unit C: SMAW – Open Root Pipe Welds

1. Prepare shielded metal arc welding (SMAW) equipment for open-root V-groove
2. Pipe welds.
3. Identify and explain open-root V-groove pipe welds.
4. Perform SMAW for open-root welds in the:
    - Flat (1G ROTATED) position
    - Horizontal (2G) position
    - Multiple (5G) position
    - Multiple inclined (6G) position

Unit D: Air carbon arc cutting and gouging

1. Identify and explain air carbon arc cutting (CAC-A) process and equipment.
2. Select and install CAC-A electrodes.
3. Prepare the work area and CAC-A equipment for safe operations.
4. Use CAC-A equipment for washing and gouging activities.
5. Perform storage and housekeeping activities for CAC-A equipment.
6. Make minor repairs to CAC-A equipment.

Unit H: GTAW- Carbon Steel Pipe

1. Set up GTAW equipment.
2. Identify and explain open-root V-groove pipe weld techniques.
3. Perform open-root V-groove pipe welds using GTAW in the following positions:
    - 1G- rotated
    - 2G
    - 5G
    - 6G

Unit I: GTAW- Low Alloy and Stainless pipe

1. Set up GTAW equipment to perform stainless and/ or low-alloy steel pipe welding.
2. Identify and explain open-root V-groove pipe techniques.
3. Perform open-root V-groove pipe welds using GTAW in the following positions:
    - 1G-rotated
    - 2G
    - 5G
    - 6G