Syllabus
Welding Technology II

School: Career and Technology Center

Instructor: Travis Leake

Course title: Welding 2

Course Description: Welding Technology 2 will include advanced welding processes, advanced cutting process (plasma arc cutting) and basic blue print reading leading to fabrication of projects. At the completion of this course, the students should have the necessary skills to be prepared to enter into welding technology 3 and 4.

Credits**:** 2 units - semester class

Grading scale
- Major: 60%
- Minor: 40%

Course Competencies/Objective

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 sheet.
6. Demonstrate safety techniques for storing and handling cylinders.
7. Explain how to avoid electric shock when welding.
8. Demonstrate proper material handling methods.

UNIT B: OXYFUEL CUTTING
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. Dissemble 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.

UNIT C: BASE METAL PREPARATION

1. Clean base metal for welding or cutting.
2. Identify and explain joint design.
3. Explain joint design considerations
4. Using a nibbler, cutter, or grinder, mechanically prepare the edge of a mild steel plate ¼” to ¾” thick at 22 ½ * (or 30* depending on equipment available).
5. Using a nibbler, cutter, or grinder, mechanically prepare the end of a pipe with a 30* or 37 ½ * bevel (depending on equipment available) and a 3/32” landing. Use 6”, 8” or 10” schedule 40 or schedule 80 mild steel pipe.
6. Select the proper joint design based on a welding procedure specification (WPS) or instructor direction.

UNIT D: SMAW-EQUIPMENT AND SETUP

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 machine for welding.
6. Identify and explain tools for weld cleaning.

UNIT E: SWAW-ELECTRODES AND SELECTION

1. Identify factors that affect electrode selection
2. Explain the America Welding Society (AWS) and the America Society of Mechanical Engineers (ASME) filler metal classification system.
3. Identify different types of filler metals.
4. Explain the storage and control of filler metals.
5. Explain filler metal traceability requirements and how to use applicable code requirements.
6. Identify and select the proper electrode for an identified welding task.

UNIT F: SMAW-BEADS AND FILLET WELDS

1. Set up shielded metal arc welding (SMAW) equipment.
2. Describe methods of striking an arc.
3. Properly strike and extinguish an arc.
4. Describe causes of arc blow and wander
5. Make stringer, weave, and overlapping beads.
6. Make fillet welds in the:
    - Horizontal (2F) position
    - Vertical (3F) position
    - Overhead (4F) 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 J: READING WELDING DETAILED DRAWINGS

1. Identify and explain a welding detailed 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 explain plasma arc cutting process.
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 F: GMAW AND FCAW- EQUIPMENT AND FILLER METALS

1. Explain gas metal arc welding (GMAW) and flux cored arc welding (FCAW) safety.
2. Explain the characteristics of welding current and power sources.
3. Identify and explain the use of (GMAW) and (FCAW) equipment:
    - Spray transfer
    - Globular
    - Short circuiting
    - Pulse
4. Identify and explain the use of (GMAW) and (FCAW) shielding gases and filler metals.
5. Set up (GMAW) and (FCAW) equipment and identify tools for weld cleaning.

UNIT M: GMAW AND FCAW-PLATE

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

WELDING-ADVANCED

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 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 gases.
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 fillet welds.