

WELDING

PHILOSOPHY

The R. D. Anderson Applied Technology Center Welding and Metal Fabrication Program is designed to meet the needs of a rapidly growing and changing field.

This program is designed to give students a sound understanding of welding in the four major areas of the welding industry:

1. Shielded Metal Arc Welding (SMAW)
2. Gas Metal Arc Welding (MIG)
3. Shielding Gas Tungsten Arc Welding (TIG)
4. Oxyacetylene Welding and Butting (OAW)

We believe that a student completing this program successfully will be able to advance his level of skill through employment and/or high education.

We believe that safety is a never-ending factor and is taught in each area of welding.

We further believe that the welding program enables students to develop responsible work habits along with proficient skills of the trade.

Based upon these beliefs, the welding program strategies will help students develop positive and rewarding career opportunities and direct them toward roles as contributing citizens and leaders.

RATIONALE

Students in the Welding Program at R. D. Anderson will become potential workforce members in the welding industry; therefore, they would benefit from the program. Additionally, a large number of students with higher education goals will gain from a solid base understanding of the skills of welding.

Since 2005 the placement percentage of the Welding Program has been 100% with students being placed in related jobs and/or continuing their education in a postsecondary institution. As a result of the R. D. Anderson cooperative education program, many students already have employment when they graduate from high school.

The South Carolina Employment Security Commission estimates that in South Carolina, there will be an increase in the number of available welding jobs from 19,023 in 2006 to an increase of 1.7% through 2008.

Students completing this curriculum increase their potential for success in the welding industry.

GOALS

1. To develop a solid knowledge of welding industry requirements.
2. To develop an appreciation of the welding industry.
3. To use decision-making skills regarding trades which are available in the welding industry.
4. To develop awareness of welding industry careers.

Introduction to Welding

Unit 1:

Oxyacetylene safety

Competency:

Simulate work safety practices.

Objectives:

1. Demonstrate shop safety.
2. Evaluate terms related to safety.
3. Simulate proper operation of a fire extinguisher.
4. Apply safety procedures for CNC Plasma CAM work area and operations

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 9-17, 410-414.
- 1b. View video on shop and oxyacetylene safety.
- 1c. Observe demonstration on safe operation of shop equipment.
- 2a. Review fire and personal safety handouts.
- 2b. Observe demonstration on air hose safety.
- 3a. Read Welding Skills: Workbook, pp. 3-4.
- 3b. Simulate proper operation of fire extinguisher.
- 4a. Review safety procedures.
- 4b. Observe demonstration of Plasma CAM area inspection.
- 4c. Inspect Plasma CAM work area for proper operation.
- 4d. Complete inspection checklist.

Instructional Materials and Resources:

- 1a, 3b. Welding Skills, Giachino-Weeks.
- 1b. Video on safety.
- 2a. Handouts from related module.
- 3a. Welding Skills: Workbook, Giachino-Weeks.
- 3b. Fire extinguisher.
- 4a. Written safety procedures.
- 4d. Plasma CAM inspection checklist.

Assessment:

Checklist on oxyacetylene, fire and shop safety
Written test
Perform safety inspection of equipment according to checklist

Introduction to Welding

Unit 2:

Oxyacetylene safety

Competency:

Critique oxyacetylene safety practices.

Objectives:

1. Analyze safety standards related to oxyacetylene safety.
2. Evaluate oxyacetylene welding station.
3. Light and adjust flame.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 62-69.
- 1b. Review video on oxyacetylene safety.
- 1c. Complete handouts.
- 2a. Read Welding Skills: Workbook, pp. 3-4.
- 2b. Observe demonstration on setting up oxyacetylene station.
- 3a. Turn on touch oxyacetylene.
- 3b. Use a striker to light flame.
- 3c. Turn on oxygen to adjust flame.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks.
- 1b. Video on oxyacetylene safety.
- 2a. Handouts from related module.
- 2b. Welding Skills: Workbook, Giachino-Weeks.
- 3a-3c. Striker, cutting glasses, oxyacetylene equipment.

Assessment:

Worksheet assignment
Checklist
Lighting torch and adjusting flame to correct working pressure

Introduction to Welding

Unit 3:

Blueprint reading

Competency:

Read and interpret blueprints.

Objectives:

1. Interpret lines, views and dimensions from blueprint.
2. Analyze basic welding symbols.
3. Identify basic types of weld joints.
4. Measure with a ruler to within 1/16" accuracy when laying out a job from a sketch or drawing.
5. Identify the elements of an automated system.
6. Perform mathematical calculations that apply to oxyacetylene cutting and welding.

Suggested Instructional Activities:

- 1a. Read Printreading For Welders, pp. 10-25.
- 1b. Discuss purpose and basic elements of blueprints.
- 1c. Identify and discuss functions of common lines used on blueprints.
- 2a. Read Welding Skills, pp. 201-204, 404-405.
- 2b. Complete Welding Skills: Workbook, p. 59.
- 3a. Read Welding Skills, pp. 416-417.
- 3b. Complete Welding Skills: Workbook, p. 60.
- 3c. Critique basic types of weld joints.
- 4a. Analyze handout of "Reading a Rule."
- 4b. Measure selected pieces of steel to 1/16" accuracy.
- 5a. Determine the need for CNC Plasma in a manufacturing process.
- 6a. Complete Unit 7 in Math for Welders, pages 49-56.
- 6b. Complete Unit 7 in Math for Welders, pages 57-64.

Instructional Materials and Resources:

- 1a. Printreading For Welders, Proctor and Gosse.
- 1b-1c. Blueprint handout.
- 2a-3a. Welding Skills, Giachino-Weeks.
- 2b-3b. Welding Skills: Workbook, Gosse.
- 4a. "Reading a Rule" handout.
- 4b. Tape measure or ruler.
- 5a. Plasma CAM self-guided tutorial.
- 6a-6b. Math for Welders, Marion.

Introduction to Welding

Assessment:

Written test on blueprint
Math text on fractions

Introduction to Welding

Unit 4:

Basic metals

Competency:

Identify basic metals.

Objectives:

1. Identify selected metals by appearance, color and weight.
2. Identify the metal shapes used for welding through the following tests:
 - a. Magnet test
 - b. Spark test
 - c. Chisel test.

Suggested Instructional Activities:

- 1a. Observe a demonstration on the identification of metals.
- 1b. Participate in the activity matching materials according to appearance, color and weight.
- 2a. Observe a demonstration on welding metal shapes.
- 2b. Identify metal shapes used for welding on a written test.

INSTRUCTIONAL MATERIAL AND RESOURCES:

- 1-2. Stainless steel, mild steel, aluminum, magnet, chisel, hammer, and grinder.

Assessment:

Teacher Observation
Objective, written test

Introduction to Welding

Unit 5:

Oxyacetylene cutting and welding

Competency:

Evaluate oxyacetylene metal cutting and welding skills.

Objectives:

1. Critique setting up and operating oxyacetylene equipment.
2. Compare welding light gauge metal on flat, vertical, horizontal and overhead positions.
3. Practice and demonstrate skills using cutting equipment.
4. Implement plasma program to perform a cutting operation.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 62-69.
- 1b. View video on shop oxyacetylene cutting and welding.
- 2a. Complete handouts.
- 2b. Read Welding Skills: Workbook, pp. 12-13.
- 3a. Observe demonstration on lighting and adjusting three welding flames and closing down an oxyacetylene station, carrying a puddle with and without filler rod, weld gauge metal in flat, vertical, horizontal and overhead positions, setting up and adjusting cutting equipment.
- 3b. Illustrate three types of oxyacetylene flames.
- 4a. Review materials on Plasma CAM tutorial.
- 4b. Observe the implementation of a Plasma CAM operation.
- 4c. Assist in the set up of a Plasma CNC cutting station.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks.
- 1b. Video on oxyacetylene welding.
- 2a. Handout of torch identification.
- 2b. Welding Skills: Workbook, Giachino-Weeks.
- 3a-3b. Metal, welding equipment.
- 4a. Handout on plasma CAM operation.
- 4b. Demonstration of Plasma CAM operation.
- 4c. Handout of Plasma CAM operation.

Assessment:

Checklist on weld beads
Written test
Illustration of flames
Instructor evaluation of Plasma CAM operation

Introduction to Welding

Unit 6:

Oxyacetylene cutting different materials

Competency:

Appraise skill to make cuts on various types of steel.

Objectives:

1. Develop skill to make square, piercing, circular and beveled cuts.
2. Compare cutting patterns, beams, angles, channel iron and pipe.

Suggested Instructional Activities:

- 1a. Observe demonstration of layout on how to make straight line, square, piercing, circular and bevel cuts.
- 1b. Compare layouts with a co-worker and discuss differences.
- 2a. Observe demonstration on correct techniques when cutting patterns, beams, angle iron, channel iron and pipe.
- 2b. Participate in contest for best cuts.

Instructional Materials and Resources:

- 1a-2b. Teacher modeling.
- 2a. Blueprint.
- 2b. Prototype.

Assessment:

Checklist
Peer evaluation on best cuts
Measurement and cutting of metal strips

Introduction to Welding

Unit 7:

Introduction to power tools

Competency:

Handle power tools and hand tools properly

Objectives:

1. Demonstrate proper handling of power tools safely.
2. Demonstrate proper handling of hand tools safely.

Suggested Instructional Activities:

- 1a. Read and study handout of tool identification.
- 1b. View video on tool safety.
- 1c. Discuss power and hand tool overhead transparencies.
- 2a. Practice using power tools safely.
- 2b. Practice using hand tools safely.

Instructional Materials and Resources:

- 1a. Tool identification handouts.
- 1b. Video of shop tool safety.
- 1c. Transparencies of shop tools.
- 2a. Selection of metal working power tools.
- 2b. Selection of metal working hand tools.

Assessment:

Written test
Perform safe use of hand and power tools.

Introduction to Welding

Unit 8:

Shielded metal arc safety

Competency:

Simulate work safety practices.

Objectives:

1. Demonstrate shop safety.
2. Evaluate terms related to safety.
3. Simulate proper operation of a fire extinguisher.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 9-17.
- 1b. View video on safety.
- 1c. Observe demonstration on safe operation of shop equipment.
- 2a. Review fire and personal safety handouts.
- 2b. Observe demonstration on air hose safety.
- 3a. Complete Welding Skills: Workbook, pp. 3-4.
- 3b. Simulate proper operation of fire extinguisher.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks.
- 1b. Video on safety.
- 2a. Handouts from related module.
- 3a. Welding Skills: Workbook, Gosse.
- 3b. Fire extinguisher.

Assessment:

Checklist on shielded metal arc safety

Introduction to Welding

Unit 9:

Shielded metal arc safety practices

Competency:

Critique shielded metal arc safety practices.

Objectives:

1. Analyze safety standards related to shielded metal arc safety standards.
2. Evaluate shielded metal arc welding station.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 62-69.
- 1b. Review video on shielded metal arc safety.
- 1c. Complete shielded metal arc welding set-up sheet.
- 2a. Complete Welding Skills Workbook, pp. 3-4.
- 2b. Observe demonstration on setting up shielded metal arc station.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino & Weeks.
- 1b. Video on shielded metal arc safety.
- 1c. Handout on related module.
- 2a. Welding Skills Workbook Giachino & Weeks.
- 2b. Welding station and equipment.

Assessment:

Workbook assignment
Checklist
Written test

Introduction to Welding

Unit 10:

Equipment set-up

Competency:

Analyze shielded metal arc welding skills.

Objectives:

1. Critique setting up equipment from setup procedures handout.
2. Select correct welding electrodes.

Suggested Instructional Activities:

- 1a. View video on setup procedures.
- 1b. Examine setup procedures handout.
- 1c. Read Welding Skills, pp. 97-108, 111-119.
- 1d. Complete Welding Skills: Workbook, pp. 113-116.
- 2a. View video on selecting electrodes.
- 2b. Complete written test on electrodes selection.

Instructional Materials and Resources:

- 1a. Video on setup procedures.
- 1b. Setup procedures handout.
- 1c. Welding Skills, Giachino-Weeks.
- 1d. Welding Skills: Workbook, Gosse.
- 2a. Video on selecting electrodes and variety of electrodes.
- 2b. Written test.

Assessment:

Written test
Workbook assignment

Introduction to Welding

Unit 11:

Strike and carry an arc

Competency:

Demonstrate how to strike and carry an arc.

Objectives:

1. Assess making pad of beads in flat and vertical positions.
2. Assess making pad of beads in horizontal and overhead positions.
3. Assess making weave bead pattern.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 121-124.
- 1b. Complete Welding Skills: Workbook, pp. 117-118.
- 1c. Analyze striking and carrying an arc.
- 1d. Observe demonstration of making pad of beads in flat and vertical positions.
- 2a. Read Welding Skills, pp. 121-124.
- 2b. Complete Welding Skills: Workbook, pp. 117-118.
- 2c. Observe demonstration of making pad of beads in horizontal and overhead positions.
- 3a. Observe demonstration of making weave bead pattern.
- 3b. Make a weave bead pattern on ¼ mild steel plate.

Instructional Materials and Resources:

- 1a, 2a. Welding Skills, Giachino-Weeks.
- 1b, 2b. Welding Skills: Workbook, Gosse.
- 1-3. Mild steel plate, 1/4" x 8" x 8", electrodes 6010-7018.

Assessment:

Weld bead checklist
Safety sheet checklist
Written test
Beads measurements analysis

Introduction to Welding

Unit 12:

Continuous beads in position

Competency:

Run continuous beads in various positions.

Objectives:

1. Analyze running continuous beads in flat and vertical positions.
2. Analyze running continuous beads in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 125-134.
- 1b. Complete Welding Skills: Workbook, pp. 119-120.
- 1c. Observe demonstration of running continuous beads in flat and vertical positions.
- 2a. Observe demonstration of running continuous beads in horizontal and overhead positions.
- 2b. Run continuous beads in horizontal and overhead positions.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks.
- 1b. Welding Skills: Workbook, Gosse.
- 1c-2b. Mild steel plates, 1/4" x 8" x 8", electrodes 6010 and 7018.

Assessment:

Weld bead checklist
Safety sheet checklist
Assignment in workbook
Measurements of steel plates evaluation

Introduction to Welding

Unit 13:

Tee welds in various positions

Competency:

Construct tee-fillet welds.

Objectives:

1. Analyze construction of tee-fillet welds in flat and vertical positions.
2. Critique construction of tee-fillet welds in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 135-166.
- 1b. Complete Welding Skills: Workbook, pp. 121-128.
- 1c. Observe demonstration on construction of tee-fillet welds in flat and vertical positions.
- 2a. Discuss Welding Skills, pp. 135-166.
- 2b. Review Welding Skills: Workbook, pp. 121-128.
- 2c. Observe demonstration on construction of tee-fillet welds in horizontal and overhead positions.

Instructional Materials and Resources:

- 1a, 2a. Welding Skills, Giachino-Weeks.
- 1b, 2b. Welding Skills: Workbook, Gosse.
- 1c, 2c. 6010 and 7018 electrodes, mild steel plates, 8" x 8" 1/4".

Assessment:

Weld bead checklist
Safety checklist
Written test
Measurements of steel plates analysis

Introduction to Welding

Unit 14:

Butt, lap and corner welds in various positions

Competency:

Produce butt, lap and corner welds.

Objectives:

1. Create butt, lap and corner welds in flat and vertical positions.
2. Create butt, lap and corner welds in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 135-166.
- 1b. Complete Welding Skills: Workbook, pp. 35-42.
- 1c. Observe demonstration on butt, lap and corner welds in flat and vertical positions.
- 1d. Practice welding butt, lap, and corner welds in the flat and vertical positions.
- 2a. Discuss Welding Skills, pp. 135-166.
- 2b. Review Welding Skills: Workbook, pp. 35-42.
- 2c. Observe demonstration on butt, lap and corner welds in horizontal and overhead positions.
- 2d. Practice welding butt, lap, and corner welds in the horizontal and overhead positions.

Instructional Materials and Resources:

- 1a, 2a. Welding Skills, Giachino-Weeks,
- 1b, 2b. Welding Skills: Workbook, Gosse.
- 1c, 2c. Mild steel plates, 7018 electrodes.
- 1d, 2d. ¼" x 2" x 8" steel plates.

Assessment:

Weld bead checklist
Written test
Squareness of metal and measurements evaluation

Introduction to Welding

Unit 15:

Vee-groove and open butt joint in various positions

Competency:

Critique single vee-groove and open butt joint welds.

Objectives:

1. Construct single vee-groove and open butt joint welds in flat and vertical positions.
2. Construct single vee-groove and open butt joint welds in the overhead positions.

Suggested Instructional Activities:

- 1a. Observe demonstration on single vee-groove and open butt joint welds in flat and vertical positions.
- 1b. Read Welding Skills, pp. 135-166.
- 1c. Review handout sheets on joint construction.
- 1d. Practice constructing single vee-groove and open butt joint welds in the flat and vertical positions.
- 2a. Observe demonstration on single vee-groove and open butt joint welds in overhead positions.
- 2b. Complete Welding Skills: Workbook, pp. 35-42.
- 2c. Practice constructing single vee-groove and open butt joint welds in horizontal and overhead positions.

Instructional Materials and Resources:

- 1a, 1d, 2a, 2c. 3/8" x 8" x 8" mild steel plates, 6010 and 7018 electrodes
- 1b. Welding Skills, Giachino-Weeks.
- 1c. Joint construction handout.
- 2b. Welding Skills: Workbook, Gosse.

Assessment:

Weld bead checklist
Safety test
Measurements of steel plates

Introduction to Welding

Unit 16:

Multi-pass vee-groove in various positions

Competency:

Construct multiple pass vee-groove welds.

Objectives:

1. Appraise multiple pass vee-groove welds in flat and vertical positions.
2. Assess multiple pass vee-groove welds in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 135-166.
- 1b. Complete Welding Skills: Workbook, pp. 35-42.
- 1c. Discuss handout on joint construction.
- 1d. Observe demonstration on multiple pass vee-groove welds in flat and vertical positions.
- 2a. Observe demonstration of multiple pass vee-groove welds in horizontal and overhead positions.
- 2b. Discuss handout on joint construction.
- 2c. Practice multiple pass vee-groove welds.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks,
- 1b. Welding Skills: Workbook, Gosse.
- 1c. Joint construction handout.
- 1d, 2a. 3/8" x 8" x 8" steel plate, 6010 and 7018 electrodes.
- 2b. Joint construction handout.
- 2c. Mild steel plates

Assessment:

Weld bead checklist
Safety test
Measurement of steel plates

Welding II

Unit 1:

Gas metal arc safety

Competency:

Simulate work safety practices.

Objectives:

1. Demonstrate shop safety.
2. Evaluate terms related to safety.
3. Simulate proper operation of a fire extinguisher.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 9-17.
- 1b. View video on safety.
- 1c. Observe demonstration on safe operation of shop equipment.
- 1d. Perform safe operation of shop equipment.
- 2a. Review fire and personal safety handouts.
- 2b. Observe demonstration on air hose safety.
- 3a. Read Welding Skills: Workbook, pp. 3-4.
- 3b. Simulate proper operation of fire extinguisher.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks.
- 1b. Video on safety.
- 1d. Shop equipment.
- 1a-3b. Handouts from related module.
- 3a. Welding Skills: Workbook, Gosse.
- 3b. Fire extinguisher.

Assessment:

Checklist on oxyacetylene, fire and shop safety
Written test
Workbook assignment sheet

Welding II

Unit 2:

Gas metal arc safety

Competency:

Evaluate gas metal arc welding safety procedures.

Objectives:

1. Analyze safety standards related to gas metal arc welding safety.
2. Evaluate gas metal arc welding station.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 62-69.
- 1b. View video on gas metal arc safety.
- 1c. Complete handouts.
- 2a. Read Welding Skills: Workbook, pp. 3-4.
- 2b. Observe demonstration on setting up gas metal arc station.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks.
- 1b. Video on gas metal arc safety.
- 1c. Handouts from related module.
- 2a. Welding Skills: Workbook, Giachino-Weeks.

Assessment:

Teacher observation
Checklist

Welding II

Unit 3:

Blueprint reading

Competency:

Read and interpret blueprints.

Objectives:

1. Interpret lines, views and dimensions from blueprint.
2. Analyze basic welding symbols.
3. Identify basic types of weld joints.
4. Measure with a ruler to within 1/16" accuracy when laying out a job from a sketch or drawing.
5. Perform mathematical calculations that apply to MIG Welding.

Suggested Instructional Activities:

- 1a. Read Printreading For Welders, pp. 10-25.
- 1b. Discuss purpose and basic elements of blueprints.
- 1c. Identify and discuss functions of common lines used on blueprints.
- 2a. Read Welding Skills, pp. 201-204, 404-405.
- 2b. Complete Welding Skills: Workbook, p. 59.
- 3a. Read Welding Skills, pp. 416-417.
- 3b. Complete Welding Skills: Workbook, p. 60.
- 3c. Critique basic types of weld joints.
- 4a. Analyze handout of "Reading a Rule."
- 4b. Measure selected pieces of steel to 1/16" accuracy.
- 5a. Complete Math for Welders, Unit 16, pages 117-124.
- 5b. Complete Math for Welders, Unit 17, pages 125-134.

Instructional Materials and Resources:

- 1a. Printreading For Welders, Proctor and Gosse.
- 1b-1c. Blueprint handout.
- 2a, 3a. Welding Skills, Giachino-Weeks.
- 2b, 3b. Welding Skills: Workbook, Gosse.
- 4a. "Reading a Rule" handout.
- 4b. Tape measure or ruler.
- 5a-5b. Math for Welders, Marion.

Assessment:

Written test
Measurement of pieces of steel

Welding II

Unit 4:

Basic metals

Competency:

Identify basic metals.

Objectives:

1. Identify selected metals by appearance, color and weight.
2. Identify the metal shapes used for welding through the following tests:
 - a. Magnet test
 - b. Spark test
 - c. Chisel test

Suggested Instructional Activities:

- 1a. Observe a demonstration on the identification of metals.
- 1b. Participate in the activity matching materials according to appearance, color and weight.
- 2a. Observe a demonstration on welding metal shapes.
- 2b. Identify metal shapes used for welding on a written test.

Instructional Materials and Resources:

- 1-2. Stainless steel, mild steel, aluminum, magnet, chisel, hammer, and grinder

Assessment:

Teacher observation
Objective, written test

Welding II

Unit 5:

Machine set-up

Competency:

Evaluate gas metal arc welding skills.

Objectives:

1. Demonstrate setting up and adjusting MIG machines.
2. Differentiate between wire compound and size.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 230-241.
- 1b. Complete Welding Skills: Workbook, pp. 54-55.
- 1c. Select and install proper gas cylinder.
- 1d. View video on gas metal arc setup and welding.
- 2a. Install gauge and hose.
- 2b. Review gas metal arc welding set-up guidelines sheet.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks.
- 1b. Welding Skills: Workbook, Gosse.
- 1c. Gas cylinder and equipment.
- 1d. Video on gas metal arc setup and welding.
- 2a. Gauge and hose.
- 2b. Handouts.

Assessment:

Performance test
Written test

Welding II

Unit 6:

Mild steel welding positions

Competency:

Critique welding mild steel.

Objectives:

1. Evaluate welding mild steel in flat and horizontal positions.
2. Demonstrate welding mild steel in vertical and overhead positions.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 242-251.
- 1b. Complete Welding Skills: Workbook, p. 56.
- 1c. Observe demonstration on weld beads in the flat and horizontal positions.
- 2a. Observe demonstration on weld beads in the vertical and overhead positions.
- 2b. Critique selection of 6 x 8 mild steel plates.
- 2c. Appraise cleaning of rust, oil and grease from plates.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks.
- 1b. Welding Skills: Workbook, Gosse.
- 2a-2c. Mild steel plates, 6 x 8.

Assessment:

Weld bead checklist
Written test
Measurements

Welding II

Unit 7:

Tee welding in positions

Competency:

Examine tee-fillet welding.

Objectives:

1. Compare tee-fillet welds in flat and horizontal positions.
2. Compare tee-fillet welds in the horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 252-262.
- 1b. View demonstration of tee-fillet welds in flat and horizontal positions.
- 2a. Welding Skills: Workbook, p. 57-58.
- 2b. View demonstration of tee-fillet welds in horizontal and overhead positions.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks.
- 2b. Welding Skills: Workbook, Gosse.
- 1-2. Mild steel plates.

Assessment:

Weld bead checklist
Written test
Measured and cut steel plates

Welding II

Unit 8:

Mild steel welds—butt, lap and corner

Competency:

Analyze mild steel welds (butt, lap and corner joint welds)

Objectives:

1. Critique butt, lap and corner joining welds in flat and horizontal positions.
2. Assess butt, lap and corner joining welds in vertical and overhead positions.

Suggested Instructional Activities:

- 1a. Observe grinder safety.
- 1b. Read Welding Skills, pp. 167-174.
- 2a. Read Welding Skills: Workbook, pp. 43-44.
- 2b. Analyze a welding operation.

Instructional Materials and Resources:

- 1a. Grinder.
- 1b. Welding Skills, Giachino-Weeks.
- 2a-2b. Welding Skills: Workbook, Gosse.

Assessment:

Weld bead quality checklist
Written test

Welding II

Unit 9:

Aluminum welding

Competency:

Evaluate aluminum welding.

Objectives:

1. Appraise welding aluminum alloy in flat and vertical positions.
2. Critique welding aluminum alloy in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. View video on aluminum welding.
- 1b. Read Welding Skills, pp. 190-196.
- 1c. Complete Welding Skills: Workbook, pp. 49-50.
- 1d. Observe demonstration of welding aluminum alloy in flat and vertical positions.
- 2a. Observe demonstration of welding aluminum alloy in horizontal and overhead positions.
- 2b. Practice welding aluminum alloy in horizontal and overhead positions.

Instructional Materials and Resources:

- 1a. Video on aluminum welding.
- 1b. Welding Skills, Giachino-Weeks.
- 1c. Welding Skills: Workbook, Gosse.
- 1d-2b. Aluminum strips, 3/16" metal, aluminum wire rolls, stainless steel wire brush.

Assessment:

Weld bead quality checklist
Workbook assignment
Written test
Measured and cut aluminum

Welding II

Unit 10:

Aluminum welds-butt, lap and corner

Competency:

Analyze aluminum welding (butt, lap and corner joint welds).

Objectives:

1. Critique butt, lap and corner joint welds in flat and horizontal positions.
2. Assess butt, lap and corner joint welds in vertical and overhead positions.

Suggested Instructional Activities:

- 1a. View video on aluminum welding.
- 1b. Read Welding Skills, pp. 197-199.
- 1c. Complete Welding Skills: Workbook, pp. 49-50.
- 2a. Observe demonstration on butt, lap and corner joint welds in flat and horizontal positions.
- 2b. Observe demonstration on butt, lap and corner joint welds in vertical and overhead positions.

Instructional Materials and Resources:

- 1a. Video on aluminum welding.
- 1b. Welding Skills, Giachino-Weeks,
- 1c. Welding Skills: Workbook, Gosse.
- 2a-2b. Aluminum strips, 1/8", stainless steel wire brush.

Assessment:

Safety checklist
Weld bead quality checklist
Written test

Welding II

Unit 11:

Stainless steel welding

Competency:

Evaluate stainless steel welding.

Objectives:

1. Compare welding stainless steel in flat and vertical positions.
2. Appraise welding stainless steel in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. View video on stainless steel welding.
- 1b. Read Welding Skills, pp. 179-184.
- 1c. Observe demonstration of stainless steel welding in flat and vertical positions.
- 2a. Observe demonstration of stainless steel welding in horizontal and overhead positions.
- 2b. Complete Welding Skills: Workbook, pp. 47-48.

Instructional Materials and Resources:

- 1a. Video on stainless steel welding.
- 1b. Welding Skills, Giachino-Weeks,
- 1c, 2a. Stainless steel strips, 1/8" metal, stainless steel wire rolls and brush.
- 2b. Welding Skills: Workbook, Gosse.

Assessment:

Safety checklist
Weld bead quality checklist
Workbook assignment
Measured and cut stainless

Welding II

Unit 12:

Stainless steel welding---butt, lap and corner

Competency:

Compare stainless steel welding (butt, lap and corner joint welds).

Objectives:

1. Critique butt, lap and corner joint welds of stainless steel in flat and horizontal positions.
2. Analyze butt, lap and corner joint welds of stainless steel in vertical and overhead positions.

Suggested Instructional Activities:

- 1a. View video on stainless steel welding.
- 1b. Read Welding Skills, pp. 185-189.
- 1c. Observe demonstration on butt, lap and corner joint welds in flat and horizontal position.
- 2a. Observe demonstration on butt, lap and corner joint welds in vertical and overhead positions.
- 2b. Review Welding Skills: Workbook, pp. 47-48.

Instructional Materials and Resources:

- 1a. Video on stainless steel welding.
- 1b. Welding Skills, Gosse.
- 1c, 2a. Stainless steel strips, 3/16", stainless steel wire brush
- 2b. Welding Skills: Workbook, Gosse.

Assessment:

Safety checklist
Weld bead quality checklist
Written test
Measured and cut stainless

Welding II

Unit 13:

Gas tungsten arc safety

Competency:

Practice work safety.

Objectives:

1. Demonstrate shop safety.
2. Evaluate terms related to safety.
3. Simulate proper operation of a fire extinguisher.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 9-17.
- 1b. View video on shop and gas tungsten arc safety.
- 1c. Observe demonstration on safe operation of shop equipment.
- 2a. Review fire and personal safety handouts.
- 2b. Observe demonstration on air hose safety.
- 3a. Complete Welding Skills: Workbook, pp. 3-4.
- 3b. Simulate proper operation of fire extinguisher.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks,
- 1b. Video on shop and gas tungsten arc safety.
- 1c. Shop equipment.
- 2a. Handouts from related module.
- 2b. Shop equipment.
- 3a. Welding Skills: Workbook, Gosse.
- 3b. Fire extinguisher.

Assessment:

Written test
Workbook assignment

Welding II

Unit 14:

Gas tungsten arc safety

Competency:

Critique gas tungsten arc safety practices.

Objectives:

1. Analyze safety standards related to gas tungsten arc safety.
2. Evaluate gas tungsten arc welding station.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 62-69.
- 1b. View video on gas tungsten arc safety.
- 1c. Complete handouts.
- 2a. Complete Welding Skills: Workbook, pp. 3-4.
- 2b. Observe demonstration on setting up gas tungsten arc station.

Instructional Materials and Resources:

- 1a. Welding Skills, Giachino-Weeks,
- 1b. Video on gas tungsten arc safety.
- 1c. Handouts on related module.
- 2a. Welding Skills: Workbook, Gosse.
- 2b. Equipment.

Assessment:

Workbook assignment
Checklist
Written test

Welding II

Unit 15:

Metal fusion

Competency:

Demonstrate welds on metal strips without filler rod.

Objectives:

1. Evaluate setting up and adjusting gas tungsten arc welding machine.
2. Critique fusion of metal strips without filler rod in flat and vertical positions.
3. Critique fusion of metal strips without filler rod in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. View video on TIG welding process.
- 1b. Observe demonstration of setting up and adjusting TIG welding equipment.
- 1c. Read Welding Skills, pp. 202, 209, 215-217, 221.
- 1d. Complete Welding Skills: Workbook, pp. 137-138.
- 1e. Observe demonstration on manipulating a TIG torch.
- 2a. Review Welding Skills, pp. 202, 209, 215-217, 221.
- 2b. Observe demonstration on fusing strips without filler rod in flat and vertical positions.
- 3a. Discuss Welding Skills, pp. 202, 209, 215-217, 221.
- 3b. Observe demonstration on fusing strips without filler rod in horizontal and overhead positions.

Instructional Materials and Resources:

- 1a. Video on TIG welding.
- 1b. TIG welding equipment.
- 1d. Welding Skills Handbook, Gosse.
- 1-3. Metal strips 1 gauge, 8" long.
- 1-3. Welding Skills, Giachino-Weeks.

Assessment:

Weld bead quality checklist
Safety checklist
Measured and cut steel

Welding II

Unit 16:

Welds with filler rod

Competency:

Appraise welds on strips with filler rod.

Objectives:

1. Evaluate welds on metal strips with filler rod in flat and vertical positions.
2. Critique welds on metal strips with filler rod in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. Observe demonstration on welding metal strips with filler rod in flat and vertical positions.
- 1b. Read Welding Skills, pp. 202, 209, 215-217, 221.
- 2a. Observe demonstration on welding metal strips with filler rod in horizontal and overhead positions.
- 2b. Complete Welding Skills: Workbook, pp. 137-138.

Instructional Materials and Resources:

- 1-2. Metal strips 11 gauge x 8".
- 1b. Welding Skills, Giachino-Weeks.
- 2b. Welding Skills Handbook, Gosse.

Assessment:

Weld bead quality checklist
Safety checklist
Measured and cut steel

Welding II

Unit 17:

Butt, lap and tee-welds, 1/8-inch metal

Competency:

Differentiate between 1/8" lap and tee-fillet welds.

Objectives:

1. Critique 1/8" welds on lap and tee-fillet in flat and vertical positions.
2. Appraise 1/8" welds on lap and tee-fillet in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. Observe demonstration of 1/8" lap and tee-fillet welds in flat and vertical positions.
- 1b. Read Welding Skills, pp. 224-225.
- 2a. Observe demonstration of 1/8" lap and tee-fillet welds in horizontal and overhead positions.
- 2b. Complete Welding Skills: Workbook, pp. 137-138.

Instructional Materials and Resources:

- 1-2. 1/8" Metal strips
- 1b. Welding Skills, Giachino-Weeks.
- 2b. Welding Skills: Workbook, Gosse.

Assessment:

Class discussion
Weld bead quality checklist
Safety checklist
Measured and cut steel

Welding II

Unit 18:

Butt, lap and tee-welds, 1/4-inch metal

Competency:

Demonstrate 1/4" lap and tee-fillet welds.

Objectives:

1. Construct 1/4" lap and tee-fillet welds in flat and vertical positions.
2. Construct 1/4" lap and tee-fillet welds in horizontal and overhead positions.

Suggested Instructional Activities:

- 1a. Read Welding Skills, pp. 224-225.
- 1b. Observe demonstration on construction 1/4" lap and tee-fillet welds in flat and vertical positions.
- 1c. Practice TIG welds in the flat and vertical positions.
- 2a. Observe demonstration on constructing 1/4" lap and tee-fillet welds in horizontal and overhead positions.
- 2b. Complete Welding Skills: Workbook, pp. 137-138.
- 2c. Practice TIG welds in the horizontal and overhead positions.

Instructional Materials and Resources:

- 1-2. 1/4" Metal plates
- 1a. Welding Skills, Giachino-Weeks.
- 2b. Welding Skills Workbook, Gosse.

Assessment:

Class discussion
Weld bead quality checklist
Safety checklist
Test in workbook
Measured and cut steel

Welding

BIBLIOGRAPHY

A. BOOKS

Althouse, Turnquist, Bowlitch, Modern Welding.

Giachino, Joseph and William Weeks, Welding Skills, Skokie, Illinois: Gabriel House, Inc.

Gosse, Jonathan, Welding Skills: Workbook, Homewood, Illinois: American Technical Publishers, Inc.

Marion, Nino, Math for Welders; Goodheart Wilcox.

Proctor, Thomas and Jonathan Gosse, Printreading For Welders, Homewood, Illinois: American Technical Publishers, Inc.