

Agriculture Welding (2025)

**PROFESSIONAL
ORGANIZATIONS AND
LEADERSHIP 1.0**

1 Student Leadership in Career Technical Student Organizations (CTSO) and Professional Associations 1.1

- 1 Explore the role of professional organizations and/or associations in the ag small engine repair industry. 1.1.1
 - 2 Define the value, role, and opportunities provided through career technical student organizations. 1.1.2
 - 3 Engage in career exploration and leadership development. 1.1.3
-

2 Supervised Agricultural Experiences 1.2

- 1 Maintain SAE record books. 1.2.1
 - 2 Describe the proficiency award areas related to the SAE program area. 1.2.2
 - 3 Describe necessary steps to receive higher degrees in FFA. 1.2.3
-

LAB ORGANIZATION AND SAFETY PROCEDURES

2.0

1 General Lab Safety Rules and Procedures 2.1

- 1 Describe general shop safety rules and procedures (i.e., pass a safety test). 2.1.1
- 2 Describe the Occupational Safety and Health Administration's (OSHA's) role in ensuring workplace safety. 2.1.2
- 3 Describe and comply with the required use of safety glasses, ear protection, gloves, and shoes (i.e., personal protection equipment [PPE]) during lab/shop activities. 2.1.3
- 4 Operate equipment according to manufacturer and general safety guidelines. 2.1.4
- 5 Operate lifting equipment to manufacturer specifications. 2.1.5
- 6 Describe work area ventilation requirements and best practices. 2.1.6
- 7 Identify safety markings and what they indicate. 2.1.7
- 8 Identify types of fire extinguishers and fire safety equipment. 2.1.8
- 9 Describe classes of fire extinguishers and procedures for using fire extinguishers and fire safety equipment. 2.1.9
- 10 Describe procedures for using eye wash stations. 2.1.10
- 11 Describe and wear appropriate clothing for shop activities. 2.1.11
- 12 Describe safe working procedures when working with high-voltage circuits. 2.1.12
- 13 Describe and follow lockout/tagout procedures. 2.1.13
- 14 Describe information contained on safety data sheets (SDS) and where they are kept. 2.1.14
- 15 Maintain a safe, clean, and organized work area. 2.1.15
- 16 Describe the components of a Hot Work Permit. 2.1.16
- 17 Define a confined space. 2.1.17

2 Hand Tools 2.2

- 1 Identify hand tools and their functions. 2.2.1
- 2 Demonstrate appropriate use of hand tools. 2.2.2
- 3 Demonstrate appropriate cleaning, storage, and maintenance of hand tools. 2.2.3

3 Power Tools and Equipment 2.3

- 1 Describe power tools and their functions. 2.3.1
 - 2 Describe shop equipment and its functions. 2.3.2
 - 3 Demonstrate procedures for using power tools and equipment. 2.3.3
 - 4 Demonstrate procedures for cleaning, storing, and maintaining power tools and equipment. 2.3.4
-

**FUNDAMENTAL PRINT
READING,
MEASUREMENT
TECHNIQUES 3.0**

1 Print Reading and Sketching/Drawing Practices 3.1

- 1 Interpret elements (e.g., title block information, dimensions, line types) of a technical drawing. 3.1.1
 - 2 Interpret industry standard welding symbols. 3.1.2
 - 3 Prepare a materials/cut list from a technical drawing (i.e., bill of material). 3.1.3
-

2 Measuring Techniques 3.2

- 1 Identify industry standard units of measure. 3.2.1
 - 2 Convert between customary standard and metric systems. 3.2.2
 - 3 Calculate size, area, and volume. 3.2.3
 - 4 Convert between fractions and decimals. 3.2.4
 - 5 Measure objects, using measurement tools common to welding. 3.2.5
-

**PROPERTIES OF METALS
4.0**

1 Material Types and Properties 4.1

- 1 Compare ferrous and non-ferrous metals. 4.1.1
 - 2 Identify forms and shapes of structural metals. 4.1.2
-

2 Filler Metals 4.2

- 1 Describe the American Welding Society (AWS) filler metal classification systems. 4.2.1
 - 2 Identify types of filler metals. 4.2.2
 - 3 Describe storage procedures for filler metals. 4.2.3
-

**SHIELDED METAL ARC
WELDING (SMAW)
TECHNIQUES 5.0**

1 Safety Procedures for SMAW 5.1

- 1 Describe types of welding current and polarity. 5.1.1
- 2 Perform safety inspections of SMAW equipment and accessories. 5.1.2
- 3 Maintain SMAW equipment and accessories. 5.1.3

2 SMAW on Carbon Steel 5.2

- 1 Set up for SMAW operations. 5.2.1
 - 2 Perform welds by operating SMAW equipment. 5.2.2
 - 3 Perform welds in the 1F position. 5.2.3
 - 4 Perform welds in the 2F position. 5.2.4
 - 5 Perform welds in the 3F position. 5.2.5
 - 6 Perform welds in the 1G position. 5.2.6
 - 7 Perform welds in the 2G position. 5.2.7
 - 8 Perform welds in the 3G position. 5.2.8
 - 9 Describe welds made in the 4F and 4G plate position. 5.2.9
 - 10 Identify 2G, 5G, and 6G pipe welding positions. 5.2.10
-

WIRE-FEED PROCESSES

6.0

1 Safety Procedures for GMAW/Wire-Feed 6.1

- 1 Describe the use of GMAW equipment 6.1.1
 - 2 Describe GMAW transfer modes (e.g., spray transfer, globular, short circuit, pulse). 6.1.2
 - 3 Perform safety inspections of GMAW equipment and accessories. 6.1.3
 - 4 Maintain GMAW equipment and accessories. 6.1.4
 - 5 Demonstrate safe startup, shutdown, disassembly, and cylinder exchange procedures for GMAW equipment. 6.1.5
-

2 GMAW-S/Wire-Feed on Carbon Steel 6.2

- 1 Set up for GMAW-S operations. 6.2.1
 - 2 Perform welds by operating GMAW-S equipment. 6.2.2
 - 3 Perform welds in the 1F position. 6.2.3
 - 4 Perform welds in the 2F position. 6.2.4
 - 5 Perform welds in the 3F position. 6.2.5
 - 6 Perform welds in the 1G position. 6.2.6
 - 7 Perform welds in the 2G position. 6.2.7
 - 8 Perform welds in the 3G position. 6.2.8
-

3 Flux-Cored Arc Welding 6.3

- 1 Describe the FCAW-G/dual shield process. 6.3.1
 - 2 Describe the FCAW-S/inner shield process. 6.3.2
-

GAS TUNGSTEN ARC WELDING (GTAW) TECHNIQUES 7.0

1 Safety Procedures 7.1

- 1 Perform safety inspections of GTAW equipment and accessories. 7.1.1
 - 2 Maintain GTAW equipment and accessories. 7.1.2
 - 3 Demonstrate safe startup, shutdown, disassembly, and cylinder exchange procedures of GTAW equipment. 7.1.3
-

2 Welds Using GTAW on Carbon Steel 7.2

- 1 Set up for GTAW operations. 7.2.1
 - 2 Operate GTAW equipment. 7.2.2
 - 3 Perform welds in the 1F position. 7.2.3
 - 4 Perform welds in the 2F position. 7.2.4
 - 5 Perform welds in the 1G position. 7.2.5
-

3 Welds Using GTAW on Aluminum 7.3

- 1 Describe setup requirements for GTAW welding aluminum. 7.3.1
 - 2 Describe operation requirements for GTAW welding aluminum. 7.3.2
-

THERMAL CUTTING PROCESSES 8.0

1 Oxy-Fuel Gas Cutting (OFC) 8.1

- 1 Perform safety inspections of OFC equipment and accessories. 8.1.1
 - 2 Maintain OFC equipment and accessories. 8.1.2
 - 3 Demonstrate safe startup, shutdown, disassembly, and cylinder exchange procedures of OFC equipment. 8.1.3
 - 4 Set up for OFC operations. 8.1.4
 - 5 Perform cutting by operating OFC equipment. 8.1.5
 - 6 Perform straight, square-edge cutting operations in the flat position. 8.1.6
 - 7 Perform shape, square-edge cutting operations in the flat position. 8.1.7
 - 8 Perform straight, bevel-edge cutting operations in the flat position. 8.1.8
-

2 Plasma Arc Cutting (PAC) on Carbon Steel and Aluminum 8.2

- 1 Describe the PAC/plasma process. 8.2.1
 - 2 Determine the appropriate PAC/plasma settings for various types of metals. 8.2.2
 - 3 Perform safety inspections of PAC/plasma equipment and accessories. 8.2.3
 - 4 Maintain PAC/plasma equipment and accessories. 8.2.4
 - 5 Set up for PAC/plasma operations. 8.2.5
 - 6 Perform cutting by operating PAC/plasma equipment. 8.2.6
 - 7 Perform straight, square-edge cutting operations in the flat position. 8.2.7
 - 8 Perform shape, square-edge cutting operations in the flat position. 8.2.8
-

WELDING CODES, INSPECTIONS, AND TESTING PRINCIPLES

9.0

1 Welding Codes, Qualifications, and Certifications 9.1

- 1 Describe the role of welding inspection/inspector and testing in the industry. 9.1.1
 - 2 Identify weld imperfections (i.e., discontinuities, defects) and their causes. 9.1.2
 - 3 Describe welder qualification tests. 9.1.3
 - 4 Describe common destructive-testing methods. 9.1.4
 - 5 Describe common nondestructive-testing methods. 9.1.5
 - 6 Perform a visual inspection of welds. 9.1.6
-

FABRICATION FUNDAMENTALS 10.0

1 Base Metal Preparation Fundamentals 10.1

- 1 Clean base metal for welding or cutting. 10.1.1
 - 2 Select the proper joint design based on welding procedure specifications (WPS) or instructor's direction. 10.1.2
 - 3 Mechanically bevel the edge of a mild steel plate, using a hand beveller and grinder. 10.1.3
-

2 Fabrication Techniques 10.2

- 1 Construct projects in proper sequence. 10.2.1
- 2 Demonstrate setup of fabrication area, equipment, and materials. 10.2.2
- 3 Lay out projects from welding prints, using appropriate tools. 10.2.3
- 4 Check for joint misalignment and poor fit-up before and after welding. 10.2.4
- 5 Check work for accuracy according to project plans. 10.2.5
- 6 Describe distortion and methods for controlling it. 10.2.6