Idaho CTE

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