Arkansas CTE

Agricultural Metals: Grades 10, 11, 12

Adopted 2007

Introduction to Agricultural Metals

1.1 Define terminology

1. Prepare a list of terms with definitions 1.1.1

1.2 Examine the importance of agricultural metals

1. Identify examples of metal work in the agricultural industry, including common methods used 1.2.1
2. Use a local directory to identify examples of businesses in the local area that work with metals 1.2.2
3. Investigate and assess emerging technology in agricultural metals and give a report in class 1.2.3

1.3 Discuss appropriate FFA activities and supervised experiences in agricultural metals

1. List FFA activities available in agricultural metals and explain the nature of the activities, including Career Development Events and Proficiency Awards 1.3.1
2. Plan and/or expand supervised experiences in agricultural metal 1.3.2
3. Maintain records on FFA and supervised experience participation 1.3.3

Safety in Agricultural Metals Work

2.1 Define terminology

1. Prepare a list of terms with definitions 2.1.1

2.2 Discuss the meaning and importance of safety in agricultural metals work

1. Explain hazards associated with agricultural metals 2.2.1
2. Demonstrate proper lab procedures and first aid methods for accidents 2.2.2

2.3 Describe the characteristics of a safe work environment

1. Identify safety colors used in agricultural mechanics labs 2.3.1
2. Inspect the agricultural mechanics lab to determine whether proper safety colors are being used 2.3.2

2.4 Describe the use of Personal Protection Equipment (PPE)

1. Identify protective clothing and equipment which should be worn/used when working with agricultural metals 2.4.1
2. Demonstrate how PPE is used 2.4.2
3. Identify protective clothing for agricultural metals work 2.4.3
4. Demonstrate proper actions to take if there is a fire in the agricultural metals lab 2.4.4

Careers and Industry Certification

3.1 Define terminology

1. Prepare a list of terms with definitions 3.1.1

3.2 Explain the meaning and importance of certification

1. Research and report the types of certification available and the training needed for each type 3.2.1
2. Identify the meaning and role of continuing education 3.2.2
3. Identify organizations that promote agricultural metals work, particularly welding 3.2.3

3.3 Discuss employment opportunities in agricultural metals, including welding

1. List examples of jobs in the area of agricultural metals 3.3.1
2. Identify education and skill preparation needed for entering a job 3.3.2
3. Identify personal attributes for success in an agricultural metals occupation 3.3.3

Metals and Metal Work

4.1 Define terminology

1. Prepare a list of terms with definitions 4.1.1

4.2 Discuss safety practices in cold metal work

1. List cold metal safety practices 4.2.1
2. List the steps to follow in case of an accident 4.2.2

4.3 Discuss the kinds of metals used and how to distinguish between them

1. Identify types of metal stock 4.3.1
2. Distinguish between ferrous and nonferrous metals 4.3.2
3. Identify the shapes of metal materials used in agriculture 4.3.3

4.4 Select and use tools in cold metal work

1. Identify tools used in cold metal work 4.4.1
2. Demonstrate the use of the following cold metal tools: hacksaw, cold chisel, fire, and drill 4.4.2

4.5 Discuss the uses of taps and dies in agricultural metals work

1. Identify how tap and drill sizes are selected 4.5.1
2. Use tap to thread inside steel plate 4.5.2
3. Identify how dies are selected based on rod diameter 4.5.3
4. Use a die to thread a steel rod 4.5.4

Tool Fitting

5.1 Define terminology

1. Prepare a list of terms with definitions 5.1.1

5.2 Discuss safety practices in tool fitting

1. List potential hazards in tool fitting work 5.2.1
2. List rules of safe work with tool fitting 5.2.2

5.3 Identify tools that may need fitting

1. List tools that commonly need fitting 5.3.1
2. List the reasons for tool fitting 5.3.2

5.4 Perform needed reconditioning of tools

1. List tools and equipment used in tool fitting 5.4.1
2. Describe use of tools and equipment in tool fitting 5.4.2
3. Demonstrate techniques in tool fitting 5.4.3

Advanced Oxyacetylene Welding and Cutting

6.1 Define terminology

1. Prepare a list of terms with definitions 6.1.1

6.2 Discuss safety precautions with gas welding

1. Use PPE in the operation of gas welding equipment 6.2.1
2. Wear proper protective clothing in operation of gas welding equipment 6.2.2
3. Properly operate gas welding equipment to assure safety, including turning on and off 6.2.3
4. Assure safety of property used with gas welding and cutting and in the vicinity of the work 6.2.4

6.3 Discuss the use of gasses in metal work

1. Name and describe fuel gasses, including acetylene, MAPPÂ® gas, propane, and natural gas 6.3.1
2. Explain the role of oxygen in welding and cutting 6.3.2

6.4 Describe tools and equipment for gas welding and cutting

1. Assemble oxyacetylene equipment 6.4.1
2. Distinguish tanks (cylinders), hoses, and fittings as to use for oxygen and gas 6.4.2
3. Test hoses and connections for proper assembly and leaks 6.4.3

6.5 Describe the correct flame for welding and cutting

1. Demonstrate the proper way to light a torch 6.5.1
2. Demonstrate adjustment to obtain the correct flame for welding and cutting 6.5.2
3. Distinguish between neutral, oxidizing, and carburizing flames 6.5.3

6.6 Explain the process of oxyacetylene cutting

1. Identify temperatures produced by cutting flames 6.6.1
2. Demonstrate proper torch setup and adjustment for cutting 6.6.2
3. Demonstrate the procedure to follow in safely cutting steel 6.6.3

6.7 Explain the kinds and processes of oxyacetylene welding

1. Distinguish between the kinds and uses of oxyacetylene welding 6.7.1
2. Distinguish between welding with and without a filter rod 6.7.2
3. Identify the types and sizes of rods used in welding 6.7.3
4. Demonstrate the ability to weld the following joints: corner weld (without rod), butt weld (with rod), and filet (with rod) 6.7.4

Advanced Shielded Metal Arc Welding (SMAW)

7.1 Define terminology

1. Prepare a list of terms with definitions 7.1.1

7.2 Discuss safety precautions with shielded metal arc welding

1. Use PPE in the operation of welding equipment 7.2.1
2. Wear proper protective clothing in operation of welding equipment 7.2.2
3. Properly operate welding equipment to assure safety, including grounding and turning on and off 7.2.3

7.3 Discuss tools and equipment used in shielded metal arc welding

1. Identify components of shielded metal arc welding equipment 7.3.1
2. Set up a shielded arc welding system for operation 7.3.2

7.4 Discuss the kinds, uses, and storage of electrodes

1. Identify color codes and numbering systems used with electrodes 7.4.1
2. Select the proper kind and size of electrode for a welding job 7.4.2
3. Properly store electrodes to maintain quality 7.4.3

7.5 Discuss procedures in making shielded metal arc welds

1. Identify types of welds and joints, including weave pattern and butt and filet welds 7.5.1
2. Identify kinds of welding positions, including horizontal, vertical, and overhead 7.5.2
3. Adjust welding equipment for proper weld 7.5.3
4. Prepare base metal for welding, including beveling, cleaning, and positioning 7.5.4
5. Correctly place an electrode in a holder and position the holder, strike an arc, and safely run a bead 7.5.5
6. Clean and inspect the quality of a bead or weld 7.5.6

Gas Metal Arc Welding (GMAW)

8.1 Define terminology

1. Prepare a list of terms with definitions 8.1.1

8.2 Discuss safety precautions with gas metal arc welding

1. Use PPE in the operation of welding equipment 8.2.1
2. Wear proper protective clothing in operation of welding equipment, including ear protection 8.2.2
3. Properly operate GMAW/MIG equipment to assure safety 8.2.3

8.3 Discuss tools and equipment used in gas metal arc welding

1. Identify components of GMAW/MIG equipment 8.3.1
2. Set up a GMAW/MIG system for operation 8.3.2

8.4 Discuss procedures in making GMAW/MIG welds

1. Demonstrate proper setting of voltage, wire speed, and shielding gas flow rate 8.4.1
2. Properly prepare base metal for welding 8.4.2
3. Demonstrate proper positioning of welding gun to safely achieve a quality weld 8.4.3

Tungsten Inert Gas Welding (TIG)

9.1 Define terminology

1. Prepare a list of terms with definitions 9.1.1

9.2 Discuss safety precautions with gas tungsten arc welding

1. Use PPE in the operation of welding 9.2.1
2. Wear proper protective clothing in operation of welding equipment 9.2.2
3. Properly operate GTAW/TIG equipment to assure safety 9.2.3

9.3 Discuss tools and equipment used in gas tungsten arc welding

1. Identify components of gas tungsten arc welding equipment, including power supply, welding gun, and gas cylinder with flow meter 9.3.1
2. Set up a gas tungsten arc welding system for operation 9.3.2

9.4 Discuss procedures in making gas tungsten arc welds

1. Demonstrate proper setting of electrical current and polarity and gas flow rate 9.4.1
2. Properly prepare base metal for welding 9.4.2
3. Demonstrate proper positioning of welding gun to safely achieve a quality weld 9.4.3

Plasma Arc Welding and Cutting (PAW and PAC)

10.1 Define terminology

1. Prepare a list of terms with definitions 10.1.1

10.2 Discuss safety precautions with plasma arc welding and cutting

1. Use PPE in the operation of welding and cutting equipment 10.2.1
2. Wear proper protective clothing in operation of welding and cutting equipment 10.2.2
3. Properly operate plasma arc welding and cutting equipment to assure safety 10.2.3

10.3 Discuss tools and equipment used in plasma arc welding and cutting

1. Identify components of plasma arc welding and cutting equipment, including control console, torch (air or water cooled), cooler, and gas cylinder with flow meter 10.3.1
2. Set up a plasma arc welding and cutting system for operation, including handheld and mechanized/computer-operated 10.3.2

10.4 Discuss procedures in making plasma arc welds

1. Demonstrate proper setting of electrical current, gas flow rate, and torch nozzel and electrode 10.4.1
2. Properly prepare base metal for welding or cutting 10.4.2
3. Demonstrate proper plasma arc welding and cutting to safely achieve a quality work 10.4.3