Welding

Course Design

2007-2008

Course Information

Organization Eastern Arizona College

Division Industrial Technology Education

Course Number MSP 110

Title Welding

Credits 2

Developed by Newell Dryden

Lecture/Lab Ratio 1 Lecture/3 Lab

Transfer Status

ASU	NAU	UA
Non Transferable	CTE Departmental Elective	Non Transferable

Activity Course No

CIP Code 48.0500

Assessment Mode Pre/Post Test (23 Questions/23 Points)

Semester Taught Upon Request

GE Category None

Separate Lab No

Awareness Course No

Intensive Writing Course No

Prerequisites

None

Educational Value

The target population is machine shop and automotive majors who will need these skills in their chosen field, and community interest students who would like to improve their skills and learn more about welding procedures.

Description

This course teaches the principles of arc and oxyacetylene welding, flame cutting, and brazing with emphasis on mastering basic welding techniques.

Supplies

Supplies are provided by the department

Competencies and Performance Standards

1. Operate all of the welding shop equipment in a safe and careful manner.

Learning objectives

What you will learn as you master the competency:

a. List all of the safety rules which apply to the welding shop.

b. Be alert to situations which produce specific hazards in the welding environment.

c. Identify The causes of accidents in case studies.

d. Develop the habits of working safely in all situations.

Performance Standards

Competence will be demonstrated:

o on the welding and cutting equipment in the EAC welding shop.

Criteria - Performance will be satisfactory when:

o learner works safely and uses appropriate safety gear with each piece of welding equipment.

o learner sets up all of the welding equipment correctly for the required conditions.

o learner operates all of the welding equipment safely.

o learner uses all appropriate safety procedures while using welding and cutting equipment.

2. Operate the O-A cutting torch and plasma torch to produce accurate cuts in metal projects.

Learning objectives

What you will learn as you master the competency:

a. Diagram the cutting processes and explain how they work.

b. List the components of an ox-acetylene cutting torch and explain how they work.

c. List the components of a plasma torch and explain how they work.

d. Demonstrate the proper cutting techniques using O-A and plasma arc cutting.

Performance Standards

Competence will be demonstrated:

o After projects are laid out, parts are cut using the equipment in the EAC welding shop.

Criteria - Performance will be satisfactory when:

o learner installs components and adjusts each piece of cutting equipment correctly.

o learner makes precise and accurate cuts on different thicknesses and shapes of metal using the oxy-acetylene torch, the plasma cutter, the arc-air torch, the power shear, the iron worker, the horizontal band saw and the abrasive cut off saw.

o learner produces a minimum of waste in the cutting process.

3. Prepare edges and joints for effective weld procedures.

Learning objectives

What you will learn as you master the competency:

a. Explain the reasons for proper edge joint preparation.

b. Diagram different edge joint preparation for a variety of welded joints.

c. List the reasons for joint spacing in square butt joints.

d. Demonstrate the increased strength of a welded joint which occurs when proper edge joint preparation has taken place.

Performance Standards

Competence will be demonstrated:

o by using the shears, saws, torches and cutters in the EAC welding shop correctly.

o by using the measuring and layout tools to produce accurate layouts.

Criteria - Performance will be satisfactory when:

o learner demonstrates correct use of the O-A torch for proper beveling and scarfing.

o learner demonstrates the correct use of the horizontal band saw and the iron worker for edge preparation.

o learner prepares 5 basic weld joints with correct edge preparation.

4. Select the proper electrodes for various welding applications on assigned projects.

Learning objectives

What you will learn as you master the competency:

a. Describe the importance of tensile strength in choosing electrodes.

b. List the ingredients in stick welding electrode coatings.

c. Explain the difference between fast fill and fast freeze electrodes.

d. Show which electrodes can be used in all positions.

e. Demonstrate the effectiveness of low hydrogen electrodes in welding new steel.

Performance Standards

Competence will be demonstrated:

o using the equipment and supplies in the EAC welding shop.

Criteria - Performance will be satisfactory when:

o learner lists the criteria for selecting electrodes.

o learner describes the advantages and disadvantages of each electrode.

o learner defines the special purpose of each commonly used electrode.

o learner chooses the correct electrode for each assigned lab project.

5. Produce sound welds in flat and horizontal positions using the O-A torch.

Learning objectives

What you will learn as you master the competency:

a. List the components of a sound weld.

b. Diagram the operations of producing a weld with good penetration and proper configuration with both O-A and Arc welding techniques.

c. Recognize the distinct sound of an arc welding operation that is being done correctly.

d. Develop a steady hand and a keen eye for detail in producing a good weld.

Performance Standards

Competence will be demonstrated:

o Using the welding equipment in the EAC welding shop.

Criteria - Performance will be satisfactory when:

o learner recognizes all of the components of correct welding procedure.

o learner sets up the arc welder correctly for the conditions at hand.

o learner sets up the oxy-acetylene torch correctly for the required job.

o learner manipulates the stinger and rod to produce sound welds.

o learner handles the torch with skill to produce high quality gas welds.

o learner is able to produce sound welds in the flat and horizontal position with both gas welding and arc welding.

6. Produce sound welds in flat and horizontal positions using the arc welder.

Learning objectives

What you will learn as you master the competency:

a. Recognize the appearance and the sound of a good weld as it progresses.

b. Manipulate the welding rod to produce maximum penetration and good weld beads.

c. Produce good sound welds with various rods and arc welding machines.

Performance Standards

Competence will be demonstrated:

o Using the arc welding machines in the EAC machine shop.

o Producing a series of assigned weld plates and submitting for evaluation.

Criteria - Performance will be satisfactory when:

o learner identifies all of the components of various arc welding machines.

o learner lists the advantages and disadvantages of each type of arc welding machine.

o learner sets up the arc welder correctly for each job.

o learner manipulates the electrode holder and the rod to produce sound welds in the flat and horizontal positions.

7. Complete six basic weld joints with both arc and gas welding.

Learning objectives

What you will learn as you master the competency:

a. List the factors which must be considered in proper weld joint design.

b. Describe the effect on the welded joint when the amount of weld material is insufficient.

c. Using the oxy-acetylene torch on 16 gage steel substrate complete the following weld

joints: butt, flange, lap, inside corner, outside corner and plug weld.

d. Using the arc welding equipment complete the following weld joints; lap, tee, butt, outside corner, groove, and pad.

Performance Standards

Competence will be demonstrated:

o Using the welding and cutting equipment in the EAC welding shop.

Criteria - Performance will be satisfactory when:

o learner uses both gas welding and arc welding techniques to produce sound butt welds and flange welds.

o learner uses both gas welding and arc welding techniques to produce sound outside corner and inside corner welds.

o learner uses both gas welding and arc welding techniques to produce sound tee joint and lap joint welds.

8. Produce sound braze joints with brass and silver filler material.

Learning objectives

What you will learn as you master the competency:

a. Describe and define the brazing process.

b. Diagram the physical and chemical process which occurs in brazing.

c. Demonstrate the effects of capillary action in brazing.

d. List the different filler materials which are used for brazing operations.

e. Demonstrate the correct procedures for joining two steel parts together with solid braze joints.

Performance Standards

Competence will be demonstrated:

o using the torches and instruments in the EAC welding shop.

Criteria - Performance will be satisfactory when:

o learner correctly describes the chemical processes which take place brazing.

o learner correctly describes the physical processes which take place in brazing.

o learner demonstrates the method for producing a sound lap joint in brazing.

o learner effectively does braze welding with a brass filler rod.

o learner completes a silver braze joint with silver and silicon rod.

Types of Instruction

Lecture

Shop work in the welding lab

Grading Information

Grading Scale

A 90 to 100% of total points on tests and projects.

B 80% to 89% of total points.

C 70% to 79% of total points.

D 59% to 69% of total points

F Less than 59% of total points