

DOCUMENT RESUME

ED 338 852

CE 059 542

TITLE Welding. Ohio's Competency Analysis Profile.  
 INSTITUTION Ohio State Univ., Columbus. Vocational Instructional Materials Lab.  
 SPONS AGENCY Ohio State Dept. of Education, Columbus. Div. of Vocational and Career Education.  
 PUB DATE 91  
 NOTE 28p.; For related documents, see CE 059 517-541.  
 AVAILABLE FROM Vocational Instructional Materials Lab, Ohio State University, 1900 Kenny Road, Columbus, OH 43210-1090 (\$1.50).  
 PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)  
 EDRS PRICE MF01/PC02 Plus Postage.  
 DESCRIPTORS Blueprints; \*Competency Based Education; Decision Making; \*Employment Potential; Entrepreneurship; Entry Workers; Ethics; High Schools; Industrial Education; Job Analysis; Job Search Methods; \*Job Skills; Lifelong Learning; Postsecondary Education; Problem Solving; Safety; State Standards; Task Analysis; \*Welding  
 IDENTIFIERS DACUM Process; Ohio

ABSTRACT

This Ohio Competency Analysis Profile (OCAP), derived from a modified Developing a Curriculum (DACUM) process, is a comprehensive and verified employer competency list for a welding program. It contains units (with or without subunits), competencies, and competency builders that identify the occupational, academic, and employability skills needed to enter this occupational area. Within the outline are three levels of items: core, advancing, and futuring. Core items are essential to entry-level employment and are required to be taught and will be the basis for questions on the state vocational competency tests. Advancing items are needed to advance in a given occupation. Futuring items are needed to enter and remain in a given occupation 3 to 4 years from now. This OCAP contains 10 units: (1) safety and housekeeping; (2) materials science, inspection, testing; (3) blueprints; (4) oxyfuel welding; (5) shielded metal arc welding; (6) thermal cutting; (7) gas metal arc welding; (8) gas tungsten arc welding; (9) flux core arc welding; and (10) employability skills. (YLB)

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# O C A P

ED 338852

## OHIO'S COMPETENCY ANALYSIS PROFILE

### WELDING

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CE 059 542



# What is OCAP?

"A comprehensive and verified employer competency list will be developed and kept current for each program." This is the second objective of Imperative 3 of the *Action Plan for Accelerating the Modernization of Vocational Education: Ohio's Future at Work*. Ohio's Competency Analysis Profile (OCAP) lists are the Division of Vocational and Career Education's response to that objective. OCAP lists evolve from a modified DACUM process involving business, industry, labor, and community agency representatives from throughout Ohio. The OCAP process is directed by the Vocational Instructional Materials Laboratory at The Ohio State University's Center on Education and Training for Employment.

## How is OCAP used?

Each OCAP contains units (with and without subunits), competencies, and competency builders that identify the occupational, academic, and employability skills needed to enter a given occupation or occupational area. Within that outline there are three levels of items: core, advancing, and futuring. Core items are essential to entry-level employment. These items are required to be taught and will be the basis for questions on the state vocational competency tests (scheduled to begin in FY93). Advancing items (marked with one asterisk) are needed to advance in a given occupation. Futuring items (marked with two asterisks) are needed to enter and remain in a given occupation three to four years from now.

Districts may add as many units, subunits, competencies, and competency builders as desired to reflect local employment needs, trends, and specialties. Local advisory committees should be actively involved in the identification and verification of additional items. Using OCAP lists, instructors will be able to formulate their courses of study and monitor competency gains via the new competency testing program.

The **Employability Skills** portion of this list was verified by the following employer panel:

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## OHIO COMPETENCY ANALYSIS PROFILE

### WELDING

#### UNIT 1: Safety and Housekeeping

##### COMPETENCY 1.0.1: Use and care for personal safety equipment

###### COMPETENCY BUILDERS:

- 1.0.1.1 Wear appropriate protective face shields and/or goggles
- 1.0.1.2 Sanitize shared shields and/or goggles
- 1.0.1.3 Wear respirator when appropriate
- 1.0.1.4 Sanitize shared respirators
- 1.0.1.5 Wear gloves, aprons, and leggings when appropriate
- 1.0.1.6 Wear safety shoes

##### COMPETENCY 1.0.2: Maintain a clean and safe work station

###### COMPETENCY BUILDERS:

- 1.0.2.1 Dispose of used consumables properly
- 1.0.2.2 Return unused consumables to proper storage facility
- 1.0.2.3 Check equipment and store tools
- 1.0.2.4 Protect others from welding hazards

##### COMPETENCY 1.0.3: Demonstrate emergency procedures

###### COMPETENCY BUILDERS:

- 1.0.3.1 Take a safety survey of weld shop
- 1.0.3.2 Locate fire extinguishers and fire exits
- 1.0.3.3 Participate in mock emergency drill

##### COMPETENCY 1.0.4: Handle compressed gases properly

###### COMPETENCY BUILDERS:

- 1.0.4.1 Explain dangers of grease and oil use with compressed gases
- 1.0.4.2 Connect hoses and regulators
- 1.0.4.3 Set up and shut down (bleed) manifold lines and cylinders
- 1.0.4.4 Change cylinders on manifold lines
- 1.0.4.5 Handle all cylinders with extreme care
- 1.0.4.6 Secure cylinders
- 1.0.4.7 Mark empty cylinders
- 1.0.4.8 Store empty cylinders and replace caps
- 1.0.4.9 Handle pressurized hoses properly

\* Advancing

\*\* Futuring

**Welding--8/91**

**COMPETENCY 1.0.5: Follow directions on hazardous materials and tags/labels**

**COMPETENCY BUILDERS:**

- 1.0.5.1 Interpret Material Safety Data Sheet (MSDS)
- 1.0.5.2 Check shop tags/labels for legibility

**COMPETENCY 1.0.6: Follow manufacturers' directions on installation, operation, and maintenance of equipment**

**COMPETENCY BUILDERS:**

- 1.0.6.1 Set up preventative maintenance (PM) systems for power sources
- 1.0.6.2 Perform daily PM check on welding equipment

**UNIT 2: Materials Science/Inspection/Testing**

**COMPETENCY 2.0.1: Identify materials**

**COMPETENCY BUILDERS:**

- 2.0.1.1 Perform spark test and magnetic test
- 2.0.1.2 Refer to bill of material
- 2.0.1.3 Perform scratch test with file

**COMPETENCY 2.0.2: Test welds**

**COMPETENCY BUILDERS:**

- 2.0.2.1 Perform destructive tests
- 2.0.2.2 Perform nondestructive tests
- 2.0.2.3 List types of, causes of, and corrective actions for weld and cutting defects by process
- 2.0.2.4 Troubleshoot problems after each welding process

**COMPETENCY 2.0.3: Demonstrate methods of distortion control**

**COMPETENCY BUILDERS:**

- 2.0.3.1 Make weldment with prepositioned parts
- 2.0.3.2 Make weldment with balanced welding sequence
- 2.0.3.3 Make weldment with restrained components

\* Advancing  
\*\* Futuring

**COMPETENCY 2.0.4: Demonstrate knowledge of basic welding metallurgy**

**COMPETENCY BUILDERS:**

- 2.0.4.1 Draw the iron carbon diagram
- 2.0.4.2 List each temper color and its temperature
- 2.0.4.3 Make cold chisel
- 2.0.4.4 Anneal cold chisel

**COMPETENCY 2.0.5: Bonding of non-ferrous materials\*\***

**COMPETENCY BUILDERS:**

- 2.0.5.1 Bond plastics using fusion process\*\*
- 2.0.5.2 Bond plastics using adhesive(s)\*\*
- 2.0.5.3 Bond aluminum to aluminum using adhesive(s)\*\*
- 2.0.5.4 Bond aluminum to plastics using adhesive(s)\*\*
- 2.0.5.5 Bond ceramics to ceramics\*\*
- 2.0.5.6 Bond ceramics to metals\*\*

**UNIT 3: Blueprints**

**COMPETENCY 3.0.1: Interpret blueprints**

**COMPETENCY BUILDERS:**

- 3.0.1.1 Locate bill of materials and identify base metals
- 3.0.1.2 Identify components of title block
- 3.0.1.3 Determine and list types of welds
- 3.0.1.4 Define blueprint abbreviation
- 3.0.1.5 Perform basic blueprint mathematical functions

**COMPETENCY 3.0.2: Interpret drawings and symbols**

**COMPETENCY BUILDERS:**

- 3.0.2.1 Identify all lines
- 3.0.2.2 Identify the three views on a drawing
- 3.0.2.3 Make a three-view sketch from a simple isometric or perspective drawing
- 3.0.2.4 Identify components of welding symbols
- 3.0.2.5 Draw the five basic welding joints
- 3.0.2.6 Make table of joints and basic welding symbols
- 3.0.2.7 Add welding symbols to simple weldment drawing

\* Advancing

\*\* Futuring

## **Welding--8/91**

**COMPETENCY 3.0.3: Identify and interpret welding procedure(s)**

**COMPETENCY BUILDERS:**

- 3.0.3.1 List specified welding procedures
- 3.0.3.2 Identify welding process(es)
- 3.0.3.3 Set up welding parameters as per data shown in welding procedure(s)

**COMPETENCY 3.0.4: Use measuring devices**

**COMPETENCY BUILDERS:**

- 3.0.4.1 Measure with 6" scale, square, protractor, 25' tape, and weld gauges
- 3.0.4.2 Measure with micrometer, vernier calipers, pi tape, and circumference rule
- 3.0.4.3 Measure joint preparations, fit-up and weld size

**COMPETENCY 3.0.5: Determine welding sequence**

**COMPETENCY BUILDERS:**

- 3.0.5.1 Plan welding sequence from blueprint
- 3.0.5.2 Make weldment per sequence

**COMPETENCY 3.0.6: Layout for duct work\***

**COMPETENCY BUILDERS:**

- 3.0.6.1 Plan duct work from drawing\*
- 3.0.6.2 Make layout and model\*

## **UNIT 4: Oxyfuel Welding (OFW)**

**COMPETENCY 4.0.1: Set up and test oxyfuel equipment**

**COMPETENCY BUILDERS:**

- 4.0.1.1 Attach regulator to fuel supply
- 4.0.1.2 Attach torch light and adjust welding torch
- 4.0.1.3 Shut down and secure welding equipment

\* Advancing  
\*\* Futuring

**COMPETENCY 4.0.2: OFW mild steel**

**COMPETENCY BUILDERS:**

- 4.0.2.1 Identify joint design and type weld
- 4.0.2.2 Select filler rod and tip size
- 4.0.2.3 Determine weld position and make weld

**COMPETENCY 4.0.3: OFW braze mild steel**

**COMPETENCY BUILDERS:**

- 4.0.3.1 Identify job requirements
- 4.0.3.2 Select filler rod and tip size
- 4.0.3.3 Clean and prepare joint
- 4.0.3.4 Determine position
- 4.0.3.5 Apply flux and complete brazing and soldering procedures

**COMPETENCY 4.0.4: OFW braze/solder cupric and ferrous metals**

**COMPETENCY BUILDERS:**

- 4.0.4.1 Identify joint design
- 4.0.4.2 Determine type and size of filler wire and tip
- 4.0.4.3 Clean and prepare joint
- 4.0.4.4 Determine position
- 4.0.4.5 Apply flux and complete brazing/soldering procedure

**COMPETENCY 4.0.5: Hardface with oxyfuel\***

**COMPETENCY BUILDERS:**

- 4.0.5.1 Determine preparation needed\*
- 4.0.5.2 Select tip, filler rod size, and type\*
- 4.0.5.3 Determine position\*
- 4.0.5.4 Complete hardfacing operation\*

**COMPETENCY 4.0.6: OFW pipe\***

**COMPETENCY BUILDERS:**

- 4.0.6.1 Identify joint position\*
- 4.0.6.2 Select filler rod and tip size\*
- 4.0.6.3 Determine position\*
- 4.0.6.4 Make weld\*

\* Advancing  
\*\* Futuring

## **Welding--8/91**

### **COMPETENCY 4.0.7: OFW cast iron\***

#### **COMPETENCY BUILDERS:**

- 4.0.7.1 Identify type of joint preparation\*
- 4.0.7.2 Determine filler rod and tip size\*
- 4.0.7.3 Determine necessity of preheat and postheat\*
- 4.0.7.4 Select flux and make weld\*

## **UNIT 5: Shielded Metal Arc Welding (SMAW)**

### **COMPETENCY 5.0.1: Set up equipment for SMAW**

#### **COMPETENCY BUILDERS:**

- 5.0.1.1 Determine operation requirements
- 5.0.1.2 Handle electrodes properly
- 5.0.1.3 Connect input power connections
- 5.0.1.4 Connect correct electrode and ground cable connections
- 5.0.1.5 Test performance of welding machine

### **COMPETENCY 5.0.2: SMAW steel structural shapes using predetermined welding procedure(s)**

#### **COMPETENCY BUILDERS:**

- 5.0.2.1 Identify joint design
- 5.0.2.2 Determine electrode size and type
- 5.0.2.3 Determine position
- 5.0.2.4 Determine polarity and adjust current
- 5.0.2.5 Make weld

### **COMPETENCY 5.0.3: SMAW mild steel using predetermined welding procedures**

#### **COMPETENCY BUILDERS:**

- 5.0.3.1 Identify joint design
- 5.0.3.2 Determine electrode size and type
- 5.0.3.3 Determine position
- 5.0.3.4 Determine polarity and adjust current
- 5.0.3.5 Make weld

- \* Advancing
- \*\* Futuring

**COMPETENCY 5.0.4: SMAW stainless steel using predetermined welding procedures**

**COMPETENCY BUILDERS:**

- 5.0.4.1 Identify joint design
- 5.0.4.2 Determine electrode size and type
- 5.0.4.3 Determine position
- 5.0.4.4 Determine polarity and adjust current
- 5.0.4.5 Make weld

**COMPETENCY 5.0.5: SMAW steel pipe using predetermined welding procedures\***

**COMPETENCY BUILDERS:**

- 5.0.5.1 Identify joint design\*
- 5.0.5.2 Determine alignment procedure\*
- 5.0.5.3 Determine electrode size and type\*
- 5.0.5.4 Determine position\*
- 5.0.5.5 Determine polarity and adjust current\*
- 5.0.5.6 Make weld\*

**COMPETENCY 5.0.6: SMAW hardfacing using predetermined welding procedure\***

**COMPETENCY BUILDERS:**

- 5.0.6.1 Prepare base metal for hardfacing\*
- 5.0.6.2 Determine electrode size and type\*
- 5.0.6.3 Determine position\*
- 5.0.6.4 Determine polarity and adjust current\*
- 5.0.6.5 Make weld\*

**COMPETENCY 5.0.7: SMAW cast iron using predetermined welding procedure\***

**COMPETENCY BUILDERS:**

- 5.0.7.1 Identify joint design\*
- 5.0.7.2 Determine electrode size and type\*
- 5.0.7.3 Determine position\*
- 5.0.7.4 Determine polarity and adjust current\*
- 5.0.7.5 Determine necessity of preheat and postheat\*
- 5.0.7.6 Make weld\*

\* Advancing  
\*\* Futuring

**Welding--8/91**

**UNIT 6: Thermal Cutting**

**COMPETENCY 6.0.1: Set up and cut with plasma arc**

**COMPETENCY BUILDERS:**

- 6.0.1.1 Identify job requirements
- 6.0.1.2 Lay out material using center punch or scribe
- 6.0.1.3 Select proper nozzle size and proper gas and gas pressure
- 6.0.1.4 Make cut and gouge

**COMPETENCY 6.0.2: Set up and cut with carbon arc**

**COMPETENCY BUILDERS:**

- 6.0.2.1 Identify job requirements
- 6.0.2.2 Lay out material using center punch or scribe
- 6.0.2.3 Select proper electrode and size and gas pressure
- 6.0.2.4 Make cut and gouge

**COMPETENCY 6.0.3: Set up and cut with oxyfuel**

**COMPETENCY BUILDERS:**

- 6.0.3.1 Identify job requirements
- 6.0.3.2 Lay out material using center punch or scribe
- 6.0.3.3 Select proper tip size and proper gases and gas pressures
- 6.0.3.4 Make cut and gouge

**COMPETENCY 6.0.4: Set up and cut with SMAW**

**COMPETENCY BUILDERS:**

- 6.0.4.1 Identify job requirements
- 6.0.4.2 Lay out material using center punch or scribe
- 6.0.4.3 Select proper electrode and size
- 6.0.4.4 Make cut and gouge

**COMPETENCY 6.0.5: Identify advanced cutting systems\***

**COMPETENCY BUILDERS:**

- 6.0.5.1 Identify CNC cutting systems\*
- 6.0.5.2 Identify laser cutting systems\*
- 6.0.5.3 Identify pressurized fluid cutting systems\*

\* Advancing  
\*\* Futuring

**UNIT 7: Gas Metal Arc Welding (GMAW)**

**COMPETENCY 7.0.1: Set up equipment for GMAW**

**COMPETENCY BUILDERS:**

- 7.0.1.1 Determine operation requirements
- 7.0.1.2 Connect machine to power supply
- 7.0.1.3 Attach ground cable to work piece
- 7.0.1.4 Connect welding gun to wire feeder
- 7.0.1.5 Maintain and service welding gun
- 7.0.1.6 Connect water supply to welding gun (if required)
- 7.0.1.7 Install and adjust flow meter
- 7.0.1.8 Attach filler wire reel to feed assembly
- 7.0.1.9 Adjust wire feed speed, amperage, and voltage
- 7.0.1.10 Test performance of welding machine

**COMPETENCY 7.0.2: GMAW stainless steel using predetermined welding procedure**

**COMPETENCY BUILDERS:**

- 7.0.2.1 Identify joint design
- 7.0.2.2 Select and install appropriate wire size and type and correct tip
- 7.0.2.3 Determine weld position
- 7.0.2.4 Install and adjust flow meter
- 7.0.2.5 Adjust wire feed speed, amperage, and voltage
- 7.0.2.6 Make weld

**COMPETENCY 7.0.3: GMAW aluminum using predetermined welding procedure**

**COMPETENCY BUILDERS:**

- 7.0.3.1 Identify joint design
- 7.0.3.2 Select and install appropriate wire size and type and correct tip
- 7.0.3.3 Determine position
- 7.0.3.4 Install and adjust flow meter
- 7.0.3.5 Adjust wire feed speed, amperage, and voltage
- 7.0.3.6 Perform preheat operations
- 7.0.3.7 Make weld

\* Advancing  
\*\* Futuring

**Welding--8/91**

**COMPETENCY 7.0.4: GMAW steel structural shapes using predetermined welding procedure**

**COMPETENCY BUILDERS:**

- 7.0.4.1 Identify joint design
- 7.0.4.2 Select and install appropriate wire size and type and correct tip
- 7.0.4.3 Determine position
- 7.0.4.4 Install and adjust flow meter
- 7.0.4.5 Adjust wire feed speed, amperage, and voltage
- 7.0.4.6 Perform preheat operations
- 7.0.4.7 Make weld

**COMPETENCY 7.0.5: GMAW mild steels using predetermined welding procedure**

**COMPETENCY BUILDERS:**

- 7.0.5.1 Identify joint design
- 7.0.5.2 Select and install appropriate wire size and type and correct tip
- 7.0.5.3 Determine weld position
- 7.0.5.4 Install and adjust flow meter
- 7.0.5.5 Adjust wire feed, amperage, and voltage
- 7.0.5.6 Make weld

**COMPETENCY 7.0.6: GMAW pipe using predetermined welding procedure\***

**COMPETENCY BUILDERS:**

- 7.0.6.1 Identify joint design\*
- 7.0.6.2 Determine alignment procedure\*
- 7.0.6.3 Select and install appropriate wire size and type and correct tip\*
- 7.0.6.4 Determine weld position\*
- 7.0.6.5 Install and adjust flow meter\*
- 7.0.6.6 Adjust wire feed speed, amperage, and voltage\*
- 7.0.6.7 Make weld\*

**COMPETENCY 7.0.7: Identify advanced GMAW\***

**COMPETENCY BUILDERS:**

- 7.0.7.1 Identify automated systems\*
- 7.0.7.2 Identify robotic systems\*
- 7.0.7.3 Identify plasma arc systems\*
- 7.0.7.4 Identify pulse arc systems\*

\* Advancing  
\*\* Futuring

**UNIT 8: Gas Tungsten Arc Welding (GTAW)**

**COMPETENCY 8.0.1: Set up equipment for GTAW**

**COMPETENCY BUILDERS:**

- 8.0.1.1 Determine operation requirements
- 8.0.1.2 Connect machine to power supply
- 8.0.1.3 Connect ground cable to workplace
- 8.0.1.4 Connect water supply (if required)
- 8.0.1.5 Install flow meter connections
- 8.0.1.6 Install torch assembly connections
- 8.0.1.7 Inspect all controls
- 8.0.1.8 Test performance of welding machine

**COMPETENCY 8.0.2: GTAW stainless steel using predetermined welding procedure**

**COMPETENCY BUILDERS:**

- 8.0.2.1 Identify joint design
- 8.0.2.2 Select electrode size and type and install in torch
- 8.0.2.3 Determine position
- 8.0.2.4 Determine polarity and adjust current
- 8.0.2.5 Adjust inert gas flow
- 8.0.2.6 Set and adjust high frequency
- 8.0.2.7 Make weld

\* Advancing  
\*\* Futuring

## Welding--8/91

**COMPETENCY 8.0.3: GTAW mild steel using predetermined welding procedure**

### COMPETENCY BUILDERS:

- 8.0.3.1 Identify joint design
- 8.0.3.2 Select electrode size and type and install in torch
- 8.0.3.3 Select filler type and size
- 8.0.3.4 Determine position
- 8.0.3.5 Determine polarity and adjust current
- 8.0.3.6 Adjust inert gas flow
- 8.0.3.7 Set and adjust high frequency
- 8.0.3.8 Make weld

**COMPETENCY 8.0.4: GTAW aluminum using predetermined welding procedure**

### COMPETENCY BUILDERS:

- 8.0.4.1 Identify joint design
- 8.0.4.2 Select electrode size and type and install in torch
- 8.0.4.3 Select filler type and size
- 8.0.4.4 Determine position
- 8.0.4.5 Determine polarity and adjust current
- 8.0.4.6 Adjust inert gas flow
- 8.0.4.7 Set and adjust high frequency
- 8.0.4.8 Determine preheat sequence
- 8.0.4.9 Make weld

**COMPETENCY 8.0.5: GTAW pipe using predetermined welding procedure\***

### COMPETENCY BUILDERS:

- 8.0.5.1 Identify joint design\*
- 8.0.5.2 Align pipe\*
- 8.0.5.3 Select electrode size and type and install in torch\*
- 8.0.5.4 Select filler type and size\*
- 8.0.5.5 Determine position\*
- 8.0.5.6 Determine polarity and adjust current\*
- 8.0.5.7 Adjust inert gas flow\*
- 8.0.5.8 Set and adjust high frequency\*
- 8.0.5.9 Make weld\*

\* Advancing  
\*\* Futuring

**COMPETENCY 8.0.6: GTAW specialty metals using predetermined welding procedure\***

**COMPETENCY BUILDERS:**

- 8.0.6.1 Determine welding practice(s) for GTAW hardfacing\*
- 8.0.6.2 Determine welding practice(s) for GTAW reactive metals\*
- 8.0.6.3 Determine welding practice(s) for GTAW corrosion-resistant metals\*
- 8.0.6.4 Determine welding practice(s) for GTAW tool and die steels\*
- 8.0.6.5 Determine welding practice(s) for GTAW cast iron\*

**COMPETENCY 8.0.7: Identify advanced GTAW systems\***

**COMPETENCY BUILDERS:**

- 8.0.7.1 Identify automatic GTAW systems\*
- 8.0.7.2 Identify robotic GTAW systems\*
- 8.0.7.3 Identify pulse arc GTAW systems\*

**UNIT 9: Flux Core Arc Welding (FCAW)**

**COMPETENCY 9.0.1: Set up equipment for FCAW**

**COMPETENCY BUILDERS:**

- 9.0.1.1 Determine operation requirements
- 9.0.1.2 Connect machine to power supply
- 9.0.1.3 Attach ground cable to work piece
- 9.0.1.4 Connect gun to wire feeder
- 9.0.1.5 Connect water supply to welding gun (if required)
- 9.0.1.6 Install and adjust flow meter (if required)
- 9.0.1.7 Attach filler wire reel to feed assembly
- 9.0.1.8 Adjust wire feed speed, amperage, and voltage
- 9.0.1.9 Test performance of welding machine

**COMPETENCY 9.0.2: FCAW mild steels using predetermined welding procedure**

**COMPETENCY BUILDERS:**

- 9.0.2.1 Identify joint design
- 9.0.2.2 Select and install appropriate wire size and type and correct tip
- 9.0.2.3 Determine weld position
- 9.0.2.4 Connect water supply to welding gun (if required)
- 9.0.2.5 Install and adjust flow meter (if required)
- 9.0.2.6 Adjust wire feed speed, amperage, and voltage
- 9.0.2.7 Make weld

\* Advancing

\*\* Futuring

**Welding--8/91**

**COMPETENCY 9.0.3: FCAW stainless steel using predetermined welding procedure**

**COMPETENCY BUILDERS:**

- 9.0.3.1 Identify joint design
- 9.0.3.2 Select and install appropriate wire size and type and correct tip
- 9.0.3.3 Determine position
- 9.0.3.4 Connect water supply to welding gun (if required)
- 9.0.3.5 Install and adjust flow meter (if required)
- 9.0.3.6 Adjust wire feed speed, amperage, and voltage
- 9.0.3.7 Make weld

**COMPETENCY 9.0.4: FCAW steel structural shape using predetermined welding procedure(s)**

**COMPETENCY BUILDERS:**

- 9.0.4.1 Identify joint design
- 9.0.4.2 Select and install appropriate wire size and type and correct tip
- 9.0.4.3 Determine weld position
- 9.0.4.4 Install and adjust flow meter (if required)
- 9.0.4.5 Connect water supply to welding gun (if required)
- 9.0.4.6 Adjust wire feed speed, amperage, and voltage
- 9.0.4.7 Make weld

**COMPETENCY 9.0.5: FCAW pipe using predetermined welding procedure\***

**COMPETENCY BUILDERS:**

- 9.0.5.1 Identify joint design\*
- 9.0.5.2 Determine alignment procedure\*
- 9.0.5.3 Select and install appropriate wire size and type and correct tip\*
- 9.0.5.4 Determine weld position\*
- 9.0.5.5 Connect water supply to welding gun (if required)\*
- 9.0.5.6 Install and adjust flow meter (if required)\*
- 9.0.5.7 Adjust wire feed speed, amperage, and voltage\*
- 9.0.5.8 Make weld\*

**COMPETENCY 9.0.6: Identify advanced FCAW systems\***

**COMPETENCY BUILDERS:**

- 9.0.6.1 Identify automatic FCAW systems\*
- 9.0.6.2 Identify robotic FCAW systems\*

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**COMPETENCY 9.0.7: FCAW hardface using predetermined welding procedure\***

**COMPETENCY BUILDERS:**

- 9.0.7.1 Prepare base metal for hardfacing\*
- 9.0.7.2 Select and install appropriate wire size and type and correct tip\*
- 9.0.7.3 Determine position\*
- 9.0.7.4 Install and adjust flow meter (if required)\*
- 9.0.7.5 Adjust wire feed speed, amperage, and voltage\*

**UNIT 10: Employability Skills**

**SUBUNIT 10.1: Career Development**

**COMPETENCY 10.1.1: Investigate career options**

**COMPETENCY BUILDERS:**

- 10.1.1.1 Determine interests and aptitudes
- 10.1.1.2 Identify career options
- 10.1.1.3 Research occupations matching interests and aptitudes
- 10.1.1.4 Select career(s) that best match(es) interests and aptitudes
- 10.1.1.5 Identify advantages and disadvantages of career options, including nontraditional careers
- 10.1.1.6 Assess differences in wages, annual incomes, and job opportunities based on geographic location
- 10.1.1.7 Develop a career plan

**COMPETENCY 10.1.2: Analyze potential barriers to employment**

**COMPETENCY BUILDERS:**

- 10.1.2.1 Identify common barriers to employment
- 10.1.2.2 Develop strategies to overcome employment barriers

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**UNIT 10: Employability Skills**

**SUBUNIT 10.2: Decision Making and Problem Solving**

**COMPETENCY 10.2.1: Apply decision-making techniques in the workplace**

**COMPETENCY BUILDERS:**

- 10.2.1.1 Identify the decision to be made
- 10.2.1.2 Compare alternatives
- 10.2.1.3 Determine consequences of each alternative
- 10.2.1.4 Make decisions based on values and goals
- 10.2.1.5 Evaluate the decision made

**COMPETENCY 10.2.2: Apply problem-solving techniques in the workplace**

**COMPETENCY BUILDERS:**

- 10.2.2.1 Diagnose the problem and its causes
- 10.2.2.2 Identify alternatives and their consequences in relation to the problem
- 10.2.2.3 Examine multicultural and nonsexist dimensions of problem solving
- 10.2.2.4 Utilize resources to explore possible solutions to the problem
- 10.2.2.5 Compare and contrast the advantages and disadvantages of each solution
- 10.2.2.6 Determine appropriate action
- 10.2.2.7 Evaluate results

**UNIT 10: Employability Skills**

**SUBUNIT 10.3: Work Ethic**

**COMPETENCY 10.3.1: Evaluate the relationship of self-esteem to work ethic**

**COMPETENCY BUILDERS:**

- 10.3.1.1 Identify special characteristics and abilities in self and others
- 10.3.1.2 Identify internal and external factors that affect self-esteem

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**COMPETENCY 10.3.2: Analyze the relationship of personal values and goals to work ethic both in and out of the workplace**

**COMPETENCY BUILDERS:**

- 10.3.2.1 Distinguish between values and goals
- 10.3.2.2 Determine the importance of values and goals
- 10.3.2.3 Evaluate how values affect goals
- 10.3.2.4 Identify short-term and long-term goals
- 10.3.2.5 Prioritize personal goals
- 10.3.2.6 Describe how personal values are reflected in work ethic
- 10.3.2.7 Describe how interactions in the workplace affect personal work ethic
- 10.3.2.8 Examine how life changes affect personal work ethic

**COMPETENCY 10.3.3: Demonstrate work ethic**

**COMPETENCY BUILDERS:**

- 10.3.3.1 Examine factors that influence work ethic
- 10.3.3.2 Exhibit characteristics that reflect an appropriate work ethic

**UNIT 10: Employability Skills**

**SUBUNIT 10.4: Job-Seeking Skills**

**COMPETENCY 10.4.1: Prepare for employment**

**COMPETENCY BUILDERS:**

- 10.4.1.1 Identify traditional and nontraditional employment sources
- 10.4.1.2 Utilize employment sources
- 10.4.1.3 Research job opportunities, including nontraditional careers
- 10.4.1.4 Interpret equal employment opportunity laws
- 10.4.1.5 Explain the critical importance of personal appearance, hygiene, and demeanor throughout the employment process
- 10.4.1.6 Prepare for generic employment tests and those specific to an occupation/organization

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**COMPETENCY 10.4.2: Design a résumé**

**COMPETENCY BUILDERS:**

- 10.4.2.1 Identify personal strengths and weaknesses
- 10.4.2.2 List skills and/or abilities, career objective(s), accomplishments/achievements, educational background, and work experience
- 10.4.2.3 Demonstrate legible written communication skills using correct grammar, spelling, and concise wording
- 10.4.2.4 Complete résumé using various formats
- 10.4.2.5 Secure references

**COMPETENCY 10.4.3: Complete and process job application forms**

**COMPETENCY BUILDERS:**

- 10.4.3.1 Explain the importance of an application form
- 10.4.3.2 Identify ways to obtain job application forms
- 10.4.3.3 Describe methods for handling illegal questions on job application forms
- 10.4.3.4 Demonstrate legible written communications skills using correct grammar, spelling, and concise wording
- 10.4.3.5 Return application to proper person, request interview, and follow up

**COMPETENCY 10.4.4: Demonstrate interviewing skills**

**COMPETENCY BUILDERS**

- 10.4.4.1 Investigate interview environment and procedures
- 10.4.4.2 Explain the critical importance of personal appearance, hygiene, and demeanor
- 10.4.4.3 Demonstrate question and answer techniques
- 10.4.4.4 Demonstrate methods for handling difficult and/or illegal interview questions

**COMPETENCY 10.4.5: Secure employment**

**COMPETENCY BUILDERS:**

- 10.4.5.1 Identify present and future employment opportunities within an occupation/organization
- 10.4.5.2 Research the organization/company
- 10.4.5.3 Use follow-up techniques to enhance employment potential
- 10.4.5.4 Compare and evaluate job offers

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**UNIT 10: Employability Skills**

**SUBUNIT 10.5: Job Retention Skills**

**COMPETENCY 10.5.1: Analyze the organizational structure of the workplace**

**COMPETENCY BUILDERS:**

- 10.5.1.1 Identify and evaluate employer expectations regarding job performance, work habits, attitudes, personal appearance, and hygiene
- 10.5.1.2 Be aware of and obey all company policies and procedures
- 10.5.1.3 Examine the role/relationship between employee and employer
- 10.5.1.4 Recognize opportunities for advancement and reasons for termination

**COMPETENCY 10.5.2: Maintain positive relations with others**

**COMPETENCY BUILDERS:**

- 10.5.2.1 Exhibit appropriate work habits and attitude
- 10.5.2.2 Identify behaviors to establish successful working relationships
- 10.5.2.3 Cooperate and compromise through teamwork and group participation
- 10.5.2.4 Identify alternatives for dealing with harassment, bias, and discrimination based on race, color, national origin, sex, religion, handicap, or age

**UNIT 10: Employability Skills**

**SUBUNIT 10.6: Job Advancement**

**COMPETENCY 10.6.1: Analyze opportunities for personal and career growth**

**COMPETENCY BUILDERS:**

- 10.6.1.1 Determine opportunities within an occupation/organization
- 10.6.1.2 Compare and contrast other opportunities
- 10.6.1.3 List benefits of job advancement
- 10.6.1.4 Evaluate factors involved when assuming a new position within or outside an occupation/organization

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**COMPETENCY 10.6.2: Exhibit characteristics needed for advancement**

**COMPETENCY BUILDERS:**

- 10.6.2.1 Display a positive attitude
- 10.6.2.2 Demonstrate knowledge of a position
- 10.6.2.3 Perform quality work
- 10.6.2.4 Adapt to changing situations and technology
- 10.6.2.5 Demonstrate capability for different positions
- 10.6.2.6 Participate in continuing education/training programs
- 10.6.2.7 Respect, accept, and work with ALL individuals in the workplace

**UNIT 10: Employability Skills**

**SUBUNIT 10.7: Technology in the Workplace**

**COMPETENCY 10.7.1: Assess the impact of technology in the workplace**

**COMPETENCY BUILDERS:**

- 10.7.1.1 Cite how past business/industry practices have influenced present business/industry processes
- 10.7.1.2 Investigate the use of technology in the workplace
- 10.7.1.3 Analyze how present skills can be applied to learning new technologies

**COMPETENCY 10.7.2: Use a variety of technological applications**

**COMPETENCY BUILDERS:**

- 10.7.2.1 Explore basic mathematical, scientific, computer, and technological principles
- 10.7.2.2 Use technology to accomplish assigned tasks
- 10.7.2.3 Create solutions to problems using technical means

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20

23

**UNIT 10: Employability Skills**

**SUBUNIT 10.8: Lifelong Learning**

**COMPETENCY 10.8.1: Apply lifelong learning to individual situations**

**COMPETENCY BUILDERS:**

- 10.8.1.1 Define lifelong learning
- 10.8.1.2 Identify factors that cause the need for lifelong learning

**COMPETENCY 10.8.2: Adapt to change**

**COMPETENCY BUILDERS:**

- 10.8.2.1 Analyze the effects of change
- 10.8.2.2 Identify reasons why goals change
- 10.8.2.3 Describe the importance of flexibility when reevaluating goals
- 10.8.2.4 Evaluate the need for continuing education/training

**UNIT 10: Employability Skills**

**SUBUNIT 10.9: Economic Education**

**COMPETENCY 10.9.1: Analyze global enterprise systems**

**COMPETENCY BUILDERS:**

- 10.9.1.1 Identify characteristics of various enterprise systems
- 10.9.1.2 Examine the relationship between competition, risk, and profit
- 10.9.1.3 Illustrate how supply and demand influence price

**COMPETENCY 10.9.2: Evaluate personal money management**

**COMPETENCY BUILDERS:**

- 10.9.2.1 Describe the need for personal management records
- 10.9.2.2 Identify methods of taxation
- 10.9.2.3 Analyze how credit affects financial security
- 10.9.2.4 Compare types and methods of investments
- 10.9.2.5 Prepare a personal budget
- 10.9.2.6 Be an informed and responsible consumer
- 10.9.2.7 Analyze the effects of advertising on the consumer

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**UNIT 10: Employability Skills**

**SUBUNIT 10.10: Balancing Work and Family**

**COMPETENCY 10.10.1: Analyze the effects of family on work**

**COMPETENCY BUILDERS:**

- 10.10.1.1 Recognize how family values, goals, and priorities are reflected in the workplace
- 10.10.1.2 Identify present and future family structures and responsibilities
- 10.10.1.3 Describe personal and family roles
- 10.10.1.4 Analyze concerns of working parent(s)
- 10.10.1.5 Examine how family responsibilities can conflict with work
- 10.10.1.6 Resolve family-related conflicts
- 10.10.1.7 Explain how to use support systems/community resources to help resolve family-related conflicts

**COMPETENCY 10.10.2: Analyze the effects of work on family**

**COMPETENCY BUILDERS:**

- 10.10.2.1 Identify responsibilities associated with paid and nonpaid work
- 10.10.2.2 Compare the advantages and disadvantages of multiple incomes
- 10.10.2.3 Examine how work can conflict with family responsibilities
- 10.10.2.4 Describe how work-related stress can affect families
- 10.10.2.5 Identify family support systems and resources

**UNIT 10: Employability Skills**

**SUBUNIT 10.11: Citizenship in the Workplace**

**COMPETENCY 10.11.1: Exercise the rights and responsibilities of citizenship in the workplace**

**COMPETENCY BUILDERS:**

- 10.11.1.1 Identify the basic rights and responsibilities of citizenship
- 10.11.1.2 Examine the history and contributions of all racial, ethnic, and cultural groups

**COMPETENCY 10.11.2: Cooperate with others in the workplace**

**COMPETENCY BUILDERS:**

- 10.11.2.1 Identify situations in which compromise is necessary
- 10.11.2.2 Examine how individuals from various backgrounds contribute to work-related situations
- 10.11.2.3 Demonstrate initiative to facilitate cooperation
- 10.11.2.4 Give and receive constructive criticism to enhance cooperation

**UNIT 10: Employability skills**

**SUBUNIT 10.12: Leadership**

**COMPETENCY 10.12.1: Evaluate leadership styles appropriate for the workplace**

**COMPETENCY BUILDERS:**

- 10.12.1.1 Identify characteristics of effective leaders
- 10.12.1.2 Compare leadership styles
- 10.12.1.3 Demonstrate effective delegation skills
- 10.12.1.4 Identify opportunities to lead in the workplace

**COMPETENCY 10.12.2: Demonstrate effective teamwork skills**

**COMPETENCY BUILDERS:**

- 10.12.2.1 Identify the responsibilities of a valuable group member
- 10.12.2.2 Exhibit open-mindedness
- 10.12.2.3 Identify methods of involving each member of a team
- 10.12.2.4 Contribute to the efficiency and success of a group
- 10.12.2.5 Determine ways to motivate others

**COMPETENCY 10.12.3: Utilize effective communication skills**

**COMPETENCY BUILDERS:**

- 10.12.3.1 Demonstrate the importance of listening
- 10.12.3.2 Demonstrate assertive communication
- 10.12.3.3 Recognize the importance of verbal and nonverbal cues and messages
- 10.12.3.4 Analyze written material
- 10.12.3.5 Prepare written material
- 10.12.3.6 Give and receive feedback
- 10.12.3.7 Articulate thoughts
- 10.12.3.8 Use appropriate language

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**UNIT 10: Employability Skills**

**SUBUNIT 10.13: Entrepreneurship**

**COMPETENCY 10.13.1: Evaluate the role of small business in the economy**

**COMPETENCY BUILDERS:**

- 10.13.1.1 Identify the benefits of small business to a community
- 10.13.1.2 Analyze opportunities for small business in a community

**COMPETENCY 10.13.2: Examine considerations of starting a business**

**COMPETENCY BUILDERS:**

- 10.13.2.1 Research a business idea
- 10.13.2.2 Compare various ways to become a small business owner
- 10.13.2.3 Investigate factors to consider in financing a new business
- 10.13.2.4 Evaluate entrepreneurship as a career option

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25