Common Welding Joints Curriculum

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Lesson One – Welding Safety

Lesson Overview

This lesson introduces the various bodily hazards in welding and the Personal Protection Equipment (PPE) required by OSHA in helping to avoid injury.

Lesson Objectives

After completing this lesson, participants will be able to:

- Identify the potential hazards to eyes, face, head, hearing, feet, hands, and body
- Identify the Personal Protection Equipment (PPE) required by OSHA whenever hazards are present

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• White board and markers • *PPE Stick Person Student Activity Sheet*	1. Print/photocopy *PPE Stick Person Student Activity Sheet* (one per participant).	10 minutes
LEARN	• *Safety: Personal Protective Equipment Welding* slide presentation • *PPE Presentation Student Notes Sheet* • *Personal Protective Equipment Fact Sheet*	1. Prepare to show *Safety: Personal Protective Equipment Welding* slide presentation. 2. Print/photocopy *PPE Presentation Student Notes Sheet* and *Personal Protective Equipment Fact Sheet* (one per participant).	30-40 minutes
REVIEW	• *Welding Safety Quiz* • *Welding Safety Quiz* – Answer Key	1. Print/photocopy the *Welding Safety Quiz* (one per participant).	10-15 minutes

Lesson One – Welding Safety

FOCUS: Personal Protective Equipment Brainstorming

10 minutes

Purpose:

This activity will begin the discussion about Personal Protective Equipment (PPE) required to avoid injury.

Materials:

- White board and markers
- *PPE Stick Person Student Activity Sheet*

Facilitation Steps:

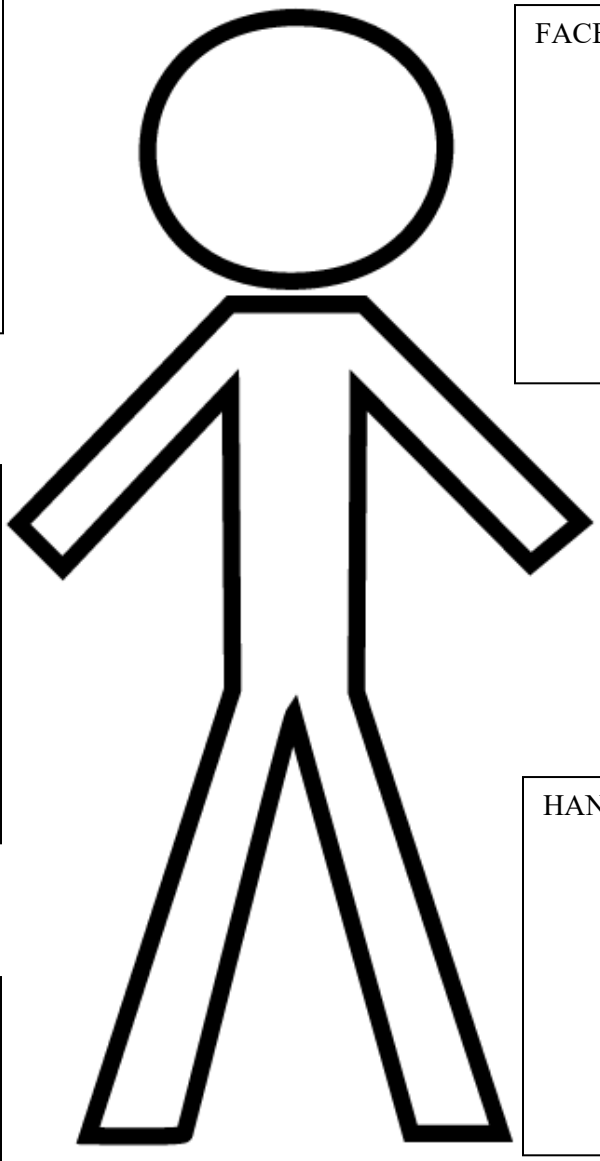
1. Ask students to pair up.
2. Hand out the *PPE Stick Person Student Activity Sheet*. Each pair should take five minutes and write down as many items of welding personal protective equipment that they can think of in the designated areas of the activity page (sections include head, face, body, hands, and feet).
3. After five minutes, call the group back together. Get each pair to volunteer a few answers and make a master list on the white board for each section. Tell students that they will be learning about many types of PPE, perhaps many more than they were aware of.

Name: _____ Class: _____

PPE Stick Person Student Activity Sheet

HEAD:

FACE:



BODY:

HANDS:

FEET:

Lesson One – Welding Safety

LEARN: Introduction to Types of Welding

30-40 minutes

Purpose:

The purpose of this activity is to have participants take a closer look at many types of required PPE.

Materials:

- *Safety: Personal Protective Equipment* slide presentation
- *PPE Presentation Student Notes Sheet*
- *Personal Protective Equipment Fact Sheet*

Facilitation Steps:

1. Prepare the *Safety: Personal Protective Equipment* slide presentation for viewing in class. If desired, print out the presentation as a notes page for your reference as you discuss.
2. Hand out the *PPE Presentation Student Notes Sheet* slide to each student. Students should insert information from the presentation as you discuss. This will help them focus and retain information.
3. Hand out the *Personal Protective Equipment Fact Sheet.* This contains all the detailed information from the presentation and is a good reference sheet for students to prepare for the assessment.

Personal Protective Equipment Fact Sheet

Hazard Assessment		
Hazard type	**Examples of Hazard**	**Common Related Tasks**
Impact	Flying objects such as large chips, fragments, particles, sand, and dirt.	Chipping, grinding, machining, masonry work, wood working, sawing, drilling, chiseling, powered fastening, riveting, and sanding.
Heat	Anything emitting extreme heat.	Furnace operations, pouring, casting, hot dipping, and welding.
Chemicals	Splash, fumes, vapors, and irritating mists.	Acid and chemical handling, degreasing, plating, and working with blood.
Dust	Harmful Dust.	Woodworking, buffing, and general dusty conditions.
Optical Radiation	Radiant energy, glare, and intense light	Welding, torch-cutting, brazing, soldering, and laser work.
		TOP

PPE Protects:

- Eyes and Face
- Head
- Hearing
- Feet
- Hands
- Body

Eye and Face Hazards:

- Flying particles: dust, dirt, metal or wood chips from chipping, grinding, sawing, hammering
- Chemical splashes: corrosive substances, hot liquids, solvents, or other hazardous solutions
- Objects swinging into eye or face: chains, tools, or ropes
- Light radiation: welding, lasers, other radiant light, heat, glare, sparks, splash and flying particles

Types of Eye and Face PPE which Must Comply with ANSI Z87.1:

- Safety glasses with side shields
- Goggles
- Face shields
- Welding hoods
- Cutting goggles

Safety Glasses and Goggles:

- Must be worn in the welding lab at all times
- If you wear glasses, you must wear goggles over them, or buy special glasses that meet ANSI Z87.1 standards

Face Shields:

- Extra protection for eyes
- Safety glasses need to be worn under face shields
- Protects the face from grinding sparks, dust, and chemical hazards (NOT impact)

Welding Helmets and Cutting Goggles:

- Must use the proper filter lens
- Arc welding: 10-11
- Oxy fuel cutting: 5
- Plasma cutting: 5-9

Skull Cap or Welding Hat:

- Welders are exposed to flying sparks that can burn your hair and skull
- Skull caps and welding hats will protect your head from sparks

Earplugs and Earmuffs:

- Grinding, machining, and some welding operations can create enough noise to damage hearing

Foot Hazards:

- Falling or rolling objects
- Sharp objects/objects piercing the sole
- Exposure to electrical hazards
- Molten metal or sparks splashing on feet
- Hot surfaces
- Slippery or wet surfaces

Shoe Precautions:

- NEVER wear open toe shoes while welding; molten metal sparks and arc rays can burn exposed skin
- Tennis shoes or open-toed shoe styles are NOT recommended while welding; molten metal can easily burn through the top of the shoe and burn the foot

Safety Shoes for Welding:

- Steel toe leather safety shoes
- Steel toe safety shoes with metatarsal guards
- Safety shoes that are nonconductive with heat resistant soles

Hand Hazards:

- Cuts or lacerations
- Abrasions
- Punctures
- Thermal burns
- Harmful temperature extremes
- Potentially injurious light radiation (arc rays)

Welding Gloves:

- Leather gauntlet style, flame retardant welding gloves are ideal for welding
- Be sure to keep welding gloves dry; wet gloves can cause electrical shock or steam burn while welding

Body Hazards:

- Temperature extremes
- Potentially injurious light radiation (arc rays)
- Hot splashes from molten metals
- Impacts from tools, machinery, and materials
- Hazardous chemicals
- Contact with potentially infectious materials, like blood

Types of PPE for the Body:

- Clothing made of wool
- Clothing made of 100% cotton
- Clothing that has a tag identifying it as flame retardant
- Leather welding jackets
- Flame retardant welding jackets
- Leather welding aprons
- Welding sleeves
- Heavy 100% cotton denim jeans
- Leather chaps
- 100% cotton socks
- Flame retardant 100% cotton bibs or overalls

Clothing Precautions:

- No cuffs in clothing
  - Molten metal will fall into cuffs and catch fire
  - Pant legs need to extend over the top of safety shoes
- Never weld in clothes with holes or frayed material
  - Frayed material catches fire quickly
- No pockets in the front of shirts
  - Molten metal will fall into front pockets and catch fire
- Always check the tags of your clothes:
- No clothing made of synthetic (manmade) fibers or synthetic blends
  - Synthetic material is any material other than wool or cotton
  - Synthetic material will melt upon contact with molten metal and can melt to the skin, causing serious burns
- Clothing should be free from grease, oil, or other combustible chemicals or materials
- Reduce exposure to oxygen
  - Exposure to oxygen can saturate clothing with oxygen, making the clothing combustible

Skin Precautions:

- Make sure all skin is covered by flame-retardant treated material, leather, wool or 100% cotton
- Any exposed skin will be burned by arc rays

Other Precautions:

- Certain products, such as flammable hairsprays, should be avoided
- Never weld under the influence of substances (drugs, alcohol, certain medications, etc.) as they may make you drowsy or interfere with your coordination and reaction time

Name: _____ Class: _____

PPE Presentation Student Notes Sheet

PPE Protects:

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Eye and Face Hazards:

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Types of Eye and Face PPE that Must Comply with ANSI Z87.1:

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Additional Protection for Head and Hearing:

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Foot Hazards:

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Foot Precautions:

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Safety Shoes:

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Hand Hazards:

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Welding Gloves:

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Body Hazards:

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Types of PPE for the Body:

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Clothing Precautions:

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Skin Precautions:

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-

Other Precautions:

-
-

Lesson One – Welding Safety

REVIEW: Welding Safety Quiz

10-15 minutes

Purpose:

To review what the students have learned about various pieces of Personal Protective Equipment.

Materials:

- *Welding Safety Quiz*
- *Welding Safety Quiz* – Answer Key

Facilitation Steps:

1. Go back to the discussion about PPE started at the beginning of the lesson. Compare the original suggestions from pairs with the information on the fact sheet. Are students surprised at the breadth of PPE required?
2. Hand out the *Welding Safety Quiz*. Give students 10 minutes to complete it in class or assign it to take home and return.
3. Use the *Welding Safety Quiz* – Answer Key to correct the quiz.

Name: _____ Class: _____

Welding Safety Quiz

1. Name six body areas that PPE protects.
   a.
   b.
   c.
   d.
   e.
   f.

2. Name four eye and face hazards.
   a.
   b.
   c.
   d.

3. What must be worn in the welding lab at all times?

   _____ or _____

4. Name an example of something that can create enough noise to damage hearing.

5. Always wear open-toe shoes while welding. True or False (circle one)

6. Name four hand hazards.
   a.
   b.
   c.
   d.

7. What can wet gloves cause? Choose all that apply.
   a. Mold
   b. Electric shock
   c. Steam
   d. Reverse arc

8. Identify types of PPE for the body. Circle all that apply.
   a. Clothing made of plastic
   b. Clothing made of 100% cotton
   c. Rayon welding apron
   d. Leather chaps
   e. Polyester socks
   f. Flame retardant 100% cotton or bib overalls
   g. Leather welding jacket
   h. Clothing made of satin

9. Clothing should be made of man-made fibers or synthetic blends. True or False (circle one)

10. Any exposed skin will be burned by arc rays. True or False (circle one)

Welding Safety Quiz – Answer Key

1. Name six body areas that PPE protects.
   a. Eyes and face
   b. Head
   c. Hearing
   d. Feet
   e. Hands
   f. Body

2. Name four eye and face hazards.
   a. Objects swinging into the eye
   b. Light radiation
   c. Flying particles
   d. Chemical splashes

3. What must be worn in the welding lab at all times?
   Safety glasses or **goggles**

4. Name an example of something that can create enough noise to damage hearing.
   Grinding, machining and some welding operations.

5. Always wear open toe shoes while welding. True or **False** (circle one)

6. Name four hand hazards.
   a. Cuts or lacerations
   b. Abrasions
   c. Punctures
   d. Thermal burns
   (Also could include harmful temperature extremes and potentially injurious light radiation.)

7. What can wet gloves cause? Choose all that apply.
   a. Mold
   b. Electric shock
   c. Steam
   d. Reverse arc

8. Identify types of PPE for the body. Circle all that apply.
   a. Clothing made of plastic
   b. Clothing made of 100% cotton
   c. Rayon welding apron
   d. Leather chaps
   e. Polyester socks
   f. Flame retardant 100% cotton or bib overalls
   g. Leather welding jacket
   h. Clothing made of satin

9. Clothing should be made of man-made fibers or synthetic blends. True or **False** (circle one)

10. Any exposed skin will be burned by arc rays. **True** or False (circle one)