HIGH-IMPACT WELDING SAFETY

This easy-to-use Leader's Guide is provided to assist in conducting a successful presentation. Featured are:

INTRODUCTION: A brief description of the program and the subject that it addresses.

PROGRAM OUTLINE: Summarizes the program content. If the program outline is discussed before the video is presented, the entire program will be more meaningful and successful.

PREPARING FOR AND CONDUCTING THE PRESENTATION: These sections will help you set up the training environment, help you relate the program to site-specific incidents, and provide program objectives for focusing your presentation.

REVIEW QUESTIONS AND ANSWERS: Questions may be copied and given to participants to document how well they understood the information that was presented. Answers to the review questions are provided separately.

ATTENDANCE RECORD: Document the date of your presentation as well as identify the program participants. The attendance record may be copied as needed.

INTRODUCTION

Welding and cutting operations demand an unyielding commitment to personal safety on behalf of the worker who performs these tasks. Not only do the hazards of welding processes endanger the safety of those welding, but they also threaten the overall well being of the entire facility. When welding accidents occur, the consequences can be disastrous.

By understanding the dangers involved with welding and taking the necessary measures to protect against them, employees can prevent the pain and suffering that results from these accidents.

This powerful program uses 6 accident re-creations* to remind viewers that welding and cutting operations are inherently dangerous and that workers who weld must follow all safety rules to protect themselves from serious injury or death. The video also illustrates positive welding and cutting safety points on a variety of topics, including gas welding, arc welding, fire prevention, handling/storage of gas cylinders, confined space work and personal protective equipment.

***Accidents re-created in this program are based on OSHA investigations or company records. Details have been changed in the interest of confidentiality and instructional clarity.**

PROGRAM OUTLINE

BACKGROUND

- All welding operations are potentially dangerous; you must be trained and authorized to attempt this type of work.

- There are two basic types of welding (gas and arc) and many combinations of materials designed to get the job done, but all welding processes have the same basic hazards.

PREVENTING FIRES CAUSED BY WELDING

- A 35-foot safe zone in all directions from the welding area must be maintained by covering all combustibles with non-combustible material or removing them.

- Don't weld on pipes or other conductive materials that pass through walls, partitions, ceilings or roofs.

- Be aware of sparks that can fall through open shafts and elevators or fall onto conveyor systems and ignite fires.

- Workers who serve as fire watches must be trained in the use of fire extinguishers and know how to sound alarms.

- Fire watches must be stationed nearby when anything more than a minor fire could develop or when substantial amounts of combustible material are located within the 35-foot zone.

- If sparks from a welding operation fall to lower levels of a structure, a fire watch must be placed at every level where hazards exist.

RESPIRATORY PROTECTION

- The fumes and gases from welding processes must be controlled in order to protect against long and short-term respiratory illnesses.

- Metal fume fever is a common illness associated with welding zinc alloys. This can produce a metallic taste in your mouth, fatigue and other influenza-like symptoms.

- Adequate ventilation is always necessary for safe breathing during all welding operations.

- Many shops have welding exhaust systems built in that remove the fumes from the immediate area.

- Some welding operations require the use of an approved air-supplied or cartridge type respirator.

PERSONAL PROTECTIVE EQUIPMENT

- Most welding hoods are designed for interchangeable lenses; check the welding materials container for the manufacturer's lens recommendation.

- It is imperative that you wear regular safety glasses under your welding hood. They will protect your eyes from flying particles when you remove the hood.

- Leather gloves with a long gauntlet and a welting that protect any sewn threads from sparks are the best choice for welding.

- Leggings and spats are available for foot protection and to prevent shoelaces from becoming ignited by sparks.

- Leather aprons and sleeves are other forms of protection. Sleeves should be worn whenever sparks, slag or molten metal are hazardous or if you are welding overhead.

PROTECTIVE CLOTHING

- Clothing plays a major role in welding safety because ultraviolet and infrared radiation can burn the skin.

- While cotton is a popular fabric in the workplace, it is highly flammable and welding sparks can ignite shirts and pants (especially if they are frayed).

- Wool is less flammable than cotton, but may not be as comfortable in some environments.

- Try to avoid synthetic clothing. Sparks can produce holes and when the fabric becomes ignited, it will melt into your skin.

- Regardless of the fabric, be aware that pockets on your clothing can catch sparks. Keep plastic butane cigarette lighters and other smoking materials away from the welding area.

WELDING IN CONFINED SPACES

- Working in confined spaces requires specific training and authorization as well as a strict adherence to safe work practices and proper procedures.

- While you must have authorization and training in lockout/tagout and confined space procedures, you must also have an understanding of hot work and open flame permits.

- The air is constantly monitored during confined space work. Adequate ventilation is a necessity.

- When you stop work for any length of time in one of these areas, all welding electrodes and gas hoses must be removed and the valves closed off at the supply.

- Don't take welding machines or cylinders inside a confined space.

OXYGEN AND FUEL CYLINDERS

- Always store oxygen and fuel cylinders in well-ventilated areas that are away from sources of heat.

- Oxygen and fuel cylinders must be separated by at least 20 feet of space or by a five-foot wall.

- Keep stored materials away from all highly combustible materials as well as oil and grease.

- When storing cylinders, make sure they are secured and that the valves are in the closed position.

- When moving cylinders, make sure they are secured. Never drag them.

- If a valve is protected by a cap, be sure to put the cap back in place.

- When returning empty cylinders, make sure to indicate their condition with the appropriate markings (such as "Empty") and store them separately from full cylinders.

- Because cylinders will always contain some residual material and pressure and are never completely empty, they should be considered as full and handled accordingly.

- Do not use a cylinder as a roller, support or any other purpose except the storage of gas.

- If you have any questions concerning the handling or storage of cylinders, ask your supplier or supervisor.

SAFE USE OF GAS WELDING EQUIPMENT

- Before lighting the torch, make sure you understand the color designation for each hose and the proper sequence for opening and closing the oxygen and gas valves.

- Be sure to use the proper wrench to open and close valves. Leave the wrench on the fuel cylinder valve while it is open so you can close it quickly in an emergency.

- When lighting any torch by hand, always use a proper igniter.

- Before beginning any gas welding task, be sure to inspect the equipment's condition.

- Maintain a regular check for leaking hoses by spraying them or submerging them in soapy water to determine the location of any leaks.

- Don't attempt to repair faulty hoses, valves or regulators unless you are qualified and authorized to do so.

ELECTRICAL ARC WELDING

- Electrical shock is a primary problem with arc welding, especially if water is present.

- Before using the welding machine, inspect the holder for cracks and other deterioration.

- Make sure the first ten feet of your welding cable is free of cuts, abrasions and splices.

- When using the welding machine, keep yourself insulated from both the work and the metal electrode with holder. Make sure the frame of the welding unit, whether portable or stationary, is grounded.

- Don't allow the exposed metal part of a electrode or holder to touch wet hands or clothing; never change electrodes with your bare hands or when wearing wet gloves.

- Keep welding cables dry and free of grease to prevent the insulation from deteriorating.

- Take precautions to keep welding cables away from power supply cables or high-tension wires.

OTHER SAFETY TIPS

- Be aware that infrared and ultraviolet rays from welding can burn the skin and produce an eye irritation called "arc eye," which is sometimes known as flash burn.

- When working around the plant, use safety cones, barricades and signs to warn others to keep their distance. Use welding screens to provide protection from harmful light rays.

- Before welding on any vessel such as a drum, make sure that the vessel has been properly cleaned and prepared for welding and be sure that you aren't violating company policy.

- Be aware that welding near explosive atmospheres containing gases, vapors or dusts is extremely dangerous and can result in disaster.

SEVEN POINTS TO REMEMBER WHEN WELDING

You can protect yourself and everyone else at your facility if you keep these seven points in mind:

❶ Understand the fire and safety requirements for welding and cutting under the conditions in which you intend to work.
❷ Make sure you have adequate ventilation at all times and use a respirator when required.
❸ Check Material Safety Data Sheets for hazards information.
❹ Understand the correct Personal Protective Equipment for the job.
❺ Know and understand how to handle and store cylinders.
❻ Inspect all equipment for safe operating condition.
❼ Make sure you have the proper authorization for the type of welding that you intend to perform.

ACCIDENTS AND THEIR LESSONS

Opening of This Program

This story simply provides a basic illustration of the fact that welding and cutting are inherently dangerous operations. When accidents occur during welding processes, the consequences can be disastrous.

Accident 1: Sparks and Slag from Welding Operation Ignite Plant-wide Fire

A maintenance man was welding overhead when some sparks and slag were drawn into an air duct that was part of the plant's ventilation system. Some of the sparks also ignited a fire in some combustibles below the worker. When one of his co-workers opened a filter housing door to check for fire, air rushed in and the fire spread rapidly. The fire consumed several buildings and resulted in serious injuries and deaths.

Safety Lessons:

1) Be aware of all hazards in your work area; think about the consequences of your actions and the effect they will have on other areas.
2) Always remove or cover combustibles in welding areas.
3) Be sure protective coverings are made of non-combustible materials (not cardboard, as was the case here).
4) Maintain a 35-foot safe zone in all directions from the welding area by removing or covering combustibles.
5) Always secure required hot-work permits before starting to weld or burn.
6) Use a fire watch when required.

Accident 2: Failure to Use Ventilation Results in Metal Fume Fever

Juan Rojas was welding on galvanized pipe and failed to turn on the motor for the exhaust ventilator. After a while, he felt like he had the flu. His joints ached and his head hurt. When he went to see the company nurse, he learned that inhaling the fumes had caused him to get metal fume fever.

Safety Lessons:

1) Be aware that welding fumes can be harmful. Always use proper ventilation when required.
2) Approved respirators can also provide protection.

Accident 3: Oxygen from Leaking Welding Hoses Causes Clothes to Ignite

Several crews were working on a project that involved welding in a confined space (a silo). Monty left his torch and hoses in the silo during a break. He knew it was a safety violation, but thought that it would be okay since they would be welding again after the break. When the crew chief discovered that Monty had left the equipment in the silo during the break, he let Monty know that he had broken an important safety rule. Oxygen leaking from the welding hoses caused Monty's clothes to burst into flames as soon as a spark was made.

Safety Lessons:

1) Don't let shortcuts and convenience trick you into breaking safety rules.
2) Never leave welding hoses or torches in a confined space during non-work periods.
3) Don't enter confined spaces unless you are trained and authorized to do so.
4) Be sure all required permits are posted before starting work.
5) Recognize that confined space work involves special hazards and be certain all required safe work practices are strictly followed.

Accident 4: Ladder Cut from Production Tower Falls and Kills Worker

A maintenance crew was working to relocate a fixed ladder on a production tower. While the welder was cutting it loose, one of the other crewmembers became concerned that the ladder might not have been properly secured to the crane. As he was going up to check it out, he was distracted by another worker. Suddenly the ladder fell and struck an assistant on the head. The assistant was killed.

Safety Lessons:

1) When welding, be aware of non-welding hazards in your work environment (for instance, ladders that are improperly rigged).

2) Use effective communication between crewmembers to control actions.

3) Use safety cones, barricades and/or signs to warn others of danger.

Accident 5: Breaking Company Policy and Safety Rules to Make Grill Results in Deadly Explosion

John Myers decided that he was going to make a barbecue grill out of an old drum he found at the plant. His co-worker warned him that it was against company policy to cut the drum and tried to stop him. John knew it was against company rules, but proceeded to cut anyway. When he began to cut, the drum exploded violently and John was killed.

Safety Lessons:

1) Always follow all company safety rules.

2) Don't weld on containers or tanks unless they have been cleaned thoroughly and prepared properly.

3) Think about the possible safety consequences of the actions you are about to take.

4) Welding and cutting around gases, vapors and dusts is extremely dangerous.

Accident 6: Using Electric Welder on Wet Floor Results in Worker's Electrocution

A maintenance mechanic was installing a brace he had just made to support a pipe underneath some equipment. The area was wet and he had to lie on his back to get into position to install the brace. He was using an electric welder and had the stinger and rod in his hand as he struggled to get into position. Because his body was contacting the wet floor, he received an electrical shock that caused his muscles to contract. A sudden jerking motion caused him to stick the rod in his eye. The accident was fatal.

Safety Lessons:

1) Don't use an electric welder in a wet environment.

2) Always think about special hazards associated with your work location (such as cramped spaces and moisture).

3) When you remove your safety glasses for any reason, always make sure to put them back on before starting back to work

4) Don't work alone when serious hazards are present.

5) Don't be afraid to say no to a job when it can't be done safely (as this particular job may have been).

PREPARE FOR THE SAFETY MEETING OR TRAINING SESSION
Review each section of this Leader's Guide as well as the videotape. Here are a few suggestions for using the program:

Make everyone aware of the importance the company places on health and safety and how each person must be an active member of the safety team.

Introduce the videotape program. Play the videotape without interruption. Review the program content by presenting the information in the program outline.

Copy the review questions included in this Leader's Guide and ask each participant to complete them.

Copy the attendance record as needed and have each participant sign the form. Maintain the attendance record and each participant's test paper as written documentation of the training performed.

Here are some suggestions for preparing your videotape equipment and the room or area you use:

Check the room or area for quietness, adequate ventilation and temperature, lighting and unobstructed access.

Check the seating arrangement and the audiovisual equipment to ensure that all participants will be able to see and hear the videotape program.

Place or secure extension cords to prevent them from becoming a tripping hazard.

CONDUCTING THE PRESENTATION
Begin the meeting by welcoming the participants. Introduce yourself and give each person the opportunity to become acquainted if there are new people joining the training session.

Explain that the primary purpose of the program is to stress that welding and cutting operations are extremely dangerous and all welding safety rules must be followed to ensure the health and safety of everyone at your facility.

Introduce the videotape program. Play the videotape without interruption. Review the program content by presenting the information in the program outline. Lead discussions about dangerous situations or accidents that have occurred during welding operations how they could have been prevented. Use the review questions to check how well the program participants understood the information.

After watching the videotape program, the viewer will be able to explain the following:

- Possible causes of the accidents and how they could have been prevented;
- Safe use of gas and arc welding equipment;
- Respiratory protection, PPE and clothing necessary for welding;
- Procedures for handling and storing gas cylinders safely;
- Safe welding work practices concerning fire prevention and confined spaces.

HIGH-IMPACT WELDING SAFETY
REVIEW QUESTIONS

Name_____Date_____

The following questions are provided to determine how well you understand the information presented during this program.

1. A ____ foot safe zone in all directions from the welding area must be maintained by removing or covering all combustibles.

a. 15
b. 25
c. 35
d. 50

2. What is required of workers who serve as fire watches?

a. must be trained in fire extinguisher use
b. must be trained and authorized to weld
c. must know how to sound fire alarms
d. must be an employee of the local fire department
e. both a and c

3. Where should you look to find out what type of lens is recommended for welding with a certain type of rod?

a. on a label inside your welding hood
b. on the welding rod container
c. on your hot work permit
d. none of the above

4. To work in a confined space, you must have training and authorization in confined space entry and _____.

a. bloodborne pathogens
b. heat stress
c. lockout/tagout
d. industrial ergonomics

5. Oxygen and fuel cylinders must be separated _____.

a. and stored in two different buildings
b. by 20 feet or more of space
c. by a five-foot wall
d. either b or c
e. none of the above

6. Why should you leave the wrench on an open fuel cylinder valve?

a. so you can close it quickly in an emergency
b. so you will not misplace the wrench while working
c. to prevent you from accidentally using the wrong wrench
d. to differentiate the fuel tank from the oxygen tank

7. Before arc welding, check the first _____ of the welding cable for cuts, splices and abrasions.

a. 10 inches
b. 3 feet
c. 5 feet

d. 10 feet

8. When using a welding machine, it is optional to ground the frame of a portable unit while stationary units must always be grounded.

a. true
b. false

9. The worker in the video who contracted flu-like symptoms because he didn't turn on his ventilator suffered from _____.

a. flash burn
b. metal fume fever
c. arc eye
d. scarlet fever

ANSWERS TO THE REVIEW QUESTIONS

1. c
2. e
3. b
4. c
5. d
6. a
7. d
8. b
9. b