

COMPRESSED AIR 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

Compressed air is second only to electricity as the most popular source of energy in today's advanced work environments. It powers a wide variety of tools and equipment as well as large machines and process lines. Benefits of compressed air include low maintenance costs, a low weight to power ratio and the ability to operate for long periods without overheating. Because electricity isn't associated with compressed air use, most people don't recognize the dangers posed by this equipment. Just like electricity, however, compressed air can be deadly if not treated with respect and used properly.

This video stresses the importance of working safely with compressed air to prevent injuries. Featured are four workplace incidents that illustrate the fact that compressed air hazards are often not easily recognized but still can have tragic consequences. Topics include dangers of cleaning with compressed air, how compressed air can injure the human body, use of hearing protection in noisy environments, inspection and maintenance of compressed air equipment and components of compressed air systems.

PROGRAM OUTLINE

BACKGROUND

- Compressed air powers a wide variety of tools and equipment found throughout the workplace.
- These tools include handheld sanders and grinders, nail and staple guns, jackhammers, rotary drills and other commonly used tools.
- Many large machines and process lines use compressed air as a source of power.
- When used correctly, compressed air is a valuable energy source that helps us do our jobs easier, faster and safer.
- When used improperly, compressed air poses serious hazards.

DANGERS OF CLEANING WITH COMPRESSED AIR

- One common misconception is that it is always safe to clean dirt or debris from a work area by blowing it off with compressed air.

- Cleaning any kind of work area with an air hose is potentially dangerous and can cause serious injuries. Three-fourths of all injuries involving compressed air occur when foreign substances are blown into an eye, ear or face.
- For this reason, it is generally not recommended to use compressed air for cleaning workstations.
- When you blow an air hose onto a workstation, you really aren't cleaning it at all. You are just moving debris from one work area to another.
- The safest and most effective way to clean your work area is to use a vacuum cleaner or a broom and a dustpan.
- Of course, areas with corners, nooks, grooves and other unusual designs can be difficult to clean. In these cases, compressed air may be the only way to clean the area of dirt and debris.

USING COMPRESSED AIR TO CLEAN

- If allowed by the company, compressed air may be used to clean hard-to-reach areas as long as safety procedures are followed.
- When using compressed air for cleaning, you must use an air nozzle that allows no more than 30 pounds per square inch of pressure. Since most air lines range in pressure from 90 psi to 120 psi, a pressure-reducing nozzle must be used.
- In addition, a “dead man” switch or constant pressure trigger must be used to stop air flow once the nozzle is released.
- One danger of cleaning with compressed air is particles and debris flying back into the face of the operator.
- To reduce this hazard, some air guns are equipped with chip guards or provide an “air curtain” around the nozzle to help reduce fly back.
- These types of devices do not offer complete protection. Proper protective equipment should always be worn when cleaning with compressed air.
- Safety goggles offer better protection than regular safety glasses. In addition, a face shield should also be worn for complete facial protection.
- Once you have protected yourself by using an approved nozzle and wearing the proper PPE, you must make sure to protect the other workers in your area.

INCIDENT #1: Debris From Air Gun Permanently Injures Co-Worker's Eye

Jim was blowing off his workstation when Brandy stopped by to ask about Jim's weekend. Brandy was not wearing eye protection at the time. While she engaged in conversation with Jim, Jim continued to blow the off the debris. Suddenly, some of the particles were blown into Brandy's eyes. One of the particles embedded into Brandy's eye, causing permanent damage to the cornea.

Safety Lessons:

- *You must be aware of co-workers in the area when using compressed air for cleaning purposes and take the necessary precautions to protect them. In some work environments, cleaning with compressed air may not be allowed due to the risk of injury to you and your co-workers.*
- *You must wear the appropriate protective equipment when working in areas where compressed air is used for cleaning, even if you are just a pedestrian passing through.*

OTHER HAZARDS OF CLEANING WITH COMPRESSED AIR

- Equipment and machinery can be damaged and operate inefficiently when compressed air is used for cleaning. Dust particles, dirt and other material blown by the air builds up on gears, rollers, circuit boards and other areas critical to machine operation.
- Some operations have a greatly increased risk of a fire or explosion if compressed air were used for cleaning.
- Many operations such as grain elevators, candy factories, cotton mills, industrial bakeries and pulp and paper mills create organic dust particles. Discharging compressed air in these environments causes the particles to become airborne.
- The combination of fine organic matter mixed with air creates an explosive atmosphere. It only takes one spark to set off a catastrophic explosion.

CLEANING OFF THE BODY WITH COMPRESSED AIR

- Blowing dust and dirt off of clothes, hair and the face is a very hazardous misuse of compressed air. This practice is very dangerous and is not permitted under any circumstances.
- Contact with compressed air can lead to serious medical conditions and even death. Our mouths, ears and eyes are very sensitive and can be easily damaged by compressed air.
- Don't be fooled into thinking that safety nozzles which regulate pressure to 30 psi can be safely used to clean the human body. Even 30 psi is too much pressure for these sensitive areas.
- As little as 12 pounds of pressure can blow an eye out of its socket. Compressed air entering the mouth can rupture the esophagus with as little as 5 pounds of pressure.
- When compressed air enters the ear canal, serious damage can occur that may lead to permanent hearing loss.
- Perhaps the most serious type of air-related injury occurs when compressed air is blown under the skin. Known as an air embolism, this type of injury can be fatal.
- When an air pocket reaches the heart, it causes symptoms similar to a heart attack. Upon reaching the brain, pockets of air may lead to a stroke.
- Because compressed air contains small amounts of oil and other contaminants, anytime compressed air is blown under the skin these contaminants enter the body and may cause dangerous infection.

INCIDENT #2: Employee's Arm Must Be Amputated Due to Infection Caused By Compressed Air

Rick had a small cut on his arm, but figured the injury would be protected by his shirt when he cleaned himself off with the airline. Although he knew better than to use the line for this purpose, he was using a gun with a 30 psi nozzle and thought the air couldn't get through his shirt. To his dismay, the air went right into a cut. Because he didn't want to get into trouble and the wound didn't appear that bad, he decided not to tell anyone about the incident. When he awoke the next morning, he was horrified to discover that his arm was black from the elbow down. As a result of the widespread infection, his arm had to be amputated below the elbow.

Safety Lessons:

- *No matter how careful you are or how many times you've done it before, never clean your clothes or body with compressed air.*
- *Report a workplace injury to the proper authority immediately, no matter what the circumstances are or how insignificant the injury appears.*

USE OF HEARING PROTECTION

- Most work areas using compressed air tools have noise levels that average between 110 and 140 decibels. This level of noise is well above the level requiring hearing protection.
- Exposure to noise levels above 85 decibels can lead to hearing loss. Ear plugs or ear muffs should be worn when you are exposed to high noise levels.
- Hearing loss occurs gradually and is not something you will notice overnight.

INCIDENT #3: Exposure To Noise While Using Compressed Air Results In Hearing Loss

Garrett had worked for years in areas where compressed air produced high noise levels. One day he began to notice that he was missing words in conversations and often had to ask other people to repeat what they were saying. He wore ear plugs on occasion, but not all of the time. When he had his hearing checked, he learned that he had suffered significant hearing loss.

Safety Lessons:

- *Be sure you understand the importance of wearing hearing protection when using compressed air tools.*
- *Hearing loss due to repeated exposures to excessive noise is gradual and often goes unnoticed until permanent damage has occurred. This is why it is so important to protect your hearing in all situations where excessive noise exists.*

INSPECTING COMPRESSED AIR EQUIPMENT

- Before using compressed air equipment, always inspect it and make sure everything is in good working order.
- Hoses should be checked carefully for any sign of damage. Air hoses with cracks or other damage should be removed from service.
- Air fittings and couplings should also be inspected. They should fit tightly into the hose and be clamped securely with an approved machine clamp.
- If your couplings require locking pins, make sure they are in place before use.
- Using compressed air with loose or improper fittings can be dangerous and lead to serious injury. If a connection blows out, a hose can begin whipping violently.

INCIDENT #4: Makeshift Air Gun Whips Erratically When Dropped And Strikes Operator In Forehead

Cameron often attached an air tool nipple directly to a hose fitting to make a pressure air hose. He did this so he wouldn't have to hold down a constant pressure trigger the whole time he used it. During one shift, he dropped the hose and it began to whip around as the air pressure continued to flow out. He tried to grab it, but couldn't and it struck him just above the eye. Although the wound required 26 stitches, Cameron was fortunate not to have his eye put out.

Safety Lessons:

- *Never use homemade air nozzles. When clamps and fittings not designed for use with compressed air are used on an air line, a blow out will occur in just a matter of time.*
- *Air tools and nozzles must have a "dead man" switch so they turn off automatically when put down or dropped.*
- *Always wear the appropriate PPE, such as eye and face protection, for your job.*

MAINTAINING COMPRESSED AIR TOOLS

- The tools used with compressed air lines must be kept in good working order.
- Never drop a tool. This can cause bent and damaged hose nipples.

- Don't carry tools by the hose. This leads to damaged hoses, bad fittings and loose connections.

COMPRESSED AIR SYSTEMS

- Every compressed air system has a compressor and tank. These come in many different shapes and sizes, but they all have a few common elements.
- The compressor tank stores the compressed air. To keep from becoming overly pressurized, the tank has a pressure relief valve that bleeds off excess pressure. This valve should be tested regularly for proper operation.
- Never remove the guarding around the belt and shaft of the compressor motor. The motor starts automatically when the air pressure in the tank falls below required levels.

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.

Make an attendance record 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 the hazards of working with compressed air and what employees can do to prevent these hazards from causing injuries.

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

Lead discussions about job tasks that involve compressed air at your facility and the specific safe work practices that must be followed to prevent injuries when performing these tasks. 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:

- The hazards associated with using compressed air for cleaning purposes;
- The importance of hearing protection in areas where compressed air produces excessive noise levels;
- What types of injuries a person can suffer when cleaning the body with compressed air;
- Why it is important to inspect and maintain compressed air systems, tools and equipment.

COMPRESSED AIR SAFETY
REVIEW QUIZ

Name _____ Date _____

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

1. What causes three-fourths of all injuries that involve compressed air?
 - a. air blown under the skin
 - b. high noise levels of compressed air
 - c. debris blown into eyes, ears or face

2. It is safe to clean your body with compressed air as long as your hose is equipped with an approved nozzle.
 - a. true
 - b. false

3. Hearing protection should be used in areas where noise levels exceed 85 decibels.
 - a. true
 - b. false

4. What risk is greatly increased when using compressed air for cleaning in such places as grain elevators, cotton mills and pulp and paper operations?
 - a. excessive noise levels
 - b. fire or explosion
 - c. potential eye injuries

5. Which of the following is possible if compressed air is blown directly into the skin?
 - a. air pocket causes symptoms similar to heart attack
 - b. air pocket leads to stroke in the brain
 - c. contaminants cause infection in soft-body tissue
 - d. all of the above

6. You should always inspect compressed air equipment before each use.
 - a. true
 - b. false

7. Why should water be drained periodically from a compressor tank?
 - a. to relieve excess air pressure
 - b. to keep carbon dioxide out of the tank
 - c. to prevent rust buildup inside the tank

ANSWERS TO THE REVIEW QUESTIONS

1. c

2. b

3. a

4. b

5. d

6. a

7. c