

Welding and Eye Injuries

The CPSC (Consumer Product Safety Commission) estimates that approximately 10,000 eye injuries related to welding occur each year, and arc welding equipment was the single most common cause. One quarter of all welding injuries are to the eyes, making them the single most common type of injury. Sadly, the grand majority of those injuries are easily preventable by adhering to a carefully constructed safety plan along with safety training. Most injuries occur by the lack or proper use of existing equipment or procedures. Low risk perception, vanity, laziness, discomfort avoidance, and inattention to detail all play a part.

Welding eye injuries fall into three general groups:

- Mechanical damage from flying particles from hot or molten metal, chipped slag, or grinding.
- Chemical burns or irritation.
- Radiation burns from UV (ultraviolet) radiation, infrared radiation (heat), and visible light.

UV, Heat, and Light Injury

In addition to normal industrial hazards, welding presents the safety challenge of radiant energy from welding itself. All of the common types of welding produce harmful ultraviolet, infrared, and visible light radiation.

Acute Light Injury

UV light damage can occur very quickly. UV radiation is absorbed by the cornea and lens of the eye resulting in an often painful but seldom permanent injury. Common effects include eye swelling, tearing, and intense pain. Welders sometimes refer to these corneal flash burns as arc eye or arc flash. Most of the time, the injury is temporary with 95 percent of the injured returning to work within a week and 50 percent within two days; however, some injuries are permanent. Especially with visible light and infrared radiation, the victim's retina or other eye structures can be permanently damaged resulting in loss of visual acuity, cataracts, and high light sensitivity. Treatment consists of initial pain relief with anesthetic eye drops and later cool wet compresses and artificial tears to relieve the ongoing symptoms. Some cases require isolation in a dark room and subsequent sunglass wear until symptoms improve.

Cumulative Light Injury

There doesn't have to be immediate effects for a victim's eyes to be injured. Corneal flash burns can also slowly occur over time with prolonged mild exposure. One study showed corneal discoloration, scarring, or membrane degeneration in approximately half of all welders tested.

Bystander Light Injury

Bystanders are frequently injured by corneal flash burns. Because they're not staring directly into the light source, they incorrectly believe they are safe. Eye damage can occur up to 50 feet away from the light source and can take as little as one second of exposure. Damaging radiation can reflect off shiny surfaces, concrete, or metal. This is why non-welders need to be part of a safety plan and proper work shielding and access control are critical.

Contact Lenses

There are persistent rumors in the welding industry about contact lenses fusing to welders' eyes from heat or light radiation. Another rumor is that contact lenses can make corneal flash burns worse than they might have otherwise been. OSHA (Occupational Safety and Health Administration) and the NSC (National Safety Council) have thoroughly investigated these claims and have found them baseless. In fact, if anything, contact lenses provide a tiny amount of additional protection.

However, the rumors themselves can contribute to an unsafe environment by encouraging workers not to wear their lenses. To combat this, the safety plan and training should clearly state the truth about contact lenses. The plan should also include procedures specific to lens wearers, such as when to remove the lenses and the importance of inspecting them regularly. Everybody in the work environment should be trained how to remove the lenses in case of emergency. Keep a record for emergency personnel of which workers wear contact lenses.

Safety Plan

There should be a standardized set of safety procedures on every job. Those procedures should be written down, and everybody in the work environment should be trained on those procedures. That safety plan should consider:

Welding Environment

- Inspect and plan the welding environment.
- Obtain a welding permit if required.
- Pay special attention to any fire or explosive hazards in the environment.
- Ensure that the work area has a functioning eyewash station or other running water source and that workers could find their way to it with their eyes closed in the event of an emergency, if other workers are not always present.
- Ensure that there is appropriate ventilation to carry away dangerous dust and fumes.

Bystander and Welder Protection

- Clear or cover any highly reflective surfaces.
- Inform bystanders that viewing a reflection can be as dangerous as looking at the UV source itself.
- Educate welders and others in the work area about the nature of corneal flash burns, including delayed symptoms and the importance of seeking medical attention.
- Educate welders and others in the work area on the safety procedures.
- Isolate the welding area with curtains if there is any possibility of bystander exposure.

- Ensure that others in the area also have eye protection, especially when chipping or grinding. If there is any possibility of their seeing past a light curtain, ensure that they wear glasses that protect from light exposure. Remember, some types of welding can damage eyes up to 50 feet away.

Welder-Specific Protection

- Always wear ANSI Z87.1 compliant safety glasses with side shields or, better still, full coverage goggles.
- Wear safety glasses or goggles under welding helmets.
- Clear or note any tripping hazards. Welding helmets and safety goggles can hamper welders' ability to navigate obstacles.
- Inspect eye safety equipment and keep it in good shape.
- In addition to head and eye gear, wear clothing and gloves that protect against UV radiation and flying materials.
- Wear safety glasses or goggles under welding helmets. Constantly removing and replacing eye protection greatly increases the chance of not having it in place when needed.
- Always read and follow the equipment manufacturer's instructions.

Emergency Response

- Establish procedures for specific injury types and special circumstances, including procedures for those wearing contact lenses.
- Train all persons in the work environment on emergency procedures.

Responding to Eye Injury

All eye injuries are serious. Seek medical attention if there's any doubt whatsoever about the severity of the injury. The severity of visible light, UV, and IR radiation injuries are especially tricky to determine immediately after the incident. Always err on the side of seeking medical attention—if the injured eye hurts, see a doctor or go to an emergency room. If you do seek medical attention, following up on the initial appointment is critical. Some eye injuries are not evident for months or years after the initial incident. Vision-threatening late effects include retinal detachment, glaucoma (high eye pressure), and cataract (clouded front of the eye).

When to Seek Medical Care

Seek immediate medical care if:

- Any caustic chemical got into the eye.
- The eye is painful or red.
- The victim is experiencing headache or nausea.
- There are any vision changes such as blurriness or double vision.
- There is uncontrollable bleeding around or from the eye.
- There is a visible scratch, cut, or penetration of the eyeball.

Acute Light Injury

In all cases:

- Do not press or rub the injured eye.
- Do not attempt to remove embedded foreign objects. Get medical attention immediately.
- Do not use fingers, cotton swabs, tweezers, or anything else on the eye itself. You may use cotton swabs on the eyelid only.
- Do not remove contact lenses unless one of these situations apply:
 - Chemicals are in the eye and flushing failed to remove the contacts.
- Prompt medical attention is not available.
- Rapid swelling occurs. UV light damage can occur very quickly, causing eye swelling, tearing, and intense pain. If swelling or pain is present, seek medical attention.

Small Objects in the Eye

Normally the eye clears itself of small foreign objects through tearing and blinking. If not, take the following steps:

Immediate Response

If the eye doesn't rid itself of the object:

1. Do not rub the eye.
2. Wash your hands before examining the eye.
3. Examine the eye in a well-lighted area or with a flashlight.
4. To locate the foreign object, have the person look up and down and then side to side.
5. If you still can't see the object, gently pull down on the lower eyelid to view between it and the eyeball. To view between the upper lid and the eyeball, put a cotton swab on the outside of the upper lid and gently fold the lid over the swab.
6. If the object is on an eyelid, gently flush it out with water.
7. Failing that, touch a second cotton swab tip to the object to remove it. Do not touch the eye with the swab.
8. If the object is on the eye (not embedded in), gently rinse the eye with water. Do not touch the eye with the swab.
9. If the object is embedded in the eye, seek medical aid.

Minor discomforts, such as scratchiness, may continue a day or two after removing tiny objects. If the person continues to have discomfort or blurred vision, seek medical attention.

Blunt Trauma

A blunt hit to the eye can be a very serious injury. A strike can damage parts of the entire eye, even the retina and optic nerve at the very back. Blunt trauma can also break the bones around the eye and can even cut the tissue of the eye in certain circumstances. The most common injuries

are discussed below. Other injuries are possible but usually only happen with severe impact in concert with other injuries, and are quite obvious to onlookers.

Immediate Response

In all cases of blunt trauma:

1. Reassure the victim. Serious eye injuries are very psychologically traumatic.
2. If there is any visible injury to the eyeball, seek immediate medical attention.
3. Very gently apply a cold compress to slow swelling and bleeding.
4. Unlike some other areas of the body, do not apply pressure to control bleeding.
5. If blood is pooling in the eye, cover both eyes with a clean cloth or bandage.

Blunt trauma can range from a minor injury up to a very serious medical emergency. In order of severity, from least to most, common results include:

Black Eye

The most common result of blunt trauma is a bruise in the tissue around the eye, commonly known as a black eye. The swelling and discoloration go away on their own after a few days or weeks. During the first day or two, delicately applied ice packs may reduce the swelling and pain. Nonsteroidal anti-inflammatory drugs, such as aspirin or ibuprofen, may be helpful in reducing pain and swelling. After a couple of days, warm compresses can help to remove the discoloration. Black eyes themselves are not serious, but they can often accompany or even mask serious injuries.

Blood Patches

Subconjunctival hemorrhage is a collection of blood in the white tissue of the eye. Sometimes the entire white of the eye can become red with blood. As with most black eyes, these hemorrhages usually look much worse than they actually are. The red will go away on its own, sometimes becoming slightly green or yellow first. The entire process usually takes one to two weeks.

Blood Inside the Front of the Eye

A hyphema is bleeding into the front chamber of the eye. Bleeding may continue for several days after the injury. Hyphema is a very serious condition that may result in permanent vision loss by blood staining the cornea or increased eye pressure damaging other parts of the eye. Hyphema can be difficult for others to see with a naked eye. The victim may only experience blurred vision and pain when exposed to bright light. Hyphema is one of the reasons it's usually best to seek medical advice on all but the most minor eye injuries.

Retinal Detachment

The retina is the light sensitive part of the eye. It is a layer on the inside of the rear of the eyeball. Trauma can cause the retina to detach from the interior surface of the eye. A detached retina is a very serious injury requiring prompt treatment, often surgery. Delayed treatment can result in further injury. Detached retinas are not obvious to the naked eye of others. The victim may see irregular dark floaters in their eyes or light flashes. He or she may have blurry vision and lose peripheral vision.

Eyelid Cuts

Eyelid cuts are serious injuries, but they are not as serious as injury to the eye itself. If a victim's eyelid is cut:

6. Reassure the victim. Serious eye injuries are very psychologically traumatic.
7. Wash your hands.
8. Carefully rinse the eye with cold water.
9. If the eyelid is bleeding apply gentle pressure with a clean dry cloth until the bleeding subsides
10. If available, cover the eye with a thick layer of an antibacterial ointment such as Neosporin or Bacitracin.
11. Cover the eye with gauze or other clean patch.
12. Gently apply a cold compress to relieve pain and swelling.
13. Seek immediate medical attention.

Puncture or Embedded Object

Eye punctures are extremely serious. If the victim's eye is cut or punctured:

1. Reassure the victim. Serious eye injuries are very psychologically traumatic.
2. Do not wash out the eye.
3. Do not push on the eye or attempt to remove anything protruding from the eyeball.
4. Wash your hands.
5. Bandage both eyes to protect the injured eye and to reduce eye movement. If there's a large protruding object, place a paper cup or something similar over the eye and tape it in place.
6. Seek immediate medical attention.

Chemical Burns and Irritation

A caustic chemical in the eyes is a very serious injury. If a victim gets chemicals in his or her eyes:

1. Reassure the victim. Serious eye injuries are very psychologically traumatic.
2. Flush the eye with cool water immediately: Turn the victim's head to the side so the injured eye is towards the floor. While holding the eye open, run water into the eye for 15 minutes straight. If the chemical is in both eyes or on other parts of the body, have the victim take a shower if possible. If running water is not available, in a pinch you can flush the victim's eye with soda pop or other relatively neutral liquid.
3. If the victim is wearing contact lenses and the flushing doesn't remove the lenses, gently remove the lenses after you finish flushing the eye or eyes.
4. Continue to flush the eye with water while seeking medical attention.
5. In all cases, seek medical attention if pain continues or the worker's vision is blurry or obscured

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Jim is CEO and founder of Arc-Zone.com. He is a master fabricator with years of hands-on experience in his own shop and also as a winning motorcycle racer, car builder, and chief mechanic for a top motorsports team. He also has extensive experience in manufacturing, technical sales, and product development. Before launching Arc-Zone.com, he held leadership positions in some of the most respected companies in the welding industry.

Arc-Zone.com

Under Jim's direction, Arc-Zone.com has led the industry in product innovation and online sales and service, becoming the world's leading supplier of high-quality, high-performance welding and metal working tools and accessories.

