Eye injuries account for one-quarter of all welding injuries, making them by far the most common injury for welders, according to research from the Liberty Mutual Research Institute for Safety. Those most at risk for welding-related eye injuries are workers in industries that produce industrial and commercial machinery, computer equipment, and fabricated metal products.

The best way to control eye injuries is also the most simple: proper selection and use of eye protection. Helmets alone do not offer enough protection. Welders should wear goggles or safety glasses with side shields that comply with ANSI Z87.1 under welding helmets and always wear goggles or other suitable eye protection when gas welding or oxygen cutting. Goggles provide better protection than safety glasses from impact, dust, and radiation hazards.

Unfortunately, workers don’t always wear goggles or safety glasses because of low perception of risk, poorly maintained lenses, discomfort, having to wear prescription lenses underneath, and vanity. It is important to stress to workers that welding-related eye injuries come from a number of sources, including:

- Mechanical damage from being struck by flying particles and chipped slag;
- Radiation and photochemical burns from ultraviolet radiation (UVR), infrared radiation, and Intense blue light; and
- Irritation and chemical burns from fumes and chemicals.

To help in reducing eye injuries, you should educate workers about all of the dangers they face and should implement an eye protection plan that outlines proper welding behavior. 

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CUMULATIVE DAMAGE RISKS
All of the most common types of welding (shielded metal-arc or stick welding, gas metal-arc welding, and oxyacetylene welding) produce potentially harmful ultraviolet, infrared, and visible spectrum radiation. Damage from ultraviolet light can occur very quickly. Normally absorbed in the cornea and lens of the eye, ultraviolet radiation (UVR) often causes arc eye or arc flash, a very painful but seldom permanent injury that is characterized by eye swelling, tearing, and pain.

While most welding-related eye injuries are reversible, with more than half of injured workers returning to work in less than two days and 95 percent in less than seven days, some eye injuries are irreversible and permanent visual impairment occurs. This is especially true with infrared and visible spectrum radiation. Damage from ultraviolet light can occur very quickly. Normally absorbed in the cornea and lens of the eye, ultraviolet radiation (UVR) often causes arc eye or arc flash, a very painful but seldom permanent injury that is characterized by eye swelling, tearing, and pain.

EYE PROTECTION GOES BEYOND THE HELMET
Helmets and protective clothing shield welders from “sunburn” and “welder’s flash,” but with the majority of their work performed with the helmet up, welders also need to wear goggles or safety glasses with side shields. These will protect them from particles sent flying during pre-job grinding, hammering, and power chipping that make it past the helmet’s protective front.

For most jobs, eye protection that conforms to ANSI Z87.1 is sufficient. However, shields or goggles with shade ratings of 3-8 should be worn for gas welding. For arc welding, safety glasses should be worn under shields.

Some guidelines and safety warnings for welding suggest workers should not wear contact lenses, even though there does not appear to be any research that would support such a recommendation. In fact, the National Safety Council, the American Welding Society, and the FDA all acknowledge that wearing contact lenses while welding is safe and even can provide UV protection. The only caveat is that contact lenses should not be used as eye protection in place of safety glasses or goggles.

Once the proper goggles/shields are in hand, you can turn your attention to the type of helmet best suited for the job. Published tables are available through the welding helmet vendor or the Internet, which can help you determine the most appropriate lens shade based on the type of welding and the amperage of the welding unit. It is a common misconception that a darker shade provides more protection against UV. Properly maintained welding helmets, regardless of shade, provide 100 percent protection against UV, according to the manufacturers.

Arc welding helmets can be fixed shade or variable shade. Typically, fixed shade helmets are best for daily jobs that require the same type of welding at the same current levels, and variable helmets are best for workers with variable welding tasks. Helmet shades come in a range of darkness levels, rated from 9 to 14 with 14 being darkest, which adjust manually or automatically, depending on the helmet. To determine the best helmet for the job, select a lens shade that provides comfortable and accurate viewing of the “puddle” to ensure a quality weld.

Now that your workers have the right eye protection for the job, it is time to implement an ongoing eye protection plan that ensures they use the equipment properly.

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**EYE PROTECTION PLAN**
An effective overall eye protection program for welding covers these:

- Review and plan the area where the welding will take place. Note that considerations of fire and explosion are particularly important, and a welding permit may be required.

- Make sure the immediate area is free of any tripping hazards; welders have no peripheral vision with the helmet down.

- Isolate the area with curtains to absorb radiation if workers other than the welder will be in the area.

- Identify and cover any highly reflective surfaces.

- Wear the appropriate eye protection selected on the basis of type of welding and visual requirements of the task. If using a helmet, be sure to wear safety glasses with sideshields under the helmet.

- Others in the area should also wear eye protection, especially if chipping hammers are used.

- Keep eye protection in good condition.

- Wear clothing and gloves that protect against UV radiation.

- Anyone experiencing a flash burn should seek medical treatment to avoid infection, which increases the potential for permanent injury.

- Educate welders and other personnel on the hazards of welding and the importance of seeking treatment for flash burns.

Through sound implementation of management of an eye protection program, we can ensure all our workers get home at the end of the day in the same condition in which they arrived in the morning.

**LOOKING FOR MORE WAYS TO KEEP YOUR WORKPLACE SAFE?**
Call **713.714.RISK** or email Pedro Mercado at **pedro@maximgroup.com**.
Wait, kill yourself while using a fall protection system? Those things are supposed to prevent that from happening, right?

Of course they are, but the key part of that phrase is: supposed to. If you’re not using a fall protection system properly, or not taking into account some external factors that could render your system useless, your fall protection is doing nothing but providing you a false sense of security. So, what are some of the things you could be doing that could be endangering yourself or your employees even if a fall protection system is in place?

**IGNORE SWING HAZARD**
As we’ve previously explained in this article, swing hazards are a very real thing. If you don’t plan properly, or if you travel at too great an angle from your anchor point, you may be hurt when you fall, even if your personal fall arrest does its job properly. Swing hazards occur when the engaging of your fall arrest system cause you to swing back into a structure. Rather than suffer injuries from the fall itself, you suffer injuries from the impact with the structure and, because of the force associated with falls, you could pick up quite a bit of speed and impact with great force.

**IGNORE FALL CLEARANCE**
You cannot determine what type of fall protection you need without first determining your fall clearance. Fall protection systems are not one-size-fits-all. Unfortunately, a great number of people feel that they have either protected themselves, achieved compliance, or fooled anybody who is looking by throwing on a 6’ lanyard and a harness and tying off, but unless your anchor point is about 18.5’ above the lower level, that fall arrest system isn’t going to help. As demonstrated here, your body length, stretching of your harness, expansion of your deceleration device, and sag in your anchor point are all factors in just how much room you need. Simply assuming a 6’ lanyard is going to protect you once you’re over 6’ is potentially deadly.

**TRUST WITHOUT INSPECTING**
If there’s one rule of thumb you should live by when it comes to safety, it’s “Inspect, inspect, inspect.” Why would you ever leave your safety to chance? If somebody else is inspecting your equipment, people make mistakes, people get tired, people get lazy, people get numb to looking at the same thing over and over, and, frankly, nobody is going to be as vigilant with your life as you will be. And that’s if somebody else is inspecting it. I’ve seen plenty of workers pick up equipment that’s never been inspected by anybody and use it. The only thing that’s keeping them safe? Luck.

Whether it’s your fall protection equipment, a ladder, a railing, a tool, a GFCI or even just your hardhat, check it out before you begin. If you ever actually need the equipment to perform its safety function, you’re going to wish you’d checked first.

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When it comes to fall protection, you should be performing a thorough inspection of every component prior to use. For instance, as we recently discussed in this article, you should be checking your harness for frays, stretching, burns, discoloring and a variety of other indications that something has happened to it that could cause it to not work properly. Your lanyards should be inspected for the same, as well as for indication that it has been used in a fall situation.

Any fall protection equipment that has deployed in a fall situation MUST be removed from service (some manufacturers will even replace your deployed equipment with new equipment so that they can use the deployed equipment for studies). Ladders should not only be inspected prior to use for defects or physical problems, but should also be checked each time you are about to put your weight on it to ensure that it is not going to shift. Remember, as a colleague discovered on a job a few years back when he stepped onto a fixed ladder that suddenly shifted to the side, that it’s not usually the cartoon-like backwards fall that you’re going to encounter, but rather a lateral slide (not that a backward fall couldn’t happen if the ladder wasn’t angled properly).

Railing is another thing that needs to be taken for granted. On a project for the Erie VA Hospital, a colleague encountered a railing that was attached to coping. A simple shake of the rail showed that it had no structural integrity and would not support the 200 lbs of force that OSHA requires it to withstand. Even wire rope rail needs to be inspected so that it is tightened properly and is not showing signs of damage. Many fatalities have occurred in construction when workers bump up against perimeter cable that is looser than expected and end up falling to their deaths.

BE ALONE ON A ROOF
Even with all of the fall protection in the world, working alone can lead to death. Go up on a roof by yourself and nobody may come looking for you for a very long time, as roofs are not areas that usually see much traffic. If you have an accident or some type of health issue, such as a heart attack, help can be delayed if they are even summoned at all before it’s too late.

Never go on a roof or any work area alone, unless you have some sort of planned communication or monitoring that would alert somebody if something was wrong. It is best to employ a roof permit process to prevent your employees from wandering up without anybody knowing about it. In fact, there are a number of good roof policies you should be following if this is a concern.

MAKE YOUR OWN... (IF YOU’RE NOT QUALIFIED)
Simply put, making your own anything is probably not a great idea. Manufactured safety equipment goes through a series of tests and has to meet certain standards before being sold (or, at least, you should be looking for the stamp or label that says it meets ANSI standards, or has been tested by UL or equivalent labs, etc.). Anything you make is not going to be tested that rigorously, if at all, and leaves a large chance for error. Even something that seems simple, like the idea of tying yourself to something as fall protection is foolish because you may not be fully aware of the forces on a body in a fall, or the fact that tying a knot in rope significantly reduces the strength of the rope.

Building your own lifeline can be dangerous as well, even though you feel you know that the wire rope, u-bolts, and anchors are all strong enough, but did you know that improper tensioning could cause the arresting force during a fall to exceed 5,000 lbs? In recent years, the cost of fall protection equipment has come down to a point where most things are reasonably priced. And, even though some things may not be “cheap”, remember that you get what you pay for. If you ever need that fall protection equipment to work, you’re going to think that it was worth every last penny if it functioned properly.

Just remember that safety isn’t about putting on a dog and pony show, it’s about actually protecting yourself and/or your employees. Giving them something that they think is going to help them, but isn’t, is almost more dangerous than giving them nothing at all. A false sense of security could lead people to take risks that they otherwise wouldn’t have taken. Do your job as a fall protection equipment user or as an employer and understand what it is you’re providing and what it is that you actually need. If they don’t match, you could be in for disaster.