Regulatory Compliance

5 Arc Flash Safety and Injury Prevention Tips for Manufacturing

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Learn how to avoid arc flash fires from the electrical energy in your manufacturing environment and stay on top of the standards. It goes well beyond simply buying the right PPE.

Free-flowing electrical energy ***isn't something*** to take lightly in a manufacturing environment.

Of all the incidents that can occur when equipment isn't turned off or handled properly, arc flash fires may be some of the most visually dramatic—and dangerous—your workers can encounter.

What Is an Arc Flash Hazard?

An arc flash hazard takes place when there is a rapid release of energy, usually from an electrical arcing fault, which can create scorching temperatures upward of 35,000 degrees.

They happen when a flash of "electric current leaves its intended path and travels through the air from one conductor to another, or to ground," ***according to OSHA***. They can be spontaneous or result from inadvertently bridging electrical contacts with a conducting object.

> **"Getting into flame-resistant clothing can drastically improve the chance of walking away from what would be considered a catastrophic event."**
> Jay Smith Jr.
> SEAM Group (formerly Lewellyn Technology)

These highly dangerous incidents happen extremely quickly but can have devastating consequences. Injuries to humans, if they don't prove to be fatal, can include severe burns, concussion, blindness, hearing loss or wounds caused by flying shrapnel.

"It's not uncommon for an injured employee to never regain their past quality of life," according to

OSHA, with extended medical care often required, sometimes "costing in excess of $1,000,000."

There are 30,000 arc flash incidents in the U.S. each year that result in 2,000 hospitalizations and 400 fatalities, according to *Industrial Safety & Hygiene News*.

The Dangers of Electrical Arcs, Explosions and Fires

An arc flash injury can mean an "excruciating road to recovery, something any reasonable person would want to avoid," says Antony Parsons, technical consultant at energy management specialist Schneider Electric, in *an interview* with Safety+Health Magazine. "There's light, sound, along with heat, that can cause damage to eyesight, hearing.

"It can also cause a lot of damage to equipment. It may mean main electrical equipment is not repairable. Maybe production is down in your facility for an extended period of time. Economic loss can come along with it. It can have a huge impact. If you have no protection, it's basically a roll of the dice."

OSHA is the governing body that regulates workplace safety, including arc flash prevention, the correct labeling of equipment and use of personal protective equipment (PPE).

Specific OSHA standards related to arc flash include *1910.137*, which covers electrical protective equipment, and *1910.269 App E*, which requires an employer to "conduct an assessment for each employee who performs work on or near exposed, energized parts of electric circuits."

While arc flash fires are possible, they are ultimately preventable. Here, we outline five fire prevention tips for keeping your staff safe from dangerous electrical explosions and fires.

Read more: Digital vs. Analog Two-Way Radios: What Are the Benefits of Going Digital?

No. 1: Optimize Your Lockout/Tagout Procedure for Electrical Design

While extra care, caution and personal protection play a vital role in protecting staff against dangerous electrical fires, if your shop isn't wired correctly (and safely), those efforts could be futile.

First, businesses must engage in proper *lockout/tagout procedures*, which primarily include finding your isolation points (where energy can be removed from the machine itself) and understanding your shop's unique program requirements (or the type of equipment workers are exposed to). As *EC&M* emphasizes, both OSHA standards and the NFPA 70E standard require that all equipment be de-energized before employees or contractors work on or near it—which means electricians and after-hours janitors alike should be accounted for.

Of course, not all electrical equipment is capable of creating apocalyptic explosions. The National Fire Protection Association (*NFPA 70E*) specifies that any piece of equipment under 50 volts is electrically nonhazardous. But with five to 10 arc flash incidents occurring with electrical equipment every day (per the *National Institute for Occupational Safety and Health*), it's probably best to err on the side of caution and de-energize all equipment before workers handle it.

No. 2: Avoid Arc Flash Fires by Continually Performing Maintenance on Equipment

Once equipment is de-energized, your company is in the clear in terms of employee safety, right? Far from it, according to Parsons.

"That's one of the biggest things many facility owners miss, doing proper periodic maintenance on

electrical equipment. They don't do it in some cases," he says in Safety+Health. "In some cases, what they do is inadequate. The less maintained it is, the less reliable it'll be. That doesn't do you any favors when you talk about arc flash hazards."

In addition to ensuring equipment is clean and up to date, a risk assessment also comes into play. The NFPA defines the term as a comprehensive approach to equipment history, where manufacturers gain an understanding of how equipment has been maintained and if manufacturer-recommended maintenance has been performed.

But as Hugh Hoagland, a senior managing partner of e-Hazard, says in *an interview* with Safety+Health, not all companies may benefit from doing their own risk assessments and may need outside help.

"The problem with risk assessment, it's very iffy and based on historical knowledge. If you're a small facility, you may struggle to know historically a piece of this equipment has had a problem. It's probably good for you to have someone with more experience help with risk assessment."

No. 3: Make Proper Arc Flash Warning Labeling and Signage a Priority

Simplified and clear labeling could also have a sizable impact on the reduction of dangerous electrical arc flashes, *EHS Today* says.

It should be noted that electrical equipment without arc flash labels is a safety violation—*OSHA* has been requiring companies to affix arc flash labels to electrical equipment since 2000. But if history (and *OSHA's Top 10 list*) has taught us anything, it's that employers will frequently dodge regulations for the sake of expedience, or simply overlook them.

To save your company the time (and inevitable fees from OSHA), EHS Today suggests enlisting the counsel of an electrician familiar with the devices on your premises and, based on the transformer sizes, nameplates, and circuit breaker or fuse information, proper labels can be applied.

Read more: 2020 OSHA Top 10 Violations: What They Cost and Tips to Avoid Them

No. 4: Oufit Staff with the Correct Arc Flash Suits and Fire-Resistant Clothing and PPE Gear

We can likely all agree that the safest type of arc flash fire is no arc flash fire. But in the event that one occurs, you'll need to ensure your staff is properly suited.

As *OH&S* reports, wearing *arc rated (AR) or flash fire rated (FFR) clothing* kits, including *gloves*, *hoods* and *jackets*, drastically improves survival odds when an arc flash fire occurs. But the article also says that while those designated items are sufficient, they aren't necessarily the best option—a title given to multipurpose PPE that meets both requirements set by the *NFPA 70E* and *ASTM F2733-21* Standard Specification for Flame-Resistant Rainwear for Protection Against Flame Hazards.

"The best thing employers can do is change what they put their people in," *explains* Jay Smith Jr., then executive vice president of Lewellyn Technology, in Safety+Health. "Getting into flame-resistant clothing can drastically improve the chance of walking away from what would be considered a catastrophic event."

In addition to regulations and standards set in place by governing bodies, PPE garments will evolve as technology does. There's a special task group associated with the NFPA 70E that tests and rates new

(and old) clothing, face shields, rubber gloves and insulated tools for electrical workers, per ***EC&M***.

No. 5: Incorporate Arc Flash Training into Your Fire Safety Plan

In the same vein as evolving PPE technology and standards, it's an employer's duty to not only stay in the know of emerging and existing regulations—but to extend that knowledge to employees as well, which ***may mean retraining them***.

It's worth reviewing ***the latest version*** of the National Fire Protection Association's electrical safety standards for any updates.

The NFPA 70E requirements, which were originally developed at OSHA's request, help companies and employees "avoid workplace injuries and fatalities due to shock, electrocution, arc flash, and arc blast, and assist in complying with OSHA 1910 Subpart S and OSHA 1926 Subpart K."

In terms of training, ***OSHA*** requires that employees be "thoroughly familiar" with the types of equipment and safety procedures their job requires. This type of familiarity relates to de-energizing equipment, using proper lockout/tagout procedures, wearing the proper PPE and maintaining a safe distance from energized parts.

Read more: The Development of Arc Flash Suit Fabrics: Flame-Resistant PPE for Electrical Hazards

MSC can help you create a safer workplace to keep your team protected from electrical hazards. For a free assessment, training, programs and products to keep safe, visit *mscdirect.com*.

Is your staff properly trained on ways to prevent (and protect against) dangerous arc flash fires? Let us know your methods in the comment section below.

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