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Employers and OSHA have teamed up in recent years to change the way people view safety in the workplace. Safety in manufacturing has moved to the forefront so it is now commonplace for **everyone** entering a manufacturing facility to attend an orientation outlining the safety rules each person must adhere to when in the facility.

Many types of dust collection share common safety concerns. This article will focus on the inspection and maintenance of dust collection equipment, whether located indoors or outside of a manufacturing facility. The four safety topics addressed are:

- 1) Lockout-tagout/electrical safety requirements,
- 2) Working in confined spaces,
- 3) Fall protection, and
- 4) Handling and lifting

LOCKOUT-TAGOUT/ELECTRICAL SAFETY

A facility's electrical safety program must follow all local codes and OSHA Electrical Safety standards relative to determining safe work conditions when employees are subjected to potential harmful electrical sources. It's critical to recognize the electrical hazards before performing any type of maintenance work, including inspections or adjustments within control panels. Everyone must take all the necessary precautions to prevent injury or even possible death. Generally all energy sources must be disconnected and Lockout-Tagout (LOTO) procedures performed in accordance with the facility's safety rules.

When installing, inspecting and doing common maintenance work on dust collectors, electrical safety and LOTO policies and procedures work together to reduce the risk of injuries. LOTO must be followed when:

- 1) There could be unexpected energy sources/start-ups of the dust collector, fan, rotary airlocks or other electrical energy sources or devices in the system.
- 2) A drive guard or other safety device is removed or made inoperable.



- 3) If someone is physically in an area of the collector or working on electrical systems in the area considered hazardous.

Many dust collector control panels include disconnects, motor starters, timers, Variable Frequency Drives and other electrical components. This can mean direct exposure to live electrical energy sources when the control panel door is opened. While it may be necessary for inspection or adjustments to pulse timers, motor overloads and VFDs, work on an energized panel should only be performed by qualified individuals.

Keep in mind that electrical energy sources can create the potential for an arc-flash incident. The radiant heat energy generated by arc-flash can result in severe burns in a fraction of a second. Only trained and qualified persons able to recognize and avoid electrical hazards should access a "live" control panel. They must know the proper use of Personal Protective Equipment (PPE), insulating/shielding materials and have the proper insulated tools/test equipment to perform the necessary electrical work. When exposed to ANY live components, the proper PPE needs to be worn. NFPA 70E provides a description of proper PPE clothing characteristics for various electrical risk categories.

Remember, any work on live electrical equipment in an area, even if unrelated to a dust collector system, can result in shocks, arc-flash, fires or falls and electrocution.

Much of the discussion on this topic is related to electrical safety and LOTO procedures for energy sources. Dust collector systems have many potential energy sources including mechanical pressures from V-belt drives, rotary lock chain drives, low/high pressure compressed air, or simple mechanical actions like manually spinning a fan wheel. These can all represent potential safety hazards that should be considered in preparation for any service or maintenance work.

Finally, NFPA standards may contain language related to incorporating fire and/or explosion mitigation systems on dust collectors. These ancillary items may also require separate de-activation and LOTO procedures. Recognizing and understanding potential hazardous energy sources associated with a dust collector exhaust system is critical. Ensure all energy sources have been identified as safety hazards.

WORKING IN CONFINED SPACES

A confined space is generally defined as *a space large enough and configured such, that work can be performed, but also has limited ingress and egress for the worker.*



Dust collector housings are often considered a confined space, especially if a worker is required to enter the collector housing to perform service or maintenance.

Manufacturing facilities may consider dust collector housings not only a confined space, but a "Permit Required Confined Space." Areas of concern include the interior spaces needed for filter bag change-out, cleaning system maintenance, or the conical/pyramidal shaped discharge hoppers. Even if not fully enclosed, hoppers could potentially trap a worker.

Additional reasons for collector housings to be designated permit required confined spaces are the collected potentially hazardous dust (review MSDS sheets), and the potential for the process air stream in the collector to have oxygen levels reduced to a dangerously low level.

Each manufacturing facility is required to determine what areas and equipment are considered Confined Spaces and which are considered Permit Required Confined Spaces. Since the process owner has the knowledge of his process safety requirements and he understands the hazards associated with their working environment, only he can provide the necessary procedures for entry into areas for workers or service personnel. The facility must then post proper signage at the ingress and egress of those areas they consider confined or permit required confined spaces.

It is extremely important for personnel entering any confined space to understand all the potential hazards. They should then coordinate with the facility on any entries being considered into the collectors. The facility must follow one of the following three different options:

- 1) Provide all necessary training in the facility's permit required confined space program for the required tasks to be completed safely. The facility must provide escorts during the complete entry procedure, or
- 2) Ensure the space is "Safe to Enter" by complying with OSHA 29CFR 1910.146 (c) (5), or
- 3) Reclassify any permit required confined space to non-permit for the maintenance or inspection to be performed if it can be determined that the confined space is not a hazardous environment.

FALL PROTECTION

Floor space in today's facilities is at a premium so location selection for many dust collectors makes access to the collector difficult. Personnel performing inspections or service often have to be on elevated surfaces. Many dust collectors are supplied with access platforms, ladders and walkways for normal servicing. There are still housing access areas not required for regular maintenance activities where safety from accidental falls becomes necessary. Physics shows that even a 10 foot fall can result in serious injuries.

Fall protection must be used when working on an elevated surface or a collector located at a height of four feet above the next lower surface. Portable ladders are considered the exception. Fall Protection is required when accessing Permit Required Confined Spaces such as conical or pyramidal hoppers where entrapment or injury could prevent an immediate rescue of personnel without this protection.



Fall protection should be used when any of the following conditions exist:

- 1) Work platforms or mezzanines at a height greater than four feet at the dust collector do not have proper handrails or toe plates.
- 2) When accessing the internals of collector hoppers (noted above).
- 3) Safety Procedures of the manufacturing facility require fall protection.

Or, when using certain equipment for access such as:

- 1) Fixed ladders greater than 20 feet tall without a cage.
- 2) Articulating boom platforms.

Other lifting equipment, such as scissor lifts used to gain access to areas of the dust collector may provide working platforms with proper handrails and toe plates, however, facility safety rules may require fall protection equipment to still be worn.

Also note the importance of a rescue plans for working on elevated work surfaces and for entering any confined space. The plans should be developed proactively for each situation and agreed upon by all involved personnel.

Most manufacturing facilities provide service personnel with the basic fall protection equipment necessary to access difficult area where service has to be performed. Those not familiar with the supplied fall protection equipment must request help. The responsibility for the proper wearing, inspection and adjustments for fitting of the fall protection equipment is with the person wearing it. Remember fall protection equipment is frequently used, and a life may depend on the condition of the equipment supplied. Inspect it closely for any wear, burns, stretching and tears of the web on the harness. Inspect all lanyards and connectors provided. Be prepared for a fall by inquiring what steps to take if a planned rescue from a fall is required and a self-rescue is not feasible. Rescue straps are strongly recommended. A facility escort should always be present for work requiring fall protection. Don't be the exception.

HANDLING AND LIFTING

Finally, let's discuss lifting and handling risks. Dirty cartridges, long cages, 55 gallon drums, lift off access doors, and many other items associated with dust collectors can be heavy and awkward during dust collector inspections and service. Heavy collector parts may present a safety hazard to anyone handling them or others in the area if they are dropped. To avoid injuries always follow instructions on proper lifting mechanics.

Everyone is different when comparing age, physical size, strength and capabilities. Except for service personnel, the lifting of heavy and awkward parts does not occur on a daily basis. It is important therefore to stop, recognize and think about what is going to be lifted or moved during a collector inspection or service.

A majority of injuries from handling and lifting are back problems. The human spine is engineered to allow the body to bend, twist and act as a shock absorber. The problem with the spine's unique structure is that it may not let anyone know when it is stressed. When stressed, damage is often done that may result in spasms, torn muscles, herniated discs



or strains. When handling and lifting heavy parts, remember several lifting mechanics designed to minimize back injuries:

- 1) Lift only very limited amounts of weight if the part is on the floor or above shoulder height.
- 2) If the item is heavy or awkwardly shaped, share the load with someone or lift with the part very close to your center of body.
- 3) Lift the part first and then pivot or turn. Do not twist while lifting.

4) Whenever possible, push a load (of boxes, drums, containers, etc.) instead of pulling it.

5) Get as close as possible to the part being lifted to give the body/spine its maximum strength capability.

Test the weight of a part first. If it feels too heavy, get help. If the part is to be taken to a different location, make sure the road is clear. If a heavy part is to be taken any distance, most manufacturing facilities can provide a wheeled cart.

Always use good lifting mechanics. A back problem can be debilitating and lifelong.

SUMMARY

The focus on safety in manufacturing facilities has changed significantly with more stringent regulation. Know the tasks involved for inspecting or servicing dust collectors. Insure proper PPE equipment and clothing is readily available for those tasks. Also, ensure proper hazard assessments and rescue plans have been developed specific to the tasks being performed and all parties are aware of their responsibilities. It is important that all parties, facility host, and service personnel be fully aware of their own corporate safety programs and procedures. The facility must also ensure this same awareness in all visitors. If any safety program conflicts are apparent, they need to be resolved before any work is performed.

The end goal is 100% quality assurance and a safe and productive workday for everyone.