

Working Safely With Grinders

10 Proven Best Practices

By Jean Ndana

“A worker’s first day shouldn’t be his last day on earth.” I said these chilling words a few months ago when I narrated the tragic story of a 23-year-old temporary employee who did not return home from his first day at a Michigan factory. He was removing imperfections on spherical surfaces with a pedestal grinder when the abrasive wheel exploded. The father-to-be was fatally struck on the head by flying fragments. His death prompted a Michigan OSHA inspection, and the company was cited for several safety violations and received fines of more than \$100,000.

Far too many preventable incidents occur daily in workplaces across the U.S. This event was one of them. This worker’s senseless death could have been avoided had the employer developed, implemented and enforced simple but efficient grinder-related safety practices.

An abrasive wheel grinder is one of the most common pieces of machinery utilized in maintenance shops and in manufacturing. These machines are used for various purposes and can be pedestal, bench-mounted or portable. After visiting and auditing many manufacturing plants, reviewing OSHA’s list of most frequently violated standards, and being the lead investigator of a fatal incident involving an

abrasive wheel pedestal grinder, it became clear that abrasive wheel safety needs greater attention. This article presents 10 best practices for grinder use that are based on several years of practice as a safety professional in many manufacturing plants in competitive, fast-paced arenas.

10 Best Practices for Using Grinders Safely

In FY2014, OSHA (2015) cited 1,014 serious violations related to grinders. Many of these hazards are preventable if employers and workers follow the best practices presented in this article.

Best Practice 1: Display a List of Persons Trained & Authorized to Operate, Mount & Dress Grinding Wheels at or Near the Grinder

In most workplaces, only employees properly trained in the safe use of equipment should operate it. Companies spend many resources preparing workers to safely use grinders, but as time passes it becomes less clear who is trained and authorized. This problem is amplified in workplaces where workers and/or supervisors change frequently. Displaying and using a list of authorized users will demonstrate management’s commitment to reducing dangerous practices, including the unauthorized use of grinders by untrained employees. Figure 1 presents an excerpt from a sample form.

Best Practice 2: Document Each Time a New or Used Abrasive Wheel Is Mounted

A mounting log (Figure 2) identifies who mounted the wheel, as well as when and whether the wheel was visually inspected and ring tested before being mounted. A ring test is one method of checking whether a wheel is cracked or damaged. OSHA (1996) concisely describes this test in Section 1910.215(d)(1) of its abrasive wheel machinery rule: “Wheels should be tapped gently with a light nonmetallic implement such as the handle of a screwdriver for light wheels, or a wooden mallet for heavier wheels. If they sound cracked (dead), they shall not be used.”

The first entry on this log confirms that the employee who mounted the wheel has been properly trained and that his/her training is still valid. The second entry addresses a critical issue: A damaged or cracked wheel is dangerous, and microscopic cracks are impossible to see with a naked eye. Thus, an employee should closely examine an

IN BRIEF

- An abrasive wheel grinder is one of the most common pieces of machinery utilized in maintenance shops and in manufacturing.
- Industry experience indicates that abrasive wheel safety needs greater attention from OSH professionals and employers.
- This article presents 10 best practices for grinder use that are based on several years of practice as a safety professional in many manufacturing plants in competitive and fast-paced arenas.

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abrasive wheel and ring test it before mounting it to ensure that the wheel is free of cracks and other defects that can lead to failures during use.

A written tracking system also reminds workers to always examine and test a wheel before installation, and it helps monitor compliance to these critical safety rules. In addition, this log provides evidence of an employer's good faith effort to comply with OSHA standards, and it can be useful when investigating an injury involving a grinder.

Best Practice 3: Permanently Mark an Exclusion Zone on the Floor Around the Grinder

Permanently marking an exclusion zone on the floor around the grinder serves several purposes. It visually alerts employees and visitors to potentially hazardous areas (Photo 1). Floor markings also remind employees that storage in this area is prohibited, and will make inadequate storage issues more apparent to management.

Safety labels and signs with important reminders, when used in conjunction with floor marking, create a visually instructive workplace—that is, the information is embedded in the environment and employees or visitors can easily understand how a workplace operates. Galsworth (2005) reports that an easier-to-understand workplace is more efficient, productive and safe. According to Galsworth (2005), a “visual workplace is a work environment that is self-ordering, self-explaining, self-regulating and self-improving—where what is supposed to happen does happen, on time, every time, because of visual solutions” (p. 10).

A visual workplace helps improve safety in several ways. To successfully create a safe work environment, safe behaviors taught must be reinforced and visuals reinforce teaching. In a busy and cramped plant, controlling the flow of people and powered industrial vehicles is an important safety concern. Marking permanent aisles and passageways is not just good practice, it is an OSHA mandate (CFR 1910.22). In a visual workplace, the environment is clean, well ordered, self-explaining and self-regulating. As a result, people are able to recognize prenear-hit conditions quickly and take corrective measures before incidents occur.

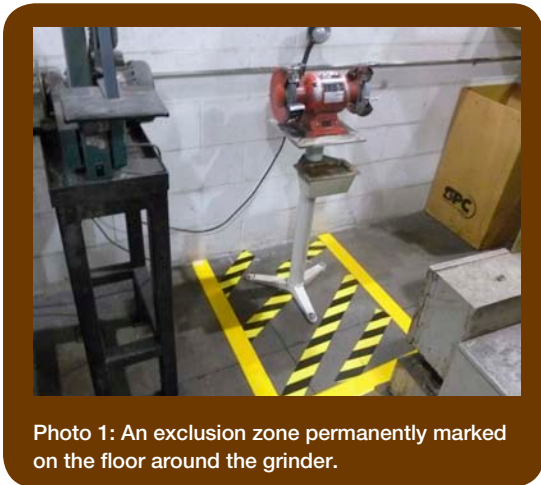


Photo 1: An exclusion zone permanently marked on the floor around the grinder.

**Figure 1
List of Trained Personnel**

Display a list of persons trained and authorized to operate, mount and dress grinding wheels near the grinder.

ABRASIVE WHEEL GRINDER SAFETY: TRAINED AND AUTHORIZED EMPLOYEES

**PLAY IT SAFE AT THE WHEEL
NEVER OPERATE OR CHANGE THE ABRASIVE WHEEL
WITHOUT PRIOR PROPER TRAINING**

Employee names	Shift	Department	Trained to operate YES / NO	Trained to change the grinding wheel YES / NO	Date of training	Retraining date

**Figure 2
Mounting Log**

Display a log for tracking abrasive wheel replacement near the grinder.

ABRASIVE WHEEL GRINDER SAFETY: WHEEL CHANGE

**SAFELY CHANGE THE WHEEL
ALWAYS VISUALLY INSPECT AND RING TEST THE ABRASIVE WHEEL
PRIOR TO MOUNTING IT ON THE GRINDER**

Employee names	Shift	Department	Have you visually inspected the wheel? YES / NO	Have you ring tested the wheel? YES / NO	Date	Comments

Best Practice 4: Display the Grinder's RPM Near the Device

All grinders and abrasive wheels are rated for a maximum operating speed, usually expressed in revolutions per minute (RPM). A wheel that is operated above its rated maximum speed may shatter. If a wheel shatters while in use, an employee may be seriously injured by pieces of shattered grinding wheel flying at high speed. Therefore, the wheel's RPM rating must be equal to or higher than the grinder's RPM, never lower (OSHA, 1996).

To effectively implement this control, the grinder's RPM rating must be legible. For various reasons, ranging from poor maintenance and poor house-keeping, to absence of the machine data plate, the rating is not always clearly visible. Even when the rating does exist, may be difficult to discern without careful examination (Photo 2, p. 28). If something cannot be easily seen or understood, it will not likely be used or heeded. Therefore, conspicuously posting the grinder's RPM rating encourages worker compliance (Photo 3, p. 28).



Photo 2 (left): Reading this grinder's RPM requires the worker to examine the device closely. Thus, it is best to conspicuously display this information (Photo 3, right) so that the operator can quickly compare grinder and wheel RPMs.

operating procedures continue to be followed; that employees are familiar with the hazards associated with grinding activities and do not become complacent or take shortcuts; that they are checking work rest and adjustable tongue guard clearances before each use; and that any deviations or procedural inadequacies observed are corrected. Competent persons include workers and others with adequate knowledge of the operations, the nature of

the hazards and proper procedures.

During the inspection, if an unsafe action is observed, the inspector must stop the work process immediately, remind the operator of the potential hazards and coach the operator on the correct procedures. Figure 3 presents a sample inspection checklist.

Best Practice 8: Display Signs to Remind Employees of Proper Controls

Most injuries sustained from grinder use involve loss of eye(s), amputation of fingers, lacerations and concussions (OSHA, 1999). Grinding wheels are designed to operate at high speeds. If a wheel is defective, mounted incorrectly or misused, it may explode, and the shooting fragments can disfigure, cause permanent disabilities or fatal injuries. Thus, grinder operators should wear full face protection (OSHA, 2009). A well-placed sign is a permanent and consistent reminder of the proper controls.

Best Practice 9: Good Housekeeping & Cleanliness Improve Grinder Safety

Conducting abrasive wheel grinding operations creates combustible dusts and sparks. Accumulated combustible dusts can ignite and a deflagration can occur. Therefore, the area around the grinder must be free of all accumulated dusts. Employees should clean the work area with a portable dust collector as needed, such as any time they observe noticeable traces of dust, to minimize dust buildup on the machinery and the surrounding workspace. The permanent floor marking around the grinder can also quickly alert management to poor housekeeping practices that require correction (Photo 6).

Best Practice 10: Conduct Training Annually, When Changes Occur or Based on Inspection Findings

Preventing grinder-related incidents in manufacturing facilities requires constant awareness, safety practices and effective training. Employees should know how to identify grinder hazards and be armed to control the risks related to grinder operation. Training should address findings from monthly inspections, cover fundamental knowledge and test application competencies.

The required fundamental knowledge can be acquired through specialized videos that discuss the risks, hazards and controls associated with grinder use and maintenance; feature scenes showing safe practices in use; demonstrate how to conduct a ring test; and share stories from people who have witnessed or been involved in grinder incidents.

Best Practice 5: Install a Cabinet Containing Safety Glasses, a Face Shield & Disinfectant Wipes Near the Grinder

Grinder use typically releases airborne particles and generates impact hazards such as sparks, flying objects, fragments and particles. Thus, operating risks include eye and face injuries. Basic eye protection devices such as goggles or safety glasses do not protect other parts of the face. Therefore, OSHA requires that a face shield be worn over suitable basic eye protection for additional protection beyond that offered by eye protection devices alone. To eliminate health risks, safety glasses and/or face shields must be cleaned and disinfected before each use, especially when the gear is shared. In addition, having required PPE readily available at the point of use and protected from dusts encourages worker use (Photo 4). It is important to note that safety glasses/goggles and a face shield are the minimum required PPE. Certain circumstances may require additional gear (e.g., respirators, hearing protection).

Best Practice 6: Install a Safety Gauge Near the Grinder

A common grinder-related safety violation is related to clearances. OSHA (1996) specifies that work rests must be kept close to the wheel with a maximum opening of 1/8 in. As the stone wears down from use, the rest and guard must be adjusted accordingly. This is critical because too large a gap enables the wheel to grab the work piece or anything loose that could get caught in the machine (e.g., loose hair, dangling jewelry, a long-sleeved shirt not buttoned at the wrist) and pull everything into the grinder, which may cause serious injuries. OSHA (1996) also states that the distance between the grinding wheel and the adjustable tongue must never exceed 1/4 in. A safety gauge helps employees measure these clearances easily and accurately (Photo 5).

Best Practice 7: Conduct & Document Grinder Inspections at Least Monthly

A competent person must conduct and document a comprehensive inspection at least once per month. This inspection ensures that safe



Photo 4: Storing a face shield, goggles/safety glasses, respiratory mask and disinfectant near the grinder helps workers comply with safe practices.



Photo 5: A safety gauge helps employees measure clearances easily and accurately.



Photo 6: The permanent floor marking around the grinder can also quickly alert management to poor housekeeping practices that require correction.

Following the video, the trainer can spark discussion by asking each trainee to share something that stood out to him/her in the video. Then, the trainer should ask trainees to put into practice the knowledge gained. For example, the trainer might give employees several sound abrasive wheels along with one or two damaged wheels and ask them to identify the bad abrasive wheels. Under the trainer's supervision, trainees can practice mounting an abrasive wheel. During the installation, they should explain each step as they go while other trainees ask questions (e.g., Why this? Why not this way? What if?).

The trainer might also show a "what's wrong with this" photo that depicts a grinder that has been altered to show several hazards and ask trainees to identify those hazards.

Conclusion

Pedestal and bench-mounted grinders are found in most maintenance shops and manufacturing plants. They are powerful, versatile devices used to sharpen cutting tools, drills, chisels and tool bits, and to remove surface imperfections. But operating any grinder is a hazardous work activity. A single mistake can have devastating consequences, not only to the user but also to those working nearby.

Implementing safe work and operating practices reduces the chances of incidents involving grinders, provided that management and line supervisors support those practices. Strong, visible leadership and engaged managers can motivate workers and serve as a catalyst to promote best practices. The responsibility of implementing these sound best practices and selling them to operators rests on their shoulders, and they must be fully on board with them and committed to ensuring their success.

Furthermore, when an organization employs practices shown to be effective elsewhere, worker buy-in and safety ownership can increase. An organization's credibility also increases because it is using a tested process and has taken the forward-thinking step of confirming that it is doing the best job possible. Abrasive wheel grinders are versatile, useful devices when used safely, but extremely hazardous when not used safely. **PS**

Figure 3

Sample Inspection Checklist

ABRASIVE WHEEL GRINDER INSPECTION FORM					
Person(s) making inspection: _____					
Time: _____		Date: _____			
YES - Adequate or proper FAIR - Needs Improvement NO - Needs Immediate Attention N/A - Does Not Apply					
**Use comments section for notes regarding the inspection and submit the completed audit to the health and safety specialist					
DESCRIPTION	YES	NO	FAIR	N/A	
Mounting					
a. Is bench or pedestal grinders permanently mounted?					
b. Before new abrasive wheels are mounted, are they visually inspected and ring tested? (check the tracking log)					
Guarding					
c. Is the grinder equipped with safety guard(s)?					
d. Are the wheel guards securely fastened?					
e. Are the wheel guards and its fastenings strong enough to retain fragments of the wheel in case of breakage during use?					
f. Is the adjustable tongue guard on the top side of the grinder used and kept to within ¼ inch (0.6350 cm) of the wheel?					
g. Do side guards cover the spindle, nut and flange and 75% of the wheel diameter?					
h. Is the work rest used and kept adjusted to within 1/8 inch (0.3175cm) of the wheel?					
Eye shields					
i. Is the grinder equipped with eye shield(s)?					
j. Is the eye shield(s) clean?					
k. Is the eye shield(s) unscored?					
Work Rests					
l. Is a work rest(s) present on offhand grinders?					
m. Is the work rest(s) of rigid construction?					
n. Is the work rest(s) readily adjustable?					
o. Is the work rest(s) adjusted and used to within 1/8 inch of the wheel?					

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