

## Coal Mill Safety In Cement Production Industries

**It may come as a surprise, but industry is not capturing nearly as many coal dust explosions that actually occur. These incidents are often reported as boiler explosions or something else because there is no mention of the fuel involved.**

We share our experience with coal mill safety in cement production facilities and answers questions like the following:

- What is the difference between direct coal-fired systems and indirect coal-fired systems?
- What are the common mistakes seen in these industries?
- How many cement facilities have no protection in place for coal-milling hazards?
- Is the use of older equipment an issue?
- What are some critical improvements that cement production facilities should be thinking about to make their coal mill safer?
- Where should you look first for hazards?

### **What Is The Difference Between Direct Coal-Fired Systems And Indirect Coal-Fired Systems?**

Vincent explained that the cement industry almost exclusively uses indirect (also known as storage) firing systems with an air swept mill. All air and material goes to a form of intermediate storage like a bag filter, and from the bag filter it mechanically or pneumatically goes to a silo, where it will be fed to the burners.

He said that in recent cases like the September 29 boiler explosion in India, a direct coal-fired system was likely being used to generate power for the plant. While this is not standard practice in cement production, cement plants in countries like India are often located far away from energy sources, so they rely on their own sources.

Power generation typically involves direct firing systems. There is an air swept mill with direct pneumatic conveying through to

the burners. The risk of explosions is more or less reduced to an explosion inside the mill, which therefore needs to be explosion, pressure, and shock-resistant. NFPA requires coal mills to be good for 50 PSI.

### **What Are Common Mistakes Seen In These Industries?**

Vincent described constructional explosion protection as the last-ditch defence against explosion hazards. You will normally try to avoid the explosion in the first place.

Most systems in the cement industry work with low oxygen levels. They can take air with 3% oxygen from the preconsigner and feed it to the mill, which normally has an inert atmosphere. Things can go wrong because the oxygen concentration can drop and suddenly go up, and as soon as it becomes more than 12 or 13%, an explosive atmosphere starts. The only thing missing is the ignition source.

### **How Many Cement Facilities Have No Protection In Place For Coal-milling Hazards?**

There appears to be a general consensus in cement production that there isn't a dust explosion hazard, as powdered cement is not a combustible dust. This often means that there are no prevention or protection measures in place for the coal milling systems.

Vincent explained that the quality of protection in a system depends on how well the designing engineers understand the hazards. "Some systems are well protected," he said. "Or I can see no system. No system I see in the field is perfectly protected."

He said that he has gone through plants with explosion experts who are unfamiliar with coal systems. They are used to hazardous situations in the chemical or pharmaceutical industry and will discover only a few things wrong with a coal-burning system.

“You need to have seen a lot of them to recognize what’s wrong with them,” he said.

### **Is The Use Of Older Equipment An Issue?**

Vincent wrote an article about coal milling safety in cement production for Global Cement. In it, he talked about facilities that have old equipment and if they replace it, it’s usually the same type and outdated from a safety standard.

He explained that these equipment designs are up to 40 years old. Pieces of equipment like mills or bag filters may have a lot of new features, but the basic concept for a coal-burning system is outdated because engineering companies are using the designs over and over again. This tendency makes it difficult to get the necessary corrections into the new designs.

### **What Are Some Critical Improvements That Cement Production Facilities Should Be Thinking About To Make Their Coal Mill Safer?**

Vincent pointed out that there is a poor understanding of the connection between the mill and the bag filter, a so-called riser duct that can be very long. Flame propagation through ducts will accelerate in relationship to the Length-to-diameter ratio. Proper venting on the riser duct can avoid flame acceleration.

“Another very important point is that no standard in the world tells you to use self-enclosing explosion vents,” he added.

Although NFPA68 and some European standards address explosion venting, there is no standard for fire protection. When the vents remain open, the filter will be open to the atmosphere, with oxygen available to feed the fire and nitrogen would get out, enabling the fire to escalate after the explosion.

“I cannot say that nothing has happened (in terms of improvement) over the years, but still you will find open explosion vents on bag filters, silos, and other equipment,” Vince said.

In Episode #38, Dr. Chris Bloore made a similar point. You protect a facility from an explosion, but the ensuing fire is what

destroys your equipment. Dr. Bloore recommended putting sprinklers in the ducting line. If you're ducting an explosion vent to an outside wall, it might be an important safety measure.

### **Where Should You Look First For Hazards?**

Vincent said that when he arrives at a facility, the first place he looks for hazards is in the yard.

“The problems always start at the yard,” he said. “There is a lot of exposure to sun and when there is a certain level of humidity, the coal will start to heat up and that intensified oxidation can further intensify due to an open fire.”

“People are not ready to work on that,” he continued. “They will try to do something with water. They have no strategy in place to get rid of that problem, and the coal with that kind of oxidation going on will end up in the plant, which is the worst thing to happen.”

When this self-oxidizing coal goes into the conveyor and gets pulled into the grinder, it meets an ignition source. Vincent warned that facilities need to have grounding or inerting systems in place: static electricity can become a problem even with coal dust.

### **Conclusion**

Vincent recommended that cement associations get involved in improving safety in their coal-milling systems. The Wood Pellet Association of Canada did something similar for its industry. With industry support, those who work in cement plants will have a better understanding of what can go wrong and plan accordingly.

If you would like to discuss further, leave your thoughts in the comments section below. You can also reach Vincent Grosskopf directly: Email: [info@coalmillsafety.com](mailto:info@coalmillsafety.com)