



# AN OUNCE OF INSPECTION, A POUND OF PREVENTION

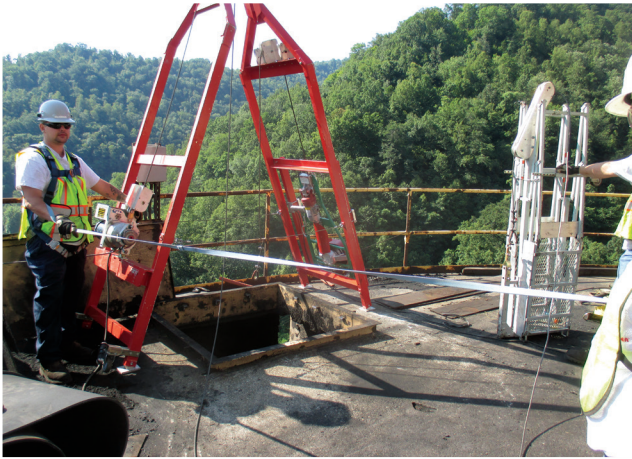
DAVE LAING, MOLE•MASTER, USA,  
EXPLAINS THE SILO INSPECTION PROCESS  
AND DETAILS THE BEST TECHNIQUE FOR  
CLEANING THE SILO IN PREPARATION.

## **Introduction**

It seemed like an ordinary task on any ordinary day in any cement plant. A worker was standing on the roof taking measurements. Normally the silo's programming would have taken care of these tasks but none of those programs were running properly that day. No problem. The work was simple and would be over quickly.

Suddenly, the roof on which the worker stood collapsed. The MSHA investigation that followed





**Figure 1. Typical rigging for a larger opening access for a two-man cage.**



**Figure 2. Typical rigging for a small opening and one engineer.**

uncovered the fact that the roof was not attached properly to the silo beams. Additionally, other alterations over the years had weakened the beams to which the roof was poorly attached.

Tragically, a silo inspection probably would have uncovered all of these problems and would have

helped prevent that worker's unnecessary death. The case, which occurred in 2012, is sadly only one of many.

### **Avoidance is not the solution**

Many companies do not want to engage in the silo inspection process, and they offer up a lot of reasons. Silo inspections can represent a big investment. They can be time-consuming. Most importantly, of course, a silo inspection can reveal serious problems like, for example, a roof insufficiently attached to the supporting beams. These problems can be expensive to fix and can even stop production. An inspection may even reveal that a silo simply is not safe and needs to be taken down.

These are all legitimate concerns, but ultimately, a company must weigh the safety of its workers more heavily than anything else. Deaths in the cement industry due to silo collapses or other integrity issues are unnecessary and entirely preventable.

### **What to inspect when you're inspecting**

The silo inspection process does not have to be a scary one. Indeed, if done properly the inspection process should run in a logical, organized fashion, and communication should be heavy throughout so there are no surprises. The process should run as follows:

### **Visual and audible inspection**

It is extremely important to make sure a professional engineer with experience in silo design, construction, and behavior is engaged for the inspection. MSHA noted the lack of a professional engineer's intervention in their summary after the collapse mentioned above. The first thing the inspector will do is visually evaluate the outside of your silo. The naked eye will be used first, followed by the use of binoculars to get a close-up look at any potential problem areas. After that, the inspector will go inside the silo and hit the silo wall in various places with a hammer. There are specific sounds for which the inspector is listening. If an area of the silo wall sounds 'dead' or muted, it is likely there are some underlying serious problems. If that is the result, the inspector may want to take a core sample, which will offer more detailed information about the status of the silo's content through several different layers. The troublesome area will also be photographed. Using a qualified, experienced rigging contractor to help provide safe access to the silo is recommended.

One important thing to make note of is that if your silo cannot be cleaned out completely before the inspection, you may need to incorporate professional silo cleaning into the process. There is an argument for having your silos cleaned on a regular basis, but if you have not had the integrity of your silos inspected for a long while, it is best to

thoroughly clean and inspect them for the sake of safety and productivity.

If you do need your silo cleaned, Mole•Master Services Corporation offers a proprietary methodology that does not require human entry. Mole•Master has traditionally used its proprietary Big Mole™ System and the Junior™ 360° machine that ‘whips’ the walls of the silo, removing material. Liquid or other contaminants are not necessary so the material can be preserved and potentially reused. The Arch•Master™ portable drill can be used to create a flow channel in hardened or compacted material. Mole•Master will also utilise the Safe-T-Shot™ CO<sub>2</sub> Blasting System, which can safely break up tough, hardened material from silo walls, bottoms, or discharges.

### **Reviewing the results**

Core samples, photographs, and other testing results will be fully evaluated at the end of the inspection process, and from that point the inspector should be forthcoming with recommendations. Generally, there are three possible results the inspection will reveal.

The most ideal scenario is a report that finds nothing structurally wrong with your silo. Plan on continuing maintenance to avoid problems in the future, but for the time being you are set to go back to regular production.

The second possible scenario is that some troublesome spots have been located and need to be repaired. The engineer will determine if it is possible to continue using the silo at either full or reduced capacity. It is up to your company how you choose to handle this news. Depending on the severity of the problem, it is possible that you could wait to remedy the situation and be perfectly fine. Alternatively, it might be in the company’s best interest to fix the problem as soon as possible in order to prevent any unnecessary mishaps or tragedies.

The worst-case scenario is that the inspection reveals that the silo is simply not stable. The recommendation may be that the silo needs to be repaired or taken out of service because it is unsafe for employees to work on or near the structure. Obviously this kind of news is a terrible blow for a company to absorb, but it is still highly preferable when compared with the tragedy inherent in the loss of a life.

### **It’s always worth it**

Regardless of what the results are of a silo inspection, there is no doubt that the investment is a worthy one. At worst, you will identify serious problems that could be placing the lives of employees in danger. At best an inspection can ensure that all employees are working in a safe, stable environment. 🌍