

# How can I keep my storage vessel in top condition?

When a storage vessel becomes blocked or damaged, the resulting downtime, material loss, and potential safety hazards can be huge problems. One of the best ways to solve such problems is to work to prevent them in the first place. The following five steps can help with storage vessel maintenance, both inside and out.

- 1. Match the vessel with the stored material.** Material flow characteristics vary greatly depending on a material's density, weight, moisture content, natural angle of repose, and other factors. I've worked on silos filled with a totally different material than the vessel was intended to hold. Problems caused by this error can be poor material flow, no material flow, or silo failure.
- 2. Regularly inspect the vessel.** Storage vessels should be inspected by a structural engineer and rigging company that specialize in silo design and material flow. A concrete silo structure doesn't behave like a parking garage. The pressures exerted on the silo walls from the stored material are enough to stretch or bulge a silo wall. An engineer can provide an assessment of the vessel that will increase confidence in that vessel's safety.
- 3. Prevent moisture intrusion.** I often encounter significant issues caused by roof leaks, open hatches or ports, cracks in concrete, rust holes in metal, or other problems that can allow moisture into the storage vessel. Materials behave quite differently when moisture is added. Ensure the roof is patched, the steel is plated, and all concrete cracks are repaired or that the concrete is replaced entirely. Although these repairs can represent an unwanted expense, the sooner they're addressed, the more money you'll save in the long term.
- 4. Rotate your material.** Material that's stored in a vessel for long time periods without movement is likely to start compacting and deaerating, which can inhibit flow. Certain materials such as lime can even absorb moisture and expand to the point that the material will create bulges in a concrete silo wall, potentially causing structural failure.
- 5. Call an expert.** When a vessel becomes plugged, bridged, ratholed, or presents any other type of blockage, call an expert! Many times well-meaning workers have made the problem worse because they don't have the experience or tools to deal with these issues. Experts are aware of the techniques and equipment that will do the job most efficiently, with the least risk to the vessel, and at the lowest cost. Most importantly, experts know how to do this kind of work safely!

*Dave Laing, general manager, Mole•Master Services, 800-322-6653*

Storage vessels are a critical but often overlooked part of the manufacturing process. Keeping a storage vessel in good condition will not only save replacement costs for a failed vessel, it will also prevent production disruptions. The most common issues with storage silos are due to neglect or poor housekeeping, both of which can result in corrosion.

For example, a steel bulk flour silo for a mill or bakery can experience serious degradation if the silo's not frequently cleaned and inspected. During the milling process, grains are crushed, releasing starch and proteins with amino acids. If exposed to moisture, these amino acids can eat through the epoxy paint and eventually the vessel's steel wall. This can occur on the vessel's interior wall, in the headspace above the material where condensation and flour dust are present, and on the roof deck.

Remedies for these degradation problems include an internal bin cleaning platform, from which the vessel's interior can be washed down and cleaned. (See

your owner's manual for cleaning recommendations before starting).

Another remedy would be to use a desiccant dryer. This will remove the humidity from the headspace and help prevent the amino acids from forming. Some operators opt for insulating the vessel to help minimize condensation from natural temperature cycles.

Similar degradation issues can occur at the silo's base, particularly for a skirted silo. If flour dust is allowed to remain inside the skirt in the presence of moisture, the silo's support skirt can begin to rust, eventually compromising the entire silo's integrity.

Another issue that can cause premature silo failure is an operating pressure that's too high or too low. Most silos are designed for an operating pressure under 1 psig and for a minimal vacuum rating. A silo is typically equipped with a pressure-vacuum relief valve, which helps the silo operate within its design parameters, but these valves can fail, so regular valve

inspection is important to keeping your storage vessel in service longer.

A vessel's dust collection system should be sized to filter out the air volume present during the silo filling process. If the dust collector is clogged, pressure may build up inside the silo — in some cases, at a rate faster than the pressure-vacuum relief valve can handle. Similarly, if the dust collector remains on after the fill cycle is complete, a vacuum can form, potentially causing a dent in the silo wall. To prevent these issues, regularly inspect and maintain the dust collector.

A well-built silo should easily last 20 to 30 years or more with proper maintenance.

If you have silos at your facility and are concerned about their condition, contact a silo specialist and have an inspection done.

*Russ Brunette, sales project manager, Imperial Industries, 800-558-2945*