



# Aeration System Maintenance

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Carol L. Jones, PhD, PE  
Professor and Buchanan Chair  
Stored Products Engineering

A properly sized and designed aeration system is certainly required to have a functional tool for keeping grain in the best condition possible. But it is only a start! Maintenance is essential for the system to perform its intended job and for it to give efficient service year after year. It is no surprise to anyone in the grain industry how much dust, environmental dirt, bird droppings and nests and heavy usage can influence the performance of electrical equipment. Aeration systems are exposed to all of these factors. Diligent and consistent maintenance will certainly help to promote the longevity and usefulness of your aeration system.

Maintenance can be divided into seasonal duties: pre- and post-harvest. However, in states like Oklahoma, handling both summer and fall harvested crops and moving grain throughout the year, maintenance becomes a continuous effort. Maintenance steps will be divided into "prior to bin loading" and "after bin loading" duties.

## Prior to Bin Loading

### **CLEAN!! CLEAN!! CLEAN!!**

Housekeeping is a task that is very important for prevention of dust explosions and reduction of insect infestations. And it is a task, along with inspection, that is often overlooked or not done with enough frequency.

- Clean tunnels and ductwork and check for leaks or damage. Repair where needed.
- Clean perforated floors with a broom. Cleaning under the perforated floor is difficult if not impossible in some structures. However, insects certainly reside in the broken kernels and dust under the floor. If possible, clean under the floor as often as feasible.
- Check aeration fans, clean blades and repair broken or loose housing. Test the fan for proper impeller/blade rotation and for any electrical problems. Repair if needed.
- Check transition manifolds and connections for leakage or damage. Sealing these connections is critical for fumigation purposes as well as getting air to the grain.
- Check all gravity/free air vents and powered exhaust fans to make sure they are clean and free of bird nests, trash, obstructions, or damage. Blocked vents or exhaust fans can cause extensive roof damage to bins during aeration fan operation.

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- Check all electrical boxes for damage, leakage, moisture and rodent activity.
- Inspect and repair all shutters, vibration dampeners and rain hoods.
- Lubricate all bearings and motors according to manufacturer's instructions.
- Clean areas around bins and fan intake areas. Check for spilled grain, animal droppings and nests, weeds and loose grass or other equipment that may have moved into the path of the fan intake. It is critical that the area around the fan intake be clear and open for several feet around the intake.

## After Bin Loading (During Storage)

Maintenance is still important when grain is in storage in the bins. Added to the maintenance steps listed above, aeration equipment can be monitored for performance while in operation.

- Check fan performance by testing the rpm with a tachometer and the pressure with a manometer or magnehelic pressure gauge. These readings should coincide with fan performance charts from the manufacturer and the air capacity can be determined from these charts.
- Check vent and exhaust fan openings often to make sure they are clear and in good repair. They are a critical part of the aeration system.
- A good way to check the performance of the aeration system and operation plan is to check the quality of the grain. Check grain temperature and headspace air quality. Check for odors coming from the grain. If there are hot spots in the grain bulk or any indication of grain deterioration, do not wait. Find out what the problem is and where the problem is located. Without attention, the problem will only get worse. Loss of grain quality is expensive and can even culminate in disasters such as explosions and fire. Therefore, maintenance and management of the aeration system is critical. Fact Sheet BAE-1116 gives tips on management of aeration systems. Manufacturer information also gives guidelines for maintaining products in storage.

## Checklist for maintenance managers when working with aeration equipment.

This list should be followed before filling the storage facility or bin. (courtesy of Perry Bledsoe, Tiernan Equipment Co.)

- \_\_\_ 1. All fans and fan mounts should be checked for loose bolts and tightened if necessary.
- \_\_\_ 2. All welded joints on fan housing should be checked for fractures and repaired.
- \_\_\_ 3. All fan housings should be checked for metal fatigue or cracks. Contact the manufacturer or distributor for plans for remediation.
- \_\_\_ 4. Motors with grease openings should be greased before each season of use. Motors without grease openings have sealed bearings and do not require grease. If motors develop noise or vibration, they should be repaired or replaced immediately to avoid further damage. These can be a potential safety hazard and an explosion/fire hazard if left unattended.
- \_\_\_ 5. Check rotation of blade or impeller with rotation sticker on the fan housing.
- \_\_\_ 6. Check fans for excessive vibration. Vibration can be caused by loose bolts or out-of-balance blades or motor. Vibration usually indicates that something is broken or loose within the fan. Either condition affects performance and can be a safety hazard.
- \_\_\_ 7. Check roof fans and connections for proper weather seals to prevent leakage into the structure. Unaddressed leaks cause serious loss of grain quality and can lead to safety problems.
- \_\_\_ 8. Check the sealing material around wall transitions or elbows. Cement grout and tar are the most common sealants on concrete structures. On steel structures, welds and silicone sealing agents are common. If sealing is cracked, hardened or missing, clean and re-seal the surface. Left unattended, moisture can enter the structure and cause significant grain deterioration.
- \_\_\_ 9. Check rubber vibration dampeners for weather cracks. Replace if necessary.
- \_\_\_ 10. Check sealing material around joints and elbows on all aeration manifold systems. Silicone sealant is the best for sealing joints from air leaks.
- \_\_\_ 11. Check butterfly valves or slide gates in manifold systems for free movement. Adjust or replace if necessary.
- \_\_\_ 12. Check full round aeration ducts for the following:
  - \_\_\_ Check roundness of duct. Grain leakage can occur in ductwork when it begins to flatten. Out-of-round ductwork should be replaced.
  - \_\_\_ Bands for connecting aeration ducts should be tightened to prevent grain leakage into the ductwork.
  - \_\_\_ Tie downs for full round ducts should be anchored to the floor and tightened to avoid floating or movement when grain is loaded.
- \_\_\_ 13. Check half round aeration ducts for the following:
  - \_\_\_ Check roundness of the "round" portion of the ducts. Grain leakage can occur if the duct is bent or flattened. That section should be replaced.
  - \_\_\_ The track that holds the half round in place should be firmly anchored to the floor or wall.
  - \_\_\_ The ducts should be lapped and secured tightly at all joints.
  - \_\_\_ The ducts should fit in the tracks or on the surface tightly to prevent grain leakage into the airway.

- \_\_\_ 14. Check flush floor and perforated flooring systems for the following:
  - \_\_\_ Floor sheets that are bent or that have holes large enough for grain to enter should be replaced or patched.
  - \_\_\_ Floor sheets should be fastened together tightly and sealed on the edge to prevent any grain leakage.
- \_\_\_ 15. Check the hopper and floors for settling. Aeration ductwork of all types must be totally supported by the surface on which they rest to avoid collapse.

Inspection comments: \_\_\_\_\_

Maintenance Performed: \_\_\_\_\_

Inspected by: \_\_\_\_\_ Date: \_\_\_\_\_

Repairs completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Location: \_\_\_\_\_ Date: \_\_\_\_\_

**References and other information sources:**

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