Starting at the Top: Bin Roof Maintenance

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As grain storage structures change, so do their safety and maintenance requirements. Today's grain bins are larger, taller and more complex than ever before. Maintaining bin roofs to prevent water infiltration and grain damage is vital to the grain processing industry.

Facility owners must adapt to changing technologies and stay current with the latest roofing maintenance techniques, waterproofing materials and safety information.

What you should know about your roof

In this paper, we will provide details about the following three roofing topics:

- Materials and processes that can be utilized to maintain and/or replace your aging roof.
- Safety requirements for accessing roofs and working on top of bins. Protect your employees from harm and your company from liability.
- Inspection and maintenance activities to manage the upkeep of bin roofs and extend the life cycle of your existing roof system.

Roofing Materials and Processes

There are many types of roof coverings and waterproofing materials used on grain storage bins.

- Metal or tin roof coverings
- Conventional built up roofs
- Single ply membranes (EPDM, TPO, Modified Bitumen, PVC, CSPE)
- Coatings (acrylics, silicones, aluminum flake, polyurea, epoxy)
- Polyurethane foam with coating
- Coal tar pitch built up systems

Not all bin tops have the same structural decking. We find metal decking, concrete plank, poured concrete and lightweight cellular concretes used as decking substrates below the waterproofing material. The type of decking at your facility often determines the type of roofing material that should be used for repair or replacement.

The 7-Step Maintenance Plan outlined later in this article can be followed for the care and protection of any of these roofing materials or deck structures.

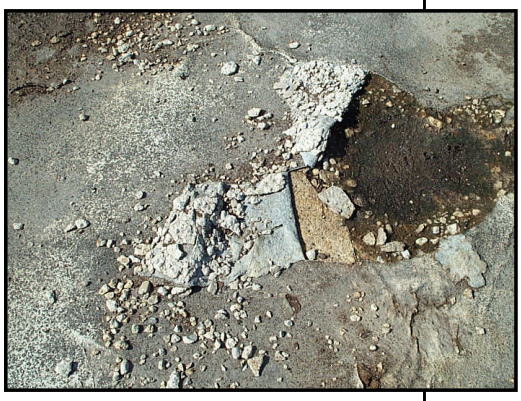
Decking is much more costly to repair or replace as compared to roofing. That's why it's so important to keep the elements away from your deck and stored product. No matter what type of sacrificial roof covering/waterproofing you may have in place, it's crucial to maintain it.

Repair is defined as implementation of work to bring a condition or detail up to a performance level the same as the rest of roof system. If roofs are too deteriorated, repairs may not be cost effective and replacement should be planned.

Following are six typical conditions found on bin roofs and a description of activities needed to repair and improve the performance of these assets.

Concrete Damage

The roof coating in this photo is a liquid applied acrylic set in a polyester reinforcement. Areas of coating wore away and exposed the concrete decking to the elements. Lack of maintenance lead to spalling of the concrete and loss of the overhanging edge. This failure exposed the product inside the bins to wind driven rain, as well as, insect and bird infiltration. It also created a safety hazard from falling concrete. In this example, the area should have the perimeter edge rebuilt and sealed. The deteriorated coating should be peeled back and new product installed to level and waterproof the roof area.



Loss of Coating

This is a close-up photo of a non reinforced spread-on coating that was improperly installed. It has had water infiltration between it and the concrete decking. Left unattended and unrepaired, it will lead to a deterioration of the material below. Clean and patch areas like this before moisture is allowed to travel between the membrane and the deck.

Replacement – Single Ply

When roofs are beyond repair, one solution is to have a lightweight thermoplastic membrane adhered. At the facility in this photo, single ply roofing covers both the bins as well as the upper monitor roof. The strength of the heat welded seams for TPO and PVC membrane systems outperform EPDM taped seams or the higher maintenance built up roof seams. Additionally, the smoothness of the membrane does not allow vegetation to grow or other debris to build up on the surface. This type of roof can be very slippery in wet or icy conditions if employees have to work on the surface.

Replacement – Liquid Applied

Not all bin tops are acceptable for single ply membrane designs – often due to bolt mounted equipment that does not meet conventional roof flashing specifications. This application uses a liquid applied polyester resin which when combined with polyester fleece forms a reinforced monolithic waterproofing and roofing membrane. The system also provides a granular texture on the surface of the roof that reduces the slip issues of smooth-surfaced waterproofing.

Difficult Roof Access

Even though areas like this are very difficult to safely work on, they still need maintenance and can lead to costly internal problems if not kept watertight. Dirt and sediment sitting on a roof at this elevation indicates deflection or settling of the roof. If an area like this starts allowing water into the bins, it should be immediately sealed before allowing free moisture under the felts. Moisture allowed to enter the system leads to adhesive loss. Loss of adhesion at this elevation usually leads to premature failure and possible blow off.

Structural Damage

Long-term moisture infiltration into a concrete-topped bin has lead to structural damage. When moisture becomes trapped under a roof waterproofing system, freeze thaw cycles can be very destructive. Besides the obvious expense of structural repairs, damage like this can undermine the safety of the entire building.

If you are not sure what compatible products to use when repairing deteriorated waterproofing, a reliable roofing contractor such as D. C. Taylor Co. can help you identify the best roofing solution. Roofing manufacturers can also assist in evaluating the current roof coverings and recommend a course of action and material that would be compatible and effective for repair.

Safety Considerations

When an accident happens at your facility, safety is everyone's problem. No matter who is responsible, newspaper reporters and customers tend to focus on where an accident happens. Can your company afford that kind of bad publicity?

Companies face direct costs and indirect costs whenever there is an accident on their property. While direct costs like workers compensation, OSHA fines and increased insurance premiums can be substantial, the indirect costs can be up to 10 times higher. Indirect costs include items such as loss of customer confidence, tarnished corporate image, property damage, production delays and time lost dealing with the accident.

How to tell if a roof contractor is serious about safety

Before hiring a roofing contractor, ask these important questions about safety. These are the contractor's responsibilities.

- Do they have a safety committee and do employees at all levels participate in the development and implementation of their safety programs?
- Does the contractor have a dedicated safety director that makes sure procedures are followed and projects are completed safely?
- Are all roofing crews tested for illegal substances prior to being hired?
- Does the contractor have a competent person in fall protection for each job site and a qualified person capable of horizontal lifeline design installation and supervision?
- Does the contractor complete a fall protection plan that clearly establishes and defines safety setup before the project begins?
- Do they perform a site specific job hazard analysis that identifies existing/potential hazards and outlines countermeasures?
- Can they show you their safety loss control manual?
- Do crews receive ongoing training to keep safety top-of mind?

The importance of training

Each employee that works on your roof should have training in the necessary topics which are directly related to safe roofing practices. For example: Since English is a second language for many roofing workers, your contractor should also offer training in Spanish.

Minimum training

- New Employee Orientation
- HAZCOM
- Fire Prevention and Protection
- Ladder Safety
- Safety & Loss Control Manual
- OSHA 10-Hour
- Fall Protection
- Deck Replacement
- On the Job Training – Continuous

Proactive vs. reactive

If your roofing contractor is not talking to you about safety before the job starts, you should ask yourself, "why not?" Talking about safety procedures after an accident is "a day late and a dollar short." Not taking a proactive approach to roof safety can cost your company considerable time and money.

Risk analysis process

Before a roofing job starts at your facility, your roofing contractor should complete a job hazard analysis and present you with a project safety plan. This is an important step that should not be overlooked.

- Work to be performed
- Hazards associated with tasks
- Countermeasures to avoid hazards

A thorough safety plan addresses employee exposures, property concerns, and assists in communication between building owners and subcontractors.

Areas of particular interest for the safety plan

- Roof access
- Loading materials
- Edge work/deck replacement
- Material handling
- Debris removal
- Working with electricity and chemicals
- Working with flammables

Evaluating a contractors safety record

Besides the ongoing safety programs initiated by a roofing contractor, there are several statistics that can give you an indication of the contractor's safety record. Ask your contractor for their updated statistics or check with OSHA for past citations.

- EMR – Experience modification ratio
- TIR – Total incident rate
- LWDIR – Loss work-day incident rate
- Past OSHA citations

Summary – safety

When you are considering hiring a roofing contractor, be sure to look at these six safety factors:

1. Culture – Does the contractor just talk about safety, or do they incorporate safety into every part of their work process?

2. Management Commitment – Does your roofing contractor financially support their safety programs and enforce their safety policies?

3. Training – Are ongoing training programs provided to the contractor's employees?

4. Proactive versus Reactive – Does your contractor identify hazards or exposures before they happen? Or do they react only after a problem has occurred?

5. Risk Analysis Process – Are these three steps completed before work begins? Analyze the task or work to be performed. Identify hazards associated with the task. Develop countermeasures to prevent or reduce the risk of the hazards.

6. Safety Record – What is the contractor's record when it comes to safety?

Extending Roof Life

One of the most common problems we encounter when inspecting bin roof systems is neglect. This out-of-sight, out-of-mind mentality is not just a phenomenon in the grain elevator and processing industry. Many building owners don't consider the upkeep and maintenance of their roofs until they are faced with a problem or water leak.

Implementing a preventive maintenance program

We now have data correlating preventive roof maintenance with lower overall life cycle costs. There are seven steps you should take to implement an effective maintenance program.

Step 1: Inspect your bin roofs at least two times per year and after any major weather events.

Problems and anomalies found early can cost less to repair than those that are left unattended. Prevent major problems, such as:

- Decking deterioration
- Water infiltration into the building and onto stored product
- Loss of flashings which can lead to blow-offs or other catastrophic events
- Coating failures and other uneven wear

Step 2: Identify competent people to perform the work.

- Trained
- Experienced
- Safety conscious

Step 3: Gather and prepare information.

- Historical data (e.g., original roof date, repairs and additions, substrate materials, surface type, and drainage and warranty information)
- Roof activity (previous roof problems, roof traffic patterns, maintenance needs, and emissions or discharge onto the roof)

Step 4: Conduct a rooftop inspection.

- Inspect roof edges, exterior walls, interior walls, projection flashings, surface conditions and rooftop equipment
- Clear and clean drains, scuppers and drain lines
- Remove storm damage and organic matter that may restrict drainage
- Repair minor problems before they become major
- Report, in either verbal or written form, the activities completed, the existing conditions and suggested actions

Step 5: Develop a comprehensive budget.

- Yearly preventive maintenance expenses
- Yearly repair expenses
- End of roof life replacement costs

Step 6: Implement an ongoing preventive maintenance program.

- Decide who will do maintenance
- Determine frequency of the work, actions required and documentation needed

Step 7: Ensure you have a solid record keeping and tracking system.

- Capture information so it is not lost with employee turnover
- Plan for current and future needs
- Helps in getting management approvals
- Track roof performance and preventive maintenance
- Document warranty compliance

Summary – extending roof life

By developing a preventive maintenance program for your bin roofs you can minimize facility disruptions, maximize the life of your roof, comply with your warranty, and – most importantly – save you time and money.

About D. C. Taylor Co.: With more than 50 years of commercial and industrial roofing experience, D. C. Taylor Co. provides responsible roofing, inside and out, by delivering expert roofing and roof retention services needed to keep its clients' facilities protected and secure.

D. C. Taylor Co. has more than 60 service and roofing crews and five service areas: Atlanta, Georgia; Cedar Rapids, Iowa; Chicago, Illinois; Concord, California and Phoenix, Arizona. The company has been ranked among the nation's largest industrial roofing contractors for over 20 years.

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