Maintenance Debt

Deferred maintenance rarely looks dramatic when the decision is made. A repair moves to next week. A temporary fix lasts another month. An inspection slips because production is busy. The danger is not one delayed work order. It is the amount of unresolved risk the organization gradually learns to carry.

> Major losses are sometimes described as sudden. The failure may be sudden. The deterioration often was not.

Maintenance is not just a reliability issue

Safety managers often see maintenance through a narrow lens. A damaged guard is a safety issue. A leaking line is a maintenance issue. A hot motor is an operations issue. A failed sensor is an instrumentation issue. An aging transformer is a facilities issue. The categories make the organization easier to manage, but the loss does not respect them.

A single equipment failure can injure a worker, damage property, start a fire, contaminate product, shut down production, create an environmental release, or interrupt a customer commitment. In many cases, the same underlying deterioration affects several of those exposures at once.

That is why maintenance deserves a place in the risk and loss-prevention conversation. The question is not simply whether maintenance is being completed. The better question is how much unresolved equipment risk the organization is carrying today.

FM, one of the world’s largest property loss-prevention insurers, identifies seven equipment factors that influence breakdown frequency and severity. Maintenance quality, operating history, operators, safety devices, operating conditions, environment, and contingency planning all matter. In FM’s framework, maintenance, operators, and safety devices stand out as major loss drivers.

For safety managers, that should sound familiar. Equipment rarely fails in isolation. A weak maintenance program often interacts with an operator who has normalized warning signs, a safety device that has not been tested recently, and a contingency plan that assumes a replacement part can be obtained quickly.

Insurance perspective: FM equipment factors

The maintenance backlog is a risk register whether you call it one or not

Most organizations already have a maintenance backlog. It may live in a computerized maintenance management system, spreadsheet, work-order queue, email folder, or supervisor notebook. The problem is that many backlogs are managed primarily by age, trade, production priority, or scheduling convenience.

Those are useful operational measures. They are not enough for loss prevention.

A backlog of 400 routine work orders may create less risk than three unresolved conditions involving a fire pump, a pressure-relief device, and the only transformer feeding a critical production line. Counting work orders tells you volume. It does not tell you exposure.

A risk-based maintenance backlog asks which open conditions can produce the greatest harm, which are getting worse, and which make the organization increasingly dependent on other controls.

Question	What to look for	Why it matters
Known	Open defects, failed tests, temporary repairs, repeat faults, overdue inspections.	Known conditions are easier to manage than hidden ones, but only if they remain visible.
Critical	Equipment or controls whose failure could cause serious injury, fire, explosion, major property damage, environmental release, or long interruption.	These items should not compete on equal terms with cosmetic or convenience work.
Aging	How long the condition has remained open and whether the risk is increasing.	A temporary repair that survives for months can become normalized even though the original risk never disappeared.
Compounding	Whether one degraded condition increases reliance on another control.	Risk rises when several barriers are weak at the same time.
Recoverable	Repair time, replacement lead time, spares, alternate capacity, supplier dependence, and business-continuity options.	The same mechanical failure can be a minor event or a prolonged business interruption depending on recovery capability.

Temporary fixes have a way of becoming permanent controls

Temporary measures are necessary in real operations. A failed component may need to be bypassed while a part is ordered. A guard may need a temporary engineered repair. A production line may need to operate under additional supervision while a permanent solution is developed.

The risk begins when the organization stops treating the condition as temporary.

Interim controls usually depend more heavily on people. They require somebody to remember the restriction, inspect the workaround, brief the next shift, keep the area segregated, or recognize when conditions have changed. The longer the workaround lasts, the more opportunities there are for those assumptions to fail.

A useful maintenance-debt rule is simple: every temporary control should have an owner, an expiry or review date, a defined operating limit, and a clear permanent action. If nobody can answer when the temporary condition ends, the organization has probably converted a repair problem into a management-system problem.

A temporary repair becomes maintenance debt when the organization keeps the exposure but stops treating it as temporary.

Production pressure changes maintenance decisions

Maintenance decisions are difficult because the cost of prevention is visible and immediate while the cost of failure is uncertain. Shutting a line down for six hours today has a clear production cost. The probability of a bearing, transformer, compressor, or control system failing next month is harder to see.

FM has described this tension directly. Plant leaders can be reluctant to stop production for maintenance because the short-term financial impact is obvious. At the same time, critical equipment failure can take months to recover from, especially when specialized parts, transformers, turbines, or other long-lead assets are involved.

This is where safety managers can add value. The conversation should not be framed as maintenance versus production. It should compare the cost of planned intervention with the credible consequences of unplanned failure.

Every deferred maintenance decision trades a certain short-term production benefit for an uncertain future loss. Risk management improves when both sides of that trade are made visible.

Further reading: FM on equipment failure and business disruption

Operators are often the earliest warning system

Condition-monitoring technology is becoming more sophisticated, but the person closest to the equipment still matters. Operators notice changes in sound, heat, vibration, smell, cycle time, pressure, response, and product quality before a dashboard necessarily declares a failure.

FM’s mechanical-breakdown guidance makes the same point. Properly trained operators can recognize when equipment is not working as designed and raise the issue early enough for maintenance to intervene with less disruption.

This creates a training opportunity that many safety programs miss. Operator training should not stop at normal operation and emergency shutdown. Workers should also learn the early indicators of degradation and what happens after they report them.

If operators repeatedly report abnormal conditions and nothing happens, the reporting system teaches them that the warning is not important. That is how abnormal becomes normal.

- Which sounds, smells, temperatures, vibration patterns, leaks, alarms, or cycling changes require escalation?
- Which conditions require immediate shutdown and which require maintenance review?
- Who receives the report and how is it tracked?
- How does the operator know the issue was evaluated?
- What temporary operating limits apply while the condition remains open?
- When should a repeat fault be treated as a reliability trend rather than another isolated repair?

Safety devices deserve their own maintenance priority

A machine can continue producing while a protective device is degraded. That is exactly why the condition can survive unnoticed or unchallenged.

Interlocks, emergency stops, pressure-relief devices, overspeed protection, alarms, suppression systems, limit switches, guards, ventilation alarms, protective relays, and other safety devices often do not generate revenue. They sit quietly until the abnormal event occurs.

FM identifies safety devices as one of the three main equipment-loss drivers in its loss experience. The lesson for safety managers is important: a safety device should not be maintained according to how often it is used. It should be maintained according to the consequence if it does not work when needed.

This is also where training and maintenance intersect. Workers should know which devices are protective, what a failed test means, and whether operation is allowed when the protection is degraded. A failed critical protection cannot simply become another open work order with a routine due date.

Maintenance debt becomes expensive when recovery is slow

Two organizations can experience the same equipment failure and suffer very different financial outcomes.

One has a critical spare, a tested contingency plan, an alternate production path, vendor support, current drawings, and people who have rehearsed the response. The other discovers after the failure that the replacement unit has a nine-month lead time.

That second organization did not merely have an equipment problem. It had recovery debt.

Current FM loss data from power-generation clients shows why this matters. Mechanical and electrical breakdowns are major drivers of property damage and business interruption, and some critical assets such as large transformers can have replacement lead times measured in years. The sector is extreme, but the principle applies broadly. Recovery time is part of equipment risk.

Maintenance question	Safety lens	Insurance and continuity lens
Can it fail?	Could failure injure someone or defeat another control?	Could failure damage property or create a covered equipment breakdown?

Maintenance question	Safety lens	Insurance and continuity lens
How will we know?	What symptoms, alarms, inspections, or tests reveal degradation?	Are condition monitoring and inspection strong enough to identify deterioration early?
How fast can we fix it?	Can the equipment be safely isolated and repaired?	Are parts, vendors, drawings, and expertise available?
What if repair takes weeks?	Can people work safely under alternate arrangements?	What production, revenue, customer, or supply-chain impact follows?

Put a dollar value beside the backlog

Maintenance teams already rank work. Safety and risk leaders can improve those rankings by making consequence more visible.

Suppose a planned repair costs $18,000 and requires eight hours of scheduled downtime. It is easy for operations to focus on that certain expense. The comparison should include the credible failure scenario: emergency contractor rates, expedited freight, secondary equipment damage, lost product, overtime, customer penalties, lost production, and the time required to source a replacement.

The organization does not need a perfect probability model. It needs enough financial context to distinguish a costly repair from an expensive risk.

OSHA’s business-case guidance makes the same broader point for safety losses. Injury and illness costs include not only direct compensation and medical costs, but investigation, replacement training, lost productivity, equipment damage, and work disruption. Property and equipment losses add another layer of financial exposure.

Cost reference: OSHA Business Case for Safety and Health

A practical maintenance-debt scorecard

A useful dashboard does not need to predict the exact date of failure. It needs to show leadership where unresolved risk is accumulating.

Measure	What it reveals
Safety-critical backlog	Open maintenance involving guards, protective devices, emergency systems, fire protection, isolation, ventilation, alarms, or other critical barriers.
High-risk backlog age	How long the most consequential issues have remained unresolved.
Temporary repairs past review date	Interim controls that are becoming normalized.
Repeat failure rate	Assets or components requiring repeated intervention.
Overdue inspection and testing	Controls whose condition is unknown because verification did not occur.
Critical-spares exposure	Business-critical assets with no practical short-term replacement.
Operator-reported abnormalities	Early warning information from people closest to the equipment.

Measure	What it reveals
Maintenance-driven downtime	How much interruption is planned versus unplanned.
Risk retired	High-consequence exposures permanently removed from the backlog.

Where insurers and loss-control teams can add value

For insurers, maintenance debt is attractive because it sits at the intersection of property, equipment breakdown, business interruption, workers’ compensation, and operational resilience.

A loss-control conversation can move beyond asking whether a preventive-maintenance program exists. The more useful questions are whether critical assets have been identified, whether the backlog is risk-ranked, whether safety devices are tested, whether repeat failures are investigated, and whether the policyholder can recover when a key asset goes down.

That creates a practical bridge between underwriting and operations. The insurer sees the quality of risk management. The policyholder receives a clearer way to prioritize limited maintenance capital.

> The maintenance backlog is not just a work queue. It is a live inventory of risk the organization has chosen, intentionally or not, to carry forward.

Where training fits and where it does not

Training cannot repair a transformer, replace a failed bearing, restore a damaged guard, or make an obsolete control system reliable. Maintenance debt is fundamentally an engineering, asset-management, and operational problem.

Training still matters in four places. Operators need to recognize degradation. Supervisors need to understand when temporary conditions have crossed an operating limit. Maintenance employees need task and hazard competence. Leaders need to understand how degraded controls change the decision to continue work.

That is where SafetyNow can support the broader system. Organizations and insurance partners can use targeted training, supervisor resources, refreshers, mobile learning, and centralized assignment and reporting to reinforce the human side of equipment loss prevention without pretending that training substitutes for maintenance.

Explore: SafetyNow Online Training | SafetyNow Insurance solutions

A 60-day maintenance-debt review

Period	Action	Output
Days 1-15	Identify safety-critical and business-critical assets. Pull open work orders, failed tests, repeat repairs, temporary fixes, and overdue inspections.	A focused inventory of conditions that matter most.

Period	Action	Output
Days 16-30	Risk-rank the backlog by consequence, degradation, dependency on other controls, and recovery difficulty.	A priority list based on exposure rather than age alone.
Days 31-45	Review the top items with operations, maintenance, safety, finance, and continuity leaders.	Agreed decisions to repair, replace, monitor, compensate, or stop.
Days 46-60	Establish dashboard measures, temporary-control rules, operator escalation training, and leadership review cadence.	A repeatable maintenance-debt management process.

The goal is not zero backlog

Every real organization carries maintenance work. Zero backlog is neither realistic nor necessarily desirable. The goal is to know what risk sits inside the backlog and to prevent unresolved degradation from becoming invisible.

A healthy system can explain why a high-risk condition remains open, what protects people and property in the meantime, who owns the decision, when it will be reviewed, and what will trigger shutdown or permanent repair.

Maintenance debt becomes dangerous when nobody can answer those questions.

The next time leadership asks how many work orders are open, safety and risk leaders should add one more question: how much loss potential is hiding inside them?