

## How Savvy Plant Managers Reduce Maintenance Costs 18% to 30% while Improving Up-Time



If you're like most plant and maintenance managers, you're under constant pressure. Pressure to stretch your operating budgets further.

Supply chain disruptions are a problem.

They are making it ever more difficult to keep a reliable inventory of parts on hand.

Or to get critical components quickly, in an emergency.

Lead times for key components like belts

and pulleys are getting longer and harder to predict.

But you also have responsibility to maximize your operational up-time. Nobody makes money when your conveyor systems are down. Everybody looks bad during a breakdown.

Whether your performance is measured on ROI, throughput, or contribution margin, it all boils down to the bottom line. And making more money for the company makes everyone smile.

I am going to point out some sobering stats. And then show you how savvy Plant Managers can reduce maintenance costs up to 30%.

All while increasing production as much as 25%.

Let's dive in.

### First Some Basic Principles

All equipment wears out and breaks down. Your job is to put the optimal amount of investment into maintaining your conveyor systems.

So that they keep running smoothly and safely.

All while maximizing your conveyor system up-time.

The science of equipment reliability centers on the concept of maintenance.

### Three Types of Maintenance

There are three types of maintenance programs:

- 1) Reactive maintenance
- 2) Preventative maintenance

### 3) Predictive maintenance

Reactive maintenance is also called “run-to-failure” maintenance. In other words, you just keep on running the conveyor systems until they fail.

And then you fix them. While the rest of the operation is idling.

As you can imagine reactive programs can be a recipe for disaster.

But the business world is resource challenged. So this old-fashioned technique has a place.

And you might be surprised by how many companies still follow this strategy.

FM Global, one of the world’s largest commercial property insurers, found that<sup>1</sup> 62 percent of equipment breakdown losses were due to lack of maintenance. This accounted for three-quarters of all equipment loss claims paid.

Plant Engineering Magazine, in its annual 2019 Maintenance Survey<sup>2</sup>, found that:

- 56% of facilities use, completely or at least partially, a run-to-failure or reactive maintenance program. Are you in that boat?
- 30% of the facilities devote MORE THAN 10% of their annual operating costs to maintenance processes. Are you in that range? If so, you probably have room for improvement.
- 64% of unscheduled downtime was due to aging equipment or unexpected mechanical failures

So those are the industry benchmarks... but think about the potential for upside.

The US Department of Energy, in its Operations and Maintenance Best Practises Guide Release 3.0, discovered something interesting<sup>3</sup>.

It found that companies using reactive maintenance programs, could save more than 18% of maintenance costs. Just by switching to a preventative maintenance program.

### **Which brings us to the next type of program: Preventative Maintenance (PM)**

In its basic format, PM programs schedule regular downtime based on some sort of planned time-frame.

Plant Engineering Magazine, in the above mentioned 2019 Maintenance Survey, found that<sup>2</sup> 78% of facilities also follow a standard PM program for at least some of their systems. Clearly, facilities incorporate multiple types of maintenance programs.

Preventative Maintenance timing can be derived from experience, or equipment/manufacture specs or recommendations.

The idea is that maintenance is performed before system failure.

Very little if any field information is typically provided as feedback. The theory, of course, is to keep the systems in “tip top” condition. Under the assumption that perfect maintenance produces 100% reliability.

But is this assumption accurate? Not really.

The problem with PM programs, is really two-fold:

- It assumes failures are predictable and regular. In fact, many are random. In Rules of Thumb for Maintenance and Reliability Engineers by R. Smith, random asset failures<sup>4</sup> can represent as much as 80% of total failures. Not good.
- It's hard to optimize the spend on PM programs. Do maintenance too frequently, and conveyor system downtime is excessive while maintenance costs are too high. Too much time between maintenance windows, and the chance of unexpected failures goes up.

Savvy Plant Managers know that this is where the use of professional surveys can make the first impact.

As stated by R. Smith<sup>4</sup>,

*"In many cases, it is possible to detect early signs of random failure by monitoring the right health indicators. In simple terms, how much has the asset degraded and how long before it no longer functions? This approach allows time to take the corrective action, in a scheduled and proactive manner"*

Reliable Plant magazine states<sup>5</sup>:

*"Condition monitoring includes all tasks you do to discover problems early – basic objective inspections, basic subjective inspections... and other methods. In several studies we have found that most problems are, in fact, detected through basic inspections"*

So if you have a standard PM program, consider giving it some flexibility and improved effectiveness with regular professional surveys.

The surveys could be conducted by facility maintenance employees.

However, many facilities find it cost effective to rely on trusted outside experts.

Surveys work even better when used in conjunction with the last system maintenance type, Predictive Maintenance (PdM) programs.

Before I dive into this professional use for Surveys, let's go over just what a PdM program is.

### **Predictive Maintenance (PdM) Programs**

PdM programs monitor the *condition* of the conveyor system. Various key indicators help predict imminent failure. Some people call this "condition monitoring".

Maintenance is then scheduled and performed before failure occurs.

Indicators (conditions) could include noise analysis, pulley wear measurement, component fit, belt wear, and splice fatigue.

PdM programs offer by far the most benefits.

Check out these stats:

- The US Department of Energy, in its Operations and Maintenance Best Practises Guide Release 3.0, states that<sup>3</sup> a properly functioning PdM program can provide savings of up to 12% over a program utilizing preventive maintenance alone. So over Run-to-Failure programs, a PdM program can *provide maintenance savings of 30%*.
- The US DoE<sup>3</sup> found independent surveys indicated average savings from starting an effective PdM program included:
  - o Return on investment: 10 times
  - o Reduction in maintenance costs: 25% to 30%
  - o Elimination of breakdowns: 70% to 75%
  - o Reduction in downtime: 35% to 45%
  - o Increase in production: 20% to 25%.
- Consulting firm Mckinsey<sup>6</sup> found that PdM programs limited the time out-of-service and helped identify the root cause of problems. “PdM can deliver...margin improvements of as much as 4 to 10 percent... reduce machine downtime by 30 to 50 percent, and increase machine life by 20 to 40 percent”

CEMA, the Conveyor Equipment Manufacturers Association, found that<sup>7</sup>:

*A combination of preventative and predictive maintenance programs will help ensure maximum availability and component life. A well-maintained conveyor system should be able to consistently operate with 90% mechanical availability.*

But the key, of course, is consistent monitoring of the right system variables. As stated<sup>8</sup> by RT Swinderman with CEMA, maintenance personnel are skilled crafts people, but “often lack a basic understanding of the conveyor as a system”.

This is where your expert partner supplier can be a huge help.

Because PdM's need data.

### **Fitting Surveys into your Maintenance Program**

Setting up a program of regular inspections will provide the data and input you need.

Data to make your Predictive Maintenance program a roaring success. Even on just a basic PM program level, regular surveys will have a good chance of catching imminent failures.

This will allow you to be proactive, rather than reactive upon system failure.

At the most basic level, a properly conducted site survey will allow the proper documentation of key conveyor system factors, such as:

- Belt type
- Idler details
- Pulley details
- Setup features

Knowing these details will allow belt and service providers to react faster upon system failure. Especially when conveyor systems are in remote locations. Faster reaction times mean less downtime, which translates to big savings.

As well, in Preventative Maintenance programs, knowing exactly what components are on site will help create supply efficiencies.

Parts can be confidently sourced and stocked in anticipation of planned shutdowns. Replacement belting is cut to size and spliced ahead of time, avoiding costly shutdown delays.

These steps will reduce costs for the conveyor system owners.

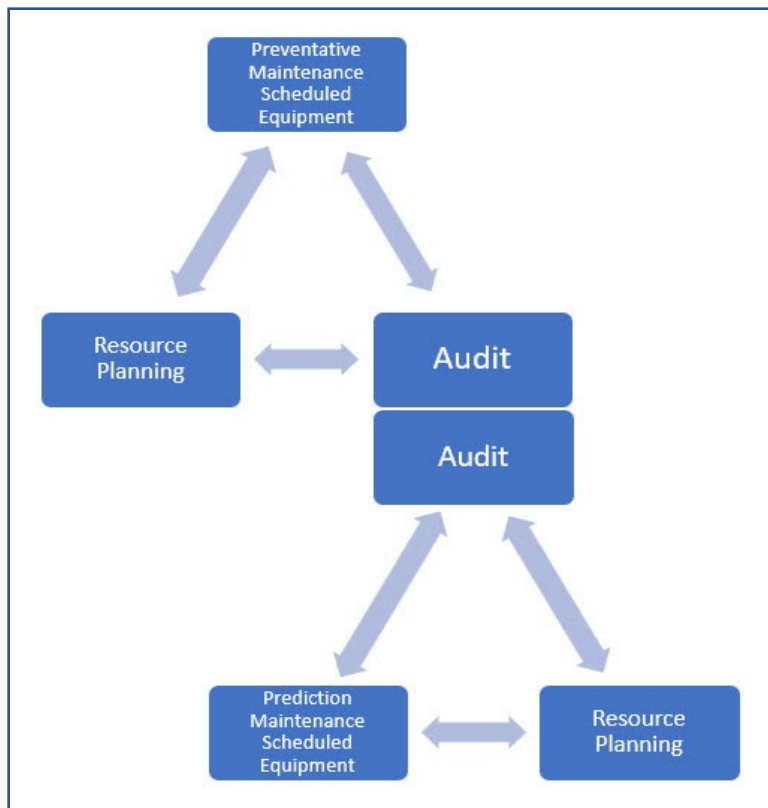
Whether you follow a PM program, PdM program, or some blended version, using the expertise of your professional partner suppliers is valuable.

They can provide the critical input you need to reduce your downtime.

Plan inventory and other resources.

Maximize your system throughput.

And avoid the disasters...not to mention the resulting nightmares.



**Fig. 1: How Survey's Fit Into Effective Maintenance Plans**

## What to Look for in an Effective System Survey

To be most valuable, effective surveys should use experienced personnel, and capture the following:

- Type and length of belting
- Belt wear
- Splice fatigue
- Lag wear; location and degree
- Bearing issues; noise, vibration
- Pulley sizes and types
- Scraper details; type, installation details, working condition
- Idlers: state of wear, seized
- Area suitability: tightness, clear of debris, access, corners, equipment proximity, lighting, working heights, fall arrest requirements, lock out details, presence of contaminants, road access.

Regular inspections could record changes in the belt and component conditions.

An experienced survey provider will be able to work with the conveyor owner to provide Predictive Maintenance data trends. These will contribute to savings in Maintenance costs.

Consider reaching out to your expert supplier partners to discuss a regular survey program. Your metrics will thank you for it.

## Next Steps

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## References

<sup>1</sup>" *Equipment breakdown responsible for nearly one-third of all property-related losses in 2018, reports FM Global*", FM Global Newsroom, July 9 2019, <https://newsroom.fmglobal.com/releases/equipment-breakdown-responsible-for-nearly-one-third-of-all-property-related-losses-in-2018-reports-fm-global>

<sup>2</sup>" *Facilities Maintenance*", Mar 2019 <https://www.plantengineering.com/wp-content/uploads/sites/4/2019/02/Plant-Engineering-2019-Maintenance-Report.pdf>

<sup>3</sup>US Department of Energy, *Operations and Maintenance Best Practises Release 3.0*, Aug 2010, by G.P. Sullivan, R. Pugh, A.P. Melendez, and W.D. Hunt

<sup>4</sup>R. Smith and R. Keith Morley, *Rules of Thumb for Maintenance and Reliability Engineers*, Butterworth-Heinemann 2007

<sup>5</sup>J. Trout, *Breaking Down Condition Monitoring*, <https://www.reliableplant.com/condition-monitoring-31760>

<sup>6</sup>V Dilda, L Mora, O Noterdaeme and C Schmitz, *Manufacturing: Analytics unleashes productivity and profitability*, Aug 14 2017, <https://www.mckinsey.com/business-functions/operations/our-insights/manufacturing-analytics-unleashes-productivity-and-profitability>

<sup>7</sup>CEMA, *Belt Conveyors For Bulk Materials, 7<sup>th</sup> Ed. – Chapter 14*, [https://cemanet.org/belt-conveyors-for-bulk-materials-7th-ed-chapter-14/?utm\\_source=Post&utm\\_medium=Social%20Media&utm\\_campaign=CEMA\\_WP-Relationship-btw-Safety-Main-4-11-18&utm\\_content=CEMA%20WP%20Relationship-btw-Safety-Maintenance](https://cemanet.org/belt-conveyors-for-bulk-materials-7th-ed-chapter-14/?utm_source=Post&utm_medium=Social%20Media&utm_campaign=CEMA_WP-Relationship-btw-Safety-Main-4-11-18&utm_content=CEMA%20WP%20Relationship-btw-Safety-Maintenance)

<sup>8</sup>CEMA, R. Todd Swinderman, *The Relationship Between Safety and Maintenance*, <https://cemanet.org/wp-content/uploads/2018/04/CEMA-The-Relationship-btw-Safety-Maintenance-Whitepaper-4-10-18-1.pdf>