

# Reliability is Worth a Second Look

By Ricky Smith, CMRP CMRT

Statistical analysis and time-based preventive maintenance don't really address the ability to perform. It's time to get familiar with the definition of reliability.

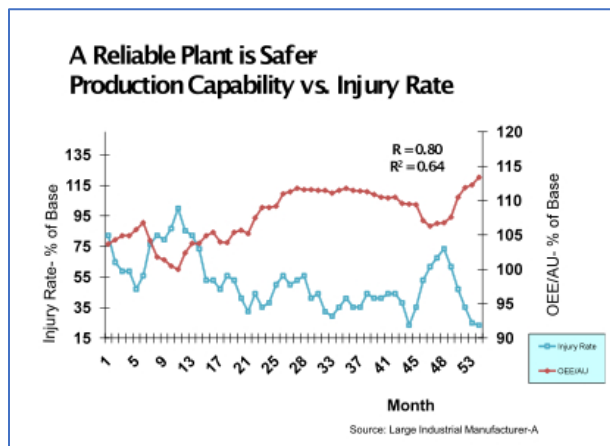
The word “reliability” unnecessarily intimidates many maintenance professionals. In my opinion, most people associate reliability with reliability centered maintenance (RCM) and they're unclear about what it actually means.

The definition is simple: *“Reliability is the ability of an item to perform a required function under a stated set of conditions for a specific time period.”*

This definition isn't at all intimidating, but having worked with more than 400 maintenance organizations, I found that most still focus on fixing failed equipment, not on ensuring reliability and avoiding failure.

A common reason is there's no time available to investigate the true requirements that ensure equipment reliability. Yet, there's a growing awareness among reactive maintenance organizations of the consequences of poor equipment performance:

- Higher maintenance costs
- More failures
- Downtime, safety and environmental issues
- Increased injury rate



It's time for reactive maintenance organizations to admit there's no silver bullet to the equipment performance problem. Lean manufacturing and world class manufacturing don't directly address optimal asset reliability. Forget the silver bullet and focus on asset reliability. The results will follow.

- The steel company Dofasco needed a corporate fact-finding mission to change its focus to asset reliability. A team of more than 60 key employees

spent more than two years researching the world’s best maintenance organizations. They found that a focus on reliability gave the biggest return with the longest lasting results. Dofasco Steel was one of the top-notch North American steel producer, and the company won many awards for its reliability-focused maintenance.

Companies like Dofasco Steel (formally one of the best maintained plants in the world) that understand reliability typically have the best performing plants. A reliability-focused organization takes a holistic approach to asset management, focusing on people and culture.

Common characteristics include:

- The goal is optimal asset health at an optimal cost
- A focus on processes — what people do to achieve results
- They measure each process step for effectiveness, not just results
- Planning and Scheduling increases “Wrench-Time” (Hands on Tool Time)

FTE Positions	Before	After
PM Techs	43	17
PdM Techs	0	11
Planners	0	8
Reliability Engineers	0	2
RE Techs	0	5
Balance of Crew	57*	57*
* Notes	Wrench time @ 28% 35 contractors 18% OT	Wrench time @ 50% 12 contractors 5% OT

- PM programs focus mainly on monitoring and managing asset health
- PM programs are technically sound, with each task linked to a specific failure mode — formal practices and tools identify the work required to ensure reliability

Don’t focus your entire maintenance effort on a PM program that has little to do with meeting the actual equipment reliability needs. Statistical analysis techniques such as Weibull only help to identify assets for which reliability is a problem.

You don’t need engineering resources to figure out that your MTBF is too small. Besides, it’s easy to identify bad actors. Rather than measuring failure frequency, figure out how to improve reliability.

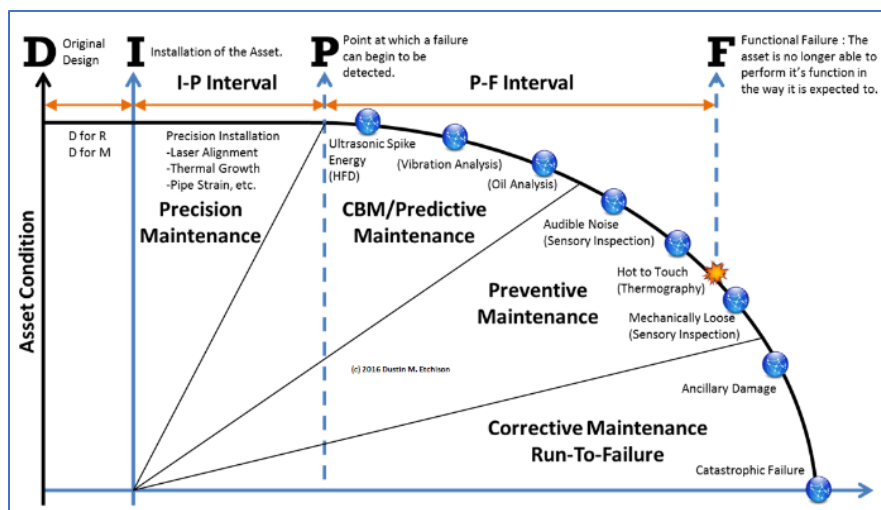
Use statistical analysis to set frequencies for time-based PMs, which should account for a very small portion of your PMs. Here are some sobering facts that will make you think twice about the effectiveness of a time-based PM program:

Less than 20% of asset failures are age related, so how does one identify the PM frequency? My findings indicate that 98% of companies don't have good failure history data.

Maintenance task	Standard	Required best practices	Consequences for not following best practices	Probability of future failures—number of self-induced failures vs. following best practices
Lubricate Bearing	Lubrication interval: time based $\pm$ 10% variance.	<ol style="list-style-type: none"> <li>Clean fittings.</li> <li>Clean end of grease gun.</li> <li>Lubricate with proper amount and right type of lubricant.</li> <li>Lubricate within variance of frequency.</li> </ol>	Early bearing failure: reduced life by 20–80%.	100% ) 20 vs. 1
Coupling Alignment	Align motor couplings utilizing dial indicator or laser alignment procedures. (Laser is preferred for speed and accuracy.) Straightedge method is unacceptable.	<ol style="list-style-type: none"> <li>Check runout on shafts and couplings.</li> <li>Check for soft foot.</li> <li>Align angular.</li> <li>Align horizontal.</li> <li>Align equipment specifications, not coupling specifications.</li> </ol>	Premature coupling failure. Premature bearing and seal failure in motor and driven unit. Excessive energy loss.	100% ) 7 vs. 1
V-Belts	Measure the tension of V-belts through tension and deflection utilizing a belt tension gauge.	<ol style="list-style-type: none"> <li>Identify the proper tension and deflection for the belt.</li> <li>Set tension to specifications.</li> </ol>	Premature belt failures through rapid belt wear or total belt failure. Premature bearing failure of driven and driver unit. Belt creeping or slipping causing speed variation without excessive noise. Motor shaft breakage.	100% ) 20 vs. 1

Most reliability studies say that 80% of asset failures are random. You can detect early signs of random failure by monitoring the right health indicators to determine whether the asset is degrading.

The P-F interval is the time between the detection of a potential failure (P) and functional failure (F). A maintenance organization needs to know the PF curve for critical equipment. This approach allows time for corrective action, in a scheduled and proactive manner, before functional failure occurs.



Take a step back and review the way you manage equipment performance. If equipment continues to fail after preventive maintenance or overhauls, then something must change. Focus on ensuring plant asset reliability.

Everyone in a plant should understand the definition of reliability and what it means to the success of the company. Make reliability your plant's collective buzzword.

## Maintenance and Reliability Best Practices Workshop

Sept 21-23, 2021

Facts concerning the training:

1. The training is held Virtual via Zoom (internet)
2. Training includes multiple hands-on exercises to enhance learning
3. Best Practices documents and templates will be provided so you can take back to your organization to assist in change
4. Each attendee will create a simple plan they will be able to implement when they return
5. Each attendee will create a Maintenance Dashboard which can be applied to their organization when they return
6. If you plan to take the CMRP Exam this workshop is for you ... and so much more

For more information email Ricky at:

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All attendees will receive a copy of Maintenance and Reliability Best Practices by Ramesh Gulati if you register before September 10.

