

Making plantwide reliability easier

The pressure is on

Today, industries relying on rotating machinery face some daunting challenges:

- **More with less**—A 20% average reduction in internal operating expenses is simultaneously accompanied by increased pressure on operating performance
- **Brain drain**—An estimated 50% of the workforce will retire in the next 5-10 years, taking their extensive accumulated machinery knowledge with them
- **Amplification of the unplanned**—3-5% of lost production is due to unplanned events, costing 2x to 5x more than planned events

Moving beyond the 1%

While it is tempting to assume that a plant can address these challenges by focusing on its most critical machinery, the critical machinery in most plants today has already been safeguarded with both protective instrumentation and condition monitoring systems. The critical machinery challenge has already been surmounted and its reliability has never been better.

Ironically, therein lies the opportunity. The critical machinery in most plants comprises a mere 1% of the total asset population. What about the other 99%? While critical assets are individually impactful and thus merit attention first, the substantial population of less-critical assets in typical plants can be collectively impactful.

Key industry trends

Insightful companies have discovered how to unlock the potential in the 99%—not just the 1%—as evidenced by several noteworthy trends:

- Online condition monitoring is growing 8x faster than online protection systems
- Online condition monitoring is growing 4x faster than portable condition monitoring
- Industrial customers are investing heavily in digital technology—20% more year-over-year on average
- The cost of online monitoring is coming down
- The ability to embed knowledge in systems is becoming easier and more cost-effective
- The focus on condition monitoring has shifted from only *critical* machinery to *all* machinery

Show me the money

Aligning with industry trends is one thing. Producing tangible results that address industry's challenges is another. In a study of companies employing plantwide condition monitoring, Frost & Sullivan found that these operators:

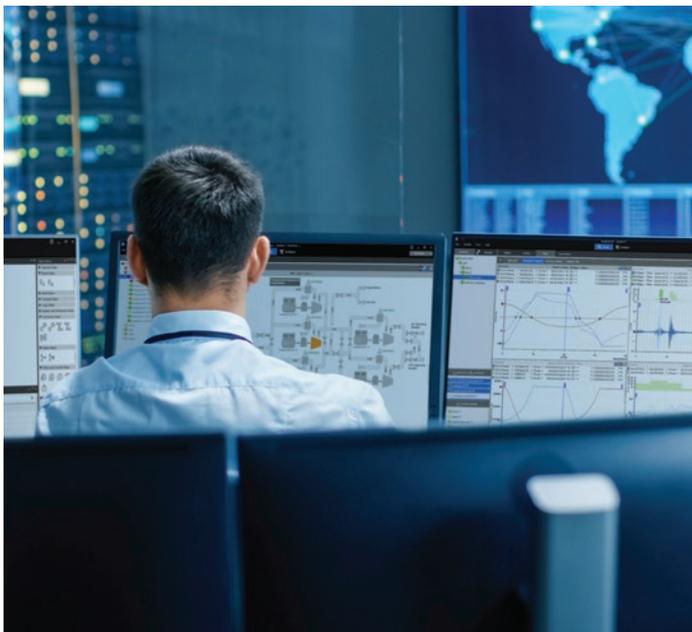
- Cut their maintenance costs in half
- Reduced their unplanned machinery failures by 55%
- Decreased their mean time to repair (MTTR) by 60%
- Extended machinery life by 30%
- And achieved six other double-digit improvements in key performance indicators

One size does not fit all

A plant's population of assets is not a monolith. Assets are different. They fail in different ways. They have failure mechanisms that proceed at different rates. And they represent different cost consequences in not just when they fail, but how they fail—and the corresponding ripple effects that can compound. It should not be surprising, then, that a single technology and single approach cannot address the condition monitoring needs and economics of every asset. By using consequence-based considerations and failure mechanism rates along with the P-F curve first described by John Moubray in his classic work Reliability-Centered Maintenance, a rational and systematic approach can be used to select the right condition monitoring technology for each asset. The result is a multi-technology mix that is tailored to the cost consequences of an asset's failure and the fastest rate at which its likely failure mechanisms will progress.

Silo elimination

While a plantwide approach will necessarily include different hardware technologies ranging from wireless for some assets, route-based portable data acquisition for others, and a variety of wired data acquisition for still others, it does not have to include different software platforms and data silos. Best practice today reflects a mix of hardware that is rightsized to the economic consequences and mechanisms of failure but knit together within a single software environment.



Process data

Condition monitoring strategies that are devoid of process data are never as effective as approaches that utilize it fully. Sometimes assets experience accelerated wear and premature failure due in part or in full to process conditions. Other times they fail for reasons unrelated to process conditions and merely impact the process. Either way, process data helps tell a more complete story of cause-effect and can help isolate root cause where ambiguity would otherwise exist. For certain fixed assets, trending and alarming certain process parameters alone can constitute highly effective condition monitoring where the same data that is used for control purposes can also be used for asset health purposes. When selecting a condition monitoring software platform, the importance of process data should not be overlooked and the relative ease and cost of integrating such data should be a primary consideration.

Embedded knowledge

Systems that don't allow users to easily embed knowledge to help with data review and anomaly detection are of limited value because they can neither retain the knowledge of a retiring workforce for the next generation to leverage, nor can they make personnel more efficient by freeing them to fix problems rather than look for problems. Many analytical tasks that were previously the sole domain of human senses can now be automated and the number of analysts needed for a given population of assets can be reduced, freeing them for higher-value activities. These capabilities also allow operators with centralized machinery expertise to embed this intelligence in the software and extend it to facilities where it would otherwise be impractical or cost-prohibitive to deliver.

More than technology

Plantwide condition monitoring entails more than just selection and deployment of appropriate technology. Indeed, the term "dusty keyboard syndrome" was coined to describe those customers that deployed plenty of capable technology but never developed the disciplines or know-how to use the technology consistently and effectively. As a result, the technology gathered dust and was characterized only by its potential to deliver value rather than by actually delivering value. To ensure customers are able to avoid this trap, Bently Nevada has identified a systematic, five-step approach that gives adequate emphasis to people and methodologies—not just products—and can address all aspects of successful program implementation.