How IIoT Can Stop Being a Buzzword and Start Creating Value in Your Plant

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You may have heard of the Industrial Internet of Things (IIoT). Or Industry 4.0. Or the Connected Plant or the Smart Factory. Or Artificial Intelligence or Deep Learning or Augmented Reality or any one of the myriad of buzzing technologies that promise to allow you to go sit on a beach while robots run your factory. Well, I hate to break it to you, but those robots probably won't be here to save you before you retire. Fortunately, I can confidently say that while IIoT may not have yet found a way to fully replace your maintenance team, it has certainly reached a level of maturity where it can start preventing costly downtime in your plant.

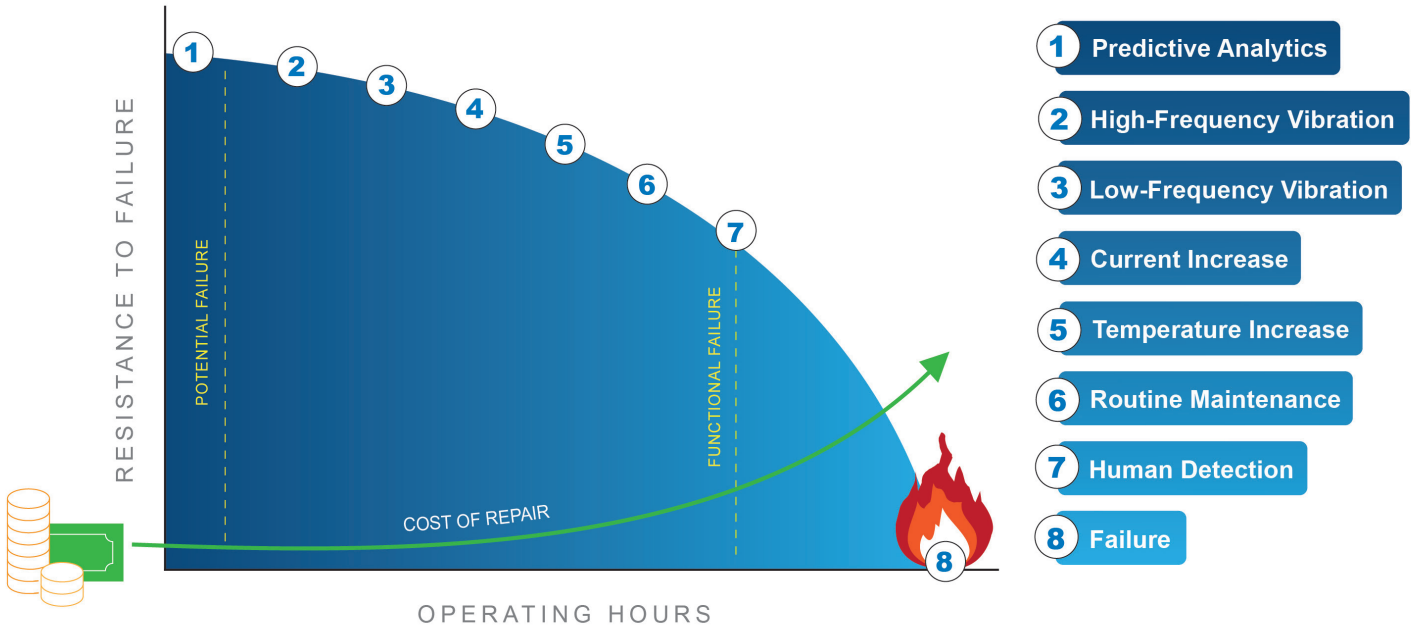
What is "IIoT"?

The Industrial Internet of Things can be defined as, "a network of machines, computers, and people enabling intelligent industrial operations using advanced data analytics for transformational business outcomes."

For an article about getting rid of buzzwords, there are certainly a lot of buzzwords in that sentence. But it does do a good job of conveying the heart of what IIoT can bring to your facility. At its essence, IIoT uses advances in sensing, communications, cloud, and computing technologies to help you (a) reduce costly unplanned downtime by providing an early indication of pending failure and (b) digitally capture human experience in a way that makes it easy to transition expertise from one worker to the next.

Unfortunately, despite what you may have heard, IIoT technologies are not a one-size-fits-all solution that you can simply drop into your plant and expect to generate immediate value. If used incorrectly, they can end up being nothing more than an expensive distraction - forcing your team to use another new piece of software and giving you a glut of information

Potential-Functional Failure Curve



that ends up requiring a team of experts to sort through. However, a properly architected IIoT solution will serve as a value-generating addition to your existing control network, provide a platform to help your understaffed maintenance team, and give you plenty of lead time to optimally schedule maintenance activities on your most critical assets.

How IIoT Can Augment Your Existing Capital Assets

It is quite common for a company to consider an IIoT technology that doesn't "play nice" with their existing networked devices. But, if your company has already invested heavily in the mechanical, electrical, and networking technology that keeps your business running, why should any new technology, no matter how promising, force you to completely ignore those existing assets in favor of shiny new toys? True, for a lot of established companies, an IIoT investment may lead to heavy use of a remote cloud for the first time. Moreover, that remote cloud will likely bring tremendous value by remotely providing predictive insights, real-time alerts, and on-demand historical data to anyone in your workforce. But, why should that same IIoT investment force you to disregard the ways that your existing PLC/SCADA/DCS is currently being used?

Your IIoT provider definitely benefits from keeping your data entirely inside their own server room, but this practice is, almost certainly, disadvantageous to you. There are often valuable insights to be gleaned by coupling IIoT-collected information with your internal process data, and this fusion can't happen if these datasets are mutually exclusive.

Fortunately, I'm here to tell you that you can have the best of both worlds. As the Internet of Things starts

to propagate within the industrial environment, I am confident that the most valuable IIoT technologies will prove to be the ones that use distributed sensors and cloud-based resources to create unique insights, and then share those insights (along with raw sensor data) with your control system using standard industrial protocols.

Filling the Void Left Behind by the Exiting Workforce

Over the past 30 years, industrial facilities have become increasingly complex in the way they do business. Just-in-time manufacturing practices have led directly to an increased demand for keeping things running 24 hours per day, 7 days per week, 365 days per year. This means both workers and equipment have had to adapt to an “always-on” mentality, and while the three-shift structure can help ease the burden on us humans, our equipment runs all day every day - resulting in increased wear and tear on the critical machinery our businesses rely on.

In contrast to this demand for equipment uptime, we have also seen a significant decrease in the number of available skilled maintenance personnel. On one hand, many of the experienced technicians that have maintained our equipment for the past decades are preparing to retire. On the other hand, suitable replacements for these skilled workers are becoming much harder to find as college graduates are increasingly drawn to innovative design roles over traditional maintenance jobs.

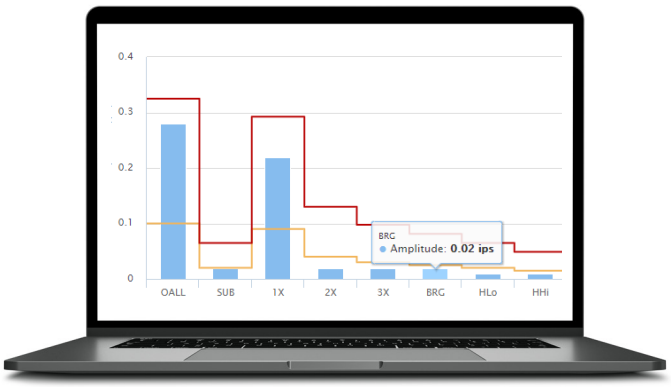
One of the overlooked benefits of IIoT is that it can provide tremendous value by bridging the gap in expertise between your exiting workforce and your often under trained and overworked group of young replacements. Specifically, a quality IIoT system will allow experienced workers to design and implement tailored alarms and notifications that capture their years of experience. Then, collected sensor data can be used to trigger these alarms and convey detailed work instructions to any other worker (regardless of experience), creating an unprecedented continuity of care for legacy equipment.

Beyond the Buzz: What Role Can IIoT Perform for You?

In the previous two sections, we’ve discussed ways in which IIoT can create value by augmenting your existing equipment and workforce. However, in order to be truly transformational, this technology needs to do more than just augment. It needs to fundamentally change the way we approach industrial maintenance.

Over the past decade, the promises of IIoT have been great, but we have yet to see a set of products truly rise up to meet the level of hype surrounding this space. There are good reasons for this: this stuff is hard, the technology is young, and it will take some time to perfect. But that doesn't help you explain to management why your large IIoT expense is not yet generating any justifiable return on investment.

Fortunately, there is an area in which IIoT is starting to create industry-wide value: monitoring vibration in rotating equipment. It is perhaps obvious that any critical piece of equipment in the industrial setting is going to have at least one major rotating component, and that these rotating components are subjected to constant mechanical and electrical loads that lead to strain, friction, fatigue, and other sources of potential degradation.



Historically, preventative maintenance programs have turned to trained vibration analysts to perform monthly or quarterly route-based inspections of critical rotating equipment. These inspections typically collect high-frequency vibration data and use it to assess the amount of energy a piece of equipment is spending in various frequency bands. The results of these analyses can be used to detect the early onset of issues like misalignment, gear tooth chipping, or bearing degradation.

The revolutionary advancement that IIoT brings about is that instead of performing these analyses on a quarterly or monthly basis, a battery-powered wireless IIoT device can assess a piece of rotating equipment in your plant once per hour. This gives a near-real-time indication of degradation in your critical assets, and provides a long runway to schedule appropriate maintenance activities before that equipment fails.

Final Thoughts

With all this in mind, the next time you find yourself looking for an IIoT technology to help you reduce downtime or solve a maintenance problem, I hope that you'll be able to look past the common IIoT buzzwords and find a solution that brings tangible value to your business. Vibration-focused IIoT can provide an hourly health check on your most critical assets, intuitive cloud-based IIoT systems can help transfer generational workforce expertise, and a fully connected IIoT network can make advanced insights available to both your smart phone and your PLC. All told, this is probably not enough to let you run your whole plant from the beach, but it just might be the ticket that frees you up to take that long-overdue vacation.

Sources:

1. *Reducing Unplanned Downtime and Helping Future-proof Automation System Assets*, by Craig Resneck, ARC Advisory Group, August 5, 2016