Changing The Tune On Asset Uptime

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Predictive maintenance practices are entrenched in regulation-driven manufacturing sectors with high costs of downtime, such as refineries or pharmaceuticals, but for the average facility, the ROI for predictive maintenance hasn't really been there.

The strategy behind predictive maintenance is to collect and track certain types of performance data over time on critical pieces of equipment, looking for changes in readings that are known to indicate degradations and then acting on those changes while the fix is still easy and equipment failure can be avoided. In addition to avoiding downtime, predictive maintenance also optimizes repair efforts: instead of replacing components on a pre-determined schedule, teams wait until the data indicates a machine needs service, costing less on labor and materials but with more peace of mind than run-to-fail.

The primary ROI of predictive maintenance is cost of failure — both wasted goods on the process line as well as cost of the ruined equipment – weighed against the cost of inspection and repair labor, equipment components, and the data tracking system, sensors, etc.

The problem is that for facilities with a less-than-catastrophic cost of failure, the cost to implement predictive maintenance is often too high compared to the failure-avoidance benefit. Implementing predictive maintenance requires employing predictive maintenance or reliability personnel who: regularly inspect the most important equipment using vibration, oil analysis, thermography, and other measurements; use automated systems like CMMS (computerized maintenance management system) and SCADA (supervisory control and data acquisition) to monitor that equipment and store and track the data; and understand the equipment and data enough to identify that sweet spot of exactly when equipment needs maintenance.

Mid-sized industrial and large commercial facilities typically have smaller maintenance teams with broad responsibilities. They know their equipment well, perform some amount of scheduled maintenance, and have strong troubleshooting skills. However, they also typically outsource specialized work and don’t have the budget for large automated systems.

These maintenance technicians often use the same techniques and tools for troubleshooting that they would to conduct inspections, log data, and share information for predictive maintenance. But without an automated data system, data has to be captured manually and written down — and these teams are more focused on solving problems, in the moment.

Challenges and Solutions

Writing stuff down is a problem. Technicians take measurements for the job at hand but unless it’s part of team practice, they don’t usually write the data down. Equipment knowledge and maintenance records exist but they’re stored in individual heads or in separate computers, not where techs can access it across teams and shifts.

The solution for this dilemma is probably already in your team members’ hands much of the day — a smart phone or tablet. Many facilities are already using these devices for distributing work orders, so why not use them to share maintenance data?

It’s a simple and inexpensive move to convert from a handwritten notebook to a smart device and a cloud-based log or spreadsheet. Yes, when techs take a measurement in the field, they still need to take their smart device out, connect to the cloud-based log, and type in the data. But using smart devices is appealing, cloud tools are pretty straightforward, and if the data is entered in the field it cuts out the duplicate step of transcribing it back in the office, which makes this an appealing one-and-done scenario. Plus, there are mobile apps for many test tools that make it easy to transfer data from the situation to the log and from the

individual to the team.

Cloud vs. SCADA

More and more companies are finding it easy to rely on the cloud: server networks that can be harnessed for remote storing, accessing, and sharing of data. The team can connect any time and from anywhere due to the mobile processing power resident in smart phones and tablets. Plus, with more and more companies using the cloud, it actually costs less to increase capabilities in the cloud than it would to increase the capabilities on in-house systems.

Because cloud computing is often paid for as a service, it comes from an operations budget rather than a capital equipment budget. This fact shifts risk over to the service provider that has to maintain the hardware and software of the cloud system. Cloud services also encrypt data and restrict access far better than most in-house systems that connect to the Internet.

SCADA systems, on the other hand, are attractive because they include fixed-mount sensors that provide automatic data capture and sophisticated analytics specific to equipment type. They’re the opposite of DIY and they work 24x7.

That brings us back to ROI. How many machines in the facility are important enough and failure prone enough that they need active monitoring? How complex is it to gather the data and analyze it? What are the options to automate the diagnosis, so that more members of a team can perform the inspection?

The pinch point comes when a machine, or some of its key components, starts to degrade. That’s when any maintenance team, large or small, wants frequent measurement data that they can access remotely. Some teams have begun using small leave-behind mini-meters that can be locked into the panel. The meters send data wirelessly to a master meter or computer, making it easier and faster to complete data checks more often. Another partial solution is for any tech in the area to take a thermal image of the machine and save it to the cloud where a more senior technician can evaluate it for change compared to previous images. Even vibration data collection has become more automated, such that handheld test tools now assess vibration signals on the spot.

The Soft-Skill Side of Predictive Maintenance

If we take a comprehensive predictive maintenance list and narrow it down to the steps necessary for a non-automated, mid-sized facility, the key points look something like this:
Know your most important pieces of equipment and their telltale measurements/inspection points that provide you with specific health information.

Whenever someone is working on a piece of equipment, make it standard practice to check those telltale data signs and save the data points to a shared location, organized by equipment type and marked by the date.

Whenever troubleshooting, check the data-share first (which could help narrow down to root cause of a malfunction much faster).

Success often hinges on an in-house champion, usually either the team lead or a senior technician. But unlike at a large facility where predictive maintenance is its own department, at a mid-size facility, success also requires bringing the whole team up to speed. Here are three tactics to consider.

1) Schedule lunch-and-learn sessions with incentives for skills training. The goal is for the whole team to discuss telltale signs of problems as well as the objectives of the predictive maintenance so that everyone knows what to look for. These meetings can also provide basic how-to sessions on cloud-based spreadsheets and other mobile measurement apps, using the team's own smart devices. As the project gets rolling, the meetings become a time and place to review the data logs and discuss inspection and repair strategies. This shared communication provides context for the data, helping the team understand how recording isolated measurement points makes a difference when aggregated over time.

2) Assign the task of regularly assessing the accumulated data. This is when trends analysis happens. Look for changes that might indicate a problem; in general, a measurement that deviates by five or ten percent of norm may need investigation. Also, the team should be encouraged to check the log while they're on the job, not just for data entry. In fact, a standard maintenance form can include a simple check-off indicating the data has been reviewed.

3) Incentivize suggestions and data sharing between team members. Reward people who speak up when they notice something that could enter into a telltale category or who come up with other ways to use the cloud log and their data sharing to improve team communications.

Changing the ROI Equation

Not all businesses have the budgets to implement a dedicated predictive maintenance system, but they do have smart devices that can be incorporated into daily use, raising the overall effectiveness of even a small maintenance team.

Industrial facilities that are trying to ramp up production may be especially prone to delaying regular maintenance, increasing the likelihood of emergency repairs that spread lean teams even further. To truly optimize the crew that you have, invest a little time in a cloud-based data tracker, some wireless tools, and some training to pull it all together. When the entire team has access to maintenance data, better decisions can be made at lower cost, before an emergency ensues — and that's an ROI equation most of us can get behind.

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