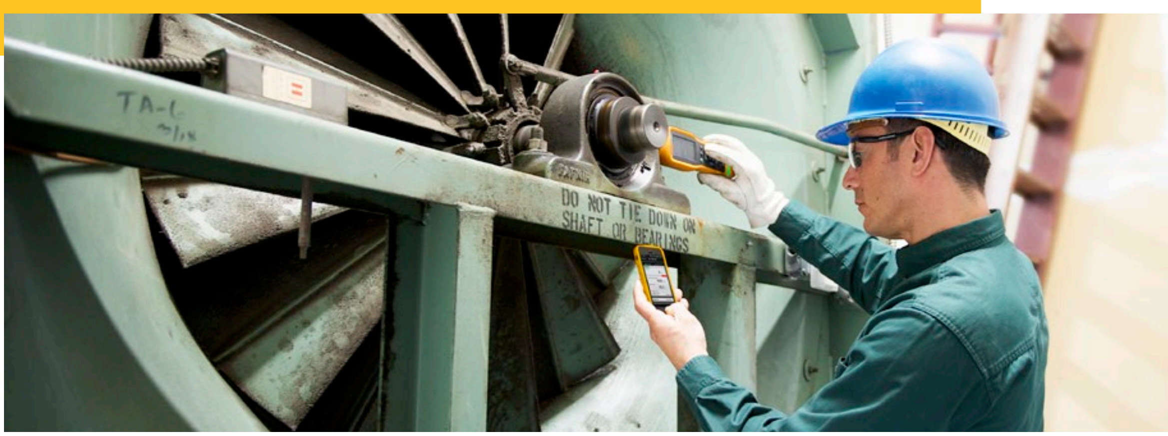
Workforce crunch?
Exception-based maintenance deploys wireless tools and the cloud

Application Note

A condition-based approach to asset management that includes wireless tools is one way to help fill the skills gap among factory workers.



Current workforce and demographic trends in North America point to a dwindling number of skilled tradespeople as baby boomer begin to retire.

Indeed, according to a 2015 survey of executives by the Manufacturing Institute, the skills gap among factory workers is widening, with some 2 million jobs expected to be left unfilled over the next decade.

In addition, the high demand for those trades is sending tradespeople overseas for high-paying jobs, and few younger people are drawn to manufacturing. Those factors combined indicate a major workforce challenge.

Experts in manufacturing processes and asset management are looking at alternate approaches to partially meet this challenge. One tactic is to use lesser skilled workers armed with a suite of high-tech tools that have the capability to easily capture data in the cloud for later analysis.

In an industrial setting, that means younger techs are making rounds in the factory with handheld tools such as vibration analyzers, point-and-shoot infrared cameras and even laser shaft alignment.

But the key to this approach is a methodology, says Kenneth Bannister, a Toronto-based author, engineer, asset management consultant and expert-level thermographer.

That method is to take the concept of the visual factory to another level. Already, many manufacturing facilities deploy this visual factory approach, by, for example, using Andon signs. When a line is stopped, these signs high above the factory floor identify the problem at a particular station. The signs signal whether there is a need for more parts, a machine is broken or other issue.

Top 3 Factory applications

1. Thermal image capture in factory
2. Vibration analysis and laser shaft alignment
3. Condition-based maintenance with Fluke Connect™ app

The checklist mentality

"We're moving into a checklist mentality where now we're looking for exceptions to the norm, classified as a no-go state," Bannister said. "It's much like when a pilot sits down in a cockpit on an aircraft and starts checking all the gauges. You start going through your checks. And all the instruments are labeled and arranged in a factory in such a way where a lower-skilled person can actually do those checks."

For example, a pressure gauge can have lines painted on it to show the acceptable upper and lower range of PSI–known as the Safe Operating Window, or SOW.

If the reading is outside the lines, then the worker alerts a supervisor of the no-go state, who can then dispatch a pipefitter to perform an expert analysis and/or repair.

"We can get a little more sophisticated with semiskilled technicians," Bannister said. "We can utilize an infrared camera for instance in a belt-driven system."

"Semiskilled" in this example is a technician with the first-level of thermography training.

Belts are set up in a 2 % slip, meaning they're running 2 % slower coming out of the pulley because the belt has to have a bit of play in it in order for it to gain traction. If belts are loose, at 5 % to 8 % for example, then they create frictional heat that results in premature belt and pulley wear and energy losses. A too-tight belt will cause problems in the bearings and again wear out the belt faster than designed.

Testing belt drives with infrared cameras

An infrared camera can be used to take a picture of the temperature signature of a belt properly installed at 2 % slip. A cross of tape can be placed on the floor to mark the optimal spot for the technician to stand in front of the machine and take a repeatable infrared picture of the belt.

"When aligned correctly, the belt with 2 % slip should show almost no heat," Bannister said. "If later infrared images show a telltale ring of fire on the belt, that's additional heat being generated and you know you have a problem. It might be misalignment, could be a worn pulley. But all you need to know is that there is an exception–the belt is showing abnormal heat. We can then send a millwright in to check it out."

Other examples of using the exception-based approach are inspecting heat exchangers and steam traps. Baseline infrared pictures can be compared to later pictures with changing heat patterns, potentially indicating a problem that should be checked out by higher skilled workers.

An exceptionally helpful system to capture the images and other data in this condition-based approach is the use of wirelessly enabled infrared cameras and accompanying Fluke Connect™ app on a phone.

Baseline, then check with wireless tools

"Once you get the (Fluke) Connect system, with uploads to the cloud, you can baseline the good state against which you can reference any corresponding future change or deterioration in state against," Bannister said. "And of course as you become more sophisticated you can start to trend on the points."

The Fluke Connect™ system gives operators the ability to track multiple data points of specific equipment.

Such an exception-based maintenance approach depends on human acumen and activity–workers making rounds to check equipment–rather than automated sensors and alarms. Those scouter systems, Bannister said, are susceptible to being ignored.

"I still see the people aspect," Bannister said. "You still need someone to go look at it. Think of Three-Mile Island (the 1979 nuclear accident), you can think of a lot of different places in which the automated alarms went off but people ignored the alarms and the backup systems that were turned off.

Humans make best alarms

"You must have a lot of drill and a lot of practice to truly understand the ramification and consequence of the alarm state and the difference between a real event and a practice event, or everyone has to know that unless they all act, there will be real consequence to inaction if a real event is occurring," Bannister said. "Otherwise, people will say, 'Oh, another false alarm.' Until they smell something or see something or have another reference element to distinguish the difference, nothing will happen."

A condition-based or exception-based asset management program combines human factors with technology working in the background that can work efficiently even with a limited availability of skilled technicians.

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