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Let's Not Confuse Activity with Productivity

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Business Improvement, of which effective maintenance and reliability processes are key components, is crucial in the world we operate in. However, for Business Improvement to be truly 'continuous', I suggest that the identified improvement must also be sustainable – we need to be confident that we can build on the progress already made (without fear that improvements already 'in the bank' might disappear!). This automatically requires us to understand exactly why those things that are hindering us, let's call them 'problems', are really happening?

In today's environment, a 'sustainable' solution increasingly is one that is not dependent on a human but is imbedded into the infrastructure of the organisation. This could be equipment based, or it could eliminate the need for human interactivity altogether. That said, it could be supported by simplified, more user- friendly procedures that are straightforward, clear and require less expertise or specialisation. Furthermore, in a genuine 'learning organisation', such lessons would be embedded into robust processes and training, thus ensuring some 'corporate memory'. Senior Management would have the necessary tools to be able to track/monitor the resultant improvements, including their Return on Investment! As a bonus, they could also readily identify 'common causes' and 'repeat problems' across complex organisations.

Doing more with less

It might seem unusual to be thankful for problems. However, isn't solving problems what maintenance professionals are paid to do? Whether it is finding ways to make a facility run more reliably, designing a structure with limited time and money, or managing a group of skilled employees, each day the typical maintenance professional is faced with multiple problems that must be resolved. Those who are successful at solving problems are usually successful in their careers. While this principle is not new, the strategies that successful people use to solve today's problems are changing.

One dynamic in the new industry reality is the pace of change at which improvements and problem solving is expected to occur. Another is the rate at which the resources available to solve them are becoming harder to secure, especially the human resources. "More with less" is now 'business as usual." Thus, in more and more situations, the strategies that delivered yesterday's solutions are not working as well, or are becoming increasingly difficult to implement.

So, if this trend continues, what does this mean for tomorrow's solutions? In short, there are many good solutions still available. If you are documenting the causes of your problems, you have options, but you will be looking at and attacking different causes than you did a few years ago. With decreasing numbers of skilled craftspeople and experts, you need to look down a new path for lasting and robust solutions—ones that rely less on people and more on systems, hardware and automation. This trend has been growing for years. However, now it should be one of your first considerations. Solutions that begin with "Create new procedure," "Implement new PM," "Stress the importance of….." are increasingly less effective these days and should be avoided if at all possible. One major reason is that, increasingly, these types of tasks aren't getting done.

A practical example

Let's consider a real problem, faced by a close colleague of mine, whilst he was working as an engineer on the front lines at a large chemical manufacturing company some 25 years ago. He had many internal experts available to help with challenges he faced. He had no idea how lucky he was.
A large, multi-belt-driven centrifugal fan utilising pillow block bearings to support the off-hung fan wheel experienced repeat bearing and belt failures resulting in significant downtime. Due to the relatively high speed and operational loads, the bearings were already heavily loaded and had experienced prior lubrication failures. Installation and tensioning of the belts is critical; too much tension results in additional radial bearing load and accelerates failure. If there's too little belt tension, the belts slip resulting in premature belt failure.

Figure 1 below shows a very basic cause and effect chart.

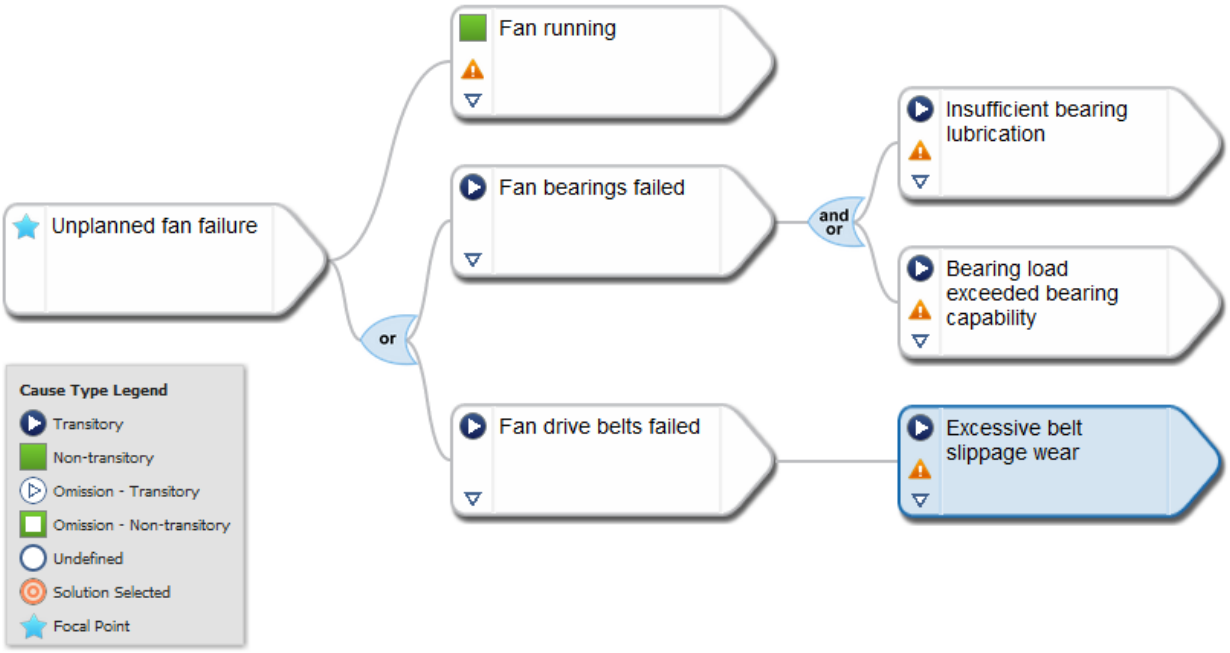

Figure 1: Fan Failure cause-and-effect chart – Basic
(Note: 'Transitory' causes in the chart above are related to "changes" and often the result of forces applied, movements, actions, decisions, etc. 'Non-transitory' causes are related to the status, properties and conditions of objects, or the operating environment, at the time the change takes place.)

His solutions at that point were: 1) Assure the bearings were of the proper speed/load rating, 2) Work with the lubrication technician to implement a new PM regime and 3) Work with the machinists to improve initial belt tensioning with a follow-up re-tension after run-in.

Today, faced with the same problem, he wouldn't implement the same solutions. First, he would go back to the cause-and-effect chart and drill deeper (Figure 2), looking for additional causes that he could attack with solutions. Regardless of where a solution is placed, once a cause is eliminated, it breaks the causal chain and prevents the causes to the left from occurring. This prevents the high-level problem -- in this case, unplanned fan failure -- from recurring. In many cases, attacking non-transitory causes can eliminate the need for precision work or skills, and it usually eliminates the need for a procedure. It does often involve a capital solution. However, weighed against ongoing, repetitive repair costs and lost production/downtime costs, it's usually a very wise move -- especially so in today's work environment.

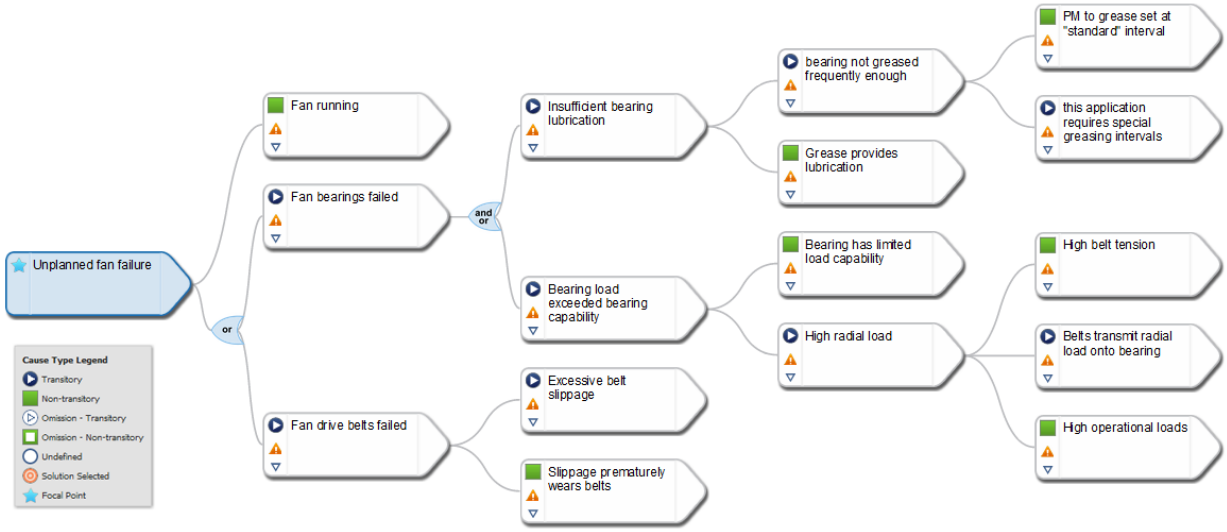

Figure 2: Fan Failure cause-and-effect chart -- Expanded

He would now seek solutions that didn't add new tasks or PMs, but instead eliminated them. He would also look for solutions that could be successfully completed with general skills instead of requiring precision skills. This is by no means an indictment of our current employee base because there are highly skilled people still around. Rather, it's a conservative approach anticipating a future where skilled trades *could* be even less available than now. A good solution not only solves the problems of today, it anticipates changes that could occur in the future. In this case, he would eliminate the belt drive altogether and replace with a direct coupled, inline drive system. Radial loads would be limited to the operational loads because belt loads would be eliminated entirely. Further, because the belts would be eliminated, this historical failure mode would also be eliminated. Because some work would be required to the fan drive base, he would take the opportunity to improve bearing life and reliability by replacing the two independent pillow block bearings with a single, two-bearing "tunnel" housing, such as an SKF PDNB series[2] (figure 3).

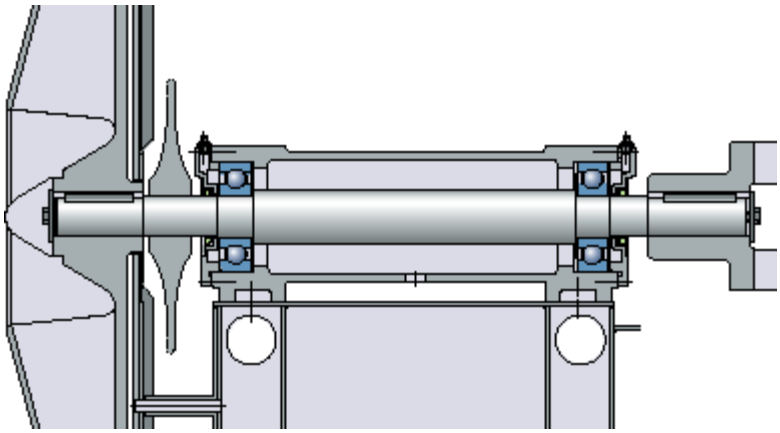

Figure 3: Improved bearing installation (Courtesy of SKF)

This system automatically aligns the bearings and would be simpler and faster for the mechanics to install while still being capable of handling the relatively high speeds and operational loads of the fan. With these changes, repairs and future maintenance would be greatly simplified and would move more towards 'error-proofing' the installation. These changes would eliminate multiple failure modes, resulting in improved reliability, and a reduction in unplanned fan failures, which is the overall objective.

The way ahead

If you evaluate your current strategies for solving problems, consider a slightly new bag of tricks—one that explores solutions that are less "people"-dependent. The good news is that these solutions will emerge from the "non-transitory causes" on the cause-and-effect chart that will be found by drilling deeper. These solutions should have the staying power you need, regardless of what happens around the next corner. The key is to select Solutions which are not only effective but are also practical, cost effective and once in place, continue to work – we move from 'fixes' to sustainable solutions and hence to continuous improvement!

These results can be obtained utilising small teams of well-trained people and a robust, well established RCA process. Even better, more consistent results can be supported using dedicated charting software. This not only has the RCA 'process' embedded but enables local results to be compared/shared, which facilitates learning at one location. Organisations that want to benefit across a wider geography should consider an 'Enterprise' version of the software. Such an application would enable routine generation of data analysis and tracking that previously required multiple experts working many hours to achieve. This

enables Senior Management or ‘corporate functions’ to actively monitor progress across a whole organisation and provides a powerful vehicle, not only for trend analysis but for identifying ‘systemic’ issues and actively sharing what happened and why it happened – the foundation of true learning. This creates a platform for sustainability of progress made and multiplies the benefits accruing to RCA.
Such an “Enterprise” application also allows people across a global organisation to data mine for ‘lessons learned’.

Adopting such a comprehensive approach to Problem Solving could even place Maintenance amongst the leaders of robust, sustained Business Improvement.

References:
SKF; http://secure.skf.com/group/products/bearings-units-housings/bearing-units/two-bearing-units/index.html