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## **Root Cause Analysis: Quality of Process? Part 3**

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[Part 1](#)

[Part 2](#)

### **Where Does Root Cause Analysis Stop, At the HOW or the WHY?**

*Abstract: When most people conduct their version of a Root Cause Analysis (RCA), where do they usually stop? How do they know when they are done? How do they know that the problem will not recur? These questions represent reality when we are the ones in the field working on a pressing problem with management on our backs. If we consider ourselves manufacturing detectives, are we content with the stopping at the “HOWS” or the “WHYS”?*

I was watching a TV series the other night, my favorite by the way, called Crime Scene Investigators or CSI. It is a series about forensic specialists that use high tech tools to prove and disprove hypotheses for mainly prosecutors and detectives. The entire show revolved around various crime scenes and how the cases are built to prepare for a “solid case” in court.

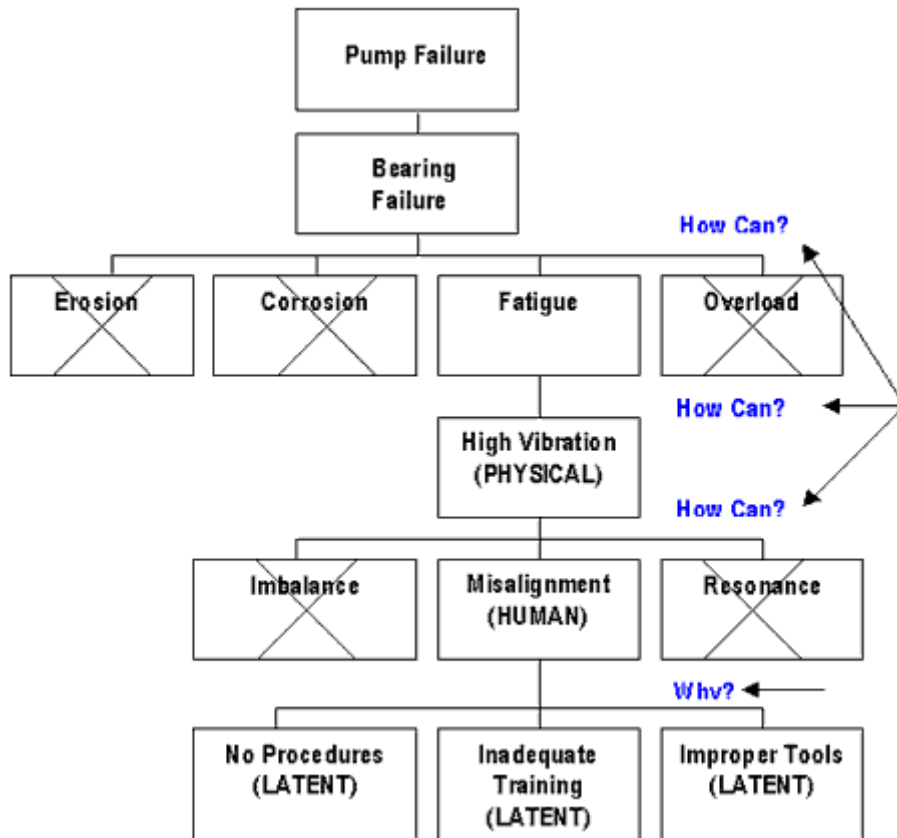
Putting this perspective into our world as RCA analysts, we too must build a “solid case.” However our court is not likely going to be a judge and/or jury, but rather a select number of managers that we are going to request money from to implement RCA recommendations. While the objectives may be different, the means to attain them are similar. In both instances, we must prove a solid case in order to obtain desired ends. In the criminal detective’s instance the goal is a conviction. In the analyst’s case, the goal is to implement recommendations to prevent recurrence of the undesirable event.

Looking at it this way, when we typically conduct analyses, are we more like the forensic engineer or the prosecutor and detective looking to win his case? What is the difference between the two roles?

The forensic engineer’s role is simply to determine with science HOW the event occurred? This means that a certain sequence of cause and effect relationships linked up and resulted in the undesirable event. Their role is to prove that each hypothesis did or did not occur. They in essence will map out HOW the crime occurred and be able to prove that it happened just that way.

Now let’s look at the role of the prosecutor and the detectives. How do they fit into the big picture? Their role is typically to determine the WHY? The forensic engineers provided them the HOW pieces of the puzzle, now the detectives and the prosecutors must determine WHY the crime was committed. In other words, they must identify the motive of the person that triggered the HOW (the sequence of events that lead to the outcome or the crime) to occur.

This is the same for us in industry. We use our technology (i.e. – vibration monitoring, infrared imaging, electron microscopy, stress analysis, etc.) to prove and disprove our hypotheses, but our analysts must explore WHY people make decisions that result in undesirable outcomes or failure. Take, for instance, the Logic Tree example below that we used in Part II of this series.



Picture 1.0 - PROACT® RCA Disciplined Logic Tree

The undesirable outcome is that some pump failed to perform its intended function. In an effort to prove our “solid case” we must understand the cause and effect relationships that lead up to the event. This will involve using science to prove our hypotheses. In the above case let’s explore HOW the pump could have failed and use science to prove our case:

Hypothesis	Verification Techniques
Erosion, Corrosion, Fatigue & Overload	Metallurgical Analysis
High Vibration	Vibration Monitoring Instruments
Misalignment Laser	Alignment Technology

These questions answer the HOW, but what about the WHY? In this case someone misaligned a pump and that decision resulted in a sequence of cause and effect relationships that caused the pump to fail prematurely. The “forensics” confirmed for us the HOW, but WHY would a person choose to align in that fashion. This is where we need to understand the motive of WHY people make decisions that are in error. As an analyst, if we were to go deeper and understand the thought process or the rationale for such a decision (Latent Root), we would uncover the real ROOT CAUSES of WHY physical failure occurs. People often misalign because they were never trained in proper alignment practices, no procedure exists outlining alignment as a required practice with specifications and/or the current alignment equipment we are using is worn or inadequate for the application.

If we do not explore the WHY, then the HOW is likely to recur. In this example, if we merely change out the failed bearing, does the problem go away for good? Even if we identify an excessive vibration and take measures to identify it sooner so that we can better predict impending failure, does that make the problem go away? If we discipline the mechanic for not aligning properly, “Does that make the issue go away?”

As you can tell, none of these commonly applied solutions will totally prevent the recurrence of the pump failure. Only the identification of the WHY that triggers the physical root to occur, will prevent recurrence.

If you now reflect on your current RCA efforts, do you stop at the HOW (forensics level) or at the WHY (detective level)?

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