



MAINTENANCE "MATTERS"

Root Cause Analysis #4 Arriving at the correct conclusion

Maintenance and Reliability can achieve profitability

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This newsletter is designed to inform you about the many aspects of maintenance. If there is a subject you would like me to address please contact me and I will research it and record my findings in the newsletter or directly to you. rsaxton@lloydelectric.net

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OUR STRENGTH IS OUR PEOPLE

Walter Meeks



Wally is another of the many highly skilled shop floor technicians who are responsible for the repairs to the equipment that our valued customers entrust us with repairing. Wally has been a valued member of the Lloyd Electric staff for over 21 years and we hope for many more years to come.



*"Did you know that:
Old deans never die they just lose their faculties
Old doctors never die they just lose their patience
Old electricians never die they just lose contact"*

When analyzing a motor failure, it is important not to assume facts that may fill in the gaps in information supplied by the customer.

The service center often does not know much about the motor application, much less the power supply and/or maintenance history. The customer dealing with the service center is probably not the person who removed the motor from service, and may not be the operator who is familiar with the motor or its application.

Incorrect, incomplete or even misleading information is common. It maybe impossible to draw the correct conclusion from the evidence provided. Never assume a piece of evidence exists just to force the "conclusion" to fit the "facts".

When a conclusion is built around erroneous information mingled with the "facts" the root cause of failure is seldom correct the result is additional failures or assigning blame to the wrong parties

Example: A winding failed, after a very short run time with a turn-to-turn failure. The customer might believe that the motors short life indicates poor workmanship, whether the motor is new or rewound. The customer failed to advise that the motor was operating on a pulse modulated width (PWM) drive with a 100 foot cable run. This would be a valuable piece of information for the service center and, at the same time, it would have accurately described the motor's power supply.

Without the knowledge of the PWM drive, the service center "forces" the conclusion that the motor manufacturer or the rewind at the service center must of damaged the winding, even though there was no such "obvious" evidence.

The wrong party is assigned blame for, and the cost of, repairing the failed motor. More importantly, the problem is not fixed and will likely occur again.

The location of the is critical evidence that may explain the real reason for the winding failure. If the turn-to-turn failure is in a coil connected to a line lead, then a transient voltage could be the culprit. The location of this failure should alert the service center to find out more about the power supply.

When a motor is operating from a PWM drive, especially with a long cable run [more than 50 feet] a turn to turn failure in the lead coil is a classic indication of high voltage spikes produced by that PWM drive and the long cable run.

The difference in knowledge will:

- Assigned the responsibility and cost of repair to the correct party
- Give credibility to the service center
- And most importantly, make sure the root cause of failure is identified and corrected

Over the last 10 to 15 years, there has been a paradigm shift that has seen maintenance become almost synonymous with achieving reliability. To truly understand this shift, it is important to know the definitions of a couple of common terms:

Maintenance. The dictionary defines maintain (verb) as follows: to hold, preserve or carry on in any state; to sustain, to keep up; to support, to provide with means of living; to keep order, proper condition or repair; to assert, to affirm, to support by reasoning, argument, etc.

Reliability. In its mechanical sense, reliability can be defined as the probability of a device to perform its functions adequately for a period of time intended under the operating conditions encountered.

The role of the maintenance professional is to maintain equipment at peak operating reliability in the most cost effective manner. Equipment manufacturers make machines for really one purpose - to make money. Likewise, customers generally buy them for that same reason. The cost of purchasing a piece of equipment tends to be relatively fixed. The actual cost of operating the equipment can be highly variable. The main aim of the maintenance department is to ensure that operating cost do not exceed income. This is achieved by minimizing downtime and repair costs.

Maximum output is now required from minimum input and this has resulted in reliability being optimized. This must be a strategic and discriminating process that considers both the cost of reliability and the consequences of unreliability. Companies that have achieved this optimization have invested heavily in people and equipment for effective asset management. Fundamental to this is education throughout the whole company.

As technology has advanced, machines have become more complex and expensive to build. Maintenance engineering has been required to develop along with the technology. From being nonexistent, maintenance has developed from a passive to an active philosophy. Proactive maintenance techniques now give some organizations their only edge over their competitors