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Season's Greetings

From all of us at Lloyd Electric. We thank you once again for the positive response we received from the first seven issues of this newsletter. Please contact me with any comments or suggestions at [rsaxton@lloydelectric.net](mailto:rsaxton@lloydelectric.net)

OUR STRENGTH IS OUR PEOPLE

Don Luther



Don is one of the many highly skilled shop floor technicians at Lloyd Electric who are responsible for the repairs to the equipment that our valued customers ask us to repair. For the last 30 years he has been a key factor in Lloyd Electric's reputation for high quality workmanship.



"That's the new boss' yes man - he came, he saw, he concurred!"

Lloyd Electric's Newsletter for the industrial Community

# MAINTENANCE "MATTERS"

## Root Cause Analysis #1 The Methodology

**Root cause methodology** is a step by step method for examining a failed motor and its system. It focuses on the stresses that acted upon the the failed component. By better understanding the stresses that acted upon a failed part, the service center is more likely to uncover the **root cause of the failure**.

The five key steps in the **root cause methodology** are:

- **Failure mode:** The manifestation, form or arrangement of the failure (e.g., turn-to-turn, phase-to-phase, etc.).
- **Failure pattern:** How the failure is configured (e.g. symmetrical or nonsymmetrical)
- **Appearance:** A visual examination of the failed part, the entire motor and the system in which it operates. Care must be taken to inspect all motor parts for damage, contamination, moisture, cracks or other signs of stress.
- **Application:** A close examination of the work performed by the motor and the characteristics of those types of load.
- **Maintenance History:** An examination of the work performed to keep the motor and systems in proper operating condition.



In an ideal world, all relevant information pertaining to the application, appearance and maintenance history is available prior to the actual inspection of the motor or failed component. however, in real life, the methodology usually unfolds by first inspecting the failed part, then the motor and finally acquiring information about the application, appearance of the system and the system's maintenance history. This sequence of events is usually driven by the urgency to return the motor to service as well as the availability of application and historical data.

The good news is, in some cases, the **root cause of failure** is obvious, e.g.,

- A balance weight comes loose and strikes the winding.
- The winding is saturated with water
- The bearing lubrication is contaminated

However, in a case where the **root cause** must be known, it is imperative that none of the steps of the methodology be skipped

## DC Motors They are still here



For years we have been hearing that the DC motor was going the way of the dinosaur. But it is still around and doing effective and efficient work in applications such as conveyers, extruders, winders, printing presses, metering pumps, cranes, hoists, traction motors, etc.

They come with permanent magnet fields in very small motors to very large motors with form wound armatures, fields and interpoles. DC Motors do need special maintenance considerations.

### Here are my suggested on-site tests

#### TESTS On-line & on-site

- Emax test on-line test
- Vibration Analysis
- Trim Balancing (to correct some forms of high vibration)

#### TESTS Off-line & on-site

- Armature Bar-to-Bar Test (preliminary testing at scheduled production outages)
- Megger test to ground
- P.I Test Whole Winding
- P.I Test Armature Only (if needed)
- P.I Test Fields Only (if needed)
- Check neutral
- Voltage Drop Test Field Circuit (If access is available)
- Total Field Resistance Check against Nameplate Volts & Amps to find possible shorted turns
- Laser Alignment (to correct some forms of high vibration)

#### INSPECTIONS

- Commutator Wear Pattern & Appearance
- Brush Wear
- Brush Tension
- Sparking Pattern
- Check for loose brush rigging that could change the Neutral Setting

#### CLEANING

- First vacuum all loose dry dirt and carbon dust from internal surfaces especially around the Commutator & riser
- Next, using (dry) air at only 30/40 psi. to blow all dirt from internal surfaces. Use in conjunction with a vacuum if possible or practical
- Do not use cleaning solvents for cleaning the inside of motors on site.