Lloyd Electric's Newsletter for the industrial Community

MAINTENANCE "MATTERS"

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This newsletter is designed to inform you about the many aspects of electric motor system 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

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OUR STRENGTH IS OUR PEOPLE

Danny Musselman

Danny 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. Danny has been a valued member of the Lloyd Electric staff for over 21 years and we hope for many more years to come.

"Sir, this new policy of restricted time away from our desks is getting to me."

Root Cause Analysis
#3 Summary of Motor Stresses

As we determined in the last issue, the majority of all motor failures are caused by a combination of various stresses acting upon the bearings, stator, rotor and shaft. In the last issue we outlined the stress type & actual stress of damage to the bearings and stator. Now we can do the same for the rotor and shaft.

Stress Type	Actual Stress or Damage
Rotor: Thermal	Thermal Overload & unbalance, excessive rotor losses, Voltage unbalance Hot spots/sparking, Incorrect direction of rotation, Locked rotor
Dynamic	Vibration, Loose rotor bars, Rotor rub, transient torque, centrifugal force/over speed, locked rotor
Mechanical	Casting variations/voids, Loose laminations and/or bars, Incorrect shaft-to-core fit, Fatigue or part breakage improper rotor-to-stator geometry, Material deviation Improper mounting, improper design or manufacturing practices
Environmental	Contamination, Abrasion, Foreign materials, poor ventilation, Excessive ambient temperature, Unusual external forces
Magnetic	Rotor pullover, uneven magnetic pull, Lamination saturation, noise, circulating currents, Vibration, electromagnetic affect
Residual	Stress concentrations, uneven cage stress
Miscellaneous	Misapplication, Effects of poor design, Mfg. variations, Inadequate maintenance, Improper operation, Improper mounting
Shaft: Dynamic	Cyclic Loads, overload Shock
Mechanical	Overhung loads, Torsional loads, Axial loads
Environmental	Corrosion, Moisture, Erosion, Wear, Cavitations
Thermal	Temperature, Rotor bowing
Electromagnetic	Excessive radial load

In the next issue we will continue looking at Root Cause Failure Analysis

The "Real" decision-making process when a motor fails

The following is an excerpt from a EASA/AEMT rewind study

In the past, the decision whether to repair or replace an electric motor has been one of economics. Replacement of an older motor with a more efficient model often makes sense for a motor operating continuously. In most cases, however, the decision is more complex. A motor operating infrequently, a motor with special mounting or design features, an already high efficiency motor, a large very expensive motor are all examples where the repair option may be a better choice.

When comparing the cost to replace or repair a motor, the equation should include not only operating cost and payback period, but also downtime and associated factors such as capital deprecation, and lost production. A misapplied replacement motor that fails within a year or two may have significantly higher cost than a repair that optimizes the motor for its unique application.

Substantial annual energy savings are quickly wiped out by unscheduled downtime when a motor fails unexpectedly.

Much of today's literature emphasizes efficiency and the cost of energy as stand-alone factors in the repair-replace decision matrix. Frequently, the cost of of the motor- or its repair-is a small fraction of the total cost of downtime when lost production is factored in.

Considerations (other than efficiency and simple payback) include reliability, performance and anticipated motor life, as well as availability of a replacement.

"Zero downtime" is a noble goal, one that requires commitment and planning and will include the tools of predictive and preventative maintenance techniques

It makes economic sense to identify the weak link in any process, and detect imminent failure before it occurs. Strengthening the weak link makes the entire process stronger. A motor subject to accidental wash-down should be a suitable enclosure, and can be modified to further protect it from this hazard. Likewise, since over 50% of motor failures start as bearing failures, bearing temperature detectors and vibration analysis are logical options.

With today's rapidly changing technology, the motor manufactures are hard pressed to incorporate emerging technology quickly. One advantage the service center has is its ability to deal with each unique motor and apply new technology as it develops to address specific concerns about a particular motors application and environment

With most companies returning to their ***"core business."*** and outsourcing maintenance, the competent service center is best qualified to assess the "cause of failure" and develop a plan to reduce the possibility of a repeat failure.