MCE™ Product Information

5 kV Electric Motor Analyzer

- Portable and battery powered
- Monitors Power Circuit, Insulation, Stator, Rotor, and Air Gap
- Variable test voltage from 250 to 5000 V
- Automatic IR, PI, DAR, and Step Voltage Tests
- Measures insulation resistance to 3 TΩ
- Precision resistance from 10μΩ to 2000Ω using 4-wire bridge test measurement
- Measures capacitance (pF) and inductance (mH)

DESCRIPTION

The MCE™ Motor Circuit Evaluation test equipment offers the most versatile approach to troubleshooting and trending de-energized electric motors on the market today.

It is equipped with a fully functional laptop computer and loaded with MCEGold, the gold standard in motor management software.

With MCEGold the entire test history of your electric motor is at your fingertips and equipped with the latest in acceptance criteria from IEEE and NEMA. Red or Yellow color-coded alarms identify any test data that is outside the acceptance criteria immediately following the test.

The case is made of ultra high impact ABS material for ruggedness. It is easy to carry and no AC power is required, making tough to reach motors or starters easier to test.

Data Includes:

- Phase-to-phase Resistance
- Phase-to-phase Inductance
- Balance of Resistance
- Balance of Inductance
- Ground Capacitance
- Polarization Index
- Dielectric Absorption Ratio
- Measured Ground Resistance
- Corrected Ground Resistance
- Rotor Influence Check
- Field Inductance
- Field Resistance
- Field Capacitance
- Field Ground Resistance
- DC Armature Tests
- Synchronous Motor Tests
- Wound Rotor Motor Tests
- More…

Ground resistance test voltages:
250-5000 V in 50 V steps
Accuracy:
±2.5% 100 KΩ to 1 GΩ @500/2500v
±5% 10 KΩ to 100 GΩ @2500v
±5% 100 KΩ to 100 GΩ @5000v
±20% 100 GΩ to 3 TΩ (≥1000 V)
Short circuit/charge current: 2 mA

Capacitance measurement:
±5% 1000 to 999,750 pF

Inductance measurement:
±1% 100 to 1000 mH
±2% 1000 to 2500 mH
±5% 2500 to 5000 mH

Resistance measurement:
Accuracy/Range:
±1% 10 μΩ to 2000 Ω
Resolution

.00001Ω	0Ω to .02Ω
.0005Ω	.02Ω to 2.0Ω
.005Ω	2.0Ω to 50Ω
.01Ω	50Ω to 1000Ω
.1Ω	1000Ω to 2000Ω

Dimension:
18.5x14.5x6 in. (46.99x36.83x15 cm)

Weight:
19 – 23 lbs (8.62 – 10.43 kg)

Test Lead set:
10 ft. (3.05 m.)

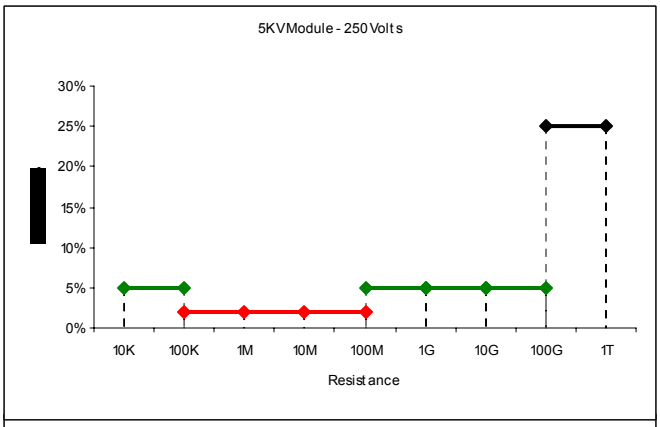
Voltage input range:
AC 100-240 V, 50/60 Hz (Computer)

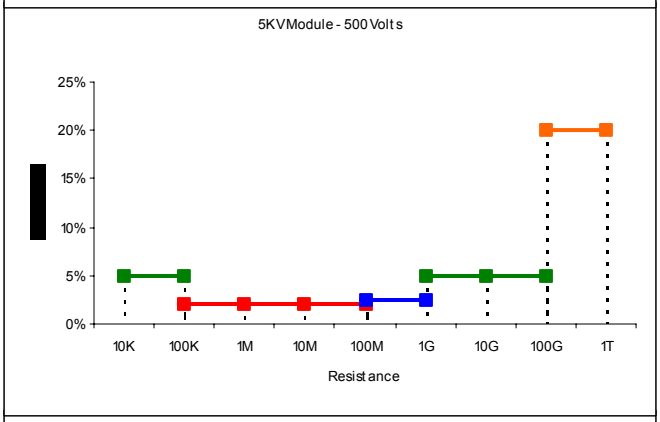
Environmental

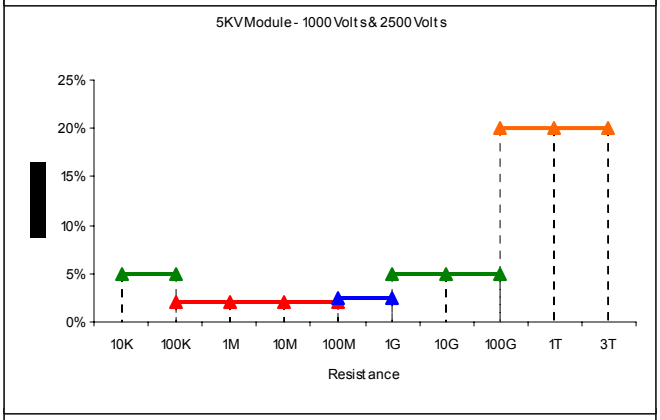
Operating temperature:
41°F to 95°F (5°C to 35°C)

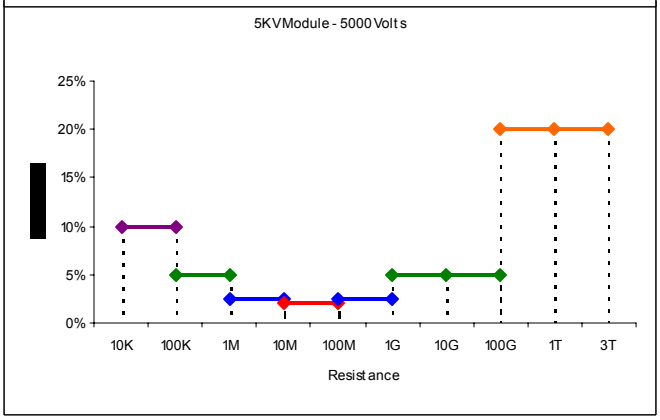
Storage temperature:
-4°F to 104°F (-20°C to 40°C)

Humidity:
20% - 80% non-condensing







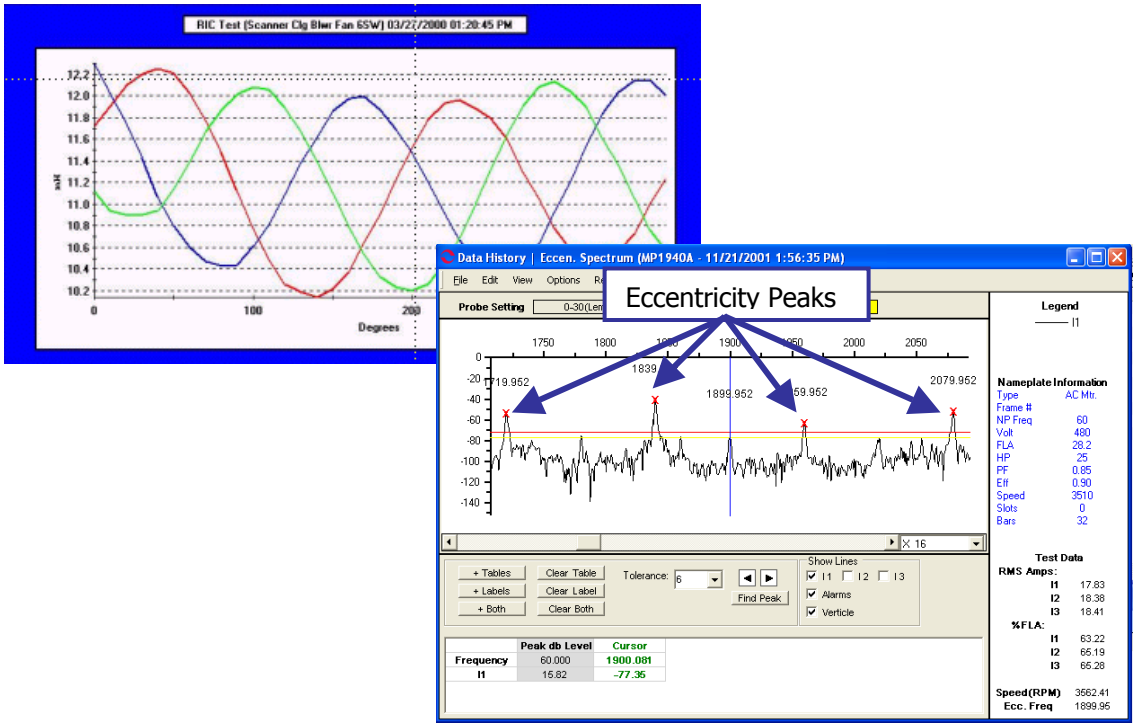


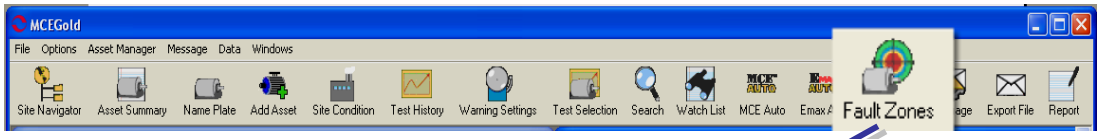
ATTENTION Accuracies and Resolutions are subject to change without notice.

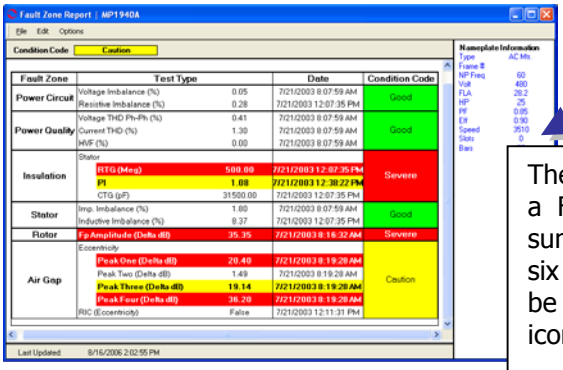
Fault Zone – **Air Gap**

The Air Gap fault zone describes the measurable distance between the rotor and stator within the motor. If this distance is not equal throughout the entire circumference air gap eccentricity occurs. The varying magnetic flux within the air gap creates imbalances in the current flow, which can be identified in the current spectrum.

Eccentricity analysis using the MCE Rotor Influence Check (RIC) test is most successfully applied in troubleshooting if pre-existing data is available so that trends can be observed. Eccentricity analysis using EMAX technology is performed through a high frequency spectrum of the current signal. If the number of rotor bars and the speed are known, the MCEGold™ software automatically places an (X) at the four peak locations which identify eccentricity.





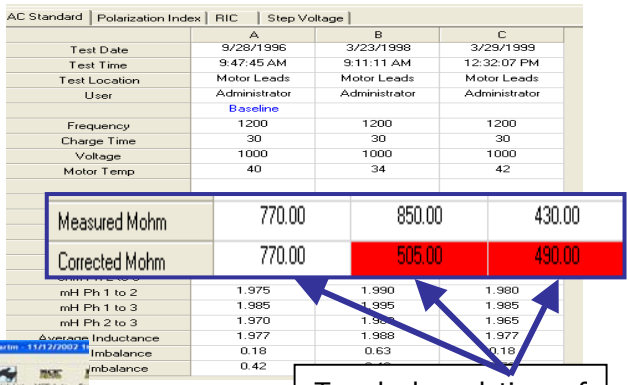


The MCEMAX powered by MCEGold™ provides a Fault Zone Report, which is a one-page summary of the test results relevant to the six fault zones. The Fault Zone Report may be reached directly through the Fault Zones icon on the toolbar.

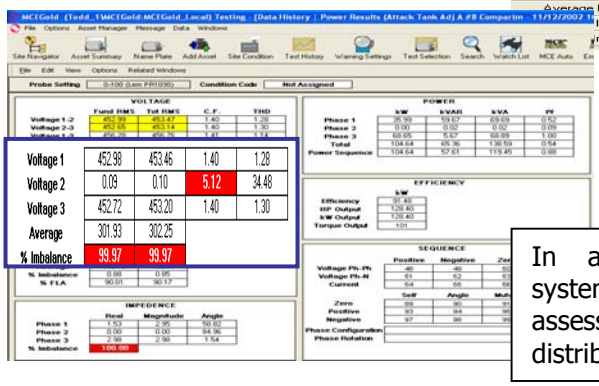
Fault Zone – **Insulation**

The Insulation fault zone refers to the condition of the insulation between the windings and ground. For electrical equipment to operate properly and safely, it is important that the flow of electricity take place along well-defined paths or circuits and that it not be leaking from one path to another. Deterioration of the insulation systems can result in an unsafe situation for personnel exposed to the leakage current

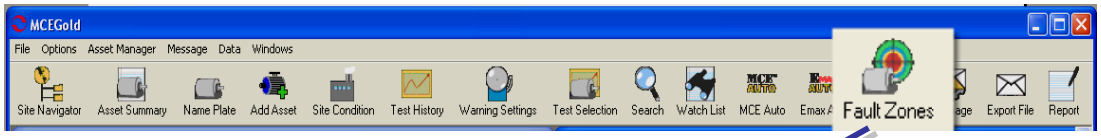
The MCE™ technology allows you to identify potential problems with the insulation by recognizing adverse trends in resistance to ground. After conducting a baseline test, all subsequent tests are compared to the initial data with significant changes in value highlighted in yellow for caution or red for alarm.

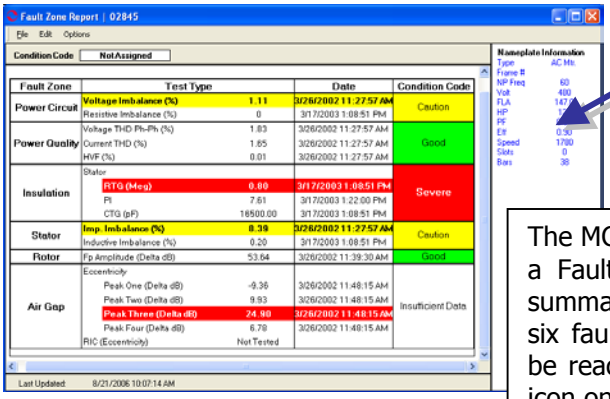


Trend degradation of insulation over time.



In an ungrounded voltage distribution system, the EMAX technology immediately assesses and displays any component on the distribution system that may be grounded.





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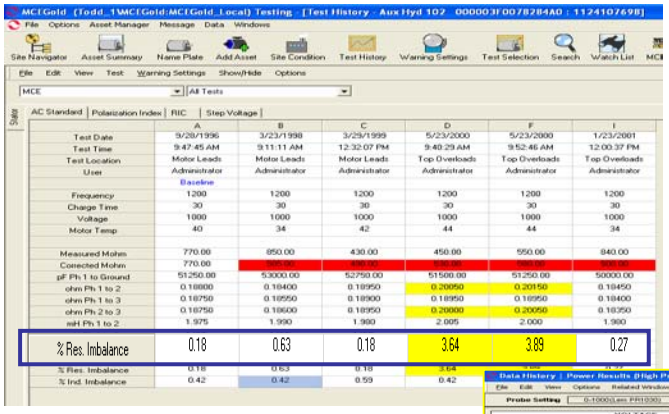
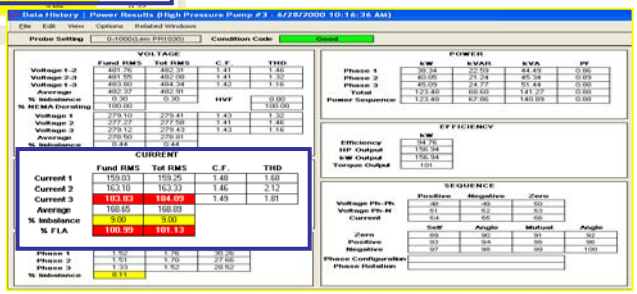
Fault Zone – **Power Circuit**

The power circuit refers to all of the conductors and connections that exist from the point at which the testing starts through to the connections at the motor. It can include circuit breakers, fuses, contactors, overloads, disconnects, and lug connections. Research on industrial power distribution systems has shown that connectors and conductors are the source of 46% of the faults reducing motor efficiency.

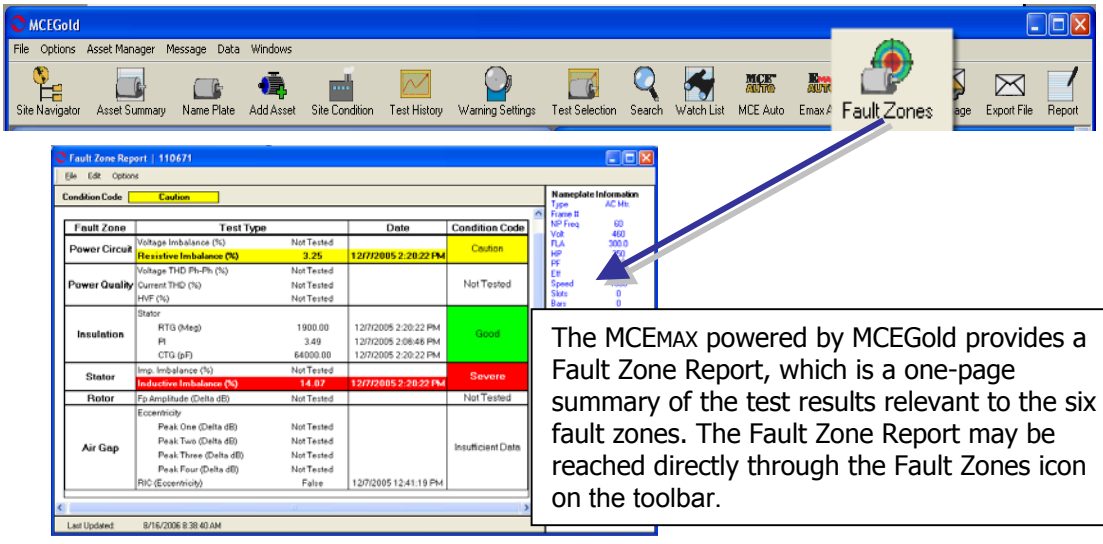
The MCEMAX powered by MCEGold™ provides a unique advantage to test the power circuit and all the associated components. Many times a motor, although initially in perfect health, is installed into a faulty power circuit. This causes problems like voltage imbalances, current imbalances, sequence currents, etc. As these problems become more severe, the horsepower rating of the motor drops, causing temperatures to increase and insulation damage to occur. It is important to evaluate the resistance and inductance of a motor circuit once a motor is installed for service. High imbalances of voltage, current, resistance, or inductance could indicate problems with the motor or power circuit. Identifying minor imbalances early will eliminate catastrophic failures and headaches later.



Trend Phase-to Phase resistance over time. If an out of tolerance condition occurs MCEGold will alert you.



All three phases of current are calculated and displayed. You are immediately alerted to any over current or imbalance condition



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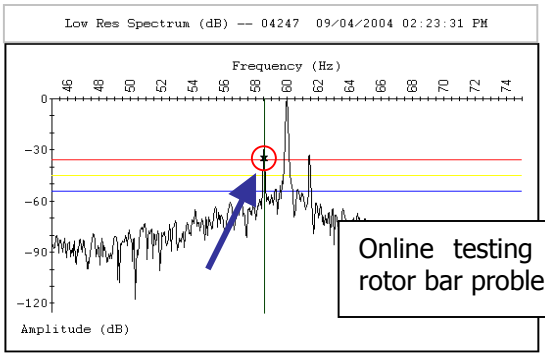
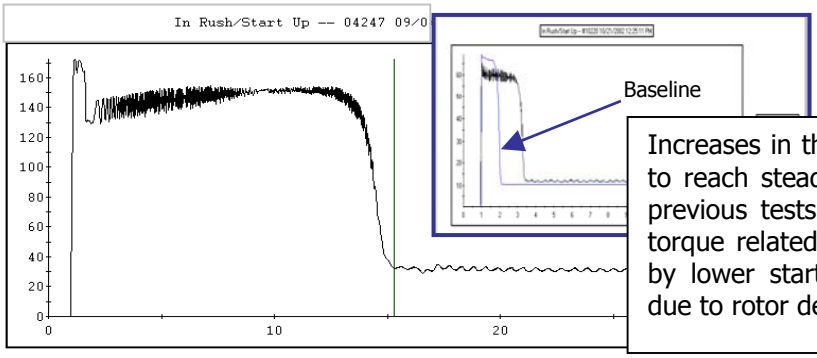
Fault Zone – **Rotor**

Rotor health refers to the integrity of the rotor bars, rotor laminations, and end rings of the squirrel cage induction motors. In a joint study by EPRI and General Electric, rotor defects were estimated to be responsible for approximately 10% of the motor failures. The rotor, although responsible for only a small percentage of the motor problems, can influence other fault zones to fail.

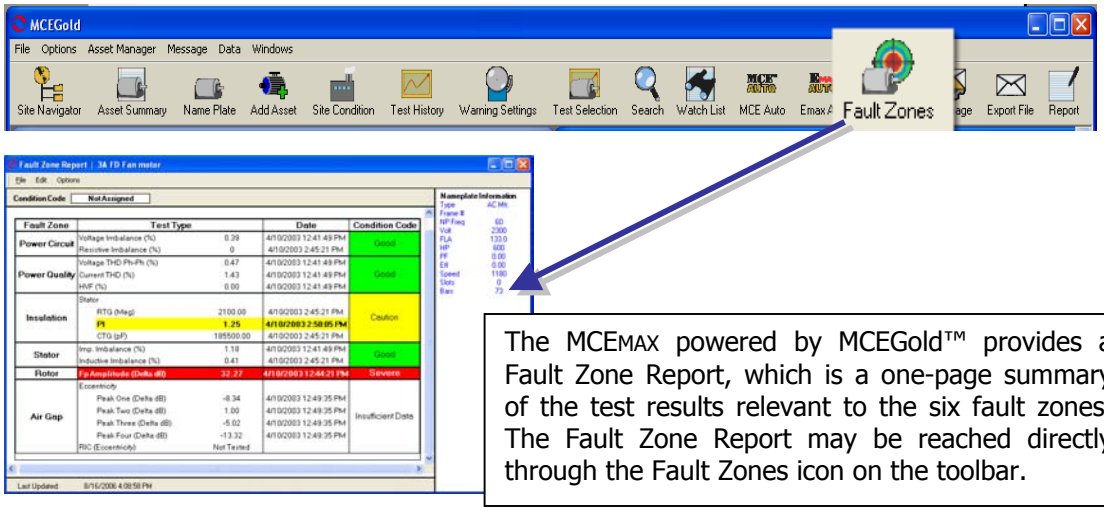
MCE™ motor circuit analysis uses inductance measurements taken from each phase of the stator windings and compares them at different rotor positions to further define the condition of the rotor. Advanced systems like EMAX provide simultaneous analysis of all three phases in its current signature analysis, which is an advantage over analyzing a single current. Using inductance measurements, current analysis, and other rotor testing technology provides the user with the ability to see very early changes in the magnetic signature of the rotor.



Online testing results indicate a severe rotor bar problem at 60% FLA.



Increases in the start-up time required to reach steady state as compared to previous tests are a result of load or torque related issues and are affected by lower start-up current and torque due to rotor defects or lower voltage.



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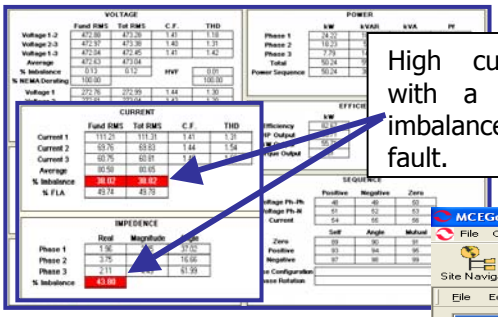
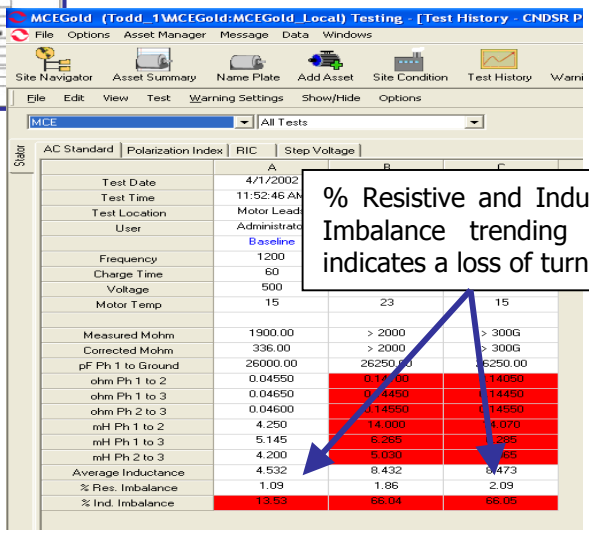
Fault Zone – **Stator**

The stator fault zone is often considered one of the most controversial fault zones due to the significant challenge of early fault detection and the prevention of motor failure surrounding the stator windings. Stator windings are the heart of the motor, producing the rotating magnetic field, induction current, and torque to turn the rotor and shaft. This challenge is further intensified in higher voltage machines, where the fault-to-failure time frame becomes much shorter. The stator fault zone is identified as the health and quality of the insulation between the turns, coils, and phases within the slots and end turns of the electric motor.

Turn-to-turn or phase-to-phase shorts can be catastrophic to the motor and not necessarily be detected by the standard megohmeter. Excessive inductive imbalance, resistive imbalance, vibration, partial discharge, or poor insulation quality can lead to stator failure and should be monitored regularly to prevent a shortened life of the electric motor stator. Stator analysis using EMAX technology is performed by evaluating the phase relationship of voltage and current for each of the three phases of an AC induction motor.

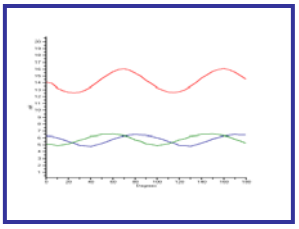


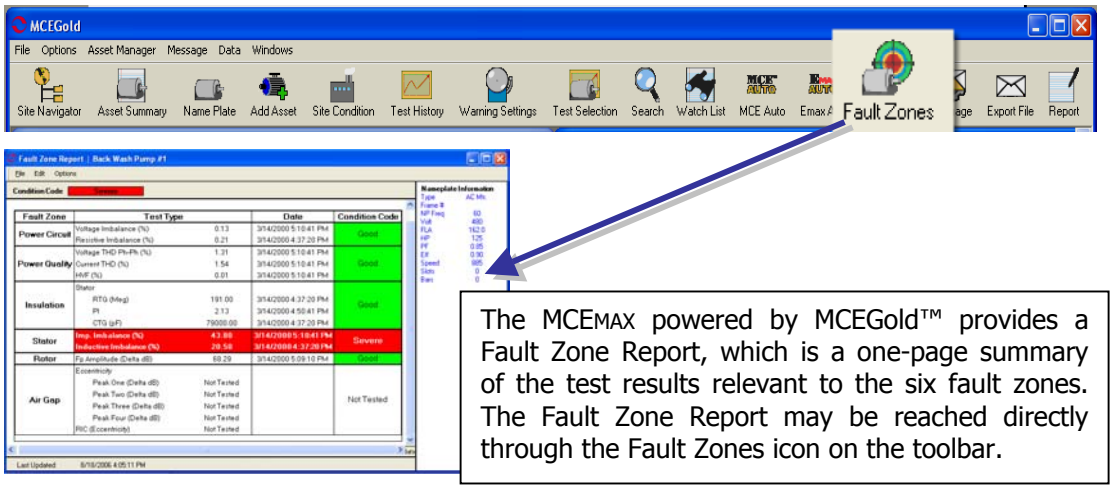
High current imbalance with a high impedance imbalance points to stator fault.



% Resistive and Inductance Imbalance trending higher indicates a loss of turns.

What the RIC will look like.





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