



Powerful Motor Management

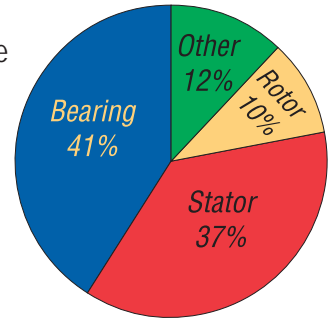


revolutionizing electrical reliability

www.pdma.com

How Do Motors Fail?

Often electrical defects are the root cause, even when mechanical failure is the apparent cause. A study by the Electrical Power Research Institute (EPRI)* identified that a major source of motor failures were electrical.



Your Solution:



Complete your electrical motor maintenance program with the addition of the **MCEMAX™** — the single most powerful component in your “toolbox.” MCEMAX provides more information in **three minutes** than any other predictive technology. Use it for:

Quality Assurance

Pre-qualify motors upon receipt and/or evaluate quality after costly repairs.



Test Date	06/03/2002	06/03/2002	06/03/2002
Test Time	10:01:58 AM	03:47:57 PM	04:16:53 PM
Frequency	1200	1200	1200
Mohm Ph 1 to Gnd			
Charge Time	60	60	60
Voltage	1000	1000	1000
Motor Temp	30	30	30
Measured Mohm	3900.0	163.9	157.5
Corrected Mohm	2000.0	82.0	78.8
pF Ph 1 to Gnd	31500	45250	44750
ohm Ph 1 to 2	0.02800	0.05700	0.05650
ohm Ph 1 to 3	0.02800	0.05400	0.05350
ohm Ph 2 to 3	0.02800	0.05550	0.05550
mH Ph 1 to 2	2.395	2.425	2.170
mH Ph 1 to 3	2.340	2.390	2.325
mH Ph 2 to 3	2.390	2.415	2.350
Avg. Inductance	2.375	2.410	2.262
% Res. Imbalance	0.00	2.70	3.02
% Ind. Imbalance	1.47	0.83	4.89
\$ Power Loss	0.00	84.14	84.14
Test Location	Motor Leads	Motor Leads	Motor Leads
MCE #	030489HV	030489HV	030489HV
User			
Notes	No	No	No

Trending

Easy to use software stores your motor data and immediately alerts you if there is an alarming condition.

Diagnostics/Troubleshooting

Analyze data, define problems and isolate the root cause of each potential motor failure.

VOLTAGE				POWER			
Phase	RMS	THD	CF	THD	W	kVAR	W/F
Voltage 1-2	440.81	1.44	1.45	1.47	4.95	4.07	8.36
Voltage 2-3	450.25	1.46	1.46	1.46	5.22	2.94	5.99
Voltage 1-3	462.70	1.45	1.45	1.54	6.46	4.93	7.87
Average	451.26	1.45	1.45	1.51	5.56	4.33	7.67
% Imbalance	0.51	0.51	HVF	0.01	18.99	11.15	20.01
NEMA Derating	92.31	NEMA	Derating	100.00	18.99	11.15	18.99

CURRENT				SEQUENCE DATA			
Phase	RMS	THD	CF	Phase	Positive	Negative	Zero
Current 1	24.04	1.80	1.80	238	491.20	12.65	0.00
Current 2	23.97	1.80	1.80	238	200.50	7.30	4.75
Current 3	28.78	1.80	1.80	238	25.50	3.38	1.15
Average	25.60	1.80	1.80	238			
% Imbalance	12.62	12.62					
% FLA	110.38	180.83					

EFFICIENCY			
Efficiency	W/F Output	W/F Input	W/F Loss
83.12	13.69	16.35	2.66
13.79			

IMBALANCE			
Phase	Real	Imaginary	Angle
Phase 1	19.92	11.04	29.66
Phase 2	9.08	10.42	29.43
Phase 3	7.80	0.26	22.62
% Imbalance	3.77		

* 1985 EPRI/ GE Study



Immediate **COLOR CODED** Evaluation

The screenshot displays the PdMA software interface. The top menu includes Setup, View, Utility, and About. The toolbar contains icons for Add, Delete, Copy, Test, Data, Reports, Find Motor, Create File, Battery Check, and Nameplate. The main window is divided into three sections: Motor List, Last Test Dates, and Motor Information.

Motor List: Shows a tree view with MCE, Motor 1, Motor 2, and Motor 3.

Last Test Dates: Displays test results for MCE Stator and Emax.

Category	Test Name	Date	Time
MCE Stator	AC Standard	06/03/02	04:16 PM
	PI	06/03/02	10:16 AM
	RIC	06/05/02	01:25 PM
Emax	Hi Res	06/03/02	02:41 PM
	Low Res	06/03/02	02:41 PM
	Eccentricity	06/03/02	02:42 PM
	In-Rush/Startup	06/03/02	02:42 PM
	Power	06/03/02	02:37 PM

Motor Information: Motor Name: Motor 1, Asset ID: [blank], Circuit: [blank], Motor Type: AC Induction, Manufacturer: LOUIS ALLIS, Horsepower: 150, Volts: 480, Full Load Amps: 162.5, Speed/RPM: 1788.

Notes: A table with columns Date and Subject. Entry: 8/1/02 9:51:33 AM, Condition Code Change.

Fault Zone Dialog: A modal dialog box showing the following fault zones and their status:

Fault Zone	Status
Power Circuit	ALARM
Power Quality	ALARM
Insulation	ALARM
Stator	ALARM
Rotor	GOOD
Air Gap	CAUTION

For every motor you test, our expert software immediately evaluates the data and color codes the condition of each motor fault zone.



Revolutionizing Electrical Reliability

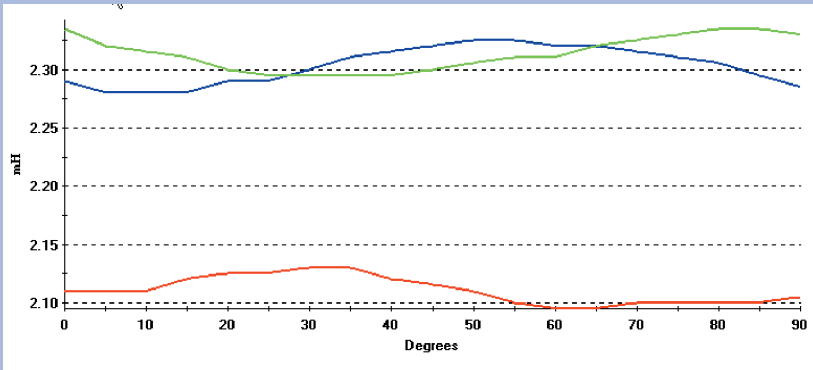
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FAX: (714) 523-3494

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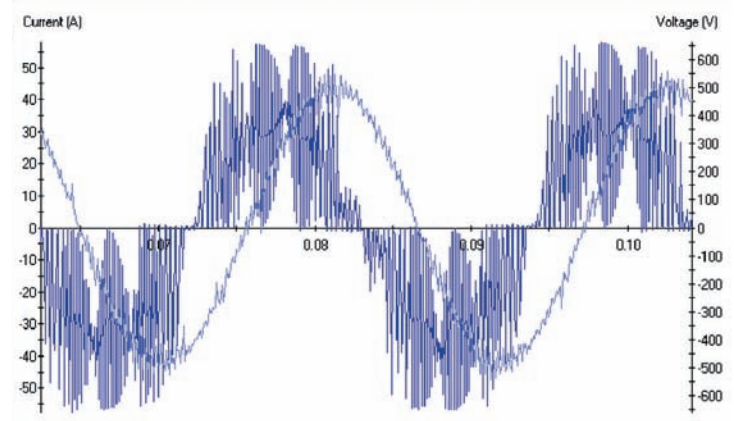
Easily Evaluate All Six Fault Zones with MCEMAX...

Stator



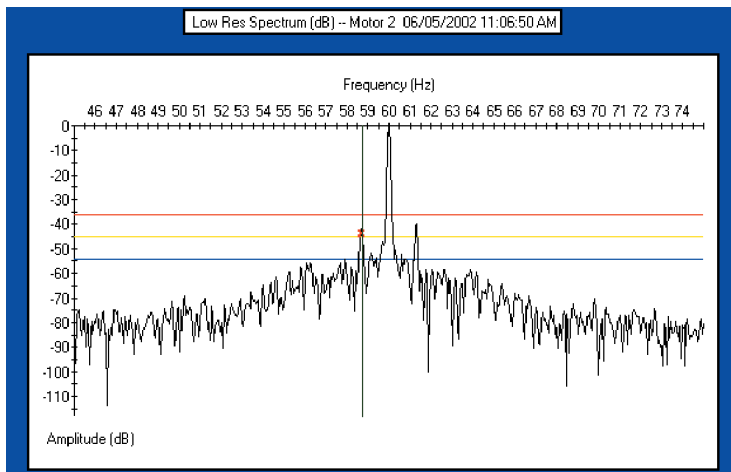
Phase-to-phase resistance, inductance, impedance and current imbalances are used to determine turn or phase shorts as well as faulty internal connections.

Power Quality



The power being fed to your motor is in reality the food it needs to operate efficiently. MCEMAX monitors three phases of voltage and current and will alert you when an unhealthy condition exists.

Rotor



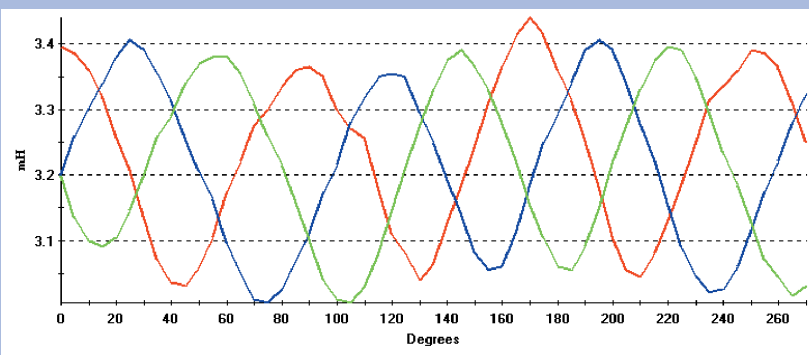
Identify cracked/broken rotor bars, porosity and high resistance connections in the end rings thru motor current signature analysis (MCSA) and the rotor influence check (RIC).

Power Circuit

Test Date	06/03/2002	06/03/2002	06/03/2002
Test Time	10:01:58 AM	03:47:57 PM	04:16:53 PM
Baseline			
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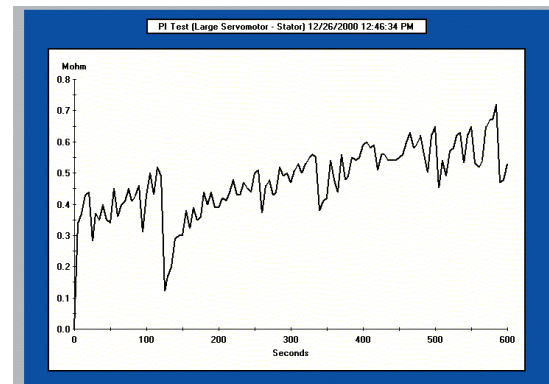
All connections, components and cables between the MCC and the motor must be resistively balanced. Potential problems occur when you introduce loose or corroded connections into the circuit. The MCEMAX compares each phase of resistance, current and voltage to ensure a perfect balance.

Air Gap



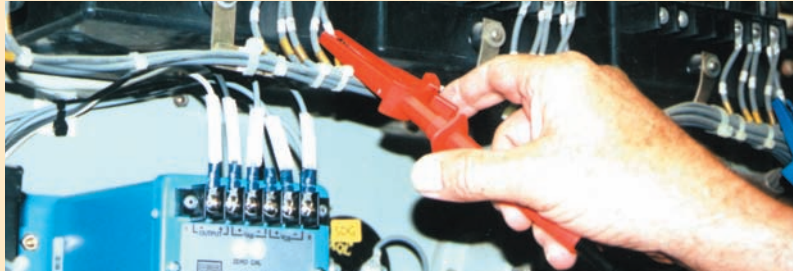
Bowed shafts, cocked end rings or degraded journal bearings create magnetic imbalances. These magnetic imbalances show up as 1st and 3rd sidebands around eccentricity frequency or as a "bow tie" shape on the RIC.

Insulation



Resistance-to-ground values for motor windings decrease as moisture and contamination increases. The MCEMAX not only provides testing capabilities up to 5000VDC** but also offers continuous graphing polarization index (PI) and computer automated step voltage tests.

**obtained with the 5kv Module



Your Benefits:

Comprehensive

MCEMAX tests all potential fault zones: stator, rotor, air gap, power quality, power circuit and insulation.

Correlative

MCEMAX correlates both online and offline data to confirm troubleshooting efforts.

Versatile

MCEMAX tests AC induction, synchronous, wound rotor, DC, specialty motors, generators and transformers.

Unparalleled Support

Free expert technical support for the life of the unit.

Frequently Asked Questions

How long does it take for the MCEMAX to pay for itself?

Based on a recent customer survey the average length of time for the MCEMAX to fully pay for itself is 5 months. There have been no reports of ROI taking longer than one year.

Are you compliant to IEEE 43-2000 standards?

Yes. When testing motor windings rated between 2501-5000 volts you should use 1000-2500 volts. With our 5kv Module, the MCEMAX is capable of providing up to 5000 volts DC for Resistance-to-Ground, Dielectric Absorption, Step Voltage or Polarization Index testing.

Do you test VFD motors?

Yes. MCEMAX is not only the most comprehensive tool on the market to test VFD motors, it also can test transformers, generators, synchronous motors, DC motors, wound rotor motors and more.

Rely on MCEMAX for the single best motor tester.

Task	MCEMAX	MCSA	Hi-Pot	Surge	Infrared	Megger
Tests stator windings	✓			○		
Tests squirrel cage rotor	✓	○				
Tests power circuit	✓				○	
Tests power quality	✓	○				
Tests armature and synchronous rotor	✓			○		
Tests insulation system	✓		○	○		○
Identifies air gap eccentricity	✓	○				
Provides statistical analysis	✓					
Provides quality assurance	✓		○	○		○
Allows for troubleshooting	✓	○	○	○	○	○
Ability for trending	✓	○				○
Powered by battery	✓	○			○	○

Clearly, the MCEMAX is the most comprehensive motor tester available.

Call for more information, references or a demonstration to see how the MCEMAX can be the cornerstone of your motor management program. Join these industry leaders in more accurately isolating motor problems and reducing downtime.

Aerospace:	The Boeing Company, NASA
Aluminum/Steel:	ALCOA, Dofasco, Nucor Steel, USS-Posco
Electric Utility:	Southern Company, Ameren-UE, Reliant Energy, Entergy Operations
Food Processing:	Kal Kan, Cargill, General Mills
Manufacturing:	Eastman Kodak, Intel, Saturn, General Motors Corp., Ford Motor Co.
Motor Repair/Service:	Magnetech Industrial Services, Reliance Electric, Smith Services
Petrochemical:	Conoco, Chevron Products Co., Pemex, DynaMCDermott, Syncrude Canada
Pulp and Paper:	International Paper, Boise Paper Solutions, Smurfit-Stone Container Corp., Georgia-Pacific Corporation
Water/Waste Water:	Miami Dade Water & Sewer, City of Dallas, Northeast Ohio Regional Sewer District



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