

## Case Study 1: ALL-TEST Pro 5 and ALL-TEST Pro OL

Condition: 1250 HP, 690 Vac, Variable Frequency motor random testing with the ALL-TEST Pro 5 dynamic test identified a rotor related problem.

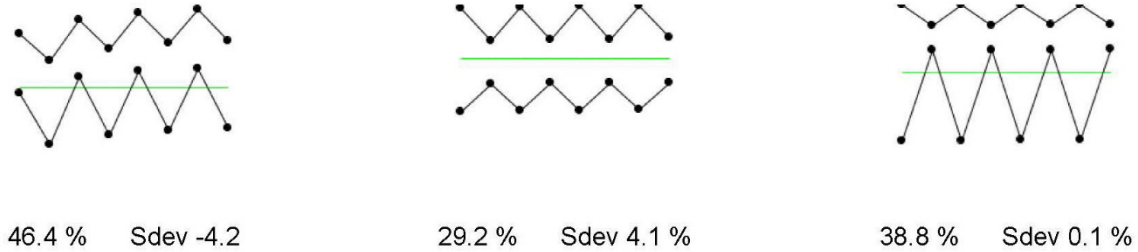


Figure 1: Rotor Inductance in relation to stator Inductance to detect rotor problems

During a MotorDoc LLC Electrical Motor Diagnostics class a 1250 horsepower, 690 Volt motor was randomly tested with the ALL-TEST Pro 5 using the ALL-TEST Pro 33 methodology (see ALL-TEST Pro 5 vs ALL-TEST Pro 33 video at <http://www.motordoc.com>) and in less than a minute the students and instruments had identified that there was a problem with the rotor bars. The following day the motor was connected to a Variable Frequency Drive and brought up to 515 Vac to allow a little slip with the motor unloaded.

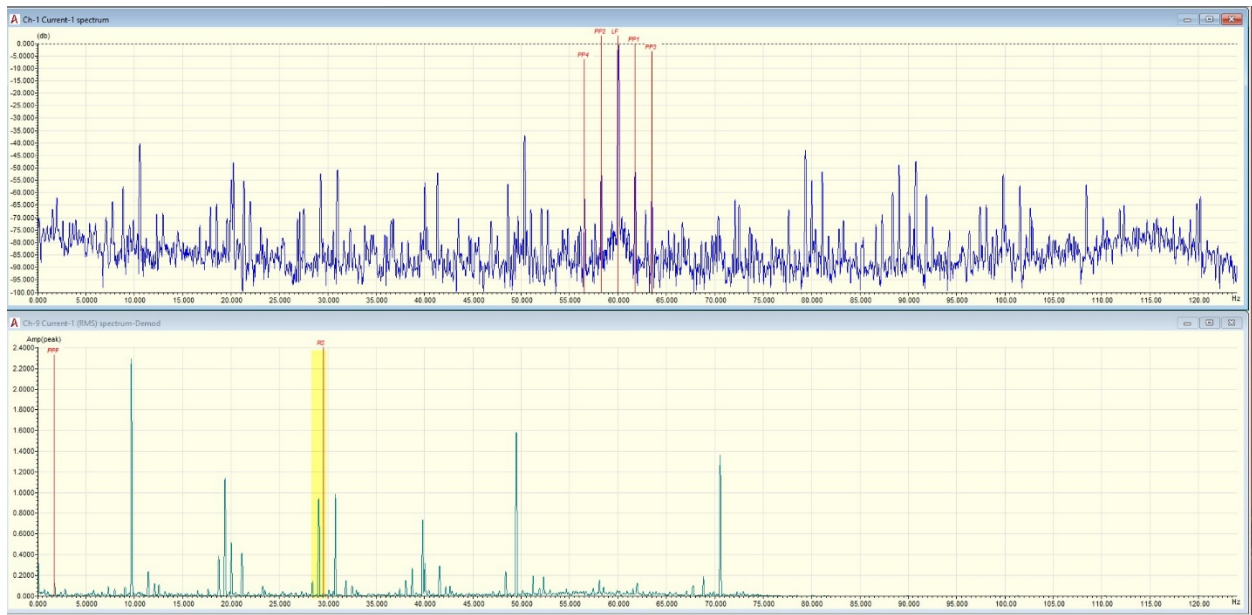


Figure 2: Electrical Signature Analysis indicating rotor problems.



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Electrical Signature Analysis using the ALL-TEST Pro OL instrument was performed and sidebands of pole pass frequency were found around the line frequency (Figure 2). This is a clear indicator of problems with the rotor which is aluminum and of new manufacture. This would indicate that there are severe casting voids that may cause some level of electrical vibration or operating torque issues.



Figure 3: Rotor from 1250 hp Motor

Figure 4 represents the types of casting voids that appear in aluminum cast rotors.



Figure 4: A section of a different cast rotor of similar size

The combination of the ALL-TEST Pro 5 Motor Circuit Analyzer and ALL-TEST Pro OL Electrical Signature Analyzer can detect rotor related issues in motors of virtually any size including being sensitive enough to detect casting voids in cast aluminum rotor motors. Limited experience is required as the personnel who identified the problem using the ALL-TEST Pro 5 were using the instrument for the first time. The motor was randomly selected to provide an example of a 'good motor' as it was brand new.

Contact MotorDoc LLC for more information on how to obtain your ALL-TEST Pro instruments!



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# Individual Analysis - MotorDoc LLC

**Equipment:** Demo\_Motor      **Type:** 3PhaseAC      **TI:** 1

Name: Random      **Connection:** Empty

Manufacturer:      Motor Type:

Model:

Serial No:

Size HP:      Amps:      Ins. Class:

Size KW:      Volt:      Enclosure:

Efficiency:      Power Fact:      Frame:

Temp Rise:

RPM:      kVA Code:

**20150810-09:33:47**

		32	21	13	
Resistance (Ohm)	<b>BAD</b>	0.006	0.006	0.006	<b>5.48</b>
Impedance (Ohm)					NA
Inductance (mH)					NA
Phase Angle (°)					NA
I/F (%)					NA
Stator	BAD - CC				
Rotor	<b>BAD</b>				
Insulation (MOhm)	OK	>999			Test Value 3.53
					Ref Value 3.53
					0.00%
Contamination (%)	NA				Frequency
Capacitance (nF)	84.5				

**Findings:** Check for loose connections.  
 Stator winding issue found. Repeat the test to confirm it.  
 Concentric Windings  
 Rotor issue found. Repeat the test to confirm it.

Recommend check at motor if tested from MCC.  
 Insulation Test Voltage: 500V

**Notes:**

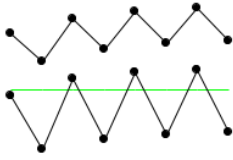
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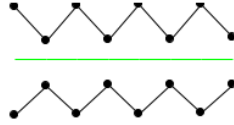
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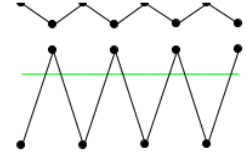
# Individual Analysis - MotorDoc LLC



46.4 % Sdev -4.2



29.2 % Sdev 4.1 %



38.8 % Sdev 0.1 %