CS9604

CASE STUDY—POWER CIRCUIT

Fault Isolated to Control Circuit

Industry:	**Aerospace**	**Fault Zone:**	**Power Circuit**
Motor Type:	**Induction**	**Voltage:**	**4160**
HP:	**1750**	**Speed:**	**1200 rpm**

Summary

Defective surge capacitor cable identified as root cause of overheating.

Problem

This motor was running hotter then expected and exhibited excessive vibration. A similar motor, Chiller #2, was tested at the same time and provided "normal" readings for comparison. The Space Shuttle was scheduled for an immediate launch, limiting the test window. Therefore, the initial readings were taken with the power factor and surge capacitors still in the circuit.

Looking for the Root Cause:

As expected, the wye-connected ground configuration of the motors produced a low resistance to ground and a high capacitance to ground reading (see table). However, the 16% inductive imbalance on Chiller #1 was much higher, than the .52% imbalance found on Chiller #2.

	Chiller #1		Chiller #2	
	Tested with Caps	Tested w/o Caps	Tested with Caps	Tested w/o Caps
Balance of Resistance	1.74%	.5%	2.164%	2%
Balance of Inductance	16.00%	2.56%	.52%	.5%
Capacitance to Ground	999999pF	38750 pF	99999 pF	37250 pF
Resistance to Ground	0 Mohms	>2000 Mohms	0 Mohms	>2000 Mohms

During the final tests the capacitors and ground connection were removed. The inductive imbalance dropped from 16% to less than 3% for the Chiller #1 yet stayed the same for Chiller #2. One of the capacitors in the Chiller #1 circuit was suspected.

Solution

While inspecting the cables inside the controller, the engineer found a large hole in the insulation of the cable running from power factor capacitor #3 to the surge capacitor. The hole in the insulation was repaired.