

Critical Motor Failure within a Large Medical Equipment Manufacturer

A large medical equipment manufacturer utilizes a vast air conditioning system that must perform without failure nor malfunction. The system requires two large cooling towers that incorporate dozens of fan motors. The cooling towers have been engineered specifically for this customer and the intention was to have abundant capacity even at peak demands.

During the first 18 months of operation, over half of the motors failed. The motor manufacturer had warranted them, providing the customer with new motors without question. The continued failure of even replacement motors led the manufacturer to become concerned regarding their installation and environment. Mr. Tim Thomas the of Suncoast Electric of Tampa Bay, Florida was engaged to determine the root cause of these persistent failures.

Visual inspection appeared to show no abnormalities and the environment caused no reason for concern. Tim performed dynamic testing on seven of the motors. Tests were performed on motors at various stages of operating time including some that were recently replaced and some that had operated nearly a year.

Diagnoses of the data revealed a definite trend in the life of the motors. The motors that were recent replacements were running at over 110 percent load and as they aged their ability to carry the extra load apparently diminished until failure. Some of the motors developed broken rotor bars and others had stator related failures due to the excessive heat.

ID	Amps	HP	%Load	Torque	Flags
C-1	15.4	8.3	110.6	50.2	
B-3	14.4	8.2	108.8	50.3	
D-3	15.3	7.8	103.8	47.0	
B-2	14.1	7.5	100.5	46.6	
B-7	13.5	7.5	100.5	46.2	
B-6	13.7	7.5	99.6	45.8	Rotor Bar
D-5	13.7	7.4	99.2	44.9	Rotor Bar

Table 1

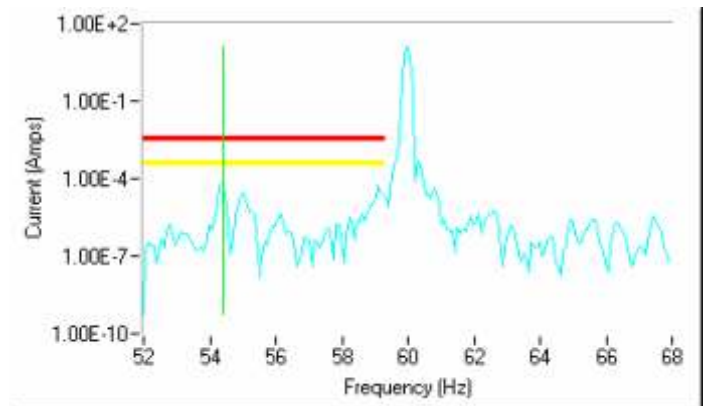


Figure 1

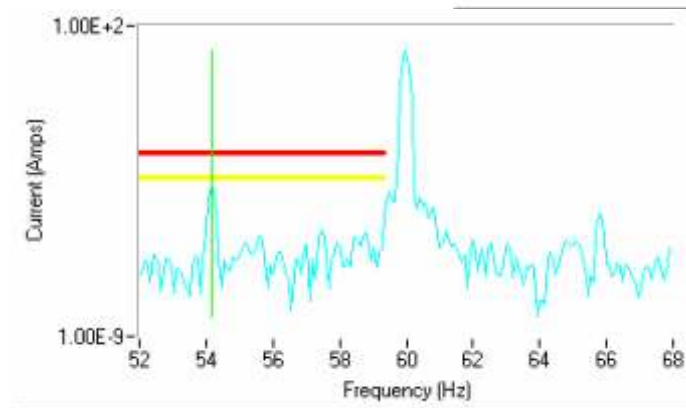


Figure 2



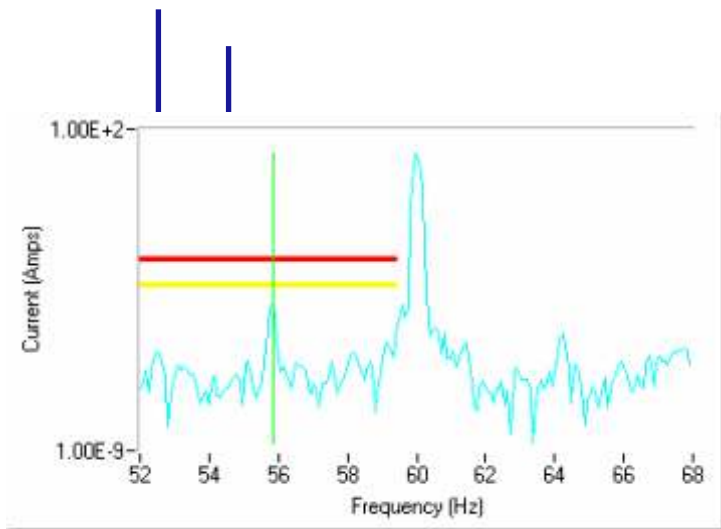


Figure 3

Figure 1 is representative of a recently installed motor and, although it shows some stress the rotor is intact. Figures 2 and 3 are typical of motors with four to eight months of operating time. Figure 4 is from motor B-6 and has started showing the results of the stress on the rotor.

As a result of the study performed by Tim Thomas, the motor manufacturer has declined any further responsibility until a redesign of the cooling tower can better define the motors operational requirements and specifications.

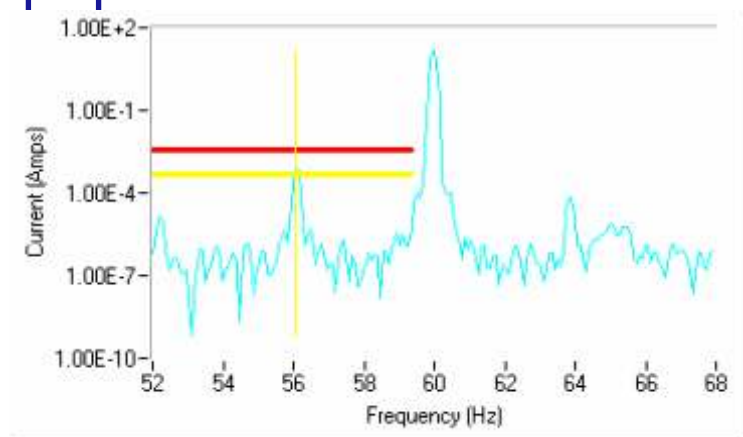


Figure 4

