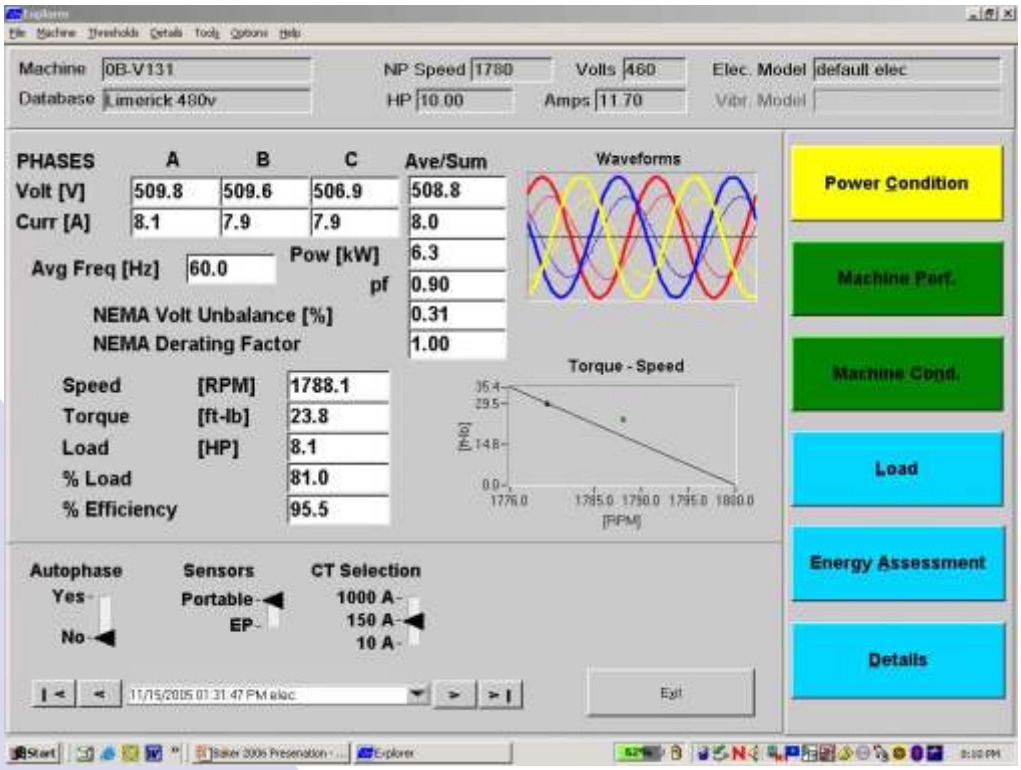
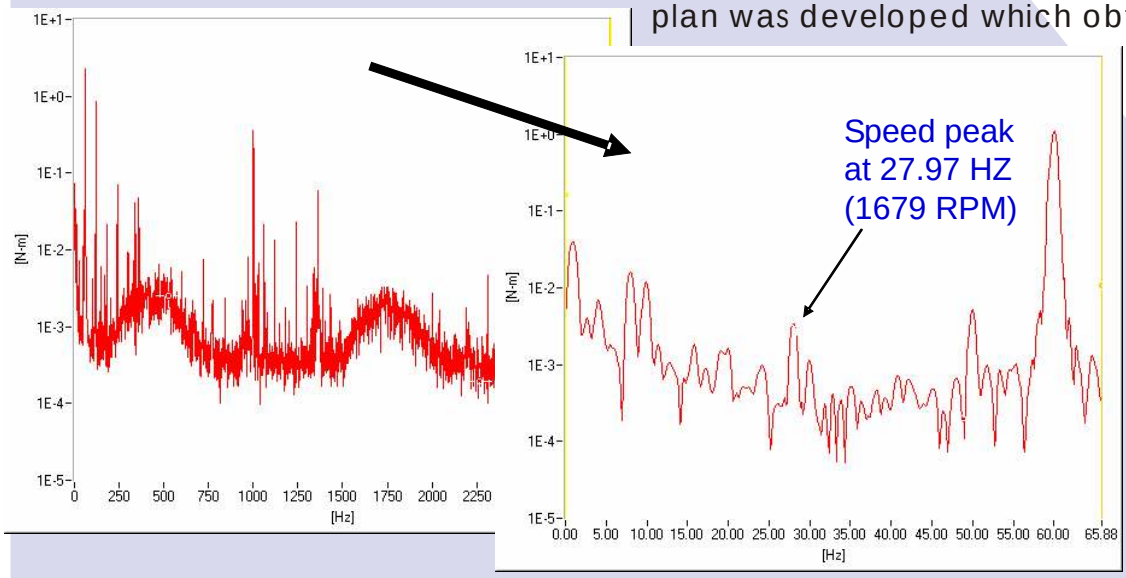
A Delta Connected Motor Wired in a Wye Connection Format

In March of 2005, a work order request was generated to investigate the Standby Gas Treatment Motor (OB-V131) due to leaking grease from the motor and a less than adequate airflow through the motor. The motor is a 10Hp, 460Vac motor operating at 1780 RPM that is attached to an overhung squirrel cage type fan. It was determined through investigation, that the internal cooling fan was degraded and that the best course of action was to replace the motor. The work order was planned and a new motor was ordered. The original motor was obsolete and engineering procured a replacement motor, which was evaluated to have the same critical characteristics (voltage, current, speed, horsepower, etc.). The motor was bench tested electrically and installed on 9/16/2005. The PMT (Post Maintenance Testing) included vibration data was satisfactory at the time of the installation.



On 11/14/2005, an equipment operator noted that grease was again leaking from the motor and the coupling and that the motor was much hotter to the touch than previously noted. The operator also noted that a burnt smell was present at the air discharge vents. A troubleshooting plan was developed which obtained data with a contact pyrometer, a thermography camera, strobe, handheld vibration and the Explorer. The data revealed vibration values below the normal levels, but higher when compared to the installed PMT data. The casing temperature was greater than 200 degree F and the speed,



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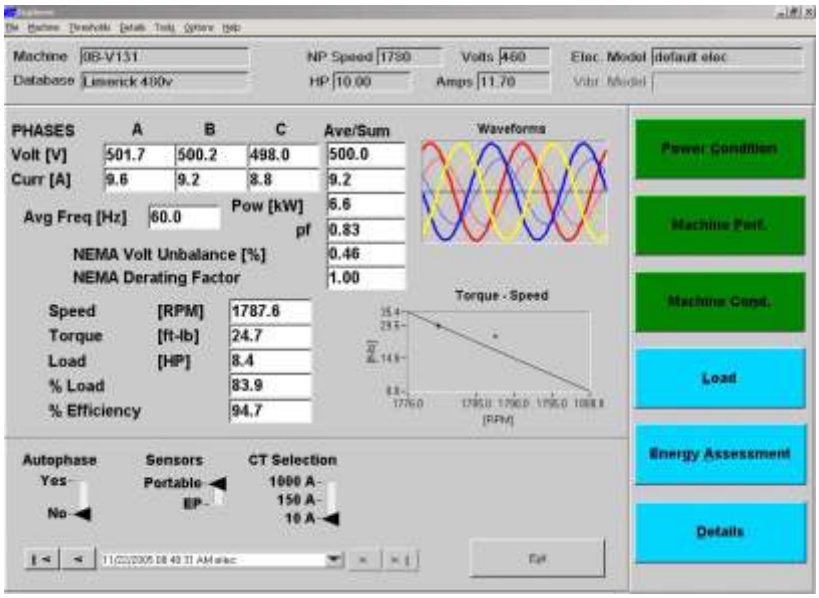
confirmed with the strobe, was 1675 rpm. The Explorer data showed that the motor was operating significantly lower than the nameplate data. Detailed analysis of all of the data suggested that an investigation was required into the design of the motor and it's application. After contacting the vendor of the replacement motor and a subsequent check of the wiring, it was determined that the new motor was a delta run motor. The motor had been connected in a wye configuration (as per the removed motor).



Compare Electrical Data

Wye Connection (Incorrect)		Delta Connection (Correct)	
Spectrum Data:		Spectrum Data:	
60 Hz	2.26 Nm	60 Hz	2.87 Nm
120 Hz	0.849 Nm	120 Hz	2.125 Nm
180 Hz	0.021 Nm	180 Hz	0.049 Nm
240 Hz	0.071 Nm	240 Hz	0.239 Nm
360 Hz	0.047 Nm	360 Hz	0.336 Nm

Notice that there are significantly higher magnitude electrical frequencies in the properly connected motor, especially those at 120, 240 and 360 Hz.

Comparison of Summary Data

Wye Connection (Incorrect)	**Delta Connection (Correct)**
Voltage 499.4 / 498.2 / 495.5 V	Voltage 501.7 / 500.2 / 498.0 V
Amps 8.2 / 8.0 / 7.9 A	Amps 9.6 / 9.2 / 8.8 A
KW 6.3	KW 6.6
KVAR 3.8	KVAR 4.5
KVA 7.0	KVA 8.0
Torque 23.7 FtLbs	Torque 24.7 FtLbs
Torque Ripple 3 – 4.5%	Torque Ripple 9 – 11%
Load 8.1 HP	Load 8.4 HP
Efficiency 95.5%	Efficiency 94.7%
Speed: 27.97 Hz (1678.6 RPM)	Speed: 29.64 Hz (1778.4 RPM)
THD V / I 0.7 %V / 0.4 %A	THD V / I 0.7 %V / 1.8 %A