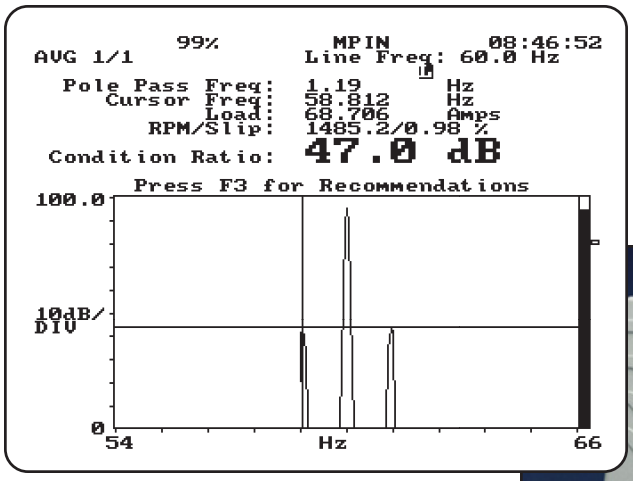
AC Motor Analysis

Motor Current Signature Analysis (MCSA) with the Microlog



Description

Motor Current Signature Analysis (MCSA) is a technique used to determine the operating condition of AC induction motors without interrupting production. SKF Condition Monitoring offers several integrated methods to assess and track the condition of critical plant induction motors.

The SKF Microlog and PRISM^4 Pro™ software give the user two options for monitoring critical induction motors. The Microlog gives immediate on site recommendations with the Motor Current Analysis Wizard™ while the PRISM^4 Pro software package can be used to both trend and expand the analysis of potential mechanical defects.

Features

- Testing can be performed on-line without production interruption.
- Combining MCSA with standard monitoring techniques such as vibration and temperature (Multi-parameter monitoring) increase decision making confidence.
- PRISM^4 Pro combines mechanical and electrical symptom evaluation with historical data to give the edge to root cause analysis.
- The Microlog Current Analysis Wizard™ provides on the spot recommendations with no historical information needed.
- Detect problems such as high resistance joints, cracked end rings, broken or cracked rotor bars and casting porosity or blow holes in die-cast rotors.
- Testing can be done on a primary circuit or safely done on low voltage secondary switch gear.

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"AC Motor Analysis – Motor Current Signature Analysis (MCSA) with the Microlog"

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Benefits

Field studies have shown that 20% of all the induction motors in use suffer from problems such as high resistance joints, cracked or broken rotor bars or air gap eccentricities. Typically, starting a motor can induce five to six times the starting current in the rotor and stator windings.

Easy to use techniques can be employed to detect and analyze critical electrical machinery to prevent catastrophic failure and loss of production. MCSA techniques can be used in coordination with vibration and thermal analysis to confirm key machinery diagnostic decisions.

For example a major chemical manufacturer was trying to determine whether to fully rebuild a spare 600 HP (448 kW) motor. Twenty-five percent of plant production was dependent upon the reliability of this machine. The motor in use was exhibiting high vibration and plant personnel were concerned.

MCSA techniques applied to the motor confirmed the presence of high resistance, typically caused by several broken rotor bars. The spare motor was quickly repaired and put back into service. Shop inspection did indeed reveal several broken bars.

If the motor had failed catastrophically the motor would have required total rebuild and plant production would have dropped to 75% of full capacity.

Theory

MCSA operates on the principle that induction motor circuits can, in essence, be viewed as a sensor. By clamping a Hall Effect Current sensor on either the primary or secondary circuit, fluctuations in motor current can be observed.

Research has shown that when high resistance exists (for example due to broken rotor bars) harmonic fluxes are produced in the air gap. These fluxes induce current components in the stator winding that cause modulation of the supply current at ± the number of motor poles times slip.

Advanced signal processing techniques in the Microlog extract the modulating frequency and clearly represent the amplitude relationship of modulating frequency to line frequency.

Knowing this relationship allows one to estimate the presence and severity of the defect.

SKF Solution

SKF Condition Monitoring offers two complementary approaches to detecting and analyzing defects in AC induction motors. For quick on-site detection and analysis the Microlog's Motor Current Analysis Wizard™ is ideal. To expand the capability to include historical information and general machinery diagnostics use the Microlog with PRISM⁴ Pro and PRISM⁴ for Windows™.

SKF Hardware/Software Offerings

CMVA 60 Microlog Data Collector/ Analyzer System

CMSS 6187-CE (Primary) Current Clamp Probe (rated to 60 and 600 amps/600 volts, sensitivity: 10 mV/EU or 1 mV/EU)

CMSS 6187-1-CE (Secondary) Current Probe (rated to 20 and 200 amps/600 DC or 480 AC volts, sensitivity: 100 mV/EU or 10 mV/EU)

CMS 100 PRISM⁴ for Windows

CMS 101 PRISM⁴ Pro

– OR –

CMS 300 PRISM⁴ Pro and PRISM⁴ for Windows

Training and Support

SKF offers a comprehensive range of customer support courses to assist you in implementing and realizing full benefit from your predictive maintenance program. Courses to support the detection and analysis of AC motor problems are:

CMS 100TC Microlog and PRISM⁴ for Windows

CMS 101TC PRISM⁴ Pro

CM 303 Vibration Analysis III