SKF Dynamic Motor Analyzer – EXP4000

Integrated testing capabilities

The SKF Dynamic Motor Analyzer – EXP4000 integrates a wide range of monitoring capabilities which meet high quality standards. Designed for in-service monitoring of power circuit issues, overall motor health, load, and performance, it gives the user a comprehensive look at overall motor integrity. This instrument was designed for remote monitoring from the Motor Control Center (MCC) or through the EP1000 connection. It is a non-hazardous, low voltage, battery operated unit, which makes it highly portable and durable for use in tight and rugged locations.

Continuous innovation

Continual design breakthroughs demonstrate our ongoing commitment to quality, reliability, and competitive advantage. This instrument provides data on degradation of motor performance and the effects of overheating on motor operation. Survey plant wide efficiency, determine load mismatches, oscillating load and transient peak energy. Results are immediate, showing operating efficiencies, thereby allowing the user to determine the true cost of wasted energy.

Comprehensive analysis

The SKF Dynamic Motor Analyzer – EXP4000 performs seven major functions to enhance a P/PM program. Within these functions evaluate the incoming power, motor and load utilizing a system wide approach to predictive maintenance, troubleshooting and quality assurance. This motor analyzer offers a wide variety of capabilities for the maintenance professional to understand the condition of the rotating system. It is programmed to supply information on

voltage level, voltage balance, harmonic and total distortion, rotor cage condition, motor efficiency, effective service factor, overcurrent, operating condition, torque ripple, load history among others. This wide range of tests allows exploration of the true condition of motor integrity and conditions related to motor performance.

Advanced data collection and organization

Once testing is completed, results can be saved and stored for each motor. This type of documentation is critical for any maintenance program. It allows the recalling of information for true trending capabilities. Test results are managed using standard MS Access relational database file formats. Reports can be quickly generated through the main print console, allowing operators visual confirmation of motor integrity.

The software and data transfer package enables the creation of multiple databases to organize collected data to specifications set by users. This eases communication channels by handling data in a manner that is useful, complete and accessible.

Test domains

Power quality
This domain identifies non-optimal power quality problems, which cause additional motor stress. Flag frequent problems with voltage level, voltage unbalance, harmonic distortion, total distortion, power and

harmonics tests. These issues identify improper tap settings on supply transformers, poorly distributed single phase loads, overloading (saturating) supply transformers, excessive VFDs on low voltage busses, excessing non-harmonic frequencies on a VFD, missing line inductors on VFD applications, missing or open power factor correction capacitors along with high resistance connections.

Machine performance
Conclusively evaluate the operation of the motor, identifying stressful operation and its source with this domain. It looks at Effective Service Factor, Load, Operation Condition, Efficiency, and calculates Payback Period. Commonly found problems include: thermal overloading of the motor, machine deterioration recognition among other items that are directly related to the motors health and the energy wasted with inefficiencies.

Current
Currrent level and current unbalance are utilized to determine overall electrical machine health. These parameters are used to determine the following issues overloading, connection issues, miss connections, iron saturation and improperly wound motors.

Spectrum
This domain has the rotor bar test along with V/I spectrum, Demodulated Spectrum, and Harmonics. It shows current and voltage relationships with regards to frequency. Electrically it will find saturation problems, broken rotor
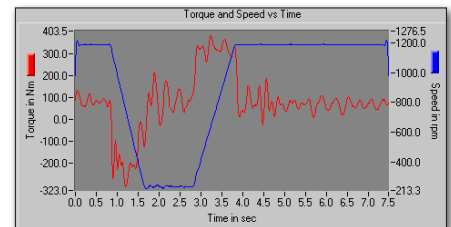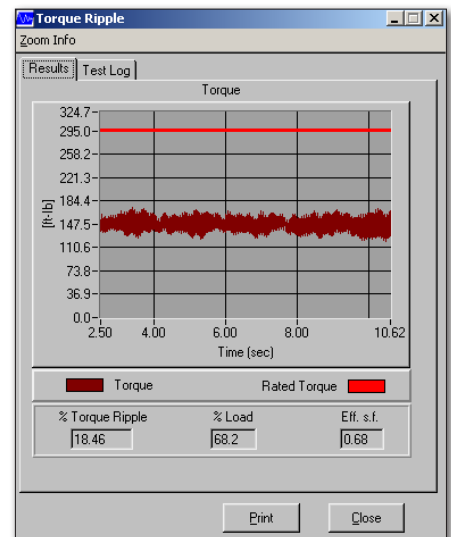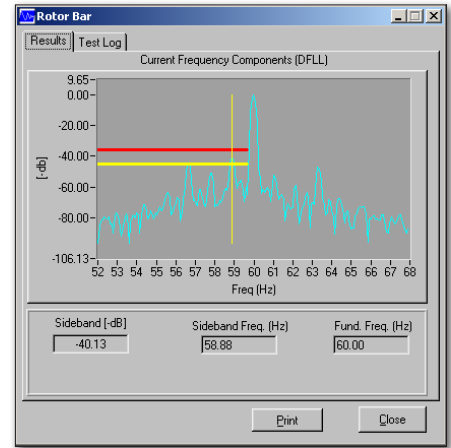
bars, excessive VFD drives on low voltage busses and mechanical problems.

Torque (Optional)

The torque domain is a substantial break-through by Baker Instrument Company, an SKF Group Company. Torque Ripple and Torque Spectrum enable the user to find numerous problems quickly and accurately. It specializes in diagnosing mechanical issues, shows transient overloading, finds mechanical imbalances along with bearing problems, and cavitation, among others.

Connections

This portion of the SKF Dynamic Motor Analyzer - EXP4000 software offers additional tools including phasor diagrams, three currents and voltages, instantane-ous voltage, and symmetrical components. This data provides the operator with valu-able power data as well as a way to make sure the EXP4000 is correctly connected.

VFD monitoring (Optional)

Along with any three phase induction motor and generator, the SKF Dynamic Motor Analyzer - EXP4000 will monitor the activities of VFD applications and AC servo motors using the VFD4000 software module. These types of drives have always created problems for maintenance professionals and for the first time comprehensive diagnosis of motor problems are facilitated even under the most demanding VFD operation.

Continuous monitoring (Optional)

The continuous monitoring software (CM4000) enables the user to monitor 41 data points real time. This real time and continuous data gathering capability will give immediate impact in finding intermittent problems with motors such as electrical tripping. This user customized software enables the operator to collect real time data on whatever is deemed the
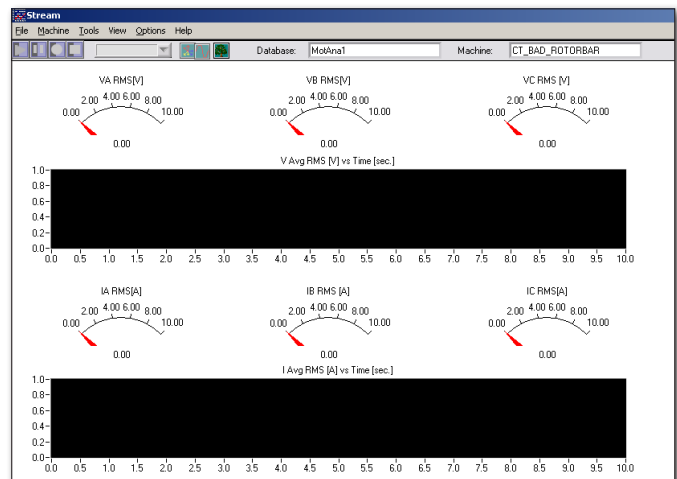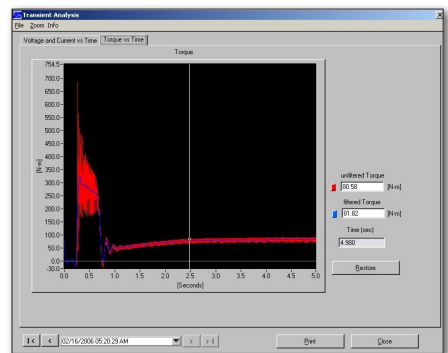
most important to their operation. This software will also act as a power analyzer to determine actual power quality.
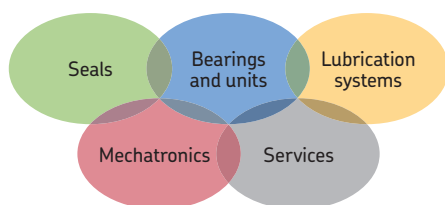
Transient Analysis

The SKF Dynamic Motor Analyzer - EXP4000 also performs a start up analysis using the transient analysis tool. The traces are the rms currents and voltages of all three phases. This data can be zoomed, panned, and the cursors allow reading of levels and time within the graphs. Along with this powerful analysis capability, startup Torque versus Time can also be evaluated. These tools allow the user to visually see the amplitude of voltage, current and torque at startup, along with motor startup time. Only by monitoring all three phases of the current, voltage and torque can the maintenance professional separate between a power, motor or load issue on start up.

Efficiency

Efficiency assessment, pay-back period and Motor Master+ identify motors performing under par, and calculates the pay-back period if replaced by a new motor. The SKF Dynamic Motor Analyzer - EXP4000 exceeds the performance of other instrumentation in both accuracy of efficiency estimation and in ease of use for field environments.

Technical specifications	Benefits

- Voltage Unbalance
- Voltage THD
- Current THD
- Negative Sequence Impedance
- Speed calculation
- % Load & % Efficiency
- Spectrum Voltage
- Spectrum Current
- Current Level
- Effective Service Factor
- Power details
- Continuous acquisition
- O-Scope
- Auto Phasing
- Auto testing including timer function
- One button testing
- Bearing check
- Startup Transient Voltage
- Startup Current
- Startup Torque
- Torque Spectrum
- Torque Time Waveform
- Efficiency Estimation

- Power Quality
- Poorly performing transformers
- Connection issues
- Rotor
  - Cracked bars
  - Poor welds
  - Broken bars
  - Eccentricity
- Load Issues
  - Over load
  - Process
- Mechanical
  - Bearing faults
  - Miss alignment
  - Fan unbalances
  - Belt frequencies
  - Worn Impellars
  - Gear mesh frequencies
- VFD
  - Power quality
  - Shorted IGBT's
  - Feedback loop
  - Process information
  - Tuning/Setup
- Soft Start
  - Tuning/Setup
  - Troubleshooting
- Energy Assesment

Specifications

Input Power	110-250 VAC, 50/60 Hz integrated power supply
Maximum Rated Measurement/Testing Voltage	1,000 V AC, 500 V DC
Current Transformers (all portable)	0-10 A, 0-150 A, 1-1,000 A, 0-3,000 A
Connections – Amphenol military spec twist type	Power entry module (1) Portable voltage connection (1) Portable current connection (1) EP Port (1) Vibration sensor connection (1)
Computer specifications	40 GB – 4,200 rpm or better 512 MB - 2GB installed RAM Battery or AC power operated Software Platform: Microsoft Windows XP, Professional, Windows 7 or better USB 2.0
Weight	15 lbs
Industrial standards	NEMA MG-1 IEEE 519 EN61000-2-2 EN 61000-2-7 VDE 839-2-2 VDE 839 -2-2

The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide.

These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems.

A global presence provides SKF customers uniform quality standards and universal product availability.

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