ABB MACHsense-P
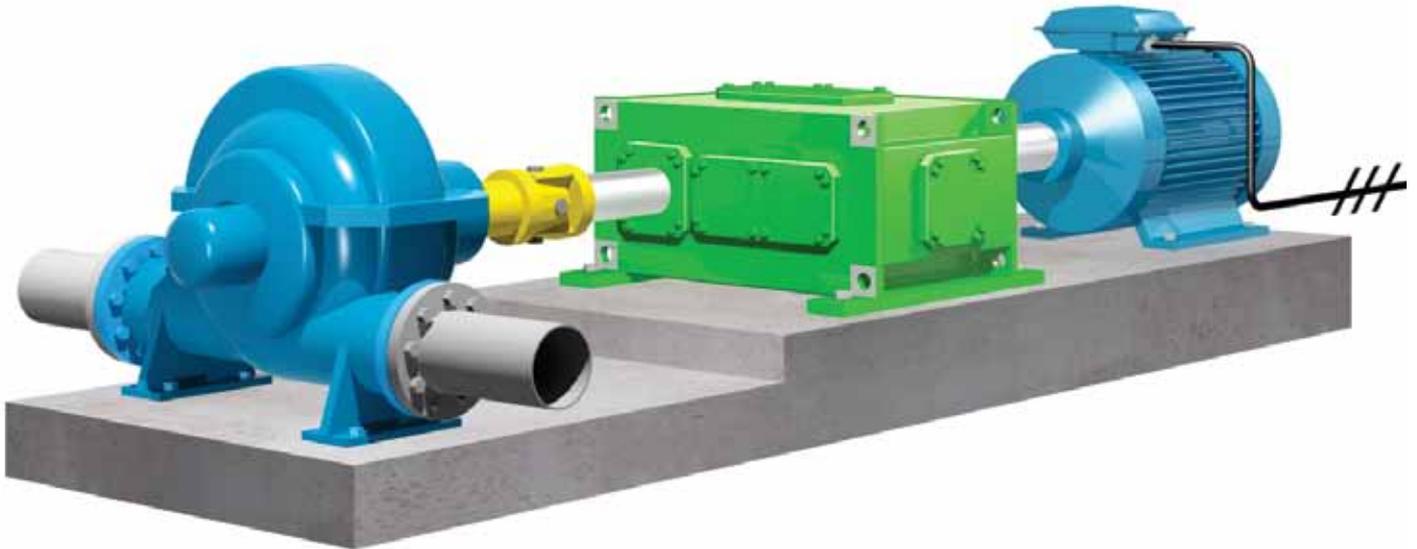# For on-line condition monitoring of the complete shaft line

ABB MACHsense-P is a condition monitoring service that addresses the reliability of the complete shaft line, including the motor, gearbox and driven load (pump, fan or compressor). It identifies electrical and mechanical issues related to the rotor, bearings, gearbox and other components – problems which account for a major percentage of total failures.

ABB MACHsense-P is a 'walk-around' condition monitoring service offered by ABB which provides reliable early warnings of defects, allowing more time for effective maintenance planning. By contrast, other systems only give a reliable warning when failure is imminent.

ABB MACHsense-P utilizes a custom developed data collector along with unique analysis tools based on in-depth research by ABB. For more effective results it takes an integrated approach, using the same hardware and software to detect, monitor and diagnose electrical and mechanical problems in the entire shaft line.

Methodology

An ABB service engineer collects a combination of electrical and vibration measurements on the entire shaft line under normal machine running conditions. The data are then analyzed and a detailed report supplied to the customer. The report interprets and analyzes the test results, identifying the defects, quantifying their severity and listing possible causes. The 'health' of each unit in the shaft line is assessed on a component-by-component basis.

Motor

ABB MACHsense-P analyzes electrical data (current and voltage), vibration, and torque in combination to derive indices that describe the severity of defects in:

– Rotor
– Bearings
– Installation
– Power quality

The analysis also takes aspects of the motor design and construction into account to calculate fault criticality values for the specific type of motor.

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Gearbox

ABB MACHsense-P service provides automated detection of the gearbox faults. This is based on ABB Group's years of experience in manufacturing and servicing gearboxes, including complicated planetary gears, and on intensive R&D at ABB research centers.

A Physics of Failure approach supported by advanced signal processing means that defects can be detected early, with improved identification of defect type and severity. ABB MACHsense-P is typically used to analyze parallel shaft (up to 4 shafts), epicyclic and worm gearboxes.

Advanced algorithms enable time synchronous averaging of vibration signals from the gearbox without the need for a speed related trigger. The range of faults picked up by the service includes:

– Gear faults –both distributed faults such as gear wear, and localized tooth faults caused by tooth pitting or cracking
– Torsional forces from load side

Probability of Fault Distribution for the Gearbox Shafts
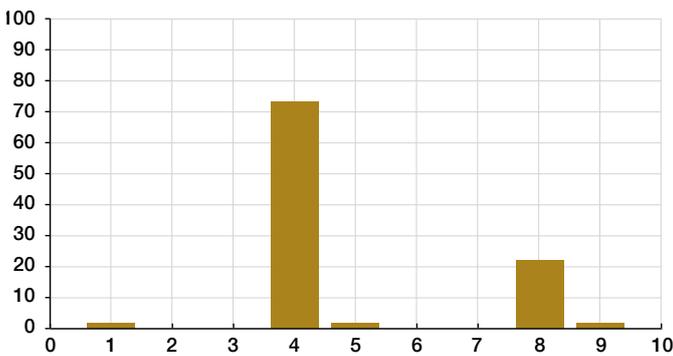
1 - Input Shaft Looseness
2 - Layshaft I Looseness
3 - Layshaft II Looseness
4 - Output Shaft Looseness
5 - Input Shaft Misalignment
6 - Layshaft I Misalignment
7 - Layshaft II Misalignment
8 - Output Misalignment
9 - Unknown

Driven load (centrifugal fans, pumps, compressors)

ABB MACHsense-P can be used to analyze driven equipment such as pumps, fans and compressors. The analysis is not impacted by changes in the load or other system conditions. Some of the typical faults that can be identified in the driven system are flow turbulence, bearing issues and other mechanical problems.

ABB MACHsense-P uses a novel method, capable of combining vibration, shaft speed measurements and electrical signals (from the motor) to identify and quantify faults in the motor, gearbox and load.

Main benefits

– Holistic approach to condition monitoring of entire shaft line including motor, gearbox and driven load.
– Multi-sensor approach (vibration, current, voltage) with integrated analysis and reporting.
– Early warnings of developing faults provide adequate time for maintenance.
– ABB Motors and Generators Service units form comprehensive support network.

For more information please contact:

www.abb.com/motors&generators

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