BEARING SPECIFIC TOPICS

Bearing Installation & Fitting
Bearing Repair
Hybrid Ceramic Ball Bearings
Linear Bearings
Plane Bearings
Seal Selection
Spherical Plain Bearings
Vibration Analysis
Wear Sleeves and Other Shaft Repair Options
Planetary Roller Screws
Bearings for the Food & Beverage Industry
Split Roller Bearing Technology
Bearing Mounting Tools

BEARING INDUSTRY INFORMATION

Bearing Standards Organizations
Brief History of Bearings
The Domestic Bearing Industry: Investing in the Future
History of Adhesives
Load Ratings & Bearing Life
Status of Bearing Load Ratings

Reduced Operating Costs Through Condition Monitoring

Condition Monitoring consists of a variety of tools to measure the changes in operating conditions of machines and their components. The use of these tools can result in improved reliability of equipment, extended product life, reduction in downtime which means increased productivity, and lower operating costs. Is an exact replacement seal desired or should an alternate seal be used? (There may be better choice for particular applications.)

Machinery components such as bearings, gears, seals, etc. have a finite life and must be changed at various intervals to keep the machine in operation. Equipment manufacturers provide a recommended overhaul period that takes into account the typical operating conditions to determine when the bearings, seals, gaskets, etc. should be replaced. This value may be conservative or optimistic depending on the operating conditions. Various factors influence the actual life achieved, such as installation procedures, lubrication and vibration levels.

Figure 1 shows a typical life curve of a group of machines. Some of the machines will have early stage failures from installation problems, material defects, etc., while the majority will have end of life failures typical of components wearing out. In this example, point A is the overhaul period specified by the manufacturer for a machine that is properly installed and maintained, and point B is for a machine that is running at higher than-rated capacity or has not been maintained properly. As can be seen from point A, there is a significant amount of life left in the machine components and overhauling the machine at this point removes components that are still in operating condition. Point B, on the other hand, is never reached, because a component failed before the scheduled overhaul period was vereached.

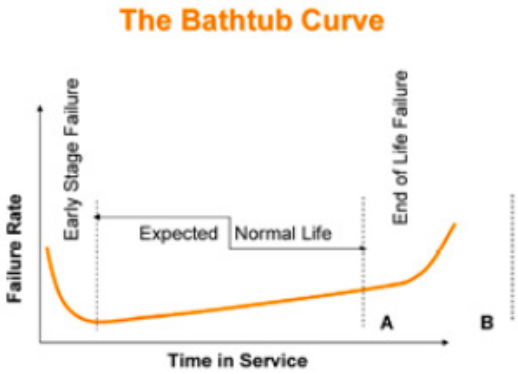

Figure 1: Bathtub curve representing a typical failure rate vs. time in service

Determining when each machine is going to have a failure is difficult without a means of monitoring the condition. Vibration Analysis is one technology used to monitor the machinery to determine the condition of each component and to trend these measurements to allow for advanced notice of potential problems.

Various strategies are employed based on how critical a piece of equipment is to the plant and how much detailed analysis is required. An entry level monitoring device such as shown in Figure 2 is mounted on a pump, motor, fan, etc. and continuously monitors the vibration of the equipment and triggers an alarm when it has exceeded the set point. This type of device requires little knowledge of vibration analysis and is easy to implement. However it does not allow for any analysis capabilities.

Figure 2: Entry level monitoring device installed on a pump

For plants wishing to have more detailed knowledge of the operational condition of the plant's equipment, a hand held data collector is used. These hand held route based data collectors are used by a vibration technician to collect data from points on the machine. If any of the points exceed the preset alarm limits, an alarm is displayed on the detector. This data is stored in the analysis software database and allows for trending of the readings as well as advanced analysis of the vibration signals.

For more critical equipment, online condition monitoring equipment is preferable. These online condition monitoring units continuously monitor the vibration as well as other process variables, to trend the condition of the equipment and assist in determining when it should be removed from service for repair. They run as a stand alone device and periodically transfer the measured data to a storage computer. Should an alarm occur, it automatically triggers an alarm to the plant control system and generates an email message. These systems are capable of automatically communicating through a variety of methods, from Ethernet though GSM modem and allow monitoring of remote locations anywhere in the world.

Figure 3: Handheld data collector shown taking a measurement

Advances in condition monitoring technology over the past several years allow plants a wide variety of methods for maintaining equipment health, from entry level monitoring devices through advanced online systems capable of remote monitoring anywhere in the world.

Typical machine or machine equipment being monitored:

Bearings	Gearboxes	Paper Machinery
Pumps	Compressors	Electric Motors
Fans	Blowers	Couplings

Industries that have successfully utilized or are currently using condition-monitoring equipment:

Pulp and Paper	Petroleum	Mining & Aggregate	Cruise Ships
Automotive	Power Generation (Wind energy)		