



Why Vibration Analysis Is So Important In Condition Based Maintenance

It is now generally accepted that to avoid costly breakdowns, Condition Based Maintenance (CBM) is a far superior approach to Planned Periodic Maintenance (PPM). Not only is PPM needlessly costly, due to the time wasted stripping down perfectly functioning machinery, it can sometimes make matters worse by introducing faults during the process of stripping down and rebuilding a perfectly healthy machine. Even more of a problem is deciding the correct PPM time intervals. Too short, means more wasted time and cost (and more potential for introducing faults) but too long means more unexpected breakdowns.

CBM, using tools such as vibration analysis, thermal imaging and oil analysis, is nowadays clearly recognised as the way to run an efficient and effective maintenance program. But why is vibration analysis so important and what does it tell us about machine condition?

Put simply, it all boils down to two measurements. One is the average (RMS) value of the low frequency vibration that tells us how well the machine is running. The other is the average value of the high frequency vibration that tells us something about the condition of the bearings.

The low frequency vibration is the typical "hum" you hear from a rotating machine due to the centrifugal force resulting from any out-of-balance in the machine. Since it is virtually impossible to exactly align a machine's centre of gravity with its centre of rotation, even a well-balanced machine will still vibrate. But what is an acceptable level? This is where the International Standards Organisation (ISO) comes to our aid. ISO produces a set of guidelines that define acceptable levels of machine vibration in the frequency range 2Hz to 1kHz (120 RPM to 60,000 RPM), the frequency range covering the vast majority of machine running speeds normally encountered.

The high frequency vibration is the typical "whine" you hear from a badly worn bearing. In practice, it is there all the time but is inaudible until the bearing becomes so bad it is probably about to fail. Fortunately, a vibration analyser can detect the inaudible bearing noise well before it gets to that point.

This means bearing wear can then be displayed, for example, in Bearing Damage Units (BDU) that very roughly can be thought of as a "percentage" of bearing wear. Modern, easily affordable vibration analysers can

capture vibration from a machine and automatically generate the ISO reading and the bearing condition. It is largely this ability that distinguishes them from simple vibration meters.

Test Products International manufactures a complete range of low-cost, high-performance vibration analysers from the £575, one-button-to-press TPI 9070, to devices that include advanced diagnostics and machine balancing. The TPI 9070 features colour coded alarm levels and zoomable on-screen vibration frequency plots together with on-meter detection of machine faults such as unbalance, misalignment, looseness and bearing wear.

The TPI 9085 from £1,995 simultaneously captures vibration data and bearing temperatures and comes complete with license-free PC based trending software that includes automatic report generation and email notification of alarms, implementing a full CBM solution. The TPI 9085 can store lists (routes) of machines (up to 1000), each with up to 10 measurement points, all with full vibration waveform and frequency spectrum (FFT) capture.

Routes and readings can be transferred to and from the TPI 9085 via the included USB docking cradle, wirelessly via Bluetooth or remotely via a Bluetooth link with a smart phone or tablet PC running the free TPI Bridge App. This allows service personnel to receive and return routes and readings, no matter where they are in the world.

For more information please contact TPI Europe's head office on +44 1293 530196 or take a look on the website at www.tpieurope.com or email sales@tpieurope.com

