

## VIBRATION MEASUREMENT AS A TOOL FOR MACHINE DIAGNOSTICS

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### Abstract

Changes in vibration levels measured on the surface of a machine are the result of changes in internal forces. These forces, and therefore vibration levels, increase when the condition of the machine deteriorates – due to unbalance, misalignment, bearing & gear tooth wear. High vibration can also arise from resonances or structural modifications such as corrosion, structure and foundation cracks, coupling resonances, etc. Checking machine vibration levels over a period of time or permanently, as is done in on-line monitoring systems, will indicate the development of fault conditions (but not the nature of the fault). This process is called Machine Condition Monitoring.

By using various diagnostic techniques, which also use vibration measurement as an indicator, the root cause of the deteriorating machine condition can be established. The Plant Engineer can therefore plan the corrective measures at a convenient time, and prepare appropriate spare parts. Diagnostic techniques are extremely effective because they use the information contained in the machine's vibration signature. The signature is obtained by frequency and time analysis of the machine vibration signal from a sensor fixed on the surface of (or inside) the machine. It enables troubleshooting of rotor dynamic problems, rotating component deterioration as well as structural problems. This process is called Machine Diagnostics.

An overview of some basic tools (FFT Analysis, FFT Order Analysis, Order Tracking Analysis, Envelope Analysis, Cepstrum Analysis ) for Machine Diagnostics, contained in the multi-analyzer PULSE and addressed to vibration problems of machines, is given in this paper.