Vibration Analysis for Engineers

Engineers and Plant Management are responsible for daily maintenance decisions that effect the operation and profitability of their company. This course is fast paced and designed by NorthPoint Engineers for Engineers.

The intention of this course is not to train Engineers and Managers how to collect vibration data or perform vibration related tasks. NorthPoint's objective is to ensure that Engineer's have the tools and knowledge required to make educated, informed and confident decisions based on the data and reports submitted by their Vibration Analysts. We highly recommend course attendees review basic vibration theory prior to attending this course. The course is recognized by the Engineering Institute of Canada for Continuing Education Units (CEU's).

Topics covered – 4 days

- Review of predictive maintenance: detecting and diagnosing machine problems, predictive maintenance programs;
- Overview of vibration and machinery vibration measurement: wave-forms, orbits, amplitude, frequency, spectrum, resolution, and units and conventions;
- Safety guidelines and review of data collection process;
- Instrumentation: vibration transducers, appropriate measures, review of instrumentation, integration (analog & digital, waveform & spectra);
- Review of types of filtering: low pass, high pass, and band pass;
- Phase Measurement: relative phase, phase marker, phase relationship – displacement, velocity, acceleration, use of phase;
- The FFT (Fast Fourier Transform) analyzer and the RTA (Real Time Analyzer);
- Basic sampling theory, aliasing, windows, types of averaging;
- Identifying mechanisms & fault frequencies – troubleshooting, unbalance, cracks, looseness, misalignment, bows and bends;
- Machinery components;
- Rubs: behavior of rubs and review of case histories;
- Identifying malfunctions of rolling element bearings: diagnostic tools and review of causes of bearing failure. Bearing fault frequencies, spectra, and waveforms. Review of case histories on dryer exhaust fan and motor bearings;
- Electrical fault review and comparison to mechanical faults on induction motors: sources of rotor vibration and review of case study on 1000 hp motor; air gap, dynamic eccentricity, AC induction motor analysis related to stators; variable frequency drives; diagnostic testing procedures and shut off tests; concentricity, run out and frame twist; rotor bar problems; motor failure progression and review of electrical problem data. Comparison of induction motors and DC motors;
- Gears & gearboxes: gear mesh frequencies, gearbox acceleration, gear tooth wear, assembly phase number, and tooth repeat frequency, loading and misalignment;
- Machine instabilities: causes & diagnosis of oil whirl, plane bearings and tilting pad bearings, oil whirl instabilities and whip instabilities on turbo expanders & turbine generator, anti whip and anti whirl bearings and anti swirl and honeycomb seals;
- Resonance: description & diagnosis of resonance problems;
- Review of field trim balancing: machinery rotor balancing, and single plane balancing using calibration weights;
- National, international and industry standards and guidelines for machinery vibration;
- Glossary of terms included and reference guide for additional self-study.

For more information or to register email adoyle@northpointts.com