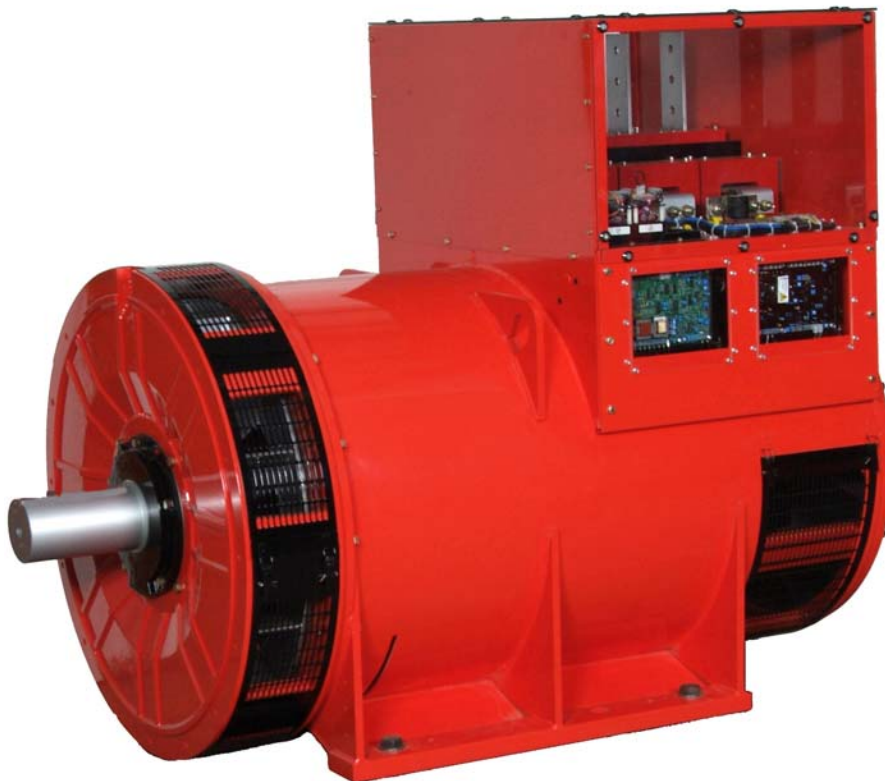


## Application Note

# SO Analyzer – Machinery Condition Monitoring

Vibration condition monitoring of rotating machines is an important activity for equipment manufacturers, installers, operators and maintenance companies.



Courtesy of Cummins Generator Technologies

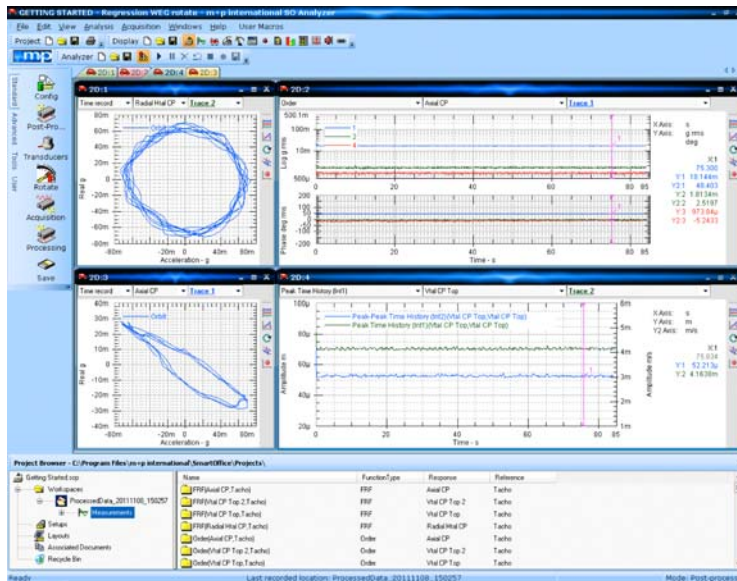
The rotational dynamics module within m+p international's SO Analyzer now includes the functionality required to measure and analyse both fixed and variable speed rotating machines for development diagnostics, commissioning evaluation, post-maintenance performance checks and a host of other monitoring applications.

In these applications RMS, peak and peak-peak measurements of acceleration, velocity and displacement are valuable indicators of machine condition. More advanced fault detection and diagnosis can be achieved with the addition of order analysis, spectral 3D maps, orbit analysis etc.

SO Analyzer includes on-line and post-processing capabilities to make all these measurements based on machine speed or, when running at constant speed, with time-based logging providing

time history statistics, spectrum analysis as well as order analysis with both amplitude and phase results. All these functions are available in parallel for complete and immediate on-line results and flexible post-test diagnostics.

Balance, bearing condition and performance characteristics can all be evaluated for quality control, commissioning checks, wear comparison over time, checks between machine builds or before and after maintenance etc. Short-term measurements over seconds to long-term monitoring over days and weeks are all possible.

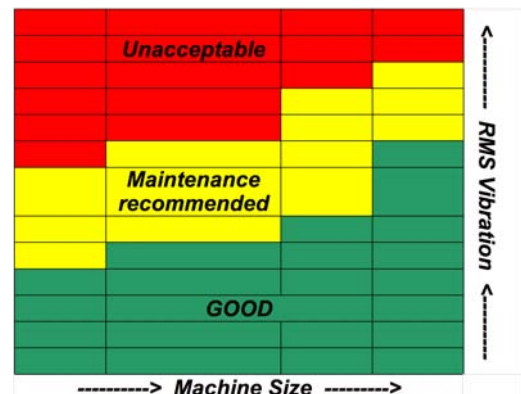


Input sensors can be accelerometers, velocity sensors or proximity (displacement) probes while software processing selections provide acceleration, velocity and displacement results from the same input channel. Together with pre-filtering these flexible processing options meet the requirements of the numerous

standards in this area such as ISO 13373, ISO 7919, ISO 10816, VDI 2056, ISO 2372, NF 90-300/310, BS 4675 or the API acceptance testing series etc.

### Typical condition evaluation applications would be:

1. For electric motor performance checks measurements over a few minutes to compute velocity peak time history together with displacement peak or peak to peak following a user-defined band-pass filter (e.g. 10 Hz to 1000 Hz).
2. For generators with roller bearings velocity rms is often required while displacement is required as peak or peak to peak data, both with a band-pass filter from 10 Hz to 1000 Hz. Measurements can be run for days to evaluate condition trends.
3. On large gas turbines for power generation a useful pre-delivery and commissioning test involves order 1 and 2 amplitude + phase together with velocity peak both from accelerometer inputs.



Many standards are available to define appropriate levels

4. Velocity rms or peak filtered between 10 Hz – 10 kHz is used to evaluate residual unbalance.
5. For bearing defect detection an acceleration signal, band-pass filtered from 10 Hz to 10 kHz or 1 kHz to 10 kHz or 3 kHz to 10 kHz, is commonly used. By measuring both rms and peak values crest factor can be computed as a performance metric. Another method would be to compute Kurtosis from the time history.

All the above methods and many more are possible with SO Analyzer giving the user a flexible and easy to use system for all types of diagnostic testing across a wide range of machinery monitoring applications.



Notebook PC and USB powered acquisition module provides an ultra-portable solution

A number of hardware configurations are also possible providing the best of portability and flexibility together with integrated online diagnostics and analysis.



m+p's VibPilot frontend can measure up to 32 channels