Cross-channel phase with @ptitude Analyst and AX & GX Series Micrologs

Reliability bulletin WI 1021

Cross-channel phase is a convenient tool to capture phase and amplitude relationships at virtually any problematic frequency on a machine - without a trigger.

There are many applications for cross-channel phase measurements for both trending and analysis purposes.

Periodic phase measurements between the horizontal and vertical directions on each bearing in a machine train may reveal structural and/or rotor changes such as balance condition or alignment on machines that have shown a tendancy to change over time. Changes in the phase angle relationsips over time may help to identify not only when corrections are necessary, but can also aid in identifying the source or cause of the vibration.

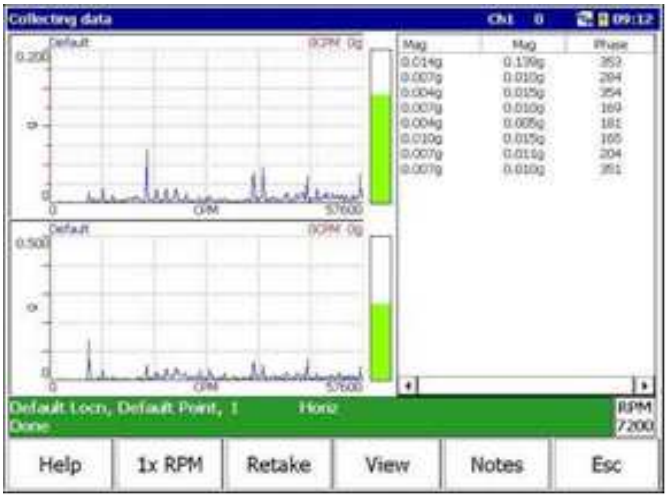
Basic phase analysis measurements to fill out an amplitude/phase diagram (balloon chart) can also be programmed as a route to simplify the collection of readings. Follow these steps:

- Program the first point as a reference, for example 1V-1V for the outboard motor readings.
- Place the channel 1 and 2 accelerometers next to each other on the motor to verify the readings and confirm the phase difference between the two is approximately 0 degrees.
- The set up readings for the rest of the machine as 1V-2V, 1V-1H, 1V-2H, etc.
- When acquiring these measurments, leave the channel 1 accelerometer in the 1V position as it will be the “reference” for all subsequent measurements.
- Move the channel 2 accelerometer from point to point to complete the diagram.
- When taking readings on the driven machine, continue to use 1V as the reference.
- Enter the channel 2 amplitude for the running speed frequency at each location on the diagram and show the phase as a tick-mark.
- An inspection of the diagram will aid in the identification of the true machine fault.
- The cross-channel reading will provide phase and amplitude results for the initial frequency/speed specified for the measurement and up to 7 multiples of that speed. This is useful when trying to identify machine behavior at vane pass frequency, for example, or even a non-synchronous frequency.

While this measurement is easy to acquire there are two important requirements to help ensure that the results are valid:

- First, the machine speed must remain constant during the colllection process - the phase relationship is computed for the speed that was determined at the start of the reading and if the speed changes, the results are often noise divided by noise.
- Second, it is especially important that the reference transducer is placed at a position where there is a strong signal at the frequency being investigated. It does not have to be the highest amplitude, but one where the signal is large enough to produce a valid phase comparison.

The roaming/response accelerometer can be placed at any location on the machine or surrounding structure but be aware of very low amplitudes and a phase reading that constantly changes. The readings are usually left blank on a phase diagram so that the random phase readings are not misinterpreted.



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