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Deducing vibration data

Electronic vibration analysis instruments are very useful tools, but considering the numerous kinds of contaminating noise signals that might interfere with readings, knowing when to double-check a reading can save time and money.

I use vibration spectrum analyzers, but I don't depend on those readings alone. I need supporting information, which can include any of the following:

1. Temperature — a higher-than-normal bearing temperature is reason for concern because it can indicate friction, that bearing clearances are reduced, and possible heat distortion. For grease-lubricated bearings, 200°F is the warning level. For oil-lubricated bearings, higher levels are acceptable.
2. Noise — an abnormal noise, like thumping, is definitely a cause for concern, regardless of what the vibration readings are. Listen to the bearings with a stethoscope, especially during coastdown.
3. Metal particles in lubricant.
4. A poor maintenance history of frequent repairs.
5. Another measurement with separate instruments and another interpretation by a separate analyst, with results that match up to the first tests.

If none of the above supporting indicators are present, than I let the machine operate and observe the trend. Some vibrations are serious and need attention. These are:

- High vibration amplitude at rotating speed (1x rpm)
- High harmonics of 1x rpm (except on reciprocating machines)

- Shock pulses
- Large amplitude, perceptible vibrations at other frequencies (possible resonance)

Everything else is normal machine operation and benign, including noise.

As we grow older, and hopefully more mature, I have noticed three trends among vibration analysts. The first is that we buy lighter and smaller instruments. The second is that cables get longer. And the third is caution in expressing judgment until more data comes in to support the conclusions.

More data that supports the conclusion is always desirable. At some point in time, the owner will demand a recommendation, and he deserves one. This is when we get to apply judgment and experience, in addition to data. We must make a judgment call that it is OK or not, and if not, then what to repair. This is what we are paid to do.

To avoid the pitfalls of recommending an incorrect repair, and having to explain yourself later, consider these protective measures:

- a. Never condemn a machine on vibration alone. Insist on supporting information.
- b. Separate serious indicators from benign sounds.
- c. Delay recommending any corrective action until your confidence level in the analysis is more than 50 percent. If you don't have that much confidence in the analysis, doing nothing might do less damage in the long run. *ET*