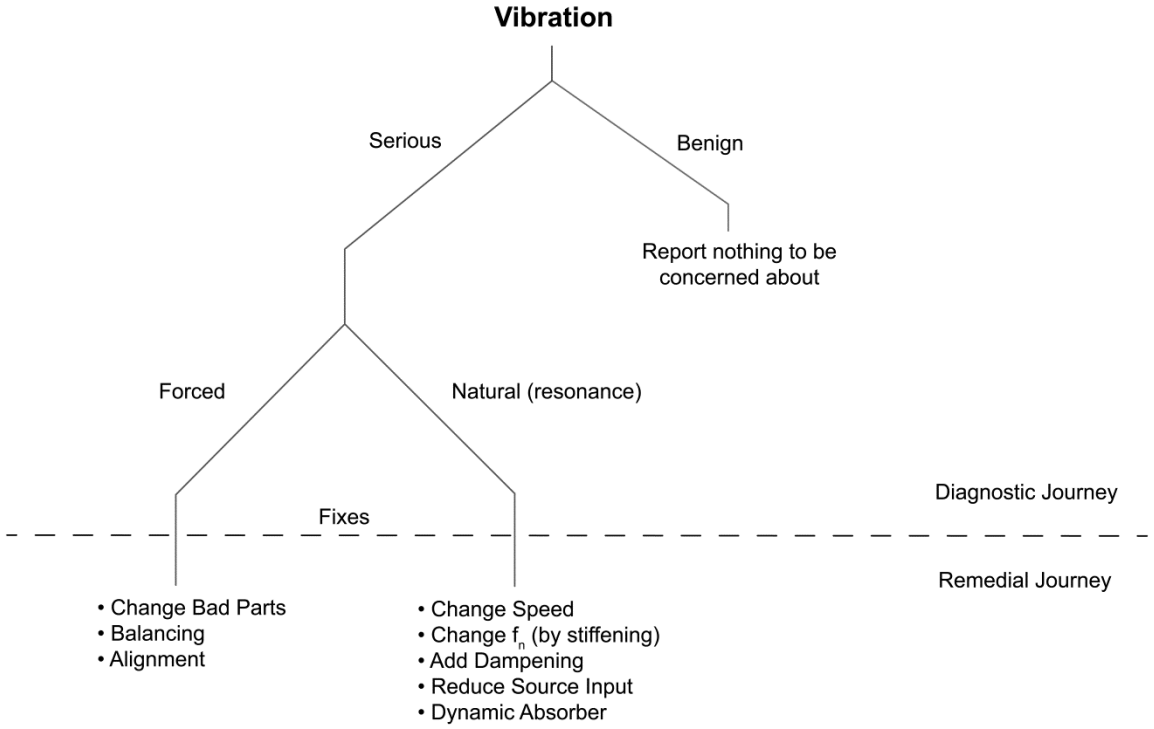
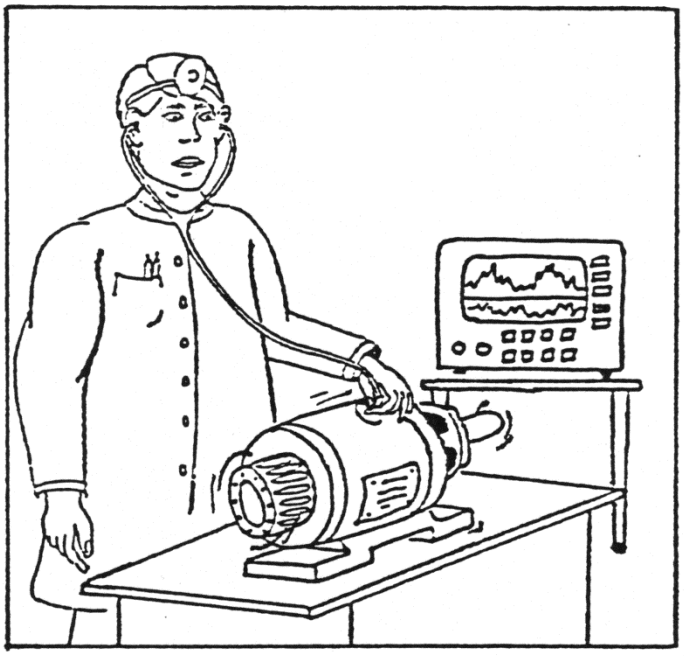
Serious or Benign

by Victor Wowk, P.E.

There are two kinds of machine vibrations—serious and benign. The first task of a vibration analyst is to decide which, sooner rather than later. This places him or her at the first fork in the diagnostic journey.



Serious vibrations are those that cause cracks or component failures. In terms of the spectral pattern, any larger-than-normal amplitude at 1X rpm is usually serious. If it is accompanied by harmonics, then it is doubly serious. Other indicators of serious vibrations are shock pulses from the bearings. Noise is not always cause for immediate alarm, until the source of the noise is discovered. Machines have a tendency to activate panels into resonance. Flexible panels can act like sounding boards, and then the machine becomes a musical instrument. Squeals, from metal rubs, and impact noise from metal-to-metal contact, are cause for concern. These do not display well with vibration instruments, but a stethoscope on the machine is most useful to discern the character of the noise. The human ears are remarkably sensitive, and the human brain is unsurpassed for pattern recognition. We have still not produced an electronic instrument that can surpass the human brain in speed for recognizing a normal voice from a sick one.



Benign vibrations are characteristic of a machine's operation and will not cause any long-term degradation or reduction in reliability. Examples of benign vibrations are blade-passing tones, gear-mesh frequencies, broadband-fluid-motion noise, 120-Hz motor hums, and high-frequency pure tones from motors which are rotor bar/stator slot passing frequencies, and VFD carrier frequency noise. Sometimes, the owner of a machine just needs to be re-calibrated as to the non-seriousness of a particular noise, and be calmed. This, in itself, is a valuable service provided by the vibration analyst.

When a machine vibration is deemed to be serious, then this takes us to the second fork in the diagnostic road, which is the subject of the next issue.

This first decision of serious or benign cannot be overemphasized. Every analyst has probably had the humbling experience of trying to back out of a benign vibration, or a non-problem. After burning up many hours (and dollars) of the client's analysis budget, the rationalizing can become rather creative on where we go from here. As vibration analysts, we gather data to understand the truth. The diagnosis is subject to continuous revision, and we should be professional enough to revise it at any time that new information comes to light. I encourage all students and experienced analysts to gather data in the initial survey to obtain a complete picture. Then spend some time staring at the data, before deciding what it is telling us. This is interpreting the data and is the function of analysis. As for me, I am usually looking for reasons to declare it benign, because then I can pack up my instruments and go back to the office. It becomes a shorter work day. More than one machine has been rebuilt unnecessarily because the incorrect choice was made at the first fork.

Victor can be reached at victor@machinedyn.com or by telephone at (505) 884-9005. The website www.machinedyn.com has links to other articles and schedules for training seminars.