

Engineer's Notebook

Ultrasound Technology



Airborne/Structure Borne Ultrasound is a predictive maintenance/energy conservation technology used to locate leaks, detect electrical emissions and to inspect mechanical conditions in operating equipment. Instruments based on this technology receive high frequency sounds that are above human perception (20 kHz-100 kHz) and electronically translate them down into the audible range where they can be heard through headphones and seen as intensity increments on a meter or display panel.

Typical applications include: compressed air leak detection, vacuum leak detection, steam trap inspection, mechanical condition inspection, bearing testing and detection of arcing, tracking and corona in electrical equipment.

What makes airborne ultrasound so effective? All operating equipment, most leakage and electrical problems produce a broad range of sound. The high frequency ultrasonic components of these sounds are extremely short wave in nature. A short wave signal tends to be fairly directional. It is therefore easy to isolate these signals from background plant noises and to detect their exact location. In addition, as subtle changes begin to occur in mechanical equipment, the subtle, directional nature of ultrasound allows these potential warning signals to be detected early, before actual failure.

Although the ability to gauge intensity and view sonic patterns is important, it is equally important to be able to "hear" the ultrasounds produced by various equipment. That is precisely what makes these instruments so popular. They allow inspectors to confirm a diagnosis on the spot by being able to clearly discriminate among various equipment sounds. This is accomplished in most ultrasonic translators by an electronic process called "heterodyning" that accurately converts the ultrasounds sensed by the instrument into the audible range where users can hear and recognize them through headphones. The high frequency, short wave characteristic of ultrasound enables users to accurately pinpoint the location of a leak or of a particular sound in a machine.

The basic advantages of ultrasound and ultrasonic instruments are:

1. They are directional and can be easily located
2. They provide early warning of impending mechanical failure
3. The instruments can be used in a loud, noisy environment
4. The instruments support and enhance other PDM technologies or can stand on their own in a maintenance program

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