

CASE STUDY

Sound Power Testing of Drive Assemblies
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Although most disk drives produce noise well within the limits established by workplace noise regulations, the large computer makers that buy the disk drives are still pressuring the disk-drive manufacturers to make their disk drives even quieter to meet customer demands. Multichannel Sound Power for PULSE™ provides the answer to disk drive sound power testing needs.

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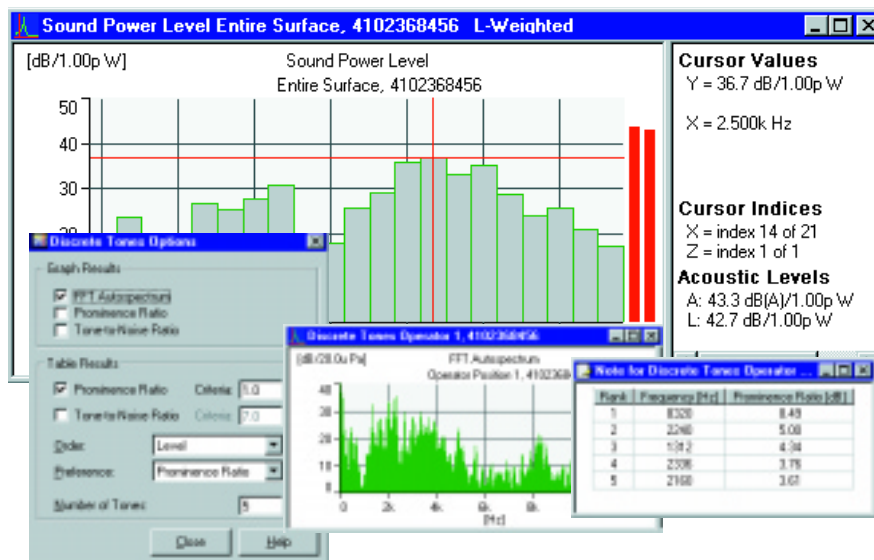
Background Noise

Disk drive manufacturers have special problems when testing their drive assemblies. One of these problems is background noise. A typical $2\frac{1}{2}$ " drive has a sound power level of about 40 dB. This means that in a sound power test, where you typically measure one meter away from the source, you are measuring a sound pressure level of about 30 dB. Since background noise must be at least 6 dB, and preferably more than 10 dB, below the noise of the source, the only practical place to make this test is within an anechoic or semi-anechoic chamber. And with the next generation of drives, they are talking of typical sound power levels of 30 dB instead of 40 dB.

Multi-analysis Needs

Pure tone determination is another problem area. Pure tones are single frequencies that dominate a sound field and are often irritating to the listener. The standards for noise measurements on office machines include testing for pure tones. Since the noise from an idling disk drive assembly usually contains them, this requirement has become the responsibility of the disk-drive manufacturers. Unfortunately, this measurement has to be carried out using an FFT analyzer, while the sound power determination requires 1/3-octave analysis.

Fig. 1 Measure sound power and discrete tones in one shot with PULSE and Multichannel Sound Power



Another problem is a growing production volume. Although noise testing only takes place on a sample basis, ever-increasing production volume puts more pressure on already limited noise-testing facilities if the same percentage of production is to be tested. This could be solved by adding extra noise-testing facilities, but building and equipping a good semi-anechoic chamber is an investment of hundreds of thousands of dollars. Clearly an alternative way would be welcome.

Testing the Old Way

The traditional way of testing the sound power is to use 9 or 10 microphone positions and multiplex these into a single-channel analyzer, meaning only one microphone can be used at a time. With 10 microphones and 30 seconds measurement time per channel (to measure down to 100 Hz), this means a minimum of 5 minutes to make the test. This does not include the time required for re-measurement, for instance, due to background noise problems. More time is consumed making the pure tone determination at one or more microphone positions. If we include other operations, like mounting and dismounting the drive, reporting results and so on, it is easy to see how testing a single drive could take ten minutes or longer.

The Solution – PULSE Sound Power

Enter PULSE and Multichannel Sound Power Software. As Niels-Jørgen Jacobsen of the software development team puts it, “There are a lot of products out there for making sound power measurements, all of them using some variation of the traditional way that consumes so much time. But now that we’ve brought this software on board with the PULSE system, this is the first time you can do your measurements in parallel rather than serially due to PULSE’s multichannel and multi-analysis capabilities. This means PULSE can carry out 1/3-octave analysis for sound pressure measurements and FFT analysis for pure tone determination at the same time. PULSE can be configured with up to 32 channels. So if you have a typical sound power measurement that requires 10 microphones on the measurement surface and two operator and bystander positions, it won’t be a problem with a sufficiently large PULSE system to measure even up to 20 kHz in a single pass. Of course, if your PULSE system is configured with, say, four channels and one DSP board, you can easily set up the software to make multiple passes for the same measurement. And the ability to make batches of measurements during one session means you can really assembly-line your measurements and raise productivity.”

Fig. 2 Setting up and making a batch of measurements has never been easier



Keen Interest

Needless to say, the disk-drive industry has shown considerable interest in PULSE and the Multichannel Sound Power software. The first orders have already been received. The startling increase in productivity PULSE can offer, added to the fact that PULSE is PC-based, runs on Windows NT[®], is tightly integrated into the Microsoft[®] Office Pack, and is OLE 2.0 compatible makes it an extremely cost-effective solution.

For Further Information

PULSE Literature:

For more information on PULSE Sound Power see the Sound Power brochure (BG 1314), or System Data sheet (BU 3072)

PULSE Demo:

The PULSE demo will whisk you through PULSE's concept, functionality and options interactively with easy to use con-

trols. For your free copy contact your local representative or see it live on our homepage www.bk.dk

The Internet:

A comprehensive selection of Brüel & Kjær literature as well as software demos are available on our website www.bk.dk

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