Ribbon driver technology represents the next evolution in speaker design, providing enhanced clarity, dramatically reduced distortion and ultra-fast transient response. Professional speaker systems utilizing ribbon drivers have been developed for a range of applications and successfully deployed in demanding situations where high output and high audio quality, as well as a high level of reliability are required.
Ribbon driver technology

Ribbon drivers feature a very strong and lightweight thin metalized (PEN or polyimide) film ribbon with circuit traces on it suspended between a set of high power neodymium magnets. They are direct radiators and do not require a horn to produce sound. When alternating current from an amplifier is applied to the ribbon, this causes it to be alternatively repelled and attracted by the magnets. This vibration of the ribbon generates sound waves directly. Used as high frequency/midrange drivers, today's ribbon drivers have wide, even horizontal dispersion and are capable of high power handling and high output levels.

Comparison: compression drivers vs. ribbon drivers

How different drivers work

Traditional speaker design is based on horn loaded compression driver technology. This design features a metal diaphragm with a voice coil surrounded by a magnet. These elements are mounted inside an enclosure with an aperture at one end, in front of the diaphragm. The diameter of this aperture is less than that of the diaphragm. A horn is attached to the aperture of the compression driver enclosure, to provide directivity control. This compression process is prone to creating distortion and high frequency breakup. There can be additional distortion caused by interaction between sound waves and horn, due to reflection and reverberation. Additionally, the voice coil is subject to power compression and loss of high frequency output over time.

When alternating current from an amplifier is applied to the voice coil, this causes it and the attached diaphragm to be alternatively repelled and attracted by the magnet. This vibration of diaphragm generates sound waves, which are compressed through the aperture and then expanded into the horn.

In comparison to compression drivers, the extremely low mass of a ribbon diaphragm allows for a much faster transient response and uses a direct radiator configuration. Sound waves from a ribbon driver are not compressed and then expanded into a horn – this reduces distortion, eliminates high frequency breakup and provides extended high frequency response. In addition, because ribbon drivers do not have a voice coil and instead use circuit traces on a diaphragm, they do not suffer from power compression.
Driver dispersion patterns

Sound produced by a compression driver point source results in a spherical propagation pattern, which spreads equally in all directions. This requires the use of a horn to provide directivity control, which can create detrimental reflections and reverberation inside of the horn and an increase in lobbing effects.

In contrast, sound produced by a ribbon driver line source results in a cylindrical propagation pattern, which has wide horizontal dispersion and controlled vertical dispersion. In addition, SPL (Sound Pressure Levels) produced by a line source system decays at half the rate of a point source system, (3dB per unit of distance vs. 6dB per unit of distance) resulting in more uniform SPL throughout the entire listening area.

Line array technology

Traditional line array speaker systems are created by stacking multiple identical speaker cabinets atop each other, creating a curved or straight vertical array. A line array configuration can provide a highly focused cylindrical dispersion pattern over a large area. As such, line arrays have become the standard in the professional audio industry as sound reinforcement and public address systems in such applications as live sound, large scale events, stadiums and outdoor festivals. The superior audio performance of line array technology also benefits fixed-install applications in a wide range of venues such as cinemas, houses of worship, nightclubs and more.

Advantages: ribbon driver line array

Ribbon drivers are an ideal building block for line arrays because of their cylindrical propagation pattern. Since ribbon drivers do not require horns, they can be much more compact than traditional horn loaded compression drivers. As such, they are perfectly suited to build a compact line array with a single cabinet, using either a straight or articulated design.

A ribbon driver based line array is a true line source audio system producing a cylindrical propagation pattern. It is capable of producing very wide horizontal dispersion and highly focused vertical dispersion, with very consistent SPL throughout the entire listening area. Combining the superior audio characteristics of ribbon drivers with the proven performance factors and reliability of a line array system, the solution provides several advantages over traditional point-source, compression driver audio systems.

Conclusion

Combining ribbon drivers and line arrays offer distinct audio performance advantages over traditional speaker technology and driver configurations. The use of ribbon drivers within a single cabinet line array design makes for an exceptionally compact, high-performance system.
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CHR3624_EN_MAR14