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The Loudspeaker Problem

Loudspeakers – you can't live with them and you can't live without them. While some may dispute the claim, your speaker is the single most important and problematic piece of your audio / video system. If you are unhappy, it is most often the culprit, through sins of commission or omission. And, while most of your prized gear is probably of the high tech or at least modern variety, most of the parts and technology in your loudspeaker date back twenty to fifty years. Certainly in the past several decades there have been improvements to basic speaker and driver technology, but most of these have not addressed some of the underlying problems inherent in the existing driver, crossover and cabinet technology.

The Airfoil System was designed to overcome the problems inherent in these conventional speaker technologies. But before we get into the Airfoil, let's cover some basics.

- There are three main types of speaker drivers: cones/domes, ribbons and electrostatics
- All of them are designed to move air by back and forth, piston motion
- This motion causes rapid changes in pressure that our ears tell our brain is sound

To achieve theoretical perfection, the above driver types would need:

- Near zero mass to move quickly enough to reproduce a broad range of frequencies (too heavy and you can't move the driver fast enough to reproduce the high frequencies)
- Infinite strength to maintain perfect driver shape during this piston motion so as not to distort the sound (and change in driver shape during movement generates errors)

Moreover, these drivers would have to marry together to:

- Generate coherent timber and phase and launch speed over the full frequency range
- Present a uniform and seamless dispersion pattern
- Function as a point or line source (to maximize imaging)
- Present broad horizontal dispersion to maximize the sweet spot

The net result is that speakers using cones, ribbons or electrostatic panels usually require multiple drivers of different sizes to reproduce the broad range of sounds our ears can hear. To make these drivers operate coherently, crossovers are required and these are often very complex. The simple fact is that many crossover types can drastically alter the sound you hear, particularly in the sensitive mid range. And, despite best efforts, rarely do drivers blend seamlessly.

The facts of speaker life outlined above have been known for well over half a century! These "rules" however, draw the boundaries … set the stage … and start the best speaker designers on the path to compromise.

Impact won't walk the walk

We can't help it. At Impact, we want, indeed demand a different way. In the face of advances in sources (analog and digital) and electronics, the speaker becomes, more than ever, the bete noir. Our search for technologies which rewrite the rules led us to develop the Airfoil loudspeaker. This product will shatter your preconceptions of what a loudspeaker is capable of!

The Patented Airfoil Driver

We start with the Airfoil Driver (An Impact Patent), a unique broad band bending wave driver. That technological mouthful, however, can be distilled into a few easy to understand facts. The driver membrane is flexible and will not distort the sound as it moves. In fact, it moves in waves, mimicking the way sound travels through air! It does not struggle to be a perfect piston! It is thin and light so it can move fast and reproduce the highest frequencies. But that's not all. This 6" driver reproduces most of the sound spectrum from 150 Hz to over 20KHz! In addition it has true time and phase coherence across its operating bandwidth. The Airfoil Driver is sweet sounding, and has ultra low distortion.

Because the Airfoil Driver is a dynamic wave bending device it has another great benefit – it reproduces transients in a natural way. Human response to the leading edge of transients (the first attack of sound to reach our ears) is at the heart of the psychoacoustics of hearing. The Airfoil preserves the natural attack of transients which eliminates fatigue from the listening process.

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The airfoil driver is different. Let’s look at the differences:

- The diaphragm is pliable. It doesn’t need to maintain a rigid shape. In fact it bends with the waves of sound
- It has no limitations in reproducing high frequency sound
- It can reproduce a wide bandwidth of sound and requires only a simple crossover for low frequency information
- The driver is time and phase coherent and has extremely low distortion

The AirfoilV Loudspeaker System

No matter how great the driver, its no good unless you get it into the right loudspeaker. The Airfoil series from Impact Technology is such a line of loudspeakers. Our first offering, the AirfoilV is our statement product and it allows the full potential of the Airfoil driver to be realized. No compromises, no shortcuts!

The heart of the AirfoilV is a line source tower utilizing nine Airfoil drivers in a vertical array. This is a true line source with excellent imaging and extended vertical and horizontal dispersion. In fact, horizontal dispersion is phase correct and within 2 dB over 150 degrees! The panel takes advantage of this wide bandwidth and the ultra-low distortion of the Airfoil driver to achieve stunning resolution and transparency. The array achieves broad band-width extends from 170 Hz to over 20 KHz, eliminating the need for crossover points anywhere near the critical mid frequencies. This permits not only remarkable reproduction of inner detail but ensures that the array is free of the phase anomalies that introduce time alignment errors.

The Airfoil arrays are complemented by a pair of high performance sealed box coupling woofers, each having two 6.5" drivers in an ultra-linear alignment. This sub-enclosure operates from 170 Hz to 50 Hz. Below the coupling woofer, the signal is handled by two patented Balanced Force Compression subwoofers. These unique devices reproduce the remainder of the low frequencies to 17 Hz. They do so with a speed and lack of distortion unheard of in this type of device. The patented enclosure eliminates nearly all of the vibration and therefore the coloration associated with most subwoofers.

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The AirfoilV is supplied with a passive, first order series crossover network between the array and the coupling woofer and an active crossover, which includes level and variable phase control for the subwoofer signal. The subwoofers are self-powered by built in 250 watt class A/B solid state amplifiers.

The sound? The AirfoilV directly and positively speaks to the music. It confirms that reproduced sound can move us in the way that live music does. It is not HiFi … and always prompts listeners to use words like natural, musical, un-fatiguing, engaging … and these words come at the end of listening sessions which are many hours long. Hear the magic for yourself. Visit an Impact dealer and audition the AirfoilV. It defines our creed – imitation is not our strategy!