warwick audio technologies

"Sound, as you've never seen it!"

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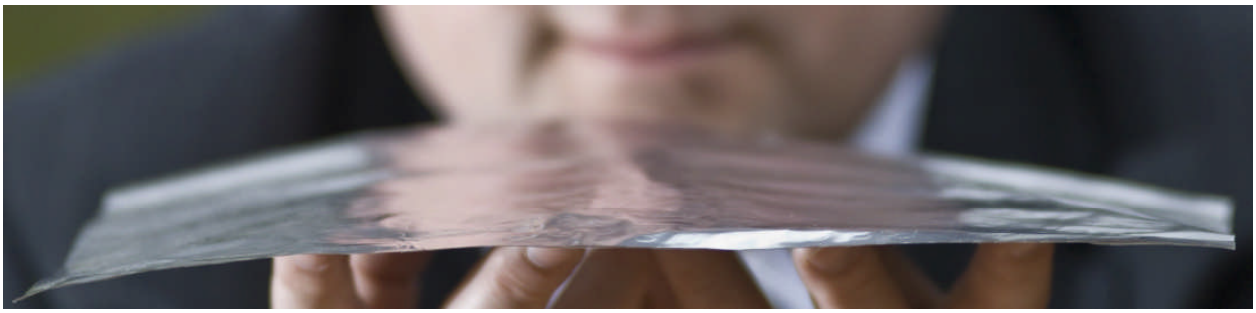
Warwick Audio Technologies has developed a Flat Flexible Laminated, [***FFL***] loudspeaker technology with major groundbreaking benefits for audio products.

FFL loudspeakers are created by using a carefully designed assembly of thin polymer and metallic films. The technology is ultra-thin (between 0.25 to 1mm thick), lightweight, inexpensive to manufacture, low power and can be made in several forms: flat and rigid; flat and semi-flexible so it can be curved; or flat and as flexible as paper so it can form complex shapes. Our research shows it to be thinner and more flexible than any existing flat loudspeaker on the market today.



The flat, flexible laminated speaker material

With its ultra-thin and lightweight construction the speakers lend themselves to easy and convenient mounting positions on walls and ceilings and can be designed into OEM audio products. The speakers are easy to conceal or may be a 'feature' in a room by being printed on or designed into custom shapes.

"Using a unique combination of optimal acoustic materials and leading-edge technology, we have brought the world's first Flat, Flexible Laminated loudspeaker to market"

The growth in the speaker market continues unabated and is being driven by changes in lifestyle demanding portability and low power.

The rise in the popularity of audio and video entertainment, the integration of television, radio, films, music and games into one entertainment platform and the development of MP4 and other digitally compressed music formats has lead to a dramatic take-up in PC multimedia, home theatre systems and portable iPod speakers.

In addition, there is demand by the public for up to the minute, crisp and clear information in all walks of life and particularly in passenger terminals when travelling.

These lifestyle changes are shaping loudspeaker design; thinner, smaller, and compact speakers are replacing the traditional, heavy box speaker systems from the past. The trend in the Public Address and Audio Visual markets is towards high-fidelity audio speakers which are sleek, unobtrusive, and visually appealing in design, and styled to blend gracefully with the décor of modern homes, offices and public places.

FFL technology gives designers the freedom to develop sleeker, elegant and smoother products with contoured edges, textures, and colours. The technology will enable artistically designed speakers to be incorporated into applications and circumstances where, up until now, it has been impossible for high quality sound to be used.

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Features and Benefits

Ultra-thin and lightweight construction

All ***FFL*** products feature the combination of ultra-thin, lightweight and flexible materials used to produce directional, high quality audio.

Flexible

The directionality of the sound produced by ***FFL*** technology is controlled by flexing the laminate, allowing sound properties to be modified in a similar way to light with a lens. The speaker can be shaped as long as there is suitable mechanical support. For instance, the speaker might be applied as a column wrap creating broader sound coverage in a retail environment.

Printable

The surface materials used in the construction process are printable and may be cut to customised shapes where audio requirements allow.

Easy to conceal

Product features are optimised for those wanting to offer a seamless audio environment without intrusive technology. For example the laminate material can be bonded to the rear of canvas artwork in buildings and boardrooms

Sound pressure levels of 80-105dB at 1m at 1kHz can be achieved

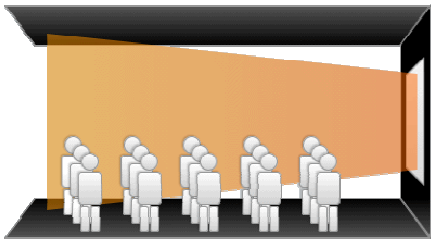
Actual SPL depends on the area of the laminate material selected. Laminates are offered in standard A5, A4 and A3 European paper sizes and in custom sizes to suit customers with specific unusual applications.

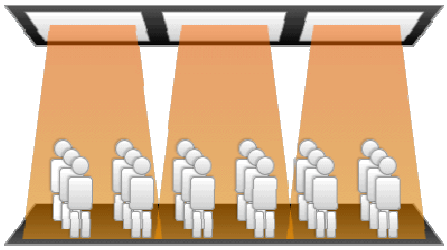
Low-power, high efficiency

Unlike the power hungry alternatives *FFL* technology is very efficient as very little electrical energy is wasted as heat. The speaker is voltage driven and uses milliwatts of power rather than Watts.

Planar and projected sound

The speaker laminate produces planar sound waves that project further and are evenly distributed to your audience; the sound levels do not fall away rapidly as you stand further from the speaker, as with a conventional speaker. Instead, they remain at a more uniform level throughout your audience. They are ideal for conference and presentation rooms.





Improved background sound ambiance

Understanding the benefits of directionality is best explained in terms of analogy with lighting. To get the best out of lighting we use shades and reflective surfaces to form visual effects and to direct light to where it is needed. Without this directionality in modern spaces, the visual ambiance is largely lost. Similarly, *FFL* technology with its directional properties can improve the ambience of the listening experience.

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Custom design and unusual applications

The *FFL* material can be cut into specific shapes subject to the sound output required. It can be flexed and formed allowing unusual speaker designs to be made. Various designs of lighting shades could be speakers or a life-size picture of your teenager's favourite singer may be a speaker in his/her bedroom.

The laminate is ideal for large scale production and printing processes

The result will be low cost, high quality *FFL* speakers for volume applications

Applications

The following applications are just a few of the many areas where our patented technology offers a reliable audio platform, delivering value and innovative design to audio engineers and their products.

Public Address systems in public spaces

Multiple cone speakers in public spaces interfere with each other, creating audio anomalies. *FFL* technology creates a focused directional sound into the space, so that the audible level is more stable throughout, reducing interference and ensuring key announcements are heard.

Audio visual and education

Many presentation spaces, such as conference centres, auditoriums, boardrooms, class rooms and briefing rooms increasingly make use of interactive displays. *FFL* technology allows discrete audio products to be located in walls and ceilings for optimum sound quality. Now even the listener at the back of the room has no excuse for not hearing.

Talking 'point of sale' displays, advertising posters and exhibits

Many exhibitions and retail display systems now include quality audio. The challenge is to provide lightweight and discrete audio sources that are easily installed and yet blend into the surroundings and that deliver sound where it is required. With every square foot of space costing a premium, the *FFL* ultra thin speakers will produce a timely payback. The speaker materials are printable too, so combining the audio function with a key marketing message, is a powerful selling tool.

In-car audio and transport PA

Automotive interiors are a challenging environment for the audio designer. The *FFL*, thin, flexible and ultra lightweight speakers are perfect for use in car, bus and truck interiors. Use them in spaces where you just can't place ordinary speakers. Most car speakers sit well below the listener's ear. Our lightweight speaker materials can be mounted above the listener's ear without degrading car-handling performance. High perceived power is sustained but from low power consumption electronics. *FFL* technology can create a big sound experience from a simplified audio system.

"FFL technology opens up new applications and circumstances for sound where traditional speakers have not been able to be used"

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