Experience a new type of speaker

HYLIXA is the result of extensive research and development at Node's Cambridge facility, to thoroughly reimagine what is possible from a compact loudspeaker.

Conventional passive loudspeaker designs often require large cabinets to deliver wide-bandwidth, heavily braced enclosures to control colouration, or single driver systems to preserve a 'single point source' output.

HYLIXA deploys a raft of elegant innovations that not only collectively deliver these performance advantages, but also overcome many of the compromises associated with existing designs.

These innovations are only possible by leveraging manufacturing techniques new to the audio industry.

As a result, HYLIXA represents a category defining passive loudspeaker - a "Helical Bass" design, offering stand-out performance and iconic acoustic design.

This technical white paper communicates the key innovations that collectively make HYLIXA so different from existing loudspeaker designs.
Reproducing the human voice

Human hearing is most sensitive to voice. HYLIXA masters its reproduction to convey the smallest emotional nuance.

Early adoption by significant Hi-Fi brand leaders has established the ‘Balanced Mode Radiator’ (BMR®) in the finest high-end fidelity loudspeakers.

The BMR® offers unique attributes that prove immensely advantageous to sound quality reproduction. Namely, the technology provides wide bandwidth in unison with wide directivity, the latter approaching a point source model - giving rise to a uniform sound power response.

The former enables pure mid-band performance, free of any crossover distortion anomalies, crucial throughout this delicate part of the audio spectrum.

Unlike separate pistonic or coaxial driver units that push the breakup region out of the operating range of their respective diaphragms, the BMR® harnesses these breakup modes.

To do this, the eponymous BMR® carefully balances these resonant modes. By harnessing the composite panels’ modal behaviour, it operates as a pistonic panel at lower frequencies, and a bending wave panel at higher frequencies.

These movements can occur simultaneously, reproducing a wide audio band from a single point, meaning HYLIXA exhibits remarkably wide, uniform dispersion, even up to 90 degrees off-axis.

*Based on BMR® technology from TE*
Eliminating standing-wave colouration

The BMR® is pressure loaded in a dynamically inert enclosure.

An additional advantage of the BMR® is its ability to align in compact enclosures due to its composite panel, large voice coil and high force motor system.

A smaller volume enclosure is less prone to internal standing waves for the same frequency band than a larger enclosure. With the BMR® able to align in smaller volumes and the relative modes sets now much higher in frequency, two key advantages are utilised:

- Enclosure acoustic modes start higher in the frequency spectrum and are more efficiently controlled by internal acoustic damping.
- The composite panel of the BMR® (thickness, mass and stiffness) offers a significant advantage over conventional monolithic cone diaphragms - providing less acoustic transmission of the internally ‘trapped’ sound (self-baffling), that can otherwise manifest itself as enclosure colouration, commonly associated with low mass, low BL, monolithic cone structures.

01 - Combined bass driver and HTL output flows out around the baffle
02 - BMR® honeycomb composite panel
03 - Small, dynamically inert BMR® rear volume
04 - Baffle assembly mounted to the bass driver magnet
Acoustically stealth cabinet

HYLIXA’s streamlined profiles are designed to dramatically reduce resonance and edge diffraction.

With the BMR® located at the nose of the speaker, the cabinet exhibits a unique streamlined profile designed to achieve the lowest possible acoustic diffraction.

Its three-dimensional surface continuity reduces ‘lobing’ in all planes, meaning the BMR® and ring radiators’ wide directivity performance remains uncoloured.

The stanchion and base are also profiled to achieve the smallest possible acoustic footprint. Free from flat surfaces, their flowing form suppresses the build-up of external standing waves.

Crucially, every part interface is flush fitting, with all screw fixings designed to be hidden, eliminating micro-diffraction around such elements.

As such, HYLIXA is the first loudspeaker to use BMR® technology in a low diffraction cabinet, liberating its point-source performance potential to achieve truly wide directivity and uniform sound power.
A low frequency revolution

Unlike any other, HYLIXA represents a new category of speaker - 'Helical Bass', delivering bass extension that is, quite literally, revolutionary.

The compact, passive, wide bandwidth design is made possible by a unique (patent pending) ‘Helical Transmission Line’ (HTL), driven by a rearward firing, low distortion high excursion bass driver for an extended low frequency response over comparable passive, sealed and ported conventional designs.

A Transmission Line (TL) is an acoustic waveguide that harnesses the drivers rearward radiation, absorbing the higher frequencies yet allowing the lowest frequencies to pass through in-phase with the bass drivers frontal radiation, enhancing its output.

HYLIXA’s three-dimensional helix shaped transmission line provides a minimal acoustic flow impedance that maximises efficiency and minimises TL standing waves relative to the standard folded type transmission line designed enclosure.

Uniquely, the internal three-dimensional geometry allows for a special tuning attribute – the orbital transmission line is driven from two points by a single bass driver, enabling nodal acoustic loading for vastly improved control of the first line longitudinal standing wave.

The HTL is tapered and constantly changes in section thus considerably increasing static and dynamic structural stiffness. Moreover, this significantly reduces the impact of transmission line ‘width modes’ often problematic with standard rectilinear TL formats.

Critically placed acoustic damping provides enough mechanical resistance for the bass driver to remain controlled and uncoloured throughout its operating band.

The orbital path of the transmission line allows external venting of the sound pressure to be radiated from a single point, maintaining the ‘point source’ ethos of the BMR® and resulting in minimal time domain distortions.

The rotational pressure vortex developed within the transmission line improves acoustic room integration whilst also increasing the effective line length to 1600mm. This, combined with the low diffraction baffle and enclosure results in a truly holographic sound stage image.
Cabinet outer skin and inner helix partially hidden

01 - Rearward firing bass driver
02 - Concentric 'summed' bass output
03 - Secondary point HTL is driven
04 - Initial point HTL is driven
Hear nothing but music

HYLIXA’s cabinet has been meticulously optimised using both acoustic and structural computer simulation, lifting the veil of resonant colouration.

To prevent resonance, the cabinet is curved in both planes, with the continuous wall of the HTL forming a radial brace. The outer and inner wall sections are constantly changing in thickness to prevent the build up of standing waves.

Indeed, the fully coalesced cabinet is free of any flat surfaces (excluding the bass driver mounting face), and is ‘finite element’ optimised to push it’s resonant frequency well out of the operating range of the bass driver.

Similar to the cabinet, the aluminium extruded stanchion is profiled to maintain a low acoustic footprint, whilst maintaining high rigidity in the acceleration normal of the drive units.

The extruded aluminium stanchion is braced with compressed Nylon inserts to prevent ‘ringing’.

The mass of the loudspeaker cabinet provides the correct amount of inertia for it to be structurally and dynamically decoupled from the stanchion. As such, cabinet effectively ‘floats’ on top of a compliant, visco-elastic Sorbothane® gasket. This turns vibrational energy to heat, decoupling the cabinet from destructive environmental vibrations.

The tri-foot design ensures all feet are touching the ground at all times. Two foot types provide the correct coupling with either a carpet or hard floor, and are fully adjustable to set the speaker level with the aid of the supplied target spirit level.

Each foot features a locking ring which can be wound up once the correct level is set, eliminating ‘ringing’ which could otherwise manifest in the interface of the screw threads.
Grown by lasers

Liberated from conventional manufacturing, HYLIXA’s innovations and strength are only possible by exploiting manufacturing techniques new to the audio industry.

HYLIXA’s complex, optimised geometry cannot be manufactured by conventional techniques such as moulding, casting or machining. Instead, HYLIXA uses a process more widely used in Formula One motor racing.

‘Selective Laser Sintering’ is a process whereby a computer controlled laser systematically fuses microscopic particles of glass and nylon, each 0.2mm layer at a time. The speaker geometry is gradually built in a temperature controlled, inert environment.

Once cleaned of unsintered powder, the completed part is remarkably inert compared to a rectilinear cabinet, with a high glass content of 30% volume, resulting in an almost ceramic feel.

Uniquely, the process results in a fully unified cabinet and baffle, free from joins or bonding. This ensures HYLIXA’s cabinet is acoustically and structurally consistent every time, with laser accuracy.

The process allows for a single part to be far more functional, removing the need multiple part interfaces and fixings that would otherwise present a potential for resonance.
Preserving precious signal

Leveraging the same laser sintering process, HYLIXA incorporates the first unified three-dimensional crossover.

Replacing the use of flat fibre glass boards (either printed circuit or hard wired), the sintered Nylon chassis is designed to cradle each of its capacitors, inductors and resistors in the optimal layout within the speaker, with absolute precision in their placement.

The thick chassis topology is an extremely rigid component, without the bending characteristics of a panel, designed to reduce micro-vibrational interference that can develop in a conventional flat board.

Using the highest quality Mundorf® components exclusively, these are carefully orientated to provide the optimum performance whilst occupying the minimum footprint. The resulting 3D wire runs enable exacting point-to-point hard wiring, whilst negotiating each component.

Located at the foot of the stanchion, the crossover sits furthest away from the magnetic fields of the drivers, and is uniquely magazine loaded for ease of service.

The low-order crossover network, along with all internal wiring, is connected using silver wire, with silver solder throughout.

Similarly, the input terminals are machined from solid copper and are silver plated, providing the very best signal transfer.

Within the stanchion, the internal wire runs are contained within a Nylon channel, critically spacing them away from the aluminium stanchion, which could otherwise impart destructive eddy currents on the signal.