

Science and sound

Acustica Beyma is a Spanish manufacturer dedicated to the art and science of loudspeaker production. **Richard Lawn** tours the factory



Beyma's commercial director Espartaco Saez and president Jose Masip take on the world from their office in Mancaada

IN THE LAST 10 TO 15 YEARS, loudspeaker developers have become increasingly specific for choice when it comes to the drivers and woofers that are available on the market. Like an artist's palette, each component reflects a different tonal hue playing a critical part in whether the cabinet design will succeed. The loudspeaker grille is often the device where art meets science, where the internal components continue to produce a personal signature. As developers continue to score the globe in their quest to produce the next V-Disc, Blackline or Eon, one Spanish company has quietly continued to style itself appropriately without selling out to fashion.

Having successfully negotiated Spain's worst economic recession in living memory, Acustica Beyma continues to flourish as a family-owned company. The Masip family originally established its factory in 1969 some 400km to the north of Barcelona, but moved to Valencia shortly afterwards. Having been the first Spanish company to exhibit at Frankfurt Pro Light & Sound, Beyma has always had an eye on the expert market, so much so that the company increased its international distribution from 15 to 60 countries during the 1980s. As a market leader of professional audio components, Beyma also developed products for the car audio market in the 1990s.

The company relocated to its current three-store, purpose-built, modern facility in the suburban area of Mancaada in Valencia in 1997, and at the same time qualified for the ISO 9002 standard. It was further awarded with ISO 9001:2000 certification by the Spanish AENOR institute in 2002. Beyma is a one company in that 27 per cent of its more than 300 strong workforce is directly employed in R&D, annually submitting white papers to the Audio Engineering Society (AES) for the past 10 years.

As an official member of the American Loudspeaker Manufacturers' Association (ALMA), the R&D department develops many research lines in parallel, attempting to understand the real behaviour of the various loudspeaker parts with which it works. Its papers include the measurement and analysis of sub-harmonics and other distortions in compression drivers, modal analysis and non-linear normal modes (NLM) on moving assemblies of loudspeakers and stress analysis on moving assemblies and suspensions of loudspeakers.



Members of the Beyma R&D team

and AEMVE: Instituto Tecnológico Mecánico (certificates relating to tests that Beyma cannot conduct). Magnet assemblies are simulated, structural analysis is conducted by finite elements and non-linearity tests in long excursions are performed using Heliox measurement equipment. The dynamic analysis of moving assemblies and suspensions is conducted by Fast Fourier Transform, while modal impedances of the speakers are tested in a vacuum chamber and voice coil temperatures are monitored during a fatigue test.

The fruits of these labours are hard earned patents such as Heliox technology, for solving Beyma's air-magnet recognition that the metal parts standardised in subwoofer magnet assemblies were suffering from heat dissipation. Heliox Technology was patented in 2008 following exhaustive surveys that found its loudspeaker designs could operate at lower temperature rates. With a higher power handling capacity in excess of 1,500W, the thermal limit has been effectively reduced, allowing the voice coil to operate 80 degrees C below that of a previous thermal circuit. Having reduced the power compression losses, the Heliox transducers have demonstrated more consistent SPL readings.

Beyma's engineers devised Neck Coupling Reinforcement (NCR) membranes as a result of extensive R&D in the critical zones of the cone and suspension together with new spider materials and designs. Furthermore, the Mechanical Mirror Suspension System (MMSS) was devised as a tool for the application in soft parts design, providing a symmetrical and linear behaviour of the moving assembly displacement, resulting in low distortion and low offset issues. Beyma continually attempts to devise low products for new markets, recently exemplified with the addition of the

18SW16000d and 6a200 woofers. The semi-automated production lines in the main area of the second floor are dedicated to the assembly of various low frequency loudspeakers. Here the spiders, cones, voice coils and electronic circuitry are assembled for various models such as the famous SR range of loudspeakers.



The 18P1000M

Coaxials, horns and high frequency compression drivers are also produced in the main production area, where the bulk of the products are built to order. More than 30 assembly workers can produce as many as 1,500 speakers per day during peak times on a 7am to 3pm shift, although average daily production runs account for approximately 1,000 speakers.

The adjacent offices on the first and second floors are dedicated for sales, administration and management. However, amongst the spacious surroundings are a number of research and development areas, where the main test engineers are continually investigating new methods of production and new areas of development, complete with a large anechoic chamber. A copper coil winding and mobile assembly area where the voice coils and mounts are produced is also in this vicinity. The coils and electronics are tested extensively before being passed downstairs for assembly.

The downstairs section serves as a loading bay for components and materials as well as finished goods for final shipment. The upstairs section, however, is home



Continued investments in R&D are wholly based on Beyma's insatiable desire to improve its catalogue or customised OEM designs. Following theoretical background developments, products are put through their paces to the point of destruction in what could only be described as gory fun. The fact that transducers can contain as many as 70 components requires different approaches and technologies to obtain the best results in a final professional application. These tests and analyses are conducted in cooperation with the Universidad Politécnica de Valencia (Univeridat a nalyse of metal parts), Universidad Politécnica de Cataluña (mechanical properties)



Beyma's Chinese office was opened in 2009

FEATURES: COMPANY PROFILE



Solar panels on the roof of the Mancaada headquarters

to the company's testing equipment once the various products have been assembled. A total of three impactor areas (drivers, tweeters, compression drivers) serve as quality control using Audio Precision analysers and B&K microphones. Testing for all loudspeakers includes a visual inspection, a hearing test (200 to 5,000Hz) using SV, a polarity test and finally a frequency curve test with a tolerance of +/-1dB between 500 to 5,000Hz. There is also ample room in this section for additional storage during times of peak production.

A tool shop adjoining the warehouse on the ground floor was established in 2009 following one of the company's main local metal suppliers entering

relationship. Fortunately for Beyma, the opportunity presented itself to acquire four machines and reemploy three of the staff, thus providing the manufacturer with greater control in its primary production phases. Here, incoming raw steel and aluminium blocks are cut to size, then being subjected to lathes and other industrial processes before being polished and transferred to the second floor for assembly via a large elevator.

One of the most distinguishing features of the Beyma factory is the extensive solar paneling that has adorned the rooftop since 2007, having installed these at a time when green issues were lower down the political agenda. Beyma invested



Inside the anechoic chamber



The semi-automated production line

heavily in a technology that takes advantage of the Valencia sun's high, lowering production costs whilst repairing the lenses and oranges in

the adjacent fields. By consuming the energy produced, Beyma saves the atmosphere above of 36,500kg of CO₂ emissions.

Over 75 per cent of Beyma's market share is based in professional audio products. Of this share, the majority is for OEM to a number of high profile loudspeaker manufacturers. Each OEM manufacturer specifies a custom-made product or variant in order to derive the personal performance desired and Beyma can tweak the products from its catalogue accordingly. Branding has also been introduced onto all of Beyma's packaging, thereby speeding up delivery times. In addition, the entire factory was upgraded with an extensive new software system over the past two years. All incoming parts and outgoing goods are input allowing the production managers a much improved view of stocks for forecasting.

Beyma's profile in the Asia Pacific continues to rise thanks to the placement of a number of active distributors throughout the region. Having successfully analysed market changes and predicted increased demand from OEM, sales have risen by over 50 per cent since 1996 and demand for the company's products seems destined to continue in an upward direction. During the final quarter of 2012, the manufacturer

opened its own sales office in Guangzhou area managed by two Spaniards in order to properly address the increasing needs of the Chinese market in both commercial and technical sides.



The Beyma show room

"As a company we may have grown and matured, but our avid attention to detail remains unchanged," declares president Jose Masip. "In our early years, we simply want to produce the best possible speakers in the market, but we have evolved through continued investments, developing new patents and technology."

Beyma is a hub of scientific creativity, but through its continued advances it maintains its role as a significant contributor towards loudspeaker manufacturing around the world. Without its significant being added to the cabinets, the art world would be a lot less colourful.