

‘SUONO PURO’: Automobili Pininfarina develops the sound of sustainable luxury

Auto

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- Automobili Pininfarina reveals the technical process behind the soundscape for the Battista hyper GT; influenced by pure, emotional design and creating a signature sound for the brand
- Vehicle architecture, tailored software and the latest audio technologies were used to deliver an essential yet emotive sonic experience, co-developed by sound technicians and designers
- Paolo Dellachà, Chief Product and Engineering Officer for Automobili Pininfarina: “SUONO PURO will delight Battista owners. It’s voice adds a deep emotional connection to the hyper GT by channelling the natural vehicle architecture sound”
- New film presents the unique sound of Battista, also visualised through its transmission in water: youtu.be/E5etYYeFnik

(CAMBIANO/MUNICH – 12 APRIL 2022) : Following more than 2,000 hours of intensive research, conceptualisation, and development, Automobili Pininfarina has revealed the sound of Battista and the story of its creation. The pioneering technical development process behind its uniquely crafted sound included studio composition with sound experts, Novo Sonic, laboratory testing in a sound-insulated anechoic chamber and extensive tuning on the road following customer feedback. One key difference between traditional Internal Combustion Engine (ICE) cars and electric vehicles (EVs) is the sound they create, and the way that makes the driver

feel. With an authentic sound experience that doesn't try to mimic a traditional ICE sports cars, the Battista's pure-electric experience is taken to new heights by capturing the phenomenal, 1,900 hp four-motor powertrain's natural sound.

The result is SUONO PURO – the concept that Automobili Pininfarina's engineers refer to as 'the sound of sustainable luxury'. Unique to the Italian brand, it enhances the connection to Battista for both occupants and onlookers, providing feedback to the driver from the moment they start the vehicle, all the way through each of Battista's five drive modes, and features an Acoustic Vehicle Alert System (AVAS) for pedestrians – a legal requirement for all EVs.

Paolo Dellachà, Chief Product and Engineering Officer for Automobili Pininfarina, said: "The SUONO PURO sound strategy delivers both emotional and essential benefits to the driver. Our aim has been to enhance the enjoyment for occupants by channelling natural vehicle architecture sound through an innovative software arrangement, which ensures unwanted noises are omitted and the frequency at which sound is transmitted supports the comfort and wellbeing of the driver."

"Today we have many clients looking forward to taking delivery of their unique Battista. In addition to an unprecedented 1,900 hp dynamic experience, they will also enjoy a unique 'voice' of this pure-electric hyper GT, enhanced by an equally thrilling 1,300W sound system developed specifically for Battista by our luxury brand partner Naim Audio."

Pure frequency

SUONO PURO centres around the purity of the 432 Hz frequency – widely agreed to be an authentic, uplifting frequency that was used by composers Verdi and Mozart. At idle speed, the Battista's signature is 54 Hz (down

three octaves from 432 Hz) – a base note identified as pure and resonant with a positive influence on the driver’s wellbeing.

The effect of this frequency is seen by the way in which it impacts the most natural of elements – water. Sound resonating at this frequency creates a unique and beautiful ripple effect from the sound waves – forming a perfectly symmetrical appearance. This brings a positive effect to the human body, which is around 70 per cent water and is one of the key benefits of the chosen sound design.

Advanced software and synthesisers shape the aural character of Battista’s five drive modes

Using the Battista’s state-of-the-art technology, bespoke software that was created exclusively for SUONO PURO controls the natural powertrain sounds to be experienced by occupants.

The software delivers sound via synthesisers created exclusively for Battista, transmitted via 12 speakers by our luxury brand partner Naim Audio, located inside and outside the car. These synthesisers and 432 Hz frequency-tuned samples respond to the vehicle speed, torque pattern and other inputs such as the steering in real time. All these elements are integrated in the sound software application called the ‘sound heart’ – a unique control module that enables the most immersive sound experience and feedback for the driver.

The sound characteristics and driving experience can be modified to the preference of the driver via five manually selectable drive modes. The standard driving mode, **Calma**, provides the natural sound of the electric motors, also repeated outside for pedestrian safety reasons. **Pura** adds more character and introduces the 54 Hz base note, audible at ‘idle speed’. **Energica** increases the intensity of the base note in line with enhanced

dynamic performance of the vehicle, while **Furiosa** provides an entirely unique sound character with greater intensity and power. **Carattere** enables the driver to select their choice of sound from any of the other four modes, along with personalised vehicle dynamics settings.

Bespoke Naim Audio partnership

To perfectly project the 54 Hz high-resolution sound experience, synthesisers were exclusively developed for Battista, with Naim speakers transmitting the whole frequency spectrum in exceptional quality. Delivering 1,300 watts of sonic power through 10 speakers throughout the cabin, the system features a Dual Voice Coil Subwoofer located between the seats, with super-tweeters amplifying higher frequencies from behind the seats and in the doors.

Naim Audio masters have also tuned the Battista's amplification and built-in Digital Signal Processing (DSP) system to deliver the highest quality, immersive and engaging interior sound experience. The symmetrical layout of the speakers inside the cabin ensures an auditorium-like effect for both driver and passenger, encapsulating the occupants as if the music is playing directly in the car.

Fine-tuning using an anechoic chamber

After development work in the studio, sound creation moved to a dedicated anechoic chamber – a completely echo-free room that absorbs all unwanted sounds and vibrations. It enabled the Automobili Pininfarina engineers and sound designers to tune the sound in minute detail. With the final soundscape installed, the human-centric process of reviewing the sound to then remove imperfections could begin.

Equipment used in the chamber measures the frequency produced by the Battista from all angles – including inside. The engineers also listen for

imperfections with the support of advanced audio recording equipment to ensure the sound is as pure as possible. A process that can often take up to five years in a regular series production vehicle has been completed in 24 months by a dedicated and passionate team, amassing more than 2,000 hours of studio, road testing and simulation work.

Q+A: In discussion with: Automobili Pininfarina NVH & Sound Managing Engineer, Garry Lane, and Novo Sonic Founder and CEO, Tom Huber.

What was the initial brief for the sound of Battista?

Garry Lane: We wanted SUONO PURO to be unique and pure, to let the powerful electric motors speak for themselves, while also finding inspiration in the purest sound frequencies. We had to ensure the Battista's sounds are instantly recognisable – we want people to hear it and know it is a Battista before seeing it. We also wanted to emotionalise the customer experience, ensuring a strong connection between Battista and its owner.

Tom Huber: The sound needed to accentuate the brand's focus on sustainability and design purity. That is why we began in the studio with the brand's Chief Design Officer, Luca Borgogno, forming a design-inspired 'leitmotif' – a short, recurring musical phrase – that took direct influence from the shape of Battista.

What was the most challenging aspect of the sound project?

GL: The tremendous performance of the Battista needed to be felt, while also translating the Battista design line to create something emotional and engaging. We have done all of this in around half the time it typically takes larger-volume manufacturers, who can often take four to five years to complete research and engineering. We did this not only for a truly special car, but an entire brand.

What was the most important innovation?

GL: Developed from scratch, software that enables the sound to come through as naturally and beautifully as possible is unique. The highest quality sound was implemented via newly engineered synthesizers and, together with Naim Audio, we worked on a specially developed speaker created exclusively for Battista.

TH: Ensuring we had the right software and hardware to reproduce what we created in the studio was important. The Battista's inherent futuristic sound is unique and engaging, with a positive impact on the driver's comfort thanks to the pure 54 Hz signature frequency.

Why 432 Hz?

TH: According to music theory, A=432 Hz is mathematically consistent with the universe. This is known as Verdi's 'A' – named after Giuseppe Verdi, a famous Italian composer. Music tuned to 432 Hz is softer and brighter and is said to provide greater clarity and is more pleasant to listen to. Listening to an orchestra playing in this tuning, many would agree on its significant warmth and pureness.

What is the most special thing about the final sound that you are most proud of?

TH: The driver plays the role of conductor through the various drive modes, hearing as much or as little of the voice as they like. The 'music' composed is emotional and deep, enhancing to the driving experience and the emotional connection to the Battista.

GL: We love the fact that people will be hearing the authentic SUONO PURO of the Battista's advanced powertrain in a way that speaks to the car's design and directly to the driver's heart. We are convinced drivers will

feel the same as we did during the creation process.

PRESS CONTACTS

Dan Connell

Chief Brand Officer

(M) +49 (0) 160 553 0318

d.connell@automobili-pininfarina.com

Franziska Queling

Global Head of Public Relations

(M) +49 (0) 171 265 4094

f.queling@automobili-pininfarina.com

FOR MORE INFORMATION, VISIT

automobili-pininfarina.com/media-zone

EDITOR'S NOTES

THE AUTOMOBILI PININFARINA BATTISTA

The Battista will be the most powerful car ever designed and built in Italy and it will deliver a level of performance that is unachievable today in any road-legal sports car featuring internal combustion engine technology.

Faster than a current Formula 1 race car in its 0 -100 km/h sub-two second sprint, and with 1,900 hp and 2,360 Nm torque on tap, the Battista will combine extreme engineering and technology in a zero emissions package.

The Battista's 120 kWh battery provides power to four electric motors – one at each wheel – with a simulated WLTP range of up to 500 km (310 miles) on a single charge. No more than 150 examples of Battista will be individually hand-crafted at the Pininfarina SpA atelier in Cambiano, Italy.

ABOUT AUTOMOBILI PININFARINA

Automobili Pininfarina is based in operational headquarters in Munich, Germany, with a team of experienced automotive executives from luxury and premium car brands. Designed, engineered and produced by hand in Italy, the Battista hyper GT and all future models will be sold in all major global markets under the brand name Pininfarina. The new company aims to be the most desired, sustainable luxury car brand in the world. The company is a 100 per cent Mahindra & Mahindra Ltd investment and has been named Automobili Pininfarina following the signing of a trademark licence agreement between Pininfarina S.p.A. and Mahindra & Mahindra Ltd. Pininfarina S.p.A. is an influential role in supporting design and production capacities based on their unique 90-year experience of producing many of the world's most iconic cars.

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