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THE NEW ROLLS-ROYCE GHOST PERFECTION IN SIMPLICITY

INTRODUCTION

In 2009, Rolls-Royce announced a new addition to its portfolio that offered something entirely different to its flagship Phantom. This product resonated with a new group of men and women who responded to the marque's relentless pursuit of perfection in design, engineering and craftsmanship, but sought a more modest and minimalist expression of Rolls-Royce. The execution of the first Goodwood Ghost, and its laser focus on meeting the demands of its clients, was an unmitigated success, and over the course of its ten-year lifecycle, this transformative motor car became the most successful product in the company's 116-year history. Ghost's formidable success was vital in enabling the brand to scale up production, invest in its capabilities and establish Rolls-Royce as the truly global brand it is today.

Additionally, Ghost's decade-long market presence enabled the marque's Luxury Intelligence Specialists to gather vital information about developing behaviours in how Ghost clients use their motor car, how they commission it and how they perceive Rolls-Royce. These highly successful and diverse entrepreneurs and founders, who selected this product to celebrate their ongoing ascension, were citizens of the world – they had been educated abroad, they travelled extensively and experienced Rolls-Royce in many cultures.

Due to Ghost's energetic, dynamic personality, these clients came to realise that the Rolls-Royce brand could offer more than a chauffeur-driven experience. Indeed, in the United States of America and areas of Europe, clients were self-driving their Ghost from the very early stages of its introduction. Meanwhile, in Asia, clients were engaging heavily in the connected technology on board, be it for business or pleasure.

Across all markets, when clients commissioned their Ghost they asked the marque's representatives about the driving experience, even if they had selected an extended wheelbase. During the weekend, this business tool morphed into a discreet celebration – clients would switch to the driver's seat and relish a trip to a restaurant or second home with their friends and family. They celebrated this breadth of character, and this reflected in less formal colourways and more personalisation in the driver's eyeline. These were profound learnings.

Meanwhile, at Goodwood, significant advances were being made with the marque's proprietary aluminium spaceframe architecture. First used on Phantom, then Cullinan, this spaceframe is unique to Rolls-Royce and enables the brand's designers and engineers to develop an authentically super-luxury product, free from the constraints of platforms used to underpin highvolume vehicles. As Ghost clients required even more of their motor car, Rolls-Royce used its architecture to respond, incorporating technology such as all-wheel drive and all-wheel steering in Ghost, unlocking an entirely new, purposeful personality.

Concurrently, the design team were tracking an emerging movement that came to define Ghost's aesthetic treatment. It spoke of a shifting attitude among Ghost clients in the way success is expressed. Named 'Post Opulence' internally, it is characterised by reduction and substance. In service to this, exceptional materials must be selected and celebrated. Design must be limited, intelligent and unobtrusive. This philosophy is the antithesis of 'premium mediocracy', a term coined

by the fashion cognoscenti. This refers to products that use superficial treatments, such as large branding or, in the context of motor cars, busy stitching and other devices that create an illusion of luxury by dressing products lacking in substance in a premium skin.

The collective result is new Ghost. This is a motor car precisely tailored to its clients, that appears perfect in its simplicity, that is underpinned by remarkable substance, that is less but better.

ENGINEERING - Proprietary Aluminium Spaceframe Architecture

The marque's designers, engineers and craftspeople demanded the freedom to create a very specific personality for new Ghost. These men and women were only able to create an authentically super-luxury product without the constraints of platforms used to underpin lesser, high-volume vehicles. Hence, the Rolls-Royce proprietary aluminium spaceframe architecture.

Reserved exclusively for Rolls-Royce, this architecture already underpins its flagship, Phantom, and its transformative SUV, Cullinan. The spaceframe's flexibility and scalability freed the marque to serve the unique aesthetic and mechanical demands of new Ghost, and in doing so created an acoustically superior, highly rigid and dynamic proposition for Ghost within the RollsRoyce product portfolio.⁴

In its most pared back form, the Rolls-Royce architecture is based around four fixed points, one at each corner of the motor car. The moveable aluminium bulkhead, floor, crossmembers and sill panels were positioned specifically to ensure new Ghost meets client expectations as a motor car that is equally enjoyable to drive as it is to be driven in. Two of the cast suspension mounting assemblies were pushed to the very front of new Ghost, placing its 6.75-litre V12 behind the front axle to achieve an optimum 50/50 weight distribution.

To accommodate this without intruding on new Ghost's interior suite, its overall length has grown by 89mm, compared to the first Goodwood Ghost, to 5546mm, and its overall width has grown by 30mm to 1978mm. Significant changes were also made to the double-skinned bulkhead and floor structure packaging.

These were undertaken to incorporate an all-wheel drivetrain, all-wheel steering and completely redesigned Planar Suspension System, which further enhances the marque's hallmark Magic Carpet Ride. This was achieved without compromising the motor car's low centre of gravity, which aids cornering dynamics.

Further capitalising on the marque's aluminium expertise, the metal superstructure of new Ghost is 100% made of the material. The car's outer body is rendered as one clean, expansive piece, flowing seamlessly from the A-pillar, over the roof and backwards to the rear of the car, recalling the seemingly one-piece coachbuilt Silver Dawn and Silver Cloud models.

This complete absence of shut lines allows clients to run their eye from the front to the rear of the car uninterrupted by ungainly body seams. To achieve this, four craftsmen hand weld the body together simultaneously to ensure a perfectly continuous seam. In addition, 100% aluminium, laser-welded doors have been used. This not only offers weight benefits and remarkable 40,000Nm/deg stiffness, but the material has a lower acoustic impedance than steel, improving cabin ambience.

6.75-Litre Twin-Turbocharged V12

Client feedback asking for near-instant torque and near-silent running led the marque to further develop the Rolls-Royce 6.75-litre twin-turbocharged V12 petrol engine. A bespoke Ghost engine map was created to ensure ample performance for this dynamic motor car, delivering 563bhp/420kW and 850Nm/627lb ft of torque to the all-wheel steer, all-wheel drivetrain. Commensurate with clients' expectations, maximum torque is available from just 1600rpm – only 600rpm above tick-over. To further refine its already remarkable acoustic properties, the air intake system incorporated larger porting to reduce engine presence in the interior suite.

Planar Suspension System

The marque's hallmark Magic Carpet Ride has evolved. For new Ghost, engineering specialists redesigned the motor car's suspension completely to deliver what is called the Planar Suspension System. Named after a geometric plane, which is completely flat and level, the system is the result of ten collective years of testing and development to create a sense of flight on land never before achieved by a motor car.

Created through physical engineering developments as well as sophisticated scanning and software technology, it incorporates a world-first Upper Wishbone Damper unit above the front suspension assembly, creating an even more stable and effortless ride. This works alongside the Flagbearer system, which uses cameras to read the road ahead and prepare the suspension system for any changes in road surface, as well as the marque's Satellite Aided Transmission. These technologies are managed as one through a bespoke Planar software system. New Ghost can now anticipate and react to the most demanding road surfaces.

The Upper Wishbone Damper alone was the result of five collective years of road and bench testing. Reserved exclusively for Rolls-Royce, this technology further evolves the marque's double-wishbone Magic Carpet Ride suspension system. The ethos of the marque's founder, Sir Henry Royce, was "Take the best that exists and make it better," and in this spirit chassis specialists developed the Upper Wishbone Damper to further improve the continuously variable, electronically controlled shock absorbers and the self-levelling high-volume air strut assemblies. It has never before been applied to a production motor car.

The five-link rear axle benefits from the same self-levelling high-volume air suspension technology, as well as rear-wheel steering. Both axles are managed via the marque's Planar software. This also governs new Ghost's other chassis technologies, including the all-wheel drive, all-wheel steering, stability control and self-drying braking systems, to ensure the motor car is reacting as one to changes in surfaces or grip levels while also maintaining a spirited, dynamic personality.

The Planar software also manages information that requires new Ghost to proactively adapt to intrusions in the road ahead. The first of these technologies is the marque's Flagbearer system. Evocative of the men who were required by law to carry a red flag ahead of early motor cars, this technology consists of a stereo camera system integrated in the windscreen to see the road ahead, adjusting suspension proactively rather than reactively up to 100km/h. The second is Rolls-Royce's Satellite Aided Transmission system, which draws GPS data to pre-select the optimum gear for upcoming corners. The result is unprecedented levels of ride comfort and control for a motor car.

Effortless Doors

Rolls-Royce clients have enjoyed self-closing doors since the first Goodwood Phantom. Operated by a button on the dashboard and on the C-pillar for motor cars with rear doors, this innovation has been celebrated among customers. For new Ghost, the marque's engineers elected to further develop this hallmark technology and, for the first time, clients can now also open the doors with power assistance.

Clients first open the door with one pull of the interior handle, then allow the handle to return to its resting position while they check for potential hazards, and then pull and hold it for full power assistance on opening. Once the door is opened sufficiently for the client's egress, they simply stop pulling the handle, which engages a door brake.

Once the client has alighted, they are able to close the door completely automatically at the push of a button on the exterior door handle. If they prefer to close the door manually, the operation is power assisted. On-board longitudinal and transverse sensors, as well as G-force sensors fitted to each door, allow the same speed of operation regardless of hill or driveway angles.

Micro-Environment Purification System

New Ghost benefits from a new Micro-Environment Purification System (MEPS). Existing air filtration technology was further developed to incorporate a full suite of hardware and software improvements. Highly sensitive Impurity Detection Sensors were introduced to detect ambient air quality, automatically switching fresh air intakes to Recirculation Mode if unacceptable levels of airborne contaminants are present. This channels all cabin air through a nanofleece filter, which is capable of removing nearly all ultra-fine particles from the Rolls-Royce's microenvironment in less than two minutes.

The Most Technologically Advanced Rolls-Royce Yet

New Ghost is perfect in its simplicity, but creating this pure and detoxifying environment was one of the greatest challenges in the marque's history. Indeed, new Ghost is the most technologically advanced motor car Rolls-Royce has ever produced. Further equipment includes: LED and laser headlights with more than 600m of illuminated range, vision assist, including day and night-time wildlife and pedestrian warning; alertness assistant; a four-camera system with panoramic view, all-round visibility and helicopter view; active cruise control; collision warning; cross-traffic warning; lane departure and lane change warning; an industry-leading 7x3 high-resolution head-up display; Wi-Fi hotspot; self-park; and the very latest navigation and entertainment systems.

ACOUSTICS - The Formula for Serenity

Ghost clients operate in complicated business worlds. From the moment they step into the interior suite of their Rolls-Royce, it is essential that they are imbued with a sense of wellness. Visually, this is the result of an obsessive approach to reduction and unwavering dedication to material quality and substance. Experientially, however, this is achieved through peerless chassis and drivetrain engineering, as well as an unrelenting approach to creating a serene acoustic ambience within the interior suite. Rolls-Royce acoustic engineers are experts in serenity.

For new Ghost, it was decided that this expertise would be formalised and the marque's specialists would create a Formula for Serenity that could help inform future products.

The first element of this formula is the Rolls-Royce spaceframe architecture. Its aluminium construction has a higher acoustic impedance compared to steel. Additionally, it is constructed from complex forms, rather than flat, resonant surfaces. Both the bulkhead and floor sections are also double-skinned, sandwiching composite damping felts to reduce road noise intruding into the passenger suite. Larger sections of the architecture have also been created with specific access points for the installation of acoustic damping materials – new Ghost uses more than 100kg in total, applied in the doors, roof, between the double-glazed windows, inside the tyres and within nearly all of the architecture itself.

Once a highly insulated sound stage is created, components that generate almost imperceptible sound waves are tracked and modified. These are known by acoustic engineers as 'hidden inputs'. In the development of new Ghost, every component was interrogated to assess whether it created noises that engineers defined as unacceptable and were completely reengineered as a result. The inside of the air conditioning ducting, for example, created an unacceptable level of wind noise so it was removed and polished to inform the production of the final component. Even drivetrain hardware was adjusted to create new Ghost's near-silent soundstage – the diameter of the prop shaft was adjusted and its rigidity increased to improve acoustics.

The final element of the formula is harmonising the car. The marque's acoustic specialists experimented with a completely silent interior suite, but found the experience to be disorientating. To overcome this, they elected to create a 'whisper', a soft undertone that is experienced as a single, subtle note.

To achieve this, each component had to be tuned so it shared a common resonant frequency. The seat frames in early prototypes, for example, resonated at a different frequency to the body, so damping units were developed to bring the noise together into a single note. Additionally, the large, 507-litre boot cavity produced a low frequency that could be felt at motorway speeds – ports were built underneath the rear parcel shelf that allowed these disruptive sound waves to escape and therefore better harmonise new Ghost's overall acoustics.

Bespoke Audio

As well as creating a serene environment for clients to enjoy in near silence, Rolls-Royce's pursuit of acoustic perfection created an unparalleled sound stage for the marque's Bespoke Audio engineers. These men and women were embedded in the architecture's design phase to create a sound system for new Ghost, engineering audio quality into the very fabric of the motor car.

New Ghost incorporates a resonance chamber into the body's sill section; the frequency response of the Bespoke Audio speaker component defined the chamber's size and shape. In essence, this transforms the motor car into a subwoofer.

A powerful amplifier controls 18 channels (one for each speaker), providing a 1300W output. State-of-the-art optimisation technology and high-precision magnesium-ceramic compound speaker cones enable infinitesimal changes in sound with an outstanding frequency response. For new Ghost, exciter speakers were used alongside more conventional cone-type speakers. These units are bonded to the surface of an object, imparting vibration from the exciter's moving mass directly into it – in the case of new Ghost, the Starlight Headliner, in effect transforming the motor car's ceiling into a large speaker.

Two active microphones in the cabin also enable an adaptive function, detecting the absence or overemphasis of frequencies before triggering the amplifier to adjust the loudness of certain frequency ranges to counteract it. The Bespoke Audio system makes the most of the highest quality uncompressed music, providing an exceptional listening experience.

DESIGN Exterior

Since the launch of the first Goodwood Rolls-Royce, great care has been taken to create a distinctive aesthetic universe for each motor car. These unique domains have been created based on the design values to which different layers of Rolls-Royce clients respond. New Ghost reflects an evolved appreciation of luxury, one defined by minimalism and purity, but underpinned by great substance. In the pre-sketch ideation phase of new Ghost's design development, this treatment was named 'Post Opulence' – a movement defined by authenticity of materials rather than overt statement, which had already established roots in architecture, fashion, jewellery and boat design.

Pursuing this minimalist aesthetic for new Ghost was the design team's absolute objective throughout. The desired treatment was not sterile, but confident in its purity and unmistakably belonging to a Rolls-Royce. This begins with the car's first impression. Rolls-Royce's proprietary architecture allowed the design team to increase the width by 30mm, subtly communicating presence. This is framed by sharp bow lines that intersect with an angular light signature, creating an assertive yet beautiful front end.

In addition, new Ghost was given its own ethereal front-end character. This was achieved not by way of overt design, but with light. 20 LEDs underneath the top of the radiator grille subtly illuminate the veins. During the development phase, early prototypes were over-effective and the light reflecting from the polished uprights looked too striking. In the spirit of Post Opulent aesthetics, the marque's engineering team brushed the back of the metal grille bars, making them less reflective, subduing the effect and perfecting the restrained glow desired.

The front of new Ghost is an exemplar of the design team's obsession with reduction. Owing to the hand-welded aluminium body structures, the main structure of the car appears as one fluid canvas, uninterrupted by shut lines, recalling the coachbuilt Silver Dawn and Silver Cloud. For the first time, the Spirit of Ecstasy is not surrounded by panel lines but rather stands sits within her own 'lake' of bonnet.

Turning to the flanks, a single straight stroke is used to emphasise the motor car's length. The lower 'waft line' borrows from boat design and uses reflection to lighten the surfacing and create a pure, uncomplicated sense of motion.

Moving to the glasshouse, it is wilfully neutral, with both doors sharing an equally proportioned window graphic, gesturing that new Ghost strikes a balance as both a driver-oriented and a chauffeur-driven car. A subtly arched roof line gently proclaims its dynamic intent. The rear end follows this sense of movement and resolves in a taper.

The subtle near-square rear light graphic has become a tenet of contemporary Rolls-Royce design. It remains, but has been modernised with a slight forward tilt. Not surrounded by shut lines, it appears as if it is an island within the painted surface.

Interior

A clear understanding of clients' changing luxury consumption patterns and a broader view of emerging design movements informed the marque that the interior aesthetic should pursue the same minimalist principles as the exterior. Busy details and superficial embellishments were rejected not only to create a more relaxing refuge, but to better celebrate the material substance and maximise the impact of bespoke colour personalisation.

However, creating an environment defined by reduction, simplicity and elegance is an extremely complex endeavour. It also relies on sourcing the very finest materials; leathers, woods and metals left unembellished will invite the scrutiny of these most discerning of clients. To this end, each of the 20 half hides used to create the interior suite of new Ghost are subject to the automotive industry's most exhaustive quality control checks to ensure that each of the 338 panels used – however visible – is of the very best quality. Further demonstrating the marque's competence in leathercraft, complex, busy stitchwork has been eschewed for scant but incredibly long and perfectly straight lines, again welcoming scrutiny from the marque's clients.

Wood sets for new Ghost are available in an open-pore finish, bravely showcasing materials in their naked form. Indeed, two new finishes have been developed specifically for the motor car. The first is Obsidian Ayous, inspired by the rich versatility of colours found in lava rock. The second is Dark Amber; this introduces subtle glamour to the interior suite by integrating veins of fine aluminium particles into the dark wood. As with the leather finishes, this material is left exposed as long, single-veneer leaves, bisected only by cold-to-the-touch real metal vents, through which MEPS-filtered air reaches the cabin.

BESPOKE - Illuminated Fascia

For new Ghost, the marque's Bespoke Collective of designers, engineers and craftspeople created Illuminated Fascia: a world-first innovation that subtly echoes the Starlight Headliner, which has become as much a part of Rolls-Royce iconography as the Spirit of Ecstasy, Pantheon Grille and 'Double R' monogram.

Developed over the course of two years and more than 10,000 collective hours, this remarkable piece brings an ethereal glowing Ghost nameplate, surrounded by more than 850 stars, into the interior suite of the motor car. Located on the passenger side of the dashboard, the constellation and wordmark are completely invisible when the interior lights are not in operation.

Perfectly attuned to new Ghost's Post Opulent design treatment, the Bespoke Collective chose not to use simple screen technology to achieve the effect they desired. Instead, they embarked on creating a highly complex and true luxury innovation. The illumination itself comes from 152 LEDs mounted above and beneath the fascia, each meticulously colour matched to the cabin's clock and instrument dial lighting. To ensure the Ghost wordmark is lit evenly, a 2mm-thick light guide is used, featuring more than 90,000 laser-etched dots across the surface. This not only disperses the light evenly but creates a twinkling effect as the eye moves across the fascia, echoing the subtle sparkle of the Starlight Headliner.

Extensive engineering work was undertaken to ensure the Illuminated Fascia remains completely invisible while not operational. To achieve this, three layers of composite materials are used. The first is a piano-black substrate, which is laser etched to allow light to shine through the wordmark and star cluster. This is then overlaid with a layer of dark-tinted lacquer, hiding the lettering when not in use. Finally, the fascia is sealed with a layer of subtly tinted lacquer before being hand polished to achieve a perfectly uniform, 0.5mm thick high-gloss finish, matching other high-gloss accents incorporated into the interior.

ENDS