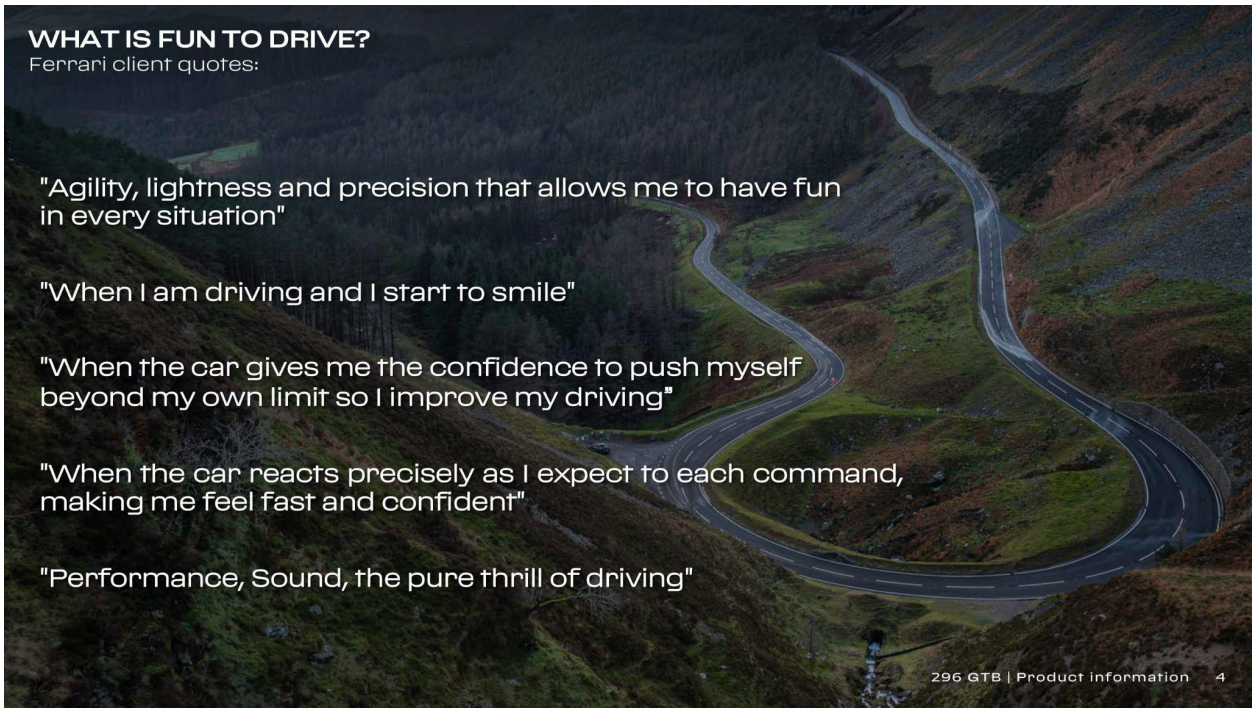
INDEX

PRODUCT CONCEPT

1



CONCEPT

Having fun behind the wheel is the main feature of mid-rear sport berlinettas Ferrari.

From an engineering point of view, it is defined as «**Fun to Drive**». For clients, it is translated as getting out of their Ferrari with a smile.

The 296 GTB, the latest evolution of the Ferrari mid-rear-engined 2-seater berlinetta, aims to raise the bar in terms of Fun to Drive in order to guarantee both exhilarating driving in day-to-day contexts and a thrilling experience on the limit.

To achieve this ambition, we perfected the formula that underpins the success of our mid-rear-engined berlinetta sports cars by:

- Introducing a **new powertrain**
- Introducing innovative **dynamics logics and aerodynamics**
- Revolutionising the **car's dimensions** which are more compact compared to previous sports cars.

This new formula means that the 296 GTB sets the new market benchmark in terms of both **performance** and **Fun to Drive**.

CONCEPT

The main innovation is most definitely **the new 2.992-litre V6 twin-turbo**, with a V120° architecture, which in this car works coupled with a plug-in hybrid system.

This new engineering masterpiece is the first 6-cylinder engine installed on a road car sporting the Prancing Horse badge. However, it is far from Maranello's first V6. In 1961, six decades before the launch of the 296 GTB, Ferrari's competition cars were powered by a V6 and won on both the road (the Targa Florio with the 246SP) and in Formula 1 (first Constructors' World title with the 156F1).

The new power unit, which flanks the marque's multi-award-winning 8- and 12-cylinder power units, is a 663 cv 120° V6 with maximum revs of 8,500 rpm.

The **ICE** is coupled with an **electric motor** by means of a Transition Manager Actuator (TMA) and is capable of delivering a further 167 CV.

Thanks to a massive **830 CV** total power output, the 296 GTB delivers previously unthinkable performance levels and an **innovative, exhilarating** and **unique soundtrack.**

Even the car's name, which combines its total displacement (2992-litre) and number of cylinders (6), references the new engine.

CONCEPT

The **296 GTB's PHEV system** guarantees astonishing usability, pedal response time of zero and a maximum range of 25 km in electric-only mode.

The car's compact dimensions and the introduction of innovative dynamic control systems as well as meticulously honed aero ensure that the driver will instantly experience its astonishing agility and responsiveness to commands. This particular characteristic means that the 296 GTB sets a new benchmark in terms of Fun to Drive.

The new car effortlessly manages and instantly responses to all driving commands such as steering, accelerator, brake and gear-shifts.

The 296 GTB is also Best In Class in its segment in terms of overall performance, referring to **0-200 km/h** acceleration, cut to just **7.3 seconds**, and **0-200 km/h** stopping distance, also cut to just **107m.**

Its Fun to Drive and Performance targets were achieved without compromising either occupant space and comfort or overall dimensions. Thanks to perfect integration with the entire driveline, it was possible to reduce the car's wheelbase, to the benefit of agility, retain the rear bench which can stow a golf bag, and also the generous front boot.

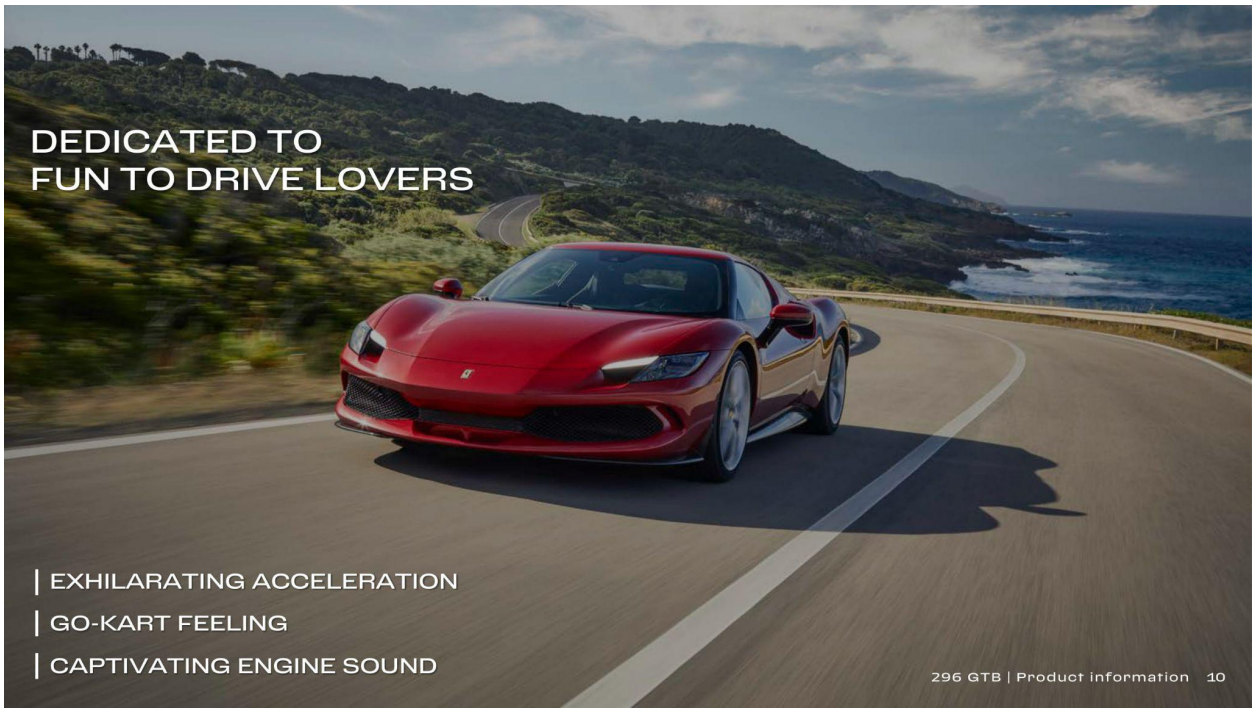
CONCEPT

Its sporty, sinuous **design** and extremely compact dimensions also visually underscore its dynamic abilities

In its exceptional modernity, it brilliantly references 1960s cars of the likes of the 250 LM which made simplicity and functionality their iconic signatures.

For clients that want to really exploit the car's extreme power and performance to the utmost, we have also created the 296 GTB **Assetto Fiorano** package: it is completely uncompromising in terms of maximum performance and design, thanks to significant weight reduction, aero and aesthetic contents.

Ferrari and the idea of undiluted, entertaining and involving driving thrills are inextricably linked. The new formula adopted for the 296 GTB consolidates that association still further, by delivering **sportiness, performance** and **Fun to Drive** at their best!



CUSTOMER PROFILE

THE 296 GTB IS DEDICATED TO ALL ENTHUSIASTS OF FUN DRIVING

100%

Lovers of sporty driving who appreciate both engine performance and design

80%

They will mostly use the car on weekends away or during leisure time

60%

They often take along a passenger when they drive their car

SOURCE OF VOLUMES

REPEATERS
from the current V8 SPORTS CAR range

Attracted by the performance, Fun to Drive and versatility offered by the new model
≈50% of clients

NEW CLIENTS
from the sports car segment

Attracted by the brand, new tech (such as the V6 and PHEV) and how easy the new model is to drive.

Crossing over predominantly from:
McLaren 720S and Artura, Lamborghini Huracan, Porsche Turbo S

DIFFERENT FERRARI FOR DIFFERENT FERRARISTI
DIFFERENT FERRARI FOR DIFFERENT MOMENTS

A further step in the evolution of the Ferrari mid-rear-engine berlinetta in terms of performance and driving pleasure.

- Engine performance
- Vehicle compactness
- New dynamic and aerodynamic content

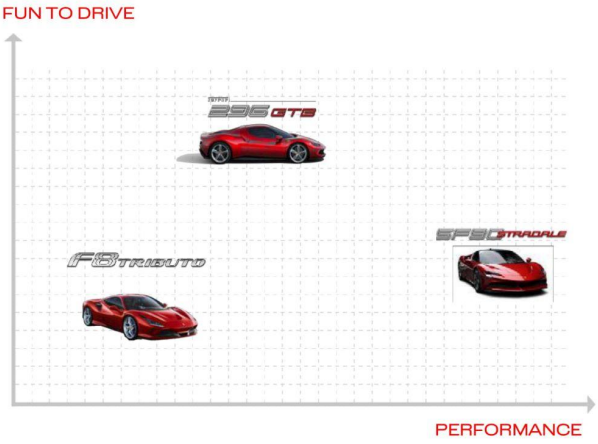
Fun to Drive becomes accessible in all situations.

Designed to ensure all fans of sporty driving can drive on the limit. This is possible thanks to:

- Agility and compactness
- Electrification
- New vehicle dynamic controls

The new 296 GTB joins the Ferrari range but is not a replacement for any specific model. In fact, it completes the range with a new Ferrari dedicated to different kinds of Ferraristi which can be used in different contexts.

The 296 GTB completes Maranello's sports car offering as it enjoys a position that is complementary to the F8 Tributo, the ultimate celebration of the Ferrari V8, and the SF90 Stradale, which remains the "production Supercar" in the range.



KEY DISTINCTIVE ELEMENTS
Which ingredients did we use to innovate the Fun To Drive factor?

① Innovative powertrain
NEW V6

② Performance usable in all situations
HYBRID AND AERODYNAMICS

③ Agility and response to commands
SHORT WHEELBASE AND DYNAMIC CONTROLS

④ Design
CLEAN LINES AND SPORTINESS

KEY DISTINCTIVE ELEMENTS
Which ingredients did we use to innovate the Fun to Drive factor?

① Innovative powertrain
NEW V6

- **First V6** to sport the Ferrari badge
- **V 120° Hot V*:** compact and efficient
- Best in Class performance
  - **2.992 l V6 Turbo** delivering **663 CV**
  - **221 CV/l:** Record specific power output
  - **8.500rpm** max revs
  - **830 CV** max power output thanks to electrification
- Exhilarating and unique V6 **sound**

② Performance usable in all situations
HYBRID AND AERODYNAMICS

- The first Ferrari **RWD PHEV** with:
  - **25 km** e-range
  - Even shorter pedal response time
- **Aero** derived from supercar/sports prototype experience
  - **360kg** @ 250km/h downforce
  - **Active aero:** contributing for 100kg downforce in the rear

③ Agility and response to commands
SHORT WHEELBASE AND DYNAMIC CONTROLS

- Exhilarating **Fun to Drive** in all sporty driving situations
  - Breath-taking **longitudinal acceleration** – Best In Class
  - Exhilarating lateral acceleration
    - **2.600mm:** short wheel base
    - **1,77kg/CV** weight to power
    - **New ABS evo** – World Premiere
  - New generation **8-speed DCT**
  - Braking precision and instantaneous response
    - **ABS evo + 6w-CDS sensor**
    - **Brake-by-wire**

④ Design
CLEAN LINES AND SPORTINESS

- **New approach** to berlinetta design that is a significant departure from previous models
- Compact yet **sinuous design** that underscores the car's sporty soul
- Lines inspired by Ferrari's most iconic berlinettas, particularly the **250LM**

*the 6 cylinders are arranged in a V with a 120° angle, allowing the turbos to be located inside the V (hence the "Hot V" moniker)

TECHNICAL DETAILS

2

KEY DISTINCTIVE ELEMENTS

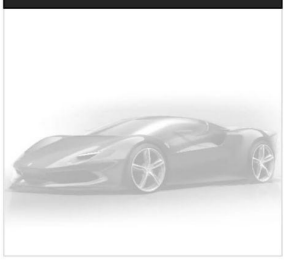
Which ingredients did we use to innovate the Fun To Drive factor?

① Innovative powertrain
NEW V6

② Performance usable in all situations
HYBRID AND AERODYNAMICS

③ Agility and response to commands
SHORT WHEELBASE AND DYNAMIC CONTROLS

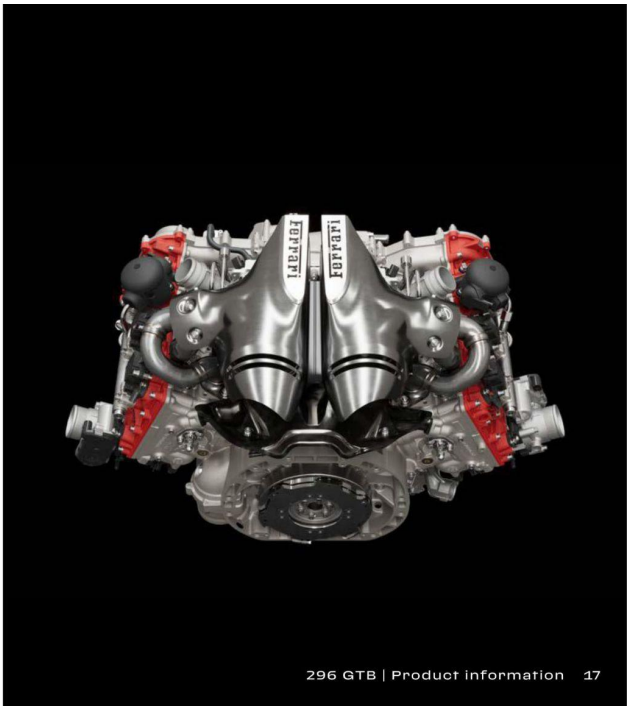
④ Design
CLEAN LINES AND SPORTINESS



INNOVATIVE POWERTRAIN
New V6

- **First road V6** to sport the Ferrari badge
- **120° Hot V:** compact and efficient
- Exhilarating and unique **V6 sound**
- Best in Class engine **performance**

Type	V6 - 120° - turbo – dry sump
Overall displacement	2992 cc
Max. power output	663 cv @ 8000 rpm
Max. torque	740 Nm @ 6250 rpm
Specific power output	221 cv/l
Max. revs	8500 rpm
Bore x Stroke	88mm / 82mm
Compression ratio	9.4:1



INNOVATIVE POWERTRAIN
Main elements

120° V WITH CENTRAL TURBOS

- Equally-spaced firings (sound benefits)
- Turbos located inside the V
- Mass reduction: -30kg vs V8
- Intake plenum integrated into crankcase

COMBUSTION CHAMBER DERIVED FROM SF90

- 350bar central injectors
- +10% chamber pressure vs SF90 - Highest in the range in order to reach 221CV/l
- Improved fuel-air mix in chamber and boosted performance
- Emissions reduced

CENTRAL EXHAUST AND SOUND

- Central single tailpipe contributes to unique soundtrack impact
- Linear exhaust layout: improved permeability to cope with increase in power
- All-Inconel to reduce weight and boost heat resistance

INNOVATIVE POWERTRAIN
Concept

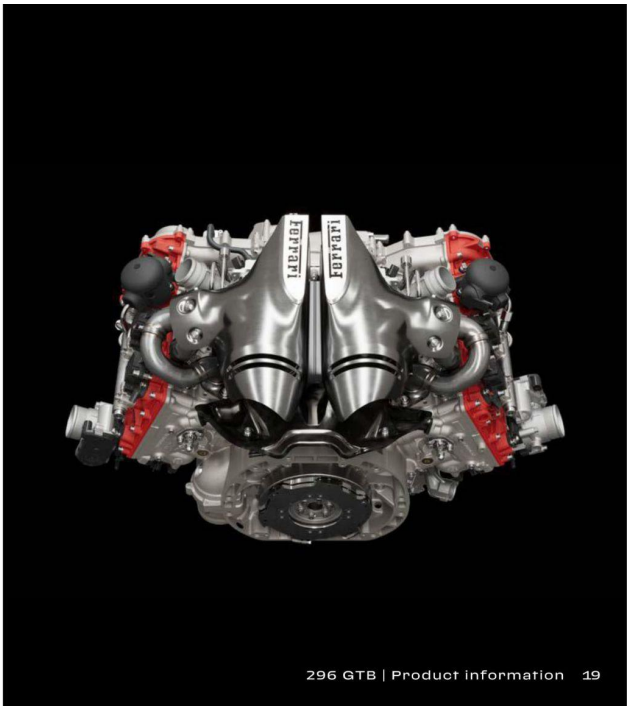
The 296 GTB ushers in a powertrain revolution. It is the first Ferrari-badged road car to sport Maranello's latest engineering masterpiece: the **new Ferrari V6 turbo engine**.

The architecture in the 296 GTB's new ICE is innovative: its six cylinders are arranged in a V with an angle of 120° between the cylinder banks. This allowed the turbos to be installed inside the V in what is known as a Hot-V configuration.

Aside from bringing significant advantages in terms of packaging, lowering the centre of gravity and reducing engine mass, this particular architecture helps deliver on extremely challenging power targets.

The result is that the new Ferrari V6 has set a new specific power output record of **221 CV/l** for a range car.

Integrating it with an electric motor at the rear means the 296 GTB's combined maximum power output is 830cv, ensuring that the 296 GTB is Best in Class in the rear-wheel-drive sports car segment as well as making it extremely usable. Usable in terms of day-to-day contexts (the 296 GTB has a full-electric mode range of 25 km) and in driving enjoyment (accelerator pedal response is instant and consistent at all engine speeds).



INNOVATIVE POWERTRAIN
Concept

Lastly, this powertrain architecture clearly draws on the wealth of experience Ferrari has built up over the years in motor sport, referencing in particular:

1. **Mid-rear V6:** in 1961, the 246 SP (a sports prototype competition car) was the first Ferrari to adopt this type of architecture. It won the Targa Florio in 1961 and 1962.
2. **120° V6:** the 1961 156 F1, which won the F1 World Championship, was the first car in the world to sport a 120° V6 engine
3. **120° V6 with central turbos:** the 126 C, which won the F1 World Championships in 1982 and 1983, was the world's first car to sport turbos between its cylinder banks
4. **Hybrid V6 Turbo:** since 2014, the F1 World Championship cars are powered by a hybrid V6 turbo

INNOVATIVE POWERTRAIN
A 120° hot-V layout

The development of the new engine was preceded by a long and painstaking phase of research and analysis all of the possible architecture types and configurations before the design we see today was finally produced. The **120° V** angle between the two cylinder banks can accommodate two generously-sized turbos in complete synergy with component packaging and optimal mass distribution factors. The architecture is also successful in terms of:

- Firing order (120° crank angle and equally-spaced firings) has **advantages in terms of sound**: the equally-spaced firing balance the sound, guaranteeing both purity to the orders of harmonics as well as power;
- **Integration of intake plenum** (fluid-dynamic detuning and time-to-boost) and engine supports on the intake sides of the cylinder heads: the engine is thus lighter and more compact because of the elimination of the plenums and exterior supports, while the fluid-dynamics benefit from the reduction in volumes, boosting intake efficiency.
- **Reduction system weight and dimensions**: because the 120° V offers more space inside its V than a 90° V, the turbos could be installed centrally, thus significantly reducing the unit's overall size and the distance the air has to cover to arrive in the combustion chamber, maximising the permeability and efficiency of the intake and exhaust line ducts.

The new 120° V6 architecture and the content introduced allowed the engine's overall weight to be significantly reduced: **-30kg** compared to Ferrari's recent V8s.

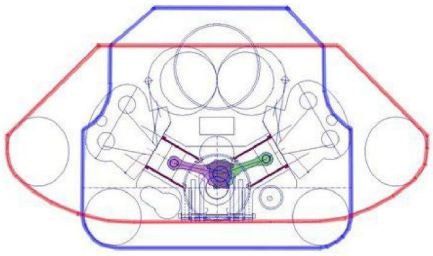


Fig. 1 V6 Engine – First draw

Fig. 2 Final engine

INNOVATIVE POWERTRAIN
Turbos

The engine's new **Hot V layout** with a 120° angle between the cylinder banks allowed the creation of a new exhaust assembly with the twin turbos positioned centrally. This configuration, adopted previously on historic Ferrari F1 cars, such as the 126CK driven to victory at Monaco by Gilles Villeneuve, yields a more compact, efficient layout, particularly from a heat perspective.

The **turbos**, one per cylinder bank, feature aerodynamics developed using CFD optimisation techniques. The new geometries allow 180,000rpm to be reached with an enhancement of performance and efficiency, and with a 24% boost increase. The turbos, which are symmetric and counter-rotating, are designed with a monoscroll architecture; these solutions allowed to reduce the compressor wheel diameter by 5% and the turbine wheel diameter by 11% compared with V8 applications. The benefits derived by the reduction of rotating masses (11% reduced inertia compared with F8 3,9l engine) led to a reduction of time-to-boost, in favour of an immediate power release.

The **rev sensors and electric actuators**, an evolution of those used on previous Ferrari models, allow the turbos' range of use to be extended and deliver excellent dynamics in high speed manoeuvres, guaranteeing maximum reliability.

The **exhaust manifolds**, optimised to maximise performance and guarantee a full, pure V6 soundtrack, are made entirely from Inconel, which means they can be thinner and thus lighter without compromising on reliability.

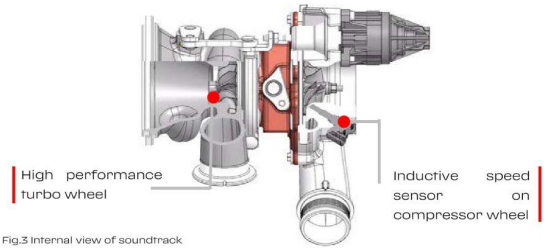


Fig.3 Internal view of soundtrack

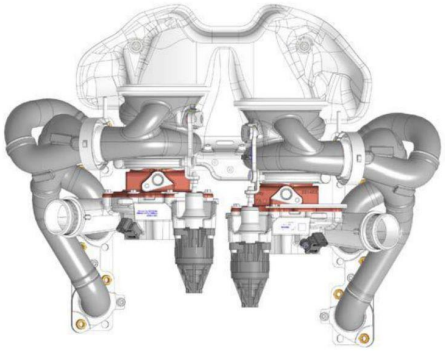


Fig. 4 Turbocharger with exhaust manifolds

INNOVATIVE POWERTRAIN
Combustion chamber pressure

The engine benefited from the latest Ferrari combustion chamber development introduced on the SF90 Stradale: central injector and spark plug with 350-bar pressure injection system that improves mixing in the chamber, performance and emissions reduction.

The intake and exhaust ducts were redesigned and tuned to maximise volumetric efficiency and guarantee high levels of turbulence in the chamber (knock mitigation).

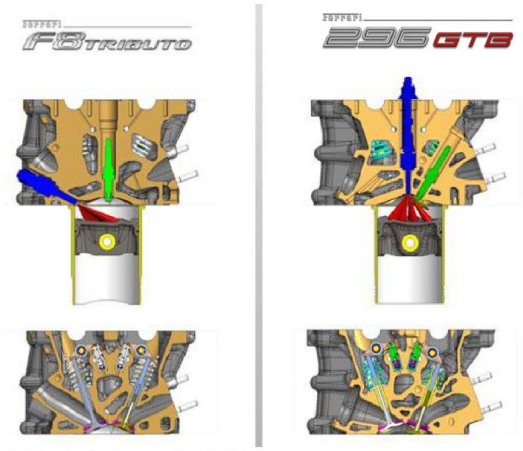


Fig. 5 Combustion chamber with central injector

INNOVATIVE POWERTRAIN
Combustion chamber pressure

To deliver 221 CV/l, the pressure in the combustion chamber had to be pushed to new heights (+10% vs SF90 Stradale), completely unexplored in previous Ferrari turbo engines.

Boosting the pressure in the chamber demanded exceptional development from both a thermal-fluid-dynamic and structural point of view without compromising on engine weight and reliability.

To that end, Ferrari poured all of its significant expertise in alloys, dimensioning and components into engineering entirely in-house the complete aluminium engine block and cylinder heads. All components are new and specific to the new V6 architecture.

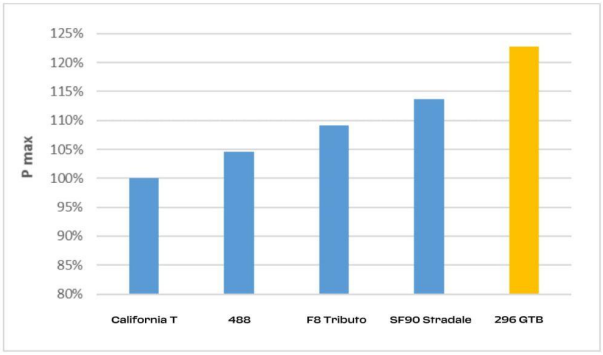


Fig. 6 Comparison of maximum combustion chamber pressure

INNOVATIVE POWERTRAIN
Distribution and valve train

The distribution is completely new: drive is transmitted from the crankshaft via chains sized specifically for the new V6 and for the specific 120° layout: to the pump assembly (water and oil) via a timing chain and to the valve train via an offset sprocket and a dedicated timing chain per cylinder bank.

The assembly thus comprises:

- The main chain with a dedicated hydraulic tensioner
- Two bush chains - with relative hydraulic tensioner and different calibrations for right and left bank - are used as the secondary drive of each bank
- A dedicated chain for the oil pump assembly.

This is the first time a hydraulic tensioner has been used on the main chain in a Ferrari engine and is there to cope with the engine's record power, guaranteeing correct chain dynamics and keeping the tension of the chains within the mechanical limits.

The distribution mechanism, which has roller fingers with hydraulic tappets, has intake and exhaust valve train profiles specific to this V6. The new 120° architecture demanded specially developed hydraulic tappets to guarantee there was no air in the system on start up after the car had been stopped for some time.

All of the technical solutions adopted in the distribution system allow the new V6 engine to simultaneously deliver a record specific power output of 221CV/l without compromising on maximum revs, increased to 8,500 rpm compared with V8 Turbo Ferraris, and on reliability.

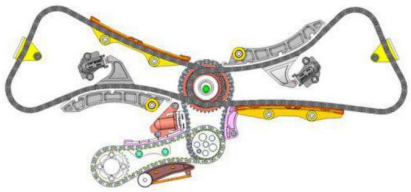


Fig. 7 Distribution system

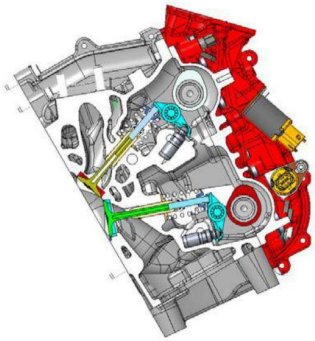


Fig. 8 Valvetrain

INNOVATIVE POWERTRAIN
Crankshaft

The V6's crankshaft is made from nitrided 30CrMoV10 steel.

What makes this crankshaft, which has a 120° crank angle, different is the process used to make it. To ensure it has the aforementioned crank angle, in addition to the initial forging of the rough ingot, the crankshaft is twisted to achieve the 120° crank angle.

It is then subject to deep nitriding heat treatments (to guarantee mechanical characteristics such as resistance to high loads), machining and balancing. All of these stages are completed entirely in-house in Maranello.

The firing order of the new V6 is the result of the crankshaft's journal geometry. The order selected was 1-6-3-4-2-5, which takes into account performance and sound requirements.

Its level of balance -100% of the rotating masses and 25% of the alternating masses are balanced - allows loads on the bushings to be reduced without increasing the weight of the engine.

The use of specific technical content also allowed the dimensions of the front and rear codoli to be reduced, with the aim of making a significant contribution to reducing weight and size.

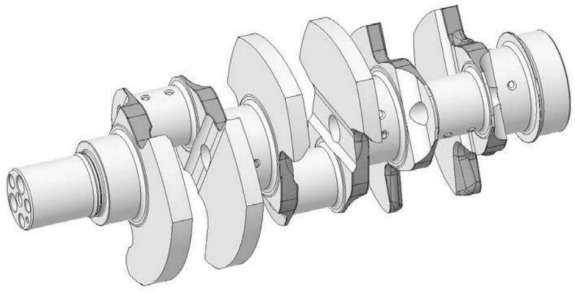


Fig. 9 Crankshaft

INNOVATIVE POWERTRAIN
Variable displacement oil pump

A completely new variable displacement oil pump was developed to guarantee that the oil pressure is continuously controlled right across the engine's entire operating range.

A solenoid valve, controlled by the engine ECU in a closed loop, is used to control the pump's displacement in terms of flow and pressure, delivering only the amount of oil required to guarantee the functioning and reliability of the engine, whilst simultaneously providing a reduction in the power absorbed by the pump itself.

On the oil scavenge side, to minimise splashing losses, the suction system was made more powerful using six scavenge rotors: three specific dedicated rotors for the crankcase below the crank throws, one for the distribution compartment and two for the cylinder head compartments.

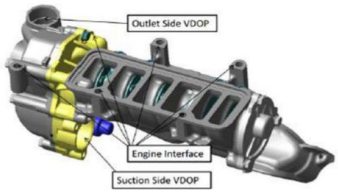


Fig. 10 New oil pump with electronic variable displacement flow

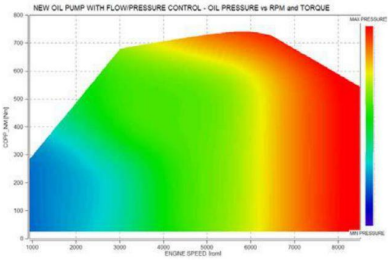


Fig. 11 Oil pressure-engine rpm/torque control

INNOVATIVE POWERTRAIN
Intake plenum

In Ferrari engines, the intake plenum is normally located in the centre of the V.

However, the V6 hails a paradigm shift in that regard: its plenums are on the side of the cylinder heads, leaving the space inside the V open for the two turbos. The volume of the plenum is partly integrated inside the cylinder head, partly delimited with a cover which supports the throttle valve.

The use of intake plenum on the side of the cylinder heads results in:

- Reduction in engine weight
- Boosted performance thanks to very short inside the head and consequent fluid-dynamic detuning
- A reduction in time-to-boost (as a result of the reduction in the volume of the high pressure air line)

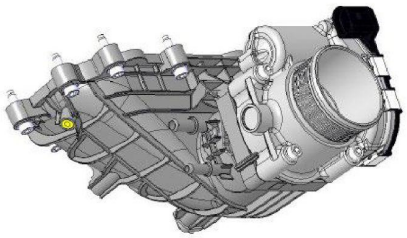


Fig. 12 Intake plenum

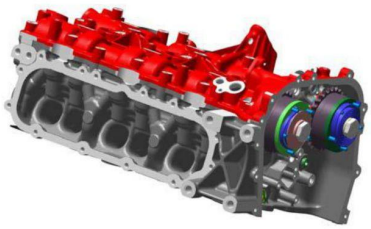


Fig. 13 Cylinder heads with part of integrated intake duct

INNOVATIVE POWERTRAIN
Single exhaust line and tailpipe

The new V6 engine has **Hot V** architecture meaning that the turbos are located centrally between the two cylinder banks. This new architecture encouraged the development of a more **linear exhaust line** located in the upper part of the engine compartment and is enhanced by the large visible engine bay.

The shape of the exhaust increases the permeability of the exiting gasses and makes a significant **contribution to the engine's record-breaking performance.**

The exhaust manifold and catalyser housings are made entirely from **Inconel®**, a steel-nickel alloy that reduces the weight of the exhaust and makes it more resistant to high temperatures.

Particular attention was focused also on insulating materials with age and high temperature resistant finishes

The exhaust line ends in a **single central tailpipe** which unites the two banks and contributes to this engine's unique sound in addition to being the most distinctive styling element of the rear of the car.

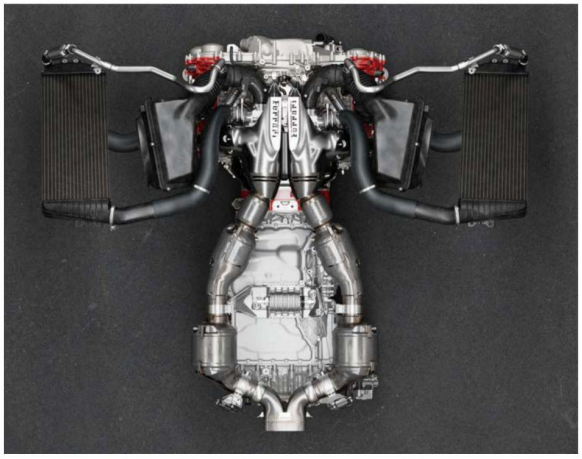


Fig. 14 Upper view of all powertrain, with linear exhaust layout

INNOVATIVE POWERTRAIN
Sound

This Ferrari's soundtrack matches its performance, creating a sense of unprecedented involvement: a new page has been turned in Maranello's berlinetta history. Even at low revs, the sound inside the cabin (represented by Figure 15) features the **pure V12 orders of harmonics** which then, at higher revs, guarantee that **typical high-frequency treble**. Even to those outside the car, the shrill sound of the engine is instantly recognisable.

The uniqueness of the sound is a result of the architectural choices made at the engine and car's concept phase, and the perfecting of every single detail during the development process to deliver maximum engine performance and maximum sound expression.

The **120° V architecture** guarantees a symmetrical firing order while the **equal-length, tuned exhaust manifolds** combined with the **single exhaust line** outside the hot-V amplify the pressure waves.

These characteristics are what lend such purity to the orders of harmonics, which are further helped by a limiter that hits an impressive 8500 rpm.

The patented **"hot tube"** has been completely redesigned and is positioned prior to the exhaust gas treatment systems so that it channels the pure sound into the cabin.

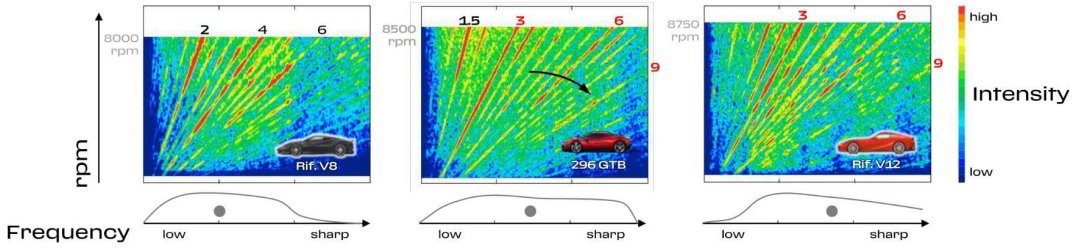
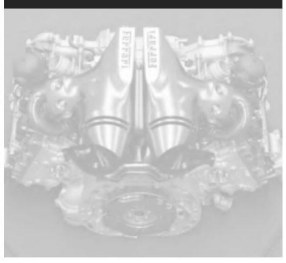


Fig. 15 Sound pressure spectrum in cabin as revs rise. The F171 has the rich full harmonics (indicated by arrow) typical of Ferrari's V12s whilst retaining the intensity of the V8 turbo.

KEY DISTINCTIVE ELEMENTS
Which ingredients did we use to innovate the Fun To Drive factor?

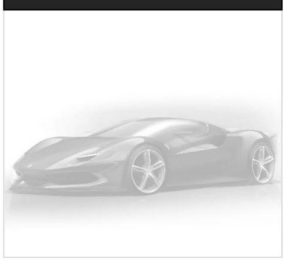
① Innovative powertrain
NEW V6



② Performance usable in all situations
HYBRID AND AERODYNAMICS

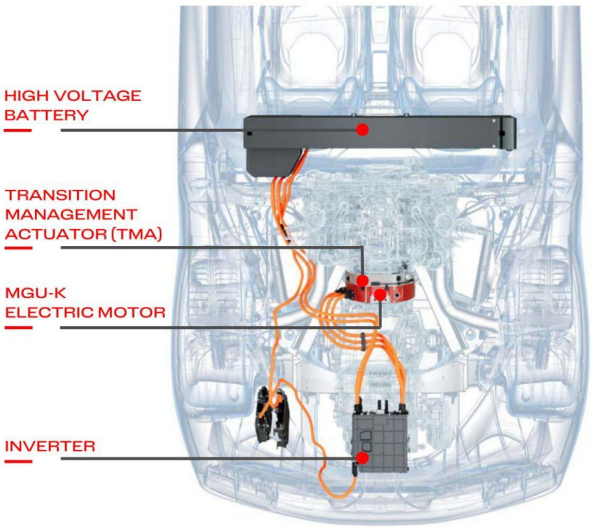
③ Agility and response to commands
SHORT WHEELBASE AND DYNAMIC CONTROLS

④ Design
CLEAN LINES AND SPORTINESS



PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid

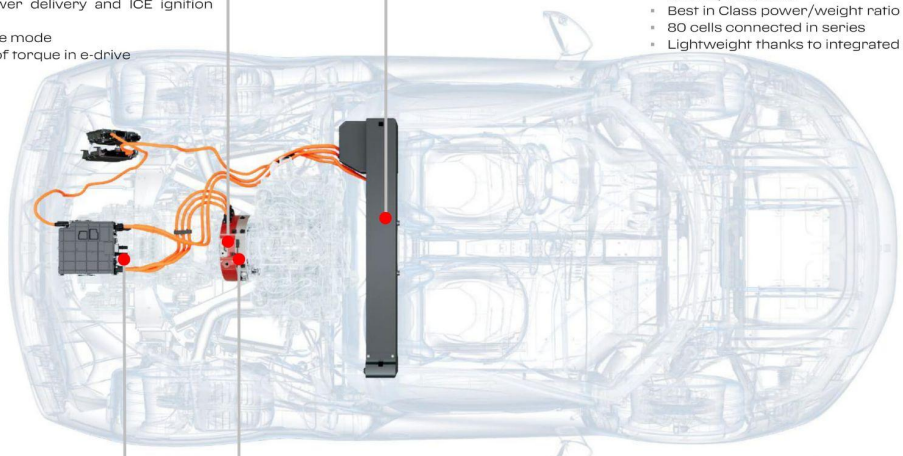
- First RWD PHEV Ferrari: **25km e-range**
- Electric motor: increase Max Power to **830CV**
- Instantaneous response to pedal
- Hybrid manettino to manage powertrain



PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid - Main elements

MGU-K ELECTRIC MOTOR
- Axial flow, between ICE and gearbox
- Charging, power delivery and ICE ignition functions
- Enables e-drive mode
- Up to 315Nm of torque in e-drive

HIGH VOLTAGE BATTERY
- 7,45Kw/h capacity
- Best in Class power/weight ratio
- 80 cells connected in series
- Lightweight thanks to integrated components



INVERTER
- With parallel modules
- Optimised to deliver increase in MGU-K to 315Nm

TRANSITION MANAGEMENT ACTUATOR (TMA)
- Manages hybrid/electric transitions
- Extremely compact: only 50 mm wide

PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid - Concept

This is the first ever Ferrari with a rear-wheel drive-only PHEV (Plug-in Hybrid Electric Vehicle) architecture in which the ICE is integrated with a rear-mounted electric motor derived from the Formula 1 configuration from which it inherits the MGU-K (Motor Generator Unit, Kinetic) moniker.

The electric motor and ICE are coupled by the Transition Manager Actuator (TMA) which allows them to be used both together to produce a combined power output of 830CV or decouples them to allow the electric motor to work alone, which guarantees an e-drive range of 25 km.

The new powertrain's architecture is comprised of the following:

- V6 turbo ICE
- 8-speed DCT with E-diff
- MGU-K electric motor connected to the ICE and located between the engine and gearbox
- TMA (Transition Manager Actuator) which decouples the electric motor from the ICE to manage electric and hybrid driving modes
- High voltage battery, located under the floor, with a capacity of 7.45 Kwh
- Power electronics (inverter) to manage the electric motors

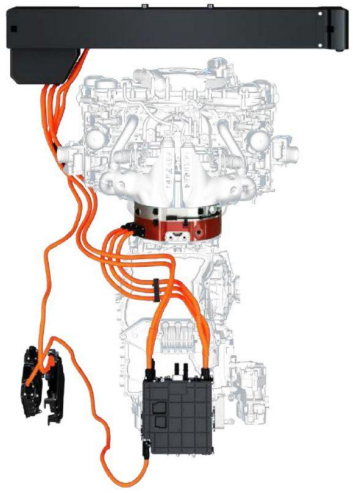


Fig. 16 Hybrid System layout

PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid - MGU-K

The **MGU-K** is a dual-rotor single-stator axial flux motor.

The structure of this extremely compact motor designed to be coupled with the ICE (specifically between the ICE and the gearbox) and its axial flux connotation allowed the length of the powertrain to be reduced helped shorten the 296 GTB's wheelbase. The electric motor fulfils various functions:

- it **charges** the high voltage battery
- **turns on the ICE**
- supplies it with additional **torque** and **power**
- allows the car to be driven in all-electric **eDrive mode**.

In e-drive mode, the MGU-K is decoupled from the ICE by an additional decoupler. To guarantee optimal driving performance in e-drive mode without using the electric front axle, the MGU-K's design was improved to allow it to reach maximum torque of 315 Nm, around 20% more than previous applications.

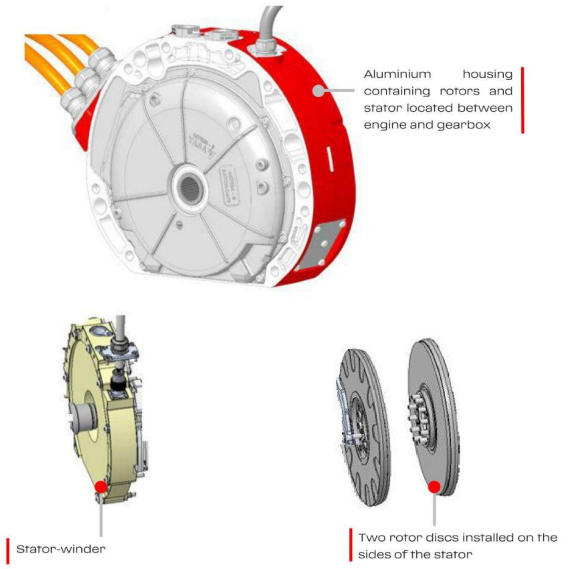


Fig. 17 MGU-K

PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid - Transition Manager Actuator (TMA)

The **TMA (Transition Manager Actuator)** allows very rapid static and dynamic transitions from electric to hybrid/ICE mode and vice versa, thereby guaranteeing smooth, progressive torque.

Its control software, which was developed entirely in-house by Ferrari, dialogues with the DCT, motor and inverter software to more efficiently manage ICE ignition and its connection and disconnection to the transmission.

The TMA was designed to minimise weight and bulk. Thanks to new generation, the TMA allowed the design of an incredibly compact transmission unrivalled on the market in terms of systems of this kind.

In fact, the system has an overall impact on the length of the powertrain of just 54.3 mm.

The new TMA's architecture comprises the following components:

- Triple-plate dry clutch
- Clutch command module in line with the driveline with a clutch control linkage
- ECUs.

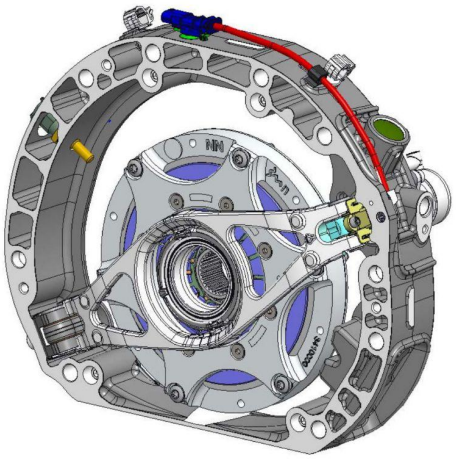


Fig. 18 Transition Manager Actuator (TMA)

PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid - Battery

The high voltage battery is a highly integrated and very powerful energy storage system.

Thanks to an innovative design manufactured using laser welding, the 296 GTB's high voltage battery has a **7.45 kWh capacity** and a **competitive weight/power ratio**.

The battery pack is located under the floor to the benefit of packaging (and compactness) and the usability earned by retaining the rear bench.

To minimise the batter's volume and weight, the cooling system, structure and fixing points are integrated into a single component.

The cell modules contain 80 cells connected in series (Cell to Pack).

Each Cell Supervisor Controller is installed directly in the modules to reduce volume and weight.

Lastly, to reach the challenging weight targets set, meticulous attention was focused on the specific design of every single battery component and the use of lightweight materials such as thin aluminium.

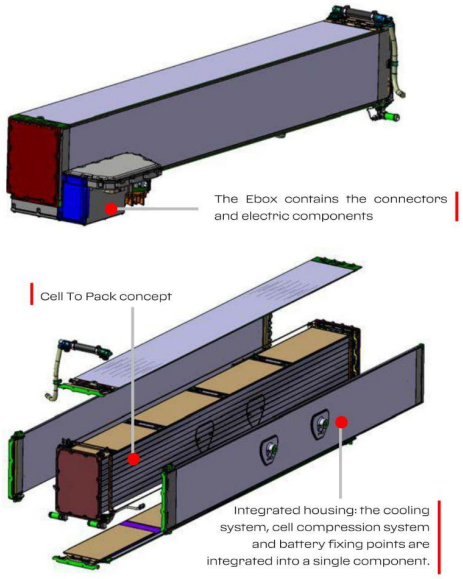


Fig. 19 High Voltage Battery

PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid - Inverter

This component converts the direct current from the battery into alternating current which can be used for the MGU-K. The inverter works both ways, based on the driver's requests: it can charge the battery or deliver power.

The 296 GTB's inverter is based on two silicon modules connected in parallel, the power delivery mode of which has been optimised to achieve the MGU-K's **20% torque increase** to **315 Nm**.

This 296 GTB's inverter converts the electric energy with an extremely high level of efficiency (over 94%).

It can supply the power required to start the V6 even when there is maximum demand for electric power.

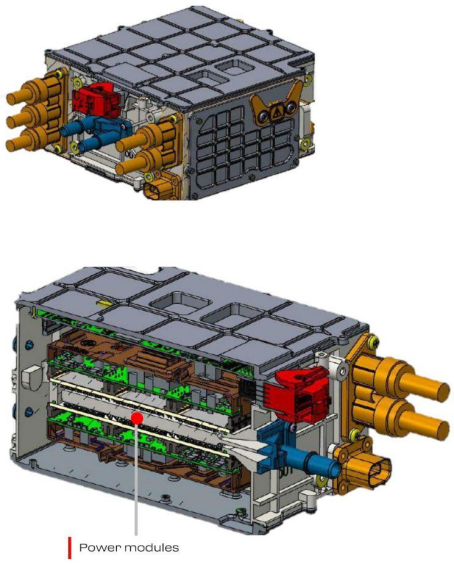


Fig. 20 Inverter

PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid - Functionality

To describe how the hybrid system works, the energy flows can be split into two main categories:

1 **Power delivery** (traction, discharging battery) regulated by the driver's accelerator pedal commands, managed by engine control, supervised by hybrid control in terms of energy flows and monitored by traction control.
Power delivery modes can be divided up as follows:

- **Electric mode:** eDrive with rear wheel drive
- **RWD hybrid mode:** with synergic management of the V6 engine, the MGU-K electric motor, the DCT8 gearbox and the TMA decoupling actuator.

2 **Energy recovery** (battery charging): completely controlled by the hybrid system's control logic using three strategies:

- **Regenerative braking:** only available on rear axle in both standard braking conditions and under ABS control.
- **Overbraking:** active on rear axle when accelerator pedal is released
- **ICE recharge:** battery-charging function achieved by load point shifting between the ICE and the rear MGU-K electric motor.

PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid - eManettino

MODE ALIAS	ELECTRIC (E)	HYBRID (H) Default mode	PERFORMANCE (P)	QUALIFY (Q)
CONCEPT	Electric drive	Powertrain at maximum efficiency	Sustainable performance (repeated laps)	Max Performance (fewer laps)
BATTERY MANAGEMENT STRATEGY (SOC*) *SOC: state of charge	(Depleting) 	(Depleting & Sustaining) 	(Charging) 	(Charging) 
TRACTION	Electric Only MGU-K	Hybrid MGU-K + ICE	Balanced ICE + MGU-K	Peak ICE + MGU-K
ENERGY RECOVERY	MGU-K	MGU-K	MGU-K	MGU-K

Unlike previous applications, the Hybrid (H) position, normally Depleting-Sustaining, allows the driver to select a Hybrid Recharge function using a manual override in the system menu on the display. The system will then charge the battery as if the eManettino were in Qualify mode, but will ensure that electric-only driving is available at speeds of under 20 km/h within a charge status adjustment range.

PERFORMANCE USABLE IN ALL SITUATIONS
Hybrid - eManettino

Power management plays a pivotal role in a hybrid powertrain: it was thus necessary to have a selector to manage the power flows alongside the vehicle dynamics control selector (the traditional Manettino).

This selector, known as the **eManettino**, manages the power flows from and to the high voltage battery and the wheels.

eManettino modes:

- **E-DRIVE**- Combustion engine remains off and traction is entrusted entirely to the electric rear axle. Starting with a fully charged battery, the car can cover up to 25 km in this mode. It is ideal for city centre driving or any other situation in which the driver wishes to eliminate the sound of the Ferrari V6. The speed limiter at 135 km/h means the 296 GTB can be used to its full potential on out of town roads
- **HYBRID** (default mode) – In this mode, the power flows are managed to optimise the overall efficiency of the system. The control logic autonomously decides whether to keep the internal combustion engine running or turn it off. If it is on, the internal combustion engine can run at maximum power thus guaranteeing powerful performance whenever the driver requires. Speed in e-drive mode is limited to 125km/h with less sharp acceleration but nonetheless the car can be used in both urban and out of town contexts.
- **PERFORMANCE**: unlike 'Hybrid', this mode keeps the ICE running because the priority is more on charging the battery than on efficiency. This guarantees that power is instantly and fully available when required. This mode is best suited to situations in which driving pleasure and Fun to Drive are the main focus.
- **QUALIFY**: this control logic prioritises maximum performance over battery charging.

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics

- **Supercar** and racing car-derived aerodynamics
- Downforce: **360 kg @ 250 km/h**
- Rear **active aero:** contributing for **100 kg @ 250km/h**

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Main elements

TEA-TRAY
- Competition-derived solution
- Increases front downforce
- Flow accelerated towards the car's underbody

FRONT UNDERBODY
With louvres optimised for:
- Downforce generation
- Car systems cooling

AIR CURTAIN
- Air vent on the wheelarch
- Reduces drag

SIDE SPLITTERS
The side splitters generate downforce by channelling the air flow which strikes a vertical nolder at the edge of the bumper which generates a local recompression area that increases downforce.

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Main elements

VIRTUAL REAR SCREEN
- Virtual fairing created by wing profile
- Channels flow towards rear

ACTIVE SPOILER
- Spoiler armonically integrated into car design
- Only when required, the spoiler deploys and generates +100kg of downforce

REAR UNDERBODY
- Optimised ventilation apertures
- Surface area recovered for downforce generation

DIFFUSER
- Central channel with double kink line
- Modifies the direction in which the flow sucked along the underbody is released into the car's wake, containing drag.

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Concept

CONCEPT DERIVED FROM SUPERCAR

The sharp break from the past is further highlighted by aero choices which have turned the active aero paradigm introduced into the V8 2-seater berlinetta family from the 458 Speciale onwards, on its head.

To achieve the ambitious downforce target set, an active device is being used not to manage drag but to generate extra downforce as happened with supercars of the likes of the SF90 Stradale and the LaFerrari. Inspired by the latter, in fact, the active spoiler integrated into the rear bumper allows the 296 GTB to generate a high level of rear downforce when required.

This conceptual choice also had repercussions on the aerodynamic design which has been strongly influenced by the need to increase downforce at the front of the car to achieve the correct balance between the two axles in all conditions of use: in both **Low Drag (LD)** and **High Downforce (HD)** situations.

Thanks to the close collaboration with the Ferrari Styling Centre and meticulous CFD aero and wind tunnel development work, this balance was achieved by seamlessly integrating form and function and continuously honing the car's volumes, all in the pursuit of performance. The result is a car with an extremely clean, elegant design in which all the performance-oriented elements meld effortlessly with the styling, underscoring the inextricable marriage of technology and aesthetics that is the signature of all Ferraris.

As further proof of this, the aero development work done on the 296 GTB means that even in LD configuration the car can deliver a downforce up to **360kg @250km/h**, benefiting from 100 kg thanks to the active aero in the HD configuration.

This delivers an overall downforce figure completely unmatched by any previous berlinetta, and which maximises handling and braking performance, resulting in peerless driving fun and dynamics as well as safety.

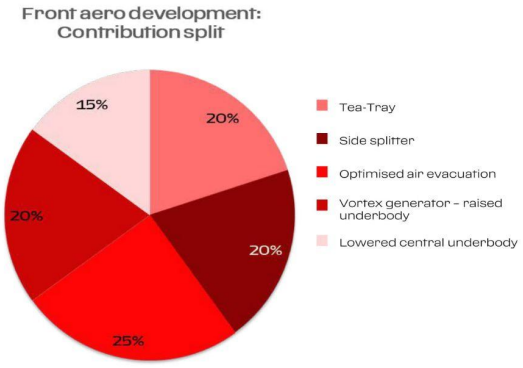
PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Front

OPTIMAL SYNERGY BETWEEN AERODYNAMICS AND HEAT MANAGEMENT

As is the case in every Ferrari, the front of the 296 GTB is crafted around the form-follows-function concept, raising its aesthetics and styling to new heights. It is because of this, and thanks to the close and constant collaboration between the technical and styling departments, that all of the elements that guarantee the car's performance are highlighted in the design.

From an aerodynamic perspective, the development of the front of the car focused principally on the need to maximise downforce so as to guarantee the optimal aerodynamic balance for flawless corner entry, even in HD conditions with the spoiler deployed. Parallel to the search for pure aerodynamic performance, the designers also focused on the cooling requirements for the engine and brake fluids which were analysed in the preliminary stages of the layout process to maximise cooling whilst still retaining the car's compact packaging and thus also enabling a series of opportunities to boost downforce.

The result of this synergic approach between aerodynamics and heat management allowed the side and particularly the central areas of the bumpers to be used to generate downforce, which simultaneously improved cooling. This made it possible to push the design of the car's underbody to new extremes and achieve the ambitious and challenging downforce target without having to adopt heavy and complex active front aero mechanisms.



PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Tea Tray

The signature – and also most innovative - aerodynamic element at the front of the 296 GTB is definitely the **Tea-Tray** which takes its name from racing nomenclature.

The arrangement of the radiating masses at the sides of the car frees up a central volume into which the tea tray is set, framed by the bridge that perfectly integrates it into the architecture and styling of the front bumper

The Tea-Tray is an aero device that uses a concept widely applied to high-nosed **competition cars**. The rear surface of the bumper works in synergy with the upper surface of the tea tray to create a high overpressure field which counteracts the depression field that characterises the underbody.

The two different pressure regions remain separate as far as the edges of the tea-tray. But at those points, the two fields of opposing pressure come together once again and the air flow rolls back on itself creating an extremely coherent and energised vortex that is directed below the underbody.

The vortex movement of the air translates into a localised **acceleration of the flow** that produces a high level of suction and thus, acting on the car's underbody, **greater downforce** over the front axle.

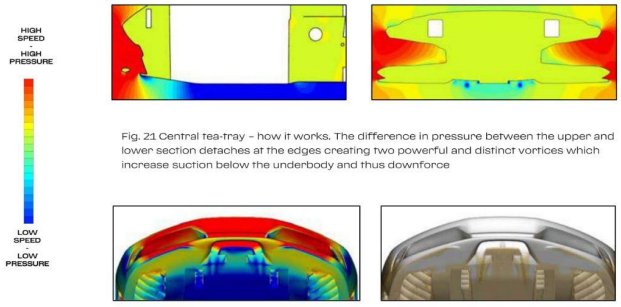


Fig. 21 Central tea-tray – how it works. The difference in pressure between the upper and lower section detaches at the edges creating two powerful and distinct vortices which increase suction below the underbody and thus downforce

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Side of the bumper

The second area of the front of the car on which aero development focused was the side of the bumper, an important zone for downforce generation and managing drag, because of its close dependency on the air flow striking the front wheel.

The extremely tight restrictions resulting from installing the radiators at the side focused development on maximising the optimisation of the volumes of the lower area of the bumper below the wheel axis. From this height, it is clear how the side volume creases sharply inwards, almost folding up over the side splitter.

The empty volume thus created allows the flow to be more efficiently channelled and maximises the flow of air in the lower part of the bumper.

1. The overpressure can act directly on the splitter's protruding surfaces, increasing downforce.
2. By masking the tyre tread from the front, it also avoids the increase in drag that would occur if the flow struck it directly
3. The suction generated behind the vertical nolder increases the extraction capacity of the hot air from the radiators, thereby improving cooling of the car.

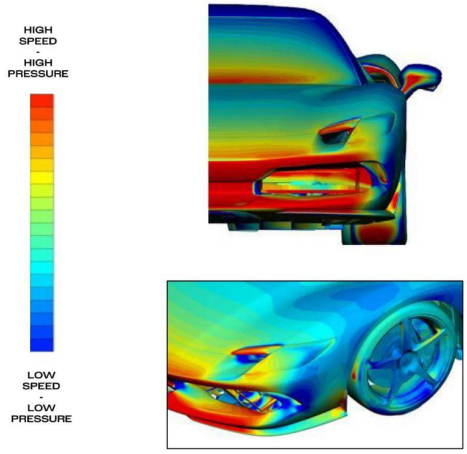


Fig. 22 Recompression effect of the vertical nolder at the end of the side splitter and the scooped out bumper

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Air Curtain

Also on the side of the bumper, the side **air curtain** channels the air from the front part of the bumper towards the wheel well, so that it vents through a specially created opening in the wheelarch.

The exit section of this duct is calibrated to avoid the wheel itself: this means that the charged flow from the front of the car is used to clean turbulence generated around the wheel, by containing the transverse expansion of the wake.

Aerodynamically, this means that **drag is reduced** compared to the base line condition without the duct.

To exploit the potential of the flow striking the side splitter to the fullest, the bumper ahead of the wheel is completed by a vertical end plate which generates a local recompression area that has a three-fold beneficial effect.

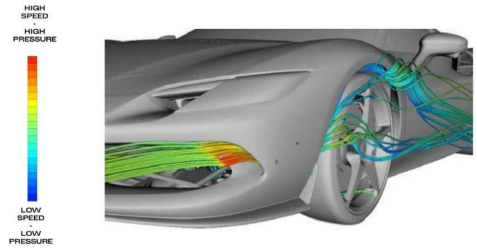


Fig. 23 Flow through air curtain duct

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Front underbody

The design of the front underbody played a pivotal role in reaching the aerodynamic targets set as part of the 296 GTB's development. So much so in fact that the choice made regarding the active aero demanded that front downforce be maximised (without resorting to further active devices that would impact on weight efficiency).

The proximity of the underbody to the road surface boosts the efficiency of the aero appendages on the underbody which, thanks to ground effect, can generate high levels of highly efficient downforce whilst only increasing drag slightly.

Conceptually, the challenge the aerodynamicists faced was to satisfy two diametrically opposed requirements.

1. The need to increase downforce, which pointed towards minimising openings on the underbody
2. To guarantee that the various cooling circuits worked efficiently which steered them in the opposite direction of increasing the number of heat evacuation areas.

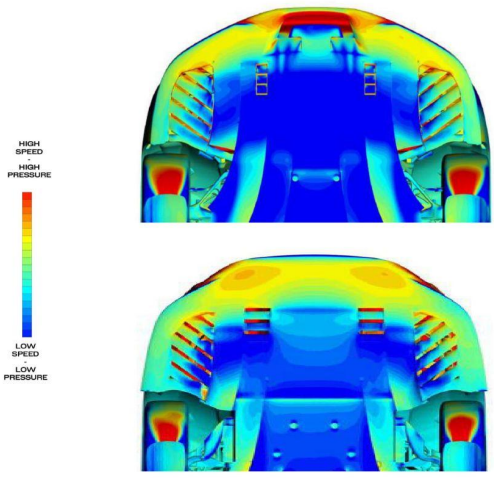


Fig. 24 Optimisation of openings on front underbody, comparison with F8 Tributo, bottom.

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Front underbody

This is why the first part of the CFD and wind tunnel development work focused on achieving the best possible compromise regarding the layout and geometry of the side and central louvres. It also aimed at avoiding any impact on the design of the body and to ensure the styling of the front was clean and consistent with the rest of the car.

The results of the optimisation research can be seen very clearly by comparing the 296 GTB and the F8 Tributo. Compared to the latter, in fact, apertures have been reduced to an absolute minimum both at the sides and, in particularly, centrally. This leaves significant room to develop downforce generation in the central area of the underbody and the strip between the heat evacuation areas.

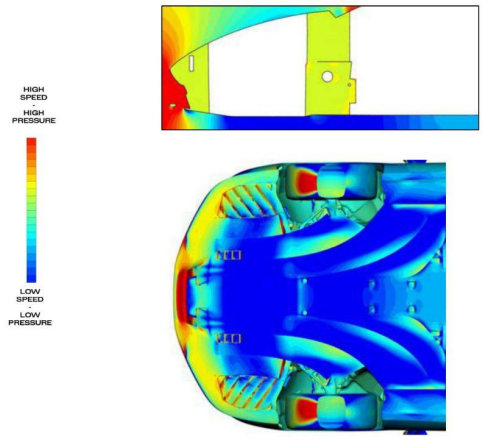


Fig. 25 Lower front underbody and cascade of vortex generators installed on raised underbody area

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Central underbody

The most significant modification to the central section was a localised lowering of the surfaces to the minimum height permitted under homologation requirements. This brought the underbody closer to the road, exaggerating the suction created as a result of ground effect and, in the final analysis, front downforce.

Immediately downstream of the lowered central area, the underbody has been slightly raised above the minimum height. This solution was already adopted very successfully on the SF90 Stradale and is the result of a carefully thought-out architectural and ergonomic decision made about the driving position. It has a two-fold beneficial effect:

1. It maximises the quality of air flowing between the underbody and the ground
2. It exposes more of the vertical surfaces of the vortex generator strakes.

Both of these factors combine to improve the efficacy of these powerful aero devices which can thus create more intense vortex structures which, because of the effect they have of accelerating air, can produce high levels of suction on the underbody.

Their specific geometry was designed and optimised in the wind tunnel to balance the downforce produced at the front with the effect created on the rear underbody, thus guaranteeing the car remains correctly balanced in all dynamic driving conditions.

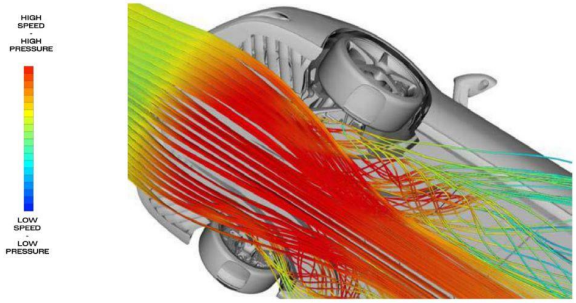


Fig. 26 - Vortices created by the underbody vortex generators

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Side area

To complete the development of the front underbody, the engineers focused on the side area. Here most of the aero contribution comes from the solution chosen for the car's braking system.

The adoption of the same brake callipers as used on the SF90 Stradale allowed the dedicated cooling system to be created without an intake duct under the suspension arm which was required by the previous generation calliper installed on the F8 Tributo.

The direct result was an improvement in the front diffuser's performance, as the extra space freed up increased the downforce developed. Secondly, the space was used to widen the flat underbody in that area, which increased the downforce generating surface and thus front downforce. Furthermore, it was possible to add an extra vortex generator with an innovative L section.

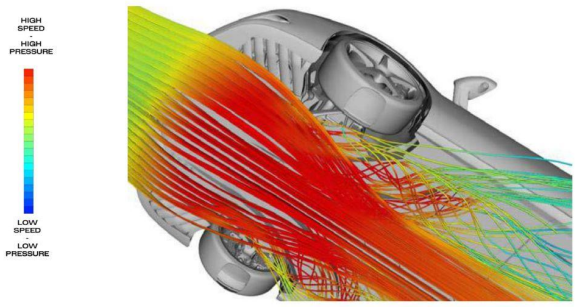


Fig. 27 Vortices created by the underbody vortex generators

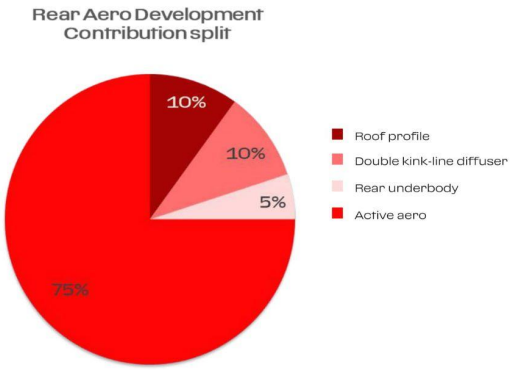
PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Rear

The aerodynamic development of the rear of the 296 GTB focused on two aspects in particular:

1. First and foremost of these was introducing a downforce-generating active aero device, a new concept for a rear-engined Ferrari berlinetta which had only previously been adopted on cars such as the LaFerrari and the SF90 Stradale. The result is that the 296 GTB delivers a completely unprecedented level of downforce for a production berlinetta

2. Secondly, the management of the wake behind the rear screen has been redesigned to avoid increasing drag or impacting the cooling of the hybrid system's radiators.

The styling of the tail, in fact, hails an unequivocal break from traditional Ferrari coupé design by adopting architecture that creates a spider-like discontinuity between roof and rear engine cover. This choice makes the 296 GTB both unique and instantly recognisable and, from an aerodynamic perspective, led to the addition of a new wing profile on the roof which extends into two side fins that define and hug the edges of the rear engine cover.



PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Active Spoiler

The main aerodynamic signature of the rear of the 296 GTB is an **active spoiler** that generates extra downforce and maximises the car's handling and braking performance at high speeds.

From this perspective, the 296 GTB really rewrites the rulebook for rear-engined berlinettas: the active aero concept is actually diametrically opposed to the one introduced on the V8 models. From the 458 Speciale all the way to the F8 Tributo, flaps on the diffuser allowed a transition from a **HIGH DOWNFORCE (HD)** configuration to a **LOW DRAG (LD)** one that allowed maximum speed to be reached on the straight. However, on the 296 GTB, the switch between the two configurations is the exact opposite, as per the SF90 Stradale: when the active aero device is deployed it increases downforce.

As happens at the front, the active spoiler is seamlessly integrated into the bumper design, taking up almost all of the space between the taillights. When the car is at a standstill and in all dynamic conditions that don't require maximum downforce, the spoiler is stowed in a compartment in the upper section of the tail. But as soon as longitudinal or lateral acceleration figures, which are constantly monitored by the car's dynamic control systems, exceed a specific threshold, the spoiler deploys and extends from the fixed section of the bodywork.

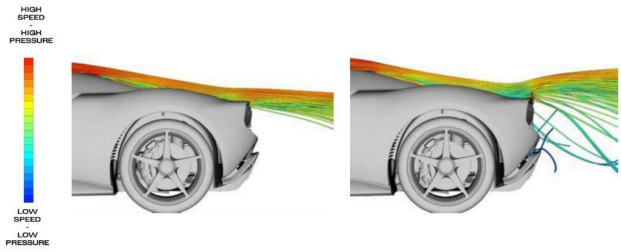


Fig. 28 Active rear spoiler: difference between LD and HD conditions

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Active Spoiler

The device works on the basis of the significant increase in compression on the engine cover as a result of the vertical deployment of the dam.

The effect is beneficial to the rear underbody and the diffuser which, in synergy with the upper body when the dam is at its highest extension, guarantees an increase in suction on the underbody.

This combined effect results in a 100 kg increase in downforce over the rear axle which enhances the car's prowess in high performance driving situations and also under braking.

Because of the importance of active aero on the car's overall design it was essential to guarantee that the flow over the rear remained extremely efficient in both LD and HD conditions.

The main problem in this regard was the styling of the rear: not having a rear screen running from the trailing edge of the roof to the tail as on previous berlinettas meant that the flow separation from the roof had to be meticulously managed.

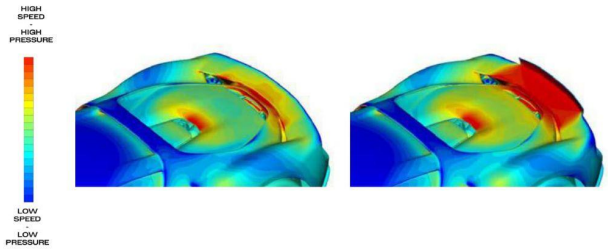


Fig. 29 Active rear spoiler: difference between LD and HD conditions

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Virtual rear screen

The turbulence inevitably generated behind the rear screen by the sharp volume change would have resulted in an increase in drag as well as significantly reducing the cooling efficiency of the rear radiators.

To offset these effects it was essential to keep the dimensions of the separation bubble compact by creating a **virtual fairing** that would allow the air flow over the roof to strike the rear of the car correctly as if it were being channelled by an actual but **invisible rear screen.**

This is how the very successful duo comprising the wing profile and consequent blown area over the end section of the cabin work. The latter was a detail specifically calibrated during CFD development and then validated in the wind tunnel.

The reduced section of the blown area actually causes the flow to accelerate. The flow is then channelled from inside the wing profile and deflected upwards as a result of the specific geometry of the end section. This slight upwash transmitted to the flow inside the blown area allows the air above the profile to be correctly deflected so that the car's aerodynamics and cooling are as efficient as possible.

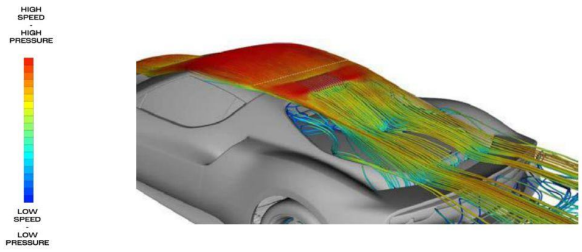


Fig. 30 Virtual rear screen created by the blown area between the cabin and the wing profile on the roof

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Rear underbody

Thanks to the benefits of adopting active aero which creates the downforce necessary to enhance the car's performance, the development of the 296 GTB's rear underbody and the diffuser focused on correctly managing aerodynamic balance and reducing drag.

The significant development of the front, which was needed to balance the car when the active spoiler is deployed, also required the effect on the rear to be counterbalanced in LD configuration i.e. when downforce over the rear does not benefit from the extra 100 kg.

In this regard, the designers fully exploited the opportunities opened up by the layout of the exhaust line which clustered the main heat sources in the upper part of the engine compartment. This allowed the ventilation apertures for the components under the cover to be optimised, thereby clawing back large surfaces for downforce generation, particularly in the central area under the engine, which avoided damaging impacts on the efficiency of the underbody flow.

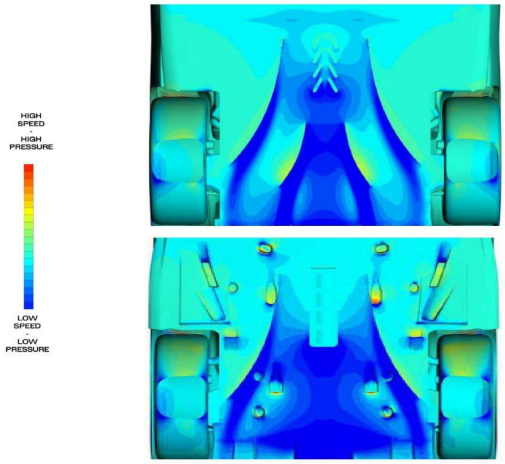


Fig. 31 Comparison between the rear underbody of the 296 GTB and F8 Tributo

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Rear diffuser

Another benefit from the work done on the venting of the engine bay is the diffuser design which, thanks to the fact that flow upstream from it is so efficient, has a very clean, linear design that is in perfect symbiosis with the upper section of the rear bumper.

The central channel of the diffuser is characterised by a double kink line.

Thanks to this device, which was developed in the wind tunnel, it is possible to modify the direction in which the flow is sucked along the underbody is released into the car's wake. By straightening the diffuser flow lines, the vertical expansion of the car's wake and thus drag, can be contained.

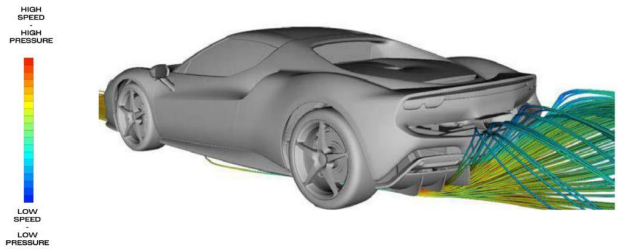


Fig. 32 Rear diffuser with double kink-line in the central channel

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Heat management

The complexity of the powertrain's PHEV architecture, combined with the new V6's truly exceptional specific power output of 221 cv/l, posed the engineers with their toughest challenge when it came to heat management and this resulted in a meticulous study of the cooling flows.

The different yet inextricably interlinked cooling demands were tackled in the preliminary phase of the design process to guarantee that the layout would be as compact as possible and thus avoid compromising aero development.

The **ICE** and the **gearbox** are cooled by two radiators installed at the front of the car, ahead of the front wheels, where there are also two condensers for the cabin air-con and high voltage battery cooling.

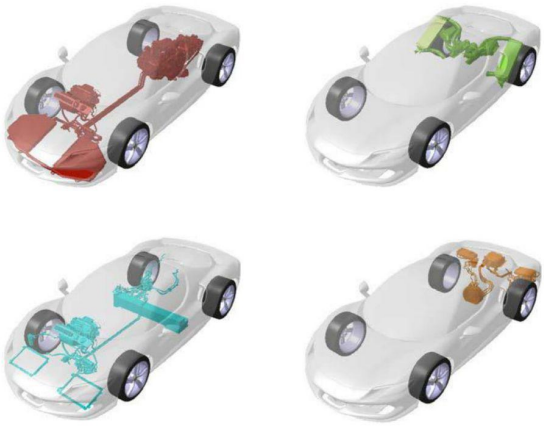


Fig. 33 Car's cooling circuit layout. Red: engine fluids; Green: turbocharged air; Blue: cabin and HVB; Orange: electric motors-

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Heat management

The hot air is evacuated along the underbody, in the same way as models from the 488 Pista onwards, to avoid it interfering with the cooling air to the intercoolers along the upper part of the flanks. This choice made it possible to maximise efficiency and thus minimise the size of the relevant air intake, further streamlining the car's already clean styling.

The radiators for the hybrid system are located at the rear of the car and have been given two vents just below the side sections of the spoiler. This solution has the combined advantage of both freeing up the central part of the front of the car, which has thus been used to generate downforce, and optimising the routing of the various circuits, to the direct benefit of packaging and weight.

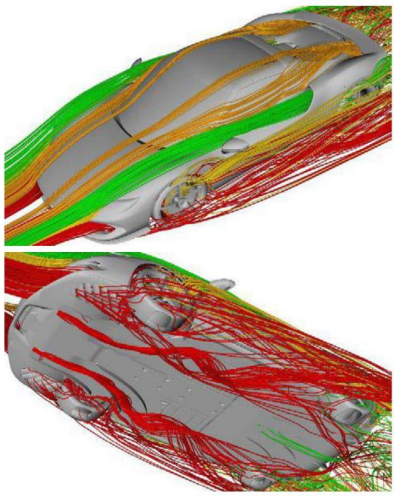


Fig. 34 Overview of cooling flows. Red: engine fluids

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Powertrain heat management

Particular attention was paid to the engine bay which had to incorporate both the usual ICE components, which can function at peak temperatures of over 900°, and electric and electronic components that must function at lower temperatures. This led to a complete redesign of the turbo layout and the entire exhaust system line compared to its Ferrari berlinetta predecessors.

The 296 GTB's powertrain is characterised by a **hot-V layout** in which the turbos are located above the engine. This makes it possible to cluster all of the main heat sources in the engine bay in its upper central area, which significantly simplifies thermal management under the bonnet, both when the car is moving at speed or if the car is in traffic.

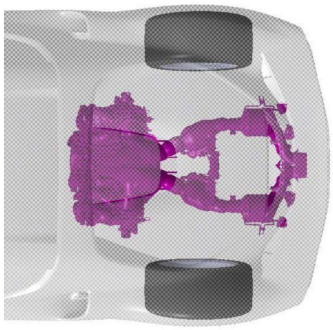


Fig. 35 Hot-V layout of turbo and central exhaust line

PERFORMANCE USABLE IN ALL SITUATIONS
Aerodynamics - Brake cooling

The brake cooling system was developed around the callipers introduced on the SF90 Stradale with ventilation ducts integrated into their castings.

This brake cooling concept requires a dedicated duct to correctly channel cool air coming in through the air intakes on the front bumper through the wheelarch. In the case of the 296 GTB, the intake has been integrated into the headlight design. Just below the DRL, on the inner section, an aperture connects the wing to the wheelarch via a duct running parallel to the chassis strut, thus providing the cool air to the brakes.

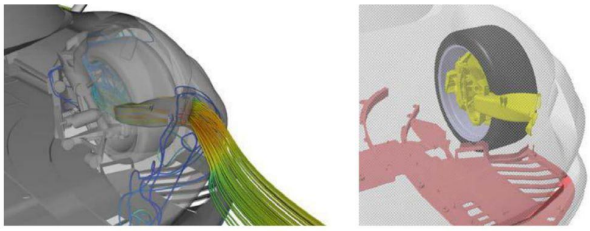
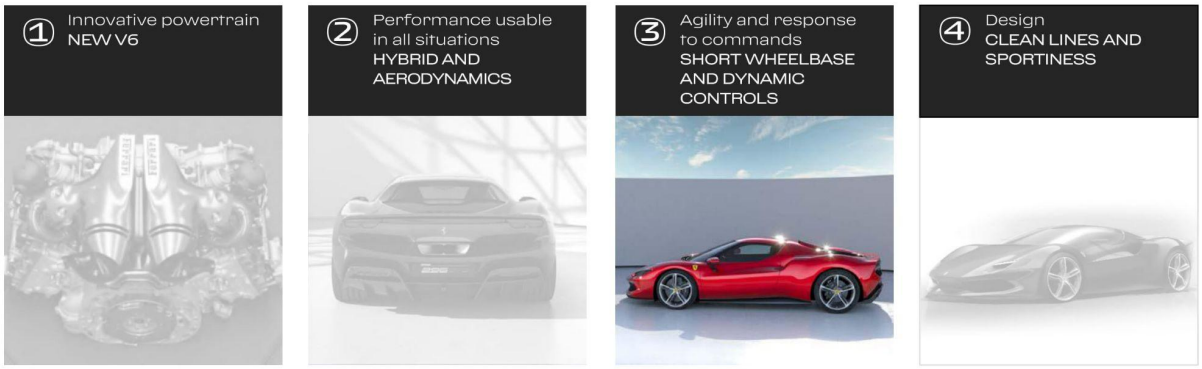


Fig. 36 Front brake cooling using duct integrated into headlight area

KEY DISTINCTIVE ELEMENTS
Which ingredients did we use to innovate the Fun To Drive factor?



AGILITY AND RESPONSE TO COMMANDS
Short wheelbase and dynamic controls

- Shortest wheelbase in the range: **2,600mm** (-50mm vs F8)
- Best-in-class weight/power: **1.77 kg/CV**
- World Premiere: **ABS evo with 6w-CDS sensor**
  - Easier to drive at the limit
  - Instant braking: 200-0 km/h in **107m** (≈ -10% vs F8)

AGILITY AND RESPONSE TO COMMANDS
Main Elements

How 296 GTB excels in Fun to Drive?

BREATH-TAKING LONGITUDINAL ACCELERATION
- 0-100km/h: 2,9s
- 0-200km/h: 7,3s

ENHANCED LATERAL ACCELERATION
- Shorter wheel base: -50mm vs F8
- Best In Class weight/power ratio: 1.77kg/CV
- Grip Estimator

NEW GENERATION GEARBOX
- 8-speed DCT

BRAKING PRECISION AND INSTANTANEOUS RESPONSE
- New ABS-evo control module with 6w-CDS sensor
- Brake-By-Wire
- Immediate braking: 200-0 km/h in 107m

UNIQUE ENGAGING SOUND

AGILITY AND RESPONSE TO COMMANDS
Concept

The 296 GTB's main objective was to innovate and raise the bar on the so-called "Fun to Drive" factor: all of the elements that combine to put a smile on the face of anyone driving a Ferrari in sporty mode.

To achieve this, the Ferrari engineers lavished particular attention on all the indicators that characterise the Fun to Drive factor both in terms of integrating the vehicle's basic running gear with electronic control components and by introducing new components.

Below are the 5 indicators that characterise the Fun to Drive (F2D) factor plus the technical solutions applied to ensure the 296 GTB excels in each one

INDICATOR	SOLUTION APPLIED	HOW 296 GTB EXCELS
LONGITUDINAL ACCELERATION	Response to accelerator pedal (response times, longitudinal acceleration increases with revs)	▪ Hybrid powertrain which reduces response times and supports ICE with torque provided by MGU-K
LATERAL ACCELERATION	Responsiveness to steering wheel inputs in terms of feeling of promptness and readiness of rear axle, and ease of driving	▪ Compact dimensions: -50mm wheelbase ▪ Active aerodynamics increasing downforce (100kg) ▪ New electronic controls: ABS evo + 6w-CDS ▪ Grip Estimator
GEAR-SHIFTING	Driver sensation with every gear shift in terms of shifting and sensation of progression through gears, gear by gear	▪ New 8-speed DCT
BRAKING	Brake pedal feedback both in terms of travel and responsiveness (efficiency and modulability)	▪ Brake By Wire ▪ New ABS evo + 6w-CDS
SOUND	The level, in-cabin quality and progression of engine sound as revs rise	▪ Equally-spaced firings every 120° ▪ Exhaust resonator and single tailpipe exhaust line

AGILITY AND RESPONSE TO COMMANDS
Breath-taking longitudinal acceleration

The 296 GTB sets a new benchmark in terms of longitudinal performance on the rear-wheel-drive market.

Thanks to a combined power output of 830CV, the hybrid powertrain can deliver completely unprecedented performance for a rear-wheel-drive production berlinetta. The benefits of the power of the ICE and the support of the torque supplied by the electric motor are particularly clear in the response times to inputs from the accelerator pedal which are even shorter than the already excellent figures delivered by Ferrari's previous V8 berlinettas (fig. 37).

The 296 GTB thus has markedly better longitudinal performance than Ferrari's previous V8 berlinettas, thereby also significantly broadening the gap with its competitors.

0-100 km/h	2,9s
0-200 km/h	7,3s

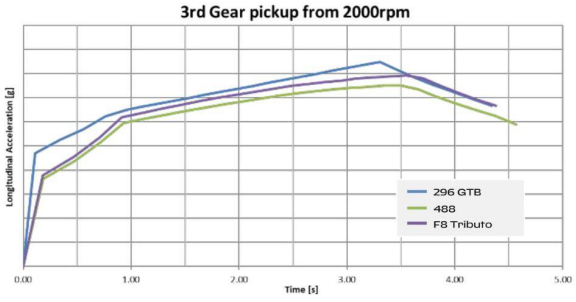


Fig. 37 Pick-up in 3rd gear, response times

AGILITY AND RESPONSE TO COMMANDS
Exhilarating later acceleration - Short wheelbase

Lateral dynamics is undoubtedly the area in which the 296 GTB is at its very best.

From the very earliest phases of the car's development, Ferrari's engineers researched and set themselves incredibly challenging lateral dynamics goals for the 296 GTB: they aimed to develop a light, agile, precise car capable of thrilling and putting a smile on the face of drivers not just after sporty driving sessions but also in everyday situations.

The result is a car's that is agile and precise in its response to all commands: accelerator, brake, gearbox, steering wheel.

Many different technical solutions were introduced to achieve this, but one of the most obvious (including aesthetically) is the car's **compact size.** The 296 GTB's wheelbase has been shorted to 2,600mm, 50mm shorter than Ferrari's recent V8 berlinettas. Its centre of gravity is also now 10mm lower than that of the F8.

These compact dimensions yield agility and precision of response to commands: just a quick drive around your local streets and roads will be enough to prove that this is a very different driving experience to anything available prior to the arrival of the 296 GTB.

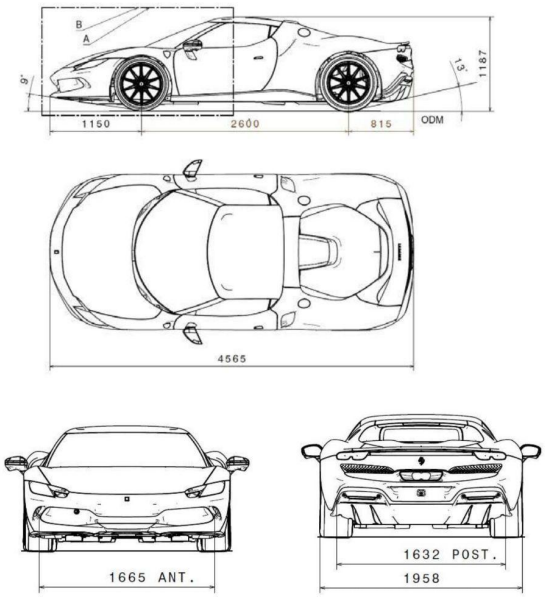


Fig. 38 Vehicle dimensions

AGILITY AND RESPONSE TO COMMANDS
Exhilarating later acceleration - Weight

A further key element in the Fun to Drive formula is **weight reduction.**

The additional mass of the electric motor was thus in part offset by several different elements:

- Much more compact and much lighter V6 (-30 Kg) than the V8 installed on the SF90 Stradale.
- Extensive use of lightweight materials such as carbon-fibre.
- Assetto Fiorano Package, which further extends the application of carbon-fibre and introduces more lightweight materials such as titanium for the damper springs and Lexan (optional) for the engine cover.

All of these technical solutions combined have yielded best-in-class figures:

$$\frac{1.470\ \text{Kg}}{830\ \text{cv}} = 1{,}77\ \text{Kg/cv}$$

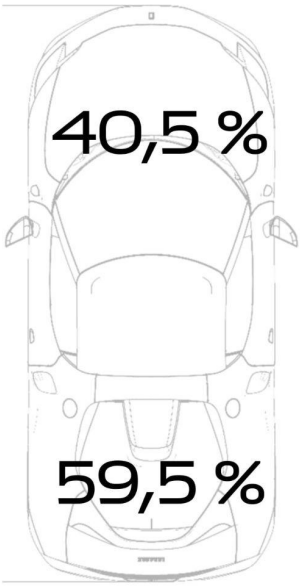


Fig. 39 Front / rear weight distribution

AGILITY AND RESPONSE TO COMMANDS
Exhilarating lateral acceleration - Dynamic controls

DYNAMIC VEHICLE CONTROLS

E-SSC DYNAMIC CONTROL SYSTEM INTEGRATED WITH ELECTRIC MOTOR:

- ABS evo (World Premiere) with 6-way Chassis Dynamic Sensor (6w-CDS)
- E-TC (Electric Traction Control + E-Diff)
- SCM (Magnetorheological Damping)
- FDE 2.0 (Ferrari Dynamic Enhancer)
- EPS (Electric Power Steering) with Grip Estimation

DIFFERENT HIGH PERFORMANCE SET-UP FOR EACH MANETTINO POSITION:

- WET: guaranteed stability in the wet
- SPORT: guaranteed stability on the dry
- RACE: Performance plus stability on track only
- CT-OFF: Maximum Fun to Drive, stability not guaranteed
- ESC-OFF: Controls deactivated

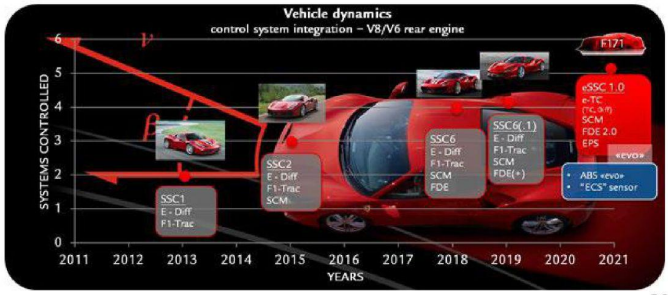


Fig. 40 eSCC10 and 'ABS evo'

AGILITY AND RESPONSE TO COMMANDS
Exhilarating lateral acceleration - Grip Estimation

The grip estimator in the Side Slip Control (SSC) system is flanked by a second device based on the electric power steering.

By using the information from the EPS (particularly RackForce) and cross-referencing it with the side slip angle estimated by the SSC, the logic can estimate the grip of the tyres on the road during every steering manoeuvre.

The advantage of this new approach is it can estimate grip even when the car is not being driven on the limit, thereby speeding up the process of the system learning about real grip in order to guarantee that the controllers intervene correctly based on grip conditions.

Fig. 41 Rack Force measured by EPS system

≈35%

faster grip estimation in track driving

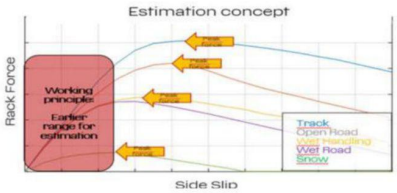


Fig. 42 Grip estimation provides self-aligning torque

AGILITY AND RESPONSE TO COMMANDS
Exhilarating lateral acceleration - ABS evo with 6w-CDS sensor

The car is also equipped with a new ABS controller, available in high grip situations and in Manettino positions from Race upwards. It was developed with and for Ferrari by the supplier of the EPS.

This new controller used the information from the 6-way Chassis Dynamic Sensor (6w-CDS) to obtain a more precise estimation of speed, determine the Target-Slip for all 4 wheels and optimise braking distribution.

The 6w-CDS sensor gathers much more information than the traditional Yaw Rate Sensor (YRS) sensor used until now. Specifically, the new sensor uses the information from the 6w-CDS to obtain a more precise estimation of speed and optimise braking distribution compared to the Yaw Rate Sensor used up until now. The 6w-CDS measures both the acceleration and the speed of rotation on three axes (X, Y, Z) enabling the other vehicle dynamic controls to more accurately read the car's dynamic behaviour thus optimising their intervention.

This greater accuracy allows the longitudinal force of the tyres to be better exploited when braking in a straight line and on switchbacks (brake in turning), when the rear axle is subject to the natural compromise between braking performance and lateral stability.

At the same time, the more accurate estimation allows repeatability of the manoeuvre around the target value to be maximised, reducing drift due to the tight tolerances of the components or the natural variability of test conditions due to the likes of asphalt temperature and consequently the resulting grip.

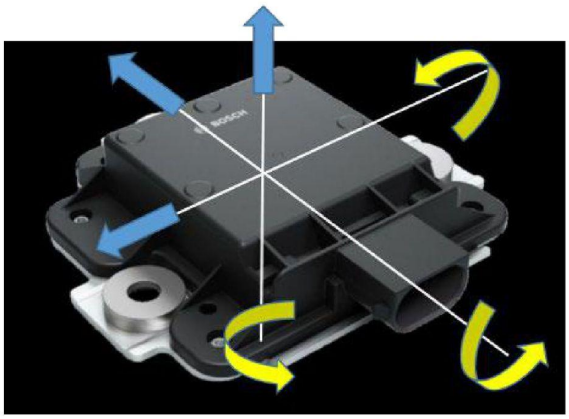


Fig. 43 6w-CDS sensor

AGILITY AND RESPONSE TO COMMANDS
New generation gearbox

The dual clutch oil bath architecture has been completely redesigned and now has eight speeds.

Its layout has been optimised thanks to the adoption of a dry sump and the significant compacting of the clutch assembly (diameter now 20% smaller than current gearbox). This allowed its installation height in the car to be reduced by 15mm with the centre of gravity of the running gear also lowered.

The new clutch improves performance by 35%, delivering dynamic torque in shifting up to 1,200 Nm.

Thanks to new generation actuation hydraulics, clutch fill time has been reduced by 30%. The total gear shifting times are thus reduced to 200 ms, 30% faster than the previous 7-speed DCT.

The 296 GTB's shifting in particular is characterised by the feeling of short gear ratios (Fig. 44).

The new spacing allows the progression of the short ratios to be maintained and to flank the last long gear to the benefit of range in motorway driving.

Down-shifts have been calibrated to ensure smooth shifting with specific focus on the fun-to-drive factor and the sound of the new V6 ICE.

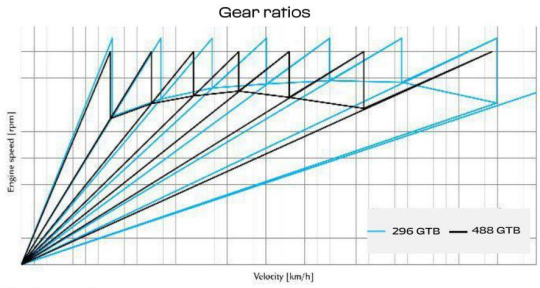


Fig. 44 Gear ratios

AGILITY AND RESPONSE TO COMMANDS
Precision braking and instantaneous response

The new ABS evo control module's performance results are comparable to the traditional Hi-Perfo ABS, car contents and vehicle conditions being equal. Figure 45 is a general graphic representation of the performance improvements in terms of:

- Overall stopping distances (m): **107m on 200-0 km/h**
- Repeatability and consistency of stopping distance performance from that speed: **+24%**
- Efficiency of quality of electronic control **(+3,6%)** which with respect to asymptotic performance (100% = ideal exploitation of Maximum Longitudinal Force on right-hand tyre), is the highest recorded by the applications in the range

Thanks to brake-by-wire, pedal travel is reduced to an absolute minimum which boosts the feeling of sportiness without neglecting efficiency when braking lightly or pedal travel feel when on the track.

The lack of a mechanical connection between driver input and pressure generated also allows braking response to be differentiated as a function of speed with the aim of maximising initial bite at high speeds and simultaneously limiting it at low speeds when greater modulability is preferable.

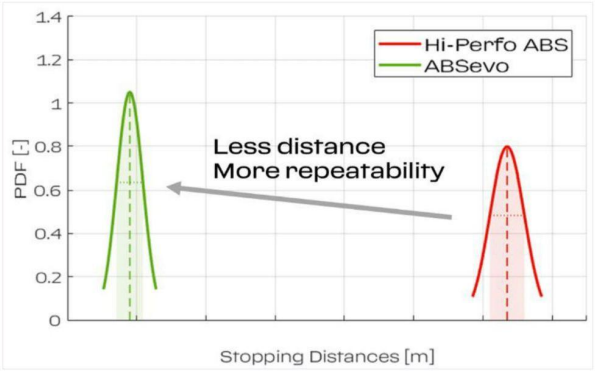
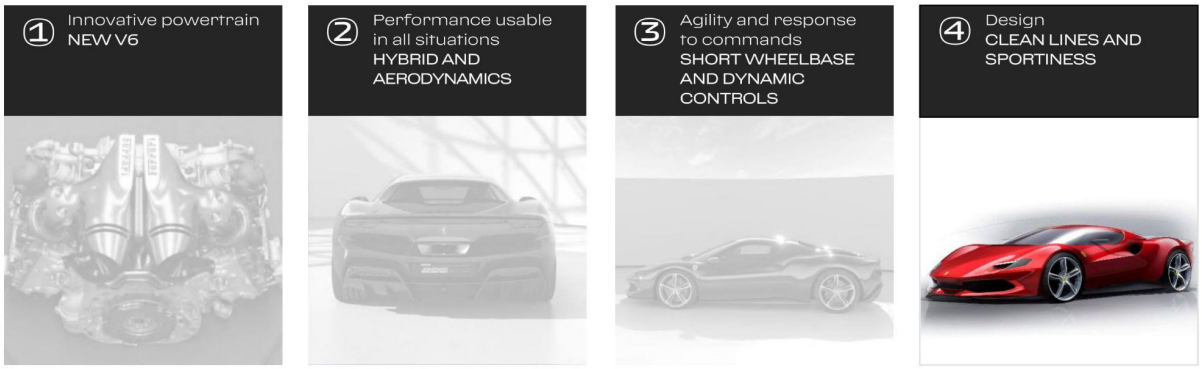


Fig. 45 ABS controller improvement

KEY DISTINCTIVE ELEMENTS
Which ingredients did we use to innovate the Fun To Drive factor?



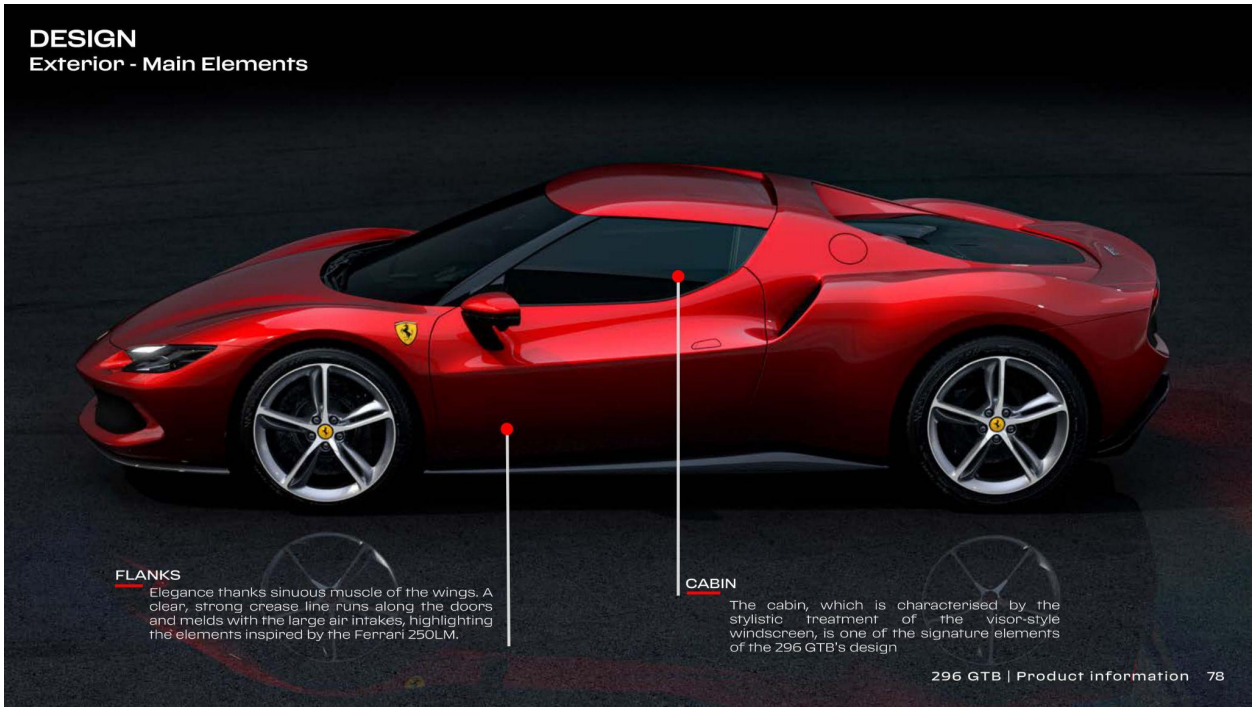
DESIGN
Clean lines and sportiness

COMPACT SINUOUS DESIGN
THAT UNDERSCORES ITS SPORTY SOUL

ELEMENTS INSPIRED BY
THE FERRARI 250LM

NEW DESIGN FEATURES

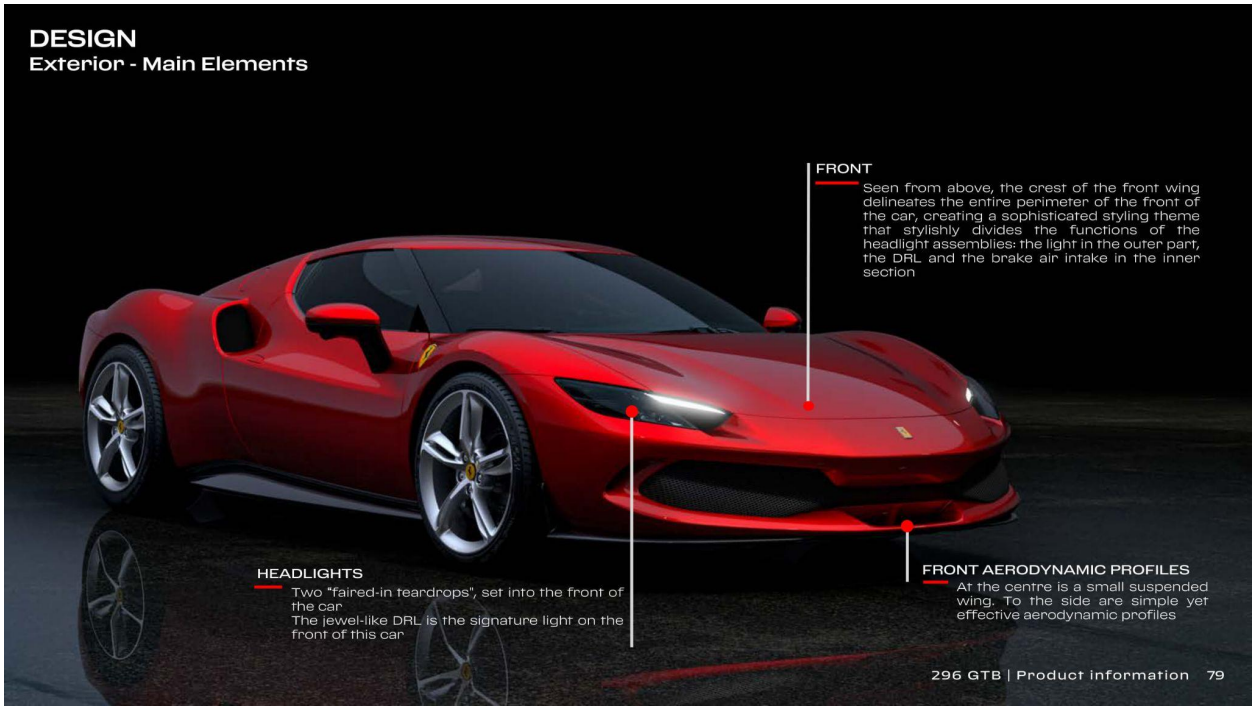
DESIGN
Exterior - Main Elements



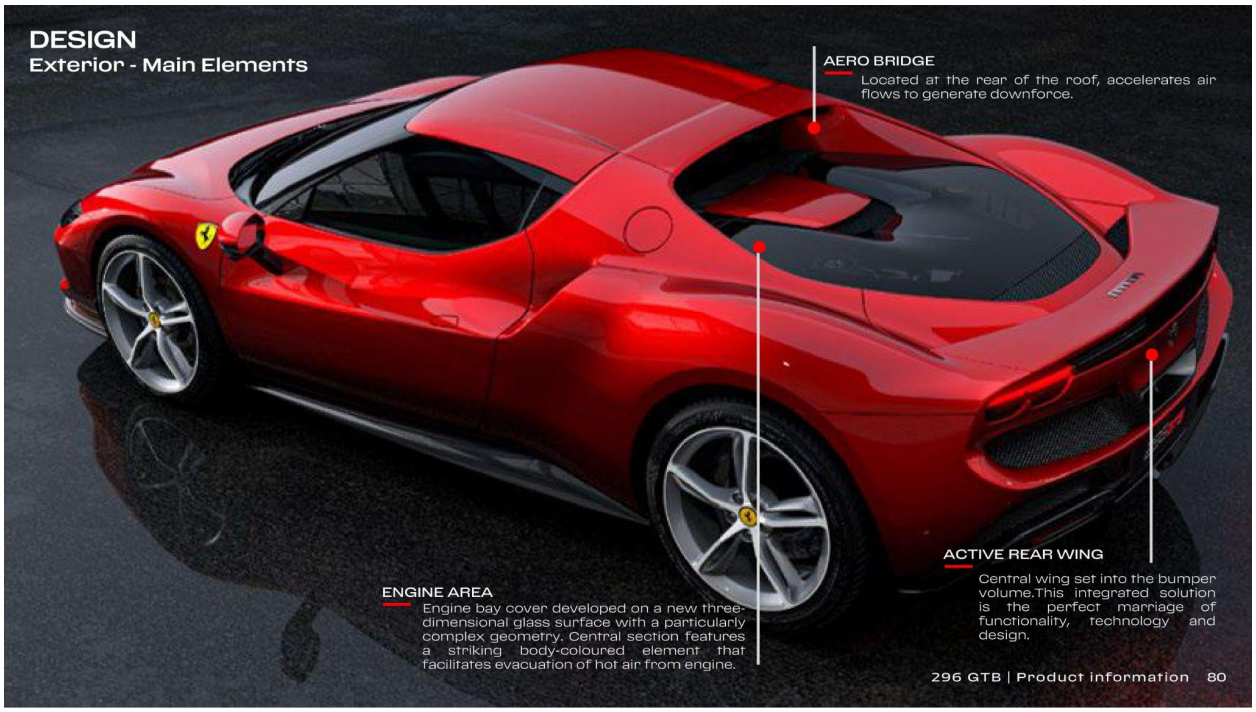
FLANKS
Elegance thanks sinuous muscle of the wings. A clear, strong crease line runs along the doors and melds with the large air intakes, highlighting the elements inspired by the Ferrari 250LM.

CABIN
The cabin, which is characterised by the stylistic treatment of the visor-style windscreen, is one of the signature elements of the 296 GTB's design

DESIGN
Exterior - Main Elements



DESIGN
Exterior - Main Elements



DESIGN
Exterior - Main Elements

REAR

Kamm tail, a surface carved out of a solid volume, that underscores the car's compact volumes. Horizontal feel to the rear aesthetic. With the lights off, a thin "black screen" line runs horizontally the entire wide of the bumper. When the taillights are on, two strips of light appear on either end of the rear, in a modern take on the twin taillight aesthetic.

NEW SINGLE TAILPIPE EXHAUST

More modern than the classic twin tailpipe layout. The exhaust design completes the wine-glass profile in the centre of the bumper, which extends upwards to the taillights at either end

DESIGN
Exterior - Concept

The Ferrari 296 GTB's design is the result of the Maranello marque's desire to redefine the identity of the mid-rear-engined two-seater berlinetta, by giving it an extremely compact line with an original, modern look.

Thanks to its short wheelbase and its monolithic, sculpted structure, the 296 GTB is indeed the most compact berlinetta to emerge from Maranello in the last decade.

Rather than going for the typical berlinetta fastback configuration, the Ferrari Styling Centre opted instead to concentrate on creating a cabin architecture that visually seems set into an imposing volume – the combined effect of the short wheelbase and the composition of deliberately harmonious elements, such as very muscular wings, the visor-style windscreen, robust flying buttresses and an all-new vertical rear screen.

These forms produce a highly original cabin that dominates the overall perception of the car.

The 296 GTB's design demanded no flourishes or stylistic artifice. It is, in fact, the result of impeccably clean, simple architecture that seems the work of a single pencil stroke. There are neither artificial optical effects designed to lighten the car's volumes nor stark colour contrasts aimed at emphasising the aggressiveness of its forms.

Instead the designers chose the most convincing archetype to give the car a unique identity all of its own, so unique it rewrote the entire rulebook by rediscovering the most authentic principles of Italian car design.

DESIGN
Exterior - Concept

Its controlled reflections, clean forms and interlocking volumes enhance the 296 GTB's uncompromisingly sporty character, ensuring it is the worthy heir to a philosophy that can be traced back to the very roots of Ferrari tradition.

Its exceptional modernity references 1960s' Ferraris, which made simplicity and functionality their signatures.

The 250 LM, in particular, provided the designers with significant inspiration through elements such as the sinuous, sculpted look of the body, the design of the B pillar, the unusual composition of the wings in which the air-intakes are set, and the Kamm tail, which further enhances the car's sense of stylistic perfection.

Maranello's latest berlinetta hails the return of the V6 after a 50-year absence and reinstates that unique vision of sportiness which, by doing away with artifice and constructs of all kinds, reinterprets certain stylistic canons that Ferrari's DNA is founded upon.

DESIGN
Exterior - Architecture

One of the most recognisable aspects of the 296 GTB's silhouette is definitely its cabin, which has a visor-style windscreen, a marked departure from the styling of Ferrari's most recent sports cars.

Already adopted on several limited-edition Ferraris, including the J50, and one-offs, such as the SP38 and the P80/C, this theme has now been fully developed for a road car.

The wraparound theme at the front connects organically to the flying buttress theme at the rear, inspired by the 250 LM, together with a transparent engine cover that brilliantly showcases the engine, the undisputed jewel in the new berlinetta's crown.

The 296 GTB's aesthetic and performance prowess are instantly clear at the first glance of the car from the rear three quarters.

The powerful relationship between body and cabin is emphasised by the cut line of the roof, the unusual conformation of the flying buttresses and the imposing muscle of the wings. The result is a very compact car in which the cabin is visually inset into the surrounding volumes.

DESIGN
Exterior - Flanks

The 296 GTB reveals all of its elegance in the side view, which is characterised by the sinuous muscle of the wings.

A clear, strong crease line runs along the doors and melds with the large air intakes positioned at the most aerodynamically efficient point.

The cylindrical volume of the air intakes gives rise to the protrusion of the muscular rear wing. The cross section of the rear wing was meticulously designed to guarantee that the air flow to the spoiler was sufficient to deliver the high aerodynamic performance demanded for this car.

DESIGN
Exterior - Front

The 296 GTB's front volumes are very pure, clean and extremely compact, a result that demanded meticulous honing of the geometries. Compared to previous mid-rear engine V8 models, the front of the 296 GTB is much more tapered, something that becomes very clear indeed when the car is on the road.

Seen from above, the car's volumes are strikingly compact and harmonious, with the crest of the front wing delineating the entire perimeter of the front of the car, creating a sophisticated styling theme that elegantly divides the functions of the headlight assemblies: the light in the outer part, the DRL and the brake air intake in the inner section

The headlights take their inspiration from the "teardrop" shaped headlights of the past. On the 296 GTB, this styling theme is interpreted through two "faired-in teardrops" which are set into the front of the car like a jewel and are completed by the formal composition of the DRL, which acts as the signature of the front of this car, and the brake air intake.

The central grille has its origins in the single grille concept derived from the 488 GTB. In this instance, the styling theme has been interpreted by reducing the height of the grille in the centre. The result is a barbell shape which hints at the presence of the two powerful radiators. An aero device required to boost downforce is in the central section. This is a compact suspended wing, reminiscent of solutions adopted in F1. Depending on the version, it also incorporates the ADAS radar.

DESIGN
Exterior - Rear

The upper surface of this ultramodern tail is dominated by an imposing flying buttress.

At its base, it incorporates the engine bay cover which has a unique, three-dimensional glass surface with a particularly complex geometry. The central section features a striking body-coloured element that facilitates evacuation of hot air from the engine bay and also references a styling theme dear to Maranello that can be traced all the way back to its legendary sports prototypes and the iconic likes of the Testarossa and F355.

The 296 GTB's other rear-end styling feature, making its first appearance on a berlinetta after an absence of several years, is its Kamm tail, a surface carved out of a solid volume, that underscores the car's compact volumes.

The upper section of the tail also incorporates a highly distinctive horizontal element that itself incorporates the taillights and integrated retracting spoiler.

With the lights off, a thin "black screen" line runs horizontally the entire width of the bumper. When the taillights are on, two strips of light appear on either end of the rear, in a modern take on the twin taillight aesthetic.

To complete the perception of traditional twin round taillights, the designers also introduced two "claw marks" on the lower part which incorporate other light functions.

DESIGN
Exterior - Rear

The 296 GTB features a single central exhaust tailpipe that is higher up on the tail, a clearly modern addition that differentiates it from Ferrari's more traditional twin circular tailpipe layout.

The exhaust design completes the lower part of the wine-glass profile in the centre of the bumper, which extends upwards to the taillights at either end, thereby emphasising the horizontal feel of the rear of the car.

Lastly, the diffuser is derived from the SF90 Stradale, but sports two less prominent external fences. Detailed development work with the engineering/aerodynamics department produced a very compact volume integrated into the car's body without any negative impact on the visual lightness of the tail.


DESIGN
Sporty, driver-oriented cabin
NEW HMI WITH FULL-DIGITAL CLUSTER AND HEAD-UP DISPLAY
FUNCTIONAL, COMPACT DRIVER-ORIENTED COCKPIT
MINIMALIST PASSENGER AREA WITH INTEGRATED PASSENGER DISPLAY
296 GTB | Product information 89


DESIGN
Interior - Main Elements
COCKPIT
Very compact, functional driver-oriented architecture that nonetheless does not detract from the overall geometric development which is quite horizontal.
PASSENGER AREA
The passenger area is very minimalist but enhanced by a passenger-side display, allowing the passenger to live the driving experience very much as a participant, almost a co-driver.
296 GTB | Product information 90


DESIGN
Interior - Main Elements
DOOR MEDALLION
A deep lozenge-shaped scoop, a three-dimensional element that includes the door handle in a theme that merges with the dashboard.


DESIGN
Interior - Main Elements
CARPET
The carpet rises up from the floor integrating with the back section of the tunnel to complete the trim in an organic way.
TUNNEL
It incorporates the SF90 Stradale-inspired modern take on the classic gear-shift gate and a compartment for stowing the ignition key with its now iconic Prancing Horse badge.

DESIGN
Interior - Concept

The 296 GTB's cockpit was developed around the new concept of an entirely digital interface, first debuted by Ferrari on the SF90 Stradale. This interior layout is inspired by ergonomics and draws on the SF90 Stradale's stylistic coherence for its forms and furnishings. However, while with the SF90 Stradale the designers wanted to highlight the presence of extremely advanced technology and underscore a clear break with the past, in the case of the 296 GTB, the idea was to wrap the entire technological wealth of the previous model in much more sophisticated clothes. They wanted to give the 296 GTB a much purer, even more minimalist connotation characterised by a powerful elegance that, on an aesthetic level, perfectly mirrors the design of the exterior and reflects its spare beauty.

The design for both models began with the idea of integrated cabin architecture. That said, the 296 GTB's cabin raises the concept of the formal purity of the functional elements to new heights thanks to the clever use of materials. A good example is the finish of the leather trim used on the dashboard and on the door panels which disguises certain tech features that, although present, are not explicitly highlighted. In the SF90 Stradale, the components that significantly revolutionised the HMI used in Ferraris are only partly leather-trimmed, with the deliberate aim of highlighting them. On the 296 GTB, however, the designers sought to greatly simplify the forms, integrating them into the trim to avoid loudly advertising their presence.

DESIGN
Interior - Concept

From a formal perspective, when the engine is off, the onboard instruments go black, further enhancing the minimalist look of the cabin. Exclusive Italian leather trim on the seats is further enhanced by the noble technical materials – metals and carbon-fibre – used on the functional components.

Once the Start Engine button is pressed, all of the components gradually spring to life and the 296 GTB reveals its technological glory in the form of an exceptionally modern, ergonomic and completely digital interface.

DESIGN
Interior - Dashboard

The 296 GTB's dashboard exudes a sense of extreme lightness, thanks to its beautifully honed and sculpted forms.

Most of the onboard instrumentation is clustered on the driver's side – the result is a very compact, functional driver-oriented architecture that nonetheless does not detract from the overall geometric development which is quite horizontal.

The focus is on the main instrument cluster, which is set into a deep cleft carved out of the dashboard trim, itself characterised by a deliberately clean, taut surface. From it emerges

- the SF90 Stradale-derived steering wheel
- the instrument cluster supported by two visible structural supports, which taper seamlessly into the dashboard.

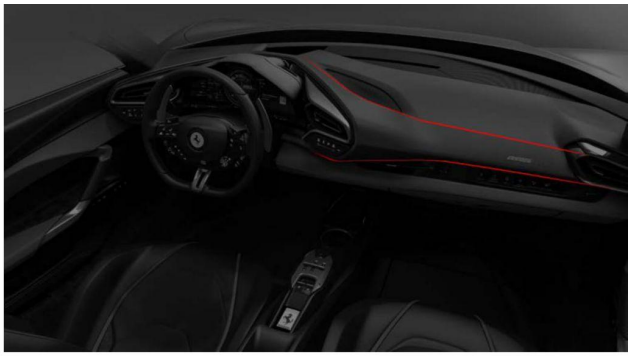
This solution results in sense of extreme lightness because of the floating effect it creates.

Completing the picture are two side satellites, each with its own capacitive touch area, and an air vent that draws on SF90 Stradale technology. The symmetrical satellite theme, creates an arrow-shaped overall composition.

DESIGN
Interior - Dashboard

The passenger area is very minimalist indeed with the possibility of choosing a passenger-side display, allowing them to live the driving experience very much as a participant, almost a co-driver.

The air vents are integrated ducts and so have been visually resized, thanks to the presence of a visible barrel, which is used to adjust the direction of the air flow into the cabin. A fourth central vent is set into the passenger display surround, a solution that very effectively camouflages its presence as it merges into the volume of the lower dashboard.



DESIGN
Interior - Door panel

The sculptural door panel is a seamless continuation of the dashboard in terms of both materials and colour. There is thus a clear relationship with the cockpit and the lower dashboard, creating a perfectly integrated effect.

On the central medallion, the styling cue is a deep lozenge-shaped scoop, a three-dimensional element that seems almost to float free of the panel. Its design also includes the door handle in a theme that merges with the dashboard. This type of architecture with a contrasting medallion in the foreground makes the entire door panel look extremely light and integrates the theme that connects to the rear trim.

DESIGN
Interior - Tunnel

The tunnel is similar to the SF90 Stradale: there is an intriguing interplay of volumes which visually lightens the structure.

It incorporates the SF90 Stradale-inspired modern take on the classic gear-shift gate and a compartment for stowing the ignition key with its characteristic Prancing Horse badge.

Even the carpets mirror the philosophy of integrating all of the contents and trims: the layout is identical to the SF90 Stradale. The carpet rises up from the floor integrating with the back section of the tunnel to complete the trim in an organic way.

DESIGN
Interior - Seats

For the 296 GTB, the designers created specific diapason-style seats using contrasting grooves which coordinate aesthetically with the edge strip of the instrument cluster. Clients may also choose a single-piece racing seat similar to the one in the SF90 Stradale from which it inherits its design, technology and structure.

PERSONALIZATION

3

PERSONALIZATION
Assetto Fiorano

- More extreme handling thanks to racing-derived suspensions
- Specific front aero profiles (+10kg downforce)
- Weight reduction (up to -15kg): carbon fiber parts and Lexan (opt)
- Dedicated racing livery (opt)

PERSONALIZATION
Assetto Fiorano

The **Assetto Fiorano** package is designed to push the 296 GTB's racing vocation to new extremes and is thus dedicated to clients seeking the ultimate in performance, design and exclusivity.

The Assetto Fiorano package adds to the standard spec a whole series of exclusive content that powerfully characterises the car:

- **Handling:** special GT racing-derived Multimatic shock absorbers with track-optimised calibration.
- **Weight reduction:** 12 kg lighter than the standard version, thanks to the even more extensive use of lightweight materials such as carbon-fibre (internal panels, rear spoiler and engine bay escutcheon) and titanium (suspension springs). However, the Assetto Fiorano package involves much more than simply replacing elements. Some components required that the standard basic structure be redesigned, including the door panel in which the central medallion is integrated into the panel wall in a single carbon-fibre part. The component is thus completely seamless.
- **Aerodynamics:** carbon-fibre high downforce appendages on the front bumper, giving an extra 10kg @250km/h downforce in the front
- **Special livery:** dedicated exclusively to this package to further accentuate its racing orientation (available as an optional).
- **Lexan rear screen:** further reduces car's weight by further 3kg and makes the engine more visible as is more transparent (available as an optional).

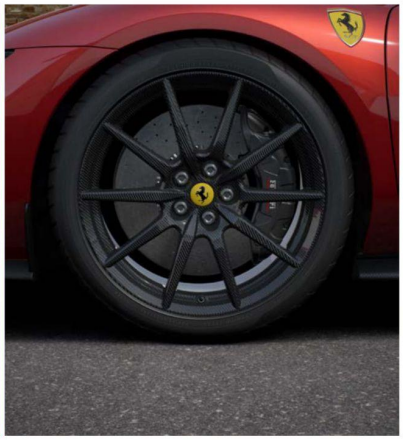
PERSONALIZATION
Assetto Fiorano Livery

The sporty impact of the Assetto Fiorano package is further underscored by a special livery inspired by the 250 Le Mans.

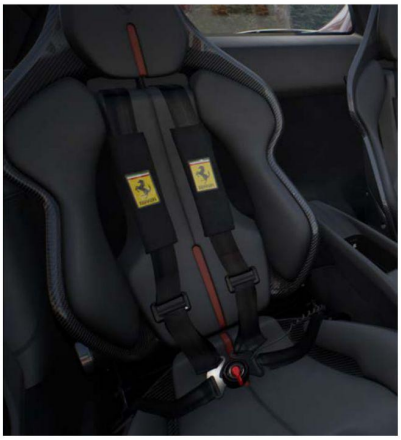
Its design runs from the front wings and hugs the central grille and delineates its edges. This styling element continues along the bonnet, creating a hammer motif before running lengthways up to the roof and then further on to the rear spoiler. There it melds with the tail where it again expands in a similar way to the front.

PERSONALIZATION
Main Elements

NEW ROSSO IMOLA
- New deep metallic red



CARBON FIBER RIMS
- 45% lighter than standard rims

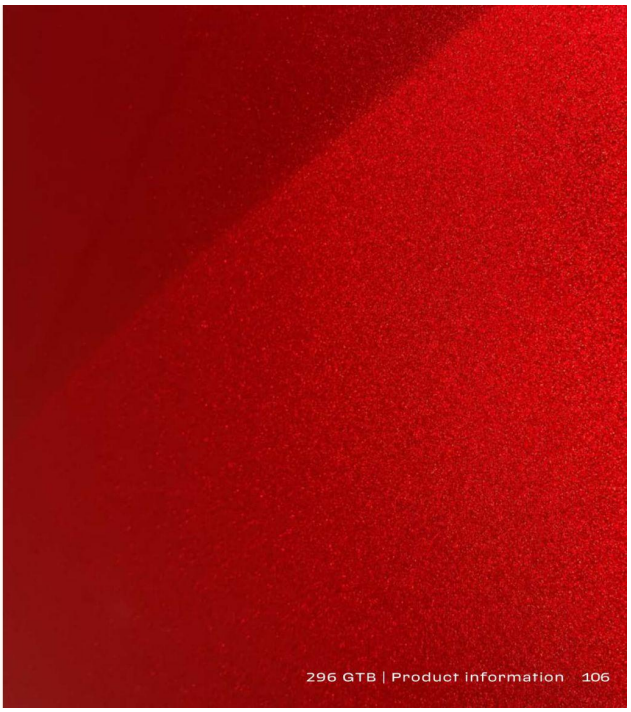


RACING SEATS WITH NEW 4-POINT HARNESSES
- For a more exhilarating driving experience

PERSONALIZATION
Launch colour: Rosso Imola

The launch colour for the car is a very deep metallic red enlivened by a hint of orange which lends it a particularly fresh, modernity.

In other words, a new 'red' joins the new range of Ferrari reds.



PERSONALIZATION
Carbon-fibre wheels

Carbon-fibre racing wheels are a signature of the more high performance models in the Ferrari range, and are characterised by the following attributes:

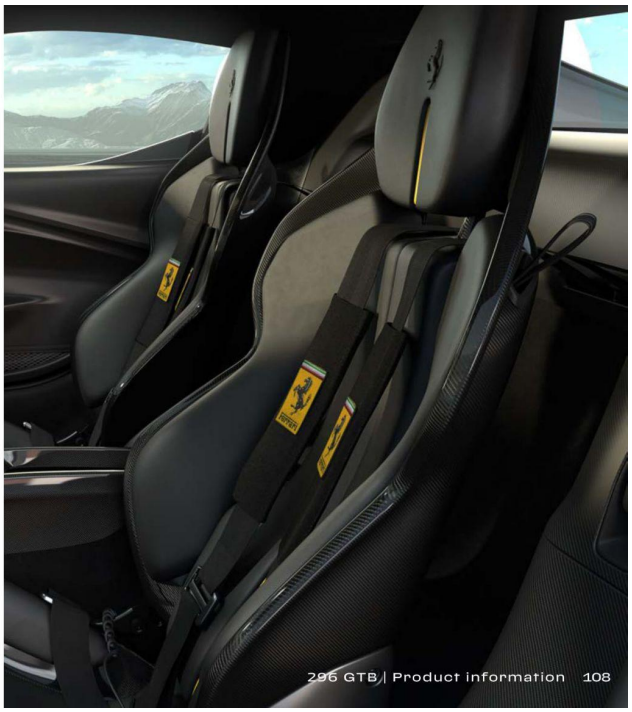
- **Lightness and performance:** an all-carbon-fibre structure protected by aerospace paint ensures a 45% weight-saving on unsprung rotating masses compared to standard wheels, a guarantee of even more precise, responsive handling. This was achieved through weight reduction that did not have an impact on the car's overall distribution. On both track and road, the reduction inertia is crystal-clear with the carbon wheels cutting braking and, in particular, acceleration times. Steering precision has been raised to dizzying new heights in terms of responsiveness in all kinds of movements: horizontal, vertical and longitudinal.
- **Design:** the carbon-fibre look can be extended to set new aesthetic, sporty and racing standards. The design of the new carbon-fibre wheels instantly communicates their incredible lightness whilst complying with the aesthetic canons of Ferrari DNA.

PERSONALIZATION
Racing seats

The new racing seat is available as a four or six-way and is derived from Ferrari's motorsport experience. It is 1kg lighter than the previous racing seat without impacting on driver comfort.

This was achieved by taking a competition seat-style approach to its design, which involved optimising the seat's shape whilst removing material wherever it was not strictly necessary to ergonomics or structural strength.

A special ad hoc pad trim technology was developed especially for it also that allows preformed leather/Alcantara inserts or pads to be applied directly to the carbon-fibre double shell, which means that even the bare structure of the front of the backrest is revealed.

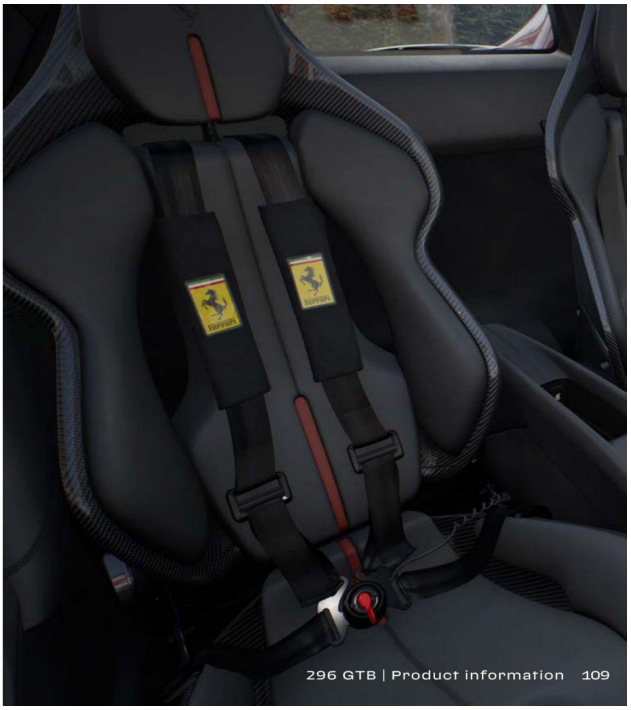


PERSONALIZATION
4-point safety harnesses

Clients looking for an even more exhilarating driving experience both on the road and the track can opt for the new 4-point safety harnesses, completely renewed starting from the hook that comes from Motorsport experience.

On a design level, the car's sporty, racing character is further underscored by the brand-new faster, safer motorsport-derived safety harness buckle and lighter bare carbon-fibre structure. Taken together these features bring numerous benefits in terms of ergonomics, occupant containment in cornering, braking and under acceleration.

They are available in a choice of 4 colours: Nero, Rosso, Giallo, Blu.



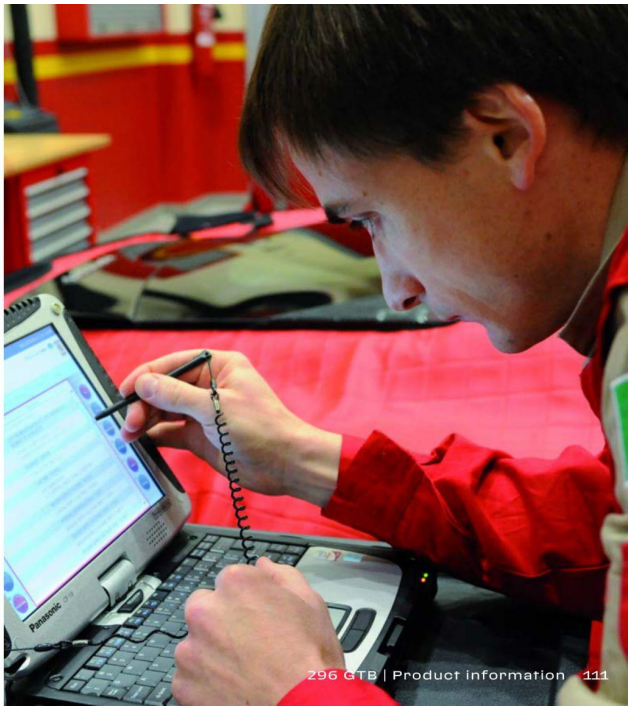
7 YEARS MAINTENANCE 4

7 YEARS MAINTENANCE

Ferrari's unparalleled quality standards and increasing focus on client service underpin the extended seven-year maintenance programme offered with the 296 GTB. Available across the entire range, it covers all regular maintenance for the first seven years of the car's life. This scheduled maintenance programme for Ferraris is an exclusive service that allows clients the certainty that their car is being kept at peak performance and safety over the years. This very special service is also available to owners of pre-owned Ferraris.

Regular maintenance (at intervals of either 20,000 km or once a year with no mileage restrictions), original spares and meticulous checks by staff trained directly at the Ferrari Training Centre in Maranello using the most modern diagnostic tools are just some of the advantages of the Genuine Maintenance Programme. The service is available on all markets worldwide and from all Dealerships on the Official Dealership Network.

The Genuine Maintenance programme further extends the range of after-sales services offered by Ferrari to satisfy clients wishing to preserve the performance and excellence that are the signatures of all cars built in Maranello.



TECHNICAL SPECIFICATIONS 5

DIMENSIONS AND WEIGHT

Overall length	4565 mm
Overall width	1958 mm
Height	1187 mm
Wheelbase	2600 mm
Front track	1665 mm
Rear track	1632 mm
Dry weight*	1470 kg
Weight distribution	40,5% ant - 59,5% post
Boot capacity	202 l
Rear bench capacity	112 l
Fuel tank capacity	65 l (10 reserve)

TYRES

Front	245/35 ZR 20 J9.0
Rear	305/35 ZR 20 J11.0

BRAKES

Front	398 x 223 x 38 mm
Rear	360 x 233 x 32 mm

INTERNAL COMBUSTION ENGINE

Type	V6 - 120° - Turbo – Dry Sump
Total displacement	2992 cm^3
Maximum Power**	663 cv @ 8000 rpm
Maximum Torque	740 Nm @ 6250 rpm
Specific Output	221 cv/l
Maximum revs per minute	8500 rpm
Compression ratio	9.4:1

*With optional equipement
**With 98 Ron fuel

ELECTRIC SYSTEM

Battery capacity	7,45 kWh
Maximum autonomy in eDrive	25 km

PERFORMANCES

Maximum Power - Hybrid mode	830 CV
Maximum Power – eDrive mode	154 cv
Maximum speed	>330 km/h
0-100km/h	2,9 s
0-200 km/h	7,3 s
200-0 km/h	107 m
Dry weight/power ratio	1,77 kg/cv
Fiorano Lap Time	81 s

FUEL CONSUMPTION AND EMISSIONS

Fuel consumption****	under homologation
CO_2 Emissions****	under homologation

TRANSMISSION AND GEARBOX

8 gears F1 dual clutch transmission

ELECTRONICS CONTROL

eSSC: eTC, eDiff, SCM, FDE2.0, EPS, ABS Evo with 6w-CDS

Performance ABS/EBD with energy recovery

*** In modalità Qualify (eManettino)
**** Ciclo WLTP

DIMENSIONS AND WEIGHT

Overall length	179,7 in
Overall width	77,1 in
Height	46,7 in
Wheelbase	102,4 in
Front track	65,6 in
Rear track	64,3 in
Dry weight*	3241 lb
Weight distribution	40,5% ant - 59,5% rear
Boot capacity	7,1 cu ft
Rear bench capacity	4,0 cu ft
Fuel tank capacity	17,2 US gallon (2,6 reserve)

TYRES

Front	245/35 ZR 20 J9.0
Rear	305/35 ZR 20 J11.0

BRAKES

Front	15,7 x 8,8 x 1,5 in
Rear	14,2 x 8,8 x 1,3 in

INTERNAL COMBUSTION ENGINE

Type	V6 - 120° - Turbo – Dry Sump
Total displacement	182,6 cu in
Maximum Power**	487,6 kW @ 8000 rpm
Maximum Torque	546,1 Nm @ 6250 rp,
Specific Output	2,67 kW/cu in
Maximum revs per minute	8500 rpm
Compression ratio	9.4:1

*With optional equipement
**With 98 Ron fuel

ELECTRIC SYSTEM

Battery capacity	7,45 kWh
Maximum autonomy in eDrive	15,5 mi

PERFORMANCES

Maximum Power - Hybrid mode	610 kW
Maximum Power - eDrive	113 kW
Maximum speed	>205 mph
0-62 mph	2,9 s
0-124 mph	7,3 s
124-0 mph	351 ft
Dry weight/power ratio	5,31 lb/kW
Fiorano Lap Time	81 s

FUEL CONSUMPTION AND EMISSIONS

Fuel consumption****	under homologation
CO_2 Emissions****	under homologation

TRANSMISSION AND GEARBOX

8 gears F1 dual clutch transmission

ELECTRONICS CONTROL

eSSC: eTC, eDiff, SCM, FDE2.0, EPS, ABS Evo with 6w-CDS

Performance ABS/EBD with energy recovery

*** In Qualify mode (eManettino)

**** WLTP Cycle