



Ducati V4 Granturismo engine

Introducing the all-new V4 Granturismo, Ducati is presenting an extremely compact, light and performing engine, featuring rich torque values. Built to respond to the most demanding "adventuring" needs, this project also offers the perfect combination of supreme thrills and sporty flavour. Designed to power fourth-generation Ducati Multistrada, the V4 Granturismo engine is ready to opening up an entirely new era for the Borgo Panigale-based motorcycle manufacturer. It faithfully embodies true Ducati values - Style, Sophistication, Performance, Trust - and is dedicated to enjoy on and off-road riding pleasure. Built with latest-generation technology as well as first-in-class materials currently available in order to guarantee both durability and reliability, the V4 Granturismo stands out for its never so high maintenance intervals. Not to mention that it has been created to be the heart of performing and dynamic bike, ready to explore every corner of the planet.

Unstoppable engine

Ducati's philosophy has always been focused on developing advanced technology to offering superior riding experience. Every single technical solution has been adopted to ensure not only truly unique performance in the segment but also best functionality. Ducati followed thus the same path in designing the V4 Granturismo. While the V4 Granturismo shares its overall layout together with precise technical choices with the Desmosedici Stradale, it has also been designed and developed to perfectly combine Ducati sportiness with great capability and versatility. Moreover, its reliability and durability come from the fact that some of the main components have been developed to withstand the extreme stresses of the Desmosedici Stradale. Among its exclusive components the all-new distribution, developed to considerably lengthen the heaviest maintenance intervals, now achieving an impressive 60,000 km. Figures obtained thanks to the in-depth expertise Ducati acquired in the use of materials, treatments and technical solutions developed around the Desmodromic system. All this, applied to a spring valve return system which stresses less the components if compared to the Desmo, brought to set an outstanding milestone never set before by a motorcycle engine.

The profiles of the camshafts and the valve lift speeds have been developed to obtain throttle delivery suitable to a touring-oriented engine, without leaving out performance, which remain at the top of the category. The innovative distribution of the V4 Granturismo engine guarantees great regularity of operation, in particular at low speeds and revs, an innate feature of spring-loaded engines, and contributes to the compact dimension and lightness of the whole engine.

Specific focus was given to fluid dynamics. Length, diameter of the pipes, layout of the combustion chambers as well as valve diameter: all contributed to achieve fluid and regular delivery, even at low revs. Also to be mentioned are the absolute performance, maximum power at high revs and top speed just like an authentic sports engine. All clear hallmarks for a Ducati engine. The V4 Granturismo delivers 125 kW (170 hp) at 10,500 rpm and a maximum torque of 125 Nm (12,7 Kgm) at 8,750 rpm. All these data meeting the stringent Euro 5 emission regulation.

Light and compact

Road riding, having fun traveling, even fully loaded: the great character of the new V4 Granturismo engine focuses on these ingredients. 1,158 cc displacement came out as being the perfect point of connection in terms of performance, lightness and dimension of a V4 engine, capable of being lighter and more compact than the Testastretta twin-cylinder, powering the previous Multistrada 1260. Compared to the latter, the



V4 Granturismo results 85 mm shorter, 95 mm lower and only 20 mm wider. In addition, weight has been reduced by 1.2 kg. Structural lightness represents the cornerstone of all Ducati's projects as well as a key value for an even more effective riding. The engine is the heaviest element of the whole vehicle: that is why building a light engine is a must in order to design a bike that is both performing and pleasant to ride. The know-how that Ducati has gained through years of racing stands out in every single motorsport projects. Even the V4 Granturismo engine, with its mere 66,7 kg, can boast a record lightness.

The V4 compact layout allows to house the engine in the frame more effectively and centrally to positively influence the position of the bike's center of gravity. The direct result is an even more easy-to-handle bike, effective between curves and with a high minimum ground clearance, but at the same time with truly contained seat height (this also thanks to the extremely compact sump guard).

What's more, this kind of engine, thanks to very low vibrations, is able to offering excellent riding comfort, both on long motorway journeys and in the accelerations and decelerations when riding on mixed terrains. About this theme, an in-depth "sound quality" studies assigned to the V4 Granturismo a "gentle" sound characterized at the same time by the classic captivating tune of the V4, pinnacle of the Borgo Panigale-based motorcycles manufacturer.

Performance to reach unexplored corners of the planet

On the V4 Granturismo, Ducati engineers focused on offering travelers superb engine, capable of delivering record-breaking performance in its category mixed with great regularity of operation. For this reason, particular attention has been reserved to torque curves specifically dedicated to each gear. This contributed to give life to a smooth engine at low revs, rich in torque in the mids and with a sporty soul at highs.

Thanks to the long-term commitment in professional motorcycle races, Ducati honed in-depth knowledge of engines equipped with counter-rotating crankshaft. This undoubtedly represents a winning technical choice not only in competitions but also in road rides. That is why even the all-new V4 Granturismo engine adopts this solution.

The distinctiveness of "counter-rotating" lies in the fact that the crankshaft runs in the opposite direction as the wheels, compensating for the gyroscopic effect, improving handling and agility and reducing pitch when accelerating as well. These are all greatly appreciated values not only on the track but also - and specially - in everyday life or when traveling fully loaded.

Even the Twin Pulse technology applied on the new V4 Granturismo engine comes from the competitions world. Ducati always aims to achieve best possibile performance management, both on track and road. Feeling an "instant throttle response": this is what the professional riders look for and, in short, what motorcyclists with various levels of experience appreciate most.

That is why the V4 Granturismo engine features the crank pins offset at 70°. The result? A unique and captivating sound combined with a rich delivery across revs range and yet perfectly in control, especially when exiting the curve.

Intake is entrusted to a throttle body with intake horns and specific length ducts. These solutions optimise balance between performance and handling providing at the same time for full and regular delivery from low-to-mid revs together with top speed like an authentic sports engine.



All these technical solutions have been adopted to give life to a new-generation engine, which perfectly complies with current regulation. A compact and light road-oriented engine featuring the most advanced solutions and capable of offering performance at the top of the segment.

V4 Granturismo main technical data

- 1158 cm³ 4-cylinder 90° V engine
- Bore x stroke 83 x 53,5 mm
- Compression ratio 14:1
- Maximum power 125 kW (170 CV) at 10,500 rpm
- Maximum torque 125 Nm (12,7 Kgm) at 8,750 rpm
- Euro 5 homologation
- Distribution part chain, part gear - timing with dual overhead camshaft, 4 valves per cylinder
- Counter-rotating crankshaft with crank pins offset at 70°
- Wet multiplate anti-patter servo clutch
- Semi-dry sump lubrication with three oil pumps: 1 delivery and 2 return
- Fuelling with four oval throttle bodies (46 mm diameter equivalent)
- 6-speed gearbox with Ducati Quick Shift (DQS) Up & Down System
- 60,000 km maintenance valves interval

90-degree V4 engine

Ducati sees the 90-degree V4 layout not only as the main sporty interpretation of a motorcycle engine but also as top-level solution for motorcycles of whatever segment, especially if the engine results as ultra-compact and light as the V4 Granturismo. Lateral compactness perfectly fits with that of a twin-cylinder engine while the longitudinal one, thanks to Ducati's choice to maintaining the stroke of the Desmosedici Stradale, results as compact as that of a racing engine. This allowed Ducati designers to house the engine in the frame by centralizing the masses and optimising the weight distribution as well.

The 90-degree "V" layout builds first order forces naturally without having to resort to a balancing countershaft to prevent vibrations, a solution that, as known, increases weight and absorbs power. All this in the name of a supreme ride comfort.

Built to ride longer

Absolute reliability together with long-maintenance intervals are among the prior requirements for an engine intended for motorcycles capable of undertaking long journeys. The great experience gained over years of development of Desmodromic system is reflected into the new spring timing, specifically



designed for the all-new V₄ Granturismo engine. The aim? Achieving long-time and absolutely reliable distribution.

The maintenance plan of the V₄ Granturismo engine provides for the replacement of the oil, the check of the air filter (every 30,000 km) and the engine filter every 15,000 km (or 2 years). The check and eventual adjustment of the valve clearance and the replacement of the spark plugs are instead scheduled every 60,000 km: one and a half times around the world.

No other motorcycle engine currently on the market goes that far. All this means low maintenance costs, also thanks to the careful research accomplished during the engine design phase, which allowed to limit the time necessary to carry out the various interventions required by the maintenance plan. A guarantee of total safety for the rider, who will find in the V₄ Granturismo the perfect adventures ally.

Counter-rotating crankshaft

On standard production bikes the crankshaft turns in the same direction as the wheels. Its inertia is added to that generated by the wheels. On engine equipped with a counter-rotating shaft, instead, the crankshaft compensates the inertia of the world. This makes the motorcycle even more handling and effective when entering the curve. That is why this solution is also adopted in MotoGP. In other words, the benefits of the counter-rotating crankshaft are so evident that after employing it both in MotoGP and on Desmosedici Stradale, Ducati introduced this element even on the new V₄ Granturismo.

As mentioned before, the counter-rotating crankshaft partially allows to compensate the gyroscopic effect generated by the wheels during the ride. This provides for a greater handling and therefore a "lighter" bike to ride, easy and agile when changing direction. Those benefits are evident not only in sporty adventures but also in every single riding phase of whatever motorcycle.

Another benefit has to do with inertia (the resistance of any physical object to any change of its state) of both motorcycle and rotating parts of the engine. During acceleration, the torque transmitted to the ground tends to lift the front end and, to the limit, make the bike wheelie. Similarly, when braking or during very speedy decelerations, the bike tends to raise the rear or lift-up. Crucial events that the counter-rotating crankshaft constantly aims to prevent, reducing pitch and thus ensuring not only greater safety but also greater comfort both for rider and passenger.

Twin Pulse ignition

A combination of 70° crank pin offset and 90-degree "V" layout generates what Ducati calls a "Twin Pulse" firing order because it's as if the engine were reproducing the firing sequence of a twin-cylinder. The distinctiveness lies in the fact that the two left-hand cylinders fire closely together, as do the two right-hand ones. In the timing chart, the ignition points are, then, at 0°, 90°, 290° and 380°. This particular firing order makes the V₄ Granturismo sound comparable to that of a twin-cylinder, and for this reason immediately recognizable and, at the same time improves hi-standard torque results as well as regularity of operation. This system represents the best formula for hi-end all-round bikes such those to which the new V₄ Granturismo is designed for. The thrilling soundtrack of the exhaust has been carefully designed to enhance acoustic comfort. High-standard vibro-acoustic tests also contributed to optimise both materials and gear behaviour to obtain maximum sound quality. In short, the voice of the V₄ Granturismo.

Fuelling system, exclusive injection



For the V₄ Granturismo engine, Ducati designed a dedicated injection system. On touring-oriented motorcycles, hi-end included, priorities lie in achieving a delivery curve suitable to all revs as well as a consistent power torque, capable of offering superior on road riding taste. This is why Ducati engineers chose an exclusive injection system, in which the diameters and lengths of the ducts have been specifically designed to offering supreme on road delivery. For example, compared to a performance-oriented engine like the Desmosedici Stradale, the V₄ Granturismo engine has smaller diameter throttle bodies, longer ducts and optimised combustion chambers. The throttle bodies of each bank are driven by a dedicated electric motor and can activate the throttles asynchronously between the two banks. This solution, thanks to the complex control strategies managed by the full Ride by Wire system, allows the rider to shape the character of the engine according to the selected Riding Mode.

Deactivating rear bank

All the engines characterized by "V" layout features the rear cylinders very close to the rider. In some crucial situations this can lead to a reduction in comfort due to the heat transmitted by the rear cylinders. This is especially evident at very low speeds or in urban riding, when the stop at traffic lights becomes frequent. That is why, the V₄ Granturismo adopts a mechanism to deactivate the rear bank. When the motorcycle is stopped at the traffic lights, the rear bank deactivates (there is no combustion in the cylinders), a mechanism that not only improves overall heat comfort but also reduces consumption.

High-inertia flywheels masses

Designing a modern touring-oriented engine deals with ambitious goals from the point of view not only of performance but also - and especially - of riding pleasure and regularity of operation. Instant response and regularity when increasing speed marks the perfect cornerstone of a road taste. Power must be delivered right exactly when the rider needs it and therefore must be "spread" across the whole revs range. From the diameter of the valves to the inertia of the rotating and/or moving elements: each single component of the engine contributes to achieve this goal. Crankshaft, rods and pistons are specifically designed for the Ducati V₄ Granturismo engine, not to mention clutch and flywheel. In-depth studies introduce specific masses for flywheel and alternator to obtain delivery as regular and consistent as possible at all speeds. This solution offers the rider the feeling of a real "instant throttle response".

Reliability and durability as a cornerstone

The technical choice of adopting spring timing is perfectly in keeping with the philosophy of this engine, which aims to optimise performance from the low-to-mid rev range, for which camshafts with specific profiles are required.

The four V₄ Granturismo engine camshafts exploit the follow finger and control the sixteen steel valves: 33,5 mm diameter on intakes and 26,8 mm on exhausts.

The camshafts are controlled by two "silent" timing chains. At the front, the chain drives the intake camshaft which, in turn, transmits drive to the exhaust camshaft via a pair of cogs (hybrid chain-cog timing). On rear timing, instead, the chain drives the exhaust camshaft, which transmits drive to the intake camshaft. This solution minimises timing power absorption, enhancing performance and reliability. Front cylinder timing is controlled by the chain on the right-hand side of the engine, turned by the crankshaft via a gear obtained on the primary drive pinion. The one that controls rear cylinder timing is on the left-hand side of the engine and is driven by a monobloc gear on the crankshaft. Each cylinder head has an "anti-knocking" sensor that optimises spark advance to prevent any combustion shock.



Semi-dry sump lubrication

Ducati is at the forefront in conceiving advanced technical solutions. That is why the V4 Granturismo engine inherits from the Desmosedici Stradale the semi-dry sump lubrication, with delivery and return stages that ensure proper lubrication of all moving parts at all times. A technical solution derived directly from the race world yet capable of ensuring maximum reliability for a road engine that still needs optimal lubrication in whatever situation. In addition, the "high" sump positioning significantly contributes to increase the ground clearance.

Cooling system

Housed in the engine "V", the water pump is operated by a shaft, in turn driven by a gear train. This positioning solution is designed to minimise circuit size, boost efficiency and optimise engine weight.

Gearbox and clutch

The 6-speed gearbox has been specially designed for road use to which the V4 Granturismo engine is dedicated. The opening of the gearbox (ratio between reduction of first and sixth gear, to be precise) goes from 2171 of the Desmosedici Stradale to 2849 to obtain a short first gear. This solution results perfect for moving at very low speed, for easier uphill starts especially at full load and off-road riding while maintaining a sixth gear sufficiently long during motorway rides.

The gearbox is equipped with a rotary gear sensor to work optimally together with the Ducati Quick Shift (DQS) Up & Down System.

The hydraulically controlled wet clutch features a progressive self-servo mechanism that compresses the friction plates when under drive from the engine without requiring any extra effort from the rider to release the clutch.

The same mechanism enables a slip rate in the event of negative torque and prevent the hopping of the rear wheel during aggressive down-shifting, with the added benefit of improving comfort and safety.