

Engine and drivetrain

Enhanced power, greater efficiency

The new 911 also brings a new generation of turbocharged flat-six engines. Advanced development has been primarily focused on further enhancing performance, alongside meeting the latest emissions standards by including a gasoline particulate filter (GPF). New, larger turbochargers with symmetrical layout and electrically controlled wastegate valves, a completely redesigned charge air cooling system, increased compression, as well as the newly implemented piezo injectors combine to attain engine improvements in all relevant areas: responsiveness, power, torque characteristic, efficiency and manoeuvrability. In addition to the 22 kW (30 PS) increase in power to 331 kW (450 PS) at 6,500/min, the engine offers 30 Nm higher torque, at 530 Nm between 2,300 rpm and 5,000 rpm.

The new six-cylinder engine features forced induction by an almost completely new intake system. Two mirrored turbochargers replace the previously used identical parts. In addition, the compressor and turbine wheels are now arranged in mirrored configuration in relation to the engine, and therefore rotate in opposite directions. The diameter of the turbine wheels has been increased by three millimetres to 48 millimetres, while the 55-millimetre compressor wheel is now four millimetres larger. Thanks to a newly developed lightweight cast manifold and the adapted turbine housings, it has been possible to improve the air flow conditions on the turbine inflow and outflow. This contributes to increasing efficiency, responsiveness, torque and power.

Control of the wastegate valves is also new. The valves are no longer adjusted by a vacuum, but electrically using stepper motors, making boost pressure control faster and more precise overall. The maximum boost pressure of the 911 Carrera S with GPF is around 1.2 bar.

Increased efficiency: charge air coolers now under the rear lid grille

Further downstream in the intake section, compressed air flows through the two newly positioned charge air coolers, which were previously installed in the location of the air filter – they have now swapped places. Instead of being located at the sides in the rear wings, the charge air coolers are now located directly over the engine in a central position under the rear lid grille. This new position permits improved air inflow and outflow of the cooling air and the dethrottling of the process air path, while the increased size of the charge air coolers significantly boosts their efficacy.

The entire basic engine has been targeted for further development, and numerous details have been optimised. For the first time, piezo-controlled injectors directly inject fuel into the combustion chambers. Piezo injectors open and close even more rapidly than the previous solenoid-operated components, meaning that the injection volume can be divided across up to five injections per cycle. In addition, the injector opens outwards so that fuel is distributed better and in finer droplets into the combustion chamber. Without the new piezo injectors, the only way to implement these improvements would have been by increasing the injection pressure; the chosen method has made it possible to retain the pressure level of 200 bar.

Asymmetrical valve lift for better combustion

The VarioCam Plus variable valve control system uses asymmetrical intake camshafts with a small valve stroke to control gas exchange for the first time. In this arrangement, the two adjacent valves of a cylinder open in this partial load position at different partial strokes. Where previously both intake valves had a uniform 3.6-millimetre small valve stroke, on the new engine the lift is at 2.0 millimetres and 4.5 millimetres. This dethrottling in the partial load area and various other detail optimisations have improved fuel management and therefore combustion – reducing consumption and emissions. Smoother running at low engine speeds and loads also increases comfort on the road. When full stroke is selected for higher engine performance, both inlet valves of the cylinder open with parallel strokes.

Emotional sound both inside and out

The unmistakable sound of the 911 also contributes to the driving pleasure of this sports car. That's why the engineers have paid great attention to the sound balance of the intake and exhaust sides when carrying out further development. The exhaust systems have been revamped to offer a characteristic and appealing sound experience for the Porsche 911, in spite of stricter noise requirements and installation of the gasoline particulate filter. The twin-branch exhaust system now includes map-controlled and fully variable exhaust flaps. This regulation capacity enables both optimum power development and an emotional sound profile. The flaps are electrically actuated by stepper motors. This also makes it possible to now set intermediate positions – for an even more emotional sound experience. A sports exhaust is also available. While the standard system has two double tailpipes, the sports exhaust system has two oval outlets.

Completely newly developed eight-speed dual-clutch transmission

The 911 Carrera S and 911 Carrera 4S are being launched exclusively with the first eight-speed dual-clutch transmission (PDK) for Porsche sports cars. Compared with the seven-speed transmission of the previous models, the new PDK offers a host of improvements. The driver can directly feel the enhanced combination of comfort, performance and efficiency. All gears have new ratios: first gear is now shorter and eighth gear longer than before. This has made it possible to implement a longer final-drive ratio, thereby further reducing engine speeds in the upper gears. The result is harmonious ratio stepping and further potential for reducing fuel consumption. Maximum speed can still be achieved in sixth gear. The use of a controlled oil pump and advanced fuel-efficient engine oils are further measures that reduce both power losses and fuel consumption. The oil pressure required for changing gear and clutch operation is controlled based on demand, and power losses in the transmission are reduced.

Fast gear changes for better dynamics

The new fast gearshift enables the driving dynamics of the 911 to be experienced even more intensely. This function is available for shifting up both in manual mode, and when Sport Plus is activated, also in automatic mode. As with the 911 GT sports cars, this means much shorter response times and faster gear changes. Fast gearshifts are generally used at high engine speeds and loads, and require significantly improved clutch switching during the gearshift operation. The hydraulically controlled clutch changeover takes place much faster thanks to an additional filling bypass.

Sport Chrono Package with a new mode switch

The Sport Chrono Package is the first choice when it comes to increasing driving performance and driving pleasure. The package includes the new mode switch with Sport Response button and PSM Sport Mode, dynamic engine mounts, as well as the stopwatch and the Porsche Track Precision app. Driving modes are selected by means of the new mode switch in the steering wheel, and the currently active mode is displayed in the instrument cluster.

The dynamic engine mounts – which have a new position better aligned to the engine's centre of gravity – combine the advantages of both hard and soft engine mounts. They increase both driving comfort and driving stability thanks to electronic control. The PSM Sport mode is separately switchable and adjusts the stability system to an especially sporty mode, in which ambitious drivers can get even closer to the limit range of their vehicle in a safe environment. Inspired by motor sports, the Sport Response button offers the option of setting engine and transmission responsiveness to maximum performance for 20 seconds. The Porsche Track Precision app enables measurement of lap times and driving data on race tracks; using a smartphone, this data can be recorded and managed, as well as shared and compared with other drivers.

In combination with the optional Sport Chrono Package, the new Wet Mode, which is standard for all 911 models, can be selected via the mode switch. The standard Sport function can then also be activated only by means of the mode switch.

The 911 Carrera 4S with more powerful front-wheel drive

The enhanced performance of the new 911 Carrera 4S goes hand-in-hand with the further development of the front-axle drive. The clutch and differential unit is now water-cooled and has reinforced clutch discs to increase robustness and load capacity. The increased actuating torques at the clutch improve its adjustment accuracy and as such also improve the function of the additional front-axle drive. In total, the refined front-axle transmission in combination with PTM (Porsche Traction Management) support even better traction on snow, as well as in both wet and dry conditions. In the area of driving dynamics, the precision, performance and load capability for race track use have been optimised.