

# PORSCHE

## The new 911 Carrera Technology Workshop

Chassis





### Total vehicle concept



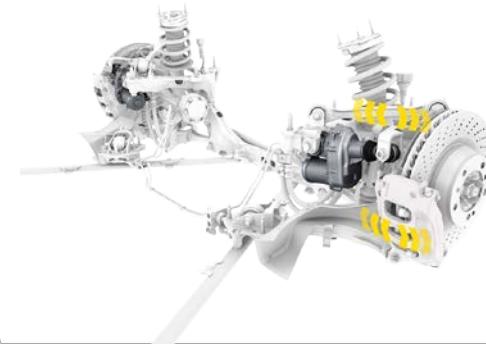
- Systematic attention to vehicle dynamics requirements in total vehicle concept

### Chassis mechanics



- High-performance tyres
- Performance fixed-calliper brakes
- Stiffness-optimised lightweight suspensions
- Maximum precision in wheel location

### Mechatronic systems

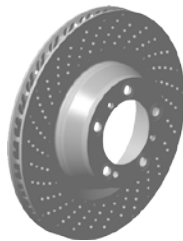


- Further boost to performance potential
- Spread between vehicle dynamics and comfort



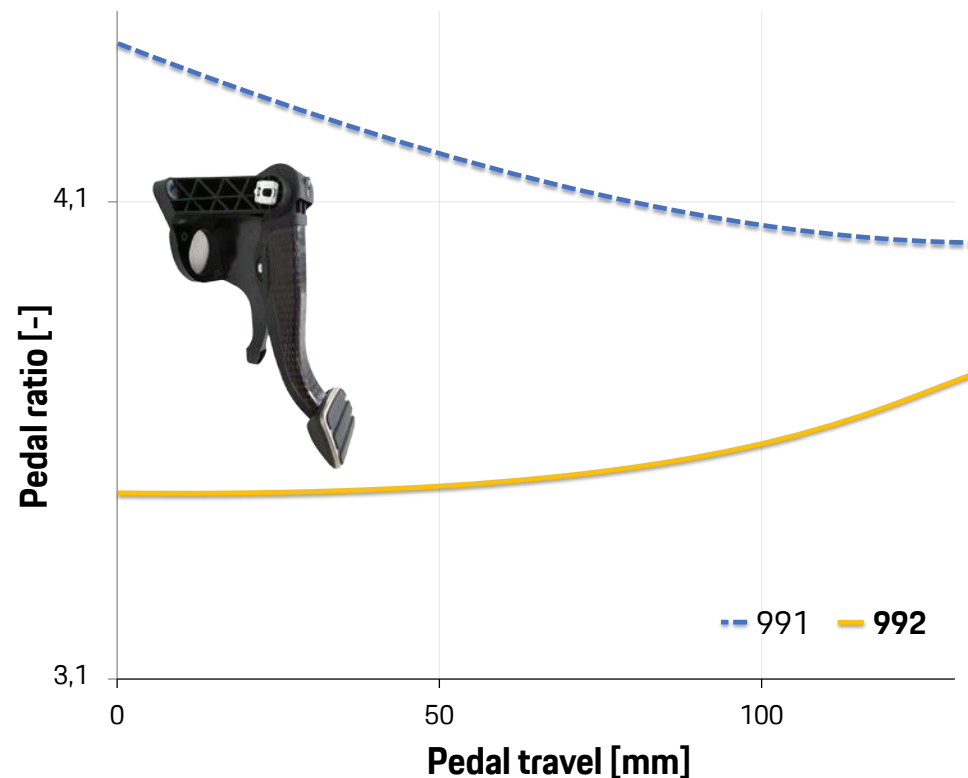
Modified brake dimensions and contribution to environmental protection  
by the use of copper-free brake linings in all brakes

911 Carrera S/4S	Front axle		Rear axle	
<b>Standard grey cast iron brakes</b> Conversion to copper-free brake linings, front brake dimensions similar to previous model, diameter of rear brakes increased 20 mm with same thickness	Six-piston fixed calliper	Grey cast iron 350 x 34 mm	Four-piston fixed calliper, red	Grey cast iron 350 x 28 mm
<b>PCCB (optional)</b> Conversion to copper-free brake linings, dimensions similar to previous model	Six-piston fixed calliper	ceramic-Compo-site disc 410 x 36 mm	Four-piston fixed calliper, yellow	ceramic-Compo-site disc 390 x 32 mm



**More direct brake pedal ratio and electric brake booster (EBB)  
for shorter pedal travel, more precise response and transparent pedal feel**

**Pedal ratio is function of pedal travel**



**Lightweight organic sheet pedal**

Technology from 918:  
-41% weight compared to 991

### Mixed wheel sizes for first time with different wheel diameters at front and rear

#### Advantages: larger outside tyre diameter and rim diameter

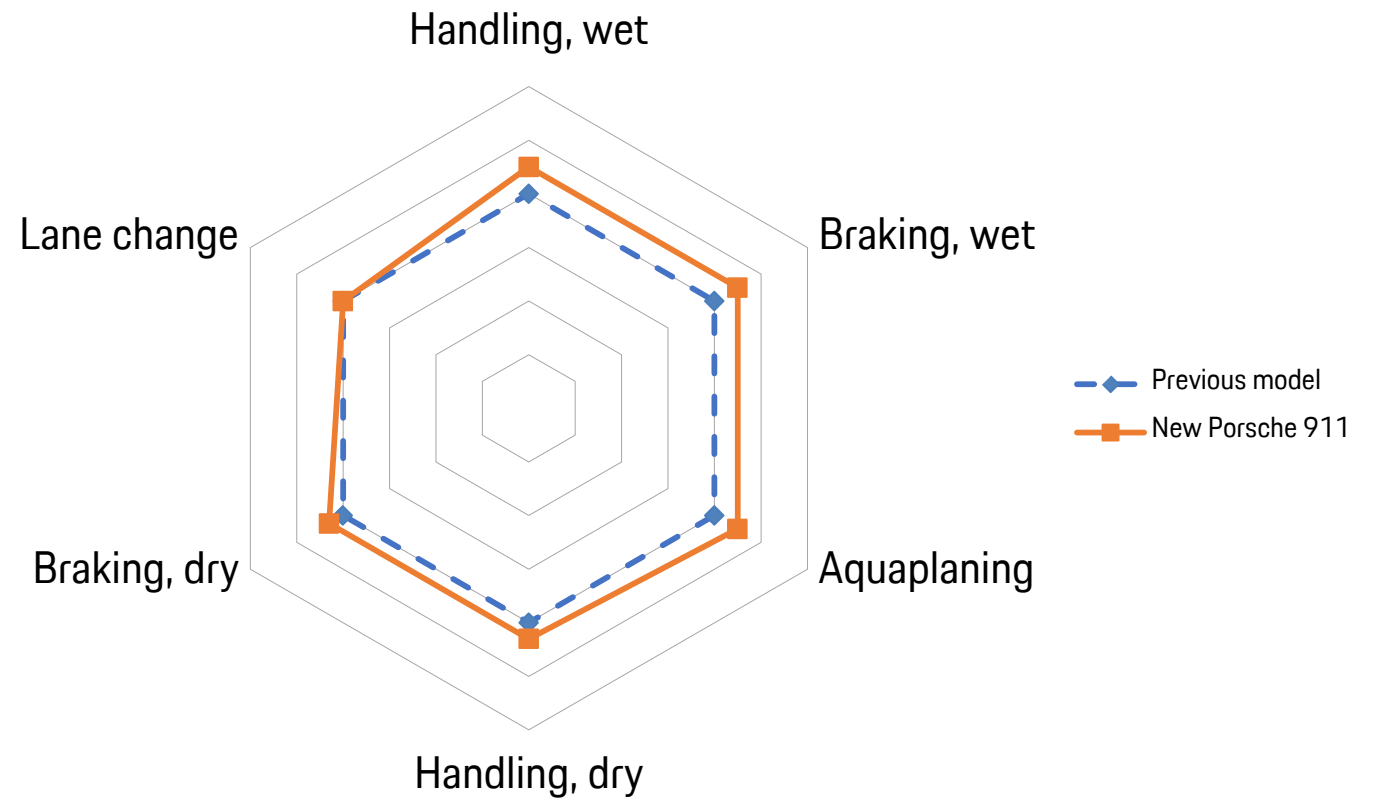
- Greater temperature stability due to larger mass of the tyre belt and larger rolling diameter
- Smaller local deformations of the tyre belt in tyre contact area
- More homogeneous pressure distribution in tyre contact area

→ Result is linear behaviour and

→ Thereby better fulfilment of vehicle dynamic balance requirements for the new Porsche 911



### Tyre properties of the new Porsche 911





### Braking distance optimisation in conjunction with PSM

#### Consideration of tyre types and tyre size in ABS (RDK)

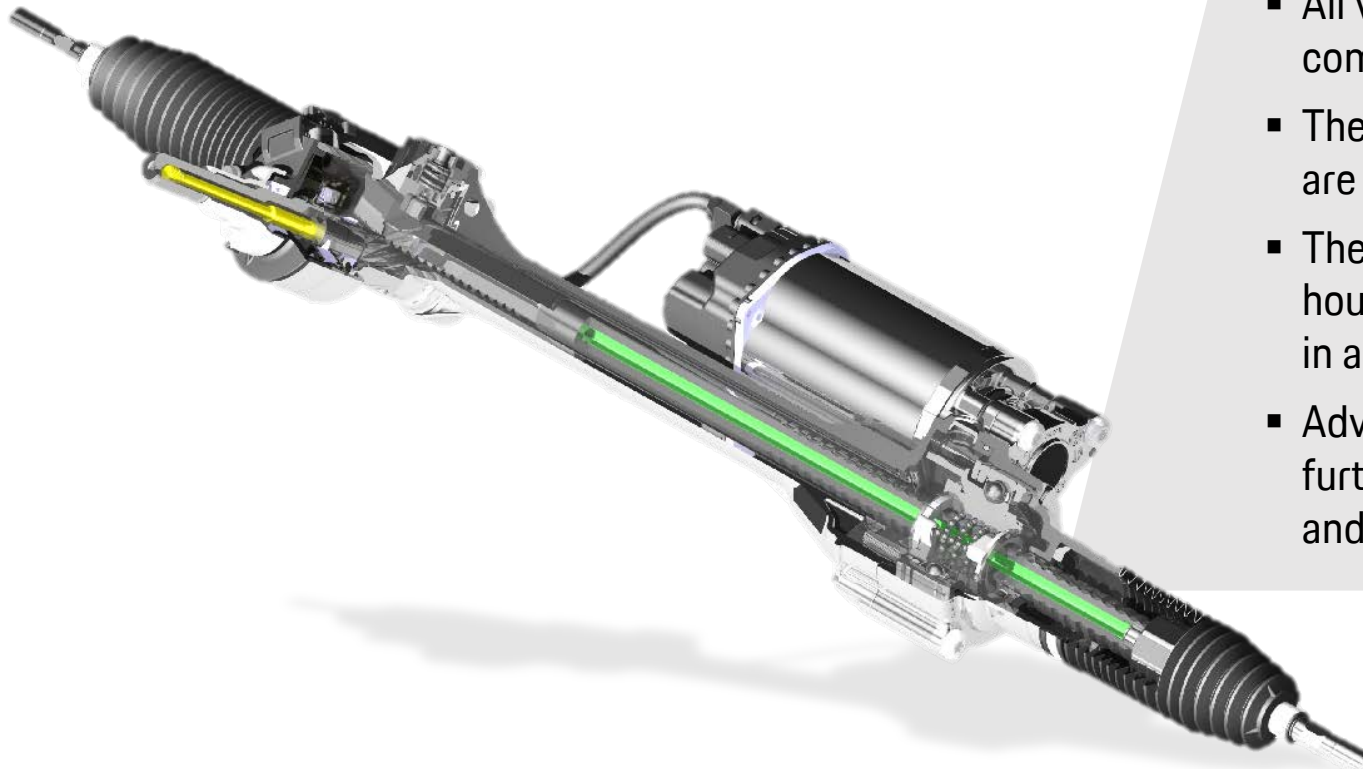
- Tyre-specific enhancement of braking performance (consideration of tyre stiffness)
- Braking distance reduced for braking actions from very high speeds by utilising active aerodynamics (Airbrake). Braking distance reduced by up to approx. 1.5 m in the 911 Carrera S

### Braking distance in interplay with the overall chassis and tyres

1 m shorter from 100 km/h  
12 m shorter from 300 km/h



### The new Porsche 911 gets more direct steering for even sportier handling

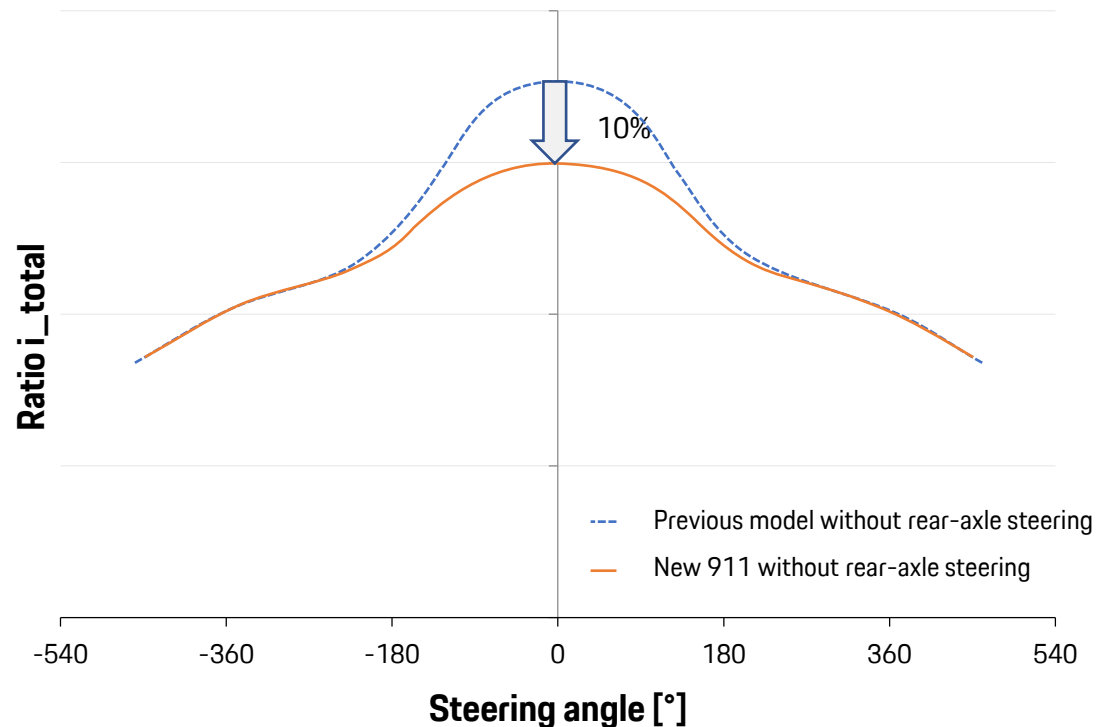


- All vehicles are getting a more direct steering ratio compared to the previous model
- The direct, sporty response and steering precision are further improved by using a stiffer torsion bar.
- The change to a steering controller produced in-house assures unique feedback of the driving state in all situations
- Advanced engineering of the rear-axle steering further improves the spread between agile handling and a high level of vehicle stability

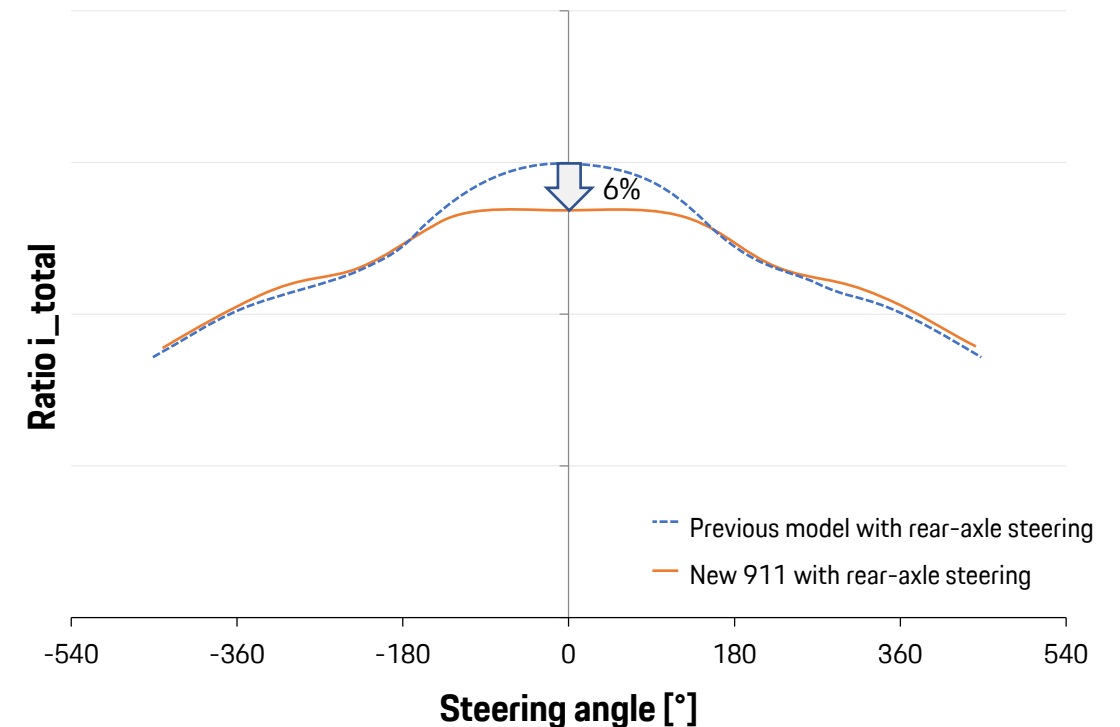
### Direct steering ratio in the new 911

- Without rear-axle steering: ten per cent more direct
- With rear-axle steering: six per cent more direct

#### Without rear-axle steering



#### With rear-axle steering



		991 II	Difference	992
Normal chassis	FA	26 N/mm	15 %	30 N/mm
	RA	63 N/mm	14 %	72 N/mm
Sport chassis	FA	38 N/mm	18 %	45 N/mm
	RA	102 N/mm	23 %	125 N/mm

### Higher spring rate to enhance performance

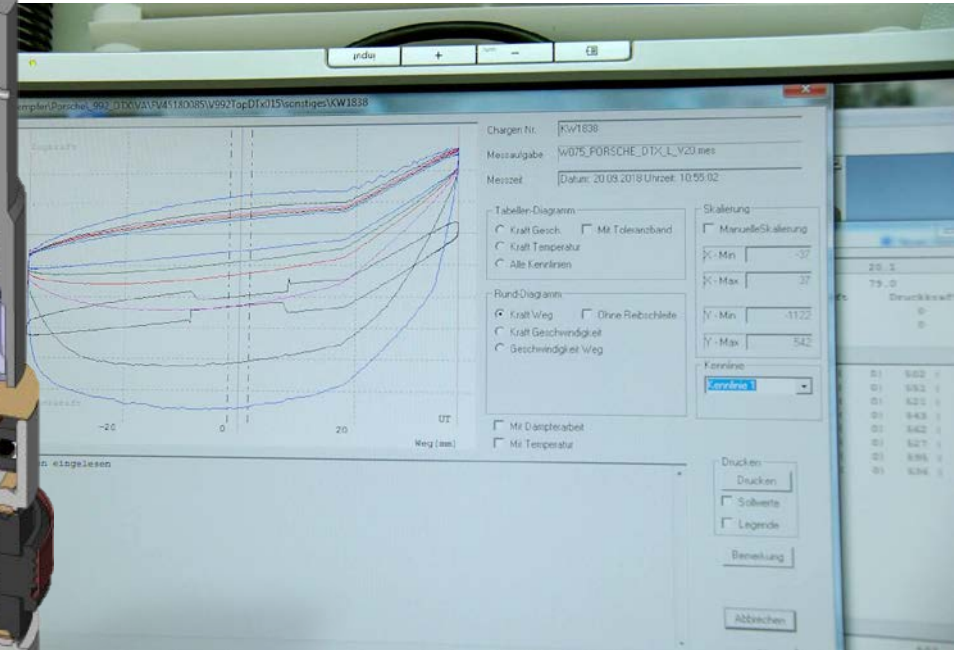
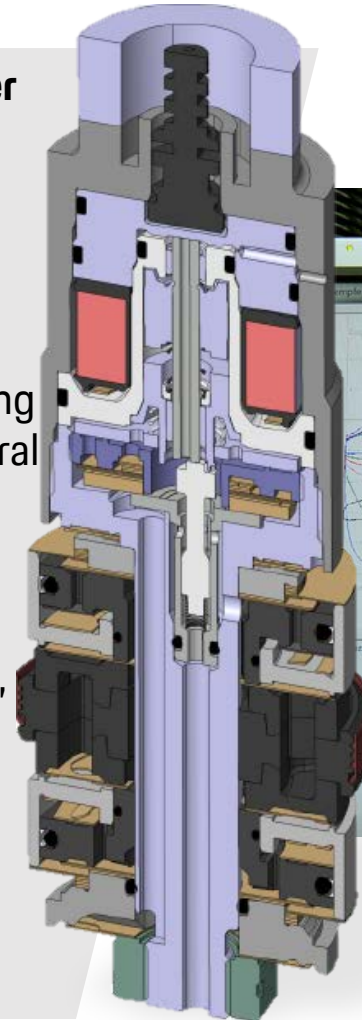
- Significantly improved sportiness
- Improved dynamic handling
- New damper technology enhances comfort



### PASM dampers featuring new technology

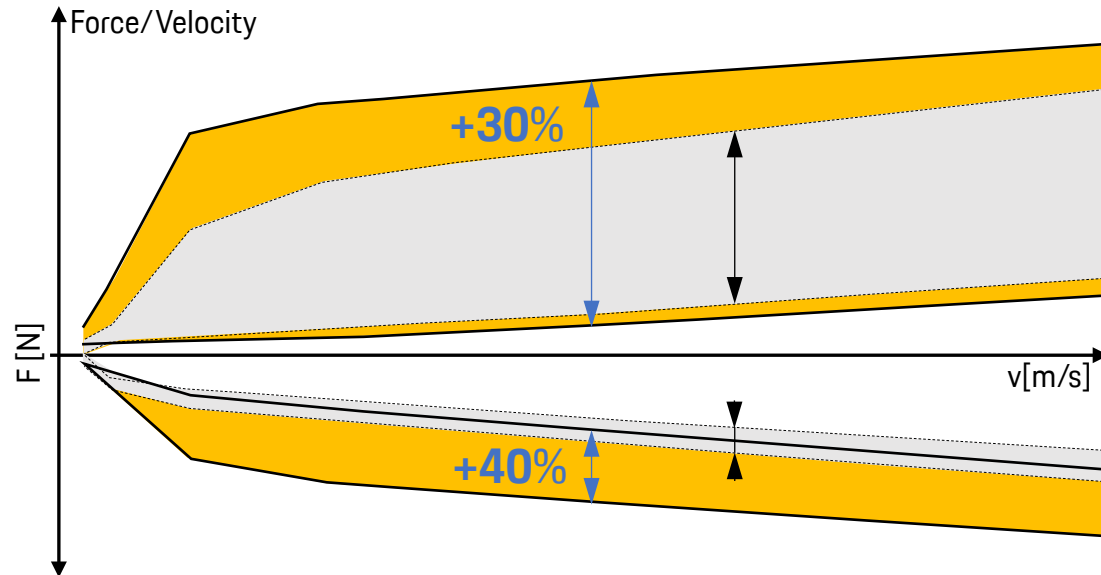
**Introduction of a variable, i.e. continuously adjustable damper valve with high dynamics (Bilstein DTX technology)**

- New Porsche damper control, software developed in-house
- Physical control concept (model-based physical approach) with Skyhook controller
  - Computes and makes adjustments to dampers according to the driving situation and specific to each wheel several hundred times per second.
- The power required for the dampers is determined under consideration of multiple influencing factors (e.g. driving situation, road condition, excitation, vehicle weight, masses, suspension kinematics)
- Pre-control functionality, e.g. special driving situations (e.g. powertrain and braking influences, Launch Control)
- Damper and software enable highly dynamic and highly precise control

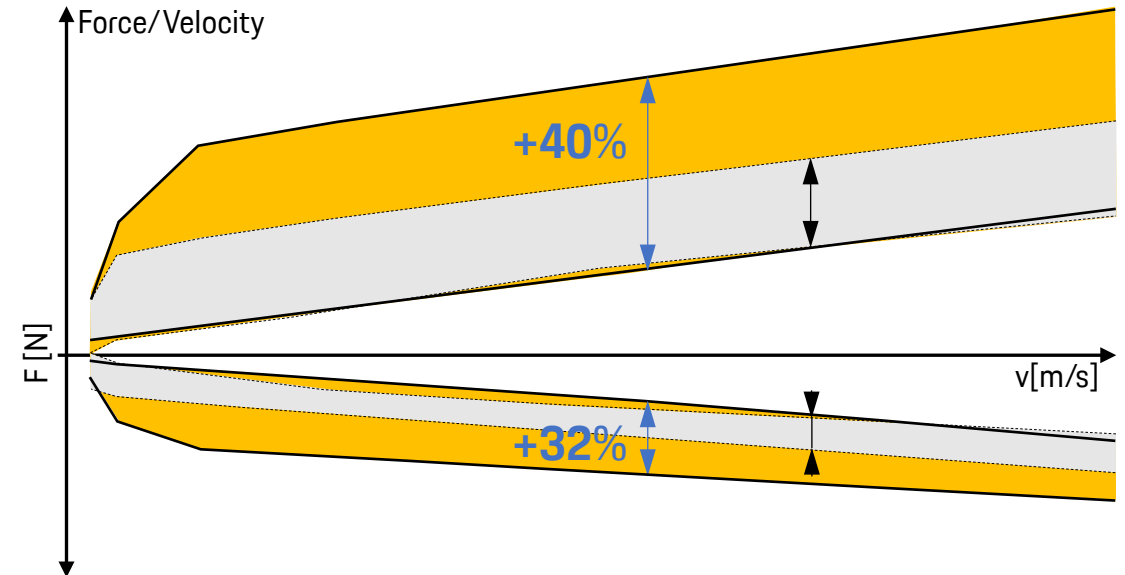




### Damper characteristic, FA (standard chassis)

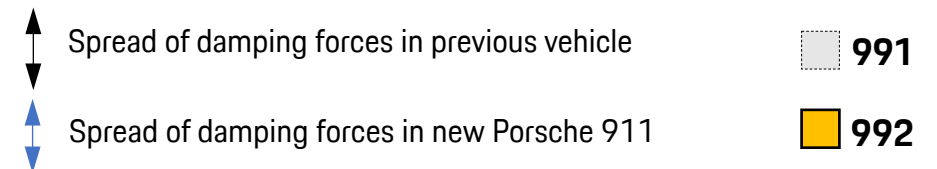


### Damper characteristic, RA (standard chassis)



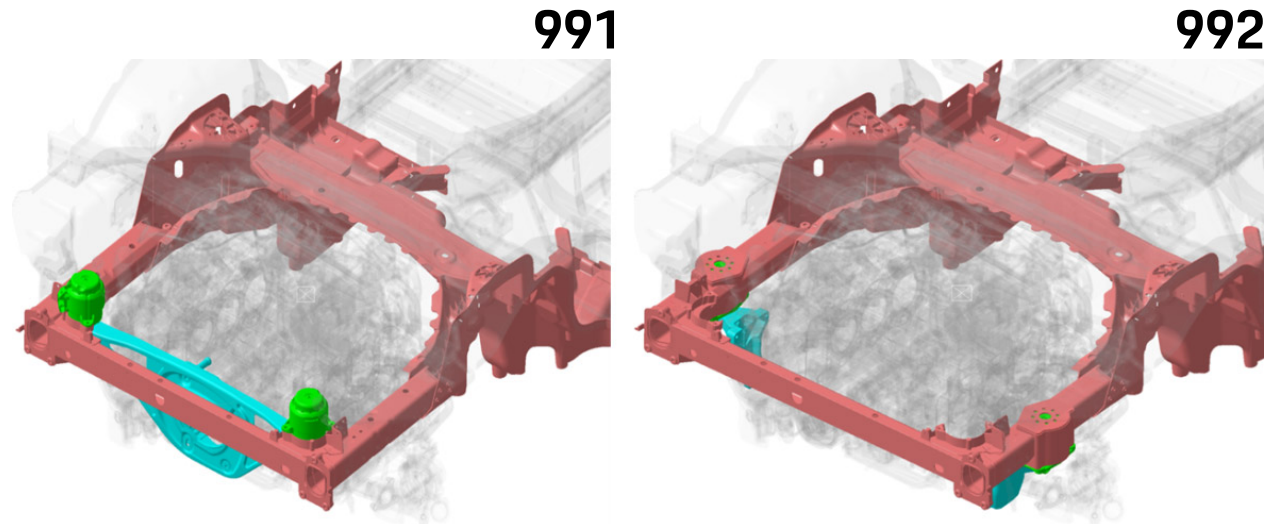
### New damper technology enables need-based and precisely timed switching of valves

- Significantly larger spread between comfort and sportiness
- Better connection to the structure
- Enhanced comfort by improved responsiveness

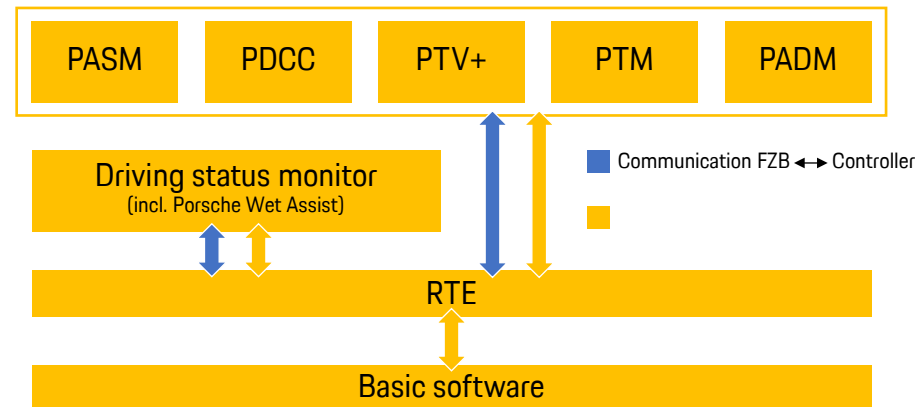


### New engine mounts

- 168 mm further forward and 113 mm further to the sides
- Significantly stiffer link between engine and transmission
- Increased solidity and optimised transfer stiffnesses
- Improvement of vehicle reactions in sporty style of driving
- Comfort gains due to reduced engine chugging

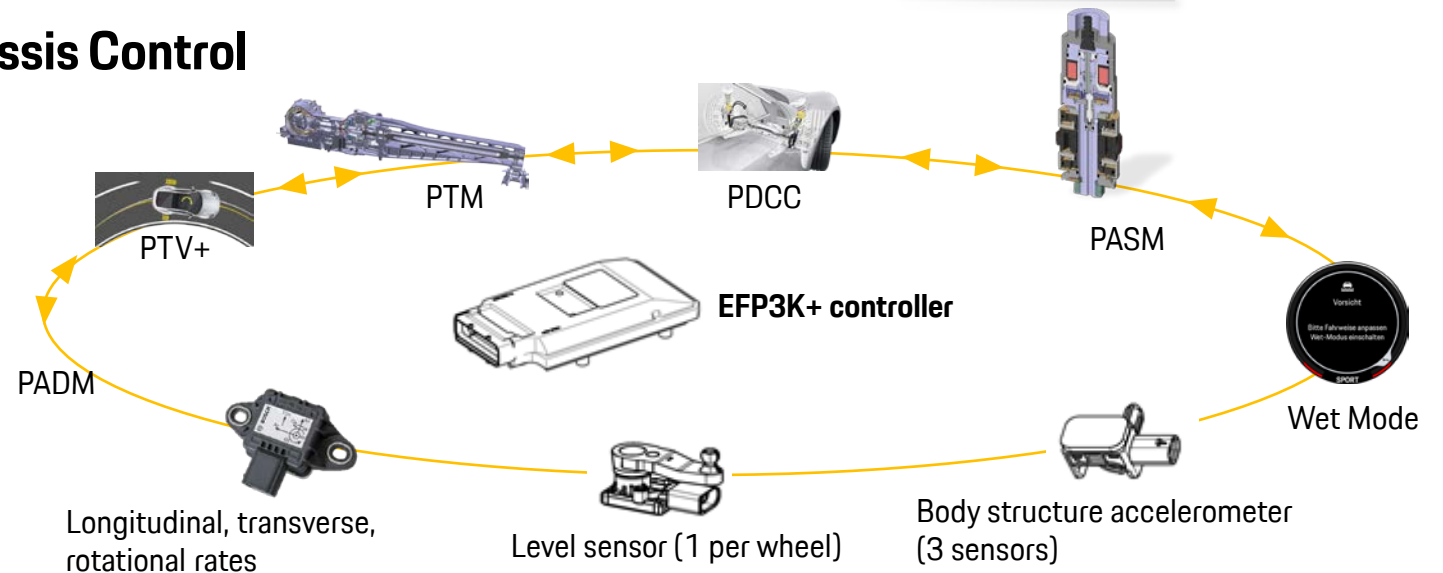


### Electronic Chassis Platform (ECP) – 4D Chassis Control



### In-house software development

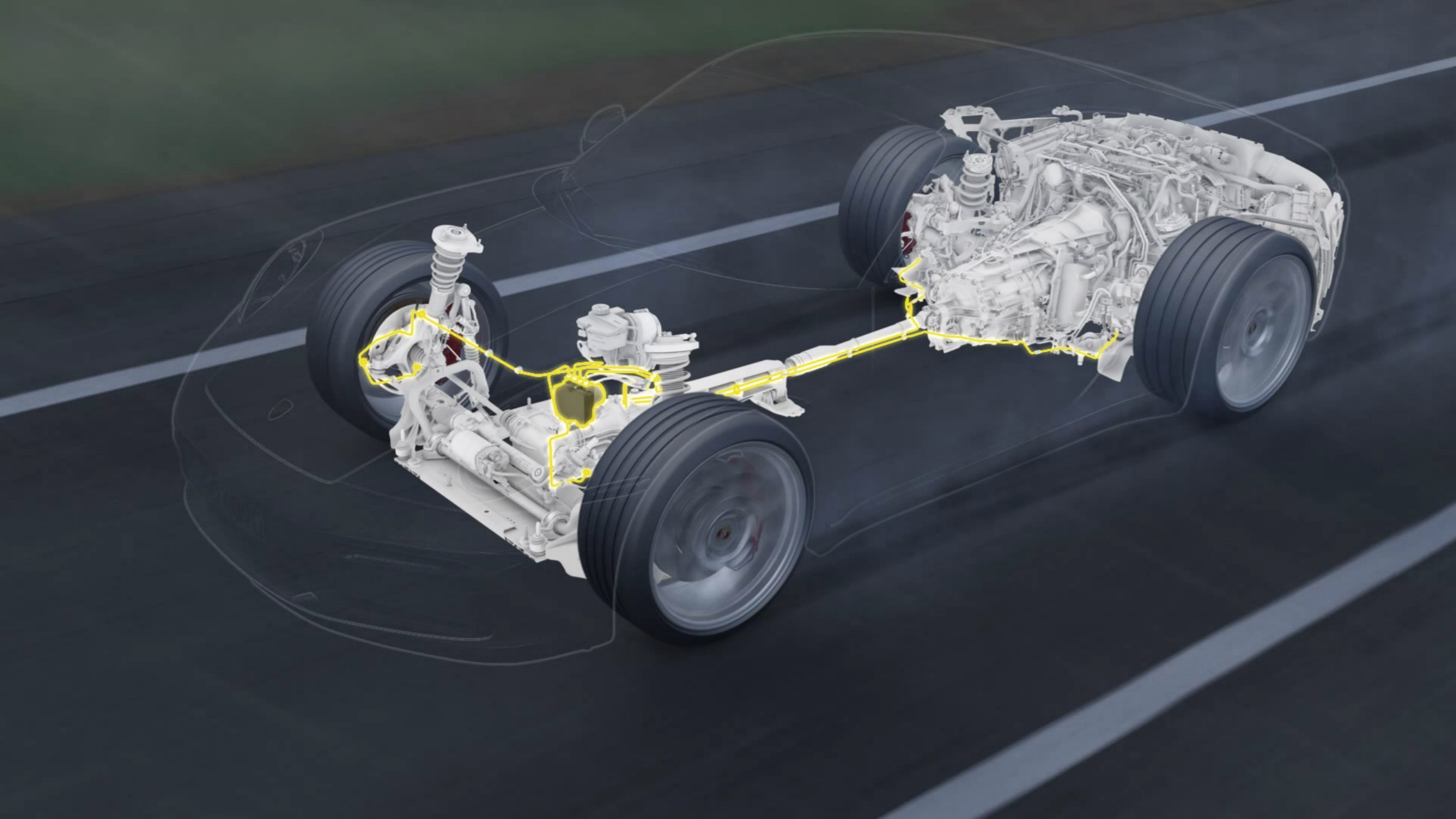
- Extended software developed in-house to achieve Porsche-specific type of handling
- Advanced development of vehicle state monitoring
  - Systems use centrally prepared information as basis for their control functions
- Centralisation of chassis functions in one control unit with significantly boosted computing performance (EFP3k+)
- Expanded communication between control functions
  - Performance is enhanced by chassis functions ideally tuned to one another with minimal signal propagation times











Global innovation: Wet Mode



Roadway detection and vehicle preconditioning

Driver indicator

Adjustments to handling

(after Wet Mode has been activated)

1st stage

Analysis of road condition

In wet conditions: PSM and PTM preconditioning

2nd stage

Note on detected wet  
Recommendation for  
activating Wet Mode and  
adjusting style of driving

3rd stage

Adaptation of PSM, PTM,  
aerodynamics, PTV Plus  
and engine responsiveness

Effects of Porsche Wet Mode on vehicle systems

Engine

- Reduces buildup of engine torque
- Flatter accelerator pedal characteristic

Transmission

- Shifting strategy adapted to modified engine application

PSM

- More sensitive ASR control and more sensitive stabilisation control
- ABS control thresholds lowered
- Adaptation of brake module for bends

PTM (all-wheel drive)

- Basic torque distribution is biased to the front

Aerodynamics

- Maximum output with understeer balance

PTV Plus

- Reduced degree of locking of controlled differential lock

20/21-inch

Standard: Carrera S wheel



Option: Carrera Classic wheel



Option:  
RS Spyder Design wheel



Option: Carrera Exclusive wheel



911 Carrera S/4S

Summer tyres/wheels
Winter tyres/wheels

Front axle

245/35 ZR 20 on 8.5J x 20 ET53
245/35 R 20 91V on 8.5J x 20 ET53

Rear axle

305/30 ZR 21 on 11.5J x 21 ET67
295/30 R 21 98V on 11J x 21 ET66

# PORSCHE

## The new 911 Carrera – Steering wheel



### New generation steering wheels

**Sporty design**

**Diameter: 360 mm**

**SPORT Response button for  
vehicles with PDK transmission**

**GT sport steering wheel optional  
(picture)**

**Total vehicle concept**

Chassis mechanics

Mechatronic systems



The new Porsche 911 further extends the spread between performance and comfort while simultaneously improving road safety under consideration of efficiency and environmental requirements

