

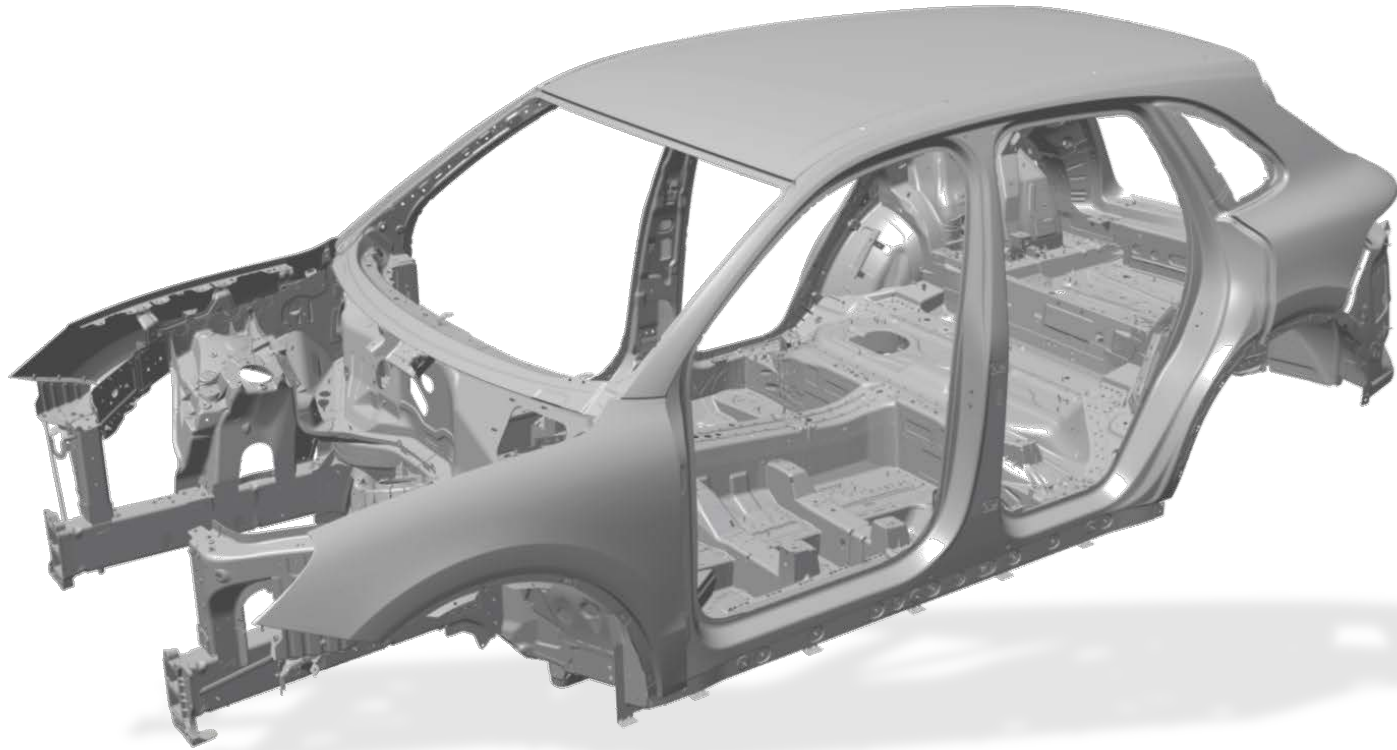
PORSCHE

Body

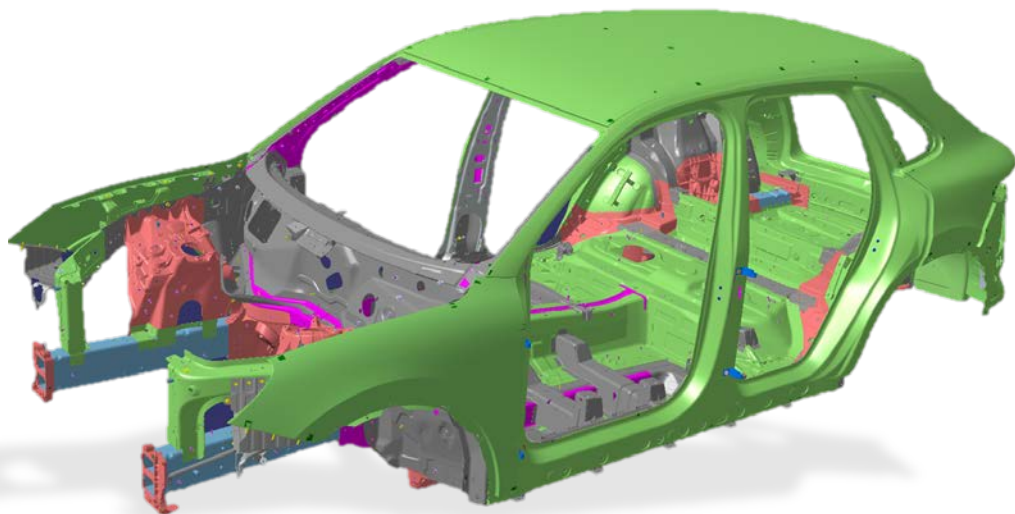
Technology Workshop Cayenne



The body of the new Porsche Cayenne generation



Body-in-white



Multi-material mix of:

Aluminium

Sheet metal

Castings

Extruded profiles

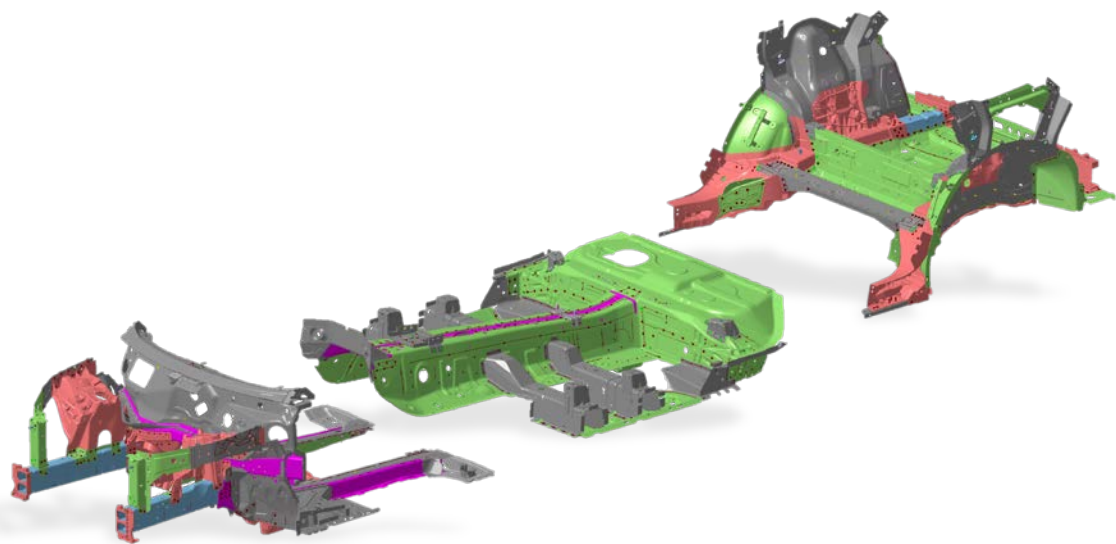
Steel

Conventional

Hot formed

■ Steel sheet (cold) ■ Steel sheet (hot) ■ Aluminium sheet ■ Extruded profile ■ Aluminium casting

Platform Architecture



Platform of three modules

| Front body

| Middle floor

| Rear body

Layout for

| Steel and air suspensions

| All-wheel drive

■ Steel sheet (cold) ■ Steel sheet (hot) ■ Aluminium sheet ■ Extruded profile ■ Aluminium casting

Inner side section

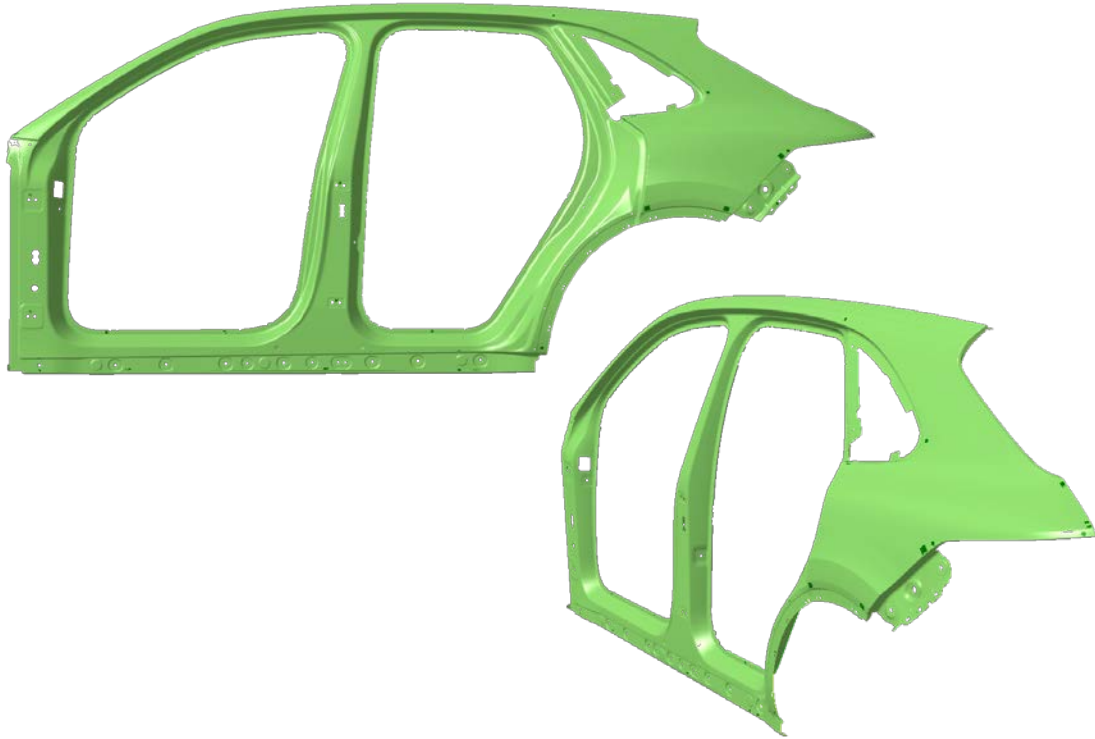
Mixed construction technology

| Demand-driven material concept



■ Steel sheet (cold) ■ Steel sheet (hot) ■ Aluminium sheet ■ Extruded profile ■ Aluminium casting

Side panel



Side panel made from aluminium

| Porsche-typical styling:

| Flared wheel-houses

| Special requirements on:

| Manufacturability

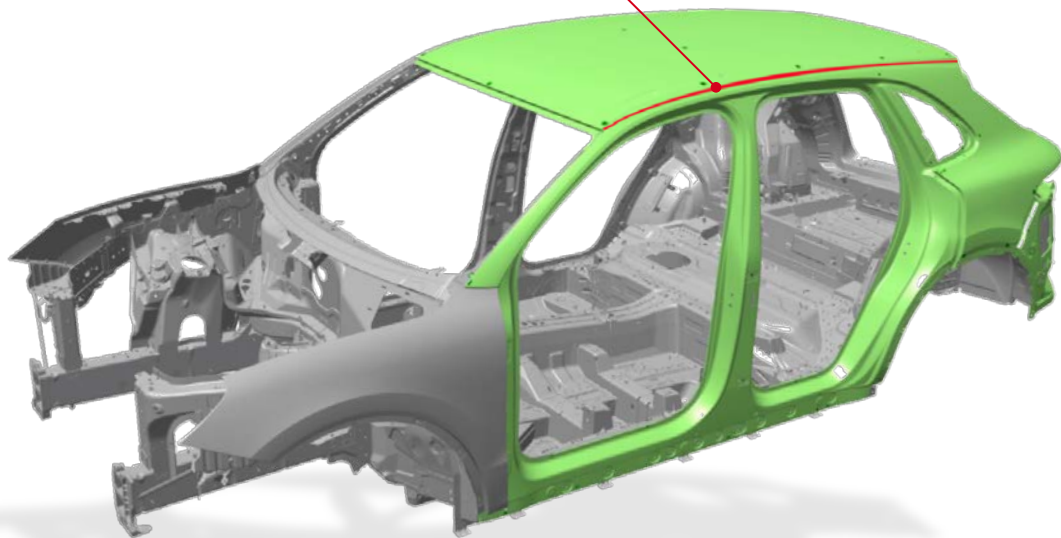
| Joining technologies

| Drawing depth 240 mm

Multi-material construction

Intelligent lightweight design

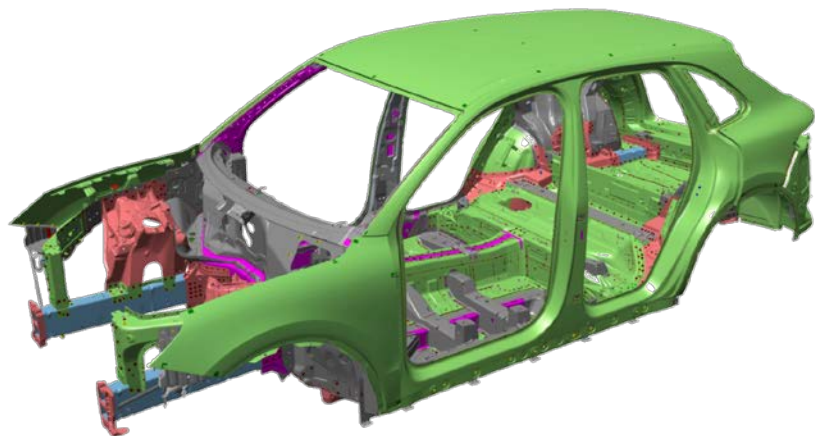
Laser weld



- | Roof made of aluminium
- | Roof laser-welded to side panels
- | Roll-hemmed door flanges

Multi-material construction

Joining technology



■ Steel sheet (cold) ■ Steel sheet (hot) ■ Aluminium sheet ■ Extruded profile ■ Aluminium casting

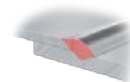
Flow drill screws [n]
631



Punch rivet [n]
2039



MIG welding [m]
2.26



Adhesive [m]
163.56



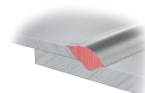
Clinching [n]
136



Resistance spot welding [n]
2741



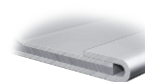
MAG welding [m]
1.93



Laser welding [m]
7.73



Roll hemming [m]
7.06



Projection welding [n]
56



Cold metal transfer welding [m]
0.42



Friction element welding [n]
155

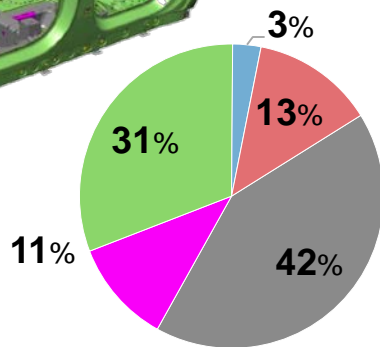
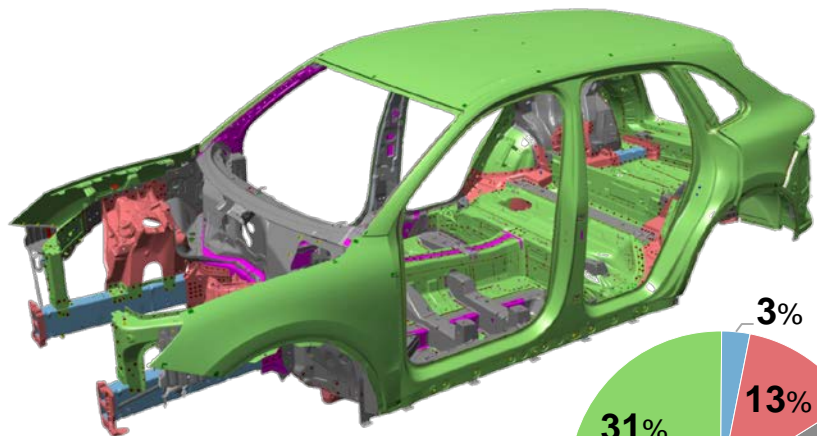


Stud welding [n]
412

Crimping [n]
80

Multi-material construction

Intelligent lightweight design



■ Steel sheet (cold) ■ Steel sheet (hot) ■ Aluminium sheet ■ Extruded profile ■ Aluminium casting

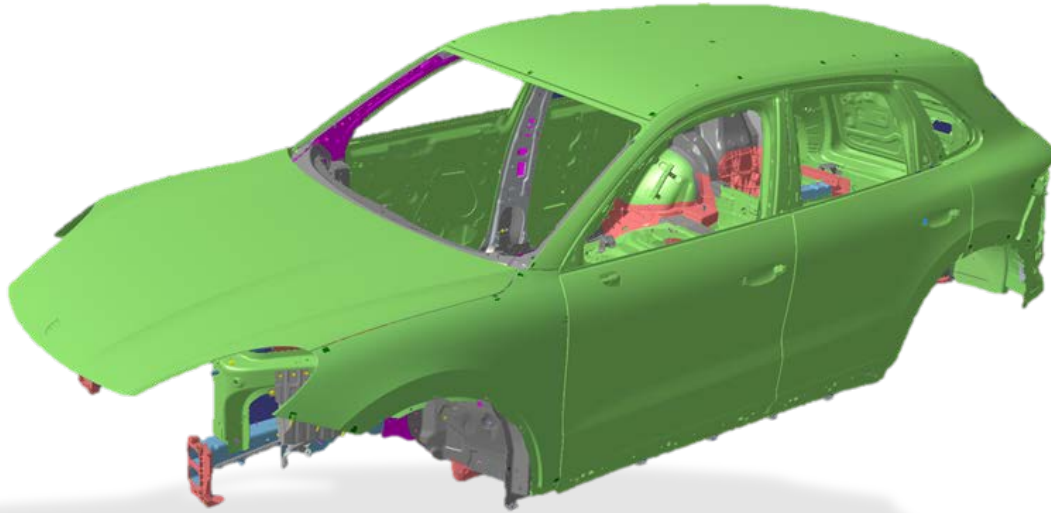
Body-in-white before painting: **392 kg** (-22 kg)

Full compensation for added weight from additional product substance and increased requirements

In introducing multi-material mix in construction, aluminium share **47 percent**

Increased body rigidity, dynamic and static

Hang-on parts



Hang-on parts: **-13.5 kg**

Weight reduction through the use of aluminium on doors, tailgate, bonnet and fender

■ Steel sheet (cold) ■ Steel sheet (hot) ■ Aluminium sheet ■ Extruded profile ■ Aluminium casting

Porsche adaptive aerodynamics

Efficiency and performance

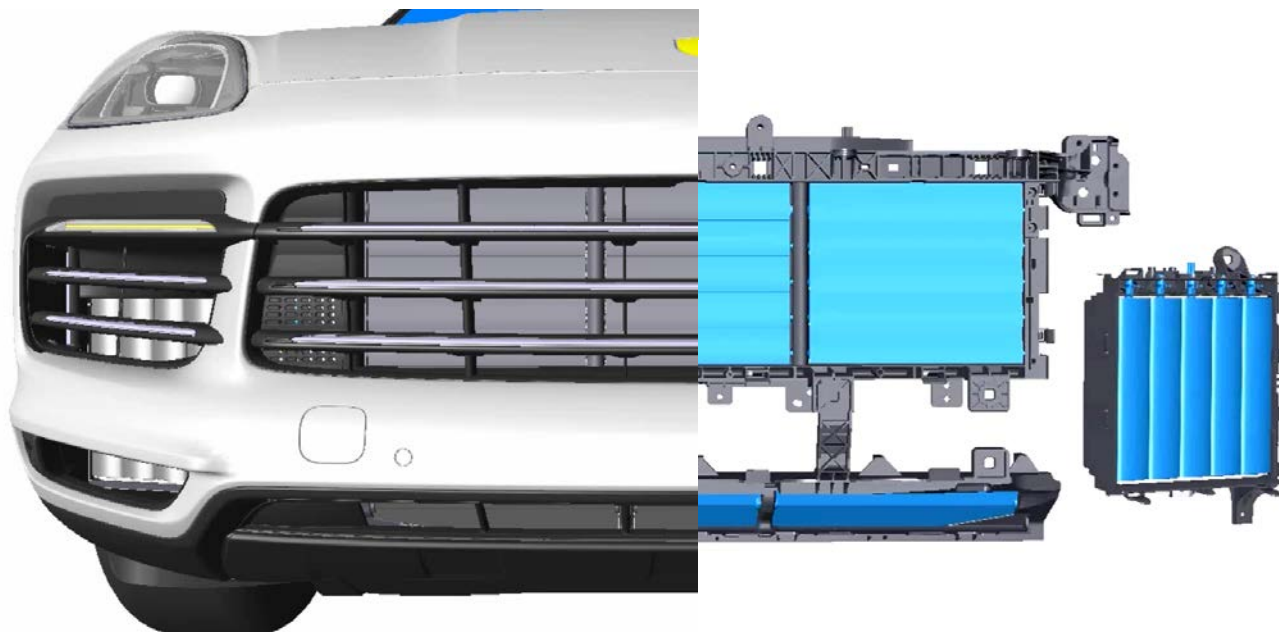
Adaptive radiator flaps



Adaptive roof spoiler



Overview on adaptive radiator flaps in the new Porsche Cayenne

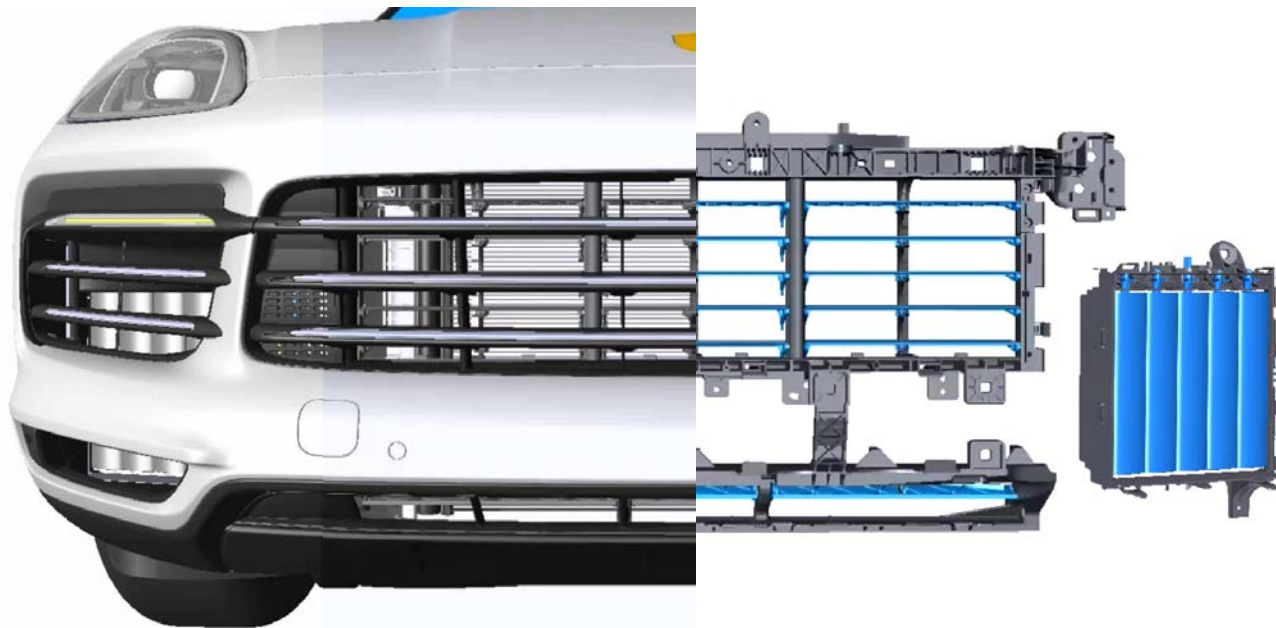


First vehicle with
100% adjustable closure
of all air radiators

Four adaptive systems
(+three systems)

Reduction of drag

Radiator flap system actuation



Numerous parameters control the position and actuation of the flaps

Step-less actuation

Separate actuation of central and side flap systems

Porsche adaptive aerodynamics

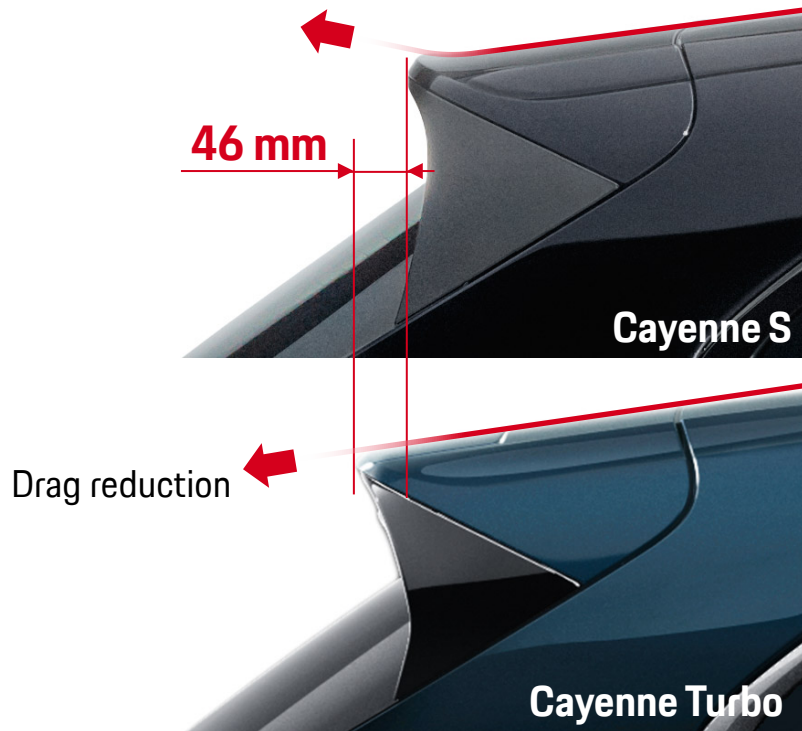
The new Cayenne Turbo



First SUV with adaptive
roof spoiler

Porsche adaptive aerodynamics

Adaptive roof spoiler



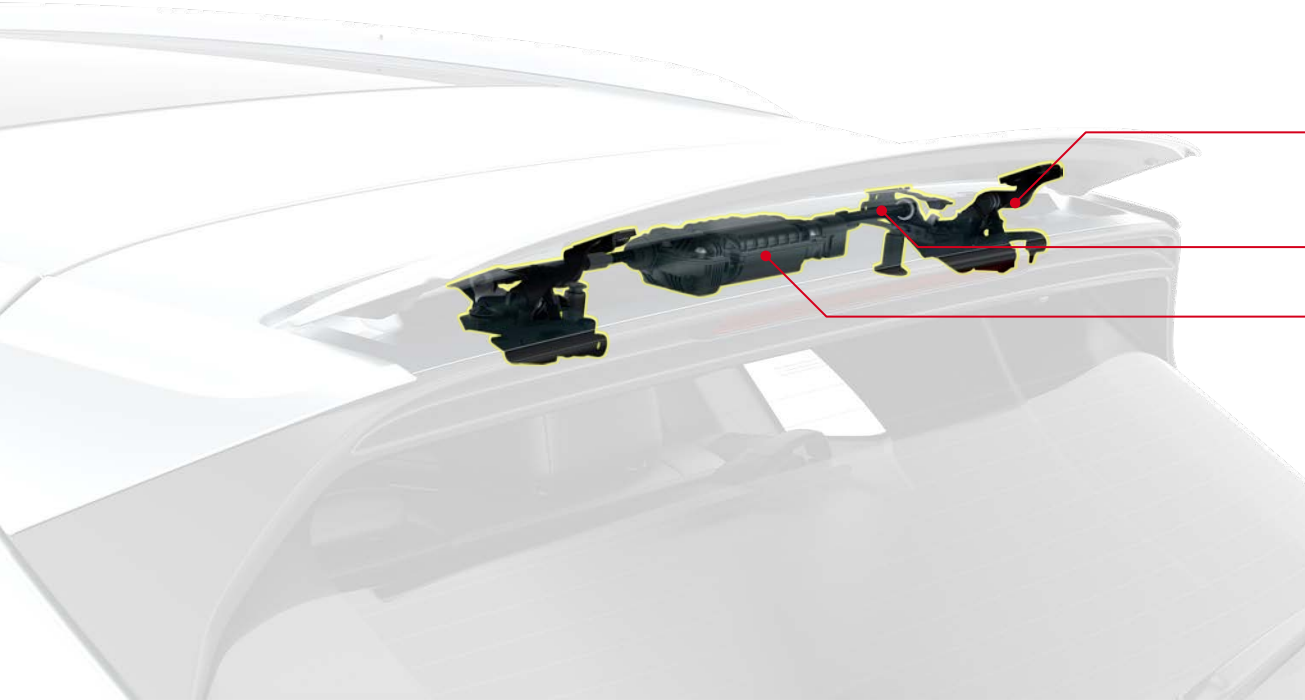
Spoiler length increased by
46 mm *

Spoiler trailing edge lowered by
16.5 mm *

* Compared to roof spoiler of Cayenne/Cayenne S

Porsche adaptive aerodynamics

Spoiler drive mechanism



Left/right kinematic unit
connected to spoiler wing

Kinematic output shaft

Drive motor
with gearbox

Porsche adaptive aerodynamics

Roof spoiler positions



1. Eco: at below 160 km/h

| $\Delta z = 0$; retracted

| Position of minimum c_d

| Minimal drag

Porsche adaptive aerodynamics

Roof spoiler positions



2. Performance: at above 160 km/h

| $\Delta z = 20 \text{ mm}$

| Increased downforce
at the rear axle

Porsche adaptive aerodynamics

Roof spoiler positions



3. Sport Plus: Selected manually

| $\Delta z = 40 \text{ mm}$

| More downforce than in the Performance position, for example on the race track

Porsche adaptive aerodynamics

Roof spoiler positions



4. Compensation: Panorama roof open

| $\Delta z = 60 \text{ mm}$

| When the panorama roof is opened, efficiency of the spoiler is reduced.
To compensate the spoiler extends further.

Porsche adaptive aerodynamics

Roof spoiler positions



5. Airbrake

| $\Delta z = 80 \text{ mm}$ (maximum)

| In case of emergency braking, the spoiler extends at driving speeds above 170 km/h

| Braking distance reduced by approx. two meters at a speed of 250 km/h

