

Technology

Let There Be Light

Driving at night and turning onto a narrow rural road can often mean turning into pitch-darkness. Now, Porsche can help. The new Cayenne offers a dynamic cornering light that helps illuminate the corner as the driver turns into it.

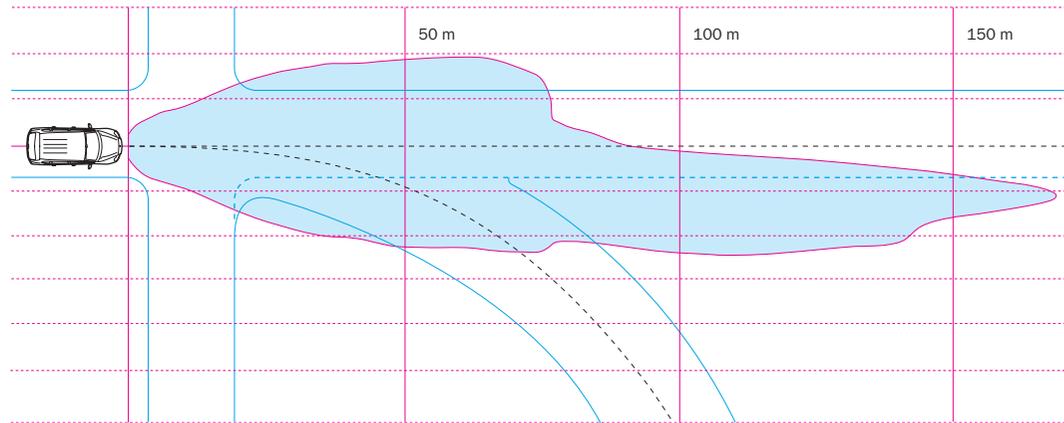
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Photos by
Porsche AG; Joel Micah Miller



Comparison of conventional low-beam headlights and the Cayenne's dynamic cornering light

Light distribution with a conventional, fixed low-beam headlight:



Light distribution with a combination dynamic and stationary cornering light:



The stationary cornering light illuminates the turn-off lane; the dynamic cornering light illuminates the bend of the curve

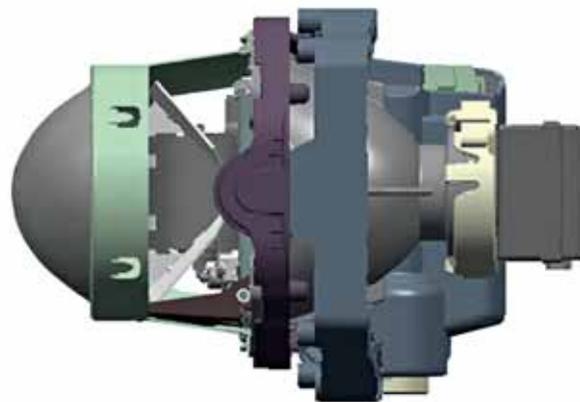
Schematic drawings:

The illumination distances and roadway coverage are not in true-to-life scale in relation to the vehicle

Sometimes, less can be much more, as the new Cayenne proves. The bi-xenon headlights, standard in the Cayenne Turbo and optional for the Cayenne and Cayenne S models, are more compact than the previous versions, yet provide greatly enhanced performance. For the first time, a dynamic cornering light has been integrated into the light unit, along with the low and high beams and the stationary cornering light. The Cayenne thus provides a two-pronged approach to cornering illumination: a swiveling light supported by another fixed headlight.

As soon as the Cayenne exceeds 3 km/h (nearly 2 mph), and until it reaches 130 km/h (80 mph), motors swivel the headlights toward the inside of the curve. The inner dynamic cornering headlight turns a maximum of 15 degrees, while the outer cornering light turns up to 7.5 degrees. "That way, the steered headlight illuminates the entire course of a curve cleanly, including the area into which the driver is looking," says Jürgen Bortolazzi, director of electronics and bodywork development at Porsche's Weissach Development Center. The dynamic cornering light operates whenever the headlights are on, even when the high beams are used. ▶

**High-tech in compact format:
The dynamic-cornering-light module**



Turn on the light: The motor-driven dynamic cornering light (left) swings toward the inside of the curve



“With the dynamic headlight, we can illuminate the area you’re driving into approximately twice as far as with low-beam headlights.”

Jürgen Bortolazzi,
director of electronics and bodywork development

On the other hand, the stationary cornering light is switched off when the high beams go on, because this additional headlight has other work to do. As Bortolazzi, who is also an experienced lighting engineer, explains, “With the stationary light, which is dimmed up and down slowly for reasons of comfort, we achieve clean illumination in turns. That way, for example, the driver can see the curb edge more easily.” And in narrow curves, such as double bends, it allows the driver to see where he’s headed early on, so that he can adapt his driving accordingly.

Why this double effort? “With the dynamic cornering light, we can illuminate the area you’re driving into approximately twice as far as with low-beam headlights. When entering a curve of 190 meters’ (625 ft.) radius, the illuminated area usually is about 30 meters (100 ft.). This new headlight technology expands that distance by about another 25 meters (82 ft.)—an increase of almost 90 percent,” Bortolazzi explains.

The potential enhancement to nighttime driving safety with the stationary cornering light is just as impressive. Together with the steered low-beam headlights, it improves lateral visibility. With fixed low-beam headlights, that’s about 10 meters (35 ft.); the new technology ups it to about 40 meters (130 ft.).

The headlights don’t just swivel over parallel to the wheels. The system takes input from various sensors, including steering angle, rate of the steering angle change, vehicle speed, and the yaw rate. Based on these values, a computer calculates the necessary pivot angle as well as the pivot dynamics, and passes the appropriate commands to servos in the two headlights. Again, the inside and outside lights turn to different degrees: 7.5 degrees maximum for the outer cornering light, and 15 degrees maximum for the inner cornering light. “In repeated test drives, these pivot angles provide the optimum in illumination and a minimum of dazzling effect for oncoming traffic,” Bortolazzi explains. In addition, these calculations have been set as the legal limits in Germany.

The new headlights are more compact, yet they give the customer a better view of the road. “In lighting technology, we at Porsche want to keep setting the benchmarks,” says Bortolazzi. In the new Cayenne, the engineers have achieved that goal. ◀