

Guide to car headlight technology

Do these new lamps actually help you see better? Or are they just a pricey fashion accessory?



The days of basic low and high beams are over as car headlights become ever more sophisticated.

The new technologies bring promises of brighter light, greater reach down the road, and even the ability to spot pedestrians and animals long before they would be illuminated by conventional bulbs.

The new lights also free up car designers, who can now create distinct looks and identities not possible with the round and rectangular frames of old, and convey a brand image anywhere from friendly to a menacing “get out of my way.”

But our tests have found that in the real world, high-tech headlights don't necessarily let you see any further. They're often brighter than current halogen lights, but they don't necessarily throw light farther down the road. And they can be scarily expensive to replace. Here's a look at some of the latest trends in headlight design to watch for the next time you're in the market for a new car.

Adaptive headlights. The lights illuminate around corners by aiming the beam in the direction you've turned the steering wheel. Mechanical systems that do the same thing have been around for the better part of a century, but these days, electronics do the job. We've seen mixed results and have differing opinions from our testing. Make sure to try them on a nighttime test drive, and be aware of the added cost.

HID. High-intensity discharge headlights do away with the heated filament of ordinary bulbs and instead use gas. The result is lower operating temperature and longer life. But HID headlights cost hundreds of dollars to replace, and they require a transformer that can run more than \$500 if it goes bad. In our tests, HID headlights generally haven't performed any better than basic halogen lights overall. (Note: Even budget models such as the Mazda3 include them with certain option packages.)

LED. Light-emitting diode headlights have several advantages over conventional bulbs, including compact size, reduced energy consumption, and longer life. Their flexible, string-like arrangements help designers create a distinct look. The downside is the replacement cost can run to hundreds or even thousands of dollars. All for a technology that shows little benefit in our tests.

Laser. The latest trend in automotive lighting, laser headlights provide a focused long-range beam that can double the reach of normal high beams, focusing a beam up to 2,000 feet, according to manufacturer claims. Already offered in Europe on select models from Audi and BMW, laser headlights aren't yet legal in the U.S.

LED adaptive. The next big thing in headlights combines some of the technologies listed above. Adaptive LED systems use a matrix of individual LEDs that automatically turn on and off based on where the car is headed and other vehicles that the system detects on the road. That provides high-beamlike optimum illumination while not blinding oncoming drivers. We tried one such system on a Euro-market Audi, and found that it worked well. It too, is an expensive option, costing \$2,500. But don't run down to a dealer looking for them; they're not yet legal in the U.S.

Night vision. We've sampled vehicles from Audi and BMW that use infrared cameras and sensors to detect pedestrians and animals far in the distance. Images appear on the center screen in the car. The systems even put a little extra light on an image as you draw closer. We see a lot of potential for those systems, but the trick will be incorporating the benefit without increasing the distraction.

The dark side of pricey lights

The newest car lights come with cool features—as well as some problems. Most major automakers, including BMW, Ford, General Motors, Nissan, Tesla, and Toyota, have issued Technical Service Bulletins (TSBs) warning about fogged or defective lenses, outright headlight failure, and other problems. Before you spend big bucks, ask your dealer whether your car is covered, or do the research online.

