

From Carbide Lamps to High-performance Headlights

In the early days of motoring, cars were only suitable for excursions during the daytime and in good weather. They were not equipped with any lights or with any means of protecting the occupants from the rain. The route which led from lanterns and carbide lamps via halogen systems to LED headlights has been documented by ATZ and was characterized for many years by purely technical considerations. It was not until the start of the new millennium that headlights also became a design feature.



1935 Mercedes-Benz 150 Sport-Roadster with a central high beam headlight (© Daimler)

120 ATZ

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Although the electric bulb had already been invented, in the early decades of automobile manufacturing, cars were fitted with lanterns and later gas lights for the purposes of seeing and being seen. However, this period was not without its innovations. In 1908, for example, the name Hella was used for the first time for an acetylene gas headlamp which had a system of parabolic reflectors and a lens with a reflective coating to allow a greater proportion of the light from the acetylene gas flame

to be emitted than had previously been possible. In the luxury version of this headlamp, a converging lens in front of the flame extended its range from 150 to 300 m. This lamp produced 50 times as much light as candles or paraffin lamps and was probably the first to merit the name headlight.

The move away from gas and paraffin lamps was only made possible when cars were fitted with electrical systems. A brief article in ATZ 7/1963 reads: “The electrical equipment in cars took a decisive step forward with the development of the electric lighting and starter system brought onto the market in 1913 by Robert Bosch.” The introduction of voltage regulators and the design of purpose-made headlights paved the way for further developments.

As cars became more widely used on a day-to-day basis and their increasing speed required more safety features, dipped beam headlights were joined by main beam lights. Some models were fitted with a third main beam headlight on the front. In the meanwhile Osram was working on an innovation that would remain in use for decades. The Bilux dual-filament bulb, which was developed in 1925, allowed one headlight to provide both high beam and dipped beam.

The improved performance of lighting systems increased the problem of dazzling oncoming drivers. In ATZ 10/1957 August Kazenmaier reported on the difficulties of introducing an international standard for the light distribution of car headlamps and the efforts made to develop an asymmetrical dipped beam of the kind used for the first time in the Borgward Isabella in 1958.

In the early 1970s, the emergence of halogen technology represented a major milestone in headlight development. Halogen lights soon became widespread. ATZ reported in its 1/1978 issue that only five years after the market launch of halogen lighting around half of new cars were fitted with the new systems. Although halogen systems emitted much more light than their predecessors, the lighting engineers still had more work to do. In ATZ 4/1983 Hans-Hermann Braess described their next task, which was to produce more light at the sides of the vehicle for journeys on winding roads.

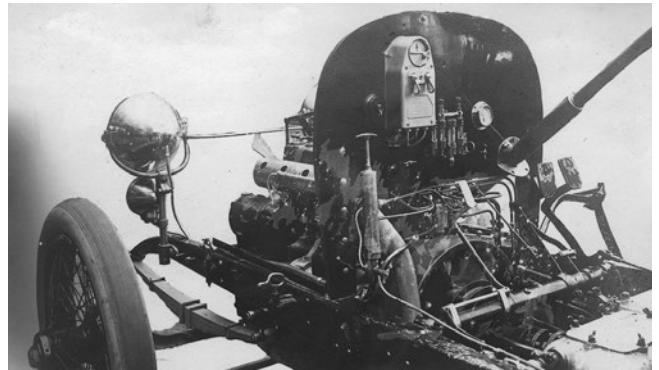
At the same time the developers needed to reduce the space taken up by the headlights to allow them to be integrated more effectively into modern body designs. Most importantly they had to redesign the reflectors, because the parabolic systems that had been in use since 1908 produced correspondingly less light as they were made smaller. Hans-Otto Ernst described ellipsoid headlights as being one possible alternative in ATZ 11/1986 and headlights with free-form reflectors as another option in ATZ 3/1988.

Today the industry is focusing on the opportunities presented by LEDs and OLEDs. For example, ATZ 4/2015 contained a report on the BMW Concept M4 Iconic Lights model, which not only had laser headlights, but also OLED (Organic Light Emitting Diode) rear lights. These light sources can be used over large surfaces and make it possible to create lights in almost any shape, which opens up a whole new range of design options. Instead of the points of light produced by LEDs, OLEDs cover larger areas. These can be produced in any shape and result in uniform light features that create a distinctive design. In the ATZ anniversary year the previous issue has had a cover story devoted to the subject of light.

Stefan Schlott



1908 Acetylene gas headlight with a parabolic reflector and a lens with a reflective coating (© Hella)



1913 The original version of the Bosch lighting system on a Mercedes 10/25 PS with a dynamo, headlight, and regulator (© Bosch)



1925 The Bilux dual-filament bulb allows one headlight to produce both high beam and dipped beam (© Osram)



2015 The BMW Concept M4 Iconic Lights model with the first OLED rear lights (© BMW)