



BMW has upgraded its current 5 Series models by giving them a convincing facelift. The most obvious new feature is the redesigned front headlight that now incorporates light guides from Schott.

# The Energetic Look

The new design of the BMW lighting systems was produced by engineers from the leading motor vehicle supplier Hella in Lippstadt, Germany, who drew on the skills and experience of Schott Glas in making use of light guide technology.

## One light source per headlight

The new BMW 5 Series headlights have a ten watt light bulb as the light source, located in the back of the headlight. Four flexible glass fiber light guides transmit the light through the headlight housing to the light rings. The rings are thin light guide rods into which the light is fed from opposite directions through two input points, to achieve an even illumination all around.

## A demanding challenge

Before this design could be converted into reliable technology, a whole range of demanding challenges had to be faced up to. Without the use of glass fiber light guide technology it would have been impossible to achieve success. As the temperature in the headlight housing gets as high as 150°C, the

light source could not be located directly on the ring. As plastic light guides would not stand up to the high temperatures involved either, only glass fiber light guides could be considered to connect the light source and the ring. These will resist temperatures of up to 350°C for many years without any problems or adverse effect on their optical properties.

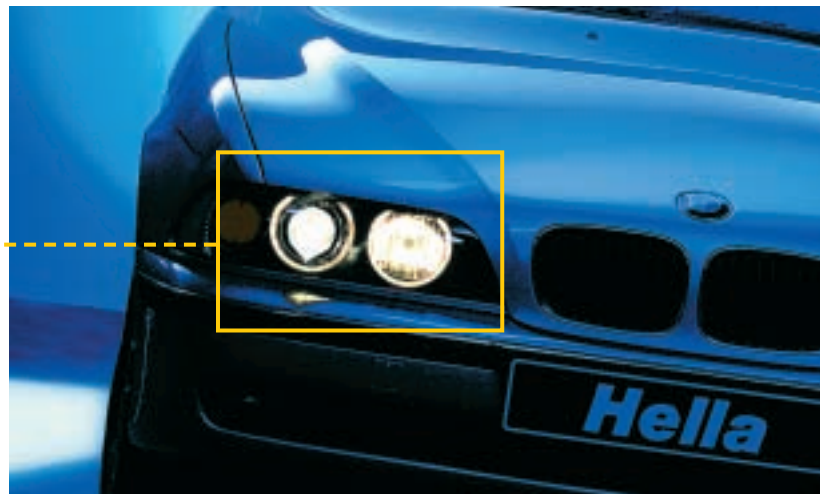
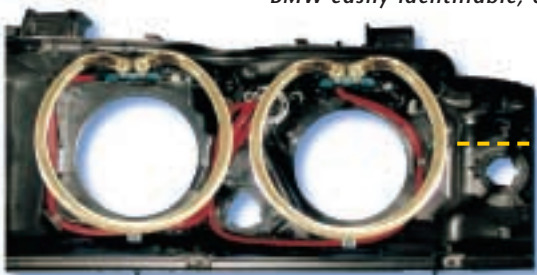
The conventional sheathing used to protect the glass fiber bundles proved to be less resistant and would not have been able to withstand the extreme conditions in the headlight housing. Working jointly with the Hella specialists, Schott looked for a suitable alternative material that not only had to meet the technical requirements but that was also acceptable from a cost point of view. The new sheath material chosen was a thermoplastic elastomer (TPE) which met both conditions excellently. In addition TPE like glass fiber is chemically resistant to motor oil and battery acid, two corrosive liquids which the materials could come into contact with at any time in the engine compartment.

The high flexibility of the glass fiber light guides proved to be a further

The BMW brand has a reputation in the automobile industry for sporty elegance: the Bavarian manufacturer produces premium models that combine technical functionality with elegant design. And the current 5 Series is no exception. Quite the contrary. BMW has carried out a discrete facelift and succeeded in making the series even more attractive.

The most obvious change involves the headlights which now incorporate a navigation light emphasizing the contour. The parking light is in the form of four light rings positioned around the two double headlights. When the driver switches on the parking light, the four plastic light guide rods light up. These new corona-style headlights give the BMW 5 Series an "energetic look" that is quite distinctive by day or night. What made this unusual technical and design feature possible was Schott's light guide technology.

*The light of a ten watt bulb is fed into the plastic light rings via four flexible glass fiber light guides (shown in red), making the four-eyed face from BMW easily identifiable, even at night.*





*The fiber optic light guides for the BMW 5 series lighting system are manufactured at Schott Fiber Optics in Doncaster, England: 10,000 pieces per week.*

## **Fiber optic light guides: flexible in every aspect**

Schott has been developing fiber-optical products for more than thirty years and they can be found in the most varied of applications. The benefits of these products speak for themselves: fiber optic light guides are extremely versatile components that can be flexibly adapted to the most widely varying requirements regarding design, installation and environment.

Extremely flexible glass fiber cables with diameters from one to seven millimeters transport light to the required point. For this purpose the light from a lamp with a reflector is projected onto the glass fibers which transport it elsewhere. An end ferrule specific to the particular application is fitted to the end of the glass fiber light guide to

provide the desired effect from the safety point of view. Transmitting the actual light instead of electricity is a powerful argument in favor of this technique, as is the fact that glass does not catch fire.

benefit in design and manufacture. Glass fibers can be manufactured considerably thinner than plastic which results in greater flexibility, a property which is especially useful in the extremely tightly configured space in the headlight housings. As headlights also have to be adjustable, many of the components in the housing, such as the reflector for example, require a certain amount of "play", which increases the problem of space even more. "The enormous flexibility of the glass fiber light guides gave our designers extra design freedom", says Hella's Ralf Appelbaum, explaining one of the decisive benefits of glass for this project.

### **Joint development work**

"The complex challenges the project presented could only be mastered by cooperation between BMW, Hella and Schott", explains Rudolf Kunstmann, manager of Schott's Automotive Product Group. "Ultimately, it was not just a question of making BMW and Hella's creative requirements possible – but also of complying with the legal requirements as regards navigational automobile lighting. We were able

to find appropriate solutions for all the problems that arose in the course of our many meetings and discussions".

As an innovative technology-driven concern Schott is continually developing new products in the fiber optical lighting field – often in close cooperation with customers. In the development of individually tailored components, consultation on special applications and joint problem-solving, the customer is always in the forefront. Hella had already had good experiences with this Schott philosophy. Two years ago they developed its revolutionary CELIS (Central Lighting Systems) lighting concept for vehicles in conjunction with Schott. With this system, fiber optical light guide technology provides optimum lighting when getting into or out of a vehicle as



well as glare-free and even illumination for reading and working. Extra comfort and safety are the result. "Our good experience on that project was by no means the least of the reasons for deciding to work with Schott on the "Corona lighting" project which was technically very demanding", explains Appelbaum ■