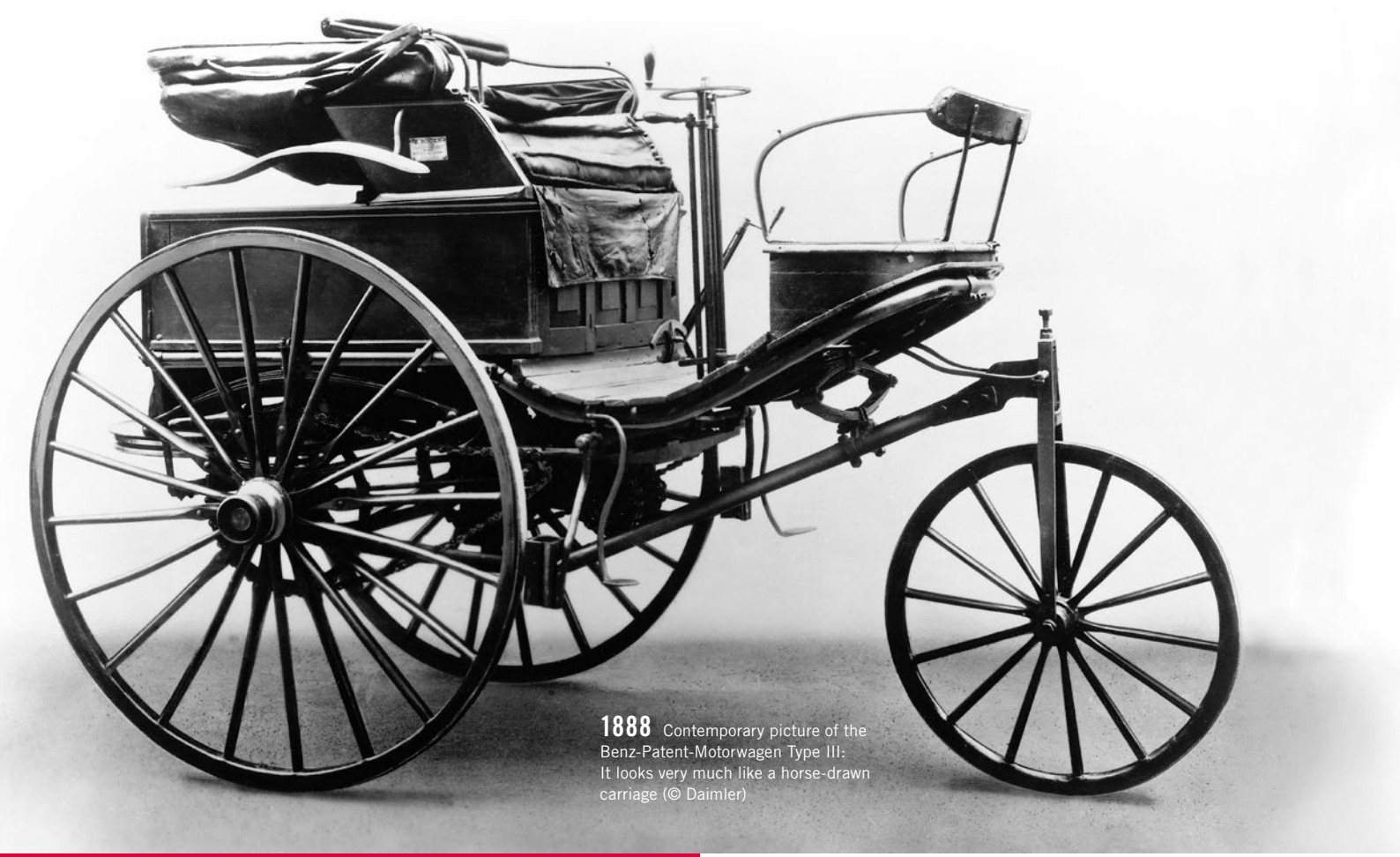
From Carriage Building to High-performance Bodywork

When the first issue of "Der Motorwagen" magazine, the forerunner of ATZ, appeared 120 years ago, all the cars it reported on, from the Benz-Comfortable to the Lutzmann-Pfeil, looked just like horse-drawn carriages with engines. We have come a long way from their wooden frames to today's aerodynamic, lightweight car bodies that are designed for safety and made from a variety of different materials. All of the progress that has been made has been documented in ATZ over the years.



1888 Contemporary picture of the Benz-Patent-Motorwagen Type III: It looks very much like a horse-drawn carriage (© Daimler)

Disregarding for a moment the many fashionable trends in body design, over the decades the development of vehicle bodywork has become a discipline that has to meet a number of criteria. At first it was cartwrights and engine builders who produced seats, propulsion systems, and sometimes even a roof for the early models. The comfort levels and crumple zones that we take for granted in modern cars were completely unheard of, along with lightweight components and good aerodynamic properties. Even though discussions about the future of

the car are dominated today by driver assistance systems, emissions, and alternative powertrains, the ongoing development of automobile bodies has been a constant feature of carmaking which has sometimes been overshadowed by the fashionable trends of the time. In 1926 in issue 19 of the magazine, which had by then been renamed "Auto-Technik", H. Müller described the Benz-Comfortable as "a horse-drawn hackney cab with the shafts removed".

During this era, car bodies were made mainly from wood, in some cases reinforced with steel. This was the case in Germany at least. In a short piece in issue 4/1926 of Auto-Technik, an author known only as Abt. explains "that in America it is likely that bodies will soon be made entirely of steel without the use of any wood at all." The reason for this was the start of mass production on assembly lines which was pioneered by Henry Ford. Many companies emulated the success of Opel, which invested one million gold marks from 1924 onward in modernizing vehicle manufacturing and introducing mass production methods for the first time in Germany. This led to steel bodies becoming the norm for many years.

However, advances continued to be made. In issue 6/1949 J. Walter considered the reflection of light in vehicle bodies and described the light-catching contours as "a highly sensitive means of monitoring the quality of the geometric form". At the same time there were discussions on subjects that are still relevant today. As early as issue 2/1937 of the publication, which by this time was called ATZ, Kurt C. Volkhart called for the development of lightweight chassis and bodywork. In this case, lightweight design still involved steel. In ATZ 9/1959 W. Buck described the body of the NSU Prinz which was made from steel 0.88 mm thick. At only 495 kg, it was a genuine lightweight compared with its contemporaries.

However, it was not long before competitors for steel as a vehicle construction material began to emerge. In issue 7/1963 S. Haenle reported that in Germany around 6 to 8 kg of plastic was used in each car, while in the USA the figure was already as much as 14 kg. Around 15 years later, the numbers looked quite different. In 1978 the BMW M1 was the first vehicle with a plastic body to be launched on the market. In issue 7-8/1978 E. Boigt explained that threshold of 100 kg of polymers per car "has long since been crossed and the figure of 200 kg per vehicle is coming ever closer".

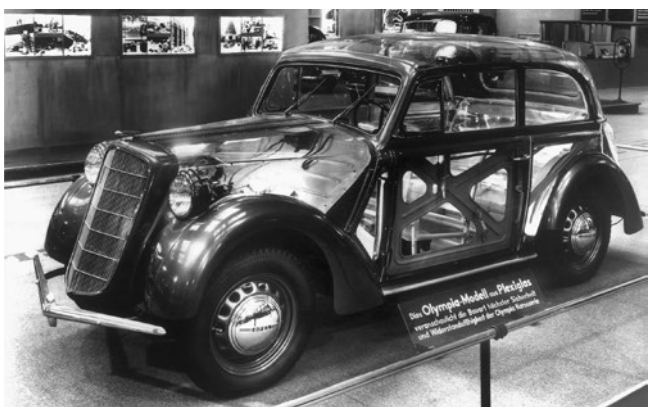
Soon another competitor began putting pressure on the steel industry. In the early 1990s Honda manufactured its NSX with an aluminum body instead of the traditional steel. Audi, however, took a different approach. The company's development work in this area, which started in 1982, resulted in 40 patent applications. F.-J. Paefgen and his co-authors described the events in ATZ 4/1994. A concept car known as the ASF preceded the production model and caused a sensation at the IAA Frankfurt Motor Show in 1993. The monocoque aluminum body of the Audi A8, which followed in 1994, weighed only 249 kg and followed the Audi Space Frame principle that is still in use today: a framework with profiles and nodes.

A commitment to one single material is now a thing of the past and bodies made of multiple materials have become widespread. It is clear that bodywork design and production will continue to change and develop even after the first 120 years.

Stefan Schlott

1912 Henry Ford with his Model T: The start of mass production was accompanied by the widespread introduction of steel bodies (© Ford)

1925 Cutaway model of the Audi 18/70 PS Type M: The wooden chassis can clearly be seen (© Audi)



1934 The shiny Opel Olympia exemplified the principle of the monocoque steel body (© Opel)

1993 The Audi concept car known as the ASF was launched on the market a year later in the form of the A8, which had a monocoque aluminum body (© Audi)