

BMW Group

Corporate and Governmental Affairs

Media Information
8 June 2009

Ascent to undreamt-of heights 90 years ago - the first BMW world record.

Munich. The cruising altitude of modern airliners ranges from 10 to 12 kilometres. It is hard to imagine, then, that a pilot managed to broach these heights a full 90 years ago. It was a BMW engine which, on 17th June 1919, propelled Franz Zeno Diemer to an altitude of 9,760 metres. If further proof were needed of the superiority of the ingenious yet simple concept of BMW's high-altitude engines, it was furnished during that summer of 1919 at Munich's Oberwiesenfeld airfield. No human had previously piloted an aircraft to a greater height.

When Diemer set out on his record flight from the Oberwiesenfeld on 17th June, his DFW F 37/III – an altitude aircraft specially developed by Deutsche Flugzeugwerke – was powered by a BMW IV aero engine. Based on the tried and tested BMW IIIa, the new BMW IV engine had its bore and stroke increased by 10 mm to boost output from 185 to 230 hp. Glorious flying weather saw the engine deliver a consistently excellent performance on that Sunday, enabling Diemer to make a steady ascent to ever greater heights. After 87 minutes he had reached 9,760 metres. No other aeroplane had previously attained such an altitude. Later Diemer announced that the engine still had reserves in hand, but that he himself had reached the limits of his capacity. After all, in his open pilot's seat he not only had to contend with temperatures as low as -50° Celsius, but also with the low oxygen levels in the air at this altitude, which took their toll on him physically.

The challenge Diemer faced during his world record flight was the same underlying problem with which all aircraft engines had to grapple during the First World War: loss of power at altitude. Normally an aeroplane requires maximum output on the ground in order to take off at all. But with aircraft now forming a separate military arm, the requirements changed. Engine output also became crucial to survival at high altitude, for example for rapid climbing to escape hostile combat squadrons.

With increasing altitude, however, the air density steadily diminishes, and this led to power loss in the engines. Two different concepts were pursued in an attempt to counteract the loss of output in the thinning air. Some manufacturers – such as Daimler – turned their attention to charging, whereby air was forced into the carburettor by means of a charger. But this technology was too complex to bring to production readiness within a short space of time, and only established itself in the 1930s. BMW's head designer Max Friz, on the other hand, opted for an over-square, high-compression unit for the first BMW aircraft engine, the forerunner of the BMW IV world record engine. This design principle involved an enlargement of the cylinder volume as well as an increased compression ratio. To avoid engine overload, it had to be throttled back at take-off and low flying altitudes.

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To meet the demands of a high-altitude engine, Max Friz had designed a special carburettor which was to deliver a steady supercharged pressure and ensure a consistent air/fuel mixture ratio. The carburettor was controlled by two levers, one for normal operation and one for high altitudes. By means of these two levers, the pilot could control the throttle valves of the BMW carburettor in such a way that the optimum mix was prepared to suit the aircraft's altitude at any time. The throttle valves were only opened fully once an altitude of 3,500 to 4,000 metres had been reached. This configuration meant that the loss of power of the IIIa at altitude was less than in other engines.

One of the first advocates of this concept was war hero Franz Zeno Diemer, an experienced flyer who had already obtained his pilot's licence in 1913. During the First World War he served as a test pilot in the Bavarian Flying Corps. It was in this role that he came into contact with BMW in 1917 when testing the BMW IIIa aero engine. His record flight in the summer of 1919 won international acclaim, even though it was denied official recognition. All aviation records had to be confirmed by the Fédération Aéronautique Internationale (FAI) in order to be ratified. Although Germany was a founder member, it had been excluded from the FAI as a result of the First World War. That is why Diemer's record never entered the official record lists. But even without a certificate, the ascent to almost 10,000 metres was a sensational testimony to the potential of the BMW aero engines.

Even at that time, the BMW engines were compelling not only for their outstanding performance, but for their fuel economy as well. The first BMW IIIa already featured lightweight components in its design. Its crankcase and pistons were made of aluminium, giving a weight of just 285 kg and a weight-to-power ratio of 1.54 kg/hp. Diemer's record-setting engine, the BMW IV, boasted a mere 1.24 kg/hp. Fuel consumption figures demonstrated the superiority of the BMW engine over the competition. During throttled operation, in the region of 1,050 rpm, the BMW IIIa consumed 200 grams per hp and hour, which was more than a third less than a "normal" aircraft engine in this performance class. In practice it meant that, with a supply of around 200 kg of fuel – i.e. some 260 litres – an aircraft with the BMW IIIa had an operating range of 1,200 kilometres, while the same amount of fuel in a normal unit was good for only around 730 km.

Indeed, the BMW IIIa also had the edge over another form of transport. On one of his test flights, Diemer made it from Augsburg via Leipzig to Döberlitz in just under four hours, with the BMW IIIa engine powering his aircraft getting through just 84 litres of fuel. Over the same distance, a car at the time took 14 to 16 hours and consumed between 100 and 120 litres.



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