The Volkswagen Beetle

The Volkswagen Beetle, officially called the Volkswagen Type 1 (or informally the Volkswagen Bug), is an economy car produced by the German auto maker Volkswagen (VW) from 1938 until 2003. With over 21 million manufactured in an air-cooled, rear-engine, rear-wheel drive configuration, the Beetle is the longest-running and most-manufactured car of a single design platform, worldwide.

Although designed in the 1930s, the Beetle was only produced in significant numbers from 1945 on, when the model was internally designated the Volkswagen Type 1, and marketed simply as the "Volkswagen". Later models were designated VW 1200, 1300, 1500, 1302 or 1303, the former three indicating engine displacement and the latter two being derived from the type number and not indicative of engine capacity. The model became widely known in its home country as the Käfer (German for "beetle") and was later marketed as the Volkswagen Beetle in other countries.

In the 1950s, the Beetle was more comfortable and powerful than most European small cars, having been designed for sustained high speed on the Autobahns. It remained a top seller in the U.S., owing much of its success to high build-quality and innovative advertising, ultimately giving rise to variants, including the Volkswagen Karmann Ghia and the Volkswagen Type 2 bus.

The Beetle had marked a significant trend led by Volkswagen, Fiat, and Renault whereby the rear-engine, rear-wheel drive layout had increased from 2.6% of continental Western Europe's car production in 1946 to 26.6% in 1956. The 1948 Citroën 2CV and other European models marked a later trend to front-wheel drive in the European small car market, a trend that would come to dominate that market. In 1974, Volkswagen's own front-wheel drive Golf model succeeded the Beetle. In 1994, Volkswagen unveiled the Concept One, a "retro"-themed concept car with a resemblance to the original Beetle, and in 1998 introduced the "New Beetle", built on the Golf platform with styling recalling the original Type 1.

## Design Overview

The Beetle featured a rear-located, rear-wheel drive, air-cooled four-cylinder, boxer engine in a two-door bodywork featuring a flat front windscreen, accommodating four passengers and providing luggage storage under the front bonnet and behind the rear seat – and offering a coefficient of drag of 0.41. The bodywork attached with eighteen bolts to its nearly flat chassis which featured a central structural tunnel. Front and rear suspension featured torsion bars along with front stabilizer bar – providing independent suspensions at all wheels. Certain initial features were subsequently revised, including mechanical drum brakes, split-window rear windows, mechanical direction-indicators and the non-synchronized gearbox. Other features, including its distinctive overall shape, endured.

While the overall appearance of the Beetle changed little over its life span, it received over 78,000 incremental changes during its production

## History

In 1931, Ferdinand Porsche developed the Porsche Type 12, or "Auto für Jedermann" (car for everybody) for Zündapp. Porsche already preferred the flat-four engine, and selected a swing axle rear suspension (invented by Edmund Rumpler), while Zündapp insisted on a water-cooled five-cylinder radial engine.

## Development

Initially designated the Porsche Type 60 by Ferdinand Porsche, the design team included Erwin Komenda and Karl Rabe. In October 1935 the first two Type 60 prototypes, known as the V1 and V2 (V for Versuchswagen, or "test car"), were ready. In 1936, testing of three further V3 prototypes, built in Porsche's Stuttgart shop, began. A batch of thirty W30 development models, produced for Porsche by Daimler-Benz, underwent 1,800,000 mi (2,900,000 km) of further testing in 1937. All cars already had the distinctive round shape and the air-cooled, rear-mounted engine. A further batch of 44 VW38 pre-production cars produced in 1938 introduced split rear windows; both the split window and the dash were retained on production Type 1s until 1953. The VW38 cars were followed by another batch of 50 VW39 cars, completed in July 1939.

The car was designed to be as simple as possible mechanically, so that there was less to go wrong; the air-cooled 25 BHP (19 kW) 995 cc (60.7 cu in) motors proved especially effective in actions of the German Afrika Korps in Africa's desert heat. This was due to the built-in oil cooler and the superior performance of the flat-four engine configuration. The suspension design used compact torsion bars instead of coil or leaf springs. The Beetle is also nearly airtight and can float for several minutes on water.

Originally dubbed the “Strength through Joy Car” (Kraft durch Freude-Wagen) after World War II, it was known as the Volkswagen Type 1, but became more commonly known as the Beetle.

## Post-war production and boom

Mass production of civilian VW cars did not start until post-war occupation. The Volkswagen factory was handed over by the Americans to British control in 1945; it was to be dismantled and shipped to Britain. Thankfully for Volkswagen, no British car manufacturer was interested in the factory; "the vehicle does not meet the fundamental technical requirement of a motor-car ... it is quite unattractive to the average buyer ... To build the car commercially would be a completely uneconomic enterprise." The factory survived by producing cars for the British Army instead. Allied dismantling policy changed in late 1946 to early 1947, although heavy industry continued to be dismantled until 1951. The re-opening of the factory is largely accredited to British Army officer Major Ivan Hirst (1916–2000). Hirst was ordered to take control of the heavily bombed factory, which the Americans had captured. His first task was to remove an unexploded bomb that had fallen through the roof and lodged itself between some pieces of irreplaceable production equipment; if the bomb had exploded, the Beetle's fate would have been sealed. Hirst persuaded the British military to order 20,000 of the cars, and by March 1946 the factory was producing 1,000 cars a month, which Hirst said "was the limit set by the availability of materials". During this period, the car reverted to its original name of Volkswagen and the town was renamed Wolfsburg. The first 1,785 Type 1s were made in 1945.

Following the British Army-led restart of production, former Opel manager (and formerly a detractor of the Volkswagen) Heinz Nordhoff was appointed director of the Volkswagen factory. Under Nordhoff, production increased dramatically over the following decade, with the one-millionth car coming off the assembly line by 1955. During this post-war period, the Beetle had superior performance in its category with a top speed of 115 km/h (71 mph) and 0–100 km/h (0–60 mph) in 27.5 seconds with fuel consumption of 6.7 l/100 km (36 mpg) for the standard 25 kW (34 BHP) engine. This was far superior to the Citroën 2CV which was aimed at a low speed/poor road rural peasant market and Morris Minor that was designed for a market that had no motorways / freeways, and even competitive with more advanced and small wheeled city cars like the Austin Mini.

During the 1950s, the car was modified progressively: the obvious visual changes mostly concerned the rear windows. In March 1953, the small oval two-piece rear window was replaced by a slightly larger single-piece window. More dramatically, in August 1957 a much larger full width rear window replaced the oval one. 1964 saw the introduction of a widened cover for the light over the rear licence plate. Towards the end of 1964, the height of the side windows and windscreen grew slightly, giving the cabin a less pinched look: this coincided with the introduction of a very slightly curved ("panoramic") windscreen, though the curve was barely noticeable. The same body appeared during 1966, with a 1,300 cc engine in place of the 1,200 cc engine: it was only in the 1973 model Super Beetle that the Beetle acquired an obviously curved windscreen. The flat windscreen remained on the standard Beetle.

There were also changes under the bonnet. In 1954, Volkswagen added 2 mm to the cylinder bore, increasing the displacement from 1,131 cc to 1,192 cc. This coincided with upgrades to various key components including a redesign of the crankshaft. This increased power from 33 BHP to a claimed 40 BHP and improved the engine's free revving abilities without compromising torque at lower engine speeds. At the same time, compression ratios were progressively raised as, little by little, the octane rating of available fuels was raised in major markets during the 1950s and 1960s.

There were other, less-numerous models, as well. The Hebmüller cabriolet (officially Type 14A), a sporty two-seater, was built between 1949 and 1953; but numbered only 696. The Type 18A, a fixed-top cabriolet, was produced by Austro-Tatra as a police and fire unit; just 203 were assembled between January 1950 and March 1953.

Beetle sales boomed in the 1960s, thanks to clever advertising campaigns, and the Beetle's reputation for reliability and sturdiness. On 17 February 1972, when Beetle No. 15,007,034 was produced, Beetle production surpassed that of the previous record holder, the Ford Model T. By 1973, total production was over 16 million, and by 23 June 1992, over 21 million had been produced.

## Decline

Though extremely successful in the 1960s, the Beetle was faced with stiff competition from more modern designs. The Japanese had refined rear-wheel-drive front-engine water-cooled small cars so that they sold well in the North American market, and Americans introduced their own similarly sized rear-wheel-drive Chevrolet Vega, Ford Pinto and AMC Gremlin in the 1970s. The super minis in Europe adopted even more efficient transverse-engine front-wheel-drive layouts, and sales began falling in the mid-1970s. There had been several unsuccessful attempts to replace or supplement the Beetle in the VW product line throughout the 1960s; the Type 3, Type 4, and the NSU-based K70 were all less successful than the Beetle, though aimed at more upscale markets for which VW lacked credibility. The over-reliance on the Beetle meant that Volkswagen was in financial crisis by 1974. It needed German government funding to produce the Beetle's replacement. Only when production lines at Wolfsburg switched to the new water cooled, front-engine, front-wheel drive Golf designed by Giorgetto Giugiaro in 1974, (sold in North America as the "Rabbit") did Volkswagen produce a car as successful as the Beetle. The Golf would be periodically redesigned over its lifetime – entering its sixth generation in 2008 – with only a few components carried over between generations, while the Beetle had only minor refinements of its original design.

The Beetle outlasted most other cars which had copied the rear air-cooled engine layout such as those by Subaru, Fiat, and General Motors. Porsche's sport coupes which were originally based on Volkswagen parts and platforms continue to use the classic rear engine layout (which later became water-cooled) in the Porsche 911 series, which remains competitive even well into the 21st century.

## Worldwide end of production

By 2002, over 21 million Type 1s had been produced, but by 2003, annual production had dropped to 30,000 from a peak of 1.3 million in 1971. VW announced the end of production in June 2003, citing decreasing demand, and the final original Type 1 VW Beetle (No. 21,529,464) rolled off the production line at Puebla, Mexico, on 30 July 2003 65 years after its original launch and unprecedented 58-year production run (counting from 1945, the year VW recognizes as the first year of non-Nazi funded production). This last Beetle, nicknamed El Rey (Spanish for "The King" after a legendary Mexican song by José Alfredo Jiménez) was delivered to the company's museum in Wolfsburg, Germany.

## In popular culture

Like its contemporaries, the Mini, the Citroën 2CV, and the Fiat 500, the Type 1 has long outlasted predictions of its lifespan. It has been regarded as something of a "cult" car since its 1960s association with the hippie movement and surf culture; and the obvious attributes of its unique and quirky design (the Beetle could float on water thanks to its sealed floor pans and overall tight construction, as shown in the 1972 Volkswagen commercial).

Much like their Type 2 counterparts, Beetles were psychedelically painted and considered an ancestor of art cars. Currently, there is a wide array of clubs that are concerned with the Beetle. Part of their cult status is attributed to being one of a few cars with an air-cooled, horizontally opposed engine design, and the consequent ease of repair and modification, as opposed to the more conventional and technically complex water-cooled engine design. The original flat-four boxer design had fewer than 200 moving parts.

The Beetle has made numerous appearances in Hollywood films, most notably (Disney's) The Love Bug comedy series from 1968 to 2005, starring as "Herbie", a pearl-white, fabric-sun roofed 1963 Beetle—racing number 53. In the plot of the 1973 Woody Allen film Sleeper, Allen's character was able to instantly start a Beetle which lay hidden and unused in a cave for 200 years, leading to the punch line "Wow, they really built these things, didn't they?" The race cars in the 1975 action-comedy film Death Race 2000 were actually Type 1s with outlandish customized bodies. In the 1984 series The Transformers character Bumblebee transformed into a Beetle, as well fellow Autobot Glyph and the Decepticon Bugbite. In 2006 animation Cars, every bug or insect is represented by a Type 1.