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## **The BMW M5 Story.**

**High-powered saloons, four-door automobiles for the race track, businessman's express, invisible sports car – the many different descriptions used to characterise the BMW M5 bear witness to the fascination this vehicle concept has engendered since the very beginning. In the meantime, the sixth model generation has lined up on the starting grid – more powerful than ever before while at the same time inimitably part of the heritage. This tradition was launched 33 years ago with the development of the first BMW M5 and the associated establishment of a completely new vehicle category.**

The BMW M5 combines the driving characteristics of a blue riband sports car with the comfort and functionality features of a luxury saloon. The fact that no compromises are necessary is a tribute to the harmony typical of BMW M automobiles encompassed in the overall concept of engine, power transmission, chassis and design. This philosophy empowered the BMW M5 Story to become an exceptional tale of success.

Technological progress combined with an evolutionary change in the engine and drive concept have ensured that each new model generation moves forward to ascend even higher dimensions of dynamic driving performance. This progress does not impact on the essence of the driver's experience. Regardless of the number of cylinders and the powered wheels, the BMW M5 guarantees development of power that is spontaneous while also being

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sustained over a long period of time thanks to the high-revving concept. Additional features are provided by exceptional agility and secure handling characteristics on the road alongside superior dynamic performance on the race track. Another element of constancy threading through the BMW M5 Story is the understatement inherent in the automobile's appearance. The model-specific design attributes of the high-performance saloon harmonises with the fundamental look of the BMW 5 Series.

**The first chapter in the BMW M5 Story:****The engine of the BMW M1 under the bonnet of a saloon.**

Technology from motor sport in the guise of a saloon – the fundamentals of this successful concept for the BMW M5 were already laid in 1972. BMW Motorsport GmbH was founded then and the BMW 5 Series was also launched in the marketplace that year. During the initial years, the new subsidiary company of BMW AG was primarily occupied with the construction of racing cars. In parallel with this activity, the company responded to the wishes of customers who were sporting enthusiasts. They wanted additional power for the BMW 5 Series saloon and this was made available with selectively modified drive and chassis technology. An initial highlight in this field was produced in 1980 with the BMW M535i, which was powered by an inline six-cylinder engine generating 160 kW/218 hp. But this was by no means the end of the story.

BMW Motorsport GmbH developed a 3.5 litre inline six-cylinder engine for the mid-engined BMW M1 sports car, designed with a four-valve cylinder head, mechanical petrol injection, individual throttle valves and dry sump lubrication. Apart from enormous potential for competing on the race track, this configuration also provided excellent prerequisites for road use approval. When the production run of the BMW M1 came to an end in 1981 after around 400 series automobiles had been produced, the torquey six-cylinder engine found its way under the bonnet of the BMW M635i and soon afterwards it was mounted in the BMW M5. Optimised digital engine electronics meant that it there developed maximum power of 210 kW/286 hp at an engine speed of 6 500 rpm.

The BMW M5 was presented for the first time in the spring of 1985 at the Amsterdam Motor Show, which had a comparatively low profile by international comparisons. The official announcement was also rather reserved in nature: "The engineers at BMW Motorsport GmbH have developed a new, independently designed automobile on the basis of the proven BMW 5 Series." This was in line with the understated profile of the BMW M5. After all, at first glance the automobile could only be identified by the identification plates at the rear and on the front trim.

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The engineers of BMW Motorsport GmbH had left virtually no traces on the external appearance of the BMW M5 and yet they had carried out a great deal of work. The six-cylinder engine mobilised almost three times the power offered in the basic model of the BMW 5 Series – the BMW 518i. The series version of the automobile only weighed a total of 1 430 kilograms and a number of features combined to provide a harmonious overall concept that was focused on maximum performance. These included a strengthened five-speed gearbox, a differential lock in the rear axle, a low-slung sports chassis with mono-tube gas-pressure shock absorbers, a powerful braking system with newly tuned anti-lock system, forged lightweight alloy wheel rims and special tyres with reinforced flanks which were forerunners of today's run-flat tyres. The result was impressive right from the start. "The BMW accelerates in a way that is otherwise the preserve of thoroughbred sports cars," was the conclusion in the first drive reports.

The test drivers also reported that the developers had engaged in understatement when they had specified the performance figures – 6.5 seconds for acceleration in the sprint from zero to 100 km/h and a top speed of 245 km/h. The neutral handling of the BMW M5 in fast cornering situations was equally positive and easily controllable oversteering signalled the approach of physical limits.

The high level of dynamic performance was combined with everyday comfort and tailor-made equipment. All the special equipment available for the BMW 5 Series was supplied for the high-performance saloon. And since the BMW M5 was almost entirely assembled in hand-crafted work, individual special requirements could also be complied with. A bodyshell supplied by the BMW plant formed the platform for each vehicle to be produced by BMW Motorsport GmbH precisely in accordance with the wishes of the customer. Up until 1987, more than 2 200 examples of the first BMW M5 were produced in this way.

### **The second BMW M5 was based on proven understatement and even more motor-sport technology.**

When production of the successor started in 1988, BMW Motorsport GmbH had significantly expanded its production capacities. Ten years after the debut of the BMW M1, the workforce had increased from the original number of 100 employees to the current level of 370 workers. After all, in the meantime the BMW M3 had also developed and BMW Motorsport GmbH was celebrating successes both on and off the race circuit. The second generation of the BMW M5 continued to be hand-crafted. And the character of the new edition dovetailed seamlessly with the proven concept. The external appearance of the new BMW M5 only differed on closer inspection from the models in the BMW 5 Series fitted with conventional engines. The only indications of the dynamic driving potential of the new high-power saloon were provided by a body designed 20 millimetres lower, subtly modified front and rear aprons



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and side sills, 17-inch wheels and the two tailpipes of the exhaust system, each configured with a diameter of 70 millimetres. Although the automobile had wider wheels, the BMW M5 had the same drag coefficient ( $C_w$  value) of 0.32 as the BMW 535i.

Other special features were revealed by a swift glance into the interior. The second BMW M5 was designed as a four-seater. The driver and passenger were accommodated on newly developed sports seats and the highly sculpted single seats were separated by a fixed armrest incorporating a storage compartment. The cockpit of the BMW M5 also included a new leather steering wheel, specific instruments and an additional oil temperature gauge with red indicators.

Significant advances had also been made in the area of drive technology. The original inline six-cylinder engine developed on the basis of the BMW M1 underwent thorough revision for engine output, power characteristics, environmental compatibility and efficiency. Displacement initially expanded to 3.6 litres and from 1992 to 3.8 litres increased the power of the engine to 232 kW/315 hp and 250 kW/340 hp respectively. A catalytic converter was integrated into the exhaust system as standard right from the start.

Alongside a new camshaft, the engine was also provided with resonance charging by means of an intake tube. The use of intake-tube vibrations in the air collector with speed and load-regulated length of the oscillation tube enabled engineers to improve the torque at low and mid-range engine speeds. This was achieved using an additional electrically controlled throttle valve in the air collector to assist this process since it was able to separate the intake path into two flow areas for two banks of three cylinders. As a result, the 3.6 litre engine was already able to generate about 80 percent of the maximum torque of 360 Nm from 2 900 rpm. Indeed, the 3.8 litre engine already developed around 75 percent of its maximum torque of 400 Nm at 1 800 rpm. The result was continuous, powerful torque up to the maximum engine speed of 7 200 rpm. The time necessary for the sprint from zero to 100 km/h was consequently reduced to 6.3 seconds. After the further increase in displacement, power and torque, just 5.9 seconds were required for the standard sprint.

The second generation of the BMW M5 received comprehensively developed chassis technology as an additional element in the harmoniously integrated overall package. The BMW M5 was now equipped as standard with level regulation on the rear axle. Although taut tuning was implemented for springs and dampers, the suspension system offered the drive comfort typical of the BMW 5 Series. A 25-percent differential lock and a complex and exceptionally powerful braking system once again contributed to precisely controllable handling. In parallel with the power increase in model year 1992, the BMW M5 was fitted with an adaptive M chassis with electronically controlled dampers.

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The system comprised electronically controlled damper force adjustment with three characteristic lines. This yielded tangibly optimised drive stability when cornering and comfort when driving at low speeds.

Just a few months after the model was revised, a new launch took place in the summer of 1992 during which BMW Motorsport GmbH once again established a completely new vehicle category. The BMW M5 touring was presented. Power of 340 hp and an overall concept designed for the race track combined with five seats and the large baggage compartment of a touring model – nothing comparable had ever been seen before. The marketing department celebrated the coup with large-scale advertisements and a confident statement: “The new BMW M5 now has significant competition,” was the message there, and a photo of the BMW M5 touring was crowned with the sentence: “The fifth door from BMW Motorsport GmbH.”

In 1994, the engineers also incorporated a six-speed gearshift and a completely redesigned high-performance braking system into the BMW M5 shortly after the company had been renamed BMW M GmbH. They made use of a design principle derived from motor sport which is also applied in the current compound braking systems. For the first time, a slide bearing provided the friction ring of the brake disc with free expansion when it became hot. This removed the risk of the discs becoming thermally deformed while the new design also reduced the weight of the brake disks and increased their lifetime.

The second generation of the BMW M5 remained in the product range until 1995. By that date a total of around 12 000 units had been sold, almost 900 of them as the BMW M5 touring.

**The third generation of the BMW M5:  
for the first time fitted with an eight-cylinder engine and aluminium chassis.**

The third generation of the BMW M5 was launched on the roads in spring of 1998. This automobile was more unique than ever but it continued to emanate typical understatement. An athletic appearance was delivered with the front apron design incorporating a large inlet for cooling air, the rear apron styled with a powerful profile, prominent side sills, aerodynamically sculpted M external mirrors and 18 inch M lightweight alloy wheel rims in a double-spoke design configured with high-performance tyres. Two tailpipe pairs also indicated that significant work had been carried out under the engine bonnet.

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This was the first time that a V8 engine had provided the BMW M5 with the appropriate power and thrust that were necessary in order to retain the leading position in this vehicle segment that other manufacturers had meanwhile discovered. The 5.0 litre eight-cylinder engine generated 294 kW/400 hp, the maximum torque was 500 Nm. The engineers from BMW M GmbH had developed the crankcase of the V8 power unit and the cylinder heads with a new channel layout specially developed for the BMW M5. The engine also had radial force-controlled oil siphoning with electrically controlled pumps, double VANOS variable valve timing for the camshaft and hydraulic valve play compensation. The single individual throttle valves for mixture management were moved by an electric actuator for the first time.

The valves were fully opened within the space of 120 milliseconds and this was approximately the time required by an experienced driver to floor the accelerator pedal. This delivered extremely precise and spontaneous reactions to any movement with the right foot. The drive-by-wire principle also facilitated additional functions such as automatic speed regulation, idling speed control, limitation of the top speed to 250 km/h and display of two characteristics lines. After activation of the M dynamic driving control, the electric throttle valve control was activated even more directly. At the same time, steering assistance provided by the Servotronic steering was reduced in the low and middle speed range in order to give the driver particularly authentic contact with the road surface.

The third BMW M3 accelerated in the sprint from zero to 100 km/h in just 5.3 seconds.

A surge from 80 to 120 km/h in fourth gear only took 4.8 seconds. According to a drive report in a celebrated automotive magazine, the BMW M5 “does not simply overtake, it leaps past all the other automobiles in the world”. The fact that it slowed down with equal mastery was due to the compound brakes which were now mounted on all four wheels. The mechanical differential lock was again on board to ensure optimised traction during dynamic cornering.

BMW works racing driver Leopold Prinz von Bayern was among the first drivers to put the third generation BMW M5 through its paces in comprehensive testing. “I have never driven a comparable car,” was his conclusion after testing had been completed. “A few years ago, you could have competed on race circuits with an automobile like that. And you would have won races – despite the leather upholstery and air-conditioning.”

In fact, the comfort features left virtually nothing to be desired. Power adjusted M sports seats with lumbar support and two-stage heating offered ideal lateral support and comfort over long distances. In the cockpit, classic round instruments were complemented by a variable warning field in the speedometer. Orange and red indicator fields signalled when the engine had reached its optimum operating temperature.

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The third generation of the BMW M5 remained in the product range until 2003. More than 20 000 units of the extremely sporty four-door automobile had been sold up to that point. Its characteristic V8 engine had an even bigger production run. The power unit was also mounted in the BMW Z8 roadster from 2000.

### **Formula 1 technology for the fourth edition of the BMW M5.**

The fourth generation BMW M5 was presented in 2004. This automobile continued to epitomise the principle of providing fascinating driving pleasure in everyday traffic with motor-sport technology. A V10 high-revving engine generating 373 kW/507 hp derived directly from Formula 1, the sequential M gearbox with seven gears and Drivelogic function, and variable speed-sensing M differential lock ensured that the automobile had outstanding handling performance.

20 years after the first BMW M5 invented the segment of high-performance saloons, the fourth generation defined new benchmarks in this exclusive vehicle class, above all with its ten-cylinder engine. The two rows of five cylinders configured at an angle of 90° in the new power unit had an aluminium bedplate with grey-cast inlays for the crankshaft bearings and aluminium cylinder heads. The all-electronic single throttle valves were supplied from two air collectors and a flow-optimised intake tube in order to deliver equally spontaneous and sensitive response characteristics. Once again, the double VANOS variable valve timing for the camshaft ensured optimum gas exchange. An extremely powerful in-house development by BMW M GmbH was provided by engine control with three 32-bit processors and ion-current technology for knock control.

The number of cylinders had increased and the output had risen by 25 percent compared with the previous power pack. The main characteristic of power development was particularly spectacular. This is because the maximum revs of 8 250 rpm took this ten-cylinder naturally aspirated engine into the realms of motor sport. At the same time, 80 percent of the maximum torque of 520 Nm were delivered over a wide range of engine speeds of around 5 500 rpm. This allowed the V10 power unit to deliver exceptionally consistent thrust for vigorous and commanding acceleration manoeuvres. The sprint from a standing start to 100 km/h took 4.7 seconds, and after 15 seconds the needle of the speedometer passed the 200 km/h mark. As usual, the top speed was limited electronically to 250 km/h. For the first time, the M Driver's Package enabled the limit to be increased to 305 km/h. The V10 engine won the overall placing in the "Engine of the Year Award" back to back in the years 2005 and 2006. During the two subsequent years, the power unit took first place in the celebrated competition for the category of engines with displacement of more than 4.0 litres.

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The second global innovation in the fourth-generation BMW M5 was the Sequential M Gearbox (SMG) with seven gears and Drivelogic function. This enabled automatic and manual gear selection using the gear lever or the shift paddles on the steering wheel. The Drivelogic function provided drivers with eleven shift options. This allowed the shifting characteristics of the gearbox to be precisely adapted to the individual driving style. The Launch Control function facilitated maximum acceleration from a standing start. The SMG also took over safety functions. For example, when shifting down on an icy carriageway the clutch could be released for fractions of a second in order to prevent the vehicle from swerving if the drag forces exerted by engine braking were too high.

The model-specific chassis technology of the fourth BMW M5 encompassed Electronic Damper Control (EDC) with three different engine characteristics selectable at the touch of a button and an even more powerful compound braking system. A new version of the Dynamic Stability Control (DSC) was also developed specially for the BMW M5 with two selectable dynamic driving programs. This system allowed the M Dynamic Mode to be activated using the MDrive button on the steering wheel, in which DSC only intervened when the car reached the absolute physical limit of drive capability.

In the model year 2007, BMW M GmbH provided another model version alongside its latest high-power saloon that was almost as powerful in terms of acceleration but much more diverse. The BMW M5 touring needed just 0.1 seconds more than the saloon to accelerate in the sprint to 100 km/h from a standing start and also kept pace convincingly in a direct comparison on the race track. A variable baggage compartment with a volume up to 1650 litres was still included. The fourth edition of the BMW M5 ended its production run in the summer of 2010 after more than 20 500 units.

**BMW M5 Story, chapter five:****New dynamic best values with M TwinPower Turbo technology.**

Permanent innovation and consistent compliance with the typical M principle of a harmonious overall concept comprising engine, chassis and body once again created unmistakable fascination in the fifth chapter of the BMW M5 story. More than ever before, the new edition of the high-performance saloon presented in 2011 succeeded in combining motor-sport passion and outstanding dynamic performance with the superior qualities of a premium saloon in the luxury class. The athletic proportions of the BMW 5 Series saloon were complemented by typical M attributes in the exterior design. These features were based with customary precision on the technical requirements relating to the supply of cooling air and aerodynamics.

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The large, three-part air inlet in the front apron provided a clear indication of renewed increase in power under the bonnet. For the first time, the high-revving engine developed by BMW M GmbH was fitted with a turbocharger. The M TwinPower turbo technology developed for the 4.4 litre V8 engine of the fifth BMW M5 combined design features that were derived directly from motor sport with innovations that benefited both the typical M power development maintained constant right up to the high-rev ranges, and efficiency. It comprised a charging system based on the Twin Scroll Twin Turbo principle including a cross-bank exhaust manifold, the direct petrol injection system High Precision Injection and VALVETRONIC fully variable control of the valve lift. The two turbochargers of the eight-cylinder engine were accommodated together with the catalytic converters in the V-shaped space between the cylinder banks. The cross-bank exhaust system permitted uniform pipe lengths and a configuration of the combustion chambers to match the ignition sequence. The uniform rhythm of the gas flows generated a continuous pressure to the charger free of any counterflows and this enabled the turbines to respond particularly spontaneously.

These technical refinements meant that the V8 engine was able to deliver its maximum torque of 680 newton metres over the broad range from 1 500 to 5 750 rpm. The turbocharged engine developed its maximum power of 412 kW/560 hp or more between 6 000 and 7 000 rpm. In conjunction with the Competition Package introduced in 2013, the engine output was increased to 423 kW/575 hp. In 2014, an appropriate special anniversary model with 441 kW/600 hp followed punctually to celebrate the 30th anniversary of the debut of the first model generation.

Maximum output was also achieved in the transmission of power to the rear wheels. The M DKG Drivelogic developed specifically for the model delivered exceptionally fast and convenient gearshifts in automated (D mode) and in manual operation (S mode). The seven-speed double-clutch transmission also provided three shift programs each in S and in D mode, and the Launch Control function already familiar from the previous model. The rear-axle differential with variable lock function was also typical for M and it was once again optimised. The new Active M Differential now used an electronically controlled multi-disc lock to optimise traction and drive stability.

The fifth generation of the BMW M5 achieved another best value for dynamic driving with a time of 4.3 seconds for acceleration in the sprint from zero to 100 km/h.

The anniversary model packing 600 hp required just 3.9 seconds for the standard sprint from a standing start.

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**The new BMW M5:  
continuation of the success story with overwhelming power and M xDrive.**

The latest model change will add another fascinating chapter to the BMW M5 Story. Once again, typical M innovations inspired by motor sport will ensure that the outstanding performance of powerful saloons will be experienced even more intensively.

The sixth BMW M5 (fuel consumption combined: 10.5 l/100 km; CO<sub>2</sub> emissions combined: 241 g/km) is powered by a significantly advanced V8 engine with the latest M Twin Power turbo technology, which generates maximum power of 441 kW/600 hp from a displacement of 4.4 litres and mobilises a maximum torque of 750 Nm. The eight cylinders transfer their power through a new 8-speed Steptronic gearbox with a unique choice of transmission to the rear wheels or to all four wheels.

This is made possible by the newly developed all-wheel system M xDrive. It delivers dynamic driving at a new level and ensures that the driver can easily handle the new BMW M5 even with a very sporty driving style and high application of power. The rear-based design means that the system only engages the front axle when the rear wheels reach their limits of power transmission and additional tractive force is necessary. Even with the new all-wheel system, the new BMW M5 weighs in at a lower weight than its predecessor. This is achieved by using a roof made of carbon-fibre reinforced plastic (CFRP). Force, traction and lightweight construction deliver acceleration from zero to 100 km/h in 3.4 seconds.

The driver of the new BMW M5 has a choice of five different configurations that are based on combinations of the DSC modes (DSC on, MDM, DSC off) and the M xDrive modes (4WD, 4WD Sport, 2WD). This enables the power unit to be tuned precisely to the individual driver's requirements and to the specific driving purpose. The new BMW M5 also offers purists the opportunity to completely deactivate the all-wheel system and opt for the classic rear-wheel drive.

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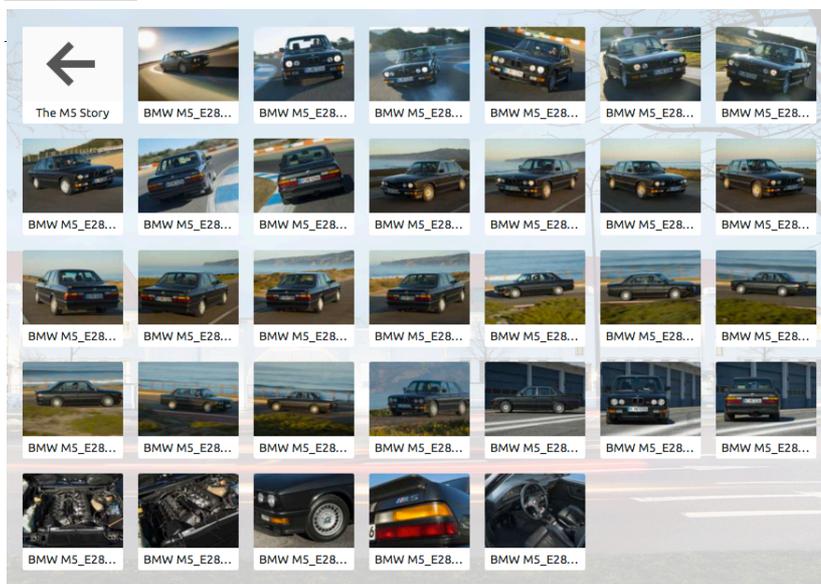
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## Media material

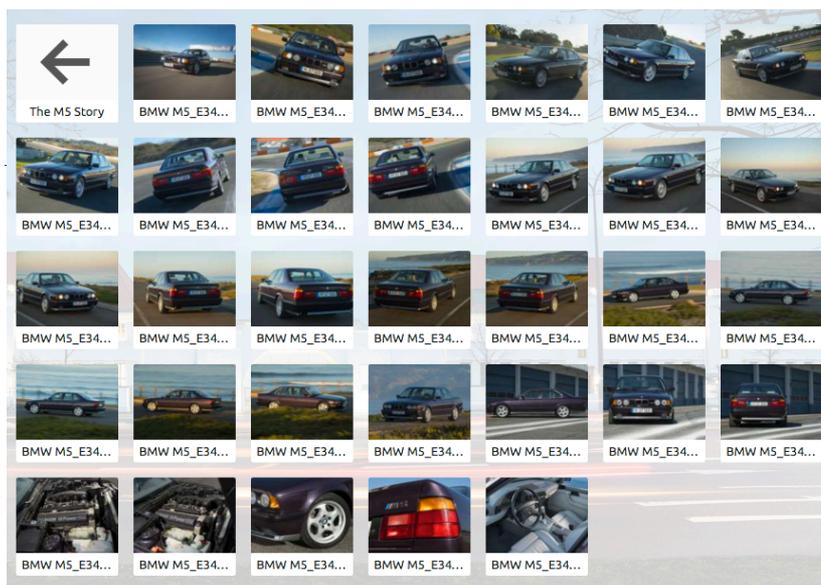
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## Photos

### BMW M5 E28



### BMW M5 E34





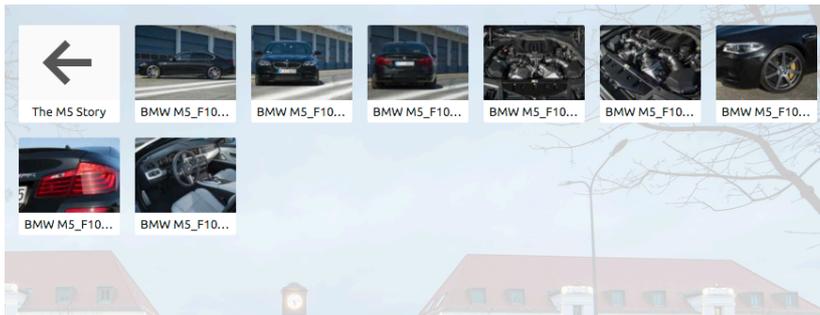
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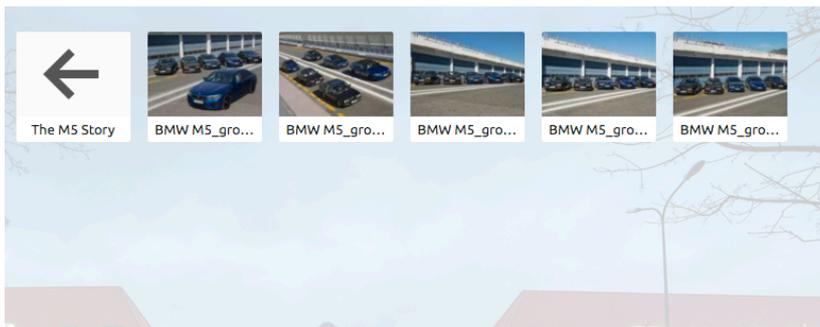
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### **BMW M5 F10M**



### **BMW M5 group**



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**Die BMW Group**

With its three brands BMW, MINI and Rolls-Royce, the BMW Group is the world's leading premium manufacturer of automobiles and motorcycles and also provides premium financial and mobility services. As a global company, the BMW Group operates 31 production and assembly facilities in 14 countries and has a global sales network in more than 140 countries.

In 2016, the BMW Group sold approximately 2.367 million cars and 145,000 motorcycles worldwide. The profit before tax was approximately € 9.67 billion on revenues amounting to € 94.16 billion. As of 31 December 2016, the BMW Group had a workforce of 124,729 employees.

The success of the BMW Group has always been based on long-term thinking and responsible action. The company has therefore established ecological and social sustainability throughout the value chain, comprehensive product responsibility and a clear commitment to conserving resources as an integral part of its strategy.

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