

The story of an exception: the BMW M3 is 25.

The anticipation began in August 1985. That summer Germany's automobile magazines built up their readers' expectations for the fastest 3 Series BMW of all times. The key data revealed a sports car that would punch way above its class: 200 hp, top speed in excess of 230 km/h, sprint from a standing start to 100 km/h inside 6.7 seconds. However, the story was that "the most dynamic BMW 3 Series drivers" would have to wait until mid-1986. The pundits were right on that count. But one prediction missed the mark by a mile: anyone who "wants to be in the A Team needs to be turbocharged under the bonnet". Not true. The BMW M3 became the most successful touring car in motor-sport history.

The M3 project was launched just a few months earlier. Production of the M1 mid-engine sports car had already been discontinued for some time and BMW CEO Eberhard Kuenheim commissioned a design for a successor, almost as an aside, according to legend. After one of his regular visits to Motorsport GmbH in Munich's Preußenstraße he said, almost as he was leaving: "Mr. Rosche, we need a sporty engine for the 3 Series." His aspiration was in good hands. Motorsport GmbH with its managing director of technical development Paul Rosche had demonstrated its expertise with the legendary 5 Series saloons driven by M engines as well as developing the Formula 1 turbo engine that powered Brazilian Nelson Piquet to win the World Championship in the Brabham BMW in 1983.

**Power source: a four-cylinder engine with 2.3 litres displacement and four-valve engineering.**

The new 3 Series engine had something in common with this: the crankcase. It originated from volume production and actually formed the basis for the two-litre engine with four cylinders. Four cylinders meant less weight and high torque, an ideal platform for a sports engine in the projected displacement class. Naturally enough, the series four-cylinder engine was much too tame for a sports engine. A comprehensive power boost was called for in order to turn the plucky daily workhorse into an athletic and sporty power unit. The BMW design engineers increased the displacement to 2.3 litres and applied a formulation that had already achieved significant successes over a period of many years: four-valve engineering. There was also another reason for the decision to opt for a four-cylinder engine and not adopt the six-cylinder engine introduced in the BMW 3 Series. The longer crankshaft in the big engine started to vibrate much earlier than the shorter four-cylinder shaft. The design engineers therefore designed the crankshaft drive of the BMW M3 with sufficient torsional stability to achieve 10,000 revolutions a minute and more. By comparison with the four-cylinder engine installed in the series

vehicles, this represented an increase of more than 60 percent. The rated speed for the road version of the BMW M3 was still significantly below the critical range at 6,750/min and therefore offered sufficient scope for further developments.

Paul Rosche recalls: "We started work immediately. One advantage was that the big six-cylinder engine originally had the same cylinder gap as the four-cylinder engine. We therefore cut two combustion chambers off the four-cylinder head of the M88 and bolted a panel over the hole on the rear side." This meant that the new four-cylinder engine had a second fore-bear. The six-cylinder engine that had initially created a sensation in the M1 and had meanwhile transformed the M635CSi into one of the fastest coupés in the world. Paul Rosche: "Whether you believe it or not - we had created an outstanding four-cylinder engine for the 3 Series within the space of two weeks. Under the development name S14, this engine was to generate headlines in sport and in volume production over the years to come. One Sunday, I drove to von Kuenheim's flat and gave him the car for a test drive. When he came back he said: 'Good, I like it.' And that's how the M3 came into being.

Contrary to the situation with the mid-engine sports car, the BMW M3 was not going to be crafted by hand in small batches. This car was to be produced as a mass-production automobile on an assembly line. It was destined to compete in near-production touring car motor sport, or more precisely as a Group A racing car, defined as a "production car", of which at least 5000 units have to be built within the space of twelve consecutive months in accordance with Annex J of the international automobile sport regulations. Naturally, this meant that the M3 had to be capable of operating as an everyday road vehicle.

**Clean exhaust: developed for operation with catalytic converter right from the start.**

This was not the only challenge taken on by the engine specialists in spring 1985. If the M3 was destined to become a pioneering sports car, then this should be the case in as many disciplines as possible. And that also applied to emissions. The four-cylinder engine was developed right from the start so that a three-way catalytic converter could easily be fitted. This approach involved BMW in another public relations exercise because lead-free petrol didn't exactly have the reputation of promoting the life expectancy of high-performance engines in the mid-1980s. Another factor was that bolt-on catalytic converters significantly stifled the power build-up of some cars. The M3 proved that there was also another way. The development of catalytic converters was still in its infancy, but the sporty 3 series still generated an unrivalled 143 kW or 195 hp.

## Test trial Nürburgring.

There's no joy without sorrow - the developers of the BMW M3 experienced this on the initial test drives. Although the engine performed without any incidents, the exhaust system clearly failed to digest everything that was blown into its manifold by the high-performance power unit. The pipes fractured and this gave the development department some sleepless nights. It transpired that these problems were caused by the very high temperatures of the exhaust gases when the engine was operating at full power. The test drives on the north loop of the Nürburgring were particularly hard on the materials and the high-performance exhaust system became so hot that it expanded by as much as 25 millimetres and became distorted within its mounting. This problem was solved shortly afterwards with a distinctly unspectacular solution. A simple set of different washers allowed more play. The vehicle was now ready to roll, and the test drivers from BMW Motorsport GmbH immediately proved the point with an impressive performance on the high-speed test track in Nardo, Italy. The exhaust system withstood the test just like the rest of the car.

## World premiere at the Frankfurt Motor Show in 1985.

On the BMW exhibition stand at the Frankfurt Motor Show in autumn 1985, the M3 was presented to a more broadly based public audience for the first time. Even without a special paint finish, it was not difficult to distinguish the car from the other BMW 3 Series vehicles. The boot lid was crowned by a spoiler across the width of the car. Aprons all round indicated the refined aerodynamic work that had been carried out on the body. The C-pillar of the BMW M3 was slightly wider than that of the series model and had a flatter taper in order not to interrupt the airflow over the edge of the roof and at the same time direct it more effectively onto the rear spoiler. Thick cheeks had sprouted over the wide wheels of the M3, with the flared wheel arches coming to an end in a striking lip below the edges of the wings. There was no question about it - the BMW M3 looked fast even when it was perched on an exhibition stand.

However, test drivers and customers alike had to be patient for at least another six months. In spring 1986, the first pilot-production cars were ready and the M3 was launched to a press audience - appropriately on the racing track at Mugello. The test drivers established that the aerodynamic profile of the M3 was an understatement rather than an overstatement - impressive high-quality racing technology was housed under the beefy bodywork. Axle kinematics, suspension and damping had changed. The braking system with ABS as standard comprised inner-vented brake discs with ventilation at the front and a high-pressure pump operated by the engine.

This servo pump delivered power to the steering at the same time so that both systems were able to operate independently of the negative pressure of the engine.

The BMW M3 weighed in at just 1200 kilograms without payload on the scales and hence remained a sporty lightweight. The weight-to-power ratio at only 6.15 kilograms for every 1 hp was an extremely impressive figure even by today's standards. This was primarily due to the use of plastic components. Although the bodywork including the wide wheel housings were made of metal in keeping with tradition, the front and rear bumpers, and side sills, boot lid and spoilers were made of plastic.

**235 km/h top speed for 58,000 marks.**

The refined aerodynamic work paid off with an outstanding cw value of 0.33. The lift at the front axle was around half that of the other two-door 3 Series models. The large rear wing reduced the lift on the rear axle by some two thirds. This was evident to the driver in the form of significantly increased driving stability and more precise steering characteristics at very high speeds. In fact, the standard M3 reached a top speed of 230 km/h with catalytic converter and 235 km/h without catalytic converter. And yet it was relatively fuel-efficient for super. Using the then current Euromix formula for super made up of Speed 80, 120 and town cycle, the M3 consumed significantly less than nine litres for every 100 km/h driven. However, the power pack came at a price: an M3 cost 58,000 marks when it was launched in 1986. By comparison, the 325i convertible at 43,300 marks was the next car down the BMW 3 Series price list.

Nevertheless, finding customers for the requisite volume of 5000 vehicles simply wasn't a problem. In the summer of 1986 - long before delivery started - purchase contracts for the M3 were being offered on the relevant advertisement pages at a premium price. In actual fact, it wasn't until 1987 that all 5000 units of the first M3 were gathered on the BMW parking lot in Munich-Freimann for a family photo before being shipped all over the world.

**300 hp for competitive racing.**

However, many of them immediately disappeared again into garages and workshops to be given a new outfit. After all, the M3 had been designed as a racing car, and now was the time to prove that it really could "race". A World Touring Car Championship was held for the first time in 1987. And that was exactly what the M3 had been built for. But not quite in the guise in which it was seen on the streets. Instead of 200 hp, the 2.3 litre engine delivered up to 300 hp at 8,200 rpm in the racing version. This put it on a par with the BMW M635CSi. BMW didn't line up

on the starting grid with its own team but supported a number of famous racing outfits like Schnitzer, Linder, Zackspeed and Bigazzi. Drivers like Markus Oestreich, Christian Danner, Roberto Ravaglia and Wilfried Vogt took the wheel, and Anette Meeuvissen and Mercedes Stermitz formed a ladies' team.

### **Roberto Ravaglia in a BMW M3: first and last World Touring Car Champion.**

The first race for the 1987 World Touring Car Championship started in Monza on 22 March 1987 - and ended with a sensation. All the M3 cars were excluded from the placings. The vehicles were checked under chaotic conditions and disqualified because of sheet-metal thicknesses that were allegedly contrary to the regulations. BMW appealed but the sports tribunal decided that the appeal had been lodged too late. There was no longer any talk of infringements of the rules. All the brouhaha naturally didn't have any effect on the result of the championship. At the end of the season, Roberto Ravaglia was standing on the podium as the first World Touring Car Champion. But that was only the pinnacle of the success list. Wilfried Vogt took the title of European Champion. Altfried Heger came in second - both driving a BMW M3. Eric van de Poele won the prestigious German Touring Car Championship. Moreover, the most sporty 3 Series car was also winning competitions off the race track. An M3 crossed the finishing line in first place in the Corsica Rally and secured a victory for BMW after a gap of 14 years in a race for the World Rally Championship.

### **"Most sporty saloon of the year".**

The well-informed public rewarded the success story of the newcomer when readers of racing magazine sport auto voted the M3 "the most sporty saloon of the year". The high-profile 3 Series also became increasingly exciting in its civilian version. In 1987, it was equipped with electronically adjustable shock absorbers. Drivers had a knob beside the handbrake lever which allowed them to choose between the adjustments sport, normal and comfort. Control lamps on the instrument panel displayed the setting that had been selected.

The resilience of the four-cylinder under tough operating conditions on the race tracks rewarded private customers with two very special offers in 1988. BMW created an exclusive special series of even more powerful M3 cars with the suffix "Evo" for Evolution. Identifiable by even more opulent spoilers, this special M3 was powered by a 220 hp engine, while the 'cat' version of the standard M3 generated 215 hp. The second package was intended for a very special circle of customers: an open M3 based on the 3 Series Convertible. The 215 hp convertible had a top speed of 239

km/h and was by far the fastest open-top four-seater to be bought in a limited series.

## **24 Hour Race: M3 double victory on the Nürburgring.**

In the meantime, the BMW M3 was really getting going on the race track. The two-door car didn't just win the German Touring Car Championship. It also took the national titles in France, England and Italy. In the following year, the BMW racing car was equally difficult to beat. The M3 packing 300 bhp beat its touring-car competitors in Germany, Belgium, Holland, France, Italy, Finland, Spain, Sweden and Yugoslavia hands down. Belgian Marc Duez battled through the Monte Carlo Rally with an M3 and took eighth place as best driver in a car without four-wheel drive. Altfried Heger and Roberto Ravaglia crowned the success story with a sensational twin victory at the 24 Hour Race on the Nürburgring.

## **Specials: Sport Evo and 320is.**

The M3 had a commanding presence on the international touring car racing scene for five years. It became the most successful touring car of all times by winning the champion's title several times in the European Touring Car Championship and twice in the German Touring Car Championship. There were also numerous further victories and championship wins at international level. Depending on the competition rules, the four-valve engine had to be adapted to national regulations. For example, the capacity for England was limited to 2 litres while for Germany and France it was raised to 2.5 litres with effect from 1990. This enabled the four-cylinder to deliver up to 360 bhp. Depending on the version and the deployment profile, engine and mixture management also varied. Air intake was managed by independent throttle valves and valve control systems. In the version with the biggest capacity, the engineers of BMW M GmbH went up against the limits of what was feasible. In order to make full use of the 2.5 litre limit, they not only increased the stroke of the 2.3 litre unit from 84 to 87 millimetres, but also increased the bores of the four cylinders from 93.4 millimetres each to 95.5 millimetres. This reduced the width between the cylinders to just 4.5 millimetres. But success proved the development engineers right. The engines withstood the stresses and strains of touring-car racing even at maximum output without any problem.

A civilian version of this original M3 with the biggest capacity drove onto the roads with the additional name of Sport Evolution. Its characteristic feature was the two-tier rear wing. This 238 hp sports car was limited to 600 units. A version of the two-litre engine used in Italy was also marketed for everyday use. It was designated 320is, packed 192 hp

and was sold in Italy and Portugal to come below the statutory capacity limits valid here for highly taxed luxury cars.

By the end of 1991, 17,970 BMW M3 cars of the first generation had left the manufacturing facility, including 786 convertibles. Nobody had anticipated this overwhelming success, either on the road or on the racing circuit. Continuing this success was an obvious step - with the new 3 Series that had already been launched on the market in 1990.

### **The wolf in sheep's clothing: the second generation of the M3 with six-cylinder engine.**

This M3 was a completely new car - and a completely different car. This was the end of an era for an uncompromising sports car that was consistently tailored to be competitive in racing and demanded bold qualities from its drivers. An elegant and sophisticated coupé now emerged on the roads with a powerful yet cultured six-cylinder engine. The four-valve engine delivered 210 kW or 286 hp, thanks to the VANOS variable valve timing. This innovation allowed the opening point of the inlet valves to be adjusted to the engine speed and load. The advantage was that torque, power and consumption could be optimised simultaneously. The new M3 engine was a pioneer among naturally aspirated engines generating 320 newton metres at 3600 revolutions. The six-cylinder generated as much power as the previous M3 engine with a peak value of 230 newton metres virtually from idling speed. This made the M3 a world champion. No other naturally aspirated engine had such a high specific output - 97 hp for each litre of displacement - or such a high specific torque - 108 newton metres per litre of displacement. The coupé took 6.0 seconds to sprint from a standing start to a speed of 100 km/h, and the acceleration only stopped at a speed of 250 km/h. This was not because the engine had run out of power but because the electronics brought the acceleration to an end - BMW had set this voluntary limit.

Meanwhile, the DIN consumption values were at a level that would also have looked good on paper for a mid-range car: the BMW M3 used 9.1 litres of super in the Euromix formula. Lead-free was standard because naturally the super sports car had a catalytic converter. The engineers had revised the catalytic converter technology specifically to meet the needs of the new engine and developed the "stereo" oxygen sensors. This allowed the mixture for groups of three cylinders to be regulated separately with an oxygen sensor through separate exhaust systems. It enabled the vehicle to comply with the specified exhaust limits, in fact undercutting them by more than half.

**Chassis and brakes: adapted to the performance data.**

The substantially enhanced engine output of the new model demanded a revision of the chassis and braking system. The result had to be thoroughbred athleticism yet suitable for everyday road use, as well as being specially designed to meet the requirements for 17-inch tyres. Despite the extreme width of the tyres and the 40 section width, BMW M3 customers expected an acceptable level of comfort and good straight-line stability. A key element was once again a single-joint spring strut front axle with reinforced spring plates and axle knuckles. The centrally guided rear axle, used for the first time in the BMW Z1, reduced pitching of the body when driving off and braking to a minimum. Apart from one change involving the longitudinal arm being adjusted to the increased hp. The dampers and anti-roll bars also had to be tuned more tautly. These changes were reflected in the height of the bodywork. The BMW M3 was exactly 31 millimetres lower than a BMW 3 Series Coupé. The values for lateral acceleration also demonstrated how well all the chassis components were tuned to each other. Under normal circumstances, the adhesion limit was reached at a lateral acceleration of 0.8 g - 0.8 times the earth's gravitational acceleration. The chassis of the BMW M3 was subjected to the same intensive tests on the Nürburgring as that of its predecessor, and the value for the new chassis of the BMW M3 came out at an impressive 1 g.

Where powerful forces are being exerted, excessive power needs to be kept under control. The new model was therefore given a particularly powerful braking system with generously dimensioned inner-vented swing-calliper front and rear disc brakes. At that point, ABS systems were already being installed as standard in every BMW, and the ABS for the M3 was specially tailored to the performance of the high-power sports coupé. The result was that the new BMW M3 decelerated from high speeds even more effectively than its predecessor, which had defined benchmarks in this area. At a speed of 100 km/h, the car only needed 2.8 seconds or 35 metres to come to a standstill. Braking from 200 km/h was possible in less than 6.0 seconds.

**The mirrors shall be the identifying feature.**

The new M3 exhibited an understated profile but the car was unmistakable for aficionados. A maw the size of the typical BMW kidney grille opened up under the front bumper and behind the fly guard a generous oil cooler assisted in regulating the temperature of the six-cylinder engine. The BMW M3 had unique, specially developed alloy rims in a double-spoke design and two specially crafted outside mirrors. The mirror housing is attached by two wing-shaped struts to keep drag to a minimum. At the time, these four struts were the ultimate status symbol for coupé drivers. After all,



they signalled a coupé with a price tag of 80,000 marks, around one and a half times the price of the two-door 325i as the top-range model for volume production.

Yet the new M3 could be much more than just a sophisticated street sports car. Motorsport GmbH developed a version for competitions in record time starting in April 1992. The new M3 was already lining up on the grid for the first race in the German Touring Car Championship in April 1993. The new regulations were only defined at the beginning of 1992.

### **M3 GTR wins the Warsteiner-ADAC GT Cup.**

In April 1993, the new M3 GTR was ready to go in the striking chequered flag design. The six-cylinder packed 325 hp, the car weighed 1300 kilograms in accordance with the regulations. Johnny Cecotto and Kris Nissen took off in the Warsteiner-ADAC GT Cup which Cecotto was ultimately to win at the end of the series. However, this brought the M3 motor-sport chapter to an end for the time being. Changes in the regulations did not leave the powerful BMW 3 Series any real hopes of victory.

Naturally enough, the M3 remained in the winners' class in its civilian life. Readers of sport auto voted the M3 "Car of the year" as the most agile of all 3 Series cars twice in succession, while Auto Plus in France even gave the M3 the accolade of "Car of the century". Immediately after the market launch in the USA, trade journalists from Automobile magazine also awarded the new star in the market the endorsement "Auto of the year" - the first imported car to be granted this title. And this was despite the fact that the BMW M3 - while still very well equipped - had to make do with significantly reduced power for the American market. In order to be certain of complying with US exhaust emission laws, engineers used a 525i engine enlarged to three litres. This engine generated 244 hp in the M3 thanks to the VANOS variable valve timing and generated speeds of up to 220 km/h. It could have packed a bigger punch but the regulations precluded this.

### **1994: debut of the new BMW M3 convertible.**

Although the M3 Coupé was elegant and beautiful some customers still had enhanced aspirations. Calls for a new edition of the M3 Convertible became more vociferous. Meanwhile, the motor sport subsidiary company of BMW had been renamed M GmbH and it had anticipated this demand by laying plans for a convertible. In 1994, the new open-top M3 based on the four-seater 3 Series Convertible was launched - fitted with a power-operated hood as standard and innovative safety technology. BMW's rollover protection

system provided occupants of the convertible with innovative protection unknown in previous convertibles. In combination with the extremely rigid frame design of the windscreen, two roll-over bars integrated behind the headrests of the rear seats provided protection for passengers if the car rolled over. Sensors monitored the position of the vehicle and released the locking mechanism of the roll-over bars once the limit values were reached. A spring-action mechanism rather than a pyrotechnic device forced the bars out. The newcomer had an enhanced power pack under the body to ensure that high power could be effortlessly transformed into sheer driving pleasure. The convertible weighed some 80 kilos more but this only exerted a minimal effect on performance. Instead of 6.0 seconds, the open-top M3 required precisely 6.2 seconds for the sprint from 0 to 100 km/h. The top speed was the same as the coupé at 250 km/h - and was electronically limited like the coupé. When production ceased in 1999, 12,114 units of the safe and swift BMW M3 Convertible had rolled off the production line.

In 1994, BMW also debuted the four-door saloon. This car enabled BMW to meet the desires of a large number of customers for a compact, luxury saloon with the genes of a high-performance sports car. The four-door car was undoubtedly the most successful combination of sportiness and everyday road use that had been sold up to that point under the M3 badge. This model was particularly attractive to customers who found the convertible and the coupé too sporty and too much of a thoroughbred. The driving characteristics of the saloon were the same as those of the coupé, and the saloon had an impressive profile with the superlative standard interior fittings that featured wood inlays and Nappa leather seats. The production figures told their own story. Up to 1999, 12,435 cars were sold in this body version.

In spring 1995, BMW M GmbH introduced a rather special version when it launched a strictly limited edition as the BMW M3 GT Coupé for homologation. This car was intended to compete on the race track in the IMSA GT Series in the USA. The appeal of this car was for drivers who wanted their BMW M3 to display even more bite. The already generous power was again raised. The special version could only be purchased in the colour British Racing Green. The upgraded 3.0 litre six-cylinder engine now packed 217 kW/295 hp and accelerated the BMW M3 GT to 100 km/h in 5.9 seconds. The aerodynamic design of the vehicle was also revised and now boasted striking spoilers at front and rear. The really special feature was that the angle of the front spoiler could be adjusted by the driver. As far as equipment was concerned, the BMW M3 GT Coupé was a genuine benchmark. Two airbags were included as standard together with sports seats in Nappa leather and carbon-fibre interior trims. The price of the special model manufactured in a limited series of 350 was DM 91,000.

**Power boost: more advanced engine with 3.2 litres displacement and 321 hp.**

Nothing is so good that you can't make it even better. Shortly after the expansion of the M3 stable by the four-door saloon, BMW AG announced on 20 July 1995 that the M3 was getting even more dynamic. The new model could only be distinguished by white indicator lenses, a black cool-air intake in the front spoiler and wheels styled differently from the coupé.

The special feature of the new M3 was the more advanced engine. Firstly, it had a bigger displacement than the existing engine, precisely 3201 cubic centimetres, and hence a good basis for improvement of the key statistics. The maximum torque rose by some ten percent to 350 newton metres while the reference engine speed fell from 3600 rpm to 3250 rpm. The six-cylinder engine with four valves for each cylinder generated 236 kW or 321 hp at 7400 revs. At the same time, the development engineers increased the compression from 10.8 to 11.3, which benefited power and consumption.

All these improvements had been facilitated primarily by the new engine electronics that had been jointly developed by BMW electronics specialists and engineers at M GmbH. Computing power of 20 million commands per second enabled the MSS 50 to calculate the relevant optimum operating data such as ignition point, injection time and knock sensing. It controlled the new double VANOS variable valve timing and managed the adaptive stereo oxygen sensors. And there was much more. This engine management system represented a pioneering step for the subsequent generations of electronic controls.

**Double VANOS variable valve timing also for the exhaust camshaft.**

Improvements continued to be made to power, torque, idling and level of pollutant emissions in the new M3 by installation of an adjustable inlet camshaft. Synchronous control of the exhaust camshaft was also added. This permitted internal exhaust gas recirculation, which significantly reduced nitrogen oxides. However, the variable system also increased the torque in the lower and middle range of engine speeds, generated lower levels of uncombusted gases during idling as a result of less overlap, and thereby assisted in further reducing consumption. The overall effect was that the new M3 consumed 8.7 litres of super in the Euromix formula despite added power. Naturally, the most impressive features were provided by the performance stats of the new M3. The sports car sprinted to 100 km/h in just 5.5 seconds. The explosive performance curve was combined with a high level of elasticity. The sports car needed just 5.7 seconds for acceleration at speed from 80 km/h to 120 km/h in fourth gear.

**Six-speed gearbox with overdrive.**

The engine in the new M3 was not the only area to have a thorough overhaul. The engineers at M GmbH also carried out some intensive work on the power transmission and chassis. For example, they implemented the desire of many M3 customers for an additional drive level with a new six-speed gearbox. The sixth gear exerted an overdrive effect. This reduced revolutions at high speeds, which mainly served to minimise driving noise at very high speeds and cut down fuel consumption.

The chassis sector was – and indeed remains – one of the key domains of each M3. Engineers were mainly working on chassis tuning here. Dampers and spring rates were completely revamped without reducing ride comfort. The servo-assisted rack-and-pinion steering was retained in principle, although the steering effect was transmitted rather more directly and conveyed rather more road contact to the driver than previously.

#### **Unique: M compound braking.**

The new front axle brake provided a very special highlight that was only otherwise available in this form with the M5: compound braking. The advantage of this system was in the compound design of the aluminium disc brake chamber and the grey cast-iron friction ring. The friction ring was attached to the chamber on a floating mount so that it could expand when braking without becoming distorted. This system provided excellent heat dissipation even at very high temperatures and this additionally exerted a positive effect on the service life.

#### **World first 1997: the first Sequential M Gearbox.**

Although this had meanwhile become a pure road sports car, it was deriving continual benefit from developments in racing. In 1997, M GmbH was the first automobile manufacturer in the world to market the M3 with the Sequential M Gearbox (SMG) at a premium price. This gearbox offered seamless gear change with the clutch being operated fully automatically. The model for this was the successful BMW 320i touring car. The driver simply pulled back briefly on the selector lever to go up the gears and pushed it forward for downshift. This system delivered extremely short shift times while at the same time preventing the driver from selecting the wrong gear.

The new gearbox combined the easy operation of an automatic with the opportunity for sporty manual gear change and demonstrated a broad array of advantages on the road. On the one hand, the clutch pedal was eliminated, while in contrast to a conventional automatic there was no hydraulic converter with its losses, weights and inertias resulting from the operating

principle. Compared with a conventional manual gearshift, there were neither losses in performance values nor efficiency compromises on the basis of the converter slip. Most importantly, the joy of changing gear experienced a tangible enhancement because the Sequential M Gearbox enabled lightning manual gear changes up and down even when the accelerator pedal was floored. The driver no longer had to concentrate on changing gear - high-performance cars in particular demand precise gear changes - and could instead exploit the reserves of the M3 and concentrate entirely on driving.

**No wrong gears and no skidding when taking your foot off the accelerator.**

The Sequential M Gearbox also proved to have many benefits for operational safety. Generally speaking, the driver could no longer select the wrong gear because the system only accepted commands that could be implemented without incurring any danger. The limit to the engine drag torque was defined automatically so that in critical driving situations, for example going down the gears on icy roads, the car didn't go into an uncontrolled skid.

Aside from all the improvements to enhance sporty driving, the SMG also offered further comfort. The automatic clutch made driving in stop-and-go traffic effortless. A second shift level allowed driving in the Economy ("E") level in the same way as an automatic. If peak performance was required, the driver simply had to floor the accelerator and the SMG shifts through to sixth gear. Over-revving the engine during gearshift only took approximately 250 milliseconds. In order to avoid this, the engine control system intervened by adjusting the ignition timing or suppressing one cylinder.

**Success story: every second M3 with SMG gearbox.**

The gearbox took the M3 into new territory in the sport-car sector - and was a runaway success story. A boom followed on from initial scepticism - when production was brought to a close, almost every second M3 in this generation was fitted with an SMG gearbox. The exceptional sports car had become a sales hit. This car rolled off the production line in Regensburg precisely 71,242 times. From 1992 until 1999, it was the silent star in the firmament of the extensive BMW range to be manufactured there - as a coupé, convertible and saloon. The concept was so impressive that two more derivatives joined the M3 in the final two years of production. The M Roadster and the M Coupé had the same engine with identical output, but were otherwise essentially based on the open and closed Z3.

**The third M3: high performance and precision in exciting design.**

The community of aficionados of the M3 didn't have to wait long. The next M3 gave lots of scope for discussion when it was unveiled as a show car at the Frankfurt Motor Show in September 1999. Six months later, it celebrated a world premiere at the Geneva Motor Show.

The third M3 was very powerful, wide and yet elegant. Thanks to a special front apron with integrated fog lamps and large cooling air intakes, it presented a significantly different profile to all other models in the BMW 3 Series. The engine compartment lid made of aluminium was curved in the centre, forming a power dome to create space for the M3 engine.

The side profile of the M3 body including the wheel arches had undergone an increase in width of 20 millimetres, with air intakes and M3 badge in the front side panels. This beefy appearance was a visible consequence of aerodynamic optimization and an attribute creating a profile distinct from that of the 3 Series coupé. It was accompanied by appropriately beefy wide wheels in the format 225/45 ZR 18 at the front and 255/40 ZR 18 at the rear.

The impressive visual appearance of the M high-performance athlete was underscored by aspherical M outside mirrors, side sill trims and an aerodynamically optimised rear apron with rear spoiler lip. Any driver who was still unaware of which car had overtaken them was left in no doubt when they saw the four tailpipes of the twin-chamber exhaust system that it was a member of the M family of automobiles.

Sports seats developed in-house with outstanding ergonomic characteristics provided an impressive combination of lateral support and unrestricted capability for travelling long distances. Apart from the diverse electrical adjustment options at all levels, adjustment of the reclining width was also supplied as a special.

**New six-cylinder with more power and torque.**

People had expected no less. The heart of the new M3 was again an inline six-cylinder engine - the classic BMW power unit. Like its predecessor, this completely new engine offered lots of torque, even more power and all this for relatively low petrol consumption and low exhaust values.

The M3 engine generated the impressive power of 343 hp (252 kW) from displacement of precisely 3246 cubic centimetres at an engine speed of 7900 rpm. The maximum torque achieved 365 newton metres at 4900 rpm. This yields a specific power of 105 hp for every litre, a value that has only

been achieved by a few high-performance sports cars in the world not fitted with a turbocharger.

The highlights of the engine included a friction optimised cylinder head with cam follower valve timing. The double VANOS variable timing familiar from the other M models was further optimised. Electronic throttle valve control was responsible for actuating the six individual throttle valves. It communicated directly with the MSS 54 engine control unit specially developed for the M3. This multiprocessor system has two 32 bit microcontrollers and two timing coprocessors and computing power of 25 million calculations per second.

However, the main goal of developing the new M3 engine was not geared simply to the generation of torque at all costs. The primary objective was to generate thrust as an indication of optimum handling of the available potential power. Thrust is mainly based on the exceptionally high torque of this engine combined with a relatively short final drive ratio. The available power could be converted into acceleration much more efficiently than in engines rotating at a lower speed. And this held over the entire range of speeds. In addition, the radial force-controlled oil siphoning guaranteed reliable lubrication and cooling for the engine in journeys with hairpin bends and manoeuvres involving heavy braking.

A few more statistics provide an indication of the athletic performance. The M3 accelerates from a standing start to 100 km/h in just 5.2 seconds. It took this car just 5.4 seconds to accelerate from 80 to 120 km/h in fourth gear. A special switch, the M Driving Dynamic Control, also allows drivers to select between sporty and high-comfort engine response.

### **World first for the M3: variable M differential lock.**

This sophisticated but powerful performance curve can be effortlessly transferred to the road with the six-speed manual gearshift. The variable M differential lock being used for the first time in the M3 provided efficient support.

Differential locks can distribute different levels of tractive force individually to the rear drive wheels, depending on which wheel currently has the best traction. The special feature of the variable M differential lock was that it recorded the different rotational speeds rather than the different torque of the left-hand and right-hand rear wheels as in conventional systems. The difference in rotational speeds was compensated by the limited-slip system containing viscose oil so that adequate forward thrust was provided. This system provided a lo-

cking effect from 0 to 100 percent. This offered the M3 driver tangible benefits when starting off from difficult situations, and on sporty driving round hairpin bends.

The M sports chassis of the M3 was put to the test many times in international motor sport and underwent further development. The chassis ensured outstanding roadholding and this automobile was also defending the endorsement of “Best Handling Car”. The engineers at BMW M implemented a lot of ideas to ensure that the car was capable of rising to the challenge of all types of handling limits: a high level of stiffness and minimising of the unsprung suspension components combined with a directness in performance unrivalled in this class. Lots of power also demanded excellent braking force. That’s why the M3 was given a robust high-performance braking system with floating compound brakes and perforated brake discs.

### **A revelation: the M3 Convertible.**

The new M3 Coupé had hardly been launched successfully when a second attractive version was making waves: the new M3 Convertible, an open-top sports four-seater in the premium class was launched on the marketplace in spring of 2001. Although this car was identical with the M3 Coupé down to the A-pillar, it exuded a high level of independence. The distinctive belt line and the character of a convertible made the car appear even wider and more powerful, the overall impression conveyed by the M3 Convertible was more muscular, flatter and broader.

Naturally, all the typical M characteristics were integrated within the M3 Convertible, such as a powerful 343 PS/252 kW high-revving naturally aspirated engine, a perfectly tuned M chassis, the variable M differential lock, M high-performance brakes and the independent M design elements with the familiar qualities of the 3 Series Convertible. Other features included sports seats with power adjustment and integrated seat-belt system, as well as a variable folding-top compartment and a high level of safety achieved through maximally rigid body stiffness and a standard rollover protection system.

The interior atmosphere was even more luxurious than the previous model – already a major success in a small niche market. And the M3 Convertible with its top speed of 250 km/h had awesome power. It took just 5.5 seconds for it to sprint from a standing start to 100 km/h, and required only 5.9 seconds to accelerate from 80 to 120 km/h in fourth gear. Average consumption was just 12.1 litres for every 100 kilometres.

### **US racer M3 GTR: the most powerful M3 ever.**



Meanwhile, quite a different M3 was creating a sensation in the USA. In 2001, the first starting flag came down for the new BMW M3 GTR with a 450 hp V8 engine. The most powerful M3 ever was now setting benchmarks in the GT class of the American Le Mans Series (ALMS) with its four-litre engine and with four cars competing in the series. The BMW Motorsport Team entered two cars under the management of Charly Lamm, while the American BMW Team PTG run by Tom Milner - who is of German extraction - entered another two cars. The coupé achieved seven wins in ten races with six pole positions. BMW works driver Jörg Müller won the Drivers' Championship in the GT Class, BMW Motorsport took victory in the team placings, and BMW won the Manufacturers' Championship in the company's most important foreign market.

Starting in February 2002, the road sports car - derated from 330 kW/450 hp to 258 kW/350 hp - could also be purchased at a price of some 250,000 euros. The engineering of the civilian version was closely based on the racing version. A V8 high-performance engine with dry sump engineering provided the power unit under the engine compartment lid with additional cooling slits. A six-speed manual gearbox was also onboard, together with a double-disc clutch like the clutch used in the racing car. The body was also similar to the racing version. The roof, rear wing, and front and rear aprons were made of carbon-fibre reinforced plastic to save weight.

### **Second generation of the Sequential M Gearbox: paddles on the steering wheel.**

The advanced development of the M3 idea was by no means at an end. The next highlight followed within a few months, just as dynamically as the cars themselves. The Sequential M Gearbox (SMG) that had achieved the perfection level of the second generation in the M3. Paddles on the steering wheel activated the SMG to change gear at lightning speed. And the driver could keep the accelerator pedal floored. The latest engine electronics interrupted the power of the engine for milliseconds, the control unit changed gear and opened and closed the clutch through an automated hydraulic system. This second generation of the SMG gearbox also provided an impressive performance with even shorter power interruptions - now the time for the fastest gearshifts was just 80 milliseconds. Virtually, nobody can change gear that quickly using a manual gearshift. Drivelogic also provided M3 drivers with the option of manual dynamic gearshift in six different programs to match their driving style in the sequential gearbox - from well-balanced dynamic shift to definitively sporty. Moreover, the S6 driving program could be selected if the DSC System (Dynamic Stability Control) supplied as standard in the M3 was switched off. The SMG then changed gear with gearshift times of a sporty thoroughbred similar to a racing car.

## M3 CSL: the 110 percent car.

In 2003, BMW launched the series version of a concept car on the market which had already created a sensation at the Frankfurt Motor Show in 2001: the BMW M3 CSL. The initials stood for Coupé, Sport and Lightweight. A tradition that went back to the 1930s at BMW, when the legendary BMW 328 Mille Miglia Touring Coupé came into being. The focus for the design of this vehicle was not a radical slimming regime consisting of removing individual components, but intelligent weight reduction by using the most suitable materials at the right point. The experts managed to slim down the BMW M3 by more than 110 kilograms so that the CSL version weighed in at just 1,385 kilograms. The engine was also revised and generated 256 kW/360 hp in this version. This resulted in a power-to-weight ratio of only 3.85 kilogram to every 1 hp - a truly sensation value that gave the BMW M3 CSL even more agility than the standard BMW M3. The classic sprint from a standing start to 100 km/h was achieved in just 4.9 seconds. Acceleration from zero to 200 km/h only took 16.8 seconds. The top speed was limited electronically to 250 km/h.

## M Track Mode.

The M Track Mode was a special treat for ambitious drivers with motor-sport aspirations. This function of Dynamic Stability Control (DSC) was specially tailored to driving on race tracks and had to be deliberately activated by the driver pressing a button on the steering wheel. The system only intervened when the car was being driven to the very limit. In this way, the M Track Mode allowed ambitious lay drivers to take corners safely at the physical limits.

## Innovative materials at the right point.

The intelligent lightweight construction of the M3 CSL exerted a particularly significant effect with the roof manufactured in carbon-fibre reinforced plastic (CRP) to create a striking visual profile. This large component was manufactured by specialists at the BMW plant in Landshut. Not only was it around six kilograms lighter than a conventional roof. Its exposed position also reduced the centre of gravity of the car. The BMW M engineers put virtually every component in the M3 through a weight test and integrated each component using the most suitable materials geared to saving weight. Even glass-fibre reinforced plastics from aerospace were used for the M3 CSL, for example the thermoplastic composite for the structure of the through-loading compartment and the rear bumper mount. Or the honeycomb sandwich panel for the under-boot floor - like the M3, the M3 CSL has an engine compartment lid made of aluminium while the rear

window is made of thin glass.

## 2004 and 2005: the M3 GTR dominates on the Nürburgring.

Eleven years after the first BMW M3 GTR drove to victory in Europe, the new-generation M3 GTR lined up on the starting grid in 2009. Two each of these racing cars fitted with eight-cylinder engines lined up on the starting grid for the 24 Hour Race in Spa-Francorchamps, Belgium, and on the Nürburgring. The result was a class victory in Belgium and twin one-two victories at the legendary racing track in the Eifel.

## Concept Car 2007: the new M3 says hello.

Seven years after sales started, the M3 had by no means become an old car, but in the fast-moving sports scene it was already getting on in years. BMW showed the way forward at the 77th Geneva Motor Show. The concept study presented to the public for the first time in spring 2007 gave an impression of what a future BMW M3 might look like on the road. The basic design of the BMW M3 Concept Car followed traditional lines and was based on the current BMW 3 Series Coupé. However, only a few components were transferred directly from the series model. They included the headlamps and taillights, and the two doors and the boot lid, as the only bodywork elements. The engine compartment lid made of aluminium again had the strikingly large power dome. Like the air vents positioned alongside, it provided an indication of the high potential to be expected from an engine under the bonnet of a BMW M3. Moreover, it heralded a premiere. The M3 Concept Car was powered by an eight-cylinder engine rather than a six-cylinder. Right from the start, it was an open secret that an engine of this nature was also planned for the subsequent series car.

## Premiere of the fourth generation in the BMW M3: eight-cylinder engine with 420 hp.

The fourth generation of the BMW M3 actually gave its debut a few months later and included everything promised by the concept car. Apart from a few components, the fast coupé was a completely redesigned vehicle. A newly designed eight-cylinder V-engine formed the impressive power unit to guarantee outstanding performance and uniquely dynamic sportiness. The new engine mobilised an output of 309 kW/420 hp from a displacement of 3,999 cubic centimetres and a maximum torque of 400 newton metres. Accordingly, the new BMW M3 was able to demonstrate breathtaking vehicle performance. It accelerated from a standing start to 100 km/h in just

4.8 seconds and achieved a top speed of 250 km/h - limited by the engine electronics.

The eight-cylinder engine owed its most striking feature to generation of the power-to-displacement ratio typical of the BMW M. The V8 only reached maximum revs at 8,400 rpm, and anyone using the accelerator pedal was able to experience the joy of the imposing thrust. By contrast, fuel consumption of the new high-performance V8 was almost modest with an average of 12.4 litres for each 100 kilometres.

Seine prägnanteste Charaktereigenschaft verdankte der Achtzylinder-Motor der Umsetzung des BMW M typischen Leistungsausbeute: Erst bei 8.400/min erreichte der V8 seine Höchstdrehzahl und wer bis dahin auf dem Gaspedal blieb, konnte sich imposanter Schubkraft erfreuen. Fast schon bescheiden nahm sich dagegen der Kraftstoffverbrauch des neuen Hochleistungs-V8 mit durchschnittlich 12,4 Liter je 100 Kilometer aus.

The favourable value was largely due to intelligent energy management. Brake Energy Regeneration further increased the efficiency of the power unit. Generation of electricity for the onboard network focused on the cruise and braking phases, while during the traction phases, the dynamo was generally uncoupled. Aside from particularly efficient power generation, this procedure also resulted in more tractive force being available for acceleration.

## **Lightweight chassis provides optimum implementation of superior engine performance.**

The chassis of the new BMW M3 was created on the basis of the wheel suspension of the BMW 3 Series Coupé, although virtually all the components were completely redesigned. Apart from harmonising with the significantly higher tractive forces, the overall objective was to significantly reduce weight. The front axle was designed as double-strut and virtually all its components were manufactured from aluminium. The five-link rear suspension also had a lightweight construction and was completely redesigned apart from one link. A weight-saving of some 2.5 kilograms was achieved here. Engineers at BMW M GmbH even succeeded in saving more weight in the high-performance braking system with compound discs. The new rear axle differential of the BMW M3 was equipped with the variable M differential lock, which could provide up to 100 percent locking power and therefore ensured optimum traction even in particularly demanding driving situations. The lightweight chassis was supplemented by the Servotronic steering, a high-performance braking system with all-round vented discs and electronically managed Dynamic Stability Control (DCS). The new BMW M3 also had an option of selecting the Electronic Damper Control (EDC).

Electronics permit harmonisation to individual driving style.

While the newly developed chassis of the BMW M3 provided ambitious drivers with an outstanding platform, the particularly sporty driver could use the electronic controls to match the coupé even more precisely to individual driving style. For example, the Dynamic Stability Control could be switched off immediately. The iDrive control concept could also be used to preselect the level of the Servotronic steering support. The optional Electronic Damper Control allowed the damper force to be adjusted and optimised when cornering, and during braking and acceleration, further enhancing the dynamic response. It had three programs that could be preselected at the touch of a button. Three injection control maps were available for engine management and they significantly modified the response of the eight-cylinder.

**Exclusive in the vehicle segment: carbon-fibre roof.**

The roof was the epitome of the advanced technology designed into the new BMW M3. This component of the bodywork was made of carbon-fibre reinforced plastic (CRP). The interesting aspect was that the fibre structure of the lightweight material remained visible - only a clear varnish coated the high-tech surface. Apart from the exclusive visual appearance, the main attribute of the CRP roof provided a definite technical advantage. It weighed significantly less than a steel roof. This not only reduced the total weight of the vehicle, but the weight-saving at the highest point of the bodywork also significantly reduced the vehicle's centre of gravity and hence optimised performance when cornering fast.

**Debut firework: saloon and convertible followed just months later.**

Within a period of eight months, BMW let off a veritable M3 firework. In autumn 2007, the five-seater saloon lined up on the starting grid alongside the four-seater coupé. Just in time for the open-air season in 2008, the M3 Convertible came along. This was only one year after the concept car had celebrated its world premiere at the Geneva Motor Show. The consequence was that BMW M GmbH achieved its second best result in the 30 years of the company's history in the business year 2008. The BMW M3 in particular provided the driving force for this positive development. In the first full year of production, almost 18,000 units of the BMW M3 had been sold worldwide. A vast array of awards and test wins provided customers with confirmation that they had bought the right car. Like its predecessor with six cylinders, the V8 installed in the M3 gained the prestigious accolade of "International Engine of the Year" a number of

times, and it was repeatedly voted the “Sportiest Saloon of the Year”.

## Available from 2008: M DCG with Drivelogic

BMW M GmbH presented the world’s first double clutch gearbox designed for high-speed power units with the M Double Clutch Gearbox with Drivelogic in 2008. It enabled gear shifts to be made without interruption of power and traction, and seven gears offered optimum gear increments for particularly dynamic acceleration. The new M Double Clutch Gearbox with Drivelogic was the fourth, consistently enhanced generation of the automated manual gearbox in M-specific configuration. It was supplied with the models BMW M3 Coupé, BMW M3 Saloon and BMW M3 Convertible.

## Comeback in triumph: the M3 is back on the race track.

In the meantime, the new M3 is also taking off in motor sport. BMW Motorsport Director Mario Theissen: „Sportiness is undoubtedly in the genes of the series model of the BMW M3. That’s what motivated us to develop a racing version of this car.” As a near-series M3 GT4, it assists private drivers in winning races, and as the M3 GT2 with the resilience for covering long distances it is used to compete as a works car. In May 2010, the new 500 hp long-distance athlete won the 24 Hour Marathon at the Nürburgring at its first attempt. M GmbH launched the M3 GTS at virtually the same time. The coupé is directed towards club sport and is powered by the V8 engine with increased displacement and enhanced power. It also has specific tuning of the 7-gear M DCG Drivelogic and modified chassis technology combined with strategic optimisations in aerodynamics and lightweight design. The eight-cylinder engine of the M3 GTS expanded to 4,361 cubic centimetres develops 331 kW/450 hp, and thanks to a weight-to-power ratio of only 3.4 kilograms for every 1 hp, it powers the coupé effortlessly. The BMW M3 GTS has a gearbox and chassis configuration optimised for the race track and accelerates from a standing start to 100 km/h in just 4.4 seconds. The 1,000 metre sprint is achieved from a standing start in just 22.5 seconds while the top speed is 305 km/h.

The data have changed. But the M3 idea remains the same after 25 years.