BMW Sauber F1 Team

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1. Team.

Fresh start.

From zero up to race speed in 262 days.
Munich. It was set in concrete as the day dawned on 22nd June 2005: BMW would for the first time be running its own team in the FIA Formula One World Championship, starting the very next season – 2006. On the afternoon of that same day in June, the Board of Management's decision was announced to the public at large. It was the starting signal for the race before the race: with just 262 days to go, the combined pulling power of a 600-strong team had to get things moving from standstill up to race speed.

On 12th March 2006 in Bahrain, the BMW Sauber F1 Team will launch its first season with the BMW Sauber F1.06, driven by Nick Heidfeld and Jacques Villeneuve.

As Professor Burkhard Göschel, BMW Board Member for Development and Purchasing, points out: "This project represents a strong, long-term commitment to Formula One on BMW's part. For the BMW Group, Formula One acts as a high-tech laboratory and technology accelerator. This synergistic effect has already had a very positive impact in our six years as an engine partner. But you can't win races with an engine alone, which is why we wanted to be involved in all the success factors. In keeping with that, we have now taken on overall responsibility. Formula One seems tailor-made for BMW's brand values, and there's no other sporting event that generates so much attention on such a regular basis worldwide. In 2006 we will primarily be building up experience. In 2005 Sauber came eighth in the Constructors' World Championship. That is our starting point, and I can see plenty of upside potential."

"To set up a new team is a huge challenge", says Professor Mario Theissen, who as BMW Motorsport Director oversees all of BMW's racing involvements. "Our concept includes boosting staff numbers, expanding the facility in Hinwil, an intensive development programme and the networking of all activities in Munich and Hinwil. The division of labour is as follows: Munich is in charge of the powertrain and electronics, Hinwil is responsible for the chassis and race

deployment. We will be recruiting more than 100 new staff in Switzerland. The key priorities will be to convert the wind tunnel from single to three-shift operation as well as setting up an autonomous test team. The Hinwil wind tunnel is outstandingly good. Overall, the factory is good but not yet big enough. The extension plans, which include new offices as well as development and production facilities, have been drawn up and we expect planning permission to come through in spring of 2006. All measures will be fully implemented by the end of 2007. The 2006 season will be a year of development. That also applies to the technical package, whose concept was already largely established in Munich and Hinwil before the takeover. In 2006 we aim to grow together and maximise our potential."

After 13 years as a team principal in Formula One, Peter Sauber has stepped back from the operational side of the business. Now 62, he will act as advisor to the new team. "I was delighted that Sauber is to remain part of the team name. I shall be keeping a close eye on the progress of the BMW Sauber F1 Team. I'm especially pleased for the staff in Hinwil, who will now have the opportunity to demonstrate their skills with the support of their colleagues from BMW."

Two adoptive Swiss in the cockpit.
They've long known each other, they've both raced for Sauber before, they both live in Switzerland – but they've never before been team-mates. Drivers Nick Heidfeld and Jacques Villeneuve can look back on a combined tally of 250 grands prix.

Heidfeld (28) made his Formula One debut at the start of the 2000 season and competed for the Swiss racing team from 2001 to 2003. His best results so far are the two second places he claimed for the BMW WilliamsF1 Team in the 2005 season. He also took a pole position in the same year. The man from Mönchengladbach, whose daughter – and first child – was born in July 2005, has 98 race starts under his belt.

"I'm really looking forward to the new season and the new team, many of whom I already know from years past", says Heidfeld. "Besides, I can get to Hinwil in 15 minutes by car, which is a real advantage. It's natural for a racing

driver to be impatient when it comes to achieving success, but we need to be realistic. For me the most important thing is that we're moving in the right direction. We have to work hard and make steady progress."

No other driver in Formula One has risen to World Champion status as rapidly as Jacques Villeneuve. In 1996, his debut year, the Canadian already finished as runner-up behind his then Williams-Renault team-mate Damon Hill. Then in 1997 he beat Michael Schumacher to the title for Williams-Renault. In 152 grands prix he has taken eleven victories and claimed pole 13 times.

After five years with the BAR team, it seemed his F1 career was over in 2003. But then he was given the chance to compete in the final three races of season 2004 for Renault. In 2005, the son of the famous Ferrari driver Gilles Villeneuve was signed up by Sauber.

"Building up a new team is a very complex task", says Villeneuve looking ahead to 2006. "I've already been through it in the past. But I think we've got a number of good prerequisites coming together here. I'll be doing my very best to help the BMW Sauber F1 Team achieve success."

New regulations.
The most radical technical changes for 2006 affect the engines: Formula One is switching from three-litre V10 engines to V8 units with 2.4 litres' displacement. The rules governing the new engines are far more tightly regulated and the scope for engineers has shrunk. The switch to the more compact V8 powerplants also brings with it noticeable modifications to the chassis. Among other changes, the cars will feature pared-down sidepods as the radiators can now be designed smaller than before.

Racing fans can again look forward to the spectacle of tyre changing in the pits, which has the go-ahead again as of 2006. The qualifying format is also new: for the 2006 World Championship, grid positions will be determined in a shootout. From 14.00 to 15.00 hrs on Saturday, the fast laps will be driven in three time sections, with the slowest drivers in the first two 15-minute periods taking no further part in qualifying, leaving the remaining drivers to compete for the best starting positions in the final session.

Warm up.

Tentative talks led to gentle bonds being forged. A decision began to ripen. Then in June, things started happening. By January, the new BMW Sauber F1 Team was ready to present itself.

January 2005	First concrete discussions between BMW and Sauber regarding engine supplies for 2006.
Spring 2005	Discussions become more involved. Both sides discover shared concepts and goals.
May 2005	The first-specification BMW P86 V8 engine is trialled on the test rig in Munich.
21st June 2005	Negotiations go on far into the night. The realignment of the BMW Formula One venture is signed and sealed.
22nd June 2005	At a press conference in Munich, BMW Board Member Professor Burkhard Göschel, BMW Motorsport Director Professor Mario Theissen and Peter Sauber announce that BMW has acquired a majority stake in the Sauber team. Credit Suisse extends its sponsorship by a further three years and signs up as an official partner of the BMW Sauber F1 Team from 2006.
13th July 2005	The BMW P86 engine embarks on its first track test in Jerez.
July 2005	Joint working groups are created and the first meetings held in Munich and Hinwil. The integration process begins.

September 2005	Workforce requirements are laid down and applicants are invited for more than 100 new jobs in Hinwil.
16th September 2005	BMW announces a three-year contract with Nick Heidfeld as a team driver.
End of September	The concept for the 2006 chassis is signed off.
13th October 2005	At the Chinese GP there are celebrations in honour of Peter Sauber. It is his 62nd birthday and he is withdrawing from his operational responsibilities at the end of the season to become a team advisor.
28th October 2005	Nick Heidfeld arrives in Hinwil for a seat fitting in the interim chassis.
14th November 2005	The team name is announced.
15th November 2005	The first BMW V8 engine for joint winter testing is delivered to Hinwil.
November 2005	The race car receives its new livery.
22nd November 2005	The BMW V8 is fired up in the interim chassis in Hinwil.
24th November 2005	The BMW Sauber F1 Team and Petronas agree to a four-year contract in Kuala Lumpur, making the Malaysian oil and gas company the team's main sponsor.
28th November 2005	Nick Heidfeld sets out on the first winter test in Barcelona in the Sauber C24B driven by the BMW P86 V8 engine.

30th November 2005	The first 2006 monocoque emerges from the autoclave.
1st December 2005	Jacques Villeneuve is confirmed as a team driver.
mid-December 2005	Nick Heidfeld and Jacques Villeneuve sit in the 2006 chassis for the first time for a seat fitting.
	BMW and Intel announce a comprehensive partnership. Intel becomes a new official partner of the BMW Sauber F1 Team.
27th December 2005	Construction of the first 2006 chassis is launched.
13th January 2006	The BMW V8 runs in the 2006 chassis for the first time at the Hinwil factory.
14th January 2006	The BMW Sauber F1.06 chassis heads for Valencia for the rollout of the new race car.
16th/17th January 2006	The BMW Sauber F1 Team presents itself to the public in Valencia. The BMW Sauber F1.06 embarks on its first outing.
End of February 2006	Planning application for the extension of the Hinwil facility is submitted.
1st March 2006	Around 30 tonnes of freight are loaded up in Hinwil and transported to the grand prix in Bahrain.
12th March 2006	The BMW Sauber F1 Team races in the Bahrain GP.

Who's who.

BMW Motorsport Director	Prof. Dr.-Ing. Mario Theissen
Driver number 16	Nick Heidfeld
Driver number 17	Jacques Villeneuve
Technical Director Chassis (Hinwil)	Willy Rampf
Technical Director Powertrain (Munich)	Heinz Paschen
Project Manager	Walter Riedl
Head of Aerodynamics	Seamus Mullarkey
Team Manager	Beat Zehnder
Chief Race Engineer	Mike Krack
Chief Mechanic Race Team	Urs Kuratle
Head of Sponsoring and Business Relations	Guido Stalmann
Head of BMW Motorsport Communication	Jörg Kottmeier

Pit stop in Munich.

At the Munich site, 300 employees from a wide range of departments are involved in BMW's Formula One venture.

Anton-Ditt-Bogen is the road where the pulse of the project beats. It is the home of BMW Motorsport. Here, in the north of Munich, is where the Formula One engines are developed, tested and built. The latest expansion phase saw state-of-the-art test rigs and laboratories introduced at the end of 2005. It also allows transmission development to be based in Munich.

Formula One component manufacturing occupies a building of its own, along with the attached quality control department. Thanks to the electronic systems also being developed and manufactured here, the entire powertrain is integrated in a single location.

The road in this industrial district is also home to numerous offices, including those of BMW Motorsport Director Mario Theissen and Heinz Paschen, the Technical Director responsible for the entire powertrain. The Sponsoring and Business Relations division is also based here, and the logistics department is run from the same site. Any motor racing fan would regard the materials warehouse as an Aladdin's cave – it houses the clothes depot with the gear worn by the F1 crew, as well as a wide range of exhibits.

Knorrstrasse in Munich is home to the BMW Forschungs- und Innovationszentrum (BMW Research and Innovation Centre), or FIZ for short. For the Formula One engineers it is just a few hundred yards to the FIZ specialists for face-to-face consultations on material analysis or rapid prototyping. Landshut, around an hour's drive northeast of Munich, is where the Formula One foundry is located, next-door to its series production counterpart.

BMW has been manufacturing high-performance engines since 1917. Today, the BMW Group embraces the BMW, MINI and Rolls-Royce brands. With the objective of becoming the most successful premium manufacturer in the motor industry, the company launched a product and market offensive with an unprecedented number of new models. BMW Group sales are set to

rise to 1.4 million by 2008 (2004: 1,208,700 cars sold). The BMW Group employs around 106,000 staff in some 50 countries worldwide. As the Board Member for Development and Purchasing, Prof. Dr. Burkhard Göschel is also responsible for the group's motor sport projects. BMW's Formula One history goes back to the year 1952. The greatest success to date came in 1983 when Nelson Piquet won the Drivers' World Championship in a Brabham BMW. Ahead of season 2006, BMW can look back on 200 starts, 19 grand prix wins and 32 pole positions.

Pit stop in Hinwil.

As of January 2006, the facility in the tranquil uplands around Zurich numbers around 300 employees. By the end of 2007, the workforce at Hinwil will swell to more than 400. To cope with the challenging development and testing programme, staff numbers in all departments will be ramped up, with the aerodynamics division receiving the biggest boost to allow for 24-hour operation of the wind tunnel in due course.

The Hinwil complex embraces three buildings. The main building in Wildbachstrasse 9 houses the management, chassis concept and construction, and the administration. Along with the quality control department, the system and vehicle engineers as well as the race and test team are also housed here. The four-storey office and factory complex covers more than 6,800 square metres and also accommodates carbon-fibre production, chassis assembly and storerooms.

Sauber had already moved into today's annexe in Wildbachstrasse 3b back in the era of the World Sports Car Championship. When the planned involvement in Formula One put space at a premium in these premises, the company relocated to the new block in 1992. Today this is the main building, while mechanical production remains at the former company headquarters.

The state-of-the-art wind tunnel right next to the main building went on stream in spring of 2004. The structure measures 65 metres long, 50 metres wide and 17 metres high and is particularly striking for its glass façade. Working here alongside the technicians who operate the wind tunnel are also the model designers and constructors, the CFD specialists and other employees in the aerodynamics department. "Albert", the 18-tonne supercomputer for CFD calculations and one of the most powerful machines in Formula One and the motoring industry as a whole, was put on the ground floor. An event area rounds off this technological and architectural tour de force.

2. Season.

Grand prix information.

As at December 2005.

GP 2006	Date	Start time local/GMT	Circuit length	Race distance	Winner 2005	Pole 2005	Lap record
1 Bahrain	12.03.	14.30 hrs/ 11.30 hrs	5.417 km	308.523 km 57 laps	F. Alonso Renault 1:29:18.531 hrs	F. Alonso Renault 3:01.902 min*	M. Schumacher (2004) Ferrari 1:30.252 min
2 Malaysia	19.03.	15.00 hrs/ 07.00 hrs	5.543 km	310.408 km 56 laps	F. Alonso Renault 1:31:33.736 hrs	F. Alonso Renault 3:07.672 min*	J.P. Montoya (2004) McLaren-Mercedes 1:34.223 min
3 Australia	02.04.	14.00 hrs/ 03.00 hrs	5.303 km	307.574 km 58 laps	G. Fisichella Renault 1:24:17.336 hrs	G. Fisichella Renault 3:01.460 min*	M. Schumacher (2004) Ferrari 1:24.125 min
4 San Marino	23.04.	14.00 hrs/ 12.00 hrs	4.933 km	305.609 km 62 laps	F. Alonso Renault 1:27:41.921 hrs	K. Räikkönen McLaren 2:42.880 min*	M. Schumacher (2004) Ferrari 1:20.411 min
5 Europe	07.05.	14.00 hrs/ 12.00 hrs	5.148 km	308.863 km 60 laps	F. Alonso Renault 1:31:46.648 hrs	N. Heidfeld BMW WilliamsF1 1:30.081 min	M. Schumacher (2004) Ferrari 1:29.468 min
6 Spain	14.05.	14.00 hrs/ 12.00 hrs	4.627 km	305.256 km 66 laps	K. Räikkönen McLaren 1:27:16.830 hrs	K. Räikkönen McLaren 2:31.421 min*	G. Fisichella (2005) Renault 1:15.641 min
7 Monaco	28.05.	14.00 hrs/ 12.00 hrs	3.340 km	260.520 km 78 laps	K. Räikkönen McLaren 1:45:15.556 hrs	K. Räikkönen McLaren 2:30.323 min*	M. Schumacher (2004) Ferrari 1:14.439 min
8 Great Britain	11.06.	13.00 hrs/ 12.00 hrs	5.141 km	308.355 km 60 laps	J.P. Montoya McLaren 1:24:29.588 hrs	F. Alonso Renault 1:19.905 min	M. Schumacher (2004) Ferrari 1:18.739 min
9 Canada	25.06.	13.00 hrs/ 17.00 hrs	4.361 km	305.270 km 70 laps	K. Räikkönen McLaren 1:32:09.290 hrs	J. Button BAR Honda 1:15.217 min	R. Barrichello (2004) Ferrari 1:13.622 min

* The grid lineup for the first six GPs of 2005 was based on the aggregate of two timed laps.

Grand prix information.

As at December 2005.

GP 2006	Date	Start time local/GMT	Circuit length	Race distance	Winner 2005	Pole 2005	Lap record
10 USA	02.07.	13.00 hrs/ 18.00 hrs	4.192 km	306.016 km 73 laps	M. Schumacher Ferrari 1:29:43.181 hrs	J. Trulli Toyota 1:10.625 min	R. Barrichello (2004) Ferrari 1:10.399 min
11 France	16.07.	14.00 hrs/ 12.00 hrs	4.411 km	308.586 km 70 laps	F. Alonso Renault 1:31:22.233 hrs	F. Alonso Renault 1:14.412 min	M. Schumacher (2004) Ferrari 1:15.377 min
12 Germany	30.07.	14.00 hrs/ 12.00 hrs	4.574 km	306.458 km 67 laps	F. Alonso Renault 1:26:28.599 hrs	K. Räikkönen McLaren 1:14.320 min	K. Räikkönen (2004) McLaren-Mercedes 1:13.780 min
13 Hungary	06.08.	14.00 hrs/ 12.00 hrs	4.381 km	306.663 km 70 laps	K. Räikkönen McLaren 1:37:25.552 hrs	M. Schumacher Ferrari 1:19.882 min	M. Schumacher (2004) Ferrari 1:19.071 min
14 Turkey	27.08.	15.00 hrs/ 12.00 hrs	5.340 km	309.720 km 58 laps	K. Räikkönen McLaren 1:24:34.454 hrs	K. Räikkönen McLaren 1:26.797 min	J.P. Montoya (2005) McLaren-Mercedes 1:24.770 min
15 Italy	10.09.	14.00 hrs/ 12.00 hrs	5.793 km	306.720 km 53 laps	J.P. Montoya McLaren 1:14:28.659 hrs	K. Räikkönen McLaren 1:20.878 min	R. Barrichello (2004) Ferrari 1:21.046 min
16 Belgium	17.09.	14.00 hrs/ 12.00 hrs	6.976 km	306.944 km 44 laps	K. Räikkönen McLaren 1:30:01.295 hrs	J.P. Montoya McLaren 1:46.391 min	K. Räikkönen (2004) McLaren-Mercedes 1:45.108 min
17 China	01.10.	14.00 hrs/ 06.00 hrs	5.451 km	305.066 km 56 laps	F. Alonso Renault 1:39:53.618 hrs	F. Alonso Renault 1:34.080 min	M. Schumacher (2004) Ferrari 1:32.238 min

Grand prix information.

As at December 2005.

GP 2006	Date	Start time local/GMT	Circuit length	Race distance	Winner 2005	Pole 2005	Lap record
18 Japan	08.10.	14.30 hrs/ 05.30 hrs	5.807 km	307.573 km 53 laps	K. Räikkönen McLaren 1:29:02.212 hrs	R. Schumacher Toyota 1:46.106 min	K. Räikkönen (2005) McLaren-Mercedes 1:31.540 min
19 Brazil	22.10.	14.00 hrs/ 17.00 hrs	4.309 km	305.909 km 71 laps	J.P. Montoya McLaren 1:29:20.574 hrs	F. Alonso Renault 1:11.988 min	J.P. Montoya (2004) McLaren-Mercedes 1:11.473 min

Looking ahead.

GP	Mario Theissen	Willy Rampf	Heinz Paschen
1 BHR	"Bahrain has proved to be a valuable addition to the F1 calendar since the first GP there in 2004. The circuit is the centrepiece of a state-of-the-art facility which also houses the BMW Performance Center, with its BMW Driver Training programme and Formula BMW Racing School. As a manufacturer of premium cars, BMW has much to gain from the arrival of Formula One in the region. In 2005 the BMW Group recorded an increase in sales of some 25 percent in Bahrain."	"This GP will be our first opportunity to see how we match up against our rivals and we'll find out whether we've done our homework. The sand means that we can expect a high level of tyre wear. This circuit demands maximum downforce and good traction is particularly important in the corner leading out of the start/finish straight. The extra width of the track encourages the drivers to overtake – and that goes down well with the fans."	"The race in Bahrain will be a baptism of fire for the BMW P86 engine. We also have to prepare for two particular sources of wear on the engine: heat and sand. Last year the air temperature was 42 degrees Celsius and we set the car up to draw in as much cool air as possible. More finely-meshed air filters, meanwhile, help to deal with the sand blown in on the desert wind. In 2005 the team suffered engine damage caused by excessive coolant temperatures."
2 MAL	"We are very much looking forward to Petronas' home race. Not many cities are so dominated by a single company as Kuala Lumpur, gazing up as it does at the Petronas Twin Towers. As part of its Asia strategy, the BMW Group has stepped up its activities in Malaysia in recent years. These include establishing a sales company, a parts sales centre and an IT facility."	"Sepang is a good mixture of slow corners demanding optimum grip and fast sections requiring maximum stability. Turns 9 and 11 are particularly tricky, the drivers having to brake into the corner under heavy lateral acceleration. As a result, you need to be very careful with car set-up and can expect to do a lot of work on the electronics. The asphalt is quite abrasive and temperatures are normally high, putting the tyres under extreme loads."	"The engines have to withstand extremely hot conditions in Sepang and fuel temperatures also rise to critical levels. All the teams will have additional or bigger air-cooling intakes in the sidepods, as well as apertures in the shape of slits, flues or exhaust vents. It's the task of the aerodynamics engineers and engine experts to find the right compromise."

Looking ahead.

GP	Mario Theissen	Willy Rampf	Heinz Paschen
3 AUS	"Melbourne will be rather different in 2006. It's not the first race of the season this year, having been pushed a month further back into the Australian autumn. The city always saves an exuberant welcome for Formula One and is sure to be oozing infectious enthusiasm again in 2006."	"On the Friday, the track is still pretty dirty and grip only improves after quite a few laps. Melbourne is also very hard on the brakes, which is why we prioritise braking stability. The layout of the circuit is very similar to Imola and that's where we'll have our final pre-season testing. The settings we use in Imola will get the nod again in Melbourne."	"As far as engine wear is concerned, the layout of the Albert Park circuit and the weather we're likely to get should make for well-balanced conditions. There aren't any real extremes which demand special preparations for the engine."
4 SMR	"Everybody looks forward to the start of the European season – with both people and materials having less distance to travel – and the working conditions in the paddock are better. When we get to Europe, the teams become home-owners, with the motorhomes set up for the first time in the year. We will have a new home this year and are looking forward to settling in. However, the F1 village will have to squeeze into one of the smallest paddock areas for the European curtain-raiser."	"Imola not only demands a lot of downforce, it also places huge pressures on the brakes. That's why we use maximum brake cooling and the optimum brake specification for this race. The kerb stones in Imola are fairly high and the drivers have to be able to drive straight over them to set a good lap time. This places considerable mechanical loads on the chassis and suspension. Plus, the large number of chicanes make overtaking tricky."	"As the cars run with considerable downforce at Imola, the engines have to work under heavy loads. There are also uphill sections which put the materials under even more pressure."
5 EUR	"The two Formula One races in Germany naturally hold a special significance for BMW. The brand has celebrated some glorious touring car victories on the Nürburgring – a shining example of how to keep a historic racing track intact while enhancing it with state-of-the-art circuit architecture."	"The cars tend to suffer from understeer at this circuit and that's the main thing we have to bear in mind with the car set-up. This under-steer can be evened out through aerodynamic balancing or mechanical modifications to the set-up. The track offers good levels of grip and rubber wear is not too extreme, which allows us to run a relatively soft compound."	"The full-throttle percentage and maximum speeds recorded at the Nürburgring are mid-way up the F1 scale. The engines are all affected by the altitude of the track, which is located a good 600 metres above sea level. For every one hundred metres above sea level, the thinning air sucks out around one percent of an engine's output."

Looking ahead.

GP	Mario Theissen	Willy Rampf	Heinz Paschen
6 ESP	“In years gone by, Spain has often failed to attract the fans. In 2005, however, the organisers announced a sell-out crowd. It’s fantastic the euphoria Fernando Alonso has triggered in his home country. Spain is a significant growth market for BMW and we are delighted that interest in F1 has taken off in this way.”	“Barcelona is a popular venue for testing and is therefore well known to all the teams. Here, the aerodynamic efficiency of the cars and the performance of the tyres come to the fore. The circuit used to be considered something of a tyre-wrecker, but the asphalt was re-laid at the end of 2004 and we were able to use a softer rubber last year. The circuit reacts strongly to temperature fluctuations, which is reflected in grip levels and consequently in the lap times as well. The teams therefore need to make constant adjustments.”	“The long straight rewards power, of course. Circuits like this one, which otherwise place only average loads on the car, will provide welcome relief in 2006. The problem is that variable intake trumpets – which were previously used to optimise torque development and engine driveability – are not permitted on the new V8 engines.”
7 MCO	“The eyes of the world are on Monaco for the GP. The race around the principality represents the jewel in Formula One’s crown, although the circuit has little in common with a modern race track. The glamour side of it is a matter of taste, but it’s all part of F1’s image.”	“In contrast to other tracks, speeds here are relatively low. Downforce therefore takes precedence over aerodynamic efficiency. Traction is also a key factor. As the course is re-opened to public traffic between each practice session, grip levels can fluctuate wildly – a nightmare when it comes to set-up. The car’s responses have to be extremely precise here, as the smallest error can bring your race to an end.”	“Raw power doesn’t get you very far on the tight and twisty Monte Carlo course. Instead, it is good engine driveability that makes the difference. The Loews hairpin was the only corner on the F1 calendar where the V10s fell below 5,000 rpm.”

Looking ahead.

GP	Mario Theissen	Willy Rampf	Heinz Paschen
8 GBR	"Silverstone has been the source of frequent discussions, but remains a classic GP circuit. Britain is the only market for the BMW Group which has production facilities for all three of the Group's brands. The MINI is built in Oxford, Rolls-Royce cars in Goodwood and BMW car engines in Hams Hall. Great Britain is the third-largest market for the BMW Group after the USA and Germany and tops the sales charts for the MINI."	"Silverstone is a high-speed circuit, where the drivers have to carry as much speed as possible out of the fast corners into the straights. The balance and stability of the car is determined chiefly by aerodynamic measures. The amount of braking energy generated here is not generally that great but the track surface is hard on tyres, so the teams tend to opt for a harder compound."	"At 58 percent, the full-throttle percentage at Silverstone is slightly above the average for the season and the engines are pushed hard down the three straights."
9 CAN	"Montreal is an extremely demanding track from a technical and driving point of view, and its unique location on the island in the St. Lawrence River – which has also hosted an Expo and the Olympic Games – gives it a special allure. The people here are certainly mad about Formula One. A lot of BMW fans come to watch the race and celebrate BMW M Night in the city centre, where a street is sealed off for the event."	"Montreal demands a moderate amount of downforce, but is harder on the brakes than any other circuit on the F1 calendar. Maximum brake cooling and the use of high-performance brake materials are essential. Through the back section, the drivers skirt right along the concrete wall. This means a well-balanced car is vital in order to create the necessary trust between man and machine."	"The Circuit Gilles Villeneuve is a high-speed track, recording the third-highest top speeds on the calendar. Only in Monza and Indianapolis do the cars travel faster. The long straights push the P86 engine to the limit. Its idyllic location on the tree-covered island also has a negative side, with the car radiator easily becoming blocked by foliage."

Looking ahead.

GP	Mario Theissen	Willy Rampf	Heinz Paschen
10 USA	"We are sincerely hoping that the American motor sport fans can forgive Formula One for the disappointment of 2005. The events in Indianapolis have made us all the more determined to offer them top-class racing in 2006. Assessed by sales volume, the USA is the most important market for the BMW Group, and the company's largest production facilities outside Germany are also to be found here."	"Its high-banked corner makes Indianapolis a unique circuit in Formula One. The mixture of a tight infield and the full-throttle section through the oval curve and along the start/finish straight means we have to strike a compromise in the car set-up. On the one hand you need good braking stability and traction over the slower sections, but you also have to ensure low drag and high top speeds for the long straight. Turn 1 of the oval is taken flat out, and as such is not really a corner in the F1 definition of the word. Indeed, it would be more accurately described as the longest straight in Formula One."	"Indianapolis puts the BMW P86 engine under maximum mechanical loads. The drivers run at full throttle for a full 20 seconds through the oval section, with the engines under particular stress over the second half of the straight. Here the cars are at the limit of their performance for ten seconds at the end of the straight. For me Indianapolis is always something rather special. Nowhere else do you hear the engines running under maximum loads and at maximum revs for so long."
11 FRA	"In some respects, Magny-Cours is the opposite of Monte Carlo. Glamour is conspicuous by its absence in this serene but rather inaccessible corner of central France. This leaves you to focus on the racing and the technical challenge presented by the circuit. It was here in 2001 that we took our first pole position since returning to Formula One."	"From a technical point of view, this race track offers a fascinating mix of slow corners – like the Adelaide hairpin and the right-left combination before the start/finish line – and the fast S-shaped sector mid-way through the lap. The slower sections put the emphasis on traction and here the rear tyres in particular are under heavy loads. Indeed, tyre wear plays an important role in deciding the best race strategy."	"The full-throttle percentage, top speeds and long straight are central elements in the Circuit de Nevers. However, heat has also frequently been a factor in previous years. Increased thermal loads clearly place significant demands on the durability of the engine."

Looking ahead.

GP	Mario Theissen	Willy Rampf	Heinz Paschen
12 GER	"The German Grand Prix is one of the highlights of the season for BMW. That's especially true for the fans, who create an extraordinary atmosphere inside the Motodrom stadium section. However, from a sporting point of view our home grand prix is essentially just another race for the team and drivers and we set out to do the best we can."	"The smooth track surface means that tyre wear isn't a serious issue here. The best overtaking opportunity is at the hairpin after the Parabolika, although the high speeds carried into the corner demand outstanding braking performance and stability. Plus, the car requires good grip levels on the exit from the turn."	"As an engine man, I still mourn the loss of Hockenheim's long run through the forest, which was still a feature of the track up to 2001. However, the loads on the engine remain in the top third of F1 tracks and high temperatures are bound to be a factor in late July."
13 HUN	"The German/Hungarian GPs make up the fourth of six back-to-back race weekends in 2006. And that places huge stresses on the teams and cars. Many team members don't manage to get home at all in between races. Setting up and clearing away, preparing the cars and transportation all take place under considerable time pressure and there are no opportunities for testing. Hungary is currently the BMW Group's fastest-growing market. Sales almost doubled between 2004 and 2005."	"Like Monaco, the twisty Hungaroring requires maximum downforce, and overtaking opportunities are few and far between. And no sooner is the sand cleared from the track one day than it is back again the next. Grip is consequently in short supply, with understeer never far away. However, the teams normally run softer tyre compounds. As far as the car set-up is concerned, you have to pay particular attention to the second sector with its variety of corner combinations."	"The Hungaroring has the lowest full-throttle percentage of any circuit on the calendar bar Monaco. Instead, it is the heat which pushes the engines to their limits in Budapest. The circuit is set in a deep bowl, which really traps the heat when the midsummer temperatures start to soar, as they often do. With the absence of straights on the circuit, a lack of cooling air can also be a problem."
14 TUR	"The Turkish Grand Prix earned its place on the F1 calendar with its debut in 2005. The set-up and track design here are outstanding. Formula One has been welcomed with open arms in this melting pot of cultures, where tradition and the modern world come together. This grand prix follows a short breathing space in the schedule, during which testing is not permitted."	"In 2005 we were expecting high temperatures, but the heat never really materialised. The layout of this new circuit caught the imagination of the whole F1 community, and the drivers especially were full of praise. Consisting of four distinct sections following one after the other, turn 8 presents a particularly stern challenge. The ideal line is far from clear and several drivers got into difficulty there in qualifying last year."	"The track layout challenges the drivers to catch the acceleration point spot-on on the exit from the corners so as not to sacrifice any engine power. Added to which, high air temperatures here could, of course, become an issue for the engines."

Looking ahead.

GP	Mario Theissen	Willy Rampf	Heinz Paschen
15 ITA	"The Italian Grand Prix in Monza is the nearest the Hinwil-based team have to a home race. Just a three-hour journey away, the race has traditionally attracted hordes of Sauber fans and we're looking forward to seeing them there again. The circuit in the Royal Park is the king of all high-speed tracks and inspires great respect from everybody involved. In 2002 we became the first engine manufacturer to break through the 19,000-rpm barrier there."	"To set a good lap time in Monza you have to be quick along the straights. Low drag and therefore low downforce are the key. The drivers brake heavily coming into the chicanes, which places immense loads on the materials. However, to be quick through the chicanes, the car also has to be able to run smoothly over the kerbs and generate good grip. And that represents a serious challenge for the engineers, given the low downforce necessary. A special aero package – not used at any other circuit – is pressed into action at Monza."	"There's no question, Monza is the hardest circuit of the lot on engines. At 67 percent (with the V10), the Italian track has the highest full-throttle percentage of any F1 circuit and nowhere else do top speeds reach these heights. The longest flat-out section measures 1,268 metres, the third-longest after Spa and Indianapolis."
16 BEL	"Today, Spa-Francorchamps is the only remaining Formula One circuit which can justifiably be called a 'natural race track'. Firstly, the track follows the contours of the landscape rather than vice-versa. Secondly, unpredictable weather conditions are an ingrained part of the Ardennes' austere character. Waterproofs and warm clothes are the order of the day."	"The extreme contrasts of the track layout hit you right from the start of the lap. After the slow La Source hairpin comes Eau Rouge, which the drivers take flat out. Here, the drivers have to cope not only with lateral loads, but also compression forces as the car bottoms out. This wide variety of corners means that the engineers have to make sure the chassis is well balanced in the interests of car stability. Added to which, the high speeds through several of the corners, such as Blanchimont, exert heavy loads on the tyres."	"If the drivers keep their foot on the gas all the way through the legendary Eau Rouge compression at Spa-Francorchamps, they will enjoy – at 1,821 metres – a slightly longer full-throttle period than even at Indianapolis, making it the longest on the F1 calendar. Plus, the changes in elevation at Spa place heavy demands on the engines. The start of the race is always particularly exciting, as the track rises up and then suddenly pitches the drivers into the first-gear La Source hairpin."

Looking ahead.

GP	Mario Theissen	Willy Rampf	Heinz Paschen
17 CHN	"The dimensions of the Shanghai circuit complex were still extremely impressive on our second visit to the track last year. Giving China a round of the World Championship in 2004 opened the door to amazing opportunities for all the companies associated with Formula One. The Chinese market has enormous growth potential for the BMW Group as well, with the company registering a 30-percent increase in business in 2005. BMW has its own production facilities in China, building 3 Series and 5 Series models there."	"Like Suzuka, this circuit demands high downforce and the same kind of compromise in ensuring speed both through the corners and on the straights. The generous track width is great for overtaking, provided the car set-up has been well thought through. The asphalt surface is fairly abrasive, which leads to tyre graining and adversely affects the balance of the car."	"The Shanghai circuit is fairly middle-of-the-road compared to the other Formula One venues on the 2006 calendar when it comes to full-throttle percentage and top speeds."
18 JPN	"It is for good reason that many drivers name Suzuka as their favourite track. An exacting challenge, this is the only current F1 circuit with a figure-8 layout and the amusement park adds extra charm. The Japanese Formula One fans are fantastic and Japan is an important market for the BMW Group. In 1981 the company became the first European carmaker to establish a subsidiary there and today it is the market leader in the premium segment."	"A well-balanced car is a must here. The Esses at the start of the lap are particularly critical. The car has to be able to change direction here quickly and with great accuracy, and any handling problems will cost time. Suzuka's numerous corners take a heavy toll on the tyres and that can take the edge off your race pace. Indeed, the concentration of corners is one of the highest anywhere. The small run-off areas are another characteristic feature of the track and mean small driver errors can take you out of the race."	"Suzuka is another of the power circuits in the final quarter of the season. The ultra-fast 130R corner places particularly heavy loads on the engine's oil circuit. We measured lateral acceleration of up to 6g with the V10 engine – and that makes it difficult to keep the oil flowing."

Looking ahead.

GP	Mario Theissen	Willy Rampf	Heinz Paschen
19 BRA	“For an exciting final race you need the World Championship to still be up for grabs. The demanding nature of the track and frequently adverse weather conditions in Sao Paulo create all the conditions for a gripping grand prix.”	“Like Imola and Istanbul, Interlagos is an anti-clockwise track. And that exerts even more pressure on the drivers’ neck muscles. Interlagos is know as something of a mogul field, which makes it vital that the car’s spring and damper settings are tweaked to provide an optimum set-up. The rough asphalt means tyre wear invariably becomes an issue. The strong likelihood of rain often requires a compromise set-up which covers the possibility of both dry and wet track conditions.”	“The engines are really put through their paces at Interlagos by the start/finish straight, which is not only long but also rising. This incline also serves to make the start particularly exciting. The altitude of the circuit and the thinner air which this entails deprives the car of some eight percent of its output, an even more extreme loss of power than at the Nürburgring and one that afflicts all the engines in equal measure.”

Regulations.

The only constant factor is change.
It's back to the drawing board once again for spectators, drivers and strategists alike in 2006, with the introduction of a series of new technical and sporting regulations.

– Smaller engines: from 2006, the Formula One cars will line up with 2.4-litre V8 engines. Alternatively, derated 3.0-litre V10 engines from 2005 may also be used.

– More tyres: different types of tyre are permitted for dry and wet or damp track conditions, as well as for extreme weather. Over the course of the race weekend, each driver is permitted a maximum of seven sets of dry-weather tyres with no more than two specifications. However, all tyres used in qualifying and the race itself have to be of the same specification. During the race, tyres (of the same specification) may be changed as often as desired. In addition, each driver may have a maximum of four sets of wet-weather tyres and three sets of extreme-weather tyres. Only one specification is permitted of both these types of tyre. This specification must meet the precise stipulations governing contact area when new.

– Knockout qualifying: the single-lap qualifying system of 2005 has been axed. In 2006 the track is free for all cars between 14.00 and 14.15 hrs. The slowest five then drop out and fill the final five grid positions in order of lap time. After part 2 of qualifying between 14.20 and 14.35 hrs, the five slowest drivers again drop out and fill grid positions eleven to 15. If there are 22 or 24 cars at the start of qualifying, the slowest six drivers in each of the first two qualifying sessions drop out.

– Qualifying for the top ten drivers lasts for 20 minutes and lap times set so far are erased. The remaining drivers must begin the final 20-minute session with the same fuel load with which they plan to start the race. Whatever fuel they use in the 20 minutes may be replaced at the end of the session. During the first 40 minutes of qualifying, on the other hand, the cars may be refuelled as often as desired. Drivers finishing outside the top ten in qualifying (or the top twelve if there are 24 qualifiers) may also refuel between qualifying and the race.

(As at December 2005)

3. Technology.

Chassis.

The BMW Sauber F1.06 takes to the stage.
Although the most important change to the regulations for the 2006 season concerns the engines – down from ten cylinders to eight and 3-litre displacement to 2.4 litres – there are also far-reaching consequences for the chassis construction. The V8 power units are shorter, use less petrol and require a smaller radiator surface, which has a significant effect on the car's design.

The minimum chassis dimensions stipulated by the FIA ensure that the cars' overall dimensions will remain almost unchanged. "The more compact engine gives the designers more freedom in the design of the overall car", explains Willy Rampf, Technical Director at the BMW Sauber F1 Team. The reduced tank capacity of the BMW Sauber F1.06 influenced both the design of the monocoque and the position of the engine. Added to which, the shorter engine allowed the engineers to extend the length of the 7-speed transmission's titanium casing. This, in turn, encouraged the construction of a particularly svelte rear end.

Aerodynamics in the spotlight.
Although knowledge gained from the development of the Sauber C24 has not surprisingly found its way into the new car, the BMW Sauber F1.06 is every inch a new design. The engineers focused in particular on aerodynamics, widening their objectives beyond just optimum downforce to enhancing efficiency as well. The construction, arrangement and design of all the car's sub-assemblies and components were based around these criteria.

The front section of the new car has been given some striking new features. The chassis has been lowered considerably at the front, with the effect that the lower wishbones are no longer attached below the monocoque but to the side of the chassis. The nose of the car has also been lowered further to the ground, with its underside curving upwards slightly. Naturally, the front wing has been modified in line with the other changes through a host of optimisation measures. All of these measures help to optimise the air flow around the aerodynamically critical underbody.

The reduced cooling requirement of the V8 engine allows not only the use of more compact radiators, but also smaller apertures in the sidepods. This also benefits the car's aerodynamics. The same applies to the rollover bar with integral air intake, which has been reduced in size due to the engine's lower air throughput. Plus, complex finite-element calculations made it possible to significantly reduce the weight of the rollover bar, while at the same time meeting the stringent safety stipulations.

The shorter engine has allowed the rear end of the BMW Sauber F1.06 to become even leaner and more harmonious, ensuring optimum air flow over the rear wing. The exhaust tailpipes have been moved further back from their location on the C24. The engineers used computational fluid dynamics (CFD) to position them in such a way that the hot exhaust gases are channelled around structural components such as the rear suspension and rear wing in the most efficient way possible.

The development of the rear wing will be a significantly higher priority during the coming season. "Last year we started most races with maximum downforce", explains Rampf. "The high output of the 3-litre engines meant that drag did not play a dominant role at many circuits." That has now changed fundamentally. The 20-percent reduction in engine displacement means the team will be looking at making compromises at many more circuits when it comes to downforce and drag. Whereas in 2005 the team used three basic rear wings for high, medium and low downforce, this year there will be a greater number of variants. "If we're also looking to achieve the top speed which we've calculated as a target, there will only be a few tracks where we can still run with maximum downforce", says Rampf. And that means aerodynamic development work will focus far more closely than in the past on the development of finely graded rear wing variants.

New design for the suspension.
A totally new feature of the BMW Sauber F1.06 is the design of the front and rear suspension. On the front axle, the layout is influenced significantly by the higher attachment points of the lower wishbones, which reflect the focus on aerodynamics. The rear axle is also a new construction. Here, modified

kinematics aimed at responding better to the Michelin tyres were at the centre of the engineers' considerations. As Rampf confirms, "The new rear suspension geometry will allow us to exploit the potential of the Michelin tyres much more effectively."

Lowering the front section also allows the assembly position of the pedals and inboard front-axle components to drop by a similar degree, as well as ensuring a lower position for the driver's legs. All these factors help to bring down the car's centre of gravity.

"Our declared aim in the medium term is to close the gap on the leading teams. The BMW Sauber F1.06 represents our first step in that direction", says Rampf of the team's objectives.

BMW Sauber F1.06 – technical data.

Chassis:	carbon-fibre monocoque	
Suspension:	upper and lower wishbones (front and rear), inboard springs and dampers, actuated by pushrods (Sachs Race Engineering)	
Brakes:	six-piston callipers (Brembo), carbon pads and discs (Brembo, Carbone Industrie)	
Transmission:	longitudinally mounted 7-speed transmission, carbon-fibre clutch (AP)	
Chassis electronics:	Magneti Marelli	
Steering wheel:	BMW Sauber F1 Team	
Tyres:	Michelin	
Wheels:	OZ	
Dimensions:	length	4,610 mm
	width	1,800 mm
	height	1,000 mm
	track width, front	1,470 mm
	track width, rear	1,410 mm
	wheelbase	3,110 mm
Weight:	600 kg (incl. driver, ready to drive, tank empty)	

The wind tunnel: high-tech tool and marketing instrument.
"Aerodynamics account for around two thirds of a modern Formula One car's performance", says Willy Rampf. It is therefore important to give this area the priority it deserves. In its drive to shave off those extra tenths of a second, the BMW Sauber F1 Team can rely on the services of one of Formula One's most advanced wind tunnels. This facility represents the state of the art in terms of the wind speed it can generate, the size of the test section and models, the dimensions of its rolling road, the model motion system and its data collection capability.

The wind tunnel has a closed-circuit design, a total length of 141 metres and a maximum tube diameter of 9.4 metres. The total weight of the steel elements, including the fan housing, stands at 480 tonnes. The single-stage axial fan with carbon rotor blades, including the motor and housing, weighs in at 66 tonnes. When operating under full load, the main fan uses 3,000 kW of power, enabling wind speeds of up to 300 km/h. In order to eliminate the transmission of vibrations to the building, the axial fan is mounted on vibration dampers fixed to a solid concrete base.

The core element of any wind tunnel is the test section, where the models are exposed to air flow. The extremely generous cross-section and length of the rolling road create optimum conditions for achieving precise results. The tests are carried out with 60-percent models.

The entire rolling road platform can be rotated in order to simulate not only frontal but also side-slip conditions at an angle of up to ten degrees. It is fitted with a steel belt which simulates the relative motion between the vehicle and the road. The moving steel belt reaches the same velocity as the air stream, i.e. up to 300 km/h. Located underneath the moving belt are load cells, which are used to measure wheel lift during the tests.

As a rule, wind tunnels are not the easiest buildings on the eye when viewed from the outside. Things are rather different at Hinwil, through, where the designers also focused on enhancing the exterior qualities of the facility. The building leaves quite an impression, and not just in terms of its dimensions

(length 65 m, width 50 m, height 17 m). Indeed, the glass-clad façades ensure that the facility wears its unique character – as a combination of industrial installation and event venue – proudly on its sleeve.

From the outside, the building appears to be one homogeneous hall, but it actually consists of two clearly detached elements: the wind tunnel itself and a multistorey wing with working areas and an event platform. The two sections are separated by a glass wall, preserving the optical connection yet forming an effective barrier against the noise from the wind tunnel.

In the interests of achieving a strong visual impact, the central axis of the wind tunnel tube is positioned more than eight metres above ground. With the exception of the test section, which is embedded in a concrete construction, the steel elements of the circuit appear to be “floating” inside the hall.

The second part of the building, with a total of four storeys, is also designed to offer ample space. The first-floor gallery, which accommodates 150 people, provides a very special setting for marketing and customer relations events and seminars.

Located on the floors immediately above are the working areas for the aerodynamic experts, model designers, model builders, CFD specialists and other members of the aerodynamics team.

In terms of its overall concept, this wind tunnel is truly unique.

“Albert” is very calculating.

Computational fluid dynamics (CFD) offers apparently limitless options when it comes to the calculation process in the development of aerodynamics components. However, it does require extremely large computer-based capacity. To this end, the BMW Sauber F1 Team can count on one of the most powerful supercomputers not only in Formula One, but in the automotive industry as a whole. “Albert”, as the system has been christened, was built using a total of 530 64-bit processors by Swiss firm DALCO. The software is supplied by Fluent.

CFD helps to calculate the design of aerodynamic components and is an important complement to wind tunnel work. “Aerodynamics has been gaining steadily in importance over recent years. And this means that computational fluid dynamics has also become increasingly important”, explains Willy Rampf.

Altogether, the new Sauber supercomputer comprises 530 processors in a cluster architecture with dual nodes. The processors are installed in high-density cooling enclosures supplied by American Power Conversion (APC). These enclosures are self-contained, closed-loop water circuits that provide up to 15 kW of cooling power per enclosure. The supercomputer comprises a total of ten enclosures, each one metre wide, a 1.20 metres deep and 2.30 metres high, resulting in a total width of ten metres and a weight of 18 tonnes.

The technical data is as impressive as the “hard facts”: the supercomputer boasts peak performance of 2.3 Tflop/s and is equipped with 1 TB RAM and 11 TB of hard-drive storage

To illustrate the point for non-computer experts, this means that “Albert” is capable of performing 2,332,000,000,000 computing operations per second. To achieve the same computing performance, the entire population of the city of Zurich (350,000) would have to multiply two eight-digit figures every four seconds for a whole year. The machine has over 1,085,440 megabytes of physical memory and over 10,880 gigabytes of hard-drive storage

The virtually unlimited technical possibilities of the Sauber supercomputer are used for analysis in the field of aerodynamics. CFD is used in the computer-aided calculation of aerodynamic components for the Formula One race car. This involves the use of numerical grid models that are made up of a maximum of 100 million cells. Thanks to the new supercomputer, it will be possible to further refine these models, thus improving the quality of the results significantly. The extremely short calculation times possible with “Albert” allow a large number of different variants to be evaluated. In addition, complex driving situations can be simulated. CFD plays an important role in the development of front, rear and auxiliary wings as well as in engine and brake cooling.

Computational fluid dynamics is intended to complement, rather than replace, the work in the wind tunnel. Indeed, CFD and experimental work in the wind tunnel are closely interlinked and thus generate valuable synergies benefiting both sides.

In the development of a new front wing, up to 100 variants are evaluated in two-dimensional form before roughly half a dozen of them are analysed in 3D. The most promising versions are subsequently built for the 60-percent model and tested. CFD thus enables the wind tunnel to be used particularly efficiently.

Engine.

The BMW P86.
Revolution, not evolution: the Formula One World Championship will not just be welcoming new engines to the fray in 2006, but a whole new generation of engines. Thanks to a change on the regulations, the new V8 units with 2.4-litre displacement replace the 3.0-litre V10 powerplants which ruled the roost last year. Heinz Paschen, the Munich-based Technical Director responsible for the entire powertrain of the new F1 car, gives us a glimpse of what to expect: “The new V8 engines are shorter and, with displacement reduced by 600 cc, have lower output and fuel consumption. However, they are no lighter, cheaper or less complex than their ten-cylinder predecessors.”

An all-new concept.
Although the V8 with the now compulsory cylinder angle of 90 degrees may look like a sawn-off V10, technically it is an entirely separate concept with its own specific characteristics. The V8 has a distinct firing sequence and requires a fundamentally different crankshaft design. Whereas a 72-degree offset crankshaft was used in BMW’s V10 Formula One engine, V8 powerplants can feature crankshafts with either four throws spaced at 90 degrees or four throws spaced at 180 degrees. Standard production cars are fitted with 90-degree crankshaft variants due to their better dynamic attributes, but a 180-degree crankshaft is favoured in racing-car engine design. The improved performance this allows offsets the disadvantages in terms of dynamics.

As a rule, we can expect the new V8 engines to have around 20 percent less power than their V10 predecessors and 20-percent smaller radiators – both reduced in proportion to the lower displacement.

Two cylinders are fired.
In addition to the inherent differences in the design of a V8 engine, numerous other specification details contained in the new regulations have sent the engineers back to the drawing board.

Lightweight construction principles have taken centre stage. The new V8 has to be heavier than its predecessor, even through the 2005 engine had two extra cylinders. This season's powerplants must tip the scales at no less than 95 kilograms. This should include the intake system up to and including the air filter, fuel rail and injectors, ignition coils, sensors and wiring, alternator, coolant pumps and oil pumps. It does not include liquids, exhaust manifolds, heat protection shields, oil tanks, accumulators, heat exchangers and hydraulic pump.

Added to which, the new regulations stipulate that the engine's centre of gravity must be at least 165 millimetres above the lower edge of the oil sump. The experts had previously managed to lower the ten-cylinder engine's centre of gravity to the benefit of the car's handling. However, the longitudinal and lateral position of the V8's centre of gravity has to be in the geometric centre of the engine (+/–50 millimetres). For the technical commission, checking that everything is in order no longer consists of a simple weighing process. Now, making sure that the rules have been observed involves weighing on two levels and making calculations according to the lever principle.

Previously a closely guarded secret, the dimensions of the cylinder bore are now limited to a maximum 98 millimetres. The gap between the cylinders is also set out in the rulebook – at 106.5 millimetres (+/– 0.2 mm). The central axis of the crankshaft must not lie any less than 58 millimetres above the reference plane.

Farewell to variable intake systems.

Another critical change in the regulations is the ban on variable intake systems. Known as "trumpets", these systems could previously be used to optimise the car's torque curve. The fixed duct lengths will now make achieving good engine driveability a more exacting challenge. "The teams will have to devote a lot more time and effort to this area", confirms Paschen. "We have to strike a compromise between maximum power and good driveability." Where the best compromise for the pipe lengths is to be found depends on various factors. The track layout and the weather, for example, both play a role. The teams will favour one set of intake pipe lengths for circuits with long straights – like Monza, Indianapolis and Spa – where power is critical, and a different selection for twistier grand prix tracks such as Budapest and Monaco,

where driveability relegates raw power to the back seat. The same applies to different weather conditions. Joining variable intake systems on the black list are variable exhaust systems and variable valve control systems.

The power supply to the engine electrics and electronics is limited to a maximum 17 volts and the fuel pump now has to be mechanically operated. Only an actuator may now be used to activate the throttle valve system. With the exception of the electric auxiliary pumps in the petrol tank, all sub-components must now be driven mechanically and directly via the engine.

“Sensibly, a long list of exotic materials have been excluded”, says Paschen in reference to another chapter of the regulations. “Now we are all working with the conventional titanium and aluminium alloys stipulated in the regulations.”

That means there are now fewer differences in the technical make-up of the various manufacturers’ engines. However, this does not mean that the challenge for the engineers has been in any way diluted. As Paschen explains: “It’s all about who can find the best solution within the framework of the new rules in terms of thermodynamics and mechanical dynamics.”

Indeed, mechanical dynamics and vibrations represent a particularly critical area of development for the new generation of Formula One engines. The V8 units have different firing sequences and intervals from their V10 predecessors, which leads to a totally different situation in terms of vibrations. The V10 entered a critical area between 12,000 rpm and 14,000 rpm. However, this was not an issue as the engine did not spend much time in this rev band and smoothed itself out again once the driver stepped up the revs. And, since the upper rev band was where it spent the majority of its time, vibrations were not a worry. A V8, on the other hand, is not so well off. Its vibration curve enters critical territory later than the V10 – from approximately 16,000 rpm – and continues to climb from there.

It’s therefore no longer possible to think in terms of getting through a difficult patch and everything will be all right. Now, the problem of constantly increasing vibrations has to be confronted head on. “If you don’t get a handle on vibrations”, says Paschen, “they will eat into the service life of the engine and multiply the loads exerted on chassis components. In order to get on top

of this problem, the calculation and analysis of each individual engine component has to be totally reliable. However, analysis of the individual components is only part of a larger challenge. Determining how they work with and against each other in simulations of the overall system is the main task."

Regarding the costs involved in the changeover from V10 to V8, Paschen pulls no punches: "The manufacturers had a deep well of experience with the V10 concept and that helped to keep development costs down. The expense involved in developing a whole new unit, though, is huge. At least in the initial development phase for the V8, a relatively small reduction in cylinders has meant a relatively large hike in costs."

Development work from November 2004 to March 2006.
Development work on the BMW P86 V8 began in late November 2004. "In an ideal world, you would have 18 months to develop an engine", says Paschen. "However, as it only became clear at a relatively late stage that V8 engines would be stipulated in 2006, we have had to make do with 15 months up to the first race." The teams also found themselves faced with a key rule change at short notice last year. In July 2004 it was announced that the engines for 2005 had to last through two GP weekends. Plans to introduce the BMW P85 in 2005 were shelved as a result and the P84/5 was drafted in to take its place. The designation P86 restores the natural order of the naming tradition.

The champagne was flowing at BMW's Formula One engine factory at Anton-Ditt-Bogen in Munich in May 2005 after the first-specification P86 successfully completed its opening examination on the test rig. An updated specification made its track debut in Jerez on 13th July 2005, when Antonio Pizzonia climbed in behind the wheel of a Williams chassis modified to accommodate the new engine. A further developed version was fitted in the interim Sauber chassis which began winter testing in Barcelona on 28th November 2005.

The BMW P86 changed again ahead of the first rollout for the new car on 17th January 2006. As Paschen explains: "The development of an engine is an ongoing process which runs throughout the season. Indeed, we continue to work on further optimisation measures right up until the latest-specification

unit is loaded onto the plane for the final overseas races of the season. By this time, the process has already long been taking place in parallel with the development of the engine for the following season."

Under the microscope.
Before a new specification reaches race readiness, it has to successfully complete an extended session on the dynamic test rigs. BMW first introduced the new-generation engine to these testing facilities, which stretch out over several floors and fill entire halls, in autumn 2005. The exacting challenge for the new powerplant remains unchanged: 1,500 kilometres on a pre-programmed circuit profile based on Monza. No other GP venue can match the full-throttle percentage of the Italian track.

Engines earmarked for transportation to the race venue complete a rather more gentle functioning check on the test rigs. This is followed by quality checks, with the oil undergoing spectrometer analysis to identify any metallic residue. Then it's time for action on the track.

Endurance stamina and sprinting prowess.
From the outset, the new V8 engine has to display the same durability shown by its tried-and-tested predecessor in 2005, with two full race weekends to be negotiated. The current regulations require the engines to cover up to 1,500 kilometres – four times the distance their 2002 forebears had to contemplate.

"People like to refer to the limit of what is technically feasible, but to me there is no such set limit", affirms BMW Motorsport Director Mario Theissen. "Each new innovation pushes back the boundaries a little further." It is an assertion borne out impressively by the development of the peak engine speeds achieved by BMW's F1 powerplants over the years. The final evolution of the P82 engine used by BMW in 2002 reached 19,050 revs per minute. From 2003 the demands placed on the engines multiplied and the teams had to coax one powerplant through both qualifying and the race itself – a total of some 400 kilometres. It was almost like forcing a marathon runner to sprint one lap of the track just before the start of his race.

BMW belied the apparent limitations imposed by the punishing new directive by further boosting revs and output in their 2003 engine. The BMW P83 recorded an impressive 19,200 rpm at the season-ending Japanese Grand Prix, developing well in excess of 900 bhp in the process and providing a model of reliability. The team's only engine failure during the season – in the Austrian Grand Prix – was caused by a leak in the water cooler.

The one-engine-per-weekend rule was introduced in 2004, doubling the distance the engines had to cover. In 36 starts the team suffered just one engine fault, which was traced back to a defective part. By the start of the European season in Imola, BMW could confidently release the peak engine speed – topping 19,000 rpm once again – over the entire race distance. "And that was in seventh gear as well – the highest gear, where the engine spends most of its time", emphasised Theissen.

In 2005, as the mileage the engines were expected to cover was doubled once again, a general reduction in engine speeds was widely predicted. However, the final evolution of the BMW P84/5 once again breached the 19,000 rpm barrier, developing peak output of 940 bhp. This time, there were to be two engine failures in 38 starts. On both occasions, the temperature limit for the coolant was exceeded, causing the engine to overheat and cut out.

A Formula One engine has to complete various disciplines between the Friday and Sunday of two successive GP weekends. In free practice, where the car set-up is fine-tuned and a decision made on tyres, the teams preserve their engines by throttling back engine speed and limiting their number of laps. The high-stakes shootout of qualifying, however, allows no such luxuries. "During a race, on the other hand, you can vary engine speed", says Paschen. "If a driver is in a promising position, he has to be able to push the engine to its limit at any time, but if he is stuck back in a bunch or has moved clear of the field in the latter stages of a race, you can always reduce the revs slightly on the Sunday to give the engine a bit of a breather."

Yesterday the engine, tomorrow the entire powertrain.
With the formation of the BMW Sauber F1 Team, the Munich-based BMW engineers will see their roles extended to cover new areas. Starting with the car for the 2007 season, they will be responsible for the entire powertrain. The transmission for the 2006 car was developed at Hinwil.

BMW had already built up a Formula One transmission department during its partnership with WilliamsF1. The aluminium transmission casing was made in Landshut using a sand-casting process, while other transmission parts were sourced from the BMW F1 factory. Gear wheels were produced at BMW's Dingolfing plant alongside components for road cars. Armed with this considerable preparation, the support of BMW's Research and Innovation Centre (FIZ) and the new Anton-Ditt-Bogen testing facility, the Munich experts are ready to embrace their new responsibilities.

The demands placed on a Formula One race transmission are huge. The aim for the new 7-speed transmission is to combine maximum rigidity with a lightweight construction, low centre of gravity, compact dimensions and the shortest possible shift times.

Synergies between F1 and production car development.
"The Formula One project is a vast technology laboratory for BMW", says Theissen. "The new challenges presented by grand prix racing as far as the engine and transmission are concerned will serve to accelerate the pace of development across the whole company. The creation of synergy effects between F1 and volume production was a key prerequisite for our return to Formula One in 2000. And we are constantly introducing effective measures to speed up the transfer of technology."

It was therefore clear from the start that the BMW power units for the blue-riband category of motor racing would be developed and produced in Munich. The BMW Research and Innovation Centre (FIZ), a type of automotive think tank, plays a key role in this process. The F1 factory was built less than a kilometre away from the centre and the two facilities are interconnected. "The FIZ represents the future of BMW, with elite engineers working in state-of-the-art research and development facilities", says Theissen. "The FIZ is given vast resources, from which we benefit directly. At the same time, due to

the extreme technical challenges and pace of development demanded by grand prix racing, the company's involvement in F1 represents a unique proving ground for our engineers."

BMW has made the vision of a seamless process chain a reality, following the development of the car from concept to construction, casting, component production, assembly and testing all the way to race action on the track – and all under its own roof. Transportation of parts – and the quality problems this can cause – is no longer an issue, and the expertise acquired within the company can be channelled directly into the development of production cars.

A cast of experts.
The casting quality of the engine block, cylinder head and transmission plays a crucial role in determining the performance and durability of the power units. Advanced casting techniques, coupled with high-precision process management, enable lightweight components with impressive rigidity.

To ensure that production models benefit from these developments, BMW has its own foundry in Landshut. In 2001, this was joined by a dedicated F1 casting facility. "The two departments are jointly managed", explains Theissen, "and that ensures a constant exchange of information and expertise."
The same sand-casting procedure as is used for the production of the Formula One V8 engine is also applied to oil sumps for the M models, the intake manifold for the eight-cylinder diesel engine and prototypes for future generations of engines.

Virtually at the same time as the F1 foundry went on stream, an F1 parts manufacturing facility based on the same template joined the series production facility. This is where the team make components such as the camshafts and crankshafts for the F1 engine.

Electronics for the race track and the road.
The demands placed on the engine management system of a high-revving Formula One engine, which must also be driveable at low speeds, are immense. Ignition timing and fuel supply have to be seamlessly coordinated on a millisecond-to-millisecond basis in order to achieve optimum efficiency. The ambitious aim is maximum performance coupled with minimal fuel

consumption. Low consumption means both better lap times and greater flexibility for the race strategy. Apart from engine management, the on-board electronics are also responsible for monitoring all functions.

With the backing of the electronics experts at the FIZ, BMW had the confidence from day one to develop the F1 engine management system in-house as well, rather than turning to established motor sport specialists. Engineers normally devoted to developing the electronics for the M models also created the engine management system for the F1 engines. The expertise they gained in the process filters back into series production. Top-of-the-range BMW cars, such as the 7 Series and M models, have long featured two new types of microprocessor which BMW first used and tested in Formula One. Added to which, data storage technology which had first proved itself in F1 was used to hone internet access and the navigation system for the BMW 7 Series. “Function monitoring systems are another area where our accumulated knowledge is used to enhance road cars”, Theissen adds. “Early warning systems and automated electronic intervention technology can play an important role in enhancing safety and guarding against damage in production cars as well as racing machines.”

Another transmission innovation from Formula One has proved its mettle in the BMW M3, M5 and M6: the “Sequential M Gearbox – SMG with DRIVELOGIC”. The SMG drive concept delivers F1 transmission technology for everyday use. The driver changes gear electrically via paddles behind the steering wheel. As in Formula One, an electrohydraulic system replaces the mechanical clutch and shift process, and SMG users can similarly keep their foot on the accelerator while changing gear.

Materials development and model construction.
Materials which are both extremely lightweight and impressively robust remain the holy grail of grand prix teams under the new F1 regulations. The materials research section at the FIZ provides crucial input for the development of BMW’s F1 engines and transmissions, with aviation and aerospace technology frequently serving as a basis. Some highly promising developments, which as yet remain too expensive for use in production

models, have already found their way into BMW's F1 project.
This opportunity to introduce fresh technological blood helps the engineers to continue developing innovations for series production.

In the relentless environment of Formula One, you have to react quickly to make progress and overcome hurdles. The number of design modifications to a Formula One engine over the course of a season is on a par with those introduced for the entire range of production engines.

In order to shorten the "new design, new tools, new components" process, the BMW F1 team can turn to the Rapid Prototyping/Tooling Technology department of the FIZ. Once the necessary parts have been designed – using a CAD system – computer-controlled machines use laser beams or three-dimensional pressure technology to create scale models made out of resin, plastic powder, acrylic, wax or metal. That enables installation and interactions to be simulated without delay, allowing any necessary modifications to be carried out before the final manufacturing process gets underway.

BMW P86 – technical data.

Type:	normally aspirated V8
Bank angle:	90 degrees
Displacement:	2,400 cc
Valves:	four per cylinder
Valve train:	pneumatic
Engine block:	aluminium
Cylinder head:	aluminium
Crankshaft:	steel
Oil system:	dry sump lubrication
Engine management:	BMW
Weight:	95 kg

Full-throttle circuits and go-kart tracks.

The characteristics of the grand prix circuits make a wide range of demands on the Formula One engines. At times peak power is called for, at others more is gained by good driveability. Sometimes heat introduces an added burden, and occasionally leaves can pose a hazard.

GP	Full-throttle ratio Ø race	Top speed race	Longest flat-out section	Specific demands on the engine
BHR	61 %	325.9 km/h	1,007 m	Fine-meshed air filter for protection against desert sand
MYS	57 %	315.7 km/h	804 m	Bigger or extra air intakes and outlets due to heat
AUS	58 %	317.9 km/h	689 m	–
SMR	60 %	312.4 km/h	629 m	–
EUR	55 %	317.1 km/h	726 m	–
ESP	60 %	327.3 km/h	982 m	–
MCO	41 %	302.5 km/h	502 m	In the Loews hairpin, engine speed drops below 5000 rpm in 1st gear
GBR	55 %	322.9 km/h	876 m	–
CAN	60 %	334.5 km/h	995 m	Radiators are easily blocked by leaves from the surrounding trees
USA	n/a	n/a	1,820 m	On the oval section, drivers go flat out for more than 20 seconds
FRA	53 %	313.8 km/h	898 m	–
GER	61 %	318.0 km/h	1,047 m	–
HUN	48 %	318.0 km/h	693 m	No long straights, frequently hot races, hardly any cooling air
TUR	60 %	329.3 km/h	1,190 m	–
ITA	67 %	369.4 km/h	1,268 m	The quintessential race track – with the highest full-throttle percentage in the GP calendar
BEL	60 %	330.8 km/h	1,821 m	Inclines and the longest full-throttle section if Eau Rouge is taken flat out
CHN	50 %	337.8 km/h	1,341 m	–
JPN	58 %	325.4 km/h	1,205 m	In the 130R turn the oil system has to withstand lateral loads of 6g
BRA	56 %	322.4 km/h	1,203 m	The altitude (800 m above sea level) curtails performance of every engine by approx. 8%

All information based on data gathered by BMW in the 2005 races.

Stats and facts.

- The 2006 Formula One calendar has 19 grands prix. Only once before in the history of Formula One were as many races held: in 2005.
- The race venues are spread across 17 countries and four continents.
- A total of 1,182 race laps are lined up for the drivers.
- At the start of season 2006, Hinwil and Munich will have around 300 employees each working for the BMW Sauber F1 Team.
- By the end of 2007, the workforce in Hinwil is set to expand by a further 100 staff.
- The entire crew on a grand prix weekend numbers up to 100.
- Air freight for a grand prix tips the scales at more than 30 tonnes. This includes at least four chassis, six engines, tyres, spare parts, tools, more than 50 computers, 100 radio sets with headphones, and pit garage equipment.
- The transport fleet for the European grands prix comprises five trucks from Hinwil, one engine truck from Munich and special carriers for the team's hospitality facilities.
- On a GP weekend, a team uses up to 1,200 litres of fuel, between 60 and 80 litres of engine oil and up to 30 litres of transmission oil.
- Between set-up and dismantling at a hot race, the team and its guests will consume up to 3,300 litres of mineral water and soft drinks.
- A Formula One driver loses an average two kilograms of body weight during every grand prix.
- The average temperature in the cockpit is 50 °C.

- The steering wheel is a computer and control centre. On the display, drivers can monitor at least 15 functions, including basic information such as selected gear, engine speed, fuel supply and temperatures. Behind the steering wheel is the shift paddle. Nick Heidfeld pulls the right side of the paddle forward to change down a gear and the left side to change up. Jacques Villeneuve prefers a different configuration, pushing to change up and pulling to change down. The steering wheel also has buttons for the pit radio, drinking bottle and program selection for the engine management and differential settings.

- A modern Formula One helmet is made of carbon and, to meet regulations, may not exceed 1,800 grams in weight.

- To produce a Formula One driver's seat, a foam shape is first created using PU pellets in which the driver sits. The impression is scanned before a seat shell is shaped out of carbon and finally covered. The production process takes around 24 working hours and the seat weighs between 2,000 and 3,000 grams.

- A Formula One race car takes 4.2 seconds or a distance of 170 metres to come to a complete standstill from 300 km/h. This is made possible by the extremely high downforce in the upper speed range, which increases tyre grip accordingly. To brake from 200 km/h to zero takes 3.7 seconds or 100 metres.

- In extreme braking manoeuvres, drivers are pressed into their harness with a force of 5g.

- Carbon brake discs and pads require an operating temperature of at least 550–650 °C. During braking they reach temperatures in excess of 1,000 °C.

- Formula One tyres may heat up to 130 °C. Beyond this threshold they risk blistering.

- It takes the team at least eight working hours after a race to dismantle a car, test and replace individual parts and reassemble the racer.

- Assembling the BMW engine takes around 120 working hours.

- More than 200 units of the BMW P86 engine are built for rig testing, test drives and races.

- The BMW P86 engine is made up of 1,105 different parts. In total it comprises some 5,000 parts, which is only around 200 fewer than in the previous ten-cylinder P84/5.

- 1,329 CAD drawings had already been produced for the first test of the BMW P86 V8 engine on 28th November 2005.

- Maximum piston acceleration of the BMW P86 is 10,000g. Peak piston speed is 40 metres per second – or from zero to 100 km/h in 0.3 milliseconds. This exerts a force of almost three tonnes on the conrod. The average piston speed is approx. 26 metres per second.

- The exhaust reaches a temperature of up to 950 °C, while the air temperature in the pneumatic system rises to 250 °C.

- Over an average race distance of 300 kilometres, the BMW V8 engine undergoes around eight million ignitions per grand prix.

- When the car returns to the pits during practice or qualifying, oil samples are taken for spectrometer analysis in the pit garage. Metal traces in the oil provide important clues as to the state of the engine.

4. Drivers.

Nick Heidfeld.

The "aha" effect.

Nick Heidfeld, it has to be said, is a bit of a revelation. On the surface he may seem like just a goody two-shoes, shy, boring even. But that couldn't be further from the truth. It's easy to underestimate the man from Mönchengladbach. After he roared into the limelight in 2005 with two second-placed finishes and a pole position, he was hailed as the surprise of the season. Yet most observers have no idea that he is also a party animal who hits the dance floor clad in funky gear, is passionate about modern art, and regularly pushes engineers to the limits of their capacity. But it suits Heidfeld that this side of him is not very well known. In Formula One he wants to be judged by his performance alone. He values the stopwatch as an honest critic.

He is self-confident. He knows what he is capable of. When it came to the weeks of competitive testing with Antonio Pizzonia in 2005 for a cockpit place in the BMW WilliamsF1 Team, he handled it all with aplomb and won out in the end. But he's not one for interviews on the grid. "I still get nervous before the start of a race", he confesses – despite two decades of track experience. He turns 29 on 10th May 2006.

As a young nipper not yet five years old, he was already riding Motocross with his younger and elder brother. Small machines with 50 cc engines provided two-wheeled fun aplenty. "Until I had an accident where I got my leg stuck between the wheel and the mudguard, and unfortunately the engine was jammed at full throttle…", Heidfeld recalls the painful loss of his calf muscle.

He wanted to take up go-karting when he started school: "But I was too small. At the hire kart tracks they had these bars. If you could walk under them you weren't allowed to drive." But then on one of numerous family outings to the Nürburgring he finally made his debut. With two tyres and a blanket wedged behind his back, he was allowed to take to the brand-new karting track. By passing his father Wolfgang and leaving him trailing, Nick Heidfeld qualified for

his very own go-kart, which he was given at the age of eight. Through club championships in Kerpen-Manheim, national races and involvements in European and World Championship races, he had a thorough apprenticeship and collected trophies the way other kids collected bubble-gum cards.

Impressive Formula racing debut.
At the age of 17, Heidfeld dominated the German Formula Ford 1600 Championship with eight wins in nine races. A year later he took the title in Formula Ford 1800. In 1996, aged 19, he was the youngest driver on the grid of German Formula 3 and gained an instant foothold with three wins and third place overall, as well as claiming pole position and a race win in the Formula 3 World Final on the challenging Macau city circuit, and third place in Formula 3's European showdown at Zandvoort.

Even before the start of the 1997 season, Nick Heidfeld was being heralded as the up-and-coming Formula 3 Champion, particularly as Mercedes was also applying some polish to the rough-diamond driver. His first Formula One test drives drew the attention of the media. At the time, Formula One was enjoying a tremendous boom in Germany in the wake of Michael Schumacher's first two World Championship titles. Heidfeld was nothing if not single-minded. He had the talent to win the championship, and in the Opel Team of Bertram Schäfer he also had the right material at his disposal. He began turning this potential to good account, pulling off a coup with five wins in the German Championship. After winning the Formula 3 Grand Prix in Monaco, his name began appearing in international lights too.

Masterstroke in Formula 3000.
1998 and 1999 would become even more intensive learning years. Heidfeld contested the International Formula 3000 Championship, taking three wins and ending as championship runner-up in the first year. In the second year, four wins were enough to secure him the title. "My team manager David Brown was a very good engineer", says Heidfeld. "He had already worked with Ayrton Senna and Nigel Mansell, among others, and he taught me an amazing amount when it came to the setup." Heidfeld's committed approach to setup work and his know-how have also made an impression in Formula One. "Nick can work with great precision. He's every engineer's dream", says BMW Motorsport Director Mario Theissen. "He is a courageous and fast

driver, but also an analytical and meticulous worker. Besides, he knows both the sites and workforces of the new BMW Sauber F1 Team. He will be invaluable to us during the difficult starting phase."

Heidfeld gleaned his first Formula one experiences in 1999 as a test driver for McLaren-Mercedes. That same year, he was part of the Mercedes driving squad for the Le Mans 24 Hours, from which the cars had to be withdrawn, however. In 2000, he found a job with Prost as an F1 team driver. "Hopes were high", he recalls. "The team had good people and good sponsors. But in the end, we didn't earn a single point. There were a lot of races I didn't even manage to finish."

There followed three years with Sauber. In 2001, he earned his first podium place in Brazil. "It was a great time", says Heidfeld, "I felt very good with Sauber and always kept up friendly relations, which I can now build up on again. I'm really looking forward to it." It was at this time time, too, that he set up base privately in Switzerland as well with his girlfriend Patricia. "Monaco was always fun for a few days, but it wasn't what I was seeking for the long term." Meanwhile, he has bought a house in the Swiss town of Stäfa. "Built in the mid-19th century," he points out. Its gym, modern interior features and modern art are in stark contrast to the traditional style of living. "The area is ideal for cycling." Heidfeld's fitness regime also includes tennis, golf "and a lot of other sports. I enjoy everything. There isn't a single sporting discipline that I favour above the rest."

Variety is the spice of life. Despite his growing attachment to nature, Heidfeld wouldn't want to miss the bright lights of the big city. Zurich is just a 15-minute drive away.

On 3rd July 2005, the house in Stäfa welcomed a new occupant: baby daughter Juni is a Sunday child, which added to the expectant father's stress in Magny-Cours. Even before the start of the race he knew the birth was imminent. Technical problems threw him back into a hopeless position, but due to the qualifying format there was still a chance of achieving a better starting position for the timed lap in the next GP if rivals retired from the race.

Heidfeld chased the field all the way to the finish, dashed off to the airport – and made it just in time to be there at the birth of his daughter. “No matter how you imagine it’s going to be, it’s an experience you just can’t describe and a source of great happiness for Patricia and me.”

Tough winters.

He didn’t always strike lucky. At the end of 2003, his three-year contract with Sauber was not renewed. There followed a tough winter. “I was glad to get the opportunity to drive for Jordan, even though I knew it was going to be a very difficult season. Halfway through the season there simply wasn’t any money left for development work.” Heidfeld does not complain, he merely states a fact. The next winter was tough for a different reason. He had to prove himself against Pizzonia in an elimination procedure. The question was: who will be the second team driver and who will be test driver? It wasn’t until just before the presentation at the end of January that Frank Williams informed Heidfeld that he had been selected. For Heidfeld it was a well-earned reward and a chance to show what he was capable of in 2005. He made his mark on track with speed and sensational passing manoeuvres, and behind the scenes with his well-founded expertise.

An accident during testing caused by a broken wheel suspension in Monza in August signalled an early end to the season for him. After free practice in Monza the following weekend it was clear that concussion and back problems would not permit him to race. The race in Spa a week later also fell through for him. That weekend things got worse for Heidfeld: to find out whether his raised pulse was still causing him a headache, he had leapt onto his bicycle in Stäfa. The accident that ensued was his own fault, as he admits: “I failed to see a motorcycle at a crossroads”, he said, kicking himself, and had to spend the remaining weeks of the season nursing a cracked shoulderblade. Yet he had made such a deep impression that BMW swiftly signed him on for the 2006 season. “That’s my next chance”, says the German. “I want to win races and become World Champion. But I’m also a realist: a new start like this isn’t easy. We’re going to have to work hard and exercise a lot of patience.”

Interview.

Questions to Nick Heidfeld:

You like to go to races with your family. How important is their company?
For me it's a kind of morale booster – not so much at the circuit as in the evenings. It helps me switch off better. I'm always really pleased if somebody from the family – or Patricia – comes with me. But you have to remember that for them the days are pretty boring because I have so little time as a driver.

Will Patricia be joining you again with baby Juni?
She'll certainly be attending a few races, though not as many as in the past. Juni will travel with her but won't be at the trackside. I don't believe that's the right place for a baby. Juni will be better off back in the hotel with her grandmother.

In what way has Juni changed your life?
Hugely! Before she was born I talked to people who tried to explain to me what it's like. But the reality has far exceeded anything you can imagine. For me it's the most wonderful thing in the world to have a child like Juni. And we plan to have more kids. This hasn't meant Formula One has become less important, but life has simply taken on another meaning. I also sense how I'm better at coming to terms with failures when I can go home to little Juni.

Is cycling still a hobby after your accident?
Oh, definitely. I stopped cycling for a while because it took a long time for my shoulder to heal properly. And I prefer my mountain bike again rather than the racing bike. It's more fun and also less dangerous riding it in traffic. Provided, of course, you don't get too adventurous going downhill. I would enjoy that, but the risk of a tumble is too great.

What differentiates the Swiss and the Germans?
In my view the Swiss are a little bit more reserved than the Germans. Other than that, as far as one can generalise at all, I think that a lot of what people say about the Germans applies to the Swiss as well. Things like punctuality and precision, for example.

Did you ever wish you were taller?
If I had designed myself, I might have been a bit taller. But I've never been bothered by my height, and anyway in motor racing it gives you a certain advantage.

Are you a happy person?
Yes, I am. Especially now with the family. Of course I'm not one hundred percent happy all of the time, but I don't suppose anyone is. I believe you get used to everything – unfortunately the good things as well. And I also set myself goals which I want to achieve. First and foremost the World Championship.

Biography.

Nick Heidfeld.

Born:	10th May 1977/Mönchengladbach (GER)
Nationality:	German
Residence:	Stäfa, Switzerland
Website:	www.nickheidfeld.de
Marital status:	Partner Patricia, daughter Juni
Height:	1.64 m
Weight:	59 kg
Hobbies:	Sport, eating
Favourite food:	Liver
Favourite drink:	Orange juice spritzer, virgin pina colada
Favourite tracks:	Suzuka and Macau
First drive:	Aged nine with his father's car on the Kerpen-Manheim karting track
First race:	1986, Kerpen-Manheim karting track
First win:	1987, Kerpen-Manheim karting track

Career highlights.

1988–1993	Karting successes, first at a national level, then qualified for European and World Championship
1994	Winner of the German Formula Ford 1600 Championship, eight wins out of nine races
1995	Winner of the International German Formula Ford 1800 Championship, four wins
1996	3rd place German Formula 3 Championship, three wins; pole position and race win at the Formula 3 World Final in Macau; 3rd place Formula 3 Masters in Zandvoort

1997	Winner of the German Formula 3 Championship, five wins; winner of the F3 Grand Prix Monaco; Formula One test (McLaren-Mercedes)
1998	2nd place European Formula 3000 Championship, three wins; Formula One test driver (McLaren-Mercedes)
1999	Winner of the European Formula 3000 Championship, four wins; Formula One test driver (McLaren-Mercedes)
2000	Formula One World Championship (Prost Peugeot), no points
2001	8th place Formula One World Championship (Sauber Petronas)
2002	10th place Formula One World Championship (Sauber Petronas)
2003	14th place Formula One World Championship (Sauber Petronas)
2004	18th place Formula One World Championship (Jordan Ford)
2005	11th place Formula One World Championship (BMW WilliamsF1 Team)

Formula One statistics pre-2006.

First grand prix	Australian GP, Melbourne, 2000
GP starts	98
Pole positions	1 European GP 2005
Wins	–
Podium places	4 3rd place Brazilian GP 2001 3rd place Malaysian GP 2005 2nd place Monaco GP 2005 2nd place European GP 2005
World Championship points	56 2001: 12/2002: 7/2003: 6/ 2004: 3/2005: 28
Fastest laps	–

Jacques Villeneuve.

High speeds, sandals and steel-rimmed specs.
He was the golden boy of F1 when he set his Williams Renault on pole at his debut in Australia back in 1996, and he was team-mate Damon Hill's closest challenger for the world title that season. Only an incorrectly mounted oil pipe prevented him from winning that race in Melbourne.

Subsequently he traded that instant speed – only Mario Andretti and Carlos Reutemann had previously started their first grand prix from pole position – into victory at the fourth attempt and went on to add three more race wins, two more pole positions and six fastest laps to his tally that season. A year later he was World Champion. The manner in which he had taken his Williams round the outside of Michael Schumacher in the last corner at Estoril, and later his pounce on the German in Dry Sack (turn 6) at Jerez, which resulted in their controversial collision and in Villeneuve cementing his title, provided two of the most outstanding passing moves and two of the most hotly debated incidents in recent history.

Father and son.
Not a natural conformist, Jacques Villeneuve has always courted controversy. Already in his Formula 3 days he was far a far cry from the dapper athlete outside the cockpit. He unabashedly sported a long ponytail, steel-rimmed specs, sandals and an mischievous charm. When he came into F1 in 1996 he upset some purists with his downbeat reaction to the inevitable questions about following his illustrious father, the late Gilles, who raced for Ferrari in the late 1970s and early '80s until his death in practice for the Belgian Grand Prix at Zolder in May 1982. Villeneuve was not about to wear his heart on his sleeve just to satisfy the needs of others and refused to say the romantic things that some wanted to hear.

Instead, it took him no time at all to demonstrate his candour and a penchant for saying exactly what he was thinking. It is an innate honesty that has led him into trouble at times, notably when criticism of the FIA, the sport's governing body, resulted in him being summoned from Canada to Paris just prior to the 1997 Canadian race in Montreal on the track named after his father.

Villeneuve merely shrugs at such things. “I have always spoken my mind”, he says. “I was brought up to say what I feel, that’s all. Why would I behave any other way?”

Honesty and honour are two key cornerstones of his character. He is often described as a maverick, but once you understand those factors everything else falls into place. Besides speaking his mind, he has a code of driving ethics of which his father would have been proud. For father and son, the manner in which they fought a race was often more important than the actual result, and like his father he has always regarded the correctness of the tactics you adopt while defending position as a crucial part of his make-up as a racing driver. Look back over his lengthy career, with its eleven victories and that World Championship crown, and you will never find Jacques Villeneuve pulling unsporting moves on his rivals.

Equally, he has firm ideas on how he wants a car to be set up and always likes to work very closely with his engineers. At Williams his preferences flew in the face of perceived engineering wisdom within the senior management, but he was undeniably quick and competitive as he resolutely ploughed his own furrow.

The courage to move on.

His critics said he left the team at the end of 1998 purely because of the money he was offered to go to the newly emergent BAR team, which grew out of Tyrrell. Villeneuve has always denied this and part of the decision was down to his loyalty to long-time friend and manager Craig Pollock. He believed in Pollock’s dream, and typically was brave enough to want to go with him in pursuit of it. A lesser man might have stayed where he was, but Villeneuve has always liked taking chances.

That trait, after all, was what had already helped him to win the 1995 Indianapolis 500 and that season’s CART IndyCar crown. It is also seen in his love of skiing. Even his broad-based taste in music is reflective of his inquisitive, open-minded character.

Villeneuve's time at BAR was rarely fulfilling. It was a new team and it was still learning many of the hard lessons that all F1 enterprises have to assimilate. There were some podium finishes, but more often than not there was only frustration for an intensely competitive man, and the final dose of that came when he left the team prior to the Japanese Grand Prix in 2003, just before the team really began to make progress.

After the best part of a season on the sidelines he returned to F1 at the end of 2004 as Fernando Alonso's partner at Renault before inking the deal with Peter Sauber that sees him with BMW today.

Rough return.

For a former champion, 2005 was no easy season. It took time to develop the Sauber Petronas C24, and often the fact that he was on a different refuelling strategy to team-mate Felipe Massa disguised their relative performances in both qualifying and races. But Villeneuve was not about to put on a show to hide any personal shortcomings. "Your heart forgets how to cope with high speed!" he explained when asked about his fitness after his lay-off. "When you start going fast again it goes up 20 pulses or more to begin with, then it gets used to it and settles back after a while to an even beat as you become accustomed to it all over again."

Then there was the continual criticism from the media and suggestions that he might lose his drive before the season was over. Villeneuve took all that in his stride, too. "It's okay. I'm used to it. I've had years of practice! You learn not to read what's written about you. It's much better not to. If I haven't seen it, I don't care. When you're working hard and there's no problem internally, I don't really care what's written. If I do this job, if I race, it's because I love racing, I love the competition. I don't want to be racing at the back so I'll always be working as hard as I can to get closer to the front."

If you ask him to put his finger on his underlying problems in 2005, he says: "I just think we weren't doing enough mileage. Our winter testing was not conclusive because we didn't do a lot of mileage and then the test where we were going to concentrate on set-up work got snowed off. Then with the

two races per engine rule and only two cars, you didn't drive much on the Friday or even on the Saturday, you just did the minimum number of laps to choose a tyre. You didn't really work on set-up."

The new rules permitting tyre changes in a race, and BMW's fresh investment in the team, will certainly help this season, and Jacques Villeneuve remains confident that he still has what it takes to race at the front in the sport he loves. "If I didn't feel that", he says, "I would be staying at home."

Interview.

Questions to Jacques Villeneuve:

People say that you are a rebel. Do you agree with that?
I disagree with that. Being a rebel means going against the establishment purely for the fact of being against the establishment and not because of having your own ideas. Sometimes I disagreed with the establishment, but this is because I have my own ideas, which is different to being a rebel. Normally a rebel is without a cause.

You like to spend your spare time skiing and playing ice hockey with the "Monks of Bretaye". You also love music. What do your hobbies mean to you?
It means that you can get up in the morning and do what you like doing. It's something for your personal satisfaction, and this needs to be part of your life. It's very important.

You take your own motorhome to the European GP rounds. In doing so you separate yourself from almost all of the other drivers.
Having the motorhome simply means being closer to the race track and the team I work with. That's the key element. On race weekends you never spend time with the other drivers anyway, even when you stay in a hotel room. You just go to the race track and work with the people, and then you go to the room to sleep. You don't have a social life outside the race track.

What was the reason for choosing Switzerland as your residence? Do you still feel like a Canadian or already like a Swiss?
I went to boarding school in Switzerland when I was 12 to 17. And every year I kept going there in winter and in summer. I finally moved to the place I went to school. Being a Canadian I always loved the snow, the winter and the countryside, and Switzerland with its mountains reminds me a bit of Canada.

What is the ideal set-up of a race car for you: do you prefer understeer or oversteer?
I prefer a neutral car, but I hate understeer more than oversteer. I can drive an oversteering car, but understeer I find difficult. You're limited with understeer. The fastest car is a neutral car, always. An oversteering or understeering car doesn't really exist, it's relative to your driving style. An understeering car could be oversteering with another driver, and vice-versa. It just depends on how you apply the pedals and steering angles.

Which race of your career did you enjoy most?
There are two races: the Indy 500 in 1995 and Jerez in 1997.

Your overalls are always too large. Is there any practical reason behind it or does it have any other deeper sense?
No, my overalls are not too large. All the other drivers have them too tight...

Biography.

Jacques Villeneuve.

Born:	9th April 1971 in St-Jean-sur-Richelieu, Quebec (CAN)
Nationality:	Canadian
Residence:	Villars, Switzerland
Website:	www.jv-world.com
Marital status:	Single
Height:	1.71 m
Weight:	67 kg
Hobbies:	Ice hockey, skiing, golf, music, reading, writing
Favourite food:	Meat
Favourite drink:	Freshly squeezed orange juice
Favourite track:	Suzuka
First drive:	1976 on his father's lap
First race:	September 1988, Italian Touring Car Championship
First win:	1992 in Japan, Japanese Formula 3 Championship

Career highlights.

1990	14th place Italian Formula 3 Championship
1991	6th place Italian Formula 3 Championship
1992	2nd place Japanese Formula 3 Championship
1993	3rd place Formula Atlantic
1994	6th place and Rookie of the Year IndyCar-Championship: 2nd place 500 Miles of Indianapolis
1995	winner of the IndyCar Championship; winner of the 500 Miles of Indianapolis
1996	2nd place Formula One World Championship (Williams Renault), four wins
1997	winner of the Formula One World Championship (Williams Renault), seven wins

1998	5th place Formula One World Championship (Williams Mecachrome)
1999	Formula One World Championship (BAR Supertech), no points
2000	7th place Formula One World Championship (BAR Honda)
2001	8th place Formula One World Championship (BAR Honda)
2002	12th place Formula One World Championship (BAR Honda)
2003	16th place Formula One World Championship (BAR Honda)
2004	Formula One World Championship (Renault), no points
2005	14th place Formula One World Championship (Sauber Petronas)

Formula One statistics pre-2006.

First grand prix	Australian GP, Melbourne 1996
GP starts	152
Pole positions	13 Australian GP 1996 Belgian GP 1996 Japanese GP 1996 Australian GP 1997 Brazilian GP 1997 Argentinean GP 1997 San Marino GP 1997 Spanish GP 1997 British GP 1997 Belgian GP 1997 Austrian GP 1997 Japanese GP 1997 European GP 1997
Wins	11 European GP 1996 British GP 1996 Hungarian GP 1996 Portuguese GP 1996 Brazilian GP 1997 Argentinean GP 1997 Spanish GP 1997 British GP 1997 Hungarian GP 1997 Austrian GP 1997 Luxembourg GP 1997
World Championship points	228 1996: 78/1997: 81/1998: 21/2000: 17/ 2001: 12/2002: 4/2003: 6/ 2005: 9
Fastest laps	9

5. Management.

Mario Theissen – BMW Motorsport Director.

Analyst and pioneer.
He isn't one for small talk and hollow phrases. Mario Theissen is a technician and analytical manager. His career path is paved with facts and figures, while his private byways are dominated by a love of his family and of nature. For the 53-year-old, personal fitness is a sine qua non and a recreation.

Being able to blend his passions for sport and technology represents a dream job for Mario Theissen. Since April 1999 he has been BMW Motorsport Director. With a doctorate in mechanical engineering and an honorary professorship, he is responsible for all BMW motor sport projects. Apart from the Formula BMW series, this covers the company's involvement in the FIA World Touring Car Championship, 24-hour events – and the Formula One venture. "Within this portfolio, Formula One has taken up the lion's share since BMW's comeback as an engine supplier in 2000", says Theissen. "Running a complete team now presents us with far greater challenges."

Theissen is convinced that the success of a Formula One team demands a centralised and consistent project management. Two locations, one management. What is occasionally questioned in Formula One circles goes without saying for the BMW Group. The Munich-based mother company runs factories and think tanks around the globe.

Mario Theissen grew up in Monschau in the Eifel. "The people there are as rough as the climate, but they are warmhearted, reliable and straight as a die," he says. Monschau, he recalls, "was virtually equidistant form the Nürburgring and Spa, and I always found someone to take me along."

He bought his first car at the age of 13: a Fiat 500 for 100 marks. It served primarily for experimental purposes before being replaced by a legally registered road car when he came of age.

His technical interest in engine design and his professional and private enthusiasm for motor racing accompanied him through his engineering degree and subsequently led him straight to BMW, with whom he has been since 1977. In 1999 he took charge of the company's racing involvement jointly with Gerhard Berger. He will never forget BMW's triumph in the Le Mans 24 Hours that year. Since October 2003, Mario Theissen has been BMW's sole Motorsport Director, which brought a curtailment of his leisure time: "I no longer have the time to do marathon training as I used to", he says, but makes sure he does his daily jogging or physical training as part of the BMW Fitness Programme he initiated for the BMW Motorsport staff.

Biography.

Prof. Dr.-Ing. Mario Theissen.

Born:	17th August 1952, Monschau/Eifel (GER)
Nationality:	German
Marital status:	Married to Ulrike, children Pascal (23), Isabel (21) and Janina (18)
Residence:	Munich (GER)
Hobbies:	Sport, especially running, cycling and skiing
1971–1977	Engineering degree at the Aachen University of Technology, diploma in engineering
June 1977	First BMW job in the engine calculation department
1989	Doctorate at the Ruhr University in Bochum
1991	Director of Product Concepts at BMW AG
1992	Director Advanced Drivetrain Development at BMW
1994	Managing Director of BMW Technik GmbH
1998	Head of Technik GmbH and responsible for setting up the BMW Technology Office in Palo Alto, California (USA)
1st April 1999	Appointed BMW Motorsport Director alongside his colleague Gerhard Berger
October 2003	Sole BMW Motorsport Director after Berger's departure
July 2005	Honorary Professorship for Innovative Vehicle Development in the Mechanical Engineering/ Process Engineering faculty of the University of Applied Sciences in Dresden
1st January 2006	As BMW Motorsport Director now also responsible for the new BMW Sauber F1 Team

Heinz Paschen – Technical Director Powertrain.

From racing driver to engineer.
In his youth, the Swabian with the physique of a jockey was not so much interested in machines as in language and studied to become a typesetter. Heinz Paschen only discovered his technical talent when he came of age. He was a keen motorcycle racer and soon came to the conclusion that if he failed to build a faster engine he might well break his neck one day. Compensating for a lack of horsepower and stability with driving skills was becoming too risky. Paschen studied energy and vehicle technology and taught himself in other disciplines. He picked up skills in plastics and glass processing by watching boatbuilders and learnt the basics of soldering from a blacksmith.

His best season results was runner-up in the German Championship, 8th place in the European Championship and 7th place in the World Championship race in Hockenheim. The painful experience of an accident in the legendary 130R turn at Suzuka impacted on his career path. In 1990 he abandoned racing and set up an engineering office. The first industrial commission came from Toyota. In Cologne he successfully designed engines for Le Mans sports cars and World Rally racers, and subsequently in the USA he produced winning Toyota engines for the ChampCar Series. Seven years on it was time for a new challenge. Since BMW's Formula One comeback in 2000, Heinz Paschen has been on board with the Munich team.

Born:	15th July 1953 in Mengen (GER)
Nationality:	German
Residence:	Munich (GER)
Hobbies:	Surfing, motorcycling
1968–1971	Qualified as a typesetter
1971–1972	Intermediate high school certificate
1972–1975	Typesetter
1975–1976	Qualified for advanced technical college
1976–1982	Degree in energy and vehicle technology at the University of Applied Sciences in Ravensburg
1983–1993	Freelance engineer

1993–1998	Head of Construction at Toyota Motorsport in Cologne
1998–1999	Head of Engine Construction at Toyota Racing Development in California.
1st January 2000	Head of Construction and Calculation for BMW Formula One engines
End of 2002	Head of BMW Formula One Engine Development
End of 2005	Responsible for the powertrain as Technical Director in the BMW Formula One project

Willy Rampf – Technical Director Chassis.

True love never dies.
Born in Bavaria, Willy Rampf studied vehicle engineering at Munich's University of Applied Sciences and in 1979 joined BMW in Munich to take up a post as development engineer. From 1989 to 1993 he worked for BMW in South Africa, where he also encountered Formula One for the first time. Prior to that he had mainly been interested in motorcycle racing. "Peter Sauber made his Formula One debut in Kyalami in 1993. He invited me to attend the race", he recalls. Six months later Rampf signed a contract with Sauber as a racing engineer. For three years Willy Rampf was the race engineer responsible for Heinz-Harald Frentzen, and in 1997 for Nicola Larini, Norberto Fontana and Gianni Morbidelli. After four years of racing he returned to BMW. "I needed a new challenge", says Rampf looking back.

In Munich he managed BMW's motorcycle involvement in the Paris-Dakar Rally. Once again Rampf was successful: BMW rider Richard Sainct took a superior victory in the legendary desert rally. At the end of 1999 Rampf began his second career with Sauber, where he was appointed Technical Director on 1st April 2000 and has since been responsible for defining the vehicle concept, for design, development and vehicle deployment at the race track.

Born:	20th June 1953 in Maria Thalheim (GER)
Nationality:	German
Marital status:	Married to Maria, children Peter (22), Andrea (19) and Katharina (16)
Residence:	Pfäffikon, Switzerland (CH)
Hobbies:	Motorcycling, cooking
1975–1979	Studied vehicle engineering at Munich's University of Applied Sciences; diploma in vehicle technology; first joined BMW in Munich as a development engineer
1989–1993	Test engineer at BMW in South Africa
1994–1996	Race engineer for Heinz-Harald Frentzen at Sauber in Hinwil

1997	Race engineer for Nicola Larini, Norberto Fontana and Gianni Morbidelli at Sauber
1998–1999	Ran the motorcycle involvement in the Paris–Dakar Rally at BMW in Munich
End of 1999	Head of the racing and test team at Sauber
1st April 2000	Technical Director at Sauber
1st January 2006	Technical Director Chassis BMW Sauber F1 Team

6. History.

BMW Motorsport.

Sports is the agenda.
BMW has scored racing successes around the globe with its motorcycles, touring and sports cars, at rallies, in Formula 2 and in Formula One. Yet never has the company lost sight of the importance of promoting young racing talent. Innovative technology for sporting competitions and record-breaking attempts has been an integral aspect of the BMW identity since the company's fledgling years. It has defined BMW production cars – and made motor sport history.

The beginnings – BMW's aircraft propeller touches down.
The stylised propeller in the BMW logo recalls the world records achieved with aircraft engines early on in the company's history. Following numerous championship titles won on motorcycles, BMW also began to make a name for itself in car racing. In 1940 it claimed a one-two victory with the BMW 328 in Italy's legendary Mille Miglia road race. The post-war years in Germany initially saw touring car racing take a back seat while motorcycle racer and record-breaker Schorsch Meier rose to folk hero status on BMW Boxer bikes. It was with its Boxer engines, too, that BMW collected 19 World Championship titles in sidecar racing between 1953 and 1973.

Touring cars – a key pillar of BMW motor sport.
In the 1960s, touring car racing became the central pillar of BMW's motor sport activities. Hans Stuck Senior, at the wheel of a BMW 700, took the German Championship title in 1960. In 1964, Hubert Hahne drove the BMW 1800Ti to victory in the German Circuit Championship. Following the launch of the BMW 2000Ti, Josef Schnitzer carried off the German Touring Car Championship two years later. The BMW 2002 in which Dieter Quester claimed the European Touring Car Championship in 1968 and 1969 marked the first use of a turbocharger, and between 1973 and 1979, another six European Touring Car Championship titles were taken with the BMW 3.0 CSL. Driving the BMW 320 fielded by the Schnitzer Team, Harald Ertl won the German Motor Racing Championship in 1978.

In the mid-1980s, the impressive BMW 635 CSi Coupé was the force to be reckoned with in the European Touring Car Championship. Following individual race wins in 1985, Italian driver Roberto Ravaglia secured the European Championship in 1986. 1987 saw the slim-line, earthy successor to the 6 Series Coupé lining up on the grid: the BMW M3 was a driving machine with a 2.5-litre power unit that packed 355 bhp. In its first year on the race track, BMW managed to take the World Championship title (Ravaglia), the European Championship (Winni Vogt) and nine further titles. The M3 became legendary, whether competing in the Asia-Pacific Championship, the European Hill-Climb Championship or in rally events. By the end of 1992, BMW M3 drivers had secured more than 1,500 individual wins and over 50 international titles.

Super touring cars – stars of the 1990s.
For the introduction of a new category of near-production touring cars – initially known as Class 2 or the two-litre class, later Super Touring Cars or STC for short – BMW set about building another superlative touring car: the BMW 320i. From 1993 through to 1998, this 320i (E36) won BMW 29 championship titles around the world, including three in Germany.

Revival of the European Touring Car Championship.
After a gap of 13 years, the FIA once again gave its sanction to the European Championship in 2001. BMW followed developments with great interest and made its mark on the series. Peter Kox (NLD) immediately took the 21st European Touring Car Championship title in 2001, driving a BMW 320i fielded by Ravaglia Motorsport. From 2002 onwards, the European Touring Car Championship (ETCC) was a firm fixture of BMW's motor racing agenda, though not as a traditional factory involvement: the competitors were backed by various national subsidiaries, which put up to five country teams on the grid. In 2002, BMW Team Deutschland (Schnitzer-Motorsport) fared best of all with BMW works drivers Jörg Müller and Dirk Müller finishing second and fourth in the European Championship, while BMW came runner-up in the manufacturers' standings.

In 2003, BMW managed to secure the Manufacturers' title in the penultimate race. In the battle for the Drivers' title, Jörg Müller had to concede defeat just one point short of the winner's score. BMW again took the Manufacturers' title before the close of the 2004 season. This time the Driver's Championship also went to BMW courtesy of British entrant Andy Priaulx, bringing BMW's total of European titles in touring car racing to 24.

BMW wins World Touring Car Championship again in 2005.
Another world championship in touring car racing was staged in 2005 – for the first time since 1987. The FIA World Touring Car Championship (WTCC) was launched to replace the ETCC. In 1987 the winner was Roberto Ravaglia in a BMW. 2005 saw Andy Priaulx (GBR) of BMW Team UK/RBM claim the World Championship title in a BMW 320i. In the Manufacturers' World Championship, the drivers of the four BMW national teams similarly drove to victory, while in the privateer classification it was also a BMW driver who made it to the top: Marc Hennerici (Mayen, Germany).

Marathon men – Nürburgring, Spa and Le Mans.
BMW is by far the most successful marque in the 24 Hour Race on the North Loop of the Nürburgring. In 1970, when the event was first launched, Hans-Joachim Stuck was part of the winning team, as he was in 1998 when BMW became the first manufacturer to win a marathon of this kind with a diesel-powered car. In 2004 too, Stuck was on board the M3 GTR with which BMW claimed its 17th overall victory in the "Green Hell". In 2005 the BMW M3 GTRs scored an 18th overall victory with a second consecutive one-two finish. In the Spa-Francorchamps 24 Hours, meanwhile, BMW touring cars managed to collect 21 wins by the end of the 1998 season.

On 13th June 1999, BMW took its first overall victory in the Le Mans 24 Hours, beating one of the strongest fields of starters in the history of this classic marathon. After the closed-top McLaren F1 GTR sports car driven by the BMW V12-cylinder had won the event back in 1995, 1999 saw the celebration of the first victory in an open-topped car with a later evolution of the engine. The winners, Joachim Winkelhock (GER), Pierluigi Martini (ITA) and Yannick Dalmas (FRA), had completed 366 laps of 13.6 kilometres each in the BMW V12 LMR. Back in the BMW pit garage it was celebrations all round, along with a good deal of commiseration: after 18 hours in the lead,

the second BMW V12 LMR with Tom Kristensen (DNK), JJ Lehto (FIN) and Jörg Müller (GER) was forced to abandon the race with just four hours to go following an accident.

Sports cars in Europe and overseas.
What had begun in the mid-1990s with the McLaren F1 GTR and its BMW twelve-cylinder engine was to continue in 1999 with the BMW V12 LMR. If the FIA GT Championship was the arena for the successful factory deployment of the closed racer (runner-up in the 1997 championship), it was the American Le Mans Series (ALMS) that became the stomping ground of the BMW V12 LMR. With its uprated 580 bhp six-cylinder V12, it scored six wins in the ALMS in 1999 and 2000.

In 2001, BMW switched from the Prototype to the GT Class of the ALMS. Under the management of Charly Lamm, as before, the muscly BMW M3 GTR swept the board in all disciplines. BMW works driver Jörg Müller won the Drivers' title, BMW Motorsport came top of the team classification and BMW took the Manufacturers' Championship in the company's most important export market.

Early talent promotion in and around Formula racing.
In the period from 1973 to 1982, the BMW four-cylinder engine was the benchmark for the Formula 2 junior league. Jean-Pierre Jarier became champion in 1973, Patrick Depailler in '74, Jacques Laffite in '75, Bruno Giacomelli in '78, Marc Surer in '79 and Corrado Fabi in '82. All of them later made the leap into Formula One, where Formula 2 was usually held as part of the support programme.

BMW implemented a new concept in 1979 and 1980 which was similarly tied to the grand prix events: the Procar Series. In this high-class, one-make series featuring the fast BMW M1 road-going sports car, talented juniors regularly pitted their skills against the top five qualifiers from Formula One. The BMW Junior Team (Eddie Cheever, Marc Surer and Manfred Winkelhock) made a name for themselves in the late 1970s as the "Wilde Reiter GmbH" (Wild Riders Ltd).

Formula BMW – today's benchmark for junior talent promotion.
1991 saw the launch of a joint talent promotion scheme in Formula racing run by BMW and the ADAC. It was here that Formula One drivers such as Ralf Schumacher, Timo Glock and Christian Klien learnt the fundamentals of Formula racing. From 1998 to 2001, the series comprised two racing categories.

In 2002, radical changes were implemented and the new Formula BMW vehicle made its debut. A small Formula racing car with an ultramodern carbon-fibre monocoque, it matches Formula One standards in several respects, is propelled by a 140 bhp BMW motorcycle engine and sets standards in terms of safety. This junior class provides an opening for talented young kart racers, some as young as 15, who are taken through a comprehensive training course.

The coaching programme includes driving technique and strategy, vehicle dynamics and chassis set-up, fitness training and nutrition, media and PR, as well as sponsoring and sports management.

The most promising young drivers, along with the best rookie of the previous year, are each granted a scholarship. In Germany's Formula BMW ADAC Championship alone this is worth 50,000 euros per scholarship driver. Since then, the Formula BMW concept has gone global. 2003 saw the introduction of Formula BMW Asia, to which was added the Formula BMW UK Championship and Formula BMW USA in 2004. All of the series also run races as part of the F1 grand prix support programme. 2005 will see the first World Final.

Formula One with sheer power.
On 24th April 1980, BMW announced the company's first foray into Formula One as an engine supplier. Paul Rosche took a four-cylinder production engine block and rebuilt it to create a 16-valve unit reduced in size to 1.5 litres. Running on a special fuel mixture, and with the help of an exhaust gas turbocharger, the unit started with an output 650 bhp. Later this was increased to reach 1,400 bhp.

On 23rd January 1982, Nelson Piquet and Riccardo Patrese entered the season's first race at Kyalami in a Brabham BMW from the front row of the grid. However, both has to retire early due to an accident and loss of oil respectively.

On 9th May 1982, in the fifth race for the new engine, Piquet picked up the first World Championship points when he finished fifth in the Belgian GP. The Brazilian claimed his first win on 13th June of the same year in Montreal and his first pole position on 15th August in Zeltweg, Austria.

For the 1983 World Championship, Brabham's designer Gordon Murray had managed to respond with remarkable speed to new technical regulations. BMW's turbo power, moreover, had been given a further boost, and Piquet won the season's curtain raiser in São Paulo. Apart from Piquet and Patrese, this was the first time a third BMW turbo driver appeared in the race: Manfred Winkelhock in an ATS BMW.

World Championship after 630 days.
The 1983 season proved to be a nailbiter. It took twelve races and exactly half a year before Piquet carried off another win. But in the meantime he managed to hold his nerve and was busy scoring points. The team perfected Murray's idea of the "planned pit stop" – the designer with the hippyish looks knew how to clock improved lap times on a reduced fuel load. Piquet managed to pick up wins in Monza and Brands Hatch, and at the final in Kyalami a third-placed finish was enough to secure the World Championship title. It was exactly 630 days since the BMW engine had premiered on the race track.

In 1984, Piquet ended the World Championship in fifth place. Also competing for Brabham during that season were Manfred Winkelhock and the Fabi brothers, Teo and Corrado. Gerhard Berger made his Formula One debut in an ATS BMW.

1985 saw Berger driving an Arrows BMW alongside Thierry Boutsen. The best-placed BMW driver was again Piquet in a Brabham BMW, who finished eighth in the World Championship. In 1986, Berger was to replace him as the best-placed BMW-powered competitor: the Austrian driver

came seventh in the World Championship. In Mexico he took the final win for the BMW four-cylinder in a Benetton. At the end of 1987, construction of these BMW F1 engines was halted – the turbo era of Formula One was over.

Gearing up for a Formula One comeback.
On 8th September 1997, BMW announced at the Frankfurt Motor Show (IAA) that, following a twelve-year absence, it would be returning to Formula One in 2000 in partnership with WilliamsF1.

Paul Rosche designed the first BMW Formula One V10-cylinder unit of the new era and oversaw the building of the new engine factory in Munich, which was erected close to BMW's Research and Innovation Centre (FIZ).

On 1st October 1998, Gerhard Berger took up his post as BMW Motorsport Director. In April 1999, engineering expert Dr Mario Theissen joined him as the second BMW Motorsport Director. In December 1998, BMW signed up Jörg Müller as a Formula One test driver.

By the summer of 1999, the team had swelled to almost 200. Rosche, who had built BMW racing engines for 42 years, retired at the end of 1999.

Starting at 9.26 hrs on 27th April 1999, BMW began its first track test of the Formula One engine, initially at the company's own test site in Miramas, France. A 1998 chassis from WilliamsF1 served as a test bed, and Müller was behind the wheel. The start of the official FIA test drives on 1st December 1999 in Jerez marked the beginning of the BMW WilliamsF1 Team story.

Accelerating out of the blocks.
The joint venture of BMW and WilliamsF1 kicked off with a sensation: on 12th March 2000 in Australia, Ralf Schumacher ended the first grand prix of the German-British partnership in third place, making it the most successful Formula One debut of an engine manufacturer since 1967.

Extreme reliability and unstinting development work were the hallmarks of the season. Schumacher and the young British driver Jenson Button made it into the points 14 times. Schumacher climbed onto the podium three times, and the BMW WilliamsF1 Team claimed 36 points in their debut season to finish third in the Constructors' Championship.

A winning team by season 2001.
In 2001 the team exceeded its own expectations. Nobody had reckoned on four superior wins. Ralf Schumacher and his Colombian team-mate Juan Pablo Montoya were now up among the front-runners, claiming nine podium finishes between them. With a tally of 80 points, the BMW WilliamsF1 Team made its mark by claiming third place among the leading teams.

World Championship runner-up in year three.
In the third year of the partnership, the team achieved the next stage of its goal: second place in the Constructors' World Championship. McLaren-Mercedes had been outflanked, but Ferrari's superiority was almost overwhelming. By season's end the Italian World Champions had 221 points – as many as all the other teams put together.

Schumacher and Montoya celebrated their first one-two win in Malaysia, followed by a further eleven podium places. In the 16th of 17 GPs, the team secured an early second place in the World Championship. Montoya's seven pole positions also commanded respect in 2002. During qualifying at Monza, the Colombian smashed a 17-year record when he clocked the fastest average lap speed ever achieved in an F1 racing car. The BMW WilliamsF1 Team, moreover, claimed top honours in the reliability league by completing more race laps than any other team.

2003 title chances up to the final.
The FW25 was an innovative new development. A shortened wheelbase was the main reason why the team had to abandon all its previous data. Despite disappointing tests, faith in the new concept remained unbroken. A concerted effort under the pressure of the ongoing season shaped the FW25 into a winning car. In Monaco the racer powered by the BMW P83 engine proved invincible: Schumacher took pole while Montoya won the prestigious

grand prix event. Canada saw both drivers up on the podium, while on the Nürburgring and in Magny-Cours they carried off one-two wins, and in Hockenheim Montoya won with more than 65 seconds to spare.

With a four-point lead in the Constructors' Championship, the team headed off for the two final GPs in the USA and Japan. Although the BMW P83 engine reached a speed of 19,200 rpm, a penalty and a heavy downpour in Indianapolis put paid to Montoya's chances of winning the title. In Japan, the second retirement of the season due to a technical fault put him out of the race from the lead and also buried all hopes of winning the Constructors' title. Even so, with a final score of 144 points this was a clear improvement on the previous year's result. In 2002, 92 World Championship points had sufficed to place the team second in the Constructors' World Championship.

Below par for the first time in 2004.
After the BMW WilliamsF1 Team had consistently exceeded its targets for four years, it fell short of expectations for the first time in 2004. The FW26 with its new aerodynamic concept and striking nose cone had given rise to great hopes during winter testing, but in the first races it soon became clear that the design drawbacks outweighed the benefits identified during simulation tests.

The low point of the season came with the Canadian and US GPs. In Montreal both drivers were disqualified. In Indianapolis, Montoya was disqualified and Schumacher had a serious accident, forcing him to drop out of six GPs while Marc Gené and Antonio Pizzonia took over.

Not until the second half of the season did things start looking up again thanks to a radically modified chassis. The Italian GP also saw the final evolutionary stage of the BMW P84 engine introduced, which made an instant impact by claiming two world records: in prequalifying, Montoya achieved the highest ever average speed in F1 at 262.242 km/h. In the race, Pizzonia recorded a top speed of 369.9 km/h. Montoya's win in the final in Brazil brought a consolatory end to the season.

Finale and new beginning.
2005 turned out to be the second difficult season in succession: the FW27 proved uncompetitive. The BMW WilliamsF1 Team failed to win any races and dropped to fifth place in the Constructors' Championship. The highlights of the season were the races in Monaco and at the Nürburgring. In the Mediterranean principality, German driver Nick Heidfeld and his Australian team-mate Mark Webber stepped onto the podium in second and third places. In the Eifel a week later, Heidfeld took the team's only pole position and again finished second. Prior to that, Heidfeld had claimed a third-placed finish in Malaysia.

The sixth season together, and the longest in F1 history with 19 grands prix, also marked the end of the partnership between BMW and WilliamsF1. The final tally after six years: ten wins, three of them one-two finishes, a total of 45 podium places and 17 pole positions in 104 races. BMW took over the Swiss Sauber Team and will be managing its own F1 team in the 2006 season.

Taking stock.
The bottom line after the six years from 2000 through to 2005: ten wins, three of them one-two finishes, a total of 45 podium places and 17 pole positions in 104 races.

The first grand prix involvement of a BMW engine dates back to 1952. For the period prior to 2000, BMW recorded 96 GP races, nine wins and 15 pole positions.

BMW chronology of success.

17.6.1919	BMW's first world record – flying a plane powered by a BMW six-cylinder, Zeno Diemer reaches an altitude of 9,760 metres or 32,013 feet.
1925–1926	The BMW R37 motorcycle claims more than 200 wins and two German championships.
28.11.1937	World motorcycle speed record – riding a BMW, Ernst Jakob Henne reaches a speed of 279.5 km/h (173.29 mph) on an autobahn near Frankfurt.
1936–1953	Schorsch Meier wins seven motorcycle championships on a BMW boxer.
1940	The BMW 328 finishes 1st, 2nd, 4th and 5th in the Mille Miglia road race in Italy.
1954–1973	Winning sidecars: racing boxer motorcycles with fuel injection, BMW wins 19 World Championships in motorcycle sidecar racing.
1960	Hans Stuck senior wins the German Hill-Climb Championship in a BMW 700.
1964	Hubert Hahne wins the German Circuit Championship in a BMW 1800Ti.
1966	Josef Schnitzer wins the German Touring Car Championship at the wheel of a BMW 2000Ti; racing a BMW 2000Ti, Hubert Hahne becomes the first driver to lap the north circuit of the Nürburgring (22.835 km/14.16 miles) in less than ten minutes; his exact time is 9:58.5 min.
1968	The radial four-valve power unit named after BMW designer Karl Apfelbeck makes its debut in Formula 2 and in the BMW Monti. Running on nitromethane, the engine sets up no fewer than eight world records; Dieter Quester driving a BMW 2002 wins the European Touring Car Championship.
1969	Dieter Quester again wins the European Touring Car Championship at the wheel of a BMW 2002 powered for the first time by a turbocharged engine.
1970	Hans-Joachim Stuck wins the 24 Hours of the Nürburgring at the wheel of a BMW 2002Ti; BMW's 1600 cc Formula 2 engine scores its first victory in Salzburg, with Jacky Ickx at the wheel.

1973	Toine Hezemans wins the European Touring Car Championship in a BMW 3.0 CSL; Achim Warmbold/Jean Todt win the Austrian Alpine Race for the World Rally Championship, driving a BMW 2002.
1973–1982	Six drivers win the European Formula 2 Championship with BMW four-cylinder power: Jean-Pierre Jarier (1973), Patrick Depailler (1974), Jacques Laffite (1975), Bruno Giacomelli (1978), Marc Surer (1979), Corrado Fabi (1982).
1974	Hans-Joachim Stuck sets up a new lap record at the Nürburgring with a BMW 3.0 CSL – 8:09.6.
1977	The BMW Junior Team – Eddie Cheever, Marc Surer and Manfred Winkelhock – make their debut in the BMW 320.
1978	Driving for Team Schnitzer, Harald Ertl wins the German Motor Racing Championship at the wheel of a BMW 320 Turbo.
up to 1979	The BMW 3.0 CSL wins a total of six European championships.
1979–1980	Formula One and touring car drivers contest the Procar Series at grand prix events, introducing a top-class brand trophy featuring the BMW M1 sports car.
1980–2004	BMW Team Schnitzer score ten wins in the Macau Touring Car Race: 1980, 1981, 1983, 1987, 1988, 1991, 1992, 1994, 1998, 2004.
1980	Siegfried Müller jun, Team Eggenberger, wins the European Touring Car Championship in a BMW 635 CSi.
1981	Helmut Kelleners/Umberto Grano bring home the European Touring Car Championship in a BMW 635 CSi; Hubert Auriol riding a BMW R80 wins the motorcycle category in the Paris-Dakar Rally; Piquet and Riccardo Patrese at the wheel, score their first Formula One points on 9th May in Zolder at the Belgian Grand Prix (Piquet finishing 5th); first GP wins in Montreal on 13th June in the Canadian GP (fifth race, Piquet); first pole position in Zeltweg on 15th August, in the Austrian GP (Piquet).
1983	Nelson Piquet wins the Drivers' Formula One World Championship at the wheel of a Brabham BMW; first appearance of the BMW Formula One engine with the ATS Team (Manfred Winkelhock); Dieter Quester, Team Schnitzer, wins the European Touring Car Championship in a BMW 635 CSi; Hubert Auriol riding a BMW R80 wins the motorcycle category in the Paris-Dakar Rally.

1984	Volker Strycek, Team Gubin, wins the German Touring Car Championship (DTM) at the wheel of a BMW 635 CSi; Nelson Piquet finishes 5th in the Formula One World Championship in a Brabham BMW; Teo Fabi, Corrado Fabi, and Manfred Winkelhock also drive a Brabham BMW; Gerhard Berger and Manfred Winkelhock drive an ATS BMW; Gaston Rahier wins the motorcycle category of the Paris–Dakar Rally on a BMW R80.
1985	Nelson Piquet finishes 8th in the Formula One World Championship at the wheel of a Brabham BMW; François Hesnault and Marc Surer drive a Brabham BMW, Gerhard Berger and Thierry Boutsen an Arrows BMW; Gaston Rahier wins the motorcycle category of the Paris–Dakar Rally on a BMW R80.
1985–1995	BMW Team Schnitzer wins the 24 Hours of Spa-Francorchamps no fewer than five times: 1985, 1986, 1988, 1990, 1995.
1986	BMW supplies engines to the Brabham (Riccardo Patrese, Elio de Angelis, Derek Warwick), Arrows (Marc Surer, Thierry Boutsen, Christian Danner), and Benetton (Gerhard Berger, Teo Fabi) Formula One teams; Berger brings home the last grand prix win for a BMW 1.5-litre four-cylinder turbo in Mexico and finishes 7th in the World Championship; Roberto Ravaglia, Team Schnitzer, wins the European Touring Car Championship in a BMW 635 CSi.
1987	Roberto Ravaglia, BMW M Team, wins the World Touring Car Championship in a BMW M3; Winni Vogt, BMW M Team, wins the European Touring Car Championship in a BMW M3; Eric van de Poele, BMW Junior Team, wins the German Touring Car Championship (DTM); the BMW M3 wins the FIA Manufacturers' Trophy for Group A cars in the European Hill-Climb Championship; Helmut König wins the Austrian Touring Car Championship in a BMW M3; Per Gunnar Andersson wins the Swedish Touring Car Championship in a BMW M3; Hansueli Ulrich wins the Swiss Touring Car Championship in a BMW M3; Bernard Beguin/Jean-Jacques Lenne, Team ProDrive, win the Corsica race for the World Rally Championship in a BMW M3; Jose Maria Ponce/Jose Carlos Deniz win the Spanish Rally Championship in a BMW M3; Xavier Riera wins the Spanish Touring Car Hill-Climb Championship in a BMW M3; Matthias Moosleitner/Margit Tüchler win the Mitropa Rally Cup in a BMW M3;

Brabham (Riccardo Patrese, Andrea de Cesaris, Stefano Modena) still uses BMW engines in the Formula One World Championship; by the end of the turbo era, BMW engines look back at 91 starts, nine wins and15 pole positions.

1988 Roberto Ravaglia, Team Schnitzer, wins the European Touring Car Championship in a BMW M3;
Trevor Crowe wins the Asian-Pacific Championship in a BMW M3;
Francis Dosierès wins the European Touring Car Hill-Climb Championship in a BMW M3;
Jim Richards wins the Australian Touring Car Championship in a BMW M3;
Fabien Giroix wins the French Touring Car Championship in a BMW M3;
Mika Arpiainen wins the Finnish Touring Car Championship in a BMW M3;
Arthur van Dedem wins the Dutch Touring Car Championship in a BMW M3;
'Pequepe' wins the Portuguese Touring Car Championship in a BMW M3.

1989 Roberto Ravaglia, Team Schnitzer, wins the German Touring Car Championship (DTM) in a BMW M3;
Johnny Cecotto wins the Italian Touring Car Championship in a BMW M3;
Frank Sytner wins the English Touring Car Championship in a BMW M3;
Harri Toivonen/Heikki Salmenautio win the Finnish Touring Car Championship in a BMW M3;
Jean Pierre Malcher wins the French Touring Car Championship in a BMW M3;
Arthur van Dedem wins the Dutch Touring Car Championship in a BMW M3;
"Pequepe" wins the Portuguese Touring Car Championship in a BMW M3;
Lennart Bohlin wins the Swedish Touring Car Championship in a BMW M3;
Marc Duez/Alain Lopes win the Belgian Rally Championship in a BMW M3;
François Chatriot/Michel Perin win the French Rally Championship in a BMW M3;
Giuseppe Zarpellon wins the Italian Hill-Climb Championship in a BMW M3.

1990 Roberto Ravaglia, Team Schnitzer, wins the Italian Touring Car Championship in a BMW M3;
Jean-Michel Martin wins the Belgian Touring Car Championship in a BMW M3;
Heikki Salmenautio wins the Finnish Touring Car Championship in a BMW M3;
Per Gunnar Andersson wins the Swedish Touring Car Championship in a BMW M3;

Josep Bassas/Antonio Rodrigues win the Spanish Rally Championship in a BMW M3;
Xavier Riera wins the Spanish Touring Car Hill-Climb Championship in a BMW M3.

1991 Will Hoy wins the British Touring Car Championship in a BMW M3;
Tony Longhurst wins the Australian Amscar Series in a BMW M3;
Jean-Pierre Malcher wins the French Touring Car Championship in a BMW M3;
Roberto Ravaglia wins the Italian Touring Car Championship in a BMW M3;
Cor Euser wins the Dutch Touring Car Championship in a BMW M3;
Francis Dosierès wins the French Touring Car Hill-Climb Championship in a BMW M3;
Hansueli Ulrich wins the Swiss Touring Car Championship in a BMW M3;
Peter Zakowski wins the Private Drivers' category in the German Touring Car Championship (DTM) in a BMW M3;
Formula Junior, BMW's and ADAC's joint talent programme, enters its first season.

1992 Johnny Cecotto, Team Fina Motorsport, finishes 4th in the German Touring Car Championship (DTM) in a BMW M3;
Team Bigazzi wins the 24 Hours of Spa with a BMW 320i.

1993 Johnny Cecotto, Team Warthofer, wins the ADAC GT Cup in a BMW M3 GTR;
Joachim Winkelhock, Team Schnitzer, wins the British Touring Car Championship in a BMW 318i.

1994 Johnny Cecotto, Team Warthofer, wins the ADAC Touring Car Cup in a BMW 320i;
Joachim Winkelhock, Team Schnitzer, wins the Asian-Pacific Championship in a BMW 318is;
Tony Longhurst wins the Australian Touring Car Championship in a BMW 318i;
Thierry Tassin, Team Valier, wins the Belgian Touring Car Championship in a BMW 318is;
Shaun van der Linde wins the South African Touring Car Championship in a BMW 318is;
Roberto Ravaglia/Alexander Burgstaller/Thierry Tassin, Team Bigazzi, win the 24 Hours of Spa in a BMW 320i.

1995 Joachim Winkelhock, Team Schnitzer, wins the ADAC Super Touring Car Cup in a BMW 320i;
Steve Soper, Team Schnitzer, wins the Japanese Touring Car Championship in a BMW 320i;
Paul Morris wins the Australian Touring Car Championship in a BMW 318i;
Thierry Tassin wins the Belgian Touring Car Championship in a BMW 318is;
Yvan Muller, Team Oreca, wins the French Touring Car Championship in a BMW 318is;

Per Gunnar Andersson wins the Scandinavian Touring Car Championship in a BMW 318is;
JJ Lehto/Yannick Dalmas/Masanori Sekiya win the 24 Hours of Le Mans in a BMW V12-powered McLaren Formula One GTR;
Roberto Ravaglia/Alexander Burgstaller/Marc Duez, Team Bigazzi, win the 24 Hours of the Nürburgring in a BMW 320i;
Joachim Winkelhock/Steve Soper/Peter Kox, Team Schnitzer, win the 24 Hours of Spa in a BMW 318is.

1996 Eric Cayrolle wins the French Touring Car Championship in a BMW 318is;
Alexander Burgstaller/Thierry Tassin/Jörg Müller, Team Fina Bastos, win the 24 Hours of Spa in a BMW 318is.

1997 The BMW 320i wins the FIA Touring Car World Cup;
Paul Morris wins the Australian Touring Car Championship in a BMW 320i;
Didier de Radiguès wins the Belgian Touring Car Championship in a BMW 320i;
Heikki Salmenautio wins the Finnish Touring Car Championship in a BMW 320i;
Eric Cayrolle wins the French Touring Car Championship in a BMW 320i;
Emanuele Naspetti wins the Italian Touring Car Championship in a BMW 320i;
Duncan Huisman wins the Dutch Touring Car Championship in a BMW 320i;
Craig Baird wins the New Zealand Touring Car Championship in a BMW 320i;
Oscar Larrauri wins the South American Touring Car Championship in a BMW 318is;
Charles Kwan wins the South-East-Asian Touring Car Championship in a BMW 320i;
Bill Auberlen, Tom Milner Racing, wins the Exxon Supreme GT Series Drivers' and Manufacturers' Championship, GT3 Class, in a BMW M3;
Didier de Radiguès/Eric Hélary/Marc Duez, Team Fina Bastos, win the 24 Hours of Spa in a BMW 320is;
Steve Soper, Team Bigazzi, wins the Macau Touring Car Race in a BMW 320i;
Sabine Reck/Johannes Scheid/Peter Zakowski, Team Scheid, win the 24 Hours of the Nürburgring in a BMW M3;
Geoff and David Brabham win the Bathurst 1000 in a BMW 320i;
JJ Lehto/Steve Soper, Team BMW Motorsport, finish 2nd in the FIA GT Championship in a McLaren BMW;
Jean Marc Gounon/Anders Olofsson/Pierre-Henri Raphanel, Gulf Team Davidoff, Peter Kox/Roberto Ravaglia/Eric Hélary, Team BMW Motorsport, finish 2nd and 3rd in the 24 Hours of Le Mans in a McLaren BMW (McLaren Formula One GTR with a BMW V12);
Joachim Winkelhock, BMW Team Bigazzi, finishes 2nd in the ADAC Super Touring Car Cup in a BMW 320i.

1998

Johnny Cecotto, BMW Motorsport Team Schnitzer, wins the German Super Touring Car Championship (STW) in a BMW 320i;
Fredrik Ekblom, BMW Dealer Team, wins the Swedish Touring Car Championship in a BMW 320i;
Charles Kwan, Team EKS Motorsport, wins the South-East-Asian Touring Car Championship in a BMW 320i;
Eric Cayrolle, Team Sda, wins the French Touring Car Championship in a BMW 320i;
Oscar Larrauri, Team Proas, wins the South American Touring Car Championship in a BMW 320i;
Sinisa Kosutic, Team Valier, wins the Croatian Touring Car Championship in a BMW 320i;
Arto Salmenautio, OS Motorsport, wins the Finnish Sport 2000 Touring Car Championship in a BMW 320i;
Brett Riley wins the New Zealand Touring Car Championship in a BMW 320i;
Luca Capellari, Team Duller, wins the International Group N above 3000 cc in a BMW M3;
Cameron McLean wins the Private Drivers' category in the Australian Touring Car Championship in a BMW 320i;
Mark Peters wins the Private Drivers' category in the Bankfin Touring Car Championship South Africa in a BMW 318is;
Thomas Winkelhock, Brinkmann Motorsport, wins the German Touring Car Challenge in a BMW 320i;
Sabine Reck/Johannes Scheid, Team Scheid, win the German Veedol Nürburgring Endurance Trophy in a BMW M3;
Mark Simo, PTG M3 Team, wins the Drivers', Constructors' and Team categories in the US Professional Sports Car Series in a BMW M3 GT3;
Ross Bentley, PTG M3 Team, wins the Drivers', Constructors' and Team categories in the US Road Racing Championship in a BMW M3 GT3;
Tim Sugden/Steve O'Rourke win the English GT Championship in a BMW V12-powered McLaren Formula One GTR;
Hans-Joachim Stuck/Christian Menzel/Marc Duez/Andreas Bovensiepen, Team Warthofer, win the 24 Hours of the Nürburgring in a BMW 320d;
Bill Auberlen/Marc Duez/Boris Said, PTG M3 Team, win the GT3 Class in the 24 Hours of Daytona in a BMW M3;
Alain Cudini/Marc Duez/Eric van de Poele, Team Juma, win the 24 Hours of Spa in a BMW 320i;
Joachim Winkelhock, Team Schnitzer, wins the Macau Touring Car Race in a BMW 320i;
Markus Moufang/Rüdiger Hähner win the German Rally Challenge in a BMW M3;
Otokar Kramski wins the European Touring Car Hill-Climb Championship in a BMW M3;
Eric Pernot wins the French Touring Car Hill-Climb Championship in a BMW M3.

1999	Yannick Dalmas/Pierluigi Martini/Joachim Winkelhock, BMW Motorsport, win the 24 Hours of Le Mans in a BMW V12 LMR; Tom Kristensen/JJ Lehto/Jörg Müller, Team BMW Motorsport, win the 12 Hours of Sebring in a BMW V12 LMR; JJ Lehto/Steve Soper, Team BMW Motorsport, win the Sears Point, Laguna Seca and Las Vegas races for the American Le Mans Series in a BMW V12 LMR; BMW Team PTG wins the GT Class Team Cup in the American Le Mans Series with a BMW M3; Cor Euser wins the Dutch Touring Car Championship in a BMW 320i DTC; Vladimir Soukhov wins the Russian Touring Car Championship in a BMW 320i DTC; Jason Richards wins the New Zealand Touring Car Championship in a BMW 320i DTC; Paul Morris wins the Australian Touring Car Championship in a BMW 320i; Charles Kwan wins the South-East-Asian Touring Car Championship in a BMW 320i; Kim Esbjug wins the Private Drivers' category in the Swedish Touring Car Championship in a BMW 320i; Otokar Kramski wins the Czech Touring Car Championship in a BMW M3; Dagmar Suster wins the Slovenian Touring Car Championship in a BMW M3; Niko Pulic wins the European Touring Car Hill-Climb Championship in a BMW M3; Georg Plasa wins the German Touring Car Hill-Climb Championship in a BMW 320i; Slavko Dekleva wins the Slovenian Touring Car Hill-Climb Championship in a BMW M3; Eric Pernot wins the French Touring Car Hill-Climb Championship in a BMW M3; Robert Brooks/Robert Wilson win the International Special Car Series in a BMW M3; Richard Sainct wins the Motorcycle category of the Granada-Dakar Rally on a BMW F 650.
2000	Niko Pulic wins the FIA European Touring Car Hill-Climb Championship, Group A, in a BMW M3; Franz Tschager wins the FIA Sports Car Hill-Climb Championship in an Osella BMW; Franz Engstler wins the German Touring Car Challenge in a BMW 320i E46 DTC; Mikhail Ukhov wins the Russian Touring Car Championship in a BMW 320i E36 DTC; Duncan Huisman wins the Dutch Touring Car Championship in a BMW 320i E46 DTC; Jason Richards wins the New Zealand Touring Car Championship in a BMW 320i DTC; Alessandro Bertei wins the Italian Touring Car Championship, Group N1, in a BMW M3 E36 Group N;

Paolo La Neve wins the Italian Touring Car Championship, Group N2, in a BMW 325i E36 Group N;
Stefano Valli wins the Italian Touring Car Championship, Group N3, in a BMW 320i Group N;
Georg Severich/Luc Pensis win the Touring Car category of the Belgian Championship in a BMW 320i STC;
Xavier Riera Vilarrasa wins the Spanish Hill-Climb Championship in a BMW 320i;
1st, 2nd, 3rd and 4th places in the motorcycle category of the Paris–Dakar-Cairo Rally go to Richard Sainct, Oscar Gallardo (both on BMW F 650 RR), Jimmy Lewis (BMW R 900 RR) and Jean Brucy (BMW F 650 RR) respectively; Jimmy Lewis wins the Dubai Rally (BMW R 900 RR).

2001 Manufacturers', Team and Drivers' Championship American Le Mans Series, Jörg Müller, Team BMW Motorsport, BMW M3 GTR;
Peter Kox, Ravaglia Motorsport, wins the FIA European Super Production Championship in a BMW 320i E46 SPC;
Niko Pulic wins the FIA European Hill-Climb Championship for Touring Cars, Group A, in a BMW M3;
Franz Tschager wins the FIA European Hill-Climb Championship for Sports Cars in an Osella BMW;
Markus Gedlich wins the German Touring Car Challenge in a BMW 320i E46 DTC;
Sandor van Es wins the Dutch Touring Car Championship in a BMW 320i E46 DTC;
Stefano Valli, wins the Italian Touring Car Championship, Group N1, in a BMW M3;
Alessandro Bernasconi wins the Italian Touring Car Championship, Group N2, in a BMW 320i;
Yvan Lebon wins the ST class French Super Touring Car Championship in a BMW 320i STC;
3rd place FIA Formula One Constructors' World Championship, BMW WilliamsF1 Team, Ralf Schumacher and Juan Pablo Montoya (four wins, four pole positions).

2002 2nd place FIA Formula One Constructors' World Championship, BMW WilliamsF1 Team, Juan Pablo Montoya (3r place) and Ralf Schumacher (4th place), one one-two finish (Schumacher ahead of Montoya in Malaysia), seven pole positions (Montoya);
2nd place Drivers' and Manufacturers' rankings of the FIA European Touring Car Championship (ETCC), BMW Team Germany (Schnitzer-Motorsport), Jörg Müller, BMW 320i;
Franz Tschager wins the FIA European Hill-Climb Championship for Sports Cars in an Osella BMW;
Duncan Huisman wins the Dutch Touring Car Championship in a BMW 320i;
Massimo Pigoli wins the Italian Touring Car Championship (Super Production) in a BMW 320i;
Komarov Grigory wins the Russian Touring Car Championship in a BMW 320i;
Alberto Cerrai wins the Campionato Italiano Velocità Turismo in a BMW M3;

	Mario Merten wins the Nürburgring Endurance Championship in a BMW 320i; Herbert Stenger wins the German Hill-Climb Championship in a Stenger BMW; Duncan Huisman wins the Macau Touring Car Race in a BMW 320i.
2003	2nd place FIA Formula One Constructors' World Championship, BMW WilliamsF1 Team, Juan Pablo Montoya (3rd) and Ralf Schumacher (5th), two one-two finishes (Schumacher ahead of Montoya, European and French GP), two single victories (Montoya, Monaco and Germany), four pole positions (Schumacher three, Montoya one); Manufacturers' Championship FIA European Touring Car Championship (ETCC) and 2nd place Drivers' Championship, BMW Team Germany (Schnitzer-Motorsport), Jörg Müller, BMW 320i; Claudia Hürtgen wins the German Touring Car Challenge (DTC) in a BMW 320i DTC; Mikhail Ukhov wins the Russian Touring Car Championship in a BMW 320i (E46); Bill Auberlen wins the Speed World Challenge for Touring Cars in the US in a BMW 325i; Herbert Stenger wins the German Hill-Climb Championship, Group CN sports cars, in a Stenger BMW; Jörg Weidinger wins the DMSB Mountain Trophy for Touring Cars, Group G, in a BMW 318is; Duncan Huisman wins the Macau Touring Car Race in a BMW 320i.
2004	Manufacturers' and Drivers' Championship FIA ETCC, BMW Team Great Britain (RBM), Andy Priaulx, BMW 320i; 1st and 2nd place 24 Hours of the Nürburgring, Dirk Müller/ Jörg Müller/Hans-Joachim Stuck, Team BMW Motorsport (Schnitzer Motorsport), BMW M3 GTR; 4th place FIA Formula One Constructors' World Championship, BMW WilliamsF1 Team, Juan Pablo Montoya (5th), Ralf Schumacher (9th), Antonio Pizzonia (15th), one win (Montoya, Brazil), one pole position (Schumacher, Canada); Robert Senkyr wins the FIA European Hill-Climb Championship in a BMW M3; Giulio Regosa wins the Category 2 FIA European Hill-Climb Championship in an Osella BMW; Dirk Müller/Jörg Müller/Hans-Joachim Stuck, Team BMW Motorsport (Schnitzer Motorsport), win the Group 2 24 Hours of Spa in a BMW M3 GTR; Claudia Hürtgen wins the DMSB Production Car Championship in a BMW 320i; Richard Göransson wins the Swedish Touring Car Championship in a BMW 320i; Casper Elgaard wins the Danish Touring Car Championship in a BMW 320i; Patrick Beliën wins the Belcar Championship in a BMW M3; Grigory Komarov wins the Russian Touring Car Championship in a BMW 320i;

Bill Auberlen wins the Grand Am Rolex Sports Car Series in a GT Class BMW M3 GTR;
Will Turner wins the Speed World Challenge for Touring Cars USA in a BMW 325i;
Alessandro Bernasconi wins the Campionato Italiano Velocita Turismo in a BMW 320i;
Arnd Meier/René Wolff wins the Endurance Championship Nürburgring in a BMW 318ti compact;
Herbert Stenger wins the German Hill-Climb Championship for Racing Cars in a Stenger BMW;
Carlos Hernandez wins the Spanish Hill-Climb Championship in a BMW 320i;
Jörg Müller wins the Touring Car Race in Macau in a BMW 320i.

2005 Manufacturers' and Drivers' Championship FIA WTCC, BMW Team Great Britain (RBM), Andy Priaulx, BMW 320i;
1st and 2nd place 24 Hours of the Nürburgring, Pedro Lamy/ Duncan Huisman/Andy Priaulx/Boris Said ahead of Dirk Müller/ Jörg Müller/Hans-Joachim Stuck, Team BMW Motorsport (Schnitzer Motorsport), BMW M3 GTR;
5th place FIA Formula One Constructors' World Championship, BMWWilliamsF1 Team, Mark Webber (10th), Nick Heidfeld (11th), Antonio Pizzonia (22nd.), four podium places, one pole position (Heidfeld, European GP);
Jörg Weidinger wins the FIA European Hill-Climb Championship in a BMW M3;
Alessandro Zanardi wins the Italian Touring Car Championship in a BMW 320i;
Franz Engstler wins the Asian Touring Car Championship in a BMW 320i;
Vladimir Nechaev wins the Russian Touring Car Championship in a BMW 320i;
Richard Göransson wins the Swedish Touring Car Championship in a BMW 320i;
Richard Göransson wins the European Touring Car Cup in Vallelunga in a BMW 320i;
Casper Elgaard wins the Danish Touring Car Championship in a BMW 320i;
Claudia Hürtgen wins the Endurance Championship Nürburgring in a BMW 320i;
Herbert Stenger wins the German Hill-Climb Championship for Sports Cars in a Stenger BMW.

Sauber.

A byword for Swiss motor racing.
It all began in 1970 when electrician Peter Sauber set up his own business and began building open two-seater sports cars. It was during this time that he constructed the Sauber C1 in the cellar at his parents' house. The model designation derived from the first letter of his wife Christiane's name. With the C1, Sauber went on to win the Swiss Championship, but subsequently only put in sporadic race appearances.

By the time Sauber hung up his helmet in 1973, his focus had already turned entirely to the construction side. The "C" was retained as a trademark, and by 2005 Sauber had got as far as the C24. For linguistic reasons there was no C10 (it sounds odd in German), but along the road there appeared a sports car named the C291.

Success with sports cars.
The first major successes began in the late 1980s after Sauber had managed to persuade Mercedes to return to the race track. Highlights of the partnership with the Stuttgart carmaker were a one-two finish in the 1989 Le Mans 24 Hours and two consecutive wins of the Manufacturers' and Drivers' title in the World Sports Car Championship (1989 and 1990).

Among the drivers who earned their racing spurs under Sauber's aegis in 1990 and 1991 were three who went on to become Formula One aces: Michael Schumacher, Heinz-Harald Frentzen and Karl Wendlinger.

Sauber's Formula One venture began almost 15 years ago. When the Mercedes-Benz and PP Sauber AG partnership was debating its racing future in the early 1990s with the demise of the World Sports Car Championship in sight, the subject of Formula One was soon tabled and firmed up as a joint project during the summer of 1991.

Preparations in Stuttgart and Hinwil proceeded apace and there seemed no reason not to embark on the new venture. It thus came as a heavy blow to Peter Sauber when, in November 1991, the Mercedes executive board decided against a Formula One involvement for the time being.

Formula One as a solo venture.
It left Peter Sauber sitting on the brand-new high-tech facility established in Hinwil, the comprehensive racing expertise that had been developed with Formula One in mind and the staff taken on to run the project. In January 1992 he resolved to go it alone – albeit with financial and technical support from Mercedes, but also taking on board the considerable personal risk of joining the sorry ranks of Formula One failures made in Switzerland.

Nonetheless, 14th March 1993 saw two Sauber C12 cars – as planned – lining up in Kyalami for the South African GP. JJ Lehto's fifth-placed finish turned it into a debut worthy of celebration. In the history of Formula One, there had only been four teams previously who had collected points in their maiden race.

Contracts with Red Bull and Petronas from 1995 provided a solid foundation and enabled the Swiss team to establish itself as a firm fixture of Formula One.

Fourth in the 2001 World Championship.
It was some time before the breakthrough came, but in 2001 there were suddenly three highlights in the team's history following hot on each other's heels: a partnership with the major Swiss bank Credit Suisse, confirmation of fourth place in the Constructors' Championship in mid-October, and a few days later the groundbreaking ceremony for the company's own wind tunnel.

When it entered Formula One in 1993, Sauber had a staff of less than 70. In 2005, around 300 experts were working exclusively on Formula One at the 6,800-square-metre Hinwil complex that comprises the development centre and the adjacent wind tunnel. In addition, almost 200 suppliers in the Hinwil region benefit from commissions coming from the racing team. Compared to 1993, the annual budget has grown fourfold within a decade.

From 1993 through to 2005 the Sauber Team contested 216 out of 218 grands prix. The two races they missed out on were the 1994 Monaco GP following Karl Wendlinger's serious accident and the 2000 Brazilian GP, from which the team withdrew for safety reasons after rear wing fractures were discovered during practice.

Balanced against 257 completed races, which earned the team 93 championship points, there were 169 retirements. Eight of these occurred at such a late stage that the affected drivers were nevertheless classified – JJ Lehto even coming fourth at Imola in 1993.

In theory the line-up of 17 Sauber drivers should be able to claim 432 race starts, but they only managed 428 since there were four occasions when only one driver took part in the race. A convalescing Karl Wendlinger missed out on the Spanish GP in 1994, while in 1996 Johnny Herbert was forced to watch the restart in Australia from the trackside after being involved in a pile-up. Gianni Morbidelli passed up the Japanese GP in 1997 due to a hand injury sustained during practice, while 2003 saw Heinz-Harald Frentzen fail to make the restart in Austria due to a clutch failure.

Six podium places.

Six third places are the team's best results. On two occasions victory seemed within grasp. At the Monaco GP in 1996, Frentzen finished fourth after colliding with Eddie Irvine's Ferrari while attempting to pass him and later dropping further back on account of two extra pit stops. In France in 1999, Jean Alesi spun off a wet track and out of the race just before the safety car was sent out.

Statistics (1993 to 2005).

Drivers	Grands prix for Sauber	Points Sauber
JJ Lehto (FIN/1993–1994)	18	5
Karl Wendlinger (AUT/1993–1995)	25	11
Heinz-Harald Frentzen (GER/1994–1996/2002–2003)	64	42
Andrea De Cesaris (ITA/1994)	9	1
Jean-Christophe Boullion (FRA/1995)	11	3
Johnny Herbert (GBR/1996–1998)	48	20
Nicola Larini (ITA/1997)	5	1
Gianni Morbidelli (ITA/1997)	7	0
Norberto Fontana (ARG/1997)	4	0
Jean Alesi (FRA/1998–1999)	32	11
Pedro Diniz (BRA/1999–2000)	32	3
Mika Salo (FIN/2000)	16	6
Nick Heidfeld (GER/2001–2003)	50	25
Kimi Räikkönen (FIN/2001)	17	9
Felipe Massa (BRA/2002/2004–2005)	53	27
Giancarlo Fisichella (ITA/2004)	18	22
Jacques Villeneuve (CAN/2005)	19	9
Total	**428**	**195**

Championship points and Constructors' Championship placings.

Season	Grands prix	Points	Position
1993	16	12	7th
1994	16	12	8th
1995	17	18	7th
1996	16	11	7th
1997	17	16	7th
1998	16	10	6th
1999	16	5	8th
2000	17	6	8th
2001	17	21	4th
2002	17	11	5th
2003	16	19	6th
2004	18	34	6th
2005	19	20	8th
Total	**216 (428 starts)**	**195**	

Placings by year.

	93	94	95	96	97	98	99	00	01	02	03	04	05	Total
1st	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2nd	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3rd	0	0	1	1	1	1	0	0	1	0	1	0	0	6
4th	2	2	1	2	2	0	0	0	3	1	0	2	2	17
5th	2	1	3	0	2	2	0	2	1	2	2	2	0	19
6th	2	4	5	1	2	2	5	2	6	4	1	2	2	38
7th	2	3	1	3	3	5	1	3	4	5	0	2	1	33
8th	2	0	3	4	3	2	1	5	1	2	2	6	2	33
9th	2	0	1	3	5	1	2	2	2	4	5	8	3	38
10th	0	1	3	1	1	5	0	4	2	3	3	2	6	31
11th	0	0	1	0	1	0	0	4	1	0	2	2	6	17
12th	0	0	1	0	1	1	0	0	0	1	2	3	3	12
13th	1	0	1	0	0	0	0	0	0	1	2	2	2	9
14th	0	0	0	0	2	0	1	0	0	0	0	0	3	6
15th	0	0	0	0	0	0	0	0	0	0	0	0	1	1
16th	0	0	0	0	0	0	1	0	0	0	0	0	0	1
17th	0	0	0	0	0	0	0	0	0	0	1	0	0	1
	13	**11**	**21**	**15**	**23**	**19**	**11**	**22**	**21**	**23**	**21**	**31**	**31**	**262**

7. Press service.

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Services.

Press releases in English and German, and also in French, Italian, Japanese and Spanish for the relevant grands prix, are available in various email formats (text only, pdf, html) or by fax.

Requests for changes to the **mailing list** should be sent to Heike Hientzsch: bmw@heikehientzsch.de, fax +49 (0) 2293 – 90 39 95.

Previews are generally sent out on the Friday nine days ahead of a GP.

Practice, qualifying and race reports are sent out daily on GP weekends around 60 minutes after the end of the last session or the end of the race.

Test reports containing the most important data are sent out after each test day.

Online press releases, press kits and photos are available at: www.press.bmw.com. Further information can be found on the team website www.bmw-sauber-f1.com and at www.bmw-motorsport.com.

Transparencies and colour prints as well as **TV footage** can be obtained from the listed contacts.

A new **CD-ROM** will be available at the start of the season. It contains the press kit texts in five languages (English, German, French, Italian and Spanish) along with the latest photos.