Sauber F1 Team

# Sauber F1 Team

## Press Kit 2014

# Content

# Season

## Preview

Hinwil, 26th January 2014 - On its website (www.sauberf1team.com) the Sauber F1 Team today presents the new Sauber C33-Ferrari with which its two drivers, Esteban Gutiérrez (MX, 22) and Adrian Sutil (DE, 31), will be lining up on the grid for the start of the 2014 FIA Formula One World Championship. The team has signed up Giedo van der Garde (NL, 28) as its test and reserve driver as well as Sergey Sirotkin (RU, 18) as test driver. The Sauber C33-Ferrari will be rolled out in Jerez de la Frontera (ES) during the first winter test starting on 28th January.

Looking ahead to the new season, Team Principal Monisha Kaltenborn said: "We have put a very challenging year behind us. The first half of 2013 in particular was difficult for us, but the second half saw us making significant strides. We learnt a great deal during this time and will be applying the lessons in the new season."

But the Team Principal is careful to make any forecasts for the new season: "Due to the radical changes in the technical regulations, predictions are simply impossible to make at this stage. Even more so than in previous years, any impression of how the teams stand against each other will only emerge once winter testing has been completed. That is also when we will announce our goals for the 2014 season. One thing's for sure: reliability will be of the essence, especially at the beginning of the season."

Kaltenborn is optimistic about the new brace of drivers: "Adrian is somebody we've been observing for some time and with whom we've been in contact since September. That is why I'm particularly delighted we've managed to get him on board. He has repeatedly demonstrated just how fast he is, and he isn't lacking in experience either, being about to enter his seventh season. In the light of the far-reaching technical changes, that is an advantage not to be underestimated."

"As for Esteban Gutiérrez," the Team Principal continued, "we have long considered him to be a talented racing driver. We know him extremely well as his connections with our team go back several years. Last year he had a difficult start, but managed to steadily progress. He has also settled into the team very well. We are confident he can now turn his experience into good results."

Adrian Sutil is delighted with his move to the Sauber F1 Team: “After six good years in the same team, it was time for me to look for a new challenge. I’m determined to have a successful future with the Sauber F1 Team and will do my bit to ensure that. In recent years the team has repeatedly demonstrated its potential, not least in the second half of the last season. And as for infrastructure, the Sauber F1 Team are a match for anybody. I can’t wait to take on the challenge!”

“Last season I had a steep learning curve,” said Esteban Gutiérrez, “but working together with the team, I was able to make steady progress. This is my fourth year with the Swiss team, and the second as a racing driver. Last year I learnt a great deal and I feel ready for the next step. The 2014 season will be a huge challenge on the technical front, which makes it all the more important to know the people you work with well. I will do everything I can to improve further and to support the team with all the resources I have.”

On January 21st, the team announced Giedo van der Garde as its test and reserve driver. Team Principal Monisha Kaltenborn said: “Giedo has four years of experience in GP2 and he drove one year in Formula One. These are good credentials to work successfully with our team. Many times Giedo has shown his talent as a race driver. At the same time the team would like to support him to further develop his skills. Giedo has the right attitude to take the next step forward.”

Taking on the role of test driver is 18-year-old Sergey Sirotkin of Russia. “Last year Sergey already had a chance to glean a first-hand impression of Formula One,” said Monisha Kaltenborn. “He spent several days in the factory, spoke at length with our engineers, was with the team at the Italian Grand Prix and drove 60 laps in a Ferrari in Fiorano. Our aim, as before, is to prepare him for entry into Formula One.”

## The Sauber C33-Ferrari – branching out in new directions

The changes to the regulations introduced for 2014 are arguably the most sweeping ever seen in Formula One. As far as the engine in particular is concerned, the changes require a completely new concept. In place of last season's naturally aspirated 2.4-litre V8 engine comes a 1.6-litre turbocharged V6 power unit, backed up by an energy recovery system (ERS) which is twice as powerful as in the past and with, potentially, more than ten times the deployable energy.

But that's not all; key changes have also been introduced on the aerodynamics. For example, the maximum width of the front wing is now 165 cm (previously 180 cm) and the nose will be very low. This is intended to improve safety. Lower noses have been introduced by agreement between the FIA and the teams to reduce the risk that a car will be launched into the air in the case of a nose to rear wheel accident and also to reduce the risk of a driver injury in the event of a "T bone" accident.

Modifications have also been made to the dimensions of the chassis profile at the front of the car and the side crash elements, which are now standardised. The side impact test has been replaced by push off and load tests which are more stringent than before. These structures, combined with the way they are attached to the chassis, should result in better safety in the case of an oblique side impact. In addition, the lower rear wing is now removed. The aerodynamic effects, which could previously be achieved at the rear of the car through the manipulation of exhaust gases, are now restricted, with the position of the exhaust now more precisely defined. Side exhaust exits are no longer permitted; the exhaust tailpipe will now exit centrally and rearwards, with only minor changes allowed to its angle.

All of these measures reduce downforce and, therefore, decrease cornering speed. The cars will also be slower due to the raising of the minimum weight, which increases from 642 kg (including driver) to 691 kg, cancelling out – at least in part – the weight added by the new technical systems.

As Eric Gandelin, Sauber F1 Team Chief Designer, explained: "Together, these changes present the engineers with a huge challenge, especially with time pressure also a major factor. We've had to make various decisions on the chassis before all the necessary data and information was available to us. That is understandable, given that engine development continues alongside that of the rest of the car up to the last possible moment. And ultimately, of course, that is in our interests as well."

The engineers, therefore, followed the path offering the greatest possible flexibility, which allows them to respond to unexpected factors or developments.

**Low nose**

Perhaps the most visually striking element of the Sauber C33-Ferrari is the very low, snout-like nose. The front wing pylon's attachments on the nose have been moved out as far as possible allowed by the regulations to channel as much air as possible under the car.

The aerodynamics engineers were handed a new brief for the design of the front wing, which is 7.5 centimetres narrower on either side than the previous version. This creates very different airflow conditions. The entire front wing with its complex end plates, has, therefore, been newly developed from the ground up.

The front suspension concept has changed little, with its springs and dampers again pushrod-actuated. However, the changes to the regulations regarding the chassis profile have called for some detail adjustments.

The side crash elements have had a significant influence on the form of the side pods which is clearly visible in the design of the car. The cooling air intakes are slightly larger than those of last year's car because the cooling requirements of the power unit and ancillaries have increased considerably. For the same reason, the vertically mounted radiators are now significantly larger. Again, the engineers have built a degree of flexibility into their design to allow scope to react should requirements shift in one or other direction.

**Complex power unit**

The car's engine, energy recovery system and gearbox are supplied by Ferrari. The 1.6-litre turbocharged V6 engine has a rev limit of 15,000 rpm. A maximum 100 kg of fuel can be used for each race. Previously there was no limit on fuel usage and up to 140 kg of fuel was used, so this represents a significant improvement in fuel efficiency. Continuing the environmental theme, this year the number of engines which can be used in a season is also reduced from eight to five.

Where previously a maximum KERS boost of 60 kW was available for 6.6 seconds, now the drivers will be able to call on an extra 120 kW of power for 33 seconds per lap from the batteries. This additional output is fuelled not only by the kinetic energy generated under braking, but also by the heat energy produced by the engine. The system now comprises two electric

motors/generators, one coupled to the V6 engine's drive unit, the other connected to the turbocharger. It is also possible to drive the electric motor attached to the engine directly from the one driven by the turbocharger, which can extend the total usable electrical energy further. The turbocharger can also be driven electronically to limit delays in the creation of engine power on first application of throttle.

The all-new carbon gearbox has eight forward gears (as stipulated in the regulations), whose ratios may only be changed once over the course of the 2014 season.

The whole power unit may not weigh less than 145 kg.

**Flexibility and Adaptability**

The concept for the rear of the Sauber C33-Ferrari also includes a degree of adaptability, so that the engineers can make adjustments to this area of the car in response to varying conditions. The exhaust tailpipe is positioned centrally between two pylons, which connect the rear wing to the rear impact structure. A change in the regulations has enlarged the maximum permitted aperture between the flap and the main wing to 65 mm (during DRS activation - previously 50 mm), which increases the DRS effect of the rear wing.

The concept of the rear suspension remains unchanged. As previously, it is pull-rod-actuated.

The weight of the car presents the engineers with a major challenge, as the 49 kg higher minimum weight only partly cancels out the weight added predominantly by the power unit and its ancillaries. But not only the weight itself is a challenge, also the weight distribution is crucial when it comes to making optimum use of the tyres.

**Reliability is key**

Another tricky task for the engineers has been the packaging of the car's components. The complexity of the power unit has resulted in a threefold increase in the number of electronics boxes alone compared to the Sauber C32-Ferrari. This means they had to find a way to accommodate over 40 such components, more than 30 of which require cooling. It has become clear that thermal management is a key factor this season.

The braking system concept is totally new, taking the form of a brake-by-wire system for the first time at the rear wheels. This has become necessary due to the significantly increased performance of the ERS, which requires much greater variations in rear wheel braking torque than previously. With brake-by-

wire, an electronic system measures how hard the driver presses the brake pedal and then – using the additional information from energy recuperation – determines in a split-second the amount of braking pressure that should be fed through to the rear brake callipers.

“The radical changes to the technical regulations for 2014 mean that it’s even harder than usual to make predictions for the new season,” explained Chief Designer Eric Gandelin. “We know what kind of package we’ve put together here, but it is difficult to foresee what shape our rivals are in. The earliest opportunity to gain an impression of where the teams are in relation to one another will come during testing. The path we have followed with the design of the Sauber C33-Ferrari allows us maximum flexibility, so that we can react quickly. It is also clear that reliability will be an important factor in the first few races in particular. So this is an area which we have given very high priority.”

The Sauber F1 Team will begin the test in Jerez with a roll-out version of the Sauber C33-Ferrari. This means, that the car will be fully functional, but without a number of performance parts, which will be introduced for the two tests in Bahrain. Eric Gandelin explained: “On the one hand this gives us time to maximise the development of these performance relevant parts, and on the other hand we can run the car during the first test and check all the systems, which we feel is crucial, considering all the technical changes.”

**Sauber C33-Ferrari – Technical details**

| | | |
|---|---|---|
| Chassis | carbon-fibre monocoque | |
| Front suspension | upper and lower wishbones, inboard springs and dampers (Sachs Race Engineering) actuated by push-rods | |
| Rear suspension | upper and lower wishbones, inboard springs and dampers (Sachs Race Engineering) actuated by pull-rods | |
| Brakes | brake callipers (Brembo), carbon-fibre pads and discs (Brembo) | |
| Transmission | Ferrari 8-speed quick-shift carbon gearbox, longitudinally mounted, carbon-fibre clutch | |
| Chassis electronics | MES | |
| ERS | Ferrari | |
| Steering wheel | Sauber F1 Team | |
| Tyres | Pirelli | |
| Wheels | OZ | |
| Dimensions | length | 5,300 mm |
| | width | 1,800 mm |
| | height (minus T Camera) | 950 mm |
| | track width, front | 1,460 mm |
| | track width, rear | 1,416 mm |
| Weight | 691 kg (incl. driver, tank empty) | |

**Ferrari Engine**

| | |
|---|---|
| Configuration | V6 90° |
| Displacement | 1600 cc |
| Bore | 80 mm |
| Stroke | 53 mm |
| Valves | 4 per cylinder |
| Maximum revs | 15,000 rpm |
| Turbo charging | single turbo |
| Maximum fuel flow | 100 kg/h |
| Maximum fuel capacity | 100 kg |
| Injection | 500 bar – direct |
| Units per driver | 5 |

| ERS SYSTEM | |
|---|---|
| Battery Energy (per lap) | 4 Mj |
| MGU-K power | 120 kW |
| MGU-K maximum revs | 50,000 rpm |
| MGU-H maximum revs | 12’000 rpm |

# Team

## Organisation Tasks and people

| | |
|---|---|
| President of the Board of Directors | Peter Sauber (CH) |
| Team Principal | Monisha Kaltenborn (AT) |
| Driver number 21 | Esteban Gutiérrez (MX) |
| Driver number 99 | Adrian Sutil (DE) |
| Test and reserve driver | Giedo van der Garde (NL) |
| Test driver | Sergey Sirotkin (RU) |
| Marketing Director | Alex Sauber (CH) |
| Operations Director | Axel Kruse (DE) |
| Chief Designer | Eric Gandelin (FR) |
| Head of Aerodynamics | Willem Toet (GB/AU) |
| Head of Vehicle Performance | Benjamin Waterhouse (GB) |
| Team Manager | Beat Zehnder (CH) |
| Head of Track Engineering | Giampaolo Dall'Ara (IT) |
| Race engineer for Esteban Gutièrrez | Francesco Nenci (IT) |
| Race engineer for Adrian Sutil | Marco Schüpbach (CH) |
| Head of Track Operations | Otmar Bärtsch (CH) |
| Chief Mechanic | Reto Camenzind (CH) |
| Head of Communications | Hanspeter Brack (CH) |

## Hinwil – Headquarters and facilities

Coming from Zurich, you pass its eponymous lake on your right and drive southeast for half an hour before reaching Hinwil. This municipality of 10,000 at the foot of the 1,115-metre Bachtel mountain is a rural community. International visitors tend to be heading for one place: Sauber Motorsport AG, which is itself eminently international: the 300 or so staff listed at the start of the 2014 season represent more than 25 different nationalities.

The attractive industrial complex consists of three sections which were built in succession and, thanks to farsighted forward planning, were linked up in an ideal way. Located between the first factory and office building (completed in 1992) and the wind tunnel building (opened in 2004) is the most recent extension, which was occupied at the end of 2007. This increased the surface area for offices and production facilities to 15,600 square metres, not counting the wind tunnel.

Form follows function. Notwithstanding the architectural appeal of the buildings, the overall concept adhered to a strictly practical brief that ensured short distances and optimal work flows. Efficiency is a paramount aspect, as seen for example in an enclosed bridge that links the wind tunnel with the area housing the design office.

On the ground floor is the truck bay, with adjacent space for major production equipment, such as the portal milling machine. Also housed here are the mechanical production department and the autoclaves. The eroding machines, quality control and warehouse are located on the first floor.

The second floor has a particularly fascinating design. The central area is an atrium. This is where the Formula One racing cars are serviced and, thanks to its design, the cars can also be seen from the third floor. The second upper floor also houses the carbon-fibre, car body, hydraulics and rapid prototyping departments, with the administration, design office and electronics department on the level above.

### Wind tunnel

Immediately adjacent to the latest building stands the state-of-the-art wind tunnel, which went on stream in spring 2004. The exterior view of this structure, which measures 65 metres long by 50 metres wide and 17 metres high, is arresting with its glazed façade. Inside it are the workplaces of highly qualified specialists. In addition to the aerodynamicists, these also include model designers and model builders, CFD (Computational Fluid Dynamics) engineers and other staff from the aerodynamics department.

The facility boasts cutting-edge technology for all the relevant aspects such as wind speed, size of the test section and of the models, dimensions of the rolling road, model motion system and data collection.

The wind tunnel is designed as a closed circuit, measuring 141 metres in length (without the test section) and with a maximum tube diameter of 9.4 metres. The overall weight of all the steel elements plus the fan housing comes to 480 tonnes. The single-stage axial fan with carbon rotor blades uses 3,000 kW at full load.

At the heart of any wind tunnel is the test section. Both its diameter and the length of the rolling road are generously sized to provide optimal conditions for precise results. Testing with the actual racing car is technically possible, but tends to be the exception due to the regulations. Work is carried out almost exclusively using 60-percent scale models.

To allow the test models to be exposed to the air stream not just frontally but at an angle of up to ten degrees as well, the entire measuring platform can be rotated. The platform features a rotating steel belt which simulates the relative motion between the vehicle and the road and which runs in sync with the flow of air. Load cells are mounted under the belt to measure wheel loads.

Externally, the elegant wind tunnel building appears as a homogeneous hall, whereas in fact it consists of clearly separate elements: the actual wind tunnel and a wing with work offices and an event platform where partners and sponsors can hold events in a unique setting. The first-floor gallery has room for 150 guests.

This area is divided from the technical section by a glass wall, which ensures that the visual link is preserved while insulating it against the noise from the wind tunnel.

# Drivers

## Esteban Gutiérrez

### No more a rookie

Esteban Gutiérrez finished his debut 2013 season in Formula One as best rookie in 16th in the drivers' championship. With his great talent he has demonstrated that he's got what it takes for the top echelon of motor racing. Already he is well integrated in the team, where he is valued as an open, loyal and politely reserved young driver.

Gutiérrez began his career in karting. He then finished runner-up in the Formula BMW USA series in 2007 and went on to win the Formula BMW Europe crown a year later. After a spell in the Formula 3 Euro Series, he switched to the GP3 Series in 2010 and stormed to the championship title with five race wins. Two seasons in GP2 followed, the second of which (2012) saw him collect three victories and finish third in the standings. Gutiérrez was given his first chance to test for the BMW Sauber F1 Team in 2009 and further opportunities occurred in the next few years.

The team got to know Gutiérrez in 2008. He drove an outstanding season in Formula BMW Europe, which earned him the reward of a Formula One test drive in Jerez at the end of 2009. The young Mexican acquitted himself well and Sauber took him under its wing as an affiliated driver for 2010. The track schedules dovetailed nicely: with the GP3 races being held against the backdrop of the European Formula One events, Gutiérrez was always on location. That gave him frequent opportunities to listen in on the radio messages from the F1 garage and take part in technical meetings. He quickly grew into the team, was promoted to test and reserve driver in 2011 and Formula One driver in 2013. Team Principal Monisha Kaltenborn: "Last season he experienced how hard it can be for a rookie to step into Formula One. He had a tough start, nevertheless he improved significantly throughout the season in qualifying as well as in the races, and finished the season as best rookie in the drivers' championship. We are confident that he will be able to translate his experience he gained into good results."

### Family ties

Gutiérrez has four brothers and a sister, him being the second youngest. Chauffeuring all of them around individually was not an option for the parents, and so it was rather convenient that Esteban discovered karting as a hobby at the same time as his brother Andres, seven years his senior. For the older

brother it was to remain a hobby: today he works for his father's business, which includes a supermarket chain, a wholesaler for the outlets, and a steel company.

"As children we were always busy doing things and we also had a lot of different toys," recalled Gutiérrez. "However, when I started clamouring for a go-kart, my father was initially opposed. Fortunately, my cousin already had a go-kart, which helped my case." After cutting his teeth in kart racing in 2004, his career soon picked up speed. At the age of 13 he began competing in races, at 15 he had switched to a single-seater raceing car, and at 16 he was lining up on the grid in Europe for the first time.

Gutiérrez has been with Sauber for four years now. He feels comfortable and is looking forward to the continuing collaboration. "I am happy to be able to continue as a driver for the Sauber F1 Team. It was a steep learning curve during the past season, but working together with the team I was able to improve continuously. It will be my fourth year with the team, the second as a racing driver, and I feel comfortable to take the next step. The technical challenges in 2014 will be massive. Therefore it will be even more important to know the people you are working with very well. I will do my very best to improve even more and support the team as best as I possibly can."

**Esteban Gutiérrez**

| | |
|---|---|
| Date / Place of birth | 5th August 1991 / Monterrey, Nuevo Leon, Mexico |
| Nationality | Mexican |
| Website | www.estebanracing.com |
| Marital status | Single |
| Height / Weight | 1.80 m / 63 kg |
| Hobbies | Karting, motorbike trials, golf, skiing, virtual racing |
| Favourite food | Italian cuisine and sushi |
| Favourite drink | Lemonade |
| Favourite music | Coldplay, Muse, Kings of Leon |
| Favourite race track | Hockenheim |
| Languages | Spanish, English, French |
| **Career:** | |
| 2004 | Kart racing: Mexican Rotax Max Challenge |
| 2005 | Kart racing: Mexican Rotax Max Challenge,<br>3rd place in the Grand Nationals in South Bend |
| 2006 | Kart racing: Mexican Rotax Max Challenge,<br>1st place North Mexican Series,<br>4th place in the Mexican Grand Nationals in Zacatecas; |

| | |
|---|---|
| | Camkart Challenge Mexico: 5 wins in 5 races;<br>tests Formula Renault 2000<br>Ayrton Senna award and trophy for Achievement and Sportsmanship |
| 2007 | 2nd place Formula BMW USA, Rookie of the Year, 4 wins, 8 podiums, 9 poles;<br>tests A1 GP;<br>Formula BMW races in Hockenheim and World Final in Valencia |
| 2008 | 1st place Formula BMW Europe, 7 wins in 16 races, 12 podiums, 3 poles; 3rd place Formula BMW World Final in Mexico City; Formula Master races in Imola and German Formula 3 Championship in Oschersleben;<br>tests Formula 3 Euro Series |
| 2009 | 9th place Formula 3 Euro Series, 3 podiums (1 in the F3 Euro Series and 2 in the British F3 Int.-Invitational Division) tests Formula One (BMW Sauber F1 Team) and GP2, youngest Mexican driver in history to test an F1 Car, at 18-years-old |
| 2010 | 1st place GP3 Series, five wins, total of nine podiums, 3 poles; affiliated driver at Sauber Motorsport for Formula One |
| 2011 | GP2 Asia and GP2 Main Series, 1 win, total 2 podiums<br>test and reserve driver Sauber F1 Team |
| 2012 | 3rd place GP2 Series, 3 wins, total 7 podiums;<br>test and reserve driver Sauber F1 Team |
| 2013 | 16th FIA Formula One World Championship, 6 points (Sauber F1 Team) |

| **F1 stats to date:** | |
|---|---|
| First GP | Australia 2013 |
| GP starts | 19 |
| Best race result | 7th Japan (2013) |
| Best qualifying | 9th Korea (2013) |
| Points | 6 |
| Wins | - |
| Pole positions | - |
| Podium places | - |
| Fastest race laps | 1 |

## Adrian Sutil

### From piano to the steering wheel

Adrian Sutil has walked quite a different path until he became a racing driver. Up until he was 14-years-old he was a very talented pianist: “Back then all I did was play the piano. My family is very musical.”

His father Jorge, who emigrated to Germany from Uruguay when he was a child, played in the Munich philharmonic orchestra for many years. At the age of 14 Sutil had his first experience with karting: “My brother Daniel took me along to an indoor kart centre in Munich. From that moment on we were both smitten. We spent all our free time at the kart centre. At some point my brother got his own kart. After he had raced in the German championship for a year, he stopped and I inherited his karts and all the gear. That’s how I started to seriously get into motor racing with the clear goal of Formula One ahead.”

Sutil dominated several local kart series and in 2000 he was third in the German ICA Karting Championship. In 2002 Adrian started driving single-seaters. He won the Swiss Formula Ford Championship with 12 wins in 12 races. In 2005 he came second in the Formula 3 Euro Series, and despite five retirements in 18 races he was on the podium 11 times.

### One clear goal

“I have wanted to become a racing driver ever since my first contact with motorsport. All of my attention was on the sport and from that moment forward the roar of an engine was music to my ears,” Sutil explained. In 2006 he had a first glimpse of Formula One as test driver for Midland F1 Racing. The same year he won the Japanese Formula 3 championship.

After nine years in motor racing, with five of them in formula racing, in 2007 Sutil made his debut in Formula One with the Spyker F1 Team. The highlights of his career to date are starting from second on the grid and finishing fourth in the 2009 race in Monza. His best ever ranking in the drivers’ championship was ninth in 2011. After a one-year break, Sutil returned to Formula One in 2013 driving for Sahara Force India.

### Speed and experience

Adrian Sutil also knows that looking at the new rules, 2014 will be a challenge and he is confident his experience and the experience of the team will be very valuable: “I am very happy to join the Sauber F1 Team. For over 20 years Sauber has been an established name and is a team that has a lot of experience. Especially during the second half of the 2013 season, you could

see what the team is capable of. It was able to significantly improve the C32. I was also impressed by the factory and the wind tunnel, which are superb. The 2014 season will be a challenge looking at the new regulations, so it is good to have an experienced team to enter this contest."

**Adrian Sutil**

| | |
|---|---|
| Date/Place of birth | 11th January 1983 / Starnberg (DE) |
| Nationality | German |
| Website | www.f1.adriansutil.com |
| Height / Weight | 1.83 m / 75 kg |
| Marital status | In a relationship |
| Hobbies | Hiking, reading, modern and classic cars |
| Favourite food | Various pasta dishes, Asian cuisine |
| Favourite drink | Smoothie from Jennifer |
| Favourite music | From soundtracks to classic, to hip hop to electro – it simply depends on my mood |
| Favourite track | Spa Francorchamps, Monaco |
| Languages | German, English, Spanish |
| **Career:** | |
| 2000 | 2nd place German ICA Karting Championship |
| 2001 | Driver for Birel Motorsport (Italy) |
| 2002 | 1st place Swiss Formula Ford (12 wins in 12 races) |
| 2003 | 6th place German Formula ADAC BMW Karting |
| 2004 | 17th place Formula 3 Euro Series |
| 2005 | 2nd place Formula 3 Euro Series |
| 2006 | 1st place Japanese Formula 3<br>Formula One test driver (Midland F1 Racing) |
| 2007 | 19th place FIA Formula One World Championship, 1 point (Etihad Aldar Spyker F1 Team) |
| 2008 | 20th place FIA Formula One World Championship (Force India F1 Team) |
| 2009 | 17th place FIA Formula One World Championship, 5 points (Force India F1 Team) |
| 2010 | 11th place FIA Formula One World Championship, 47 points (Force India F1 Team) |
| 2011 | 9th place FIA Formula One World Championship, 42 points (Force India F1 Team) |
| 2013 | 13th place FIA Formula One World Championship, 29 points (Sahara Force India F1 Team) |
| **F1 stats to date:** | |
| First GP | Australia 2007 |
| GP starts | 109 |

| | |
|---|---|
| Best race result | 4th Monza (2009) |
| Best qualifying | 2nd Monza (2009) |
| Points | 124 |
| Wins | - |
| Pole positions | - |
| Podium places | - |
| Fastest race laps | 1 |

## Giedo van der Garde

### Revving it up at a young age

Giedo van der Garde will swap his race seat and join the Swiss racing outfit as test and reserve driver for the upcoming 2014 season. The 28-year-old Dutchman started his racing career at the tender age of nine. “My dad has a bit of a racing history too. He drove a Ford 2000 as a hobby, he didn’t have that much money, but he won every race,” van der Garde recalled. “I started with karting when I was nine. After I won the Dutch Championship, -I was 12 back then - I told my mum that I wanted to be a Formula One driver. Fifteen years later I was a Formula One driver.”

After a successful karting career, van der Garde advanced to Formula Renault in 2003. He finished sixth in the Euro Cup and fourth in his native Netherlands championship. Aged 19 he graduated to Formula 3 in 2004 and finished ninth in the Euro Series standings in his debut year. He raced in the Formula 3 Euro Series for two more years, and moved up to the World Series by Renault in 2007, scoring a sixth place overall in his debut season. In 2008 he stayed in the World Series Championship, winning the title with five race victories and eight podiums.

### A first taste of Formula One

In 2007 and 2008 he gained first experiences of Formula 1 by testing for Force India and Renault. Van der Garde entered the GP2 Series in 2009, winning three races in his debut season and finishing seventh in the championship. He continued in GP2 for the next two seasons, scoring nine more podiums. Van der Garde also raced in the GP2 Asia Series for two years, finishing third in the standings in 2011.

In 2012 van der Garde joined the Caterham Group as a race driver for the Caterham Racing GP2 team and reserve driver for the Caterham F1 Team. He won GP2 races in Spain and Singapore and finished sixth in the drivers’ championship. Van der Garde also took part in six FP1 sessions as well as pre-season and end-of-season tests. He became the first driver to graduate from Caterham’s GP2 team into a full-time Formula 1 race seat. In 2013 van der Garde made his debut in Formula One.

Now he is looking forward to joining the Sauber F1 Team. He will be driving during some Friday sessions and in several tests in the 2014 season. “I consider this an important step in my career. It is my goal to help the team with the development of the new car. But, of course, I am a racing driver, and I want to show the team and everybody else what I am capable of and that I deserve a race seat with the Sauber F1 Team in 2015. After all, my ambition remains unchanged and I am highly motivated to succeed in Formula One, especially in the long term,” van der Garde explained.

“For now, I am really very excited to have signed a contract with the Sauber F1 Team. For every driver it is a dream to work for a well established team such as Sauber. In recent years it has shown impressive results. I am really grateful for this opportunity and I will certainly do my utmost to succeed.”

**Giedo van der Garde – Test and reserve driver**

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|---|---|
| Date/Place of birth | 25th April 1985 / Rhenen, (NL) |
| Nationality | Dutch |
| Website | www.giedoveandergarde.com |
| Height / Weight | 1.83 m / 70 kg |
| Marital Status | Married |
| Hobbies | DJ-ing, soccer, paddle |
| Favourite food | Japanese |
| Favourite drink | Water |
| Favourite music | House |
| Favourite track | Spa Franchorchamps |
| Languages | English, Dutch, German |
| **Career:** | |
| 1995-2002 Karting | World Champion Karting Formula Super A Karting |
| 2003 | 6th place Formula Renault Euro Cup<br>4th place Formula Renault NL |
| 2004 | 9th place Formula 3 Euro Series<br>13th place Formula 3 Masters |
| 2005 | 9th place Formula 3 Euros Series<br>6th place Formula 3 Masters |
| 2006 | 6th place Formula 3 Euro Series<br>2nd place Formula Masters |
| 2007 | testing Force India F1 Team<br>6th place Formula Renault 3.5 Series |
| 2008 | testing Renault F1<br>1st place Formula Renault 3.5 Series |
| 2009 | 7th place GP2 |
| 2010 | 7th place GP2 |
| 2011 | 5th place GP2<br>3rd place GP2 Asia |
| 2012 | Test Driver Caterham F1 Team<br>6th place GP2 |
| 2013 | 22nd place FIA Formula One World Championship<br>(Caterham F1 Team) |
| **F1 stats to date:** | |
| First GP | Australia 2013 |
| GP starts | 19 |

| | |
|---|---|
| Best race result | 14th Hungary (2013) |
| Best qualifying | 14th Belgium (2013) |
| Points | 0 |
| Wins | - |
| Pole positions | - |
| Podium places | - |
| Fastest race laps | - |

## Sergey Sirotkin

### Destined to race

Sergey Sirotkin is a young, ambitious racer who is wasting no time in advancing to the crème de la crème of motor sport, Formula One. The Russian took to the wheel of a kart for the first time at the tender age of five, during a family holiday in Spain. “I was always watching Formula One on TV with my father so, of course, I wanted to have a try when I saw the karts. Not long after that a karting track opened near where we were living, and I couldn’t get enough of it,” he recalled. After realising his speed matched his passion, he started competing in several local as well as national series.

### Life in the fast lane

Debuting in competitive karting in 2003, Sirotkin won the Moscow championship in 2006 and became Russian champion for two years in a row, in 2007 and 2008. There were two things in Sirotkin’s life - racing and school. “My racing was never really an issue for my parents. Of course, when I started school that seemed more important, but through my results in karting I was able to convince my parents that both were equally important.”

In the search to be more competitive he soon left Russia to race in Europe. His brief karting career outside of his home country saw him competing in several KF3- and KF2-Championships, and at just 15-years-old Sirotkin had already graduated to single-seaters.

“I went to Europe to compete in karting, and I learned a lot. The problem was I was becoming a bit too heavy and tall for the kart.” He finished third in the Formula Abarth Winter Cup in 2010 and went on to win the Formula Abarth European Series, being runner-up in the Italian Formula Abarth in 2011. During 2012 Sirotkin drove in the Auto GP World Series, finishing third, and was fifth in the European and Italian Formula 3 Series. Having tested in World Series by Renault in 2012, Sirotkin finished ninth in the 2013 Series.

### Working hard for the big dream

Inspired by the Formula One heroes of the 90’s and 2000’s and moving up the ranks from karting to single-seaters, Sirotkin’s ambition to be a successful Formula One driver does not stop at developing his skills as a driver. Upon finishing high school, he started a degree at the Moscow State Automobile and Road Technical University in 2012. This will help him to gain a good technical understanding.

“If you like something, it should challenge you. I used to play football as well, I liked it and it was fun, but the challenge was missing. Racing was always something special to me, the urge to always win and improve keeps me

motivated, as well as the fascination of cars, how they work and how you can push the limits."

Monisha Kaltenborn explained: "We see what great talent Sergey has. He is a very focused person, calm and collected. We will support him in getting his super license. Our goal is to prepare him for a debut in Formula One."

**Sergey Sirotkin – Test driver**

| | |
|---|---|
| Date / place of birth | 27th August 1995 / Moscow, Russia |
| Nationality | Russian |
| Website | N/A |
| Height / weight | 1.84 m / 71 kg |
| Marital status | Single |
| Hobbies | Karting |
| Favourite food | Italian |
| Favourite drink | Water, coffee |
| Favourite music | Depends on the mood |
| Favourite track | Mugello, Monaco |
| Languages | Russian, English |
| **Career:** | |
| 2006-2008 Karting | 2006 Moscow Champion<br>2007-8 Russian Champion |
| 2010 | 4th place Viking Trophy KF2<br>5th place Florida Cup USA, KF3<br>3rd place Formula Abarth Winter Cup |
| 2011 | 1st place Formula Abarth European Series<br>2nd place Formula Abarth Italian Series |
| 2012 | 3rd place Auto GP World Series<br>5th place European Formula 3<br>5th place Italian Formula 3<br>Formula Renault 3.5 Series (tests) |
| 2013 | 9th place Formula Renault 3.5 Series |
| 2014 | Formula Renault 3.5 Series<br>Test driver Sauber F1 Team |

# President of the Board of Directors

## Peter Sauber

### A unique career

What's in a name? As a Formula One team boss, Peter Sauber (which translates as "clean") enjoys the reputation of a straight-as-a-die racer and responsible businessman. The Swiss entrepreneur built up his team in his home country – where motor racing wasn't exactly popular – and has weathered some rough times over the course of 40 years. He has been married to the same wife for almost five decades and makes a point of naming his racing cars after her – the C stands for Christiane Sauber. The couple have two grown-up sons and three grandchildren.

By his own estimation, the qualified electrician would not have got very far as a racing driver, even though he became Swiss champion in 1970 in the C1, his first self-constructed race car. But his passion for building cars proved greater and was matched by the courage it took to set up his own operation. This, along with his ability to talk others into an involvement, set the course for some remarkable achievements.

A glimpse inside the team shows ample evidence of this. Formula One is known for its rapid burnout effect on those involved, yet some team members have been on board for 25 years now. Peter Sauber has also successfully applied his powers of persuasion to negotiations with corporate executives. In the mid-1980s he brought Mercedes back onto the international racing stage, and it was with Sauber's team that BMW planned a long-term future in motorsport's crowning discipline.

In January 2006, TV audiences across Switzerland's various language regions voted Peter Sauber "Swiss of the Year" for 2005, in recognition of his achievements in both the sporting and the business world.

Two thousand and ten saw him return to the pit wall after buying back the business from BMW at the end of 2009. "It wasn't by choice," he declares, "but it was the only way to save the workplaces and technical facilities."

Since then, a great deal has happened. At the end of 2011 he gave a third of the company's stakeholding to Monisha Kaltenborn. On 11th October 2012 – two days before his 69th birthday – he stepped back entirely from business operations, also entrusting her with the role of Team Principal. Peter Sauber remains the majority shareholder and President of the Board of Directors and,

as such, he continues to influence company strategy. The operational side is handled by the management team headed up by Monisha Kaltenborn. Peter Sauber divides his time between his house in Wilen on Lake Zurich and his second home in Laax. Time permitting, he enjoys taking his motorbike out for a spin or heading off for the ski slopes.

**Peter Sauber**

| | |
|---|---|
| Date / place of birth | 13th October 1943 / Zurich, Switzerland |
| Nationality | Swiss |
| Residence | Wilen (CH) |
| Marital status | Married to Christiane, sons Philipp (1971) and Alex (1973) |
| Hobbies | Motorcycling, skiing, horse-riding, golf |
| **Career:** | |
| 1970 | Swiss champion (as driver) in a self-built sports car (Sauber C1) |
| 1976 | Interserie championship title, Herbert Müller (Sauber C5) |
| 1982 | Debut in World Sports Car Championship |
| 1986 | Victory in the Nürburgring 1000 km race, Nürburgring (Sauber-Mercedes C8) |
| 1989 | World Sports Car Championship manufacturers' and drivers' title (Sauber-Mercedes C9),<br>one-two in the Le Mans 24 Hours |
| 1990 | World Sports Car Championship manufacturers' and drivers' title (Sauber Mercedes C11),<br>setting up of junior team with Michael Schumacher, Karl Wendlinger, Heinz-Harald Frentzen |
| 1993 | Formula One debut at the South African GP, 5th place for JJ Lehto (Sauber C12) |
| January 2006 | BMW takes a majority stake in the team, Sauber takes on an advisory role in the BMW Sauber F1 Team;<br>Sauber named 2005 "Swiss of the Year" |
| November 2009 | Team bought back from BMW |
| 2010 | The Sauber F1 Team competes as a privateer team |
| Late 2011 | Peter Sauber gives one third of the company to Monisha Kaltenborn |
| 11th October 2012 | Peter Sauber retires from his post as Team Principal |

# Team Principal

## Monisha Kaltenborn

### Charm and perception

As a child her ambition was to be an astronaut. When she made her first acquaintance with the world of motor sport, she was determined one day to compete in the Paris-Dakar Rally. Monisha Kaltenborn had no time for minor aspirations. She plotted her career path early on: law was what interested her, and she also had an executive position firmly in mind. Now aged 42, Kaltenborn's career trajectory led her from the Fritz Kaiser Group straight into Formula One. In 2010 she was appointed CEO of the Sauber F1 Team – the first woman to head up the business operations of an F1 outfit. On 11th October 2012 she also took on the role of Team Principal.

She was still a child when her family decided to emigrate from their homeland of India and settle in a different part of the planet. "Back then it happened not out of necessity but more out of curiosity," she recalled, "and in the end my parents opted for Vienna." It was there that Kaltenborn completed her law degree and took on Austrian citizenship. She was to continue her law studies at various internationally renowned universities, worked for the United Nations as well as for German and Austrian law firms. When she joined the Fritz Kaiser Group in 1998, Kaiser was a shareholder in the Red Bull Sauber F1 Team. The group's legal and corporate affairs became Kaltenborn's responsibility. When Kaiser sold off his shares in the team at the turn of the millennium, she moved to Hinwil to run the Sauber Group's legal department. She has been on the Board of Management since 2001, which she now heads after her appointment as CEO in 2010.

Negotiating watertight contracts with drivers, sponsors and suppliers was her daily fare over all those years. She also dealt with relations with the FIA, the commercial rights holder FOM, and FOTA. Prior to 2010 she rarely appeared on the public radar, though she was well known to company directors and key figures such as Bernie Ecclestone and Jean Todt. Unlike a former team boss: "For a whole year he assumed I was Peter Sauber's interpreter," Kaltenborn recalled with a laugh. She has no problem in graciously allowing a man in a man's world to believe what he wants and will occasionally conceal her razor-sharp mind behind a smile. "Being underestimated can sometimes be an advantage to be exploited," she said.

Kaltenborn is involved in the FIA's Women in Motorsport Commission, founded in April 2010 and headed by Michèle Mouton. At Hockenheim in 2010, she was

the first woman to attend an FIA press conference, where she was representing the team's top management. It attracted a good deal of attention at the time, but since then much has become routine. The spotlight shone on her even more brightly at the first Grand Prix held in her home country India. She rates her media profile purely in terms of whether it's good for the team or not. But her objectivity is no bar to the sheer enjoyment she takes in her job, which she will sometimes admit with refreshing candour to be "really cool". "But the truly exciting part of my job," she pointed out, "takes place behind the scenes."

Strict management structures are also de rigueur in her private life. Kaltenborn, with her family, lives in Küsnacht, just a 20-minute drive from the factory. When a rare window of leisure time opens up, she will usually make the most of it on a yoga mat, on the tennis court or on a rare visit to the opera.

**Monisha Kaltenborn**

| | |
|---|---|
| Date / place of birth | 10th May 1971 / Dehradun, India |
| Nationality | Austrian |
| Residence | Küsnacht (CH) |
| Marital status | Married to Jens, one son (2002), one daughter (2005) |
| Hobbies | Yoga, tennis, opera |
| **Career:** | |
| 1990-1995 | Law degree at the University of Vienna (AT), qualified as Magister iuris |
| 1994 | Seminar on International Civil Law, Hague Academy for International Law (NL) |
| 1995 | Research assistant at the UN Organisation for Industrial Development in Vienna; research work for the UN Commission for International Trade Law in Vienna |
| 1996 | Master of Law, International Business Law, at the London School of Economics (GB) |
| 1996/1997 | Law firm Gleiss, Lutz, Hootz, Hirsch in Stuttgart (DE) |
| 1997/1998 | Law firm Wolf, Theis + Partner in Vienna (AT) |
| 1998/1999 | Fritz Kaiser Group, legal and corporate affairs of the Red Bull Sauber F1 Team |
| 2000 | Sauber Group, Head of the Legal Department |
| 2001 | Member of the Board of Management |
| From January 2010 | CEO Sauber Motorsport AG |
| End of 2011 | Receives a third of the company's stakeholding |
| October 2012 | Takes over from Peter Sauber as Team Principal |

# Technology and background

## Monocoque

The monocoque constitutes the core of every Formula One car. It is the driver's workplace and survival cell in one. The engine is flanged onto it at the rear, the car's nose at the front. The shape of the monocoque is dictated by various factors. These include the dimensions – as per regulations – of the cockpit opening, for example, as well as the length of the wheelbase, the size of the fuel tank, the driver's measurements and various aerodynamic requirements.

In the design process for the monocoque, the first stage is to define the surface form. Following that, finite-element calculations are carried out to ensure that the safety cell complies with the necessary levels of rigidity and strength identified by the engineers. These are based on the one hand on the dynamic loads experienced by the car, and on the other on the safety stipulations of the FIA. Standards have become increasingly stringent over recent years, ensuring a significant increase in passive safety for the drivers. The most important tests are the frontal crash (with the nose section) at a speed of 15 m/s, the stationary load test for the rollover bar, which has to withstand around 12 tonnes of pressure and the newly introduced side impact structure squeeze test, where ten and 15 tonnes are applied simultaneously to the upper and lower side structures to test the monocoque's strength. A total of four dynamic and more than a dozen stationary tests are carried out on the car as a whole.

The monocoque consists of a carbon-fibre/aluminium honeycomb composite, which makes for extremely high rigidity and strength while keeping weight low. The composite engineers work out how many layers of carbon fibre are needed in which areas of the car so as to fulfil the diverse requirements. Here they can also select various types of carbon fibre, depending on whether forces are exerted from a single direction or several. In areas subjected to particularly high loads, up to 60 layers of carbon fibre may be stacked on top of each other. In total, a monocoque is made up of some 1,500 individual carbon-fibre elements.

It consists of two half-shells into which additional strengthening elements are glued. Following several curing stages in the autoclave, the two halves are glued together. The final stage involves the assembly of numerous securing components.

Their extremely high strength means that monocoques provide drivers with maximum protection even in major accidents. Because the fuel tank is also

contained within the monocoque, dramatic accidents involving fires are a thing of the past. After a crash, the safety cell can almost always be repaired.

At Hinwil, four monocoques are built per year for use in races and testing as well as for rig tests. Every single safety cell has to be homologated by the FIA, although only the first example has to pass the full range of tests.

## Carbon fibre

With the exception of the engine, gearbox components and wheel rims, a Formula One car is made almost entirely of carbon fibre. The salient properties of carbon are its high rigidity and strength coupled with very low weight. It compares with steel in terms of rigidity, yet it is around five times lighter. The downside is the highly complex manufacturing process and the high cost of the material: one square metre of pre-impregnated carbon-fibre sheeting costs from 50 to 200 euros.

Carbon fibres have a diameter of five to eight micrometres. Generally, between 1,000 and some 20,000 fibres are bundled together before being woven into fabric-like structures.

Approximately 20 different types of carbon-fibre material are used in Formula One, largely distinguished by their structure and the type of resin with which they are impregnated. If forces only come from one direction, a unidirectional weave is used, whereas forces emanating from various directions require a bidirectional weave. Specialist composite engineers determine which weave is required with which resin and how many layers are needed to achieve the desired properties.

The manufacturing process for carbon-fibre parts involves several stages. First the component is designed on the computer by means of CAD (Computer Aided Design). This data is then refined and serves as a basis for CAM, or Computer Aided Manufacturing. Using a five-axis milling machine, the form is cut into a tooling block that serves as a positive mould. The laminators lay the pre-shaped carbon-fibre pieces on this tooling block. Once this process has been completed, the entire item is packed into a polythene bag, vacuum-sealed and placed inside an autoclave, where it is cured for ten to 20 hours at a temperature of around 50°C. Following some final touches, the resulting negative mould is then ready to be used for the manufacture of the actual carbon-fibre component.

The laminators lay the pre-shaped carbon-fibre pieces on top of and alongside each other in the negative mould following plans drawn up by the composite engineers. Depending on the component, these can number up to several hundred. When everything is ready, the mould with its carbon-fibre inlay is

likewise packed into a polythene bag, vacuum-sealed and baked for five or six hours at a temperature of approx. 150°C. After this curing process, the individual parts are further refined and combined to form complete components. A front wing, for example, consists of around 20 individual carbon-fibre parts. For components that have to be exceptionally robust, Kevlar or Zylon are used alongside the carbon fibre.

## Brakes

As a rule, it is not so much the speed as the deceleration that really takes a rookie driver by surprise the first time he gets behind the wheel of a Formula One car. The braking power – which can sometimes peak at over 5*g* – is quite literally breathtaking.

This kind of deceleration derives from a combination of high aerodynamic downforces and extremely high-performance braking systems. Unlike road cars with their steel brake discs, racing cars use carbon-fibre discs and pads. Not only are these components much lighter than their steel counterparts – a complete set of discs and pads weighs less than 10 kg – but they can also generate vast amounts of braking energy.

While carbon fibre is used for the discs and pads, the front and rear callipers are made of aluminium alloy. On safety grounds, Formula One cars have two brake circuits, one front and one rear, and therefore also two master cylinders – one for each circuit. The diameter of the master cylinder is variable, depending on the preferences of the driver and the stipulation for 2014 that their master cylinder diameters are within two millimetres of each other. A larger-diameter master cylinder limits maximum braking pressure but will give better feel. The driver's foot has to pile on plenty of pressure too – coming into the first chicane at Monza, drivers will typically apply anything up to 150 kg of force at the pedal. But they can be sure of getting results: cars need no more than 2.5 seconds and 130 metres to brake from 335 km/h to 90 km/h. For the driver, the effect is like being punched in the pit of the stomach.

For maximum deceleration, it is important to keep the brake discs at the right temperature. The optimal range lies between 350° and 550° Celsius, although short peaks of up to 1,000° are permissible. Different race circuits make different demands in terms of brake venting. A track like Montreal, for example, where the brakes take a lot of punishment, will require a high degree of brake cooling – unlike Silverstone, where the demand is low.

When following the safety car, the temperature of the brakes can soon fall below 200°C. This is always a challenge for the drivers, who have to increase the temperature of their brakes as much as possible just before the safety car

is withdrawn and the race restarts. But they have to be careful, otherwise there is a risk the brake discs could vitrify. In other words, the surface of the discs could harden, resulting in significant loss of braking performance.

Finally, it is perfectly normal practice for Formula One drivers to alter the brake force distribution on their car during the race. In the past this was performed by using a lever in the cockpit, however in 2014 a regulation change associated with the new power unit permits the use of a brake-by-wire (BBW) system, which regulates the pressure to the rear circuit. This enables the driver to modify the brake balance of the car via a switch on the steering wheel. If the front wheels are showing a tendency to lock, the driver can direct more brake force to the rear in order to reduce the load on the front wheels. Drivers also have a second switch with which they can adjust the brake balance shape to be suitable for individual corners.

## Seat

As well as generating immense deceleration under braking, Formula One cars also subject the drivers to over 4 *g* of lateral acceleration through corners. During a race these forces are repeatedly exerted on the drivers over a period of one-and-a-half to two hours, which means the perfect seating position is absolutely crucial as even the tiniest pressure points can lead to pain or cramp. That is why each driver uses his own seat that has been precisely tailored to his body measurements.

When a new seat is manufactured, a basic carbon-fibre shell is lined with a polythene bag. This contains either a dual-component foam or polystyrene granules which are then vacuumised. The driver gets inside the seat and waits until the mass gradually moulds itself to his body shape. While this is going on, small modifications are repeatedly carried out. In addition, the position of the steering wheel and the pedals are adjusted. When the perfect fit has been established, the seat foam or polystyrene granules are left to harden.

This kind of seat fitting will occupy a driver for between a half and a full day. The resulting seat is a transitional version which will be used for the initial tests and serve as a prototype for the permanent seat. To create the definitive seat, the interior surface of the provisional model is electronically scanned. The engineers then use this scan to create a mathematical surface based on which the shape of the seat is milled into a tooling block. Through the layering of individual carbon-fibre sheets, the final seat takes shape before being cured in the autoclave.

In the final stage the seat is given its finish, which includes cutting the apertures for the safety and rescue belts and adding a layer of padding roughly one millimetre thick. A finished seat weighs in at around three kilograms.

## Steering wheel

The steering wheel of a Formula One car acts as the driver's command centre. He uses it to steer, operate the clutch and change gear, as well as controlling numerous electronic functions by means of various buttons and switches.

The first stage of the design process involves the engineers specifying the functions that are to be controlled by buttons or rotary switches. Following that, the initial layout is determined before a provisional version of the steering wheel is made by means of rapid prototyping. Now the driver can judge whether all the controls are in just the right position. If not, he advises on where he would like changes to be made.

Manufacture of the definitive wheel can now start. A carbon-fibre shell with a lid forms the basis. The holes for the switches and buttons are drilled into the lid before the foam for the steering wheel grip is applied, which is in turn wrapped in carbon fibre. During the finishing process, various coverings are used. Depending on driver preference, the grip can be lined with leather or even with a silicon mass moulded to the shape of the driver's hands.

Now the buttons and switches are mounted and wired up to the circuit board before the display is connected as well. Since 2008 the circuit board and the display have been part of the SECU (Standard Electronic Control Unit) and are available from the FIA as standardised components.

Once all the electronics work has been carried out, the specialists start mounting the mechanical parts on the reverse of the steering wheel; these include the gearshift and clutch paddles as well as the quick release mechanism. It is a familiar sight to see drivers removing the steering wheel to get in and out of the car and then replacing it afterwards. The quick release mechanism must also pass an FIA test in which the driver has to be able to vacate the cockpit within five seconds.

Before the steering wheel is deployed on the track, it is thoroughly checked on a test rig. Once the tests have been successfully completed, the buttons and switches are glued onto the reverse of the frame – and the 1.8 kg high-tech component is ready for action.

# History and statistics

## Tales of the unexpected

Peter Sauber had never been particularly interested in cars, and motor racing didn't do anything for him at all. The fact that, in 2010, Sauber was able to celebrate the 40th anniversary of Sauber Motorsport had a lot to do with chance in the early days, but afterwards it was down to sheer perseverance and, later on, a good deal of hard graft and skill.

Sauber's father owned a company for electrical systems, which employed around 200 staff and had premises in Zurich as well as on Wildbachstrasse in Hinwil. Sauber's career path seemed to be mapped out. He trained as an electrical fitter with the aim of gaining further qualifications and following in his father's footsteps. But it would all turn out rather differently.

In 1967 Sauber used to drive to work every day in a VW Beetle – until a friend persuaded him to have some tuning work done. For a bit of fun he then entered it in a few club races in 1967. Far more significantly, it sparked his passion for tinkering with cars. He modified his Beetle to such an extent that eventually it was no longer fit for road use. This led to the next stage in Sauber's career: in 1970 he decided to set himself up as an independent builder of open two-seater racing sports cars. Out of the cellar of his parents' home in Zurich emerged the Sauber C1. He used the first name of his wife Christiane as the model designation.

That same year, he set up PP Sauber AG and moved into a specially built workshop on the premises of his father's company in Wildbachstrasse. With the C1 he won the 1970 Swiss sports car championship, but soon whittled things down to the occasional appearance as a racing driver. In 1974 he donned his helmet for the last time before turning his full attention to car construction. The "C" was retained as a trademark.

It wasn't the easiest of tasks Sauber had set himself: surviving on constructing racing sports cars in Switzerland seemed a doomed prospect. But he would not be deterred and was determined to battle on. The working day often stretched deep into the night and money was in short supply.

## Sports car successes

Sauber achieved international prominence with the C5 in which Herbert Müller won the then acclaimed Interserie championship in 1976. That was followed by his first forays at Le Mans. By this time Sauber Motorsport had four employees

on the payroll. In 1981 Hans-Joachim Stuck and Nelson Piquet won the Nürburgring 1000-kilometre race in a Sauber-built Group 5 BMW M1.

The following year was a decisive one for Sauber. He was commissioned by Swiss composite materials manufacturer Seger & Hoffmann to build a car for the Group C World Sports Car Championship: it was to become the Sauber C6. During this time he made contact with engineers at Mercedes who expressed an interest in motorsport – though all very much at a private level, as international motor sport had been an unmentionable subject for the Stuttgart carmaker since the tragic accident at Le Mans in 1955.

In 1985 Sauber began fitting Mercedes engines into his racing sports cars, moving that bit closer to the Stuttgart company. Just a year later, Henri Pescarolo and Mike Thackwell won the Nürburgring 1000 Kilometres in a Sauber C8. Further triumphs were to follow, ultimately prompting Mercedes' comeback to international motor racing. From 1988, Sauber and his crew acted as Mercedes' official works team. Professor Werner Niefer, Chairman of Mercedes at the time, decided the cars should be painted silver, marking the revival of the famed "Silver Arrows". The highlight of this partnership was the year 1989, which brought not only the drivers' and manufacturers' titles in the World Sports Car Championship, but a one-two result in the legendary Le Mans 24-hour race as well. The following year saw a repeat win of the World Championship title. Sauber Motorsport had grown to a workforce of 50.

It was also during this time that the junior team was set up, based on an idea of Sauber's business partner of the time, Jochen Neerpasch. The drivers selected were Michael Schumacher, Heinz-Harald Frentzen and Karl Wendlinger. Peter Sauber paved the way for all three to enter Formula One.

**Formula One**

With the lustre of the World Sports Car Championship beginning to fade, Mercedes now looked to Formula One. In the summer of 1991 it was declared a joint project, and preparations went into full swing. Sauber set about building a new factory on the company site in Hinwil.

However, that November brought with it bad news. Due to the straitened economic climate, the Mercedes board had decided against sending a works team into Formula One. Sauber had two options: to accept a financial settlement and withdraw, or to use the money as start-up capital for his own Formula One involvement. In January 1992 he took the plunge, and by autumn the first tests in the C12 were under way, with an Ilmor engine providing power. The company was then employing just under 70 staff.

On 14th March 1993, according to plan, two Sauber C12 cars driven by Karl Wendlinger and JJ Lehto lined up for the South African Grand Prix. With two World Championship points for fifth place claimed by the Finnish driver, this debut turned out an acclaimed success. Contracts signed with Red Bull and Petronas in 1995 provided a solid foundation and enabled the Swiss team to establish itself as a firm fixture in Formula One. In 1995 and 1996 Sauber served as the works team for Ford, and from 1997 onwards the cars were powered by Ferrari engines bearing the name of the title sponsor Petronas.

But the breakthrough was some time in coming. Finally, in 2001, three high points in the team's history arrived in rapid succession: the partnership with major Swiss bank Credit Suisse, fourth place in the Constructors' World Championship secured in mid-October and, just a few days later, the ground breaking ceremony for the team's very own wind tunnel.

Sauber also decided to introduce some fresh blood into Formula One at this time, signing up Kimi Räikkönen and Felipe Massa to his team and later recommending Robert Kubica to the decision-makers at BMW.

**BMW era**

Two thousand and five saw Peter Sauber on the lookout for a new engine partner. Now in his sixties, he was not disinclined to pass his life's work on into capable hands. An offer from BMW seemed like a good solution. The car manufacturer, which had been involved in Formula One with Williams since 2000, was keen to set up its own works team. On 22nd June 2005, BMW announced its acquisition of a majority stake in the Swiss team.

The 2008 season – the third year of the BMW Sauber F1 Team – would mark the next milestone in the history of the team. The extension at Hinwil had in the meantime been completed and the workforce had crossed the 400 threshold. The team's target for that year was to achieve its maiden victory – which turned out to be a one-two, with Robert Kubica winning in Canada ahead of Nick Heidfeld. In all, the BMW Sauber F1 Team notched up 11 podium places in 2008. Kubica claimed the team's first pole position in Bahrain and Heidfeld boosted the statistics with the first two fastest race laps. The team ended the World Championship in third place with 135 points.

Following a challenging start to the 2009 season, shock news broke on 29th July: at a press conference in Munich, BMW announced it was withdrawing from Formula One at the end of the season. The company bowed out with 36 points and sixth place in the World Championship.

## Starting over

The next press conference would be held on 27th November 2009, this time in Hinwil. Peter Sauber had reached an agreement with BMW and bought back his life's work. But the joy was tempered by disappointment as BMW had already decided to reduce the workforce. Employee numbers were whittled down from 388 to 260. It was with this pared-down workforce, with Ferrari as engine partner and drivers Kamui Kobayashi and Pedro de la Rosa that the Hinwil team embarked on the 2010 race season.

The first half of the season was marred by numerous retirements for technical reasons, which were unprecedented in the team's history. After the first eight races, the team had a single World Championship point to its name. By the end of the season this had risen to 44, of which Kobayashi had picked up 32, with De la Rosa and Heidfeld – who replaced the Spaniard for the last five Grands Prix – each contributing six points.

## The 2011 Season

The team hired another rookie, Sergio Pérez, for the 2011 season. The Mexican's arrival meant Kobayashi would have to take on leadership responsibilities in only his second full season on the F1 grid. The year began with the team getting to grips with the tyres developed by the new sole F1 supplier Pirelli, completing a promising programme of winter testing and jetting off for an opening race in which a strong team performance ultimately gave way to frustration. Pérez and Kobayashi crossed the finish line seventh and eighth in Melbourne, only to be subsequently disqualified after a rear wing element was deemed to have contravened the rules. The team lost the ten points its performance had earned, but consolation arrived in the knowledge that the necessary speed was there. Strong showings duly followed in the next few races. In Monaco, for example, Pérez had just made it through to the top-ten qualifying shootout for the first time when he lost control of the C30 on the exit from the high-speed tunnel section and slammed into the barriers with devastating force. The Mexican youngster was initially motionless in the car. After what felt like an eternity the news came through that he had got away with severe concussion. Kobayashi went on to show great mental strength to finish fifth in the race, the best result of the season for the Sauber F1 Team. Pérez also had to sit out the next race in Canada, with De la Rosa taking his place at short notice.

After a good first half to the season, which saw the team occupying what looked like a safe sixth place in the Constructors' World Championship, the team endured a drop in form. The cause of the downturn was rooted in a controversial technology: diffusers fed by the car's exhaust flow, even – thanks

to sophisticated engine mapping – when the driver is off the throttle. The FIA announced a ban on the practice, only to subsequently reverse its decision. In the meantime, the team had stopped development of an "outboard blown" diffuser for the C30, which put it at a disadvantage against rival teams still running the technology. Despite this handicap of well over a second per lap, the young drivers still managed to add to the team's World Championship points haul. The Sauber F1 Team eventually finished seventh in the Constructors' Championship on 44 points. Kobayashi was responsible for 30 of those, with Pérez recording 14 points. Both Kobayashi and Pérez, together with Mexican reserve driver, Esteban Gutiérrez, were confirmed for the 2012 season as early as the summer.

**The 2012 Season**

The Sauber F1 Team lined up for 2012 with the unchanged pairing of Pérez and Kobayashi in the race seats. And the season began strongly, Pérez coming home eighth and Kobayashi sixth at the opening race in Melbourne. But that was only the start; even greater excitement was to follow in Malaysia, where Pérez delivered a sensational performance in fluctuating weather conditions. A clever tactical move in the early stages saw him make up a number of places, and the Mexican driver was subsequently the fastest man on a wet, then merely damp and finally drying track. Moving up into second place, he even put the race leader – Ferrari's Fernando Alonso – under pressure before briefly running wide and losing critical seconds. Second was still an outstanding result, though, and, most of all, it underlined what an excellent car the team had developed in the Sauber C31-Ferrari.

The next highlight of the season was not long in coming. Pérez qualified 15$^{th}$ for the Canadian GP, but a well thought-out strategy and the Mexican's ability to look after his tyres allowed him to work his way up to third – giving him and the team their second podium of the season at this still early stage.

The low point of the season came at Spa. The weekend had begun perfectly; Kobayashi secured second place on the grid, with Pérez starting immediately behind him. However, the race had barely begun when both the Sauber cars were involved in the same collision caused by a rival driver. Their race was ruined and the disappointment was immense.

However, compensation for the Sauber F1 Team arrived just a week later in Monza, Pérez providing further evidence of his tyre-preserving prowess. The Mexican cut through the field like a hot knife through butter – most notably in the latter stages of the race after taking on more fresh rubber – to wrap up another second place. The final highlight of the season came courtesy of Kobayashi in his home Grand Prix at Suzuka. The Japanese star had already

qualified third to send his compatriots into raptures. Then he also made a fine start to the race, cementing his position at the business end of the field. Going into the final quarter of the race he came under increasing pressure from the ever-closing Jenson Button, but the local hero held firm to set the seal on his first podium finish in Formula One. For many in the team, the podium ceremony provided the season with its most emotional moment.

It was a very good year for the Sauber F1 Team, headlined by four podium finishes, 126 World Championship points and sixth place in the constructors' standings – a position higher once again than the previous year and an achievement that earned the praise of many outside observers.

**Handing over the reins 2012**

The 11th October 2012 marked a milestone in the history of the team – the day when Sauber stepped down as Team Principal and passed on the baton to Kaltenborn.

**The 2013 Season**

The Sauber F1 Team started into the 2013 season with a new drivers pairing. Nico Hülkenberg joined the Swiss squad for his third Formula One season. Esteban Gutiérrez was promoted from test and reserve driver to a race seat.

The season opener in Melbourne was chastening. Nico Hülkenberg was not even able to start the race due to a leak in the fuel tank of the C32. Gutiérrez finished his debut race 13th.

However, the first points weren't as far away as the team might have through on Sunday in Melbourne. Nico Hülkenberg collected the first four points of the season in Malaysia and followed up with a 10th place in China. After this there were a number of races without any points scored.

Scoring seven points and qualifying only twice for Q3 in the first half of the season, the performance didn't at all meet the expectations of the Sauber F1 Team. In Hungary the team introduced an update package for the Sauber C32-Ferrari, and was confident it would improve performance during the second half of the season.

Finally things turned round in Monza: Hülkenberg qualified third and finished fifth in the race adding ten points to the teams tally. The remainder of the season saw at least one car qualifying in Q3.

In Singapore Gutiérrez made the top-ten for the first time and delivered one of his best weekends of the season. In Korea both drivers qualified in the top ten

with the Mexican rookie just missing out on his first point by finishing 11th. Hülkenberg drove one of his best races in the season finishing fourth. The Sauber F1 Team advanced to seventh place in the Constructors' World Championship.

Only one weekend later, another highlight took place in Japan. Hülkenberg and Gutiérrez both finished in the top-ten adding a total of 14 points to the teams tally.

Disappointment struck in India. Hülkenberg was forced to withdraw from the race early due to a broken brake disc. Gutiérrez missed the points due to a drive through penalty. And it didn't look any better as the team left Abu Dhabi empty handed as well. This time Hülkenberg got the drive through penalty. During the last two races Nico Hülkenberg scored a further 12 points for the team.

With 57 points the Sauber F1 Team finished the 2013 season seventh in the Constructors' World Championship. Looking at 2012 where the team finished in sixth, this result was hardly satisfying. However there were also positive aspects: after the C32 was barely competitive in the beginning of the season, the team was able to significantly improve during the second half of the season by scoring 50 points. Nico Hülkenberg finished the drivers' championship in tenth, his best result in his Formula One career. Esteban Gutiérrez scored six points and became the best placed rookie of the season.

Only three teams on this year's grid – Ferrari, McLaren and Williams – have been in Formula One longer than Sauber. Between 1993 and 2013 a total of 24 drivers lined up for the Swiss team in 365 Grands Prix.

**Stats (1993 through 2013)**

| Driver | Grands Prix for Sauber | Points for Sauber |
|---|---|---|
| JJ Lehto (FI/1993-1994) | 18 | 5 |
| Karl Wendlinger (AT/1993-1995) | 25 | 11 |
| Heinz-Harald Frentzen (DE/1994-96/2002-03) | 64 | 42 |
| Andrea De Cesaris (IT/1994) | 9 | 1 |
| Jean-Christoph Boullion (FR/1995) | 11 | 3 |
| Johnny Herbert (GB/1996-1998) | 48 | 20 |
| Nicola Larini (IT/1997) | 5 | 1 |
| Gianni Morbidelli (IT/1997) | 7 | 0 |
| Norberto Fontana (AR/1997) | 4 | 0 |
| Jean Alesi (FR/1998-1999) | 32 | 11 |
| Pedro Diniz (BR/1999-2000) | 32 | 3 |
| Mika Salo (FI/2000) | 16 | 6 |
| Nick Heidfeld (DE/2001-2003/2006-2009/2010) | 125 | 194 |
| Kimi Räikkönen (FI/2001) | 17 | 9 |
| Felipe Massa (BR/2002/2004-2005) | 53 | 27 |
| Giancarlo Fisichella (IT/2004) | 18 | 22 |
| Jacques Villeneuve (CD/2005-2006) | 31 | 16 |
| Robert Kubica (PL/2006-2009) | 57 | 137 |
| Sebastian Vettel (DE/2007) | 1 | 1 |
| Pedro de la Rosa (ES/2010/2011) | 14 | 6 |
| Kamui Kobayashi (JP/2010-2012) | 58 | 122 |
| Sergio Pérez (MX/2011-2012) | 37 | 80 |
| Nico Hülkenberg (DE/2013) | 18* | 51 |
| Esteban Gutiérrez (DE/2013) | 19 | 6 |
| **Total** | **719** | **774** |

*could not start Australian GP due to technical problems.

**World Championship points and rankings in the Constructors' World Championship**

| Season | Grands Prix | Points | Ranking |
|---|---|---|---|
| 1993 | 16 | 12 | 7. |
| 1994 | 16 | 12 | 8. |
| 1995 | 17 | 18 | 7. |
| 1996 | 16 | 11 | 7. |
| 1997 | 17 | 16 | 7. |
| 1998 | 16 | 10 | 6. |
| 1999 | 16 | 5 | 8. |
| 2000 | 17 | 6 | 8. |
| 2001 | 17 | 21 | 4. |
| 2002 | 17 | 11 | 5. |
| 2003 | 16 | 19 | 6. |
| 2004 | 18 | 34 | 6. |
| 2005 | 19 | 20 | 8. |
| 2006 | 18 | 36 | 5. |
| 2007 | 17 | 101 | 2. |
| 2008 | 18 | 135 | 3. |
| 2009 | 17 | 36 | 6. |
| 2010 | 19 | 44 | 8. |
| 2011 | 19 | 44 | 7. |
| 2012 | 20 | 126 | 6. |
| 2013 | 19 | 57 | 7. |
| **Total** | **365** | **774** | |

# Sustainability

## The system behind the sustainability

Environmental protection has a long tradition at Sauber. For 20 years now the team has been using local power from a nearby incineration plant to heat its main building and, since 2004, the wind tunnel as well. Around 50 per cent of the electricity used by the team is provided by renewable resources (hydroelectric power). At the end of 2011 the team adopted, for the first time, a systematic approach to environmental protection by drawing up an environmental policy. Monisha Kaltenborn explained the reasons behind the move: “It is clear to see that the burden on our environment has become a key challenge for our society. By implementing our environmental policy we are aiming to face up to this challenge and fulfil our ecological responsibility. Our core business remains constructing and running Formula One racing cars. That will not change, and we will continue to do so with great conviction and equal passion. But we want to do what we do as responsibly as possible.”

## Certified environmental management system

The Sauber F1 Team has made a serious commitment to the environment. On 3rd April 2012, ISO 14001 certification was awarded to the Sauber Group’s environmental management system. ISO 14001 is the most widely established standard in this area worldwide, and certification attests that the team meets all the stated requirements.

The team began the development of its environmental management system with a comprehensive risk analysis and assessment. A set of organisational, technical and operational rules intended to ensure sustainable environmental protection was then put together with the participation of all employees.

“We are very pleased our environmental management system has been awarded certification. It confirms the high priority we attach to this issue,” explained Team Principal Monisha Kaltenborn.

Sauber’s environmental policy sets out the following principles and guidelines governing its commitment to environmental protection:

- Make the environment a management focus.
- Involve all employees in the process and ensure they have the necessary training.
- Reduce energy consumption and use renewable energy sources in place of fossil fuels.

- Reduce material consumption and ensure consistent recycling of waste materials.
- Use third-party projects to transfer knowledge into ecological mobility concepts.
- Incorporate suppliers and customers into the company's environmental activities.
- Maximise transparency towards employees, authorities and partners (inventory, targets, evaluation).

As well as the development and certification of the environmental management system, the implementation of the company's environmental policy has also prepared the ground for other projects, such as the construction and activation of a solar park at Sauber's headquarters in Hinwil, in cooperation with its partner Oerlikon.

**The Sauber F1 Team goes greenhouse gas neutral**

After ISO 14001 certification was awarded to the company's environmental management system in early April 2012, the next step followed: the Swiss team operates carbon neutral. CNI is one of the world's leading companies for carbon offset schemes.

Offsetting carbon involves companies financing or part-financing projects that save the equivalent amount of carbon generated by the company. The Sauber F1 Team opted for 30 per cent excess. The key factor in this offset scheme is the judicious choice and monitoring of high-quality projects.

Monisha Kaltenborn explained: "We attach great importance to carbon offsetting, which is a consequence of the environmental policy we have adopted. It allows us to make an important contribution to protecting the environment. In Carbon Neutral Investments we have found the ideal partner for implementing these efforts. The certification of our environmental management system signified an important step towards our ecological goals and is now followed by a further step with our carbon offset commitment."

**Solar park**

The solar park constructed for the Sauber F1 Team in Hinwil by premium partner Oerlikon has been on stream since September 2012. It is one of the largest solar car ports in Switzerland. The construction, consisting of 1,573 technically advanced and aesthetically appealing thin-film silicon photovoltaic modules, stretches over an area measuring 2,249 square metres. A roof of one of the factory buildings was fitted with solar modules and large sections of the

company’s car park were covered, which brings a number of benefits. It took just six weeks to construct the solar park thanks to the innovative and cost-efficient way the modules are fitted. The installation delivers 155,600 kilowatt hours of power per year – equivalent to the electricity needs of 44 households – and generates peak power of 173 kWp*. The energy payback time for the thin-film silicon solar modules is less than a year.

*One 1 kWp system in this geographical location produces approximately 1,000 kilowatt hours (kWh) of electricity per year and covers a surface area of around nine square metres. This equates to roughly a fifth of the annual electricity consumption of a local four-person household.