



Sauber F1 Team

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Press Kit 2015

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Season

Preview

The Sauber F1 Team will go into the 2015 FIA Formula One Championship with new drivers Marcus Ericsson (SE, 24) and Felipe Nasr (BR, 22). Raffaele Marciello (IT, 20) has signed as test and reserve driver. The roll-out of the new Sauber C34-Ferrari will take place at the first winter test in Jerez de la Frontera (Spain).

With regard to the 2015 season, team principal Monisha Kaltenborn said: "2014 was a very disappointing year. However, this is in the past, and we now focus on what comes next. We have learned our lessons and are confident for the new season."

The team principal's prediction for the new season is short and concise: "We have to improve, and be able to fight for championship points." For the Sauber F1 Team 2015 is its 23rd season in Formula One; it is the fourth oldest of the current brands.

Monisha Kaltenborn is optimistic about the new driver line-up: "I am delighted about our two new drivers who bring a breath of fresh air. Both are young, talented and highly motivated. On their way to Formula 1 both stood out through victories in Formula BMW and Formula 3. Both then finished this career progression off in the GP2-Series. While Marcus looks back to one season in Formula 1, Felipe will have his rookie year in which he comes fully prepared due to his role as test and reserve driver at Williams last year. I feel confident with regard to our drivers."

Marcus Ericsson also looks into the future with optimism: "I am pleased about being a member of the Sauber F1 Team. After a difficult season, we want to move forward and fight in the mid-field like the team previously did. From a driver's point of view, I want to continue to learn and establish myself as a Formula One driver. I have the feeling of being in the perfect environment to do so. In Formula One it is difficult to have precise targets, as it depends on the overall package. It is clear that we want to be fighting for points."

Felipe Nasr explains: "In my rookie season there is a lot to learn, and especially as I have not yet driven on some circuits yet. In general, I am ready to take on this challenge. In my role as test and reserve driver for Williams last year, I was involved in every race weekend. Furthermore, I also had the chance to drive the car a few times, so I think I have a certain understanding of Formula One. Now I am taking the next step in being a race driver, and I am looking forward

to bringing my experience from 2014 as well as to supporting the Sauber F1 Team in getting back into the points.”

Test and reserve driver is Raffaele Marciello who, as well as other series, won the 2013 Formula 3 Championship in an outstanding way. Last year he had two podium finishes and won the main GP 2 race in Spa-Francorchamps. Raffaele will also have the opportunity to participate in some Friday practice sessions during Grands Prix. Monisha Kaltenborn said: “Raffaele’s previous career is impressive. Therefore it is a logical step for us to give him the opportunity to become more familiar with Formula 1. As a team we are pleased to be there with him on his way to the pinnacle of motorsport.”

Raffaele Marciello explained: “I am really pleased to be a member of the Sauber F1 Team, which has a long tradition of building up excellent drivers. I really think that this is the best choice for my future career. I am also happy to compete for one more season in the GP2 Series, which, together with my new F1 role, will give me a very busy 2015 season. I want to thank the people at the Ferrari Driver Academy who are responsible for giving me this important opportunity, and now I really can’t wait to start delivering my best.”

Sauber C34-Ferrari

After a season with the most comprehensive technical changes in the history of Formula One, there are significantly fewer regulation changes for the 2015 season. During the development of the new Sauber C34-Ferrari the Sauber F1 Team's engineers focused on three areas: performance in slow corners, weight reduction, as well as braking stability.

Eric Gandelin, chief designer of the Sauber F1 Team, explained: "We were able to gain a lot of experience during the course of the 2014 season, which will have an influence on the Sauber C34."

Aerodynamics traditionally play a key role in the development of a new car. But on this occasion it wasn't only a question of optimising downforce and drag, but also improving the balance of the car and its responses in particular through low-speed corners.

The greatest visual difference compared to the Sauber C33 can be found around the nose section, which is now bigger in volume and lower to the ground following further changes to the technical regulations. This has a considerable impact on the aerodynamics of the entire car: the nose and front wing play a key role in determining how the air flows around the front wheels and how effectively the central and rear sections of the car function aerodynamically. The new design of the wheel rims has progressed in a similar direction, in the interests of optimising airflow around the front wheels.

The front suspension concept has changed little, with the springs and dampers again pushrod-actuated. However, the engineers put a lot of effort into improving the feedback from the steering for the drivers.

The sidepods of the new Sauber C34, however, are now slimmer than those of the Sauber C33, despite higher cooling requirements from the new power unit. This has been made possible by modifications to the attachment of the side crash elements. In addition, the architecture of the radiators, which are now positioned horizontally, has been fundamentally revised. The engineers also paid great attention to the flexibility of the cooling system, which can be adapted precisely – and individually for the various components – to the ambient temperature and circuit characteristics. For example, small air vents on the side of the cockpit are only used in certain situations.

Beyond this, the rear section as a whole is less voluminous, which benefits aerodynamic efficiency.

The car's minimum weight has been increased in line with the FIA's technical regulations, up from 691 kg a year ago to 702 kg now. The engineers, of

course, set out to undercut this figure in order to give themselves ample room for manoeuvre when it comes to weight distribution – an important factor in determining how the car uses its tyres.

Modified powertrain

The car's engine, energy recovery system and gearbox are again supplied by Ferrari. The 1.6-litre turbocharged V6 engine has a rev limit of 15,000 rpm. The technical regulations allow for certain components to be completely redesigned for the 2015 season. The aim has been not only to increase the power from the turbocharged engine, but above all to optimise the car's energy recovery and energy storage capability.

In terms of its concept, the engine is very much comparable with last year's, but its architecture has changed significantly, necessitating numerous adjustments to the chassis.

The exhaust tailpipe is again positioned centrally between two pylons, though they are no longer supported by the rear crash element, but by the gearbox housing.

The spring and damper elements at the rear axle are again pullrod-actuated, but otherwise this is a totally new construction with separate lower wishbone legs. In addition, the engineers worked on improving the mechanical traction. Besides a number of other parts, there will be optimised gear ratios to support this effort.

As with its predecessor, the packaging of the C34 presented the engineers with a genuine challenge. After all, in excess of 40 electronics boxes have to be accommodated, of which more than 30 require cooling.

New parts to follow in stages

A first impression of the value of these measures will be obtained at the first test in Jerez. "Later on it will be crucial to see where we stand in comparison to our competition," explained chief designer Eric Gandelin.

The Sauber F1 Team will use a roll-out version of the car for the first test at Jerez. Some components are still from the C33 and will be successively replaced by new parts. "We will use the time up to Melbourne to ensure we're as competitive as possible when we line up on the grid for the season opener," added Eric Gandelin.

Technical data

Chassis	carbon-fibre monocoque	
Front suspension	upper and lower wishbones, inboard spring and damper elements (Sachs Race Engineering) actuated by push-rods	
Rear suspension	upper and lower wishbones, inboard spring and damper elements (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 (without T Camera)	950 mm
	track width, front	1,460 mm
	track width, rear	1,416 mm
Weight	702 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	4

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

Team

Organisation tasks and people

President of the Board of Directors	Peter Sauber (CH)
Team Principal	Monisha Kaltenborn (AT)
Driver number 9	Marcus Ericsson (SE)
Driver number 12	Felipe Nasr (BR)
Test and reserve driver number 36	Raffaele Marciello (IT)
Marketing Director	Michael Schmidt (AT)
Operations Director	Axel Kruse (DE)
Chief Designer	Eric Gandelin (FR)
Head of Aerodynamics	Willem Toet (GB/AU)
Head of Vehicle Performance	Elliot Dason-Barber (GB)
Team Manager	Beat Zehnder (CH)
Head of Track Engineering	Giampaolo Dall'Ara (IT)
Race engineer for Marcus Ericsson	Erik Schuivens (NL)
Race engineer for Felipe Nasr	Craig Gardiner (GB)
Head of Track Operations	Timothée Guerin (FR)
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 approximately 330 staff listed at the start of the 2015 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

Marcus Ericsson

A new chance

In the history of Formula One there are not that many Swedish racing drivers. Last year Marcus Ericsson became the tenth driver from the Scandinavian country, making his debut with the Caterham F1 Team. For the upcoming 2015 season, the Sauber F1 Team took the 24-year-old Swede on board. "2014 was a difficult season for me, but also a great year as my dream to be a Formula One race driver came true." After learning a lot about Formula One in his rookie season, he is now ready to take on a new challenge. "Getting the chance to drive for the Sauber F1 Team is a great opportunity. With my experience from last year I have a solid base, and I am willing to learn as much as I can."

Marcus started his racing career with karting more by coincidence, as he admitted. "My family was never involved in motorsport, so I got into racing more by accident. When I was eight years old I went to a shopping mall with my parents. They had a rental go-kart track there. I wanted to try it out and convinced my parents." It happened that Marcus almost broke the lap record on his first kart drive. The owner of the track was Fredrik Ekblom, who is a Swedish racing driver. After Fredrik convinced Marcus' father to buy him a kart, the motorsport journey began. Interestingly, Marcus' roots are in Kumla/Örebro. The region in the middle of Sweden is well known for motorsport as many Swedish racing drivers come from this area. One of the most famous was Ronnie Peterson, the Swedish Formula One legend from the '70s. Fellow countryman, Marcus, admits that he is one of his Formula One heroes.

After successful years in karting being the Nordic and Swedish champion, the next logical step for Marcus was a switch to formula racing. In his rookie year in 2007 he became the Formula BMW UK champion with seven wins. A year later he finished fifth in the British Formula 3 Championship.

Big in Japan

"When my manager called me saying that I was going to live in Japan and race there for a year, I could not believe it," explained Marcus. In the end, it was not a joke, and so the 18-year-old Swede left Europe and continued his career in 2009 in Japanese Formula 3. He moved from his parents' house in Sweden to live in an apartment in Japan, on the other side of the world. "That was a massive change for me. I lived there on my own, and I had to learn to grow up very fast." All in all, a huge challenge, but also a great experience. "Looking

back, I think it was a great year which helped me to develop not only as a driver, but also as a person.” At the end of an intense year, Marcus clinched the Japanese Formula 3 championship with five wins.

The greatest gift was that Marcus was offered a test in the Brawn GP Formula One car during the Young Driver Test days in Jerez. “It was an amazing experience that made me realise that this is what I want to do. After that I worked even harder to reach the ultimate goal to drive in Formula One.”

In 2010 Marcus came back to Europe to have his first year in the GP2 Series. Overall, he competed for four seasons in GP2, with his best result being sixth overall in 2013.

First taste of the Sauber C33

Looking forward to the 2015 season, the Swede has already had the opportunity to test the Sauber C33 during the two test days in Abu Dhabi at the end of November 2014. “It was great to drive the Sauber C33 and to start working with the team. Overall, it was very positive and I can’t wait to get the 2015 season started.”

Marcus Ericsson

Date/Place of birth	2 nd September 1990 / Kumla (SE)
Nationality	Swedish
Website	www.marcusericsson.com
Height / Weight	1.80 m / 70 kg
Marital status	Single
Hobbies	Ice hockey, football and work out
Favourite food	Swedish and sushi
Favourite drink	Water
Favourite music	Depending on situation, likes most styles
Favourite circuit	Suzuka, Silverstone
Languages	Swedish, English
Career:	
2014	FIA Formula One Championship (Caterham F1 Team)
2013	6 th place GP2 series
2012	8 th place GP2 series
2011	10 th place GP2 series 6 th place GP2 Asia
2010	11 th place GP2 series
2009	1 st place Japanese Formula 3
2008	5 th place British Formula 3
2007	1 st place Formula BMW UK
1999 - 2006 Karting	Swedish and Nordic Champion – ICA Junior 2005 Swedish Champion – Formula Mini 2003 Rookie of the year and 4 th overall – Swedish Formula Mini 2002 Rookie of the year – Swedish Formula Micro 2000
F1 stats to date:	
First GP	Australia 2014
GP starts	16
Best race result	11 th Monaco (2014)

Felipe Nasr

Born into a racing family

After spending a year at the Williams F1 Team as a test and reserve driver, the 22-year-old Brazilian Felipe Nasr takes the next step to become a Formula One race driver. "I am very happy to be part of the Sauber F1 Team, and I am really looking forward to working with everyone."

Felipe Nasr became involved with racing when he was seven years old. It was not a surprise, as Felipe comes from a motorsport family. His uncle was a racing driver and competed in the British Formula Ford series in the '80s. "When he came back to Brazil, he and my father decided to start their own racing team in F3," explains Felipe. In the late '90s, Felipe followed some races of the South American F3 Championship, but never thought about becoming a racing driver. One day his father asked him if he would like to drive a go-kart, and Felipe could not say no to this offer. "I also liked playing football, but driving a kart for the first time was a unique feeling for me." After this experience, the young Brazilian started his career in karting, and showed his potential by winning the Brazilian Kart Championship three times.

After some successful years in karting back home in Brazil, Felipe continued his career in the Formula BMW Europe series in 2009. "When I was 16-years-old I moved to Italy and started working with an Italian Formula BMW Team, which was based close to Milan. It was not easy to leave my family and friends behind." Although Felipe had to adapt to a new environment and language, he already had the dream in his mind, "If I want to make it into Formula One, I have to start from here." By having lunch with the engineers and mechanics he picked up the Italian language. "I had a good time there." Indeed, in his rookie year he won the Formula BMW Europe title without knowing any of the race tracks.

In 2011 Felipe became British Formula 3 Champion and finished second in the prestigious Macau Grand Prix Formula 3 race. From 2012 until 2014 he competed in the GP2 Series. In 2014, in his double role as GP2 driver and test and reserve driver for the Williams F1 Team, Felipe finished third in the GP2 Series.

Lebanese roots

Felipe's grandfather originally comes from Lebanon and immigrated to Brazil in the '60s. "He came by ship, and it took him about three months." Together with his wife, whom he met in Brazil, they moved to Brasilia. So far Felipe has never been to his grandfather's home country. However, the Lebanese culture

continues in Brazil. “Every Saturday the whole family goes to my grandmother’s house where she cooks Lebanese food. This is very traditional for us.”

Whenever Felipe has some time off back home he has a special hobby - fishing. Completely the opposite to racing, nature helps him to recharge his batteries. “There is always a balance between the professional and personal life. For me fishing is a time to relax, which I can spend with my friends.” Interestingly, Felipe does not eat fish or any sea food. “I don’t like fish at all, I only catch them and then I let them go.”

Felipe Nasr

Date/Place of birth	21 st August 1992 / Brasilia (BR)
Nationality	Brazilian
Website	www.felipenasr.com
Height / Weight	1.75 m / 68 kg
Marital status	Single
Hobbies	Karting, RC Cars, Fishing
Favourite food	Italian and Lebanese Food, no sea food
Favourite drink	Orange Juice
Favourite music	Brazilian Music, Classic Rock, Johnny Cash, Bob Dylan, Dire Straits
Favourite circuit	Spa-Francorchamps
Languages	Portuguese, English, Italian
Career:	
2014	Test and reserve driver Williams F1 Team 3 rd place GP2 series
2013	4 th place GP2 series
2012	10 th place GP2 series
2011	1 st place British Formula 3 2 nd place GP Macau Formula 3
2010	5 th place British Formula 3
2009	1 st place Formula BMW Europe
2000 – 2007 Karting	1 st place Brazilian Kart Championship in 2004, 2006 & 2007

Raffaele Marciello

Double role

Raffaele Marciello will go into the 2015 season as test and reserve driver for the Sauber F1 Team as well as racing in the GP2 Series. "I am really pleased to be a member of the Sauber F1 Team, which has a long tradition of building up excellent drivers. I really think that this is the best choice for my future career. I am also happy to compete for one more season in GP2, which, together with my new F1 role, will give me a very busy 2015 season." The 20-year-old Italian will now have the chance to further develop in his role as test and reserve driver.

Raffaele's father always liked motorsport and raced for fun with his friends. He then put Raffaele into a kart when he was only four years old. As he was not allowed to drive a kart on a race track because he was too young, he tried it in a parking lot. "I don't remember it as I was very young, but my parents have told me at the beginning I didn't like it that much." He quickly changed his mind after winning his first kart race at the age of six in the Swiss Kart Championship. "From that moment on I started to like motorsport," emphasized Raffaele.

In his karting days, the youngster was the Swiss Champion twice in 2003 and 2005 as well as the Champions Cup Winner in 2006.

That certain something

In 2009 Raffaele was in Sarno (Italy) for a kart race when a Ferrari representative noticed the 14-year-old racer. "He came to me and invited me to Maranello," explains Raffaele. It all happened very quickly, as the Italian promptly accepted the invitation and became part of the Ferrari Driver Academy. "You need to be talented, as well as lucky and surrounded by the right people. These three things combined build a good package." In fact, convinced by Raffaele's speed and focus on becoming a race driver, Ferrari has been supporting him on his way to the top since 2009.

The switch from karting to single seaters with Formula Abarth happened the following year. He won the first race in Misano and finished third in the championship at the end of the season. In 2011 Raffaele clinched third place in the Italian Formula 3 Championship before he moved to the European Formula 3 Championship. In 2012 he became runner-up in the European Formula 3 Championship, followed by an impressive 2013 season in which he was the champion with 13 wins. Last season Raffaele finished his first season in the GP2 Series in eighth and will go into his second year in 2015.

Italian blood

Raffaele was born in Zurich and grew up in Caslano (Switzerland), but drives under the Italian flag. "I have lived all my life in Switzerland, but in the end I am Italian as my whole family comes from Italy." During the week he lives in Maranello close to Ferrari, and at the weekends he goes back home to Switzerland to his parents' place in Lugano (Switzerland).

Raffaele „Lello" Marciello – Test and reserve driver

Date/Place of birth	17 th December 1994 / Zurich (CH)
Nationality	Italian
Website	www.raffaelemarciello.com
Height / Weight	1.86 m / 71 kg
Marital Status	Single
Hobbies	Fitness, Football
Favourite food	Pasta
Favourite drink	Ice Tea
Favourite music	Listens to different music styles, depending on mood
Favourite track	Mugello
Languages	Italian, English, French
Career:	
2014	GP2 Series, 8 th overall, one win, two 3 rd places
2013	FIA European F3 Champion (13 wins)
2012	FIA European F3 Championship, 2 nd place overall , 8 wins, Winner Grand Prix do Pau
2011	Italian Formula 3 Championship, 3 rd place overall
2010	Formula Abarth, 3 rd place overall; since 2010 Ferrari Driver Academy
2005 – 2009 Karting	2006 Champions Cup Winner, 2005 Swiss Champion, 2004 Winner European Bridgestone Cup, 2003 Swiss Champion

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") enjoyed 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 more than 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.

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

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 motorsport, 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 43, 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 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. "However, 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	10 th May 1971 / Dehradun (IN)
Nationality	Austrian
Residence	Küsnacht (CH)
Marital status	Married to Jens, one son (2002), one daughter (2005)
Hobbies	Yoga, tennis, opera
Career:	
October 2012	Takes over from Peter Sauber as Team Principal
End of 2011	Receives a third of the company's stakeholding
From January 2010	CEO Sauber Motorsport AG
2001	Member of the Board of Management
2000	Sauber Group, Head of the Legal Department
1998/1999	Fritz Kaiser Group, legal and corporate affairs of the Red Bull Sauber F1 Team
1997/1998	Law firm Wolf, Theis + Partner in Vienna (AT)
1996/1997	Law firm Gleiss, Lutz, Hootz, Hirsch in Stuttgart (DE)
1996	Master of Law, International Business Law, at the London School of Economics (GB)
1995	Research assistant at the UN Organisation for Industrial Development in Vienna; research work for the UN Commission for International Trade Law in Vienna
1994	Seminar on International Civil Law, Hague Academy for International Law (NL)
1990-1995	Law degree at the University of Vienna (AT), qualified as Magister iuris

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 5g – 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 since 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, since 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 has to successfully pass an FIA crash test, which simulates the impact of a driver's helmet. 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 Sauber Motorsport has stayed in business more than 40 years 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 15th 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 driver 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 thought on Sunday in Melbourne. Nico Hülkenberg collected the first four points of the season in Malaysia and followed up with a tenth 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 team's 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 team's 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.

The 2014 Season

The Sauber F1 Team undertook the 2014 season with a mixture of youth and experience: Esteban Gutiérrez went into his second year together with his new team mate Adrian Sutil, who had his seventh season ahead of him. Test and reserve driver was Giedo van der Garde. The team was completed by test driver Sergey Sirotkin.

2014 was the year of the most comprehensive technical changes in the history of Formula One. There were major modifications in the area of aerodynamics as well as passive safety. However, the most radical changes were those in the area of the powertrain. The 2.4-litre-V8 engines were replaced by the 1.6-litre-V6 turbo engines which had a highly complex and very efficient energy recovery system (ERS). The brake-by-wire system was also introduced.

Due to different reasons, the Sauber F1 Team was not able to match its direct competitors from the beginning of the season. Insufficient performance, lack of reliability, mistakes by the pit crew and or the drivers. In the course of the

season the Swiss team was able to pick up on its competitors. However, the gap to the front was simply too big to be closed completely. The result was sobering: With zero points the Sauber F1 Team finished the World Championship in tenth position. It was the first time in the history of the team it finished a season without any championship points.

Time for a new beginning.

Stats (1993 through 2014)

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 (MX/2013-2014)	38	6
Adrian Sutil (DE/2014)	19	0
Total	757	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.
2014	19	0	10.
Total	384	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.

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 carbon-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. In 2015 carbon-connect AG became Promotional Partner of the Sauber F1 Team.

Offsetting carbon involves companies financing or part-financing projects that save the equivalent amount of carbon generated by the company. The key factor in this offset scheme is the judicious choice and monitoring of high-quality projects.

Monisha Kaltenborn explains: "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-connect AG we have found the ideal partner for these efforts."

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.

More information about environmental management can be found on our homepage: <http://www.sauberf1team.com/en/corporate/environmental-management/>

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