The McLaren Group Magazine

RacingLine

073

March 2004 £4.50

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by McLaren

READY FOR ACTION

WE GO BEHIND THE SCENES WITH TEAM McLAREN MERCEDES AS THEY GEAR UP FOR THE CHALLENGE OF THE NEW SEASON

PLUS WE COMPARE A 1968 M7 McLAREN FORMULA 1 RACER WITH MP4-19 ■ AUSTRALIAN AND MALAYSIAN GRAND PRIX PREVIEWS

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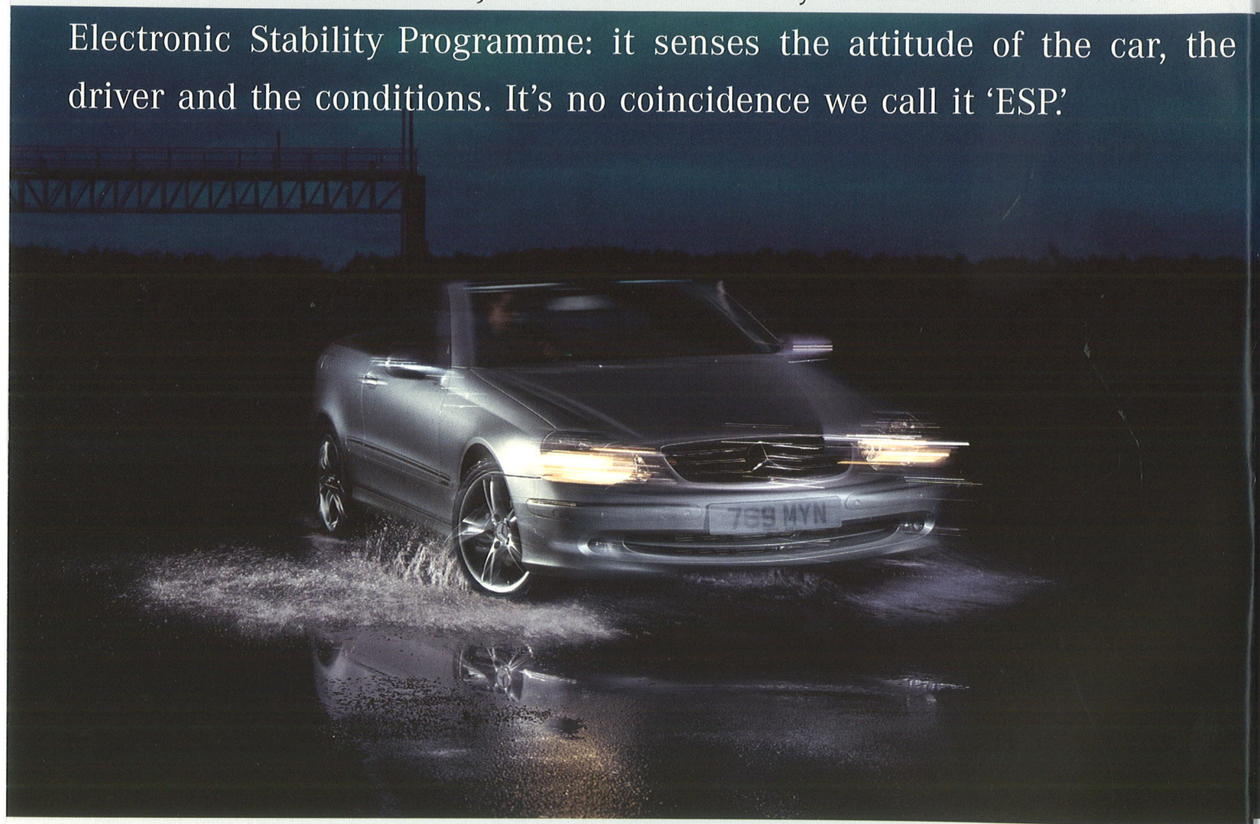

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RacingLine

MARCH 2004

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12

"DAVID GUNS THE CAR DOWN THE LONG PITLANE AND IS IMMEDIATELY INTO TURN ONE. THE ENGINE NOISE SEEMS TO FOLLOW JUST BEHIND"

McLaren's Roll of Honour

Eight Constructors' Championships
1974 – M23-Ford, 73 points
1984 – MP4/2-TAG Porsche, 143.5 points
1985 – MP4/2B-TAG Porsche, 90 points
1988 – MP4/4-Honda, 199 points
1989 – MP4/5-Honda, 141 points
1990 – MP4/5B-Honda, 121 points
1991 – MP4/6-Honda, 139 points
1998 – MP4-13-Mercedes, 156 points

Eleven Drivers' Championships
1974 – Emerson Fittipaldi – M23-Ford, 55 points
1976 – James Hunt – M23-Ford, 69 points
1984 – Niki Lauda – MP4/2-TAG Porsche, 72 points
1985 – Alain Prost – MP4/2B-TAG Porsche, 73 points
1986 – Alain Prost – MP4/2C-TAG Porsche, 72 points
1988 – Ayrton Senna – MP4/4-Honda, 90 points
1989 – Alain Prost – MP4/5-Honda, 76 points
1990 – Ayrton Senna – MP4/5B-Honda, 78 points
1991 – Ayrton Senna – MP4/6-Honda, 96 points
1998 – Mika Häkkinen – MP4-13-Mercedes, 100 points
1999 – Mika Häkkinen – MP4-14-Mercedes, 76 points

2003 GP Results

Australian GP: David Coulthard 1st; Kimi Räikkönen 3rd
Malaysian GP: David Coulthard DNF; Kimi Räikkönen 1st
Brazilian GP: David Coulthard 4th; Kimi Räikkönen 2nd
San Marino GP: David Coulthard 5th; Kimi Räikkönen 2nd
Spanish GP: David Coulthard DNF; Kimi Räikkönen DNF
Austrian GP: David Coulthard 5th; Kimi Räikkönen 2nd
Monaco GP: David Coulthard 7th; Kimi Räikkönen 2nd
Canadian GP: David Coulthard DNF; Kimi Räikkönen 6th
European GP: David Coulthard DNF; Kimi Räikkönen DNF
French GP: David Coulthard 5th; Kimi Räikkönen 4th
British GP: David Coulthard 5th; Kimi Räikkönen 3rd
German GP: David Coulthard 2nd; Kimi Räikkönen DNF
Hungarian GP: David Coulthard 5th; Kimi Räikkönen 2nd
Italian GP: David Coulthard DNF; Kimi Räikkönen 4th
United States GP: David Coulthard DNF; Kimi Räikkönen 2nd
Japanese GP: David Coulthard 3rd; Kimi Räikkönen 2nd

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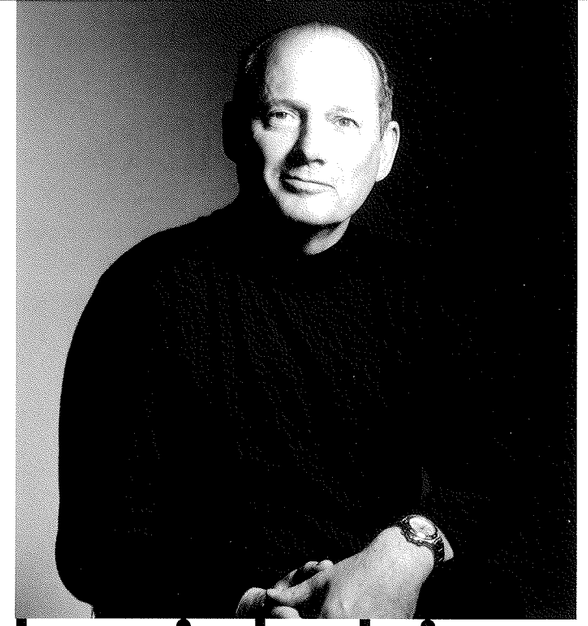


Portrait by Hugo Burnand

InsideLine

One of the long-established traditions at McLaren has been to host a pre-season lunch and media briefing for a group of our Formula 1 journalistic friends. These are enjoyable occasions, although I often find them to be quite mentally challenging affairs where I'm forced to think on my feet in order to answer all their detailed questions in a way which is neither ambiguous nor misleading.

This year was the first such meeting to be hosted at the McLaren Technology Centre and I think our guests enjoyed the day as we covered a lot of ground. The topic of David Coulthard's potential performance in 2004 was understandably near the top of their agenda and I found myself having to field a great number of enquiries as to how we at Team McLaren Mercedes would be managing his personal situation.

I was glad that David was mentioned in our lunchtime chat because it gave me the chance to outline the structured and self-contained manner in which we tackle every season. There were two key points I was anxious to emphasise. Firstly, irrespective of what he might or might not be doing from the start of 2005, David remains a leading Formula 1 driver who certainly has the capability of challenging for the championship in 2004.

In that respect, he has everything to gain from the coming season. He also has the strength of character and realistic outlook which makes him more than capable of coming to grips with any frustrations and disappointments he might experience. Moreover, we do not discount a possible continuing role for David with the team in 2005. Although he wants to continue racing he is a man who always wants to make forward progress in his professional life and I do not think he would continue unless it was with a fully competitive team.

Following on from the issue surrounding David, I was asked what I felt about the situation whereby he and Jenson Button would be the only two British drivers contesting the 2004 world championship. This led me to make the obvious point that Formula 1 is a meritocracy and drivers are selected by talent, not nationality.

Of course we at Team McLaren Mercedes like to think we are doing our bit for British interest in motorsport. We are continuing to support young Lewis Hamilton as he moves up into the Euro Formula 3 series this season. We have tremendous belief in his talent and I have every confidence that he can be a competitive Formula 1 competitor in two or three years' time. So I hope I gave our press colleagues some positive, balanced information. Not to mention a good story.

Ron Dennis CBE
McLaren Group Chairman and CEO

Partnership with Siemens to continue; Team McLaren Mercedes' 150th grand prix

SIEMENS PARTNERSHIP EXTENDED

Team McLaren Mercedes and Siemens have recently signed a new sponsorship agreement extending the Partnership that began in 1998. One consequence of the agreement is that the team's racing cars will now carry the Siemens logo in place of the Siemens Mobile logo that was previously displayed. This is to enable all parts of the vast Siemens group to benefit from the long-running Partnership.

Ron Dennis, CEO and Chairman of the McLaren Group, said, "We are delighted that an important Partner such as Siemens is extending its relationship with the team. This continued commitment and support is important for us to achieve our objective of winning more races and world championships."

Rudi Lamprecht, member of the managing board at Siemens AG, said, "Formula 1 is one of our most important sports marketing activities with a global effect. The expansion of the series into China and Bahrain in 2004 puts us into growth markets that are very important to us and will continue to advance our profile and brand image."

McLAREN AND MERCEDES-BENZ CELEBRATE 150 RACES AT AUSTRALIAN GRAND PRIX

The first race of 2004, at Melbourne on March 7, will be the 150th race in the ongoing partnership between McLaren and Mercedes-Benz. The Formula 1 team first ran with Mercedes-Benz engines in 1995 and has since won 33 grands prix, two Drivers' World Championships with Mika Häkkinen and one Constructors' World Championship. From its first 149 grands prix, the Partnership has also taken 35 pole positions, 43 fastest race laps, 109 podium finishes and 172 points finishes.

The collaboration has also yielded the Mercedes-Benz SLR McLaren, the pace-setting sportscar that was launched last year.

PICTURE CREDITS>
LAT/HOCH ZWEI/TILKE/DAIMLERCHRYSLER/ADRIAN MYERS

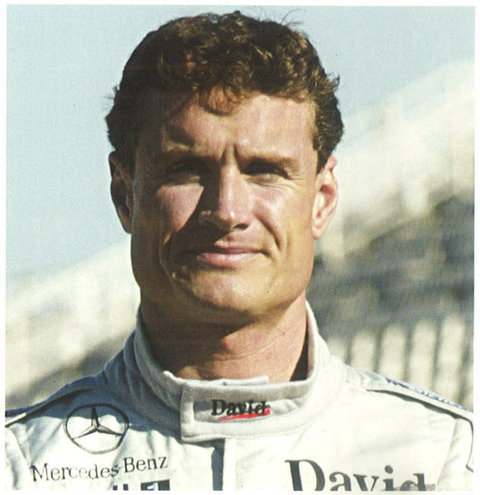
SHANGHAI CIRCUIT IS NEARING COMPLETION

The brand new racing circuit at Shanghai, China, is progressing nicely. Construction began towards the end of 2002 and all key installations will be in place by the end of March 2004. The first Formula 1 Chinese Grand Prix will be held there on September 26 this year.

Teams are preparing for the race using computer simulations, which suggest that the lap time will be roughly 1m34s at an average of 205km/h. The circuit can accommodate up to 200,000 spectators, of whom the 30,000 in the main grandstand by the pitlane will be able to see 80 percent of the circuit.

EXXONMOBIL LAUNCHES NEW PUBLICITY DRIVE

Team McLaren Mercedes Technology Partner ExxonMobil has recently given 30,000 windscreen stickers to its sales staff in Indonesia and is handing out 50,000 credit-card style calendars in Hong Kong. The calendars are being used internally by ExxonMobil staff and also by distributors, in workshops and at retail outlets. The aim of the initiative is to spread awareness of the ExxonMobil name.



DAVID TO DRIVE AT MERCEDES-BENZ EVENT

Team McLaren Mercedes driver David Coulthard will be getting into the mood for the Australian Grand Prix with some slightly less competitive motoring. On the Tuesday before the race, Mercedes-Benz is holding a driving day for its customers on Phillip Island, just off Melbourne's coast. Coulthard's presence is bound to make it an even more memorable day for the lucky visitors.

NEW HELMET DESIGN FOR KIMI IS UNVEILED

Team McLaren Mercedes driver Kimi Räikkönen will be wearing an updated helmet design for the 2004 Formula 1 season. The new design (shown right) has the same colour scheme as Räikkönen's 2003-vintage helmet, but the details have been updated to create a more vibrant, distinctive look.

MERCEDES-BENZ SLR McLAREN RAISES $2.1M IN CHARITY AUCTION

DaimlerChrysler recently donated a Mercedes-Benz SLR McLaren to be auctioned for charity in New York. Indeed, it was the very *first* example of the sportscar to roll off the McLaren Technology Centre production line. It took just two minutes of bidding to sell for $2.1 million, the largest single sum contributed to the Laureus Sport for Good Foundation since it was established in 1999.

The Foundation aims to promote the use of sport as a tool for social change and helps young people to overcome disadvantages such as poverty, homelessness and war. Its ambassadors include members of the Laureus World Sports Academy, several of whom attended the auction. Among these high-profile supporters was ex-McLaren World Champion Emerson Fittipaldi.

Adding to the prestige of both car and auction, the sum raised is the largest amount ever paid for a brand new car.

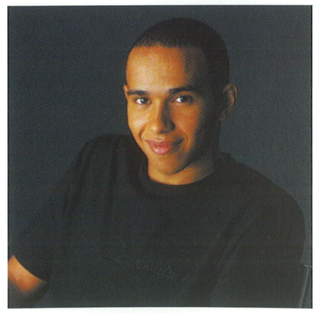
SUN ENJOY TRADE FAIR

Technology Partner Sun Microsystems took a Team McLaren Mercedes race simulator to the Object Oriented Programming (OOP 2004) software development fair in Munich, Germany, which took place in January. The event gave visitors a chance to find out all the latest news in the computer programming field.

Visitors to Sun's stand included managing directors and CEOs, who were able to meet and talk with Sun's Vice President Peter Meinel. The race simulator helped to create a friendly and relaxed atmosphere and proved very popular – even the most eminent visitors to the stand needed only one invitation to have a go.

MODELMAKER GIVES TALK FOR McLAREN GROUP STAFF

Members of the McLaren Group recently enjoyed an informal visit from Tony Walshaw, who makes 1:15 working model aero engines. Walshaw gave a talk about his modelling, which began as a hobby and gradually became his livelihood. Since 1976 he has been making about four engines a year and he has now built more than 100 in total. A typical commission takes about 2,000 man-hours to complete.



LEWIS HAMILTON ENJOYS UK PHOTOSHOOT

McLaren- and Mercedes-Benz-backed driver Lewis Hamilton (above) recently participated in a photoshoot for the UK magazine *Men's Health*. It was a far cry from his usual racing work and proved an enjoyable day. Find out more about this story in next month's *Racing Line*.

information information information

- A photoshoot involving all four Team McLaren Mercedes drivers took place in February. The purpose of the event was to supply the team with a fresh bank of photographs for the new racing season. You can read more about the event in the next issue of *Racing Line*.

- The official McLaren Group website – www.mclaren.com (above) – now features a ticker supplied by Team McLaren Mercedes' Official Timekeeper TAG Heuer to help you count down to the start of this year's first grand prix, in Australia on March 7. Other new features on the site include historical quizzes and a 'Guess Who?' picture game.

SHOWTIME FOR GROHE AT NEC

In January, McLaren Technology Centre Partner Grohe attended the UK's largest trade show for the kitchens and bathrooms industry at Birmingham's National Exhibition Centre.

The four-day event, called Kitchens, Bathrooms and Bedrooms, gave Grohe the opportunity to display to industry professionals a wide range of their shower products and sanitary systems.

A Team McLaren Mercedes showcar featured on Grohe's stand alongside an area dedicated to the company's work on the McLaren Technology Centre. This included a demonstration of the water management computer system that manages all the washroom facilities.

SCHÜCO ANNOUNCES KART CHALLENGE

McLaren Technology Centre Partner Schüco is to hold an international Kart Challenge for Schüco sales divisions across Europe. The company held a UK Karting Challenge last year with the support of Team McLaren Mercedes, who invited the winners to spend a day with the team. This year's event – the first to be held on the international stage – is also being supported by Team McLaren Mercedes. The semi-finals and final will take place in Majorca, Spain, in Autumn 2004.

TESTING TIMES

OUR DAILY BREAD

Testing remains the largely unseen element of Formula 1, but the work carried out determines a team's chances of realising world championship ambitions. *Racing Line* joined Team McLaren Mercedes at Valencia in Spain to look and learn

WORDS **LUKE HAYTER** PHOTOGRAPHY **CHARLES COATES,LAT/HOCH ZWEI**

The early-morning sunshine is bright enough to hurt the eyes, yet the air is searingly cold. Though it promises to be a fine Spanish day, coats are fully fastened and hands rubbed together in the hope of generating some warmth.

Racing Line has come to the Circuit Ricardo Tormo, which sits in a natural bowl, looked down upon by mountainous hills, just west of Valencia on Spain's east coast. It is, along with Barcelona, a popular winter testing destination for the Formula 1 community, largely due to the clement nature of its climate. Its plethora of second-gear corners, though, makes it an ideal location to test the performance of a car in low-speed corners, *á la* Monaco or Hungary.

Team McLaren Mercedes is here, testing two of its new MP4-19 race cars. As the first team to unveil its 2004-spec season challenger, it has had plenty of opportunity to pile on the miles, and this four-day test in Valencia further augments that intensive development programme.

The circuit seems to be contained within itself, and every turn is completely visible from any vantage point. There are no crowds here today, though, no seas of support; instead, the squat grey concrete grandstands sit empty, serving merely as resonance points for the distinctive sound of the team's latest Formula 1 powerplant.

The alarm that signals the pitlane's opening – and therefore the track's – sounds abruptly, and just as quickly the place is silent again. The densely vegetated hills that surround the bowl sit silently, absorbing noise as they have done for thousands of years.

At 9.08, David Coulthard swings his MP4-19 out of the garage in a tight arc, the noise from his engine getting fingers inside people's ears. He guns the car down the long pitlane and is immediately into Turn One. It's time for the one-lap systems check that precedes any day's testing effort. The engine noise he is creating seems to follow just behind, never quite catching up. Indeed, it seems as if there are two cars on the track, one invisibly following the other. As the morning progresses, the sun warms up as surely as the car's engine and casts long shadows across the pitlane.

One of the main objectives of this test is to evaluate tyre performance, because Team McLaren Mercedes and Michelin have not – at the time of writing – settled on the exact specification of rubber that will be manufactured for the 2004 season. A session such as today's allows them to assess all areas of a tyre's performance, including different compounds, methods of construction and sidewalls.

"THE PRIMARY OBJECTIVE FOR TODAY IS TO PUT SOME SUBSTANTIAL MILEAGE ON THE CAR"

INDY LALL, TEST TEAM MANAGER, TEAM McLAREN MERCEDES

Visible proof of this objective comes in the form of one garage given over entirely to the round and black objects, stacked high and neat, all wrapped in their individual jackets to protect them and keep them warm. The whole space smells strongly of rubber, and it's not unpleasant.

No sooner has a car completed its run than the wheels are removed and a Michelin engineer prods the still-smoking rubber with a temperature probe. This information is the kind that can win and lose races and, ultimately, world championships.

By now, it is mid-morning and the clouds are thin and long, as if stretched through the sky by some invisible hand. Everything is warm. >>

Testing is hard work for all involved. There is not the pressure of a grand prix, but there is the pressure of knowing that the work carried out here will determine whether the team can look forward to a reliable and competitive season

For the mechanics and engineers, pre-season testing is intense work, with none of the glamour of a grand prix, but all of the pressure. Indeed, this Valencia test is just a small part of a schedule in which they must travel to Jerez and then Barcelona to hone MP4-19 in readiness for the first race.

Meanwhile, David Coulthard is in deep conference with his race engineer, Phil Prew, using his hands to explain the car's behaviour when words will not stretch. The track is starting to rubber-in now and the high sun catches the black marks, exposing the blackened racing line. The sky is a lucid blue, filling in the expanse between the now almost-linear cloud.

Kimi Räikkönen strides purposefully into the garage as David is pulling on his balaclava for another run. He chats with his engineers before donning his own Nomex mask. He settles into the cockpit and follows just behind David, who has already smashed the pitlane speed limit on his way on to the track.

The lap here at Valencia is quite short and the cars seem to be travelling past the pitlane almost constantly. The speed with which they do so is truly astonishing. Both drivers seem smooth, though, unhurried throughout the lap – truly a feat given the speeds at which they are travelling.

"The primary objective for today is to put some substantial mileage on the car," explains Test Team Manager Indy Lall. "With the new regulations for 2004 [which stipulate that a team can use only one engine per car, per grand prix weekend] it's vital that we have a reliable and durable engine. This extended running also allows us to experiment fully with a host of new components on the car."

Days such as today cannot be enjoyed by all teams in Formula 1, but an outfit such as Team McLaren Mercedes – with the backing and resources generated by a full portfolio of committed Partners – can ensure that it is always pushing the sport's design and technology envelope. This means the team is in a position to push forward the entire design language of Formula 1.

"It is crucial that the team is able to stay on the cutting edge," Indy says. "The resources we have allow us to push the limits, to have more of everything. For example, having two dedicated test drivers of the quality of Alex [Wurz] and Pedro [de la Rosa]. This allows us to go into the season as well prepared as we can be. Not >>

VALENCIA CIRCUIT

The Circuit Ricardo Tormo, named after the late Spanish 50cc motorcycle world champion, was constructed in 1999 and held its first MotoGP, for 500cc motorcycles, the same year. At 4km long, this sinuous and short circuit is comparable to the grand prix tracks at Hungary and Monaco, insofar as it consists mainly of tight, slow corners, with no high-speed turns to speak of. The warm climate and varied topography, however, make it an ideal place to hone and tweak the many complex systems and components of a modern Formula 1 car.

The circuit has many changes of camber and direction, which can allow a team to learn more about how its car copes in low-speed, high-grip mode. It would be futile to come here to discover how a car will perform at, say, Monza or Spa, but Valencia has much information to offer up about a car's performance at some of the grand prix season's less fiery turns. Another important characteristic of the track is that it has very low levels of grip, which makes it ideal for putting a tyre through its paces.

Pre-season tests allow the drivers and engineers to become familiar with the individual characteristics of the team's new car – in this case,the MP4-19

all teams in the pitlane can lay their hands on these resources so they go into the season perhaps slightly less well prepared. The fact that we can formulate and maintain a structured development programme helps us to remain as competitive as we can be at any point throughout the season."

Both drivers are sitting in their cockpits, helmets on, ready for the signal. Kimi is the first to glide from the garage. He travels a few metres along the pitlane before delicately bringing the car to a halt. There follows a display of mechanical force that truly widens the eyes. Kimi stands on the accelerator and jets of grey-blue gas pour from the exhausts – it looks more like a jet fighter than a car. Then he is gone, away on another lonely run.

There is an adage about racing cars that runs along the lines of "if it looks quick, it probably is" and, if this is the case, MP4-19 should certainly have no problems. Its design is purposeful, its sweeping lines hinting at speed even while stationary. With a driver behind the wheel and the engine fired, the machine comes alive, throbbing with latent energy. Each run is like a mini grand prix but, if there are faults in the machine, they will be ironed out here, away from the crowds and cameras.

As the team breaks for lunch, the sun is at its highest point and it is a relief to be out of its prickling heat for a time. Immediately at the end of the break, David and Kimi return to the garage and ensconce themselves in their cars. Both sides of the garage are active now, and the cars are prepared for more running by the many mechanics.

Despite the huge amount of work that goes into testing days such as today, Formula 1 is notoriously fickle and has a habit of throwing up surprises that can upset even the best-laid plans. Despite this, testing still provides the only worthwhile barometer of pace that a team can expect to have come the start of the season.

"Obviously we know what our pace is currently, because we know how the cars are set up, what level of fuel we're running, so on and so forth," says Indy. "However, because we are testing alone today, we cannot accurately judge what other teams are doing. If we were sharing the circuit with somebody else and they were running a similar sort of pace to ours, we could try to gauge whether they were doing the same sort of times as we are. So it is possible to pick up quite a bit from what other people are doing, particularly with the special speed-trap system that we use, which allows us to accurately gauge other teams' split times and top speeds."

This testing, at once luxurious and essential, is daily bread for a Formula 1 driver: there are no cameras clicking on his every move, no autograph hunters, no world championship points on offer. Testing, though, is the arena where gains are made and solutions found.

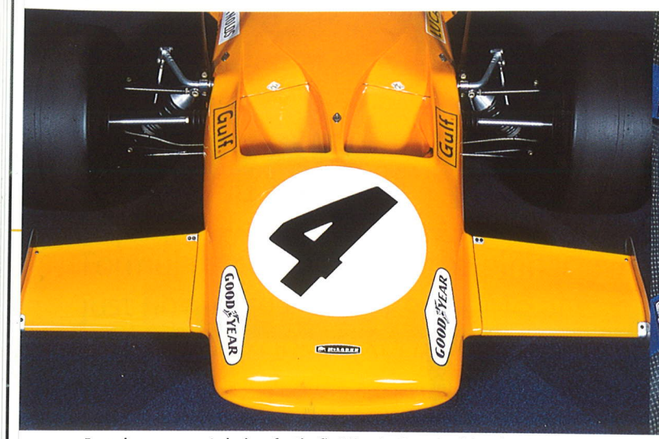
So, when the lights go out to start the season's first race, at Melbourne in March, everyone knows what is possible. Then it's just a question of making it happen – with just a little help from the Formula 1 gods. ■

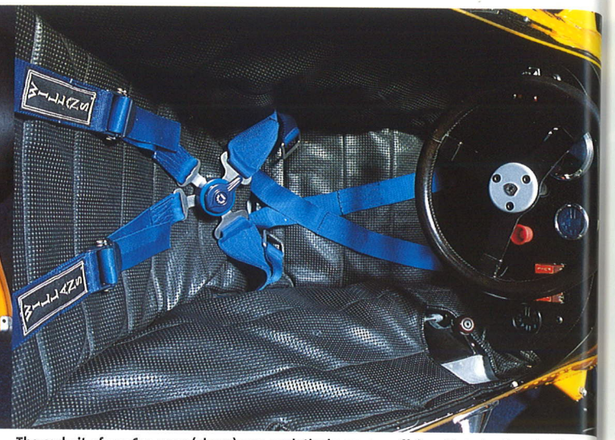
FLYING WITH WINGS

Formula 1 cars represent the pinnacle of automotive technology, but just how different is a 1960s McLaren racer from 2004's MP4-19? In a world exclusive, *Racing Line* finds out

WORDS **BRUCE JONES** PHOTOGRAPHY **GLENN DUNBAR,LAT**

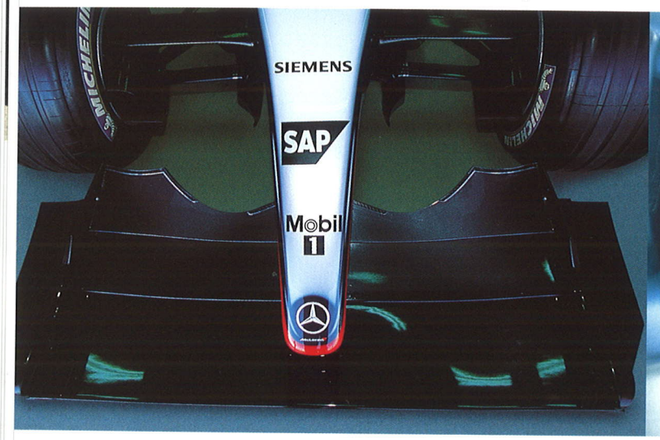
M7 VERSUS MP4-19

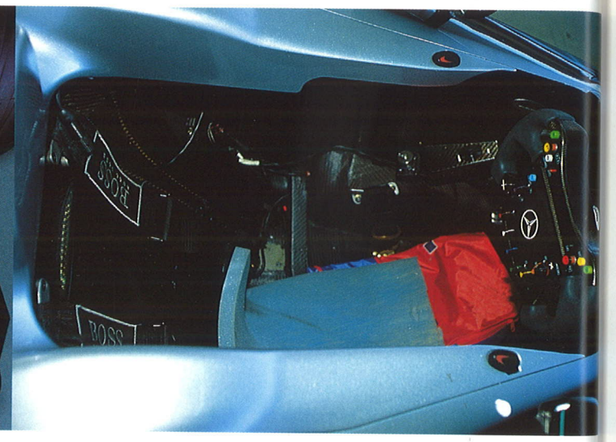




Formula 1 cars sprouted wings for the first time in the 1960s (above) and they soon caught on. In 2004 (below) their sophistication and effectiveness is unquestioned

The cockpit of a 1960s racer (above) was a relatively spartan affair, with just a few simple controls. In 2004 (below) the driver has a host of functions controllable by his fingertips





Today's cars, such as Team McLaren Mercedes' MP4-19, are the results of thousands of hours of work, the fruits of design genius, inter-departmental clarity of focus and no little sweat. The tools of the trade are mind-boggling to the public, with computer-aided design and manufacture (CAD/CAM) easing the passage from concept to reality and high-tech wind tunnels, autoclaves and computational analysis easing that process. It's small wonder that more than 100 specialists are involved. What a far cry this is, then, from the way that McLaren produced the M7 back in 1968 just as Formula 1 made the breakthrough to harness downforce for the first time. To call Formula 1 a cottage industry back then is not to be unkind. It was hit and miss and, sadly, tragic accidents were common. Formula 1 has come a very long way.

Denny Hulme won that year's Italian Grand Prix in his M7 at an average of 234km/h. Thirty-five years later, the winning speed was a record 248km/h. You might consider this meagre progress, but the fact that there are three chicanes now breaking the flow puts the gain into perspective. If today's cars are aerodynamic masterpieces, the harnessing of aerodynamics in 1968 was so poor that McLaren chose to run at Monza with no wings in the quest for speed down the straights.

McLaren Racing Technical Director Adrian Newey is clear on why today's car makes the M7 look ancient: "There were perhaps three or four people involved in 1968, some of whom were probably also working on McLaren's Formula 2 and CanAm cars. We had seven engineers and draftsmen in my first year in Formula 1 with Fittipaldi in 1980 and we have over 100 people involved in the design of the MP4-19. So, there's a huge difference in resources and it's this that has prompted the massive gains in aerodynamics and materials research. In 1968, finances were considerably less. The basic pressures of developing your car through the year and year-to-year remain the same, though. That's Formula 1."

The simplicity of the M7 is demonstrated by its design process. Executive Director of Engineering Neil Oatley explains: "There were only 86 drawings for the M7. The MP4-19 has 3,900. In 1968, many parts weren't drawn at all and were produced by some arm-waving in the workshop. The M7 would even have taken parts from other cars."

As to the tools in hand in 1968, there was still an element of being sketched on a tablecloth. "I don't think the M7 ever saw the inside of a wind tunnel," says Oatley. "Designing the wings that appeared for the first time that year was very ad hoc. McLaren even tested its rear wings on a van! These days, with so many more factors, there's a lot more work done up front, with computational analysis, even before the car goes to the wind tunnel, and plenty more after that…"

The M7 was designed without wings, but these grew to ever greater heights as teams experimented. Unfortunately, some broke, and Jochen Rindt's injury at the 1969 Spanish Grand Prix led the FIA to restrict the height of wing supports. Since then, aerodynamic devices have been heavily regulated. "This goes back to resources," explains Newey. "A 1960s team couldn't have built a car to pass modern crash tests. Today, a lot of effort is expended just satisfying those regulations."

Oatley points out the scale of today's limitations: "The chief difference between 1968 and now is that there were only two pages of technical regulations then. Now, there are 50 pages plus 30 more on interpretation."

A water-tight set of technical regulations leaves the designers restricted relative to their 1960s forebears who were, if lucky, able to make appreciable gains. Newey is almost wistful: "Because regulations are so stringent, it's hard to find new areas to explore. One of the best things about the 1960s was the great variety in the cars, whereas the basic shape of the car today is almost defined by the regulations."

Today, every single part has to comply with the wishes of the aerodynamic overlord. However, it's not just in wind-cheating that today's cars leave the likes of M7 in the shade; safety has also made a quantum leap.

"Safety was almost non-existent," says Oatley. "Seat belts were only just becoming mandatory. Unbelievably, some people preferred to be thrown out in an accident. In the 1960s, if they needed extra fuel, they'd strap another tank over the driver's legs…"

Newey grimaces at the safety record of the 1960s: "It must have been a horrid feeling on the grid knowing that there was a good chance that you or a rival might not be alive at the end of the race." The chief change is that drivers are now encased not in a simple metal monocoque and surrounded by fuel tanks, but in a considerably tougher carbon fibre monocoque with deformable structures all around them. >>

"BECAUSE REGULATIONS ARE SO STRINGENT IT'S HARD TO FIND NEW AREAS TO EXPLORE"

ADRIAN NEWEY, TECHNICAL DIRECTOR, McLAREN RACING

McLAREN M7

Engine	Ford Cosworth DFV
Format	V8
Cubic capacity	2,995cc
Maximum power	430bhp
Maximum revs	9,000rpm
Electronics	Lucas fuel injection, Autolite spark plugs

TRANSMISSION

Gearbox	Hewland DG300
Forward speeds	5
Clutch	Borg & Beck

CHASSIS

Brake discs	Lockheed
Brake pads	Ferodo

FRONT SUSPENSION

Upper and lower single links with trailing radius arms. Outboard coil spring dampers

REAR SUSPENSION

Single upper link, reversed lower wishbones, radius arms and outboard coil spring dampers

Dampers	Armstrong

DIMENSIONS

Wheelbase	2,413mm
Front track	1,448mm
Rear track	1,448mm
Weight	575kg
Front wheel width	305mm
Rear wheel width	406mm
Fuel tank capacity	181 litres

SUPPLIERS

Fuel/Oil	Gulf
Tyres	Goodyear

VICTORIES

1968 Belgian GP, 1968 Italian GP, 1968 Canadian GP, 1969 Mexican GP

TEAM McLAREN MERCEDES MP4-19

Engine	Mercedes FO 110Q
Format	V10
Cubic capacity	3,000cc
Maximum power	More than double that of M7C
Maximum revs	Approx 18,000rpm
Electronics	McLaren Electronics

TRANSMISSION

Gearbox	McLaren semi-automatic
Forward speeds	7
Clutch	McLaren, hand-operated

CHASSIS

Brake discs	Hitco
Brake pads	AP Racing

FRONT SUSPENSION

Double wishbone, inboard torsion bar/damper system, pushrod and bell crank-activated

REAR SUSPENSION

Double wishbone, inboard torsion bar/damper system, pushrod and bell crank-activated

Dampers	Penske/McLaren

DIMENSIONS

Wheelbase	Not available
Front track	Not available
Rear track	Not available
Weight	600kg (including driver)
Front wheel width	Not available
Rear wheel width	Not available
Fuel tank capacity	Not available

SUPPLIERS

Fuel/Oil	Mobil 1
Tyres	Michelin

VICTORIES

None, yet...

THE GENERATION GAME

The McLaren M7 is small and orange, with only a smattering of logos discreetly adorning its flanks. Its cigar-tube shape is broken by a pair of wings on either side of the nose and a low-mounted, single-plane aerofoil above the engine. Thirty-five years younger, the MP4-19 is small and silver darkening to grey, but looks larger because there are wings front and rear, turning vanes, bargeboards, sidepods and a diffuser to bulk up its appearance, all shaped for aerodynamic efficiency and the maximum strength for the minimum weight.

The M7 has slick tyres, the MP4-19 grooved rubber. The M7 has a simple cockpit amid a monocoque of light aluminium alloy panelling over steel bulkheads with a steering wheel flanked by three dials and a gearlever. It uses the then trend-setting approach of having the engine as a stressed section of the car, taking the load of the rear suspension.

The MP4-19's made-to-measure cockpit looks more like something from a spaceship, its lay-back driving position markedly different from the relatively upright position of old and its high-sided carbon fibre monocoque made to withstand impacts that would undoubtedly have left a driver of a 1960s Formula 1 car severely wounded or even dead. Bruce McLaren and Hulme would have wondered why there was no gearlever and just two pedals, because paddle-shift, semi-automatic gearboxes didn't arrive until 1989.

In short, the drivers of the M7 (McLaren and Hulme) had a very different piece of machinery under their control from that enjoyed by David Coulthard and Kimi Räikkönen in 2004. The M7 was state-of-the-art in the late 1960s, just as the MP4-19 is in 2004; it's just that the game has moved on so far. Equally, though, compare the M7 with a car from 35 years before its pomp and you're contrasting it with, say, an Alfa Romeo P3, showing how Formula 1 is always advancing. Indeed, as Adrian Newey and Neil Oatley have outlined, the parameters involved in the design and production of the M7 and MP4-19 could hardly have been more different with the finance, personnel and materials available at the time.

This M7 is actually M7C, a one-off built for Bruce McLaren, using the more rigid monocoque from the Formula 5000 McLaren M10 fitted with the M7A suspension. It made its debut in the second round of 1969, the Spanish GP – the race in which both Lotus's rear wings collapsed, leading to the FIA's banning of high-mounted wings. Bruce was second in that race in Spain and third at Silverstone and the Nürburgring before selling the car in 1970. It was later hillclimbed in Switzerland until being bought back by McLaren in 1999.

Formula 1 designers were beginning to realise the effect of wings in the 1960s

"Today's safety structures absorb the energy as they fracture so that the deceleration the driver experiences is kept as low as is practical," says Oatley. "Even the radiators in the sidepods absorb a reasonable amount of energy."

Other safety improvements include fireproof overalls and proper helmets, with more energy-absorbent carbon fibre ones being mandatory from mid-2004, replacing the glass fibre ones. There's also padding around the top of the cockpit to protect a driver's head and shoulders in conjunction with the HANS device.

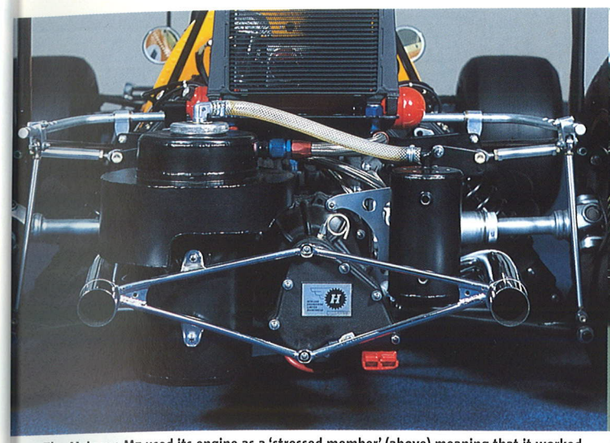
"In 2003, there were several instances of drivers being concussed," Oatley points out, "and perhaps they wouldn't have survived had we not had this level of cockpit safety."

Unlike in 1968, safety is now very much a key to design, a starting point rather than an afterthought. "Safety has to be divided into primary and secondary safety," explains Newey. "The former is how safe it will be for a driver if a car hits a barrier. The regulations we have covering the location of the fuel tank, the front impact test, headrest specification and lift-out seats don't really restrict the shape of the car. What do restrict it are the secondary factors such as how quick a car's lap time is or how fast it is in a straight line, meaning that the restrictions are aerodynamic or with the introduction of elements such as grooved tyres rather than slicks or a limit on horsepower. These are largely dimensional restrictions. If the FIA relaxed these, we'd have much quicker lap times, but you need secondary safety because otherwise no matter how good your primary safety is you'll have accidents that are so big that somebody will get hurt."

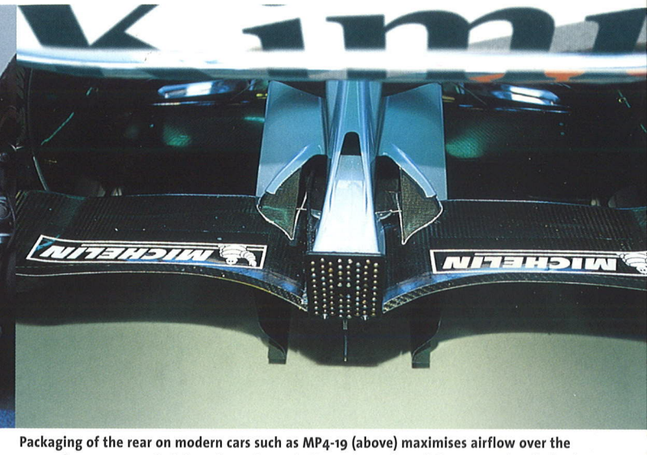
Designing the safety into a car isn't just a case of fitting within the aerodynamic parameters, though, as Oatley explains: "The regulations take quite a lot of engineering to make the monocoque strong enough for the crash tests. We know that if we make a 150kg monocoque there'll be no problems, but we want to make them as light as we can, so a lot of empirical testing goes into those crash tests."

Most designers and engineers don't like restrictions. Newey, for one, wants more: "We developed a system of regenerative braking in 1998 in which every time the brakes were used they stored some of the energy by using a medium – compressed gas – that was released on acceleration. This made the car faster around a lap, but think what a benefit this would be for urban driving, with a tremendous fuel saving. Sadly, the FIA banned it."

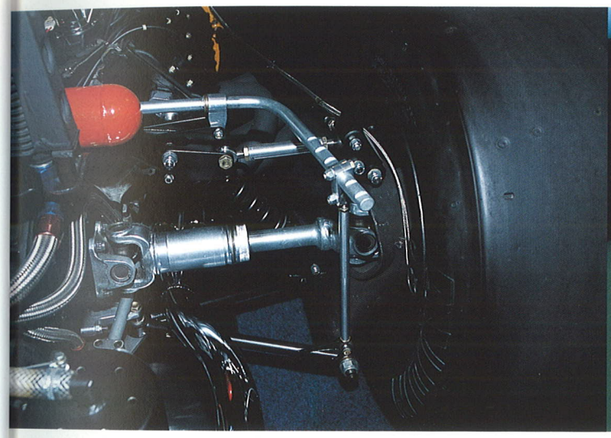
So, the game has changed as Formula 1 has powered forward, and although the philosophy remains the same – building the best car you can with the aim of winning races – the designer today is buoyed by knowledge, equipment and financial clout but kept in check by regulation, a corollary of 21st-century life. ■

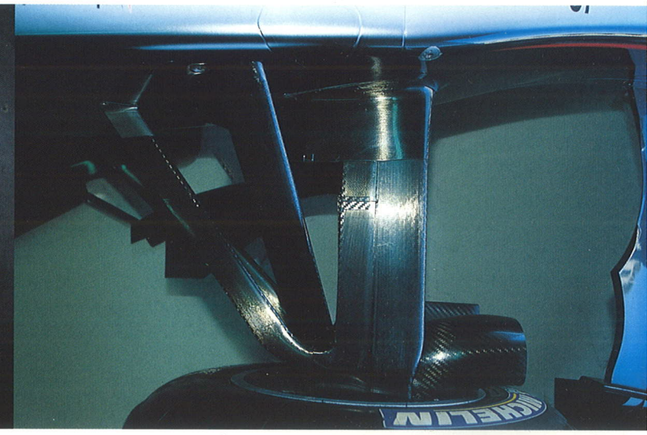


The McLaren M7 used its engine as a 'stressed member' (above) meaning that it worked as part of the chassis. The suspension (below) used a simple, effective wishbone layout



Packaging of the rear on modern cars such as MP4-19 (above) maximises airflow over the car, and space-age materials and aerodynamic theory have shaped the suspension (below)





"THERE WERE ONLY 86 DRAWINGS FOR THE M7, WHILE THE MP4-19 HAS 3,900"

NEIL OATLEY, EXECUTIVE DIRECTOR OF ENGINEERING, McLAREN RACING

INSIDE INSPIRATION

For Faram, furnishing the McLaren Technology Centre was no ordinary job. Faram created a brand new, homogeneous range of solutions. The result is a series of deeply innovative and highly functional workspaces

WORDS **SUZANNE ARNOLD** PHOTOGRAPHS **MARC BURDEN** ILLUSTRATION **McLAREN GROUP**

When McLaren set out to create the Technology Centre, Group Chairman and CEO Ron Dennis knew exactly what was to be achieved: "the ideal surroundings with which to influence, inspire and motivate our employees." The success can in part be credited to Faram, who provided the furnishings for the facility.

It was a vast and immensely challenging project, but Faram and the McLaren Group were ideal partners and worked well together. Each values efficiency, quality and style. Neither is willing to aim at less than perfection and neither tries to cut corners. These shared values enabled the project to be just as technologically innovative as any Team McLaren Mercedes Formula 1 racing car, as McLaren's Design Engineer Mike Grubb explains.

"We outlined our requirements to three companies and asked for their proposals," says Grubb. "Two of the companies came back with an evolutionary step on their standard product. Faram came back with something that was radically different – a completely new product. It was really because of this that everyone warmed to them, because they were embracing the idea of what we were trying to do."

For Faram, too, it was refreshing to work with such forward-thinking partners: "We were delighted to find a client who was involved in every single stage of the development," says Faram Managing Director Dino Pase. "We were able to put forward more sophisticated solutions because the client understood the reasons for them and gave us the support necessary."

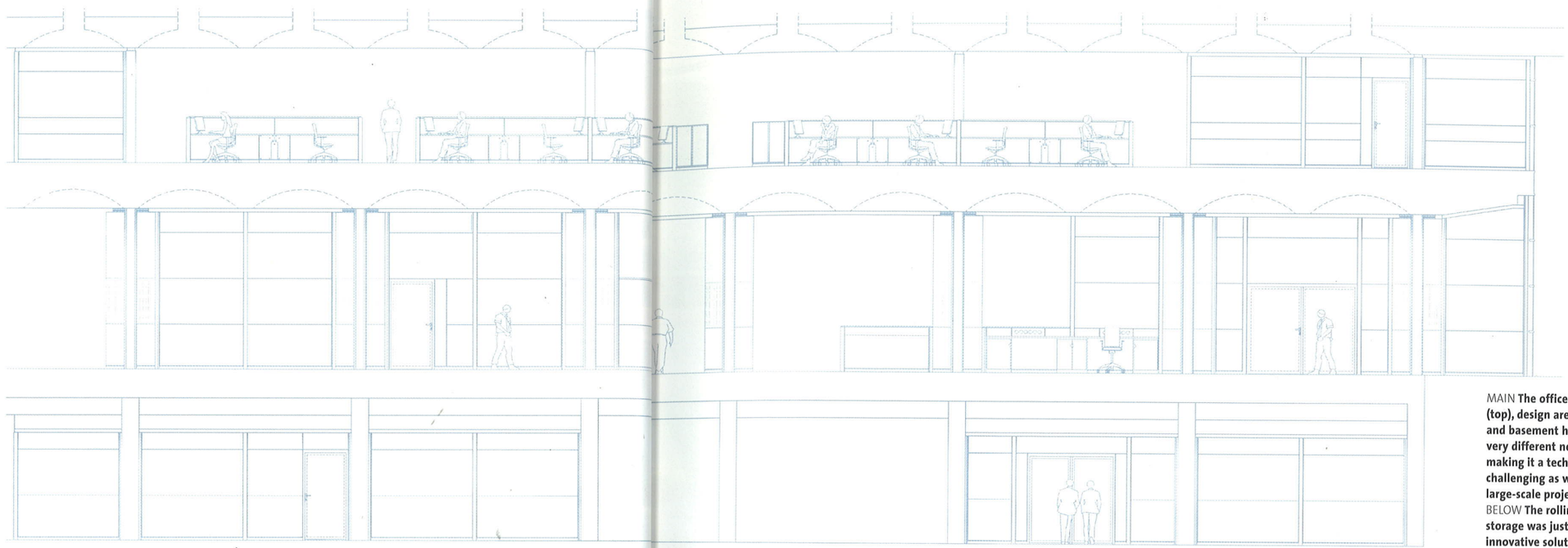
The "sophisticated solutions" he refers to were in fact completely new ideas developed specifically to meet the Technology Centre's requirements. The first of these, as Pase explains, was the partitioning from which walls would be constructed.

"The architects had required three different types of partition," says Pase. "The first floor had to have a very high design content and executive look, because it was the office area. The production areas had very high >>

ceilings, so they needed a system where the partitions were very rigid, because they had to be so tall. The basement had less of a visual requirement but was equally important for functionality because it was an area where partitions might need to be moved around quite frequently as the company's requirements evolved. We thought we had a system which could do all three together." That system was selected and installed, with great success, and formed the basis of Faram's other developments.

Next came the furnishings – especially the desks and storage provision. The first major innovation was to use the partition designs for the furniture: it would have the same construction, finishes, details and architectural features.

"This is an obvious idea," says Pase, "but it does not normally happen. We have now demonstrated the logic in doing it and that it can be done successfully and efficiently."



MAIN **The offices (top), design areas and basement had very different needs, making it a technically challenging as well as large-scale project.**
BELOW **The rolling storage was just one innovative solution**

Desks emerge from partitions, supported by cabinets, and each area is decorated with abstract images

"It's not only the continuity of finishes and the aesthetic look," adds Pase's colleague, Designer Nigel Coutts. "You also gain efficiencies. For instance, being able to suspend the desks from the full-height partitions without needing any changes. The traditional way would be to have legs. We didn't take that approach. We integrated everything – worktops and storage – into the partitioning. It gives a continuity of design."

It also makes the workstations much easier to use, because the age-old spatial battle between table legs and human legs is finally resolved.

Complementing this is the fact that computer towers have their own beneath-desk cabinets, ensuring that workspaces are always tidy. These CPU (computer processing unit) cupboards have quick-release fastenings so that the company's IT department can remove walls for easy access should any computer repairs be necessary.

Even while addressing such complex functionality concerns, Faram always kept an eye on its design aesthetics. "It was clear that the designers were trying to use a lot of glass in the building," says Pase. "Indeed, we had used a lot of glass in the partitions. Most of them are glazed. We decided to construct storage cabinets by precision welding metal tubes to create a framework and cladding it with glass."

"THE INNOVATION WITH THE STORAGE IS AMONG THE MOST SIGNIFICANT THAT WE MADE"

DINO PASE, MANAGING DIRECTOR, FARAM

The intra-office windows also meant that floor-to-ceiling shelves or cupboards were out of the question, putting storage space at a premium. Faram and the McLaren Group worked together to create a new kind of rolling storage that, unlike its traditional counterpart, does not require rails laid into the floor. This makes it very easy to relocate as and when office layouts evolve over the Technology Centre's lifetime. It also offers the greatest possible storage space because individual cupboards do not need fixed access space around them: you simply turn a wheel to move the row of cabinets along until an access space appears beside the one you need to open.

"The innovation with the storage is probably the most significant that we made," says Pase. "Using the McLaren Group's engineering expertise and our manufacturing capabilities we designed a system with a similar visual appeal to everything else in the building but also with a mechanism underneath which allows it to move across the floor. The cabinets are attached to partition walls so they have a definite location and travel within a certain span. But there's the flexibility to relocate them, which you don't get with rails."

The next in this exciting series of innovations was the decoration of individual working areas. The McLaren Group's Interior Designer Colin Gold decided to print photographs onto >>

ABOVE **Note that the partition glass is flush with its frame. It is bonded direct to the structure, rather than being framed by it, giving the offices a clean, glazed look**

the glass desk partitions, giving each workstation colour and identity. It was yet another new technological challenge for Faram to overcome, aimed at personalising desks and creating that inspirational environment that McLaren had set out to achieve.

Gold wanted the images to be abstracted, "almost modern works of art, but with a natural feeling to them," he says. For instance, McLaren Cars' area has a water theme and McLaren Marketing has a tropical leaf theme, but the details are blown up so far that some of them just look like stripes. Seen together, though, they create a working environment with movement and individuality while complementing and blending in with the overall building design.

McLaren Marketing moved into the Technology Centre last year and reacted positively to their new, highly conceptualised workspace. "Our department sits together and all our files are located nearby. This new set-up gives me a greater feeling of teamwork," says one employee.

"FARAM'S PRODUCTS PERFECTLY SUIT THE VISION BEHIND THE CENTRE"

RON DENNIS, CHAIRMAN AND CEO, McLAREN GROUP

Another says, "Our new desks have more than enough room to store our day-to-day files and, when I'm working on several projects, there is enough space for me to keep all my files out on the desk and still have plenty of room in which to work."

For two years, Faram had about 50 people working on-site and another 50 working on design, production and so on. Their schematic drawings alone, if stacked, would form a pile perhaps half a metre tall. So much hard work for furnishings that many people would notice only if asked to think about them. But that's the point, says Pase. "The desks look fantastic and are very functional so are almost unimportant to people, who concentrate on their work, not on the desks."

Ron Dennis said, at the outset, "We believe that Faram's products perfectly suit the vision behind the McLaren Technology Centre." He was right. The building looks fabulous and embodies all that the McLaren Group stands for. It is also, thanks to those technological advances, a comfortable and practical place to work. ■

Q&A

Former McLaren driver **Mark Blundell** has enjoyed a rich and successful motorsport career: from Formula 1 to CART via the Le Mans 24-Hour race. He's even competed in a round of the World Rally Championship. *Racing Line* caught up with him

WORDS **LUKE HAYTER** PHOTOGRAPH **CHARLES BEST**

You raced and tested for McLaren in the 1990s. What are your memories of your time with the team?
I tested for the team in 1992 and in 1995. It was a lot of fun and the people at McLaren and Mercedes-Benz were great to work with – especially Ron Dennis, from whom I learned a lot. When I went back to test for the team in 1995, I got a call 10 days before the first grand prix telling me that I would be racing. Perhaps the highlight of my year was out-qualifying Mika Häkkinen at Estoril for the Portuguese Grand Prix. I still keep in touch with several people at the team, often visiting them at races, and they always welcome me.

How do you rate Team McLaren Mercedes' chances for 2004?
I think the team is looking strong. The new MP4-19 looks a very quick car, and the fact that the team have been able to start testing it so early can only be a good thing, in my view. Also, in Kimi Räikkönen and David Coulthard they have a pair of dependable, quick drivers. I think there's every chance that the team can go one better than it did last season.

After Formula 1 you went on to carve a successful career in the CART series in the US. What kind of experience was that?
It was very rewarding. Having previously worked with Formula 1 levels of technology, though, I was surprised to see the somewhat more basic facilities that were commonplace in CART at that time. I managed to secure a number of wins for my team, including its first-ever 500-mile event, becoming only the fourth Briton in history to win a 500-mile oval race in the United States.

Could you tell me a little about the difference between CART machines and Formula 1 cars?
CART machines were much heavier and also employed steel brakes, which have much less stopping power than the carbon fibre brakes that are used in Formula 1. There was also a sequential gearbox, which I hadn't used for about 10 years prior to getting into the CART series. There was no fly-by-wire throttle control, no traction control, ABS and so on. It was a very much more basic experience than driving a Formula 1 car, and the driver couldn't rely so much on wind-tunnel data and computer simulations. It required a much more intuitive set-up approach, which in some ways took me back to the cars I had raced earlier in my career.

You triumphed at the Le Mans 24-Hour race back in 1992. How good did it feel to add your name to the list of great drivers who have triumphed there?
Le Mans is, along with the Monaco Grand Prix and the Indianapolis 500, one of the races that almost everybody in the world has heard of. It's different, though, because you're sharing a car with other drivers. Driving sportscars can be a great way for drivers to learn the basics of good technique: it teaches you to be consistent and disciplined and to look after your car for the entire race distance. Sportscars in general require lots of feel from the driver.

Of all the different disciplines you've raced in, from Formula Ford to Formula 1 via sportscars and CART, which series have you enjoyed most?
There is no thrill greater than that of driving a Formula 1 car at 100 percent. I would have to say, though, that the best *racing* I've ever experienced was in the United States. It is unbelievable to be cornering at some 360km/h, with just a few centimetres between you and the guy in front. A truly incredible experience. Also, standing on the top step of the podium at Le Mans with 50,000 Union Jacks waving beneath you takes some beating.

Many people will now know you from your role on [British broadcaster] ITV's Formula 1 coverage in the UK. How did you get into that?
While I was driving in America, my good friend [former Formula 1 driver] Martin Brundle temporarily left his ITV commentating duties to compete at Le Mans and, because that race didn't clash with any of my commitments, I filled in for him.

When I finished racing in the 'States, I was asked if I'd be interested in doing some studio analysis work. It was a good opportunity for me because it allowed me to continue with my driving activities. It also keeps me abreast of matters in Formula 1. I really enjoy it, but it still doesn't compare to the thrill of driving around a racetrack and putting in a really quick lap.

Do you have any plans on the driving front for 2004?
I made a pact with myself that when I slowed down from racing, I would drive only machinery that was ultra-competitive and manufacturer-backed. If that's not the case I'd rather not do it because, if I'm going to take part, I want to try and win. I have some opportunities for 2004 but nothing has been finalised. Even though I may look 47, I'm only 37 years old, so there's a bit of driving in me yet! ■

McLAREN ELECTRONICS

WE ARE ELECTRONIC

McLaren Electronic Systems provides the heart of each Team McLaren Mercedes Formula 1 machine, but this is not all. The company's projects vary in scope from world rally cars to the Mercedes-Benz SLR McLaren sportscar

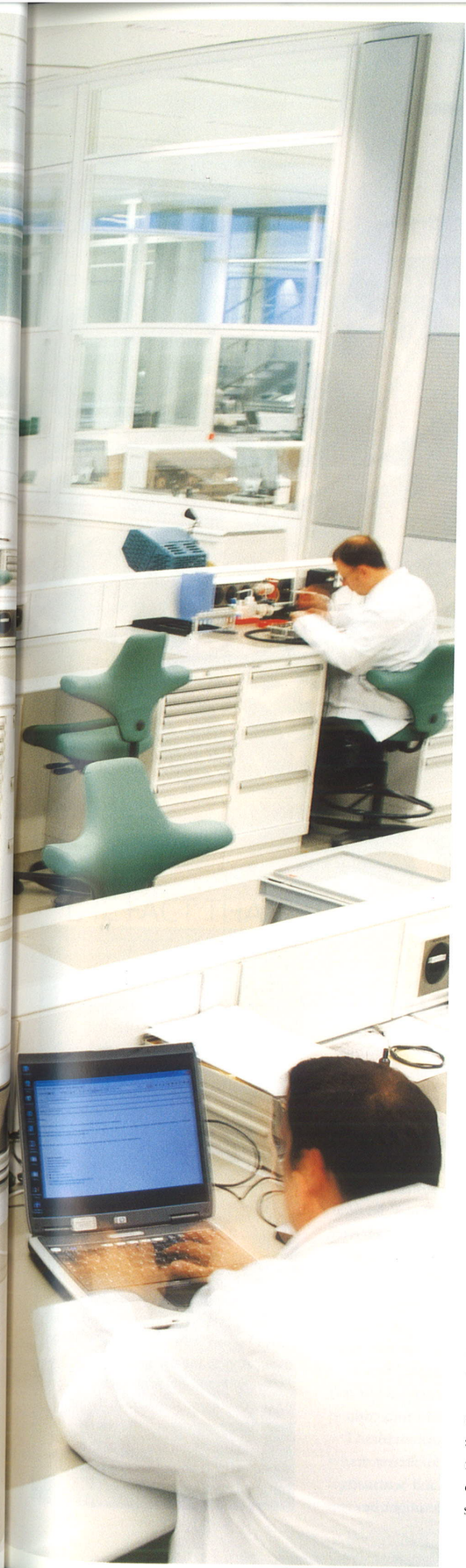
WORDS **MARK SKEWIS** PHOTOGRAPHY **MARC BURDEN**

The McLaren MP4-19's 'brain' is an electronic control unit so small and light that it could sit in the palm of your hand. It controls every major function on the car and must withstand violent vibration, intense temperatures and extreme *g*-forces. A grand prix presents an extraordinary test of electrical components, which is why Team McLaren Mercedes' control units are built by an extraordinary company: McLaren Electronic Systems.

The MP4-19 features a highly integrated chassis/engine package which depends upon the powerful no-compromise electronics package to make it work. This system is exclusive to the grand prix team, but much of McLaren Electronic Systems' other technology is affordable, and attractive, to players in the wider marketplace.

In world rallying, for instance, the company has traditionally supplied alternators and sensors to many of the teams. It now also provides the entire control system for one of the leading factory teams in this most brutal of racing environments. Such expertise is also harnessed for the Le Mans 24-Hour race, the Indy Racing League and MotoGP Racing. >>

McLaren Electronic Systems has greatly benefited from moving into the state-of-the-art facilities provided by the McLaren Technology Centre



Soldering the connections on the main control unit chassis is intricate work

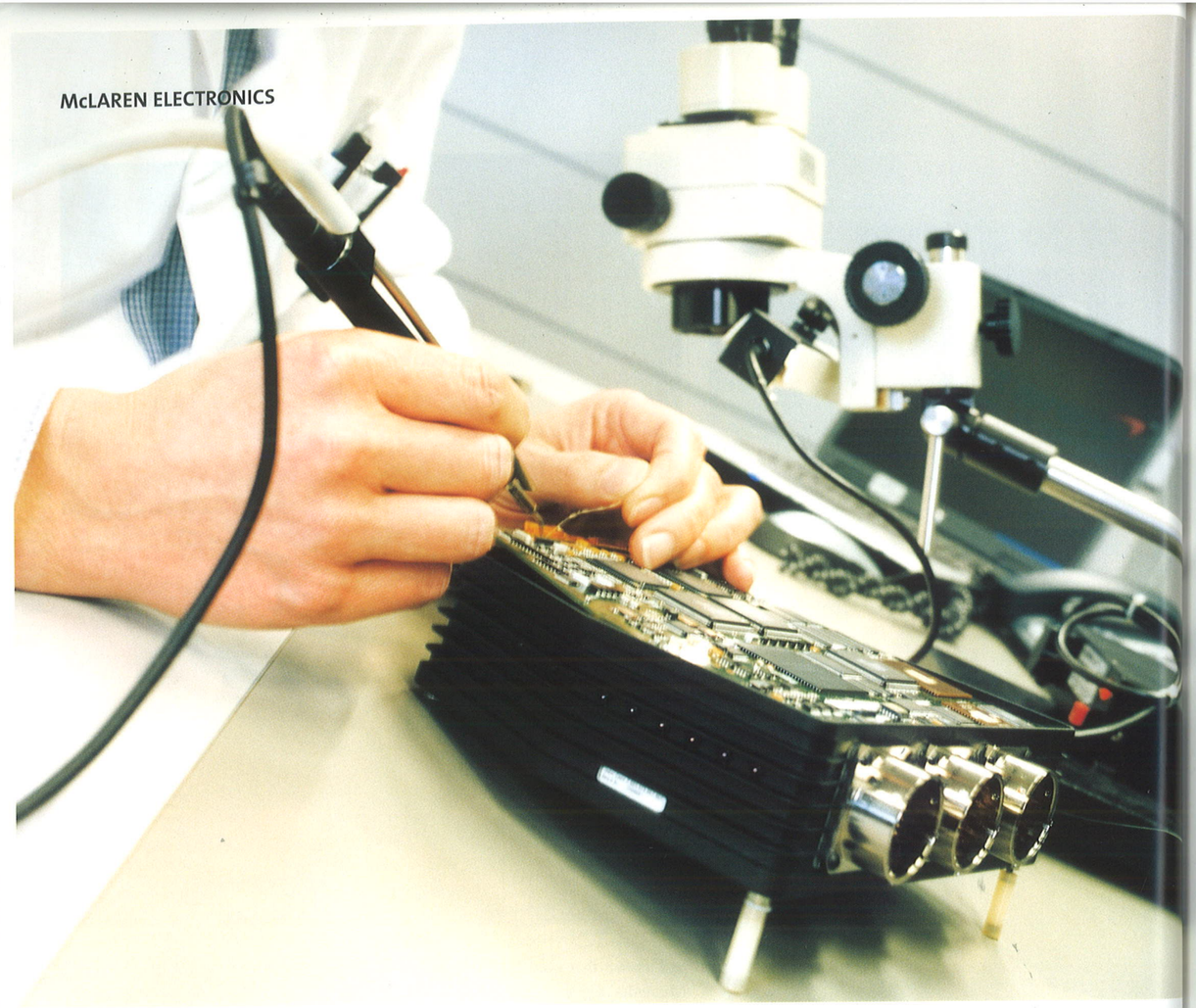
The fact that even Team McLaren Mercedes' fiercest rivals use products from McLaren Electronic Systems is the ultimate tribute to the quality of its work. The company supplies some components to every car on the Formula 1 grid. Yes, *every* car!

Dr Peter van Manen, Managing Director of McLaren Electronic Systems, draws parallels between his company's philosophy and the approach McLaren brings to racing. "McLaren Racing has always let its drivers race each other with no team orders," he says. "Similarly, the McLaren Group does not apply team orders to its operating companies. We compete in the marketplace and it is up to the teams and engine makers to make the best use of what we supply." That policy adds an extra twist to the interest with which the company's 100 employees watch each grand prix.

Van Manen believes that this healthy approach to business creates a win-win situation. "There is a benefit to the racing team as a whole in having this centre of competence kept up to speed," he stresses. "Supporting our development and manufacturing facility across a number of different customers, and a number of different racing formulae, allows us to maintain a healthy and highly responsive resource. All of this without compromising the confidentiality of our many customers.

It also exercises people's minds and talents to keep them fresh, ready for the next project." Those talents include department heads John Crosbie, Bob McDonald and Chris Reid. The laboratory standards of Reid's Electronic Production department, in which components are mounted to circuit boards, are indicative of the ultra-efficient level at which the whole company operates.

"We have very tightly controlled conditions with temperature and standards of cleanliness maintained to exacting standards," he explains. "The flooring is anti-static and we have these stylish things, too!" he says, gesturing towards his shoes. The footwear may not make it to the Paris catwalk, but it serves a vital function. "They prevent build-up of static >>



The intricate nature of the tasks carried out by McLaren Electronic Systems calls for a strictly controlled laboratory work environment

electricity which could otherwise blow up a component when it is touched." The electronic control box used in a Formula 1 car contains no fewer than 3,700 such components and over 20,000 soldered joints. It is in Reid's unit that this complex jigsaw begins to take shape. A special paste is applied to the circuit boards and the electrical components set into them automatically by an automated 'Pick and Place' machine. Accurate to within one hundredth of a millimetre, such machines can place thousands of components every hour. A nitrogen-filled oven then carefully heats the board in two-degree increments beyond the solder paste's 180-degree melting point.

Once the boards have cooled and been inspected under a microscope, most are passed on to Crosbie's Electronic Manufacturing department, which builds key computational systems for the MP4-19 and Mercedes-Benz SLR McLaren sportscar. People, not machines, dominate this department. Driven by the Formula 1 programme, the constant demand for new parts and variants of existing components means there is no substitute for human expertise.

With each two-millimetre thick circuit board containing no fewer than 12 layers of copper, and a control box consisting of many such boards, the work in each department requires remarkable precision. "The build of a single control box, just at this stage, can take almost 100 man-hours," explains Crosbie. "A grand prix car is very hard on components. They have to be of a rugged construction and yet as small and light as possible, so it is very intricate work." Some circuit boards are also required in the Electro-Mechanical Production department, where work focuses on components such as alternators, ignition coils, sensors and actuators. The end products here might be destined for a wider range of clients, but a common thread unites each department: high quality.

"The same principles, the hand-build, the high-precision parts, the rigorous testing, apply throughout the product range," says McDonald. "We transfer the Formula 1 ethos into other categories. Our standards are high and that's why people come back to us for a product. They know that we take pride in what we do."

With reliability often dictating the fine line between winning and losing, McLaren Electronic Systems operates a 'zero-tolerance' approach to faults. The development of its own automatic test equipment – a large project in its own right – has given it the ability to conduct a range of rigorous tests, including vibration, thermal and electrical noise checks.

Each of these has been neatly accommodated within the design of the McLaren Technology Centre, which has taken the company another step forward. Its production activities are now much more intimately connected to each other and to the development teams and it has far better access to internal customers such as McLaren Cars, whose production line for the Mercedes-Benz SLR McLaren is right next door.

RAPID DEVELOPMENT

McLaren Electronic Systems Managing Director Peter van Manen cites the high-speed telemetry system used by Team McLaren Mercedes as a fine example of his company's capabilities.

"A huge challenge for the industry has been the trend towards more intelligent collection, transportation and use of data," he says. "Race engineers need to have instant and high-rate data from the car if they are to make the right decisions to win grands prix.

"Our guys in McLaren Electronic Systems have risen to the challenge and have developed, from scratch, the best telemetry system in Formula 1. Full stop."

The system transmits over two million parameters to the garage from the car every second and from all areas on the circuit – so fast, in fact, that a gearchange registers on the telemetry screen in the pit garage before the sound of the change has even reached the engineers' ears.

Electronics is one area of Formula 1 that has developed most rapidly over the past decade. McLaren Electronic Systems has been at its heart

"THE FACT THAT EVEN TEAM McLAREN MERCEDES' FIERCEST RIVALS USE PRODUCTS FROM McLAREN ELECTRONIC SYSTEMS IS THE ULTIMATE TRIBUTE"

Founded in 1989, the company's early work is perhaps best remembered for its groundbreaking electronic systems on the MP4/8 active suspension car in 1993. This was, for many people, the ultimate grand prix car. Since then, the landscape of the whole industry has changed. The trend is towards ever more processing power, more intelligent gathering and exploitation of data (see sidebar, left) and teams and engine manufacturers increasingly writing their own software. McLaren Electronic Systems has evolved to meet these changing demands. It no longer writes its customer software line-by-line, but has tailored systems to allow the customer to prepare new control strategies on top of a very solid custom operating system and input/output structure.

The road car industry has similarly evolved. Where the company was responsible for all the powertrain electronics on the McLaren F1 road car, individual manufacturers now increasingly use their own platforms to control a car's systems. Instead, the company has carved itself a reputation for developing innovative solutions that sit side by side to the mainstream powertrain control.

The Mercedes-Benz SLR McLaren, which was developed with the help of logging and data analysis equipment first created for Formula 1, provides a good example of this. Most of its systems use existing platforms but McLaren Electronic Systems used its expertise to devise a special ACL (air brake and central locking) unit to control the air brake, which is itself exclusive to McLaren (see *Racing Line*, February 2004). "Although the unit is quite a small part on the car, quite a lot of our heart and soul has gone into the SLR," says van Manen.

Conceived originally as TAG Electronic Systems, today's company has evolved in every respect – name included – from its original incarnation. Healthy order books suggest the key to that success is not merely an ability to move with the times; it is the innovation and drive to stay ahead of them. ■

BITS & PIECES >NO.0020

THE BRAKE CALIPER

WORDS **SUZANNE ARNOLD** PHOTOGRAPH **TED HUMBLE-SMITH**

Racing on a circuit such as Monza, in Italy, drivers regularly brake from more than 350km/h to less than 100km/h. That demands world-class engineering such as that embodied in the Team McLaren Mercedes brake caliper.

The caliper is located on the car's upright assembly, which is buried inside each wheel, and its primary function is to apply pressure to the brake pads, forcing them into contact with the brake disc.

"When the brake pedal is pressed by the driver," explains Head of Race Engineering Steve Hallam, "it applies hydraulic pressure, via a master cylinder, into the caliper. This forces the caliper's six pistons [which sit in the round holes within the inner surface – see right] out of the caliper, squeezing the two brake pads against the disc and thus slowing the car. When the driver relaxes his foot from the pedal, the pressure on the hydraulic system is released and the caliper and pads relax, freeing the car to accelerate when the driver applies the throttle."

There are, of course, four brake calipers on the car – one at each corner. The rear calipers are slightly smaller than the front ones because the car's braking distribution is biased towards the front, as Hallam explains. "When a car brakes, it transfers weight onto the front axle and therefore the front wheels have more capacity to brake – and, because it's transferring weight onto the front axle, it's transferring weight off the rear axle, so the rear wheels have less capacity to brake compared with the front ones."

A different brake specification can be used for circuits where heavier braking is required such as Montreal, in Canada, and Monza. This will have been planned for over the winter. Apart from that, the design doesn't change much from year to year. It's more a case of reducing weight by a few grammes than of making huge technological leaps.

In terms of design requirements, the caliper has to be light and stiff – as does any racing car component. If the caliper were flexible, the driver would experience a 'spongey' brake pedal – which is the last thing he wants at more than 300km/h. The caliper also has to be very durable. Friction between the pad and disc can generate temperatures of 1,000 degrees Celsius. Operating in this harsh environment of high temperatures, and being subject to massive mechanical forces, the caliper requires cooling while in operation. Consequently, it needs to be fed with air from the brake duct (which directs air onto the brakes to cool them) and there are cooling fins on the caliper's side, helping to keep the temperatures under control while the car is out on the track.

Of course, it's not only racing cars that need to stop when the heat is on. Perhaps surprisingly, road car brake calipers are recognisably similar to the Formula 1 variety. Hallam explains that the caliper on a small road car might contain only one piston, or one pair of pistons, whereas a top-end car such as the Mercedes-Benz SLR McLaren will have a larger caliper. "You'd be able to put the three calipers side by side and recognise them as one and the same thing," Hallam says. The main difference, then, is that the road car doesn't have to decelerate by 250km/h in just a few metres, for the racing car alone enjoys the exhilaration of braking at Monza.

i TECHNICAL SPEC

DIMENSIONS Width 255mm, depth 170mm, height 60mm, weight 1,570g
MATERIAL Aluminium alloy
NUMBER USED PER SEASON 50-60

A TESTING SEASON

IT TAKES TWO...

Alex Wurz and Pedro de la Rosa are the unsung heroes of the Team McLaren Mercedes driver line-up, working hard to ensure the squad remains competitive. But what do they do while Kimi and David are racing? *Racing Line* finds out

WORDS **LUKE HAYTER** PHOTOGRAPHY **CHARLES COATES,LAT/HOCH ZWEI**

Modern Formula 1 demands extraction of the maximum, be it in terms of driving the car or building an individual component. The arena in which this way of working finds a home is testing, the initial proving ground for all technological advancements hoping to find their way into grands prix.

Team McLaren Mercedes is lucky enough to have two adroit and capable test and development drivers supplementing the two race pilots: Alex Wurz and Pedro de la Rosa.

While David and Kimi are waiting on the grid for the lights to go out at the season's first race, what becomes of Pedro and Alex? What do their roles demand of them at this time?

For both Alex, who joined the team for the 2001 season, and Pedro, who came on board last year, the aim is to get Team McLaren Mercedes into a position where it can win races and, ultimately, world championships. Neither could achieve this without excellent technical feedback skills and, of course, raw speed behind the wheel.

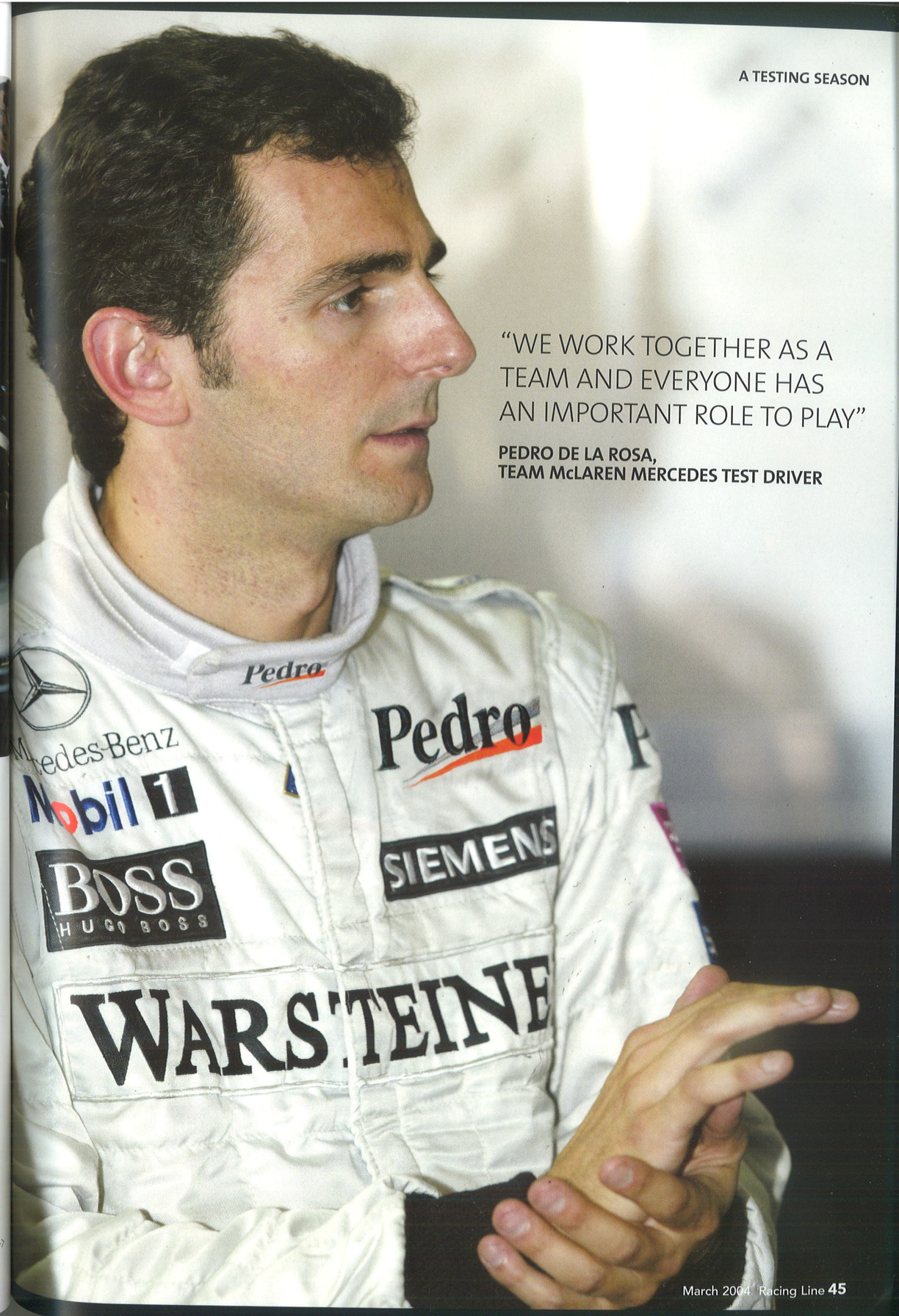
The testing resources available to Team McLaren Mercedes are considerable, and having two quick and reliable test pilots brings further benefit

The two drivers have very different roles when the season starts, however. For Alex, who attends every grand prix as official Third Driver of the team, there is no let-up when the season begins because he has to be in a position to actually race at a grand prix should any mishap befall either Kimi Räikkönen or David Coulthard. Meanwhile for Pedro, the workload immediately eases off somewhat, allowing him to return to his home in Barcelona to spend time with his young family while continuing to maintain his fitness level.

"The busiest time of the year for me is, undoubtedly, pre-season," explains Pedro. "When the racing begins, I can relax for a little while because the team is away taking care of business in the first, fly-away, grands prix of the year. However, I do spend time with the engineers at the team's headquarters, continually pushing to find solutions to make the cars faster."

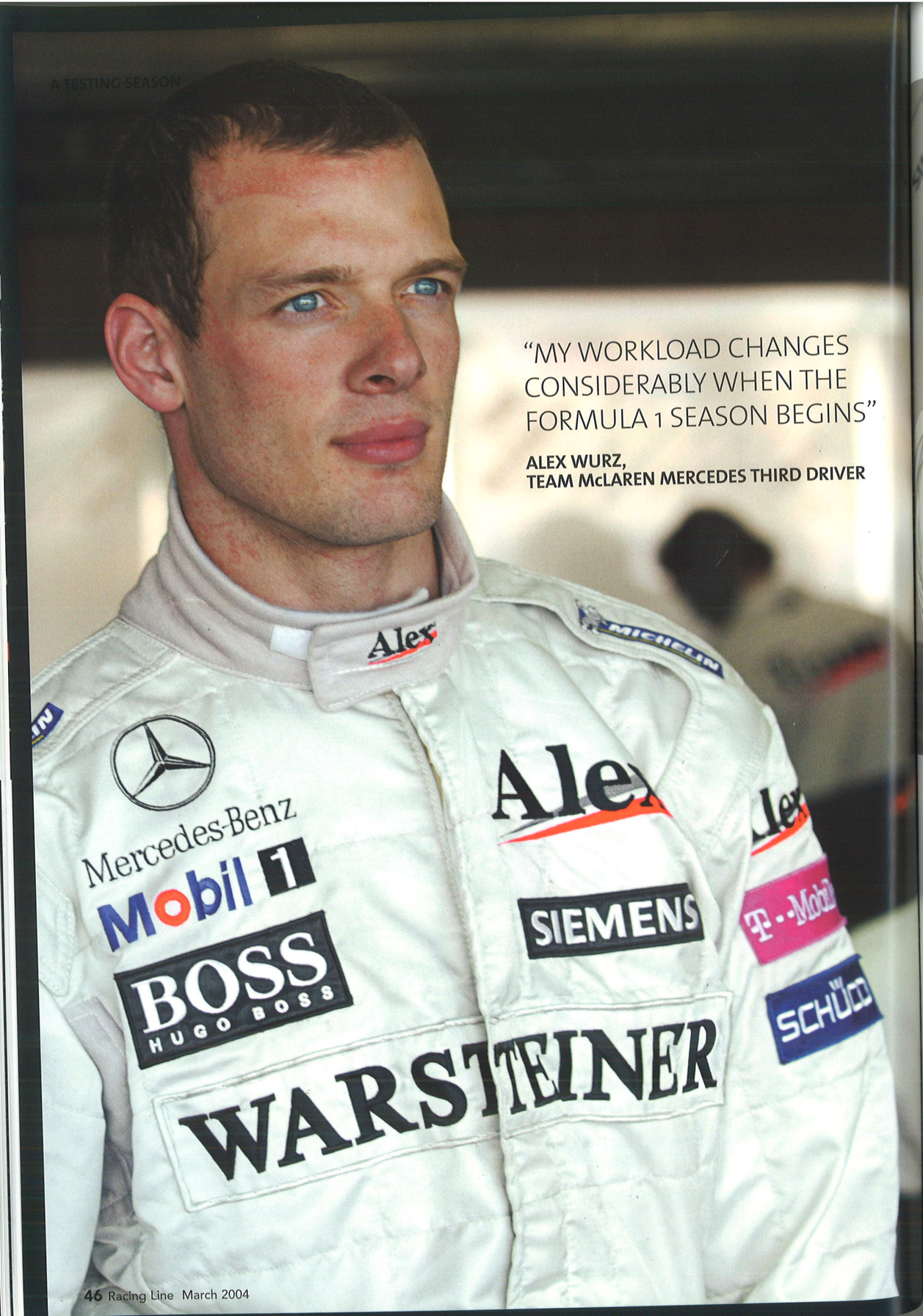
For Alex, the start of the season is one of the busiest times in his year, because there are fly-away races to be attended and much work to be done. "My workload doesn't really ease off when the Formula 1 season begins; it just changes," he explains. "The first four months of the year are the most hectic for me because I travel to all the overseas races and am involved in all the testing. It really is the busiest time of the year for me."

While Alex is travelling with the team, Pedro will be enjoying some time at home. This is a strange experience for Pedro, who has been »



"WE WORK TOGETHER AS A TEAM AND EVERYONE HAS AN IMPORTANT ROLE TO PLAY"

PEDRO DE LA ROSA, TEAM McLAREN MERCEDES TEST DRIVER



"MY WORKLOAD CHANGES CONSIDERABLY WHEN THE FORMULA 1 SEASON BEGINS"

ALEX WURZ,
TEAM McLAREN MERCEDES THIRD DRIVER

racing solidly for the past decade

"I've recently become a father for the first time," Pedro says. "So my role as a test driver means that I have a lot more time to spend with my family. When I was racing, I was always at home during the week, but away for weekends; now I'm in a testing role, I get to spend weekends at home and I'm away during the week!"

In the bygone days of Formula 1, testing was considered something of a luxury and the whole process was a lot less scientific than it is today. This wholesale change in the way that teams approach the development of cars means that a complete side-industry has emerged, with the top teams such as Team McLaren Mercedes often having an entire squad of engineers, mechanics and, indeed, drivers working flat-out all through the year in order to keep the pace of development on the cars constant. Tangible expression of this is found in the roles of both Alex and Pedro, who are a vital part of the team in a very real sense, even though they are not on the world's television screens every fortnight during the season.

Alex and Pedro share their testing duties with Kimi Räikkönen and David Coulthard, and their schedule includes testing immediately after each grand prix, evaluating the information that has been gleaned from race running. Alex and Pedro will also shake down the race cars during the week prior to each race, making sure that each machine arrives at each grand prix ready to go straight into action in competitive form.

During the race itself, Pedro is usually at home, glued to the television screen, willing the team onward. "One of the biggest bonuses that you get out of testing is the fact that you are helping the team to be competitive at the races," he explains. "Also, when the team does well, it reflects well on the testing effort and shows that a good job is being done. It means the team is going forward. Look at last year, for example, when David and Kimi won races and took podiums, and the team came within a whisker of winning the World Drivers' Championship. Remember, this was with a development of the previous year's car – so it really was an accurate reflection of the job that myself and Alex do as development drivers. I say 'we' because we work together as a team and everyone has an important role to play." Teamwork, then, is the key to success.

Team McLaren Mercedes relies on the feedback it gets from Pedro (above) and Alex to push development in the right direction

During the racing season, both drivers have to maintain their fitness: driving Formula 1 cars on the limit >>

WHAT DOES ALEX DO OVER A RACE WEEKEND?

As we have seen, Alex Wurz attends all the season's races in his role as Third Driver. He is not – save any mishap – required to drive the car, so what exactly *does* he get up to? "Obviously, I am the Third Driver, so I have to be at the circuit in case anything happens to David or Kimi. This is the main reason I'm there," he explains. "I also do a lot of work with the Team McLaren Mercedes Partners and, of course, the media. For example, I may be required to go along to the hospitality area and talk to the team's guests about the forthcoming race, or perhaps give them a driver's view of the circuit layout.

"Furthermore, I also serve as a link between the race team and the test team," he continues. "For example, if I have been developing and trying out parts at a test and these parts are then used in the race, I can listen to the conversations from the pitwall and attend the briefings and debriefings to offer my opinion. Every race weekend I know what's going on and I can sometimes help the engineers during the sessions. I can help to find the right set-up for new parts or whatever. I'm able to look, listen and absorb. This makes both the engineers and myself happy, because it helps them in their work and also keeps me more involved in the various processes.

"I'm also there to learn, because any problems we have at a race, I then have to help solve during subsequent testing. This has turned out to be a useful and interesting role, and one that I'm developing into more and more."

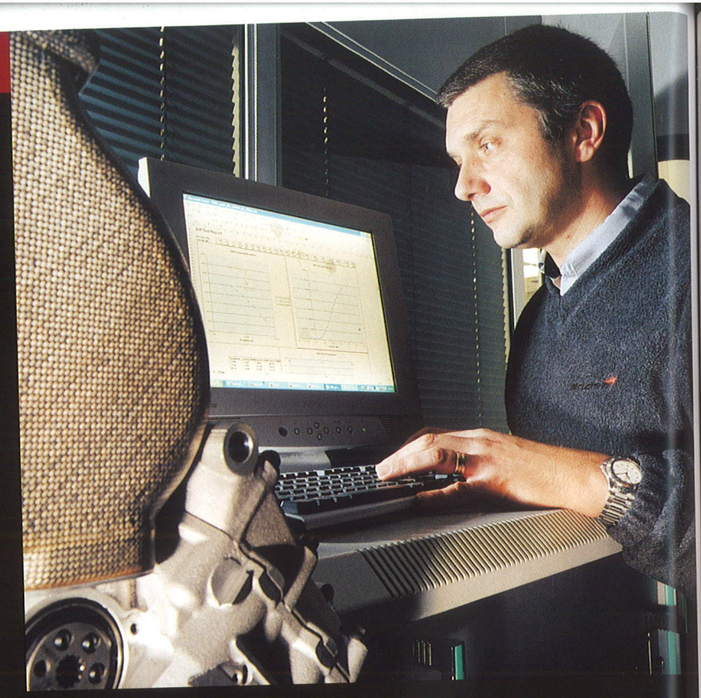
for days at a time is a gruelling business and, if you are not driving flat out, there is no point to testing – for a Formula 1 car behaves very differently when it is driven at eight or nine-tenths from when it is being pushed to the maximum. It is while the car is operating in the 10-tenths zone that engineers can safely assess potential race performance. This requires almost superhuman levels of fitness – something to which both Alex and Pedro are well accustomed.

"I try to train five days a week during the racing season," says Pedro. "I've recently taken up mountain biking, which is a great way to stay in shape. Because I live in Barcelona, I can just grab my bike and ride off out of the door to some great terrain that is almost on my doorstep. There are a lot of tough mountains surrounding the Barcelona grand prix track and they're really challenging to ride and keep you very fit. You could actually stay there for days and not ride the same stretch of track twice – it's that big!"

Alex Wurz serves as the official Third Driver nominated by the team, ready to pick up the baton and race if the situation renders it necessary

Alex, despite having a somewhat different race-season schedule, also enjoys the challenges of staying in top physical shape over the course of a racing season. "My schedule is such that I need to make sure that I've reached a peak level of fitness before January," he explains. "From that point on, I only have time to top up that level of fitness. With all the travelling and other work I have to do, there is no time to actually *improve* my condition to any great degree, only to maintain it. Therefore November and December are my most busy months for training. During the Formula 1 season itself, I use sport for relaxing, to allow my muscles to get loose and to get my metabolism going. The kind of maintenance work I do tends to be low heart-rate, long distance work, with some more intense activity thrown in – this helps to keep the speed in the muscles. If I feel particularly strong on any given day, though, I can push more."

Testing, training and time at home: the three prongs of a development driver's grand prix season. While Kimi and David stand squarely in the world's spotlight, Alex and Pedro operate in the shadows, pounding the track alongside empty grandstands and sparsely populated pitlanes. Without them, though, Team McLaren Mercedes would not be able to extract the maximum from their machines. It really is as simple as that. ■



STEVE DENT
HEAD OF HYDRAULICS SHOP

WORDS **SUZANNE ARNOLD** PHOTOGRAPH **STEVE ORINO**

What does your job entail?
I run the hydraulics shop, looking after supply to our customers – Mercedes-Ilmor, Mercedes-Benz and obviously McLaren Racing – with hydraulics systems, power steering, some clutch actuation parts, dampers and so on. We are a team of four and we typically deal with numerous sets of hydraulic parts plus power steering systems and several sets of dampers per season.

The team has been testing in Spain recently. You're now working with the parts they've brought back, are you?
Yes, and we're also building further race quantities. The build process for a hydraulic set from start to finish is three to four days, including testing. Then as soon as you build one, it gets used and it's due to be serviced, which is what we're now doing post-testing. It's a case of attaining the quantity needed to service everybody as quickly as possible while keeping the cars and dynos running as much as we can.

Do the hydraulic parts develop much over a season?
Yes, they evolve continually. If there are issues that you have to resolve, you have to modify all the sets and they're with Mercedes-Benz, with Mercedes-Ilmor, in Woking with us, in the cars… It's a lot to keep track of.

How does the workload of the hydraulics shop vary over the course of the year?
It doesn't. The pressure is constant because, even if the cars aren't running, the dynos are running – and if there's a break in the season, you're already working for the next season, so it's constant.

How long have you been with McLaren and how much has the company changed in that time?
About 12 years. The main change is in terms of size. Not just the number of people, but also the volume of equipment. We used to have far fewer sets of hydraulics and they were much simpler than they are today– they weren't packaged in such a small way and there were fewer parts of the car that required hydraulic powering.

How did you come to join McLaren?
Before I came to McLaren, I worked in the Royal Air Force. I joined the team at about the time that active suspension – which, of course, employed hydraulics – was first introduced onto Formula 1 cars. I had worked on airframes and engines during my time with the RAF, and a lot of the aerospace technology carried over to the kind of work that goes on in Formula 1. All the basics, concepts and principles are the same across both disciplines.

What qualifications do you need for your job?
The people I work with tend to come from a general mechanical engineering background. Once you've grasped the theories of how it works, what's meant to happen, analysing particular faults, you learn with experience. I obviously had some more formal training because of my background. Anybody with a sound understanding of mechanics who is prepared to work hard can learn the required skills.

Your aerospace background must have given you something of an advantage at McLaren?
Yes. At the time, hydraulics were new to Formula 1. They were just experimenting with the first semi-automatic gearboxes when I arrived. The first one was pneumatic and then they went to hydraulic. Part of the challenge of the job is adapting to the changes in technology. ■

RACE PREVIEW #1

AUSTRALIAN GRAND PRIX

ALBERT PARK, MARCH 5-7

David Coulthard has had much success in Australia, including his victory in the 2003 event, which started the team's season on just the right note

The sunshine certainly helps, but it's not just the weather that makes the Australian Grand Prix most people's favourite race of the Formula 1 season.

The city of Melbourne is in many ways the dream venue for the curtain-raiser to the ultimate global sporting contest. The race is held on a semi-permanent track skirting around a lake in the picturesque Albert Park.

The circuit features a mix of flowing corners ranging from the 251km/h Lauda Curve (Turn Eight) to the Clark Chicane (Turn 10), taken at 88km/h. Teams have to trade off the desire for a high-speed configuration with the need for stability through the chicanes, which remain the key to a good lap time.

A carnival atmosphere surrounds this event. Make no mistake, Australia knows how to stage top international sporting occasions. Behind the scenes, meticulous attention to detail is the key to the race's success. The relaxed and friendly atmosphere that surrounds racing Down Under had attracted top drivers from around the world for decades before the event was finally classified as part of the Formula 1 World Championship. Legends such as Bruce McLaren, Stirling Moss, Jack Brabham and Jim Clark all graced the racetracks that hosted the Australian Grand Prix and the hugely popular Tasman Championship.

Not until 1985, the 50th running of the Australian Grand Prix, did the race win a place on the official calendar. Held on a street circuit in Adelaide, it was an immediate success. The fantastic atmosphere that quickly came to surround the event has withstood both a change of venues – the grand prix moved to Melbourne in 1995 – and a switch of dates to become the season curtain-raiser rather than its finale.

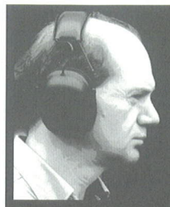
It is not only the fans who enjoy the race. McLaren has fond memories of the event, having reaped no fewer than eight pole positions and eight victories from the 19 World Championship races held in Australia.

One of the most famous of those triumphs was Alain Prost's victory in 1986, in which he emerged with the title from a three-way showdown. He repeated his success in 1988.

In 1991 Ayrton Senna won the shortest grand prix in history when torrential rain caused the race to be stopped after just 14 laps. It was the first of three consecutive wins for the team. Gerhard Berger was first across the line in 1992 and the following season Senna scored what was, tragically, to be his last Formula 1 victory. David Coulthard won the race for Team McLaren Mercedes in 1997 and his team-mate Mika Häkkinen repeated the feat one year later at the start of a campaign that would sweep him to his first Drivers' World Championship.

Last year's race emphasised just how much Formula 1 has become a team sport. Coulthard and Kimi Räikkönen qualified 11th and 15th as the new rules created a chaotic weekend, but some innovative team strategising enabled them to finish first and third to start the year in flying fashion. ■

LOCATOR



NEWEY'S VIEW

The first race of the grand prix season is always tough. Even though every team has tested as much as possible, a race can bring unforeseen complications, so there tends to be a higher rate of mechanical failure than later in the season.

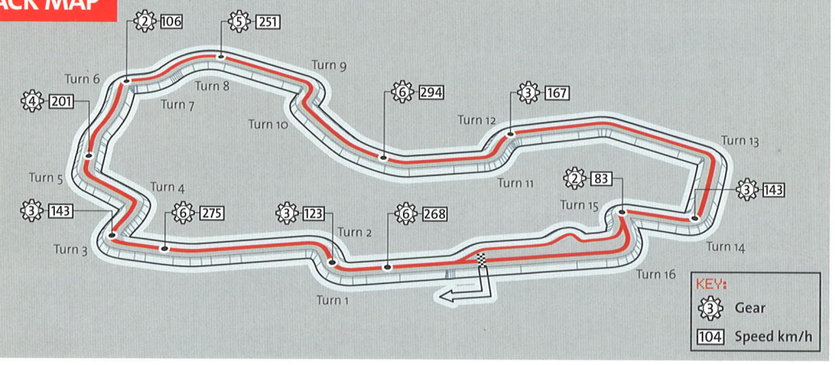
Albert Park is one of the heaviest circuits on braking, after Montreal in Canada and Monza in Italy. It's a high-downforce track, too, even with several long straights, but with rear wings having two planes in 2004 rather than three or more as in previous seasons, it may now be a circuit on which we'll run our rear wing at maximum downforce settings.

Melbourne isn't that tough on drivers, but it's famous for its temperature swings from the mid-teens to over 30 degrees Celsius. Because we have tested this year's car mainly in the European winter, cooling systems will be vital.

There are also new timetables to be adapted to, with less time between practice and qualifying on Saturday. This will keep us on our toes.

In addition, there's the change to one engine per meeting, and I'm sure various teams will restrict their mileage on the Friday so that they can be more confident that the engine will last the distance in the race.

TRACK MAP



TRACK INFORMATION

LAP LENGTH	5.303km
RACE DISTANCE	307.574km
NUMBER OF LAPS	58
2003 POLE POSITION	1m27.173s (218.943km/h)
2003 RACE LAP RECORD	1m27.724s (217.623km/h)

PREVIOUS McLAREN WINS

1986 **Alain Prost** MP4/2C (Adelaide)
1988 **Alain Prost** MP4/4 (Adelaide)
1991 **Ayrton Senna** MP4/6 (Adelaide)
1992 **Gerhard Berger** MP4/7A (Adelaide)
1993 **Ayrton Senna** MP4/8 (Adelaide)
1997 **David Coulthard** MP4-12 (Melbourne)
1998 **Mika Häkkinen** MP4-13 (Melbourne)
2003 **David Coulthard** MP4-17D (Melbourne)

RACE TIMETABLE

FRIDAY MARCH 5
11.00-12.00 Practice session one
14.00-15.00 Practice session two

SATURDAY MARCH 6
10.00-10.45 Practice session three
11.15-12.00 Practice session four
14.00-15.40 Qualifying session

SUNDAY MARCH 7
11.10-11.15 Drivers' photo
11.15-11.26 Drivers' parade
14.00 Australian Grand Prix

FURTHER INFORMATION

NEARBY CITIES (AIRPORTS)
Melbourne (Tullamarine)
TICKET INFORMATION
+61 131 641
WEBSITE www.grandprix.com.au

CLASSIC RACE MELBOURNE 1997

David's win in the 1997 event was his first for Team McLaren Mercedes and the first for the team in its new livery

1	David Coulthard	1h30m28.718s
2	Michael Schumacher	+20.046s
3	Mika Häkkinen	+22.177s
4	Gerhard Berger	+22.841s
5	Olivier Panis	+1m0.308s
6	Nicola Larini	+1m36.040s

The opening race of the 1997 season not only produced a victory for Team McLaren Mercedes, it also ushered in a new era of success.

The MP4-12 wasn't the quickest car in the field that weekend but the team's strategy, allied with David Coulthard's flawless drive under constant pressure, made for a winning combination. It was a landmark result in every respect: it was the first race for the team's new Title Partner, McLaren's first victory for three seasons and the first grand prix win for Mercedes-Benz since Juan Manuel Fangio's success in the 1955 Italian Grand Prix.

Coulthard started from fourth on the grid and benefited from a first-corner pile-up that removed Eddie Irvine's Ferrari, Johnny Herbert's Sauber and Jacques Villeneuve's Williams from the running. This enabled David to move into second place behind Heinz-Harald Frentzen's Williams.

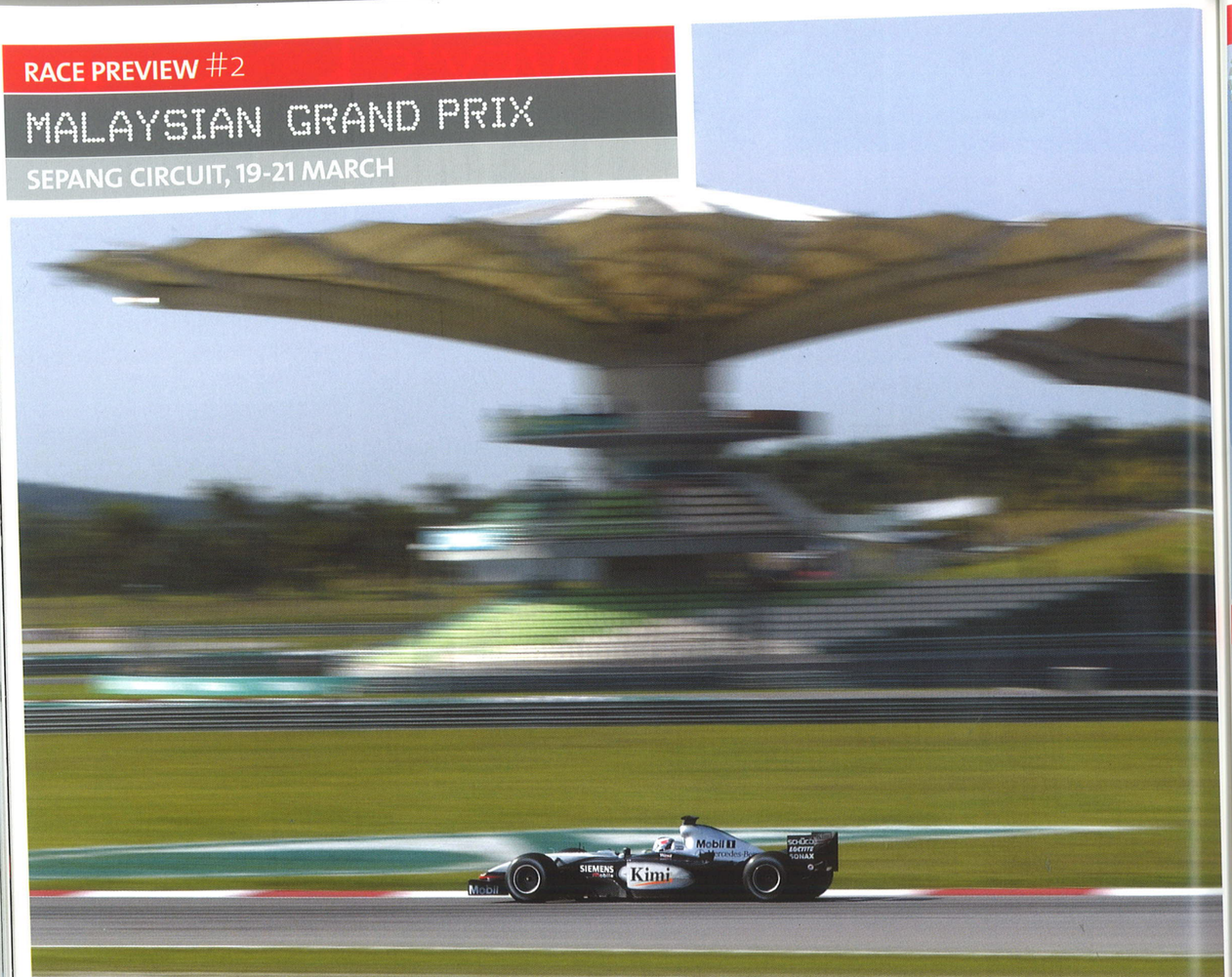
Frentzen pitted on lap 18, giving Coulthard the lead. The Williams was struggling with brake wear, meaning that Frentzen had to pit twice whereas Coulthard pitted only once. Michael Schumacher in second place and Frentzen behind him chased hard, but David held onto his advantage.

It was a tough race, but David kept his wits about him to win ahead of Michael. Team McLaren-Mercedes team-mate Mika Häkkinen completed the top three. ■

RACE PREVIEW #2

MALAYSIAN GRAND PRIX

SEPANG CIRCUIT, 19-21 MARCH



Kimi Räikkönen took his first Formula 1 win in Malaysia last year with a confident, professional drive

Malaysia was added to the Formula 1 calendar in 1999 and instantly proved a hit with locals, fans and teams alike.

The race is held on the Sepang International Circuit, around 50km south of Malaysia's capital, Kuala Lumpur. The circuit was constructed at a cost of some $80 million over a 90-hectare site. Consisting of long, fast straights and sharp turns, the circuit demands a bit of everything from the driver. It is also one of the widest on the calendar, allowing drivers plenty of scope for overtaking.

There have been only five Malaysian Grands Prix so far, yet already the race has moved around the schedule somewhat. It first ran towards the end of the year then, in 2000, it took the prestigious end-of-season slot. More recently, it has moved to the early-months batch of fly-aways, giving it the excitement of playing host to still-new cars and drivers. The combination of the early slot and the circuit's layout makes for some spectacular racing in which established drivers go for points, new drivers try to prove themselves and a few cars inevitably reveal unexpected glitches.

The atmosphere is hot and steamy, the setting exotic, the racing exhilarating. The facilities are state-of-the art, making Sepang a treat to visit. From the grandstands, spectators enjoy fantastic views across much of the circuit. For the teams, the large garages are a luxury much appreciated by engineers who get space to work in comfort. It's a far cry from Monaco's cramped conditions, for example.

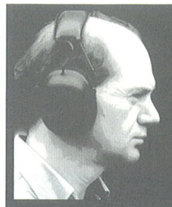
Perhaps the greatest challenge is the humidity, which makes life almost unbearable for those unused to being in such an environment. It's difficult for the fans and team personnel, but spare a thought for the drivers. They're clad in their fireproof clothing and in a tight-fitting cockpit where temperatures soar and the only relief is provided by a water bottle. Training regimes have to be intensified for this ordeal, which is heightened by the journey through several time zones in quick succession, from Europe to Australia and on to Malaysia.

With five podium finishes from five races – including one win (see right) – Team McLaren Mercedes goes well at Sepang. Indeed, at the maiden grand prix in 1999, Mika Häkkinen finished third to keep himself in that year's title fight, going on to clinch the championship at the Japanese Grand Prix for the second year in succession. Häkkinen's team-mate, David Coulthard, took second place in the 2000 event, following that with a great drive in monsoon conditions to claim the final podium slot at the 2001 race.

Ah yes, the Malaysian monsoon. For once, it's actually true to say that when it rains, it pours. The astonishing 2001 race started fairly normally but almost immediately a wild storm began and succeeded in catching out many experienced campaigners. The unpredictable weather is just one of the many exciting variables that this race has brought to Formula 1.■

LOCATOR

NEWEY'S VIEW



It's very hot and humid in Malaysia, so it's tough for the drivers. Fatigue can become a real issue because of the intense temperatures so we have to keep the cockpit as cool as possible by fitting extra vents there.

Sepang is quite a fast circuit where overtaking is possible, if a little difficult. It's a high-downforce track because there are lots of tight bends as well as the long straights and fast corners. It's hard on tyres because of the high temperatures and the abrasive surface. With its mixture of corners, it's challenging for both the drivers and race engineers in getting the car set-up right.

Rain can be a factor and, when it comes, it comes as a monsoon. Everyone witnessed just how torrid the weather can become in Sepang during the 2001 grand prix, when it was very difficult for the drivers even to stay on the circuit. Perhaps the best way of dealing with wet-weather running is to strategise according to the conditions and not to try to out-guess nature!

In the first three races of the season, all fly-aways, there's little that you can do between each grand prix to develop the cars, so what you race in Australia tends to be what you compete with in Malaysia and Bahrain.

TRACK INFORMATION

LAP LENGTH	5.543km
RACE DISTANCE	310.408km
NUMBER OF LAPS	56

2003 POLE POSITION
1m37.004s (205.567km/h)

2003 RACE LAP RECORD
1m36.412s (206.974km/h)

PREVIOUS McLAREN WINS

2003 **Kimi Räikkönen** MP4-17D (Sepang)

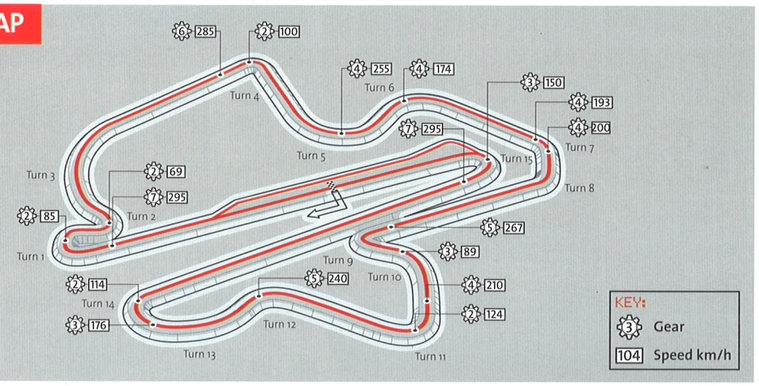
RACE TIMETABLE

FRIDAY MARCH 19
11.00-12.00 Practice session one
13.00-14.00 Practice session two

SATURDAY MARCH 20
9.00-9.45 Practice session three
10.15-11.00 Practice session four
13.00-14.00 Qualifying session

SUNDAY MARCH 21
12.25-12.35 Drivers' parade
15.00 Malaysian Grand Prix

TRACK MAP



CLASSIC RACE SEPANG 2003

Any driver's first grand prix victory is a landmark in his career, and this one merely confirmed Kimi Räikkönen's obvious potential

1	Kimi Räikkönen	1h32m22.195s
2	Rubens Barrichello	+39.286s
3	Fernando Alonso	+1m04.007s
4	Ralf Schumacher	+1m28.026s
5	Jarno Trulli	+1 lap
6	Michael Schumacher	+1 lap

Potential is one thing; delivering on it is quite another. Kimi Räikkönen, Team McLaren Mercedes' latest Flying Finn, delivered on his prodigious promise to claim a first Formula 1 victory at the 2003 running of the Malaysian Grand Prix. The feat was made all the more remarkable considering the fact that Kimi had qualified in seventh position.

At the first corner of the race, there was chaos as a collision between the Renault of Jarno Trulli and the Ferrari of Michael Schumacher bunched up the field. Kimi managed to keep a cool head and steer through the trouble, however, moving up to fourth in the process.

He then made light work of former team-mate Nick Heidfeld's Sauber to move into third place. This third soon became second when current team-mate David Coulthard was forced to retire with electrical problems. Kimi inherited the lead when a lightly fuelled Renault pitted on lap 14.

When Kimi had made his own pitstops he again got out in front and stayed there. It can often be daunting for a driver to be leading a grand prix, and errors can creep in as a result, but there were no such problems for the young Finn. In the end, Kimi looked like he had been leading grands prix all his life. The momentum that started at Sepang carried Kimi to within a whisker of the World Championship.

FURTHER INFORMATION

NEARBY CITIES (AIRPORTS)
Kuala Lumpur (Kuala Lumpur International)

TICKET INFORMATION
+60 385 262033

WEBSITE
www.malaysiangp.com.my

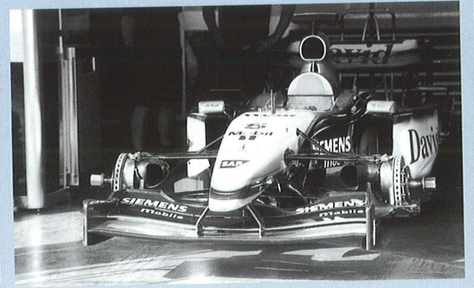
FAST EXPOSURE

F1 LIFE THROUGH *YOUR* LENS

Back in November, we invited you to send us your photographs of Team McLaren Mercedes during the 2003 season. We've been overwhelmed by the response and are delighted to see that we have so many talented members.

In January, we printed two readers' pictures. Now it's time for another two fans to see their efforts in print. As previously, we showed the entries to Steven Tee, photographer with agency LAT Photographic. Steven waxed lyrical about your efforts, praising the level of creativity and your unusual shots which bypass the difficulties of access and visibility that so often afflict spectators.

You can still send us your pictures, whether from last year or from the 2004 season. For full details, see the foot of the page.



RIGHT **The black and white photo uses light to great effect in a dramatic composition and the colour picture shows something that fans rarely get to see**

RICHARD VENN, HEMEL HEMPSTEAD, UK

"Black and white photography is still very relevant in modern-day Formula 1," says Tee. "The shot of the car in the garage is very dramatic, with the light catching the car's nose nicely, and it's a great way of using natural light and shadow to good effect. The photo of the front wings on the stands is a nice way of looking at something that people rarely get to see and makes for a nice, quirky image which catches the eye."

RIGHT **This is merely a stationary showcar, but imaginative observation turns it and its dramatic logos into works of art. Excitement even where there's no actual racing**

SHARON WELCH, SEVENOAKS, UK

"Sharon has used the very strong graphics on the car to really good effect," says Tee. "Her framing of the close-up shot of the logo on the car's sidepod is particularly nice and the little bit of highlighting at the top of the image makes for a strong overall effect. The other shot is well-lit and an interesting composition. Both of these photos are examples of how you can still make something interesting out of a static showcar by using careful framing and a bit of imagination."

To have your pictures judged, send a selection of your best photos as prints to ***Racing Line***, **Haymarket Publishing, Somerset House, Somerset Road, Teddington, TW11 8RU, UK.** Please remember to mark your envelopes 'Photo competition' and, if you want your pictures returned, enclose a stamped, addressed envelope

AUTOSPORT INTERNATIONAL COMPETITION RESULT

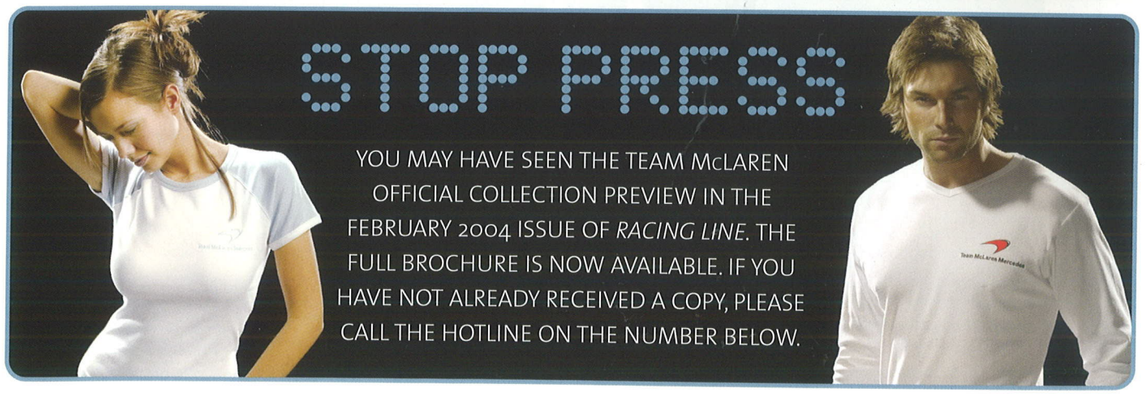
Team McLaren's AUTOSPORT International stand, at the Birmingham show in January, proved popular with the public as well as with existing members. The show always attracts thousands of visitors and, as usual, hundreds of those were Team McLaren members, many of whom took up our offer of trade-day tickets and the chance to walk around the show on the Friday, when the crowds were smaller. They also received free tickets for the Live Action Arena Show, which proved a much-appreciated bonus.

The Formula 1 grid was again a popular attraction, enabling visitors to view a selection of cars from the 2003 grid.

Meanwhile, at the Team McLaren stand, Kimi Räikkönen's car was on display. It was a rare opportunity for fans to get as close as they liked, examine it from all angles and take as many photographs as they wished. Those more technically minded scrutinised the show engine also on display, alongside tyres, a race suit and a steering wheel.

As well as examining Formula 1 technology at close range, visitors browsed merchandise from the Official Team McLaren Mercedes Collection. The clothing and accessories proved as popular as ever and sold quickly to members and non-members.

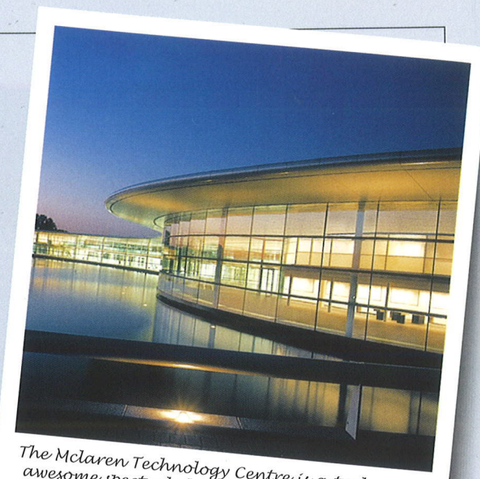
New and renewing members at the show had the chance to enter a competition to win VIP tickets for a Team McLaren event during 2004. It was an offer that proved very popular. Full details of this very special prize have not yet been finalised, but we are pleased to announce that the winner is Katherine Hartley from Stamford, Lincolnshire, UK. We will be in touch soon, Katherine.



POSTCARDS FROM WOKING

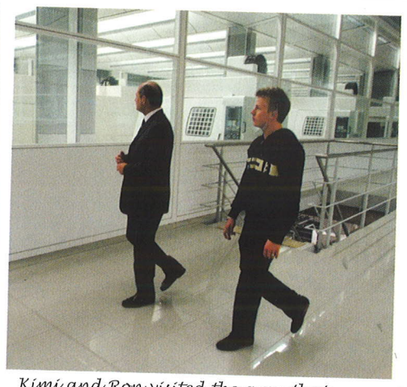
IN ASSOCIATION WITH CANON

Kimi Räikkönen was a recent visitor to the McLaren Technology Centre in Woking, England, where he was given a tour of the facility by none other than the McLaren Group Chairman and CEO, Ron Dennis. *Racing Line* joined them



The Mclaren Technology Centre is a truly awesome spectacle by day, let alone by night

As the tour took place in the evening, Kimi and Ron were able to have almost the whole building to themselves. Here they are in the space between the MP4-19 production areas

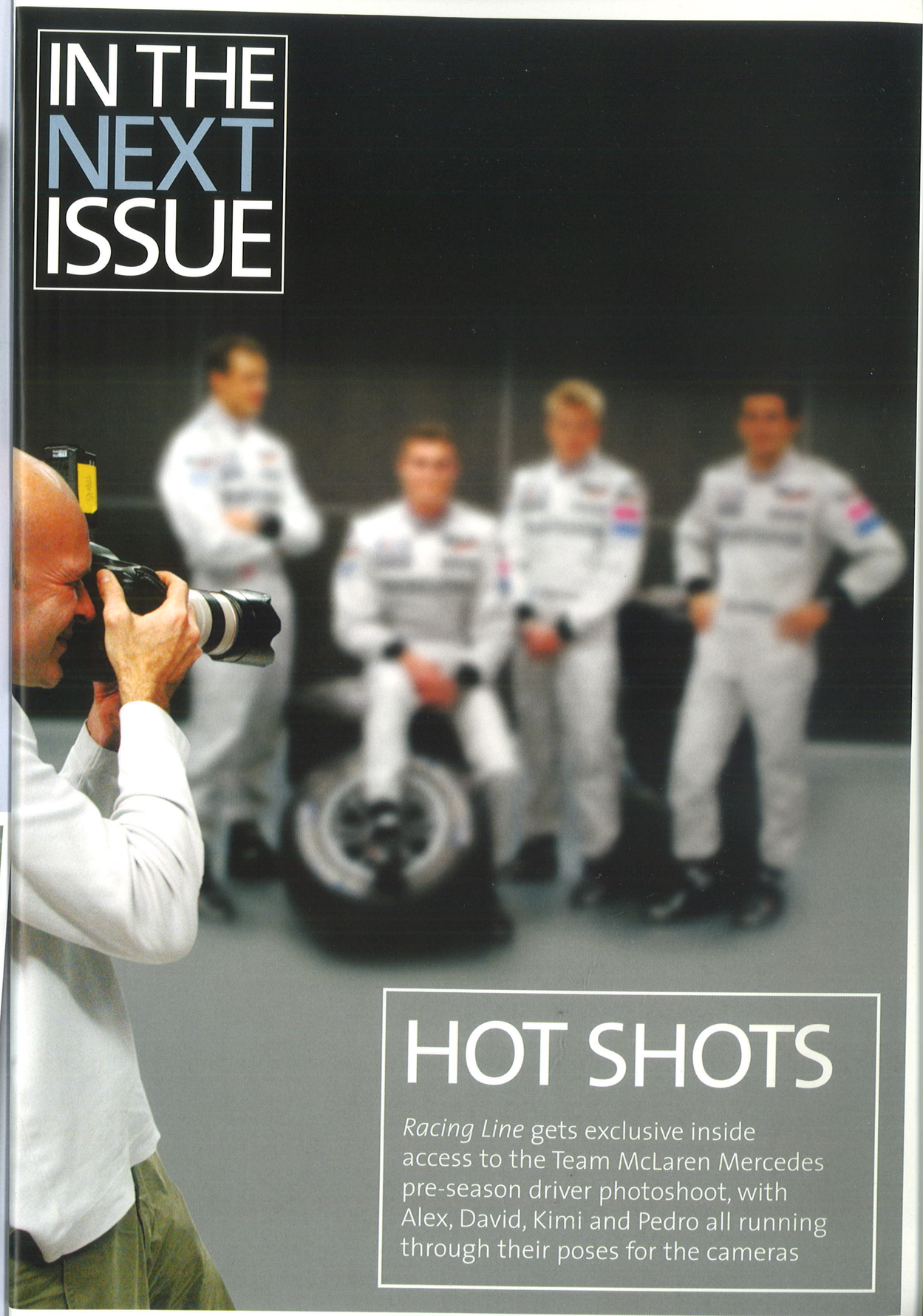


Kimi and Ron visited the area that will soon be occupied by McLaren Racing

The building is divided into eight 'fingers' which house different McLaren Group companies

Ron explains how this area will house McLaren Racing's design team, the people who will conceive future Formula 1 challengers

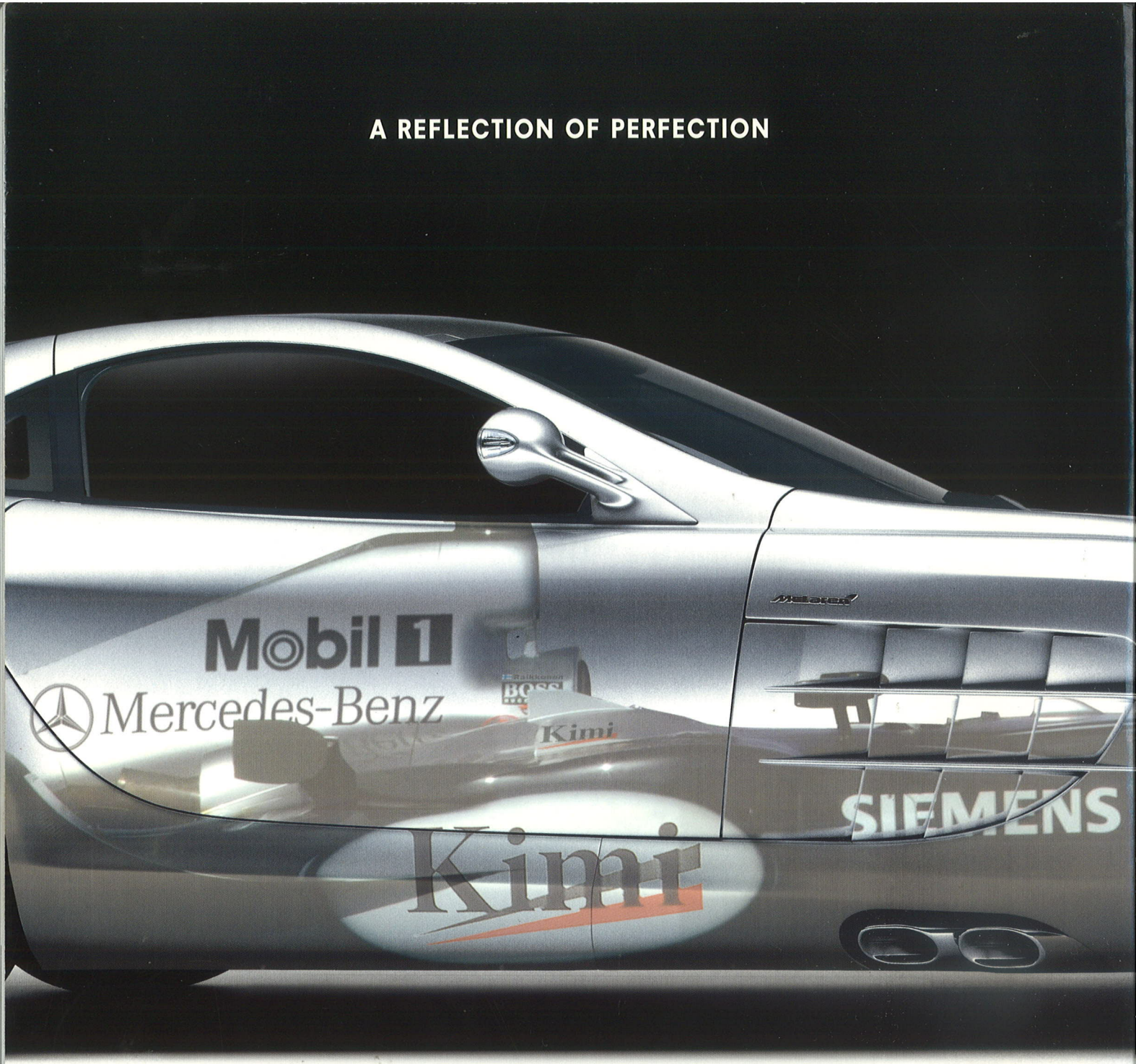
IN THE NEXT ISSUE



HOT SHOTS

Racing Line gets exclusive inside access to the Team McLaren Mercedes pre-season driver photoshoot, with Alex, David, Kimi and Pedro all running through their poses for the cameras

A REFLECTION OF PERFECTION



What do the Team McLaren Mercedes MP4-19 and the Mercedes-Benz SLR McLaren have in common? Both rely on Mobil 1 with SuperSyn technology to protect the engine and enhance performance in extreme conditions.

Team McLaren Mercedes
TECHNOLOGY PARTNER

Mobil Command Performance