# 2014 PIRELLI FORMULA ONE MEDIA GUIDE

## CONTENTS

## INTRODUCTION BY PAUL HEMBERY

Welcome to the 2014 grand prix season, the start of another three-year contract during which Pirelli will exclusively supply tyres to Formula One and its feeder series, GP2 and GP3.

A new era opens within the sport, containing probably the most far-reaching set of rule changes seen in the recent history of the Formula One. As a result, the 2014 tyres have been redeveloped from the ground up, with changes to all the compounds and constructions, in order to best suit the characteristics of the latest Formula One cars.

What hasn't changed though is Pirelli's core philosophy and sporting DNA. Our original brief was to help spice up the action by encouraging overtaking and providing between two and three pit stops per race.

Since entering the pinnacle of world motorsport, we have fulfilled that brief, during three seasons that have been characterised by a number of new records, such as the highest amount of overtaking manoeuvres ever in the history of Formula One or seven winners in as many races.

Now we face a new series of challenges, with tyres that have been designed to lead Pirelli into its next chapter of Formula One. In developing them, we have relied heavily on virtual modelling and simulation data, while fully utilising all the experience we have gained over the past three seasons.

As ever, all the lessons learned – not just from Formula One, but also our other racing programmes such as GT and rally – feed into the road car product, underlining Pirelli's reputation as the world leader in the Ultra High Performance sector.

**Paul Hembery**
**Pirelli Motorsport Director**

**PIRELLI'S 2014 TYRES**

For a new generation of cars and a new season, Pirelli introduces a new family of tyres, refined by Pirelli's engineers using simulation technology and data supplied by teams as well as real on-track testing results. Here are the essentials:

* New compounds and new constructions for 2014 to meet the requirements of the latest cars, with increased torque and extra energy recovery systems, as well as reduced aerodynamics.

* The compound designations and colours remain unchanged: P Zero Red (supersoft), P Zero Yellow (soft), P Zero White (medium), P Zero Orange (hard), Cinturato Green (intermediates), Cinturato Blue (full wets).

* A new profile for the front tyres, to take into account the altered vehicle dynamics for 2014 and improve handling. The rear profile will not have any significant changes.

* The new compounds will generally be slightly harder than their 2013 equivalents, without however compromising grip or performance. In general, stability will be increased and degradation will be reduced.

* A reduced performance gap between the compounds, designed to open up as many strategic options as possible for the new generation of cars.

* New wet tyre. The full wet tyre has a new rear tread pattern in order to reduce aquaplaning by increasing how much water can be dispersed at full speed – now up to 65 litres per second from 60 litres per second previously. It also has a new compound that is able to work well in damp and/or drying conditions, in order to increase the crossover point to the intermediate tyre.

* The effect of the new engine regulations is to potentially increase wheelspin due to the extra torque, which is why the tyres need to be more resistant this year. The cars will also carry a lighter fuel load, with a smaller tank, but the mandatory minimum weight has been increased by 50 kilogrammes this year, so the overall weight is heavier. All these factors will have a significant effect on tyre behaviour.

## WHAT'S NEW FOR 2014?

There have been a number of changes in the 2014 tyres compared to their predecessors. In summary:

***New compounds***
All of the compounds are new: on the whole slightly harder, to take into account the different characteristics of the 2014 cars and improve stability.

***New structures***
Pirelli has made another step forwards in optimisation of the footprint pressure and temperature distribution. This presents a more even contact with the asphalt and improves grip and handling.

***Wider working range***
The working ranges of each tyre are closer. This means that there is a smaller difference between the high and low working range compounds.

***Smaller performance gaps between the compounds***
These have been reduced to just over half a second per lap on average, in order to give the teams an increased number of strategic possibilities during a season when the relative levels of performance between the cars is uncertain.

***More driveability in the wet***
The wet tyre has been redesigned to reduce aquaplaning and provide more grip even in very wet conditions. It has also been altered to make it a viable alternative to the medium in drying conditions as well as heavy rain.

## MEET THE 2014 COMPOUNDS

### *Dry compounds*

### *Supersoft (red)*

The softest compound in the range is ideal for slow and twisty circuits, especially in cold weather, when maximum mechanical grip is needed. The supersoft benefits from an extremely rapid warm-up time, which makes it ideal in qualifying as well, but the flip side to that important characteristic is of course increased degradation. This is a low working range compound. One of the key evolutions this year has been optimisation of the footprint pressure and temperature distribution. This presents a more even contact with the asphalt, improving grip and handling.

### *Soft (yellow)*

This is one of the most frequently-used tyres in the range, striking a very good balance between performance and durability, with the accent on performance. It is still biased towards speed rather than long distances, but is nonetheless capable of providing teams with a competitive advantage both at the beginning of the race on full fuel and when used as a 'sprint' tyre at the end. This is a high working range compound.

### *Medium (white)*

Theoretically this is the most perfectly balanced of all the tyres, with an ideal compromise between performance and durability. As a result, it is extremely versatile, but it often comes into its own on circuits that tend towards high speeds, temperatures, and energy loadings. This is a low working range compound.

### *Hard (orange)*

The toughest tyre in Pirelli's range is designed for the circuits that put the highest energy loadings through the tyres, with fast corners or abrasive surfaces, and are often characterised by high ambient temperatures. The compound takes longer to warm up, but offers maximum durability – which frequently means that it plays a key role in race strategy. This is a high working range compound.

***Wet compounds***

***Intermediate (green)***

The intermediates are the most versatile of the rain tyres, dispersing approximately 25 litres of water per second at full speed. They can be used on a wet as well as a drying track. This is the only tyre that has not changed compared to last year.

***Wet (blue)***

The full wet tyres can disperse up to 65 litres of water per second at full speed (increased from 60 litres last year), making them the most effective solution for heavy rain. The latest evolution of the Cinturato Blue means that it is also effective on a drying track, with increased durability. The full wet tyre has a new compound and a redesigned rear tread pattern to further reduce aquaplaning. The result of this intensive work is increased driveability in a wide variety of conditions.

## TYRE REGULATIONS IN 2014

The basic tyre regulations for the 2014 season have stayed unchanged from previous years, with Pirelli nominating two out of the four available slick compounds in advance for each race: i.e. one softer and one harder compound.

The most notable modification this year is an increase in the overall tyre allocation, which changes from the previous 11 sets to 12 sets per car. This allocation is divided into seven sets of the harder compound and five sets of the softer compound per race weekend.

One set of the harder compound may now only be used in the first 30 minutes of the first free practice session (FP1) of the weekend and it must be returned before the start of the second free practice session (FP2).

An additional set of the harder compound must be returned before the start of FP2 as well, just as was the case before.

Then, one more set of the harder compound and one more set of the softer compound must also be returned before the start of the third free practice session (FP3).

Should both FP1 and FP2 be declared wet, one set of the tyres normally returned before the start of FP3 may be retained by each driver but must be returned before the start of qualifying.

From the remaining slick tyre sets, one set of each nominated compound must be returned before the start of qualifying. This leaves the teams with three sets of each compound for both qualifying and the race, and the way in which they use these six crucial sets of tyres forms the basis of the tyre strategy for the weekend.

At the start of the race the top 10 cars must be fitted with the tyres with which the driver set his grid time. This rule will only apply if slick tyres were used to set the grid time and if slick tyres are used at the start of the race.

The drivers within the top 10 who did not set a time for any reason may choose either nominated slick compound to start the race on.

During the race, the drivers have to use each type of tyre at least once (unless it rains, in which case this rule does not apply). If they do not do this, they will be excluded. If a dry race is suspended for any reason before the drivers have used both types of tyre, then 30 seconds is added to their cumulative race time.

During Friday practice (Thursday in Monaco) Pirelli has the possibility to provide teams with one additional set per car of either the harder or the softer compound, in accordance with FIA regulations.

Alternatively, Pirelli also has the possibility to supply teams with two additional sets per car of prototype tyres, for development purposes. In each case, these sets must be returned before the start of FP3.

***Wet tyres***

Teams are allowed four sets of intermediate tyres and three sets of wet tyres per race weekend for each car, if it rains at any point. If it rains during FP1 and/or FP2, one extra set of intermediates is allocated to each car. This set has to be returned before the start of FP3.

If the race is started behind the safety car in wet weather, then the teams must all start on the wet tyre.

If it starts raining during the race, then the teams are no longer obliged to run both slick compounds, and they can change over to either the intermediates or wets, as they feel is appropriate for the conditions.

Both the wet and intermediate compounds are available at each round of the championship and are given to the teams before the start of FP1.

***Tests***

One day out of the total of 12 pre-season testing days is reserved for Pirelli to carry out a wet-weather tyre test. Pirelli will make all arrangements for this test day, in accordance with the FIA and the teams.

In addition, one day from the four additional in-season tests (specifically, the four two-day tests taking place on a race circuit where an event has just taken place) is reserved for Pirelli to carry out tyre testing. Tyres used during this test will not be taken from a team’s annual allocation of tyre testing.

**2014 FORMULA ONE TRACKS AND THEIR TYRE CHARACTERISTICS**

***Australian Grand Prix***

The Australian Grand Prix is a race loved by teams and fans alike. The atmosphere is great, the weather is usually warm and the track is close to the vibrant city of Melbourne. All the dry compounds will be a little bit more conservative compared to previous years but they should still provide interesting racing, with a window of two pit stops per car and race. With the Australian circuit being a semi-permanent facility, there is a high level of track evolution as the weekend goes on.

***Malaysian Grand Prix***

Sepang is hot, humid and frequently home to tropical downpours. The track itself is very abrasive, and in combination with the high ambient temperatures, this circuit is one of the toughest all year for the tyres. In order to master this difficult track, high-speed stability from the tyre is particularly important. The chances of seeing the latest generation of our Cinturato Green intermediate and Cinturato Blue full wet compounds in action here is one of the highest all year.

***Bahrain Grand Prix***

The Bahrain International Circuit is very tough on the rear tyres in particular and a high level of traction and grip is necessary for a representative lap time. As it is located in the desert, it is quite common to have sand on the track, which can lower the grip levels, in particular at the start of a session. The temperatures can be very high, a fact that increases thermal degradation: the real limiting factor at this track. This is a track where tyre management is important, with rear traction in particular being the key to a strong qualifying and race pace.

***Chinese Grand Prix***

The Shanghai International Circuit has been host to some thrilling and unpredictable races in the past and a wide variety of pit stop strategies can work at this track. Although ambient temperatures can be quite low and the surface is relatively smooth, tyre degradation can be high due to the unique track layout. Overall, it is a demanding circuit for the tyres, in particular the front left tyre, and the heavy braking that is a characteristic of this track tends to put more strain on the front tyres than the rears.

***Spanish Grand Prix***

Barcelona is an extremely well-known circuit to all the drivers and teams because of the many tests that have been held there in the past. The circuit itself has several medium to high speed corners that test every aspect of a tyre’s performance and can lead to a notable degree of wear and degradation. The asphalt is rather abrasive and temperatures can be high. It is one of the most challenging circuits of the season for tyres, also due to the high lateral loads it puts on them, particularly on the left-hand side.

***Monaco Grand Prix***

Monaco is probably the most famous race of the season, taking place on a street circuit in the Principality. It is also the slowest and least abrasive circuit of the year. Tyre wear is low; mechanical grip and high levels of low-speed downforce are very important here. Overtaking is nearly impossible, putting the emphasis on qualifying. With limited run-off areas and a high risk of incidents the safety car has often influenced the race outcome at this track in the past. Nevertheless, a one-stop strategy can work here under the right circumstances.

***Canadian Grand Prix***

Montreal is known for being a great city with a fantastic race track: races here often lead to a surprise or two. The iconic Circuit Gilles Villeneuve is a semi-permanent track, infrequently used during the year, which means that at the beginning of the weekend the track is very 'green' and slippery. However, there is plenty of track evolution as more rubber gets laid down throughout the weekend. This track puts a lot of longitudinal stress through the tyres, and is very demanding in terms of braking and traction. The surface provides little grip, which can lead to the cars sliding more. The rear tyres are particularly stressed at this track, due to the traction required out of the low and medium speed corners.

***Austrian Grand Prix***

Although it is technically a new circuit, there have actually been 26 Austrian grands prix in the past. The first one took place in 1964, when the circuit was simply called Zeltweg – after its nearest city, and was won by Lorenzo Bandini in a Ferrari. After a gap of six years, during which the track was completely rebuilt and renamed as the Osterreichring, Formula One returned in 1970 and this time the race was won by Carlos Reutemann in a Brabham Ford. Until 1987 there was a race every year, then Austria had to wait until 1997 when Formula One returned for seven years to the completely rebuilt and newly baptised A1-Ring. During Formula One's absence the track underwent extensive construction work once more to become the Red Bull Ring. As is the case with all new tracks, this is a voyage into the unknown for both the teams and Pirelli as only simulator data is available. As good as that is, it's no substitute for real data.

***British Grand Prix***

Silverstone is another challenging track for the tyres. Here, aerodynamics play a more important role than mechanical grip, due to a high average speed. The circuit features a technical layout, taking in a variety of very high-speed corners with some slower and more technical sections. This, together with an abrasive surface, tends to lead to a high wear rate. Temperatures in Silverstone can often be rather low and there is always a risk of rain. But when dry, temperatures can equally be quite high, which means that a very versatile compound choice is required for this track.

***German Grand Prix (Hockenheim)***
Hockenheim, which alternates with the Nurburgring to host the German Grand Prix, was formerly one of the fastest circuits in the world. It is now characterised by long straights combined with a much slower and more technically complex stadium section. This requires a very versatile set-up, and the tyres too have to cope with an extremely wide range of speeds and conditions. Getting good traction out of all the slow to medium speed corners is key to a quick lap, and the tyres play a vital role in this. There are also a number of heavy braking areas.

***Hungarian Grand Prix***
Hungary is the slowest permanent circuit of the year, which does not make it any easier on the tyres. It is a very twisty track and often slippery, in particular at the start of the weekend. This means that much more heat is put through the tyres than on a fast and flowing layout because the tyres are moving around more: particularly when it is hot, which is often the case in Hungary. Therefore, balancing the demands of speed and durability is key to getting the most out of the compounds, in order to keep degradation under control. Overtaking is traditionally difficult at this track, so drivers have an opportunity to use strategy to gain track positions.

***Belgian Grand Prix***
Spa-Francorchamps is the longest and one of the most iconic circuits on the Formula One calendar, with flat-out corners such as Eau Rouge placing extreme demands on the tyres. It is the track that puts the highest vertical loads on the tyres during the season: often in excess of 1000kg per tyre in the Eau Rouge and Radillon section. The undulating surface at Spa also means that the tyres work hard as part of the car's suspension, placing heavy demands on the structure, while the sustained high speeds mean that the drivers have to be careful not to overheat the rubber. On top of this, the weather can be very changeable – and because the track is so long, it is not unusual for it to be raining on one part of the circuit but dry in another.

***Italian Grand Prix***
The Italian Grand Prix is Pirelli's home grand prix, as Monza is just half an hour from our headquarters in Milan. There is always a special atmosphere thanks to so many passionate fans. The track is characterised by very high speeds, putting a lot of energy through the tyres, so the cars run the lowest downforce levels of the year. Consequently, the tyres tend to slide more. There are also a number of high kerbs, which mean that the tyres have to constantly absorb heavy structural impacts. Overall, this track puts some of the highest demands on the tyres that they will face all year.

***Singapore Grand Prix***
Singapore is another street circuit but unique as it is the season's only night race, run under powerful spotlights. The circuit itself is low-grip and slippery, evolving considerably as more rubber gets laid down. Average speeds are contained, so degradation is not usually an issue provided that wheelspin – which can lead to overheating and blistering – is controlled out of the slower corners. The softest compounds are usually well suited for this race, and the fact that the high temperatures tend to fall as the race goes on can put an interesting spin on strategy.

***Japanese Grand Prix***
Suzuka was resurfaced a couple of years ago, so it is a little less aggressive on the tyres than in the past, but the circuit is still a difficult one for the rubber because of the track layout. It contains a wide variety of fast and flowing corners that place high lateral loads on the tyre but there are also some heavy braking areas and tighter corners. The first half of the lap is essentially a non-stop series of corners, which put plenty of heat through the tyres with no significant straight where they can cool down. Away from the track Suzuka is a very special place as well. It has some of the most enthusiastic fans of the season, who arrive at the track very early and stay until late, just watching the pit lane for any sign of a driver or Formula One personality.

***Russian Grand Prix***
Unlike the Austrian Grand Prix, this race is an absolute newcomer, and it will be the first time ever that Formula One goes to Russia. The track was purpose-built in Sochi, near the Black Sea, which also welcomes the 2014 Winter Olympics. In fact, the track is built inside the Olympic Park, which should provide an interesting backdrop. With regards to the race itself, Pirelli and the teams will have to rely on simulation data. As is the case with the Austrian Grand Prix, Pirelli will send two of its engineers to the track as soon as the final layer of asphalt is laid to measure and check the surface so that the most suitable compounds can be chosen.

***United States Grand Prix***
The United States Grand Prix is still a relative newcomer to the Formula One calendar, with the first race in Austin having taken place two years ago, but it has already established itself as a favourite of teams and spectators alike. The track contains a variety of elevations, plus some slow and technical sections alternating with very fast parts. It's a good test of a tyre's all-round ability, with traction demands out of slow corners just as important as lateral grip through the high-speed changes of direction that are another key characteristic of the 5.513-kilometre Circuit of the Americas.

***Brazilian Grand Prix***

Brazil is Pirelli's biggest market outside Italy, so this grand prix is always very busy for us. Unlike the last few years, the 2014 Brazilian Grand Prix will not be the season finale but this should not prevent the passionate Brazilian fans from turning up en masse to cheer on their favourite drivers. The track is one of the shortest but also one of the most challenging of the year. There are some big elevation changes and it is notably bumpy, which makes it hard for the tyres to find traction and increases the physical demands on the drivers. The track surface is on the rough side but as the corners are not very fast, degradation is not usually an issue.

***Abu Dhabi Grand Prix***

As was the case in 2010, Abu Dhabi will host the season and maybe the titles will once more be decided here. Pirelli tested extensively in Abu Dhabi in the run-up to entering Formula One – including a world first: a rain tyre test, in the dark. The track surface is generally smooth, so degradation is low. The circuit provides a variety of speeds and corners, so the tyres have to withstand a wide range of different demands. As the race starts late in the afternoon and continues into dusk, ambient and track temperatures tend to fall as the race goes on, which alters the usual strategy calculations. There is always a risk of sand straying onto the circuit from the desert, but Abu Dhabi has one of the most sophisticated track-cleaning machines of the whole championship, so the sand stands no chance…

## THE LIFE OF AN F1 TYRE

In Milan, the home of Pirelli, 150 research engineers work exclusively on Formula One. The starting points are the physics and chemistry labs, where new compounds and structures are tested. There are about 100 elements in each tyre and 18 structural components.

At the motorsport factory in Izmit, Turkey, physical prototypes are built on the basis of the virtual model. Nearly 200 people work in the Formula One department at Izmit, from fitters to technicians to engineers. This is when the theory gets turned into practice: the compounds and structure are tailor-made and all the components are finally put together.

The first physical tests take place at Pirelli's experimental test centre in Milan, where sophisticated machines simulate every race condition and measure all the stresses to which the tyres are subjected. Once various laboratory tests have been concluded, the tyres then get to experience a real circuit. The tyres that have successfully made it through the track tests are then eligible to form part of the final selection offered to the Formula One teams for racing.

In Izmit, there are two parallel production lines. One line makes the shoulder and the carcass of the tyre. At the same time, on a parallel line, the belt and tread pattern are produced. Natural rubber, synthetic rubber and other artificial fibres are among the key ingredients. The elements produced by the first two production lines are assembled on a third line – which represents the key part of the production process, as a recognisable Formula One tyre is born.

The barcode, which acts as the tyre's 'passport', is affixed to the tyre. This contains all the relevant data about the tyre and allows its usage to be tracked from production to race.

The next step, the vulcanisation period during which the tyre is 'cooked', determines the definitive characteristics of the compound and structure. It also seals in the barcode.

Finally there is quality control, which takes in a visual check, weight check and a scan of the tyre similar to an x-ray. The tyre is then ready for dispatch to a race or test.

## HOW PIRELLI PREPARES FOR A NEW VENUE

In 2014, two new races join the Formula One calendar: Austria in July and Russia in October. Every new race track holds a set of new challenges, but how does Pirelli prepare tyres for a track that no Formula One car has ever driven on before?

This is far from a new experience for the Italian tyre firm, as in 2010 it prepared tyres for its Formula One debut from scratch, having last been represented at the pinnacle of the sport in 1991.

There's a clearly established protocol that enables Pirelli to come up with the best possible tyre choice for each race – even the ones that are brand new.

It starts with extensive computer and simulation work long before there is an actual track, based on circuit layouts and other available data. Understanding the nature of a new track is always complicated, particularly when there is no previous data. But a lot of calculations can be made just using the circuit map as a guide.

Once the actual track is ready, two of Pirelli's engineers will physically inspect the new tracks in order to look at the surface and the layout in detail. In order to do so, they will bring with them sophisticated laser measuring equipment to assess the abrasiveness of the circuit by examining closely the spacing and shape of the stones that make up the aggregate. Several readings will be taken from the machine, to ensure an accurate representation. Using these readings a virtual representation of the track from the tyre's point of view will then be created, using sophisticated computer software.

Together with some asphalt samples from the new venues Pirelli will be in a position to calculate the likely wear rate and the effect of the asphalt and ambient temperatures on the tyres at different points on the circuit.

This information is used to assess which will be the most effective tyre choice for the circuit, so that the right compromise between performance and durability can be reached – while keeping the right number of pit stops.

One important aspect to bear in mind is the fact that a new track is constantly evolving. New asphalt tends to present a lot of surface grease, due to the process by which it is made, but in time this sinks to the core of the track. The individual stones that make up the asphalt also tend to become more polished with the passage of time – but these characteristics evolve most rapidly during the first few years of a circuit's life. So the most suitable tyre for a circuit like Austria or Russia could change from one year to the next – and getting it right the first time is always the hardest challenge.

**PIRELLI'S FORMULA ONE TEAM AND KEY MOTORSPORTS PEOPLE**

The 50 or so people who form the Pirelli F1 race team are only the forefront of the hundreds of people who work on Pirelli's Formula One campaign, many of whose efforts behind the scenes go unnoticed by the general public. At Pirelli's HQ in Milan, Italy, there are hundreds of people working not only in the R&D department, thus forming the physical foundations for the future race tyres, there are many more working on F1's marketing, communication and activation. Then there is of course the state-of-the-art motorsport facility in Izmit, Turkey, where the tyres are made in the 'Factory of Champions'.

The Motorsports Logistics Centre is based in Didcot, close to Oxford in the UK, where all of the tyres for each event get delivered to, accounted for and pre-allocated. And on top of that there are all the Pirelli regional offices around the world and in each country visited by the grand prix circus, which are also heavily involved in their home races, assisting the core team. As Paul Hembery puts it: "Myself, and all the other people who are visible at the races, constitute just the tip of the iceberg. None of us would be able to carry out our jobs were it not for all the dedicated people back at home in Italy, in Turkey, Romania and the UK, as well as all the other Pirelli offices around the world. We're not actually competitors in Formula One, but we are still very much a team. Our people, especially those who the public don't see, are our biggest asset."

In total, Pirelli – the fifth-largest tyre manufacturer in the world in terms of revenue – employs over 37,000 people in more than 160 countries. Around 500 people are directly involved in the Formula One programme.

***Paul Hembery***
*Motorsport Director*

Paul Hembery was born in Yeovil, England, but lives in Milan and Cheltenham. After being educated in the UK, he spent 20 years in the tyre industry, working in Research and Development before moving onto a commercial role. He joined Pirelli in 1992 and has been in charge of motorsport for over a decade.

He masterminded Pirelli's contract to supply control tyres to the World Rally Championship from 2008 onwards, and was then behind the Italian firm's move to Formula One. Paul's role on-event is to oversee all aspects of Pirelli's operations in Formula One and represent the company as it consolidates its motorsport programme into the future.

***Mario Isola***
*Racing Manager*

Mario, born in Milan, started his career in motorsport as a test driver for Pirelli's road car tyres, and the sensitivity of his touch meant that he was soon drafted into the R&D division, designing road car tyres before heading over to motorsport.

He was initially involved in designing tyres for GT cars and then moved onto managing Pirelli's sportscar campaigns in the FIA GT Championship. From 2006 he moved over to rallying, overseeing Pirelli's tenure of the exclusive tyre supply contract from 2008-2010 while also managing Pirelli's return to single-seater racing in GP3. In 2011 Mario became Pirelli's racing manager, in charge of day-to-day operations on the track for Formula One, GP2, and GP3.

***Piero Losi***
*Head of Design and Product Development, Formula One*

Piero joined Pirelli back in 1987 in the research and development department for road car tyres, starting to work within the pre-development division from 1995. As a passionate enthusiast it wasn't long before he made the move to motorsport, where he headed up Pirelli's circuit racing department from the end of 2001, working chiefly in endurance racing series.

One year later he went back to his first love of research and development – but this time in motorsport, looking at the latest advances in competition tyres and pushing the boundaries of technology. Piero has been involved in Pirelli's Formula One project from the very beginning but does not travel to all the races as his team chiefly focuses on development back at base in Milan.

***Dario Marrafuschi***
*Modelling and application engineering*

Dario is Milan born and bred, having studied engineering at university there. After graduating he went straight to Formula One, having worked as a tyre engineer and in various other technical roles, before going on to head up Ferrari's test team from 2006 to 2008 as trackside engineer.

He joined Pirelli at the end of that year as circuit racing manager, overseeing all of Pirelli's track-based activities. In 2010, Dario joined the growing R&D division as it started work on the Formula One project, specialising in modelling and pre-development. As well as keeping a close eye on the tyres for this year, Dario is concentrating on the future development of Pirelli competition tyres.

**PIRELLI MOTORSPORT KEY NUMBERS**

| | |
|---|---|
| 2 | Number of commercially available Pirelli road car tyres inspired by Formula One: P Zero Silver and P7 Cinturato Blue |
| 5 | Pirelli is the fifth-largest tyre company in the world |
| 8.5 | Weight in kgs of a P Zero Formula One slick front tyre |
| 9.5 | Weight in kgs of a P Zero Formula One slick rear tyre |
| 11 | Number of dedicated GP2 / GP3 staff at each race |
| 18 | In psi, approximate pressure of a F1 tyre at the start of a race |
| 20-21 | In psi, approximate pressure of a F1 tyre during a race |
| 22 | Number of Pirelli tyre factories all over the world |
| 25 | Litres of water dispersed per second by a Cinturato Green intermediate tyre at 300kph |
| 50 | Number of times per second a P Zero tyre rotates at full speed |
| 52 | Number of Pirelli personnel that travel to each F1 race |
| 65 | Litres of water dispersed per second by a Cinturato Blue wet tyre at 300kph |
| 130 | Peak temperature reached by the P Zero compounds in centigrade |
| 252 | Number of international and national championships supplied by Pirelli |
| 450 | Speed in kilometres per hour that Pirelli tyres are accelerated up to during laboratory tests |
| 1900 | Approximate amount of tyres supplied for each F1 race |
| 4500 | Approximate amount of patents held by Pirelli all over the world |
| 15,000 | Space in square metres covered by Pirelli’s Izmit factory, where the Formula One tyres and all of Pirelli’s competition tyres are made |
| 36,000 | Approximate number of kilometres carried out by Pirelli in private testing since 2010 |
| 50,000 | Number of tyres that will be produced for Formula One in 2014 |
| 270,000 | Number of competition tyres made by the Izmit factory each year |

**PIRELLI'S MOTORSPORT HISTORY AND WORLDWIDE ENGAGEMENT IN MOTORSPORT**

The story actually started in China. Pirelli's first major motorsport victory was the 1907 Peking to Paris race, an adventure that at the time was regarded as a bit like attempting to drive to the moon. Several people said that the race was entirely impossible – but Giovanni Battista Pirelli, the company founder, was not one of them.

Neither was Prince Scipione Borghese, the well-known Italian adventurer who would go onto win the 15,000-kilometre marathon in a seven-litre Itala running on Pirelli tyres. The most incredible thing about his success was that one of the four Italian tyres actually went the entire distance without needing to be changed – and then drove on from Paris to Milan after the finish.

That success inspired the elongated 'P' logo that will once more be seen on all the Formula One cars this year. But Pirelli's involvement in Grand Prix racing actually dates back to the 1920s, before Formula One was formally established, thanks to a partnership with Alfa Romeo that saw some of the legends of the time such as Antonio Ascari and Giuseppe Campari triumph on the Italian tyres. Pirelli's first World Championship win came in 1925, thanks to Gastone Brilli-Peri in an Alfa.

Road racing was also a major part of Pirelli's sporting philosophy, with several victories in the iconic Mille Miglia that tore through Italy, bringing the whole country to an excited standstill.

But the real glory days arrived with the beautiful Formula One cars of the 1950s, and drivers such as Juan Manuel Fangio who have shaped the history of the sport. During the early part of the decade Pirelli was unbeatable, sweeping up four world titles in total with the last one being clinched by the great Fangio in 1957: his victory from the back at the German Grand Prix in that year is reckoned by many to be the greatest race ever.

Pirelli also triumphed in the Le Mans 24 Hours in 1954, with Maurice Trintignant and Jose Froilan Gonzalez winning in a Ferrari 375 MM. Other sports car successes followed at the equally well-known Sebring 12 Hours.

The competition wasn't just limited to four wheels. Since before the turn of the century Pirelli had been supplying tyres to motorbike racers, and by 1948 Pirelli-equipped motorbikes had set more than 30 speed records.

After Pirelli withdrew from the frontline of competition in 1957, the Italian tyres raced mostly in the hands of privateers.

In the 1970s, Pirelli came back to motorsport through rallying, where it has been represented ever since. Pirelli won in the very first year of the World Rally Championship, 1973, and the consequent success led to the company being asked to develop a brand new tyre for the fire-breathing Lancia Stratos: a race car for the stages capable of developing 240 horsepower. The radial tyre with a wide tread pattern and low sidewalls that resulted was the P7: and this was the thinking behind Pirelli's return to Formula One in the 1980s.

The company returned to the forefront of Grand Prix racing in 1981 with the Toleman team: the same outfit that would go on to give Ayrton Senna his Formula One debut on the Italian rubber. Victories in France with Nelson Piquet in 1985 and Mexico with Gerhard Berger in 1986 – not to mention innovations such as brightly coloured tyres – formed the highlights of Pirelli's comeback, before a short sabbatical while the team developed the first P Zero family of tyres: a name that is still used today.

The final Pirelli victory of the previous era in Formula One was at the 1991 Canadian Grand Prix, with Nelson Piquet after a dramatic race. Pirelli then bowed out of Formula One at the end of that season, having racked up a total of 44 victories from 200 starts.

Fast forward to 2011, when Pirelli returned on a three-year exclusive supply contract, which has been renewed from 2014 onwards. Pirelli's mission was to help give a new lease of life to the action in Formula One, which was achieved thanks to a record-breaking number of overtaking manoeuvres and seven winners from the first seven races in 2012: another record. As a result, global interest in Formula One has never been higher. But it's not just Formula One where Pirelli is represented in the world of motorsport.

The company is also the official supplier to Formula One's feeder series, GP2 and GP3, as well as being the official supplier to a number of GT racing championships all over the world, including the headlining Blancpain Sprint series and Endurance series.

Pirelli returned to the World Rally Championship this year, having previously been sole supplier from 2008-2010, and remains as exclusive supplier to the World Superbike Championship.

**GP2**

Launched in 2005, the GP2 Series is a one-make single-seater championship that has become the acknowledged stepping-stone to Formula One. Pirelli has been its exclusive supplier of tyres since 2011.

The 2014 season will once more host 26 aspiring drivers competing at the wheel of identical Pirelli-equipped Dallara cars, powered by a V8 Renault engine. This year's GP2 tyres are the same as those successfully raced last year when it comes to compound and construction, designed to help prepare young drivers for Formula One.

The GP2 Series adopts a similar points system to Formula One and features closely aligned tyre regulations. The GP2 teams and drivers will have at their disposal two different types of Pirelli P Zero slicks to use during a race weekend, just like Formula One. The same colour markings used in Formula One will also be applied in GP2.

Every car will have five sets of dry tyres and three sets of wet weather tyres available for the race weekend. The five sets of dry tyres comprise three sets of the harder compound and two sets of the softer compound. There is a new rule for this year designed to bring the championship even closer to Formula One: each driver must use at least one set of each specification of dry weather tyres during race one (unless it is a wet race, in which case the rule doesn't apply).

The 2014 GP2 calendar takes in 11 races with several flyaway rounds in support of the Formula One season. Each round will include a single practice and qualifying session followed by two races.

A race weekend is composed of one 45-minute practice session (up from 30 minutes in 2013) and one half-hour qualifying session, followed by two races. The qualifying session is a straight fight for the fastest lap time, and determines the order of the grid for Race One.

Two additional driver points are awarded for pole position. Race One is run over 170 kilometres or one hour, and each driver must complete one compulsory pit stop during which all four tyres must be changed.

The top 10 drivers score points, with an extra two points awarded to the driver who sets the fastest race lap. The grid for Race Two is determined by the finishing order of the first race, with the top eight positions reversed. Race Two is run over 120 kilometres or 45 minutes, with no compulsory pit stops. The top six finishers in Race Two score points, and the driver who sets the fastest lap again scores two additional points.

The points for fastest lap in both Race One and Race Two will only be awarded to a driver who finishes in the top 10, and who has started the race from the grid.

**GP3**

Pirelli has been proud to support the GP3 Series since it began in 2010, marking the Italian firm's return to the top flight of single-seater racing. Last year, the series benefitted from a brand new 400 horsepower car designed to bring it closer to GP2, which is the same model that will be used this year, with no other rule changes.

The GP3 Series follows the same basic rules and principles as GP2: a single chassis and engine with tightly controlled technical regulations to ensure a level playing field. Racing with identical cars and set-ups, it is the driver's ability that makes the difference.

Pirelli supplies the GP3 Series with three types of P Zero dry weather tyre (hard, medium and soft) – one type of which is nominated for each race weekend – and one pattern of wet weather tyre. During each race weekend every driver is provided with three sets of dry tyres and two sets of wet weather tyres. Pirelli is introducing new tyres for GP3 this year, with a new and larger size at the front intended to push car performance towards oversteer: reminiscent of Formula One.

The 2014 GP3 season increases to nine race weekends (up from eight in 2013) and concludes once more at Yas Marina in Abu Dhabi.

The geographical scope centres on European venues in order to contain costs. Likewise, the race weekend format has been designed to maximise track time: each round features one practice session and one qualifying session, followed by two races.

Points are allocated in the same way as GP2, with the aim of putting the spotlight firmly on driving talent.

**GT**

Pirelli will continue to be represented in the front line of GT racing this year, supplying the Blancpain Endurance Series and Sprint Series. Both series are based on race versions of road-going supercars, with Italy's Alex Zanardi one of the stars of the 2014 field.

Pirelli has a long and illustrious history in endurance racing, ranging from the Le Mans 24 Hours (which it won in 1954 with Maurice Trintignant, Froilan Gonzalez and Ferrari) to recent multiple titles in the American-based Grand Am series.

Pirelli has also claimed a huge variety of class wins in GT racing all over the world, as well as supplying exclusive one-make series such as the Ferrari Challenge, Lamborghini Super Trofeo and Maserati Trofeo.

This year's GT championships take place over a wide range of circuits both in and out of Europe. Manufacturers represented include Audi, BMW, Ferrari, Lamborghini, Mercedes-Benz and McLaren: all of which use Pirelli P Zero tyres as original equipment on their road cars. The slick tyres used for GT racing will also be branded P Zero: just like the slicks that have become a central feature of Formula One.

The design of the new Pirelli GT tyres has taken on board many of the lessons learned from other series, with the working processes further optimized to meet the needs of the Blancpain championships while maintaining the performance characteristics that endurance drivers have appreciated in the past.

The GT series cars use 18-inch tyres, with the exception of Ferrari, which uses 19-inch tyres on the rear. These sizes are very close to those used for road cars, allowing a direct technology transfer from the track to the road.

Pirelli has also developed a new size (325/660-18) as a front fitment for central and rear engine cars. This new size ensures a better feel for the driver. Once more, motorsport has proved to be a brilliant proving ground for the tyres used by everyday motorists.

## RALLY

Pirelli returned to the World Rally Championship this year, having been involved in the series since its inception in 1973.

Pirelli was last represented at the top level of world rallying from 2008-2010, when the company was sole supplier to all the teams. Pirelli also backed the Star Driver scheme and WRC Academy, with the aim of promoting the next generation of young drivers to the top of the sport.

Now the Italian firm returns in open tyre competition, having been nominated together with three other tyre manufacturers to supply the World Rally Championship from 2014. Not only that, but Pirelli continues to be present on the European Rally Championship, as well as retaining single-supplier status on prestigious national series such as the British Rally Championship.

Pirelli has a long and illustrious history in rallying both as a single supplier and in open competition. To date, the Milan-based company has racked up 180 world rally championship event wins and 23 world titles.

For a tyre manufacturer, rallying is a massive challenge as the tyres are tested on every road surface, in a huge variety of climatic conditions. With rallying renowned for being an extreme sport on the limit of adhesion, the tyres can make a massive difference.

Pirelli’s on-going rally tyre testing campaign continues this year alongside the circuit racing programme. The newest generation of Pirelli’s rally tyres have been adapted to the latest World Rally Championship regulations, combining performance with durability and respect for the environment.

## FROM THE RACE TRACK TO THE ROAD

Technology, safety, ecology and a sporting philosophy is what unites the Pirelli P Zero tyres seen on the race track with those driven by ordinary motorists on the road.

Both racing cars and road-going sports cars are guaranteed performance and reliability thanks to the P Zero range of Ultra High Performance tyres. Pirelli is a world leader in the automotive industry and has an exclusive relationship with over 50 racing series worldwide, including Formula One. This experience filters straight down to road car tyres.

The direct exchange of information and technology between Pirelli's motorsport division and the road tyre group has resulted in innovative products such as the P7 Cinturato Blue: a road car tyre that is inspired by the wet weather capability of its Formula One counterpart. There is also the P Zero Silver, which prioritises strong performances for drivers who cover long distances.

With eight worldwide Research and Development centres employing more than a thousand specialist engineers, the Pirelli group now has 22 factories in five continents, and is the holder of more than 4500 international patents. The Italian firm is one of the tyre-makers that invests most in research and development – up to 3% of its annual revenue.

From Ferrari to Porsche, Pirelli is used as original equipment by all of the world's most prestigious carmakers, with more than 200 homologation approvals.

The original equipment homologation process requires an incredible amount of research and development to fine-tune tyre characteristics in order to reach the performance goals that the vehicle designers have in mind.

In this respect, the lessons learned from Formula One are invaluable. Just as is the case in Formula One, homologating a tyre for original equipment use involves several rounds of engineering and manufacturing prototypes, then testing and adjusting each subsequent version to achieve the performance level that the vehicle manufacturer has targeted.

The result, in Formula One and on the road, is unprecedented levels of performance. The Italian firm currently holds the production car lap record for the Nurburgring Nordschleife, after a Pirelli-equipped Pagani Zonda R completed the 22.8-kilometre course in just 6m47s.

That's just one example of how competition benefits every tyre in Pirelli's range: from the track-derived P Zero, to the eco-friendly P1.

## PIRELLI AND GREEN TECHNOLOGY

At the heart of Pirelli's sporting philosophy is green technology, which covers every aspect of the company's business, from Formula One down to the smallest road cars.

The 50,000 Formula One tyres needed for this year are manufactured at Pirelli's state of the art facility in Izmit, Turkey, where the company has been present for more than 50 years.

The processes used in Izmit are based on energy and water efficiency and the reduction of dangerous emissions like carbon dioxide. Special attention has been given to the re-use of production remnants and used tyres. Pirelli's waste handling protocol includes the recycling of all used Formula One tyres for either the generation of new primary material or energy production.

Formula One tyres, in line with the Pirelli Group's Green Performance strategy, have a pronounced natural rubber content, avoiding the need for damaging refinement procedures and benefitting recycling.

As well as pioneering new technology, Pirelli has traditionally led the way when it comes to sustainability, having eliminated aromatic oils from all elements of its tyre production processes long before legislation demanded it.

Formula One is Pirelli's most valuable mobile laboratory, constantly revealing new areas in which efficiency can be improved and pushing the boundaries of technologies in areas that will eventually see mass production.

Pirelli's attention to sustainability is also shown by its recent confirmation in the Dow Jones Sustainability World Index, where the Group has been the leading company in the 'Autoparts and Tyre' sector for seven consecutive years.

Exactly the same thinking behind Pirelli's road car tyres applies to Formula One: ultimate performance and cutting-edge technology need not come at the expense of the environment.

## THE P ZERO ROAD CAR TYRES

The name P Zero, used in the highest categories of single-seater racing, also describes a family of Ultra High Performance tyres for the road. The key to P Zero technology is the patented P Zero system, which uses directional tread at the front axle and asymmetric tread on the rear. Using directional tyres on the front maximizes the expulsion of water. In this way the asymmetric tyres fitted on the rear axle encounter a drier surface, adding up to a uniquely safe yet exhilarating driving experience. At a recent international tyre test with all the major brands represented held by Evo magazine, the magazine wrote that the P Zero was: “the only tyre to bring sparkle to the test car’s steering. There’s no doubt about our winner.”

### *P Zero*

The P Zero is the famous benchmark for all top-of-the-range sports and high-powered vehicles, setting the standard in every key area: road holding, grip, braking and traction. The structural integrity of the tyre improves steering response and also ensures uniform tread wear while enhancing driver feedback. This tyre has been developed for all top of the range, sports and high-performance vehicles, with more than 200 homologations, and five patents protect its unique design. More than just a tyre, P Zero has become a motoring legend.

### *P Zero Corsa System*

The P Zero Corsa System is the latest Pirelli Ultra High Performance product specifically developed as an original equipment fitment for the highest-performing next generation vehicles. Developed with an innovative racing tread compound it is ideal for the fastest and most powerful cars in the Ultra High Performance sector.

### *P Zero Nero GT*

In P Zero Nero, Pirelli has created a tyre that gives extraordinary all-round performance, offering maximum sports driving pleasure together with optimal safety. The tread design has been developed to offer excellent levels of grip and road holding, as well as reduce the risk of aquaplaning.

### *P Zero Rosso*

The P Zero Rosso is renowned as one of the most comfortable sports tyres to come out of Italy. It is the ideal choice for optimum balance between performance and comfort, while still providing precise steering response on dry and wet roads.

***P Zero Silver***

The P Zero Silver has been directly developed from the Italian firm's involvement in the highest level of motorsport and was Pirelli's first road tyre derived directly from Formula One. It shares the same modelling process as Pirelli's grand prix tyres, using cutting-edge mathematical simulation to finalise the design of the tyres under a wide range of road conditions. P Zero Silver, intended primarily as an aftermarket tyre, offers top performance, particularly for drivers who cover long distances.

***P Zero Trofeo***

The P Zero Trofeo is classified as a motorsport tyre but is still road legal, and it is intended for drivers who regularly take their cars out onto race tracks. It was developed using technology acquired from Pirelli's asphalt World Rally Championship tyres.

## PIRELLI IN EVERYDAY LIFE

There is much more to Pirelli than just tyres. Not only is the Italian firm well-known for its iconic calendar, but also for the P Zero fashion range, which is represented by the corporate uniforms you will see in the Grand Prix paddock, and its sponsorship of the Inter Milan football team, as well as different charitable foundations all over the world.

When Giovanni Pirelli founded his tyre and cable company in 1872, he employed only 45 people. He would probably have never guessed that his outfit would grow to become part of Italy's social fabric, thanks to some legendary tyres such as the 'Stelvio' – named after a tortuous mountain pass in Italy – and the 'Stella Bianca', which means 'white star' in Italian. The public awareness of these tyres was reinforced through colourful advertising campaigns that made full use of the stars of the day. "Today I've got the Cinturato on my car," proclaims Juan Manuel Fangio from one poster in 1965. "It's a tyre that's truly different to the others. What's most surprising is the absolute driving precision. Extraordinary."

### *The Cal*

The Pirelli calendar is still one of the concepts most closely associated with the Italian brand. The very first calendar in 1962 simply featured models from Pirelli's key markets with images of tyres superimposed on them. But after this low-key start, Robert Freeman – who famously photographed the Beatles – changed it completely with his shots of models on the beaches of the Cote d'Azur.

The calendar was discontinued in 1974 because of the global recession due to the oil crisis and it took 10 years for it to be resurrected. Shortly afterwards it became a legend, establishing itself as a collectors' item all over the world with only a strictly limited run of 40,000 copies made per year.

Photographers have included Richard Avedon, Mario Testino and Patrick Demarchelier. Supermodels have included Cindy Crawford, Kate Moss and Helena Christensen. This year, the 50th anniversary calendar featured previously unseen images shot by Helmut Newton in 1986.

### *Inter Milan*

Pirelli also connects with its customers on a day-to-day level through its sponsorship of the legendary Inter Milan football club.

The association between Pirelli and Inter Milan has existed since 1995 and it goes way beyond just a name on a shirt. Together, Pirelli and Inter Milan have created the 'Inter Campuses' charity scheme. This idea, which started off in Italy and then spread to the rest of the world, aims to help underprivileged children by giving them a start in academic and sports education.

***P Zero Fashion***

Similarly, the P Zero fashion range is not just all about clothes. There are watches, belts, bags and shoes, favoured by celebrities ranging from Rupert Everett to Naomi Campbell, and a boutique – complete with a Formula One car and a Pirelli inflatable motorboat – in Milan.

Pirelli's core product will always be tyres, and the ultimate expression of that art is Formula One. Yet Pirelli is more than just a tyre company: it is a household name not only in Italy, but also throughout the rest of the world.