

1987 – 2012: Michelin celebrates the 25th anniversary of the radial motorcycle tire And announces the new 2013 tire ranges

The series-produced MICHELIN X Radial motorcycle tire was introduced a quarter of a century ago.

When Michelin brought to market the first-ever radial tire for road motorcycles in 1987, it launched nothing less than a revolution in the world of two-wheel motor vehicles. As a result, enormous advances have been made in motorcycle engines and cycle parts.

Twenty-five years later, this Michelin innovation continues to extend its reach. The trend toward radial tires introduced in 1946 when Michelin filed a patent for the radial car tire is ongoing. Among the new tires that Michelin will launch in 2013 are four new radials for motorcycles: the MICHELIN Power Super Sport, MICHELIN Pilot Power 3, MICHELIN Anakee 3 and MICHELIN Pilot Street radial. All of them will found around the world, on roads in Southeast Asia, South America and Europe.

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From 1987...



...to 2012: a quarter of a century of Michelin innovations to meet motorcyclists' needs



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In 2012, the MICHELIN X Radial motorcycle tire is celebrating its 25th anniversary

The MICHELIN X Radial motorcycle tire is celebrating its first 25 years.

Three years after first using it in racing, in 1984, Michelin decided to bring to market its radial motorcycle tire. In 1987, the MICHELIN A59X and M59X signaled the beginning of a revolutionary new era for high-performance tires that enabled riders to get the most out of the new motorcycles of the period. Today, all road, sport and supersport bikes are equipped with radial tires.

Without the radial tire, racing bike engines would never have become so big since traditional cross-ply tires would not have been able to support today's 1,000 cc engines. The radial tire has been the key driver of the faster pace technical improvements for racing and series-produced motorcycles in terms of the torsional stiffness of the cycle parts as well as the power output of the engine.

In 1983, thanks to the genius of Freddie Spencer, Michelin won the first Grand Prix event on a 500 cc bike fitted with a radial tire (on the rear wheel only). The following year, Randy Mamola became the first rider to win a Grand Prix race (San Marino) on a motorcycle equipped with radial tires on both the front and rear wheels.

A radial tire undergoes less heat build-up than a conventional tire. As a result, the rubber remains softer and delivers better grip when cornering.

“The introduction of the radial was the most important tire innovation of my career,” says three-time world champion Freddie Spencer. “A driver needs grip, feedback and longevity, and the radial tire represented a real improvement in all three areas. It also influences other aspects of motorcycle design. The first thing I noticed about the radial tire was that it gave me much better grip and stability when cornering rapidly. I could reaccelerate sooner, which I always tried to do in races.”

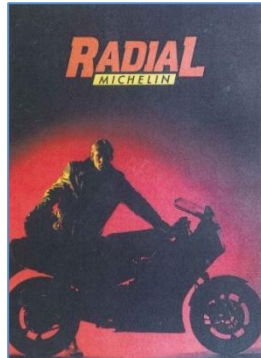


Since the integration of radial technology in motorcycle tires 25 years ago, other important Michelin innovations have been introduced that are meeting the needs of today's riders.

These innovations range from the introduction of silica to the use of Michelin dual compound technology in tire manufacture (See below for more technical information).

A look back in time: Michelin's communication about its new radial motorcycle tire from the 1980s

Before launching the tire in 1987, Michelin released information about the product, in October 1986. This information provides an opportunity to appreciate – in its historical context – the emergence of this innovation that was to benefit so many users around the world.



"Since 1981, Michelin has been experimenting with radial technology as applied to motorcycle tires. Before that date, sidewall rigidity had been obtained by a conventional cross-ply structure that prevented the tire from collapsing against the hub when the motorcycle tilted during cornering. The first radial tires were tested in races and very quickly proved their effectiveness, enabling Gilles Burgat to win the Trial World Championship on MICHELIN radial tires in 1981. Then in 1985, Freddie won titles in two different Grand Prix categories. That year, all leading speed and endurance riders competed – and won – on Michelin radial tires, demonstrating the validity of this architecture. Today, Michelin is introducing five tires (two sizes for the front wheel and three for the rear) called the A59X and the M59X, designed for the leading large motorcycles."

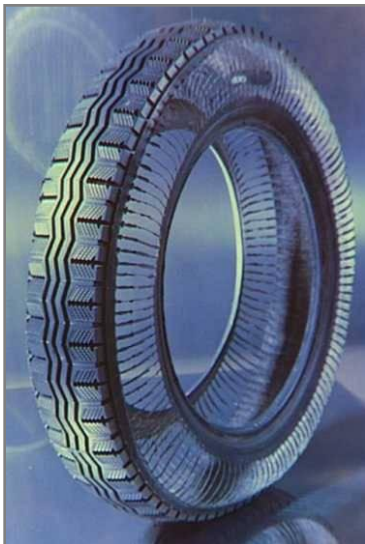
The Michelin Group also prepared the following technical talking points: *"1,000 cc on 40 sq. cm, whether cornering or accelerating – technology indeed solves a lot of problems. The improvements in motorcycle performance have brought to light the limits of conventional tire design, especially in the area of heat build-up. Designed and developed from data gathered from racing, the Michelin radial tire weighs less and operates at a lower temperature. For large touring bikes, Michelin produces tires that meet road requirements as well as rider demand for improved grip, handling and comfort. And to deliver performance that lasts for thousands of kilometers, Michelin engineers focused on optimizing stability of the contact point. This means that with the A59X or M59X riders can travel farther and longer without having to choose between safety and enjoyment."*

While Michelin was the pioneer in developing the radial motorcycle tire, all the major tire manufacturers followed its lead. The same trend had occurred 40 years earlier for the radial car tire.

A brief history of the MICHELIN X Radial tire

Even though the conventional cross-ply tire gave an enormous boost to mobility around the world in the first half of the 20th century, its design limits could be clearly seen. The tire's resistance to high speeds and to heat build-up were problems and its longevity and overall reliability could still be improved, since many vehicles were sometimes out of service because of tire-related incidents.

In the late 1930s, a Michelin researcher named Marius Mignol designed a concept tire whose sidewalls were replaced by widely spaced, radial metal cables. Because of its very singular architecture, the prototype was known in-house as the fly cage. Tests and measurements confirmed that the tire's tread did not heat up, while the movements of the cross-ply layers of a conventional tire generated most of their heat in the sidewalls. Michelin was convinced that the radial tire was destined for a great future.



The so-called "fly cage" was the first radial tire prototype
(Photo credit: Michelin)

Research into this technology continued secretly in Occupied France during World War II and on June 4, 1946, the patent for the X tire was filed. In just a few years, the radial tire would clearly demonstrate its superiority.

In 1951, the Lancia Aurelia B20 was the first series-produced car to be fitted with the celebrated Michelin radial tire as original equipment. Lancia and the new Michelin radials had already established their credibility, having that same year scored a notable win in the two-liter category at the 24 Hours of Le Mans. To derive maximum benefit from the radial tire, it was decided to purpose-design a vehicle with running gear that would enable the tire to display its qualities. This came in 1955, with the launch of the Citroën DS, and the radial tire was well on its way to success in France. The tire's international development gained momentum a decade later, in 1966, when the Ford Motor Company, unsatisfied with all the tires it had tested for its new Lincoln Continental Mark III, set its sights on

the Michelin X as original equipment for its new model. The rest is history. To prepare adequately for the total revolution that the radial represented, Michelin extended its new technology to tires for other vehicles. In 1952, Michelin completely transformed the transport industry by introducing the first radial truck tire, followed by the first radial earthmover tire in 1959. In 1981, Michelin brought to market the first radial aircraft tire. Then, in 1984, came the first radial tire for motorcycles, initially developed for racing bikes. Michelin quickly transferred the technology to street tires, launching the A59X/M59X range in 1987. The tires set new standards in terms of road-holding performance.

Michelin's history has been shaped by innovation and there's no better proof of that fact than the radial tire.

Superior performance across the board: At the heart of Michelin's basic research activities

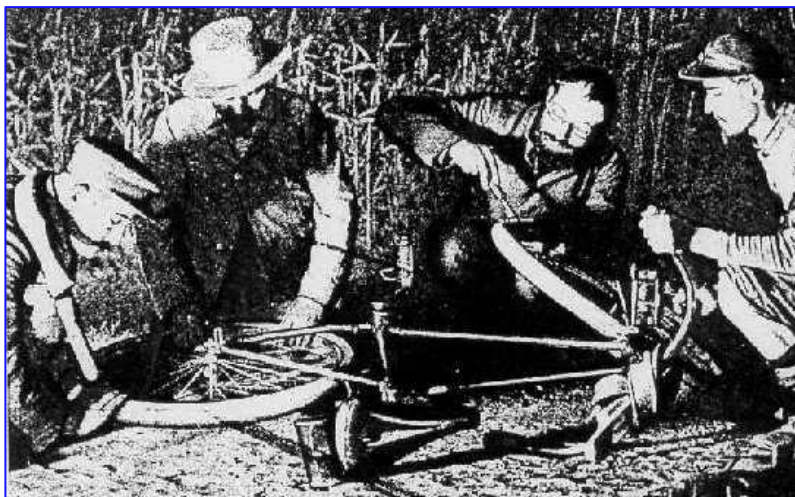
Michelin's pledge to consumers is to deliver more performance with each new tire. This involves engineering tires that leverage advanced technologies to eliminate performance tradeoffs for users. With Michelin tires, consumers are ensured of enhanced grip in all situations as well as riding enjoyment and greater total mileage. And that's exactly what the first radial motorcycle tire provided in 1987.

Delivering more performance in the same tire is a characteristic shared by all Michelin tires, regardless of the type of vehicle they equip. The problem is that some types of performance are hard to reconcile with others. Combining them all in the same tire requires advanced technologies as well as purpose-designed testing capabilities and manufacturing processes. That's what Michelin has always deployed, ever since the Company was founded. To simultaneously improve different areas of tire performance, which represents the surprising, unique aspect of Michelin's innovations, the Company's engineers – like its founders – understood the importance of working on each tire feature separately.

This process can be broken down into four stages.

1891: separating the tire from the wheel

In 1891, Michelin invented the first removable bicycle tire. Previously the tire and wheel had been glued together, which in addition to making repairs long and fastidious made the "wheel" and "tire" functions inseparable. Before Michelin's innovation, it was impossible to address tire-related issues without dealing with the wheel as a whole.



1946: separating the crown from the sidewalls

When Michelin filed a patent for the radial tire in 1946, it laid the foundations for the modern car tire that still sets the standard today. What made it different at the time was that the mechanical properties of the crown were treated separately from those of the sidewalls. The new tire had a rigid crown that improved steering and longevity, while the sidewalls were flexible, thereby enhancing comfort and helping to reduce rolling resistance.



In 1984, Michelin tested its first radial motorcycle tires in Grand Prix events and they very quickly set new performance standards. Since then, Michelin has won 21 world titles in 23 seasons in the 500 cc premier class.

In 1987, Michelin leveraged its experience in racing to introduce the first radial tires for street motorcycles: the MICHELIN A59X and M59 X (see photo opposite)

Radial technology provided a critical advantage in terms of resistance and stability at high speeds, as well as consistently superior, long-term road performance, riding comfort and wear-resistance.

1992: separating properties within the rubber compound

The integration of silica in the rubber compound in 1992 resolved the tradeoff between grip and rolling resistance. The reduction in rolling resistance also made it possible to increase fuel efficiency without adversely affecting grip.

In early 1990, Michelin introduced motorcycle racing tires with a silica-reinforced rubber mix developed through the Group's basic research programs. This innovation marked the beginning of a new era of supremacy for Michelin, especially in races held on wet surfaces. By adding silica to the rubber compound used in motorcycle tires, Michelin established a new

benchmark for grip on wet tracks.

In 1999, the **MICHELIN Pilot Sport** became the first series-produced tire to integrate this innovative feature.

1994: separating the rubber compound on the shoulders from that on the crown

Dual compound technology enabled Michelin to widen its technological lead over the competition, as the tire maker continued to dominate the sport's premium 500 cc category.

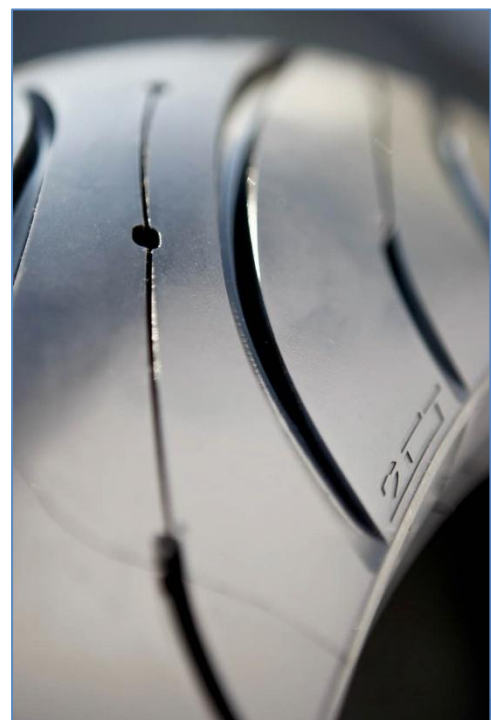
In 2005, the first hypersport tire with different rubber compounds on the crown and shoulders was introduced. Called the **MICHELIN Power Race**, it was the first racing tire approved for road use to integrate this dual compound.

In 2006, Michelin went even further in applying its dual compound technology. Integrating technologies developed through track racing, the **MICHELIN Pilot Power 2CT** was intended for sports motorcycles used mainly on the road.



In 2007, the Group brought to market the **MICHELIN Pilot Road 2**. Its use of dual compound technology made it possible to reconcile two contradictory areas of performance: longevity and wet grip. The tire was intended for roadsters and touring bikes.

In 2011, the **MICHELIN Pilot Road 3** delivered two important advances. The first was the use of an innovative technology – MICHELIN XST (X-Sipe Technology) – that combines sipes and wells. The tread breaks the film of water on the road and increases drainage capacity to deliver the grip conditions found on roads that are practically dry. The second was the integration of the latest MICHELIN 2CT (Two-Compound Technology). Used together, MICHELIN 2CT and MICHELIN XST allowed for regular tire wear that increases longevity and enables high performance over the long term.



Motorsports: A Michelin technological laboratory

✓ Racing to spur innovation: key facts and dates

With 360 wins between 1976 and 2008 in Grand Prix motorcycle racing, 14 Endurance World Championship titles, and 13 wins in both the 24 Hours of Le Mans motorcycle race and the Bol d'Or, Michelin has achieved an unrivaled record while developing leading-edge motorcycle tire expertise.

All of these track victories were won in competition with other tire manufacturers. Michelin firmly believes that races that are open to more than one tire maker can serve as a powerful innovation driver. At the same time, competition makes the races more exciting for spectators while enabling Michelin to demonstrate the technical superiority of its products.

Part of Michelin's DNA, racing is a full-fledged technological laboratory that promotes the emergence of innovative solutions.

Michelin is committed to widely sharing these technological advances as well as the performance benefits they deliver in terms of safety and riding pleasure. A manufacturing pioneer, the Group has revolutionized the motorcycle tire segment with such innovative products and processes as the radial tire, the semi-slicking racing tire and the integration of silica in its rubber compounds. More recently, multi-compound technology has allowed Michelin to produce the first racing tire adapted to the specific feature of each circuit or track by taking into account the differing demands made on each side of the tire.

In short, Michelin's ground-breaking innovations developed through motorsports have become industry benchmarks. **Here's a look back at five major innovations:**

1977: The semi-slick tread

To meet the needs of increasingly powerful motorcycles, Michelin focused its research on tread design and completely eliminated the tread grooves, which was a revolutionary approach at the time. Introduced in Grand Prix racing in 1977, the slick tire enabled Barry Sheene, on a Suzuki bike, to win the 500 cc World Championship that same year. **In 2004**, the MICHELIN Pilot Power was launched as the hypersport motorcycle tire with the lowest void ratio in the market.

1984: Radial technology

Michelin tested its first radial motorcycle tires in Grand Prix events and they very quickly became the benchmark.

In 1987, Michelin leveraged its experience in racing to introduce the first radial tire for street motorcycles: the MICHELIN A59X and M59X. Radial technology provided a critical advantage in terms of resistance and stability at high speeds, as well as consistently superior, long-term road performance, riding comfort and wear-resistance.



1992: Silica

In early 1990, Michelin introduced racing tires with a 100% silica-reinforced rubber mix, developed through the Group's basic research programs. This innovation marked the beginning of a new era of supremacy for Michelin, especially in races held on wet surfaces. By adding silica to the rubber compound used in motorcycle tires, Michelin established a new benchmark for grip on wet tracks.

In 1999, the MICHELIN Pilot Sport became the first series-produced tire to integrate this innovative feature.

1994: The first dual compound tire in the Grand Prix 500 cc category

Dual compound technology enabled Michelin to widen its technological lead over the competition, as the tire maker continued to dominate the sport's premium 500 cc category. In 2005, the first hypersport tire with different rubber compounds on the crown and shoulders was introduced. Called the MICHELIN Power Race, it was the first racing tire approved for road use to integrate this dual compound. In 2006, Michelin went even further in applying its dual compound technology. Deploying technologies developed through track racing, the MICHELIN Pilot Power 2CT was intended for sports motorcycles used mainly on the road.

2009: Asymmetric Technology

This technology was introduced in 1994 in GP 500 motorcycle racing. Combining asymmetric technology (AST) with three compound technology (3CT) made it possible to use different rubber compounds on the right and left sides of the tire, as well as a third, more resistant compound for the center of the tread. In this way, the shoulder that is more often in contact with the ground during a race will use a harder rubber so that its lifespan is aligned with the total distance to be covered. In 2009, thanks to AST technology, the 16.5-inch Michelin Power One was the first tire in this category to adjust to the special features of each track, taking into account the different demands put on each side of the tire, depending on whether the circuit has more left or right turns.

✓ From the track to the road: developing expertise synergies

Innovation is the motor that drives Michelin's development. One of the tiremaker's objectives is to bring innovations to market faster, thereby responding rapidly to users' needs and expectations by providing them with the latest technological advances.

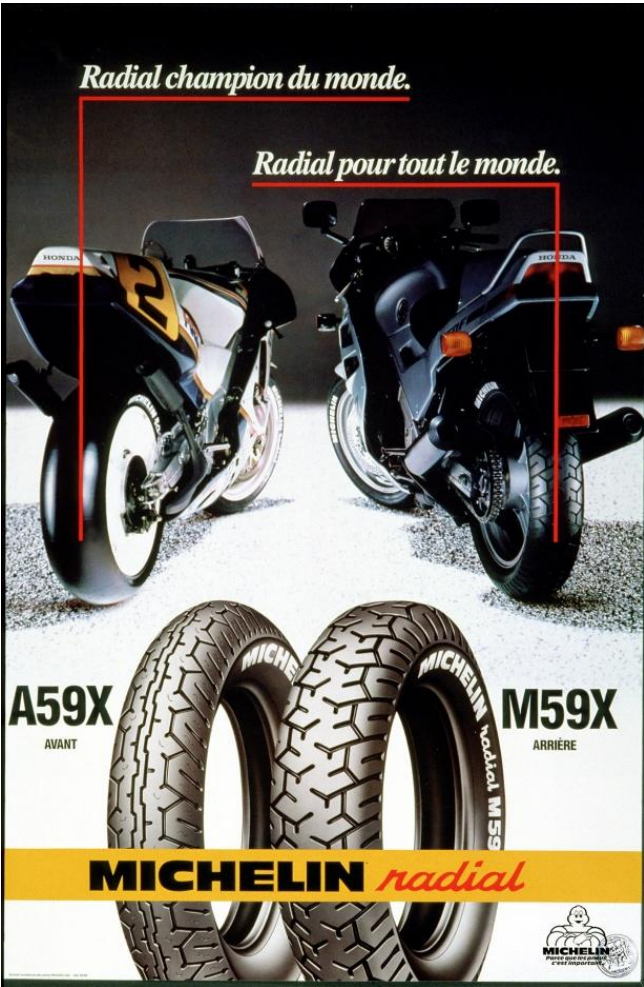
The Michelin Group has always maintained ties between its racing-tire and street-tire development teams. Racing is used as a laboratory for validating innovations at the highest level before integrating them into series-produced tires. The MICHELIN radial motorcycle tire introduced in 1987 was developed in this way (see illustration below).

One of the particularities of the Michelin Group is in its organization and the way teams work together. Over time, technological gateways between racing and street tires have been built up and reinforced. This approach structures both research programs undertaken by development teams and the teams themselves. By validating innovations in extreme conditions of use, sharing feedback from the field, testing products in international races,



holding regular debriefings and using a common technical language, synergies are developed that make it possible to more fully understand tire performance.

The organization energizes the work process since teams conduct a test session the day after each race. Some circuits have features and conditions that are beneficial to the development of series-produced tires. This long-term vision fosters innovation to serve the general public, with the goal of responding more effectively to the needs of amateur riders increasingly in search of superior performance and precision. These work methods were used for the MICHELIN Power Cup and MICHELIN Power Slick, which were designed and developed to deliver outstanding performance, grip and handling.



The MICHELIN X Radial motorcycle tire, today and tomorrow

Twenty-five years after the first radial motorcycle tire was brought to market in 1987, these products hold a substantial share of replacement tire markets. In 2012, they accounted for 58% of unit sales in Europe and 32% in North America.

History is moving forward and the trend toward radial technology is continuing.



For Michelin, 2013 will see the launch of four other important new tire ranges for road bikes. It's a special year as it represents the first time that so many new MICHELIN tires are being introduced in such a short time. The new tires will cover a broad range of motorcycles that are used differently, including supersport models, small utility bikes, roadsters and on- and off-road motorcycles.

MICHELIN
POWER SUPERSPORT



Designed for sports bikes, the **MICHELIN Power SuperSport** is intended for use on both road (50%) and track (50%).

FRONT	Width	Height	Diameter	Load Index	Speed Index	TL/TT
	120	70	17	58	(W)	TL

REAR	Width	Height	Diameter	Load Index	Speed Index	TL/TT
	180	55	17	73	(W)	TL
	190	50	17	73	(W)	TL
	190	55	17	75	(W)	TL
	200	55	17	78	(W)	TL

MICHELIN
PILOT POWER 3



The **MICHELIN Pilot Power 3** is designed for roadsters and sport bikes. Primarily intended for road use (85%), the new tire can also deliver an exciting ride on the track.

FRONT	Width	Height	Diameter	Load Index	Speed Index	TL/TT
	120	60	17	55	(W)	TL
	120	70	17	58	(W)	TL

REAR	Width	Height	Diameter	Load Index	Speed Index	TL/TT
	160	60	17	69	(W)	TL
	180	55	17	73	(W)	TL
	190	50	17	73	(W)	TL
	190	55	17	75	(W)	TL

**MICHELIN
ANAKEE III**



A multipurpose tire for large trail bikes, the **MICHELIN Anakee 3** delivers enjoyment whether riding alone or in pairs. Its design represents a real breakthrough compared to existing standards in this tire category and reflects changes in the latest generations of large trail bikes.

FRONT	Width	Height	Diameter	Load Index	Speed Index	TL/TT
	100	90	19	57	H	TL/TT
	110	80	19	59	V	TL/TT
	110	80	19	59	H	TL/TT
	120	70	19	60	V	TL/TT
	90	90	21	54	H	TL/TT
	90	90	21	54	V	TL/TT
	90	90	21	54	S	TL/TT

REAR	Width	Height	Diameter	Load Index	Speed Index	TL/TT
	120	90	17	64	S	TL/TT
	130	80	17	65	S	TL/TT
	130	80	17	65	H	TL/TT
	140	80	17	69	H	TL/TT
	150	70	17	69	H	TL/TT
	150	70	17	69	V	TL/TT
	170	60	17	72	V	TL/TT

**MICHELIN
PILOT Street Radial**



The **MICHELIN Pilot Street Radial** is the latest addition to the radial tire lineup for small motorcycles (250 to 400 cc). Bikes this size can be found throughout Southeast Asia, South America and Europe.

FRONT	Width	Height	Diameter	Load Index	Speed Index	TL/TT
	110	70	17	54	H	TL/TT

REAR	Width	Height	Diameter	Load Index	Speed Index	TL/TT
	130	70	17	62	H	TL/TT
	140	70	17	66	H	TL/TT

MICHELIN
Pilot Street



The **MICHELIN Pilot Street** is intended for small utility motorcycles.

It is ideally suited to day-to-day use in urban and suburban areas. The tire demonstrates the Group's commitment to renewing its entire offering to enhance mobility for a wide array of users around the world.

FRONT	Width	Height	Diameter	Load Index	Speed Index	Standard / enhanced	TL/TT
	90	80	17	46	S		TL/TT
	100	80	17	52	S		TL/TT
	110	70	17	54	S		TL/TT
	2.75	-	18	42	P		TL/TT

REAR	Width	Height	Diameter	Load Index	Speed Index	Standard / enhanced	TL/TT
	80	100	14	49	L	REINF	TT
	100	90	18	56	P		TL/TT
	130	70	17	62	S		TL/TT
	140	70	17	66	S		TL/TT
	90	90	18	57	P	REINF	TL/TT

FRONT / REAR	Width	Height	Diameter	Load Index	Speed Index	Standard / enhanced	TL/TT
	80	90	16	48	S	REINF	TL/TT
	80	90	17	50	S	REINF	TL/TT
	80	90	14	46	P		TL/TT
	90	80	14	49	P	REINF	TL
	90	90	14	52	P	REINF	TL/TT
	80	80	14	43	S	REINF	TL
	2.50	-	17	43	P		TT
	100	80	14	48	P		TL/TT
	110	80	14	59	P	REINF	TL/TT
	60	100	17	33	L		TL/TT
	60	90	17	30	S		TT
	70	90	14	40	P	REINF	TL/TT
	70	90	17	38	S		TT
	70	90	17	43	S	REINF	TL/TT

Michelin Group: Milestones

For more than a century, MICHELIN has dedicated all its expertise and innovation to enhancing mobility for motorists around the world.

- **1889:** Creation of **Michelin et Cie**.
- **1891:** Michelin files its first patents for removable and repairable tires.
- **1895:** Michelin introduces **Éclair**, the first car fitted with pneumatic tires.
- **1898:** Birth of **Bibendum**, the Michelin Man.
- **1900:** First **Michelin guide** published.
- **1905:** Introduction of a new Michelin **tread with hobnails** to improve tire grip and durability.
- **1910:** First 1:200,000-scale Michelin **road map** published.
- **1913:** Michelin invents the **removable steel wheel**.
- **1923:** First **low-pressure car tire** (2.5 bar).
- **1926:** Michelin creates its first **Green Guide for tourists**.
- **1930:** Michelin files a patent for the **integrated tube tire**.
- **1938:** Michelin introduces **Metalic, the first truck tire with a steel casing**.
- **1946:** Michelin invents the **radial tire**.
- **1959:** Michelin introduces the first radial tire for earthmovers.
- **1979:** The Michelin radial tire wins the Formula 1 championship.
- **1981:** The MICHELIN Air X is the first radial aircraft tire.
- **1987:** The MICHELIN A59X and M59X are the first series-produced radial motorcycle tires.
- **1989:** Michelin launches the first online travel itinerary service, on France's Minitel teletext network.
- **1992:** Launch of the fuel-efficient MICHELIN ENERGY™ tire.
- **1993:** Michelin invents the new C3M tire manufacturing process.
- **1995:** The US space shuttle lands on Michelin tires.
- **1996:** Michelin invents the vertically anchored PAX System tire.
- **1998:** The first Michelin Challenge Bibendum, the leading international clean vehicle event.
- **1998:** The Michelin Man's 100th birthday.
- **2000:** The Michelin Man elected best logo of all time by an international jury.
- **2001:** Michelin brings to market the world's largest earthmover tire.
- **2003:** Launch of a range of MICHELIN brand automotive accessories.
- **2004:** New corporate signature introduced: "**Michelin, a better way forward**".
- **2004:** Launch of the MICHELIN XeoBib, the first agricultural tire that operates at a constant low pressure.
- **2005:** Michelin provides tires for the new Airbus A-380 aircraft – Launch of the MICHELIN Power Race, the first dual-compound racing tire approved for road use.
- **2006:** Michelin revolutionizes the motorcycle tire segment with the MICHELIN Pilot Power 2CT, the first dual-compound series-produced tire.
- **2007:** Launch of the new MICHELIN ENERGY™ Saver tire, which reduces fuel consumption by nearly 0.2 liters per 100 kilometers, thereby lowering CO₂ emissions by 4 grams per kilometer.
- **2009:** 100th edition of the MICHELIN guide France.
- **2010:** Market launch of the MICHELIN Pilot Sport 3 and MICHELIN Pilot Super Sport tires.
- **2011:** The MICHELIN Pilot Road 3 motorcycle tire integrating MICHELIN XST (X-Sipe Technology) is introduced. Combining sipes and wells, its highly innovative tread breaks the film of water on the road and increases drainage capacity to deliver the grip conditions found on roads that are practically dry.
- **2013:** Michelin will launch four new motorcycle tires, including the MICHELIN Pilot Street Radial.

Michelin Group: Key Figures

Founded:	1889
Production base:	69 manufacturing sites in 19 countries
Number of employees:	115,000 worldwide
Technology Center:	More than 6,000 researchers on three continents: North America, Europe and Asia
Annual R&D budget:	€592 million
Annual output:	176 million tires produced, over 10 million maps and guides sold in more than 170 countries, and 875 million itineraries calculated by ViaMichelin
2011 net sales:	€20.7 billion