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**MICHELIN PRO4**  
innovation and performance

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# Overview

## The MICHELIN PRO4: the bicycle tyre which pushes out the envelope on all fronts

Throughout the Group's 120-year history, the successive challenges that Michelin's research specialists and developers have been led to face have been overcome by transforming each difficulty into an innovation.

The challenge in the case of the MICHELIN PRO4 was to produce a range of tyres that were capable of going more quickly. But that wasn't all. For three years, Michelin's engineers also worked to push out the performance envelope on several seemingly irreconcilable fronts at the same time.

The new family of Michelin PRO4 road tyres for exacting cyclists comprises four products:

- MICHELIN PRO4 Endurance,
- MICHELIN PRO4 Service Course,
- MICHELIN PRO4 Comp Service Course,
- MICHELIN PRO4 Comp Limited Service Course.

The quest for maximum efficiency for these different forms of cycling served as the cornerstone for each one of these four innovative tyres.



As the only point of contact between the bike and the ground, tyres need to cover all the different conditions that cyclists are likely to encounter, from dry to damp and wet road surfaces. For example, the **MICHELIN PRO4 Service Course improves cornering speed\* in the wet by 16 percent**. In addition to delivering enhanced speed and safety, it also provides outstanding protection against cuts and features new dual-compound technology. **As a consequence, the MICHELIN PRO4 Service Course considerably extends tyre life\*\*** and stands out as a new benchmark.

Meanwhile, the **rolling efficiency of the MICHELIN PRO4 Comp Service Course has been increased by an average seven percent\*\*\*** over its predecessor to deliver unprecedented performance.

It is this balanced performance package which characterises Michelin's approach when it comes to research and development. Indeed, the fact that an improvement on one front is never achieved to the detriment of another is a hallmark of Michelin's innovations.

\* 25.6kph at a lean angle of 27.5 degrees for PRO4 compared with 22kph and an angle of 21 degrees in the case of PRO3 Race (test carried out round Michelin's 56-metre circumference circular test track using a special Michelin test bicycle).

\*\* Results based on input from 25 different riders. In total, the tyres which underwent testing covered more than 250,000km.

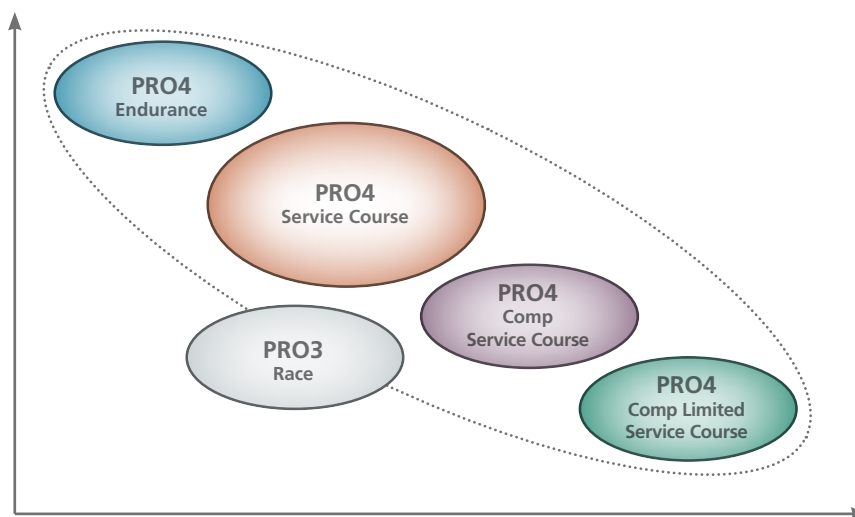
\*\*\* At a speed of 15kph, the MICHELIN PRO4 Comp Service Course uses seven percent less energy (22.4 watts compared with 24.7 watts) compared with the PRO4 Service Course

# Technology

## MICHELIN PRO4: a range of four tyres for exacting cyclists

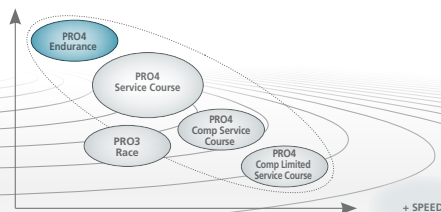
The MICHELIN PRO4 range comprises four different tyres and has been tailored to cover the different needs of exacting cyclists, from the quest for high performance in all types of conditions, to an exclusive, fast and extremely lightweight tyre for against-the-clock competition.

+ ROBUSTNESS



+ SPEED

+ ROBUSTNESS

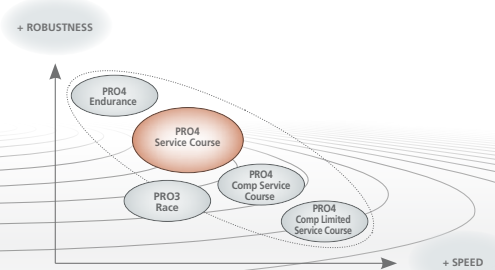


## MICHELIN PRO4 Endurance: longer tyre life and enhanced protection

This tyre was designed to meet the needs of riders who place the emphasis on endurance. Thanks to its **reinforced protection** against punctures and cuts, the MICHELIN PRO4 Endurance combines high performance with outstanding durability.

The performance of the MICHELIN PRO4 Endurance stems from the combination of several innovations:

- Its dual-compound tread is designed to ensure exceptional resistance to wear and enhanced grip when leaning through corners. The grey, yellow and blue compound employed for the shoulders provides a very high level of grip on wet roads, while the compound used for the central part of the tread delivers greater protection against punctures and impact damage.
- The combination of the 110TPI casing and bead-to-bead breaker ply ensures outstanding resistance to perforation and contributes to the tyre's remarkable durability.



### MICHELIN PRO4 Service Course: performance in all circumstances

The MICHELIN PRO4 Service Course delivers the best trade-off between sports performance and long tyre life. The achievement of the engineers is to have simultaneously enhanced its speed, safety, agility and resistance.

The MICHELIN PRO4 Service Course is **not only safer but it is also an average 16 percent faster when cornering on wet road surfaces\***.

These improvements were achieved thanks to its optimised dual-compound technology which features:

- Wider lateral bands for optimal grip at all angles of lean,
- New compounds incorporating new elastomers and silica for extra grip at the shoulders.

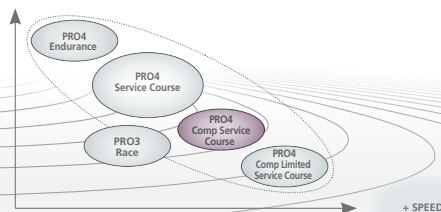
The tyre's new, more pointed profile optimises the contact patch when leaning into corners for extra grip, as well as **enhanced agility**.

At the same time, the specific compounds employed by the latest dual-compound technology provide superior rigidity for the central part of the **MICHELIN PRO4 Service Course's** tread band – the part of the tyre which is exposed to the biggest constraints – **for even longer tyre life**.

Finally, the **MICHELIN PRO4's resistance to cuts**, thanks to the presence of a nylon high-density breaker beneath the tread, considerably reduces the risk of perforation.



+ ROBUSTNESS



### MICHELIN PRO4 COMP Service Course: the emphasis on rolling efficiency

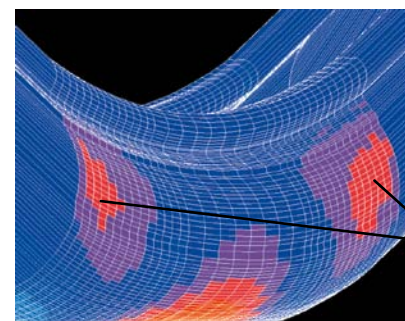
This tyre targets exacting cyclists who place the emphasis on rolling efficiency. As a consequence, the new MICHELIN PRO4 COMP Service Course delivers unprecedented **rolling efficiency which is an average seven percent superior\* to that of the MICHELIN PRO4 Service Course.**

This remarkable result is due to the tyre's new 150TPI casing (600 threads/dm). As a consequence, the casing is 30 percent lighter, while the tyre's overall weight has been reduced by 10 percent compared with that of the Michelin PRO3 Race. The new tyre's total weight is just 180g and its rolling resistance is consequently extremely low at 3kg/t.

In addition to this unprecedented level of rolling efficiency, the MICHELIN PRO4 COMP Service Course delivers exceptional grip in the wet (**cornering speed in the wet up 16 percent**), while its **agility and durability are also of a very high standard for this type of tyre.**

These improvements are due to four different innovations:

- The MICHELIN PRO4 COMP Service Course's new dual-compound technology incorporates new elastomers and new silica-based compounds,
- The contact patch is optimised thanks to the tyre's remarkably supple casing. The use of less dense threads enables this tyre to take irregularities in the road surface in its stride,



23-622 PRO4 COMP  
50daN load – inflated  
to 8 bars inflation pressure

3D view of the  
tyre's deformation

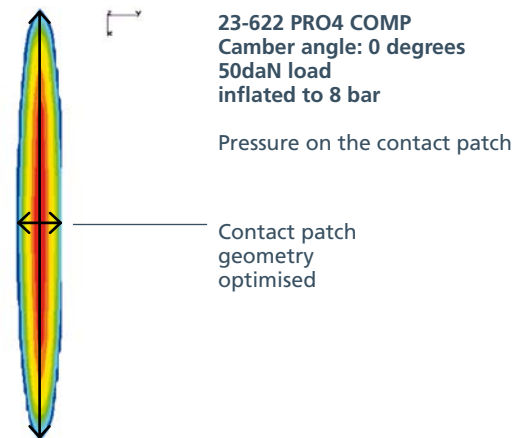
Less energy is lost through  
tyre deformation thanks  
to the new fabric



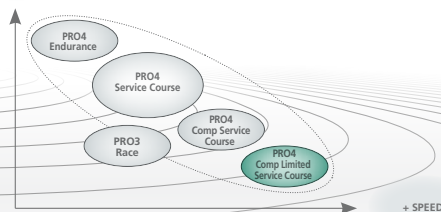
- A high-density nylon breaker laid beneath the tread considerably enhances the MICHELIN PRO4 COMP Service Course's resistance to cuts,



- The tyre's new, more pointed profile optimises the contact patch for even more agile performance.



+ ROBUSTNESS



## MICHELIN PRO 4 COMP Limited Service Course: for extra speed

This tyre is exclusively given over to the quest for extra speed. It is the range's fastest tyre and allows cyclists to cover **four additional metres per minute** for the same input compared with the **MICHELIN PRO4 Service Course**. Acceleration of 250 watts over a period of 60 seconds enables the tyre to cover 544 metres and reach 38.4kph. **It also delivers the market's lowest rolling resistance (2.8kg/t), for a weight of just 165 grams.**

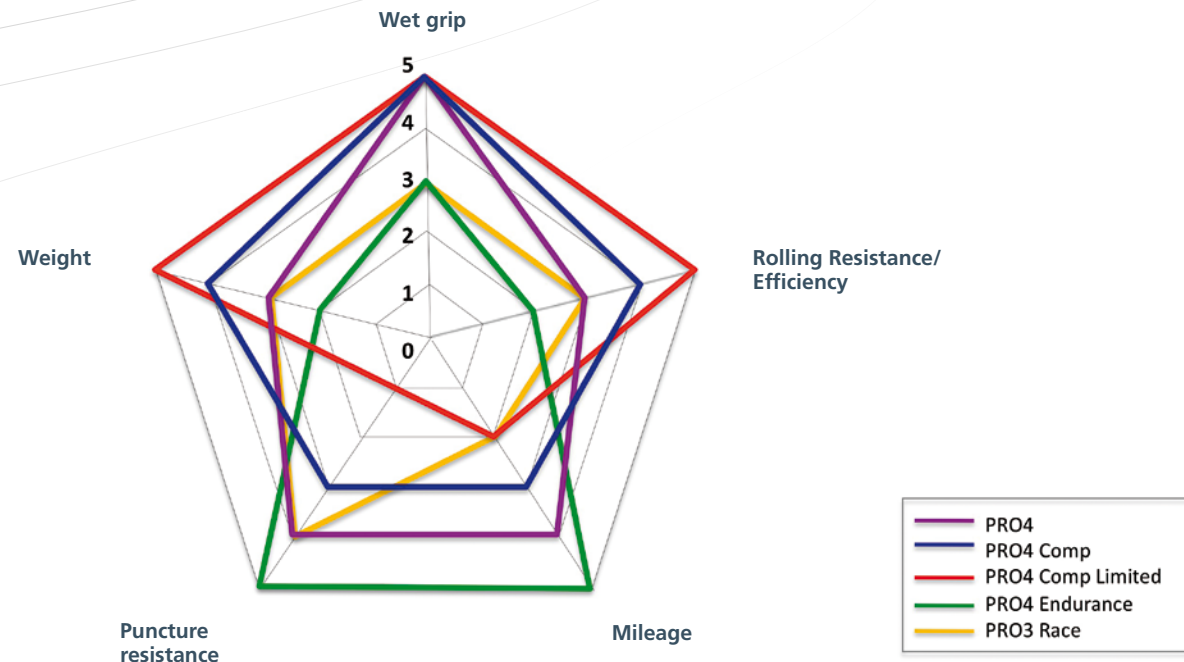
Yet this performance does not detract from the remarkable grip and handling that are hallmarks of the tyres that make up the range.

Its dual-compound technology employs new silica-based compounds and elastomers. The compound used for the central part of the tread has been selected for long tyre life and low rolling resistance, while the compounds used for the shoulders favour grip as the rider leans through corners.

Finally, the contact patch of the MICHELIN PRO 4 COMP Limited Service Course is optimised thanks to the tyre's supple casing. The use of finer threads enables it to soak up irregularities in the road surface.


\* Tests carried out using a Michelin rolling resistance measuring rig.

**MICHELIN PRO4: the choice for cyclists looking for unrivalled performance**




# The MICHELIN PRO4 Line-up

## MICHELIN PRO4



Availability	Name	Bead	ETRTO	Dimensions	Weight (g) +/- 7%	TPI	Min-Max pressure (in bar)	Inner Tube	Puncture resist. reinforcement	Colors
Q1 2012	PRO4	TS	23-622	700X23C	200	110	6.0-8.0	A1	■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■
Q1 2012	PRO4	TS	20-622	700X20C	200	110	6.0-8.0	A1	■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■
Q1 2012	PRO4	TS	25-622	700X25C	200	110	6.0-8.0	A2	■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■
Q1 2012	PRO4	TS	23-571	650X23C	200	110	6.0-8.0	B1	■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■

## MICHELIN PRO4 Comp



Availability	Name	Bead	ETRTO	Dimensions	Weight (g) +/- 7%	TPI	Min-Max pressure (in bar)	Inner Tube	Puncture resist. reinforcement	Colors
Q1 2012	PRO4 COMP	TS	23-622	700X23C	180	150	6.0-8.0	A1	■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■

- Digital Blue
- Dark Blue
- Black
- Ivory
- White
- Pink
- Red



### MICHELIN PRO4 Endurance

Availability	Name	Bead	ETRTO	Dimensions	Weight (g) +/- 7%	TPI	Min-Max pressure (in bar)	Inner Tube	Puncture resist. reinforcement	Colors
Q1 2012	PRO4 ENDURANCE	TS	23-622	700X23C	225	110	6.0-8.0	A1	■	■ ■ ■
Q1 2012	PRO4 ENDURANCE	TS	25-622	700X25C	225	110	6.0-8.0	A2	■	■



### MICHELIN PRO4 Comp Limited

Availability	Name	Bead	ETRTO	Dimensions	Weight (g) +/- 7%	TPI	Min-Max pressure (in bar)	Inner Tube	Puncture resist. reinforcement	Colors
Q1 2012	PRO4 COMP LIMITED	TS	23-622	700X23C	165	150	6.0-8.0	A1		■



- Grey
- Black
- Yellow
- Red

# The accent on **innovation**

## **Research and innovation are two fundamental features of the MICHELIN PRO4 range**

Research and development have always been essential driving forces at Michelin, and the MICHELIN PRO4 range has benefited extensively from this philosophy. Thanks to this new range of cycling road tyres, Michelin intends to maintain its number one status both in this domain as well as in the field of mobility solutions. In 2010, a budget of €545 million was allotted to the Michelin Group's Technologies Centre.

Throughout the company's history, the bid for innovation and research into new technologies that are of genuine benefit to customers have been at the heart of Michelin's strategy. These innovations serve to meet the needs of the users of its products and also to shape mobility in the future thanks to safer tyres which make less of an impact on the environment.

The scope of these activities is extremely broad and extends from an understanding of fundamental chemical and physical phenomena to the creation and evaluation of prototype products, not to mention production feasibility. The availability of research facilities on three continents ensures a thorough understanding of local usages. It also facilitates collaboration work with top independent research laboratories and permits technical partnerships that bring complementary skills to the table.



The development of the MICHELIN PRO4 range called for no less than three years of research, plus hundreds of tests for each of the range's tyres which involved covering some 250,000km. It was in France, at the Ladoux Technology Centre near Clermont-Ferrand (which was created in 1965 and which employs a staff of 3,400), that all the research, innovation and testing work took place. Subjective and objective testing, both on rigs and on the test track, played an essential role during the development of the new Michelin Pro4 range, with each performance factor evaluated separately. This testing programme ensured a detailed understanding of the tyres' functional properties and allowed the engineers to evaluate their rolling resistance, their grip on both dry and wet roads, their resistance to cuts and their durability. To this end, Group's bicycle tyre department used advanced and, in some cases, purpose-designed tools.

#### \*Lateral grip on wet road

Michelin developed this unique three-wheeled bike to test lateral grip in the wet, i.e. through corners. The third wheel, added for safety purposes, can be set at an angle of between 20 and 40 degrees. The aim of the test was to measure the maximum possible lean angle on wet roads. A patent has been registered for this apparatus.

#### \* Rolling resistance

It is this patented rig which Michelin uses to measure the rolling resistance of the different tyres produced by the Group (cars, trucks, bikes, etc.). The extremely precise results it delivers played a key role in the development of the MICHELIN PRO4 range. Tyres are placed on a drum while load and pressure are carefully controlled. The deceleration of the drum is measured as pressure is applied to the tyre. The rolling resistance coefficient indicates the energy lost because of the tyre: the lower the figure, the more efficient the tyre.

The tyre was submitted to other tests in the course of its development, including its resistance to cuts and tearing, its durability and ozone testing.



# A little bit of **history**

## The same philosophy for 120 years

Ever since the very early days of bicycle tyres, Michelin has stood out as a pioneer. Today, in 2011, the philosophy that drives the Michelin Group hasn't changed, as illustrated by the new MICHELIN PRO4 range.

Michelin's history dates back more than 120 years to 1889 when brothers André and Edouard Michelin laid the foundations for what would become a formidable human and industrial adventure, with the focus on innovation to facilitate modern means of transport, promote freedom and stimulate economic growth.

The first bicycle tyre dates back to 1891. The Michelin brothers were visionaries who caught the majority of their contemporaries off-foot.

The strength of their idea lay in the fact that it enabled a punctured inner-tube to be replaced in just 15 minutes, using mechanical means without the need to call on a specialist... It was a removable tyre which anybody could repair...

The Michelin brothers applied for three patents for their removable, repairable tyre in the summer of 1891, including one that was registered less than a month before the start of the celebrated Paris-Brest-Paris road race which was an unprecedented 1,200km in length.





Even more worried than the bicycle manufacturers, André and Edouard Michelin inspect French racer Charles Terront's bike to verify one last time the rims for which they have adapted their invention, the Michelin "removable" tyre. The two brothers are the only people who believe in the tyre, which is about to make its official debut.

Exactly 71 hours and 18 minutes after the start, Charles Terront crossed the finish line to win the inaugural Paris-Brest-Paris race by a margin of almost nine hours over his closest rival. "The winner tells us that he owes his success to his tyres," it was reported in the papers the day after Terront's victory.

In 1892, another event allowed Michelin to showcase the efficiency of its removable tyre: the "Course aux Clous". On a course that ran from Paris to Clermont-Ferrand, Edouard Michelin had nails placed on the road to ensure the success of his riders who were competing on removable tyres that could be changed in three minutes. For the first time, competitors were able to benefit from a technical support service during the competition.

**In 2011, the Aventure Michelin exhibition covers this 120-year history in the form of a temporary display in its reception hall. The display will run from July 11 until August 21 (10am-7pm). Entry is free of charge.**

# An overview of the **Michelin Group**

## Key figures

Founded	<b>1889</b>
Production facilities	<b>72 factories</b> in <b>19 countries</b>
Number of employees	<b>111,000</b> worldwide
Technology Centres	<b>More than 6,000 research staff</b> working on three continents: North America, Europe and Asia
Annual R&D budget	<b>More than €500 million</b>
Annual production	<b>Approximately 175 million tyres</b> , more than <b>10 million maps and guides</b> marketed in <b>more than 170 countries</b> . <b>More than 875 million itineraries</b> calculated by ViaMichelin
Net sales (2010)	<b>€17.9 billion</b>

## A broad portfolio of brands to cover all the market's different segments:

Michelin, BFGoodrich, Kleber, Uniroyal, Riken, Taurus, Kormoran, Warrior, Pneu Laurent, Recamic, Michelin Remix, Euromaster, TCI Tire Centers, Euromaster, TyrePlus.

To find out more about the history of the Michelin Group, visit **L'Aventure Michelin**.  
News and practical information can be found at  
**[www.laventuremichelin.com](http://www.laventuremichelin.com)**

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