Press Release

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1952 – 2012: Michelin celebrates the 60th anniversary of the X Radial truck tire

The Michelin X Radial truck tire is celebrating its 60th anniversary.

Patented in 1952, the tire represented nothing less than a revolution for the transport industry.

This innovation marked the second major phase in the shift to radials, following the patent filed in 1946 for a radial car tire, which quickly became known by its generic name: X.

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… to 2012: For 60 years Michelin has leveraged its expertise to serve truckers

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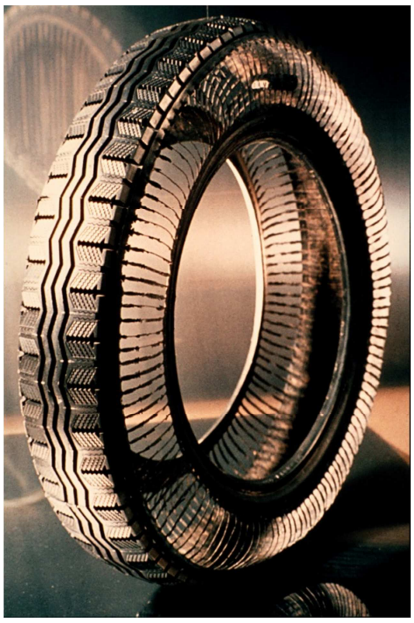
MICHELIN
A better way forward

1. A brief history of the 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, it had design limits that tire manufacturers could clearly see. Its resistance to high speeds and to heat build-up posed a problem 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 to have a great future.



The fly cage, the first radial tire prototype

(photo: 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. However, 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 all its qualities. This happened 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 in had tested for its new Lincoln Continental Mark III, chose 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 also created the first radial tire for aircraft. 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 tire 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.

2. Helping to rebuild the world with the radial tire

Michelin does not innovate just for the sake of innovation. Today, as when it was founded, Michelin is always firmly focused on promoting better, safer, more efficient mobility while enhancing driving enjoyment and, already in the past, protecting the environment.

In the decade following the end of World War II, the world was being rebuilt and the need for mobility was increasing at an exponential rate.

Road traffic in France was on the rise. In 1950, just 2,500 kilometers of the country's roads were traveled by more than 2,500 vehicles a day. That level of traffic density could be seen on 6,300 kilometers of roads in 1955 and 13,200 kilometers in 1960[1].

Between 1955 and 1960, traffic increased by 36% on major secondary roads, 56% on national roads and 70 to 80 %[2] on highways.

Today's consumer society was emerging, meaning that more and more goods had to be transported – and not only goods, but people as well. The goal of a public transit company is not just to carry more passengers but also to transport them faster, more safely and on buses with more seats. This represented a major challenge not only for the transport vehicles but also for their tires. For example, the average distance travelled daily by a bus in the Bordeaux's CITRAM public transit system increased from 98 kilometers in 1938 to 155 kilometers in 1950 and 169 kilometers in 1961. At the same time the buses themselves became larger, increasing from an average of 24 seats in 1934, to 39 in 1950 and 43 in 1961[3].

As roads were being used more and more, vehicles had to be made safer and – even at the time – more fuel-efficient.

These developments demonstrated the value of the X radial tire for truck and bus operators as it delivered a range of benefits that enabled them to clearly optimize their profitability.

Compared with a conventional cross-ply tire, the MICHELIN X Radial offered a host of advantages, including:

- Superior road-holding.
- Enhanced resistance to cuts and scrapes.
- Increased longevity.
- Greater driving comfort.
- Reduced fuel consumption.
- Lower total cost of use.

[1] Source: Bib Revue no. 343, 1963.
[2] Source: Bib Revue no. 343, 1963.
[3] Source: Bib Revue no. 334, 1963.

3. Factual proof

Michelin has always preferred to demonstrate the validity of its innovations through factual analysis rather than through marketing messages. As early as 1891, a Michelin tire won the Paris-Brest cycling race and in 1895, Éclair, a car fitted with Michelin tires, took part in the 1,200-kilometer Paris-Bordeaux-Paris race.

The same fact-based approach was used to convince potential users of the superiority of the X Radial truck tire. Michelin offered a large number of transport operators the opportunity to test[4] the X Radial tire and compare it to the conventional cross-ply tire in real conditions of use.

One of these tests was conducted on December 17 and 22, 1962[5] by the Cipierre transport company, based in Thiviers, France. It involved driving two Berliet TLM10 trucks loaded with nearly 40 cubic meters of boards some 435 kilometers towards Paris. One truck was equipped with conventional cross-ply tires[6] and the other with the new Michelin X radials.

On the outbound portion of the trip, the Berliet fitted with the conventional tires consumed 212.95 liters of fuel while the other, equipped with MICHELIN X Radials tires, consumed only 175.9 liters. The difference was also substantial for the return trip: 211.05 liters versus 190.1 liters. Overall, fuel consumption was reduced by 6.76 liters per 100 kilometers, a savings of 13.87% with the Michelin X Radial tires, compared with the conventional cross-ply tires.

The truck drivers said they preferred the X Radial tire because it provided clearly superior comfort and road-holding as well as other performance benefits. For example, the Berliet truck equipped with Michelin X Radials was able to climb certain hills in third gear while its counterpart fitted with cross-ply tires had trouble going up the same slope in second gear.

The degree of continuity in Michelin's approach may seem striking today. A full 20 years before the first oil crisis and 40 years before vehicle fuel-efficiency became a major societal issue, Michelin was already aware that its technological capabilities and superior products made it possible to improve overall tire performance in several areas simultaneously. Already in the past – and still today – safety, comfort, longevity and fuel-efficiency could all be improved, with no trade-offs needed.

Logically, many of the tests and trials were conducted in France, helping to ensure the success of the highly innovative X Radial truck tire. Among the many customer testimonials received were[7]:

- René Courtin, from Angers, who reported a fuel savings of 12%.
- Mr. V. Rapp, from Remering in eastern France, who reported that his truck covered 480 kilometers with 150 liters of diesel fuel and a 20-liter jerry can on X radial tires and that when he returned from his round, there were still 16 to 18 liters of fuel in the tank.

[4] In France alone, over 230 series of tests were carried out with transporters. Source: Bib Revue no. 344, 1963.
[5] Source: Bib Revue no. 344, 1963.
[6] For all its tests, Michelin compared its new Michelin Radial X tire with a same-size conventional, cross-ply Michelin tire.
[7] Source: Bib Revue no. 344, 1963.

- Mr. Arlabesse, from Saint-Affrique, who measured his fuel consumption accurately and said that using Michelin X tires had enabled him to reduce his fuel consumption from 32.30 liters to 30.90 liters per 100 kilometers.
- Mr. A. Cabanel, also from Saint-Affrique, who said he reduced fuel consumption by 8 to 10%, representing a savings of 1.75 old French francs per kilometer.
- The Lelièvre transport company in Mazingarbe, in northern France, which reported that previously for trips from their warehouses to Strasbourg in eastern France, the trucks needed to be refueled in Phalsbourg, 50 kilometers from their destination. However, once the trucks had been fitted with Michelin X Radial tires they were able to complete their journey to Strasbourg without refueling.

Thanks to word-of-mouth advertising and the undeniable, fact-based benefits delivered by the new tires, the transport industry quickly began to shift to radials.

4. From different advertising campaigns around the world to a truly global campaign

In the early 1950s, Michelin was already a global enterprise, producing and distributing its tires in many countries. Prior to 1950, Michelin had operations throughout Europe, as well as in North America, Argentina and Vietnam. Bibendum, the Michelin Man, was already well known and widely used in the brand's advertising. Tests identical to those carried out in France, were conducted in other countries, always with the goal of convincing potential users through fact-based proof of the superiority of Michelin's tires, as demonstrated in normal conditions of use. In Italy[8], for example, a series of 57 tests involving 3,794 participants and covering 6,582 kilometers showed that the Michelin X Radial truck tire reduced fuel consumption by 9.6%.

From the outset, Michelin has always created powerful, attractive advertising campaigns, such as the 1901 posters proclaiming *Nunc est Bibendum* – "Michelin tires drink (i.e. 'absorb') obstacles." The benefits of the Michelin X Radial truck tire were showcased on advertising posters around the world In Arab, Finnish, Flemish, English, Portuguese, German, Spanish and many other languages, thereby helping to expand awareness of the Michelin brand and the quality of its products.

With nearly 100 % recognition[9] in Europe, North America, Russia and China, the Michelin brand is known and appreciated worldwide. Delivering safety, reliability, longevity, energy efficiency and services, the Michelin brand inspires confidence that generates tire purchases and builds user loyalty. Today, the Michelin brand is worth an estimated $3.4 billion[10].

Voted the best logo of the 20th century in 2000, the Michelin Man gained further recognition in 2011, when he joined the world's most famous brands on the Madison Avenue Advertising Walk of Fame in New York.

[8] Source: Michelin advertisement, circa 1963.
[9] Brand Health Tracker, 2011.
[10] Brand Finance Global 500, 2011.

5. The radial truck tire, today and tomorrow

The Michelin X Radial truck tire has totally transformed the road transport industry and incited other manufacturers to pursue the same path. Michelin is proud of this innovation, which has helped to make the road transport industry safer and more efficient. Today, it can be said that the worldwide market is shifting to radial tires, even if the situation varies from one region to another, each of which is faced with its own economic realities. Michelin estimates that the percentage of radial truck tires in 2011 was as follows;

- **Worldwide: 73%**
- Western Europe: 100%
- Japan and South Korea: 98%
- North America: 97%
- China: 80% (up from 61% in 2007)
- South America: 74% (up from 55% in 2007)
- Africa (including North Africa) and India: 43%
- Eastern Europe and Russia: 43% (up sharply from 21% in 2007)
- Southeast Asia: 33% (up from 27% in 2007)

Not satisfied to simply be a pioneer, **Michelin continues to innovate with the goal of providing a comprehensive response to the major challenges facing the transport industry**.

What are these challenges? In an unsettled, competitive economic environment in which business is down sharply, transport companies have two main concerns:

1) To ensure the robustness of their business with reliable vehicles capable of protecting the merchandise carried and meeting their customers' requirements.
2) To lower their main expense items, in particular by reducing fuel consumption as well as maintenance and repair costs.

Michelin is deploying **an end-to-end strategy that focuses on three aspects of its new tire ranges**. Innovation plays a key role in this solution, not only with regard to tires but also for services.

- A comprehensive solution to make **trucking safer**. The new MICHELIN Truck tires deliver enhanced grip, endurance and resistance to cuts and scrapes. This means greater safety for both people and merchandise. At Michelin, innovation is underpinned by the ability to simultaneously improve different areas of performance.
- A comprehensive solution to make **trucking more cost-effective**. Michelin is addressing this issue from all angles: fuel savings, total mileage and the "multiple lives" of a tire. This cost-effectiveness results from improvements in different areas of tire performance that are generally hard to reconcile.
- A comprehensive solution to support **sustainable development**. At Michelin, tire performance and manufacturing performance go hand in hand. Regarding tire performance, greater fuel efficiency means less CO_2 and fewer tire casings to cover a given distance (thanks in particular to InfiniCoil technology) As for manufacturing performance, Michelin tires are produced in ISO 14001-certified plants.

When MICHELIN Technology Center teams design a new tire and plant operators manufacture it, the focus is always the same. MICHELIN tires need to ensure outstanding performance in different areas. They must deliver superior safety, maximum total mileage and greater fuel-efficiency.

For Michelin, the challenge is to simultaneously improve performance in several areas, including grip, tread life, durability, damage resistance and fuel efficiency. Michelin's strength resides in its ability to never sacrifice performance in one area to improve it in another. That's why MICHELIN tires deliver total performance, which is their hallmark.

Achieving this performance combination requires leading-edge technology, which is backed by an annual research and development budget of €592 million.

It's also the result of solid commitments. The MICHELIN radial tire first produced 60 years ago is one illustration. Twenty years ago, the Group's research and development teams entered a new era by designing truck and car tires capable of reducing fuel consumption – and consequently carbon emissions – without affecting other key tire properties, such as safety and total mileage.
More recently, trucking companies have been provided with two important innovations:

- The MICHELIN X-One, an extra-wide tire that replaces dual-mount wheels and reduces fuel consumption. More than one million of these tires have already been distributed.

- The communicating tire that features an RFID[11] chip and a TPMS[12] sensor. The new tire is intended to improve fleet maintenance operations by optimizing two areas of performance previously considered to be irreconcilable: time-savings on one hand and enhanced safety and traceability on the other.

For Michelin, "A Better Way Forward" expresses a constant, ongoing commitment.

[11] Radio Frequency Identification: a system for transmitting data via radio waves.
[12] Tire Pressure Management System: an information system that monitors tire pressure and temperature, and enables the data to be transmitted to an electronic sensor.

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 the **MICHELIN Sole** 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 X Air is the first radial aircraft tire.
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: Michelin Man voted best logo of all time by an international jury.
2001: Michelin brings to market the world's largest earthmover tire.
2003: Launch 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 truck tires with MICHELIN Durable Technologies.
2007: Launch of the new MICHELIN ENERGY™ Saver tire, which reduces fuel consumption by nearly 0.2 liters per 100 kilometers, thereby lowering carbon emissions by almost 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.
2012: Launch of the MICHELIN Primacy 3 tire in Europe.
2012: European launch of two new high-performance winter tires, the MICHELIN Pilot Alpin and MICHELIN Latitude Alpin.
2012: European launch of the **new MICHELIN ENERGY™ Saver+ and MICHELIN Agilis+ tires**.

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