

Q&A FOR UPTIS PROTOTYPE

at Movin'On 2019

1. What is the Uptis Prototype and what advantages does it offer?

The UPTIS Prototype (the acronym stands for “**Unique Puncture-proof Tire System**”) is an assembled **airless wheel structure**. Uptis has been made possible through Michelin’s expertise and mastery of of HIGH-TECH MATERIALS. It is also an evolution of Michelin’s expertise in TWEEL technology. It can be thought of as the first in a new generation of airless solution. This technology, now available for passenger vehicles, offers a number of advantages:

- Car drivers feel safer and more secure on the road since the dangers of flat tires and blowouts are eliminated.
- Fleet owners and professional vehicle drivers optimize their business productivity (no downtime from flats, near-zero levels of maintenance).
- Raw material use is reduced, which in turn reduces waste.

2. What is the strategy behind the Uptis Prototype?

The Uptis Prototype represents Michelin’s and General Motors’ vision for the future of mobility. Michelin illustrated its vision of sustainable mobility through the Vision concept, which the Group unveiled at Movin’On in 2017.

Uptis shows how the Group is adhering to its roadmap for research and development, which comprises these four main pillars of innovation: Airless, Connected, 3D-printed and 100% Sustainable (i.e., renewable or bio-sourced materials).

With its airless Uptis Prototype, the Group demonstrates **that its vision of future mobility is an achievable dream**.

Intended as a mainstream product as early as 2024 and developed in collaboration with General Motors, Uptis marks the **first fundamental step** in the Group’s journey toward achieving its sustainable development model.

3. How is Uptis different from Tweel?

Uptis is the first in a new generation of Tweel technology.

The Uptis Prototype is derived from the MICHELIN Tweel technologies and shares some design concepts in common — a tire-wheel assembly, “spokes” that carry the load and a shear beam outer ring, among others.

Although Uptis outwardly resembles Tweel, its structure and materials represent a technological breakthrough. These innovations replicate the functions of a traditional tire, without the inflation pressure required to achieve the target performances. The Uptis Prototype is re-engineered for handling and maneuvering at highway speeds, whereas



current Tweel applications can bear a car's weight but handle only at much slower speeds. Simply put, Uptis is tuned for the requirements of passenger vehicles, Tweel is not.

Tweel was introduced in 2004 and industrial production started a few years later. Michelin has achieved a 10-year-plus advantage in its abilities to manufacture these technologies at scale for mainstream passenger-vehicle applications. Without Tweel, Uptis would not be here today.

4. Why was General Motors selected as a partner?

Together, Michelin's and GM's long-term development ambitions are tightly aligned. Today, GM is a leader in a new transformation, one that will create a safe and smarter world, and GM's ambitious plan of zero crashes, zero emissions and zero congestion drives every decision the company makes. Together, Michelin and GM are leading the automotive sector in this direction.

5. How does this fit with GM's Zero-Zero-Zero strategy?

Each year, 20 percent of drivers suffer an air loss, causing crashes, large amounts of tire waste and congestion on the roads. Over 99 percent of these issues will be eliminated with an airless wheel assembly.

6. Is GM an exclusive partner?

GM is the first OE manufacturer with a joint research agreement to advance the development of the Uptis Prototype. Michelin is excited about the "first-mover" opportunities the partnership creates. Michelin is evaluating a very limited number of other partnerships allowed within the context of the first agreement with GM.

7. Which GM vehicles will include Uptis?

Michelin and GM are testing the Uptis Prototype beginning this summer on a fleet of Chevrolet Bolt EV vehicles (as seen at the Movin'On Summit this year in Montreal) in Milford, Mich. No decision has been made at this stage for other vehicles.

8. Will drivers notice the difference between Uptis and a standard tire?

It's not likely. Uptis improves the vehicle's performance without compromising comfort in any way. Uptis performances are comparable to a zero-pressure tire.

A standard pneumatic tire and wheel typically weighs nearly 21 kg, while a mounted zero-pressure ("run flat") mounted can weigh up to 23 kg. The Uptis Prototype assembly's current design weighs about 22.5 kg.

Uptis can also yield overall vehicle weight reductions by removing the need for a spare tire, jack or tire pressure monitoring systems that exist in most vehicles today.

9. In what respect is Uptis sustainable?

Airless technology makes the Uptis Prototype impervious to flats and blowouts. When applied to large-scale production (unlike other airless products intended for limited applications), this characteristic means Uptis offers significant potential for reducing the use of raw materials and waste, as it ...

- reduces the number of punctured tires that are scrapped before reaching the end of their life cycle;
- reduces the use of raw materials, energy for production and emissions linked to the manufacture of spare tires that are no longer required;
- lasts longer by eliminating irregular wear and tear caused by over- or under-inflation;
- reduces dangers related to flats and blowouts (losing control of the vehicle or stopping on the roadside to replace a flat tire).

Based on internal research, Michelin projects that Uptis airless technology could prevent premature scrapping of up to 200 million tires a year worldwide — a material savings roughly equivalent to the weight of 200 Eiffel Towers!

Above all, it is a product particularly well-suited to new forms of mobility — connected, autonomous, shared and electric — that require near-zero levels of maintenance.

10. When is this Uptis Prototype expected to be in market?

Michelin and GM expect the Uptis solution will be operational and available as an option for select GM models as early as 2024.

11. What markets is Uptis focused on?

The automotive industry is going through a revolution that can be summed up in a simple acronym: C.A.S.E, for Connected, Autonomous, Shared and Electric. Michelin believes that future mobility will inevitably converge toward large fleets of shared vehicles.

The Uptis airless design dispenses with the need for regular maintenance, pressure checks and checks for punctures or other damage, which makes it ideal for the vehicles of tomorrow, from self-driving shuttles to all-electric and shared-service cars, whose occupants would not be expected to replace a flat tire.

The most obvious target market segments for Uptis focus on fleet applications, especially autonomous passenger fleets or urban fleets that transport high passenger volumes.

Although Uptis is an ideal solution for these new forms of mobility, its range of possibilities is much broader — including immediate improvements in safety and efficiency for global markets where flats occur at higher rates. Professionals and individuals will also have access to this solution as it goes on the market.