

Airless Tire Technology is a Game Changer for the U.S. Army

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In 2019 an U.S. Army team took an airless tire on a trip to the Amazon rainforest to test the technology on the U.S. Army's Light Tactical All-Terrain Vehicles (LTATV) to see how it would hold up in extreme conditions. While sleeping in an austere CONEX encampment (aka "Resort") and trying to avoid the myriad of hazardous flora and fauna, the team was surprised by how well the airless tire held up to the challenge.

But this came as no surprise to Nathan Kamprath, Special Systems & Components Tire Engineer with the U.S. Army Combat Capabilities Development Command (DEVCOM) Ground Vehicle Systems Center (GVSC), who says the Army has been looking into the benefits of airless tires for many years and the advantages are numerous.

"The number one reason to use the airless tire technology is puncture survivability," Kamprath says. "Unlike pneumatic tires, the airless tires can keep going potentially for hundreds of miles when compromised. Also, the unit wouldn't have to carry spare tires into expeditions and the airless tires can withstand severe and unique environmental conditions. Consequently, these tires can help keep our Soldiers out of harm's way, and for that, they're a real game changer."

In addition, airless tires are not susceptible to air leaks or low-pressure issues such as increased fuel usage or safety hazards.

Airless tire technology has been around in some form since 1999 and has become popular with lawn service equipment, recreational vehicles, light construction equipment, and commercial-industrial vehicles that operate in rugged conditions where pneumatic tires are susceptible to flats. The airless tire replaces current pneumatic tire and wheel assembly and is easily bolted on to existing hubs without the need of unique mounting. There is no air pressure to maintain due to the patented poly-resin spoke technology.

Utilizing the Commercial Technologies for Maintenance Activities (CTMA) Program, GVSC partnered with Michelin Tweel Technologies to demonstrate and evaluate the benefits of using the airless tire technology on some of the Army's vehicles.

From the 2019 test, and input from several other involved stakeholders, the industry partner conducted an engineering analysis and is redesigning the tires to better accommodate traction, payloads, handling characteristics, and operational limits specific to the Army's needs.



Caption: Airless Developmental Test in Suriname—obstacle crawling deflection.

The airless tire can potentially have increased wear life over traditional pneumatic tires.

“This reduces vehicle maintenance down time and the chance of a tactical vehicle becoming non-operational, while also limiting waste,” Kamprath says

In the second phase of the initiative, tire prototypes are being developed to undergo preliminary testing at Michelin’s lab facilities and proving grounds using new materials and designs based on the initial testing and engineering analysis results. In 2022, the developed improved airless tires are scheduled to be mounted on a new LTATV Special Forces vehicle model and will make the trip back to U.S. Army Tropic Regions Test Center (TRTC) in Suriname for further evaluation by a seasoned team from TRTC (TRAX International Corp), GVSC, and Michelin.

The Army sees a lot of potential with this technology for other vehicles, such as the HMMWV, Infantry Squad Vehicle (ISV), and future autonomous vehicles at later stages. The results of this initiative may also contribute to airless tires being adopted by the commercial sector.

“With the advent of autonomous vehicles, there will be no driver to change a flat tire,” says John Duty, Senior Product Development Engineer with Michelin Tweel Technologies. “The airless tire may be the solution of the future.”