

INVEST IN THE SMART TIRE COMPANY

# World's first high performance airless tire made from space-age materials @ NASA

PITCH VIDEO INVESTOR PANEL



[smarttirecompany.com](http://smarttirecompany.com)

Los Angeles CA



Main Street

Technology

Hardware

Hard Tech

Science

OVERVIEW

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WHAT PEOPLE SAY 318

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## Highlights

- 1 12+ years research and \$10M+ invested in this NASA technology, originally designed for Mars missions
- 2 Strategic partnership & collaborations with Felt Bicycles and Spin Mobility (Ford Motor Company)
- 3 3x patents licensed: superelastic, radially stiffened shape memory alloy, tubular SMA tires
- 4 Addresses the \$250B global tire market, from bikes to off-road, automotive, trucking and aerospace
- 5 Space Act Agreement between The SMART Tire Company and NASA Glenn Research Center
- 6 Inventor is a 2x R&D 100 Award Winner ("the Oscars of Innovation")

- 7 Eco-friendly alternative: tire industry produces more than 50 billion pounds of toxic waste annually
- 8 Invented, developed, and manufactured in the USA

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## Our Team



**Earl Cole** CEO

A senior executive, entrepreneur and producer, who studied business & entrepreneurship at the University of Washington and Stanford. Worked with mega brands Disney, Sony, Google, Honda, and CBS, and is the first ever unanimous winner of Survivor.

When new technology and legacy industry collide, is when disruption occurs. The tire industry is a 100+ year-old global industry that affects all of our lives. Making tires greener, longer-lasting and safer, has the potential to make a significant impact all over the world.



**Brian Yennie** CTO

A technology leader from diverse startups across education, gaming, manufacturing and blockchain, Brian studied computer science at Dartmouth College before joining his first startup at 19. Runs CelticsStrong.com to feed his Boston sports addiction.



**Calvin Young** Mechanical Engineer

Calvin Young is a mechanical engineer from Portland, OR. His passion for space exploration intersected with his love of cycling as an intern at NASA Glenn Research Center where he co-invented a new bicycle tire design based on Mars rover technology.

[SEE MORE](#)

## Reimagining the wheel, by reinventing the tire

### NASA: Tire Company?

Pneumatic (air-filled) rubber tires were first invented in the 19th century

In the 1960's, NASA began its own tire development for space exploration. You might recognize their first attempt, riding around on the moon:



Lunar Roving Vehicle



Watch later



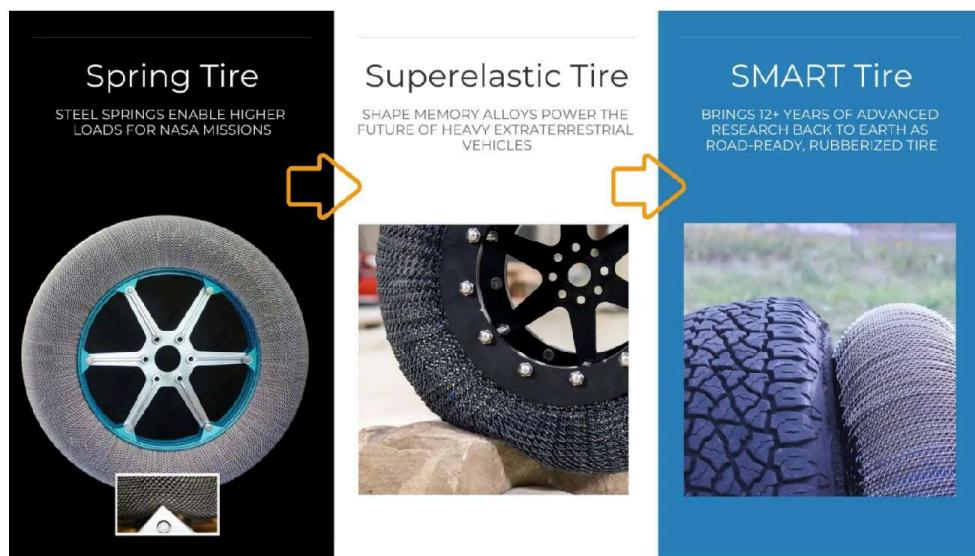
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Fast forward 50+ years and multiple rover missions, and we need the ultimate tire to put large vehicles on Mars (someday, with people on them). That's where we come in.

## Down to Earth: The SMART Tire Company

The SMART (Shape Memory Alloy Radial Technology) Tire Company was formed for the express purpose of commercializing a new category of airless tire invented for the future of space exploration. We're taking the extreme properties of this Mars-grade technology, coating it with a special rubber-like material (which work great on Earth roads), and optimizing it for all major transportation uses.



## The Master Plan

The tire industry is both deep and wide, which is why The SMART Tire Company has performed extensive research to develop our go-to-market strategy. Starting with the world's first high-performance airless bicycle tire (METL™), we plan to enter the 2-wheel market in 2022, all the while developing the advanced capabilities necessary for the automotive and trucking industries. As we scale our production capabilities and drive down costs, STC can compete with major tire companies and achieve \$1B+ in revenue within 5 years by first

capturing market share in bicycles, eBikes, scooters and mopeds and then coinciding our automotive products with the rise of EVs and autonomous vehicles (for which we are ideally suited). Interest in these products is already sky high!

#### TIMELINE (5-YEAR)



## Tire Industry Problems

Despite our best efforts, flat tires are a fact of life -- about 1 flat per driver, per year in the USA. Tire failures contributes to over 20% of roadside emergencies, and reduce fuel efficiency every day on every vehicle, as they slowly leak pressure.

The tire industry is incredibly dirty. Every year, over 50B pounds of used tires become waste. Most of this waste stream goes into landfills or is burned in enormous tire yards. 20-30% of all ocean micro-plastics come from tires.

Future applications are even more demanding. Electric vehicles carry heavier loads over longer distances, with less margin for error. An autonomous ride is useless and unsafe with a flat tire, and we will need a technology originally invented to solve exactly that problem.

Trucking & aerospace are even more demanding than consumer automobiles, and superelastic tires solve for key problems in both industries. We can save hundreds of pounds of payload on a 737 jet, or run fuel efficient double-wide truck tires without worrying about downtime for flats.

## The SMART Solution

SMART (Shape Memory Alloy Radial Technology) tires made from shape memory alloys are fundamentally different than anything available on the market today.

- **Airless tires are never flat.** Flat tires are the #1 problem in the tire industry. By removing air pressure from the equation, SMART tires are safer and require less maintenance. According to the NHTSA, there are over 11,000

tire-related crashes every year. Under inflated tires also reduce fuel efficiency in all vehicles.

- **Elastic like rubber, yet strong like titanium,** this radial design can support 20,000 lbs with a single tire, more than enough for a fully loaded semi-truck, or the landing gear of a 737 jet. This isn't the limit either; novel designs can go even farther when we need it.
- **Longer lasting & eco-friendly.** With a tire that can last the lifetime of the vehicle, we can save billions of pounds of waste, tens of billions of hours of maintenance, and increase the fuel efficiency of vehicles worldwide.

*The advantages of this type of tire are obvious. Not only does it eliminate potential issues with temperature or pressure affecting a gas-filled tire, it also eliminates the possibility of deflation.*

- Car & Driver Magazine



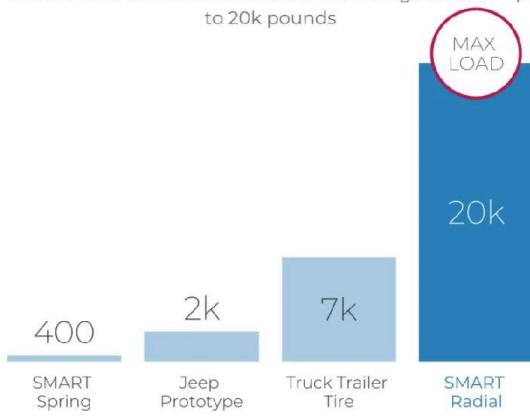
### Elastic like rubber

SMART Tires with shape memory alloys can yield to the rim with 100% recovery



### Strong like titanium.

SMART Tires can accommodate a wide range of loads up to 20k pounds



CLEAN TIRE TECH

#### REDUCE WASTE

50B lbs of tire waste comes from end-of-life tires. Longer lasting, lower rubber content, means less waste.

#### RETREAD-ABLE

Only the trucking industry focuses on retreads; all of our structural tires can be retreaded and reused.

#### REUSE RUBBER

De-vulcanized rubber sources further close the loop towards a circular tire economy.

#### INCREASE MPG

Low tire pressure reduces fuel economy across automotive & trucking, primary consumers of fossil fuels.

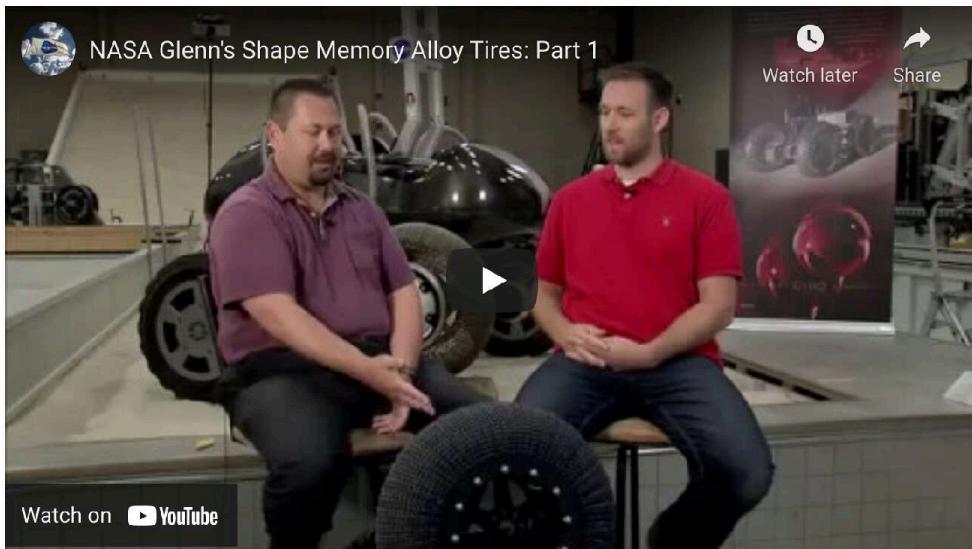
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## Technology

Born from the mission requirements at NASA, these tires were originally invented to withstand continuous use on Mars. That means operating at extreme temperatures from -200F to 200F+, never, ever going flat, remaining lightweight, and staying energy efficient.

Like many great inventions, the SMA tire was invented when two different disciplines worked together at NASA. Listen to mechanical engineer Colin Creager and materials scientist Santo Padula talk about how SMA solved the biggest limitation of steel spring tires, plastic deformation, and created a whole new category of performant tire technology:

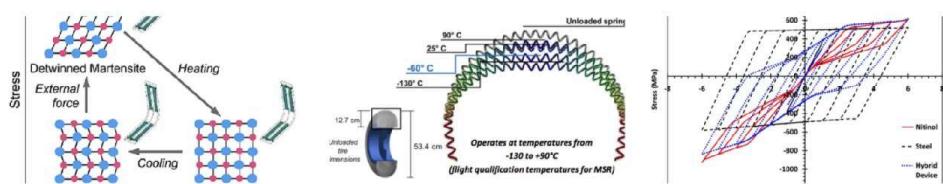


*Shape memory alloys look extremely promising in revolutionizing the entire terrestrial tire industry, and that's just the tip of the iceberg.*

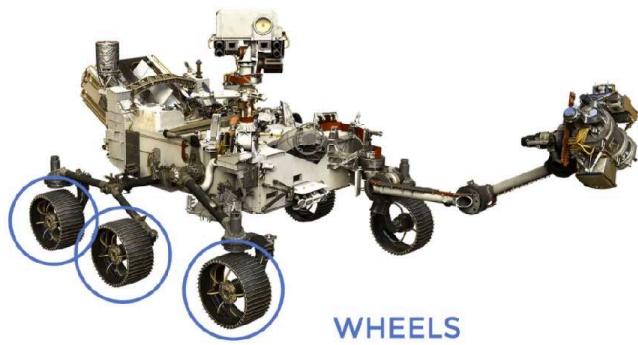
- Dr. Santo Padula II, Ph.D, 2x R&D 100 award winning inventor

What makes SMA tires so special? It's the combination of innovative structural design, with the unique properties of these alloys. Heather Oravec describes how the material actually rearranges its molecular structure instead of stretching chemical bonds in response to stress. This "superelastic" or pseudoelastic effect

is fundamentally superior to the everyday notion of "elastic" material.



On Mars, this means that NASA was able to change future rovers from a 6-wheel design back to 4. Ever wondered why the Perseverance Rover has 6 wheels?  
Because it didn't have SMA tires that could handle the terrain!



# HOW NASA REINVENTED THE WHEEL

Watch on  YouTube

## Our Team

Members of our team have 40+ years experience at NASA, 30+ at Goodyear Tire & Rubber Company, Disney, Honda, as well as prior VC-backed startup experience across multiple industries including education, gaming, manufacturing, hardware and blockchain. Collectively we've operated a global children's charity, won R&D 100 awards, supported wildlife conservation, run ultramarathons, built a variety of startup businesses, and strive to be pretty-good humans. Our combined mission is to build the next great American tire company.

With the rise of electric and autonomous vehicles to make our cities smarter, we understand that everyday and high-tech vehicles all require TIRES in order to operate. Shape memory alloys have the potential to be as disruptive as the electric car, and the most important metal alloy since the advent of steel. We're just the messengers.

### Team work

STC is a diverse dream team of entrepreneurs, engineers and dreamers dedicated to global impact.



## Elite Industry Partners

NASA Glenn Laboratory (Cleveland, OH) is situated in the heartland of American manufacturing, miles from Goodyear Tire & Rubber Company, Cooper Tires, and numerous automotive and aerospace companies. SMA tire technology was invented here as a collaboration between world-leading materials science research, and cutting-edge tire engineering. The SMART Tire Company is an official licensee of the full SMA tire technology suite, and engaged in an ongoing public/private research partnership with NASA scientists & engineers to continue developing the product.

*We're looking at shape memory alloys for the moon and Mars in tires for rovers. We have to make sure those tires are very resilient and resistant. Imagine if we can use that technology for the tires on our cars. We could avoid the risk of puncture. You probably would not need air, so the tires would be more resistant to potholes and everything. That would be of value, especially in Cleveland.*

*- Marla Perez, Ph.D, Director of NASA Glenn Research Center*

Of course, even breakthrough technology is not enough on its own. That's why we've partnered with multiple industry leaders to develop competitive products that solve real-world problems. All of our mobility partners are based in the USA and leaders in their field.

**Felt Bicycles** is a world-leader in high-performance bicycles, known for their dedication to cutting edge technologies, and the "dream bike" of many cyclists. As a strategic partner, they will contribute to the development of the first METL bicycle tire.

*At Felt, innovation and technology inspire us to create high-performance bikes. STC's tire solution shows an exciting new frontier and we're excited to offer our bikes to support their testing.*

*- Eric Sakalowsky, VP Global Marketing & E-Commerce, Felt Bicycle*



Spin Mobility (Ford Motor Company) is a micro-mobility leader owned by Ford Motor Company. Known for innovation, they are the 3rd largest rental fleet after Lime and Bird. In collaboration with STC, they will contribute to the development of electric scooter tires and eBike technologies.

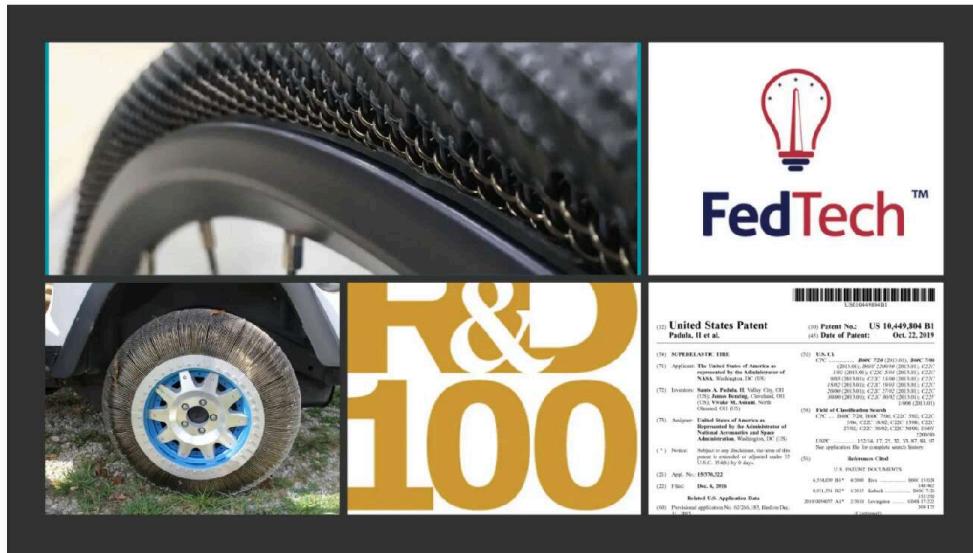
*Spin is always looking to increase comfort, the safety, and longevity of e-scooters, and to minimize environmental impacts. We are excited about the potential of METL and we are sharing our knowledge about scooter tire performance and specifications with The SMART Tire Company with the hope that they can help advance our mission to create a cleaner, safer and better transportation for all.*

*- James Berg, Research and Development Manager, Spin Mobility*



## Key Accomplishments

- Multiple NASA patents protect this innovation: Superelastic tire, Radially stiffened shape memory alloy tire, and a 3rd patent is pending.
- Developed two generations of a bicycle tire prototype, called METL™
- Radial tire prototype tested on a commercial Jeep vehicle
- Computer models show potential for aerospace
- Strategic partnerships with industry leaders
- NASA Startup Studio 1st place winners, pitch contest
- University connections to cutting-edge SMA research
- Space Act Agreement with NASA



## Business Model

Our business model is inspired by the Tesla Master Plan  
(<https://www.tesla.com/blog/secret-tesla-motors-master-plan-just-between-you-and-me>)

Whereas the overarching mission behind Tesla Motors was to transition the automotive industry from fossil fuels to solar/electric, ours is to phase out pneumatic, disposable product in favor of long-lasting, renewable shape memory tires.

We plan to do this through a systemic series of products, in our case traversing both downwards through price points and upwards into larger and more demanding markets. The STC Master Plan at a high level looks like:

- 1) Create a high-end bicycle tire that establishes the value of shape memory alloy tires, and puts it into the hands of consumers

- 2) Decrease costs and grow within the two-wheel and off-road markets to include scooters, eBikes, mopeds and motorcycles
- 3) Optimize material costs and supply chain to the point where a radial tire becomes commercially viable
- 4) Enter the automotive and/or trucking markets
- 5) Continue to reduce costs and increase capacity up to 90% since introduction
- 6) Reduce global pollution through significant market share, licensing shape memory alloy innovations as necessary to increase adoption
- 7) Save \$billions in jet fuel and emissions by replacing high-pressure landing gear, containment chambers and related equipment on commercial aircraft

## Competition

The global tire industry is highly fragmented, with the top 3 manufacturers (Bridgestone, Michelin, Goodyear) each holding less than 10% market share. No major competitor specializes in airless tires. It is our belief that a focus on elastomers (the specialty of all major tire companies, which are first and foremost rubber companies) puts them at a major disadvantage compared to SMART products.

Our technology is protected by multiple NASA patents, our own proprietary methods, and special knowledge of large scale structural engineering with SMAs.

The prevailing business model among our competitors is replacement tires, which comprise 70% of all sales. Switching to a renewable model using different materials would be a difficult paradigm shift for any of these companies. Please see our FAQ for more details about cost, and scaling the production of SMART tires.

## The Market Opportunity

The opportunities for a superior tire technology are nearly as large as the industry itself (\$250B); however, we've identified short, medium and long-term opportunities as follows (*exact timeline not guaranteed*):

**Years 1-2:** 2-wheel market (cycling, micromobility)

**Years 2-4:** mopeds, off-road, military

**Years 5+:** automotive & trucking

**Years 6+:** aerospace

Our first product, the METL™ bike tire, is purpose-built for the cycling industry

due to the higher margins, lower regulatory restrictions, and consumer appeal.

We expect METL to be ready for production in Q1 of 2022, with first units delivered to customers later that year.

## MARKET OPPORTUNITY

### TWO WHEEL VEHICLES

**\$250B**

GLOBAL TIRE MARKET

**9%**

TWO WHEEL MARKET  
SHARE

**10%**

CAGR

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### Go-to Market: Cycling and Micromobility

The first commercially available SMART Tire, is the METL™ bicycle tire, a high-performance airless tire for road, gravel, mountain and eBikes.

Cycling presents a strong opportunity to address a customer need (flat tires & constant maintenance) in the fastest growing segment of the tire industry (two-wheel vehicles). Profit margins are high, and regulatory costs are low relative to the tire industry at large.

### METL TIRE

#### 1 Made with SMA

The first metal bike tire is made from proprietary shape memory alloys

#### 2 Mars Rover Tough

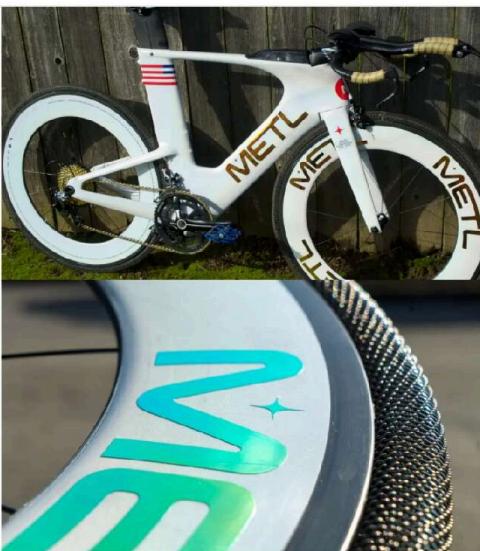
Tires last the life of the vehicle, as a mission requirement

#### 3 Smooth Like Air

The smoothest riding airless tire, creates a new category of performance airless.

#### 4 Consumer Appeal

Space age gold & metallic blue finishes make the alternatives look boring.

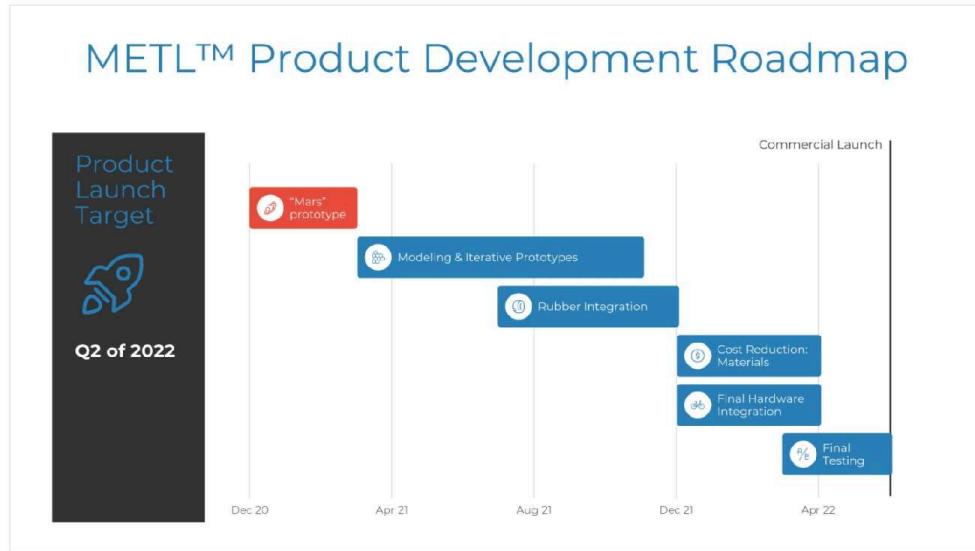


Commercialization of the METL™ bicycle tire is part of a larger multi-stage process (see "Business Plan" below) in which STC will iteratively:

- Increase the production of shape memory alloy components
- Improve our manufacturing methods with custom machinery
- Test fatigue characteristics & all-weather performance

- Gather additional real-world customer feedback

Our 12 month roadmap for METL™ is presented here:



Disclaimer: These projections cannot be guaranteed

R&D performed as part of our go-to-market will contribute as well to the next tier of products for heavier motorized vehicles, as demonstrated here on a Jeep SUV (final product will include rubber treads, driven here for comparison purposes).



## What People are Saying

Don't just take our word for it, here are just a few things people are saying about SMA tire technology:

"Although these prototypes were created for rovers to be used on missions to Mars, the technology could trickle into real-world applications here on our own planet."

**CAR AND DRIVER**

"Can withstand more deformation than any other non-pneumatic tire."

**engadget**

"No matter how many rocks it rolls over, this 'Superelastic tire' will return to its pre-deformed shape like nothing ever happened."

**Mashable**



"A viable alternative to pneumatic tires here on Earth, particularly for off-road applications."

**BUSINESS  
INSIDER**

"Mars destroys tires, so NASA reinvented the wheel by giving it a memory."

**Newsweek**



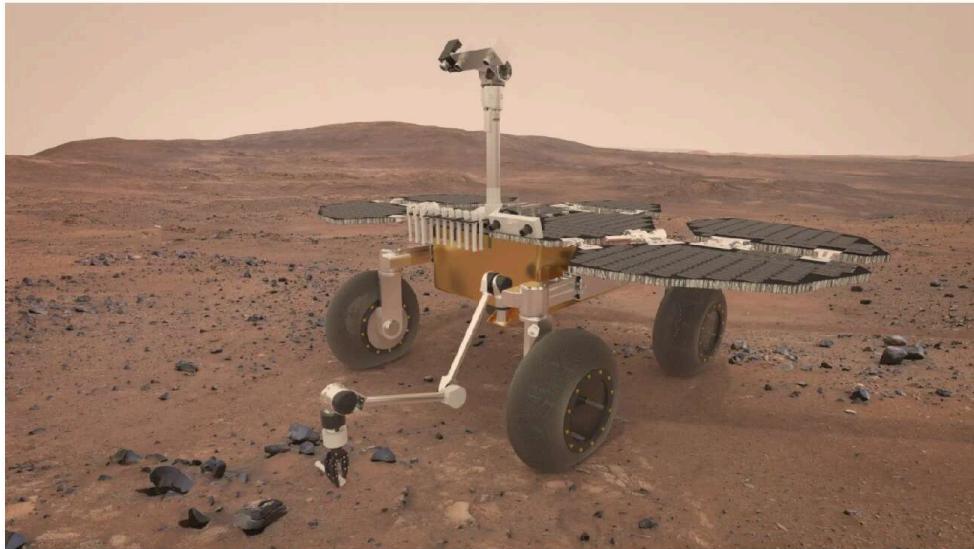
"NASA has been in constant pursuit of a better tire design for decades."

"The ultra-flexible wheel is designed to handle the Red Planet's harsh terrain."

## The Future (to Mars and beyond)

In addition to the exciting terrestrial uses for shape memory alloy tires, research & development continues in the Mars Rover program. With an expected launch date of 2026, SMA tires will debut in outer space on the Mars Fetch Rover, and become the future platform for larger vehicles. One day the first manned missions to Mars may even feature vehicles with these tires, carrying an astronaut on the first ever off-roading adventure on the Red Planet!

This also means many more years of federally funded research, that will benefit the future of all SMA tech.



## One last word

Join us! American-made, NASA-invented, eco-friendly... and backed by YOU, our amazing supporters. Help us achieve our goal of *Reimagining the wheel™* as the next great American innovation.

*We are building the next, great American tire company, for a new generation of smarter vehicles and cleaner transportation.*

To learn even more, visit <https://smarttirecompany.com>, or drop us a message at hello@smarttirecompany.com.

To join the waiting list for METL™ bicycle tires, please visit our cycling page at <https://smarttirecompany.com/cycling>

