



INVEST IN THE SMART TIRE COMPANY

Never Flat, Sustainable Tires Developed @ NASA Disrupting \$300B Global Tire Industry

smarttire.com

Akron, OH

Technology

B2B

Hardware

B2C

Minority Founder

Highlights

1 SMART Tire selected as TIME's Best Inventions of 2023

2 Hyundai Motors and Kia Official Collaboration

- 3 Current Space Industry Revenue from Multiple Global 500 Aerospace Customers
- 4 \$300B Market Opportunity in Terrestrial Tires, Key Supplier to Future \$1T Private Space Industry
- 5 15,000+ Customer Waiting List for our Groundbreaking METL™ Bicycle Wheelsets
- 6 Exclusive NASA license & 5x new Patent Pending Tire Inventions to Corner the Future Market
- 7 12+ years and \$10M+ in Government Funding and Research Invested into this Technology
- 8 Partnerships: NASA, EPA, Hyundai, Felt Bicycles, The Ohio State University, University of Akron

Our Team



Earl Cole CEO

Techstars mentor, Stanford & University of Washington business program mentor, worked with mega brands @Disney, @Honda, @Google. Proud father (x2), serial entrepreneur and unanimous Survivor champion.

Pneumatic (air-filled) tires haven't changed much in 100 years. However, NASA has been working for decades developing new tire technologies for outer space. Our mission is to bring this space age innovation back down to earth, as we usher in a new era of electric and autonomous vehicles. Safer, cleaner transportation can impact all of our lives.



Brian Yennie CTO

3x cross-industry technical founder. Previously @IDEX, @Showroom, @Newzcard.

Creator of first eco-friendly virtual world for kids. National Merit Scholar. Owner / admin @CelticsStrong.



Jim Benzing Principal Engineer

R&D 100 Award Winner, original inventor of the lunar spring tire, NASA consultant, 20+ tire patents. 43 years at Goodyear include developing production manufacturing equipment and overseeing factory rollouts on 4 continents.



Charles Weinberg Senior Engineer, Shape Memory Alloys

PhD in Mechanical Engineering from University of Minnesota. Studied structural design with shape memory alloys and co-authored papers on new nitinol applications & forms.



William Farah , Esq General Counsel, Venture Capital Advisor

Entrepreneur & lawyer. Consultant for SOS Ventures. Director @ First Step Foundation and former ATP tour tennis pro.



Karen Jones, MBA Advisor, Federal Aviation Administration

Executive MBA with 20+ years experience working for the government in supply chain logistics and employee relations. Enterprise operations for the FAA in dealing with businesses, government and labor regulations within the aviation industry.



Angela Helin Advisor & Investor

Principal Load Engineer, SpaceX



Brennan Swain Patent / IP Counsel

The SMART Tire Company



Introducing the world's first high performance, airless, and sustainable tires made from **shape memory alloys**, a space-age metal material that has its own memory. This will change everything you ever thought you knew about tires.

- **GET IN NOW:** Raised over \$1M in just 3 days into our first fundraising campaign, pre-SALES target met in just 15 minutes
- Originally invented for NASA's Mars Rover Program
- Superelastic and flexible like rubber
- Lightweight and strong like titanium (even bulletproof)
- Able to bend and stretch down to the rim, roll over nails and potholes, and instantly snap back to its original shape, unaffected
- Air-free, flat-free, integrated with rubber (50% less than standard

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tires), the ultimate, eco-friendly tire for cycling, automotive, trucking, aerospace and more

- The multiple award-winning, SMART airless tire

First developed at NASA, now brought down to Earth by The SMART Tire Company, these SMART (Shape Memory Alloy Radial Technology) tires require no air pressure, ride smooth just like pneumatic tires, feature low rolling resistance, are more fuel efficient, affordable, and can last the life of your vehicle. Plus, they look pretty cool, too!

NASA: Space Tire Company

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



The requirements were extreme. After all, the moon is a pretty harsh environment. But what has happened to that technology since? We've sent rovers to Mars, probes to deep space, but no more manned missions. Until now. With the US and other countries planning manned missions back to the Moon and someday to Mars, we're going to need

missions back to the moon, and someday to Mars, we're going to need truly incredible tires to get the job done.

Not to worry. For the past 12 years+, with over \$10M in research committed, NASA has continued developing the ultimate tire made from a shape memory alloy material called NiTiNol (*Nickel Titanium*).

Down to Earth: The SMART Tire Company

The SMART Tire Company was formed for the express purpose of commercializing a new category of airless tire invented for the future of space exploration. Starting with the extreme capabilities of this Mars-grade technology, we've developed new, patented tires designs for cycling, automotive, trucking and aerospace applications. We've also created the ultimate lunar tire, capable of carrying multiple astronauts plus cargo across the south pole of the moon as part of NASA's Artemis program (Lunar Terrain Vehicles) and CLPS program (smaller rovers).

The SMART Tire Company is disrupting an old but evergreen industry (tires) with new technology at the intersection of two rapidly emerging trillion dollar industries: electric vehicles (including autonomous) and space exploration. *Reinventing the tire™* for the new era of transportation.

Disrupting the \$300B Global Tire Industry with Space Tech





SMART Tires solve four major problems faced by every vehicle on the road, by inventing the first ever lightweight, high-performance, sustainable airless tire.

1. **Maintenance & Safety:** 200M+ flat tires every year in the US alone
2. **Fuel Economy:** fuel consumption starts at the tires (rolling resistance)
3. **Pollution:** the tire industry produces over 50B lbs of waste and 20% of ocean plastics

4. **Electric Vehicles:** EVs are heavy and increasingly rough on regular tires

How big is the opportunity? Really BIG!!

Do you remember when Michelin and Goodyear were just startups? Probably not (hint: it was the late 1800s). The tire industry is now a \$300B global market, projected to grow to \$500B over the next decade. It touches the daily lives of billions of people every day from cars and trucks, to bikes, scooters, buses, planes, agriculture, construction and more.

Space exploration is also here to stay (\$1T industry by 2030). Whether it's NASA, SpaceX, ESA or Blue Origin, the future of space includes land vehicles and rovers carrying heavier loads. SMART Tire is one of the only companies in the world developing space tires capable of these kinds of missions.

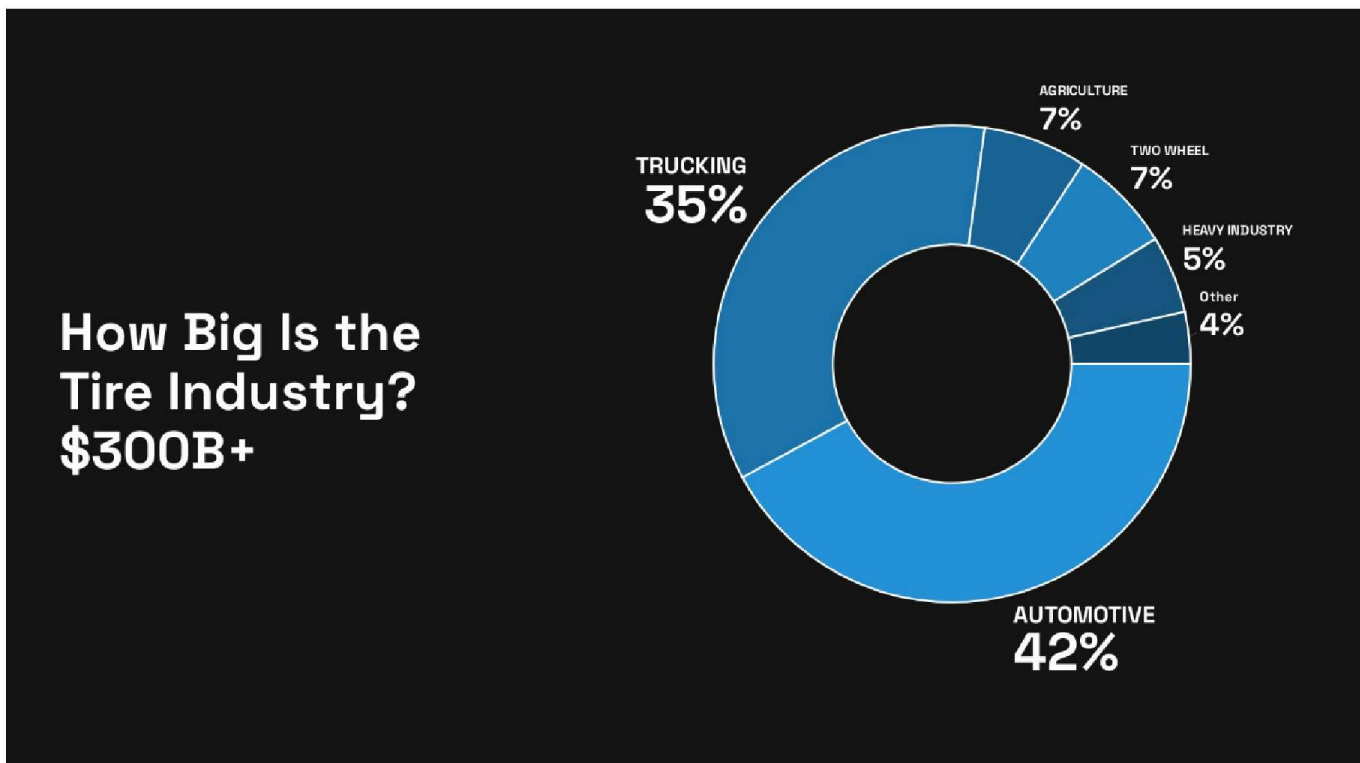




Photo: Lunar rover concept vehicle made by Leidos in partnership with NASCAR (racecar driver Bubba Wallace pictured). Tires were designed, developed & built by The SMART Tire Company in Akron, OH, USA.

Why now?

Now is the perfect time for innovation in the 100+ old tire industry. Material breakthroughs, sustainability initiatives and outdated thinking by competitors have created a unique opportunity to change transportation as a whole.

Timing is everything and shape memory alloys represent a new material revolution. No more flats, more fuel efficient, sustainable, and designed for the future of electric vehicles, autonomous vehicles, space applications AND a real game-changer within the cycling industry (to kick things off - \$10B bike tire market). From millions of casual riders and weekend warriors, to Olympic USA Cycling, Tour De France and ridesharing. What's not to love?

Why Now?

1 | Material Breakthroughs

Only possible in last 10 years; SMA performance predicted to double again in 5 years

2 | Space Race

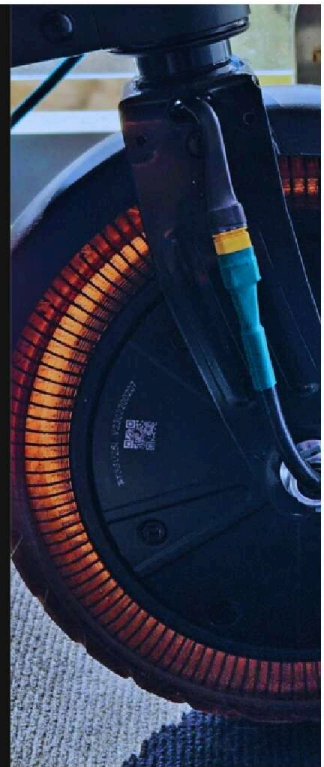
Our tires on the moon = revenue, marketing, talent acquisition, R&D benefits

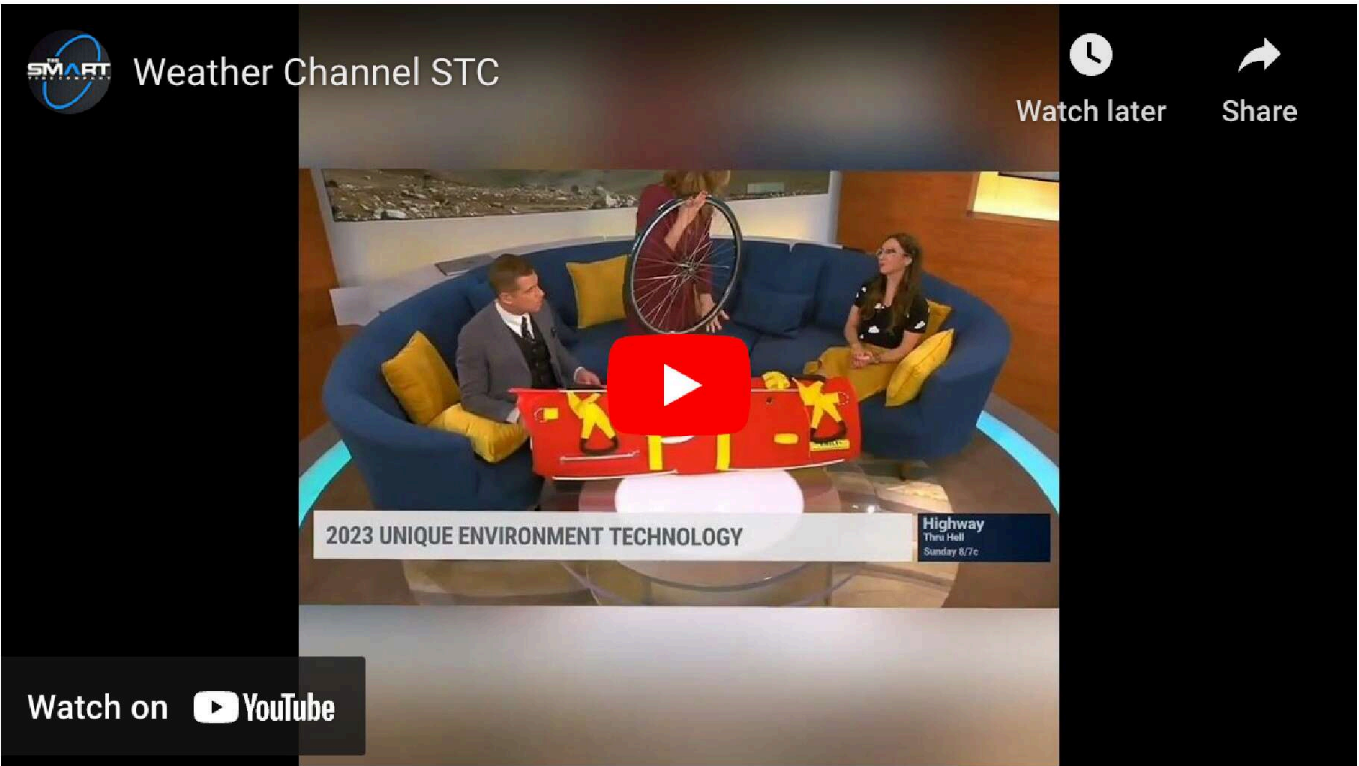
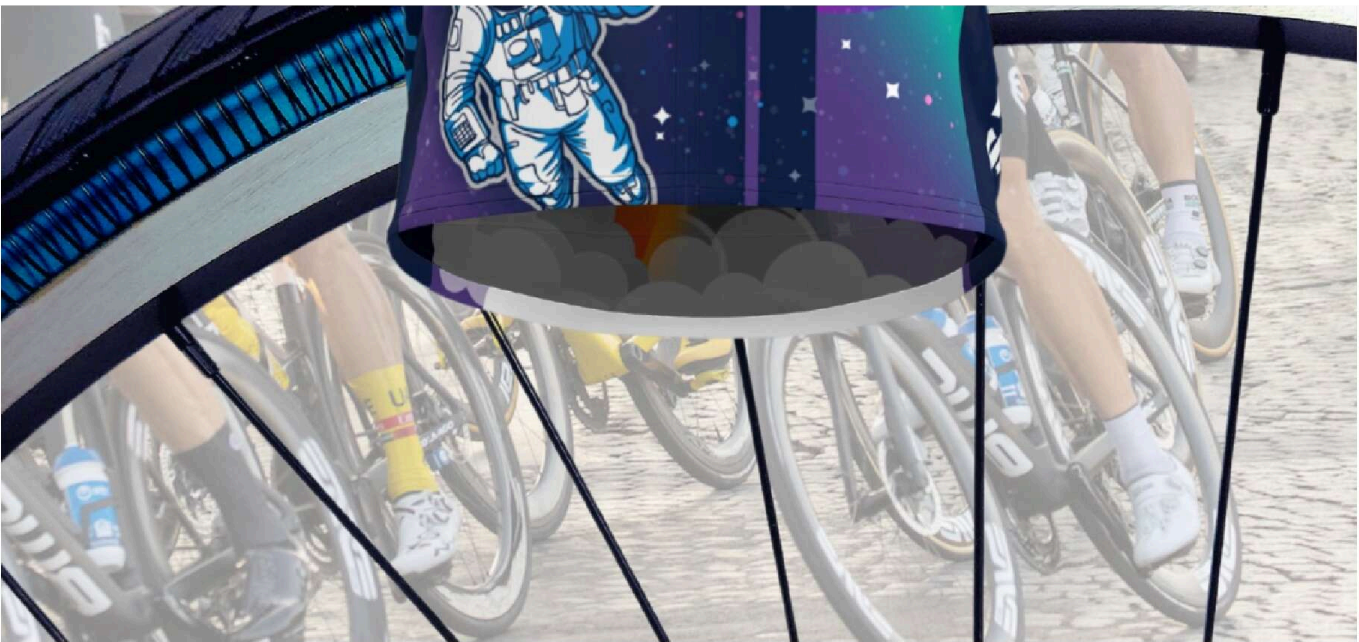
3 | Sustainability

Tires are a universally need product with zero sustainable options, sustainability is hot

4 | Industry Fragmentation

No strong market leader or technology differentiation remains





Competition

Key SMART Tire competitors include the big 4:

- 1. 🇯🇵 Bridgestone
- 2. 🇫🇷 Michelin
- 3. 🇩🇪 Continental

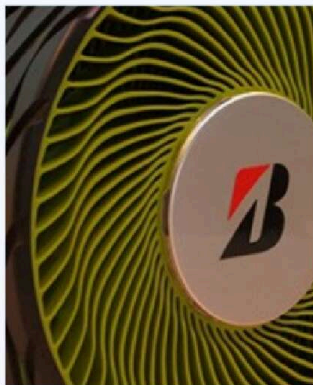
4. 🇺🇸 Goodyear

The global tire industry is highly fragmented, with the top 4 manufacturers each holding less than 10% market share. Big tire companies are in no hurry to change the old system and business model they put into place (in the early 20th century) and continue to profit from, today. They've invested *billions* of dollars in capital assets that revolve around pneumatic (air-filled) designs, with no end in sight. 70% of their business is in replacement tires, so they literally benefit off of your flats and inconvenience.

None of these companies have good airless solutions: No amount of rubber and plastic components can produce a competitive airless tire, as evidenced by 18+ years of failed attempts at this approach. SMART Tire replaces conventional materials with the power of shape memory alloys, an entirely new approach to high performance tires.



MICHELIN TWEEL/UPTIS
(2005-2024)



BRIDGESTONE AIRLESS
(2013-2024)



GOODYEAR NPT
(2021-2024)



TANNUS BIKE FOAM
(2015-2024)

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 down to -230C, never, ever going flat, remaining lightweight, and staying energy efficient.

The "superelastic" tire was invented when two different disciplines

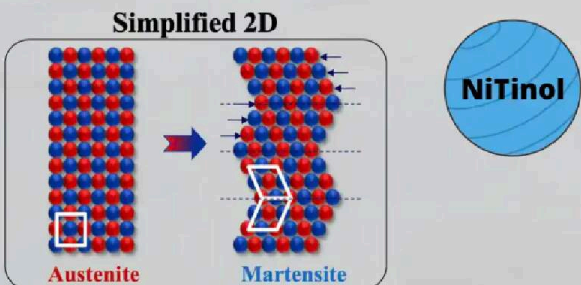
THE superelastic tire was invented when two different disciplines worked together. Having built previous extraterrestrial tires out of steel and aluminum, NASA had a problem: the tires were taking too much permanent damage from the terrain. Enter cutting edge material science: a special metal alloy (Nickel Titanium or NiTiNol) that can recover completely from the same types of deformation that were damaging the steel.

Shape memory alloys are capable of undergoing phase transitions at the molecular level with reversible strains an order of magnitude more than ordinary materials, before undergoing permanent deformation. The use of a NiTi shape memory alloy produces a superelastic tire that is elastic like rubber, yet strong like titanium.

Shape Memory Alloys: An Introduction

- ❑ Alloys that have a “memory.” These materials have the ability to remember and recover their original shapes with load or temperature.
- ❑ SMAs exhibit a solid-to-solid, reversible phase transformation capable of storing **over 30x** the deformation that can be done in an **elastic** bond stretch.

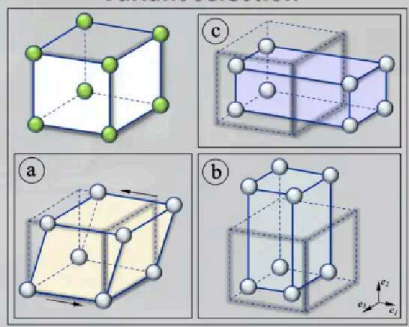
Simplified 2D



Austenite **Martensite**


- ❑ **How?**
 - ✓ Bain strain → (lattice deformation)
 - ✓ Lattice invariant shear → (accommodation)
 - ✓ **Inelastic** deformation (transient twinning) → **REVERSIBLE**

Variant selection




Microstructure

Austenite



Martensite



Courtesy of A. Garg



SUPERELASTIC MATERIALS

Shape memory alloys (ex. NiTiNol) are a superelastic metal

The main three physical causes of rolling resistance



FUEL EFFICIENT

80-95% of tire rolling resistance comes from deformation of the



STRUCTURAL DESIGN

Through a Space Act Agreement with NASA designs are



MANUFACTURING

STC has developed cost effective methods to integrate SMA

NiTi alloys are a superelastic metal that can undergo 30x the reversible strain of steel, without damaging the material. Instantly snaps back to its original shape at 100%.

Comes from deformation of the contact patch. SMA has the highest energy return of any known material.

With NiTi, designs are optimized for cost and performance. Final designs are protected by pending patents.

Methods to integrate SMA structures with wheel rims and rubber treads that are easily retreadable once worn down.

NiTiInol can be formulated into multiple colors which add to our "cool look" and aesthetic options that are possible when developing SMART tire products.

Watch this **Veritasium** feature on our SMA tire technology (12M+ views), where we ride over a bed of nails and demonstrate the incredible properties of shape memory alloys in our SMART Innovation Lab (Akron, OH), just down the road from NASA Glenn Research Center.

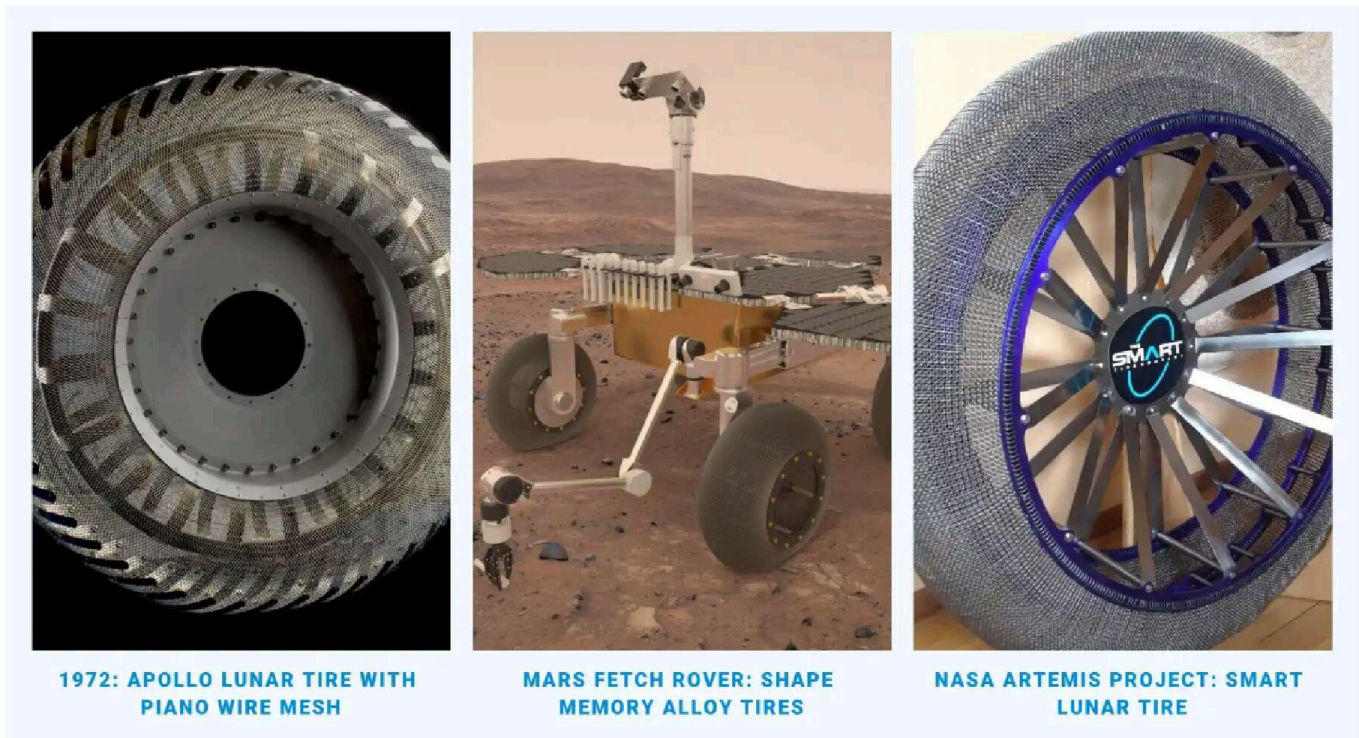


Building on these superelastic properties, the chief engineer of The SMART Tire Company is also the original inventor of the lunar spring tire, which was awarded an R&D 100 award ("the Oscars of innovation"). NASA Glenn Research Center, now collaborating with STC under a Space Act Agreement, originally developed the superelastic aspects.

The original Lunar Roving Vehicle contract was awarded in 1969 to

Boeing, and the budget was over \$302M (in 2022 USD). This kind of high tech, high budget, low volume work is a perfect revenue source for SMART Tire. The Artemis program has humans returning to the Moon as its primary objective (which will include the first woman and first POC astronauts to finally step foot there), and a budget of \$35B.

Pictured below: a SMART lunar tire built to take advantage of superelastic materials, uses a patented structural design to be the first ever "space tire" suited for heavy vehicles on the Moon and Mars.



THE SMART TIRE COMPANY

Terrestrial applications for extraterrestrial mobility innovation

The SMART (Shape Memory Alloy Radial Technology) Tire Company (STC) was formed for the express purpose of commercialising a new category of airless and highly-durable tires invented for the future of space exploration.

Starting with the extreme capabilities of Mars-grade technology, STC is developing patented designs for terrestrial tires which tackle the structural, material and environmental problems associated with conventional tires. Applications will include cycling, automotive, trucking and aerospace.

STC is a commercial licensee of NASA's superelastic tire technologies, through which it has an agreement to further develop this tire technology for commercial use with assistance from engineers and scientists at the NASA Glenn research centre in Ohio.

Heritage of the tire technology

Innovators at NASA Glenn developed the Superelastic Tire, a game changing, robust, non-pneumatic rover tire, for lunar and Mars missions. This technology represents the latest evolution of the Spring Tire, which was invented by NASA Glenn and Goodyear and inspired by the Apollo lunar tires.

NASA's revolutionary tire technology features the novel use of shape memory alloys (SMAs) capable of undergoing high strain as load bearing components. Instead of typical elastic materials, without permanent damage.

The innovative SMA used for the superelastic tire structure is called Nitinol®; a material that is elastic like rubber, but can be set to springs, providing substantial load carrying and improved design flexibility.

SMAs are superelastic in nature, meaning they can be stretched up to 30x more than conventional materials and will return to their original shape without permanent damage.

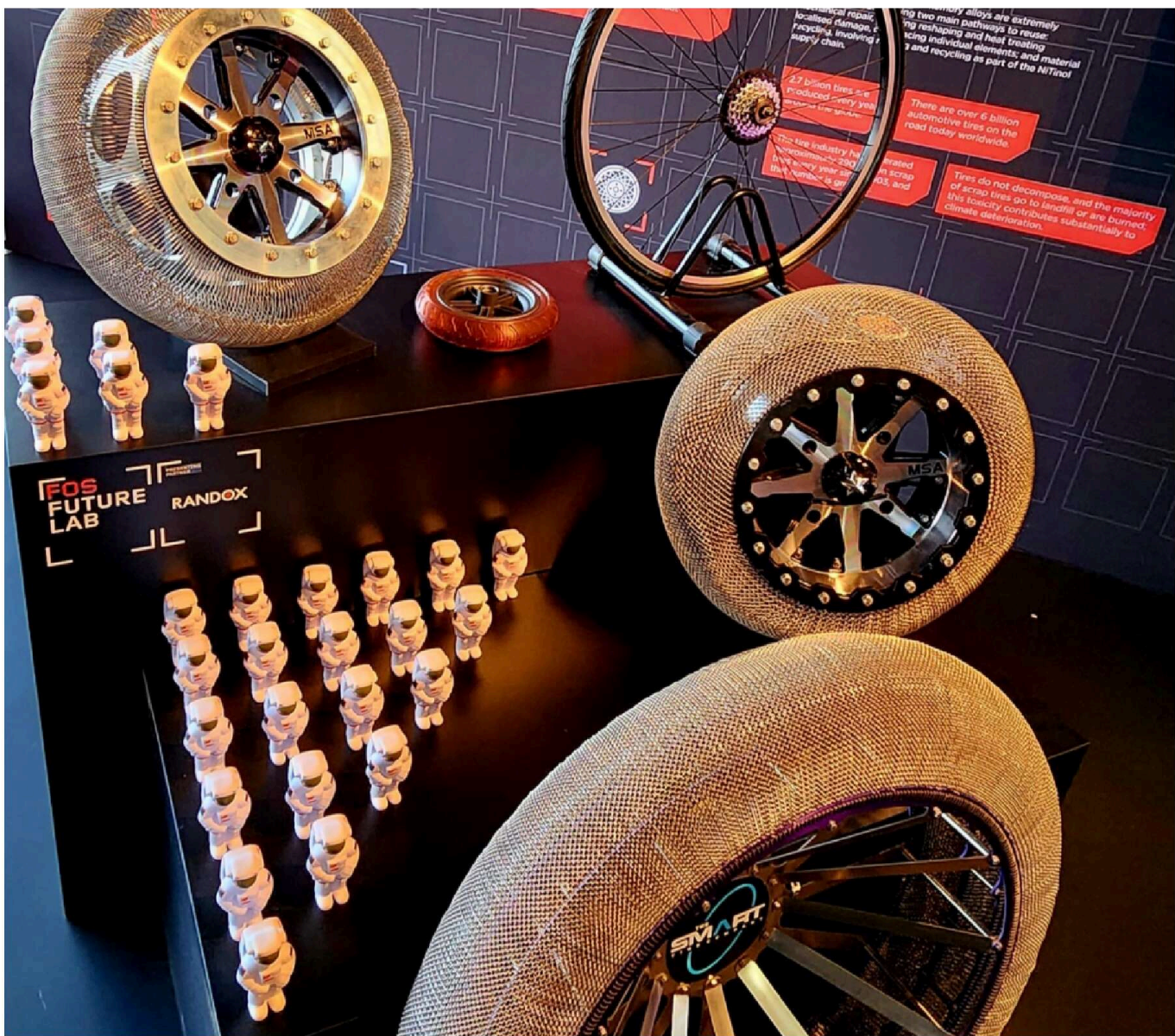
Introducing the SMART tire

The resulting SMART tire promises traction equal or superior to conventional pneumatic tires. Since the tire is airless, the risk of punctures or blow-outs is eliminated, and tire stiffness never varies. While the possibility of running is also eliminated, thereby improving vehicle fuel efficiency and safety.

Unlike lunar or Mars applications where the tires are purely metal construction, the commercial SMART tire is designed for use on the same terrain as a conventional tire, so is integrated with a rubber tread.

Probably, even with a long-lasting material solution, eventually it will wear down and need replacing; the difference is, it's re-usable. STC expects its structural tires to last for many years, which is a significant improvement over conventional tires, which typically last for a few months or less.

And while the tires are being developed, STC is also working on a shape memory alloy wheel design.



Future of Transportation

Tires aren't a sexy product, but the money and impact definitely are! Air-filled tires (pneumatic) are practically on every vehicle that moves on Earth. From bicycles, scooters, motorcycles and cars, to trucks, buses, airplanes and even wheelchairs. Yet, this old technology of a rubber tube structure filled with air, hasn't changed much in the past century. Today's tires are still prone to flats, deflation and catastrophic blowouts. Building a tire with a new kind of material, changes everything.

We are taking the magic of shape memory alloys, integrating them with rubber treads, and delivering a product which is literally the best of

both worlds, from Mars to Earth. This will affect the way we think about, buy, and use tires around the globe, to change the future of transportation for the better. Safer & smarter tires, for smarter vehicles AND smarter customers!



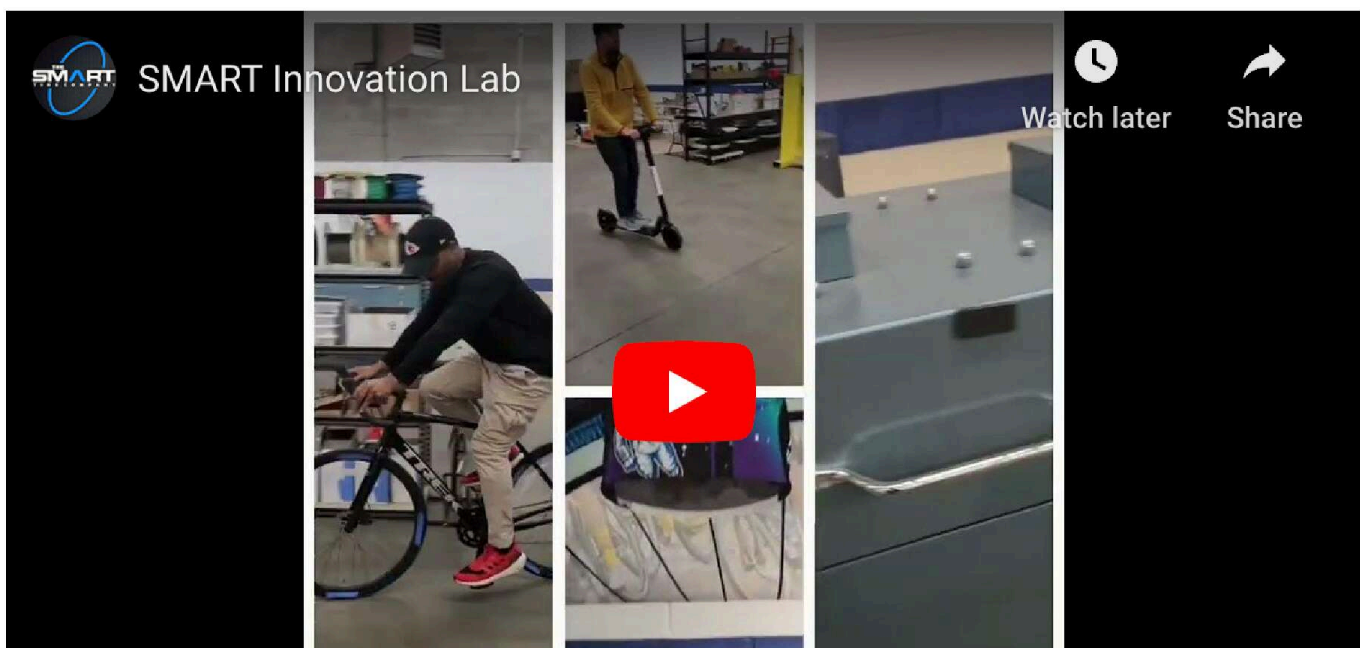


Applications

The applications for a high performance airless tire are nearly endless, making up a significant portion of the tire industry, which stands to grow to \$500 billion by 2030.

- **Cycling:** flats and tire inflation are an everyday pain
- **Mobility Fleets:** constant tire maintenance causes expensive downtime
- **Electric Vehicles:** are heavier and harder on ordinary tires
- **Autonomous:** specific safety & maintenance concerns with flats

- **Military:** tires need to go off-road, get soldiers home safe, and survive
- **Airlines:** a commercial jet using our tire tech can save 27,000 lbs of jet fuel every year
- **Space:** future missions to the Moon and Mars need stronger, more reliable tires that can roll over the harshest of terrains
- **Trucking:** where an 18 wheeler becomes a 10 wheeler, saves on fuel costs and never gets a dangerous blowout or multiple flats
- **Motorsports:** consistently perform and race at the highest speeds, distances and temperatures, without punctures or tire failures



Sustainability

Tires are an inherently unsustainable and polluting product. 50 billion pounds of waste tires are produced every year, tire wear is a primary contributor to ocean plastics and landfills, and the manufacturing process is also dirty.

Conversion to non-pneumatic (airless) solutions can greatly reduce the waste.

In recognition of SMART Tire's efforts in sustainability, we were recently awarded a Phase I SBIR grant by the US Environmental Protection Agency to investigate methods of recycling and reusing nitinol tires.



The infographic is a collage of images and text blocks. The top left has a green background with the title 'SMART SUSTAINABILITY' and a list of benefits: '100% NON-PNEUMATIC TIRE', '50% LESS RUBBER MATERIAL', '0% CHANCE FOR A FLAT', and '1 OF A KIND ECO DESIGN'. A QR code is next to this text. The top right shows a family of four riding bicycles on a path, with the word 'SOCIAL' above them. The middle left shows a close-up of a car's charging port with the word 'ECONOMIC' below it. The middle right shows a green globe with the word 'ENVIRONMENTAL' above it and 'SMART' on the globe. The bottom left shows a large pile of discarded tires with the word 'HUMAN' above it. The bottom right has a green background with the text 'LESS TIRE WASTE', 'MORE TIRE SAFE', and 'SMART.TIRES' at the bottom.

SMART SUSTAINABILITY

- 100% NON-PNEUMATIC TIRE
- 50% LESS RUBBER MATERIAL
- 0% CHANCE FOR A FLAT
- 1 OF A KIND ECO DESIGN

SOCIAL

ECONOMIC

ENVIRONMENTAL

HUMAN

LESS TIRE WASTE
MORE TIRE SAFE
SMART.TIRES

50 BILLION LBS OF TIRE WASTE IS BURIED OR BURNED EVERY YEAR
ONLY 10% IS ACTUALLY RECYCLED

Airless
Tubeless
Sustainable
Retread-able
Futuristic
Durable
Lightweight
Never flat
Beautiful

EARTH.TIRES



Team

The SMART Tire Company has a multidisciplinary team that combines deep tire industry experience with material science, mechanical engineering, space exploration, early stage startups, intellectual property law, manufacturing and product marketing.

Experience isn't enough, though. We're also passionate about affecting change and giving back. Our founder & CEO, Earl Cole, created the Perthes Kids Foundation, a global nonprofit charity to benefit children with a rare disease. CTO Brian Yennie's first business was an eco-friendly virtual world, that donated a portion of all proceeds to wildlife charities, a full decade before the Metaverse became a trend.

Revolutionizing the tire industry is not just a potential unicorn company in the making, it means cleaner and safer transportation for everyone, worldwide, and we're the right team to do it!





The Road to \$1B (Business Model & Strategy)

In July of 2003, [Teels](#) was founded to disrupt one of the most successful

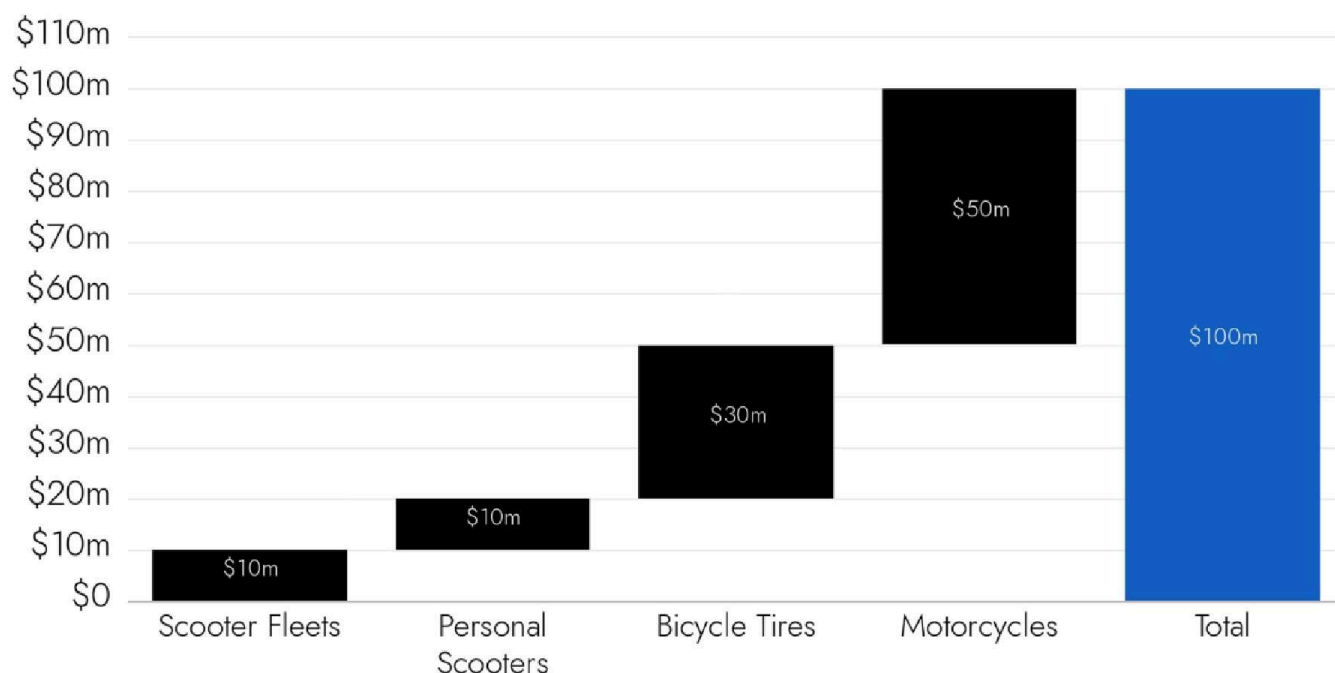
In July of 2003, [Tesla](#) was founded to disrupt one of the most successful inventions of all time: the combustion engine. 20 years later, EVs are the future of transportation, and Tesla is one of the most valuable companies on Earth.

How do we do the same, this time for the pneumatic rubber tire?

Step 1: Two Wheel Vehicles

With a waiting list of over 15,000 cyclists, LOIs and early partnerships from rideshare companies, two wheel mobility is our strategic play for the first \$100M in STC revenue. Extraterrestrial work keeps interest high and our R&D department cutting edge, while we take on tire industry incumbents here on earth.

A combination of scooter fleets (several millions units in service worldwide), personal scooters, bicycle tires and motorcycles presents an opportunity to scale to over \$100M in revenue through higher margin, two wheel markets alone.

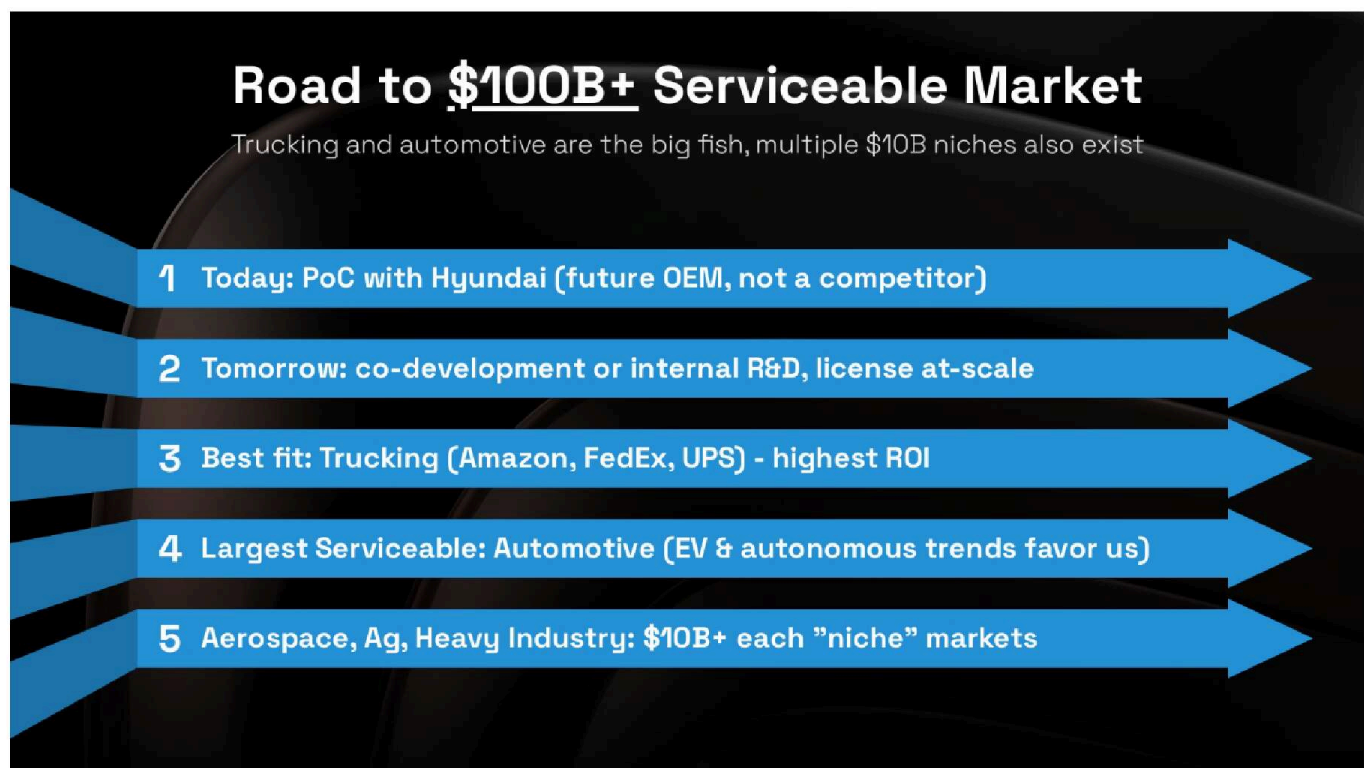


Step 2: Building for a \$100B+ Serviceable Market

Our wheels are already turning towards the largest tire markets:

automotive and trucking. Starting with a proof of concept project with Hyundai Motors, STC has developed proprietary designs that support 10,000+ lb loads for everything from passenger vehicles to heavy trucks.

The STC business model is to cooperatively develop with automotive OEMs, aerospace partners, and future customers such as Amazon logistics in order to address their needs. Future “niche” markets are also quite large, including aerospace, agriculture and construction which are each multi-billion dollar opportunities.



Step 3: Licensing vs Manufacturing

STC currently manufactures bicycle and scooter tires in-house by proprietary methods, which are being translated from lab scale to larger manufacturing partners at scale.

Certain high-margin consumer markets (example: road bikes, eBikes) are perfect opportunities for custom manufacturing, where STC captures the majority of the profits directly.

Because there are so many potential markets for tires, STC plans to license our patents in areas where manufacturing is capital intensive or

license our patents in areas where manufacturing is capital intensive, or margins may be lower. Our IP portfolio includes:

- Exclusive licensing of core NASA patents (SMA spring tire, tubular tires)
- Space, automotive and bike tire utility patents (issued and pending)
- Design patents (our signature “see through” look)
- Numerous trade secrets for manufacturing with shape memory alloys
- Trademarks and domains (Reinventing the Wheel®, SmartTire.com)

Be sure to check out our global media coverage in *TechCrunch*, *Fast Company*, *TIME*, *Pink Bike*, *Mashable*, *Popular Science* and TV networks CBS, ABC, FOX, TF1 (France), Antena 3 (Spain) and many others, to get a glimpse of the demand for our first phase of SMART tire products.

Featured in/on:





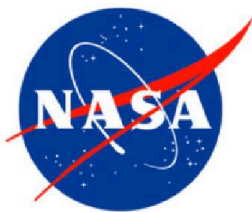
10 Key Accomplishments

1. Space Act Agreement with NASA Glenn Research Center to continue optimizing shape memory alloy tire designs
2. Reduced the material cost of our bicycle tires by 90% since 2021, as part of our go-to-market strategy, manufacturing and supply chain partnerships
3. Awarded \$100,000 grant from the Environmental Protection Agency to further research the recyclability of shape memory alloys (NiTiInol)
4. Signed contract w/ Fortune 100 aerospace company for lunar tire development which generates revenue for our company
5. Won the Accelerate the Future Challenge sponsored by Hyundai/Kia Motors to develop a car tire concept using our technology
6. Recently granted tire patent for our aerospace work; Patent pending methods for wheel and rubber tread integrations with shape memory alloys

7. University collaboration to develop special alloy joining methods
8. Opened The SMART Innovation Lab, a state-of-the-art 5000 sq ft research & development facility in Akron, Ohio
9. Exhibited at major conferences around the world from San Francisco (TechCrunch), London (MOVE) and Paris (Viva Technology) to Monterey Bay (Sea Otter Classic), Abu Dhabi (MOVE) and England (Goodwood Festival of Speed) with overwhelming excitement from attendees
10. Selected as one of TIME's 200 Best Inventions of 2023 (worldwide), 2X CES Innovation Award Honoree, R&D 100 Winner, Hyundai Accelerate the Future Challenge Winner & GreenTech Award Finalist

Partners

A few of the great companies and organizations working with The SMART Tire Company are listed below. Early partners include large aerospace companies, micro-mobility providers, bike manufacturers, and world-class research institutions. We are currently developing relationships with additional automakers and private space companies.



"ALONE WE CAN DO SO LITTLE; TOGETHER WE CAN DO SO MUCH."

One Last Word

INVEST NOW: We welcome you to join us on this special journey. Made In the USA, better for the environment, NASA-invented technology, backed by YOU, our visionary, amazing supporters. Help us achieve our goal of *Reimagining the wheel™* and building the next great, American tire company... The SMART Tire Company!

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

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



**DISRUPTING THE \$300B
GLOBAL TIRE MARKET**



*Reimagining the wheel.™
Reinventing the tire.™*

SMART.TIRES

SMART.TIRES
SHAPE MEMORY ALLOY RADIAL TECHNOLOGY



"Don't miss out!" 🚀