

A Pathway Polymers White Paper



Tire Fill Provides the Most Reliable, Safe and Cost-Effective Flatproofing Solution

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Contents

Got Flats?	1
Available Solutions	1
Cost Savings Calculator	2
Why Use a Tire Fill Product	3
Benefits of Using Tire Fill	4
Pathway Polymers TyrFil™ is the Best Tire Fill Solution . .	4
Summary of Benefits	5

Got Flats?

A flat tire on a piece of construction or mining equipment is more than just an annoying interruption to the work day. A flat tire costs money, squanders resources, wastes time and poses a safety risk. The damaged tire must be repaired or replaced. Employees must sit idle while the machine is inoperable. Productivity grinds to a halt while deadlines are missed and customers are disappointed.

To eliminate the costs and risks associated with flat tires, tires must be flatproofed. How can a tire be guaranteed not to get flat? What options are there to prevent a tire from going flat?

Available Solutions

Ideally, a solution needs to be found to prevent flats from ever occurring. The best solution would be a more reliable tire that is also cost-effective and safe. When considering tire options for your equipment, all these factors should be weighed to determine the best solution for your business.

Three commonly considered options to prevent the high cost of flat tires are solid tires, tracks and polyurethane tire fill.

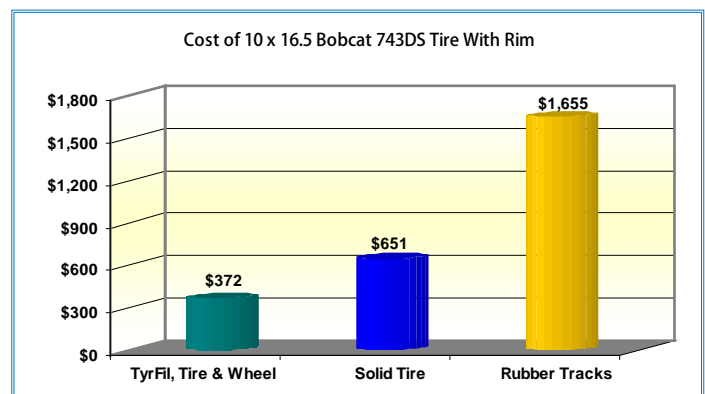
Solid Tires

Typically, a solid tire is formed of solid rubber or custom molded from plastic compounds.¹ A solid tire is more expensive than an air-filled (pneumatic) tire. While the life of a solid

tire is similar to that of an air-filled tire,² the functionality and range of this type of tire is limited.

A solid tire is specially made for use on slow moving vehicles. It should not be used on high speed vehicles as the solid tire is inflexible so it more likely to roll over.

A solid tire is more rigid than other available solutions. This lack of flexibility causes more wear and tear on the vehicle, as well as an uncomfortable ride for the driver. Although a solid tire can be used indoors and outdoors, outdoor use is limited because of this rough ride and poor traction in soft or wet soil conditions.



Finally, use of solid tires requires specialized installation equipment. A solid tire requires a tire press, specialty stands and cages to press and properly mount the tire.³

Tracks

Another option when attempting to avoid flat tires is rubber tracks. When compared to air-filled tires, rubber tracks are more costly and have limited capabilities.

¹ All-Used-Tires.com. <http://www.all-used-tires.com/articles/solid-tires.php>

² The Essentials of Forklift Tires. <http://www.tire-information-world.com/forklift-tires.html>

³ Bird Tire Sales & Service Frequently Asked Questions. <http://www.birdtire.com/faq.htm>

Rubber tracks are more expensive to purchase and are more costly to maintain. Even with the proper care, rubber tracks are not designed to last as long as an air-filled tire and are more prone to damage.

Rubber tracks are also limited to certain vehicles and environments, as they allow for less mobility. While they do have better traction and stability, they cannot be used in harsh terrain.⁴ Tracks also provide a much rougher ride than air-filled tires.

Polyurethane Tire Fill

A polyurethane filled tire is a tire that is filled with a specially engineered polyurethane resin blend. This replaces all of the air in a pneumatic tire. The polyurethane fill is pumped through the valve stem after drilling a hole in the top of the tire so the air can escape as the polyurethane fills the tire. The tire is filled until optimum tire pressure — determined by the tire manufacturer — is reached. In as little as 24 hours, the mixture inside the tire cures to a soft, resilient

Cost Savings Calculator

No Downtime Due to Flat Tires!

With the costs of tires and labor so high, not only will TyrFil increase your productivity, it will save you a lot of money!

Savings Example - Estimated Cost Per Flat Tire (exact costs will vary based on location)

Labor Costs Per Flat Tire

- a) Hours of downtime per flat tire
- b) Number of employees idled per flat
- c) Cost of labor hour (Salary/Benefits)
- d) Total labor costs (a x b x c)

Example

- a) 1.5
- b) 2
- c) \$35
- d) **\$105**

Your Flat Tire Calculation

- a) _____
- b) _____
- c) _____
- d) _____

Lost Income Per Flat Tire

- e) Income per hour per vehicle
- f) Income lost per flat tire (a x e)

- e) \$250
- f) **\$375**

- e) _____
- f) _____

Total Cost Per Flat Tire

- g) Downtime costs per flat tire (d + f)
- h) Average number of flats per tire life
- i) Downtime cost over tread life (g x h)

- g) \$480
- h) 3
- i) **\$1440**

- g) _____
- h) _____
- i) _____

Total Cost Savings Per Tire

- j) Cost of TyrFil per tire
- k) Total Savings by using TyrFil (i - j)

- j) \$325
- k) **\$1015**

- j) _____
- k) _____

Other considerations in the TyrFil value assumption:

- Less lost tire life because of non-reparable injuries
- No more damage to equipment from blowouts
- No more back-up equipment needed due to tire failures

⁴ Dan Rafter, Tire Versus Tracks. <http://www.gradingandexcavation.com/january-february2005/tires-versus-tracks-2.aspx>

elastomer or rubber-like product. Rather than riding on air, the equipment now rides on a cushion of polyurethane tire fill.

Tire fill products imitate the riding qualities of air. Any size tire can be filled and tires filled with tire fill operate successfully on the heaviest industrial equipment and in the most severe environments. The tires can't go flat since the air has been replaced with the solid fill product.

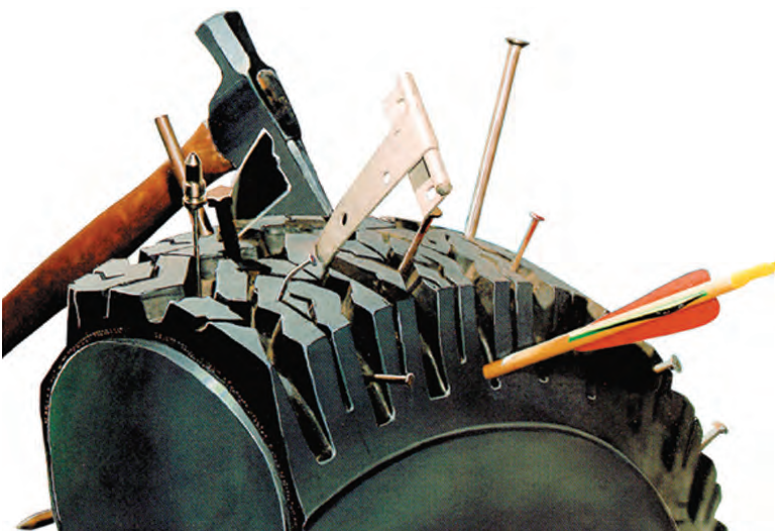
For more than 40 years, the durability of tire fill has been proven in thousands of industrial applications including mining and construction applications.

Why Use a Tire Fill Product

Increased Productivity; Reduced Costs

Polyurethane tire fill allows industrial equipment to run over broken glass, nails, sharp metal and rock without going flat, thus increasing productivity and reducing costs.

In spite of punctures and cuts, tire fill enables a vehicle to remain operational and reduces expensive downtime and production losses. Customer satisfaction is also enhanced when schedules are maintained.



Tire Fill Applications

- ✓ Off-Road Construction
- ✓ Mining Equipment
- ✓ Farm and Agriculture
- ✓ Military Vehicles
- ✓ Cranes
- ✓ Skid Steers
- ✓ Loaders at Transfer Stations
- ✓ Man Lift Equipment
- ✓ Tractors
- ✓ Steel Mill Vehicles
- ✓ Fork Lifts
- ✓ Airport Equipment
- ✓ Garbage and Sanitation Vehicles
- ✓ Earth Moving Equipment
- ✓ Landfill Equipment

Increased Safety and Comfort

Polyurethane filled tires contain no air, and therefore limit risks associated with pneumatic tires. Polyurethane filled tires can't blow out and cause the machine to tip or cause the operator to lose control. Additionally, tire fill is heavier than air so it provides better ballast, which allows for greater stability when working with heavy equipment and machinery.

Some machine operators prefer pneumatic tires because they like the ride they provide. Fortunately tire fill is available in a variety of durometers (a measurement of the hardness of the tire fill) to give any machine the desired operating characteristics — depending on the area of application — such as a soft ride and rock solid stability.

Benefits of Using Tire Fill

There are many reasons to use a tire fill product. A tire fill product:

- ✓ Eliminates costly downtime
- ✓ Lowers vehicle center of gravity
- ✓ Provides greater vehicle stability
- ✓ Maximizes work output
- ✓ Improves tire tread wear
- ✓ Maintains proper tire pressure and footprint shape for the life of the tire
- ✓ Increases the life and performance of tire
- ✓ Requires no maintenance
- ✓ Eliminates the need for tire repair
- ✓ Improves operation in harsh areas
- ✓ Enhances operator safety
- ✓ Increases driver confidence and comfort
- ✓ Minimizes uneven tread wear
- ✓ Reduces wheel slippage because of weight
- ✓ Provides multiple levels of hardness
- ✓ Reduces shock and stress to equipment compared to solid tires or tracks

Using a tire fill product will pay for itself many times over. (Refer to the *Savings Calculator* on page 2.) While product cost is a very important consideration, productivity, safety and morale are also very significant factors. Flat tires can lead to down time, lost work and wages, as well as dissatisfied customers. Eliminating the daily frustration of dealing with flat tires will increase the morale of employees and customers alike.

Consider the additional safety risks a flat tire brings. A tire filled with polyurethane offers a

huge advantage. When equipment is operated under safer conditions, it creates a greater understanding of how much value is received for the initial monetary investment.

When choosing to eliminate flat tires, many equipment operators consider the need for increased productivity, safety and comfort and then they make the choice to use polyurethane tire fill. This allows them to get the strength and protection of a solid tire while still enjoying the ride and comfort similar to that of an air filled tire. “The extra safety and cost savings definitely compensate for the slight difference in the comfort of the ride,” states Ahmed Zurkiya, Ph.D., Executive Vice President, Research and Development.

“Advance Tire Incorporated has been a loyal customer since 1987... Pathway’s sales staff has always kept us informed with the latest technology in compounds, as well as the latest pumping equipment...Our sales representative has always helped in establishing new customers, as well as helping us maintain our current ones.”

*John J. Merris
Operations Manager
Advance Tire, Inc.*

Pathway Polymers TyrFil™ is the Best Tire Fill Solution

Pathway Polymers invented the TyrFil brand of tire fill, the world’s first polyurethane tire fill material intended to flatproof tires, in 1971. Since then, TyrFil has eliminated downtime due to flat tires and increased productivity for the construction industry. According to Joseph P. Danules, President and CEO of Pathway Polymers, “As great as it is to be known as the inventor of TyrFil, it is more important that our

customers know we take an even greater sense of pride in the many innovations we have made to constantly improve our TyrFil products.”

TyrFil is a urethane product specially formulated to flatproof pneumatic tires. This product replaces all of the air in any pneumatic tire with a highly engineered polyurethane resin blend. Within as little as 24 hours the mixture cures to a soft resilient elastomer.

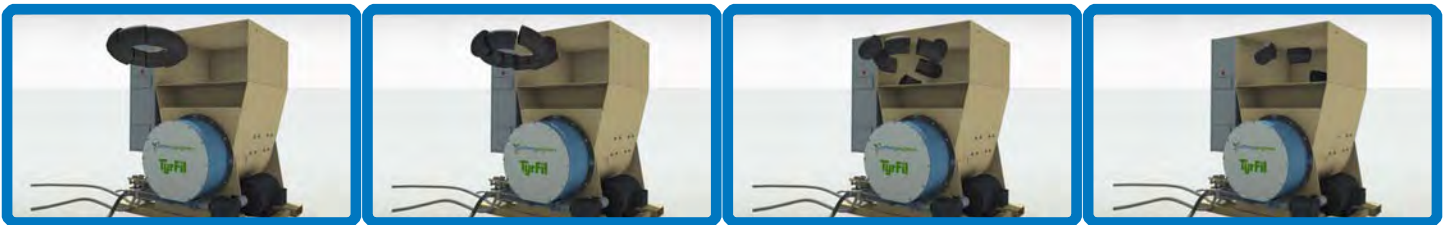
It is specially formulated to closely resemble the feel of riding on pneumatic tires without the risks that are associated with air-filled tires. It is tough enough to use in tires of the heaviest industrial equipment and in the most severe work environments.

The durability of TyrFil’s composition has been substantiated by decades of experience in over 500,000,000 pounds of product sold

worldwide. It has been proven in thousands of applications and is currently used by the United States Armed Forces, major airlines (for ground support equipment), major equipment rental fleets and original equipment manufacturers.

**Pathway Polymers’
Innovations Reduce Landfill Waste**

TyrFil provides a safe, trouble-free ride for the life of tires. In addition, Pathway Polymers TyrFil products are economical and environmentally responsible. “With our innovative AutoFil Recycler System and TyrFil Green Formulations, TyrFil can now be recycled and reused in your new tires when your old tires are worn out,” explains John Danules, Chief Operations Officer.



Recycling Process

Summary of Benefits

Benefits	Polyurethane Filled Tires	Solid Tires	Tracks	Air-Filled Tires
Eliminates costly down time	X	X	X	
Reduces shock and stress to equipment	X			X
Maintains proper tire pressure indefinitely	X	X	X	
Increases driver efficiency	X	X		
Reduces driver fatigue	X			X
Minimizes uneven tread wear	X	X		
Adds stability	X	X	X	
Extends tire life	X	X		
Reduces maintenance costs	X	X	X	
Multiple levels of hardness	X	X		X
Can be retread	X	X		X
Works under harsh conditions	X	X		
Improves tire tread wear	X			
Meets OSHA environment standards	X	X	X	X



Pathway Polymers is the inventor and manufacturer of TyrFil, the world's first polyurethane tire fill product. A subsidiary of the The Vita Group, Pathway Polymers is a global technology leader in the tire flat proofing industry and exclusive provider of the patented AutoFil Recycling Systems®.

Find more information at www.pathwaypolymers.com or call 800.251.7642