

TANK TRAILER WHITE PAPER



DRASTICALLY REDUCE WIND DRAG AND WEIGHT FOR INCREDIBLE ROI

Losing Weight and Improving Fuel Efficiency

A 10% decrease in weight can result in a 6.6% increase in fuel efficiency, according to the U.S. Department of Energy. Even a slight reduction in weight can translate into thousands of dollars in fuel savings or allow a fleet to increase trailer payload.

HELPING TO REDUCE WIND RESISTANCE

Air Products commissioned a study from Lehigh University to look at ways they could save fuel. For the study, Air Products sent a tractor-trailer to the university, which then built a scale model and tested it in a wind tunnel. During the test, one of the engineering students asked why the trailer had air scoops on it. Typically, tank trailers come from the manufacturer with big long fenders on the front, which allow the trailer to hook up to any tractor and still protect itself from road debris.

Changing the fender configuration allowed Air Products to take approximately 140 lbs. of dead weight off the trailer because they had been using aluminum fenders and brackets. They were also able to reduce maintenance costs because they no longer had to tighten the clamps and weld the fenders throughout their life.

Air Products opted to use Minimizer's fenders made of proprietary composite material with a lifetime guarantee.



Air Products was curious about what would happen if they removed those fenders, so the fender was removed and the model trailer was put back into the wind tunnel. The result? A major reduction in aerodynamic drag. So Air Products decided to remove trailer fenders and instead put fenders on the rear drive axle of the tractor in order to reduce aerodynamic drag but still protect the tank trailer from road debris.

"If you are always mating your own tractors and trailers [as Air Products does], you can eliminate the trailer fenders, which act like big wind catchers and diminish fuel economy," retired Air Products maintenance specialist Ron Szapacs said. "In a fleet our size, if we can increase the fuel economy by one-tenth of a mile per gallon, we can save well over \$1 million a year."

Extra Benefits

While increased fuel economy and the ability to carry more payload were the most significant advantages of removing trailer fenders and installing fenders on the rear of the tractor, vehicle safety and appearance improved as well.

Following the switch in fender location, Air Products followed a truck with the old configuration while videotaping the water spray coming off the tire during a rainstorm. "Then we went back and grabbed a truck that we had converted to the Minimizer fenders and did the same thing," Szapacs said. "The spray coming off the tires was dramatically reduced, so it was a safety feature for the people around us."

SAVING WEIGHT AND SAVING MONEY

Tank trailer operators face a unique set of challenges trying to remain profitable while adhering to government regulations, following safety standards and managing higher operating costs. Due to the types of cargo some tank trailers haul, such as milk, petroleum products, or volatile gases, they are also subject to more stringent regulations than other carriers. Recognizing this additional need for safety, many tank carriers spec their equipment with additional features including electronic stability control or lane departure warning systems, etc. According to industry experts, it is not unusual for a tank trailer operator to pay \$100,000 for a trailer, and this does not include the cost of the tractor, which easily could be another \$100,000. It is also important to note that tank trailers typically have a loaded mileage ratio of roughly 60 percent, which means they run empty 40 percent of the time. In short, tank trailer carriers must juggle all these challenges while continuously monitoring their equipment and their operations to look at ways to gain a competitive advantage.

Losing Weight and Improving Fuel Efficiency

One way to improve profitability is simply to haul more cargo per trailer load. Yet, in order to do that, weight needs to come off the tractor or the trailer so that total vehicle maximum weight limits are not exceeded. Every pound of weight that is taken out of a commercial vehicle means the fleet owner can haul an additional pound of product in the trailer "If we can take weight off of other areas, we can put it where it's needed and that is to carry more product," said Ron Szapacs, former maintenance specialist at Air Products. "Delivery is basically a fixed cost. If you deliver 34,000 lbs. or 36,000 lbs. there is no difference in the cost to deliver — the driver's wages are the same, the equipment is the same, etc. If you can deliver another 2,000 lbs. of product, it's kind of like free delivery," he said.

Jerry Curl, director of operations for Hoffman Transportation LLC/G&D Trucking Inc., explained that being able to carry extra cargo is especially advantageous with customers a fleet delivers to multiple times in a day. "When you reduce the number of trips you make in a day, you use less fuel and less tires, and in general you limit your exposure. In recent years tank trailer manufacturers have recognized

the importance of offering lightweight tank trailers, turning to materials like aluminum and FRP composites in an attempt to reduce overall tank trailer weight. Dan Furth, president of the National Tank Truck Carriers said, "I believe tank trailer manufacturers are doing every thing they can, without sacrificing strength, to reduce the weight of their tank trailers."

In addition, fleet owners have switched to options like aluminum wheels and wide-base tires in order to further reduce trailer weight. As a result of all these changes there has been a significant drop in tank trailer weight. However, it is unlikely that the industry will see any other significant drop in tank trailer weight unless some of the concerns about other lightweight material like magnesium and titanium can be addressed.

AVERAGE COST



That does not mean that there can't be incremental decreases in tank trailer weight. Even a slight reduction in weight can translate into thousands of dollars in fuel savings or allow the fleet to increase trailer payload. Air Products found that for every pound of weight it took off its tank trailers they could save \$10 annually. While \$10 a year may not seem like much, that is a per trailer figure and the savings add up quickly the more trucks you have or the more weight you take off.

BEING SAFE AND LOOKING GOOD

Think about this: If a single tank trailer can carry an extra 50 gallons of fuel, with fuel retailing at \$4 a gallon, and a fleet can do that on every single tank load on every one of its tank trailers, that quickly adds up to increased revenue. Alternatively, if a fleet prefers not to add payload, reducing weight also results in fuel economy improvements. A 10% decrease in weight can result in a 6.6% increase in fuel efficiency, according to the U.S. Department of Energy. Unfortunately, because of the cylindrical nature of tank trailers, they don't necessarily pick up the type of fuel efficiency gains resulting from reduced drag that over-the-road van trailers do, Furth explained. However, some fleets are adding aerodynamic skirts to their tank trailers and are seeing some fuel economy benefits.

The incremental weight loss on a tank trailer can be something as simple as using lighter weight dolly legs or switching from a metal fender to one made of a blended material. Curl said Hoffman Transportation studies everything that goes on one of its trucks. "With the extra weight of the emissions engines it became critical for us to study everything more closely. We compare everything from a wheel to a hub to a brake drum to a bracket to a fender. We study every single thing to see if there is a lighter weight option."

Air Products has a demonstrated commitment to weight reduction has done a great deal to reduce the weight of its tank trailers. "We look at every component we put on a vehicle and then we analyze it and look at dollars per pound, the cost of the product and the benefits we get out of it. If we can reduce weight, yet the cost is more than the standard product, we still look at how much weight it can take off overall and what that value is. We put a dollar figure on it and compute whether to put it on or not. Even if it costs more to buy, if it saves enough weight in the long term, we can cost justify it," Szapacs said.

Some additional benefits of the Minimizer fender, according to Szapacs, are its durability and the fact that it maintains its appearance even after many

road miles. Appearance is important to fleet owners, he said. "We think of our trucks as rolling billboards. Thousands of people see them every day. That's our exposure and if people see dirty, beat up equipment that is how they'll view our company."

Curl said that although Hoffman's main reason for choosing Minimizer fenders was the weight savings, the fleet is also concerned about appearance. "Obviously we want our trucks to look a certain way and project a certain image. Minimizer fenders helped us do that. I got the look of a stainless steel fender, yet it was made of lightweight plastic."

**6.5 TO
6.6 MPG
— WE CAN
SAVE WELL OVER
\$1 MILLION A YEAR**



Fenders made of a blended composite material will not fade and never need to be painted because the color is molded all the way through the fender. And they do not rust so maintenance is virtually eliminated. "The weight reduction to increase payload was the primary reason for our choosing Minimizer," Curl said. "But I also now have less maintenance with them, they are easy to install and they look good. All those things are added benefits to the weight reduction."

And it's not only customers and prospects that are affected by the appearance of a vehicle. CSA inspectors have some discretion in which vehicles they pull over for roadside inspections. "Inspectors are more likely to pull over a vehicle that looks bad," Szapacs said. "Our drivers have told us that while they are waiting in line, inspectors pull over certain trucks, but when they see ours coming, they motion them to go right through."

SAVE TIME ON MAINTENANCE

KEEP WHAT'S ON THE ROAD OFF YOUR TRAILER

When a truck does not have fenders on the tractor rear, those tires throw whatever is on the road - rain water, magnesium chloride, snow, cinders - and spray the belly of the trailer. This chips the paint and eventually results in additional maintenance. But a fender on the tractor drive axle encapsulates the drive tires so that no matter which way the wheels turn, the fender still covers the tire and debris returns to the road.

This is especially important with the liquid de-icing chemicals many municipalities are using on their roads in the winter. "Road spray has become a big concern because of the corrosiveness of these chemicals," Szapacs said. "I've seen parts that look like they've been dropped in a barrel of acid after being subjected to these chemicals." Keeping the tires covered means the spray will be forced back to the roadway so the trucks, tanks and loads are cleaner.

Is your fleet's image important? There are several other products you should consider to improve the overall look of your trucks.

FLOOR MATS

Minimizer floor mats are another solution to help with interior cab corrosion and retain the value of the tractor. They protect floorboards and other interior components from harsh chemicals and solvents, dirt and grime. The result: a cleaner cab, a happier driver and less downtime for repair.

WORK BENCHES

The Minimizer Maintenance Line is designed to make working on semi trucks easier, and the **Single Tire** and **Tandem Work Benches** do just that. Both hold all your tools for the job, with the **Single Tire Bench** sitting on the front tire and the **Tandem Work Bench** resting on the rear tandem.

TOOL BOXES

Minimizer toolboxes make for indestructible transportation boxes when shipping, moving or storing your gear. Made of solid molded plastic material, Minimizer tool boxes will never rust, crack or need paint. They will also save your rig weight, meaning more money in your pocket.

To get a quote or learn what products will work best for your specific scenario, call 800-248-3855 or email info@minimizer.com.

