MYTHBUSTING, NITROGEN TIRE INFLATION STYLE

Nitrogen Tire Inflation is rapidly becoming standard a service in progressive auto dealerships. The benefits of offering a nitrogen service, including increased customer retention, incremental revenue and reduced false TPMS alarms have been well received within the marketplace. Even though inflating tires with nitrogen has become increasingly popular, it is still a "new" service, so there are numerous myths still circulating within the industry. "Mythbusting" will yield more educated service personnel and more realistic expectations with your customers. Here are ten commonly encountered myths:

1.) NITROGEN ELIMINATES THE NEED TO REGULARLY CHECK TIRE PRESSURES. This is absolutely untrue. While nitrogen leaks through a tire at a slower rate than oxygen, that doesn't eliminate the necessity of regular pressure checks. There are numerous issues (valve stem, puncture, rim seal) that can still cause major leaks within a tire and lead to unsafe driving conditions. Nitrogen will maintain pressure longer than tires filled with compressed air, but is not a substitute for regular pressure checks.

2.) NITROGEN PROVIDES LONGER TIRE LIFE AND INCREASED FUEL ECONOMY. This is one claim that informed consumers have trouble grasping, since compressed air is already made up of 78.1% nitrogen. This can cause some skepticism with informed customers. Minimizing underinflation will lead to longer tire life and increased fuel economy. Since it's the oxygen portion of compressed air that leaks through a tire, nitrogen inflation maximizes pressure retention. But remember, proper inflation pressure is providing the tire life & fuel efficiency improvement, the nitrogen is just a source of proper inflation pressure.

3.) THE NITROGEN STORAGE TANK DOESN'T MATTER IN A TYPICAL AUTO DEALERSHIP APPLICATION. This could not be further from the truth, it is absolutely essential. First, in a typical dealer application using an autoinflator, the nitrogen tank allows the generator to keep creating (and storing) nitrogen during the tire purge process. As anybody who has a nitrogen generator knows, the purge process (removal of air from the tire) is about 75% of the cycle time per automobile. If you don't have a tank to store nitrogen made during the purge process, the equivalent flow rate would need to be 3-6x as large to provide an equivalent fill time. Don't be fooled by overstated flow rates and underengineered systems, a nitrogen storage tank

is essential. Without one, you will see your service time increase dramatically while your potential revenue decreases.

4.) THE HIGHER THE IN-TIRE PURITY THE BETTER. In-tire purities should be based on partial pressures of oxygen, since oxygen readily permeates the sidewall. The sweetspot for a 32 psig tire is 93.4% nitrogen. At that purity, the oxygen inside the tire is in balance with atmospheric oxygen, and you will maximize your nitrogen inflation. As hard as it is to believe, as you stray from that purity level, it is possible for oxygen to leak back in. NHTSA recently showed that, if your in-tire purity is 97%, oxygen will leak back in within 3 months.

32 PSIG Tire	
14.7 PSIG Atmospheric Pressure	
78.1% N2 in Atmosphere	
20.9% O2 in Atmosphere	
Partial Psig O2 Atm = 14.7 * .209 =	3.072
Partial Psig O2 Tire = (32+14.7) * .209 =	9.7603
Oxygen permeates tire to atmosphere	
O2% in 93.42% Nitrogen Filled Tire	0.0658
Partial Psig O2 in N2 Filled Tire = (32 + 14.7) * .066	3.073
Oxygen in Tire in Balance with Atmosphere	

5.) TIRES FILLED WITH NITROGEN ARE NOT AFFECTED BY TEMPERATURE. There is no significant difference in expansion and contraction characteristics of nitrogen compared to air when moisture is absent, as long as the gases are dry in a fixed volume container such as a tire. Nitrogen and compressed air respond to changes in ambient temperature in a similar manner, a 1.9% change of pressure for every 10F change in temperature. However, water is usually present in the case of conventional compressed air where dewpoints can be as high as 70F, compared with -40F+ for nitrogen. As temperature increases, liquid water vaporizes to become a gas and its volume expands causing tire pressure to be higher than that of a dry gas, such as nitrogen. So the presence of water in a tire contributes to wild pressure variations as temperatures changes. The bottom line is that you will still see pressure changes with nitrogen, but they should be more consistent than compressed air.

6.) NITROGEN INFLATION IS ONLY INCREASING NITROGEN FROM 78.1% to 93.4%+, THERE IS NO BENEFIT TO SUCH A SMALL INCREASE. This is one that I hear from customers quite frequently.

Decreasing the percentage of oxygen is a more important factor than increasing the concentration of nitrogen. It is important to explain the nitrogen inflation process to your customers, so they can fully understand the distinction and that the existing compressed air is completely removed. The tires are purged twice, removing the 78.1% “bad” nitrogen (that is laden with water vapor, oil contamination, particulate, etc.) and replacing it with nitrogen that is clean (99.99% of all liquids and

solids removed @ 0.01u) and dry (-40F or lower dewpoint). The nitrogen now has the properties of an engineered gas. Water vapor causes pressure fluctuations during normal driving, so removing it is a distinct advantage.

7.) **COMPRESSED AIR FILTRATION ISN'T AN IMPORTANT PART OF A LONG LASTING NITROGEN INFLATION SYSTEM.** Regardless of whether you use pressure swing adsorption or membrane nitrogen generation, filtration is an integral part of system operation. Parker Hannifin recommends multiple stages of filtration, including separators, coalescers and carbon adsorption on all of its nitrogen tire inflation equipment. Undersized or omitted filtration can be especially troubling on a pressure swing adsorption system because it continuously reduces the capacity of the system. Once the user discovers the issue and tries to remedy it, its often too late and they have to live with reduced capacity or purchase a new system.

8.) **THE EQUIPMENT DOESN'T MATTER, IT'S YOUR NITROGEN PROGRAM.** There is no doubt that dealerships can maximize nitrogen inflation revenue by using a custom marketing and retention program, often involving tire hazard and roadside assistance plans. Parker Hannifin offers these programs as well. But don't be fooled into thinking that the equipment doesn't matter. Buying high quality equipment from reliable manufacturers should be an auto dealers top priority when considering adding a nitrogen inflation service. How valuable is your nitrogen inflation program if the equipment fails, and you are waiting for service or a loaner from a supplier working out of his garage? Buying imported equipment from low cost, low quality manufacturers without a proven history of successful technical support can be a recipe for disaster.

9.) **LOOK AT THE PERIODIC TABLE, NITROGEN MOLECULES ARE NOT LARGER THAN OXYGEN MOLECULES.** The periodic table is separated based on molecular weight, not molecular size. That being said, diatomic nitrogen is slightly larger than diatomic oxygen, and this difference allows it to fit through the relatively tight passage ways between polymer chains in the rubber. Also note that oxygen is the third most permeable element of the nine elements found in atmosphere, nitrogen is ninth. If you are truly interested in the chemistry behind the permeation of oxygen through a tire, there is ample information in my blog: www.tirenitrogen.typepad.com/tirenitrogen. Search permeation.

10.)TIRES PER HOUR IS AN ACCURATE MEASUREMENT OF NITROGEN EQUIPMENT CAPACITY. The flow rate, often in standard cubic feet per minute (scfm), is the only true measurement of nitrogen capacity. The higher the scfm, the larger the capacity. Tires per hour calculations can be clouded by tank size and other

arbitrary features. Measuring scfm at equivalent operating purities and pressures is the only true way to make an apples to apples comparison of nitrogen equipment capacity.

11.)I ALREADY OFFER NITROGEN INFLATION AT MY DEALERSHIP, SO NO NEED TO DISCUSS IT. A typical dealership can capture the majority of their nitrogen inflation customers within 18-24 months. It is very difficult to sell nitrogen inflation by itselft to a customer that has already paid for it. Dealers that are offering other programs with their nitrogen service, such as tire protection and roadside assistance plans, can continue to offer value to their customers every year. It is much easier to convince the customer of the necessity of an annual nitrogen refill when you are cost effectively bundling it with other benefits for the customer. These customer retention programs are readily available from Parker Hannifin. Successful dealerships can take a good – better – best approach, as outlined on the following chart..

Okay, so I said ten myths, and I had eleven. So be it. Don't continue to perpetuate a lot of the misconceptions about nitrogen to your customers, its not in your best interest. Service writers schooled in the proper benefits of nitrogen inflation will be able to convince a customer of the benefits . A well-informed buyer of nitrogen inflation equipment will help the dealership get the most bang for their buck, and a long lasting, reliable nitrogen service. Bust these myths at your dealership, and it could lead to increased profitability and better customer retention.

ABOUT THE AUTHOR

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ABOUT THE COMPANY

Parker Hannifin is the world leader in nitrogen tire inflation, with over 20,000 nitrogen generators installed worldwide. Parker offers the most complete product line in the industry. With annual sales exceeding $10.5 billion, Parker Hannifin is the world's leading diversified manufacturer of motion and

control technologies and systems, providing precision-engineered solutions for a wide variety of commercial, mobile, industrial and aerospace markets. The company employs more than 57,000 people in 46 countries around the world. Parker has increased its annual dividends paid to shareholders for 50 consecutive years, among the top five longest-running dividend-increase records in the S&P 500 index. For more information, visit the company's web site at http://www.parker.com, or its investor information site at http://www.phstock.com.