Retreaded Bus Tires

Going Green with New Technology

by Larry Plachno
Photos by author unless noted

The new Brahler tire retreading plant in Jacksonville, Illinois is located in a small industrial park near the interstate. Being both new and independent, the plant has been able to use the latest state-of-the-art equipment and procedures including some developed in Europe. It is considered to be among the top 50 retreading plants in the United States.

Like many articles in NATIONAL BUS TRADER, the topic of retreaded bus tires was suggested by reader questions. Many bus companies are "going green" in several ways including the new EPA engines with less pollution, biodiesel fuel, and using used engine oil to heat the garage. These operators want to know whether using retreaded tires can be included under the banner of "going green." At the same time, other bus operators have had experiences with retreaded tires that have been less than satisfactory. For them, we took the time to research the new retread technology and how much it has improved in the past few years.

Here are answers to some basic questions regarding bus retreaded tires.

1. Going Green

Yes, using retreaded bus tires is another way to "go green." Bus tires are basically petrochemical products. It takes approximately 22 gallons of oil to manufacture one new bus tire. Since most of the oil is used in the tire casing, which is reused in the retreading process, only seven gallons of oil is used to retread the same tire.

Hence, each time a tire is retreaded, approximately 15 gallons of oil are saved. Since approximately 430,000 to 470,000 transit and coach bus tires are sold annually, retreading conserves millions of gallons of oil every year.

2. More Green in your Pocket

Green also looks good in your pocket. The experts tell me that bus operators can save as much as 40 percent of tire costs by using retreads. Please note that on buses, retreads are not recommended for use on the steering tire positions.

3. Improved Technology and Quality

No one who is honest will argue that people have not had problems with retreaded tires in the past. However, the good news is that some tire retreaders have rolled into a new era (pun intended) in the past few years. Using the new Marangoni® technology and Ringtread® system, the quality of retreads has improved tremendously. With these improved retreads, both bus and truck operators are reporting fewer failures with retreads than with new tires.

The "trick" to all of this is understanding the difference between the old retread technology and the new. We took the time to learn about the new, higher quality technology. Keep reading and we will take you on a tour of a modern retreading plant and share our "inside" information with you.

4. Rolling Resistance and Fuel Economy

We also learned that there are tires and tread patterns that reduce rolling resistance and improve fuel economy. With the price of fuel today, this may well be a smart question to ask when buying tires.

Unique Bus Tire Programs

Before getting into some of the technical stuff, I feel obligated to mention that we bus people have some unique tire problems that are less likely to affect truckers. One problem is that, like bus engines, bus tires are more enclosed. Truck engines are typically in front where they can take advantage of ram air for cooling. Being in the rear, bus engines (which are really truck engines) are more difficult to cool. The same situation applies to bus tires.

This problem is caused by the traditional configuration of bus bodies. Usually, drive position tires are shrouded by sheet metal, which has been formed to create a rear wheel well that is almost completely enclosed. This design restricts the air flow around the tire and actually encourages heat build-up. Heat is a tire's single greatest enemy.

As a result of this, bus tires are often made differently. Special compounding and casing constructions are sometimes used for bus tires to improve their usefulness in their unique operating environment.

A second problem typical in the bus industry is scrubbing of the tire tread surface. Due to the longer wheelbase on buses, plus the fact that they do not bend in the middle, tire treads rub on the pavement surface during turns. The tire industry calls this "scrubbing." Teaching your drivers to be more cautions on turns will reduce scrubbing. However, tire scrubbing and hitting curbs are two major reasons why you typically only get one retread from a bus tire

while you frequently can get two retreads on a premium truck tire casing.

The Brahler Retreading Plant

Our search for tire retreading information and new technology started with Harvey Brodsky of the Tire Retread Information Bureau. Brodsky was our source of information since his news releases and retreading information have appeared in the pages of NATIONAL BUS TRADER a few times in recent years.

When we told him that we wanted "inside" information on the new retread tire technology, he introduced us to Rich Brahler of Brahler's Truckers Supply in Jacksonville, Illinois. Brahler not only invited us to inspect his state-of-the-art retreading plant but personally took us on a guided tour while explaining all of the new developments in tire retreading. It was enlightening to say the least.

Brahler's Truckers Supply was originally founded by Richard William (Bill) Brahler in 1971 as a Bandag franchisee in Meredosia, Illinois. As it expanded, the company later relocated to Jacksonville, Illinois and then added a second retreading plant in Granite City, Illinois, near St. Louis. The Granite City facility was destroyed by fire in 2003 when a fire started in an adjacent building and spread, destroying the retreading plant.

Incoming tires for retreading are inspected at each of the Brahler Tire Centers prior to shipment to the Jacksonville Retreading Plant. The first station at the retreading plant is called Visual Inspection and Non-Destructive Testing. Here, the tires are again inspected for broken casings, damage and aging. An electrical charge is used to locate any small liner punctures.

Like the proverbial Phoenix, the Granite City fire prompted Brahler's to start construction on a new state-of-the-art, 80,000-

This overhead view of the new Brahler tire retreading plant shows how the various stations are located in one large area. An overhead monorail system makes it easy to move the tires from station to station and facilitates an assembly line operation. The 13 regular stations make almost a complete circle inside the building. BRAHLERS.

square foot retreading plant in Jacksonville. Taking advantage of the fresh start, Brahler's gave up their franchise and became an independent tire retreader so they could use the latest equipment including Ringtreads from Marangoni. Originally developed in Italy, the Marangoni equipment and Ringtreads are now very popular in higher quality retreading in Europe. In 1998, Marangoni opened a division in Madison, Tennessee and offered their equipment and Ringtreads to the American retread market.

After the death of his father in 2005, Richard W. Brahler II purchased the company. It is now among the top 50 tire retread plants in the United States.

Brahler's operates six strategically-located commercial tire centers across Illinois and eastern Missouri. Locations include Jacksonville, Urbana, Morton and Joliet (Chicago), Illinois as well as Palmyra and St. Louis, Missouri. In addition to retreading tires, Brahler's also sells new tires and their own line of vehicle maintenance and tire tools. In addition to retreading bus and truck tires, Brahler's also deals in industrial, agricultural and off-road tires.

As an independent retreader, most of Brahler's retreading business comes from individual truck and bus companies that either bring their retreadable tires to one of the Brahler Tire Centers or have them picked up by the Brahler people. It is noteworthy that the Brahler Tire Centers inspect the incoming tires for any obvious flaws that would reduce the quality of the retread process.

The Shearography machine uses state-of-the-art technology to check incoming tires for possible problems. It takes photos of the tire both with and without a vacuum and compares them using computer technology to look for problems. The tire shown came from Peoria Charter Coach for retreading.

In addition, each incoming tire receives a unique code number that goes into the Brahler computer system. This number ties to individual information for each incoming tire including the tire's owner, what the owner wants done with the tire, and even what type of tread is requested during the retread process. This number remains with the tire as it arrives at the Jacksonville retreading plant. Many of the stations during the retread process have computers that can read this number and tell the Brahler staff what the customer wants.

Brahler's state-of-the-art retreading plant in Jacksonville is located on the east side of town in a small, modern industrial park near Interstate 72. Incoming tires for retreading typically arrive at the north doors and then enter the retreading process. Rich Brahler identifies 13 different stations or stages in the retreading process. The stations almost make a complete circle in the huge retreading plant. Several of the stations use modern, state-of-the-art equipment from Marangoni. An overhead monorail system moves the tires from one station to the next. This not only makes work easier on the staff, but effectively sets up the equivalent of a flowing assembly line through the plant.

The very first station is Visual Inspection and Non-Destructive Testing. While each of the Brahler Tire Centers inspect each tire before it is sent to Jacksonville, this station provides a more detailed inspection using professional equipment and staff specially trained for this operation.

The inspectors are looking for manufacturing defects, signs of impact that might have broken the casing, repairable damage, non-repairable damage, and excessive aging. In addition to using a hand-held light to see minor defects better, an electrical charge is used inside the tire to find liner punctures too small for the human eye. Tires that do not pass inspection usually go back to the tire owner and some may be eligible for a refund from the new tire manufacturer.

Excess tread rubber is removed in the buffing process, the third station of the retreading plant. In addition to using a solid center plate to assure perfect alignment, the machine also is programmed with computer profiles on all major tire brands and models. Rubber removed from the tire is collected by vacuum lines and is recycled.

Once the excess rubber tread is removed, the tire goes through yet another inspection where trained technicians probe for tire holes or defects in a process known as Skiving.

Tires with problems discovered in the Skiving process are sent to the Repair Station where any hole is repaired using a TECH thermocure patch that is stronger than the original line.

From here Brahler's sends the the tires that pass inspection to their second station, a Marangoni Shearography machine. This is a major step forward in finding hidden tire defects and in qualifying tires for retreading. Tires feed in on rollers and this computerized machine automatically adjusts itself for each individual tire size.

The laser shearography process takes nine different photos of sections of the tire interior from bead to bead, effectively looking at the entire tire. Then, a vacuum is applied to the tire and another nine matching photos are taken. A sophisticated computer program then digitally overlays and compares the two sets of photos. This will show any separation or movement in the tire layers. It also allows the inspector to confirm the integrity of any prior tire repairs.

Tires that pass inspection at the first two stations then move on to the third station, buffing. This is where the old rubber tread is buffed off the tire. The rubber that is buffed from the tire is removed from the area using vacuum hoses and is eventually sold for recycling.

What is critical at this station is that the buffing process be perfectly circular with no flat spots or oblong shape. In order to achieve this, the Brahler buffing machine has two features not found on many other buffers. One is that it uses solid center plates for holding each size tire during the buffing process rather than a generic expanding center. This requires changing the center plates for different size tires, but it eliminates the possible problems of irregularities with an expanding center hub that might not always work properly.

The second feature is that the buffing machine is computerized and has profiles of all major tire brands and models. Hence, this procedure eliminates human error and ensures optimum casing dimensions for the perfect fit of the new tread. Those tires that will be retreaded with the Ringtread are given a contour for a perfect fit.

Buffing removes the excess tread rubber but leaves some rubber above the belts. At Brahler's, after the buffing process the tires go through a fourth station and an additional probing inspection called Skiving. Here a trained tire technician checks the buffed tire for holes or defects. If any are found, the tire then goes to station five, the Repair Station. Any hole is repaired using a TECH thermocure patch. This type of patch has an inner belt pattern and is actually stronger than the original tire belts.

Stations six, seven and eight at Brahler's involve the placement of the new tread and most of this now uses new state-of-the-art technology. In the prior way of retreading, a thin layer of uncured cushion gum is placed around the buffed tire. Then, a device known as a Tread Builder places a pre-formed flat tread on the tire, cuts it to length, and splices the ends together. Depending on the length of the pre-formed flat tread, approximately every third tire has two splices. The two disadvantages to this process are that the tread has splices and the tread is flatter than new tires.

For its high quality retreads, Brahler's uses the Marangoni equipment and Ringtreads. As the name implies, the Ringtreads are treads pre-formed into a circle with different sizes for different tires. The two big advantages of the Marangoni Ringtreads are that they have no splices and the tread rings are contoured to match the tire casing.

More state-of-the-art technology can be found at station six, the Extruder. Here, a computerized machine extrudes warm cushion gum onto the tire casing under pressure. In addition to filling any irregularities, the depth of the gum is highly calibrated and wing formers create the correct base for the treads.

Station nine takes the tire with its new tread and puts it into a rubber sleeve called an envelope. In this photo, the outer envelope has already been placed and the technician is inserting an inner envelope.

Brahler's uses a steam autoclave to cure the retreaded tires. Not only does the steam prevent the tire from drying out during curing, but it also holds the length of the curing process to only 94 minutes. BRAHLER'S.

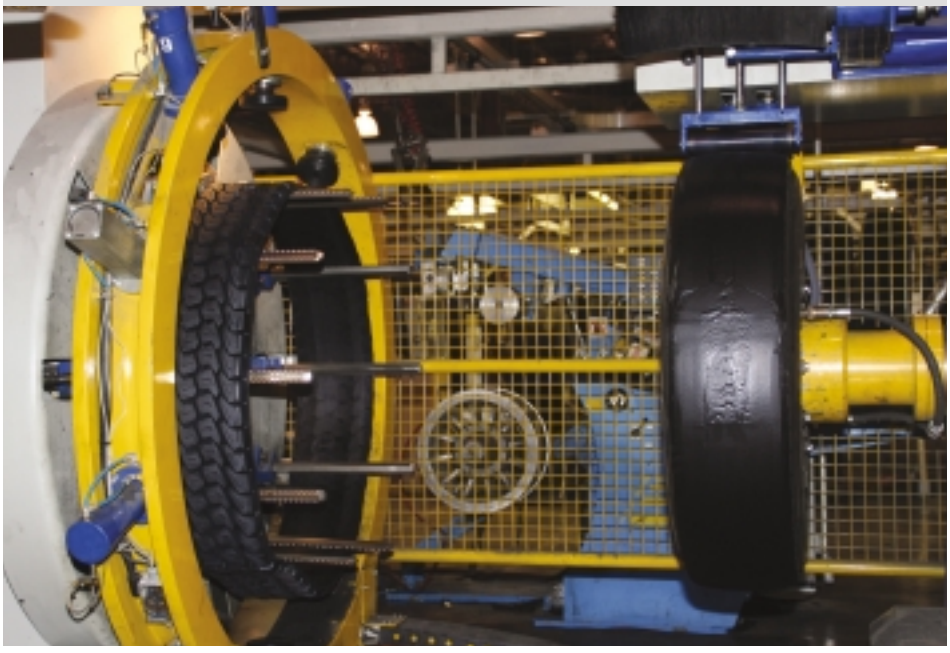
Step six is the AZ Extruder. Instead of the old fashioned rolls of cushion gum, this computerized machine extrudes warm cushion gum onto the tire casing under pressure. This process offers several advantages over the other application method. The gum fills any irregularities in the tire surface while its depth is highly controlled for maximum durability – one millimeter of gum on the center of the tire and two millimeters of gum on the sides. In addition, the AZ Extruder also has wing formers to create the correct base for the treads.

Tires slated for the more modern Marangoni Ringtreads then go to station seven, the Ringtread builder. The technician feeds the Brahler tire number into his computer to find out what tread pattern the customer wants. He then selects the appropriate Ringtread and carefully unwraps it to avoid touching it with his hands. It is then placed on the Ringtread builder. Using computer and laser technology, the Ringtread is slightly expanded, the tire inserted in the center of the Ringtread, and then the Ringtread contracts around the tire in precisely the proper location.

Station eight is the tread builder for the older flat tread type of retreads. This is less costly than the Ringtreads but does not have the same quality features. At Brahler's, the flat tread retread is primarily sold for use on truck trailers and less critical applications.

After the tread has been mounted on the tires, they move to station nine which prepares them for curing. While some retreaders use only an outside rubber sleeve called an "envelope," Brahler's uses both an inside envelope and an outside envelope to maintain the highest quality. An air hose is attached to each tire and a vacuum is applied to provide pressure on the tire components during the curing process.

Brahler's high quality retreads use the seamless Marangoni Ringtreads. This photo shows the Ringtread Builder with the slightly expanded Ringtread on the left and the tire casing with a layer of cushion gum on the right. Using computer and laser technology, the tire is inserted into the Ringtread and the Ringtread is allowed to contract around the tire in precisely the proper location.



Station 10 is the actual curing process. Some retreaders use open electric heating for curing while Brahler's uses closed autoclaves with steam. One advantage of steam over electric is that it provides moisture during the curing process to prevent the rubber from drying out and becoming brittle. Given the fact that heat is the worse enemy of tires, a second advantage of the steam is that it allows a shorter curing process. The Brahler autoclaves will cure a retreaded tire in 94 minutes. Some of the traditional electric retread heaters require as long as four-and-a-half hours.

An interesting side note is that some retreaders using the prior technology may leave tires in the electric heaters overnight. This is known as a "sleeper cure" and can be bad for the retreads since the excess heat can make the tires brittle.

When removed from the autoclaves, the tires are allowed to cool at room temperature and then moved on to station 11, the Final Inspection. What is particularly interesting is that the man in charge of the final inspection was once a Brahler's customer who was very critical of the retreads and personally inspected every tire. Today he works for the company and now inspects every tire as they come from the autoclave. He has full authority to reject tires or send them back to any station. At this point each tire is given a DOT code and date to identify it.

Station 12 is a pressure test. While final pressure testing is popular in Europe, it is still relatively new on this side of the Atlantic. At Brahler's, each tire is placed in a cabinet to

After being cured, the retreaded tires are cooled at room temperature and then go through a final inspection. The inspector has full authority to reject tires or send them back to any station.

Tires at Brahler's also go through an actual pressure testing where they are placed in a cabinet to protect the technician while they are subjected to increasing pressures as a final test.

shield the operator and then inflated in stages up to 100 pounds. This test confirms the fact that the retreaded tires are capable of holding air pressure. Approximately once each month a tire fails this test when a sidewall separates in what is known as a "zipper."

After station 12, the tires are painted and packaged as required and some are given a customer bar code. The retreaded tires are then shipped back to the Brahler Tire Centers or to the customers that sent their tires in for retreading.

The obvious question is "what should someone look for in a retreading company in order to get the highest quality retreads?" Based on our research, we would recommend that you select a company using the Marangoni Ringtreads. If possible, that retreading company should also have laser shearography, an extruder instead of rolls of cushion gum, inner and outer envelopes, steam autoclaves for curing, and pressure testing of retreaded tires. These state-of-the-art improvements could mean that your retreads will hold up better than your new tires.

Rolling Resistance and Fuel Economy

Some people have asked whether there is a relationship between tires and fuel economy. The obvious negative is that underinflated tires will not only increase your fuel usage but will also shorten tire life. However, many tire manufacturers and retreaders offer fuel efficient tires based on lower rolling resistance and unique tread designs.

Tires that are fuel efficient cost a little more but can increase your fuel economy by as much as six to nearly eight percent. One figure we saw indicated that with today's diesel fuel prices, a coach equipped with these tires could save as much as $4,000 to $5,000 for every 100,000 miles driven. Hence, fuel efficient tires are probably of little value on converted coach or on charter coaches that do not run many miles. However, they could offer substantial savings in larger fleets that operate more miles. You can ask your tire dealer or retreader whether they carry tires like this. ❑