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DPF COMES CLEAN

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PLUS

UTI: Basic safety tips are worth revisiting

It's often a good idea to dust off past contributions to *BUSRide Maintenance* for the valuable information they contain. In this case, a piece by Aaron Bereiter, a National Certified Trainer and Technical Team Leader for the Universal Technical Institute (UTI) campus in Glendale Heights, IL. He is also an ASE Master Technician.

In his write-up, Bereiter writes that UTI students have to study OEM and OSHA-mandated safety standards, recognize safety symbols designating electric charges and dangerous chemicals, and learn the proper methods for venting, handling, storage and disposal of chemicals. In addition to all of this, Bereiter includes a list of the top 15 safety practices every technician should follow. These are second nature to many of our readers, but a refresher never hurts:

1. Safety glasses should be worn at all times in the shop
2. No loose or baggy clothing
3. Proper footwear, such as closed-toe shoes or boots
4. No jewelry
5. Clean spills immediately
6. Pick up tools and creepers to prevent trip hazards
7. Dispose of all fluids according to federal, state and local standards
8. Know your surroundings
9. Dispose of rags and oil drying mats properly
10. Practice proper lifting techniques
11. No horseplay in the shop
12. Select proper tools for the job and practice proper tool usage
13. Always properly support a vehicle with jack stands before beginning any work
14. Always chock wheels on any axle still on the ground to prevent rollaway
15. Always properly lockout equipment to prevent accidental operation

To read Aaron's full piece (and more like it) go to **busridemaintenance.com** and search for "The most valuable tool in the shop: Safety knowledge," or find *BUSRide Maintenance's* March 2011 issue.

Richard Tackett
Editor
BUSRide Magazine

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Voith increases power and reduces fuel consumption

Voith's two-stage air compressors offer a range of benefits to commercial vehicle operators including a high degree of energy efficiency, low-emissions, reduced weight and longer service intervals. The key to this range of benefits is an inter-cooling system that ensures consistently high air quality and noticeably lower fuel consumption. An extended compressor lifetime is another advantage of the two-stage principle which benefits all bus operators using any Voith air compressor. The two-stage principle features an intermediate chamber with cooler between the suction and pressure chamber. This allows air to be cooled as it makes its way from the first to the second compression stage.

Voith Turbo, Inc.
York, PA

New apps estimate cost savings with propane

The Propane Education & Research Council released a suite of cost calculator tools for customers in three of the industry's fastest-growing markets: agriculture, commercial landscape, and on road fleets. The calculators estimate potential fuel savings and ROI with clean, American-made propane when compared with conventional fuels like gasoline and diesel. The PERC cost calculator series currently includes the Propane Irrigation Engine Calculator, Propane Mower Calculator, and Propane Autogas Calculator, which are conveniently available in multiple different platforms. The web tools can be operated with Internet access online at propanecostcalculator.com.

Propane Education & Research Council
Washington, D.C.

TextSpeak targets ADA, signage and onboard bus systems

TextSpeak™ has released both the tiny TTS-EM module and the TTS-EN-M amplifier system to offer the most sophisticated voice synthesis paging and announcement product family of its kind. The stand-alone packages require only a digital input signal and a speaker connection to produce spoken audio with integrated Text-To-Speech. The conversion of informational data to a clear, natural sounding voice is completely automatic. Dynamic and real-time passenger information, announcements and security warnings can be spoken from message queues, CAD/AVL systems, streaming data or directly from typed text.

TextSpeak
Westport, CT

Trans/Air makes transit compressor available

Trans/Air's TM43 is a heavy-duty transit compressor for buses and coaches. It provides the high reliability and capacity only available from a transit compressor design for heavy-duty split system and rooftop applications. With a capacity of 80K (SAE) / 128K (IMACA) Btu/hr, features include 10 cylinder swash plate for smooth operation, heavy-duty transit clutch in multiple configurations, flexible port and mounting design for easy installation, high and low pressure switches for protection, oil sump for reliability, and compact / light-weight design enabling mounting directly to the engine. Mount & drive kits are engineered for Ford F650/F750, Freightliner M2, and selected conventional school bus chassis.

Trans/Air Manufacturing
Dallastown, PA

Balance with beads

Two companies discuss the advantages of this tire balancing technology

While wheel weights have been around for years, a better solution for heavy-duty commercial vehicles might be the use of balancing beads. Inserted into the tires and easily installed, these over-the-road (OTR) products continuously balance the tires as the vehicle is moving.

Innovative Balancing, Rochester, NY, markets its high-density ceramic beads as Dyna Beads and Counteract Balancing Beads, Georgetown, OT, Canada, manufactures a patented specially coated glass bead it says will not breakdown or degrade. Each product is similarly placed directly into the tire where it moves freely and automatically balances the complete wheel assembly.

Dyna Beads are essentially free-moving weights that react to the centrifugal force in the rotating tire to counterweight a tire imbalance from a point farthest from the axis of rotation. Innovative Balancing says the amount of material will distribute itself in weight and position dependent on the balance requirements of the individual tire. If the axle were hard fixed in a bearing with no chance of movement, the bearing would be forced to handle the imbalance and the beads would do nothing significant. However, vehicles come with a suspension system and the axle moves as required.

According to Innovative Balancing, as the vehicle speeds up, the force of the tire imbalance increases as the tire seeks to rotate around its own center of rotating mass, which may not be at the center of the axle. The center of mass is on the heavy side of the wheel with respect to the center of the axle. This is precisely where the beads will roll. The company says the result is a smooth, vibration-free ride, derived from continuous repositioning of the beads as the tire wears, ridding wheel vibration and tire cupping problems.

Innovative Balancing says its reusable balancing beads are less expensive than bolt-on balancers and will not break down in tires or damage the inner liner such as with powders and granules. The product also is safe for shop personnel and kind to the environment.

Three ways to install

Applicator Method —The applicator method is the standard installation for tires already mounted. Simply remove the valve core, install the customer Applicator and allow the beads flow into the tire.

Pour In — For tires not yet mounted on the rims, simply mount the first tire bead over the rim, then cut the bag and pour in the contents. Mount the last tire bead and inflate.

EZ Open Bags® — The preferred installation for volume users of large heavy-duty commercial vehicles.

The Applicator cannot be used on valve stems with TPMS unit attached. In that case, the Pour In method must be used.

Properly balanced tires run cooler, place less stress on suspension components and can even increase fuel mileage.

Counteract Balancing advises not to combine other internal balancing agents or balancing rings with its beads, as free flowing internal balancing products fall to the bottom at every stop and have to go through the inertia (vibration) balancing process after every stop. If problems occur with other balancing products in use, the company suggests removing them before installing Counteract Balancing Beads.

The company says its balancing beads utilize an additional scientific principle that helps stabilize the product in the balanced position, even during stops and turns.

As this also applies to dual wheels, Counteract Balancing also suggests not having a free flowing product on one of the dual wheels and its product on the other wheel for the same reason.

In addition to pour-in and throw-in bag installation method, Counteract Balancing Beads also offers an injector pump for quick wheel-on installation or an airless pump method.

Counteract Balancing has this advice for tire rotation: Hit the tire on the tread area with a hammer to free up the beads for immediate readjustment to the new wheel assembly position. The company says its beads balance the complete wheel assembly and must readjust to the new rotors, break drum and other wheel components.

Counteract Balancing Beads install easily by dropping a pre-measured package into the tire cavity before mounting or to be injected through the tire valve stem. And, because they were developed to allow anyone to install them, the company says its balancing beads essentially eliminate the costs associated with mounting and dismounting tires, not to mention balancing them the old fashioned way. BRM

When the tire is at rest, all the beads are on the bottom.

As the tire begins to roll, the beads distribute equally around the inner circumference of the tire.

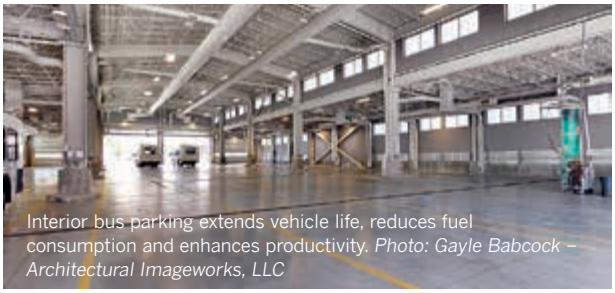
Every time the heavy spot in the tire goes up slightly and quickly, the beads resist this motion and are forced downward.

As the oscillations get smaller, the beads move more slowly to a point of final precise counterbalance. All this happens within a few seconds with no transitional vibration.

The tire is vibration-free and the beads stay fixed in their position due to centripetal force.

Bus parking– inside and out

By Ken Booth and Sheena Zimmerman



Interior bus parking extends vehicle life, reduces fuel consumption and enhances productivity. *Photo: Gayle Babcock – Architectural Imageworks, LLC*

Interior versus exterior bus parking has become a hot topic for transit providers in cold weather climates. Proponents of interior storage assert that warmer, sheltered parking improves and extends the life of the buses, makes maintenance easier, reduces fuel consumption and carbon emissions, and enhances worker morale and productivity. Critics argue that the construction, energy and maintenance costs are prohibitive. When evaluating indoor versus outdoor bus parking, there are several factors to consider.

Initial cost

While the design of interior bus parking is basic and does not require expansive infrastructure, it does involve significant capital expenditure for the structure. Even the most basic building will need exhaust ventilation, adequate lighting, space for vehicle maneuvers, and heating to prevent vehicles and components from freezing.

Exterior bus parking is not without cost. Depending on the agency's fleet size, significant site acreage could be needed as well as additional paving, increased site drainage and retention ponds. In addition, outdoor parking has increased requirements for site lighting, security devices and infrastructure for engine block heaters.

Lifecycle cost

The above initial costs are all direct costs at the outset of the bus parking decision. However, there are many lifecycle costs that come into play. The interior bus parking will require ongoing maintenance and upkeep - like any other building - to keep it functioning well and servicing the agency for its anticipated lifetime.

Exterior parking lifecycle costs, while not as evident, can add up over time. Of most significance is the wear and tear on the buses themselves. Doors, windows, hydraulic systems, tires and the body of the bus itself will all wear out much faster when stored in extreme temperature and weather. When buses are stored outside, they often run overnight or for hours in the early morning to be ready for operations on very cold mornings. This additional run time produces more wear on the engines and increases fuel costs.

According to the staff for Southern Teton Area Rapid Transit (START), Jackson, WY, when it is extremely cold, buses must be left running all night. On ordinary winter nights with less extreme temperatures, buses must be started an hour or two before a shift to ensure they are warm enough to run. The agency estimated it used an additional 8,000 gallons of fuel per year and created 170,000 pounds of unnecessary carbon emissions. By storing buses indoors, both the amount of fuel and carbon emissions are reduced considerably.

Finally, exterior parking increases staff time for snow removal from pavement and buses. The cost of the extra work hours for these tasks, compounded with the increased risk for employee accidents due to ice, snow and cold temperatures, all add into the lifecycle costs of exterior parking.

Non-monetary impacts

While bottom line costs are usually the driving factor in facility decisions, there are several less quantifiable impacts to parking buses outside. Due to site layout requirements and necessary infrastructure for engine block heaters, agencies have less flexibility for building, circulation and parking layout. It can also limit future facility expansion on the site.

Operationally, storing buses in an interior heated building with good lighting provides a more favorable work environment and improves employee morale. It also benefits the agency's clients, allowing for quicker access to buses and reducing loss of productivity associated with preparing buses for operation.

Indoor parking also impacts the surrounding community. When buses are prepped for service indoors, the associated noise from buses backing up, headlight glare and bus exhaust are less intrusive on neighbors. This is true in the case of START, whose neighbors include an upscale hotel and residences.

The final non-monetary impact is becoming more frequently cited - carbon emissions. In addition to significantly reducing fuel costs, not running bus engines all night and for extra hours cuts carbon emissions. This improves air quality in communities prone to thermal inversion and smog, and for the planet as a whole.

Because every agency is unique, bus parking solutions should always be tailored to meet each agency's specific requirements. However, it is imperative to take into account all costs - initial construction, lifecycle, bus maintenance and replacement, and fuel - as well as the intangibles of employee satisfaction, safety and impact on the environment and surrounding community. BRM

***Ken Booth**, Mountain Region manager, and **Sheena Zimmerman**, facility designer, for Maintenance Design Group – a nationally recognized leader in bus maintenance facility design – have worked with over 100 agencies to plan and design their facilities. To learn more about their capabilities, please visit www.maintenancedesigngroup.com.*

DPF COMES CLEAN WITH FSX INC.

TrapBlaster 7 corrects for failures in traditional methods

By David Hubbard

The Diesel Particulate Filter (DPF) has proven a huge success in removing soot particulate matter from the exhaust stream since the 2007 EPA emissions mandate went into effect. The good news is these vehicles no longer belch black smoke and leave the stench of diesel fuel in their wake.

The bad news, according to Drew Taylor, president of FSX Inc, Granite Falls, WA, an industrial filtration cleaning company, is that the DPF is more fragile than originally thought and requires some careful maintenance of its own.

"In the case of the DPF, the designers anticipated the gradual buildup of ash deposits in the filter," Taylor says. "Unfortunately, the tools to correct this condition were almost an afterthought."

He says once the mandates came out following an "endangerment finding," and EPA then implemented its emission reductions in successive stages. OEMs and vendors went scurrying to incorporate the best available methods for achieving compliance.

He thinks with a little more time to spend on the R&D side and working out the physics, the various manufacturers may have been able to come up with a more effective and less disastrous approach to cleaning and maintaining a DPF.

"The technology was not as refined as we would have liked," Taylor says. "Everyone began experiencing problems and wondering why."

Taylor says the focus was more on low cost and a small environmental footprint than on actually paying attention to how well the process was cleaning the DPF. As it stands today with the earliest DPFs coming out of warranty after five years, it has become very clear the traditional filtration cleaning methods do not apply to new technology.

These early cleaning tools proved ineffective at clearing ash and the full destructive power of ash deposits left in a DPF became apparent. Many transit authorities that relied on these early cleaning tools immediately struggled with high DPF replacement rates, which at $3,000 each became a major budget buster. Several large metropolitan transit authorities lost sums amounting to many hundreds of thousands of dollars inside one year.

Taylor remembers the day King County Metro, Seattle, WA, came to FSX for help in regaining control of the 300 DPFs it had retrofitted onto 300 articulating coaches in the KCM fleet. These Caterpillar and Cummins DPFs were unlike anything he and his associate Cole Waldo had ever seen in all their years of providing industrial filter cleaning services for Boeing and other Puget Sound manufacturers.

A DPF is a large cylindrical ceramic filled can, honeycombed with thousands of small cells open on one end and closed on the other. With no other method available, FSX began the task by cleaning every DPF manually with an air nozzle. This laborious process actually produced a much higher quality cleaning than the traditional pulse tools in use then by KCM.

The TrapBlaster 7.

"The person doing the cleaning could readily see the soot and ash spurting out the opposite end of the DPF," Taylor says. "He knew where to focus the cleaning and he knew he was done when no more ash and soot came out. This process could last anywhere from 30 minutes to an hour, and it always left the person exhausted mentally and physically."

Taylor says that prior to 2004, this industry had never encountered a DPF filter and assumed falsely that pulse technology – the only available cleaning method at the time – would work fine. The Dallas Transit Agency lost nearly a half-million dollars in DPFs before realizing pulse technology was a failing proposition.

"We determined then and there to develop a better way," he says. "We began by looking for the reasons traditional pulse technology could not do the job."

Cole Waldo engaged in a focused effort to automate the manual process and in about six months produced the forerunner to the

current TrapBlaster 7 pneumatic stage 1 DPF cleaning machine (now at the top of the wish lists of most public transit authorities across North America).

According to Taylor, the pulse method assumes the 6,000 individual cells within a DPF load equally. This is not the case, as FSX discovered trying to shotgun blast the soot out of the cells all at once.

The Trap Blaster features two air knives that deliver focused, high-pressure airflow against both ends of a DPF as it turns on a variable speed turntable (See the video at www.fsxinc.com). This tool addresses all 6,000 cells and usually cleans them within 20 minutes. It can even custom-clean specific areas such as the heavily loaded outside edges.

Why all the fuss to remove a pint or so of sand-like ash from a DPF?

A DPF successfully burns off hundreds of pounds of diesel soot without a trace. Another substance known as ash (which originates not in fuel but in engine lubricants) and wear does not burn off but builds up steadily in the cells, occupying more and more space needed for soot oxidation.

Restriction sensors on the DPF call for more forced regenerations to try and purge the growing restriction inside the cells. Fuel mileage shrinks and cracks form in the ceramic substrate, which is irreversible damage. This cancer-like process dooms a diesel particulate filter.

"We learned the cell loads are lighter at the center and heavier toward the edges," Taylor says. "The pulsed air simply takes the least path of resistance, with all the energy going directly to the center cells in the filter, clearing an easy path and barely addressing the heavier clogged cells filled with ash and not soot."

Removing the ash from all the cells early and often thwarts this destructive process. Think of a DPF as a sophisticated garbage can that also needs dumping regularly — and that means all 6,000 cells. Taylor says nothing does this as effectively as the FSX TrapBlaster 7. In addition to the TrapBlaster 7, the FSX system also includes the SootSucker 2 collection and disposal system for safe handling of the collected soot and ash; the TrapTester Test flow bench to verify recovery levels are near that of a new DPF; and the TrapBurner, which provides an off vehicle thermal regeneration option for those DPFs requiring further soot oxidation work to achieve full recovery. Taylor says the FSX technology also has a built-in diagnostic feature that makes it possible to detect filters that are failing.

From left to right: TrapBurner Stage 2, SootSucker 2 Dust Collector, TrapBlaster 7 Stage 1 Cleaner.

"Had pulse technology worked, the industry would have a very inexpensive cleaning tool using shop air and taking up very little space in the shop," Taylor says. "Instead, it has proved a non-starter that only exacerbated the situation." BRM

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