News Release

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FOR IMMEDIATE RELEASE

BENDIX TESTING CONFIRMS LINK BETWEEN SLACK ADJUSTER PERFORMANCE AND FUEL CONSUMPTION

Minimizing Even Occasional Brake Drag Can Lead to Significant Fuel Savings

AVON, Ohio – Dec. 1, 2022 – Every fleet knows that small changes can have a big impact when applied to the number of vehicles and miles traveled per year. A tenth of a mile-per-gallon here or a few pounds of weight reduction there add up quickly. In testing the role that slack adjusters can play in a vehicle's fuel economy, Bendix Commercial Vehicle Systems LLC (Bendix) concluded that minimizing even occasional brake drag can lead to reduced fuel consumption.

"When you consider every drum-braked wheel-end in a fleet, and the cumulative effects of brake drag on fuel consumption, it's easy to see the importance of spec'ing the right slack adjuster," said Mark Holley, Bendix director of marketing and customer solutions, Wheel-End. "Once you have a dragging brake, the only way to resolve it is to either burn through the friction to the point where the drag becomes insignificant or have a technician identify it and manually adjust the brake. Either way, this costs the fleet money through an increase in fuel consumption and/or additional labor/maintenance costs."

A fleet with a unit that has dragging brakes can experience at least a 1.5% increase in fuel consumption, based on drag occurring 25% of the time. According to Holley, "A vehicle with one dragging brake can consume about one extra gallon of fuel per 90 miles. Traveling 400 miles per day, that means an extra 4.4 gallons are consumed each day."

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Holley continued, “Let’s look at the numbers. With the average year-to-date U.S. price of on-highway diesel fuel at $5.14 per gallon – as reported in November 2022 by the U.S. Energy Information Administration (EIA) – that means $5,654 per year, based on 250 working days per year, in extra fuel costs. If drag occurs only 25% of the time, then it’s an extra $1,413 per year per vehicle that could have been prevented.”

Drums and Dragging

Automatic slack adjusters are designed to provide incremental adjustments of the brake shoes toward the drum during braking. Some designs are stroke sensing, others are clearance sensing, and some designs have a more rapid adjustment rate.

During braking, as heat builds up in the brake system, the drum thermally expands away from the friction. Brake drag can occur when a slack over-adjusts to “chase” the expanded drum. When the drum eventually cools down and contracts, the running clearance (the space between the friction and drum) is eliminated. As a result, the friction remains in contact with the drum even when the brakes are not applied.

A dragging brake not only means additional wear to friction and the surface of the drum – it means additional fuel consumption to overcome the brake drag torque until the friction wears down and/or until the drum heats back up and expands away from the friction. Once the drum cools again, the brake drag continues to reset itself more or less to a lower drag torque value. When the drum heats up again, the slack “chases” it, and again the cycle repeats itself. This is why adjustment speed matters.

The Bendix® Versajust® LS™ and GS™ automatic slack adjusters provide a gradual, continuous, and precise adjustment rate, avoiding over-adjustment and better maintaining the running clearance to help prevent brake drag. According to Holley, the Versajust link-style LS suits the needs of about 90% of applications, while the grounded-style GS is designed to fit unique packaging requirements along with higher brake-duty cycle applications that run at higher loads – for example, refuse.

“The heat of a drum brake application expands the drum and increases the running clearance, so the slack adjuster will need to compensate,” Holley said. “Our benchmark testing has shown that other slack adjusters in the marketplace today can adjust up to three times faster than Versajust for the same amount of brake shoe travel, which demonstrates their greater risk of producing brake drag.”

Putting It to the Test

Bendix dynamometer ("dyno") testing had already shown that competitive slacks exhibited various levels of brake drag, while the Versajust® slack did not show drag. Next, Bendix turned its attention to understanding the fuel impact of brake drag by conducting a SAE J1321 Fuel Consumption test at the Transportation Research Center (TRC) test track in East Liberty, Ohio.

Bendix tested two identical tractors and trailers with the test unit adjusted to produce the level of drag collected in the lab and the other unit untouched. Both the test unit (exhibiting brake drag) and control unit (no brake drag) were then run on the track at the same time so they were subjected to the same environment – temperature, wind speed, etc. – to eliminate any fuel-impacting influences. After multiple runs (100 miles/run) on the track collecting data, the fuel consumption was measured and compared. The results were very compelling, where the worst drag case demonstrated a fuel consumption penalty of more than 1.5% during the 100-mile test.

The Big Picture

This translates to an additional 0.011 gallons per mile of added consumption when a vehicle's brakes are dragging. Assuming a $5.14 per gallon cost for diesel at the pump, that would be $0.06 of added cost per mile.

"We consistently hear that the two greatest vehicle operational costs to a fleet are fuel and tires; so, if the fleet can avoid dragging brakes and prevent that added fuel cost, then it could translate to savings that they didn't know could be realized because the wasted fuel costs were always there," said Holley. "It's important to understand that brake drag can go undetected to the driver because the engine is trying to pull an 80,000-pound GCW combination – and/or when you include other mechanical losses, such as transmission, drivelines, engine brakes, aerodynamic drag, etc. Only a technician would detect it during maintenance, if they were to check the brake free stroke – verifying none – or notice that the tires don't spin freely."

Extrapolating the extra fuel consumption due to a dragging brake over the life cycle of a tractor and trailer can lead to some big numbers when considering the number of vehicles a fleet has in operation multiplied by miles traveled. But automatic slack adjusters also impact other total cost of operation (TCO) factors, including maintenance costs and regulatory compliance.

By reducing brake drag, the Versajust slack can improve drum life by up to 30%, extend brake lining life by up to 16%, and reduce the need for brake adjustments due to brake drag.

Properly operating slack adjusters are also crucial to keeping drum brake stroke within Compliance, Safety, Accountability (CSA) guidelines.

"We feel it's important to educate fleets and technicians on the signs of brake drag and the importance of preventing it," Holley said. "Safety and fuel consumption are always high-priority issues for fleets, and the right slack adjuster can address both in significant measure, while at the same time helping to lower total cost of ownership."

About Bendix Commercial Vehicle Systems LLC

Bendix Commercial Vehicle Systems, a member of Knorr-Bremse, develops and supplies leading-edge active safety technologies, energy management solutions, and air brake charging and control systems and components under the Bendix® brand name for medium- and heavy-duty trucks, tractors, trailers, buses, and other commercial vehicles throughout North America. An industry pioneer, employing more than 4,400 people, Bendix – and its wholly owned subsidiary, R.H. Sheppard Co., Inc. – is driven to deliver the best solutions for improved vehicle safety, performance, and overall operating cost. Contact us at 1-800-AIR-BRAKE (1-800-247-2725) or visit bendix.com. Stay connected and informed through Bendix expert podcasts, blog posts, videos, and other resources at knowledge-dock.com. Follow Bendix on Twitter at twitter.com/Bendix_CVS. Log on and learn from the Bendix experts at brake-school.com. And to learn more about career opportunities at Bendix, visit bendix.com/careers.

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