

S-Cam Foundation Brakes: Improving Performance and Brake Life Through Proper Preventive Maintenance

Extra Attention to Adjustments and Components Impacts Uptime and Safety

S-cam drum brakes – the most common air foundation brakes on the road – are a familiar sight to every wheel-end technician in the North American trucking industry. As part of its Bendix Tech Tips series, Bendix Commercial Vehicle Systems LLC offers preventive maintenance guidelines for S-cam foundation brakes that can elevate the effectiveness of regular brake jobs.

“It’s easy to view preventive maintenance as a quick adjustment, grease job, and new brake pads, but there’s much more to it,” said Kevin Pfof, Technical Service Coordinator, Bendix Spicer Foundation Brake LLC (BSFB). “Paying attention to a few key details during a routine brake job can have a major impact on keeping trucks on the road and in good working condition, reducing maintenance costs, and improving safety.”

Free Play and Brake Stroke

Tools are available for measuring a brake’s free play and stroke, as well as the do-it-yourself method of cutting a short segment of tape measure and attaching a magnet to one end. Place the tape measure against the face of the brake chamber and position it to measure the travel of the pushrod at the center of the large clevis pin.

Use a tool such as a small pry bar to move the slack adjuster and check the brake’s free play – how far the center of the large clevis pin moves before the brake shoes come in contact with the drum. Free play should be between 3/8 and 5/8 of an inch. If free play falls below the minimum or exceeds the maximum, inspect all brake components for damage or out-of-spec conditions. Free play should be the same across all brakes on a system.

To measure brake stroke, bleed the air system down to between 90 and 100 psi, and note the center of the clevis pin’s position on the ruler. Next, either have someone fully apply the brakes and hold the pedal down, or wedge the brake pedal in the fully applied position. This will actuate the brakes between 90 and 100 psi. Note the new position of the center of the clevis pin on the ruler. The distance between the two marks indicates the brake’s power stroke. The maximum allowable power stroke varies depending on the chamber size and type.

Brake stroke is one of the key measurements during roadside brake inspections such as the Commercial Vehicle Safety Alliance’s annual Brake Safety Week campaign: In September 2014, more than one in 10 vehicles inspected was placed out of service due to brakes being out of adjustment.

“If the brake is out of adjustment, do not adjust the automatic slack adjuster (ASA) – I can’t emphasize this enough,” Pfof said. “There are many factors that can cause an automatic slack adjuster to overstroke, but none will be remedied by a manual readjustment. Manually adjusting an ASA involves working against its internal back-off clutch, which can impact the life of the adjuster. Refer to the manufacturer’s instructions and mechanism tests to determine whether the slack adjuster is properly adjusting the brake.”

Another important note on brake chambers and slack adjusters: There are two common types of brake chambers – standard and long stroke – as well as two common sizes of slack adjusters (5.5 inch and 6 inch, as measured from the center of the cam shaft to the center of the clevis pin). For both regulatory and brake performance reasons, all slack adjusters and air chambers on any given axle must be the same type and size.

Greasing and Seals

When greasing brakes, it's important to grease the brake to capacity. Putting in less grease than is needed to fill all interior gaps can lead to condensation forming inside the brake components, which may cause rust and corrosion. Seals inside the cam tube are engineered to let excess grease out of the area, meaning new grease should be added until any dirty grease or condensation is visibly purged out of the end cam tube near the slack adjuster.

Grease purging at the opposite end of the cam tube, near the S-cam head, indicates a bad grease seal that must be replaced. Grease purged at the cam head can drop into the brake drum, contaminating the drum and lining, and impacting brake performance.

Brake Jobs: More Than Friction

Check the lining wear: If it's time to do a brake job and replace the friction, it's time to check the cam bushings and shims as well.

After removing the wheel and brake drums, disconnect the slack adjuster from the chamber clevis by removing the clevis pin. Remove the dial indicator from the inboard end of the cam and rotate it over to the cam head, then manually move the cam head up and down to measure the radial play. If the radial play is 0.030 of an inch or more, the cam bushing or camshaft is worn and needs to be replaced. Keep in mind that even if the radial play is below maximum, the next brake servicing may be several hundred thousand miles down the road, and too much radial play leads to uneven brake shoe wear, as well as a loss of stopping power.

Bendix recommends keeping radial play below 0.010 of an inch by replacing cam bushings as needed. Cam bushings are a low-cost component that can make a huge difference in the long run.

Bronze bushings are recommended for severe-duty vehicles and heavy-wear brake situations, such as refuse vehicles. Nylon bushings generally suffice for line haul and highway applications.

Next up is checking slack adjuster alignment and "end play." Put the slack adjuster back on, placing a washer between the adjuster and the cam tube, and another on the cam head. This will help keep dirt and contaminants out of the bushings and seals. Add or remove washers (shims) between the slack and the end of the cam tube to ensure that it lines up directly with the center of the clevis. The shims on the outside of the slack adjuster next to the snap ring are for adjusting "end play," which should be between .005- and .025-inch on the dial indicator. The closer "end play" is to zero, the better, since it will increase as the brake is worn-in over the first month of use.

"Shims get worn down through exposure to the elements and road grit, so we recommend changing the shim packs during brake jobs," Pfof said. "The few minutes spent making these measurements, re-shimming, and re-bushing are well worth the extension in brake life and performance."

Information in the Bendix Tech Tips series, along with instructional videos and interactive training, can also be found at the Bendix On-Line Brake School, www.brakeschool.com. For more information on drum brake maintenance, reference the Bendix Foundation Drum Brake Service Manual (BW7258) in the Document Library on bendix.com.

About the Bendix Tech Tips Series

Bendix, the North American leader in the development and manufacture of leading-edge active safety and braking system technologies, is committed to helping keep commercial vehicles on the road and in good working condition. The Bendix Tech Tips series addresses common commercial vehicle maintenance questions and issues concerning the total range of components found within foundation and air brake systems, as well as advanced safety systems.