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## **Benefits of Air Disc Brakes (ADB) Over S-Cam (Drum Brakes)**

The North American commercial vehicle industry has been steadily transitioning to the use of Air Disc Brakes (ADB) for many years and the presence of ADB systems in virtually every market segment certainly cannot be ignored. While traditional S-Cam air brake systems have been reliable and effective in many ways, there are distinct advantages of Air Disc Brakes over S-Cam.

ADB systems have fewer components to be concerned about during routine maintenance and/or reline. There is no external return springs, cam rollers, camshafts, anchor pins/bushings; therefore, the need to invest and stock these items are eliminated.

Previous generations of ADB incorporated the use of a spring brake chamber and slack adjuster for brake actuation. This platform, while effective by its design, created inconsistent braking application especially when parking the vehicle. With today's ADB systems, there is no need for push rod modification (cut to length) as there is with S-Cam brakes. The piston rods of ADB chambers are precisely machined and calibrated to fit the socket on the internal adjuster of the caliper and the chamber simply bolts onto the caliper mounting flange. If a pad change is all that is required, time needed for a reline is substantially lessened.

Most all ADB aftermarket chambers are orientated the same as the OEM units, so repositioning to achieve proper port angles, etc. is not necessary making installation quicker and more consistent. There may be some exceptions where repositioning is required to accommodate proper port and clamp band angles set forth by the manufacturer.

In many applications, ADB have been found to last longer than S-Cam brakes, providing more miles between relines. ADB systems tend to operate and function at lower temperatures causing less heat related failures, such as cracked friction material and opposing surfaces.

ADB pads are easier to conform to the opposing surface (i.e. the brake rotor). S-Cam brakes rely heavily on the exact machined area of the brakes drum I.D. and the final surface grind of the friction material (brake block) for proper contact area achieved. As 90% plus is the desired contact area, many S-Cam systems are achieving only 30% - 50% contact leading to uneven contact and, often, tremendous brake noise.

Brake fade is much less with ADB over S-Cam which leads to more consistent torque levels produced during stopping occurrences. Brake adjustment should be easier to maintain also. S-Cam brake adjustment has to factor in the pushing nature of a brake shoe against a hot and often expanding brake drum. The clamping nature design of ADB pads clamping a brake rotor should help reduce over stroke scenarios with the brake chamber and keep the brakes within the proper adjustment area.





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There are challenges with visual inspection of ADB systems, as everything is enclosed inside the caliper, but there are common ways to help verify proper function of the ADB system, including comprehensive electronic brake monitoring systems.

According to studies, driver behavior and reaction times are the same with ADB or S-Cam brakes, so driver re-training is not a concern as the brakes would “feel” the same.

Whether it is commercial air brakes, or any other type of brake system, safety is always the overriding factor when making decisions regarding such products. Data does support ADB vehicles having fewer collisions than vehicles equipped with S-Cam brakes and enhanced S-Cam brakes (vehicles with upgraded steer axle brakes) \*.

The same studies also show, in instances, where the ADB vehicle was involved in a collision, the collision was at a highly reduced speed as compared to vehicles utilizing S-Cam brakes. Both of these scenarios would obviously lead to fewer lives lost due to commercial vehicle collisions.

When studying stopping distances, it was learned ADB equipped vehicles decelerating from 60 MPH stopped at 16% less distance than enhanced S-Cam equipped and 30% less distance than S-Cam equipped vehicles.

It was also learned that ADB equipped vehicles were 15.7% less likely to be in a collision, keeping in mind, as mentioned previously, driver behavior, reaction times, etc. are the same with ADB or S-Cam brakes.

Stopping distance requirements are more easily achieved with ADB systems and may not be met in some cases with S-Cam systems. Even if distances are met, just a few feet may mean the difference between a collision and a non-collision, so 16% - 30% shorter stopping distances is a very important statistic to keep in mind.

### **Summary:**

Current ADB system designs, compared to previous generation ADB platforms, are proving to be increasingly reliable in providing a more efficient and effective way to stop a commercial vehicle. ADB manufacturers are consistently improving platform designs that will provide consistent performance under all running conditions. As with anything new, there is always an adjustment period and short learning curve, but the pros of an ADB system seem to outweigh the cons.

Source \* NHTSA DOT HS 811 367 – October 2010



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