Why should my fleet care about PBBTs?
Examining the measured brake forces for a vehicle can help determine:

• Whether the choice of brake lining is appropriate and cost-effective for your fleet’s needs;
• The origin of uneven brake lining wear problems;
• The potential sources of tire wear problems;
• The origin and nature of air valve or other air system problems;
• The origin of stability problems during braking;
• An objective response to driver complaints regarding the vehicle’s braking performance;
• Whether a vehicle involved in an accident had adequate braking capability; and,
• Whether the vehicle meets the minimum DOT regulated brake performance standards.

Performance-Based Brake Testing for Safety, Savings & Performance

In my maintenance shop, can the same information be obtained from a complete brake inspection?
While some of the information available from a PBBT can be determined from a physical brake inspection, additional complementary information is obtained. In particular, no known visual inspection method can determine whether a given brake has adequate braking forces. Visual inspections can detect a potential lack of performance if certain components are missing, damaged or are out of adjustment. However, the actual brake performance depends not only on all components being present and in proper mechanical order, but particularly on the friction forces generated at the drum/block or disc/pad interface. In the case of non-PBBT devices, contaminated or glazed lining and pressure restrictions in air lines, the braking performance can be dramatically degraded despite the proper appearance of all mechanical components. The use of the two complementary inspection methods is ideal for a maintenance shop.

Can’t I get the same information from a stopping distance test performed in my yard?
No. While stopping tests are the oldest quantitative method of determining overall vehicle performance, they provide limited information. The detailed brake force and balance information which helps a fleet keep its maintenance costs down are not available from a stopping distance test. Nor is any of the diagnostic air system information that can be determined with some PBBTs available from a stopping test.

What is a Performance-Based Brake Tester (PBBT)?
A PBBT is a machine which can assess the braking performance of a vehicle. This is done through direct measurements of the brake forces at each wheel end, axle, or for the entire vehicle. Such devices include roller dynamometers (roller-dyno) and flat plate brake testers. Each of these devices can determine the brake forces without restriction to the brake type (disc vs. drum) or energy supply (air, hydraulic, or electric). In addition, PBBTs based on mechanical or electronic decelerometers can assess the overall vehicle braking capability through a stopping performance test in which deceleration and/or stopping distance is obtained, also independent of brake type or application method. PBBTs have been used worldwide for decades for both safety inspections and as part of regular preventative maintenance work.
Are PBBTs used during roadside safety inspections?
In the United States, as of February 5, 2003, section 394.52 of the Federal Motor Carrier Safety Regulations (FMCSRs) was amended such that certain PBBTs which meet the Federal Motor Carrier Safety Administration (FMCSA) functional specifications can be used for enforcement of minimum braking performance requirements on commercial motor vehicles. For vehicles with weight ratings greater than 10,000 lb, the regulation requires that the breaking forces as a percentage of gross vehicle or combination weight (BFtot/GVW) must be at least 43.5. Other minimum values are required for different commercial vehicle types, with values ranging from 52.8 to 65.3. Additionally, the Commercial Vehicle Safety Alliance (CVSA) approved PBBT-based out-of-service criteria for roadside enforcement officials which became effective throughout North America on April 1, 2008.

What if my vehicle “fails” a PBBT test?
If failure was simply the result of a driver’s not providing a full brake application, a full brake application will likely raise the vehicle’s performance score. If a full application was made, then there are a limited number of reasons the brake forces may be low when compared with the vehicle weight. The first check should be whether the vehicle or truck weight is too high. Reducing the weight will increase the brake force-to-weight ratio. After this, obvious mechanical problems such as pushed travel, broken or missing components, air system problems or degraded/inadequate lining should be checked. Although experienced mechanics often will find the problem without any assistance, a systematic check of these brakes will nearly always find the cause of the low brake force. Repairs and/or adjustments should be made, after which a re-test on the PBBT can be used to ensure that the poorly performing brake(s) have been brought up to adequate performance. What if my vehicle “fails” a PBBT test?

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Are the results of a PBBT test consistent with a visual inspection of a brake system?
In general, yes. However, the two inspection methods assess different two things. A PBBT measures brake forces as a percentage of gross vehicle or combination weight, versus a visual inspection, which examines the vehicle for the presence and appropriate functioning of physical components. While a visual inspection can indicate a potential problem with a brake component, in practice the actual brake performance can never be determined by visual inspection. Generally speaking, the brake force measurement method is more objective and in favor of the vehicle during a roadside inspection as well as in a maintenance facility. For example:

- A slightly lighten vehicle or a vehicle equipped with aggressive brake linings can often meet the BFtot/GVW requirements, even though some brakes may be out of adjustment or other apparent defects may have been identified. Thus, a vehicle may be considered safe to proceed in its current location to a location where the defective components may be repaired.
- On the other hand, a vehicle’s brake system can appear defect free, yet low BFtot/GVW can still result from overload, low-friction linings, air system problems and any number of other not visually apparent or “hidden” defects. It is very important for the air system shop to locate the cause of the low BF brakes and implement corrective measures to ensure a vehicle has adequate stopping capability and is not a potential liability to the fleet owner and/or a haz to all highway users.

What specific test results are obtained with a PBBT?
A PBBT can provide wheel-by-wheel and axle-by-axle brake forces, which are important for:

- Benchmarking – New vehicles’ brakes can be checked on delivery to establish a baseline for future brake work or lining replacement selection.

Limiting Liability – Equipment providers can ensure that the vehicles they lease or rent have adequate braking capability before they are added to an in-service fleet. Similarly, in dry or other drive-away operations, trailers that are picked up can be checked prior to heading out.

Air System Problems – PBBTs have the capability to locate and identify problems within the air system. For example: a single brake with an early apply threshold can reduce lining life by hundreds of dollars per axle, per year.

Drum Problems – Out-of-round and out-of-square, deflated or constricted brake chambers, both brake wear and braking performance, can be identified with a PBBT.

Parking Brake Problems – Broken or weak spring brakes can easily be identified with a PBBT.

Brake Balance – The brake forces at each wheel should optimally be in proportion to the loads on each wheel during a stop. Low brake force on one brake axle is overloaded if it, reducing the weight will increase the brake force-to-weight ratio. After this, obvious mechanical problems such as pushed travel, broken or missing components, air system problems or degraded/inadequate lining should be checked. Although experienced mechanics often will find the problem without any assistance, a systematic check of these brakes will nearly always find the cause of the low brake force. Repairs and/or adjustments should be made, after which a re-test on the PBBT can be used to ensure that the poorly performing brake(s) have been brought up to adequate performance.

What other benefits are there for my fleet?
Increased Throughput – Every vehicle’s brakes can be checked in a matter of minutes before it leaves the yard, or for a motorcoach, before it goes into service for the day, providing peace of mind to the fleet operator.

Potential Savings on Insurance – Work with your insurer to determine what you can use in evidence the purchase and use of PBBTs. One fleet’s PBBT purchase was paid for in the first year through the reduction in premiums.

Lower Fuel Costs – Identifying and correcting dragging brakes or bad bearings can reduce fuel consumption.

Safety and Performance – Stopping distance, for which maximum braking capability is but one factor, can be enhanced through improved brake balance and increased overall maximum brake strength.