

### 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 fleets' 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

### 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 some non-OEM replacement linings, contaminated or glazed linings 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.

### How do I find out more about PBBTs?

[www.fmcsa.dot.gov](http://www.fmcsa.dot.gov)  
[www.truckbrakesafety.com](http://www.truckbrakesafety.com)

## Performance-Based Brake Testing for Safety Savings & Performance



### 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.

# Performance-Based Brake Testing for Safety, Savings and Performance



## Are PBBTs used during roadside safety inspections?

In the United States, as of February 5, 2003, section 393.52 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 lbs, the regulation requires that the braking force as a percentage of gross vehicle or combination weight (BF<sub>tot</sub>/GVW) must be at least 43.5. Other minimum values are required for different commercial vehicle types, with values for passenger-carrying vehicles 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.

## I have never tested a vehicle using a PBBT before. How will I know what to do?

Aside from following the instructions of the inspector, there is little you need to do other than ensuring that full system air pressure is available (the test should be conducted with 90-100 psi) and a full brake application is made.



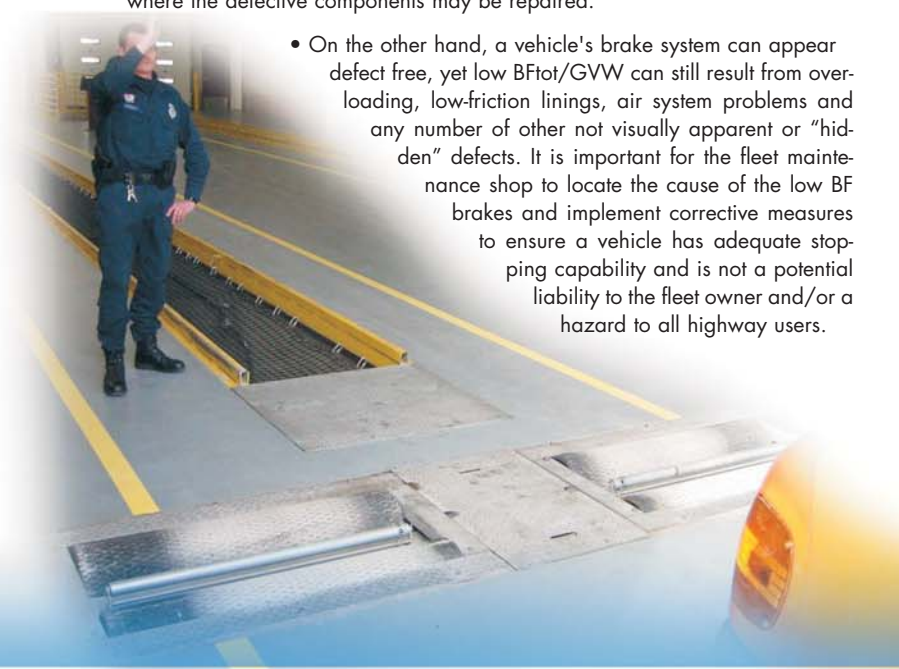
## What if my vehicle "fails" a PBBT test?

If failure was simply the result of a driver's not providing a full brake application, a true 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 axle is overloaded. If so, reducing the weight will increase the brake force-to-weight ratio. After this, obvious mechanical problems such as pushrod 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 checklist of brake system components, such as that provided by the Technology and Maintenance Council (TMC) of the American Trucking Associations (ATA) RP-649, can be helpful. The PBBT test results identify the location of the poorly performing brake(s), and 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 standards. If a problem with the linings (i.e. glazed, low friction value, etc.) is the cause, generally something more than a simple adjustment will be required to bring this vehicle to a safe operating condition.

## 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 two different things. A PBBT measures brake forces as a percentage of gross vehicle or combination weight, versus a visual inspection, which examines a 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 lightly laden vehicle or a vehicle equipped with aggressive brake linings can often meet the BF<sub>tot</sub>/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 condition 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 BF<sub>tot</sub>/GVW can still result from overloading, low-friction linings, air system problems and any number of other not visually apparent or "hidden" defects. It is important for the fleet maintenance 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 hazard to all highway users.



## What specific test results are obtained with a PBBT and how will these benefit my fleet?

A PBBT can provide wheel-by-wheel and axle-by-axle brake forces, which are important for:

**Benchmarking** - New vehicles' brakes can be checked upon 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 drayage 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 two-thirds. Correcting such a problem can save hundreds of dollars per axle, per year.

**Drum Problems** - Out-of-round and off-center drums, affecting both brake wear and braking performance, can be found 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 results in increased demand and accelerated wear on the other brakes.

**GVW Check** - Although not a substitute for a certified scale, all current PBBTs have axle weighing capability.

## 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 whether your premiums can be lowered through the use of a PBBT. 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.