

Power Booster System PBS



Applications

- Truck
- Bus
- Mobile and stationary Construction Machines
- Off-road Vehicles
- Diesel Locomotives

Pneumatic Booster System

PBS eliminates turbo lag on diesel engines, improves performance and saves valuable energy.

POWERTRAIN

For decades, engineers have been working to reduce the problem of turbo lag on turbo-charged diesel engines – the performance lag which typically occurs when accelerating from rest or changing gear. With its Pneumatic Booster System (PBS), Knorr-Bremse has developed an intelligent system which brings a huge improvement in throttle response and acceleration performance in trucks and buses. PBS will go into production in early 2013.

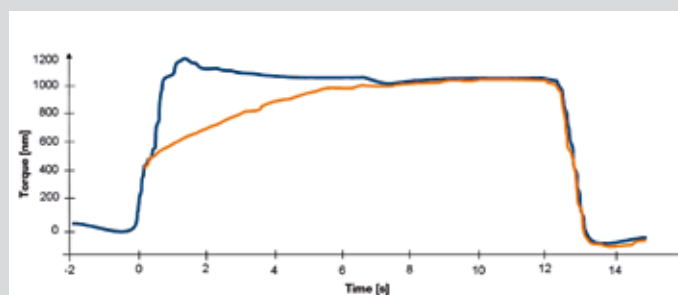
THE CONCEPT

During acceleration, PBS briefly injects air from the vehicle's compressed air system into the engine's injection manifold. This allows a correspondingly larger amount of fuel to be injected, so that full-load torque is available almost immediately. PBS is a mechatronic product which has its own ECU and functionality software, and can interface directly with the engine management system.

THE ADVANTAGES

Initially, the development objective was simply to enhance performance and acceleration, where PBS can bring improvements of up to 150%. As work continued however, customers became increasingly interested in the energy efficiency aspect. Here too, PBS opens up new possibilities, since in the context of efficiency the significant improvement in accelerating power can also be used to support downsizing or downspeeding.

Downsizing: This approach offers particularly promising potential for buses and delivery trucks – vehicles that are frequently fitted with larger engines than strictly necessary, in the interests of livelier performance. Using PBS it is possible to develop the same accelerating power from a 25-30% smaller displacement. The customer sees the benefits in weight savings, which also lead to reduced fuel consumption and costs.



With PBS (blue), a turbodiesel engine develops boost pressure and torque much faster than without (orange).



The test vehicle: a 430 hp MAN TGA semitrailer rig with automated transmission.

Downspeeding: There are two possible approaches to downspeeding, which can be used either separately or together. Firstly, particularly in the case of vehicles with automated manual transmission, the transmission shift logic can be optimized so that the entire improvement in accelerating power translates into lower-rpm shifting. The transmission then shifts up significantly sooner, and shifts down less frequently, but with no loss of accelerating power and with an improvement in fuel consumption. The second possibility is to opt for a longer final drive ratio, but only to the point where the resultant drop in the rate of acceleration can still just be offset by PBS. This solution has the advantage of reducing engine speeds even when driving at a constant road speed, thereby saving fuel.

In conjunction with modified engine operating parameters, PBS can also reduce particulate and nitrogen oxide emissions.



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