

A BREAK WITH

As they strive for better performance and safety standards from their vehicles, manufacturers are increasingly integrating advanced electronic systems to work with core components on trucks and vans. Much of this work revolves around commercial vehicle braking systems, the development of which is having a positive impact not only on brake performance, but also on tyre, powertrain and chassis behaviour.

Operators may not feel the full force of these retardation improvements for several years to come, given that many such systems are currently still under development and new, Europe-wide regulations are still some way off (see panel: Brake systems and the law). However, some improvements are either imminent or already on the market, so it's not a bad plan to keep up – particularly since they may well affect braking component specifications.

The adoption of ESP (electronic stability program) in LCVs, for example, has led to strides being made by suppliers of core brake components that wish to remain ahead of the game – and their competitors. And, similarly, development work by suppliers to the truck world has also led to improvements, some with striking results.

One company aiming to provide the latest and greatest braking innovations is Wabco. Its most recent development, OnGuardPlus, is an addition to the firm's existing OnGuard family, which integrates AEBS (advanced electronic braking systems) and earlier ABS (antilock braking system) technology. Essentially, radar sensors mounted on the truck monitor movements of other vehicles in the vicinity, with audible and visual warnings being generated for the driver, should it detect any unusual or potentially dangerous behaviour.

If the driver ignores warnings and the dangerous situation persists, OnGuardPlus-equipped trucks will apply emergency braking power autonomously, slowing vehicles down, if required, to a standstill. Furthermore, if an impact is inevitable – for example, when approaching traffic congestion at speed – the system adopts an 'in-crash braking' mode, where the controlled braking period is optimised. The goal, according

New legislation that impacts on brakes and braking systems is causing suppliers to work harder to improve their products. John Challen assesses latest developments aimed at optimising performance

Brake systems and the law

In March 2009, the European Parliament agreed to make ESP (electronic stability program) mandatory for all new vehicles. According to the regulations, from November 2011 all new light commercial vehicle and passenger car types registered in the European Union had to be equipped with ESP. From November 2014, this legislation applies to all new vehicles.

For AEBS (advanced electronic braking systems), the key dates are 1 November 2013 – when mandatory fitment is introduced for new vehicle types – and 1 November 2015, when the legislation impacts all new vehicles. From a safety perspective, the EU believes that adopting these systems could prevent 5,000 fatalities and 50,000 serious injuries per year across the region.

TRADITION



Some brake pads are becoming lighter, but remain as effective at stopping vehicles

to Wabco, is to rely on the truck wheel brakes as much as possible, instead of other vehicles' crush zones, to bring it to a halt.

"OnGuardPlus is the commercial vehicle industry's first and most advanced emergency braking system, and it offers customers [an] increased level of vehicle safety, while also improving driver effectiveness," insists Jean-Christophe Figueroa, Wabco vice president for vehicle control systems. He argues that Wabco's goal of "substantially reducing the number of commercial vehicle accidents by 2020" is being helped by the adoption of OnGuardPlus by several major European truck manufacturers and, further afield, also South Korea's Hyundai, which has a long-term contract with the supplier.

Padded sells

But at a far more conventional, even basic, level, brake pads – one of the pivotal components in the search for more effective vehicle stopping – are also evolving, most recently to ensure that performance is optimised with AEBS and ESP systems. John Hibbert, technical sales engineer at



Commercial vehicle brake products from Federal Mogul

friction parts supplier Federal Mogul, explains that even minor adjustments can make all the difference, as witnessed when his company worked with Knorr-Bremse and Meritor on the OE (original equipment) contract to supply the Mercedes-Benz New Actros tractor unit with pads optimised for that application.

Hibbert reveals that lighter and therefore smaller pads were required for this truck manufacturer, presenting the challenge of maintaining similar retardation rates for a reduced package and braking footprint.

"Friction materials are developing, along with the braking systems themselves," he says, pointing to the increasing adoption of regenerative braking systems on hybrid and electric vehicles, and the growing number of vehicles with built-in retarders, where service brakes are exposed to generally lower levels of duty. "For vehicles trucking on the motorway, and fitted with EBS and ABS, there are also problems with tractor and trailer compatibility when it comes to the brakes. So, with the New Actros and its fully electronic systems, we had to make sure that reaction times were better."

For Federal Mogul, that meant investigating more materials and particularly those offering resistance to glazing – a common problem typically caused when the friction material overheats, resulting in crystallisation on the pad surface and the brake disc, which can affect stopping performance and cause vibration or cracks in the material.

Generally, avoiding the problem is about, on the one hand, not operating the brake pads at temperatures above those specified and, on the other, following the bedding-in instructions. But Hibbert explains that problems posed by glazing in new truck applications can be overcome with appropriate blends of proven friction materials, based, for example, on steel and titanium. And rest assured: "All the pad features are still there and we still maintain the same integrity," he says.

Other brake pad developments, such as high friction coatings, which can improve first-time test pass rates, tend to be driven by the truck manufacturers. And Hibbert states that much the same is the case with the drive towards reduced brake system maintenance. He gives the example of air disc callipers. "They're being improved all

the time, and we're working with brake manufacturers to make it possible to change the pads without taking the wheels off."


Beyond these, Hibbert returns to brake system weight and robustness as important factors for development, making the point that both the calipers and automatic adjuster mechanisms can also benefit from different metals. "Pad durability is another essential factor, but not at the expense of the discs or the drums," he adds. "Some manufacturers bulk up [their pads] with steel fibres and end up with hard, abrasive materials. But those don't like low-level duty, and are damaging to the discs and drums."

Stopping selections

Elsewhere in the brakes industry, competition is thriving in the aftermarket. Unipart Group's TTC, for example, has launched what it is calling "a quality alternative" for commercial vehicles. TTC's range covers pads for the Mercedes-Benz Sprinter, Ford Transit, Renault Master, Vauxhall Movano, Iveco Daily and Volkswagen Crafter models. All its brake pads are ECE R90 approved (see panel: Put to the test), tested in the UK (at MIRA) and come with accessories.

The brake pads are clearly marked on the backing plate with E11 number, TTC part number and batch code, for full traceability. Also, friction materials are benchmarked against OE pad materials and formulated to suit vehicle type and application, according to the company. For Darren Miller, head of marketing at TTC, it's all about competing on cost and selection. "Our aim is to develop products to align with the needs of our customers and ensure the products we offer are competitively priced," he says.

Meanwhile, back at Wabco, the company's next generation of air disc brakes for trailers has recently been unveiled. The single-piston PAN range, currently available in North America, but planned for introduction into Europe soon, covers rim sizes from 16 to 25in, and can be fitted on axle applications up to 10.6 tonnes. Wabco is claiming that the PAN range is "one of the lightest trailer air disc brakes in the industry", with the 22.5in item tipping the scales at just 36kg, including pads. This low weight, argues the supplier, allows operators to increase payload and/or improve fuel economy, while also reducing maintenance and service costs by using thicker brake pads.

It's clear that, while reduced maintenance and downtime, alongside even better performance, are the goals, they won't come without investment in technology and engineering. Suppliers are promising more breakthroughs from their R&D departments, with revelations possible at next month's IAA event in Hanover. 

Put to the test

Operators and truck manufacturers want to know that new brake and braking system developments will perform reliably as specified. So it's good to know that Juratek, among others, is committed to meeting and exceeding regulations for the aftermarket – such as ECE R90.

This regulation came out of work by a combination of braking experts from European governments, technical services such as the TÜV, vehicle manufacturers, and the OE brake and friction companies. The aim was to ensure that brake pads sold in the European aftermarket met specific minimum standards in terms of performance and manufacture, but also distribution, sale and installation of replacement brake pads.

ECE R90 thus covers a range of tests, as well as evaluations against OE products. Assessment procedures include: static rig tests; shear and compression tests to check the integrity of pad assemblies; corrosion tests; dynamometer tests; performance versus pressure and speed over the range 40 to 120km/h; fade and recovery; simulated downhill tests; and pad and disc wear condition versus temperature over the range 100 to 600°C.

Manufactured in a factory that is itself ISO9001 and ISO14001 approved (standards that recognise the quality of products and materials, as well as environmental friendliness), brake pads from Juratek, for example, are, according to the company, manufactured to specifications based on OE parts. Every batch of discs released for sale passes through an in-house testing facility to ensure conformity to the required specifications of dimensional integrity, hardness, strength and chemical composition, while every part carries batch control numbers for traceability from factory to distributor, it insists.

Cover photograph:
Charlie Milligan
Disc brake pads supplied by
TMD Friction
www.tmdfriction.com