

Brake by Wire (Part 2) - by: Greg Byrnes

In the second instalment of this three-part ARTSA series, Greg Byrnes, Engineering Manager, Air Brake Corporation of Australia, explains how electronic braking systems (EBS) and trailer electronic braking systems (TEBS) can improve brake pad wear and stability.

Advantages of EBS and TEBS



Disc pad wear sensors connected to the EBS' electronic control unit (ECU) allow the system to 'track' pad wear rates, while pressure sensors integrated into the various solenoid valve assemblies allow the ECU to adjust the relative pressure between steer and drive axles at low brake application pressures (typical of everyday braking) to even out pad wear. This means that all brakes realise maximum life, and all pads can be replaced at one service stop.

At higher application pressures, axle loading is evaluated and brake pressure is proportioned to estimated axle weights (using electronic load sensing). Some EBS systems determine drive axle load by measuring air pressure in the suspension air bags, while others, like Wabco, compare the differences in wheel slip via the wheel speed sensor signals.

At any brake application pressure or deceleration rate, if any wheels ap-

proach a lockup situation, the integral ABS function of EBS takes over and modulates individual actuator pressure to prevent wheel lock and maintain maximum stability.

In addition, the ECU continuously evaluates the pressure being delivered to the actuators and trailer control coupling against the pedal position and vehicle deceleration rate measured via the wheel speed sensors.

These relationships are defined in the ECU programming for the truck. If anything deviates from these defined characteristics, the EBS dynamically adjusts the truck's braking relative to the trailer to improve the balance between truck and trailer. This 'compatibility control' function will work to some extent with conventional 'dumb' non-TEBS trailers, but with limits.

For example, very few Australian trailers have load proportioned braking (load sensing), so when operated at reduced axle weights behind an EBS-equipped truck, trailer braking relative to the truck (with electronic load sensing) will be much more aggressive, leading to accelerated trailer brake wear and increased risk of wheel lock and instability.

TEBS not only provides faster brake application and release to match the truck but incorporates the same electronic load sensing as the truck. As with EBS, the trailer experiences better brake balance and more even brake wear, while the integral ABS ensures overall stability.

TEB kits

Air Brake Corporation of Australia have developed a wide range of ADR38-approved TEBS kits to suit most common trailer configurations, in both 12 volt and 24 volt versions for either European or North American towing vehicles. All kits incorporate Wabco's roll stability system (RSS) that has become a key attraction of TEBS. Kits have also been developed for special niche trailer applications that use the high-tech features of TEBS to meet legal requirements



previously not met with conventional pneumatic systems.



*Next issue:
EBS, TEBS safety and value.*

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