

Braking performance and new braking technology – by: Dr Peter Hart

The electronics revolution has hit heavy vehicle braking with future promises of increasing sophistication and improved braking performance.

The fundamental braking requirement is to stop the vehicle in an acceptably short distance without losing directional control. The Australian Design Rules and Australian Vehicle Standards Rules specify minimum stopping distance levels for new and in-service vehicles. In-service heavy vehicles are required to stop within 16.5m from 35 km/h, around 55m from 60 km/h and around 150m from 100 km/h.

Intelligent braking technologies encompass ABS, EBS, traction control and ESC, as well as collision avoidance sensing. All will play a bigger part in stopping trucks in future.

Anti-Lock Brakes (ABS) are standard on European manufactured heavy vehicles but not on Australian, US or Japanese manufactured vehicles. It is mandated on B-Double prime-movers here and on dangerous good trailers

when in a B-Double combination. The main benefit of ABS is that it stabilises the vehicle during braking by preventing gross wheel lock-up. This provides a high level of lateral stability and helps avoid oversteer (jack-knife) and trailer swing.

Electronically Controlled Braking Systems (EBS) go several steps beyond ABS. EBS controls the braking at each wheel group in response to conditions to achieve near optimum performance. It is usually implemented in conjunction with a load-proportioning brake system.

EBS looks at individual wheel speeds, applied brake pressure as well as the demanded brake level. Because the system also monitors load level from an air-bag suspension signal, EBS accounts for load changes and will control the brakes differently depending on whether the vehicle is laden or unladen.

Traction Control Systems apply the drive-wheel brakes to control wheel

slip under tractive effort. Drive wheel slip is undesirable at any stage because it promotes oversteer. Low speed drive-wheel slip reduces the tractive performance of vehicles and can lead to the vehicle getting bogged or otherwise failing to climb hills. Traction control overcomes the action of the differential by retarding free-wheel action when one side is slipping. Traction Control automatically applies selected brakes in the drive group. It also instructs the engine controller to alter the engine power appropriately. Vehicle (or Electronic) Stability Control Systems (ESC) can apply selected brakes to counteract the tendency for vehicles to roll-over or loose directional control whilst cornering at higher speeds. The system monitors the lateral acceleration of the vehicle and predicts impending loss-of-control events. ESC will act to apply the outside brakes when an oversteer condition is sensed or the inside brakes when an understeer condition is sensed.

In sophisticated ESC systems the functions are integrated with EBS. Furthermore, the engine throttle can be reduced by action of the ESC via electronic data communication. Collision Avoidance Sensing systems are at the initial stages of commercial release. They act to apply selected brakes when a potential collision situation is sensed by intelligent assessment of radar sensors at the front of the motive vehicle. Automatic brake adjustment should be used in conjunction with all the intelligent brake technologies. These keep the brakes in adjustment and provide the intelligent control with a more certain brake response.

As with all intelligent controls the performance depends on the sophistication and level of development of the software in the controller. Australian experience with a range of vehicle technologies has been that software refinements have been necessary for Australian road and vehicle conditions. There is hence a need to be cautious

when introducing new technologies. One of the most difficult factors has always been that the vehicle parts used in combinations often have un-coordinated brake technologies.

You don't need to wait for tomorrow to achieve improved brake performance. All these technologies are available and in use today and already achieving improved braking outcomes. The next ARTSA column will talk about brake balance and how this is a fundamental driver of braking performance.



Colrain correction

TBB wishes to apologise to Colrain for misprinting its contact details in last month's edition.

The correct contact details are:

137 Swann Drive,

Derrimut, VIC 3030

Phone: 03 9368 7077

Fax: 03 83682164

E-mail: sales@colrain.com.au

The correct contact details for the Rocklea branch are:

1890 Ipswich Road,

Rocklea, QLD, 4106

Phone: 07 3373 8355

We made mention of the Flexlite range from Arvin Meritor, this range is currently unavailable in Australia.

We apologise for any confusion.

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