

AN INVESTIGATION INTO WSP ACTIVITY IN RELATION TO VEHICLE SPEED AND BRAKE DEMAND

Previous studies into wheel tread damage showed that damage is associated with failures of the Wheel Slide Protection (WSP) system, allowing the wheel to slide during braking. This conclusion led to follow up work to analyse further braking data obtained from two Mk III coaches instrumented to record brake cylinder pressure, WSP dump value energisation, brake demand level and vehicle speed.

This data contained enough information to establish:

- The braking conditions (a combination of brake level and vehicle speed) under which WSP operations most frequently occur.
- How drivers brake in service.
- The amount of WSP activity per unit distance travelled, in each speed band.
- The number of damaging wheel slide events that may occur in one year of HST running.

Data analysis showed that:

- The likelihood of WSP blowdown was on average 5 times greater when braking at speeds in excess of 60 mph with a high brake demand (brake cylinder pressure above 30psi) than when braking at lower speeds and / or lower levels of brake demand.
- An increase in WSP activity was shown to exist with increasing vehicle speed, which implies a substantial reduction in the available adhesion due to dynamic effects.
- From the data collected during this and previous studies over a speed range of 15 to 60 mph, it was calculated that the adhesion is insufficient to meet the demanded vehicle retardation rate for approximately one minute of braking per year. This increases to four minutes per year over the whole operating speed range.