

## BRAKES AND WHEEL/RAIL ADHESION

This memorandum presents the text of a paper that was presented to the International Conference on Railway Braking held by the Institution of Mechanical Engineers at York, 26<sup>th</sup> and 27<sup>th</sup> September 1979.

Wheel/rail adhesion levels required by braking are compared with the available adhesion measured by the tribometer train. The probability of wheelslide in the worst of normal conditions is enumerated. The extremes of low adhesion due to autumn leaves or thick rust are described. An account is given of the adverse effects of some composition blocks measured in the laboratory, and evidence supporting the use of auxiliary cast iron or abrasive 'scrubber blocks' to maintain adhesion is outlined.

The paper concludes that:

- When braking, modern trains demand adhesion coefficients of about 0.09. Judging by adhesion measurements, the probable extension in stopping distance due to the lowest adhesion normally encountered on main lines is 8%. These conditions occur about 4% of the time when the weather is wet. Such an extension is within signalling safety margins.
- Careful attention should be paid to sites where excessive or unusual contamination is prevalent, especially to the location of lineside trees where extremely low adhesion is to be expected every autumn.
- Cast iron blocked trains make consistent demands on adhesion levels of 0.12 or more, which provides evidence that cast iron blocks improve adhesion conditions. Auxiliary blocks apparently provide significant improvements to non-treated brake stock, as do more lightly loaded 'scrubber blocks' made of abrasive-filled material.
- Small scale testing confirms that some types of composition block significantly reduce wheel/rail adhesion and suggests that improvements caused by cast iron blocks are due to a cleaning action rather than the abrasive nature of the debris.