

A BASIC STUDY OF WHEEL / RAIL ADHESION. 8. LABORATORY STUDIES OF THE EFFECTS OF SOLID DEBRIS

Previous studies have shown that particles of solid debris are always present on the railhead, even where the rail looks clean. The particles adhere quite strongly to the rail, and evidence shows that as they become trapped beneath the wheels, they transmit some proportion of any traction or braking forces. The most significant property of the particles appears to be the size of the surface area over which oil can spread.

The studies used the small-scale rigs used in the study of fluid lubricants and also the torsional friction rig. Experiments focused on thick layers of debris and rust, dispersed layers of debris, similar to the coverage on well used rails, and properties of self-generated debris which adheres to surfaces which roll continuously against one another. Measurements of the strength of compressed pellets formed from rail debris are reported and correlated with the friction measurements.

The conclusions of the study include:

- Debris on rail surfaces can be roughly classified as either thinly dispersed particles, generally found on well used lines or thick films of particles which completely obscure the wear band at a few particular locations.
- Dispersed debris improves adhesion on dry rail. The particles provide a large surface area on which spilt oil can be spread, thus reducing the amount of oil on the rail.
- In humid conditions the strength of the debris particle is reduced and adhesion is worse affected when the surface density of the particles is high.
- Adhesion becomes lower as the layers of debris become thicker.