

Understanding Your SPAD

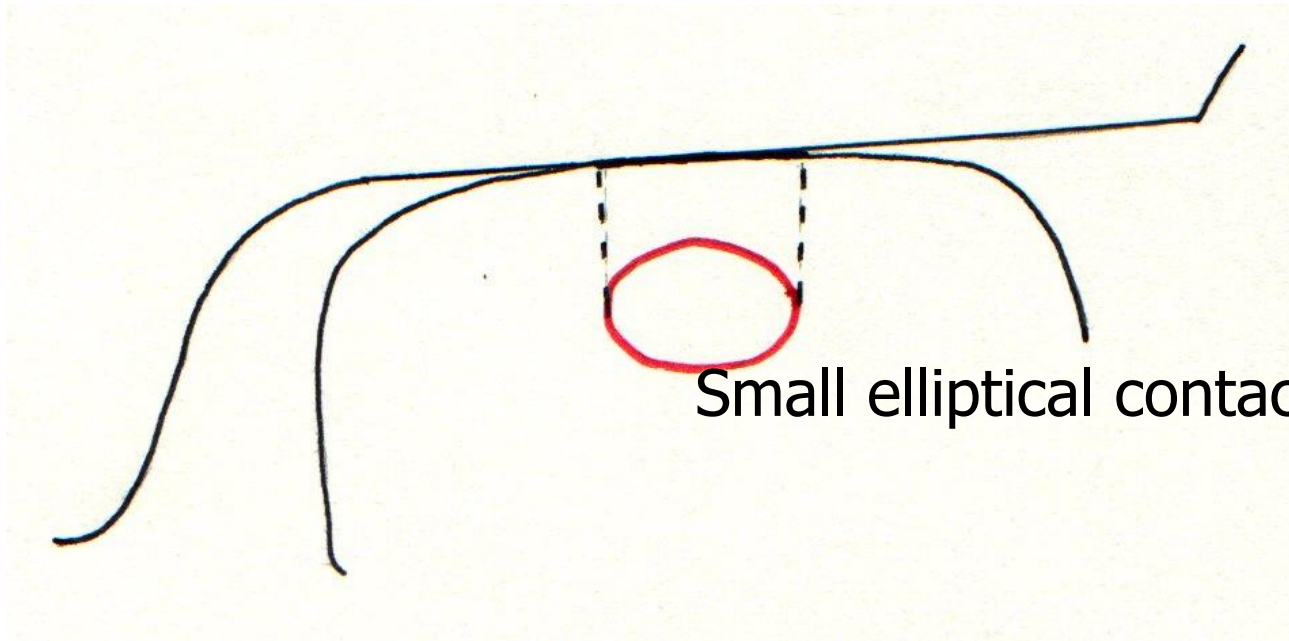
What can the rail head tell you?

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Today's Agenda

- Wheel/Rail Contact Mechanism
- Adhesion Levels
- Common Contaminants
- Identifying Contaminants
- Leaf Fall
- Case Studies

Wheel / Rail Contact



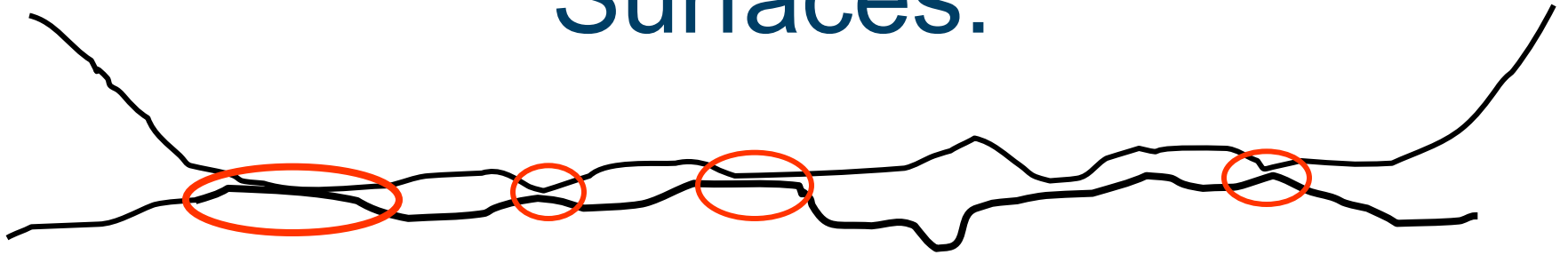
Small elliptical contact patch

The Wheel / Rail Contact Patch Governs:

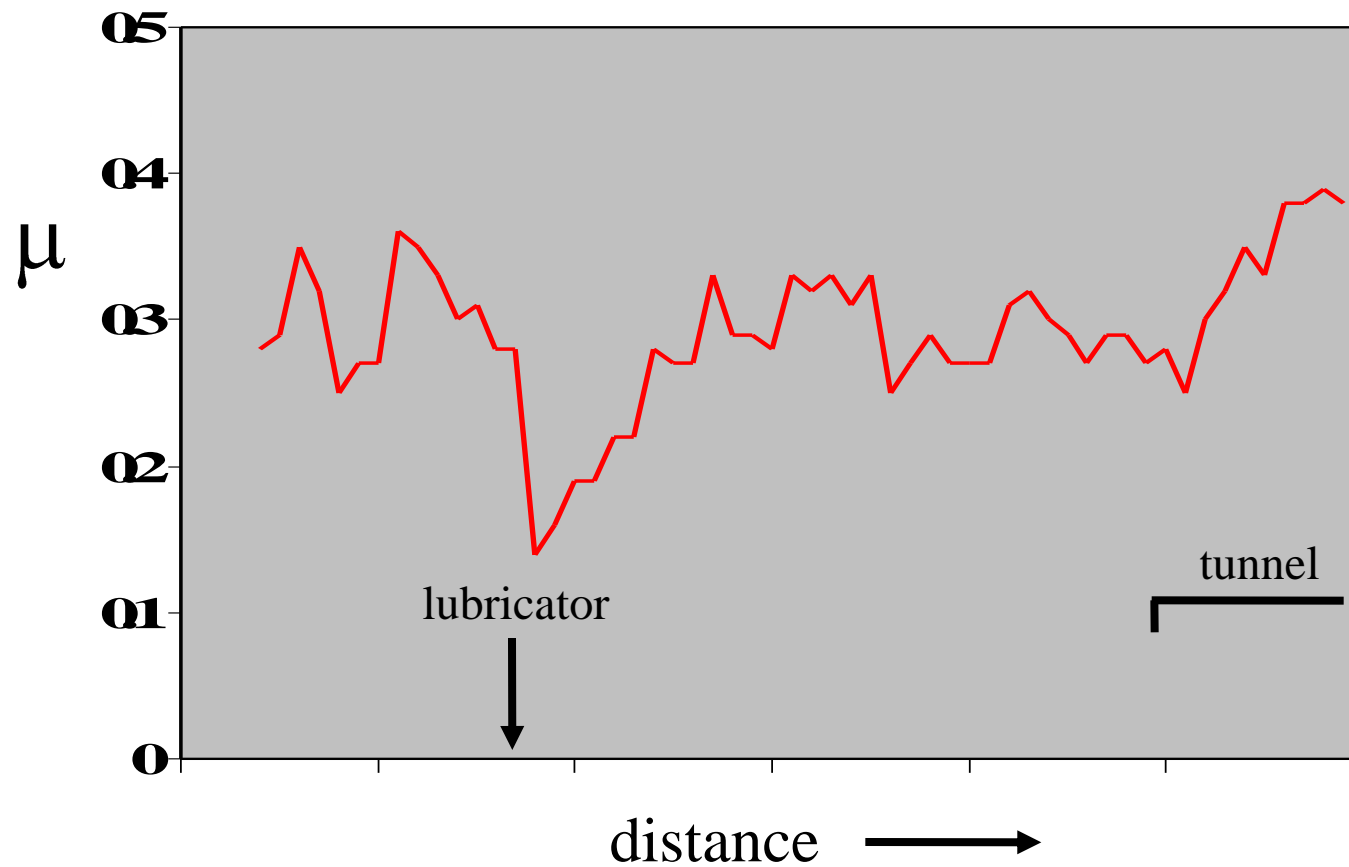
- traction forces
- braking forces
- steering behaviour

Contact stress can be
very high

Magnified Contact Between Hard Surfaces:



Example Tribometer Train Output

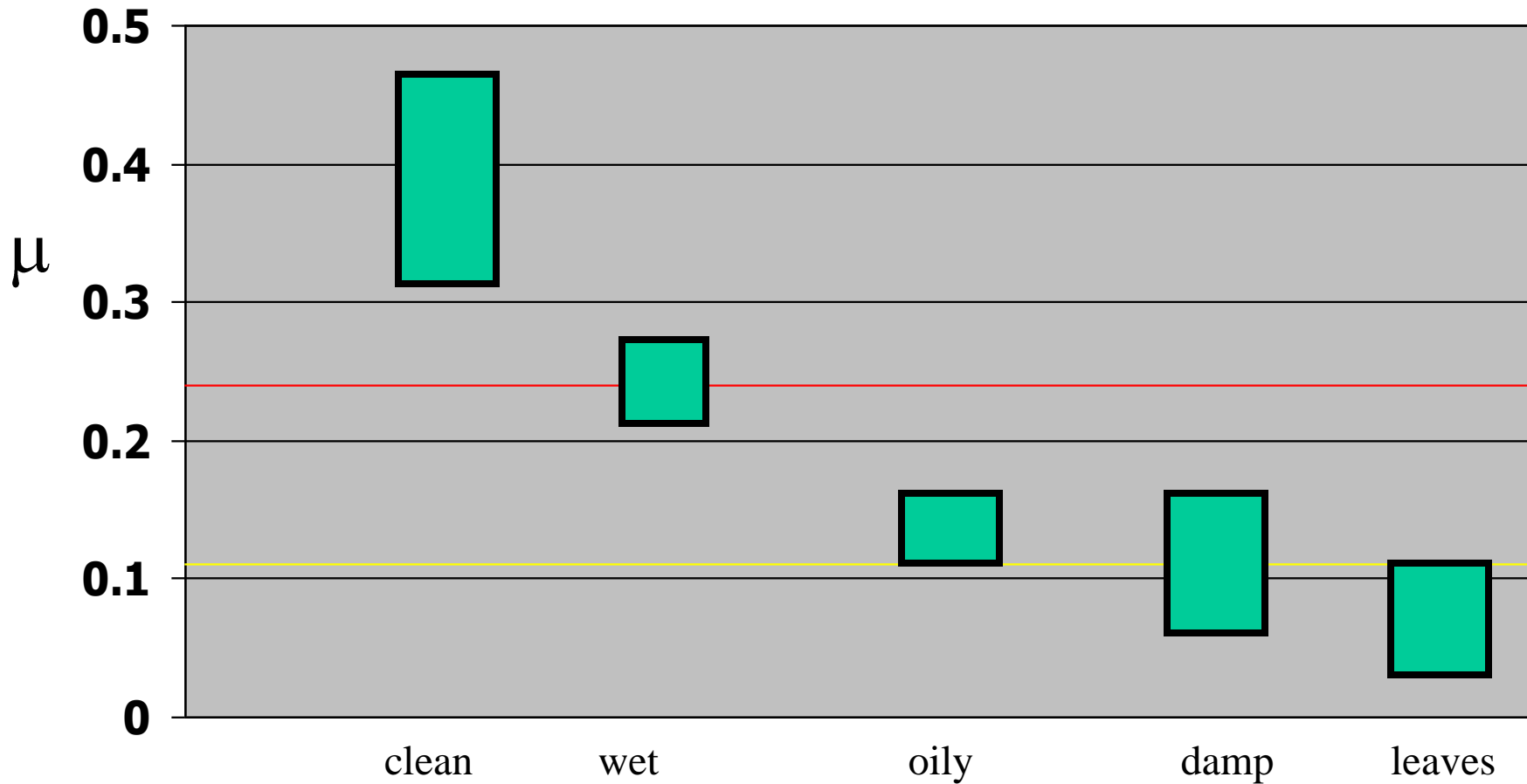


Typical Adhesion Levels

μ

clean steel on steel, laboratory conditions	0.5 - 0.6
clean, dry rails - typical mainline track	0.3 - 0.45
wet rails as in continuous rain	0.2 - 0.25
visible oil or grease contamination (poorly adjusted flange lubricator, etc)	0.1 - 0.15
damp / dewy rails (particularly combined with rust)	0.05 - 0.15
leaf films (damp)	down to 0.04

Adhesion In Perspective....



Common Rail Contaminants

- water
- ice / snow
- rust
- solid particulate cargo spillage
- salt
- sand
- sandite
- oily matter
- grease
- fuel oil
- aviation fuel
- de-icing fluids
- leaves
- sawdust

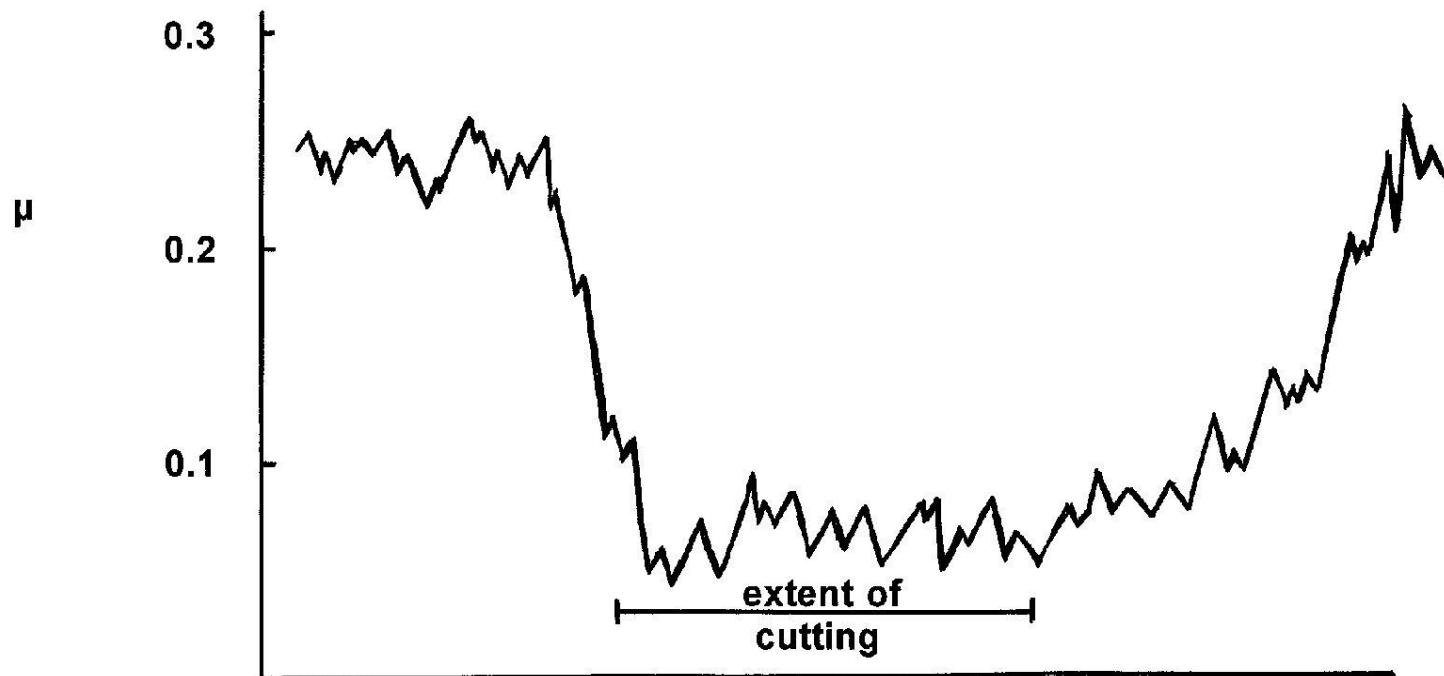
Identifying Railhead Contamination

- Rail Head Swabs -
 - Identify contamination
- Low level contamination can cause problems
 - Low levels may not be visible

Leaves - Facts and Fiction

- leaves don't fall on the rails to be trapped by passing trains
- slipstream turbulence lifts leaves
- 'leaf mulch' does not describe the film
- leaf films are hard, tenacious and black

Leaves And Adhesion



Factors Affecting Leaf Film Build-Up

- FROST - promotes leaf fall
- SPEED - slipstream effects, little leaf pick-up at low speed
- RAIN - wet leaves are not readily picked up in slipstream
 - rain softens leaf film, traffic removes it

Case Studies

- Slough Incident 1992
 - Class 165 Unit collided with bay stops
 - Leaf debris carried by new stock
- Esher Incident 2005
 - Train slid 2500 - 3000m
 - Weather conditions possible cause



Esher Incident November 2005

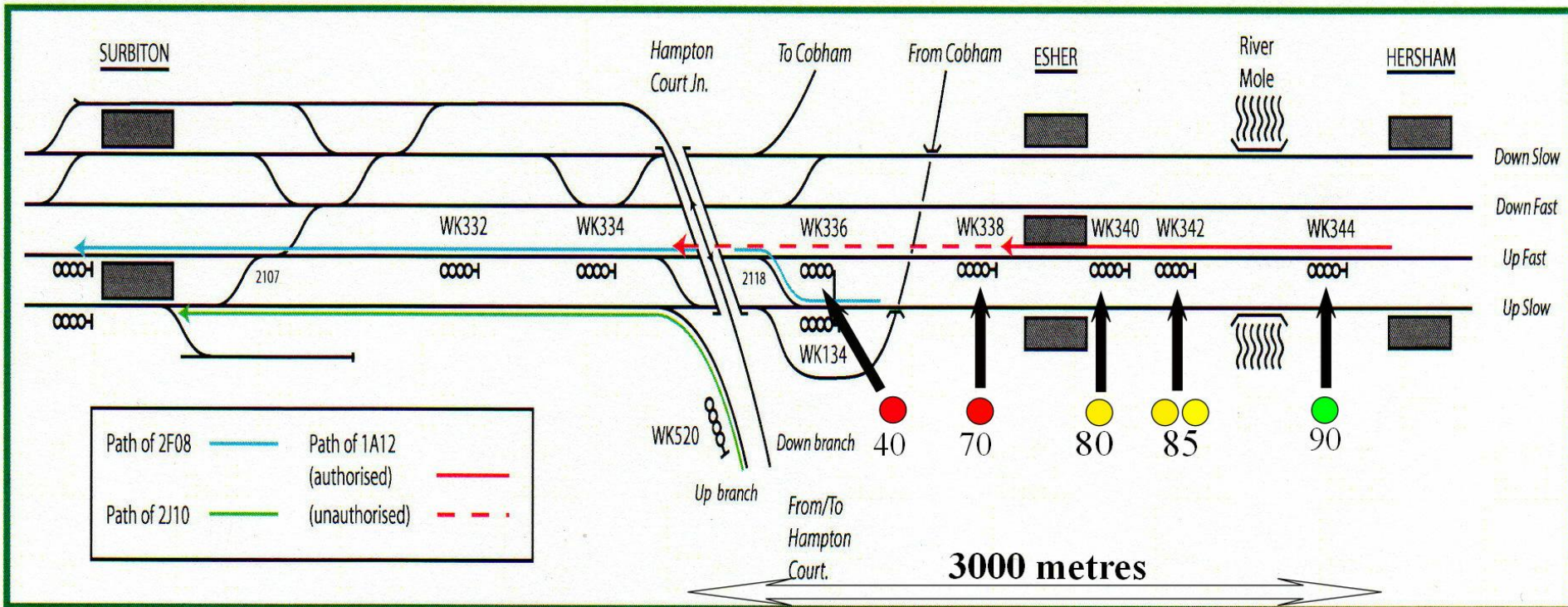


Figure 2: Key features of the track layout between Hershams and Surbiton.

RAIB Report Quotes

- ..either exceptionally clean or that ineffective swabbing had been performed
- No swabs were taken where the slide commenced (on the approach to signal WK342, which was displaying a double yellow aspect).

Summary

- Adhesion problems are complex
- Environmental conditions are important
- Swab tests can assist in the right place

