MEASUREMENT OF WHEEL-RAIL CONTACT FORCES AT A SELECTION OF SWITCHES AND CROSSINGS USING HSFV1 EQUIPPED WITH LOAD MEASURING WHEELSETS

During September 1979, 2 axle experimental vehicle HSFV1 was run through a selection of modern switches and crossings to ascertain the wheel-rail contact forces which occur in practice. The results are reported and their implications for the design of the switches and crossings discussed.

The results show that, for HSFV1, the peak lateral force generated at facing switch blades is made up of two components, one due to curvature and another due to impact of the unsprung mass on the blade. The curvature effect drops off for the higher speed switches on account of the fine entry angle and easier curvatures. The dynamic effect appears to be worse at higher speed switches. The lateral forces generated at trailing blades were comparable to those at an equivalent facing blade; peak values occurred on the plain rail beyond the trailing blades.

The dynamic effects will be larger for vehicles with a large unsprung mass and the curvature effects larger for a vehicle with poor curving characteristics. Hence it follows that a long wheelbase vehicle with a large unsprung mass will behave worse on a given switch.

On the high speed turnouts (especially GV) the heel gave rise to significant lateral forces on the high rail. The results clearly show how beneficial the transitioning to straight in crossovers is in reducing lateral impacts at facing crossings. Non transitioned high speed turnouts generated large lateral impact forces at the crossings.

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