

DEWIREMENT DYNAMICS - FINAL REPORT

This is the final report of the Research project into Dewirement Dynamics.

Dewirement of pantographs occurs typically 80 times per year, and in the more serious incidents widespread disruption of train services occurs. The average direct cost of a single incident has been calculated as £20,000, with the total cost to BR of a serious incident has been estimated as up to £250,000. With the spread of electrification, and the reduction in the number of diesel locomotives available as alternatives, the significance of the problem is bound to increase.

An in-depth study has been carried out of many of the mechanisms contributing to wind-induced dewirement. Recent advances in vehicle dynamic modelling techniques permit more accurate modelling of pantograph sway, and have allowed a quantitative analysis of many of the factors which were previously not well understood. With current practices there could be a significant risk of dewirement at wind speeds which might be encountered once or twice a year. Two possible mechanisms are put forward, but evidence from incidents suggests that neither has been significant and inadequate design or maintenance of the overhead equipment has been blamed. Careful maintenance to minimise the deviation of the wire from its designed position at supports is an important factor in avoiding wind-induced dewirement.

The contact force generated by the pantograph is an important factor in determining the propensity to dewirement. This force has been shown to be very variable and dewirement due to excessive uplift would be a significant risk with particularly poor pantographs in high winds, were it not for the speed limit policy on the West Coast Main Line in these circumstances.

The recent high winds in the South and Midlands, though reportedly not causing any true blow-off incidents, did cause widespread disruption to electrified services and are a salutary reminder of the risk of high winds. Evidence is growing that the world is entering a period of rapid climatic change, and wind conditions could deteriorate significantly during the lifetime of current overhead equipment. The results of this study indicate that although the current situation is acceptable, margins of error in avoiding blow-off are small, and any relaxation of current standards cannot be recommended.

The guidelines for future operation given in this report are intended to offer a modest reduction in the risk of dewirement, rather than attempting to eliminate the possibility entirely.