



R3.105 Rail Squats – Progress Report 1 – Executive Summary



Rail Squats Progress Report 1

This summary reports progress on the study of rail squats; a form of rolling contact fatigue of increasing concern to railways worldwide. A rail squat is literally a depression of the surface of railway track, also caused a dark spot. This arises from plastic flow of the surface of the rail, which becomes possible because a subsurface crack frees the layer of steel above it to flow. The present project “R3.105 Rail Squats” examines the formation of rail squat cracks, with an aim to identify formation mechanisms, and to investigate methods of prevention of rail squats, and factors driving early growth.

In particular, field observations of squats in NSW and Queensland were investigated. Squats observed all seem to initiate from an existing flaw. One pattern in these observations is that squats often occur in transitions into curves. Simulation of tractions and creeps occurring in transitions using Vampire software was modelled. This enables the trade-off between the likelihood of wear or rolling contact fatigue of a rail to be assessed. High wear can remove flaws before they grow to squats, but any situation leading to high tractions, without high wear favours the occurrence of a fatigue failure. Water appears to be essential to growth of squats, as there is a notable lack of squats in tunnels, except where water is found. In separate laboratory investigations, squat crack observation by infrared thermography and other techniques, and optical microscopic study of squat cracks has been conducted. Some preliminary results of this testing are presented.

Other studies are beginning. Measurement of early growth of a crack in rail steel by fractography has begun at Monash University. Study of finite element rail models has begun at Monash University and at University of Queensland. A study of spraying water onto track has begun at Erskineville in Sydney, to test how this affects growth of existing squats.