

MEASUREMENTS OF DYNAMIC LOADS AT A DIPPED RAIL JOINT, WRINEHILL 1971 – COMPARISON OF RESILIENT AND CONVENTIONAL WHEELS

As part of the development process of AC locomotives, track forces at a dipped rail joint were measured in a series of tests at Cheddington, in 1970. A comparison was also made with the peak forces induced by other locomotives passing over the same joint. Since the AL6 locomotive produced some of the largest forces, possible modifications to its design have been considered. A further set of track measurements were made at Wrinehill in October 1971 to check the effect of these modifications.

The SAB resilient wheel offers one of the most promising ways of reducing the track forces. This is due to the flexible rubber bushes between the wheel rim and the hub which significantly reduces the unsprung mass of the wheel. Accordingly, two AL6 locomotives with resilient wheels (one of which also had flexicoil suspension) were run over a dipped joint to compare their force levels with those of a standard locomotive.

The report concludes that resilient SAB wheels, when fitted to a class 86 locomotive, reduced the maximum dynamic wheel loads recorded by measuring baseplates to between 30% and 50% of the load levels of the standard class 86 at a speed of 45m/s (100mph). The resilient wheel also produced a 20% reduction in stress range in the wheel web as measured by a shear gauge between the rail end and the first bolt hole. Calculations indicate that for resilient wheels of this design the loads should be virtually independent of the traffic stiffness at a joint, whereas for conventional wheels the loads are proportional to the square root of track stiffness.