

VEHICLE END CRUSHING TESTS

The report forms part of project directed at developing a rational approach to the longitudinal design strength of locomotives, multiple units and passenger coaches. Tests were completed, with the main objectives to:

- Simulate an end on collision in which overriding occurs and determine the energy absorption of the vehicle end following such a collision.
- Indicate the plastic deformation modes and areas of excessive strength or weakness, thereby proving pointers towards improved energy absorption in new designs of vehicle and structure.
- Provide experimental data for comparison with theoretical predictions developed to simulate large deflections and plastic collapse of beam structure.

The main conclusions drawn from the study are:

- Each of the three end structures met the European end load standard relevant to the type of vehicle.
- Class 317 specimens absorbed approximately twice as much energy as the Mk3 specimen.
- The relatively poor energy absorbing capability of the Mk3 vehicle was caused by local crushing of the crash pillar, thereby reducing its moment carrying ability.
- The load/deflection curves for the driving and trailing end of the Class 317 vehicle are similar. These are characterised by high loads and hence accelerations, but overall low energy absorption due to the substantial reduction in load.
- There is a necessity to pay close attention to the detail joint design, demonstrated by the behaviour of the Mk3 crash pillars and Class 317 corner pillars.