PERFORMANCE OF RAIL WELDS

OVERVIEW

Continuously-welded rail (CWR) has replaced fish-plated joints as the preferred method of joining rails in track. Rail welding in Australia is generally carried out using either flashbutt or aluminothermic processes.

CWR reduces the level of impact loading below that typical of jointed track. However welds still represent a discontinuity at the rail running surface, due to a variation in material characteristics (strength, hardness and microstructure), and potential misalignment at the rail ends.
In addition, welded joints may contain weld defects and high residual stress levels. All of these factors are combined to produce higher, localised loads on the track structure, and the potential for fatigue failure of the weld.

Weld collar

Aluminothermic welding

RESEARCH PROGRAM

Current research activities are directed at improving the performance of rail welds under high axle load conditions. Major deterioration modes of concern are:

- fatigue failure due to torsional loading on the web of the rail;
- batter and associated impact loading arising from wheel-rail contact.

ACTIVITIES

Characterisation of rail welds through measurement of:

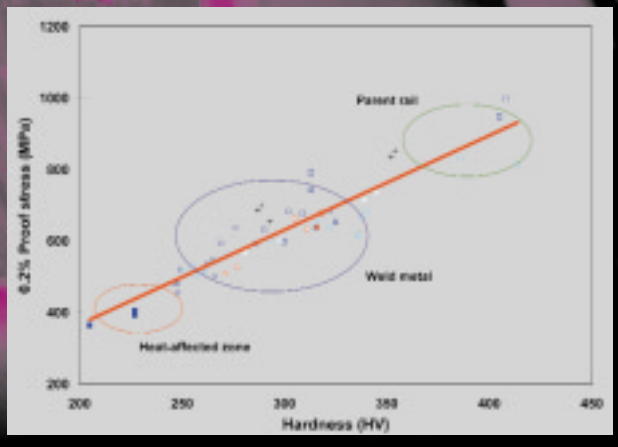
- mechanical properties (hardness)
- stresses under torsional loading
- residual stresses

Fatigue testing under simulated service conditions

Monitoring of weld behaviour under in-service loading

BENEFITS

- 70% reduction in web fatigue failures.
- Minimise rail grinding requirements to control weld dipping
- Reduced impact loading & track damage
- Performance-based specifications for rail welding.



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