

STEEL SLEEPER DEVELOPMENT

OVERVIEW

Although steel sleepers have been used for over 100 years, BHP initiated a research program in 1978 to assess the applicability of steel sleepers to the Australian market. Combining this effort with market development carried out by BHP Rail Products resulted in the current Australian market of 500,000 steel sleepers per annum. Present domestic usage is about 13% of track, predicted to grow to 25% by 2020.

CUSTOMER BASE

Steel sleepers are currently in use across the Australian railway industry including:

- Insulated sleepers for the Brisbane Suburban and North Coast Main Lines
- Non-insulated systems for QR's Mount Isa to Hughenden line
- Insulated and non-insulated sleepers on NSW Class 1 and 2 tracks (up to 25 tal)
- Non-insulated systems for Emu Bay (80% coverage) and Tasrail (65% coverage)
- General usage in Western Australia since 1979 (primarily interspersed)



Steel Sleepered Track at BHP Iron Ore



Installation of Instrumented Sleepers at QR

BENEFITS

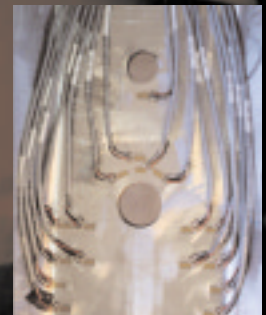
- Steel sleepers have provided Australian railways with a serious alternative to concrete and timber.
- Steel sleepers have provided BHP with a market for 30,000 tonnes of finished steel product.
- Excellent track performance is achieved through full resleepering with steel.
- Existing track structures can be interspersed with steel sleeper as a temporary measure to maintain track capacity

RESEARCH PROGRAMS AND OUTCOMES

The success of steel sleepers has been due to minimising costs and working closely with Railways to ensure superior performance.

Research programs have included:

- **Structural Design:** Sleeper cost is dependent on weight, hence design was optimised to maximise strength and minimise weight while ensuring adequate track support.
- **Fastening Performance:** Fastening design has focused on maximum fatigue life plus easy and safe installation. Fastener application forces have been designed to comply with OH&S safe lifting requirements.
- **Field Testing:** Data embracing the full range of service conditions of the product has been collected, providing full understanding of the load environments and the sleeper response to these loads – data critical to the design process.
- **Mechanical Testing:** Over 400 fatigue tests have been completed on steel sleeper assemblies since 1992. Data have provided a better understanding of sleeper capability, thus leading to improved designs. Laboratory data have been validated by field testing.
- **Customer Feedback:** Continuous feedback of research outcomes to customers along with frequent track performance assessments have been crucial to the research process.



Strain Gauge Instrumented Sleeper