

IMPROVING WHEEL RAIL INTERACTION FOR HONG KONG'S MTR CORPORATION

BACKGROUND

Hong Kong's MTR Corporation (MTRC) operates one of the world's most heavily utilised urban mass transit system with high expectations for service reliability by the customers. On its 43.2 route km Urban Lines it carries 2.3 million passengers per day and has annual tonnages of traffic of over 45 million gross tonnes (MGT).

RESEARCH PROGRAM

The research project identified poor wheel-rail interaction characteristics contributed to excessive contact stresses which resulted in significant rail deterioration. A comprehensive project was conducted since 1989 to improve the interaction between wheel and rail.



RECOMMENDATIONS

Significant modifications were recommended to components and procedures to improve the wheel-rail interaction characteristics:

- modification of wheel and rail profiles to reduce wear, sub-surface defects and corrugations by improving the wheel-rail contact conditions and hence reducing contact stresses;
- improvement of lubrication procedures by modifying the lubricant applied to reduce wear;
- improvement of rail pad characteristics to reduce the level of dynamic (impact) loading;
- improvement of rail maintenance procedures including rail grinding operations;
- development of a Rail Management Model and a Rail Grinder Scheduler.

All major recommendations were successfully implemented and the effects of these changes were continuously monitored

OUTCOMES

Substantial savings in MTRC's operating and capital costs were achieved:

- 40% reduction in rail replacement volume (savings of HK\$5m per annum);
- 59% reduction in average corrugation growth rates;
- 55% reduction in wheel depletion due to wear;
- 28% reduction in quantity of lubricant required;
- 59% reduction in rail replacement due to shelling;
- 3% reduction in traction energy consumption per car kilometre; and
- An additional benefit of the improved wheel-rail interaction has been reduced noise levels leading to a positive environmental impact of the measures introduced.