



Optimised advice to drivers of long-haul trains to help minimise fuel consumption and maintain correct schedules

The FREIGHTMISER® system comprises software that prepares journey data, and an on-board computer for generating and displaying driving advice.

Features

- FREIGHTMISER's main function is to advise how to achieve, from a given current location and with a specific destination arrival time, an efficient usage of fuel while still maintaining the schedule.



The FREIGHTMISER on-board advice unit installed on a locomotive and ready to provide energy-optimal driving advice.

- FREIGHTMISER's control and speed profiles are automatically adjusted so that the train arrives at the next target location at the specified arrival time, not just at the earliest time, while also keeping fuel consumption to a minimum.
- FREIGHTMISER has a simple train interface and does not require extensive onboard or trackside hardware. Detailed information about the train is not required to operate FREIGHTMISER.
- FREIGHTMISER minimises energy consumption using a control strategy based on Optimal Control Theory. The Signalling & Control Group at the University of South Australia developed the optimal control algorithms.

Benefits

- Fuel and energy costs reduced by up to 20%.
- On-time arrivals improved by 10%.
- Reduction in braking of 30% leading to reduced wear.
- Smoother train handling due to increased coasting (by up to 30%) and reduced powering.

FREIGHTMISER®



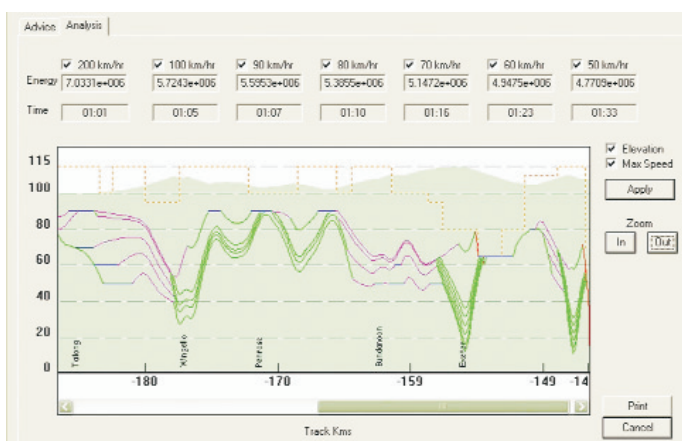
Methodology

For each type of trip, the optimisation software is used to compute the speed profiles for six different total journey times. Each profile is designed to minimise fuel consumption for the given journey time.

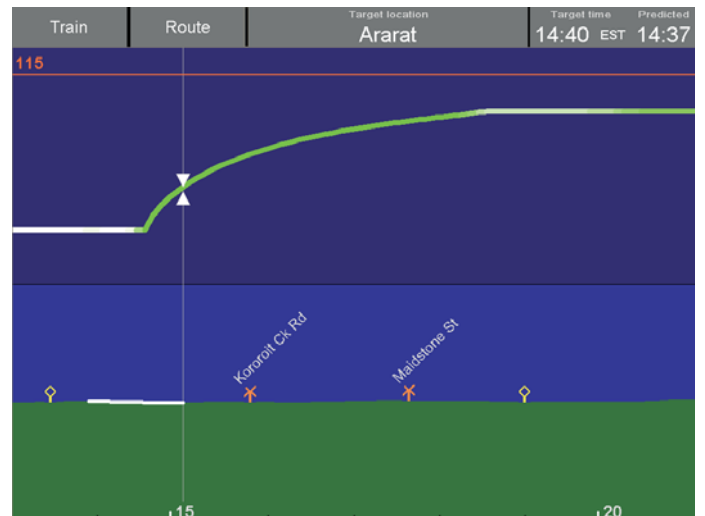
As the time allowed for the journey decreases, the minimum possible fuel consumption increases, providing drivers with the best possible strategy to reduce fuel consumption.

Use of pre-computed speed profiles

FREIGHTMISER is able to work with pre-computed profiles because, in practice, if the control mode is changed too early or too late, switching amongst the different pre-computed profiles will automatically adjust future control strategies to compensate.



Display of various pre-computed speed profiles over a given alignment and the associated speed limits. Different control modes are represented by the variation in the speed profile colours.



The Man-Machine Interface, as seen by the driver, is used to communicate the route information, actual versus ideal train speed and control modes. Here the green speed profile advises the driver to apply maximum tractive effort (full notch) in order to accelerate the train up to the holding speed.



In this example the white speed profile advises the driver to use zero tractive effort (coast), in order to exploit the kinetic-potential energy of the train and geography to bring the train speed down to the lower speed limit ahead. The precise switching point from powering to coasting can be clearly seen.