

Enhanced decision support for train drivers: “Driving a train by the seat of your pants”

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Abstract

Train drivers in the UK travel at speeds of up to 125 mph (200 km/h). At such speeds it takes over a mile for the train to stop so drivers must initiate speed control actions long before the target comes into view. Safe and efficient performance is achieved via a reliance on the driver’s memory of the infrastructure and terrain, known as route knowledge. Much work has been undertaken to provide more information to support route knowledge so that the driver can operate efficiently at levels well below the limits of human performance, even in degraded conditions. Examples include in-cab signalling systems and the European Rail Traffic Management System (ERTMS) interface, designed to facilitate interoperability throughout Europe. The standardisation of in-cab interfaces has clear advantages; but the resulting ‘all-in-one’ design may provide insufficient support to suite the natural environments and driver preferences in each country. This paper used cognitive task analysis and cognitive field research methods to understand the requirement of UK train driving tasks and explore the potential impact of ERTMS information on driver decision making. The results recognise several types of driving task in existence on the domestic network and consider the suitability of ERTMS integration into the country.

Scope and introduction

The Railway Gazette’s recent Speed Survey tables (2005), record the British InterCity 225 High-Speed Train (HST) as the 8th fastest train in the world (see Table 1). The fastest entry time for this train highlights a start-to-stop journey covering a distance of 77.8 miles (125 km) from Stevenage to Grantham, travelling at an average speed of 112 mph (181 km/h). The train itself is easily capable of exceeding the stipulated track limits of 125 mph (200 km/h), and in practise, drivers regularly attain these sorts of speeds in an effort to optimise the journey, adhere to scheduled times and generally bring about greater efficiency to the task.

In trying to define a ‘High-Speed Train,’ the industry appears to encounter a number of obstacles. Whilst the ability to achieve/exceed a particular speed provides a clear basis for a set of criteria, a parallel school of thought considers the quality of the service of trains running at lower speeds but with specific features, e.g. tilting

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