Human factors study of fatigue and shift work (T059)

**Background**

Fatigue, resulting from the schedules of work and rest, is an important issue in the rail industry. Unfavourable shift systems can have wide-ranging effects, on the personnel concerned, on the efficiency of the organisations for which they work and, most critically, on the safety of the rail system.

The requirement for this work primarily arose from recommendations resulting from a formal inquiry following a serious rail accident at Southall in 1997. The inquiry recommended that 'current rules governing drivers hours should be reviewed in light of current research into human behaviour'.

This project presents a broad programme of work concerned with the risks through an individual's fatigue, associated with current shift patterns.

**Aims**

It was originally hoped that this research would include all safety critical workers; unfortunately it was only able to focus on passenger train drivers. The aims of this research project were to understand the risks of current shift patterns in train drivers in Great Britain and develop strategies for risk reduction and control. Specifically, the aims were:

- To determine the risk associated with the current situation.
- To determine mitigation strategies that could be applied across the industry to effect reduced levels of fatigue-related accidents.
- To determine a method of monitoring the rail system to provide on-going assessment of fatigue related risk.
- To deliver useable and practicable guidance for designing shift patterns for drivers within the rail industry.

**Methods**

The study involved a range of approaches to provide an in-depth understanding of:

- The culture of shift working practices
- The methods for monitoring fatigue
- The relationship of accidents and incidents to factors associated with shift work
- The analysis of data from train drivers

Initial interviews were carried out with roster clerks in order to understand the practices used in different train operating companies (TOCs). The main component of the programme involved the collection of information from the drivers themselves, by means of two surveys. The first survey was a questionnaire relating principally to the drivers’ shift patterns and attitudes to various aspects of shiftwork. It also included questions on the health and well being of drivers.

The second survey was in the form of a diary of drivers' sleep and duty, which was completed over 28 consecutive duty periods. An investigation of accident risk based on the occurrence of signals passed at danger (SPADs) was undertaken. The project identified and evaluated strategies for drivers to combat the effects of fatigue and the tools and techniques used for estimating risks associated with shift work.

**Findings**

The work of the project was extensive, leading to the five reports that accompany this brief. The reports follow a logical progression, looking at rostering, working patterns, tools and techniques available to estimate the risk associated with shift patterns, a review of coping and intervention strategies that can be adopted and guidelines for the management of fatigue in drivers.
An industry-wide workshop was held in February 2005, at which the results of the research, together with the draft guidelines, were presented and discussed. Feedback was received from representatives of the Association of Train Operating Companies (ATOC), passenger and freight train operating companies, infrastructure renewals companies, Associated Society of Locomotive Engineers and Firemen (ASLEF) and the Health and Safety Executive (HSE) concerning the practicalities of implementing these guidelines. The input from this workshop was incorporated into these guidelines.

**Next steps**

This work, led by RSSB’s Human Factors team, has been presented to the main stakeholders, the TOCs at several forums and was well received.

The outputs of this research are now being used to develop a good practice guide for fatigue management systems, which will help the industry comply with the forthcoming Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS). This should be available towards the end of the year (2006).

A separate, hard copy guidance booklet, entitled ‘Coping with shift work and fatigue – a good practice guide for drivers’ is now available from RSSB’s Human Factors team. Further work to address the specific shiftwork issues that relate to track workers in the infrastructure companies is being developed.

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