THE SIRC COLUMN

Fatigue: what's known and what's being done

New research into fatigue should help shipowners and managers to identify and monitor those most at risk, says Neil Ellis of the Seafarers' International Research Centre

Within the last decade there has been an increased interest in the "human factor" within seafaring, especially in relation to safety. Past attempts to improve safety have often concentrated on mechanical and practical solutions, ranging from early low-tech solutions such as loading limits defined by plimsoll lines, to modern hi-tech solutions such as radar to aid collision avoidance. Although these measures undoubtedly have increased safety, they ignore one of the most important factors in safety: the crew that operate and work within these systems. Contemporary crews are generally well trained and qualified. However, owing to the increasing demands of modern day seafaring, such as reductions in crewing, faster turnaround times, and long working hours, seafarers today may often be subject to fatigue. Fatigue not only has an effect on the physical and mental wellbeing of crew members, but it may also have important implications for safety, and the efficient operation of vessels. Such potential effects of fatigue were, for example, graphically illustrated by the grounding of the passenger vessel Star Princess in which the main factor in the incident was considered to be the chronic fatigue of the pilot.

Although many shipping companies, management agencies, and ship operators, recognise that fatigue may have important implications for the safe and efficient operation of their vessels, few have a proper understanding of what causes fatigue, or how to address this. To date, there has been limited academic research into fatigue in the maritime industry. However this deficit is currently being rectified by a study headed by Professor Andrew Smith at the Centre for Occupational and Health Psychology at Cardiff University, which was initially developed in collaboration with the Seafarers' International Research Centre. This research uses two methods to study fatigue in the short sea and coastal industry and is one of the most sophisticated studies of fatigue in the maritime industry to date. Firstly, a questionnaire was sent out to seafarers through unions and companies which examined factors such as work schedules, rest periods, health and wellbeing, sleep patterns, and reported fatigue. Secondly, a number of onboard measures were employed to assess fatigue, including daily diaries which recorded work patterns, sleep patterns and perceived fatigue. Crews also completed computerised performance tests, and wore "sleep watches" which measured sleep efficiency.

The findings of the study showed that there are a number of factors which may be linked to fatigue. Not surprisingly, the type of vessel on which the seafarer was serving was found to be associated with fatigue, with highest levels being found on ferries. This finding probably does not relate solely to ship type, but to a number of factors relating to ferries, such as quick turnaround times, shift patterns, and having to deal with passengers in addition to marine-related duties. Length of tour was also found to relate to fatigue. However, surprisingly, those on longer tours fared better, which could be attributed to habituation to their working environment. This seems feasible as sleep efficiency was also found to improve further into the tour. However, fatigue was not shown to be influenced by rank, suggesting that fatigue is a problem for all those working in the industry. Hours of work, unsurprisingly, were found to relate to fatigue, with those indicating that their working hours were a danger to health and safety reporting higher levels of fatigue. However, this finding seems to be related to the perception of long working hours, and not actual working hours as no direct correlation was found between hours worked and reported fatigue. It was not only factors relating directly to jobs that were found to cause fatigue. Environmental factors such as noise and vibration, and the physical work environment were also found to relate to increased fatigue.

Although these individual factors have an effect on fatigue, the study showed that the best predictor for fatigue was not any *single* factor, but a combination of factors. For example, those working short tour lengths combined with long hours on certain ship types may be more vulnerable to fatigue. In fact these factors were shown to be cumulative, with the number of fatigue factors the individual was exposed to being positively correlated with increased risk of fatigue.

This cumulative effect on fatigue has a number of important implications. Firstly it suggests that seafarers who work on certain vessels under specific circumstances may be subject to an increased risk of fatigue. This has important consequences for any attempt to address fatigue. Schemes need to focus on a range of factors which may be concurrently present, such as tour length, shift pattern etc. As a result, shipowners and managers are likely to have to implement a wide range of changes within present practices if they wish to address the problem of fatigue. Although this may have cost implications initially, the potential benefits far outweigh the costs, as a non-fatigued crew will operate more efficiently and safely.

THE small bulker Jambo ran aground (left) off the west coast of Scotland last year, and subsequently sank (right), when the chief officer, who was alone on the bridge, fell asleep and missed a course change. According to the Marine Accident Investigation Branch (MAIB), only the vessel's master and mate were cleared for watchkeeping and worked alternate six-hour stretches, a system which it described as inherently very tiring. The first officer also suffered increased levels of fatigue as a result of regular port visits during which he had to oversee cargo operations. Following the investigation, MAIB revealed that an average of six ships a year went aground in British waters as a result of the watchkeeper falling asleep, becoming incapacitated or being absent from the bridge. (Photos: MAIB)

Another important implication of the combined factors approach is that it may be used to measure fatigue by shipping companies and managers who wish to monitor the wellbeing of their crews, and by authorities such as port state control. Such parties may employ checklists of the factors which have been found to contribute to fatigue in order to identify those who are at high risk. This approach would not only serve to identify those at risk, but could also help target preventative measures efficiently.

At present, however, few shipping companies and managers seem to be taking active measures to address fatigue onboard. Over 90 per cent of those questioned in the fatigue study at Cardiff reported that they had not received any training in recognising or dealing with fatigue. Investment in such training is essential and not only would it benefit companies by improving safety, but it could also have a knock-on effect of improving the operational efficiency of the crew.

However, blame for lack of fatigue training should not be attributed solely to companies because, although many recognise fatigue as an important issue, they generally still understand little about what causes it. This is the gap that the present study hopes to fill.