

# Project Martha round-up

The effects of fatigue on performance and motivation go beyond what was previously expected – and Masters are particularly affected

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**I**nterManager and Warsash Maritime Academy, have presented the findings of their joint fatigue study, Project MARTHA, to the International Maritime Organization (IMO).

Speaking at the presentation, Captain Kuba Szymanski, FNI, Secretary-General of InterManager urged the maritime industry to take notice of the findings as the industry recruits aspiring seafarers. The report highlights growing levels of fatigue, particularly among Masters and watchkeepers, and noted that lack of motivation was a major result of fatigue experienced by seafarers.

Findings from the project's predecessor, Project Horizon, which looked at the effects of different watchkeeping schedules, will already be familiar to many *Seaways* readers. However, the long-term psycho-social effects of sleepiness and fatigue were much less well researched. Results from the MARTHA project indicate that fatigue and stress increase for most crew as the voyage length increases, while motivation decreases.

## Data collection

The presentation made to IMO is based on data drawn from a number of studies. Data was collected by a variety of methods. Four shipping companies were selected to assist in the collection of data. All four have very different trading and operating patterns. They were:

- A company operating small product tankers in north-west Europe, with port calls every three days;
- A company operating large container ships on liner routes including the Far East to Europe and Asia to South America. Busy periods of port calls are interspersed with long ocean passages;
- A state-owned Chinese company operating bulk carriers trading worldwide;
- A state-owned Chinese company operating tankers in Far Eastern waters.

The first two companies operated primarily with European officers and Filipino or mixed crew, while the second two employed only Chinese officers and crews. This allowed comparison of cultural difference in attitudes towards sleepiness and fatigue.

Questionnaires and interviews were conducted with all participants. In addition, participants were

asked to keep a weekly diary throughout their tour of duty, which in some cases lasted more than 10 weeks. This diary was based on general questions about the individual's sleep. Questions were based on the Karolinska Sleepiness Scale and the Multidimensional Fatigue Index.

Seventy seafarers took part in a survey using 'actiwatches' to measure movement and sleep over the two years of the field study. Participants included 15 Captains, 19 watchkeeping deck officers, 13 day working engineers and 23 ratings, on 12 participating vessels.

## Fatigue's effect on Masters

One striking – if unsurprising – finding was that Masters suffer more than their colleagues from both fatigue and stress. Many would contend that a Master's place on a ship is central to its performance. The project confirmed this view and found several ways in which a Master's role differed from that of other crew members. Among the findings were that Masters:

- Have more weekly work hours
- Feel that work in port is less demanding than work at sea
- Are far more fatigued at the end of a contract
- Are slightly more overweight compared with others on board
- Suffer from mental fatigue, as opposed to the physical fatigue suffered by other seafarers.

It was noticeable that while a slight majority of watchkeeping officers reported that they felt more fatigued at the end of a voyage than at the beginning, a large majority of Masters did so. Overall, the night-time watchkeeper (typically the Second Officer) was shown to be getting considerably less sleep than colleagues – an average of 5.6 hours in a 24-hour period, compared with 6.6 hours for the Master, and 6.8 hours for the Chief Officer, Chief and First Engineer – yet Masters experienced much higher overall feelings of fatigue. Officers in general were a little more tired at work, suffered a lower quality of sleep and a higher level of stress than ratings.

## Fatigue's effect on performance

The performance of seafarers on board is paramount to a vessel's operation and efficiency. The study found that:

- For seafarers, not being relieved on time damaged their motivation
- In the view of 48.6% of participants, stress was

higher at the end of a voyage

- Sleepiness levels vary little during the voyage, suggesting there are opportunities for recovery while on board
- Analysis of results from actigraphy (watches measuring movement and sleep period) shows that both the amount and quality of sleep decrease over time for all crew members.

Interviews with the crew also showed the psychological effects of fatigue, some of which are quoted in the overview of the project's findings. These range from the everyday – evidence of irritability, forgetfulness, lack of attention etc – to the dramatic. In one particularly striking case, an AB reported that all the crew were so tired that 'Sea water poured into the engine room, but nobody noticed that. When it was noticed, it was too late to take any actions. The ship sank. Fortunately, nobody died.'

### What drives fatigue?

Issues that were repeatedly mentioned by seafarers as contributing to their levels of fatigue and sleepiness were (in no particular order):

- New regulations and more requirements placed on seafarers
- Increased inspections and more paperwork
- The bad condition of ships' accommodation
- Lack of proper maintenance
- Work in port
- Working on board a new ship
- The quality and professionalism of work colleagues.

### Fatigue and the cultural perspective

Project MARTHA also sought to examine differences in attitudes to rest and fatigue. It threw up some interesting results, in which some clear divides between European and Chinese seafarers were found. However, it is worth noting that all companies – including the two based in Europe – employed Asian crew, suggesting that these differences are a result of organisational culture, rather than national culture. It was found that:

- European seafarers worked fewer hours than their Chinese colleagues
- Chinese seafarers on dry bulk carriers worked an average of 15.11 hours a day compared with an average 10.23 hours a day worked by European seafarers
- There is evidence of higher levels of fatigue and stress in Chinese seafarers than in European seafarers.

### Use of a FRMS

The report goes on to give details of a case study looking at the use of a fatigue risk management system (FRMS). It is a concept that has been adopted in other safety-critical transport sectors, but it has not yet been widely used in the marine industry. The key elements of a FRMS are:

- Fatigue awareness training and cultural change programmes
- A fatigue reporting system within a just culture
- Data-driven analysis for operational fatigue risk assessment, workload management and monitoring

## Sleepiness and fatigue

### Short-term sleepiness

- Healthy individuals
- Rapid onset
- Short duration
- Single cause
- Short-term effect on daily activities

### Long-term fatigue

- May cause health disorders (physical and mental)
- Insidious onset
- Persists over time
- Multi-factor causes
- Significantly affects behaviour and wellbeing

of adequate sleep for those onboard.


The concept allows for different levels of engagement as the system grows and is accepted by the workforce. Engagement begins by promoting simple fatigue awareness messages and can then build to a more interactive approach. Eventually, seafarers can take greater ownership of the system by reporting incidents and keeping a check on their own fatigue levels. The company may also consider carrying out periodic reviews of crew fatigue, eg through sleep diaries. Raising awareness is a key part of the initial FRMS process. In one company, this was achieved with presentations on the project at their annual Captains' seminar, where participants showed considerable interest in the topic and were keen to contribute their views.

### Taking the results forward

Addressing IMO delegates and invited guests, Captain Szymanski said: 'I sincerely hope the results of our research will be read and acted upon by ship managers and shipowners, who will go on to revise their attitudes and procedures. There are a number of 'low-hanging fruits', which, with a little adjustment, could make a big difference. These are not necessarily costly changes – such as having seafarers relieved on time and organising work on board with humans and not regulations in mind and engaging sea staff in decisions – but empowering seafarers to take care of their lives more than it is today.

'Our people are our assets and we need to develop a strategy whereby shipping is once again seen as a career of choice for tomorrow's young, talented people,' Kuba said.

'There is no avoiding the fact that the global fleet is increasing and more manpower is needed. However, we are demanding more from current seafarers rather than recruiting even more cadets into the market. Attracting new seafarers and retaining them will test the industry, but we cannot ignore these findings in making the industry an attractive place for aspiring seafarers.'

Overall, survey participants recognised that there needs to be a cultural change in the industry's attitude towards fatigue, by both seafarers and shore management. The response 'But it's always been like this' is no longer acceptable. 

For a full copy of the project report, contact [secretary@intermanager.org](mailto:secretary@intermanager.org)