

FATIGUE

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The engine, deck and liquid cargo simulators at Warsash Maritime Academy will be used to provide realistic tests of performance on typical watchkeeping patterns

Research will take fatigue to a new level



A wealth of marine expertise behind the study



Graham Clarke

The teams involved in Project Horizon include many key personnel with extensive maritime experience.

Project leader is Graham Clarke, who trained as a naval architect and worked in shipyards in Southampton, Gosport, Hamble and Barrow in Furness. He has worked in the marine industry for more than 40 years, with increasing involvement over the past 20 years in European issues.

Mr Clarke ran the EU Maritime Industries Forum for 17 years, where he also coordinated for the MIF Human Resources Group. He has been involved in research projects, studies and consultancy at regional, national and European levels, and has successfully developed and managed two EU-funded projects in the research field (ship repair operations and shipyard supply chains), as well as an inter-regional project involving EU port cities, before working on the bid to fund the Horizon Project. Two former ships' officers are heading the research work at

Warsash Maritime Academy. Mike Barnett, professor of maritime safety and head of postgraduate studies and research, is a former chief officer who started his academic career at Warsash in 1985, as a lecturer in tanker safety. David Gaffield, senior lecturer and unit manager of the machinery space simulator, served as an engineer officer and technical superintendent with Shell Tankers before joining Warsash in 1996.

Leading the Swedish team is Margareta Lutzhof, associate professor at Chalmers University of Technology. Ms Lutzhof is a master mariner, who served at sea for 13 years before studying for a degree in cognitive science and a Master's in computer science. In December 2004 she received a PhD in the subject of human-machine interaction on the ship's bridge. She was the project leader for the three-year 'fatigue at sea' field study for the Swedish National Road and Transport Research Institute, VTI.

Nautilus International is involved in a major multi-partner European research project aiming to tackle the problems posed by seafarer fatigue, which was launched with a two-day inaugural meeting at Warsash, in the UK, last month.

The European Commission-funded Project Horizon brings together 11 academic institutions and organisations with a broad range of interests from the shipping industry in a 30-month research programme to examine the way in which fatigue affects the cognitive performance of ships' watchkeepers.

The €3.78m project will make extensive use of bridge, engine and liquid cargo handling simulators in Sweden and the UK to produce real-time, realistic scenarios in which the impact of fatigue on decision-making and performance can be assessed.

Launched in response to concern over aspects that lead to seafarer fatigue, the project seeks to improve safety at sea by developing a fatigue management toolkit for the industry, as well as recommendations for improving work patterns at sea.

'What we now have evidence to show the scale of the problem associated with fatigue amongst seafarers, this project will take the understanding to a new level based on robust and reliable empirical data that can be used to make concrete fact-based recommendations for avoiding or mitigating the dangers,' said project manager Graham Clarke.

'All the partners welcome the support shown by the European Commission in this important area through the funding of this research,' Mr Clarke added.

The project brings together academics from Southampton Solent University in the UK, Chalmers University of Technology in Sweden, the Stress Research Institute from Stockholm University and Bureau Veritas Marine Division, along with representatives from the European Community Shipowners' Associations, the European Transport Workers' Federation, the European Harbour Masters Committee, the International Association of Independent Tanker Owners, the Standard P&I Club, the Marine Accident Investigation Branch, and the Maritime & Coastguard Agency.

Sixty deck and engine officers will be taking part in the project, with their performance being measured by researchers as they undertake typical watchkeeping



The Project Horizon team members meet at Warsash last month

duties on simulators over a succession of seven-day periods. Experts will use a variety of scientific methods to measure the fatigue levels experienced by the officers and any resulting degradation in performance during a wide range of regular on-board operating conditions.

'This is a highly significant project, and we hope it will result in a better understanding of the problem of fatigue and effective measures to improve the safety of shipping and the health and welfare of seafarers,' said Nautilus senior national secretary Allan Graveson.

'We believe this work has the potential

to deliver huge benefits to the industry, and the wider community,' he added. The programme documentation notes the MAIB study of casualty figures, which showed that fatigue was involved in around one-third of accidents over a 10-year period.

'A conservative extrapolation of those figures would suggest that more than 125 ships would have suffered the same fate, around the EU coastline over the same period. In Europe alone, the costs involved in fatigue-related losses could total at least US\$1.7m per year, not to mention the costs of the adverse effects on the health and wellbeing of seafarers,' he added.

US survey examines workers' sleepiness

A US dentist has launched an online survey of transport workers to determine the extent to which they are affected by sleepiness at work.

The survey is being run by Dr Laurence Barsh, a dentist who has been involved with sleep medicine since 1992 and who now works full-time on public education about the role of dentists in the recognition and management of snoring and the condition of sleep apnoea.

Dr Barsh says the anonymous survey forms part of a campaign to

establish a confidential anonymous nationwide US screening and treatment programme for sleep apnoea — with names hidden from employers, insurance companies and the government for people in those industries that affect the public.

Some transport workers are presently reluctant to discuss the problem because of fears about repercussions for their jobs, he adds.

'Because of this lack of testing and follow-up treatment, the problem continues to get worse as excessively sleepy people drive our trucks, fly our planes, engineer our trains and captain our ships, resulting in an ever-increasing accident and death rate.'

The survey can be found on the website: www.SnooringIsSexy.com

Seafarer volunteers will be a key part of studies

Project Horizon will involve some of Europe's leading fatigue and stress experts, who will be working in a six-stage project to assess the impact of fatigue on the decision-making performance of watchkeepers and to determine the best ways of minimising risks to ships and seafarers.

The project will begin with a research, design and development study, which will utilise literature on fatigue obtained from maritime and other relevant sources. A range of fatigue measurement tools and procedures will be examined and selections made.

Experimental scenarios will then be designed that will allow for the observation of certificated watchkeepers, undertaking watchkeeping routines, under realistic conditions in bridge, engine room and liquid cargo handling simulators.

The project will seek to replicate realistic seagoing conditions, with sufficient experiments and candidates to ensure the statistical validity of the results.

of the candidates.

A total of 60 volunteer experienced seafarers will take part in the simulations, which will run for seven days at a time. The candidates will be recruited in exactly the same way as if they were going to sea to fulfil the same functions that will be required under simulated conditions. They will be checked for their health and suitability for the research.

Data collected from the experiments will be analysed using mathematical and regression modelling techniques to determine the effects of fatigue on the cognitive performance of maritime watchkeepers under different watch patterns.

Applied to all of this will be the overlay of significance of operation — enabling an assessment to be made of the seriousness of impact of loss performance, and whether it can be tolerated or mitigated.

The results of this data analysis will lead to the development of a fatigue management toolkit for use by interested parties such as ship managers, maritime regulators, flag states, port states and the International Maritime Organisation.



Fatigue, not alcohol, was a key cause of the Exxon Valdez disaster in 1989. Picture: US Coast Guard

Project seeks to deliver 'toolkit' for safer work

Researchers will build upon growing evidence of danger

Project Horizon aims to build upon a growing body of evidence of seafarer fatigue problems gained from accident investigations and academic studies.

One of the most extensive pieces of work was the six-year research programme carried out by Cardiff University, with support from Nautilus, the Maritime & Coastguard Agency, and the Health & Safety Executive.

The findings drew from a survey of more than 1,850 seafarers, and objective testing onboard, with results including:

- One in four seafarers said they had fallen asleep while on watch
- Almost 50% of seafarers reported working weeks of 85 hours or more
- Around half said their working hours had increased over the past 10 years
- Almost 50% of seafarers considered their working hours present a danger to their personal safety
- Some 37% said their working hours sometimes posed a danger to the safe operations of their ship
- Many reported that they had worked to the point of collapse

Similar research in Sweden has also reinforced the way in which work patterns at sea — and the six-on/six-off rota in particular — can result in dangerous levels of sleepiness being built up by seafarers.

In 2003, the Swedish researchers found that 73% of officers taking part in a closed voting session had admitted to having fallen asleep one or more times whilst

on watch. When the question was repeated last year, the numbers were even higher.

A 2004 report by UK Marine Accident Investigation Branch showed that one-third of the incidents it investigated between 1994 and 2003 involved a fatigued watchkeeper alone on the bridge at night, whilst a US Coast Guard study showed fatigue to have contributed to some 16% of critical vessel casualties and 33% of personal injuries.

And whilst the 1989 grounding of the Exxon Valdez tanker is often linked to alcohol, the US National Transportation Safety Board determined that the probable causes included 'the failure of the third mate to properly manoeuvre the vessel because of fatigue and excessive workload' and 'the failure of the Exxon shipping company to provide a fit master and a rested and sufficient crew for the Exxon Valdez'.

However, the Exxon Valdez disaster resulted in stringent new controls on drinking at sea — but little in the way of new regulations to combat fatigue. In fact, studies have shown marked similarities between the effects of fatigue and alcohol.

Research in Norway for sustained wakefulness, cognitive psychomotor performance decreased to a level equivalent to the performance impairment

observed at a blood alcohol concentration of 0.05%. After 24 hours of sustained wakefulness, cognitive psychomotor performance declined to a level roughly comparable to the effects of a blood alcohol concentration of 0.10%.

Whilst working weeks of up to 98 hours are permitted under international maritime regulations, the hours of airline pilots are strictly controlled — with the International Civil Aviation Organisation setting a limit of between 70 and 100 hours of flight time allowed over a period of month.

Project Horizon aims to build on this knowledge, setting the following objectives for its work:

- To provide a realistic, high fidelity, voyage scenario in which watchkeeper cognitive performance can be measured
- To provide various watchkeeping patterns which will lead to fatigue in the watchkeeping officers
- To capture empirical data on the cognitive performance of the watchkeepers undertaking these watchkeeping patterns
- To analyse this empirical data to determine the effect of fatigue on the cognitive performance of the watchkeepers
- To develop a fatigue management toolkit for use by ship managers, maritime regulators, flag states, port states and the International Maritime Organisation to derive a set of recommendations that maritime regulators and ship managers can use to improve the safety and reliability of vessels