

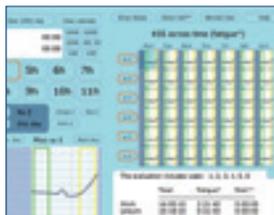


# An accident waiting to happen...

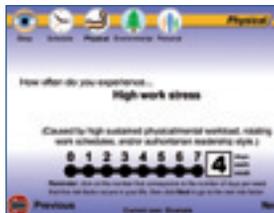
## The Complete Guide to ship manning **p4-5**



## MARTHA a new HORIZON **p6**



## Crew Endurance Management **p7**



A Nautical Institute project



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Piotr's wife agreed it was unlucky that the accident which has blighted his career happened when he was on watch; he was a good man trying to do a good job. In the same circumstances it could have happened to anybody.

That particular ill-fated watch had started promisingly. At midnight the sky was clear and the moon, sinking in the west, left shimmering silver traces right ahead of the vessel on the mirror calm sea. Piotr felt relief - the preceding days of gales and hellish seas had meant hours spent wedged into a corner staring bleary eyed through the bridge front windows with wipers whirring and the occasional thump of heavy water pounding against the glass.

There had been no respite below, wakeful hours had been spent clinging on to the mattress, hoping that the Captain was alert on the bridge and trusting that the naval architects and designers had done their work properly. The small bulk carrier had been tracking westwards in the Channel when they had encountered the severe gale two days ago. They had made little useful progress since that time. Now, miraculously, only a large lazy swell remained, gently moving the ship which was back on course and heading towards the alter course position to the south east of the Scillies.

The Captain had left the bridge almost as soon as Piotr had arrived to take over, grateful at last, for the promise of 6 hours of quality rest. Before leaving Piotr alone he had pointed him to his night orders and alerted him to two ships that had recently passed them on nearly reciprocal courses. Their stern lights could be seen receding into the blackness astern. There was no seaman lookout, of course - there never was: with a total crew of only six there was more pressing work for their attention.

Piotr had glanced at the chart and noted the Captain's midnight fix. The vessel was on the newly drawn track and two or three hours from the alter course position: a glance at the GPS confirmed his assessment.

Largely because of the poor weather Piotr now had a backlog of paperwork to deal with including chart corrections, passage planning and unanswered emails from the company. The 6 hour watch was a good opportunity to tackle some of it. The Captain was a hard taskmaster and fair but he had no sympathy with complaints about tiredness or overwork. Piotr, for his

*He knew the importance of keeping a proper lookout*

part, was hard working, conscientious and diligent. So, he made himself a cup of coffee, scanned the horizon ahead, glanced at the radar and set to work at the chart table.

Although he was desperately weary he wanted to please and to be seen to be capable and efficient. He knew the importance of keeping a proper lookout and

resolved to check the instruments and the horizon frequently. All went well. He had not noticed any other traffic and, as he plotted the ship's position at 0100, he noted that they were making good progress and were still on track. He turned back to his paperwork.

Some time later, he woke with a start as his lolling head hit the shade of the anglepoise lamp. He made himself another cup of coffee and walked around the small wheelhouse. For a fleeting moment he thought about calling the Captain but immediately discounted the idea - after all he too needed sleep to be fit to take over again at 0600. Feeling slightly more alert he returned again to his work.

He was thrown forcefully forward at the moment of grounding hitting his head on the GPS before falling to the deck. The cold coffee spilled across the chart and the gentle buzzing coming from the GPS was drowned by a multitude of other alarms.

# Introduction

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In this issue of **Alert!** we offer some thoughts on safe manning, and on mitigating the effects of fatigue and other risk factors on crew endurance. We expand upon what has been articulated in issue 13 of **Alert!** - *Time to wake up to the consequences of Fatigue* ([www.he-alert.org/documents/bulletin/Alert!\\_13.pdf](http://www.he-alert.org/documents/bulletin/Alert!_13.pdf)) - and its associated Vodcast: ([www.he-alert.org/user/vodcast13.asp](http://www.he-alert.org/user/vodcast13.asp)).

The Case Study on Page 1 tells the all too familiar (albeit fictional) story of the Officer of the Watch whose otherwise uneventful career is blighted by an accident that may have been avoided had the ship been properly manned. This was a ship with a crew of 6; there was no lookout; the OOW was fatigued because of the atrocious weather that they had encountered on passage; he was working a 6-on-6-off routine with the Master; he was behind on his paperwork; and he was conscious that the Master had no sympathy with complaints about tiredness or overwork.

The Nautical Institute has, for some time, been lobbying to dispense with the master/mate 6-on-6-off watchkeeping regime. Paragraph 2.7 of Annex 3 to the IMO's *Principles of Minimum Safe Manning* (IMO Resolution A.1047(27) adopted on 30 November 2011) states that: *'The Administration should consider the circumstances very carefully before allowing a minimum safe manning document to contain provisions for less than three qualified officers in charge of a navigational watch, while taking into account all the principles for establishing safe manning.'*

But, 'safe' manning is not just about numbers; it is also about ensuring that all seafarers are properly rested, and that they can understand and mitigate the effects of fatigue and other risk factors on crew endurance.

In issue 13 of **Alert!** (Page 1) we argue that **Fatigue management** should be high on the agenda for all ship designers, managers and seafarers. We particularly commend Maritime New Zealand's *Fatigue Advisor Resource* - which provides advice on the development of Fatigue Management Plans (downloadable from: [www.he-alert.org/documents/published/he011130.pdf](http://www.he-alert.org/documents/published/he011130.pdf)) - and their Wheelhouse Fatigue Checklist (downloadable from: [www.he-alert.org/documents/published/he011135.pdf](http://www.he-alert.org/documents/published/he011135.pdf))

The hours of work and hours of rest requirements of the 2010 Manila amendments to the STCW Convention and of the ILO Maritime Labour Convention 2006 (MLC 2006) are, to some extent, in variation of one another. The Oil Companies International Marine Forum (OCIMF) provides some useful guidance on the application of these requirements ([www.ocimf.com/mf.ashx?ID=9d7d7e0f-562f-4a2e-96aa-481565bc9e7a](http://www.ocimf.com/mf.ashx?ID=9d7d7e0f-562f-4a2e-96aa-481565bc9e7a)) which are consistent with the ISF Watchkeeper Software Version 3.3, designed to demonstrate compliance with crew work and rest hour regulations (<http://home.isfwatchkeeper.com>).

## Reports & Studies

### Situation Awareness and its practical application in the maritime domain

Captain Majid Safahani, Manager, Marine Simulation, BC Ferries Inc,  
Captain L. Scott Tuttle, Manager, Marine Simulation, BC Ferries Inc,

Downloadable from:  
[www.he-alert.org/documents/published/he011120.pdf](http://www.he-alert.org/documents/published/he011120.pdf)

### Changing Attractions of Seafaring Life

Captain Shahrokh Khodayari

Downloadable from:  
[www.he-alert.org/documents/published/he011115.pdf](http://www.he-alert.org/documents/published/he011115.pdf)

### Seafarer Accommodation on Contemporary Cargo Ships

Ellis, N., Sampson, H., Acejo, I., Tang, L., Turgo, N., Zhao, Z.  
SIRC, The Lloyd's Register Educational Trust Research Unit

Downloadable from:  
[www.sirc.cf.ac.uk/Uploads/Publications/Publications%202012/Seafarer%20Accommodation.pdf](http://www.sirc.cf.ac.uk/Uploads/Publications/Publications%202012/Seafarer%20Accommodation.pdf) : << [Click here](#) >>

### Familiarization on Board

Captain Shahrokh Khodayari

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[www.he-alert.org/documents/published/he011110.pdf](http://www.he-alert.org/documents/published/he011110.pdf)

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# A Rough Guide to interpreting the Principles of Safe Manning

Captain Michael Lloyd, Commodore David Squire

On 30 November 2011, the IMO adopted Resolution A.1047(27) - **Principles of Minimum Safe Manning** - which revokes Resolutions A.890(21) and A.955(23).

Paragraph 1.4 of Annex 2 - **Guidelines for Determination of Minimum Safe Manning** – states that in determining the minimum safe manning of a ship, consideration should also be given to the number of qualified and other personnel required to meet peak workload situations and conditions, with due regard to the number of hours of shipboard duties and rest periods assigned to seafarers.

A few definitions of peak work load conditions could be:

- for cargo ships: the ability to moor safely in adverse weather conditions where springs

and ropes must be put out together and possibly tugs lines tended, all supervised by a responsible officer;

- for cruise ships: the ability to evacuate the ship safely in poor weather conditions at night without assistance from the shore facilities in the time specified by the IMO;
- for smaller vessels: the ability to enter port, work cargo and sail the same day and comply with the requirements for hours of work and hours of rest;
- for engineering staff: the ability to man the machinery control room or machinery monitoring station when navigating in restricted waters and/or berthing/unberthing;
- for maintenance: the ability to undertake essential ship/system/machinery

maintenance in harbour during cargo operations or bunkering operations whilst attending to inspectors and port or company officials.

**The Guidelines for Determination of Minimum Safe Manning** are only viable if they are strictly complied with. To date, there is no mathematical formula for assessing the manpower requirements of a ship taking into account these Guidelines - while these are very sensible guidelines, they are nevertheless open to individual interpretation, and we can only offer our own thoughts on how to apply them. This we have done by way of a Template titled **A Rough Guide to interpreting the Principles of Safe Manning**, which can be downloaded from:

[www.he-alert.org/documents/published/HE01125.pdf](http://www.he-alert.org/documents/published/HE01125.pdf)

NOTE: Example only - for the whole matrix go to: [www.he-alert.org/documents/published/HE01125.pdf](http://www.he-alert.org/documents/published/HE01125.pdf)

OPERATIONAL FUNCTION	OPERATIONAL FACTORS TO CONSIDER	RELEVANT INSTRUMENTS	TASK CAPABILITY	ATTRIBUTES	WORKLOAD ASSESSMENT
<b>NAVIGATION</b>  Plan and conduct safe navigation	Ocean navigation Coastal navigation Ice navigation Port approaches Pilotage Equipment functionality Weather Visibility Manoeuvrability Sea & air draft Communications	STCW Code	Passage planning Anchorage planning Maintenance of Nav aids, charts etc Communications	Duration: Constant Frequency: Depends on trading pattern Competence: STCW Importance: High	Additional to watchkeeping duties  Contingency to increase for weather & traffic density
Maintain a safe navigational watch in accordance with the requirements of the STCW Code	Ocean navigation Coastal navigation Pilotage waters Weather Traffic density Communications Visibility	STCW Code	Electronic & visual watchkeeping BRM	Duration: Variable depending on trading pattern Frequency: Frequent Competence: STCW Importance: High	Normal watchkeeping pattern & lookout requirements  Ability to increase watchkeepers as situation requires
Manoeuvre and handle the ship in all conditions	Weather Port approaches River/channel navigation Ice areas Ship type & manoeuvrability Visibility Traffic density Ship handling Communications Pilotage needs Duration of passage Availability of tugs	STCW Code	Ship handling all weather conditions Knowledge of ship's manoeuvrability Knowledge of river and mud navigation Knowledge of ice navigation	Duration: Short Frequency: Frequent Competence: STCW, BRM, ice experience, river experience Importance: Critical	Normal watchkeeping pattern & lookout requirements  Increasing to high for poor visibility, coastal, port approaches & pilotage  Highest workload for master and bridge officers

# The complete guide to ship manning

## Safe Manning

### Considerations

- Operational functions
- Operational factors to consider
- Relevant instruments
- Task capability
- Attributes
- Workload assessment
- Hours of work and hours of rest requirements
- Watchkeeping patterns

### Guidance & Tools

- IMO Principles of Minimum Safe Manning (Resolution A.1047(27))  
[www.imo.org/KnowledgeCentre/IndexofIMOResolutions/Documents/A%20-%20Assembly/1047\(27\).pdf](http://www.imo.org/KnowledgeCentre/IndexofIMOResolutions/Documents/A%20-%20Assembly/1047(27).pdf)
- A rough guide to Minimum Safe Manning  
[www.he-alert.org/documents/published/HE01125.pdf](http://www.he-alert.org/documents/published/HE01125.pdf)
- Recommendations Relating to the Application of Requirements Governing Seafarers' Hours of Work and Rest  
[www.ocimf.com/mf.ashx?ID=9d7d7e0f-562f-4a2e-96aa-481565bc9e7a](http://www.ocimf.com/mf.ashx?ID=9d7d7e0f-562f-4a2e-96aa-481565bc9e7a)

## Organization & Ma

### Performance Influencing Fa

- Top Level Management
- Personnel
- Operational
- Technical
- Safety Management

### Guidance & tools

- Alert! Issue 2 Centrespread  
[www.he-alert.org/documents/centrespreads/centrespread\\_2.pdf](http://www.he-alert.org/documents/centrespreads/centrespread_2.pdf)

## Future considerations

- Remote platform/system monitoring
- Traffic Organization Services
- Navigational Assistance Services
- Remote pilotage
- Autonomous vessel operations

## Other considerations

- Need for additional crew (above minimum manning)
- Administration officer
- Information Management officer

### Supernumeraries

- Company representatives
- Mooring crews
- Cargo crews
- Training officers
- Officers/ratings under training
- Riding gangs

## Management

### Factors

## Fatigue management

### Causes, effects and mitigation

- Alert! Issue 13 Centrespread  
[www.he-alert.org/documents/centrespreads/centrespread\\_13.pdf](http://www.he-alert.org/documents/centrespreads/centrespread_13.pdf)
- Alert! Issue 13 Vodcast  
[www.he-alert.org/user/vodcast13.asp](http://www.he-alert.org/user/vodcast13.asp)

### Responsibilities

#### Ship designer

- 'Design out' debilitating effects of noise, temperature, motion, vibrations, intensity of lighting etc

#### Shipowner/shipmanager

- Comply with Safe Manning requirements
- Develop a fatigue management plan
- Authorise master to anchor if crew are fatigued

#### Seafarers

- Identify the causes of fatigue
- Take appropriate and early measures to prevent fatigue
- Review watchkeeping patterns
- Comply with hours of work and hours of rest

### Guidance & tools

- IMO guidelines on fatigue mitigation and management (MSC/Circ.1014)  
[www.imo.org/OurWork/HumanElement/VisionPrinciplesGoals/Documents/1014.pdf](http://www.imo.org/OurWork/HumanElement/VisionPrinciplesGoals/Documents/1014.pdf)
- Crew Endurance Management System (USCG)  
[www.he-alert.org/documents/published/HE00520.pdf](http://www.he-alert.org/documents/published/HE00520.pdf)
- Crew Endurance Decision Support Software  
[www.uscg.mil/hq/cg5/cg5211/docs/DSS.zip](http://www.uscg.mil/hq/cg5/cg5211/docs/DSS.zip)
- ISF Watchkeeper  
<http://home.isfwatchkeeper.com>
- MARTHA  
[www.warsashacademy.co.uk/about/resources/martha-software-and-documents.zip](http://www.warsashacademy.co.uk/about/resources/martha-software-and-documents.zip)
- MLC 2006 Pocket Checklist  
[www.ukpandi.com/fileadmin/uploads/uk-pi/LP%20Documents/Checklists/ILO%20MLC%20pocket%20checklist\\_September%202012.pdf](http://www.ukpandi.com/fileadmin/uploads/uk-pi/LP%20Documents/Checklists/ILO%20MLC%20pocket%20checklist_September%202012.pdf)
- ILO MLC Smartphone App  
[www.ukpandi.com/loss-prevention/apps/](http://www.ukpandi.com/loss-prevention/apps/)
- Fatigue Advisor Resource (Maritime New Zealand)  
[www.he-alert.org/documents/published/he01130.pdf](http://www.he-alert.org/documents/published/he01130.pdf)
- Wheelhouse Fatigue Checklist (Maritime New Zealand)  
[www.he-alert.org/documents/published/he01135.pdf](http://www.he-alert.org/documents/published/he01135.pdf)
- Recommendations Relating to the Application of Requirements Governing Seafarers' Hours of Work and Rest  
[www.ocimf.com/mf.ashx?ID=9d7d7e0f-562f-4a2e-96aa-481565bc9e7a](http://www.ocimf.com/mf.ashx?ID=9d7d7e0f-562f-4a2e-96aa-481565bc9e7a)
- The Nautical Institute Fatigue Forum  
[www.nautinst.org/en/forums/fatigue/index.cfm](http://www.nautinst.org/en/forums/fatigue/index.cfm)

# MARTHA a new HORIZON

Professor Mike Barnett, Southampton Solent University

[www.solent.ac.uk/research/research-university/international-research/international-maritime.aspx](http://www.solent.ac.uk/research/research-university/international-research/international-maritime.aspx)

Human error has been implicated in between 60% to 90% of maritime casualties, particularly in collisions and groundings. This finding has prompted the European Union to investigate the human factors related to workloads and working conditions that contribute to shipping accidents. The EU-funded Project HORIZON represented one important initiative in this area.

Working with academic institutions and the shipping industry, the project team focused on the fatigue levels of watch keepers by conducting extensive simulator experiments to examine ships officers' cognitive performance in different workload conditions during a 7 day voyage. 90 experienced volunteers took part in realistic shipboard operations under two watch regimes – the 4/8 and the 6/6 system - using linked bridge, engine and cargo control room simulators.

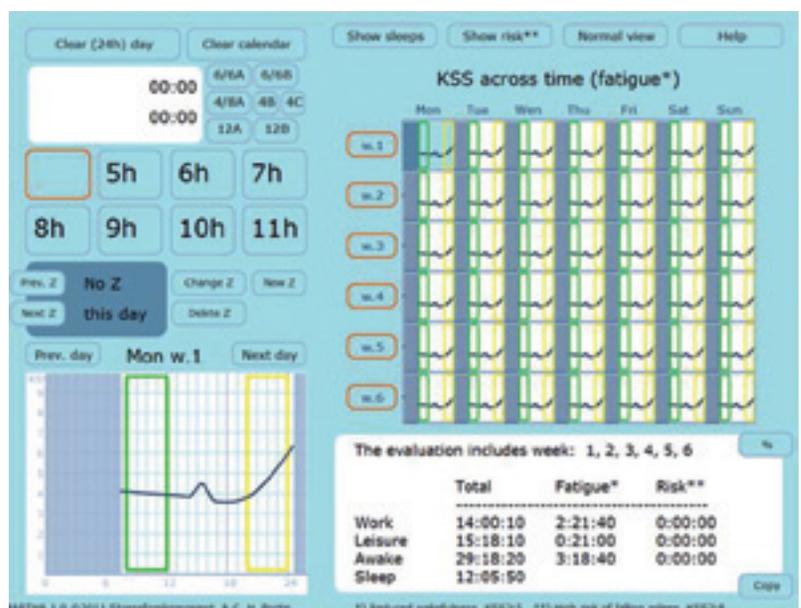
The project team obtained a wealth of data on sleepiness and stress levels using validated indicators of fatigue. Periodically, volunteers were also fitted with electrodes and their brain activity measured. The team analysed the ship's logs and recorded the candidates' work on video to glean further information on performance and signs of sleepiness.

Stakeholders have already shown significant interest in the project and its conclusions. The project's final results contain recommendations for industry, regulators and seafarers, and a prototype fatigue prediction software model, named MARTHA. The latter can be downloaded from the project website ([www.project-horizon.eu](http://www.project-horizon.eu)) and is set to empower ship managers to optimise operations and work schedules, as well as improving crew welfare.

It is anticipated that MARTHA will be used by ship managers within a Fatigue Risk Management System (FRMS) to monitor and moderate fatigue levels of crew during critical phases of the voyage.

Projects HORIZON and MARTHA are thus making a valuable self-regulated contribution to maritime safety, by enhancing the safety of passengers and crew on board, the environment and the economy.

*Projects HORIZON and MARTHA are making a valuable self-regulated contribution to maritime safety, by enhancing the safety of passengers and crew on board, the environment and the economy*



MARTHA can be downloaded from the project website: [www.project-horizon.eu](http://www.project-horizon.eu)

# Crew Endurance Management

Addressing the mariner lifestyle

Jo Ann Salyers, Salyers Solutions LLC - <http://salyerssolutions.com>

The lifestyle of the mariner is challenging to the natural design of the human body. This 24/7 operation challenges crewmembers to work against their body's natural biological need to sleep at certain times and adjust their other biological needs. Maintaining a healthier lifestyle is vital, both on the vessel and at home, to optimize a good quality of life. The derailment of a mariner's career because of health problems and accidents is a high price to pay for not identifying the challenges and working towards better health.

The Crew Endurance Management System (CEMS) was developed by the US Coast Guard to address these challenges in a specific and proven application. One focus is the biological need for sleep at certain times and the risk factors that lead to sleep degradation affecting the quantity and quality of sleep, issues directly related to health problems and accidents.

Risk factors, defined as factors which can threaten operational safety and crewmember efficiency, must be identified. The CEMS Decision Support System Work Sheet consists of 15 risk factors that are categorized under sleep, schedule, physical, environmental or personal areas which must be completed by each crewmember.

The CEMS Work Sheet is designed to evaluate risk factors during an average 7 day work period realizing at any given times these risks may be higher or lower. Each risk factor is ranked between 0 – 7 (i.e. - 0 if the risk factor doesn't occur; 7 if the risk factor occurs all 7 days).

The CEMS Decision Support Software (DSS) training tool enables maritime operators to assess 15 Crew Endurance Risk Factors and subsequently develop crew endurance plans to address those areas needing improvement. Each evaluation is entered in this DSS tool and the average of all work sheets is grafted.

The Data Graph summary provides a snapshot providing the basis for developing a Crew Endurance Plan. Clicking on a risk factor will bring up a Results Summary and Crew Endurance Risk Factor Controls page which provides an explanation of that risk factor and where to find more information on how to control this particular risk factor in the Crew Endurance Guide, also located on the USCG CEMS website.

The DSS training tool can be downloaded from: [www.uscg.mil/hq/cg5/cg5211/docs/DSS.zip](http://www.uscg.mil/hq/cg5/cg5211/docs/DSS.zip)

The Crew Endurance Management Guide can be downloaded from: [www.uscg.mil/hq/cg5/cg5211/cems.asp](http://www.uscg.mil/hq/cg5/cg5211/cems.asp)

**Physical**

Sleep Schedule Physical Environmental Personal

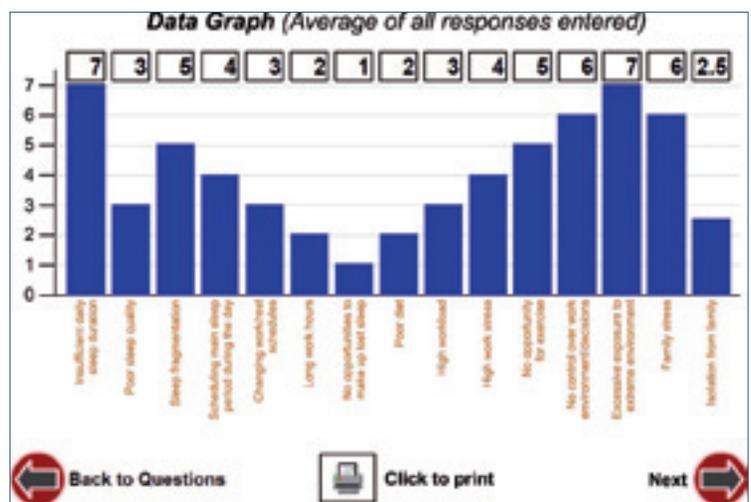
How often do you experience...  
**High work stress**

(Caused by high sustained physical/mental workload, rotating work schedules, and/or authoritarian leadership style.)

0 1 2 3 4 5 6 7 **4** days each week

Reminder: click on the number that corresponds to the number of days per week that this risk factor occurs in your life, then click **Next** to go to the next risk factor.

Previous Current user: Example Next



**Results Summary and CE Risk Factor Controls**

Click a Risk Factor to learn more about it:

**High work stress**

Average weekly occurrences: **4**

An extreme environment, high sustained physical or mental workload, rotating work schedules, and/or authoritarian leadership can contribute to high stress in a crewmember.

To learn more about how to control this risk factor, read **Section 4.4** in the *Crew Endurance Management Guide*.

Back to Graph Next

# The use of riding gangs aboard ship

It has become common practice to employ riding gangs to assist with onboard maintenance and other tasks – and, more recently, armed guards for the protection of the ship and its crew against piracy attacks. But, there do not appear to be any internationally accepted guidelines on the employment conditions for these gangs nor for the tasks on which they can be employed aboard ship, such that there is a risk that riding gangs can be used to bypass the regulations that apply to a ship's crew.

The International Transport Federation (ITF) advises that riding gangs must be covered by agreements giving at least comparable rates of pay to the crew, and minimum conditions and protections.

The US Coast Guard, through their Maritime Transportation Act of 2006, defines a riding gang member as: *someone who is not a registered seafarer and who does not perform watchstanding, automated engine room duty watch, or personnel safety functions; or cargo handling functions, including any activity relating to the loading or unloading of cargo, the operation of cargo-related equipment (whether or not integral to the vessel), and the handling of mooring lines on the dock when the vessel is made fast or let go; does not serve as part of the crew complement; and is not a member of the steward's department.*

Riding gangs are only permitted to perform any work on board a US vessel in preparation for it to enter a shipyard located outside of the United States; for the completion of residual repairs after departing a shipyard located outside of the United States; or for technical in-voyage repairs, in excess of any repairs that can be performed by the vessel's crew, in order to advance the vessel's useful life without having to actually enter a shipyard.

The International Association of Classification Societies (IACS) *Guidelines for Voyage Repairs and Maintenance* (UR Z13) state that where repairs to hull, machinery or equipment, which may affect classification, are to be carried out by a riding crew during a voyage they are to be

planned in advance and agreed upon by a Surveyor reasonably in advance, otherwise the vessel's class may be suspended. But, this is not a mandatory requirement, and it does not apply to the maintenance and overhaul of hull, machinery and equipment in accordance with manufacturers' recommended procedures and established marine practice and which does not require the Classification Society's approval.

## *All should be properly supervised by an appropriately qualified ship's officer*

Taking all this into consideration, it is suggested that ship operators who wish to employ riding gangs (including armed guards) should ensure that they:

- are properly qualified for the job in hand and are covered by agreements giving at least comparable rates of pay to the crew, and minimum conditions and protections, similar to those set out in MLC 2006;
  - are identified on the ship's crew list;
  - have been checked as free from risk to the security of the ship, its crew and its cargo;
  - are subject to the same disciplinary regime as for crew members, including random testing regimes for drugs and alcohol;
  - have received basic safety familiarization and basic safety training approved by the Flag State as satisfying the requirements for such training under Section A-VI/1 of the Manila Amendments to the STCW Code.
- The use of riding gangs should be limited to:
- the preparation of a vessel entering a shipyard;
  - the completion of residual repairs after departing a shipyard;

- technical in-voyage repairs, in excess of any repairs that can be performed by the vessel's crew, in order to advance the vessel's useful life without having to actually enter a shipyard, but subject to the IACS *Guidelines for Voyage Repairs and Maintenance* (UR Z13);

- the maintenance and overhaul of hull, machinery and equipment in accordance with manufacturers' recommended procedures and established marine practice and which does not require the Classification Society's approval

- the protection of the ship and her crew against piracy attacks (Armed Guards);

All should be properly supervised by an appropriately qualified ship's officer. It stands to reason that no riding gang member should perform any duties onboard associated with the day-to-day operations of the ship which are normally carried out by a registered and appropriately qualified seafarer.

## Alert!

The International Maritime Human Element Bulletin

Editor: David Squire, FNI

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