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**The casualty report has been issued on 08.06.2010**

**Case:** 201000032

The casualty report is available on our homepage: [www.dma.dk](http://www.dma.dk).

### **The Division for Investigation of Maritime Accidents**

The Division for Investigation of Maritime Accidents is responsible for investigating accidents and serious occupational accidents on Danish merchant and fishing vessels. The Division also investigates accidents at sea on foreign ships in Danish waters.

### **Purpose**

The purpose of the investigation is to clarify the actual sequence of events leading to the accident. With this information in hand, others can take measures to prevent similar accidents in the future.

The aim of the investigations is not to establish legal or economic liability.

The Division's work is separated from other functions and activities of the Danish Maritime Authority.

### **Reporting obligation**

When a Danish merchant or fishing vessel has been involved in a serious accident at sea, the Division for Investigation of Maritime Accidents must be informed immediately.

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# 1 Summary

The accident occurred on the forecastle deck during the mooring operation at departure from Singapore. When heaving the spring lines, the messenger lines got entangled. This resulted in the spring lines tightening. Subsequently a rope guide broke and a spring line hit an AB on his right hip. The AB was slung against the windlass and sustained injuries to his hip, head and arm.

## 2 Conclusion

The mooring winches were operated at high speed, which caused the messenger lines to entangle as the ends of the spring lines approached the roller fairleads. As a consequence the spring lines tightened. **(6.1)**

The rope guides did not have enough strength to absorb the load from the sudden tightening of the spring lines. **(6.1)**

It is the assessment of the Division for Investigation of Maritime Accidents that the 2<sup>nd</sup> officer and the ABs either did not realize the risk associated with the job they were doing or tolerated the risk, given their previous experience in similar situations. **(6.2)**

It is the assessment of the Division for Investigation of Maritime Accidents that consistent safety planning and communication in connection with the mooring operation was lacking **(6.2)**

It is the assessment of the Division for Investigation of Maritime Accidents that the safety assessment of the rope guide concept was inadequate. **(6.2)**

## 3 Initiatives and recommendations

### Initiatives

The ship management has analysed the accident and issued an internal investigation report.

Maersk Line has issued safety flash 01-/2010 on 12<sup>th</sup> March 2010 to all vessels regarding utilisation of Safe Job Analysis.

Maersk Line has issued safety flash 02-/2010 on 23<sup>rd</sup> April 2010 to all vessels regarding mooring operation.

Maersk Line has commenced a fleet campaign on safer mooring.

The main themes of the safer mooring campaign are:

- Better planning means safer mooring
- Complacency causes accidents
- Always know where your team members are
- Good communication with the bridge is essential

### Recommendations

In the period 1997-2005, OKE has processed 17 serious or very serious marine casualties related to mooring operations on merchant vessels, which have been compiled in a safety survey issued on 1 December 2006. The publication is in Danish and can be found on:

<http://www.soefartsstyrelsen.dk/ulykkesopklaring/publikationer/Sider/Temaundersogelser.aspx>

Consistent safety planning and communication in connection with mooring operations was lacking on board. This may have contributed to a downgraded risk perception and a reduced safety awareness of the situation.

A safety assessment of the rope guide concept could have contributed positively to the risk perception and safety awareness in connection with mooring operations.

The Division for Investigation of Maritime Accidents recommends the shipping company to:

- Ensure that safety planning and communication in connection with hazardous routine tasks is maintained at a sustainable level on board.
- Ensure safety assessments of improvement concepts and suggestions as part of the implementation on board.

## **4 The investigation**

The Division for Investigation of Maritime Accidents has made interviews and gathered information on board AP MOELLER in Euro port.

The Division for Investigation of Maritime Accidents received "*Personal injury report*", a statement of facts, pictures from the accident scene and an internal investigation report from the vessel regarding the accident.

The Division for Investigation of Maritime Accidents has met with the Head of Nautical Department and the Process Safety Manager at Maersk Line head quarters in Copenhagen.

## 5 Factual Information

### 5.1 Accident data

Type of accident (the incident in details)	Accident to seafarer
Time and date of the accident	1935 local time, 19 December 2009
Position of the accident	Alongside in Singapore
Area of accident	Mooring deck, forecastle
Injured persons	Able bodied seaman
IMO casualty class	Serious

### 5.2 Navigation data

Stage of navigation	Departure
Port of departure	Singapore

### 5.3 Ship data

Name	AP MOELLER
Home port	Dragør
Call sign	OVYQ2
IMO no.	9214898
ISM responsible operator/owner	A.P. Moeller – Maersk A/S
Register	DIS
Flag State	Denmark
Construction year	2000
Type of ship	Container ship
Tonnage	91560 GT
Classification	ABS
Length	346.98 m
Engine power	54898 kW
Regulation	Notices from DMA B

### 5.4 Weather data

Wind – direction and speed	NW 1-5 m/s
Sea	Calm
Visibility	Good
Illumination	Daylight

### 5.5 The crew

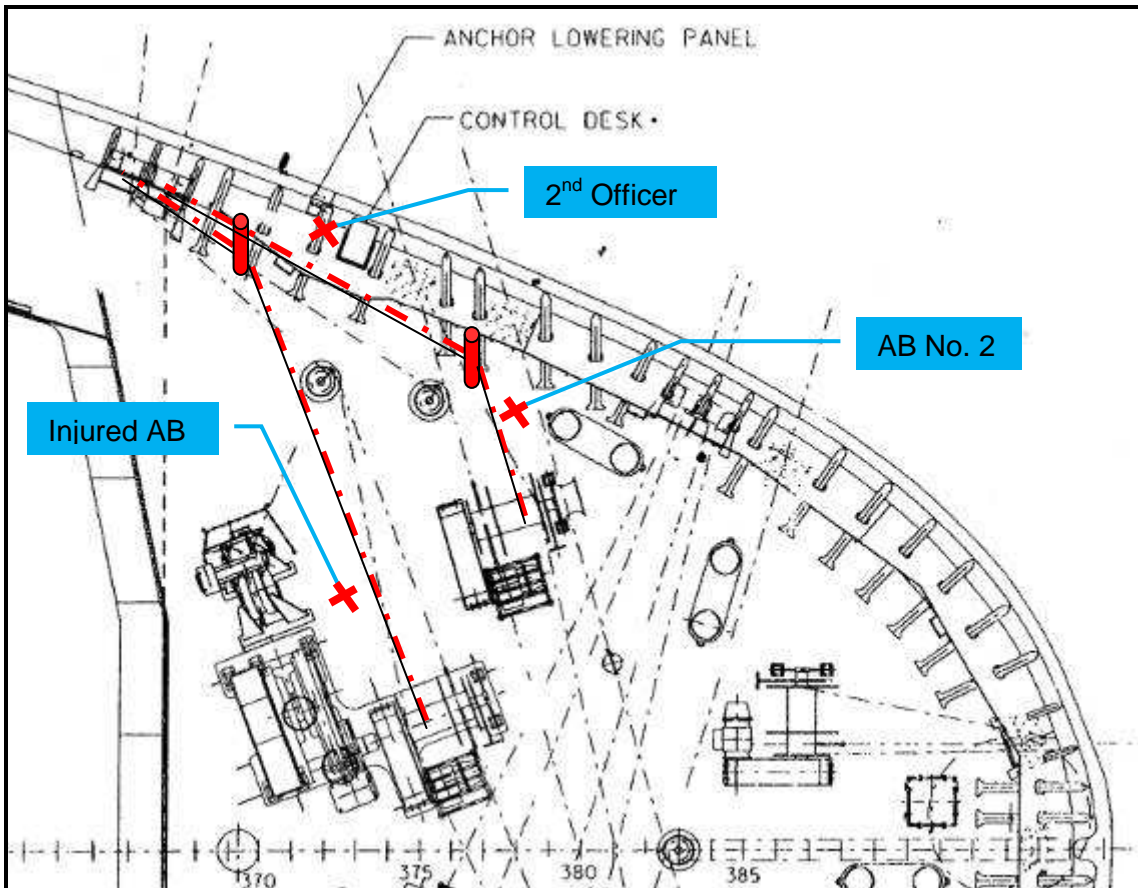
Number of crewmembers	25
Watch on the bridge	4-8 at sea. 6-6 at berth
Minimum safe manning	13
Occupation on board the ship at the time of the accident (crewmembers relevant to the accident)	Age, certificate of competency, other certificates, training, service at sea.
2 <sup>nd</sup> officer	Navigational officer, 37 years old. Employed in A.P. Moeller – Maersk since 2006. STCW II/1. Nationality : Danish
Injured person (IP)	Able bodied seaman. 50 years old. Employed in A.P. Moeller – Maersk since 2003. § 16 safety certificate. Nationality: Filipino

## 5.6 Narratives

On 19 December 2009 at 1620, the vessel was ready to depart Singapore berth and the 2<sup>nd</sup> officer together with 2 AB's were on the forecastle to assist with the departure.

At 1622 the two first headlines were let go and taken on board and at 1627 the last two headlines were let go and taken on board.

At 1634 both port side spring lines were let go. Whilst the spring lines were being heaved, one AB was controlling and assisting the aft spring line to spool properly on the storage drum. The other AB was controlling and assisting the forward spring line to spool properly on the storage drum. See picture 1.



Picture 1: Accident scene before the accident.

(Arrangement by courtesy of Maersk Line)

As the spring lines were approaching the adjacent roller fairleads, the messenger lines entangled.

According to the 2<sup>nd</sup> officer, he looked over the side and after a moment of inattention he suddenly realized that the spring lines were very close to the roller fairleads. He immediately stopped the winches by setting the control handles in the stop position. However, the winches did not stop immediately resulting in heavy tightness of the lines.

The aft rope guide bended and the aft spring line flipped over the rope guide and snapped back. The AB assisting was positioned aft of this spring line. He was hit by the line and was slung into the windlass foundation.

The forward rope guide broke off and the forward spring line snapped back. The AB assisting was positioned forward of the line. He was not hit.

The 2<sup>nd</sup> officer immediately stepped down from the platform at the control panel to provide aid to the injured AB.

The master was also immediately advised and he decided to bring the vessel alongside at once.

At 1636, the master called an emergency response team and an ambulance.

Shortly after the accident, the chief officer arrived at the forecastle with an AMBU unit and stretcher and started recovery of the injured person.

At 1646, a shore-based Emergency Response Team and an ambulance arrived and two minutes later the vessel was alongside.

At 1649, the Emergency Response Team came on board to recover the injured person.

At 1719, the injured person was evacuated and transported to a hospital.

The AB sustained injuries to his hip, head and arm.

## **5.7 Mooring – Equipment**

### **Winches**

The vessel is equipped with six mooring winches on the forecastle deck according to the arrangement in picture 1. The mooring winches are of the type Aquamaster-Rauma with split drums, i.e. a tension drum and a storage drum on the same shaft.

The winches are electrically powered and controlled from a central control panel on an elevated platform by the bulwark. The speed of the winches can be set in three steps.

The two combined windlass and mooring winches provide the following speed options: Low speed – 12m/min. Medium speed – 22m/min. High speed – 44m/min.

The four dedicated mooring winches provide the following speed options: Low speed – 9m/min. Medium speed – 18m/min. High speed – 54m/min.

According to Maersk Line Nautical Department, electric winches with stepwise speed adjustment are installed on the majority of the company's vessels. Some vessels have winches with continuously variable speed. When electric winches with stepwise speed adjustment were introduced, the Nautical Department received complaints about the reduced flexibility compared to the flexibility provided by winches with continuously variable speed.

According to the Nautical Department, personal safety aspects are not considered when winches are specified or purchased during a new building project. Winches are normally an off-the-shelf item provided by the building yard.

According to the Nautical Department optimized safety and functionality is always aimed for when reviewing the preliminary arrangements as presented by different yards, with due regard to design limitations.

### **Rope guides**

The purpose of the rope guides is to make it easier to spool the mooring lines in even layers on the storage drum with a minimum of manual handling.

Rope guides were introduced in the fleet a few years ago as an initiative to improve safety in connection with mooring operations.

Rope guides have not been systematically installed on all vessels but the concept has been emphasized and promoted as a good idea to the vessels by Maersk Line Nautical Department.



Picture 2: Spring line and rope guide.

(Picture by courtesy of Maersk Line)

The design, installation and implementation of the rope guide concept on a particular vessel are only managed on board. The structural design is approved by the chief engineer on board the particular vessel.

According to Maersk Line Nautical Department, several improvement concepts/suggestions from the vessel fleet, like the rope guides, have been recorded over time and some have been shared with the entire fleet. It is the intention to publish a “catalogue of good ideas” when all vessels come online during this year.

Observations had been made previously on board of messenger lines getting entangled and rope guides being bended.

### **5.8 Mooring – details and planning**

According to the master and 2<sup>nd</sup> officer, the 2<sup>nd</sup> officer was designated responsible person on the mooring deck.

According to the 2<sup>nd</sup> officer, the mooring operation was a routine task and thus not subject to any planning apart from the mooring plan, which was pointed out by the master.

As the lines were let go, the winch speed was set in position 3 at the highest speed possible in order to get the mooring lines clear of the water and hence the thrusters. As the lines came clear of the water the operation of the winches continued at the highest speed.

According to the Nautical Department, heaving at high speed after the mooring lines are clear of the water is not unseen on board the company's vessels. Despite this, it is not recognized as best practice.

According to the 2<sup>nd</sup> officer, it was his plan to reduce the speed as the spring lines came clear of the water. He did not know why he did not reduce the speed, which he considers the right thing to do.

The 2<sup>nd</sup> officer noted that masters on some vessels did not have sufficient patience to wait for the lines to be heaved at medium speed, but this was not the case with the actual master on board.

According to the 2<sup>nd</sup> officer, the injured AB was positioned forward of the spring line when the spring lines were let go. He did not notice that the injured AB changed position from forward of the spring line to aft of it.

Both the 2<sup>nd</sup> officer and the injured AB have long experience with mooring operations.

### ***5.9 Mooring – formalized written instruction***

The instruction for mooring operations (ID: 9829) is contained in the on-board "Global Ship Management System" (GSMS). See enclosure 7.1.

The purpose of the instruction is *"To specify a global approach to mooring operations and use of mooring equipment."*

It describes in general terms:

- The personnel and their responsibilities.
- Personal protective equipment to be worn.
- How mooring areas should be maintained.
- The mooring procedure.
- How to handle the various types of mooring equipment.

### ***5.10 Mooring – Safe Job Analysis (SJA)***

Hazardous work on board is risk managed by a process described in a risk management procedure which is contained in the on-board "Global Ship Management System" (GSMS).

An SJA is one out of six main elements in the process of risk management. All six elements are not always to be considered while assessing a task.

An SJA is ship specific and made on board.

There is a separate SJA for mooring operations. See enclosure 7.2.

The SJA for mooring operations describes by which control measures a given risk could be reduced.

The 2<sup>nd</sup> officer was aware that an SJA for mooring was available in the deck office.

It was not his understanding that SJAs should be used as reference in daily routine tasks.

### ***5.11 Safety work on board – in general***

All crew members are to go through a familiarization process within 72 hours after having signed on. A certain number of familiarization items have to be completed within 24

hours. The majority of the items are related to safety on board. All persons involved in the accident had signed an attendance sheet.

Safety meetings are held on board on a monthly basis.

According to the minutes from the safety meetings, several safety related issues, such as safety flashes, technical flashes, incident reports, near misses, on board area inspections, etc., have been discussed.

According to the master, mooring situations are discussed on a regular basis at the safety meetings but the actual type of mooring accident had not been discussed.

According to the minutes from the recent six safety meetings before the accident, mooring operations had not been on the agenda.

A Video On Demand System (VOD) is available on board and has been introduced at safety meetings before the accident. The videos cover various safety topics, including mooring operations.

There is evidence that the daily work lists have been used to communicate safety instructions and to address safety awareness.

### ***5.12 Safety work on board – after the accident***

After the accident, the following steps were taken:

- The master and chief officer conducted an accident investigation, where risk and non-risk areas on the mooring deck were discussed.
- An extraordinary safety meeting was held, where the details from the accident were discussed.
- The master and chief officer reassessed the SJA for mooring and amended it to reflect the lessons learnt from the accident.

As a part of the daily work list, the crew has been requested to watch relevant “videos on demand” such as the one on “safe mooring practice”.

After the monthly fire/boat/MOB/SOPEP drills, the participants are being asked about related safety matters.

### ***5.13 Rest hours prior to the accident***

According to the rest hour sheets, the 2<sup>nd</sup> officer had rested between 14-16 hours per day during the week leading up to the accident.

On the day of the accident, the 2<sup>nd</sup> officer began his watch at 1200 after six hours’ consecutive rest. According to the 2<sup>nd</sup> officer, he felt fit and rested.

According to the rest hour sheets, the AB had rested between 12-14 hours per day during the week leading up to the accident.

On the day of the accident, the AB began his watch at 0800 after 13 hours’ consecutive rest.

## 6 Analysis

### 6.1 Immediate causes

#### *Unsafe actions*

The mooring winches were operated at the highest speed.

The injured AB and his colleague were guiding the spring lines on the storage drums while they were being heaved at high speed.

During the mooring operation, the injured AB changed position from forward of the mooring line to aft. In this position, the AB stood in a latent snapback zone.

The 2<sup>nd</sup> officer was inattentive for a moment.

The mooring winches were operated at high speed, which caused the messenger lines to entangle as the ends of the spring lines approached the roller fairleads. As a consequence the spring lines tightened.

#### *Unsafe surroundings*

The aft rope guide bended and the aft spring line flipped over the rope guide and snapped back.

The forward rope guide broke off and the forward spring line snapped back.

The winches did not stop at once when the control handle was released due to inertia in the winch system.

The rope guides did not have enough strength to absorb the load from the sudden tightening of the spring lines.

### 6.2 Contributory causes

#### *Involved persons*

Both the 2<sup>nd</sup> officer and the injured AB had long experience with mooring operations.

According to the Nautical Department, heaving at high speed after the mooring lines are clear of the water is not unseen on board the company's vessels. Despite this, it is not recognized as best practice.

Observations had been made previously on board of messenger lines getting entangled and rope guides being bended.

It was possible to adjust the winch speed in three steps with large increments.

The 2<sup>nd</sup> officer noted that masters on some vessels did not have sufficient patience to wait for the lines to be heaved at medium speed, but this was not the case with the actual master on board.

It is the assessment of the Division for Investigation of Maritime Accidents that the 2<sup>nd</sup> officer and the ABs either did not realize the risk associated with the job they were doing or tolerated the risk, given their previous experience in similar situations.

## *The Safety system*

### *Mooring operations*

According to the 2<sup>nd</sup> officer, the mooring operation was a routine task and thus not subject to any planning apart from the mooring plan, which was pointed out by the master.

According to the minutes from the recent six safety meetings before the accident, mooring operations had not been on the agenda

The 2<sup>nd</sup> officer was aware that an SJA for mooring was available in the deck office.

It was not his understanding that SJAs should be used as reference in daily routine tasks.

The SJA for mooring operations describes by which control measures a given risk could be reduced.

The SJA for mooring operations does not describe how the control measures should be achieved. I.e. the SJA says that the risk can be reduced by “Adequate supervision and training” but does not define or discuss what adequate supervision and training means.

It is the assessment of the Division for Investigation of Maritime Accidents that consistent safety planning and communication in connection with the mooring operation was lacking.

### *Rope guide design*

The design, installation and implementation of the rope guide concept on a particular vessel are only managed on board. The structural design is approved by the chief engineer on board the particular vessel.

It had been observed previously that rope guides had been bended by mooring lines.

It is the assessment of the Division for Investigation of Maritime Accidents that the safety assessment of the rope guide concept was inadequate.

# 7 Enclosures

## 7.1 Instruction for mooring operations (ID: 9829)

Procedures and Instructions | Ship Operations | Operation | Deck Operations | Mooring | Mooring Operations

### Mooring Operations

#### UNCONTROLLED COPY

Editor.: | Approver.: | Released By.:APMM TO Quality Manager | Revision Date.:04/09/2009 |  
Revision Number.:1 | Document ID.:9829

#### Purpose

To specify a global approach to mooring operations and use of mooring equipment.

#### Scope

Procedure applies to all vessels.

#### Personnel and Responsibilities

Mooring operations are to be carried out as safely as practicable

All personnel involved in any mooring operation should be fully familiar with this procedure.

All personnel have a duty of care for their own safety.

The Master will designate who is to be responsible for the oversight of safety at mooring stations forward and aft. This will be determined by the vessel type and route.

Mooring operations must be completed and reported to the Master before any shell doors or ramps are opened or Gangways lowered. This includes bow, stern or side doors and ramps.

Unmooring operations shall not commence until all shell openings are confirmed closed to the Master.

Gangways may be lowered with the express permission of the Master, for Pilot embarkation/disembarkation whilst the vessel is not moored.

#### Master

The Master in charge of the vessel, whilst planning arrivals and departure should take into consideration the Berthing/Un-berthing operation and discuss this with the Persons responsible for control of the mooring decks. This may be done at Bridge Resource Management meetings, Passage Planning Meetings or Bridge Discipline meetings as appropriate for the vessels trade/route.

The Master should ensure that there are sufficient personnel present on the mooring station to carry out the duties as required in a safe and controlled manner.

#### Designated Responsible Person on the mooring deck

The person designated above by the Master MUST be present before any mooring operation commences.

- He should be fully conversant with the vessel operations manual with regards to the mooring equipment.
- He must be aware of the risks involved in mooring operations, brief the crew, and reduce the

risks as much as possible before and during the operation.

- He is responsible for the Safety of ALL personnel on the mooring deck and working in the vicinity of mooring lines on the shore whilst running or heaving on the lines.
- Instructions or signals given to crew or shore personnel, should be clear and precise, there should be no ambiguity.

## Deck Crew

A full complement of deck crew, as determined by the Master, shall be present on the mooring deck before any mooring operation commences.

- No ropes are to be adjusted by the crew, taken off the bits and put on drum ends or vice versa, until the person in charge has been given permission by the bridge and then informed the crew.
- All crew on the mooring deck must be in their correct positions as determined by the person in charge prior to commencing mooring operations.
- Only experienced personnel may operate a winch. Inexperienced personnel may operate a winch under supervision for training purposes; however the Master should be informed before this is done so as he can make an assessment based on the prevailing circumstances and conditions.
- Crew should be trained in the use of any emergency stops for the winches.
- Crew should be shown how the controls operate, i.e. heave/slack auto return to stop when released etc.
- Crew new to the vessel or to the company should be accompanied in mooring operations until fully trained as per their Familiarisation requirements.

## Personal Protective equipment (PPE)

All personnel working on the mooring decks should wear appropriate PPE. This includes the following:

1. Safety Shoes or boots
2. Close fitting clothing, Boiler suit or Uniform as required for your vessel.
3. Safety Helmet
4. Gloves, as necessary. Be aware that when working with wires, gloves may snag on parted strands and take the wearer with them.

## Mooring Deck Areas

Mooring deck areas should be maintained in a clean and tidy fashion (shipshape!)

- Ropes to be coiled down when not in use.
- Ropes to be flaked out before use.
- Stowed away and/or covered when not required for longer periods.
- Decks to be clear of loose gear and equipment.
- All roller leads to be kept free moving.
- Mooring areas should be well lit AT ALL TIMES
- Snap back areas should be clearly identified and marked as necessary.
- Safety Cages where constructed should always be used by the appropriate personnel.

## Mooring Procedures

ALL Personnel should be aware that the **WHOLE MOORING DECK** is a **DANGER AREA**.

- Stand Clear of ropes under tension
- Stand clear of Snap back zones
- Stand clear of Bights in ropes
- Only handle ropes, heave, render, slack or slip lines when directed by the person in charge.
- NEVER heave on a line which is on a bollard next to a linesman ashore, ask him to move away.
- NEVER heave on a line which is still being handled by a linesman. This is especially true whilst unmooring from the bollards. If it is necessary to heave on a trapped mooring line that has been 'un-looped' ashore, make sure the linesmen are well clear, include an extra snap back area for the rope tails on the mooring line.
- NEVER throw a heaving line AT a linesman.

## Ropes/Wires

Only ropes and wires which can be specifically identified by reference to a manufacturers certificate should be in use.

All ropes and wires to be used should be inspected prior to use and on completion of use to ensure suitability for the safe mooring of the vessel. This is the responsibility of the person in charge on the mooring deck. Any defects found should be reported to the Chief Officer as soon as practicable. Any rope or wire deemed to be unfit for the purpose should have the damaged section removed; be end for ended or be removed from service and condemned/replaced as appropriate.

Ropes should be monitored periodically during use for wear, especially where the rope leads through or round a lead.

Caution should be exercised by the responsible person when lowering ropes over the side of the ship not to allow sufficient slack to accumulate in the water to cause fouling of any propellers or thrusters units.

When using drum ends to heave up ropes, the tight rope should be transferred to bitts after mooring is completed. If this is deemed unsatisfactory by the Master, then the ropes should at least be backed up on the bitts.

## Mooring winches with split drums.

- Personnel should apply the turns to the split with as little weight on the rope as possible and with the drum turning at minimum speed appropriate to safe mooring operations.
- The rope should be PULLED onto the split, this means that if the person should let go, slip or tension should suddenly come on the rope, it will move away from them.
- When the rope is on the split drum there should only be a single layer of rope and a minimum of 3 turns on it. This will help prevent ropes 'burying' in extra layers.
- Rope drums should be taken out of gear and brakes fully applied once the ship is moored.
- Transfer of ropes onto the split should be, wherever possible, directly supervised by the person responsible for the mooring deck.

## Self Tensioning Winches/Auto Tension Winches

Vessels fitted with Self tensioning systems should ensure that the winches are set at the correct tensions for their rope type and size. Refer to operators manuals and rope certificates.

## Other Winches

Some mooring winches are marked with a power rating by the manufacturer. It should be noted that some winches are not and that with some electrical winches there is an initial 'surge' when engaging the power to enable the motor to start turning. This initial surge may be significantly higher than that at which the winch is rated and may snap mooring ropes which are not in Good to Excellent condition.

## Heaving lines

Heaving lines should not have heavy metal items embedded in them or be weighted in any other exceptional way.

## Adverse Weather and other Diversities

During poor weather conditions there will be occasions when ropes come under tension quicker than usual, lines don't go out as planned, unusual berth configurations or many other influences are experienced which cause the mooring operation to be adversely affected.

If the mooring operation is known in advance to be a difficult one, ie weather, a briefing should be held to discuss possibilities.

If the Berth is unknown or awkward and/or officers and responsible people are new to the ship or port, a briefing should be held to discuss possibilities.

In any event, good communication before and throughout the operation will keep both the bridge and the opposite end of the vessel informed of any untoward events.

## References

Definitions

4657 - OCIMF Mooring Lines Guidelines

1198 - Mooring Equipment Records

## 7.2 SJA for mooring operations



MAERSK

## Safe Job Analysis

SJA Title

**Mooring Operations**

Authorising Officer

CPT

Assessor:

C/O

Location(s):

**Forecastle, Main Deck, Poop Deck**

Creation Date:

**11/01/2009**

### Adverse Weather

Hazard Effect	Consequence	Probability	Risk
Personal injury/Structural damage	Involving a serious injury or fatality (C4)	Possible, i.e. the event may have occurred and represents a credible scenario (P4)	16
<b>Control Measures</b>			
Description	Responsible Person	Consequence	Residual Risk
Weather Forecast	Master	Injury leading to RWA or LTA (C3)	6
Additional resources- Manpower/Tugs	Master	Injury leading to RWA or LTA (C3)	6
Adequate PPE and situation awareness	All	Injury leading to RWA or LTA (C3)	6

### Equipment failure/Line Parting

Hazard Effect	Consequence	Probability	Risk
Personal injury	Involving a serious injury or fatality (C4)	Possible, i.e. the event may have occurred and represents a credible scenario (P4)	16
<b>Control Measures</b>			
Description	Responsible Person	Consequence	Residual Risk
Regular Maintenance and inspection	Chief Officer	Involving a serious injury or fatality (C4)	12
No sharp leads or angles	All	Involving a serious injury or fatality (C4)	8
Adequate supervision/Training	Officers	Injury leading to RWA or LTA (C3)	6

### Slips/Trips/Falls

Hazard Effect	Consequence	Probability	Risk
Personal injury	Involving a serious injury or fatality (C4)	Possible, i.e. the event may have occurred and represents a credible scenario (P4)	16
<b>Control Measures</b>			
Description	Responsible Person	Consequence	Residual Risk
Adequate PPE and Situation awareness	All	Injury leading to RWA or LTA (C3)	6
Non slippery surfaces	All	Injury leading to RWA or LTA (C3)	6
Good housekeeping	All	Injury leading to RWA or LTA (C3)	6
Good communications	All	Injury leading to RWA or LTA (C3)	6

### Unsafe working practices

Hazard Effect	Consequence	Probability	Risk
Personal injury	Involving a serious injury or fatality (C4)	Possible, i.e. the event may have occurred and represents a credible scenario (P4)	16

#### Control Measures

Description	Responsible Person	Consequence	Probability	Residual Risk
Adequate supervision and training	Officers	Involving a serious injury or fatality (C4)	Unlikely, less than average i.e. easy to hypothesize an incident but unlikely (P3)	12
Sufficient number of personnel	Master	Involving a serious injury or fatality (C4)	Unlikely, less than average i.e. easy to hypothesize an incident but unlikely (P3)	12
Correct use of all equipment	All	Involving a serious injury or fatality (C4)	Unlikely, less than average i.e. easy to hypothesize an incident but unlikely (P3)	12
Situation awareness	All	Involving a serious injury or fatality (C4)	Unlikely, less than average i.e. easy to hypothesize an incident but unlikely (P3)	12
Mooring winches to be handled with utmost care	Officers	Involving a serious injury or fatality (C4)	Highly unlikely, would require multiple failures of systems and controls (P2)	8
Extrem caution and awareness to be maintained while handling mooring ropes - Always make sure to be positioned in non-risk area	All	Injury leading to RWA or LTA (C3)	Highly unlikely, would require multiple failures of systems and controls (P2)	6

### Safe Job Analysis Authorisation

This SJA has been authorised by CPT

Signature :

Date :