Mooring Operations

1. Introduction

Mooring has always been a hazardous operation. However due to the frequency of PSV port calls, mooring becomes something of a routine operation. This can have a positive and negative effect. The positive aspect is that operators become very experienced with the equipment and different mooring methods. However, the negative side is a reduced awareness of personnel (both on board and on the quayside) of the very real risk involved in mooring operations.

The graphs below highlight the increasing trends of mooring accidents as reported by a UK P&I club.

Figure 1: Trends in Mooring accidents
Figure 2: Linesmen at work at Paleiskade (1)

Figure 3: Linesmen at work at Paleiskade (2)
2. Risk Assessments

Although incident investigations often refer to defective mooring equipment or lack of attention to moorings, they also point out that in many cases a proper risk assessment was not undertaken. It is therefore recommended that appropriate risk assessments are carried out, taking into consideration the vessel’s characteristics and prevailing weather conditions. Factors to be taken into consideration should include the following:

**Vessel related factors**
- Size/type of vessel - windage area (including windage area due to cargo or containers if applicable) including effects of changes in wind and tidal conditions.
- Mooring equipment: - design/type and condition of, limitations and weaknesses.
- Mooring pattern - number of lines, lengths, angles and leads and the ability to maintain even tension on the lines.
- Manning level/crew availability for normal as well as adverse weather conditions.
- Weather - forecast and warnings - reliability.
- Propulsion - Readiness of engines, thrusters, anchors and power on deck.
- Additional moorings - availability, condition and readiness of.

**Examples of port/berth related factors**
- History of the port & berth - and any unusual occurrences.
- Peculiar features – e.g. overhanging berthing arrangements, obstruction by Gantry cranes, wind funnelling effects from shore structures.
- Shore mooring equipment - design/type, position, quality and adequacy, including storm moorings and fenders.
- Tugs - availability
- Environment - Exposure at the berth to wind, tide and swell. Proximity of other vessels and hazards in the vicinity of the berth
- Delay in the availability of shore mooring equipment, mooring gangs, pilots and tugs etc. in normal as well as emergency situations.
- Effect of passing vessels on vessels moored alongside. (surging)
3. **Principal Hazards in Mooring Operations**

   **“Snap-Back” Zones**

   Snap back of ropes is one of the major causes of injury in mooring operations. Most seafarers are aware of what snap back zones are but it is quite rare to see this awareness taken into account when actually carrying the mooring operation. Many vessels have taken to painting the danger zones near the mooring bitts to highlight the danger when actually carrying out the mooring operation. The idea being the rope configuration at the time might not be applicable to danger zone painted on the deck. But it does prompt personnel to consider the present snap-back zones.

   The diagram below is a very common illustration of Snap-back Zones.

   ![Figure 6: Snap back Zones](image-url)
Bights

Again, most seamen are aware of the dangers of bights but accidents involving bights on ropes are still occurring. This is perhaps more applicable to OSVs due to the frequent small working areas involved on many OSVs.

The diagrams below highlight how easily this can happen and the fatal consequences involved.

Figure 7: Snap Back Zones (2)

Figure 8: Danger of Bights
Mooring operations

Masters have the primary responsibility for the safe mooring of their vessels. There are various publications and guidelines to assist vessels in safe mooring practices. After consultation with the SNS Pool Vessels and the linesmen of the Port authority the following guidance/preferences have been formulated to assist co-operation and understanding between all parties.

The mooring diagrams below show the common mooring arrangements within the SNS Pool. The diagrams show the mooring methods as agreed between vessels and linesmen.

Quayside

![Mooring along Quayside](image)

**Figure 9: Mooring along Quayside**

Alongside another vessel

![Mooring alongside another vessel](image)

**Figure 10: Mooring alongside another vessel**
Preference of Ropes.

Insofar as preference to type and quality are concerned, the majority of the SNS Pool vessels opt for 8-Strand Polypropylene UV stabilised.

Figure 11: Preferred ropes

Rope Tails

Natural fibre rope tails are preferred by the linesmen as they are far easier to grip when pulling the mooring line ashore.

Figure 12: Rope tails
Figure 13: Manilla Rope Tails preferred

Note how, on the eye of the rope, manila fibre is used to attach the heaving line. Once pulled to the quay, it can be better placed over the bollard. Then, once secure, the heaving line can be safely and easily released back to the ship by the linesmen.

Figure 14: No nylon Rope Tails

Not so favourable is the use of Nylon on the end of the eye. Difficult to maintain a good solid grip of the rope. Once it reaches the quayside, pulling it up over the quayside and over the bollard becomes a difficult task at times.
Heaving Lines

Heaving lines commonly used by the vessels are 16mm Nylon. However due to the below description it is recommended that vessels change to fibre heaving lines.

**Advantages:** Reasonably cheap, and once damaged it is easily replaced.

**Disadvantages** - Because of the components used to make the product it is difficult to achieve a solid grip around the rope, once tension and the weight of a mooring line is suspended on the other end.

In conjunction with the slippery surface of the rope, an added problem is the circumference sizes used; additionally the Linesmen find it difficult pulling the rope over a distance from vessel to Quay.

*Figure 15: Preferred is Manila or similar*