Section 1: Mooring

Introduction

Learning outcome 1
At the end of section 1 you’ll be able to act as a member of the deck crew to work mooring lines and assist in the mooring of a vessel.

Mooring

Parts of ships and berthing lines
To standardise terms for parts of ship and ship manoeuvres and so on, the Australian Maritime Safety Authority (AMSA) has produced a standard marine vocabulary. You should become familiar with this standard or official vocabulary.

However, if you find that your employer and skipper are using different words, use the words they use on that vessel.

What’s most important is that you and your skipper communicate effectively so that you both clearly understand what’s being discussed about your job. If you’re on a different vessel, use your own judgement about which terms to use.

Figures 1 to 3 show you some of the terms we’ll use in this module. Others are explained in the glossary.
Figure 2: Shipboard terms
Figure 3: Shipboard terms

You'll notice that these three figures display ocean-going ships. The same terms are used for small vessels. You need to become very familiar with the expressions and abbreviations used in berthing and other operations. Take some time to study the glossary at the beginning of this module. If you wish to know more, consult a dictionary of nautical terms.
Standard wheel and engine orders
When taking the wheel as your vessel approaches or leaves the wharf, use
standard wheel orders. Make sure you know what the skipper’s orders mean.

All wheel orders given by the skipper should be repeated by the helmsman
and carried out correctly and immediately. All wheel orders should be held
until countermanded. The helmsman should report immediately if the vessel
does not answer the wheel.

When the skipper of the watch requires a course to be steered by compass,
the direction in which he wants the wheel turned should be stated and each
numeral is to be said separately, including zero.

Before berthing and unberthing
Before a vessel leaves or approaches a wharf, have a clear idea of the
skipper’s plan. If you’re the only deckhand on board, go to your skipper and
find out what’s required. If you’re one of several deckhands, the senior
deckhand will see the skipper and then tell you about your tasks.

During berthing and unberthing operations, many things that can go wrong.
If you notice dangers, obstructions or anything else not seen by your skipper,
pass on the information. In fact, it’s a good idea, well before the operation,
to know what sort of information is important to pass on.

You are under the direction of the skipper or senior deckhand at this point.
Follow all instructions carefully.

Safety precautions during berthing and unberthing
Berthing and unberthing operations are normally carried out safely and
uneventfully, but there are some hazards to be aware of.

Bights of line
When a length of rope is folded or bent, the ‘bend’ is called the bight of line.

A fairlead is a fitting used to redirect a line slightly. It is designed to
minimise damage caused by friction (see Figure 10 for examples of
fairleads, listed as ‘chocks’).

Imagine the following scene. It’s a very real situation.

A berthing line is lying in a bight on deck. One end of the line is on the bollard
ashore and the inboard end is made fast (on the winch or capstan). Strain is put
on the line, so the bight pulls tight. A deckhand happens to have their foot in the
bight. The rope pulls tight around their foot. The line happens to run out through
a fairlead and the deckhand is taken out with the line.
The message is: never stand in a bight of line no matter how harmless it may look!

![Diagram of bights of line]

Figure 4: Bights of line

**Lines under strain**

If too much strain is put on a berthing line, it will break. The line may also break if the vessel moves in an unexpected way when a line is made fast to the bollard ashore. The table below briefly explains how to recognise signs of strain in natural and synthetic fibre lines. The pull or tension can cause the rope to break or part. This can be very dangerous.

**Signs of strain**

**Natural fibre lines**

Natural fibre lines usually make a creaking sound when they approach breaking strain.

**Synthetic fibre lines**

The line gets thinner and stretches. There’s no sound; it just breaks like an elastic band.

If synthetic fibre lines part, they will whip back and injure, and wrap around a person standing near. Deckhands have lost limbs in this way!

*The message is:*

- Watch lines closely. If the lines come under strain, keep an eye on your skipper and be ready to ease the line.
- If for some reason it isn’t possible to ease the line, warn others nearby to move away.
Leave lines slack to allow for tidal range!

Passengers near lines
Don’t let anyone near the berthing and unberthing operations, especially passengers.

Be ready
Always have lines ready ahead of time. This avoids delays in making the vessel fast. Often a combination of tide, current or wind factors make it difficult to manoeuvre the vessel into position and hold it there while it is made fast. Your actions and initiative as a deckhand will help the skipper.

Preparations for harbour stations (starboard side to)

Figure 5: Stern of vessel with fenders, heaving line, springs etc ready for berthing (RAN p 49)

Communication
Make sure you have two-way communication with the skipper at all times, even when out of sight.
Handling lines

The best way to learn to handling lines is to watch an expert, and then try yourself under the expert’s guidance. Watch how lines are handled on your own vessel and also on vessels around you. Take every opportunity to practice because successful moorings will often depend on your skills in handling lines.

Heaving lines

A *heaving line* is a light line you ‘heave’ ashore to someone on the wharf. The person then uses the heaving line to pull your berthing line across to the wharf. Whether or not you use a heaving line depends on the size of your vessel and the berthing operation.

There are two parts to heaving a line. You need to prepare the line, ready for throwing. This is sometimes called *making up the line*.

Make up a small tight coil in your throwing hand (either right-handed or left-handed). On the end of the coil attach a small sand bag. This small coil will be about one-third of the rope length.

In your other hand, you make up larger, looser coils. You will need enough length to reach the wharf.

After you have made up the line, you are ready. The small coil is thrown with your throwing hand straight out. The line must be allowed to run freely from the looser coil in your other, now open, hand. The most frequent cause of bad casts is not to have the larger coil properly clear for running.

Do not put weights of any sort on the end of a heaving line. This can be dangerous!
Lassoing a bollard

Use the lasso technique on small vessels with lighter lines or in calm waters where the vessel can easily approach the wharf. The wharf bollard is lassoed with the berthing line.

<table>
<thead>
<tr>
<th>Steps for lasso technique</th>
<th>Other information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil line</td>
<td>Coil enough line to reach the bollard in your throwing hand.</td>
</tr>
<tr>
<td>Hold the eye</td>
<td>Hold the eye so that the soft side of the eye near the splice is also held in your hand.</td>
</tr>
<tr>
<td>Throw the line</td>
<td>Throw the line and sufficient coils of it to the top of the wharf post or bollard.</td>
</tr>
</tbody>
</table>

It takes practice, on-the-job experience and expert advice before you become skilled at lassoing. Practise in your spare time both aboard and ashore. Ask more experienced deckhands for tips or advice on your throw.

<table>
<thead>
<tr>
<th>Steps to cast off</th>
<th>Other information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slack away line on board.</td>
<td>The eye will rise up and off the mooring post or bollard on the wharf. Practice makes perfect.</td>
</tr>
<tr>
<td>Give line a vertical flick.</td>
<td></td>
</tr>
</tbody>
</table>

Fendering

Fenders are used to avoid damage to the vessel’s paintwork, the side fittings and equipment as it approaches the wharf or after tying up and the waves and swell move the boat about.

Fenders are rigged to absorb impact and/or chafing. Fenders come in many shapes and sizes, from rubber to small fibreglass and plastic ones. Note that life jackets should never be used as fenders—that’s not their purpose.

Fenders are often needed when any difficulty occurs with the berthing or unberthing operation. So be ready. Lay them out ahead of time.

Take care when using fenders. Sometimes it’s appropriate to hold them in place by their lanyard, and sometimes they need to be secured. Avoid getting your hands caught. Plan how to tie them off safely.
Tie off fenders with either a slipping clove hitch or a clove hitch and a half hitch.

Tie the fenders onto the bollards or bitts. Do not to tie fenders to guardrails or handrails if there is any possibility that the fenders will get caught and pull the rail. Bent rails are expensive to repair.

**Sharing wharf bollards**

Sometimes more than one vessel uses the same post (bollard) on the wharf. What occurs, then, if the first vessel wants to leave before the second vessel with its lines on top! Does this mean that the vessel with its lines at the top must always leave first?

Fortunately there is a simple way around this problem, referred to as *dipping the eye*.

**Dipping the eye**

If you arrive at a wharf and you find another vessel’s lines already occupying the bollard you want to use, you need to:

- pass the eye of your berthing line through the eye of the other vessel’s line at the bollard
- then pass your line over the bollard (see Figure 6).

This allows either vessel to let go without interfering with, or needing the cooperation of, the other vessel.

![Figure 6: Dipping the eye](image-url)
Synthetic and natural fibre lines

Both synthetic and natural fibre lines are used around ships. Some differences are listed below.

**Synthetic fibre ropes**
- usually derivatives of plastic
- tend to be more slippery and require an extra turn when tied in a knot
- tend not to rot when exposed to sea water for long periods
- some types rot in sunlight; others resist sunlight very well
- stronger than natural ropes
- usually float
- slippery around bitts

**Natural fibre ropes**
- often either sisal or manila
- tend to grip better when used in knots on drum ends and in splices
- tend to rot when exposed to sea water for long periods
- not as strong as synthetic ropes
- usually sink
- grip on bitts, especially when wet.

Capstans and warping drums

A capstan and warping drum are both parts of winching gear and are used to control or tighten lines. The most obvious difference is that a capstan is on a vertical shaft, whereas a warping drum is on a horizontal shaft. The procedure is explained below.

Controlling or tightening lines

**Steps**
- Send berthing line ashore.
- Transfer inboard end to drum.
- Take several turns around drum.
- Tension line.
- Transfer line to bitt.

**Other information**
- Four turns usually maximum. How many depends on what berthing line is made of and stress on line.
- Avoid riding turns (where one turn on the drum rides over next turn). A riding turn can prevent you slacking back.
- Lean back on line, and then bring in hand over hand.

Be careful to stand out of the line of recoil, to avoid being hit if the line parts (see bollard hitch in Figure 11).
Rope stoppers

Rope stoppers are used to temporally hold the strain in a line while it is transferred from the drum to the bitts.

Fixing or passing a stopper for natural fibre lines

![Natural fibre lines](image)

*Figure 7: Stopper fixed (natural fibre)*

Fixing or passing a stopper for synthetic fibre lines

![Synthetic fibre lines](image)

*Source of strain*  
*First cross the stopper lines on the berthing line*  
*Stoppers after being passed around the berthing line*

*Figure 8: Stopper passed (synthetic fibre)*

While the stopper is temporarily holding the berthing line under stress, the inboard end of the berthing line is transferred to the bitts.

Securing lines to bitts, cleats and staghorns

There is definitely a right way to turn up a line.

<table>
<thead>
<tr>
<th>Done properly</th>
<th>Done badly</th>
</tr>
</thead>
<tbody>
<tr>
<td>turning up a line is quick and easy</td>
<td>may jam</td>
</tr>
<tr>
<td>the job will hold</td>
<td>may be difficult to release</td>
</tr>
<tr>
<td>the line can be slacked off or released under control</td>
<td>may take charge at the last turn and run out uncontrollably, if under strain</td>
</tr>
</tbody>
</table>
Never fasten a mooring, berthing or anchor warp or line to a single post with any form of hitch or knot such as a clove hitch. If the hitch is wet, or under strain you will not get it off (see bollard hitch in Figure 11).

**Bitts**

*Using synthetic fibre lines*

- Take two turns around front bitt and ease or surge line if under strain.
- Commence figure-of-eight turns.

*Using natural fibre lines*

- Take the first turn once around both bitts.
- Commence figure-of-eight turns.

**Figure 9:** Turning upon a bitt
**Cleats**

*Using natural fibre lines*
- Take a half turn around the cleat.
- Commence the figure-of-eight turns.

Ask your instructor to demonstrate.

*Using synthetic lines*
- Take a full turn around the cleat.
- Take the figure-of-eight turn, or belaying.

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*Figure 10: Deck fitting used in moorings*
Staghorns
Staghorns are a combination of a fairlead and cleat. Lines are turned up as for cleats. Ask your skipper or senior deckhand to point these out for you.

Sampson post or bollard
Some small vessels may have a single post (a sampson post) for berthing lines and anchor warps (line). The following is the correct technique.

Bollard hitch (or lighterman’s hitch)
- Take several turns around the single post.
- Bring a bight of line under the standing part.
- Drop the bight over the post, as shown below.

![Figure 11: Mooring over a post](a) correct (b) incorrect

On your vessel
Vessels are constructed and fitted out in different ways, and they perform very different operations. It is, therefore, practical to check with your skipper what are the requirements for particular tasks. Generally, mariners are happy to explain why they want a task done in a particular way.

If you see operations you don’t understand, ask other deckhands, the senior deckhand or the skipper. It’s better to ask questions than make mistakes.
Check your progress 1

Answer the following questions after reading section 1 and observing mooring operations on a variety of vessels.

1. Why are rope stoppers used?

2. Describe the safety precautions when using capstans and warping drum ends:

3. Briefly explain how a rope stopper is used to transfer a head line from the drum to the bitts.

4. List the different tasks during berthing and unberthing.

5. List at least four safety precautions to consider during berthing and unberthing.
6 What side-to will the vessel be made fast alongside?

7 What lines should go ashore first?

8 Why are fenders required?

9 Will there be linesmen ashore to help with berthing and unberthing?

10 Name the mooring equipment found on the foredeck:

11 Name four berthing lines:

12 Sometimes a berthing line may lie in a bight on deck. Explain the importance of keeping your feet clear of this line.
13 Briefly explain what happens if too much strain is put on a berthing line:


14 As a vessel’s deckhand, what is important to know about berthing?


15 When and how would you use a heaving line?


Summary

You should now understand the following:

- safety precautions during berthing and unberthing
- lines under strain and handling lines
- synthetic and natural fibre lines
- fendering
- sharing wharf bollards by dipping the eye
- using capstans and warping drums
- securing line to bits, cleats and staghorns.

Check with your skipper before assuming how any particular task should be done on your vessel. Can you now:

- throw a heaving line?
- throw a light berthing line to lasso a bollard?
- flick a berthing line off a bollard ashore?
- turn up a berthing line?
- take turns on a warping drum?

Do you know where the following are stowed on your vessel?

- berthing lines
- fenders
- heaving lines

If not, speak to your skipper/facilitator. Seek help. Practise more. Gain experience. If you consider you are competent, ask to be assessed.
Answers to Check your progress 1

1 Why are rope stoppers used?
   To temporarily hold the strain on a line while it’s transferred from the drum to the bitts.

2 Describe the safety precautions when using capstans and warping drum ends.
   Avoid riding turns. They may prevent you from slacking back. Stand out of the line of recoil to avoid being hit if line parts.

3 Briefly explain how a rope stopper is used to transfer a head line from the drum to the bitts.
   See ‘Rope stoppers’ in the text.

4 List the different tasks during berthing and unberthing.
   - lines on deck
   - securing lines to bitts
   - dipping the eye
   - working with the machinery
   - stowage of lines.

5 List at least four safety precautions to consider during berthing and unberthing.
   - lines under strain
   - working with wires
   - feet clear of lines
   - working with machinery.

6 What side-to will the vessel be made fast alongside?
   Get lines on deck in advance.

7 What lines should go ashore first?
   Find out by asking skipper, crew and linesmen.

8 Why are fenders required?
   To avoid unnecessary damage to vessel.

9 Will there be linesmen ashore to help with berthing and unberthing?
   Berthing is easier with linesmen ashore.

10 Name the mooring equipment found on the foredeck:
    - capstan
    - windlass
    - roller fairlead
    - bitts (bollard)
11 Name four berthing lines:
   • headline
   • forward spring
   • aft spring
   • forward breast line
   • aft breastline
   • stern line

12 Sometimes a berthing line may lie in a bight on deck. Explain the importance of keeping your feet clear of this line.
   If weight were to suddenly come on the line your foot would be caught.

13 Briefly explain what happens if too much strain is put on a berthing line:
   Fibre line: a creaking sound is heard, then the rope breaks (parts).
   Synthetic lines: the rope gets thinner and stretches, then it breaks like an elastic band.

14 As a vessel’s deckhand, what is important to know about berthing?
   Find out what is required, eg which lines are to be used, which hand signals or method of communication are to be used.

15 When and how would you use a heaving line?
   When the boat is too far off the wharf to throw a mooring line around a bollard. Tie the bitter end of the heaving line around the eye of the mooring line. Coil a medium-sized coil and a small coil with a heaving line. If right-handed, hold the medium-sized coil in your left hand and throw the monkeys fist (or small sandbag) and small coil with your right hand onto the wharf.