GET MOOR LIFE FROM YOUR ROPES

Veronika Aspelund, Wilhelmsen Ships Service, Norway, explains how the service life of mooring ropes can be extended with a little effort, and minimal cost.

In the mooring ropes sector, irrespective of whether it is an important sales meeting, product demonstration, impromptu chat at an exhibition, or even just a casual email inquiry, one question is guaranteed to always come up. It does not matter where, when, how or with whom one is speaking to, the question is the same: "so… how long will this type of rope typically last?" The question of longevity is an obvious and of course valid question. Sadly, there is no easy answer, as there are a plethora of different factors that can influence the lifespan of the ropes used on board vessels.

The lifespan of ropes

Firstly, vessel type will obviously define how often the ropes are in use, and how they are used. Different vessel types have different mooring decks and equipment. Related to this, the design of the mooring system itself can be less than

ideal and may even cause unnecessary abrasion of the ropes. The trading pattern of the vessel is also an important factor in rope lifespan, as if the vessel's regular route has a long sailing period, obviously the ropes will be used less than for a vessel that has a short sailing route. On that route, the ports themselves can be a major factor in determining a rope's longevity, as different ports have different environments and standards of equipment. Badly maintained equipment in port can easily damage ropes, and, if that was not bad enough, there are actually some ports where ropes are routinely dragged across the pier by truck, causing severe and totally unnecessary damage.

Not man-made, but also a major factor in the longevity of ropes is the environment. High temperatures, for example, can influence the performance of HMPE ropes, because the low melting point and wind/swell can cause shock loads or overloading of the rope.

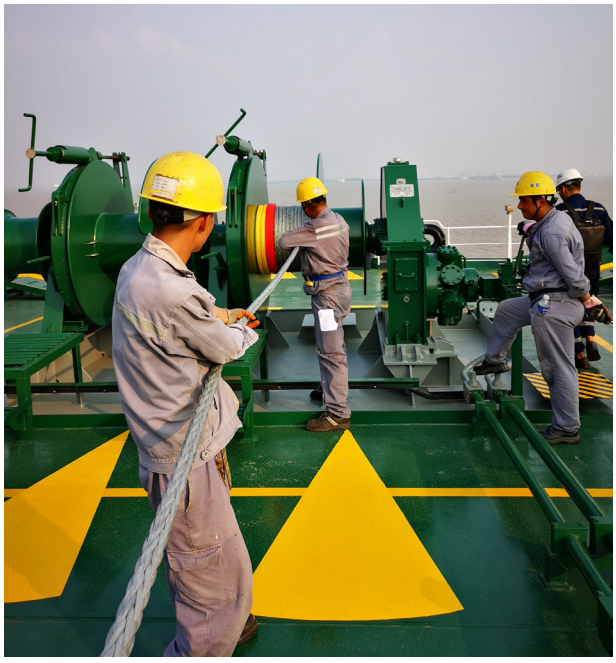

Figure 1. Timm™ Acera Amundsen installed on a new tanker vessel, with focus on correct installation. The two first layers on the winch need to be lightly tensioned, for easy installation of the following rope layers.

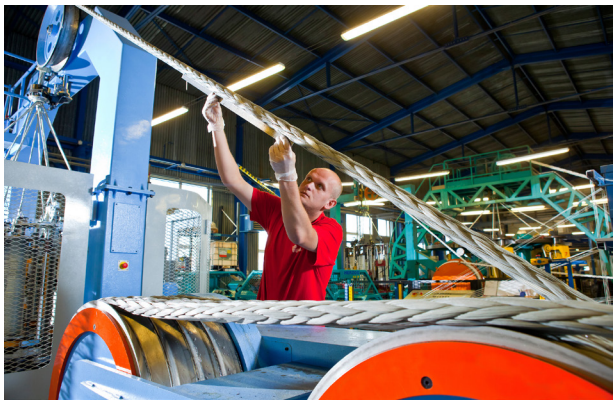

Figure 2. During production, it is important to do quality checks to make sure that a high realisation factor is kept. The realisation factor is an important part of identifying how much strength of the original fibre is kept in the final rope design.

The final factor relates to the position of the rope. Spring or breast lines typically have a shorter service life, because of their position in the mooring arrangement and their regular usage.

In addition to these factors which can affect longevity, how we actually measure lifespan is in itself far from clear cut. It can, for example, be measured in months or years from its first installation on the winch. Alternatively, we can try to measure it in mooring hours – the exact hours the rope has actually been in use.

However, irrespective of how the measurement is taken, the life of a vessel's ropes can be prolonged, with some forward-thinking and some basic good housekeeping from the crew. This article presents some key tips to getting the most out of a vessel's ropes.

Improving longevity

- Correct rope installation – installation should be carried out by an experienced crew and according to the manufacturer's instructions. Incorrect winding on the drums or adding twists are common errors made during installation. These errors should be avoided at all costs, as twists are likely to decrease the strength of a rope and can in fact cause the rope to break. Using a rotating platform helps avoid twists on the rope and using a two-colour rope enables easy detection of the twist.
- Regular maintenance of mooring equipment – uneven surfaces and sharp edges destroy fibres. So, it is incredibly important to have well-maintained mooring equipment. Well maintained Panama chocks seem to work best, whereas roller fairleads tend to stop rolling and need more maintenance. In addition, the D/d ratio (the diameter of the bend divided by the diameter of the mooring rope) should be as large as possible. A small D/d ratio will reduce strength and the working life of the rope. According to the Oil Companies International Marine Forum's (OCIMF) Fourth Edition of its Mooring Equipment Guidelines (MEG4), the recommended D/d ratio for mooring fittings should be at least 15.
- Careful rope handling on board – crew should handle the ropes with care and follow the manufacturer's recommendations.
- Storage – keep the ropes covered when not in use, out of direct sunlight and away from potentially harmful chemicals.
- Proper usage – it is recommended to use the same ropes on all positions, where ropes are working in parallel. Two ropes working in tandem made of different materials, with different elongation, will not cooperate. The rope with lower elongation will then have to take a greater share of the load. This situation will of course decrease the lifespan of the overloaded rope.
- Rope protection – investing in rope protection can help limit damage. There are several solutions, such as a braided protective jacket on the entire length, or parts of the length, or chafe protection that can be purchased separately.
- Work within the load limits – overloading a rope will decrease its service life. According to OCIMF MEG4, the typical operating range of the rope is up to 22% of the ship design MBL. The ship design MBL is the minimum breaking load of new, dry mooring lines for which a ship's mooring system is designed, in accordance with OCIMF standard environmental criteria restraint requirements (OCIMF MEG4). The working load limit is 50% for synthetic ropes and 55% for wire ropes. Loads

higher than this limit will cause damage to the rope, exceed its residual strength and cause breakages. OCIMF MEG4 recommends retiring mooring lines when the residual strength has reached 75% of the ship design MBL. Today, this can only be tested by a destructive test.

Ensuring ropes are being used within their limits is of course not so difficult when working in terminals equipped with tension monitoring. But for everywhere else, having a clear picture of the load put on a rope is impossible.

This is why Wilhelmsen Ships Service continues to refine its Timm™ Smart Ropes system, which, via a sensor embedded in the rope, can accurately measure the tension of the rope in real-time and relay the information via Bluetooth to a vessel's bridge. Currently being beta-tested aboard working vessels, the system will help ensure quick, safe and efficient mooring, eliminating the chances of overloading. It will also provide a wealth of load data, which going forward can be used to better understand how the lifespan of ropes are affected by the various aforementioned factors.

The service life of ropes can be prolonged by correct rope handling, good installation and maintenance. Crew should be well trained to understand the manufacturer's recommendations and be willing and able to pay attention and take good care of mooring ropes. Ropes should be regularly inspected and ideally there should be close cooperation with the manufacturer, including the testing of residual strength of the ropes on board.

Mooring ropes in the LNG industry

Timm ropes are used on some of the world's largest and most technologically advanced vessels. With attention to fibre regularity, abrasion resistance and coating, the company's aim is to provide its customers with the right rope quality for each vessel's needs.

Timm Acera Amundsen or Acera daGama ropes, with Timm Master or Flex stretchers, are well suited to the unique demands of LNG vessels and offer certificated and class-approved OCIMF MEG4 performance. Wilhelmsen mooring ropes are designed and constructed to reduce internal abrasion between fibres and optimise external abrasion on the surface of the rope.

Case study

Wilhelmsen provides ropes and mooring equipment to a number of LNG customers, including Höegh LNG. The company currently supplies Timm Acera Amundsen ropes, with Timm Master tails, to several Höegh LNG vessels, which operate either as LNG tankers or as floating storage and regasification units (FSRUs).

These vessels of course need to follow the OCIMF MEG4 mooring equipment guidelines, which require enhanced communication between vessel and rope manufacturer, especially for rope management and retirement. To support its customers, such as Höegh LNG, in meeting these guidelines, Wilhelmsen provides installation supervision, onboard inspections, support and even load tests, when visual inspections reveal signs of wear and tear. Load tests help make it possible to decide when it is best to retire the ropes currently installed onboard a vessel. Testing can also help with the future rope management of the vessel, with the previous rope history becoming part of the onboard line management plan. **LNG**