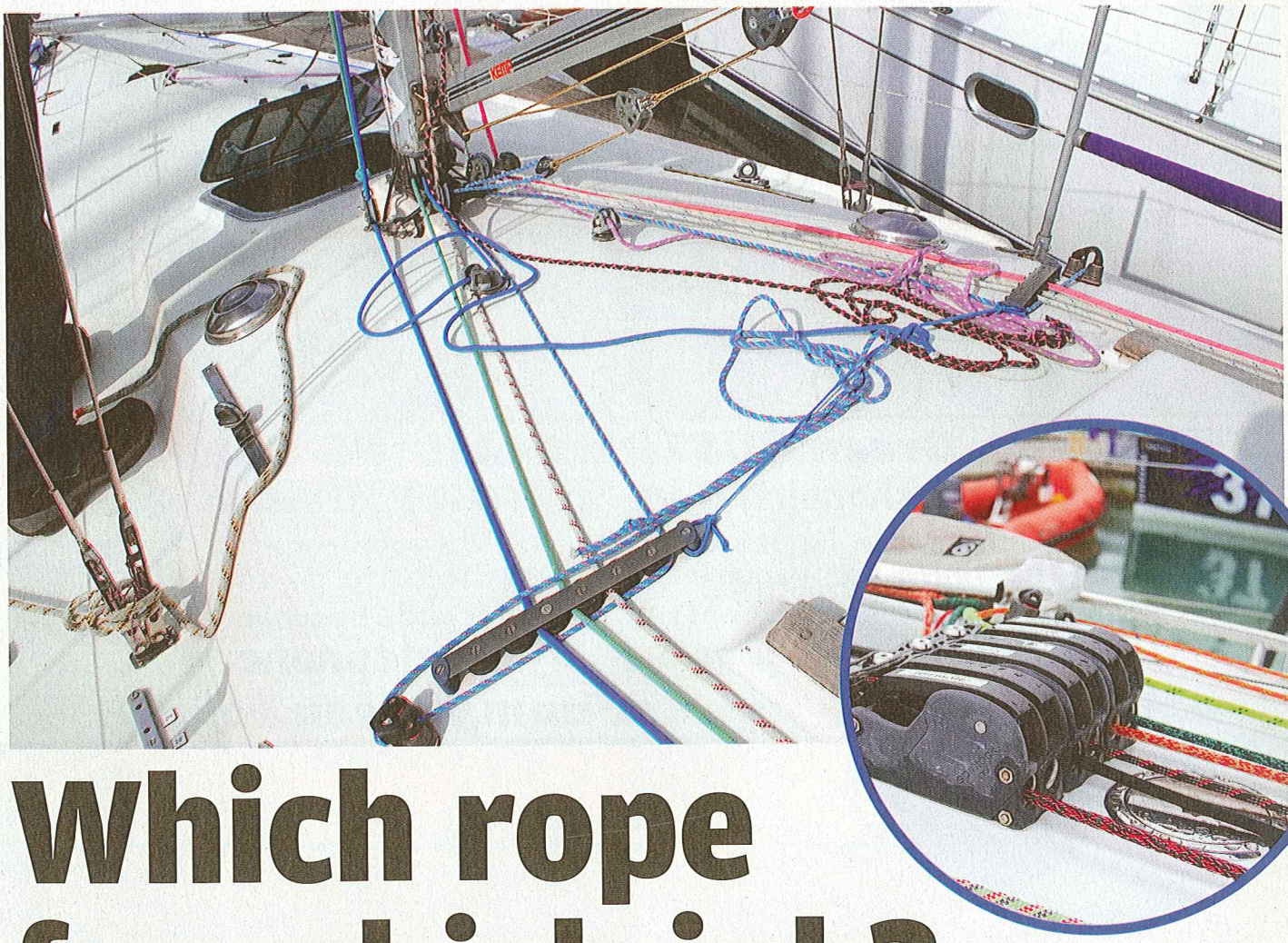


Which rope for which job?

How do you know if you're using the right rope for the appropriate task on your boat? David Pugh enters the fray to prevent us all from tying ourselves in knots

There's a trend for any running rigging on board, be it a line, cable, sheet, halyard or hawser, to be referred to as 'string'. Lazy and colloquial perhaps, but maybe in some way it's a reaction to the sheer complexity of the ropes on offer today. Counting through the Liros catalogue reveals 77 different ropes, and the other brands have a similarly large selection.

So how do we know we're using the right rope for the job? By the time we get to the chandlery the selection has been whittled down to about 10 products in different sizes, which makes choosing easier, but the range of technologies and prices can still be bewildering.

Rope materials

If we discount traditional fibres such as manila, hemp and sisal, the go-to materials for rope making over the last 50 years have been nylon, polyester, polypropylene and, if minimum stretch is essential, wire. Let's look at these in turn.

Nylon

Nylon rope, when dry, is extremely strong. It's also highly elastic, increasing its length by between 10% and 40% under load, and offers good abrasion resistance. On the negative side, it becomes very slippery when wet and loses about 10% of its strength. It also degrades with exposure to UV, acids or paints.

These properties make nylon well adapted for use in mooring lines, where the elasticity helps damp jerky movements as the boat snubs against the lines. The UV aspect can be an issue for permanent lines, but for those which spend a large part of their life stuffed in a locker, nylon is a good choice. Mooring lines are rarely run at their limits, so the strength reduction when wet is generally not a problem.

Nylon is most commonly available in three-strand or other multi-strand twisted lays, which make lines easy to splice. The construction can also add extra stretch.

Polyester

Polyester has naturally lower stretch than nylon, around 8%, and this can be reduced to less than 4% by processes such as pre-stretching and heat setting. It is resistant to acids, alkalis, abrasion and UV, suffers no loss of strength when wet and has good resistance to flex and fatigue. However, it is weaker than nylon under shock loads.

With a list of attributes like that, it's perhaps no surprise that polyester remains the standard line for cruisers. It's also pretty cheap in rope terms, so if you're looking to equip your boat on a budget, polyester will provide

Polyester is resistant to acids, alkalis, abrasion and UV

good, hard-wearing sheets, halyards and even mooring lines.

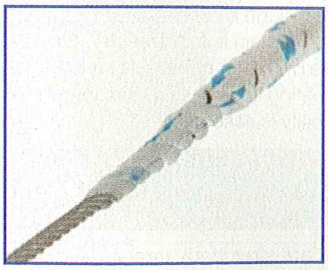
Polyester lines are available in a range of constructions. Choose a smooth braided line for running rigging: sheaths are typically 16-, 24- or 32-plait, with 32-plait giving the smoothest, most snag-resistant finish. For sheets, 16-plait is often chosen as it offers better grip. For mooring lines, a multiplait construction is easier to splice, has more stretch and is easier to coil.

Polypropylene

Polypropylene is weaker than both nylon and polyester, and has a low melting point – so if you ease it around a winch with too much enthusiasm, it'll melt. That said, it has two major advantages over other materials – it's light, and it floats. For that reason, polypropylene remains popular for rescue lines as it can be easily thrown and brightly coloured lines can be seen on the water's surface.

Wire

Wire running rigging is rarely found on cruisers, but racing yachts used to use it a lot as halyard leaders, spliced to a pre-stretched polyester tail to allow it to be winched.



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Wire has obvious disadvantages, its relative inflexibility, susceptibility to fatigue and ability to injure people being the obvious ones, coupled with the need for special sheaves and splicing techniques. However, it has minimal stretch – less than 1%, even under high load – making it a good choice to maintain luff tension and hence performance.

Modern lines

The older man-made fibres we've mentioned are still good choices for stretch-tolerant uses on board, but performance racers and cruisers have always been seeking ways to make lines lighter and less elastic.

Over the last 15 years or so, aramid fibres have become commonplace. Aramids are a collective term for a range of fibres: Vectran, Dyneema/Spectra, PBO and Kevlar are those most commonly used for leisure marine applications. They are exceptionally strong, meaning that lighter, smaller-diameter lines can be used, and they have much lower stretch.

Spectra/Dyneema

In practical terms, these two products can be treated in the same way. Spectra is a trade name of DuPont in the USA and Dyneema belongs to DSM in the Netherlands. The fibres used are extremely strong, and offer excellent resistance to abrasion, UV and repeated flexing. Spectra/Dyneema's Achilles' heel is creep – it slowly and permanently stretches when placed under load.

Its high strength makes Spectra/Dyneema a good choice for saving weight as you can specify a line size or two smaller than the equivalent polyester line while still achieving the same breaking strength. It's also a good performer for halyards for cruising or club racing, but the creep problem poses a problem for high-performance yachts.

Treatments such as heat-setting, pre-stretching and coating are now commonly available for Spectra/Dyneema, which can make the line even stronger and help to reduce creep.

Another advantage over polyester is that Dyneema lines are more resistant to flattening, which can help with regularly winched lines.

Kevlar

Well known for its use in high-impact situations, Kevlar was one of the first high-modulus fibres to be used in ropes. It has high heat and abrasion resistance, low stretch and low creep, but is let down by a lack of tolerance to flexure and fatigue, and a poor tolerance to UV light. It's rarely found in ropes now, but sometimes as reinforcement in high-performance laminate sails.

Vectran

A development of Kevlar, Vectran offers high strength, extremely good creep and stretch resistance and reasonable tolerance to fatigue and abrasion.

However, it still suffers badly from UV damage and is expensive. These latter two points make Vectran a costly option as an unsheathed line can degrade in a single season. Sheathing with polyester is common, but it's essential to make sure the sheath does not chafe through.

PBO

PBO is not just short for Practical Boat Owner – it also stands for polybenzoxazole. It's the strongest and least stretchy of all the modern fibres, with almost twice the strength and half the stretch of Kevlar or Vectran. It's expensive though, has poor UV resistance and hates going around corners.

Grand Prix yachts that can afford to change their halyards on a regular basis may use PBO, but its most common use is for standing rigging where flexing is kept to a minimum.

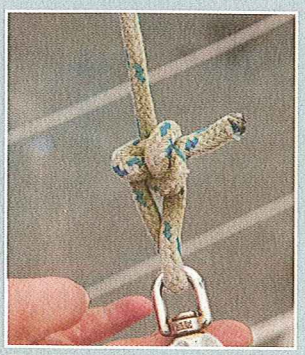
Using fibre rigging removes a lot of weight aloft compared with stainless steel rod rigging, but it's vital to ensure the UV protective sheath is not damaged or the rig may fail.

High-tech lines on low-tech boats

If, like most PBO readers, you're a cruising sailor or club racer, you would probably rather not change your running rigging on too regular a basis. That rules out PBO and Kevlar for a start, although you might sometimes find a line has some Kevlar fibres in the cover to add abrasion resistance.

Vectran is expensive, but worth considering for applications such as fibre backstays. Choose a rope with a UV-resistant cover and make checking the cover for chafe a regular task – UV light can quickly degrade the core and make the rope useless.

Spectra and Dyneema, on the other hand, have come down in price as production volumes have risen and are well worth a look for cruisers and racers alike. Most manufacturers are now making lower-cost line with these materials, aimed at the cruising market, which – allied to the ability to choose a smaller line size – makes them more affordable. You'll still be looking at roughly double the price of polyester, however. In my opinion, it's a worthwhile investment for your mainsail and genoa halyards, as the low stretch helps improve windward performance by keeping the sail luffs taut, while the reduced diameter makes for easier hoists and drops.



Check your lines regularly for wear and tear

Hybrid lines, where Dyneema or Spectra is mixed with lower-tech fibres to provide a low-stretch rope at lower cost, can provide a useful compromise.

Which line where?

HALYARDS If you can afford it, get rid of the stretch. Vectran is king, but Dyneema and Spectra are a close second and will be longer lived. Remember that you can reduce the rope diameter for the same strength.

SHEETS Polyester or hybrid lines make sense here. Larger-diameter lines are easier to handle, a 16-plait braid offers good grip, and a little stretch helps absorb shocks as sails fill or during a gybe. If the line creeps you can always sheet in a bit: you should be keeping an eye on your sail trim in any case.

Most rope manufacturers recommend their heat-set products for this, which generally have around 5% stretch. Hybrid or cruising Dyneema/Spectra lines will be more resistant to flattening around the winch.

BACKSTAYS If you have a fibre backstay or adjuster, buy an aramid fibre. It's worth it – you won't need much, and stretchy rigging can lead to rig failure. Replace regularly, and certainly if you spot any chafe. The same applies to running backstays.

SPINNAKER GUYS While spinnaker sheets can tolerate some stretch, guys run at high loads and almost become part of the static rig. Dyneema or Spectra work well here, or choose a low-stretch polyester or hybrid line.

REEFING LINES Although Dyneema or Spectra would make sense to maintain luff and leech tension, many choose polyester or hybrids for low cost and reliability. Reefing lines pass round some tight corners, so flexibility is essential.

MOORING LINES Nylon or polyester (not pre-stretched), three-strand or multiplait. Stretchy, chafe resistant and easy to splice, these should give long life, absorb shocks and stand up to a lot of abuse.

PBO conclusion

Not all ropes are created equal, and like most things on boats, part of the equation includes the depth of your pockets. But the fact remains that modern fibres offer incredible performance, and if used judiciously can transfer this to your sailing. Next time you come to buy a new line, think carefully about how it is used. Is stretch a blessing or a curse? Would reducing diameter make line handling easier, or would a narrow line cut your hands to shreds? Is the line going to be subject to significant UV and chafe, or will it be protected most of the time? If you plan to splice it yourself, is the rope design one you can splice? Spending more is not always the answer, but wise investment can help your boat sail better.