

It cuts both ways

Following last year's MBM investigation, we have been working hard to create a test bench that will allow us, for the first time, to actually test rope cutters in a realistic environment. The result is you won't read a more comprehensive review anywhere else

REPORT BY EMRHYS BARRELL

See the cutters in action at mbmclub.com

Last year we carried out an investigation into the rope cutters available on the market. We spoke to owners who use them and we described how they can help make your boating safer. At the time, though, we didn't carry out a practical test as we didn't have access to a rig that we thought would give a valid comparison of how they operate in real conditions.

Since then we have developed a rig that we think gets as close as possible to real world situations you are likely to encounter out at sea or

on the river, and using this we have put seven of the latest rope cutters to the test.

Of course, even this cannot completely replicate what happens under your boat at speed – for that we would have to kit our photographer Graham out in a scuba suit, and tow him up and down the Channel beneath MBM's boat *Blue Fin* at 20 knots. Oddly, he was quite up for it but we didn't think the company insurance would cover us.

Even so, we think our test gets very close to most situations, and is

certainly the most comprehensive and detailed study ever carried out by a magazine.

How they work

There are three main types of cutter, each with completely different actions, and they are best described as scissors, discs and shavers.

The scissors-type came on the market first and comprises a rotating cutter clamped to the shaft, with two or more blades, plus a fixed cutter bolted to the P-bracket or stern tube. As the blades rotate,

rope, weed or obstructions are drawn down into the blades and cut or chopped up.

Advantages are a positive cutting action, which also shreds weed and netting. Disadvantages are a more complex installation, and the possibility of a spacer needing to be fitted in the gearbox coupling. Also the thin plastic bearings on which the fixed cutter spins on the shaft wear and have to be replaced every two years or so. The blades can also reduce top speeds by 1-2 knots. Scissor cutters are also the most expensive to buy.

The disc cutter comprises a thin stainless steel disc with a sharpened edge or circumference. The disc can be split and clamped round the shaft, or solid, in which case the prop has to be removed and the disc slid up the shaft. In both cases the cutter is held in place with a grub-screw. As the shaft spins, any rope or debris that is drawn down to the disc is gradually cut through as it passes over the knife-edge.

Advantages are simple installation and low cost, plus minimal loss of boat speed. Disadvantages include the lack of a positive cutting action,

and discs struggle to cut through weed and plastic sheeting.

The shaver-type is a new development and comprises fixed blades mounted on a block attached to the P-bracket. A plastic spool or cylinder is slid over the shaft attached to the front boss of the prop, running under the cutter blades. As rope or debris is encountered, it is forced into the gap between the blades and the prop. As the

blades spin, the rope is gradually shaved away.

Advantages include reduced load on the structure and transmission when the cutting is taking place, plus minimal loss of boat speed. Disadvantages involve complex installation, often requiring removal of the shaft, prop and P-bracket, and accurate fitting in a machine shop.

Price wise, shavers are midway between discs and scissors, although you would have to add in the cost of machining the P-bracket and prop.

Models on test

There are at eight makes of cutter on the UK market that we know about – three scissors, four discs and one shaver. We explained to all eight manufacturers how we would be conducting our test and the rig we would be using. We invited all of the suppliers to send us samples to test and to attend in person if they wanted. Six companies were happy to take part, and sent us samples to test. Plastimo couldn't provide us

TRIVIA
90% of all prop fouling occurrences throughout the year are fishing boats catching their own ropes and nets

with a unit but we managed to buy one instead. The Quickutter is a new shaver cutter but its manufacturers declined our invitation with concerns over our rig and its suitability for the Quickutter. If any readers have experience of these units, we would be pleased to hear from you.

Fitting

We fitted each of the cutters in turn to the P-bracket and shaft to see how easy this was to carry out. In theory anyone with reasonable DIY skills can fit a cutter to their boat. In practice you need to be confident of your abilities, especially with the scissor-action units. When it is working in anger, a scissor cutter exerts enormous loads, especially to the fixed structure it is attached to, and it is no use if it breaks free. Disc cutters put less load on the structure but even these need to be correctly fitted, and if you are in any doubt get a boatyard to fit it for you.

In most cases you will have to lift the boat out of the water for the

fitting. With this in mind a quick lift, with the boat not leaving the slings, and the yard doing the job for you, will cost you no more than if you had the boat lifted and choked up ready for you to do the honours.

For the scissors-type you will have to accurately drill and tap the P-bracket. You also need to be sure that you have the correct clearance between the P-bracket or stern

bearing and the prop. This distance is critical for all the makes, but especially for the scissor-action. Many shafts will not have enough free length exposed, in which case you will have to fit a spacer between the gearbox and the coupling to move the shaft back the required amount. Usually the cutter manufacturers can supply you with the right spacer to suit most common gearboxes.

Because of the loads on the fixed scissor-type blocks, cutters can usually only be fitted to metal P-brackets. GRP isn't strong enough

to stop the tapped machine-screws pulling out, but in some cases a plate can be made up to take the block, which is then glassed or bolted to the hull.

Disc types can be fitted to any shaftdrive boat, but sterndrives and saildrives are more of a problem. Stripper has a model for saildrives and Quickutter claims its unit can be fitted to sterndrives.

Disc cutters put less load on the structure

All types must be spaced 6-10mm back from the P-bracket or stern

tube to take up any movement as the engine goes into ahead, and to allow a flow of water through the cutless bearing. All cutters must be fitted to the parallel section of the shaft, not the taper, or they will slip. Scissor-types also need to be lined up correctly, relative to the propeller blades, to reduce interference with water flow into the prop. All manufacturers recommend you use a threadlock liquid on the screws to prevent them undoing.

Scissor action



1 Coming in two parts or more, a scissor cutter can be attached without removing the prop



2 The fixed blade fitted here sits on a bearing which will have to be replaced every two years or so



3 The fixed cutter is held in place by this block, which must be tapped into the P-bracket

Removing the prop

For some of the disc cutters you will have to remove the prop. This sounds simple but in practice it can be a major job. Over time, corrosion will cause the prop to bind onto the shaft. To remove it will require a puller but, more often than not, heat will also be needed to expand the prop and break it free. Even then you will probably have to hit the prop sharply to break it loose. If this is the case, don't use a steel hammer directly onto the blades as you will damage or dent them. Either use a wooden drift, a copper drift or a copper-faced hammer.

The rig

This comprised a tank – 1.2m long, 0.6m wide and 0.9m deep. In this was fixed a P-bracket with cutless bearing carrying a 1.5in mild steel shaft with a tapered end, and a 16in by 12in three-bladed bronze prop.

The shaft was driven by a 2.2kW three-phase AC motor, running through a 6:1 reduction ratio gearbox. The motor was controlled by an inverter and regulator, which allowed us to adjust the motor speed from zero to maximum and also reverse its direction. It also allowed us to run the motor from a normal, single-phase, 240V supply. These inverters are now used in the machine tool and hobby market, allowing you to run three-phase equipment from your standard house mains. Ours was

made by Transwave, and came from www.powercapacitors.co.uk. Its features include overload protection, soft starts and adjustable ramp-up times, which enabled us to accurately replicate the action of your engine and gearbox. An inspection window in the side of the tank allowed us to film the cutters in action and replay the video to see how they actually worked.

Log on www.mbmclub.com to see the cutters in action.

The test

We started the motor in ahead, and got it running up to speed. Initially we fed the rope into the scissor cutters and let them draw it in and cut it up. However, the disc cutters didn't pull the rope in, which we realised was because there was no load on it, so they wouldn't cut it. In a real-life situation, you would be encountering long lengths or bundles of rope, which would provide tension at the end, or the rope would get caught round your

P-bracket, which would also create a resistance and tension.

To simulate this effect, we fed the rope from ahead of the P-bracket, with one turn taken round it, and kept a gentle tension on the end. This drew the rope down onto the blades, which replicated the scenario of your boat at sea more effectively.

If the cutters chopped the rope, we classed this as a 'pass'. Sometimes the ropes would stall the motor, so we reversed its direction, which again you would do in a real-life situation. It should be noted that we were only using a 3hp motor. In reality you would have a diesel of anything from 20hp to several hundred horsepower, so the cutting action would be more severe. The same techniques were applied to the netting and tarp but the wire was fed into the spinning cutter from ahead.



Our rig ran on an electric motor with forward and reverse gears



All the hard work and planning that went into this test proved highly fruitful



What we threw in

From our experiences with the MBM Cruising Club we have found the most common material encountered on passages is floating rope, either long lengths or bundles. This is followed by netting of all sizes and thicknesses, and plastic sheeting or tarpaulin. Finally, you could also hit a lobster pot line.

To best replicate these materials, we took the following: three-strand polypropylene rope – 6mm, 12mm and 25mm diameter; three-strand and braided polyester – 15mm and 25mm;

and three-strand 15mm nylon rope. We also tried a wide variety of netting, from the finest monofilament, through 3mm nylon and up to 4mm polypropylene. These nets, we are assured by a UK fishing industry supplier, are what you are most likely to encounter around our coasts. The net was cut into 1m x 2m rectangles and fed into the prop.

We then took heavy-duty polytarp sheeting, also cut into 1m x 2m rectangles. This was followed by 10sq mm copper cable, and finally 1.5mm diameter galvanised steel wire, both single strand and cable.



A typical disc set-up



1 Solid discs will require the prop to be removed



2 With the fixing point marked the shaft is drilled



3 Prepare the area before fitting



5 The blade is positioned, allowing a 6-10mm gap



6 With the prop fitted, final adjustments are made



Stripper

Design Ambassador Marine's Stripper arrived on the market shortly after the Spurs. This manufacturer took an alternative design for its cutters, with serrated edges claiming to hold the rope in the jaws while it is being cut. Otherwise it uses the same principle of a fixed block, machine-screwed to the P-bracket with fixed and cutting blades

on the shaft. It is made of 316-grade stainless steel, unhardened. It's available in 2, 3 or 4-blade versions, depending on the number of blades on your prop. The Stripper also has the option of a venturi tube, clamped to the P-bracket, which is claimed to reduce cavitation over the prop, extending its life, and reducing

loss of performance. One other variation is jacking screws on the fixed block, which allow you to adjust its shape to different radius P-brackets.

On test The Stripper cut all the rope quickly. On occasions free rope tended to be thrown out from the blades, but was drawn in and cut as soon as it

wrapped round the shaft. Netting was quickly shredded, as was the polytarp, after one reverse. The copper wire was cut cleanly, as was the single strand steel but the steel wire tended to jam in the blades.

Sizes From 0.75in to 4in

Prices From £319 to £1460

A 1.5in cutter is £429

Contacts Ambassador Marine
www.ropestripper.com
Tel: 01962 775405



Gator

Design This new unit on the market was developed by two boatowners tired of getting ropes caught round their props and breaking their existing cutters. They looked at the current designs, and claim to have made improvements. The scissors-type Gator has three blades, which are serrated and dove-tailed in shape. This is claimed to snag ropes and prevent them from being thrown outwards. They have also strengthened key areas of the construction, beefing up the sections of the rings and their locking mechanism, and adding stiffeners to the back of the blades. It is made of 316 stainless, unhardened steel. The fixed block also has three jacking screws.

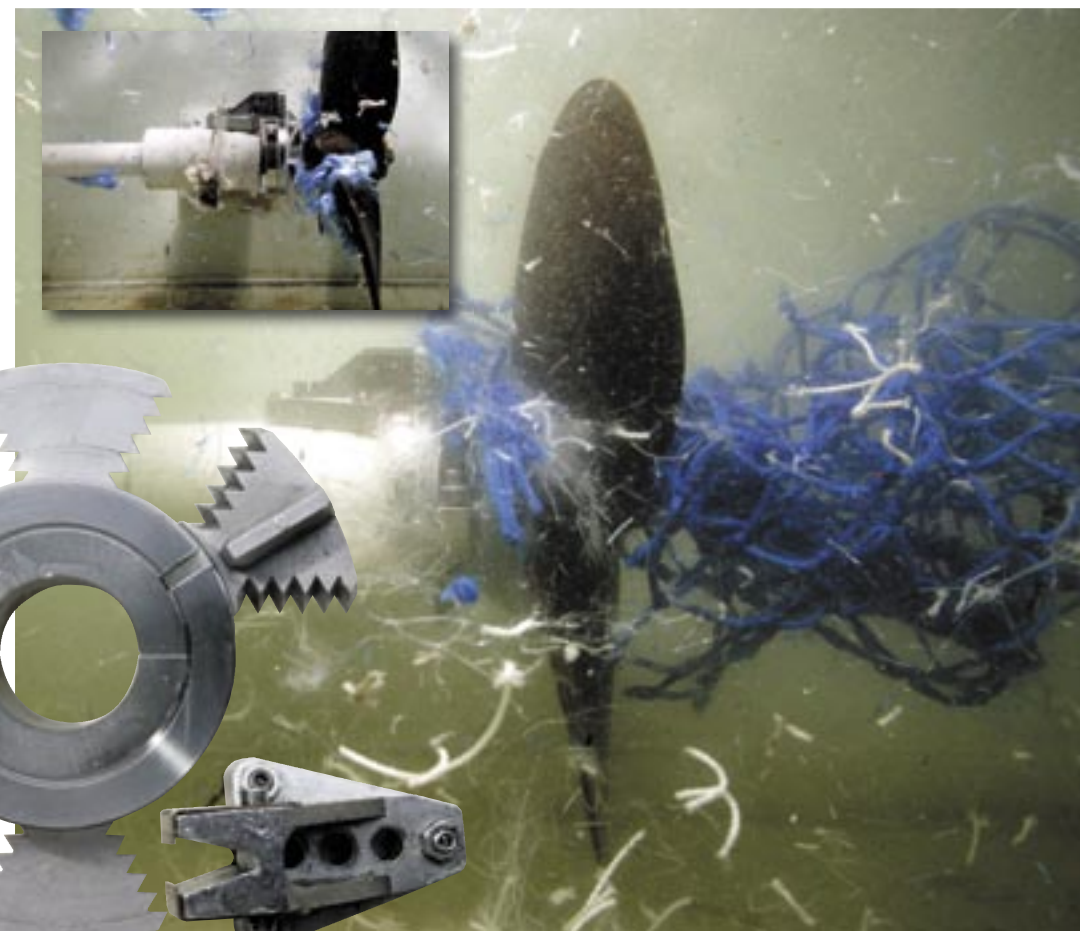
On test The Gator instantly chopped the rope and shredded the netting and polytarp after a reverse, with no tendency to throw it outwards. The copper wire was chopped cleanly but the steel wire tended to jam the blades after one cut.

Sizes From 1in to 3in

Prices From £320 to £700.

A 1.5in cutter is £552

Contacts SAK Equipment Ltd
www.sakequipment.com
Tel: 01323 735078



Spurs

Design This was the first successful cutter, developed in 1982 in the US. A scissors-type, it comprises two spinning blades and one fixed. The blades are claw shaped, so that rope can be trapped between them as they spin, and can't be thrown out. The blades are made from hardened 17-4PH grade stainless steel. Spurs claims this makes it sharper for longer and can deal with harder materials better. The downside is this grade of stainless is more prone to corrosion, so a small anode is fitted as standard. Fitting is straightforward, with a 16-page installation manual.

On test The Spurs chopped through every type of rope instantly and the finer netting. The toughest net required reversing the engine but this is what you would do in practice. Similarly the tarpaulin was also dealt with quickly, with one reverse chewing it up completely. The copper wire was snapped in one pass, as was the steel rod. The flexible wire was cut once but the second time it jammed between the blades. In fairness, Spurs don't claim this unit will cut wire.

Sizes From 0.75in to 6.5in

Prices from £335 to £2082. A 1.5in cutter is £376 **Contact** Harold Hayles Marine
www.spurscutters.co.uk
Tel: 01983 760373



Plastimo

Design A solid disc cutter so only available in slide-on versions. Made from unhardened 316 stainless steel, it has a serrated edge that claims to give a better cutting action. The disc section was thinner than its rivals and despite being supplied as suitable for a 1.5in shaft, it seemed a loose fit. Fitting it was simple though, once you had removed the prop.

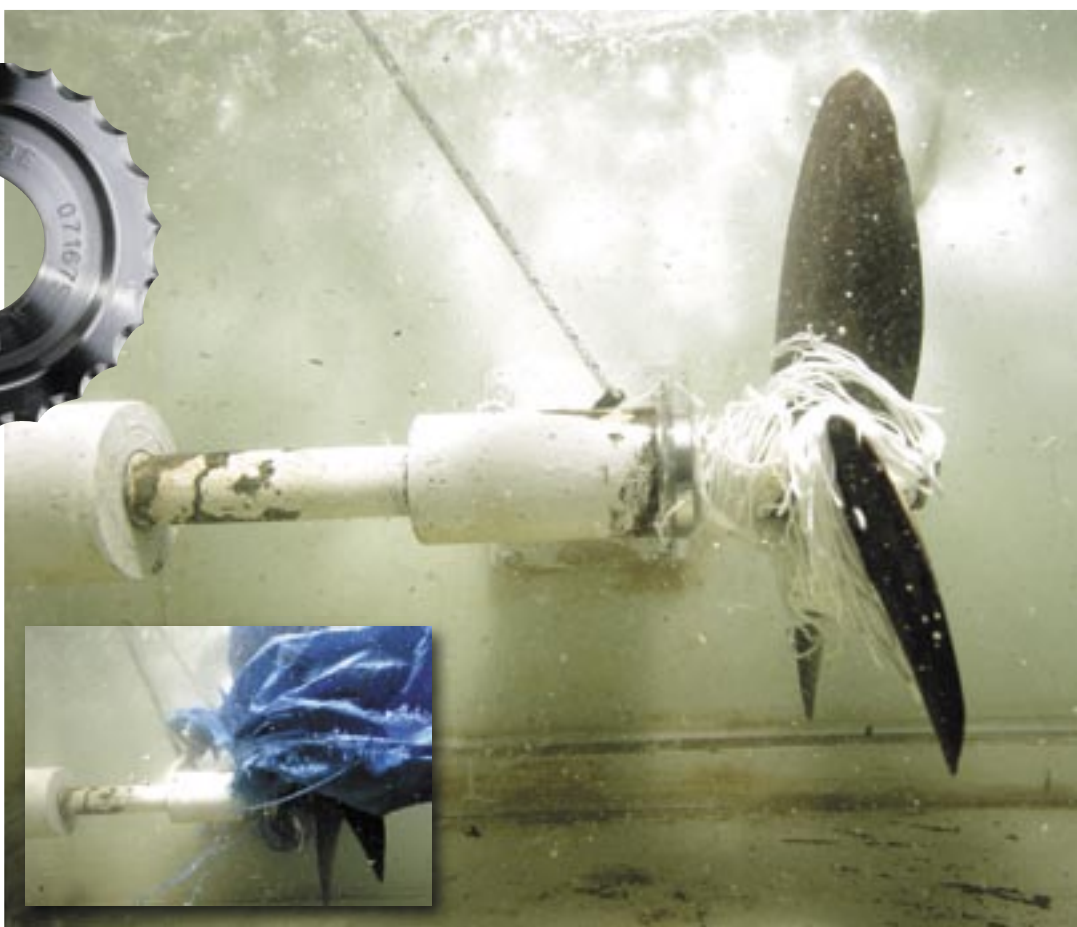
On test The Plastimo cutter cut the rope quickly and the netting eventually. It wasn't clear whether the serrations were a benefit, giving more of a sawing action, or a drawback, tending to snag the materials, and stall the motor. The polytarp was cut once it was held down, with the serrations doing a better job than the smooth discs but at times it got snarled up round the prop. None of the wires were cut.

Sizes from 22mm to 80mm

Prices from £115 to £428.

A 1.5in cutter is £132

Contacts Plastimo www.plastimo.com



R&D

Design R&D Marine, well-known suppliers of sterngear, has recently developed a disc cutter. It features a tapered leading edge to the boss, which is machined to the outside diameter of the P-bracket. The benefit of this is that it shrouds the bracket, preventing rope from being drawn down into the gap between it and the cutter. Other features include holes through the disc, which claim to improve water flow to the prop, although we're not sure how significant this would be at 25 knots. Made of 316 stainless, unhardened steel it has heavier sections than its rivals.

On test The R&D cutter cut the rope cleanly, and the netting after a couple of reverses with none of it being drawn down into the shaft. Again, the polytarp was cut as soon as tension was applied but it still hung round the blades on some occasions. Reversing removed it most times. None of the wires were cut.

Sizes From 20-50mm

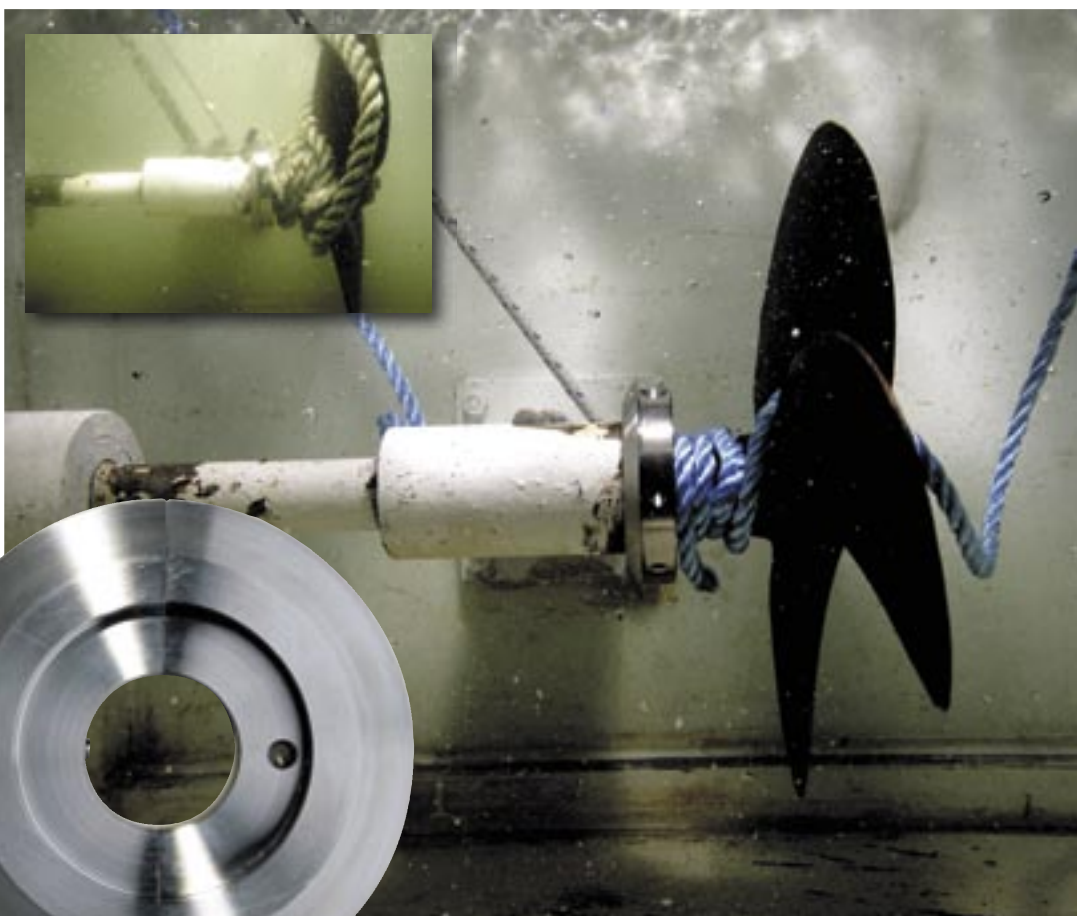
Prices from £126 - £152.

A 1.5in cutter is £144

Contacts R&D Marine

www.randdmarine.com

Tel: 01462 539163



Prop Protector

Design This disc cutter has been on the market for over 10 years. Available in slide-on or clamp-on versions, it is easy to fit, backed up by a four-minute installation DVD. Just drill a dimple in the shaft, then clamp the two halves together, and tighten up the grub-screw. It is made from 316 stainless, unhardened steel. It had the sharpest edge of all the units, and came with a plastic ring to stop you from cutting yourself during fitting and a warning notice.

On test The Prop Protector cut the rope cleanly, and all the netting. It didn't shred the netting but cut through it, dividing it in two, and would prevent your boat being anchored by a long length. When the



polytarp was left to drift into the prop, it tended to get caught on the blades and just swirled around but as soon as a slight amount of tension was applied, it was cut through. However, it

wasn't shredded and sometimes remained on the blades, which would reduce thrust. In practice, a large sheet would possibly apply enough drag to make the cutter work. It couldn't cut any of the wires though. The netting and smaller diameter ropes could sometimes be drawn down into the gap

between the cutter and the P-bracket but reversing tended to loosen this. **Sizes** From 1in to 4in **Prices** £95 to £400. A 1.5in slide-on cutter is £106, a 1.5in clamp-on is £146 **Contacts** Prop Protector Ltd www.prop-protector.co.uk Tel: 01622 728738

Shaft Knife

Design Another disc cutter, this time from TW Norris, a supplier of propellers and sterngear. This cutter was found late in the day, so it missed the main photo session. However we were still able to put it through the tests. A slide-on unit, made from unhardened stainless, with a smooth edge, it was simple to fit.

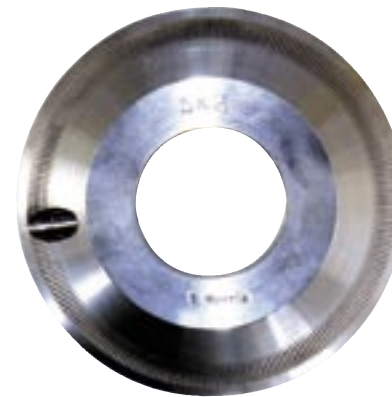
On test The Shaft Knife performed similarly to the other smooth-edge discs, cutting the rope and netting, plus the tarpaulin when it was held down. None of the wires were cut.

Sizes from 0.75in to 2.5in

Prices £82 to £165. A 1.5in cutter is £94. Larger sizes available on order.

Contact TW Norris Tel: 0208 560 3453

www.tnorrismarine.co.uk



Conclusion

Our test clearly shows that any rope cutter will bring a definite safety benefit to your boat. Watching them in action it was amazing how quickly they all cut through most of the debris we threw at them.

Clearly the scissors-type had the edge in what they would handle, coping with rope, netting, polytarps and

even copper or thin steel wire.

The disc cutters sliced through rope and netting, and made a good shot at polytarp but this could sometimes defeat them. Disc cutters could potentially have the same problem with weed on a river.

All three scissor cutters performed well, with each one having some advantages over the other styles on test. Of the discs, the clamp-on versions have a definite fitting edge, judging by the effort required to get the prop off our test rig.

When it comes to design the R&D cutter benefits from its tapered leading edge, which shrouds the exposed shaft.

Obviously price and ease of fitting have a bearing on which you choose, with the scissors-type being the most costly option in both departments. The disc types are much cheaper to buy, and the clamp-on disc versions are the easiest to fit, taking just a few moments.

The jury is still out on the shavers – all we can do is wait for reports.