

PERFORMANCE Propellers

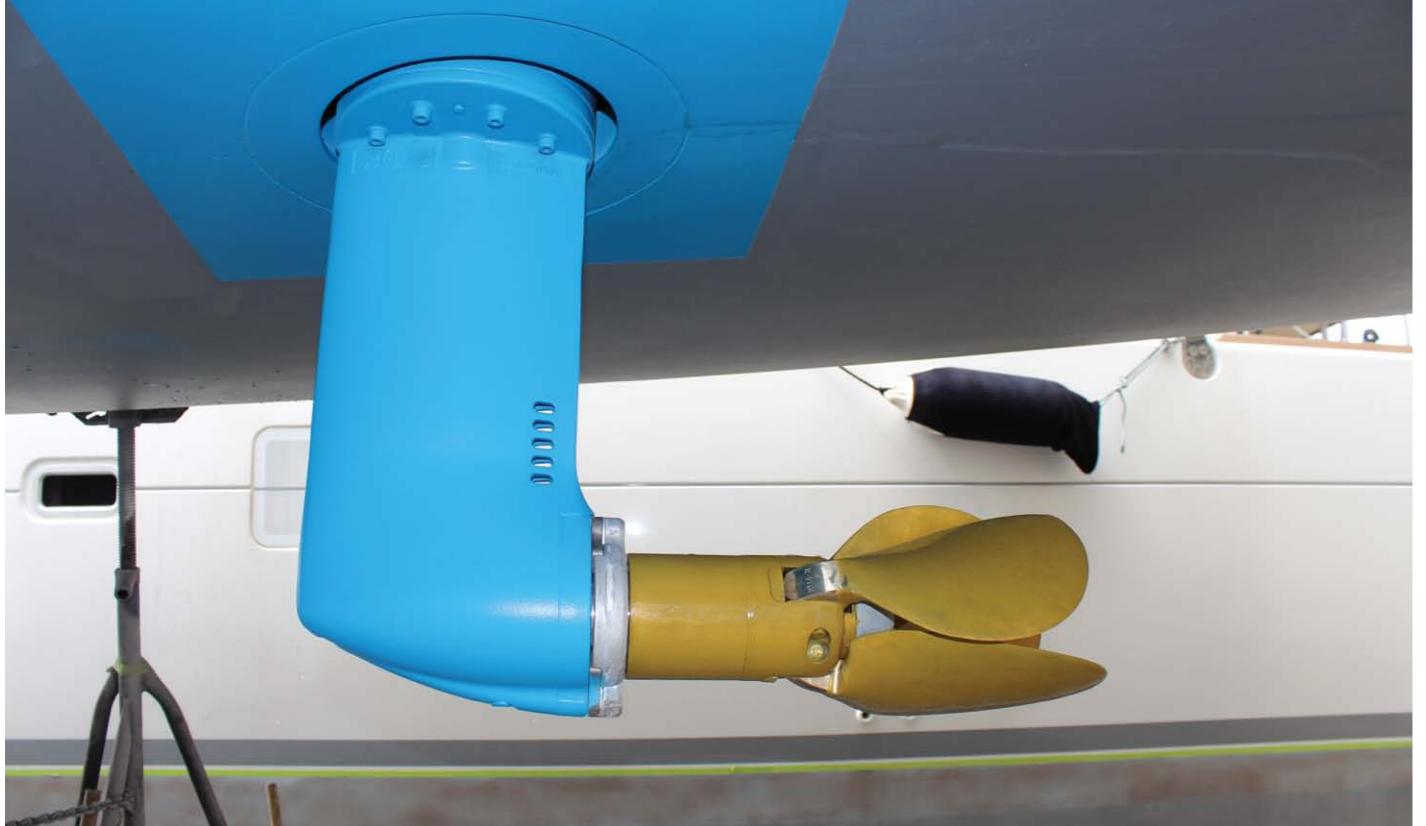
Improving your boat's handling, sailing and not to forget those fuel bills are just some reasons to consider performance propellers, reports KEVIN GREEN.



Performance improvement can be significant with the right set of propellers fitted.
Photo Kevin Green



Danish Flexifold is available in 2, 3 and 4-bladed folding and claim high efficiency for their two-blade-classic model that did prove itself in tests conducted by the UK's *Yachting Monthly* magazine. Photo Flexifold



Life can be a real drag with a fixed propeller but of course catamarans can have two so the downside is even worse, with a cost of 1-2kts. This really adds up on long voyages. The other downside is having to buy two of course and when it comes to paying for those high performance models the cost can be several times that of a fixed propeller. Looking around some the boat yards in Sydney recently while writing another story I saw quite a few worn, chipped and damaged propellers so the owners of these catamarans will have some decisions to make, which this market snapshot will hopefully help with.



top: Electrolysis can be a major risk for saildrives so beware when you fit a new folding propeller in terms of the metal mix. Photo Kevin Green

above: The stainless Austral Slipstream folding propeller fits shaft and saildrives from 12-20 inches on all major engine manufacturers. It's available in two or three blades. Photo Kevin Green

FOLDING OR FEATHERING

Modes of operation varies, with feathering, folding and even automatic pitch available – such as Bruntons Autoprop range which changes its pitch as operating conditions vary. Feathering models align the blades to the water flow when sailing but can of course catch weed, while folding models can be super efficient when it comes to drag but some can jam from marine growth. A primary consideration is the number of blades; which can vary from two to even five, with performance boats often choosing the smaller number and the lightest material. Locally there is a good choice of Australian made models from companies such as Austral Propellers, Seahawk and Hydralign who offer performance and cruising models.

HANDLING UNDER POWER

The bugbear for any kind of folding propeller is how it actually works under power and often going astern can be compromised. Many modern propellers have the ability to rotate the leading edge of each blade according to the direction, so for example the Seahawk Autostream self-feathering model rotates its three blades 180° when changing from forward to reverse, giving the same efficiency in both directions. However on designs where the leading edge becomes the trailing edge, reverse power can suffer and then so

can stopping ability; an important facet of marina handling. Prop walk, where there is a bias to port or starboard is a common monohull characteristic but negligible on twin screw catamarans as the engines are installed so that the propellers counter-rotate. Another power factor is the angle a propeller operates at, with the horizontal sail drive cited as getting the best out of propellers rather than the acute angle found on shaft drives.

WHAT TO LOOK FOR

The number of blades can indicate how much power or thrust a propeller generates but also affect vibration, with four blades often cited as giving a smoother ride than a three but there are exceptions to this rule and tuning is important. Avoiding the common problem of over or under revving the engine is best done by consulting experts such as Proptech in Sydney who operate a patented Prop Scan computer optimisation system. "The



American PYI's Max-Prop five bladed Whisper generates a lot of thrust while automatically feathering to minimise drag.
Photo Kevin Green





Austral in Sydney supply Seahawk's range including the Autostream self-feathering model shown which fits both shaft and saildrives. Photo Kevin Green



above and right: Brunton's in conjunction with SPW Germany supply the Varifold range that comes in 2, 3 and 4-bladed folding models, offer ultra-low drag. Photo Bruntons



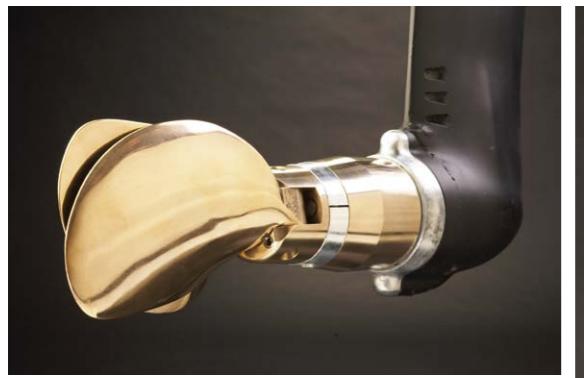
Brunton's Varifold 3 blade (made by SPW in Germany) is a popular choice as it gives a combination of minimum drag with power. Photo Bruntons



The Italian Marine made J-Prop range is supplied by Calibra Marine UK and offers mechanical pitch adjustment for their models that are 2-blade, 3-blade and 4-blade propellers for 8hp to 400hp engines; in both shaft and sail drives. Photo Calibra Marine (UK)



Darglow UK build a range of Featherstream propellers that use a cassette to vary their pitch. Suitable for mono or multi-hulls up to 55ft the come in 12-20 inch diameters with 3 or 4-bladed models for both shaft and saildrive. The company offers discounts for cat owners buying two props. Photo Darglow UK



Brunton's Autoprop automatically varies its pitch depending on operating conditions and the sail drive model is ideal for catamarans. Photo Bruntons

Disc Area Ratio calculates the area of the blades in relation to the circle it makes while turning, so is something to be aware of when choosing a propeller," advises Colin Laing from Proptech in Sydney. Typically motor cruisers will have a higher ratio than a propeller made for yachts – which use them as auxiliary power. Tuning may include adjusting pitch and even reshaping blade sections which can reduce vibration, improve fuel economy

and correct engine loading; the latter a common problem due to lacking tuning. Some models can be adjusted such as the PYI made Max-Prop '4 Blade Fast' Variable Pitch (V.P.) which has external pitch adjustment, making it easy to fine tune with the vessel in the water.

For racing boats and smaller cruising boats two blades may be best, giving minimum drag. The original Max-Prop was designed in the early 70's for the high tech race boat market and Gori's

two blade model offers an ultra smooth folded profile favoured by racing sailors. A common characteristic of two bladed models is a thud or similar vibration as the water flow pressure changes between the relatively wide 180° angle gap across the blades. But this can also be affected by keel configurations.

Material used includes the traditional niral bronze, stainless, aluminium mixes and even titanium. Kiwiprop uses toughened plastic and Italian J-Prop use

aluminium alloy. High-tech engineering company Ewol from Italy offer titanium models for increased strength and reduced weight. Hydralign smelt their own propellers in Sydney in aluminium-bronze and 316 stainless steel – which allows thinner blades – and ensures long life and dependability. Among the leading engine manufacturers Volvo make their own varieties which I viewed during the Sydney Boat Show. The slightly hooked shape Volvo favour is claimed to give better performance under power than symmetrical blades. Yanmar favour Gori but this doesn't preclude using other specialist propellers. I've used Gori on many yachts and find its overdrive feature – found on its three bladed model – of changing pitch to lower RPM useful for economical cruising.

Walking around Noakes Yard one day I saw a few very worn anodes and in Sydney City Marine I was amazed to see a relatively new catamaran with major electrolysis throughout both



above: When fitting out a new catamaran there's a wide choice of performance propeller options but some may be more suited to the angle of a shaft drive than that of sail drive, so do your homework. Photo Kevin Green



Ewol's prize winning titanium feathering model can be micro adjusted to maximise engine revs while offering a high performance under sail. Photo Ewol Italy



Ewol offer special blades for multihulls (Hi-Speed blades) to avoid unwanted self-pitching of props when the multihulls are at high-speed during sailing. Photo Ewol Italy

saildrives, which prompted me to contact metallurgy specialists Logix Group for a chat. "Electrolysis can occur quickly so is a constant hazard and something that can affect new fixings including propellers, so proper installation and checking of sacrificial anodes is essential," warns Jessica Gatt from Logix Group. These guys consult on top boats including *Wild Oats XI* and

regularly come across severe cases, so beware when fitting your new propellers that the installation is checked.

Using plastic blades as Canadian based Kiwiprops do is a clever way of avoiding metal fatigue, at least on one major component. "Also the ability to quickly replace a damaged blade at low cost underwater when cruising is

a strong reason to fit our models with sacrificial blades," says John Blundel from Kiwiprops

COST FACTOR

Fixed bladed models can cost hundreds of dollars but the performance propellers generally cost thousands, so the difference is significant. Catamaran owner's requiring two propellers means



Danish Gori is a popular brand as it's recommended for Yanmar engines and distributed locally by Power Equipment which offers the full range of 2, 3 and 4-bladed models calibrated precisely for Yanmar and other engines. Its two bladed racing model is ultra low drag and its unique overdrive changes its pitch. Photo Power Equipment

cost is a major factor so it pays to shop around and bargain. Darglow UK told me their Featherstream range is discounted for catamaran owners, for example. Fuel saving can be an important cost factor for larger vessels. "Cat owners invariably run on one motor when travelling any distance when

cruising to save fuel so replacing fixed props will dramatically reduce drag on the non-operating motor and improve cruise speed and fuel consumption," says John Blundel from Kiwiprops.

Italian made Ewol claim fuel savings is a significant factor in their high-tech



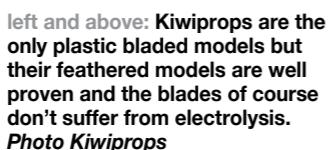
models via an outer Micrometric Pitch Setting Device allowing the precise inclination of blade with angled steps of 0.25°, corresponding to variations of about 30-50rpm at max throttle. It was interesting to read Nigel Calder's article in Australian Yachting which showed that fitting a fuel meter – as most



left: Sydney made Hydralign claim the largest range of feathering propellers in Australia – offering 2, 3 and 4-blades, ranging up to 36 inch diameter, including specialist ‘aperture’ models for classic yachts. *Photo Hydralign*



The Hydralign ‘aperture’ model is ideal for rudder inserted propellers and comes in 12-19 inch diameters. *Photo Hydralign*



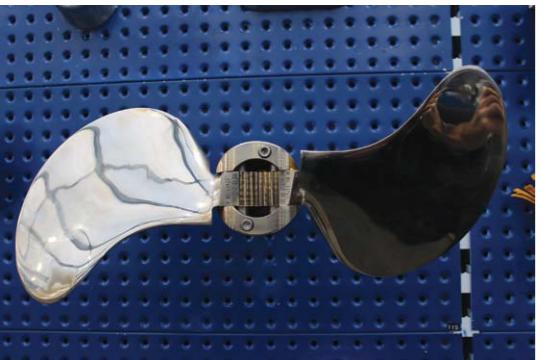
left and above: Kiwiprops are the only plastic bladed models but their feathered models are well proven and the blades of course don't suffer from electrolysis. *Photo Kiwiprops*



The Volvo sail drive folding model is designed for ultra low drag; important when there's two of them. *Photo Volvo Australia*



Regular maintenance and replacement of anodes is important to combat electrolysis.



Volvo range of folding propellers comprise 2, 3 and 4-blade models for both shaft and saildrives; and of course are built specifically for their engine gear ratios for maximise performance. *Photo Kevin Green*

motorboaters do – was one of the best ways to optimise using your engine/propeller usage as it showed the best consumption and speed combination. Maintenance can be another costly issue with folding propellers and I've experienced jammed or misaligned blades caused by marine growth, so regular inspection is needed, including greasing and checking bushes.

VALUE-ADDS

Renewable energy from propellers is being studied by some manufacturers including Ewol. Italian made Ewol props give the possibility to recharge the

boat's batteries (when not in feathering position) and are now already used in some electric sailing boats. On the other hand, engine manufacturers vary in requirements about locking drive shafts to avoid gearbox wear, so read the fine print carefully.

Having snagged a few lines in my time, including in remote locations, rope cutters are a useful accessory to consider when fitting new props. So ensure they will work with your chosen propeller. Noise reduction is another value-add that models such as Varifold claim. Noise and vibration reduction are achieved by Varifold using computer modelled CNC blade design and helical pitch distribution, including pitch reduction towards the blade tip. This is intended to reduce cavitation and, in combination with the skewed blades, lessens noisy pressure pulses against the hull says the Italian manufacturer.

SUPPLIER LIST

- www.australpropeller.com.au
- www.bruntons-propellers.com
- www.calibramarine.com
- www.darglow.co.uk
- www.ewoltech.it
- www.flexofold.com
- www.gori-propeller.com
- www.hydralignprop.com
- www.kiwiprops.com
- www.logixgroup.com.au
- www powerequipment.com.au
- www.proptech.com.au
- www.pyiinc.com
- www.seahawk.com.au
- www.spw-gmbh.de

TECH TALK

DAR – Disc area ratio that describes the bladed area of a prop

Feathering propellers – align with water flow in neutral

Folding propellers – fold into various shapes to minimise drag

Pitch – angle of blade

Hand – e.g. a right-handed propeller spins that way when viewed from behind.

Nibral bronze – A mix of nickel, bronze, and aluminum