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CAPTAIN'S LOG
STEVE BURTON ABOARD MY HOPE

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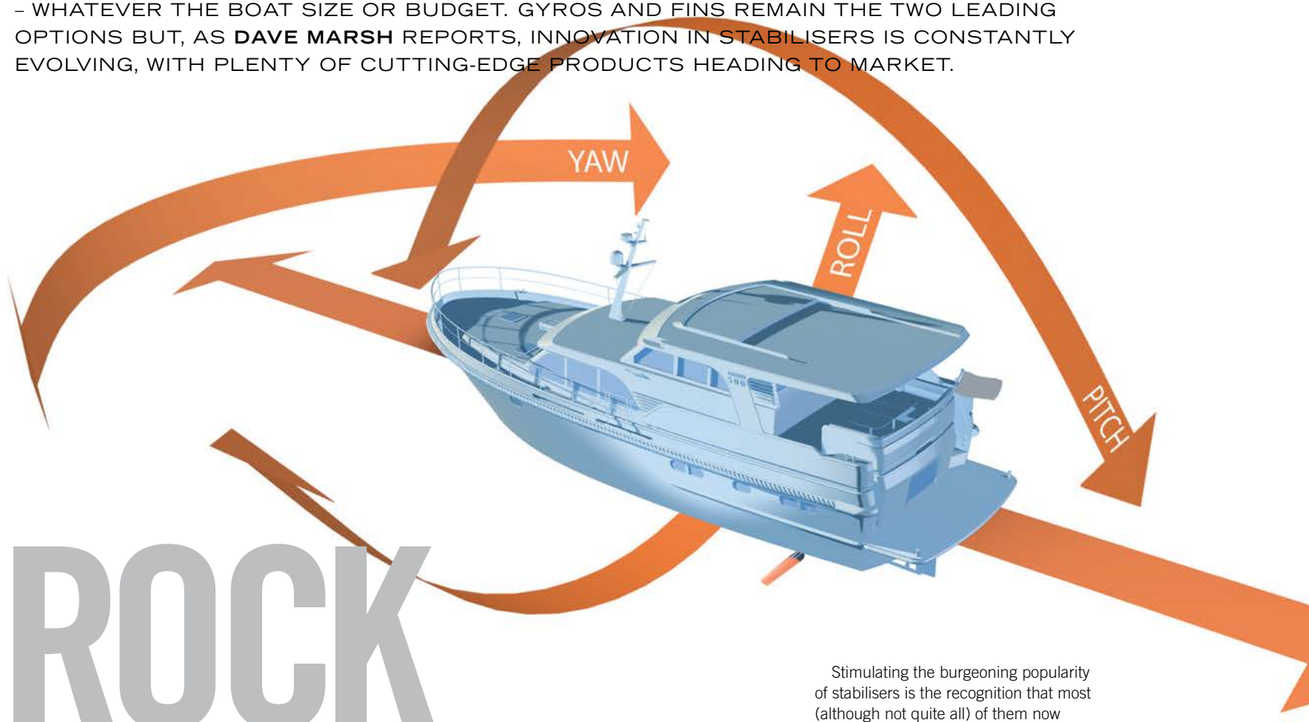
THE POPULARITY OF STABILISING SYSTEMS IN RECENT YEARS HAS BEEN MET BY ADVANCES IN TECHNOLOGY THAT ENSURE OWNERS HAVE A FASCINATINGLY WIDE RANGE OF CHOICE WHEN IT COMES TO MAKING THEIR BOAT STEADY AND SAFE ON THE WATER – WHATEVER THE BOAT SIZE OR BUDGET. GYROS AND FINS REMAIN THE TWO LEADING OPTIONS BUT, AS **DAVE MARSH** REPORTS, INNOVATION IN STABILISERS IS CONSTANTLY EVOLVING, WITH PLENTY OF CUTTING-EDGE PRODUCTS HEADING TO MARKET.



ROCK STEADY

Do you remember the days when bow thrusters were considered an indulgence, only deemed necessary on the biggest boats? How times have changed. Now it's not unheard of for 20-foot sportsboats to have these handy helpers. There's a similar change going on with stabilising systems. In the last few years, we've witnessed unprecedented technological advances in the field. Nor is it just the usual full displacement and semi-displacement benefactors that are fitting stabilisers in increasing numbers. Little by little, our big planing cruisers have become increasingly corpulent and top-heavy, a change driven by the demand for voluminous accommodation, with hefty additions such as fixed hardtops adding considerable windage as well as weight aloft. The consequence is that even fast boats that develop dynamic stability at speed can benefit significantly from stabilisation.

Stimulating the burgeoning popularity of stabilisers is the recognition that most (although not quite all) of them now also work at rest. Hey presto, no more spilled Martinis when you're anchored. Comfort may be the big selling point, but in this writer's experience the huge improvement in onboard safety remains an underrated benefit, and not just on a towering Nordhavn crossing the South Pacific. It is so much easier to control any boat effectively in rough weather when it's not lurching from side to side, especially if your technique is to steer around the most terrifying lumps. And passengers do so appreciate not having to deploy crampons to make it safely across the palatial handrail-free zones that some of our contemporary saloons have become.

Time was when we only had a simple twofold choice between fins and gyros. Whilst these two principal systems have undergone huge improvements, they have also recently been joined by at least five other systems, some of which we have been fortunate enough to test, while others are still in the development stage. No single system has all the answers – they are too diverse for that – but hopefully our roundup, analysis and hands-on test experience will help you decide which system is best for you.

GYROS

The principle difference between gyros and fin stabilisers is the nature of the stabilising energy they generate, and the way it can be harnessed. A gyro uses a phenomenon called precession to generate its energy. When a spinning gyro flywheel is pushed off its vertical axis, it generates an angular force (torque) that acts (in simple terms) at right angles to the movement of the gyro. The gyro's magic trick is that it is the roll of the boat itself that makes the gyro precess and produce a corrective heeling force that acts in the opposite direction to the roll. It's simpler to observe than to unravel the physics involved, and demonstration videos can be easily found online.

Naturally, the gyro can only move so far, so once it reaches the end of its travel, it is unable to produce any more stabilising energy until the boat starts to roll in the other direction and the procedure is reversed. By contrast, stabilising fins will continue indefinitely to generate hydrodynamic lift (and hence a corrective heeling force) as long as they are moving forwards though the water.

Whether this defining characteristic is a limitation depends on the size of your gyro-stabilised boat, its speed, the sea conditions you want to overcome, and the size of your wallet. If you have a superyacht-sized hull to play with, and super-sized pockets, it is theoretically possible to install enough gyro power to deal with virtually any sea state. On sub-superyacht size cruisers though, it's generally not financially viable or physically possible to cram in that level of gyro power. That manifests itself as a tailing off of effectiveness as the speed of the boat increases and the sea state worsens. Typically, on all the sub-30-metre mainstream flybridge cruisers I've tested, the effectiveness of the gyro starts to tail off as the speed climbs above 10 knots or thereabouts, and I've yet to test a planing boat where I can feel a gyro's stabilising effect above the high teens.

Set against this limitation, the gyro has a long list of plus points. In my experience, they are outstanding at rest or when a boat is moving at low speed where they react faster and more smoothly than fins. Their internal installation throws up fourfold safety credentials: there is no risk of getting tangled up with a net or worse, no danger of damage from a semi-submerged container, no risk of grounding, and big boat skippers won't be inclined to turn a gyro off when there are swimmers around, as they might be with big zero-speed fins.

Although strictly speaking the extra weight of a gyro will add some minuscule drag (for example, the Azimut 72's Seakeeper 16 adds 996 kilograms to its 53,000 kilograms of loaded weight, only two percent) that will almost certainly be outweighed by the boat's smoother motion through the waves. Gyro installation is typically easier than fins, mostly because gyros can be installed anywhere on the boat, the exception being boats subject to high G-forces which may require the gyro to be aft of the longitudinal centre of gravity. Retrofitting a gyro is far easier because it doesn't involve puncturing and reinforcing the hull structure, and gyros can even be mounted away from a boat's centreline.

FAST & STEADY
Top: The Azimut 72 uses Seakeeper's model 16 gyro; A Seakeeper 5 on a Princess 43 shows just how compact small gyro stabilisers are; Seakeeper 3DC is (currently) unique in its ability to run off battery power alone.

Because angled fins generate a degree of sideways force, if they were sited aft they would pull the stern from side to side; this is why they are sited amidships, to minimise yaw. So when it comes to noise, a gyro's potential advantage is that it can normally be located in a heavily sound-insulated engine room, rather than in the vicinity of the owner's archetypal midships cabin. Underway, that's no big deal, but moored in a quiet anchorage, come bedtime the swooshing of big zero-speed fins has the potential to disturb the owner.

Gyros can also have a profound effect on mooring in challenging conditions, as I discovered even in the confines of a marina. With Seakeeper's model 5 gyro engaged, my Princess 43 test boat became an ultra-rigid platform that was easier to move around on, and hop on and off. That's going to be an even greater benefit on joystick-controlled boats, particularly pod-drive craft where enthusiastic joystick twiddling can cause a boat to gyrate and rock around noticeably.

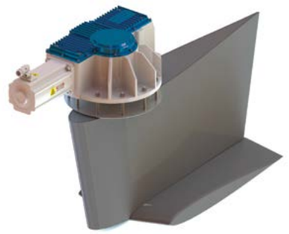
Whose gyro you encounter will depend mainly on how big your boat is. For example, VEEM manufactures a range of three powerful gyros that are more likely to be found in craft around 30 metres long and larger. Mitsubishi makes four gyros suitable for boats weighing between approximately 10 and 60 tonnes. Seakeeper has the largest range, six in all, suitable for boats from 10 to (very roughly) 30-35 metres. The American company's latest development deserves a special mention. Outwardly indistinguishable from the Seakeeper 5 (same 358 kilograms, identical dimensions, same US$30,800 price) the new 3DC spins at 6,400rpm instead of the 5's 10,700rpm, and hence generates half of the 5's 13.0kNm of torque. Consequently, the 100-watt gyro control system is fed from a simple 12-volt supply, and the motor itself can draw its 900-watt maximum from a (110-230-volt, 50/60Hz) true sine wave inverter. That is significant because it means that it's now possible to power a small gyro using batteries alone. Ergo, modest boats without generators now have access to stabilisers.

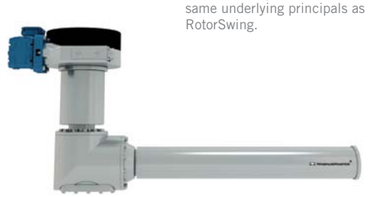
FINS

Turning off the zero-speed TRAC stabilisers on the Princess 98 I was driving at 20 knots in an F7 gusting F8, along the troughs and crests of three to four-metre seas, was an enlightening experience. In the space of seconds we went from a sublime and generally roll-free ride, to a state where the loose furniture was careering around the saloon. It was a terrific demonstration of the ability of a good fin system to transform a boat's behaviour in rough weather, even one as competent as a deep-V planing hull designed by Bernard Olesinski. The point of the story is to emphasise that the principal advantage that fins have over gyros – that fins never run out of energy as long as the boat is still moving – should not be underestimated. Seakeeper typically claims roll reduction of 70-90 percent; not 100 percent, but that does not mean that in the conditions we encountered that a typical gyro installation would have reduced roll by 70-90 percent relative to the TRAC fins' 100 percent. The bulk of a gyro's roll reduction ability is concentrated further down the speed range, which is where they excel.

From a standing start, gyros also take time to spool up to their operational speed. This varies, but it's typically about half an hour to the point where stabilisation can be engaged, and another 10 minutes to full rated rpm. Conversely, simply press 'Go' and zero-speed fins are fully functional. Only you can decide if that's an issue. Personally, I've never been able to pack away my kit, check the oil and water, carry out a safety briefing, and get underway in less than half an hour. However, inside a windswept marina, it can be very agreeable to have instant stability.

So far we've only mentioned zero-speed fins – those fins that are able to frantically flap around when the boat is stationary and consequently provide stability at rest. To achieve this, they are slightly larger in area than the original fin stabilisers, and so in theory have higher drag. However, stationary stability has become so important to most buyers that more versatile zero-speed fins are ultimately likely to eliminate conventional fins. As for drag, just like a gyro, in rough weather the drag of a fin will be offset by the boat's smoother motion. Although that's clearly not true for fins in flat water, anecdotal evidence I've heard suggests that the real-world drag from a fin stabiliser is often less than fluid hydrodynamics would suggest. The most speed I've heard of being lost is roughly two knots off a 30-knot planing boat, but a single knot is not uncommon, and I've even heard tales of a null effect because of the small amount of dynamic lift that an appropriately controlled fin stabiliser can provide a boat with.





FIT FOR A PRINCESS
Above: TRAC fins are used by the Princess 98 motor yacht to great effect. Left: TRAC stabilising fin with an electric motor-actuator; DMS AntiRoll Stabiliser Fin; Magnus Master mechanism by DMS uses the same underlying principals as RotorSwing.

Fins have two other potential advantages. Because a gyro cannot produce its stabilising force indefinitely in one direction, it cannot continuously correct wind-induced heel in the same way that a fin stabiliser can. Similarly, fin manufacturer Sleipner has developed control software for its Vector fins, which provide a 'co-ordinated turn' function, a sensor-enabled function designed to heel the boat in the turns just the right amount for optimum onboard comfort.

There is a debate about the pros and cons of hydraulic versus electric actuators/motors for fins. Electric motors can be relatively compact and extremely fast-acting. However, I've never tested a hydraulic fin system that felt as though it needed speeding up even minutely. As for comparative noise levels, we don't have sufficient quantitative data or anecdotal evidence to pass judgement. If our experience of the hugely varying sound levels we record on boats with identical engines is anything to go by, the quality of the installation itself is likely to be as impactive as the underlying noise of the system. If you buy a production boat, you might conceivably get a choice between fins and a gyro, but don't expect to choose your fin system. So if the electric fin systems do have an advantage, it's most likely to be in the retrofit market, where the (albeit chunky) electrical cables will probably be easier to install than hydraulic pipes.

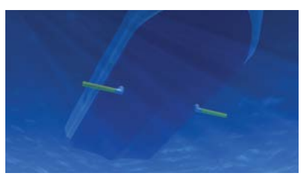
ALTERNATIVES

We ought to mention the incomparably simple stabiliser alternative, the power CAT, which Australians have long been more appreciative of than multihull-shy Europeans. And trans-ocean cruisers often carry flopper stoppers (aka Paravanes) as a trouble-free backup for their mechanical systems. However, there are also now five distinct motorised alternatives to conventional fins and gyros.

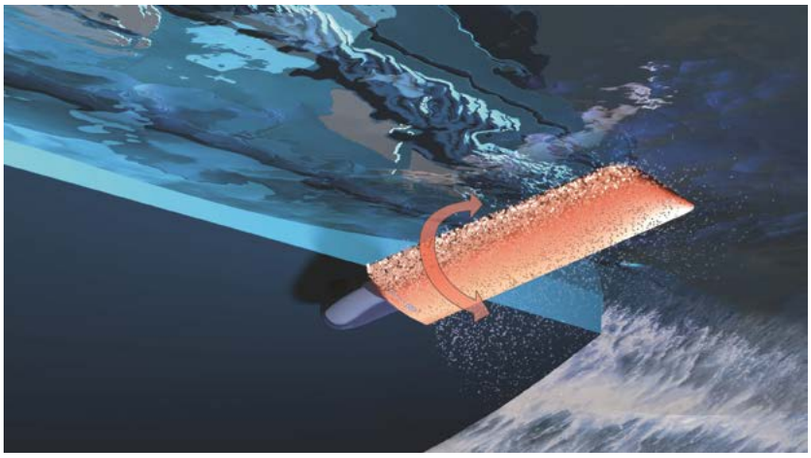
DMS AntiRoll is a fin system with a difference. AntiRoll has two independent shafts, so although it can rotate around its principal axis as a normal fin does, at rest its high aspect zero-speed fins flap like bird wings around the other axis instead of waggling around their shafts as conventional fins do. That should make the zero-speed operation considerably more efficient because the whole of the fin is pushing against the rolling motion. AntiRoll is aimed at boats of 30 metres and larger. Introduced in 2014, the system is relatively new, and the first AntiRoll has been installed on a 37-metre Van der Valk trawler.

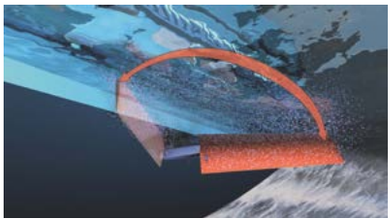
HEY PRESTO, NO MORE SPILLED MARTINIS

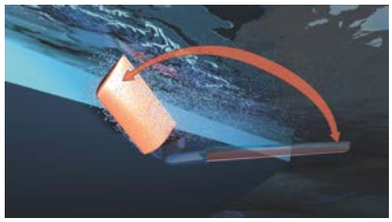
BRAIN WAVE
Above right: Innovative builder Van der Valk uses a variety of stabilising systems including AntiRoll on this 37-metre trawler. Right: DMS AntiRoll Stabiliser Fin articulation. Below: Magnus by RotorSwing is used on the Grand Sturdy 529; Magnus by RotorSwing operational position (left); Magnus by RotorSwing folded position (right).



Dutch company RotorSwing makes the two oddballs of the stabiliser world. The RotorSwing Magnus relies on a phenomenon called the Magnus effect, and uses the lift generated by a spinning cylinder moving through a liquid. The cylinders can be folded flush with the hull, and this has made them particularly popular in Europe where the shelving banks of the inland waterways are sometimes so intrusive that even ordinary short fins would be at risk from grounding. Although they fold, the drag they generate makes them unsuitable for planing craft; displacement and slower semi-displacement boats are their forte. DMS also makes a similar product (the MagnusMaster), which uses the same Magnus effect.

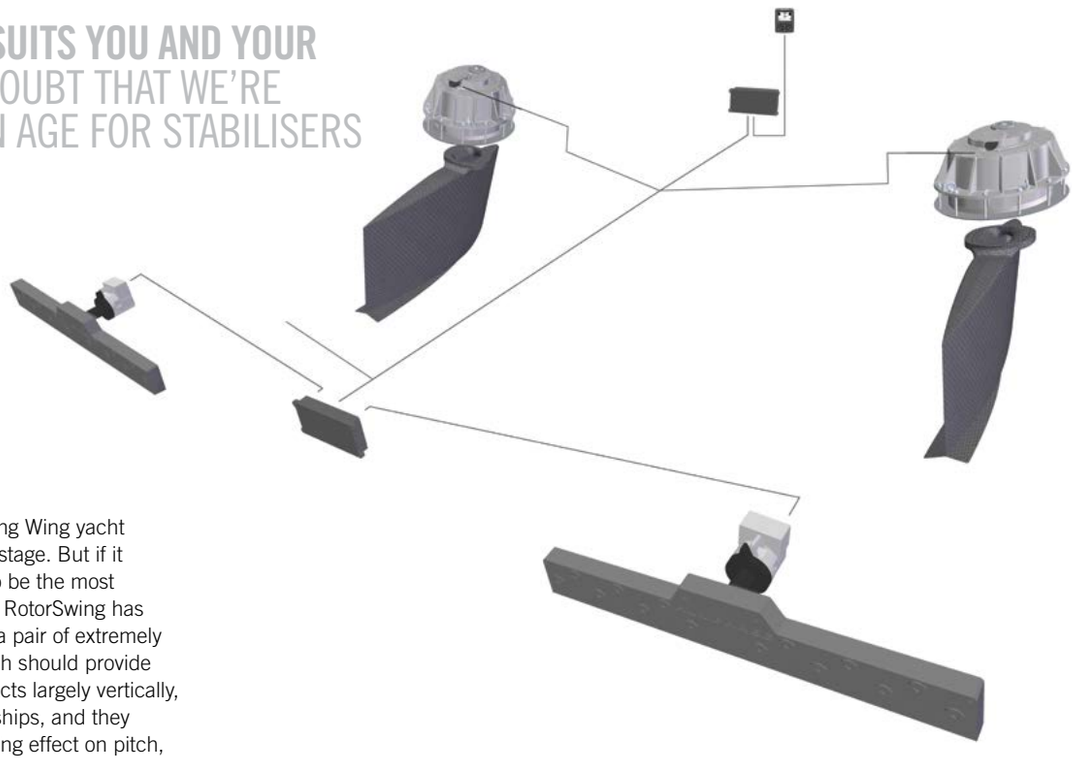






Finally, planing boats and faster semi-displacement boats should always factor in the potential of interceptors such as Humphree and Zipwake. Modern interceptors are very powerful and extremely fast acting: full-up to full-down in around one second. They certainly won't be able to stop a slow-speed Nordhavn rolling around, but once boat speed approaches the high teens, trim and list and pitch can all be controlled to varying degrees, and even integrated to provide a full active ride control that can meaningfully reduce rolling, albeit not to the same degree as a fin stabiliser. With this in mind, there's a new Humphree integrated system that combines its interceptors with its own proprietary electric fins. Naturally, it's possible to combine interceptors with any other stabiliser system – fin or gyro – but the advantage Humphree's new system has is that everything is controlled by a single digital brain.

WHATEVER SYSTEM SUITS YOU AND YOUR BOAT, THERE'S NO DOUBT THAT WE'RE ENTERING A GOLDEN AGE FOR STABILISERS



The even more esoteric RotorSwing Wing yacht stabiliser is still in the development stage. But if it all works as hoped, it could prove to be the most multitalented stabiliser system ever. RotorSwing has replaced its Magnus cylinders with a pair of extremely high-aspect hydrofoils (wings), which should provide excellent lift-drag figures. Their lift acts largely vertically, so they don't have to be sited amidships, and they should also have a beneficial damping effect on pitch, or even be used as a trim control system with the right software. To generate lift for the zero-speed function, the wings sweep back and forth, which might prove more efficient than a flapping action. Because the control heads/motors are fully articulated, RotorSwing is hoping to develop an emergency propulsion and dynamic positioning system, whereby the wings perform a sort of doggy paddle to either propel the craft at low speed in the event of engine failure, or to hold the boat on station, courtesy of a GPS link. It sounds slightly crazy, but then I suspect some people thought spinning cylinders were crazy too.

SURF ROCK
Above, from top: RotorSwing Wing Yacht stabiliser pitch and stabilising control position; RotorSwing Wing Yacht stabiliser deployed for emergency propulsion and dynamic positioning; RotorSwing Wing Yacht stabiliser deployed for zero-speed stabilising; Humphree Integrated system links zero-speed fins with high-speed interceptors.

Whatever system suits you and your boat, there's no doubt that we're entering a golden age for stabilisers. Whether underway or at rest, they have the ability to transform levels of onboard comfort, and to markedly improve safety. In doing so, they could well draw in a whole new boating audience who thought that rock and roll was an unavoidable part of motor boating.