NEWTECH

The latest marine engines and innovations


TECHNICAL
Dave Marsh


NAVIGATION
Mel Bartlett


PRODUCTS
Nick Burnham


Stability at rest has become as important as stability under way

Sea trial: Sleipner stabilisers

FULL TEST *We take to the water in a Princess 56 and a 58-foot workboat to test their effectiveness*

The eagle-eyed among you will spot that this is not the first time we have written about Sleipner's zero-speed Vector stabilising fins. Two years ago we were observers during the stabiliser and engine commissioning trials on a Fairline Squadron 65 (see *MBY* September 2014).

This time we had a different and far more comprehensive experience. We took to sea off the coast of Norway without the distraction of commissioning engineers and spent our time testing two very different vessels (a Princess 56 and a 58-foot workboat); Sleipner treated us to a full factory tour; and during the course of our 14-hour day, we also had Sleipner's owners and technical supremos (Ronny & Thomas & Arne Skauen) with us to answer all our questions.

There's little doubt that there is a battle raging for the boatbuilder's stabilising spend between the manufacturers of fins and gyros. So one of the most significant things that emerged was Ronny's declaration that, in his opinion, the perfect stabilising set-up would be to combine a pair of zero-speed fins (Sleipner, of course!) with a small gyro. It was a refreshing acceptance of the idea that the two systems are so different that they are unlikely to ever offer the very best of everything.

So what did we learn, and how did Sleipner's curved vector fins perform compared with their gyro rivals, err sorry, new best friends? There are four key aspects to consider, and their importance will vary depending on your expectations and the type of boating you do.

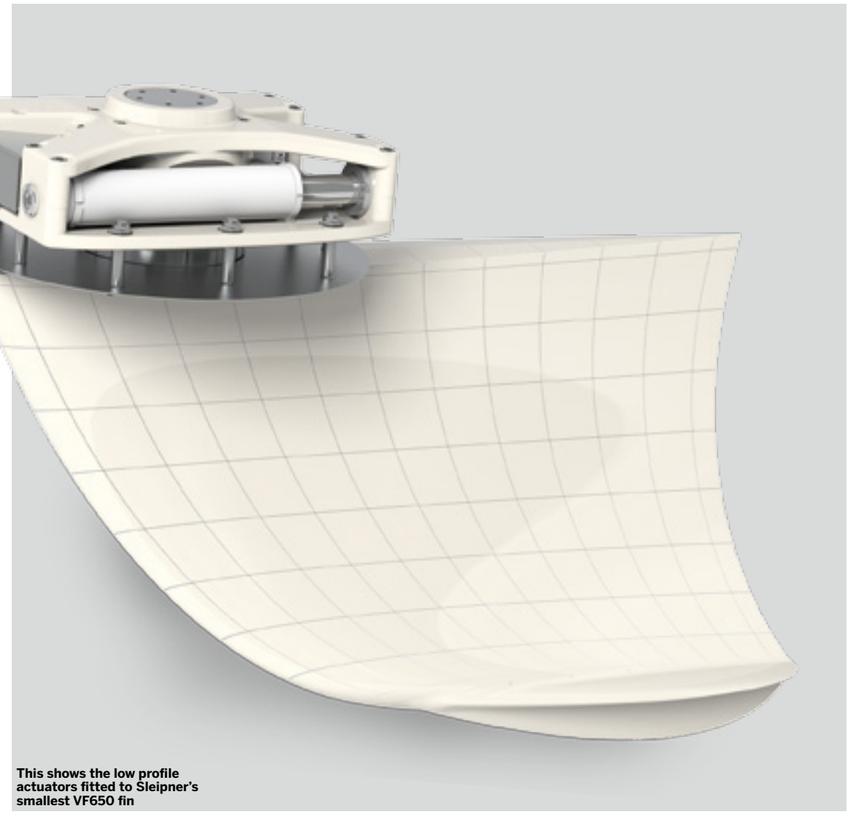
MY TAKE The debate between fins and gyros will continue to rage on but it's clear that both systems still have a bright future ahead as more and more owners are won over by them and their price and size continue to fall. **Hugo**

EFFECTIVENESS AT SPEED

Driving the Princess 56 at speed in breezy conditions immediately revealed one of the advantages that fins have – the ability to correct continuously for wind-induced lean. Gyros cannot produce their corrective stabilising force indefinitely in one direction, which is why gyro manufacturer VEEM openly recommends fitting interceptors to perform this duty.

Sleipner's control algorithms work in conjunction with the gyro sensor to provide what Ronny calls a 'coordinated turn function' – something I call a 'neutral G' turn. In other words, the system controls the heel in the turns so that your body – or even your precious gin and tonic – does not fall towards the inside of the turn, nor conversely does it get forced outwards uncomfortably. And it really does work as it should.

This coordinated turn isn't just great for comfort though, it's actually indispensable for the boat's proper functioning. Unlike gyros, it doesn't really do to switch off and lock your fin stabilisers while travelling at speed on a boat like the Princess 56. It's fine in a straight line, but what you don't want is two huge fixed keels (which is effectively what locked fins comprise) fighting the boat's natural movement in the turns; when we did this, the Princess would turn flat or even lean outwards and misbehave a little. The message is; if you have big zero-speed fins, you really need to run them continuously under way. Of course, only lovers of unnecessary rock'n'roll will find this an impediment.


This shows the low profile actuators fitted to Sleipner's smallest VF650 fin

Another bonus is being able to fine-tune the Sleipner fins, either increasing their response or softening their reaction to rolling motions, to suit the boat's behaviour and the owner's preferences. If it sounds contrary – surely the complete elimination of roll is what's required – then take my word that an over-reactive fin in particular can produce an uncomfortable ride, like a car with too stiff a suspension set-up. So it is good to have this extra control.

I wish I could tell you more about the comparative effectiveness of Sleipner's uniquely curved and very slippery looking fins. However, although the science that underpins their functioning is undeniable, without the dream test scenario of identical boats pitched back-to-back and fitted with competing fin systems, it's impossible to judge how much extra efficiency and/or reduction in drag they provide, or how they interact with any particular boat compared with their rivals. However, like all fin systems, the most significant advantage they have over gyros is that, as long as your boat is moving forward through the water, they will continue to generate the hydrodynamic lift that's needed to keep your boat upright. On the other hand, when the rams on a gyro have reached the extent of their travel, a gyro cannot produce any more energy until the boat heels in the other direction and the process is reversed.

This is significant because it is to all intents impossible to pack in enough gyro power into a sub-superyacht sized boat to cancel the rolling effects of all sea states, particularly as the speed of the vessel increases, and I've not yet tested a mainstream planing boat where I could feel the gyro's stabilising effect above the high teens. In contrast, the hydrodynamic lift generated by a fin is proportional to the square of its speed through the water, so a rise from say 17 knots to 24 knots would double the lift from the fins. If you want to stay bolt upright at any speed, in nigh on any sea state, fins are the only answer.

NOISE

Despite our experience with Sleipner's fins, noise remains a difficult topic to nail down. Although at arms length I could just about hear the two exposed hydraulic rams in the actuators pumping back and forth while the 58-foot workboat was stationary, even with the engines switched off my sound meter couldn't detect any increase above the irregular noises made by the waves on the hull. On deck, I could hear the gentle swooshing of the fins as they reached the end of their stroke and disturbed the water near the surface, but nothing whatsoever from below decks.

Under way, it's a different story. On our Princess 56 the hydraulic actuators were buried beneath the cabinetry in the owner's cabin, so it's no surprise that no noise could be heard at all. Whether either or both of these fin-related sounds could be heard lying in bed in a silent anchorage is difficult to say. The advantage a gyro has is that it can normally be located in a heavily sound-insulated engineroom, although in theory, like any piece of rotating or reciprocating machinery, it has the potential to generate structure borne noise. Given that both systems will be running off their generators, the night-time noise from that piece of equipment is likely to be the deciding factor.

Over the years, I've recorded greatly varying sound levels on similar boats with identical engines – up to 10dB(A) in extremis. So with both gyros and fins, the quality of the installation and the extent of the soundproofing is likely to prove as important as the underlying noise of the system itself. Unless you have a

Our Princess 56 in slings, showing the unique curvature of Sleipner's Vector fins

matter of designing the structure and its surrounding space with retrofit in mind, and leaving conduits for the wiring. The more forward thinking boatbuilders have already started to do this, but not all are so considerate.

EFFECTIVENESS AT REST

Stability at rest has become a big issue. Whichever system you chose, or have chosen for you by the boatbuilder, it's important to realise that neither gyros nor fins have an unlimited capacity to reduce roll at rest; given a tall enough wave or set of waves, both will eventually run out of steam simply because when the rams on a gyro have reached the extent of their travel, or a zero-speed fin reaches the end of its paddling motion in a particular direction, they cannot develop any more stabilising energy until the process is reversed.

When it comes to stabilisers, size really is important. If stability at anchor is your overriding consideration, and you have deep pockets, it's always worth asking the question: "Could I fit the next model up?" because it will make a noticeable difference. The data we recorded on our Princess 56 (see Fig 1 Roll Comparison 1 small waves, and Roll Comparison 2 larger swell, above right) reveals two things. In small waves, Sleipner's flapping fins (its smallest VF650 model) damped down the roll considerably, to the point where it became no more than an agreeable suppleness in the motion of the 56. The data also confirms the idea that, if a big enough swell comes rolling through (see Comparison 2) the fins will still damp the motion, but they cannot eliminate it entirely.

However, if zero-speed stability was the only issue, I'd go for a big gyro. And that's principally because of the way a gyro generates and harnesses its energy. Because gyros from the likes of Seakeeper and VEEM are actively controlled by their rams to maximise their efficiency and provide safety stops at the end of their travel, there's sometimes a misconception that these rams actually force the gyro to precess in order to generate the angular torque that provides the corrective heeling force. In fact, the gyro's talent is that it is the roll of the boat itself that makes the gyro precess and hence produce the counteractive force. And because they are reacting directly to the boat's roll, gyros act extremely quickly and extremely smoothly. I'm convinced that their distinctive operation produces a similarly distinctive stabilising action that feels different to that of zero-speed fins, and it manifests itself as a more resolute and yet more comfortable motion. It's doubtless why Ronny's perfect stabilising set-up would include a small Seakeeper gyro. Fortunately, even though they both use gyro sensors, the two systems would not confuse each other, they would simply enhance each other's capacity.

PS For the record, my dream set-up would be; Seakeeper gyro, Sleipner Vector fins and Humphree's ACTIVE ride control interceptor system. Now, where was that form for remortgaging the house? MBY

Contacts www.sleipner.no; www.cmcmarine.com; www.seakeeper.com; www.veemgyro.com; www.humphree.com

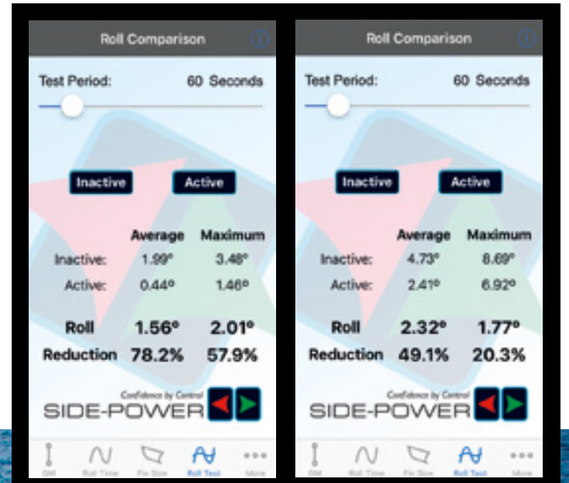


FIG1: On the left is roll comparison 1 in small waves; on the right is roll comparison 2 in a larger swell, as recorded on board the Princess 56

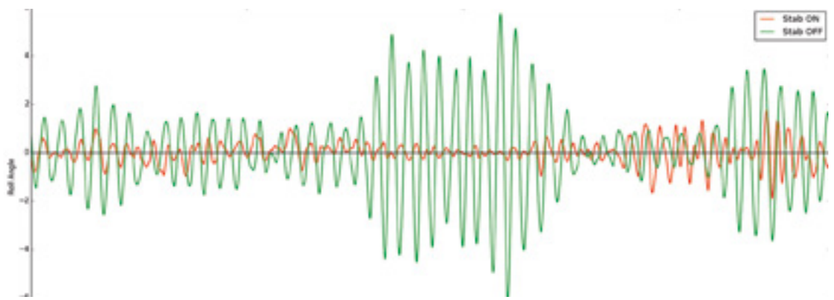
mate with an identical boat, you're unlikely to find out exactly how quiet any particular system is at night.

INSTALLATION

When stabilisers are designed and installed at inception, neither system is problematic. Sleipner's beautifully engineered actuators are exceptionally low profile affairs which will delight the designers and boatbuilders who are trying to hide them away, typically at the back end of the midships owner's cabin. A gyro is far bulkier than the equivalent hydraulic pack that powers Sleipner's fins, but then a simple rectangular gyro box is practically all there is. Installation is very straightforward, and it's normally a doddle for a designer to adapt and reinforce the longitudinal structure to provide landings for the gyro's feet.

Retro-fitting is a different matter. Gyros are almost invariably easier to retrofit, although if the available space is constricted and the existing structure is disobliging, even a simple gyro can take a lot of man hours to install. Fins with electric actuators, such as Stabilis Electra from CMC Marine, have the potential advantage of electrical cables that are easier to run than hydraulic pipes, but even CMC's smallest actuator is way taller and bulkier than Sleipner's sleek actuators, so the trade is definitely not one-way.

Given the burgeoning popularity of stabilising systems of all stripes, it's surely about time that all boatbuilders designed and engineered their boats for possible retrofit. For fins that would involve no more than constructing boats with the necessary hull reinforcement where the actuators would live, and leaving conduits or space for pipe and cable runs. For gyros, it's simply a



Data logging from a test on Sunseeker's Manhattan 65

One of our two test boats was the Princess 56