A Quick Look at Yacht Stabilizers

by Glenn Hayes

If you've ever battled seasickness, or watched helplessly as someone else suffered in misery, you know that being on board a rolling vessel is not necessarily a pleasurable experience. But there is a solution, one that is not the result of a yacht's design but rather the technology on board.

In recent years, stabilizer control systems have evolved into sophisticated and responsive mechanisms that can reduce vessel roll by as much as 90 percent. This is a vast improvement over earlier systems, which were more reactive than proactive and only worked while the vessel was under way. Those systems were more of a roll dampener than a stabilizer, reducing rolls to less than half the roll without stabilizers.

The improved performance of modern stabilizers can be directly attributed to newer technology and advanced designs from all the major players in the market. Some of the earliest stabilizers were comprised of anti-roll tanks within the hull that were filled with water. The water was moved around in the tank to counter the rolling motion. These tanks were heavy and had to be installed at the time of the build, they added to displacement and were far from efficient. They proved more effective on larger commercial vessels and were not really a viable or practical solution for the yachting world.

Until recently, the most popular stabilization system for use under way was comprised of external fins that would move up and down, creating a counter force to the motion of a roll-inducing sea. Working much like an airplane wing, they proved most effective with water flowing across the surface of the wings, but when the vessel slowed or came to a stop, they lost their stabilizing ability and their drives could not keep up with the motion of the rolling vessel.

Now, newer technology and algorithms in the control units driving these fins and their hydraulics has increased their capability and efficiency. Even older fins can be retrofitted with newer controls. The hydraulics and systems driving the fins are smaller in size and can be installed easily in locations previously impossible, allowing their use on smaller vessels and as a retrofit on older yachts.

But roll stabilization while under way is only part of the problem. With the increase of larger yachts cruising the major yachting destinations and their respective marinas filling to capacity, yachts are finding themselves at anchor with greater frequency and a demand for stabilization while sitting still has developed. The charter industry is now eagerly seeking out vessels with newer technology at rest or zero-speed stabilizers, passing over yachts that lack them. Charter clients are becoming savvier and are asking for vessels equipped with this technology. They want to be on the yacht that will allow for a luxury experience sans discomfort.

Early on, smaller yachts used at-rest stabilization technology quite effectively. These earlier systems (known as Flopper Stoppers) were comprised of what were basically bags hung in the water, on opposite sides of the vessel from booms or outriggers. Although they worked well, it is a system that is far from a practical solution for larger yachts. More recent innovative designs have become practical answers from major players in the stabilizer industry — including designs from Naiad Marine Systems and Quantum Stabilizers.

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One issue with the older fin stabilizers was that they were not big enough to be effective when the vessel was at rest, they needed more surface area to do the job. Bigger fins would solve the problem, but then there would be higher drag while the vessel was under way. This would reduce efficiency and effectiveness at speed and would put the fins outside the beam restrictions of the vessel.

The solution was to have a secondary fin extend out from the main fin, creating a larger surface area and allowing the fin to be the right shape to provide maximum stability. Now, with the newer systems, the larger fins pivot in opposite directions simultaneously. With precise and almost instantaneous movement, the force of the seas creating the roll is counteracted and the vessel remains steady. When the yacht goes under way again, the outer fins retract and take on the properties of a more traditional fin system that rely on water flow across them.

The stabilization principle these systems use while the vessel is at rest is the same as bracing with your paddle in a kayak, just in a larger and faster, more efficient manner. As you push down on the paddle blade, it forces the kayak in the opposite direction. These at-rest stabilization systems have proven very effective and are responsible for almost no roll in seas typically found in most anchorages. This is even true with following or quartering seas.

Recent technology has also been developed to minimize rolling while running at slower than cruising speeds, such as trolling speeds for larger sportfishing yachts. This has been accomplished with the aid of an old principle known as the Magnus effect. Simply put, lift is created when rotating cylinders are placed in water. Developed as a retractable system, this technology of retractable cylinders on either side of the yacht is one of the next-generation solutions for roll management while at rest, drifting or running at low speed. Once the vessel goes beyond cruising speeds in the single digits, the cylinders retract and a fin system takes over.

With all of the developments in the technology involved in stabilization, it has not only become a valuable option for the megayacht industry but many would argue that it is an absolute necessity. Yachts are spending more time on the hook, and as a result, there is no need for spilled drinks and uncomfortable guests. The future looks like smooth sailing with stabilization systems.

Glenn Hayes is a freelance photographer and writer living in West Central Florida. A second-generation professional photographer and journalist, he specializes in marine photography and writing. He can be reached at www.hayesstudios.com.

Gyroscopic Stabilizers

Unlike fin or cylinder applications, which require external appendages, gyroscopic stabilizers like those from Seakeeper use an internal gyro with a heavy flywheel that spins at high speed. The angular momentum of this flywheel produces a gyroscopic torque that exerts a powerful righting torque to counteract boat roll. Seakeeper units include an active control mechanism that optimizes the gyro's performance over a wide range of sea states and vessel speeds — including zero speed. Seakeeper gyros can be refit in any boat and are completely internal. The company offers superyacht applications in vessels ranging from 100 to 213 feet and recently won a 2011 American Superyacht Forum Innovation Award. "Winning [this award] is a testament to the uniqueness of our product line," said John Kermet, Seakeeper's VP of sales and marketing. "It also highlights Seakeeper's applicability in the superyacht sector, where we've been supplying products since mid-2008."

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