

Superyacht Ratings

BENEFICIAL OR UNFAIR HANDICAPPING?

Superyacht regattas now abound – indeed we are perhaps suffering from an overdose of them. This is shown by reduced numbers and cancellations as the finite available fleet is fragmented among the various ones on offer, both established and upstart. Despite the clear fact that they are fun events, there are – as Dennis Connor once acidly pointed out – no good losers in yacht racing, only many losers and a winner. And the superyacht owner certainly wants to win despite whatever Corinthian ideals or social events such proceedings embody. Who actually is the winner is not so clear outside of one design racing, and so enter the *bête noir* of all superyacht races: the handicap and rating system. Roger Marshall here explains and assesses the varied systems currently in use. Amongst them too there really is no clear winner and another quote likely applies, that of PT Barnum (or Abe Lincoln): “You can please some of the people some of the time, but...” you know the rest!

WITH MORE MEGA SAILING YACHTS BEING RACED THESE DAYS, the question of rating these yachts is increasingly important. Most have similar hull forms, but length, weight and performance differ greatly from yacht to yacht. In the old days, 30-metre plus yachts, such as the J Class, were built to racing rules that dictated a waterline not to exceed 90 feet (27.4 metres). This led to overall lengths around 115 to 128 feet and some of the most graceful vessels ever built. Today very few people want to design racing yachts to outmoded rules that were last used in the 1930s. So what can be done to standardise the handicapping system?

A hundred and forty years ago, five clipper ships, each carrying more than a million pounds of tea, set sail from Foochow to London in what has become known as the Great Tea Race. The prize to the winner was not a trophy, but rather a bonus payment for every ton of tea delivered, with a share of the earnings going to the captain. After 14,000 miles of sailing, the two leaders arrived in London within ten minutes of each other. The third-place vessel was only a few hours behind. Vessels that are this evenly matched over such a long distance don't need a handicapping system.

Today, the finishes of mega sailing yacht races are a very different story. Even over a course of just 20 to 30 miles, the boats often arrive at the finish line at widely disparate times. In a Newport Bucket regatta a couple of years ago, the first yacht over the start line left more than an hour ahead of the next yacht, and it was passed on the second reaching leg by a yacht that had started nearly two hours later. Granted, the handicapping was a little off, mostly because of a major wind shift shortly after the first yacht started. But still, the racing is not what could be called close. A good handicapping system is needed to even the playing field.

Right now there are about 100 yachts that have raced or are interested in racing. These yachts use three different handicapping systems. These include the Bucket regattas, which have especially developed the VPP-based system and have about 80 yachts in their fleet; the Superyacht Cup uses its own system based on the first day's racing, while the St. Barth's Superyacht Regatta uses the IRC rating system.

The Bucket Handicapping System

Jim Teeters, Associate Offshore Director at US Sailing, says handicapping large yachts is very difficult. He calculates the ratings of the yachts that take part in the Newport and St. Barth's Bucket regattas. "It's not easy to put together a handicap system that is fair to many very different yachts," Teeters said. "In fact, it's downright difficult. And it can all be totally screwed up by an unexpected change in the wind." Teeters obtains information about the yachts he rates from the captains of those vessels and from the websites of their yacht designers. He also uses

“Teeters is also very cognizant that the wind can change during a race, throwing a wrench into the handicapping system.”

photographs of the boat out of the water, and any other information that can help to nail down the yacht's hull shape. From this data he builds a set of hull lines for each boat. He then plugs this data into a Velocity Prediction Program (VPP), which predicts the yacht's performance around a race course. The data can also be used to create polar diagrams. With all this information in hand, Teeters can predict how much time each yacht is likely to spend on each leg of the course given a certain wind speed and direction. On the day of the actual race, he gets a weather forecast for the local area from one of the weather services and uses it to calculate the elapsed time on each leg of the course for each yacht. Then, for a pursuit race like a Bucket regatta, that information is used to determine the total elapsed time and ultimately the start time of each vessel.

How good is the handicapping system that Teeters provides? "Just look at the elapsed times for the St. Barth's Bucket," said Hank Halsted, Managing Director of the Bucket regatta. "Teeters is a magician. The boats are so close, it's unbelievable. The first ten boats finished within two and a half minutes, with the first three boats only 25 seconds apart... Right from the first day of the St. Barth's Bucket we had fast, heavy, good racing." Obviously, Halsted is delighted with Teeters' system and the close racing that it enables. Plus, the trade wind was consistent from day to day, allowing the handicapping system to work perfectly.



St. Barth's Bucket



A handicapper's nightmare, different hull configurations with low wetted surface (Morning Glory) and moderate wetted surface (Rebecca) behind. Morning Glory is extremely fast in light winds, while Rebecca is much more comfortable.

Later, by actually observing the performances of the various yachts on the race course, Testers can adjust the ratings to make them even fairer. Testers gave the example of tacking. "If I see that a yacht is taking more time to tack than the program allows," he said, "I can go in and adjust the VPP slightly to take that into account. Some yachts can tack with the headsail only one-third rolled up, while others need to roll it away entirely to tack. If I see that, I can adjust the VMG (speed made good to windward) accordingly."

Testers is also very cognizant that the wind can change during a race, throwing a wrench into the handicapping system. He tries to take this into account as much as he possibly can. "If I get a forecast for 12 knots, I average the peters between, say, eight and 16 knots, so that I cover the range of wind speeds that the yacht might encounter," Testers explained. "The biggest problem I have is a totally unexpected wind shift. As a result, it's very hard to get completely accurate handicapping for a pursuit race."

Testers pointed out that the kind of rating system he does for mega sailing yachts is based on the science of boat performance. Testers should know. He also runs the non-profit Sailing Yacht Research Foundation, which has done extensive research into sailing yacht performance, spending hundreds of thousands of dollars running a systematic series of yachts through towing tanks to get accurate figures. Right now the foundation is looking for additional funding for a new series of tests.

The Superyacht Cup

The Superyacht Cup (see images opposite) uses a different handicapping system from the more high-tech one used for the Bucket regattas. The rating committee hold a race on the first day of the event that counts for only 0.1 points. On the basis of these results, they then adjust the rating for the following day's racing. This same procedure is followed for each subsequent day of the series. Of course, by carefully optimizing your speed around the course on the various days of the series so that you avoid receiving a large handicapping penalty, but still do well enough to stay in contention, you can theoretically win the regatta. This is not cheating under the current system, but it is gaming the system. However, if the rating committee members see you gaming during a race, they can arbitrarily decide to up your rating.

Captain Charles Dwyer of S/Y *Herneke* has participated in many of the Superyacht Cups and thinks that the current handicapping system works fine as long as those who are racing don't demand too much of it. In his view, the Superyacht Cup "is the last bastion of having some plain old fun in large-yacht racing without having to crunch numbers and design new boats". He therefore believes that the rating system should not get "too serious". However, he does suggest that the data from cup to cup be kept on file and factored into the next series. "This would take a little of the guesswork out of the first days of racing," he said, "and in so doing make the finishes a little closer and more exciting for the owners and guests."



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The BI Superyacht Regatta

Held at Porto Cervo, Italy, the BI Superyacht Regatta uses the IRC rating system. This system was developed from the old Channel Handicapping System and is a structure that measures the yachts and assigns them a single rating number. This number is then multiplied by the yacht's actual elapsed time to get a corrected time. There are two types of IRC certificates, endorsed and unendorsed. To get an endorsed certificate the yacht is measured by an official measurer and is physically weighed. For an unendorsed certificate the measurement details are provided by the yacht's owner along with an estimate of the weight.

A Simpler Rating System

A far less time-consuming approach, originally developed by Chick Walsh for events such as the Open House Cup, is now used for several classic regattas. This handicapping rule uses a very simple formula:

$$L + \frac{SA \cdot PF}{D}$$

Where L is the yacht length, SA is sail area multiplied by the rig factor (which takes into account different rig configurations), PF is a propeller factor, and D is a variable that depends upon the hull configuration, loading time and other factors that are difficult to assess accurately.

Is High-Tech Better?

Does going high-tech give a better handicapping result? High-tech handicapping systems are based on a velocity prediction program that enables the speed of a yacht to be predicted over a range of wind speeds and wind angles. Davide Battistin, Ph.D., a research fellow in Italy, has done a lot of work related to VPPs and has some valuable insights regarding their use and limitations. Basically, he said, a VPP can predict the performance for yachts of any size. The main limitation is in the treatment of the sail plan and rig. Although only the sloop rig has been very thoroughly tested for performance prediction, a VPP-based handicapping system (like IMS and the new ORC International) can be effectively used to rate both sloops and ketch/yawl rigged boats. However, you need to adapt an 'equivalent' sloop or ketch for other types of rig. "We have already done this type of work," Battistin explained. "For example, *Mattese Falcon* has been measured and rated under IMS using this method. We find that the biggest problem in measuring very large yachts is that inclining experiments to assess the yacht's stability are very difficult to do."

Computational fluid dynamic (CFD) programs can also be used to predict boat speeds over a range of wind strengths and wind angles. Battistin pointed out that there are many 'favours' of CFD, serving

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different purposes. Inviscid potential flow (panel methods) can assess wave-making resistance, while RANSE (sicout) codes can more precisely assess viscous phenomena occurring in the wake and on the appendages. There are also sea-keeping and manoeuvring codes that can provide valuable information about added resistance in waves and the ability to manoeuvre. The problem with CFD performance prediction, according to Battiston, is one of preparation time and computer time. Both are expensive. At the very top level, CFD analysis is now being used for some VPP studies, but most VPPs use empirical models based on results taken from towing tank or full-size testing.

Dr Battiston had one final comment to make about rating sailing yachts. "I just want to underline the difference between VPP and handicap," he said. "A VPP is an instrument for predicting the performance of a boat in the most reliable way. Handicapping is a system for allowing different boats racing together to have the same probability of winning the race. It is desirable to have a handicapping system that is based on a VPP because this will give the best results. But you must remember that when the yachts in a fleet are very different from each other, it is extremely difficult to rate them all in a completely fair way."

The fairness of handicapping systems is clearly a major concern. In the ideal world, handicaps would be so equitable that yacht racing would be extremely close, depending only on the skill of the sailors. However, all the experts seem to be saying that this idealised goal is exceedingly difficult to achieve, particularly given the unpredictability of wind conditions. Still, there is another, much more achievable goal – convenience. Ideally, yacht owners who want to race should have a single rating for their boat that allows it to sail in any race anywhere in the world. This would avoid reinventing the handicapping wheel for every regatta. By standardising on a single handicapping rule, owners and captains could save a sizable amount of money, time and aggravation. In my opinion, a VPP-based rule offers the strongest scientific basis for this kind of handicapping. Apart from, of course, a case of champagne for the rating committee. (Note: This is required if you want to lodge a protest in the Bucket regatta.)

Roger Marshall

Photos: Roger Marshall, Norma Teasdale and Superyachtart's Caroline Hillier and Brooke Shaw

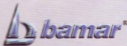
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