Auto-Adjusting Handicaps: What's Best for My Club?

This is an often asked question so we have tried to summarise our usual responses, but first an important aside.

Important Note:

It is not possible to evaluate the effectiveness of a handicap system unless you first state the aims of the system. Without an aim it is difficult to quantify if any criticism is valid or not and/or whether to seek out a better system.

Suggested Aims

1. The HC corrected times of all competitors should be very close together for each race.

2. At the end of a Series the Aggregate Scores for those competitors who are not loaded down with DNFs etc. will be as close together as possible. Preferably to the extent that the first 3 or so places will be decided in the last race.

3. For that Series the handicaps may change but should not just wiggle up and down a little after each race where such wiggles do not reflect a trend.

4. Any competitor whose performance is trending away from their allocated value shall have his handicap altered appropriately. [Note this states "trends" not who has "one good race".] So adjustments are on trend, not by virtue of the value of a single Back Calculated Handicap (BCH).

5. To provide a mathematical system that does not require human intervention/judgement and hence can avoid the cries of 'bias' or 'un fair'.

Comment on Aims.

While first aim seems the obvious aim, in fact it is has not proved very useful for determining the "best" form of handicapping. From experimentation with a variety of handicapping systems it has been observed that the time spread of handicap corrected times approach an asymptote that cannot be further improved. Presumably this is because of the uncontrollable race-to race variability caused by weather, courses etc.

But this measure has been useful for eliminating poor handicap systems even if it has been of little value in determining the "best".

In providing a Measured Performance handicap system, the key word is "trend" (of measured performance). Any system that just provides a knee jerk reaction to a single race is not really considering the "average" performance of a competitor and is little better than rolling dice.

Please see the document 'Handicapping: Two Less Desirable Handicapping Methods'.

Auto Adjusting Handicaps: what's best for my club?

There is no perfect solution for any club. The best is always a compromise.

The systems considered below each develop a handicap in response to the measured performance of each boat when compared to all other boats within the group. They have no *absolute* value and do not interrelate with values used in any other Group or at any other club[1].

It is this measured, relative performance that determines the new handicap, and **not** whether a boat won, came second or came last. Place/penalty based handicap systems do not take into account whether a boat won by 1 second, 1 minute or 1 hour and provide the same handicap "penalty" irrespective. Such systems are good for "rotating" the prizes but are not a measure of performance.

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[1] TopYacht has the flexibility to allow handicap calculations across groups when configured correctly

TopYacht supports two forms of auto adjusting handicapping systems used for keel boats clubs and off the beach clubs.

Weighted Exponential Average.

The formula is very simple: calculated handicap equals three quarters of handicap allocated to the boat for this race plus one quarter back calculated handicap (ie the handicap boat needed to be equal first in today's race). i.e. new handicap = ¾ Allocated handicap + ¼ Back Calculated Handicap.

This system has two advantages and two disadvantages.

- **Advantage One**: if you sail well, your new handicap increases, if you sail poorly your handicap goes down; this happens for each race and is easy and obvious for the sailors to see.

- **Advantage Two:** you only need the handicap for this race and the 'measured performance'/'back calculated handicap' for this race. You need no information about performances in previous races.

- **Disadvantage One**: because the system methodology is so obvious, it is easy for the sailors to cheat and deliberately perform poorly prior to a major race.

Disadvantage Two: it does not provide quite as good handicapping as the weighted running average system.

Weighted Running Average.

The calculated handicap is the average of the weighted, back calculated handicaps (ie measured relative performance) for each of the last four races.

i.e. new handicap = (BCH1 + BCH2 + BCH3 + BCH4)/4.

From a number of tests we have found this system to provide the most satisfactory handicapping over most racing series. This judgment is based on several criteria:

- The tightness of handicap corrected finish times on a race by race basis,

- The fact that a good variety of boats receive podium places within a series,

- The tightness of the series scores for those boats who are in contention i.e. have not lost the series through not starting (DNC, DNF, DSQ etc.)

The Disadvantages:

- Because it is a running average, after each race oldest performance is removed from the averaging process and a new one added. This may result in apparent anomalies were a winning boat could actually have their handicap drop, because the discarded BCH is replaced with one which is lower.

- This system does not work particularly well in short series.

Problems with small fleets

The problem small clubs face is boats sailing on an ad-hoc basis. The opportunity is rare (if ever) to get a fleet-wide comparison of every boat, race after race. This makes the development of handicaps mathematically very difficult.

Appendix 1

Below a screen dump of the standard PHC1 handicapping system as delivered with each virgin TopYacht download. We have found this to be the simplest and most effective system

- If you prefer to use exponential averaging then the same settings apply except you select 'exponential as the method and set the 'gain' to 4.

- If you wish to stop boat's handicap from the drifting too low, then utilise option 16 restrict minimum handicap.

- *Important note*: The options 8 to 20 are **only** available to clubs who purchase the KeelBoat Handicapping Option as part of the license.

The values chosen for PHC1 come from the following observations.

- A boat's relative, measured performance oscillates up and down around an average value on a race by a race basis.

- Such oscillations normally occur within the window of +/- 3 to 4 percent, with a slow deterioration (in keelboats) between cleaning of the bottom events

- Consequently, if a boat's measured performance (BCH) is well outside this window we would consider this an unusual performance and one that should not be allowed to overly influence the ongoing development of handicaps. This determines the value of the "clamps" and "limits".

- While a boat's performance may increase from race to race or decrease from race to race it is most unusual for this to occur for more than three consecutive races. Hence we nominate 4 races to be averaged to produce new handicap. This is outside the window of 3 potential

increases or decreases but is small enough to take into account any actual changes of the boat e.g. new sail, new skipper etc. If you average over a larger number of races any such changes don't ever seem quite to catch up to the handicap.