

Steady as we go

One of the joys of *Seahorse* magazine is its snail mail rhythm – you know it’s been a while since you read the last one, and then one morning it’s on the doormat in all its tactile glory. An opportunity to stop scrolling Twitter and read something. The only downside as a contributor is that the magazine arrives on a Thursday and the deadline for the next issue is the following Tuesday, so it’s hard to digest the previous issue before writing something appropriate for the next, but here goes.

I’ve been intrigued by the column inches produced by *Celestial* winning the Rolex Sydney Hobart Race. Why the fact that a well-prepared, well-sailed, well-designed yacht won the race has produced so much discussion I’m not sure.

It was unfortunate that the crew fell foul of an ORC rule about setting spinnakers and multiple headsails, but that will be resolved for next year. The talk is of ‘clicks’ on their rating, which I assume is shorthand for the third decimal place of the Time Correction Factor (TCF) used to calculate the corrected time from the elapsed time: one click = one-tenth of one per cent of the TCF.

Five clicks for leaving a spinnaker on the dock, three or four clicks for taking some weight out of the bulb. This exchange rate for clicks suggests that 10 clicks (one per cent) is a big deal. I’m not sure it’s really appreciated how much heavy lifting the TCF is being asked to do when handicapping an offshore class.

In the last ORC column we asked the readers to imagine a Farr 40 and a Class40 engaged in a handicap race. Both these types of boats hold IRC certificates, their TCFs under IRC are around 1.153 for the Farr 40 and 1.207 for the Class40. The Class40 is 4.5% faster than the Farr 40 ($1.207 \div 1.153 = 1.045$).

Meanwhile, the front pages of the ORCi certificates for a typical Farr 40 and Class40 are shown opposite. The certificate shows the ORC single number All Purpose Handicap (APH): 476 seconds to sail a mile for the Farr 40 and 455 secs/mile for the Class40. The Farr 40 is slower than the Class40, and the Class40’s TCF is 1.045 relative to the Farr 40. (I acknowledge some sleight of hand to produce perfect agreement with the IRC value).

The ORCi VPP calculates a polar speed table and this has seven wind speeds and 10 points of sail (True Wind Angles). The polar table is typical of those used by navigators and routers.

The All Purpose handicap is calculated from a weighted average of the polar speeds across all wind speeds and True Wind Angles.

The APHs for the two boats are 4.5% different, ie 45 clicks; but if we compare single points on the polar outputs (*opposite below*) there are speed differences of more than 1kt. The Farr 40 is faster in light airs, despite the APH showing it to be slower.

Growing deltas

This speed difference across the range is shown in the tables (*opposite*) as TCFs calculated at each point on the polar curve. For example, in 6kt True Wind Speed at 52° True Wind Angle (TWA) the Farr 40 is going at 6.54kt, the Class40 at 6.41kt. Now the Farr 40 is going 1.020 times the speed of the Class40, ie 2% faster. The TCF for the Class40 to the Farr 40 is 1.020, ie 20 clicks.

The table of comparisons (*opposite*) shows how many clicks the boats would owe each other if they competed on that exact point of sail in that wind strength.

The deltas run to hundreds of clicks in stronger winds on a reach – this is more than loose change in the TCF currency.

Take a simple windward leeward course

In the diagram below we are looking at where the Farr 40 must finish to save her time on the Class40.

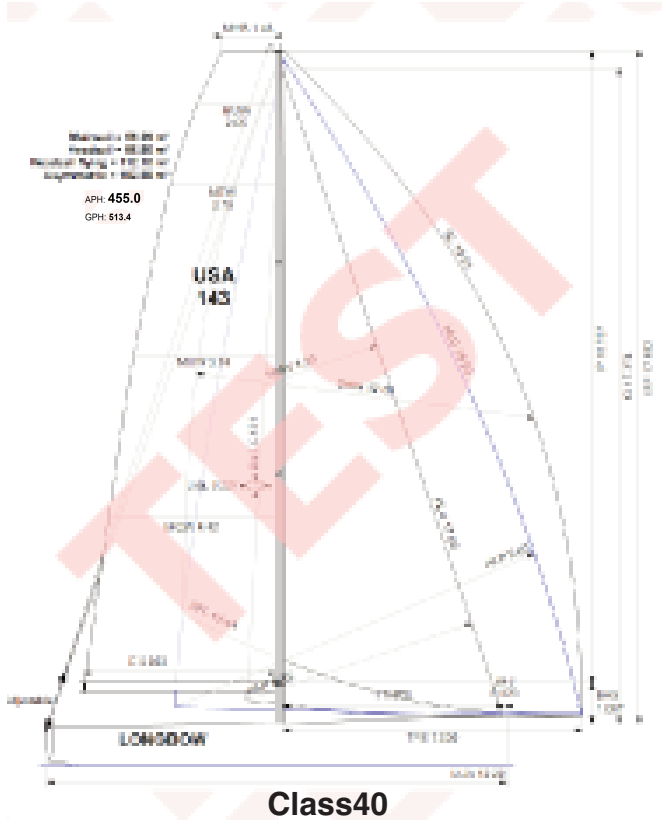
Depending on the wind strength and course mix each boat will feel the gain or loss of these bonus seconds compared to when a race is sailed using the single number TCF. The distribution of the ‘bonus clicks’ across all wind speeds is also shown *opposite*. Grey shaded cells are a bonus to the Class40 from using PCS, blue shaded cells are a bonus to the Farr 40.

This is an extreme example of every dog having its day. But if you do this kind of analysis on any pair of boats there will always be differences between the polar point TCFs and the single number APH.

No matter which way you dice or slice it a single TCF cannot capture the relative performance of a fleet in all wind speeds and course types. This is the heart of the ORC offering: if you know wind speed and points of sail that prevailed during a race you can score the race based on the TCF for each leg of the course.

This should reduce the effect of bonus clicks that are an inherent part of single TCF scoring. But it is a hard concept to grasp, and with a layer of added complexity it is not everyone’s cup of tea.

Recently driving with my wife she was obliged to sit through an ITC conference call discussing the merit of giving race committees



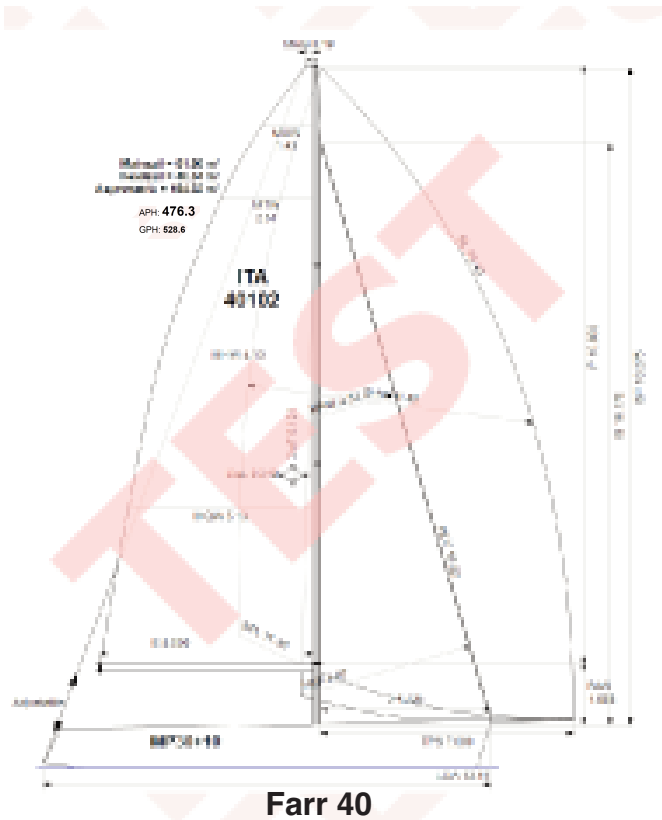
| Rated boat velocities in knots | | | | | | | |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Wind Velocity | 6 kt | 8 kt | 10 kt | 12 kt | 14 kt | 16 kt | 20 kt |
| Best Angle | 43.2° | 40.6° | 38.0° | 35.4° | 32.4° | 30.4° | 28.9° |
| Best VMG | 4.21 | 5.09 | 5.53 | 5.75 | 5.88 | 5.88 | 6.03 |
| 52° | 6.41 | 7.32 | 8.14 | 8.45 | 8.68 | 8.81 | 9.02 |
| 60° | 6.74 | 7.66 | 8.58 | 8.92 | 9.18 | 9.34 | 9.58 |
| 75° | 7.02 | 8.09 | 8.98 | 9.56 | 9.91 | 10.19 | 10.59 |
| 90° | 7.17 | 8.38 | 9.23 | 9.79 | 10.48 | 10.94 | 11.64 |
| 110° | 6.87 | 8.19 | 9.23 | 10.28 | 11.19 | 11.88 | 13.08 |
| 120° | 6.46 | 7.90 | 9.08 | 10.11 | 11.02 | 12.22 | 13.94 |
| 135° | 5.72 | 7.33 | 8.51 | 9.57 | 10.70 | 12.09 | 14.37 |
| 150° | 4.79 | 6.17 | 7.41 | 8.48 | 9.38 | 10.34 | 12.94 |
| Run VMG | 4.19 | 5.34 | 6.42 | 7.35 | 8.13 | 8.90 | 11.21 |
| Clyde Angle | 142.1° | 145.1° | 145.1° | 149.5° | 149.7° | 148.9° | 140.6° |

| Wind Velocity | 6 kt | 8 kt | 10 kt | 12 kt | 14 kt | 16 kt | 20 kt |
|---------------|------|------|-------|-------|-------|-------|-------|
| Best VMG | 78 | 57 | 39 | 31 | 26 | 21 | 6 |
| 52° | 65 | 32 | 2 | -11 | -20 | -28 | -41 |
| 60° | 58 | 22 | -14 | -30 | -41 | -49 | -61 |
| 75° | 46 | 14 | -26 | -56 | -68 | -77 | -93 |
| 90° | 8 | -28 | -52 | -59 | -86 | -100 | -119 |
| 110° | 52 | 20 | -37 | -97 | -136 | -156 | -154 |
| 120° | 92 | 47 | -4 | -53 | -88 | -136 | -168 |
| 135° | 114 | 66 | 24 | -11 | -36 | -60 | -90 |
| 150° | 118 | 92 | 55 | 21 | -8 | -23 | -37 |
| Run VMG | 118 | 92 | 55 | 24 | -9 | -23 | -37 |
| W-L | 98 | 74 | 46 | 28 | 11 | 3 | -9 |
| All P | 9 | -41 | -74 | -98 | -118 | -130 | -144 |

more pre-constructed courses to encourage the adoption of Polar Curve Scoring. When I hung up she asked ‘what was all that about?’ I delivered my spiel along the lines explained above. Disappointingly this cut no ice with her.

She held firm to her view that the owner had made his choice about what boat to buy. If it was slow in light airs that was his look-out, and anyway he should do better when it was windy. He shouldn’t look to the rating system to rescue him – if you bought a Class40 to race in Long Island Sound, more fool you.

This is a widely held view. Every dog having its day is an inherent part of handicap racing; massage your TCF to within an inch of its life to gain a few clicks, then let the weather gods sprinkle tens of ‘bonus’ clicks across the fleet to help some and hinder others.



| Rated boat velocities in knots | | | | | | | |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Wind Velocity | 6 kt | 8 kt | 10 kt | 12 kt | 14 kt | 16 kt | 20 kt |
| Best Angle | 42.4° | 38.6° | 37.2° | 34.5° | 31.6° | 29.9° | 27.0° |
| Best VMG | 4.39 | 5.16 | 5.50 | 5.66 | 5.77 | 5.83 | 5.89 |
| 52° | 6.54 | 7.43 | 7.79 | 7.98 | 8.10 | 8.18 | 8.29 |
| 60° | 6.83 | 7.87 | 8.08 | 8.28 | 8.38 | 8.47 | 8.57 |
| 75° | 7.03 | 7.88 | 8.33 | 8.61 | 8.79 | 8.92 | 9.11 |
| 90° | 6.90 | 7.77 | 8.34 | 8.77 | 9.11 | 9.30 | 9.73 |
| 110° | 6.92 | 7.94 | 8.47 | 8.84 | 9.17 | 9.50 | 10.47 |
| 120° | 6.77 | 7.92 | 8.61 | 9.12 | 9.58 | 10.01 | 10.98 |
| 135° | 6.11 | 7.49 | 8.33 | 9.04 | 9.84 | 10.79 | 12.43 |
| 150° | 5.14 | 6.48 | 7.48 | 8.29 | 9.06 | 9.84 | 11.83 |
| Run VMG | 4.49 | 5.59 | 6.48 | 7.19 | 7.70 | 8.39 | 10.29 |
| Clyde Angle | 142.4° | 145.5° | 148.6° | 151.4° | 149.5° | 148.6° | 144.6° |

| Wind Velocity | 6 kt | 8 kt | 10 kt | 12 kt | 14 kt | 16 kt | 20 kt |
|---------------|------|------|-------|-------|-------|-------|-------|
| Best VMG | 21 | 13 | -5 | -13 | -19 | -24 | -38 |
| 52° | 20 | -13 | -42 | -56 | -65 | -72 | -86 |
| 60° | 13 | -23 | -58 | -75 | -86 | -93 | -106 |
| 75° | 1 | -30 | -71 | -100 | -113 | -122 | -138 |
| 90° | -37 | -72 | -97 | -104 | -131 | -145 | -164 |
| 110° | 7 | -25 | -82 | -141 | -181 | -200 | -199 |
| 120° | 47 | 3 | -49 | -98 | -133 | -180 | -213 |
| 135° | 69 | 21 | -21 | -55 | -80 | -105 | -135 |
| 150° | 73 | 47 | 10 | -23 | -53 | -68 | -82 |
| Run VMG | 73 | 47 | 10 | -21 | -53 | -68 | -82 |
| W-L | 53 | 29 | 2 | -17 | -33 | -42 | -54 |
| All P | 35 | 4 | -30 | -54 | -73 | -86 | -100 |

Almost all handicap races are scored using a single, predetermined TCF. For many fleets the predetermination is done weeks ahead of the regatta. But for a growing number of regattas with diverse fleets, the TCF is fixed on the day of the race using the anticipated wind speed and direction and anticipated course layout.

For fleets of similar boat types with a small size range the discussion about how and when to post the TCF scratch sheet is moot. But for more diverse fleets where a wide mix of boat types want to race together the use of Polar Curve Scoring can deliver a more rational handicap scheme. No one need leave the dock feeling that the weather has already robbed them of any chance to do well.

Andy Cloughton,
Chair, International Technical Committee



Both 40-foot long and that’s where it ends. The Farr 40 (top) remains a rewarding (relatively inexpensive) all-round performer, high and fast inshore and as good downhill as any traditional pole+spinnaker design of its size. The Class40 is a somewhat different machine