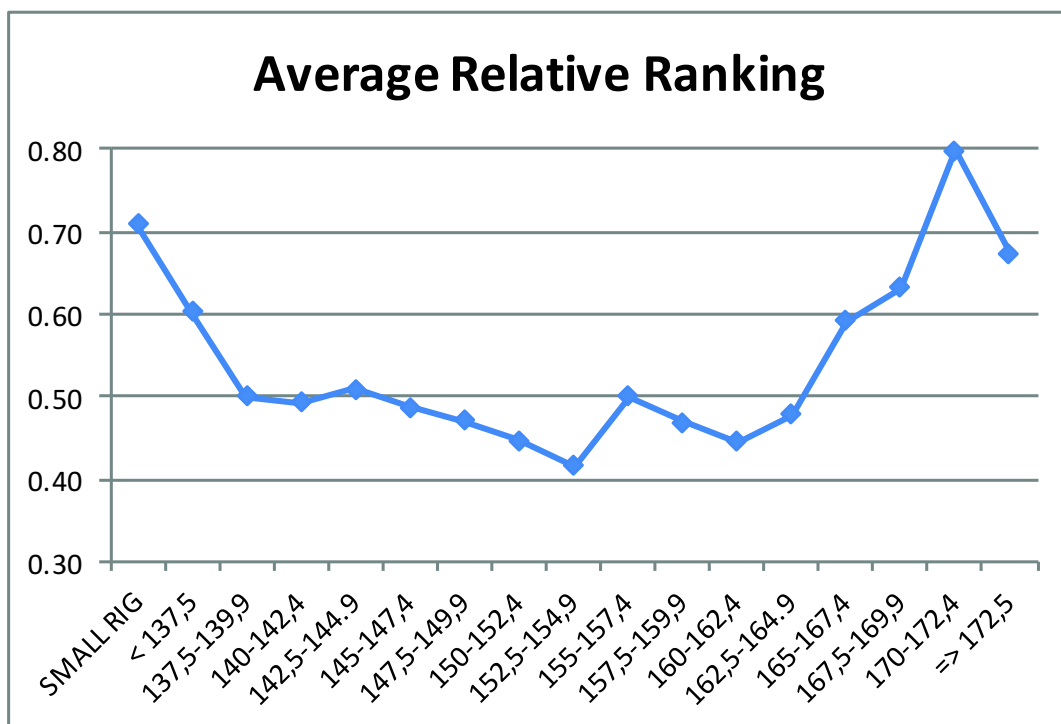


The case for change

The current F18 crew weight correction system - a combination of crew corrector weights and two sets of sailplans - was designed over twenty years ago based on the state of catamaran design of that time and without the benefit of much empirical evidence. For example, in the early 90's there was little experience with small sport catamarans fitted with gennakers. F18 designs have evolved a lot since the early 90's. Data from recent F18 Worlds confirm that the current crew weight correction system is not effective (anymore).

Below graph shows the F18 Worlds results for the years 2011-2015, already shared with World Council in August 2015. The data suggest a competitive crew weight in a range of 17.5 kg (147.5-165 kg; data was analysed in brackets of 2.5 kg) and a somewhat competitive crew weight in a further range of 10 kg (137.5-147.5 kg).



By making lighter crews more competitive we want to attract more female sailors as well as young sailors who are looking for a next challenge once they have out-grown youth classes like the Nacra 15. By making heavier crews competitive we want to support growth of the Class especially in those countries where F18 is already popular but where male teams tend to be heavier (e.g. the USA, some countries in Western Europe and Australia).

Analysis method used

We have used SCHRS to predict performance. We have compared the outcome of this rating model with actual F18 Worlds results to validate the predictions. We also used the F18 Worlds results to determine the BMI score of an average / typical F18 sailor (see below).

SCHRS is a known and tested model for producing handicap ratings for open catamarans. SCHRS has been in use for a long time and has been refined over time. Also, an earlier version of SCHRS was used for writing the original F18 Class Rules.

We have run analyses by using varying crew weights as input in the SCHRS model. We have made one adjustment to SCHRS, which is that we used the estimated average crew height for any given crew weight as an extra variable. Crew height influences leverage when trapping and thus a longer body height gives a crew a performance advantage in trapping conditions (similar to a cat with a wider beam). We have used the BMI (Body Mass Index) (formula) to calculate the body height for any crew weight. Comparing the final rankings of the 2013-15 F18 Worlds produces a matching BMI of 26.7, which is slightly more than the average BMI's of the populations in the F18 member countries.

Objective and parameters

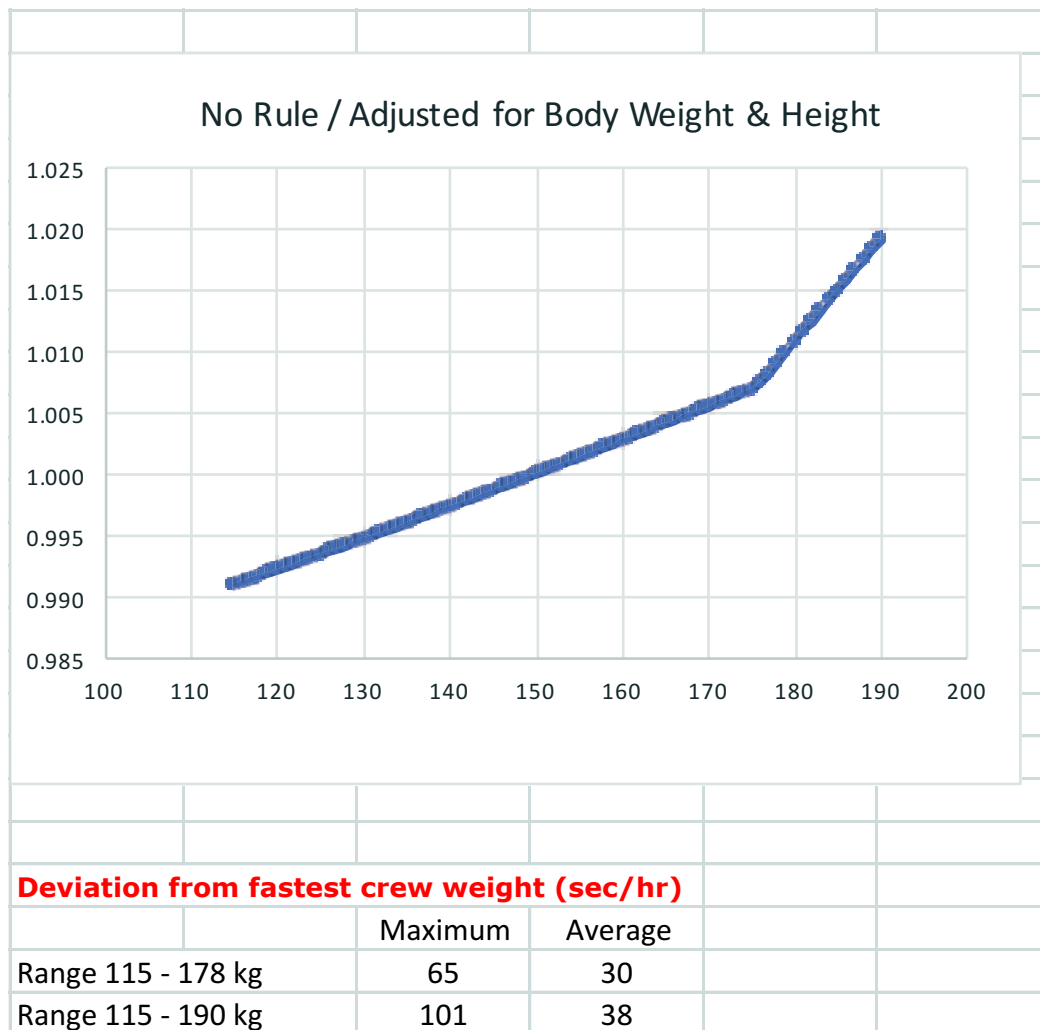
The objective is to offer fair racing - i.e. where teams with different crew weights have the same chances of winning - in F18 for an as large as possible crew weight range, using the following parameters:

- wind speed ranging between 5 and 25 knots, with probability of wind speeds distributed equally within this wind speed range
- rules independent from conditions in which racing takes place
- based on modern popular F18 designs (Nacra Infusion, Goodall Design C2, BCM Cirrus R2, Exploder Scorpion, Windrush Edge)
- no changes in F18 Class Rules, except for:
 - * use of crew weight corrector weights
 - * use of boat weight corrector weights
 - * availability of maximum two different sizes of jibs (4.15/3.45 sqm) and a maximum of two different sizes of gennakers (21.00/19.00 sqm)
- minimum total boat weight, excluding corrector weights, remains 173.0 kg
- default minimum total boat weight, including corrector weights, remains 180.0 kg; however, this number may be lower for certain crew weights
- no deterioration of performance, in absolute terms, for any crew weight

All graphs below are shown using the same scale for optimal comparison.

Current situation

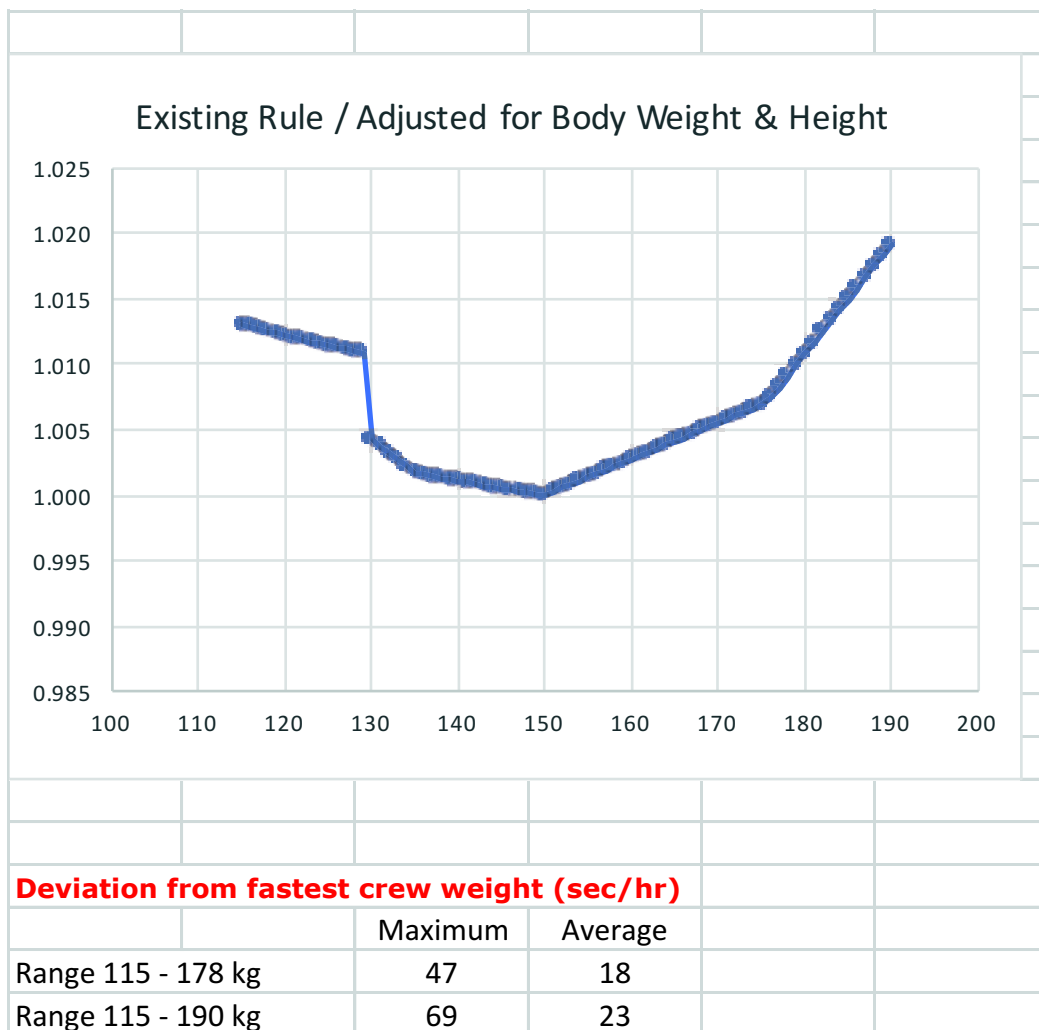
Without crew weight correction, the performance curve of a F18 would look as follows:



This graph shows the implied handicap rating (Y-axis) for a given crew weight (X-axis) if we would not use any correction for crew weight. The table below the graph provides the maximum and average time differences (expressed in seconds per hour of racing) between the fastest team (115 kg) and the teams within mentioned crew weight ranges (115-178 kg and 115-190 kg).

Over one hour of racing, a crew of 178 kg can be expected to be 65 seconds slower than a team of 115 kg. On average, teams weighing between 116 kg and 178 kg can expect to be 30 seconds slower than a crew that weighs 115 kg.

Applying the current F18 Class Rules, the performance curve looks like this:



We see that the current F18 weight correction does have some positive effect. The maximum and average time differences are lower than when we would not use any correction. In theory, based on SCHRS, the fastest crew weight is 150 kg.

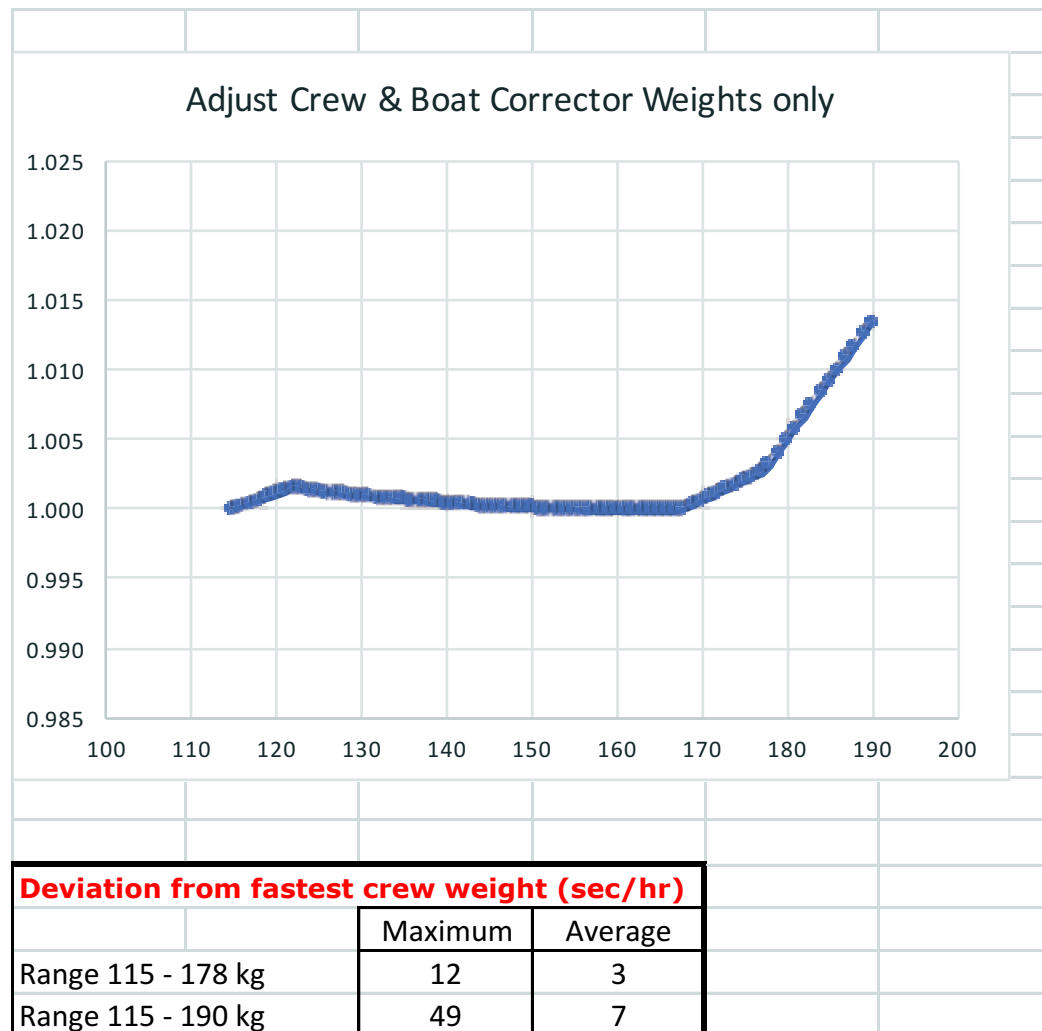
The shape of the performance curve is quite similar to the results curve based on the 2011-15 F18 Worlds.

Note:

- 1) the steep angle for crews weighing more than 176 kg: this reflects that the F18 platform (using standard sails) is not powerful enough for these teams. We would have to introduce quite radical measures (like increasing sail area) to make these heavier teams competitive in F18.
- 2) the step-up of the rating between 130 and 129 kg. This reflects the mandatory use of the small rig, which has proven to be very uncompetitive (now confirmed in the graph).

Possible solution

We have worked with various variables to produce a performance curve which is as flat as possible. This has led to the following performance curve:



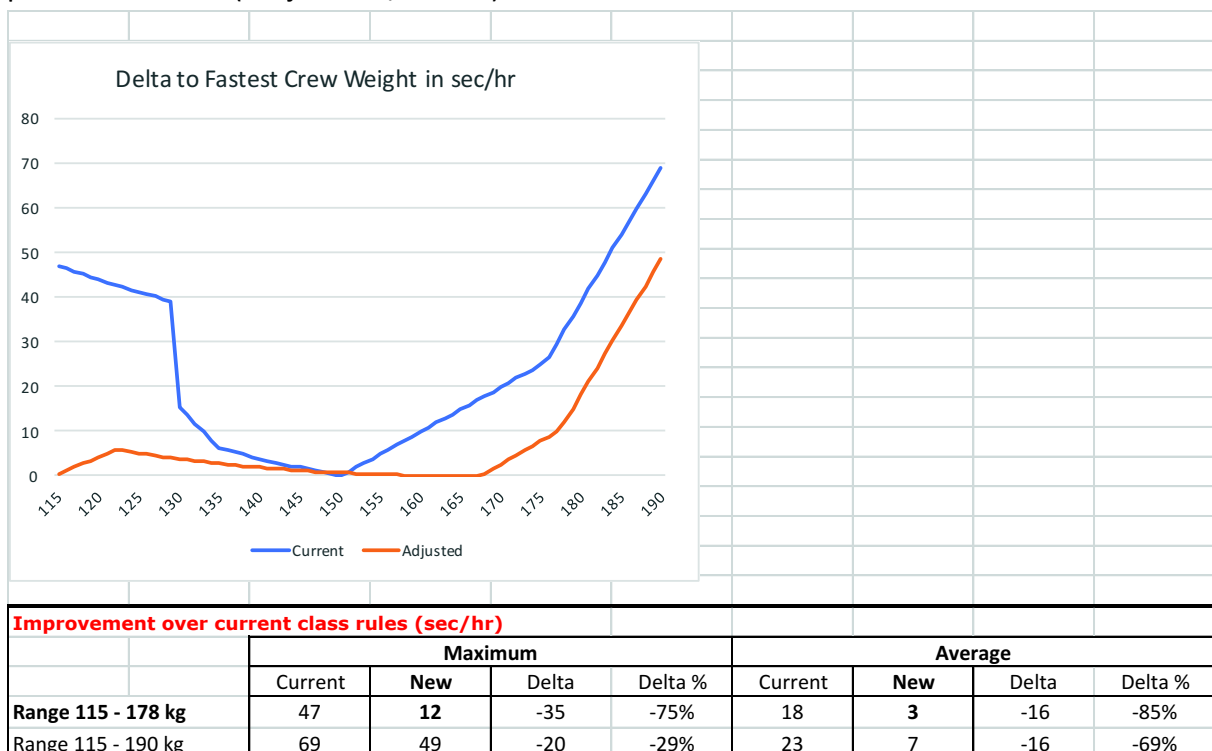
This would be the performance curve of the following set of F18 class rules:

- 1) Standard rig only; standard F18 boat weight when racing is (remains) 180 kg.
- 2) For crews weighing less than 150 kg, for each kg less weight than 150 kg, add 0.4 kg crew corrector weight. The maximum corrector weight is 11.2 kg.
- 3) For crews weighing more than 150 kg, for each kg more weight than 150 kg, deduct 0.4 kg boat corrector weight (if otherwise required). Maximum deduction is 7 kg, translating into a minimum potential F18 boat weight when racing of 173 kg.
- 4) In addition, allow any boat weight of over 180 kg to count towards crew corrector weights.

This translates into:

- The maximum crew corrector weight of 11.2 kg is reached at 122 kg crew weight (compared with 12.5 kg at 130 kg currently if sailed with a standard rig).
- Minimum boat weight of 173 kg is reached at 167.5 kg crew weight.
- In addition, there will be further equalization of performance for teams weighing less than 150 kg that sail with boats that are heavier than 180 kg.

The following graph better illustrates the time differences in the current situation and the possible solution (“adjusted” / “new”):



The steeper part of the curve starts at a crew weight of 178 kg, instead of 176 kg.

The theoretically fastest crew weighs 166 kg, and crews weighing 147 – 168 kg as well as those weighing (exactly) 115 kg are less than 1 sec/hr slower. The maximum difference between 115 kg and 173 kg is less than 6 sec/hr. With the current Class Rules, the maximum difference for the same crew weight range is 47 sec/hr.

All teams see their performance difference with the fastest crew (weight) reduce, with the exception of crews weighing between 148 and 150 kg (see where the blue line dips just below the orange line in the graph).

Furthermore, all teams except those weighing exactly 150 kg, will sail faster outright and they will be more competitive in handicap races than in the current situation.

Implications:

- The small rig is no longer part of F18 equipment. This increases standardization and avoids the existence of sail sets for which there is little market demand and reduced prices when in used condition.
- In order to avoid value destruction, the small rig can be grandfathered in the sense that when the small rig is used, no corrector weights need to be carried irrespective of crew weight. This may make the small rig still useful for light crews when racing in heavier wind conditions.
- Boat builders will have a stronger incentive to build boats of 173 kg. There may be initial extra demand for new boats from teams that weigh more than 150 kg.
- Used boats weighing more than 173 kg and especially those weighing more than 180 kg (whose surplus weight can be counted against crew corrector weights) will find a natural destiny in lighter crews, which are more likely to include youth teams.

And most importantly:

- **F18 will be an attractive class to join for more sailors;**
- **It will be easier to sail with the person with whom you (really) want to sail in F18, because combined crew weight will matter much less.**