World leader in rating technology

Meeting of the **International Technical Committee** of the Offshore Racing Congress held on 6 – 8 October 2017 in TU Delft (Holland)

Present:	Alessandro Nazareth (Chairman)	Jason Ker (GBR)
	Nicola Sironi (ORC Chief Measurer)	Jim Schmicker (USA)
	Zoran Grubisa (CRO-ORC Staff)	Rob Ranzenbach (USA)
	Panayotis Papapostolou (GRE-ORC Programmer)	David Lyons (AUS)
	Davide Battistin (ITA-ORC Programmer)	Lex Keuning (Research Associate)
	Antoine Cardin (FRA) as alternate of Tobias Kohl (GER)	
Observers:	Gennaro Aveta (ITA-FIV - ORC)	Leo Van Raam (Noordzee Club)
	Simon Forbes (GBR – World Sailing)	Javier Cela (ESP – RFEV)
	Arthur Peltser (NED – KNWV)	Michiel Voor (NEED KNWV)
	Peter De Jong (NED – KNWV)	Roland Kleiter (GER – KND)
	Wick Hillege (NED – TU Delft)	Matteo Polli (ITA)
	Kostantina Skafianaki (GRE)	

Apologies for absence were received from committee member Andy Claughton (GBR)

1. WELCOME, MEETING LOGISTICS

The Committee thanks TU Delft for hosting the meeting, and Lex Keuning for hosting the entire ITC and all observers for the Saturday dinner and for his assistance during the meeting. ITC would like also to thank Wick Hillege for assisting for the full duration of the meeting.

2. PREVIOUS MEETING MINUTES APPROVAL

The minutes of the last meeting in Rome of July 2017 were approved with no further discussion.

3. SUBMISSIONS REVIEW

3.1 ITA 1 – IMPLIED WIND

ITC discussed at length the Implied Wind scoring method in response to submission ITA 1.

The committee acknowledges the original Implied Wind method is a "genuine" performance index and the committee still believes (though not unanimously), after three years of use, that the approach of setting the time allowances for the fleet based on the Implied Wind of the winner is the best way of applying the concept of Performance Curve Scoring. Using the Implied Wind of each individual boat to determine its time allowance skews the results in favour of boats with lesser performance in lighter winds.

Nevertheless, during the committee's discussion a list of potential errors of both scoring approaches (fixed and variable) was analyzed. Appendix A gives an example of the benefit from using time allowances based on the performance of the winning boat while listed below are some minor disadvantages:

- When the winning boat finishes with an Implied Wind that is greater than the observed wind (e.g. because of a good exploitation of all wind shifts) then boats that are relatively faster in stronger winds (e.g. light boats) are favoured. Vice versa, when the winning boat finishes with an Implied Wind that is less than the observed wind then boats that are relatively slower in light winds (e.g. heavy boats) are favoured. Scoring of boats with corrected times significantly slower than the winning boat would then vary depending on the Implied Wind of the winner and potentially not for mistakes they made on the race course.
- When the winning boat is disqualified or penalized the scoring must be re-done using the "new" winning boat and results in the fleet may swap positions and cause confusion.
- The method of setting the time allowances for the entire fleet based on the Implied Wind of the winning boat has not been applied in several constituencies, notwithstanding the rule making its use compulsory.

The committee recommends leaving the use of the Implied Wind of the winning boat for the entire fleet as per ORC rule 402 as "default" method, but also to allow the option of the use of IW of each boat as performance index. If the last method will be used it needs to be included into the NoR and for the ORC Championship the "default" method shall be used.

The committee reiterates that PCS with an Implied Wind calculation (ORC 402) should be used only when wind conditions are the same for whole fleet. In situations with big wind shifts affecting only part of the fleet the resulting Implied Wind can be significantly different from reality. In such situations ORC 403 (simple scoring options) should be used.

3.2 ITA 2 – RESISTANCE IN WAVES

The final all effect test run (see 15) showed small movement in ratings of light boats compared to the heavier boats, leaving the situation almost unchanged, so the committee decided to leave the added resistance in waves formulation unchanged for 2018 so the full formulation of added resistance in waves made last year was decided to be kept in stand-by for another year.

It must be noted that at recent world championships the wind speed never went over 10 kts TWS favouring lighter boats. Yet the winner of Class B (and runner up in Class A) was a Swan 42 that has an LVR of about 5.75 that is in the average of the world fleet and not a very light boat (as a reference GS 40 has 5.44, First 40 5.52, X-41 5.61, XP44 5.62, Landmark 43 5.68, Farr 40 6.18 to name just a few).

The ITC believes that the proposed VPP changes for 2018 are moving boat ratings in the correct direction as could be seen in test runs and comparing the speed changes with real speed (see 15)

3.3 RUS 1 – STATION SPACING

The committee agrees with the submission and suggests including this minimum station spacing in IMS rule B2.2. The submission is therefore supported.

3.4 RUS 2 – SYMMETRY OF APPENDAGES

The ITC noted that current version of the LPP already addresses the issue of asymmetric appendages when these are not exactly on the hull centerplane if stations describing the appendage are correctly placed in both sides of it.

So, the committee believes that modifying an offset file after measuring is not a correct procedure. The measurement manual that will be prepared by ORC Chief Measurer will explain in detail how to place stations. The submission is not supported.

3.5 RUS 3 – TOP POINTS

The committee discussed at length this proposal and acknowledges the fact that the angle of positive stability in presence of bulwarks above the deck level is increased. The ORC programmers next year will study an LPP revision that will include the full section above the deck that will be used for stability calculations.

3.6 RUS 4 – PCS SELECTED COURSES

This submission has been withdrawn.

3.7 USA 1 – CREW WEIGHT VARIANCE EFFECT

The situation reported by the US submission originated from the situation during last world championship when many crew members were left on the dock when light wind was expected for the day. The ITC suggests to introduce a minimum crew weight obtained by subtracting the greater of either the 25% of Declared CW or 85 kg from the Declared CW. The minimum crew weight shall be mandatory on the ORC Championship events, while other events may use it by stating it in the Notice of Race and Sailing Instructions.

The submission is supported.

4. AERODYNAMICS

4.1 Upwind Aero Model CFD research completion.

Jason Ker presented a new report about status of the research (attached). The research is almost completed with a very good comparison with current ORC VPP aero model. The major incongruences found at this stage with ORC model where:

- PHIUP (causing more lift and heeling moment)
- Cd0 (windage of hull and crew)
- Cl
- Effective Height of sailplan

During the meeting further test runs were made with

- NO PHIUP
- Cd0 +20%
- Cl +10%
- Heff +40%

During the discussion it was noted that the majority of the ORC fleet is slower downwind so an adjustment to the Power Function (surface correction factor related to pole/sprit length over the size of spinnaker) was prepared to accelerate almost all fleet.

The new Power Function is:

$$\textbf{Power} = 1.00 + |fsp|^{1.5}\textbf{, but not to exceed } 1.28$$

that replaces the old one:

Power = 0.92 + |fsp|$^{1.5}$, but not to exceed 1.20

Each single effect test run was examined and a final aero all-effect run was prepared with the following variations (Heff and PHIUP effects have been halved to avoid big disruption in the fleet in a one year change, although the modifications were confirmed by CFD analysis):

- PHIUP function halved
- Cd0 +20%
- Heff +20%
- Power function

The results of test runs were going in the correct direction also double checking the effect on real data and rescoring of major races of 2018. The analysis of CFD results and their comparison will go on during 2018 mainly focusing on:

1. Overlapping jibs
2. Effective Re number in light winds with slight size factor

and aero model will be adjusted accordingly.

The committee's goal is to produce a new aero model based on this aero CFD research to be tested long term and may be used in the place of the existing one.

5. HYDRODYNAMICS

5.1 Hydro CFD research status

Attached is Jason Ker's last report about the status of CFD research.

The present ORCi hydro model, developed in 2012, is based on inputs of BTR and an LVR which uses a pre-determined length mixture, based on LSM1, LSM4 and LSM6, the ratio of each depending on Froude number. Following a procedure used for shape optimisation of yachts, a model will be created that will be sensitive to the length and beam characteristics of a wide range of hull shapes, in addition to transom drag and dynamic viscous drag.

The ultimate aim is to directly create an improved hydro model for the ORCi VPP. The present 'transparent' concept of the existing model is retained but the drag surfaces at each Fn will change and the accuracy should improve with the additional LSM's and better use of the existing LSM's. Depending on the size of the differences from the present model, it may be best to phase in the replacement slowly by using a weighted average of the new and old models.

All the preparatory work has been completed so now 500 CFD models will be run and post-processed. Also, some additional RANS panel code will be used to validate results.

The planned delivery of a new model draft should be for the next ITC meeting in March 2018.

5.2 Induced Drag and crew transversal position

Jason Ker reported that in checking the new formulation of Induced Drag introduced in 2012 he noticed that the amount of load on appendages was unduly overloading the rudder. The induced drag factor was originally based on a premise of load sharing between the rudder and the keel so that changes were related to heel angle.

Typical leeway in 6kts is about 2.75 degrees, but that is based on the current ORC rudder load assumption of the rudder area factor 1 at zero degrees of heel. The new formulation proposed is based on the rudder load being reduced compared to the total side force, and the rudder being 50% of the effective span of the keel.

The resulting formula is:

If Heel < 15°:
    DiFactor = 0.002500 * Heel2 - 0.075000 * Heel + 1.562500
Else:
    DiFactor = 1

The Di factor was further washed out by a smoothing function based on the matrix of Fx/Fy (Drag/Side Force) to reduce the effect at wider AWA. In making this amendment to the Induced Drag with this load Di factor also to the transverse movement of the crew was slightly corrected changing the crew position as follows:

- Upwind - Crew transitions from leeward to windward between 6 - 12 degrees of heel
- Downwind - Crew transitions from leeward to windward between 2 - 10 degrees of heel

This should only have an effect upwind in light winds, in particular crediting the heavy or otherwise stiff boats that cannot be heeled in low wind pressure, even with the crew.
On the contrary, because of their light weight and light bulbs, most of the canting keeled boats are already at 15° degrees of heel in 6 kts TWS upwind, so logically not benefiting from the Di Factor unlike the rest of the fleet. However, once we're allowing the crew to move to leeward upwind, the low wind upwind heel angles of fixed keel boats such as TP's will increase to a similar amount.

The above modifications will be included into 2018 VPP.

5.3 Foils. Establishment of a working group to develop a routine to address foils.

After the discussion in Rome about the project of VARUNA foils received by ITC, the committee agreed that currently it is not possible to rate boats equipped with foils. For this reason Jim Schmicker will work in conjunction with ORC programmer Davide Battistin to write an outline of what could be needed (research, code, data, measurement issues, possibly a budget etc.) and then a new module of the VPP will be tested with the scope of returning a good evaluation of foil performance.

CFD and other tools will be necessary to develop a 4-degrees of freedom VPP (or more). The development of a VPP with 4 or more degrees of freedom may be a worth funding not only for addressing foils but also to be used as a validation tool for the normal VPP and to test it, as there will be surely a transition towards this kind of VPP in the near future. In any case foil boats (when rated) will be suggested to be grouped into a separate class.

5.4 Added resistance in waves update.

Lex Keuning reported about the long-term research in TU Delft. Unluckily they are still looking for a PHD student that could be involved as researcher under the guidance of Lex, so no results can be expected before next year. He then opened the discussion on how the possible results could be transferred to a handicapping VPP like the ORC VPP.

Main concerns are on how the wave spectrum could be dealt with by the VPP without introducing further variables in the output (besides TWS and TWA, also wave height, period and direction). The gyradius computation is another issue as it is the main driver for added resistance evaluation.

Following seas are also a concern as the boats are reacting in different ways according to their characteristics (light boats might plane while heavy boats may be slowed down).

A short discussion followed, and the committee decided to wait until the end of this research and then work on it to decide on how to modify or completely change the current formulation. The restoration of the full wave drag formulation made last year (now currently detuned to about half of its effect) will be kept in place by for another year and will be checked before implementing the 2019 VPP.

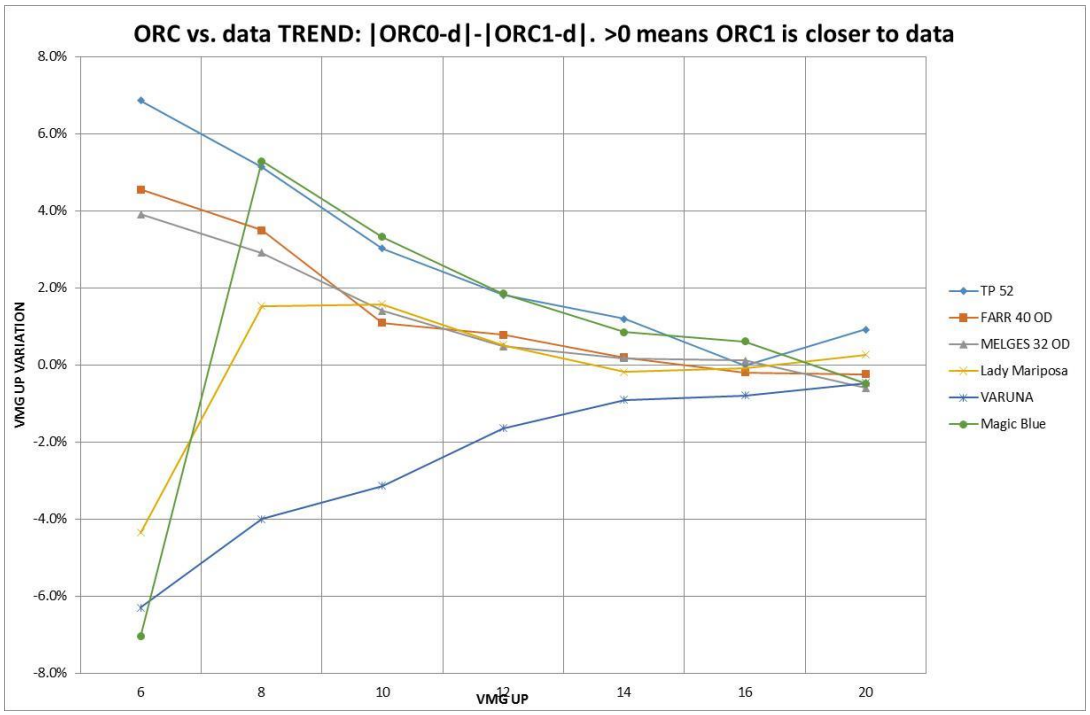
6. DATA ACQUISITION STATUS

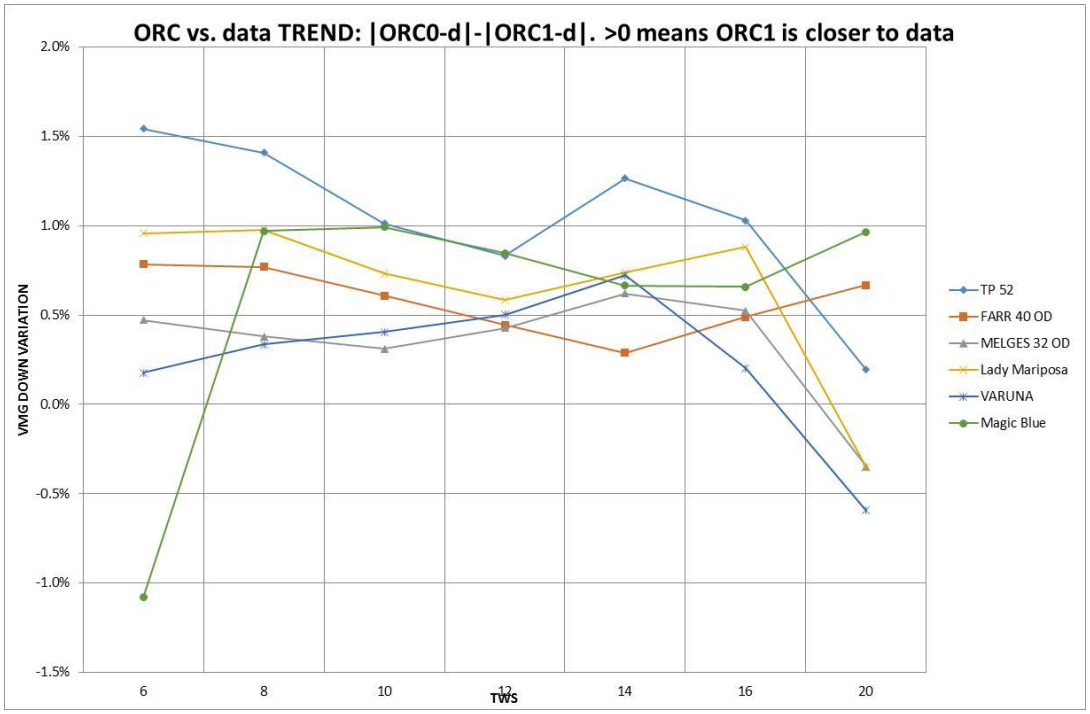
Roland Kleiter from KND was present in the first day of meeting.
The current situation of the boats that could be transferred into the database was reviewed.
This is the current list:

- TP52
- Melges 32
- Farr 40
- Wally 94: Magic Blue / Frers 2002
- Ker 56 (CQ): Varuna
- Ker46: Lady Mariposa
- Momo (Maxi72)

Rob Ranzenbach coordinated the data transfer with Dimitri Nicolopulos of KND and supervised the progress of analysis. ORC programmer Davide Battistin prepared a spreadsheet as a post-processing tool that could make quick comparisons of all the boats analysed by KND with the various versions of the beta VPP.

ITC suggests that, thank all those that gave or will give permission to use their data, ORC would issue a press release of gratitude and appreciation for the owners for their contribution and post this on ORC web site. This data analysis is a fundamental tool for validating and support our recommendations to the Congress. In fact, for the boats listed above the differences between the new VPP 2018 speeds (see below 15) and the recorded speeds (in %) are plotted here below for both UPVMG and DOWN VMG:





The plots are showing the movement of the VPP speeds related to the recorded speeds in %. If the value is positive it means that the gap is reduced, if the value is negative the gap is increased. As can be seen (apart some uncontrlled movements at 6kts and a boat – KER 56 VARUNA – that has some unreliable data according to his designer) the modifications introduced are working in the expected direction by reducing the gap between the observed data and the VPP.

This tool will be further developed as more boats will be added to this list.

7. ORC/IRC 2018 WORLD'S CHAMPIONSHIP UPDATE

Alessandro Nazareth and Zoran Grubisa reported about the current status. Rescoring of the last world championship is still to be completed because IRC ratings for some of the boats must be received from the RORC rating office (Andrew Yates). The NOR has been issued and posted. As a recap of the technical decisions taken in the WP (ORC + RORC + OA) to harmonize the two rules:

CREW WEIGHT
The combined weight of all crew members on board while racing weighed in light street clothes shall not be greater than the lesser of:

a) The maximum crew weight as defined in ORC 102.1 and ORC 102.2.
b) The maximum crew weight printed on the IRC Certificate (Crew Number x 85kg)

SAIL LIMITATION
ORC 206.1 will be enforced and all boats must comply. IRC certificates shall be adjusted when more than 3 spinnakers will be carried on board.

SPARE MAINSAIL
The spare mainsail shall have a minimum of one set of reef points. The mainsails may be interchangeable but should not be brought on board while racing.

SCORING
Regarding the scoring, following scoring system is suggested by the ITC:

Each race will be scored as follows:

a) Finishing place on corrected times calculated under ORC (TN for W/L Races, single ToT offshore number for offshore race) will be scored in accordance with RRS A4
b) Finishing place on corrected times calculated under IRC (Single TCF) will be scored in accordance with RRS A4
c) Points scored in a) and b) will be summed up.
d) Final finishing place will be determined by the points calculated in (c).
e) Final race score will then be assigned from the final finishing places in accordance with RRS A4 (First – 1 point, Second – 2 points, Third – 3 points, etc…).
f) If there is a tie in points calculated in (c), the points for the place for which the boats have tied and for the place(s) immediately below shall be added together and divided equally.
g) Any disqualification or scoring penalty will apply to the final race score in accordance with RRS A6.

By using this system 9 races will be scored with 9 final race points on the same way as when single rating system is used.

8. DEFAULT RM REGRESSION REVISION

Antoine Cardin with Tobias Kohl continued the development of a new formulation of the Default RM. Different regressions were tested and a different approach that computes VCG of pure hull after deducting keel and mast weight was studied. The regression of this VCG versus L was reshuffling too much the fleet as all the other regressions tested.

The ITC decided to investigate the issue one more year.

9. CONSTRUCTION MATERIALS LIMITS REVISION

ITC discussed the necessity of revising construction material limits to be in line with current boat technology. Some designers and engineers returned some feedback on this regard and David Lyons wrote a new ORC rule 101.2 with the following revised limits:

- Max modulus 320 GPA
- Max temperature 90°

This new rule will be valid for hull shell and deck shell (no restriction on secondary structural elements such as stiffeners that support the hull shell and deck shell). Also, IMS B7.1 will be amended changing High Strength Carbon in just Carbon Fiber. This is the proposed wording for the new rules:

101 Construction Materials and Processes

101.1 It is the intention of the ORC Rating Systems to promote safety, address cost and allow materials that are readily available while prohibiting materials and processes that are not readily available.

101.2 The following materials and processes are prohibited for modifications on existing boats or on boats with Age Dates more recent than 2018:
a) In hull shell and deck shell structures: Carbon fiber with modulus exceeding 320 GPa.

b) In spars with the exception of booms, bowsprit and spinnaker poles: Cored sandwich construction where the core thickness at any section exceeds the thickness of the two skins.

c) Material with density greater than 11340 kg/m3

d) Pressure applied in the manufacture of hull and deck structures greater than 1 atmosphere.

e) Temperature applied in the manufacture of hull and deck shell structures greater than 90°C.

f) Aluminium honeycomb cores in the hull shell and deck shell structures.

g) In hull shell and deck shell structures: Plastic foam core of nominal density less than 60 kg/m3.

B7 Other Hull Measurements

B7.1 ***Hull construction*** shall be recorded as one of the following:

a) SOLID: Non-cored, solid E-glass, metal or wood hull and deck, but including also E-glass decks with core material. Where the construction is of wood, the minimum density of any layer shall not be less than 300 kg/m3.

b) CORED: Hull skin of E-glass (see above) or wood, but incorporating a core material of less density than the skin.

c) LIGHT: All other construction types, but excluding the incorporation of any carbon fiber.

d) CARBON: Where carbon fiber has been incorporated anywhere in the construction of the hull shell and/or deck shell.

Carbon fiber edge-capping of bona fide hull structural frames, girders and stringers, and as localized reinforcement of chain plate attachments are allowed in each hull construction category provided it is used below decks between 0.3 * ***LOA*** and 0.7 * ***LOA*** aft of the stem.

For hull and deck construction, a declaration from the owner may be substituted for examination of one or more elements, but all elements are subject to examination at any time in case of doubt.

10. SCRATCHING CONSTANTS USED FOR TCF CALCULATIONS

During the season some questions were raised to the ORC rating office about the scratching constant used to transform the current allowances in sec/nm (for TOD scoring) in TMF (for TOT scoring).

Currently the offshore TMF is obtained by using 600 as a constant (TMF= 600/TOD), while for the inshore TMF 675 is used (TMF=675/TOD), and this was creating confusion and questions why the constant used is not always the same (no changes in scoring order would happen, only corrected times would change when there is a change of the constant).

Using the same constant would also produce the closest TMF in value for both inshore and offshore. Vice versa, it was noted also that for Triple Number scoring the constant used is always the same (675), which also raised a number of questions.

After a short discussion by the committee, notwithstanding the fact that unifying the constant would not be a wrong move, it was decided to leave this unchanged in the current formulations to not create certain complaints about TMF changes from 2017 to 2018.

For the sake of clarity it was decided to print on the certificate the formulation to derive TMF from TOD and to check current documentation wording to remove any inconsistencies with the VPP code.

ORC rules will be amended accordingly.

11. MAINSAIL RATED AREA REVISION

During the season some questions were raised about some inconsistencies between the rated sail area printed in the Manager software and the output of the VPP. This was due to mainsail rated area corrections when the mast diameter exceeds the base diameter. This is the formulation that should be introduced in the manager (no VP change as it already consider the same formulation):

853. Effective Diameter of Mainmast (EDM).
EDM = (0.5(EHM-TL)*(MDT1+MDL1)+0.25*TL*(MDT1+MDL1+MDT2+MDL2))/EHM*
For the purpose of calculating EDM, the following limits apply:
MDL1 shall not be taken as greater than MDL1max.
MDL1max shall equal the lesser of 0.036(RM25*IG)^0.25 or 2*MDT1.*
MDT1 shall not be taken as greater than (0.036(RM25*IG)^0.25)*(MDT1/MDL1).*
*MDL2 shall not be taken as greater than 2*MDT2.*
Where the measured value of MDL1 exceeds MDL1max, the value of any excess shall be added to the mainsail girths MGL, MGM, MGU and MGT for the purpose of calculating EC (see 826.2b) and mainsail area (see 844.4).
Where, in the taper of any mast presented for measurement and built after 1/1/97, a hollow is found in the fore and aft profile (see TH on the Certificate), EDM shall be calculated as follows:
EDM = (0.5(EHM-TL)*(MDT1+MDL1)+0.25*TL*(MDT1+MDT2+2.2*MDL2))/EHM.*

The ORC programmers will work to remove this inconsistency.

12. ORCSY UPDATE

The chairman updated the committee on current SY VPP work in progress with the season completed (nine events have been successfully raced). The following new features are under analysis and tested to be possibly implemented in 2018:

1. Light boats (high LVR) residuary resistance fine tuning
2. Dynamic and Tacking allowances revision
3. PHIUP factor revision
4. Refinement of propeller installation area (PIPA) for 3 and 4 blade propellers, including the default calculation
5. Better assessment of boats without spinnakers but with only headsails set flying
6. Improvement of resistance calculation for vertical centerboards
7. Dynarig assessment improvement (eg, MALTESE sailplan)
8. Allowances range revision
9. Penalty for boats not fully measured
10. Revision of allowance for the sail inventory
11. Ketches/Schooner aero fine tuning
12. Furling vs non-furling jib aero assessment
13. Mizzen Staysail effect revision
14. Owner driver allowance
15. Cruising interior definitions
16. Corinthian VPP development
17. Re-wording of the ORCSY rule

A short discussion on the possibility to include the 4-blade propeller PIPA calculation also in the ORC INT VPP (currently the 4 blades are treated as 3 blades prop) followed. The chairman showed some examples of SY 4-blade propellers with twisted blades and very large clearance between the blades when folded. The PIPA formulation that will be implemented in the ORC SY VPP will return a corresponding increase in resistance that would be dangerous to introduce in small boats when a 4-blade propeller may have a different shape, and having less increase in drag.

So the decision was to leave ORC formulation as it is with PIPA for 3 and 4 blade propellers computed in the same way to avoid any possible exploitation.

13. VPP DOCUMENTATION RELEASE

VPP documentation with new 2018 features will be possibly posted at the beginning of the year. During the discussion some incorrect wording on the 2017 documentation was detected and those will be corrected before the new documentation will be issued.

14. RHINO PLUG IN FOR DERIVING OFFSET FILES

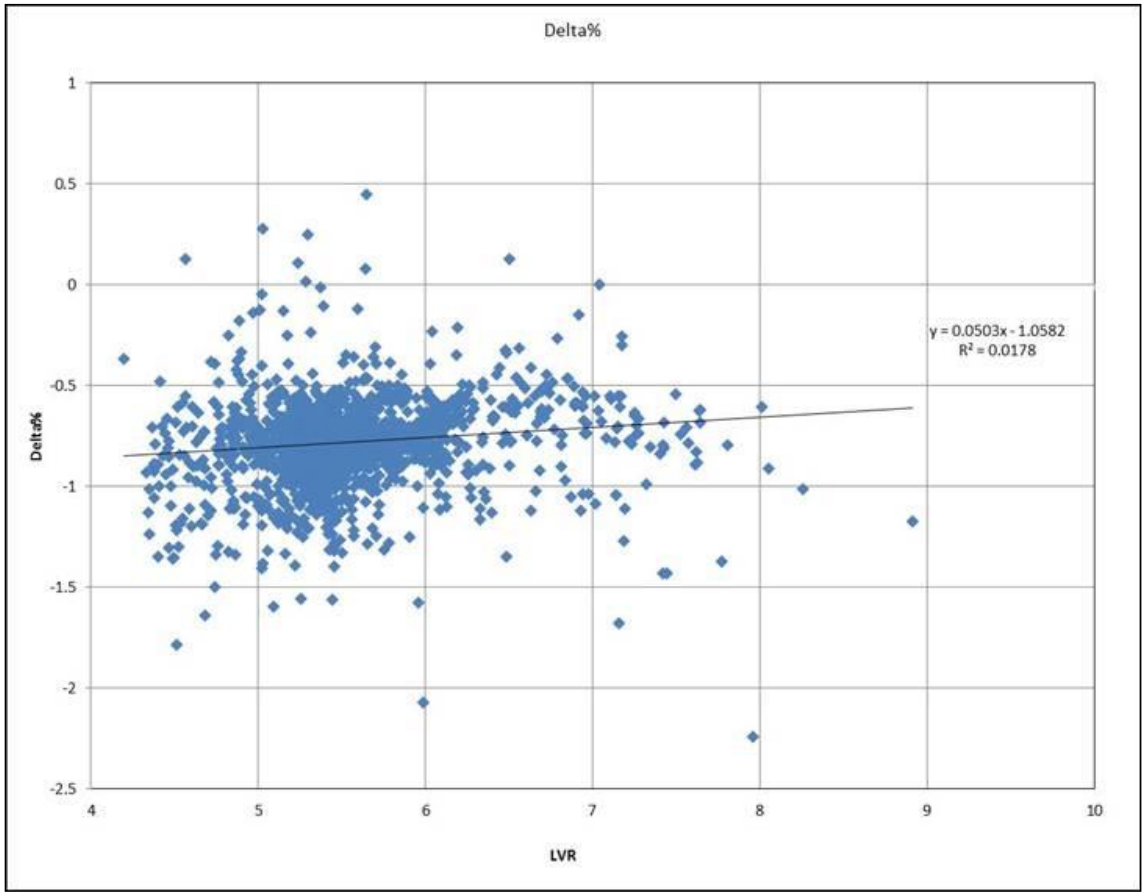
ORC programmer Davide Battistin completed the coding of a new RHINO plug-in for deriving offsets files from 3D surfaces dealt by this McNeel program. He also produced a video that clearly explains the features of this new tool. This product will be made available after further tuning before the end of the year.

15. 2018 VPP: PREPARATION OF AN "ALL-EFFECTS" TEST RUN AND A BETA VPP FOR IMMEDIATE RELEASE

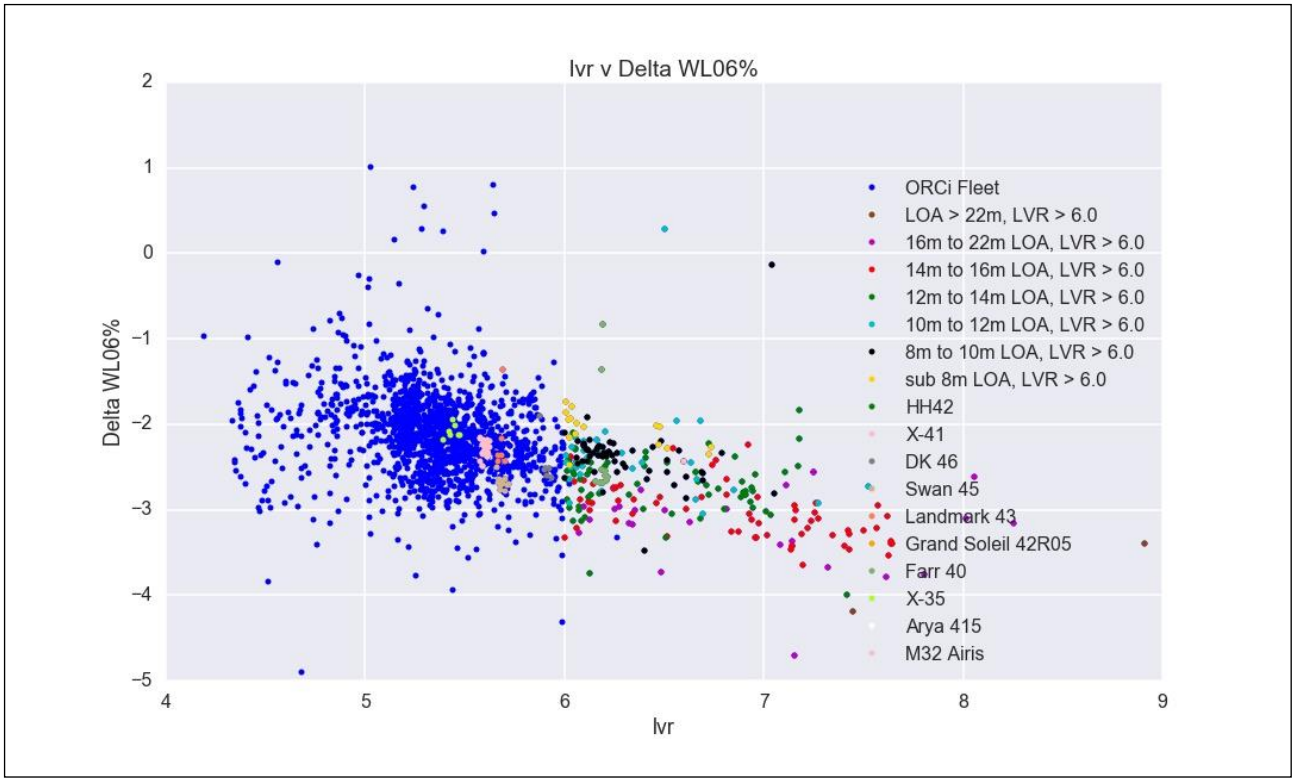
An all-effects test run has been prepared after the meeting with the following features:

- Aero Effective Height +20% (see 4.1)
- Aero Cdo +20% (see 4.1)
- Aero PHIUP formulation halved (see 4.1)
- Aero Power Function updated (see 4.1)
- Induced Drag Formulation updated (see 5.2)
- Crew transversal position modifications (see 5.2)

A corresponding beta VPP has been prepared and the ITC suggests its distribution to RO and DVP users for debugging. The test run showed correct variations in handicaps for the various kinds of boats. An overall effect in GPH variations is represented by the following plot:



The ORC International world's fleet is accelerated by an average 0.75% with the majority of boats between 0.5% and 1.5% (only a few of them are out of this range). Rescoring of major championships did not show any large re-shuffling of results. The single WL handicap variations showed an obviously higher acceleration in the fleet with a slight tendency in accelerating the light boats more (higher LVR, length/volume ratio):


lvr v Delta WL06%
Delta WL06%
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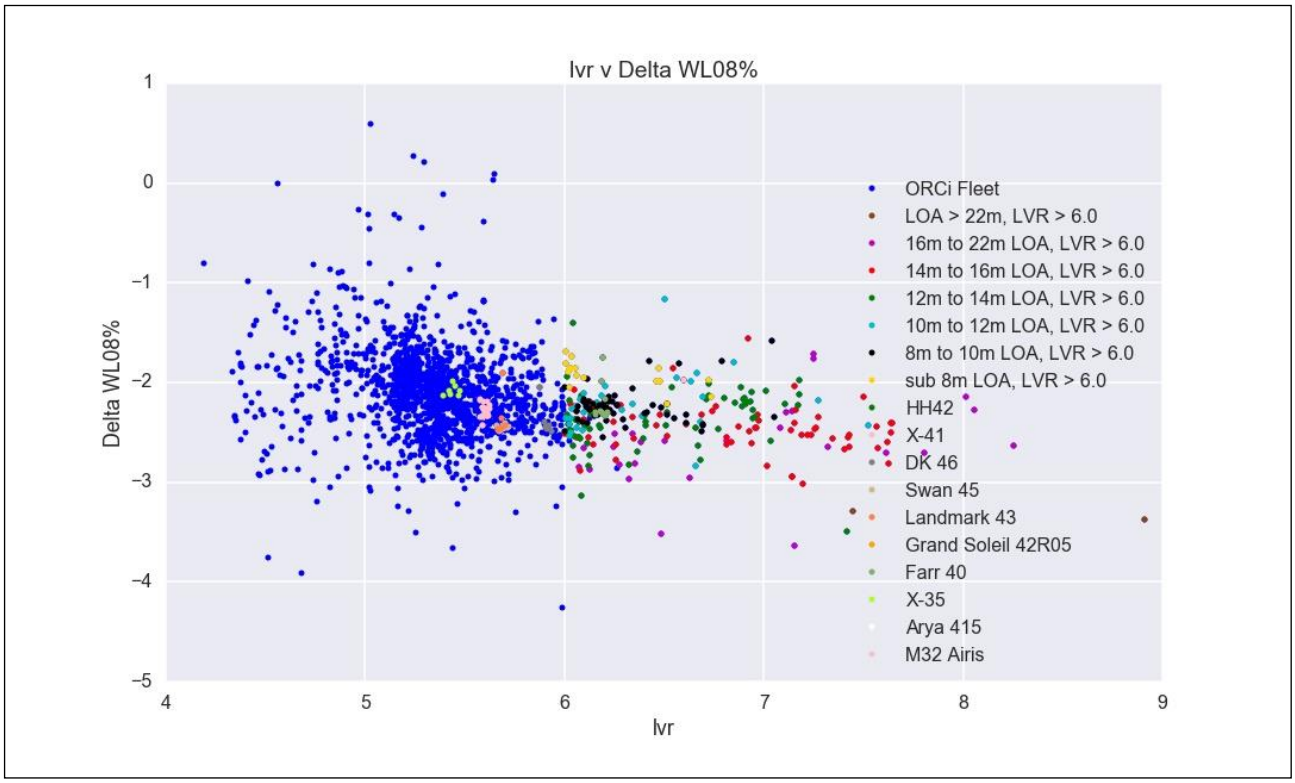
ORCi Fleet
LOA > 22m, LVR > 6.0
16m to 22m LOA, LVR > 6.0
14m to 16m LOA, LVR > 6.0
12m to 14m LOA, LVR > 6.0
10m to 12m LOA, LVR > 6.0
8m to 10m LOA, LVR > 6.0
sub 8m LOA, LVR > 6.0
HH42
X-41
DK 46
Swan 45
Landmark 43
Grand Soleil 42R05
Farr 40
X-35
Arya 415
M32 Airis


lvr v Delta WL08%
Delta WL08%
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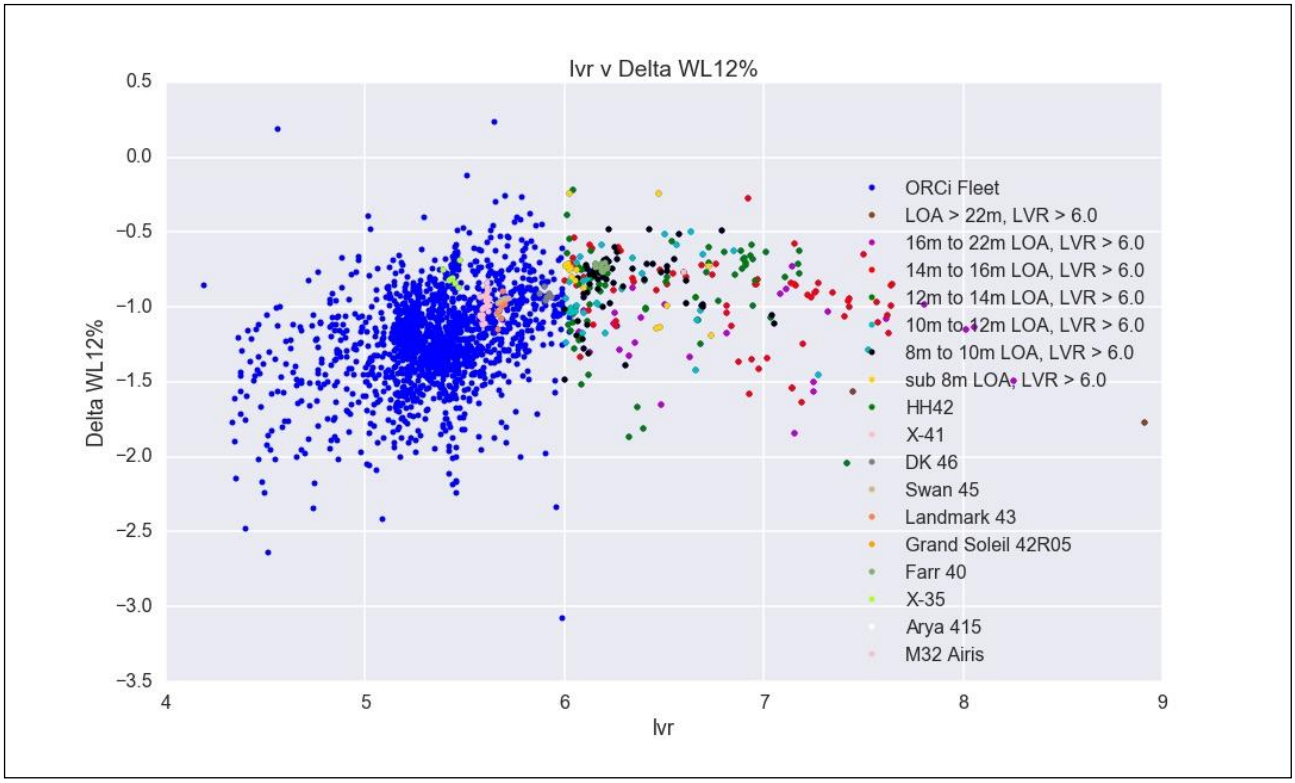
ORCi Fleet
LOA > 22m, LVR > 6.0
16m to 22m LOA, LVR > 6.0
14m to 16m LOA, LVR > 6.0
12m to 14m LOA, LVR > 6.0
10m to 12m LOA, LVR > 6.0
8m to 10m LOA, LVR > 6.0
sub 8m LOA, LVR > 6.0
HH42
X-41
DK 46
Swan 45
Landmark 43
Grand Soleil 42R05
Farr 40
X-35
Arya 415
M32 Airis


lvr v Delta WL12%
Delta WL12%
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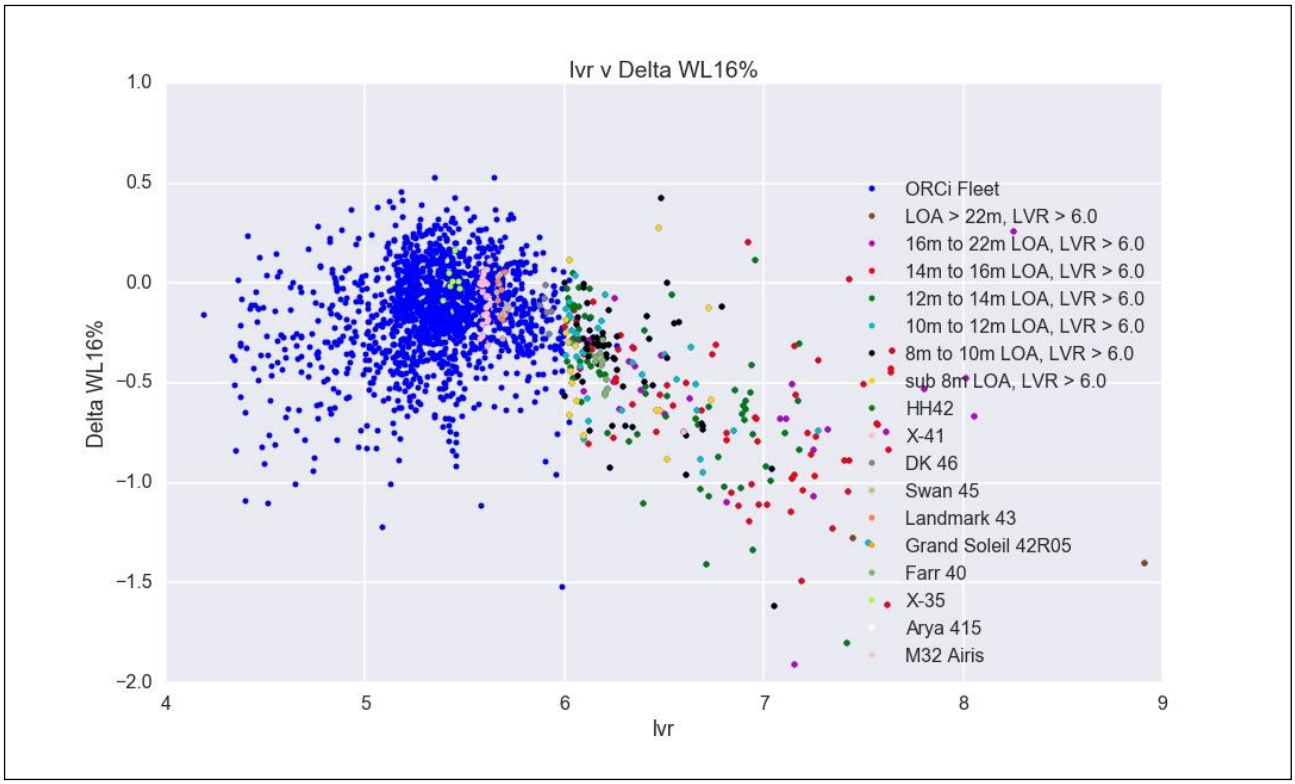
ORCi Fleet
LOA > 22m, LVR > 6.0
16m to 22m LOA, LVR > 6.0
14m to 16m LOA, LVR > 6.0
12m to 14m LOA, LVR > 6.0
10m to 12m LOA, LVR > 6.0
8m to 10m LOA, LVR > 6.0
sub 8m LOA, LVR > 6.0
HH42
X-41
DK 46
Swan 45
Landmark 43
Grand Soleil 42R05
Farr 40
X-35
Arya 415
M32 Airis


lvr v Delta WL16%
Delta WL16%
lvr
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
4
5
6
7
8
9
ORCi Fleet
LOA > 22m, LVR > 6.0
16m to 22m LOA, LVR > 6.0
14m to 16m LOA, LVR > 6.0
12m to 14m LOA, LVR > 6.0
10m to 12m LOA, LVR > 6.0
8m to 10m LOA, LVR > 6.0
sub 8m LOA, LVR > 6.0
HH42
X-41
DK 46
Swan 45
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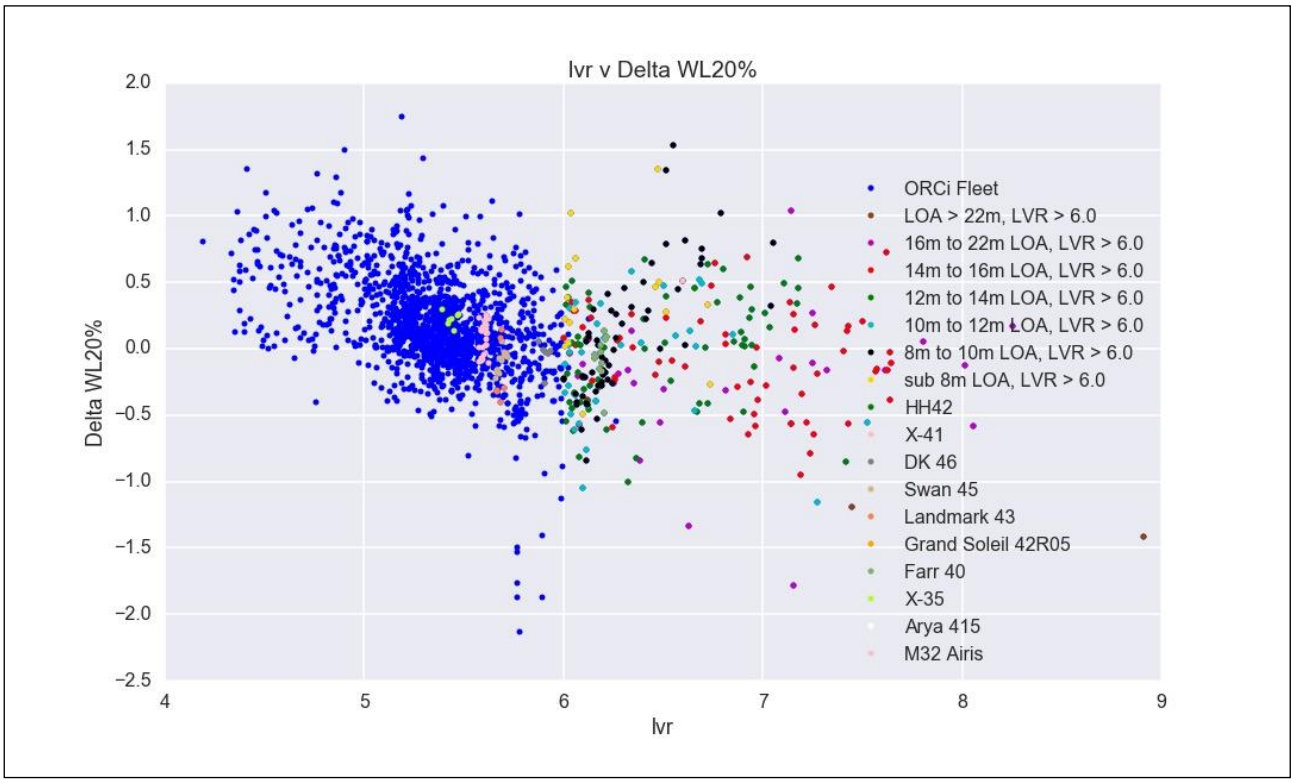


16. COMPLETION OF RECOMMENDATIONS TO THE CONGRESS

- Aero Effective Height +20% (see 4.1)
- Aero Cdo +20% (see 4.1)
- Aero PHIUP formulation halved (see 4.1)
- Aero Power Function updated (see par 4.1)
- Induced Drag Formulation updated (see 5.2)
- Crew transversal position modifications (see 5.2)
- Construction Materials updated (see 9.)
- Minimum Crew Weight for ORC Championship Events (see 3. – USA1 Submission)
- Minimum Station spacing (see 3. – RUS 1 Submission)
- Suggested IW calculation method (see 3. ITA 1 Submission)

17. ORC RESEARCH BUDGET PLANNING FOR 2018

The committee discussed possible research projects that could be funded for 2018 and decided that the funding will be covering the completion of projects already in progress:

- Aero CFD research completion (see 4.1)
- Hydro CFD research follow up and completion (see 5.1)
- Data Analysis with more data log acquisition (see 6.)

The chairman will discuss research funding with the Management Committee in Puerto Vallarta.

18. STRATEGIC PLANNING FOR WORK AFTER THIS MEETING, MAIN PROJECTS FOR 2018

Looking at items already in the agenda and other items coming from submissions deferred to next year, this is the preliminary work agenda for 2018:

- Aero CFD research completion
- Hydro CFD research completion
- Data Analysis with addition of boats that could cover all the characteristics of the ORC world fleet
- Foils assessment
- Default RM formulation

19. NEXT MEETINGS SCHEDULING

Next meeting (2 days) is scheduled on the weekend of the 24th and 25th March 2018 in Athens, in conjunction with Management Committee that will meet in the same week end So the final dates (fri-sat or sat-sun) will be decided later according also to Management Committee schedule to have maximum one day of superimposing meetings

20. ANY OTHER BUSINESS

Spinnaker pole and Bowsprit

The committee discussed for a while the issue brought to ITC's attention by the Chief Measurer and coming also from the Argentinian NA. Some boats find themselves with unfavorable ratings because they carry symmetric spinnakers (flying on a pole) and asymmetrics on CL (that could be on sprit). As a consequence, the VPP treats them as only asymmetric on pole. It was noted that changing the way the VPP works when these two kinds of downwind sails configurations are coupled together is quite complicated, and would need the introduction of some new variables – it is also difficult to police. So the decision was to ask these boats to choose between the two configurations to avoid this treatment.

BLR

Simon Forbes from World Sailing brought to the attention of the committee a submission presented by Australian NA to the WS OSR committee about the use of BLR Index (Ballast Recovery Index). The discussion was focused about the fact that the ITC/ORC would not like to provide BLR as a replacement for what is determined by naval architecture.

The BLR was introduced by ITC/ORC 15 years ago making some assumptions on ISO 12217 FKR and then analysing the fleet distribution of boats of those times with moveable ballast boats to fix the limits. Now ballast systems have changed and ITC does not know how the BLR limits included in the submission have been computed, adding further uncertainty.

A couple of years ago ITC/ORC removed any safety screening factor on LPS and stability index, leaving this job to OSR but still providing the same LPS and Stability Index on the certificate printout. At the end of discussion ITC proposed to print on the certificate the value of BLR, re-introducing in ORC rule 106 the BLR formulation but removing the words "as required by WS OSR."

APPENDIX A – IMPLIED WIND EXAMPLE

The single characteristic of the ORCi handicap system that makes it superior to other handicap systems is its ability to assess both the relative and absolute performance of boats as the wind speed and course configuration varies. Excerpt from the ORC guide to scoring:

Performance Curve Scoring is the most powerful engine of the ORC International (ORCi) rating system. It is this unique feature that makes this rule fundamentally different from any other handicap system, as it recognizes that yachts of varied design perform differently when conditions change.

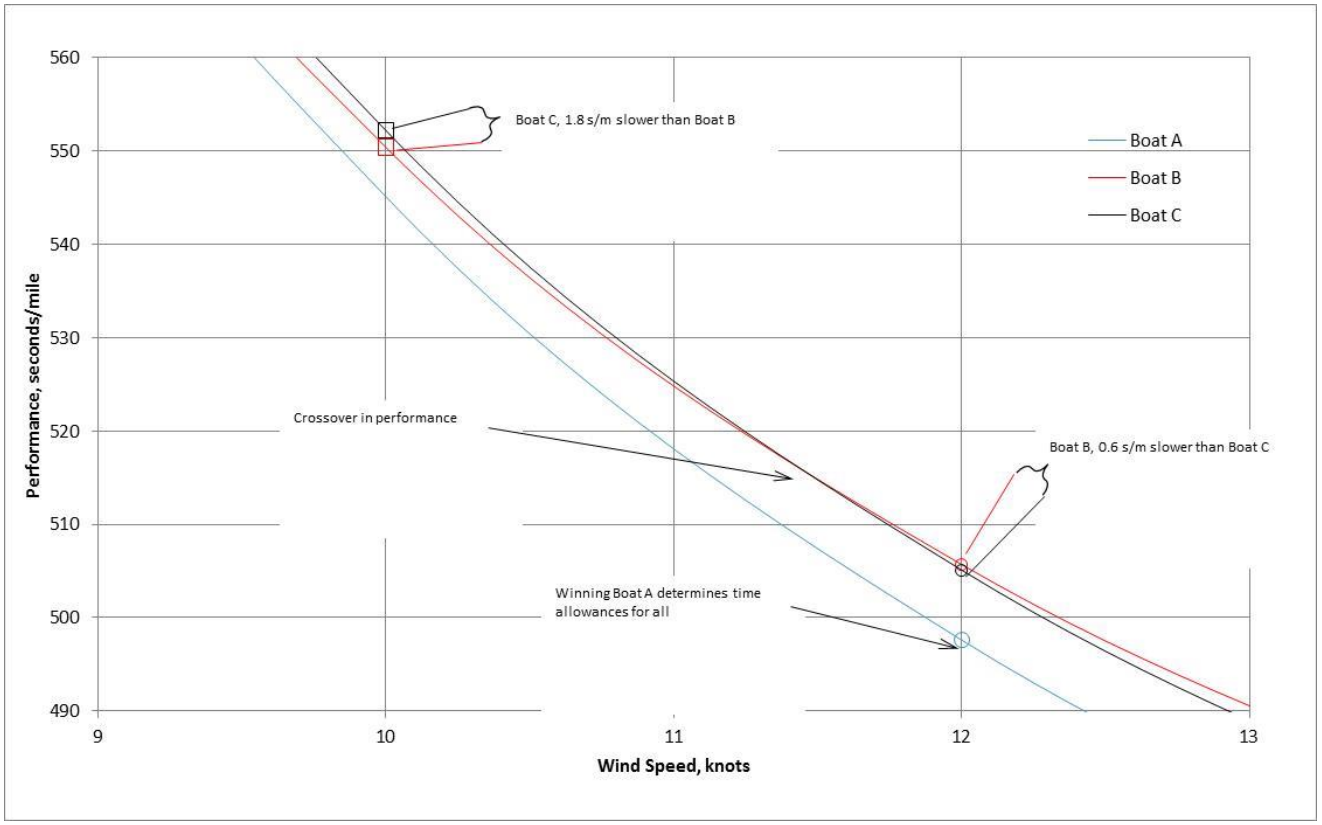
This means that yachts of different designs will have different time allowances in each race depending on the weather conditions and the course configuration for that particular race. For example, heavy under-canvassed boats are slow in light airs but fast in strong winds, boats with deep keels go well to windward and light boats with small keels will go fast downwind.

Performance Curve Scoring allows race organizers to determine the wind speed representative of the wind speed on the course during the race. Because the ORCi system calculates varied performance as the wind speed and course configuration changes, it is important for the representative wind speed to be correctly chosen just as it is important for the course configuration to be correctly chosen. If the wrong wind speed is chosen then the time allowances applied for calculating the corrected times and the results in a race will be incorrect.

By definition, under Performance Curve Scoring the boat that completes a race in the least amount of time relative to its estimated performance will be the winner. Also by definition, the winning boat will have the greatest wind speed (implied wind) associated with its elapsed time and the course configuration chosen by the race committee. It is entirely consistent that ALL boats should be scored with time allowances (predicted performance) based on the achieved performance of the winning boat. Non-winning boats should not be rewarded with a larger time allowance because they have finished with an elapsed time associated with a lower implied wind than the winning boat.

The following table shows the implied wind calculated for a winning boat (A) and two non-winning boats (B and C). The winning boat sails a 10-mile course in an elapsed time of 4967 seconds producing the greatest implied wind of 12 knots. Boat B is OCS and has to return to the start line. Boat C hits several marks each requiring a 360-degree turn. Boats B and C both finish with elapsed times that, if calculated using their performance curves, produce implied winds of only 10 knots. It is not correct to score boats B and C with implied winds of 10 knots because an implied wind of 12 knots was shown to be achievable and represents the best possible performance of the boats. The performance curves of boats B and C crossover between 10 and 12 knots. Boat B beats boat C using time allowances of the 12-knot wind speed. Boat C ties boat B using time allowances of the 10-knot wind speed (see plot below).

Time Allowances, s/m			Elapsed Time	Time Allowance diff, 12 knots	Corrected Time, 12 knots	Time Allowance diff, 10 knots	Corrected Time, 10 knots
	10 knots	12 knots	sec	sec	sec	sec	sec
Boat A	545.1	497.6	4976	0	4976	0	4976
Boat B	550.4	505.7	5504	81	5423	53	5451
Boat C	552.2	505.1	5522	75	5447	71	5451



Scoring methods that use time allowances derived from non-optimum, slow performances incorrectly favour boats that are relatively slower than their competitors in lighter winds.

5th November 2017