INTERNATIONAL TECHNICAL COMMITTEE

Meeting
held on Friday, 11th - Sunday 13th October
in Utrecht, Netherlands

M I N U T E S

Present: Alessandro Nazareth (Chairman), Jason Ker (UK), Andy Claughton (UK), Nicola Sironi (ORC Deputy Chief Measurer), Antoine Cardin (FRA-GER), Rob Ranzenbach (USA), Matteo Polli (ITA), Zoran Grubisa (CRO-ORC Chief Measurer), Panayotis Papapostolou (GRE-ORC Programmer), Davide Battistin (ITA-ORC Programmer), David Lyons (AUS), Manolo Ruiz de Elvira (Spain)

Apologies: Apologies for absence were received from Jim Schmicker (USA) and Research Associate Lex Keuning

Observers: Michiel Woort (Holland – Watersportverbond), Peter De Jong (Holland – Watersportverbond), , Simon Forbes (UK – World Sailing), Philippe Luke (HOL – Hoek Design), John Victorin (GER), Arthur Peltser (Holland), Roberto Biscontini (ITA), Willem Ellmeet (Holland), Vassili Alexeiev (RUS), Raymond Roesnink (Holland), Wick Hillege (Holland - TU Delft)

1. Welcome, meeting logistics

The Committee thanks Peter de Jong, Michiel Woort and Watersportverbond for organizing the meeting in their offices in Utrecht.

2. Review of July 2019 meeting minutes

The minutes of the last meeting in Valencia of July 2019 were approved with no amendments nor discussion.

3. Report from Chief Measurer on the 2019 season

3.1 Default RM

See USA 6 Submission

3.2 Manual rudder

To balance the treatment of boats with manual rudder and boats with rudder in the OFF file (currently there is an automatic adjustment in L for manual rudders to obtain similar rated length with the other boats) the committee agreed with Nicola Sironi suggestion to transform all rudders measured in OFF files into manual rudder using the values computed by LPP from OFF files. This approach will be included into LPP 2020.

3.3 Rating sensitivity on the post-race measurement checks

There were few complaints or issues raised during the season. Zoran Grubisa noted that some measurement issues arose during the Sportboat Europeans Championship for freeboards and weight checks, as the dimension of the boats makes the one mm approximation of freeboard measurement quite effective on the handicap, often going outside the tolerances set in ORC rule 305.2. For the future it should be studied if those tolerances should be increased for Sportboats, but the concern is that everybody will use the increased tolerance for tuning the handicap.

The above issue is mainly found in small boat where as an example the 1 mm approximation on freeboard measuring is quite effective on the handicap, often going outside the tolerances set in ORC rule 305.2. No action was decided at this time

4. Submission Review

ESP 1- CREW WEIGHT IN SAILING TRIM

The Committee believes that to avoid the issue described on the ESP1 submission the RO should enforce rule 102.3 that fixes the Minimum Crew Weight. The submission is therefore not supported.

ESP 2 – MEASUREMENT PROTEST

ITC thinks that decreasing the tolerance for measurement checks will create more problems in every control during an event (0.1% of GPH is already a very low tolerance and the committee believes that for Sportboats it should be even increased). The submission is therefore not supported.

ESP3 - FSP MEASUREMENT

This submission is deferred to Measurement Committee as the FSP input could be adjusted internally by VPP according to the way it is measured.

ESP4 - DYNAMIC ALLOWANCE FOR PERFORMANCE BOATS

In the ORC INT world fleet about 980 boats are “Performance” Division, with DA ranging from 0 to 0.6% (max DA for real cruising yacht is about 1.5%). Only very few (about 60) have a DA over 0.25%, but whatever is the DA assigned the Committee believes that Performance boats deserve some DA only if they are very old, so from 2020 the DA will be applied fully only to boats with an Age or Series Date above 30 years (1990 or before for 2020 VPP)

ESP 5 - USE OF ASYMMETRIC SPINNAKER

The ITC, to avoid such an issue, will propose to amend rule 304.1 c) ii) requiring that the maximum area of each kind of sail (mainsail, headsail, headsail set flying, symmetric and asymmetric spinnaker, mizzen and mizzen staysail) that will be on board when racing shall be recorded on the rating certificate. The submission is therefore not supported.

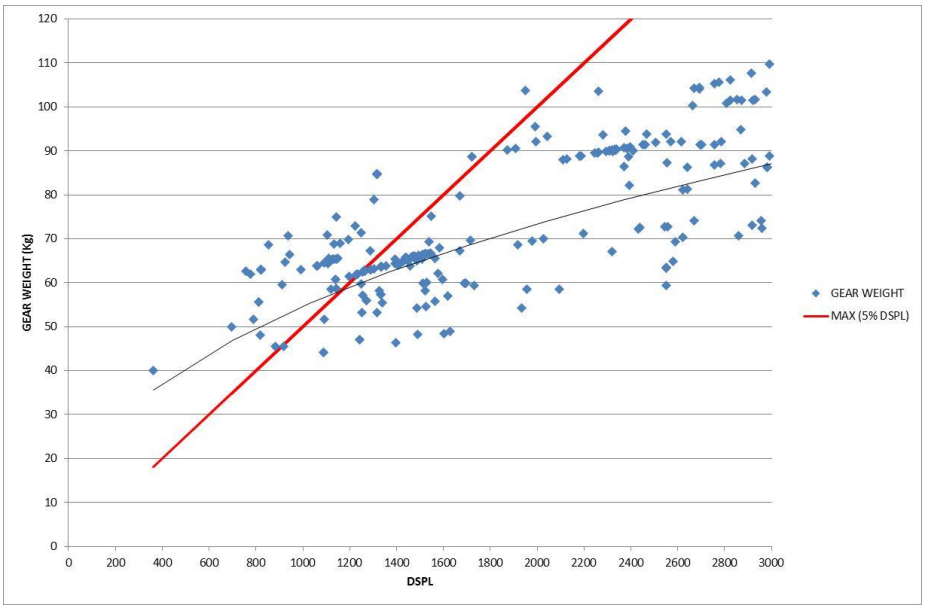
MANCOM 2 – ORC DOUBLE-HANDED CERTIFICATE

The committee support the submission but believes that the current ORC VPP allows to build any kind of scoring option. By the way following the ManCom not-written request the ITC is working on two new scoring options (PREDOMINANT UPWIND and DOWNWIND) that will be included in the specific printout of the certificate. The above scoring options will be built with the same approach as the OSN was built some years ago concentrating the allowances in the upwind and downwind regions.

RUS 1 – EQUIPMENT AND GEAR WEIGHT ON SMALL BOATS

The committee studied the issue of gear weight and revised all the default weights added to the measurement trim to compute the sailing displacement, including also the sails weight. The default gear weight was considered correct apart from boats under 2000 kgs so a limitation is proposed to be introduced (max gear weight = 5% MEASURED DSPL).

The following plot shows the distribution of gear weight at various displacements, with the red line representing the 5% limit and it could be seen that the affected boats are mainly below 2000 kgs, in some way answering the Russian submission.



The sails weight (mainsail and other sails) was then revised using actual sail weights from a relatively small (7.3 m LOA) and a medium-large (15.8 m LOA) boats and relating the weight to pressure (from Righting Moment) and sail area. The new formulations are:

*Mainsail weight (MW) = K1 * 0.00065 * Area_Main**2 + Area_Main * 0.12 + 1.5*

*Other Sails weight = JIBW * INT (Max(Limit_Headsail / 2, 1))+ SPW * Limit_Spinnaker * 0.6*

where

*JIBW (jib weight) = K1 * 0.00091 * Area_Jib**2 + Area_Jib * 0.12+ 1.5*

*SPW (Spi weight) = Max(K1 * 0.0013 /30 * Area_Spin**2, 0.08 * Area_Spin)*

*K1 = rm25 / (0.43 * (P + BAS + Draft_Measurement_Trim + HBI)) / (Area_Main+Area_Jib)*

*rm25 = GZ25 * (Dspl_Measurement+CrewWt)+CrewWt * BMax / 2 * 0.906*

*Limit_headsail = (0.23*LSM0+3.16)*

this formula was selected to match existing ORC rules for maximum # of sails that can be allowed onboard but using LSM0 rather than CDL (which is only known after the certificate is run)

*Limit_spinnaker = (0.23*LSM0+1.16)*

this formula was selected to match existing ORC rules for maximum # of sails that can be allowed onboard but using LSM0 rather than CDL (which is only known after the certificate is run))

RUS 2 - LONGITUDINAL CREW POSITION

The committee discussed the proposal contained in this submission and it was noted that the current VPP already includes an optimization of longitudinal crew position in the transom drag formulation. By the way ITC thinks that when the Hydro CFD research will be completed a new transom drag formulation will be introduced (hence with optimization of longitudinal CW position) so this item will be included also in 2020 ITC agenda

USA 3 - PCS SCORING

ITC believes that PCS should always be the preferred scoring option, obviously when RC has all the tools to measure wind conditions and directions for each leg of the race. By the way PCS may not always be the best option as in some weather conditions with very variable and instable winds, so a rule that obliges to adopt PCS based on a factor computed on the entries could return bad results. The submission is therefore not supported

USA 5 - MULTIPLE HEADSAILS SET AT THE SAME TIME

It was brought to the committee attention the following sail configuration showed in this picture:

The above is not allowed in ORC rule because of rules

- 208.3 (tack pennant too long)
- 208.6 (More than one headsail set at the same time)

The ITC has no concerns in removing both rules just modifying the minimum HSF area with the formula below:

HSF Min Surface = ISP*TPS/2

and having the VPP using tight luff coefficients for the above HSF minimum surface.

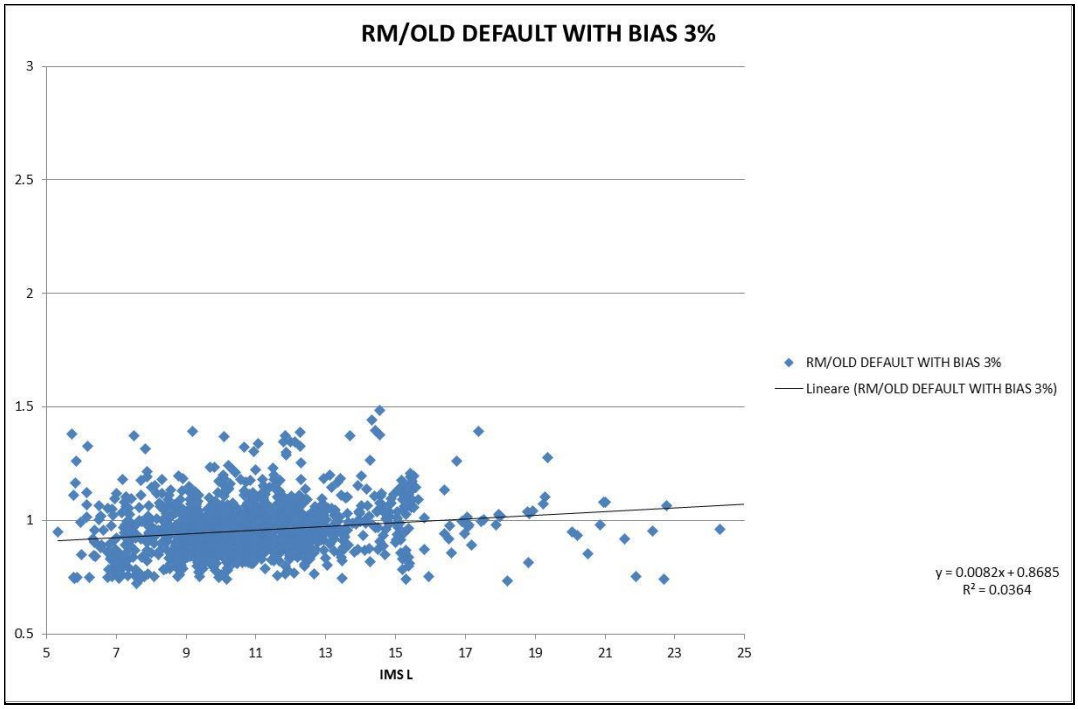
The submission is therefore supported

USA 6 - DEFAULT STABILITY FOR ORC CLUB

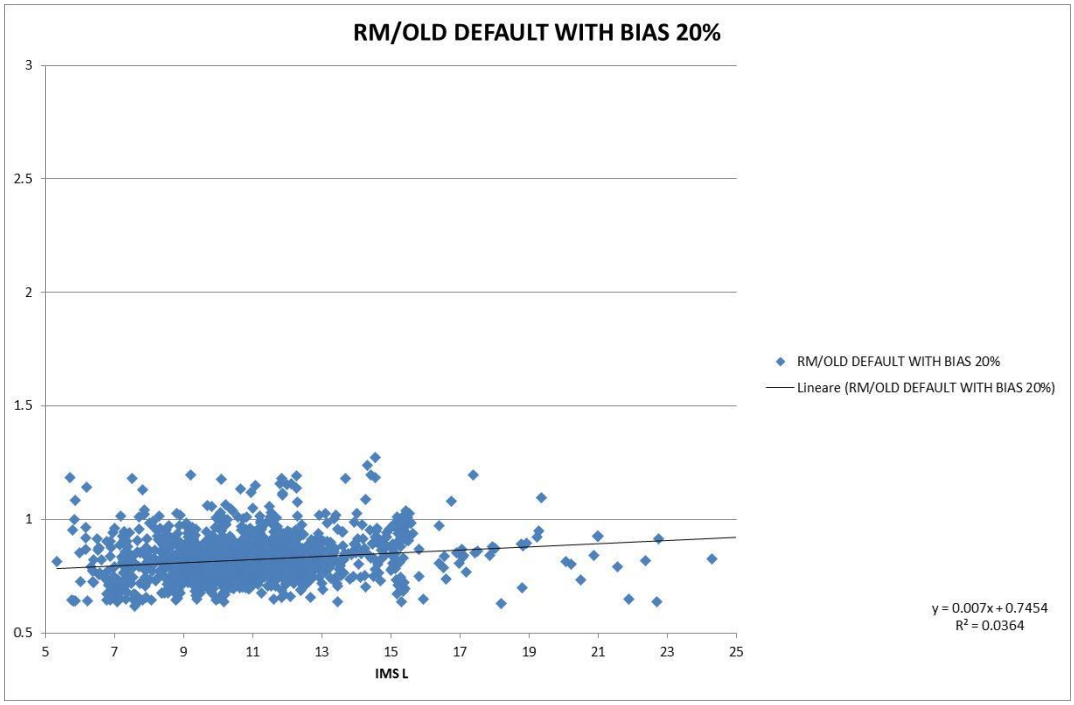
All RO's have all the tools to assess stability of ORC CLUB boats in the best way using measured stability or measured stability of sisterships. So ITC disagree to downgrade all ORC CLUB measured certificate by adopting the approach proposed by this submission.

It must be noted also that Default RM is under revision since many years and ITC is studying a new formulation for ORC CLUB boats without any stability data measured. This was under revision to try to limit the number of boats that get an advantage with CLUB certificates in non-measuring stability. New regressions based on ORC INT boats measured stability were tested but without a better correlation with measured stability.

To reduce so the number of boats that could have a lower default RM than the measured one, the current 3% BIAS should be increased. Here below two plots are included where the effect of the bias is clearly shown. On the vertical axe is the ratio between measured and default (over 1 means that default is lower than measured). All the boats above 1 will get a disadvantage if measured.



To avoid this the BIAS should be increased a lot, further penalizing boats with low estimated stability (see below with 20% where some boats still remain above 1):



For this reason the ITC decided to keep unchanged the current BIAS and not to support the submission.

5. Aerodynamics

5.1 Upwind Aero Model CFD research update

A further development of the CFD analysis will be performed in 2020. Jason Ker and Rob Ranzenbach will send a proposal with "reduced" budget to be made with WOLFSON UNIT Virtual Wind Tunnel. The study will run additional models of overlapping sails with sheeting angles taking into account chainplate width. The objective is to tune the new Aero model for overlapping jibs but possibly also to check the current formulation of:

- Fractionality
- Square top mainsail
- Aspect ratio of sailplans

NORTH SAILS and QUANTUM will be asked to provide flying shapes of sails to form the basis of the study.

5.2 Revision of TWIST function

Antoine Cardin made a thorough revision of the TWIST function to be more congruent with current way of depowering of boats in a way also to promote stability. The TWIST function, that is related to flat factor, was doubled reducing also the flatmin to 0.1 before beginning to reef. In the first test tender boats seems accelerated and heeling less, while stiff boats don't change too much.

Antoine went on working on these items coupling the effect of the new TWIST function with the complete removal of Default RM correction in RM used for VPP and also of the so called PHIUP function and re-introducing the 20% Heff increase that was not implemented in 2017.

A test run of the new depowering system described above has been prepared and analysed but a not desired disruption on the fleet has been detected although the amendment proposed is surely good physics. For this reason, the Committee will continue inspecting the depowering and will keep this in 2020 agenda.

6. Hydrodynamics

6.1 Hydro CFD research Update

Jason Ker presented a report about current situation of Hydro CFD research . A clear point spread has been found between the CFD points of the original test fleet (circa 500 boats) vs the baseline boat surfaces, with a greater spread found at the lower Froude Numbers.

A significant part of this discrepancy is transom drag, which has had a large 'polluting' effect on many of the data points, including up to and above the critical sailing region of FN 0.355, so transom drag became the focus of the Hydro Project. From Valencia meeting this work has been done:

- Create additional CFD data points in OpenFOAM to provide a collection of resistance data and wave surface STL files for investigation.
- Create a direct regression model for Sink and Trim using the CFD data.
- Using algorithms presented in Lawrence Doctors' 2006 paper 'A Numerical Study of the Resistance of Transom-Stern Monohulls', determine the length of a virtual 'Cone' hull extension behind the transom.
- Add the cone to the curve of areas and determine an additional effective length.
- Deduct 'transom drag' using the Horner algorithms currently used in the rule, possibly also investigating difference between RANS and Inviscid codes (Antoine's Das Boot)
- Create new residuary resistance surfaces using the new CFD data points and revised length, perhaps including some additional parameters beyond LVR, BTR & FN.

To take this project forward the ITC agreed the work should be split into two stages:

Transom Drag Model – for presentation at the March 2020 ITC meeting

- Script the export of streamline data from the CFD results to plot the flow leaving the transom. Determine the length of the clean flow cone for the CFD fleet.
- Use the streamline data to construct geometries with transom scoops (as a secondary patch) and rerun some existing CFD data points using fixed 'final' sink and trim. Calculate the transom drag of the original boat by comparing the two results and deducting the viscous drag of the new transom scoop patch.
- Compare the Drag values found with those predicted by Hoerner and determine a correction method (probably based on the shape of the immersed transom – circular or otherwise).
- Validate the formulation by running dedicated CFD sweeps (both with physical scoop and without) through fixed trim angles (or by adjusting the CoG fore and aft) to force the transom to run at different levels of wetness, and check the formulation works correctly.

Residuary Resistance Model update – for presentation at the July 2020 ITC meeting

- Use the transom drag model from stage one to cleanse the CFD dataset of its current transom drag.
- Use the streamline based transom scoop method to construct an effective length modification model (likely based on Froude No., LVR, BTR and some additional measurable ratios local to the transom and bow)
- Update the Residuary Resistance surfaces based on the new length measurement method.

The above work could allow to obtain a revised Residuary Resistance formulation with new Transom Drag and length assessment to be tested for inclusion in the VPP 2021

6.2 Heel effect on hull balance

Andy Claughton presented last year a proposal for addressing heel balance of boats and induced drag dependency on heel (Di factor). Davide Battistin coded a routine following the above approach and produced a test run, but the ITC believes that the results are still not as expected so this item will be kept into 2020 agenda as it is an important effect that should be included into the ORC VPP.

6.3 Foils assessment in VPP

Geometry Definition

ORC programmer Davide Battistin almost completed the new LPP code that will have the possibility to handle more complex foils geometry. For the input it has been suggested that IGES files of the foil surface are a preferred format to obtain a better geometric representation of the foil. The LPP MKII will be easily adapted to perform calculations at any freeboard and heel angle and can easily read an appendage like the foil. Then it will be then rather straightforward to add any 'force model' to it and perform the equilibrium solution also having to free the vertical degree of freedom for the foils configuration.

The new LPP will be firstly introduced in the new born MH VPP at the end of this year and further tested while it needs some more time to be introduced into ORC INT VPP, so the foils treatment will be kept in stand-by for next year until the validation of the new LPP will be completed.

VPP Formulation

If any foil boat will need to be rated in 2020 the VPP has all the tools to issue and "experimental" certificate with this feature. In 2021 the foils routine will be fully integrated into the ORC INT VPP. It is anticipated that during 2020 the CFD study on foiling monohulls, described in Section 8, will be completed by a working group of Antoine Cardin, Jason Ker and Andy Claughton. Once completed this will surely improve the current experimental code (see par.8).

6.4 Added resistance in waves upgrade – Gyradius adjustment revision

Antoine Cardin worked on a thorough revision of current wave energy curve formulation presenting a proposal that is differentiating more small from big yachts (similarly to what was already proposed by ITC in 2016 that was then halved in the effect to avoid big disruption in the fleet).Matteo Polli worked in parallel on the formulation of mast weight gyradius increment that last year was conservatively halved as the committee was not comfortable in going on with the present code for as some strange results happened.

Matteo noticed some strange result in default mast weight calculation that should be checked and was proposing to remove the 0.5 coefficient in the gyradius adjustment and reduce the multiplier in the formula for added resistance from 0.01575 to 0.010:

f(Kyy) = 0,01575*(GYR-0.25).

as this would work better in the desired direction. A corresponding test run was prepared and ITC suggested to include this in the 2020 VPP. Finally, with the support of the Delft Technical University and their published archive the Added Resistance in Waves formulation will be checked from the ground up.

6.5 Keel frictional resistance revision

Manolo Ruiz worked on a revision of keel frictional resistance. Here is an excerpt of his report on the above:

FLAT PLATE FRICTION COEFFICIENT

The current model uses a transitional model for the calculation of the flat plate friction coefficient which is very flat in the range of values of the Rn for yacht appendages. This is caused by the presumption of a transitional flow situation which is probably accurate for ideal clean surfaces. In terms of flat plate friction coefficient, the use of the ITTC57 friction line changes this, assuming a fully turbulent flow and thus reducing the coefficient in a 17% when going from a Rn of 1 million to 3 million. Not insignificant but also not dramatic. This would be in line with the assumption of a Ncrit number between 2 and 3.

The effect of this change is a reduction in the friction coefficient for higher Reynolds numbers and this increases boat speeds. The consequence is that larger and faster yachts are accelerated so there is a net rating benefit for smaller and slower yachts (or small chord lengths in general, everything being equal would favour appendages with shorter chord lengths).

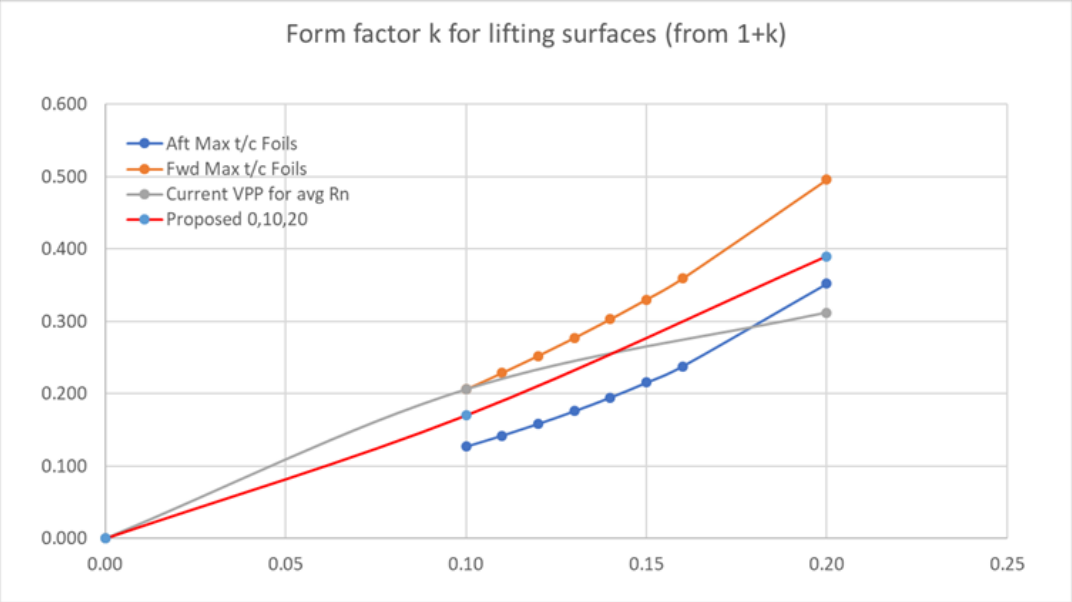
The planned proposal was the use of the ITTC friction line: Cf0=0.075/(Log10(Rn)-2)^2 for the calculation of the Cf0 (flat place frictional coefficient). However, given that the proposed (turbulent) friction line provides significantly higher friction coefficients the fleet is significantly slowed down (around 8 seconds in GPH), very especially in results for 6 and 8 kt of TWS. The ITC feels that this needs a more detailed review and thus this change will be considered for the 2021 VPP but not for the 2020 VPP.

Along with a more detailed review of the effects of the change in the friction line the form factor applied to hulls will be consider as it may be too high. A change in the appendage's friction line in conjunction with the hull form factor may reduce the global impact on the fleet. Also the friction drag treatment for the hulls could be reviewed.

FORM FACTOR DEPENDENCY WITH THE THICKNESS-TO-CHORD RATIO (TCR)

In terms of effects of thickness to chord ratio on the drag coefficient the ORC coefficients are pessimistic for thin foils (10%) and optimistic for thick foils (20%). Given that the "perception" is that thick keels are disfavoured the proposal is to modify the current effect of TCR on the final friction coefficient.

The following graph shows standard approaches for the "k" value of the form factor, defined as (1+k) where k is zero for a flat plate. The blue line represents the change of the k value for more laminar foils, the orange one for fully turbulent foils and the grey one the current approach in the VPP.



The Red line corresponds to the proposed change formulated as:

cff = Cf0 * (1 + (1.45 * tcr + 2.5 * tcr^2))

which represent a k value (from a form factor formulated as 1+k) of 0.17 for tcr=0.1 and 0.39 for tcr=0.2. In order to implement this value in the current code new coefficients are derived for tcr=0.1 and 0.2. The original values:

REYNOLDS_NUM	1000	3162	10000	31623	100000	316228	1000000	2511886	6309573	15848932	50118723	199526231
cdf_tcr0(nrey)	0.04456	0.02485	0.01386	0.00773	0.00495	0.00346	0.00300	0.00300	0.00300	0.00281	0.00239	0.00196
cdf_tcr10(nrey)	0.06222	0.04207	0.02893	0.02020	0.01074	0.00499	0.00362	0.00362	0.00362	0.00339	0.00288	0.00236
cdf_tcr20(nrey)	0.06486	0.04412	0.03051	0.02142	0.01150	0.00540	0.00394	0.00394	0.00394	0.00369	0.00314	0.00259

would be replaced by (values in colour are replaced, red values are manually edited to different form factors to maintain the trend but correspond to values of Rn in general outside of the area of interest with only one set corresponding to very small rudders at extremely slow speeds and thus having an insignificant impact on results).

REYNOLDS_NUM	1000	3162	10000	31623	100000	316228	1000000	2511886	6309573	15848932	50118723	199526231
cdf_new_tcr0(nrey)	0.04456	0.02485	0.01386	0.00773	0.00495	0.00346	0.00300	0.00300	0.00300	0.00281	0.00239	0.00196
cdf_new_tcr10(nrey)	0.06100	0.04100	0.02830	0.01970	0.01040	0.00480	0.00351	0.00351	0.00351	0.00329	0.00279	0.00229
cdf_new_tcr20(nrey)	0.06600	0.04500	0.03150	0.02200	0.01230	0.00580	0.00417	0.00417	0.00417	0.00391	0.00332	0.00272

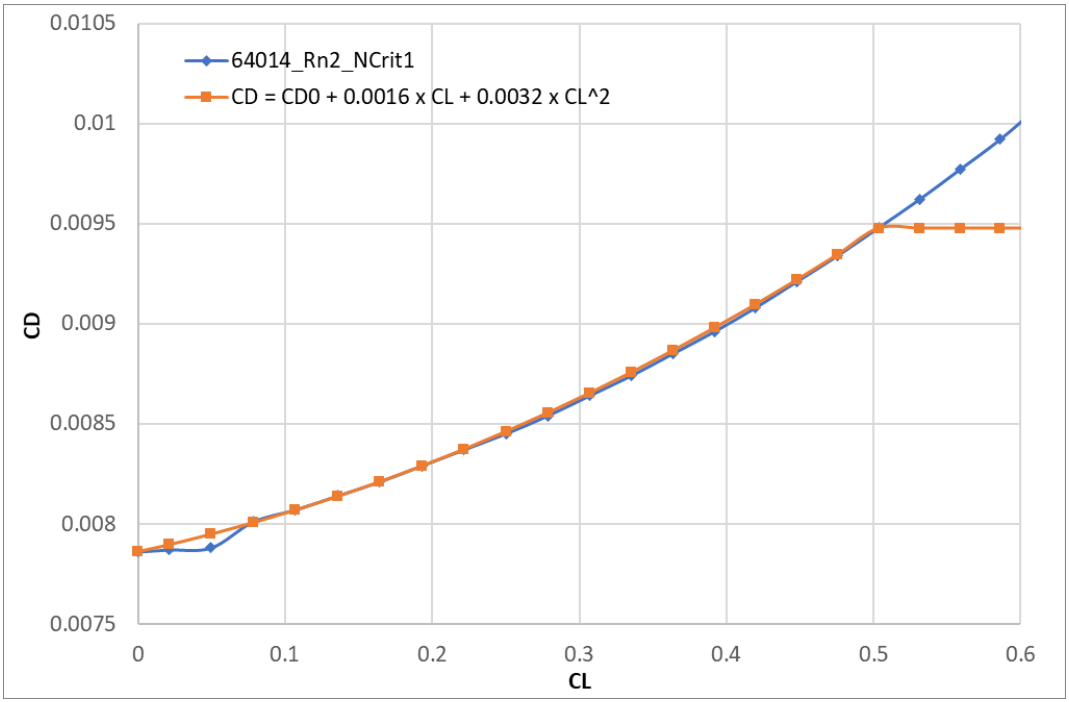
So, the proposal to implement in the 2020 VPP regarding appendages frictional drag is the use of the new form factors to provide some relief to thick keels. The choice of form factors is such that keels with a tcr=0.14 will see no change.

VARIATION OF THE APPENDAGE DRAG COEFFICIENT WITH THE LIFT COEFFICIENT.

Up until this moment the VPP has no consideration for the influence of the CL on the CD of keel and rudder. As a consequence, there is a penalty for appendages which operate at higher values of CL (either because they have small appendages, larger stability of low boat speed). In order to take into account this, the effects of the CL on the CD were evaluated using as a reference a NACA 64014 foil for a Rn of 2 million and a Ncrit value of 1 using Xfoil. The proposal is to use an approximate interpolation polynomial was fitted to the results corresponding to:

CD=CD0 + 0.0016 x CL + 0.0032 x CL^2

With the increase of the CD being capped to that corresponding to a CL of 0.5. This means that no yacht will see an increase in the calculated keel and rudder viscous resistance greater than about 20%
The following graph shows the results in blue and the fitted correction proposed:



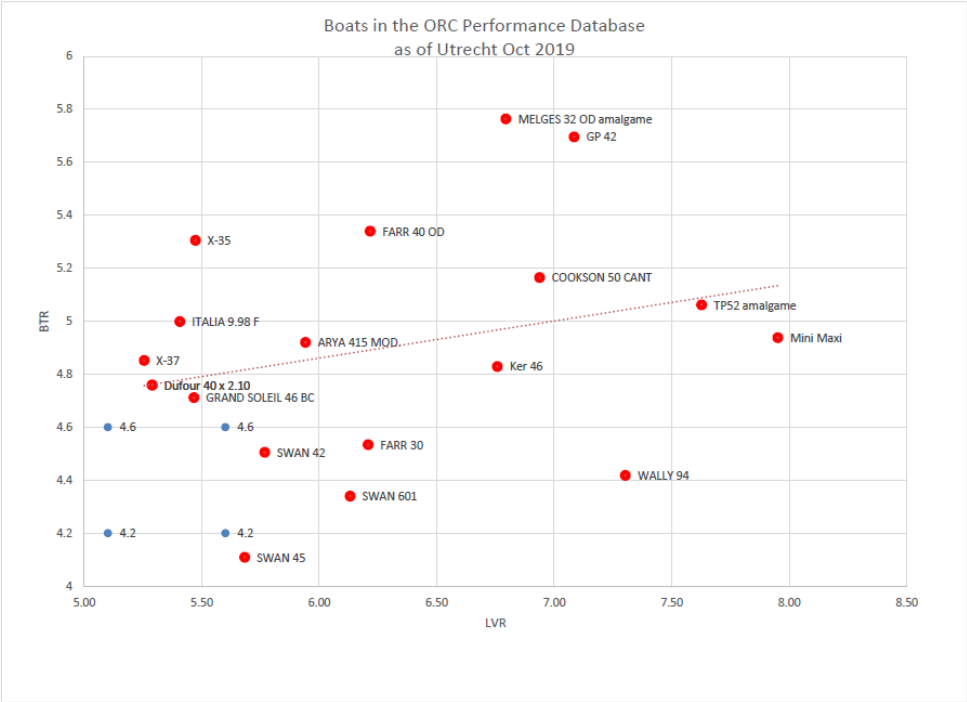
The keel and rudder CL values are to be calculated based on the estimated side force load sharing which changes with the heel angle. The new form factor and CD as a function of CL will be included in 2020 VPP

7. Data acquisition - Database status

Rob Ranzenbach made an update of current situation of Database. The following boats are currently loaded into ORC database for VPP comparison (all boats have been processed and analysed by KND to check if the data is suitable)

1. TP52- 4 boats in KND database
2. Farr40- Plenty (owner supplied data logs)
3. Melges 32- 2 boats in KND database
4. Wally 94- Magic Blue (owner supplied data logs)
5. JV72- Momo (owner supplied data logs)
6. Swan 42- Selene (owner supplied data logs)
7. Lady Mariposa Ker 46 (owner supplied data logs)
8. X37- Hansen (owner supplied data logs)
9. Swan 45- Elena Nova (navigator supplied polar transformed to 10 M)
10. GP 42- Silva Neo (navigator supplied polar transformed to 10 M)
11. Dufour 40 Performance- Flying Dolphin (owner supplied data logs, but KND expressed some concern about data quality)
12. Italia 9.98 Low Noise: Polar provided by Matteo Polli, but KND expressed some concern about data quality
13. Cookson 50 Mascalzone: Polar provided by navigator, but KND but expressed some concern about data quality
14. Swan 601- Flow Polar provided by KND but expressed some concern about data quality (Thanks Nicola)
15. Pazza Idea Arya 415 (from 2019 Worlds)
16. Moxie X35 (from 2019 Worlds)
17. Heat Farr 30 (from 2019 Worlds)
18. Luduan Reloaded GS 46R (from 2019 Worlds)

The following plot shows a distribution of current database in the LVR-BTR plane:



KND has also data of the following: X41 Beneteau 36.7 in both configuration (overlapping and non-overlapping jib. ITC will continue to collect data logs during 2020and invites all owners to cooperate for improving this important tool.

8. SYRF-ITC collaboration projects

Andy Claughton presented a report about the development of a research project to develop force models for semi foiling monohulls like the Figaro 3. The project will be jointly funded by ORC and the Sailing Yacht Research Foundation (SYRF). The technical scope of the project was developed through consultation with SYRF and their input has ensured that the work will be conducted to the best standards. The ITC would like to thank SYRF for their efforts in this regard. Following is the Introduction and Summary sections of the Proposal.

SYRF – ORC
Joint study to develop handicapping method for foil supported yachts.
5th September 2019

1.1 Introduction.

There is an increasing demand to create handicap polars for yachts that have foils which produce dynamic righting moment and partially support the yachts weight. The following proposal describes a program of CFD studies to generate data on a range of “typical” yachts. The test matrix would also be designed to feed into the parametric1 force models used by the ORC. This study aligns with the SYRF mission statement, and the current ORCi and ORCmh development road map.

1.2 Summary.

A RANS CFD study will be carried out to determine the hydrodynamic performance of a range of contemporary racing yachts which use lifting foils deployed on the leeward side of the hull. The CFD simulation will deliver overall forces/moments of the combined hull and appendage package and individual components. The CFD models will be adjusted to ensure that local lift coefficients are modest to ensure reliable simulations.

The simulated local foil viscous drag coefficients will be checked against published data. The adequacy of the surface piercing simulations will be assessed against published data. The analysis method of described in Reference 1 (a physical model test to some common foil types) will be adopted. It is anticipated that the induced drag factor and drag due to heel will vary in a plausible and smooth manner.

Members of the ORC International technical committee will compile a report on the study, containing the geometry, test results and images and the raw CFD output at a component level in the platform agnostic VTK format.

The proposal contains the following information:

- Description on the RANS CFD that will be used in the research
- Kind of racing boats that will be included in the configurations studied with the different shapes of foils
- The scope of work and the method that will be used
- The Verification and Validation process
- Budget
- Deliverables
- Time schedule

9. ORCSY update

Alessandro Nazareth made a quick report of the SY season. Six races were already made:

- Antigua
- Millennium Cu in NZ
- Bucket in St. Barth
- Loro Piana Superyachts in Porto Cervo
- Palma Super Yacht
- Newport (Candy Store Cup)

Main amendments to the 2020 ORCSY VPP will be focused on:

- NEW WIND RANGES
- KETCHES / SCHOONERS
- KEELS
- OVERLAPPING SAILS
- DROP/HOIST ALLOWANCE
- SAILS INVENTORY ALLOWANCE DIFFERENT APPROACH

The only item that the chairman asked for a more detailed suggestion to ITC was about Ketches and Schooners and how to improve the treatment of rigs with a big distance (between the two masts (EB). The ratio of the areas of the sails hoisted by any single mast related to the height and the distance between the two single masts have been addressed as parameters to be taken into account in a routine that could in some way assess the different efficiency of the rigs. Andy Claughton will try to return a formulation to be tested

10. Decisions already taken in previous meetings to be recommended to next Congress:

LPP amendment for inclining performed with lifting keel up (only for SY)

This procedure will be modified for 2020 LPP for SY as many of these yachts perform the inclining test with the keel lifted in the up position. Current SY LPP takes into account only VCG movement but not VCB that is changing due to the fin partially entering the hull. The same process will be done for the canting keel boats when sailing , where the correct LCB and TCB of hull + rotated appendages is currently not taken into account as the volume and CB are computed with keel in the vertical position.

Small rating effects

Zoran Grubisa reported that the rating effects of some inputs are relatively low. After some discussion about the various effects it was decided to remove in 2020 VPP the following:

- No fwd accommodation allowance
- No penalty for taper hollows in masts
- No backstay allowance
- No penalty for jumpers

Also the IMS rule B.7.3 to assign Carbon rudder gyradius increment will be changed in a way that gyradius will be adjusted only if the rudder stock will be in carbon fibre.

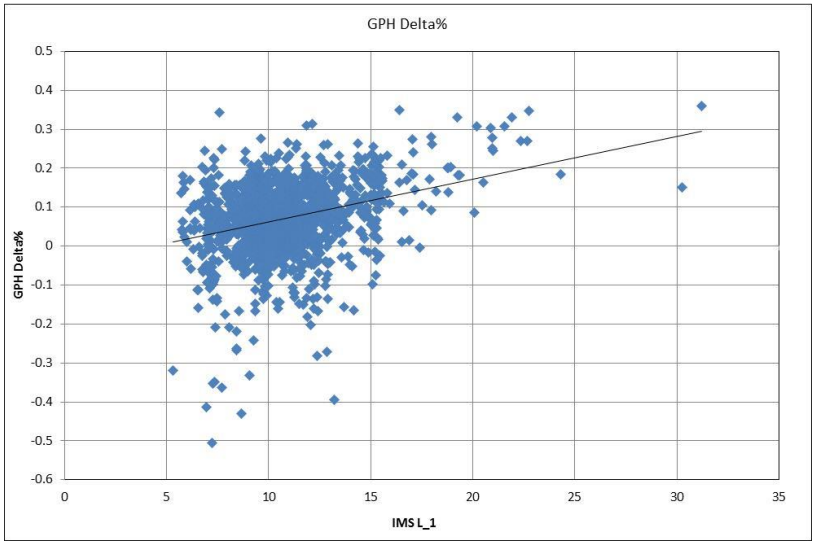
11. 2020 VPP. Preparation of an "all effects" test run and a beta VPP for immediate release

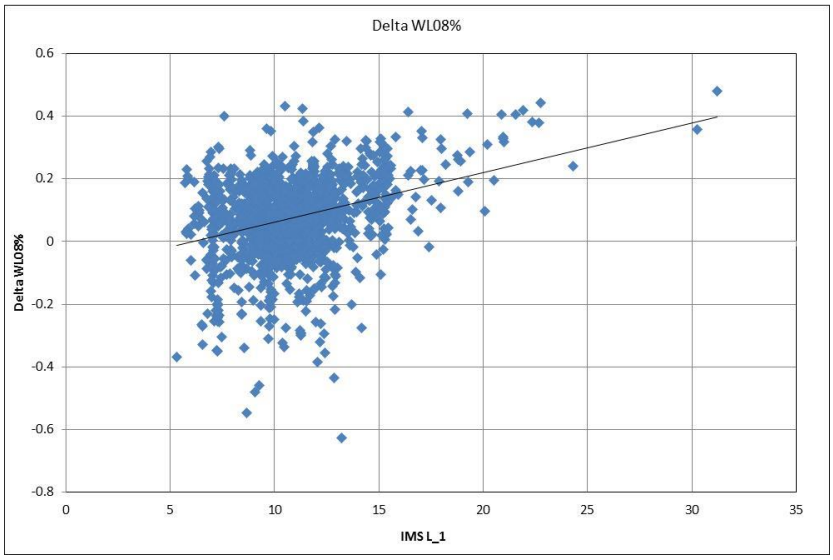
An all-effects test run has been prepared after the meeting with the following features:

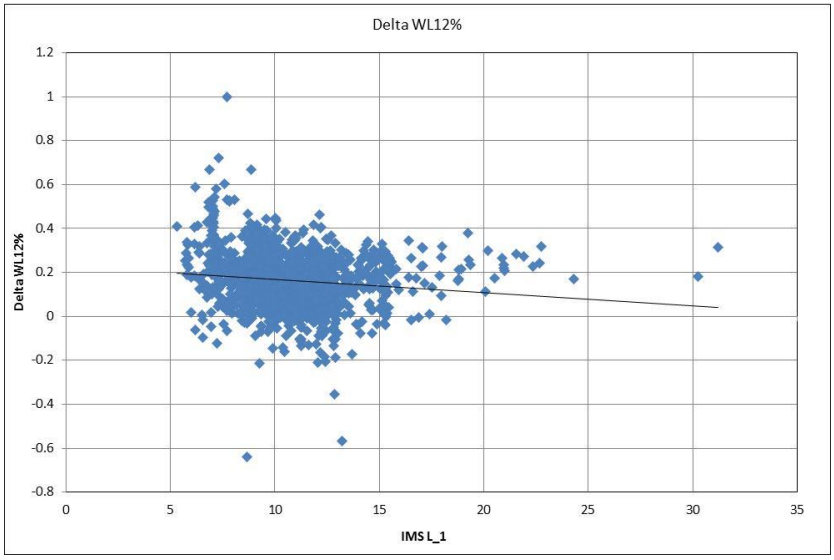
- Added resistance and Mast gyradius adjustment
- Keels frictional resistance revision
- New Default Gear weight
- New Default Sails weight
- Age allowance related to 2020
- Removal of small rating effects
- DA applied to Performance division only after 30 years

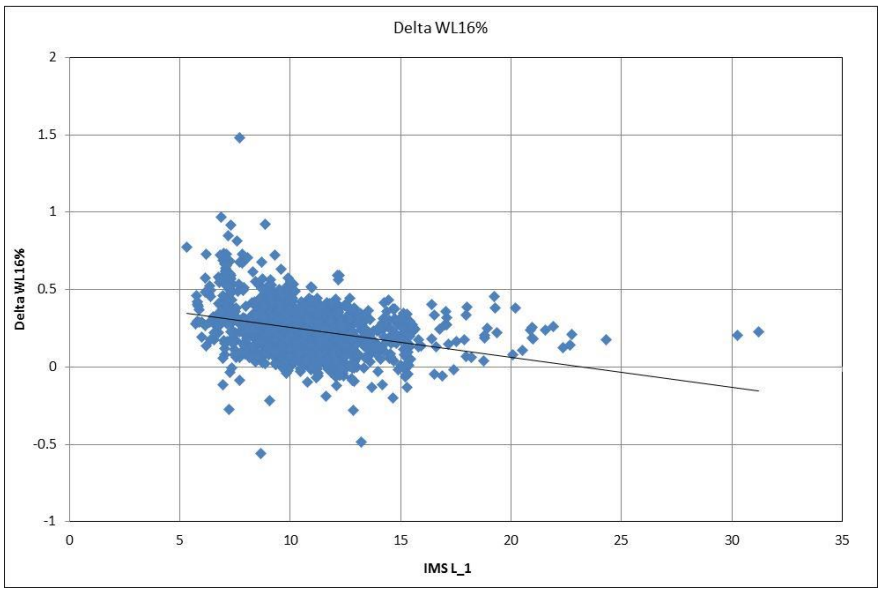
A corresponding beta VPP has been prepared and the ITC suggests its distribution to RO and DVP users for debugging. The test run showed correct variations in handicaps for the various kinds of boats. An overall effect in GPH variations is represented by the following plot:

The ORCi world fleet's GPH is changing in the range of 0.5% in its majority (-0.2% to 0.3%), the single WL handicap variations showed a similar variation, without any significant trend (L, LVR etc.).




Delta WL08%
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
Delta WL08%
0
5
10
15
20
25
30
35
IMS L_1


Delta WL12%
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
Delta WL12%
0
5
10
15
20
25
30
35
IMS L_1



The rescoring of major championships did not show any large re-shuffling of results.

12. Completion of recommendations to the Congress

- Headsail Set Flying (HSF) including multiple headsails configuration
- Added resistance and Mast gyradius adjustment
- Keels frictional resistance revision
- Default Gear weight
- Default Sails weight
- No FWD accommodations
- No taper hollow in mast penalty
- No backstay allowance
- No jumpers penalty
- Foils
- Manual rudder conversion from LPP
- Canting keel hydro fine tuning in LPP
- Carbon rudder improved definition

13. ORC Research Fund budget planning for 2020

The committee discussed possible research projects that could be funded for 2020.Aero CFD research- Using the Virtual Wind Tunnel (VWT) at Southampton, perform modest study of overlapping headsails and HSF to determine whether any changes to the VPP are appropriate.

Hydro CFD research. Completing the ongoing research for a better assessment of transom drag, residuary resistance and dynamic length. Data Analysis - The committee will add the X41 and Beneteau 36.7 with overlapping and non-overlapping headsails. In addition, the committee will repeat the effort to get participants in the World Championships to provide data. Finally, after reviewing the data quality of the entire database with updated information from KND, the committee will look to obtain additional data (if feasible) from particular boats already in the database to improve the quality of the data.

In addition, for a short-term research a joint cooperation with SYRF will be possibly established (see par. 11). The Chairman will discuss research funding with the Management Committee in Bermuda.

14. Strategic planning for work after this meeting - Main projects for 2020

Looking at items already in the agenda and other items coming from submissions deferred to next year, this is the preliminary work agenda for 2020:

Aero

- Develop force models for overlapping sails and Headsails Set Flying (HSF). for a revised RR Follow up with NS & Quantum for flying shapes.
- Plan for jib coefficients with Whisker poles.
- Completion of the revision of Depowering function (see par.5.2)

Hydro

- Continue current approach with Jason Ker for immersed transom resistance and length assessment (Hydro CFD completion)
- Heel effect on hull balance, Andy Claughton and Davide to progress using current method.
- Foils assessment in the VPP.
  Execute SYRF-ORC joint study & update current force model
- Added resistance in waves update.
  Check Gyradius adjustment revision using Delft data as an independent check on current ORCi formulation.

Data Acquisition

- Get from KND Bin counts & heel data.
- X41 and First 36.7 Masthead and Fractional inclusion in database
- Review data bin counts Seek additional data from boats already in database with low bin counts (i.e. low confidence data)
- Request participation from competitors at next International events for additional data Scope out potential project with SYRF to explore value of App based data gathering in a fleet.

15. Next meetings scheduling

Next meeting will be held in Winchester (UK) April 4-5 2020

16. Any other business

Headsail Set Flying (HSF)

The committee decided to revise the treatment of HSF because when including in the sail inventory a spinnaker or an HSF with the same surface consistent rating jumps are shown. Rob Ranzenbach worked on a proposal based on a new set of coefficients for both HSF and spinnakers with mid girth below 85% of foot length. Spinnakers with mid girth above 85% won't be affected by this new formulation.

The Committee finally agreed to implement the whole new treatment of HSF with a smooth transition between spinnaker under 85% and HSF. This is an excerpt of Rob proposal

The advent of cableless specialty reaching sails has severely impacted the ORC ITC's confidence in the existing method by which we assess the range of performance of HSF and even relatively small mid-width spinnakers (up to 85%). The concern is that we can no longer differentiate whether a sail is intended for relatively tight AWA or wider AWA based upon our present luff length approach AND it is becoming much easier to build specialty reaching sails with mid-widths that exceed 75% (so they will be considered spinnakers) that will never be assessed for the enhanced reaching performance that they offer. Both of these circumstances hold promise to substantively disrupt the ORC fleet. We recognize that this relatively new type of sail is growing in popularity amongst the ORC fleet and felt it was necessary to devise a method so properly assess the performance of the entire range of specialty reaching sails. Based upon conversations with several sailmakers, the ITC decided to utilize mid-width as the deciding factor when inferring whether a specialty reaching sail is oriented towards relatively tight AWA or relatively loose AWA and then adjust the aerodynamic coefficients accordingly. One of the side

benefits to sailors of this approach is that it should limit the shenanigans of building inefficient (extra leech material flapping in the breeze as an example) specialty reaching sails at just over 75% mid-width to mask their real intended purpose as a specialty reaching sail.

The following approach was agreed in ITC meeting and work is ongoing to put pieces in place for the 2020 VPP:

- All HSF and all spinnakers smaller than 85% shall be measured and declared by the owner on the certificate.
- Each HSF and each spinnaker smaller than 85% mid-width will be run in the VPP individually and the collection of the best of the best will create a performance envelope that will form the speed prediction for a boat.
- The aero coefficients for each individual HSF and each spinnaker smaller than 85% will be selected as a function of mid-width using a set of blended coefficients (under development) that vary continuously from greater than 50% to less than 85% of mid-width. The mid-width for HSF will be calculated from the following formula: mid-width ratio=HHW/HLP. This approach was originally identified when the measurement of code zero sails was transitioned in 2013-2014 from spinnaker style measurements to headsail style measurements and has subsequently been found to be an excellent method for closely estimating the mid-width of a headsail without requiring this parameter to be measured directly. The mid-width for spinnakers smaller than 85% will be from the certificate.
- Also the center of effort height will be blended from the HSF at 0.38*ISP to the 0.565*ISP of the spi
- This approach does not change the definition of what is a spinnaker and what is a HSF, it just adjusts the way we handle assessing the contribution of each HSF and spinnaker smaller than 85% mid-width in the VPP.
- Depowering HSF and for spinnakers with mid-width less than 85% will be made only with the use of FLAT and TWIST and no REEF (except for the mainsail), as we have all the surfaces of the HSF and spi under 85% in the inventory
- Vary the available amount of FLAT/TWIST between 50-85% mid-width in a smooth way so that amount of FLAT/TWIST for a 51% sail is almost the same as a jib and the amount of FLAT/TWIST available for a 84% sail is like that for a spinnaker
- Depowering for spinnakers 85% and larger will not change
- Area of HSF used within the VPP will remain as per current formulation of headsails area.
- Area of spinnakers less than 85% used within the VPP will be determined by a TBD method
- To accommodate multiple head rigs like in par. 4 USA 5 submission, we will delete 208.3 and 208.6. In addition, we will take the minimum area of a HSF in this case to be no less than ISP X TPS/2 and the aero coefficients will be based upon an assumed mid-width of 60% for such a configuration.
- In addition, the minimum area of any HSF or spinnaker shall be ISP*TPS/2

2020 World's Championship scoring

The ITC after a long and productive discussion with a re-scoring of the 2019 Combined ORC-IRC World Championship suggested to use for next year event in Newport a combined scoring averaging the corrected time of the two systems. The corrected time to be averaged will be the difference from the winner to avoid big influence of one of the two systems when summing the corrected time This system will enable also the use of TOD (PCS) for ORC and TOT for IRC

WS submission on outriggers

This item has been left in stand by waiting for WS decision on it.

New chairman

Finally the chairman announced at the end of the meeting his intention of stepping down from ITC chairmanship after 13 years, so he thanked the whole committee for the work done in all these years and for the results reached that would have never happened without the important contribution of all members (including those that are no more part of the committee).

He then proposed Andy Claughton as new chairman due to his long-term membership in ITC (since 1993) and Andy was very happy to accept this new duty. By the way Alessandro Nazareth will continue as a member of ITC in the following years and will act as deputy chairman to help Andy in the transition period. The final appointment of Andy Claughton will be ratified in the next Congress in Bermuda

Not having anything else to discuss the meeting was adjourned at 5.00 PM