



INTERNATIONAL TECHNICAL COMMITTEE

Meeting

Friday 9th and Saturday, 10th October 2020 via Zoom

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

Apologies: Apologies for absence were received from Research Associate Lex Keuning

Registered Observers:

*Teresa Rios (ESP), John Victorin (GER), Johan Tuvstedt (SWE),
Robert Jacobsen (GER), Arthur Peltzer (NED), Luiz Kahl (USA), Amit Yaffe (ISR),
Jeremy Elliott (GBR), Dmitry Barishkov (RUS), Aleix Ballester (ESP),
Mikko Brummer (FIN), Phillipp Luke (NED), Michele Molino (FRA),
Paul Cronin (USA), Suzy Leech (USA), Paul Zabetakis (USA), Eiji Mizukoshi (JPN),
Raymond Roesnik (NED), Ernest Rohner (SUI), Tony Rey (USA),
Maurizio Cosutti (ITA), Marco Lostuzzi (ITA), Hannes Renzch (GER),
Fabio Trusendi (ITA), Jaroslaw Gorski (POL), Alberto Pindozi (ITA - ORC),
Matteo Zuppini (ITA - ORC), Simon Forbes (GBR - WS), Gennaro Aveta (ITA - ORC),
Hendrik Plate (GER),*

Minutes

1 Review of July 2020 meeting minutes & September interim meeting.

The minutes were accepted as an accurate record of the proceedings.

2 Report from Chief Measurer on 2020 season and matters arising.

Due to Covid 19 pandemic all three major ORC Championships (Worlds, Europeans and Sportboat Europeans) were cancelled or postponed until next year. Many other races were cancelled and therefore the feedback from the racing areas is minimal. However, several issues have been noted and are summarized below.

2.1 Headsail Set Flying (HSF) and minimum rated area.

When the ORC introduced the 'blended' HSF coefficients in 2020, multiple headsail combinations were also specifically allowed in response to a submission. To fairly accommodate the approach of flying a small HSF in front of a jib, it was necessary to introduce a minimum rated HSF based on a function of ISP and TPS. Since then, it appears that some boats are setting HSF's, not from the ISP and TPS but from less high hoists and less than the full length of the sprit. If only the ISP and TPS are used to calculate the minimum rated area, this produces a draconian restriction that is not consistent with the ITC's intentions, and does not fairly reflect the performance of such sails. Since the new blended coefficient approach tracks each individual sail (all of which must be declared on the certificate), then

it is possible to set a minimum area for each HSF that uses the intended hoist and sprit length for each sail rather than solely upon the maximum ISP and TPS.

These multiple tack and hoist positions will be recorded as a “grid” of I and J and ISP and TPS. All sails (headsail or asymmetric spinnaker) set forward of the mast will be associated with their appropriate hoist and tack points recorded in the grid, and these will be used for calculating the minimum area

A new minimum rated area for each HSF declared in the inventory is proposed. It is a function of mid-girth (or mid-width) the declared hoist and tack length, and the SHW/SFL ratio (midgirth%).

$$min_HSFn^1_area=(ISPn/6*(4*TPSn*midgirth%)+TPSn)..$$

The changes to the VPP will be implemented for the 2021 VPP.

2.2 Minimum jib area, minimum I and J, post Presto 30 (Wishbone style cat rigged centreboarder) certificate issue

The current VPP does not allow boats to run without a minimum jib area and a minimum IG and J. This is a legacy from the IOR that prevented Cat rigged boats exploiting that rule. There is no reason for ORC to exclude Cat rigged boats. For 2020 a solution was found by using the minimum area headsail and correcting mainsail area to approximately compensate the difference.

As part of the VPP code upgrade the minimum jib requirement will be removed, and the sail measurement scheme will be updated to accommodate this type of rig for both ketches and sloops..

These changes to the VPP will be implemented for the 2022 VPP

More research will be needed to determine a more appropriate force model for mainsails without jibs.

2.3 Gybing angle output

The VPP solutions for the optimum downwind VMG True Wind Angle (TWA) sometimes result in “flat” polar curves, i.e. they predict a nearly constant VMG for TWA’s from 140 to 180 degrees. To a layman, this suggests an inconsistency in the way gybing angles change as the TWS increases. For example, the optimum gybe angle may be in range of 140 – 150 deg for wind speeds of 6, 8, 10, 12, and 20 knots while for winds of 14 and 16 knots the gybe angle can be 180 degrees. A review of the VPP showed that this is not due to an error in the sail force coefficients nor the solution algorithm. Some boats in some conditions have a wide range of TWA’s over which downwind VMG does not vary by a discernable amount. The ORC VPP is primarily designed to handicap boats and in that sense, the committee agreed that it is acceptable for gybing angles not to vary monotonically with TWS.

The predicted TWA at optimum downwind VMG has a very small effect on a yacht’s handicap, and it will therefore be removed from the first page of the ORC certificate. All the predicted performance data will continue to be available as part of the “Speed Guide” should sailors and designers require the data to better understand their boat’s behaviour.

These changes to the Certificate will be implemented for the 2022 VPP, no changes will be made to the VPP.

¹ “n” is Identification Number (ID) in the grid of headsails, ISP and TPS.

2.4 Housed propeller shaft as appendage with twin rudders

Fairings around propeller shafts are intended to be clipped from the canoe body. The code works correctly with a single centreline rudder. A problem arises with a housed shaft and twin rudders where the LPP interprets this arrangement as three rudders, which is more than the maximum allowed.

As part of the LPP code upgrade this will be corrected.

This will be implemented for 2021.

2.5 Centreboard span and draft calculations

This anomaly in the calculation of effective draft also arose from the Presto 30 yacht where a centreboard retracts into the canoe body, rather than into a parent keel appendage.

As part of the VPP code upgrade this will be corrected for 2021.

This will not affect any current ORCi or ORCsy handicaps

2.6 ST2 on electric propulsion strut drive and PIPA calculations

The development of strut drives for electric propellers and generators, which now have a torpedo shape that extends both ahead and behind the mounting strut no longer fit the ORC PIPA measurement paradigm which was developed for strut drives.

The ITC will extend the PIPA formulation to this type of installation to ensure they are equitably handicapped. In the case of the generators, e.g. Watt and Sea, the varying drag of the unit as the current load is changes will need some collaboration with the manufacturers.

It is anticipated that this will be implemented for 2022.

3. Submissions

MANCOM 2 -SPL measurement

The committee agrees on a proposed change to SPL measurement. No changes in the VPP is needed, but for 2021 all DXT files in the database will have an increase of SPL applied of 2% SPL or 8 cm, whichever is the bigger, Any SPL measured after 01/01/2021 will be measured from the foreside of the mast and entered as such in the DXT file.

GER 1 - Viscous resistance

The Committee reviewed the submission and additional calculations from the observers. The Committee did not agree that this change would significantly alter the relative handicaps of smaller boats vs. the TP 52. As noted in the 2019 minutes “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”. There being no racing held under the 2020 VPP the Committee do not feel that altering the formulation for 2021 is appropriate. The Committee recognizes the concerns expressed, and this aspect of the VPP will remain under scrutiny.

The submission is not supported.

The VPP documentation will be updated to reflects th state of the code used in the 2020 VPP.

NOR 1 - Crew position with double lifelines

The Committee agreed that double lifelines do allow the crew to move their centre of gravity further outboard than with single lifelines. The Committee also received information (from Willem Ellemeet) about the effect of toe rails and top side shape on the crew's ability to hold their weight outboard.

With the current measurement scheme the VPP cannot use anything other than the sheerline beam as abasis for the crews transverse C of G (TCG)

However, for yachts less than 8.5m, where OSR allows single lifelines it is proposed to use a negative CEXT (Crew Extension) value of -0.2m to reflect the restriction on hiking due to the use of single lifelines.

This will be implemented for the 2021 VPP.

RUS 1 - Heel angle limit

The ORCi VPP has a sophisticated model of drag due to heel that allows the VPP to determine the optimum heel angle at the VPP solution points. There is also a "hard" limit on heel angle "rail under drag" that avoids spurious high heel solutions being found. In some cases when the boat is over pressed the predicted heel angles, and therefore speeds are higher than the yacht can realistically achieve. This happens because the VPP iterates to an equilibrium sailing speed and heel angle in only 3 degrees of freedom, surge, roll moment and sway, it does not solve for yaw moment balance of the aero and hydro forces by adjusting rudder angle. It is the absence of this degree of freedom that gives rise to the anomalies presented in the submission.

The ORCi VPP is a handicap VPP, based on measurements, and the lack of a yaw moment balance does not affect its performance in this regard. Prediction of yaw moment balance is not planned for the VPP.

Introducing ad hoc performance limits, which might make the predicted heel angles match the observations more closely, but not change handicaps is not considered appropriate.

Hence the submission is not supported

RUS 2 - Longitudinal crew position.

The committee discussed the proposal contained in this submission. The current VPP includes an optimization of longitudinal crew position to define the sailing trim. The VPP Documentation will be updated to clarify the process.

Additionally, the Hydro CFD research carried out during 2020 has increased our knowledge of the drag of an immersed transom and this will be implemented in a new crew LCG optimization procedure for 2022

4. Aerodynamics

4.1 Upwind Aero Model CFD research candidates update.

The ITC plans to review the aerodynamic force model with respect to masthead and overlapping headsails, and the sheeting of sails to a leeward whisker pole. are Robert Ranzenbach has approached North Sails on the ORC's behalf to procure some typical flying shapes for yachts whose rig and sail plan are not strongly represented in the existing CFD database. These are characterized as mast head rigs

with overlapping headsails and shroud envelopes that affect sail sheeting. North Sails will supply a single “flying shape” for several boats, and these will be morphed using a process developed by the ITC over the last several years.

Our general needs are broadly:

- Swan 42 or Landmark 43 (successful ORC boats that anchor the results of the study)
- IMX 45 (nominally a performance cruiser with modest overlap and modest sweptback spreaders/rig envelope)
- Beneteau 36.7 with genoa (nominally a performance cruiser with genoa that is in our performance database)
- Beneteau 36.7 with jib (nominally a performance cruiser with jib that is in our performance database)
- A successful Farr masthead (representing something close to an “optimal” rig envelope, Jim Schmicker suggested a 1999 era IMS 49 or Sayonara)
- Mainstream masthead/genoa (nominally a cruiser more in keeping with many yachts in the ORC fleet with a relatively wider rig envelope, Alessandro Nazareth has provided some candidates from the Italian ORC fleet)

In anticipation of a supportive response, the ORC will allocate funds for this work with a view to updating the sail force model for 2022

4.2 Whisker pole sail coefficients

The development of these coefficients presents several challenges.

Measurements to determine the sheeting angle of the sail are not currently taken. Indeed, the ORC VPP sail coefficients are blind to any definition of jib sheeting angle, sheer line beam and shroud envelope.

Therefore, any scheme to accommodate these niche sails should really be expected to address the handicap implications of jib sheeting constraints amongst the wider fleet, who will not adopt the expensive whisker pole equipment.

Thus, this is rather more than a progressive development of the existing methods, it is the addition of another layer of measurement **and** research on sail sheeting effects.

The studies described in item 4.1 will go some way to starting this process.

The degree to which the use of whisker poles will grow is unclear.

To address these questions Robert Ranzenbach will approach the sail making community to find

- a) Some typical flying shapes for whisker pole trimmed sails
- b) The extent to which the whisker pole permits smaller sails to be set under the larger sail and,
- c) The appetite of the boat owners to purchase these sails.

Based on this information the studies outlined in item 4.1 may be extended to address sails trimmed to a whisker pole for 2022

5. Hydrodynamics

5.1 Hydro CFD research update.

The workflows described in the 2019 ITC minutes have been progressed seeking to investigate the correlation, at lower Froude Numbers, between the CFD points of the original test fleet (circa 500 boats) and the baseline boat surfaces. The two stages of Residuary resistance research described in the 2019 ITC minutes have been completed, namely improving the immersed transom drag algorithm, and using this results to revise the CFD data set and develop a new R_r formulation based on an updated length calculation.

The current R_r model is a very simple formulation using:

Froude Number ($\text{Speed}/\sqrt{9.81 \times \text{LSM}}$),

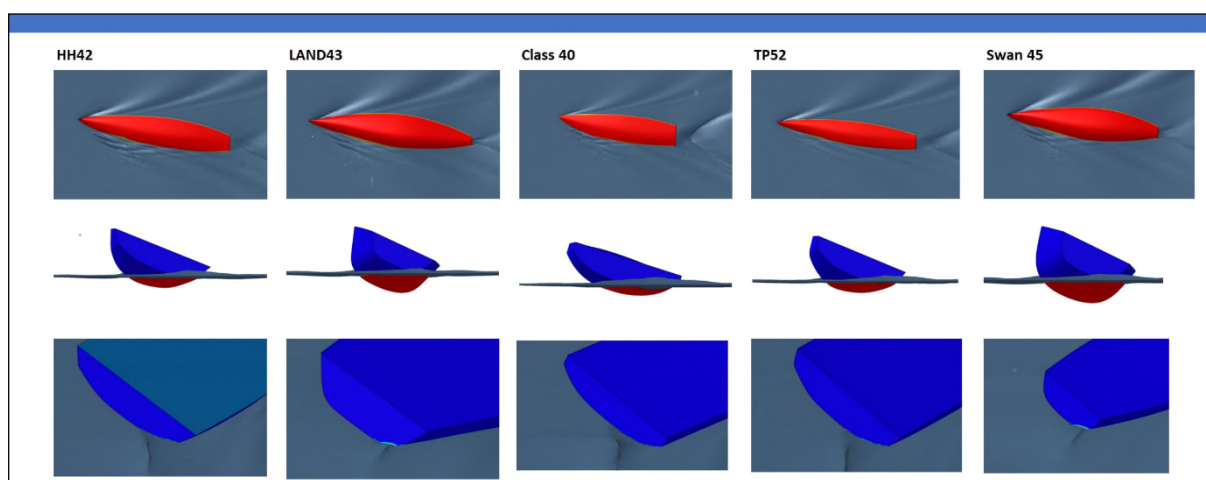
Length Volume Ratio, (LVR) and

Beam to Canoe Body Draft Ratio (BTR).

It was hoped that by mid-2020 this simple scheme could be modified by using a more sophisticated LSM, and the new immersed transom drag to “improve” the R_r formulation. The revised LSM method proved not to be an improvement.

The residuary resistance (R_r) model has been in use for 6 years. It is simple, and robust against exploitation, which previous formulations were not. However, with several seasons of race results available it is apparent that some styles of boat do well in light airs, and less well in stronger winds and vice-versa. During 2019 CFD studies have been carried out on specific boats in the ORCi racing fleet. The aim of this study was to compare directly the CFD results and the output from the VPP force model. The boats were chosen to offer the widest possible range of hull types so that all the components of the force model (residuary resistance, upright and heeled, immersed transom drag, induced drag etc.) were given the widest range of input parameters (BTR, WSA, LSM’s etc.) Each boat was run in CFD at the specific sailing points (Speed, heel and yaw) extracted from the VPP solutions.

The boats evaluated during 2019 are shown in the graphics below, and work is in progress to add an X40 and Beneteau 36.7.



Thanks to the cooperation of the designers this process has proved remarkably illuminating and is an approach that up until two years ago would have been prohibitively complex and expensive to carry out.

This improved understanding of the hydrodynamic mechanisms at work will not only drive improvements to the hydrodynamic resistance model, but also help to isolate where perceived biases to particular hull and rig types might arise. In the past improvements to the VPP force models which were “better science” could not be implemented because of an undesirable re-ordering of the test fleet with the new VPP. With better understanding from the “boat specific” comparisons the ITC are better able to combine several simultaneous developments of the VPP force models which will reduce any favouring of boat types.

Developing the R_r formulation remains on the ITC research agenda. Preliminary studies indicate that the R_r calculation can be improved by using more parameters of hull form and effective length.

The following collaborative workplan between Ker Design & ORC staff was proposed and accepted.

- I. Get Neural Networks working in the VPP.
- II. Determine the best ‘short term’ Network to use for RR (e.g. LSM1 measurements above).
- III. Explore any more ‘easily available’ LPP parameters to train networks by & use if found.
- IV. Apply new measurement methods in the LPP. e.g.
 - At dynamic sink and trim (LSM2)
 - And with a transom cone (LSM3)
- V. Train new networks for RR based on the best combination of inputs and apply them in the VPP.

This will require substantial effort on the part of the ORC staff, but the groundwork for this has been laid during 2020, but it will require the ORC VPP to interface to the Neural Network calculations.

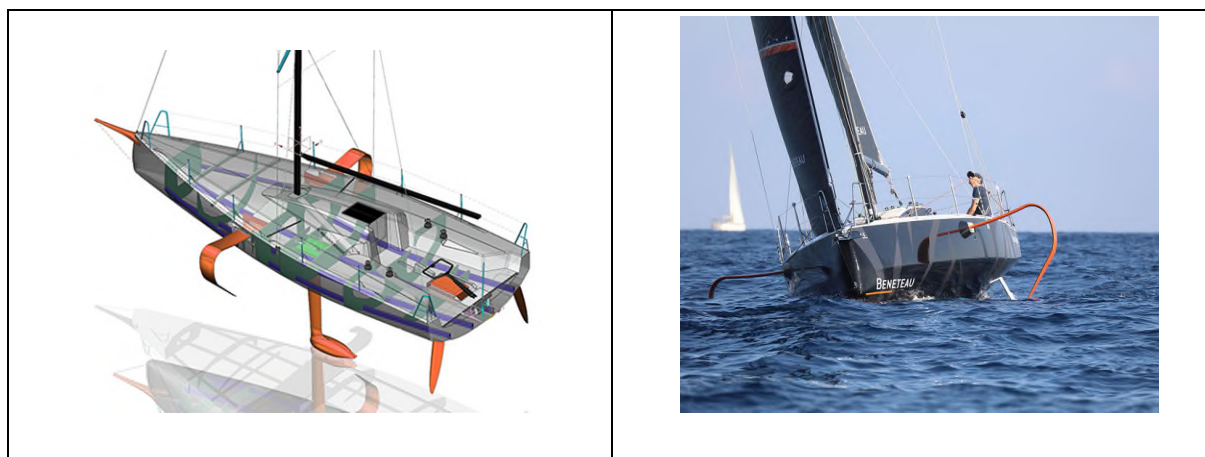
It was also agreed to use the CFD licence capacity afforded by the SYRF/ORC Foils project to run some hull types and also extend the speed range in some cases. This will create a larger and more focussed and consistent data set to support the work described in I – IV above.

5.2 Centreboard force model, effect of part embedded in the canoe body.

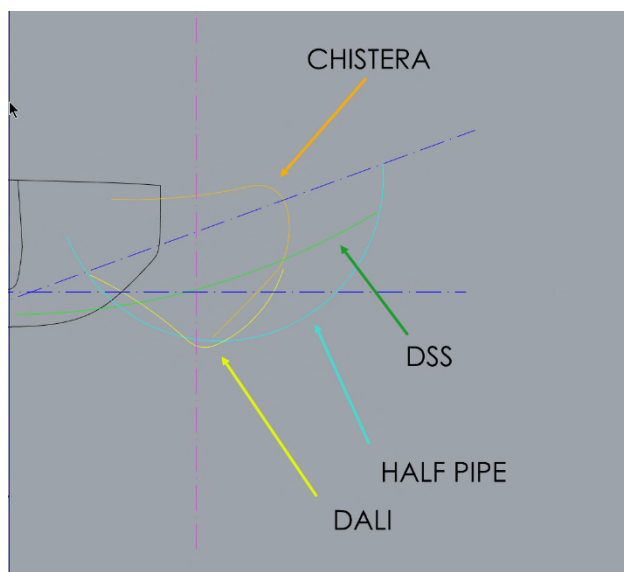
Davide Battistin to check and de-bug

5.3 Foils assessment in the VPP

The ORC SYRF Foils research project has now completed the majority of its CFD investigations. This has created a dataset of forces and moments for a range of foil types across a range of sailing conditions for a generic Figaro 3 style yacht, shown below (© Beneteau Yachts).



The foil types are shown below.



A force model based on predicting the optimum foil force both horizontally (sideforce) and vertically (F_z) has been created, as described in the following paragraphs.

Viscous Drag

The standard appendage C_f formulations will be used based on the chord and thickness distribution.

Induced Drag

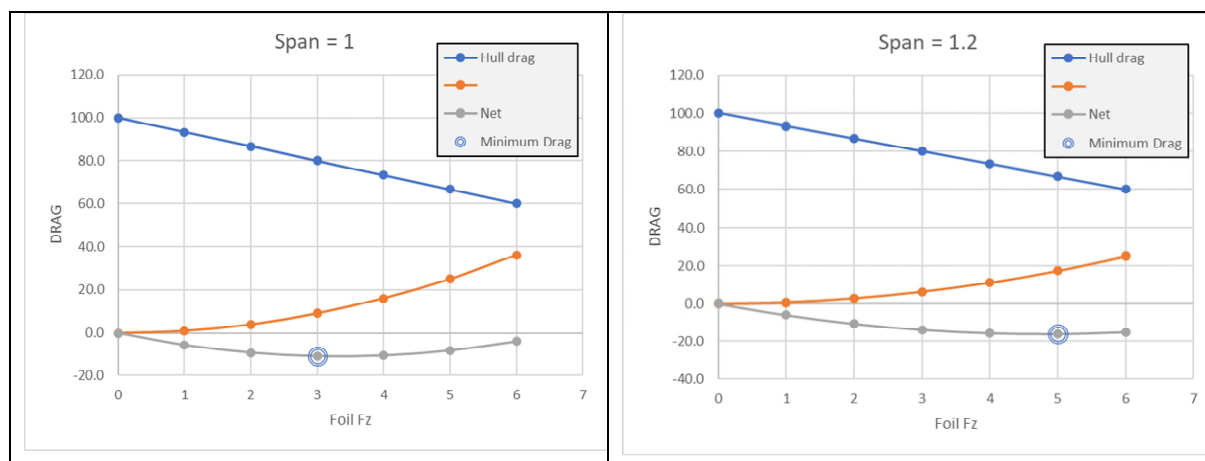
This type of foil may make a contribution to the sideforce (F_y) and the vertical force (F_z).

The first step in the process is to determine the magnitude of each of these, then the direction of the resultant force can be calculated and an induced drag calculated using an appropriate value for the effective span.

There is already a routine that calculates the proportion of F_y carried by a dagger board, and this approach will be extended to the foils based on the projected span on the xy plane in the WCS.

The vertical forces produced by the foil will not be calculated from knowledge of the section shape and angle of attack. Rather the “optimum” vertical force will be calculated by finding the vertical force that creates the lowest drag for the complete boat. As F_z is increased the drag of the hull is reduced as WSA and effective displacement are reduced. But the induced drag increases with the square of F_z , so at some point the extra induced drag will outweigh the drag reduction on the canoe body. This behaviour is shown in the figures below. On the left an effective span of 1m results in an optimum foil Force of 3 kN. If the Effective span of the foil is increased to 1.2m the optimum F_z rises to 5 kN.

This optimising process will not be bounded by what angles of attack are possible on the boat, it rather assumes that the designers have done a similar calculation and configured the boat accordingly. This aligns with the usual process when adding new types to the vpp in that we look to overestimate the predicted speeds.



5.4 Keel viscous resistance.

As discussed in item 3.2 the appendage viscous resistance is on the research agenda. Whilst no changes are planned for 2021, it is likely that an adjustment to the viscous resistance formulation will be made in due course as part of a package of VPP upgrades.

5.5 Added resistance in waves.

Studies on this topic have continued during 2020, but no proposals for an improved formulation have been developed.

6. VPP & Output

6.1a OFFSETS 2.0

The ORC staff are working on the development of a new format for the Offset file (.OFF). A new format is needed to make the input of the various appendages more logical defined by a common procedure. Moreover, we need to store information about the boat superstructures, that cannot be accommodated by the current format. With the above goals in mind, the staff worked on a new file format that will be extensible, and is therefore written in XML. It will comprise different blocks; canoe body, daggerboard, rudder, superstructures etc. Each block will be independently described, and a 'parent-child' relationship among blocks will be defined. This will allow components to be 'glued' to any point on the hull defined by x, y, z coordinates and set at the required cant (rotation about the longitudinal X axis) and rake angle (rotation about the transverse, Y axis). The appendage input is in terms of a series of point describing the ²rondure of the appendage leading edge, and for each point the associated chord and thickness are also defined.

In this way rudders and retractable appendages can be more accurately measured when removed from the parent hull, and the data easily integrated into the .OFF file for hydrostatic and VPP calculations.

6.1b LPP + VPP new source code

The history of the ORC (and previously) IMS source code is 45 years old. The code was modified and continuously developed over the years by a number of programmers, reaching a very large size and level of complexity. The current programmer took it over in 2006, reorganizing completely the VPP portion in 2008-2009. In recent years, the continuous requests for new features and adaptations, with

² Locus of the leading edge in the 3D space

the addition of the superyacht rule (ORCs_y) in 2014 and the multihull rule (ORC_{mh}), which includes lifting foils in 2019, has clearly highlighted the limits of the layout of the present source code, which has proven very difficult and time consuming to manage and evolve.

Therefore, during the multihull project, a new code has been developed, making use of a number of rationalisations and cleaner algorithms written during the last several years. On top of these algorithms a modular object oriented structure has been devised, making use of all the powerful new features offered by the last Fortran release (Fortran 2008). This reorganisation will ensure a more easily maintained code which can be developed in a single framework for all the ORC rule VPP's.

6.2 Certificate upgrade & scoring options

The Committee discussed the content of the revised Rating Certificates.

This will comprise of 3 pages:

Page 1: Rated Yacht Data, rig hull and appendage drawing, performance tables at 7 wind speeds.

Page 2 Complete Measurement data, Foretriangle grid, sail inventory and weight inventory.

Page 3 Preconstructed course handicaps.

The final layout will be confirmed with other ORC Committees.

New style Certificates and Speed Guides are anticipated for 2021.

6.3 Stability output rationalization

The ORC Stability Index will be presented on the Certificate **only** for yachts that have been measured for ORC_i, i.e. have a bona fide inclining test result.

ORC Club yachts will be handicapped using a default righting moment or entering directly VCG/RM if known from parent boats, that is **NOT appropriate** to use for deriving the Stability Index.

7. Data acquisition and correlation of VPP to observed data.

During the last 3 years the ITC have been using high fidelity from yachts instrument logs to compare with the V predictions. Great care has been taken to ensure that the observed data is taken from well crewed yachts with well calibrated instruments. With the assistance of KND to parse the observed data, this process is proving very helpful in evaluating the VPP. The ITC intend to expand this data base so that we have a wider spread of boat types.

Candidates for inclusion in the database based on both their position in the fleet (based on LVR & BTR, shown below) and the likelihood of gathering a useful quantity of good data.

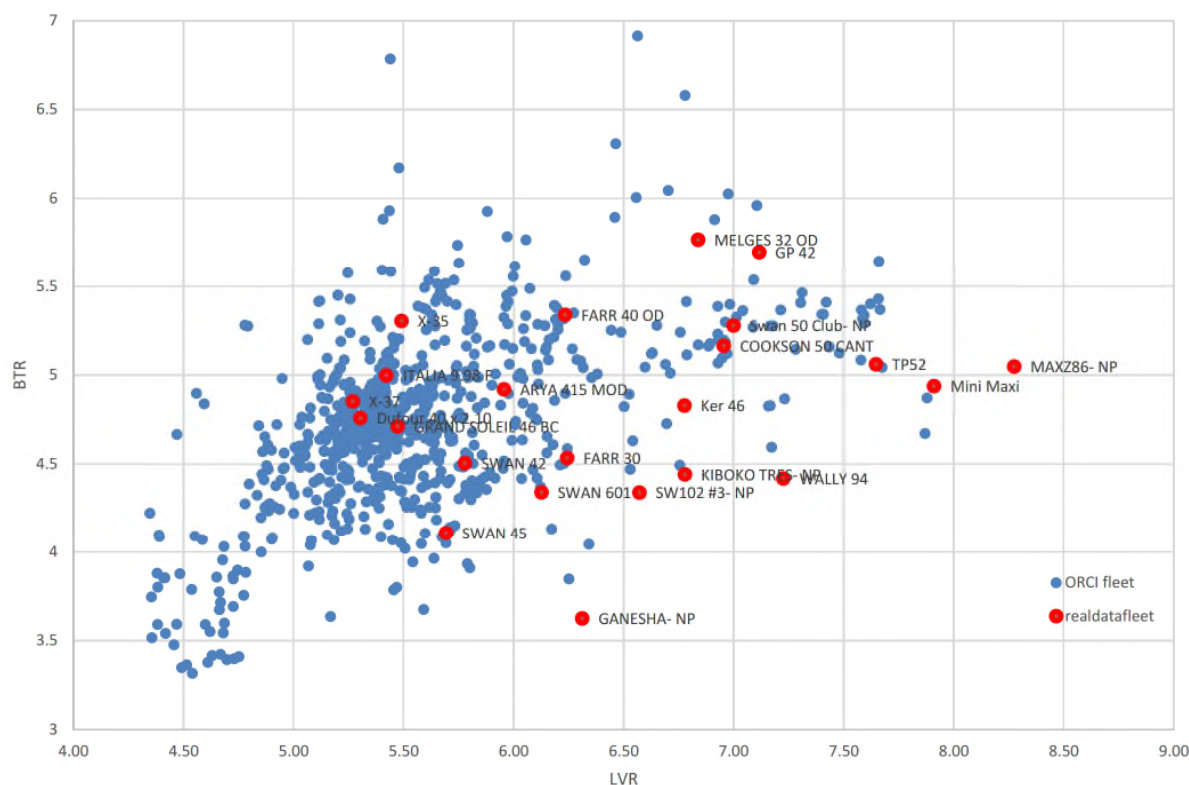
6 candidates were selected.

- Swan Club 50
- Farfalla Southern Wind 102
- Ganesha
- Beneteau 36.7 with overlapping genoa
- Beneteau 36.7 with non-overlapping jib
- X-41

Information for the first 3 boats will likely be provided by Nacho Postigo under the terms of an NDA signed by him, the ITC Chairman and the boat owners.

The second three boats will be provided by their respective owners or team managers.

KND have provided a ROM cost to produce polars in the standard ORC ITC Performance database format (with the addition of bin counts and heel if available), and update the existing boats to the maximum extent practical with heel and bin counts.



8. Stability screening for non-inclined ORC Club boats. (formally “Default RM”)

The Default righting moment is still part of the ORCi VPP and will remain so for the 2021 season. However this is only a handicapping tool not a reliable measure of the boats actual righting moment and hence its capsizes angle. No stability index will be shown where a yacht has not been measured afloat. (See also Agenda Item 6.2.)

The ORC Staff have developed a tool for the Rating Officers where data for all measured boats can be shown based on the offset file in use including min, max and average of righting moment and several other parameters. Rating officers may then use these data for ORC Club boats with non-measured stability

9. ORC SY – Aero coefficients for 2021.

Alessandro Nazareth described the current ORCsyo aero force model which creates a “global” set of coefficients for each rig type that is sensitive to sail area and affective span

To stay abreast of the increased use of HSF’s it is proposed that the SY sail coefficient sets are improved by adding intermediate coefficient sets for say 2 HSF girths e.g. 60% and 75% girth ratio, that may be activated if these sails are carried by the yacht. To set the basis for the above work Alessandro Nazareth presented a comparison study between ORCsyo and ORCi upwind aero coefficients curves (ORCi curves are built according to separated set of coefficients for the headsail and the mainsail)

Alessandro and Robert Ranzenbach will formulate a proposal and bring this to the ITC for discussion with a view to implementation in 2022.

10. Recommendations to the Congress.

- a) HSF new minimum area. (2.1)
- b) Check if minimum jib area could be removed from VPP (2.2)
- c) Gybing angle to be removed from certificate. (2.3)
- d) Introduction of hoist (ISP) and tack (TPS) points for each HSF
- e) Grandfathering of all SPL adding a +10cm (or less) if not measured in 2021
- f) PIPA for electric thruster pods and generator struts WATT & SEA)
- g) Experimental Foils VPP module. (5.3)

11. Strategic planning for 2021.

1. VPP, LPP & Manager housekeeping. (100% Staff)
2. Upwind Aero CFD. (20% Staff 80% ITC)
 - 2.1. Source Candidate sail shapes
 - 2.2. Create CFD Geometry
 - 2.3. Run CFD
 - 2.4. Analyse CFD
 - 2.5. Prepare updated Aero model.
3. Residuary Resistance. (50% Staff 50% ITC)
 - 3.1. Get Neural Networks working in the VPP.
 - 3.2. Determine the best 'short term' Network to use for RR (e.g. LSM1 measurements above).
 - 3.3. Explore any more 'easily available' LPP parameters to train networks by & use if found.
 - 3.4. Apply new measurement methods in the LPP. e.g.
 - 3.5. Train new networks for RR based on the best combination of inputs and apply them in the VPP.
4. Database. (100% ITC)
 - 4.1. Re-analysis of existing data (bin counts etc)
 - 4.2. Add new boats
 - 4.3. Continue analysis
5. Foils. (50% Staff 50% ITC)
 - 5.1. Implement OFF 2.0
 - 5.2. Implement Foil force model and optimisation routine.
 - 5.3. Complete ORC/SYRF Report
6. Boat Specific Analysis. (20% Staff 80% ITC)
 - 6.1. Complete CFD studies.
 - 6.2. Review Regatta data vs, yacht parameters.

12. Next meeting scheduling

Mini meeting mid congress after Rating Officers & Measurement Committee?

Nov 2nd

Interim Meeting of 3 hours in the period October 30th to Nov 4th to agree research plan and resource allocation post Council meeting conclusion.

ARC to circulate Doodle poll

Beta VPP & Manager by Nov 7th.

April 2021 Possible face to face meeting in Winchester (avoid Easter on 4th April.)

13. Any other business.

There being no other business the meeting was closed at 16:30 CET.

The Chairman thanked the Committee for their contributions and the observers for giving their time and valuable input.