OFFSHORE RACING CONGRESS

World Leader in Rating Technology

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ITC - INTERNATIONAL TECHNICAL COMMITTEE

Minutes of a meeting of the **International Technical Committee** of the Offshore Racing Congress held on 28-30th October 2011 at UVAI, Rome Italy.

- Present: Alessandro Nazareth (Chairman) Andy Claughton David Lyons Philippe Pallu De La Barriere Kay Enno Brink Nicola Sironi (Chief Measurer) Fabio Fossati. (Research Associate) Davide Battistin (ORC Programmer) Panayotis Papapostolou (ORC Technical staff) Zoran Grubisa (ORC Technical staff) Enrique Mollinelli (ORC Technical staff)
- Observers: Francesco Siculiana (UVAI) Riccardo Provini (UVAI) Gennaro Aveta (Italy) Claudio Schiano (Italy) Matteo Polli (Italy) Emanuela di Mundo (Italy) Andrea Falcon (Italy) Emanuel Richelmy (Italy)

Apologies for absence were received from committee members Rob Pallard and Manolo Ruiz de Elvira, and Research Associate Lex Keuning

1. WELCOME, MEETING LOGISTICS

The Committee thanks the UVAI for their customary hospitality and for their friendly staff assistance during the meeting.

2. MINUTES OF THE LAST MEETING

The minutes of the previous meeting in Delft were approved.

3. CHIEF MEASURER REPORT – LIGHT SHIP TRIM

The chief measurer reported that there were no major concerns raised during the racing season in all major events.

He went through the measurement of severalWallys, who chose to use the IMS measurement platform to make an accurate evaluation of displacement and overhangs on boats whose size does not allow a simple and accurate displacement measurement. This led him to propose in Delft to change the measurement trim from the "measurement" trim as was set up in IOR times, and continued unchanged in the IMS then ORC, to the "light ship" trim, where all items not permanently installed need to be removed for measurement.

The concern for generally adopting light ship trim is the protection of the existing fleet, in an effort to avoid a massive re-measurement exercise, and the committee devoted a long time in trying to list all the advantages and the disadvantages of such a new flotation trim. The main problem should be to correct compute stability after the weights have been deducted, since the inventory is made without recording the VCG.

After the Delft meeting the software has been programmed to take into account all items listed in the Measurement Inventory, and to deduct them to obtain a new flotation trim.

Since the Inventory list may be incomplete, and not take into account several items, the committee agreed to maintain unchanged the current procedure of measuring floatation for next year, but to also include a new routine in the LPP that is able to calculate the empty LIGHT SHIP TRIM DSPL removing all the weight included in the Measurement Inventory, and all geometric measurements like LWL, BWL, overhangs and all other useful information that new LPP will provide as output. This will enable the correct deduction of some "extra" weights, such as fuel in the tanks, which is allowed in the Rule but does not activate an automatic calculation.

For future further developments of this measurement trim procedure, the ITC suggested adding the vertical location (VCG) of all gear to the weight and LCG already included in the inventory list.

4. SUBMISSIONS REVIEW

Submission: GRE 3 - HEAVY ITEMS

The anchor & chain are the only items remaining from the "Heavy items" pitch gyradius scheme that is giving credit for these items when placed in the forward 30% of LOA. Given the following facts - the rating credit is rather small, the anchor weight is mostly declared and rarely really weighed, and the small changes in anchor LCG will not result in significant change of GPH - the committee supports the submission by removing Anchor & chain pitch gyradius credit.

Furthermore, it was noted that – independently from the effect on rating, moving sails or equipment with the intention of improving performance constitutes a breach of ORC Rule 201 and RRS 51.

Submission: MANCOM 1 – INCLINIG TEST FOR SAILING SHIPS

The committee supports the change of minimum heel angle of 1° for boat with LOA > 24.0 m (sailing ships). From the ITC point of view it is also acceptable to measure a boat with LOA > 24.0 m with extra weight on board and to adjust the freeboards accordingly. Tools for this are already available in the new LPP which is now integrated in the Offset editor. In order to evaluate effect to stability, VCG of all extra weights shall also be noted. These adjustments shall be verified and approved by the ORC Chief measurer.

The following rule changes are proposed as result of this submission:

- Add new **IMS E2.2** (and renumber accordingly IMS 2.2): "For boats with LOA > 24.0 m considered "ships" at all effects items whose removal from the boat is impractical, may remain aboard with their weight and longitudinal and vertical positions recorded. Freeboards and stability measurements shall then be adjusted for displacement, trim and stability calculated by taking out recorded items. Such a procedure shall be verified and approved by the ORC Chief Measurer."
- Add to IMS E2.3 for all except (f): "height from the waterline".
- **IMS E4.7**: Add: "+/- 0.01 * *PL* of 0.0275 * *PL* for yachts with *LOA* > 24.0 m"
- Add new **IMS E4.9**: "For boats of LOA > 24.0 m inclining data presented in the "stability booklet" issued by classification societies or other maritime authorities may be used provided they are adjusted to the correct measurement trim and condition as defined in E2.2. Use of such data shall be verified and approved by the ORC Chief Measurer.

Submission: NED 2 – IRC OVERHANGS

The current LPP together with the Offset editor and its latest improvements give a lot of possibilities for checking and deriving what the submission is asking. The ORC Technical staff will continue to work on further improvements of the software which will allow the use of ORC measurement data for any other rating system or purpose when needed.

Submission: NED 6 - WEIGHT USED AS INPUT FOR CLUB CERTIFICATE

The direct input of displacement in ORC Club includes a so called "pessimization" routine, that is re-drafted for 2012 and together with the new formulation of transom drag is expected to give slightly better results, reducing the difference between measured freeboards and entered weight ratings.

However, the committee reminds ORC that if the use of direct weight input results are unsatisfactory, freeboards measurement or stern height if available can always be used. The new Manager with integrated LPP will allow very quick checks to obtain a correct estimated flotation in ORC Club.

Submission: NOR 1 – ASYMMETRIC SPINNAKERS

The committee devoted some time in Delft discussing the current treatment of asymmetric spinnakers in the VPP.

After some tests with different spinnaker configurations (eg, symmetric, asymmetric on CL and on a pole) with the same surface areas and same length poles (see also item 5(d)), there was no strange behaviour noted.

The efficiency of asymmetric spinnakers on moderate to heavy displacement boats is clearly not comparable to that of light boats that are sailing at more reduced AWA where these kinds of sails are more powerful compared to symmetric ones. This is even more evident when the asymmetric is tacked on the centreline. The current aero model is based on wind tunnel experience that obviously is independent of boat displacement. This season there were many races with many boats equipped with asymmetric spinnakers who performed very well, even winning series of races.

In addition, there are some possible advantages of light boats have been corrected (see the transom item below in 6(b), and the shape function item 5(b)).

Hence the committee thinks that there is no need to revise the aero model for asymmetric spinnakers so the submission is not supported, but the committee will keep this item in its 2012 agenda for review.

Submission: RUS 3 – VPP - APPENDAGES

Having an asymmetric appendage in the offset file means that one or both sides of it have been measured without a correct centreline reference. This could return a larger or smaller volume of the appendage with large effects on the boat handicap.

The committee fully agrees with what the submission is reporting, but there is no other way apart from re-measuring the appendage correctly (with the current separate appendage method it could be done easily). The ITC has asked the Russian NA to send some examples of such offset files to better study the problem next year.

Submission: RUS 4 – VPP – CREW POSITION

This submission highlights a known problem of the effect of crew position on boat performance and how the optimal position changes with TWS and TWA.

Last year this problem was examined with the crew moving from the leeward to the windward side with increasing TWS. This year the committee introduced in the VPP a longitudinal forward movement of the crew to avoid excessive trim aft, and hence the high transom drag (see below item 6(b)), that is already a step towards what this submission is requesting.

The longitudinal movement of crew is something that should also be checked with reference to trimming moment of sails (which currently is not taken into account in the VPP) and should be part of a long term investigation. So the committee decided to postpone this item to next year's agenda.

Submission: RUS 5 – GENOA AND CODE 0

Code 0 wind tunnel tests were performed with two different sails, one with 58% of AMG/ASF ratio and another with 67%, thus covering almost the entire range of Code 0 sails (currently 55% to 74.9% in the rule). These sails were tested in flying shape.

The Code 0 is a special type of asymmetric spinnaker, as it may be free-flown or with a stay in the luff. So, in order to avoid an exploitation of making sails as a genoa with a roach (which is not permitted according to the IMS G4.5) and declaring it as a Code 0, the following change to the ORC 208.5 is proposed:

- Add new ORC 208.5: "The Spinnaker luff shall not be attached to the forestay."

5. AERODYNAMICS

a) <u>Simplified rig treatments revision</u>

The committee feels comfortable with the current treatment of the simplified rig, although it is known that the effect of it is maximized with light winds and disappears with stronger winds, which

is contrary to what happens in reality. Nevertheless, this item will be kept on the ITC agenda for a thorough revision.

b) <u>Analysis of type-forming against fractional spinnakers</u>

Some concerns were raised by the sailing constituency about an existing type-forming tendency against fractional spinnakers (both symmetric and asymmetric). In the VPP there are two main factors that affects spinnakers when moved from fractional to masthead configuration:

- a) The wind gradient
- b) The shape function

The wind gradient is the main factor and accounts for the physics of wind increasing with height, while the shape function evaluates the dimension of the spinnaker compared to that of the foretriangle (ISP & J) to take into account the loss of efficiency of big spinnakers below 12 kts of true wind speed (TWS).

The shape function reduces the area of the spinnakers more than the reference area below 12 kts of TWS, but since the reference area calculation is related to the ISP measure, then moving the spinnaker to the masthead returns a less effective shape function for the same spinnaker area. The committee thus decided to use IG instead of ISP in the reference area calculation for the shape function in 2012, in order to evaluate identical area spinnakers with different ISP heights.

Some test runs showed that the effect of the shape function is about 20% of the effect of wind gradient (at 6 kts TWS, reducing then to 0% at 12 kts) so ITC feels comfortable in adopting this modification to the shape function in the 2012 VPP.

A test run on the world fleet showed max variations of 0.4% in GPH. This is thus intended to be included in the 2012 VPP.

c) <u>Mainsail depowering revision (including an investigation on heel angles greater than reality, like the Farr 400 case)</u>

The committee devoted a long time discussing the depowering scheme currently applied to the mainsail and jib. Some cases (like the Farr 400) reported higher heeling angles than reality and also discontinuity in the VMG upwind in over 14 kts TWS, with up and down VMG changing in a non-monotonic way (a so-called saw tooth VMG curve).

With the new aero model introduced some years ago, the depowering on sails begins with a flat that reduces the total sail lift (applied down to a min flat = 0.6). There is another depowering function connected to the flat called twist that lowers the centre of effort of sails trying to reproduce the way sails are twisted to be depowered.

Then the reef function starts reducing the genoa area until it reaches the minimum area and then, if further heeling force reduction is required, the mainsail is reefed. The committee belief is that there are two open issues related to this depowering scheme:

- The CEH (Center of Effort Height) lowering with increased depowering
- The EH (Effective Height) of the sailpan reduction with depowering

The CEH of the non-reduced sailplan is lowered by the TWIST function that was introduced with an old aero model when flat was reduced down to around 0.30/0.35, thus enabling the centre of effort of sails to lower more compared to the present VPP where flat is stopped at 0.6.

In addition, the CEH is slightly lowered in the phase when the jib is reefed, not taking into account that jibs could also be twisted by the crew. The EH is not changing at all when the CEH is lowered, so it is constant up to the moment when mainsail is reefed. Some test runs were prepared with a new

TWIST function that lowered the CEH more, and with a formulation of EH coming from the Milan Wind Tunnel tests that relates EH to lowering CEH.

The first test partially solved the excessive heeling problem (but left the VMG saw tooth over 14 kts TWS), while the second one increased heel on the boats. So a new formulation that takes into account the depowering of jibs when their area is reduced was prepared, which thus lowers the CEH of the sailplan by a further 5% when the jib is reefed.

The test run prepared showed a reduction in heeling angle in all the fleet, and no sawtooth pattern in upwind VMG. The new formulation of CEH lowering is more related to the reality of current sailplan depowering, so being the test runs positive it will be implemented in next year VPP:

A test run on the world fleet showed max variations of 0.3% in GPH (with boats accelerated).

d) Analysis of gybing angles of different spi configurations

During the season some concerns were raised about the evaluation of gybing angles for various spinnaker configurations. Some tests with different spinnaker configurations (symmetric, asymmetric on CL and on pole) with same area spinnakers and same poles length, were prepared and the different gybe angles obtained compared to each other, and no strange behaviour resulted.

6. HYDRODYNAMICS

a) <u>Residuary Resistance – Working Group update</u>

The Residuary Resistance Working Group (Andy Claughton, Kay Enno Brink, Davide Battistin, Philippe Pallu) met the day before the ITC meeting. The chief measurer Nicola Sironi was present too.

This is a report of the meeting from group leader Andy Claughton:

Complete the cleaning of database with fix of negative RR

The Delft database is complete with test data for a model tested upright without keel and with sail force trimming moment applied, except models 71-73, where some anomalous behavior needs to be resolved by Delft.

A plan has been devised to bring all the residuary resistance (Rr) values to zero in a consistent way by using Hughes viscous resistance (Cf) line and model specific Form Factors (1+k). Kay Enno Brink will report on progress with this and the possibility of predicting 1+k values based on hull parameters.

Choice of the parameters to be given to Delft for new models

2 new models based on Series 4 are proposed:

• Cp 0.54 LCB 0.565

• Cp 0.56 LCB 0.555

with other parameters as guided by Lex Keuning.

Choice of the models to be tested at high speeds

The Rr working group has no strong views on which models should be tested. We suggest that Delft start with models that are easiest to test and go from there.

CFD validation tests

Start with a validation test on the 5 hulls of the Delft series 8. Use the upright canoe body-only data scaled at lwl = 10m Kay will organise the supply of:

- igs file of hull shape
- displacement
- xCG, (LCB)
- trim moments applied during tank test
- set of velocities

The following codes will be tested:

- OpenFOAM (Multiphase RANS code) by Wolfson & Crain
- icare: by Crain
- reva: by Crain
- isis: by Ecole Centrale Nantes if they can do it for zero cost.

There are no costs associated with this validation, on the understanding that if a code shows its worth then calculations on new hull geometries will be the subject of some commercial agreement.

Next year's agenda

Try to get a new regression based on all Delft models for review at the Spring meeting.

Also develop better methods to evaluate the effect on the fleet, perhaps by re-scoring regattas to see place changes, rather than looking at sec/mi;

Also evaluate more sophisticated ways of assessing "errors," perhaps by looking at weighting the "error" to Fn range, say 0.3 - 0.45.

The Working Group will meet again one day before or one day after the ITC spring meeting that will possibly be done in Delft in next March (if Lex Keuning will be available).

b) Transom drag upgrade

To correct the trend towards stern-down trim that emerged after the introduction of the calculation of the immersed transom drag, the committee revised the current routine. This happens mainly in small boats were the crew weight is very effective compared to DSPL. The intention is to limit the total amount of transom drag and to optimize the longitudinal crew position to avoid any possible exploitation.

The ORC programmer prepared some test runs on a reduced fleet of small boats (it was on small boats that the difference in handicap for excessive aft trim were very high with the 2011 VPP), and he tested the boats with a set of same displacement trims:

a) Fixing a maximum of transom drag at 20% of viscous (now it is limited of 20% of total drag)b) Moving the crew position forward at 10% LSM0 fwd of LCB

The first test was effective for those boats with excessive transom immersed drag, while the second was obviously affecting the entire fleet, so Andy Claughton made a proposal of evaluating the transom drag at Fn = 0.35 and if >0, only in this case move the crew forward of maximum 15%LSM0 to reduce it.

The test was satisfying, so a combined test run with the transom drag at a limit of 20% of Rf coupled with the fwd movement of crew weight was prepared. 300 boats were accelerated (mainly small boats) with a maximum of 0.7% GPH decrease (only a mini transat was accelerated 1.8% but this was a case considered anomalous last year). The rest of the fleet was not affected.

The committee approved this modification and its inclusion in 2012 VPP

c) <u>Canting keel + canard(s)</u> treatment revision

The ORC programmer checked the treatment of the canards when a percentage of it remains outside of the boat in any conditions, and a small bug was fixed.

d) Increase in accuracy in the appended L calculation for manual single rudder

In the current VPP there is a "manual fix" with a reduction of the 20% of the wetted area for the manual rudder, to return the same values as the appended L with complete offset files. Panayotis Papapostolou has almost completed a routine that in the case of a single rudder (for manual double rudder configuration this is not possible) will re-build a dummy offset file with vertical sections in way of the rudder (with same volume, surface and dimensions of the manual rudder). This could be then used to compute the appended L as it is done for all the offset files containing a rudder. This will be ready for next year's VPP.

7. DA FORMULATION REVISION

The chairman prepared a thorough revision of the DA formulation and proposed some modifications. The proposal was made in the direction of applying DA only to true cruising boats, passing through a revision of the 6 different allowances that are composing DA (the D/L allowance was removed having a unfair effect) and a general reduction of the overall effect of DA.

After a short discussion on this item, the test run prepared by Davide Battistin was reviewed. Boats were accelerated of maximum 1% in GPH with an average of 0.3% GPH decrease. The overall maximum DA allowance decreased from 1.5% to 0.75%.

The ITC therefore decided to implement this into next year's VPP.

8. INVESTIGATION ON VMG UP OSCILLATION WITH INCREASING TWS (eg, FARR 400 CASE).

This problem was directly connected to the depowering of sails, and so corrected by the introduction of the CEH lowering while the jib is reefed (see above item 5(c)).

9. NEW "OFFSHORE SINGLE NUMBER HANDICAP"

At the prompting of ORC Chairman Bruno Finzi at the beginning of the season the ITC studied the possibility of introducing a new OSN (Offshore Single Number) handicap. David Lyons made a reformulation of the Offshore Single Number Handicap based on different courses and wind speeds to more accurately reflect the race course geometries used.

The new OSN will be computed as a weighted average of the following polar speeds (not wind averaged):

TWS	8	12	16
Beat VMG	40%	25%	10%
60	5%	10%	20%
90	5%	15%	20%
120	5%	15%	20%
150	5%	10%	20%
Run VMG	40%	25%	10%

The resulting speed at 8 kts TWS will be accounted at 25%, the one at 12 kts TWS at 50% and that at 16 kts at 25%.

The above scheme takes into account more windward/leeward directions in light winds, which is gradually reduced to have more reaching as the TWS increases. This is quite different from the present GPH which is an average of circular random 8 and 12, and thus being more moved towards strong winds and with less reaching in light winds. The overall OSN is generally 5% faster than current GPH in average, and this reflects the average speed of boats during an offshore race.

GPH will be retained in any case to identify boats and classes as a reference by crews and owners, and the new OSN will be added to the set of options currently available.

10. ORC CLUB "PESSIMIZATION" ROUTINE IMPROVEMENT

See item 4 above - Submission NED 6

11. STATUS OF DEVELOPMENT OF APPENDAGE MEASUREMENT WITH INDEPENDENT STATIONS

Panayotis Papapostolou presented the last version of the ORC Offset Editor. The procedure that interpolates stations in a separate measured appendage to re-build a correct Offset File is in the works, accepting appendages measured with horizontal waterlines instead of vertical sections.

The vertical stations required by the LPP are therefore constructed using other points which are measureable more easily and accurately in horizontal, diagonal or contour sequences. Another routine able to correct a wrong trim re-build vertical station instead of simply displacing them vertically is also under development.

The development of this very powerful tool that now includes the LPP is very helpful in finding some offsets with clipping problems that will hopefully be corrected either automatically within the LPP or manually with the help of the graphic tool of the Offset Editor.

12. STATUS OF DEVELOPMENT OF IMS AS A GLOBAL MEASUREMENT TOOL

The IMS measurement platform is providing information for displacement, LWL, overhangs, rig and sail measurements, plus hydrostatic and stability data that could be used also as reference for notified bodies or registers for boat certification.

Some handicap systems are using the VPP in the background to issue their certificates. All the tools are in continuous development and there is no doubt that the current IMS system is a really global measurement tool. ITC fully supports its distribution around the world that could be also a way of expanding the use of ORC handicap.

13. COMPLETION OF RECOMENDATIONS TO THE CONGRESS

- a. Transom drag fine tuning (max drag at 20% of Rf + movement of the crew forward if drag >0)
- b. Sailplan CEH lowered when jib is reefed to take into account also the jib twist
- c. Spinnaker SHAPE FUNCTION revision with reference area of spinnaker related to IG instead of ISP
- d. DA reduction
- e. No anchor gyradius adjustment
- f. New Offshore Single Number Handicap GPH remains to identify boats and classes
- g. New pessimization routine for ORC CLUB boats with declared DSPL
- h. Minimum Inclining Angle at 1° or acceptance of data coming from Stability Booklet for boats with LOA>24 m

- i. Computation of Measurement Trim DSPL deducting extra weights (like liquids in the tanks, sails, gear) for boats above 24 m LOA
- j. Light Ship trim DSPL computation in LPP output
- k. Acceptance of endorsed additional information's for ORC CLUB certificate issue when DSPL is entered
- 1. Computation of Windward/Leeward handicap without wind averaging
- m. New rule for code0 sails (and generally for all spinnakers) making compulsory to set them flying
- n. New inventory list with indication of VCG of gear

The above modifications represent the list of the Recommendations to the Congress.

ITC strongly suggests that the new beta VPP will be immediately and widely distributed to expert RO and DVP users. Former ITC members have expressed their availability to be part of the beta testers too. Debugging performed before the end of the year should enable the ORC to avoid having to issue new versions of the VPP during the 2012 season.

14. 2012 VPP. PREPARATION OF AN "ALL EFFECTS" TEST RUN AND A BETA VPP FOR IMMEDIATE RELEASE.

An "all effects" test run and a beta VPP has been prepared at the end of the meeting and is ready to be distributed to RO and Beta Testers. These two products contain:

- New shape function (see item 5(b) above)
- New transom drag routine (see item 6(b) above)
- New jib twist function (see item 5(c) above)
- New DA formulation (see item 7 above)

15. 2012 VPP DOCUMENTATION RELEASE

The committee, looking at the 2012 VPP modifications, will try to deliver the 2012 VPP Documentation before the end of the year when the new VPP will be released.

16. ORC RESEARCH FUND BUDGET PLANNING.

The ITC is planning to perform the following research program next year:

- 1. Two new models will be built and tested in Delft (see 6a)
- 2. Some existing models will be tested at high speed in Delft (see 6a)
- 3. Some CFD validation work will be performed (see 6a).)

The whole research program could be performed free of charge (the no charge for the construction of the two new models must still be confirmed). The CFD validation test may be done free of charge but if the validation process could be completed early next season ITC would like to make some new models to be tested with CFD and these new tests most probably will not be free of charge.

So the committee will ask to ManCom the establishment of a fund that may be used during the year 2012 or in 2013.

17. STRATEGIC PLANNING FOR WORK AFTER THIS MEETING. MAIN PROJECTS FOR 2012

- New residuary Resistance
- Heeled drag revision
- Fine tuning of transom Drag
- Revision Asymmetric Spinnaker treatment
- Evaluation of crew optimum position with varying TWS and TWA

- Effect of asymmetric appendages
- Revision of Clipping Routine
- Code0 treatment revision
- Simplified rig treatment revision
- DA revision

18. NEXT MEETINGS

The next ITC meeting will be held next March and possibly in Delft (6a)). Other possible locations could be Athens, Madrid, or Hamburg that could be taken into account also for the September meeting (middle of September weekend).

Since the 2012 AGM will be in Dublin, the ITC thinks that the final ITC meeting could be made there, ending at least 2 days before the AGM to allow the preparation of minutes and test runs.