ORC

Everybody's at it

Autumn in the ORC calendar is a busy time. Proposals that were on the year's research agenda must now sink or swim for their approval at the annual meeting and research that has been reviewed in preparatory ITC meetings must be ready for implementation into the VPP for next year – if it is approved.

This can be a difficult process, because what may solve one problem may create others as the changes are tested out in the 'field'. This year there was just such a project conducted on Residuary Resistance (Rr), where the factors used to characterise this effect were updated to be more accurate for the latest-generation planing boats and other modern designs.

ITC chairman Alessandro Nazareth notes, 'Polar speeds printed on an ORCi certificate frequently prove slower than the actual speeds, and this is becoming more evident with the high speeds

It should be read as a positive sign that people are at last again hungry enough about their racing to begin pushing at the edges more forcefully. In ORC, just as under IRC, the rule managers are now having to work harder to keep pace with the sail designers, although Hugh Welbourn's reinterpretation of a once traditional configuration (*top left*) is more about handling than rule dodging

of today's light boats. The Implied Wind scoring calculation is now always higher than the observed TWS, meaning that boats are going faster than the ORC VPP. Interestingly, the greatest differences are downwind in light air, with differences decreasing upwind and more generally as wind speed increases.'

The suspected culprit creating this discrepancy is the Rr formulation in the VPP. A working group of Andy Claughton, Kay Enno Brink, Philippe Pallu and Jason Ker have been attacking the problem from different angles: Brink collating and examining Delft tank test data; Pallu using CRAIN CFD tools to explore the reliability of the original tank tests; and Ker using his Numeca Fine-Marine CFD tools to generate a new data series for more modern yacht types and higher speeds.

The group have derived a new Rr formulation that captures the BTR and LVR changes more accurately and more rationally than previous formulations, regressing the new formulation so that differences to the existing fleet are minimised.

Part of the new proposals was related to a new formulation of heeled drag, based on the calculation of residuary resistance using the same parameters of upright Rr (BTR and LVR), calculated with the boat heeled, then adding an element to account for the hull asymmetry with heel.

Claughton and Ker have now drafted a new induced drag methodology as follows:

1. Formulate lift area versus leeway angle slopes and axis intercepts for the hull and also for the combined appendages, based on simple lifting line theory.

2. From the LPP determine an effective hull yaw angle at zero leeway due to the asymmetry of the heeled hull shape.

3. Combine both hull and appendage Lift Coefficient (Cl) vs Leeway lines to create a total Cl line that considers areas and initial slopes (for canard or trim tab yachts the hull share of lift is currently assumed to be zero).

Another hydrodynamic issue being addressed is fine-tuning the transom drag model to compute the added drag at all heel angles. For this and other hydro items the VPP solver will be updated with new algorithms, and once the structure of the method is programmed it should be possible to fine-tune the factors to match the CFD and tank data closely and then verify the results on the water. The committee thinks that this will be a significant improvement on the current formulation, lessening the scope for 'exploitation' by improving the modelling.

There are numerous other items on the ITC agenda – such as fine-tuning the effect of moving crew weight in light air, and the effects of measurement inventory items on the adoption of light ship trim – but the change in Rr will deliver a welcome overall improvement in accuracy for the newer boats in particular.

On the aero side the ITC has been examining (as has IRC in Lymington) Hugh Welbourn's new double clew headsail, or so-called quad sail. Welbourn claims these sails 'are easy to trim, can cope with a wide range of wind angles, and are forgiving and well balanced in use. One big benefit is that on a bigger boat one such sail can replace three other sails from the inventory...'

The committee believes that these sails should presently be measured as a jib, virtually extending the leech and foot and using the new projected shape to define the LP and girths; however, the ITC is also examining the consequences of considering this sail as a Code 0 or asymmetric spinnaker.

Another issue brought to the attention of the committee relates to the 'upper-yankee' style headsail, seen in the upper right photo on the latest German Ker 50 *Varuna*.

Such a headsail when flown outside the jib and with a very high tack point is currently in breach of several ORC rules:

- Strop length greater than 0.762m (ORC 207.2)
- Clew point aft of the inner jib (ORC 207.1)

Hence it is illegal under current IMS rules.

Both these cases highlight the fact that jibs or genoas can be hoisted outside the foretriangle, as presently prescribed under IMS regulations. The committee therefore believes that the relevant rules should be modified as follows:

- IG measurement should now take account of the uppermost halyard with which a jib could be hoisted.
- The J measurement should also now take into account the foremost possible jib tack point.

This will be just one of the interesting challenges facing the ITC as work now begins on collating all existing measurement rules into one single new Universal Measurement System...

Dobbs Davis ❑