Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	Arthur M. Reed
Affiliation	David Taylor Model Basin (NSWCCD, USA)

Name of Technical Committee or group to be discussed	Specialist committee on Performance of Ships in Service (PSS)

Written Discussion (within 1,000 words of length)

I was puzzled by some of the discussion of added resistance in waves (ARW) during the presentation, by the Specialist Committee on Performance of Ships in Service. So I started to read the report on that topic, and find references to the STA-Joint Industry Program, STA-Group, STAwaves1, STAwaves2, etc. However, nowhere is there a definition of STA (it is missing from the nomenclature), and there are *no* formal citations or references to STA, this an unsatisfactory situation, that the Committee should fix before their report is finally published—using Google, I find that STA probably stands for a MARIN activity Ship Trial Analysis, but I should *not* have to make this assumption.

In the discussion of ARW, the Committee parses ARW into two components, one "reflection of short waves on the hull," and second "the wave induced ship motions." This is an inaccurate statement of what is happening hydrodynamically, although it does in a sense capture what is occurring. Based on a momentum theory analysis, ARW is a consequence of second-order interactions between the waves radiating away from the vessel and the ambient waves and the radiating waves interacting with themselves. These radiating waves can be decomposed into seven components: those 6 wave systems resulting from the ship acting as a wave maker as it moves in 6 degree-of-freedom motions, and the wave system due to the diffraction of the incident waves.

The "reflection of short waves on the hull" are diffracted incident waves, but all of the incident waves are diffracted—not just the short waves. The "the wave induced ship motions" are not waves, but result in the generation of waves that radiate away from the ship. In general, the contribution of diffracted waves to ARW is small relative to the contributions due to the waves resulting from the 6-DoF motions of the vessel. But, when the waves are short, there are no ship motions and all of the ARW results from the diffracted waves interacting with the incident waves and themselves.

It has long been reported that tankers transiting areas like the Straits of Malacca experience significant speed loss while undergoing very little motion due to the short waves in that region. This is a manifestation of a tanker diffracting short waves, when there are very little motions induced by the ambient seas.

The "validation" of the STAwave1 and STAwave2 models by comparison with the results from one test on a single Panamax containership and a single Aframax tanker should *not* be considered as anything approaching validation, but rather as a check that the formulas are not "out to lunch." It should be noted that the STAwave2 model is not defined in the report, though I recollect that it was given in the Committee's presentation.

PSS Response:

The Committee would like the thank Dr. Reed for his elaborate notes and discussion. We have the following responses to the raised issues:

1. Description and citation of STA JIP. The Speed Trial Analysis (STA) joint industry project (JIP) is well known among interested companies, shipyards and ship operators world-wide. The primary objectives of this project was to come out with a completely revised (compared to the existing ISO15016-2002 standard) speed and power trial procedure, which shall be practical, simple, transparent and accepted by all parties involved. The STA project is cited at three places in our deliverables:
   - First in the references to Part II of the procedure 7.5-04-01-01.2, reference (17) „Sea Trial Analysis Joint Industry Project: Recommended Analysis of Speed Trials, MARIN, 2006“ and reference (19) „Boom, H.van den, Huisman, H. and Mennen, F.:”New Guidelines for Speed/Power Trials” SWZ/Maritime, Jan./Feb.2013“
   - econdly, in the main PSS Committee report to the Conference, under „Journal Referecnes“ - “Recommended Practice for Speed Trials”, STA-JIP publication, 2006, available from www.marin.nl

2. The discussion about the reflected waves, and waves induced by the ship motion, and the associated definitions is well recognized, but it has a rather academic trend. In the spirit of the governing objectives (transparent, simple and easily understandable procedure and corresponding correction methods), the Committee still believes that the adopted approach for wave added resistance is well in line with the experimental practice of the towing tank community. As far as the verification data, approach and process are concerned, this topic has the highest priority in the future Committee work.

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	Dr. Reddy Devalapalli & Jan Otto de Kat
Affiliation	Lloyd's Register American Bureau of Shipping

Name of Technical Committee or group to be discussed	Specialist committee on Performance of Ships in Service

Written Discussion (within 1,000 words of length)

Section 7.1 on "Minimum Power Guidelines" refers to

(1) Adverse conditions extracted from MSC-MEPC2/???11 and
(2) New power lines in table 3 from MEPC 232(65). As MEPC 232(65) is the updated version of ???, it may be remarked that the revised "Adverse Conditions" as mentioned in MEPC 232(65) are referred to.

The conclusions in section 7.2 are based on a study using numerical method for estimation of "added resistance in waves" as against the recommended procedure to obtain the same from model tests as stated in 3.12 of MEPC 232(65). In view of this, it may be beneficial to comment and provide(??) more evidence and validation with experimental data.

Section 7.2 also mentions formulation of recommendations for future ITTC work on this topic. However, we would like to stress the need for additional work on verification and validation studies on use of numerical methods for estimation of added resistance in waves.

PSS response:

In response to Dr. Reddy's comments, the PSS Committee have to mention the following:

- Of course there are inaccuracies in the estimation of added resistance (AR). However, these inaccuracies do not affect the essence of the results. For a 20% deviation of the results, the conclusions are still valid.

- On the comment that the revised sea conditions for assessing minimum power requirements are not presented in the conference, they are included in the report of the committee.

- Furthermore, PSS committee recommends further elaboration on the assessment of the performance of ships in adverse weather conditions, accounting for the worst cases, since safety is the prime requirement. Therefore, head waves for AR should be included in the study as

well as ballast condition (heavy ballast condition) which was not accounted for satisfactorily in IACS document submitted to IMO/MERC to recommend the establishment of the respective condition in the Guidelines.

Finally, we should be very careful when we employ complicated methods like CFD calculations for propulsion and manoeuvring to establish rules on practical matters, directly affecting shipping community.

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	Prof. Michael Schmiechen
Affiliation	Formerly VWS, the Berlin Model Basin

Name of Technical Committee or group to be discussed	Specialist committee on Performance of Ships in Service

Written Discussion (within 1,000 words of length)

Written Discussion to the Report and Recommendations of the Specialists Committee on Performance of Ships in Service
27.08.2014

In view of my extended correspondence with the SC I am amazed at the Report and Recommendations. The Report and the References attached deal to a large extent with subjects to be treated by the Propulsion Committee proper, while the SC has decided not to consider, not even to mention my pertinent critical remarks and published results. After all, I had expected a convincing argument for not adopting at least the mature routines of the rational procedures I am promoting in the interest and for the benefit of our clients.

The Terms of Reference are extremely vague, lacking a clear-cut structure, though (maybe?) not the fault of the SC. But 'consequently' the Report suffers from the same deficiencies. The Terms start with the misleading statement: "The purpose of the Committee is to improve the performance predictions …". But the purpose of the Specialists Committee and of the Procedure 7.5-04-01-01-2, Rev. 1, proposed for adoption by ITTC and subsequently by ISO and IMO is to provide generally acceptable standards for trials and monitoring, permitting to prove that the performance under service conditions meets the predicted and/or contracted values.

The basic rules of fair-play require that the same 'people', who have produced the prediction, should not produce the proof 'as well'. I have always been wondering how long ship owners will accept this practice and I claim, that ITTC can only save its credibility, abandoning this practice as soon as possible, resorting to truly transparent, objective procedures. And according to my experience this can be achieved by clearly distinguishing between the analysis of the performance at the trials condition and 'reduction' to the nominal no wind and waves condition, without reference to any prior data as it must be, and the 'extrapolation' (!) to the performance at the contracted condition, if different from the trials condition, avoiding reference to prior data wherever possible. Both problems are not problems of hydro-mechanics, but of simple, generally intelligible and thus acceptable conventions.

The Terms of Reference proposed for the next SC, if any, tend to perpetuate this state of affairs, unless the Advisory Council successfully enforces the goals it has set forth in the 'ittc news' no. 64. These goals have evidently been conceived in view of the failure of the SC and the deplorable consequences, I have pinpointed repeatedly. Among the randomly listed 'aspects' to be investigated I am missing among other important items the influence of the propeller submergence at trials in ballast, the most common condition. As my evaluation of the ANONYMA trials has shown reference to the performance of deeply submerged model propellers in open water is evidently nonsensical.

The 'Direct Power Method', a blatant misnomer, is still kept alive by many prior data to be sucked from thumbs, and the propulsive efficiency in particular, the joker to be drawn out of the sleeve. I have not found, wherefrom else it comes! According to the 'commandment of objectivity' the goal must be to introduce highly aggregate models, the few parameters of which can be identified from the few data usually acquired. For an independent check I am still trying to obtain the data of the example claimed to be included. As the members of the SC know, I have published such studies in every detail in case of the standard ISO 15016: 2002-06 and, more recently, in case of the ANONYMA trials for Dr. Hochkirch of DNV-GL and in case of my PATEs for Dr. Hollenbach of HSVA.

Most 'surprising' in the Report and the Procedure is the naive identification of the current prevailing at the trials. In view of the omnipresent random disturbances the analysis of individual double runs is not acceptable, as I have explained to Dr. Hollenbach in detail. Already in 1998 I have demonstrated how the current can be identified objectively and reliably, including all double runs and without reference to any prior data. (Filed by JISC/JMSA as 'Prof. Schmiechen's comments to ISO/TC8/SC9/WG2 /N20, Informative' under ISO/TC8/SC9 /WG2/N28, dated 1998-06-23).

And what is a 'verifier' supposed to do, that has no experience (page12)? If his sole purpose is to check (✓) formal compliance with more or less obscure 'regulations', the SC should have rejected his 'institution'! How long are we going to afford this and other incredibly inefficient 'bureaucratic' procedures, instead of caring for the essentials and forgetting about the doctrine 'not invented here'? The first of the chapters of the report are full of such 'procedures'!

Surprisingly, or rather not (!), I noticed that, different from the established practice followed by all other Committees, the SC PSS does not cover all pertinent publications, at least over the past conference period. 'Instead' I find, after all our correspondence, the ritual repetition of the incorrect (!) statement: "With the acceptance of these new procedures, the ITTC and IMO have established a transparent, straightforward best practice and a level playing field for the delivery of new ships for all stakeholders."

Most amusing and revealing 'best practice' and 'level playing field' are in bold print! As the Report shows, the procedure is neither straightforward nor transparent and, most important, the ITTC has not yet accepted this procedure! And according to the 'News from the Advisory Council', ITTC is not a playground!

The term Recommendations occurs in the Heading and further only twice in the Report, a concise list is missing. If the Procedure 7.5-04-01-01-2, Rev. 1 proposed for the evaluation of traditional trials will be approved by the Full Conference, not only progress will be prevented for decades, but ITTC will have lost its reputation based on serving clients at the forefront of research. The EC needs Experts understanding the nature of the difficult problems to be solved and being familiar with the advanced

conceptual, statistical and numerical methods necessary for their professional solution, being 'naturally' standard' in other fields of science and technology, and, last but not least, responsible Experts producing reliable Reports and Procedures meeting explicitly stated and clearly understood goals and resulting requirements.

PSS response:

Dear Prof. Schmiechen,
Please let us comment on some of your remarks of your written discussion of our committee report.
You state, “You have always been wondering how long ship owners will accept the practice, that the same people who have produced the prediction, produce the proof as well.” Indeed, exactly this has not been accepted by some large ship owners in the past, and they initiated together with MARIN the joint industry project “STA Sea Trial Analysis”. Today 19 ship owners, among others AP Moeller Maersk, Shell, Stena and Stolt are participating in STA. And this was the reason, why ITTC invited STA to cooperate with the aim providing generally acceptable standards for trial preparation, conduct and evaluation.
We do not agree that the “Mean of Means” is a naive identification of the current. More precise, the method does not identify the current, but the method is eliminating the effect of the current. Especially the ship owners like this method very much because they can calculate the current corrected speed immediately during the trials without any special scientific expertise. So simple this method is the committee is well aware of its limitations.
Therefore the committee agreed investigating the so called “Iterative Method”, proposed by Japan in the ISO. The results of this investigation are not included in the report, because the work has been performed after editorial deadline. The proposed method is promising and further investigations on this topic are one of the recommendations for the next periods committee work.
We as well do not agree with your polemic criticism of the “Direct Power Method”. This method is widely accepted in the towing tank community for a very long time and we see no need at all to skip this method.
We thank you for your remark, that the Committee is missing investigating the influence of the propeller submergence during trials at ballast draught and the Committee agrees to put this item onto the list of recommendations for the next periods Committee work.
Finally we are confident that ITTC will not lose reputation when approving our proposed procedures. The cooperation between ITTC and ISO and especially the very active role of Prof. Strasser representing ITTC at the IMO bodies, has strengthened the position and the reputation of the ITTC in the international shipping and shipbuilding industry as independent and trusted advisor.

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	Michael Schmiechen
Affiliation	VWS, the Berlin Model Basin

Name of Technical Committee or group to be discussed	Specialist Committee on Performance of Ships in Service

Written Discussion (within 1,000 words of length)

Many thanks Dr. Hollenbach for your very short preliminary answer to my written contribution to the report of the Specialist Committee on Performance of Ships in Service.

Your answer as well as Dr. Minchev's presentation of the report are not only in my opinion perfect confirmations of the failure of the Specialist Committee adequately to address the essential problems I have pinpointed in my Written Discussion and in my oral contribution to the discussion at the previous session.

PSS response:

The PSS Committee does not agree with and cannot accept the above conclusion! The fact that the proposed updated speed and power trial procedures, as well as the final report of the Committee are well accepted and approved by the full Conference, clearly demonstrates the success of the Committee to accomplish its assignments within the defined Terms of Reference.

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	Jin Kim
Affiliation	KRISO, Korea

Name of Technical Committee or group to be discussed	Specialist committee on Performance of Ships in Service

Written Discussion (within 1,000 words of length)

1. The Committee finally adopted a direct power method. I believe the Committee fully investigated both iterative method and direct power method.
   What was the main deficit of the iterative method?

2. For the wind correction, the STA uses the table of empirical data based on the experiments for the different ship types.
   If ship designers made an effort to reduce the air drag and applied the special technology, how the present procedure take in account?

PSS response:

1) More elaborate investigation and comparison with the iterative method is put forward as one of the major tasks of the 28th ITTC PSS Committee.
2) In such cases project specific wind tunnel tests could be recommended both to verify the positive wind drag reduction effect and also to provide accurate wind drag coefficnets.

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	James Millan
Affiliation	NRC Canada

Name of Technical Committee or group to be discussed	Specialist committee on Performance of Ships in Service

Written Discussion (within 1,000 words of length)

Since speed and shaft power are the two main parameters to be recorded during sea trials, it is essential that these are obtained from the correct instruments.

On p. 599, Vol. II, the committee rejects STW as measured by Doppler speed logs and indeed does not even require the recording of it durig trials.

Is there some sort of reference that can be provided which indicates what the problems might be with Doppler speed measurements? SOG as measured by DGPS is a very different thing and is actually the speed of the antenna over the ground.

PSS Response

The speed-power trial is aiming at assessment of the ship speed with high accuracy (error < 0.1 kn). Although one of the traditional instruments on board, speed logs have proven not to provide the speed through water very accurately. Actually the ship log is normally calibrated during the speed trials.
Doppler logs measuring the relative water velocity well outside the boundary layer should be capable to measure STW. In practice however we see also for this type of log quite some variations in speed. The origin of these variations is still not well under stood; the profile of the current could be a possible explanation.

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	Guillaume Delefortrie
Affiliation	Flanders Hydraulics Research

Name of Technical Committee or group to be discussed	Specialist committee on Performance of Ships in Service

Written Discussion (within 1,000 words of length)

I have noted the discussion on currents in your interesting report. I would like to add some comments:

- What is the effect of lateral currents? (Drift is of importance if the track is set.)
- How do you think the current field is affected by the presence of a big ship?

PSS response:

First, in Part I, section 6.5 it is recommended that areas with known large current variations in time or space shall be avoided.
The drift effect caused by strong lateral current could be possibly indicated by the need of larger rudder (steering) angles. In Part I, section 8.5 the single rudder angles are limited to maximum 5 deg. If larger rudder angles are required to maintain the course, the heading shall be changed into the prevailing current direction in order to reduce drifting effect.
The presence of a large ship may affect the current field, but within the time of a return run (of course depending on the vessel speed), this effect is assumed to die out.

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	TAE-IL LEE (tilee@hhi.co.kr)
Affiliation	Hyundai Maritime Research Institute

Name of Technical Committee or Group to be discussed	Specialist committee on Performance of Ships in Service

Written Discussion (within 1,000 words of length)

Hyundai very appreciates for wide activities of PSS Committee to establish new guideline for Ship's Speed Trial Analysis Method.

But Hyundai concerns the accuracy of the correction method. Because the result of speed trial analysis is closely related with the contract between ship builder and owner.

Generally, the accuracy of correction method can be validated using speed trial results of sister ships. So it might be more useful if there were more cooperation between Committee and ship builders for the validation of correction accuracy.

In the future, we expect the improvement of correction methodologies for wind, wave encounter angle, trial course, tidal current, steady rudder and drift angle, especially with side direction, to reduce serious conflicts between ship owner and builders.

PSS Response:

The Committee thanks the contributor for his valuable comment. We agree that the continuous improvement of the applied correction methods shall be and it is the highest priority in the future PSS Committee activity.

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	TAE-IL LEE (tilee@hhi.co.kr)
Affiliation	Hyundai Maritime Research Institute

Name of Technical Committee or Group to be discussed	Specialist committee on Performance of Ships in Service

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	Hyun-ho Lee (hhlee@hhi.co.kr)
Affiliation	Hyundai Maritime Research Institute, Hyundai Heavy Industries Co., Ltd.

Name of Technical Committee or Group to be discussed	Specialist committee on Performance of Ships in Service

Written Discussion (within 1,000 words of length)

Reference is made to the Recommended Procedures and Guidelines for Speed and Power Trials Part I; Preparation and Conduct (7.5-04-01-01.1, Revision 1.0).

Preferably, wave information is to be measured by using equipment such as wave buoys, wave radar or lidar during sea trials. And wave measuring equipment should be calibrated and the accuracy should be validated and documented. However, it is very difficult and almost impossible to apply this guideline in the real sea trials. Therefore, discussions for applying the wave measuring equipment in sea trials are expected to be made within the Committee.

1) It is very difficult to calibrate wave information because the “true” wave information is unknown. Comparison with the measured data from a wave buoy also has a problem because the wave buoy itself should have been calibrated in advance.

2) Practically, many of wave rider buoys (especially using GPS signals) do not provide and require any calibrations.

3) The wave radar system cannot be calibrated for every different ship for sea trials because of the limited time and resources available e.g. wave buoys. In some devices, the calibration is protected after purchasing the equipment.

4) There is no guideline for minimum accuracy for application. In my opinion, accuracy of ±0.5 m for significant wave height, ±10 degrees for wave direction and ±0.5 seconds for wave period seems to be reasonable figures.

PSS Response:

The recommended instrumentation for measuring and documenting the sea state condition shall be generally purchased from acknowledge venders. The latter shall provide relevant User Manual, as well as calibration instructions and data, together with the expected measuring accuracy of the device.

Form of Written Discussion at the 27th ITTC Conference

Discusser	
Name	Hyun-ho Lee (hhlee@hhi.co.kr)
Affiliation	Hyundai Maritime Research Institute, Hyundai Heavy Industries Co., Ltd.

Name of Technical Committee or Group to be discussed	Specialist committee on Performance of Ships in Service

Form of Written Discussion at the 27th ITTC Conference

Name: Tom Dinham-Peren

Affiliation: BMT Defence Services

Name of Technical Committee or Group to be discussed: The Specialist Committee on the Performance of Ships in Service.

Thank you for the presentation, which was excellent. The subject of the performance of ships in service is extremely interesting and pertinent and indeed is one of the reasons we are discussing it today.

I have two questions on the procedure '*7.5-04-01-01.2: Speed and Power Trials, Part II Analysis of Speed/Power Trial Data2'*.

1. Is the correction for the resistance due to wind correct? I fear that the procedure as it stands does not add back in the resistance due to still air – as it should. Care is required as to how this is introduced into the procedure, as we need to know the 'still air' vessel speed before we can do this and I imagine that we want to avoid introducing an iterative process.
2. The corrections in Appendix E appear suspect. The same correction is applied to the trial and design conditions at the same the same power and hence the same correction is applied at different speeds for the two conditions. This does not seem right, as we would normally apply empirically based corrections at the same speed.

I have one comment on the presentation:

1. In section 6.5, Figures 2 and 3, the committee presents strong evidence that correlation factors vary with speed and draught for a given vessel. I draw the committees attention to the ship model correlation factors developed by Brian Bowden that show a strong dependency on draught and those of J R Scott that show a strong dependency on speed. While these factors are based on the ITTC57 method, the variation in predictions between the ITTC57 and ITTC78 method are such that the trends for the ITTC57 method can largely be read across and support the idea that correlation factors that do vary with speed and draught.

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PSS Response:

1) Yes, eq. (5) in Part 2 of the Procedure is incomplete. The air resistance due to ship speed shall be deducted. Will be updated in the next version of the Procedure.
2) The Committee agrees that the correlation process from different draughts and speeds is extremely important for accurate speed-trial analysis. As pointed out in Section 7.5 of Part I, the Committee is recommending that "…For all draughts and trims, the same methods, procedures and empirical coefficients shall be used to extrapolate the model scale values to full scale…". Indeed, there are some initial indications that the correlation coefficients applied could be both speed and draught dependent. This, however, needs further verification, which was included as an important topic for the future work of the Committee.
3) The above response could be also extended to the latest comment of Mr. Tom Dinham-Peren