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ISO/JMSA TC8/SC9/WG2
DIN/NSMT WG Ship Speed Trials
ITTC Trials and Monitoring Committee
ITTC Propulsion Committee
and, for information,
ITTC Symbols and Terminology Group
ITTC Quality Systems Group

Berlin, 04.03.1999

Sub.: **Evaluation of ship speed trials**
here: **Further evaluation**
Ref.: Examples and on my website,
in particular 21010_data_mod
and 21010_eval_mod

Dear Colleagues,

it will not come as a surprise to you that I have continued the consideration of the results obtained so far and further developed my ideas. Written discussions with colleagues have been very helpful in clarifying some of the issues.

Apart of the notes in the programs I would like to offer the following observations and remarks as **contributions to the discussion of a subject of great practical importance.**

Motivation

The stimulus for my recent activities has been the Japanese ISO / Committee Draft (CD) 15016. My first reaction was a different draft proposal together with a cover letter and two examples, all published on my website. My reservations were, and are even stronger now, that **an ISO standard should not just continue to refine past practice, but should meet the highest 'standards' and take advantage of the latest state of the art and technology of systems identification**, not only in view of the legal implications, but the requirements of ISO 9001 as well. **And it must be the result of a joint effort of the whole community concerned, including theoreticians.**

My reservations, though not my principles and procedures, are shared by my German colleagues on the DIN/NSMT WG 1.1.1.2 on Ship Speed Trials. In the meantime I have received a copy of the fax JSMA 98-217 by the Japan Marine Standards Association addressed to the corresponding German DIN / NSMT to the effect that voting for approval of ISO / CD 15016 as a Draft ISO Standard (DIS) has been cancelled because of the importance of the suggestions of the NMST/WG, the final version to be submitted soon.

Principles

My principles or goals are to keep the models as simple and the method **as transparent as possible in order to make the results as trustworthy as possible.** Consequently I adhered

to the rule: **keep separate problems separate as far as possible** and keep the exposition as simple as possible.

Procedure

The resulting procedure is:

1. identification the current and the powering performance in the behind condition at the given load condition from measured data only,
2. comparison with the predicted performance at that condition,
3. comparison with the contracted performance at that condition,

and, for the purposes of my study,

4. comparison with the final results of traditional evaluations, whichever has been used by the yard or institution supplying the data.

The first task has been solved in terms of a powering model and a current model as shown already in the draft proposal and in the accompanying examples and in the new examples. **The usual, rather involved iterative solution of a problem with at least five unknowns is replaced by the straightforward solution of a system of linear equations.** The second and third tasks could not be performed in the examples due to lack of data. Task 4 has been performed as far as data have been made available.

One observation concerns the best choice of the shaft power to be used in the evaluation. In my opinion the shaft power measured, according to my understanding **the brake power, is the correct reference. In proving the conformance with contract conditions it does not require further assumptions on top of those necessary for the strain gauge measurements in the usual absence of calibrations proper.** Consequently in the examples I will have to change the data and the evaluation, resulting a small shifts only, where applicable. Care has to be taken in introducing model data, being mostly in terms of delivered power.

'Evaluation'

The advantage of this procedure is that **a minimum of assumptions, i. e. conventions to be agreed upon, are necessary. No references to model or resistance data are necessary.**

Further, even with moderate deviations from the contract conditions the powering performance does not change, provided the submergence of the propeller does not change. Changes of salinity can be accounted for computationally.

If the submergence of the propeller changes with load conditions, especially from partially submerged to fully submerged, trials have to be conducted at all relevant conditions anyway. Subsequently the powering performance can to identified at all these conditions.

Reduction to no wind etc

The objection to this procedure was and is that the traditional procedure goes further and establishes powering performance at certain service conditions. My response is: by doing so, **a Pandora's box of problems is being opened. But if one wants to do this, for whatever reason, one should look for a solution following the principles stated.**

After having reached this point I suspected that **any educated guess, i. e. systems identification of the wind effects and reduction to the no wind condition, might be more convincing and consistent than the traditional procedures** followed so far. Consequently I have, as a first attempt, developed the very simple procedure, which you find in the 21010_eval_mod file, the data being provided in the 21010_data_mod file. And you will find that **the results agree perfectly with those obtained by the yard!**

The model used in the program is a linear to cubic interpolation of the power due to water resistance and a cubic interpolation of the power due to wind resistance. **This model is of course open for discussion as are the extensions to account for other deviations from contract**

conditions. In order to identify these effects correctly the conduct of the trials has to be changed as I have proposed earlier.

The idea can be extended to phenomena as e. g. changes of trim etc, as soon as the corresponding changes are being performed during the trials and the parameters are available for purposes of correlation. And **in due course the effects of waves, shallow water etc will have to be considered consistently with the procedure developed sofar.** Of course this will lead in many cases to the use of data, which have been used up to now as well.

In that sense **the whole exercise is to be considered as a necessary rationalisation of the traditional procedure, if one wants to adhere to it. I repeat my former appeal: naval architects should do this better themselves before other people tell them what to do better.**

I wonder how contract conditions are being phrased. According to my present knowledge this is being done differently from yard to yard. I would appreciate any detailed information concerning this matter. **I am sure that convincing simplifications will be welcome.**

Looking forward to your kind consideration of my remarks and, maybe, your response I remain with best regards yours sincerely,

Michael Schmiechen.