The Quality Systems Group

Final Report and Recommendations to the 24th ITTC

1. INTRODUCTION

1.1 Membership and Meetings

The Members of the Quality Systems Group of the 24th ITTC were as follows:

- Prof. Gerhard Strasser (Chairman)
  Schiffbautechnische Versuchsanstalt in Wien, Austria.
- Ing. Barbara Günther.
  Schiffbau Versuchsanstalt Potsdam, Germany.
- Prof. Marco Ferrando.
  Università di Genova, Italy.
- Dr. Akira Masuko.
  Ishikawajima-Harima Heavy Industries Co. Ltd., Japan.
- Prof. Kai Yan.
  China Ship Scientific Research Center, China.
- Prof. Phil G. Sayer.
  Universities of Glasgow and Strathclyde, United Kingdom.

The Group met three times:

- Genova, Italy, June 2003.
- St Johns, Canada, August 2004.
- Vienna, Austria, January 2005.

1.2 Tasks Given by the 23rd ITTC to the QS Group

1. Revise and update the ITTC Recommended Procedures. Modify and re-edit the existing procedures according to the comments of the Conference and the Technical Committees.
2. Update the ITTC Symbols and Terminology List according to ISO 31 Standard.
3. Put the ITTC Symbols in a relational database in order to be able to search according to your personal requirements.
4. Revise and complete the Working Instructions on Standard Measuring Devices.
5. Stimulate, monitor and support validation work within the Technical Committees.

1.3 Co-Operation with Other Committees and Other Institutions

One of the basic tasks of the Quality Systems Group is to review the ITTC Recommended Procedures and Guidelines which are proposed by the technical committees with respect to formal aspects, e.g. conformity with the ITTC Symbols list, consistency, completeness etc. prior to publishing.

The experience of the QS Group of the 23rd ITTC showed that the procedures of many technical committees do not really comply with the ITTC symbols list and also the formatting given in ITTC Procedure 4.2.3-01-01, Guide

for the Preparation of ITTC Recommended Procedures.

In order to help the Technical Committees to produce consistently formatted "Recommended Procedure" a template of an ITTC Recommended Procedure was developed which contains the main formatting items which occur in a procedure. Additionally a work instruction for the use of this template was made.

Work instruction and template have been sent out to the Chairmen of the Committees together with the symbols list.

The Specialist Committee on Water Jet Test Procedures have submitted a whole set of revised symbols which have been incorporated in the ITTC Symbols and Terminology List. The symbols which had been supplied by the Specialist Committee on Stability have now been completely updated according to ISO 31 standard.

The ITTC Symbols List has been handed to the IMO Committee on Intact Stability. This is the first step to get more conformity.

The ISO Standard on propeller nomenclature has been compared with the ITTC Symbols. There were some differences; however, this could not be settled by now, because this standard does not comply with the ISO Standard 31.

2. REVIEW OF THE "ITTC RECOMMENDED PROCEDURES"

For the 24th ITTC the Advisory Council had decided to review the ITTC Recommended Procedures with respect to content and acceptability by the ITTC members. This in the long run should lead to higher quality of the Procedures. Some "Procedures" were rejected by the AC, because they were no procedures but rather recommendations or guidelines. However, these contributions of the technical committees were considered to be valuable and to be contained in the QS manual. A decision was made to add to the Heading "ITTC Recommended Procedures" also "and Guidelines". The Guidelines are labelled as such.

The following Procedures have been reviewed:

Committee	Submitted procedure	AC decision	Comments
Resistance	ITTC worldwide series for identifying facility bias	Not accepted	The proposed document is a data base and not a procedure.
Propulsion	7.5-01-02-02 Propeller model accuracy	Accepted	-
Manoeuvring	7.5-02-06-01 Free model test	Accepted	Further work needed, uncertainty analysis has not been included. Name of procedure should be changed to "Free running model test"
	7.5-02-06-02 Captive model test	Accepted if suggested revisions are made	The needed revisions concerns nomenclature.
	7.5-02-06-03 Validation of manoeuvring simulation models	Retain present version	The changes in the procedure are minor

Committee	Submitted procedure	AC decision	Comments
	7.5-02-05-05 Manoeuvrability evaluation and documentation of HSMV	Retain present version	The changes in the procedure are minor
	7.5-04-02-01 Full scale manoeuvring trials	Retain present version	The changes in the procedure are minor
Seakeeping	7.5-02-07-02.1 Sea keeping experiments	Accepted	Further work is needed
	7.5-02-07-02.2 Prediction of Power Increase in irregular waves from model tests in regular waves	Not accepted	Further work is needed
	7.5-02-07-02.3. Experiments on Rarely Occurring Events	Not accepted	Further work needed
	7.5-02-07-02.4. Validation of sea keeping computer codes in the frequency domain	Not accepted	Further work needed Co-operation with Ocean Eng.
	7.5-02-07- xx Validation of sea keeping computer codes in the time domain	Not accepted	Further work needed Co-operation with Ocean Eng
Ocean Engineering	7.5-02-07-02.4 Validation of sea keeping computer codes in the frequency domain	Retain present version	Revised procedure should be made in co-operation with the sea keeping committee
	7.5-02-07-03.1 Floating offshore platform experiments	Accepted	
	7.5-02-07-03.5 Truncation of Test Models and Integration with Numerical Simulations	Accepted	
	7.5-02-07-01.1 Laboratory Modelling of Multidirectional Irregular Waves	Accepted as a guideline	
Stability in Waves	7.5-02-07-02.5 Model Tests on Intact Stability	Accepted	
	7.5-02-07-02.6 Model Tests on Damage Stability	Accepted	
	7.5-02-07-02.7 Predicting the Occurrence and Magnitude of Parametric Rolling	Accepted as a guideline	To be further developed

Committee	Submitted procedure	AC decision	Comments
Ice	7.5-02-04-02.5 Experimental uncertainty analysis for ship resistance in ice tank testing,	Accepted	
Validation of Waterjet Test Procedures	7.5-02-05-03.1 Waterjets – propulsive performance prediction	Accepted	
	7.5-02-05-03.2 Waterjets – systems performance	Accepted	
	7.5-02-05-03.3 Waterjets – uncertainty analysis	Accepted	
Cavitation Erosion on Propellers and Appendages on High Powered/High Speed Ships	7.5-02-03-03.5 Cavitation Induced Erosion on Propellers, Rudders and Appendages Model Scale Experiments	Accepted	
Azimuthing Podded Propulsion	7.5-02-03-01.3 Podded Propulsor Tests and Extrapolation	Not accepted	
	7.5-02-03-03.6 Podded Propulsor - Model – Scale Cavitation Test and Cavitation Appearances	Accepted as a guideline	
Powering Performance Prediction	Accumulate Trial Results	Not accepted	The proposed document is a database and not a procedure
	Spreadsheet for friction line using Grigson's direct method	Not accepted	
	7.5-02-03-01.5 Predicting Powering Margins:	Accepted	
	7.5-04-01-01.1 Preparation and Conduct of Speed / Power Trials	Accepted	
	7.5-04-01-01.2 Analysis of Speed/Power Trial	Accepted	

2.1 Revised Procedures

All above accepted procedures have been revised by the QS Group; additionally the Register 0.0 has been updated.

2.2 Cancelled Procedures

The Procedures 7.5-04-01-01.1 till 75-04-01-1.6 have been replaced by 7.5-04-01-01.1.

2.3 Conclusions from the Review Procedure

As the comparison of the reviewed procedures (31) with the accepted ones (19) shows there was a big rate of failure. If there were not introduced the guidelines (3) only half of the total number of revised procedures would have been accepted.

The consequence is that a not accepted revision is more or less lost and the old version of the procedure stays in the QS Manual.

There are several potential reasons for the above result:

- The Committees are not competent enough to do the job.
- The reviewers are either too rigorous or not competent enough to do the job.
- The committees and/or the reviewers do not know exactly what is meant by "procedure".
- The Committees are not getting enough information on what they are supposed to do.

When we exclude or ignore the two first possibilities, there seems to be necessity to change the system. This has also been recognized by the AC. Therefore much more effort of the AC has been put into the formulation of the tasks for the Technical Committees.

The QS Group is of the opinion that not every procedure can be perfect, because in some fields development is going on and there may only be the possibility to write an interim procedure, which we still consider better as none.

On the other hand the QS Manual should not contain procedures which are technically poor or physically not well founded.

It also turned out that there is no space for benchmarks in the book. It therefore is suggested to add a third volume which contains valuable benchmark results.

2.4 Definition and Requirements of an ITTC Recommended Procedure or Guideline

In paragraph above the need to define a procedure was elaborated. There is a definition which has been given in the ITTC QS Manual in the procedure 4.2.3-01-01 since 1999. As obviously nobody is referring to this a short excerpt is given as follows:

- *Procedure:* A manner of proceeding or acting. The method of conducting a course of action.
- *ITTC Recommended Procedure:* A procedure which has been adopted by the Full Conference as a recommended procedure. A guide for a manner or method of proceeding, testing or calculation recommended by ITTC to the Member Organisations.
- *ITTC Interim Recommended Procedure (IIRP):* A procedure which has been suggested by a Committee or Group and which needs some time for confirmation as the conference is not sure whether it can be recommended without modifications. If there are no objections from ITTC Members the interim recommended procedure then becomes a recommended procedure if it is adopted by the next Full Conference.

Requirements a Procedure Should Meet. The description of a procedure should principally contain only methodology, instructions or use of physical laws or parameters etc. about which the Conference is able to decide. There should not be any intentions or recommendations for future work.

The formulation of the procedures should be concise, clear, comprehensive, and should not contain explanations of physical laws, symbol terminology. The explanations should be included in the Technical Committee Reports to which reference should be made.

The description of the procedure should be well structured, for instance:

a) preparation of tests
b) experiment procedure
c) measurement analysis
d) extrapolation method
e) presentation of the results

The descriptions in the procedure may contain alternatives. However, in such case criteria should be given. It is not acceptable that there are given several alternatives without reflection and without validation results. It is not acceptable that the procedure simply consists of the working instruction of one single institution. A procedure has to be more general.

The parameters list should contain all parameters which are of importance to that procedure (even if the parameters are in common usage by all member institutions)

General statements like "the accuracy should be sufficient" must be avoided. Instead, it should be stated what is considered to be sufficient; criteria should be given which have to be achievable and reasonable or even better, based on physical laws.

The structure of the contents and the expected main items are given in the ITTC Recommended Procedure 4.2.3-01-01.

2.5 Distribution and Publishing of QS Manual

As there was for quite a long time no access via internet to the newest version of the ITTC Recommended Procedures as well as to the Symbols List and the rest of the QS Handbook, and once it was available all the dynamic links did not work in the internet version, the QS group decided to produce the whole ITTC QS Manual on CDs and distribute one CD to each member of the ITTC. This should insure a quick and uncomplicated way to have access to the newest version of the ITTC QS Manual.

3. ITTC SYMBOLS AND TERMINOLOGY LIST

The impression was that many Committees did not care too much about the ITTC symbols list. Some Committees helped to update the list, however, they are not familiar with the ISO 31 and therefore there was practically no procedure where the symbols had not to be changed to comply.

In order to make clearer to all Members of the ITTC how symbols should be used a short summary of the ISO 31 is given here. More details can also be found in the ITTC Structured Symbols List.

Symbol description	Format	Example
Symbols for **physical units**	**italic**, one letter, except dimensionless quantities	*A* (e.g. Area in m²)
Symbols for **characteristic numbers**	**2 letters italic**	*Re*, *Fr*
Numbers	**roman**, generally	10^3
Symbols **representing numbers**	**italic**	x_{ij}
Units	**roman**, lower case unless derived from name	m, Pa
Prefix of units	roman	µm
Symbols for chemical elements	roman	H_2O
Symbols for u**niversal constants**	**italic**	g = 9,80665 m/s²

Superscripts signify **Operators**:
Numbers in **roman**
(power of *n*)
Symbols representing numbers
(*n* = 1, 2, 3 etc.) in ***italic***

SYMBOLS in *italic*

$$K_{T\mathrm{M}}^{2} \times 10^{n}$$

NUMBERS in roman

Subscripts signify **Identifiers**:
Symbol for **physical quantity** in ***italic***
(*T* = Thrust)
Other symbols in **roman**
(M = Model)

The ITTC Symbols List has been revised to follow the above scheme. Also the new procedures have been updated according to this List.

Up to now the QS Group could not find an easily accessible method to organize the symbols list in a relational database. As the QS Group also supplies an alphabetic list which simplifies searching a symbol the problem is not as urgent as it was before this.

4. WORKING INSTRUCTIONS ON STANDARD MEASURING DEVICES

The QS Group has gone through the Working Instructions and has tried to identify any further working instruction of general interest, however, apart from the template for the ITTC Recommended Procedures and Guidelines and the one for the Working Instructions none could be identified. There were also no suggestions from any ITTC Member or Technical Committee.

5. ITTC DICTIONARY ON HYDRODYNAMICS

In a broad interpretation of Task No. 2 assigned by the 23rd Conference to the Quality Systems Group: "Update the ITTC Symbols and Terminology List according to ISO 31 Standard." it was felt by the group that a re-edition of the ITTC Dictionary of Ship Hydrodynamics was advisable for two main reasons:

- An up to date public collection of uniform definitions is strongly needed so that it can be referred to by Standardisation Organisations;
- Some of the definitions of the Symbols and Terminology List cannot be readily understood by non Naval Architects;

The dictionary, as was stated in the Introduction of the 1978 edition, "*is intended for a broad readership including practising naval architects who wish to acquire and apply knowledge of hydrodynamics and also physicists and theoretical hydrodynamicists who wish to apply their particular knowledge to the solution of ship problems.*"

As for the previous edition, the symbols given are in accordance with those in the latest ITTC Symbol and Terminology List which is a complementary document.

The present version of the dictionary is mainly an updated electronic version of the old one. The process consisted in digitizing the 1978 edition and obtaining text by OCR software. All of the formulae have been retyped and all the figures have been reproduced by means of CAD software. The symbols have been checked and updated to the current version of the SaT List.

This is only a preliminary work that should be continued during the next ITTC term, in order to obtain a more rational dictionary. In particular, the Group suggests removing the subdivision in sections, to provide a more agile structure of the document and to avoid redundancy.

For the sake of reference a .pdf file is also provided, containing the digitized 1978 version of the Dictionary in order to preserve the old knowledge that will be otherwise unavailable to our community, since the old paper version is difficult to find.

6. ISO 9001/2000

The investigation whether there are any changes regarding the ISO 9001/2000 standard confirmed: there are no changes.

7. USAGE OF ITTC RECOMMENDED PROCEDURES

A questionnaire has been sent out to all ITTC Member Institutions. 16 Member Institutions answered.

Nine of the answering Institutions are certified acc. to ISO 9000. Four out of the 16 do not have a quality control system.

All answering Members confirm that they are using the ITTC Recommended Procedures, and all but one use the ITTC Symbols List. This one Institution did not know that such a list exists and shall also use it in the future. The majority uses the alphabetic symbols list; two use exclusively the structured list, some both.

The ITTC Sample Working Instructions are used by 6 out of the 16, some refer to them or use them partly (4). The rest does not use the working instructions because they have their own more or less specific working instructions.

8. CONCLUSIONS

The ITTC Recommended Procedures have been updated. The ITTC Symbols and Terminology List has been updated according to the ISO 31 Standard (Principles of Notation) and complemented according to some requirements of Technical Committees.

Many member Organisations use the ITTC Recommended Procedures. This is encouraging for the continuation of the updating of the manual.

The ITTC Dictionary has been re-edited and is published together with the Symbols List.

9. RECOMMENDATIONS TO THE CONFERENCE

Organisations should use the ITTC Recommended Procedures as a reference in their own Quality System.

Members and Member Organisations should examine the need for new ITTC Recommended Procedures.

It is recommended that the revision of the ITTC Recommended Procedures should be done in a more effective way. The Technical Committees should be given indication in which respect updating is considered necessary before they start their work, not after.

Member Organisations should use the ITTC Symbols and Terminology List in all their publications.

Member Organisations should examine the need for updating the ITTC Symbols and Terminology List to include further symbols.

In order to complete the QS supporting documents, there should be introduced another volume containing results of benchmarks. There should be no printed version of this, but only electronic access.

10. RECOMMENDATIONS FOR FUTURE WORK

Revise and update the ITTC Recommended Procedures. Modify and re-edit the existing Procedures according to the comments of the Conference and the Technical Committees.

Update the ITTC Symbols and Terminology List.

Cross-check the ITTC Symbols List and the Dictionary with other Standards e.g. ISO Standards.

Stimulate, monitor and support validation work within the Technical Committees.